

Table of Contents

CHAPTER 7 - CADD QUALITY ASSURANCE / QUALITY CONTROL	7-1
7.1 GENERAL	7-1
7.2 PRESERVATION OF THE PROFESSIONAL OF RECORD	7-1
7.3 ELECTRONIC DELIVERY PROCESS MANAGEMENT	7-2
7.4 QUALITY ASSURANCE (QA) – CENTRAL OFFICE ROLE	7-2
7.4.1 QA Reports	7-2
7.5 QUALITY CONTROL (QC) – DATA PRODUCERS’ ROLE	7-2
7.5.1 FDOT FileChecker	7-3
7.5.1.1 FileChecker's Interface	7-4
7.5.1.2 FileChecker Reports	7-5
7.5.2 Quality Control (QC) Software	7-6
7.5.2.1 QC Quick	7-7
7.5.2.2 QC Batch Report	7-8

Chapter 7 - CADD QUALITY ASSURANCE / QUALITY CONTROL

CADD Production Criteria Handbook

7.1 GENERAL

Offices under the direction of the Chief Engineer are responsible for determining the critical Quality Assurance (QA) requirements for their functional areas and have developed plans to monitor those requirements. The Engineering/CADD Systems Office (ECSO) defines the critical Quality requirements for electronic deliverables in the CADD Manual and this handbook. These include standard file formats and components for data delivery, adherence to a standard project directory structure, file naming conventions and standard graphic symbology for electronic plans. ECSO also establishes a QA monitoring plan for CADD in Florida Department of Transportation (FDOT) to facilitate compliance with these electronic deliverable requirements.

FDOT standards require that all critical design files which are shared across disciplines, or used in quantity calculations for pay items, or used in automation by downstream applications meet a minimum of 95% threshold compliance for standard level symbology. The threshold is the number of graphical elements in the design file on the prescribed level symbology divided by the total number of elements in that design file. If submitted critical files do not meet threshold requirements, a written variance from the FDOT Project Manager with supporting documentation shall be included within the project Journal. A minimum 80% threshold compliance for level symbology is targeted for non-critical design files.

Every design file shall meet the threshold of compliance as defined in any CADD Quality Control (QC) plan or scope of work approved by the Districts. Within these compliance thresholds requirements, FDOT provides an allowance for up to 10 exceptions to prescribed level symbology standards. A Standard Rule defines the prescribed level symbology of a design file base on the files name (which implies the content). An allowable exception is a deviation from standards defined in a Standard Rule for a given project directory. For example, if a municipality required a special symbology for an element needed that was not covered in the Standard Rule, that element could be drawn on the special symbology, and all occurrences of that symbology would be counted as only one exception.

7.2 PRESERVATION OF THE PROFESSIONAL OF RECORD

Whether it be product or management practice, what must occur is sound, uninterrupted legal record of the project data. Therefore it is important that both the data producer and the Department make a sensible effort to ensure the documents supporting the signing and sealing of files electronically by a professional signatory and the securing of the electronic delivery be preserved in a manner consistent with those responsibilities under the rules of the Boards of Professional Regulation in Florida.

Districts should emphasize all the practices implied by the rules of the Florida Boards of Professional Regulation and implemented in the Professional's Electronic Data Delivery System (PEDDS) software. For example: Signature Documents - as important as the data, since without these documents, the data is not considered signed and sealed electronically under Board rules. As such, the Signatory's seal cannot be authenticated. Likewise, the Manifest Document speaks to the integrity of the entire delivery, and should also receive attention and care for its preservation as part of the delivery of data.

For these reasons, some data producers have begun the practice of scanning the final signed paper version of Manifest Document, and the paper signed and sealed Signature Documents into PDF format, including them in the _meta_info folder of the project before delivery to the Department.

Since the _meta_info folder is treated differently during the securing and authentication process by PEDDS, it is possible to place files into the _meta_info folder after a project data set has been secured without violating the security paradigm PEDDS uses. The person responsible should take special care not to overwrite PEDDS files managed in this _meta_info folder, including adding files without file extensions, zero-byte files, or files whose file name might conflict with the operation of PEDDS.

