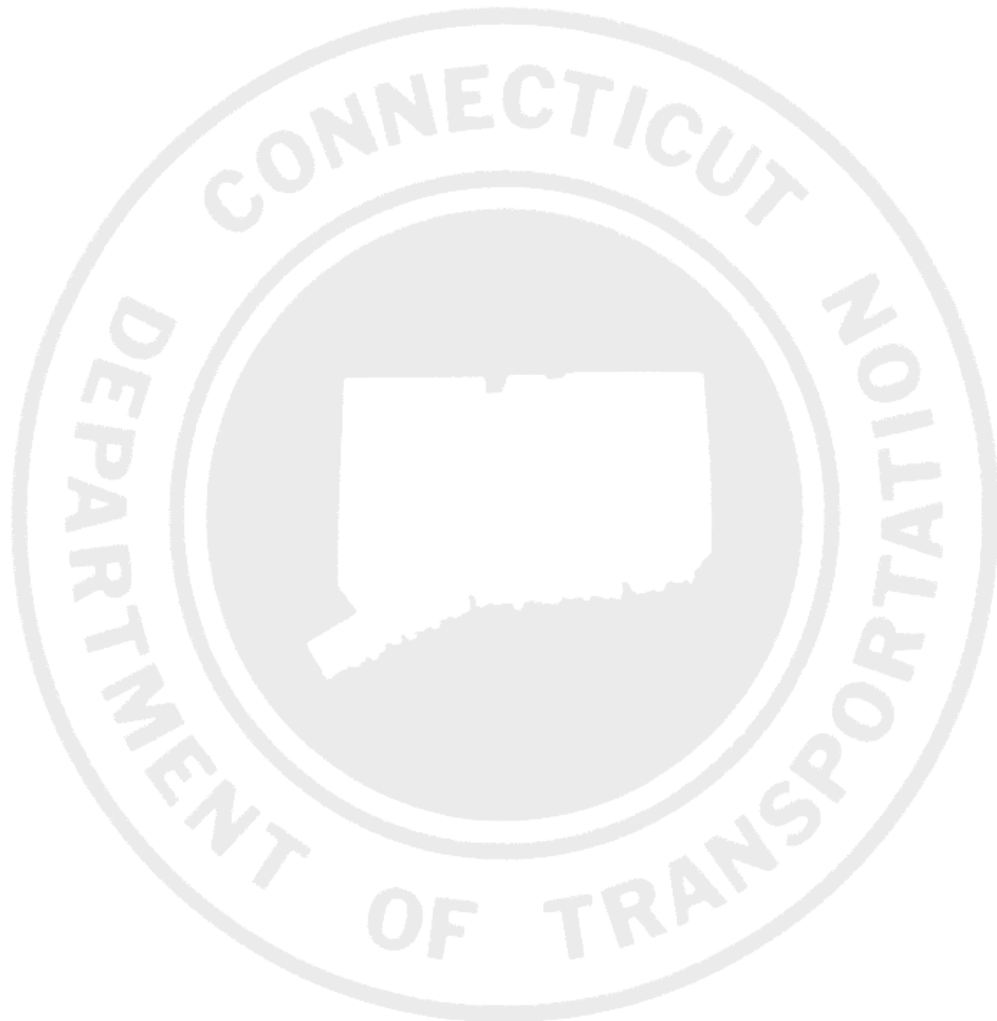


**Pilot Project
for
Electronic Engineering Data
Use and Delivery**

Office of Engineering
AEC Applications - Division of Facilities & Transit
Connecticut DOT



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Section 1 Overview

1.1 Problem to be addressed or improvement desired

The high value Electronic Engineering Data (EED) that is being developed during design is not being passed onto the construction phase of the project. This data can be used to leverage new technologies in construction inspection, layout and machine control. It can also be used during the design phase for better estimates, visualization, and clash detection.

In order to accomplish this, another issue of the EED is that it frequently does not match the contract plans. Models are typically developed to a 50%-60% level of detail and then the final design is done by simply editing the graphics. CAD drafting standards are also not being adhered to.

1.2 Goal of the pilot project

To implement and test a strategy for moving towards a model centric method of design and delivering those models (called Electronic Engineering Data or EED) for use during design and construction. There is also a secondary goal of improving CAD drafting practices.

