

1CS1 Prepare Conceptual Construction Cost ~~Estimates~~ Estimate

Overview

Develop conceptual construction cost estimates for all alternatives/alignments under consideration for a project.

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

- [Contract Standards and Development Procedures Manual](#)
- [Conceptual Construction Cost Estimation Guidelines](#)
- [Construction Cost Estimate Form](#)
- [Division Let Guidance](#)
- [Pre-Construction Finance Guide](#)
- [Pre-Construction Finance Guide](#)
- [Division Engineer Approval for Cost Verification Memo](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Preliminary Estimates Section or Division Staff	Project Lead
Conceptual Construction Cost Estimate ^Q	Provide Conceptual Design Stage Quantities		X
	Review Conceptual Estimates	X	X
Verified Conceptual Construction Cost Estimate	Provide Conceptual Design Stage Quantities – Selected Alternative		X
	Review Conceptual Estimates – Selected Alternative	X	X
Cost Verification Letter ^Q	Request Cost Verification Letter		X

^Q Indicates that final document(s) or data set(s) require review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Provide Conceptual Design Stage Quantities

For conceptual design stage quantities, the Project Lead:

- Requests a cost estimate from the Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects \$5 million and under).
- Submits the conceptual design stage quantities for each alternative/alignment on the Construction Cost Estimate Request Form to the estimator.

Review Conceptual Estimates

The Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects) prices the estimate, and the Project Lead reviews the conceptual estimates for each alternative/alignment, considering the following:

- Costs for each pay item are determined using historical bid data and backup projects of similar work in the market area.
- Estimates are available as the project moves forward and can be part of the considerations for selecting the Least Environmentally Damaging Practical Alternative (LEDPA), if applicable.

Provide Conceptual Design Stage Quantities – Selected Alternative (if applicable)

The Project Lead provides the most current conceptual stage quantities for the selected alternative/alignment to the Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects) on the Construction Cost Estimate Form. This is to ensure one is working with the most up-to-date estimate, considering that:

- Quantities/cost may change depending on 1) the amount of time that has passed allowing for increased costs ~~due to~~because of inflation and supply chain issues and 2) the number of design changes that may have been implemented since the last estimate request.
- Updates to the estimates are to be made by submitting the Construction Cost Estimate Form any time new quantities are available or every two years, whichever occurs first.

Review Conceptual Estimate – Selected Alternative

For the selected alternative/alignment, the Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects) prices the estimate, and the Project Lead:

- Reviews the conceptual estimates to ensure there are no obvious errors in quantities or items.
- Includes a copy of the most recent estimate within the appendix of the Project Scoping Report (see [1FS31FS2](#) for more information).

Request Cost Verification Letter

After satisfactory review, the Project Lead generates and distributes a Cost Verification Letter per the process detailed in the *Division Engineer Approval for Cost Verification Memo*.

2CS1 Prepare Initial Design ~~Construction Cost~~ Estimates (Optional)

Overview

Develop the ~~construction~~initial cost ~~estimates~~estimate for the ~~Alignment Defined~~Stage 2, occurring just prior to the ~~Field Inspection~~Design Recommendation Plan Set Review Meeting.

References

- [Contract Standards and Development Procedures Manual](#)
- [Conceptual Construction Cost Estimation Guidelines](#)
- [Construction Cost Estimate Form](#)
- [Division Let Guidance](#)
- [Pre-Construction Finance Guide](#)
- ~~[Pre-Construction Finance Guide](#)~~
- [Division Engineer Approval for Cost Verification Memo](#)

Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader	Additional Support	
		Preliminary Estimates Section or Division Staff	Project Manager	Other Unit Design Lead (as identified)
Initial Design Construction Cost Estimate (Optional) ^q	▪ Provide Design Stage Quantities		X	X
	▪ Review Estimate	X	X	As assigned
Cost Verification Letter	▪ Generate Cost Verification Letter		X	X

^q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Provide Design Stage Quantities

The Project Manager provides the most current design stage quantities for the design documents to the Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects \$5 million and under) on the Construction Estimate Request Form. The Project Manager or appropriate Division staff is to verify that the Utility staff submit utility construction (PH 300) estimate quantities (see 3UT2 for more information).

Review Estimate

The Preliminary Estimates Section or the appropriate Division staff prices the estimate and provides the documentation to the entire team, notifying the Project Manager when complete. The project team (led by the Project Manager and including the estimator) reviews the estimate to ensure there are no obvious errors in quantities or items.

As applicable, the Environmental Document Lead includes a copy of the most recent estimate within the appendix of the NEPA document.

Generate Cost Verification Letter

After satisfactory review, the Project Manager generates and distributes a Cost Verification Letter per the process detailed in the *Division Engineer Approval for Cost Verification Memo*.

2CS2 Prepare Field ~~Inspection~~ Construction Cost Estimates Estimate

Overview

Develop the next construction cost ~~estimates~~ estimate for ~~the Alignment Defined~~ Stage 2, occurring just prior to the Field Inspection Review Meeting.

References

- [Contract Standards and Development Procedures Manual](#)
- [Conceptual Construction Cost Estimation Guidelines](#)
- [Construction Cost Estimate Form](#)
- [Division Let Guidance](#)
- [Pre-Construction Finance Guide](#)
- ~~[Pre-Construction Finance Guide](#)~~
- [Division Engineer Approval for Cost Verification Memo](#)

Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader	Additional Support	
		Preliminary Estimates Section or Division Staff	Project Manager	Other Unit Design Lead (as identified)
Field Inspection Construction Cost Estimate ^Q	▪ Provide Design Stage Quantities		X	X
	▪ Review Estimate	X	X	As assigned
Cost Verification Letter	▪ Generate Cost Verification Letter		X	X

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Provide Design Stage Quantities

The Project Manager provides the most current design stage quantities for the design documents to the Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects \$5 million and under) on the Construction Estimate Request Form. The Project Manager or appropriate Division staff is to verify that the Utility staff submit utility construction (PH 300) estimate quantities (see 3UT2 for more information).

Review Estimate

The Preliminary Estimates Section or the appropriate Division staff prices the estimate and provides the documentation to the entire team, notifying the Project Manager when complete. The project team (led by the Project Manager and including the estimator) reviews the estimate to ensure there are no obvious errors in quantities or items.

As applicable, the Environmental Document Lead includes a copy of the most recent estimate within the appendix of the NEPA document.

Generate Cost Verification Letter

After satisfactory review, the Project Manager generates and distributes a Cost Verification Letter per the process detailed in the *Division Engineer Approval for Cost Verification Memo*.

3CS1 Prepare ~~Plan in Hand (13 Month Let List)~~ Construction Cost Estimate/3CS2 Review Design Estimates

Overview

Develop Construction Cost Estimates for ~~the Plan in Hand~~ Stage 3, occurring just prior to the ~~Plan in Hand~~ Design Complete Review Meeting.

References

- [Contract Standards and Development Procedures Manual](#)
- [Conceptual Construction Cost Estimation Guidelines](#)
- [Construction Cost Estimate Form](#)
- [Division Let Guidance](#)
- [Pre-Construction Finance Guide](#)
- ~~[Pre-Construction Finance Guide](#)~~
- [Division Engineer Approval for Cost Verification Memo](#)

Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader	Additional Support	
		Preliminary Estimates Section or Division Staff	Project Manager	Other Unit Design Lead (as identified)
Plan in Hand (13 Month Let List) Construction Cost Estimate ^q	▪ Provide Design Stage Quantities		X	X
	▪ Review Estimate	X	X	As assigned
Cost Verification Letter	▪ Generate Cost Verification Letter		X	X

^qIndicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Provide Design Stage Quantities

The Project Manager provides the most current design stage quantities for the design documents to the Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects \$5 million and under) on the ~~Plan in Hand (13 Month Let List)~~ Construction Cost Estimate Form. The Project Manager or appropriate Division Staff is to verify that the Utility staff submit utility construction (PH 300) estimate quantities (see 3UT2 for more information).

Review Estimate

The Preliminary Estimates Section or the appropriate Division staff prices the estimate and provides the documentation to the entire team, notifying the Project Manager when complete. The project team (led by the Project Manager and including the estimator) reviews the estimate to ensure there are no obvious errors in quantities or items.

~~Request~~Generate Cost Verification Letter

After satisfactory review, the Project Manager generates and distributes a Cost Verification Letter per the process detailed in the *Division Engineer Approval for Cost Verification Memo*.

4CS1 Complete PS&E Package and Advertise the Project

Overview

Finalize and review the final PS&E package for authorization of construction funds and project advertisement. ~~While~~Although the Divisions may develop the PS&E package and assemble the proposal, the NC General Statute currently decides if the project is let at the division level or centrally in Raleigh.

References

- [Contract Standards and Development Procedures Manual](#)
- [Roadway Standard Drawings](#)
- [Standard Specifications](#)
- [2018 Plans Checklist \(Currently being revised\)](#)
- [PS&E Checklist for Centrally Let Projects OR Division PS&E Checklist](#)
- [Automated Proposal Application \(APA\)](#)
 - ~~(APLUS)~~
- [Tentative Letting Lists \(12-month and 13-month let lists\)](#)
 - ~~Let Plans Preparation – SharePoint Guidance~~
- [Division Let Guidance](#)
- [NCDOT Bidding and Letting Section](#)
- [Central Let Resources](#)
- [Pre-Construction Finance Guide](#)
 - ~~Pre-Construction Finance Guide~~

Deliverables

Deliverable	Task	Responsible Party				
		Plan Review Engineer	Proposal Engineer	Contract Time Engineer	Provisions Engineer	Estimating Engineer
Final Plans ^Q	<ul style="list-style-type: none"> Complete Pre-Bid Process 	X				
Proposal ^Q	<ul style="list-style-type: none"> Complete Pre-Bid Process 		X	X	X	X
	<ul style="list-style-type: none"> Advertise the Project 		X			
Confidential Engineer's Estimate	<ul style="list-style-type: none"> Complete Pre-Bid Process 		X			X

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Pre-Bid Process

The pre-bid process covers ~~several~~two steps led by Contract Standards & Development staff or the equivalent Division staff.

- ~~These steps are to~~ Prepare and approve the PS&E package (using the [PS&E Checklist for Centrally Let Projects OR the](#) Division PS&E Checklist, as applicable) for advertisement
- ~~and~~ Obtain authorization for construction funds.

Review Plans

To complete the plan review, the Plan Review Engineer or the Division's Proposal Engineer:

- Reviews the plans and quantities for fatal flaws.
- Sends plan checking comments to the Project Manager, who post, sign, and date Final Plan files to the Let Preparation area of the project SharePoint site.
- Passes the PS&E package to the Proposal Engineer for completion.

Establish Contract Times

The Contract Time Engineer (or equivalent Division Lead) reviews the ~~temporary traffic control plans, Transportation Management Plan (TMP), Utilities by Others Plans (UBO), other applicable plans,~~ environmental documents, Intermediate Contract Times (provided by Work Zone Traffic Control), and pay items and quantities to establish ~~any intermediate contract times and the~~ overall contract times. (This includes the Completion Dates.) ~~This task runs concurrent with the Goal Setting~~ These tasks must be completed prior to the Contract Time Committee Meeting.

Generate Roadway Special Provisions, and Engineer's Final Estimate tasks noted below: run concurrently with Establish Contract Times.

Facilitate Goal Setting Meeting

The State Proposals Engineer or the Division Construction Engineer facilitates a meeting to establish the MBE, WBE, DBE participation goals based on federal and state regulations.

Generate Special Provisions

The Proposal Engineer reviews the plans and compiled estimate to provide special provisions for pay items not covered by the Standard Specifications (APLUSAPA program initiated).

Generate Final Pay Items and Quantities

~~The Estimating Engineer or the Proposal~~ The Proposals Engineer reviews final pay items and quantities ~~to generate the~~. The Estimating Engineer then generates the Confidential Engineer's Estimate and generates the percentage breakdown cost for work activities. The Proposals Engineer uses this information to identify the major contract items.

Assemble Proposal

The Proposal Engineer assembles the standard special provisions, the project special provisions, and item sheets into the final proposal as described in the *Central Let Resources* and the *Division Let Guidance*.

Advertise the Project

When the PS&E package has been finalized and construction funding is authorized, the project is ready to be advertised. *Central Let Resources* and the *Division Let Guidance* provide more information on the authorization (including necessary federal approval, certification, coordination, and timing requirements), advertisement, document posting, and point-of-contact designation for both Central and Division-let projects.

Advertisement

For Central-let projects, the electronically signed and sealed plan files and the electronically signed and sealed proposal are posted to the NCDOT Bidding and Letting section of the Connect Site (4 weeks prior to the letting date and 8 weeks prior to the letting date for special projects). For advertising a Division-let project, the *Division Let Guidance* provides more information on the advertisement process.

The NCDOT Bidding and Letting section of the Connect Site is the central repository for project letting information, including updated information for letting, newly advertised projects, addendums, and bid results.

Prepare Addendums

The State Plans and Standards Engineer or the [State Proposals and Specifications](#) Engineer (or designated point of contact for Division-let projects) [field responds to](#) questions about ~~projects~~ currently advertised [projects](#) from contractors. Addendums to the plans and proposal are developed, posted, and processed in accordance with *Central Let Resources* and the *Division Let Guidance*.

4CS2 Let, Award, and Execute

Overview

Let, award, and execute the project in accordance with Sections 102 and 103 of the *Standard Specifications* and the letting guidance for both Central and Division-let projects.

References

- [Contract Standards and Development Procedures Manual](#)
- [Standard Specifications](#)
- [Tentative Letting Lists \(12-month and 13-month let lists\)](#)
 - ~~[Let Plans Preparation—SharePoint Guidance](#)~~
- [Division Let Guidance](#)
- [NCDOT Bidding and Letting](#)
- [Central Let Resources](#)
- [Letting Administration User Guide](#)

Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
Award Letter	<ul style="list-style-type: none"> ▪ <i>Awarding and Executing a Contract</i> 	State Contract Officer or Division Contract Engineer (or designee)
Goal Confirmation Letter	<ul style="list-style-type: none"> ▪ <i>Letting the Project</i> ▪ <i>Awarding and Executing a Contract</i> 	State Prequalification Engineer or Division Contract Engineer (or designee)
Execution Letter	<ul style="list-style-type: none"> ▪ <i>Awarding and Executing a Contract</i> 	Contract Office / Contract Engineer (or designee)

Letting the Project

On Let day, bids are received, verified as being responsive, and read aloud along with the Engineer’s Estimate. Central Highway Letting Date is the 3rd Tuesday of each month. Each Division ~~has been~~ assigned designated letting dates as detailed on the Division Letting Map in the *Division Let Guidance*. While different days may be set for special lettings, this is to be the exception and not the typical practice.

The letting process also includes several checks to verify the bids are responsive and the winning bidders are responsible to get a contract ready for award and execution, all of which follows the *Central Let Resources* and *Division Let Guidance*:

- Guidelines for bid openings
- Confirmation of documentation required to be included with the bids
- Process to review and verify the bids as responsive

Good Faith Effort Review Committee Meeting

The State Prequalification Engineer or Division Construction Engineer facilitates and records a meeting to review a submittal of Good Faith Effort should the project’s MBE/WBE/DBE goal not be met. The committee determines whether a Good Faith Effort was met or was not. If the bidder was found in Good Faith, a Goal Confirmation Letter is written to outline the revised goals of the contract.

- For a simple revision, the Roadway Design Lead modifies the current Roadway Design Plans, allowing time for all affected Design Leads to review and comment on the proposed changes.
 - **Note:** The Roadway Design Lead incorporates any comments/recommendations into the plans. There may be a need for additional coordination to resolve any issues or conflicting information.
- If ~~there is a need for~~ major revisions **are necessary**, the Project Manager directs the affected Design Leads to revise their respective plans in parallel. Each Design Lead reviews the revisions, incorporating the changes into the Let Plans.
 - **Note:** Additional coordination may be needed to resolve any issues or conflicting information across the disciplines.

Typically, a Construction Revision Memorandum is issued with updated information from all affected disciplines. ~~As part of~~ **When** preparing the memo ~~to be issues~~, the Project Manager coordinates with each Design Lead to determine when to provide their portion for inclusion. However, depending on Division needs and time required to issue the construction revision, the Project Manager may elect to distribute submittals from the Design Leads separately.

Update Quantities and Special Provisions

In addition to updating the Let Plans, all affected Design Leads are to:

- Update their quantities, providing the net quantity adjustment (+ or -) to the Project Manager.
- Revise any special provisions, as needed, that are impacted by the construction revision.

Document Construction Revisions

To complete the construction revision process, the Project Manager:

- Conducts a completeness check of the plans, quantities, and special provisions (if applicable). If the revision impacts a municipal or developer agreement, the Project Manager includes any engineering cost in the documentation.
- Coordinates with the Design Leads to address further comments and changes
- Confirms that all revised files and documents have been uploaded to the project's SharePoint site.
 - **Note:** The affected Design Lead creates the PDFs and seals their respective construction revision before uploading.

The Project Manager completes the process by issuing a Construction Revision Memorandum that:

- Identifies the plan sheets and special provisions (if applicable) that have been modified
- Summarizes the design revisions on each plan sheet
- Issues a construction revision estimate for affected pay item quantities
- Provides a link to corresponding PDFs and MicroStation design files

Contract Standards and Development or the Division Contracting Office distributes the revised plans in accordance with the process detailed in the *Construction Revision Memorandum*.

A construction revision may trigger a change to the right-of-way, or additional property negotiations may require updates to the Final ROW Series Plan Set (e.g., a change to a “fee simple” acquisition, modifications to property access, or a change in easement boundaries).

To address these changes, the Project Manager issues a Right of Way Revision Memorandum that notifies the Central ROW office, the project team, Location and Surveys, and others, of changes made to the plans. This memo:

- Summarizes the right-of-way revisions on each plan sheet.
- Provides a link to the revised right-of-way files.

Location and Survey modifies the ROW Reference CADD following the process in 5LS1— [and 5LS2](#). [The work may involve performing additional surveys to update the design plans resulting from a construction revision, in addition to providing necessary construction survey support detailed in 5LS2.](#)

The Project Manager and Division ROW Office establish the deadline to acquire the new property based on when construction work is to occur in the impacted area.

1EN1 Establish Environmental Needs

Overview

Ensure that all projects, federal or state funded, comply with relevant environmental laws, including the Clean Water Act, National Environmental Policy Act (NEPA), State Environmental Policy Act (SEPA), Section 4(f), Section 106, the Endangered Species Act, Section 6(f), Title VI of the Civil Rights Act, and Farmland Protection Policy Act.

At this stage it is very important to know the scope and schedule for the project as directed by the Project Lead. If the project is small and less complex (bridges) it may include a shorter duration for planning and design. In this case, environmental analysis may be accelerated and fully commence at 1EN1. If the project has many issues that involve more time for planning and design, then it is important to raise environmental “red flags” via an initial screening and the deeper dive for environmental analysis occurs at 2EN1. It is important to note that requests for Environmental Analysis Unit (EAU) actions start with a submittal via the Environmental Tracking & Coordination System (ETRACS). Division environmental staff may lead other environmental analysis efforts and use other informal request/coordination processes. NCDOT Natural Environment Lead review ground disturbing projects within the Division and/or EAU staff. Division environmental staff can lead many of the EAU-related tasks contained herein as long as they fulfill NCDOT policies and regulatory requirements.

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, the Central Project Manager (from PMU), or someone in a similar role as tasked by a state or local agency.*

References

- [2020 Section 106 Programmatic Agreement](#)
- [Programmatic Agreement Manual for Minor Transportation Projects in North Carolina](#)
- [Historic Architecture Group Procedures and Work Products](#)
- [Tribal Coordination Protocol](#)
- [ETRACS System and Tutorial](#)
- [NRTR Scope Template and Guidance](#)
- [NRTR Procedures Manual](#)
- [Division ETRACS Request for Section 7 Surveys](#)
- [NCDOT Traffic Noise Policy](#)
- [NCDOT Traffic Noise Manual](#)
- [NCDOT Air Quality Handbook](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Comments on Draft Scoping Report	<ul style="list-style-type: none"> Review Draft Project Scoping Report 	Environmental Staff	Project Lead
Complete Request	<ul style="list-style-type: none"> Receive Initial Request (ETRACS or Other Informal Means) for Human and Natural Environment Studies 	Project Lead	Environmental Staff
Landowner Letters	<ul style="list-style-type: none"> Prepare and Send Landowner Survey Notification Letter 	Environmental Staff	Project Lead
Cultural Resources Programmatic Agreement Cultural Resources Screening Checklist for Section 106	<ul style="list-style-type: none"> Complete Cultural Resource Screening 	Project Lead	Environmental Staff
Traffic Noise and Air Quality (TNAQ) Notification Scoping Report Recommendations	<ul style="list-style-type: none"> Determine Noise/Air Analyses Needs 	Environmental Staff	Project Lead
Community Screening	<ul style="list-style-type: none"> Determine Community Analyses Needs 	Environmental Staff	Project Lead

Use of the references, development of deliverables, and applicability of the tasks listed below depend on the scope and schedule of the project, which is decided by the Project Lead prior to determination of requests going forward in this stage. This activity ~~requires the development of~~ involves developing a Project Study Area ~~as the boundary to be studied by multiple NCDOT disciplines.~~

- The Project Study Area is to be inclusive of all potential alternatives; yet not oversized to cause unnecessary review from NCDOT or unintentional concerns from unimpacted landowners.
- Depending on project size and complexity, setting the boundaries of the Project Study Area may require input from the technical leads/Units to ensure the size is appropriate for all factors.

If the Project Lead determines that this stage involves only a screening for possible environmental “red flags” then the following should occur:

- Prepare Project Initiation Letter or scope of project and distribute to groups in EAU
- Receive Feedback from groups in EAU
- If Feedback provides “red flags” from any group, then request a screening from that group

The screening helps to determine further the scope and schedule for the project.

Review Draft Project Scoping Report

Upon request of the Project Lead, groups in the EAU review the draft Project Scoping Report and provide comments to the Project Lead (see [1FS31FS2](#) for related information).

Receive Initial Request (ETRACS or Other Informal Means) for Human and Natural Environment Studies

The Environmental Analysis Unit (EAU) receives requests from the Project Lead to begin human and natural environment studies as part of the Project Scoping Report (see [1FS31FS2](#) for related information).

- Projects that are scheduled to receive Notice to Proceed within the next 12 months, have the their requests prioritized.

- Projects scheduled for Notice to Proceed beyond the next 12 months, have their requests scheduled to begin 12 months before Notice to Proceed is anticipated.

The Project Lead ensures that, as appropriate, requests are sent to the following EAU human and natural environmental groups:

- Environmental Coordination and Permitting (ECAP) (for [Natural Water Resources Technical Report, and WEX/WET File](#), Section 7 Surveys)
- Biological Surveys Group (BSG) (Section 7 Surveys (only for Division Managed Projects))
- Cultural Resources (Historic Architecture and Archaeology)
- Traffic Noise and Air Quality
- Public Involvement, Community Studies, and Visualization (PICSviz)

If a resource has potential to be impacted or requires more analysis to determine impacts, 2EN1 and 2EN2 provide details to complete the necessary tasks and deliverables.

The following tasks provide additional steps that each resource lead completes when a request is made.

Determine Natural Resources Technical Report (NRTR) Needs

Once a request has been received, the Natural Environment Lead determines whether the NRTR is to be developed in-house or if development is assigned to an on-call consultant. If determined that the NRTR is to be developed by an on-call consultant, then the Natural Environment Lead coordinates the scope of work and fee necessary for the NRTR in accordance with *NRTR Scope Template and Guidance*.

Determine Section 7 Survey Needs

Once a request is received, the Natural Environment Lead adds a Section 7 Survey Request to the project which populates the threatened and endangered (T&E) species for the county(ies) and notifies BSG. BSG/ECAP assigns the review of T&E species listed to a biologist. If BSG determines Section 7 surveys are needed, surveys may be done in-house or a separate scope of work and fee is prepared. Division requests Section 7 surveys when it is required for BSG to review and survey for terrestrial and aquatic animal species.

Prepare and Send [Landowner Survey](#) Notification Letter

The [landownersurvey notification](#) letter is sent to landowners within the study area prior to any field work.

- The [landownersurvey](#) notification letter is sent out by Environmental Staff.
- The letter notifies landowners that NCDOT is beginning a project, and personnel may be on their property.
- If the project study area changes, a new landowner letter may be required.

Complete Cultural Resource Screening

For projects with a federal nexus, the Project Lead completes the Cultural Resources Screening Checklist for Section 106 provided in the *2020 Section 106 Programmatic Agreement for the Transportation Projects Program in North Carolina*.

- Using the results of the checklist, or other requirements under state and federal environmental laws and regulations, the Project Lead determines if the project is subject to further historic preservation review. If additional review is required, the requester completes an request for a Historic Architecture and Archaeology review.
- The request is assigned to an appropriate Culture Resource Specialist and investigations begin.

Identification of Cultural Resources may be finalized during the Project Initiation stage or during ~~the Alignment Defined stage~~[Stage 2](#).

Please note that the *2020 Section 106 Programmatic Agreement* for the Transportation Program in North Carolina does not pertain to the Federal Railroad Administration, Federal Transit Administration, Federal Aviation Administration, or Locally Administered Program undertakings or state funded transportation projects without a Federal Nexus.

For state funded and locally administered project, separate guidance is under development.

Determine Noise/Air Analyses Needs

The Project Lead consults with the Traffic Noise and Air Quality (TNAQ) Group ~~Leader~~ to determine if a project needs a traffic noise or air quality analysis, the results of which are incorporated into the Project Scoping Report. The determination to include a traffic noise analysis and/or air quality analysis is based on both the proposed improvements and the type of environmental document being prepared for the project. It is not based on funding type.

If a traffic noise analysis is necessary, then ~~the~~ Traffic Noise and Air Quality ~~Group~~ advises whether a Traffic Noise Report or a Design Noise Report should be scoped/prepared. A Traffic Noise Report is recommended when there is a high degree of confidence that noise abatement is unlikely, or when only preliminary design is being developed concurrently. A Design Noise Report is recommended when it is expected that noise abatement may be likely, and final designs are developed concurrently with the NEPA/SEPA document development.

- ~~If An Air Quality Report is not required if a Minimum Criteria Determination Checklist (MCDC) or Categorical Exclusion (CE) is prepared for the project.~~
- If an Environmental Assessment (EA) or Environmental Impact Statement (EIS) is prepared for the project, then an Air Quality Report will be needed.
- Usually this will be a qualitative report, but sometimes a quantitative Air Quality Report may be needed for EAs and EISs. Additional coordination with the Traffic Noise and Air Quality Group ~~Leader~~ is needed in these instances.

If the Traffic Noise and Air Quality Group determines that a Traffic Noise Report (TNR) ~~or~~, Design Noise Report (DNR), or Air Quality Report (AQR) is required, and that a consultant is needed (through a Division contact, PMU contract, or ~~Noise and Air~~EAU on-call contract), then the firm develops a scope of work using the ~~TNR Standard Scope Template or DNR Standard Scope Template~~of [Services Generator](#) for ~~the~~ Traffic Noise and Air Quality ~~Group Leader's~~~~Group's~~ review. Once ~~the~~ scope is finalized, Traffic Noise and

Air Quality Group prepares an in-house estimate and negotiates the fee as appropriate with the consultant.

Determine Community Analyses Needs

The Project Lead submits a request for any required Community Analyses. The Community Studies Group reviews the project and determines the level of Community Analyses appropriate for the project (Community Characteristics Report, Community Impact Assessment, Land Use Scenario Assessment, etc.) and develops a Community Screening for completing analyses.

Complete QC/QA Procedures

Environmental Staff is to coordinate the applicable QC review following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist.

2EN1 ~~Assess~~Initiate Natural ~~Environmental Impacts~~Resources Analysis

The environmental analysis required for this activity ~~are~~is separated into the following sub-activities ~~of~~:

- ~~▪ Natural Resources Technical Report (NRTR) and WEX/WET File~~
- ~~▪ Biological Surveys~~



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Natural Resources Technical Report (NRTR) ~~and WEX/WET File~~

Coordinate ~~review~~the preparation and QA/QC of the ~~draft and final Natural~~following tasks/deliverables:

- ~~▪ Survey Notification Letter~~
- ~~▪ NRTR Report~~
- ~~▪ Section 7 Surveys/Coordination~~
- ~~▪ Water Resources Technical Report (NRTR), WEX (a MicroStation file or shapefile of delineated, potentially jurisdictional waterbodies)/WET (a MicroStation file or shapefile of delineated, jurisdictional waters, and File*~~
- ~~▪ Jurisdictional Determination package Resources Package*~~

*If needed.

References

- [NRTR Scope Template and Guidance](#)
- [NRTR Procedures Manual](#)
- [ETRACS System and Tutorial](#)
- [Division ETRACS Request for Section 7 Surveys](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Natural Environment Lead	
NRTR ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete Survey Notification Letter ▪ NRTR and WEX Report** ▪ Section 7 Surveys/Coordination ▪ Water Resources File* ▪ Jurisdictional Resources Package* 	✗ (for all tasks)	<ul style="list-style-type: none"> ▪ None ▪ None ▪ Biological Surveys Lead ▪ CADD Tech, Locations and Surveys ▪ CADD Tech
WEX File ^{A, Q}	▪		CAD Tech
Signed Jurisdictional Determination and Buffer Package ^Q	▪ Conduct Agency Field Review (if needed) and Create WET File	✗	CAD Tech
WET File ^{A, Q}	▪ Conduct Agency Field Review and Create WET File	✗	Location and Surveys

Comments on NEPA/SEPA Document	*—Review NEPA/SEPA Document	x	Environmental Policy Lead (Division Environmental or EPU)
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^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete NRTR and WEX File

The NRTR, ~~the WEX file,~~ and any associated GIS deliverables are developed by the Natural Environment Lead using the *NRTR Template and Guidance* in conjunction with the *NRTR Procedures Manual and Consultant GPS CADD Guidance*.

The final NRTR and WEX file are placed on the ATLAS Workbench, with the Project Manager, Hydraulics Unit, Locations/Surveys Unit, Structures Management Unit, Utilities Unit, and Roadway Unit (and others as appropriate) being notified.

The Natural Environment Lead sends the Water Resources File to the Locations and Surveys Unit for the incorporation of the water resources into the project's Final Survey file.

Complete Jurisdictional Determination and Buffer Package

The Preliminary Jurisdictional Determination and Buffer (if applicable) Package are part of the deliverables for an NRTR. ~~The final package is placed on ATLAS Workbench and the Natural Environment Lead submits the package to the US Army Corps of Engineers (USACE) for review.~~

Conduct Agency Field Review (if needed) ~~and Create WET File~~

The Natural Environment Lead:

- Coordinates the scheduling of a field review with the USACE, North Carolina Division of Water Resources (NCDWR), and consultant (if applicable). The Project Manager is notified of this meeting but is not required to attend.
- At the end of the field review, if any changes are made, updates the WEX Water Resources File and rename it/notifies Locations and Surveys for incorporation into the WETFS file.
- ~~▪ Updates the Jurisdictional Determination and Buffer (as appropriate) Package to be resubmitted to the USACE and NCDWR for signature.~~

~~The signed Jurisdictional Determination and Buffer Package and WET file are placed in ATLAS Workbench by the Natural Environment Lead.~~

Complete QC/QA Procedures

Environmental Staff is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist.

Review NEPA/SEPA Document

~~The NEPA/SEPA Lead or Project Manager coordinates the Natural Environment Lead, or team lead, to review the natural resources section(s) of NEPA/SEPA documents. This review is to:~~

- ~~▪ Focus on the accuracy of the information in the document.~~

- ~~Ensure that avoidance and minimization measures have been captured.~~
- ~~Ensure the Project Special Commitments (Green Sheets) agreements made with the agencies have been captured.~~

~~This coordination is tracked via an ETRACS request if involving EAU staff.~~

2EN2 ~~Assess~~Initiate Human ~~Environmental Impacts~~Environment Analysis

The environmental analysis required for this activity ~~are~~is separated into the following sub-activities ~~of~~:

- ~~Community Studies~~
- ~~Cultural Resources~~
- ~~Traffic Noise and Air Quality~~



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Community Studies

Complete the Community Characteristics Report and the Indirect and Cumulative Effects report (if determined necessary in Stage 1) for the study area or study corridors to inform project decision making, design, and permitting. A Community Characteristic Report is only needed if community impacts influence alternative selection. Complete an Indirect and Cumulation Effect only if screening indicates a need for assessment. Complete the Community Impact Assessment or Direct and Indirect Screening Tool based on the preliminary design for the preferred alternative, as well as the Land Use Scenario Assessment (if indicated), and document project decisions, commitments, recommendations, outstanding direct impacts, and potential future development areas.

References

- [Community Characteristics Report / Community Impact Assessment Resources](#)
- [Indirect and Cumulative Effects / Land Use Scenario Assessment Resources](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Community Studies Lead	PICSViz Team Member/ On-call Staff
Community Characteristics Report ^{A, Q}	▪ Develop Community Characteristics Report	X	X
Indirect and Cumulative Effects Report ^{A, Q}	▪ Develop Indirect and Cumulative Effects Report	X	X
Community Impacts Assessment ^{A, Q}	▪ Develop Community Impact Assessment	X	X
Land Use Scenario Assessment ^{A, Q}	▪ Develop Land Use Scenario Assessment	X	X
Comments on NEPA/SEPA Document	▪ Review NEPA/SEPA Document	X	X

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Overview: ~~Complete Cultural Resource Tasks~~ Resources

Determine the potential effects of projects to cultural resources, historic architecture, and archaeology, as required by Section 106 of the National Historic Preservation Act (applies to state and federal projects) and Section 4(f) (applies to federal projects only). Section 4(f) resources may also include publicly owned public parks and recreation lands and waterfowl and wildlife refuges, in addition to historic resources. These additional resource types are identified and discussed in the Community Impact Assessment.

References

- [Programmatic Agreement Manual for Minor Transportation Projects in North Carolina](#)
 - [Historic Architecture Group Procedures and Work Products](#)
 - [Archaeology Work Products](#)
- [Tribal Coordination Protocol](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Cultural Resource Specialist
Historic Architecture and Landscapes No Survey Required Form ^A	<ul style="list-style-type: none"> ▪ Complete Cultural Resource Screening 	X	
No Archaeological Survey Required Form ^A			
Historic Architecture and Landscapes Survey Required Form (if needed) ^A			
Archaeological Survey Required Form (if needed) ^A			
Archaeology Report ^Q	<ul style="list-style-type: none"> ▪ Complete Archaeology Report 	X	
No National Register of Historic Places Eligible or Listed Archaeological Sites Present Form ^A			
Archaeology Assessment of Effects Required Form			
Historic Architecture Building Inventory ^Q	<ul style="list-style-type: none"> ▪ Complete Historic Architecture Building Inventory 	X	
No Historic Architecture and Landscapes Effects Required Form (if needed) ^A			
Historic Architecture Eligibility Evaluation Report ^Q	<ul style="list-style-type: none"> ▪ Complete Historic Architecture Eligibility Evaluation Report 	X	
Historic Architecture and Landscapes Effects Required Form ^A			
No National Register of Historic Places Eligible or Listed Historic Properties Present or Affect Form ^A			
No National Register of Historic Places Eligible or Listed Archaeological Sites Affected Form ^A	<ul style="list-style-type: none"> ▪ Conduct Cultural Resource Effects Determination (Archaeological) 	X	
No National Register of Historic Places Eligible or Listed Archaeological Sites Adversely Affected Form ^A			
Archaeological Adverse Effect Determination Form ^A			
National Register of Historic Places Eligible or Listed Historic Properties Effects Determination Form ^A	<ul style="list-style-type: none"> ▪ Conduct Cultural Resource Effects Determination (Historic Architecture and Landscapes) 	X	
No National Register of Historic Places Eligible or Listed Historic Properties Present or Affected Form ^A			

Overview: Traffic Noise and Air Quality

Consult with the Traffic Noise and Air Quality Group to determine if a traffic noise analysis and/or an air quality analysis is required. Complete the Traffic Noise analysis (Traffic Noise Report or Design Noise Report), Air Quality Report, and prerequisite deliverables and tasks, once alternatives/alignments are developed. An Air Quality Report is required for all projects for which either an Environmental Assessment (EA) or Environmental Impact Statement (EIS) is being prepared.

References

- [Traffic Noise & Air Quality Resources Page](#)
 - [NCDOT Traffic Noise Policy](#)
 - [NCDOT Traffic Noise Manual](#)
 - [NCDOT Air Quality Handbook](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Traffic Noise Analysis Work Plan ^Q	<ul style="list-style-type: none"> ▪ Develop Traffic Noise Analysis Work Plan 	Traffic Noise and Air Quality Lead	Traffic Noise and Air Quality Group Team Member/ On-call Consultant <ul style="list-style-type: none"> ▪ XProject Manager ▪ Local Government Agency ▪ QA Reviewer
Right_of_Entry Letter			
Traffic Noise Report (or Design Noise Report) ^{A, Q}	<ul style="list-style-type: none"> ▪ Perform Field Work and Noise Model Validation 	XLead Traffic Noise Analyst	<ul style="list-style-type: none"> ▪ XQA Reviewer
Noise Model Validation Memorandum ^Q			
Traffic Noise Report or Traffic Noise Report Addendum ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete theDevelop Traffic Noise Report (or Design Noise Report) 		<ul style="list-style-type: none"> ▪ Project Manager ▪ Local Business Owners (for ER calculations) ▪ QA Reviewer
Streamlined Text			
Air Quality Report ^{A, Q}	<ul style="list-style-type: none"> ▪ Prepare Air Quality Report 	XLead Air Quality Analyst	<ul style="list-style-type: none"> ▪ XProject Manager ▪ FHWA ▪ QA Reviewer
Streamlined Text			

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Develop ~~Traffic Noise Analysis Work Plan~~

The ~~consultant or Lead~~ Traffic Noise and Air Quality team member ~~Analyst~~ develops a ~~draft Traffic Noise Analysis Work Plan~~ based on ~~the current template templates~~ and guidance included in the ~~Traffic Noise Manual maintained by Traffic Noise and Air Quality group as defined in above references.~~ The ~~draft Traffic~~

Noise Analysis Work Plan identifies items such as noise study areas, noise-sensitive receptors, and potential noise measurement locations.

- ~~With the submission~~ Upon approval of the draft Traffic Noise Analysis Work Plan, ~~at the~~ Traffic Noise and Air Quality ~~team member submit~~ Group provides a signed right-of-entry letter. The Lead Traffic Noise Analyst prepares a draft right-of-entry letter using the using the standard template.
- ~~The work plan and right of entry letters are approved by~~ The Traffic Noise and Air Quality Lead Group must sign and issue right-of-entry letters prior to any noise measurements ~~or noise modeling~~.
- The Lead Traffic Noise and Air Quality Lead then issues a right of entry letter. ~~Analyst marks the approved~~ Noise Analysis Work Plan as final on the project SharePoint site.

Perform Field Work and Noise Model Validation

The Lead Traffic Noise and Air Quality Lead Analyst conducts validation of project models using the noise measurement results, documented using the current template, in accordance with the *Traffic Noise Manual*.

~~The Traffic Noise and Air Quality Lead uploads the final Traffic Noise Report or Design Noise Report to the ATLAS Workbench and notifies the NEPA/SEPA Lead and the Project Manager. The Traffic Noise and Air Quality group supplies streamlined text for the environmental document, Noise Study Areas, and the location results of long-term measurement sites to the NEPA/SEPA Lead for use. The validation are documented in the environmental document.~~

~~Complete the~~ Traffic a Noise Report or Design Noise Report

~~The consultant or~~ Traffic Noise and Air Quality Lead develops a draft Traffic Noise Report or Design Noise Report based on Model Validation Memorandum using the current template templates and guidance maintained by Traffic Noise and Air Quality group and included in accordance with the *Traffic Noise Manual*.

- The Traffic Noise and Air Quality Group must approve the Noise Model Validation Memorandum prior to submitting the draft Traffic Noise Report.
- The draft Lead Traffic Noise Analyst marks the approved Noise Model Validation Memorandum as final on the project SharePoint site.

Develop Traffic Noise Report (or Design Noise Report)

The Lead Traffic Noise Analyst develops a Traffic Noise Report, Traffic Noise Report Addendum, or Design Noise Report based on current template and guidance included in the *Traffic Noise Manual*. The Traffic Noise Report or Design Noise Report evaluates the existing and no-build conditions, and the build conditions for each detailed study alternative alignment, documented in the environmental document. Abatement is considered for all impacted receptors.

- ~~If the draft Traffic Noise Report or Design Noise Report is prepared by an on-call consultant, the Project Manager submits an request to Traffic Noise and Air Quality group to review the draft Traffic Noise Report or Design Noise Report.~~

- ~~The on-call consultant revises the draft Traffic Noise Report or Design Noise Report based on Traffic Noise and Air Quality group comments.~~
- ~~The revised Traffic Noise Report or Design Noise Report and a memo describing the response to each comment is submitted via ETRACS.~~
- ~~Additional reviews and roundsIf noise walls are identified as unlikely, no additional traffic noise analysis is required.~~
- ~~If noise walls are identified as likely, a Design Noise Report is required (see 3EN1 for related information).~~
- ~~A Design Noise Report may also be required in situations where the Traffic Noise Report identified noise walls as unlikely, but where the Design Noise Report could have different findings.~~

~~Upon acceptance of comments are prepared as necessary to finalize the Traffic Noise Report, the Lead Traffic Noise Analyst submits the draft streamlined text using the appropriate [template](#).~~

~~The consultant uploads only the accepted Traffic Noise Report to the ATLAS Workbench and notifies the NEPA/SEPA Lead and the Project Manager. This automatically marks the accepted Traffic Noise Report as final and as KeyHE “TNR” on the project SharePoint site. Only the accepted Traffic Noise Report or Design Noise Report should be marked with the KeyHE “TNR”. The Lead Traffic Noise Analyst uploads the approved TNM files in a zipped folder to the project SharePoint site and marks it as final.~~

Prepare Air Quality Report

~~The Traffic Noise and Lead Air Quality Lead completes the Air Quality Template to perform a Project Level Air Quality Analysis, if requiredAnalyst develops an Air Quality Report based on the [current template](#) type and guidance included in the *Air Quality Handbook*.~~

- ~~If a federal EA or EIS is being prepared **and** extent a preferred alternative was not selected prior to January 1, 2022, then greenhouse gas emissions must be calculated in MOVES.~~

~~Upon acceptance of the project.~~

~~Once Notice to Proceed has been issued, perform the air analysis and submit the draft Air Quality Report, as described in the 2020 NCDOTLead Air Quality Handbook, to the Traffic Noise and Analyst submits draft streamlined text using the appropriate template.~~

~~The consultant uploads only the accepted Air Quality group for review and comment. Report to the ATLAS Workbench and notifies the NEPA/SEPA Lead and the Project Manager. This automatically marks the accepted Air Quality Report as Final and as KeyHE “Air Quality Report” on the project SharePoint site. Only the accepted Air Quality Report should be marked with the KeyHE “Air Quality Report”.~~

- ~~After the Traffic Noise and Air Quality group comments are received, prepare a final Air Quality Report.~~

~~The Traffic Noise and Air Quality group provides a draft of the streamlined project-level air quality text for use in the environmental document.~~

Complete QC/QA Procedures

Environmental Staff is to coordinate the applicable QC review and QA reviews following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist and QA Checklists. A comment response matrix must be provided to document all comments for each deliverable.

~~3EN1~~2EN3 Develop Design Noise Report or Addendum

Overview

Prepare the Design Noise Report (if one is required and one has not yet been completed) or a Design Noise Report Addendum (if a Design Noise Report has been completed but updated design information or design changes require additional or new final design traffic noise analysis) ~~and compile obligations from the environmental document, avoidance and minimization measures, Project Special Commitments, and completed Section 106 Memorandum of Agreement (MOA) and Section 7 consultation, as appropriate, or if new noise-sensitive development that was not included in the Design Noise Report has been permitted along the project prior to the Date of Public Knowledge).~~

References

- [Traffic Noise & Air Quality Resources Page](#)
 - [NCDOT Traffic Noise Policy](#)
 - [NCDOT Traffic Noise Manual](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		<u>Lead Traffic Noise Analyst</u>	
Design Noise Report or Design Noise Report Addendum <u>Analysis Work Plan</u> (as applicable) ^{A, Q}	<ul style="list-style-type: none"> ▪ <i>Develop Design Noise Report or Design Noise Report Addendum (as applicable)</i> 	<u>Traffic Noise and Air Quality Group</u>	<ul style="list-style-type: none"> ▪ Project Manager or On-call Consultant <u>Local Government Agency</u> ▪ <u>QA Reviewer</u>
<u>Right of Entry Letter</u> (as applicable)			<ul style="list-style-type: none"> ▪ <u>QA Reviewer</u>
<u>Noise Model Validation Memorandum</u> (as applicable) ^Q			<ul style="list-style-type: none"> ▪ <u>Project Manager</u> ▪ <u>Local Business Owners</u> (for ER calculations) ▪ <u>Design Discipline Leaders</u> (for feasibility review) ▪ <u>QA Reviewer</u>
<u>Design Noise Report or Design Noise Report Addendum</u> ^{A, Q}			

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^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Develop Design Noise Report or Design Noise Report Addendum

If a Traffic Noise Report was previously completed and abatement ~~determination~~ was ~~incorrect~~ found to be likely or ~~project delays require a re-evaluation, then the if the~~ Traffic Noise and Air Quality Lead develops a draft Group determines that a Design Noise Report would be required even though the Traffic Noise Report found that abatement was unlikely, then the Lead Traffic Noise Analyst develops a Design Noise Report based on ~~current templates and the~~ guidance maintained by Traffic Noise and Air Quality group and in accordance with the included in the Traffic Noise Manual.

The Design Noise Report evaluates the entire preferred/selected alternative/~~alignment~~, considers abatement for all impacted receptors, and creates a noise wall ~~envelope(s)~~envelopes in MicroStation/~~ORD~~ for ~~anyall~~ noise wall(s)walls recommended in the Design Noise Report. ~~(To be feasible and reasonable, a noise wall or berm must meet 5 criteria— 2 feasibility criteria and 3 reasonableness criteria. A wall or berm recommended in the approved Design Noise Report meet both feasibility and two of the three reasonableness criteria. The final reasonableness criteria, which is the public’s preference, is are determined through the noise abatement balloting process (see 3EN2 for related information) conducted after the approval/acceptance of the Design Noise Report. #Although a Design Noise Report recommends noise abatement, but it is only after the subsequent balloting process that abatement (walls or berms) areis determined to be feasible and reasonable.)~~.

- ~~▪ If the Design Noise Report is prepared by a consultant, they submit a request toA Noise Analysis Work Plan may not be required for a Design Noise Report. The Traffic Noise and Air Quality Group advises if one is necessary while developing the scope of services.~~
- ~~▪ A Noise Model Validation Memorandum may not be required for a Design Noise Report. The Traffic Noise and Air Quality Group to review advises if one is necessary while developing the scope of services.~~
- ~~▪ If a Noise Model Validation Memorandum is required, the draft Design Noise ReportTraffic Noise and Air Quality Group provides a signed right-of-entry letter. The Lead Traffic Noise Analyst drafts a right-of entry letter using the standard template. Ambient Noise Measurements cannot be conducted without a signed right-of-entry letter.~~
- ~~▪ Traffic Noise and Air Quality Group provides comments on the draft Design Noise Report.~~
- ~~▪ The consultant revises the draft Design Noise Report based on the Traffic Noise and Air Quality group comments.~~
- ~~▪ The revised Design Noise Report and a memo describing the response to each comment is submitted via ETRACS.~~
- ~~▪ Additional reviews and rounds of comments are prepared as necessary to finalize the Design Noise Report.~~
- ~~▪ Before the Design Noise Report can be accepted, a comprehensive inter-disciplinary engineering feasibility review must be conducted (as described in the following subsection).~~

~~The consultant uploads only the accepted Design Noise Report to the ATLAS Workbench and notifies the NEPA/SEPA Lead and the Project Manager. This automatically marks the accepted Design Noise Report as Final and as KeyHE “DNR” on the project SharePoint site. Only the accepted Design Noise Report should be marked with the KeyHE “DNR”. The consultant also uploads the approved TNM files and design files in CADD format in a zipped folder to the project SharePoint site and marks it as final.~~

Interdisciplinary Engineering Feasibility Review

When a draft Design Noise Report is submitted, the Traffic Noise and Air Quality group is responsible for circulating the ~~Design Noise Report~~recommended noise walls or berms to all appropriate parties for interdisciplinary review to identify feasibility and constructability concerns. This includes Division, Utilities, Signing and Delineation, Geotech, Structures, Roadway, Hydraulics, and other appropriate parties ~~to review for hydraulics and roadway.~~

If feasibility concerns are identified, the Traffic Noise and Air Quality Group works with the ~~consultant team~~ Lead Traffic Noise Analyst and the reviewing party to resolve.

- The Division Engineer has final authority to determine if noise walls are not feasible due to engineering or constructability conflicts.
- If the Division Engineer determines a noise wall is not feasible to construct, then the reasons for this are documented in the Design Noise Report.

If a Design Noise Report was previously completed and abatement was determined to be likely/recommended, then ~~a review of the Traffic Noise and Air Quality Group reviews~~ the Design Noise Report and its noise wall recommendations ~~must be reviewed~~ in light of any additional final design information ~~or design changes that have become available since the Design Noise Report was developed.~~ The Traffic Noise and Air Quality group coordinates with appropriate inter-disciplinary review parties to verify that there are still no feasibility concerns with the recommended noise walls in light of the final design information to be reflected in the Right-of-Way Plan Set. If feasibility concerns are identified, then the Traffic Noise and Air Quality Group staff coordinates with appropriate parties (Division, Utilities, Signing and Delineation, Geotech, Structures, etc.) to resolve.

If resolution of these issues changes the noise wall recommendations from the Design Noise Report, then a Design Noise Report Addendum is prepared to document the new noise wall recommendations and the supporting reasons and analysis.

If resolution of these issues does not change the noise wall recommendations from the Design Noise Report, then a memo documenting this is prepared, stating that the Design Noise Report noise wall recommendations remain valid, and no further final design noise analysis is needed.

Complete QC/QA Procedures

Environmental Staff is to coordinate the applicable QC ~~review~~ and QA reviews following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC ~~Checklist~~ and QA Checklists. A comment response matrix must be provided to document all comments for each deliverable.

~~3EN2~~3EN1 Document Noise Abatement ~~Strategy~~ Decision

Overview

Complete this step when noise abatement is recommended for a project based on the analysis done as part of the Design Noise Report or Design Noise Report Addendum. ~~(see 3EN1 for related information).~~ After approval of the Design Noise Report or Design Noise Report Addendum, and after all feasibility concerns have been thoroughly resolved and final design information that could affect recommended noise wall locations has been verified, conduct the balloting process (detailed in the *Traffic Noise Manual*) to determine whether the majority of property owners and tenants who would benefit from a noise wall or berm support its construction. Prepare a memorandum that summarizes the ~~public~~ balloting process, results, and final determination of noise wall installation.

References

- [Traffic Noise & Air Quality Resources Page](#)
 - [NCDOT Traffic Noise Policy](#)
 - [NCDOT Traffic Noise Manual](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Traffic and Air Quality Lead TNAQ Group	
Benefited Receptor Mailing List Balloting Figure	<ul style="list-style-type: none"> ▪ Conduct Noise-Related Public Ballot Process 	X	<ul style="list-style-type: none"> ▪ Assigned Engineering Firm
Benefited Receptor Mailing List		X	<ul style="list-style-type: none"> ▪ On-Call Consultant
Notice of Upcoming Ballot and/or Public Noise Meeting (optional)		X	<ul style="list-style-type: none"> ▪ On-Call Consultant (Assigned Engineering Firm) ▪ Project Manager ▪ Roadway Design Lead ▪ Public Involvement Officer
Noise Wall Ballots		X	<ul style="list-style-type: none"> ▪ On-Call Consultant
Noise Wall Balloting Results ^Q		X	X

^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Conduct Noise-Related ~~Public~~ Ballot Process

The Traffic Noise and Air Quality Group conducts the noise-abatement-~~public~~ ballot process detailed in the *Traffic Noise Manual*. The process determines the preference regarding noise barrier construction (for or against) of property owners and tenants of all benefited receptors (including properties represented by equivalent receptors).

Prepare Memorandum on Noise Wall Balloting Results

~~To prepare this memorandum, Upon completion of the balloting process,~~ the Traffic Noise and Air Quality Group:

- ~~Upon completion of the balloting process,~~ Prepares the Memorandum on Noise Wall Balloting Results to ~~documents~~document which noise abatement measures are feasible and reasonable and are therefore to be implemented for a project; and then notifies the Project Manager, FHWA, and other appropriate parties via a courtesy copy or other appropriate method.
- Uploads Memorandum on Noise Wall Balloting Results to ATLAS Workbench as a KeyHE document and provides it to the appropriate parties (e.g., the Roadway Design Lead, Structures Lead, and Geotechnical Design Geotechnical Engineer), notifying the Project Manager when complete.

Complete QC/QA Procedures

Environmental Staff is to coordinate the applicable QC review and QA reviews following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist and QA Checklists.

~~3EN3~~3EN2 Apply for Permits

Overview

Apply for the required project permits once permit impact drawings have been completed and impacts are calculated, ~~and a pre-application meeting (sometimes referred to as a pre-filing meeting) has been conducted with relevant agencies, and mitigation obligations have been secured for unavoidable impacts (if applicable).~~

References

- [Permit Application Timeline](#)
- [Permit Types and Due Dates](#)
- [Individual Permit Application Template](#)
- [e-PCN Worksheet](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Traffic and Air Quality Lead	Traffic and Air Quality Team Member/ On-call Consultant
Permit Applications ^{A, Q}	▪ Prepare Permit Applications	Natural Environment Lead (or Division Environmental Officer)	Various Multi-Discipline Staff

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^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

~~Complete Pre Application Meeting and/or Pre Filing Notification~~

~~The Natural Environment Lead coordinates with regulatory agencies and with appropriate design personnel to ensure permit drawings are prepared accurately. During this process, the pre-filing notification to NC Division of Water Resources should be submitted (this may have been completed prior to this stage as well). Based on the regulatory agency coordination, the Natural Environment Lead may need to coordinate a pre-application meeting with relevant regulatory personnel to review the proposed designs, impacts, avoidance and minimization measures, mitigation, anticipated applicable permits, commitments, and potential permit conditions.~~

Prepare Permit Applications

The Natural Environment Lead (or Division Environmental Officer) receives draft permit drawings for review of completeness, avoidance and minimization measures, and accurate capturing of impact type and location. Based on this information, the Natural Environment Lead submits applications for the following permits and others, as appropriate:

- Section 404: Nationwide, Regional General, or Individual Permit (USACE)
- Section 401: Water Quality Certification, General or Individual (NCDWR)
- Buffer Authorization (NCDWR)

4EN1 Secure ~~Environmental~~ Permits

Overview

Coordinate with the agency representative for any additional information that is needed to issue the permit(s). Once the agency(ies) issues the permit(s), update the Project Special Commitments (Green Sheets) to include special permit conditions and prepare the permit package for distribution.