The practice mentioned above does not excuse the data producer or the Department from their responsibility to preserve the paper records of the Signatory Documents or Manifest Documents for a project since these bear the wet ink signature and impression seal. FDOT shall maintain the paper copies of these documents until it is determined how these records may be preserved in other media that meets the requirements of the Florida Boards of Professional Regulation.

7.3 ELECTRONIC DELIVERY PROCESS MANAGEMENT

Each district is responsible for having a management plan for quality control of the electronic delivery. Realizing that each district has a slightly different workflow, it is expected that district management plans comply with the CADD Manual.

7.4 QUALITY ASSURANCE (QA) – CENTRAL OFFICE ROLE

The Central Office role for Quality Assurance is to monitor the districts' individual Quality Control Plans in accordance with the **CADD Manual**. This involves establishing procedures and standards for electronic deliverables and reviewing district compliance with these items. QA also encourages continuous improvement through sharing both ideas and improved technology advances.

Note Districts will be expected to ensure that their own Process Management Plan is in place for Electronic Delivery and that projects comply with that process.

7.4.1 QA Reports

The CADD Quality Assurance reviews of the districts' will be conducted according to the Department procedure and will be based on the published CADD QA monitoring plans of both the districts and ECSO. Reports are distributed to the district Secretaries and other affected offices.

7.5 QUALITY CONTROL (QC) – DATA PRODUCERS' ROLE

Each district shall maintain an established review process to determine and report the quality and compliance levels of project data as it relates to CADD.

FDOT provides tools to help ensure the creation of the standard project directory structure, standard file names and the standard symbology of all design files, in accordance with the specifications in this document. QC software is also provided to check a design file's adherence to the FDOT level-symbology standards at any time during the production phase of the project. The main tools are listed below with further detailed explanation in the sections to follow.

- **FileChecker** The **FileChecker** program provides reporting for certain portions of the Electronic Delivery compliance with standards and business rules.
- **QC Software** The CADD **QC Software**, **QC Inspector**, is software that contains tools used to check, correct and report the compliancy of elements within any design file against the FDOT CADD Standards. Aside from any corrective functionality in relation to elements, QC Inspector tools do not write any additional information into the design file. All checking and reporting is performed in real time and the results recorded into reporting documents that are saved to the current active project. The following components are included within QC Software:

- **QC Overwatch** – An application that runs during the closing of a design file checking all elements within all models of the current design file against the FDOT CADD Standards, then displays the percentage of compliancy.
- **QC Check** - User initiated tool that runs a check on all elements within all models of the current design file against the FDOT CADD Standards, then displays the percentage of compliancy.
- **QC Quick** – User initiated QC checking and correcting tool. This too then displays all Invalid (non-standard) element information in a QC Quick report. The QC Quick report allows interactive correction functionality for the user.
- **QC Batch Report**– User initiated tool that runs a check on all elements within all models of the current design file against the FDOT CADD Standards, and then creates a Quality Control (QC) Summary Report required for the electronic delivery of all FDOT Project submittals. An optional QC Detailed Report is also available for the user to produce to detail any errors within the selected group of design files. The two reports available will be displayed to the user.

Important: The FDOT2010 V8i MR1 version of the CPCH serves as the transitional and final period for moving from the old GDM QC Process and Software to the new QC Inspector Process and Software described above. The only access to the old GDM QC Software will be under the FDOT menu option: Actions > Cleanup and QC Utilities > GDM QC Software.

