Resident Engineer Guide

January 2025

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How to Use the Resident Engineer (RE) Guide

The NCDOT Resident Engineer (RE) Guide is a one-stop shop reference document for REs. This *How To* preface answers some of the typical questions regarding the purpose and use of the RE Guide, alongside defining some of the common terms used throughout.

What is the purpose of the RE Guide?

The RE Guide was developed to provide consistency and ease of access to construction resources, enabling the RE, and RE Staff, to improve reliability and efficiency. The RE Guide outlines stages, activities, tasks, deliverables, and references (see RE Guide Common Term to the right) to accomplish these goals.

Specifically, the RE Guide assists the RE:

- Maintain consistency through a logical progression of construction activities.
- Outlines the typical steps and procedures for construction activities.
- Identifies best practices learned over time from more experienced REs.
- Highlights key deliverables to track through construction.

RE Guide Common Terms

Stage: A major step or phase in the construction process.

Activity: The overall action(s) needed to complete a stage in the RE Guide.

Task: The process(es) necessary to complete an activity.

Detail: The task description that explains what and why of a task.

RE Guide Activity Overview Figure: A "map" of all RE Guide activities used to deliver the construction process.

How is the RE Guide organized?

The RE Guide is separated into the following stages:

- **RE Basics**: Outlines general construction management activities the RE is responsible for (overseeing scope, schedule, budget, risks, etc.) during construction.
- **Project Development**: Identifies important activities during the project development phase that the RE should engage in as the project is prepared for letting.
- **Pre-Construction**: Identifies activities the RE is responsible for between project award and construction.
- **Physical Construction**: Identifies RE responsibilities during construction.
- **Closeout**: Identifies closeout processes the RE is responsible for at the completion of the project.

How is this RE Guide updated?

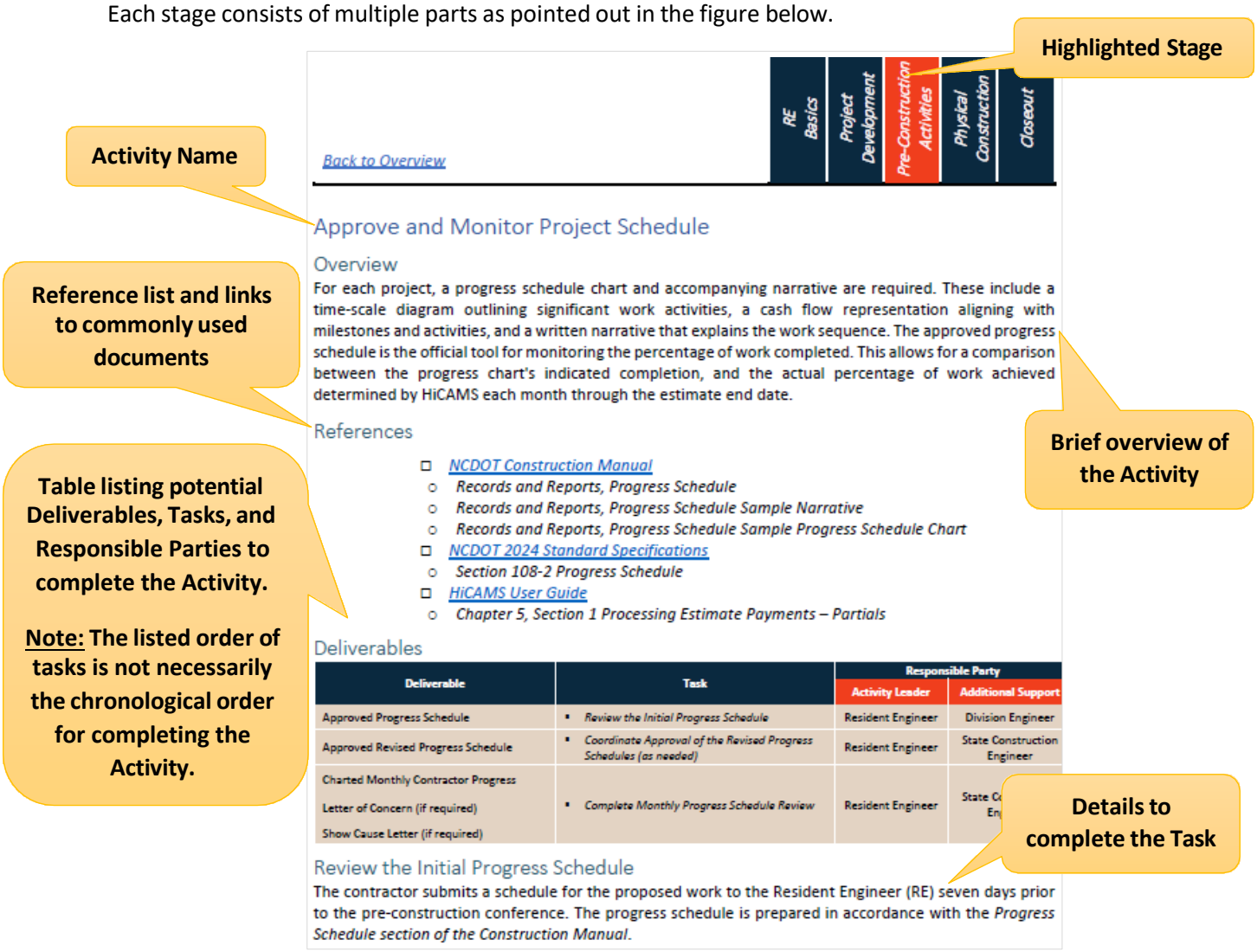
The RE Guide is intended to be dynamic and continually improved upon over time to ensure REs are equipped with updated processes and best practices. As such, suggestions and comments are encouraged from all users to further improve the RE Guide as a beneficial resource for construction.

A formal process for submitting comments and suggestions is found on the Construction Connects site.

Submitted comments will be reviewed regularly for incorporation into the document. While an update to the RE Guide can take place at any time depending on the critical nature of the change, updates are planned annually.

How are each of the stages and activities presented in the RE Guide?

Each stage consists of multiple parts as pointed out in the figure below.



What is the RE Guide Activity Overview Figure?

The figure on the next page illustrates a "map" of all the RE Guide activities that could apply when constructing a project.

- Each stage is organized by column and represents a series of activities that may need to be completed before moving on to the next stage.
- The activities are not laid out chronologically and many activities can and should be completed simultaneously.
- The RE is ultimately responsible for ensuring that each of the activities is completed, keeping in mind that activities could occur in different stage(s) to optimize the construction schedule.
- Each activity box is interactively linked to its associated section in the RE Guide. By clicking on an activity box, a user is directed to that section for further details on the required activity's tasks and/or deliverables.
- The header of each discipline's section includes a "Back to Overview" link that takes the user back to the RE Guide Activity Overview Figure.

NCDOT RE Guide

January 2025

RE Basics

- Construction Project Management
- Project Staffing
- Staff Development
- Manage Staff and Project Resources

Construction

Project Development

- Participate in Plan and Constructability Reviews
- Execute Project Development Utility Tasks
- Review and Verify Agreements
- Attend Public Hearing and/or Meetings
- Support Property Acquisition

Pre-Construction Activities

- Confirm Contract Execution and Activate Contact in HiCAMS
- Approve and Monitor Progress Schedule
- Lead Pre-Construction Conference
- Confirm Contract Compliance with Federal and State Requirements
- Complete Pre-Construction Utility Tasks
- Conduct the Environmental Permit Pre-Construction Meeting
- Review and Approve Submittals

Physical Construction

Contract Administration

- Coordinate Initial Construction Public Outreach
- Monitor Utility Relocations
- Manage Contract Changes
- Resolve Claims
- Monitor Federal and State Regulatory Compliance
- Coordinate Revisions
- Processing Monthly Estimates
- Monitor Project Schedule
- Maintain As-Builts

Quality Assurance

- Complete Construction Survey
- Manage Work Zone
- Integrate Structure Activities
- Monitor Site Compliance

Closeout

- Conduct Final Inspection and Issue Acceptance
- Assemble Final Estimate
- Monitor Utility
- Process Final Documents from Contractor
- Project Guarantees and Warranties
- Participate in Post Construction Assessments
- Records Retention

Construction Project Management

Overview

Construction project management is a multifaceted discipline that necessitates involvement and effective oversight throughout the project lifecycle, from planning through design, procurement, and construction. It encompasses the strategic management of scope, schedule, budget, quality, risks, and safety, with a critical focus on robust contract administration and documentation. Although there are overlaps in project management and contract administration, they each have distinct purposes. Contract administration is specifically concerned with ensuring that contractual, legal, financial, and schedule obligations are met. Comprehensive understanding and active engagement in each of these essential project management components contributes to positive outcomes and enhances the likelihood of successful project delivery.

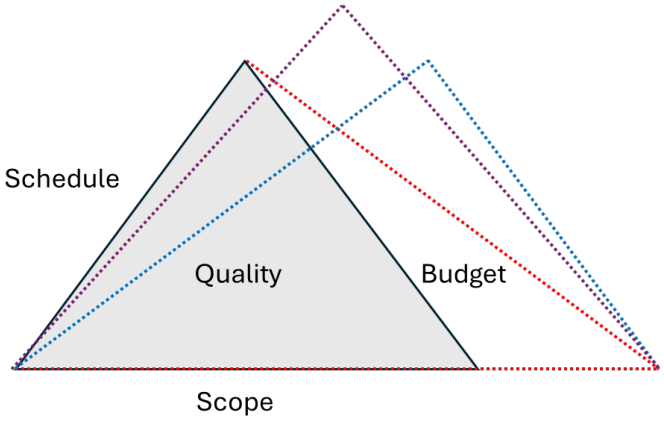
The primary goal of this document is to serve as a comprehensive resource for construction project management, offering valuable guidance, resources, best practices, and project support. By providing insights into the intricacies of construction project management, this document is designed to empower individuals in the field, foster continuous learning, and contribute to improved project outcomes. To ensure the relevance of the information, the document will be regularly updated to align with current practices. We welcome suggestions for enhancement, which can be submitted to XXX at XXX.ncdot.gov for consideration in future updates.

Construction contracts within the North Carolina Department of Transportation (NCDOT) are facilitated through collaborative efforts between construction teams, comprised of contractors, subcontractors, fabricators, and suppliers, under the vigilant oversight of Department representatives. The pivotal role of contract administration is entrusted to the assigned Resident Engineer (RE), who leads a team consisting of key staff members such as the Assistant Resident Engineer (ARE), Inspectors, and Administrative Assistants.

NCDOT's construction projects demand an engaged and knowledgeable construction staff that actively conducts on-site assessments to ensure quality assurance and the seamless execution of projects. The RE, supported by the ARE and other key personnel, holds responsible charge for overseeing project implementation in adherence to the defined scope, schedule, and budget outlined in the contract documents. Further, a steadfast commitment to project safety, environmental stewardship, and quality should be emphasized in daily activities.

The RE should comprehend the intricate relationships within the project management triangle, regarding scope, schedule, and budget. It is crucial to recognize that any adjustment to one facet of the triangle inevitably requires corresponding adjustments to at least one other facet. Typically, alterations in one leg lead to shifts in all legs of the triangle. Scope is directly proportional to both time and cost, meaning that an increase in scope ultimately leads to an increase in schedule and/or budget. In the course of the project management planning and development process, the RE should acquaint

themselves with the project priorities and potential trade-offs which may be necessary across the project lifecycle to achieve its primary objectives. As scope expands, additional costs can accelerate the work and meet a critical completion milestone. Being engaged throughout the project development phase will assist a RE in making these important decisions.



To navigate the complexities of construction project management and administer contract requirements successfully, the RE should possess a comprehensive understanding of various topics including but not limited to the information found within resources listed below.

References

- ☐ 2024 Standard Specifications for Road and Structures
- ☐ *2024 Roadway Standard Drawings*
- ☐ NCDOT Construction Manual;
- ☐ *NCDOT Minimum Sampling Guide*
- ☐ *Manual on Uniform Traffic Control Devices (MUTCD)*

Note: The Department has a support network established for REs to rely upon for guidance, assistance, and collaborative problem-solving throughout the life of the project. This manual lists those individuals most appropriate to assist with the subject matter; however, recognize that this list of positions is not all encompassing or may not capture your project anomaly.

Project Construction Management Support Team

- ✓ Division Construction Engineer
- ✓ Assistant Division Construction Engineer
- ✓ Peer Resident Engineers
- ✓ *Construction Unit*

Safety

Ensuring safety is of paramount importance to the Department as it plays a critical role in safeguarding the well-being of both workers and the traveling public. Safety measures are integral to the success of any transportation project, and NCDOT places a strong emphasis on implementing and enforcing safety measures and procedures throughout the entire project.

Safety is everyone's responsibility. The contractor ultimately holds the liability for safety within their construction site and submits a safety program to be approved by the Resident Engineer at the start of each construction project. Adherence to this approved safety program is the responsibility of the contractor. As the eyes and ears of the RE in the field, the inspectors are given authority to temporarily suspend work on the project if safety violations are witnessed. The Contractor must stop work once directed and conduct a safety standdown meeting to discuss the safety concerns and implement

corrective action prior to resuming work. This ensures the RE and inspectors on-site act as a key liaison between the Department's project team and the contractor, actively promoting a culture of safety awareness and compliance.

The impact of the Resident Engineer's role extends beyond the construction operations to the protection of the traveling public. Through utilizing inspectors to routinely observe construction operations, conduct project audits prior to major phasing shifts, observe maintenance of traffic (MOT) operations and measures, and to address safety concerns swiftly, the Resident Engineer contributes to the creation of a safe and reliable transportation project. It is the responsibility of the Contractor to mitigate any issue that may arise including the cost/liability of these corrective actions, these responsibilities do not fall on the RE Team or the Department. This, in turn, assists in protecting the traveling public and builds trust and confidence in the efficiency and safety of NCDOT projects. The Resident Engineer's dedication to safety reflects NCDOT's commitment to making transportation safer and providing great customer service.

Safety: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Safety Consultant
- ✓ Director of Safety and Risk Management

Reference:

NCDOT New Employee Safety and Health Handbook

NCDOT Safety Policy and Procedures Manual

Contract Administration

Contract administration specifically deals with the management of the contract and project compliance to the plans, specifications, and regulatory requirements. The contract is a legally binding agreement between the contractor and the Department detailing the terms and conditions for the execution of the project. It serves as the primary point of reference for making decisions, providing a comprehensive framework that governs the rights, responsibilities, and obligations for both the Department and the Contractor.

While contract administration encompasses a range of activities, from pre-construction planning to post-construction evaluation, the primary objective is the oversight and execution of the contract, ensuring that the project adheres to specifications, timelines, and budgetary constraints. Effective contract administration involves coordination among various stakeholders, conflict resolution, along with an abundance of communication and documentation. While adherence to Department policies and procedures is fairly consistent across all projects, each project entails unique contractual obligations, special provisions, permit requirements, funding sources, pay items, and project-specific mandates.

Successful contract administration hinges upon a comprehensive understanding of each project's contract.

Contract administration involves effectively managing and overseeing various key responsibilities, with most being further elaborated upon within this manual, including:

- Contract Oversight
- Regulatory Compliance
- Budget Management
- Quality Assurance
- Schedule Management
- Communication and Documentation
- Risk Management
- Contract Modification and Negotiation
- Dispute Resolution
- Public Relations
- Reporting and Accountability
- Staffing, Training, and Personnel Development

Contract Administration Support Team

- ✓ Deputy Division Construction Engineer
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Assistant State Construction Engineer
- ✓ State Construction Operations Engineer
- ✓ State Construction Engineer
- ✓ Peer Resident Engineers

Scope

While project contract administration follows a fairly consistent framework, it is important to recognize the uniqueness of each construction project. The project scope and essential elements of the construction project are explicitly outlined in the contract documents. These documents encompass various components, including special provisions, project special provisions, permit commitments, pay items, and schedule requirements. Additionally, associated documents such as project plans, standard specifications, roadway standard drawings, as well as all relevant amendments and supplements, play a crucial role in defining the project scope and identify:

- Physical project location and limits.
- Type of infrastructure construction or repair.
- Permanent construction materials to be used.
- Specific technical and regulatory requirements and/or guidelines to follow.
- Project restrictions, constraints, and limitations.
- Completion date, milestones, intermediate contract times
- Project Cost that is directly associated with the Contractor's Schedule

Best Practices: Scope

- ✓ Engage with Project Development as early as possible.
- ✓ Attend design milestone meetings
- ✓ Understand the project's purpose and critical objectives
- ✓ Review design documents, plans, pay items, and permit requirements
- ✓ **Read the Contract Document**!!!
- ✓ Do not assume the contract is the same as the last or adjacent project.

Scope: Support Team

- ✓ Project Development Engineer (PM)
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer

The RE is responsible for effectively administering the contract by thoroughly understanding the project scope when making project decisions related to scope, schedule, and budget, while not forsaking quality, safety, or regulatory requirements.

Schedule

The project schedule is a foundational piece of any project and is used for planning, communication, coordination, and performance management purposes. It is crucial for project metric control and serves as the standard for performance comparison.

A project schedule is an estimate of time required to accomplish the project tasks based on the specific contract requirements and scope of work. The contractor's project schedule is derived from assembling activities with defined durations in a logical order to execute the project work, while considering resources available and the contractor's work schedule, including any restrictions. Regardless of the type of project schedule developed (CPM, Gantt Chart, or Bar Chart) every project will have a controlling operation(s) and a critical path leading from the initial activity to project completion. The critical path is the longest

continuous chain of activities that establishes the project durations. This activity, or set of activities, at any given point during the project is known as the contractor's controlling operation(s). This is defined as any operation or operations, as determined by the Engineer, that if delayed would delay the completion of the project. The Department identifies the contractor's controlling operation(s) in Weekly Project Reports. Only a delay to the contractor's controlling operation would warrant a time extension per the NCDOT Standard Specifications, Article 108-10.

The contractor's construction schedule can be used to:

- Determine what activities are required to execute the project
- Establish and communicate when activities will occur
- Plan resources
- Order materials
- Monitor progress
- Make informed decisions
- Predict cash flow when cost-loaded
- Identify time impacts of scope creep or extra work
- Plan for and reduce risk
- Plan quality assurance operations

Per Article 108-2 of the Standard Specification, the contractor is responsible for providing a project progress schedule which is reviewed and approved by the RE. Approval of the Contractor's schedule is further discussed in the Preconstruction Activities section.

Best Practices: Schedule

- ✓ Engage with Project Development PM to understand estimated schedule.
- ✓ Become familiar with time restrictions, moratoriums, or other schedule constraints.
- ✓ Review plans and project phasing for sequencing of work activities.
- ✓ Communicate with Contractor about schedule, upcoming activities, controlling operation(s)
- ✓ Share schedule updates and project schedule. Anticipate needs with administration team.
- ✓ Document deficiencies when they occur and throughout the delay.
- ✓ Be proactive and specific in documenting schedule delays to the Contractor.

The project schedule should be central to all progress meetings. The schedule serves as a tool to examine activities directly ahead (1-2 weeks), what are the distant milestones (1 month) and what is further down the road (3 months). Proactively discussing future project activities enables the project team to anticipate potential risks or issues well in advance, providing ample runway for resolution. The contractor's progress schedule should be studied and discussed at each construction meeting with any shortcomings thoroughly documented. The controlling operation(s) should be understood, acknowledged by the RE, and detailed in each progress meeting minutes. The RE should share the contractor's progress schedule along with any short-term outlooks with their project team as a resource for consensus on the direction of the project and for planning/scheduling resources.

Schedule: Support Team

- ✓ Project Development Engineer (PM)
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer

Although this manual cannot provide comprehensive training on scheduling, the RE should have general knowledge of scheduling, scheduling terms, construction activity sequencing, activity durations, and be capable of assessing critical path activities. This comprehensive understanding of the project schedule, construction phasing, sequencing of operations, and controlling operation(s) is required to make informed decisions regarding:

- Progress delays
- Contractor's requests for time extensions
- Contractor construction activities supporting Intermediate Contract Times (ICTs),
- Contractor's ability to meet ICTs, the completion date and potential impacts to the traveling public,
- Cash curve progress and whether it is representative of actual construction,
- Differences between the Department and Contractor controlling operations,
- Third-party commitments,
- Project staffing (e.g., needs, projections, and inspection budget, etc.)

References

- 2024 Standard Specifications for Road and Structures, See Section 108 Prosecution and Progress
- NCDOT Construction Manual; Records and Reports, Progress Schedule
- NCDOT Construction Manual; Section 108, Prosecution and Progress Schedule
- Construction Manual; Records and Reports, Forms and Examples, Sample Progress Schedule Chart
- FHWA NHI Course 134049, Successfully Managing Construction Scheduling and Risk
- Using Critical Path Method Scheduling to Manage Projects, May 2008
- Use of CPM for Estimating, Scheduling, and Timely Completion, April 2008

Budget

The Department is tasked with creating a comprehensive financial plan for each project that includes cost estimates for every facet of the work from planning, design, right of way, utility relocation, project administration, quality assurance inspection, environmental mitigations, regulatory requirements, work requirements (scope), work restrictions, inflation, global market conditions, and contingencies. Budgets are necessary to ensure funding is available and efficiently managed throughout the project lifecycle. Generally, cost estimating is performed at the planning, scoping, design, and final design stages of the project with the estimates becoming more accurate over time as more information, development, and details of the project are known with less contingency cost associated with the unknowns and potential risks. Typically, the project budget is segmented for allocation of funding or funding sources and also for expense tracking purposes, e.g. right of way budget. The project budget may consist of multiple funding sources including federal, state, and/or local government funds, and even funding from third parties for betterments. The RE should coordinate with the Division Construction Engineer (DCE) and Division Program Manager (DPM) to understand all stakeholder funding sources involved.

Best Practices: Budget

- ✓ Contribute to budget development during the project development phase.
- ✓ Manage administration costs and track other project expenditures.
- ✓ Track projected project expenditures along with any additional or potential project expenditures (supplemental agreements, claims, overruns, etc.) and to confirm financial vitality.
- ✓ Perform monthly budget tracking and reporting.
- ✓ Inform DCE and others or potential budget variances.
- ✓ Do not allow WBS to go into overdraft

Prior to let, the Department will develop a confidential Engineer's Estimate, which is an estimation of the cost for labor, materials, equipment, permits, and other essential components required for successful project completion per the contract requirements. The contractors' bids are compared against the Engineer's Estimate in the determination to award the project and historically should be within -15% and +10% of this estimate. Once the project is awarded, the Construction Budget is the contract bid amount (contractor's bid price) which is a summation of all pay item costs and/or lump sum costs.

The Department utilizes a cash flow model in managing its overall transportation program financials. This modeling allows for projects to be awarded when cash and future revenues will meet the financial obligations of the current and future project expenditures. However, when relying on future revenues to cover project expenditures, it is critical to be knowledgeable of the project's cash curve (how quickly money will be paid out during the project) and to manage and track additional expenditures (overruns, claims, and supplemental agreements) to avoid funding overdrafts. The responsibility for overseeing and tracking this budget information lies with the RE and their administration team. Projects should have accurate overrun and completion information within HiCAMs. Any occurrences or potential

Budget: Support Team

- ✓ Project Development Engineer (PM)
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Estimating Engineer

occurrences of supplemental agreements, compensation claims, force accounts, significant overruns, line code adjustments (AC/Fuel), pay reductions or incentive payments should be promptly recorded in HiCAMs. The execution of any claim or supplemental agreement should note that the "Budget has been verified".

The Department will establish a Project Construction Budget which includes the Construction Budget (Contractor's bid) plus additional funding for the administration, quality assurance inspection, and contingency costs for projected expenditures. Typically, the Project Construction Budget will include the contractor bid amount plus an additional 15% for the remaining project activities. Each Division is responsible for managing, reporting on budget variances, and requesting supplemental funding, tailored to the needs of each individual project. Before the onset of construction, the RE should verify through SAP that the appropriate WBS has been adequately funded and should monitor expenditures throughout the project lifecycle. As the project advances, the RE should be able to estimate monthly project expenditures and use this data along with the additional expenditures, i.e. supplemental agreements, etc., to forecast whether additional funding will be needed to meet the evolving financial requirements of the project.

References

Division Let Guidance, May 2023

NCDOT June 21, 2021 Workshop Budget Presentation

AASHTO Practical Guide to Cost Estimating

FHWA NHI Course 134205

NCHRP Research Report 1025, Contingency Factors to Account for Risk in Early Construction Cost Estimates for Transportation Infrastructure Projects

NCHRP Report 574: Guidance for Cost Estimation and Management for Highway Projects During Planning, Programming and Preconstruction

Staff Development

Overview

The Department prioritizes the continuous growth, development, and training of its construction staff to ensure they have the necessary knowledge and expertise. Continual training assists the employees in their knowledge and understanding, as well as enabling them to meet their personal goals and improve the overall efficiency of the Department.

Staff Development: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineers
- ✓ Regional Bridge Construction Engineer
- ✓ M&T Field Services Engineer

Training

Training is offered to enhance skills and to ensure employees understand their roles and responsibilities within the Department to be more effective and efficient in their job duties.

Online Training

A variety of online training is available for all employees through the following pages:

- NCDOT Learning Management System (LMS)
- Materials and Tests Unit Training Schools
- *On the job training*
- Construction Resources – Roadway and Structure Bulletins

Employees can request and managers can assign online training at any time to learn about many topics, including Department policies and directives, project management, construction techniques, safety protocols, quality control, contract administration, and other relevant regulatory compliance.

Webinars and Workshops

Other training events (e.g., lunch and learning webinars, workshops, etc.) also provide opportunities for learning and professional development. These events often focus on specific areas of interest or emerging trends in the construction industry, allowing employees to stay up to date on the latest practices and technologies.

Staff are encouraged to attend these opportunities whenever their schedules allow.

Technical Certifications

Field staff working in the Resident Engineer's office are required, as part of the Department's Quality Assurance Program, to obtain and maintain relevant certifications to inspect and test materials that are incorporated into the project. Inspectors are also required to maintain these certifications by completing intermittent assessments to ensure they remain knowledgeable and competent in testing and sampling procedures.

The Materials and Test Unit provides training through the Materials and Tests Units Training Schools. The transportation technicians' supervisors and/or managers are responsible for enrolling individuals into these classes on the Materials and Test Unit website.

On-the-Job Training/Mentorships

Construction staff also benefit from a combination of on-the-job training and mentorship/coaching. They are guided by experienced professionals and gain essential skills and training to advance their construction knowledge.

To maintain and expand the Department's knowledge base while fostering staff development, the Resident Engineer (RE) should consistently involve their Assistant Resident Engineer (ARE) and lead Technicians in the day-to-day management of projects and decision-making processes. The objective is to facilitate the personal and professional growth of these individuals, preparing them to step into future RE roles through on-the-job training and mentorship provided by the RE. While the manual outlines RE responsibilities, it is anticipated and encouraged that ARE and construction support staff will collaboratively execute these duties alongside the RE.

Staff Performance Evaluation

Annual performance evaluations are a joint effort between managers and employees through *North Carolina Valuing Individual Performance (NCVIP).* Valuing Individual Performance is the North Carolina's statewide performance management (PM) process, which is designed to enable employees to develop and enhance individual performance, while contributing to the achievement of the organizational mission, goals, and business objectives. The three-stage NCVIP process includes:

- Stage 1: Planning – discuss the upcoming year's plans and set expectations.
- Stage 2: Feedback – continuous dialogue on plans and expectations made in Stage 1.
- Stage 3: Evaluation – review of the year's work to determine if the employee meets the performance plan goal.

A critical element of this program is clearly defining expectations such that both the employee and manager have the same understanding. Routine discussions about the expectations and performance are encouraged to allow the employee feedback throughout the year.

The NCVIP process helps ensure that the Department expectations and employee development are being met. It is automated; managers and employees receive system notifications when actions are required.

References

- ☐ Learning Management System (LMS)
- ☐ Materials and Tests Units Training Schools
- ☐ State Maintenance Operations Training
- ☐ North Carolina Valuing Individual Performance (NCVIP)
- ☐ *Performance Management Process Info Graphic*
- ☐ NCDOT Construction Manual
- ☐ Roadway and Structure Bulletins
- ☐ Construction Trainings, Webinars, Workshops, and Committee Meetings
- ☐ NC Learning Center
- ☐ NC State University – Erosion and Sediment Control

Project Staffing

Overview

References

- ☐ NCDOT Resources for Consultants (Guidelines, Forms, and Consultant Utilization)
- ☐ Construction Engineering & Inspection Contract Administration Guidelines
- ☐ Bidding and Letting for Consultants

Project Staffing: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Construction Operations Engineer
- ✓ Central Construction Unit, Project Closeout Engineer
- ✓ Peer Resident Engineers
- ✓ Division HR Representative

Assess Internal Staffing Needs

The Department recognizes the necessity of recruiting and retaining appropriate staffing levels with the experience and expertise to continually deliver its construction program and individual projects. Creating employee opportunities for cross training and new certification training will assist in diversifying their knowledge base and capabilities to oversee a variety of project types.

When a new construction project is assigned, the Resident Engineer (RE) should assess their current and upcoming project workload for their office to determine if adequate internal staff is available to manage, administer and oversee the work (e.g., inspections, surveys, office administration, etc.). It is helpful to have a staffing matrix developed to easily view staff assignments and project coverage for the office. This can be in the form of a whiteboard, spreadsheet, etc. and should include active as well as upcoming projects. The staffing matrix should be updated by the RE Office each time a new project is assigned.

Assessing internal staffing needs generally follows the process outlined below.

- The Division assigns a project to the RE Office.
- The RE estimates the number of engineers and technicians (along with their appropriate qualifications) needed to manage, administer and oversee the project. (See Assigning Staff to Project)
- The RE then utilizes a staffing matrix to compare the total number of engineers and technicians (possessing the required qualifications) needed each month versus the current total number of positions internally available.
- If an excess number of staff is identified beyond that internally available, the RE should notify the Division of the need for shared internal resources or the utilization of consultant Construction Engineering and Inspection (CEI) resources to deliver the project in the interim or long term.

Procurement of CEI (Project-Specific or On-call)

- When internal staffing resources do not cover the anticipated project needs, the RE should complete the *Division Workload Spreadsheet,* discuss the projected staffing needs with the Division Construction Engineer (DCE) and assess whether additional staffing, through either project-specific or on-call CEI services, is needed to deliver the upcoming project. **Project-specific:** If the project duration is more than two years and the project requires more than eight inspectors, a project-specific CEI contract should be considered. If this criterion is not met, discuss the project details and the project needs with the Central Construction Unit (CCU) State Construction Operations Engineer to determine if a project- specific contract would be appropriate.
- **On-call:** If a limited number of inspectors are needed for shorter-duration projects, utilize staff from the Statewide On-Call CEI limited services contract.

Best Practices: Assessing Internal Staffing Needs

- ✓ Develop a staffing matrix of engineer and technician complement needed over duration of the project.
- ✓ Consult with the Division Construction Engineer about impact of any vacant positions, postings, or anticipated hires.
- ✓ Discuss with Division Construction Engineer the possibility of sharing resources with other Resident Engineers (REs) (internal or CEI), to retain consistent workload across the Division and retain skilled inspection staff.

Prior to proceeding with CEI services the RE should become familiar with the Construction Engineering & Inspection Contract Administration Guidelines. CEI solicitation, award, administration, and closeout processes should be conducted in accordance with the specifics of these guidelines.

Manage Staff and Project Resources

Overview

Lead and manage staff to create and build a comprehensive construction contract administration team that is engaged, technically skillful, highly effective in project oversight, well equipped, and safety conscious. The administrative team should be of adequate size and skillset to efficiently oversee the RE office workload and remain within budget constraints. Jim Collins, author of *Good to Great* states, "Those who build great organizations make sure they have the right people on the bus and the right people in the key seats before they figure out where to drive the bus. They always think first about who and then about what. When facing chaos and uncertainty, and you cannot possibly predict what's coming around the corner, your best "strategy" is to have a busload of people who can adapt to and perform brilliantly no matter what comes next."

References

- ☐ *Consultant Memos*
- ☐ Guidelines, Forms and Consultant Utilization
- ☐ Construction Engineering & Inspection Contract Administration Guidelines
- ☐ Construction Projects Homepage
- ☐ *Evaluation of Consultant Performance, Ronald Keener Memo, dated December 30,2020*
- ☐ Consultant Evaluation Process

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Meeting Minutes	▪ *Conduct Monthly Safety Meetings*	Resident Engineer	Administrative Assistant Assistant Resident Engineers Processing Assistant Inspection Staff
Inventory Orders	▪ *Perform Inventory Control*	Resident Engineer	Administrative Assistant District Construction Engineer
Staff Assessment	▪ *Complete Staff Assessment*	Resident Engineer	N/A
Invoice CEI Evaluation	▪ *Administer Construction Engineering and Inspection (CEI) Contract*	Resident Engineer	Administrative Assistant CEI Firm

Conduct Monthly Safety Meetings

The Resident Engineer (RE) is responsible for conducting a monthly safety meeting and discussing safety topics, safety risks, or operating procedures specific or relevant to the upcoming or ongoing projects. The safety meeting is to reinforce NCDOT's safety culture and consistently emphasize that each employee place safety and health as a priority in the performance of their work duties. A safety program can be viewed as a three-legged stool, 1) employee has responsibility and accountability for their own safety, 2) all employees share responsibility for fellow employees and the public on projects, and 3) Manager (RE)

responsible for providing training, PPE, safety guidance, and program administration to enable a safe working environment.

The RE, or assigned staff, should develop an agenda for the meeting which may include topics from a variety of sources including:

- Safety and Health Handbook
- Safety and Risk Management SOPs
- Identified Accidents
- Near Misses
- Websites such as UNC Highway Safety Research Center, OSHA, FHWA, NHTSA and IIHS
- Division Safety concerns
- Safety policy or procedural updates
- Upcoming Safety training
- Safety Equipment needs (forward thinking)

The RE may elect to utilize the second portion of the meeting as a general staff meeting to address general office, performance, or staffing concerns. Topics may include:

- Staff announcements (promotions, birthdays, babies, marriages, etc.)
- Introduction of new employees/staff
- Project Staffing (holidays, vacations, etc.)
- General areas of concern (recent audit)
- Updates from HR
- Updates from Division
- Training
- Equipment needs

Best Practices: Monthly Safety Meetings

- ✓ Set up recurring safety meetings at the same time and date of each month.
- ✓ Rotate responsibility for conducting the safety meeting among REs and AREs.
- ✓ Engage staff in safety discussions. Meeting should be interactive.
- ✓ Holding two meetings, morning and late afternoon, may lead to greater accessibility for field staff.
- ✓ Broadcast Safety Meeting through virtual Teams Meeting so technicians can attend remotely.

