TDOT
Department of Transportation

Quality Manual

Version 2.1 | July 2025

Integrated Program Delivery (IPD)

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1.0 Introduction

The Tennessee Department of Transportation (TDOT) has developed and implemented this Quality Manual to provide guidance and direction on how TDOT can provide the highest-quality products to TDOT Divisions, Regions, other state agencies, federal agencies, consultants, and contractors. Consultants are required at a minimum to follow the procedures set forth in the manual to provide equal or greater Quality Control and Quality Assurance (QC/QA) procedures on all deliverables to provide high-quality work. The QC/QA process applies to all types of projects. The QC/QA process applies to the development of design guidelines, design, design calculations, spreadsheets, manuals, and specifications. It may be necessary to modify the Quality process based on the complexity of the project. Additionally, modifications to the QC/QA procedures may be required for large or complex projects or for alternate delivery projects.

1.1 What is Quality?

Quality refers to the daily processes, practices, and checks in place to control the quality of the project design, plans, analyses, and documents, as they are being developed. Quality Control (QC) improves the operational and safety performance of highways by providing review and documentation of design calculations, design completeness, and attention to detail. All project team members (Project Managers, Design Managers, Technical Discipline Leads, Discipline Design Engineers, Agents, Appraisers, Consultants, etc.) are responsible for QC.

QC further includes providing ongoing training and supervision to staff, continually improving design practices.

Definition of terms

- **Quality Control (QC):** Refers to the daily processes, practices, and checks implemented to control the quality of the project development by checking the accuracy of design, plans, drawings, documents, analyses, and quantities as they are being developed. QC is expected to be completed at each Milestone deliverable. It is tied to the Project Delivery Network (PDN) as indicated in Section 3.0 of this manual.
- **Quality Assurance (QA):** Refers to the formal, high-level independent review performed by personnel outside of the design team. This review of the project plans and quantities occurs by an experienced qualified individual (in some cases this individual can be an engineering manager) at strategic points in the plan development process, to certify that the plans and quantities meet established quality standards and provide for appropriate flexibility and cost savings before advancing to the next stage. The QA role is described in more detail in Section 4.0 of this manual.

1.2 Philosophy of What Quality Is and Is Not

Quality is the process of checking the accuracy of calculations and consistency of the drawings, detecting and correcting design omissions and errors prior to finalizing design plans, and checking the accuracy of project specifications. The Quality Process is *not* intended to be a replacement for the TDOT CADD standards manual or become a process delivery manual. It is intended to be a check of the design appropriateness, plan completeness, and correctness by an experienced and qualified reviewer.

1.3 The Project Delivery Network and Project Commitment Document

This Quality Manual is intended to complement the PDN and Project Commitment Document (PCD). The PDN provides guidance on when QC is to be performed during a project's life span, identified as quality checks in the PDN flowcharts. Discipline-specific Project QC Checklists have been developed as part of the PDN to assist project teams through QC checks and to provide the necessary QC documentation.

The PCD formalizes a project's scope, schedule, and budget. Consider QC and QA when developing the schedule and budget for each project. The Project Manager will coordinate with the Discipline leads to ensure the quality process is included in the schedule and budget.

1.4 How to Use This Manual

The TDOT QC Procedures assist the project team in creating and verifying that designs are safe, constructible, maintainable, and economical. Implement the Quality Control Procedures in all aspects of project development including design, plans, reports, and estimates. Following the Quality Control Procedures is required and should be included in project schedules or budgets. The Quality Control Procedures may be modified on a case-by-case basis to reflect unique aspects or project-specific requirements. Any alternate Quality Procedures or other modifications must be requested in writing to the Project Manager for approval. All project deliverables must be QC checked. Quality checklists have been developed for each discipline and can be found in Appendix D through Appendix O. Some disciplines may have checklists other than what is listed in the appendix and are to be used in conjunction with those listed in Appendix D through Appendix O.

1.5 How to Develop a Quality Management Plan

The Project Manager begins the Project Quality Management Plan form at the beginning of a project. The Project Manager completes the project information and, with Discipline leads, identifies the QC Check Leads, and confirms the project QA Reviewer. Discipline-specific Project QC Checklists have been developed as part of the PDN to assist project teams in completing

thorough QC checks and to provide the necessary QC documentation. Discipline QC check leads are to complete and submit all required checklists as part of the QC documentation. Each Discipline-specific Project QC Checklist provides recommended QC documentation for each deliverable and additional checklist items.

For consultant-prepared documents, the consultant must submit their Project Quality Management Plan to the TDOT Project Manager before starting work. The consultant is required to complete QC on all designs and documents; TDOT ensures the quality process occurs by performing the Quality Assurance role. The consultant's Project Quality Management Plan is required to be equal to or exceed TDOT's Quality Process.

2.0 Quality Management: Roles and Responsibilities

2.1 Project Manager

The Project Manager has primary management responsibility throughout a project's development. They allocate resources to specific project components based on schedule and budget and identify and resolve problems or conflicts that may arise. The Project Manager is responsible for ensuring technical reviews occur and maintains frequent communication with the project team, local governments, other state agencies, and the public. To perform these duties efficiently, it is critical that the Project Manager instruct team members to utilize the Quality Manual throughout a project's design and development. A project's cost, schedule, and scope are constraining factors, and the Project Manager shall consider the work associated with the QC procedures to develop accurate cost estimates, plans, specifications, and project schedules. It is the Project Manager's responsibility to ensure that QC processes, practices and reviews are implemented on all projects.

2.2 Design Originator

The Design Originator is typically a Civil Engineer licensed in the State of Tennessee capable of performing analyses and calculations. This individual could be the functional area team member or a qualified delegate that develops the documents to be checked. The Design Originator provides the data, such as design sketches and calculations necessary for all deliverables including EBR, permit applications, estimates, and deliverables for detail drawing development. In addition, the Design Originator checks the details for errors, completeness, conformity, and consistency. In cases where a professional engineer seal is not required, the Design Originator can be the responsible professional developing the documents that need to be checked.

2.3 Quality Check Roles

The process followed by the Quality Reviews is covered in *Section 3.0, Related Documents* - *Figure 1* and *Figure 3.*

Checker (QC Check Lead)

The Checker is an engineer licensed in the State of Tennessee. They thoroughly check the calculations, design, documents, and detail drawings for errors, omissions, completeness, and conformance. The Checker must not have prepared the item being checked. The Checker cannot function as the Design Originator, Back Checker, Engineer of Record, or be a part of the Regional Quality Team. The Checker not being the Engineer of Record allows the checker to be that third party reviewer for a project. This ensures that multiple people are reviewing a project in hopes that all the potential challenges are found and resolved prior to the turn in.

Back Checker (Originator/Designer)

The Back Checker reviews the corrections developed by the Checker. This includes validating and/or opposing the corrections submitted by the Checker. The Back Checker is the Design Originator in most cases. The Back Checker cannot function as the Checker or be a part of the Regional Quality Team.

Corrector (Originator/Designer/Back Checker)

The Corrector incorporates all corrections after the Checker and Back Checker finalize the corrections required following their review. The Corrector can be a drafter, engineer, or qualified individual who generates and revises details, plan sheets, documents, and drawings in an electronic format. In most cases the Corrector is the Design Originator or a qualified delegate. The Corrector cannot function as the QC Check Lead or be a part of the Regional Quality Team.

Verifier (Checker)

The Verifier validates that the back-checked corrections are accurately made and incorporated without error. They confirm that all information is highlighted to verify that it has been checked. The verifier annotates the check print with instructions and returns it to the Corrector if a correction was not made or was made in error. The Verifier cannot function as the Corrector or be a part of the Regional Quality Team. The Verifier is the Checker in most cases.

Engineer of Record

The Engineer of Record is responsible for the design and will sign and seal the complete Discipline-specific set. The Engineer of Record can be the Design Originator if they are a Civil Engineer licensed in the State of Tennessee. The Engineer of Record cannot be the QC Check Lead.

Quality Assurance Evaluator

The Quality Assurance Evaluator verifies that all project documents were checked according to the Quality Management Plan. The Quality Assurance Evaluator is a member of the TDOT Regional Quality Team; or they can be an individual who has not performed any of the QC Procedures. More information regarding the Quality Assurance Evaluator role can be found in either Section 2.4 and Section 4.0

2.4 Regional Quality Team Roles

Policies and Procedures

The Regional Quality Team should ensure that Department policies, technical guidance, procedures, software, and systems are current and accurate for incorporation into the project delivery process and implements the TDOT Quality Manual as part of the Pre-construction Division's activities.

Milestone Reviews: PDN Stage 1-4

During PDN Stages 1-4, the Regional Quality Team will act as the Quality Assurance Evaluator to review plans for constructability, applicability, completeness, and conformity. See Section 4.2 for more information regarding this process.

Final Deliverables Review

At the end of PDN Stage 4, the Regional Quality Team will assist the Preconstruction Regional Transportation Engineer to perform a Quality Assurance review of final deliverables. This includes reviewing all plans, estimates, reports, provisions, and supporting documentation. This will ensure the completeness of the Final PS&E Package. During this stage, the Regional Quality Team will upload the project deliverables to the appropriate ProjectWise Folder to assure a timely submittal to HQ Construction for Turn in.

Letting Revisions

If there are Letting Revisions, the Regional Quality Team uploads and maintains electronic plans to ProjectWise until the contract is awarded. They will review the Letting Revision Package and then update the ProjectWise 04 Final Letting Packet Stage 4 folder. This will include a subfolder for each letting revision with the naming convention identified in the Letting Revisions folder of "Letting Revision MMDDYY". Then notify the Preconstruction RTE that the revision complete.

Awarded Projects

The Regional Quality Team will copy the Final PS&E Package to the appropriate ProjectWise Folder once projects are awarded. This will prompt the Preconstruction Regional Transportation Engineer to alert the Resident Engineer and Assistant Resident Engineer that the plans are ready to upload to PlanGrid and to alert HQ Design Quality Team to upload the plans to FileRoom FileNet for final archiving.

Tracking and Continuous Improvement

The Regional Quality Team routinely identifies and documents potential design challenges, common errors, and design discrepancies. They will collaborate with the Preconstruction Regional Transportation Engineer to brief Leadership, Managers, Team Leads, and Engineering

Production Support with findings associated with quality reviews and acquired knowledge. This collaboration will continue to improve the quality program moving forward.

Consultant Evaluations and Feedback

The Regional Quality Team will assist the Roadway Manager, Project Managers, and Director of Pre-Construction in preparing the Consultant Evaluation.

2.5 Consultants-Prepared Plans

Consultant Responsibilities

For consultant-prepared plans, the consultant is not required to submit their Quality Control Plan in writing prior to starting work. However, TDOT reserves the right to review the consultant's Quality Control Plan, if needed. The Consultant QC Plan must meet or exceed the QC procedures laid out in this TDOT Quality Manual.

During the development of the plans, TDOT shall perform a QA review of the plans at each milestone review per the PDN. TDOT reviews the plans for constructability, applicability, completeness, and conformity.

TDOT's project managers will typically not review the consultant's work in detail. Generally, TDOT will maintain limited oversight of the consultant's work, with emphasis on some areas.

Under no circumstance does a QA Review by TDOT release the consultant from their responsibilities involving QC/QA or from professional liability involving the engineering, plans, quantities, and cost estimates, or from recovery of damages that result from errors and omissions in the plans.

