3D Engineered Models for Construction
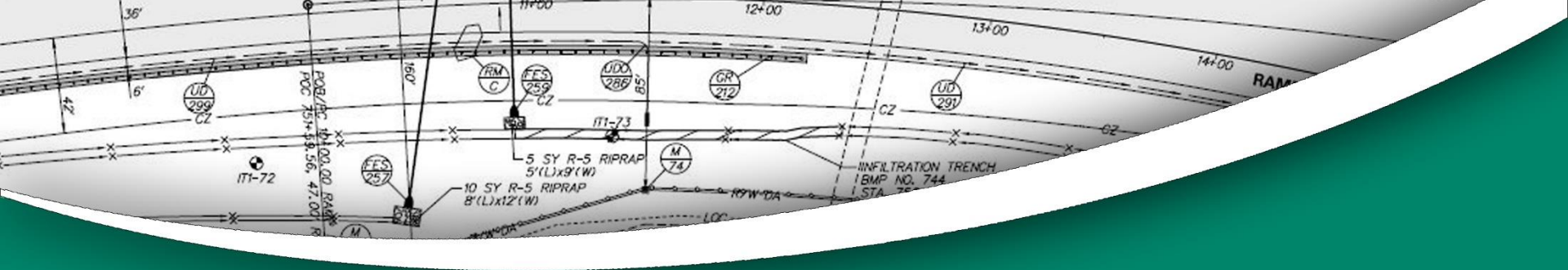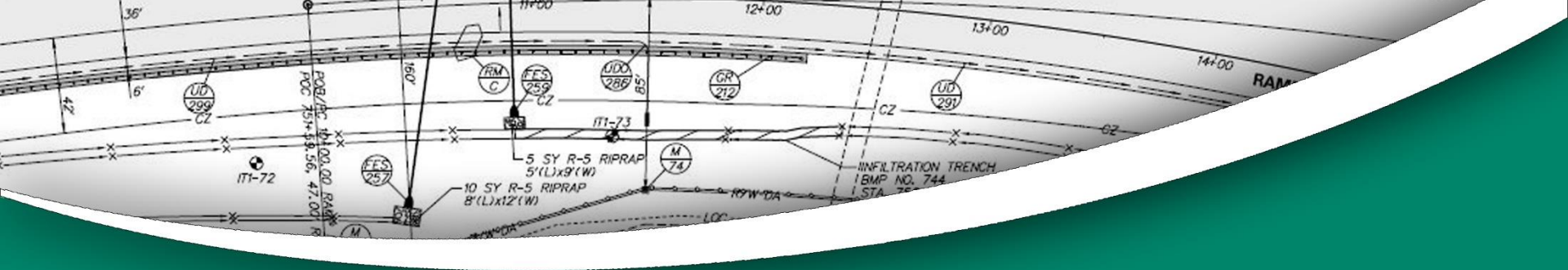
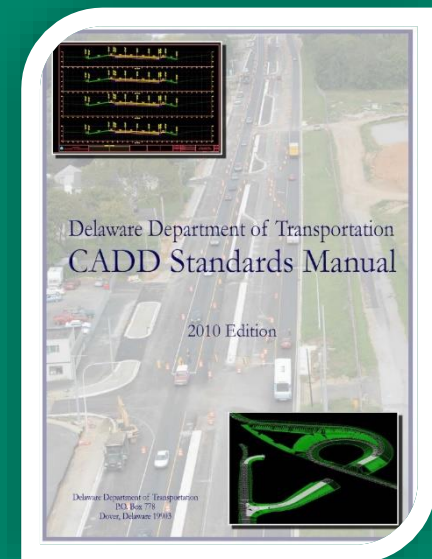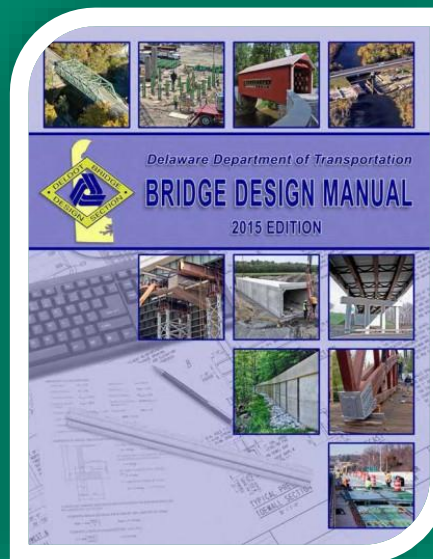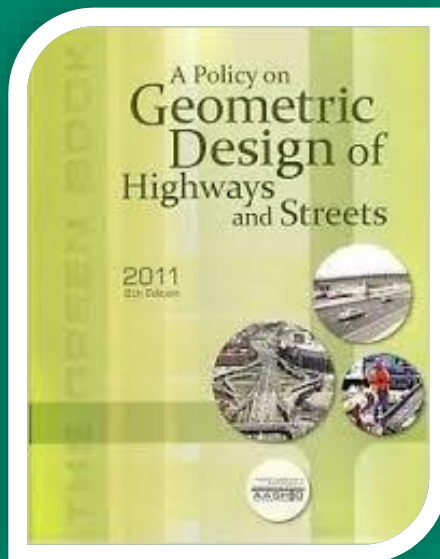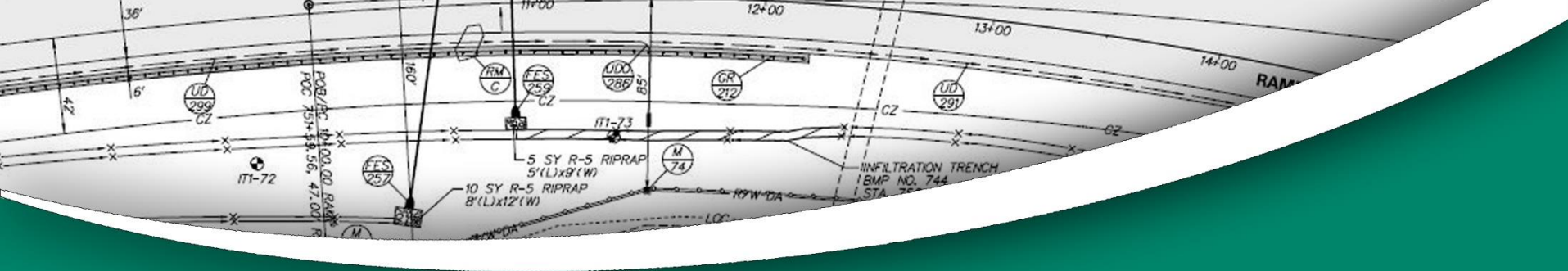Delaware Contractors Association Presentation – June 7th, 2017

Agenda

- What's Inside the 3D Engineered Models

- Current Delivery Method for Electronic Data

- Proposed Delivery Method for Electronic Data

- Key Points from DCA Contractor Interviews
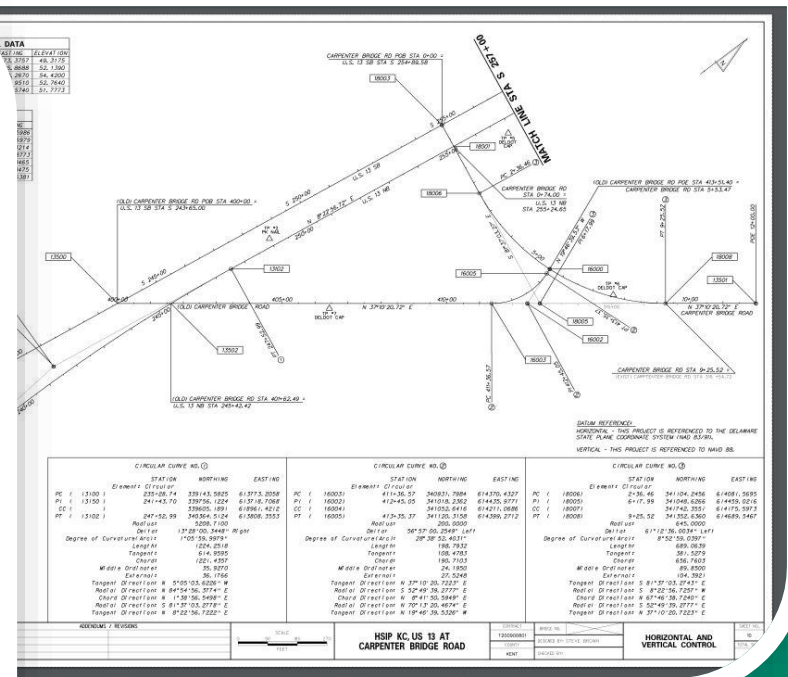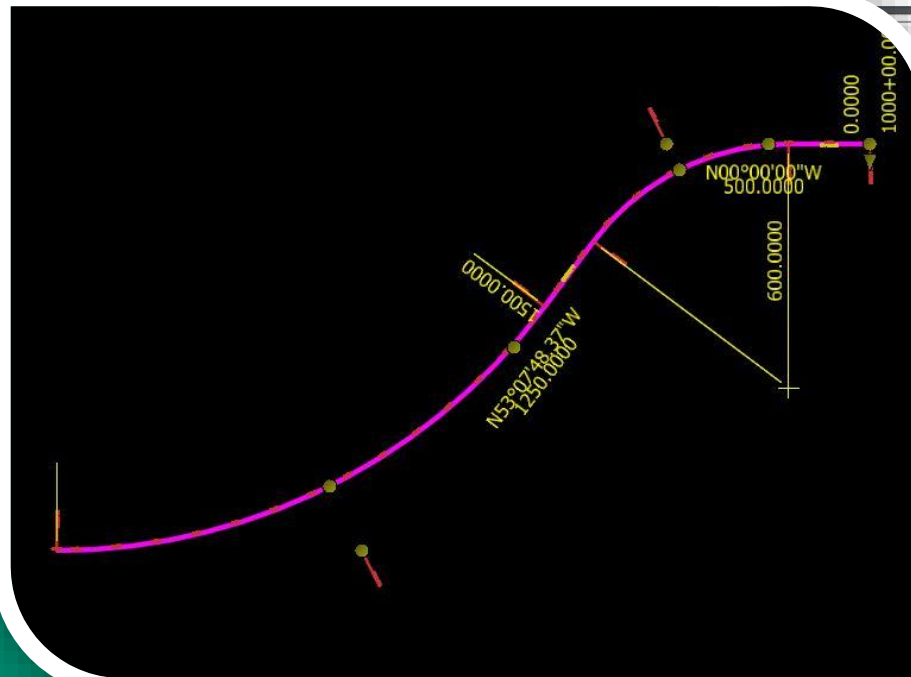
What's Inside a 3D Engineering Model