The RE should review the meeting agenda and address any revisions or additions needed. During the meeting, the RE designates a staff member to record attendance and take meeting minutes. After the meeting, the RE reviews the final minutes and stores them in the RE Office files. Action items should be documented and with follow-up and reporting of outcomes at the next meeting.

Complete Staff Assessment

The RE regularly conducts staff assessments to ensure that each team member is the right fit for their current project role and possesses the necessary skillset.

When completing this review, the RE considers:

- Personnel files
- Project-related documentation
- Certifications to verify alignment with the project's requirements and the team's collective expertise.
- Feedback from peers to gain insights into performance.

During these assessments, the RE avoids potential biases and considers if there might be other opportunities for staff on different projects that could build specific skill sets.

When an employee is excelling, the RE should recognize their achievements, complement their performance, and seek ways to leverage their skills within the project or elsewhere to promote continued personal and professional growth. If an employee is falling short of expectations or exhibiting poor performance, the RE should address the issue through discussions, additional training, assigning a mentor, or developing a personalized work plan. A RE should recognize that everyone perceives performance differently, meaning without clear expectations one could assume they are performing well when actually their performance is subpar. Therefore, defining and communicating clear expectations and standards allows for a benchmark of performance and if needed action plans to address performance.

Brene Brown, Author of *Dare to Lead,* states “Clear is kind. Unclear is unkind.” Managers often avoid tough conversations and clarity because one believes they are being kind (not hurting someone’s feelings), when in actuality they are being unfair and unkind to the employee. Providing half the information or sugar coating the issues most often is about the manager feeling more comfortable but does not address the employee’s expectations of the situation to improve performance. Not providing clear expectations and then holding someone accountable to those standards is unkind. Clear is kind. Unclear is unkind. In cases of recurring problems, the RE consults the Human Resources Manual and collaborates with the Division Human Resources representative to develop a resolution plan.

Administer Construction Engineer and Inspection (CEI) Contract

The RE administers the Construction Engineer and Inspection (CEI) contract in accordance with the *Construction Engineering & Inspection Contract Administration Guidelines.* See "Evaluate Project Workload" for additional information on the CEI procurement process.

The below tasks represent an overview of the RE responsibility for CEI contract administration.

Invoicing

The RE reviews invoices for accuracy, then uploads them to SAP with an Invoice Form-Cost Plus. Invoice items to confirm include but are not limited to the number of inspectors, time worked, and the Work Breakdown Structure (WBS) the CEI firm is charging.

The RE contacts the CEI firm to review and update the invoice if there is missing or incorrect information and when confirmed, email it to the AA or Division Business Officer (DBO) to enter SAP for payment.

- CEI firms must submit invoices every 30 days or monthly.
- NCDOT must pay invoices within seven days of receipt.

Quarterly Meeting with Project Manager

The RE will typically meet with CEI firm managers quarterly to discuss:

- CEI staff training needs, work assignments, individual progress and milestones, corrective and disciplinary action, or policy-related issues.
- Future staffing workload (ramping up or down). (see "Evaluate Project Workload" for additional information).

Best Practices: Administering CEI Contract

- ✓ Establish internal office process to compare timesheets/trucks/mileage with invoices for prompt review.
- ✓ Use DocuSign to forward invoices to the contractor's administrative assistant to speed up the process.
- ✓ Discuss CEI personnel issues quickly as they arise. Do not wait until the quarterly meeting.
- ✓ Discuss personnel needs well in advance of need to obtain quality candidates.
- ✓ Consider trainees to grow the number of inspectors within the industry.
- ✓ Routinely provide CEI firms clear feedback on performance.

Monitoring Expenditures

The Division Business Officer (DBO) is responsible for monitoring CEI Purchase Orders (PO) budgets, specifically dollars allocated and expenditures. They review the percentage of budget remaining from the omitted and will verify it against SAP. If the percentage is approaching 75 percent, the DBO should collaborate with the RE and DCE to confirm if a supplemental budget allocation or new PO is required.

- Supplementals
  - If the end of the PO is approaching, the DBO/DCE creates a new PO with a new estimate.
  - If the current or existing PO has a longer duration, the DBO/DCE follows the process to request an estimate from the CEI firm.
- Closing POs
  - The DBO closes POs either yearly (12 months from Notice to Proceed (NTP)) or when the CEI firm completes a task or project.
  - The DBO ensures the commitments align with the invoice amount.

The RE coordinates with the DBO on a regular basis to ensure all expenditures are accounted for.

Evaluations

Private Engineering Firms providing services to the North Carolina Department of Transportation should be evaluated during their contract/task order assignment. Evaluations should provide feedback to the firm as to their performance on the project(s) for which they are providing services. The evaluation form should be completed by the Resident Engineer in charge of the work or his/her designee.

The frequency of evaluations is dependent on the length of the contract/task order:

- For contracts/task orders with a duration greater than one year and broader scopes, an initial evaluation should be performed at 90 days into the contract/task order, then once every six months from NTP date as long as the contract is open. A final evaluation should be performed no later than 30 days after the end of the contract/task order, incorporating the preparation of the final estimate, if included in the firm's assigned tasks.
- For contracts/task orders with a duration less than one year, an initial evaluation should be performed at 30 days into the contract/task order, then once every six months. A final evaluation should be performed no later than 30 days after the end of the contract/task order, incorporating the preparation of the final estimate, if included in the firm's assigned tasks.
- For contracts/task orders with a duration of less than six months, an initial evaluation should be performed at 30 days into the contract/task order. A final evaluation should be performed no later than 30 days after the end of the contract/task order, incorporating the preparation of the final estimate, if included in the firm's assigned tasks.
- Additional evaluations may be required for the following reasons:
    - Recognition of outstanding performance
    - Notification of poor performance
    - Requests from the consultant based on possible improved performance.

If areas of improvement are noted, provide specific examples and information to convey noted concerns and where improvements are needed.

The Consultant Evaluation Form can be accessed at Consultant Evaluation Management System. The RE should review and compare deliverables to standard criteria (see Performance Criteria below) and complete all fields on the online form (including comments). The RE should affix a digital signature to the form and forward the evaluation to the consultant (for review and/or comment and signature). After the evaluation has been signed by both parties, a copy should be attached to the CEMS evaluation.

For firms receiving an evaluation rating of "1 – Unacceptable" a meeting will be scheduled between the firm, the evaluator, and a representative of the Construction Unit to discuss the deficiencies noted and to outline process improvements to correct the area(s) of concern. The Professional Services Management

Unit should be invited to the meeting if the Private Engineering Firm disputes their rating. The Resident Engineer will be responsible for scheduling this meeting. Written documentation including a detailed explanation outlining the performance issue and necessary corrective measures should be provided.

Private Engineering Firms, who disagree with the evaluation or wish to provide additional information regarding the evaluation, may submit this information jointly to the RE, the Professional Services Management Unit, and the State Construction Engineer.

Participate in Plan and Constructability Reviews

Overview

At least by the 90% plan phase, the RE should perform a thorough review of the design plans to support the Project Manager and Design Lead in mitigating construction issues that may impact cost and schedule. In the review, consideration should be given to project access, phasing, and efficient construction practices.

Plan and Constructability Review: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Project Development Project Manager
- ✓ State Value Management Engineer

References

- *Value Management Office*
  - Constructability Review Program
  - Constructability Review Checklist
- Project Delivery Network (PDN)
  - *(reference the Value Management activities (1VM1 through 5VM1) therein)*
- Project Management (PM) Guide
  - *(reference the Constructability Review activities therein)*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Site Visit Notes/Identified Concerns Documentation	▪ *Visit the Project Site*	Resident Engineer	▪ Division Construction Engineer ▪ Area Construction Engineer
Constructability or Plan Review Comments	▪ *Attend Constructability Review(s)*	Division Construction Engineer	

Visit the Project Site

A key component to ensuring quality construction plans is early construction input during the project development phase.

The Resident Engineer (RE) assigned to the project should attend and provide comments during any plan review meetings, and it is good practice for them to familiarize themselves with the scope of work and project details considering the project site.

By visiting the project site and becoming familiar with the existing conditions, the RE can offer additional insight for all subsequent review meetings. To complete a site review, the RE should:

- Familiarize themselves with the project scope, major work items, typical sections, roadway profile, proposed traffic management plan and construction phasing.
- Use aerial photography to identify the project boundaries, construction access routes, utility facilities and/or rights-of-way (ROW), railroads, emergency service access routes, facilities (e.g., hospitals, fire stations, police stations, etc.), and other prominent features.

- See "Prepare to Monitor Utility Relocations" for specific utility considerations when attending a site visit.

- Drive the project alignment and note potential conflict points or physical constraints that could complicate construction access or operations such as vertical or horizontal alignments that impact material or equipment delivery or posted or low clearance bridges.
- Take photographs of existing conditions along with potential conflicts or constraints.
- Walk the project site to get a general idea of buried and aerial utilities that could be impacted during construction.
- Coordinate with the local communities to determine local events that could be affected by the work.

The RE should summarize the site visit findings and discuss any concerns with the Project Manager and Design Lead. This documentation is useful for reference during the plan or constructability review meetings.

Attend Plan and/or Constructability Review(s)

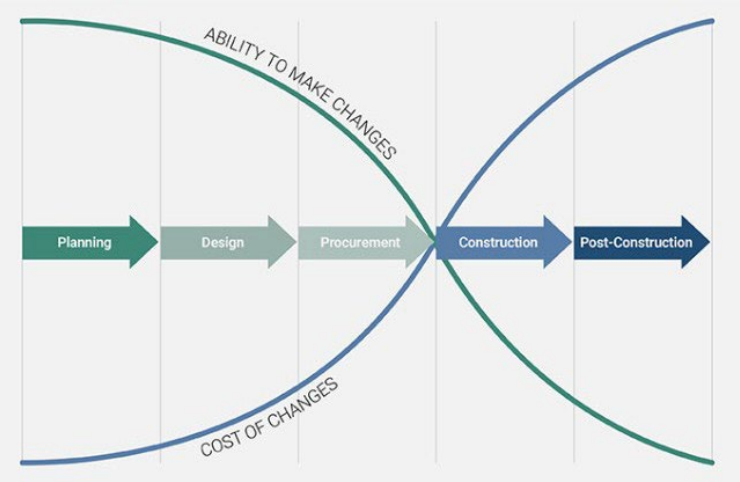
The primary purpose of a plan review or a Constructability Review is to identify, examine, and resolve constructability challenges or construction-specific complications ***before*** a project is let for construction.

Plan or Constructability Reviews could occur at any stage in the project development phase, but generally have the most value during either PDN Stage 2 (Alignment Defined) or Stage 3 (Plan-in-Hand), where:

- Design plans can still be modified to address constructability complications or site-specific constraints.
- Right-of-way and maintenance of traffic plans (and the Transportation Management Plan) are still being developed to ensure the contractor has enough room to work (via temporary

Best Practice: Effective Plan and Constructability Reviews

- ✓ Complete a site visit prior to the review to become familiar with the area and possible constraints.
- ✓ Review all project information available prior to the meeting (e.g., current plans, constructability checklist, agreements, utility as-builts, location maps, survey files).
- ✓ Comment, comment, and comment again on the plans, leaning on your expertise in delivering construction projects on-time and on-budget.
- ✓ Consider construction risks and potential mitigation strategies early in the design development process to reduce the possibility for schedule delays or cost-prohibitive change orders



construction easements and adequate work/staging areas) and the appropriate site access to maximize construction efficiency.

- Design can still avoid delays from utility relocations through utility deconfliction or applying unique construction means and methods for avoidance.
- Construction input can still inform environmental and permit decision making to reduce the risk of re-evaluation or permit modifications later in the process.

The RE may be asked to provide input during a Constructability Review, as coordinated with the Value Management Office and/or the Project Manager. This process is critical to ensure that the project's design is comprehensive, constructible, and biddable. When asked to attend the RE should prepare for and actively participate in the review meeting as follows:

- Review the project's Constructability Review Checklist prior to the meeting to get a full sense of potential construction issues.
- Review the plans, any known external or environmental commitments, utility as-builts or location information, and draft/final municipal agreements prior to the meeting.
- Provide comments on the review form noting any site constraints, construction issues, or missing commitments.
- Inform the PM of any additional municipal agreement, environmental commitment, permit requirement, or construction-specific ROW needs.

As one reviews the plans and related documentation, it is good practice to:

- Identify all ROW or easements (temporary construction easements, permanent maintenance easements, or utility easements) needed to safely and efficiently construct the project. This feedback is to inform potential changes to the ROW footprint in the forthcoming ROW plans (see 2RD2 and 3RD1 in the PDN and "Support Property Acquisition Activities" for related information).
- Locate all points where water is leaving or entering the project and environmentally sensitive areas, considering temporary erosion concerns or inundation during each phase of construction. Review erosion control plans to confirm adequate measures are in place and right of way or easements allow for placement and maintenance of the devices.
- Review the proposed construction phasing and the related Transportation Management Plan (TMP) to determine construction access, operational conflicts, crossover wedging; temporary

shoring; traffic and pedestrian safety measures; adequate lane widths for each phase; temporary drainage, or erosion control concerns.

- Confirm that pavement marking plans and signal plans correlate with assumed traffic pattern modifications.
- Review plans for conflict points between utilities, drainage systems and guardrail.
- Confirm adequate area for on-site staging or access.
- Review the structure and/or culvert plans and phasing to confirm adequate construction access, crane lift and swing clearances, water diversions, spoil retention, and staging of materials.
- Review special provisions (as part of the Stage 3 and 4 review) for inclusion of necessary construction requirements.
- Review geotechnical recommendations for issues related to undercut, unsuitable soils and groundwater issues.
- Review any quantity information to confirm appropriate pay items and quantity allocation.
- Detail any areas requiring temporary shoring during construction phasing.
- Confirm signal placement and that poles do not conflict with other elements like drainage, utilities, guardrail, or sidewalk.
- Review details regarding railroad, FAA, or municipal involvement or coordination.

For each constructability review, Value Management or Division PDU staff uploads the meeting minutes to the project SharePoint site under the topic of Constructability Review.

The Project Manager and Design Lead will organize all comments, develop responses and take actions for updating the project's design plans, right-of-way and utility plans, and environmental/permit documents. The Project Manager or Design Lead may reach out to the RE to ask questions or gather additional information as each technical discipline/Unit lead addresses the constructability issues, comments, and recommendations.

Determine Survey Responsibility

The DCE or RE is responsible for determining whether the project construction surveying will be performed in house or provided by the contractor. Prior to making this decision, the RE should collaborate with the Location and Surveys Unit to assess the project's survey requirements and ensure that the Department possesses the necessary personnel, expertise, and equipment to complete the survey contact requirements in accordance with the *2024 Standard Specifications and Special Provisions*, the *2024 Roadway Standard Drawings*, and the *Manual for Construction Layout*. Decisions on construction surveying should occur during the project development phase to avoid adding this work and pay item by a supplemental agreement per *Article 104-7 of the Standard Specifications*.

Execute Project Development Utility Tasks

Overview

Utility conflicts are commonly encountered on most projects and may pose a significant risk to both project cost and schedule. During the project development phase, processes are in place to confirm utilities are identified, conflicts are detected, and the execution and filing of necessary utility relocation permits, agreements, and authorizations is performed. The RE also has a role in the process as part of the plan review and/or constructability review. The RE should

- Confirm that the locations of all visible utilities are correctly represented on the plans.
- Note special utility facilities that may be difficult to relocate or will require a focused effort to keep on schedule.
- Identify any new utility installations not shown on the plans.
- Review environmental permitting sites for confirmation that measures shown address the utility relocations.
- Use project plans or related documentation to notate all the field findings and share with PM.

Support Team: Utilities

- ✓ Project Manager – Plan and Contract comments
- ✓ Division Utility Engineer/Coordinator- Agreements and relocation coordination
- ✓ Division ROW Agent – ROW and easement
- ✓ Division Planning Engineer – Permitting
- ✓ Division Construction Engineer
- ✓ Regional Utilities Manager
- ✓ Regional Environmental Coordination and Permitting Lead

The RE should become familiar with the utilities residing on the project and be actively engaged in the relocation meetings and coordination efforts. The RE should routinely communicate with the personnel preforming utility relocation oversight to obtain progress updates, discuss issues encountered, and confirm that appropriate documentation is being obtained.

Best Practice: Utilities

- ✓ Identify utility conflicts early during project development
- ✓ Promptly engage ROW in process
- ✓ Initiate and establish clear lines of communication with utility owners
- ✓ Establish collaborative partnerships with utility companies
- ✓ Expedite permits, agreements, and authorizations
- ✓ Meet early and often
- ✓ Consistently document and share relocation progress updates
- ✓ Remain persistent
- ✓ Provide public outreach as needed

References

- ☐ *Utilities Accommodations Manual*
- ☐ Project Delivery Network (PDN) (see the Utilities activities)
- ☐ *Utilities by Others (UbO) plans and special provisions*
- ☐ *Utility Construction (UC) plans and special provisions*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Identified Concerns Documentation	▪ *Attend Constructability or plan Review/Site Visit*	Resident Engineer	Project Manager, Utilities Lead
Encroachment Agreements Hold Harmless Letter (Post-let)	▪ *Communicate Encroachment Agreements*		Regional Utilities Manager, Utilities Lead, Contractor (Post-let)
Roles & Responsibilities Documentation	▪ *Select Monitoring Personnel*		Regional Utilities Manager, Utilities Lead

Confirm Relocation Authorization to Construct

Proper authorization is necessary to initiate any utility relocation. The RE should coordinate with the Division Utility Coordinator and/or Project Manager to confirm that the proper authorizations have been issued prior to attending the Relocation Scheduling Conference (see *4UT2* in the Project Delivery Network (PDN)) and prior to each utility starting their relocations.

If proper authorization is not on the project's SharePoint site, the RE should contact the Regional Utilities Manager and Utilities Lead to confirm status of the relocation authorization.

Confirm Environmental Permits Issued

Utility relocation work and the overall construction schedule can be delayed if the proper environmental permits have not been issued/obtained. To confirm all permits are in place, the RE should coordinate with the Project Manager and the Division Environmental Engineer to verify the required environmental permits have been issued and uploaded prior to attending the Relocation Scheduling Conference (see *4UT2* in the PDN for related information) and prior to each utility starting their relocations.

If proper authorization is not on the project's SharePoint site, the RE should contact the Project Manager, Natural Environmental Lead, and ECAP Team Leader to confirm status of the permit(s).

Confirm Acquisitions of Right-of-Way and Utility Easement(s)

The RE should coordinate with the Division Right of Way Agent to confirm that the needed rights-of-way and/or utility easements have been acquired for the utility relocations. Verification should be performed prior to attending the Relocation Scheduling Conference (see *4UT2* in the PDN for related information)

Select Monitoring Personnel

Divisions are utilizing differing staffing strategies for the coordination and oversight of utilities relocations during project development. While some Divisions are placing utility responsibility within the assigned RE office, other Divisions are centrally managing this work within the Division either with internal and/or consultant staff assistance. Regardless of the staffing strategy, the RE should coordinate with the Division Construction Engineer to confirm adequate staffing is available and experienced in coordinating, monitoring, and documenting utility relocations for the project. (See *Evaluate Project Workload Section*). The RE should determine the level of assistance needed to monitor the utility relocation,

installations, removals and collaborate with the Utilities Lead and appropriate team members to determine if in-house staff or consultant services are needed.

Review and Verify Agreements

Overview

The status of all project agreements (complete or tracking to completion) should be confirmed during Stage 3 and Stage 4 of the project development phase, prior to advertising a contract. The RE should review the agreements and related special provisions to understand project commitments, third-party requirements, and timing constraints to be coordinated with the contractor.

Project Agreement: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Project Development Project Manager
- ✓ NCDOT Rail Division- Engineering Coordination Manager
- ✓ Division of Aviation – FAA coordination

References

- ☐ Railroad Agreement Resources
- ☐ Rail and Rail-Related Maps
- ☐ *NCDOT Rail Corridor Preservation Policy*
- ☐ Utility Agreements
- ☐ *Utilities Accommodations Manual*
- ☐ Maintenance with Municipalities
- ☐ ROW Acquisition and Certification Resources
- ☐ Project Delivery Network (PDN)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Railroad Right-of-Entry	▪ *Confirm Railroad Agreement(s) (including Right-of-Entry)*	Rail Division	DCE Resident Engineer

Verify Railroad Agreement(s) (including Right-of-Entry Coordination)

A railroad agreement is required for any work that occurs on or adjacent to a railway. Without this agreement, work in or around the railroad's right-of-way simply cannot occur. During the project development phase, the Rail Division coordinates and completes all railroad agreements and related special provisions, except for structures over/under the railroad, which are handled by the Structure Management Unit (SMU).

If the project requires a railroad agreement, the RE should contact the Rail Division to confirm the status of obtaining the agreement and right-of-entry. It is good practice to reach out early at the beginning of Stage 3 and Stage 4 of the project development phase (see the Project Delivery Network (PDN) for related information). Historically, agreement, certification, and coordination requirements are successfully managed by engaging with the railroad early in the project

Best Practice: Agreement Review (General)

- ✓ Coordinate status and requirements early in the project development phase because the noted agreements often take longer than expected to obtain.
- ✓ Take an active role in providing feedback and construction needs during field inspections, constructability, and plan review meetings.

development process. The RE should familiarize themselves with the railroad work/agreements and take an active role in providing feedback and construction needs during the field inspection and related plan review meetings. Items for consideration are number and type of trains, pedestrian crossings, flange guards at crossing, railroad communications/utilities, track/ballast work, crossing gates, contractor access (crossing of tracks), construction within the Railroad ROW, inspection requirements, along with future right of entry and coordination for railroad flaggers.

Confirm FAA Coordination and Agreements

When a proposed project is near an existing airport, it must be screened for potential impacts, not only to the physical property, but to the flight paths approved for use by aircraft. Impacts to airspace are called encroachments or obstructions. Federal Aviation Administration (FAA) coordination and potential agreements are required anytime a roadway project is within proximity or will infringe on aerial rights near an airport or runaway. Coordination with NCDOT's Division of Aviation and the Federal Aviation Administration (FAA) should occur early to assist in decision making throughout the project development process. This coordination is required for both the big commercial airports and the smaller general aviation airports. Early identification of potential encroachments defines design and construction constraints. During project development, the Project Manager will coordinate with the NCDOT Division of Aviation to complete Form FAA 7460-1 – Notice of Proposed Construction or Alteration and possibly FAA 7460-2 Supplemental No Form 7460-1 - During project development, the RE should familiarize themselves with FAA Form 7460-1 and any special provision detailing construction requirements, such as tower notifications, reporting requirements, lighting provisions, blasting provisions, or crane operations. These provisions should be covered in detail during the preconstruction meeting.

Utility Agreements

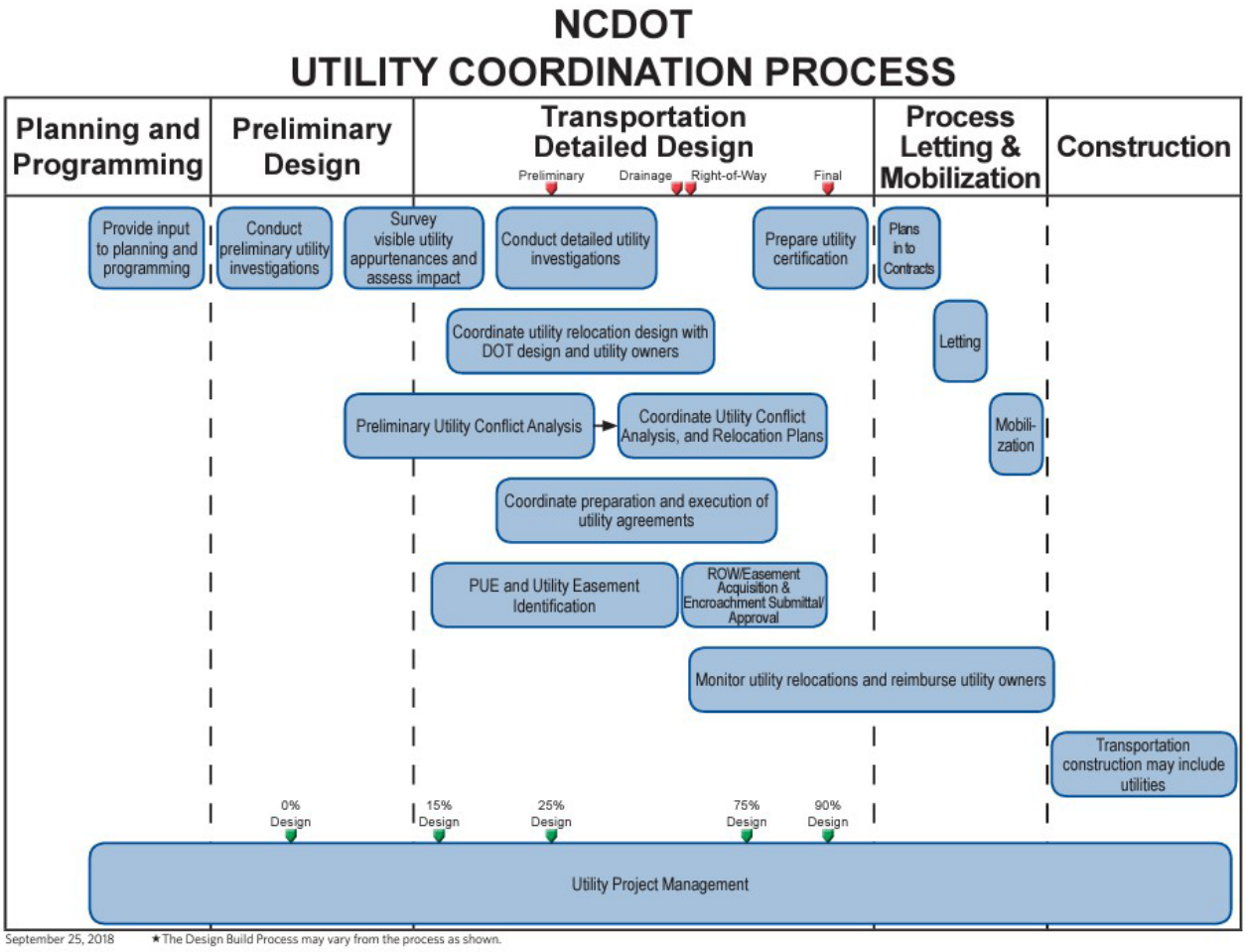
Most projects involve some type of relocation, adjustment, or protection measure for utilities impacted by the project construction. The Utility Agreements NCDOT enters into with the Utility Owners define the necessary terms and conditions for the utility owner to complete their work in a timely and compliant manner.

As detailed within the "Prepare to Monitor Utility Relocations" activity, the RE should confirm the project has obtained the letter of authorization for related utility work.

The RE should coordinate with the Project Manager and Division Utility Coordinator and familiarize themselves with the impacted utilities, the Utility Agreements, and whether the relocation is compensable. In general utilities located within the NCDOT ROW are relocated at the owner's expense and those located outside the NCDOT ROW, within privately obtained ROW or easement, are relocated at the Department's expense to include purchasing new ROW and/or easement.

Reference

- NCDOT Utilities Accommodation Manual
- Initiative to Reduce Utility Delays, Carl Barclay memo March 20, 2019.
- Utility Preliminary Agreement
- Utility Relocation Agreement



Where projects interface with a municipality, the RE should obtain all project municipal agreements from the Division Contracts Engineer and familiarize themselves with the contents. Depending on the agreement details, certain items of work may require quantity tracking during construction and prior to close out.

- Reviews and communicates requirements to inspection staff for documentation (quantity tracking), change management, and compliance verification.
- Submits to the Division Contracts Officer the itemized total, including actual quantities and unit prices, for all work noted in the municipal agreement upon project completion and acceptance.

Best Practice: ROW Agreements

- ✓ Early coordination can prevent last minute surprises.
- ✓ Communicate ROW status after the field inspection or plan review meetings to eliminate project delays and to ensure intermediate contract time (ICT) reflects all ROW considerations/limitations.
- ✓ Specifically review the FRM3-C for parcels where access is delayed and note when the parcel date of availability will be to mitigate potential construction delay risk.

Attend Public Hearing and/or Meetings

Overview

Prepare for, attend, and review documentation from the project's public hearing and/or public meetings. The RE should support the project development team by reviewing and providing comments on the meeting materials prior to the meeting and then providing one's expertise to answer the public's construction questions during the meeting. These efforts will assist in gathering knowledge for the upcoming project to guide both the design team to effective solutions and the construction team to mitigate risks.

References

- ☐ Project Delivery Network (PDN)
- ☐ Public Involvement, Community Studies & Visualization (PICSViz) Resources

RDeliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Comments on Public Meeting/Public Hearing Materials (if necessary)	▪ *Attend Public Hearing and/or Meetings*	Division Construction Engineer	Resident Engineer

The Division Construction Engineer (DCE) or Resident Engineer (RE) may be asked to attend and participate in a project's public hearing, or its public meeting(s) as coordinated with the Project Manager and Public Involvement Lead.

To complete this activity, the RE (or DCE) should prepare for the meeting/hearing by:

- Verifying attendance requirements, including if one should attend the local official's meeting that often occurs before the meeting/hearing.
- Reviewing corridor or design hearing maps in advance of the meeting/hearing.
- Consolidating all comments and recommendations (from both the RE and DCE) to send to the Project Manager or Public Involvement Lead regarding enhancements or corrections to the mapping or other hearing/meeting documents.
- Share project information especially regarding construction activities, timeline, expected operations.
- Meet with property and business owners and develop relationships.
- Introduce attendees to other members of the project team to answer questions about various subject matters of concern (ROW, Noise, Environmental Study, etc.).

Best Practice: Public Meeting/Hearing Prep and Participation

- ✓ If not provided, request the corridor and design hearing maps to keep in the RE office to aid with public inquiries during construction.
- ✓ Ask for a revised set of maps if the design has significantly changed.
- ✓ Wear a name badge and bring business cards to the meeting/hearing.
- ✓ Review the meeting minutes and confirm that the Project Manager has uploaded the minutes to the project SharePoint site.

- Be present, be an active listener, build trust in the project and project management.
- Establish open lines of communication.
- Share project information especially regarding construction activities, timeline, expected operations.
- Meet with property and business owners and develop relationships.
- Introduce attendees to other members of the project team to answer questions about various subject matters of concern (ROW, Noise, Environmental Study, etc.).

During the meeting itself, the RE should consider him/herself a Division representative who supports the project development team in answering the public's questions. The DCE and/or RE are to listen and respond accordingly with consideration for a project's complexities, the public's interest, and focal point on the forthcoming construction phase. Note that the public hearing/meeting is a great opportunity to begin establishing relationships with property and business owners and can set the tone for future interactions and outreach throughout the project duration.

Support Right-of-Way Acquisition

Overview

The RE should support the right-of-way (ROW) acquisition process through early plan review, attending acquisition meetings with property owners during the project development phase, and helping to advance construction revisions (if identified) that impact ROW during the construction phase (post project development).

References

- ☐ Right-of-Way Resources
- ☐ Project Delivery Network (PDN) *(reference the 5CS1, 2RD2, 3RD1, and ROW activities referenced therein)*
- ☐ NCDOT Right of Way Manual
- ☐ North Carolina General Statutes Chapter 136
- ☐ Title 49, CFR Part 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs.
- ☐ Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970

Deliverables

Deliverable	Responsible Party	
	Activity Leader	Additional Support
Field Inspection Plan Set Review Comments	DCE (or assistant); RE; ARE	ACE
ROW Construction Revision	Project Manager	DCE; RE

The ROW Agent may request the RE's assistance when meeting with property owners to answer construction questions during the ROW acquisition process.

To support the process, the Division Construction Engineer (DCE) or Resident Engineer (RE), as assigned, is to:

- Review the project's Field Inspection Plan Set and environmental document, providing comments on constructability or contractor-oriented insight that may inform changes to the ROW shown in the pending ROW Plans (see 2RD2 and 3RD1 in the Project Delivery Network [PDN] and "Participate in Project Development Plan and/or Constructability Reviews" for related information).
- Attend meetings with property owners to answer questions and provide input into the process as the project transitions into the construction phase.

The ROW Agent or Project Manager may also request assistance or guidance for finalizing certain ROW deliverables and any needed ROW-related construction revisions (see 5CS1 and 5RW1 in the PDN for related information).

- As requested, the DCE or RE may assist in helping to resolve ROW acquisition impasses with property owners.

- If a construction revision triggers a change to the ROW, or additional property negotiations require updates to the Final ROW Series Plan Set, the RE and/or DCE communicates needed changes to the Project Manager, also notifying the Division ROW staff of a pending ROW construction revision.
- The Project Manager leads the process to issue the ROW construction revision, and the DCE and/or RE work closely with Division ROW staff to complete the acquisition. This includes the DCE or RE communicating the timeline for acquisitions and impacts for advancing construction work.

Feedback and support throughout the ROW acquisition ensures both the plans accurately portray all needed ROW is acquired and to help expediate the pending ROW acquisition process.

Confirm Contract Execution and Activate Contract in HiCAMS

Overview

Use the Highway Construction and Materials System (HiCAMS) for contract administration, materials tracking, and payment to the contractor. When a contract is fully executed in the Transport System, the contract-related data is automatically imported into HiCAMS where it is reviewed for accuracy, and the contract is authorized and activated.

