Innovative Tools for the Job

Presented by the I-96 Field Office
Topics:
1) I-96 Project
2) Use of Technology
3) The cloud
4) Adobe editing applications
5) Other collaborative tools
6) E-Construction
I-96 - Telegraph to Newburgh

- 7 mi. freeway reconstruction (58 lane miles)
- 37 bridges (2 full replacements)
- 15+ miles of sewer installed
- 700,000 sq yds of new concrete pavement
- 800,000 tons of aggregate
- 800,000 yds of earth excavated
- $148 million contract
- 167 days
I-96 Project Personnel

- Dan’s Excavating - Prime Contractor

Approximately:
- 53 Contractors
- 56 MDOT Employees
- 33 Consultant Employees
- 8 Testers
- Assistance from various other resources
E-Construction
MDOT is Going From This...
E-Construction?

Piece of Cake
Concerns from I-96 Team

1) A+B schedule
2) Document volume and document tracking
3) Personnel roles
4) Learning curve
I-96 Team

1 Documentation person
3 Office techs
1 Payroll tech (LCP Tracker and B2GNOW)
70+ inspectors (MDOT, Co-ops, Consultants)
Document Volume

- 250+ Shop drawings
- 91 RFI’s
- 100+ MSL’s
- 500+ Certs
- 5,830 IDR’s
- Daily reports, submittals and correspondence
Naming and Sequence #s

- Follow Standard Naming Convention and add sequence #s to docs as they come in
  - Shop Drawings, RFI’s, Certs, MSL’s, correspondence and more
- Reference sequence #s in Field Manager
- Don’t create more folders than necessary
## General Item Information

- **Item:** 7070015, Bearing, Elastomeric, 1 3/4 inch
- **Prop. Ln:** 3770
- **Unit:** Sin
- **Type:** Original
- **Auth. Qty:** 17,280.000
- **Unit Price:** $0.780
- **Pending Chgs:** 0.000
- **Auth. Amt:** $13,132.80
- **Qty. Placed:** 17,280.000
- **Qty. Paid:** 17,280.000

## Item Materials

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Unit</th>
<th>Usage Factor</th>
<th>Total Qty Approved</th>
<th>Total Qty Used</th>
<th>Total Qty Available</th>
<th>Qual/Cert Product</th>
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</thead>
<tbody>
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<td>Bearing Pad, Elastomeric</td>
<td>Sin</td>
<td>0.0000</td>
<td>0.00</td>
<td>21,525.00</td>
<td>0.00</td>
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<td>Quantity Approved</td>
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<td>Lot No.</td>
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<tr>
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<tr>
<td>1/23/2014</td>
<td>E300/501/15</td>
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<td>D.S.BROWN</td>
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<td>Test Data Certification</td>
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<td></td>
<td>201-023 S15</td>
<td>TDC in file 307-053 (S14 and S15)</td>
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<td></td>
<td>201-159 (S07 and S10)</td>
<td>Show test results for shear modulus and S10 ASTM D4014</td>
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<td></td>
<td>201-174 (S05)</td>
<td>V'I'd and accepted on IDR MC1 6/6/2014</td>
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</table>

MSL location: File 300/Seq Num 15
Cert location: File 307/Seq Num 053
Shop Drawing location: File 201/Seq Num 022
Shop Drawings and RFI’s

- One point of contact
- Make corrections and comments in PW
- Create a sortable tracking spreadsheet, but also utilize ProjectWise workflows
- Sequence drawings as they come in
- Encourage questions to come in as RFI’s
Material Source Lists

- Contractor needs to submit early
- Link into Field Manager
- MDOT to review and comment in PDF
- Corrections and approvals much faster
# Material Source List