References

- [Project Special Commitments \(Green Sheets\) Guidance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Natural Environment Lead	ECAP Team Leader
Permit Package ^{A, Q}	<ul style="list-style-type: none"> Finalize Permit Package and Address Agency Comments 	X	X
Project Special Commitments (Green Sheets)	<ul style="list-style-type: none"> Update Project Commitments 	X	

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^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Finalize Permit Package and Address Agency Comments

The Natural Environment Lead coordinates with the agency representative as necessary to finalize the needed permits for the project. These permits may include:

- Section 404: Nationwide, Regional General, or Individual Permit (USACE)
- Section 401: Water Quality Certification, General or Individual (NCDWR)
- Buffer Authorization (NCDWR)
- Coastal Area Management Act (CAMA) Permit (NC Division of Coastal Management)
- Section 10 Permit (USACE and US Coast Guard)
- Federal Energy Regulatory Commission (FERC) Coordination and Approval
- Bridge Permit or Exemption Approval (US Coast Guard)

Update Project Commitments

When the permits are received, the Natural Environment Lead reviews them for any additional permit conditions required by agencies. If there are additional permit conditions, the Natural Environment Lead ensures they are included in the Project Special Commitments (Green Sheets). The Natural Environment Lead also develops and uploads a permit package that includes project permits and notifies the Project Manager, Contract, Preconstruction Unit Heads, and Division. Approved permits are required to be in place before any construction authorized under the permit conditions can occur.

1EP1 Initiate Environmental Review NEPA/SEPA Coordination

Overview

Begin NEPA/SEPA efforts early and clearly document any decisions being made that could affect the NEPA/SEPA process. Assist with the development and/or review of Merger Pre-Screening, Merger Screening (if needed), Merger Concurrence Point 1 (CP 1) (if needed), Project Scoping Report, and Project Initiation processes in accordance with NCDOT *Express Design/Scoping Report Guidance*, NCDOT Project Initiation Guidance, and NCDOT *Merger Guidance*.

Note: A “NEPA/SEPA Lead” (a subject matter expert in National Environmental Policy Act [NEPA] and North Carolina Environmental Policy Act [SEPA] documentation, which generally means Division Environmental Staff, Environmental Policy Unit staff, and/or consultants) is generally responsible for oversight of these tasks, in collaboration with a Project Lead and other relevant team members.

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

- [NCDOT Merger Pre-Screening Guidance](#)
- [NCDOT Project Scoping Report Guidance](#)
- [NCDOT Project Initiation Guidance](#)
- [NCDOT Project Initiation Form](#)
- [NCDOT Merger Guidance](#)
- [Merger Calendar](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Merger Screening ^A	<ul style="list-style-type: none"> ▪ Complete Merger Pre-Screening 	NEPA/SEPA Lead	Environmental Policy Unit
	<ul style="list-style-type: none"> ▪ Schedule Merger Screening Meeting (if needed) 	Environmental Policy Unit	NEPA/SEPA Lead
Merger Plan (if needed) ^A	<ul style="list-style-type: none"> ▪ Coordinate and Review Merger Plan (if needed) 	NEPA/SEPA Lead	Project Lead and Environmental Policy Unit
Merger CP1 Meeting Packet ^{A, Q}	<ul style="list-style-type: none"> ▪ Review Merger CP1 Meeting Packet (if needed) 	Project Lead and NEPA/SEPA Lead	Environmental Policy Unit
CP Documentation ^A	<ul style="list-style-type: none"> ▪ Conduct Concurrence Point 1 (if needed) 	Project Lead, NEPA/SEPA Lead, and Environmental Policy Unit	Applicable Regulatory Agencies

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Initiate Environmental Documentation

The Project Lead coordinates with the NEPA/SEPA Lead as the Project Scoping Report is developed (see 1FS2 for related information). The NEPA/SEPA Lead provides both technical content and recommendations to be included in the Project Scoping Report. Since the Project Scoping Report outlines recommendations for project initiation activities, the NEPA/SEPA Lead and the Environmental Policy Unit are to review each Project Scoping Report for accuracy; these materials are relied upon for future environmental reviews and NEPA/SEPA documentation throughout the life of the project.

Lead Project Initiation Meeting

The NEPA/SEPA Lead attends the Project Initiation Meeting and is available to assist as the Project Manager takes over the project from the Project Lead prior to Notice to Proceed and beginning at the Alignment Defined Stage. The Environmental Policy Unit confirms the National Environmental Policy Act (NEPA) or State Environmental Policy Act (SEPA) class of action for the project (Categorical Exclusion, Minimum Criteria Determination Checklist, Environmental Assessment/Finding of No Significant Impact, or Environmental Impact Statement/Record of Decision). The NEPA/SEPA Lead coordinates with appropriate staff to begin documenting the Purpose & Need and the initial Study Area, in addition to completing other coordination efforts (e.g., Start of Study notification, sending Project Initiation materials to identified agencies, and conducting tribal protocols).

Complete Merger Pre-Screening

Once there is enough data to support a valid Merger Screening effort, the NEPA/SEPA Lead completes the Merger Pre-Screening Form per current NCDOT guidance; the Environmental Policy Unit reviews the Form to ensure accuracy and validate the decision.

Upon completion, the NEPA/SEPA Lead and/or Environmental Policy Unit leads the following activities:

- If a project pre-screens out of the Merger Process with Environmental Policy Unit concurrence, document the decision ~~and upload~~ using the form ~~to~~ in the ATLAS Workbench.
- If a project pre-screens into the Merger Process, coordinate with Environmental Policy Unit to schedule a Merger Screening meeting and update/file the form.

The NEPA/SEPA Lead is responsible for ensuring the Merger Pre-Screening documentation is on the ATLAS Workbench.

Schedule Merger Screening Meeting (if needed)

If needed, the Environmental Policy Unit schedules and helps the Project Lead host a Merger Screening meeting, per NCDOT guidance. The NEPA/SEPA Lead works with the Environmental Policy Unit to support the Project Lead in consideration of:

- Relevant environmental regulations and permitting requirements
- Merger process requirements
- Meeting facilitation strategies where needed
- Production and review of a draft Merger Plan, if proceeding into Merger

Coordinate and Review Merger Plan (if needed)

If a project screens into the Merger Process, the Project Lead works with the NEPA/SEPA Lead to develop a Merger Plan, in coordination with the Environmental Policy Unit and per NCDOT guidance. Plan development is to be discussed during the Merger Screening Meeting to streamline and customize the Merger Process to benefit the project.

The Environmental Policy Unit reviews the Merger Plan prior to finalization and distribution to the Merger Team; the Plan can be posted to the project's External Collaboration SharePoint site for consumption by the Merger Team. The Merger Plan is a living document, to be updated at each concurrence point, with the final versions of the Merger Plan posted to the ATLAS Workbench.

~~Initiate Environmental Documentation~~

~~The Project Lead coordinates with the NEPA/SEPA Lead as the Project Scoping Report is developed (see 1FS3 for related information). The NEPA/SEPA Lead provides both technical content and recommendations to be included in the Project Scoping Report. Since the Project Scoping Report outlines recommendations for project initiation activities, the NEPA/SEPA Lead and the Environmental Policy Unit are to review each Project Scoping Report for accuracy; these materials are relied upon for future environmental reviews and NEPA/SEPA documentation throughout the life of the project.~~

~~Lead Project Initiation Meeting~~

~~The NEPA/SEPA Lead attends the Project Initiation Meeting and is available to assist as the Project Manager takes over the project from the Project Lead prior to Notice to Proceed and beginning at the Alignment Defined Stage. The Environmental Policy Unit confirms the National Environmental Policy Act (NEPA) or State Environmental Policy Act (SEPA) class of action for the project (Categorical Exclusion, Minimum Criteria Determination Checklist, Environmental Assessment/Finding of No Significant Impact, or Environmental Impact Statement/Record of Decision). The NEPA/SEPA Lead coordinates with appropriate staff to begin documenting Purpose & Need as well as the initial Study Area.~~

Set Up Merger CP1 Meeting (if needed)

In general, the formal Merger Screening Meeting and CP 1 pre-meeting can be a combined meeting. The Project Lead coordinates closely with the Environmental Policy Unit and the NEPA/SEPA Lead to determine the appropriate format and content of any Screening and Concurrence meetings. The Project Manager is to consider the following when requesting a meeting:

- The request takes place 6 to 8 weeks in advance of the requested date.
- A calendar is posted with reserved dates each month for western and eastern Merger projects.

While it is expected that all Merger meetings be held in Raleigh on the selected dates so Merger Team members can plan accordingly, it is possible to have meetings on other dates or in other locations. For instance, some meetings may require a field visit and are held at a location near the project (e.g., Division office) and/or on-site. Also, some concurrence points may be achieved via informal coordination, without a meeting at all.

Review Merger CP1 Meeting Packet (if needed)

The Project Lead and NEPA/SEPA Lead coordinate to provide a draft CP1 packet to the Environmental Policy Unit for review. An important element of the CP1 packet is the project's Purpose and Need statement. For a Purpose and Need statement that involves safety, the project team collaborates safety data with the Traffic Safety Unit/State Traffic Engineer (see 1TS1 for related information). As a foundational element of a project's future decision-making, the Purpose and Need is to be thoroughly reviewed prior to regulatory agency review.

Host Merger CP1 Pre-Meeting (if needed)

Per NCDOT guidance, the Project Lead coordinates with the NEPA/SEPA Lead and the Environmental Policy Unit to host a pre-meeting with the Merger MOU signatory agencies:

- Pre-meetings include, at a minimum, NCDOT, Federal Highway Administration (FHWA) (for federal projects), US Army Corps of Engineers (USACE), and the North Carolina Division of Water Resources (NCDWR).
- All pre-meetings are scheduled a minimum of three weeks in advance of the respective concurrence point to allow adequate time to modify the Merger packet, if necessary.
- The project team is to solicit comments and encourage input at the pre-meeting, with the intent of producing a reliable Purpose and Need and a Study Area that can garner agency concurrence.

Conduct CP1 (if needed)

Per NCDOT Merger guidance, the Project Lead works with the NEPA/SEPA Lead and the Environmental Policy Unit to request concurrence from the relevant agencies on the project's Study Area and its Purpose and Need. Once concurrence is received, [the Project Lead uploads](#) a completed meeting summary and signature form ~~is uploaded~~ to the ATLAS Workbench, along with appropriate GIS files for the Study Area. These files are relied upon for future environmental reviews and NEPA/SEPA documentation throughout the life of the project.

Complete QC/QA Procedures

The NEPA/SEPA Lead is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

2EP1 ~~Prepare Environmental~~ Advance NEPA/SEPA Documentation

Overview

Prepare, assist, coordinate, and/or review all relevant environmental disciplines as projects navigate the NEPA/SEPA documentation and 404/NEPA Merger processes (as applicable for the project), including the quality control and quality assurance reviews of all relevant environmental documentation.

Note: For projects using the Merger Process, the following tasks are required for Merger Concurrence Points (CP) 1 through 4A, unless specifically noted below. The 404/NEPA Merger process supports NCDOT’s NEPA/SEPA documentation and decision-making efforts and are to be viewed as a more robust/structured version of the everyday non-Merger agency and permitting coordination efforts.

References

- [NCDOT Environmental Policy Unit Policies, Procedures, and Guidance Documents](#)
- [NCDOT Merger Guidance](#)
- [NCDOT-FHWA CE Programmatic Agreement](#)
- [NCDOT Section 4\(f\) Guidance](#)
- ~~[NCDOT Section 4\(f\) Guidance \(In-development\)](#)~~

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Merger Preparation Materials ^Q	<ul style="list-style-type: none"> ▪ Set Up Merger Concurrence Points ▪ Review Merger Concurrence Point (CP) Materials 	NEPA/SEPA Lead and Environmental Policy Unit	Project Manager and Environmental Policy Unit
Merger CP Outcomes ^A	<ul style="list-style-type: none"> ▪ Distribute Merger CP Meeting Materials and Conduct Meeting 	NEPA/SEPA Lead and Project Manager	Environmental Policy Unit
Comments on Merger Public Engagement Materials	<ul style="list-style-type: none"> ▪ Review Merger Public Engagement Materials 	Environmental Policy Unit	Public Involvement Staff
Approved NEPA/SEPA Documentation ^{A, Q}	<ul style="list-style-type: none"> ▪ Prepare NEPA/SEPA Documentation 	NEPA/SEPA Lead	Division Environmental Officer Staff or Environmental Policy Unit
Comments on Environmental Documents	<ul style="list-style-type: none"> ▪ Review Environmental Documents 	NEPA/SEPA Lead	Environmental Policy Unit
Approved Section 4(f) Documentation ^Q	<ul style="list-style-type: none"> ▪ Review Section 4(f) Documentation 	NEPA/SEPA Lead	Environmental Policy Unit and EAU Community Studies Staff/Division Environmental staff
Annual CE Review and Report	<ul style="list-style-type: none"> ▪ Provide Categorical Exclusions (CE) Compliance Review 	Environmental Policy Unit	Federal Highway Administration

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The following activities build upon 1EP1 and most other Stage 1 and 2 discipline activities. If project circumstances did not include all 1EP1 activities, these activities are generally to be integrated into this Stage. Ongoing cross-disciplinary coordination is essential for any robust NEPA/SEPA documentation and decision-making efforts, and the NEPA/SEPA Lead must be kept apprised of most project development activities throughout this Stage.

Set Up Merger Concurrence Points

All Merger concurrence points can be achieved via in-person [or virtual](#) meetings, ~~online/teleconference~~, or coordinated via email. The project's NEPA/SEPA Lead coordinates with the Environmental Policy Unit to maintain the Merger Plan and align it with the overall project schedule. As each Concurrence Point approaches, the Environmental Policy Unit's activities begin when the Unit receives an [ETRACS request to place a Merger CP on the Merger Calendar.email at EPU@ncdot.gov](#). This request takes place at least two months in advance of the requested date. Dates have been reserved each month for Merger meetings. A calendar is posted each year with selected dates for western and eastern projects ([see the EPU website](#)).

While it is expected that all Merger meetings are held in Raleigh on the selected dates so Merger Team members can plan accordingly, it is possible to have meetings on other dates or in other locations. For instance, some meetings may require a field visit and are held at a location near the project (e.g., Division office) and/or on-site.

- For the Merger CP2A meeting, the project team may elect to schedule a field meeting to review the proposed major crossing structure locations and get a better idea of the quality of the impacted resources. If needed, the Project Manager ~~is to coordinate~~[coordinates](#) the meeting date, time, and location with the Merger Team, notifying the Environmental Policy Unit as a courtesy.

Review Merger Concurrence Point Materials

In collaboration with the Project Manager and in accordance with the NCDOT Merger guidance, the NEPA/SEPA Lead provides the draft Merger Concurrence Point (CP) materials and submits it to the Environmental Policy Unit [Lead](#) for review, which minimally includes the following for each Merger CP:

- Meeting purpose
- Project description, vicinity map, and study area figure
- Summary of Merger Process decisions to date
- Nearby STIP projects
- Project schedule
- Summary of public engagement (as applicable)
- Avoidance and minimization measures to date

For Merger CP2, the packet also includes:

- Summary of alternatives considered
- Summary of proposed detailed study alternatives

For Merger CP2A, the packet also includes:

- Water resources summary
- Major Hydraulic Crossings and Alignment Review

For Merger CP3 and CP4A, the packet also includes:

- Cost Estimates
- Impact summary
- Recommended least environmentally damaging practicable alternative (LEDPA)

- Avoidance and minimization measures summary for each concurrence point and for activities that have taken place since Merger CP3

Host Merger CP Pre-Meeting

Prior to a scheduled Merger meeting, the project team may host a call with the Merger MOU Signatory agencies to solicit questions and address agency concerns.

- Pre-meetings include, at a minimum, NCDOT, Federal Highway Administration (FHWA) (for federal projects), US Army Corps of Engineers (USACE), and the North Carolina Division of Water Resources (NCDWR).
- All pre-meetings are scheduled a minimum of three weeks in advance of the respective Merger meeting to allow adequate time to modify the Merger packet, if necessary.

Pre-meetings are required at Merger [CP1 and](#) CP3 and are encouraged at Merger CP2, CP2A, and CP4A for complex projects. The project team is prepared to address concerns expressed at the pre-meeting prior to or at the Merger meeting (i.e., in the Merger packet or in the meeting presentation).

Distribute Merger CP Meeting Materials and Conduct Meeting

The Merger Process requires that the completed packet and relevant logistical information (e.g., meeting invitation, videoconference link, and/or teleconference number) is circulated to Merger Team members at least two weeks prior to the scheduled meeting date. The Environmental Policy Unit oversees the material distribution requirements, in addition to supporting the NEPA/SEPA Lead with securing audio and visual equipment, a conference call number, and video meeting link, initiating each at the beginning of the meeting.

The NEPA/SEPA Lead and/or Project Manager ~~conduct~~[conducts](#) the concurrence point coordination, with the Environmental Policy Unit and Division Environmental staff supporting the Project Team throughout [the Merger process](#).

Review Merger Public Engagement Materials

Public engagement (e.g. public meeting, newsletter) requirements for a project in the Merger process are detailed in *NCDOT's Merger Guidance*. The Environmental Policy Unit and NCDOT Public Involvement staff review the draft public engagement materials in order to ensure compliance with the guidance and adhere to USACE permitting requirements.

Prepare the NEPA/SEPA Documentation

Due to the complexity and variability of NEPA/SEPA documentation, the guidance provided herein is simply an overview. In most cases NEPA/SEPA documentation is prepared by a consulting firm on behalf of NCDOT; in other cases, NCDOT staff prepares the environmental documentation in-house. While the documentation itself (Categorical Exclusion, Minimum Criteria Determination Checklist, Environmental Assessment/Finding of No Significant Impact, or Environmental Impact Statement/Record of Decision) is the culmination of the process, the analyses and documentation efforts are taking place throughout the project's development, beginning in the Project Initiation Stage of the PDN.

The final NEPA/SEPA documentation is often referred to as NCDOT's "decision document" because it presents the case for why a project is proceeding forward with action based on the identified needs,

purpose, and in light of the relevant environmental and design constraints analyzed. The entirety of the PDN's ~~Project Initiation and Alignment Defined~~ Stages 1 and 2 build up to completion of the project's NEPA/SEPA documentation.

The NEPA/SEPA Lead (~~typically in coordination with the~~ Division Environmental or Environmental Policy Unit staff within NCDOT) oversees preparation of NEPA/SEPA documentation, including:

- Coordination with project team members to gain a full understanding of the project's location and proposed actions.
- Evaluating the project's potential impacts with up to date environmental resource information in accordance with state and federal environmental rules, regulations, and policies.
- Ensuring transparency of NCDOT's decision-making and environmental impact analysis processes, including public involvement and stakeholder input.
- Preparing and coordinating approval of the environmental documentation in accordance with current NCDOT procedures; for example, many STIP projects are documented as Categorical Exclusions, so the current *FHWA-NCDOT CE Programmatic Agreement* governs the preparation of that documentation.

Upon NCDOT approval of the NEPA/SEPA documentation, the NEPA/SEPA Lead coordinates with the Division Environmental staff or Environmental Policy Unit to:

- Inform the project team and upload the final document and supporting memos, determinations, correspondence, and technical studies to the ATLAS Workbench.
- Ensure the environmental documentation's project commitments are included in the Green Sheet, communicated to the project team, and incorporated into the project's plan set. (*Note: Environmental commitments that impact the project's overall scope, schedule, or budget are to be coordinated with the Project Manager and the appropriate discipline leads prior to their inclusion in the project's PreConstruction Commitments Dashboard.*)

Review Environmental Document(ation)

The NEPA/SEPA Lead is responsible for coordinating with the Environmental Policy Unit to provide quality control reviews for NEPA (Environmental Assessments [EAs]/Findings of No Significant Impact [FONSIs], Environmental Impact Statements [EISs], and Records of Decision [RODs]) and SEPA documents. The Environmental Policy Unit and/or Division Environmental staff provide quality control reviews of NEPA Categorical Exclusion (CE) and SEPA Minimum Criteria Determination Checklist (MCDC) documentation. Once requested, the Environmental Policy Unit and/or Division Environmental staff:

- Reviews the environmental documents (draft and final versions) and provides comments back to the preparer,
- Obtains federal agency review (as needed), ~~and~~
- Ensures the NEPA/SEPA Lead uploads the final document(ation) to the ATLAS Workbench
- Ensures the final document(ation) is ~~uploaded to the ATLAS Workbench~~ readily available for others.

NCDOT staff review and approval is directly tied to state/federal requirements and quality assurance processes. For example, the *FHWA NCDOT CE Agreement* states that NCDOT must rely on "qualified NCDOT staff to make CE approvals or certifications submitted to FHWA under this agreement. The NCDOT

may not delegate its responsibility for CE approvals or certifications to third parties (i.e., consultants, local government staff, and other State agency staff).”

Review Section 4(f) Documentation (if needed)

The NEPA/SEPA Lead is to work with the Environmental Policy Unit, EAU Community Studies staff, and/or Division Environmental staff to review, coordinate, and complete Section 4(f) documentation, as needed.

- Section 4(f) documentation is often completed with the draft environmental document and is necessary for USDOT agency administered (such as FHWA) projects that may impact a Section 4(f) recreational resource (the Environmental Analysis Unit’s Cultural Resources staff generally coordinates Section 4(f) documentation for historic resource impacts – see 2EN2 for related information).
- The impact may involve *de minimis* or “programmatic use” coordination with FHWA and the local official with jurisdiction over the resource, or it may involve more complex Section 4(f) use evaluations.

This documentation is very project specific. A Section 4(f) use evaluation could become a driver for project decision-making and significantly affect project schedule. Potential 4(f) resources are to be identified during the Project Initiation Stage and be tracked throughout a project’s development. More information on this task is detailed on the Environmental Policy Unit [website](#) ~~website~~ and in 2EN2.

Provide Categorical Exclusion (CE) Compliance Review

Under the terms of the *FHWA-NCDOT CE Programmatic Agreement*, the Environmental Policy Unit works collaboratively with FHWA to conduct an annual Compliance Review and Report of CEs completed by the various Units and Divisions. The review typically includes at least one CE from each Unit or Division that developed a CE within the calendar year and a total of at least 10 percent of completed CEs; it may also include reviews of Section 4(f) documentation.

As part of the Report, the Environmental Policy Unit develops a list of CEs completed by Type, which is provided to FHWA. The Environmental Policy Unit develops and finalizes the Compliance Review Report, making it available to NCDOT staff and FHWA. NCDOT and FHWA ~~then meet to jointly~~ review areas of improvement and best practices noted in the CE review and report, determining if trainings or other steps are needed to ensure continued improvement in CE development.

~~3EP1 Complete Right-of-Way Consultation~~
3EP1 Revisit NEPA/SEPA Documentation

Overview

Conduct Consultation (a written summary to evaluate whether the prior NEPA/SEPA documentation remains valid) prior to executing right-of-way authorization if more than one year has passed since approval of the environmental document(ation) or if substantial project changes have occurred.

References

- [NCDOT Consultation and Re-Evaluation Guidance](#)
- [NCDOT NEPA/SEPA Consultation Form](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		NEPA/SEPA Lead	Project Manager and Roadway Design Lead
NCDOT NEPA/SEPA Consultation Form ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete Right-of-Way Consultation (as applicable) 	X	X

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Right-of-Way Consultation (as applicable)

At least three months prior to requesting right-of-way authorization (see 3RW2 for related information), the Project Manager and Roadway Design Lead coordinate with the NEPA/SEPA Lead (typically Division Environmental or Environmental Policy Unit staff within NCDOT) to determine if a Consultation is required. The Consultation is completed in accordance with the current version of the NCDOT *Consultation and Re-Evaluation Guidance* and documented on the *NCDOT NEPA/SEPA Consultation Form*. As an example, the Consultation process could require updated Threatened and Endangered species surveys, additional Section 4(f), ~~6(f)~~, LWCF, or 106 coordination, or revisions to other environmental resource reports. ~~The completed Consultation is distributed by the NEPA/SEPA Lead to the Project Manager and applicable project team members and uploaded to the ATLAS Workbench.~~

The completed Consultation is:

- Approved by NCDOT NEPA/SEPA staff (and FHWA if needed).
- Distributed by the NEPA/SEPA Lead to the Project Manager and applicable project team members.
- Uploaded to the ATLAS Workbench.

4EP1 Complete ~~Construction Consultation~~ NEPA/SEPA Documentation

Overview

Conduct Consultation (a written summary to evaluate whether the prior NEPA/SEPA documentation remains valid) prior to executing construction authorization if more than one year has passed since approval of the environmental document(ation) or if substantial project changes have occurred.

References

- [NCDOT Consultation and Re-Evaluation Guidance](#)
- [NCDOT NEPA/SEPA Consultation Form](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		NEPA/SEPA Lead	Project Manager and Roadway Design Lead
NCDOT NEPA/SEPA Consultation Form ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete Construction Consultation (as applicable) 	X	X

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Construction Consultation (as applicable)

At least three months prior to requesting construction authorization, the Project Manager and Roadway Design Lead coordinate with the NEPA/SEPA Lead (typically Division Environmental or Environmental Policy Unit staff within NCDOT) to determine if a Consultation is required. The Consultation is completed in accordance with the current version of the NCDOT *Consultation and Re-Evaluation Guidance* and documented on the *NCDOT NEPA/SEPA Consultation Form*. As an example, the Consultation process could require updated Threatened and Endangered species surveys, additional Section 4(f), ~~6(f)~~, LWCF, or 106 coordination, or revisions to other environmental resource reports. ~~The completed Consultation is distributed by the NEPA/SEPA lead to the Project Manager and applicable project team members and uploaded to the ATLAS Workbench.~~

The completed Consultation is:

- Approved by NCDOT NEPA/SEPA staff (and FHWA if needed).
- Distributed by the NEPA/SEPA lead to the Project Manager and applicable project team members.
- Uploaded to the ATLAS Workbench.

1FS1 Complete Express Design

Overview

As the ~~first~~ initial step ~~in take of projects from Project Sponsors (Metropolitan Planning Organizations (MPOs), Rural Planning Organizations (RPOs), the planning and Highway Division offices), design of a candidate project,~~ produce a consistent and reliable description of ~~projects~~ project alternatives that ~~includes a cost estimate, could be used to~~ 1) better define project scope and costs as part of prioritization and 2) more effectively relay information to a project manager to jump-start the environmental planning process. Components of an express design typically include:

- Project-specific goals (determined in coordination with locals)
- A summary of viable alternatives/alignments for a proposed project
- Cost estimates
- NEPA/SEPA-appropriate information that can inform a project's purpose and need statement, and high-level environmental screening.

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 Division-based Corridor Development Engineer, the Division Planning Engineer, or someone in a similar role as tasked by a state or local agency.*

References

- [Express Design Project Scoping Report Process](#)
- [Express Design Traffic Evaluation Procedures](#)
- [Candidate Project: Systems Planning to Programming Flow Chart](#)
- [Candidate Project Screening Tools](#)
- [Candidate Project Guidance](#)
- ~~[NCDOT Quality Management Program: Quality Control and Quality Assurance](#)~~ *(In development)*
- ~~[\(In development\)](#)~~
- ~~[\(In development\)](#)~~
-

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Pre-Prioritization Design, Concept, & Scope Sufficiency Form	<ul style="list-style-type: none"> ▪ <i>Complete Pre-Prioritization Design Concept & Scope Sufficiency Form</i> 	Project Sponsors (MPOs, RPOs, Highway Divisions)	<ul style="list-style-type: none"> ▪ Project Lead ▪ Division Planning Engineer ▪ Transportation Planning Division
Express Design Evaluation Package (Cost Estimate only or Full Express Design) ^{A, Q}	<ul style="list-style-type: none"> ▪ <i>Conduct Express Design Evaluation (Cost Estimate only or Full Express Design)</i> ▪ <i>Finalize Express Design Deliverables</i> 	Feasibility Studies/ Corridor Development Unit	<ul style="list-style-type: none"> ▪ Project Lead ▪ Division Corridor Development Engineer ▪ Division Planning Engineer

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
	<ul style="list-style-type: none"> Submit the Express Design Evaluation 		<ul style="list-style-type: none"> Project Sponsor (MPO, RPO, Highway Divisions) Transportation Planning Division Assigned Private Engineering Firm

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench ([refer to Appendix A in the Express Design Project Scoping Report Process Guidance](#)) and the [Conceptual Express Design Site](#).

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Pre-Prioritization Design Concept & Scope Sufficiency Form

Once projects have been identified as being of high priority for implementation through the Preliminary Prioritization Candidate Project List, they can be screened for adequacy of concept scope development and cost estimates through the submission of a Pre-Prioritization Design Concept & Scope Sufficiency Form. Projects not shown on the Preliminary Prioritization Candidate Project List can still be submitted on the sufficiency form. Once completed for a potential project improvement, the form is submitted to the Feasibility Studies/~~Corridor Development~~ Unit ([FSU](#)) for review.

Receive Pre-Prioritization Design Concept & Scope Sufficiency Form and Conduct Adequacy Evaluation

Once a Pre-Prioritization Design Concept & Scope Sufficiency Form is received by ~~the Feasibility Studies/Corridor Development Unit~~[FSU](#), the form and potential project is ~~be~~ reviewed, and next steps are recommended. There are three potential recommendations:

- No further analysis,
- Recommend a cost estimate update, or
- Recommend conducting an Express Design.

~~The Feasibility Studies/Corridor Development Unit~~[FSU](#) develops the parameters for adequacy of the evaluation.

Receive Project Express Design Evaluation Request

If the Project Sponsor decides that an Express Design is needed to fully evaluate a potential project, they send a Project Evaluation Request to ~~the Feasibility Studies/Corridor Development Unit~~[FSU](#) to request an Express Design Evaluation.

Note: ~~It is anticipated that all projects~~[All project concepts to be prioritized and/or programmed should have an Express Design Evaluation. As this process is being implemented, completed.](#) However, it is up to the ~~Feasibility Studies/Corridor Development Unit~~[discretion of FSU and the Divisions to determine what project concepts are viable and should be evaluated.](#) Additionally, [FSU](#) focuses on ensuring that all candidate projects needing an Express Design Evaluation are developed and supplied to the [Division-based](#) Corridor Development Engineer to allow for the project to be reviewed using SPOT Online and reviewed to determine if the project is ready for prioritization submittal (see 1SP1 for related information).

If a project is submitted to the Strategic Prioritization Office (SPOT) and an Express Design Evaluation or similar study has not been initiated, then SPOT submits a Project Evaluation Request to ~~the Feasibility Studies/Corridor Development Unit~~ FSU for inclusion into the Express Design Evaluation program.

Conduct Express Design Evaluation (Cost Estimate only or Full Express Design)

~~The Feasibility Studies/Corridor Development Unit~~ FSU performs Express Design Evaluations or Cost Estimate Evaluations on candidate projects as capacity permits.

~~To conduct a full Express Design Evaluation, the Feasibility Studies/Corridor Development Unit is to:~~

- ~~▪ Obtain the Long Range Transportation Plan (LRTP) (Metropolitan Transportation Plan [MTP] or Comprehensive Transportation Plan [CTP])~~

~~Most full express designs are assigned to one of FSU's on-call consulting firms, with direction and oversight from FSU, and the design is to be prepared in accordance with the *Express Design Project Scoping Report Process* guidance. FSU manages the following tasks:~~

- ~~▪ Coordinate with the Metropolitan and/or Rural Planning Organizations (MPOs/RPOs)/assignment of the express design with Division Engineer/Project Lead and possibly the impacted municipality or county~~
- ~~▪ Coordinate staff to understand the development of Express Design Traffic Volumes (EDTVs) with the Transportation Planning Division (see 1TP1 for related information)~~
 - ~~▪ Conduct context of the project and the appropriate level of capacity analysis (see 1TM1 for related information). This is referred to as the Express Design Traffic Analysis (EDTA). firms to be considered.~~
 - ~~♦ Coordinate Determine what firm to assign for the express design.~~
- ~~▪ Consult with Traffic Management Unit (the NCDOT Congestion Management), as appropriate~~
 - ~~♦ Compile the completed Section to determine if an Express Design Traffic Evaluation (EDTE). EDTE = EDTV + EDTA) is needed.~~
- ~~▪ Coordinate with the Traffic Safety Planning Engineer to complete a Traffic Safety Screening Tool (see 1TS1 for related information)~~
- ~~▪ Review Complete Streets Evaluation Methodology, in coordination with the LRTP and local transportation plans, to determine preferred pedestrian and bicycle improvements.~~
- ~~▪ Conduct high level environmental screening using ATLAS~~
- ~~▪ Conduct highway stormwater screening~~
- ~~▪ Prepare conceptual designs based on the Express Design~~
- ~~▪ Prepare ITS cost estimates~~
 - ~~♦ Coordinates the conceptual construction cost. If an EDTE is needed, then the NCDOT Congestion Management Project Engineer determines the EDTE level of analysis. The NCDOT Project Lead and Congestion Management Project Engineer agree on a firm to complete the work based on the prequalification status of the available firms. FSU coordinates the development of the EDTE as outlined in 1TP1 and 1TM1.~~
 - ~~♦ **Note:** Projects with substantial new location facilities require a project-level traffic forecast or traffic estimate. In those situations, consult with both the Congestion Management Section and the Transportation Planning Division (see 1TP1 and 1TP2 for related information).~~

- Provide general information of the project, including a project description, preliminary stakeholder plan, and priority of assignment.
- Identify stakeholders (refer to the *Express Design Project Scoping Report Process*) and ensure that the firm has fully coordinated with all appropriate parties (e.g., Metropolitan and/or Rural Planning Organizations (MPOs/RPOs), NCDOT staff, etc.).
- Set up and facilitate a kickoff meeting to determine the scope of the express design.
- Provide readily available data to the project team, including crash data, adjacent project CADD files, and structures reports.
- Review and provide oversight on all express design deliverables as outlined in the *Express Design Project Scoping Report Process*.
- ~~Coordinate the conceptual cost estimates~~ with the Contract Standards and Development Unit ~~(see 1CS1 for related information)~~
- ~~Coordinate the preliminary estimate of utility relocation cost with the~~ Utilities Coordinator ~~(see 1UT1 for related information)~~
 - Coordinate, and the conceptual appropriate Right-of-Way (ROW) cost estimate with the Central ROW Office (see contact (refer to 1CS1, 1UT1, and 1RW1, respectively, for related information)
 - Coordinate with the Traffic Safety Planning Engineer, as needed (see 1TS1 for related information)

Finalize Express Design Deliverables

Following the *Express Design Project Scoping Report Process*, ~~the Feasibility Studies/Corridor Development Unit~~FSU compiles a package of information developed during the Express Design Evaluation, including conceptual design, cost estimates, and ~~Express Design Summary~~the project initiation form.

~~The Feasibility Studies/Corridor Development Unit~~FSU coordinates with the local MPOs/RPOs to ensure that the Final Express Design Evaluation Package is compatible with the local vision for the project. ~~The Feasibility Studies/Corridor Development Unit~~FSU revises the Express Design, if needed.

The Final Express Design Evaluation Package is uploaded to the ATLAS Workbench, which copies the document package to the Conceptual Express Design Site~~Scoping Help SharePoint site~~. (refer to Appendix A in the *Express Design Project Scoping Report Process Guidance*).

Submit the Express Design Evaluation

~~The Feasibility Studies/Corridor Development Unit~~FSU submits the Final Express Design Evaluation Package to SPOT, including the anticipated costs of the improvements. In addition, ~~the Feasibility Studies/Corridor Development Unit~~FSU notifies key NCDOT and MPO/RPO partners of the package being complete.

Complete QC/QA Procedures

The ~~Feasibility Studies Unit/Corridor Development Unit~~FSU Lead is to coordinate the applicable QC review following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC/QA Checklist before upload and distribution of all related deliverables.

1FS2 Complete Project Scoping Report

Overview

~~Begin when a project is programmed in the State Transportation Improvement Program (STIP) to validate and enhance project information developed in the earlier Express Design Evaluation. To do this the Feasibility Studies/Corridor Development Unit develops a Project Scoping Report that has more alternatives/alignments, details, and may engage key stakeholders in discussions of those options. Produce a Project Scoping Report (PSR) that includes a consistent and reliable description of project alternatives that can be used to:~~

- ~~▪ Better define project scope and costs~~
- ~~▪ Effectively jump-starts the environmental planning process through coordination with the Project Manager~~

~~When or if the project is programmed in the STIP, it will be at the discretion of the Project Lead to determine the best time to initiate the PSR. The PSR is an update to the express design and provides a more in-depth evaluation to inform how the project should proceed.~~

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 Division-based Corridor Development Engineer, the Division Planning Engineer, or someone in a similar role as tasked by a state or local agency.*

References

- [Express Design Project Scoping Report Process](#)
- [Express Design Traffic Evaluation Procedures](#)
- [Construction Contract Decision Matrix \(and training module\)](#)
- [Candidate Project Screening Tools](#)
- [Candidate Project Guidance \(and Flow Chart\)](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Candidate Project: Systems Planning to Programming Flow Chart \(In development\)](#)
- [Candidate Project Screening Tools \(In development\)](#)
- [Candidate Project Guidance \(In development\)](#)
-

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Project Scoping Report Level-of-Detail Screening Form ^A	<ul style="list-style-type: none"> ▪ Review/Update Information from the Express Design Evaluation ▪ Complete Project Scoping Level-of-Detail Evaluation 	Feasibility Studies/ Corridor Development Unit	<ul style="list-style-type: none"> ▪ Transportation Planning Division ▪ Division Corridor Development Engineer ▪ Division Planning Engineer ▪ Project Sponsor (MPO, RPO, Highway Divisions) ▪ Project Lead

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
			<ul style="list-style-type: none"> Environmental Policy Unit Assigned Private Engineering Firm
Project Scoping Report Package ^{A, Q}	<ul style="list-style-type: none"> Develop and Complete Project Scoping Report 	Feasibility Studies/ Corridor Development Unit	Assigned Private Engineering Firm
Final Project Initiation Packet ^{A, Q}	<ul style="list-style-type: none"> Compile Final Project Initiation Packet 	Division Corridor Development Engineer	<ul style="list-style-type: none"> Division Planning Engineer Feasibility Studies/Corridor Development Unit Project Lead Project Sponsor (MPO, RPO, Highway Divisions) Transportation Planning Division

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench ([refer to Appendix A in the Express Design Project Scoping Report Process Guidance](#)) and the [Conceptual Express Design Site](#).

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Review/Update Information from the Express Design Evaluation

If, during prioritization (see 1SP1 for related information), a project is selected for programming in the STIP (see 1S11 for related information), a review and update (if necessary) of the project data developed during the Express Design Evaluation is required. The *Express Design Project Scoping Report Process* is used to update the Express Design Evaluation information, as appropriate, and provides more in-depth information in the [Project Scoping Report/PSR](#) to inform the Project Manager how the project is to proceed in ~~the Aligned Defined Stage- 1.~~

Components of a PSR include:

- [Project-specific goals \(determined in coordination with locals\)](#)
- [A summary of viable alternatives/alignments for a proposed project](#)
- [Cost estimates](#)
- [NEPA/SEPA-appropriate information that can inform a project’s purpose and need and high-level environmental screening](#)

Output from a PSR is a deliverable package that can include a combination of the:

- [Preliminary Environmental Considerations \(PEC\) Checklist](#)
- [Project Initiation Form](#)
- [A Project Scoping Technical Report \(depends on the complexity of the project\)](#)
- [Public involvement/Resource Agency Documentation](#)

Complete Project Scoping Level-of-Detail Evaluation

Before development of the [Project Scoping Report \(PSR\)](#) can begin, a decision must be made to determine which tier of PSR is completed. The three tiers of PSRs are:

- Streamlined PSR:** For small, straightforward projects, to include only a Screening Checklist and Project Initiation Form

- **Regular PSR:** Includes a Screening Checklist and Project Initiation Form, plus a more detailed Technical Report
- **PlusEnhanced PSR:** Includes a Screening Checklist, Project Initiation Form, and Technical Report of the Regular PSR, plus Public Involvement Documentation and Resource Agency Documentation needed to define Merger Screening and document achieving Merger Concurrence Point 1

For each project that has received a sufficiently high Project Prioritization score to be considered for inclusion in the STIP, the Feasibility Studies/~~Corridor Development~~ Unit (FSU) completes the ~~Project Scoping Report~~PSR Level-of-Detail Screening Form. The form recommends the PSR level-of-effort commensurate with previous analysis for the project. The form, together with the supporting documentation, is reviewed by the Environmental Policy Unit and Project Lead. Should there be disagreement with the recommendation, they meet with ~~the Feasibility Studies/Corridor Development Unit~~FSU to resolve the discrepancy.

Develop and Complete Project Scoping Report

Following review and update (if necessary) of the Express Design Evaluation and Project Scoping Level-of-Detail Evaluation, ~~FSU manages the Feasibility Studies/Corridor Development Unit develops~~development of the ~~Project Scoping Report~~PSR Package as detailed in the *Express Design Project Scoping Report Process*, which includes:

~~To develop the package, the Feasibility Studies/Corridor Development Unit is to:~~

- ~~Prepare the Project Scoping Screening Checklist~~
 - ~~Coordinate assignment of the PSR with Division staff to understand the context of the project and the firms to be considered.~~
 - ♦ ~~Determine what firm to assign for the PSR~~
 - ♦ ~~Consult with the NCDOT Congestion Management Section to determine if the existing Express Design Traffic Safety Planning Evaluation (EDTE) is current and relevant.~~
 - ♦ ~~If a new EDTE is needed, then the NCDOT Congestion Management Project Engineer determines the EDTE level of analysis. The NCDOT Project Lead and Congestion Management Project Engineer agree on a firm to complete a Project Scoping Report Traffic Safety Screening Tool (see 1TS1 for related information)the work based on the prequalification status of the available firms. FSU coordinates the development of the EDTE as outlined in 1TP1 and 1TM1.~~
 - ♦ ~~ReceiveNote: Projects with substantial new location facilities require a project-level traffic forecast from or traffic estimate. In those situations, consult with both the Congestion Management Section and the Transportation Planning Division (see to 1TP1 and 1TP2 for related information).~~
 - ~~Develop survey limitsReview and request mapapprove the consultant's Project Scoping Screening Checklist~~
 - ~~Review and provide oversight on all PSR deliverables as outlined in the Express Design Project Scoping Report Process (dependent upon PSR level of detail).~~
 - ~~Coordinate with NCDOT Environmental Policy Unit (EPU) on Merger if the Merger Pre-Screening determines the project should have a formal Merger Screening and potentially enter the Merger Process (see 1LS11EP1 for related information).~~

- Coordinate development of SUE level D with the Location & Survey Division Team Lead (see 1LS1 for related information)
- Coordinate the best available geospatial data from the Photogrammetry Unit (see 1PH1 and 1PH2 for related information).
- Coordinate with the Roadway Design Unit as appropriate (see 1RD1 for related information).
- Coordinate with NCDOT Public Involvement, Community Studies, and Visualizations (PICSviz) to receive recommendations on potential impacts to community resources or demographics and determine if a Public Involvement Plan (PIP) is needed for the project.
- Develop the Project Scoping Technical Report
- Complete the Construction Contract Decision Matrix
- ~~Complete the NEPA/Section 404 Merger Pre-Screening Form (and Merger Screening meeting and Concurrence Point 1, if appropriate) (see 1EP1 for related information)~~
- ~~Update the Project Initiation Form (Express Design Summary)~~
 - Coordinate with the Geotechnical Unit (GeoEnvironmental) to complete the GeoEnvironmental screening process and the Geotechnical Report for Planning (see 1GT1 for related information)
- ~~Coordinate with the Geotechnical Unit to complete the Geotechnical Report for Planning (see 1GT1 for related information)~~
- ~~Coordinate with the Environmental Analysis Unit (EAU) and Environmental Policy Unit (EPU) (see 1EN1 and 1EP1 for related information)~~
- ~~Develop and initial Public Involvement Plan (PIP) in coordination with the Public Involvement Lead (see 1PI1 for related information)~~
 - Initiate railroad coordination, if required for the project (see 1RR1 for related information)
- ~~Prepare Coordination Log~~
 - Coordinate with the Communications Group when the Project Scoping Report PSR is complete to request comments (see 1CG1 for related information)

~~The Feasibility Studies/Corridor Development Unit~~FSU uploads the Project Scoping Report PSR Package to ATLAS Workbench, which copies the package to the Conceptual Express Design Site Scoping Help SharePoint site. (refer to Appendix A in the *Express Design Project Scoping Report Process Guidance*).

Compile Final Project Initiation Packet

Throughout the Candidate Project process, a record of documents that have defined the project are compiled and maintained for ultimate delivery to the project development team. This includes an opportunity for public review and comment on all project planning materials included in the Final Project Initiation Packet. The Division Corridor Development Engineer compiles the packet and provides it to the Project Lead to move forward in the PDN process.

Complete QC/QA Procedures

~~The Feasibility Studies Unit/Corridor Development Unit~~The FSU Lead is to coordinate the applicable QC review following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QCQA Checklist before upload and distribution of all related deliverables.

1GT1 ~~Complete~~ Geotechnical and Geopavement & GeoEnvironmental Screening Planning

Overview

~~Identify~~The following ~~geo-planning~~ activities are requested from ~~and complete~~ an accurate depiction of historical and existing facilities within the project limits and identify geotechnical issues that complicate or lead to unusual construction. ~~Recommend this stage be performed with~~ by internal NCDOT staff of the Geotechnical Engineering Unit ~~personnel for~~ Geotechnical Engineering Unit input during the Project Initiation Stage is separated into subtasks related to the three focus areas of the Unit:



Task details and deliverables are found in the corresponding sections below. These tasks are initiated by the Project Manager submitting a [Work Request Form](#) ~~historical perspective.~~

Overview: Geotechnical

Identify potential geotechnical risks to the project. Detailed exploration of the project site and in-depth analysis are not performed during this task. General risks posed by soil, rock, and ~~to identify need of additional investigation~~ groundwater in the project geologic setting and ~~reports~~ negative construction impacts to the surrounding area are primary considerations.

References

- [Geotechnical Investigation and Recommendations Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader	Additional Support	
		GeoEnvironmental Project Engineer	Project Geological Engineer	Design Geotechnical Engineer
Geotechnical Input on Express Design	▪ Provide Geotechnical Input on Express Design	*	*	*
Geotechnical Report for Planning Report	▪ Develop Geotechnical Report for Planning Report	NCDOT Project Geological Engineer	*NCDOT Geotechnical Design Engineer	
GeoEnvironmental Scoping Comments Report [^]	▪ Develop GeoEnvironmental Screening Report	*		

[^]Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

~~Provide Geotechnical Input on Express Design~~

~~Led by the GeoEnvironmental Project Engineer and/or Project Geological Engineer, the geotechnical team identifies what major Geotechnical/GeoEnvironmental issues in study area are to be avoided. The request may originate from the Transportation Planning Division for large projects, known existing conditions, or projects involving unique features, such as large and/or complex structures.~~

~~Develop Geotechnical Planning Report for Planning~~

~~In accordance with Utilizing the *Geotechnical Investigation and Recommendations Manual*, the Project Geological Engineer with the support of the Geotechnical Design Engineer reviews the conceptual design, available project information, geologic maps, soil surveys, and any available nearby geotechnical team:~~

- ~~• May provide pre-scoping comments followed by a formal screening report.~~
- ~~• Conduct a site visit with possible early borings when a large and/or complex bridge, three-sided culvert, or other unusual structure is a possibility or complete hand probes of areas of soft/organic soil in the study area that can be avoided by an alternative/alternate.~~
- ~~• Document findings and potential construction issues in the report.~~

~~Develop GeoEnvironmental Screening Report~~

~~To complete the screening report, explorations to inform the GeoEnvironmental Project Engineer is to:~~

- ~~• Conduct a desktop review of GIS database files Manager and ATLAS links design team of the project study area anticipated subsurface conditions and implications for GeoEnvironmental sites of concern.~~

~~Prepare a report that includes a map and shapefile of the noted sites of concern project as proposed. Preliminary geotechnical project design recommendations such as preferred slope configurations will be included.~~

~~Complete QC/QA Procedures~~

~~The Project Geological Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before distribution of the Geotechnical Planning Report through the project Connect site.~~

[\(Back to activity overview\)](#)

Overview: Geopavement

This task is primarily recommended for arterial and larger facilities or more complex projects to determine the investigation approach and potential benefit of subgrade stabilization or pavement reclamation. Geopavement tasks provide the:

- Roadway Design Engineers with recommendations for subgrade preparation to include in models and plan set
- Pavement Design Engineers with the project pavement support and existing pavement data to evaluate pavement alternatives.

References

- [Geotechnical Investigation and Recommendations Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance The GeoEnvironmental Project](#)

Deliverables

<u>Deliverable</u>	<u>Task</u>	<u>Responsible Party</u>	
		<u>Activity Leader</u>	<u>Additional Support</u>
Geopavement Planning Report	▪ Develop Geopavement Planning Report	NCDOT Geopavement Engineer	NCDOT Pavement Design Engineer

Develop Geopavement Planning Report

The Geopavement Engineer evaluates the proposed project relative to the existing pavements and geologic setting. The Geopavement Engineer then confers with the Pavement Design Engineer to gather any available records for the existing pavements and determines the investigation needs for the project as well as the benefit of subgrade stabilization or pavement reclamation. The Geopavement Engineer prepares a summary report of their findings and recommendations for subsequent Geopavement tasks to the project team.

Complete QC/QA Procedures

The Geopavement Engineer is to coordinate the applicable QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before ~~upload~~ distributing the Geopavement Planning Report through the project Connect site.

[\(Back to activity overview\)](#)

Overview: GeoEnvironmental

Identify and complete an accurate depiction of historical and existing potential hazardous waste sites within the project limits.

References

- [□ Geotechnical Investigation and Recommendations Manual](#)
- [□ GeoEnvironmental Product Matrix](#)
- [□ NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
GeoEnvironmental Scoping Comments Report [^]	▪ <u>Develop GeoEnvironmental Scoping Comments Report</u>	NCDOT GeoEnvironmental Project Engineer

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

Develop GeoEnvironmental Scoping Comments Report

The GeoEnvironmental Project Engineer conducts a desktop review of GIS database files of the project study area for GeoEnvironmental Sites of Concern. The GeoEnvironmental Project Engineer summarizes the review in a report that includes a map and shapefile of the noted GeoEnvironmental Sites of Concern, if discovered.

Complete QC/QA Procedures

The GeoEnvironmental Project Engineer is to coordinate the applicable QC review following the [NCDOT Quality Management Program: Quality Control and Quality Assurance](#) procedures and the respective QC Checklist before distribution of any deliverables.

[Back to PDN Overview](#)

Project
Initiation

Environ and
ROW Plans

Final Plans

PS&E/Letting

Post-Letting/
Construction

[the GeoEnvironmental Scoping Comments Report through the project Connect site.](#)

2GT1 ~~Prepare~~ GeoEnvironmental Phase I ~~Report~~

Overview

~~Develop the~~Confirm GeoEnvironmental ~~Phase I Report. Recommend~~Sites of Concern within the project corridor, compile data for the DGN, and evaluate risk. This stage should be performed with Geotechnical Engineering Unit personnel for ~~the~~ historical perspective and to identify the need of additional investigation and reports.

References

- [Geotechnical Investigation and Recommendations Manual](#)
- [NCDOT GeoEnvironmental Phase I Scope of Work](#)
- [NCDOT GeoEnvironmental Phase I Template](#)
- [NCDOT GeoEnvironmental Product Matrix](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
		GeoEnvironmental Project Engineer
GeoEnvironmental Phase I Report [^]	<ul style="list-style-type: none"> ▪ Complete<u>Develop</u> GeoEnvironmental Phase I Report and Related Materials 	X (Internal NCDOT Staff) <u>GeoEnvironmental Project Engineer</u>
GeoEnvironmental Phase I <u>Spreadsheet</u> DGN		
GeoEnvironmental GIS Shape File [^]		

[^]Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

~~Complete~~Develop GeoEnvironmental Phase I Report and Related Materials

This task is to develop Phase I products in accordance with the guidelines and references linked above.

~~For the GeoEnvironmental Phase I Report,~~ The Project Manager submits a Work Request Form ~~coordinates~~ with the GeoEnvironmental Project Engineer to the GeoEnvironmental Project Engineer (internal NCDOT Staff) to identify sites of concern within the preferred alternative/alignment study limits via field reconnaissance and review ~~of~~ available aerial imagery, maps, regulatory databases/files. This information is included in the HazMat section of the environmental document or checklist. The GeoEnvironmental Project Engineer develops the GeoEnvironmental DGN file that indicates GeoEnvironmental Sites of Concern to be referenced and shown in the roadway plan set by the Roadway Design Lead.

~~To complete the GeoEnvironmental Phase I Spreadsheet, the GeoEnvironmental Project Engineer populates the spreadsheet template with details from identified sites of concern for upload into Geotech database.~~

~~The GeoEnvironmental Project Engineer develops the GeoEnvironmental GIS shape file, using the GIS template to populate details from identified sites of concern and uploads into the ATLAS workbench.~~

Complete QC/QA Procedures

The GeoEnvironmental Project Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before ~~upload and/or~~ distribution of any deliverables [through the project Connect site](#).

2GT2 ~~Initiate~~ Roadway Geotechnical & Geopavement Investigations ~~and Provide Preliminary ROW Recommendations~~

Overview

~~Conduct subsurface investigation and provide design and construction recommendations as part of the development of the Design Recommendation Plan Set. If the investigation and recommendations are not complete in stage 2, preliminary Right of Way Recommendations will be provided to inform the project footprint and Field Inspection Plans established in Stage 2.~~

~~**Note:** This activity involves~~ The Roadway Geotechnical and Geopavement investigations are generally corridor-wide and typically require the same or similar equipment, investigation methods, and soil laboratory testing. The investigations assist in developing recommendations for different recipients and purposes.

