5D BIM: Design Costs Analysis

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5D BIM: Design Costs Analysis

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5D BIM: Design Costs Analysis

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5D BIM: Design Costs Analysis

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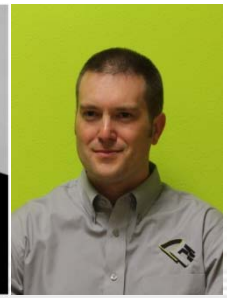

Pete Evans

5D BIM: Design Costs Analysis

Upcoming Events

5D BIM: Design Costs Analysis

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5D BIM: Design Costs Analysis

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5D BIM: Design Costs Analysis

Course Description

The use of computer technology has allowed designers to explore inspiring and radical design ideas. And, when these ideas are presented to clients the designers are challenged with “Can this world-class architecture be constructed within the project budget?” Surely computer technology can assist designers to monitor predicted construction costs? Surely computer technology can automate the tedious task of measuring, counting and organizing design components for cost estimating? This webinar explores the challenges and successes of using BIM for predicting construction costs through a series of three presentations provided by Beck Technology, Project Time & Cost, Inc. and Vico Software.

5D BIM: Design Costs Analysis

AIA/CES Learning Objectives

Participants will be able to:

1. Discuss the concepts of using BIM for design cost analysis.
2. Describe BIM authoring requirements needed to support cost estimating.
3. Lead a discussion within the firm to consider project workflow requirements to support BIM for cost analysis.
4. Describe the basic data exchange requirements between BIM and cost estimating applications.

5D BIM: Design Costs Analysis

Schedule - Eastern Standard Time (EST)

1:00 – 1:05 Opening Announcements

1:05 – 1:20 Corey Sanders presents

1:20 – 1:35 Kenneth Roberts presents

1:35 – 1:50 Donald Henrich presents

1:50 – 2:00 David Scheer, AIA, moderators the Q&A

5D BIM: Design Costs Analysis

Speakers

Corey Sanders
Business Development Manager
Beck Technology

Kenneth A. Roberts, PMP, CCC
EVP and President Personnel Development
Project Time & Cost, Inc.

Donald Henrich
EVP & Co-Founder
Vico Software, Inc.

David Scheer, AIA
Moderator

5D BIM: Design Costs Analysis

Speaker

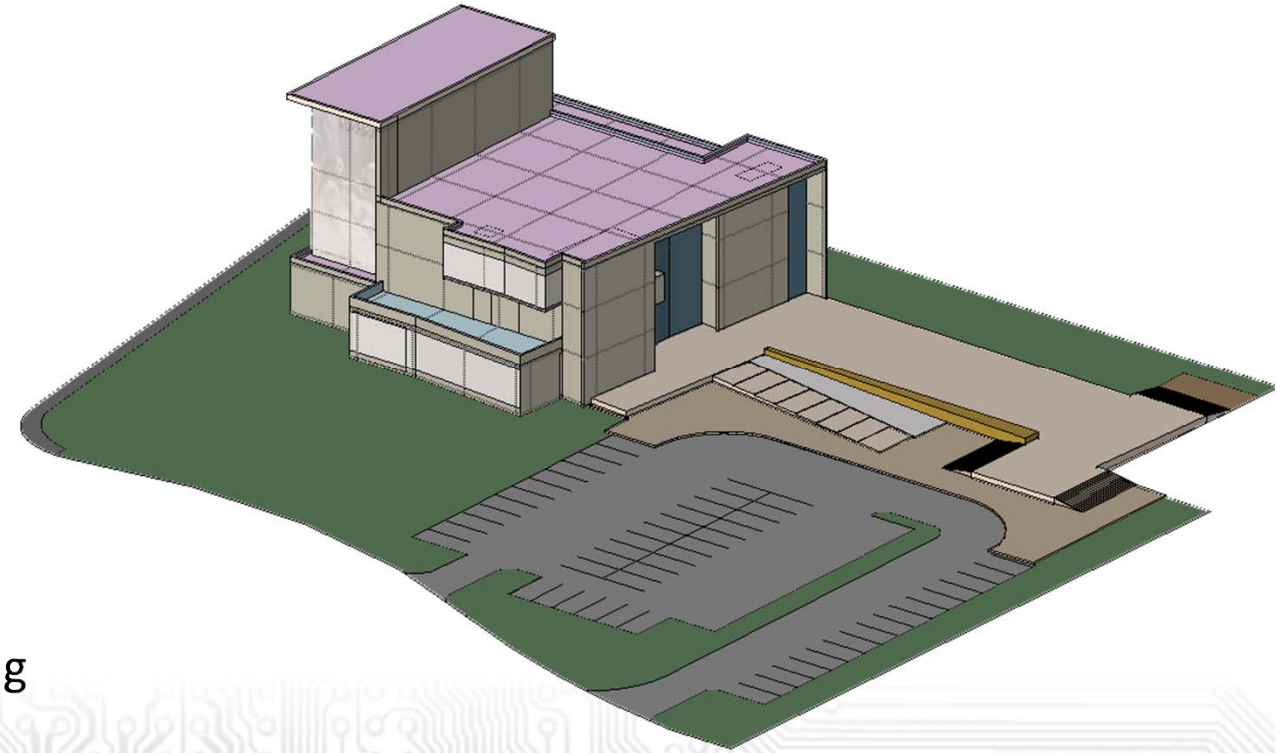
Corey Sanders
Business Development Manager
Beck Technology

Beck Technology

Macro BIM - Overview

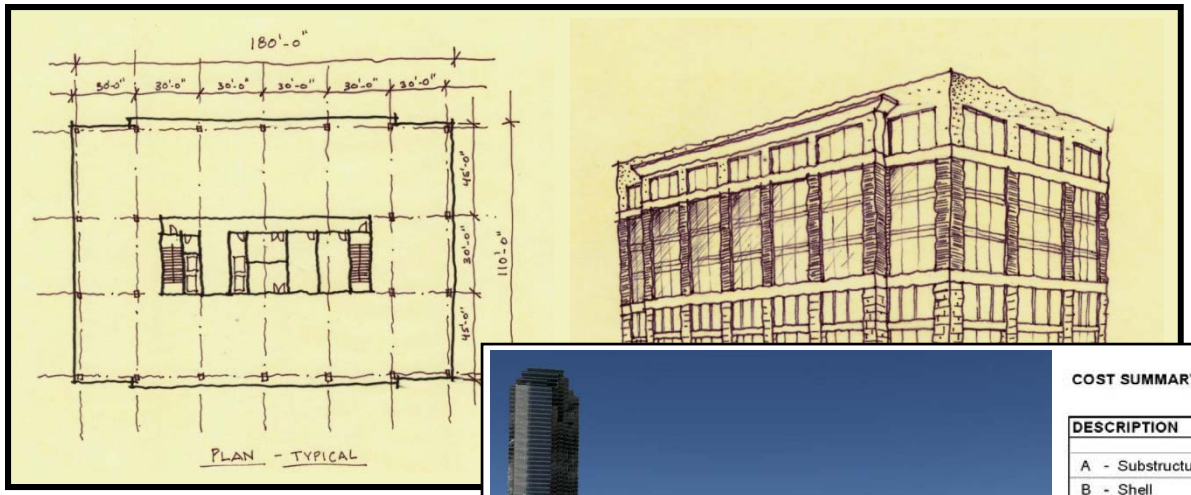
Opportunities for Early Analysis with Macro BIM:

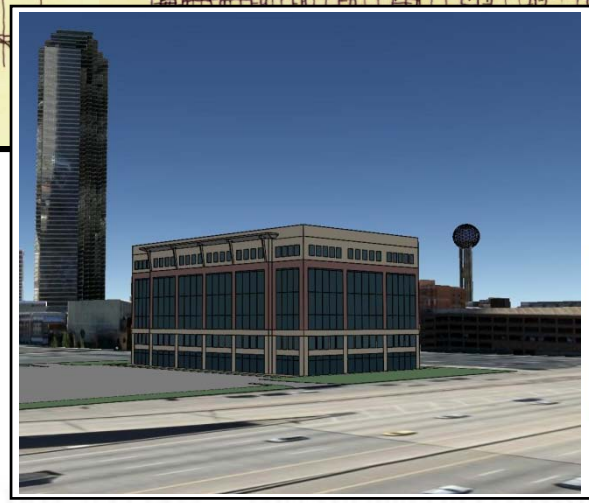
- Visualization
- Space Analysis
- Cut/Fill & Site Analysis
- Phasing/Sequencing
- Energy Performance
- Cost Modeling/Estimating
- Alternative Evaluations – What if's



Accurate Conceptual Cost Modeling

Faster and better information….





COST SUMMARY

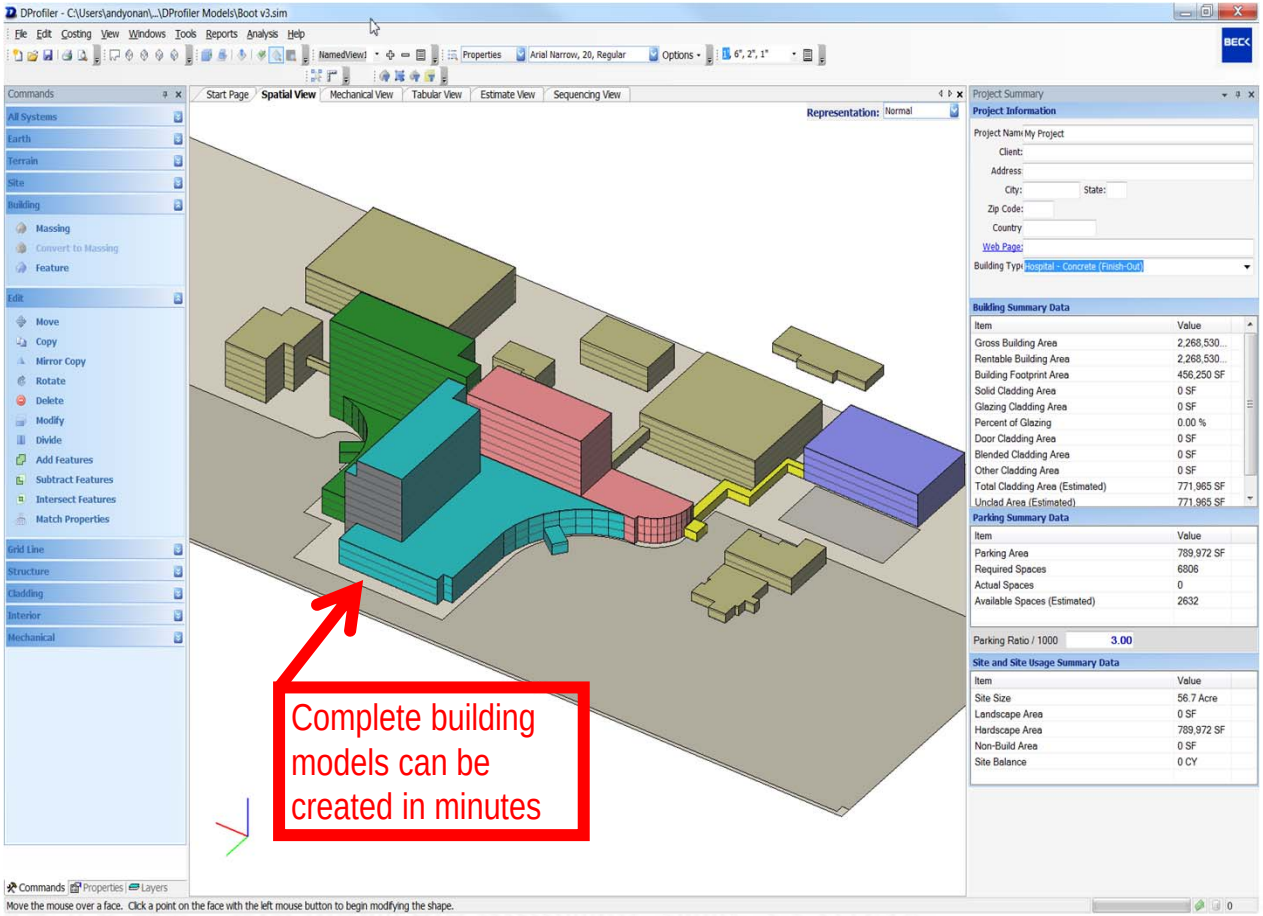
Profiler

DESCRIPTION	$/SF	COST
A - Substructure	$2.28	$ 320,628
B - Shell	$49.73	$ 6,981,274
C - Interiors	$12.19	$ 1,711,453
D - Services	$39.41	$ 5,531,915
G - Site Work	$8.62	$ 1,210,448
I. SUBTOTAL	$112.23	$ 15,755,718
General Conditions	8.00%	$ 1,260,457
General Liability	1.00%	$ 157,557
Builder's Risk	1.00%	$ 157,557
Fee	3.50%	$ 551,450
II. TOTAL COST	$127.39	$ 17,882,739

