

QC the Model: 3D Modeling Tips for Deliverables



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Description:

- ◆ In this session we will discuss 3D engineered models.
 - ✓ Brief FDOT CADD/Industry History
 - ✓ 3D engineered models and to what detail?
 - ✓ QA and QC as defined by FDOT
 - ✓ QC review on the Model, checklist and tools
 - ✓ 3D deliverables



History and Background: How did we get here?

- ◆ FDOT – legacy software
GEOPAK/MicroStation (2d based for plans)
- ◆ FDOT Open CADD Platform
MicroStation and AutoCAD
- ◆ FDOT – contemporary software
OpenRoads, Civil3d (3d model based for designing models and plans)
- ◆ Contractors – making models from plans
??? uugh
- ◆ Consultants – plans and models, oh my!
- ◆ Future- Design Office bulletin forth coming

Name	Date modified
FDOT2002	10/3/2006 10:06 AM
MenuBuilder	8/9/2010 3:35 PM
FDOT2008	2/21/2011 11:23 AM
FDOT2011.C3D	5/5/2011 3:13 PM
FDOT2004	11/6/2012 3:10 PM
FDOT2010	1/17/2013 8:20 AM
FDOT2012.C3D	8/11/2014 10:03 AM
FDOTSS3	1/30/2015 11:44 AM
FDOTSS2	7/20/2015 2:23 PM
FDOT2015.AutoCAD	1/27/2016 12:01 PM
FDOT2015.Civil3D	1/29/2016 1:47 PM
FDOT2014.C3D	4/19/2016 5:02 PM
FDOTSS4	9/29/2016 5:03 PM
FDOT2016.AutoCAD	10/3/2016 9:57 AM
FDOT2017.AutoCAD	10/3/2016 10:04 AM
FDOT2016.Civil3D	10/3/2016 10:47 AM
FDOT2017.Civil3D	10/3/2016 11:15 AM



When is 3D model delivery required ?

- ✓ Project Suite - Work Program Code – 3DPR?
- ✓ What do the District Project Managers require?
- ✓ What's in the Professional Services Contract?
- ✓ What the CADD Manual defines for deliverables?

ProjectSuite Enterprise Edition

Go To Project -

DASHBOARD PROJECT SEARCH MONTHLY SCHEDULE UPDATE CREATE A PROJECT MY ASSIGNMENT

Project (Click to collapse)

Project: -

Active Status: All

Item Segment Group:

Transportation System:

Projects With No PSEE PM:

Projects With PSEE PM:

Without Permits:

PSEE Project Manager:

WP Project Manager:

Description / Item Seg. Comments:

Contract Number:

1401 - Er 2014 Event #1-Spring Flood
15AG - 2015 Auditor General Request
1756 - I75 Cap/6-Ln Sr54 To Sr691/Tpk
1CST - First Coast Expressway
2011 - The 2011 Plan
2012 - Fihs Fiscal Year 2012
2013 - Fihs Fiscal Year 2013
30DA - 30 Day Advertisement
3DPR - 3D Design Model W/Proj Deliver
4BTU - I-4 Beyond The Ultimate
5307 - Urbanized Area Formula Program
5309 - Capital Investments Grant Prgm
60DA - 60 Day Advertisement
75ML - I-75 Managed Lanes

Contains ☐ Starts With ☐ Exact ☐



... and to what level of detail ?