~~These investigations require~~ field work with equipment, ~~which that~~ could be affected by weather, difficulty of access, property owners, moratoriums, and traffic control ~~and/or~~ conflicts with existing traffic control, etc construction activities. The effort and duration required for these investigations vary based on project size, complexity, and location. For bridge replacement projects, these tasks may be performed concurrently with the Geotechnical Structure Investigations (2GT3) tasks. For larger and more complex projects these investigations may be initiated as the Design Recommendation Plan Set is nearing approval.

~~Task details and deliverables are found in the corresponding sections below. These tasks are initiated by the Project Manager submitting a~~ [Work Request Form](#).



Overview: Roadway Geotechnical Investigation

~~Conduct a subsurface investigation and provide design and construction recommendations to support the overall roadway design. The roadway geotechnical investigation provides a recommendations report addressing cut slope and embankment stability, subgrade stability, depth to groundwater, subsurface drainage, special ditches, borrow, and wells and bodies of water in or near the corridor.~~

References

- [Geotechnical Investigation and Recommendations Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Preliminary Roadway Recommendations Memo			

Roadway Subsurface Investigation Inventory	<ul style="list-style-type: none"> ▪ Design <u>Complete Roadway Geotechnical Engineer Investigation, Reporting, and Recommendations</u> 	Project Geological Engineer <u>or Geologist</u>	Regional <u>Geotechnical Manager Design Engineer</u>
Roadway Recommendations Report			
Right-of-Way Recommendation Memo ^a Geotechnical Summary Tables (3G Sheet)	<ul style="list-style-type: none"> ▪ 		
Roadway Special Details (2G Sheets)	<ul style="list-style-type: none"> ▪ 	<u>Geotechnical Design Engineer</u>	<u>Project Geological Engineer or Geologist</u>
Special Provisions	<ul style="list-style-type: none"> ▪ 		

^aIndicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

~~Provide Preliminary~~ Complete Roadway Geotechnical Investigation, Reporting, and Recommendations

~~This task is to conduct subsurface investigation to form~~ Although coordination of the subsurface investigation ~~Inventory Plan Set based on~~ may proceed, the approved Design Recommendation Plan Set (see ~~2RD1~~ 2RD2 for related information). ~~In~~ and model are required to develop the Roadway Recommendations Report. The Project Geological Engineer uses the available design model to coordinate the subsurface investigation in accordance with the *Geotechnical Investigation and Recommendation Manual*, ~~the Geotechnical Engineering Unit completes a Roadway Subsurface Investigation Inventory Report (with graphics)~~. The inventory requires the following preliminary roadway information:

- ~~Plan view, profile, and cross sections developed under 2RD1~~
- ~~Proposed roadway retaining wall locations, if known, developed under 2RD1~~
- ~~Proposed sound barrier/noise wall locations, if known, developed under 3EN1 and 3RD1~~

~~The inventory is initiated when the Roadway Design Lead sends a request for recommendations, with a date information is needed by and location of electronic plans, to the appropriate geotechnical division:~~

- ~~_____~~
- ~~_____, or~~
- ~~_____.~~

~~From there, the geotechnical team:~~

- ~~Assigns the work to an in-house field office or Private Engineering Firm.~~
- ~~Holds a kickoff meeting and develops an investigation plan.~~
- ~~Notifies 811 to locate utilities, where needed, and completes a field investigation.~~
- ~~Assigns samples for lab testing and compiles results.~~
- ~~Enters field log data into gINT and post bore logs.~~
- ~~Develops stratigraphy and complete graphics.~~

~~The geotechnical team~~ The Project Geological Engineer summarizes results of the subsurface investigation in the ~~inventory report,~~ Roadway Subsurface Investigation Inventory listing soils, rock type, and groundwater levels present in the project area and geotechnical areas of special interest.

~~For The Roadway Recommendation Report (possibly with graphics), the Design Geotechnical Engineer or Project Geological Engineer completes Section I of recommendations, with the Project Geological~~

~~Engineer completing Section II thru IV of recommendations. Subsurface Investigation Inventory is included in the Let package for Contractor information.~~

~~¶The Project Geological Engineer, with the Roadway Recommendation Report is not available prior to developmentsupport of the Field Inspection Plan Set, the Geotechnical Engineering Unit providesDesign Engineer, may provide a Right-of-Way Preliminary Roadway Recommendations Memo to the Project Manager (for information) and, the Roadway Design Lead, and the Hydraulic Design Engineer. This memo addresses any preliminary geotechnical recommendations that may affect right-of-way requirements and appropriate technical discipline/Unit Leads (for action)-would be prepared prior to the full recommendations package to document geotechnical recommendations necessary to advance the project design. Items to be addressed are slope configuration, retaining wall type if known (anchors or soil nails may require additional right-of-way), and special ditches in coastal plain to lower groundwater, or subsurface drains in Coastal Plain to lower groundwater. These preliminary recommendations will be based on the limited information available from site reconnaissance and subsurface investigations completed to date. Therefore, the recommendations are subject to change based on additional information obtained after the date of issuance and are superseded by the Roadway Recommendations Report~~

~~Additional Roadway Recommendation report content includes development of:~~

- ~~▪ Recommendation graphics,~~
- ~~▪ Geotechnical quantity summary (attached to report), and~~
- ~~▪ Geotechnical summary of quantities spreadsheet.~~

~~For Special Provisions, the Geotechnical Engineering Unit considers:~~

~~The Project Geological Engineer, with the support of the Geotechnical Design Engineer, uses the Roadway Subsurface Investigation Inventory to develop final recommendations for grading and construction of the roadway corridor. The Roadway Recommendations Report includes a summary of estimated contract pay item quantities, adjustments for earthwork calculations, and other miscellaneous items. Geotechnical Summary Tables, Roadway Plan Sheet 3G-1, are prepared by the Project Geological Engineer and distributed with the recommendations.~~

~~The Geotechnical Design Engineer, with the support of the Project Geological Engineer, prepares any special roadway details (roadway plan set 2G sheets). Special details may be required to show miscellaneous geotechnical items and quantities, such as staged construction, ground improvement, surcharges, embankment or slope reinforcement, and specialized geotechnical instrumentation. Any Project Special Provisions needed for construction of the details are prepared and distributed with the Roadway Recommendations Report. Some typical geotechnical Special Provisions include:~~

- ~~▪ Special handling of material~~
- ~~▪ Ground Improvement~~
- ~~▪ Geotextile for Pavement StabilizationReinforcedSubgrade Stabilization~~
- ~~▪ Reinforced Soil Slopes (RSS)~~
- ~~▪ Cellular Confinement Systems~~

- Rock Embankments
- Blasting or vibration requirements ~~in addition to what is in the NCDOT Spec Book Transmit Inventory and Recommendation Report~~

Complete QC/QA Procedures

The ~~Geo~~Environmental Project ~~Geological~~ Engineer ~~is and~~ ~~Geotechnical Design Engineer are~~ to coordinate the applicable QC review ~~for the inventory and recommendations report following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload to the project SharePoint site and/or distribution of any deliverables.~~

2GT3 Complete Pavement and Subgrade Investigation Report and Recommendations

Overview

~~Conduct investigation of existing pavement and subgrade and provide recommendations for proposed pavement designs. Refer to the NCDOT Geotechnical Investigation and Recommendation Manual linked below.~~

~~**Note:** This activity involves field work with equipment, which could be affected by weather, difficulty of access, property owners, moratoriums, traffic control and conflicts with existing traffic control, etc.~~

References

- ~~☐~~
- ~~☐~~

Deliverables

Deliverables	Task	Responsible Party	
		Activity Leader	Additional Support
		Geopavement Engineer	Geopavement Supervisor
Supporting Investigation Documents (e.g., boring layout, investigation plan, etc.) [ⓐ]	▪ Complete Pavement and Subgrade Investigation		
Pavement and Subgrade Inventory Report [ⓐ]	▪ Prepare Pavement and Subgrade Inventory and Recommendations Report	X	X
Pavement and Subgrade Recommendations Report [ⓐ]			

[ⓐ]Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Pavement and Subgrade Investigation

~~This task involves conducting investigation of existing pavement and subgrade to provide recommendations for proposed pavement designs (see 2PD1 for related information) and to inform the contractors on areas with critical geotechnical issues that could be encountered during construction. In accordance with the Geotechnical Investigation and Recommendation Manual, the Geotechnical~~

~~Engineering Unit receives a request from Pavement Design Engineer or Project Manager to begin work. The investigation requires the following roadway information: plan view, profile, and cross section.~~

~~Upon receipt, the geotechnical team:~~

- ~~▪—Reviews existing data and the proposed design.~~
- ~~▪—Completes field reconnaissance and boring layout.~~
- ~~▪—Develops an investigation plan and conducts a scoping meeting with the Private Engineering Firm.~~
- ~~▪—Coordinates traffic control.~~
- ~~▪—Notifies 811 to locate utilities, where needed, and completes a field investigation.~~
- ~~▪—Assigns samples for lab testing, perform lab test, and compiles results.~~
- ~~▪—Develop graphics with pavement core photos.~~

~~Prepare Pavement and Subgrade Inventory and Recommendation Reports~~

~~The geotechnical team (NCDOT Geotechnical staff and the Private Engineering Firm) prepares two separate reports using information obtained during the pavement and subgrade investigation: the Pavement and Subgrade Inventory and the Recommendation Reports. The reports are prepared in accordance with the *Geotechnical Investigation and Recommendation Manual*.~~

~~The Pavement and Subgrade Inventory lists the areas investigated, presents and interprets all of the data collected, and is available in the Let package for contractor reference. The Pavement and Subgrade Inventory is also used to generate the Pavement and Subgrade Recommendations Report.~~

~~The Recommendations Report lists specific design and construction recommendations required to build the project and to develop the contract documents.~~

~~Complete QC/QA Procedures~~

~~The Geopavement Engineer is to coordinate the applicable QC review for reports following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload to the project SharePoint site and/or distribution of any deliverables. Provide deliverables to the Pavement Design Engineer (for action) and Project Manager (for information), distributing any deliverables they prepare through the project Connect site.~~

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Overview: Geopavement Investigations for Roadway Subsurface Inventory and Recommendations

Overview

Conduct subsurface investigation of existing pavements and subgrades to provide design and construction recommendations based on the Pavement Design Recommendation Plan Set. If the investigation and recommendations are not complete in Stage 2 (the intent), the recommendations will be delivered early in Stage 3 to mitigate any redesign that may be needed based on the recommendations.

Note: This activity involves Engineer field work with equipment, which could be affected by weather, difficulty of access, property owners, moratoriums, traffic control and conflicts with existing traffic control, etc. data and subgrade characteristics necessary to generate and evaluate pavement design alternatives.

References

- [Geotechnical Investigation and Recommendations Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable/Deliverables	Task	Responsible Party		
		Activity Leader	Additional Support	
Pavement and Subgrade Investigation Report	<ul style="list-style-type: none"> ▪ Complete pavement and subgrade investigation and recommendations 	-Design Geotechnical Geopavement Engineer	Project Geological/Pave ment Design Engineer	
Provide Roadway Inventory and Recommendations for Pavement and Subgrade				
Roadway Recommendation Report possibly with graphics ^a Geotechnical Summary Tables (3G-1) Sheet				
Special Provisions ^a			x	x

^aIndicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Provide Roadway Inventory Complete Pavement and Subgrade Investigation and Recommendations

This task is to conduct subsurface The Geopavement Engineer coordinates an investigation to form the Subsurface Investigation Inventory Plan Set based on the Design Recommendation Plan Set (see 2RD1 for related information).

of existing pavement, existing subgrade, and soils within the corridor in accordance with the NCDOT Geotechnical Investigation and Recommendation Recommendations Manual, the Geotechnical Engineering Unit completes a Roadway Subsurface Investigation Inventory Report (with graphics). The inventory requires the following preliminary roadway information:

- Plan view, profile, and cross sections developed under 2RD1

- ~~Proposed roadway retaining wall locations, if known, developed under 2RD1~~
- ~~Proposed sound barrier/noise wall locations, if known, developed under 3EN1 and 3RD1~~

~~The inventory is initiated when the Roadway Design Lead sends a request for recommendations, with a date information is needed by, and location of electronic plans to the appropriate geotechnical division:~~

-
- ~~, or~~
-

~~From there, the geotechnical team:~~

- ~~Assigns the work to an in-house field office or Private Engineering Firm.~~
- ~~Holds a kickoff meeting and develops an purpose of the investigation plan.~~
- ~~Notifies 811 to locate utilities, where needed, and completes a field is to gather information about the condition of existing pavements and characterize the soils on the project for pavement support. The findings of the investigation~~
- ~~Assigns samples for lab testing and compiles results.~~
- ~~Enters field log data into gINT and post bore logs.~~
- ~~Develops stratigraphy and complete graphics.~~

~~The geotechnical team summarizes results are presented in the inventory report, listing soils present in the project area and geotechnical areas of special interestPavement and Subgrade Investigation Report. The Pavement and Subgrade Investigation Report is included in the Let package for Contractor information.~~

~~ForThe Geopavement Engineer provides Recommendations for Pavement and Subgrade for use by the Roadway Recommendation Report (possibly with graphics), thePavement Design Geotechnical Engineer or Project Geological Engineer completes Section I of and the Roadway Design Lead. The Pavement Design Engineer uses these recommendations, with to evaluate pavement sections in the Project Geological Engineer completing Section II thru IV ofComplete Pavement Design activity (see 2PD1 for related information).~~

~~The Roadway Design Lead references these recommendations to determine if subgrade stabilization by mechanical (Aggregate Subgrade) or chemical (Lime, Cement) means is recommended and for which alignments. The Roadway Design Lead should include the appropriate details and any specific locations for these recommendations in the typicals and details of the roadway plan set (see 2RD3 for related information). Additionally, the Roadway Design Lead should review the recommendations for other pay item quantity estimates to be included in the project contract. If the Geopavement Engineer recommends Aggregate Subgrade, he/she creates a Geotechnical Summary Tables (3G-1) sheet to accompany the recommendation, which is to be included in the roadway plan set.~~

~~Additional Roadway Recommendation report content includes development of:~~

- ~~Recommendation graphics,~~
- ~~Geotechnical quantity summary (attached to report), and~~

- ~~Geotechnical summary of quantities spreadsheet.~~

For Special Provisions, the Geotechnical Engineering Unit considers:

- ~~Special handling of material.~~
- ~~Ground Improvement~~
- ~~Geotextile for Pavement Stabilization Reinforced Soil Slopes (RSS)~~
- ~~Cellular Confinement Systems~~
- ~~Rock Embankments~~
- ~~Blasting or vibration requirements in addition to what is in the NCDOT *Spec Book Transmit Inventory and Recommendation Report*~~

Complete QC/QA Procedures

The ~~GeoEnvironmental Project~~Geopavement Engineer is to coordinate the applicable QC review ~~for the inventory and recommendations reports~~ following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before ~~upload to the project SharePoint site and/or~~ distribution of any deliverables

3GT2 Prepare GeoEnvironmental Phase II Report

Overview

Develop the GeoEnvironmental Phase II Report to identify potential risk and impacts to sites of concern.

References

- ☐
- ☐
- ☐
- ☐

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		GeoEnvironmental Project Engineer	GeoEnvironmental Supervisor
GeoEnvironmental Phase II Report [Ⓐ]	Develop GeoEnvironmental Phase II Reporting	X	X
GeoEnvironmental Right-of-Way Recommendations [Ⓐ]		X	X
GeoEnvironmental Design and Environmental Conflict Memo [Ⓐ]		X	X

[Ⓐ]Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete GeoEnvironmental Phase II Reporting

The task of developing the Phase II report involves:

- ☐ Conduct geophysical survey to identify Underground Storage Tanks (USTs)
- ☐ Collecting samples from sites of concern to determine risk and potential impacts to through the project.
- ☐ Completing the GeoEnvironmental right-of-way recommendations, where acquisition recommendations on sites of concern inform the Right-of-Way Plan Set and Phase II Investigation results.
- ☐ Coordinating the QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution.

Complete QC/QA Procedures

The GeoEnvironmental Project Lead is to coordinate the applicable QC review for the *GeoEnvironmental Design and Environmental Conflict Memo* following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload to the project SharePoint site and/or distribution of any deliverables. Provide the memo to the recommendations the appropriate technical discipline/Unit lead (for action) and the Project Manager (for information), identifying conflicts discovered during the Phase II investigation.

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[3GT3 Advance Connect site.](#)

2GT3 Geotechnical Structure Investigations for Structures Recommendations

Overview

Conduct subsurface investigation and recommendations for proposed structures. This activity can be initiated in Stage 2 if all the following items are complete: Bridge Survey and Hydraulic Design Report (BSR), Culvert Survey and Hydraulic Design Report (CSR), of bridges, box culverts, retaining wall envelope with plan view walls, sound barrier/noise wall envelope with plan view, and Traffic Management Plan with walls, and temporary shoring locations. A final report with applicable subsurface inventory, engineering recommendations, necessary details, and provisions will be provided for each proposed structure.

Note: This activity involves field work with equipment, which could be affected by weather, difficulty of access, property owners, moratoriums, traffic control and conflicts with existing traffic control, etc.

References

- [Geotechnical Investigation and Recommendations Manual](#)
- [Temporary Shoring Standard Provision](#)
- [Standard Temporary Shoring Detail 1801.01](#)
- [Standard Sound Barrier/ Noise Wall Foundations](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverables	Task	Responsible Party		
		Activity Leader	Additional Support	
		Design Geotechnical Engineer	Project Geological Engineer	Regional Geotechnical Manager
Structure Subsurface Investigation Inventory Report with graphics ^Q	<ul style="list-style-type: none"> ▪ Provide Complete Structure Subsurface Inventory Report Investigation and Structure Foundation Recommendations Reports Geotechnical Design Deliverables 	Geotechnical Design Engineer	X Project Geological Engineer	
Design Scour Elevation Report ^Q				
Structure Foundation Recommendation Recommendations Report ^Q				
Foundation Tables Structure Special Provisions Plan Sheet ^Q				
Provide Retaining Wall Inventory Plan and Recommendations Details (W Sheets)				
Retaining Wall Recommendation Report with Details ^Q	---	X		
Retaining Wall Special Provisions ^Q		X		
Sound Barrier/Noise Wall Subsurface Inventory Graphics ^Q	<ul style="list-style-type: none"> ▪ Provide Sound Barrier/Noise Wall Inventory and Recommendations 		X	
Sound Barrier/ Noise Wall Recommendations Report ^Q		X		
Temporary Shoring Recommendations ^Q	<ul style="list-style-type: none"> ▪ 			
Special Provisions				

³Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Provide Complete Structure Subsurface Inventory Report and Structures Foundation Recommendations Report

In accordance with the Geotechnical Investigation and Recommendation Manual, the process to develop the necessary recommendations and documentation is initiated when the Investigation and Structure Lead sends the Preliminary General Drawing, a request for structure and foundation recommendations, date information is needed, and location of electronic plans to:

- _____,
- _____, or
- _____.

From there, the Geotechnical Engineering Unit:

- Reviews the existing data and proposed design.
- Assigns the work to an in-house field office or Private Engineering Firm.

Holds a kickoff meeting and develops an investigation plan that includes a review of the theoretical scour from the Bridge Survey and Hydraulic Design Report (BSR) (see 2HY2 for related information). Deliverables

The Project Manager should initiate this task by submitting a Work Request Form Setup GPS and boring. The following project deliverables are required to coordinate the structure subsurface investigations:

- Hydraulic Survey Reports developed in 2HY2 for culverts or bridges over water
- Structure Preliminary General Drawing developed in 2ST2 for bridges
- Retaining wall envelopes
- Sound barrier wall locations- developed in 2EN3
- Contact property owners.
- Prepare subcontracts (if necessary).
- Coordinate traffic control.
- Notifies 811 to locate utilities, where needed, and completes a field Temporary shoring locations
- Transportation Management Plan concepts
- The Geotechnical Design Engineer coordinates an investigation-
- Assigns samples for lab testing , perform lab test, and compiles results.
- Enters field log data into gINT and post bore logs.
- Develops stratigraphy and complete graphics.
- Summarizes the results in the inventory, as necessary.

To complete a Design Scour Report, of each structure with the support of the Project Geological Engineer and/or, in accordance with the Design-Geotechnical Engineer calculates geotechnically adjusted scour and develops the report.

~~For the Foundation Investigation and Recommendation Report, the Geotechnical Engineering Unit or geotechnical firm is to:~~

- ~~▪ Determine most appropriate foundation type for each bent or culvert.~~
- ~~▪ Determine point of fixity for drilled shafts or piles.~~

~~Prepare and send Load Request Letter based on preliminary foundation design to Manual. The Geotechnical Engineering Unit for review. The Load Request Letter is sent to the Structures Management Unit or assigned Private Engineering Firm for action. Design Engineer and Project Geological Engineer summarizes the subsurface investigations in a Structure Subsurface Investigation Inventory. The Structure Subsurface Investigation Inventories are included in the Let package for Contractor information.~~

~~This task also includes developing special provisions, if needed.~~

~~For bridges over water, the Project Geological Engineer and/or the Geotechnical Design Engineer evaluates the theoretical scour predicted by the Hydraulic Design Engineer for each bridge foundation location and determines if adjustment based on the materials encountered during the subsurface investigation is warranted. Adjustments to or acceptance of the theoretical scour elevation are documented in the Design Scour Elevation Report. The Methodology of computations is to be in accordance with the Geotechnical Investigations and Recommendations Manual.~~

~~The Geotechnical Design Engineer will prepare foundation recommendations based on the applicable Structure Subsurface Investigation Inventory. The recommendations include a short summary report with the following as applicable to the type of structure:~~

- ~~▪ Plan notes~~
- ~~▪ Foundation Tables Sheet~~
- ~~▪ Retaining Wall Typical and Details (W plan sheets)~~
- ~~▪ Project Special Provisions~~
- ~~▪ Standard Temporary Shoring / Wall Details~~

~~Deliverables should be distributed through project SharePoint and designated as recommendations and details accordingly.~~

Complete QC/QA Procedures

~~The Geotechnical Engineering Unit is to Design Engineer and Project Geological Engineer are to coordinate the applicable QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before distributing any deliverables they prepare through the project Connect site.~~

3GT1 GeoEnvironmental Phase II

Overview

For projects where GeoEnvironmental Sites of Concern are identified, develop the GeoEnvironmental Phase II deliverables to determine potential risk and document impacts to project.

References

- [GeoEnvironmental Report Standards](#)
- [Geophysical UST Rating](#)
- [Geotechnical Investigation and Recommendations Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

<u>Deliverable</u>	<u>Task</u>	<u>Responsible Party</u> <u>Activity Leader</u>
GeoEnvironmental Phase II Report	<ul style="list-style-type: none"> ▪ Develop GeoEnvironmental Phase II reporting 	NCDOT GeoEnvironmental Project Engineer
GeoEnvironmental Right-of-Way Recommendations		
GeoEnvironmental Design and Environmental Conflict Memo		

Develop GeoEnvironmental Phase II Reporting

When sites of GeoEnvironmental concern are identified for a project during the GeoEnvironmental Planning (1GT1) or GeoEnvironmental Phase I (2GT1) tasks, this task is to be the first intrusive GeoEnvironmental investigation. The Project Manager submits a [Work Request Form](#) to the [GeoEnvironmental Project Engineer](#) the Inventory and Recommendation Report files to initiate this task once Right-of-Way Plan Set are completed (see 2RD4 for related information). The GeoEnvironmental Project Engineer coordinates the geophysical surveys to identify underground storage tanks (USTs) and collection of soil and groundwater samples from sites of concern. The collected samples are analyzed to determine risk and potential impacts to the project.

Based on the findings, the GeoEnvironmental Project Engineer prepares the right-of-way acquisition recommendations for GeoEnvironmental Sites of Concern to inform the Roadway Designer of right-of-way and easement needs and Right-of-Way Agent of the recommended acquisition method and any transaction details, such as withholds for contaminated soil expenses. If conflicts can be avoided, the GeoEnvironmental Project Engineer prepares a GeoEnvironmental Design and Environmental Conflict Memo addressed to the Project Design Engineer outlining the conflict.

Complete QC/QA Procedures

The GeoEnvironmental Project Engineer is to coordinate the applicable QC review following the [NCDOT Quality Management Program: Quality Control and Quality Assurance](#) procedures and the respective QC Checklist before ~~upload to the project SharePoint site and/or~~ distribution of any deliverables. ~~Provide the~~

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~~recommendations to the originator of the request (for action) and the Hydraulics Unit and the Project Manager (for information), through the project Connect site.~~

~~Provide Retaining Wall Inventory~~

3GT2 Verify Geotechnical Deliverables

Overview

Review plan sets and Recommendations

~~To complete subsurface investigations and providing provisions to verify geotechnical recommendations for proposed retaining walls, the Roadway Design are included correctly and update plans and/or Structures Lead (depending on the project) initiates the request for recommendations, date information is needed, and location of electronic plans to: as needed.~~

References

- [□ Geotechnical Investigation and Recommendations Manual](#)
- [□ NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Roadway Special Details (2G Sheets)	<ul style="list-style-type: none"> ▪ Review Plan Sets and Coordinate Let Package Preparation 	NCDOT Geotechnical Design Engineer	NCDOT Project Geological Engineer NCDOT Geopavement Engineer
Geotechnical Summary Tables (3G Sheet)			
Foundation Tables Structure Plan Sheet			
Retaining Wall Plan and Details (W Sheets)			
Special Provisions			

Review Plan Sets and Coordinate Let Package Preparation

- ~~The Project Manager or a Design Lead may initiate this task by submitting a [Work Request Form](#),~~
- ~~, or~~
- ~~_____.~~

~~The Design Geotechnical Engineer, supported by the Project Geological Engineer, refers to the *Geotechnical Investigation and Recommendation Manual* when developing the recommendations and performs, if possible, the investigation during roadway subsurface investigation.~~

- ~~Reviews the existing data and proposed design.~~
- ~~Assigns the work to an in-house field office or Private Engineering Firm.~~
- ~~Holds a kickoff meeting and develops an investigation plan that includes a review of the theoretical scour from the Bridge Survey and Hydraulic Design Report (BSR) (see 2HY2 for related information).~~
- ~~Setup GPS and boring locations.~~
- ~~Contact property owners.~~
- ~~Prepare subcontracts (if necessary).~~
- ~~Coordinate traffic control.~~
- ~~Notifies 811 to locate utilities, where needed, and completes a field investigation.~~
- ~~Assigns samples for lab testing, perform lab test, and compiles results.~~
- ~~Enters field log data into gINT and post bore logs.~~

- Develops stratigraphy and complete graphics.
- Summarizes the results in the inventory, as necessary.

To complete the Retaining Wall Recommendation Report (with details), the Design Geotechnical Engineer is to:

- Determine the most appropriate retaining wall for cut or fill site.
- Confirm no scour issues or recommend countermeasures in conjunction with Hydraulics Unit.
- Check bearing capacity of soils as appropriate.
- Check global stability.
- Develop details.

This task also includes developing special provisions, if needed.

. The Geotechnical Design Engineer with support from the Project Geological Engineer and Geopavement Engineer, if applicable, will review project plans to verify the geotechnical recommendations, plan sheets, details, and notes have been included correctly. The Project Geological Engineer will confirm all project Subsurface Investigation Inventories are denoted in the Project SharePoint Geotechnical directory and placed in Let Preparation. The Geotechnical Design Engineer will confirm that all Geotechnical Project Special Provisions are sequentially numbered, sealed, and ready for let.

Complete QC/QA Procedures

The Geotechnical Design ~~Geotechnical~~ Engineer is to coordinate the applicable QC review ~~for the Inventory and Recommendation Report files~~ following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before ~~upload to the project SharePoint site and/or~~ distribution of any deliverables. ~~Provide the recommendations to the originator of the request (for action) and the Project Manager (for information).~~

Provide Sound Barrier/Noise Wall Inventory and Recommendations

To complete subsurface investigations and provide recommendations for proposed sound barrier/noise wall foundations, the Roadway Design Lead or Structures Lead (depending on the project) initiates the request for recommendations, date information is needed, and location of electronic plans to:

- ,
- , or
- :

In accordance with the *Geotechnical Investigation and Recommendation Manual*, the Design Geotechnical Engineer develops the recommendations, including any sound barrier/noise wall inventory graphics. This includes:

- Reviews the existing data and proposed design.
- Assigns the work to an in-house field office or Private Engineering Firm.
- Holds a kickoff meeting and develops an investigation plan that includes a review of the theoretical scour from the Bridge Survey and Hydraulic Design Report (BSR) (see 2HY2 for related information).

- ~~Setup GPS and boring locations.~~
- ~~Contact property owners.~~
- ~~Prepare subcontracts (if necessary).~~
- ~~Coordinate traffic control.~~
- ~~Notifies 811 to locate utilities, where needed, and completes a field investigation.~~
- ~~Assigns samples for lab testing, perform lab test, and compiles results.~~
- ~~Enters field log data into gINT and post bore logs.~~
- ~~Develops stratigraphy and complete graphics.~~
- ~~Summarizes the results in the inventory, as necessary.~~

~~To complete the Sound Barrier/Noise Wall Recommendation Report (with details), the Design Geotechnical Engineer is to determine the most appropriate foundation for cut or fill site.~~

~~Complete QC/QA Procedures~~

~~The Design Geotechnical Engineer is to coordinate the applicable QC review for the Inventory and Recommendation Report files following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload to the project SharePoint site and/or distribution of any deliverables. Provide the recommendations to the originator of the request (for action) and the Project Manager (for information).~~

~~Provide Temporary Shoring Recommendations~~

~~Initiated by the Work Zone Traffic Control, a request for recommendations, date information is needed, and location of electronic plans are sent to:~~

- ~~,~~
- ~~, or~~
- ~~.~~

~~The Design Geotechnical Engineer then develops temporary shoring recommendations in accordance with the *Temporary Shoring Standard Provision*. This task is assigned to in-house staff and involves:~~

- ~~Reviewing the proposed structures, Traffic Management Plan (TMP) with shoring locations, and subsurface information.~~
- ~~Meet with staff from Work Zone Traffic Control and Structure Management Unit to discuss TMP and shoring on large or complicated phasing projects.~~
- ~~Determining if standard shoring is appropriate.~~

~~Complete QC/QA Procedures~~

~~The GeoEnvironmental Project Engineer is to coordinate the applicable QC review for the temporary shoring recommendations following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload to the project SharePoint site and/or distribution of any deliverables. Provide the recommendations to the originator of the request (for action) and the Project Manager (for information).~~

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4GT1 Prepare GeoEnvironmental Phase III Reports

4GT1 Manage GeoEnvironmental Impacts

Overview

Prepare GeoEnvironmental Sites of Concern for Let by removing underground storage tanks, (USTs), contaminated materials, and environmental monitoring wells in conflict with the project, documenting each. Document the activities in the GeoEnvironmental Phase III reports. Items that are not practicable appropriate report and distribute to remove prior to NCDOT project letting are to be addressed in a project special provision. Project Managers, Division, Geotechnical Offices, and team, North Carolina Department of Environmental Quality (NCDEQ) are recipients of these reports, and the Environmental Protection Agency (EPA) also receive a report if a Superfund site is present, as required.

References

- [GeoEnvironmental Report Standards](#)
- [NCDOT GeoEnvironmental Product Matrix](#)
- [Geotechnical Investigation and Recommendations Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
Underground Storage Tank Closure Report Underground Storage Tank Environmental Groundwater Monitoring Well Closure Report ^q	<ul style="list-style-type: none"> ▪ <i>Prepare GeoEnvironmental Sites of Concern for Let</i> 	<u>NCDOT GeoEnvironmental Project Lead Engineer</u>
Environmental Groundwater Monitoring Well and Closure Report ^q Contaminated Soil Removal Report		
Contaminated Soil Removal Report ^q Materials Management Plan		
Contaminated Materials Management Plan <u>GeoEnvironmental Special Provisions</u>		

^qIndicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Provide Prepare GeoEnvironmental Phase III Reports Sites of Concern for Let

Once an access agreement is in place or NCDOT has acquired a GeoEnvironmental Site of Concern, the Project Manager or Right-of-Way Office should initiate these tasks with a [Work Request Form](#) to the [GeoEnvironmental Project Engineer](#). ~~The GeoEnvironmental Project Lead prepares the following reports and/or plans to complete the GeoEnvironmental Phase III Reporting. Each report is independent and may not be necessary on every project.~~

. The GeoEnvironmental Project Engineer will coordinate removal of USTs, contaminated materials, and environmental monitoring wells in conflict with the project. Items that are not practicable to remove before project letting are to be addressed in a project special provision prepared by the GeoEnvironmental Project Engineer. The GeoEnvironmental Engineer coordinates and completes the following as necessary for GeoEnvironmental Sites of Concern:

- Underground Storage Tank ~~Closure Report~~Removal
 - Remove USTs in conjunction with right-of-way.
 - Document the process, results, and future actions (if necessary) in the Underground Storage Tank Closure Report.
 - Upload the report to project SharePoint site and inform the Project Manager, Right-of-Way, and NCDEQ, as required by regulation.
- Environmental Groundwater Monitoring Well ~~Closure Report~~Abandonment
 - ~~Close~~Abandon monitoring wells in conflict with the project.
 - Document the process, results, and future actions (if necessary) in the report.
 - Upload the report to project SharePoint Site and inform the Project Manager, Right-of-Way, and NCDEQ, as required by regulation.
- Contaminated Soil Removal ~~Report~~
 - When practicable, remove contaminated soil prior to project letting ~~if practical~~.
 - Document the process, results, and future actions (if necessary) in the report.
 - Upload the report to project SharePoint site and inform the Project Manager, Right-of-Way, and NCDEQ, as required by regulation.
- Contaminated Materials Management Plan
 - Remove ~~other~~ contaminated media prior to project letting if practical.
 - When it is not practical, develop a Materials Management Plan to describe materials handling during construction.
 - Develop project special provision(s) to be included in the contract that describe material handling, personal protective equipment (if needed), and any other processes necessary to construct the project.

Applicable reports are also distributed to The Environmental Protection Agency (EPA) if a GeoEnvironmental Site of Concern is also a NPL Superfund site.

Complete QC/QA Procedures

The GeoEnvironmental Project Lead Engineer is to coordinate the applicable QC review ~~for the reports~~ following the *NC DOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before ~~upload to the project SharePoint site and/or~~ distribution of any deliverables. ~~Provide the recommendations to the originator of the request (for action) and the Project Manager (for information).~~ through the project Connect site.

5GT1 Geotechnical and GeoEnvironmental Construction Support

The [Geotechnical Engineering Unit](#) provides the following support during the Construction Phase:

- Provides technical expertise and answers questions related to geotechnical conditions during the pre-construction meeting and throughout construction and during claims.
- Completes Construction Revision (as needed): Perform construction revisions of the latest version of the Let Plans (see 5CS1 for related information) to address identified field issues
- Reviews working drawings and associated calculations for:
 - Drilled Pier Construction Plans
 - Crosshole Sonic Logging (CSL) Reports
 - Pile Driving Equipment Data Forms
 - Pile Driving Analyzer (PDA) Reports
 - Retaining Wall designs
 - Temporary Shoring designs
- Works with Resident Engineer's office and contractor to review and accept foundation repairs.
- Reviews blasting plans and ~~monitor~~[monitors](#) associated vibrations.
- Reviews settlement monitoring and ~~approve~~[approves](#) completion and field investigations for soft soils, undercuts, and underdrains.
- Analyzes unstable cut and fill slopes and recommend repair.
- Samples and determines rates of chemical stabilization of subgrades or recommend aggregate subgrade, as needed.

The [GeoEnvironmental Engineering Section](#) provides Construction Phase support for:

- Removing previously unknown USTs encountered during construction.
- Contaminated soil disposal from previous unknown locations not addressed with special provisions.
- Providing containers and disposal for dewatering in contaminated areas.
- Waste disposal characterization.

2HY1 Develop Preliminary Hydraulic Recommendations

Overview

Provide preliminary hydraulic information to refine line and grade and establish the hydrologic performance standards for the project. ~~A preliminary Stormwater Management Plan (pSMP) is developed to comply with the Department’s statewide National Pollutant Discharge Elimination System (NPDES) stormwater permit. A scalable~~ Hydraulic Planning Report is prepared to provide preliminary hydraulic recommendations, identify permitting requirements; ~~identify risk; and risks~~, define avoidance and minimization opportunities; ~~and estimate any major drainage structure sizes where appropriate. If necessary, preliminary hydraulic modelling is conducted to inform project impacts and revise final alternative. If~~ A preliminary Stormwater Management Plan (pSMP) is developed to comply with NCDOT’s statewide National Pollutant Discharge Elimination System (NPDES) stormwater permit. If the project is in Merger, hydraulic support is provided for any Merger meetings up to and including LEDPA (CP3)-Avoidance and Minimization (CP4A). Additional action items, such as preliminary hydraulic modeling, may be added on a project-specific basis when items are required to select/refine an alternative or reduce project risks and costs.

References

- [Guidelines for Drainage Studies and Hydraulic Design](#)
- [Hydraulics Unit Web Page Content and Guidance Documents](#)
- [Stormwater Management Plan Template](#)
- [Hydraulics Planning Report Template](#)
- [NC-SELDM Catalog Application](#)
- [NCDOT Hydroplaning Assessment Tool](#)
- [Training Videos for Using the NC-SELDM Catalog \(NC Learning Center – requires NCID\)](#)
- [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 Program: Quality Control and Quality Assurance](#)
- [Merger Process](#)
- [Risk Management Guide v2](#)
- [Guidance For Merger Concurrence Point 2A Meeting](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Hydraulic Design Engineer	Project Manager
Hydraulic Planning Report (HPR) ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete Hydraulic Planning Report (HPR) 	X	X
Preliminary Stormwater Management Plan (pSMP) ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete Preliminary Stormwater Management Plan (pSMP) 	X	
<u>Hydraulic Control Letter</u>	<ul style="list-style-type: none"> ▪ <u>Complete Hydraulic Control Letter</u> 	X	

Comments on Design Recommendations Plan Set(s) ^Q & Final Hydroplaning Assessment (as needed) ^Q	<ul style="list-style-type: none"> Review Preliminary Roadway Plans 	X	
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^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Hydraulic Planning Report (HPR)

The Hydraulic Design Engineer completes the Hydraulic Planning Report in accordance with Chapter 3 of the *Guidelines for Drainage Studies and Hydraulic Design*. ~~Completion of the HPR template referenced in Chapter 3 is recommended.~~ The HPR allows the project team to:

- ~~The HPR allows~~ Become familiar with the design team to identify and establish project
- ~~Establish preliminary~~ hydraulic design parameters; ~~prepare Initial Design Estimates (2CS1); refine assumption; and assumptions~~
- ~~Identify and mitigate risk;~~
- ~~Identify permitting requirements and provides~~ provide input for the Environmental Documentation (see 2EP1); ~~for related information~~
- ~~Provide preliminary recommendations for use in preparing the Design Recommendations Plan Set (see 2RD2 for related information)~~

Completing the Hydraulic Planning Report with these objectives realized reduces the amount of potential re-work and schedule delays for the project; ~~and helps identify and mitigate other project risks.~~

~~The HPR is scalable and should only include information necessary to inform decisions that could not otherwise be made later during final design; or may otherwise adversely affect the project scope, schedule, or budget; or are addressed through programmatic agreements and are not project-specific concerns. Examples include alignment and bridging decisions that are needed for CP2 and CP2A in Merger; replacement of major drainage structures that may affect project cost; recommended major revisions to line, grade, or typical section. Close coordination with the project team is necessary to refine the scope and content of the HPR to ensure it is of utmost value to the project.~~

~~Coordination with others should also occur to ensure Hydraulic Recommendations are practical and feasible. Example of this coordination include:~~

- ~~Contacting Division to identify existing drainage issues and any design preferences or constructability concerns~~
- ~~Coordinating with Utilities to identify utilities that should be avoided~~
- ~~Coordinating with EAU and EPU regarding project-specific compliance items such as FERC permits~~
- ~~Coordinating with Structures and Division to verify preliminary bridge and culvert recommendations are practical and don't present undue constructability or maintenance concerns.~~

~~The Hydraulic Design Engineer uses his/her expertise and judgment to determine project-specific coordination needs.~~

The Hydraulic Design Engineer also:

- Prepares the Hydraulic Planning Report and coordinates the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance 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.
- Upon approval by the Hydraulics Reviewer, posts the HPR on the Preconstruction Site via ATLAS and notifies the Project Manager of the report’s location and that it is ready for distribution.

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~~Project Manager also provides the report as follows 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). This includes evaluating and incorporating typical sections and mitigation strategies (ex. pavement mix design) recommended by the Preliminary Hydroplaning Assessment (if needed).
- 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~~The NEPA/SEPA Lead, Environmental Analysis Lead, and Project Lead use the report in the development of the Environmental Document and recommendations from the Preliminary Hydraulic Recommendations table included in the Hydraulic Planning 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 an 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 ‘General guidelines for filling out the pSMP’ which is located in the Overview tab of the 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 and may impact the work of other disciplines such as Right-of-Way (RW), Utility Coordination and Design (UT), Geotechnical (GT), etc. In such cases where a stormwater control measure may impact Right-of-Way or other disciplines, the

Hydraulics Design Engineer is responsible for coordinating with discipline leads and the project manager. The PCSP workflows require implementation of Stormwater Toolbox BMPs to the maximum extent practicable for certain receiving waters based on waterbody classification or other characteristics. For project areas that drain to other waters the workflows require use of the NC-SELDM Catalog. The NC-SELDM Catalog is an application, developed by NCDOT in partnership with the USGS, which is specifically designed to assist the engineer in establishing the stormwater treatment goals for the project. If the appropriate PCSP workflow 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).

2. The final SMP is prepared in activity 3HY1. The final SMP serves to document the stormwater management decisions made for the project to comply with the NPDES stormwater permit, and when required, is included in applications for other permits such as the 404/401.

Review Preliminary Roadway Plans

Coordination with the Roadway Design Lead should occur throughout development of the Design Recommendations Plan Set (see 2RD2 for related information). During development of the plan set, the Roadway Design Lead sends the plans to the Hydraulic Design Engineer for review and comment. This allows the Roadway Design Lead to make any needed changes before final roadway review and distribution of the plan set. This coordination helps to prevent schedule delays and rework that are more likely if revisions occur after the plan set has been distributed.

As part of this review, the Hydraulic Design Engineer:

- Provides comments on the plans, identifies potential drainage issues, and makes recommendations that improve drainage conditions on the project.
 - Minimally, the review includes the items listed in Section 4.2 of the *Guidelines for Drainage Studies and Hydraulic Design*.
- If a Final Hydroplaning Assessment is performed, provides mitigation strategies for areas that show risk for hydroplaning.
- Reviews subsequent roadway plan submittals to make sure comments have been addressed and no new concerns have been created.

After receiving the Design Recommendation Plan Set, the Hydraulic Design Engineer attends (if requested) the Design Recommendation Plan Set Review Meeting (see 2RD2 for related information).

Complete Hydraulic Control Letter

At the request of the Roadway Design Lead, the Hydraulic Design Engineer provides a written statement of any specific hydraulic grade requirements to the Roadway Design Lead. If there are no specific grade requirements, the Hydraulic Design Engineer provides a written statement to the Roadway Design Lead that the grade is not hydraulically controlled. The Hydraulic Design Engineer determines grade requirements using information gathered and calculations completed during completion of the HPR and

reviews of preliminary roadway plans. This correspondence is used by the Roadway Design Lead during development of the Design Recommendations Plan Set and becomes part of the project documentation.

Provide Hydraulic Support

The Hydraulic Design Engineer provides continuous support to the project team and other technical disciplines/Units— during this activity. This allows any hydraulic concerns and risks to be communicated during the early phases of the in the project's development so appropriate steps can be taken to mitigate those risks, deliver high quality projects, reduce project. This costs and avoid later revisions and rework that could impact the scope and schedule. The Hydraulic Design Engineer should be proactive in identifying drainage-related project concerns or opportunities for improvement and in communicating these to the project team for consideration. Providing hydraulic support may include:

- Attending meetings and offering hydraulic expertise and recommendations related to the project.
- Responding to drainage-related questions and concerns as each occurs.
- Coordinating with others to resolve conflicting recommendations among disciplines/Units.

For Merger projects (if applicable), the Hydraulic Design Engineer is to:

- Attend the Merger CP2, CP2A, and CP2ACP4A meetings to respond to hydraulic, floodplain, or general stormwater management questions or concerns (see 2EP1 for related information).
- Attend other Merger meetings as needed to provide hydraulic information and recommendations and to identify potential issues related to the drainage design.

2HY2 Complete Drainage Design ~~for Field Inspection~~

Overview

~~Review and provide comments on~~ **Complete** the ~~Design Recommendation Plan Set and complete~~ drainage design to be ~~shown on~~ **included in** the Field Inspection Plan Set, ~~attend the Field Inspection Meeting, and~~ **complete any drainage revisions necessary for incorporation into the Right-of-Way Plan Set.**

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](#)
- [Highway Floodplain Program](#)
- [U.S. Geological Survey Resources](#)
- [Guidance for Concurrence Point 4B Meetings and Plans](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Hydraulic Design Engineer	Roadway Design Lead/Project Manager
Comments on Design Recommendations Plan Set(s)^Q & Final Hydroplaning Assessment (as needed)^Q	<ul style="list-style-type: none"> Review Roadway Design Plans for Drainage Concerns Complete Final Hydroplaning Assessment (as needed) Attend Design Recommendations Plan Set Review Meeting 	X	
Hydraulics Pre-Design Meeting Documentation ^Q	<ul style="list-style-type: none"> Prepare for and Conduct Hydraulics Pre-Design Meeting 	X	
Hydraulic Survey Reports for Major Structures ^{A, Q}	<ul style="list-style-type: none"> Complete Field Visit and Hydraulic Surveys Request Additional Information Prepare Major Hydraulic Structure Reports 	X	
		X	X
		X	
Drainage Plans for Merger CP4B Plans and Meeting and Minutes^A	<ul style="list-style-type: none"> Conduct Merger CP4B Meeting or the Hydraulic Design Review (as applicable for the project) 	X	X
Drainage Plans for Field Inspection ^{A, Q}	<ul style="list-style-type: none"> Complete Drainage Designs for the Field Inspection Plan Set/Design Complete Hydraulic Summary 	X	
		X	
Railroad Revised Drainage Submittals Plans (as needed)^{A, Q}	<ul style="list-style-type: none"> Coordinate Railroad Review Field Inspection Plan Set and Attend Field Inspection Attend Preliminary TMP Review Meeting Complete Drainage Design (if applicable for the project) Revisions 	X	

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^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

~~Review Roadway Design Plans for Drainage Concerns~~

~~The Roadway Design Lead sends the Design Recommendation Plan Set to the Hydraulic Design Engineer for review. This allows the Roadway Design Lead to make any needed changes before conducting the rest of the tasks in this phase and helps to prevent schedule delays. The reviewers are to:~~

- ~~▪ Provide comments on the plans, identify potential drainage issues, and make recommendations that improve drainage conditions on the project. Minimally, the review is to include the items listed in Section 4.2 of the *Guidelines for Drainage Studies and Hydraulic Design*.~~
- ~~▪ If a Final Hydroplaning Assessment is performed, then provide mitigation strategies for areas that show risk for hydroplaning.~~
- ~~▪ Review subsequent roadway plan submittals to make sure comments have been addressed and no new concerns have been created.~~
- ~~▪ Attend Design Recommendations Plan Set Review Meeting.~~

~~After receiving the Design Recommendation Plan Set, the Hydraulic Design Engineer is to attend (if requested) the Design Recommendation Plan Set review meeting, which is further detailed in 2RD1.~~

Prepare for and Conduct Hydraulics Pre-Design Meeting

After receiving the approved Design Recommendations Plan Set (see 2RD1 for related information) and prior to starting the drainage design, a Pre-Design Meeting should be conducted in accordance with the pre-design guidance provided in the *Guidelines for Drainage Studies and Hydraulic Design* to prevent schedule delays and limit re-work. The Hydraulics Pre-design Meeting provides an opportunity for the hydraulic designer and hydraulic reviewer to discuss quality assurance elements such as procedures, criteria, and methods, and to reach concurrence before final hydraulic design begins. This meeting should occur before commencing detailed drainage design. The meeting is important to prevent schedule delays and limit re-work. For the Pre-Design Meeting, the Hydraulic Design Engineer is to:

- Complete Page 1 of *Pre-Design Checklist for Drainage Study and Hydraulic Design* which can be found in the *Guidelines for Drainage Studies and Hydraulic Design* manual. In preparation for the Hydraulics Pre-Design Meeting the engineer should prepare a list of questions addressing drainage design, assumptions and criteria.
- Review the project's Risk Assessment Worksheet.
- Schedule and conduct the Hydraulics Pre-Design Meeting with the designated Quality Assurance Expert in accordance with the hydraulics pre-design meeting guidance, which can be found in Section 4.4. of the *Guidelines for Drainage Studies and Hydraulic Design* manual.
- Prepare and submit for review/approval the Hydraulics Pre-Design Meeting Minutes to document decisions made during the meeting and follow-up tasks that need to be completed.

Complete Field Visit and Hydraulic Surveys

The hydraulic field visit and surveys are conducted after the Design Recommendations Plan Set is completed and are used to familiarize the Hydraulic Design Engineer(s) with the project area, identify and document existing drainage patterns and problems, and identify and obtain additional survey information needed to complete the drainage design- and hydraulic structure reports. This task is also used to try to prevent issues from arising during construction based on field conditions that vary from the final survey.

For this task, the Hydraulic Design Engineer:

- Conducts field surveys in accordance with Field Reconnaissance and Survey, Section 5.2 of the *Guidelines for Drainage Studies and Hydraulic Design*.
- Incorporates field notes, photos, and documentation of ~~surveys~~ survey and other data gathered into the drainage redlines, major structure reports, or separate documentation posted on the project SharePoint site.

The Hydraulic Design Engineer should notify the Project Manager, Locations and Surveys, and other appropriate disciplines of any major inaccuracies or oversights in the final survey file that would impact design by Hydraulics or others. Examples could include:

- New development within, or very close to, the project's proposed R/W
- Significant channels or other drainage features that are missing from Locations and Surveys final survey files
- Inaccuracies in existing storm sewer data shown in the final survey files when such data is required to complete the drainage design

Request Additional Information

The Hydraulic Design Engineer identifies and requests any additional information or revisions needed from other technical disciplines/Units and informs the Project Manager of these ~~request~~ requests. To minimize the risk of project delays, the Hydraulic Design Engineer should notify the Project Manager and the Hydraulics Reviewer as soon as they identify the need for additional information from others. The method for any requests ~~will~~ is to be determined through regular communication and coordination with the ~~PM~~ Project Manager and the affected disciplines. ~~Such~~ The Project Manager considers the needs of all disciplines and the project schedule when coordinating requests for additional information. For additional surveys, the Project Manager may combine requests from multiple disciplines into a single request before submitting to Locations and Surveys if the project schedule allows. Additional information request may include:

- Additional survey requests
- Subsurface investigation requests
- Existing pipe inspections
- Corrections to survey or WET/WEX files
- Special detail requests

Prepare Major Hydraulic Structure Reports

Major structure reports include the Bridge Survey and Hydraulic Design Reports (BSRs), Detour Survey and Hydraulic Design Reports (DSRs), and Culvert Survey and Hydraulic Design Reports (CSRs). ~~Major hydraulic structure reports are used~~ The Hydraulic Design Engineer prepares the major structure reports after the Design Recommendations Plan Set is completed and after the Hydraulic Pre-Design Meeting occurs. These reports are used to document the hydraulic structure design and to facilitate efficient communication between the Hydraulic Design Engineer and other Discipline Leads. This reduces re-work and schedule delays by having agreement on Major Hydraulic Structure design elements and assumptions before the design begins. Information in these reports is used by other disciplines such as Structures, Geotechnical, Work Zone Traffic Control, and Roadside Environmental to complete their designs.

The reports are also distributed to Division for their information and review so any constructability concerns can be identified, discussed, and resolved. For this task, the Hydraulic Design Engineer is to refer to the *Guidelines for Drainage Studies and Hydraulic Design* when determining if a Bridge, Culvert, or Detour Survey Report is required. A Construction Phasing Plan is required in conjunction with any Culvert Survey Report to demonstrate a temporary drainage plan that may be used to maintain flows adequately during culvert construction. The Construction Phasing Plan is used by the Roadside Environmental Engineer and may be used to inform other decisions regarding permitting and construction needs.

~~The major hydraulic structure reports are used to document the hydraulic design and to provide information to others.~~ For this task, the Hydraulic Design Engineer ~~is to~~:

- ~~Complete~~Completes field reconnaissance and surveys at each major hydraulic structure prior to completing the report.
- ~~Prepare and submit~~For bridges, submits a draft BSR to the ~~Project Manager (for information) and the Structures Management, Geotechnical, and Hydraulics Reviewer (for action).~~ Reviewers.
 - ~~The draft BSR is reviewed by the Hydraulics Reviewer, as coordinated~~these disciplines for concurrence with the Structures Lead, to determine if the proposed structuressuperstructure and substructure type, bridge length, span arrangement, ~~and other design information is acceptable.~~bent locations, and skew. Reviewers will also review in regards to potential constructability concerns.
 - The Structures ~~Lead~~Reviewer coordinates with the Regional Bridge Construction Engineer and the Area Construction Engineer on constructability issues and concerns.

~~Prepare~~Upon receipt of comments, the Hydraulic Design Engineer initiates further coordination, as needed, to resolve the comments and revises and resubmits the draft BSR. Upon approval of the draft BSR by the reviewers above, the Hydraulic Design Engineer proceeds with preparation of the final BSR, including:

- Preparing QC (in accordance with the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist) and ~~submits~~submits major structure reports to the Project Manager (for information) ~~and~~, Hydraulics Reviewer and Structures Lead (for review).
 - **Note:** CSR submittals are to include a construction phasing plan.
- ~~Revise~~Revising and ~~resubmit~~resubmitting the major hydraulic structure reports upon receiving comments from the Hydraulics Reviewer.