…typically between 2% and 5%

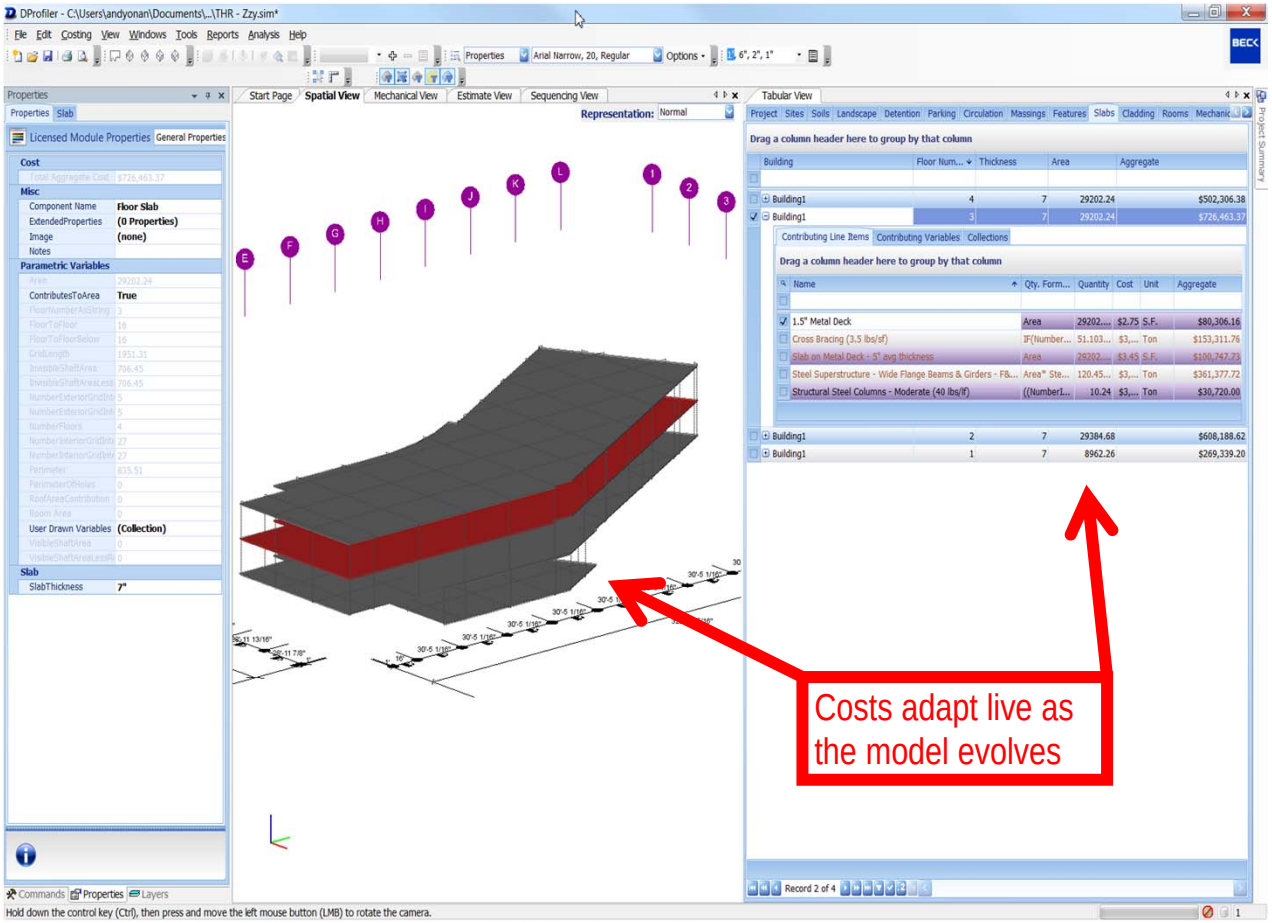
Accurate Conceptual Cost Modeling

High Level Graphical Modeling



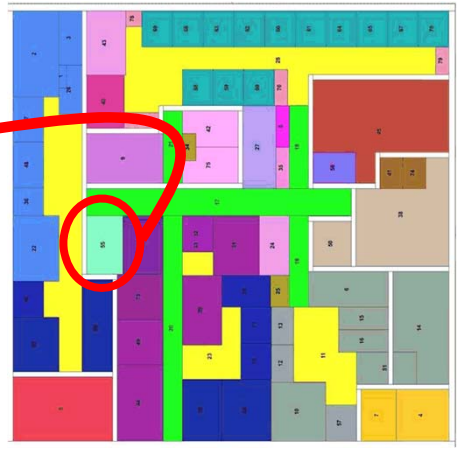
Accurate Conceptual Cost Modeling

Real Time Data Feedback



Macro BIM – Cost Modeling/Estimating

- Conceptual cost modeling for early design
- Eliminate assumption gaps



Offices	1	Office	Student	13'-5"	143.29	$3,516.20

Contributing Line Items

Drag a column header here to group by that column

Clas...	I...	Name	Qty. Formula	Quantity	Unit	Cost	Aggregate
09910200	B007	Paint Door & Frame	Each	1	Ea.	$76.00	$76.00
09910200	B004	Paint Drywall Partitions	WallArea	644.71	S.F.	$0.40	$257.88
09680800	B002	Carpet - Broadloom - Class B	Area / ConvertToSY	15.921111	S.Y.	$32.00	$509.48
09651200	B001	4" Rubber Base	Perimeter	48.052769	L.F.	$1.25	$60.07
09510760	B001	Acoustical Ceiling Allowance /sf (Tile & gri...	Area	143.29	S.F.	$3.25	$465.69
09250700	B001	1 Layer of 5/8" Type "X" Gyp Board	WallArea	644.71	S.F.	$1.05	$676.95
09250700	B001	Tape & Bed	WallArea	644.71	S.F.	$0.42	$270.13
08210900	B001	Interior Door/Frame/Hardware	Each	1	Ea.	$1,200...	$1,200.00

Healthcare Project Example

Initial Budget: ~~$900 million~~

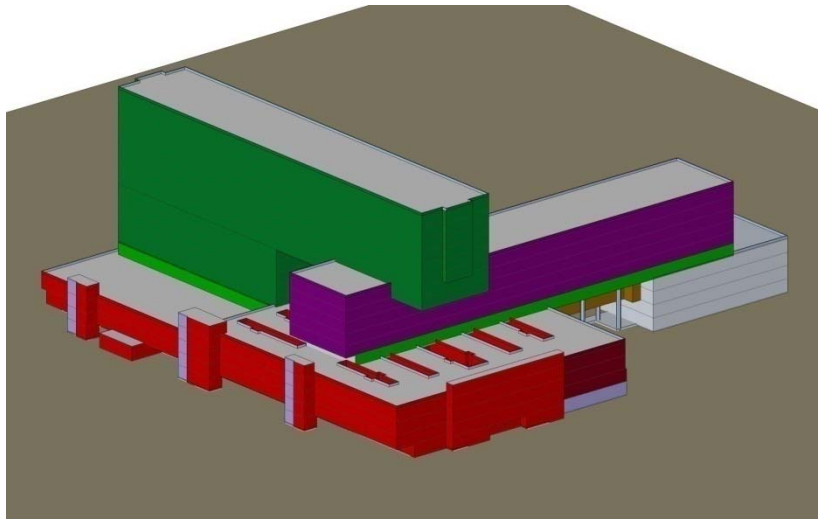
+$400 million
30% DD Estimate: $1.3 billion
…Largest in US today

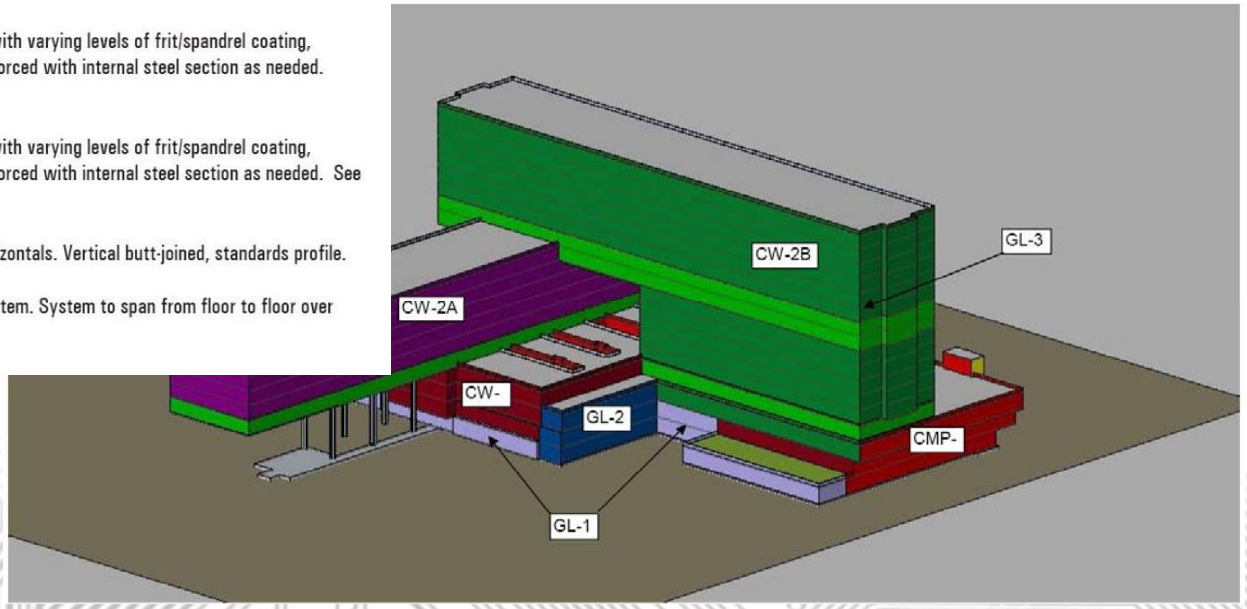
Healthcare Example - % based skin estimate

Exterior Skin Systems Description 1
New Parkland Hospital
Dallas, Texas
February 15, 2010

Apex Cost Consultants
8a, SDB, HUBZone, SBE Certified

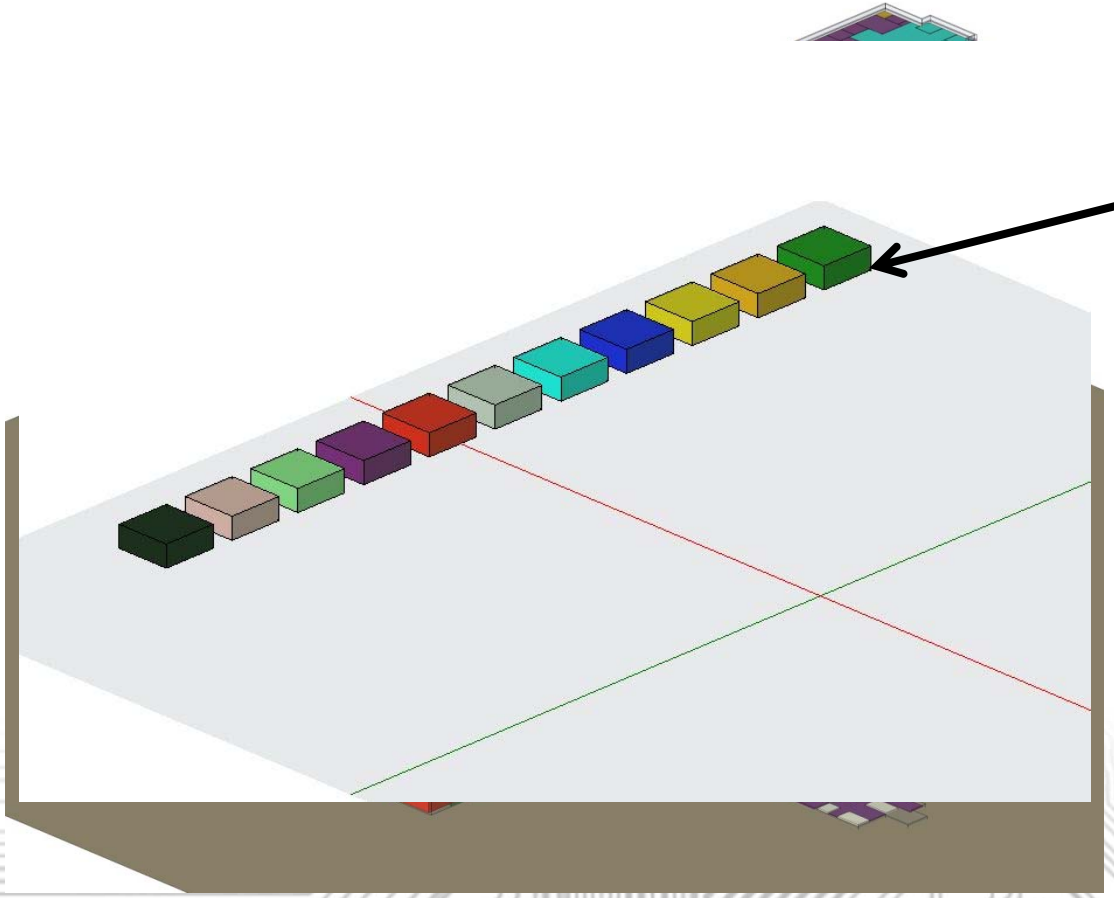
CMP-1	Aluminum-faced composite wall panel assembly. Dry rout and return system with a 3-coat fluoropolymer finish with suspended metal flakes. To include components necessary for a complete weathertight system. See Sketch 1.
GL-1	1" insulated low iron, low-e, in butt jointed glazing in top and bottom track with 90% vision glass and 10% frit.
CW-1	2 way structural silicone 1" insulated glazed aluminum curtain wall system with 75% silkscreened ceramic frit coating. 25% pictoral images created by direct to glass printing. Custom profile horizontal mullions expressed. See Sketch 2.
GL-2	Stainless steel cable net curtainwall glazing system at lobby with 1" insulated units. Tension cable system components to be capable of resisting live and dead loads acting upon the system.
GL-3	Single pane ¼" float glass over concrete or concrete masonry unit back-up. Backpainted / frit coated units in line with louvers.
CW-2A	1" insulated aluminum curtain wall 4 way structural silicone system with varying levels of frit/spandrel coating, thermally broken with internal weep drainage systems. Mullions reinforced with internal steel section as needed. See Sketch 3.
CW-2B	1" insulated aluminum curtain wall 4 way structural silicone system with varying levels of frit/spandrel coating, thermally broken with internal weep drainage systems. Mullions reinforced with internal steel section as needed. See Sketch 4.
CW-3	1" insulated, low-e, aluminum curtain wall system with caputured horizontals. Vertical butt-joined, standards profile.
CW-4	Clear structural channel glass system equal to Pilkington "Profilit" system. System to span from floor to floor over levels 3 and 4.

