BUILDING PROJECTS WITH SDD
Goals for Presentation

• Bring awareness to some possible uses for technology in construction
• Encourage teamwork throughout the process
• Help designers and construction staff understand each others needs and limitations
• Show a few tips and tricks
• Encourage innovative thinking in the field
Today's Topics

• Deliverables from Design
• Use of Deliverables in Construction
• Construction Survey Equipment
• Efficient Accurate Techniques
• Working with Trimble and Bentley
• Construction Staking
• AMG – Use and Limitations
• Field Verification
• Survey Committee and Training
What This Presentation is Not

• Intended to be all inclusive
• Intended to be a training
• Necessary the most current technology
• The only way to do the job
Engineering Flowchart

DOES IT MOVE?

No

Should it?

No

No Problem

Yes

No Problem

Yes

Should it?

Yes

No

No Problem

No
Plan Production

- Preliminary Survey
- Existing Alignment & Right of Way
- Existing Ground Surface
- Proposed Alignment and Profile
- Proposed Surface Model
- Drainage

- Plan & Profile Sheets
- Cross Sections
P&P Sheets

- Finish Profile of Top of Pavement
- Existing topography
- Pipe Elevation
- Stationing
- Quantities
- Right of Way
- Construction Limits
Cross Section Sheets

- Break point elevations
- Stationing
- Cross Slopes
How Do We Do It
Supplemental Design Data!!
SDD

Alignment & Profile.xml
Subgrade, Base, Finish Surfaces.xml
Background Images.dxf

SDD to Field Survey

Alignment & Profile.rxl
Subgrade, Base, Finish Surfaces.ttm
Cross Section Templates
First Things First

Multiple alignments in design file

Multiple surfaces created

Need to understand limitations

**AAReadme**

This aareadme file does not list all limitations with the model. It is only provided as a place to start your review. The contractor is responsible for reviewing model information and determining if and where it may be applicable.

**Alignments**
- Chain – EX 85
- Profile - PRUS85

**Surfaces**
- Proposed Top (T)
- Proposed Base (B1)
- Proposed Dirt Grade (DG)
- Proposed Geogrid Fabric (G1)

**Model Limitations**
Approach radii were not modeled. Any information shown at the location of an approach radius is not accurate.
Exporting Alignment & Profile
Exporting Alignment & Profile

![Image showing the Export LandXML 1.2 window with selected options and the resulting file 'US85A&P.xml']
Drag and drop the .xml alignment and profile into TBC
.xml Surfaces

- DG_US85.xml
- G1_US85.xml
- B1_US85.xml
- T_US85.xml
Use of the Surface Model
Use of the Surface Model
Use of the Surface Model
Review and Understand Limitations
Exporting the Model to Data Collector
Cutting Cross Section Templates from surfaces for staking
Stn: 2714+00.000ift (XS,T)
String: CL Offset: 0.000ift
North: 331941.669ift East: 1290436.798ift Elev: 2850.021ift

End of Surface

4:1 Slope Stake

End of Surface

19.7ift
SDD to Field Survey

SDD

Alignment & Profile.xml
Subgrade, Base, Finish Surfaces.xml

Trimble Business Center

Alignment & Profile.rxl
Subgrade, Base, Finish Surfaces.ttm
Cross Section Templates
Horizontal alignment
Vertical alignment
Templates
Template positions
Superelevation & widening
Station equations
Additional points
Stn: 2714+00.000ift (XST)
String: CL Offset: 0.000ift
North: 331941.669ift East: 1290436.798ift Elev: 2850.021ift
Slope Staking

- Using Template Created from Surface
- Using Side Slope Definition and Cross Sections
Slope Staking with Side Slope Definition
Slope Staking with Side Slope Definition

Hinge point definition
Hinge derivation method: **Offset and elevation**
H. Offset: 32.500 ft Right 2847.090 ft

Side slope definition
Cut slope: 25.0000%

Subgrade shoulder Hinge Point
Slope Staking with Side Slope Definition
Slope Staking with Template

Select station

| Road name: | 2704+00.000ft (T) |
| Stake: | 2705+00.000ft (T) |
| Station an Target height: | 2706+00.000ft (T) |
| 5.000ft | 2707+00.000ft (T) |
| 2708+00.000ft (T) |
| 2709+00.000ft (T) |
| 2710+00.000ft (T) |
| 2711+00.000ft (T) |
| 2712+00.000ft (T) |
| 2713+00.000ft (T) |
| 0.000ft (T) |
| 2714+00.000ft (T) |
| 2715+00.000ft (T) |

Select offset

| Road name: | (Left side slope) |
| Stake: | 49.497ft Left |
| Station an Target height: | 32.460ft Left |
| 5.000ft | 21.460ft Left |
| 16.000ft Left | 0.000ft Left |
| 0.000ft CL | 0.000ft Right |
| 16.000ft Right | 0.000ft Right |
| 21.460ft Right | 32.460ft Right |
| 50.404ft Right | 0.000ft Right |

Esc Enter

Esc Enter
Blue Topping Methods

- Templates
- TTM Surface
- Creating Report
- Cross Section Labels
Blue Topping with Template
Blue Topping with Surface

- Difficult to pinpoint the breakpoint
- Offset isn’t readily available
- Works great for grade verification
Blue Top Report from TBC
Cross Section Labels

Sta 2714+00.00 R1

-32.5'
-2847.09
.dgn Files

- CONTROL.dgn
- Design.dgn
- DS_Align.dgn
- profile.dgn
- RDM_US85.dgn
- RW_bndy.dgn
- Terrain_Ext.dgn
- TOPOG.dgn
Plan View Labeling
Plan View Labeling

Station and Offset of pipe end

2707+69.30
-50.2755

2833.35

2832.41
• Need the .gpk file which contains alignment
• Need to select chain that has the stationing you want to reference
• If you want elevation you can load one of the .tin files provide in the SDD
Background Images for Data Collector
Background Images
Automated Machine Guidance (AMG)
Contractor Benefits

- Increased Productivity
- Reduction in labor
- Material savings
- Safety
- Reduction in survey cost
- Increased Accuracy
- Reduction in Fuel
- Daily As-Builts
Changing Role of Surveyor

- Establishes horizontal and vertical project control
- Data management
- Acquires and validates DTM
- Set Fewer Stakes
- Performs and Documents Check Shot
- Verifies Grades
Changing Role of the Inspector

- Performs field work with less support from surveyors
- Checks constructed elements for grade, alignment, or width with fewer stakes available
- Needs additional technology to check stake-less construction
Field Verification is Key

- Discuss what you want done
- Check shots – Contractor and Engineer
- Final Documentation
- GPS Signal During Finishing
- Work together
- A few stakes doesn’t hurt
Survey Committee & Training

• Survey committee meetings and topics
• Help guides and survey guidance in O:\22 Committees Meetings\Survey Committee
• Talk to each other
• Submit topics and request training to survey committee
• Don’t be afraid to ask questions and try things
• Share the information you have with others
• Jason Fischer, P.E.
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• jrfischer@nd.gov
LOONEY TUNES

“THAT'S ALL FOLKS!”