Upon notification that the report is approved and signed by the Hydraulics Reviewer, the report is sent to the NCDOT Hydraulics Staff or NCDOT Project Manager to initial the front of the report upon acceptance.

Upon acceptance from NCDOT Hydraulics Staff or ~~NCDOT~~ Project Manager, the Hydraulic Design Engineer ~~is to distribute~~distributes the approved major hydraulic structure reports (bridge and culverts) together with any construction phasing plan(s) to the Project Manager, Division Engineer, Area Bridge Engineer, Roadway Design Lead, Structures Lead, and Design Geotechnical Engineer. In addition to the above, CSRs are to be distributed with the construction phasing plan to the Roadside Environmental Engineer.

Conduct Merger CP4B Meeting or the Hydraulic Design Review (as applicable for the project)

If the project is following the Merger Process (see 2EP1 for related information), the Merger CP4B meeting is held after the CP4A meeting and ~~while during development of~~ the drainage ~~designs are being completed for the Field Inspection Plan Set design~~. In some cases, a project may not follow the Merger process formally, but will have a quasi- CP4B meeting, normally described as a Hydraulic Design Review Meeting. This keeps the appropriate agencies informed of impacts to environmental resources, while discussing avoidance and minimization efforts used for the project. This process allows for easier permit reviews and subsequent approvals.

During the meeting, the Hydraulic Design Engineer presents ~~the~~ preliminary drainage designs and obtains input, comments, and concerns from the team members.

The Hydraulic Design Engineer is to:

- Notify the Hydraulics Reviewer of the preferred date and amount of time needed for the Merger CP4B meeting (or Hydraulic Review Meeting) a minimum of two months prior to the preferred date for central managed projects. ~~(further described herein as the meeting)~~
 - The Hydraulics Reviewer coordinates with the Environmental Policy Unit to schedule the meeting and notify attendees.
 - For non-central managed projects, follow the direction of the Project Manager for scheduling the meeting and inviting attendees.
- Prepare and submit the meeting plans for review to the Hydraulics Reviewer, Project Manager, ~~and~~ Environmental Analysis Unit ~~or, and~~ NEPA/SEPA Lead for central managed projects or as directed by the Project Manager/Division Environmental Officer for non-central managed projects.
 - It is recommended the meeting plans be submitted for review at least five weeks prior to the scheduled meeting to allow adequate time for review and revisions, if necessary.
 - The plans are to be developed in accordance with the *Guidance for Concurrence Point 4B Meetings and Plans*.
 - Review comments are returned to the Hydraulic Design Engineer.
- Revise and resubmit the meeting plans as needed for approval.
 - Upon approval, the Hydraulic Reviewer provides the final meeting plans to the Environmental Policy Unit to post for team members to access.
 - Plans are to be posted at least two weeks prior to the meeting date.
- Conduct the meeting in accordance with the *Guidance for Concurrence Point 4B Meetings and Plans*.
- Prepare meeting minutes/summary in accordance with the *Guidance for Concurrence Point 4B Meetings and Plans* to document discussion and decisions made during the meeting.

Complete Drainage ~~Designs for the Field Inspection Plan Set Design~~

The Hydraulic Design Engineer completes the Redline Drainage Plans in accordance with the project's scope of work and *Guidelines for Drainage Studies and Hydraulic Design*. The ~~pre-design meeting and~~ field visit and hydraulic surveys are completed prior to completing the drainage designs. ~~The~~ The drainage design may be completed concurrently with completion of Major Hydraulic Structure Reports. The

drainage design is documented on the Redline Drainage Plans- and will be incorporated into the Field Inspection Plan Set

Once complete, the Hydraulic Design Engineer:

- Coordinates the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.
- Submits the Redline Drainage Plans along with all supporting documentation and calculations to the Project Manager (for information) and the Hydraulics Reviewer (for action) to complete a review and QA audit. The Redline Drainage Plans are to include the items specified in the redline guidance provided in Chapter 5 of the *Guidelines for Drainage Studies and Hydraulic Design*.
- Revises and resubmits the Redline Drainage Plans to address comments received from the Hydraulics Reviewer.

Upon approval of the Redline Drainage Plans, the Hydraulics Reviewer notifies the Project Manager (for information) and the Roadway Design Lead (for action) that the drainage design is ready for incorporation into the Field Inspection Plan Set. The Hydraulics Reviewer also distributes the drainage design to the Utilities Design Lead and Roadside Environmental Design Lead (for information).

Draft Hydraulic Summary

The Hydraulic Design Engineer provides the Roadway Design Lead with drafts of the Hydraulic Summary Sheets. Tools available in Microstation or OpenRoads Designer are used to produce the Draft Drainage Summary Sheet. The Hydraulic Design Engineer should ensure the tools produce a reasonably complete product but are not expected to otherwise revise or refine the draft from what is produced using the automated methods. These drafts are included in the Field Inspection Plan Set to allow preliminary review by construction and other disciplines during the Field Inspection Review Meeting and are used to generate preliminary cost estimates prior to the Field Inspection Review Meeting.

Review Field Inspection Plan Set and Attend Field Inspection

The Hydraulic Design Engineer reviews the Field Inspection Plan Set prior to the ~~meeting~~Field Inspection Review Meeting. The Hydraulic Design Engineer is to verify the drainage design shown matches the approved drainage design and reviews for any drafting errors or potential conflicts with the drainage design. The Hydraulic Design Engineer attends the Field Inspection Review Meeting. This allows ~~design~~the project team ~~members~~ to voice concerns and potential issues to be addressed before the project ~~is let,~~ which leads proceeds, leading to fewer Right-of-Way revisions and change orders during construction. This task includes:

- ~~▪ Coordinating the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.~~
- Responding to questions or concerns relating to the drainage design.
- Initiating discussion on drainage items that may need coordination or that other disciplines need to be aware of.
- Verifying that drainage easements shown on the plans are adequate for construction and maintenance purposes.
- Participating in traffic control and phasing discussions as it relates to ~~the~~ drainage design.

- Obtaining information needed to complete environmental permit drawings, such as amount and type of clearing required and construction methods and impacts required for construction of major drainage structures (e.g., temporary work bridges, causeways, and work pads).

Coordinate Railroad Attend Preliminary TMP Review Meeting

The Drainage Design Engineer attends the Preliminary TMP Review Meeting (see 2TM2 for related information), when applicable for, which may be held in conjunction with the Field Inspection or separately. The Drainage Design Engineer:

- Provides input on hydraulics concerns.
- Answers drainage-related questions as they relate to temporary drainage concerns.
- Participates in identifying solutions to any problems that are identified.

The Hydraulic Design Engineer coordinates with the Traffic Engineer upon request and as needed before and after the TMP Review Meeting.

Complete Drainage Design Revisions

The Hydraulic Design Engineer coordinates with others prior to and during completion of the drainage design so the need for subsequent revisions is minimized. However, despite best efforts, revisions may be necessary after the initial approval of deliverables. Common reasons for revisions after initial approval include:

- Comments or concerns brought up during the Field Inspection Review Meeting
- Revisions by other disciplines
- Private development within the project area
- If railroad drainage Constructability concerns
- Utility conflicts
- The addition of noise walls

The Hydraulic Design Engineer coordinates with the Project Manager and other disciplines, as needed, to identify and incorporate any necessary revisions. When revisions are necessary, the Hydraulic Design Engineer:

- Follows the guidance given elsewhere for the specific deliverable to complete the revision.
- Coordinate the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.
- Submits the revised deliverable to the appropriate reviewers for QA audit, as provided elsewhere for the deliverable being revised.
- Revises and resubmits the deliverable to address comments received from the QA Reviewer(s).
 - Revised submittals are required for the project to include a list of all revisions made, an updated copy of the deliverable along with all supporting documentation and calculations necessary to review and approve the revisions.
 - The Hydraulics Reviewer notifies the Project Manager (for information) and the Roadway Design Lead (for action) when the revisions have been approved and may be incorporated into the current roadway plans.

Upon final approval, the Hydraulic Design Engineer submits a final record set of the updated deliverable, computations, and supplemental data (including photos) for archiving. Where applicable, the final deliverables are uploaded to the Preconstruction Site using ATLAS Workbench.

Provide Hydraulic Support

Throughout this activity, the Hydraulic Design Engineer provides drainage plans, drainage calculations, and other drainage information requested by the Structures Lead or Project Manager, as needed for support to the project team and other technical disciplines/Units. This communication and coordination with the applicable railroads for approval help the project team to deliver a high-quality project while minimizing scope changes and schedule delays. The Hydraulic Design Engineer should be proactive in identifying drainage-related project concerns or opportunities for improvement as early as possible and in communicating these to the project team for consideration. Providing hydraulic support may include:

This information is supplied after the drainage design has been advanced. If the project schedule and expected timeframe for railroad review and approval allow, it is recommended this coordination take place after any necessary revisions from the Field Inspection Review Meeting have been incorporated.

The Hydraulic Design Engineer submits any required information to the Hydraulics Reviewer for review/comment, and upon approval, the Reviewer provides the information back to the requester (Structures Lead or Project Manager).

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Project
Initiation

Environ and
ROW Plans

Final Plans

PS&E/Letting

Post-Letting/
Construction

- Attending meetings and offering hydraulic expertise and recommendations related to the project
- Responding to drainage-related questions and concerns from others as they occur
- Coordinating with others to resolve issues that occur

3HY1 Complete Hydraulic Design Permitting Tasks and Finalize Plans

Overview

Complete the final drainage designs to be shown on the Right-of-Way Plan Set and Complete all hydraulic action items required to secure project permits and authorizations. This includes completing environmental permit drawings—and, Federal Emergency Management Agency (FEMA) compliance packages—and railroad drainage packages when required. The Hydraulic Design Engineer responds to and coordinates with others, as needed, to assist the responsible parties in obtaining any required permits and authorizations.

The Hydraulic Design Engineer generally begins these tasks after the Right-of-Way Plan Set is complete (see 2RD4 for related information) and significant design revisions that would affect these products are not expected. When design revisions are anticipated, the Hydraulic Design Engineer should closely coordinate with the Project Manager and other disciplines to determine when permitting tasks should be completed to minimize the need for re-work after initial completion and minimize schedule delays. The Hydraulic Design Engineer generally aims to complete these tasks prior to the 15-month Let Review Meeting or earlier, if requested by another technical Unit/discipline and the Project Manager. Coordinate with others, as needed, to complete design revisions and prepare Final Plans.

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](#)
- ❑ [Highway Floodplain Program](#)
- ❑ [Guidance for Concurrence Point 4C Meetings and Plans](#)
- ❑ [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- ❑ ~~[Guidance for Concurrence Point 4C Meetings and Plans](#)~~ [Merger Process](#)
- ❑ [Risk Management Guide V2](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Hydraulic Design Engineer	
Final Railroad Drainage Design ^{A, Q} <u>Submittals</u>	▪ <u>Complete Final Railroad Drainage Design Packages (if applicable for the project)</u>	X	
FEMA/NFIP Compliance Packages (SFC/CLOMR) ^{A, Q}	▪ <u>Prepare and Submit FEMA Compliance Packages</u>	X	Hydraulics Unit (Floodplain Management)
Hydraulic Summary Sheet(s) ^Q	▪ <u>Complete Final Drainage Summary Sheet(s)</u>	X	

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Hydraulic Design Engineer	
	<ul style="list-style-type: none"> Complete Stormwater Control Measures Summary Sheet 		
Stormwater Management Plan ^{A, Q}	<ul style="list-style-type: none"> Finalize Stormwater Management Plan 	X	
Environmental Permit Drawings ^{A, Q}	<ul style="list-style-type: none"> Complete/Submit Environmental Permit Drawing Package 	X	
Merger CP4C Meeting Package and Minutes ^A	<ul style="list-style-type: none"> Conduct Merger CP4C Meeting (if applicable for the project) 	X	Project Manager (as applicable)

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete ~~Final~~ Drainage Design Revisions (as needed)

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:

~~Coordinate~~ Design revisions after the right-of-way date should be minimized as much as possible. Design revisions may be required for many reasons such as new development within the project area, property owner concerns that come up during right-of-way acquisition, conflicts with other disciplines' designs, and constructability issues. Design revisions after the right-of-way date have greater potential to adversely impact the scope, schedule, and budget and should be closely coordinated with the Project Manager and other disciplines involved to ensure they are necessary and to make sure all applicable products are updated accordingly. The Hydraulic Design Engineer must make sure to review and revise permitting, compliance, and authorization packages when they are impacted by any design revisions.

When drainage revisions are necessary, the Hydraulic Design Engineer:

- Follows the guidance given elsewhere for the specific deliverable being revised to complete the revision.
- Coordinates the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.
- ~~Revise and resubmit the Redline Drainage Plans to the Roadway Design Lead and other affected disciplines/Units as directed by the Hydraulics Reviewer to complete a review and QA audit.~~
- ~~Submit all revisions to the Project Manager (for information) and Hydraulics Reviewer (for action).~~
- Submits the revised deliverable to the appropriate reviewers for QA audit, as provided elsewhere for the deliverable being revised.
- Revises and resubmits the deliverable to address comments received from the QA Reviewer(s).
 - Revised submittals are to include a list of all revisions made, an updated set/copy of Redline Drainage Plan the deliverable along with all supporting documentation and calculations necessary to review and approve the ~~drainage~~ revisions.

- The Hydraulics Reviewer notifies the Project Manager (for information) and the Roadway Design Lead (for action) when the revisions have been approved and may be incorporated into the current roadway plans ~~under this stage~~.

Upon final approval, the Hydraulic Design Engineer submits a final record set of the updated Redline Drainage Plans deliverable, computations, and supplemental data (including photos) for archiving. Where applicable, the final deliverables are uploaded to the Preconstruction Site using ATLAS Workbench.

- Revise permit drawings, FEMA compliance packages, and/or Railroad Drainage Submittal Packages if needed due to the drainage revision.

Complete Railroad Drainage Design Packages (if applicable for the project)

If railroad drainage submittals are required for the project, the Hydraulic Design Engineer provides drainage plans, drainage calculations, and other drainage information requested by the Structures Lead or Project Manager, as needed for coordination with the applicable railroads for approval.

- This information is supplied when no further revisions are expected that would affect the railroad. Limited exceptions to this may occur but require close coordination with the Project Manager, Structures Management Unit, and others as needed, to avoid or minimize impacts to the project schedule.
- The Hydraulic Design Engineer:
 - Submits the Railroad Drainage Design Package along with all supporting documentation and calculations to the Project Manager (for information) and the Hydraulics Reviewer (for action) to complete a review.
 - Revises and resubmits the Redline Drainage Plans to address comments received from the Hydraulics Reviewer.

Upon approval of the Railroad Drainage Design Package, the Hydraulics Reviewer notifies the Project Manager (for information) and the Structures Design Lead (for action).

Prepare and Submit FEMA Compliance Packages

To complete this task, the Hydraulic Design Engineer:

- Prepares any FEMA/NFIP compliance packages needed for the project following the procedures for the type of State Floodplain compliance required.
 - Additional information on this process is included on the Hydraulics Unit's Highway Floodplain Program website and in Chapter 15 of the *Guidelines for Drainage Studies and Hydraulic Design*.
- Revises and resubmits documents to address comments from FEMA and/or FMP.
 - The Hydraulics Unit (Floodplain Management) uploads approval letters to the project SharePoint site and notifies the Roadway Design Lead, Hydraulics Reviewer, and Project Manager when approval is received.
- Informs the Project Manager and other disciplines, as needed, of plan changes and commitments resulting from FEMA and/or FMP review.

Complete Final Drainage Summary Sheet(s)

The Drainage Summary Sheets are completed after the Field Inspection Review Meeting ~~is and after any revisions that come out of that meeting are complete and may require.~~ Once completed, the Drainage Summary Sheet requires ongoing incorporation of any 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.~~ These summary sheets are used for cost estimates prior to Let and provide approximate drainage structure elevations, types, and pipe sizes, which facilitate quantity take ~~offs and allow other design units to coordinate and resolve possible conflicts.~~ offs and may help identify conflicts with other disciplines such as utilities if those conflicts were not identified during earlier stages.

To complete this task, the Hydraulic Design Engineer is to:

- Complete the Drainage Summary Sheets according to the guidance entitled *Completing 3D Series Hydraulic Summary Plan Sheets, (Section 5.5 of the Guidelines for Drainage Studies and Hydraulic Design)* and provide them to the Roadway Design Lead for incorporating into the current roadway design plans/Right-of-Way Plan Set.
- Coordinate the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.
- Revise and resubmit the Drainage Summary Sheets to the Roadway Design Lead and other affected disciplines/Units as directed by the Hydraulics Reviewer to complete a review and QA audit.

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.

Provide Any Required Hydraulics Special Details or Project Provisions

When Hydraulic Special Provisions or Drainage Special Details are required, the Hydraulic Design Engineer provides those to the Roadway Design Lead for incorporation into the PS&E Plans and Submittal. The Hydraulic Design Engineer:

- Coordinates with the Project Manager and Hydraulic QA Reviewer to determine if NCDOT has the required provision or detail needed.
- When the required provision or detail is not available from NCDOT, prepares the provision or detail. When a required drainage provision or drainage detail involves multiple disciplines, the Hydraulic Design Engineer coordinates with the appropriate discipline design engineer to produce the final product.
- Submits a copy of the sealed detail or special provision to the Hydraulics QA Reviewer

- Upon approval from the Hydraulics QA Reviewer, provides a sealed copy of the special detail or special provision to the Roadway Design Lead.

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.
 - Coordination with the Structures Lead ~~coordination~~ and Division Construction Engineer may be required to determine impacts due to temporary work pads, work bridges, causeways, etc. if this information was not available earlier, such as during the Field Inspection Meeting.
 - The Hydraulic Design Engineer should ensure impacts shown on the Environmental Permit Drawings are sufficient for the proposed erosion control as shown on the Erosion Control and Sedimentation Plans.
 - Others are consulted 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 Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.
- Submit the drawings with the Stormwater Management Plan to the Project Manager (for information), the Hydraulics Reviewer to complete a review and QA audit, the Roadway Design Lead, and Environmental Analysis Unit or NEPA/SEPA Lead (for action).
- Revise and resubmit (as needed) to address comments received.

- Conduct the Merger CP4C meeting (if required for the project; see Conduct Merger CP4C Meeting section below), incorporate any changes agreed to during the Merger CP4C meeting, and then resubmit the package to the Hydraulics Reviewer.
- Revise and resubmit (as needed) to address comments received.
- Provide CADD files of the impacts.
 - The Utilities Coordinator uses these CADD files to complete their own permit drawings showing additional utility impacts.
 - The Roadside Environmental Engineer uses these files to ~~determine if additional~~verify impacts ~~need to be included to shown~~ account for erosion control measures, notifying the Hydraulic Design Engineer and Hydraulics Reviewer if additional impacts are needed.
 - The Roadway Design Lead uses these files for a consistency review with the current roadway design plans.
- Assist the Environmental Analysis Unit (Environmental Coordination and Permitting), as needed, for them to complete the environmental permit applications or respond to permitting agencies' questions or concerns until necessary permits are secured.
- Ensure all avoidance and minimization measures have been documented appropriately.

Chapter 14 in the *Guidelines for Drainage Studies and Hydraulic Design* provides additional information on how to prepare these drawings.

Conduct Merger CP4C Meeting (if applicable for the project)

If the project is following the Merger Process (see 2EP1 for related information), the Merger CP4C meeting is held after the Merger CP4B meeting to present the ~~approved Redline Drainage Plans~~final drainage design and Environmental Permit Drawing Package to the agencies and allow for discussion of the environmental impacts. Other items that may be discussed are avoidance and minimization measures and changes from what was presented during the Merger CP4B meeting. The Merger CP4C meeting is held after approval of the Redline Drainage Plans, the combined field inspection, and submittal of the Environmental Permit Drawing Package.

The Hydraulic Design Engineer is to:

- Notify the Hydraulics Reviewer of the preferred date and amount of time needed for the Merger CP4C meeting a minimum of two months prior to the preferred date for central managed projects.
 - The Hydraulics Reviewer coordinates with the Environmental Policy Unit to schedule the meeting and notify attendees.
 - For non-central managed projects, follow the direction of the Project Manager for scheduling the meeting and inviting attendees.
- Prepare and submit Merger CP4C Environmental Permit Drawing Package to the Hydraulics Reviewer, Project Manager, and Environmental Analysis Unit or NEPA/SEPA Lead for central managed projects or as directed by the Project Manager/Division Environmental Officer for non-central managed projects.
 - The CP4C package should be submitted for review at least seven weeks prior to the scheduled Merger CP4C meeting to allow adequate time for review and revisions, if necessary.
 - The plans are to be developed in accordance with the *Guidance for Concurrence Point 4C Meetings and Plans*.

- Review comments are returned to the Hydraulic Design Engineer.
- Revise and resubmit the Merger CP4C Environmental Permit Drawing Package as needed for approval.
 - Upon approval, the Hydraulic Reviewer provides the final Merger CP4C Environmental Permit Drawing Package to the Environmental Policy Unit to distribute to [merger](#) team members.
 - Plans are to be posted at least two weeks prior to the meeting date.
- Conduct the Merger CP4C meeting in accordance with the Merger CP4C Meeting Guidance.
- Prepare meeting minutes in accordance with the *Guidance for Concurrence Point 4C Meetings and Plans* to document discussion and decisions made during the meeting.

4HY1 Complete Any Open Provide Hydraulic Tasks Support

Throughout this activity, the Hydraulic Design Engineer provides support to the project team and other technical disciplines/Units. This communication and coordination help the project team to deliver a high-quality project while minimizing delays to the schedule, scope changes, and schedule delays. The Hydraulic Designer is to Design Engineer should be proactive in identifying drainage-related project concerns or opportunities for improvement as early as possible and in communicating these to the project team for consideration. Providing hydraulic support may include:

- Attending meetings and offering hydraulic expertise and recommendations related to the project.
- Responding to drainage-related questions and concerns from others as they occur.
- Coordinating with others to resolve issues as they arise.

4HY1 Hydraulic Let Preparation

Attend the Design Complete Review Meeting and provide support and assistance, as needed, in the preparation of the PS&E package and the final Let Plans.

In Stage 3, the Hydraulic Design Engineer prepared various permitting and compliance packages. If final permits and authorizations for the project were not received during Stage 3, complete any outstanding tasks from the previous stages, including revisions to drainage and coordinate with other disciplines as necessary to secure the required permits and authorizations. Address any drainage related comments from plan checking and reviews and seal the applicable sheets of the final plans.

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 NCSAC 04B .0109](#)
- [Highway Floodplain Program](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Risk Management Guide V2, major structure reports,](#)

Review Plan in Hand Plan Set and Attend Design Complete Review Meeting

The Hydraulic Design Engineer reviews the Design Complete Review Plan Set prior to the Design Complete Review Meeting. The Hydraulic Design Engineer verifies the drainage design shown matches the final approved drainage design and reviews for any drafting errors or potential conflicts with the drainage design.

The Hydraulic Design Engineer attends and participates in the Design Complete Review Meeting. This allows project team to voice concerns and potential issues to be addressed before the project proceeds, leading to fewer change orders during construction. This task includes:

- Responding to questions or concerns relating to the drainage design.
- Initiating discussion regarding drainage items that may need attention or coordination.
- Participating in traffic control and phasing discussions as each relates to the drainage design.

Provide Hydraulic Support

While the Hydraulic Design Engineer's goal is that all hydraulic design and permitting deliverables are complete prior to Stage 4, some action items from Stage 3 may continue into Stage 4. For example, FEMA compliance packages may have been submitted during Stage 3, but final SFC approval may not have been received before the end of Stage 3. While environmental permit drawings, FEMA packages, Hydraulic Summary Sheets, and the Stormwater Management Plan. This includes submitting all outstanding deliverables with their were completed by the Hydraulic Design Engineer during Stage 3, additional coordination with the Environmental Analysis Group may be required during Stage 4 to secure final permit approval.

~~Questions and comments may arise during the preparation of the PS&E package or during plan checking. The Hydraulic Design Engineer is to address any drainage questions and comments in a timely and 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 manner to avoid schedule delays.~~

~~Revisions during this stage should be minimized as revisions may create delays to the project schedule. Closely coordinate any revisions and secure the permits.~~

~~The QA reviewer is to review all outstanding tasks to ensure that the design complies with the *Guidelines for Drainage Studies and Hydraulic Design* and applicable standards, and deliverables are current and stored in the appropriate location with the Project Manager to minimize schedule delays. If revisions are necessary, the Drainage Design Engineer reviews all previously completed permitting and compliance deliverables from Stage 3 and revises those items as needed, in addition to revising the drainage plans (see 3HY1 for related information regarding revisions).~~

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 ^A	<ul style="list-style-type: none"> ▪ Complete Drainage Investigation 	X
Construction Support Documentation ^A	<ul style="list-style-type: none"> ▪ Complete Hydraulic Construction Support <i>(tasks vary)</i> 	X

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

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 the drainage design component of any construction ~~revision~~ revisions in accordance with 5CS1 and hydraulic references noted above.

- If construction revisions change the permitted environmental impacts, the Hydraulic Design Engineer coordinates the changes with the Division Environmental Officer.
- If construction revisions change floodplain impacts as approved in any State Floodplain Compliance authorizations, the Hydraulic Design Engineer coordinates with the Hydraulics QA Reviewer and the NCDOT Highway Floodplain Engineer to ensure the Department remains in compliance with NFIP floodplain requirements.
 - Reviews shop drawings for stormwater control measure devices as needed.

Throughout the hydraulic construction support process, the Hydraulic Design Engineer may provide best practices or lessons learned to the CLEAR Program as needed- (see related VM activities for related information).

5HY2 Review As-Builts

Overview

Provide timely reviews and technical certification of As-Built plans for structures located in FEMA regulated areas- (including appropriate coordination with Locations and Survey and the construction revision process per 5LS2 and 5CS1).

References

- [Hydraulics Unit Web Page Content and Guidance Documents](#)
- [Highway Floodplain Program](#)
- [Construction Manual – Records & Reports: FEMA Certification](#)

Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
		Highway Floodplain Program
As-Built Certification Package to NCFMP ^A	<ul style="list-style-type: none"> ▪ <i>Submit Final Certified As-Built Package to NCFMP</i> 	X
LOMR Approval ^A	<ul style="list-style-type: none"> ▪ <i>Process LOMR Application to FEMA and Obtain Final LOMR Approval</i> 	X

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

Receive FEMA As-built Structure Drawings

To complete this task, the Highway Floodplain Program Engineer ensures FEMA As-built Structure Drawings have been provided by Division or Construction Unit staff in accordance with procedures outlined in the *NCDOT Construction Manual*.

Review FEMA As-Built Structure Drawings

To complete this task, the Highway Floodplain Program Engineer is to follow the process outlined on the Highway Floodplain Program site.

Submit Final Certified As-Built Package to NCFMP

To complete this task, the Highway Floodplain Program Engineer ~~is to~~:

- ~~Review~~**Reviews** the applicable as-built documents in accordance with *As-Built Certification Review Form* per Highway Floodplain Program.
- ~~Address~~**Addresses** any follow-up issues, as applicable.

Process LOMR Application to FEMA and Obtain Final Approval

To complete this task, the Highway Floodplain Program Engineer is to follow the LOMR application and approval process as set forth in FEMA NFIP regulations, as applicable.

1LS1 Provide Photogrammetric Control and Initiate Surveys

Overview

Provide photogrammetric control in support of the Photogrammetry Unit, preliminary utility mapping in support of long-range transportation planning, and initiate base mapping surveys once project mapping limits have been completed and reviewed.

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

- [Location & Surveys Connect Site](#)
- [Location & Surveys GPS Guidelines](#)
- [Location & Surveys Coordinate Systems](#)
- [Location & Surveys CADD Mapping Standards](#)
- [Location & Surveys Baseline Guidelines](#)
- [Location & Surveys Traffic Signing Diagrams](#)
- [Location & Surveys SUE Guidelines](#)
- [Location & Surveys Procedure Memos](#)
- [Location & Surveys File Naming Convention](#)
- [Location & Surveys Project Review Checklist](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Photogrammetric Control for Preliminary/Planning Mapping (NC Grid Datum) ^Q	<ul style="list-style-type: none"> ▪ Complete Photogrammetric Control for Preliminary/Planning Mapping (NC Grid Datum) 	Locating Engineer	<ul style="list-style-type: none"> ▪ Photogrammetry Unit ▪ Assigned Engineering Firm
SUE Level D Mapping ^Q	<ul style="list-style-type: none"> ▪ Complete SUE Level D 	Locating Engineer	<ul style="list-style-type: none"> ▪ Feasibility Studies Unit ▪ Assigned Engineering Firm
Final Mapping Limits Polygon ^{A, Q}	<ul style="list-style-type: none"> ▪ Perform Independent Review of Mapping Limits Polygon 	Locating Engineer	<ul style="list-style-type: none"> ▪ L&S Regional Engineer ▪ Feasibility Studies Unit ▪ Roadway Design Engineer ▪ Photogrammetry Unit
Photogrammetric Control for Final Survey Mapping (Local Datum) ^Q	<ul style="list-style-type: none"> ▪ Complete Photogrammetric Control for Final Survey Mapping (Local Datum) 	Locating Engineer	<ul style="list-style-type: none"> ▪ L&S Regional Engineer ▪ Photogrammetry Unit ▪ Assigned Engineering Firm
Primary Survey Control Sheet ^Q	<ul style="list-style-type: none"> ▪ Complete Primary Survey Control (C-Series) 	Locating Engineer	<ul style="list-style-type: none"> ▪ Assigned Engineering Firm

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Photogrammetric Control for Preliminary/Planning Mapping (NC Grid Datum)

Photogrammetric control is critical to orient aerial photography onto the North Carolina State Plane Coordinate System. To complete this task, the Location & ~~Survey Division Team Lead~~[Surveys Locating Engineer](#) is to:

- ~~Confirm that~~[Contact](#) all property owners where aerial targets are placed, or those properties crossed to place an aerial target ~~were contacted~~. Contacts are to be made by [the appropriate approved](#) letter, ~~phone, or in person and is to be documented~~.
- Conform to Field Procedures in the *Location & Surveys GPS Guidelines*, complete panel control target surveys where panel targets are placed according to a panel plan provided by the Photogrammetry Unit (see 1PH2 for related information).
- Process and develop panel control in accordance with Office Procedures from the *Location & Surveys GPS Guidelines*.
- Provide panel control to the Photogrammetry Unit, considering:
 - Panel control text file (Grid Datum) for the Photogrammetry Unit to orient aerial photography.
 - Include northing, easting, and elevation projected onto the North Carolina State Plane Coordinate System.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

Complete SUE Level D

Being that SUE Level D mapping may be useful for long-range planning and early design development, the Location & ~~Survey Division Team Lead~~[Surveys Locating Engineer](#) is to:

- Research and/or obtain existing utility records by contacting and coordinating with project utility owners in accordance with the *Location & Surveys SUE Guidelines*.
- Develop and provide a SUE Level D CADD file (NC Grid Datum) that maps existing utility records using the latest approved NCDOT MicroStation version.
- Provide the SUE Level D CADD file to Feasibility Studies Unit (see [1FS31FS2](#) for related information).
 - Note: Ensure this deliverable conforms to the NCDOT CADD Mapping Standards, Procedure Memo PROC 2018-6, and Location & Surveys File Naming Convention.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

Perform Independent Review of Mapping Limits Polygon

The mapping limits polygon defines the boundary for mapping and surveys that are needed for project development. To complete this task, the Location & ~~Survey Division Team Lead~~[Surveys Locating Engineer](#) is to:

- Review and evaluate mapping limits to confirm they are adequate for the proposed design and analysis, but not excessive to overburden resources. Further coordination with the Photogrammetry Unit and the Project Lead may be needed for this task (see ~~1FS3~~1FS2, 1RD1 and 1PH2 for related information).
- Revise and provide a mapping limits polygon that involves:
 - Map final mapping limits using the latest approved NCDOT MicroStation version.
 - Provide final mapping limits CADD file to the Photogrammetry Unit and/or Project Lead.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* procedures.

Complete Photogrammetric Control for Preliminary/Planning Mapping (Local Datum)

With photogrammetric control being critical to orient aerial photography onto a localized North Carolina State Plane Coordinate System, the Location & ~~Survey Division Team Lead~~ [Surveys Locating Engineer](#) is to:

- Develop a local project control network by using the current National Spatial Reference System (NSRS) projected onto the North Carolina State Plane Coordinate System. This process is to conform to the *Location & Surveys GPS Guidelines* and *Location & Surveys Coordinate Systems*.
- ~~Confirm that~~ [Contact](#) all property owners where aerial targets are placed, or those properties crossed to place an aerial target were contacted. Contacts are to be made by letter, phone, or in person and is to be documented.
- Conform to Field Procedures, 6B.3-3 in the *Location & Surveys GPS Guidelines*, perform panel control target surveys where panel targets are placed according to a panel plan provided by the Photogrammetry Unit (See 1PH2 for related information).
- Process and develop panel control in accordance with Office Procedures, 6B.3-4 from the *Location & Surveys GPS Guidelines*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* procedures.
- Provide panel control to the Photogrammetry Unit, considering:
 - Panel control text file (Local Datum) to the Photogrammetry Unit to orient aerial photography.
 - Include both Grid/Local northing, easting, and elevation projected onto the North Carolina State Plane Coordinate System.

Complete Primary Survey Control (~~C-Series~~)

The project's primary control is the critical foundation for establishing the localized horizontal and vertical datum to be utilized for all subsequent surveys. The Location & Surveys ~~Division Team~~ [Lead Locating Engineer](#) is to:

- Establish a local project control network by creating horizontal and vertical survey control monuments using the current National Spatial Reference System (NSRS) projected onto the North

Carolina State Plane Coordinate System. This process is to conform to the *Location & Surveys GPS Guidelines* and *Location & Surveys Coordinate Systems*.

- Develop Primary Survey Control Sheet(s) (~~C-Series~~) using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Baseline Guidelines*, *Location & Surveys Procedure Memos*, and *Location & Surveys Connect Site*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

While these tasks and the related deliverables may be completed during Stage 1, task completion may also extend into Stage 2. Complete Final Surveys (2LS1) provides additional details on each task and how to complete the related deliverables.

2LS1 Complete Final Surveys

Overview

Provide complete surveys and mapping, including wetlands, jurisdictional streams ~~and buffers~~, for the project’s survey mapping limits in support of the design, right-of-way acquisition, and construction phases.

References

- [Location & Surveys DTM Manual](#)
- [Mobile and Terrestrial LiDAR Guidelines](#)
- [Location & Surveys GPS Guidelines](#)
- [Location & Surveys Coordinate Systems](#)
- [Location & Surveys CADD Mapping Standards](#)
- [Location & Surveys Hydro Manual](#)
- [Location & Surveys Baseline Guidelines](#)
- [Location & Surveys Traffic Signing Diagrams](#)
- [Location & Surveys SUE Guidelines](#)
- [Location & Surveys Procedure Memos](#)
- [Location & Surveys Connect Site](#)
- [Location & Surveys Project Review Checklist](#)
- [NCDOT Wetland Mapping Guidelines](#)
- [Location & Surveys File Naming Convention](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Final Surveys ^Q	<ul style="list-style-type: none"> ▪ Complete Field Surveys and Project Mapping 	Locating Engineer	<ul style="list-style-type: none"> ▪ L&S Regional Engineer ▪ Assigned Engineering Firm ▪ Other Technical Disciplines or Unit Leads
Surveyed Wetlands ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete Wetland/Jurisdictional Stream/Buffer Field Surveys and Mapping 	Locating Engineer	<ul style="list-style-type: none"> ▪ Environmental Engineer ▪ Assigned Engineering Firm
Secondary Survey Control Sheets ^Q	<ul style="list-style-type: none"> ▪ Complete Secondary Survey Control (C-Series) 	Locating Engineer	<ul style="list-style-type: none"> ▪ Assigned Engineering Firm
Parcel Polygon File ^Q	<ul style="list-style-type: none"> ▪ Complete Parcel Polygon Mapping 	Locating Engineer	<ul style="list-style-type: none"> ▪ Assigned Engineering Firm
Final Survey Mapping Limits Polygon ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete Survey Limits Polygon 	Locating Engineer	<ul style="list-style-type: none"> ▪ Assigned Engineering Firm

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Field Surveys and Project Mapping

With accurate field surveys and mapping being the critical foundation for all subsequent design, right-of-way acquisition, and construction phases for a project, the Location & [Survey Division Team Lead Surveys Locating Engineer](#) is to:

- Confirm that all property owners impacted by the mapping limits and those properties accessed to perform required surveys were contacted. Contacts are to be made by ~~letter, phone, or in person and is to be documented~~ the appropriate approved letter.
- Establish the project's primary control (Azimuth Pairs), secondary control (Baseline), and benchmarks (Vertical) in accordance with the *Location & Surveys GPS Guidelines*, *Location & Surveys Baseline Guidelines*, and *Location & Surveys Coordinate Systems*.
- Obtain planimetric mapping and ground elevation data included in the project's survey mapping limits (See 1PH2 for related information).
- Conform to the *NCDOT CADD Mapping Standards*, complete planimetric classification that includes field classifying and labeling existing planimetric features referenced in the Final Survey CADD File and map per the latest approved NCDOT MicroStation version.
- Perform ~~and/or obtain~~ pavement and ground DTMs and/or coordinate with the Terrestrial Scan LiDAR Group (TSLG) in accordance with the *Location & Surveys DTM Manual* and *Mobile and Terrestrial LiDAR Guidelines*. This includes developing the Final Terrain Model CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Perform hydrographic surveys and/or coordinate with the Hydrographic Sonar Group (HSG) in accordance with the *Location & Surveys DTM Manual* and *Location & Surveys Hydro Manual* to obtain hydrographic features and are referenced in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Perform Sanitary Sewer and Storm Utility surveys in accordance with the *Location & Surveys DTM Manual* and *Location & Surveys Hydro Manual* to obtain sanitary sewer and storm sewer features and are referenced in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- In accordance with the *Location & Surveys SUE Guidelines*, perform subsurface utility surveys (per scope) by:
 - Obtaining subsurface utility data and referencing in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
 - Providing the subsurface utility CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards* to obtain linear footage.
- Perform Septic System surveys in accordance with the *Location & Surveys Procedure Memo (Septic System Mapping In Development)* to obtain septic system features (See 2RD1 and 2RW1 for related information) and are referenced in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Develop property mapping by performing courthouse research, reconning and locating monumentation, requesting the Right-of-Way Abstract (See 2RW1 for related information), and investigating as-builts and maps according to records and monumentation. Reference in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.
- Notify the project team, including the Project Manager, that all MicroStation base mapping files and deliverables have been completed (See 2RD1 for related information).

Complete Wetland/Jurisdictional Stream/~~Buffer~~ Field Surveys and Mapping

Required Wetland/Jurisdictional Stream/~~Buffer~~ Field Surveys and Mapping are critical for obtaining necessary agency permitting. For this task, the Location & ~~Survey Division Team Lead~~ [Surveys Locating Engineer](#) is to:

- Complete the wetland/jurisdictional stream/~~buffer~~ surveys in accordance with the *NCDOT Wetland Mapping Guidelines (Wetland Procedures In Development)*. This work includes:
 - ♦ Field locations to create a surveyed WEX or WET CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
 - ♦ [Field locations to create a surveyed jurisdictional streams and buffers referenced in the Final Survey](#) CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.
- Notify the project team, including the Project Manager, that all wetland/jurisdictional stream/~~buffer~~ mapping files and deliverables have been completed (see 2EN1 for related information).

Complete Secondary Survey Control [Sheets](#) (C-Series)

The project's Secondary Survey Control Sheets are a critical part in documenting the localized horizontal and vertical datum to be utilized for all subsequent surveys. The Location & Surveys ~~Division Team Lead~~ [Locating Engineer](#) is to:

- Develop Primary and/or Secondary Survey Control Sheets (C-Series) by computing existing alignments (ELN) and compiling both C-Series right-of-way sheets using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Baseline Guidelines*, *Location & Surveys Procedure Memos*, and *Location & Surveys Connect Site*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

Complete Parcel Polygon Mapping

The Parcel Polygon Mapping CADD file defines the parcel's property lines to be used during the right-of-way acquisition stage (4LS1) and allows NCDOT to develop accurate metes and bounds descriptions. The Location & Surveys ~~Division Team Lead~~ [Locating Engineer](#) is to:

- [Compile and prepare a GIS Centroid Property Data Layer utilizing the Statewide ArcGIS Centroid Property Database in conformance with the Location & Surveys Procedure Memo \(Parcel Polygon Procedure In Development\), and Location & Surveys Connect Site.](#)
- Compile and prepare a Parcel Polygon Mapping CADD file utilizing the property mapping in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Procedure Memo (Parcel Polygon Procedure In Development)*, and *Location & Surveys Connect Site*.

- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

Complete Survey Limits Polygon

The Survey Limits Polygon CADD file defines the boundary of final surveys to be used as a GIS database layer historically documenting the project's survey limits. To complete this task, the Location & ~~Survey Division Team Lead~~ [Surveys Locating Engineer](#) is to:

- Map the final Survey Limits Polygon ([ECTM Boundary or](#) TIN Hull) mapping limits using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Procedure Memo (Survey Limits Polygon In Development)*, and *Location & Surveys Connect Site*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

2LS2 Complete SUE Level A and ROW Advanced Acquisition Surveys

Overview

Complete SUE Level A investigations for utility conflict resolutions. Provide field delineation and acquisition exhibits and/or descriptions in support of right-of-way (ROW) advanced acquisitions.

References

- [Location & Surveys GPS Guidelines](#)
- [Location & Surveys Coordinate Systems](#)
- [Location & Surveys CADD Mapping Standards](#)
- [Location & Surveys Traffic Signing Diagrams](#)
- [Location & Surveys SUE Guidelines](#)
- [Location & Surveys Procedure Memos](#)
- [Location & Surveys Connect Site](#)
- [Location & Surveys Project Review Checklist](#)
- [Location & Surveys File Naming Convention](#)
- [Location & Surveys Unit Property Survey Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
SUE Level A ^Q	<ul style="list-style-type: none"> ▪ Complete SUE Level A and Revise Mapping 	Locating Engineer	<ul style="list-style-type: none"> ▪ Utility Engineer ▪ Assigned Engineering Firm
ROW Advanced Acquisition Surveys ^Q	<ul style="list-style-type: none"> ▪ Complete ROW Advanced Acquisition Surveys and Mapping 	Locating Engineer	<ul style="list-style-type: none"> ▪ Division L&S Regional Engineer ▪ Assigned ROW Agent ▪ Assigned Engineering Firm

^Q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete SUE Level A and Revise Mapping

Accurate SUE Level A data is needed to minimize utility conflicts and avoid unnecessary costs and delays when relocating utilities. For this task, the Location & ~~Survey Division Team Lead~~ [Surveys Locating Engineer](#) is to:

- Perform/obtain surface utility Level A data and reference in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards* (See 2UT1 for related information).
- Compile and deliver the SUE Level A Certification Sheets in accordance with *NCDOT Location & Surveys Standard Procedures*, *Location & Surveys SUE Guidelines*, *Location & Surveys File Naming Convention*, *Location & Surveys Procedure Memo PROC 2018-6*, and *Location & Surveys Baseline Guidelines*.

- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

Complete ROW Advanced Acquisition Surveys and Mapping

Accurate advance acquisition exhibits and/or descriptions allow NCDOT to acquire property necessary for timely project construction. To accomplish this, the Location & ~~Survey Division Team Lead~~[Surveys Locating Engineer](#) is to:

- Collaborate with the Project Manager (for information) and ~~Division~~[Assigned](#) Right-of-Way Agent (for action) to identify and prioritize all Advance Acquisition Parcels (See 2RW1 for related information).
- Verify with the ~~Division~~[Assigned](#) Right-of-Way Agent that all affected property owners have been contacted and Right-of-Entry has been granted.
- Complete field delineation of proposed right-of-way and easements across all affected project parcels in accordance with the *Location & Surveys Baseline Guidelines*.
- Compile and prepare an advance acquisition exhibit (PDF) and/or description (txt) using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. This exhibit and/or description is to conform to the *Location & Surveys Procedure Memo PROC 2018-6* and *Location & Surveys Unit Property Survey Manual*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

3LS1 Complete Additional Surveys and Initiate ROW Acquisition Surveys

Overview

Provide additional surveys and base mapping for the project’s revised mapping limits in support of the design, right-of-way acquisition and construction phases. Initiate right-of-way field delineation, metes and bounds descriptions, and eminent domain exhibit maps in support of right-of-way acquisitions.

References

- [Location & Surveys DTM Manual](#)
- [Location & Surveys GPS Guidelines](#)
- [Location & Surveys Hydro Manual](#)
- [Location & Surveys Coordinate Systems](#)
- [Location & Surveys CADD Mapping Standards](#)
- [Location & Surveys Baseline Guidelines](#)
- [Location & Surveys Traffic Signing Diagrams](#)
- [Location & Surveys SUE Guidelines](#)
- [Location & Surveys Procedure Memos](#)
- [Location & Surveys Project Review Checklist](#)
- [Location & Surveys File Naming Convention](#)
- [Mobile and Terrestrial LiDAR Guidelines](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverables	Task	Responsible Party	
		Activity Leader	Additional Support
Additional Surveys ^Q	<ul style="list-style-type: none"> ▪ Complete Additional Field Surveys and Revise Project Mapping 	Locating Engineer	<ul style="list-style-type: none"> ▪ L&S Regional Engineer ▪ Assigned Engineering Firm ▪ Other Technical Disciplines or Unit Leads
Parcel Polygon File ^Q	<ul style="list-style-type: none"> ▪ Complete <u>Updated</u> Parcel Polygon Mapping 	Locating Engineer	<ul style="list-style-type: none"> ▪ Assigned Engineering Firm
Final Survey Mapping Limits Polygon ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete <u>Updated</u> Survey Limits Polygon 	Locating Engineer	<ul style="list-style-type: none"> ▪ Assigned Engineering Firm

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Complete Additional Field Surveys and Revised Project Mapping

Building on the work done in 2LS1, 2LS2 and as needed for the project, the Location & **Survey Division Team Lead Surveys Locating Engineer** is to:

- Collaborate with the Photogrammetry Unit for readily available mapping and/or additional flight control to fly and compile planimetric mapping and ground elevation data- [\(See Proposed 3PH1 for related information\)](#).
- Coordinate with the appropriate disciplines/Units to confirm the Latest Survey CADD File(s).

- Confirm that all property owners impacted by the mapping limits and those properties accessed to perform required additional surveys were contacted. Contacts are to be made by ~~letter, phone, or in person and is to be documented~~ the appropriate approved letter.
- Establish additional secondary control (Baseline) and benchmarks (Vertical) in accordance with the *Location & Surveys GPS Guidelines*, *Location & Surveys Baseline Guidelines*, and *Location & Surveys Coordinate Systems*.
- Update Primary and/or Secondary Survey Control Sheets (C-Series) by computing existing alignments (ELN) and compiling both C-Series right-of-way sheets using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Baseline Guidelines*, *Location & Surveys Procedure Memos*, and *Location & Surveys Connect Site*.
- Conform to the *NCDOT CADD Mapping Standards*, complete planimetric classification that includes field classifying and labeling existing planimetric features referenced in the Final Survey CADD File and map per the latest approved NCDOT MicroStation version.
- Perform ~~and/or obtain~~ pavement and ground DTMs and/or coordinate with the Terrestrial Scan LiDAR Group (TSLG) in accordance with the *Location & Surveys DTM Manual* and *Mobile and Terrestrial LiDAR Guidelines*. This includes developing the Final Terrain Model CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Perform hydrographic surveys and/or coordinate with the Hydrographic Sonar Group (HSG) in accordance with the *Location & Surveys DTM Manual* and *Location & Surveys Hydro Manual* to obtain hydrographic features and are referenced in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Perform Sanitary Sewer and Storm Utility surveys in accordance with the *Location & Surveys DTM Manual* and *Location & Surveys Hydro Manual* to obtain sanitary sewer and storm sewer features and are referenced in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- In accordance with the *Location & Surveys SUE Guidelines*, perform subsurface utility surveys (per scope) by:
 - Obtaining subsurface utility data and referencing in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
 - Providing the subsurface utility CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards* to obtain linear footage.
- Perform Septic System surveys in accordance with the *Location & Surveys Procedure Memo (Septic System Mapping In Development)* to obtain septic system features (See 2RD1 and 2RW1 for related information) and are referenced in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Develop property mapping by performing courthouse research, reconning and locating monumentation, requesting the Right-of-Way Abstract (See 2RW1 for related information), and investigating as-builts and maps according to records and monumentation. Reference in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

- Notify the project team, including the Project Manager, that all MicroStation base mapping files and deliverables have been updated to include the requested additional surveys (See 2RD2 and 3RD1 for related information).

Complete Updated Parcel Polygon Mapping

The Parcel Polygon Mapping CADD file defines the parcel's property lines to be used during the right-of-way acquisition stage (4LS1) and allows NCDOT to develop accurate metes and bounds descriptions.

The Location & Surveys ~~Division Team Lead~~[Locating Engineer](#) is to:

- ~~Compile and prepare a~~[Compile and prepare an Updated GIS Centroid Property Data Layer utilizing the Statewide ArcGIS Centroid Property Database in conformance with the *Location & Surveys Procedure Memo \(Parcel Polygon Procedure In Development\)*, and *Location & Surveys Connect Site*.](#)
- [Compile and prepare an Updated](#) Parcel Polygon Mapping CADD file utilizing the property mapping in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Procedure Memo (Parcel Polygon Mapping In Development)*, and *Location & Surveys Connect Site*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

Complete Updated Survey Limits Polygon

The Updated Survey Limits Polygon CADD file defines the current boundary of final surveys to be used as a GIS database layer historically documenting the project's survey limits. To complete this task, the Location & ~~Survey Division Team Lead~~[Surveys Locating Engineer](#) is to:

- Map the final Survey Limits Polygon ([ECTM Boundary or](#) TIN Hull) mapping limits using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Procedure Memo (Survey Limits Polygon Mapping In Development)*, and *Location & Surveys Connect Site*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

While these tasks and the related deliverables may be completed during Stage 3, task completion may also extend into Stage 4. Complete ROW Acquisition Surveys (4LS1) provides additional details on each task and how to complete the related deliverables.

4LS1 Complete ROW Acquisition Surveys

Overview

Provide right-of-way field delineation, metes, and bounds descriptions, [polygonsCADD Take Maps](#) and tables, [Plan Sheet Exhibits](#), eminent domain exhibit maps, special acquisition maps and the ROW Series Plan Set in support of right-of-way acquisitions.

References

- [Location & Surveys Baseline Guidelines](#)
- [Location & Surveys CADD Mapping Standards](#)
- [Location & Surveys Unit Property Survey Manual](#)
- [Location & Surveys Procedure Memos](#)
- [Location & Surveys Project Review Checklist](#)
- [Location & Surveys File Naming Convention](#)
- [North Carolina General Statutes §136-19.4A](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
ROW Field Delineation ^Q	<ul style="list-style-type: none"> ▪ Complete ROW Field Delineation 	Locating Engineer	<ul style="list-style-type: none"> ▪ DivisionL&S Regional Engineer ▪ Assigned ROW Agent ▪ Assigned Engineering Firm
ROW Metes and Bounds Descriptions, PolygonsCADD Take Maps and Tables, and Plan Sheet Exhibits ^Q	<ul style="list-style-type: none"> ▪ Complete ROW Metes and Bounds Descriptions, PolygonsCADD Take Maps and Tables, and Plan Sheet Exhibits 	Project Data Condemnation Engineer	<ul style="list-style-type: none"> ▪ DivisionAssigned ROW Agent ▪ Locating Engineer ▪ Assigned Engineering Firm
Eminent Domain Preliminary Exhibits ^Q	<ul style="list-style-type: none"> ▪ Complete Eminent Domain Preliminary Exhibits 	Locating Engineer	<ul style="list-style-type: none"> ▪ Project Data Condemnation Engineer ▪ L&S Regional Engineer ▪ Assigned Engineering Firm
Eminent Domain Final Exhibits ^Q	<ul style="list-style-type: none"> ▪ Complete Eminent Domain Final Exhibits 	Project Data Condemnation Engineer	<ul style="list-style-type: none"> ▪ Attorney General's Office ▪ Locating Engineer ▪ L&S Regional Engineer ▪ Assigned Engineering Firm
Special Acquisition Maps ^Q	<ul style="list-style-type: none"> ▪ Complete Special Acquisition Maps 	Locating Engineer	<ul style="list-style-type: none"> ▪ DivisionL&S Regional Engineer ▪ Assigned ROW Agent ▪ Project Data Condemnation Engineer ▪ Government/Private Agency ▪ Assigned Engineering Firm
ROW Series Plan Set ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete ROW Series Plan Set 	Locating Engineer	<ul style="list-style-type: none"> ▪ L&S Regional Engineer ▪ Assigned Engineering Firm

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^q Indicates that final document(s) or data set(s) requires review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete ROW Field Delineation

Accurate field delineation of proposed right-of-way and easements allows the ROW Agents and property owners to visualize impacts to affected parcels. For this task, the Location & ~~Survey Division Team~~ [Lead Surveys Locating Engineer](#) is to:

- Verify that ROW authorization has been granted by the Board of Transportation and collaborate with the Project Manager (for information) and ~~Division Assigned~~ Right-of-Way Agent (for action) to prioritize staking of parcels (See 3RW2 for related information).
- Contact all property owners identified for property acquisition and those properties that may need to be accessed to perform ROW surveys. Contacts are to be made by ~~letter, phone, or in person and is to be documented~~ [the appropriate approved letter](#).
- Perform field right-of-way delineation in accordance with the *Location & Surveys Procedure Memo (ROW Procedures In Development)*. This work includes:
 - Computing and verifying plan locations of proposed right-of-way and easement monuments.
 - Completing field delineation of proposed right-of-way and easement monumentation across all affected parcels in accordance with the set of plans used for acquisition.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures.

