

# PREPARING FOR THE INDUSTRY OF TOMORROW



"Cool" is a terrible business plan!

### The following CE credits are offered for this session:





**1.0 AIC CPD Credit** | AGC of America has been approved to offer Continuing Professional Development (CPD) credits for qualifying programs by the <u>American Institute of</u> <u>Constructors</u> (AIC).



**1.0 SMPS CEU Credit** | AGC of America is approved by the <u>Society for Marketing Professional</u> <u>Services</u> (SMPS) to offer SMPS CEUs.



AGC of America is registered with the National Association of State Boards of Accountancy (NASBA) as a sponsor of continuing professional education on the <u>National Registry of CPE</u> <u>Sponsors</u>. This session is designated for **1.2 CPE credits** in the field of Information Technology.



**1.0 CM-Lean CE Credit** | AGC of America recognizes the Annual Convention as qualifying for continuing education hours towards the renewal of AGC's Certificate of Management-Lean Construction (CM-Lean).



**1.0 CM-BIM CE Credit** | AGC of America recognizes the Annual Convention as qualifying for continuing education hours towards the renewal of AGC's Certificate of Management-Building Information Modeling (CM-BIM).



### How to earn CE hours for this session

Participants must:

- 1. Check in with attendance scanner at the door or in the back of the room.
- 2. Attend at least 95% of the session.
- 3. Complete the session and post-program evaluation.

Additional instructions will be emailed to attendees requesting CE credits.

For those requesting AIA credits, please provide your AIA number so we can report your attendance. You may contact **Jo-Anne Torres**, Manager of Professional Development and Continuing Education, at **jo-anne.torres@agc.org** or (703) 837-5360 for questions.



### **Learning Objectives**

By the end of this session, participants will be able to:

- 1. Identify types of technology that executives should be tracking.
- 2. Sort through new technology to find potential improvements.
- 3. Explore shortlisted technology to begin implementation.
- 4. Apply change by having people use the technology productively.



### **Benjamin Crosby**

Director of BIM / VDC Yates Construction





Insert Presentation Title Here



# **Cool is a terrible business plan!**

We want productive Tech!



Insert Presentation Title Here



### **Cool is a terrible business plan!**

We want productive Tech!

Benjamin Crosby – Spectrum Capital

@BIMjamin

www.bimjamin.com



### Cool – Christmas 2015





## **Blowing money - 2016**



James Eng Dec. 16. 2015



IMAGE: CHAPPAQUA FIRE DEPARTMENT MASHABLE.COM Adario Strange Jan 21 2016

#### Half a million hoverboards recalled due to fires, explosions and injuries

Mass recall comes after reports of hoverboard battery packs that exploded or caught fire and caused injuries such as burns to the neck, legs and arms



A Hoverboard explodes during a test drive

THEGAURDIAN.COM Associated Press Wed 6 Jul 2016

### **Great Investment – October 2019**





### **Things to know - Hoverboards**



#### Hoverboard buying and caring tips

- Don't buy cheap (less than \$300) hoverboards; invest in higher-quality brands.
- Look for a model with a UL-certified charger or battery pack.
- Check manufacturer's warranty before you buy.
- · Unplug the hoverboard when it's completely charged to avoid overcharging.
- Do not leave the hoverboard unattended while it's charging.
- To avoid all instances of hoverboard self-destruction and personal injury, do not buy a hoverboard.







#### VALENTINA PALLADINO

Valentina reviews consumer electronics for Ars Technica, testing all kinds of gadgets with a focus on mobile devices and wearables. She has a soft spot for Chromebooks.

TWITTER @valentinalucia



## **Things to know – Practical Application**



- 1. Don't try to go cheap
- 2. Check/Get Certification
- 3. Check for quality/history
- 4. Don't overdo it
- 5. Check on progress
- 6. Buy a horse to ride

#### Hoverboard buying and caring tips

- Don't buy cheap (less than \$300) hoverboards; invest in higher-quality brands.
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- Check manufacturer's warranty before you buy.
- Unplug the hoverboard when it's completely charged to avoid overcharging.
- Do not leave the hoverboard unattended while it's charging.
- To avoid all instances of hoverboard self-destruction and personal injury, do not buy a hoverboard.

