

NCDOT's Quality Management Program:



Quality Control and Quality Assurance

Technical Services

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List of Acronyms

CLEAR.....	Communicate Lessons, Exchange Advice, Record
GESC	General Engineering Services Consultant
PDN.....	Project Delivery Network
PEF	Professional Engineering Firm
PSF	Professional Service Firm
PM	Project Manager
NCDOT	North Carolina Department of Transportation
QA	Quality Assurance
QC	Quality Control

QA/QC Definitions

Quality Control reviewer – An experienced subject matter expert with sufficient knowledge in the discipline of the work being reviewed. Responsible for performing a detailed review using the QC checklist.

Quality Assurance reviewer – The NCDOT subject matter expert or designated GESC responsible for performing the quality assurance review. For projects developed by NCDOT staff, another team within the discipline or a PSF not involved in the project can perform the QA review.

Project Manager – The person responsible for providing high-level oversight reviews of all draft and final work products for consistency with project context, stakeholder engagement, and discipline integration. Also responsible for ensuring all work products undergo the quality process and confirming the proper level of quality oversight is performed on all work products generated under their responsibility.

Quality Control – An accuracy review on products to ensure that all applicable State and Federal regulations, standards, and policies are met and all calculations, designs, reports, etc. are complete, accurate and reasonable.

Quality Assurance – This review is two part: 1 - It ensures the appropriate QC process took place. 2 – it includes performing a high-level fatal flaw review to ensure the deliverable was developed using the appropriate standards, specifications, and policies.

Preferential Comments – Comments that reflect aesthetic or habitual desires, rather than pertaining to noncompliance with standards, policies, or regulations, or changing the purpose of an identified concept or design component.

Stakeholder – External or internal individuals with an interest in the delivery or outcome of the project.

Subject Matter Expert – An individual who has advanced knowledge in a particular area and is qualified to provide guidance and strategy in that area.

1. Introduction

Quality is a direct reflection on how well our customers' expectations are met in the services and project deliverables provided to them. The North Carolina Department of Transportation (NCDOT/Department) Quality Assurance / Quality Control (QA/QC) Manual is the first step in a department wide Quality Program to provide project managers (PMs), discipline units and industry partners with uniform statewide quality guidance.

The processes in this manual and the discipline quality checklists combined with the standard processes established in the [Project Delivery Network \(PDN\)](#), [the PM Guide](#), and the [PDN Scope of Service Generator](#), ensure quality control is completed and meets State and Federal regulations, standards, and expectations. This allows NCDOT staff to focus on the most critical aspects of the project or program - performing **fatal flaw reviews**, **contextual considerations**, and overall **discipline integration**.

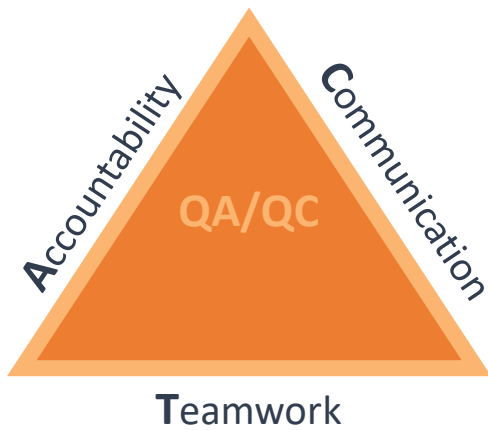
The QA/QC process is a NCDOT best practice for all design-bid-build projects throughout the Preconstruction phase of project development. This process will help avoid costly errors, rework, and scheduling delays by ensuring project deliverables are of the highest quality and meet project objectives and NCDOT standards. The following sections describe the QA/QC process at NCDOT and the activities associated with consistently delivering quality services and products to our customers.

“Quality is everyone’s
responsibility”

W. Edwards Deming

2. QA/QC Process at NCDOT

The QA/QC process and the quality program in general at NCDOT is not stagnant, it is continuous throughout the life of the project and is based on three core principles, known as ACT:



Accountability – Holding each other accountable for delivering quality products and meeting the expectations within the project. NCDOT uses an objective based evaluation system to address performance issues.

Communication – Every team member is responsible for communicating to ensure expectations are understood and there are no surprises.

Teamwork – Quality cannot be achieved in silos. It requires NCDOT staff, Professional Services Firms (PSFs), Professional Engineers Firms (PEFs), and agency partners to work together to develop a common understanding of the quality expectations to be successful.

Applying these three principles to a QA/QC process that is customer focused and process driven sets teams up to consistently deliver high-quality services and products.