**Project Location:** I-96 from Newburgh to US-24 - Livonia & Detroit, Wayne County

<table>
<thead>
<tr>
<th>MDOT SPEC #</th>
<th>MDOT MATERIAL/PRODUCT NAME</th>
<th>TYPE OR CLASS</th>
<th>APPT. QTY.</th>
<th>SOURCE OF MATERIAL (NAME, ADDRESS, LOCATION, P.O. #)</th>
<th>FOR OFFICE USE ONLY (Owner Agency)</th>
<th>BASIS OF ACCEPTANCE</th>
<th>CERTS</th>
<th>REMARKS/OTHER</th>
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<tbody>
<tr>
<td>913.065</td>
<td>manhole drainage structure</td>
<td>24&quot;</td>
<td>18 ea</td>
<td>Co-Pipe Products, Inc.</td>
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<td></td>
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<td>manhole drainage structure</td>
<td>48&quot;</td>
<td>1131 ea</td>
<td>20501 Goddard Rd</td>
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<td>913.065</td>
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<td>25 ea</td>
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<td>manhole drainage structure</td>
<td>96&quot;</td>
<td>1 ea</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>913.065</td>
<td>RCP CL IV Premium joint</td>
<td>12&quot;</td>
<td>45858 ft</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>Approved Manufacturer*</td>
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<td>913.065</td>
<td>RCP CL III Premium joint</td>
<td>15&quot;</td>
<td>103300 ft</td>
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<td></td>
<td></td>
<td>X</td>
<td>Approved Manufacturer*</td>
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<td>913.065</td>
<td>RCP CL IV Premium joint</td>
<td>18&quot;</td>
<td>107 ft</td>
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<td></td>
<td></td>
<td>X</td>
<td>Approved Manufacturer*</td>
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<tr>
<td>913.065</td>
<td>RCP CL III Premium joint</td>
<td>10&quot;</td>
<td>5321 ft</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>Approved Manufacturer*</td>
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<td>913.065</td>
<td>RCP CL III Premium joint</td>
<td>24&quot;</td>
<td>2460 ft</td>
<td></td>
<td></td>
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<td>X</td>
<td>Approved Manufacturer*</td>
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<td>30&quot;</td>
<td>67 ft</td>
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<td></td>
<td>X</td>
<td>Approved Manufacturer*</td>
</tr>
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</table>

* General certification to be sent to Construction Field services,

**Contractor:** Dan's Excavating, Inc.

**Control Section:** 52122

**Job Number:** 50006

**Print Name:** Joseph Goodall, Project Manager

**Telephone Number:** 586-254-2040

**Date Submitted:** 1/23/2014

**Date Received:**

**Signatures:**
- **Owner Agency (Rep. Signature):** Mike Cleaver
- **Print Name:** Mike Cleaver
- **Telephone Number:** 586-254-2040
- **Date Submitted:** 1/23/2014
- **Date Received:**

---

- **TeachoutM2:** 6/4/2014 10:54:04 AM
  - CO-pipe providing class V pipe but being billed to contractor as requested class. Hence, different class types.
Sequence 001R1

Attn: Mr. Mike Cleaver
MDOT

Re: Job# 82122-89095

Dear Sir:

With regard to the 12", 15" and 18" Reinforced Concrete Pipe supplied to the project listed above, Co-Pipe Products Inc. only manufactures and supplies class 5 pipe. The pipe is invoiced at the class that is specified in the specifications of the job, but class 5 is always delivered. Due to the minimal difference in the required steel area for these sizes of pipe we have decided not to stock class 3 and 4 pipe. When a contractor calls for 12", 15" and 18" class 3 or 4 pipes they are quoted and billed for that respective class. We feel that by supplying only class 5 pipes for these sizes it offers our customers a superior strength pipe at the cost of the lower strength pipe.

If you have any questions or concerns please do not hesitate to contact me.

Best Regards,

Wesley Bailey
Co-Pipe Products Inc.
20501 Goddard Rd.
Taylor, Michigan 48180
Certs

- Sequence numbers and naming convention
- Link into Field Manager
- Contractor separates certs if necessary
- Have contractor identify pay item(s) the cert correlates to
Bill of Lading

Bill of Lading #: 280832 - 1
Date Shipped: 03/31/2014

Shipment Information:

Ship To:
Job Name: NDOT-ITEM #601 CONTRACT #82122-669095
Customer: C A HULL COMPANY INC
Address: 196
City State Zip: LIVONIA, MI 48150

Carrier:
Name: William McCoy
Pro Number:
SCAC:
Trailer Number:

Delivery Date: 03/31/2014
Time:

Special Instructions:
BILL

Load Information:

