Cadd Nuggets with Conditional Dipping Sauce

Jeff Frye

CADD/BIM/CIM Manager HDR, Inc.

Spenser Hays

Transportation Engineer HDR, Inc.

Jeff Frye, HDR Inc.

- 27 years of production drafting and cad management
- HDR trainer
- Production oriented
- Faster and easier

Spenser Hays, HDR Inc.

- Used AutoCAD since 2003
- Avid user of Inventor, Infraworks, and Civil 3D
- HDR Trainer
- Improve Workflows/Process Improvement

What is a Nugget?

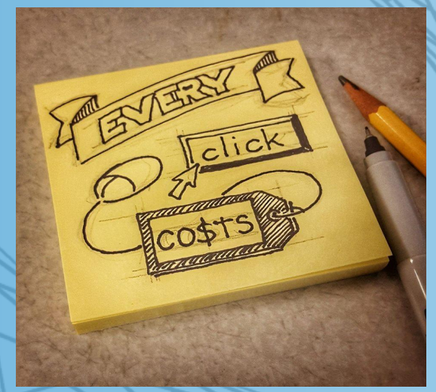
- “An unexpected tip, trick, time saving command or other click reducing workflow”

Workflow Nuggets

a. Alignments – Profiles – Assemblies – Subassemblies
b. Data Extraction examples
   - object data to tables
   - construction notes
c. Conditional subassemblies
d. Project Case Study – Cond. Subassemblies

Office hours – Tonight at 5:30 – 6:30 this room – light refreshments

Agenda

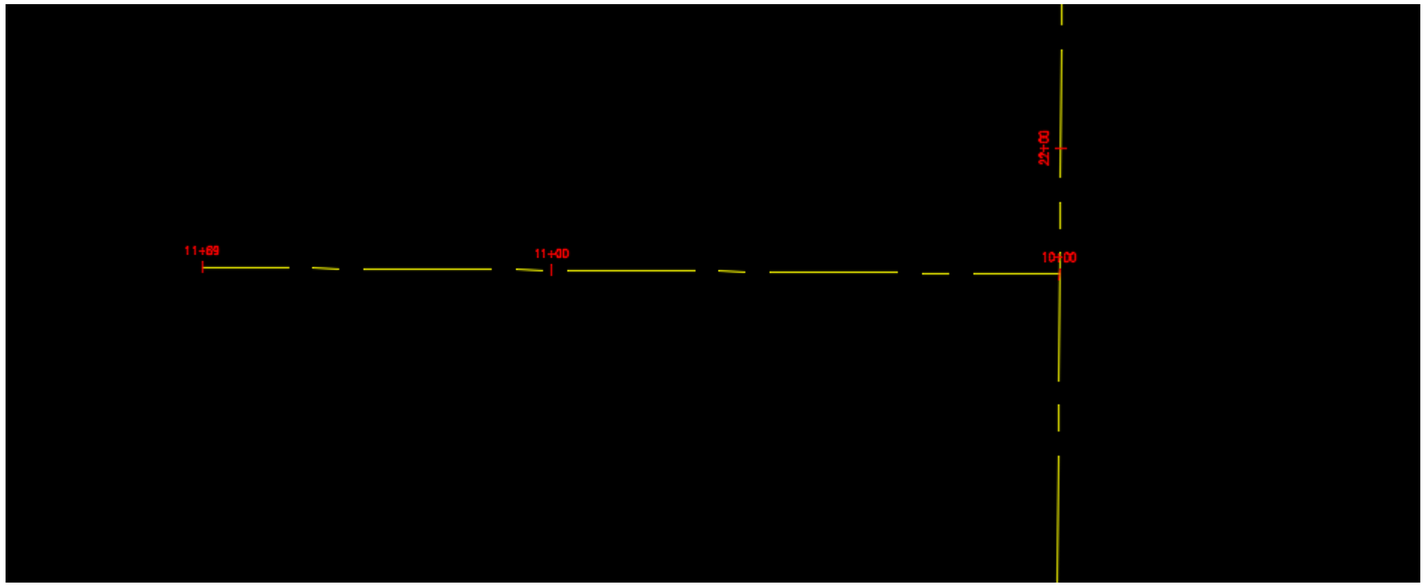


Getting Started with Modeling

- Basics required to start modeling.

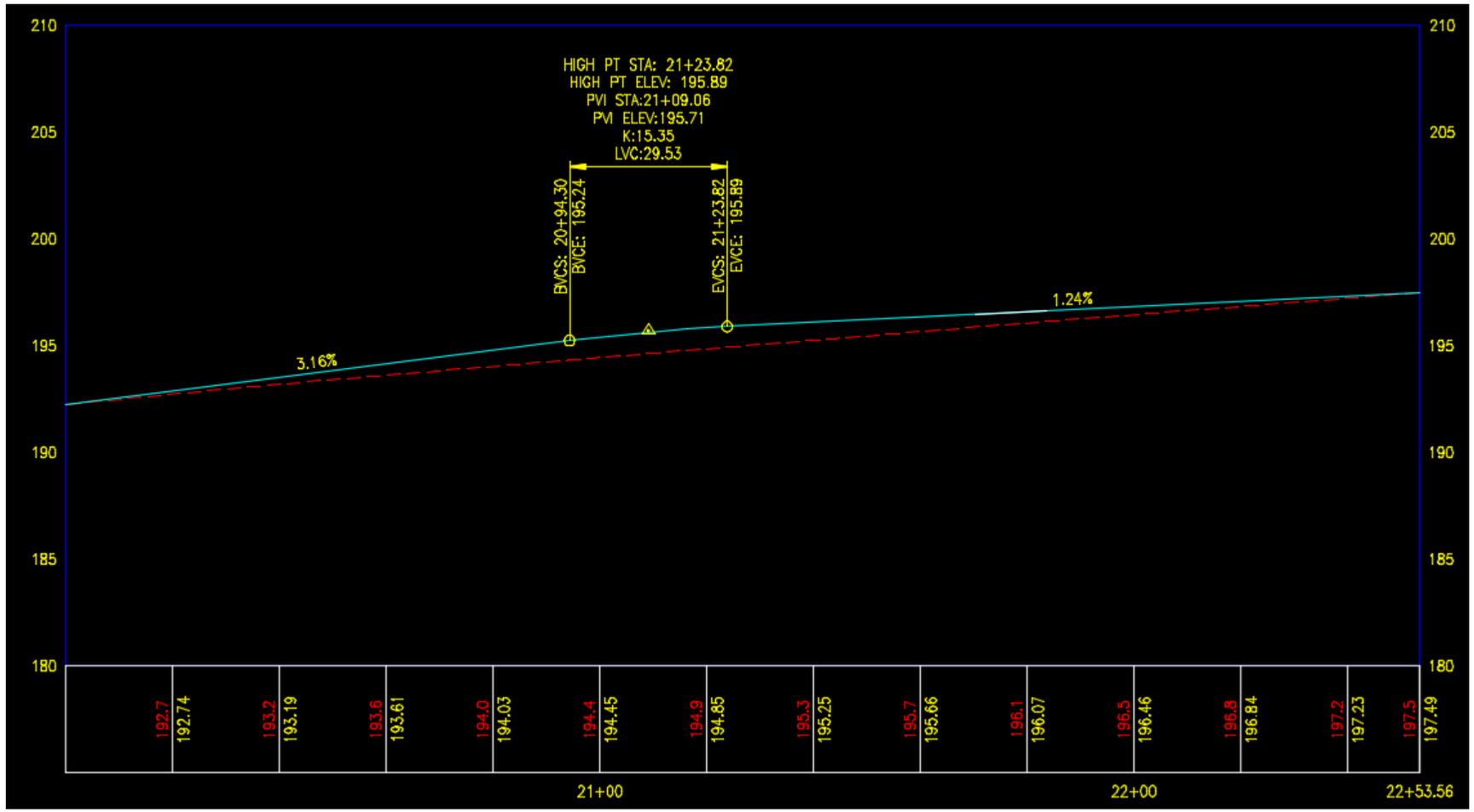
Getting Started with Modeling

- Basics required to start modeling.
  - **Alignment**



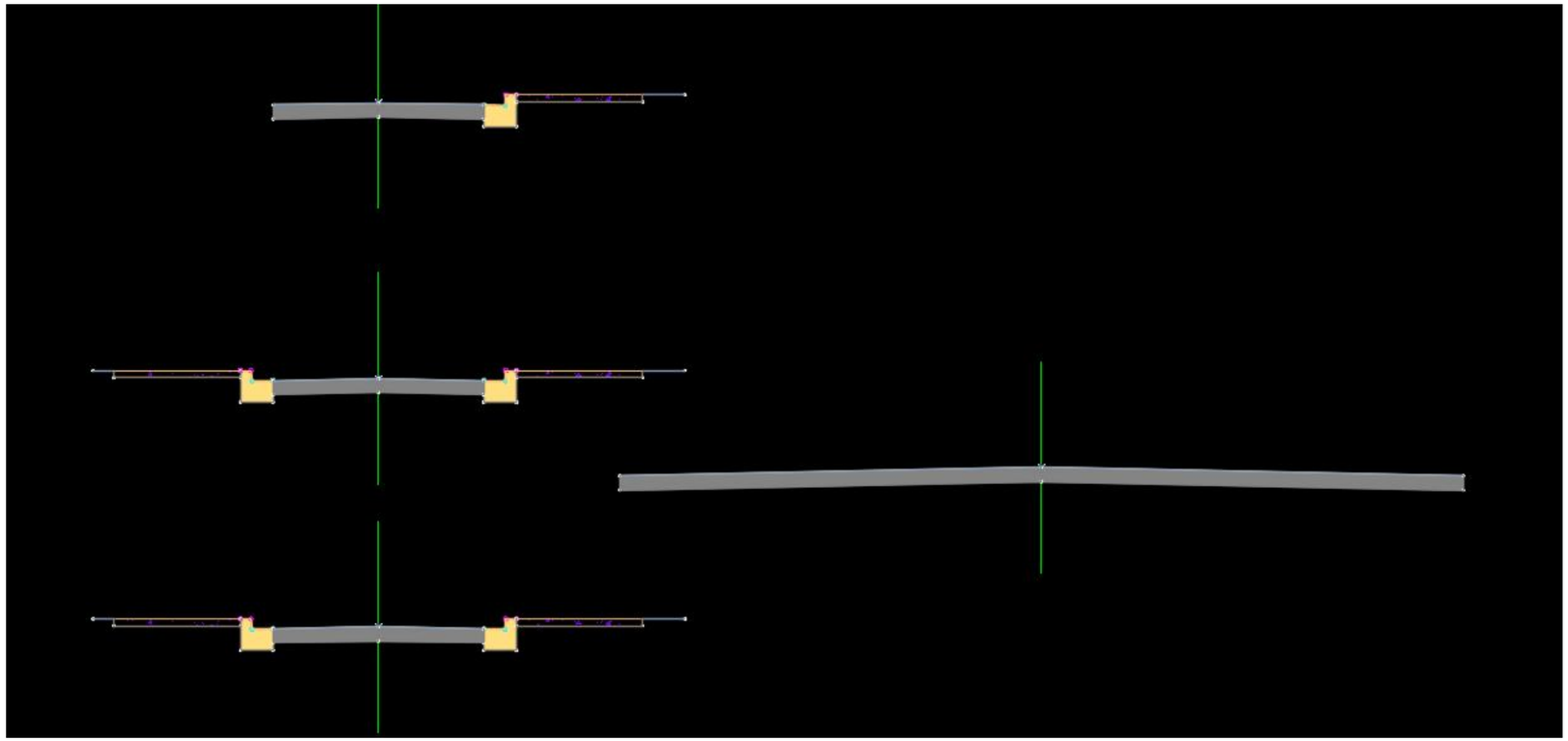
Getting Started with Modeling

- Basics required to start modeling.
  - *Alignment*
  - **Profile**



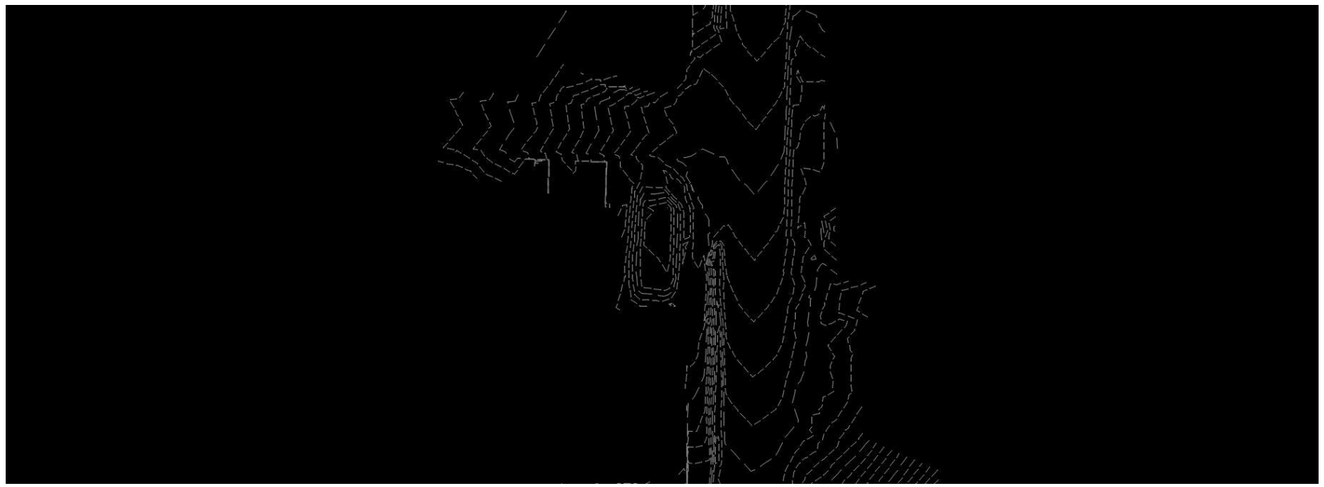
Getting Started with Modeling

- Basics required to start modeling.
  - *Alignment*
  - *Profile*
  - **Assembly**



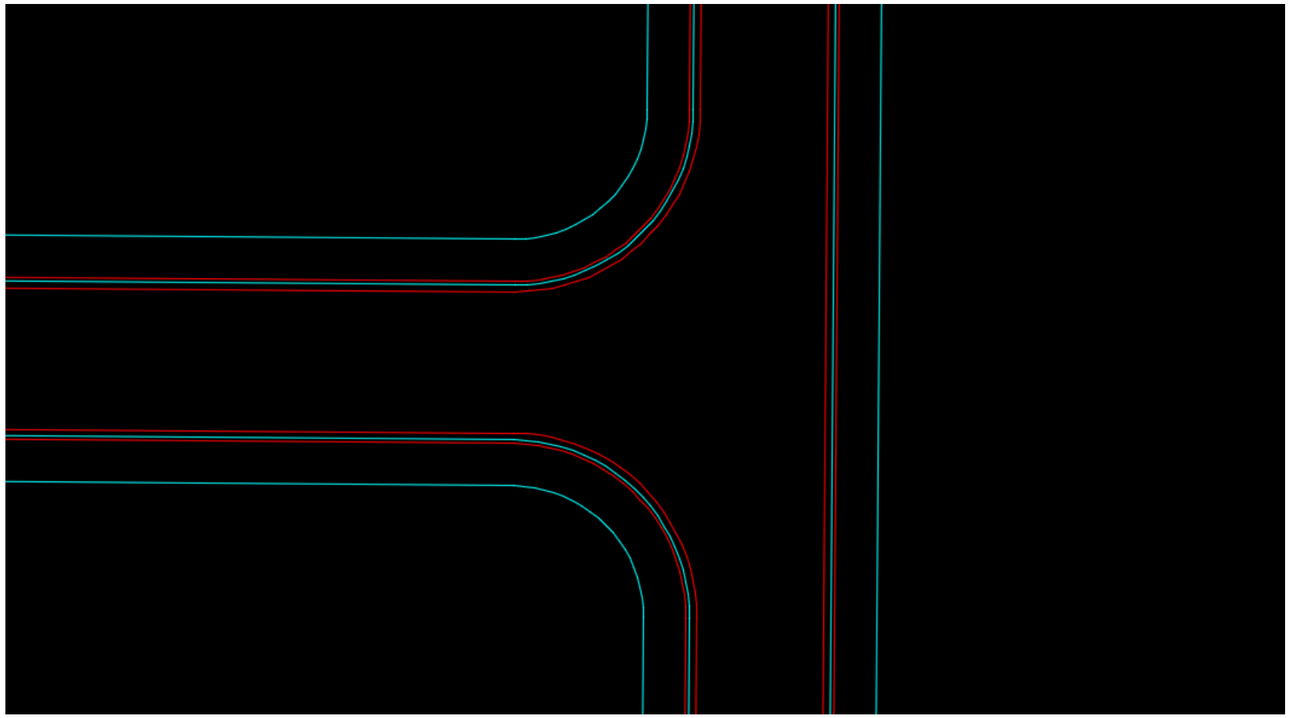
Getting Started with Modeling

- Basics required to start modeling.
  - *Alignment*
  - *Profile*
  - *Assembly*
  - **Existing Ground**



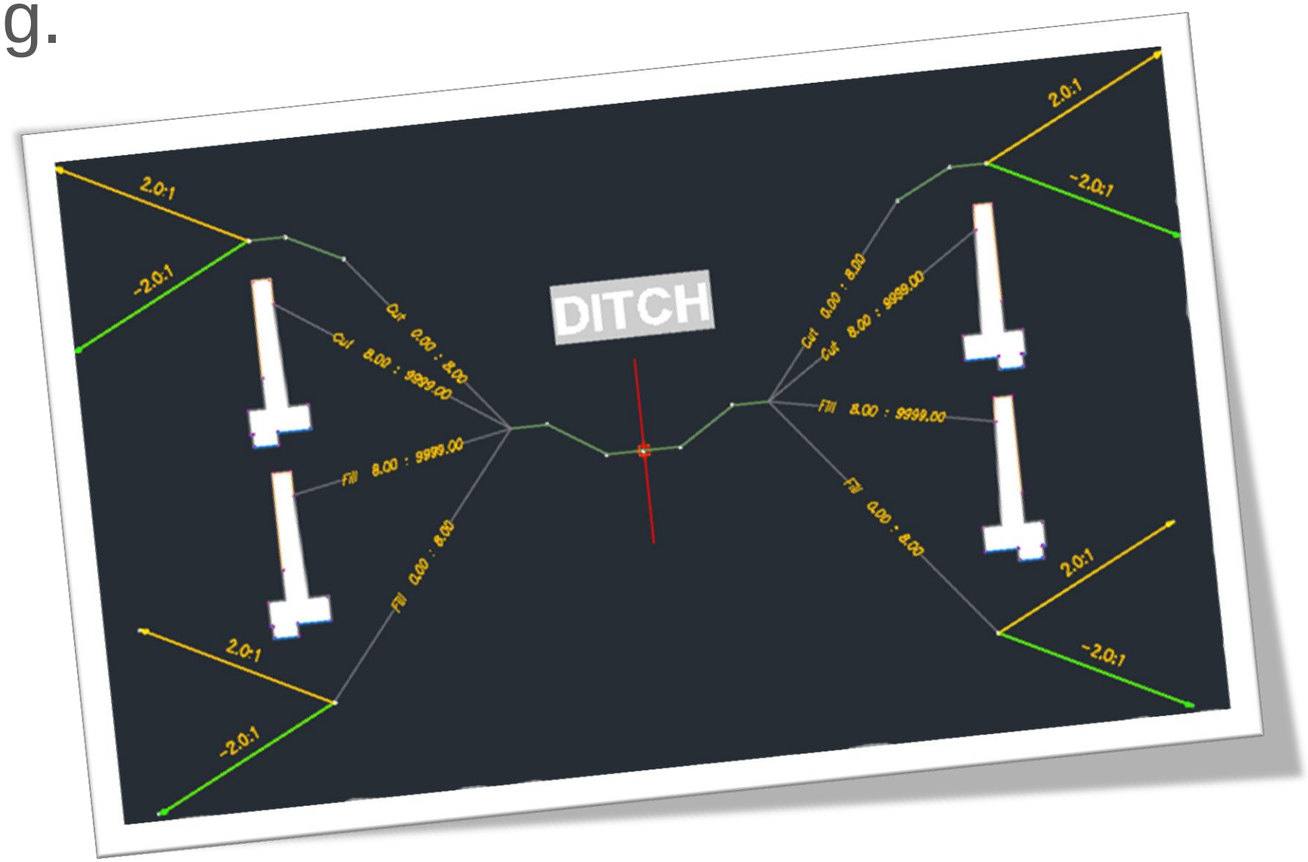
Getting Started with Modeling

- Basics required to start modeling.
  - *Alignment*
  - *Profile*
  - *Assembly*
  - *Existing Ground*
  - **2D linework**



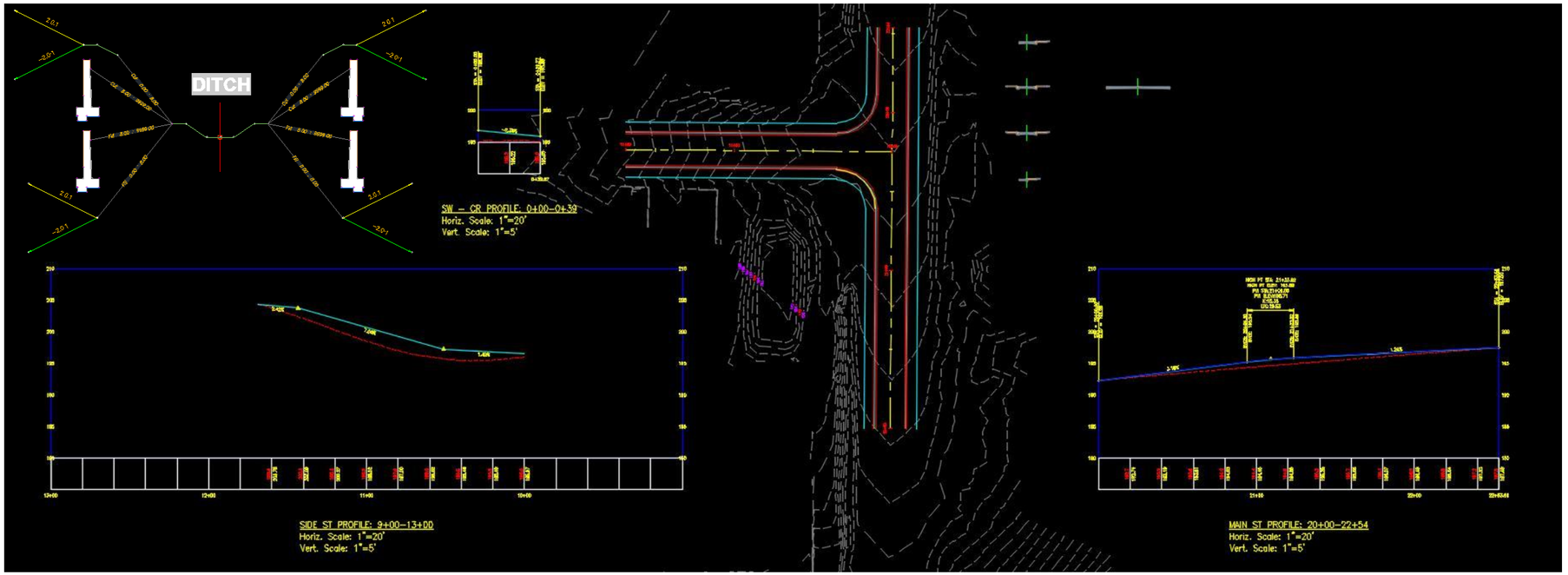
Getting Started with Modeling

- Basics required to start modeling.
  - *Alignment*
  - *Profile*
  - *Assembly*
  - *Existing Ground*
  - 2D linework
  - **Conditional subassemblies**