3.0 Quality Control Procedures

3.1 Overview

Quality Control is required during the entire project process. QC includes checking all documents before distribution to verify completeness, accuracy, and compliance with TDOT and industry standards. The following QC Procedures provide consistent and thorough QC reviews:

- Complete QC review according to the specific document type QC procedures (see Sections 3.3 to 3.6). The QC process is complete when all information is highlighted yellow to show that it is correct or has been corrected in the final deliverable. QC checking must be completed and shared with the Regional Quality Team before distribution for each milestone review meeting. See Figure 3 for a flowchart of the QC Process
- Complete the appropriate QC Checklist verifying that each item has been completed. Then share the completed checklist with the Regional Quality Team before distribution of each milestone review meeting
- Once QC is complete, the Regional Quality Team performs a Quality Assurance Evaluation to verify the QC Procedures were properly followed and that the QC documents are appropriately stored before each milestone review meeting. (See Section 4.0)

QC Check Process

The Design Originator makes a check print of project documents being worked on by completing the following:

- Scan or copy all original documents. The check print does not have to be a hard copy, it may be a .pdf or other format that the QC Check Lead can appropriately review and annotate as required.
- If electronic documents are checked such as models, provide a summation of items to be revised on the Comment Resolution Form.
- Place a check print stamp on the front sheet of all check print documents, and then number, sign, and date it. See Figure 2 in Section 3.2.
- Once a document has been checked, no additional quality checks are required unless data or elements within the document have been changed or modified.

Checking

The QC Check Lead is the Checker who completes a thorough review of each component from the design originator. Use the following color code on the check print to document the checking review:

- Yellow Highlight: Highlight in Yellow all correct items.
- Red: Corrections, mark through incorrect items and add corrections.
- Blue: Commentary notes, include discussion items, questions, references, and methods of checking.

When the check is complete, sign and date the check print stamp. Complete the appropriate Project QC Checklist. Add any relevant information or comments for the Back Checker.

Give the project QC checklist and the completed and signed check prints back to the design originator who is now in the role of the Back Checker.

There is no need for back checking or further signatures on the check print stamp in the case where no corrections, additions, or deletions are found. Return all completed and signed QC documentation to the Design Originator.

Back Checking

The Design Originator is now in the Back Checker's role. They review the Checker's corrections on the check print document. Use the following color code on the check print to document the Back Checker review:

- Green Checkmark: To agree with the Checker's corrections, place a check mark next to the Checker's correction.
- Green: Use for additional corrections or alterations to the Checker's corrections. The Checker then confirms the Back Checker's corrections with a red check.

The Back Checker crosses out the Checker's correction and adds additional corrections or alterations in green when if they do not agree with the Checker's marks.

The term STET (a Latin word meaning let it stand) shall be used to indicate that a previously marked change shall be ignored. If STET is used, the Back Checker discusses the reasons for the STET with the Checker.

Discuss all changes to the Checker's corrections with the Checker. If the Checker agrees, they place a red check next to the cross out. The Back Checker and Checker shall resolve differences encountered during the checking process together. If they cannot reach a resolution, they will consult with the Discipline Lead or Discipline Manager.

Sign and date the check print stamp when back check is completed. Document the discussion between the Checker and Back Checker as needed.

Corrections

The Design Originator is now in the Corrector's role. They make the corrections from the Checker and Back Checker mark ups. Use the following color code on the check print to document the Corrector's review:

- Green Circles: Marking that the corrections have been incorporated.

Ensure any design revisions based on the calculations are revised appropriately. Sign and date the check print stamp when all the corrections have been made. Provide the Verifier with the original check print and an updated clean print that includes all completed corrections and no QC markings. Do not place a check print stamp on the updated clean print.

Verifying

The QC Check Lead is now in the Verifier's role. They compare the check print corrections with the updated clean version to confirm that all corrections are incorporated without error. Use the following color code on the check print to document the Verifier's review:

- Yellow Highlight: Shows that any necessary design corrections have been properly made.

If a correction was not made or is in error, annotate the updated check print with instructions and return it to the Corrector and have a discussion with the Corrector regarding the errors and annotations.

Sign and date the check print stamp once all corrections are verified. Return the check print set to the Design Originator.

Additional Changes or Corrections

Create a new check print when a change is made to the checked document to check the area that has changed. The check print is stamped and labeled check print 2, 3, 4, etc., as applicable and attached to the previous check prints. The checking follows the same procedure as the original check print except only those portions that changed need to be checked. The QC process then moves on to QA, which is documents and described in Section 4.0.

3.2 Related Documents

Sample TDOT QC Color Code

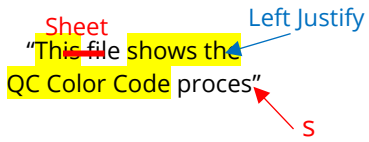
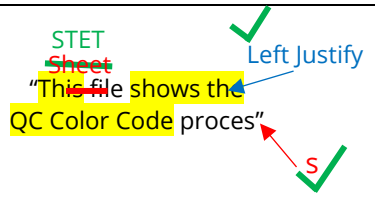
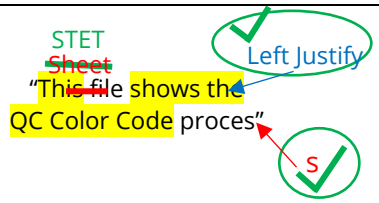
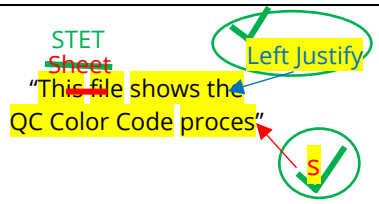
Originate Check Print: (Originator/Designer)	Create Check Print. Do not use Red, Yellow, or Blue	"This file shows the QC Color Code proces"
Check: (Checker)	Yellow Highlight for Correct Items. Red for corrections, additions, or deletions. Blue for notes, instructions and comments for clarification or direction but not to be drafted.	
Back Check: (Back Checker/Originator)	Green Check Mark indicates agreement with change. STET (a term used to indicate that a previously marked change is to be ignored) and cross out is used when no change should be made.	
Correct: (Corrector/Originator)	Green Circle when the update is complete. Print the final document when all updates are completed.	
Verify: (Verifier/Checker)	Check against updated print and yellow highlight all items correctly updated.	
Updated Print:	Final clean print after the QC process has been completed.	"This file shows the QC Color Code process"

Figure 1: TDOT QC Color Code

Sample Check Print Stamp

Each sheet/document includes a check print stamp. After each person has completed their task, the Check Print box is filled out by each person with their Initials and the date the action is finished. It then moves to the next QC step.

Note: This Check Print can be a text box within Adobe or whichever software you are using to list each QC role and who completed each step.

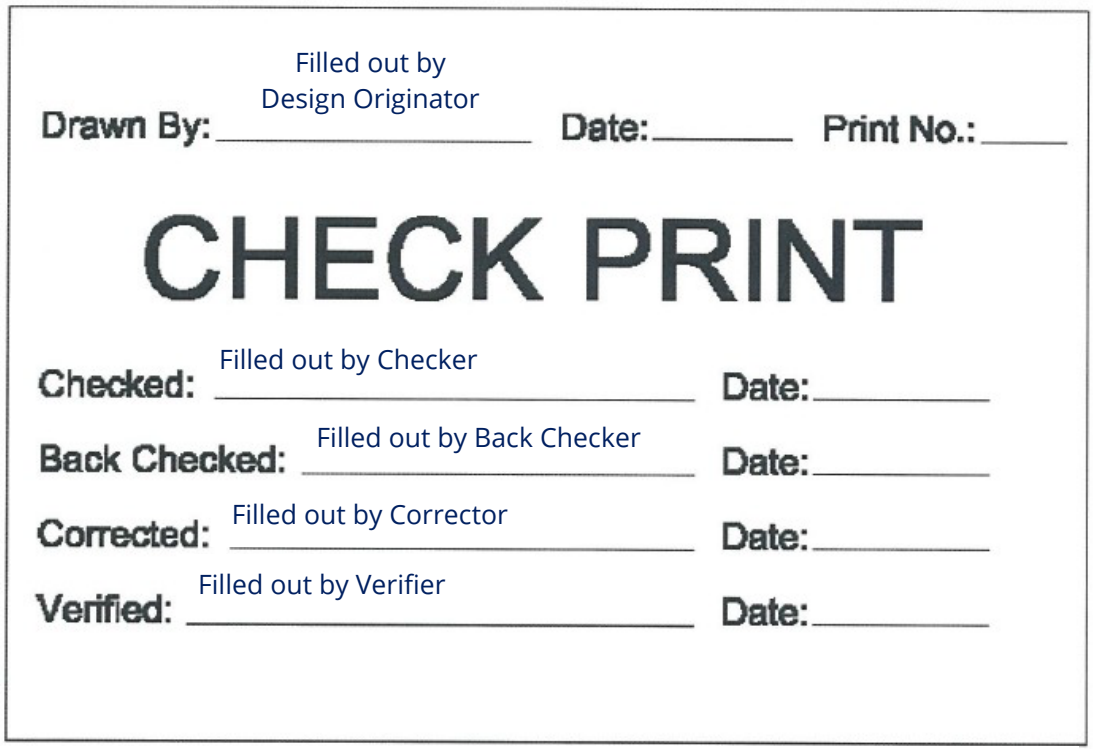


Figure 2: Sample Check Print stamp

Quality Control Flowchart

This is the Quality Control review process as a flow chart. This shows the path that the check print document goes on while the QC review is being performed before each milestone review meeting.

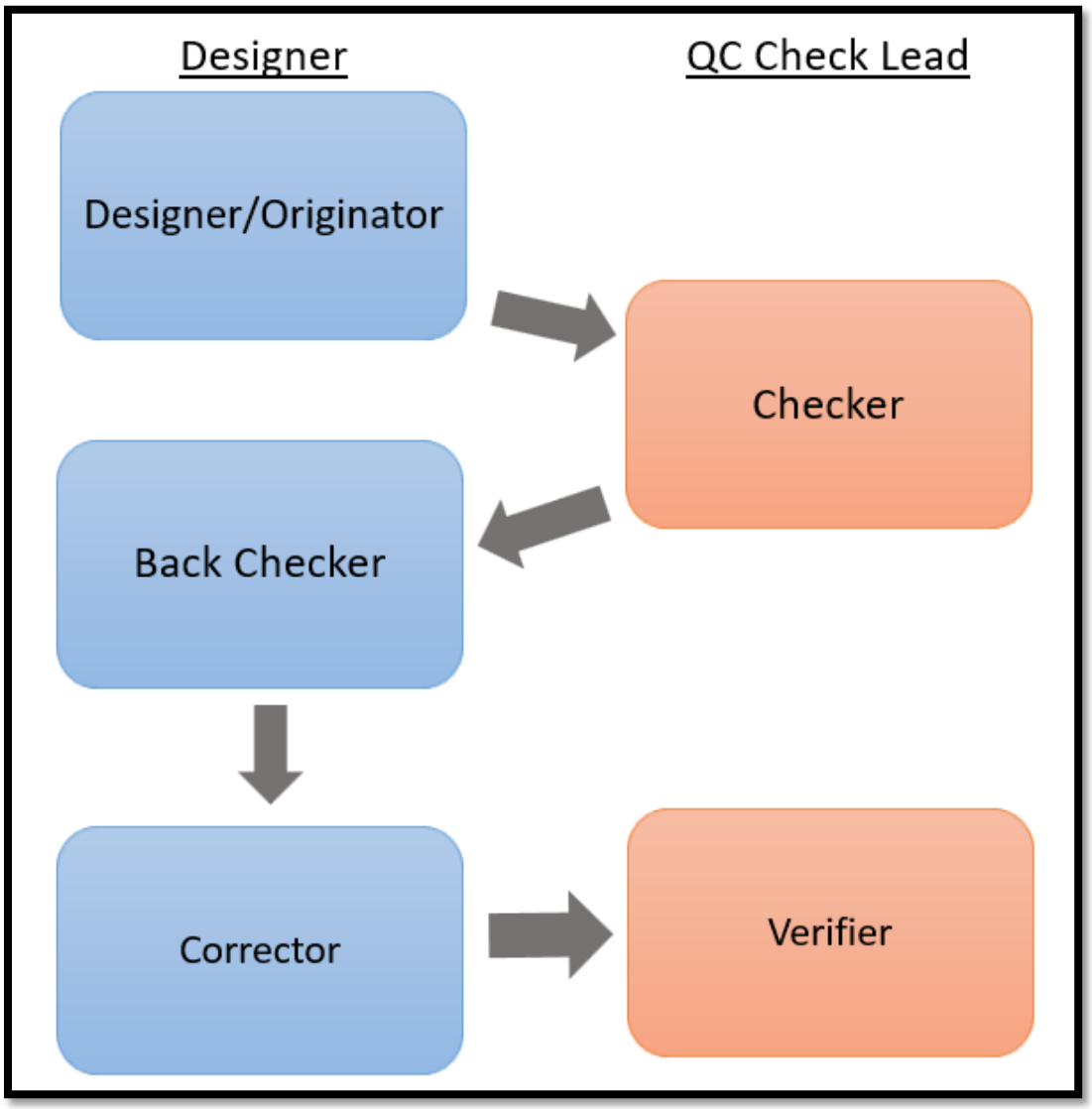


Figure 3: TDOT QC Review Flow Chart

3.3 Detailed Checking of Design Calculations

Overview

Perform all calculations on standard calculation sheets or use approved software. Clearly label each sheet with the project information, necessary signatures, and dates. Number all pages sequentially. Clearly state all assumptions, references, units, and conclusions. Use sketches as required to clarify calculations.