1.3 Objective of the pilot project

Deliver 2D/3D models of the design along with contract plans at FDP. This model will include 2D CAD graphics, alignments and surfaces that were used to develop the plans. This will be accomplished in three phases:

- 1.3.1 Phase 1 – delivery of 2D MicroStation CAD graphics and InRoads SS2 alignment data. This phase will focus on improving CAD drafting practices.
- 1.3.2 Phase 2 – Phase 1 deliverables along with the top surface curb to curb using MicroStation and InRoads SS2. This phase will focus on moving towards the delivery of 3D models by requiring the top surface from curb to curb of the project.
- 1.3.3 Phase 3 – deliver a full 3D model using MicroStation and OpenRoads SS4. This phase is dependent on the implementation of Bentley's design software, OpenRoads.

1.4 Pilot Project List

For a list of pilot projects see [EED Pilots_AEC_Working_.docx](#)

Section 2 Establishing Success Criteria

AEC will perform Q&A on the EED when it's delivered at FDP. The data will also be tracked during the construction phase to see how it was used in the field.

Section 3 Resources

3.1 Project Personnel

- 3.1.1 Design Engineers of various pilot projects
- 3.1.2 AEC Applications personnel

3.1.3 Inspectors of various pilot projects

Section 4 Hardware

4.1 Trimble Site Positioning Systems:

[Site Positioning Systems | Trimble Civil Engineering and Construction](#)

4.2 Software

4.2.1 Standard CTDOT install of Bentley products for all designers

4.2.2 Business Center - Heavy Construction Edition for AEC personnel, select construction inspectors

4.2.3 SCS900 Site Controller Software on all hand held mobile devices

4.3 Funding

4.3.1 SPR-2253 for hardware/software purchases (State Project Number 0093-0164)

Section 5 Start Date/Schedule

2013, May 2014 & February 2016 – met with Connecticut Construction Industry Association (CCIA) to inform contractors of CTDOT’s plans for EED and to hear find out what the contractors needed.

April 12 & 13 2016 - AEC Applications hosted an Every Day Counts-3 FHWA workshop on 3D Engineered Models for Highway & Bridge Construction Workshop/Peer Exchange.

June 2016 - Begin piloting delivery of EED at FDP

[EED Pilots AEC Working .docx](#)

July 11 & 18 2016 - Model Centric Roadway Design And Delivery Open House

January 2017 – issue Phase 1 Directive

June 2017 – issue Phase 2 Directive

December 2017 – issue Phase 3 Directive

[EED All Phases AEC Working .mpp](#)

Section 6 Procedures for Gathering Data for Pilot Evaluation

Section 7 Risk Management

7.1 Identify Risks

7.1.1 EED not matching contract plans

7.1.2 Improper use of EED/mobile devices during construction phase

7.2 Risk Mitigation

7.2.1 Held a workshop and open houses to inform the users of what is expected and how to accomplish goals. This included CTDOT personnel, consultants and contractors.

7.2.2 Q&A at delivery of EED at FDP [EED Checklist](#)

7.2.3 Proficiency Rating of inspectors using EED in the field
[2016-07-28 GPS Proficiency CN OOC Miscellaneous .pdf](#)

7.3 Risk Transfer

7.3.1 Allocate risks to the parties best able to manage them

Q&A at delivery of EED at FDP – initially AEC, then Design project engineers

Improper use of EED/mobile devices during construction phase – OOC

Section 8 Key Performance Indicators

8.1 Planned Labor

8.2 Labor spent

8.3 Planned Dollars

N/A

8.4 Dollars spent

N/A

8.5 Planned delivery date

See [Section 5](#)

8.6 Actual delivery date

TBD

Section 9 Production Deployment Plan

Issue directives for the 3 phases after pilot projects have been completed

Section 10 Lessons Learned

AEC report to be issued. To include a lists of all pilot projects.to include problems encountered, issues/problems that were avoided/mitigated from using the EED.

