Steidle Renovation Case Study

Ervin Kulenica, Bill Derence, Eric Nulton
Managing BIM – Agenda:

• Project Overview
• BIM Execution Plan
  • AE, CM, & Owner Collaboration
  • Execution Plan Documentation
  • BIM Workflow
• Construction Planning
• Facility Asset Management
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Project Overview:
Existing Conditions
• 86,053 gsf
• Science/lab building

Designed in 1929 and house Material Sciences department, Energy & Mineral Engineering

Building is now dedicated to the MatSE Department (Materials Science & Engineering)
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Project Overview:
New design
• 102,000 sqft bldg
• 79 Fume Hoods
• Lab equipment loads
• Lab Planning – key for MEP system design
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*Project Overview::*
New design
- Research Clusters
- Shared Facilities
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*Project Overview:*
Model Rendering
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**Project Overview:**
Team Selection
• AE, CM
• Collaboration
• Conflict Avoidance
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Project Overview:
Team Selection
• How do you get it?

• Agreements with Design and Construction Professionals
  – BIM Addendum (Optional BIM Uses)
  – Approved BIM Plan (Project Specific)

• Contract References:
  – BIM Standards and Guidelines
  – BIM Planning Template
  – Asset Attribute List

• Access to Project Documents?

• Ownership and Use of Documents

• Model Deliverable
**Project Overview:**

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Contract Structure
- AE
- CM
- BIM Contract Documentation

- Professional Agreement
- CM Agreement
- BIM Addendum
- BIM Standards
- BIM Planning Template (BIM Execution Plan)
- Asset Attribute List
- BIM Process Maps
- LOD Matrix
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*BIM Execution Plan:*
Execution Plan
Documentation
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**BIM Execution Plan:**
Execution Plan Documentation
- LOD Matrix

<table>
<thead>
<tr>
<th>LOD Matrix</th>
<th>Design Model</th>
<th>Design Documents</th>
<th>Construction Administration</th>
<th>Existing Conditions Record Model</th>
<th>Record Drawings</th>
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<td>Yes/No</td>
<td>LOD MEA</td>
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<td>Wall &amp; Column Foundations</td>
<td>Yes No</td>
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<td>Foundation Walls</td>
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<td>300 RSA</td>
<td>300 RSA</td>
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<td></td>
<td>Pile Caps</td>
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<td>300 RSA</td>
<td>300 RSA</td>
<td>510</td>
</tr>
<tr>
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<td>300 RSA</td>
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<td>Underprinting</td>
<td>Yes No</td>
<td>300 RSA</td>
<td>300 RSA</td>
<td>510</td>
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<td>Yes No</td>
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<td>530</td>
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<td>Inclined Slab on Grade</td>
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<td>Trenches, Pits, and Basins</td>
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<td>300 RSA</td>
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**BIM Execution Plan:**
Execution Plan Documentation
- LOD Definitions
- Variations from AIA
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*BIM Execution Plan:*
Execution Plan Documentation
- LOD Definitions
  - Variations from AIA

AIA LOD 100 Development
In Approx. As-Built Location, Barcode, & Specific FM Data also provided

- Very Seldom Used for PSU deliverables after project completion
AIA LOD 200 Development
In Approx. As-Built Location, Barcode, & Specific FM Data also provided

**BIM Execution Plan:**
Execution Plan Documentation
• LOD Definitions
  - Variations from AIA

- Used for less critical items
  - Valves
  - Meters
  - Tanks
  - Conduits

Image compliments of AIA
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**BIM Execution Plan:**
Execution Plan Documentation
- LOD Definitions
  - Variations from AIA

AIA LOD 400 Development
In As-Built Location, Barcode, & Specific FM Data also provided

Typically Excessive Data for FM
-Captured in As-Built Model
-Data Maintenance is Problematic

Image compliments of AIA
AIA LOD 300 Development
In As-Built Location, Barcode, &
Specific FM Data also provided

Primary deliverable to PSU
- Requires little added effort
- Provides PSU with needed Data
- Data is maintainable

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BIM Execution Plan:
Execution Plan
Documentation
- LOD Definitions
  - Variations from AIA

Image compliments of AIA
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**BIM Execution Plan:**
Execution Plan Documentation
• Model Deliverables

**As-Built Model**
Static Navis Model derived from Construction Coordination
Most Components LOD 540
LOD Prescribed by Contractors
Model to be Archived in Building Records

**Record Model**
Revit Model Derived from Design Model
Most Components LOD 530
LOD Prescribed by PSU
Model to be Maintained & Modified Throughout Building Lifecycle
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**BIM Execution Plan:**
Execution Plan Documentation