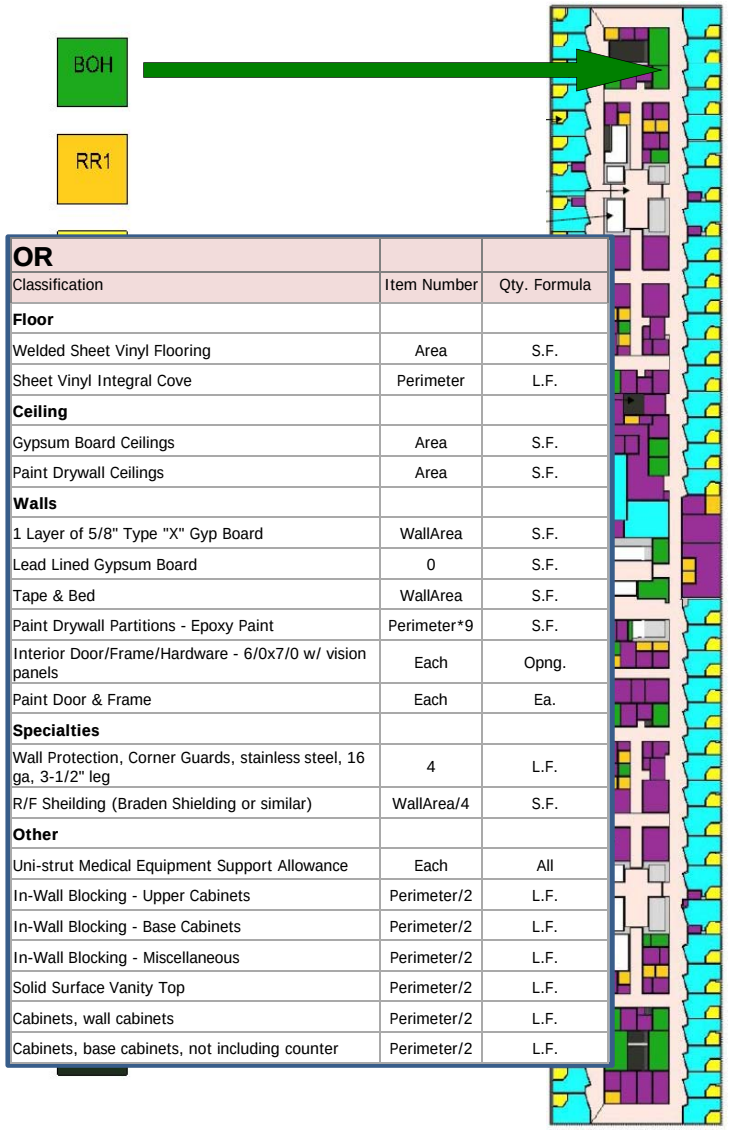




Healthcare Example

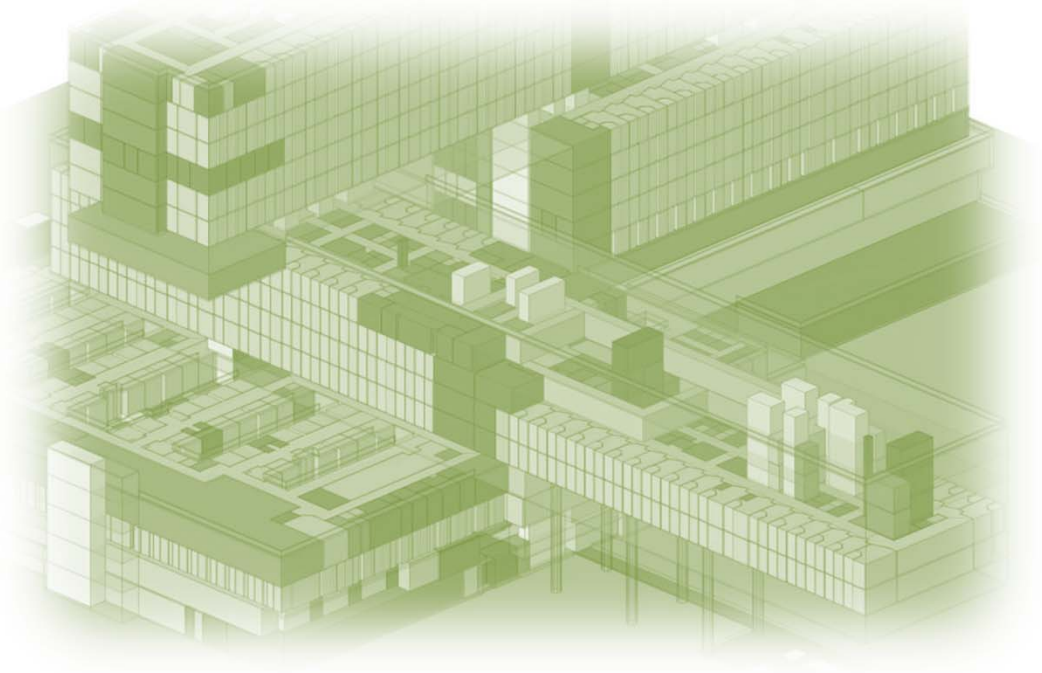
Define Room Types that represent major costs for equipment and finishes





OR		
Classification	Item Number	Qty. Formula
Floor		
Welded Sheet Vinyl Flooring	Area	S.F.
Sheet Vinyl Integral Cove	Perimeter	L.F.
Ceiling		
Gypsum Board Ceilings	Area	S.F.
Paint Drywall Ceilings	Area	S.F.
Walls		
1 Layer of 5/8" Type "X" Gyp Board	WallArea	S.F.
Lead Lined Gypsum Board	0	S.F.
Tape & Bed	WallArea	S.F.
Paint Drywall Partitions - Epoxy Paint	Perimeter*9	S.F.
Interior Door/Frame/Hardware - 6/0x7/0 w/ vision panels	Each	Opng.
Paint Door & Frame	Each	Ea.
Specialties		
Wall Protection, Corner Guards, stainless steel, 16 ga, 3-1/2" leg	4	L.F.
R/F Sheilding (Braden Shielding or similar)	WallArea/4	S.F.
Other		
Uni-strut Medical Equipment Support Allowance	Each	All
In-Wall Blocking - Upper Cabinets	Perimeter/2	L.F.
In-Wall Blocking - Base Cabinets	Perimeter/2	L.F.
In-Wall Blocking - Miscellaneous	Perimeter/2	L.F.
Solid Surface Vanity Top	Perimeter/2	L.F.
Cabinets, wall cabinets	Perimeter/2	L.F.
Cabinets, base cabinets, not including counter	Perimeter/2	L.F.

Healthcare Example



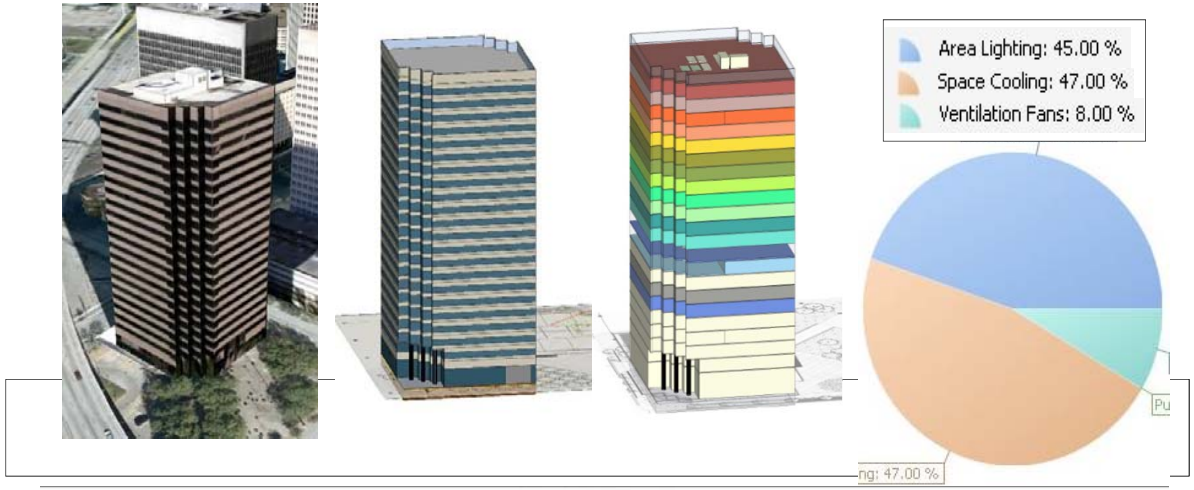
- 1500+ interior spaces
- 2 million SF
- Start to finish in 10 days
- 1.5% Estimate Variance from CM

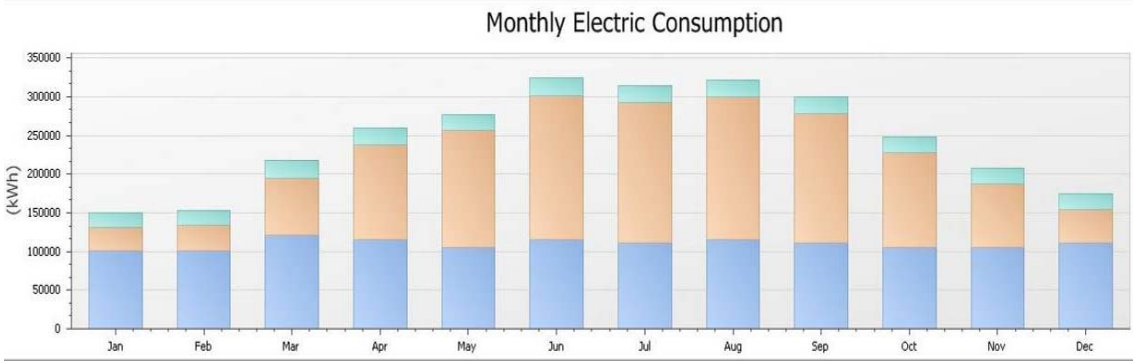
New budget $1.27billion

Macro BIM – Energy Analysis

Energy Analysis

- Order of magnitude impact
- Uses Dept. of Energy DOE2 engine
- Configured to local weather data