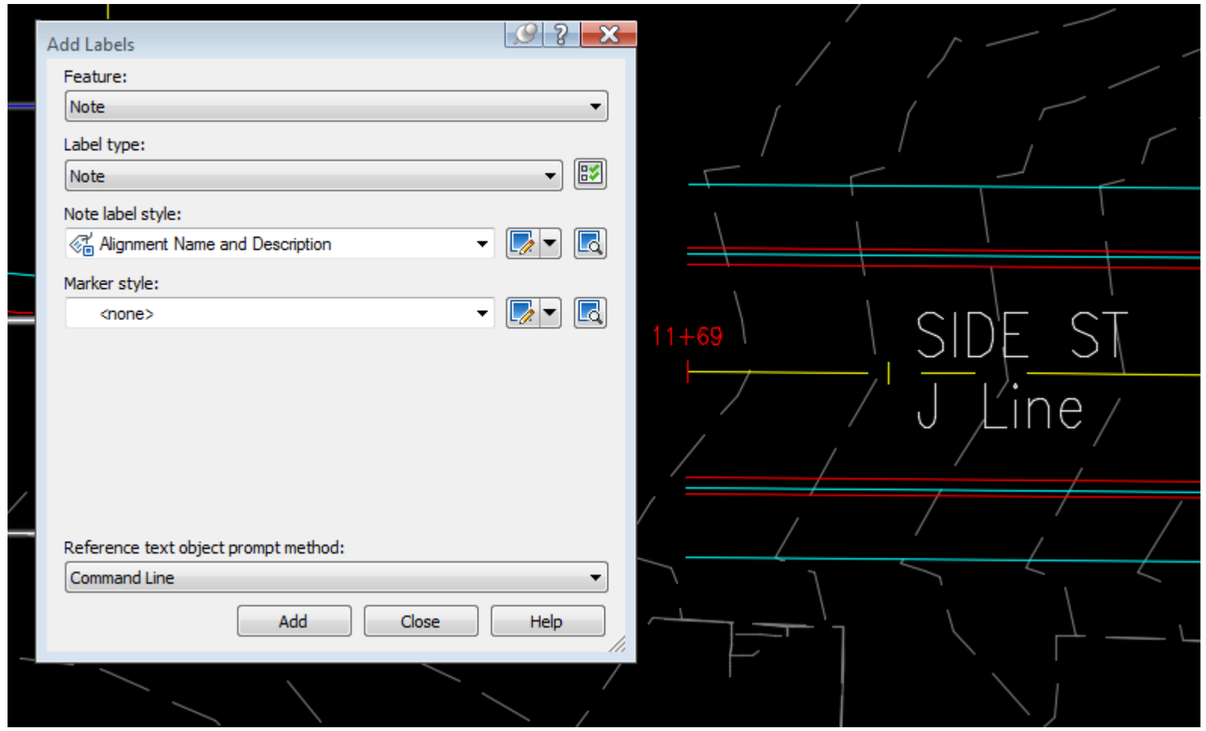
Time to leverage the data inside the model

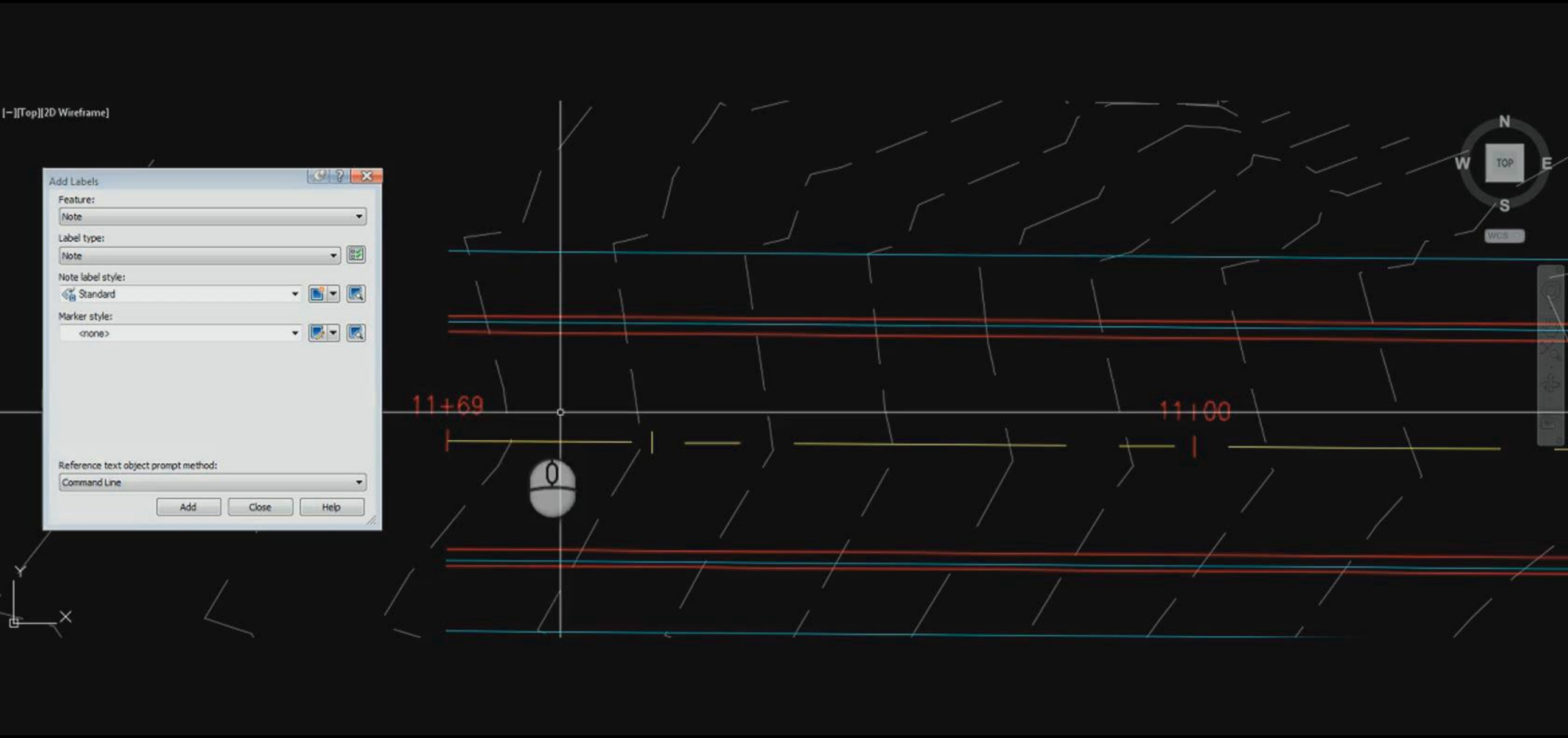
- Basics required to start modeling.
  - *Alignment*
  - *Profile*
  - *Assembly*
  - *Existing Ground*
  - *2D linework*
  - Conditional subassemblies



Alignment

- Add a note or alignment label to show the name and description of your alignments.
  - ***Alignment***
  - *Profile*
  - *Assembly*
  - *Existing Ground*
  - *2D linework*
  - Conditional subassemblies




[−][Top][2D Wireframe]
Add Labels
Feature:
Note
Label type:
Note
Note label style:
Standard
Marker style:
<none>
Reference text object prompt method:
Command Line
Add
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Help
11+69
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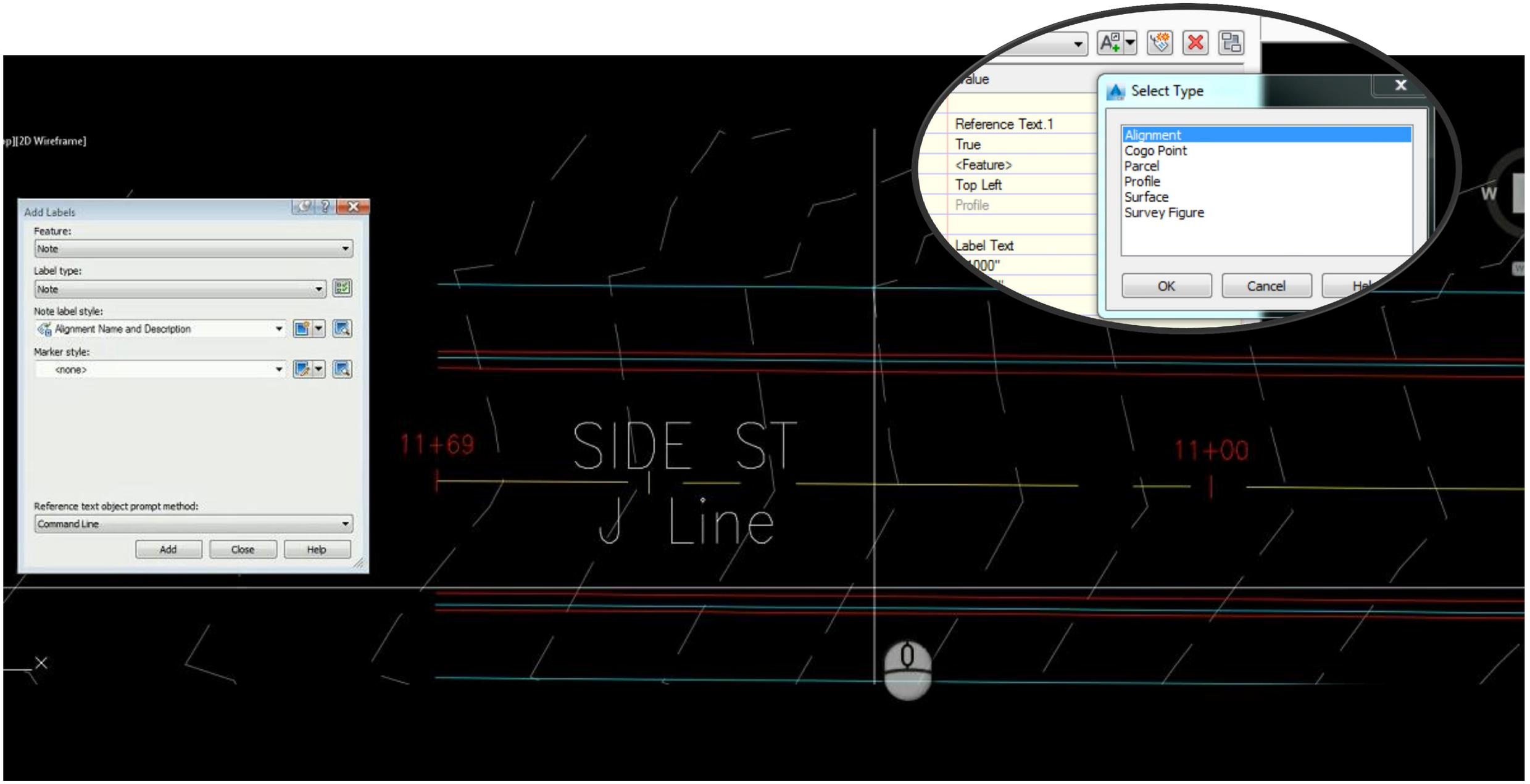
Alignment


Add Labels
Feature:
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Label type:
Note
Note label style:
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Reference text object prompt method:
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Help
Reference Text.1
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Surface
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OK
Cancel
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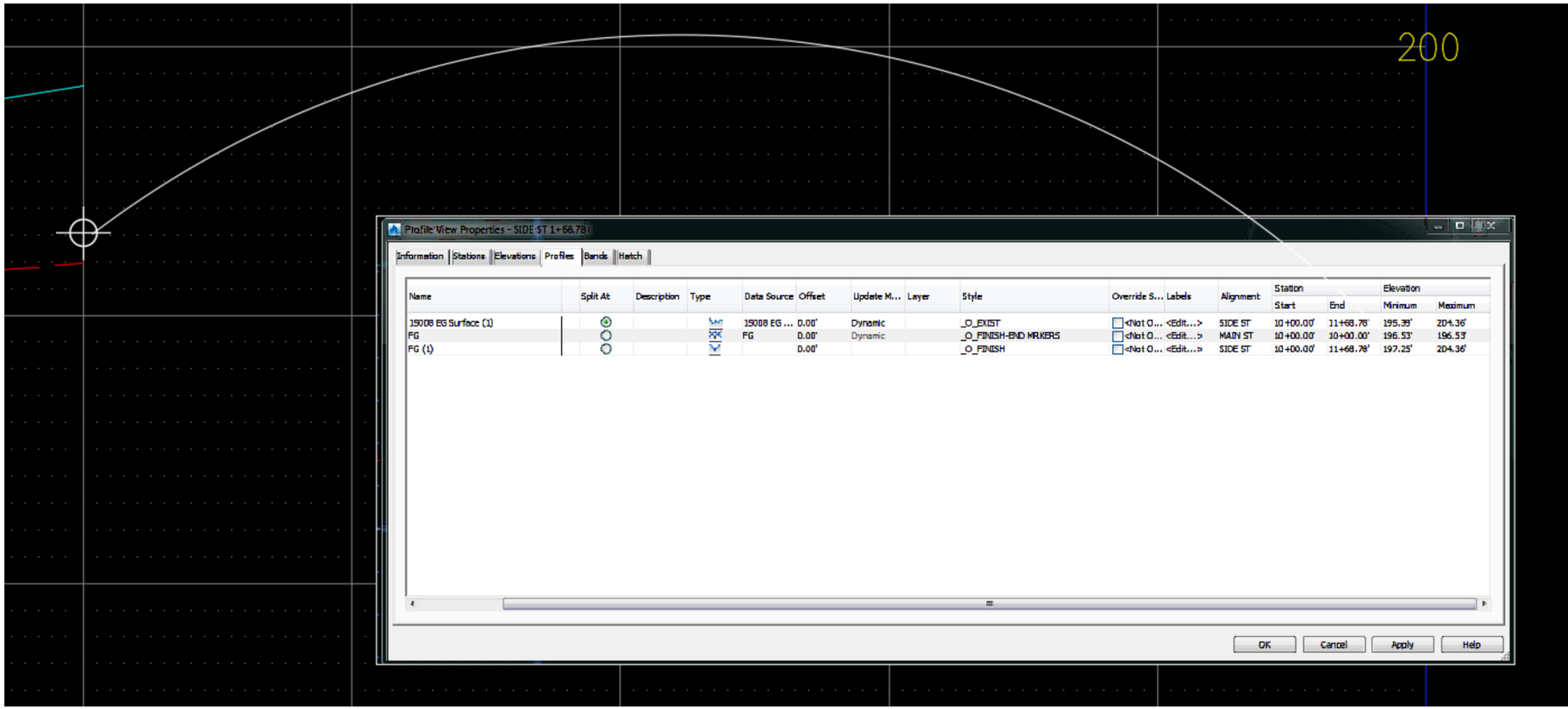
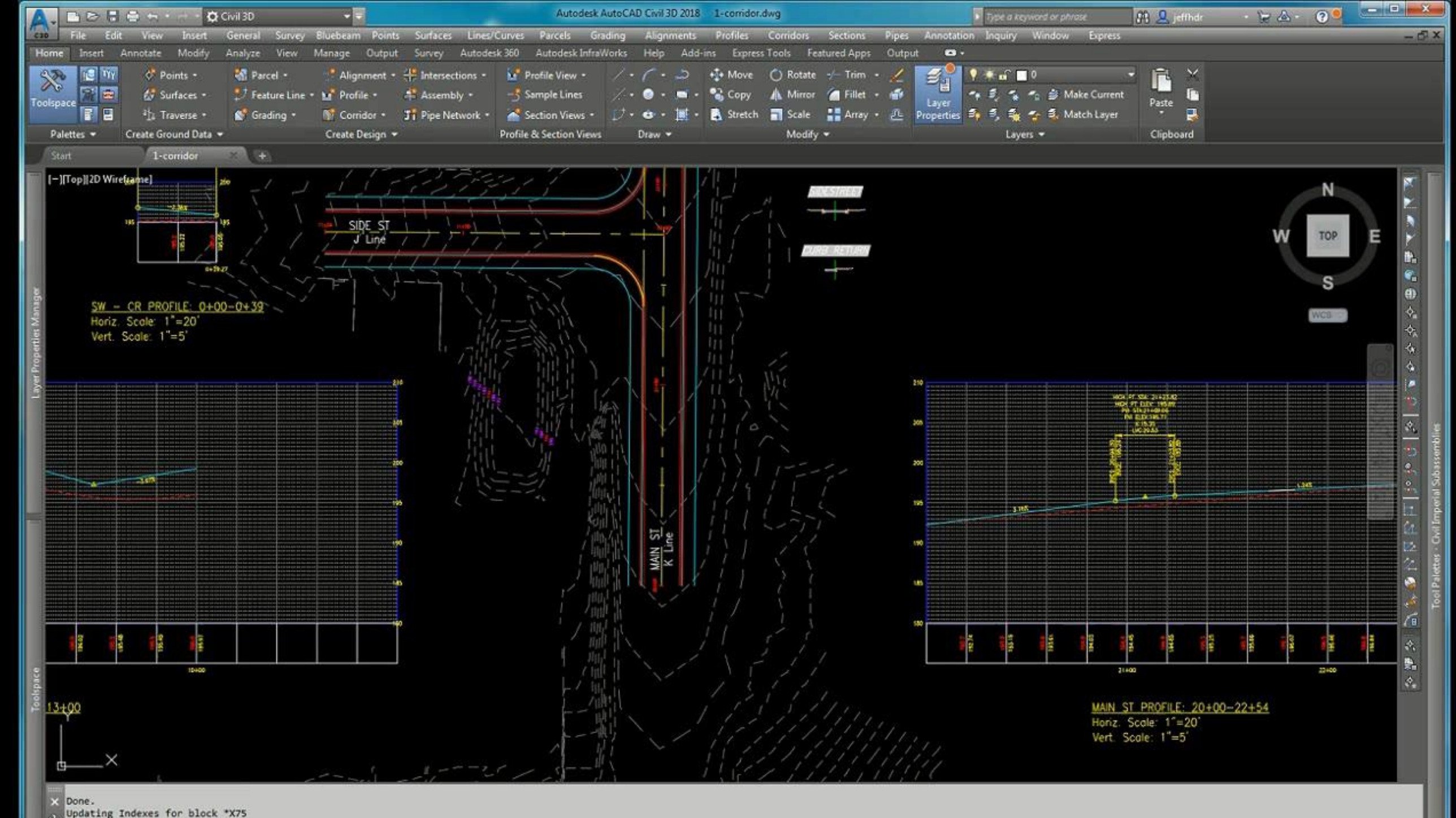
Superimposed Profile data

- Superimposing intersecting profiles.
  - *Alignment*
  - ***Profile***
  - *Assembly*
  - *Existing Ground*
  - *2D linework*
  - Conditional subassemblies




Autodesk AutoCAD Civil 3D 2018 1-corridor.dwg
Civil 3D
File Edit View Insert General Survey Bluebeam Points Surfaces Lines/Curves Parcels Grading Alignments Profiles Corridors Sections Pipes Annotation Inquiry Window Express
Home Insert Annotate Modify Analyze View Manage Output Survey Autodesk 360 Autodesk InfraWorks Help Add-ins Express Tools Featured Apps Output
Toolspace
Points Surfaces Traverse
Parcel Feature Line Grading
Alignment Profile Corridor
Intersections Assembly Pipe Network
Profile View Sample Lines Section Views
Move Copy Stretch
Rotate Mirror Scale
Trim Fillet Array
Layer Properties
Make Current Match Layer
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Palettes Create Ground Data Create Design Profile & Section Views Draw Modify Layers Clipboard
Start 1-corridor
[-][Top][2D Wireframe]
SIDE ST
J Line
MAIN ST
K Line
SW - CR PROFILE: 0+00-0+39
Horiz. Scale: 1"=20'
Vert. Scale: 1"=5'
MAIN ST PROFILE: 20+00-22+54
Horiz. Scale: 1"=20'
Vert. Scale: 1"=5'
13+00
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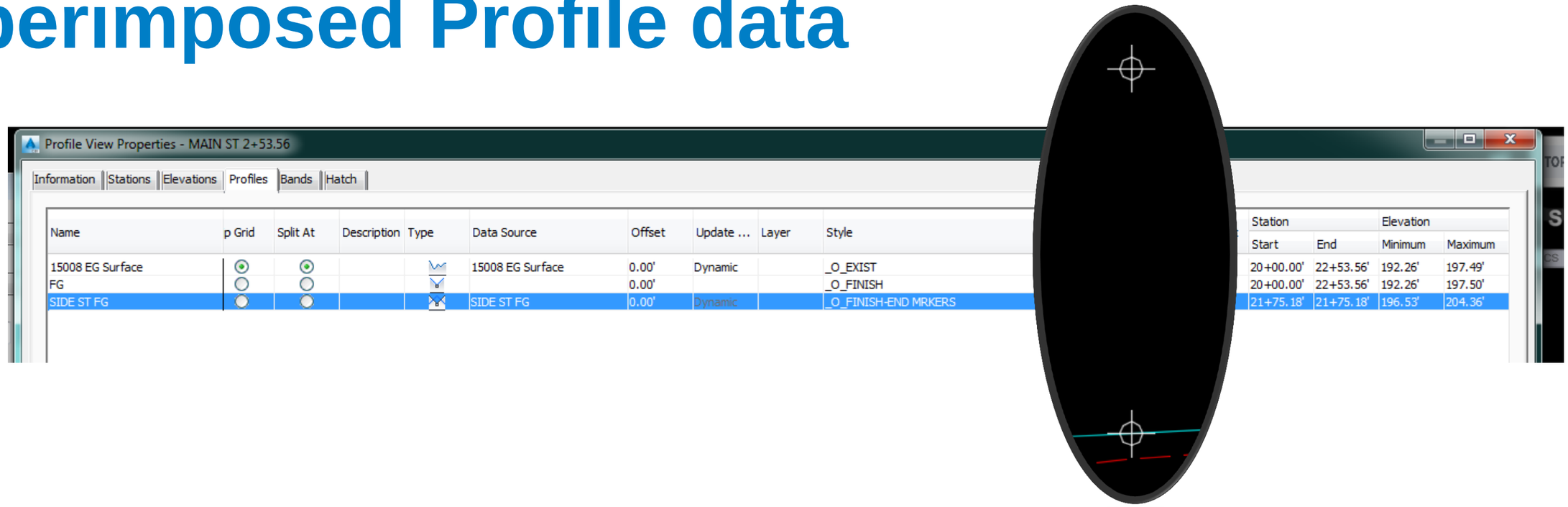
Done.
Updating Indexes for block *X75
Layer Properties Manager
Toolspace
Tool Palettes - Civil Imperial Subassemblies