Contract Execution: Support Team

- ✓ Division Contract Engineer
- ✓ State Contract Officer
- ✓ Division Construction Engineer
- ✓ State Construction Operations Engineer - HiCAMS

References

- ☐ Construction Projects Homepage
- ☐ Letting List
- ☐ HiCAMS UserManual:
  - *Chapter 2 Contract Maintenance, Section 1 Authorize Contracts*
  - *Chapter 2 Contract Maintenance, Section 2 Activate Contracts*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Resident Engineers Office Assignment HiCAMS	▪ *Authorize Contract in HiCAMS*	Division Construction Engineer (DCE)	Assigned RE Office
Contract Activated HiCAMS	▪ *Activate the Contract in HiCAMS*	Resident Engineer	Assistant Resident Engineer

Contract Award and Execution

The notification of award is a letter sent to the selected contractor to initiate the execution process. Although the RE Office is not copied on this letter, the RE can check the status of awarded projects on the Letting List link. The Contracts and Standards Unit or the Division Proposals Engineer uploads the Execution Letter to the project's construction site.

Authorize Contract in HiCAMS

Defined further in the *HiCAMS User Guide: Chapter 2 Contract Maintenance, Section 1 Authorize Contracts*, authorizing the contract generally consists of:

- Validating the WBS elements in SAP.
- Reviewing and revising HiCAMS contract data by comparing it to the executed contract.
- After authorization in HiCAMS, the RE will receive a notification that the contract is ready for activation.

Activate the Contract in HiCAMS

With the contract authorized, the assigned RE, or assigned staff, activates the contract. This allows others access so they can generate estimates and enter project specific information.

Defined further in the *HiCAMS User Guide: Chapter 2 Contract Maintenance, Section 2 Activate Contracts*, activating the contract generally consists of:

- Verifying the materials on the Contract Bill of Materials.
- Verifying the Dates and Damages information in Contract Times.
- Setting the AC, Fuel, Major Item, and Specialty Line-Item indicators, etc.
- Checking and setting correct Fuel Factor per contract.

When the contract data entry and verification are complete, click the "activate" button to add staff who need to be notified and to customize your notification message. When complete, click "send" to distribute the contract-activated notification. Contract functions within HiCAMS are enabled once the contract has been activated.

Best Practice: Use the HiCAMS Training Database for Practice

1. Start HiCAMS.
2. Enter your username, or select the name of another HiCAMS user, depending on what you would like to practice.
3. Enter "hicams" as the password.
4. Click the Options button.
5. Click the drop-down arrow in the Server list and select HICAMS_TRAIN.
6. Click the drop-down arrow in the Database list and select Train.
7. Click OK.

Approve Progress Schedule

Overview

Progress Schedule: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer

For each project, a progress schedule chart and accompanying narrative are required. These include a time-scale diagram outlining significant work activities, a cash flow representation aligning with milestones and activities, and a written narrative that explains the work sequence. The approved progress schedule is the official tool for monitoring the percentage of work completed. This allows for a comparison between the progress chart's indicated completion and the actual percentage of work achieved determined by HiCAMS each month through the estimate end date.

The Department is utilizing Critical Path Method (CPM) scheduling on select complex or time sensitive projects. The CPM schedule requirements for contractor submission and Department review are detailed in a project special provision within the contract. Typically, scheduling resources are provided to the RE to assist in the initial base line and monthly review of the contractor's CPM schedules. The RE should coordinate with the DCE and Central Construction Unit for CPM training and resources.

References

- ☐ NCDOT Construction Manual
  - *Records and Reports, Progress Schedule*
  - *Records and Reports, Progress Schedule Sample Narrative*
  - *Records and Reports, Progress Schedule Sample Progress Schedule Chart*
- ☐ NCDOT 2024 Standard Specifications
  - *Section 108 Prosecution and Progress Cost-loaded Critical Path Method Project Schedule Special Provision*
  - HiCAMS User Guide
  - Chapter 5, Section 1 Processing Estimate Payments – Partials

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Approved Progress Schedule	▪ *Review the Initial Progress Schedule*	Resident Engineer	Division Engineer
Approved Revised Progress Schedule	▪ *Coordinate Approval of the Revised Progress Schedules (as needed)*	Resident Engineer	State Construction Engineer
Charted Monthly Contractor Progress	▪ *Complete Monthly Progress Schedule Review*	Resident Engineer	State Construction Engineer
Letter of Concern (if required)			
Show Cause Letter (if required)			

Review the Initial Progress Schedule

The contractor submits a schedule for the proposed work to the Resident Engineer (RE) seven days prior to the pre-construction conference per Article 108-2 of the Standard Specifications. The progress schedule is prepared in accordance with the *Progress Schedule section of the Construction Manual*.

The RE coordinates review and approval of the initial Progress Schedule with the Division Construction Engineer (DCE) on behalf of the Division Engineer (DE). General items of the Progress Schedule include:

- Progress schedule chart with project details, time scales, major activities, and milestones.
- Bar graph to display progress rates for each major activity.
- A project cash curve.
- Written narrative explaining work sequence, controlling operations, schedule, resources, permit requirements, and coordination with subcontractors and utilities.

Through the schedule review process, the RE should understand how the contractor's operations will progress over the project duration and obtain a general understanding of critical path operations (controlling operations through project duration). Note the approved schedule will become the base line for any future project time extensions per Article 108-10B(3) of the Standard Specifications. The RE should discuss the progress schedule at each project progress meeting and reaffirm project progress and controlling operation(s).

The DCE approves the Project Schedule and the RE is then responsible for notifying the Contractor of approval and uploads it to the project's SharePoint files.

On a monthly basis, the RE plots the actual percentage of completion, as determined by the monthly estimate, onto their copy of the progress schedule.

Coordinate Approval of Revised Progress Schedules (as needed)

The RE manages the approval process of a Revised Progress Schedule, consulting with the State Construction Engineer if the Division seeks clarification or an additional review.

A revised progress schedule is required any time approved time extensions exceed 30 days, or when the project is expected to overrun by more than five percent.

The RE is informed of the Revised Project Schedule's approval by the DE and is responsible for its maintenance within the project's SharePoint files.

Complete Monthly Progress Schedule Review

As part of the monthly pay estimate process, the RE reviews the Progress Schedule and charts the contractor's actual progress in relation to the approved progress schedule, identifying any deviations. The RE enters the percent complete per the approved progress schedule into HICAMS each month.

If the contractor falls more than 10 percent behind, or if the Contractor fails to begin and pursue work before the expiration of 5 percent of the original contract time, a "Letter of Concern" is issued, prompting a subsequent dilatory progress meeting.

If the progress falls to 15 percent behind or if the contractor fails to meet established milestones discussed in the dilatory progress meeting, the RE coordinates with the State Construction Engineer to send a "Show Cause" letter for further evaluation of project completion and the contractor's retention on the prequalified bidders list.

The RE also ensures the accurate calculation of overruns in HiCAMS to capture the correct percentage of completion and that any potential or actual requests for time extensions have been accurately documented

If a CPM schedule is required, review the CPM Schedule special provision for information on Contractor's monthly progress submittals and the Department review procedures.

Lead Pre-Construction Conference

Overview

The Pre-Construction Conference is crucial for defining work responsibilities and communication channels. It provides a platform for both the Department and the contractor to address concerns before commencing construction. While it's a two-way exchange, the Department should clearly communicate policies and procedures along with the expectations that procedures be followed.

Preconstruction Conference: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Right of Way Agent
- ✓ Division Utility Coordinator
- ✓ Division Environmental Officer

References

- ☐ NCDOT Construction Manual
  - *Records and Reports, Correspondence for Construction Conferences*
- ☐ *NCDOT Standard Specifications*
- ☐ National Pollutant Discharge Elimination System (NPDES) form SPPPForm30
- ☐ *Project Special Commitments or "Green Sheets"*
- ☐ *Project Contract*
- ☐ *Project Plan Sheets*
- ☐ *NCDOT Worksite Audit Form R-1*
- ☐ *NCDOT Asphalt QMS Manual*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Pre-Construction Conference Invitation and Agenda	▪ *Organize the Preconstruction Meeting*	Resident Engineer	▪ Assistant Resident Engineer ▪ Contractor ▪ Subcontractors ▪ Stakeholders ▪ Utility Companies ▪ Applicable NCDOT Staff
Pre-Construction Conference Meeting Minutes	▪ *Conduct the Pre-Construction Conference*		

Organize the Pre-Construction Conference

The Pre-construction Conference is a forum for the Department and the contractor to thoroughly discuss the specifics of the contract, establish work responsibilities, facilitate effective communication, address concerns, identify project construction risks, and ensure clear communication of relevant procedures before construction begins.

Prior to the meeting, the Resident Engineer (RE) reviews the *Records and Reports, Correspondence for Construction Conferences in the NCDOT Construction Manual*.

The RE completes the following when organizing the Pre-construction Conference:

- Schedule the conference on a date with adequate lead time to accommodate the contractor and representatives from municipalities, utilities, and environmental agencies.

- Review contract documents and identify specific agenda items and topics.
- Send an invitation to all invitees specifying the date, time, location, and agenda topics. The contractor is responsible for inviting relevant subcontractors.

The attendance of NCDOT staff and relevant agencies at the Pre-construction Conference depends on the project's nature and complexity.

- The RE consults the *Records and Reports, Correspondence for Construction Conferences in the NCDOT Construction Manual* to identify potential invitees.
- Review the project commitments as the permitting agencies often require participation at the pre-construction conference.

Conduct the Pre-construction Conference

The RE conducts the Pre-construction Conference on the agreed-upon date, addressing the predetermined agenda items to ensure the contractor has a clear understanding of their role.

Following the conference, the RE ensures that any action items are promptly addressed and uploads the meeting minutes to the project's SharePoint site.

The items below are examples of various Pre-construction Conference topics and common discussion points that are led by the RE.

Introductions and Expectations for Project Success

Facilitating the introduction of NCDOT staff, contractor personnel, and subcontractor personnel, including their name and job title. This practice fosters a clear understanding of everyone's roles and responsibilities, ultimately fostering a team-oriented approach. This is also helpful when determining an escalation path (matrix) for when issues arise on the project.

Best Practices: Organize the Pre-construction Conference

- ✓ Choose an appropriate meeting location based on project size and complexity considering locations within city limits with municipal interest.
- ✓ Upon scheduling the preconstruction meeting, request contractor to submit items such as schedule and subcontract request during the meeting.
- ✓ Invite the appropriate attendees
- ✓ Understand project scope and contract requirements - Come prepared
- ✓ Create agenda and bring copies for attendees
- ✓ Stay on task
- ✓ Ensure Contractor and stakeholders concerns are heard and addressed
- ✓ Appoint a dedicated person to take meeting minutes.
- ✓ Create list of action items
- ✓ Promptly distribute meeting minutes to attendees

Lines of Communication

Establish effective lines of communication for both NCDOT field and office staff. This includes the identification of emergency contacts and the individuals in direct charge of the project, as outlined in *Sections 108-3 and 108-5 of the NCDOT Construction Manual*.

Review the contractor provided list of project personnel and make note of individuals authorized to sign supplemental agreements on behalf of the company. Ensure NCDOT Staff and the contractor know their designated counterparts, so they know who to contact in different scenarios.

Discuss the importance of addressing discrepancies promptly and resolving issues at the lowest responsible level to uphold the project schedule and ensure contract compliance. Establish an escalation matrix or chain of command, from the field level up to the manager level, to aid in expedited resolution of issues.

Safety

Discuss the Department's safety expectations and requirements for maintaining safety standards, including addressing specific safety challenges unique to the project and proposing resolutions.

Ensure the contractor has provided a list of OSHA Competent Persons for review and verification.

Right-of-Way

Engage in a thorough discussion about right-of-way conflicts, entry delays, and condemned property. Address specific project obstacles, including any right-of-way issues or delay of entry parcels, and establish acquisition timelines through coordination with the Division Right of Way Agent. Anticipate potential issues, assess their likelihood, and formulate response strategies in advance of any such events.

See “Support Property Acquisition” for additional information.

Utilities

Discuss utility plans, special provisions, and potential conflicts. Ensure project personnel possess contact information for utility owners and examine the current utility relocation schedule. Emphasize the importance of timely utility relocations and discuss any required staking requests from the utility companies. Discuss expectations for inspection and documentation of the utility relocation.

Inform the contractor of any upcoming meetings as described in the “Monitor Utility Relocation” Sections.

See “Complete Pre-construction Utility Tasks” for additional information.

Project Commitments

Review the project comments, also known as "Green Sheets," and engage in a discussion with the contractor regarding their strategies for ensuring commitment fulfillment.

See “Engage in Project Phase Transitions” for additional information.

Erosion Control, BMPs, and Applicable Permits

Specifics for these items are provided in the “Lead Environmental Pre-construction Meeting” section of this guide. If a separate environmental pre-construction meeting is not scheduled, discuss environmental objectives and expectations during the Pre-construction Conference. Confirm the Method of Clearing the contractor will be using on the project.

See “Lead Environmental Pre-construction Conference” and "Review and Approve Submittals" for additional information.

Schedules

Engage in a comprehensive discussion covering the contractor's plan of operation, progress schedule, planned start date, and estimated end date, emphasizing the significance of achieving efficient and effective project completion. Additionally, ensure the contractor comprehends the contract requirements pertaining to liquidated damages and intermediate contract times. Ask the contractor about their controlling operation(s) and/or critical path activities that may shed light on any project risks. Understanding the contractor's "plan of attack" is extremely beneficial when trying to mitigate any unforeseen delays or conflicts.

Discuss both Department viewed project risks and contractor viewed project risks. Discuss any discrepancies. Document risk for future progress meeting where plans and actions can be established to minimize and/or mitigate these risks prior to potential schedule or cost impacts.

See "Approve Progress Schedule" for additional information.

Subcontracting

Discuss the contractors' subcontracting requirements for Disadvantaged Business Enterprise (DBE) Contract Commitments, Replacement of DBEs, Lease Agreements, and Joint Checks, allowing the DBE Compliance Officer to participate as needed. Discuss the inclusion of Title VI requirements into subcontracts, in addition to the FHWA 1273 on applicable federal aid projects.

Request that the contractor provide SAF's in accordance with Article 108-6 of the Standard Specifications, which states within 30 days of the date of availability or prior to expiration of 20% of the contract time. These must be reviewed and approved in a timely manner to ensure that the inspection staff can create inspector daily reports when the subcontractor begins work on the project.

Review DBE commitments in the contract and verify the contractor is planning to fulfill these commitments.

Best Practices: Subcontracting

- ✓ Purchasing materials for subcontractors is not part of the contractor's completion percentage.
- ✓ Enter Subcontract Approval Forms promptly, as they have time-sensitive certifications.
- ✓ Partially certified DBE firms require approval to be included in project commitments.
- ✓ Verify that subcontractor HiCAMS codes align with the specified scope of work.

Self-performing of work must meet 35% threshold as outlined in 108-6 Submittals

Prioritize submittals, establish tracking mechanisms to monitor progress (with updates discussed during monthly meetings), and define critical timeframes with the contractor.

See "Review and Approve Submittals" for additional information.

Supplemental Agreements

Ensure the contractor is familiar with the process for submitting supplemental agreements per Articles 104-3 and 104-7 along with execution of the agreement per Article 104-8. Supplemental agreement authorization, the standard pricing form, and the contractor's proposed markups should be discussed.

Claims Process

The RE should initiate a collaborative work environment with both the Department and the contractor striving to minimize or eliminate claims. However, the contractor should understand that if a claim becomes necessary, the requirements of *Section 104-8 of the Standard Specifications* should be strictly followed.

Final Inspection Process

Discuss the final inspection processes with the contractor and emphasize they have a joint responsibility to identify and rectify any issues uncovered during the prosecution of the project and at final inspection.

Closeout Conferences

Inform the contractor the closeout conference follows the S.D. DeWitt memorandum, dated May 8, 2000.

Terms of Contract

Discuss and answer contractor questions related to the contract terms.

Surveying

Discuss construction survey requirements for the project with the contractor and the Locations and Surveys Unit Representative. If the project is utilizing contract surveying discuss expectations as outlined in the Manual for Construction Layout.

Earthwork Measurment

Discuss the project's earthwork measurement methods, as specified in *Section 225-7 of the Standard Specifications*, including considerations for capturing data through methods like flight, in-place measurement, and truck count.

See "Review and Approve Submittals" for additional information.

Paving Expectations

Discuss the Asphalt Quality Management System (QMS) manual, Division 6 Standards, rideability requirements, density methods, Job Mix Formulas, and other paving related items. Discuss E-ticketing requirements, if applicable.

Traffic Signal Special Provisions

If applicable, review the signal inspection checklist with the contractors.

Work Zone Traffic Control

Discuss temporary traffic control fundamentals with the contractor, covering aspects like sign spacing, taper lengths, buffers, and equipment/material storage. Additionally, verify that the listed contractor

Best Practices: Surveying

- ✓ Meet with designated survey party chief, contractor, and any applicable subcontractors.
- ✓ Discuss surveying control and verification of the control.
- ✓ Determine if the contractor will be using automated machine guidance methods and discuss expectations for review and approval of the contractor's model PRIOR to stakeouts commencing on the project.
- ✓ Establish clear expectations for drainage layout submittals.
- ✓ Outline Department responsibilities for stakeout verifications (structure, utility, ROW, etc.).

personnel (work zone supervisors, installers, flaggers, etc.), are certified and registered on the Verified Work Zone Personnel Lookup.

Discuss the project's pedestrian access requirements, ensuring they are maintained as required, with minimal impact on pedestrian facilities during construction.

Remind the contractor of material storage and equipment parking while adhering to sight distance guidelines, per *section 1101-8 of the Standard Specifications*.

Railroad Coordination

The RE should include the Rail Division Lead to the preconstruction meeting and thoroughly review the train/track information, the railroad agreement, insurance/safety requirements, flagging operations, and any construction plan approvals required by the Project Special Provision. For railroad right-of-entry, the RE:

- Reviews the related special provisions for right-of-entry requirements set forth therein. A signed and executed right-of-entry must be in place before the contractor can work in the railroad right-of-way.
- Notes time requirements for railroad review on the right-of-entry application and coordinates timing with the contractor.
- Communicates any cost requirements set forth in the rail provisions.

Once received, the RE files the right-of-entry on the project SharePoint site.

- Advance notice of starting work
- Insurance approval
- Flagging services acquired and scheduled
- Written authorization from Railroad to begin work
- Schedule of Contractor's operations

References:

- 2024 Standard Specifications, Article 107-9
- North Carolina Administrative Code, 19A NCAC 02B .0150 thru .0158

Structure Special Provisions

Discuss the structural special provisions with the contractor to facilitate a streamlined review and approval process for any related submittals. Discuss demolition plans, permit requirements, and any specific structure related items.

See the "Review and Approve Submittals" for related information.

Plans

Discuss the contractor's questions related to the project's plans to ensure clarity and address any remaining concerns regarding the construction process and project compliance.

Confirm Contract Compliance with Federal and State Requirements

Overview

All construction projects are required to conform to federal and/or state guidelines. Compliance with these policies and procedures is critical to project certification and federal funding.

Contract Compliance: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Construction Operations Engineer
- ✓ FHWA (NC Division) Operations Engineer

References

- ☐ NCDOT Construction Manual
- ☐ Certified Payroll Webinar- Michelle Gaddy Central Construction Unit
- ☐ Subcontract Approval Webinar
- ☐ Commercially Useful Function Requirements
- ☐ Disadvantaged Business Enterprises (DBE) CUF Training for Inspectors
- ☐ *Form FHWA 1273*
- ☐ *Subcontract Approval Form*
- ☐ *HiCAMS Manual, Chapter 2, Section 6 Review Subcontracts*
- ☐ *NCDOT Standard Specifications, Article 108-6*
- ☐ *2019 Resident Engineer Workshop Presentation, Michelle Gaddy*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Subcontract Approval Forms (SAF) and Full Subcontract Agreements	▪ *Review Sub-Contractor Approval (SAF) Form*	Resident Engineer	▪ Office Technician ▪ Assistant Resident Engineer (ARE) ▪ Contractor
Certified Payrolls	▪ *Review Certified Payroll Requirements*		ARE
DBE Documentation	▪ *Inform Staff of Disadvantaged Business Enterprises (DBE) Commitments*		▪ Assistant Construction Engineer (ACE) ▪ Inspection Staff
	▪ *Monitor DBE Committed Hauling Subcontractor Requirements*		Inspection Staff
Buy America Documentation	▪ *Monitor Buy America Certification*		Inspection Staff
Commercially Useful Function (CUF) Form	▪ *Monitor DBEs Commercially Useful Function (CUF)*		ACE
HiCAMS DBE Payment Report	▪ *Perform Subcontractor Payment Tracking*		Inspection Staff

Review Sub-Contractor Approval (SAF) Forms

The prime contractor is allowed to sublet portions of the work to prequalified subcontractors; however, the percentage of work is limited by the requirements of Article *108-6 of the Standard Specifications*. The RE's approval of the Subcontract Approval Form (SAF) should be performed prior to the subcontractor mobilizing the project. The contractor should provide SAF at the scheduled preconstruction conference or at least within 30 days of the date of availability or 20 percent of contract time, whichever is greater.

The SAF should contain all work that is performed by the subcontractor and be signed by both the subcontractor and the prime contractor. Other details on the SAF include the contract unit price for the work, the Disadvantaged Business Enterprises (DBE) unit price that the subcontractor is to be paid (if applicable), an indication if the work is a partial or portion, and the quantities that the subcontractor performs. The contract unit price shall not exceed the contract unit price between NCDOT and the prime contractor. The DBE unit price (if applicable) can be lower or higher than the contract unit price but must be reflective of the amount that the DBE is being paid.

It should be noted if you have a 2nd tier subcontractor, the SAF should be signed by the 2nd tier subcontractor, the 1st tier subcontractor, and the prime. A 2nd tier subcontract cannot include work that was not subcontracted to the 1st tier subcontractor.

Upon receipt of the SAF, the RE reviews the form to ensure the following items:

- **Verify that the subcontractor is prequalified to perform the work**. The firm should be prequalified as a Bidder, PO Prime, or Subcontractor and approved in the work codes that they are being subcontracted to perform. This can be confirmed in the Vendor application or in the *Directory of Firms on the Connect NCDOT site.* The name, address, and vendor number should be compared against the information on the SAF for accuracy.
- Determine that the proposed DBE subcontractor on federal projects or Women/Minority Business Enterprises (WBE/MBE) subcontractor on state projects is committed in the contract. The contract commitments are listed in the back of the executed contract. If the firm is committed, then all unit prices and quantities that the prime committed in the back of the contract must be met or exceeded. The DBE unit prices and totals should be completed if the firm is a DBE, MBE, or WBE, regardless of if the firm is committed.
- Review subcontract unit prices to ensure that contract unit prices do not exceed the unit prices in the contract between NCDOT and the prime. If the subcontractor is not performing a partial amount of the line item, then the subcontracted unit price should be equal to the contract unit price If the subcontractor is performing a partial amount of the line item, then the portion of the work should be detailed on the SAF form.
- **Verify that all calculations are correct.** DBE Unit Price * Quantity = DBE Sublet Amount. Subcontract Unit Price * Quantity = Total Subcontract Amount

Confirm that the Prime Contractor is self-performing the required contract amount per Article 108-6 of the Standard Specifications. Once the SAF form has been reviewed and found to be complete and accurate, the assigned staff enters the SAF information into HiCAMS under Subcontracts. Detailed instructions for HiCAMS entry is located in the HiCAMS Manual, Chapter 2 Contract Maintenance, Section 6, Review Subcontracts. The Subcontract data entry is then approved in HiCAMS by the RE or ARE. The RE then signs the SAF form and the form is scanned into the project SharePoint Site, and a copy of the fully signed SAF form is forwarded to the Prime contractor.

At least two (or 10 percent of the SAFs received, whichever is greater) copies of the fully executed subcontract between the prime contractor and the subcontractor are to be reviewed by the RE with a minimum of 1 DBE subcontractor and 1 non-DBE subcontractor are reviewed. (ie. Contract has 3 SAFs= 2 full subcontract agreements required; contract has 21 SAFs = 3 full subcontract agreements required.)

The RE should review the fully executed subcontract agreements and ensure that Title VI and FHWA 1273(if federally funded) full language (multiple pages for each) is included in the agreement and is physically incorporated into the agreements. The full language of Title VI and FHWA 1273 (if applicable) shall be physically incorporated into the language of the subcontract agreement. It should not be added as an attachment or addendum to the subcontract agreement.

Review Certified Payroll Requirements

The FHWA Federal Aid Policy Guide (23 CFR 633.102(b)e) requires that Form FHWA-1273 be physically incorporated in each construction contract funded under title 23. The Prime Contractor is required to provide weekly Certified Payrolls, in the weeks in which work was performed, for themself and all subcontractors. If funding sources do not require the submission of certified payrolls a special provision entitled "Submission of Records – Federal Aid Projects" will be included within the contract. Otherwise, it is expected that the RE will receive and review certified payrolls from the date that work begins on the project through final project acceptance by NCDOT.

Certified payrolls should be submitted to NCDOT by the prime contractor on a regular basis throughout the life of the project. The prime is responsible for submitting certified payroll, at minimum once per month, for anyone who performed work on the project within the previous month, including certified payrolls from their subcontractors who performed work.

Inform Staff of Disadvantaged Business Enterprise (DBE) Commitments

Each contract Let by NCDOT contains a DBE goal for federally funded contracts or a Minority Business Enterprise (MB)/Women Business Enterprise (WB) goal for state-funded contracts. The Prime Contractor is obligated, at minimum, to utilize the DBE subcontractor that are committed to perform the work (line items) or portion thereof at the contract percentage amount specified within the contract. At a minimum, the DBE is required to perform the specified quantity of work at the unit price documented within the contract.

It is the RE's responsibility to track DBE utilization and promptly address compliance issues related to DBE participation in the contract.

Best Practices:

- ✓ Review the commitments in the contract as soon as it becomes available.
- ✓ Confirm the Subcontract Approval Form (SAF) submitted for DBE subcontractors correctly detail the committed quantity of work and the unit price.
- ✓ If DBE commitments cannot or are not being met, discuss with your Area Construction Engineer (ACE).

Complete Pre-Construction Utility Tasks

Overview

Ideally, during the project development phase, the majority of utility conflicts have been addressed, specifically agreements, right of way/easements, coordination and relocation. As discussed in Project Development - Execute Project Development Utility Tasks, the RE should be familiar with the utilities residing on the project and be actively engaged in the relocation meetings and coordination efforts. Prior to the Preconstruction Meeting, the RE should routinely communicate with the personnel performing utility relocation oversight to obtain progress updates, discuss issues encountered, and confirm that appropriate documentation is being obtained. As the project approaches construction, the RE should take an active role in ensuring utilities are relocated or that provisions are being taken to address utilities during the project construction.

Support Team: Utilities

- ✓ Project Manager – Plan and Contract comments
- ✓ Division Utility Engineer/Coordinator- Agreements and relocation coordination
- ✓ Division ROW Agent – ROW and easement
- ✓ Division Planning Engineer – Permitting
- ✓ Division Construction Engineer
- ✓ Regional Utilities Manager
- ✓ Regional Environmental Coordination and Permitting Lead

References

- ☐ Utilities Accommodations Manual
- ☐ Project Delivery Network (PDN)
- ☐ *Utilities by Others (UbO) plans*
- ☐ *Project Special Provisions: UbO*
- ☐ *Utility Construction (UC) Plans*
- ☐ *Project Special Provisions: Utility Construction*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Relocation Schedule	▪ *Attend Utility Relocation Scheduling Conference*	Resident Engineer	▪ Regional Utilities Manager ▪ Utilities Lead ▪ Utility Contractor ▪ Utility Owner
Utility Relocation Pre-Construction Meeting Minutes	▪ *Attend Utility Relocation Pre-Construction Meeting*	Resident Engineer	▪ Regional Utilities Manager ▪ Utilities Lead ▪ Utility Contractor ▪ Utility Owner

Attend Utility Relocation Scheduling Conference

The Resident Engineer (RE) attends the Relocation Scheduling Conference to discuss the project's upcoming utility relocations.

The project's Utilities Coordinator schedules and conducts the Relocation Scheduling Conference for each utility after receiving the Utility Authorization (See 4UT2 in the Project Delivery Network (PDN) and 4.2.7.4 in the Utilities Accommodation Manual (UAM)).

- Conference attendees include the utility company, the utility's contractor, the Department's Project Manager, the RE, and others as required.
- The RE confirms any concerns noted in the site review are addressed at the meeting.
- The Utilities Coordinator updates the Utilities Relocation Schedule and distributes it to the RE, Utilities Lead, and Project Manager.

The RE ensures a copy of the Utilities Relocation Schedule is uploaded to the project's SharePoint site.

Attend Utility Relocation Pre-Construction Meeting

The RE attends the Utility Pre-construction Meeting held between NCDOT and the Utility Owner contractor to discuss and review the project on-site (unless other arrangements are necessary) prior to starting the relocation construction.

The RE is responsible for:

- Assisting with meeting arrangements and facilitation.
- Discussing and addressing Department or Utility Owner's concerns.
- Discussing surveying needs.
- Discussing erosion control and permit compliance requirements.
- Confirming communication channels are in place and that the utility contractor is promptly conveying relocation information, especially schedule updates and roadblocks, to the Utility Coordinator and RE.

At the meeting's conclusion, the RE prepares meeting minutes, distributes them to all participants and others, and uploads a copy to the project's SharePoint site.

Best Practices: Attend Utility Relocation Pre-Construction Meeting

- ✓ Invite the appropriate personnel and decision makers in ensuring the 3rd party utility is relocated.
- ✓ Include all utilities that may reside on aerial pole line
- ✓ Use proper safety measures (vests, vehicle flashers, etc.) at the site meetings.
- ✓ Ensure updated plans are available and referred to at the meeting.
- ✓ Document relocation schedule including start date and anticipated relocation duration.
- ✓ Promptly prepare and distribute meeting minutes.
- ✓ Consistently follow up to confirm relocations are on schedule.

Conduct the Environmental Permit Pre-Construction Meeting

Overview

The Environmental Permit Pre-Construction Meeting provides an opportunity to review any environmental permit requirements, as well as any general environmental features within the project area with the contractor and the permitting agencies. This includes but is not limited to jurisdictional water resources (i.e., streams and/or wetlands), federally protected species and associated moratoriums, and the project's environmental commitments also known as "Green Sheets". The meeting is intended to ensure that all who work on the project are aware of the permit conditions and know who to contact if issues arise so that the project maintains environmental compliance.

Environmental Compliance: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Environmental Staff
- ✓ Roadside Environmental Field Operations Engineer
- ✓ Environmental Agency Representatives

References

- ☐ 404/US Army Corps of Engineers (USACE) Permits
- ☐ 401/North Carolina Department of Environmental Quality (NCDEQ) Permits
- ☐ NCDOT Field Operations Documents
- ☐ National Pollution Discharge Elimination System (NPDES) Inspection Form (SPPPForm30)
- ☐ Borrow, Waste, and Staging Site Reclamation Procedures for Contract Project
- ☐ Borrow Pit/Waste Area Information Form for State Historic Preservation Office Review

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Meeting Agenda and Invitation	▪ *Prepare for the Environmental Permit Pre-Construction Meeting*	Resident Engineer	▪ Division Environmental Supervisor ▪ Regulatory Agencies ▪ Contractor ▪ Subcontractor
Meeting Minutes	▪ *Conduct the Environmental Permit Pre-Construction Meeting and disperse notes to the team*	Project Manager	Resident Engineer
Erosion Control Plans	▪ *Discuss Environmental Boundaries and Jurisdictional Resources*	Division Environmental Supervisor	Roadside Environmental Engineer
Approved Reclamation Plans	▪ *Discuss Waste and Borrow Requirements*	Resident Engineer	Division Environmental Supervisor Roadside Environmental Engineer
Environmental Permits	▪ *Discuss Environmental Permits and Related Commitments*	Division Environmental Supervisor	Roadside Environmental Engineer

Prepare for the Environmental Permit Pre-Construction Meeting

The Environmental Permit Pre-Construction Meeting is a critical step toward ensuring environmental compliance throughout the project's lifecycle.

The Resident Engineer (RE) and Division Environmental Supervisor should collaborate to thoroughly review the project's plans, contract, and environmental commitments or "Green Sheets" to:

- Compile a comprehensive list of invitees, which includes NCDOT staff, regulatory agencies, the Contractor, Subcontractors, and more.
- Organize meeting discussion topics.
- Gather essential documentation, such as permits, permit drawings, species moratorium protocols, etc.

The RE then schedules the meeting with the meeting agenda attached and provides a minimum of 30 days for regulatory agencies to respond before moving forward.

Conduct the Environmental Permit Pre-Construction Meeting

The RE, in coordination with the Division Environmental Supervisor, conducts the Environmental Permit Pre-construction Meeting on the agreed-upon date, addressing the predetermined agenda items including the project's environmental permits and other environmental commitments in order for the Contractor to understand their role related to environmental compliance.

Following the meeting, the RE should promptly address any action items identified and upload the meeting minutes.

While the below list is not exhaustive, environmental compliance discussions could include:

Environmental Permit Boundaries and Jurisdictional Resources Locations

The Contractor is informed about the critical need to recognize jurisdictional environmental resource boundaries and permit locations. Failure to identify these boundaries poses a risk of potential permit violations for both NCDOT and the Contractor.

These environmental permit boundary areas must be clearly marked with flagging and/or enclosed by orange safety fencing to create a distinct separation between the project area and the environmentally sensitive areas. Only those areas specified in the permit drawings and related permits are permissible for impact. The Contractor is instructed to notify the RE to facilitate in-field approval of delineated areas.

401/404 US Army Corps of Engineers (USACE) Permits

The details of Section 401 or 404 USACE permits should be thoroughly reviewed with the Contractor for clear understanding.

The RE should provide all relevant parties with an electronic copy of the corresponding permit and permit drawings. Additionally, a physical copy of all permits, permit drawings, and erosion control plans must be present on the project site. The RE is responsible for providing such permits and permit drawings if requested by regulatory personnel during site visits.

Endangered Species

The Division Environmental Supervisor or Environmental Specialist should initiate a discussion about project Best Management Practices (BMPs) requirements pertaining to federally threatened and endangered species.