<table>
<thead>
<tr>
<th>Barlist #</th>
<th>Description</th>
<th>Color/Symbol</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>0156E</td>
<td>S30 - PRJ RESTEEL - C A HULL</td>
<td>Brown C 62</td>
<td>870 Lbs.</td>
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<tr>
<td>0153E</td>
<td>S11 - PRJ RESTEEL - C A HULL</td>
<td>Blue A 63</td>
<td>2377 Lbs.</td>
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<td>0154E</td>
<td>S31 - PRJ RESTEEL - C A HULL</td>
<td>Maroon J 64</td>
<td>870 Lbs.</td>
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<td>0155E</td>
<td>S12 - PRJ RESTEEL - C A HULL</td>
<td>Green B 65</td>
<td>1805 Lbs.</td>
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<td>LtGreen E 66</td>
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<td>0157E</td>
<td>S33 - PRJ RESTEEL - C A HULL</td>
<td>Orange J 67</td>
<td>870 Lbs.</td>
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<td>0158E</td>
<td>S26 - PRJ RESTEEL - C A HULL</td>
<td>Pink M 66</td>
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<td>0159E</td>
<td>S34 - PRJ RESTEEL - C A HULL</td>
<td>Purple H 69</td>
<td>765 Lbs.</td>
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<td>0170E</td>
<td>S16 - PRJ RESTEEL - C A HULL</td>
<td>Red L 70</td>
<td>2153 Lbs.</td>
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<td>0171E</td>
<td>S35 - PRJ RESTEEL - C A HULL</td>
<td>Tan T 71</td>
<td>715 Lbs.</td>
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<td>0172E</td>
<td>S17 - PRJ RESTEEL - C A HULL</td>
<td>White X 72</td>
<td>1934 Lbs.</td>
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<td>0173E</td>
<td>S18 - PRJ RESTEEL - C A HULL</td>
<td>Yellow N 73</td>
<td>1231 Lbs.</td>
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</table>

Mill Certs Attached? No

Note: Liability limitation for loss or damage in this shipment may be Applicable. See 46 USC-14706(c)(1)(A) and (B)

Trucked or Non-NMFC LTL Carriers Rejected, subject to individually determined rates or contracts that have been agreed upon. In writing, between the carrier and shipper, if applicable, otherwise the rates, classifications and rules that have been established by the carrier and are available to the shipper on request, and to all applicable state and federal regulations.

Shipper Signature/Date
Name: Ambassador Steel Fabrication, LLC
Date:

Carrier Signature/Pickup Date
Name: 
Date:

Arrival/Departure Times:
Name: 
Date: 

Customer Signature/Pickup Date
Name: 
Date: 

File and Sequence # 307-004
CERTIFICATION OF STEEL BAR REINFORCEMENT

We certify that the following described material meets the specification requirements of the MICHIGAN DEPARTMENT OF TRANSPORTATION SPECIAL PROVISION FOR BUY AMERICA (105.10 Scope of steel and iron) for the above project and is material certified by the manufacturer(s)/brand(s) indicated below. Their certifications for this material on file.

**EPOXY COATED STEEL BAR REINFORCEMENT**

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<tr>
<th>Power Lot</th>
<th>Manufacturer</th>
<th>Heat No.</th>
<th>Bar Size</th>
<th>Grade</th>
<th>Imp</th>
<th>Soft</th>
<th>Imp</th>
<th>Soft</th>
<th>Imp</th>
<th>Soft</th>
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<td>INGOLD STEEL</td>
<td>KN131051301</td>
<td>4</td>
<td>60</td>
<td>600</td>
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<td>3T001524</td>
<td>INGOLD STEEL</td>
<td>KN1310454301</td>
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<td>6,124</td>
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<td>3T001524</td>
<td>INGOLD STEEL</td>
<td>KN1310454201</td>
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<td><strong>TOTAL</strong></td>
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<td>40,617</td>
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</table>

**PLAIN STEEL BAR REINFORCEMENT**

All steel furnished is of domestic origin and is in compliance with the project "Buy America" provision.
IDR’s

- Senior inspector will check IDR in PDF and E-sign
- No sequence numbers - sorted by date and inspector initials
- Attachments - Pictures of forms or drawings, fillable forms, marked up pdf plans
## Inspector's Daily Report

**FieldManager 5.00**

### Item Postings

<table>
<thead>
<tr>
<th>Item/Material Description</th>
<th>Item Code</th>
<th>Prop. Line</th>
<th>Project</th>
<th>Category</th>
<th>Quantity</th>
<th>Unit</th>
<th>Location</th>
<th>Breakdown ID</th>
<th>Attr</th>
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<td>Light Std. Framable Transformer Base</td>
<td>6190201</td>
<td>2335</td>
<td>103335A</td>
<td>0001</td>
<td>2.000</td>
<td>Ea</td>
<td>NE/SE quadrant of 035 of 1293</td>
<td>02122 (East Beach Driveway)</td>
<td>(11)</td>
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</tbody>
</table>