- Initial Draft

Late SD Phase
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**BIM Execution Plan:**
Execution Plan
Documentation
• A/E & Owner
  Updates

- Early DD Phase

- Laser Scanning:
  Was not possible due to building occupation
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BIM Execution Plan:
Execution Plan Documentation
• A/E & Owner Updates

4.1. Ownership. The BIM Model is an instrument of service and is considered to be a component of Design and Construction Documents governed by Article 7 of the Owner/Professional AGREEMENT (Form 1-P), Article 1 of the Owner/Contractor Agreement (Form 1-C), and Article 14.3 of General Conditions of the Contract (Form CM-GMP-GC) without exception. In addition, each Model Element Author (MEA) contributing to the BIM model(s) and database agrees to provide all project stakeholders and Penn State (Owner) a non-revocable, exclusive license to utilize any and all intellectual property provided by each MEA contained within this BIM for the sole purpose of completing the design, construction and other uses as stipulated and/or implied by the executed Owner/Professional Agreement and Owner/Contractor Agreement for this project.

4.1.1. Model(s), drawings, and all embedded asset attribute information may be used at the discretion of the OPP throughout the design, construction and lifetime of the facility.
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BIM Execution Plan:
Execution Plan
Documentation
• A/E, CM, Owner
  Updates

Early DD Phase

Comment [WSD7]: During coordination, weekly is insufficient. Outside of coordination, weekly is excessive. Recommend design models be issued bi-weekly to cover RFI's (weekly only if large number of RFI's), or with each and every issuance of a PR, ASI, etc. Recommend component models be issued as needed during coordination and with successive changes thereafter. If no changes, no need to re-post.

Comment [WSD8]: See comment above.
BIM PROJECT EXECUTION PLAN
UPDATED VERSION FOR
STEIDLE BUILDING RENEWAL
PSU# 00-01306.00
SUBMITTED BY STEIDLE BUILDING PROJECT TEAM
[6/20/2014]

TEAM PROJECT STAKEHOLDERS

Please direct any questions about this template to:
PSU – Eric Nolan (eric.nolan@psu.edu)
EYP – Ervin Kulencia (ekulencia@eypae.com)
Mascaro – Bill Derence (bderence@mascaroconstruction.com)

ROLE | NAME | EMAIL
---|---|---
Project Executive | Edward P. Elinski | edelinski@mascaro
Project Manager | Matthew E. Morris | mmorris@mascaro
Project Estimator | Peter A. Mastro | pmastro@mascaro
Architectural Modeler | William S. Derence | bderence@mascaro
Mechanical Construction Engineer | Christ L. Saunders | cssaunders@mascaro
Electrical Construction Engineer | William R. Rost | brest@mascaro
Structural Engineer | Eugene Vennare | gvennare@mascaro
IP Coordinator | Chaz Ott | cott@mascaro
Superintendent | Michael P. Schoeneman | mschoeneman@mascaro
Project Engineer | Zachary Walters | zwalters@mascaro
Contract Manager | Himmlberger | himmlberger@gov
In-House Designer | Tim Kilburn | tim.kilburn@mascaro
In-House Designer | Jeff Dull | jeff.dull@mascaro
In-House Designer | John Brown | john.brown@mascaro
In-House Designer | Matt Baskotta | matt.baskotta@mascaro
Sr. Project Manager | Scott Chory | scchory@wgt
Associate PM | Albert Kish | akish@wgt
CAD Manager | Ron Miller | rmiller@wgt

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BIM Execution Plan:
Execution Plan
Documentation
• Trade Contractor
Updates

Late DD Phase
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BIM - Attitude
- EYP/relImaginE campaign (Fall 2011) (John Tobin VP of Operation – BIMForum 2013)
  - Day One Thinking
  - Live Sets
  - Active QM
  - Lean Documentations
  - Active Coordination
  - Everyone Leads

BIM Execution Plan:
BIM Workflow
- Model Design
Challenges:
- Existing space limitations
- Complexity of labs
- Keeping up with BIM Execution Plan:

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BIM Execution Plan:
BIM Workflow
- Model Design
  - 8 Disciplines
BIM - Attitude

High performance team
- Weekly team meeting
- Bi-weekly coordination meeting

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*BIM Execution Plan:
BIM Workflow
- Model Design

DD → CD Phases
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*BIM Execution Plan:*
BIM Workflow
• Model Review
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*BIM Execution Plan:*  
BIM Workflow  
• Model Review  

DD → CD Phases
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**BIM Execution Plan:**
BIM Workflow
- CM Review of Design
- Design to Budget