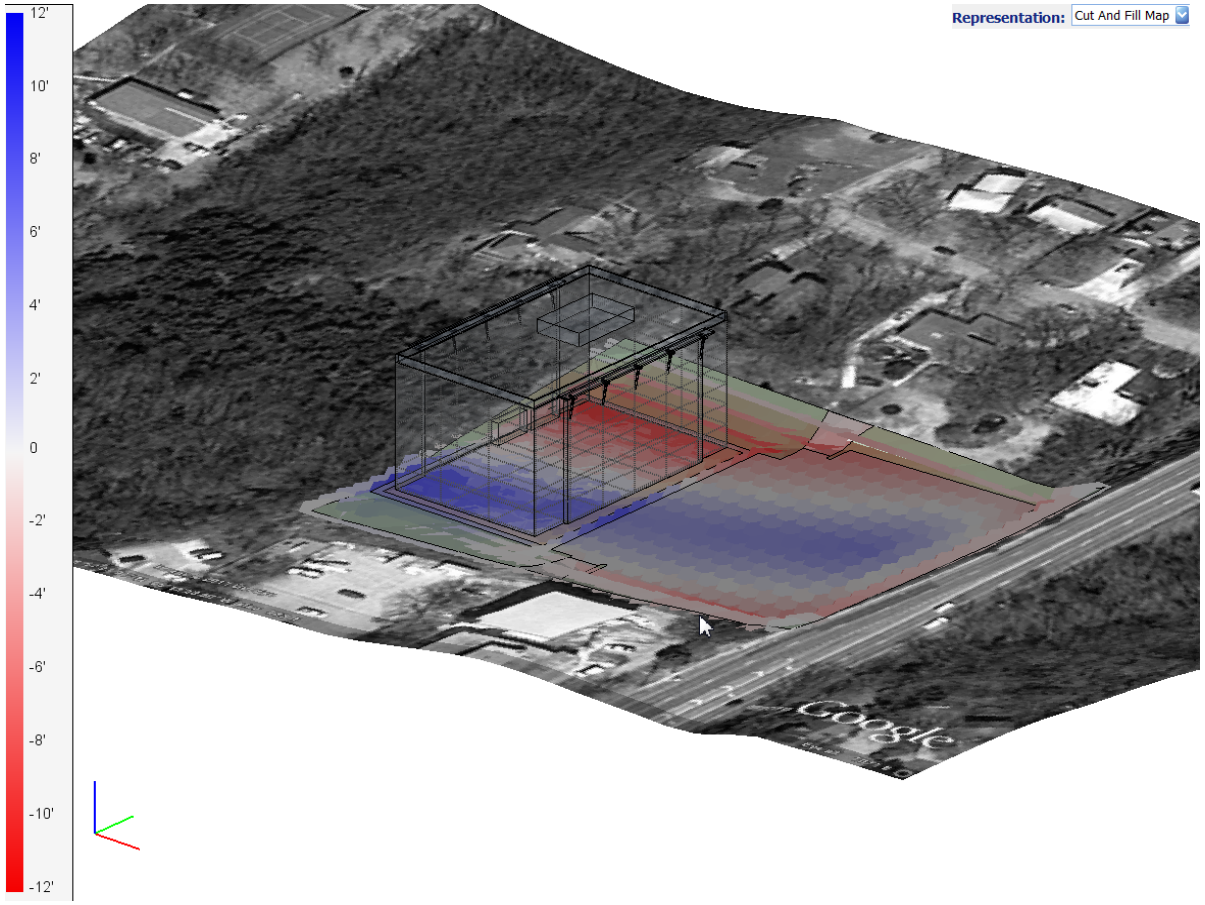




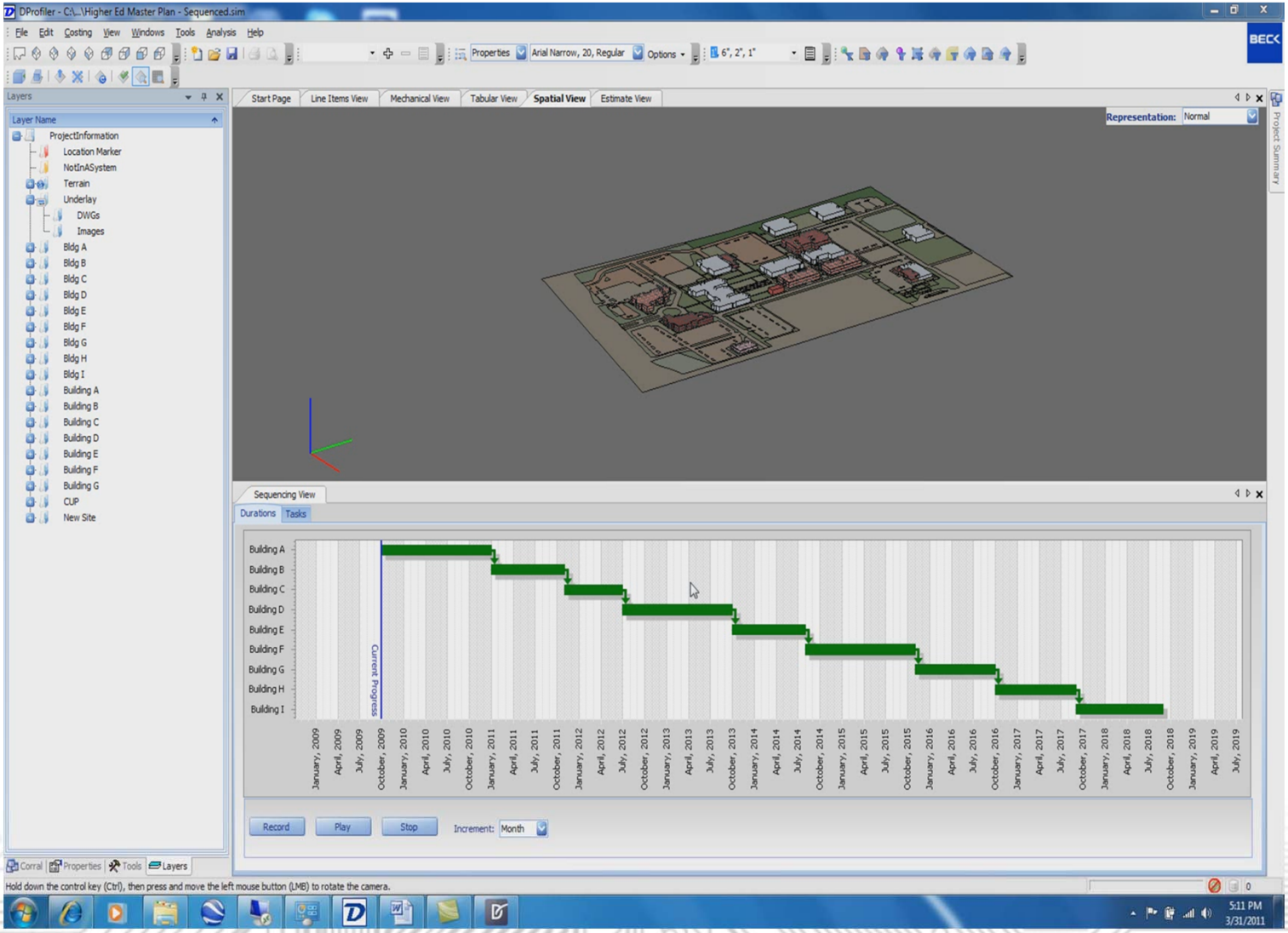
Macro BIM – Site Analysis

Conceptual Sitework Analysis

- For site feasibility studies
- Cut and Fill costs
- Soil strata information and cost calculated if known



Macro BIM – Phasing/Sequencing



Bringing it all Together

Deliverables...

- Detailed Cost Estimate
- Estimate Clarifications
- Use Information Downstream

5D BIM: Design Costs Analysis

Speaker

Kenneth A. Roberts, PMP, CCC
EVP and President Personnel Development
Project Time & Cost, Inc.

5D BIM Design Phase Control Estimates

PT&C
Project Management
Construction Management

Tri-Service Automated Cost Engineering Systems

(TRACES)

- **Tri-Service – Army, Navy and Air Force**
- **TRACES**
  - Suite of Cost Engineering Software Applications and Databases
  - Used by Tri-Service Cost Engineering Community, Including its Architecture-Engineering Contractors
- **TRACES Administered by U.S. Army Corps of Engineers**
- **PT&C has held TRACES Support Contract Since 2001**
- **In 2009 Tasked with Developing a BIM Interface**
  - TRACES Detailed Cost Estimating Application Interface with BIM
  - Presentation Focuses on Lessons Learned from this Task

TRACES BIM Interface

Task Overview

- **A Multi-Phased Task**
  - Proof of Concept
    - Gap Analysis – Cost Estimate Input Needs vs. BIM Output
    - Closing the Gap
    - Data Export/Import Requirements
    - Interface Prototype
  - Prototype Testing
    - Repeat Gap Analysis – Different Facility
    - Closing the Gap
    - Refine Data Export/Import Requirements
  - Interface Definitive Design
    - Open Architecture to Maximize Interoperability

Perceived Impact of BIM on Cost Estimating

Fact versus Fiction

"BIM is going to make the cost estimator obsolete – just push a button and out pops an estimate."

FICTION

"BIM will dramatically increase the accuracy of cost estimates."

FICTION

"BIM can dramatically increase cost estimating efficiency – the time required to produce an estimate can be cut in half."

FACT

"BIM can provide a complete quantity take-off to the estimator."

FICTION

"BIM can improve the accuracy of cost estimates."

FACT

"To fully reap the benefits of BIM requires better collaboration between designers and cost estimators."

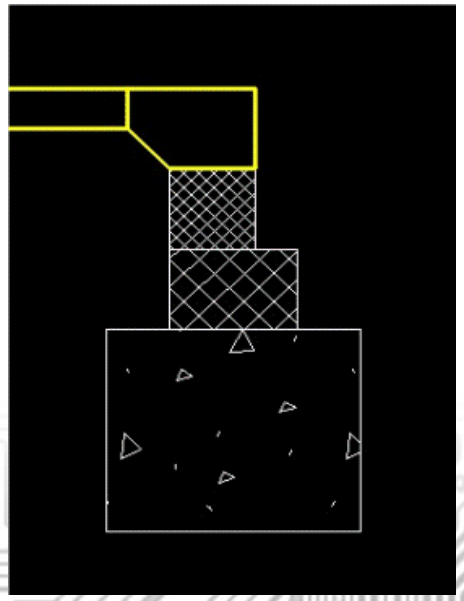
FACT

TRACES BIM Interface

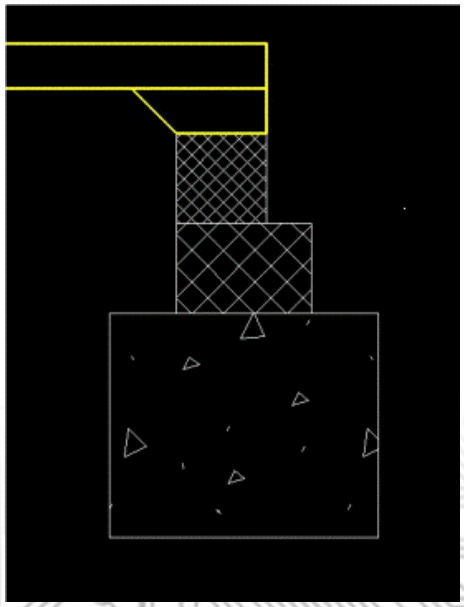
Lessons Learned

- **Model "Quality/Suitability" is Everything**
  - BIM Quantities Must be the **Right** Quantities
  - Design Intent vs. Construct Intent
  - **Example #1**
    - Typical Turndown Slab

As Originally Modeled



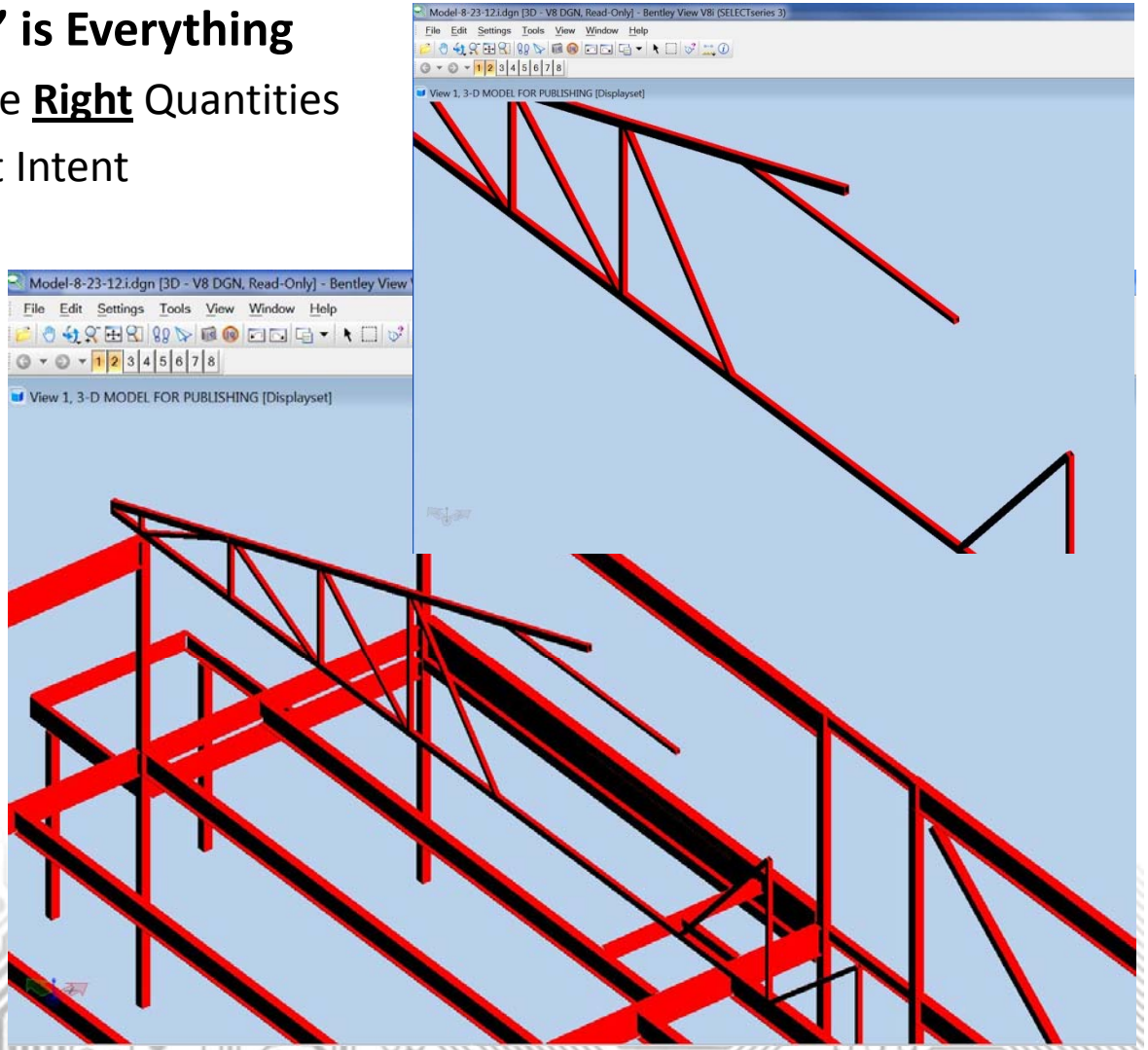
As Re-Modeled



TRACES BIM Interface

Lessons Learned

- **Model "Quality/Suitability" is Everything**
  - BIM Quantities Must be the **Right** Quantities
  - Design Intent vs. Construct Intent
  - **Example #2**
    - Long Span Steel Joist