7.5.1 FDOT FileChecker

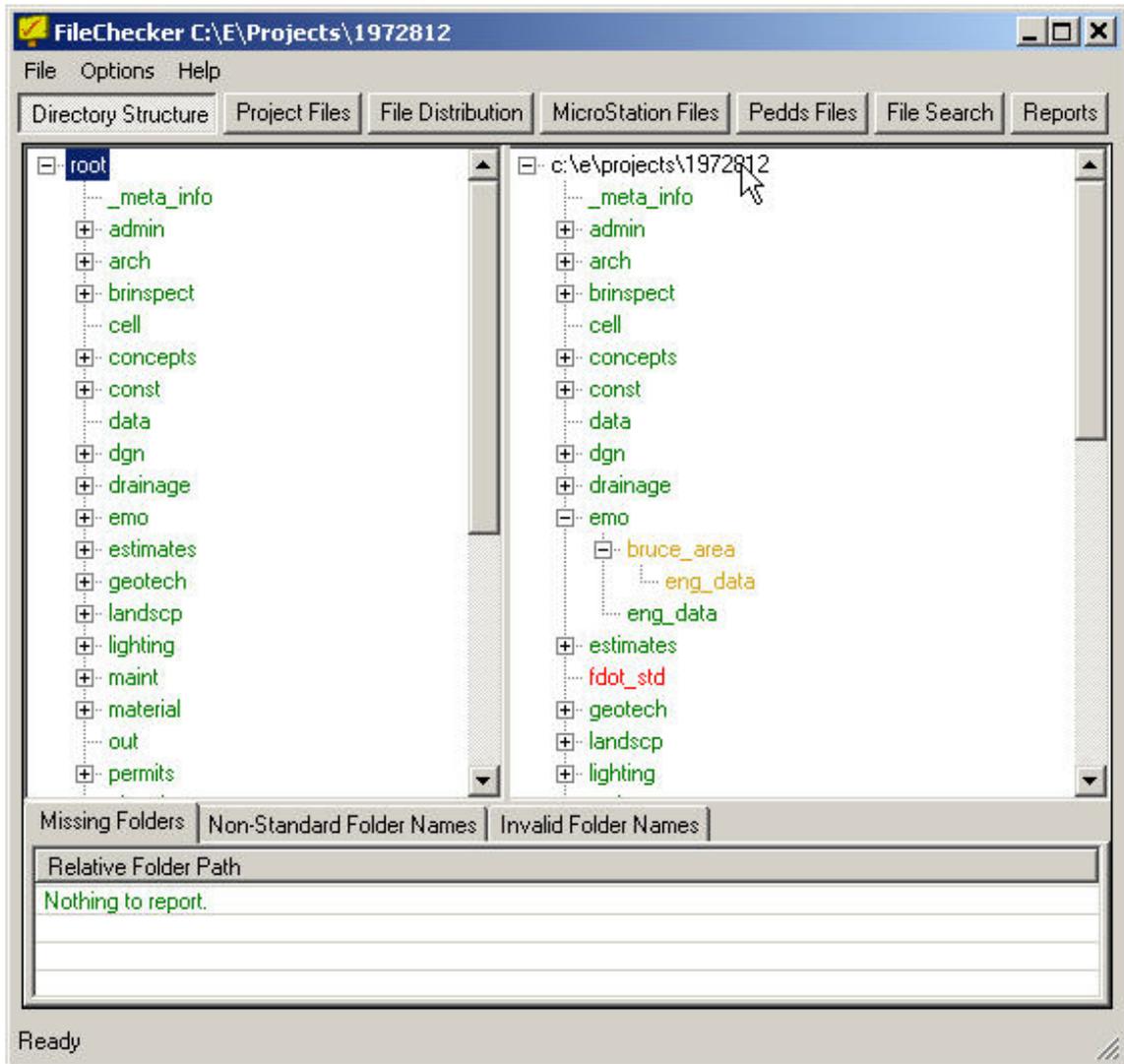
FileChecker is an application that uses data present in the project to provide broad reporting of quality control items that the user should be concern with. The program presents results in color coded reports to the user.

The following is a few of the items checked by FileChecker:

- FDOT directory structure (directories added / deleted / and non-standard directories)
- Reports directory names greater than 16 characters, containing spaces, multiple consecutive spaces, or special characters in their names
- Full paths to files that are 255 characters or greater
- Reports file names with spaces, multiple consecutive spaces, long file names, and containing special characters
- Same file names, found in different paths, with same or different file content noted
- Same file content, but with different file paths / file names
- Large files (could indicate a problem file?)
- Design files that do not meet FDOT file naming conventions
- Sheet files that have been signed / sealed, but are not included in the index
- Indexed sheets that are not signed / sealed
- Determines presence and chronology of key ED component files (SheetNDX.htm, ProjectIndex.XML, Project.pdf, Projectfiles.xml)
- Cross validation between the Index data, PEDDS data, and the data on-disk
- QC reports present and represented in sortable tables.