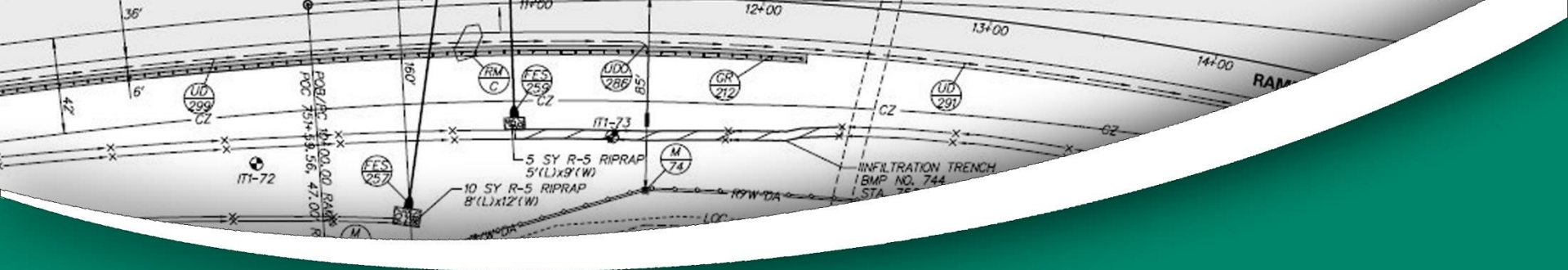- Designer's Intent
- Engineering Standards (AASHTO)

What's Inside a 3D Engineering Model
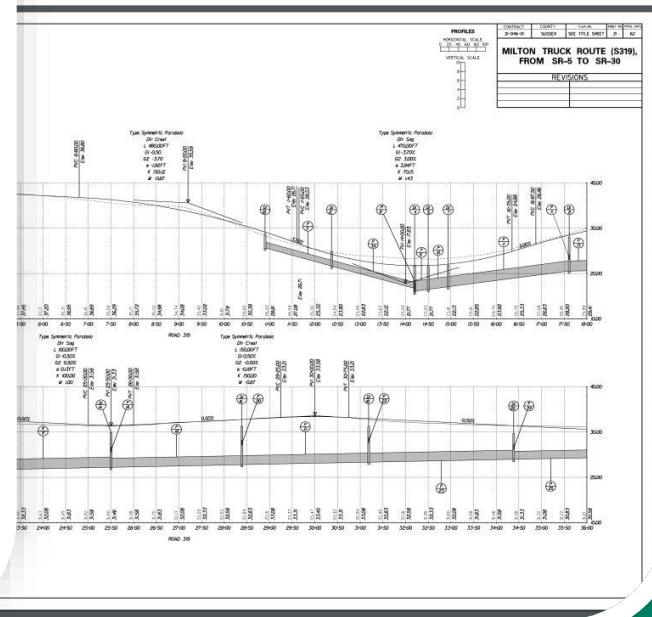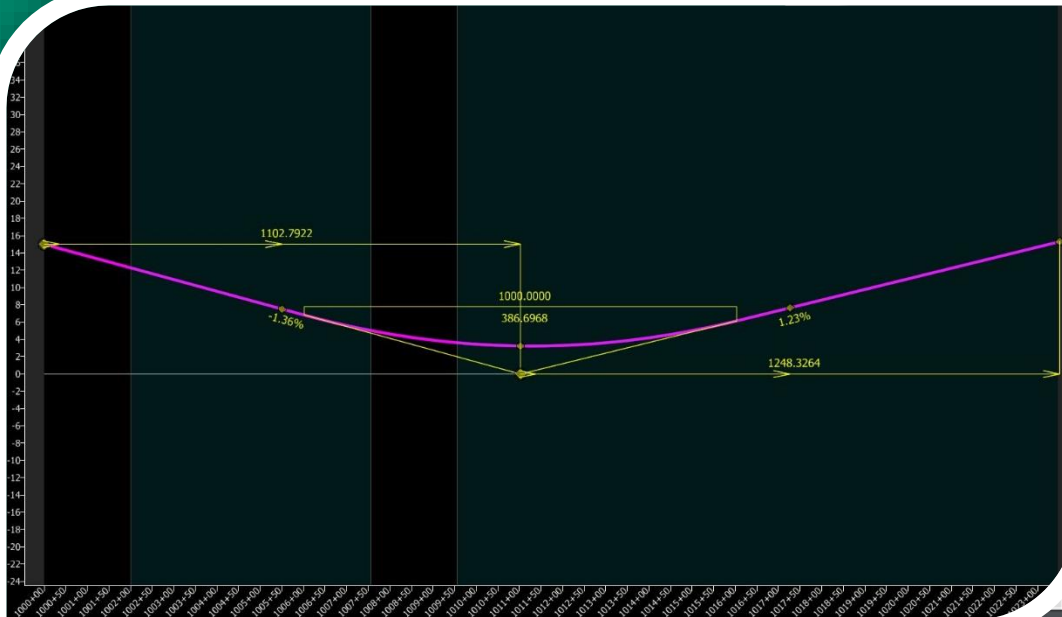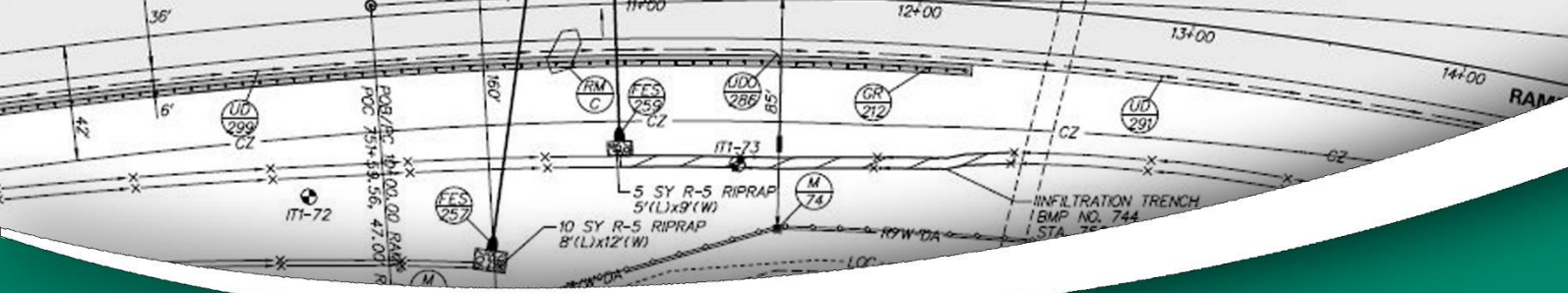
- Horizontal Alignment(s)

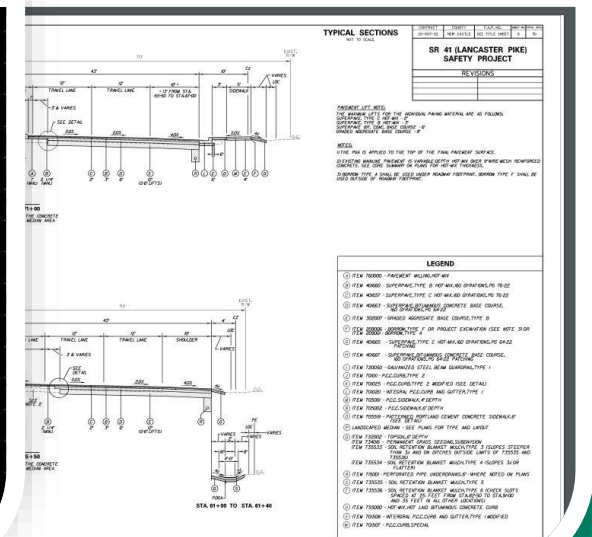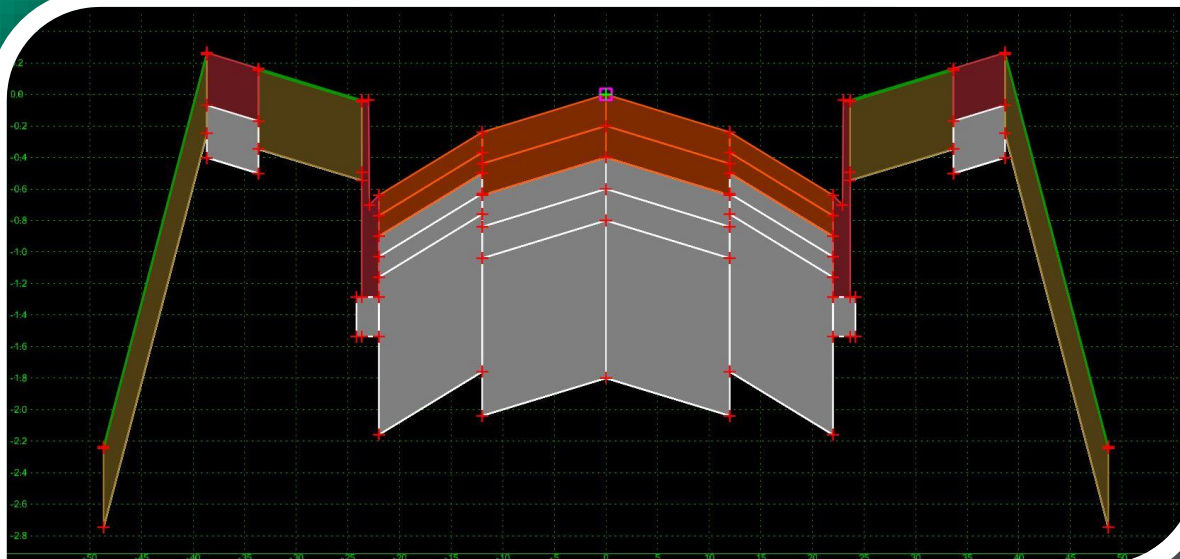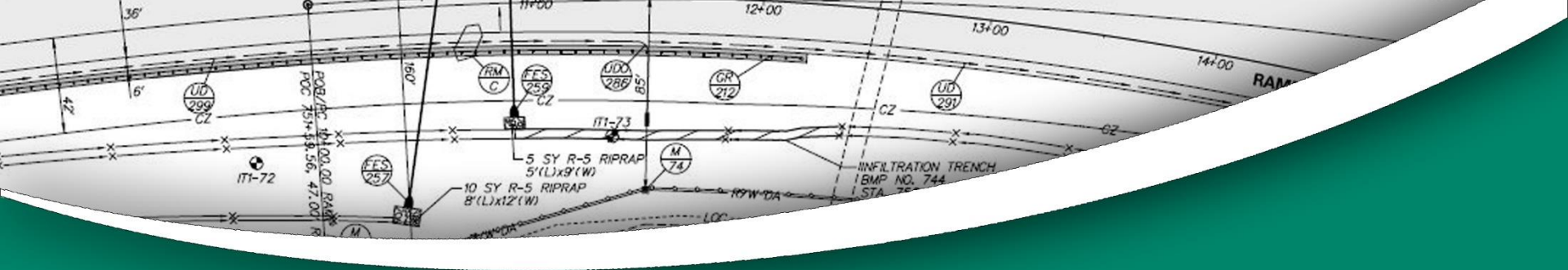# What's Inside a 3D Engineering Model