Complete ROW Metes and Bounds Descriptions, ~~Polygons~~ [CADD Take Maps](#) and [Tables](#), and [Plan Sheet Exhibits](#)

Accurate right-of-way metes and bounds descriptions, ~~polygons~~ [CADD Take \(CT\) Maps](#) and [Tables](#), and [Plan Sheet Exhibits](#) allow NCDOT to acquire necessary property to construct the project. To do this, the Location & ~~Survey Division Team~~ [Lead Surveys Project Data Condemnation Engineer](#) is to:

- Collaborate with the Project Manager (for information) and ~~Division Assigned~~ Right-of-Way Agent (for action) to prepare ROW metes and bounds descriptions, ~~polygons~~ [CADD Take \(CT\) Maps](#) and [Tables](#) for the entire project.
- Compile and prepare [Polygons CADD Take \(CT\) Maps](#) and [Tables](#) Mapping CADD file utilizing the Parcel Polygon Mapping and ROW Plan Set CADD file (See 3RD1 for related information) using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Procedure Memo (Deed Description Procedure In Development)*, and *Location & Surveys Connect Site*.
- Compile and prepare ROW metes and bounds descriptions utilizing the [Polygons CADD Take \(CT\) Maps](#) and [Tables](#) Mapping CADD file using the latest approved NCDOT MicroStation version. Complete in conformance with the *Location & Surveys Procedure Memo (Deed Description Procedure In Development)*, and *Location & Surveys Connect Site*.
- ~~Compile and prepare GIS Layers in conformance with the Location & Surveys Procedure Memo (Deed Description Procedure In Development), and Location & Surveys Connect Site. Compile and prepare a Plan Sheet Exhibit (Formerly PCM) using the latest approved NCDOT MicroStation~~

version and NCDOT CADD Mapping Standards to be utilized in the litigation process by the Attorney General's Office.

- Complete the Location & Surveys Project Review Checklist (PRC) and the applicable QA/QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures.
- Provide ROW metes and bounds descriptions, ~~polygons~~CADD Take (CT) Maps and Tables, and Plan Sheet Exhibits in PDF format to Project Manager (for information) and ~~Division~~Assigned Right-of-Way (for action) in accordance with *Location & Surveys Procedure Memo* (Deed Description Procedure In Development) (See 4RW1 for related information).
- Provide Plan Sheet Exhibits in PDF format to the Attorney General's Office. (See 4RW1 for related information).

Complete Eminent Domain Preliminary Exhibits

NCDOT uses eminent domain preliminary exhibits in the condemnation process for ~~both mediation and as a courtroom~~preparation of the eminent domain final exhibit. Exhibits are to be prepared in accordance with North Carolina General Statutes §136-106 and are on a strict schedule mandated by this statute. To support the preparation of these exhibits, the Location & ~~Survey Division Team~~Lead Surveys Locating Engineer is to:

- Collaborate with the Project Data and Condemnation Engineer to compile and prepare a Plan Sheet Parcel Exhibit Preliminary Eminent Domain Exhibits (See 4RW1 for related information) using the latest approved NCDOT MicroStation version and NCDOT CADD Mapping Standards to ~~be produce an Eminent Domain Preliminary Exhibit~~ utilized by the Project Data and Condemnation Engineer in the litigation in conformance with the *Location and Surveys Unit Property Survey Manual*.
- Complete the Location & Surveys Project Review Checklist (PRC) and the applicable QA/QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures.
- Provide Eminent Domain Preliminary Exhibits in CADD and PDF formats to the Location & Surveys Project Data and Condemnation Engineer in conformance with the Location and Surveys Unit Property Survey Manual.

Complete Eminent Domain Final Exhibits

NCDOT uses eminent domain final exhibits in the condemnation process by the Attorney General's Office for both mediation and as a courtroom exhibit. Exhibits are to be prepared in accordance with North Carolina General Statutes §136-106 and are on a strict schedule mandated by this statute. To support the preparation of these exhibits, the Location & Surveys Project Data and Condemnation Engineer is to:

- Collaborate with the Locating Engineer to compile and prepare ~~an~~ Preliminary Eminent Domain Exhibit Exhibits (See 4RW1 for related information) using the latest approved NCDOT MicroStation version and NCDOT CADD Mapping Standards to produce an Eminent Domain Exhibit utilized by the Attorney General's Office in conformance with the Location and Surveys Unit Property Survey Manual.

- Collaborate if needed with North Carolina Attorney General’s Office ~~and Locating Engineer~~ to complete the Final Eminent Domain ~~Exhibit~~Exhibits.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.
- Provide Eminent Domain Final Exhibits in PDF format to Right-of-Way Unit (for information) and Attorney General’s Office (for action) in conformance with the *Location and Surveys Unit Property Survey Manual*.

Complete Special Acquisition Maps

NCDOT uses special acquisition maps to acquire necessary property to construct the project. Maps are to be prepared in accordance with individual government or private agency requirements. To support the preparation of these maps, the Location & ~~Survey Division Team Lead~~Surveys Locating Engineer is to:

- Compile and prepare special acquisition maps using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the individual governmental or private agency requirements. This work may include:
 - Railroad Easement Maps (See 3ST1 and 3RR1 for related information~~})~~)
 - Federal Energy Regulatory Commission (FERC Map~~})~~)
 - American Land Title Association (ALTA Map).
 - Department of the Interior (Federal Refuge and Park Land Maps~~})~~)
 - Department of Defense (Military Installations~~})~~)
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

Complete ROW Series Plan Set

The ROW Series Plan Set provides information necessary for re-establishment of all permanent right-of-way, control of access, and easement monumentation by NCDOT or private surveyors. ~~The~~This Plan Set is used as documentation for ROW acquisition in combination with the Roadway Plans. When Roadway Plans have not been developed, a stand-alone ROW Series Plan Set may be used in lieu of a Recorded 47-30 Plat. The ROW Series Plan Set is prepared in accordance with *North Carolina General Statutes §136-19.4A*. To complete the ROW Series Plan Set, the Location & ~~Survey Division Team Lead~~Surveys Locating Engineer is to:

- Complete the ROW Series D, E, and RW Sheets using the ROW Plan Set (See 3RD1 and 4RW1 for related information) or the scoped ROW acquisition surveys in lieu of ROW Plan Set with the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Ensure this deliverable conforms to the *Location & Surveys Procedure Memo PROC 2018-3*, *Location & Surveys Procedure Memo PROC 2018-5*, *Location & Surveys Connect Site* and *Location & Surveys File Naming Convention*.

Complete Photogrammetric Control for Construction Panels (Local Datum)

With photogrammetric control being critical to orient aerial photography onto a localized North Carolina State Plane Coordinate System, the Location & ~~Survey Division Team Lead~~[Surveys Locating Engineer](#) is to:

- Conform to Field Procedures, 6B.3-3 in the *Location & Surveys GPS Guidelines*, perform panel control target surveys where panel targets are placed according to a panel plan provided by the Photogrammetry Unit (See 5PH1 for related information).
- Process and develop panel control in accordance with Office Procedures, 6B.3-4 from the *Location & Surveys GPS Guidelines*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* procedures.
- Provide panel control to the Photogrammetry Unit, considering:
 - Panel control text file (Local Datum) to the Photogrammetry Unit to orient aerial photography.
 - Include both Grid/Local northing, easting, and elevation projected onto the North Carolina State Plane Coordinate System.

Complete Unmanned Aircraft Vehicle Construction Support

The use of Unmanned Aircraft Vehicles in support of construction and/or additional surveys and mapping, the Location & Surveys ~~Division Team Lead~~[Locating Engineer](#) is to:

- Collaborate with the Resident Engineer in support of earthwork quantities that include but are not limited to borrow pits, project corridors, and project site developments.
- Collaborate with the Resident Engineer to provide aerial photography and/or aerial videography for documenting project progress, erosion control monitoring and incident violations.
- Collaborate with the Resident Engineer to obtain additional survey mapping for the completion of design and construction revisions.

Complete Additional Field Surveys and Revise Project Mapping

Building on the work done in 2LS1, 2LS2, 3LS1 and as needed for the project, the Location & ~~Survey Division Team Lead~~[Surveys Locating Engineer](#) is to:

- Collaborate with the Photogrammetry Unit for readily available mapping and/or additional flight control to fly and compile planimetric mapping and ground elevation data (See 5PH1 for related information).
- Coordinate with the appropriate disciplines/Units to confirm the Latest Survey CADD File(s).
- Confirm that all property owners impacted by the mapping limits and those properties accessed to perform required additional surveys were contacted. Contacts are to be made by letter, phone, or in person and is to be documented.
- Establish additional secondary control (Baseline) and benchmarks (Vertical) in accordance with the *Location & Surveys GPS Guidelines*, *Location & Surveys Baseline Guidelines*, and *Location & Surveys Coordinate Systems*.
- Develop Primary and/or Secondary Survey Control Sheets (C-Series) by computing existing alignments (ELN) and compiling both C-Series right-of-way sheets using the latest approved

NCDOT MicroStation version and *NCDOT CADD Mapping Standards*. Complete in conformance with the *Location & Surveys Baseline Guidelines*, *Location & Surveys Procedure Memos*, and *Location & Surveys Connect Site*.

- Conform to the *NCDOT CADD Mapping Standards*, complete planimetric classification that includes field classifying and labeling existing planimetric features referenced in the Final Survey CADD File and map per the latest approved NCDOT MicroStation version.
- Perform and/or obtain pavement and ground DTMs in accordance with the *Location & Surveys DTM Manual* and *Mobile and Terrestrial LiDAR Guidelines*. This includes developing the Final Terrain Model CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Perform hydrographic surveys in accordance with the *Location & Surveys DTM Manual* and *Location & Surveys Hydro Manual* to obtain hydrographic features and are referenced in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- In accordance with the *Location & Surveys SUE Guidelines*, perform subsurface utility surveys (per scope) by:
 - ♦ Obtaining subsurface utility data and referencing in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
 - ♦ Providing the subsurface utility CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards* to obtain linear footage.
- Develop property mapping by performing courthouse research, reconning and locating monumentation, requesting the Right-of-Way Abstract, and investigating as-builts and maps according to records and monumentation. Reference in the Final Survey CADD file using the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.
- Notify the project team, including the Project Manager, that all MicroStation base mapping files and deliverables have been updated to include the requested additional surveys (See 5CS1 for related information).

Complete Construction Survey Support

Accurate construction stakeout is necessary for the timely completion of transportation facility projects, the Location & ~~Survey Division Team Lead~~[Surveys Locating Engineer](#), is to:

- Coordinate with the appropriate disciplines/Units to confirm the Latest CADD File(s).
- Perform construction surveys as directed and in accordance with the *Manual for Construction Layout*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

5LS2 Perform Verification of Right-of-Way and As-Built Surveys

Overview

Perform verification of all permanent right-of-way, control of access and easement monumentation and provide final ROW Series Plan Set. Complete as-built surveys at the time of project completion.

References

- [Location & Surveys Baseline Guidelines](#)
- [Location & Surveys Procedure Memos](#)
- [Location & Surveys CADD Mapping Standards](#)
- [Location & Surveys Procedure Memo PROC 2018-3](#)
- [Location & Surveys Project Review Checklist](#)
- [Location & Surveys Procedure Memo PROC 2018-6](#)
- [Location & Surveys Procedure Memo PROC 2018-5](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Final ROW Field Delineation ^Q	<ul style="list-style-type: none"> ▪ Complete Final ROW Field Delineation 	Locating Engineer	<ul style="list-style-type: none"> ▪ Resident Engineer ▪ Division Assigned ROW Agent • Assigned Engineering Firm
Final ROW Series Plan Set ^{A, Q}	<ul style="list-style-type: none"> ▪ Complete Final ROW Series Plan Set 	Locating Engineer	<ul style="list-style-type: none"> • Resident Engineer • Assigned Engineering Firm
As-Built Surveys ^Q	<ul style="list-style-type: none"> ▪ Complete As-Built Surveys 	Locating Engineer	<ul style="list-style-type: none"> • Resident Engineer • Other Technical Disciplines or Unit Leads • Assigned Engineering Firm

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) require review in accordance with NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Final ROW Field Delineation

Accurate field delineation of recorded right-of-way and easements provides information necessary for re-establishment of all permanent right-of-way, control of access, and easements owned by NCDOT. For this task, the Location & [Survey Division Team Lead Surveys Locating Engineer](#) is to:

- Perform final field right-of-way delineation in accordance with the *Location & Surveys Procedure Memo (ROW Procedures In Development)*. This work includes:
 - Computing and verifying plan locations of final permanent right-of-way and easement monumentation.
 - Completing field delineation of final permanent right-of-way and easement monumentation across all affected parcels in accordance with the set of plans used for acquisition.

- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.

Complete Final ROW Series Plan Set

The Final ROW Series Plan Set provides information necessary for re-establishment of all permanent right-of-way, control of access, and easement monumentation by NCDOT or private surveyors. The plan set is prepared in accordance with *North Carolina General Statutes §136-19.4A*. To complete the Final ROW Series Plan Set, the Location & ~~Survey Division Team Lead~~ [Surveys Locating Engineer](#) is to:

- Complete the Final ROW Series D, E, and RW Sheets using the current ROW Plan Set (See 5RD1 for related information) with the latest approved NCDOT MicroStation version and *NCDOT CADD Mapping Standards*.
- Ensure this deliverable conforms to the *Location & Surveys Procedure Memo PROC 2018-3*, *Location & Surveys Procedure Memo PROC 2018-5*, *Location & Surveys Connect Site* and *Location & Surveys File Naming Convention*.
- Complete the *Location & Surveys Project Review Checklist (PRC)* and the applicable QA/QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures.
- Notify the [Division Assigned](#) Right of Way Agent or Central Right of Way office (Procedure In Development), including the Project Manager that the ROW Series Plan Set have been updated in accordance with *Location & Surveys Procedure Memo PROC 2018-3*, *Location & Surveys Procedure Memo PROC 2018-5*, *Location & Surveys Connect Site* and *Location & Surveys File Naming Convention*. (See 5RW1 and 5CS1 for related information).

Complete As-Built Surveys

As-Built Surveys provide a record or accurate representation of the projects' infrastructure at the time of completion. ~~To complete this task, the Location & Surveys Team Lead is to:~~

~~Procedures In Development~~

Provide More Current Mapping Product

If the Project Lead determines that the best available geospatial data is obsolete, the Project Lead submits a request to the Photogrammetry Unit to obtain current mapping. The Photogrammetry Resource Page includes instructions on how to request photogrammetric mapping and the process used by Photogrammetry Unit to produce mapping. This work includes:

- Obtaining controlled aerial photography ([see 1LS1 for related information](#))
- Compiling elevation data
- Creating the orthoimagery
- Compiling topographic mapping

Complete QC/QA Procedures

The Photogrammetry Assistant Unit Head is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution.

1PH2 Compile Aerial Photography and Mapping

Overview

Upon request, obtain controlled aerial photography that covers the project mapping limits to ensure horizontal and vertical mapping accuracies are achieved. Use in-house staff or a Private Engineering Firm to perform aerotriangulation using ground survey control provided by the Location and Surveys Unit and airborne GNSS-IMU control, compiling planimetric and digital terrain mapping data, and creating a digital mosaic.

References

- [Photogrammetry Resource Page](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Photogrammetry Assistant Unit Head	
Controlled Aerial Photography (and all related plans)	<ul style="list-style-type: none"> ▪ <i>Schedule and Fly Project</i> 	X	Location and Survey Unit and Aviation Unit
Large Scale Mapping ^Q (Planimetric with Surface model)	<ul style="list-style-type: none"> ▪ <i>Providing Mapping Product</i> 	X	
Digital Mosaic ^Q		X	
Airborne Survey reports ^Q		X	

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Schedule and Fly Project

Controlled aerial photography requires coordination with both the Location and Surveys Unit and the Aviation Unit. This involves the following steps:

- Create a Flight and Ground Control Survey Plan that shows the proposed flight lines for the project with specific flying heights, forward overlap, and side overlap that optimally facilitates aerotriangulation to ensure horizontal and vertical mapping accuracies are achieved.
- Obtain ground control survey- [\(see 1LS1 for related information\)](#).
 - ♦ The Photogrammetry Unit creates a ground control plan that shows the approximate location of proposed ground control targets (panels).
 - ♦ The panel plan is submitted to the Location and Surveys Unit to layout out the panels and to survey coordinates for each panel point.
 - ♦ The Location and Surveys Unit localizes the control coordinates to the project control network.
- Upon notification of completion of the panels, the Photogrammetry Unit coordinates with the Aviation Unit to fly the project to obtain the aerial photography.
- After the project has been flown, the Photogrammetry Unit completes post-processing for both the aerial photography and the GNSS-IMU data that was collected during the flight.

Provide Mapping Product

Once the aerial photography is obtained and all data posted processed, the Photogrammetry Unit either uses in-house staff or a Private Engineering Firm to complete the mapping product. The Photogrammetry Unit is to localize all ancillary support data to the project control network. Aerotriangulation using the ground surveyed panel coordinates is performed next to establish accurate exterior orientation parameters for each photograph.

An Aerotriangulation Report is completed, sealed and certified by an NC PLS, if the work is contracted with a Private Engineering Firm. The planimetric mapping and ground elevation data is also compiled, and a digital mosaic completed, while the mapping is compiled.

Complete QC/QA Procedures

The Photogrammetry Assistant Unit Head is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution.

Provide Additional Photogrammetry Support

As needed, the Photogrammetry Unit may reengage in later stages if additional survey is required (see the [Location and Surveys](#) section for related information). The additional work during Stage 2 or 3 could involve generating additional mapping from previous flights and/or conducting new flights (to inform new mapping) using the process described in this 1PH2.

5PH1 Photogrammetry Construction Support

The Photogrammetry Unit provides the following support during the Construction Phase:

- ~~Provides~~Provide technical expertise and answers questions on the project's imagery or data needs
- Complete construction earthwork quantity determinations (as requested)
- Support the Location and Surveys Unit regarding Photogrammetric Control for Construction Panels, including conducting manned or UAV flights (see 5LS1 for related information)
- Coordinate with the Location and Surveys Unit regarding any revised project mapping (see 5LS1 for related information)

2RD1 Alternative Development (Optional)

Overview

Develop conceptual level alternative designs to evaluate what alternative could be pursued for the final design phase. This task is only necessary if additional alternative investigation is needed beyond what was previously explored during Stage 1.

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 4th Edition and Errata](#)
- [Roadway Design Manual](#)
- [Roadway Standard Drawings](#)
- [Roadway Design Consultant Coordination Guidelines \(In Development: The guidelines are being updated.\)](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)^{2RD1}

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Preliminary Design Criteria and Associated Typical Sections ^Q	<ul style="list-style-type: none"> ▪ Complete Preliminary Design Criteria and Typical Sections 	Roadway Design Plan Review Group Leader or Division Personnel	Roadway Design Lead
Prepare Alternative Design ^Q	<ul style="list-style-type: none"> ▪ Complete Alternative Design(s) 	Roadway Design Lead	
Design Public Meeting Maps ^Q		Roadway Design Lead	

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Develop Design Criteria and Typical Sections for Alternatives

Coordination with municipalities, RPOs, and MPOs on Complete Streets elements to be incorporated into the project begins in Stage 1. This information is captured in design criteria for the mainline, major y-lines, ramps, and loops and is provided in the Project Scoping Report (see 1FS2 for related information). The Roadway Design Lead ensures this information has been incorporated into the design criteria for the entire project (see 2IM1 for related information).

While the Roadway Design Lead may not perform all tasks associated with the development of the roadway design, the Roadway Design Lead ultimately seals the final plans and, as such, has a responsible charge for both the roadway design and documentation of design decisions. To determine design criteria and typical sections, the Roadway Design Lead completes the design criteria package and submits it for review.

- The design criteria and typical sections are generated in accordance with the *AASHTO A Policy on Geometric Design of Highways and Streets*, *AASHTO Roadside Design Guide*, *Roadway Design Manual*, and *NCDOT Standards*. Decisions regarding elements that are considered non-standard are documented in written format.
- The design criteria and typical sections are submitted to the Roadway Design Unit or Division designee for review and comment.

The Roadway Design Review Engineer or Division designee:

- 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.

Complete Alternative Design(s)

Alternative designs should be developed using the best available survey or mapping data. To develop the plan set, the Roadway Design Lead develops the horizontal and vertical alignments for all affected roadways, which involves:

- Developing the roadway designs 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*.
- Evaluating the horizontal and vertical alignments to ensure each fit the context of the subject roadways. **Note:** Design decisions deviating from the guidance are to be 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:
 - Roadway design elements identified in the Traffic Operations Analysis Technical Memorandum from the Congestion Management Project Engineer if available (see 2TM1 for related information).
 - Structural design elements on the 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*.
- 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, railroad, or navigable waterway are provided in the approved design criteria.
 - Vertical clearance calculations are generated to confirm each has been met.

- Develop conceptual 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 lays out limits of construction (slope stakes), considering:

- The 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 Roadway Design Lead details the appropriate version of software in the scope of work.

Right-of-Way and Easement Layout

The Roadway Design Lead also lays out the 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 alternative development.

Public Involvement Engagement

For public engagement at this point in the process, the Roadway Design Lead develops design public meeting maps to conform with the public involvement and mapping guidelines (found in the *Roadway Design Manual*) and coordinates the QC review following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* 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.

Attendees at the meeting include the Roadway Design Lead and representation from:

- The Division
- Public Involvement Lead/Unit
- Environmental Analysis Unit (Community Studies and Visualization)
- Experts representing the technical disciplines/Units (including Hydraulics, Utilities, Work Zone Traffic Control, and Structures Management)
- Any other relevant stakeholders (including the municipality, MPO/RPO).

Technical experts are to be either representatives from central technical units or appropriate Division staff. Once all comments from the review meeting are addressed and the maps updated, the Public Involvement Officer and/or Communications Group is notified so that the website can be updated (see 2PI1 for related information). The Project Manager is included in the correspondence.

After the Design Public Meeting has been held and the comment period closed, the Roadway Design Lead coordinates with the Project Manager to schedule a Post-Public Meeting Resolution Meeting to determine the best path forward to address the comments.

- Meeting attendees include those invited to the map review and anyone else who can provide feedback on the concerns from the public.

- The resolutions requiring revisions to the designs (as presented to the public) are incorporated into the plans.

Alternative Design Plan Set(s) Preparation

The Roadway Design Lead lays out the alternative designs on roll plots that encompass all the work proposed by the project, providing the design data used to establish the design criteria for the mainline. The horizontal and vertical alignment data are transferred into the plan and profile plots. The Roadway Design Lead also develops earthwork quantities for cost estimate requests per the guidance in the Roadway Design Manual.

Additionally, as part of this task, the Roadway Design Lead lays out roadway and structural design elements, basing both on the:

- 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.

Lastly, the Roadway Design Lead completes the QC Checklist following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures before upload and/or distribution of Alternative Design Plans.

Design Alternative Plan Review

Since the character and complexity of each project is different, a determination of how to generate feedback on the Alternative Designs should be made when the work is scoped. The Roadway Design Lead coordinates with the Project Manager to distribute plans to the technical disciplines/Units for review.

For roadway designs developed by a Private Engineering Firm/consultant firm, the NCDOT Roadway Design reviewer or Division designee uses 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, considering the following.

- Comments and recommendations from the review are analyzed to determine if each is 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 in preparation for the Alternative Selection Meeting.

Alternative Selection Meeting

The Roadway Design Lead coordinates with the Project Manager to distribute revised plans to the technical disciplines/Units and appropriate Division personnel for a review period and to schedule an Alternative Selection Meeting.

During this meeting, the project team is tasked with selecting one or more of the designs to move forward into the development of a Design Recommendation Plan Set.

2RD2 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 4th Edition and Errata*
- [Roadway Design Manual](#)
- [Roadway Standard Drawings](#)
- [Roadway Design Consultant Coordination Guidelines](#) (*In Development: The guidelines are being updated.*)
- American Association of State Highway Transportation Officials (AASHTO) *Roadway Lighting Design Guide*
- National Cooperative Highway Research Program (NCHRP) *Report 152 "Warrants of Highway Lighting"*
- *Location and Design Approval Procedures*
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Approved Design Criteria and Associated Typical Sections ^Q	<ul style="list-style-type: none"> Complete Design Criteria and Typical Sections 	Roadway Design Plan Review Group Leader or Division Personnel	Roadway Design Lead
Design Public Meeting Maps ^Q	<ul style="list-style-type: none"> Complete Design Recommendation Plan Set 	Roadway Design Lead	Other Technical Discipline/Unit Leads (Roles noted in the descriptions below)
Design Recommendation Plan Set ^Q		Roadway Design Lead	
Approved Design Exception ^{A, Q}	<ul style="list-style-type: none"> Formalize Design Exceptions 	Technical Services Director or Division Engineer	Roadway Design Lead/State Roadway Design Engineer or Division Personnel Project Development Engineer
Initial Lighting Assessment	<ul style="list-style-type: none"> Determine Lighting Needs and Owner 	Roadway Lighting Design Engineer	
Lighting Evaluation Report ^Q		Roadway Lighting Design Engineer	
Agreement with Municipality for Lighting Ownership and Maintenance			Division Engineer
Location and Design Approval Support Document	<ul style="list-style-type: none"> Issue Location and Design Approval (LADA) 	Technical Services Director or Division Engineer	State Roadway Design Engineer or Division Team LeadProject Development Engineer
Location and Design Approval Letter (LADA)		Technical Services Director or Division Engineer	State Roadway Design Engineer or Division Team LeadProject Development Engineer

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Design Criteria and Typical Sections

Coordination with municipalities, RPOs, and MPOs on Complete Streets elements to be incorporated into the project begins in the Project Initiation Stage. This information is captured in design criteria for the mainline and is provided in the Project Scoping Report. The Roadway Design Lead ensures this information is incorporated into the design criteria for the entire project (see 2IM1 for related information).

While the Roadway Design Lead may not perform all tasks associated with the development of the roadway designs, the Roadway Design Lead ultimately seals the final plans and, as such, has responsible charge for the roadway designs and documentation of design decisions. To determine design criteria and typical sections, the Roadway Design Lead completes the design criteria package and submits for approval.

- The design criteria and typical sections are generated in accordance with the *AASHTO A Policy on Geometric Design of Highways and Streets*, *AASHTO Roadside Design Guide*, *Roadway Design*

- 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, or navigable waterway 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: (see 2LS1 and 2RW2 for related information). 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 (found in the *Roadway Design Manual*) and coordinates the QC review following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* 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.

- Attendees at the meeting are the Roadway Design Lead and representation from each of the following: the Division, Public Involvement Lead/Unit, Environmental Analysis Unit (Community Studies and Visualization), experts representing the technical disciplines/Units (including, but not limited to, Hydraulics, Utilities, Work Zone Traffic Control, and Structures Management) and any other relevant stakeholders (including, but not limited to, municipality, MPO/RPO).

Technical experts are to be either representatives from central technical units or appropriate Division designees. Once all comments from the review meeting are addressed and the maps updated, the Public Involvement Officer and/or Communications Group are notified so that the website can be updated (see 2PI1 for related information). The Project Manager is included on the correspondence.

After the Design Public Meeting has been held and the comment period closed, the Roadway Design Lead coordinates with the Project Manager to schedule a Post-Public Meeting Resolution Meeting to determine the best path forward to address the comments.

- Attendees to the meeting include those invited to the map review and anyone else who can provide feedback on the concerns from the public.
- The resolutions requiring revisions to the designs as presented to the public are incorporated into the plans.

Potential Retaining Wall Location Evaluation

To complete this subtask, the Roadway Design Lead evaluates roadway design information for potential locations where retaining walls are a cost-effective solution to reduce impacts. The evaluation includes coordination efforts with the Hydraulics Design Engineer, Design Geotechnical Engineer, Structures Lead, Utility Coordinator, and appropriate Division personnel. Of note:

- Where determined to be viable, the retaining wall locations are incorporated in the typical sections, plan sheets, and cross section sheets.
- Retaining wall envelopes are developed for each retaining wall location.

The Roadway Design Lead requests the retaining wall investigations and design recommendations from the Geotechnical Engineering Unit (see 3GT2 for related information). The Project Manager is included [in](#) the correspondence.

Design Recommendation Plan Set Preparation

The Roadway Design Lead is to lay out the title sheet, plan and profile sheets, and cross section sheets to include a title sheet that:

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 Roadway Design Lead coordinates with the Value Management Office to determine the need for a Value Engineering Study. As directed, the Roadway Design Engineer prepares the necessary documentation in accordance with the *Value Management Guidelines* (see 2VM1 for related information). The Project Manager is included on all 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.

To complete this task, the Roadway Design Lead completes the design exception package and submits the package ~~to State Roadway Design Engineer~~ as follows:

- The design exception checklist is completed per the design exception guidance in the *Roadway Design Manual*.
- All pertinent data in the current design exception request letter ~~is completed and~~ includes the responses to all questions on the “Basis of the Exception”.
- Sketches of the design exception locations are developed with the AASHTO and proposed dimensions associated with the exception
- A report of the most recent 5-year crash history is requested from Transportation Safety and Mobility.
- The letter, checklist, sketches, crash history and location of the design plans is submitted to the ~~State Roadway Design Engineer~~ designated NCDOT or Division designee ~~GESC reviewer~~ for review.

The ~~State Roadway Design Engineer~~ NCDOT or Division designee ~~then~~ GESC Reviewer reviews the design exception package for accuracy and completeness, considering that :

written comments and associated documents are provided to the Roadway Design Lead (for action) and the Project Manager (for information).

If deemed necessary, a meeting is held to ensure clarity of comments and responses. For centrally managed projects, a review by the State Roadway Design Engineer required prior to moving forward with signatures.

Once comments have been adequately addressed, the process for obtaining signatures is as follows:

- For Centrally Managed Projects: Engineer of Record, a NCDOT or GESC Reviewer, a State Roadway Design Engineer ~~signs the document and forwards it to the,~~ a Technical Services Director, ~~who reviews the package and provides~~
- For Division Managed Projects: Engineer of Record, a NCDOT or GESC Reviewer, a Division Engineer

The Technical Services Director or Division Engineer have an opportunity to provide additional comments at this time, if needed. If there are no comments, the Technical Services Director or Division Engineer approves the design exception by signing the document.

2RD2/2RD3 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 4th Edition and Errata*
- [Roadway Design Manual](#)
- [Roadway Standard Drawings](#)
- [Roadway Design Consultant Coordination Guidelines](#) (*In Development: The guidelines are being updated.*)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

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

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

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~~ 2RD4 ROW Plans Completed

Overview

Evaluate and/or incorporate decisions from the field inspection, constructability review, and all remaining design recommendations from the technical disciplines/Units into the plans, ~~resulting~~which results 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 4th Edition and Errata*
- [Roadway Design Manual](#)
- [Roadway Standard Drawings](#)
- [Roadway Design Consultant Coordination Guidelines](#) (*In Development: The guidelines are being updated.*)
- [Standard Specifications for Roads and Structures](#)
- ~~American Association of State Highway Transportation Officials (AASHTO) *Roadway Lighting Design Guide*~~
- ~~National Electrical Code (NEC)~~
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Right-of-Way Plan Set w/ Noise Wall Locations ^α	<ul style="list-style-type: none"> ▪ <i>Complete the Right-of-Way Plan Set</i> 	Roadway Design Lead	Other Technical Discipline/Unit Leads (Roles noted in the descriptions below)
Quantities for Construction Estimate ^α		Roadway Design Lead	Other Technical Discipline/Unit Leads (Roles noted in the descriptions below)

^α *Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.*

Complete the Right-of-Way Plan Set

As the other technical disciplines/Units continue to make minor adjustments to finalize their plans, and the approved design noise report is issued towards the end of this Stage, the Right-of-Way Plan Set is used by:

- Location and Surveys Unit for staking of proposed right-of-way and easements (see 4LS1 for related information)
- Right-of-Way Unit for appraisal and acquisitions.

Plan Set Compilation

The Roadway Design Lead receives final designs, plans, and/or results of coordination efforts from Hydraulics, Utilities, Work Zone Traffic Control, Structures Management, Signing and Delineation, Roadside Environmental, Geotechnical Engineering, and Rail Division. Their information is reviewed for consistency with the roadway design plans per the *Roadway Design Manual*.

- If there are concerns that need to be addressed, the appropriate lead is engaged to determine practicable solutions.
- If the recommended solution has the potential to jeopardize the scope, schedule, or budget, the Roadway Design Lead informs the Project Manager, so that the Project Manager can determine what further coordination is needed.

Construction Estimate Quantities

The Roadway Design Lead and other associated disciplines/Units update the quantities for pay items associated with the construction of the proposed designs per guidance in the *Roadway Design Manual* to reflect any design revisions and/or updated recommendations from other technical Units or the Division. The quantities are provided to the Project Manager, so that the Project Manager can coordinate an updated construction cost estimate generated by the Contract Standards and Development Unit (see 3CS1 for related information).

Plan Set QC Review, Review Meeting, and Finalization

The Roadway Design Lead completes the respective QC Checklist following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* 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. 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 obtains authorization for funding.

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 4th Edition and Errata](#)
- [Roadway Design Manual](#)
- [Roadway Standard Drawings](#)
- [Roadway Design Consultant Coordination Guidelines \(In Development: The guidelines are being updated.\)](#)
- [Standard Specifications for Roads and Structures](#)
- [American Association of State Highway Transportation Officials \(AASHTO\) Roadway Lighting Design Guide](#)
- [National Electrical Code \(NEC\)](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

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

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

1SG1 Investigate Existing ITS & Signals Communications

Overview

Inventory existing signal communications and ITS infrastructure facilities in the project area. Identify signal communications equipment or fiber or ITS infrastructure that are costly to relocate or otherwise create risks for the project construction schedule if they are not relocated. Determine if signal communications fiber relocations prior to let are necessary, resulting in pre-let and post-let signal communications plans.



References

- [Signal Communications checklist \[In Development\]](#)

Signal Communications Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Signal Communications Lead	Signal System Owners/ Utilities Coordinator
Signal Communications Checklist ^{A, Q}	<ul style="list-style-type: none"> Initiate Signal System Fiber Owners and Contacts Conduct Preliminary Signal System Investigation 	X	X

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Initiate Signal System Fiber Owners and Contacts

The Signal Communications Lead meets with the Signal System owners and the Utilities Coordinator to discuss signal facilities in the project study area and vicinity. These meetings are to be with employees of the signal systems familiar with the existing facilities and with plans for future facilities in the study area. These meetings are likely held individually with each signal system owner at a location convenient for the signal system owner employees. Other projects may be discussed in these meetings, if possible and appropriate.

In this meeting, the Signal Communication Lead:

- Explains the scope of the project and the location of all alternatives/alignments.
- Explains the projected schedule and expected project duration.
- Requests that the signal system owners:
 - Provide a description of the type, size, and function of all facilities in the project area.
 - Identify critical facilities that have restrictions on service interruption for relocation or may be difficult to relocate. **Note:** 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 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 signal system owners and to search for previously unknown signal communications or ITS infrastructure.

Conduct Preliminary Signal System Investigation

If there are existing traffic signals on a project, an investigation needs to be conducted to determine the impact level to either a municipal signal system or a closed loop system. If it is an isolated signal, then no additional investigation needs to be conducted.

The Signals Communications Lead conducts an initial field investigation to determine if a project includes existing signal communications cable that may be impacted. The field investigation determines if the signal communications (fiber, radio, or modem) may require pre-let plans to relocate the equipment out of the way from utility construction.

- Where possible, consider temporary radio or cellular communications for approval by the municipality or Division. Pre-Let plans, if required, are developed in a later stage.
- The Signal Communications checklist also documents adjacent signals and the distance off the project limits to determine if the project study area needs to be increased.
- Once the initial field investigation is completed, the checklist documents the findings.

The Signal Communications Lead coordinates with the Environmental Analysis Unit if signal communications work is required outside of the project limits. Typically, connecting traffic signals to the rest of the system are outside the normal project limits and need to be evaluated as part of the environment document (see 1EP1 for related information).

Complete QC/QA Procedures

The Signals Communications Lead is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and/or distribution of any deliverables.

ITS Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		ITS Lead	TSMO Unit/ Utilities Coordinator
ITS Risk Analysis and Report	<ul style="list-style-type: none"> ▪ Conduct Preliminary ITS Investigations ▪ Submit report 	X	X

ITS Risk Analysis and Report

The [ITS Lead](#) conducts an initial field investigation to determine if a project includes existing ITS infrastructure that may be impacted or if there is planned/proposed ITS infrastructure. The field investigation determines if the existing ITS may need to be relocated and when that relocation needs to occur during construction. Once the Preliminary ITS Investigation is complete, the ITS lead submits an [ITS Risk and Analysis Report](#) to the TSMO unit for review.

The ITS Lead coordinates with the Environmental Analysis Unit if ITS work is required outside of the project limits. Typically, ITS devices and connections fall outside the project limits/Project Study Area and need to be evaluated as part of the environment document (see 1EP1 for related information).

Complete QC/QA Procedures

The ITS Lead is to coordinate the applicable QC review following the [NCDOT Quality Management Program: Quality Control and Quality Assurance](#) procedures and the respective QC Checklist before upload and/or distribution of any deliverables.

2SG1 Establish Signal ~~and~~ ITS Locations

Overview

Begin the activity as soon as the Signal Recommendations are received from the Regional Traffic Engineer. Ensure early coordination of ~~ITS and~~ Signal ~~and ITS~~ structures and equipment locations with Utilities to mitigate issues related to power and overhead/underground conflicts prior to signal/ITS construction. Pre-Let Signal Communications plans may be prepared at the discretion of the Division to relocate the fiber if it is impacted by utility pole relocations prior to letting. The specific efforts of this activity are separated into the following sub-activities ~~of:~~

- ~~Complete Preliminary Signal Pole/Cabinet Locations~~
- ~~Complete UMR Plans and ITS Device Diagrams~~



Task details and deliverables for these sub-activities are found in the corresponding sections below.

References

- [Federal Highway Administration \(FHWA\) Manual on Uniform Traffic Control Devices \(MUTCD\)](#)
- [TSMO Unit Design Manual Part 1 - Signal Design](#)
- [TSMO Unit Design Manual Part 3 - ITS](#)
- [Roadway Standard Drawings](#)
- [Standard Specifications for Roads and Structures](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Example Letters of Intent for New and UMR Poles](#)

Signal Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Signal ITS Lead	Utility Lead/Utility Owners
Signal Pole/Cabinet Location Diagrams ^Q	<ul style="list-style-type: none"> ▪ Complete Preliminary Signal Pole/Cabinet Locations 	X	X
Generate device list to allocate an IP range		X	

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Preliminary Signal Pole/Cabinet Locations

To establish the preliminary signal pole/cabinet locations, the Signal ~~ITS~~ Lead is to develop signal pole/cabinet location diagrams following the references noted herein. This includes:

- Where possible, locating poles outside the clear zone.

- Where clear zone requirements cannot be met due to utility considerations or limited right-of-way, locate poles as far as is practical from the edge of pavement.
- Where mastarms are desired, designing for a maximum of 75-foot arm length.
 - If the arm length exceeds 75 feet, consult with the ~~ITS and Signals~~[Transportation Systems Management & Operations \(TSMO\)](#) Unit (Signal Design Section).
- Avoiding conflicts by coordinating with utility owners and other Units/disciplines, including utilities, roadway design, and hydraulics.
- Providing signal cabinet locations to ensure the availability of power at proposed locations.

For acceptance and transmittal, the Signal/~~ITS~~ Lead is to:

- Submit coordinated pole/cabinet locations to the ~~ITS and Signals~~[Transportation Systems Management & Operations \(TSMO\)](#) Unit (Signal Design Section) and Utilities Coordinator for review.
- Transmit final accepted pole/cabinet locations to the ITS and Management Section), Utilities Coordinator, and the Project Manager.

Complete QC/QA Procedures

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

ITS (Stand-Alone Signal Systems) Communications Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		ITS Signal Communications Lead	Utility Lead/Utility Owners
Utility Make Ready (UMR) Plans ^Q	• Complete UMR Plans	X	X
Railroad Encroachment Agreement(s) ^Q	• Complete Railroad Application(s) and Drawing(s)	X	

^QIndicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete UMR Plans

To establish the Utility Make Ready (UMR) Plans, the ITS Lead is to finalize the boundaries of the project and develop a base map for the UMR plans. 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.

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.

Complete Railroad Application(s) and Drawing(s)

The ITS Lead is responsible for completing all applications and drawings required for processing railroad encroachment agreements for the project. The ITS Lead is also responsible for any changes requested by the Project Manager or the Railroad Company.

Complete QC/QA Procedures

The ITS Lead is to coordinate the applicable QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.

ITS (Signal Systems Widening Projects) Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		ITS Lead	Utility Lead/Utility Owners
Letter of Intent to Joint Use Pole Owners	• Complete Letter of Intent	X	X

Utility Make Ready (UMR) Plans ^a Complete Pre-Let Signal Communications and Fiber Splice Sheets	<ul style="list-style-type: none"> Complete UMR Plans <u>Pre-Let Signal Communications and Fiber Splice Sheets</u> 	X	X
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^aIndicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Letter of Intent

The ~~ITS~~ Signal Communications Lead issues a Letter of Intent to all joint use pole owners within the project limits of the Department’s request to attach to their poles. This letter informs the utility companies that the Department is installing a fiber on the pole line and reserves the spot even if there is already NCDOT fiber attached to the poles.

Complete ~~UMR Plans~~ Pre-Let Signal Communications and Fiber Splice Sheets

Begin the activity as soon as the ~~Preliminary~~ Utility Relocation Coordination Working Plans are received from the Utility Owner or their delegated representative, if applicable (see 2UT1 for related information). ~~UMR Plans are only needed for joint use poles that are not being replaced in~~

~~When developing the Utility Relocation Plans or UBO Plans. To establish plan package, the UMR Plans, the ITS Lead finalize the boundaries of the project and develop a base map for the UMR plans. This includes:~~ Signals Communications Lead is to submit preliminary pre-let signal communications and fiber splice plans to the ITS and Signals Management Section for review. These plans will be available for the Division to let a project so that the Division can relocate any existing NCDOT fiber attached to poles that are being moved prior to the project letting. The Signals Communications Lead coordinates with the project Utility Coordinator to determine which poles are impacted using the Preliminary Utility Relocation Plans from Utility Owners.

- ~~▪ Identifying, recording and mapping all roadways and driveways, cabinet and signal inventory numbers and all poles in which cable will 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.~~

~~For acceptance and transmittal, the ITS Lead is to:~~

~~Provide~~ The Signal Communications Lead references the Signal Recommendations, NCDOT Transportation Systems Management and Operations (TSMO) Unit Design Manual, and the NCDOT ITS & Signal Plan Guidelines when preparing these plans.

When finalizing the pre-let plan package, the Signal Communications Lead:

- Provides written responses to each signal communications-related and fiber splice 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.~~
- Revises the design in accordance with the responses.

- Ensures revisions conform to the Signal Recommendations (provided by the Regional Traffic Engineer), NCDOT Transportation Systems Management & Operations (TSMO) Unit Design Manual, NCDOT ITS & Signal Plan Guidelines, and the Utilities Accommodation Manual.
- Coordinate the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.

Once all previous comments are addressed and plans QC'ed, the Signal Communications Lead uploads the plan sheets to the project SharePoint/ProjectWise site and notifies the ITS and Signals Management Section for review.

Complete QC/QA Procedures

The [ITS/Signals Communications](#) Lead is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution.

ITS (Development and Design) Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		ITS-Lead	
<u>Preliminary</u> ITS Device <u>DiagramsMap</u> ^Q	<ul style="list-style-type: none"> Complete <u>Preliminary</u> ITS Device <u>DiagramsLocations Map</u> 	<ul style="list-style-type: none"> ×ITS Lead 	<ul style="list-style-type: none"> TSMO STOC Division

^QIndicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Preliminary ITS Device DiagramsMap

To establish the Preliminary ITS device locations ~~and diagrams~~, the ITS Lead ~~is to finalize~~finalizes the boundaries of the project and ~~develop~~develops a base map. The ITS Lead also develops ~~(if applicable)~~the ITS Device Location DiagramsMap (if applicable) following the references noted herein. This includes:

- 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)
- Collaborate with appropriate TSMO, Division and/or Municipal staff on proposed device quantities and locations.

For acceptance and transmittal, the ITS Lead is to :

- ~~submit~~submit coordinated preliminary 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 Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution.

3SG1 Complete ~~Signal and~~ Signals & ITS Design

Overview

Following the Signal Recommendations, NCDOT *ITS & Signal Plan Guidelines*, and other references, complete signal, signal communications, and ITS designs. The specific design efforts of this activity are separated into the following sub-activities ~~of-~~:

- ~~Complete Signal Plans~~
- ~~Complete ITS Plans~~



Task details and deliverables for these sub-activities are found in the corresponding sections below.

References

- [Federal Highway Administration \(FHWA\) Manual on Uniform Traffic Control Devices \(MUTCD\)](#)
- [TSMO Unit Design Manual Part 1 - Signal Design](#)
- [TSMO Unit Design Manual Part 2 - Signals Management](#)
- [TSMO Unit Design Manual Part 3 - ITS](#)
- [National Electrical Safety Code](#)
- [National Electric Code](#)
- [Roadway Standard Drawings](#)
- [Standard Specifications for Roads and Structures](#)
- [ITSS Project Special Provisions – PSP – Current Version](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Roadway Design Manual \(Part II, Section 15.3.5 – Proprietary Products\)](#)
- [CCTV Arterial Deployment Checklist \(In Development\)](#)

Signal Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Signal Lead	ITS Lead
Signal Plan and Electrical Detail Sheets ^Q	▪ Complete Signal Plan and Electrical Detail Sheets	X	
Quantity and Cost Estimates ^Q	▪ Complete Quantity and Cost Estimates	X	X
Project Special Provisions ^Q	▪ Develop Project Special Provisions	X	X
Project Documentation ^Q	▪ Complete Project Documentation	X	

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Signal Plan and Electrical Detail Sheets

To complete this task, the Signal Lead is to submit the signal designs to the Project Manager and ITS and Signals Management Section. This includes:

- Using Signal Recommendations (provided by the Regional Traffic Engineer), NCDOT [ITS and Signals Transportation Systems Management & Operations \(TSMO\) Unit Design Manual](#), and NCDOT [ITS & Signal Plan Guidelines](#), develop and submit the initial signal design package after completing QC.
- Electrical details are not required at this submittal.

To finalize the signal design and in submitting the electrical details, the Signal Lead is to:

- Provide a written response to each signal-related comment from the previous submittal.
- Revise the design in accordance with the responses.
- Ensure revisions conform to the Signal Recommendations (provided by the Regional Traffic Engineer), NCDOT [ITS and Signals Transportation Systems Management & Operations \(TSMO\) Unit Design Manual](#), and NCDOT [ITS & Signal Plan Guidelines](#).
- Coordinate the QC review following the [NCDOT Quality Management Program: Quality Control and Quality Assurance](#) procedures and the respective QC Checklist before upload and distribution.

Once all previous comments are addressed and the plans QC'ed, the Signal Lead is to submit plan sheets to the [ITS and Signals Transportation Systems Management and Operation \(TSMO\) Unit](#) (Signal Design Section), uploading plans on the project SharePoint site.

Complete Quantity and Cost Estimates

To complete the quantity and cost estimate, the Signal Lead is to:

- Perform quantity takeoffs following the NCDOT [ITS and Signals Transportation Systems Management and Operations \(TSMO\) Unit Design Manual](#), NCDOT Standard Specifications for Roads and Structures, and the most recent ITS and Signals Unit pay item list.
- Use standard pay items when possible and coordinate with the appropriate Lead in the ITS and Signals Management Section when generic pay items are necessary.
- Develop cost estimates using recent bid data available on the NCDOT's website and ITS and Signals Management Section resources.
- Submit the draft and final approved quantity and cost estimate to the appropriate Lead in the ITS and Signals Management Section.

Develop Project Special Provisions

The Signal or ITS Lead is to use the [ITSS Project Special Provisions-PSP-Current Version](#) and quantity list when preparing the project-related special provisions, submitting the special provisions to the ITS and Signals Management Section for review.

Once completed and accepted, the Signal or ITS Lead is to upload completed documents on the project SharePoint site.

Complete Project Documentation

The Signal Lead is to do the following concurrently with developing the signal plans and submittals:

- Submit Autoturn simulations for left-turning vehicles for all signal designs on the project.
- Provide signed clearance time calculations and clearance distances for all signal designs on the project
- Provide metal pole elevations and calculations for metal pole heights.
 - Design for 17 feet of roadway clearance except when otherwise specified.
 - Provide standard strain pole selections and justifications.
- Provide documentation of latest counts per intersection and justification of phase selection.
- Provide copies of signal related email correspondence with the NCDOT or Municipal personnel, notes from any signal-related phone conversations, and any field notes.
- Provide a database or configuration file for each location.
 - Ensure the file includes all the necessary programming entries to achieve the desired operation of the signal design for the location.
 - Ensure the file is compatible with the local controller software that is being used and is able to be downloaded directly to the controller unit without conversion.
- Place all simulations, calculations, and other documentation in the project's "Intelligent Traffic Systems and Signals" folder on the project SharePoint site and submit draft Project Documentation.

The Signal Lead is to revise and resubmit draft Project Documentation in response to any comments.

ITS

Signal Communications Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		ITS/Signal Communications Lead	Signal Lead
Complete UMR Plans	<ul style="list-style-type: none"> Complete UMR Plans 		X
Signal Communications and Fiber Splice Sheets ^Q	<ul style="list-style-type: none"> Complete Signal Communications and Fiber Splice Sheets 	X	
Electrical Service and Feeder Conductors ^Q	<ul style="list-style-type: none"> Complete Electrical Service to Devices 	X	
Quantity and Cost Estimates ^Q	<ul style="list-style-type: none"> Complete Quantity and Cost Estimates 	X	X
Project Special Provisions ^Q	<ul style="list-style-type: none"> Develop Project Special Provisions 	X	X
Railroad Encroachment Agreement(s) ^Q	<ul style="list-style-type: none"> Complete Railroad Encroachment Agreement(s) – Stand-alone Signal Systems Complete Railroad Encroachment Agreement(s) – Signal Systems Widening Projects/Development and Design 	X	

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete UMR Plans

Begin the activity as soon as the Preliminary Utility Coordination Working Plans are received from the Utility Owner or their delegated representative, if applicable (see 3UT1 for related information). UMR Plans are only needed for fiber that is attached to joint use poles that are not being replaced in the Preliminary Utility Relocation Plans. To establish the UMR Plans, the Signal Communications Lead finalize the boundaries of the project and develops a base map for the UMR plans. This includes:

- Identifying, recording, and mapping all roadways and driveways, cabinet and signal inventory numbers and all poles in which cable will 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.

For acceptance and transmittal, the Signals Communications Lead:

- Provides written responses to each related comment from the previous submittal of UMR plan sheets.
- Submits draft final UMR plans to utility companies for review and comment.
- Submits final UMR plans and requests estimates from utility companies for utility work.

Complete Signal Communications and Fiber Splice Sheets

When developing the plan package, the ITS/Signal Communications Lead is to submit preliminary signal communications and fiber splice plans to the ITS and Signals Management Section for review. The ITS/Signal Communications Lead is to reference the Signal Recommendations, NCDOT ITS/Transportation

[Systems Management and Signals Operations \(TSMO\) Unit Design Manual](#), and NCDOT [ITS & Signal Plan Guidelines](#) when preparing these plans.

To finalize the plan package, the [ITSSignal Communications](#) Lead is to:

- Provide written responses to each signal communications-related and fiber splice comment from the previous submittal.
- Revise the design in accordance with the responses.
- Ensure revisions conform to the Signal Recommendations (provided by the Regional Traffic Engineer), NCDOT [ITS and Signals Transportation Systems Management and Operations \(TSMO\) Unit Design Manual](#), and NCDOT [ITS & Signal Plan Guidelines](#).
- Coordinate the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.

[Once all previous comments are addressed and plans QC'ed, the Signals Communications Lead uploads the plan sheets to the project SharePoint/ProjectWise site and notifies the Signal Design Section for review with the signal designs.](#)

[CCTV installations on Signal Communications Projects that at more than 300 feet from the signal cabinet and that require a separate electrical service are to follow the same electrical service requirements as other stand-alone ITS devices. Electrical Service plans for these devices are to be shown on the Signal Communications plan sheets.](#)

[Complete Quantity and Cost Estimates](#)

[3SG1 under the signal's section details how to complete Quantity and Cost Estimates.](#)

[Develop Project Special Provisions](#)

[3SG1 under the signal's section details how to develop the Project Special Provisions, in addition to using the ITSS Project Special Provisions-PSP-Current Version.](#)

[Complete Railroad Encroachment Agreement\(s\)](#)

[Complete Railroad Encroachment Agreement\(s\) If the fiber will cross a railroad corridor either aerially or underground, the Signals Communications Lead is responsible for completing all applications and drawings required for processing railroad encroachment agreements for the project. The Signal Communications Lead is also responsible for any changes requested by the Project Manager or the Railroad Company.](#)

[After the applications and drawings are completed, the Signal Communications Lead submits the package to the Project Manager for further processing and payments.](#)

ITS Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		ITS Lead	TSMO UNIT
ITS Cable Routing Plans and Fiber Splice Plans ^o	<ul style="list-style-type: none"> Complete ITS Cable Routing Plans and Fiber Splicing Diagrams 	X	X
Final ITS Device List for IP Address Allocation	<ul style="list-style-type: none"> Complete Final ITS Device List for IP Address Allocation 	X	X
Quantity and Cost Estimates ^o	<ul style="list-style-type: none"> Complete Quantity and Cost Estimates 	X	X
Project Special Provisions ^o	<ul style="list-style-type: none"> Develop Project Special Provisions 	X	X
Railroad Encroachment Agreement(s) ^o	<ul style="list-style-type: none"> Complete Railroad Encroachment Agreement(s) – ITS Cable Routing 	X	X

^o Indicates that final document(s) or data set(s) require review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete ITS Cable Routing Plans and Fiber Splicing Diagrams

When developing the plan package, the ITS Lead is to submit preliminary ITS Cable Routing Plans and Fiber Splice Plans to the ITS and Signals Management Section for review. The ITS Lead is to reference the Signal Recommendations, NCDOT ITS and Signals Unit Design Manual, NCDOT ITS & Signal Plan Guidelines and any other references required for the project by the NCDOT ITS Unit when preparing these plans.

To finalize the plan package, the ITS Lead is to:

- Provide written responses to each ITS-related and fiber splice comment from the previous submittal.
- Revise the design in accordance with the responses.
- Ensure revisions conform to the NCDOT ITS and Signals Unit Design Manual and NCDOT ITS & Signal Plan Guidelines.
- Coordinate the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.