READER COMMENTS

SHARE THIS STORY 🕤 😏 🌚

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## What do you want to talk about



- Lean
- LOD
- BIM
- VDC
- 4D
- 5D
- IFC
- COBie / 6D



- UAV
- SAM
- RTS
- GPS
- GIS

### Lean = Not an acronym



### • AGC CM-Lean = Foundation





....

Course

View upcoming classes!

Calendar

Supplemental

Courses

Learn More!



Everyone related to the construction process has an incentive to get the project done faster







#### • Last Planner System = Better Meetings – Better Schedule











#### • Lean Design = BIM < iterative design < model review < VDC The MacLeamy Curve



AGC2 OPEN INTEGRATION SUMMIT 2017 | CONSTRUCTION PROGRESS COALITION



#### Informal vs. Formal Boundaries

Lean



### Lean

AG



### • Prefabrication < Manufacturing





### Lean



#### • It is a Social Tech – not a Program



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(in)



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#### Making Productivity Gains Through Material Handling and Kaizen

November 27, 2018 by Derek Buehler under the topic of: Faith Technologies, Productivity

At **Faith Technologies**, continuous improvement and innovation are at the heart of our work. Through focused, gradual improvements over a nine-year span, Faith has increased primary, or value-added, time from 39 percent to 66 percent. This represents a 69 percent improvement in time spent on what the customer pays us to do, while the construction industry overall has stagnated at 42 percent primary time throughout the same period.



engage material handlers





- 1. Hard Bid is usually not the low cost option.
- 2. Get your team educated request certification for others.
- 3. Request history / results in qualification documents.
- 4. Don't ask for everything hit the important parts.
- 5. Actively participate.
- 6. Lean is a culture, not a bolt on.



### LOD = Level of Development



#### LEVEL OF **BIM**FORU DEVELOPMENT SPECIFICATION October 19, 2016 http://bimforum.org/lod/ PARTICIPATING ORGANIZATIONS The American AGC of America BIM-M Institute of Architects USIBD Precast/Prestressed PCI Concrete Institute Copyright © 2016 BIM Forum



LOD







## LOD = Level of Developement



- 1. The Specification is free to use.
- 2. Lots of webinars on how to use it. BIMForum.org
- 3. LOD 100 and 200 and 300 for A/Es LOD 350 and 400 for Shop Models.
- 4. Don't ask for 400, 450, 500, 789.
- 5. Review models frequently (at least monthly).
- 6. No risk here, just do it.



## **BIM = Building Information Modeling**





you are a prime contractor using BIM across an entire project or a subcontractor impacted by















































DIN







Graphisoft – BIMx - Demo









• What do you use the model for during design?



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### • Review model progress regularly (don't waste time on

| Α | V19   | 20190708<br>07/16/2019 | Ŧ |
|---|-------|------------------------|---|
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|---|---|--------|-------|------------|--|
| ▶ Generic Models : #SY - DrapeText_Start : Default          | L | 2      | 0     | 2.00 EA    |  |
| <ul> <li>Structural Columns</li> </ul>                      | L | 65.75  | 18.00 | 47.75 LF   |  |
| ▶ Structural Columns : #CIP - Column - Rectangular : 18x18  | L | 29.33  | 12.00 | 17.33 LF   |  |
| Structural Columns : #CIP - Column - Rectangular : 18x36    | L |        | 6.00  | (6.00) LF  |  |
| Structural Columns : #STL - Column - HSS Rectangular        | L | 36.42  |       | 36.42 LF   |  |
| <ul> <li>Structural Connections</li> </ul>                  | L | 12     | 0     | 12.00 EA   |  |
| ▶ Structural Connections : #CN - Anchor Bolts No Plate : Co | L | 8      | 0     | 8.00 EA    |  |
| Structural Connections : #CN - Plate - Embed - Horizontal   | L | 2      | 0     | 2.00 EA    |  |
| Structural Connections : #CN - Plate - Embed - Vertical :   | L | 2      | 0     | 2.00 EA    |  |
| <ul> <li>Structural Framing</li> </ul>                      | L | 118.83 | 73.50 | 45.33 LF   |  |
| Structural Framing : #CIP - Framing - Rectangular : BM40    | L | 31.08  | 31.08 | 0.00 LF    |  |
| Structural Framing : #STL - Framing - C Shape - 2017v1 :    | L | 11.67  | 17.75 | (6.08) LF  |  |
| Structural Framing : #STL - Framing - C Shape - 2017v1 :    | L | 7.25   |       | 7.25 LF    |  |
| Structural Framing : #STL - Framing - L Shape - 2017v1 :    | L |        | 7.33  | (7.33) LF  |  |
| Structural Framing : #STL - Framing - W Shape - 2017v1      | L |        | 17.33 | (17.33) LF |  |
| Structural Framing : #STL - Framing - W Shape - 2017v1      | L | 68.83  |       | 68.83 LF   |  |
| 4551445   | L | 34.42  |       | 34.42 LF   |  |
| 4554000   |   | 24.42  |       | 24.42 1.5  |  |