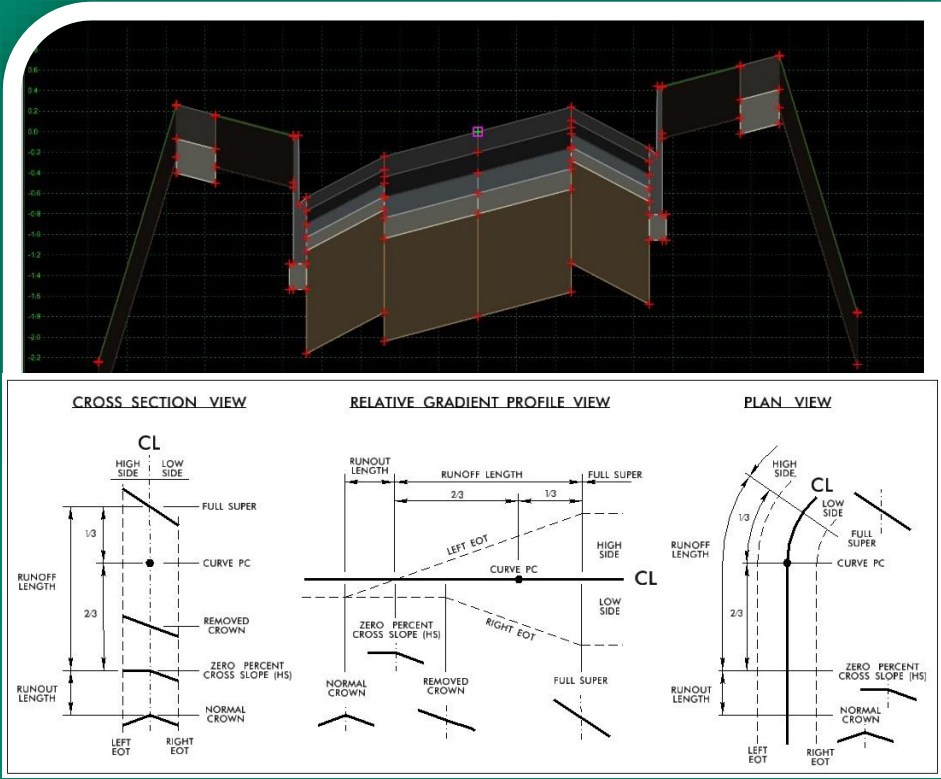- Vertical Alignment(s)

What's Inside a 3D Engineering Model

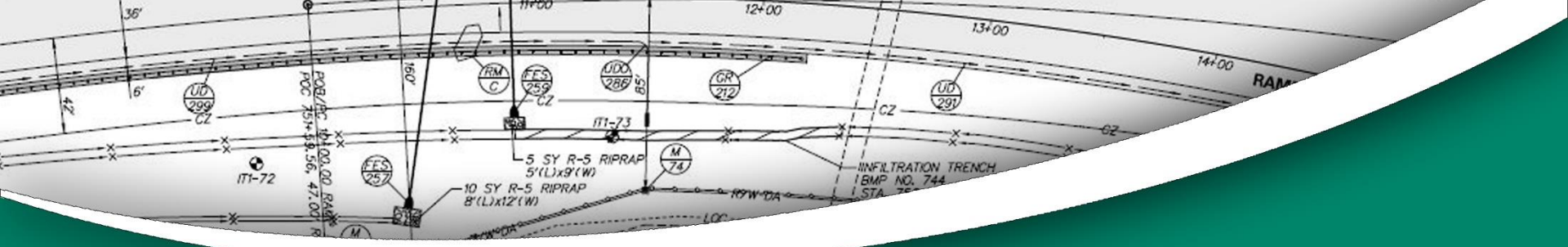- Templates / Typical Sections
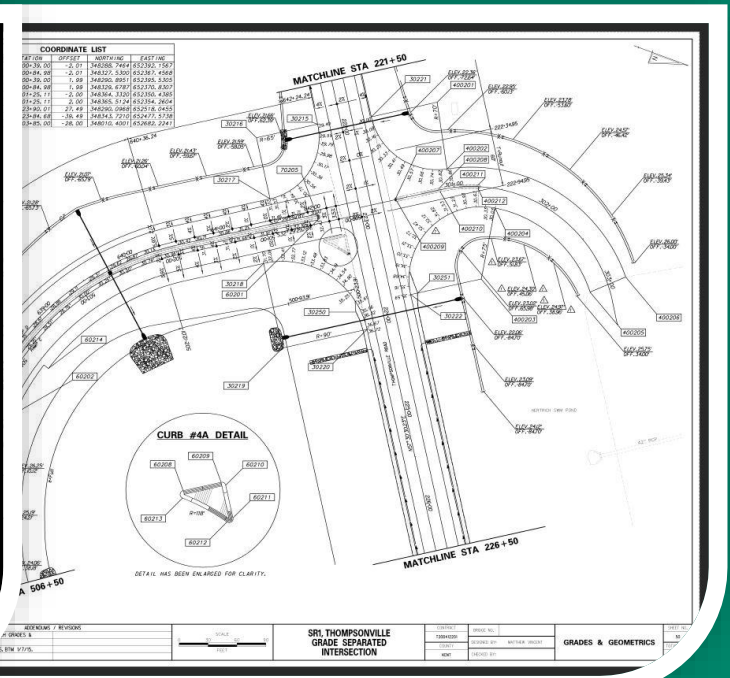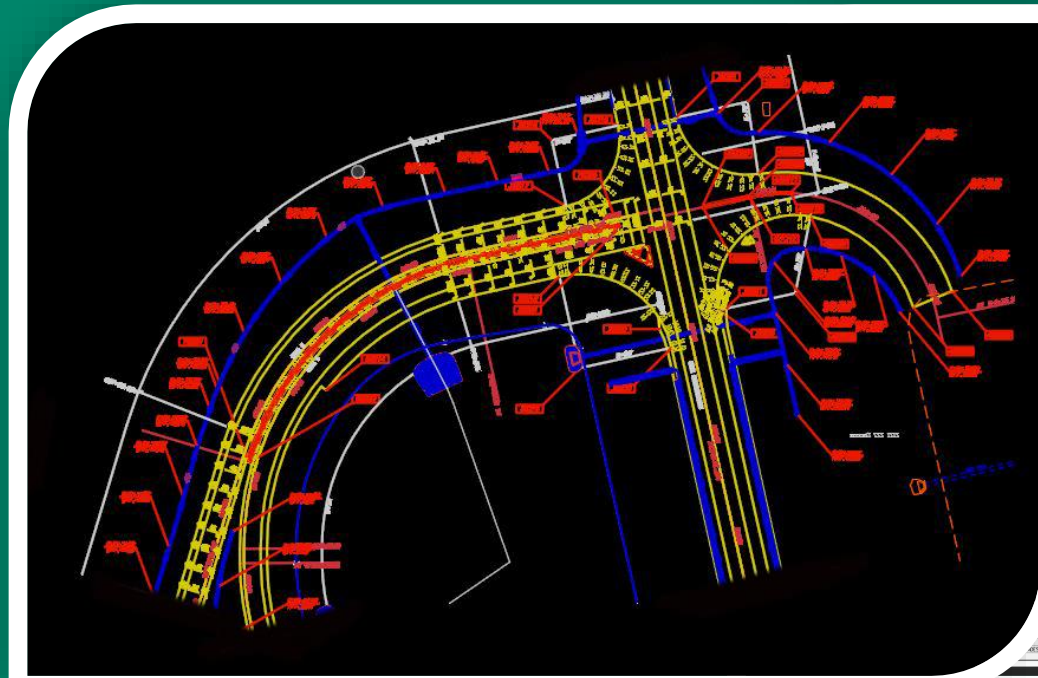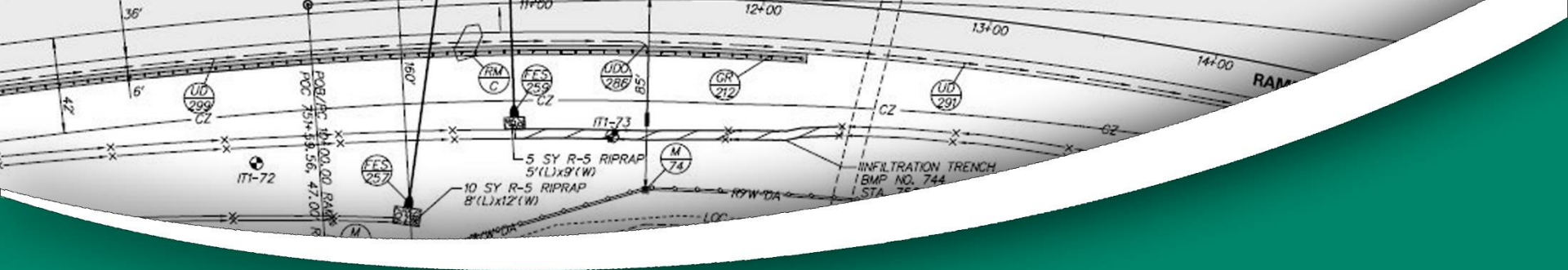
What's Inside a 3D Engineering Model