Modeled Using a Steel Tube Object

Provided the Desired Visual, but NOT the Needed Quantification

TRACES BIM Interface

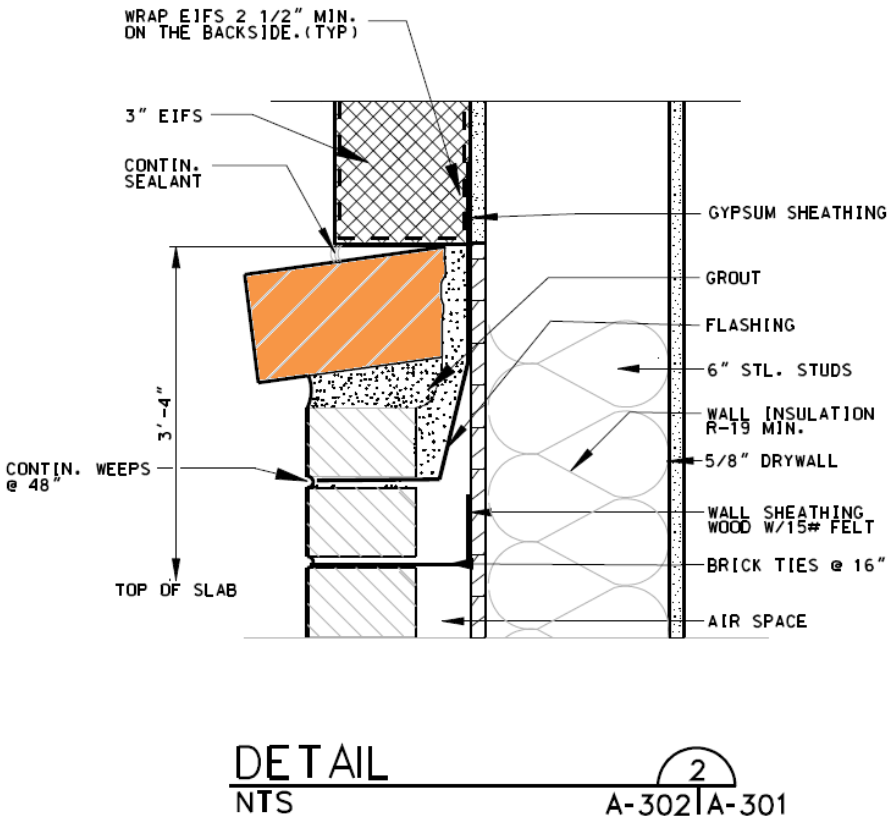
Lessons Learned

- **Model "Quality/Suitability" is Everything**
  - BIM Quantities Must be the **Right** Quantities
  - Design Intent vs. Construct Intent
  - **Example #3**
    - Cast Stone Window Sill

Modeled Using a Structural Precast Beam Object

Provided the Desired Visual, but NOT the Needed Quantification

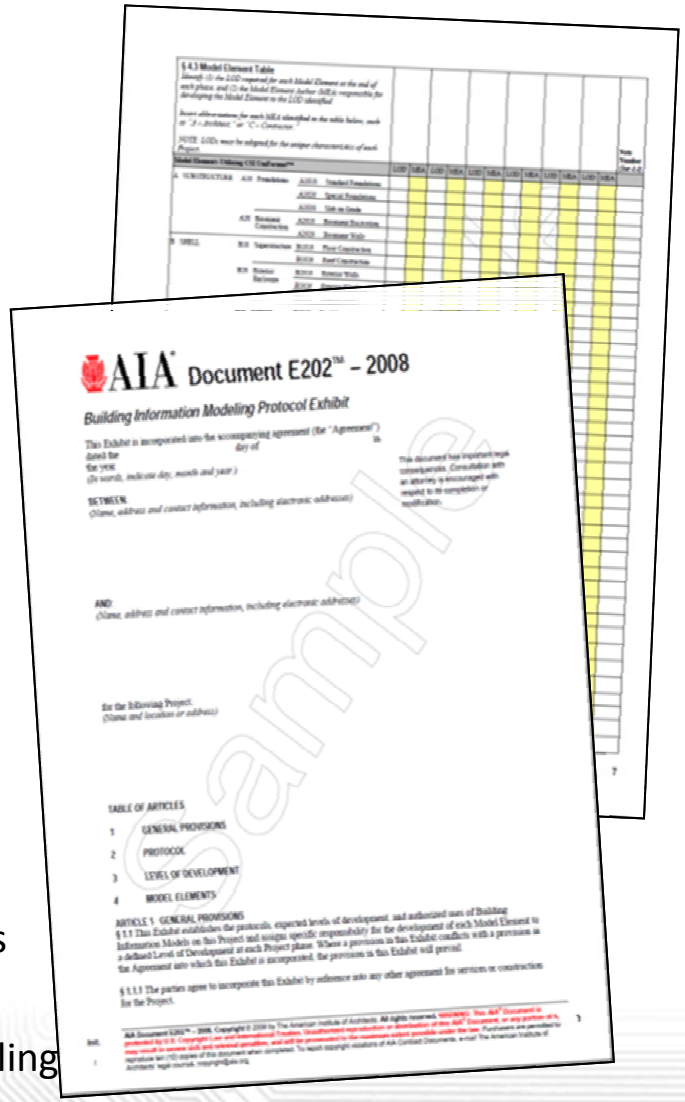
Important to Use the "Right" Object for Unique Linking to Cost Items



TRACES BIM Interface

Lessons Learned

- **Model Granularity**
  - What Isn't Modeled?
    - Reinforcing Steel
    - Waterproofing
    - Finishes
    - Wiring
    - Formwork
    - Etcetera, etcetera, etcetera
  - Level of Definition (LOD)
    - AIA E202 Building Information Modeling Protocol Exhibit
      - LOD 100 - Overall Building Massing
      - LOD 200 - Generalized Systems/Assemblies
      - LOD 300 - Specific Assemblies (Detailed)
      - LOD 400 - Fabrication, Assembly and Detailing
      - LOD 500 – Actual Constructed Assemblies


AIA Document E202™ – 2008

Building Information Modeling Protocol Exhibit

Sample

TRACES BIM Interface

Lessons Learned

- **Object Definition & Association with Cost Items/Assemblies**
  - What's Important?
  - Non-Geometric Data
  - Uniqueness/Differentiation
  - Construction Means & Methods
- **Standardization**
  - Required In Order to Fully Reap Benefits
- **Workflow Modifications**
  - Important for Designer and Cost Estimator to Collaborate

Mounting Height?

Site Equipment Attributes — BuildingDataGroup_

Window Attributes — BuildingDataGroup_01_0

Door Attributes — BuildingDataGroup_01

Attributes	Building Designer Attribute	ODBC Driver Attribute
MasterFormat	Classification | MasterFormat	ClassificationMasterFormat
OmniClass Table 21	Classification | OmniClass	ClassificationOmniClass
UniformatII	Classification | UniFormat	ClassificationUniFormat
Frame Depth	Dimension | Frame Depth	DimensionFrameDepth
Frame Depth Match Wall	Dimension | Frame Depth Match Wall	DimensionFrameDepthMatchWall
Frame Thickness	Dimension | Frame Thickness	DimensionFrameThickness
Height	Dimension | Height	DimensionHeight
Leaf Thickness	Dimension | Leaf Thickness	DimensionLeafThickness
Width	Dimension | Width	DimensionWidth
{new property}	Door | IsEgress	DoorIsEgress
{new property}	Glazing | Size	GlazingSize
{new property}	Louver | Notes	LouverNotes
{new property}	Louver | Size	LouverSize
Door Finish	Door | Finish	DoorFinish
Door Fire Rating	Door | Rating	DoorRating
Door Material	Door | Material	DoorMaterial
Door Type	Door | Type	DoorType
Door Undercut	Door | Under Cut	DoorUnderCut
Frame Finish	Frame | Finish	FrameFinish
Frame Material	Frame | Material	FrameMaterial
Frame Notes	Frame | Notes	FrameNotes
Frame Type	Frame | Type	FrameType
Glazing	Glazing	Glazing
Glazing Notes	Glazing | Notes	GlazingNotes
Hardware Electrical Rqs	Hardware | Elec. Requirements	HardwareElecRequirements
Hardware Finish	Hardware | Finish	HardwareFinish
Hardware Notes	Hardware | Notes	HardwareNotes
Hardware Set	Hardware | Set Manufacturer	HardwareSetManufacturer
Hardware Type	Hardware | Type	HardwareType

5D BIM: Design Costs Analysis

Speaker

Donald Henrich
EVP & Co-Founder
Vico Software, Inc.

COST PLANNING with BIM from a GC's perspective

- Company Introduction
- Focus of GC/CM & Use of Model
- Benefits of Visual Costing
- Technology Solution
- Importance of Standards, Libraries, and Data
- Call to Action

Vico Software

USA

UK

UAE

HU

FIN

+11 WW Partners

- Truly Exploit the Benefits of BIM for Construction
- 5D BIM Software and Services:
  - Most Integrated Virtual Construction Solution on the Planet
  - Most Experienced Virtual Construction Team
- Our Customers: **Owners** / A / E / **CM** / **GCs** / S

Over 400 customers world wide

Technology Partners

Andy Ball, CEO, Webcor Builders:

California Academy of Science
Courtesy: Webcor Builders

"Vico's software and services are revolutionizing the way we plan projects... leading to huge reductions in the inefficiencies, waste, and rework that plague our industry."