The figure below displays the elements of a good quality management program.



Quality is achieved when the team is successful in producing complete and accurate products that meet the scope and schedule of the project. This is accomplished by knowing what the expectations are, understanding everyone's role and responsibilities and working through the ACT principles.

NCDOT's quality review process is designed to achieve these expectations and is further described in Section 3.

3. Quality Review Process

The NCDOT's QA/QC process is not only a best practice, but an expectation for all project team members (internal and external) to apply to applicable project deliverables. Poor quality can have significant impacts on project costs, project schedules (especially if there is rework) and NCDOT's reputation, which is also a reflection of industry partners involved. Therefore, NCDOT expects all project team members to work together to understand their role in delivering high quality products, understand what the quality expectations are, and ensure everyone is committed to delivering high-quality products and services as promised to our stakeholders.

NCDOT's QA/QC process focuses on products meeting performance objectives, State and Federal standards and regulations, as well as the scope and schedule. Preferential comments should only be used where necessary for clarity, accuracy, or compliance.

The QA/QC process depends on quality reviews with review documentation considered a best practice. The NCDOT quality reviews consists of the following activities, which are further described in each section below:

- Quality Control (QC) reviews
- Quality Assurance (QA) reviews

3.1 Quality Control (QC) Reviews

Quality Control reviews occur prior to submitting a deliverable to NCDOT. QC reviews consist of checking project deliverables to ensure that all applicable State and Federal regulations, standards, practices, and policies are met and all calculations, designs, reports, etc. are complete, accurate and reasonable.

Responsible Entity for Performing Quality Control

The designer, PEF, PSF, or internal unit performing the work is responsible for performing Quality Control reviews on their project deliverables before they are submitted to NCDOT. When the deliverable is submitted, NCDOT presumes that all quality expectations, as documented in this manual, are followed. **NCDOT will no longer be performing QC functions and may send the product back at the submitter's expense if quality expectations are not met.**

The QC reviewer is expected to be an experienced subject matter expert in the discipline of the work being reviewed. They are responsible for performing the quality control review using pertinent criteria in the standard scopes of services and State and Federal standards, practices, policies, and regulations to ensure the submittal is accurate and complete.

QC Review Snapshot



Verify accuracy



Perform in Stages 1, 2, 3 and 4



QC Checklists



Designer, PEF, PSF or internal unit performing work

QC checklists clearly articulate NCDOT's QC expectations. These checklists were developed by NCDOT discipline units and are organized by discipline, PDN Stage and Activity Name. These checklists are available on respective Discipline Connect Sites; however, a full list is available [here](#). QC checklists are required to be used and submitted with the name of the person who performed the review listed; however, the signature is only required if a discipline unit or Project Manager requests it.

Scoping for Quality Control

Consultant firms are expected to have a quality review processes in place and should communicate what this process consists of during contract negotiations. Approval of this process by NCDOT is not required; however, expectations of QC reviews should be discussed and agreed upon during scope development. Possible questions and discussion items to consider are:

- What deliverables will have quality control reviews completed?
- Some work products have iterative submittals (i.e. plan sets) where comments may be addressed in the next major submittal, thereby reducing the number of resubmittals.
 - o Which deliverables are comments expected to be addressed as part of the next major submittal?
 - o Which deliverables are expected to be resubmitted?
 - o For deliverables with resubmittals, how many resubmittals are expected and what level of QC is expected on the resubmittal?
- For deliverables without QC, what type of review is expected to ensure quality?
- Who typically performs the QC (responsible in charge, peer review, etc.)?
- For scheduling purposes, is the QC included in the deliverable activity or listed as a separate activity?
- What are the signature expectations for quality checklists?

Where to Upload Quality Control Documents

Upload completed QC checklists or any quality related files to the applicable discipline library on the project's Preconstruction SharePoint site and designate as a QA/QC topic. Designating a file with the QA/QC topic allows project teams to find all files related to quality easier and faster.

3.2 Quality Assurance (QA) Reviews

Quality assurance reviews occur after the deliverable is submitted to NCDOT. Quality Assurance consists of having subject matter experts provide a high-level fatal flaw review to ensure that the deliverable was developed using the appropriate standards, specifications, policies, and good judgement.

Responsible Entity for Performing Quality Assurance

QA reviews are conducted by the appropriate subject matter expert at NCDOT or their designated GESC. QA reviewers are responsible for performing a high-level review to ensure the work product does not have any fatal flaws, high-risk items are adequately addressed, and all appropriate QC checks were performed. As part of the QA review, preferential comments should be avoided unless they are necessary for clarity, accuracy, or compliance.