Important: FileChecker is only a tool to assist in the examination and reporting of potential issues in projects for the items it checks. This tool does NOT check everything! One should not consider FileChecker a "black box" that will uncover all potential problems. Likewise, the responsible party should always read the reports carefully to determine if items reported are indeed problematic for the project.

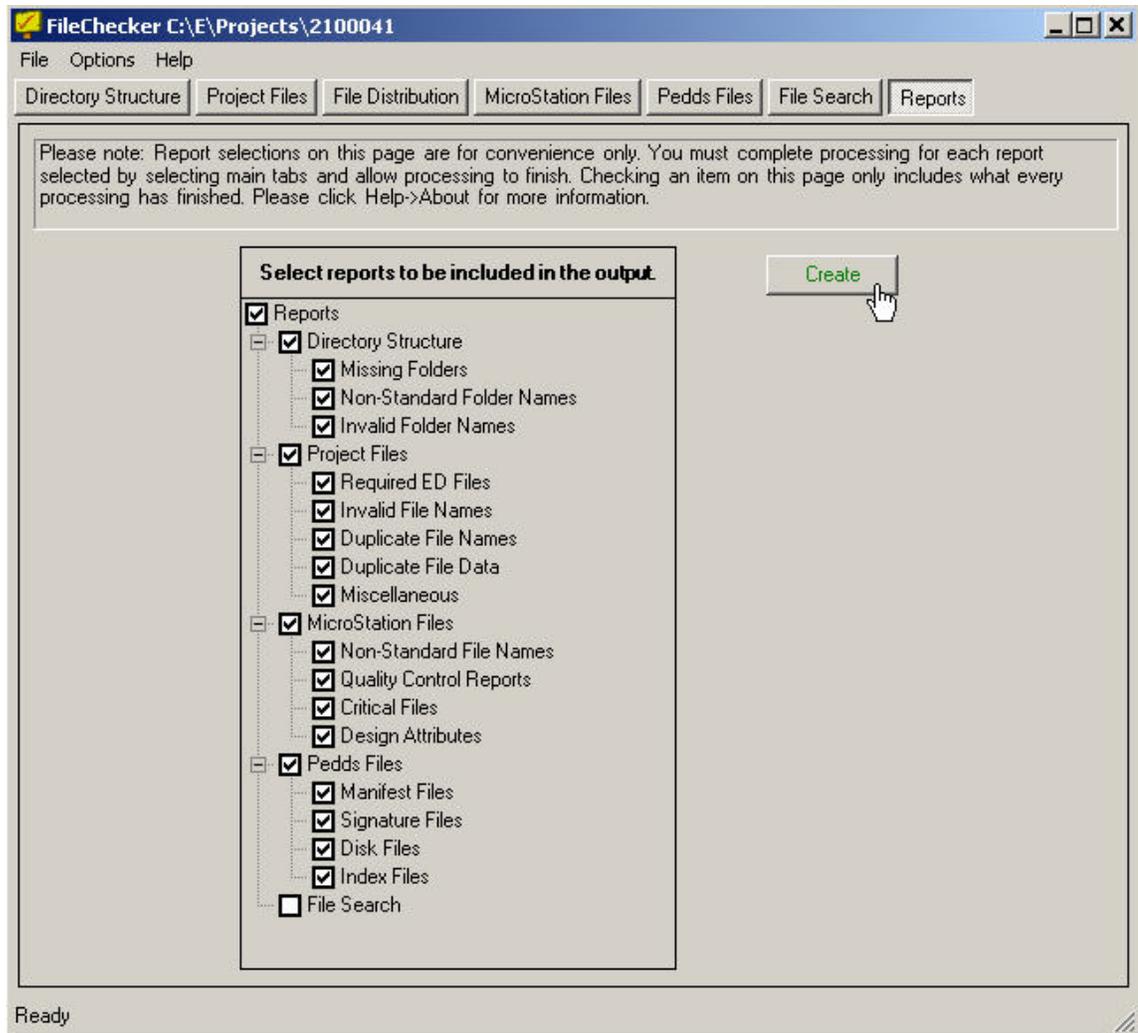
7.5.1.1 FileChecker's Interface



7.5.1.2 FileChecker Reports

FileChecker has a series of task buttons running across the top of the interface as seen in the image above. These represent the major reporting tasks performed by FileChecker. Beneath each major task, tabbed windows appear that generally offer a view of the data being reported. Each Task button and Tabbed report should be opened and examined for all projects. FileChecker also has a powerful search tool that can search for text strings, including multiple occurrences, within files.

Once all of the screens have been opened and viewed, a report may be saved to disk (FileChecker.htm at the project root folder) for later access from the following screen:



Different components of the screens viewed may be omitted from reporting by un-checking the boxes shown above. Every report produced by FileChecker contains the following text in the header:

"This report flags suspected inconsistencies in an Electronic Delivery project, but does not replace a thorough technical review by a qualified professional or eliminate the responsibility of the user. A report with few or no status errors is a good sign, but does not guarantee an error free project. Likewise a report with many status warning or errors cannot be assumed to indicate an invalid project. The user or reviewer of this report must carefully consider the standards applicable to the project at the time of development."