Superimposed Profile data



- When you do not specify a start and end station close together, you get the entire profile “stacked up” and do not get the actual elevation at the intersection

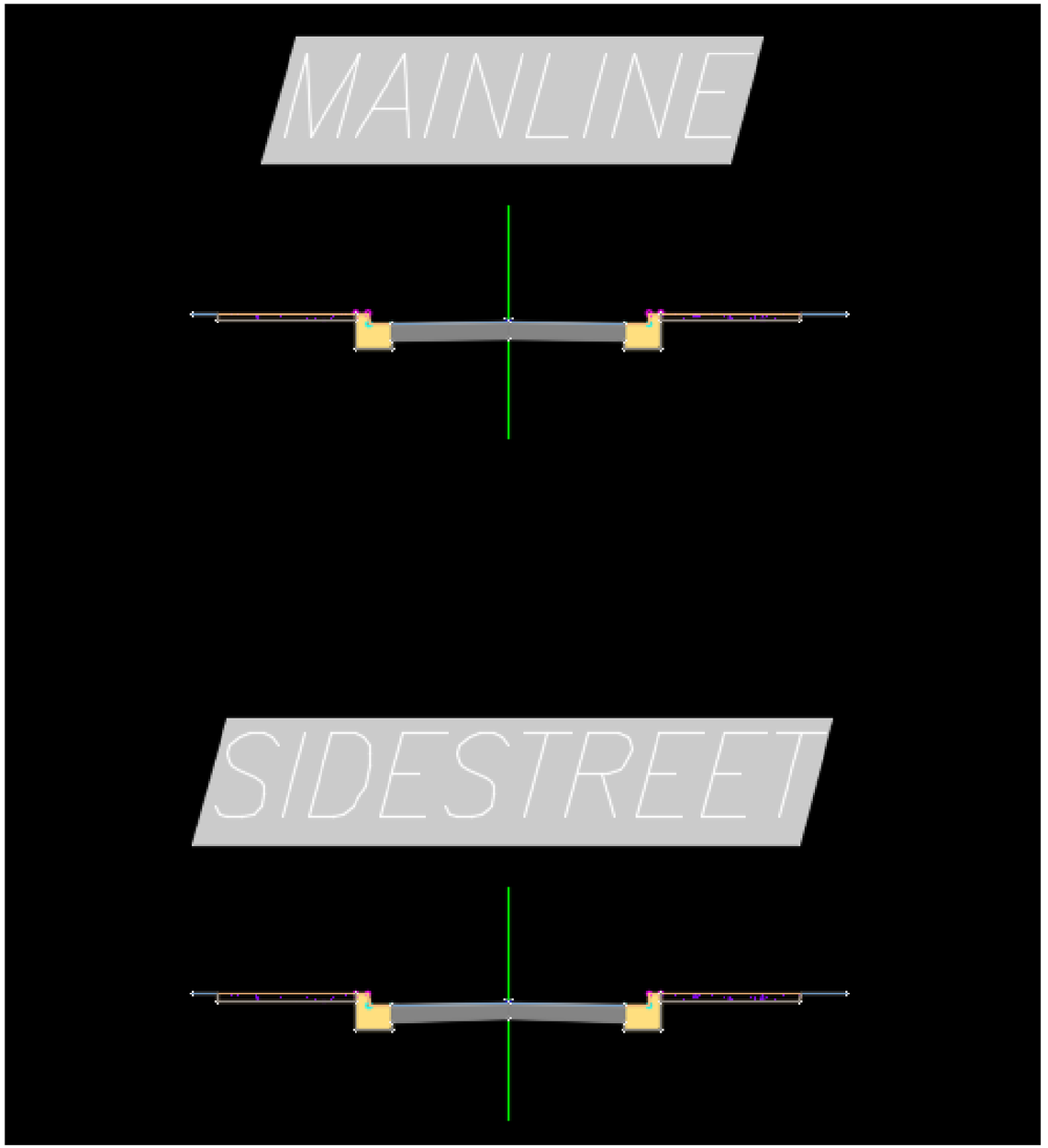
Assembly Marker labeling

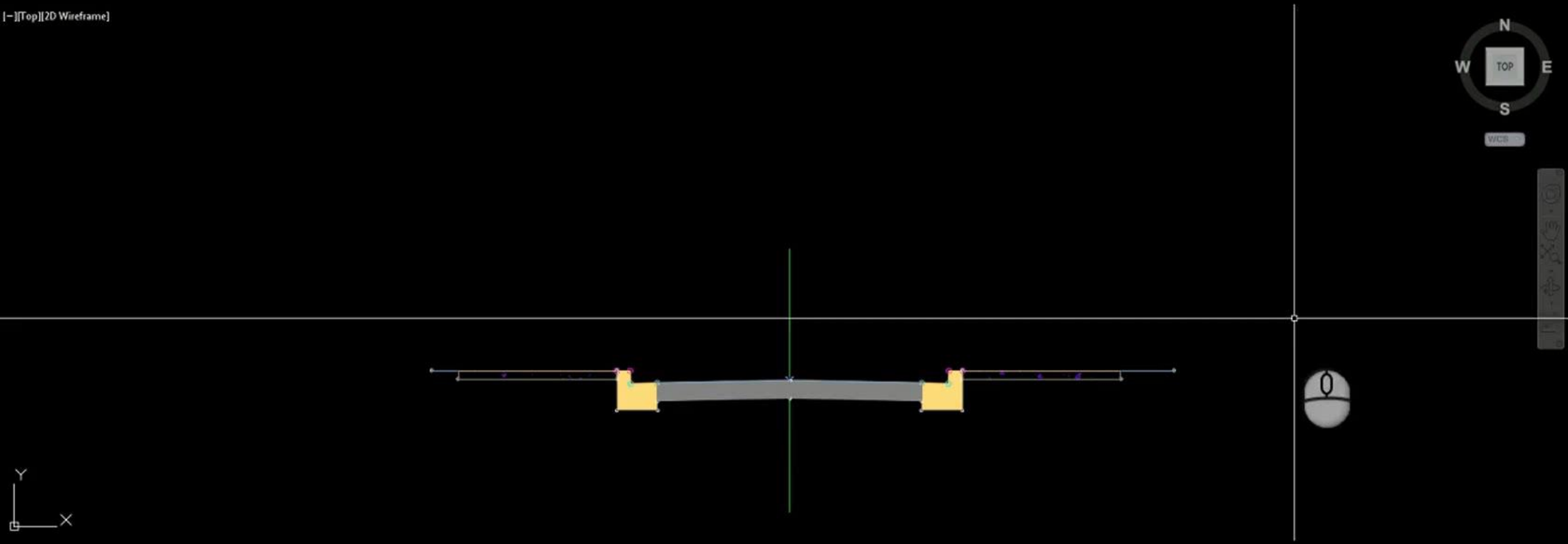
- Use a FIELD to display the Assembly name.
  - *Alignment*
  - *Profile*
  - ***Assembly***
  - *Existing Ground*
  - *2D linework*

  - Conditional subassemblies

Assembly Marker labeling

- Use a FIELD to display the Assembly name.
  - *Alignment*
  - *Profile*
  - ***Assembly***
  - *Existing Ground*
  - *2D linework*
  - Conditional subassemblies

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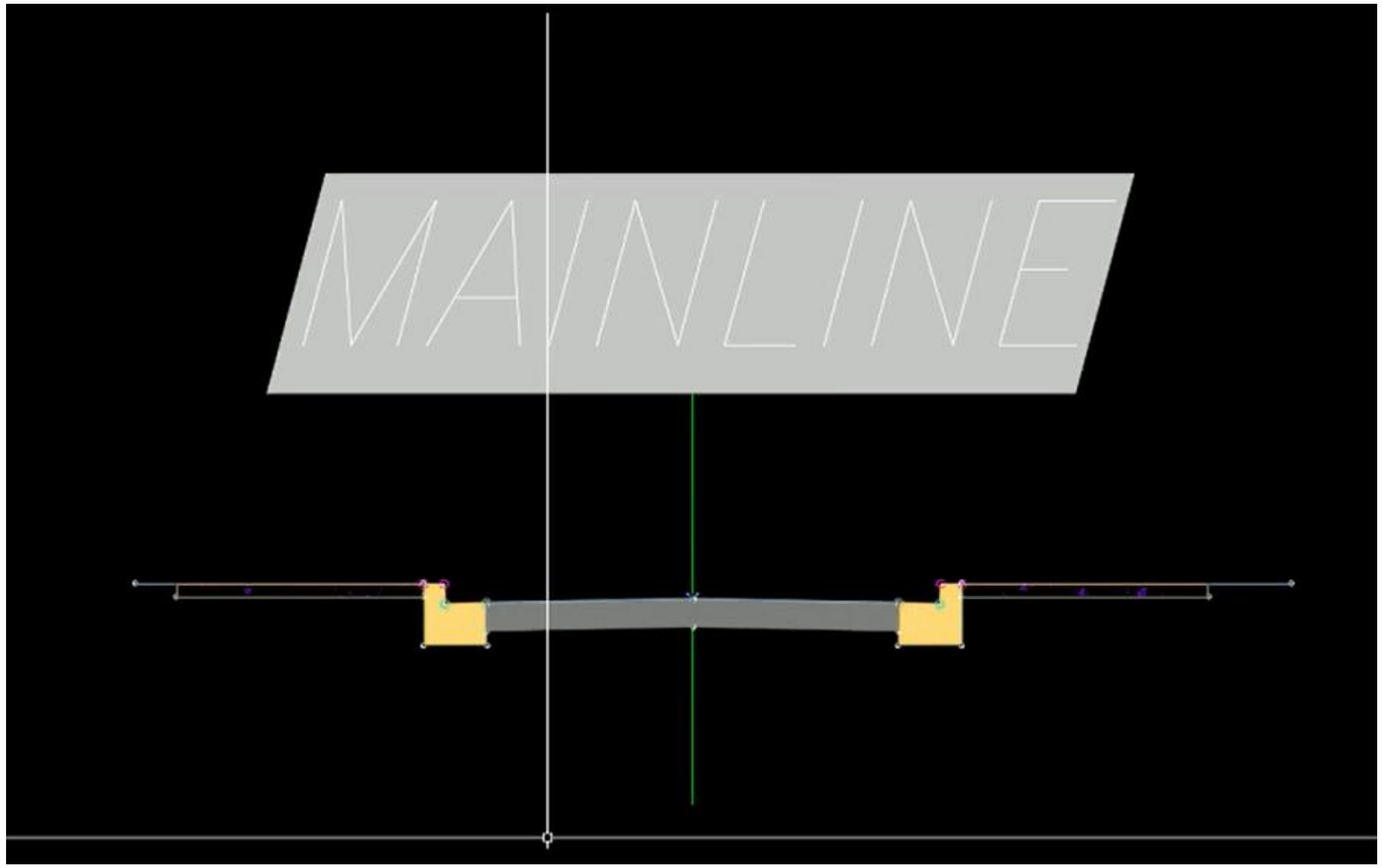
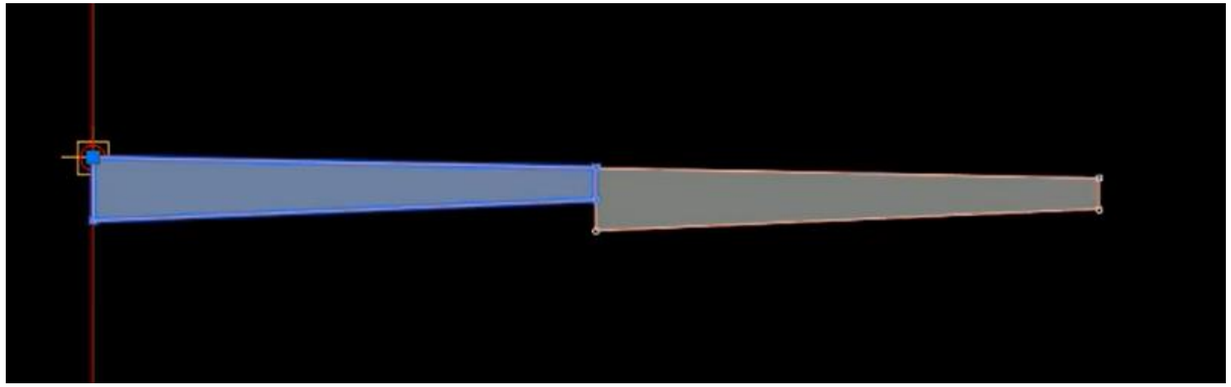
Assembly Marker labeling

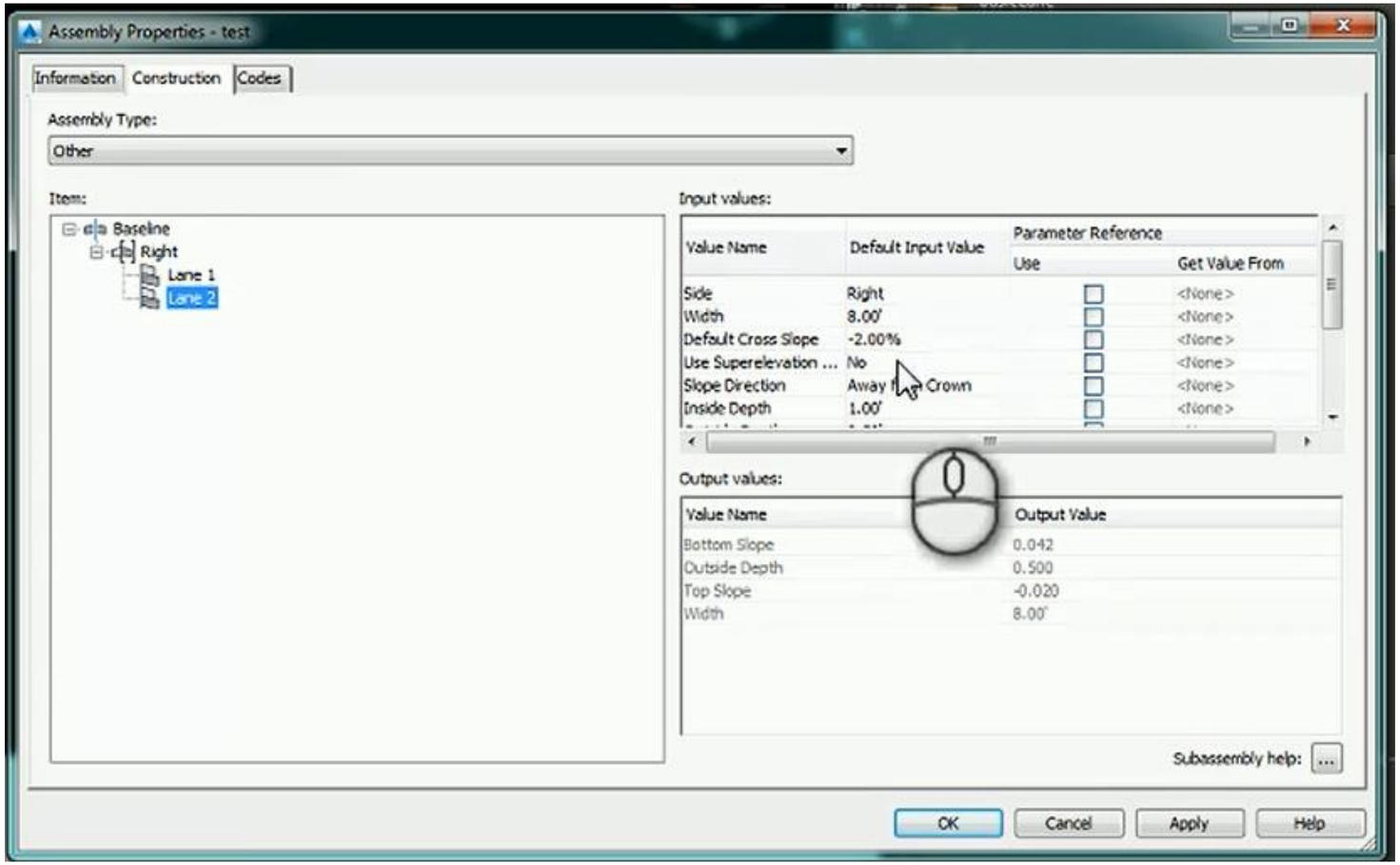
- Use a FIELD to display the Assembly name.
  - *Alignment*
  - *Profile*
  - ***Assembly***
  - *Existing Ground*
  - *2D linework*
  - Conditional subassemblies

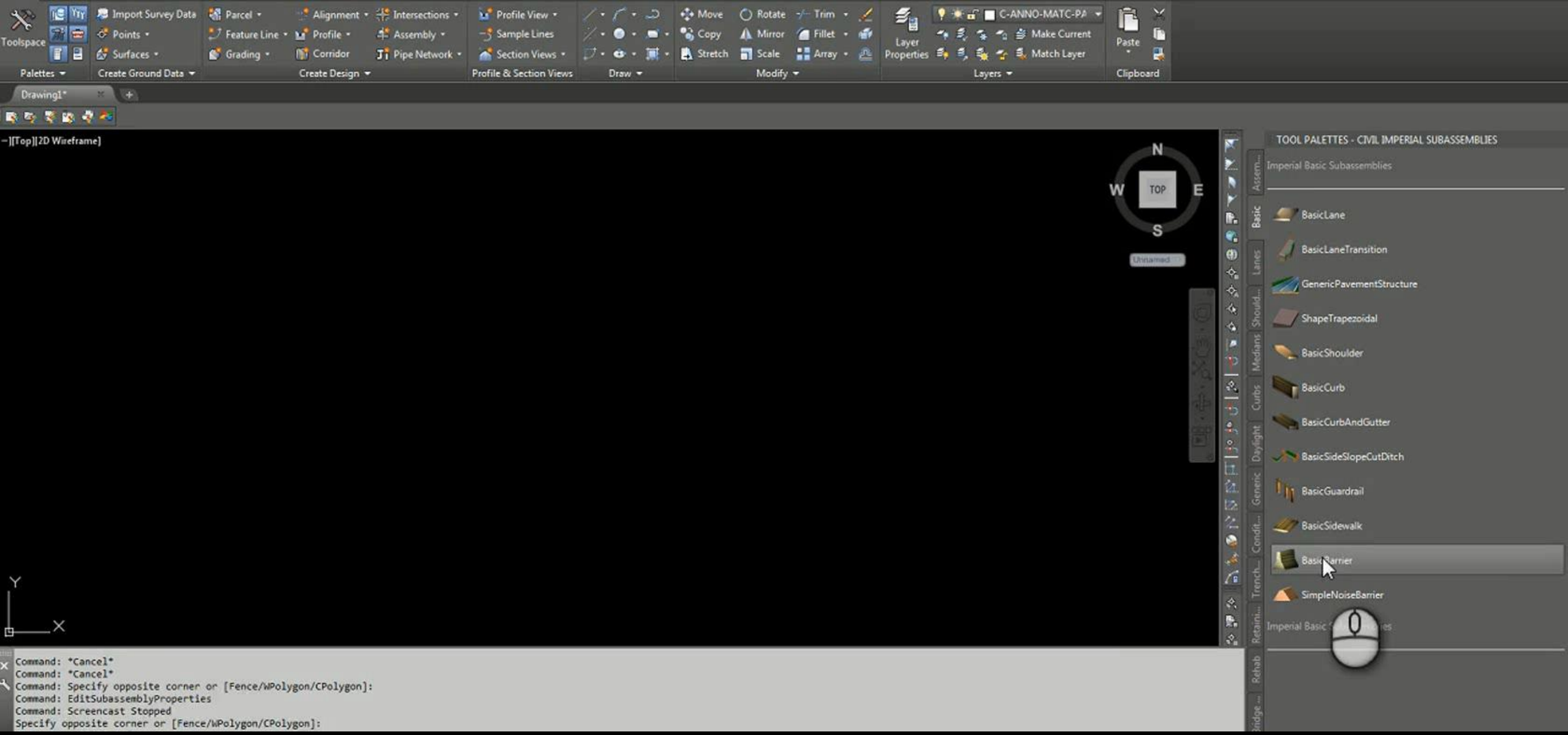


Assembly Properties



- Use Parameter Reference to add flexibility and function to assemblies.
  - *Alignment*
  - *Profile*
  - ***Assembly***
  - *Existing Ground*
  - *2D linework*
  - Conditional subassemblies




Toolspace
Palettes
Import Survey Data
Points
Surfaces
Create Ground Data
Parcel
Feature Line
Grading
Alignment
Profile
Corridor
Intersections
Assembly
Pipe Network
Create Design
Profile View
Sample Lines
Section Views
Profile & Section Views
Draw
Move
Copy
Stretch
Rotate
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Trim
Fillet
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Modify
Layer Properties
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TOOL PALETTES - CIVIL IMPERIAL SUBASSEMBLIES
Imperial Basic Subassemblies
BasicLane
BasicLaneTransition
GenericPavementStructure
ShapeTrapezoidal
BasicShoulder
BasicCurb
BasicCurbAndGutter
BasicSideSlopeCutDitch
BasicGuardrail
BasicSidewalk
BasicBarrier
SimpleNoiseBarrier
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Medians
Curbs
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Rehab
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Y
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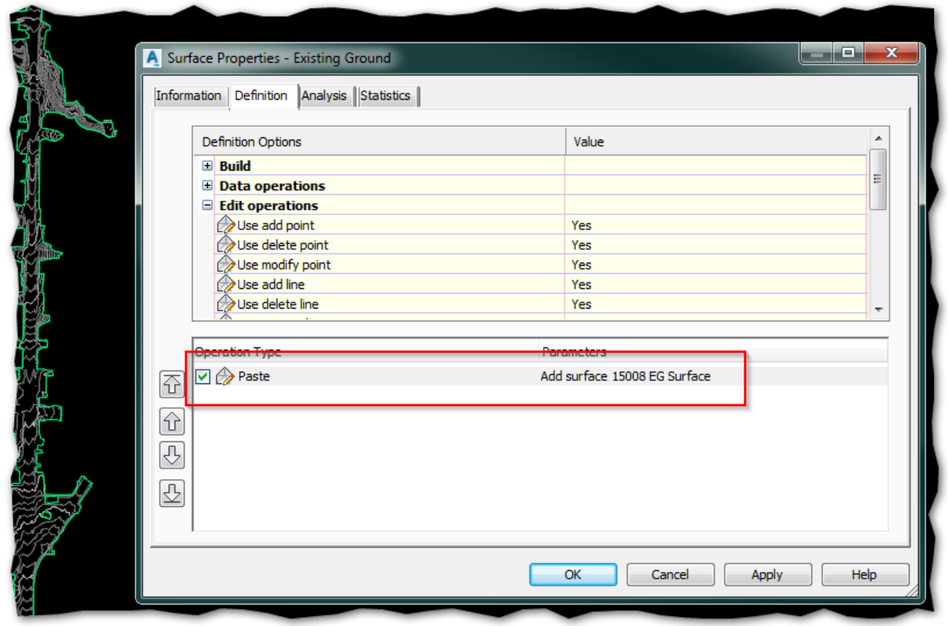
Command: *Cancel*
Command: *Cancel*
Command: Specify opposite corner or [Fence/WPolygon/CPolygon]:
Command: EditSubassemblyProperties
Command: Screencast Stopped
Specify opposite corner or [Fence/WPolygon/CPolygon]:

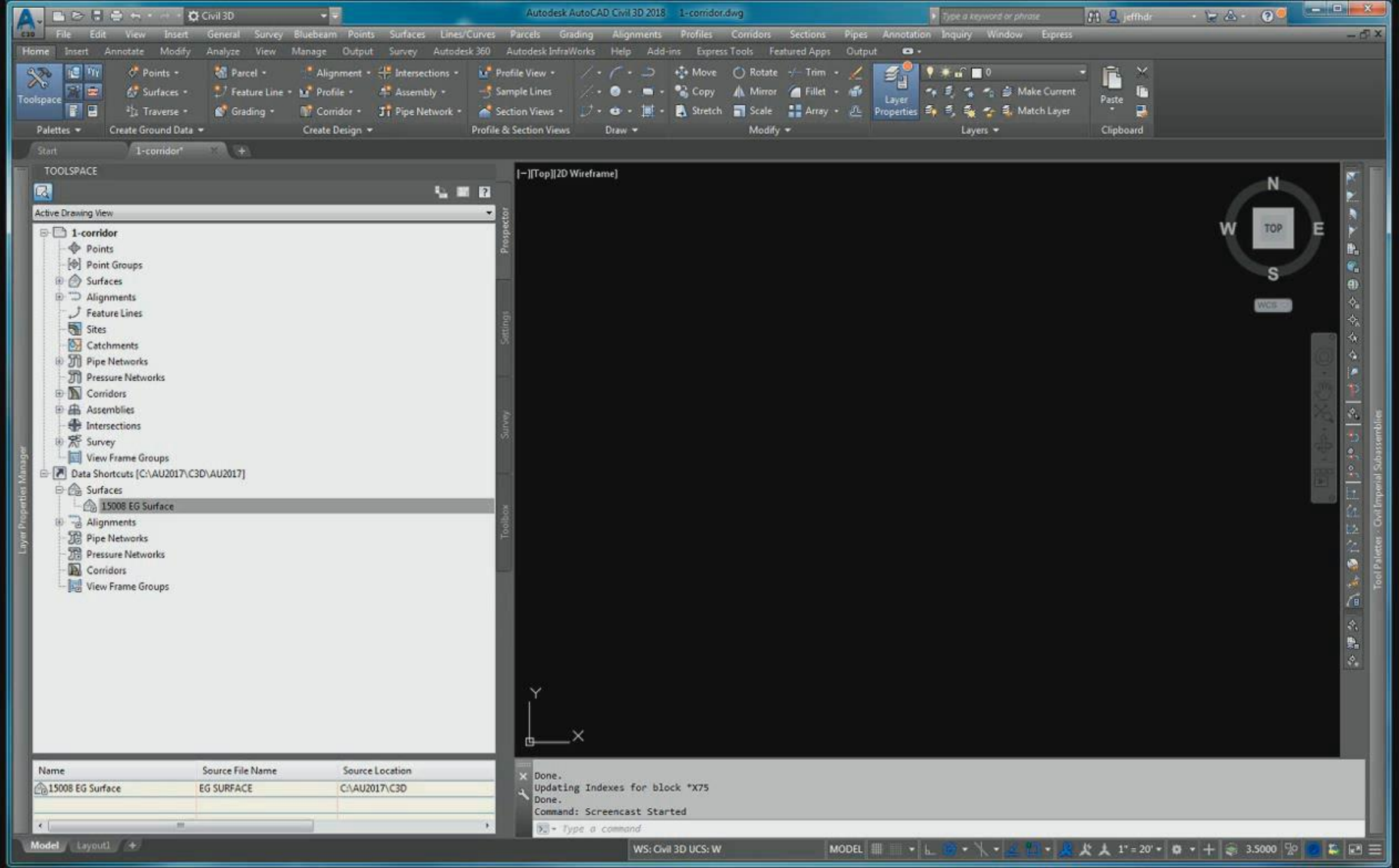
Existing Ground

- *Alignment*
- *Profile*
- *Assembly*
- ***Existing Ground***
- *2D linework*
- Conditional subassemblies

What you do…



What it feels like….


Civil 3D
Autodesk AutoCAD Civil 3D 2018
1-corridor.dwg
File Edit View Insert General Survey Bluebeam Points Surfaces Lines/Curves Parcels Grading Alignments Profiles Corridors Sections Pipes Annotation Inquiry Window Express
Home Insert Annotate Modify Analyze View Manage Output Survey Autodesk 360 Autodesk InfraWorks Help Add-ins Express Tools Featured Apps Output
Toolspace
Points
Surfaces
Traverse
Parcel
Feature Line
Grading
Alignment
Profile
Corridor
Intersections
Assembly
Pipe Network
Profile View
Sample Lines
Section Views
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Trim
Fillet
Array
Layer Properties
Make Current
Match Layer
Paste
Palettes
Create Ground Data
Create Design
Profile & Section Views
Draw
Modify
Layers
Clipboard
Start
1-corridor*
TOOLSPACE
Active Drawing View
1-corridor
Points
Point Groups
Surfaces
Alignments
Feature Lines
Sites
Catchments
Pipe Networks
Pressure Networks
Corridors
Assemblies
Intersections
Survey
View Frame Groups
Data Shortcuts [C:\AU2017\C3D\AU2017]
Surfaces
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Pipe Networks
Pressure Networks
Corridors
View Frame Groups
Prospector
Settings
Survey
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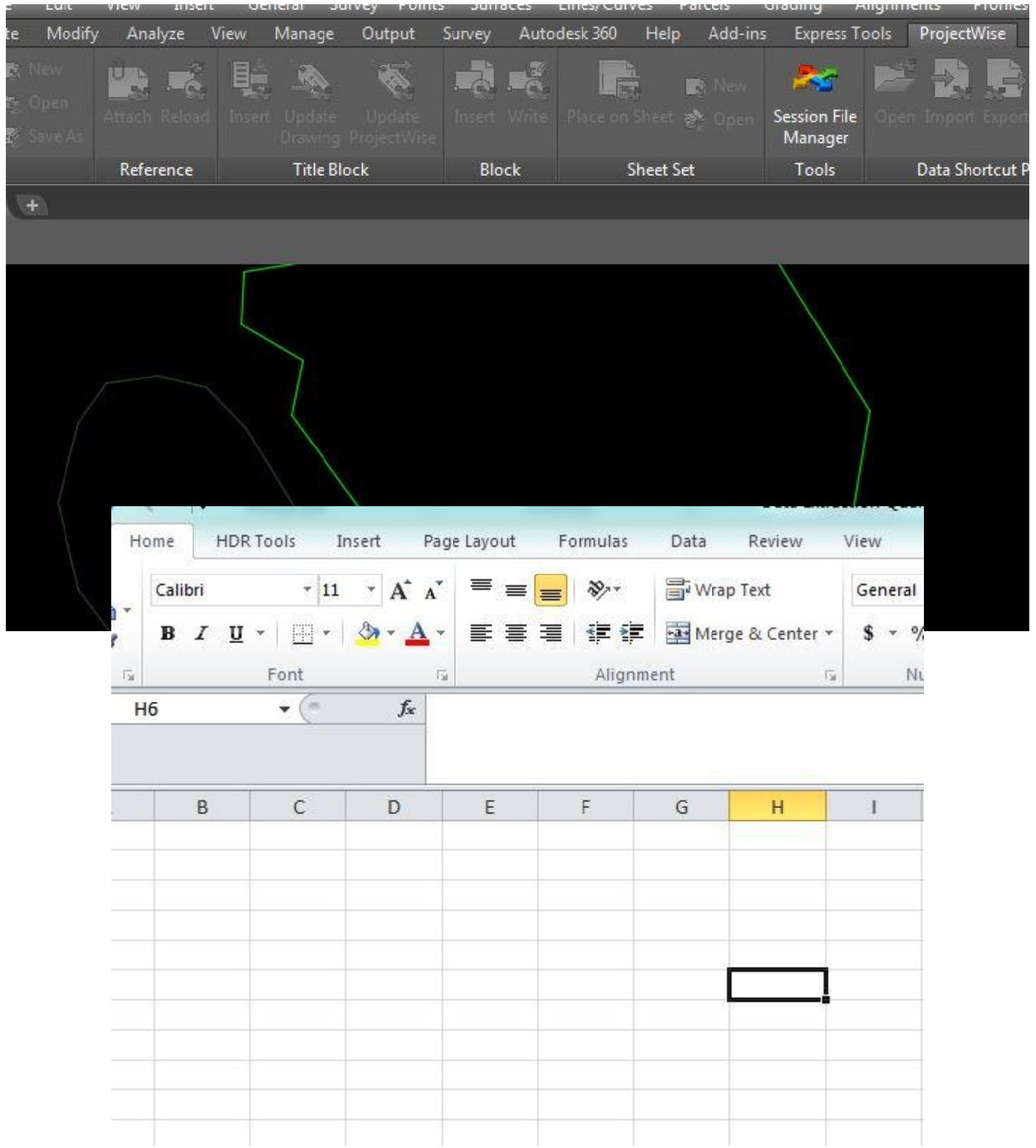
Name
Source File Name
Source Location
15008 EG Surface
EG SURFACE
C:\AU2017\C3D
Done.
Updating Indexes for block *X75
Done.
Command: Screencast Started
Type a command
Model
Layout1
WS: Civil 3D UCS: W
MODEL
1" = 20'
3.5000
Tool Palettes - Civil Imperial Subassemblies

Getting data out of 2D linework

- We all know you need to have a few things in place to start corridor modeling.
  - *Alignment*
  - *Profile*
  - *Assembly*
  - *Existing Ground*
  - ***2D linework***

Data Extraction

- Running Bill of materials
- Drainage Basins
- Calculations
- Quantities
- Design criteria check
- QC annotation



Data Extraction

- Use this tool to extract 2D model data and export to excel for quantities
- Bill of materials
- Drainage calculations
  - Dirt
  - Grass
  - Water


5-data extraction*
[−][Top][2D Wireframe]
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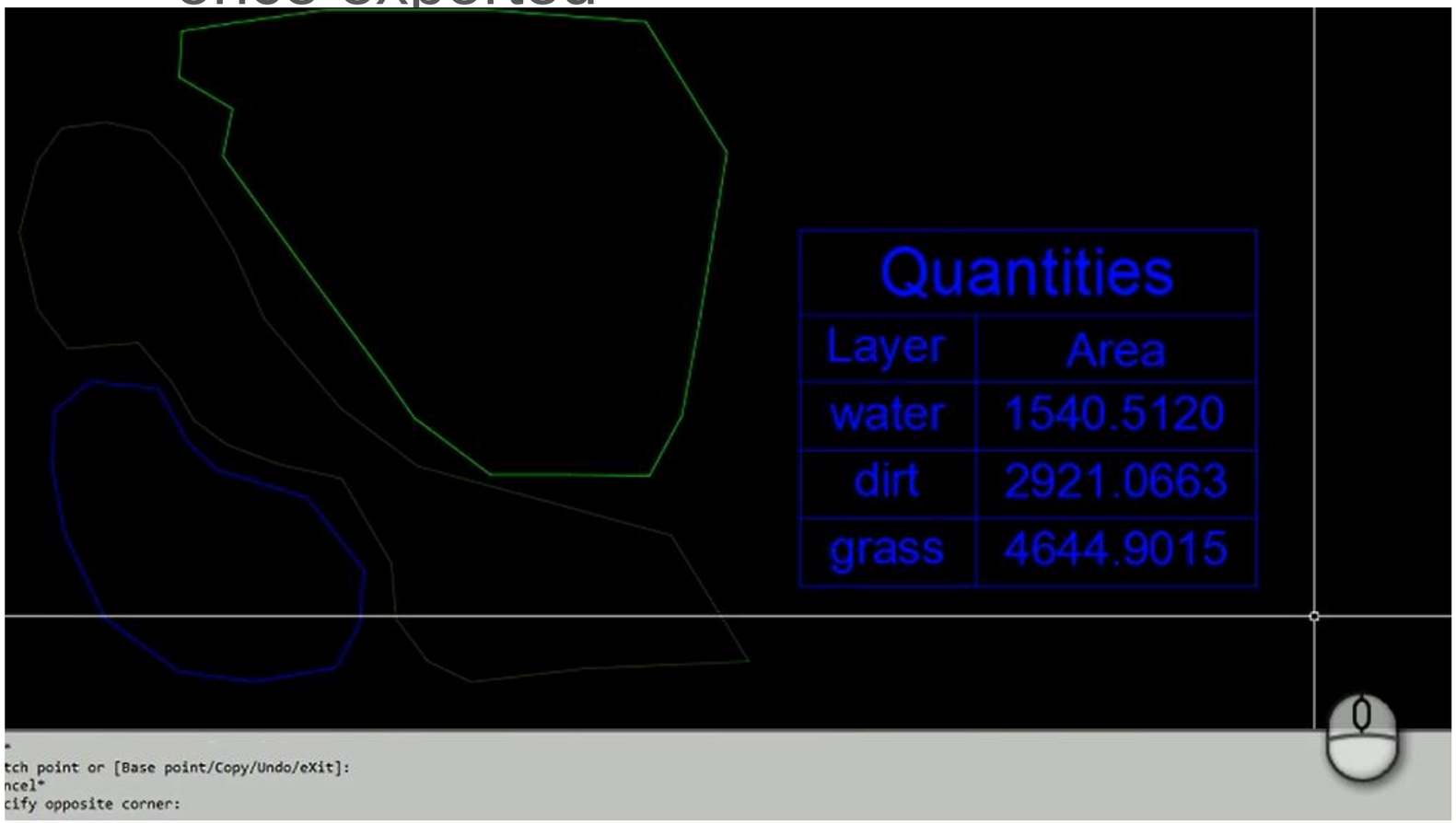
Sheet Set Manager
Toolspace
Layer Properties Manager
PANORAMA
**** No System Variable Changed ****
Command: Screencast Started
Screencast Stopped
Screencast Started
DATAEXTRACTION
Command: Screencast Stopped
Screencast Started
Type a command

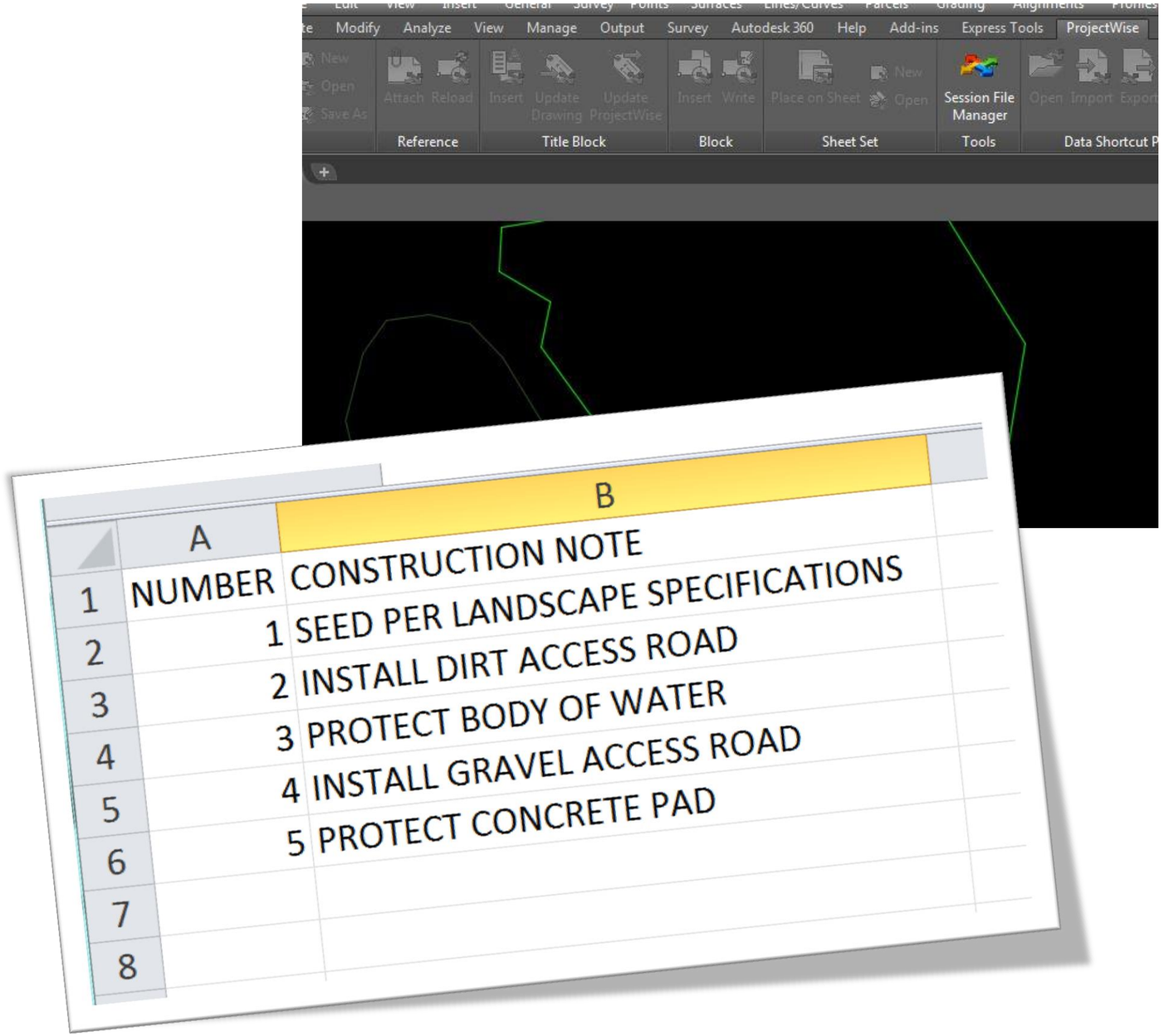
Data Extraction

- This table can be exported to excel
- It is dynamic in autocad, but static once exported



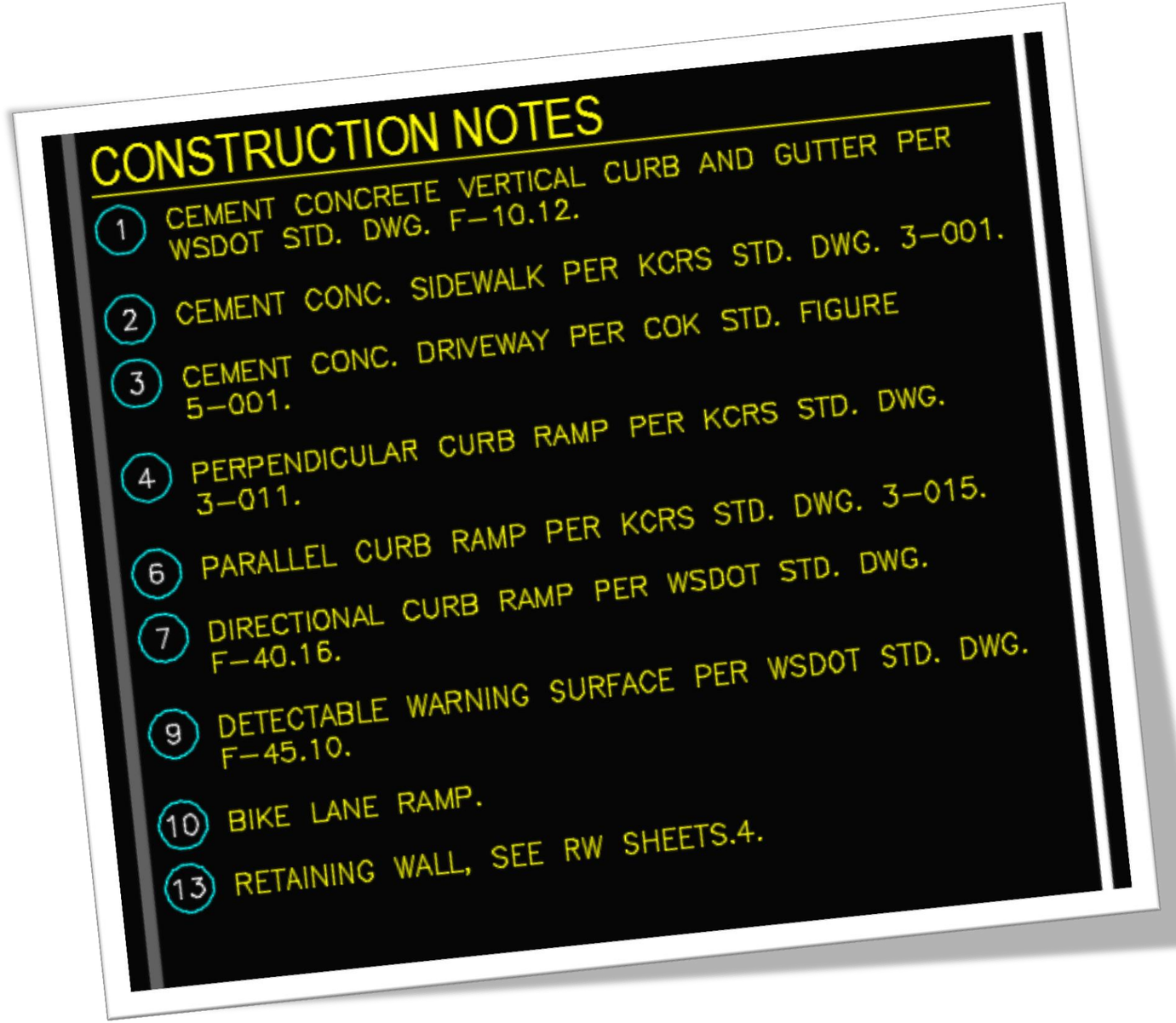
Data Extraction

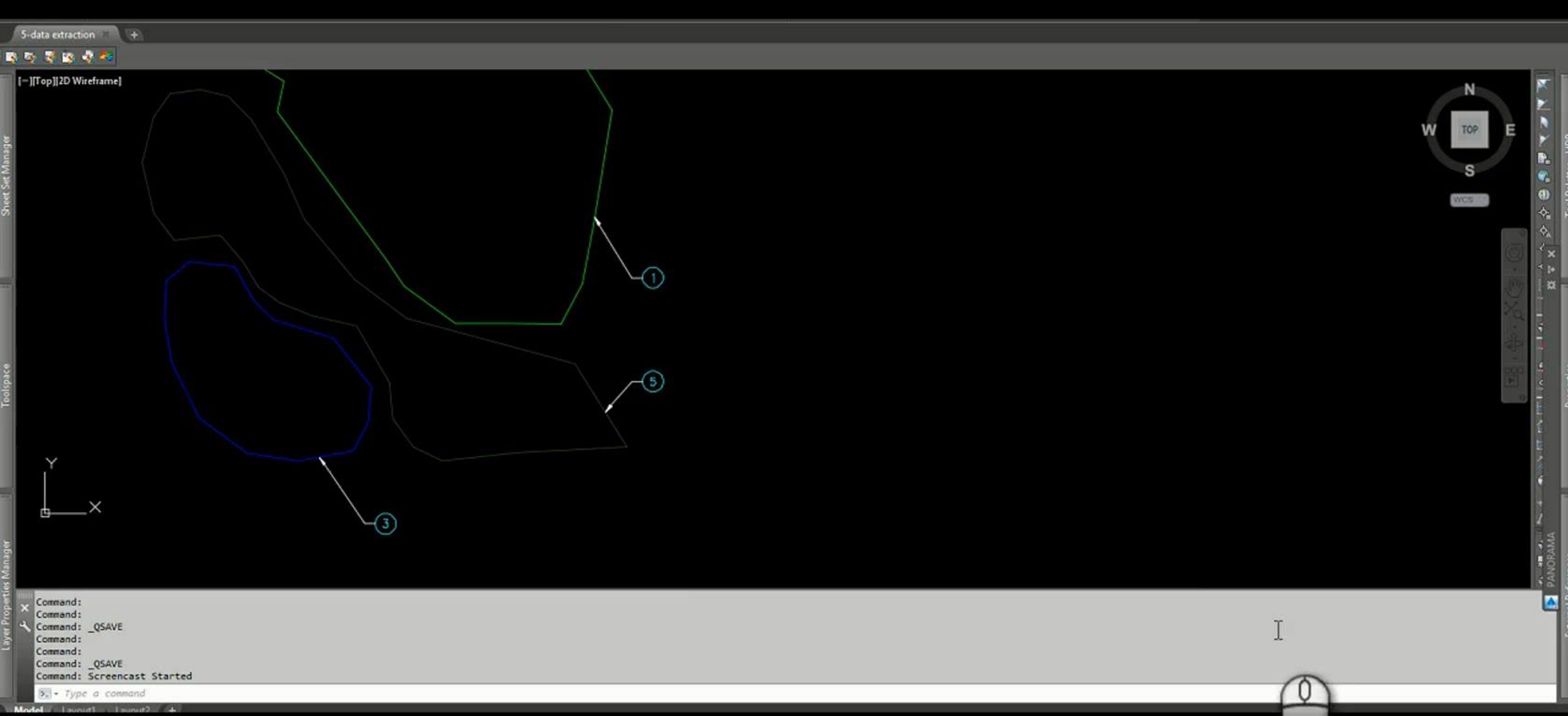
- Construction Notes
  - Per sheet
  - Discipline specific



Data Extraction

- Construction Notes per sheet
  - Multiple xrefs?
  - OLE linking to excel tabs?