10.1 Things that went well

10.2 Things that could have gone better

Appendix A. Acronyms

ALG - InRoads coordinate geometry alignment file

CCIA - Connecticut Construction Industry Association

DGN – MicroStation CAD graphics file

DTM – InRoads digital terrain model file

EED – Electronic Engineering Data

Appendix B. Tracking

Electronic Engineering Data							
Project #	Description	Lead Designer	FDP	DCD	ADV	Delivered	Phase
0124-0162	Roundabout at Route 34 and Route 188 Seymour	CTDOT	5/14/2014	6/25/2014	7/23/2014	6/25/2014	3
0148-0200	Relocation of the Northbound On-ramp to Route 15 at Interchange 65	CTDOT	11/11/2015	12/23/2015	2/3/2016	12/23/2015	1
0017-0183	Intersection Improvements Rte. 69 at Maple Ave and Peacedale St #2	CTDOT	4/27/2016	6/8/2016	7/6/2016	6/8/2016	1
0144-0191	Multi-use 4,500' trail	CTDOT	6/22/2016	8/10/2016	9/14/2016	8/10/2016	2
0158-0211	Merrit Parkway Resurf/Safety, CT 33 Westport to Morehouse Hwy Fairfield	CTDOT	7/6/2016	8/17/2016	9/14/2016	8/17/2016	1
0025-0145	Farm. Canal Trail-Cheshire	CTDOT	10/5/2016	11/16/2016	12/14/2016	11/16/2016	1
0155-0172	I- 84 Replace Guiderail with PCBC	CTDOT	10/19/2016	11/30/2016	12/28/2016	11/30/2016	1
0012-0096	Charter Oak Greenway Shared Use Path	CTDOT	11/9/2016	12/21/2016	2/8/2017	12/21/2016	1
0135-0287	CT106,US1, HAMILTON-INT.IMPRV.	CTDOT	4/12/2017	5/24/2017	6/21/2017		1
0034-0309	WIDEN SR 806	CTDOT	4/19/2017	5/31/2017	6/28/2017		1
0082-0319	Ped Improvs Main St Middletown	CTDOT	5/17/2017	6/28/2017	7/26/2017		1
0103-0269	Failed Retaining Wall – 2:1 proposed slope	CTDOT	7/5/2017	8/16/2017	9/13/2017		2
0096-0196	Realignment @CT 25, w/ drainage	CTDOT	7/5/2017	8/16/2017	9/13/2017		2
0089-0091	Rehabilitation/Replacement of Bridge Nos. 01309 & 02617	Lochner	9/13/2017	10/25/2017			3
0096-0192	Int. & Rdwy. Impr. to Rt 6, Commerce & Edmond Rds.	CTDOT	9/13/2017	10/25/2017	11/22/2017		2
0159-0191	I-91 Wethersfield Hartford Resurfacing I-91	CTDOT	11/8/2017	12/20/2017	1/17/2018		3
0082-0320	Saint John's Square and Main Street Intersection Improvements	CTDOT	11/15/2017	12/27/2017	1/24/2018		2
0134-0147	Roundabout at Route 190 and Route 319 Stafford	CTDOT	5/23/2018	7/4/2018	8/1/2018		3
0082-0318	Removal of Traffic Signals on Route 9	CTDOT	10/3/2018	11/14/2018	12/12/2018		3
0174-0405	D4 SIGNALS WITH APS UPGRADES	CTDOT	1/9/2019	2/20/2019	3/20/2019		3
0156-0180	Resurfacing, BR & Safety Improvs on I-95	CTDOT	4/10/2019	5/22/2019	6/19/2019		3
0017-0187	Major Intersection Improvements on Rt 72 @ Rt 69	CTDOT	6/12/2019	7/24/2019	8/21/2019		3
0082-0316	Reconfigure Rt 17 On-ramp to Rt 9 NB	CTDOT	9/11/2019	10/23/2019	11/20/2019		3
0044-0156	Improvement of I-95 Interchange 74 at Rte 161	Lochner	9/9/2020	10/21/2020	11/18/2020		3
0103-0257	6 Roundabouts Route 82	CTDOT		1/1/2022			3
134-TMP1	Modern roundabout, Routes 190 & 32	CTDOT		1/1/2022			3
0079-0240	I-91/691/SR 15 Interchange Reconfiguration	Lochner		1/1/2022			3
# Phase 1 Projects:	9						
# Phase 2 Projects:	5						
# Phase 3 Projects:	13						
Total:	27						
Delivered To Date:	8						