7.5.2 Quality Control (QC) Software

Symbology Standards for FDOT Projects prescribe standard Level Names with specific ByLevel Color, Style and Weight attributes for included graphics elements. These levels are grouped into specific “Rules” which are associated to each standard FDOT graphics filename as it relates to a given discipline or purpose. This is done for the function of performing the Quality Control (QC) checks for compliancy of design file CADD elements to the specification found in the QC “Rule.” Therefore, File-Level-Symbology standards are defined by “Rule”.

Each FDOT Standard Filename is automatically associated to one of these Standard Rules to validate what standards are allowable in any given design file. The QC Inspector software uses these Standard Rules in the Quality Control (QC) checking and reporting process.

Note For detailed listing of the current FDOT Standard Files and corresponding FDOT Standard Rule File information, see Chapter 4 of this document.

QC Inspector application provides three functions of QC Analysis that will be described in the following sections:

- Compliance checking during the design process and upon file closing
- Interactive Checking, Reporting and Correcting elements with invalid symbology to CADD Standards
- Summary QC Batch Reporting (Required for Electronic Delivery), and Detailed QC Batch Reporting (Optional).

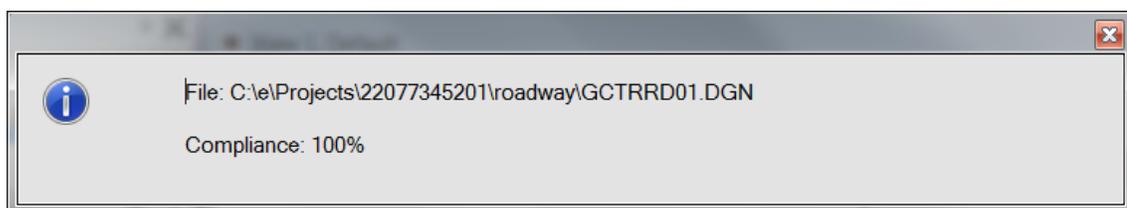
The following sub-sections outline each of the QC Software components. More instructional documentation may be accessed through the applicable Help files found on the FDOT Menu delivered with the FDOT CADD Software.

QC Check and QC Overwatch

The **QC Check** is a user initiated tool that runs a real time compliancy check of all graphical elements within all models of the current design file against the FDOT CADD Standards and displays the percentage of compliancy in an information box.