SHOW VARIANCES FOR

Added (75)

**A**(



• Existing facility = Laser scan.









- 1. Your top 20-25% design firms are doing it right.
- 2. Do they have a BIM person, or are they practicing 3D Design.
- 3. How have they used the models (consultants too) in the past.
- 4. COBie can be a killer, just ask for what is needed.
- 5. Review the models regularly (scope, alignment, progress).
- 6. If it cost more their doing it wrong.


# VDC = Virtual Design and Construction



- Virtual Design and Construction > BIM
- What do you do with the models









VDC



#### Process for better building



#### Collaboration



 A key to success is acknowledging and respecting the skillsets of the project team members, from different backgrounds and organizations.



Unit 3: BIM Project Execution Planning







VDC



 As-builts (trash) vs Record Models and Fabrication Models As-Built Drawings Design Changes Direction Construction Drawings \$ Field \$ Changes \$ Shop Drawings **Red Lines** Design changes are not incorporated into documents until the end. Building with loosely coordinated documents and sometimes 2020 Accepted in a ted changes (RFI's, Sketches, ASI's)





#### As-builts (trash) vs Record Models and Fabrication Models This is the way to do it! All Changes, RFI's, Reroutes, ASI's, are vetted in the models FIRST. Drawings Design Changes Shop Direction Models Construction Models Field Changes Shop Model Drawings Coord. \$







• As-builts (trash) vs Record Models and Fabrication Models



# VDC

• Use a good contract

Responsibility for accuracy

Standard of care.

Models have to grow into reliability, (premature reliability).

Software defects.

Copywrite and intellectual property

• Design and Trade models

Owner use of Models

Set Expectations at Start

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## Consensus Docs: 301 2011 version









- 1. Top 20-25% of firms do it right.
- 2. AGC CM-BIM Design Team, Contractor, Trades, Owner Reps.
- 3. If it cost more they don't know how to do it right.
- 4. Model all design, shops, coordination, and cut sheets.
- 5. Weekly coordination and frequent scope, quality, schedule, cost, 6D checks.
- 6. Don't build or remodel.



### 4D – Combine 3D models with Time







- 1. Have the GC do it.
- 2. Does the GC have Certified 4D Personnel.
- 3. How do they use it? See past projects, not just Marketing.
- 4. Not made for detail, work with your typical schedule.
- 5. Monthly Updates, Revisions, Fragnets, Critical path.
- 6. If it costs more they don't understand it.



5D

-

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#### • Check quantities regularly.