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### BIM Execution Plan: BIM Workflow

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Status</th>
<th>VE Items Accepted</th>
<th>VE Items Pending</th>
<th>VE Items Rejected</th>
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<tbody>
<tr>
<td>1</td>
<td>Roof stone coping to remain in place. Provide new metal coping.</td>
<td></td>
<td>0</td>
<td>(5)</td>
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<tr>
<td>2</td>
<td>Do not replace the copper roof and gutter at the existing dome. Copper roof to remain.</td>
<td></td>
<td>0</td>
<td>(5)</td>
<td>0</td>
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<tr>
<td>3</td>
<td>Revise bathroom mirrors quantity to 320sf</td>
<td></td>
<td>0</td>
<td>(5)</td>
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<tr>
<td>11b</td>
<td>Replace balance of PT-1 with a material that is close to Design To target of $13-$16/SF</td>
<td></td>
<td>(5)</td>
<td>0</td>
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<tr>
<td>11c</td>
<td>Review scope of sliding glass doors/wall system at 2nd floor offices and conference room</td>
<td></td>
<td>0</td>
<td>(5)</td>
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<tr>
<td>21</td>
<td>Replace detail for backup construction at south elevation limestone (GW vs concrete)</td>
<td></td>
<td>0</td>
<td>(5)</td>
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</table>

**SD → DD → CD Phases**

---

This table outlines the BIM workflow for the Steidle Renovation project at Pennsylvania State University, focusing on Value Engineering (VE) items and their status. The project phases are indicated as SD (Schematic Design), DD (Design Development), and CD (Construction Documents). The table highlights specific items requiring VE considerations, such as roof stone coping, bathroom mirrors, and sliding glass door/wall systems, with corresponding replacement materials and budget adjustments.
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**BIM Execution Plan:**
BIM Workflow
• CM Review of Design

DD → CD Phase
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*BIM Execution Plan:*
BIM Workflow
- CM Review of Design

Late DD Phase
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**BIM Execution Plan:**
BIM Workflow
• CM Review of Design

2014-02-12 Model Review --- Level 4 – HVAC vs. PLBG:

Early CD Phase
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BIM Execution Plan:
BIM Workflow
• CM Review of Design

PSU - Steidle - BIM
Bill Derence

Sent: Tue, 9/24/2013 3:46 PM
To: Chad Miller
Cc: Ervin Kulesco; John Schippers; Carter Reich; John Tobin; Ed Elkins; Matt Muns; Pete Mastro; Eugene J Verrone; Bill Roost

Chad,

In order to gain a better understanding of the project, as well as to have more than one set of eyes review the current status of the design, Mascaro put together a master file within Navisworks and ran Clash Detection (using the 9-3-2013 file uploads). The master file has been uploaded in .NWF and .NWD format to the following location within ShareFile: 00-01306.00 PSU – Steidle Building Renewal\BIM\Design Models\Navisworks\PSU – Coordination\.

The following is how the available status options are to be “translated” for each clash:
- New — Not checked (... there should be no “New” items at this time).
- Active — Repeat of a clash that should be part of another clash set.
- Reviewed — Clash that requires attention to develop a resolution.
- Approved — Clash that is OK as-is and can be ignored.
- Resolved — Automatic status updated generated by Navisworks when a clash has been eliminated.
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**Construction Planning:**
Site Logistics
- Crane Swing
- Truck Access
- Small Deliveries

Late DD Phase
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Construction Planning:
Saving the Trees
• North West Utilities
  (Design)
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Construction Planning:
Saving the Trees
• North West Utilities
  (Proposed)

Early CD Phase
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Construction Planning:
Saving the Trees
• North West Utilities
  (Proposed)

Early CD Phase
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Construction Planning:
Saving the Trees
- North West Utilities
  (Proposed)

Early CD Phase
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*Facility Asset Mgmt:*  
Data Collection  
- All project stages

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<th>Asset</th>
<th>Design</th>
<th>Construction</th>
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<td>Manufacturer</td>
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<td>Model</td>
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<tr>
<td></td>
<td>Driver Voltage - Phase A</td>
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<td>Driver Voltage - Phase C</td>
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Facility Asset Mgmt:
Data Collection
• Bar Codes
**Closing Remarks:**

- BIM Execution Plan
  - Understand Requirements
  - Define BIM Roles
  - Team Collaboration

- Construction Planning
  - 3D Visualization
  - 3D Coordination
  - Plan the work... work the plan

- Facility Asset Management
  - Start with the end in mind
  - Input during all project phases

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**Summary:**
Questions