Large Team Prefabrication Strategies
Denver International Airport Stakeholders Panel Discussion

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Program Overview

- 519-room Westin hotel and conference center 433,000 sf
- Public Transit Center / RTD Commuter Rail Station 212,000 sf
- Open air plaza 82,000sf
- Improvements to existing baggage and train systems
- New Restaurants
Program Timeline

2009
- Concept Planning
- Environmental

2010
- Enabling / Excavation
- Hotel / Public Transit Center / Plaza
- Roadways
- Bridges
- Enabling / Excavation

2011

2012

2013
- WESTIN HOTEL OPEN
- PTC / Hotel
- Rail Platform
- Rail Platform Turnover to RTD
- RTD EAST CORRIDOR TO DIA OPEN 1ST QUARTER 2016

2014

2015

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Presentation Format

- **Program Goals**
  - Lifecycle Management
  - Develop Standards
  - Use BIM to capture FM data
  - Use BIM for Construction operations (VDC)

- **Program Challenges**
  - Lifecycle Management
  - Standards
  - Data capture
  - Train Canopy and Hotel Bathrooms

- **Summary**
Lifecycle Management Goals

- USE of BIM / Prefabrication for Stakeholder Engagement
Lifecycle Management Goals

- Quality Control

![Diagram showing lifecycle management goals]

- Check against Basis of Design
- System Completion: all sinks have water pipes; all reheat coils have hydronic piping; equipment have access modeled; ra
- Model Completion: no hanging objects, no duplicates, pipes are connected

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Lifecycle Management Goals

- Integrate data with systems for lifecycle operations
Standardization of the building data allows for the Owner’s FM (CMMS) to be truly integral with the facilities' lifecycle of design, construction and maintenance. This in turn allows exposure to other management benefits including improvement of building sustainability, schedulable maintenance and overall predictable behavior to attain TOTAL COST OF OWNERSHIP.
It’s about the data… What Did you Say?
A New Way of Thinking...As Builts

Normalizing Data, Stakeholders and Processes

✓ **Ongoing Data Migration**
✓ **Perpetual As-Builts**

Traditional As-builts will transform from marked up field drawings and O&M’s or limited CAD or BIM’s, to a dynamic process of continuous data management that is engaged not only post construction, but throughout the entire capital planning, budgeting and operations cycle.

*Source: Daniel R. Stonecipher*
Construction Considerations

- Precast Concrete
- MEP Coordination
- Steel Canopy Erection
- Prefab Bathrooms
Program Challenges

Large and diverse team

Firm facts:
- **260** firms are working on the Program
- **227** firms are local
- **107** are minority/women-owned businesses
- **28%** of budget is MWBE

BIM content:
- **25** firms creating BIM content for Design efforts
- **10** firms creating BIM content for construction efforts.

Peak Manpower projection for 2013 is 1,053 full-time equivalents
Program Challenges

Managing large data sets

- Many LARGE Models
- Software interoperability
- Sharing data
- Design Review
- QA/QC procedures
- Document Control
- Managing deliverables

Communication and Documentation is critical
Lifecycle Management Challenges

- O & M point of recall (warranty)
Lifecycle Management Challenges

- Procurement process
Lifecycle Management Challenges

- Asset data lost due to “assembly” vs. “components”.

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Standards Challenges

**Targeting Goals**
Owner Driven End-In-Mind (Needs/Goals)

**Project Triage**
Establish Priority Goals for Projects & Training

**Communicating with Team**
Dialog with all Stakeholders

**Risk Analysis**
Value Proposition & Change Management

**Re-Examine Results**
Affirmation of Quality & Compliance

**Where to Start?**
Strategic Implementation

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Data Capture
Maintaining an Accurate Model

Incorporation of new and existing assets from BIM or CAD (tenants, in-house projects, etc.)

Integration of Models/Metadata

Integration to Base Model

Accurate Living Building Model

Performs standards compliance review, generates base historical record models

Designer updates Design Model for new project

Designer updates Design Model through "CA"

Contractor creates Construction Model

Contractor Validates As-Built Model

CxDMA to Incorporate Commissioning Data in "Reconciled Design Model"

Performs standards compliance review
Data Capture

As-Built Data Collection
Data Capture
As-Built Data Collection
Construction Challenges-Prefab Bathrooms

- Constructability
- Properly Schedule Job for Install
- Limited Vendors
Construction Challenges - Steel Canopies

- Critical Path of Project
- Large/Complex Members to Install
- Collaboration of All Parties

Animation Courtesy of Miro Structural Detailing and Anatomic Iron
Construction Challenges-Steel Canopies

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Summary - Questions

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