Focus of GC is on Quality, Cost, and Schedule

DESIGN

Architects

- Program
- Design

Engineers

- Performance

Owner

CONSTRUCTION

General Contractors

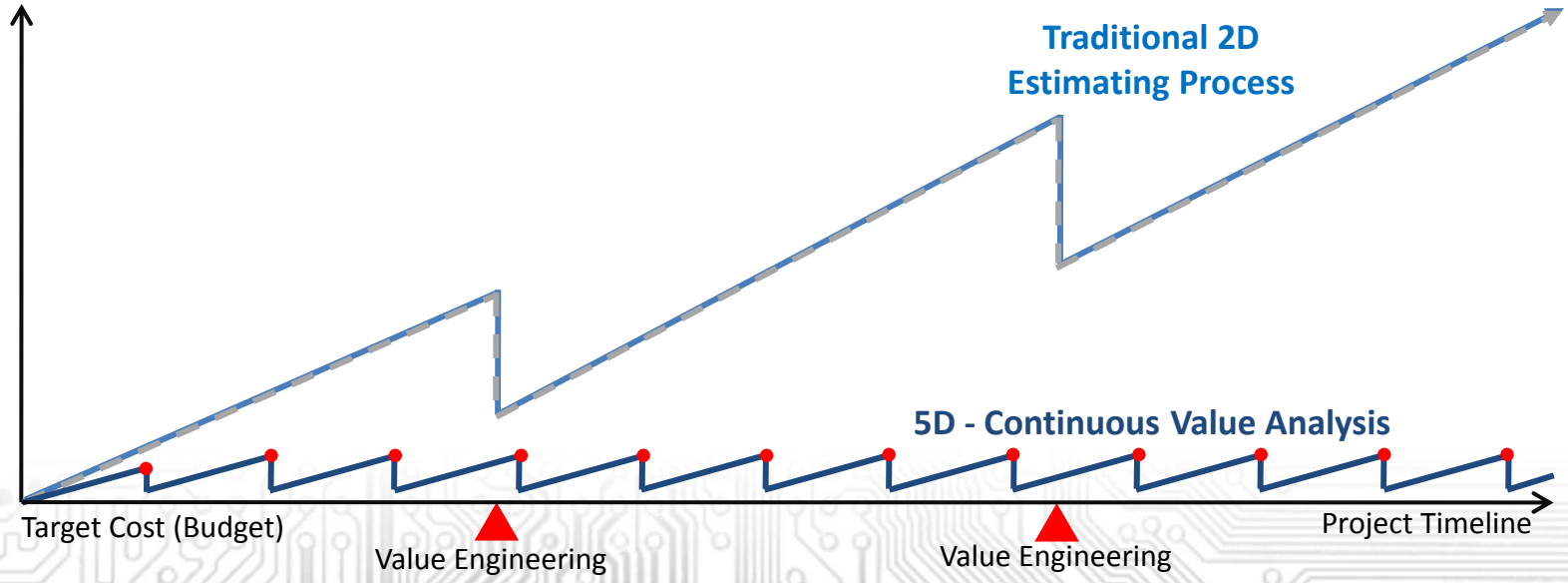
- Quality
- Schedule
- Cost

Subcontractors

Benefit to Owner / Designer
5D: Cost Planning – Budget Control

Continuous and Proactive Cost Control

Cost target set with Design team + owner per system and per departments



Benefit of Visual Cost Planning

Make Life Easy for

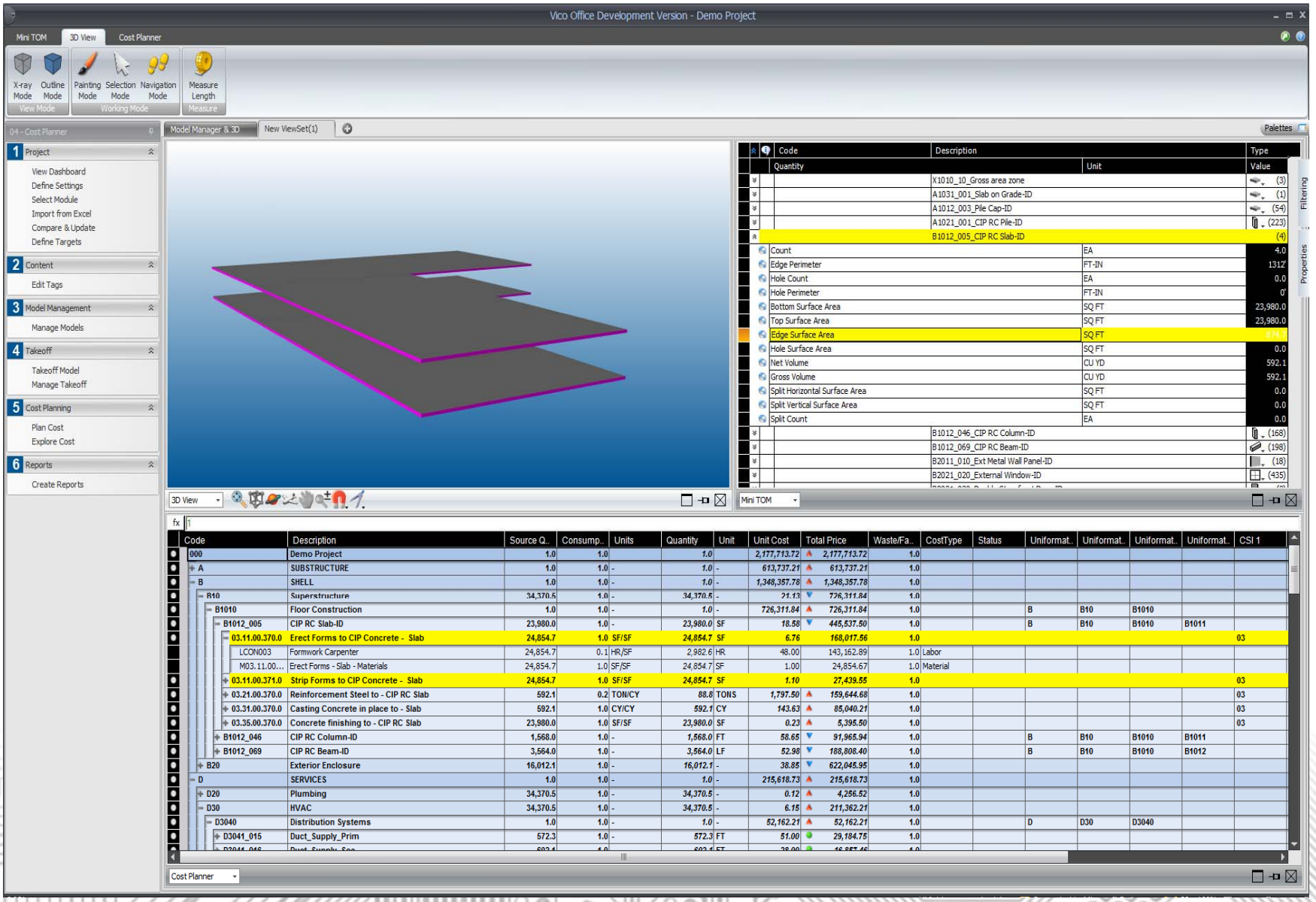
Owners and Designers

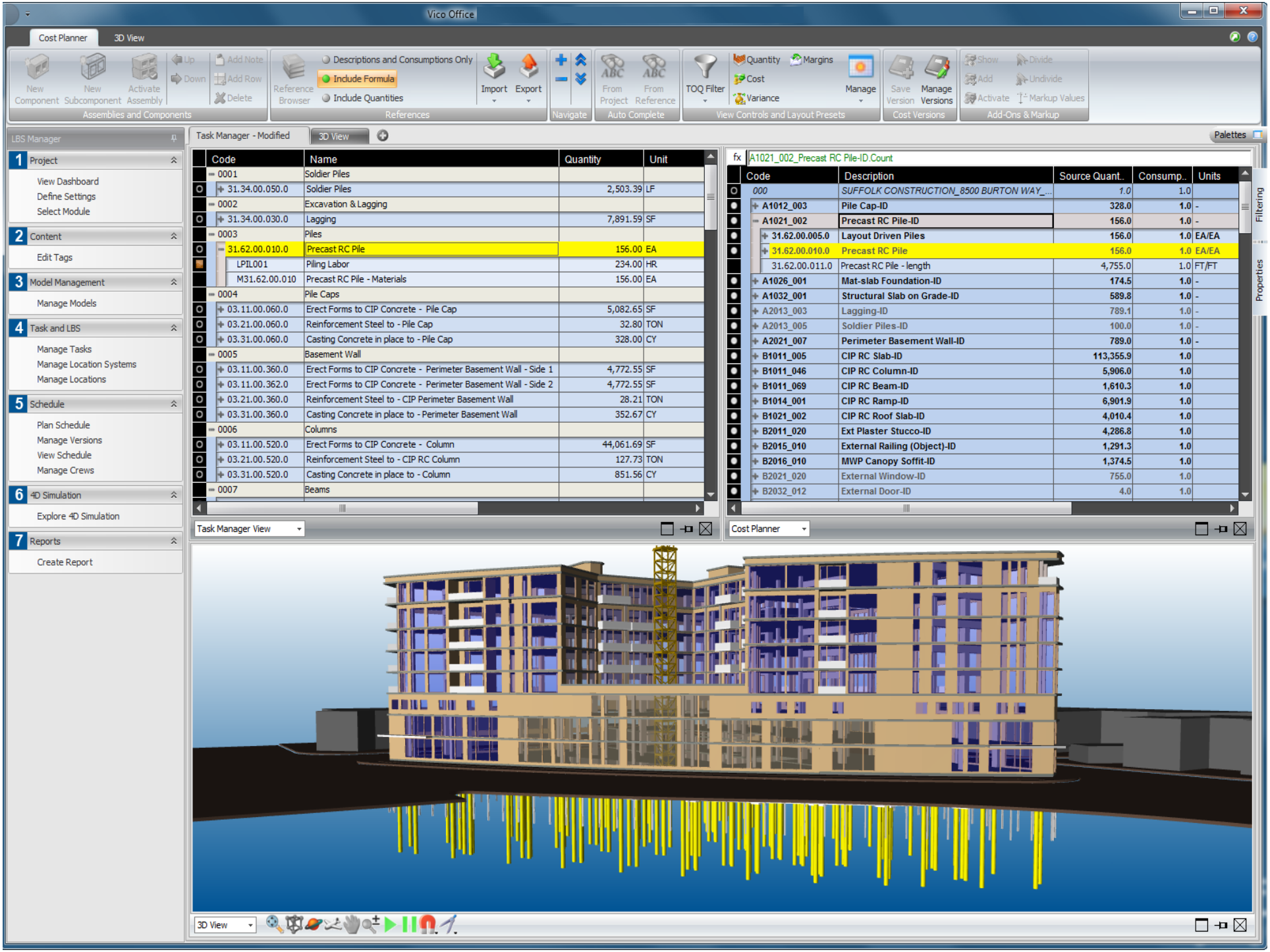
Reduce Risk

Decision Support &

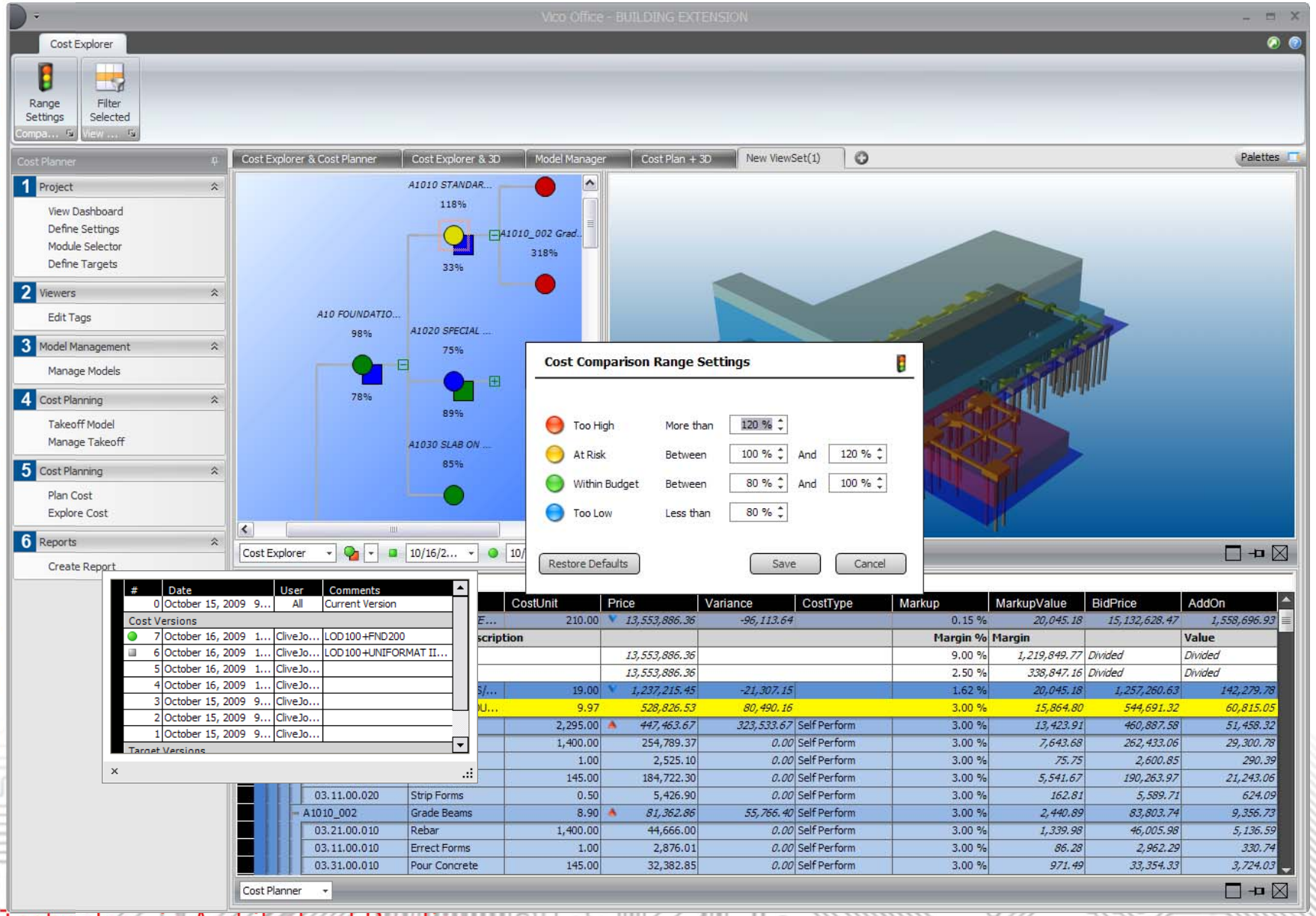
Superior Interaction

Visual Cost Planning

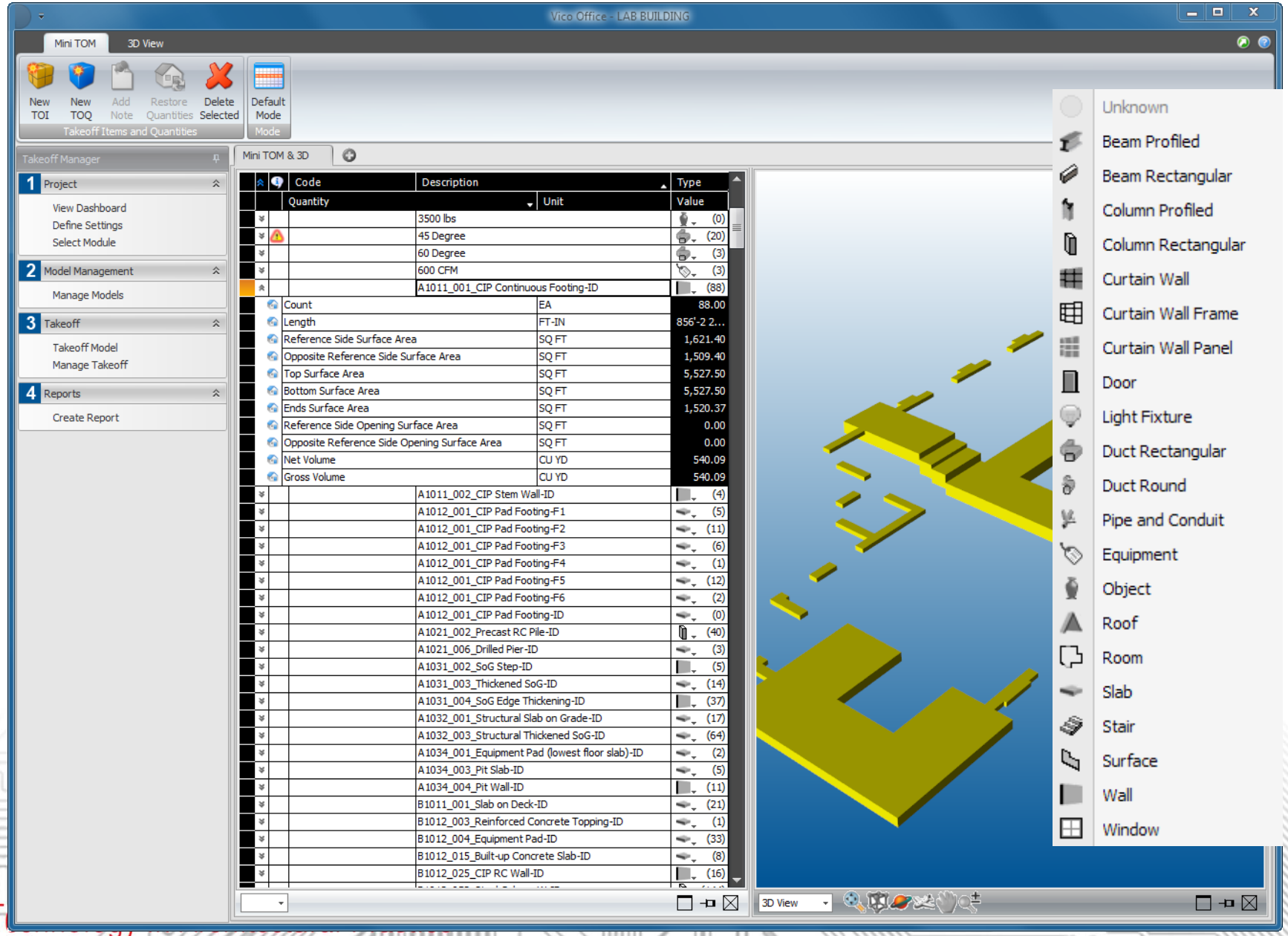



Vico Office
Cost Planner
3D View
New Component
New Subcomponent
Activate Assembly
Up
Down
Add Note
Add Row
Delete
Assemblies and Components
Reference Browser
Descriptions and Consumptions Only
Include Formula
Include Quantities
Import
Export
References
Navigate
From Project
From Reference
Auto Complete
TOQ Filter
Quantity
Margins
Cost
Variance
Manage
View Controls and Layout Presets
Save Version
Manage Versions
Cost Versions
Show
Add
Activate
Divide
Undivide
Markup Values
Add-Ons & Markup
LBS Manager
1 Project
View Dashboard
Define Settings
Select Module
2 Content
Edit Tags
3 Model Management
Manage Models
4 Task and LBS
Manage Tasks
Manage Location Systems
Manage Locations
5 Schedule
Plan Schedule
Manage Versions
View Schedule
Manage Crews
6 4D Simulation
Explore 4D Simulation
7 Reports
Create Report
Task Manager - Modified
3D View
Palettes
Code
Name
Quantity
Unit
0001 Soldier Piles
31.34.00.050.0 Soldier Piles 2,503.39 LF
0002 Excavation & Lagging
31.34.00.030.0 Lagging 7,891.59 SF
0003 Piles
31.62.00.010.0 Precast RC Pile 156.00 EA
LPIL001 Piling Labor 234.00 HR
M31.62.00.010 Precast RC Pile - Materials 156.00 EA
0004 Pile Caps
03.11.00.060.0 Erect Forms to CIP Concrete - Pile Cap 5,082.65 SF
03.21.00.060.0 Reinforcement Steel to - Pile Cap 32.80 TON
03.31.00.060.0 Casting Concrete in place to - Pile Cap 328.00 CY
0005 Basement Wall
03.11.00.360.0 Erect Forms to CIP Concrete - Perimeter Basement Wall - Side 1 4,772.55 SF