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|---|-----|------------------------|
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| <u> </u> | 1/4.0 | 20190607   |
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| Generic Models : #SY - DrapeText_Start : Default          | L | 2      | 0     | 2.00    | EA |  |  |
| <ul> <li>Structural Columns</li> </ul>                    | L | 65.75  | 18.00 | 47.75   | LF |  |  |
| Structural Columns : #CIP - Column - Rectangular : 18x18  | L | 29.33  | 12.00 | 17.33   | LF |  |  |
| Structural Columns : #CIP - Column - Rectangular : 18x36  | L |        | 6.00  | (6.00)  | LF |  |  |
| Structural Columns : #STL - Column - HSS Rectangular      | L | 36.42  |       | 36.42   | LF |  |  |
| <ul> <li>Structural Connections</li> </ul>                | L | 12     | 0     | 12.00   | EA |  |  |
| Structural Connections : #CN - Anchor Bolts No Plate : Co | L | 8      | 0     | 8.00    | EA |  |  |
| Structural Connections : #CN - Plate - Embed - Horizontal | L | 2      | 0     | 2.00    | EA |  |  |
| Structural Connections : #CN - Plate - Embed - Vertical : | L | 2      | 0     | 2.00    | EA |  |  |
| <ul> <li>Structural Framing</li> </ul>                    | L | 118.83 | 73.50 | 45.33   | LF |  |  |
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| Structural Framing : #STL - Framing - L Shape - 2017v1 :  | L |        | 7.33  | (7.33)  | LF |  |  |
| Structural Framing : #STL - Framing - W Shape - 2017v1    | L |        | 17.33 | (17.33) | LF |  |  |
| Structural Framing : #STL - Framing - W Shape - 2017v1    | L | 68.83  |       | 68.83   | LF |  |  |
| 4551445   | L | 34.42  |       | 34.42   | LF |  |  |
| 4554000   |   | 24.42  |       | 21.12   |    |  |  |

SHOW VARIANCES FOR

🖉 😑 Added (75)

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## **5D – Models for Quantities**







- 1. Have GC provide access and reports.
- 2. Check model quantities with traditional quantities/estimating.
- 3. What is in model and what is not.
- 4. don't change design model process for quantities sake.
- 5. Compare them regularly.
- 6. Get cost breakdowns as usual.



# IFC – Industry Foundation Classes

- 1. Specify all your model be delivered in IFC format
- 2. Use software that is IFC compatible/certified.
- 3. Be sure your Design team and Contractors have done it before.
- 4. Ask for the Add/Deduct for using IFC up front.
- 5. Collect models monthly for review.
- 6. Hope your current software will still open your record model in 5 years.







### COBie = 6D



#### Encapsulated Transformers .050 - 3.0 KVA Single Phase 3.0 - 15 KVA Three Phase

Φεατθρεσ

and air

brackets.

IEEE standards

heavy gauge steel enclosure.

low temperature operation.

· Rugged design resists weather

· Efficient, compact, lightweight, easy to install.

terminate within the bottom

Wiring compartment for encapsulated

Flexible wiring leads that

wiring compartment.

grade core steel. · Precision wound coils.

dust, and corrosion.



#### COBie = Construction Operations Building exchange

The stuff your main intononon arai needs to kn File Model Checking Communication Information Takeoff + 🗞 🏕 | 🗘 Spin 🕶 🕕 Info 🕶 📑 🗗 🕼 🖓 🎝 🐨 🎒 🕶 🔍 🍭 🄍 🔍 🦎 🖝 🗂 🛗 🏶 A Model Tree 🔥 🖢 🕀 🚍 🖬 3D (Div 23D-2) MACNEW\_DUCT\_JES\_02
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6