**Contractor:** Dan's Excavating, Inc.

**Items Remarks:** 1939+08 WBD 1939+11 EBD

- Framable Transformer Base
  - Material Remarks: Vented and accepted.
  - Valment

<table>
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<tr>
<th>Item/Material Description</th>
<th>Item Code</th>
<th>Prop. Line</th>
<th>Project</th>
<th>Category</th>
<th>Quantity</th>
<th>Unit</th>
<th>Location</th>
<th>Breakdown ID</th>
<th>Attr</th>
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<td>6200333</td>
<td>2745</td>
<td>106714A</td>
<td>0001</td>
<td>1.000</td>
<td>Ea</td>
<td>Inkster Road bridge (S14 of 02122)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Contractor:** Dan's Excavating, Inc.

**Items Remarks:** breakdown 1024

- NW quadrant on existing steel strain pole.

**Note:** Pay item on plans show TS as Pedestal Mtrd, but there is no Pedestal in quadrant. Directed contractor to attach to existing steel strain pole hence changing pay item

<table>
<thead>
<tr>
<th>Item/Material Description</th>
<th>Item Code</th>
<th>Prop. Line</th>
<th>Project</th>
<th>Category</th>
<th>Quantity</th>
<th>Unit</th>
<th>Location</th>
<th>Breakdown ID</th>
<th>Attr</th>
</tr>
</thead>
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<td>2740</td>
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<td>0001</td>
<td>2.000</td>
<td>Ea</td>
<td>Inkster Road bridge (S14 of 02122)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Contractor:** Dan's Excavating, Inc.

**Items Remarks:**
1. On Eastbound Service Drive (Schoolcraft) OH span wire

**Note:**
- Material Remarks: Vented and accepted.
- Carrier and Gable
- TS from Siemens

**Reviewed By:**

Arnold P. Beller

(Signature) (Date)
<table>
<thead>
<tr>
<th>Form Date</th>
<th>File/Form/Seq. No</th>
<th>Quantity Approved</th>
<th>Source</th>
<th>Lot No.</th>
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<tr>
<td>1/24/2014</td>
<td>E300/501/7</td>
<td>N/A</td>
<td>Cree Lighting</td>
<td>201-071</td>
<td>Approved shop drawings in file 201-071, SP page 702, Model #XSP2-BXSPA02/G, V'd and accepted on IDR 918.09</td>
</tr>
</tbody>
</table>
IMPORTANT SAFEGUARDS
When using electrical equipment, basic safety precautions should always be followed, including the following:

READ AND FOLLOW ALL SAFETY INSTRUCTIONS
1. To reduce the risk of electric shock, turn off power supply before installation or removal.
2. This luminaires must be installed in accordance with the NEC or your local electrical codes. If you are not familiar with these codes and requirements, consult a qualified electrician.
3. If NEMA photo control is installed, refer to NEMA fieldwiring section for instructions.
4. If mounting bolts are completely removed in the field they should be hand threaded (prior to use of prior tool) to ensure proper engagement of threads when re-installing. Failure to pre-thread before may result in cross-threading or stripping of the bolts during reinstallation.

SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE

TO INSTALL:

LUMINARIASE INSTALLATION

STEP 1:
DO NOT remove safetyguard near fixture.
If fixture is to be mounted to 125-425 (160 D.O.D.), there is no need to modify the safetyguard. If fixture is to be mounted to 220 (130 D.O.D.), remove the insert of the safetyguard (see the rear opening of the fixture while the fixture is closed. See Figure 5.

STEP 2:
To open cover, pull fixture and loosen the captive spring and allow the cover to swing open. Safetyguard may disengage from fixture, but should be repositioned once ready to mount. See Figure 5.

STEP 3:
Slide fixture on to pole through opening on rear of housing and through safetyguard. See Figure 5.

STEP 4:
To level fixture, use bubble-level located inside housing. Adjust leveling of fixture until plumb to side. To level from front to back, slide pole to different steps in upper housing. Each step changes the angle in 2-5 degree increments.

STEP 5:
Once desired position is achieved, tighten mounting bolts to the appropriate torque values specified in TORQUE VALUES table to the left. See Figure 6 (see 8/32" socket wrench).