The **QC Check** can be accessed from the FDOT Menu options:

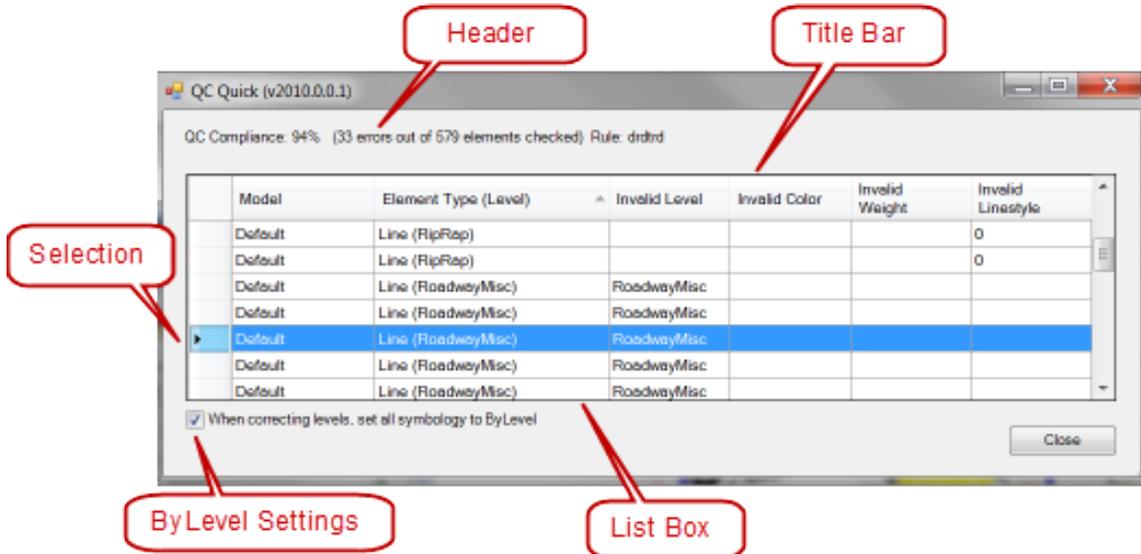
- Actions > Cleanup and QC Utilities > QC Check



The **QC Overwatch** function ‘listens’ and reacts to the closing of a design file. Upon closing , **QC Overwatch** will *automatically* run a compliancy check on all graphical elements within all models of the current design file against the FDOT CADD Standards and display the percentage of compliancy in the same information box.

7.5.2.1 QC Quick

QC Quick is a user initiated function that runs a compliancy check on all graphical elements within all models of the current design file against the applicable FDOT Standard Rule and displays all Invalid (non-standard) graphical element information in the QC Quick dialog. The QC Quick dialog allows interactive correction functionality for the user.



QC Quick will check *Critical Levels* for valid Level Names and whether the Symbology (Color, LineStyle and LineWeight) is set to the required By-Level settings. Critical Levels are those levels that down-stream applications rely upon or other disciplines utilize. All other Non-critical levels will be checked ONLY for level name when compliancy is checked, as it is presumed the symbology is set to ByLevel.

QC Quick will identify two types of errors for any given element:

- **Symbology Error** - If a valid Critical Level is found with incorrect symbology (Color, Style or Weight set to anything other than By-Level), *only the Invalid symbology* settings will display on the QC Quick dialog.
- <OR>
- **Level Error** - If an invalid Level is found, *only the Invalid Level* will display on the QC Quick dialog (with no symbology entries shown).