- Superelevation

What's Inside a 3D Engineering Model

- Grades and Geometrics

What's Inside a 3D Engineering Model

- Cross-Sectional Data for Earthwork
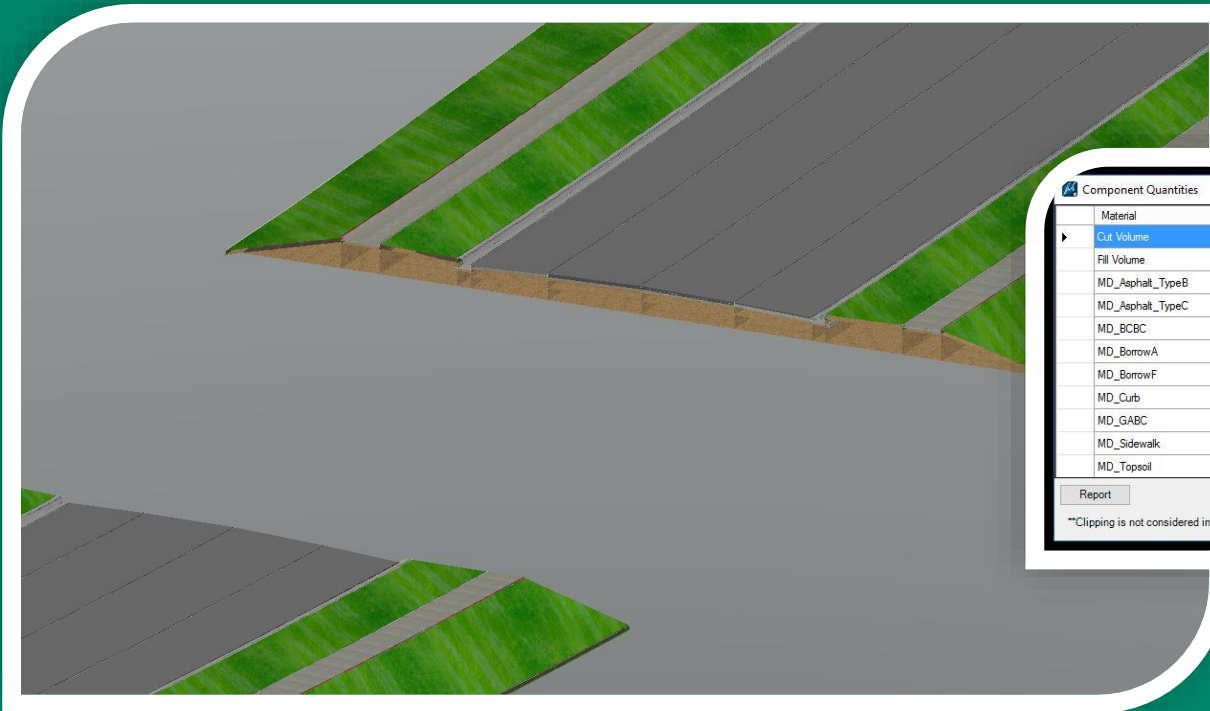
Material	Surface Area	Volume	Units	Unit Cost	Total Cost/Material
Cut Volume	0.0000	90.3090	CuY	1.00	90.31
Fill Volume	0.0000	0.0000		1.00	0.00
MD_Asphalt_TypeB	0.0000	644.0363	CuY	1.00	644.04
MD_Asphalt_TypeC	0.0000	643.3299	CuY	1.00	643.33
MD_BCBC	0.0000	646.0895	CuY	1.00	646.09
MD_BorrowA	0.0000	3825.3548	CuY	1.00	3825.35
MD_BorrowF	0.0000	70695.9545	CuY	1.00	70695.95
MD_Curb	0.0000	256.1343	CuY	1.00	256.13
MD_GABC	0.0000	1031.4393	CuY	1.00	1031.44
MD_Sidewalk	0.0000	289.7923	CuY	1.00	289.79
MD_Topsoil	0.0000	3744.1856	CuY	1.00	3744.19

Total Estimated Cost: 81866.62

Clipping is not considered in quantities.

Corridor Name: South-North
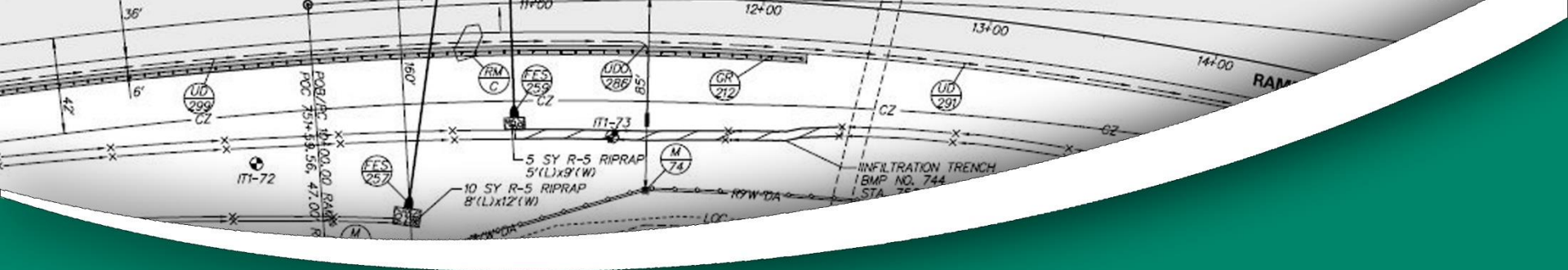
Current Delivered Method for Electronic Data

- Electronic Project Files Note

Current Delivered Method for Electronic Data
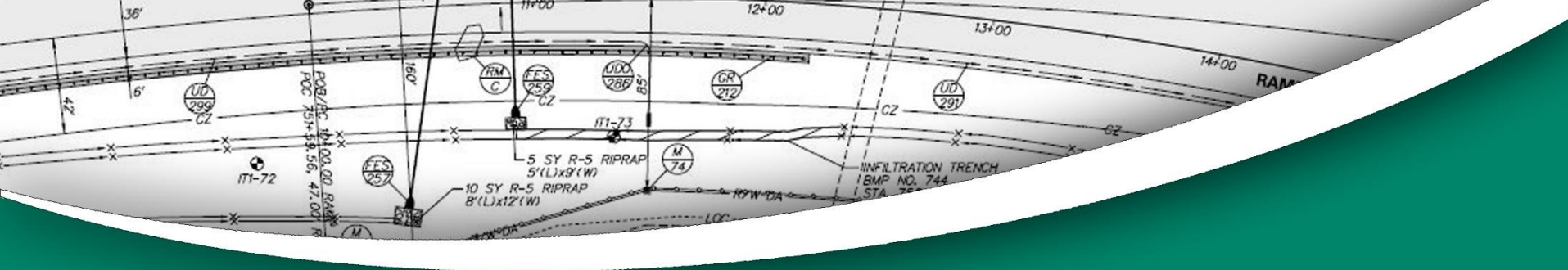
- ASCII Output Files (Point Data)
- PDF Plan Sheets