transformer

File Model Checking Communication Information Takeoff +

A Model Tree ₩ (Div 23D-2) MACNEW\_DUCT\_JES\_02 (Div 23D-3) MACNEW\_DUCT\_JES\_03 (Div 23D-4) MACNEW\_DUCT\_JES\_04 (Div 23D-5) MACNEW\_DUCT\_JES\_05 군 (Div 23D-6) MACNEW\_DUCT\_JES\_06 (Div 26L-0) MACNEW\_EDWRD\_ELEC\_ELTS\_L00 (Div 26L-1) MACNEW\_EDWRD\_ELEC\_ELTS\_L01 (Div 26L-2) MACNEW\_EDWRD\_ELEC\_ELTS\_L02 (Div 26L-3) MACNEW EDWRD ELEC ELTS L03 (Div 26L-4) MACNEW EDWRD ELEC ELTS L04 (Div 26L-5) MACNEW\_EDWRD\_ELEC\_ELTS\_L05 (Div 26L-6) MACNEW\_EDWRD\_ELEC\_ELTS\_L06 (Div 26P-0) MACNEW\_EDWRD\_ELEC\_EPWR\_L00 (Div 26P-1) MACNEW\_EDWRD\_ELEC\_EPWR\_L01 (Div 26P-2) MACNEW\_EDWRD\_ELEC\_EPWR\_L02 Div 26P-3) MACNEW EDWRD FLEC EPWR 1.03 (Div 26P-4) MACNEW\_EDWRD\_ELEC\_EPWR\_L04 (Div 26P-5) MACNEW\_EDWRD\_ELEC\_EPWR\_L05 (Div 26P-6) MACNEW\_EDWRD\_ELEC\_EPWR\_L06 (Div 26R-0) MACNEW\_EDWRD\_ELEC\_RACE\_L00 Div 26R-1) MACNEW\_EDWRD\_ELEC\_RACE\_L01 (Div 26R-2) MACNEW\_EDWRD\_ELEC\_RACE\_L02 (Div 26R-3) MACNEW\_EDWRD\_ELEC\_RACE\_L03 (Div 26R-4) MACNEW\_EDWRD\_ELEC\_RACE\_L04 < -> - 🗐 🗄 🗆 🗆 (i) Info (Div 26P-3) Object. 2.87 Dimensions(Type) Electrical - Electrical - Circuiting Electrical - Loads Electrical - Loads(Type) Electrical(Type) Identification Location Quantities Material Relations Classification Hyperlinks Con Pset ManufacturerTypeInformat Pset BuildingElementProxyCommon General Identity Data Identity Data(Type) Materials and Finishes(Type) Other Other(Type) Property Value Assembly Code D5090900 Assembly Description Misc. Other Electrical Systems Code Name Deg Rise Transformer Description Edited by

K Factor KVA Manufacturer Siemens Industry Model OmniClass Number 23.80.10.14.11 OmniClass Title Power Transformers Product Documentation Link http://www.sea.siemens.com/us/internet.dms/Internet Product Page URL http://www.sea.siemens.com/us/Products/PowerDistrib Transformer Materia Type Name 45kVA - HMT URL http://www.usa.siemens.com/ce Weight Workset Family : Electrical Equipment : Transformer-Dry-Type

Do we want to know the "Model" of this transformer? It is currently blank.

Do we want "Serial Number" for the transformer?

Do we want to know the "Room" the transformer is in? Do we want "Room", "Room Name", "Room Number", etc...

What Tab ("General", "Location", "Type") do you want the information on?

Do we want to know the "Manufacturer" for the transformer? Do we want to know the "Manufacturer" for the concrete? Do we want to know the "Manufacturer" for the hangers? Do we want to know the "Manufacturer" for the outlets?

Do we want to know the "Serial Number" for the outlets?



# 1 ?

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# COBie





#### LEVEL OF DEVELOPMENT(LOD) SPECIFICATION PART I & COMMENTARY

For Building Information Models and Data

#### September 2018



| • COBie |
|---------|
|---------|

Use the BIM Forum LOD Specificat

| BIMForum LOD Specification 2018 Part II           |                                |              |                |                          |   |  |  |  |  |  |
|---|--------------------------------|--------------|----------------|--------------------------|---|--|--|--|--|--|
| D50 - Electrical                                  |                                |              |                |                          |   |  |  |  |  |  |
| Baseline This work is licensed under the Creative | Part 1 - Attribute Description |              |                |                          |   |  |  |  |  |  |
| Additional Commons Attribution-NonCommercial 4.0  |                                |              |                |                          |   |  |  |  |  |  |
| Attribute   | Data Type                      | Units - Imp. | Units - Metric | Option Examples          | Commentary  |  |  |  |  |  |
| Global Attributes                                 |                                |              |                |                          |   |  |  |  |  |  |
| Component ID                                      | Text                           |              |                |                          | Part or Equipment Tag   |  |  |  |  |  |
| Condition Status                                  | Text                           |              |                | New, Existing, Demolish, | Status of the element, predominately used in renovation or retrofitting projects    |  |  |  |  |  |
|   |                                |              |                | Temporary, User Defined  |   |  |  |  |  |  |
| Room Number                                       | Text                           |              |                |                          | Room number where component <b>to be/</b> is installed                              |  |  |  |  |  |
| Room Name   | Text                           |              |                |                          | Room name where component <b>to be</b> /is installed                                |  |  |  |  |  |
| Story Number                                      | Text                           |              |                |                          | Floor or level room is located  |  |  |  |  |  |
| Manufacturer Name                                 | Text                           |              |                |                          | The organization that manufactured and/or assembled the item.                       |  |  |  |  |  |
| Product Name                                      | Text                           |              |                |                          | The manufacturers model name of the product model (or product line)                 |  |  |  |  |  |
| Model Designation                                 | Text                           |              |                |                          | The manufacturers model number or designator of the product model (or product line) |  |  |  |  |  |
| Target LOD  | Text                           |              |                | 100, 200, 300, 350, 400  |   |  |  |  |  |  |
| Current LOD                                       | Text                           |              |                | 100, 200, 300, 350, 400  |   |  |  |  |  |  |
|   |                                |              |                |                          |   |  |  |  |  |  |