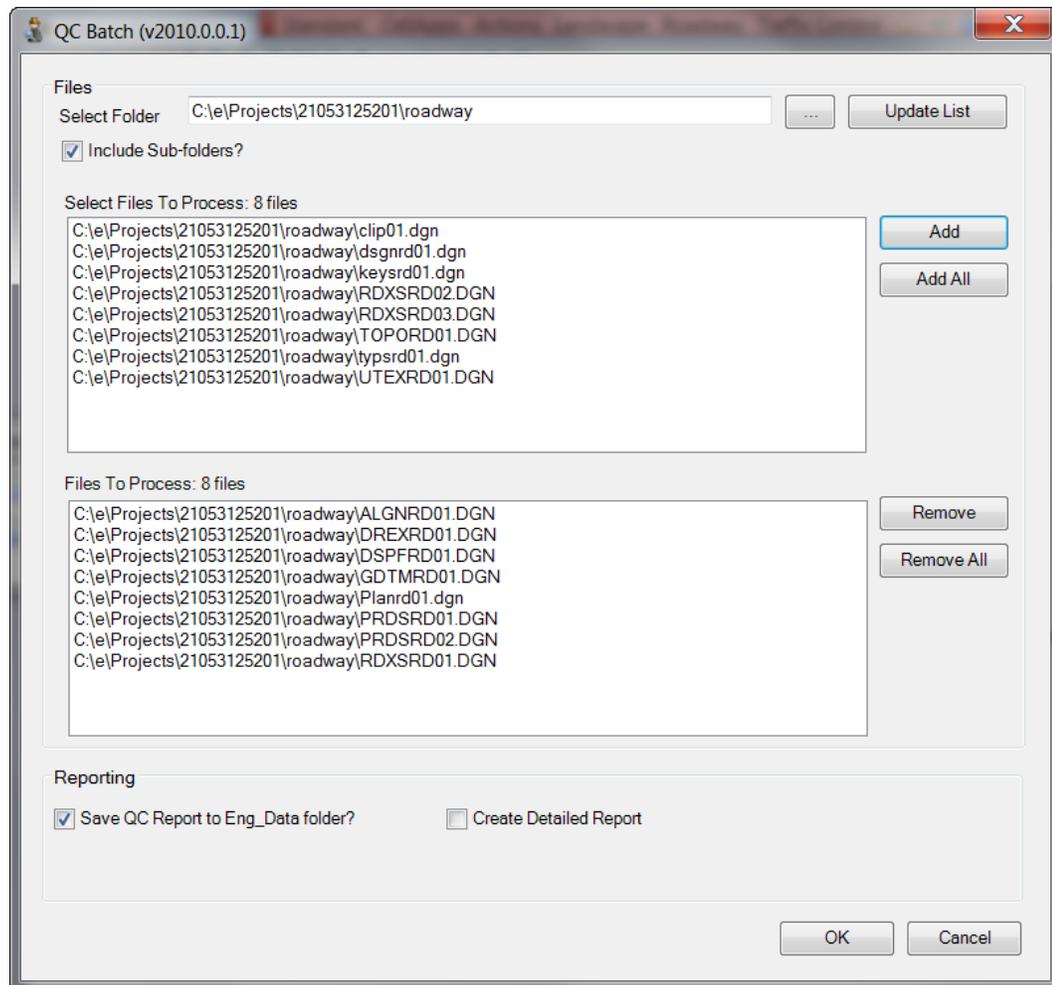
All *Critical Design Files* (files shared across disciplines and used in quantity calculations for pay items or used in automation by down-stream applications) are required to meet a minimum 95% threshold of compliancy to the FDOT CADD Standards. All *Non-critical Design Files* are required to meet a minimum 80% threshold of compliancy. (See Section 7.1 of this Chapter).

7.5.2.2 QC Batch Report

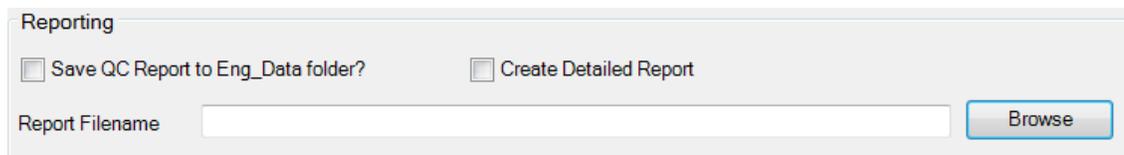
QC Batch Report is a user initiated function that runs a batch compliancy check on all graphical elements within all models of a selection of design files and creates a QC Summary Report required for the Electronic Delivery. An optional QC Detailed Report is also available that details non-compliance within the selected group of design files.

By default, QC Batch Report stores the QC report(s) in the `\eng_data` sub-folder located under the selected discipline folder containing the design files. If the `\eng_data` sub-folder does not exist, the report will be created directly in the discipline folder.

The required QC Summary Report is saved as `QCInspectorReport.txt`. The optional QC Detailed Report, when selected, is saved as `QCInspectorReport.txt.html`.