The Design Originator organizes and stores the original calculations and check print calculations in binders or electronic folders.

A thorough design check confirms the accuracy and completeness of the design calculations and individual components by eliminating mathematical errors or incorrect assumptions.

Complete a formal check of all hand calculations, spreadsheets, etc. that are the basis for engineering studies, design, construction, and maintenance documents. Check calculations as soon as practical after completion.

Related Documents

Figure 1: QC Color Code
Figure 2: Check Print Stamp
Figure 3: TDOT QC Review Flow Chart
Figure 4: Sample Design Calculations QC Review
Project Quality Management Plan
Project QC Cover Sheet Form
Project QC Checklists
Calculation Examples

Example calculations could include a wide range of examples depending on which discipline the calculation is developed in. See the list below for example calculations that would need to go through the QC process for each discipline.

Roadway – metal beam guard rail, fence, barrier length of need, horizontal curves, vertical curves, K values, Earthwork volumes, superelevation, turning radius, stopping sight distance, etc.

Drainage – channel analysis, hydraulics, time of concentration, detention basins, peak water surface elevations, flow velocities, hydrology, backwater, scour, storm sewer, culvert, dissipater, channel shear stress, sedimentation/filtration, etc.

Traffic – illumination, voltage drop, level of service, signal timing, signal warrant analysis, etc.

Structures – bridge vertical clearance, prestressed beam design, haunch design, bearing pad design, bent cap design, column design, drilled shaft design, abutment design, slab design, bent design, etc.

See *Figure 4* for a sample design calculation QC review example.

Originator

Median Openings	L (avg)	W (avg)	sy
3 each	36	26	312
6 each	36	30	840
Total			1152

Streets	L (avg)	W (avg)	SY
5 each	50	36	1000

Driveways	L (avg)	W (avg)	SY
3 each	16	15	80

Business Ents	L (avg)	W (avg)	SY
20 each	40	15	1333.3333

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
Cold Plane		415-01.01	1.75	105	lb/sy/in	183.75 lb/sy
Mainline (rdy & shlds)	77939	7161				
Median & Median Opening	5552	510				
Streets	1000	92				
Business Ent	1333	123				
Total		7885	LB			
GR "CS" mix- (Leveling)		307-01.15	0.5	115	lb/sy/in	57.5 lb/sy
Mainline (rdy & shlds)	77939	2241				
Median & Median Opening	1152	160				
Streets	1000	29				
Business Ent	1333	38				
Total		2467	LB			
GR "D" mix (Surface)		411-01.10	1.25	106	lb/sy/in	132.5 lb/sy
Mainline (rdy & inside shlds)	54443	3607				
Median & Median Opening	5552	368				
Streets	1000	66				
Business Ent	1333	88				
Driveways	80	5				
Total		4135	LB			

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
GR "E" Shoulders		411-01.07	1.25	106	lb/sy/in	132.5 lb/sy
Outside Shlds	23496	1556.61	TONS			
Trackless Tack Coat		403-02.01	General Use	0.05 - 0.10	gal/sy	0.075 gal/sy
			Milled surface	0.08 - 0.12	gal/sy	0.1 gal/sy
Mainline	77939	25.30				
rdy & shlds	77939	33.74				
Median &	5552	1.80				
Median Opening	5552	2.40				
Streets	1000	0.32				
	1000	0.43				
Bus Ents	1333	0.43				
	1333	0.58				
Driveways	80	0.03				
Total		65.04	TONS			

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

Checked: _____ Date: _____

Back Checked: _____ Date: _____

Corrected: _____ Date: _____

Verified: _____ Date: _____

Checker

Add Area Summary Box Here

Median Openings	L (avg)	W (avg)	sy
3 each	36	26	312
7 ~~6~~ each	36	30	840
Total			1152

Streets	L (avg)	W (avg)	SY
5 each	50	36	1000

Driveways	L (avg)	W (avg)	SY
3 each	16	15	80

Business Ents	L (avg)	W (avg)	SY
20 each	40	15	1333.3333

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
Cold Plane		415-01.01	1.75	105	lb/sy/in	183.75 lb/sy
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Outside Shlds	23496	1556.61	TONS			
Trackless Tack Coat		403-02.01	General Use	0.05 - 0.10	gal/sy	0.075 gal/sy
			Milled surface	0.08 - 0.12	gal/sy	0.1 gal/sy
Mainline	77939	25.30				
rdy & shlds	77939	33.74				
Median &	5552	1.80				
Median Opening	5552	2.40				
Streets	1000	0.32				
	1000	0.43				
Bus Ents	1333	0.43				
	1333	0.58				
Driveways	80	0.03				
Total		65.04	TONS			

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

Checked: H. Jones Date: 4/11/23

Back Checked: _____ Date: _____

Corrected: _____ Date: _____

Verified: _____ Date: _____

Back Checker

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Driveways	80	0.03				
Total		65.04	TONS			

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

Checked: H. Jones Date: 4/11/23

Back Checked: N.Smith Date: 4/11/23

Corrected: _____ Date: _____

Verified: _____ Date: _____

Corrector

Add Area Summary Box Here ✓

Median Openings	L (avg)	W (avg)	sy
3 each	36	26	312
7 8 each	36	30	840
Total			1152

Streets	L (avg)	W (avg)	SY
5 each	50	36	1000

Driveways	L (avg)	W (avg)	SY
3 each	16	15	80

Business Ents	L (avg)	W (avg)	SY
20 each	40	15	1333.3333

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
Cold Plane		415-01.01	1.75	105	lb/sy/in	183.75 lb/sy
Mainline (rdy & shlds)	77939	7161				
Median & Median Opening	5552	510				
Streets	1000	92				
Business Ent	1333	123	TON ✓			
Total		7885	LB			
GR "CS" mix- (Leveling)		307-01.15	0.5	115	lb/sy/in	57.5 lb/sy
Mainline (rdy & shlds)	77939	2241				
Median & Median Opening	1152	160				
Streets	1000	29				
Business Ent	1333	38	TON ✓			
Total		2467	LB			
GR "D" mix (Surface)		411-01.10	1.25	106	lb/sy/in	132.5 lb/sy
Mainline (rdy & inside shlds)	54443	3607				
Median & Median Opening	5552	368				
Streets	1000	66				
Business Ent	1333	88				
Driveways	80	5	TON ✓			
Total		4135	LB			

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
GR "E" Shoulders		411-01.07	1.25	106	lb/sy/in	132.5 lb/sy
Outside Shlds	23496	1556.61	TONS			
Trackless Tack Coat		403-02.01	General Use	0.05 - 0.10	gal/sy	0.075 gal/sy
			Milled surface	0.08 - 0.12	gal/sy	0.1 gal/sy
Mainline rdy & shlds	77939	25.30				
	77939	33.74				
Median & Median Opening	5552	1.80				
	5552	2.40				
Streets	1000	0.32				
	1000	0.43				
Bus Ents	1333	0.43				
	1333	0.58				
Driveways	80	0.03				
Total		65.04	TONS			

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

Checked: H. Jones Date: 4/11/23

Back Checked: N.Smith Date: 4/11/23

Corrected: G. Olsen Date: 4/12/23

Verified: _____ Date: _____

Verifier

Add Area Summary Box Here ✓

Median Openings	L (avg)	W (avg)	sy
3 each	36	26	312
7 8 each	36	30	840
Total			1152

Streets	L (avg)	W (avg)	SY
5 each	50	36	1000

Driveways	L (avg)	W (avg)	SY
3 each	16	15	80

Business Ents	L (avg)	W (avg)	SY
20 each	40	15	1333.3333

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
Cold Plane		415-01.01	1.75	105	lb/sy/in	183.75 lb/sy
Mainline (rdy & shlds)	77939	7161				
Median & Median Opening	5552	510				
Streets	1000	92				
Business Ent	1333	123				
Total		7885	LB			
			TON ✓			
GR "CS" mix- (Leveling)		307-01.15	0.5	115	lb/sy/in	57.5 lb/sy
Mainline (rdy & shlds)	77939	2241				
Median & Median Opening	1152	160				
Streets	1000	29				
Business Ent	1333	38				
Total		2467	LB			
			TON ✓			
GR "D" mix (Surface)		411-01.10	1.25	106	lb/sy/in	132.5 lb/sy
Mainline (rdy & inside shlds)	54443	3607				
Median & Median Opening	5552	368				
Streets	1000	66				
Business Ent	1333	88				
Driveways	80	5				
Total		4135	LB			
			TON ✓			

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
GR "E" Shoulders		411-01.07	1.25	106	lb/sy/in	132.5 lb/sy
Outside Shlds	23496	1556.61	TONS			
Trackless Tack Coat		403-02.01	General Use	0.05 - 0.10	gal/sy	0.075 gal/sy
			Milled surface	0.08 - 0.12	gal/sy	0.1 gal/sy
Mainline	77939	25.30				
rdy & shlds	77939	33.74				
Median &	5552	1.80				
Median Opening	5552	2.40				
Streets	1000	0.32				
	1000	0.43				
Bus Ents	1333	0.43				
	1333	0.58				
Driveways	80	0.03				
Total		65.04	TONS			

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

Checked: H. Jones Date: 4/11/23

Back Checked: N.Smith Date: 4/11/23

Corrected: G. Olsen Date: 4/12/23

Verified: H. Jones Date: 4/12/23

Final Print

Summary			
	Outside Shoulders	23496	sy
	Inside Shoulders	3332	sy
	Roadway	51110	sy
	Paved Median	4400	sy
	Median Openings	1152	sy
	Streets	1000	sy
	Private Drives	80	sy
	Business Entrances	1333	sy

Median Openings	L (avg)	W (avg)	sy
3 each	36	26	312
7 each	36	30	840
Total			1152

Streets	L (avg)	W (avg)	SY
5 each	50	36	1000

Driveways	L (avg)	W (avg)	SY
3 each	16	15	80

Business Ents	L (avg)	W (avg)	SY
20 each	40	15	1333.3333

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
Cold Plane		415-01.01	1.75	105	lb/sy/in	183.75 lb/sy
Mainline (rdy & shlds)	77939	7161				
Median & Median Opening	5552	510				
Streets	1000	92				
Business Ent	1333	123				
Total		7885	TONS			
GR "CS" mix- (Leveling)		307-01.15	0.5	115	lb/sy/in	57.5 lb/sy
Mainline (rdy & shlds)	77939	2241				
Median & Median Opening	1152	160				
Streets	1000	29				
Business Ent	1333	38				
Total		2467	TONS			
GR "D" mix (Surface)		411-01.10	1.25	106	lb/sy/in	132.5 lb/sy
Mainline (rdy & inside shlds)	54443	3607				
Median & Median Opening	5552	368				
Streets	1000	66				
Business Ent	1333	88				
Driveways	80	5				
Total		4135	TONS			

Type of Work:	total sy	Item No.	depth (inches)	rate	unit	weighted rate
GR "E" Shoulders		411-01.07	1.25	106	lb/sy/in	132.5 lb/sy
Outside Shlds	23496	1556.61	TONS			
Trackless Tack Coat		403-02.01	General Use	0.05 - 0.10	gal/sy	0.075 gal/sy
			Milled surface	0.08 - 0.12	gal/sy	0.1 gal/sy
Mainline	77939	25.30				
rdy & shlds	77939	33.74				
Median &	5552	1.80				
Median Opening	5552	2.40				
Streets	1000	0.32				
	1000	0.43				
Bus Ents	1333	0.43				
	1333	0.58				
Driveways	80	0.03				
Total		65.04	TONS			

Figure 4: Sample design calculations QC review.