5-data extraction
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Command:
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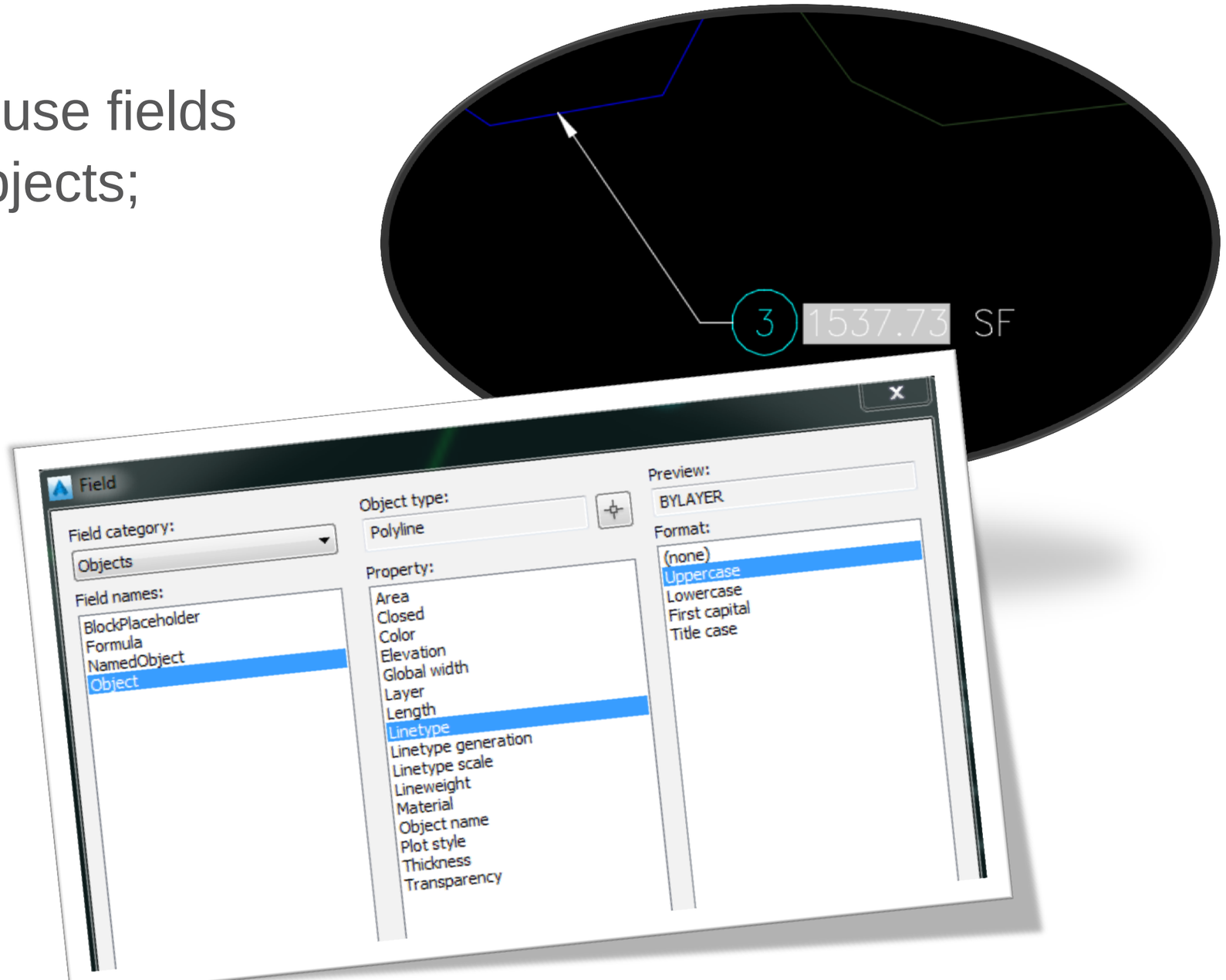
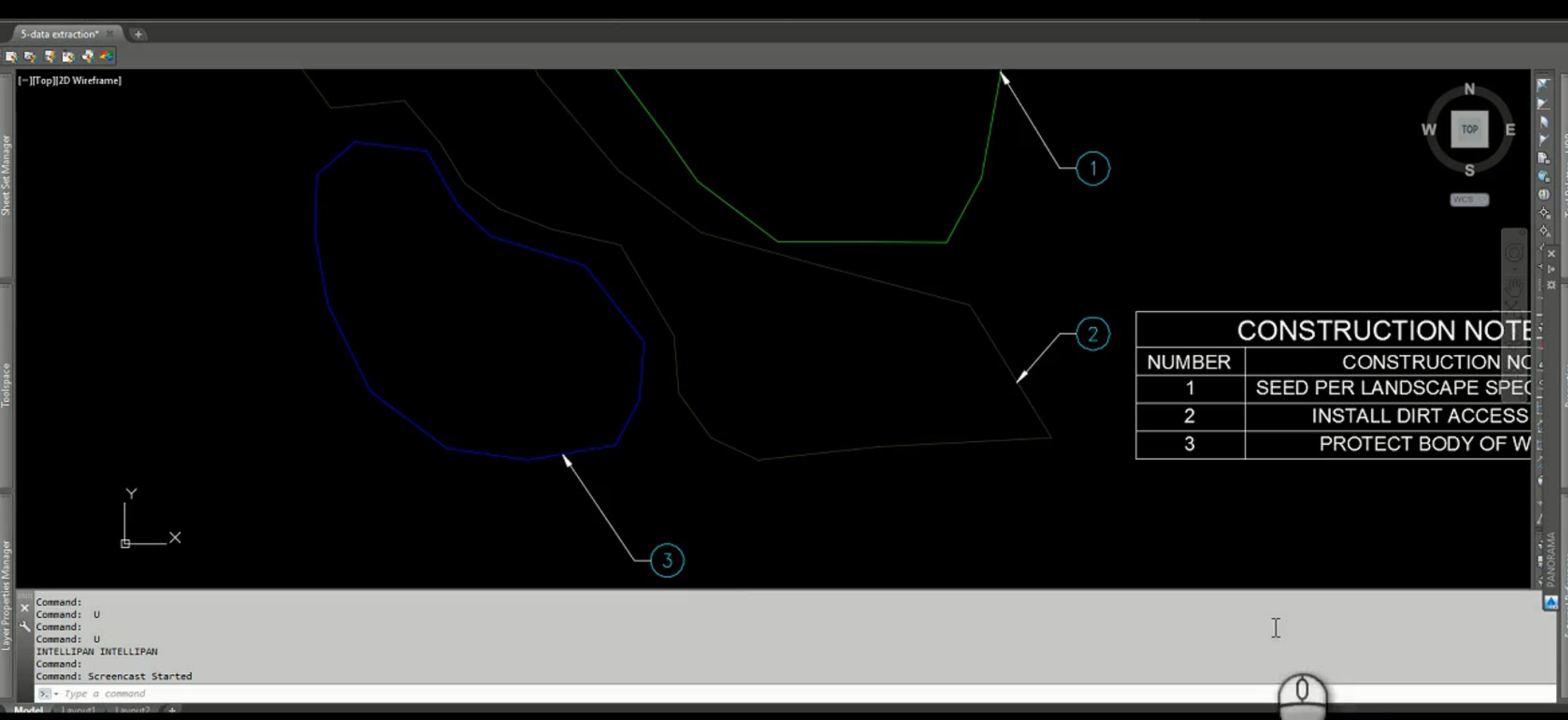
Command: _QSAVE
Command: Screencast Started
Type a command
Model
Layout1
Layout2
Sheet Set Manager
Toolspace
Layer Properties Manager
PANORAMA

COMBINING DATA EXTRACTION AND FIELDS

- Construction notes can use fields to show properties of objects;
  - Areas
  - Length
  - Layer name
  - Many more >




5-data extraction*
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CONSTRUCTION NOTE
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CONSTRUCTION NO
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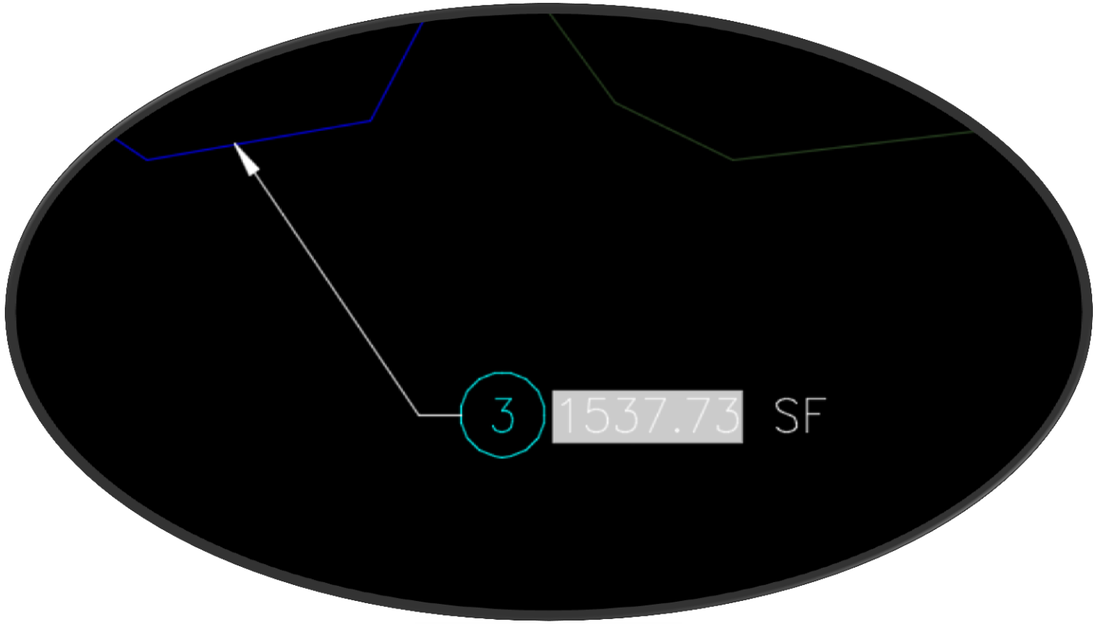
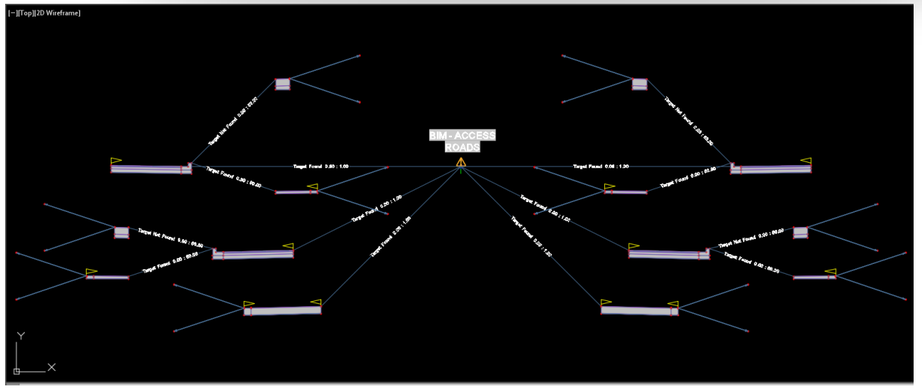
Command:
Command: Screencast Started
Type a command
Model
Layout1
Layout2
Sheet Set Manager
Toolspace
Layer Properties Manager
PANORAMA

COMBINING DATA EXTRACTION AND FIELDS

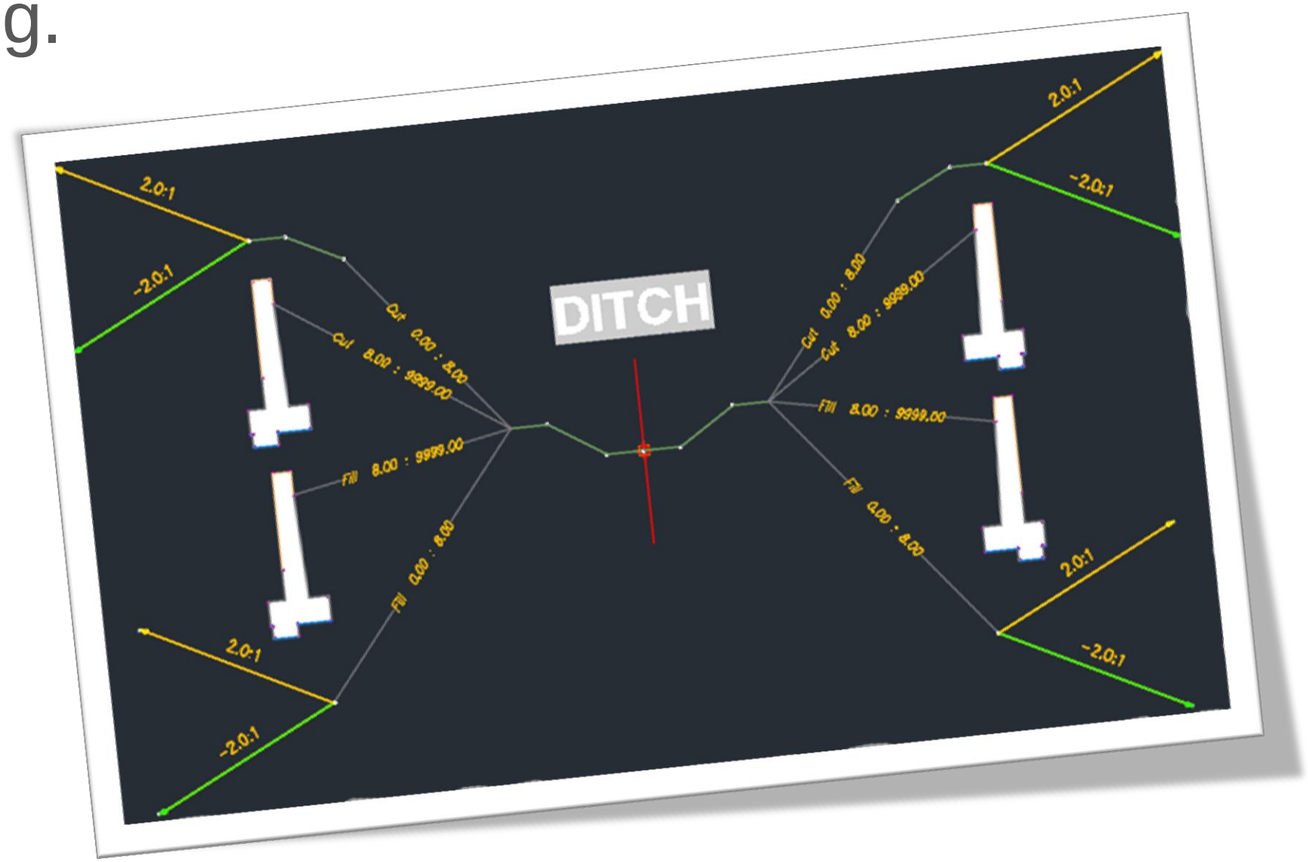
- Construction notes can use fields to show properties
  - Areas
  - Length
  - Layer name
  - Many more…
  - Coming up….
    - Conditional sub-assemblies





Getting Started with Modeling

- Basics required to start modeling.
  - *Alignment*
  - *Profile*
  - *Assembly*
  - *Existing Ground*
  - 2D linework
  - **Conditional subassemblies**

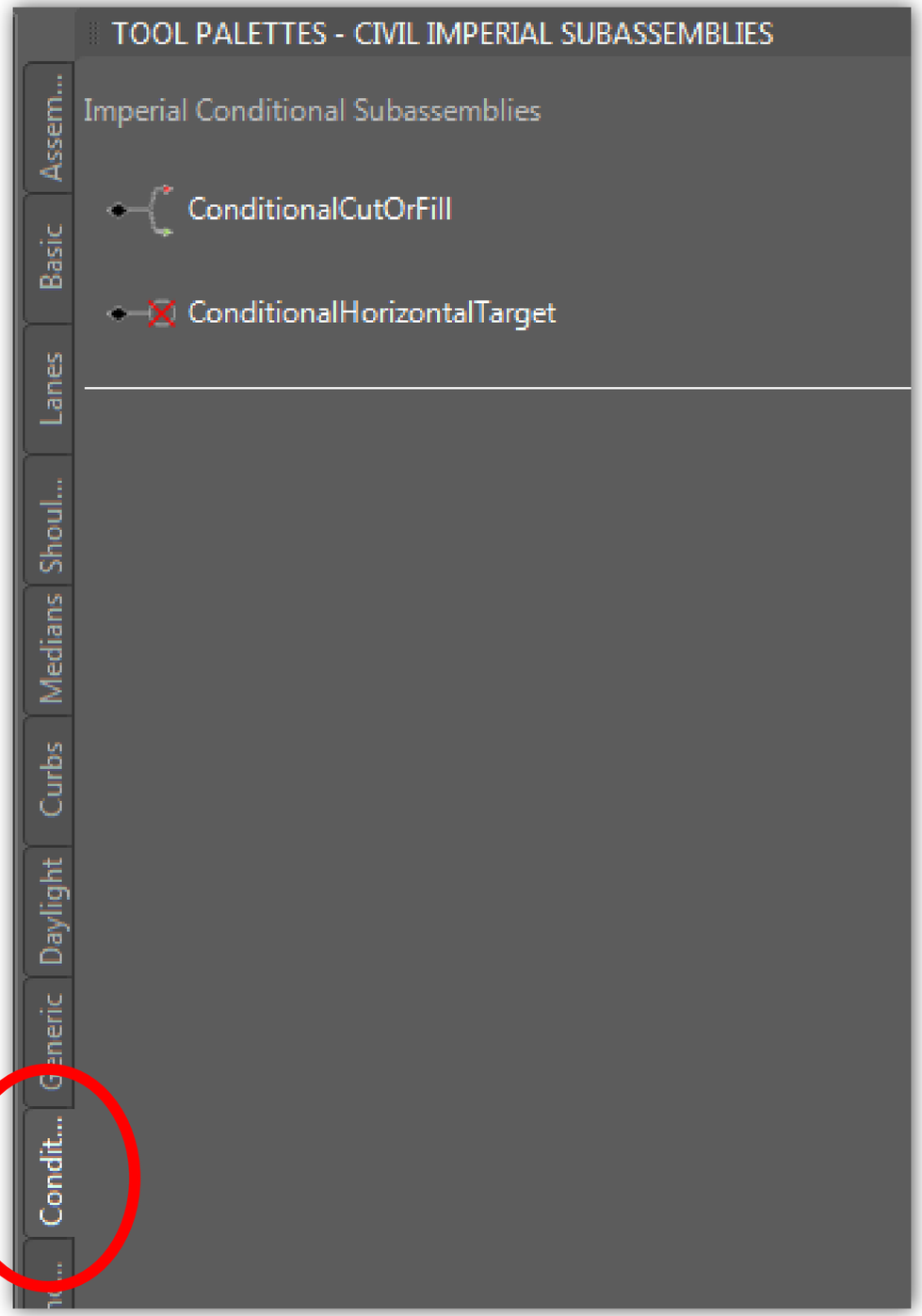


Conditional Subassemblies

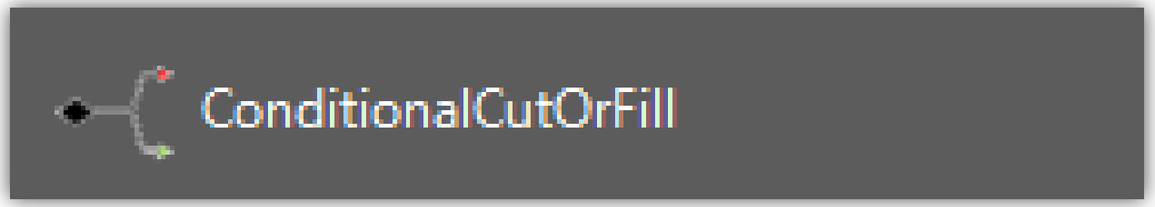
- ConditionalCutOrFill
- ConditionalHorizontalTarget
- How They Operate