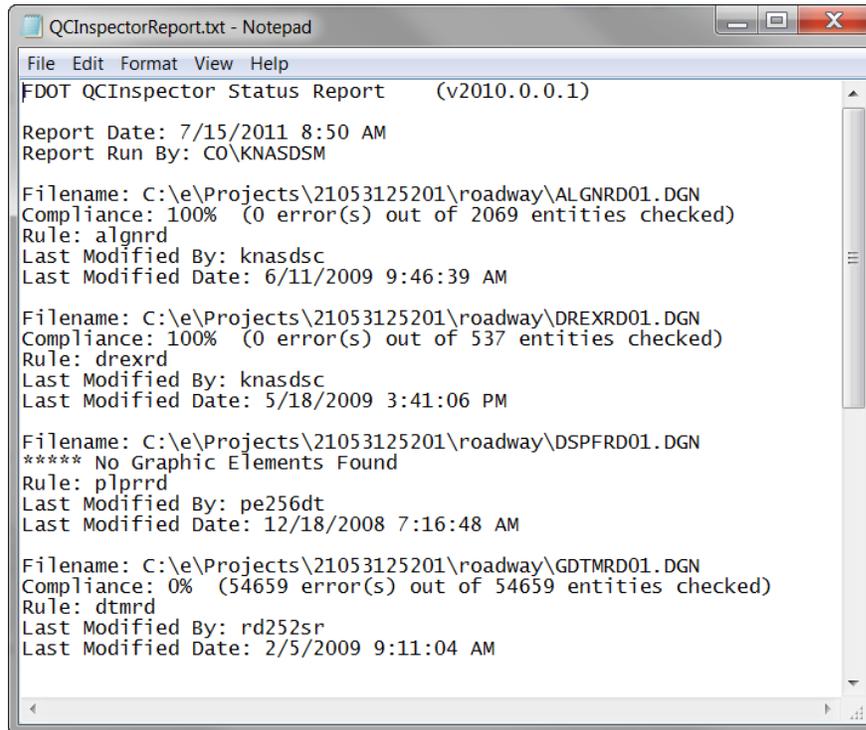
Note The user has the option to deselect the “Save QC Report to Eng_Data folder?” to manually enter a QC report name and select an alternate location to store the QC report(s) as shown below:



QC Reports can be generated at any time during the design process. These QC Reports will also include the following information, if the case applies:

- ✓ Any *Exceptions* created for the Standard Rule.
- ✓ If file has *No Graphical Elements Found*.
- ✓ If there is an *Invalid Filename*.
- ✓ If *file cannot be opened, either corrupt or access denied*.

- QC Summary Report (Required for Electronic Delivery)



- QC Detailed Report (*Optional*)

FDOT QCInspector Report (v2010.0.0.1)

Report Date: 7/15/2011 8:46 AM
Report Run By: CO\KNASDSM

Filename:	Compliance:	Rule:	Last Modified By:	Last Modified Date:
C:\e\Projects\21053125201\roadway\ALGNRD01.DGN	100% (0 errors out of 2069 elements checked)	algnrd	knasdsc	6/11/2009 9:46:39 AM

Filename:	Compliance:	Rule:	Last Modified By:	Last Modified Date:
C:\e\Projects\21053125201\roadway\DREXRD01.DGN	100% (0 errors out of 537 elements checked)	drexrd	knasdsc	5/18/2009 3:41:06 PM

Filename:	Compliance:	Rule:	Last Modified By:	Last Modified Date:
C:\e\Projects\21053125201\roadway\DSPFRD01.DGN	*****No Graphical Elements Found (0 errors out of 0 entities checked)	plprrd	pe256dt	12/18/2008 7:16:48 AM

Filename:	Compliance:	Rule:	Last Modified By:	Last Modified Date:
C:\e\Projects\21053125201\roadway\GDTMRD01.DGN	0% (54659 errors(s) out of 54659 elements checked)	dtmrd	rd252sr	2/5/2009 9:11:04 AM

*****Errors				
Element Type (Level / Model)	Invalid Level	Invalid Color	Invalid Linetype	Invalid Weight
Shape (Level 1 / Default)	Level 1			
Shape (Level 1 / Default)	Level 1			