3.4 Detailed Checking of Computer Program Input

Overview

The Checker provides systematic checks of computer program input to minimize errors. This section applies to computer program inputs such as roadway geometric design inputs, hydraulic software, traffic analysis software, etc.

The Checker reviews the input entered manually first and then reviews batch input before forwarding for processing. The Checker rechecks batch input against actual input when returned with the output. In most cases, printouts of the input data may be used to check the data for correctness. Errors, defects, or non-compliance output detected require assessment of the input to correct the deficiencies.

To check interactive CADD design input further, review graphical output along with a design report of the work. An example of graphical output could be review of cross sections in super elevation sections of the design to verify the super elevation input is being shown correctly. The Checker reviews graphical and report output to assure desirable results are attained and design standards or required criteria are met. Information showing the program inputs is required for complete QC, while the program outputs do not need to be printed and shown for QA Evaluating. In the case of large amounts of program inputs that cannot be reasonably printed and checked, the QC Cover Sheet Form must have detailed documentation of how the QC process was performed.

The QC process then continues as normal to the Back Checker.

See Figure 5 below for a sample computer input program QC review.

Related Documents

Figure 1: QC Color Code

Figure 2: Check Print Stamp

Figure 3: TDOT QC Review Flow Chart

Figure 5: Sample Computer Program Input QC Review

Project Quality Management Plan

Project QC Cover Sheet Form

Project QC Checklists

Sample Computer Program Input QC Review

Originator

Prop_SE-1

Superelevation	Name	Station	Cross Slope	Transition Type	Pivot Edge	Point Type	Ignore	Distance Constr...	Slope Constraint...	Superelevation Con...	Slope Transition 1	Slope Transition 2
CL - EOP_L	CL - EOP_L - 52+...	53+25.00	-5.44%	Linear	Right Edge	Start Point	False	None	None			
CL - EOP_L	CL - EOP_L - 53+...	53+50.00	-3.65%	Linear	Right Edge	Full Super	False	None	None			
CL - EOP_L	CL - EOP_L - 54+...	54+55.00	8.00%	Linear	Right Edge	Full Super	False	None	None			
CL - EOP_L	CL - EOP_L - 55+...	55+17.00	7.00%	Linear	Right Edge	Full Super	False	None	Cross Slope		CL - EOP_L - 54+...	
CL - EOP_L	CL - EOP_L - 56+...	56+41.20	2.00%	Linear	Right Edge	Reverse Crown	False	None	None			
CL - EOP_L	CL - EOP_L - 58+...	58+26.92	-2.00%	Linear	Right Edge	Normal Crown	False	None	None			
CL - EOP_L	CL - EOP_L - 59+...	59+66.92	-2.00%	Linear	Right Edge	Normal Crown	False	None	None			
CL - EOP_L	CL - EOP_L - 61+...	61+27.00	-8.00%	Linear	Right Edge	Full Super	False	None	Mirror Cross Slope			
CL - EOP_L	CL - EOP_L - 61+...	61+58.00	-8.00%	Linear	Right Edge	Full Super	False	None	Mirror Cross Slope			
CL - EOP_L	CL - EOP_L - 62+...	62+76.80	-2.00%	Linear	Right Edge	Reverse Crown	False	None	None			
CL - EOP_L	CL - EOP_L - 63+...	63+60.00	-1.07%	Linear	Right Edge	Full Super	False	None	None			
CL - EOP_L	CL - EOP_L - 64+...	64+00.00	2.06%	Linear	Right Edge	End Point	False	None	None			
CL - EOP_R	CL - EOP_R - 52...	53+00.00	0.47%	Linear	Left Edge	Start Point	False	None	None			
CL - EOP_R	CL - EOP_R - 53...	53+50.00	0.32%	Linear	Left Edge	Full Super	False	None	None			
CL - EOP_R	CL - EOP_R - 54...	54+55.00	-8.00%	Linear	Left Edge	Full Super	False	None	Mirror Cross Slope		CL - EOP_L - 54+...	
CL - EOP_R	CL - EOP_R - 55...	55+17.00	-8.00%	Linear	Left Edge	Full Super	False	None	Mirror Cross Slope		CL - EOP_L - 55+...	

Row: 1 of 24

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

Checked: _____ Date: _____

Back Checked: _____ Date: _____

Corrected: _____ Date: _____

Verified: _____ Date: _____

Checker

Prop_SE-1

start at 53+00.00

Show Superelevation Chart

Superelevation	Name	Station	Cross Slope	Transition Type	Pivot Edge	Point Type	Ignore	Distance Constr...	Slope Constraint...	Superelevation Con...	Slope Transition 1	Slope Transition 2
CL - EOP_L	CL - EOP_L - 52+...	53+25.00	-5.44%	Linear	Right Edge	Start Point	False	None	None			
CL - EOP_L	CL - EOP_L - 53+...	53+50.00	-3.65%	Linear	Right Edge	Full Super	False	None	None			
CL - EOP_L	CL - EOP_L - 54+...	54+55.00	8.00%	Linear	Right Edge	Full Super	False	None	None			
CL - EOP_L	CL - EOP_L - 55+...	55+17.00	~~7.00%~~ 8.00%	Linear	Right Edge	Full Super	False	None	Cross Slope		CL - EOP_L - 54+...	
CL - EOP_L	CL - EOP_L - 56+...	56+41.20	2.00%	Linear	Right Edge	Reverse Crown	False	None	None			
CL - EOP_L	CL - EOP_L - 58+...	58+26.92	-2.00%	Linear	Right Edge	Normal Crown	False	None	None			
CL - EOP_L	CL - EOP_L - 59+...	59+66.92	-2.00%	Linear	Right Edge	Normal Crown	False	None	None			
CL - EOP_L	CL - EOP_L - 61+...	61+27.00	-8.00%	Linear	Right Edge	Full Super	False	None	Mirror Cross Slope			
CL - EOP_L	CL - EOP_L - 61+...	61+58.00	-8.00%	Linear	Right Edge	Full Super	False	None	Mirror Cross Slope			
CL - EOP_L	CL - EOP_L - 62+...	62+76.80	-2.00%	Linear	Right Edge	Reverse Crown	False	None	None			
CL - EOP_L	CL - EOP_L - 63+...	63+60.00	-1.07%	Linear	Right Edge	Full Super	False	None	None			
CL - EOP_L	CL - EOP_L - 64+...	64+00.00	2.06%	Linear	Right Edge	End Point	False	None	None			
CL - EOP_R	CL - EOP_R - 52...	53+00.00	0.47%	Linear	Left Edge	Start Point	False	None	None			
CL - EOP_R	CL - EOP_R - 53...	53+50.00	0.32%	Linear	Left Edge	Full Super	False	None	None			
CL - EOP_R	CL - EOP_R - 54...	54+55.00	-8.00%	Linear	Left Edge	Full Super	False	None	Mirror Cross Slope		CL - EOP_L - 54+...	
CL - EOP_R	CL - EOP_R - 55...	55+17.00	-8.00%	Linear	Left Edge	Full Super	False	None	Mirror Cross Slope		CL - EOP_L - 55+...	