- 1. Your top 20-25% design firms and Trade Contractors are doing it right.
- 2. Do they have a BIM person, are they practicing 3D Design, will they embed the data.
- 3. Look at a past COBie/6D model they have produced.
- 4. Just ask for what is needed.
- 5. Review the models regularly (scope, alignment, progress).
- 6. If it cost more their doing it wrong.



## **UAV - Drones**

• 1. Get the Drone that meets your needs.



- 2. Pilot company has to have the FAA certification, registration, and insurance.
- 3. See results from the model/software.
- 4. Skip new, go with proven.
- 5. Stay up to date on laws, uses.
- 6. Hire a plane for aerials.





### SAM – Semi-Automated Mason





• Robotics are coming



# SAM – Semi-Automated Mason



- 1. Spend the right money, look for repetitive, physical tasks.
- 2. Have your trades figure it out.
- 3. Each construction site is different, you will need to figure it out.
- 4. Don't pay more for it, just expect it to come.
- 5. Collect daily progress and check the quality.
- 6. Don't use a robot.



## **RTS – Robotic Total Station**

- Every layout crew should be using them
  - Model based layout





#### **Coordination Model**

#### **Actual Picture**











**Best Practices:** 

1. Use an actual survey point as (0,0,0) -that has a physical marker 2. Pick a point at the Plan Southwest -All dimensions will be positive 3. Use z= elevation of marker 4. Use State Plane Feet -International Feet will not work

Local Origin point needs to be within 10 Miles, or the software will fail.



# RTS



#### Local Origin (All Models Except Civil)



**Best Practices:** 

1. Use an actual survey point as (0,0,0) -that has a physical marker

2. Pick a point at the Plan Southwest -All dimensions will be positive

3. Set Local Z=?? to Building Elevation 0' - Use z = elevation of marker

4. Local models are oriented Plan North

- Site rotation noted in state plane

coordinates









### RTS

![](_page_63_Picture_1.jpeg)

![](_page_63_Figure_2.jpeg)

#### Z at 187.76' matches O' on building elevation

![](_page_64_Figure_0.jpeg)

![](_page_65_Picture_0.jpeg)

Record This Information in the VDC Plan VDC\_03.05\_Project\_Location\_Local\_Origin\_Point

Check this early (Before Models are "Done") to make sure they align.

- 1. All Models should have a marker at the Origin (Base Point, Survey Point).
- 2. The Model should be the correct distance from this marker so all the models will align.
- 3. IFC Files are the final model deliverable
  - the alignment needs to work for IFC Files.

#### BIM Execution Plan

#### PROJECT NAME

#### 2019-04-15

#### Federation, Clash and 4D Model Requirements

The following information is designed to help all stakeholders be aware of what is needed to make the best use of VDC to increase construction activity efficiency.