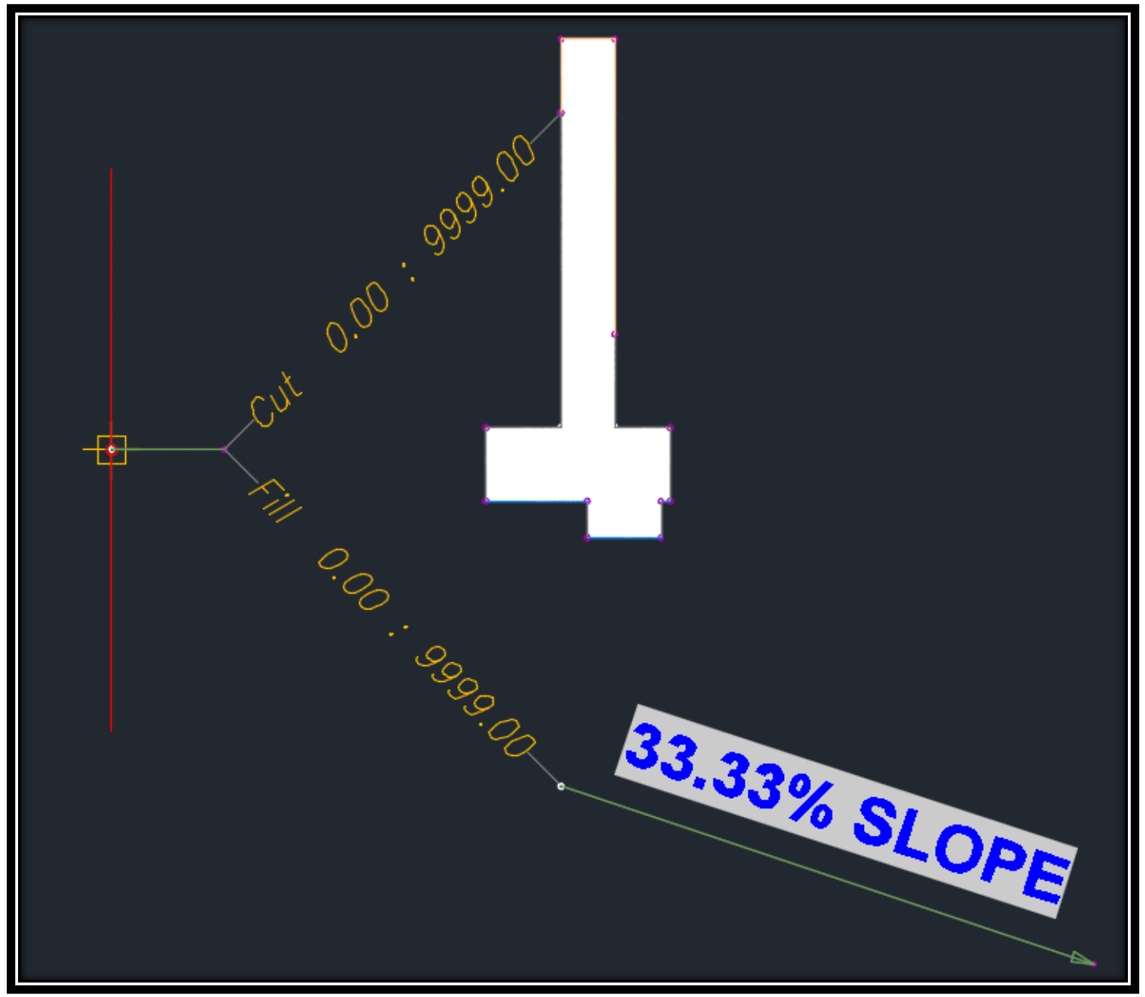
IF
"CONDITION" IS MET → THEN "ACTION"

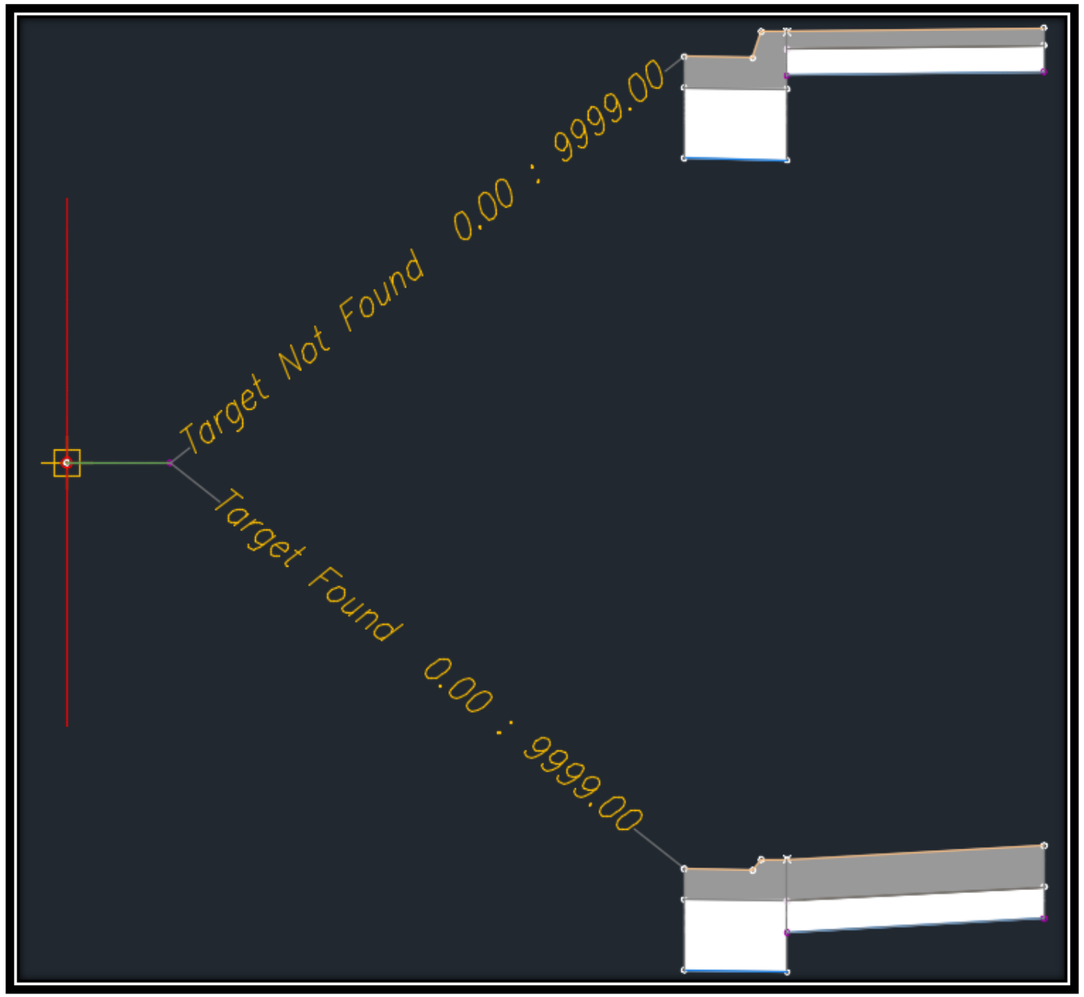
IF
"CONDITION" IS NOT MET → THEN DIFFERENT "ACTION"