Construction Moratoriums

The Contractor should be directed to the contract requirements regarding construction moratoriums to avoid harming endangered, sensitive, or threatened species. In some cases, due to the project's size or scheduling constraints, the Contractor must concentrate on clearing immediate construction areas, requiring continuous work with daily ground cover or other stabilization methods. The RE should specifically discuss project moratorium requirements with the contractor and clearly define and understand how these impact the project schedule and construction operations

Permit Modifications

Any suggested permit changes or adjustments put forth by the Contractor should be thoroughly reviewed and discussed at the meeting and presented to the Division Environmental Supervisor and appropriate permitting agency. Construction operations, such as installation of sheeting, construction of rock causeways, bridge work, or temporary impacts that weren't initially accounted for in the original permit may result in needed permit modifications The RE, Division Environmental Supervisor, and Contractor should discuss the steps needed to modify the permit and ensure that the project remains in compliance with environmental regulations and document such in the meeting minutes.

National Pollution Discharge Elimination System (NPDES) Requirements and Procedures

The Area Roadside Environmental Engineer should discuss the National Pollution Discharge and Elimination System (NPDES) procedures with the Contractor.

Both the Resident Engineer's (RE) staff and the contractor have the obligation to conduct weekly inspections of the project site, as well as after ½ inch rainfall events, even during inactivity. These inspections involve documenting the conditions of erosion and sediment control Best Management Practices (BMPs) on the NPDES Inspection Form. Any issues identified during the inspection are recorded on the NPDES Inspection Form (SPPPForm30) and must be addressed by the Contractor within 24 hours in case of emergencies and within five days for routine maintenance. A physical copy of the NPDES related inspections and erosion control plans must be present on the project site, and the RE is responsible for providing them if requested by regulatory personnel during site visits.

Sediment and Erosion Control Best Management Practices (BMP) Procedures

The Area Roadside Environmental Engineer should discuss the Sediment and Erosion Control Plans. A key focus should be placed on promptly stabilizing the project to prevent avoidable erosion and sediment movement on the site. The Contractor is informed that the Roadside Environmental Engineer collaborates with the RE and carries out monthly visits to evaluate the project area and any related waste or borrow sites. These site visits are to identify environmental issues early such that they do not become problems that will impact project cost or schedule.

Waste and Borrow Requirements

The RE, in coordination with the Division Environmental Supervisor and Roadside Environmental Field Operations Engineer, should engage the contractor in a comprehensive discussion about the Department's borrow and waste procedures. During this conversation, it is imperative to inform the Contractor about the necessary review conducted by the State Historic Preservation Office, which often takes several weeks to obtain.

A Reclamation Plan is mandatory for projects that intend to utilize borrow, waste, or staging areas. This plan is reviewed in accordance with the *Borrow, Waste, and Staging Site Reclamation Procedures for Contract Projects*, which is also discussed in the "Pre-Construction Review and Approve Submittal" section. The Division Environmental Supervisor oversees the plan's review to ensure compliance with NCDEQ erosion control standards, and to confirm that it doesn't adversely affect threatened or endangered species, jurisdictional streams, wetlands, or a 400-foot buffer around the proposed borrow/waste site. This evaluation assesses the drainage effect and the possible utilization of the Skaggs Method drainage effect.

The RE is responsible for coordinating the review and approval of the Reclamation Plan between the Division Environmental Staff and the Roadside Environmental Unit. It's important to note that the U.S. Army Corps of Engineers Special Conditions mandate their review and written concurrence before NCDOT's approval. Sufficient time must be allotted for this concurrence process.

Notification Procedures for Hazardous Spills and Sediment Losses

The RE should inform the contractor of the protocol for addressing environmental incidents, including hazardous spills and sediment losses off the project limits or near jurisdictional wetlands and streams.

Should a hazardous spill occur within 100 feet of a jurisdictional wetland or stream, the following steps are to be completed:

- The Contractor reports the incident to the RE. The RE should immediately notify the Division Environmental Supervisor or Environmental Specialist about the spill.
- The Division Environmental Supervisor or Environmental Specialist then initiates contact with the NC Department of Water Resources (NCDWR) and the NCDOT GeoEnvironmental Unit for appropriate action.

Should a sediment loss exceeding the volume of a 5-gallon bucket and impacting jurisdictional features like streams or wetlands occur the following steps should be completed:

- The RE reports the loss to the Division environmental staff
- Division Environmental Staff will report to both the NCDWR and the NC Department of Energy, Mineral, and Land Resources (NCDELMR) within a 24-hour timeframe
- A corrective action plan should be promptly implemented to address sediment loss off the project limits or within a jurisdictional boundary or feature.

Review and Approve Submittals

Overview

The Resident Engineer (RE) should work collaboratively with the Contractor to prepare a comprehensive list of required submittals. A tracking system may be utilized to facilitate the submittal status process.

Construction Submittal: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Various Units throughout the Department pending submittal specifics.
- ✓ Rail Division

References

- ☐ 2024 Standard Specifications
  - *Section 105-2 Plans and Working Drawings*
  - *Section 230 Borrow Excavation*
  - *Section 801 -2(F) Drainage and Utility Construction Systems*
- ☐ NCDOT Construction Manual
  - *Section 105-2 Plans and Working Drawings*
  - *Section 106 Control of Materials*
  - *Section 107-9 Coordination with Railway*
  - *Section 230 Borrow Excavation*
  - *Section 300-5 Invert Elevations*
  - *Section 440-2 Materials*
- ☐ NCDOT Field Operations Document – Borrow, Waste and Staging Site Reclamation Procedures for Contract Projects

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Submittal Tracking Spreadsheet/Database	▪ *Establish a Submittal Tracking Database*	Resident Engineer	Assistant Resident Engineer, Contractor, Materials & Test, Various design units
Reclamation Plan for Borrow, Waste, and Staging Sites	▪ *Coordinate Approval of Received Submittals*		Assistant Resident Engineer, Division Engineer Office, Contractor, Local Governments, Lead EC technician
Material and Source Submittals			Assistant Resident Engineer, Contractor, Materials & Test

Structures Submittals	▪ *Coordinate Approval of Received Submittals*	Resident Engineer	Assistant Resident Engineer, Lead Structure Tech Structure Design I
Geotech Submittals			Assistant Resident Engineer, Geotech Engineer
Drainage Submittals			Assistant Resident Engineer Contractor Survey Party Chief
Shop Drawings			Design Units
Railroad Insurance, Right of Entry, and Crossings			Contractor, Rail Division

Establish a Submittal Tracking Database

The RE is responsible for monitoring all contractor-submitted documents requiring approval from the Department. To streamline the submittal process and minimize potential project schedule delays, the RE and the contractor should discuss the use of a comprehensive tracking database (such as Procore or similar) or a spreadsheet detailing all required submittals. The list of submittals should be discussed and confirmed with the contract to ensure accuracy.

This tracking tool may include essential elements such as:

- A list of necessary submittals.
- Critical activities reliant on submittal approval.
- Status updates with corresponding dates indicating when the RE receives the submittal, forwards it to the approving authority, receives it back, and communicates the approval or rejection status to the contractor.

The RE may maintain the tracking database or spreadsheet on the project's SharePoint site and review the status of outstanding submittals at minimum during each progress meeting, more frequent updates may be needed based upon the speed of construction and volume of operations.

Coordinate Approval of Received Submittals

Submittals come in various forms, primarily encompassing design plans, technical specifications, and material samples, all aimed at guaranteeing compliance with stringent quality, safety, and regulatory standards. Below are a few examples of project submittals an RE could expect to oversee.

Reclamation Plan for Borrow, Waste, and Staging Sites

The contractor is required to provide a Reclamation Plan for any waste, borrow, staging, and laydown sites. The Reclamation Plan is completed in accordance with the *Borrow, Waste, and Staging Site Reclamation Procedures for Contract Projects* which includes the following guidance:

- Reclamation Plan review and approval, during construction requirements, and the final inspection and observations period.
- Environmental evaluations of borrow, waste, and staging sites
- Borrow, waste, and staging site erosion and sediment control plans
- An example form for Reclamation Plan for Contract Projects: Plan Narrative
- An example form for Reclamation Plan for Contract Projects: Plan Review Checklist

The RE uploads and maintains the Reclamation Plan on the project's SharePoint site.
See "Conduct the Environmental Permit Pre-construction Meeting" for additional information.

Material and Source Submittals

The contract provides specifications for all materials that are to be incorporated into a project. Section 106 of the Standard Specifications stipulates that all materials used in the project are to be new and unused unless indicated otherwise.

At the project's outset, the RE requests a list of materials and sources and facilitates inspections to ensure compliance with contract specifications.

The RE informs the contractor of approved or rejected materials and uploads the correspondence to the project's SharePoint site.

Structures Submittals

In accordance with *Standard Specifications Section 440-2*, all steel materials used in construction are required to meet the standards outlined in *Standard Specifications Section 1072* to maintain the structural integrity and safety of the project.

The contractor transmits the shop drawings to the Structures Management Unit for review and copies the RE. The Structures Management Unit approves the drawings by stamping "Accepted" or "Accepted as Noted" and emails the RE to inform them of the review status.

The RE informs the contractor of approval and uploads the drawings to the project's SharePoint site.

Geotech Submittals

Geotechnical data is an integral part of the construction process to ensure the stability and integrity of transportation infrastructure and can be required for various items of work required in the contract.

The RE reviews the contract documents, to determine if special submittals are required by the contractor prior to beginning work.

Drainage Submittals

In accordance with *2024 Standard Specifications, Section 801 -2(F) Drainage and Utility Construction Systems*, drainage submittals are required from the contractor seven days prior to work to ensure accurate construction layout and functionality of the drainage systems.

The contractor utilizes the plans and field data to stake a drainage network and provide the appropriate submittal to the RE. The RE or assigned representative reviews the submittal for positive drainage and determines if the appropriate type and size of pipe is shown.

The RE informs the contractor of approval and uploads the drawings to the project's SharePoint site.

Shop Drawings

The contractor is to provide shop drawings for unique or non-standard construction work per the *2024 Standard Specifications, Section 105-2 Plans and Working Drawings*.

These submissions, excluding certain structural items, go directly to the RE, who manages further reviews and approvals with the relevant Department Units using a Submittal Tracking Form.

Submittal results are communicated back to the Contractor by the RE.

Railroad Insurance, Right of Entry, and Crossings

Work within the railroad right-of-way is strictly prohibited until the contractor's mandatory insurance documents have received approval from both the railway company and the Department. Railroad processes involve unique elements in which the Department's State Railroad Agent primarily handles the responsibilities, as detailed in the *NCDOT Construction Manual, Section 107-9 Coordination with Railway*.

However, the RE does retain certain responsibilities, which include:

- Reviewing all correspondence exchanged between the Rail Division and the contractor.
- Notifying the Contractor in writing once their insurance is approved, also specifying the policy's expiration date.
- Issuing authorization for the continuation or resumption of work within the railroad right of way.

See "Review and Verify Agreements" for additional information.

Coordinate Initial Construction Public Outreach

Overview

In collaboration with the Communications Office, the RE should establish a list of project stakeholders, appropriate project information content and best methods for public outreach. In addition to the stakeholders identified during the public meeting and project development phase, the team should gather contact information for additional individuals and groups who may be affected by construction. The RE should designate staff members to receive and respond to project-related questions, comments, and concerns from the public. The Contractor should be made aware of public information being conveyed about the project and should be a valuable a resource to confirm accuracy of the information being conveyed.

Communication: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Project Development Project Manager
- ✓ Division Information Officer
- ✓ Communications Office
- ✓ Traffic Information Management (TIMs)
- ✓ Statewide Traffic Operations Center (STOC)
- ✓ Division Safety Officer
- ✓ Safety and Risk Management

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
List of Division and External communication contacts	▪ *Coordinate with Communications Group*	Resident Engineer	The Division Public Information Officer
Press Release	▪ *Press Releases*	Resident Engineer	Division Construction Engineer (DCE)
			The Division Public Information Officer
Notification Tree for Emergency Responders/Emergency Medical Services (EMS) personnel and school officials	▪ *EMS and School Coordination*	Resident Engineer	The Division Public Information Officer
Planned and un-planned/emergency project-related impacts entered into TIMS.	▪ *Update Traffic Information Management Systems (TIMS)*	Resident Engineer	State Transportation Operations Center (STOC)
List of key stakeholders and their contact information	▪ *Stakeholder Outreach*	Resident Engineer	Division Construction Engineer (DCE)
Responses to stakeholders within 24 hours			The Division Public Information Officer

Coordinate with Communications Office

The Resident Engineer (RE) should coordinate with the Communications Office to open a channel of two-way communication with project stakeholders, which is essential for effective public outreach. Proactively sharing project information, such as upcoming traffic impacts or significant milestones, with the public establishes trust, builds the Department's credibility and can improve project/public safety.

- The RE should discuss the need for public outreach and public notifications with the Division Construction Engineer (DCE). With approval from the DCE, the RE contacts the Division Public Information Officer (PIO).
- The RE and PIO develop a list of internal and external contacts and identify the most effective means to relay project information.
- The PIO continually updates and maintains the database of internal and external stakeholders and with approval from the RE, proactively shares accurate, easy-to-understand information.
- RE notifies Contractor of the public information being transmitted and the stakeholders for which the information is intended.

Best Practices: Coordinate with Communications Group

- ✓ Develop and maintain a database of key internal and external stakeholders.
- ✓ Develop a relationship with local emergency responders and schools through meetings.
- ✓ Be proactive in announcing important project operations including traffic shifts, road closures and detours
- ✓ Update Traffic Information Management Systems (TIMs) prior to known events and remember to update during emergencies.
- ✓ Respond to public inquires within 24 hours to maintain credibility.
- ✓ Collaborate with Contractor and Inspection staff to develop an emergency action protocol with contract information and redundancy if contact is unavailable. The emergency communication plan should be part of a larger project safety plan.

Press Releases

The Department may issue a press release to inform the public in advance about a project-related activity or event, such as a roadway closure or planned utility outage. Issuing a press release is an efficient way to share information about a significant impact with a large audience.

- The RE discusses the need for public notification via press release with the DCE.
- The RE contacts the PIO to develop a script with details about the event or activity and its impacts.
- The RE reviews the script with the DCE.
- When the event/activity information is confirmed, scheduled, and approved by the DCE, authorize the PIO to issue the press release as far in advance as possible. This gives the public—motorists, business owners, and others who will be affected—time to prepare for the impact.
- Notify the Contractor of the press release.

EMS and School Coordination

While all transportation-system users are important, some users demand advance information so they can successfully carry out their critical services such as Emergency First Responders/Emergency Medical Services (EMS) personnel and school transportation officials.

The RE and PIO should create a "notification tree" for Emergency First Responders/EMS personnel and school officials. The PIO proactively distributes project-related impacts and ensures that emergency project-related impacts are distributed to these groups in real-time. The RE and PIO follow these steps:

- Utilize staff at the State Traffic Operations Center (STOC) to develop a list of local emergency response/EMS personnel and their contact information.
- Conduct a meeting with emergency responders and EMS personnel to discuss likely project impacts and develop an emergency notification procedure.
- Contact the local school transportation officials and develop a list of personnel with contact information.
- Establish procedures and those responsible for conveying emergency information which should be shared and discussed with appropriate project staff and the Contractor.

Update the Traveler Information Management System (TIMS)

The RE should confirm that TIMS is up-to-date and is providing road users with accurate, timely project-related information.

- The RE enters scheduled project-related impacts into TIMS to proactively convey project activities
- The RE enters emergency (unplanned) project-related impacts promptly upon notification.

Stakeholder Outreach

Providing stakeholders with continual project updates as well as a staff member they can call or email with their questions, comments, and concerns assists in building public trust and the Department establishing and maintaining positive relationships.

- RE is engaged in Public Meetings and Project Development to begin to identify and develop relationships with project stakeholders
- RE, DCE, and PM meet to develop comprehensive stakeholder list along with contract information.
- RE communicates with stakeholders to establish an open channel for communication.
- RE proactively communicates project activities and project milestones with stakeholders.
- RE promptly responds to stakeholder questions, concerns and/or requests, ideally within 24 hours.

Monitor Utility Relocations

Overview

For those utilities not relocated during the project development phase, prior to letting, the RE should actively manage the relocation process. The Resident Engineer should manage and monitor tasks needed to relocate utilities, provide status to stakeholders as milestones are accomplished, address field changes, routinely update the contractor on schedule/progress and escalate disputes to management as necessary.

Note: Activities required prior to the project let are included in all sections of Monitor Utility Relocations.

Utility Relocation Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Utility Engineer/Coordinat
  or-
- ✓ Division ROW Agent – ROW and easement
- ✓ Division Planning Engineer – Permitting
- ✓ Regional Utilities Manager
- ✓ Regional Environmental Coordination and Permitting Lead

References

- ☐ Utilities Accommodations Manual
- ☐ Project Delivery Network (PDN)
- ☐ NCDOT Standards and Specifications
- ☐ *Utilities by Others (UbO) plans*
- ☐ *Project Special Provisions: UbO*
- ☐ *Utility Construction (UC) Plans*
- ☐ *Project Special Provisions: Utility Construction*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Updated Utility Relocation Schedule	▪ *Review Utility Relocation Progress and Reports*	Resident Engineer	Project Manager
			Utilities Lead
Utility Reports			Utilities Coordinator
			Contractor (post-Let)
Meeting Minutes	▪ *Manage Utility Progress Meeting*	Resident Engineer	
Issues/Disputes Resolutions	▪ *Field Issues Escalation*	Resident Engineer	Noted Below in Process
			Monitoring Staff
			Utility Coordinator
			Utilities Lead
Invoice Approval	▪ *Review and Approve Utility Invoices*	Resident Engineer	Monitoring Staff

Review Utility Relocation Progress and Reports

The RE should actively collaborate with the Project Utility Coordinator, engage/ maintain contact with Utilities Owners (UOs), and routinely review/update the Utility Relocation Schedule.

The RE, or assigned representative:

- Confirms utility updates are current and that relocations are proceeding as scheduled.

- Performs a review of the schedule; updates the schedule as necessary, and addresses any concerns.
- Confirms Relocation Reports are current and addresses any concerns.
- Confirms documentation of relocation operations and quantities needed for reimbursement agreements

The RE ensures that any noted concerns are addressed in accordance with the current processes or procedures.

Manage Utility Progress Meeting

This meeting provides an opportunity for utility owners, the Department, and the Contractor to discuss the progress of utility relocation work in relation to the upcoming/ongoing construction schedule.

The RE schedules the reoccurring Utility Progress Meeting on a weekly, monthly, or as-needed basis, with the Utility Coordinator, Utility Monitoring Personnel, and Utility Owner representatives.

The RE develops a project-specific agenda for discussion for each meeting.

The RE invites a representative from each impacted utility, the Division Utility Engineer, the Division Right of Way Agent, RE Office personnel, and the Contractor to attend.

Meeting participants discuss the details of proposed utility relocations including but not limited to:

- Progress of the utility relocations
- Utility Plan revisions/Project Plan revisions
- Project construction schedules, critical areas, and project milestones.
- Status of Right-of-Way acquisitions
- Priority of areas for utility relocation and timelines for completion,
- Possible delays and solutions to Right-of-Way and/or utility schedules, as well as the potential impacts the delays could have on the construction schedule.
- Impacts to local businesses, residents, and/or the traveling public.
- Overall project safety along with proper MUTCD measures.

Best Practices:

Utility Progress Meeting

- ✓ Understand both Project and utility relocation schedules and how they may impact one another.
- ✓ Address schedule delays before they become project impacts.
- ✓ Consider delaying availability or operations if utility impacts construction critical path.
- ✓ Complete an attendance sheet with everyone's contact information.
- ✓ Encourage group discussion.
- ✓ Distribute meeting minutes and attendance sheet to all parties involved with utility relocations and the Division Engineer, Division Construction Engineer, and Area Construction Engineer.

The RE tracks meeting attendance and takes meeting minutes. The RE distributes minutes to all attendees and uploads them to the construction project's SharePoint site.

Field Issues Escalation

In the Pre-construction Activities phase, identify the NCDOT and UO personnel that will represent the elevated steps in the resolution escalation process.

If the utility monitoring personnel encounter an issue in the field with the UO's work, schedule, or operations that cannot be resolved at the field level, the RE or assigned representative will:

- Assess the dispute and provide a resolution per the Department's policies and standards.
- If unacceptable to the UO, RE will escalate the issue to Department utility staff for input and proposed resolution. Equivalent escalation of UO management is expected.
- If still unacceptable to the UO, RE will then elevate to the Regional Utility Manager, who will consult with other Utilities Unit staff for resolution. Equivalent escalation of UO management is expected.
- If still unacceptable to the UO, then RE returns to Utilities Unit Regional Manager for higher management level input. Equivalent escalation of UO management is expected.

Review and Approve Utility Invoices for Processing

The RE, or assigned representative, reviews the invoice received for UO and confirms the accuracy for reimbursement as follows (See Utilities Accommodations Manual [UAM] section 4.7):

- Coordinate with the relocation monitoring staff to confirm the percentage of work matches the invoice.
- Review the invoice to verify the required information is shown on the invoice as identified on the Invoice Checklist found here.
- Assist the UO as needed to familiarize them with the process and expectations in order to receive reimbursement.

Manage Contract Changes

Overview

Almost all contracts will require changes. Those changes are typically added by a supplemental agreement or by force account. Effective cost management ensures that the project will stay within its allocated budget and prevent overruns that strain limited resources, available funding, and limit the funding of new projects. Being actively engaged in day-to-day construction project activities; proactively anticipating/identifying risks and addressing issues; and efficiently overseeing construction operations are critical elements that supports the financial success of the project.

Contract Changes Support Team

- ✓ Division Engineer
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Construction Operations Engineer
- ✓ Assistant State Construction Engineer
- ✓ State Construction Engineer

References

- ☐ *Online Learning Management System (LMS)*
- ☐ Value Engineering Proposal Program Website
- ☐ *Budget Procedures in SAP*
- ☐ *Standard Specifications*
- ☐ *Supplemental Agreement Check List*
- ☐ *Supplemental Agreement Webinar, Troy Brooks, July 2019*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Risk Register (if applicable)	▪ *Risk Management*	Resident Engineer	Project Team
Conceptual Proposal			Value Management Office (VMO)
Preliminary Submittal	▪ *Value Engineering Proposals (VEP)s*	Contractor	Resident Engineer
Final Submittal			Technical Disciplines Project Manager
Supplemental Agreement	▪ *Supplemental Agreements (Change Orders)*	Contractor or Resident Engineer	▪ Area Construction Engineer (ACE) ▪ Division Construction Engineer ▪ Regional State Construction Engineer

Risk Management

Risk

The RE plays a crucial role in understanding, tracking, and managing risk during construction. Minimizing or mitigating risks reduces project impacts, thereby resulting in more favorable budget and schedule outcomes.

Example risk types that can impact the project's overall success include:

- Utility conflicts.
- Incomplete or inaccurate design.
- Changes to the project scope.
- Contractual disputes.
- Delays or complications in obtaining required permits and/or approvals
- Supply chain issues.
- A shortage of skilled labor or workforce.
- On-site accidents and safety incidents.
- Environmental issues
- Effective risk management involves:
- Identifying, quantifying, or qualifying risks early.
- Developing appropriate strategies to minimize or mitigate risk.
- Adding newly identified risk to the register and retiring risks which did not materialize.
- Discussing risk register in detail during the construction progress meetings.
- Proactively addressing risks that are potentially high impact (Budget and/or Schedule) to ensure successful project outcomes.

Best Practices: Risk

- ✓ During the pre-construction meeting or initial construction progress meeting work with project team (Contractor/Department) to define project risks and develop a comprehensive risk register
- ✓ Discuss areas where the Contractor sees potential risks and cost contingencies,
- ✓ Consider supplemental agreements as necessary to reduce risk and benefit the project.
- ✓ Enlist the help of additional Department staff, including Area Construction Engineers (ACE), in risk strategy discussions.

Risk management is a collaborative approach that involves productive discussions between the Department and Contractor personnel. The earlier risks are identified and planned for, the greater the opportunity to minimize or mitigate the risk. Once a risk manifests, the window of opportunity to implement effective actions for addressing it is usually highly constrained.

Figure 5, Cyclical Nature of Risk Management Process *Risk Assessment and Allocation for Highway Construction Management*

- ✓ **Risk: Support Team**
- ✓ Project Development Engineer (PM)
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Value Management Engineer

By actively managing risk, the RE ensures that construction schedule and budget impacts are minimized.

References:

- *Project's Risk Assessment Worksheet (RAW)*
- *Project Combined Field Inspection*
- *Risk Assessment and Allocation for Highway Construction Management – USDOT, FHWA, October 2006*
- *Guidebook on Risk Analysis Tools and Management Practices to Control Transportation Project Costs, NCHRP Project 8-60, September 2009.*

Identifying and managing known and potential risks throughout construction is critical to avoid negative impacts to the project scope, schedule, and budget. The Resident Engineer (RE) leads the project team in a regular review of the project's risk register to update known risks, add newly identified risks (if any), and retire risks whenever possible.

Value Engineering Proposals (VEP)s

Value Engineering Proposals (VEP)s encourage contractors to develop Value Engineering (VE) ideas by utilizing their design and construction ingenuity, experience, and background. A VEP is a post-award proposal proposed by the Contractor which includes changes to project plans or details of construction that could save time or money without impeding 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 considerations.

VEPs follow the guidelines detailed in Article 104-12 of the Standard Specifications and the Construction Manual. Contractors may submit a VEP to the RE and concurrently to the Value Management Office (VMO) at any time during construction utilizing the Value Engineering Proposal Submittal Form (located within the Construction Manual). The process is as follows:

- The Contractor submits a conceptual proposal shown through sketches, mark-ups on existing plan sheets, a brief description, and related cost breakdown.
- The VMO sends the Preliminary Submittal to the RE, technical disciplines, and Project Manager for review. (The Department uses the Preliminary Submittal to review the merit of the conceptual proposal before the Contractor spends further time and money to develop a more refined Final Proposal.)
- If the Department approves the Preliminary Submittal, the Contractor submits the Final Proposal, which must include design calculations, contract plan sheet modifications, contract document changes, and a cost savings estimate based on contract line items. Note: The Contractor performs the work of developing and submitting the preliminary and final proposals at their own expense.

- The VMO sends the Final Proposal to the RE, technical disciplines, and Project Manager for review. When the review is complete and decision made, the VMO prepares the Value Engineering Proposal Memorandum and sends it to the RE.

The RE shares the Memo with the Contractor and executes any necessary Supplemental Agreements.

The VEP and supporting information should be uploaded to the Construction Project SharePoint folder.

Supplemental Agreements (Change Orders)

The Department uses Supplemental Agreements (also known as Change Orders) to document any alterations/changes to the contract requirements. Supplemental Agreements are most commonly utilized to provide additional compensation or grant time extensions; however, they should be used to document all contractual alterations regardless of whether additional compensation or time extensions are involved. All REs and AREs are required to complete Supplemental Agreements Training on the NCDOT Learning Management System (LMS) annually.

The RE should follow the steps detailed within the Supplemental Agreement Flow Chart located within Construction Manual when a contract alteration is anticipated or when notified of such by the Contractor. Per Article 104-8(A)1, a Supplement Agreement should be established and executed prior to the affected work being performed, unless the total cost is less than $25,000. In cases where the total cost is less than $25,000, the RE can allow work to start with verbal approval while concurrently establishing the Supplemental Agreement. Once the need for a Supplemental Agreement is identified, the RE should promptly proceed with obtaining the appropriate content and pricing information to expedite the execution of the Agreement. The RE should not compromise the quality of the Agreement for the urgency of performing the work.

The RE should recognize that a Supplemental Agreement is a modification of the existing Contract and contractually/legally binds both parties (Contractor and Department) to the information contained within the Agreement. In essence, a Supplemental Agreement is a contract within the broader contract and should convey clear, accurate information in sufficient detail for the parties to understand the work and associated requirements. The Supplemental Agreement Pricing Form located within the Construction Manual should be utilized for each operation within the Agreement.

In general, the RE should include the following elements within compensation Supplemental Agreements (see information below regarding Supplemental Agreements for delay time extensions) :

Scope

Prior to developing the Supplemental Agreement Scope, it is important for the RE to understand all aspects of the contract alteration. If needed, the RE should consult with others within the Department and/or the Area Construction Engineer to understand the work, requirements (labor, equipment, materials, durations, testing, mobilizations) to complete the work, risks, overhead/profit, and schedule impacts. The more research conducted, and clarity provided in the development of the Supplemental Agreement, historically the more accurate pricing/or time evaluation is achieved. The RE should provide the following:

- Establish a clear, concise description of the work to be performed. Title the supplemental agreement so that it will be easily identifiable in HiCAMS. Some place this title in all capital letters.
- Detail the Article of the Specification for which the Supplemental Agreement is being provided, such as 104-3, 104-5, 104-7, 108-10, 109-6, etc.
- Define the work in specifics, where it occurs, and what is included within the work, also what is not included.
- Reference plans, details, drawings, pay items, special provisions, manufacturer recommendations, etc to assist in providing clarity.
- Include details of the materials required,
- Note any special conditions or construction methods.
- Define method of measurement and basis of payment.

Justification

- Provide a clear description of why or what necessitated the alteration of the contract, this could be a simple as a pay item omitted from the contract to external factors impacting construction.

Line Items

- Select Line Items from the master list within HiCAMS or Line Items contained within the contract. Only use generic line items when no line item exists for the work to be performed.
- Establish an accurate quantity of the work to avoid underruns and overruns and future adjustments in accordance with Articles 104-5 and 108-10 of the Standard Specifications.
- Adjust any existing Line Items quantities which may be impacted by the affected work.
- Verify contract bill of materials to confirm materials received and minimum sampling can be accomplished.

Pricing

- Request backup information to pricing and breakdown of pricing structure.
- Review the Contractor's pricing information.
- Understand and discuss with Contractor the work involved, mobilization, duration, production rates, equipment, labor, etc.
- Compare the Contractor's price to the Average Bid Prices, considering quantities bid and region of State.
- Consult other individuals (DCE, ACE) or units within the Department.
- Reference other recent Supplemental Agreements

- Understand risks associated with the work and possible contingency pricing. Can the risk be reduced by changes or Department assuming risk (e.g. individual pay items being established in lieu of lump sum price with undefined quantities or establishing an initial excavation rate and a secondary higher rate for excavation in rock as the subsurface conditions may be unknown)?
- Understand material requirements, supply chain concerns, lead time of delivery, and transportation costs.
- Verify payroll burden, direct and indirect costs including payroll taxes, paid time off, retirement benefits, insurance, and ancillary benefits. Article 109-3 of the Specifications allows 35% markup for labor burden.
- Verify Overhead. Ideally the Contractor would provide project records and certify the overhead rate applied at the time of bid.
- Verify the Profit. Ideally the Contractor would provide project records and certify the overhead rate applied at the time of bid.
- Include any markup associated with subcontracting.

Time Extension

- Establish the contract time needed to perform the affected work (Include any Delay Time Extensions Separately)
    - No additional time,
    - Time considered upon completion,
    - Pro Rata,
    - Set Amount of time for performing work for confirmed delays to the project controlling operation(s) and critical path. Separate any project delay time extensions.
- Consider Seasonal Limitation or weather/temperature restriction that may apply to the work.
- Consider impacts to ICTs, Substantial Completion, etc.

The RE should verify project funding is available (this verification should be noted in the comments field within the Supplemental Agreement) and enter the Supplemental Agreement into HiCAMS, reference HiCAMS User Guide, Chapter 3, Contract Adjustments, Section 6 Review of Supplemental Agreements. The RE should then submit the Supplemental Agreement to the appropriate individuals for approval.

- Resident Engineer: - Supplemental Agreements for all Articles of the Specifications up to $100,000 and associated time up to 30 days on all projects.
- Division Engineer/ Division Construction Engineer: - Supplemental Agreements for all Articles of the Specifications unlimited authority for compensation and time on all projects.

- State Construction Engineer/ Assistant State Construction Engineer/ Area Construction Engineer: - Reviews Supplemental Agreements greater than $100,000 and time extensions greater than 30 days.
- State Construction Engineer/ Assistant State Construction Engineer: - Reviews Supplemental Agreements greater than $200,000 and time extensions greater than 90 days.

Once required approvals are in hand, the RE should upload the Supplemental Agreement into DocuSign and transmit it to the Contractor for execution. The RE would then distribute the executed Supplemental Agreement to the DCE and ACE, mark the signed Supplemental Agreement as "Contractor Concurrence" in HiCAMS, and uploads it into SAP. The Supplemental Agreement along with all supporting documentation should be uploaded to the Construction Project SharePoint Supplemental Agreement Checklist.

Delay Time Extensions

The RE should note that no extensions to the completion date, intermediate contract date or intermediate contract time should be authorized except as allowed by Article 108-10. When establishing a time extension supplemental agreement for project delays, the provisions of 108-10(B)3 should be followed, which requires confirmation of the following:

- Contractor's controlling operation was delayed by circumstances originating from work required under the contract and
- beyond his control and
- without his fault or negligence, Prior to initiating the time extension, the RE should perform a thorough investigation of the alleged delay and confirm impacts to the project controlling operation and critical path. Regardless of the type of project schedule developed (CPM, Gantt Chart, or Bar Chart) every project will have a critical path leading from the initial activity to project completion. The critical path is the longest continuous chain of activities that establishes the project duration. Only a delay to an activity on the critical path (controlling operation) will delay the project completion and warrant a time extension. The RE should note that any controlling operation should have zero float, meaning that delays cannot occur until an operation has exhausted all buffer time and now will delay the succeeding operations. Thus, it is critical for a RE to understand the progression of project operations and those operations which reside on the critical path. If a Contractor is providing CPM schedule updates, do not rely on screen shots which only display activities, without the logic, float, and the critical path being clearly displayed. Consult the Area Construction Engineer for additional resource assistance in evaluating time delays.

Reference sections of this manual regarding Schedule and Resolving Claims for more information.

Monitor Overruns and Underruns

Tracking the actual costs of line items in the contract is critical to maintaining the project budget. As the contract administrator, the RE should periodically evaluate line-item quantities and evaluate potential

overruns or underruns based upon current project progress. The RE should periodically complete a budget review to confirm funding is available to cover any additional costs projected due to project overruns. The RE should review line items compensated within each partial pay estimate and determine if any line items have been completed and no additional work for that line item is anticipated. If so, the RE should identify it as complete within HiCAMS. The RE should also review line items for over- and underruns and determine if a price revision is warranted.