Row: 1 of 24

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

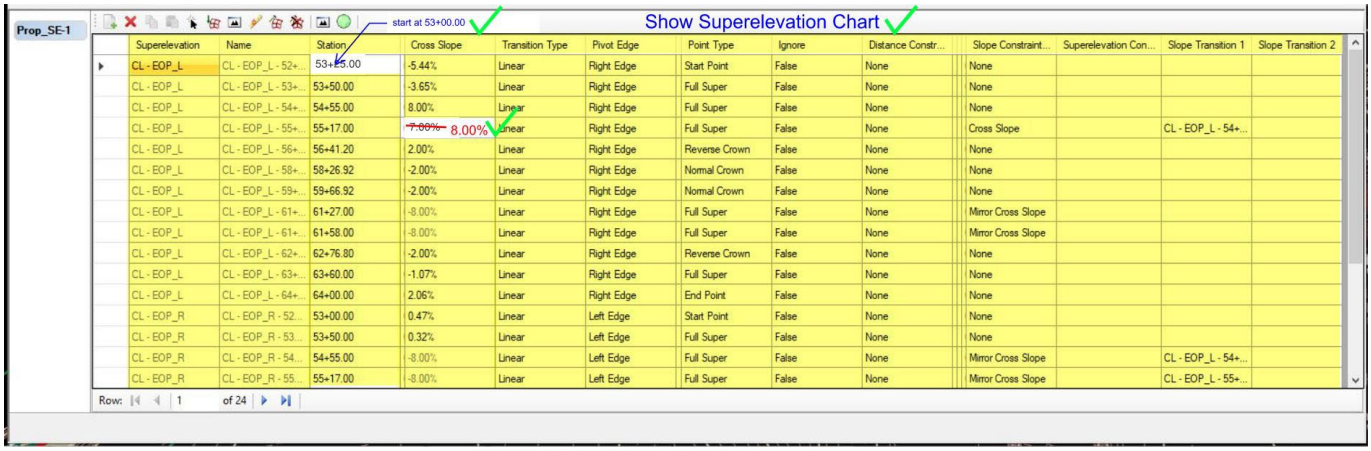
Checked: H. Jones Date: 4/11/23

Back Checked: _____ Date: _____

Corrected: _____ Date: _____

Verified: _____ Date: _____

Back Checker



Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

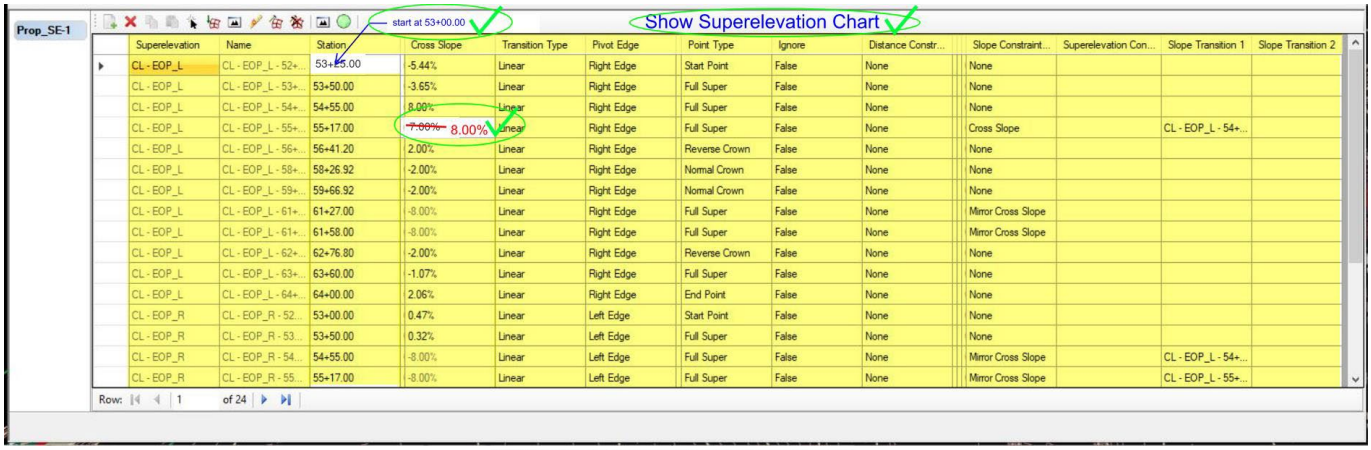
Checked: H. Jones Date: 4/11/23

Back Checked: N. Smith Date: 4/11/23

Corrected: _____ Date: _____

Verified: _____ Date: _____

Corrector



Drawn By: N.Smith Date: 4/11/23 Print No.: 1

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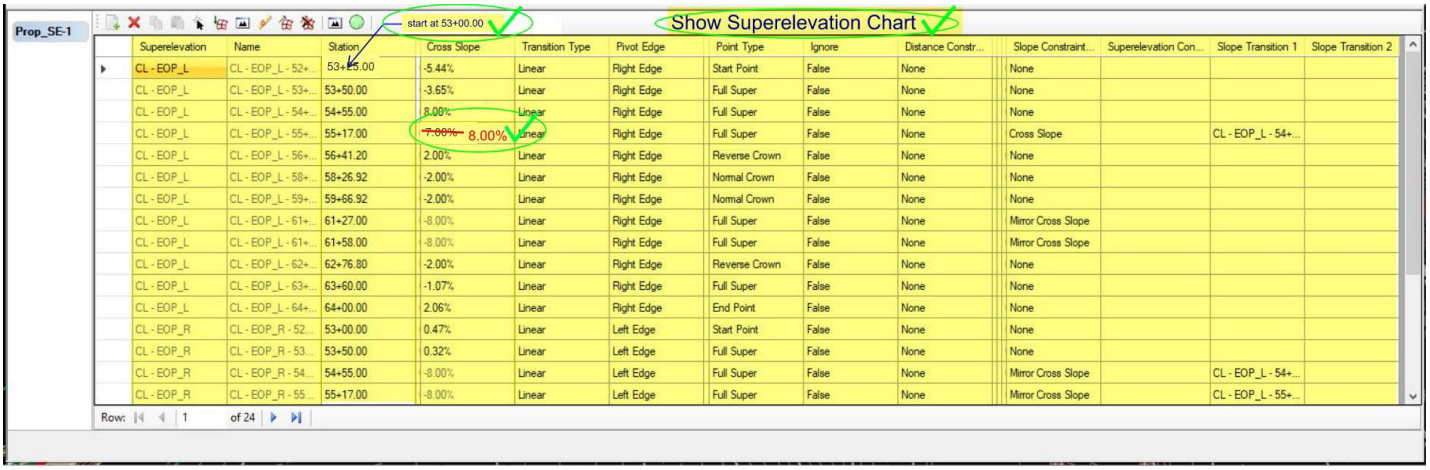
Back Checked: N.Smith Date: 4/11/23

Corrected: G. Olsen Date: 4/12/23

Verified: _____ Date: _____

Verifier



Drawn By: N.Smith Date: 4/11/23 Print No.: 1

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Checked: H. Jones Date: 4/11/23

Back Checked: N.Smith Date: 4/11/23

Corrected: G. Olsen Date: 4/12/23

Verified: H. Jones Date: 4/12/23

Final Print

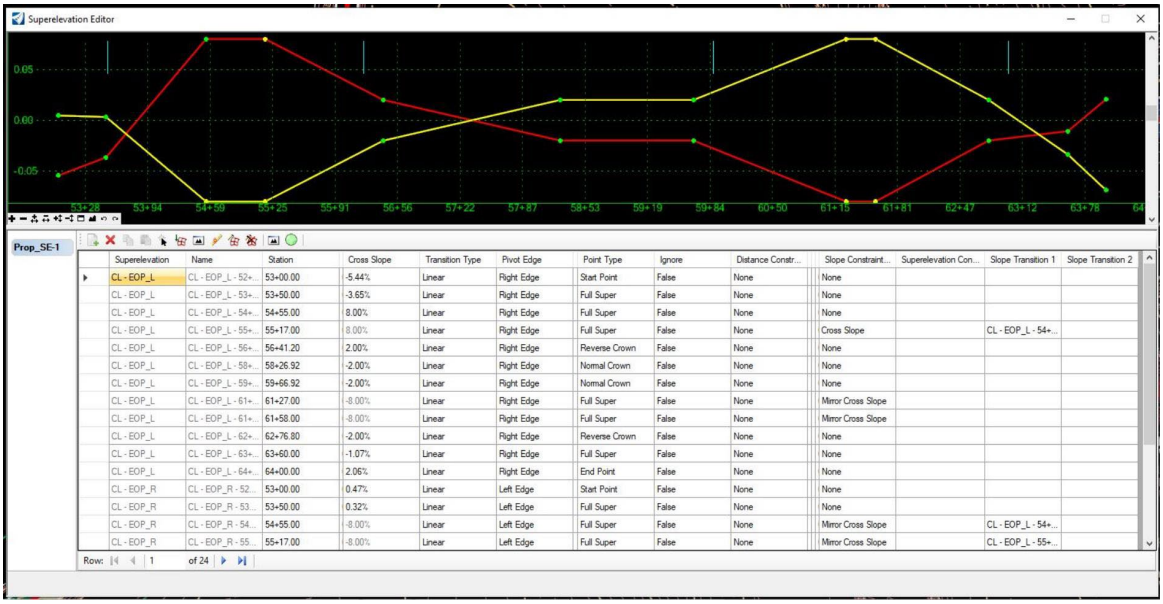


Figure 5: Sample computer program input QC review

3.5 Detailed Checking of Drawings

Overview

Provide a uniform, orderly, and efficient method for checking drawings. Complete the formal checking of the presentation of drawings, details, and exhibits before submitting for Milestone reviews. The Checker ensures all base drawing files are correct before distributing them for use by other Disciplines and that the drawings meet applicable design standards, design guidelines, and CADD Standards. The Checker will provide comments on any elements of the drawings where errors, omissions, and ambiguity are identified. While the Checker is reviewing the document, they highlight key design points and sheet layout items. It is not required to highlight all linework.

The QC process then continues as normal to the Back Checker.

See Figure 6 below for a sample drawing QC review.

Related Documents

Figure 1: QC Color Code

Figure 2: Check Print Stamp

Figure 3: TDOT QC Review Flow Chart

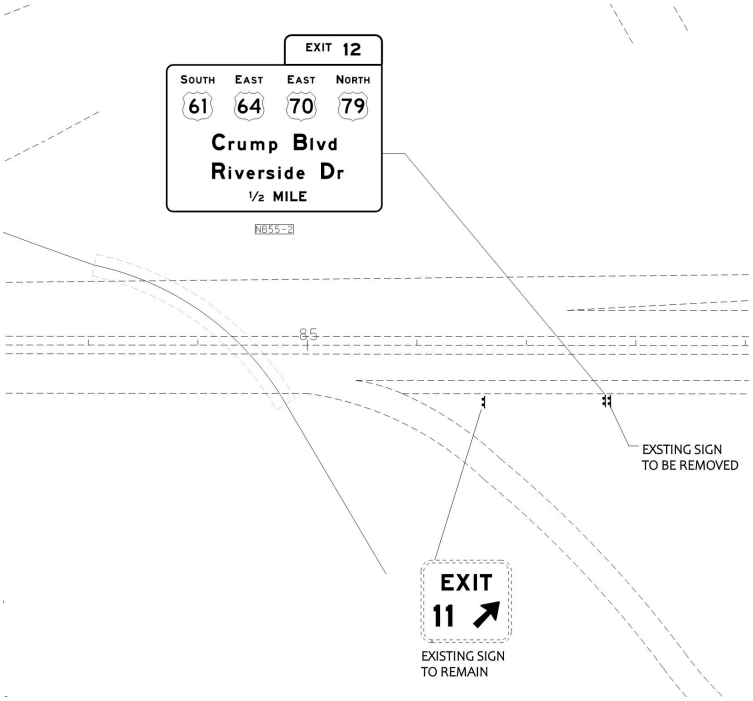
Figure 6: Sample Drawing QC Review

Project Quality Management Plan

Project QC Cover Sheet Form

Project QC Checklists

Originator



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CHECK PRINT

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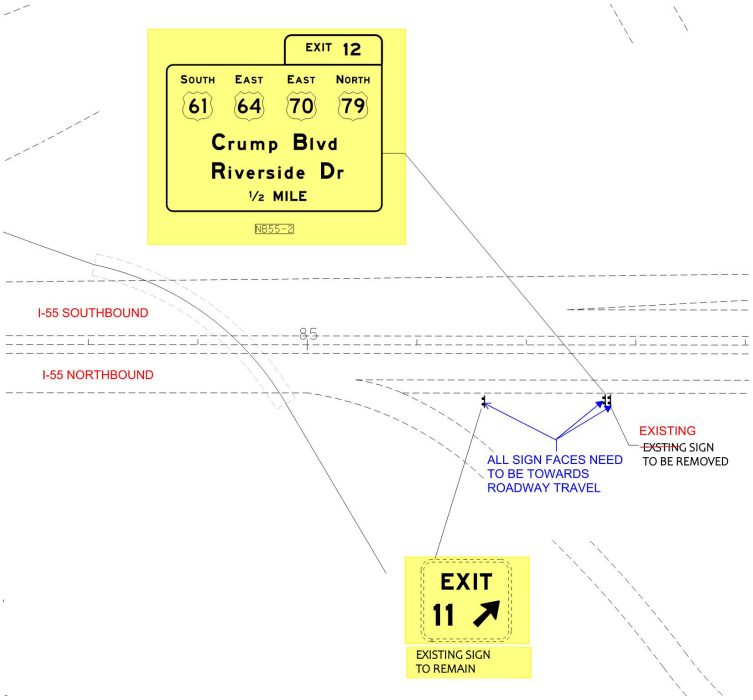
Back Checked: _____ Date: _____