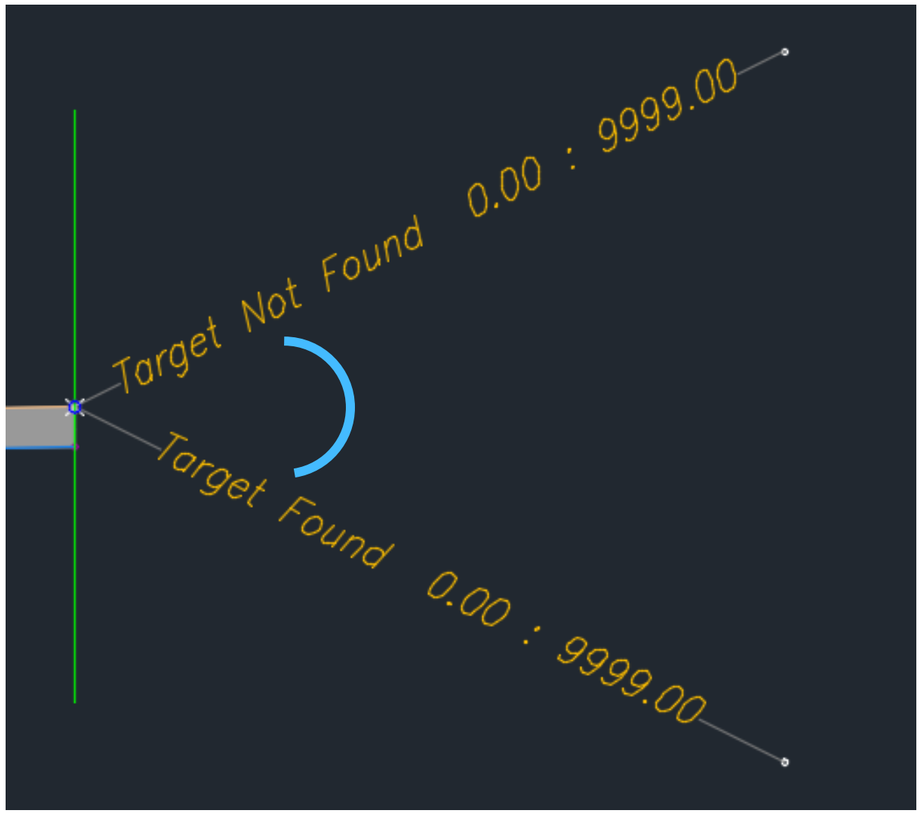
Conditional Subassemblies



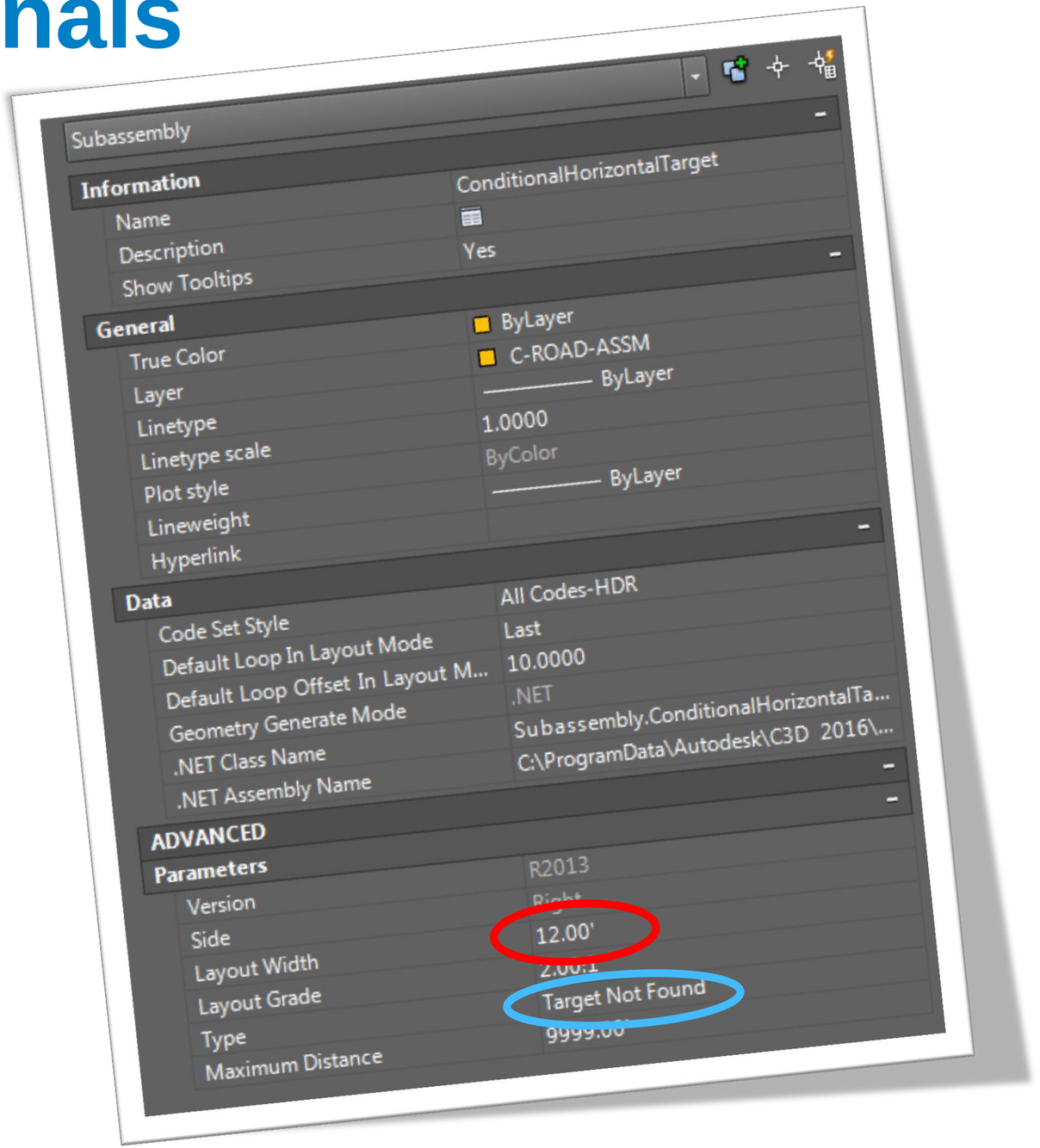




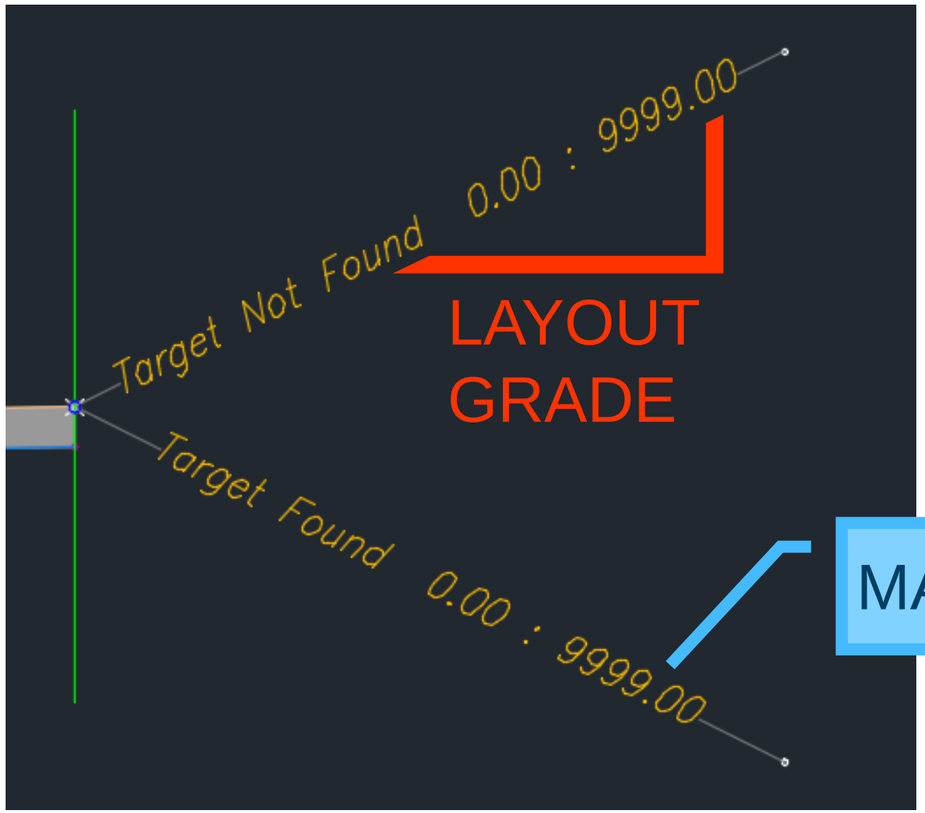
Organizing the Conditionals

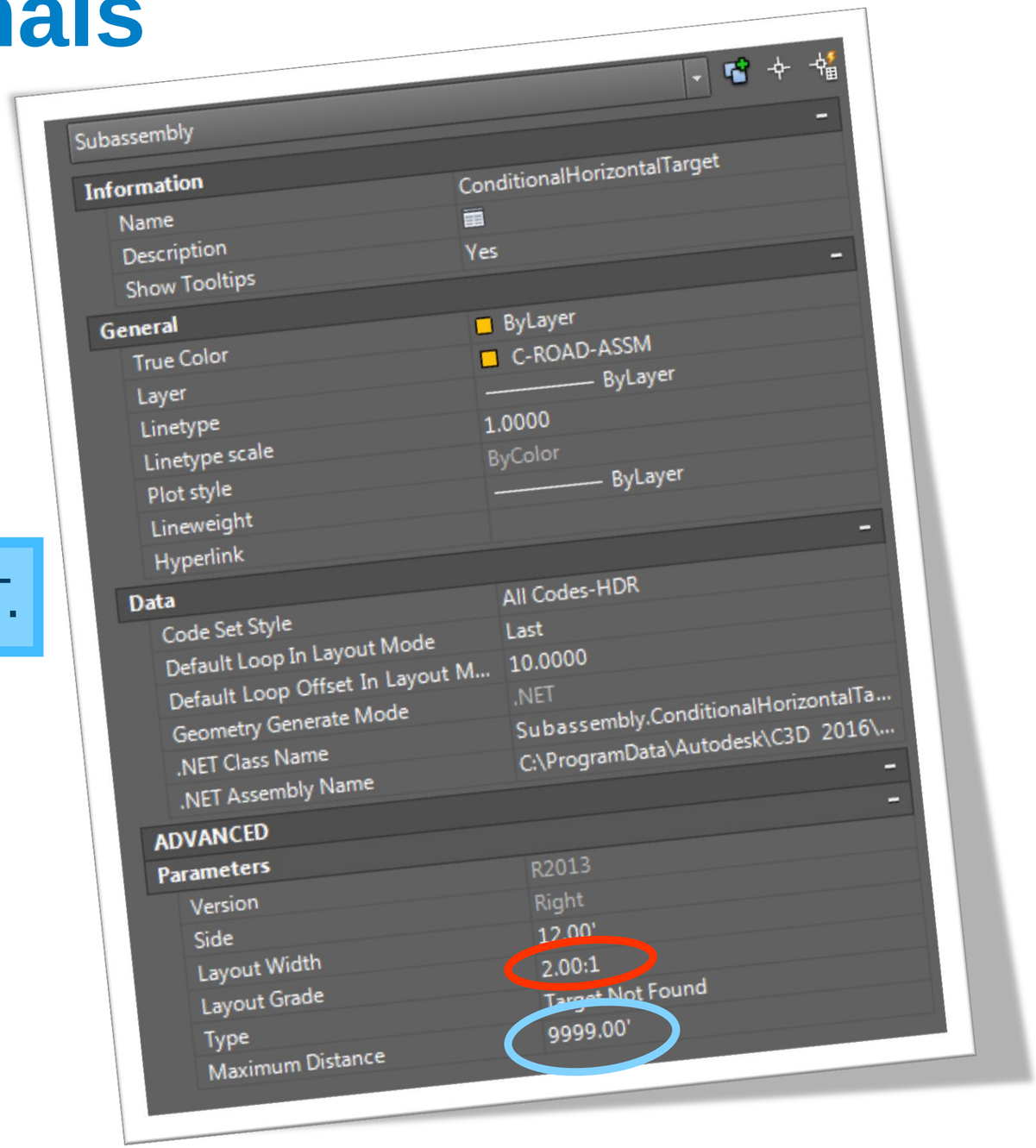


LAYOUT WIDTH



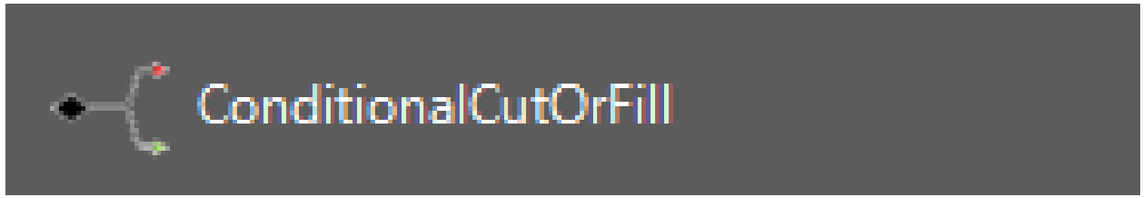
Organizing the Conditionals

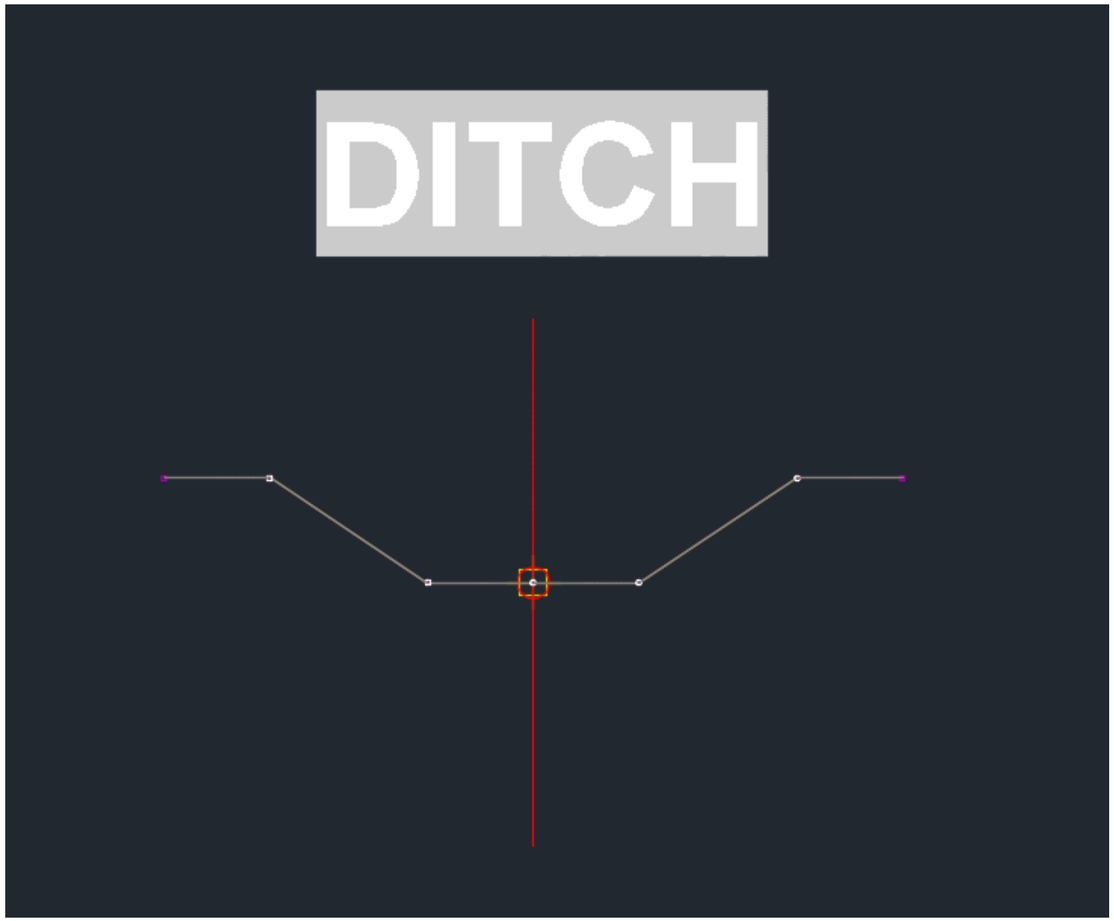




Conditional Subassemblies

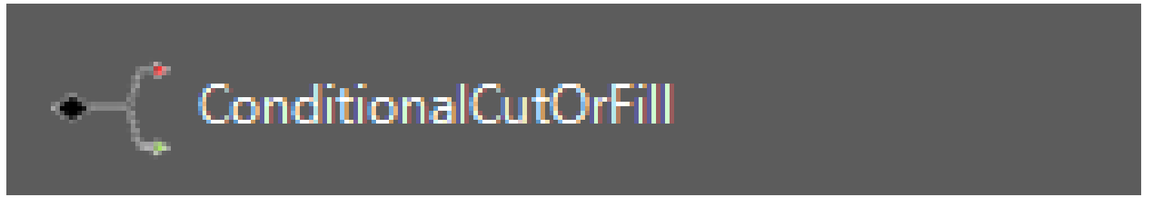
- Cut and Fill

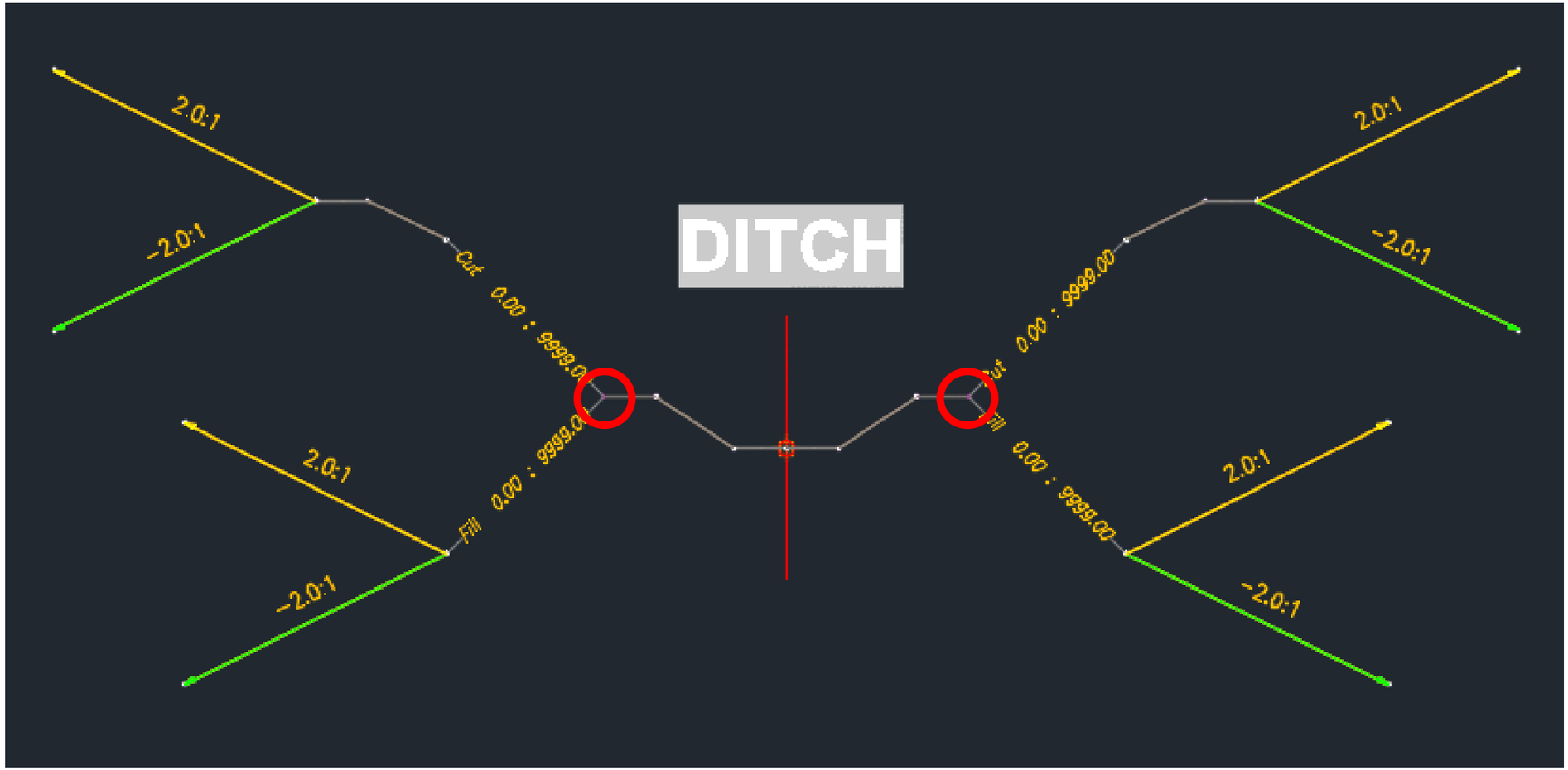


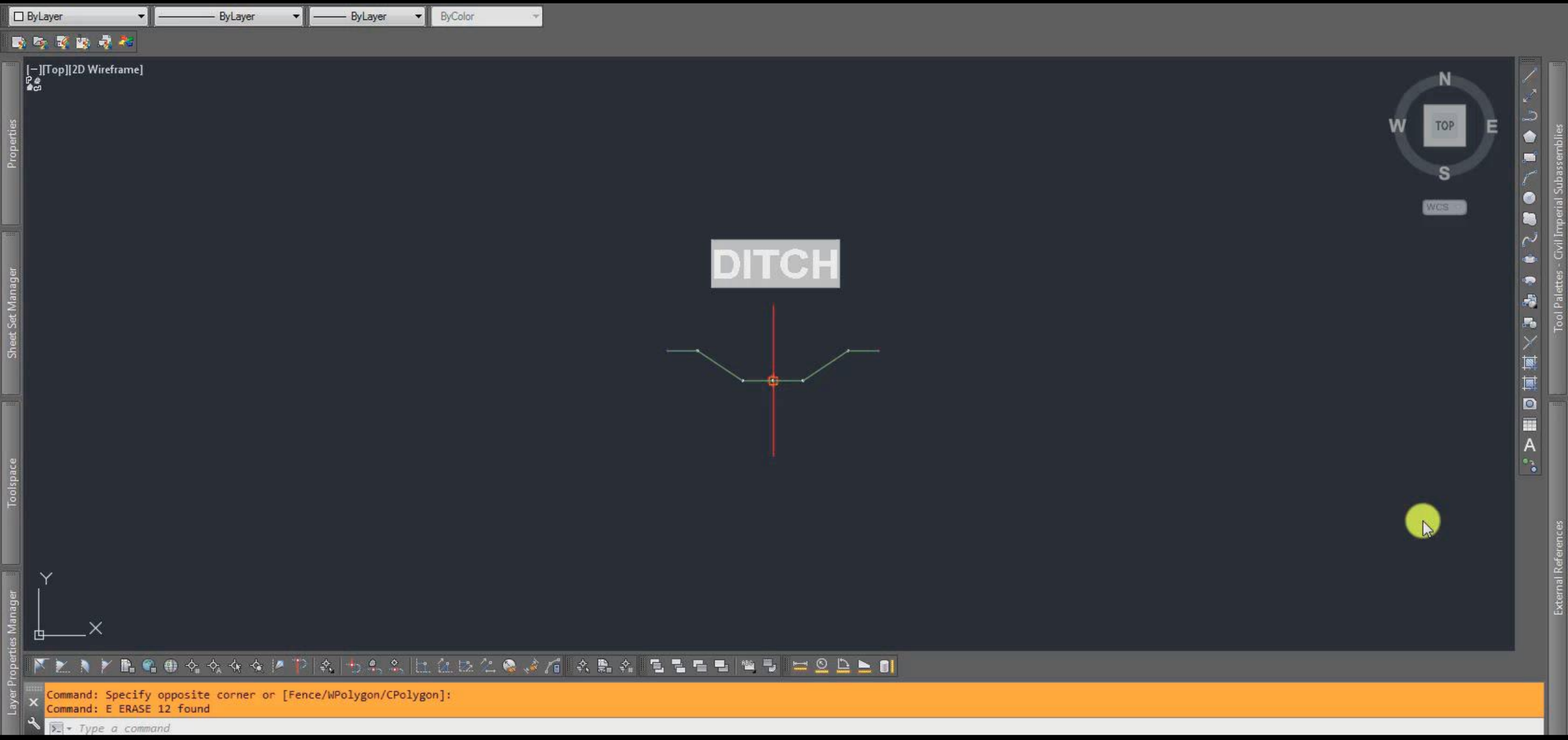


Conditional Subassemblies

- Cut and Fill

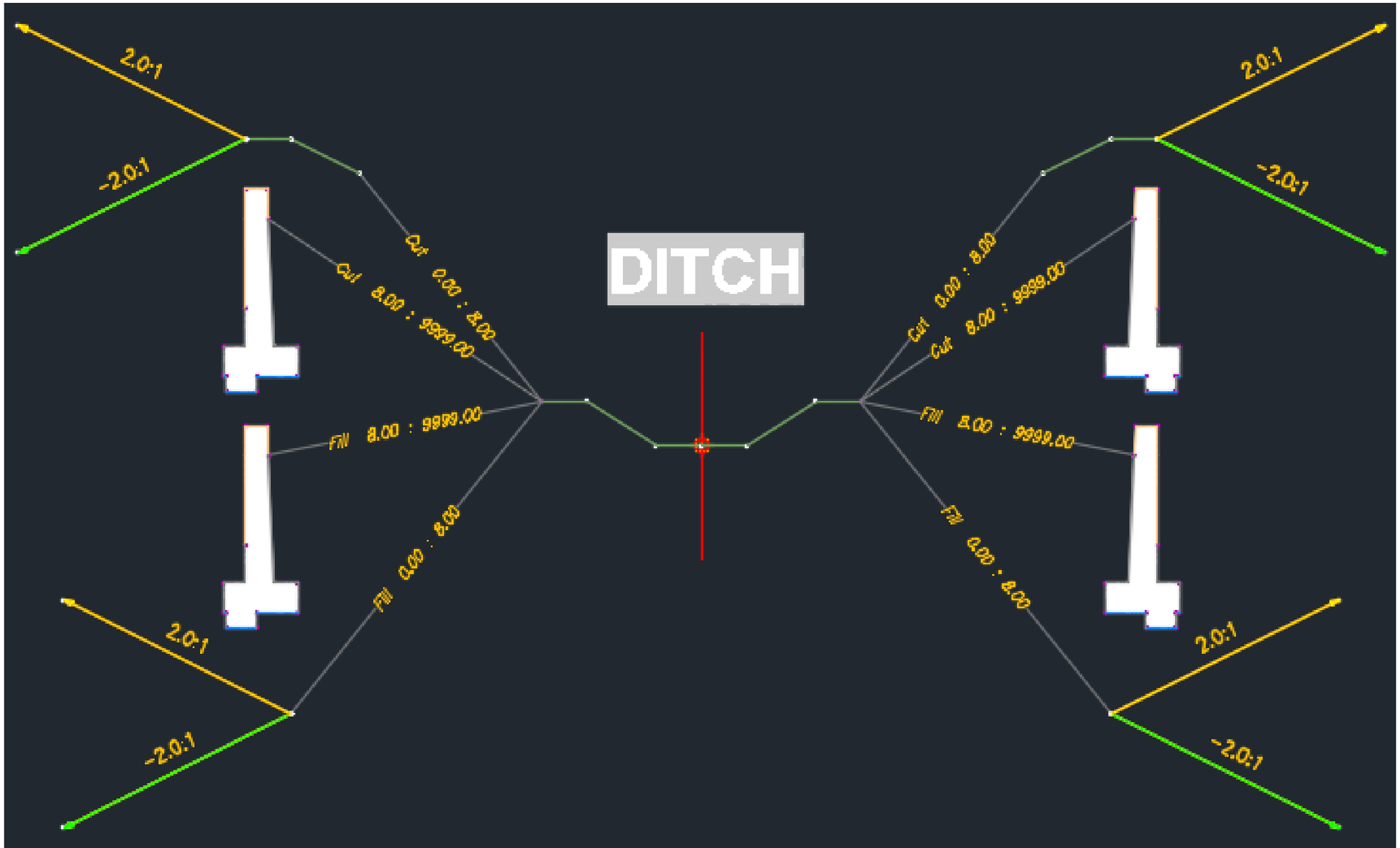


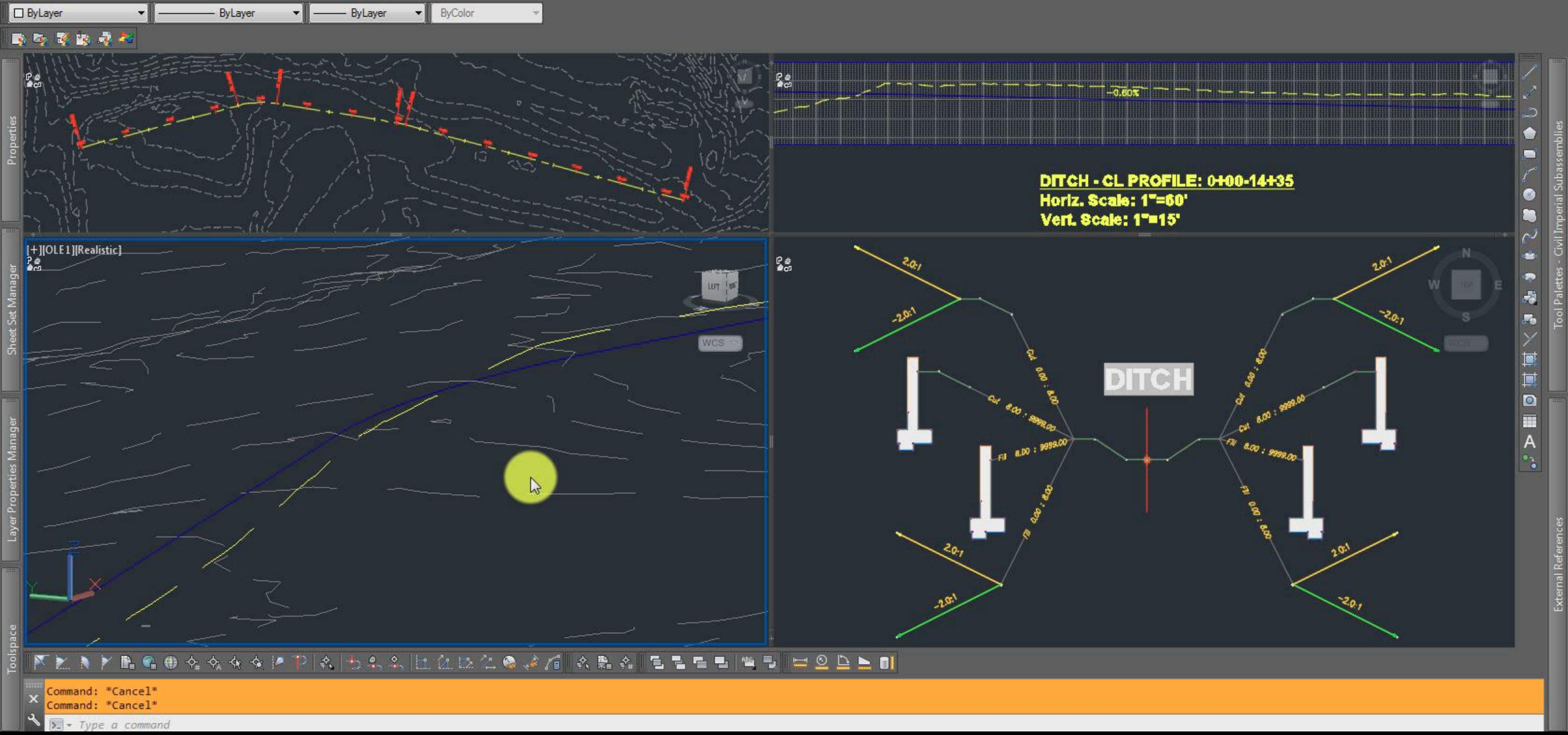



ByLayer
ByLayer
ByLayer
ByColor
[−][Top][2D Wireframe]
N
W
TOP
E
S
WCS
DITCH
Y
X
Command: Specify opposite corner or [Fence/WPolygon/CPolygon]:
Command: E ERASE 12 found
Type a command
Properties
Sheet Set Manager
Toolspace
Layer Properties Manager
Tool Palettes - Civil Imperial Subassemblies
External References

Conditional Subassemblies

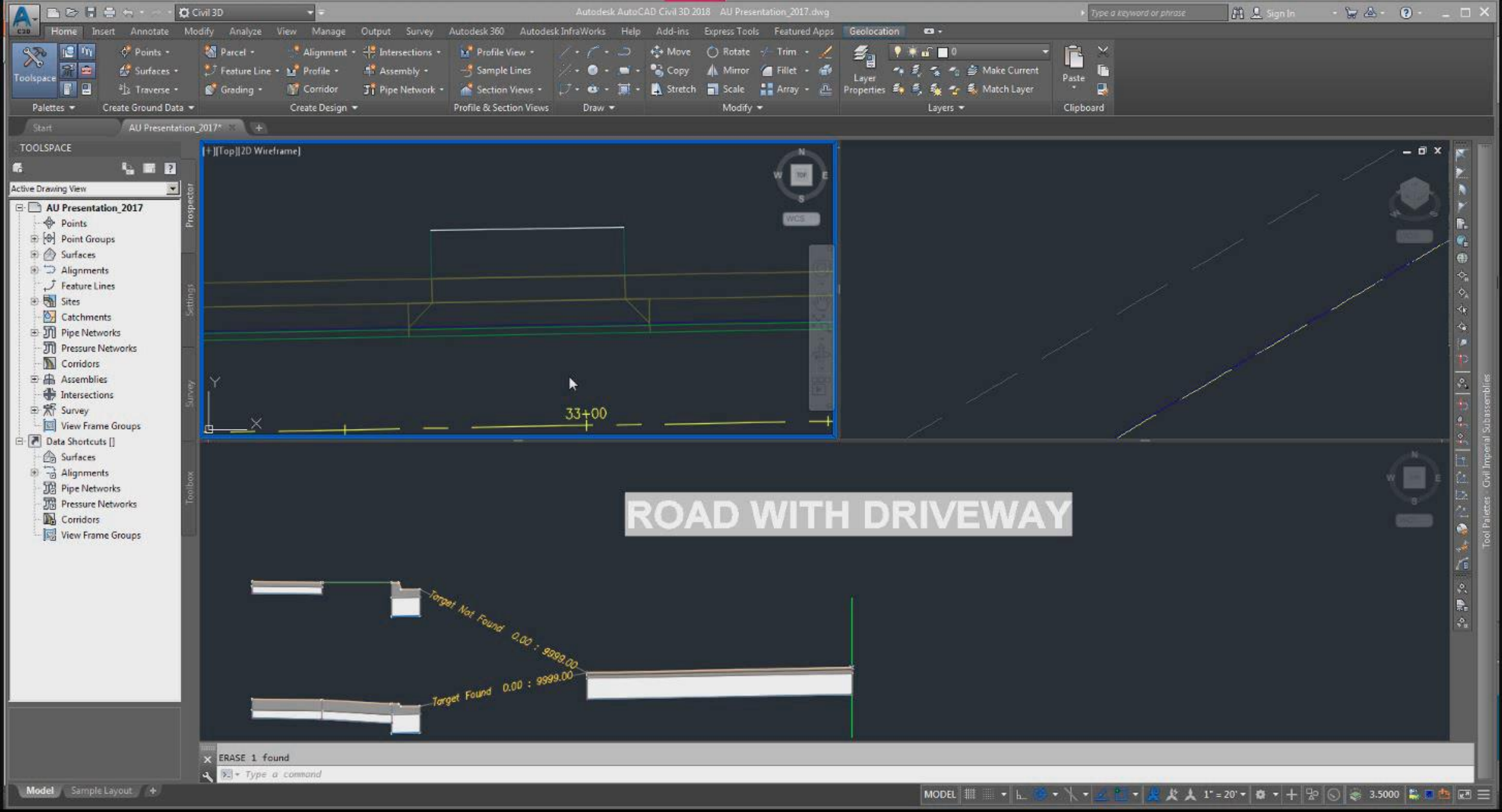
- Ditch with bench condition and retaining wall condition




ByLayer
ByLayer
ByLayer
ByColor
-0.60%
DITCH - CL PROFILE: 0+00-14+35
Horiz. Scale: 1"=60'
Vert. Scale: 1"=15'
[+][OLE1][Realistic]
WCS
DITCH
2.0:1
-2.0:1
Cut 8.00 : 8.00
Cut 8.00 : 9999.00
Fill 8.00 : 9999.00
Fill 8.00 : 8.00
Command: *Cancel*
Command: *Cancel*
Type a command

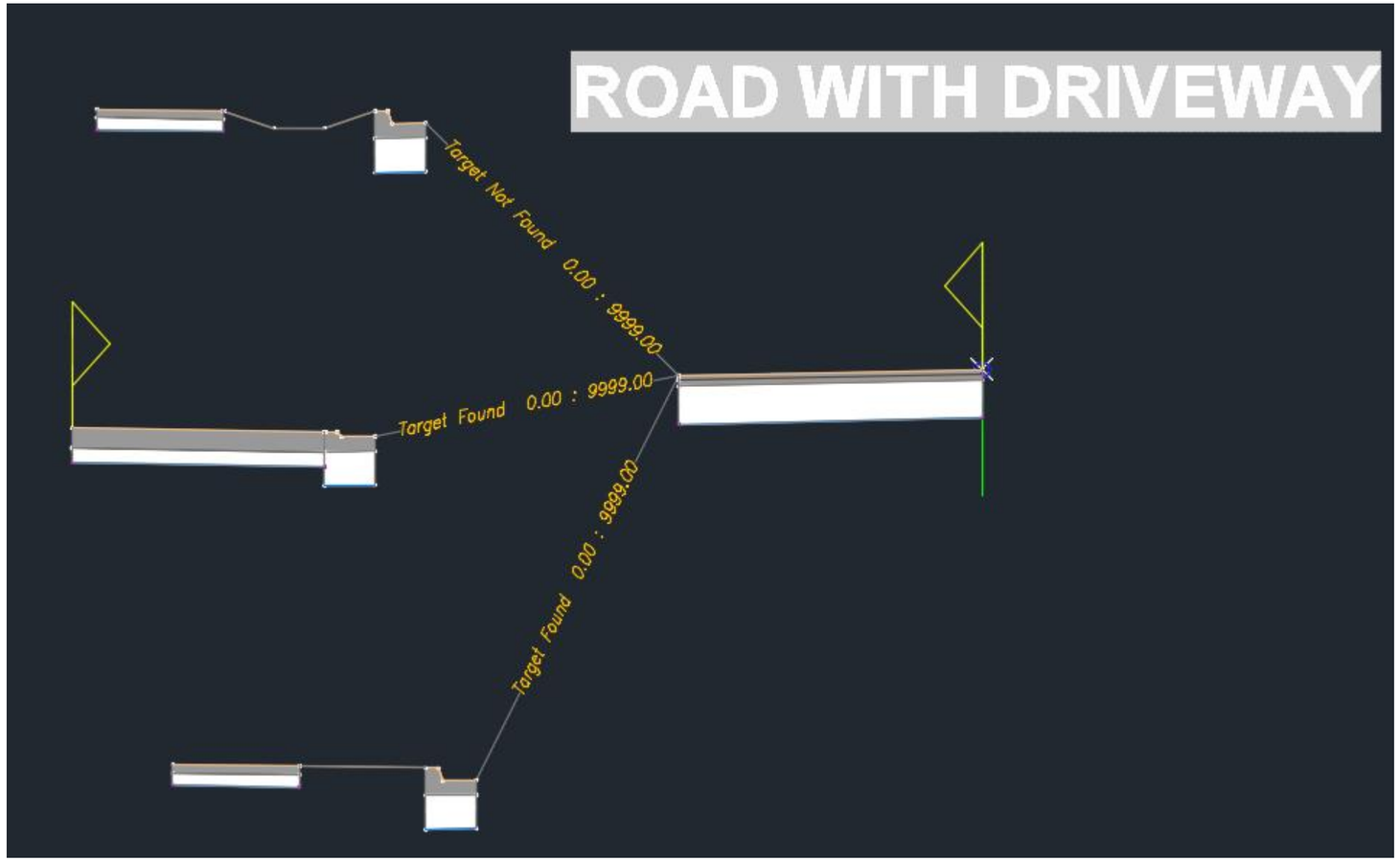
Conditional Subassemblies

- Horizontal Target


Civil 3D
Autodesk AutoCAD Civil 3D 2018 AU Presentation_2017.dwg
Home Insert Annotate Modify Analyze View Manage Output Survey Autodesk 360 Autodesk InfraWorks Help Add-ins Express Tools Featured Apps Geolocation
Toolspace
Points
Surfaces
Traverse
Parcel
Feature Line
Grading
Alignment
Profile
Corridor
Intersections
Assembly
Pipe Network
Profile View
Sample Lines
Section Views
Move
Copy
Stretch
Rotate
Mirror
Scale
Trim
Fillet
Array
Make Current
Match Layer
Layer Properties
Paste
Palettes
Create Ground Data
Create Design
Profile & Section Views
Draw
Modify
Layers
Clipboard
Start
AU Presentation_2017*
TOOLSPACE
Active Drawing View
AU Presentation_2017
Points
Point Groups
Surfaces
Alignments
Feature Lines
Sites
Catchments
Pipe Networks
Pressure Networks
Corridors
Assemblies
Intersections
Survey
View Frame Groups
Data Shortcuts []
Surfaces
Alignments
Pipe Networks
Pressure Networks
Corridors
View Frame Groups
Prospector
Settings
Survey
Toolbox
[+][Top][2D Wireframe]
33+00
ROAD WITH DRIVEWAY
Target Not Found 0.00 : 9999.00
Target Found 0.00 : 9999.00
ERASE 1 found
Type a command
Model
Sample Layout
MODEL
1" = 20'
3.5000
Tool Palettes - Civil Imperial Subassemblies