|				
501	100005.519	669380.4079	374.3334144	SIGN
502	100005.4794	669377.6708	378.4704648	TOB
503	100005.455	669381.2522	373.6119528	DITCH
504	100005.5069	669382.2581	373.66895040	SHOULDER!
505	100005.5678	669383.4834	373.6997352	EP!
506	100004.9978	669360.2576	381.6608064	SPOT
507	100006.4914	669386.827	373.7369208	CLP!
508	100004.7662	669349.7755	383.6218896	SPOT
509	100024.0052	669385.6383	373.5726336	CLP
510	100021.4448	669349.0349	382.406652	SPOT
511	100023.7247	669382.4074	373.5458112	EP
512	100023.9594	669381.0297	373.482108	SHOULDER
513	100023.9625	669380.2037	373.415052	DITCH
514	100022.8043	669363.6653	379.8536472	SPOT
515	100041.7689	669378.9815	373.1014128	DITCH
516	100023.7491	669376.4882	377.8693992	TOB
517	100041.6561	669379.9873	373.180356	SHOULDER
518	100041.2203	669375.9365	376.1890368	TOB
519	100041.6409	669381.3284	373.2388776	EP
520	100042.0036	669384.5227	373.2394872	CLP
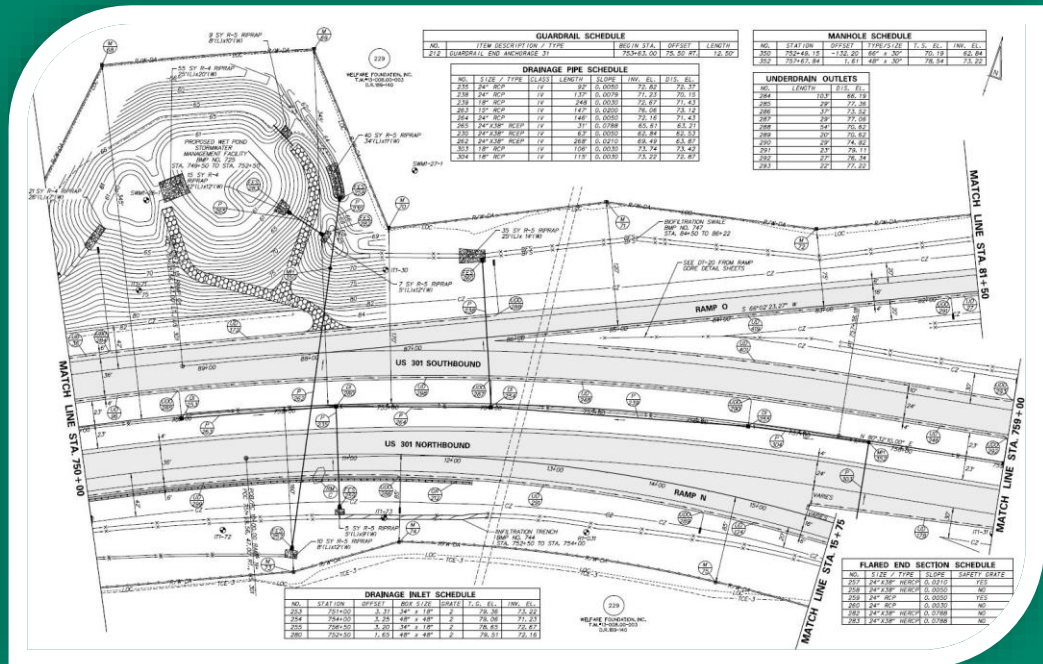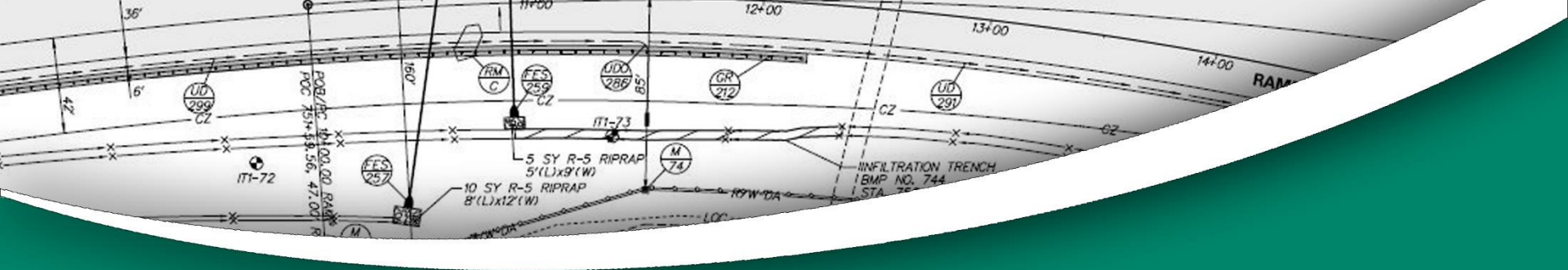
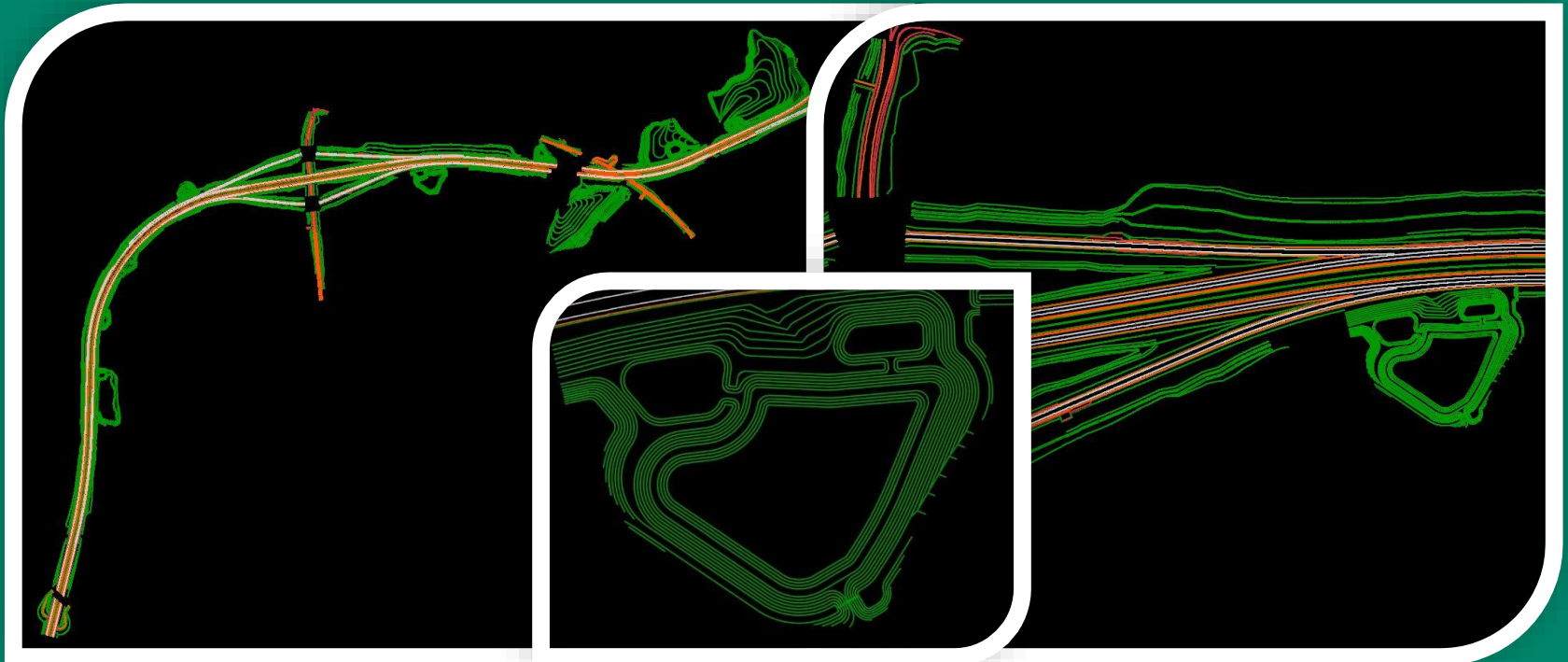# Current Delivered Method for Electronic Data
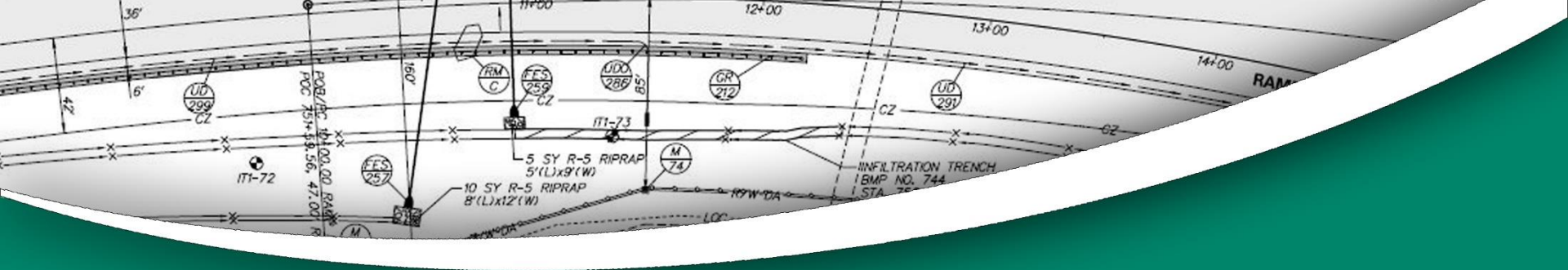
- Digital Terrain Models (DTMs)
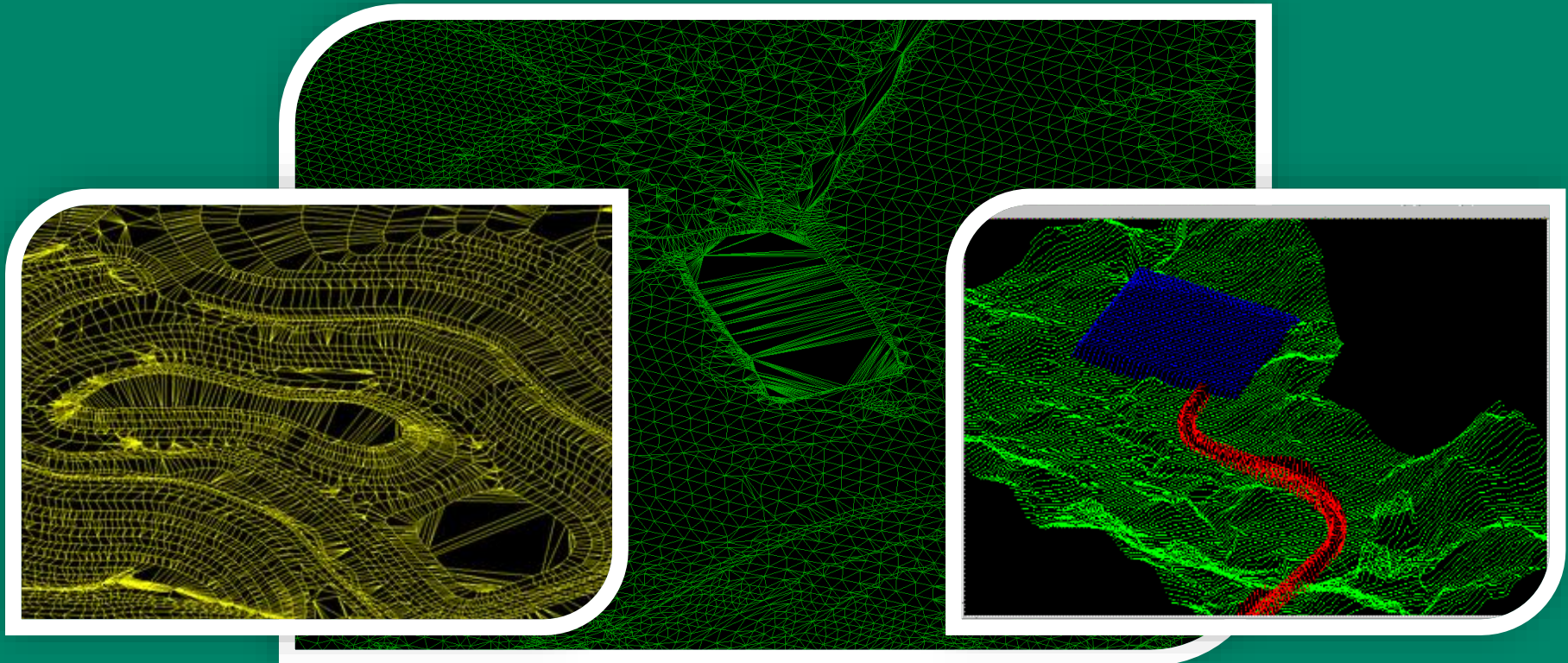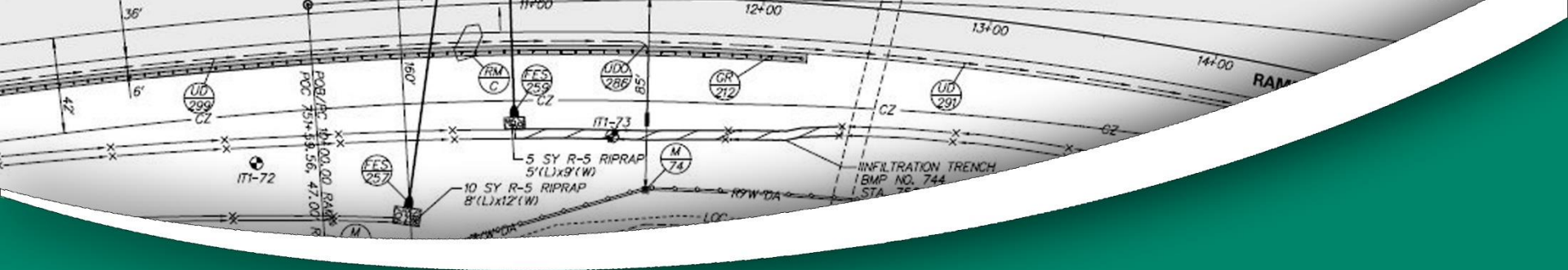
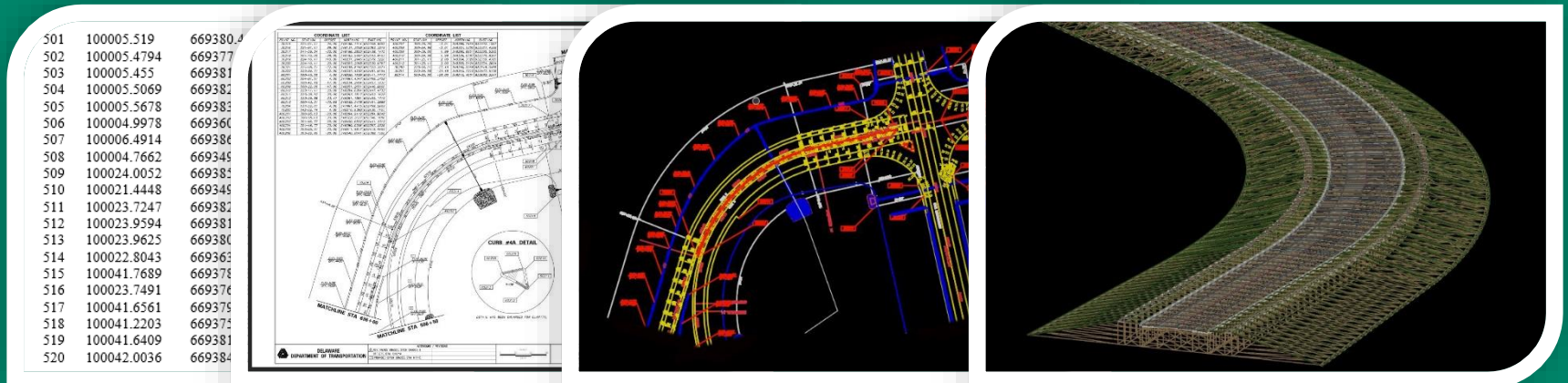## Thompsonville & US301 Pilot Projects ADDED:

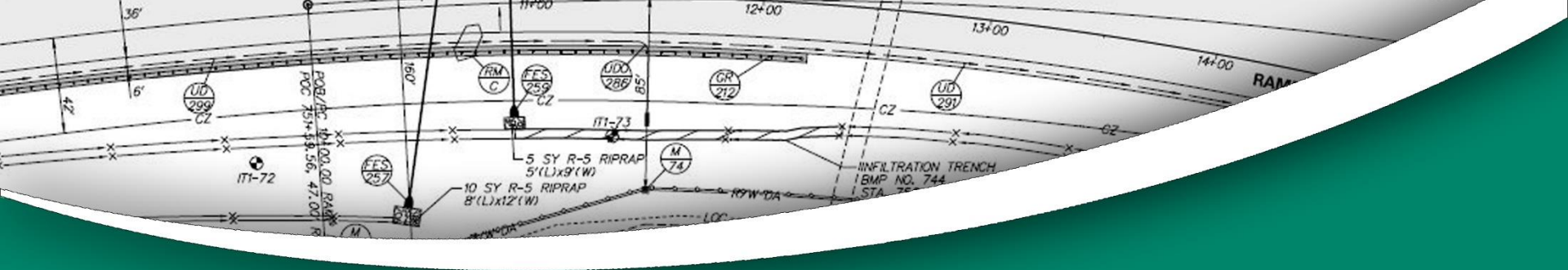- Roadway Feature Lines on Top Surface

Proposed Delivery Method for Electronic Data

- ASCII Output Files
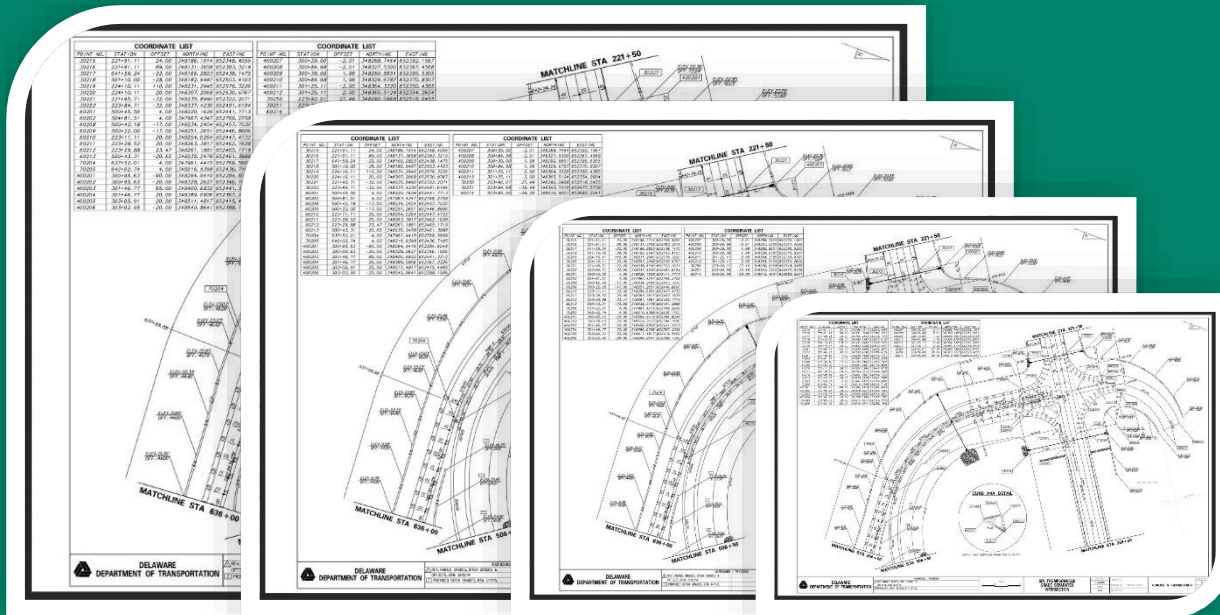- Enhanced PDF Files
- i-Model Files
- ICM Files (Infrastructure Consensus Model)
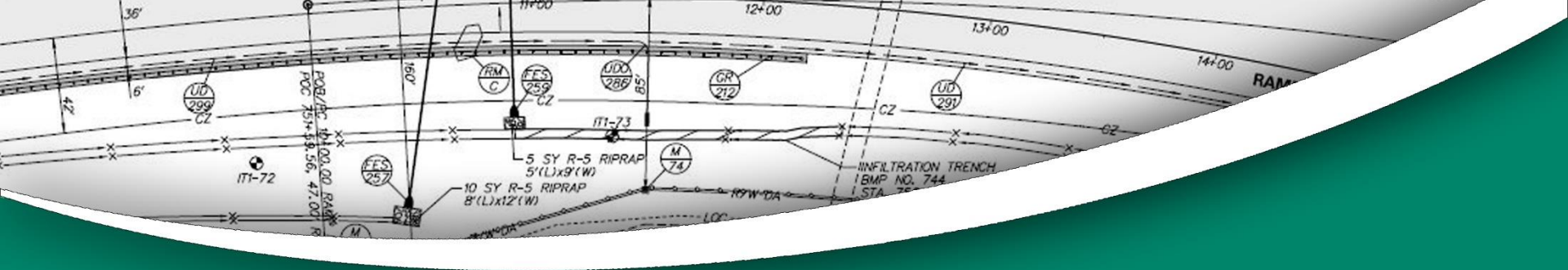
Proposed Delivery Method for Electronic Data

- Enhanced PDF Files
  - Vectorized Format (Scalable)