Review Pricing for Adjustments

The RE or the Contractor can request a price adjustment for all major line items that overrun or underrun by more than 15 percent and a price adjustment for minor line items that overrun by more than 100 percent.

Should the Contractor request a price adjustment in accordance with Article 104-5 of the Standard Specifications, the RE should evaluate the request in a similar fashion to a Supplemental Agreement Request. If the RE agrees with an adjustment to the major or minor contract item, then a Supplemental Agreement documenting the verified adjusted price should be executed or the Contractor should be instructed to proceed with the work keeping Force Account records per Article 109-3 of the Standard Specifications. Should the Force Account option be directed, the RE should revisit the line-item cost once an adequate quantity of records are submitted and consider executing an Supplemental Agreement going forth. If the RE is not in agreement with an adjusted unit price after review of the Contractor's records, the RE should notify the Contractor in writing of such. The RE should note, per Article 104-(C)2 that the total payment, including any additional compensation granted by the Engineer due to an underrun in a major contract item, shall not exceed the payment that would have been made for the performance of 100% of the original contract quantity at the original contract unit price.

Monitor Overdraft

The Department utilizes a cash flow model in managing its overall transportation program financials. This modeling allows for projects to be awarded when cash and future revenues will meet the financial obligations of the current and future project expenditures. However, when relying on future revenues to cover project expenditures, it is critical to be knowledgeable of the project's cash curve (the schedule or timeline money will be paid out during the project) and to manage and track additional expenditures (overruns, claims, and supplemental agreements) to avoid funding overdrafts. The responsibility for overseeing and tracking this budget information lies with the RE and their administration team. Projects should have accurate overrun and completion information within HiCAMS. Any occurrences or potential occurrences of supplemental agreements, compensation claims, force accounts, significant overruns, line code adjustments (AC/Fuel/Steel), pay reductions or incentive payments should be promptly recorded in HiCAMS. The execution of any claim or supplemental agreement should note that the "Budget has been verified".

- ✓ **Budget: Support Team**
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Estimating Engineer
- ✓ Division Business Officer

The Department will establish a Project Construction Budget which includes the Construction Budget (Contractor's bid) plus additional funding for the administration, quality assurance inspection, and contingency costs for projected expenditures. Typically, the Project Construction Budget will include the contractor bid amount plus an additional 15% for the remaining project activities. Each Division is responsible for managing, reporting on budget variances, and requesting supplemental funding, tailored to the needs of each individual project. Before the onset of construction, the RE should verify through SAP that the appropriate WBS has been adequately funded and should monitor expenditures throughout the project lifecycle. As the project advances, the RE should estimate monthly project expenditures and use this data coupled with the additional expenditures, i.e. supplemental agreements, overruns etc., to forecast whether additional funding will be needed to meet the evolving financial requirements of the project.

In monitoring the project budget, the RE should provide the following:

- Review the project budget utilizing HiCAMS and/or SAP periodically throughout the life of the project and at minimum at 25%, 50%, 75%, and 90% complete.
- Update all overruns in HiCAMS,
  - change in quantities that was not anticipated in the original bid amount
  - line code overrun/underrun values
  - All anticipated SA work, claim compensation, force account work
  - Any adjustments – AC/Fuel adjustments or line code adjustments (pay reductions/incentive payments
- Discuss funding levels with DCE and ACE
- If necessary, initiate an Automated Funding Request Application
- DO NOT allow the WBS to go into overdraft!!!

ReForce Account Compensation and Record Keeping

During the life of a project, the Contractor may be entitled to compensation for extra work or an alteration in the price of an existing item of work. If the RE and the Contractor cannot agree to a mutually acceptable price, the RE will issue a force account notice to the Contractor to pursue the work and keep/submit records in accordance with Article 109-3 of the Standard Specifications. In addition, when the Contractor contends, they are due compensation and the RE is not in agreement per the requirements of the Contract and Specifications, the Contractor may submit a letter of intent to file claim and must keep/submit cost records consistent with 109-3 of the Standard Specifications.

The RE should review Cost Records for accuracy and completeness with each submittal, or at minimum monthly, and document any deficiencies or inaccuracies to the Contractor. The RE has the option to revisit the line-item cost once an adequate quantity of records are submitted and consider executing a Supplemental Agreement going forth.

Reference the Construction Manual for comprehensive information on Force Account, 109-3 of the Standard Specifications, along with the Force Account Form, an excel file to assist with documenting and quantifying cost records.

Resolve Claims

Construction Claims Support Team

- ✓ Division Engineer
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Assistant State Construction Engineer
- ✓ State Construction Engineer
- ✓ Project Closeout Engineer

Overview

During the life of the project, the Contractor may submit a "Notice of Intent" to file a claim for additional contract time (Article 108-10) and/or compensation (Article 104-8). Once an intent to file a claim has been submitted the Contractor should keep thorough records in accordance with Article 109-3 of the Standard Specifications. The Resident Engineer (RE) will be responsible for reviewing these records.

References

- ☐ Claim Resolution Forms
- ☐ Construction Manual: Records and Reports – Construction Procedure for Claims
- ☐ Construction Manual: Records and Reports – Force Account Work
- ☐ Construction Manual: Records and Reports - Project Closeout Conference
- ☐ HiCAMS User Guide, Chapter 3, Contract Adjustments, Section 1: Review Claims
- ☐ Standard Specifications, Section 109-10, Documents Required for the Processing of the Final Estimate
- ☐ Standard Specifications, Section 109-3, Force Account Work.
- ☐ Standard Specifications, Section 107-24, Right of the Contractor to File a Verified Claim

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Active Claims Resolution Form	▪ *Processing Claims*	Resident Engineer	▪ Division Construction Engineer ▪ Area Construction Engineer
Agenda and Minutes – Project Closeout Conference	▪ *Project Closeout Conference*	Division Construction Engineer	Area Construction Engineer Contractor

Claims Avoidance/Mitigation Strategies

As previously discussed, the RE's active engagement in the day-to-day operations, the continuous proactive assessment of project risks, and the timely resolution of project issues results in successful mitigation of Contractor's Claims. Early in the initial phases of the project, the Resident Engineer (RE) should establish a strong relationship and good communication lines with the Contractor and discuss potential areas of project risk, including but not limited to utilities, phasing, plan errors, and constructability. (Reference Construction Cost Changes- Risk Management) Early identification of project risks give the Department and the Contractor an opportunity to adjust, reduce, and even avoid risks. The RE should seek guidance and assistance from other units (e.g., Construction, Environmental, Right of Way, Rail Division, etc.) as needed to efficiently address project risk issues.

The Preconstruction meeting and each progress meeting provides the RE an opportunity to review the discuss risks, discuss the project schedule and obtain a clear understanding of the potential cost and time impacts associated with the risks.

Initial Steps Toward Resolution

When unforeseen issues arise and the Contractor believes additional compensation and/or contract time is warranted, the RE should always try to resolve any justified request either through executing a Supplemental Agreement, or Force Account if an acceptable price cannot be reached. (see "Manage Construction Cost Changes" for additional information).

Dispute Resolution and Escalation

As part of the Pre-construction Conference, the Contractor and RE develop a project-specific issue escalation process to ensure:

- Expeditious resolution of issues at the appropriate level of authority.
- Mitigation of project delays
- Preservation of team dynamics and relationships

Both parties should follow the established escalation process for problem resolution.

Best Practices: Escalation

- ✓ Resolve issues at the lowest possible level.
- ✓ Document resolution in writing, as a follow up to conversations.
- ✓ Escalate quickly to preserve relationships (choose to agree to disagree).
- ✓ Bad news does not age well (talk through issues as soon as one becomes known).

The Importance of Documentation

If an issue escalates to a potential claim or an active claim for delays and/or compensation, the RE should continue to engage in the details of the operations and project impacts.

The RE should maintain proper, sufficient documentation at all times, which includes correspondence, emails, discussion notes, meeting minutes, Engineer Weekly Reports, and Inspector Daily Reports. Because a claim may take several weeks, months, or even years to resolve, thorough documentation is critical. They should provide enough information for a successor RE to understand the specifics and details, as is usually the case with large claims. The RE should regularly review cost records; routinely evaluate and document the impacted operations including visual documentation through photographs and/or video; and periodically revisit the Contractor's assertions regarding the compensation and time extensions. Often claims are not clear-cut and early resolution usually leads to the least amount of cost and/or time impacts to the project. The RE should alert the Contractor of any deficiencies in their cost records and ask for break downs or back up information as needed for cost/time calculations. (See Construction Cost Changes in this Manual and Force Account in the Construction Manual for additional reference)

Processing Claims

If the Contractor files a Claim, the RE embarks on a series of steps to reach a final determination regarding additional compensation or time.

The RE compiles all relevant data and information provided by the Contractor and compares it to the RE's records for the work in dispute. Records may include:

- Costs
- Inspector daily reports
- Equipment rental rates
- Contractor-submitted markups
- Material costs

The RE develops a synopsis of the claim, details of their investigations with backup information, and their recommendations regarding cost or time revisions. The RE should then engage the Division Construction Engineer, Area Construction Engineer and others that may provide valuable insight into the issue at hand to review, analyze and comment upon the impacts and recommendations.

Best Practices: Resolving Claims

- ✓ Discuss risk and schedule at every monthly construction meeting.
- ✓ Communicate early and often with the contractor once an issue arises.
- ✓ Escalate quickly to preserve relationships. Don't let things sit on the back burner.
- ✓ Get help from others. Reach out to the Division Construction Engineer and Area Construction Engineer.
- ✓ Maintain detailed project records, including notes and photos.
- ✓ Document, document, document.

Prior to a final determination being made it is beneficial to reengage the contractor along with the identified support (DCE/CCU) to further understand the contractor's perspective and negotiate any potential extensions to contract time and/or additional compensation. It is not uncommon for the contractor to modify their stance once both parties have had a chance to explain their position.

Once a final decision is determined, the RE will record the claim within HiCAMS (Reference HiCAMS Users Guide, Chapter 3 Contract Adjustments, Section 1A: Review Claims) and compile the information on the appropriate Claims Resolution Form. The RE will transmit the Claims Resolution Form to the appropriate individuals for finalization of the document.

HiCAMS is the formal record of approval or denial for documenting the Claims Process with the following approval hierarchy:

- Resident Engineer approval authority is $100,000 and 30 days for active claims under all Articles of the Specifications. Resident Engineer **cannot** deny any active claim.
- Division Engineer or his / her delegate approval and denial authority for active claims is unlimited under all Articles of the specifications.
- Area Construction Engineer reviews all active claims over $100,000 or 30 days.
- State Construction Engineer reviews all active claims over $200,000 or 90 days.

The Area Construction Engineer and State Construction Engineer active claim review must be made prior to notifying the contractor of the Department's decision. Any approval of claims outside of those allowed by the Specifications must be forwarded to the State Construction Engineer for approval.

Once the claim is approved or denied, the RE will provide written correspondence to the Contractor notifying them of the outcome. The Claim Resolution Form is an internal document and should not be conveyed to the Contractor.

Project Closeout Conference

Periodically, some claims will remain unresolved throughout the life of the project or will continue through the completion of the project. In these cases, claims may be resolved during the Project Closeout Conference. (Reference Records and Reports, Project Closeout Conference, within the Construction Manual)

After the Final Estimate has been prepared by the RE, checked by the Division and the Notification of Final Quantities has been sent to the Contractor, the RE should schedule a Project Closeout Conference to discuss any remaining outstanding issues to include quantity discrepancies, adjustment in unit prices, payment for leftover materials, and claims for additional time and/or compensation.

- For projects $10 million or less, the RE schedules the Project Closeout Conference within 60 days of final acceptance.
- For projects over $10 million the RE schedules the Project Closeout Conference within 90 days of final acceptance.

The RE and Contractor should develop an agenda of the items to be discussed. Prior to the conference, the Contractor must submit to the RE supporting information with sufficient breakdown and backup to address any outstanding issues – especially claims during the Closeout Conference.

At the conference, the Department should re-evaluate any previous claim provided the Contractor has additional information that could revise the original decision and evaluate any new claims presented.

In preparation for the conference, the RE:

- Advises the Contractor to bring the documents required for processing the final estimate as stated in Section 109-10 of the Standard Specifications.
- Prepares a written agenda and distributes it to all the involved parties prior to the meeting. Reference the Construction Manual: Records and Reports – Project Closeout Conference.

The RE invites the Division Engineer and/or Division Construction Engineer, Assistant RE, appropriate Construction Unit Staff, and the Contractor. The Prime Contractor is responsible for inviting other subcontractors as needed. The RE should note that the same approval authority for Claims remains during the Project Closeout Conference and therefore it is important to engage and invite the appropriate personnel to the meeting based upon the issues identified.

If ALL issues are resolved during the closeout conference, the RE should promptly make the necessary corrections to the final estimate assembly and document any claim issues in HiCAMS using the appropriate Project Closeout Conference Form. The Construction Unit representative will provide the Closeout Conference Form. The form must be signed by the Contractor and the Construction Unit representative. The Contractor's signature on the form signifies that he agrees with all of the final quantities and there are no further claims on the project and will suffice as his Statement of Final Claims

as required under Article 109-10. The Division Engineer should then notify the Contractor of the results of the approved changes in the final estimate and any adjustments in compensation or extensions of contract time. The final estimate assembly and final documents (Consent of Surety and Affidavit) should then be submitted to the State Construction Engineer.

If at the completion of the Project Closeout Conference there are still unresolved claim issues, the Project Closeout Conference Form should not be used to document the resolved issues. In this case, the RE should document any claim issues that are resolved at the conference as Active Claims in HiCAMS, using the appropriate Claims Resolution Form.

The Contractor should be advised to submit all unresolved issues, from the Closeout Conference, as part of his final claim letter, which should be sent directly to the State Construction Engineer.

Final Claims

An Active Claim becomes a Final Claim once it has gone through the Active Claim and Project Closeout processes, yet the Contractor still believes additional compensation and/or an extension in the contract completion date is warranted.

For centrally let contracts, the State Construction Engineer reviews and responds to final claims as part of the final estimate process. For Division let contracts, the Division Engineer reviews and responds to final claims as part of the final estimate process.

If a claim remains unresolved after the Final Claim's process, the contractor retains the right to file a verified claim submitted to the Chief Engineer per *Section 107-24 of the Standard Specifications*.

Coordinate Construction Revisions

Overview

Changes made to the advertised project plans are documented as construction revisions. Construction revisions are coordinated with the appropriate NCDOT Units (ROW, Hydraulics, Structures, Roadway, Geotechnical, Environmental, etc.) to clarify and/or modify the plan and document the revision. Ideally, a Supplemental Agreement would also be executed concurrently with the plan revision to reflect any associated adjustments in quantities, time and/or compensation.

Construction Revisions Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Project Development Project Manager
- ✓ Various Department Units
- ✓ Division Environmental Supervisor/Officer (DEO)
- ✓ Project Development & Environmental Analysis Engineer (PDEA)

References

- ☐ *Chapter 8: Manage Construction Cost Changes*
- ☐ Construction Manual – Records and Reports – Supplemental Agreements
- ☐ Geotechnical Engineering Unit Contacts in HiCAMS
- ☐ Hydraulics Unit Contacts in HiCAMS
- ☐ Roadway Design Unit Contacts in HiCAMS
- ☐ ROW Unit Contacts in HiCAMS
- ☐ Structures Management Unit in HiCAMS

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Plan Set Revisions	▪ *Complete Plan Set Revisions*	Resident Engineer	NCDOT Staff Assistant Resident Engineer (ARE) District Construction Engineer (DCE) Construction Engineering & Inspection (CEI) Contractor
Supplemental Agreements	▪ *Complete Plan Set Revisions*	Resident Engineer	Project Manager
Unit Specific	▪ *Coordinate Unit Revisions (as needed)*		NCDOT Units

Complete Plan Set Revisions

Historically, field conditions vary over time and/or unanticipated circumstances develop during the project. The RE and project administration staff typically address minor revisions which do not pose a risk to the public's safety, health, and welfare, such as minor adjustments to a drainage ditch or grading an area to properly drain, on the project site without the requirement of a plan revision and addressed in the as-built plans. Although the project plans are designed, reviewed, and checked, there are occasions when a revision to the plans is required to make design changes or correct an error or omission. Also, there are occasions when plan revisions are desired by either the Department or the Contractor to construct the project in a different manner, ideally more efficient, constructable, maintainable, safer, or durable, than

originally designed. The RE should note that project plans are sealed by an engineer of record and that when the RE directs modifications to the plans without consultation and a revised plan, they assume responsibility for the design and potentially other components of the project. Therefore, best practice is to consult with the appropriate NCDOT unit and obtain the necessary plan revisions that provide clear detail, guidance, and direction of the project construction. (Reference NCBELS Rules of Professional Conduct). For revisions requiring revised plan drawings, details, bill of materials and/or notes, the RE should perform the following:

- Collaborate with others within the Department, as needed, to confirm the revision is necessary for the completion of the project.
- Determine what necessitated the revision: plan error, omission, Department directed change, contractor requested change.
- Document when the error was discovered, what operations are being impacted, controlling operation or potential controlling operation impacts, any demolition or rework anticipated, proposed corrective measures, meeting notes, email correspondence, and timeline of events.
- Coordinate revisions with the Project Development Project Manager and/or appropriate Department Unit (e.g., Environmental, Geotechnical, Hydraulics, Roadway, Design, ROW, Structures) to describe the revisions, reasoning for such change, and actions needed to revise the plans.
- Actively engage in and follow up on the production of the plan revision to promote timely issuance.
- Determine cost responsibility and time impacts. If the revision is for the Contractor's convenience, the RE should confirm that such revision provides overall value to the project, such as time, cost, or risk reductions, which should be quantified and agreed to in a Supplemental Agreement. Caution should be exercised in making plan revisions for the Contractor's convenience without the clear project value defined, quantified and agree upon. The RE should fully understand the time implications of the plan revision, regardless whether Department or Contractor initiated, as revisions could have significant schedule impacts that endure throughout the entire project duration. Therefore, time restrictions or time extensions should be defined and agreed upon within a Supplemental Agreement issued concurrently with the revision. If the project has an up to date CPM, then revision scenarios can be run within the Primavera software to calculate and depict time impacts to the project schedule, controlling operation(s) and critical path.
- RE initiates a Supplemental Agreement to define additional work, extra work, adjustments in unit pricing, time restrictions, and/or time extensions. (Reference Chapter 8 – *Manage Construction Cost Changes- Supplemental Agreements and Monitor Budget*).

The RE files the completed plan set revisions and Supplemental Agreement on the project's SharePoint site.

Monitor Federal and State Regulatory Compliance

Overview

NCDOT must comply with state and federal regulations for many reasons, most notably, funding. Because most projects are funded at least in part with state or federal dollars, compliance with their regulatory requirements is required. Regulations also help to ensure uniformity of the nation's transportation infrastructure, accessibility for all users, opportunities for diverse contractors, and protection of the environment.

Contract Compliance: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Construction Operations Engineer
- ✓ FHWA (NC Division) Operations Engineer
- ✓ Materials and Test Unit, Manufactured Products Engineer

References

- ☐ Certified Payroll Webinar
- ☐ Commercially Useful Function Requirements
- ☐ Construction Manual
- ☐ DBE CUF Training for Inspectors
- ☐ Directory of Firms
- ☐ FHWA 1391 Instructions for Contractors
- ☐ *FHWA 1391 Training Video, Jorgelia Nino, July 13, 2023*
- ☐ *Standard Specifications*
- ☐ Subcontract Approval Webinar

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
FHWA 1391 Form	▪ *Federal Highway Administration (FHWA) 1391*	Resident Engineer	Assistant Resident Engineer Office Technician
Subcontract Approval Forms (SAF)	▪ *Review of SAF form* ▪ *Approval of SAF Form*	Resident Engineer	Assistant Resident Engineer Office Technician
Certified Payrolls	▪ *Review and Approval of Certified Payrolls*	Resident Engineer	Office Technician
DBE Commitments	▪ *Ensuring DBE Commitments are known by field staff* ▪ *DBE Hauling*	Resident Engineer	Inspection Staff
Commercially Useful Function	▪ *Commercially Useful Function Review on all DBEs*	Resident Engineer	Inspection Staff

Federal Highway Administration (FHWA) 1391

FHWA 1391 is an annual Equal Employment Opportunity report required of contractors who work on federal-aid projects, separate and independent from certified payrolls. The Department's prime contractors and active subcontractors of all tiers who have a contract value of $10,000 or more must submit a summary of employment data (including racial/ethnic and gender breakdown) for the last full

payroll period of July each year. A contractor is considered active if they have started work on the project and it has not been 100-percent completed.

FHWA 1391 Submittal and Review

- Contractors submit their annual FHWA 1391 forms through the Department's SharePoint site. This enables the Resident Engineer (RE) to approve or reject the forms online.
- The RE reviews all FHWA 1391 submittals for each federal contract he/she is administering.
- The RE checks for accuracy using certified payrolls submitted and/or diaries.
- Upon a satisfactory review, the RE signs and dates the form as the State Highway Official to signify approval.
- If the review is not satisfactory, the RE informs the prime contractor of the issue(s) and rejects the form. The contractor completes a new 1391 form with the necessary corrections and resubmits it.

Subcontractor Approvals

Per Article 108-6 of the Standard Specifications, the Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the contract or any portion thereof; or of his right, title, or interest therein; without written consent of the Engineer. All requests to sublet work shall be submitted within 30 calendar days of the date of availability or prior to expiration of 20% of the contract time, whichever date is later, unless otherwise approved by the Engineer. (Reference Preconstruction Activities/ Confirm Contract Compliance with Federal and State Requirements) Certified Payroll Requirements

Review Certified Payroll Requirements

23 CFR 633.102(b)e requires Form FHWA-1273 be physically incorporated in each construction contract funded under title 23. The Prime Contractor is required to provide weekly Certified Payrolls, in the weeks in which work was performed, for themself and all subcontractors. If funding sources do not require the submission of certified payrolls a special provision entitled "Submission of Records – Federal Aid Projects" will be included within the contract. Otherwise, it is expected that the RE will receive and review certified payrolls from the date that work begins on the project through final project acceptance by NCDOT.

Certified payrolls should be submitted to NCDOT by the prime contractor on a regular basis throughout the life of the project. The prime is responsible for submitting certified payroll, at minimum once per month, for anyone who performed work on the project within the previous month, including certified payrolls from their subcontractors who performed work.

The RE or assigned staff reviews payrolls to ensure that payroll is obtained for any firm that performed work and that employees shown on the payrolls are being provided with the minimum wage rates shown in the Wage Rate Determination included in the contract.

For a comprehensive step by step certified payroll review procedure, reference the 2018 CCU Certified Payroll Webinar, presented by Michelle Gaddy. In general, the following steps are followed while reviewing payrolls:

- Upon receipt of the first payroll of the project, create an electronic FAP-1 on the SharePoint team site. The week ending is based on the prime contractor's payrolls.

- Check the electronic FAP-1 against construction diaries to automatically denote if a firm was documented as working that week. Any firm that works on the contract should submit a certified payroll unless they are a professional service contractor (surveyor) or a hauling firm is hauling from a commercial site (asphalt plant or quarry). If a payroll is not required, check the "Payroll Not Required" checkbox for that firm.
- Verify that the number of personnel/hours reflected in the payrolls are in reasonably close conformity to the payroll submitted for each firm. This requires reviewing the hours reflected in the diaries.
- Review the payroll received to spot-check if employees shown on the payroll make at least the minimum wage rates indicated in the contract for their classification.
- Complete the FAP-1 denoting when a certified payroll is received for each firm that works. Document on the FAP-1 if a firm is not required to submit a payroll. Any firm not documented in the diaries should be denoted by checking "Active but Not in Diaries".
- Note any employees who do not make the minimum wage rates in the contract, any employees who are not classified correctly, any payrolls that are not received, or any other errors in the payroll.

The RE should contract the prime contractor regarding any notations noted during the review.

The ARE ensures that monthly estimates are not processed with compensation for the project if certified payrolls are delinquent or have outstanding questions.

DBE Commitments

Each contract let by NCDOT contains a DBE goal for federally funded contracts or a Minority Business Enterprise (MB)/Women Business Enterprise (WB) goal for state-funded contracts. The Prime Contractor is obligated, at minimum, to utilize the DBE subcontractor to perform the work (line items) or portion thereof at the contract percentage amount specified within the contract. The DBE is required to perform the specified quantity of work at the unit price agreed upon and documented within the contract.

It is the RE's responsibility to track DBE utilization and promptly address issues with DBE participation as it potentially deviates from the requirements of the contract. (Reference Preconstruction Activities/Confirm Contract Compliance with Federal and State Requirements)

Commercially Useful Function (CUF)

A commercially useful function (CUF) is defined as the subcontractor is responsible for all aspects of the operation including providing their own labor forces, equipment, materials, and supervision. The RE should assign inspection staff to observe DBE operations and confirm the DBE/WB/MBs (committed or not) is performing a CUF (Reference Preconstruction Activities/Confirm Contract Compliance with Federal and State Requirements).

DBE-Committed Hauling Sub Requirements

The use of hauling to meet DBE/MB/WB commitments is a common practice in the construction industry. A prime contractor can commit to utilizing a hauler for hauling stone, asphalt, or dirt to, from, or on the construction site. This is considered a partial commitment to the scope of work and is reflected as a partial on the subcontract approval form. The subcontractor is committed to performing the minimum quantities at the unit price reflected in the commitments. Each day the DBE subcontractor is hauling, the RE assigns inspection staff to complete a hauling report that reflects all the trucks that are meeting the commitment for each hauling material/operation. (Reference Preconstruction Activities/Confirm Contract Compliance with Federal and State Requirements)

Buy America

In Accordance with Section 106-1(B) of the *Standard Specifications*, the contractor must certify that steel and iron materials incorporated into the contract are produced in the United States of America. No more than 0.1 percent of the contract amount or $2,500, whichever is greater, may be produced outside of the USA. The RE should consult their contract for additional special provisions or project special provisions detailing Build America, Buy American (BABA) which requires more stringent requirements for domestic products. BABA requires all manufactured products and construction materials permanently incorporated into any project to meet requirements of the Build America, Buy America (BABA) Act of the Infrastructure Investment and Jobs Act (IIJA).

To confirm compliance with Buy America, the RE:

- Confirms contract requirements for manufactured products and construction materials.
- Requires the prime contractor to provide a notarized certification stating that all steel and iron products are produced in the USA at the Pre-construction Conference.
- Assigns inspection staff to review materials information for compliance with Buy America requirements during documentation of material received.
- Reviews material-received invoices/certifications for steel and iron products to verify they are produced in the USA.

Subcontractor Payment Tracking

The prime contractor is required to report all payments to DBE/WB/MBs throughout the life of the contract by logging onto the NCDOT Subcontractor Payment Tracking website using their federal tax ID and contract number. Any DBE/WB/MB payment made by a subcontractor to a 2nd tier subcontractor/supplier/manufacturer is provided to the prime so they can enter the payment information. The RE should periodically review all payments entered into the Payment Tracking system.

When reviewing the payments reported, the RE should confirm a HiCAMS “DBE Payment Report” is performed. This report provides a summary of how much each DBE should be compensated for each estimate based on approved SAFs. This function is in HiCAMS under Standard Reports on the Inquiry tab. Keep in mind that partials and portions may affect these calculations.

The RE is responsible for ensuring the following steps are complete to review Subcontractor Payment Tracking:

- Run a report for all payments reported for the contract by logging into Subcontractor Payment Tracking via the "RE Login" link. A date range is not required for all payments.
- Review the summary at the top of the table which reflects all payments reported for each subcontractor/supplier/manufacturer. This also includes any summary information based on HiCAMS payments and approved subcontract information and reflects the information in the HiCAMS DBE Payment Report.
- Compare the payments reported to what NCDOT has paid for the items subcontracted.
- If there are significant differences, the prime contractor should be questioned to determine the reason. A prompt payment letter should be issued to the prime contractor if there are no payments reported to a subcontractor who has performed work or if the prime does not satisfactorily explain the differences.
- The RE should consult with the ACE prior to withholding the monthly estimate should the prime contractor be delinquent in reporting subcontractor payments.

Prevailing Wage Interviews

The Davis-Bacon Act requires the payment of locally prevailing wages and fringe benefits to laborers and mechanics employed on Federal contracts in excess of $2,000 for construction, alteration, or repair (including painting and decorating) of public buildings or public works. Davis Bacon was enacted as a means to prevent contractors from importing cheap labor from outside the area, thereby keeping capital at home with the local labor force where it would do the most good.

In addition to the checking of payrolls prior to payment of the monthly estimate, it is the responsibility of the Resident Engineer to perform the following for all Federal Aid projects:

- Conduct spot interviews with the Contractor's employees to determine they are properly classified. Interviews should be conducted on each project no less frequently than once a quarter (based on the calendar year, not the life of the project) and at least one employee of the Prime Contractor and each Subcontractor should be interviewed during the life of the project. The Wage Interview Form located within the Construction Manual should be utilized when conducting wage interviews.
- Determine by spot interview that each employee is paid at least the minimum hourly rate described for his classification that is contained in the contract and that each employee on the project is either on the Prime Contractor's payroll or on an approved Subcontractor's payroll.
- Furnish the required Federal Aid Posters regarding employment and wages to the Contractor and require these posters be displayed on the project on a weatherproof bulletin board along with a copy of the minimum wage rates and the Contractor's EEO policy statement.

- Maintain a record in the project files of the individual interviews made to determine job classification and wage rate compliance. See spreadsheet in Certified Payroll Webinar for documenting contractor/subcontractors and quarterly wage interviews.

In addition to the above, the RE is expected to listen to all complaints by Contractor's employees regarding proper classification and payment. When employees make complaints, the RE is expected to take investigative action he considers necessary to determine the validity of the complaint and submit his findings together with recommendations to the Division Engineer and the State Construction Engineer for further handling. If there is any need for clarification and/or interpretation of any problems concerning labor compliance, the Engineer shall refer to the appropriate chapters of the Labor Compliance Manual and contact the Central Construction Unit.

Processing Monthly Estimates

Overview

Per Article 109-4 of the Standard Specifications, Partial payments will be based upon progress estimates prepared by the Engineer at least once each month on the date established by the Engineer. The Department uses the monthly estimates to pay the Prime Contractor for all labor, materials and incidentals required to build the project. Partial payments will be approximate only and will be subject to correction in the final estimate and payment.

Monthly Estimate Management Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Construction Operations Engineer
- ✓ State Materials Engineer

References

- ☐ Connect -Construction Projects Home (ncdot.gov)
- ☐ Construction Manual (ncdot.gov)
- ☐ *HiCAMS*
- ☐ RE Training- Steel Price Adjustment-20230824_130345-Meeting Recording.mp4 (sharepoint.com)
- ☐ Vendor Payment Tracking Login
- ☐ *2022 AGC/NCDOT Workshop Roadway-Materials Breakout, March 22-23, 2022*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Pay Records and Ticket Books	▪ *Measurement and Payment*	Lead Project Inspector	Resident Engineer
Estimate for CCU	▪ *Update Percent Complete/Anticipated Completion Dates*	Resident Engineer	Area Construction Engineer Assistant Resident Engineer

Project Budget Monitoring

The Resident Engineer (RE) monitors the budget through SAP to verify there is sufficient project funding allocated for the projected project costs. These costs include payments to the Contractor through HiCAMS, internal NCDOT charges against the WBS number(s), Construction Engineering Inspector (CEI) costs to the WBS number(s), and municipal costs. (Reference Physical Construction/Manage Construction Cost Changes/Monitor Budget)

The RE should routinely evaluate the project budget and take necessary actions to request additional funding. The project budget can be reviewed using the following steps:

- In SAP, the RE enters the transaction code ZPSR01 (Funding and Expense Summary) and the WBS element and clicks 'Execute.'
- The RE views the funding, expenditures, and unexpended balance.
- After checking on funding, the RE can proceed with the partial estimate OR request additional funding.

Manage Mobilization

The Resident Engineer (RE) distributes partial payments for mobilization through HiCAMS as specified in *Standard Specification 800 Mobilization*.

The mobilization process provides the Contractor compensation for preparatory work and operations, including movement of personnel, equipment, supplies, and incidental items to the project site. This includes establishment of all offices, buildings, and other facilities necessary for work on the project. See below for a summary of this process.

Partial Payments for Mobilization

The Department makes partial mobilization payments with the first and second partial pay estimates on the contract; and, at the rate of 50 percent lump-sum price on each of the partial pay estimates, provided the amount bid for mobilization does not exceed 5 percent of the total amount bid for the contract.

Amount Bid for Mobilization

When the amount bid for mobilization exceeds 5 percent of the total amount bid for the contract:

The Department pays 2.5% of the total amount bid on each of the first two partial pay estimates.
The Department pays the portion exceeding 5 percent on the last partial pay estimate.
As an exception to the above, when the contract is limited to existing pavement resurfacing:

The Department pays the entire lump sum price for mobilization with the first partial pay estimate paid on the contract, provided the amount bid does not exceed 5 percent of the total amount bid for the contract. When the amount bid for mobilization exceeds 5 percent of the total amount bid for the contract, the Department pays 5 percent of the total amount bid on the first partial pay estimate, and pays the portion exceeding 5 percent on the last partial pay estimate.

Monitoring Steel Price Adjustment

The RE should consult their contract for the special provision (SP1 G47) providing steel price adjustments for defined steel products permanently incorporated into the work. Reference NCDOT Connect Construction Forms page for SPA-1, SPA-2 and SPA-3 Forms.

> The Contractor is responsible for completing and forwarding SPA-1 listing the Contract Line Number, (with corresponding Item Number, Item Description, and Category) for the steel products they wish to have an adjustment calculated. SPA-1 must be included in the same submittal as the payment bonds, performance bonds and contract execution signature sheets, or the Contractor will not be eligible for any steel price adjustment for any item in the contract for the life of the contract. The RE should note that if the SPA-1 form is not in the back of the contract, the Contractor elected to opt out of this special provision.
> The Contractor, utilizing SPA-2 will submit separate documentation packages for each line item from Form SPA-1 for which the Contractor opted for a steel price adjustment. Each document package will contain:
> Documentation number
> Steel product quantity in pounds

Date steel product was shipped from producing mill, date received on project, or casting date (depending on the steel category)
The Contractor will utilize the Department's Steel Price Adjustment Calculator Spreadsheet (SPA-3) to summarize all the steel production packages above and provide an affidavit of validity and accuracy. Note, the most current version of SPA-3 should be used with updated steel price indices.
The RE should verify SPA-3 for accuracy against the Contract SPA-1 and Material Received reports to confirm item eligibility, adjustment date, and quantity.
The RE should apply the steel price adjustment (payment or credit) on the monthly pay estimate, after verifying accuracy.
The RE should verify that adequate budget is available for the price adjustments and request additional funding to afford anticipated project expenditures.
The RE should upload all related back up information and the pay adjustment spreadsheet to the project SharePoint site for payment documentation.