| Model Coordinates |  |                                    |              |                                     |        |                                  |        |                                       |        |
|-------------------|--|------------------------------------|--------------|-------------------------------------|--------|----------------------------------|--------|---------------------------------------|--------|
| Building          | Description                              | Reference<br>d Column<br>Line Grid | Rotatio<br>n | io To Column Line<br>in X direction |        | To Column Line<br>in Y direction |        | Elevation<br>Z<br>(First Floor Slab ) |        |
|                   |  |                                    | Degrees      | Feet                                | Inches | Feet                             | Inches | Feet                                  | Inches |
| Α                 | Building Name D1                         |                                    | 85.567       | 210                                 |        | 145                              |        | 187                                   | 9 1/8" |
| В                 | B Delete these rows if only one building |                                    |              |                                     |        |                                  |        | 0'                                    | 0"     |
| С                 | Delete these rows if only one building   |                                    |              |                                     |        |                                  |        | 0'                                    | 0"     |
| D                 | Delete these rows if only one building   |                                    |              |                                     |        |                                  |        | 0'                                    | 0"     |
| E                 | Delete these rows if only one building   |                                    |              |                                     |        |                                  |        | 0'                                    | 0"     |
| F                 | Delete these rows if only one building   |                                    |              |                                     |        |                                  |        | 0'                                    | 0"     |

Origin Marker files are located on Viewpoint for Projects

Include Images with Dimensions from Origin to Column Lines.

![](_page_65_Figure_15.jpeg)

![](_page_65_Picture_16.jpeg)

![](_page_66_Picture_0.jpeg)

- 1. Civil and MEP are different machines.
  - A. Get the green laser
  - B. Get embedded photos
- 2. Get licensed surveyor to set control points.
- 3. Have models embed the control points.
- 4. Set the controls, let the trades and GC do the work
- 5. Make sure everything aligns.
- 6. Wondering if your as-builts are any g

![](_page_66_Picture_9.jpeg)

![](_page_66_Picture_10.jpeg)

![](_page_66_Picture_11.jpeg)

# **GPS – Global Positioning System**

- 1. Spend the time to get the models in a real location (State Plane).
- 2. Get licensed surveyor to set control points.
- 3. Have models embed the control points.
- 4. Set the foundation, let the trades and GC do the we
- 5. Make sure everything aligns.
- 6. Keep wondering where your utilities are.

![](_page_67_Figure_7.jpeg)

Cone

PennState

**GEOG 862** 

Conformal

Cylinder Equator Central Meridian Cylinder Central Cylinder Cylinder Cylinder Central Cylinder Cylinder Central Cylinder Cylinder Cylinder Central Cylinder Cylinder Cylinder Central Cylinder Cylin

![](_page_67_Picture_9.jpeg)

![](_page_67_Picture_10.jpeg)

# **GIS – Geographic Information System**

![](_page_68_Picture_1.jpeg)

 1. Spend the time to get the models in a real location (State Plane).

(0,0,0)

- 2. Get licensed surveyor to set control points.
- 3. Have models embed the control points.
- 4. Set the foundation, let the trades and GC do the work.
- 5. Make sure everything aligns.
- 6. Keep wondering where your people are. (Civil Files)

![](_page_68_Picture_8.jpeg)

![](_page_69_Picture_0.jpeg)

![](_page_69_Picture_1.jpeg)

• Having a tool does not mean it is being used right.

![](_page_69_Picture_3.jpeg)

![](_page_69_Picture_4.jpeg)

![](_page_69_Picture_5.jpeg)

- Fancy / Expensive software does not fix a bad process, it makes it worse.
- Have a good process first.

![](_page_70_Picture_2.jpeg)

"Cool" issues

![](_page_70_Picture_3.jpeg)

![](_page_70_Picture_4.jpeg)

![](_page_70_Picture_5.jpeg)

- Fancy / Expensive software does not fix a bad process, it makes it worse. Schedule Collaboration
- Have a good process first.

![](_page_71_Picture_2.jpeg)

"Cool" issues

![](_page_71_Picture_3.jpeg)

![](_page_71_Picture_4.jpeg)

![](_page_71_Picture_5.jpeg)

![](_page_71_Picture_6.jpeg)
## "Cool" issues



- Make sure you have the personnel to execute that plan.
- Allow for a mistake.







## We Want Productive Tech = Profitable



• Plan, Do, Act, Change – Lean your way into a better business.





## Applying Technology for Productive Change Cool is a terrible business plan!

We want productive Tech! Benjamin Crosby – Yates Construction @BIMjamin www.bimjamin.com