Once all previous comments are addressed and plans QC'ed, the ITS Lead uploads the plan sheets to the project SharePoint/ProjectWise site and notifies the ITS and Signals Management Section for review.

Complete Electrical Service to Devices

For Electrical Service and Feeder Conductors, the ITS Lead is to note power requirements for all devices. The ITS Lead is to reference the Roadway Standard Drawings, Standard Specifications for Roads and Structures, and the National Electrical Code.

To finalize electrical service to devices, the ITS Lead is to:

- Revise the design in accordance with the responses from the ITS and Signals Management Section.
- Coordinate the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution.
- Submit final approved design to the ITS and Signals Management Section.

CCTV installations on Signal Communications Projects that at more than 300 feet from the signal cabinet and that require a separate electrical service are to follow the same electrical service requirements as other stand-alone ITS devices. Electrical Service plans for these devices are to be shown on the Signal Communications plan sheets.

Reference the UMR Plans task under the Signal Communications Deliverables for any ITS projects that require UMR work.

Complete Final ITS Device List for IP Address Allocation

The ITS Team Lead is to submit a final list of ITS device quantities, types and locations to DIT and the TSMO Unit for IP address allocation. This list shall include any device or cabinet with an ethernet device including HUB and Splice cabinets

Complete Quantity and Cost Estimates

3SG1 under the signal's section details how to complete Quantity and Cost Estimates.

Develop Project Special Provisions

3SG1 under the signal's section details how to develop the Project Special Provisions, in addition to using the [ITSS Project Special Provisions-PSP-Current Version](#).

Complete Railroad Encroachment Agreement(s) – ~~Stand-alone Signal Systems~~

~~After the applications and drawings are completed, the ITS Lead submits the package to the Project Manager for further processing and payments.~~

~~Complete Railroad Encroachment Agreement(s) – Signal Systems Widening Projects/Development and Design~~

The ITS Lead is responsible for completing all applications and drawings required for processing railroad encroachment agreements for the project. The ITS Lead is also responsible for any changes requested by the Project Manager or the Railroad Company.

After the applications and drawings are completed, the ITS Lead submits the package to the Project Manager for further processing and payments.

5SG1 ITS and Signal ~~and ITS~~ Construction Support

The Signal Lead and/or ITS Lead provides the following support during the Construction Phase:

- Provides technical expertise and answers questions related to signals and ITS design during the pre-construction meeting and throughout construction
- Completes Construction Revision (as needed): Perform applicable steps for a construction revision based on the latest version of the Let Plans (see 5CS1 for related information) to address identified field issues
- Reviews working/shop drawings
- Reviews associated materials submittals. This process includes:
 - The submittal package is sent by the contractor to the Signal or ITS Lead and other appropriate persons.
 - The submittal package is reviewed by the appropriate Group in the ITS and Signals Management Section.
 - The appropriate Group approves or rejects each item in the submittal package.
 - The completed submittal package is sent to the contractor and other appropriate persons.
- Ensures the electrical service is in compliance with NCDOT *Roadway Standard Drawings, Standard Specifications for Roads and Structures*, National electrical Safety Code and the National Electrical Code.
- Completes ITS Testing: Conducts and completes successfully the following tests before acceptance of the signal system project:
 - Conducts site tests as described in the project's Special Provisions
 - Conducts system testing as described in the project's Special Provisions
 - Signs testing documents for approval (City and/or ITS Lead)
 - Starts the 60-day Observation Period upon the successful completion of all tests and punch-list items as described in the project's Special Provisions (if applicable).

References

- *Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD)*
- [TSMO Unit Design Manual Part 1 - Signal Design](#)
- [TSMO Unit Design Manual Part 2 - Signals Management](#)
- [TSMO Unit Design Manual Part 3 - ITS](#)
- *National Electrical Safety Code*
- *National Electric Code*
- [Roadway Standard Drawings](#)
- [Standard Specifications for Roads and Structures](#)
- [ITSS Project Special Provisions – PSP – Current Version](#)
- [TSMO Unit Qualified Products List](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Complete the ~~Right of Way Plan Set~~

~~The other technical disciplines/Units continue to make minor adjustments to finalize their plans, and the approved design noise report is issued at the beginning of this Plan in Hand Stage. The Right of Way Plan Set is then used by the:~~

- ~~▪ Location and Surveys Unit for staking of proposed right-of-way and easements, and~~

~~Right of Way Unit for appraisal and acquisitions.~~ Final Plans

Noise Wall Location Incorporation

The Roadway Design Lead obtains and incorporates approved noise wall locations from the Design Noise Report into the plan set per guidance in the *Roadway Design Manual*. The Design Noise Report is generated by the Environmental Analysis Unit (Traffic Noise and Air Quality) or their designee (see 3EN1 and 3EN2 for related information).

- Note: Anticipated revisions to the plans include potential modifications to the typical sections, plan sheets, 3D model, cross sections, slope stakes, and proposed right-of-way and/or easements.

If required, the Roadway Design Lead participates in coordination to resolve any conflicts the noise wall locations may present within the designs. Others engaged in this coordination include the Hydraulics Design Engineer, Design Geotechnical Engineer, Utility Coordinator, Structures Lead, Work Zone Traffic Control (WZTC) Project Design Engineer, and the appropriate Division personnel. If the recommended solution has the potential to jeopardize the scope, schedule, or budget, the Project Manager determines what further coordination is needed to obtain a final resolution.

Plan Set Compilation

The Roadway Design Lead ~~receives~~continues to receive final designs, plans, and/or results of coordination efforts from all or a portion of the disciplines/Units. This includes but is not limited to Hydraulics, Utilities, Work Zone Traffic Control, Structures Management, Signing and Delineation, Roadside Environmental, Geotechnical Engineering, and Rail Division. Their information is reviewed for consistency with the roadway design plans per the *Roadway Design Manual*.

- If there are concerns that need to be addressed, the appropriate lead is engaged to determine practicable solutions.
- If the recommended solution has the potential to jeopardize the scope, schedule, or budget, the Roadway Design Lead informs the Project Manager, so that the Project Manager can determine what further coordination is needed.

Construction Estimate Quantities

The Roadway Design Lead and other associated disciplines/Units update the quantities for pay items associated with the construction of the proposed designs per guidance in the *Roadway Design Manual* to reflect any design revisions and/or updated recommendations from other technical Units or the Division. The quantities are provided to the Project Manager, so that the Project Manager can coordinate an updated construction cost estimate generated by the Contract Standards and Development Unit (see 3CS1 for related information).

Plan Set QC Review, [Design Complete](#) Review Meeting, and Finalization

The Roadway Design Lead completes the respective QC Checklist following the NCDOT *Quality Management Program: Quality Control and Quality Assurance* procedures before upload and/or distribution of [Right-of-Way Design Complete Review](#) 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 previously scoped Design Complete](#) 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.

4RD1 Finalize the 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](#)
- [Roadway Design Consultant Coordination Guidelines](#) (*In Development: The guidelines are being updated.*)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Roadway Design Lead	Other Technical Discipline/Unit Leads
Review Set of Final Plans [□]	<ul style="list-style-type: none"> ▪ Complete PS&E Package 	X	
Final Construction Quantities for Roadway Design Plans [□]		X	
Sealed Contract Roadway Design Plans [□]	<ul style="list-style-type: none"> ▪ Submit Contract/Final Plans 	X	X (Roles noted in the descriptions below)

[□] Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete PS&E Package

The Roadway Design Lead updates the plans based on comments from the Design Review Complete Meeting, considering:

- Comments and recommendations from the review meeting are analyzed to determine if each is feasible to address.
- 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.

For compiling a complete PS&E 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 3. 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.

2SD1 ~~Develop~~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](#)
- [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 Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader	Additional Support	
		Signing and Delineation Designer	Regional Signing and Delineation Engineer	Other Technical Discipline/Unit Leads (Roles noted in the descriptions below)
Preliminary Signing and Delineation Strip Map ^a	Complete Preliminary Signing and Delineation Layout	X	X	X
	Identify Conflicts with Utilities, Right-of-Way, Wall, and ITS Device Conflicts	X	X	X
	Distribute Plans Determine Signing and Delineation Construction Limits	X	X	X
	Ensure Lane Continuity and Adequate Merging	X	X	
	Submit Preliminary Signing and Delineation Strip Map	X		

^aIndicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Preliminary Signing and Delineation Layout

The Signing and Delineation Designer is to develop the ~~plans~~[Preliminary Signing and Delineation Strip Map](#) using NCDOT *Roadway Standard Drawings*, the MUTCD, TEPL, 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 [and marked](#) 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 [for signing design](#):

- Develop Signing and Delineation Strip Map ~~that includes both existing and proposed signing.~~
 - ~~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.~~
 - ~~If it makes the Strip Map easier to read, the existing signs may be shown on a separate strip map.~~
 - ~~Strip Map shall include all guide signs (MUTCD Chapters 2D through 2L) and all Type A, B and D signs.~~
 - ~~Show the preliminary delineation layout on the Signing and Delineation Strip Map.~~
- Determine sign messaging.
- Identify [ground mounted sign locations \(stations\) for all Type A, B and D signs.](#)
- [Identify overhead sign locations \(stations\).](#)
- [Determine overhead sign structure type.](#)
- [Determine simple \(guardrail\) or break away supports for ground mounted signs.](#)
- [Develop preliminary barrier and guardrail request for foundation and support protection.](#)
- [Review recommendations from the Complete Street Review Assessment and incorporate if appropriate.](#)
- [Coordinate with appropriate Division and TSMO that their proposed DMS locations do not conflict with permanent signs locations.](#)
- [Identify if a Work Zone Signing Staging plan is needed, as coordinate with the Traffic Management Unit \(Work Zone Traffic Control\).](#)

The Signing and Delineation Designer ~~is to coordinate~~[coordinates](#) 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, lane drops, and option lanes.
- Replace, modify, or upgrade existing signs where necessary in accordance with MUTCD and TEPL.

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, 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.

For all submittals, the Signing and Delineation Designer ~~is to upload~~ uploads the submittal onto the project SharePoint site.

Identify Conflicts with Utilities, Right-of-Way, Wall, and ITS ~~Device Conflicts~~ Devices

The Signing and Delineation Designer is to ~~considers~~ consider placement of signing, considering that regulatory, warning and guide signs have a higher priority. Of note, the:

- Remaining signs shall only be installed where adequate spacing is available between other higher priority signs.
- Other signs shall not be installed in a position where they obscure the road users' view of other traffic control devices.

Additionally, the Signing and Delineation Designer is to:

- Ensure there are no utility (e.g., gas, fiber), wall (e.g., retaining, noise), ITS device, or drainage (e.g., drop inlets) conflicts.
- Ensure the sign is visible and not obstructed by other roadway features (e.g., bridge, vertical/horizontal curvature).
- Determine if additional right-of-way is required.
- Document if signs are required to be adjusted due to conflicts.

Determine Signing and Delineation Construction Limits

Signing and Delineation construction limits can extend past construction limits. When completing this task, the Signing and Delineation Designer is to:

- Account for construction phasing for opening of portions of roadway.

- Ensure necessary routing is established throughout the project.
- Ensure all signs, including ~~advanced~~advance and route continuity, are considered when reviewing overall signing plan.
- Ensure all pavement markings, including offsite approaches and departures, are considered when developing overall delineation plan.
- Coordinate with the Traffic Management Unit (Work Zone Traffic Control) if signs are located outside of the construction limits.
- SubmitCoordinate with the Roadway Designer and Traffic Management Unit (Wok Zone Traffic Control) if required pavement markings are located outside of the construction limits.

Ensure Lane Continuity and Adequate Merging Recommendations

The Signing and Delineation Designer is to ensure lane continuity in reference to Section 2.7 of the NCDOT *Signing and Delineation Procedure Manual*. This includes review of the geometric layout to ensure that elements such as signing requirements, intersection operation, merging, exit only, lane/route continuity, end of freeway plans, and temporary connection plans are sufficient for the safety and operations of roadway users. Any necessary modifications to geometric layout to ensure lane continuity, adequate merging, and required signing are to be discussed and coordinated with all affected technical Units/disciplines (such as Roadway and Congestion Management) and all stakeholders (such as the Regional Traffic Engineer and the applicable Division).

Distribute Plan Submittals

Submit Preliminary Signing and Delineation Strip Map

The Signing and Delineation Designer coordinates the QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of any deliverables. Once the ~~plans are~~Preliminary Signing and Delineation Strip Map is QC'd, the Signing and Delineation Designer submits the ~~plans~~Strip Map and supporting documentation via the project SharePoint site for review and comment. The Signing and Delineation Designer sends email notification with a link to the submittal to the appropriate staff as applicable: Project Manager, Division office and, Regional Traffic Engineer staff for review and commentRegional SDU Engineer.

2SD2 Advance Signing and Delineation Design

Overview

Advance 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](#)
- [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 Program: Quality Control and Quality Assurance](#)

Deliverables

<u>Deliverable</u>	<u>Task</u>	<u>Responsible Party</u>	
		<u>Activity Leader</u>	<u>Additional Support</u>
		<u>Signing and Delineation Designer</u>	<u>Regional Signing and Delineation Engineer</u>
Update Strip Map ^Q		X	X
Develop Signing Plans ^Q		X	X
Develop Ground Mounted Sign Support Design Worksheets ^Q	<ul style="list-style-type: none"> ▪ Advance Signing and Delineation Design for Field Inspection ▪ Advance Signing and Delineation Design for Right-of-Way Plans 	X	X
Develop Ground Mounted Sign Support Design Cross Sections ^Q		X	X
Document Guardrail/Barrier Locations ^Q		X	X
Develop Overhead Sign Locations ^Q		X	X
Develop Pavement Marking Plans ^Q		X	X

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Advance Signing and Delineation Design for Field Inspection

The Signing and Delineation Designer is to advance the signing and delineation plans for use at the Field Inspection. The Signing and Delineation Designer is to submit the Field Inspection plans including an

updated strip map to the appropriate Division Office, Regional Traffic Engineer, Regional Signing and Delineation Engineer and Project Manager. This includes steps that involve:

- Addressing comments by the Signing and Delineation Unit and the applicable Division from the previous design phase review.
- Providing an updated Signing and Delineation Strip Map from 2SD1 with the addition of all regulatory and warning signs.
- Addressing all right-of-way, utility, drainage, retaining/noise wall, ITS device conflicts, or provide a plan of action for addressing these conflicts.
- Updating preliminary signing and marking concept per revisions to the roadway design including any changes to lane widths and intersection layouts.
- Coordinating with appropriate Division and TSMO that their proposed DMS locations do not conflict with the permanent sign locations.
- Coordinating stop bar and crosswalk locations with the Signal Design lead.
- Developing proposed signing plans with notes in accordance with MUTCD, the NCDOT *Signing and Delineation Procedure Manual (Chapter 4)*, and NCDOT *Roadway Standard Drawings (Section 9)* with supporting signing documentation including:
 - ♦ Ground mounted sign support design worksheets
 - ♦ Ground mounted sign support design cross sections
 - ♦ List of all Barrier and Guardrail Locations needed for sign foundation and support protection.
 - ♦ List of all Overhead Sign Locations - list of all overhead sign locations with coordinates
- Developing proposed pavement marking plans in accordance with MUTCD, the NCDOT *Signing and Delineation Procedure Manual (Chapter 5)*, and NCDOT *Roadway Standard Drawings (Section 12)*, including notes, schedule, pavement marking stations, labels, and proposed curb ramp locations and types

Submit Signing and Delineation Design for Field Inspection

The Signing and Delineation Designer coordinates the QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of any deliverables. Once the Signing and Delineation Plans for Field Inspection are QC'd, the Signing and Delineation Designer submits the Plans and supporting documentation via the project SharePoint site for review and comment. The Signing and Delineation Designer sends email notification with a link to the submittal to the appropriate staff as applicable: Project Manager, Division, Regional Traffic Engineer and Regional SDU Engineer.

Advance Signing and Delineation Design for Right-of-Way Plans

The Signing and Delineation Designer is to advance the signing and delineation plans and to complete the Right-of-Way Plan Set. The Signing and Delineation Designer is to submit the plans including and updated strip map to appropriate Division office, Regional Traffic Engineer, Regional Signing and Delineation Engineer, and Project Manager. This includes steps that involve:

- Addressing comments by the Signing and Delineation Unit and the applicable Division from the previous Field Inspection Plans.
- Providing an updated Signing and Delineation Strip Map.

- Addressing all right-of-way, utility, drainage, retaining/noise wall, ITS device conflicts, or provide a plan of action for addressing these conflicts.
- Updating preliminary signing and marking per revisions to the roadway design including any changes to lane widths and intersection layouts.
- Coordinating stop bar and crosswalk location changes with Signal Design Lead.
- Updating proposed signing plans in accordance with MUTCD, the NCDOT *Signing and Delineation Procedure Manual (Chapter 4)*, and NCDOT *Roadway Standard Drawings (Section 9)* with supporting signing documentation including:
 - Ground mounted support design worksheets
 - Ground mounted support design cross sections
 - List of all Barrier and Guardrail Locations needed for sign foundation and support protection
 - List of all Overhead Sign Locations - list of all overhead sign locations with coordinates
- Updating proposed pavement marking plans in accordance with MUTCD, the NCDOT *Signing and Delineation Procedure Manual (Chapter 5)*, and NCDOT *Roadway Standard Drawings (Section 12)*, including notes, schedule, pavement marking stations, labels and proposed curb ramp locations and types.

Submit Signing and Delineation Design for Right-of-Way Plans

The Signing and Delineation Designer coordinates the QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of any deliverables. Once the Signing and Delineation Plans for the Right-of-Way Plan Set are QC'd, the Signing and Delineation Designer submits the Plans and supporting documentation via the project SharePoint site for review and comment. The Signing and Delineation Designer sends email notification with a link to the submittal to the appropriate staff as applicable: Project Manager, Division, Regional Traffic Engineer and Regional SDU Engineer.

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](#)
- [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 Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable <small>Task</small>	Task	Responsible Party	
		Activity Leader	Additional Support
		Signing and Delineation Designer	Regional Signing and Delineation Engineer
Approved Complete Strip Map ^Q	<ul style="list-style-type: none"> ▪ Complete <i>Unsealed</i> Signing and Delineation Plans 	X	X
Complete Signing Plans ^Q		X	X
Overhead Sign Locations Complete Ground Mounted Sign Support Design Worksheets ^Q		X	X
Complete Ground Mounted Sign Support Design Cross Sections ^Q		X	X
Complete Guardrail/Barrier Locations ^Q		X	X
Complete Overhead Sign Locations ^Q		X	X
Complete Sign Designs and Support Chart ^Q		X	X
Complete Quantities ^Q		X	X
Develop Project Special Provisions ^Q		X	X
Complete Pavement Marking Plans		X	X
Complete Three Way Check-QC/QA		X	X
Final PlansFinalize Quantities ^Q	<ul style="list-style-type: none"> ▪ Final Signing and Delineation Plans 	X	X
Finalize Project Special Provisions ^Q		X	X
Finalize Plans and Supporting Documentation		X	X

⁹Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete ~~Unsealed~~ Signing and Delineation Plans

The Signing and Delineation Designer is to complete and submit the ~~strip map~~ [Complete Signing and Delineation Plans](#) to the ~~Roadway Design Lead~~ [appropriate Division office, Regional Traffic Engineer, Regional Signing and Delineation Engineer](#), and Project Manager. This includes steps that involve:

- ~~Addressing comments by the Signing and Delineation Unit and the applicable Division from the previous design phase review.~~
- ~~Providing approved strip map of the signing concept including labeled and stationed pavement markings and delineation~~
- ~~Addressing all right-of-way, utility, drainage, retaining/noise wall, ITS device conflicts, or provide a plan of action for addressing these. No conflicts are to be left unresolved at this stage.~~
- ~~Providing one half size hard copy and PDF~~ [Updating proposed signing plans](#) in accordance with MUTCD, the NCDOT *Signing and Delineation Procedure Manual*, [\(Chapter 4\)](#), and NCDOT *Roadway Standard Drawings* (~~Sections 9 and 12~~) [of the Section 9](#) with supporting signing documentation including:
 - ✦ ~~Proposed signing plan (including notes, sign and support designs, and stations)~~
 - ✦ ~~List of guardrail/barrier locations~~
 - ✦ ~~Compile and provide a~~ [Ground mounted support design worksheets \(PDF\)](#)
 - ✦ [Ground mounted support design cross sections \(PDF\)](#)
 - ✦ [List of all Barrier and Guardrail Locations needed for sign foundation and support protection \(PDF\)](#)
 - ✦ [List of all Overhead Sign Locations - list of all overhead sign locations to the Signing Project Engineer with coordinates \(PDF\)](#)
 - ✦ ~~Proposed pavement marking plan, including notes, pavement marking stations, labels and proposed curb ramp locations and types~~
 - ✦ ~~Complete and submit guard rail/barrier locations, if needed, prior to final plans.~~
- ~~Addressing comments by the Signing and Delineation Unit and the applicable Division from the previous design phase review.~~

~~The Signing and Delineation Designer is to upload the submittal onto the project SharePoint site.~~

Final Signing and Delineation Plans

To finalize the Signing and Delineation plans, the Signing and Delineation Designer is to:

- ✦ ~~Complete and submit sign designs and support chart via an~~ [Electronic copy of the support design worksheets \(Excel\)](#)
- ✦ [Sign Designs with one design per page \(DGN\)](#)
- ✦ [Sign Designs with one design per PDF page \(if required\).PDF](#)
- ~~Complete and submit quantities that include:~~
 - ✦ ~~Electronic submittal of final quantity estimates for signing and pavement marking items.~~
 - ✦ ~~Uploadable file for pay items in the appropriate format.~~
- ~~Include approved sign and support designs (if revisions were made)~~

- [Complete-Final Quantity Estimate Calculations \(PDF\)](#)
- [Final Quantity Estimate \(PIQ Tool\)](#)
- Special Provisions that are project specific and not included within the current NCDOT Standard Specifications-
- [Updating proposed pavement marking plans in accordance with MUTCD, the NCDOT *Signing and Delineation Procedure Manual \(Chapter 5\)*, and NCDOT *Roadway Standard Drawings \(Section 12\)*, including notes, schedule, pavement marking stations, labels and proposed curb ramp locations and types with supporting pavement marking documentation including:](#)
 - [Final Quantity Estimate Calculations \(PDF\)](#)
 - [Final Quantity Estimate \(PIQ Tool\)](#)
 - [Special Provisions that are project specific and not included within the current NCDOT Standard Specifications](#)
- Perform a three-way check and appropriate QC/QA in accordance with Chapter 4 of the NCDOT *Signing and Delineation Procedure Manual*, the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures, and the respective QC Checklist. Ensure that the Signing and Delineation Unit and the applicable Division comments are addressed.

~~Complete~~The Signing and ~~submit final plans via an unsealed electronic~~Delineation Designer is to upload the submittal ~~of final plans~~onto the project SharePoint site.

Final Signing and ~~sign designs in both DGN~~Delineation Plans

- ~~Once the Complete Signing and PDF format.~~

~~Once~~Delineation Plan package is reviewed and approved by the Signing and Delineation Unit, the Signing and Delineation Designer is to electronically submit signed and sealed PDFs, using DocuSign (or other esignatures tool acceptable). [Signing and Delineation Designer submits the Plans and supporting documentation via the project SharePoint site.](#) The Signing and Delineation Designer ~~is~~sends email notification with a link to ~~upload~~the submittal ~~onto the project SharePoint site.~~to the appropriate staff as applicable: Project Manager, Division, Regional Traffic Engineer and Regional SDU Engineer.

As appropriate, NCDOT staff also complete and submit a Private Engineering Firm evaluation at this time.

1ST1 ~~Investigate~~ Structures Screening

Overview

Provide technical input on Express Design, determine preliminary structure cost for new structures, and evaluate the condition of each existing structure to determine if replacement, rehabilitation, or widening is an option.

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

- [NCDOT Spatial Data Viewer](#)
- [WIGINS Bridge Inspection & Inventory Software](#)
- Candidate Project/Express Design

Deliverables

Deliverable	Task	Responsible Party	
		Activity Lead	Additional Support
Structures Cost Estimate for Express Design	<ul style="list-style-type: none"> ▪ <i>Gather Existing Structure Inspection Reports and Plans</i> ▪ <i>Obtain Structures Input on Express Design</i> 	Structures Management Unit Field Operations Support, Division Bridge Maintenance	Project Lead

Gather Existing Structure Inspection Reports and Plans

When existing structures are in the project study area, the Project Lead identifies all bridge and culvert structures within the area. For existing structures, the Project Lead collects all related Bridge/Culvert Inspection Reports and any existing structure plans to determine if replacement or rehabilitation is necessary. This is all done in coordination with the Division Bridge Maintenance staff and Structures Management Unit's Field Operations Engineer, considering the following.

- Obtain existing inspection reports by contacting Structures Management Unit (Inventory & Appraisal)
 - Use NCDOT Spatial Data Viewer with the structure layer to obtain the Bridge Number.
 - Provide Existing Bridge Numbers to Structures Management Unit (Inventory & Appraisal).
- Request Bridge Inspection Report from Structures Management Unit (Inventory & Appraisal).
- Request structure plans or as-built plans for existing bridge Structures Management Unit (Inventory & Appraisal).

Obtain Structures Input on Express Design

The Project Lead is to obtain input on structures for the Express Design. The Structures Management Unit's Field Operations Engineer provides the following for all identified structures:

- Coordinate with the Division Bridge Maintenance staff
- Determine preliminary feasibility for the structure design and preliminary structure depth/clearance, considering:
 - Bridge widening may require smaller girder depths.
 - For Grade Separations – coordinate with the Roadway Design Unit for vertical and horizontal clearance requirements.
 - For Stream Crossings – coordinate with the Hydraulic Unit for span length and girder height.
- Determine the existing Bridge Numbers using the [NCDOT Spatial Data Viewer](#) and the structure layer
- If necessary, collect data from a field inspection of all structures within project area, which includes all bridges, culverts, pipes, and walls.
- Investigate and document current condition of all non- NBIS structures.
- Consult with the Structures Management Unit’s Field Operations Engineer and the Division to determine if replacement is necessary or if rehabilitation is required.

In coordination with the Structures Management Unit, the Project Lead provides a summary of the preliminary structure recommendations to the Feasibility Studies Unit for the Express Design (see 1FS2 for related information).

2ST1 Scope 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

- [SMU Bridge Data Sheet – Scoping Template.xlsx](#)
- [NCDOT Workday 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 Private Engineering Firm (PEF) Coordination Group
Preliminary / Final Scoping Sheet	<ul style="list-style-type: none"> ▪ <i>Develop and Finalize Structure Scoping Sheet</i> 		X	X
Preliminary / Final Manday Estimate	<ul style="list-style-type: none"> ▪ <i>Develop Preliminary Manday Estimate</i> 		X	X
	<ul style="list-style-type: none"> ▪ <i>Finalize Manday Estimate</i> 	X	X	X
	<ul style="list-style-type: none"> ▪ <i>Initiate NTP</i> 	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~~ is to complete the StructureSMU Bridge Data Sheet – Scoping SheetTemplate. The Design Firm Structures Lead can coordinate with Structures Management Unit Private Engineering Firm (PEF) Coordination Group to develop the Structures ScopingSMU Bridge Data Sheet. The ScopingBridge Data Sheet includes:

- Project Information
- Structure Data for each site:
 - ♦ Superstructure Type
 - ♦ Number of spans
 - ♦ Span lengths
 - ♦ Skew
 - ♦ Alignment Type
 - ♦ Proposed Rail Type
 - ♦ Proposed Foundation Type

- [Utilities](#)
 - [Joint Type](#)
 - [Additional Comments – indicating additional items needed for scoping \(Sidewalk/ MUP, Staged Construction, etc.\)](#)
- 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.

Finalize Manday Estimate

The final estimate for manday and cost are to be within an allowable tolerance (5% hours, 10% cost). If negotiation is necessary, the Project Manager asks the Structures Management Unit PEF Coordination Group to negotiate with the Design Firm Structures Lead.

After negotiation, and revisions to the estimates are made, the Structures Management Unit PEF Coordination Group returns the final estimate to the Project Manager, and the consultant Design Firm Structures Lead submits a final manday estimate to the Project Manager. Upon completion, the Project Manager issues Notice to Proceed (NTP) and a purchase order (PO) number to the Design Firm.

2ST2 Develop Preliminary General Drawings

Overview

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

References

- [SMU Bridge Data Sheet – Scoping Template.xlsx](#)
- [NCDOT Workday Estimate Form](#)
- ~~[Structures Management Unit Estimate Sheet](#)~~
- 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 Program: Quality Control and Quality Assurance](#)
- [Structures QA Checklists](#)
- [Structures QC Checklists](#)

Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader	Additional Support	
		Design Firm Structures Lead	Structures Management Unit Private Engineering Firm PEF Coordination Group	Geotechnical
Draft Preliminary General Drawings (PGDs) for Review ^Q	Develop Draft Preliminary General Drawings (PGDs)	X	X	
	Submit Draft PGD for Review to Structures Management Unit Private Engineering Firm PEF Coordination Group	X	X	
Preliminary Header Elevations (if required)	Submit Draft PGDs to Project Manager PGD for Review to Structures Management Unit Private Engineering Firm PEF Coordination Group	X	X	
Vertical Abutment Wall Envelopes	Provide Vertical Abutment Wall Envelopes to Geotechnical Structures Management Unit PEF Coordination Group	X	X	X
Final Preliminary General Drawings (PGDs) for Distribution ^Q	Finalize and Distribute Final PGDs	X	X	

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

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
- For railroad crossings, verify location of future tracks provided by Rail Owner
 - Verify minimum vertical and horizontal clearance required
 - Develop preliminary span lengths
 - Develop preliminary girder designs
 - Evaluate potential changes in grade and impacts

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 ~~Private Engineering Firm~~ PEF 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 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*.

Provide Vertical Abutment Wall Envelopes to ~~Geotechnical Unit~~ Structures Management Unit PEF Coordination Group

For structures with vertical abutment walls, the Design Firm Structures Lead develops the wall envelope, submitting the envelope to the Project Manager (for information) and to Structures Management Unit PEF Coordination Group for delivery to the Design Geotechnical Engineer for wall design.

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.

Provide Geotechnical Foundation Loads

After the distribution of Preliminary General Drawings (PGDs), the Design Firm Structures Lead coordinates with the Project Manager, Structures Management Unit PEF Coordination Group, and Geotechnical Engineering Unit as follows:

- Geotechnical Engineering Unit submits its Request for Loads to Structures Management Unit PEF Coordination Group.
- Structures Management Unit PEF Coordination Group passes the request along to Design Firm Structures Lead.
- Design Firm Structures Lead submits foundation loads to Structures Management Unit PEF Coordination Group.
- Structures Management Unit PEF Coordination Group sends loads to Geotechnical Engineering Unit
- Geotechnical Engineering Unit post the Foundation Recommendations to the project SharePoint site.

Provide Access Drawings – Stream Crossings

For stream crossings and in coordination with the Hydraulic Design Engineer and Environmental Analysis Unit, the Design Firm Structures Lead provides the General Drawing of Site denoting access type (e.g., rock causeway, temporary work bridge) to the Hydraulic Design Engineer.

- For a rock causeway:
 - Provide area for the causeway.
 - Show staging for removal or construction.
 - Provide the Hydraulic Design Engineer with specific information required for Environmental Permit Drawings.
- For a temporary work bridge:
 - In most cases, assume 30-foot spans, 30-foot width for mainline, 20-foot width for fingers, and 16-inch pipe piles.
 - Provide area of piles for temporary impacts.
 - Show temporary bridge on the General Drawing.

Complete Coast Guard Permit Sketches and Coordination

The Design Firm Structures Lead coordinates with the Structures Management Unit PEF Coordination Group and Environmental Analysis Unit to develop U.S. Coast Guard permit sketches for proposed structures over navigable waters. Prepare sketches in accordance with the Structures Management Unit Manual.

Complete Railroad Coordination Support and Easement Sketches

In development.

The Design Firm Structures Lead coordinates with the Structures Management Unit PEF Coordination Group, Location & Surveys Unit, and Rail Division to develop temporary and permanent easement sketches. Once approved by Rail Owner, permanent easements are surveyed, recorded and plat maps are developed for recordation.

4ST1 Finalize Structures Design PS&E

Overview

Submit Plans, Specifications, and Estimates (PS&E) to the Structures Management Unit PEF Coordination Group, who submits to Contract Standards and Development (CS&D) for letting.

References

- [Structures Management Unit Design Manual](#)
- [Structures Management Unit SharePoint Guidelines](#)
- [Roadway Design/Structures Checklist](#)
- [Structures Working Days Guidelines](#)
- [Structures PSP Lineup Sheet](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Structures QA Checklists](#)
- [Structures QC Checklists](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Design Firm Structures Lead	Structures
Final Structure Plans—PE-Sealed ^Q	▪ <i>Complete PS&E Package</i>	X	X
Structures Working Days Estimate ^Q		X	X
Structures Project Special Provisions—PE-Sealed ^Q		X	X
Structures Quantity Estimate ^Q		X	X
Structure Design Files		X	X
Bridge Construction Elevations		X	X
Final Plans ^Q	▪ <i>Submit Contract/Final Plans to CS&D</i>	X	X

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance

Complete PS&E Package

For compiling a complete contract/PS&E package, the Design Firm Structures Lead updates the plans, as needed, for any design changes that occurred after the end of ~~the (Final Plan Review) Plan-in-Hand Stage.~~ ~~The process includes completing:~~

Stage 3. The appropriate documentation required by the Contract Standards and Development Unit or Division Contract Engineer in proper format ~~tois~~ either to be included in the plans or provided as standalone documents. Items include:

- ~~Items include the~~ Index of structures
- ~~Final Plans - single PDF of signed sealed sheets, final plans, special provisions, design files, quantities,; full set combined PDF~~
- Special Provisions

- [Design Files – Super and other key documents–Substructure calculations – PDF set](#)
- [Construction Elevations – PDF set](#)
- Structures Quantity Estimate
- ~~Structure Working Days~~

The Design Firm Structures Lead completes the respective QC Checklist following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures before upload and/or distribution of Final PS&E contract package.

For structures designs developed by a Private Engineering Firm (PEF)/consultant, the Structures Management Unit reviewer is to use 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 Structures Management Unit guidance, policies, and procedures. Items to be reviewed include material quantities, notes, and references to project special provisions.

Submit Contract/Final Plans to CS&D

Plan sheets and other key documents are uploaded into SharePoint by the Design Firm Structures Lead and sent to the Structures Management Unit Project Management Group for final processing. The Structures Management Unit Project Management Group notifies the Plan Review Engineer or the Division Contract Engineer, with a cc to the Project Manager, when the PS&E package and the contract documentation have been placed on the project SharePoint site in the Let Preparation area.

1TM1 Complete Express Design Traffic Analysis (EDTA)

Overview

Obtain a preliminary assessment of the traffic operations for a proposed project, both with and without the proposed project. The purpose of the assessment is to utilize a simplified analysis method to determine the feasibility of proposed designs that complement the Express Design process in determining viable alternatives/alignments for proposed projects. This process is referred to as the Express Design Traffic Analysis (EDTA). Collectively, the EDTV and EDTA are referred to as the Express Design Traffic Evaluation (EDTE). See below:

Express Design Traffic Components:

Traffic Evaluation (EDTE) = Traffic Volume (EDTV) + Traffic Analysis (EDTA)

The EDTA also includes the determination of the Work Zone Level of Significance. The results of the determination are included in the Project Scoping Report. The summary documents the determination in the planning process and begins the coordination with the Traffic Operations Engineer (see 1TO1 and 2TM2 for related information).

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

- ~~☐~~ ~~Express Design Traffic Evaluation Tool~~
- ☐ [Selecting Optimum Intersection or Interchange Alternatives](#)
- ☐ [NCDOT Express Design Traffic Evaluation Guidance](#)
 - ~~☐~~ ~~NCDOT Express Design Traffic Evaluation Guidance (to be developed)~~
 - ~~☐~~ ~~NCDOT Express Design Traffic Analysis Scope and Manday Resources (to be developed)~~
- ☐ [Guidelines for Determining Work Zone Level of Significance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Congestion Management Section -or- Feasibility Studies Unit	Congestion Management Section -or- Feasibility Studies Unit
Express Design Traffic Analysis Report ^a	Initiate/Scope Express Design Traffic Analysis	X	X
	Determine Alternatives for Analysis/Scope Analysis	X ^a	X
	Initiate/Produce Express Design Traffic Volumes (EDTV)	N/A – Refer to 1TP1 (Complete EDTV)	

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Congestion Management Section -or- Feasibility Studies Unit	Congestion Management Section -or- Feasibility Studies Unit
	<ul style="list-style-type: none"> Develop Traffic Analysis 	X	X
	<ul style="list-style-type: none"> Develop Express Design Traffic Analysis Summary 	X	X
Work Zone Level of Significance Documentation	<ul style="list-style-type: none"> Determine Level of Significance 	Traffic Management Unit (Work Zone Traffic Control)	

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

^Q If developed by FSU/CDU, concurrence by Congestion Management Section required.

Initiate/Scope Express Design Traffic Operations Analysis

The Express Design Traffic Analysis (EDTA) is scoped jointly with the Express Design Traffic Volumes (EDTV) in one cohesive scoping document. Therefore, the EDTE Project Manager (as designated by the FSU/CDU, Transportation Planning Division, and Congestion Management ~~Unit~~Section) will develop the scope for the overall EDTE.

The traffic operations analysis includes the development of a simplified analysis and supports the development of the Express Design alternatives/alignments. The traffic operations analysis includes the analysis of recommended lane geometries, general storage lengths and the design configurations for selected Build alternatives/alignments that are included in the Express Design study.

To initiate the traffic operations analysis, the first step is to determine the level of analysis required. ~~Determination of the level of projects is by~~ The Congestion Management Section ~~or Feasibility Studies/Corridor Development Unit~~determines the level of projects. The level of analysis is based on a combination of the complexity of the project and how the project is scored in the Prioritization Process (see 1SP1 for related information). The following are the levels of traffic operations:

- Level 0 – Low traffic volume locations where traffic operations are not critical to the design of the project. No detailed traffic analysis is required.
- Level 1 - Level 1 analysis involves basic traffic operations that can be reviewed by use of macroscopic analysis tools. This type of analysis is typically done for projects that are identified in the Prioritization Process as corridor type projects ~~where operations are not expected to be over capacity.~~ Traffic analysis software typically used for this type of analysis include Synchro, HCS or Sidra. Additionally, simplified spreadsheet analysis that utilizes critical lane volume analysis procedures may be utilized.
- Level 2 - Level 2 analysis involves more complex traffic operations that can be best evaluated by use of microscopic analysis tools. This type of analysis is typically done for projects that are developed by the Congestion Management Team in the Prioritization Process or involve more complex multi-nodal or closely-spaced junctions. Traffic analysis software typically used for this analysis is TransModeler.

- Level 3 – Level 3 analysis involves the highest complexity for traffic operations. These projects require evaluation by use of advanced methodology involving microscopic analysis tools. Typical projects may include (but are not limited to) complex freeway system interchanges, new alignment projects (both freeway and arterial) that involve potential multiple travel routing options, and multi-modal projects. Traffic analysis software typically used for this analysis is TransModeler. Level 3 projects are not typically undertaken during the EDTE and simplified methods covered in Level 1 or 2 are normally adequate at the Express Design stage. The implementation of Level 3 analysis will occur in 2TM1.

The following table provides general guidance on the appropriate levels of analysis for each Specific Improvement Type (SIT) from the Prioritization Process:

Prioritization Specific Improvement Type	Level 0	Level 1	Level 2	Level 3
1 - Widen Existing Roadway		X		
2 - Upgrade Arterial to Freeway/Expressway		X		
3 - Upgrade Expressway to Freeway	X	X		
4 - Upgrade Arterial to Superstreet Reduced Conflict Intersection (RCI) Corridor			X	
5 - Construct Roadway on New Location		X		X
6 - Widen Existing Roadway and Construct Part on New Location		X		X
7 - Upgrade At-grade Intersection to Interchange or Grade Separation			X	
8 - Improve Interchange			X	X
9 - Convert Grade Separation to Interchange		X	X	
10 - Improve Intersection			X	
11 - Access Management	X	X	X	
12 - Ramp Metering	X	X	X	
13 - Citywide Signal System	X			
14 - Closed Loop Signal System	X			
15 - Install Cameras and DMS	X			
16 - Modernize Roadway	X	X		
17 - Upgrade Freeway to Interstate Standards	X	X		
18 - Widen Existing Local (Non-State) Roadway		X		
19 - Improve Intersection on Local (Non-State) Roadway			X	
20 - Convert Grade Separation to Interchange to Relieve Existing Congested Interchange			X	
21 - Realign Multiple Intersections			X	
22 - Construct Auxiliary Lanes or Other Operational Improvements			X	
23 - Construct Grade Separation at Highway / Railroad Crossing		X	X	
24 - Implement Road Diet to Improve Safety	X	X		
25 - Improve Multiple Intersections along Corridor		X	X	
26 - Upgrade Roadway	X	X		

Based on an understanding of the project goals, the Congestion Management Section, ~~Feasibility Study Unit and/or Corridor Development Unit~~ determines the Level of Analysis on a project-by-project basis and selects the software to be utilized for the analysis.

Develop Traffic Analysis

The traffic operations analysis is to be completed in the prescribed software package in accordance with the *Express Design Traffic Evaluation Guidance*. The first step in the analysis process is to develop the Base Year and Future Year No-Build scenarios, with the following considerations.

- These may be developed and submitted separately from the Build analysis, if determined to be appropriate by the project team.
- Preliminary review and approval of the No-Build analysis may be helpful for projects where the build scenarios expand on the no-build analysis and help reduce re-analysis by identifying issues earlier in the process.

The next step is to develop the analysis of the Build alternatives/ alignments. The Build analysis is typically accomplished in one of two ways: either the traffic analysis precedes the design, or the design precedes the traffic analysis.

- For projects where the traffic analysis precedes the design, a general design concept is identified for the traffic analysis and the purpose of the analysis is to develop the details of the design to meet the goals of the project.
 - The analysis determines the recommended design layout and provides the required lane configurations and storage lengths.
 - The recommended layout is then provided to the design team for incorporation into the project's design plans.
 - If elements of the recommended layout cannot be accommodated in the design due to constraints, coordination should occur between the design team and the traffic analysis team to determine how the design can be revised and still meet the project goals.
 - The process should end with a traffic analysis of a design that fits and meets project goals.
- For projects where the design precedes the traffic analysis, a detailed design is developed and provided to the traffic analysis team for analysis.
 - The traffic analysis is developed based on the design provided and any locations where the design does not meet the project goals are identified and recommendations on design revisions are provided.
 - Additionally, any locations where the design provided exceeds what is needed to meet the goals of the project are noted and provided to the project's design team (namely the Roadway Design Lead) to determine, through value engineering, if design revisions are warranted (see 1RD1, 2RD1, 1VM1, and 2VM1 for related information).
 - At the end of the process, a comparison of the traffic analysis and design is completed to determine that they match.
 - The process should end with a traffic analysis of a design that fits and meets project goals.

Once the Draft Express Design Traffic Analysis is developed, it is submitted to the Traffic Management Unit (Congestion Management Section) [or the EDTE Project Manager \(if delegated by Congestion Management Section\)](#) for review.

Develop Express Design Traffic Analysis Summary

After a review of the analysis and receiving approval from the Traffic Management Unit (Congestion Management Section), or EDTE Project Manager, the analysis is finalized through the development of an Express Design Traffic Analysis Report. The Report includes a brief description of the alternatives/alignments evaluated, a simplified reporting of the Measures of Effectiveness (MOE), and conclusions of the evaluation.

- The final version is sealed by the Professional Engineer that was responsible of the analysis.
- The final Summary and analysis files are delivered to the Project Lead and uploaded to the project SharePoint site by the Congestion Management Project Engineer or Project Design Engineer.

All of the requirements to develop and complete the summary are described in the *Express Design Traffic Evaluation Guidance*.

Determine Level of Significance

Referencing the *Guidelines for Determining Work Zone Level of Significance*, the Traffic Management Unit (Work Zone Traffic Control) or Transportation Planning Unit evaluates the following project characteristics to determine project/work zone level of significance:

- Category and project type
- Existing volumes and traffic lanes
- Total truck traffic (dual & TTST combined)
- US or NC route
- Project length

The level of significance can be determined based on the EDTV data; however, the determination should be revisited once the project level traffic forecast is completed (see 1TP1 for related information). The Transportation Planning Unit or Traffic Management Unit (Work Zone Traffic Control Section) documents the determination in the planning process and coordinates with the Traffic Operations Engineer (see 1TO1 for related information).

2TM1 Complete Traffic Analysis

Overview

Complete a traffic operations analysis that evaluates the study area, both with and without the proposed project, to ~~identified~~identify projected traffic data and inform project design criteria.

References

- [Traffic Engineering Suite](#)
- [Capacity Analysis Guidelines](#)
- [Simulation Guidelines](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Congestion Management Project Engineer/Project Design Engineer	Congestion Management Regional Engineer
Traffic Operations Analysis Technical Memorandum ^{A, Q}	▪ <i>Initiate/Scope Traffic Operations Analysis</i>	X	X
	▪ <i>Develop Analysis</i>	X	X
	▪ <i>Complete the Traffic Operations Analysis Technical Memorandum</i>	X	X

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Initiate/Scope Traffic Operations Analysis

The traffic operations analysis is to develop the measures of effectiveness (MOEs), typically in the form of level of service (LOS), and is to support the environmental document’s purpose and need statement for projects that have congestion or mobility related needs. The traffic operations analysis also includes the development of recommended lane geometries, storage lengths, and the design configurations for the Design Recommendation Plan Set (see 2RD1 for related information) or any alternatives/alignments included in the study.

To initiate this analysis, the Traffic Management Unit (Congestion Management Section) determines the level of project complexity based on the levels of traffic operations:

- ~~Level 0~~ Level 0 – Low traffic volume locations where traffic operations are not critical to the design ~~of analysis~~ of the project.
 - ↳ ~~Typical projects include low volume bridge replacements and basic maintenance operations.~~
- No detailed traffic analysis is required.
- Level 1 ~~(Basic)~~ - Level 1 analysis involves basic traffic operations that can be reviewed by use of macroscopic analysis tools. This type of analysis is typically done for projects that are identified in the Prioritization Process as corridor type projects. Traffic analysis software typically used for this

type of analysis include Synchro, HCS or Sidra. Additionally, simplified spreadsheet analysis that utilizes critical lane volume analysis procedures may be utilized.

- ~~↳ Typical projects include simple intersection operation (unsignalized, signalized, roundabouts), basic corridor analysis, and freeway operations (including merge, diverge, weave) that are mostly under capacity.~~
- ~~↳ Traffic analysis software typically used for this analysis include Synchro, HCS, and SIDRA.~~
- ~~Level 2 (Intermediate)~~ - Level 2 analysis involves more complex traffic operations that can be best evaluated ~~reviewed~~ by use of microscopic analysis tools.
 - ~~↳ Typical projects may include freeway operations near~~This type of analysis is typically done for projects that are developed by the Congestion Management Team in the Prioritization Process or above capacity and involve more complex multi-node intersections, interchanges, and corridors that include designs such as (but are not limited to) reduced conflict intersections, continuous flow intersections, and diverging diamond interchanges.
- nodal or closely-spaced junctions. Traffic analysis software typically used for this analysis is TransModeler.
- Level 3 (~~Advanced~~) – Level 3 analysis involves the highest complexity ~~effor~~ traffic operations. These projects require evaluation by use of advanced methodology involving microscopic analysis ~~and dynamic assignment~~ tools. Typical projects may include (but are not limited to) complex freeway system interchanges, new alignment projects (both freeway and arterial) that involve potential multiple travel routing options, and multi-modal projects. Traffic analysis software typically used for this analysis is TransModeler.

Once a level of analysis is determined, the Traffic Management Unit (Congestion Management Section) verifies that the analysis is to be completed by an individual prequalified to perform the analysis. (Note that prequalification for Congestion Management work codes is by individual, not by firm.)

Once the project is assigned, the Traffic Management Unit (Congestion Management Section) ~~develops~~reviews and approves the scope of the work. The limits of the analysis and intersections to be included in the analysis typically match those included in the traffic forecast: and should be coordinated with the Congestion Management Section during the scoping of the traffic forecast (See 1TP2 for related information). The traffic analysis also typically includes the following scenarios:

- Base Year No-Build (based on existing conditions);
- Future Year No-Build (based on existing conditions, without the proposed project but with any other fiscally constrained project(s) in place);
- Future Year Build for each alternative/alignment; and
- Base Year Build may be analyzed for some projects considering:
 - If determined to be warranted by the Congestion Management Project Engineer or Regional Engineer, and
 - Typically completed only for the recommended alternative/alignment.

The scoping of the analysis is completed in accordance with the *Congestion Management Scope Templates*, which are included in the *Traffic Engineering Suite* under the Scope and Estimate Resources section.

Complete Final Unsealed Transportation Management Plan (TMP)

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 Lead/Utilities Coordinator/Utilities Design Engineer
 - Relocation of 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](#) Design Review [Complete](#) Meeting.

Concurrent with the on-going coordination, the WZTC Project Engineer is to progress the TMP for the [Plan-in-Hand](#) review Design Review [Complete](#) Meeting, including:

- Title Sheet/Legend
- Final General Notes
- Final Phasing in phase/step format
- Detailed long-term temporary traffic patterns that align with final phasing including:
 - Cut Sections at strategic locations that detail spatial relationship among traffic, traffic control devices, and construction
 - Temporary Pavement Marking
 - Channelization
 - Delineation
 - Positive Protection
 - Work Zone Signing, including the location and messaging of Portable Changeable Message Signs
 - Modifications to existing signing due to temporary traffic patterns
 - Pedestrian accommodations
- Offsite detour details that include both Advance Warning and Trail Blazing Signs
- Special Details
 - Work Zone Speed Reduction Signing
 - Portable concrete barriers at Temporary Shoring
 - Special Sign Designs

The WZTC Project Engineer is to also submit the following items with the Final unsealed TMP:

- Draft version of TMP estimate of WZTC pay items and estimated quantities.
- Draft version of Intermediate Contract Times using standard ICT templates.
- Draft version of the WZTC Special Provisions generated from the Work Zone Application for Special Provisions (WASP).

Upload final unsealed TMP and supporting documents to the project SharePoint site prior to the ~~Plan-in-Hand review~~ [Design Review Complete](#) Meeting.

Complete Final Sealed Transportation Management Plan (TMP)

Progress the TMP to the PS&E and Letting phase as follows:

- Address comments by the Work Zone Traffic Control Section and the applicable Division from the previous design phase review. Coordinate the QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist.
- Upload Final Unsealed TMP, Intermediate Contract Times, Project Special Provisions, and Estimate to the project SharePoint Let Preparation Folder for review by CS&D Unit.
- Address final comments by CS&D Unit and upload Final Sealed TMP and Project Special Provisions to the project SharePoint Let Preparation Folder for final processing by CS&D Unit.

Develop Initial Incident Management Alternate and Detour Options

To ensure that incident management alternate and detour routes are included in the environmental document, the Traffic Operations Engineer develops an initial map detailing potential routes to help refine the project limits (refer to the Integrated Corridor Management Project Process Outline for the alternative routes and/or detour routes for a project). The Traffic Operations Engineer:

- Includes any routes that need updated signal timing.
- Coordinates with the Feasibility Studies Unit to include in the project limits.
- Ensures the applicable Division(s) review the potential routes.

The Traffic Operations Engineer coordinates with the Environmental Analysis Unit if incident management alternate / detour routes are required. Typically permanent ITS devices on incident management detour routes are outside the normal project limits and need to be evaluated as part of the environment document.

The Signal Systems Engineer prepares the map in accordance with the Integrated Corridor Management Project Process Outline. After the map is complete, the Traffic Operations Engineer sends the map to the following units for their reference:

- Environmental Analysis Unit
- Feasibility Studies Unit
- The applicable Division(s)
- Traffic Management Unit (Work Zone Traffic Control)

Develop Initial Traffic Operation Strategies

The Traffic Operations Engineer could develop the following traffic operation strategies to address mobility and safety throughout the project limits to support the construction effort.

- Tow contracts
- Incident management alternate / detour route strategies
- Smart work zone technology
- Other means to improve the mobility and safety of the work zone or address concerns identified in the Operational Risk Assessment

The Traffic Operations Engineer coordinates with the applicable Division(s) on potential strategies to be used during construction, providing a checklist of items that may be feasible for the project.

Develop Travelers Information Strategy

The Traffic Operations Engineer develops a Travelers Information Strategy if applicable to project. Details regarding the Travelers Information tasks are still *in development*.

Identify New ITS Devices and Incident Management Signal Equipment Upgrades

To determine signal equipment upgrades needed for incident management, the Traffic Operations Engineer, in coordination with the Signal System Engineer:

- Determines which signal systems, if any, are affected along the project corridor or identifies/refines incident management alternate and/or detour routes using the NCDOT Signals Map.

- Compiles a list of all affected signal system and the signals within those systems. The list includes:
 - Any new systems being constructed by the project or signals being added to existing systems by the project.
 - The party responsible for traffic operations along the corridor (NCDOT or municipality).

The Signal System Engineer assigns a signal system number to any new system(s) being constructed by the project.

The Traffic Operations Engineer, in coordination with the ~~ITS and Signals~~ [Transportation Systems Management & Operations \(TSMO\)](#) Unit (Signal Design Section and Regional ITS Section), is to:

- Determine additional permanent ITS devices and locations.
- Provide a planning level map showing new and existing device locations for a corridor.

At this point, the Traffic Operations Engineer also:

- Finalizes the map, sending it to the appropriate Units or Sections included in the planning process.
- Sends the Planning Level ITS device/Signal map to the Environmental Analysis Unit to include in the project limits.

The Traffic Operations Engineer continues coordination with the Environmental Analysis Unit as the ITS device strategies are further refined on the incident management alternate / detour routes.

Develop Operational Strategy and ITS Scope Costs

For this task, the Traffic Operations Engineer develops a planning-level cost estimate for any traffic system operational strategies to be included in the conceptual construction estimate (see 1CS1 for related information). This could include:

- Tow contracts
- Integrated Corridor Management (ICM)
- Incident Management Assistance Patrol (IMAP)
- Traffic Management Center (TMC) resources

The cost could also include:

- Incident management signal system upgrades
- Signal timing
- New permanent ITS devices
- NCDOT operational cost post-construction
- Any other additional equipment needed

The Traffic Operations Engineer submits the cost estimate to the Feasibility Studies/Corridor Development Unit Lead.