Note: Calculations for price adjustment shall be shown separate from the monthly progress estimate and will not be included in the total cost of work for determination of progress or for extension of Contract time in accordance with Sub article 108-10(B)(1).

Material Discrepancy/Audit

Material Certification is the process by which the NCDOT certifies to the Federal Highway Administration (FHWA) that all materials and workmanship on each Federal Aid project are in compliance with the Standard Specifications for Roads and Structures (SSRS). The HiCAMS Project Certification module is a tool that identifies apparent discrepancies between Paid, Received, and Accepted material quantities for a project and allows early resolution of the discrepancies so that the maximum Federal Aid funding is received. Note that a project cannot be certified and closed until all material paperwork from the contractor is received. Waiting until the end of the project to review and receive material paperwork makes it nearly impossible to ensure all documentation has been received from the contractor. (Reference Physical Construction/Oversee Contractor Work/Material Discrepancy and HiCAMS User's Manual Chapter 12 Project Certification)

The RE should:

- Preview material discrepancies each month prior to paying estimates, to ensure required certifications and material paperwork is received.
- Investigate the material discrepancies and reason for difference in paid, received, and accepted materials.
- Take actions to address discrepancies with Contractor and/or project administration staff.
- Discuss materials discrepancies at construction progress meetings.
- Monitor discrepancy status and if necessary, take additional actions, including as a last resort, withholding payment for the item if the Contactor is not fulfilling their obligations.

Material Pre-Payment

Contractors are encouraged to purchase certain materials as soon as possible to ensure producers and suppliers can meet demand and negotiate the best prices for the project. Per Article 109-5 of the Standard Specifications, partial payments will be made up to 95% of

- the delivered cost of materials on hand that are to be incorporated in the work, provided that such materials have been delivered on or near the project and stored in an acceptable manner.
- the invoiced cost, exclusive of delivery cost, for bulky materials requiring fabrication at an off-site location that are durable in nature and represent a significant portion of the project cost, if it has been determined by the Engineer, that the material cannot be reasonably stockpiled in the vicinity of the work.

Reference HiCAMS User's Manual, Chapter4 Contract Tracking, Section 5 Review Material Prepayments.

The RE should perform the following:

- Verify materials are fabricated and stored in an acceptable manner either on site or at fabricator's facility.
- Verify the condition of material and document with photographs, if possible.
- Verify required documents accompany material received information.
    - Written consent of surety to make such partial payments,
    - Bill of Sale from the Contractor to the Department, and
    - Copy of invoice from material supplier verifying the cost of the material.
- Initiate payment on monthly pay estimate
- Upload all supporting information as documentation for payment.

Certified Payroll

For most Federally funded projects, the Prime Contractor is required to provide weekly Certified Payrolls, in the weeks in which work was performed, for themself and all subcontractors. The RE or assigned staff reviews payrolls to verify that payroll is obtained from any firm that performed work and that employees shown on the payrolls are being provided the minimum wage rates shown in the Wage Rate Determination included in the contract, per the requirements of the Davis Bacon Act. (Reference Physical Construction, Monitor Federal and State Regulatory Compliance)

Subcontractor Payment Tracking/ Prompt Payment

The prime contractor is required to report all payments to DBE/WB/MBs throughout the life of the contract. The RE should verify that the Contractor is providing prompt payment to their subcontractors per the requirements of 109-4 of the Standard Specifications. (Reference Physical Construction, Monitor Federal and State Regulatory Compliance)

Update Percent Complete/Anticipated Completion Dates

Per Article 108-8 of the Standard Specifications, the RE will evaluate the Contractor's progress at the time each partial pay estimate is prepared to determine satisfactory or unsatisfactory progress. Per 108-1 of the Standard Specifications, the Contractor shall pursue the work diligently with workmen in sufficient numbers, abilities and supervision, and with equipment, materials and methods of construction as may be required to complete the work described in the contract or as may be amended by the completion date. Unsatisfactory progress is described below:

(1) The dollar value of the work completed, excluding material payments allowed by Article 109-5, is less than the dollar value of the work that should have been completed, on the basis of the Contractor's approved progress schedule, by more than 15% of the current contract amount. The dollar value of the work completed will be the total estimate to date shown in the latest partial pay estimate, excluding material payments allowed by Article 109-5. The current contract amount will be the total amount bid plus accumulated overruns less accumulated underruns shown in the latest partial pay estimate.

(2) The percentage of the work completed is less than the percentage of contract time elapsed on the work by more than 15%. The percentage of work completed will be the dollar value of the work completed as defined above, divided by the current contract amount as defined above. The percentage of contract time elapsed will be the number of calendar days elapsed as shown in the latest partial pay estimate divided by the total contract time in calendar days.

(3) The Contractor fails to begin and pursue the work in accordance with Article 108-1 before the expiration of 5% of the original contract time after the date work was scheduled to begin based upon the approved progress schedule.

(4) The Engineer anticipates the Contractor will not complete the work described in the contract by the intermediate contract time or the contract completion date.

In evaluating and updating the project schedule, the RE should perform the following:

- Confirm all Supplemental Agreements are entered and updated in HiCAMS (Reference Physical Construction, Manage Construction Cost Changes, Supplemental Agreements)
- Confirm all anticipated overruns and underruns are adjusted in HiCAMS (Reference Physical Construction, Manage Construction Cost Changes)
- Confirm all material pre-payments are entered in HiCAMS. (Reference Physical Construction, Processing Monthly Estimates, Material Pre-payment)
- Confirm all time extensions to the completion date or intermediate completion date are entered in HiCAMS. (Reference Manage Construction Cost Changes, Supplemental Agreements and Physical Construction, Resolve Claims)
- Input the percent complete by progress chart into HiCAMS (Reference HiCAMS User's Manual/ Chapter 5 Contract Estimates/ Section 1 Processing Estimates Payments – Partial/ Review Estimates)

- Input the estimated completion date into HiCAMS.

HiCAMS utilizes the above information to calculate revised contract calendar days and anticipated liquidated damages per Specification requirements.

Liquidated Damages (LDs)

Once the partial payment is entered within HiCAMS, the RE should review the anticipated liquidated damages calculated by HiCAMS and add a comment to each contract time/intermediate contract time which has anticipated liquidated damages (Reference HiCAMS User's Manual/ Chapter 5 Contract Estimates/ Section 1 Processing Estimates Payments – Partial/ Review Estimates)

The Resident Engineer should review the contract completion date and any intermediate completion dates or times included in the contract to determine if anticipated liquidated damages should be withheld. Extensions or anticipated extensions of contract time per Article 108-10 of the Standard Specifications should be considered. The RE should detail their determination as to whether liquidated damages should be withheld and include such direction within the comment field on the Damages Tab. Review Open Issues To provide assistance in monitoring the quality control process, HiCAMS introduced a Tab called Open Issues. This Tab provides a snapshot view of outstanding issues. The issues detailed are many of those that are checked when a Final Estimate is forwarded to the Division Construction Engineer from the Resident Engineer. The issues shown on the Open Issues tab are:

1. Price Adjustment Recommendations that have not been closed
2. Failing Samples which have not yet been disposed
3. Field Inspection Reports for Concrete Pavement, Corrugated Metal Pipe, Guardrail, Precast, Prestressed, and SIP which have not yet been disposed.
4. Failing Density entries which do not have Pay Adjustment Recommendations
5. Claims that have not had a final decision processed
6. Electronic Material Receipts which have not been reconciled.

The Resident Engineer should review the Open Issues tab located on the Review Estimates window, to check for any "open issues" on contracts prior to sending a partial or final estimate to the Construction Unit. It is important that the Open Issues tab is reviewed because the outstanding item may result in the assessment of penalties and action should be taken in a timely manner as the penalty may have cost implications to the prime contractor, subcontractors, or material suppliers. (Reference HiCAMS User's Manual/Chapter 5 Contract Estimates/Review Estimates/ Open Issues Tab)

Processing Payment

When all open issues are addressed, damages are or are not assessed, pre-payments are reduced by the correct quantity, and pay adjustments have been checked and/or adjusted, the RE forwards the estimate to the Central Construction Unit (CCU).

Pay Adjustment

When the Materials and Testing Laboratory has tested a sample and it fails, the RE or Assistant Resident Engineer will receive a notice in HiCAMS. A nonconformance report is generated for the failing materials with potentially additional testing or corrective actions. Article 105-3 of the Standard Specifications allows the RE to accept materials and work at a reduced price. The RE would note that the material/work in question is not within reasonably close conformity with the contract and Specifications but reasonably acceptable and then recommend a pay reduction for the quantity of material/work failing to meet the standards. The Area Construction Engineer should be consulted regarding approval of the pay adjustment. (Reference HiCAMS User's Manual/Chapter 5 Contract Estimates/Review Estimates/ Open Issues Tab)

The RE should implement the following procedures concerning the processing of pay reductions:

1. Review the Open Issues tab prior to processing each monthly partial pay estimate.
2. Take appropriate action on all open issues. Action should be timely enough so that any penalty assessments can be included on the partial estimate covering the period in which the work was performed.
3. Notify the prime contractor in writing of any penalties that will be assessed on the partial pay estimate.
4. Notify the prime contractor in writing of any pending pay adjustments that cannot be completed prior to processing the partial pay estimate due to investigations. Investigations should be completed within 30 days and a follow-up letter sent providing formal disposition of the issue.
5. The RE should upload all information associated with a pay reduction, including the nonconformance report, retesting, discussions/correspondence, and outcome within the project SharePoint folder.

Monitor Project Schedule

Overview

Schedule: Support Team

- ✓ Project Development Engineer (PM)
- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Value Management Engineer

As previously discussed in the Basics Section, scope, schedule, and budget are all interrelated and modification to any one of these project components will result in additional impacts to at least one of the other components. Therefore, a RE's ability to proactively assess project risk and resolve project issues is crucial. Successful project management and delay avoidance occurs when potential risks are identified early and minimized/mitigated, and project issues are promptly resolved. These actions assist in keeping the project moving forward as originally planned and bid while retaining the project schedule and completion date. Thus, it is essential that the RE understand the Contractor's project schedule, sequence of activities (logic), activity durations, critical path, and controlling operation(s). It is the expectation of the Department that the RE and administrative staff be engaged in the project and actively participate as a partner with the Contractor in achieving the contract completion date while maintaining budgetary constraints. Delays to opening a project on time not only results in additional project costs but have implications to the Department's confidence/trust, road user delays/costs, and potential regional economic development. Therefore, thorough, and detailed discussions about the project schedule, upcoming activities, potential impacts, and realized delays should be the foundation of each construction progress meeting.

References

- ☐ NCDOT 2024 Standard Specifications – Section 108-2 – Progress Schedule
- ☐ NCDOT Construction Manual – 108-2 – Progress Schedule
- ☐ NCDOT Construction Manual – Sample Narrative & Progress Schedule
- ☐ Construction Manual: Records and Reports - Project Schedule
- ☐ Construction Manual (ncdot.gov)

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Schedule Narrative/Milestones	▪ *Review the narrative for compliance with ICTs, final completion date, and seasonal limitations.*	Resident Engineer	Assistant Resident Engineer
	▪ *Understand how local conditions, e.g. festivals, sporting events, can affect the schedule.*	Resident Engineer	Assistant Resident Engineer Technicians
Identify Controlling Operations and Changes	▪ *Perform and independent assessment of how the project should be built.*	Resident Engineer	Assistant Resident Engineer Lead Technician

Identify Controlling Operations and Changes	▪ *Engage the Contractor in their "as bid" plan for building the project.*	Resident Engineer, Contractor	Lead Technician
	▪ *Monitor the actual work completed, not just the cash curve, and engage the Contractor in conversation on how to mitigate unplanned impacts.*	Resident Engineer	Assistant Resident Engineer Lead Technician

Monitoring Project Schedule

A project schedule, as required by 108-2 of the Standards Specifications, is both a graphical and written plan of how the Contractor proposes to construct the project (scope) with 1) defined resources, 2) anticipated efficiency and 3) at contract award amount. Delays encountered to the schedule have the potential to impact resources, efficiency and ultimately cost.

The Specifications require the Contractor to develop a time scale diagram (Gantt Chart) with major work items (items composing more than 5% of the total project cost or occupying more than 10% of total contract time), anticipated durations, and milestone dates. A written narrative is also required which includes the sequence of work, the controlling operations, intermediate completion dates, milestones, project phasing, anticipated work schedule and estimated resources.

It should be recognized that transportation projects are composed of numerous interrelated construction activities sequenced together in various configurations to arrive at project completion and final acceptance. When analyzing any schedule (Gantt Chart or CPM), with a decreasing level of detail and quality of information, delay analysis becomes more subjective. Therefore, the RE should document all project schedule discussions and utilize information provided by the contractor to assist in getting a complete schedule perspective.

Schedules are dynamic, evolving documents that should not be evaluated as "originally planned". It is recognized that no schedule is perfect, and changes in the original construction plan will occur. Activities will shift; durations will increase or decrease; out of sequence work may occur. These events may restructure the project critical path and change the controlling operation(s) over the life of the project while still meeting the contract completion date. Thus, it is important to continuously discuss the schedule, sequencing of work, and critical path at each progress meeting.

So, what is a delay? A delay (noun) is a period of time by which something is postponed or is late. On construction projects, delays occur on a regular basis for a variety of reasons, some could be anticipated while others could not be anticipated. Delays to activities may occur without impacting a milestone or the schedule, these are known as noncritical delays, while those delays that impact the project completion (critical path) are defined as critical delays. All activities have the potential to migrate to the critical path if delays are not addressed and the float (time an activity can be delayed before delaying the project) is consumed. Therefore, it is incumbent for a RE to partner with the Contractor to minimize or mitigate all delays (critical and non-critical); however, it is the critical delays that should take precedence and garner the greatest amount of attention and effort. As the saying goes "Put first thing first".

Delays are also classified as excusable and non-excusable. Non-excusable delays are events that are within the Contractor's control or are foreseeable. Examples of non-excusable delays are:

- Failure to submit a shop drawing in time for review and approval.

- Failure of the subcontractor to mobilize to the project as scheduled.
- Failure to fabricate and deliver materials to the project as scheduled.
- Material failures and rework
- Historical weather conditions experienced in the location of the project (snow, ice, rainstorms)

Excusable delays are generally events that are unforeseen or beyond the Contractor's control. Examples of excusable delays are:

- Department direct changes
- Incorrect plans and associated plan revisions
- 3rd party project impacts (utilities)
- Department controlled activities (right of way)

It is valuable to understand and document all non-excusable delays as the project progresses, so they are not conflated into an excusable delay claim. Any delay analysis should include the project events that have occurred up to that specific point in time, including those non-excusable delays in which the contractor is not entitled to a time extension.

Lastly, delays can be classified as compensable or non-compensable. Non-compensable delays provide for time extensions with no compensation while the Contractor is entitled to additional compensation along with time for a compensable delay. It should be noted that only excusable delays can be compensable delays as non-excusable delays do not warrant a time extension or additional compensation.

The above stated, Article 108-10(B)3 of the Standard Specifications only allows for time extensions for critical, excusable, both compensable and non-compensable delays. As stated, the Contractor's current controlling operation must be delayed by circumstances originating from work required under the contract and beyond his control and without his fault or negligence.

Monitoring Schedule Best Practices

The project schedule is the most critical element in the administration of a construction project as it defines the activities, when they occur (logic), how long they take (combination of resources and efficiency), and cost (cash curve). As stated previously, the schedule should be the foundation of discussions during the project progress meetings. In monitoring project schedules the RE should perform the following:

- Review and understand the project scope.
- Thoroughly review the Contractor's project schedule and narrative. Ask questions and request additional information to get a complete picture of how the contractor anticipates building the project.
- Define critical path for the project.

- Keep schedule discussions at the forefront of all project progress meetings along with any changes to critical path/ controlling operation(s). Compile and document schedule information obtained during the progress meetings to assemble a comprehensive schedule perspective.
- Be cautious in reviewing the Contractor's CPM pdf screen shots. CPM schedules can be manipulated to reflect inaccurate schedule information. A proper CPM document should detail activities, durations, logic (how activities are interrelated), early start, late start, early finish, late finish, float, and critical path. Just because an activity is in sequential order on a CPM activity list does not mean there is a relationship between it and the adjacent activities. Seek assistance from Area Construction Engineer or Central Construction Unit if needed in CPM evaluations.
- Proactively evaluate risks, be forward thinking, anticipate potential project impacts
- Take prompt action to minimize and mitigate delays, placing the largest emphasis on critical and compensable delays.
- Document all delays, excusable and non-excusable, in an as-built schedule.
- If excusable delays occur, use the schedule that exists on that date (this schedule should include all non-excusable delays up to that date), not the "As Planned" schedule. Define time impacts to the critical path which exists at the time of the delay. When granting time, consider any intermediate completion dates or substantial completion dates along with the project completion date.
- Address delay impacts and grant time extensions, if warranted, as early as possible after the delay occurs. There is often hesitance to resolve the delay until the project is finished and impacts can be better defined. However, historically the further in time you get from the event, the specifics become cloudy. Claims for time extensions rarely decrease with the passing of time.
- Reference Physical Construction/Resolve Claims for procedures in processing the Contractor's request for time extension due to critical, excusable delays.

Maintain As-Builts

Overview

As-Builts drawings (also referred to as red-line drawings) illustrate how a Contractor built the project. Maintaining as-builts for erosion control, projects regulated by the Federal Emergency Management Act (FEMA), roadway, structures, and utilities is critical to document what was built vs. what was designed. Documenting what was actually constructed provides accurate information for maintenance and future projects in the area; demonstrates compliance with applicable standards, regulations, and permits; helps to mitigate potential future risks associated with the project; and demonstrates quality assurance.

References

- NCDOT Construction Manual, Records and Reports, Final Estimate Assembly Preparation Procedures.
- FEMA Certification
- FEMA Certification Sample Bridge Plan Sheet
- FEMA Certification Sample Culvert Plan Sheet – Culvert Section Normal to Roadway and End Elevation
- FEMA Certification Sample Culvert Plan Sheet – Location Sketch and Profile Along Centerline
- FEMA Certification Sample Culvert Plan Sheet – Roadway Profile
- NCDOT Construction Manual: Records and Reports – Electronic Filing System – Plans/Contracts.
- NCDOT Construction Manual: 15 Utilities

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Final As-Builts	▪ *Maintain General As-Builts*	Resident Engineer	
Erosion Control As-Builts	▪ *Erosion Control As-Builts*	Resident Engineer	Lead Inspector or Erosion Control Inspector
FEMA Certification	▪ *FEMA Certification As-Builts*	Resident Engineer	Hydraulics Unit
Roadway As-Builts	▪ *Maintain General As-Builts*	Resident Engineer	
Structures As-builts	▪ *Structures As-Builts*	Resident Engineer	Hydraulics Unit Structures Management Unit (SMU)
Utilities As-Builts	▪ *Utilities As-Builts*	Resident Engineer	

Maintain General As-Builts for the Project

The Resident Engineer (RE) should initiate procedures for administration staff to document field changes and as-built information throughout the project life and not wait until the end of the project. Reference Construction Manual, Records and Reports, Final Estimate Assembly Preparation Procedures for detail instructions on developing the as-built plans for roadway and structure projects.

Erosion Control As-Builts

As previously discussed, the RE is responsible for the administration and enforcement of the NCDOT's delegated sediment and erosion control program on construction projects.

The RE should take the necessary measures to:

- Verify that the project is constructed and maintained in accordance with the erosion control plans. Any modifications to the erosion control plans necessary to meet field conditions shall be clearly indicated on the set of erosion control plans maintained on the project.
- Develop, maintain, and make available on-site a set of as-constructed Erosion and Sediment Control Plans that denote the erosion and sediment control devices that have been installed on the plans with a date and initials, including dimensions and measurements.
- Color code and date all erosion control as-builts to document the installation of each device. Document on the as-constructed plans any modifications to the E&SC plans along with notes regarding the details of the changes. Upload final plans to project SharePoint folder.

FEMA Certification As-Builts

The Department has a Memorandum of Agreement (MOA) with FEMA and therefore must provide as-built plans and certification that projects with structures crossing FEMA-regulated streams or located within a 100-year flood plain were completed in accordance with the agreed-upon project plans and commitments. The Division shall submit sealed as–constructed construction plans along with a certification sealed by a professional engineer who is closely responsible for administering the project stating that the work within the floodplain has been constructed in accordance with the approved plans and project commitments. (Reference Construction Manual, Records and Reports, FEMA Certification and Guide for Preparing As-Built Plans for FEMA Compliance on Hydraulic Unit Connect Site)

The RE should perform the following associated with the FEMA Certification:

- Coordinate with the Hydraulics Unit and verify the certification is required and is consistent with the current FEMA MOA.
- Check As-Constructed Certification Checklist for FEMA Regulated Stream Crossings located within the Construction Manual, Record and Reports.
- Create certification of the as-constructed plans and have professional engineer in responsible charge sign and seal.
- Provide as-constructed plans and certification to the State Hydraulics Engineer at NCDOT_Hydraulics_As-Built_Plans@ncdot.gov.

Utilities As-Builts

Per Article 1500-7 of the Standard Specifications, the Contractor is required to provide as-builts for all installed utilities which include notations of the size and type material installed, coordinates of utility controls and horizontal and vertical locations of the piping sealed by a North Carolina Professional Land Surveyor (PLS).

- The Contractor should submit the as-builts to the RE electronically (such as a PDF).
- The Contractor should submit 2 hard copies in full-size sheets and PDF formatted files to the utility owner.
- The RE should confirm delivery to the utility owner and upload the utility as-built files to the project SharePoint folder.

Complete Construction Survey

Overview

Provide localized horizontal and vertical survey control; construction layout/staking; and measurements/modeling for accurate project construction and quantity verifications in compliance with plan and specification acceptable tolerances.

Construction Survey: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Office Party Chief
- ✓ Locations and Survey Field Operations

References

- ☐ Manual for Construction Layout
- ☐ NCDOT Construction Manual
- ☐ 2024 Roadway Standard Drawings
- ☐ 2024 Specifications and Special Provisions
- ☐ *Contract Documents*
- ☐ Location and Surveys Page
- ☐ *NCDOT Construction Manual, FEMA Certification*
- ☐ Structure Layout Video

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Meeting Minutes	▪ *Pre-Construction Survey Meeting*	Resident Engineer	Contract Surveyor
Automated Machine Guidance and Grading (AMG) Plan Digital Terrain Model (DTM)	▪ *Automated Machine Guidance (AMG)/Digital Terrain Model (DTM)*	Contract Surveyor	Location and Surveys

Pre-Construction Survey Meeting

When Construction Surveying is included within the Contract and the Contractor is responsible for completing the project's construction survey, the Resident Engineer (RE) should initiate and conduct a Pre-construction Survey Meeting in accordance with *Chapter 1, Section 1.4, of the Manual for Construction Layout.*

During the meeting, the RE and the contract survey team should discuss:

- Method for setting up survey books or electronic data files
- Required drainage, utility, structure and other submittals and approval procedures
- Localized surveying control and accuracy of traverse.
- QA/QC procedures to identify errors and omissions in staking and layout so the project is built correctly the first time, avoiding costly delays and rework.
- Methods for resolving notifications of discrepancies and Requests for Information (ROIs).
- Survey standards as outlined in *Article 801-2 of the Standard Specifications*.
- Payment processes as outlined in *Article 801-3 of the Standard Specifications*.

The RE uploads the meeting minutes to the project's SharePoint site.

Verify Survey Control

The RE should provide the Contractor project control data which is typically referenced in the contract documents or may be accessed by visiting the Location & Surveys home page and navigating to the NCDOT Project Control Data. If needed, the RE should contact the Location & Surveys Office for further information and assistance.

The RE should refer to the *Manual for Construction Layout* regarding methods and procedures to recover, verify, and reference the horizontal and vertical controls:

- See Chapter 2, Section 2.2, "Verifying Control Points," Section 2.3 "Referencing Control Points," and Chapter 2, Section 2.4, "Submittal Requirements,".

Automated Machine Guidance (AMG)/Digital Terrain Model (DTM)

The Contractor may elect to use automated machine guidance in conjunction with Section 801 of the *Standard Specifications*. All equipment using Automated Machine Guidance (AMG) will generate results that meet the Standard Specifications.

For reference, the RE should consult Chapter *19 of the Manual for Construction Stakeout*, which states that the Contractor shall be responsible for all errors resulting from the use of AMG and shall correct deficiencies to the satisfaction of the Engineer at no cost to the Department.

If the Contractor elects to use AMG, they must adhere to the following requirements (see Section 19.2 of the *Manual for Construction Surveying*):

- Provide proper control points.
- Provide conventional survey grade stakes at 500-foot intervals.
- Provide hubs at the top of the finished subgrade at all hinge points.
- Set final grade stakes.
- Set slope stakes regardless of grading methods for slope protection under bridges and other critical areas.

If the Contractor elects to use AMG, a Digital Terrain Model (DTM) of the design surface and all intermediate surfaces shall be developed and submitted to the RE for review. The RE verifies the DTM is correct.

Best Practices: DTM

- ✓ Check the DTM model against the plans.
- ✓ Perform traditional field checks early to confirm the model represents the information on the plans.
- ✓ Verify adequate survey control exists for AMC and control is accurate.
- ✓ Use GPS rovers to spot check behind AMC operations
- ✓ Check against conventional grade stakes
- ✓ Have survey party check critical elements along project.
- ✓ AMG equipment should be routinely calibrated to confirm precision of equipment.

At least 90 days prior to beginning grading operations, the Contractor shall submit to the RE an AMG work plan to include, but not limited to, proposed equipment, control software manufacturer and version, types of work to be completed using AMG, project site calibration report, repetitive calibration methods for construction equipment and rover units to be used for the duration of the project, how the Contractor will check into bench marks and the frequency of check-ins, and local GPS base station to be used for broadcasting differential correction data to rover units (this may include the NC Network RTK).

Until the DTM and AMG plan are received and approved by the Engineer, the Contractor shall provide conventional stakes and use conventional staking methods for all operations including but not limited to slope stakes, intermediate grade stakes, ditch stakes, and fine grade stakes. (see Chapter 19, Section 19.3 of the *Manual for Construction Layout*).

Check Survey Stakeout by Contractor

The RE should perform checks to verify the roadway, structure and incidental items are surveyed in accordance with the plans and the Manual for Construction Layout. In a similar fashion to quality assurance during inspection, assessments of the surveying should be conducted to confirm surveying accuracy. Random survey calculations, measurements, and assessments should routinely occur throughout the project on a variety of operations, to include earthwork, grading, structures, drainage, pavement, etc. Survey of critical elements such as structures should be performed to ensure accuracy.

- Confirm the proper method of clearing has been staked on the project to avoid any permit violations.
- Perform a 100 percent review of the initial structure layout
- Complete a check of at least 20 percent of roadway items throughout the project limits.
- Reviews all submittals to confirm contract compliance, document any errors or omissions, and return them to the Contract Surveyor for correction.

Best Practices: Survey

- ✓ Remember the old carpenters' adage "Measure Twice, Cut Once"? It applies to surveying as well!
- ✓ Always check and recheck survey work. When possible, check your work in a different way than it was initially calculated and staked.
- ✓ Confirm accuracy of survey equipment.

A Contract Surveyor's personnel must work under the direct supervision of their project engineer, or a professional land surveyor licensed by the State of North Carolina in conformance with the *North Carolina General Assembly* Chapter 89C—Engineering and Land Surveying (see Article 801-2 of the *Standard Specifications*).

Pipe Survey/Layout

Article 801-2(F) of the *Standard Specifications* addresses drainage and utility construction. Also see Chapter 8, "Pipe Stakes," of the *Manual for Construction Layout* for the layout of permanent and temporary drainage. Pipe summary sheets should not be used for construction stakeout. It is the responsibility of the construction stakeout crew to verify that the drainage systems detailed in the plans will function. The RE should review the drainage system stakeout to be certain that it will function as staked. Article 300-7 of the Specifications requires that no heavy equipment be allowed to operate over

any pipe culvert until the backfill is completed to at least three (3) feet above the top of the pipe. This depth may be increased if, in the opinion of the RE, the Contractor's equipment causes damage to the completed pipe culvert. In any event, it is the Contractor's responsibility to conduct his operations in such a manner as not to cause damage to any completed structure. Where possible, technicians should periodically inspect completed pipe culverts for possible damage caused by live loads developed from the construction operations. This minimum cover must be maintained until heavy equipment usage is discontinued and the Contractor is prepared to set the final grade.

- The RE verifies the correct cover is placed on the pipes. Check permit requirements to confirm pipes and culverts are buried to the appropriate depth.
- The RE ensures the cut sheets are being submitted and reviewed

Structure Layout

- For structure items, the RE will visually check the stakeout of box culverts and other minor structures for conformity to the Contractor's layout drawings. For bridges, upon completion of the bridge stakeout and prior to work beginning, the Department's survey crew will make an independent check of each reference point and each temporary benchmark. The surveyor confirms the structure dimensions in the plans i.e., confirm the span length of a girder matches the bents, bolt pattern layout, and the given dimensions.
- The surveyor consults *Chapter 17, Major Structures of the Manual for Construction Layout* and the *Construction Manual*
- The surveyor completes stakeout and control for the construction of major structures, such as bridges, culverts, and overhead signs.
- The RE reviews the Contractor's method for computing buildups over beams, screed grades, and overhang form elevations for review prior to staking out these items. The RE should confirm that Buildups and the screed grading are done in accordance with the *Construction Manual* and the *Manual for Construction Layout* and the Structure Layout Video on the NCDOT YouTube channel as listed in the references above.

If the culvert or bridge is in a FEMA Flood Study Area, an engineer or surveyor certifies and seals the plans showing the actual elevations as constructed and submits them to: NCDOT_Hydraulics_As-Built_Plans@ncdot.gov

Cross Sections/Photogrammetry

Depending on several factors, e.g. quantity of earthwork, survey resources, accessibility of borrow/waste sites to aerial photography, the RE may elect to measure and calculate earthwork quantities through manual cross-sections/DTM or aerial photogrammetry per Article 801-2(E) of the *Standard Specifications*.

The RE should determine the method of control for earthwork in compliance with Article 225-7 of the *Standard Specifications*. Decisions regarding earthwork measurement should occur early in the project to allow for proper planning and initial surveying prior to any earthwork operations.

The surveyor will obtain an adequate amount of survey points to an original DTM and then compare it to the final DTM.

Note: The RE can have multiple sets of original and final DTMs. The RE should create file names that clearly identify them within the project folder. Retaining a spreadsheet with the file names, descriptions and quantity of earthwork is helpful in processing monthly estimates and the final estimate documentation. The original DTM data set and the final DTM data set should be packaged and transmitted with the final estimate.

Best Practices: Cross Sections/Photogrammetry

- ✓ Get the earthwork captured before the material will be removed.
- ✓ If using Photogrammetry, coordinate early on with the Photogrammetry Unit.
- ✓ If using the aerial method, it requires more lead time and the development of a flight plan prior to the initial flight. Control needs to be set for the flight.
- ✓ The NCDOT Location & Surveys Office can do sonar mapping if a pit's excavation is below the water table and cannot be accessed by other methods.
- ✓ Utilize the Construction Manual, Engineering Control section, as a reference.

Verify Contractor Survey Amounts

The Contractor submits a monthly certified statement, providing a breakdown of the quantity of surveying that was completed. The RE should review this statement for accuracy of the surveying quantities.

Note: Surveying needs fluctuate over the course of project construction. Initially, a significant volume of surveying is required for verifying information, calculations, and staking. Following the completion of initial project staking, minimal surveying may be necessary until the commencement of the next project phase.

The RE should not authorize full payment of the entire lump sum amount until project completion, as survey work remains ongoing until the ROW monuments are established, and all operations are completed and accepted.

Complete Construction Stakeout

The Contractor shall provide monthly survey records and all remaining records at the completion of the project. The Contractor shall attest that the surveying and construction layout was performed in accordance with the contract by providing all receivable information signed by an engineer or land surveyor licensed by the State of North Carolina and in responsible charge.

The surveying of ROW shall be performed under the responsible charge of a North Carolina Professional Land Surveyor (PLS). Prior to the acceptance of the project, the surveyor shall re-establish and verify existing ROW monuments or the replacement of existing monuments with other material (concrete R/W markers, new iron pins, etc.). The surveyor shall attest that all right of way, permanent easement, and control-of-access monument positions are verified with signed and sealed attestation by PLS of said verification in accordance with the Manual for Construction Layout.

See "Report of Final ROW and Permanent Easement Survey" example in the *Manual for Construction Layout*; Article 801 (D) of the *Standard Specifications*; and Chapter 15 of the *Manual for Construction Layout.*

Manage Work Zone

Overview

The RE should implement initiatives to manage the defined construction limits, or work zone, and to inform the traveling public of potential hazards or changing road conditions. The work zone and associated traffic control devices protect project personnel from vehicle traffic and are critical to both Contractor and Department personnel safety.