Corrected: _____ Date: _____

Verified: _____ Date: _____

Checker



Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

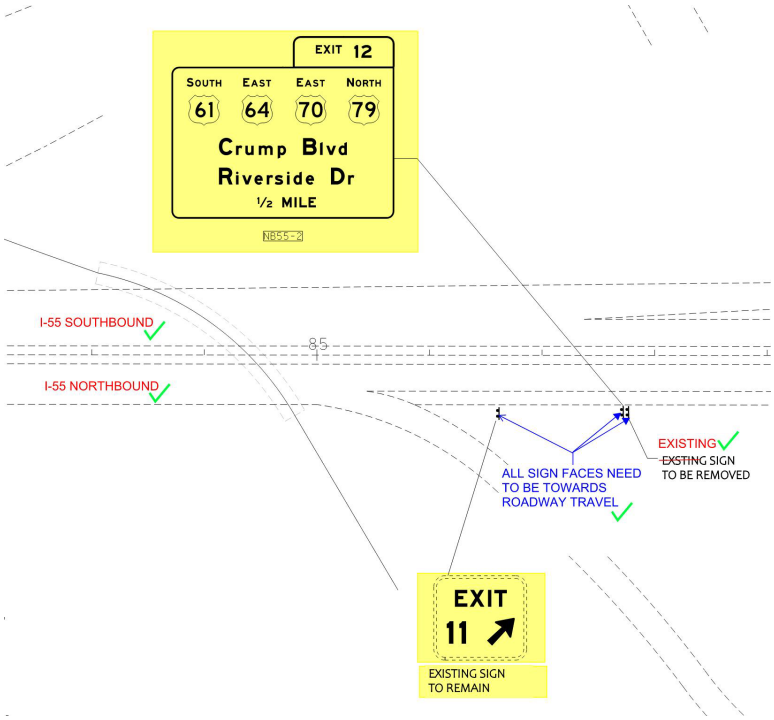
Checked: H. Jones Date: 4/11/23

Back Checked: _____ Date: _____

Corrected: _____ Date: _____

Verified: _____ Date: _____

Back Checker



Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

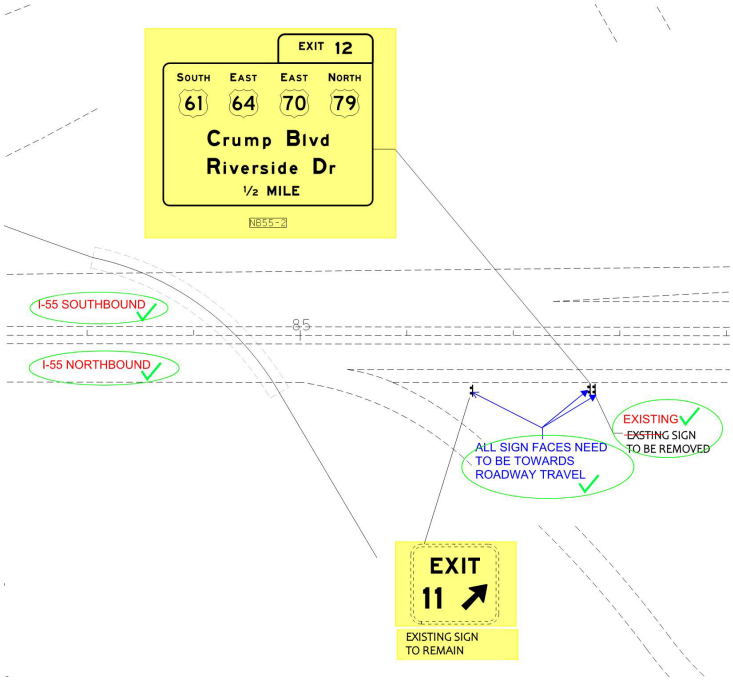
Checked: H. Jones Date: 4/11/23

Back Checked: N.Smith Date: 4/11/23

Corrected: _____ Date: _____

Verified: _____ Date: _____

Corrector



Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

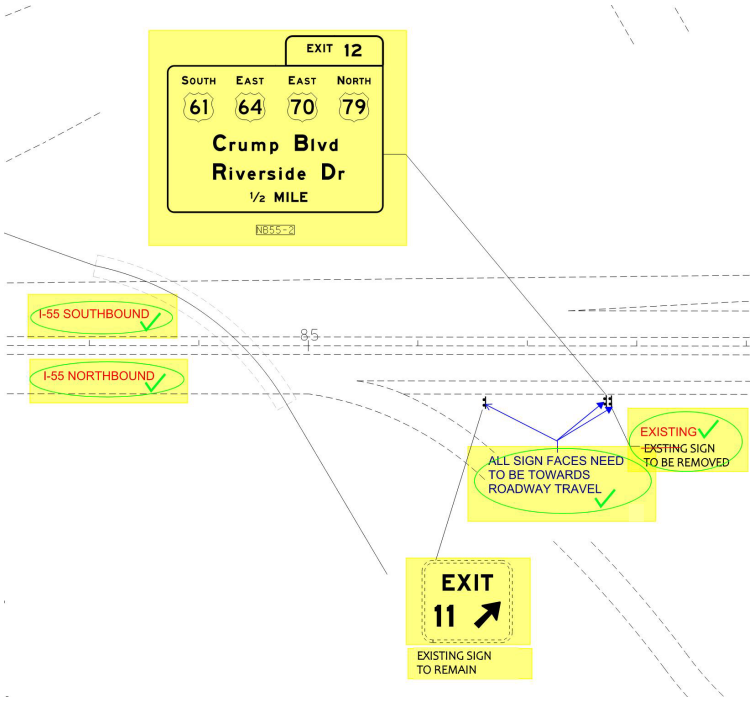
Checked: H. Jones Date: 4/11/23

Back Checked: N.Smith Date: 4/11/23

Corrected: G. Olsen Date: 4/12/23

Verified: _____ Date: _____

Verifier



Drawn By: N.Smith Date: 4/11/23 Print No.: 1

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Verified: H. Jones Date: 4/12/23

Final Print

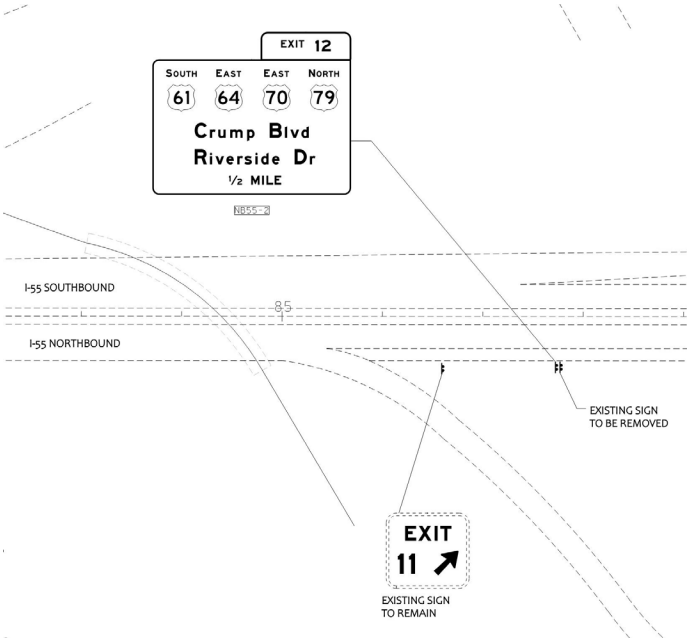


Figure 6: Sample drawing QC review

3.6 Detailed Checking of Documents/Written Documents

Overview

The Checker provides a uniform, orderly, and efficient method for checking project documents, including special provisions, quantities, reports, etc. Complete a thorough check of the project documents before submitting for the PDN Activity or Milestone review. Review tools contained within a word processor may be used as long as the quality process can be documented. If a word processor's review tools are utilized for QC, a printout of the comments and revisions should be provided to document the QC process.

Once the project documents have been checked, the QC process continues as normal to the Back Checker. The example below is a representation that could be applied to any Disciplines documents.

See Figure 7 below for a sample written document QC review.

Related Documents

Figure 1: QC Color Code

Figure 2: Check Print Stamp

Figure 3: TDOT QC Review Flow Chart

Figure 7: Sample Written Document QC Review

Project Quality Management Plan

Project QC Cover Sheet Form

Project QC Checklists

Sample Written Document QC Review

Originator

SPECIAL PROVISION

REGARDING

PROJECT COMPLETION AND LIQUIDATED DAMAGES

This project shall be completed in its entirety on or before the completion date shown on the cover of this proposal contract.

All lane closures must be approved in advance by the Engineer. A minimum of seven-days-notice must be provided in advance of any closure. Any work requiring lane closures including pavement marking operations shall be at night between the hours of 7PM and 6AM (Sunday through Thursday) and 9 PM and 8AM (Friday and Saturday) unless otherwise directed by the TDOT Operations District Engineer and the Regional Traffic Incident Management Coordinator. For each hour, or portion thereof, in which a lane is closed to traffic outside of these restrictions, the contractor will be charged $1,500 per hour per lane, not as penalty, but as liquidated damage. No lane closures will be allowed on Saturdays when the University of Tennessee plays football in Knoxville, during Special Events, Holidays or Holiday weekends in accordance with the plans and specifications, unless otherwise approved by the TDOT Operations District Engineer

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

Checked: _____ Date: _____

Back Checked: _____ Date: _____

Corrected: _____ Date: _____

Verified: _____ Date: _____

Checker

SPECIAL PROVISION

REGARDING

PROJECT COMPLETION AND LIQUIDATED DAMAGES

This project shall be completed in its entirety on or before the completion date shown on the cover of this proposal contract.

10 PM

$1,000

All lane closures must be approved in advance by the Engineer. A minimum of seven-days-notice must be provided in advance of any closure. Any work requiring lane closures including pavement marking operations shall be at night between the hours of 7PM and 6AM (Sunday through Thursday) and 9 PM and 8AM (Friday and Saturday) unless otherwise directed by the TDOT Operations District Engineer and the Regional Traffic Incident Management Coordinator. For each hour, or portion thereof, in which a lane is closed to traffic outside of these restrictions, the contractor will be charged $1,500 per hour per lane, not as penalty, but as liquidated damage. No lane closures will be allowed on Saturdays when the University of Tennessee plays football in Knoxville, during Special Events, Holidays or Holiday weekends in accordance with the plans and specifications, unless otherwise approved by the TDOT Operations District Engineer and the Regional Traffic Incident Management Coordinator.

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

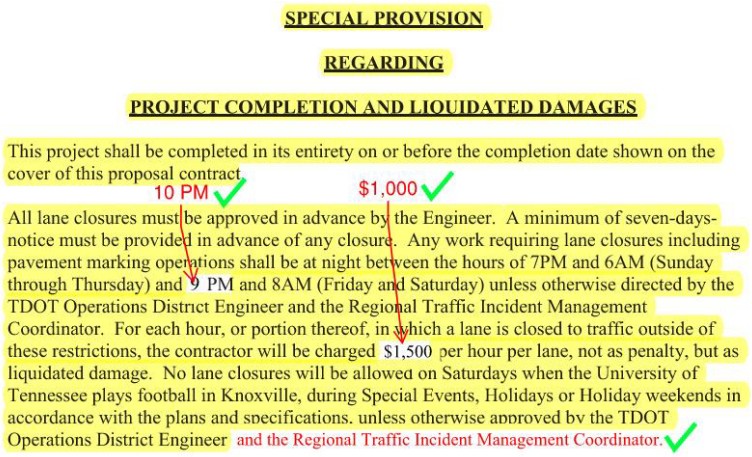
Checked: H. Jones Date: 4/11/23

Back Checked: _____ Date: _____

Corrected: _____ Date: _____

Verified: _____ Date: _____

Back Checker



SPECIAL PROVISION

REGARDING

PROJECT COMPLETION AND LIQUIDATED DAMAGES

This project shall be completed in its entirety on or before the completion date shown on the cover of this proposal contract.