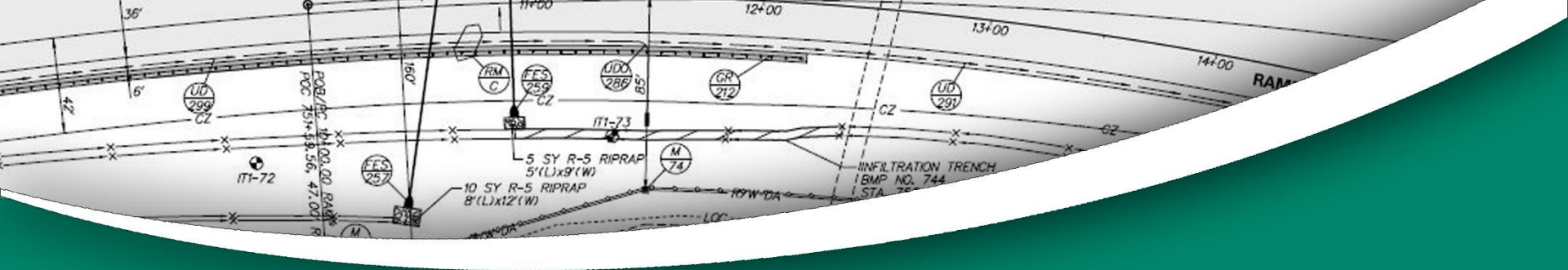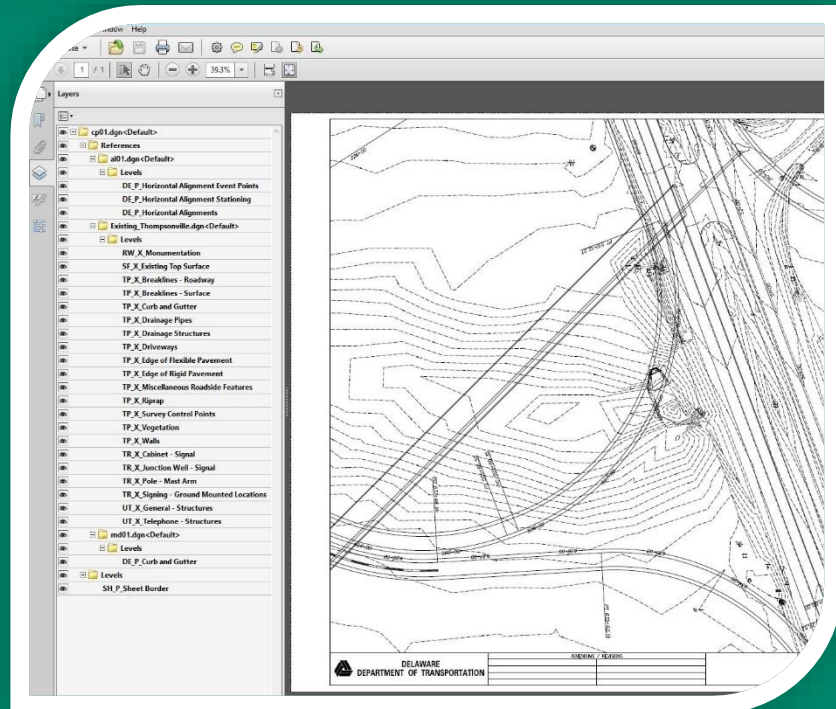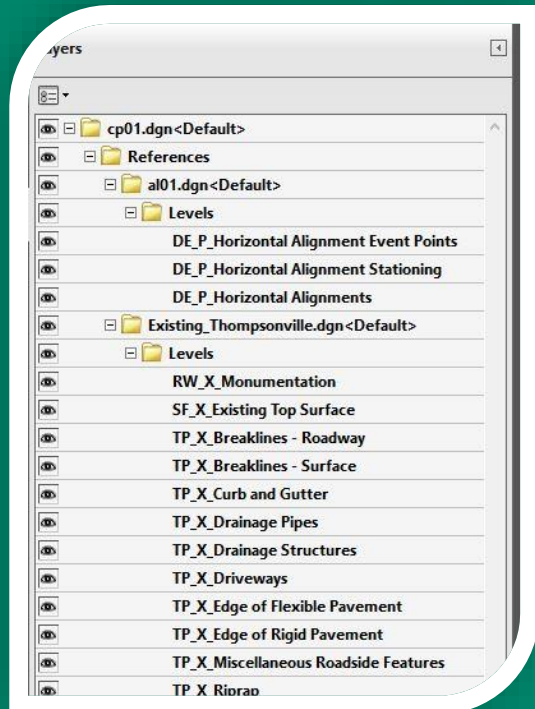# Proposed Delivery Method for Electronic Data

- Enhanced PDF Files
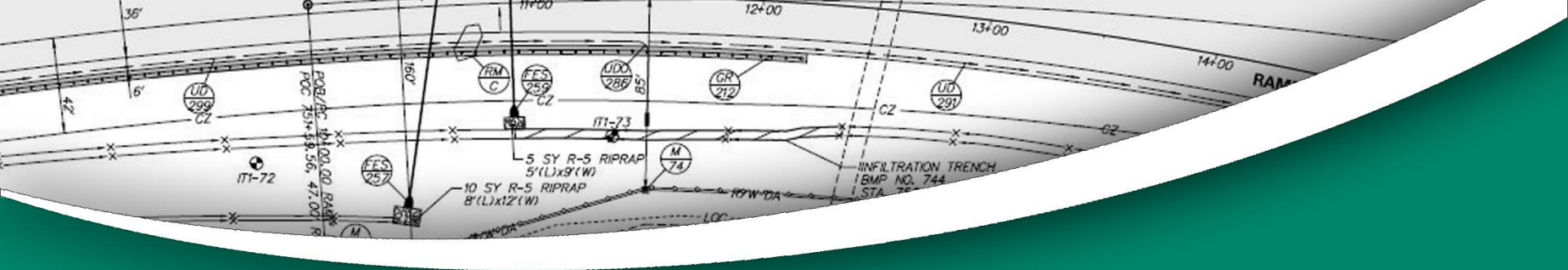 - Geographically Located (Georeferenced)
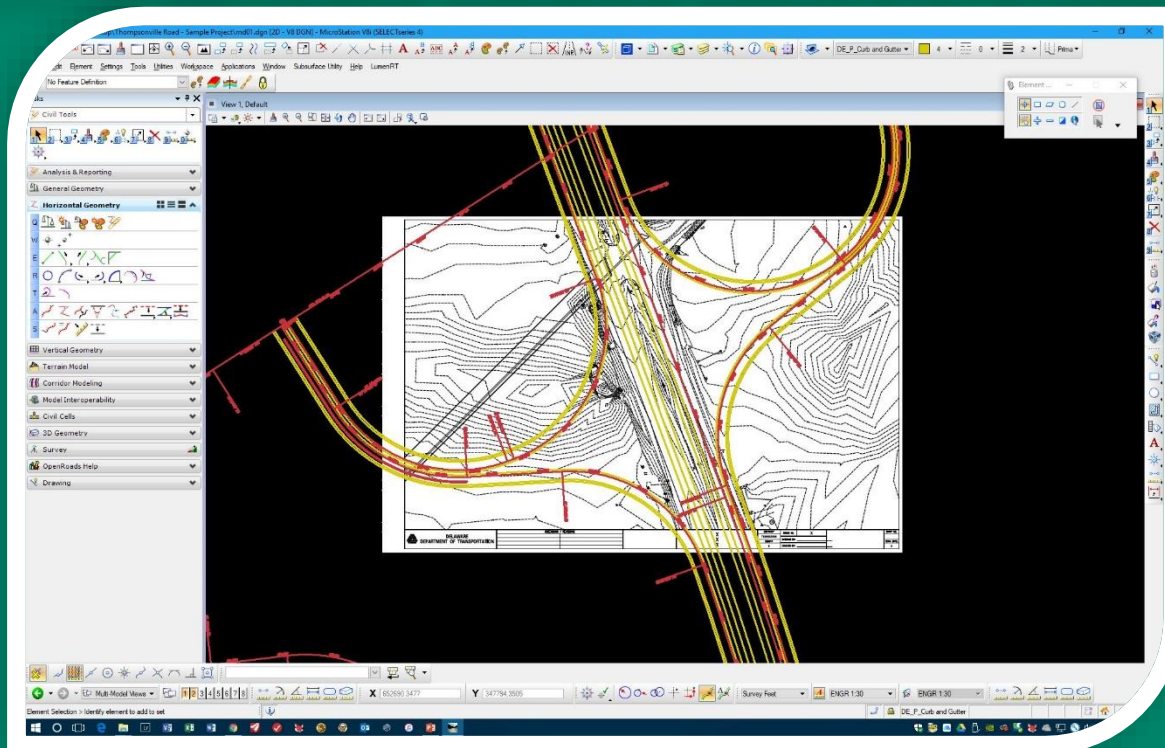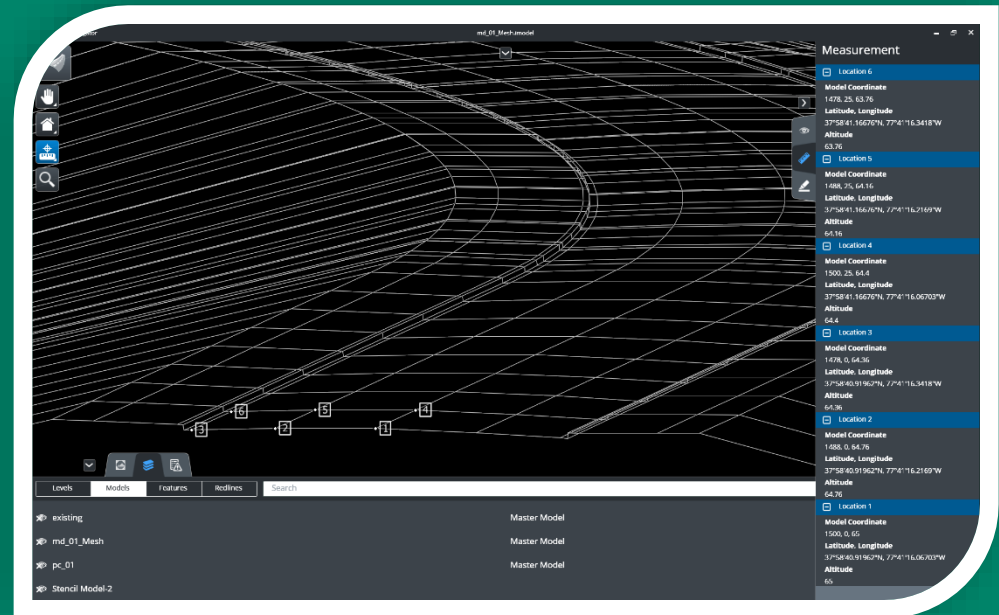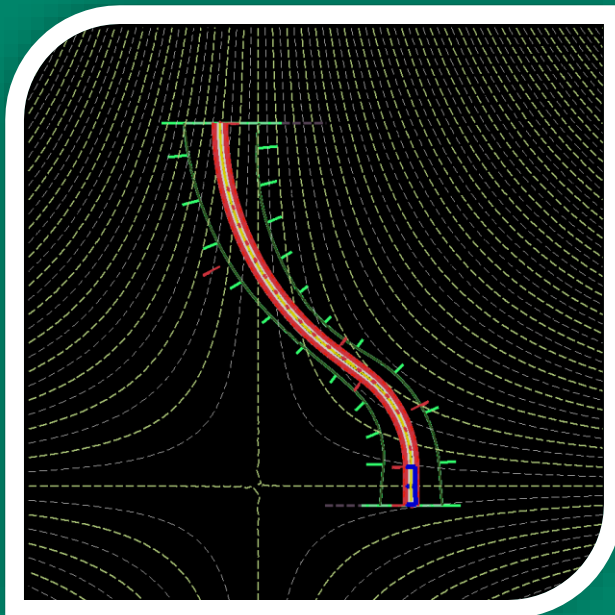
Proposed Delivery Method for Electronic Data
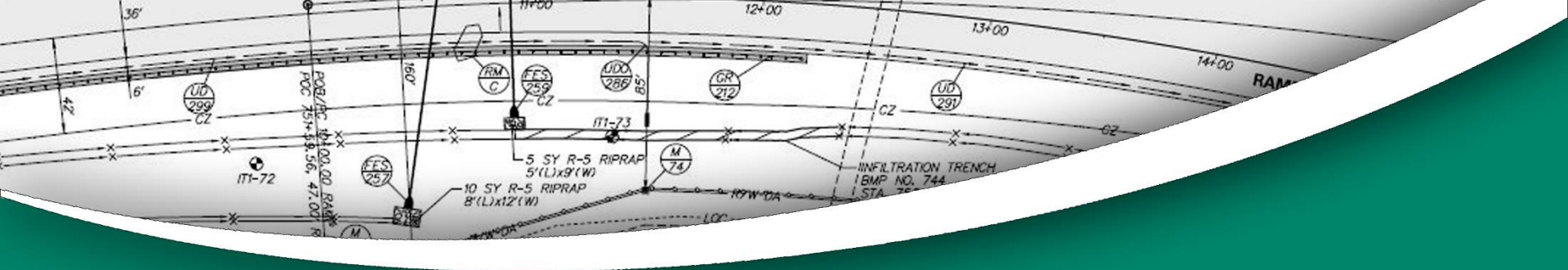
- Enhanced PDF Files
  - Embedded Levels/Layers
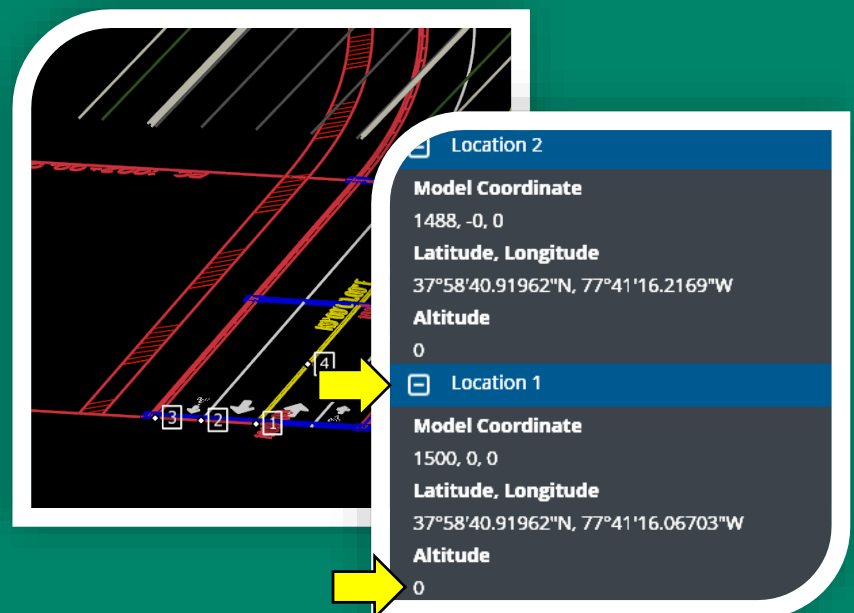
DelDOT Proposing Usage of New Formats