Work Zone Management Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Project Development Project Management
- ✓ Traffic Management
- ✓ State Traffic Management Engineer
- ✓ State Work Zone Engineer
- ✓ Traffic Safety Systems Engineer

References

- ☐ *Manual on Uniform Traffic Control Devices (MUTCD)*
- ☐ Standard Drawings: Division 11 Work Zone Traffic Control
- ☐ Construction Manual: Division 11 Traffic Control
- ☐ Special Provision: Maintenance of the Project
- ☐ Special Provision: Work Zone Supervisor/Installer
- ☐ Verified Work Zone Personnel Lookup
- ☐ Pedestrian Accommodation at Curb Ramp Work Location
- ☐ *Project Plan Sheets (TMP, Pavement Markings, Signals, Erosion Control)*
- ☐ TIMS (Traveler Information Management System)
- ☐ Worksite Audit Form
- ☐ Communications Office
- ☐ Property Damage Claim Incident Statement
- ☐ NCDOT Guidelines for the Level of Pedestrian Accommodation in Work Zones, July 2018

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Temporary Traffic Control Certifications	▪ *Manage Temporary Traffic Control*	Resident Engineer	▪ Resident Engineer Staff ▪ Area Construction Engineer ▪ Traffic Services Unit ▪ Contractor
Work Zone Sign Certifications	▪ *Manage Work Zone Signs*	Resident Engineer	▪ Resident Engineer Staff ▪ Contractor
Work Zone Pedestrian Accommodations Revisions (As Needed)	▪ *Manage Pedestrian Traffic Control*	Resident Engineer	▪ Resident Engineer Staff ▪ Division Construction Engineer/Area Construction Engineer ▪ Contractor

Transportation Management Plan Phasing Revisions (As Needed)	▪ *Implement Transportation Management Plans Phasing*	Resident Engineer	▪ Resident Engineer Staff ▪ Area Construction Engineer ▪ Design Team ▪ Contractor
TIMS Project Information and Other Media Outreach Materials	▪ *Perform Public Involvement and Media Relations*	Resident Engineer	▪ Resident Engineer Staff ▪ Communications Office
Signed Worksite Audit Form	▪ *Complete Worksite Audits*	Resident Engineer	▪ Resident Engineer Staff ▪ Safety Officer
Incident Statement and Division Construction Engineer Email	▪ *File Incident Statements/Tort Claims*	Resident Engineer	▪ Division Construction Engineer ▪ Contractor

Manage Temporary Traffic Control

After receiving the Contractor's listed personnel (e.g., work zone supervisors, installers, flaggers, and others) during the Pre-construction Conference, the RE confirms that such personnel are certified and listed on the *Verified Work Zone Personnel Lookup* (see Lead Pre-construction Conference for additional information). Temporary traffic control certifications of the Contractor's representatives should be uploaded to the project's SharePoint site.

The RE should discuss the maintenance of traffic and temporary traffic control during the preconstruction meeting and at project construction meetings to include:

- Sign spacing, taper lengths, and buffers
- Blunt-end protection
- Illuminated nighttime flagger stations
- Equipment/material storage and drop-offs
- Railroad coordination

During construction, the RE, or assigned representative, verifies that the Contractor uses the correct temporary traffic control devices, and that they are installed according to the Transportation Management Plans (TMP) and the *Standard Drawings: Division 11 Work Zone Traffic Control* when implementing lane closures, lane shifts, or traffic pattern alterations. For smaller projects without a TMP, temporary traffic control should be installed according to *Standard Drawings: Division 11 Work Zone Traffic Control.*

Best Practices: Manage Temporary Traffic Control

- ✓ Utilize law enforcement during traffic signal work or in areas with heavy traffic volumes.
- ✓ Utilize automated flagger devices (AFAD) or portable traffic signals to reduce worker exposure.
- ✓ Coordinate flagger stations with adjacent projects.
- ✓ Utilize flashers to draw attention to digital signs about reduced speed limits.
- ✓ Remove signage as soon as work is complete to reduce public complacency about traffic control signs.

The RE, or assigned representative also:

- Conducts a daily ride-through of the work zone to verify temporary traffic control devices are visible and set up properly.
- Coordinates any traffic control deficiencies or field adjustments with the Contractor as soon as possible.
- Monitors the work zone traffic control pay items and understands potential options for alternate traffic control devices.

Best Practices: Manage Pedestrian Traffic Control

- ✓ Implement ADA-compliant devices when closing sidewalks.
- ✓ Establish detours that are traversable and hazard free.
- ✓ Do not block sidewalks where work is not occurring with equipment or material storage.

The RE should periodically drive through the work zone during both daytime and nighttime operations to review the maintenance of traffic and traffic control devices. Items which should be inspected include sign reflectivity, placement, and adequacy, traffic barrier location (should not undulate in and out), reflective markers, and condition; lane closure taper lengths and signing; egress and ingress; safety/emergency pull off areas; debris along barrier (may present hazard); lighting, especially initial lane closure taper; pavement marking to include removal of conflicting lines; pavement markers especially at tapers and lane shifts; and Changeable Message Signing. Reference Policy for the use of Changeable Message Signs within the Construction Manual.

Manage Work Zone Signs

Work zone signs are installed to notify the traveling public that they are entering an active work zone, prompting them to be alert, expect changing conditions, and watch out for construction personnel.

The RE ensures that the Contractor installs the required work zone signs at the project limits (beginning and ending) and side streets (Y lines) according to the project's plans, special provisions, and *Standard Drawings: Division 11 Work Zone Traffic Control*.

The RE, or assigned representative, documents the work zone sign certifications in the Materials Received Report and uploads it to the project's SharePoint site.

Best Practices:

Manage Work Zone Signs

- ✓ Cover signs if no work takes place for seven (7) or more days.
- ✓ Coordinate beginning and end work zones with adjacent projects.
- ✓ Remove signage as soon as work is complete, so they do not lose meaning with the public.

Manage Pedestrian Traffic Control

Provide pedestrian traffic with safe passage through the work zone without exposing them to potential dangers related to construction equipment or unsafe road crossings.

The RE, or assigned representative, should:

- Ensure that the Contractor implements the pedestrian traffic control plan in accordance with the plans and contract documents.
- Routinely review the project to identify any necessary field adjustments, and coordinate field adjustments with the Contractor as soon as possible.

If pedestrian traffic is present and a pedestrian plan was not detailed in the project plans, contract documents, the RE should coordinate with the Division Construction Engineer (DCE), Traffic

Management, and/or Area Construction Engineer (ACE) to determine the required level of pedestrian accommodation in accordance with the NCDOT Guidelines for the Level of Pedestrian Accommodation in Work Zones, July 2018, *Pedestrian Accommodation at Curb Ramp Work Location* guidance. The RE informs the Contractor of any additional work zone pedestrian accommodations.

Perform Public Involvement and Media Relations

The RE has an important role in implementing strategies that keep the traveling public informed about the need for construction, when and how construction takes place, how the construction may impact their travel and what alternate routes are available. As detailed in Coordinate Initial Construction Public Outreach, the RE is responsible for inputting project information into TIMS, which is published on the Department's social media platforms. The RE coordinates with the Communications Office to disseminate project information through a variety of other means including:

- News releases
- NCDOT website updates from the project team
- Social media
- Community groups and stakeholders
- Project one-pagers and other collateral

Depending on the project, multiple resources may be needed to target local and/or regional travelers, affected property and business owners, and emergency services. The RE may also be asked to provide and/or prepare staff for media interviews or media briefings.

Complete Worksite Audits

The RE, or assigned representative, performs a monthly worksite audit, which is located within the Construction Manual Forms and Examples, under Division 11 Traffic Control, to identify potential work zone safety issues and opportunities for safety improvements for all road users and workers.

The RE, or assigned representative, completes the *Worksite Audit* Form (physical hard copy or fillable PDF on the project' SharePoint site) to rate the work zone on a specific list of categories. In general, the worksite audit confirms:

- On-site workers are utilizing the appropriate Personal Protective Equipment (PPE).
- Tools are right for the job and are being used correctly.
- Traffic control equipment is in good condition and installed according to plans
- Specific measures are in place to protect workers from known hazards.
- Other common project safety items are addressed and are not creating a hazard.

The RE, or assigned representative, immediately communicates safety concerns to the Contractor for corrective action.

The RE, or assigned representative, uploads the signed *Worksite Audit Form* to the project's SharePoint site.

File Incident Statements/Tort Claims

Per Article 107-14 of the Standard Specifications, the Contractor shall indemnify and save harmless the Board and its members and the Department, its officers, agents and employees from all suits, actions, or claims of any character brought for any injury or damages received or sustained by any person, persons, or property by reason of any act of the Contractor, subcontractor, its agents or employees, in the performance of the contract. Incident statements, or Tort Claims, are used to document work zone related incidents that result in damage or injury to a person and/or property.

The RE, or assigned representative, documents any known incidents involving the traveling public which occur within the work zone by submitting an online *Property Damage Claim Incident Statement.*

Per Article 104-10, Maintenance of the Project, the Contractor is responsible for repairing roadway conditions that may cause vehicle damage in an active work zone. To address work zone related incidents, the RE or assigned representative:

- Forwards the Contractor the work zone related incident statement.
- Ensures necessary work zone changes are made to prevent further incidents.
- Emails the DCE relevant information about how the issue was addressed.

Integrate Structure Activities

Overview

Integrating structure activities is a crucial project element that improves efficiency and cost-effectiveness; minimizes traffic disruptions, and promotes more efficient management of traffic in the project area; provides the traveling public with a more seamless transition by coordinating road alignment, elevations, and lane widths; allows for efficient allocation of resources such as equipment, materials, and labor; enables better and more effective management of environmental considerations; and can improve overall safety as standards and practices are applied consistently throughout the project.

Structure Construction Management Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Materials Engineer
- ✓ Structures Management Unit
- ✓ Geotechnical Operations Engineer
- ✓ Oversize/Overweight Permit Unit
- ✓ State Signing and Delineation Engineer (for Overhead Signs)
- ✓ Hydraulics Unit
- ✓ Division Environmental Officer

References

- ☐ Structure Layout
- ☐ Pile Driving Log
- ☐ Drilled Shaft Pre-Drill Meeting
- ☐ Bridge Deck Pre-Pour Meeting Checklist
- ☐ Latex Modified Concrete Pre-Pour Checklist
- ☐ Deck and Rail Acceptance
- ☐ Advance Notice of New Structure Completion
- ☐ Sounding Drilled Shafts for Cleanliness Video
- ☐ A Guide to Cranes and Derricks, NCDOL
- ☐ NHI Drilled Shaft Inspection Tutorial, FHWA-NHI-132070B
- ☐ YouTube NCDOT 2011 Structure Inspection Training
- ☐ YouTube NCDOT Structure Training Series
- ☐ YouTube NCDOT Transverse Screed Setup videos 1 thru 4

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Foundation Design and Calculations, Design Plans, Shop Drawings	▪ *Temporary Bridge Inspection Process*	Contractor	Resident Engineer
Engineer Acceptance Report		Resident Engineer	Structures Management Unit (SMU)
Crane, Rigging, and Personnel Certifications	▪ *Crane Safety/Critical Lift*	Contractor	Resident Engineer
Bridge Demolition Plan	▪ *Bridge Demolition Plans*	Contractor	Area Construction Engineer Structures Management Unit
Traffic Control Plans	▪ *Road Closures*	Contractor	Resident Engineer

Key Stakeholder/Public Notifications	▪ *Press release*	Resident Engineer	Area Construction Engineer Structures Management Unit Division Public Information Officer
Pile Driving Log	▪ *Pile Driving Log*	Resident Engineer Structure Inspector	Geotechnical Engineer
Meeting Minutes	▪ *Pre-Drill Meeting*	Contractor Resident Engineer	Area Construction Engineer Regional Geotechnical Operations Engineer
Shaft Integrity Tests (SID)	▪ *CC Shaft Integrity Testing (SID) for Drilled Shafts*	Contractor	Resident Engineer Materials and Testing
Girder Erection Sequence Plan	▪ *Erection Sequence Plan for Girders*	Contractor	Resident Engineer Structures Management Unit Railroad Owners (if applicable)
Meeting Minutes	▪ *CC Bridge Deck Pre-Pour Meeting*	Resident Engineer	Contractor Materials and Testing Area Construction Engineer Concrete Supplier Pump Truck Provider
Engineer Acceptance Report	▪ *Deck and Rail Inspection*	Area Construction Engineer Resident Engineer	FHWA
Advance Notice Structure Completion Form	▪ *Advance Notice Structure Completion Form*	Resident Engineer Structures Management Unit	

Temporary Bridge Inspection Process

Before opening a temporary bridge structure to traffic:

1. The Resident Engineer (RE) confirms it was built in accordance with the Project Special Provisions and the approved stamped drawings,
2. The Area Construction Engineer must complete an inspection of the bridge and advise that the workmanship is acceptable
3. The Contractor must submit a written statement certifying that the erected structure complies with the accepted detailed drawings.

For Temporary structures utilizing modular panels the bridge shall be inspected and certified by a manufacturer's representative utilizing the Temporary Bridge Inspection Report (Temporary Bridge Inspection Report Notes) and inspected every 3 or 6 months throughout the life of the temporary structure, depending on the AADT of the facility, in accordance with the Project Special Provision. Note that normally 90 percent of the lump sum price is compensated for the temporary structure construction/installation and 10 percent is withheld for maintenance and removal costs. The withheld portion of the lump sum bid price shall be included in the partial estimate for the month in which the temporary structure is satisfactorily removed.

Prefabricated Structure

The Contractor submits the foundation design and calculations to the Department for approval/acceptance by the Structures Management Unit (SMU).

The Contractor submits shop drawings from the supplier, plans, and calculations for SMU approval.
A representative from the supplier inspects the temporary structure upon completion, and regularly thereafter during the utilization of the temporary structure, according to the schedule in the provision.

New Temporary Structure

- The Contractor submits the design plans, calculations, and foundations design for SMU approval.
- A representative from the Department's Materials and Tests Unit inspects any used materials incorporated into the structure.
- A representative from the Contractor inspects the temporary structure upon completion in accordance with the Special Provisions, and regularly according to the schedule in the provision.
- The RE or Area Construction Engineer completes the Engineer Acceptance Report, located within the Construction Manual, Forms and Examples, Section 4 Major Structures, and upload the document to the project's SharePoint site with copies submitted to the appropriate units listed.

The RE should provide the Department's Oversize/Overweight Permit Unit with the estimated date that the structure will open to traffic so their staff can re-route or issue necessary permits to motorists whose vehicles are overweight, over width, overlength, and over height.

Asbestos and Lead Inspections

Existing structures may contain hazardous materials that require safe removal and disposal during demolition. Structures most commonly contain lead-based paint and materials that contain asbestos, both of which pose significant health hazards to people and animals. The RE should provide information to inspection staff regarding these hazards and advise staff against exposure during the removal process unless staff has obtained the appropriate training and protective equipment.

The RE confirms that the Contractor completes asbestos inspections of existing structures in accordance with the Project Special Provisions before any demolition works on the existing structure begins. The RE pays for the inspection under the Asbestos Inspection pay item. If the Contractor discovers asbestos on the structure during the inspection, the RE issues a Supplemental Agreement for the cost of the asbestos removal.

The RE confirms that the Contractor completes lead inspections following Section 442 and all applicable Project Special Provisions before any paint removal or demolition work begins on the existing structure. The removal and disposal of lead-based paint is covered under the contract line item for Pollution Control.

In addition to being responsible for these critical inspection processes, the Contractor must provide notifications and reports to the appropriate agencies.

Crane Safety/Critical Lift

The RE and/or assigned representatives will monitor the Contractor's crane operations to verify safe lifts on the project, including appropriate personnel, equipment, and rigging. The RE and/or assigned representative will provide the following:

Confirm that the Contractor provides crane, rigging, and personnel certifications in accordance with the current Project Special Provisions.
Review the qualifications of all personnel including Competent persons, Riggers, and Operators to ensure conformance with the project's Special Provisions.
Conducts periodic checks to confirm Crane Inspections are being conducted by the contractor and are current.
Confirm the swing area of the crane cab and counterweight is barricaded against entry into the danger zone and that pinch-points have been identified and marked/barricaded.

The Contractor must notify the RE if any changes to equipment or personnel are made and submit the change(s) to the RE for approval.

Drilled Pier Installation and Permanent Casing Decisions

The project plans will typically detail locations where permanent casing is required and will provide both top and bottom elevations of the casings. The casings are designed to normal water surface elevation which may fluctuate over time; therefore, a preliminary layout of the drilled-shaft locations is necessary to determine if revisions to the permanent casing lengths are e necessary. The Contractor should perform a preliminary layout of the drilled pier locations and confirm whether the elevations and lengths detailed in the plan remain appropriate. If revisions to the casing lengths or elevations is requested and required, the RE should consult with the Area Construction Engineer and the Geotechnical Engineer of Record and discuss specifics prior to implementing a plan revision.

Per Article 411-3(A) of the Standard Specifications, a minimum of 30 days prior to starting drilled pier construction, the Contractor is required to submit a comprehensive drilled pier construction plan to the RE. The RE should review each of the plan components and engage others/units as may be needed to verify the construction methods and materials proposed are satisfactory for the drilled pier installation specific to the project. Each structure or in some cases bents may have differing drilled pier construction methods proposed. Once satisfied with the Contractor's Drilled Pier Plan, the RE should provide approval in writing and upload the approved document with supporting information to the project SharePoint File.

Per Article 411-3(B) of the Standard Specifications, the RE should hold a drilled pier preconstruction meeting with the Prime Contractor, Drilling Contractor Superintendent, Driller Operator, Geotechnical Operations Engineer, Area Construction Engineer and structure inspectors to discuss the installation, monitoring, and inspection of drilled piers. The RE should bring the approved drill plan, Geotechnical Unit comments, and subsurface plans to the meeting. The Geotechnical Operations Engineer will discuss specifics for each shaft location. Other discussion items should include, but are not limited to, spoil disposal, where water will be pumped to and treated for wet shafts, drilling methods, placement methods, and testing requirements. Specific attention should be provided to placement, confinement, and potential environmental/erosion impacts of drilled pier spoils, especially when drilling in or near bodies of water.

The RE or designee should take meeting notes and distribute them to all meeting participants for review. Meeting participants notify the RE if the minutes do not accurately reflect what was discussed. The RE or designee shares the final, approved meeting minutes with all meeting attendees and uploads them to the Construction project's SharePoint site.

The RE should take actions, as necessary, to verify that inspections and documentations are occurring on site to ensure drilled piers are constructed in accordance with the plans and Specifications and that materials are sampled, tested, and are in conformance Specification requirements. RE should compile the appropriate drilled pier inspection forms, provide them to the Geotechnical Unit, and upload them to the project SharePoint folder.

The RE should require Drilled Pier Integrity Testing (crosshole sonic logging or CSL) when required by the plans or when whenever conditions arise which raise concern over the quality of the pier, e.g. suspected caving of the shaft walls, suspected water intrusion, problems with the concrete, or tremie and pump pipes which do not remain embedded in the concrete. The Area Construction Engineer should be consulted for guidance, as needed. The RE should obtain the Integrity Test Results, forward them to the Geotechnical Operations Engineer for further evaluation, and upload the project SharePoint folder. The Geotechnical Operations Engineer/Area Construction Engineer will advise the RE if further investigation is needed after an unsatisfactory test report. The RE should consult with the Area Construction Engineer should any drilled shaft repairs be required.

Reference: *Drilled Pier Logs*

One of the greatest risks in shaft construction is a "soft toe." In this situation, the bottom end or tip of the drilled shaft encounters soft soil or material that is less compacted instead of the anticipated firm, rock-like stratum. Because the load-bearing capacity of the foundation is reduced significantly when it rests on a "soft toe," this is extremely problematic. Shaft Integrity Testing (SID) inspections verify the condition of the bottom of the shaft before the pour occurs. The RE should discuss the need for SID inspections with the project team during the Pre-Pour Meeting and notify the Materials and Tests Unit in advance that SID might be necessary for the project. Upon SID testing the RE should notify the Contractor of the SID results and any corrective actions needed to begin the shaft pour.

Structure Demolition Plans

The Department must ensure that the demolition of existing structures is done in a way that protects the traveling public, workers, and the environment. Partial removal of a structure presents additional risks which also must be evaluated.

For most projects, a demolition plan is not included in the plans, so the Contractor develops and submits a demolition plan indicating the methods and sequence of demolition to the RE (refer to Section 402 of the Standard Specifications and any applicable Special Provisions). The Contractor's demolition plan should also include specifics regarding protection of the traveling public, lane closures, and detours.

The RE should forward the plan to the Area Construction Engineer (ACE) who approves the plan in coordination with Structures Management Unit, when more complicated structures are involved or if a partial bridge removal is occurring on a bridge that carries the traveling public.

The RE and ACE should review the Project Permit Conditions and requirements/procedures necessary to address environmental interests when bridge demolition is occurring over or near streams or wetland areas.

Road Closures

Because bridge construction cannot occur over live traffic, lanes or road closures may be necessary for the Contractor to build the structures safely. Road and lane closures could involve on- or off-site detours and traffic shifts.

Best Practice: Working with Contractors

- ✓ The Inspector reviews traffic control daily.

The Project Traffic Management Plan (TMP) detail the roadway phasing and structure sequence. If the Contractor requests changes to the structure sequence, the RE should consult with the Traffic Engineer of Record, Structure Management Unit and the Area Construction Engineer during the review of such request. The RE should provide any approvals in writing and preferably a plan revision prior to such sequencing revisions occurring.

The Contractor should implement any detour, traffic shift or lane closures in accordance with the Traffic Management Plans (TMPs). The RE should consult the contract to determine if the Contractor of Department forces are designated to install the off-site detour signs.

The RE Should drive the traffic shifts and/or detour and verify the appropriate signing and traffic-control devices have been installed and they comply with the approved plans or standard drawings. The RE or assigned representative should periodically review the traffic-control devices to confirm they provide necessary protection and direction for the traveling public.

The RE and/or Division Public Information Officer (PIO) should notify the appropriate stakeholders when implementing detours and the timeline for installation and removal. Stakeholders include but are not limited to emergency responders and Emergency Medical Services (EMS) personnel, schools, transit providers, the Oversize/Overweight Permit Unit, the Traffic Information Management System (TIMS), and US Postal Services.

Settlement Gauges

The project plans, typically sheet 3G-1, will specify whether the Contractor is required to install settlement gauges within the end bent approach fill sections. Settlement gauges are typically required to monitor the amount of settlement/consolidation of the embankment when there is a surcharge or waiting period required for the embankment. The specified waiting periods to minimize and control settlement for the end bents, if required, will also be detailed within the Plans. These waiting periods are estimated based upon limited soil testing and may be extended pending outcome of the settlement gauge results. The termination of the waiting period shall be determined by the geotechnical engineer of record based on the settlement gauge monitoring data. The RE should collaborate with the Geotechnical Operations Engineer in the review of the Settlement Gauge data and notify the Contractor in writing once the end bent has consolidated to an acceptable amount and construction of the end bent can occur. The RE should upload this notification along with the settlement data within the project SharePoint folder.

Concrete Pile Order Lengths - Form Letter to Contractor

Because concrete piles are difficult to splice, it is important to get the correct length of concrete pile when ordering them. As a result, Article 450 of the Specifications specifies that the Contractor should use the estimated pile lengths provided in the plans for pile order lengths for prestressed concrete production

piles or the Engineer will provide pile order lengths based on testing prestressed concrete piles with the pile driving analyzer (PDA). For bridges with staged construction and pile order lengths based on testing prestressed concrete piles with the PDA, order lengths for latter stages will not be provided until pile driving for previous stage of construction is complete.

Upon receipt of the authorized pile lengths, the RE should promptly notify the Contractor, using a the standard form letter, of the length of prestressed concrete piles to be ordered for each bent and the authorized linear feet to be paid

Pile Driving Log

Pile driving equipment should be adequate to drive the size and length piles required without causing damage to the piles. Heavier piles require pile hammers with higher energy ratings. Before pile driving is started, the RE should verify the hammer proposed and that the such hammer has been approved for use in accordance with **Article 450-3(D)2** of the Specifications.

A pile driving memorandum will be furnished to the RE by the Geotechnical Engineering Unit. The memorandum will provide specific information for the proposed pile hammer or hammers for the specific foundation locations. Maximum and minimum penetration rates for **10 blows** will be provided. The RE or assigned staff should utilize the pile driving log and measure the rate of penetration per 10 blows and confirm that piles are driven within the approved driving table provided. The structure inspector's pay record book should indicate the required minimum blow count was achieved, pile lengths and cut off lengths. After completing the pile driving log, the Structures Inspector stores it in the Structures Folder in the Construction project's SharePoint site.

Pre-Drill Meeting

Erection Sequence Plan for Girders

Because of the extreme size and weight of the members, setting girders can be dangerous and risky during bridge construction. To ensure this process occurs as safely as possible, a girder erection sequence plan is developed, approved, and followed.

The RE and Contractor should review the structure drawings to determine if a girder erection sequence plan is included in the plans. Typically, girder erection sequence plans are included in more complex steel structures with details about setting and splicing together multiple pieces of steel girders.

The Contractor is required to follow the girder erection sequence plan as detailed in the structure plans, assuming one is included. If such a plan is not included, the Contractor should furnish an erection sequence plan for review and approval by the Structures Management Unit (SMU).

When setting girders for structures over a railroad, the girder erection sequence plan should also be reviewed and approved by the owner of the railroad. The RE should reference the contract documents and project special provisions regarding railroad requirements and protection of railway interest.

The RE and/or the assigned representative reviews the details of the girder erection sequence plan to confirm the Contractor is following the approved plans and the requirements of Sections 430 and 440 of the Standard Specifications. Special attention should be paid to the pick points for steel girders to verify the structural materials remain clean and free from damage per Article 1072-9 of the Standard Specifications.

Dry Runs on Bridge Decks

The RE should initiate actions to ensure the Contractor has performed an acceptable screed dry run in accordance with the Dry Run Procedures for Transverse Screeds within the Construction Manual verifying the screed is properly positioned on the screed rails and at proper skew, truss is squared, carriage rail adjusted and straightened, paving rollers are aligned, screed crown is set, and screed set to grade. Ideally the screed dry run should occur prior to the Pre-Deck Pour Meeting. Reference YouTube NCDOT Structure Training Series and Transverse Screed Setup Videos 1 through 4.

Bridge Pre-Deck Pour Meeting

The final driving surface of the bridge, and its appearance, are a primary concern for the traveling public. Deck pours involve large quantities of concrete that are poured over the course of several hours requiring planning and attention to details.

The RE should schedule a Structure Pre-Deck Pour Meeting to include the Contractor, Bridge Subcontractor, Concrete Supplier, Pump-Truck Operator, Area Construction Engineer, Material and Tests Representatives, and the structure inspection team. The RE should use either the *Concrete Pre Pour Checklist* or the *LMC Pre Pour Checklist* as a guide for the meeting and should include but not limited to verification of superstructure components (SIP Forms, tying of reinforcing steel, overhangs, deck drains, etc.); Pour Sequence and proposed methods for delivery of concrete, including location of pump truck; Concrete Mix Design, clean out area, and testing of concrete; Screed setup, dry run and adequate coverage of reinforcing steel; Weather conditions; fogging methods; curing materials and blankets if necessary; traffic control; and safety risks with mitigation strategies. Other topics may include

The RE or designee takes meeting notes and distributes them to all meeting participants and uploads them to the project's Construction Teams Site.

Deck and Rail Inspection

Per Article 105-17(E) of the Standard Specifications, Bridge decks and rails that have been constructed or rehabilitated should be inspected and accepted at such times as they are open to public traffic.

Centrally Let Projects

The RE should notify the Area Construction Engineer and schedule a deck and rail inspection prior to the structure opening. The deck and rail inspection shall be performed by the Area Construction Engineer and all punch list items completed prior to opening the project to traffic. The RE should notify the Area Construction Engineer immediately when traffic is placed on the structure to facilitate the Area Construction Engineer completing the Engineer Acceptance Report (located within the Forms section of Division 4, Major Structures, of the Construction Manual) and transmitting it to the appropriate personnel listed on the form within 72 hours of opening the structure to traffic. This Deck and Rail Acceptance Form and process is required on all bridges, whether completed prior to final acceptance of the project, or in conjunction with the final acceptance. A copy of the Deck and Rail Acceptance Form along with supporting information is then uploaded to the Construction Project SharePoint folder. The Area Construction Engineer will then enter the structure completion date into the HiCAMS Guarantee Tab to begin tracking the 12-month guarantee.

Division Let and LAP Projects

The deck and rail inspection shall be performed by the RE, with assistance from the Area Construction Engineer, as needed, and all punch list items completed prior to opening the project to traffic. The RE should complete the Engineer Acceptance Report (located within the Forms Section of Division 4, Major Structures, of the Construction Manual) and transmit it to the appropriate personnel listed on the form within 72 hours of opening the structure to traffic. This Deck and Rail Acceptance Form and process is required on all bridges, whether completed prior to final acceptance of the project, or in conjunction with the final acceptance. A copy of the Deck and Rail Acceptance Form along with supporting information is then uploaded the Construction Project SharePoint folder. The RE should then enter the structure completion date into the HiCAMS Guarantee Tab to begin tracking the 12-month guarantee

FHWA requires the NBIS inspection of new structures within 30 days of opening the structure to traffic. The RE should send the Structures Management Unit an Advance Notice of New Structure Completion Form (located within the Forms Section of Division 4, Major Structures, of the Construction Manual) at least 4 weeks prior to the structure opening to traffic. The Deck and Rail Acceptance is the Contractual Acceptance of the bridge, and is the date used by FHWA in establishing the 30-day inspection requirement.

Advance Notice Structure Completion Form

The Structures Management Unit (SMU) must follow the FHWA's National Bridge Inspection Standards (NBIS) for structures that are placed into service. To comply with the NBIS, providing the SMU with advance notice from either the RE or Area Construction Engineer of when a structure will be completed aids them in preparing for and scheduling the NBIS inspection.

The FHWA requires new structures to be inspected within 30 days of opening to traffic. The SMU needs time to prepare the plans, inspect forms, and schedule the inspection to meet this deadline. If possible, the Department prefers this inspection to occur before it moves traffic onto the new structure.

The RE should notify the SMU, utilizing the Advance Notice of New Structure Completing Form (located within the Forms Section of Division 4, Major Structures, of the Construction Manual) a minimum of four weeks before opening the structure to traffic. Understanding that various impacts may cause this date to flex, the RE should provide an estimated date is when the structure is scheduled to be complete and not when traffic is being placed. The RE can resubmit changes to the date as needed if construction schedules change.

The RE should follow the steps outlined in the *Construction Manual* for completing the Advance Notice of New Structure Form, distribute to those listed on the Form, and upload a copy to the Construction project's SharePoint site.

Monitor Site Compliance

Overview

The RE should take actions to monitor site compliance overseeing that the Contractor is complying with contract requirements, Federal, State and Local regulations, and applicable guidelines. Safety, environmental stewardship, and federal requirements are critical to the success of the project and failure to comply with such requirements can result in work stoppages, fines, reputational damage, and potential Departmental impacts external to the specific project. The NCDOT's Erosion and Sedimentation Control Program is a delegated program predicated on consistent administration, oversight, and enforcement of the Program.

References

- ☐ Construction Manual: 16 Erosion Control and Roadside Development - Erosion Control Policy and Procedures for Contract Construction Activities
- ☐ Erosion and Sediment Control Design and Construction Manual (2015 Edition) via Hydraulics
- ☐ NGC01 Permit/Information
- ☐ NPDES Form
- ☐ NPDES Construction Program Information
- ☐ Safety & Risk Management SOPs & Workplace Safety Manual
- ☐ SPPPForm30
- ☐ *Worksite Safety Audit Form*
- ☐ *NCDOT Work Zone Traffic Control Review*
- ☐ *NCDOT TMSD Webinar -Work Zone Traffic Control Update, December 11, 2023*
- ☐ *NCDOT Work Zone Traffic Control/Traffic Management and Safety Division Outreach, June 6, 2022*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
MOT Punchlist Items for Correction	▪ *Weekly MOT Review*	Resident Engineer	Lead Project Inspector
Nighttime Work Zone Punchlist	▪ *Nighttime Reviews*	Resident Engineer	WZTC Unit
Erosion and Sedimentation Control Plan	▪ *Erosion Control Compliance*	Resident Engineer	Division Permit Officer
Monthly Inspection Forms			
SPPPForm30			
Worksite Audit Form	▪ *Worksite Safety*	Anyone on project	WZTC Unit
Project-specific Moratorium Guidelines	▪ *Monitoring Environmental Moratoriums*	Project Manager	Resident Engineer

Work Zone Traffic Control Review (Also reference Physical Construction/Manage Work Zone)

The Work Zone Traffic Control (WZTC) review is conducted to verify that the traffic control plan currently implemented is consistent with the plans, standards and contract requirements. The proper installation and maintenance of traffic control devices (barrier, signs, pavement marking, etc.) is crucial in providing a safe work zone for construction/Department personnel and members of the traveling public.

Work Zone Management Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Project Development Project Management
- ✓ Traffic Management Unit
- ✓ State Traffic Management Engineer
- ✓ State Work Zone Engineer
- ✓ Traffic Safety Systems Engineer

The Resident Engineer (RE) and the Lead Project Inspector are responsible for leading the WZTC reviews. Work Zone Traffic Control Unit personnel are also available to help provide guidance and additional quarterly reviews. Reviews should be documented in the Inspector's Daily Report. Some Traffic Control Devices should be evaluated are:

- Traffic Control Devices (e.g., advance warning signs, cones, barrels, message boards)
- Pavement Markings (temporary and permanent)
- Raised reflective markers, especially in traffic shifts
- Impact attenuators
- Lighting
- Barrier Rail / Temporary Guardrail
- Delineation on guardrail, barrier rail, impact attenuators

Nighttime Reviews

The RE should periodically perform nighttime WZTC reviews to gather feedback on the effectiveness of the work zone during overnight conditions. Providing proper lighting and checking reflectivity of signing, devices, and pavement markings/raised reflective pavement markers are of major importance as they guide vehicle traffic through the work zones in a safe manner.

The RE should compile the information gathered during the WZTC reviews and document the findings, action items and timeframes for resolution. The RE should contact and notify the Contractor to immediately address any eminent danger situations observed during the review. A copy of the review should be provided to the Contractor to address any shortcomings observed. Additionally, the RE should discuss any noticed trends or safety concerns during the project progress meetings and with their administration and inspection staff.

Worksite Safety Audits

Safety is the No. 1 priority. The Department's Worksite Safety Audit process assists in supporting a safe work environment by identifying unsafe conditions and detailing corrective actions. The crucial importance of a safety audit is to identify safety risks (potential issues) and take steps to minimize or mitigate the safety risk before it manifests into an incident or accident. The NCDOT Worksite Audit Form (Form R-1) provides an general safety checklist to include Safety Equipment, Traffic Control, Worksite

Items, Tools, Equipment, PPE, and People Positioning/SOPs for any employee associated with the project to perform a Safety Audit.