03.11.00.362.0 Erect Forms to CIP Concrete - Perimeter Basement Wall - Side 2 4,772.55 SF
03.21.00.360.0 Reinforcement Steel to - CIP Perimeter Basement Wall 28.21 TON
03.31.00.360.0 Casting Concrete in place to - Perimeter Basement Wall 352.67 CY
0006 Columns
03.11.00.520.0 Erect Forms to CIP Concrete - Column 44,061.69 SF
03.21.00.520.0 Reinforcement Steel to - CIP RC Column 127.73 TON
03.31.00.520.0 Casting Concrete in place to - Column 851.56 CY
0007 Beams
Task Manager View
fx A1021_002_Precast RC Pile-ID.Count
Code
Description
Source Quant..
Consump..
Units
000 SUFFOLK CONSTRUCTION_8500 BURTON WAY_... 1.0 1.0
A1012_003 Pile Cap-ID 328.0 1.0 -
A1021_002 Precast RC Pile-ID 156.0 1.0 -
31.62.00.005.0 Layout Driven Piles 156.0 1.0 EA/EA
31.62.00.010.0 Precast RC Pile 156.0 1.0 EA/EA
31.62.00.011.0 Precast RC Pile - length 4,755.0 1.0 FT/FT
A1026_001 Mat-slab Foundation-ID 174.5 1.0 -
A1032_001 Structural Slab on Grade-ID 589.8 1.0 -
A2013_003 Lagging-ID 789.1 1.0 -
A2013_005 Soldier Piles-ID 100.0 1.0 -
A2021_007 Perimeter Basement Wall-ID 789.0 1.0 -
B1011_005 CIP RC Slab-ID 113,355.9 1.0
B1011_046 CIP RC Column-ID 5,906.0 1.0
B1011_069 CIP RC Beam-ID 1,610.3 1.0
B1014_001 CIP RC Ramp-ID 6,901.9 1.0
B1021_002 CIP RC Roof Slab-ID 4,010.4 1.0
B2011_020 Ext Plaster Stucco-ID 4,286.8 1.0
B2015_010 External Railing (Object)-ID 1,291.3 1.0
B2016_010 MWP Canopy Soffit-ID 1,374.5 1.0
B2021_020 External Window-ID 755.0 1.0
B2032_012 External Door-ID 4.0 1.0
Cost Planner
Filtering
Properties
3D View

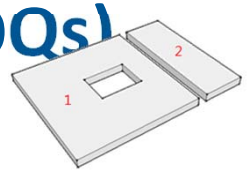
Explore and Compare Versions

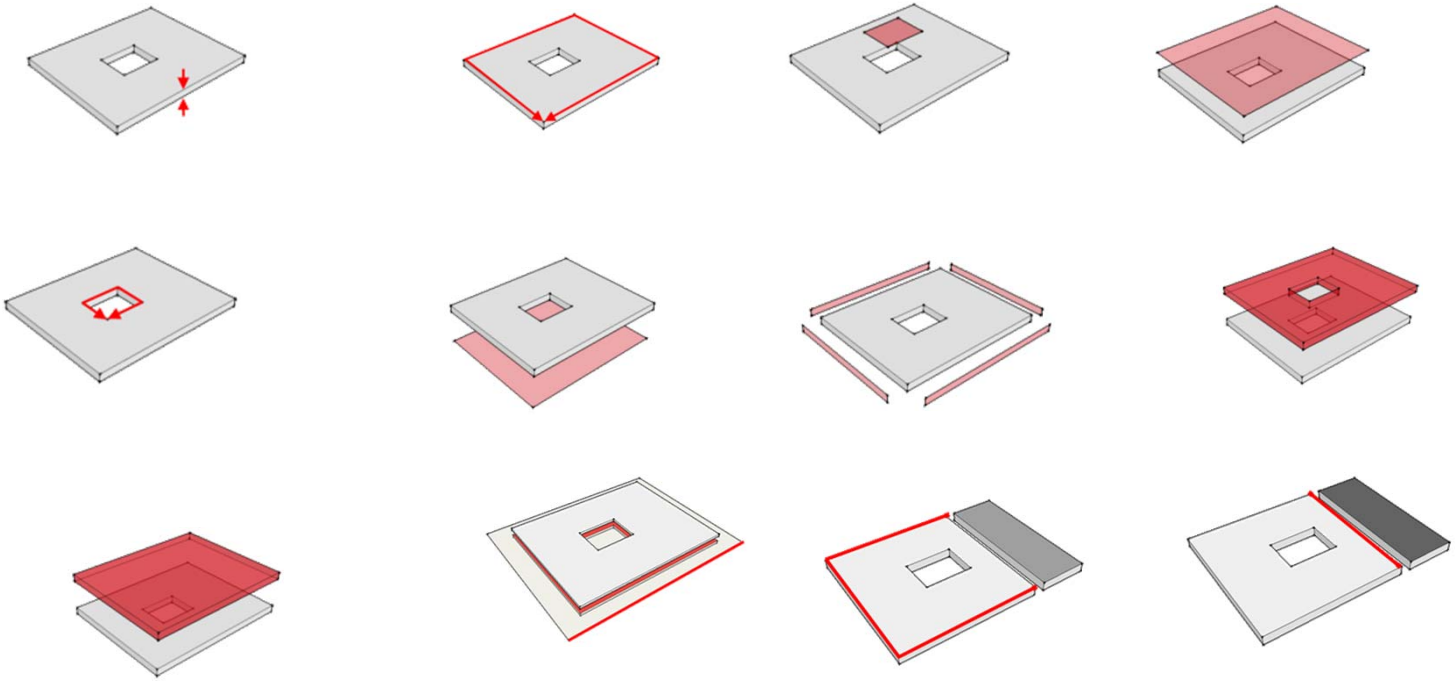


Technology – Create Take Off Items (TOIs)

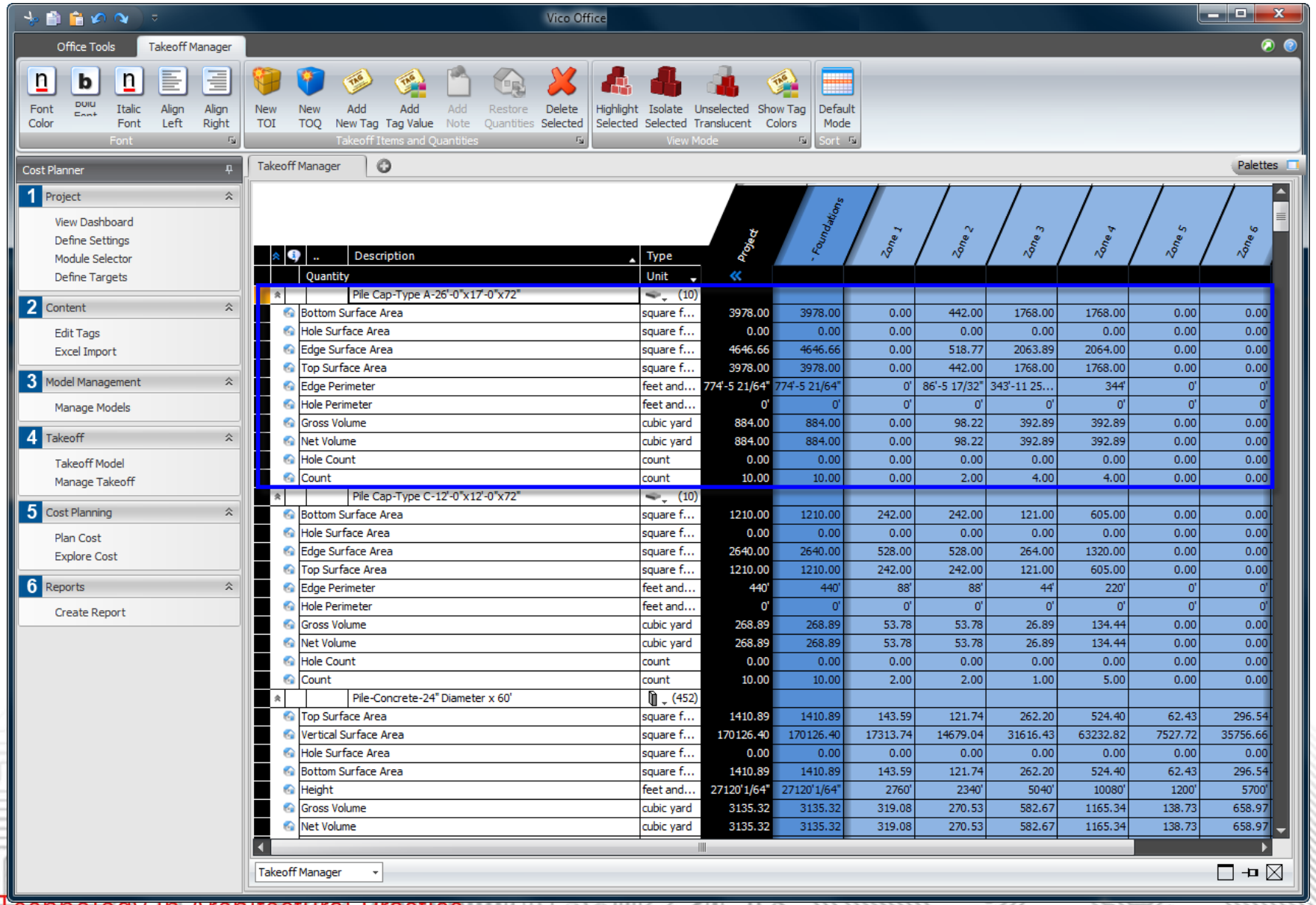


Technology - 'Create Construction Caliber'
Take Off Quantities (TOQs)



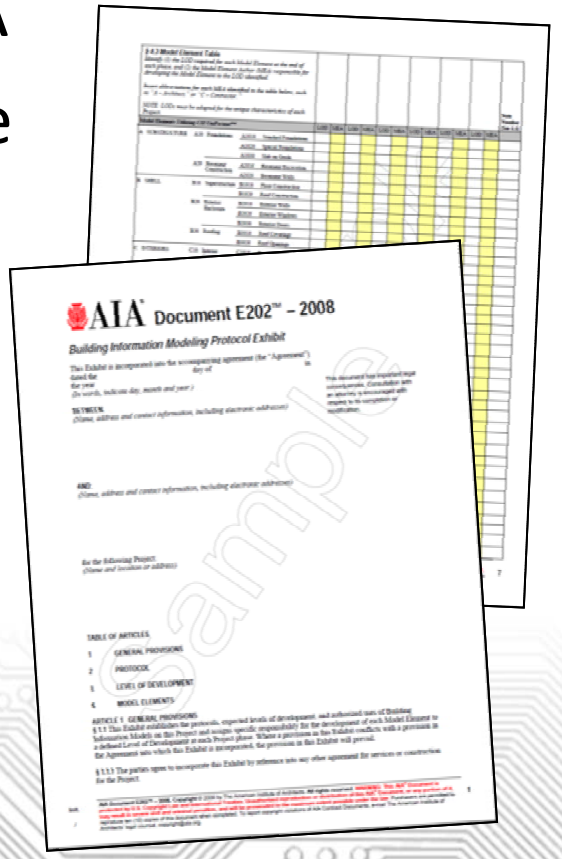


Technology – Create Quantities (TOQs) / by Location



MPS: A Brief History

- Model Progression Specification – written by Vico and Webcor
- MPS => E202 Incorporated by AIA
- MPS 2.0 => Custom Project Usage
- MPS 3.0 => Prepared Datasets for modeling, cost, and schedule