10 PM ✓ $1,000 ✓

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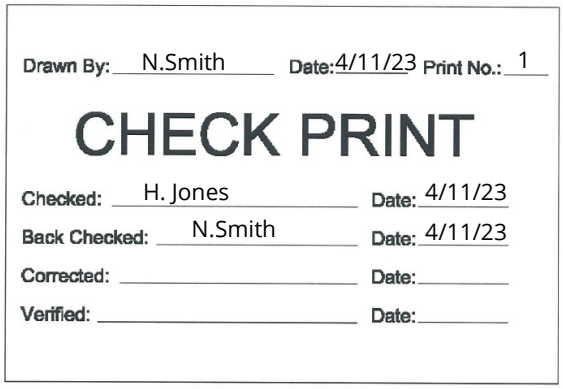

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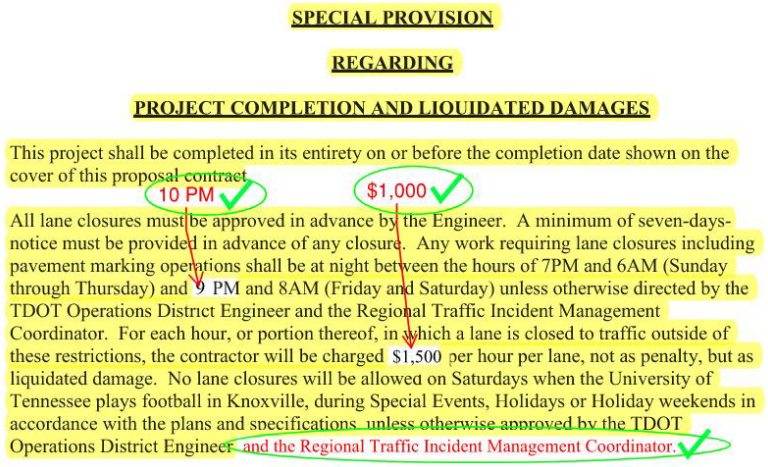
Corrected: Date:

Verified: Date:

Corrector



SPECIAL PROVISION

REGARDING

PROJECT COMPLETION AND LIQUIDATED DAMAGES

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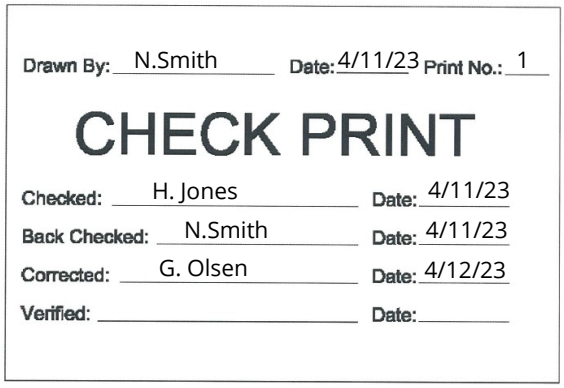

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CHECK PRINT

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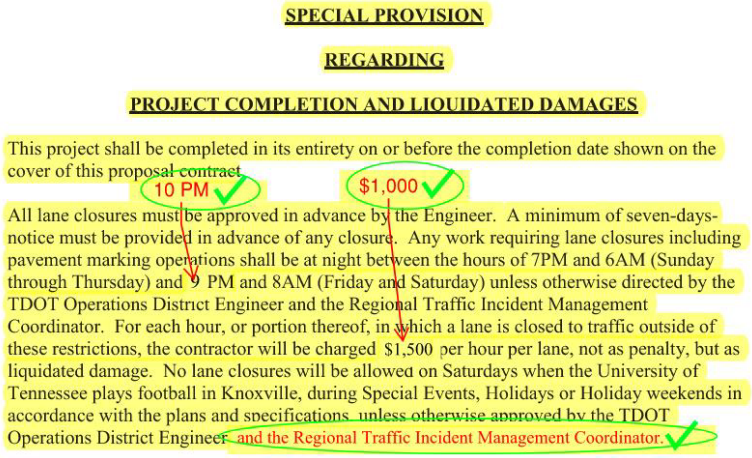
Corrected: G. Olsen Date: 4/12/23

Verified: Date:

Verifier



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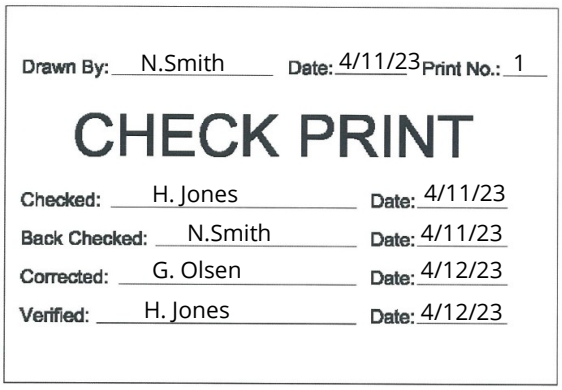

Drawn By: N.Smith Date: 4/11/23 Print No.: 1

CHECK PRINT

Checked: H. Jones Date: 4/11/23

Back Checked: N.Smith Date: 4/11/23

Corrected: G. Olsen Date: 4/12/23

Verified: H. Jones Date: 4/12/23

Final Print

SPECIAL PROVISION

REGARDING

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Figure 7: Sample written document QC review

4.0 Quality Assurance (QA) Evaluations

4.1 Overview

Quality Assurance (QA) refers to the actions, procedures, and methods of reviewing the QC process for its use and effectiveness at preventing mistakes and ensuring compliance that results in a high-quality designed project. The QA process varies depending on the stage of plan development and who develops the plan and is typically performed for each project deliverable that undergoes QC. In most cases, the Region Quality Team is responsible for the QA review.

The Regional Quality Teams verify that the project's QC procedures were followed and documented during critical design activities. They are responsible for providing a team member to perform internal QA Evaluations for each project before each milestone review meeting. This team member will be reviewing the QC Check Prints and the QC Checklist to ensure the Quality Control Process was properly followed. The Regional Quality Team completes and submits a Project QA Evaluation Form to the Project Manager as documentation.

The Final PS&E Package will be reviewed by the Regional Quality Team prior to the submittal of the project to HQ Construction. This review will be for completeness and will be in coordination with the Preconstruction Regional Transportation Engineer (RTE).

4.2 Milestone Review Procedure

The Regional Quality Team verifies the QC documentation is complete, and the QC procedures were followed. This includes reviewing the QC check prints and verifying the QC Checklist were completed for each discipline. This is not another QC Review of the deliverables, but a review that the QC procedures are being followed for each deliverable. At no time should the Regional Quality Team member take it upon themselves to perform a QC Review.

To assist in reviewing the QC Checklists, Quality Assurance checklists have been developed and are available for use. The QA Checklists validate that each QC checklist have been completed for each stage. QA Checklist should be submitted with the Project QA Evaluation Form to the Project Manager.

The Regional Quality Team shall review plans for constructability, applicability, completeness, and conformity. This also includes reviewing commonly mistaken items.

QC is an ongoing process and while there are set dates for QC to be complete, certain elements require regular checks as the project progresses. Spot checks are also used to verify that QC procedures were followed, especially on items the Regional Quality Team believes may be commonly missed or overlooked during the QC process.

Any deficient QC documentation found during the QA Evaluation is returned to the Design Originator to correct the deficiencies by following the appropriate QC procedures. The documentation is returned to the Regional Quality Team to finalize the evaluation once the corrections are complete.

The Regional Quality Team completes and signs the Project QA Evaluation Form verifying the project QC procedures were followed. The Project QA Evaluation form must be completed and submitted to the Project Manager before the Milestone review meeting begins.

4.3 Final Deliverables Review Procedure

Once the project team finalized the Final PS&E Package per the Roadway Design Guidelines Ch 1-105.10, the Project Manager will submit the Complete Package for review to the Regional Quality Team. This will prompt the Regional Quality Team to upload the Final PS&E Package onto ProjectWise in the *03 QA Working Folder* and begin their review. This review will ensure the completeness of the Final PS&E Package which includes all design files, estimates, plans, reports, special provisions, specifications, and supporting documents.

The review is complete when the Final PS&E Turn In QA Evaluation form is completed and accurate. The Regional Quality Team will communicate with the Project Manager and Design Lead to resolve any issues that arise in this review. Once the review is complete and the Final PS&E Package is ready for turn in, the package is then moved into the *04 Final Letting Packet Stage 4* folder within ProjectWise.

Following the review by the Regional Quality Team, the Preconstruction RTE will be notified that the Final PS&E Package is ready for their review. This will prompt a final review of the Final PS&E Package by the Preconstruction RTE prior to final submittal to HQ Construction. Once the Preconstruction RTE completes their review, they will submit the Final PS&E Package to HQ Construction for final submittal.

Related Documents

Project QA Evaluation Form

QA Checklists

Final PS&E Turn-In QA Evaluation

5.0 Milestone Field Review and Comment Resolution

5.1 Scope

After QC/QA has been performed on all review documents, complete a Milestone Review Comment Resolution Form (CRF) to document all Milestone review comments and responses. The Project Manager or designee will prepare a Milestone Review CRF for each review meeting, starting with the first review meeting after scoping.

Address each comment, document the action taken, and verify the action was completed. Provide the CRF to all team members and reviewers.

5.2 Background

Perform reviews before each Milestone Review to verify the project design meets TDOT expectations, conforms to standards, and is on track for letting prior CRF comments have been addressed. The CRF documents all review comments and action taken to address each comment. Although all projects will be reviewed at certain stages, the Design Team must review its own work to ensure quality and submittals as error free as possible prior to being sent out for review.

Each Discipline is responsible for compiling, addressing/resolving, and managing comments and responses. The design lead is responsible for the distribution of all comments and assists Disciplines in managing their comments.

Related Documents

Milestone Review Comment Resolution Form (CRF)

5.3 Procedure

Submit Review Comments

The Project Manager, or designated staff, shall make every effort to provide a response that outlines and provides justification for all significant modifications that were or were not implemented by the Design Team.

Each Reviewer submits their comments on a Milestone Review Comment Resolution Form (CRF) to the Design Originator at least one week prior to the Milestone Review. Complete the project information in the top portion and footer of the form. In the form title, add the name of the Milestone Review meeting (i.e., Line and Grade, Functional Design Plans/2PM5, Plan-in-Hand/3PM2, PS&E/4PM2, etc.). The Design or Review Team shall also document any inconsistencies, errors, or questions related to design standards, including standard drawings,

state standards, and CADD standards. These inconsistencies, errors, or questions should be described in an email to the Design Originator and Project Manager.

Compile Review Comments

The Design Originator compiles all comments into one Milestone Review CRF. Complete all project information (including footer) and add the title "Milestone" with the name of the Milestone Review meeting. * Typically, the CRF is compiled three days to one week prior to the review meeting. The durations for review periods and the compilation of comments may be adjusted depending on the complexity and schedule needs of the project.

Each review member submits additional comments made during the review meeting to the Design Originator for inclusion on the Milestone Review CRF.

Add all previously unresolved comments to the current Milestone Review CRF.

Provide each Reviewer with a copy of the form once all Milestone Review comments are compiled. Each Reviewer shall verify their comments were included correctly in the Milestone Review CRF. The Reviewer must contact the Design Originator to discuss any discrepancies, or if the Reviewer believes their comments may have been interpreted incorrectly.

* The project team may use one Total Project CRF that maintains all comments for each Milestone in one CRF. Make necessary adjustments to these instructions as needed. Additionally, a copy of the CRF file must be saved at each Milestone Review as a "snapshot" of the CRF at that time.

Determine Initial Disposition and Initial Response

Each Discipline responds to all comments related to their design and deliverables. To ensure that continued quality feedback is received on all projects, it is important to respond to all reviewers, notifying them that their feedback is taken into consideration.

Provide an initial disposition from the following:

- **Accept Comment.** The Designer accepts the comment and will make the appropriate correction, addition, or clarification.
- **Designer to Evaluate.** The Designer will perform additional evaluation to determine what, if any, action needs to be taken. The Designer is responsible for coordinating with the Reviewer if further clarification is needed.
- **TDOT to Evaluate.** The comment raises questions or concerns that require additional evaluation by the department. The Designer is responsible for all coordination needed for resolution.
- **Delete Comment.** The Designer will not incorporate any changes based on the comment. Coordinate with the Reviewer as needed.

Provide an explanation in the "Response/Clarification" section. Provide sufficient information so the Reviewer can verify the comment was understood and why the disposition was chosen.

Coordinate with Reviewers

Each design originator is responsible for coordinating with the Reviewers when comments are to be deleted, and to verify responses are sufficient to address the comment if there is any doubt. NOTE: Coordinating *before completing the changes or deleting the comment* will reduce the need to redo work or add additional changes at later stages of the project that may threaten the project schedule.