- ✓ Details to be defined/negotiated with District PM

DRAFT - Additional Staff Hour Considerations for 3D Design Deliverables - DRAFT					Notes following 9/13/16 Meeting
Add to Roadway Analysis Staff Hour Estimation Guidelines					
Task No.	Task	Units	Staff Hour Range	Basis for Staff Hour Range	Meeting Notes
4.5.1	<i>EXISTING TASK</i> Horizontal/Vertical Master Design Files	LS	See Basis for Staff Hour Range	All efforts required for establishing the master design files for the horizontal and vertical geometry, drainage structure features, utilities (including conflict location identification and adjustments), etc. This includes all work to create elements showing the alignment for both horizontal and vertical geometries in plan and profile portion of plan sheets. Includes efforts required to place labels and required information in accordance with the Department's CADD manual and Plans Preparation Manual in master design file. Also includes all engineering work for designing and analyzing elements required for the plan/profile geometries including horizontal/vertical alignments, back of sidewalk profiles, intersection layouts, curb return profiles, ramp profiles, utilities, etc. Includes time for EOR to develop utility conflict information and	Team agreed on Centerline (CL) Mile (plus add-ons).
4.5.2	3D Design Model (30%)	Corridor Mile	1 to 24	<p>Begins corridor modeling process and establishes the plan, profile, cross slope and superelevation of the roadway backbone. Includes the roadway pavement, curb and gutter, sidewalks, shoulders, drainage facilities and utilities. Does not include medians, crossovers, intersections, driveways and side slopes.</p> <p>Lower range projects (single alignment corridor with uniform typical sections which tie to the existing terrain) : 1 - 8 hours per mile Middle range projects (Multiple alignments with few templates or specialized cross slope conditions, super transitions or other complex profile conditions) : 8 - 16 hours per mile Upper range projects (Multiple alignments / corridors which target or merge with adjacent corridors including multi-level design) : 16 - 24 hours per mile</p>	
4.5.3	3D Design Model (60%)	Each and Corridor Mile	1 - 24	<p>Add detail that will allow the commencement of right of way mapping. This would include the addition of intersections, crossovers, gores, medians, traffic separators, retaining walls, barrier walls, guardrail terminals, side slopes, ditches and ponds.</p> <p>Ranges per each: Lower range items (Gores, crossovers, rural intersections, ponds) : 1 - 4 hours each Middle range items (Urban intersections) : 4 - 8 hours each Upper range items (Roundabout, DDI) : 8 - 24 hours each</p> <p>Ranges per mile: Lower range items (Rural - side slopes, medians, traffic separators, barrier walls, guardrail terminals, ditches and retaining walls) : 1 - 4 hours per mile Middle range items (Suburban - side slopes, medians, traffic separators, barrier walls, guardrail terminals, ditches and retaining walls) : 4 - 8 hours per mile Upper range items (urban - side slopes, medians, traffic separators, barrier walls, guardrail terminals, ditches and retaining walls) : 8 - 24 hours per mile</p>	
4.5.4	3D Design Model (90%)	Each	1 to 4	Add detail to model to include non-critical modeling areas which have minor impacts on earthwork quantities. Includes Driveways, Bridge end bent grading, Mitered end section grading, etc.	
4.5.5	3D Design Model (100%)	Each	0.5 to 4	Add detail to the model to include non-critical items such as ADA Curb Ramps, Traffic Separator bull nose, 3D Guardrail, 3D Drainage Structures and other miscellaneous details.	



QA / QC the model

Quality Assurance(QA) and **Quality Control(QC)** are two processes used to ensure the public receives a quality product.

- ✓ Quality Assurance is the responsibility of, and performed by the Central Office.
- ✓ Quality Control is a responsibility of the District Offices, and is performed by the Districts and their Agents (Consultants), as appropriate.

Topic #625-000-007
Plans Preparation Manual, Volume 1

January 1, 2016

Chapter 18

Quality Assurance and Quality Control



Quality Assurance

News

FDOT2017 C3D State Kit Software

Posted: October 3, 2016

The FDOT2017 C3D State Kit (version 01.00.00) is now available.

FDOT2016 C3D MR1 State Kit Software

Posted: October 3, 2016

The FDOT2016 C3D MR1 State Kit (version 01.01.00) is now available. FDOT2016 C3D MR1 contains updates necessitated by changes to Design Standards, Plans Preparation Manual (PPM), and the Basis of Estimates (BOE) as well as bug fixes to address reported issues.

FDOTSS4 MR2 CADD Software

Posted: October 3, 2016

The FDOTSS4 MR2 CADD Software (version 01.02.00) is now available.

- ◆ The FDOT Workspaces will check the 3D design model file for CADD compliance when a file is exited or use the QC Check tool directly.



QC the model

◆ Who will review the model?

- ✓ Consultant Designers, Engineers, Project Managers, EOR
- ✓ FDOT District Project Reviewer
- ✓ Other agency's; FHWA, local cities and counties, Permitting, Utility Companies, etc..
(How does this project affect me?)
- ✓ Contract Estimators
- ✓ Contractors



QC the model

- ◆ What will they want to QC?
 - ✓ Does the model look complete visually
 - gaps, spikes, overlaps, transitions, harmonization's
 - ✓ Normal checklist items?
 - Horizontal Vertical Curves, Tapers, K-values,
 - Pavement Lanes, Shoulders, Sidewalks, Curbs
 - Are the slopes correct, superelevation, slope breaks
 - Clearances, conflicts utilities, drainage, signs, etc.
 - Are the depths correct, pavement, sidewalk, base, driveways
 - ✓ Does the model match the plans or ... Do the plans match the model?
 - ✓ 3D Deliverables



Sample:

3D Engineered Model QC Checklist

Implementation Items	Originator	Reviewer	Comments
	<i>Initials</i>	<i>Initials</i>	
Geographical Coordinate System has be defined in the model(s)/design file			
3D Baseline/Centerline has been displayed in the model(s)			
Referenced 3D model break lines match the 2D <u>planimetric</u> lines			
Review of model(s) for completeness, visually: <ul style="list-style-type: none"> o Gaps along the model o Spikes or lips along seams o Overlapping components o Transitions between corridors and templates o Transitions between varying slope values o Slopes harmonization with existing surface o Median Crossovers o Separator Islands 			
Component Depths match the Typical Section: <ul style="list-style-type: none"> o Pavement Layers o Driveway o Sidewalk o Concrete 			
Verify Station Offset Elevation at Critical Location: <ul style="list-style-type: none"> o EOP at Drainage Nodes o Begin / End Taper Transitions o Begin / End Radius o 			
Verify Cross Slopes: <ul style="list-style-type: none"> o Pavement Lanes o Shoulders o Sidewalk o Cross Over Medians o Slopes 			
Vertical Clearance			
Clash Detection - Interference Checking			
3D Deliverable Created <ul style="list-style-type: none"> o XML files for Corridor Alignments o XML files for Existing and Proposed Surfaces (verified against 3D design) o <u>Dgn</u> or <u>Dwg</u> files for 2D and 3D lines o <u>Icm</u> file for OpenRoads Design Delivery 			



QC model applications

◆ What non CADD tools are available?

✓ DGN files

- Bentley Navigator
- Bentley DGN Viewer

✓ 3D pdf tools

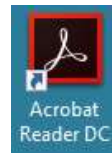
- Adobe Reader
- Bluebeam

✓ I models and tablets for field review

- OpenRoads Navigator Connect
- Bentley Navigator Connect

✓ Construction Software

- AGTEK
- Trimble Business Center

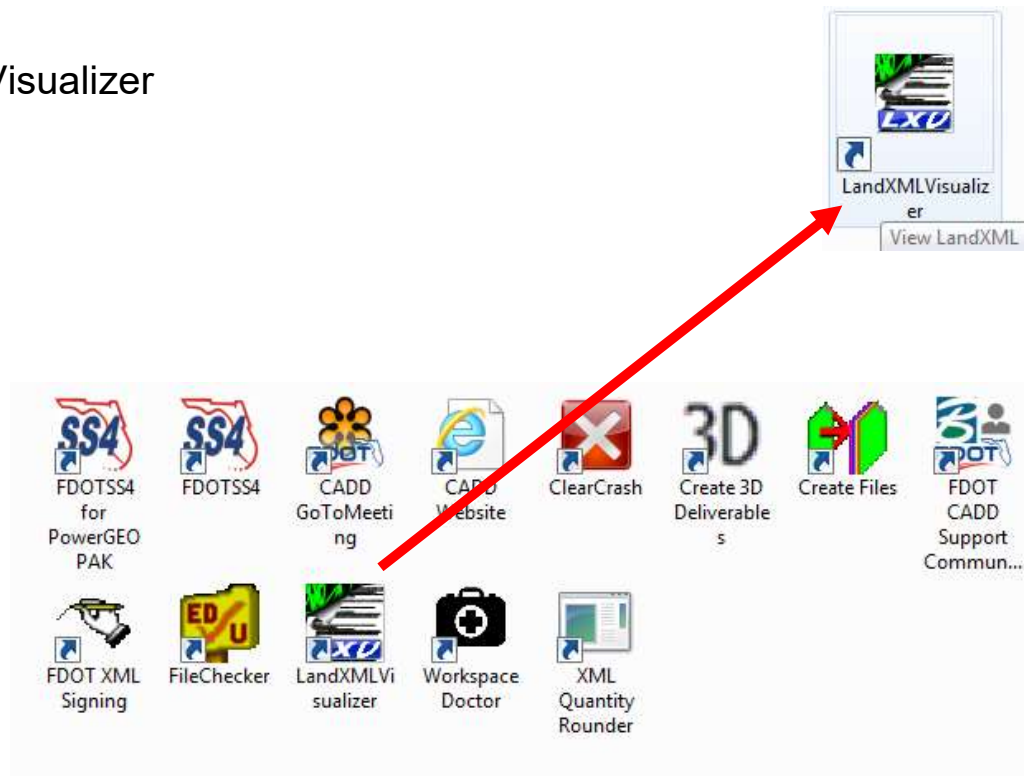


[Click here to open](#)



QC model applications

- ◆ What non CADD tools are available?
 - ✓ XML files
 - FDOTSS4 XML Visualizer



3D Deliverables

- ◆ What is delivered for the contractor?
 - ✓ Alignments and profiles in xml file
 - ✓ Existing and Final Grade surface in xml file
 - ✓ 2D planimetrics and 3D breaklines files in dgn or dwg

Future Integrated Models

- ✓ 3D Drainage Network model?
- ✓ 3D Bridge Model?
- ✓ 3D Utility Model?
- ✓ 3D Signals, Lighting, Signing?



Summary and Questions

- ◆ We, FDOT, are developing QC review list. This issue has been identified as something we will give credence to in the future along with more guidance.
- ◆ Other States have been also addressing this topic and have gone so far as having technical review meetings, similar to field review meetings, for all state holders in a project. These meeting put the 3D model on a large screen with a skilled operator “driving” to check many of the things listed above.
- ◆ All said, this topic has been recognized and it is maturing day by day!

Hope this helps?



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