	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Site Preparation	100	100	100	200	200
Sub Structure	100	200	200	300	400
Superstructure	100	100	200	200	300
Exterior Enclosure	100	100	200	200	200
Interior Build Out	100	100	150	100	200
MEP Systems	100	100	100	100	200
Site Improvements	100	100	100	100	200
Logistics	100	100	200	200	200

MPS usage:
Evolutionary Estimating Using Various Levels Of Detail (LOD)

Target $ → $ / SF → $ / SYS → $ / Element → $ / Activity → $ / Unit

Key Points

1. **Planning in advance with entire team makes this easier**
2. **LOD's can be mixed**
3. **Rich datasets can automate much of the estimating and scheduling when using a model**

LOD 100
CONCEPT
PLANNING

LOD 150
DEPARTMENTAL
SPACE
PLANNING

LOD 175
ROOM SPACE
PLANNING

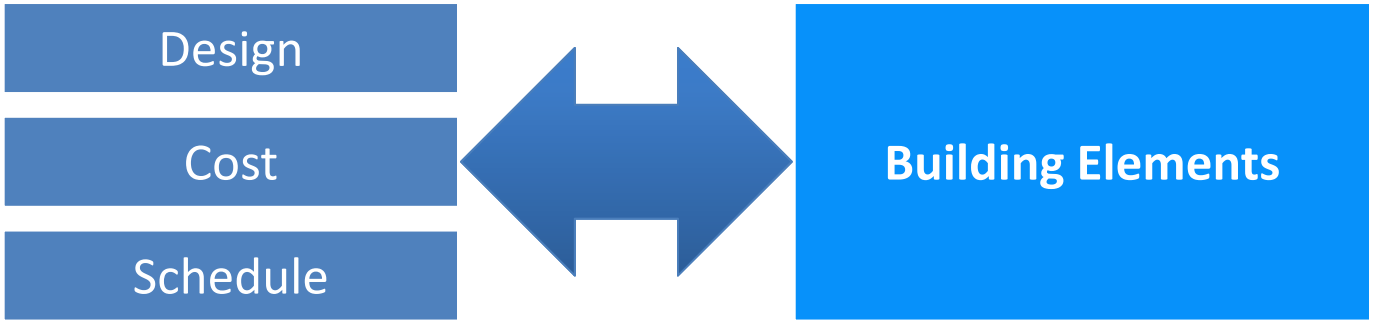
LOD 200
SCHEMATIC
DESIGN

LOD 300
DESIGN
DEVELOPMENT

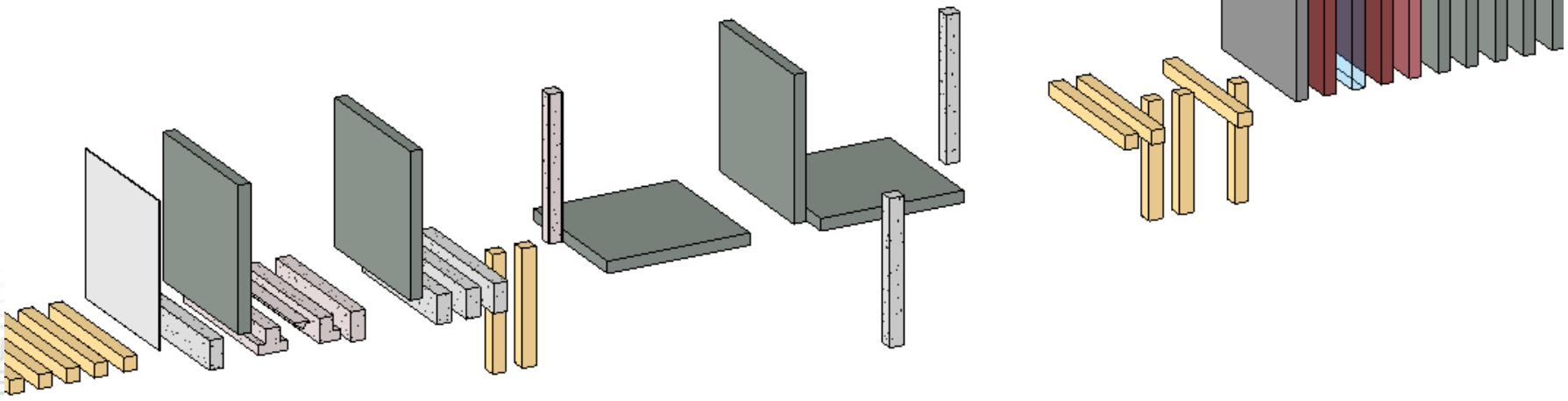
LOD 400
CONSTRUCTION
DOCUMENTATION

LOD 500
VIRTUAL MOCK- UP

MPS 3.0 - Goal: Tool Kit for Project Teams



Name of Building Object = Name of Line Item in Estimate
Cost Line Items Organized as Assemblies (tiered)
Cost Line Items contain Labor = Schedule Tasks



MPS 3.0 – Aspects, Classes, and LOD's

ASPECTS AND CLASSES

ASPECTS	CLASSES	DESCRIPTION
MODEL 'M'	M0	No Model
	M1	Building/Spatial/Room Massing
	M2	Building elements with approximate dimensions (SD)
	M3	Building elements with design dimensions (DD)
	M4	Construction Model (CD)
	M5	Fabrication / Virtual Mockup
	M6	As Built
COST 'E'	E1	Division Level Ranges
	E2	Massing Driven Ratios & Ranges
	E3	Element Driven - Assumption Based - Resource Level & Ranges
	E4	Element Driven - Specification Based - Resource Level
	E5	Element Driven - Subcontractor Based - Resource Level
	E6	Actual Cost
TIME 'S'	S1	Milestone Schedule
	S2	Element Based – average production rates
	S3	Phase Schedule – activity based using resource hour estimates
	S4	Phase Schedule – subcontractor production commitments
	S5	Weekly Workplans
	S6	Actual Progressed Schedule

MPS MATRIX

TARGET LOD	ASPECTS		
	M	E	S
000	M0	E1	S1
050	M0	E2	S2
100	M1	E2	S2
200	M2	E3	S3
300	M3	E3	S3
400	M4	E4	S3
450	M4	E5	S4
500	M5	E5	S4
550	M5	E5	S5
600	M6	E6	S6

Design

Cost

Schedule

An Example of a tiered cost plan

fx B1012_025_CIP RC Wall-ID.Net Reference Side Surface Area

Code	Description	Source Quantity	Consump..	Quantity	Unit	Ur
B1012_016	Raised Concrete Floor-ID	0.0	1.000	0.0	SF	
B1012_017	Concrete Plenum Slab-ID	0.0	1.000	0.0	SF	
B1012_019	Steel Joist Floor Structure-ID	0.0	1.000	0.0	SF	
B1012_020	Steel Frame Access Floor-ID	0.0	1.000	0.0	SF	
B1012_021	Wood Joist Floor Structure-ID	0.0	1.000	0.0	SF	
B1012_022	Wood Frame Access Floor-ID	0.0	1.000	0.0	SF	
B1012_024	CIP RC Shear Wall-ID	0.0	1.000	0.0	SF	
B1012_025	CIP RC Wall-ID	0.0	1.000	0.0	SF	
03.11.00.460.0	Erect Forms to CIP Concrete - Wall	0.0	1.000	0.0	SF	
LCON003	Formwork Carpenter	0.0	0.150	0.0	HR	
M03.11.00.460	Erect Forms - Wall - Materials	0.0	1.000	0.0	SF	
03.11.00.461.0	Strip Forms to CIP Concrete - Wall	0.0	1.000	0.0	SF	
LCON003	Formwork Carpenter	0.0	0.023	0.0	HR	
M03.11.00.461	Strip Forms - Wall - Materials	0.0	1.000	0.0	SF	
03.21.00.460.0	Reinforcement Steel to - CIP RC Wall	0.0	0.085	0.0	TON	
LCON004	Rodman	0.0	16.000	0.0	HR	
M03.21.00.460	Re Steel - CIP RC Wall - Materials	0.0	1.000	0.0	TON	
03.31.00.460.0	Casting Concrete in place to - Wall	0.0	1.000	0.0	CY	
LCON001	Concrete Pourer	0.0	0.750	0.0	HR	
M03.31.00.460	Concrete - Wall - Materials	0.0	1.000	0.0	CY	
03.35.00.460.0	Concrete finishing to - CIP RC Wall	0.0	1.000	0.0	SF	
LCON001	Concrete Pourer	0.0	0.005	0.0	HR	
M03.35.00.460	Finishing to - CIP RC Wall - Materials	0.0	1.000	0.0	SF	
B1012_026	CIP RC Elevator Core Wall-ID	0.0	1.000	0.0	SF	
B1012_027	CIP RC Stair Core Wall-ID	0.0	1.000	0.0	SF	
B1012_028	CIP RC Shaft Wall-ID	0.0	1.000	0.0	SF	
B1012_029	CIP RC Upstand Wall-ID	0.0	1.000	0.0	SF	

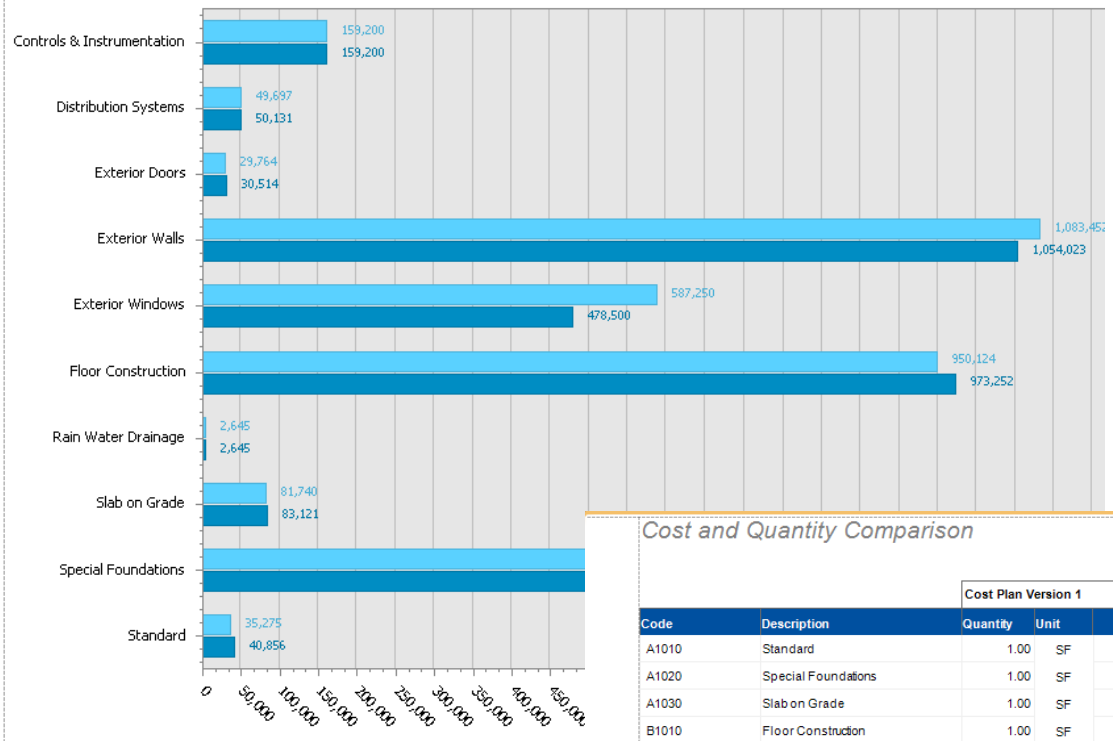
Easily show cost variance between design alternatives

Cost Plan Variance Report

Quantity and cost comparison between version 1 and version 2 of the project cost plan.

Version 1: 4_Cost Plan v04 **Version 2:** 0_Current Version

Graphical Cost Comparison



Cost and Quantity Comparison

		Cost Plan Version 1			Cost Plan Version 2			Variance	
Code	Description	Quantity	Unit	Price	Quantity	Unit	Price	Quantity	Unit
A1010	Standard	1.00	SF	40,855.90	11,999.17	SF	35,275.16	11,998.17	-
A1020	Special Foundations	1.00	SF	495,600.03	11,999.17	SF	495,600.03	11,998.17	-
A1030	Slab on Grade	1.00	SF	83,121.41	11,999.17	SF	81,739.80	11,998.17	-
B1010	Floor Construction	1.00	SF	973,251.67	35,970.00	SF	950,123.62	35,969.00	-
B2010	Exterior Walls	1.00	-	1,054,022.80	1.00	-	1,083,451.61	0.00	-
B2020	Exterior Windows	1.00	-	478,500.00	1.00	-	587,250.00	0.00	-
B2030	Exterior Doors	1.00	-	30,514.35	1.00	-	29,764.35	0.00	-
D2040	Rain Water Drainage	1.00	-	2,645.29	47,969.17	-	2,645.29	47,968.17	-
D3040	Distribution Systems	1.00	-	50,130.71	47,969.17	-	49,696.71	47,968.17	-
D3060	Controls & Instrumentation	1.00	-	159,200.00	47,969.17	-	159,200.00	47,968.17	-

5D BIM: Design Costs Analysis

Speakers

Corey Sanders
Business Development Manager
Beck Technology

Kenneth A. Roberts, PMP, CCC
EVP and President Personnel Development
Project Time & Cost, Inc.

Donald Henrich
EVP & Co-Founder
Vico Software, Inc.

David Scheer, AIA
Moderator

5D BIM: Design Costs Analysis

Thank you for joining us.

This concludes the AIA/CES Course #T12009.

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