- i-Models ➡ OpenRoads Navigator

DelDOT Proposing Usage of New Formats

- i-Models ➡ OpenRoads Navigator
- CARE & KNOWLEDGE STILL NEEDED!

DelDOT Proposing Usage of New Formats

- ICM (Infrastructure Consensus Model)

Data exchange between different systems or disciplines is a common requirement. To preserve data integrity during data exchange use Bentley i-model technology to provide model fidelity and provenance. The ICM enhances this fidelity using Bentley i-model file format (i.dgn) with an embedded Civil Consensus Model (icm.dgn). The Civil Consensus Model uses a schema that includes the geometric makeup of the civil model and can be accessed by other applications using Bentley Design Sync SDK. The schema in conjunction with the Design Sync API provides future compatibility for round trip modification and differencing in future releases.

- Jacquelyn Pettus, Bentley Technical Support Group

DelDOT Proposing Usage of New Formats

- ICM ➡ Trimble Business Center
- ICM ➡ Topcon MAGNET Office Site
- ICM ➡ Leica iCON Site
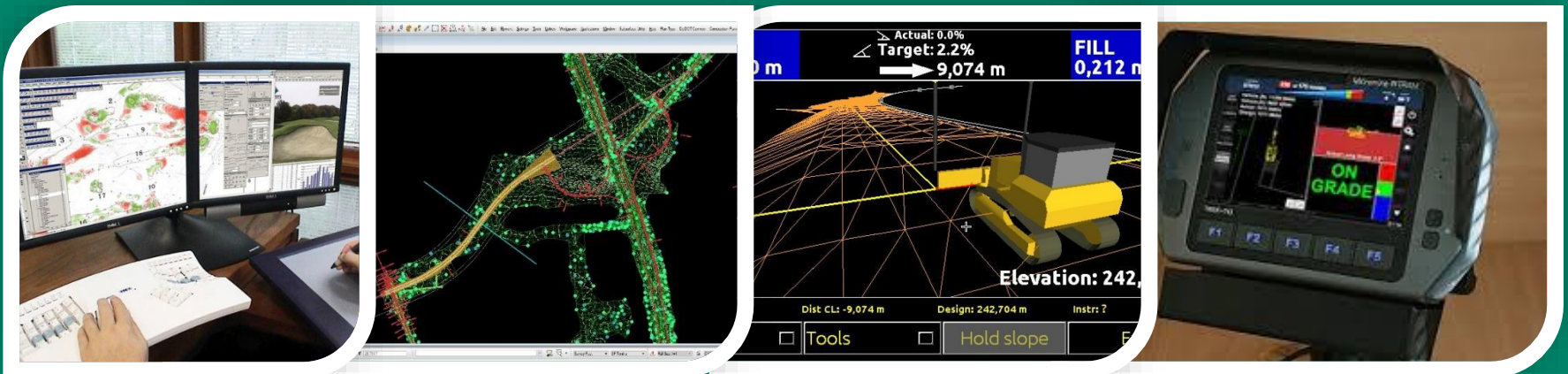
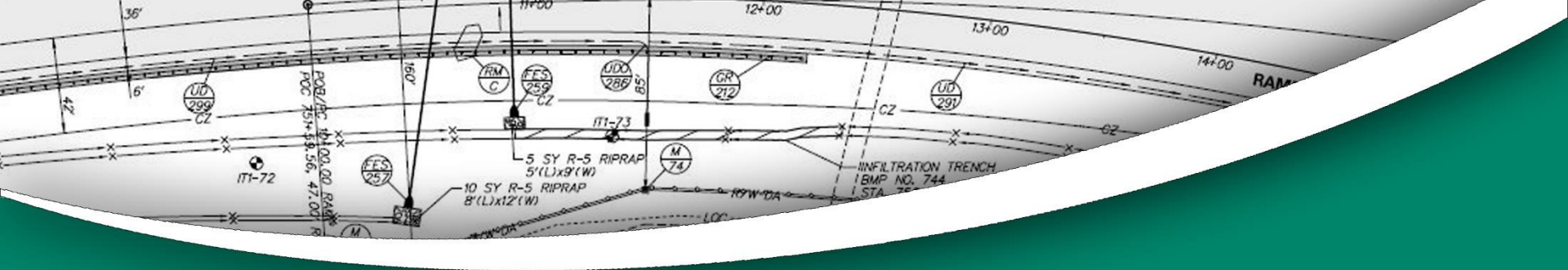## Key Points from DCA Contractor Interviews

- Improve PDF files. (Vectorized, Georeferenced, Layered) ⭐

- Provide existing surface data, in useable format. ⭐

- Provide proposed top surface data, in useable format. ⭐

- Provide subsurface data on complex projects. ⭐

- Improve consistency of information displayed on Grades and Geometrics sheets (Ditch alignments, floating ends of pipes, pavement edge transitions, etc.) ⭐

- Provide Electronic Data at Bid Letting Phase!!! ⭐
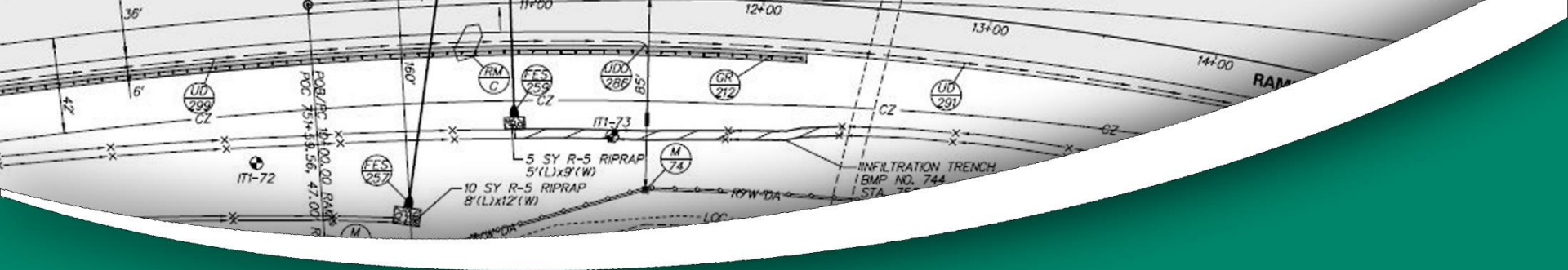
Questions?

Michael Balbierer, P.E.
CADD Technology Engineer
Michael.Balbierer@state.de.us
(302)760-2343

Sean Duphily
CADD Manager
Sean.Duphily@state.de.us
(302)760-2341