Complete QC/QA Procedures

The Traffic Operations Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and/or distribution of any deliverables.

Deliverables (if *not a Significant Project*)

Deliverable	Task	Responsible Party
		Activity Leader
		Traffic Operations Engineer
Planning Level ITS Device Map ^Q	▪ <i>Identify New ITS Devices</i>	X
Planning Level Estimate of Traffic Systems Operational Strategies ^Q	▪ <i>Develop ITS Scope Costs</i>	X

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Identify New ITS Devices

In coordination with the [ITS and Signals Transportation Systems Management & Operations \(TSMO\)](#) Unit (ITS Design Section), the Traffic Operations Engineer determines any additional ITS devices and locations. The Traffic Operations Engineer also provides a planning level map showing new and existing device locations for a corridor.

Develop ITS Scope Costs

For this task, the Traffic Operations Engineer develops a planning-level cost estimate for any traffic systems operational strategies to be included in the conceptual construction estimate (see 1CS1 for related information). This is to include new permanent ITS devices. The Traffic Operations Engineer submits the cost estimate to the Feasibility Studies/Corridor Development Unit Lead.

Complete QC/QA Procedures

The Traffic Operations Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and/or distribution of any deliverables.

2TO1 Initiate Transportation Operations Plan (if a Significant Project)

Overview

Work with Traffic Management Unit (Work Zone Traffic Control) and ~~ITS and Signals~~ **Transportation Systems Management & Operations (TSMO)** Unit to develop the traffic operations portion of the Transportation Management Plan (TMP). Work Zone Traffic Control develops the temporary traffic control (TTC) plans / Maintenance of Traffic Plan and Traffic Systems Operations develops the plans for Travel Demand Management, signal retiming, integration of ITS devices supporting incident management alternate / detour routes, and Incident Management Plan.

References

- [Guidelines for Transportation Management Plan Development](#)
- [Work Zone Traffic Control Design Manual](#)
- [Guidelines for the Use of Positive Protection in Work Zones](#)
- *Integrated Corridor Management (ICM) Project Process Outline (PPO)*
- *Incident Management Plan Guidelines*
- *Operational Risk Assessment Handbook*
- Incident Management Assistance Patrol (IMAP) Resources for Significant Project (*In Development*)
- Future Location of all Documents
 - <https://ncconnect.sharepoint.com/:f:/r/sites/trafficsystemsoperationsprojects/Shared%20Documents/References?csf=1&web=1&e=tqPQy2>
 - <https://connect.ncdot.gov/resources/safety/Tepl/Pages/tepl.aspx>
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	
		Traffic Operation Engineer	Signal System Engineer
Updated Operational Risk Assessment ^A	<ul style="list-style-type: none"> ▪ <i>Validate Operational Risk Assessment</i> 	X	
Traffic Operations Recommendations ^A	<ul style="list-style-type: none"> ▪ <i>Validate Traffic Operations Strategies</i> 	X	
Initial Incident Management (Quick Clearance) Strategies Recommendations ^A	<ul style="list-style-type: none"> ▪ <i>Initiate Incident Clearance Strategies</i> 	X	
Draft Signal Timing Plans ^Q	<ul style="list-style-type: none"> ▪ <i>Prepare Signal System Coordination Plans and Upgrades List</i> 		X
Integrated Corridor Management Decision Matrix (Ruleset) ^Q	<ul style="list-style-type: none"> ▪ <i>Develop Incident Management Alternate/Detour Route Response Plan</i> 	X	
List of Smart Work Zone Equipment	<ul style="list-style-type: none"> ▪ <i>Determine Level of Smart Work Zone Needs for Incident Management</i> 	X	
<i>Detailed Travelers Information Plan</i>	<ul style="list-style-type: none"> ▪ <i>Prepare Detailed Travelers Information Plan</i> 	X	
Updated Cost Estimate ^Q	<ul style="list-style-type: none"> ▪ <i>Prepare Detailed Traffic Operations and ITS Cost Estimate</i> 	X	
Initial Stakeholder Meeting Minutes	<ul style="list-style-type: none"> ▪ <i>Hold initial Stakeholder Meetings about Traffic Operation Strategies</i> 	X	

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^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Validate Operational Risk Assessment

After projects are selected and prioritized, the Traffic Operations Engineer determines if there are any effects that require changes to the traffic operation strategies. The Traffic Operations Engineer also updates the Operational Risk Assessment, as needed, to include any updates to the project. The validation also is to update for changes to the project limits or the phasing of adjacent projects.

Validate Traffic Operations Strategies

Once the strategies are selected to mitigate the work zone impacts and the project risks are updated, the Traffic Operations Engineer develops a concept planning document that:

- Assigns leads for each strategy.
- Establishes the need and purpose of each strategy.
- Aligns milestones to ensure synchronization of the strategy development.

Initiate Incident Clearance Strategies

The Traffic Operations Engineer coordinates with the applicable Division to provide a list of the incident clearance requirements for the project, which are to be administered by NCDOT and the Contractor. The Traffic Operations Engineer:

- Determines requirement for type and management of tow contracts (e.g., DOT managed, Contractor managed, etc.).
- Determines the expansion of Incident Management Assistance Patrol (IMAP) routes.
- Determines if any other strategies would assist in the following:
 - Incident detection
 - Incident response
 - Incident clearance
 - Incident site management; and/or
 - Incident information dissemination

Prepare Signal System Coordination Plans and Upgrades List

The Signal System Engineer coordinate with the applicable Division or Unit to:

- Coordinate with the Division and Signal/ITS lead about project schedule.
- Coordinate with the Traffic Operations Engineer to update the list of affected ITS Devices, Signal Systems and Signals from 1TO1.
- Verify with the Signal/~~ITS~~ Lead (see 2SG1 for related information) if the traffic signals along a potential incident management detour route may require equipment upgrades for NCDOT to communicate with the traffic signals.
- Develop/review draft signal timing plans along the incident management detour routes.
- Coordinate with the Signal/~~ITS~~ Lead (see 2SG1 for related information) if updated signal plans are required to replace equipment or install a new signal.
- Coordinate with ~~Signal~~/ITS Lead (see 2SG1 for related information) if traffic communication plans are required to include traffic signals in a centralized signal system software.

Develop Incident Management Alternate/Detour Route Response Plan

Using the Alternate/Detour Route Map, the Traffic Operations Engineer conducts a field inspection to validate the selected incident management routes with Division and other required stakeholders. Update the maps if needed after the field inspection.

The Traffic Operations Engineer prepares an Integrated Corridor Management Decision Matrix (Ruleset) in accordance with the Integrated Corridor Management Project Process Outline. The Traffic Operations Engineer:

- Holds stakeholder meetings to discuss the input criteria/thresholds and general response parameters for any incident at any location within the mainline project. Input discussion to include at a minimum: general route information, time of day, day of week, type of incident (Minor, Intermediate, and Major), queue threshold, and number of lanes affected. Response parameters discussion to include at a minimum: alternate/detour route usage, CMS/DMS message strategies, signal timing activation, [CTBDTB](#) activation, and Division specific restrictions.
- Develops and populates an Integrated Corridor Management Decision Matrix (Ruleset) summarizing the inputs and response parameters for each scenario from stakeholder input.
- Resolve conflicts of concurrent ICM responses with ranking during activations.

From the field inspection and with the Integrated Corridor Management Decision Matrix (Ruleset), the Traffic Operations Engineer:

- Identifies the required ITS devices, traveler information, and coordinated signal system timing.
- Updates ITS Device/Signal Map from 1TO1.
- Updates List of affected ITS Devices, Signal Systems and Signals from 1TO1.
- Coordinates the development of the ITS plans, Signal plans, and [changeabledynamic](#) trailblazers with the other Units.
- Continues coordination with the Environmental Analysis Unit about updated ITS device and Signal locations along incident management alternate / detour routes.

Determine Level of Smart Work Zone Needs for Incident Management

If a Smart Work Zone is required, the Traffic Operations Engineer:

- Meets with Traffic Management Unit (Work Zone Traffic Control) to discuss options that can be incorporated into the Incident Management Plan.
- Adds the appropriate level of involvement of the State Traffic Operations Center in the operations and maintenance of smart work zone devices.
- Assists with developing a list of Smart Work Zone Equipment.

Prepare Detailed Travelers Information Plan

The Traffic Operations Engineer will prepare a Travelers Information Strategy if applicable to project. Details regarding the Travelers Information tasks are still *in development*.

Prepare Detailed Traffic Operations and ITS Cost Estimate

Once the strategies are developed, the Traffic Operations Engineer prepares a refined estimate to include the cost to the NCDOT and the cost to the Contractor. The Traffic Operations Engineer may include an

operational cost estimate for the project after construction if items were identified. The Traffic Operations Engineer coordinates with ~~ITS and Signals~~ [Transportation Systems Management Section & Operations \(TSMO\) Unit](#) as needed. The estimate may include:

- Portable and temporary ITS devices
- IMAP expansion
- Tow contract management
- Traffic Management Center (TMC) operation
- ITS device installation

Some of these pay items are at NCDOT's cost during and after construction, and others are included in the Contractor's construction cost estimate. The estimate is sent to the Project Manager, who reviews the estimate, and Contract Standards and Development Unit (see 2CS1 for related information).

Hold Initial Stakeholder Meetings about Traffic Operations Strategies

The Traffic Operations Engineer meets with project stakeholders to coordinate associated incident management efforts that need to occur during construction within their areas. These stakeholders could include:

- Municipal and/or county Law Enforcement
- Towing industry
- Municipal traffic engineers and/or signal engineers

The Traffic Operations Engineer prepares the meeting minutes and submits these minutes to the Project Manager and all meeting attendees.

Complete QC/QA Procedures

The Traffic Operations Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and/or distribution of any deliverables.

3TO1 Advance Transportation Operations Plan (if a Significant Project)

Overview

Finalize traffic operation plans and start traffic operation discussions for desired support with outside agencies.

References

- Integrated Corridor Management (ICM) Project Process Outline (PPO)*
- Incident Management Plan Guidelines*
- Incident Management Assistance Patrol (IMAP) Resources for Significant Projects (In Development)*
- Memorandum of Understanding (MOUs) with Municipalities and Emergency Responders (In Development)*
- State Traffic Operations Center (STOC)/Traffic Management Center (TMC) Operator Training (In Development)*
- Helping All Work Zones Keep Safe (HAWKS) Process Document (In Development)*
- Tow Contract Document (In Development)*
- Future Location of all Documents
 - <https://nconnect.sharepoint.com/:f:/r/sites/trafficsystemsoperationsprojects/Shared%20Documents/References?csf=1&web=1&e=tqPQy2>
 - <https://connect.ncdot.gov/resources/safety/Tepl/Pages/tepl.aspx>
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Traffic Systems Operation	
Final Cost Estimate ^Q	<ul style="list-style-type: none"> ▪ <i>Update Construction-Phase Operations Cost Estimate</i> 	X	ITS and Signals Management Section TSMO Unit
Requirements of Incident Management Plan ^A	<ul style="list-style-type: none"> ▪ <i>Submit Requirements for Incident Management Plan</i> 	X	
CCTV Plans, DMS/CMS Plans, CT&DTB Plans, Cable Routing Plans, Signal Plans ^Q	<ul style="list-style-type: none"> ▪ <i>Coordinate Incident Management Alternate / Detour Route Response Plan</i> 		ITS and Signals Management Section TSMO Unit
Signal System Timing Plans ^Q			Signal System Engineer
Static Trailblazer Sign Plans ^Q			Signing & Delineation Designer
Message Sets, ICM Response Database ^Q		X	
Demand Management Plan ^{A, Q}	<ul style="list-style-type: none"> ▪ <i>Submit Demand Management Plan</i> 	X	
Draft Tow Contract Documents ^Q	<ul style="list-style-type: none"> ▪ <i>Submit Tow Contract Documents</i> 	X	

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Traffic Systems Operation	
Draft Law Enforcement Memorandum of Understanding ^Q	<ul style="list-style-type: none"> Initiate Memorandum of Understanding (MOU)/Agreements with Law Enforcement/Municipalities 	X	
Draft Agreement with Municipalities ^Q		X	
Coordination Meeting with NCDOT Communications Minutes	<ul style="list-style-type: none"> Coordinate with NCDOT Communication on Public Information Plan 	X	
Final Transportation Operations Plan ^{A, Q}	<ul style="list-style-type: none"> Complete Final Traffic Operations Plan 	X	
Final Equipment List ^A	<ul style="list-style-type: none"> Develop Equipment Purchase Need for Construction 	X	ITS and Signals Management Section/TSMO Unit Engineer

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

^Q Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Update Construction-Phase Operations Cost Estimate

Using the final Transportation Management Plan (TMP), the Operational Plan, and the final equipment list, the Traffic Operations Engineer develops a final cost estimate for the project in coordination with other Units/Sections (i.e., ~~ITS and Signals~~ [Transportation Systems Management Section & Operations \[TSMO\] Unit](#)), as needed.

Submit Requirements for Incident Management Plan

The Traffic Operations Engineer:

- Prepares and submits the requirements of an incident management plan for the project.
- Coordinates with Traffic Management Unit (Work Zone Traffic Control) to include the relevant information on the temporary traffic control (TTC) plans or the Traffic Operations Plan (see the *Incident Management Plan Guidelines* and 3TM1 for related information).

If the project is to be let by the Division, the Traffic Operations Engineer coordinates with the Division to let equipment, tow contract, and hiring the Incident Management Assistance Patrol (IMAP) drivers. The Traffic Operations Engineer purchases the trucks and provides training for the IMAP drivers.

Coordinate Incident Management Alternate / Detour Route Response Plan

The Traffic Operations Engineer coordinates with the following leads regarding equipment and data required to be included on the respective plans:

- ITS Lead on CCTV Plans, DMS/CMS Plans, ~~CTB~~ [DTB](#) Plans, or Cable Routing Plans
- Signal Lead on Signal Plans
- Signal System Engineer on Signal System Timing Plans
- Signing and Delineation Designer on Static Trailblazer Plans

The Traffic Operations Engineer also coordinates with applicable Division and regional personnel.

The Traffic Operations Engineer coordinates with the ITS Lead to develop [CTB/DTB](#) plans. The Traffic Operations Engineer will conduct a field review and site assessment for determination of specific placement based on:

- Advance notifications of Alternate/Detour Routes
- Roadway geometry and sight distance
- Roadway design speed
- Potential driver obstructions
- Vertical and lateral clearance guidelines from AASHTO, MUTCD, and NCDOT publications
- Spacing to existing signs
- Power source
- Existing property lines and right-of-way markers if present
- Roadway cross sections

The Signal System Engineer develops the signal timing plans for incident management detour routes and the thresholds for each plan. The Traffic Operations Engineer:

- Develops message sets for dynamic signs for each detour for each scenario using ITS device locations previously approved.
- Use decision matrix (ruleset) to populate a response plan and plan sheets for device locations. The information is populated into a ICM response database for State Traffic Operations Center (STOC)/Traffic Management Center (TMC) operators to use during construction.
- Provides a list or chart of equipment needed for each scenario impacted by the detour route.
- Develops the ICM response database for each route scenario, each route, [CTB's/DTB's](#), DMS/CMS message sets, and all other ICM response database features in accordance with the database scheme specified by NCDOT.

Submit Demand Management Plan

The Traffic Operations Engineer develops a demand management plan for the project regarding strategies for other alternative modes of transportation during construction (e.g., additional transit routes, ridesharing).

Submit Tow Contract Documents

The Traffic Operations Engineer prepares the draft tow contract documents based on the level of towing required for the project. The Traffic Operations Engineer coordinates with the applicable Division as needed.

Initiate Memorandum of Understanding (MOU)/Agreements with Law Enforcement/Municipalities

The Traffic Operations Engineer continues discussions with law enforcement regarding the project. The Traffic Operations Engineer prepares a draft Law Enforcement memorandum of understanding in response to comments summarizing the project commitments if needed.

The Traffic Operations Engineer continues discussions with the municipalities regarding the project. The Traffic Operations Engineer prepares a Draft Agreement with Municipalities in response to comments summarizing the project commitments.

Submit Detailed Travelers Information Plan

The Traffic Operations Engineer will submit a Travelers Information Strategy if applicable to project. Details regarding the Travelers Information tasks are still *in development*.

Coordinate with NCDOT Communications on Public Information Plan

If a project requires a Public Information Plan by Traffic Operations, the Traffic Operations Engineer coordinates with applicable Division, Traffic Management Unit (Work Zone Traffic Control), and the Communications Group using the information from the TMP before, during, and/or after construction.

Complete Final Traffic Operations Plan

The Traffic Operations Engineer prepares and submits the final Traffic Operations Plan for bidding or internal execution, which includes:

- A traffic response plan
- A tow contract
- A list of additional items to be included
- Items the Contractor is responsible for
- Additional equipment needed for incident management

Develop Equipment Purchase Need for Construction

Using the TMP, the Traffic Operations Engineer determines if any additional equipment is needed to be purchased and included in the overall contract by outside agencies or the Division prior to construction. This list is provided to the Project Manager and Contract Letting for bidding and/or to the Division or region for internal execution. The Traffic Operations Engineer coordinates with ~~ITS and Signals~~[Transportation Systems Management Section & Operations \(TSMO\) Unit](#) as needed. Potential equipment could include:

- Changeable message signs
- Portable closed circuit televisions (CCTVs)
- IMAP vehicles
- ~~Changeable~~[Dynamic](#) Trailblazer signs
- Traffic signal equipment

The Traffic Operations Engineer provides a list to FHWA of any exceptions to procure equipment or devices that may be used on future projects.

Complete QC/QA Procedures

The Traffic Operations Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and/or distribution of any deliverables.

4TO1 Complete Transportation Operations Plan-Related Tasks (if a Significant Project)

Overview

Finalize the remaining tasks on the Transportation Management Plan (TMP) with outside agencies to solidify traffic operation activities for construction.

References

- Integrated Corridor Management (ICM) Project Process Outline (PPO)*
- Incident Management Plan Guidelines*
- Incident Management Assistance Patrol (IMAP) Resources for Significant Projects (In Development)*
- Memorandum of Understanding (MOUs) with Municipalities and Emergency Responders (In Development)*
- State Traffic Operations Center (STOC)/ Traffic Management Center (TMC) Operator Training (In Development)*
- Helping All Work Zones Keep Safe (HAWKS) Process Document (In Development)*
- Future Location of all Documents
 - o <https://ncconnect.sharepoint.com/:f:/r/sites/trafficsystemsoperationsprojects/Shared%20Documents/References?csf=1&web=1&e=tgPQy2>
 - o <https://connect.ncdot.gov/resources/safety/Tepl/Pages/tepl.aspx>
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Traffic Operations Engineer	Division Contract/Proposal Engineer
Final Tow Contract Documents [□]	<ul style="list-style-type: none"> ▪ Complete Tow Contract Documents 	X	X
Final Law Enforcement Memorandum of Understanding (MOUs) [□]	<ul style="list-style-type: none"> ▪ Complete Law Enforcement Memorandums of Understanding 	X	
STOC Operators Training	<ul style="list-style-type: none"> ▪ Confirm available staffing for STOC/TMC 	X	
IMAP Procurement Schedule	<ul style="list-style-type: none"> ▪ Plan IMAP Coverage Expansion 	X	
Verified ICM Response Database	<ul style="list-style-type: none"> ▪ Verify Incident Management Alternate / Detour Route Response Plan 	X	

[□] Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Tow Contract Documents

The Traffic Operations Engineer finalizes the details of tow contracts for inclusion in the special provisions. The Traffic Operations Engineer will coordinate with the Division’s Contract/Proposal Engineer.

Complete Law Enforcement Memorandums of Understanding

The Traffic Operations Engineer finishes discussions with law enforcement regarding the terms of the memorandum of understanding (MOU). The Traffic Operations Engineer completes the MOU and has NCDOT and the law enforcement agency execute the MOU.

Confirm STOC/TMC Staffing

The Traffic Operations Engineer determines if available STOC/TMC staff are available for additional coverage needed during construction. If additional staff is needed, the Division coordinates with the Traffic Operations Engineer.

Details regarding any training tasks for the State Traffic Operations Center (STOC) operators are still *in development*.

Plan IMAP Coverage Expansion

The Traffic Operations Engineer coordinates with the applicable Division to prepare a schedule to ensure IMAP Route expansion in the work zone for:

- Hiring Incident Management Assistance Patrol (IMAP) drivers
- Training IMAP drivers
- Purchasing IMAP vehicles for a project/transfer vehicle to construction work zone

Verify Incident Management Alternate / Detour Route Response Plan

The Signal System Engineer verifies the signal timing plans for incident management detour routes and the thresholds for each plan. The Traffic Operations Engineer:

- Verifies if TIP schedules for adjacent projects impact alternate/detour routes.
- Verifies previously populated decision matrix or rulesets for each response plan and plan sheets for device locations. The information is verified in the ICM response database for State Traffic Operations Center (STOC)/Traffic Management Center (TMC) operators to use during construction.
- Verifies list or chart of equipment needed for each scenario impacted by the detour route is still valid.
- Verifies that the final response scenario in accordance with the Integrated Corridor Management Project Process Outline.

Complete QC/QA Procedures

The Traffic Operations Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and/or distribution of any deliverables.

5TO1 Complete Transportation Operations Construction-Related Tasks (if a Significant Project)

Overview

Finalize the remaining tasks on the Transportation Management Plan (TMP) with outside agencies to solidify traffic operation activities for construction. Provide timely reviews and technical expertise throughout the project’s construction phase.

References

- Integrated Corridor Management (ICM) Project Process Outline (PPO)*
- Incident Management Plan Guidelines*
- Incident Management Assistance Patrol (IMAP) Resources for Significant Projects (In Development)*
- State Traffic Operations Center (STOC)/ Traffic Management Center (TMC) Operator Training (In Development)*
- Helping All Work Zones Keep Safe (HAWKS) Process Document (In Development)*
- ICM Response Review (IRR) Process Document (Formerly After-Action Review (AAR))*
- Future Location of all Documents
 - o <https://nconnect.sharepoint.com/:f:/r/sites/trafficsystemsoperationsprojects/Shared%20Documents/References?csf=1&web=1&e=tqPQy2>
 - o <https://connect.ncdot.gov/resources/safety/Tepl/Pages/tepl.aspx>
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	
		Traffic Operations Engineer	
Let Tow Contract	<ul style="list-style-type: none"> ▪ Complete Let Tow Contract Documents 	X	
STOC/TMC Training	<ul style="list-style-type: none"> ▪ Train STOC/TMC Staff 	X	
ATMS Integration into STOC	<ul style="list-style-type: none"> ▪ Integrate Advanced Traffic Management System (ATMS) 	X	
Expanded IMAP Coverage	<ul style="list-style-type: none"> ▪ Finalize IMAP Expansion 	X	
Go Live Meeting	<ul style="list-style-type: none"> ▪ Conduct ICM Implementation and Testing 	X	
Implement ICM Devices		X	
Contractor submittals	<ul style="list-style-type: none"> ▪ Collaborate with Resident Engineer and Contractor 	X	
ICM Response Review (IRR) Meetings	<ul style="list-style-type: none"> ▪ Conduct ICM Response Reviews (IRR) 	X	
Updated Database ^α	<ul style="list-style-type: none"> ▪ Post Construction Assessment 	X	

^α Indicates that final document(s) or data set(s) requires review in accordance with the NCDOT Quality Management Program: Quality Control and Quality Assurance.

Complete Let Tow Contract Documents

The Division lets the Tow Contract prior to any construction activity traffic impacts. The Traffic Operations Engineer will complete any necessary training for the Tow Contractor before the date of availability.

Train STOC/TMC Staff

The Traffic Operations Engineer coordinates any training needed for STOC/TMC staff for specific projects before the Go Live date.

Integrate Advanced Traffic Management System (ATMS)

Details regarding the Advanced Traffic Management System (ATMS) integration tasks are still *in development*.

Finalize IMAP Expansion

The Traffic Operations Engineer coordinates with the applicable Division to prepare a schedule for:

- Hiring Incident Management Assistance Patrol (IMAP) drivers
- Training IMAP drivers
- Purchasing IMAP vehicles for a project

Conduct ICM Implementation and Testing

Before the ICM Go Live, the Traffic Operations Engineer:

- Schedules meeting with all stakeholders before testing to update them on ICM responses
- Gathers construction methodologies from previous projects and coordinate with applicable Division on implementation methods
- Provides implementation and integration support for the ICM devices (including traffic signals, *changeabledynamic* trailblazer signs, DMS/CMS, CCTV's, etc.) with the NCDOT statewide network and central software by:
 - Verifying Device Location
 - Programming DMS/CMS messages into statewide system
 - Programming PCCTV's into the statewide system
 - Reviewing existing test plans and prepares project specific test plans for integrating the ICM devices into the different statewide software programs and meets ICM response plan requirements
 - Documenting how the system will be tested and validated for approval
 - Observing the testing to ensure effective system operations
 - Testing the devices with the response plans and provide summary of issues observed

Collaborate with Resident Engineer and Contractor

The Traffic Operations Engineer facilitates communication between the Resident Engineer and the Contractor during construction by:

- Reviewing documents provided by Contractor
- Reviewing and coordinating details of the Incident Management Plan
- Reviewing Contractor ITS Device location/placement
- Testing ITS devices after installation
- Attending Contractor Maintenance of Traffic meetings
- Attending Incident Management Plan meetings with Contractor
- Attending other design meetings with Contractor as needed

1TP1 Complete Express Design Traffic Volume (EDTV)

Overview

The Express Design Traffic Volume (EDTV) process is a simplified method of obtaining traffic volumes for use during the development of the Express Design phase of project development. The completed EDTV is used to inform and develop the Express Design Traffic Analysis (EDTA). Collectively, the EDTV and EDTA are referred to as the Express Design Traffic Evaluation (EDTE). See below:

Express Design Traffic Components:
 Traffic Evaluation (EDTE) = Traffic Volume (EDTV) + Traffic Analysis (EDTA)

The EDTV includes daily traffic volumes, peak hour volumes, intersection turning movements, and traffic volumes for different scenarios (base year, future year, and Build alternatives). The purpose of the EDTV is to utilize simplified volume development and forecasting methods to determine design year traffic volumes that seamlessly integrate into the Express Design Traffic Analysis process and inform decision-makers in determining viable alternatives/alignments for proposed projects.

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

- [Express Design Traffic Evaluation Guidance](#)
- ~~[Express Design Traffic Evaluation Tool](#)~~
- ~~[Express Design Traffic Evaluation Guidance](#)~~
- [Traffic Data Collection Request System](#)
- [Existing Count Map – Traffic Safety Search Data](#)
- [Existing Count Database – Traffic Safety Data Files](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Approved EDTV ^A	<ul style="list-style-type: none"> ▪ Scope EDTE 	<ul style="list-style-type: none"> ▪ Transportation Planning Division ▪ Feasibility Studies/ Corridor Development Unit ▪ Congestion Management UnitSection 	<ul style="list-style-type: none"> ▪ Project Lead ▪ Congestion Management UnitSection
	<ul style="list-style-type: none"> ▪ Initiate EDTV Development Process 	<ul style="list-style-type: none"> ▪ Transportation Planning Division ▪ Feasibility Studies/ Corridor Development Unit 	
	<ul style="list-style-type: none"> ▪ Produce EDTVs 		<ul style="list-style-type: none"> ▪ Project Lead ▪ Traffic Safety Unit
	<ul style="list-style-type: none"> ▪ Review/Finalize EDTVs 	Transportation Planning Division	Project Lead

Review/Finalize Express Design Traffic Volumes

Once the Draft Express Design Traffic Volumes are developed, they are submitted to the Transportation Planning Division (or their designated reviewer) for review. Following review, any comments are addressed, and the final traffic volumes are produced. The Final EDTVs are delivered via e-mail to the Project Lead and uploaded to the project SharePoint site.

Review/Update in Project Scoping Report (if needed)

In development.

1TP2 Complete Traffic Forecast

Overview

Obtain an approved traffic forecast that provides the traffic data necessary for analysis to inform project planning, design, and operations.

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

- [Project Level Traffic Forecasting Resource Page](#)
- [Traffic Forecasting Technical Policy Manual](#)
- [Traffic Forecasting Administrative Policy Manual](#)
- [Travel Demand Model Coverage Map](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- Traffic Forecasting Decision Points Tool and Guidance (In development)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Approved Traffic Forecast ^A	▪ Initiate Traffic Forecast	Traffic Forecasting Project Manager	Transportation Planning Division Planning Staff and Traffic Forecasting Group
	▪ Determine Level of Traffic Forecast Needed		
	▪ Scope Traffic Forecast		
	▪ Produce Traffic Forecast		
	▪ Complete and Deliver Traffic Forecast		

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

Initiate a Traffic Forecast

The traffic forecast is typically prepared as the project transitions from the end of Stage 1 to the beginning of Stage 2. The project-level traffic forecast is scheduled so that it is initiated a reasonable amount of time prior to the ~~issuance of the Notice to Proceed~~[Project Kickoff Meeting \(2PM1\)](#) (typically no earlier than a few months before ~~NTP~~[the Project Kickoff Meeting](#)). The goal is to reduce the risk of a potential forecast update during Stage 2.

To initiate a traffic forecast, the Transportation Planning Division is typically contacted by the Project Lead from the:

- Feasibility Studies Unit for pre-environmental and pre-State Transportation Improvement Plan (STIP) planning and study (see 1FS2 for related information)
- Central Corridor Development Unit for pre-environmental and pre-STIP planning and study (see 1FS2 for related information)
- Divisions for the Transportation Improvement Program (TIP) project development

- Project Management for TIP project development
- Structures Management Unit for bridge replacement projects
- Rail Division, Engineering Coordination, and Safety Branch for railroad crossings/safety improvement projects
- A Traffic Forecasting Project Manager and the project team review the project to determine if a traffic forecast is needed. If a traffic forecast is needed, an inquiry can be made about the current status of the project and the availability of a forecast with the Traffic Forecasting Project Manager. If a forecast is not available, or in-progress, one may be requested.

To complete an inquiry:

- A standard Traffic Forecast Request Form (available on the Project Level Traffic Forecasting Resource Page) may be used to request a traffic forecast. However, all that is required is communicating a need for a traffic forecast with the Traffic Forecasting Group. The Traffic Request Form or the e-mail inquiry is sent to: TrafficForecast@ncdot.gov.
- The Traffic Forecasting Project Manager produces a map and traffic forecast scope and coordinates with the Transportation Planning Division and the larger project team regarding all aspects of the traffic forecast.

Determine Level of Traffic Forecast Needed

A traffic forecast may be in the form of three (3) different products:

- **Project-level Forecast:** Includes Annual Average Daily Traffic (AADT) volumes for through and turning movements, truck percentages, peak hour factors and directional distribution for the study area network. Traffic statistics for the base year (customarily the current year) and one or more future years are provided.
- **Traffic Estimate:** Is typically limited in scope to current and future-year AADT for roadway segments. Therefore, this product is only applicable to certain project situations (one example would be bridge replacement projects or other project types that do not need intersection turning movement data).
- **Express Design Traffic Volume (EDTV):** Simplified method of developing traffic volumes for use during the Express Design phase of project development. The development of EDTVs is suitable during Stage 1 (Project Initiation). An EDTV could be updated for a Project Scoping Report if it was determined to provide the appropriate amount of information.

Typical projects ~~will require the need of~~ a project-level forecast, which contains sufficient traffic statistics to support design decisions for a roadway improvement project. For unique situations where less detailed information is needed, ~~please~~ coordinate with the Traffic Forecasting Group.

Scope a Traffic Forecast

As part of the scoping process, the Traffic Forecasting Project Manager, in coordination with the project team, determines the junctions and scenarios to be included in a traffic forecast. [This coordination includes obtaining approval of the traffic forecast study area from the Congestion Management Section.](#)

Produce a Traffic Forecast

To produce a traffic forecast, the Traffic Forecaster:

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.~~

All tasks required for this activity are associated with Utilities Coordination.

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.

Overview: Utilities Coordination

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

References

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

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Preliminary Utility Relocation Estimate	<ul style="list-style-type: none"> ▪ <i>Develop Conceptual Utilities Cost Estimate</i> ▪ <i>Review Estimate</i> 	Utilities Coordinator	Project Lead
Preliminary Utility Construction Estimate			
Utility Relocation Estimate Report			

Develop Conceptual Utilities Cost Estimate

The Utilities Coordinator visits the project site and inventories utility facilities on the project in accordance with the identified manuals and procedures.

Using the inventory of facilities and the utility estimating tools on the Estimates, Materials & Approved Products for Utilities Work resource page, the Utilities Coordinator provides a preliminary estimate to the Project Lead of the preliminary ~~utilities~~utility construction costs and costs of possible utility relocations, including a short description of utilities observed. The Utilities Coordinator works with the Project Lead and Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects) to adjust the utility construction estimate as part of the review and verification process (see 1CS1 and 1FS2 for related information).

The Utilities Coordinator produces a Utility Relocation Estimate Report to accompany the Utility Relocation Estimates. This report documents the production of the estimate. This report contains an inventory of utilities on the project, including:

- A description of the facilities
- The methodology used in producing the estimate (length of facilities, length of pipe or count of unit quantities, number of poles)
- Any assumptions made, such as what needs to be relocated, facility size, etc.
- The source and date of unit prices used in the estimate

Review Estimate

The Utilities Coordinator sends the two ~~utilities~~utility cost ~~estimate~~estimates and report to the ~~Utility~~Utilities Lead, who reviews the ~~estimate~~estimates and report, before sending to the Project Lead.

Generate Cost Verification Letter

After satisfactory review, the Utilities Coordinator works with the Project Lead, who generates and distributes a Cost Verification Letter per the process detailed in the *Division Engineer Approval for Cost Verification Memo* (see 1CS1 for related information).

Complete QC/QA Procedures

The Utilities Coordinator is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

1UT2 Investigate Existing Utilities

All tasks required for this activity are associated with [Utilities Coordination](#).

Overview: [Utilities Coordination](#)

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.

[Initiate coordination with those identified utilities.](#)

[Using and analyzing available resources, the Utilities Lead and Project Manager may determine that it is not necessary to scope this utilities stage.](#)

References

- [Utilities Accommodation Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Risk Analysis and Inventory Report Critical Utilities Strategy	▪ Initiate Utility Owner Contacts Identify Critical Impact Utilities	Utilities Coordinator	Utilities Lead
Utility Project Outline	▪ Determine Utility Relocations	Utilities Coordinator	Utilities Lead
Utility Construction Requests	▪ Submit Utility Construction Requests	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 project area.](#)~~
 - ~~• [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.~~

~~As part of the initiating contact with the utility owner, the Utilities Coordinator may also:~~

- ~~▪ Contact known utility owners recorded with NC 811.~~
- ~~▪ Perform site inspection and prepare field notes and sketches.~~
- ~~▪ Contact utilities not recorded with NC 811.~~
- ~~▪ Provide roadway design plans (electronic and paper copies) to utility owners (see 2UT1 for related information).~~
- ~~▪ Conduct preliminary coordination meeting with each utility owner.~~

Identify Critical Impact Utilities

Using reports form 811, site visits, internet mapping services, available GIS data, the Preliminary Utility Relocation Estimate and Report, and other available data, the Utility Coordinator identifies utility facilities that are costly or that have a long relocation time and that pose a risk to the project budget or schedule. The Utility Coordinator discusses the preliminarily identified utilities with the Utilities Lead and Project Manager. These critical impact utilities may include energy transmission facilities (electric transmission line and gas and petroleum pipelines), telephone trunk lines, telephone SLIC/SLAC sites, raw water supply lines, large water supply lines, and sewer outfalls.

Involving NCDOT, the Utility Coordinator meets with the identified critical impact utilities to present to them the project, discuss potential impacts, and obtain utility feedback on avoidance or minimization measures.

The Utility Coordinator produces a Critical Utilities Strategy that:

- Documents the analysis of all utilities (critical or not).
- Identifies the critical impact utilities.
- Analyze the consequences relocating or otherwise impacting those utilities.

Complete QC/QA Procedures

The Utilities Coordinator is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

2UT1 Initiate Utility Coordination and/or Design

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Project Outline	<ul style="list-style-type: none"> Conduct Preliminary Utility Investigations 	Utilities Coordinator	Utilities Lead
	<ul style="list-style-type: none"> Initiate Utility Owner Contacts 		
	<ul style="list-style-type: none"> Submit Utility Project Outline 		
Utility Construction Request (UCR)	<ul style="list-style-type: none"> Submit Utility Construction Requests 		

Conduct Preliminary Utility Investigations

Using the ~~information collected~~ Feasibility Estimate from 1UT1, the ~~utilities, the~~ Critical Utilities Coordinator analyzes reasonably expected conflicts between existing Strategy from 1UT2, NC811, GIS resources, and planned utilities and the project. For each alternative/alignment ~~other online resources combined with a site visit~~, the Utilities Coordinator ~~is to:~~

~~Provide~~ creates an inventory of utilities ~~encountered~~ existing on and near the project. This inventory:

- ~~▪ 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~~ Provides a description of service at all or for more than a short period of time.
 - ~~• Facilities that are expensive to relocate because of the type, size or conditions, and function of the construction.~~
- ~~▪ Facilities that have a long design or construction duration. Any other risk the relocation of the all facilities could pose to in the project area.~~
- ~~▪ Identify facilities to avoid, and facilities that may be relocated, without significant burdens to the utility or the project.~~
 - ~~▪ Provide~~ Identifies off-site work required to perform relocation durations ~~of critical facilities as provided on the project, where possible to predict.~~
 - ~~▪ Identifies utilities that should be avoided by the utility owners, even if project.~~

In the site visit, it is good practice to take notes or sketches of the type and routing of overhead cables and the number and location of guy wires.

Begin Critical Utility Coordination

Begin or continue coordination with critical utilities identified as a facility to avoid in case project conditions prohibit avoidance 1UT2 on in this stage at an appropriate level to avoid or minimize impacts, or to begin design and planning for the relocation of utilities with long design or construction times.

- ~~▪ Identify whether construction of utility relocation may be necessary outside of the study area.~~

Initiate Utility Owner Contacts

The Utilities Coordinator notifies utility owners of the project, including the expected schedule for start of utility design (the Utilities Kickoff Meeting) and the beginning of right-of-way (ROW) acquisition. The Utilities Coordinator works with the utility owners as necessary to ensure utilities are ready to begin design for the project on time, including having a design firm selected and budgeted.

Submit Utility Risk Analysis and Inventory Project Outline

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

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

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

The Utility ~~Risk and Analysis Report~~ Project Outline 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~~ The Utility Project Outline ~~for the selected alternative/alignment. The revised report is to include:~~

- ~~A utility inventory for the alternative/alignment.~~
- ~~An analysis of risks for the alternative/alignment.~~
- ~~A projected budget.~~
- ~~Opinion of likely cost responsibility (for budgeting purposes). This is not intended to require an analysis of data or documents.~~
- ~~A preliminary schedule for the utility designs and relocations.~~
- ~~Recommendations to a living document that should be continuously updates during the life of the project~~ designers onto incorporate newly discovered utilities to avoid.

~~And encroachments, and to document design decisions or changes in strategy for the possible relocations~~ their motivation or justification. Previous versions should be preserved to maintain a project history.

~~The Utility Project Outline guides the project's design team to avoid major utility impacts. The Utilities Lead reviews the report/outline and provides comments to the Utilities Coordinator, who updates the document.~~

Submit Utility Construction Requests (UCRs)

For this task, the Utilities Coordinator:

- Identifies utilities that may want construction of their facilities completed by the selected contractor and included as part of the project's contract.
- Obtains a Utility Construction Request (UCR) from each of these utilities describing the facilities likely to be in conflict or that may need early analysis.
- Identifies in the Utility Construction Request whether NCDOT is being requested to perform construction or both design and construction.
- ~~Submits a monthly report the UCR to SharePoint and notifies the Utilities Lead an PM.~~

~~The Utilities Lead discusses acceptance of the work into the contract with a link (to be submitted throughout the Project Manager and the Division, notifying the utility coordination/design process) of the result.~~

~~These requests are submitted concurrently with the Utility Project Outline.~~

~~These requests are submitted early enough in the stage to ensure that design engineers for each of these utilities can be contracted prior to the Utilities Kickoff Meeting. This request should be obtained as early as possible if early analysis or design is required.~~

Complete QC/QA Procedures

The Utilities Coordinator is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

2UT2 Prepare Utility Relocation and Construction Estimates

All tasks required for this activity are associated with Utilities Coordination and/or Design.

Overview: Utilities Coordination

Prepare both utility relocation and construction cost estimates to support the project development process prior to the Environmental Document being approved.

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"> ▪ Prepare Utility Relocation Estimate 	Utilities Coordinator
Utility Construction (PH 300) Estimate	<ul style="list-style-type: none"> ▪ Prepare Utility Construction Estimate 	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 Coordinator prepares the project’s utility construction estimate using historic bid data adjusted for project conditions and expected price increases.

The Utilities Coordinator 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 Coordinator confirms that utility construction pay items and quantities are included in the construction estimate request, as required.

If a Utilities Design Engineer has been scoped at this time, the Utilities Design Engineer can prepare this estimate.

Review Estimate

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

Generate Cost Verification Letter

After satisfactory review, the Utilities Coordinator sends the estimates to the Project Manager, who generates and distributes a Cost Verification Letter per the process detailed in the *Division Engineer Approval for Cost Verification Memo* (see 2CS1 and 3CS1 for related information).

2UT3 Advance Utility Coordination and/or Design

The tasks required for this activity are separated into the sub-activities of:



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Utilities Coordination

Coordinate with utility owners to identify conflicts between their facilities and the project and develop a resolution for those conflicts. Coordinate preliminary utility designs to conform with the *Utilities Accommodation Manual*, preventing conflicts among utilities where possible and determining utility easement requirements.

Note: *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.

References

- [Conflict Letter Template](#)
- [Utilities Accommodation Manual](#)
- [Dig Once Policy](#)
- [Utilities Connect Site](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Proprietary Products Guidelines](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Coordination Kickoff Meeting Minutes and Conflict Letters	<ul style="list-style-type: none"> ▪ Provide Plans to Utility Owners ▪ Identify Major Utility Conflicts and Relocation Impacts ▪ Conduct Utility Coordination Kickoff Meeting (All Utilities) 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead
Routing Plan Conflict Letters	<ul style="list-style-type: none"> ▪ Initiate Cost Responsibility Analysis Provide Conflict Letters to all Utilities 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead
Utility Coordination Working plans (continuous)	<ul style="list-style-type: none"> ▪ Receive Preliminary Utility Relocation Plans from Utility Owners Initiate Cost Responsibility Analysis ▪ Submit Routing Plan Receive Preliminary Utility Relocation Plans from Utility Owners 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead
Relocation Schedule	<ul style="list-style-type: none"> ▪ Create Relocation Schedule 	Utilities Coordinator	Utilities Lead
Preliminary Utility Construction Plans	<ul style="list-style-type: none"> ▪ Submit Preliminary Utility Construction Plans 	Utilities Design Engineer	Utilities Coordinator & Utilities Lead
Subsurface Utility Engineering (SUE) Level A Request	<ul style="list-style-type: none"> ▪ Request Subsurface Utility Engineering (SUE) Level A 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead
Geotechnical Investigation (Trenchless) Request	<ul style="list-style-type: none"> ▪ Request Geotechnical Investigation for Trenchless Utilities 	Utilities Design Engineer	Utilities Design Engineer, Utilities Lead, & Design-Geotechnical Engineer
Utility Easement Request and Utility Parcel List	<ul style="list-style-type: none"> ▪ Submit Required Utility Easements and Parcel List 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead

Continuing Tasks

The Utilities Coordinator continues to maintain and update the Utility Project Outline begun in 2UT1.

Review New Encroachments

The Utilities Lead receives all new encroachments on the project from the District Office or Encroachments Section. The Utilities Lead determines the nature of the encroachment. The Utilities Lead coordinates the review and approval of all new utility encroachments. New non-utility encroachments are returned to the

Encroachment Section or District Office, as appropriate, for review coordination with the project team. The utilities Lead then notifies the Project Manager of all new encroachments and their nature.

- On new utility encroachments, the Utilities Coordinator reviews the encroachment for conflict with project utilities and the project and provides recommendations (as appropriate) to avoid the conflicts. The Utilities Lead incorporates those comments (as appropriate) in responding to the encroachment.
- On new non-utility encroachments, the Utilities Coordinator reviews the encroachment for conflict with project utilities, identifies new utility conflicts created by the encroachment, provides recommendations (as appropriate) to avoid those conflicts, and notifies the Utilities Lead and Project Manager of the findings.

Provide Conflict Letters to all Utilities

The Conflict Letter is a letter sent to a utility located on the project alerting the utility of a potential conflict with the project within ten days following the Utility Kickoff Meeting. It requires the utility to take action and relocate within a reasonable amount of time. The Conflict Letter documents that the utility is aware of the need to coordinate and relocate in a reasonable period.

The Utilities Coordinator drafts a conflict letter for each utility. The drafts are provided to the Utilities Lead for revisions and signature. The Utilities Coordinator sends the signed letters to the utilities.

Provide Plans to Utility Owners

The Utilities Coordinator provides a PDF and DGN set of the ~~Design Recommendation Plan Set~~current plans and the Utility Project Outline to the utility companies and their designated design representatives. The Utilities Coordinator requests that the utility companies:

- Review the plans for accuracy in the surveyed depiction of their facilities.
- Notify the Utilities Coordinator of facilities that are omitted or are inaccurately depicted.
- Analyze their facilities for conflicts with the project as designed.
- Consider options and schedule for relocation or mitigation of the conflicts.
- Suggest revisions that could eliminate conflicts or reduce relocations.
- Notify the Utilities Coordinator of assistance or input required from NCDOT during the project, such as any additional notification required from the Department to request establishment of a budget or schedule for the relocation.

~~The Utilities Design Engineer reviews the plans provided by the Utilities Coordinator in cooperation with and on behalf of the utilities whose facilities the Utilities Design Engineer is scoped to design.~~

Identify Major Utility Conflicts and Relocation Impacts

In this task, the Utilities Coordinator creates a set of Utilities Coordination Working Plans. The Utilities Coordination Working Plans and Utilities by Others (Ubo) plans (see 4UT1 for related information) are not the same document, although work expended in creating these plans can be leveraged for creating Ubo plans. The purpose of the Utilities Coordination Working Plans is to:

- Document points of conflict.

- Show the relocation plans (new alignments, facility retentions, and abandonments) of all utilities in a single view.
- Show the means of construction where necessary.
- Develop easement needs.
- Identify utility parcels.
- Track and coordinate unsurveyed new utility encroachments.

The Utilities Coordination Working Plans are continuously maintained after creation and are kept available for all members of the project team on the SharePoint project site. They are updated at least monthly, upon the receipt of initial or updated relocation plans from a utility, and prior to project meetings.

To complete this task, the Utilities Coordinator:

- Reviews the plans to identify likely locations of conflicts.
- Creates a set of Utilities Working Coordination Plans and documents those conflicts on the Utilities Coordination Working Plans.
- Determines the presumed responsibility for the cost of relocations based readily observable information on the plans, such as the location of facilities inside or outside of existing right of way and the existence of surveyed easements.

The Utilities Lead reviews the Utilities Coordination Working Plans are to contain information on conflicts and proposed relocations for all and updates/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.

Conduct Utility Coordination Kickoff Meeting (All Utilities)

The Utility Coordination Kickoff Meeting is conducted by the Utilities Coordinator, design team members, members the NCDOT project team, and the utilities— in order to present to the utilities the information on the project, and to gather from the utilities the information about their relocation plans and probable schedule. The meeting also provides an opportunity for utility representatives to network and discuss areas of collaboration in their relocation efforts, such as shared pole lines or duct banks.

- 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.
- Develops a utility relocation and construction cost estimate following guidance in 2UT2/3UT2.

The Utilities Coordinator schedules the Utility Coordination Kickoff Meeting. Invite all personnel required in the KO Meeting Prep QC Checklist, plus any additional personnel whose attendance may be required by the circumstances of the project.

Prior to conducting the Utilities Kickoff Meeting, 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 Coordinator also discusses possible ~~resolution~~ resolutions and areas of concern with the design team.

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 the 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.~~

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

- ~~Provide~~Provides information to the utility companies about the project, in particular discussing:
 - Review~~An overview of the project~~
 - Environmental features including environmentally sensitive areas and historic properties
 - The project schedule
 - Other features of the project that may affect utility design
- Reviews the presumptive cost responsibility and establish which utility companies believe they have a compensable interest.
- ~~Discuss the project~~Requests a preliminary relocation schedule, ~~noting feedback~~ from the utility companies ~~about their design and relocation timeframes and the schedule they can meet.~~
- ~~Elicit~~Elicits information about the risks the utilities believe they pose to the project.
- ~~Discuss~~Discusses preliminary alignments for relocations.
- ~~Inform~~Informs utilities of their responsibilities under the Dig Once Policy. The Utilities Coordinator is responsible for the administration of this policy on the project.
- Ask~~Asks~~ the utility companies to prepare preliminary plans and identify easement needs.
- Identify~~Identifies~~ action items for NCDOT and the utility companies.

~~If no Utility Design Engineer has been chosen as part of the design team by the time of the Utility Kickoff Meeting, the Utilities Coordinator gathers the needed information from any utility that has requested to be in the highway contract.~~

Following the kickoff meeting, the Utilities Coordinator prepares meeting minutes ~~and, stores them on the SharePoint project site, and sends links to the Project Manager, Utilities Lead, and other utilities personnel identified in the project scope. The Utilities Coordinator sends copies of the minutes to the utilities and sends~~ conflict letters, ~~sending to each top~~ of the affected 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.
- Compares documents provided by the utility companies ~~and assigned Right of Way Staff with the plans.~~
- 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.

The analysis of cost responsibility is an ongoing task that culminates with the production of a document stating the findings for each utility. This document becomes a part of the submittal for each relocation agreement (see 3UT1 for related information).

Receive Preliminary Utility Relocation Plans from Utility Owners

Utility Relocation Plans are the plans prepared by the utility to be attached to an agreement and are to be authorized and used by the utility for construction of their facilities.

To complete this task, the Utilities Coordinator ~~is to~~:

- ~~Receive~~Receives preliminary utility relocation plans from the utility companies and ~~from~~ the ~~Utilities~~Utility Design Engineer.
- ~~Review~~Reviews the plans to ensure compliance with the Utilities Accommodation Manual.
- ~~Coordinate~~Coordinates relocation design with relevant project team members.
- ~~Incorporate~~Incorporates the relocation plans into the Utilities Coordination Working Plans.
- Communicates the relocations to all utilities via 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 in a Document Set for each utility, updating the working plans as changes occur.

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. Work includes:~~

- ~~▪ Addressing changes and comments from field inspection meeting and incorporating these comments into Utility Coordination Working plans, utility easement requests, and utility parcel requests.~~
- ~~▪ Revising the Routing Plan based on comments from Utilities Lead and details from the hydraulic design and noise walls and signals locations.~~

~~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 Relocation Schedule is an ongoing task that begins after the Utilities Kickoff Meeting. This schedule should include start dates and durations for all utilities, and well as document the dependencies each utility has. The completion of the acquisition of utility parcels should be included as a dependency, along with other major project milestones such as let date and project availability. Some larger projects may have schedules for multiple independent sections.~~

~~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.~~
- ~~▪ Time required to remove existing facilities~~

~~The Relocation Schedule should be maintained as a narrative and as a Gantt chart.~~

~~The Utilities Coordinator maintains this schedule as conditions change and milestones are completed, coordinating this with the Project Manager, the Utilities Lead, and the larger project schedule. The project schedule delivery should be ~~at~~ updated as schedules provided by the following utilities and other milestones: ~~change.~~~~

- ~~▪ 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.

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 to be coordinated with Location and Surveys (see 2LS2 for related information).

Submit Required Utility Easements and Parcel List

The Utilities Coordinator collects, validates, and aggregates easement needs for all of the utilities. The Utilities Coordinator then prepares the Utility Easement Request and Utility Parcel List, which includes:

- Obtaining concurrence from the Utilities Lead on the eligibility for each utility to request easements that are acquired by NCDOT.
- Vetting easements requested by the utility companies for compliance with NCDOT policy.
- Compiling all eligible easements requested.
 - ♦ Draw the compiled easements on the Utilities Working Plans and submit to the Utilities Lead for concurrence in the request.
 - ♦ After receiving concurrence, submit the easement request for inclusion in the plans.
- For utilities relocating in advance of the project's contract, compiling a list of parcels containing any of those utilities in NCDOT-purchased easement or right-of-way.
 - ♦ List which utilities are occupying each parcel.
 - ♦ Determine the date each parcel is needed according to the schedule of utility construction on each parcel.
 - ♦ Provide a list of parcels requiring relocation of water backflow preventers as provided by the water utility designers.

Design files are to include stations and offsets at each easement boundary corner and be incorporated into the Right-of-Way Plan Set (see 2RD4 for related information). Easements requested by utilities should not be altered to round off stations or offsets of easement boundaries.

The Utilities Lead reviews the requested easements for compliance with the *Utilities Accommodation Manual*, for impact on property owners and for possible economizations. The Utilities Coordinator confirms all approved easements are incorporated into the Field Inspection Plan Set (see 2RD2 for related information).

Coordinate Utility Design

If Utility Construction Plans are provided by the utility, the Utilities Coordinator coordinates with the utility and the utility's Design Engineer by providing plans, project CADD file updates, and project schedules. The Utilities Coordinator monitors progress by the Utility's designer and updates the Utilities Lead and Project Manager regularly. The Utilities Coordinator coordinates the deliverables required in Initiate Utility Design but is not responsible for their production.

Complete QC/QA Procedures

The Utilities Coordinator is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

[\(Back to activity overview\)](#)

Overview: Utility Design

Initiate the design of scoped utilities, including all elements of design required to determine easement needs.