Conditional Subassemblies

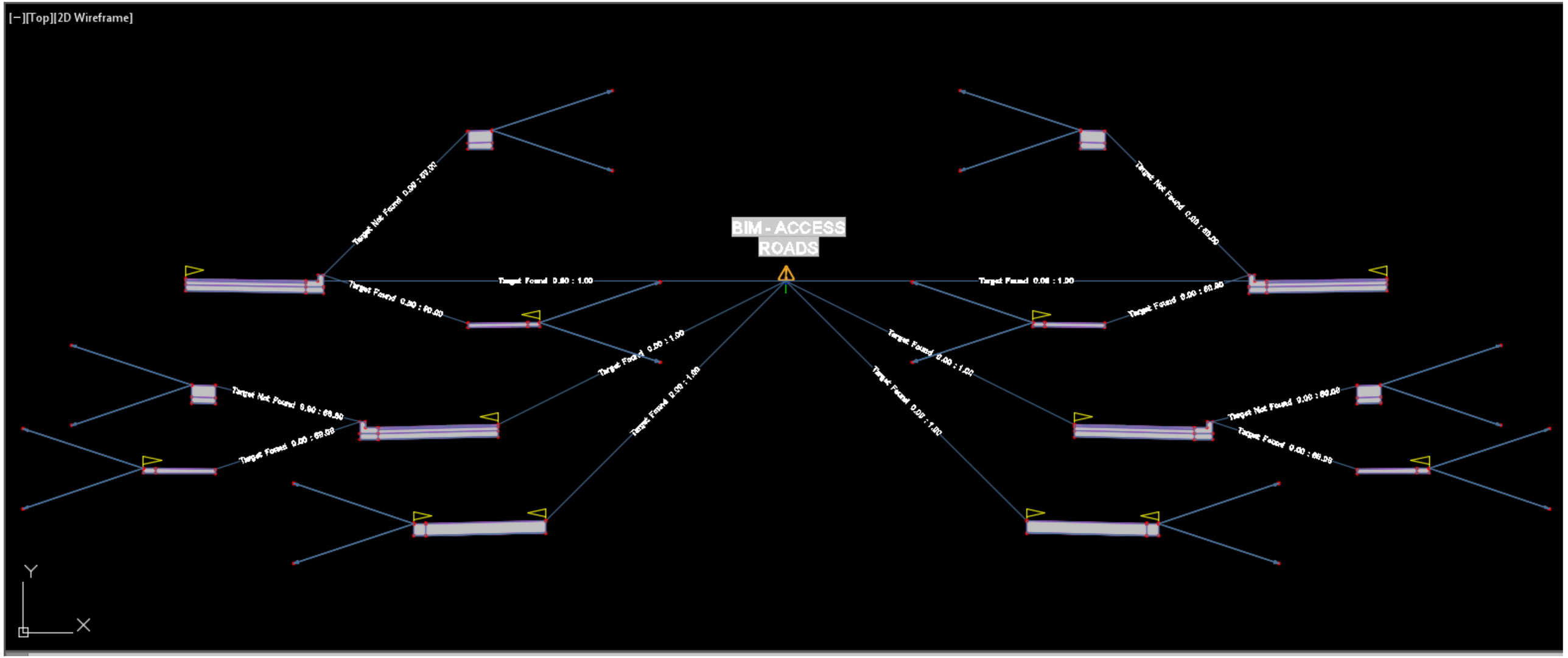
- Horizontal Target



Case Study – Federal Way Link Extension

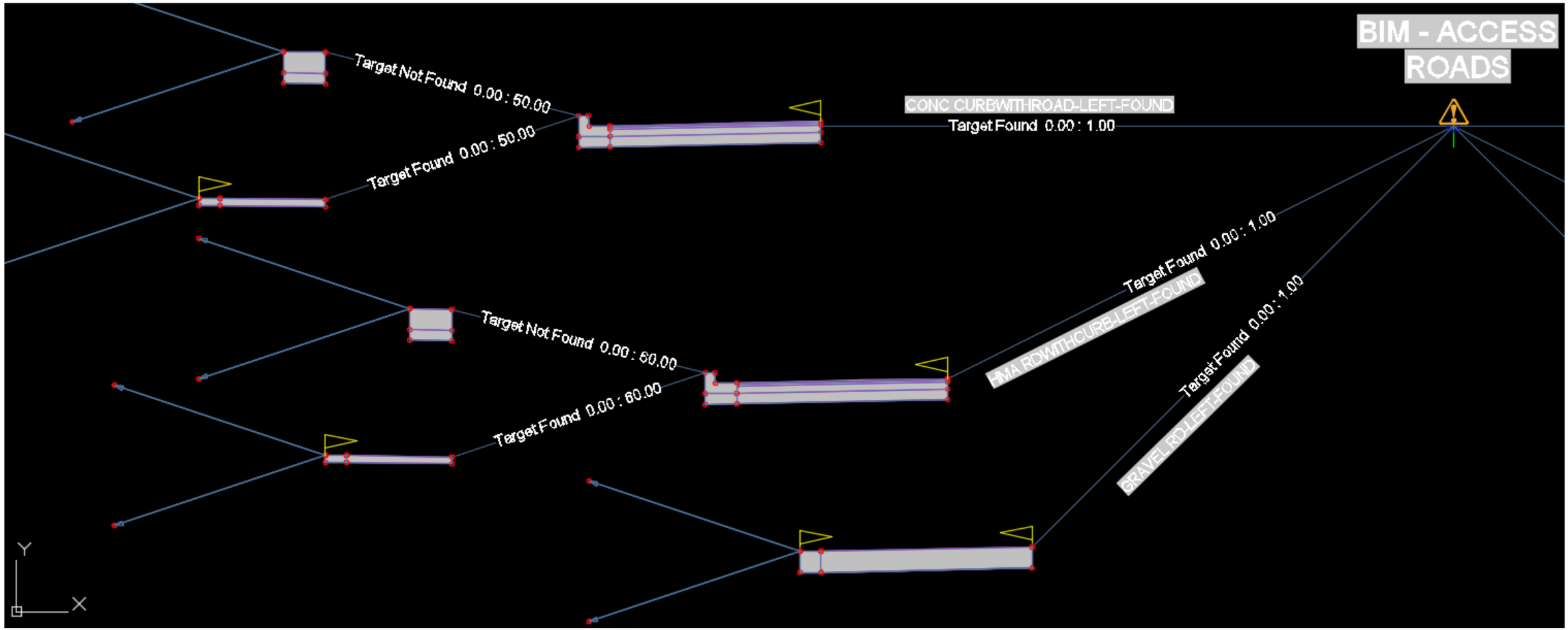
- Six Mile Long Light Rail Transit Project
- Four Local Agencies
- Different Design Standards for Access & Maintenance Roads
- 98 Access & Maintenance Roads
- Split into three different corridor models

Conditional Subassemblies



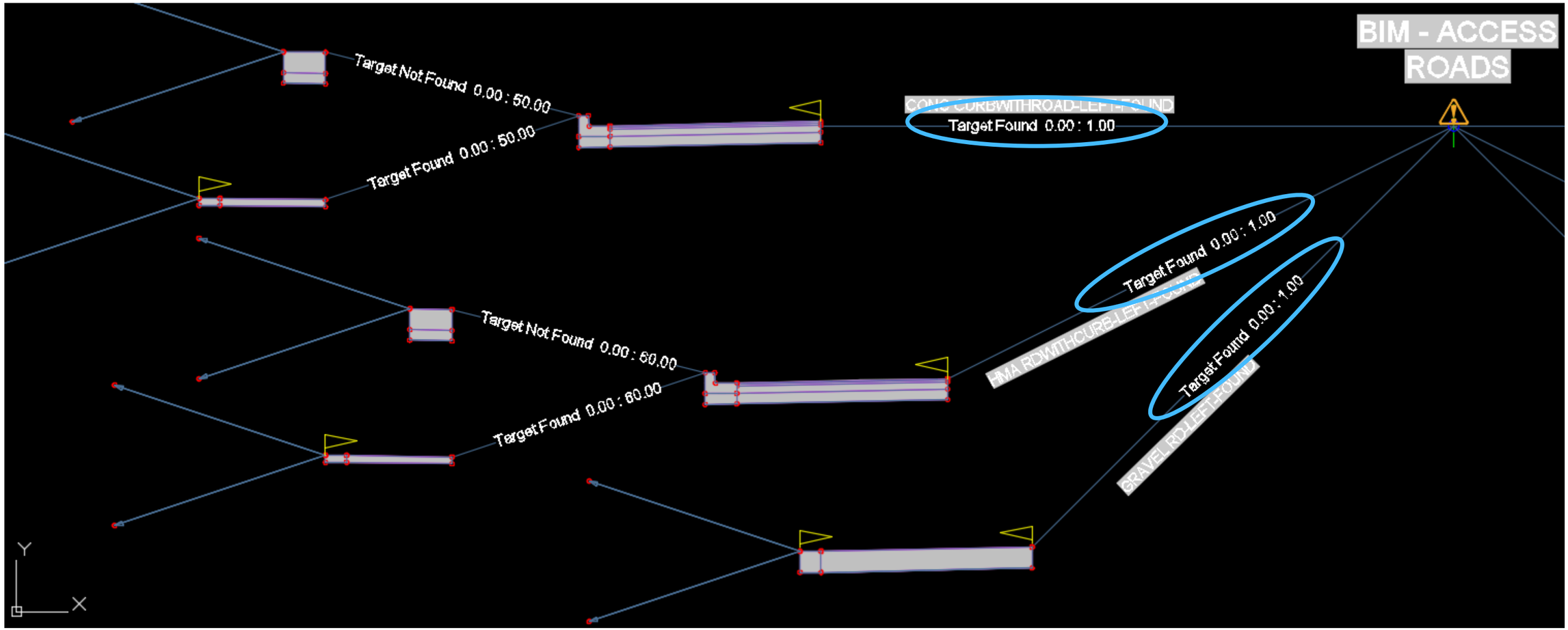
Conditional Subassemblies

- Conditional Horizontal Targets were used here to determine: Concrete, HMA, or Gravel.



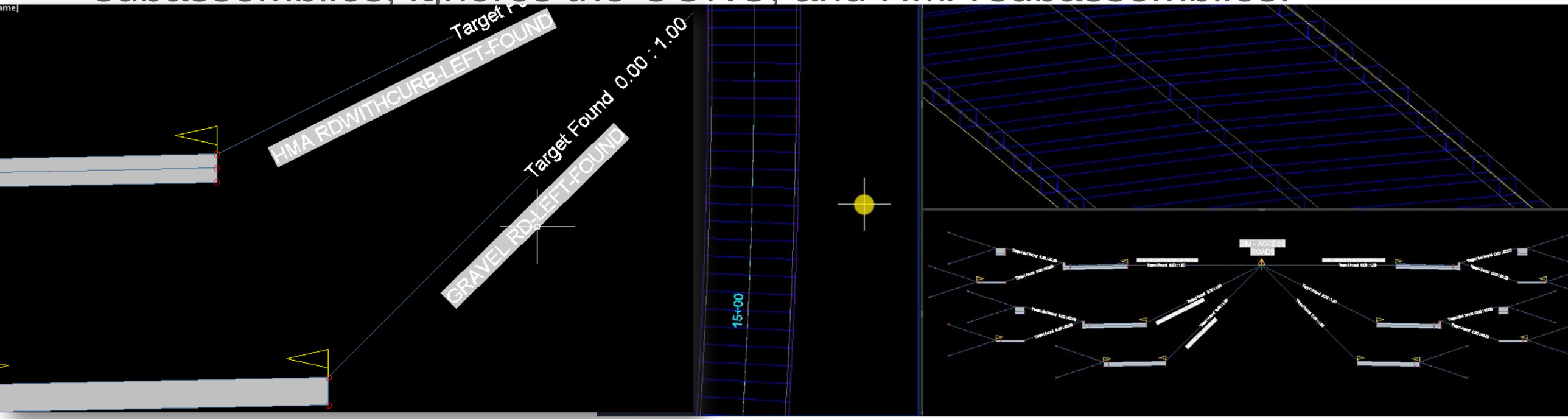
Conditional Subassemblies

- We used all “Target Found” conditions
- Target was the centerline of the road

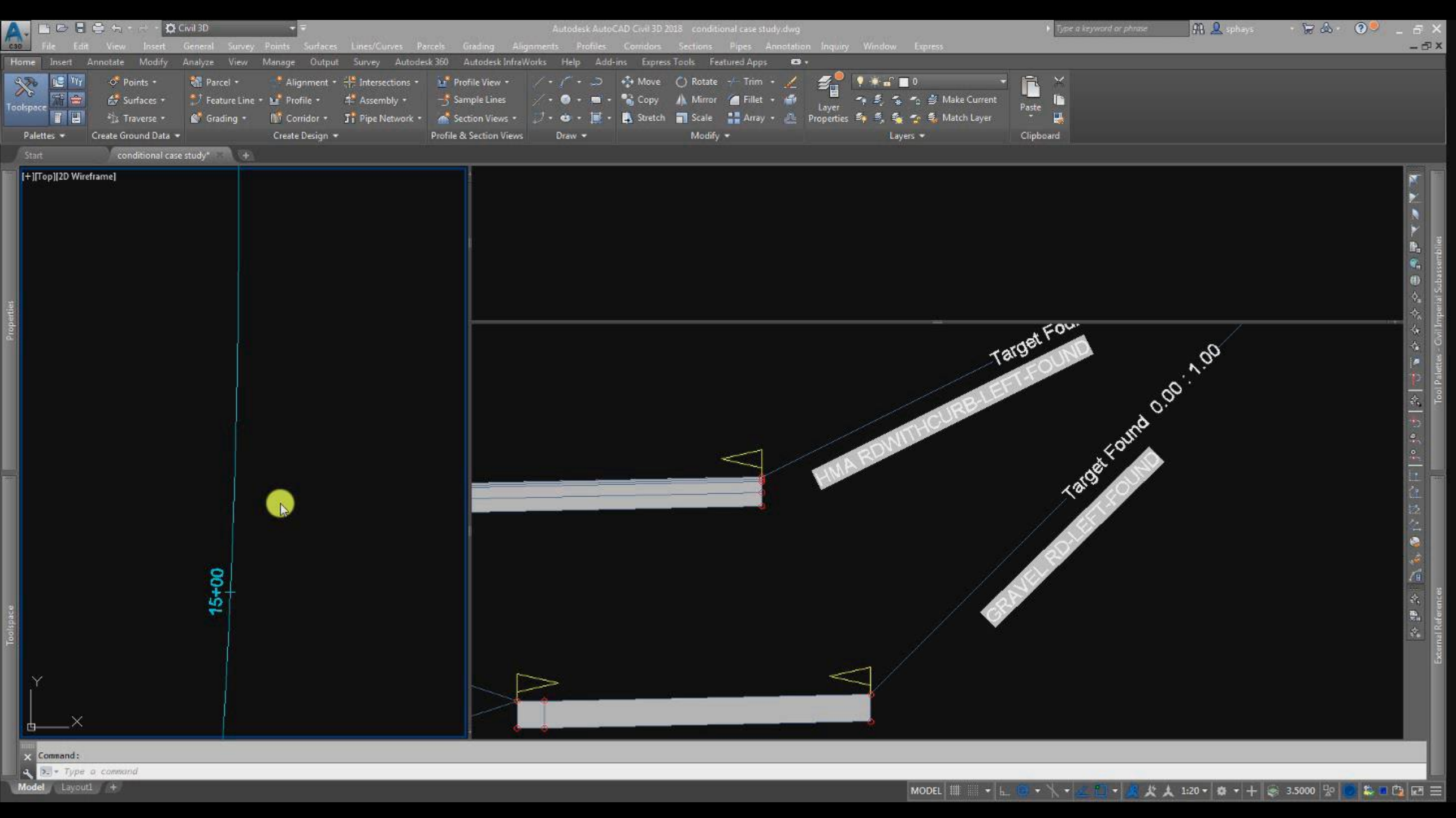


Conditional Subassemblies

- Setting the Gravel Rd-Left-Found and Gravel Rd-Right-Found conditional subassemblies, ignores the CONC, and HMA subassemblies.



Width or Offset Targets			
Target Offset	L05-R5	Gravel Rd-Left-Found	Left
Width Alignment	<None>	Gravel Lane	Left
Width Alignment	<None>	Gravel Shoulder	Left
Target Offset	L05-R5	Gravel Rd-Right-Found	Right (2)
Width Alignment	<None>	Gravel Lane	Right (2)
Width Alignment	<None>	Gravel Shoulder	Right (2)


Civil 3D
Autodesk AutoCAD Civil 3D 2018 conditional case study.dwg
Home
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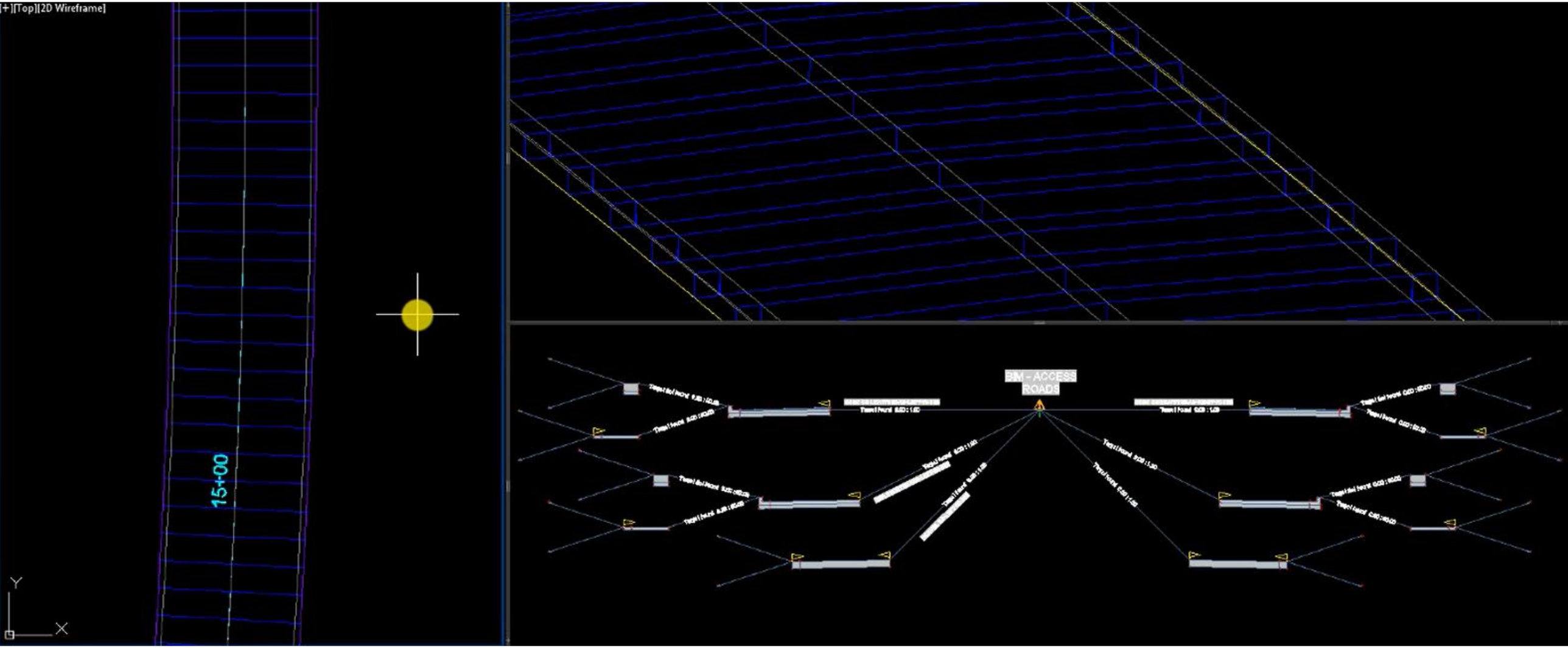
Modify
Analyze
View
Manage
Output
Survey
Autodesk 360
Autodesk InfraWorks
Help
Add-ins
Express Tools
Featured Apps
Toolspace
Points
Surfaces
Traverse
Parcel
Feature Line
Grading
Alignment
Profile
Corridor
Intersections
Assembly
Pipe Network
Profile View
Sample Lines
Section Views
Move
Copy
Stretch
Rotate
Mirror
Scale
Trim
Fillet
Array
Layer Properties
Make Current
Match Layer
Paste
Palettes
Create Ground Data
Create Design
Profile & Section Views
Draw
Modify
Layers
Clipboard
Start
conditional case study*
[+][Top][2D Wireframe]
15+00
Target Found 0.00 : 1.00
HMA RDWITHCURB-LEFT-FOUND
GRAVEL RD-LEFT-FOUND
Command :
Type a command
Model
Layout1
MODEL
1:20
3.5000

Questions?



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