Address All Comments

Each Discipline is responsible for addressing their comments adequately before the next Milestone Review. Provide a final disposition based on the action taken.

Replace the initial response/clarification with an explanation of the final action taken. Provide sufficient information so the Reviewer understands the action taken and can determine if it fully addresses the comment. Provide the name of the person responsible for the response (replace the "Responder's Name" name if it is different than the initial response).

- Explain dispositions that vary from the original comment. For example, if the comment states "… add Detail XX to DT-02," but Detail XX was added to DT-03, provide an explanation in the response section so the Reviewer understands the changes and can easily verify them.

Verify

A Verifier (cannot be the person who provided the response or performed the required action) must confirm each comment is fully addressed in accordance with the final disposition and response. The Verifier initials under the "Verified By" after verifying the comment was fully addressed. The same person is not required to verify every comment.

Provide Milestone Review Comment Resolution Form (CRF)

The Design Leader submits the final disposition Milestone Review CRF with the next package submittal (Milestone or final) to all reviewers and team members. ALL comments from the entire preconstruction phase must be compiled into one Milestone Review CRF for the Comment Resolution Review meeting.

6.0 Independent Review of Studies and Technical Documents

6.1 Scope

Complete a formal review process for all studies, technical reports, technical memoranda, or other procedures contractually required and that might not be identified in the PDN. An Independent Technical Review is used to review larger documents and reports such as Environmental Assessments, Environmental Impact Statements, Value Engineering Studies, Traffic Studies, Planning Studies, etc., or interdisciplinary reviews. Formal review of study or report-type documents will be performed on all documents before their submittal. Administrative/progress reports are not included in this procedure. This procedure is different from Section 3.0 as the items might not be listed in the PDN. TDOT can also use this review on documents that consultants have submitted where they used an approved QC process.

All drawings, tables, and calculations included in or appended to such documents are to be checked per specified procedures for those documents, including calculations, drawings, documents, and specifications.

This review procedure requires that a minimum of two people examine any document before it is issued.

Related Documents

Figure 1: QC Color Code

Figure 2: Check Print Stamp

Figure 3: TDOT QC Review Flow Chart

Project Quality Management Plan

Project QC Cover Sheet Form

6.2 Procedure

QC Procedure

Perform a QC review of the document using the Detail Checking of Project Documents Procedure before creating Review Prints.

Provide Review Print.

The Design Originator spell checks the document and creates a Review Print after the document drawings, tables, and calculations have been checked. The Design Originator applies the review

print stamp to the first page of the review print and forwards the Review Print to the Discipline Lead.

In the space allotted in the review print stamp, the Discipline Lead lists the reviewers and their review responsibility for the document, including the Editorial Review.

Reviewing

Reviewers review all portions of the document that apply to their responsible areas. Reviewers check for conformance with project criteria, project requirements, professional policies, and content. They review those parts of the document that interface with their area of responsibility to assure there are no conflicts.

Reviewers use unique colors for both comments and respective signature/initials to differentiate their comments more easily.

The Editorial Reviewer ensures there is uniform format, proper sentence structure, proper syntax, and correct spelling.

Each Reviewer completes, initials, and dates the review print stamp and Independent Technical Review form and sends it to the Design Originator and Discipline Lead.

NOTE: It is recommended that only one document Review Print be circulated for each review to minimize duplication or conflicting comments. However, when time constraints or distance considerations dictate, more than one document and/or Review Comment Forms may be used .

Review Comments and Make Corrections

The Design Originator or a designee evaluates each of the review comments and determines the proper disposition. In case of questions, disagreement, or conflict between reviewers, the Discipline Lead is consulted.

Verifying

The Discipline Lead verifies all necessary corrections were made and signs off on the Review Print Stamp.

The Design Originator sends a copy of the corrected document to each Reviewer. Each Reviewer verifies the necessary corrections are incorporated and returns the document to the Design Originator.

7.0 Documents Referenced in the Appendix

Appendix A: Project Quality Management Plan

Appendix B: QC Cover Sheet Form

Appendix C: Project QA Evaluation Form

Appendix D: Roadway Project QC Checklists

- 1RD2 Initiate Roadway Design
- 2RD1 Develop Functional Design Plans
- 3RD1 Complete Plan-In-Hand Design
- 4RD1 Finalize Construction Documents

Appendix E: Traffic Design QC Checklists

- 1TD1 Initiate Traffic and Safety Analyses [In development]
- 1TD2 Conduct Traffic Analysis, Warrants, and Significance Determination [In development]
- 2TD1 Prepare ITS, Signals, and Lighting Sheets
- 3TD1 Complete Signal, Lighting, and ITS Device Design
- 4TD1 Finalize Signal, Lighting, and ITS Plans

Appendix F: Survey QC Checklists

- 1SY1 Conduct Design-Level Survey

Appendix G: Geotechnical QC Checklists

- 1GT2 Develop Geotechnical Work Plan
- 2GT1 Complete the Soils and Geology Report
- 2GT2 Complete Foundation Reports
- 4GT1 Finalize Geotechnical Plans

Appendix H: Pavement QC Checklists

- 2PV1 Provide Pavement Design

Appendix I: Structures QC Checklists

- 1ST2 Complete Existing and No Structure Modeling
- 2ST1 Complete Hydraulic Design

2ST2 Develop Preliminary Bridge Plans

3ST1 Complete Structural Design

4ST1 Finalize Structural Plans

Appendix J : Environmental QC Checklists

1EN1 Contuct Environmental Desktop Review

1EN2 Complete Environmental Resource Identification

2EN1 Complete Environmental Resource Effects/Impacts Studies

2EN2 Complete Environmental Document

2EN3 Conduct Permit Assessment

2EN4 Conduct Mitigation Assessment and Initiate Mitigation Design

3EN1 Finalize Stream and Wetland Mitigation Design

3EN2 Complete and Obtain Aquatic Permit

4EN1 Complete and Obtain Stormwater Permit

Appendix K: Active Transportation QC Checklists

1AT1 Conduct Active Transportation Review

Appendix L: Project Management QC Checklists

1PM1 Set Up Project

1PM2 Build Project Team

1PM3 Hold Kickoff Meeting

1PM4 Conduct Initial Risk Workshop

1PM5 Hold Scoping Meeting and L&G Field Review

2PM1, 3PM1, 4PM1 Manage Project

2PM2 Complete Project Commitment Document (PCD)

2PM3 Conduct ROW Strategy Meeting(s)

2PM4 Conduct Permit Strategy Meeting(s)

2PM5 Hold Functional Design Plans Field Review Meeting

3PM2 Hold Plan-In-Hand Field Review Meeting

4PM2 Hold PS&E Review Meeting

Appendix M: Right-Of-Way QC Checklists

2RW1 Initiate ROW Pre-Acquisition Activities

2RW2 Execute ROW Proposal

3RW1 Complete Appraisal and Initiate Acquisition

3RW2 Prepare and Submit ROW Certification

Appendix N: Engineering Concepts QC Checklists

1EC1 Initiate Concept Evaluations

1EC2 Develop the Conceptual Layout and Complete Site Visit

1EC3 Develop and Finalize the Concept Report

1EC4 Complete an Interstate Access Request (IAR) or Safety and Operational Analysis Report (SOAR)

1EC5 Develop State Industrial Access (SIA) Packet [In development]

Appendix O: Utility QC Checklists

1UT2 Begin Utility Coordination

2UT1 Initiate Utility Pre-Acquisition Activities

3UT1 Perform Utility Coordination

3UT2 Prepare and Submit Utility Certification

Appendix P: QA Checklist

Stage 1 Concept/Scoping QA Checklist

Stage 2 Footprint Established QA Checklist

Stage 3 Plan in Hand QA Checklist

Stage 4 PS&E QA Checklist

Appendix Q: Final PS&E Turn-In QA Evaluation

Final PS&E Turn-In QA Evaluation

Appendix A

Project Quality Management Plan

Appendix B

QC Cover Sheet Form

Appendix C

Project QA Evaluation Form

Appendix D

Roadway Project QC Checklists

1RD2 Initiate Roadway Design

2RD1 Develop Functional Design Plans

3RD1 Complete Plan-In-Hand Design

4RD1 Finalize Construction Documents

Appendix E

Traffic Design QC Checklists

1TD1 Initiate Traffic and Safety Analyses (in development)

1TD2 Conduct Traffic Analysis, Warrants, and Significance Determination (in development)

2TD1 Prepare ITS, Signals, and Lighting Sheets

3TD1 Complete Signal, Lighting, and ITS Device Design

4TD1 Finalize Signal, Lighting, and ITS Plans

Appendix F

Survey QC Checklists

1SY1 Conduct Design-Level Survey

Appendix G

Geotechnical QC Checklists

1GT2 Develop Geotechnical Work Plan

2GT1 Complete the Soils and Geology Report

2GT2 Complete Foundation Reports

4GT1 Finalize Geotechnical Plans

Appendix H

Pavement QC Checklists

2PV1 Provide Pavement Design

Appendix I

Structures QC Checklists

1ST2 Complete Existing and No Structure Modeling

2ST1 Complete Hydraulic Design

2ST2 Develop Preliminary Bridge Plans

3ST1 Complete Structural Design

4ST1 Finalize Structural Plans

Appendix J

Environmental QC Checklists

1EN1 Conduct Environmental Desktop Review

1EN2 Complete Environmental Resource Identification

2EN1 Complete Environmental Resource Effects/Impacts

2EN2 Complete Environmental Document

2EN3 Conduct Permit Assessment

2EN4 Conduct Mitigation Assessment and Initiate Mitigation Design

3EN1 Finalize Stream and Wetland Mitigation Design

3EN2 Complete and Obtain Aquatic Permit

4EN1 Complete and Obtain Stormwater Permit

Appendix K

Active Transportation QC Checklists

1AT1 Conduct Active Transportation Review

Appendix L

Project Management QC Checklists

1PM1 Set Up Project

1PM2 Build Project Team

1PM3 Hold Kickoff Meeting

1PM4 Conduct Initial Risk Workshop

1PM5 Hold Scoping Meeting and L&G Field Review

2PM1, 3PM1, 4PM1 Manage Project

2PM2 Complete Project Commitment Document (PCD)

2PM3 Conduct ROW Strategy Meeting(s)

2PM4 Conduct Permit Strategy Meeting(s)

2PM5 Hold Functional Design Plans Field Review Meeting

3PM2 Hold Plan-In-Hand Field Review Meeting

4PM2 Hold PS&E Review Meeting

Appendix M

Right-Of-Way QC Checklists

2RW1 Initiate ROW Pre-Acquisition Activities

2RW2 Execute ROW Proposal

3RW1 Complete Appraisal and Initiate Acquisition

3RW2 Prepare and Submit ROW Certification

Appendix N

Engineering Concepts QC Checklists

ALL EC QC Checklist are in development

1EC1 Initiate Concept Evaluations

1EC2 Develop the Conceptual Layout and Complete Site Visit

1EC3 Develop and Finalize the Concept Report

1EC4 Complete an Interstate Access Request (IAR) or Safety and Operational Analysis Report (SOAR)

0EC5 Develop State Industrial Access (SIA) Packet

Appendix O

Utility QC Checklists

1UT2 Begin Utility Coordination

2UT1 Initiate Utility Pre-Acquisition Activities

3UT1 Perform Utility Coordination

3UT2 Prepare and Submit Utility Certification

Appendix P

QA Checklists

Stage 1 Concept/Scoping QA Checklist

Stage 2 Footprint Established QA Checklist

Stage 3 Plan in Hand QA Checklist

Stage 4 PS&E QA Checklist

Appendix Q

Final PS&E Turn-In QA Evaluation

Final PS&E Turn-In QA Evaluation

TN TDOT Department of Transportation