References

- [□ Utilities Accommodation Manual](#)
- [□ Dig Once Policy](#)
- [□ Utilities Connect Site](#)
- [□ NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [□ Proprietary Products Guidelines](#)
- [□ Backflow Preventer Policy](#)
- [□ Standard Specifications for Roads and Structures](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Preliminary Utility Construction Plans	<ul style="list-style-type: none"> ▪ Submit Preliminary Utility Construction Plans 	Utilities Design Engineer	Utilities Coordinator & Utilities Lead
Subsurface Utility Engineering (SUE) Level A Request	<ul style="list-style-type: none"> ▪ Submit Subsurface Utility Engineering (SUE) Level A Needs 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead
Backflow Preventer List	<ul style="list-style-type: none"> ▪ Submit Backflow Preventer List 	Utilities Design Engineer	
Geotechnical Investigation (Trenchless) Request	<ul style="list-style-type: none"> ▪ Request Geotechnical Investigation for Trenchless Utilities 	Utilities Design Engineer	Utilities Design Engineer, Utilities Lead, & Design Geotechnical Engineer

Identify Conflicts

The Utilities Design Engineer:

- [Reviews the project plans with the applicable utility companies for the facilities scoped for design.](#)
- [Reviews the plans for accuracy in the surveyed depiction of their facilities.](#)
- [Notifies the Utilities Coordinator of facilities that are omitted or are inaccurately depicted.](#)
- [Identifies conflicts, proposes preliminary relocation routing or a plan to mitigate the conflicts, and secures approval from the utility.](#)
- [Provides this information to the Utilities Coordinator prior to the Utility Coordination Kickoff Meeting.](#)

Attend Utility Kickoff Meeting

[The Utilities Design Engineer attends the Utilities Kickoff Meeting on behalf of the scoped utilities and provides information about those utilities as needed by the Utilities Coordinator.](#)

Submit Preliminary Utility Construction Plans

[The Utility Design Engineer creates plans for the construction of the scoped utility relocations. As a continuing part of this task, the Design Engineer provides the Utilities Coordinator with regular updates via pdf plans and CADD files for utilities coordination purposes.](#)

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.
- Comply with the Proprietary Products Guidelines, or identify all items that need to be brought into compliance.

~~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~~ Submit Subsurface Utility Engineering (SUE) Level A Needs

~~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. This request is to be coordinated with Location and Surveys (see 2LS2 for related information).

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 investigation along the planned location of all trenchless installations of utilities to be constructed. To do this, the Utilities Design Engineer is to:

- Identify the expected depth of the utility at each location.
- Collaborate with the Utilities Lead and the Design Geotechnical Engineer to create a final list of requested locations.

~~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 this request to the Utilities Lead for review with the Design Geotechnical Engineer.~~

~~Submit~~ Required Utility Easements and Parcel Backflow Preventer List

~~The Utilities Design Engineer prepares the easement needs for the facilities scoped for design (wet and dry utilities PUE) in .dgn and .pdf format and submits that request to the Utilities Coordinator. Design files are to include stations and offsets and be incorporated into the right-of-way plans (see 3RD1 for related information).~~

~~The Utilities Coordinator then prepares the Utility Easement Request and Utility Parcel List, which includes:~~

- ~~Obtaining concurrence from the Utilities Lead on the eligibility for each utility to request easements that are acquired by NCDOT.~~
- ~~Vetting easements requested by the utility companies for compliance with NCDOT policy.~~
- ~~Compiling all eligible easements requested.~~
 - ~~Draw the compiled easements on the Utilities Working Plans and submit to the Utilities Lead for concurrence in the request.~~
 - ~~After receiving concurrence, submit the easement request for inclusion in the plans.~~

~~For utilities relocating in advance of the project's contract, compiling a list of parcels containing any of those utilities in NCDOT purchased easement or right-of-way, requiring relocation of water service backflow preventers.~~

- ~~List which utilities are occupying each parcel.~~

~~Determine the date each parcel is needed according the schedule~~ Coordination of Utility Construction on each parcel. ~~Plans~~

~~The Utilities Lead reviews the requested easements for compliance with the *Utilities Accommodation Manual*, for impact on property owners and for possible economizations. The Utilities Coordinator confirms all approved easements are incorporated into the Field Inspection Plan Set (see 2RD2 for related information).~~

~~If, in addition to the utilities scoped to the Utilities Design Engineer, there are utilities to be constructed in the highway contract that to be designed by the utility's engineer, the Utilities Design Engineer coordinates inputting of quantity estimates, plan sheet numbering, and special pay item naming for all Utility Construction plans and Special Provisions to verify the plan set for all work. This is not to be confused with "Coordinate Utility Design" in the Utilities Coordination scope.~~

Complete QC/QA Procedures

~~The Utilities Coordinator and/or~~ The Utilities Design Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

2UT2/3UT2/UT4 Prepare Utility Relocation and Construction Estimates

The tasks required for this activity are separated into the sub-activities of:



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Utilities Coordination

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">Prepare Utility Relocation Estimate	Utilities Coordinator
Utility Construction (PH 300) Estimate	<ul style="list-style-type: none">Prepare <u>Utility Construction</u> Relocation Estimate	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. **An estimate from that prepared by the utilities is preferred at this stage.**

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

The Utilities Coordinator receives the Utility Construction Estimate from the Utilities Design Engineer or the utility’s engineer and coordinates the submittal of the estimate to the Utilities Lead and the Project Manager.

Review Estimate

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

Generate Cost Verification Letter

After satisfactory review, the Utilities Coordinator sends the estimates to the Project Manager, who generates and distributes a Cost Verification Letter per the process detailed in the *Division Engineer Approval for Cost Verification Memo* (see 2CS1 and 3CS1 for related information).

[\(Back to activity overview\)](#)

Overview: Utility Design

Prepare the construction cost estimate to support the project development process prior to the Right-of-Way Plan Set being finalized.

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	
Utility Construction (PH 300) Estimate	▪ Prepare Utility Construction Estimate	Utilities Design Engineer	

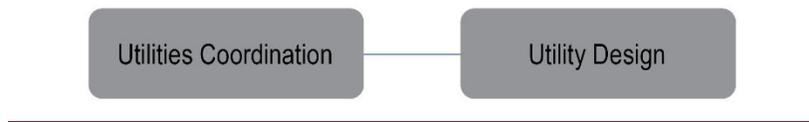
Prepare Utility Construction Estimate

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 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 pay items and quantities are included in the construction estimate request, as required.

3UT1 Complete Utility Coordination and/or Design

The tasks required for this activity are separated into the sub-activities of:



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Utilities Coordination

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

References

- [□ Utilities Accommodation Manual](#)
- [□ Dig Once Policy](#)
- [□ Utilities Connect Site](#)
- [□ NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [□ Proprietary Products Guidelines](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support

Cost Responsibility Analysis Report	<ul style="list-style-type: none"> ▪ Submit Cost Responsibility Analysis 	Utilities Coordinator	Utilities Lead
Utility Agreements (and related Authorizations)	<ul style="list-style-type: none"> ▪ Execute Utility Agreements ▪ Issue Utility Construction Authorization 	Utilities Coordinator	Utilities Lead
Utility Environmental Permit Drawings (and Narrative)	<ul style="list-style-type: none"> ▪ Provide Permit Related Utility Environmental Impacts 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead

Continuing Tasks

The Utilities Coordinator continues to maintain and update the Utilities Coordination Working Plans, Utility Project Outline, and Utilities Relocation Schedule begun in Stage 2, reviewing new utility and non-utility encroachments as described in 2UT2.

Complete Dig Once Policy Agreements

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

Review ~~Estimate~~ Utility Relocation Packages

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

Generate Cost Verification Letter

After satisfactory review, ~~final~~ Utility Relocation Plans and Estimates. The Utilities Coordinator ~~sends the estimates to the Project Manager, who generates and distributes a Cost Verification Letter per the process detailed in the Division Engineer Approval for Cost Verification Memo (see 2CS1 and 3CS1 for related information):~~

- ~~Prior~~ Reviews the plans for conformity with the *Utilities Accommodation Manual*.
- Reviews the estimates, if needed for the agreement.

The Utilities Lead reviews the agreements for compliance with policy.

The Utilities Coordinator forwards the plans and estimates to the ~~Right~~ Utilities Lead for review and approval and then assembles the utility agreement packages.

Submit Cost Responsibility Analysis

The Utilities Coordinator submits cost responsibility justification for each utility as part of ~~Way Plan Set being finalized,~~ the utility agreement package. In ~~this same process is used~~ report, the Utilities Coordinator examines the evidence provided by the utility and provides a conclusion on whether the evidence provided supports reimbursement by NCDOT.

The Utilities Lead reviews the analysis and requests additional information (if needed), comments as required, and accepts the report when ~~developing~~ complete. The Utilities Lead retains this report with the agreement documents.

Execute Utility Agreements

The Utilities Coordinator submits utility agreement packages (URAs or relocation and encroachments) to the Utilities Lead. 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 estimate during the Plan-in-Hand Stage under 3UT2 by the utility, the Utilities Coordinator prepares an authorization letter for signature by the Utilities Lead. The Utilities Coordinator sends the authorization to the utility, with copies as required.

~~3UT1 Advance Utility Coordination and/or Design~~

Provide Permit-Related Utility Environmental Impacts

The Utilities Coordinator uses the information from the Utility Coordination Working Plans to create a set of Utilities Environmental Permit Drawings. These plans consist of an environmental narrative, plans showing impacts, utility profiles, and impact area charts. Not all components are required for all projects. As part of the plans, the Utilities Coordinator:

- Coordinates areas of utility impacts with areas of roadway impacts.
- Submits to the Utilities Lead to obtain concurrence.
- After obtaining concurrence, submits to the Utilities Lead and the 3EN2 Activity Leader (for action) and Project Manager (for information).

The Utilities Lead reviews the proposed construction methods, environmental impacts of the utility relocations, and consistency with the current roadway design plans. The Utilities Lead consults with the project’s Environmental Lead about proposed environmental impacts.

Coordinate Utility Design

If Utility Construction Plans are provided by the utility, the Utilities Coordinator coordinates with the utility and the utility’s Design Engineer by providing plans, project CADD file updates, and project schedules. The Utilities Coordinator monitors progress by the Utility’s designer and updates the Utilities Lead and Project Manager regularly. The Utilities Coordinator coordinates the delivery of the deliverables required in Initiate Utility Design (2UT1) but will not be responsible for their production.

Complete QC/QA Procedures

The Utilities Coordinator and/or Utilities Design Engineer is to coordinate the applicable QC review following the NCDOT Quality Management Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution of all related deliverables.

[\(Back to activity overview\)](#)

Overview: Utility Design

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

References

- [Utilities Accommodation Manual](#)
- [Dig Once Policy](#)
- [Utilities Connect Site](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Proprietary Products Guidelines](#)
- [Standard Specifications for Roads and Structures](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Agreement Plans	<ul style="list-style-type: none"> ▪ <i>Submit Utility Agreement Plans</i> 		

Permit Applications	<ul style="list-style-type: none"> Initiate Water and Sewer Permits 	Utilities Design Engineer	Utilities Coordinator & Utilities Lead
Utility Environmental Permit Plans and Narrative	<ul style="list-style-type: none"> Provide Permit Related Utility Environmental Impacts 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead
Cost Responsibility Analysis Report	<ul style="list-style-type: none"> Submit Cost Responsibility Analysis 	Utilities Coordinator	Utilities Lead
Final Utilities Coordination Working Plans	<ul style="list-style-type: none"> Submit Final Utility Coordination Working Plans 	Utilities Coordinator	Utilities Design Engineer & Utilities Lead

~~Coordinate Noise Wall and Signal Conflicts and Service Acquisition for ITS and Signing~~

~~The Utilities Coordinator requests the number and locations for project noise walls (see 3EN3 for related information) and signals (see 2SG1 for related information) to identify conflict and coordinates utility service acquisition for ITS, signing, and lighting along the project corridor as requested by those disciplines/Units (see related RD and SG tasks for related information).~~

~~Review Utility Relocation Packages~~

~~The Utilities Coordinator receive and reviews the final Utility Relocation Plans, Estimates, and Special Provision, coordinating with Utility Design Engineer or utility owner’s engineer to address comments in order to submit final Utility Agreement Plans.~~

~~Complete Dig Once Policy Agreements~~

~~If any utilities enter into agreement under the Dig Once Policy, the Utilities 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.
- Review of UC Special Provisions and UC Plans (including notes and details) by the Utilities Designer to ensure compliance with the Proprietary Products Guidelines.
- 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~~addresses any comments and ~~submits~~submits a set of Utility Agreement Plans.

- The purpose of these plans is to be an attachment to the Utility Construction Agreement or Use and Occupancy Agreement.
- Special Provisions and agreement estimate are also required.

The Utilities Lead generates the appropriate agreement and submits it to the utility company for execution.

Initiate Water and Sewer Permits

The Utilities Design Engineer determines the need for water and sewer permits (Authorization to Construct for water and Sewer Extension Permit for sewer). It is expected that utility permits are to be obtained for all water and sewer work to be performed by the project's contractor.

The Utilities Design Engineer prepares the applications and assists the utility in submitting the applications to NC Department of Environmental Quality (DEQ) Public Water Supply Section and Division of Water Quality. The Utilities Lead may waive the utility permit requirement for a utility if it is clear a permit is not required under NCDEQ rules and the utility concurs, or may instead choose to require that the utility permit be obtained.

~~Provide Permit-Related Coordination of Utility Environmental Impacts Construction Plans~~

~~The Utilities Coordinator uses the Utility Coordination Working Plans to create a set of Utilities Environmental Permit Drawings. These plans consist of an environmental narrative, plans showing impacts, utility profiles, and impact area charts. Not all components are required for all projects. As part of the plans, the Utilities Coordinator is to:~~

- ~~▪ Coordinate areas of utility impacts with areas of roadway impacts.~~
- ~~▪ Submit to the Utilities Lead to obtain concurrence.~~
- ~~▪ After obtaining concurrence, submit to the Utilities Lead and the 3EN1 Activity Leader (for action) and Project Manager (for information).~~

~~The Utilities Lead reviews the proposed construction methods, environmental impacts of the utility relocations, and consistency with the current roadway design plans. The Utilities Lead consults with the project's Environmental Lead about proposed environmental impacts.~~

~~Submit Cost Responsibility Analysis~~

~~The Utilities Coordinator is to submit the Cost Responsibility Analysis Report, providing the recommendation for portion of cost responsibility for each utility and NCDOT. To do this, the Utilities Coordinator:~~

- ~~▪ Supports the recommendation with an analysis of the policy applied and evidence provided.~~
- ~~▪ Provides supporting documentation, including deeds, previous agreements, plans, and other evidence of compensable interest.~~

~~The Utilities Lead reviews the analysis and requests additional information (if needed), comments as required, and accepts the report when complete. The Utilities Coordinator files this completed report on the project SharePoint site. The Utilities Lead retains this report with the agreement documents.~~

Submit Final Utility Coordination Working Plans

~~The Utilities Coordinator submits the Final Utilities Coordination Working Plans, showing the final easements/PUEs and alignments to be authorized for all utilities and the current Utilities Relocation Schedule with a description of important design decisions.~~

~~The Utilities Lead performs final review of the relocations that includes a review of the application of the *Utilities Accommodation Manual*, a constructability review, and a review of the relocation schedule. The Utilities Coordinator confirms easement information is incorporated into the Right-of-Way Plan Set (see 3RD1 for related information).~~

Submit Utility Agreements for Authorization

~~The Utilities Coordinator receives the utility agreements and plans, specifications, and estimate (the Utility Relocation Package) 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.~~

~~If, in addition to the utilities scoped to the Utilities Design Engineer, there are utilities to be constructed in the highway contract that to be designed by the utility's engineer, the Utilities Design Engineer coordinates inputting of quantity estimates, plan sheet numbering, and special pay item naming for all Utility Construction plans and Special Provisions to verify the plan set for all work. This is not to be confused with "Coordinate Utility Design" in the Utilities Coordination scope.~~

Complete QC/QA Procedures

~~The Utilities Coordinator and/or~~The Utilities Design Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

3UT2 Initiate Utility Relocations by Others

All tasks required for this activity are associated with Utilities Coordination.

Overview: Utilities Coordination and/or Design

Overview

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

Support the Project Manager and Resident Engineer by maintaining contact with the utilities, maintaining the Utilities Relocation Schedule, and continuing coordination to resolve relocation issues until the relocations by the utilities are complete. This task continues as 4UT2 and may continue into construction of the roadway or may alternatively be continued as part of 5UT1.

References

- [Utilities Accommodation Manual](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Utilities Coordinator	Utilities Design Engineer
Relocation Scheduling Conference	<ul style="list-style-type: none"> ▪ Hold Relocation Scheduling Conference 	X	
Updated Utilities Relocation Schedule	<ul style="list-style-type: none"> ▪ Maintain Contact with Utilities 	X	X
	<ul style="list-style-type: none"> ▪ Update the Utilities Relocation Schedule 		
Regular Utility Meetings	<ul style="list-style-type: none"> ▪ Continued Coordination 	X	

Hold Relocation Scheduling Conference

After receiving the Utility Authorization, the Utilities Coordinator schedules and holds the Relocation Scheduling Conference for each utility. The conference is to be attended by the utility company, the utility's contractor, the Project Manager, Resident Engineer, and others, as required. The Utilities Coordinator facilitates this meeting on behalf of the Resident Engineer. The Utilities Coordinator updates the Utilities Relocation Schedule.

Maintain Contact with Utilities

The Utilities Coordinator maintains weekly contact with the utilities during their relocation construction. The Utilities Coordinator monitors the progress of the relocations and determines if intervention is needed to keep the utility relocations on schedule. If intervention is needed, the Utilities Coordinator contacts and involves needed resources or makes recommendations/implements strategies to maintain the relocations to support the overall project schedule.

Update the Utilities Relocation Schedule

The Utilities Coordinator updates the Utilities Relocation Schedule weekly and distributes the schedule to the Resident Engineer, Utilities Lead, and Project Manager.

Continued Coordination

The Utilities Coordinator continues coordination with utilities to address issues that arise during the relocation phase of the project. The Utilities Lead provides input, as necessary, to resolve issues involving the scoped utilities. Continued coordination may involve holding regular meetings with representatives of the utilities, NCDOT, and other disciplines in the project in attendance to facilitate coordination with right-of-way, clearing, and demolition activities and cooperation among utilities.

Other Construction Support

The Utilities Coordinator provides other utility construction support as scoped.

3UT3 Prepare Final Utility Relocation and Construction Estimates

The tasks required for this activity are separated into the sub-activities of:



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Utilities Coordination

Facilitate receiving the Design Complete Review Plan Set Utility Construction Estimate, if necessary.

Coordinate Utility Design

If Utility Construction Plans are provided by the utility, the Utilities Coordinator coordinates with the utility and the utility's Design Engineer to provide the quantities estimate to the Utilities Lead.

[\(Back to activity overview\)](#)

Overview: Utility Design

Prepare the Design Complete Review Plan Set utility construction cost estimates at the time of finalizing the Design Complete Review Plan Set.

References

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

Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
		Utilities Design Engineer
Design Complete Review Plan Set Utility Construction (PH 300) Estimate	<ul style="list-style-type: none"> ▪ Prepare Design Complete Review Plan Set Utility Construction Estimate 	X

Prepare Design Complete Review Plan Set Utility Construction Estimate

The Utilities Design Engineer prepares a quantity estimate for the Utility Construction Plans using NCDOT pay items.

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.

Coordination of Utility Construction Plans

If, in addition to the utilities scoped to the Utilities Design Engineer, there are utilities to be constructed in the highway contract that to be designed by the utility’s engineer, the Utilities Design Engineer coordinates the estimate quantities. This is not to be confused with “Coordinate Utility Design” in the Utilities Coordination scope.

4UT1 Finalize Utility Coordination and/or Utility Design PS&E

The tasks required for this activity are separated into the sub-activities of:



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Utilities Coordination

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

References

- [Utilities by Others Plans Development](#)
- [Utilities Accommodation Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Style Guide for Provisions](#)
- [Proprietary Products Guidelines](#)

Deliverables

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

Continuing Tasks

The Utilities Coordinator continues to maintain and update the Utilities Coordination Working Plans, Utility Project Outline, and Utilities Relocation Schedule begun in Stage 2, and continues to review new utility and non-utility encroachments as described in 2UT2.

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.

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.

Coordinate Utility Design

If Utility Construction Plans are provided by the utility, the Utilities Coordinator receives Utility Construction Plans, Special Provisions, and Estimates from the utility designer, places the plans and Special Provisions on the project site (including water and sewer permits), and enters the quantity estimate as required. The Utilities Coordinator monitors progress by the utility's designer and updates the Utilities Lead and Project Manager regularly. The Utilities Coordinator coordinates the deliverables required in Finalize Utility Design but is not responsible for their production.

Complete QC/QA Procedures

The Utilities Coordinator is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

[\(Back to activity overview\)](#)

Overview: Utility Design

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

References

- [Utilities Construction Plans Development](#)
- [Utilities Accommodation Manual](#)
- [NCDOT Quality Management Program: Quality Control and Quality Assurance](#)
- [Style Guide for Provisions](#)
- [Proprietary Products Guidelines](#)
- [Standard Specifications for Roads and Structures](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Construction Plans (PS&E)	<ul style="list-style-type: none"> ▪ Complete Utility Construction Plans 	Utilities Design Engineer	Utilities Lead
Water and Sewer Permits	<ul style="list-style-type: none"> ▪ Receive Water and Sewer Permits 	Utilities Design Engineer	Utilities Lead

Complete Utility Construction Plans

The Utilities Design Engineer ensures the compliance of the final Utility Construction Plans and Special Provisions with the Proprietary Products Guidelines.

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~~[returns](#) 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~~ [Coordination of Utility Construction Plans](#)

~~If, in addition to the~~ [utilities designed under the control of the owner, but scoped to the Utilities Design Engineer, there are utilities](#) to be constructed ~~as part of in~~ the [project's highway](#) contract.

~~Execute Utility Agreements~~

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

~~Issue~~ that to be designed by the utility's engineer, the Utilities Design Engineer coordinates inputting of quantity estimates, plan sheet numbering, and special pay item naming for all 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~~ plans and Special Provisions to verify the plan set for all work. This is not to be confused with "Coordinate Utility Certification

Design" in 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 libraryCoordination scope.

Complete QC/QA Procedures

~~The Utilities Coordinator and/or~~The Utilities Design Engineer is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

4UT2 Complete Utility Relocations by ~~Owner~~Others

All activities required for this task are associated with [Utilities Coordination](#).

Overview: [Utilities Coordination](#)

Support the Project Manager and Resident Engineer by maintaining contact with the utilities, maintaining the Utilities Relocation Schedule, and continuing coordination to resolve relocation issues until the relocations by the utilities are complete. ~~(see. This task is a continuation of the duties of 3UT2. This task may continue into construction of the roadway or may alternatively be continued as part of 5UT1 for additional information).~~

References

- [Utilities Accommodation Manual](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Utilities Coordinator	Utilities Design Engineer
Relocation Scheduling Conference	<ul style="list-style-type: none"> Hold Relocation Scheduling Conference 	X	
Updated Utilities Relocation Schedule	<ul style="list-style-type: none"> Maintain Contact with Utilities 	X	X
	<ul style="list-style-type: none"> Update the Utilities Relocation Schedule 		

~~Hold Relocation Scheduling Conference~~

~~After receiving the Utility Authorization, the Utilities Coordinator schedules and holds the Relocation Scheduling Conference for each utility. The conference is to be attended by the utility company, the utility's contractor, the Project Manager and Resident Engineer, and others as required. The Utilities Coordinator updates the Utilities Relocation Schedule.~~

~~Maintain Contact with Utilities~~

~~The Utilities Coordinator maintains weekly contact with the utilities during their relocation construction. The Utilities Coordinator monitors the progress of the relocations and determines if intervention is needed to keep the utility relocations on schedule. If intervention is needed, the Utilities Coordinator contacts and involves needed resources or makes recommendations/implements strategies to maintain the relocations to support the overall project schedule.~~

~~Update the Utilities Relocation Schedule~~

~~The Utilities Coordinator updates the Utilities Relocation Schedule weekly and distributes the schedule to the Resident Engineer, Utilities Lead, and Project Manager.~~

~~Continued Coordination~~

~~The Utilities Coordinator continues coordination with utilities to address issues that arise during the relocation phase of the project. The Utilities Design Engineer provides input, as necessary, to resolve issues involving the scoped utilities.~~

4UT3 Prepare Final Utility Construction Estimate

Overview

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

References

- ☐—
- ☐—
- ☐—

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	
		Utilities Design Engineer	
Final Regular Utility Construction (PH 300) Estimate Meetings	<ul style="list-style-type: none"> ▪ Prepare Final Utility Construction Estimate Continued Coordination 	X	

~~Prepare Final Utility Construction Estimate~~

~~As part of 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).~~

5UT1 Utility Construction Support

The tasks required for this activity are separated into the sub-activities of:



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Utilities Coordination

Support project construction by ~~coordinating~~continuing coordination with utilities and ~~reviewing~~by reviewing new encroachment requests as needed for conflict with the project and other utilities submittals to ensure relocations are completed on time and submittals are reviewed for compliance.

References

- [Utilities Accommodation Manual](#)
- [Standard Specifications for Roads and Structures](#)

Continue 4UT2 (as necessary)

The Utilities Coordinator continues the tasks of 4UT2 after let, until all utility-constructed relocations are complete.

Review New Utility Encroachments

The Utilities Coordinator reviews new utility encroachments to ensure that there are no conflicts with the project and other utilities. The Utilities Coordinator coordinates with the utility as needed to support construction.

[\(Back to activity overview\)](#)

Overview: Utility Design

Support project construction by reviewing utilities submittals to ensure relocations are completed on time and submittals are reviewed for compliance, and by creating revised Utility Construction Plans and Special Provisions as needed.

References

- [Utilities Accommodation Manual](#)
- [Standard Specifications for Roads and Structures](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Submittal Review Letter	<ul style="list-style-type: none"> ▪ Review Utilities Materials Submittals 	Utilities Design Engineer	Utilities Coordinator
Submittal Review Letter Revised Utility Construction Plan Sheets	<ul style="list-style-type: none"> ▪ Review Utilities Materials Submittals Submit Design Revisions 		

Continue 4UT2 (as necessary)

~~The Utilities Coordinator and Utilities Design Engineer continue the tasks of 4UT2 after let, until all utility-constructed relocations are complete.~~

Review Utilities Materials Submittals

The Utilities Design Engineer reviews all submitted utility shop drawings and catalog cuts for compliance with the ~~project's Special Provisions and plans and the~~ [Standard Specifications for Roads and Structures](#) ~~and the project's Special Provisions and plans~~. The Utilities Design Engineer submits a Submittal Review Letter to the Utilities Lead and Resident Engineer, approving or rejecting each utility submittal [item](#).

If the utilities were designed by an engineer hired by the utility company, the Utilities Lead is responsible for the review of submittals.

Submit Design Revisions

~~The Utilities Design Engineer revises the Utility Construction Plans or Special Provisions as needed and in consultation with the Resident Engineer, Utilities Lead, and Project Manager. Revisions are submitted to the Utilities Lead for review. The final revised design are submitted to the Project Manager for processing.~~

1VM1 Initiate Value Management Activities

Overview

Ensure that ~~the initial Constructability Review, Risk-Value Management, and Value Engineering tasks activities~~ begin in ~~this~~ Stage 1 to inform the Express Design and Project Scoping Report. ~~Also initiate the Communicate Lessons, Exchange Advice, Record (CLEAR) and Cost Containment (CC) tasks.~~

The ~~major tasksspecific efforts~~ of this ~~Stageactivity~~ are ~~defined as follows~~; separated into the following ~~sub-activities~~.



~~Task details and deliverables for these sub-activities are found in the corresponding sections below.~~

Overview: Constructability Review (CR)

~~—Support review of constructability considerations as part of project scope development.~~

- ~~a) Risk Management (RM) — support identification of potential issues (e.g., risks) that could jeopardize project delivery, including impacts to project scope, schedule, and budget goals.~~
- ~~b) Value Engineering (VE) — supports the determination if a VE Study is required (or recommended) for state or federal projects that meet or exceed defined thresholds.~~
- ~~c) Communicate Lessons, Exchange Advice, Record (CLEAR) — support identification of relevant lessons learned (LLs) and best practices (BPs), 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.~~
- ~~d) Cost Containment (CC) — support cost saving ideas such as time savings, reduction in impacts, and improved constructability to aid in alternative design selection and scope development.~~

~~While all Value Management 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 Management Guide~~
 - ~~Risk Assessment Worksheet (RAW)~~

- ~~How to use the Online RAW~~
- ~~Risk Examples and Mitigation Strategies~~
- ~~Value Engineering Schedule~~
- [ArcGIS STIP and NHS Maps](#)
 - ~~CLEAR SharePoint Site~~
- [Project Management & Delivery](#)
 - [Project Management Guide](#)

Deliverables

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

[^]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~~provides 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, they can schedule an informal/internal CR where VMO coordinates the internal CR with the technical groups and 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.~~ If Project Lead determines a Formal CR (to include Contractors) is needed, VMO will need to be contacted. VMO provides support as needed.

[\(Back to activity overview\)](#)

Overview: Risk Management (RM)

Support identification of potential issues (e.g., risks) that could jeopardize project delivery, including impacts to project scope, schedule, and budget goals.

References

- [Value Management Office](#)
- [Risk Management Program](#)
 - [Risk Management Guide](#)
 - [Risk Assessment Worksheet \(RAW\)](#)
 - [How to use the Online RAW](#)
 - [Risk Examples and Mitigation Strategies](#)
- [ArcGIS STIP and NHS Maps](#)
- [Project Management & Delivery](#)
 - [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Project Lead	
Risk Assessment Worksheet	<ul style="list-style-type: none"> ▪ Conduct Risk Management Activities 	X	Value Management Office Program Manager
Risk Assessment Study [^]			Value Management Office Program Manager

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

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 [1FS31FS2](#) for related information). If the risk review reveals potential fatal flaws, the project is reassessed with support from assigned technical leads/Units either during drafting of the 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 Guide*, risks are captured in the Project Scoping Report and transferred to the *Risk Assessment Worksheet (RAW)* around the time the project is transferred to the Project Manager. If a Connect Preconstruction Project Site has been created for the project, the Project Lead can enter risks into the Online RAW linked from the project’s Preconstruction Dashboard. While a Risk Assessment Study or Workshop 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 or Workshop 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.
- Or Provides consultant to lead Risk Assessment Study/Workshop

From there, the Project Lead monitors and controls the identified project risks following the process and procedures detailed in the *Risk Management Guide*. The Project Lead transfers this responsibility to the Project Manager right before notice to proceed (NTP) or early in ~~the Alignment Defined~~ Stage 2.

[\(Back to activity overview\)](#)

Overview: Value Engineering (VE)

Support the determination if a VE Study is required (or recommended) for state or federal projects that meet or exceed defined thresholds.

References

- [Value Management Office](#)
- [Value Engineering Program](#)
 - [Value Engineering Schedule](#)
 - [VE Guidelines](#)
- [ArcGIS STIP and NHS Maps](#)
- [Project Management & Delivery](#)
 - [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Project Lead	
Value Engineering (VE) Checklist	<ul style="list-style-type: none"> ▪ Determine if a Value Engineering Study is Needed (Available in ATLAS) 	X	Value Management Office Program Manager
Value Engineering (VE) Schedule	<ul style="list-style-type: none"> ▪ Develop the Value Engineering Schedule 		Value Management Office Program Manager

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

Determine if a Value Engineering Study is Needed

The Project Lead or Project Manager (depending on the timing of when the determination is made) notifies VMO for state or federal projects that meet or exceed are on the following thresholds: Any project that has National Highway System (NHS) and have a construction total estimate of \$2030 million or more. The total estimate includes the costs for preliminary engineering, utilities, right-of-way acquisition, and construction. If unsure if a project is on or intersects an NHS route, contact VMO for clarification.

Develop the Value Engineering Schedule

The VMO Program Manager produces an annual schedule of projected VE Studies each State Fiscal Year and publishes the schedule so Project Leads/Managers can prepare for the upcoming study. The VMO Program Manager produces and distributes updates to the schedule. VE Studies are to be held before the Design Recommendation Plan Set is published (2RD1), barring extraordinary circumstances, so that accepted VE recommendations can be included in the design.

[\(Back to activity overview\)](#)

Overview: Communicate Lessons, Exchange Advice, Record (CLEAR)

Support identification of relevant lessons learned (LLs) and best practices (BPs), to leverage past successes and errors to deliver projects more efficiently. Value Management Office (VMO) maintains the CLEAR database, which contains Department wide LLs and BPs.

References

- [Value Management Office](#)
- [CLEAR Program](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Project Lead	
CLEAR Database Search	<ul style="list-style-type: none"> ▪ Search and Share Relevant LL and BP (CLEAR Database Search) with Project Team 	X	Value Management Office Program Manager

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

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 Cost Containment Activities~~

~~The Project Lead may look to exercise cost containment measures related to scoping and alternative design selection. This may include reviewing roadway alignment, local agreements, and intersection treatment options, etc. for efficiencies or improvements. These cost containment measures including cost savings amounts can be added to a Cost Containment Worksheet for the project.~~

~~The Project Lead can choose an outside Consultant to conduct a Cost Containment Assessment (CCA) towards the end of this stage, to be conducted in Stage 2, but a third-party consultant is no longer required for cost containment activities. Additional information on the Cost Containment program can be found on the VMO Connect Site.~~

~~Complete QC/QA Procedures~~

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

2VM1 Complete Value Management Activities

Overview

Building off the work started in Stage 1, ensure ~~Constructability Review, Risk-Value Management, and Value Engineering studies and reviews Activities~~ are continuing forward, ~~along with continuing the Cost Containment and Communicate Lessons, Exchange Advice, Record (CLEAR) tasks.~~

~~The major tasksspecific efforts of this Stageactivity are defined as follows:separated into the following sub-activities.~~



~~Task details and deliverables for these sub-activities are found in the corresponding sections below.~~

Overview: Constructability Review (CR)

~~—Support review of constructability considerations as part of project scopedesign development.~~

- ~~a) Risk Management (RM) — 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.~~
- ~~b) Value Engineering (VE) — when applicable for the project, complete the VE Study for state or federal projects that meet or exceed established federal thresholds.~~
- ~~c) 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.~~
- ~~d) Cost Containment (CC) — advance cost-saving ideas such as time savings, reduction in impacts, and improved constructability to aid in alternative design selection and scope development.~~

~~While all Value Management tasks include separate items, advancing the items together allows the outcomes to inform each other since they typically overlap and may be combined (specifically for a Risk Assessment Study and VE Study).~~

References

- [Value Management Office](#)
 - ~~○ Value Management Guidelines~~
- [Constructability Review Program](#)
 - ~~○ Constructability Review Checklist~~
 - ~~○ Risk Management Guide~~
 - ~~○ Risk Assessment Worksheet (RAW)~~
 - ~~○ How to use the Online RAW~~

- ~~○ Risk Examples and Mitigation Strategies~~
- ~~□~~
- ~~○ Value Engineering Schedule~~
- [ArcGIS STIP and NHS Maps](#)
- ~~○~~
- ~~○ CLEAR SharePoint Site~~
- [Project Management & Delivery](#)
- [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Constructability Review Checklist	<ul style="list-style-type: none"> ▪ Complete Constructability Review Checklist 	Project Manager	<ul style="list-style-type: none"> ▪ Division Construction Engineer ▪ Area Construction Engineer ▪ Value Management Office
Constructability Review Minutes/CR Log [^]	<ul style="list-style-type: none"> ▪ Complete Constructability Review 	Value Management Office Program Manager	
Risk Assessment Worksheet	<ul style="list-style-type: none"> ▪ Update Risk Assessment Worksheet and Hold Risk Assessment Study 	Project Manager	<ul style="list-style-type: none"> ▪ Value Management Office Program Manager ▪ Project Team
Risk Assessment Study [^]		Value Management Office Program Manager	Project Manager
Cost Containment Activities	<ul style="list-style-type: none"> ▪ Complete Cost Containment Activities and complete Cost Containment worksheet 	Project Manager	<ul style="list-style-type: none"> ▪ Value Management Office Program Manager
Cost Containment Worksheet		Cost Containment Consultant Project Manager	<ul style="list-style-type: none"> ▪ Division Engineer
Value Engineering (VE) Study Report [^]	<ul style="list-style-type: none"> ▪ Hold Value Engineering Study and Review Report 	Value Management Office Program Manager	
Value Engineering (VE) Study Recommendations		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		Project Manager or Other Technical Disciplines/Units	Value Management Office Program Manager

[^] 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 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. As construction issues/risks are identified and documented, the Project Manager or Roadway Design Lead is to contact the respective Division Construction Engineer (DCE) or Area Construction Engineer (ACE) 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.

[\(Back to activity overview\)](#)

Overview: Risk Management (RM)

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.

References

- [Value Management Office](#)
- [Risk Management Program](#)
 - [Risk Management Guide](#)
 - [Risk Assessment Worksheet \(RAW\)](#)
 - [How to use the Online RAW](#)
 - [Risk Examples and Mitigation Strategies](#)
- [ArcGIS STIP and NHS Maps](#)
- [Project Management & Delivery](#)
 - [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Risk Assessment Worksheet	<ul style="list-style-type: none"> ▪ Update Risk Assessment Worksheet and Hold Risk Assessment Study 	Project Manager	<ul style="list-style-type: none"> ▪ Value Management Office Program Manager ▪ Project Team
Risk Assessment Study [^]		<ul style="list-style-type: none"> ▪ Value Management Office Program Manager 	Project Manager

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

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 Guide* 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 a Connect Preconstruction Project Site has been created for the project, the Project Manager should enter risks into the Online RAW linked from the project’s Preconstruction Dashboard. This RAW is intended to be a living list that follows that project throughout its lifecycle. 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. All project team members can contribute to the online RAW. 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.

~~Hold Value Engineering Study and Review Report~~

~~As outlined in the [\(Back to activity overview\)](#)~~

~~Overview: Value Engineering (VE) [Checklist](#), or as listed on the [VE Schedule](#), the Project Manager establishes if a VE study is required or recommended. When applicable for the project, complete the VE Study for state or federal projects that meet or exceed the following established VE Study thresholds:~~

References

- [Value Management Office](#)
- [Value Engineering Program](#)
 - [Value Engineering Schedule](#)
- [ArcGIS STIP and NHS Maps](#)
- [Project Management & Delivery](#) ~~Any project (or combination of projects)~~
 - [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Value Engineering (VE) Report ^	<ul style="list-style-type: none"> ▪ Hold Value Engineering Study and Review Report 	Value Management Office Program Manager	
Value Engineering (VE) Recommendations		Value Management Office Program Manager	
Final Dispositions (Responses to recommendations)		Project Manager or Other Technical Disciplines/Units	Value Management Office Program Manager

^ Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

Hold Value Engineering Study and Review Report

- ~~As outlined in the [Initiate Value Management Activities step \(1VM1\)](#), the Project Manager notifies VMO for state or federal projects that are on the National Highway System (NHS) that could and have a total estimate of at least \$50 million, or~~
- ~~Any project on the NHS that is \$40\$30 million or more for projects with structures, or~~

~~Any project that is over \$500 million regardless. The total estimate includes the costs for preliminary engineering, utilities, right-of-way acquisition, and construction. If unsure if a project is on or intersects an NHS route, contact VMO for clarification. A schedule of NHS designation upcoming VE studies will be developed and distributed by the VMO Program Manager.~~

~~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 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 and~~ 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~~Unit 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 a project 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~~shall 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.

[\(Back to activity overview\)](#)

Overview: 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 projects more efficiently. Value Management Office (VMO) maintains the CLEAR database, which contains Department wide LLs and BPs.

References

- [Value Management Office](#)
- [CLEAR Program](#)
 - [Lessons Learned Submission Form \(External\)](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
CLEAR Database Search	▪ Conduct CLEAR Activities	Project Manager or Other Technical Disciplines/Units	Value Management Office Program Manager

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 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 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: [Lessons Learned Submission Form](#).

Conduct Cost Containment Activities

~~If determined to be advantageous by the Project Lead, the Consultant identified in Stage 1 will conduct a Cost Containment Assessment and complete the Cost Containment Worksheet. There may already be a Worksheet of cost saving ideas initially identified in Stage 1. This should be provided to the firm~~

~~conducting the assessment. The assessment 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 brainstorm cost saving ideas that would reduce the Construction, Utility, Right of Way, and future Maintenance Costs without affecting functionality of the project based on its purpose and need. The output from the assessment is the *Cost Containment Worksheet*. Directions on how to fill out the worksheet for consultant firms, Project Managers, and Division Engineers can be found on the VMO Connect Site. Once the consultant firm completes the 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 on the worksheet as well. Any cost savings identified may need to be included in the Cost Verification Memo (see *Project Management Guide* for related information).~~

~~****Note:*** *A Cost Containment 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 Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.~~

3VM1 Incorporate Value Management Activities

Overview

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

~~While Value Management~~ The specific efforts of this activity are separated into the following sub-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).~~



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Constructability Review (CR)

Continue to support review of constructability considerations as part of project design development.

References

- [Value Management Office](#)
- [Constructability Review Program](#)
 - ~~Value Management Guidelines~~
 - ~~Constructability Review Checklist~~
 - ~~—~~
 - ~~Risk Management Guide~~
 - ~~Risk Assessment Worksheet (RAW)~~
 - ~~How to use the Online RAW~~
 - ~~Risk Examples and Mitigation Strategies~~
 - ~~—~~
 - ~~Value Engineering Schedule~~
- [ArcGIS STIP and NHS Maps](#)
 - [Project Management & Delivery](#)
 - ~~CLEAR SharePoint Site~~
- ~~—~~
 - ~~Project Management Guide~~

Deliverables

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

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Constructability Review Minutes/CR Log ^A	▪ Complete Constructability Review <i>(if needed)</i>	Value Management Office Program Manager	
Risk Assessment Worksheet	▪ Update and Monitor Risk Assessment Worksheet and implement mitigation strategies	Project Manager	Value Management Office Program Manager
Risk Assessment Study Report ^A		Project Team	Project Manager
Cost Containment Recommendations	▪ Implement recommendations from Worksheet	Project Manager	▪ Project Team ▪ Value Management Office Program Manager
Value Engineering Study Report (including VE recommendation Forms) ^A	▪ Implement Value Engineering Recommendations	Value Management Office Program Manager	
CLEAR Database Submission	▪ Submit LL and BP from Project Design and Development (CLEAR Submissions)	Project Manager or Other technical disciplines/Units	Value Management Office Program Manager

^A 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)

As construction 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) 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/internal Constructability Review (CR) whether ~~or not~~ one had been held during an earlier stage since multiple CRs can occur as the design develops.

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Overview: Risk Management (RM)

Continue to support identification of potential issues (e.g., risks) that could jeopardize project delivery, including impacts to project scope, schedule, and budget goals.

References

- [Value Management Office](#)
- [Risk Management Program](#)
 - [Risk Management Guide](#)
 - [Risk Assessment Worksheet \(RAW\)](#)
 - [How to use the Online RAW](#)
 - [Risk Examples and Mitigation Strategies](#)
- [ArcGIS STIP and NHS Maps](#)
- [Project Management & Delivery](#)
 - [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Risk Assessment Worksheet	<ul style="list-style-type: none"> ▪ Update and Monitor Risk Assessment Worksheet and implement mitigation strategies 	Project Manager	Value Management Office Program Manager
Risk Assessment Study Report [^]		Project Team	Project Manager

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

Update and Monitor Risk Assessment Worksheet

The Project Manager, with support from the VMO Program Manager (if needed), continually revises the risk register 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 Guide* and the *Project Management Guide*. Whether using the Excel version or the Online RAW, it is intended that the RAW is a living document that tracks project risks throughout the project lifecycle. The Online RAW can be accessed from the project’s Connect Preconstruction site and the related Preconstruction Dashboard. 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.

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*.

Implement

[\(Back to activity overview\)](#)

Overview: Value Engineering Recommendations(VE)

If a VE Study was held, incorporate accepted recommendations into the Project Manager makes sure project's design if not already accomplished before the Design Recommendation Plan Set.

References

- [Value Management Office](#)
- [Value Engineering Program](#)
 - [Value Engineering Schedule](#)
- [ArcGIS STIP and NHS Maps](#)
- [Project Management & Delivery](#)
 - [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Value Engineering Report (including VE recommendation Forms) ^A	<ul style="list-style-type: none"> <input type="checkbox"/> Implement Value Engineering Recommendations 	Value Management Office Program Manager	

^A Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

Implement Value Engineering Recommendations

If a VE Study was held, the Project Manager ensures the VE 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 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. A final audit of the design (called an Implementation Check) is to be completed before the project is allowed to be advertised per federal guidelines. Project Managers are to coordinate with VMO for the Implementation Check if not completed before project moves to the 13 month Let List.

Revisit VE Threshold Requirements (if needed)

As a project 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 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.

[\(Back to activity overview\)](#)

Overview: 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 projects more efficiently. Value Management Office (VMO) maintains the CLEAR database, which contains Department wide LLs and BPs.

References

- [□ Value Management Office](#)
- [□ CLEAR Program](#)
 - [○ Lessons Learned Submission Form \(External\)](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
CLEAR Database Submission	<ul style="list-style-type: none"> ▪ Submit LL and BP from Project Design and Development (CLEAR Submissions) 	Project Manager or Other technical disciplines/Units	Value Management Office Program Manager

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

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

The Project Manager (or assigned NCDOT employee) 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.

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

~~Implement Cost Containment Recommendations~~

~~The accepted recommendations from the Cost Containment Assessment 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 assessment. Additional changes/recommendations should be added to the 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 Program: Quality Control and Quality Assurance procedures and the respective QC Checklist before upload and distribution of all related deliverables.~~

4VM1 Complete Value Management Activities

Overview

As applicable, ensure outcomes from ~~the Constructability Review, Risk Value Management, Cost Containment, and Value Engineering Study~~ activities are incorporated into the design. Additionally, ensure Communicate Lessons, Exchange Advice, Record (CLEAR) activities continue. The specific efforts of this activity are separated into the following sub-activities.

~~While all Value Management 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).~~



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Constructability Review (CR)

Support review of constructability considerations as part of final plan development.

References

- [Value Management Office](#)
 - ~~Value Management Guidelines~~
- [Constructability Review Program](#)
 - ~~Constructability Review Checklist~~
 - ~~—~~
 - ~~Risk Management Guide~~
 - ~~Risk Assessment Worksheet (RAW)~~
 - ~~How to use the Online RAW~~
 - ~~Risk Examples and Mitigation Strategies~~
 - ~~—~~
 - ~~—~~
 - ~~Value Engineering Schedule~~
- [ArcGIS STIP and NHS Maps](#)
 - [Project Management & Delivery](#)
 - ~~CLEAR SharePoint Site~~
- ~~—~~
 - [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Constructability Review Minutes/CR Log ^A	<ul style="list-style-type: none"> Complete Constructability Review Implementation Check Complete Constructability Review (if needed) 	Value Management Office Program Manager	
Risk Assessment Worksheet	<ul style="list-style-type: none"> Update and Monitor Risk Assessment Worksheet 	Project Manager	Value Management Office Program Manager
Cost Containment Activities	<ul style="list-style-type: none"> Complete Implementation Check 	Project Manager	<ul style="list-style-type: none"> Value Management Office Program Manager Division Engineer
Value Engineering (VE) Study Report ^A	<ul style="list-style-type: none"> Complete Value Engineering Recommendation Implementation Check 	Value Management Office Program Manager	
CLEAR Database Submissions	<ul style="list-style-type: none"> Submit LL and BP from throughout Project Design and Development (CLEAR Submissions) 	Project Manager or Other Technical Disciplines/Units	Value Management Office Program Manager

^A 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)

As construction 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) 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 internal Constructability Review (CR) regardless of if one had been held during an earlier stage since multiple CRs can occur as the design develops.

[\(Back to activity overview\)](#)

Overview: Risk Management (RM)

Continue to support identification of potential issues (e.g., risks) that could jeopardize project delivery, including impacts to project scope, schedule, and budget goals.

References

- [Value Management Office](#)
- [Risk Management Program](#)
 - [Risk Management Guide](#)
 - [Risk Assessment Worksheet \(RAW\)](#)
 - [How to use the Online RAW](#)
 - [Risk Examples and Mitigation Strategies](#)
- [ArcGIS STIP and NHS Maps](#)
- [Project Management & Delivery](#)
 - [Project Management Guide](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Risk Assessment Worksheet	<ul style="list-style-type: none"> ▪ Update and Monitor Risk Assessment Worksheet 	Project Manager	Value Management Office Program Manager

Update and Monitor Risk Assessment Worksheet

The Project Manager, with support as needed from the VMO Program Manager, continually revises the RAW (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 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*.

~~Complete Cost Containment Assessment Implementation Check~~

~~The Project Manager confirms~~

[\(Back to activity overview\)](#)

Overview: Value Engineering (VE)

If a VE Study was held, confirm implementation of accepted recommendations.

References

- [Value Management Office](#)
- [Value Engineering Program](#) and completes the Implementation Check on the Cost Containment Worksheet. Any cost savings identified may need to be included in the Cost Verification Memo (see
 - [Value Engineering Schedule](#)
- [ArcGIS STIP and NHS Maps](#)
- [Project Management & Delivery](#)
 - [Project Management Guide](#) for related information).

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Value Engineering (VE) Study Report [^]	<ul style="list-style-type: none"> ▪ Complete Value Engineering Recommendation Implementation Check 	Value Management Office Program Manager	

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

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. [This step is the Implementation Check and completes the Value Engineering Study. Implementation Checks are held before the project is added to the 13 month Let List as federal guidelines do not permit projects to be advertised without a finalized Implementation Check for the VE Study.](#)

Revisit VE Threshold Requirements (if needed)

[After Stage 3, projects should not require a VE Study as designs are substantially complete. If the project scope and design is modified at this stage, however, a VE Study may be required. Project Managers should contact VMO if a project scope changes at this stage and the project estimate escalates past \\$30M in total cost. The VMO Program Manager determines if the project meets the thresholds requiring a VE Study.](#)

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Overview: 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 projects more efficiently. Value Management Office (VMO) maintains the CLEAR database, which contains Department wide LLs and BPs.

References

- [Value Management Office](#)
- [CLEAR Program](#)

~~[Lessons Learned Submission Form](#) As a project 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 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.~~

- [\(External\)](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
CLEAR Database Submissions	<ul style="list-style-type: none"> ▪ Submit LL and BP from Project Design and Development (CLEAR Submissions) 	Project Manager or Other Technical Disciplines/Units	Value Management Office Program Manager

[^] Indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench.

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

The Project Manager (or assigned NCDOT employee) continues to identify any lessons learned (LLs) and best practices (BPs) 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.

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

~~Complete QC/QA Procedures~~

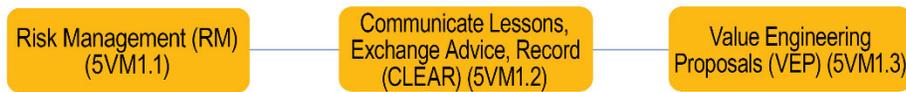
~~The Value Management Office Program Manager is to coordinate the applicable QC review following the *NCDOT Quality Management Program: Quality Control and Quality Assurance* procedures and the respective QC Checklist before upload and distribution of all related deliverables.~~

5VM1 Value Management Construction Support

Overview

As applicable, ensure outcomes from ~~the Constructability Review, Risk-Value Management, and Value Engineering Study and Cost Containment~~ activities are incorporated during construction. Additionally, ensure Communicate Lessons, Exchange Advice, Record (CLEAR) activities continue. Complete Value Engineering Proposal activities if necessary. The specific efforts of this activity are separated into the following sub-activities.

~~Complete Value Engineering Proposal activities if necessary.~~



Task details and deliverables for these sub-activities are found in the corresponding sections below.

Overview: Risk Management (RM)

Continue to support identification of potential issues (e.g., risks) that could jeopardize project delivery, including impacts to project scope, schedule, and budget goals.

References

- [Value Management Office](#)
 - ~~Value Management Guidelines~~
 -
 - ~~Constructability Review Checklist~~
- [Risk Management Program](#)
 - Risk Management Guide
 - Risk Assessment Worksheet
 - Risk Examples and Mitigation Strategies
 - [Project Management & Delivery](#)
 - CLEAR SharePoint Site
- - Project Management Guide

Deliverables

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

Update and Monitor Risk Assessment Worksheet

The Project Manager and Resident Engineer, with support as needed from the VMO Program Manager, continually revise the RAW (as needed) and reference the Risk Assessment Study Report (if a study occurred) to continue to monitor and control project risks. Be sure to follow the process and procedures detailed in the *Risk Management Guide* and the *Project Management Guide*. Resident Engineers should be able to view risks entered into the Online RAW on the project's Preconstruction project site from the related Preconstruction Dashboard.

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Overview: 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 projects more efficiently. Value Management Office (VMO) maintains the CLEAR database, which contains Department wide LLs and BPs.

References

- [Value Management Office](#)
- [CLEAR Program](#)
 - [Lessons Learned Submission Form \(External\)](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
CLEAR Database Submissions	<ul style="list-style-type: none"> ▪ Submit LL and BP from throughout Project Design and Development (CLEAR Submissions) 	Division Personnel	Value Management Office Program Manager

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: [Lessons Learned Submission Form](#).

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Overview: Value Engineering Proposal (VEP)

Support construction contractors in the development of Value Engineering Change Proposals that could result in cost or time savings without impairing the essential project functions or characteristics.

References

- [□ Value Management Office](#)
- [□ Value Engineering Proposal Program](#)
- [□ Standard Specifications for Roads and Structures](#)
- [□ Construction Manual](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Value Engineering Proposal Memo	<ul style="list-style-type: none"> ▪ Compile Value Engineering Proposal Memo 	Value Management Office Program Manager	<ul style="list-style-type: none"> ▪ CCU ▪ Technical Disciplines/Units, ▪ Resident Engineer

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 VMO at any time during construction. These proposals are to follow the guidelines in the *Standard Specifications for 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 Worksheet~~
- [CLEAR Program](#)
 - [Post Construction Assessments \(PCAs\)](#)
 - [Lessons Learned Submission Form \(External\)](#)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Post Construction Assessment Summary	<ul style="list-style-type: none"> ▪ Summary of discussion generated by VMO and shared-Project Selection ▪ Post Construction Assessment Pre-Meeting 	Value Management Office Program Manager	Project Team
CLEAR Database Submissions	<ul style="list-style-type: none"> ▪ Submit Lessons Learned and Best Practices 	Division Personnel	Value Management Office Program Manager

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 ~~Pre~~-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.