- The RE uses the Worksite Audit Form to document the evaluation of each defined category and rate it as Satisfactory, Unsatisfactory, or Not Applicable.
- The RE should also include clear comments, observations, and recommended corrective actions so the project team better understands any unsatisfactory conditions and can pursue correction action.
- The RE should review the Worksite Audit Form with the Contractor or others as required, and upload to the project SharePoint Folder.

Permit Compliance

During the Project Development phase, various state and federal agencies provide permits with specific conditions or requirements to be adhered to during project construction. (See "Conduct the Env. Permit Pre-Construction Meeting" for additional information).

A project that is not compliant with permitted activities could result in a temporary work stoppage, fines, could damage the reputation of the Department, and erode the trust of the permitting agency, which may have impact external to the project.

The RE should take actions to confirm contract and permit compliance and the project team is following detailed conditions/procedures established to protect natural resources. The RE should address items noncompliance issues promptly with the Contractor and should clearly document finding, corrective actions, and timeframe for action. Often such noncompliance issues will require immediate action to avoid project impacts. Non-critical should be addressed and documented as part of the project progress meetings.

Environmental Compliance: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Environmental Supervisor
- ✓ Division Roadside Environmental Engineer
- ✓ Division PDEA or NEPA Engineer
- ✓ Roadside Environmental Field Operations Engineer

Erosion Control and Land Quality Reviews (NPDES)

NCDOT's Delegated Erosion and Sedimentation Control Program stipulates the responsibility for the Program Monitoring and Enforcement as outlined below: The Resident Engineer is responsible for ensuring that the Contractor constructs the project in accordance with contract requirements and plan details/specifications and the latest version of the NCDOT Standard Specifications for Roads and Bridges. Project personnel manage the project to assist the Resident Engineer with this responsibility. The RE and assigned project staff along with the contractor's staff are the first line effort of maintaining correct and proper erosion and sediment control implementation. The implementation of effective erosion and sediment control on projects is a major responsibility of the RE and DCE and they are accountable to the Division Engineer and the Chief Engineer. (Reference Erosion Control Policy and Procedures for Contract Construction Activities)

The National Permit Discharge Elimination System (NPDES) Construction Stormwater Program applies to construction activities that disturb one or more acres or are part of a common plan of development of that size. The NCGO1 permit is required to allow the discharge of stormwater to surface waters or to a separate storm sewer system conveying discharges to surface waters.

During construction of the project, the Resident Engineer shall take the necessary measures to ensure that the project is constructed and maintained in accordance with the erosion control plans and NPDES requirements. Any modifications to the erosion control plans necessary to meet field conditions shall be clearly indicated on the set of erosion control plans maintained on the project. In general, the following procedures shall be followed:

- Verify the required perimeter controls and/or other appropriate measures are installed before allowing grubbing on the project site.
- Maintain a set of **as-constructed** Erosion and Sediment Control Plans (E&SC) on the project.
- Note Stormwater Discharge Outlets on the plans or document discharge points in the NPDES reports.
- Perform weekly erosion control reviews of the project and/or evaluate after every significant rainfall in conjunction with Contractor's Level II Supervisor.
- Establish a deadline for corrective action after each erosion control review.
- Develop a follow-up process to ensure that corrective measures are implemented.
- Take actions to establish early permanent vegetative ground cover.

- Verify that fertilizer top dressing is applied to all permanent stands of grass each spring and fall for the duration of the project.

Best Practices: Erosion Control

- ✓ Treat erosion control like it is going to rain every day.
- ✓ Ensure the Contractor completes the SPPPForm30 every week and provides a deadline to correct deficiencies.
- ✓ Review the required correction actions listed on SPPPForm30 and stop work when the required erosion-control measures are not being installed or maintained.
- ✓ Do an inspection during heavy rains or as soon as possible afterwards.
- ✓ Establish and maintain a field book /plans detailing locations where temporary and permanent seeding has occurred to confirm early permanent vegetation.

Monitoring Environmental Moratoriums

Project moratoriums are detailed within the Project Commitments and are typically related to in-stream work or land clearing operations and associated with protecting endangered species of animals or plants, or other wildlife and natural vegetation. The RE should discuss the moratoriums during the preconstruction conference and at the project progress meetings along with the scheduling of associated operations. Should questions regarding the moratorium arise, the RE should consult the Project Development Project Manager and coordinate with the appropriate regulatory agency to obtain clarification. The RE should communicate all moratoriums to project administration staff and take actions to verify compliance with such project moratoriums.

- With guidance from the Environmental Policy Unit, the Project Manager develops moratorium guidelines during the Pre-construction phase of the project.
- The Contractor accounts for moratorium timeframes when determining contract times and Critical Path Method.
- When construction begins, the Contractor schedules construction activity and operations around moratorium timeframe commitments.
- The RE monitors the Contractor's schedule to verify compliance.

Conduct Final Inspection and Issue Acceptance

Overview

Prior to the final inspection, the RE, ARE, and project inspection staff should compile a comprehensive list of remaining incomplete, damaged, or substandard work items (punch list) to be completed/repaired and provided to the Contractor. The RE should inspect borrow pits/waste areas, on-site concrete/asphalt plant facilities, and staging areas for compliance with reclamation plans. When all punch list items are complete, the RE notifies the ACE, who is the accepting authority on centrally let projects, DCE and other appropriate Department personnel to schedule the final inspection. Once all remaining items identified during the final inspection are completed, then the project will be accepted. Final acceptance means the contractor has satisfactorily completed all work within the contract as amended throughout the life of the project, except for any observation periods. After acceptance, the Department assumes project maintenance activities from the contractor.

Final Inspection: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Maintenance Engineer
- ✓ County Maintenance Engineer
- ✓ Division Roadside Environmental Engineer
- ✓ Division Environmental Engineer
- ✓ Project Delivery, Project Manager
- ✓ Other applicable Department Units like Signals, ITS, Lighting

References

- ☐ *NCDOT Construction Manual 109-9 Final Payment & 109-10 Documents Required for the Payment of the Final Estimate*
- ☐ *NCDOT Standard Specifications 109-9 Final Payment & 109-10 Documents Required for the Payment of the Final Estimate*
- ☐ *NCDOT Construction Manual Final Inspection*
- ☐ *NCDOT Construction Manual Borrow/Waste Reclamation Procedures*
- ☐ *NCDOT Construction Manual FEMA Certification*
- ☐ *NCDOT Construction Manual General Utility Requirements*
- ☐ *Records and Reports, Final Inspection Common Punch List Items*
- ☐ *2024 Standard Specifications for Roads and Structures*
- ☐ *Article 105-17 Inspection and Acceptance*
- ☐ *Article 108-14 Termination of Contractor's Responsibility*

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Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Final Inspection Invitations	▪ *Coordinate Final Inspection Items*	Resident Engineer	▪ Area Construction Engineer (ACE) ▪ Division Construction Engineer (DCE) ▪ Contractor ▪ County Maintenance Engineer ▪ District Engineer ▪ Lighting Unit ▪ Traffic Services ▪ Roadside Environmental Engineer
Final Punch List			

Engineer Acceptance Report	▪ *Issue Final Acceptance* ▪ *Intermediate Contract Time and Partial Acceptance*	Resident Engineer	▪ Utility companies ▪ Local municipalities ▪ ACE ▪ Construction Unit
Deck and Rail Engineer Acceptance Report	▪ *Bridge Deck and Rail Acceptance*		▪ ACE ▪ Structures Management Unit

Coordinate Final Inspection

The contractor should coordinate with the RE 2 to 3 weeks in advance of the punch list being completed to schedule the final inspection with all appropriate Departmental personnel. (Reference the Construction Manual, Record and Reports, Final inspection)

Per Article 105-17 of the Standard Specifications, upon completion of the entire project as determined by the Engineer, the Engineer will inspect the project for final acceptance. If all construction provided for and contemplated by the contract is found to be satisfactorily completed, the project will be accepted. Projects should be accepted in their entirety; however, the following cases allow for portions of a project to be accepted:

- When any continuous project is equal to or in excess of 5 miles in length, the Department will accept the project in two increments with the first increment equaling at least 50% of the total length of the project.
- Under resurfacing contracts, the Department will accept the project in parts as defined by map numbers representing at least 25% of the total length of the project.
- When it is considered to be in the best interest of the Department, other increments or parts of projects may be considered for acceptance.
- When the contract contains an intermediate completion date requiring the completion of a portion of the work in its entirety, such portion of the work may be accepted if requested in writing by the Contractor.
- Bridge decks and rails that have been constructed or rehabilitated at such times as when they are open to public traffic.
- Permanent sign panels, including hardware and retroreflective sheeting, that are located where the roadway is open to public traffic and that are required to be installed before the final acceptance of the project.

To schedule and conduct the final project inspection, the RE should:

- Receive a request for final inspection from the Contractor 2 to 3 weeks prior to project and punch list completion.
- Remind the contractor to conduct a pre-inspection of the project, ensuring compliance with *Final Inspection Common Punch List Items* outlined in the Construction Manual under Records and Reports, Final Inspection.
- Schedule the final inspection date in coordination with the Area Construction Engineer (ACE), Division Construction Engineer (DCE), contractor and pertinent NCDOT Unit personnel, including

County Maintenance Engineer, District Engineer, Lighting Unit, Traffic Services, Roadside Environmental Engineer, utility companies, and local municipalities.

- Conduct the Final Inspection of the project and collect any outstanding items, comments and/or recommendations from all Department personnel involved.
- Assemble a comprehensive "Final Punch List" detailing all remaining work necessary for Final Acceptance of the Project.
- Distribute the Final Punch List to the Contractor.
- Inspect Final Punch List items for satisfactory completion.
- Notify the Area Construction Engineer of Final Completion

Engineer Acceptance Report

The engineer acceptance report alerts various units within the Department who are responsible for maintenance of the subject work. When work detailed on the Final Punch List is complete, the RE:

On Centrally let projects, notifies the Area Construction Engineer (ACE) of project completion.

- The Area Construction Engineer will complete the online *Engineer Acceptance Report* form.
- The Area Construction Engineer will submit an email with an attached web link of the completed form to the Division Construction Engineer, Resident Engineer, and other personnel listed on the form.
- A letter will be generated by the Construction Unit notifying the Contractor of the Final or Partial Acceptance of the project.

On Division let Projects, completes the Engineer Acceptance Report detailing the final acceptance of the project. The RE submits an email with an attached web link of the completed form to the Division Construction Engineer and other personnel listed on the form. A letter will be generated by the Division notifying the Contractor of the Final or Partial Acceptance of the project.

The RE ensures the Engineer Acceptance Report is uploaded to the project SharePoint site and forwards a copy to the contractor.

Intermediate Contract Time (ICT) (Partial Acceptances)

Intermediate Contract Time (ICTs) are in the contract to encourage the completion of specific construction activities and discourage negative impacts to external stakeholders. Intermediate contract times can apply to short duration work, like nightly lane closures or can encompass a much larger phase of construction. Intermediate contract times should be treated as a contract within a contract and the contract administration actions previously detailed should apply (reference Progress Meetings, Claims Avoidance, Monitor Project Schedule, Liquidated Damages)

Assessing Liquidated Damages for ICT Violations

- The Resident Engineer (RE) considers whether there were impacts to ICT violations that were not usual and customary to the industry, and if the Contractor could have planned for or avoided the violation.
- The RE considers whether the Department had any responsibility for the violation.
- If the Contractor could not have planned for or avoided the violation, or if the Department had any responsibility for the violation, the RE may consider waiving the penalty for the specific violation.

New Road Opening Form

The *New Road Opening* form will be completed by the RE or the ACE to report road openings on new or partially new location facilities to the NCDOT GIS Unit . A road or section of a road does not need to be finally accepted by the Department to be open to traffic. Once the road or section is open, the form is complete and transmitted as detailed in the form. Bridge Deck and Rail Acceptance

Should it be necessary to place traffic onto a bridge, the bridge deck and rails may be accepted prior to acceptance of the ICT or the overall project. The deck and rail engineer acceptance report will serve as notice to the Structures Management Unit to complete the required National Bridge Inspection Standards (NBIS) inspection. This inspection should be completed within 30 days of deck and rail acceptance. It is critical that the form be completed within 72 hours of acceptance. (Reference Physical Construction, Integrate Structures)

To ensure the inspection timeframe is met, the RE:

- Submits the Advance Notice of New Structure Completion form to the Structures Management Unit (SMU) four weeks prior to the bridge completion to get the inspection scheduled.
- Notifies the ACE prior to opening the bridge(s) to traffic and requests an inspection be performed ensuring all punch list items are complete.
    - The ACE completes the Engineer Acceptance Report, leading to formal deck and rail acceptance .
    - Note: On Division Let Contracts and Locally Administered Projects (LAP), the Resident Engineer completes the Engineer Acceptance Report for Deck and Rail acceptance.

The RE ensures the Deck and Rail Engineer Acceptance Report is uploaded to the project SharePoint site and forwards a copy to the contractor.

The Deck and Rail Engineer Acceptance Report is also completed for bridges undergoing preservation/rehab work so that the SMU can update their records accordingly.

Reimbursable Agreements

Reimbursable Agreements

The RE should be mindful of the existing municipal agreements that may exist for the project, which can include a variety of items such as right or way/easements, utilities, and betterments. Depending on the items included in the municipal agreements, the RE may be required to track the associated work and cost for the final agreement cost. The RE will receive periodic requests from a Division staff members to verify quantities and costs of completed reimbursable work.

Execute Completion Certifications

The RE should review the Project Commitments to determine the appropriate regulatory agencies which require notification of final completion and/or certifications and the appropriate means for such notification/certification. Some typical examples from permits are below:

Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer shall complete the "Certification of Completion Form" to notify the NCDWR when all work included in the 401 Certification has been completed. [15A NCAC 02H.0502(f)]

Upon completion of the project, the applicant shall complete the NCDEQ "Certification of Completion Form" to notify the NCDWR when all work included in the Buffer Authorization has been completed. [15A NCAC 02H.0502(f)]

US Army Corp of Engineers requirement for “Notification of Construction Commencement and Completion “, The permittee shall advise the Corps in writing prior to beginning the work authorized by this permit and again upon completion of the work authorized by this permit.

The RE should consult with the Project Delivery Engineer, Project Manager and Division Environmental Engineer to confirm all regulatory notifications and certifications have been satisfied. (Reference Physical Construction, As-builts for FEMA Certification guidance)

Assemble Final Estimate

Overview

The Resident Engineer (RE) prepares the final estimate to document the total amount paid to the contractor to date and the amount remaining to be paid, based on the project's scope items. This estimate is used to close out the project and block the WBS structure from future charges.

Final Estimate: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Construction Operations Engineer
- ✓ Construction Project Closeout Engineer

References

- ☐ *Construction Manual*
  - *Records and Reports, Final Estimate Assembly Preparation Procedures*
  - *Records and Reports, Final Estimate Checking Procedures*
  - *Records and Reports, Project Closeout Conference*
- ☐ *DBE Tracking System Resident Engineer Login*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Special or Partial Estimates, as needed	▪ *Process Special or Partial Estimates, as needed*	Resident Engineer	▪ Assistant Resident Engineer ▪ HiCAMS Technician ▪ Division Engineer ▪ Division Construction Engineer ▪ Contractor
Final Estimate	▪ *Assemble Final Estimate*		
DBE Certification	▪ *Prepare Disadvantaged Business Enterprise (DBE) DBE Summary Report*		Construction Unit Project Closeout Technician

Final Estimate Overview

The process of preparing the final estimate starts when construction begins. The Resident Engineer (RE) reviews completed work items, notes changes with redlines, and reviews tickets and pay items in HiCAMS. Overall, the RE ensures the final estimate is prepared according to the Construction Manual, as described under the Records and Reports – Final Estimate Assembly Preparation Procedures.

The Division representative performs quality assurance checks of the final pay quantities and as-constructed plans, after which, the Division notifies the contractor in writing of the final quantities and any liquidated damages and requests final project documents per Article 109-10 of the Standard Specifications.

Contracts are separated into two categories to establish the final estimate assembly preparation and submission criteria:

A. Major contracts – These contracts typically have a total cost of more than $10 million and include: major grading; grading and structure; paving, widening, and rehabilitation; and turnkey projects.
B. Minor contracts – all other contract types not listed above.

The RE ensures a 100% review for every quantity calculation payment included in the final estimate and verifies the quantity in HiCAMS. The RE records and calculates pay quantities following procedures in the main Records and Reports section of the Construction Manual – Final Estimate Checking Procedures".

The RE reviews the following areas after the Final Quantities are updated in HiCAMS:

- Material Prepayment Balances: All Material Prepayment balances on the Prepayments Tab of Review Estimates are zero. If balances remain, enter the Previous Quantity amount in the Actual Reduction field. Do not generate the estimate for these reductions to take effect.
- Price Adjustment Recommendations (PARs): All PARs must be closed before forwarding the estimate. Go to the Review Pay Adjustment Recommendations window and check the Status column. Close any remaining PAR's with a status that is not closed. If a QA-2B Density PAR is not closed, contact the Construction Unit for assistance.
- Review and Identify discrepancies between Paid, Received, and Accepted quantities for a project, allowing for these discrepancies to be resolved to ensure maximum Federal Aid is received. This should be done throughout the project's life by the RE office and the Materials and Test Unit.
- Failing Samples: Review the View Pending Contract Samples listing for any Project Acceptance Samples that have a Sample Status or Does Not Meet Specifications. These samples require a disposition quantity and a Sample Disposition Comment. Penalties can also be applied by clicking the PAR button on the Sample.
- Field Inspection Reports: Field Inspection reports for Concrete Pavement, Corrugated Metal Pipe, and Guardrail that have failing Materials and no Disposition Comment must have a comment entered.
- Failing Densities: All Failing Asphalt Densities have a Pay Adjustment Recommendation and Pay Factor associated with them. Failing Densities are identified on the Standard Report called Density Asphalt QC Lots.

Best Practices: Review Procedures

- ✓ Each pay quantity calculation made is reviewed as soon as practicable by someone other than the original reviewer.
- ✓ Although many calculations are performed in SharePoint, ensure that field-measured quantities are verified and that electronic pay record book entries are checked for typos and errors.

Schedule for Final Estimates after Contract Acceptance

	Major Contracts	Minor Contracts
Preparation and checking by Resident Engineer	45 days	30 days
Quality assurance check by Division Engineer	15 days	15 days

Following the final inspection and issuance of project acceptance (see *Conduct Final Inspection and issue Acceptance* for additional details), the RE enters the Acceptance Date on the Completion Tab of the Review Contract Details window in HiCAMS. This triggers the project to be removed from the online "Construction Progress Report" and starts the Materials and Test (M&Ts) material certification process.

Process Special or Partial Estimates

A special estimate is processed when there is a significant current amount, whether an increase or a decrease. The RE uses best judgment in determining when another partial estimate is processed. A partial estimate is normally processed when the current amount of the final estimate is more than $5,000, a change is warranted in the number of liquidated damages withheld, or the processing of the final estimate is delayed. To process another partial estimate, change the estimate type in HiCAMS to partial and generate the estimate. When a partial estimate is processed, the RE generates the final estimate after the partial estimate is paid.

Assemble Final Estimate

When calculated quantities are reviewed and verified in HiCAMS, the RE estimate is reviewed to determine the current estimate amount. The RE ensures the final estimate assembly is compiled with the information listed below, that the information is in HiCAMS, and that it is forwarded to the DE.

Note: If all information for the final estimate is uploaded to SharePoint, there is no need to forward the "hard copies" to the Construction Unit. The Resident Engineer's office should let the Construction Unit know that all information has been uploaded in SharePoint.

Finalize As-Builts

As-builts are kept and updated throughout the life of the project. Structure and roadway as-builts are completed and signed by the DE and Division Right of Way Agent per the Manual for Construction Layout. Reference Construction Manual, Records and Reports, Final Estimate Assembly Preparation Procedures for detail instructions on developing the as-built plans for roadway and structure projects. The RE ensures the as-builts are uploaded to the Project SharePoint Site under the As-builts Final Folder.

Utility as-builts for municipal owners are completed following Standard Specifications for Road and Structures and any additional requirements outlined in the contract as required by the utility owner. As-builts are completed and submitted to the utility as partial acceptance throughout the life of the project, and final as-builts are submitted to and accepted by the utility owner before paying the final estimate. See *Complete Utility Closeout* for additional information.

Verify Final Quantities

This is done throughout the life of the project after the source document is checked but must be complete before submission of the Final Estimate.

This process is accomplished by going to Contract Estimates > Verify Final Quantities. If verifying final quantities in pay record books, enter the page total. If the pay records were entered via SharePoint, quantities need to be totaled and verified.

Final Materials Discrepancy Audit

Once the completion date has been entered for a contract, M&T receives a notification to start its material certification of the project.

In HiCAMS, go to review material pre-certification to review the materials that have been incorporated into the project and the discrepancies of materials that have not been entered into HiCAMS or SharePoint.

Municipal Agreement Final Billing

All non-participating quantities are accounted for and billed to the Municipality. Also, the signed Engineer's certification form for the billing certifies that these quantities are accurate.

The RE review for the final estimate creates a spreadsheet of all non-participating items including Description of line item, UOM, Unit Price, and Quantity for quick calculations of these materials for the municipality and the Division check of the final estimate. These items also have a document signed by the RE verifying a complete and accurate list of items being billed.

Best Practices: Municipal Agreement Final Billing

- ✓ A quick and easy way to get quantities is to run a Pay Record Summary in Standard Reports and look for the NP recorded quantity for each line item.

Generate Final Estimate

Once all pay records and ticket books are checked for accuracy, the quantities have been verified, prepayments have been closed out, and claims and supplemental agreements have been completed, the RE generates the final estimate in HiCAMS by changing the partial estimate to final. Usually, a final estimate is less than $5,000. If an error warning, such as "all completion dates have not been entered", or "there are unverified quantities", go back and complete these tasks.

Notification of Final Quantities

Following the Division's review of the final estimate, the Division Construction Engineer (DCE) or designee, sends the contractor a Notification of Final Quantities letter and a copy of the final estimate informing the contractor of the final quantities and any liquidated damages being held.

Close-out Conference

A Project Closeout Conference may be held after the quality assurance check is complete and the contractor has had sufficient time to review the final quantities and identify the claim issues. The ACE should be invited to all closeout conferences. Reference Physical Construction, Resolve Claims and the Construction Manual – Records and Reports, Project Closeout Conference)

Following the closeout conference and review of the final quantities by the contractor, necessary corrections are made to the final estimate assembly and updated in HiCAMS. The DE signs the necessary documents, and the final estimate assembly is transmitted to the State Construction Engineer immediately after the QA check is complete and after:

1. The contractor advises he does not desire to review the final estimate, OR
2. The date specified for the Contractor to review the final estimate has passed without a reply from the contractor, OR
3. The contractor reviews the final estimate, or a closeout conference is held.

Disadvantages Business Enterprise (DBE) Certification

The RE prepares the DBE Subcontract Commitment Summary and uploads it to SharePoint with the final estimate. In preparing the DBE Summary, the contract commitment is pulled from the contract and included with the summary along with the payments made by the contractor and entered into the *DBE Tracking System.* This report is checked by the Construction Unit Project Closeout Technician and sent to OCR for both “C” and “D” contracts.

The RE includes justification for any shortfall for each subcontractor in the DBE Commitment from the contract.

Monitor Utility Relocations

Overview

Coordinate and confirm the execution of utility closeout task including final documentation, certifications, invoicing (if applicable), and storage filling for each utility relocation following agreements and NCDOT policy.

Utility Closeout: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Utility Coordinator
- ✓ Division Business Officer
- ✓ State Utilities Manager

References

- ☐ Utilities Accommodations Manual
- ☐ Utility Invoice Checklist
- ☐ Utilities by Others (UBO) plans
- ☐ Utility Construction (UC) Plans

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Final Invoice	▪ *Review Utility Final Invoice*	Resident Engineer	▪ Utility Coordinator ▪ Utility Owner
Record Drawings	▪ *Collect contractor and monitoring personnel plan markups for Record Drawings*		▪ Utility Contractor ▪ Monitoring Personnel ▪ Utility Coordinator
Completion Certifications	▪ *Execute Completion Certifications*		▪ Monitoring Personnel ▪ Utility Coordinator

Final Utility (UBO) Invoice Approval

After the work is completed, the Utility Owner (UO) submits a final invoice to the Department for processing. The Resident Engineer (RE) ensures the final invoice is reviewed for completeness per the Utility Invoice Checklist as outlined in the Utilities Accommodations Manual under section 4.7 Project Invoicing and Payments.

- If there are errors or the required information is not furnished, the RE returns the invoice to the UO and advises them of the deficiencies.
- If the final invoice is acceptable, the RE forwards it to the Utilities Unit for payment.

Record As-Built Drawings

The RE ensures the accuracy of the utility (UBO) as-builts by coordinating with the utility coordinator. The utility coordinator then routes the information to the Engineer of Record, who uses it to complete the drawings. The RE ensures that the final as-builts are distributed to the UO and uploaded to the project SharePoint site.

Receive Final Documents from the Contractor

Final Documents: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Construction Operations Engineer
- ✓ Construction Project Closeout Engineer

Overview

Review the final documents submitted by the contractor before processing the final estimate.

References

- ☐ 2024 Standard Specifications for Roads and Structures
  - *Article 109-10 – Documents Required for the Processing of the Final Estimate*
- ☐ Construction Manual
  - *Article 109-9 Final Payment*
  - *Article 109-10 Documents Required for Payment of the Final Estimate*
  - *Sample Consent of Surety*
  - *Sample Affidavit*
- ☐ *Records and Reports, Project Closeout Conference*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
	▪ *Review Documents for Processing the Final Estimate* ○ *Consent of Surety* ○ *Affidavit* ○ *Final Claim Letter*	Contractor	

Review Documents for Processing the Final Estimate

Upon completion of the final estimate review, the contractor should submit the following documentation per Article 109-10 of the Standard Specifications to the State Construction Engineer for centrally let contracts or to the Division Engineer for Division let contracts:

- *Consent of Surety* documenting that the contractor's performance is guaranteed by a bond and that the surety consents to the payment of all monies due on the contractor's final estimate according to the provisions of their contract.
- *Affidavit* of the Contractor stating that all obligations and debts arising out of the construction have been satisfied or affidavit that shall include a list of obligations not satisfied.
- *Final Claim Letter* (claim or no claim) detailing that the Contractor has no request for any extension in the completion date or any adjustment in compensation from that shown in the final estimate or in lieu thereof written notice presenting all request for adjustment of the final estimate setting forth full justification for such requests. This letter affects the date interest on the final payment begins. If a Closeout Conference was successfully executed by the Contractor and NCDOT, this serves as the Final Claim Letter.

- Any other documents required by the contract – this includes all material certifications, certified payrolls, DBE/MBE/WBE payment reporting, and any other contract administration documentation needed to certify the contract complete.

These documents are necessary for the final payment to the contractor and affect the date interest on the final payment begins.

Project Guarantees and Warranties

Overview

All centrally let contracts except for resurfacing contracts contain a 12-month Project Guarantee provision, following the project acceptance date. Per Article 105-17 of the Standard Specifications, when an observation period is required that extends beyond the final acceptance date, the satisfactory completion of the observation period shall be covered by the contract bonds. The Contractor is responsible for any defects in the materials or workmanship of the major components of the project for a 12-month period. Examples of the major components include pavement structures, bridge components and sign structures. When a partial acceptance is made for completed items of work prior to the final project acceptance, the 12-month period begins on the date of partial acceptance for those items included in the partial acceptance. Near the end of the 12-month period, the RE should review the project to determine if the project guarantee needs to be invoked.

Project Guarantee and Warranties: Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Maintenance Engineer
- ✓ County Maintenance Engineer
- ✓ Other applicable Department Units like Signals, ITS, Lighting, etc.

References

- ☐ Construction Manual
  - *Records and Reports, 12-Month Project Guarantees*
  - *Records and Reports, Construction Quality Index Evaluation*
- ☐ *HiCAMS Construction Quality Index Evaluation Form*

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Issue Applicable Corrections Letter	▪ *Conduct 12-Month Guarantee Review*	Resident Engineer	▪ Division Construction Engineer ▪ Area Construction Engineer ▪ County Maintenance Engineer's Office ▪ Division Bridge Maintenance
Issue Project Guarantee Satisfaction Letter			
Construction Quality Index Evaluation Form	▪ *Conduct Construction Quality Index (CQI) Evaluation*		

Conduct Observation Period/12-month Guarantee Review

The RE should consult their contract and the Standard Specifications to develop a list of all items/observation periods required by the contract, such as pavement markings, retro-reflectivity values, signals, and ITS equipment. ,

Best Practices: 12-Month Guarantee Review

- ✓ Be sure the guarantee indicator and appropriate guarantee time frame is entered in HiCAMS.

Near the end of the observation period or 12-month Project Guarantee, the Resident Engineer (RE) reviews the project with applicable personnel (e.g., Division Construction Engineer, Area Construction Engineer, County Maintenance Engineer's Office, Division Bridge Maintenance, etc.) and provides the Contractor either a No Corrections or a Corrections Letter. Procedures for administering the 12-month guarantee provision can be found in the "*Construction Manual, Records and Reports, 12-month Project Guarantees*".

Once all the repairs have been satisfactorily performed, the DCE/RE will send a letter to the Contractor, with a copy to the State Construction Engineer, indicating that all repairs have been made and the project guarantee has been satisfied. Design-Build projects typically have unique project guarantees and warranties. Reviews should be based on the criteria detailed in the contract.

Conduct Contract Quality Index (CQI) Evaluation

The Construction Quality Index (CQI) Evaluation should be completed for all projects, except for resurfacing projects, to evaluate components of the completed project and determine if any construction elements are causing maintenance-related issues after the project's final acceptance.

The RE coordinates the CQI evaluation approximately 10 months after the acceptance of a project, ideally in conjunction with the 12-month guarantee review. Department personnel review the project using the Construction Quality Index Evaluation Form in HiCAMS. Reference the "*Construction Manual, Records and Reports, Construction Quality Index Evaluation* and HiCAMS Users Guide Chapter 13, Project Closeout, CQI for additional information".

Participate in Post Construction Assessments

Overview

Post-Construction Assessments bring together the design team, NCDOT personnel, and contractors to review lessons learned and best practices related to the construction of these projects. These lessons are shared across various NCDOT Divisions and Units to improve knowledge share and transfer and to improve future project delivery methods and procedures.

Post Construction Assessment Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ State Value Management Engineer
- ✓ Division Maintenance Engineer
- ✓ County Maintenance Engineer
- ✓ Other applicable Department Units like Signals, ITS, Lighting, etc.

References

- □ *Value Management Office*
  - *Value Management Guidelines*
- □ *Risk Assessment Program*
  - *Risk Assessment Worksheet*
- □ *CLEAR Program*
  - Project Knowledge Sharing

Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Post-Construction Assessment Recommendation	▪ *Submit Post Construction Assessment Recommendation*	Value Management Office Program Manager	Project Team Member
Submit Lessons Learned and Best Practices to CLEAR	▪ *Document Lessons Learned and Best Practices*		

Submit Post Construction Assessment Recommendation

Any project team member, Department or Contractor, can recommend a project for a Post Construction Assessment by informing the Value Management Office (VMO) as soon as it is determined beneficial, typically after substantial completion.

Coordinate Post Construction Assessment Meeting

The VMO coordinates with the project team to develop meeting agenda topics (typically lessons learned and best practices) and schedules the Post Construction Assessment meeting with all the applicable project team members and stakeholders.

Submit Lessons Learned and Best Practices to CLEAR

The VMO conducts the Post Construction Assessment meeting, records meeting minutes, and submits lessons learned and best practices generated from the discussion into the CLEAR database where it is routed to experts for vetting and implementation.

Records Retention

Overview

All project construction records are retained according to federal and state standards.

Project Records Support Team

- ✓ Division Construction Engineer
- ✓ Area Construction Engineer
- ✓ Division Business Officer
- ✓ State Construction Operations Engineer
- ✓ Construction Project Closeout Engineer

References

- □ *Construction Manual*
  - Records and Reports, Retention and Storage of Project Records and Documents

Maintaining Project Files

The Federal Highway Administration (FHWA) and the State of North Carolina require that records relevant to the project be maintained for a set amount of time after the final voucher is issued.

The following procedures for retention and storage of project records will be used on all projects:

1. Resident Engineer's Files: After submission of the final estimate assembly, the Resident Engineer should hold the remaining portion of the project files until the State Construction Engineer notifies the Division Engineer to process all affected project records. At this time, the Resident Engineer will process records as follows:

Non-federally funded projects:

- The project files will be submitted to the Division office to be screened and merged with the Division's project files.
- Project workbooks not included in the transmission of the final estimate shall be retained in the Resident Engineer's office **for one year** after the notification from the State Construction Engineer and then destroyed.

Federally funded projects:

- The project files will be submitted to the Division office to be screened and merged with the Division's project files.
- Project workbooks not included in the transmission of the final estimate assembly will be bound together and submitted to the Division office for storage for a period of **at least three years after payment of the final voucher** by the Federal Highway Administration.

2. Division Engineer's File**:** The State Construction Engineer will notify the Division Engineer when the project records are to be processed in accordance with the procedure for retention and storage of records. Upon receipt of records from the Resident Engineer, the following procedures should then be applied to all state and federally funded projects:

- The Division Engineer's file will be combined with the file received from the Resident Engineer and all duplications eliminated.
- The composite file will then be sent to Highway Records Section in Raleigh for further handling.

Note: The Final Voucher Date on the Project Closeout Tab of Review Contract Details is entered by one of the Project Closeout Technicians. The Final Voucher Date entered on the Completion Tab is entered by the Materials and Test (M&T) Unit and is not necessarily the same as the date on the FHWA Website.

Records must be maintained by the Department or Local Government agency and not the contractor or the Professional Engineering Firm that provided construction administration. During this time, FHWA and/or the State can audit a completed project at any time.

The Resident Engineer is responsible for maintaining the project records after the completion of a project following the procedures outlined in the “Construction Manual, Records and Reports, Retention and Storage of Project Records and Documents”.