NOTE: luminaires with 4 pole mount will have (3) mounting brackets and (4) mounting bolts. See Figure 6.

STEP 6:
IMPORTANT - DO NOT exceed these torque levels on the mounting bolts. Exceeding recommended torque value resulting in excessive deformation of mounting bracket will cause chipping of rear hardware which could lead to an unsafe mounting condition.

STEP 7:
Refer to Electrical Connections section for completing electrical connections.
Pros of I-96 E-Construction

- Review turnarounds (Especially with A+B)
- Transparency
- Organization
- Space saved
  - 17,601 documents  42.5 GB
- Helpful statewide support
Challenges of I-96 E-Construction

- At mercy of network connection
- PW, Field Manager, Outlook all separate
- Field documents into ProjectWise
- Still have paper tickets, ride quality, etc.
- Learning curve
- Work behind the scenes
Recommendations

● On-site server w/ battery backup and high speed internet lines
● Become familiar with E-construction before job starts and stay ahead
● Submittals- the sooner the better
● Set precedence w/ contractors
● Stay consistent with filing, naming and sequence numbers
Use of Technology
The Cloud

What is it?
In basic terms it is a central place you can keep all of your files and access from anywhere.
Obsolete?

- Thumb Drives
- Portable Hard Drives
- Disc Drives (CD/DVD)
Pros of the Cloud

● Ending the need to “back up” or “save to” hard drives and flash drives
● Share any size file without bogging down email
● Collaboration
● Files are always available
● Endless possibilities
Cloud Challenges

- Keeping up with technology
- Balancing security with flexibility
- Not a one size fits all solution
- The learning curve
- Internet/Cell service
Google Drive

Access your files...

at the office

on the go

from your home

from any device
Pros of Google Drive

● Google sheets and Google docs have simultaneous collaboration
● Works across all platforms and devices
● They have a government business model
● Integrated into many apps and programs
Challenges of Google Drive

- DTMB does not allow it to be downloaded to your computer
- Investment needed for long term use
Cons of Dropbox

- There really aren’t any cons other than cost
Pros of DropBox

● Easy to use!
● Documents update and sync automatically
● Integrated into many apps and programs
Sharepoint
Pros of Sharepoint

- Project oriented features
- Integrates with other Microsoft applications such as Lync, Outlook, Word, Excel, etc.
- DTMB is okay with it
- Robust and capable of being developed to meet specific user needs
Challenges of Sharepoint

- It's complex
- DTMB does not allow it to sync with apps on Ipad
- Doesn’t integrate well with non-microsoft products
- Automatic backup of pictures has to be done with a workaround
It doesn't matter how many "resources" you have.

If you don't know how to use them, it will never be enough.
Use of Tech Tools

● PDF Generating
  ○ Adobe, PDF Expert, Genius Scan

● Document Managing
  ○ ProjectWise, FieldManager, SharePoint, Notability, PDF Expert.

● Survey Technology
  ○ GPS, Total Station, Model Data

● Collaborative
  ○ SharePoint, Cloud Based Solutions
Demo

- PDF creation / Adobe / Master Log of Production
- SharePoint
- Survey Technology
- Cloud Collaboration
  - Google Sheets Real-Time Collaboration (MicroSoft offers this as well)
Adobe

● WHAT IS IT?
  ○ Software package developed by Adobe Systems Inc.
  ○ Creative collaborative software used for creating/viewing/managing PDFs
  ○ Available to MDOT
    ● Nuance (Consultant Staff)
  ○ Helps us to function in our new paperless environment.
  ○ PDF Expert iPad App
SharePoint
Cloud Collaboration
Survey Technology
Challenges for Tech Tools

- No Silver Bullet Solution
- Technology Constantly Evolving
- Control of Content
- Aligning objectives and creating a unified approach
- Naysayers
Challenges for Tech Tools

- No Silver Bullet Solution
- Technology Constantly Evolving
- Control of Content
- Aligning objectives and creating a unified approach
Ideas and Suggestion for the Future

- BlueBeam (https://www.youtube.com/watch?v=-nYO7SiaPTI)
- Integration of Survey Technology to help automate the approach to gathering field quantities and reporting pay items.
- QR Code/Ticket Database (Demo)
We all hold a piece to the puzzle...
It doesn't matter how many “resources” you have.

If you don't know how to use them, it will never be enough.
Questions?

Call 1-800-E-CLEASE