If quality control issues appear during the QA review process or if QC expectations were not met, as outlined in negotiations, NCDOT may send the product back and request that the appropriate QC review be performed. Additional scope and fee may not be provided for additional work caused by incomplete or poor reviews. At no time should the QA reviewer take it upon themselves to perform quality control.

QA checklists are available and expected to be used when reviewing the work. These checklists were developed by discipline units, are organized by PDN Stage or Activity Name, and are available on respective Discipline Connect Sites; however, a full list is available [here](#). QA checklists are expected to be submitted with the name of the person who performed the review listed; however, the signature is only required if a discipline unit or Project Manager requests it.

QA Review Snapshot



Validate compliance with standards, policies & specifications



Perform in Stages 1, 2, 3 and 4



QA Checklists Available



NCDOT or GESC

Scoping for Quality Assurance (GESCs)

Consultant firms performing this role are expected to have a quality review process in place and communicate what the process consists of during contract negotiations. In addition, expectations of QA reviews should be discussed and agreed upon during scope development. Possible questions and discussion items to consider are:

- What deliverables will have quality assurance reviews completed?
- Some work products have iterative submittals (i.e. plan sets) where comments may be addressed in the next major submittal, reducing the number of resubmittals.
 - o Which deliverables are comments expected to be addressed as part of the next major submittal?
 - o Which deliverables are expected to be resubmitted?

- For deliverables with resubmittals, how many resubmittals are expected and what level of QA is expected on the resubmittal?
- What are the signature expectations for quality checklists?

Where to Upload Quality Assurance Documents

Upload completed QA checklists or any quality related files to the applicable discipline library and designated as a QA/QC topic on the Preconstruction SharePoint site. Designating a file with the QA/QC topic allows project teams to find all files related to quality easier and faster.

4. Continuous Improvement Activities

An essential element of consistently providing quality services and products to our stakeholders is promptly and proactively communicating and incorporating lessons learned from other projects. This knowledge can reduce issues and uncertainties as well as improve decision-making capabilities throughout the project development process.

NCDOT's [CLEAR](#) (Communicate Lessons, Exchange Advice, Record) program facilitates knowledge transfer of lessons learned, innovative ideas and best management practices through an easy to use technical platform. NCDOT staff and industry partners are encouraged to use the CLEAR database to identify, incorporate, and submit lessons learned that are applicable and beneficial to their project. Additional CLEAR information is described in Stages 1, 2, 3 and 4 of the [PDN](#), under the Value Management discipline.

Appendix A: Roles and Responsibilities

Project Managers/Corridor Development Engineers (or designee)

Responsibilities	NCDOT or GESC	PEF/PSF*
QC Review		
Provide oversight and guidance to ensure the QC review process is completed accurately and on time: <ul style="list-style-type: none"> - Ensure reviews are completed in a timely manner to comply with the project schedule. - Provide a high-level oversight of QC documents and checklists to ensure all checks and corrections are complete. (This is not a technical review) 		✓
QA Review		
<ul style="list-style-type: none"> - Provide oversight and guidance to ensure the QA review meets the NCDOT quality process and that conflicts are resolved in a timely manner. - Ensure the quality process and proper documentation was completed. 	✓	
Constructability Review		
Review the PDN for Constructability Requirements	✓	

**For internally designed projects, these responsibilities would transfer to NCDOT or GESC staff.*

Experienced Subject Matter Experts

Responsibilities	NCDOT or GESC	PEF/PSF*
QC Review		
Serve as the Quality Control reviewer: <ul style="list-style-type: none"> - Review work product using the appropriate QC checklist within the agreed timeframe in the project schedule. - Review work product assumptions, analysis, design process and results for reasonableness within the timeframe in the project schedule. - Verify comments are addressed and incorporated appropriately. - Upload quality checklists to the applicable discipline library and designated as a QA/QC topic on the Preconstruction SharePoint site. 		✓
QA Review		
Serve as the QA reviewer: <ul style="list-style-type: none"> - Perform a high-level review using the appropriate QA checklist within the timeframe in the project schedule. - Confirm comments were adequately addressed and incorporated appropriately. - Upload quality checklists to the applicable discipline library and designated as a QA/QC topic on the Preconstruction SharePoint site. 	✓	

**For internally designed projects, these responsibilities would transfer to NCDOT or GESC staff.*