

# 2012 Professionals Choice BIM Award

Presented by AIA TAP and BIMForum

# YOU are the Jury!!

- Here in person at BIMForum | San Antonio
- Online at AIA TAP Webinar
- Selection of Professionals' Choice will be Immediately After these Presentations
- Take Notes and Be Prepared to VOTE!



**...And In Addition:  
2012 Owners' Choice BIM  
Award**

**Presented by AIA TAP and COAA**



**Ed Gannon**  
Manager of Design  
Services

The Pennsylvania State  
University



**Gene Herring**  
Associate Director

University of Florida  
Facilities Planning and  
Construction



**Patrick Wilson**  
Project Manager

University of Chicago

## **2012 COAA | AIA Owners' Choice BIM Awards Jury**

To be Presented at COAA's 2012 Spring Owners'  
Leadership Conference | Dallas Texas | May 10 2012



## Your Moderator and Hosts from AIA

- Stephen Hagan FAIA
- Calvin Kam AIA PhD
- Tony Rinella Assoc AIA
- David Scheer AIA
  - 2012 Chair of AIA TAP

# Session | Online Webinar Learning Objectives

- Learn and discover award winning team dynamics, the people and process side of BIM and its influence on architectural practice
- Identify what BIM is, and what its future could be, based on lessons learned from eight years of AIA TAP BIM awards
- Recognize how sustainability can be enhanced and enabled using BIM
- Identify the interface between BIM and Integrated Project Delivery (IPD) and Process Improvement



# Online Webinar Information



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## 2012 Professionals' Choice and Owners' Choice BIM Awards (free)

Like Sign Up to see what your friends like.

Wednesday, April 25, 2012, 4:30 PM - 6:00 PM

This session is co-sponsored by BIMForum, COAA and AIA TAP. It will present the five AIA TAP 2012 BIM Award winners in Category B (Process Innovation Using BIM), competing for the 2012 Professionals' Choice BIM Award. Following presentations by each of the teams, both online webinar attendees as well as those in attendance in San Antonio real-time, will vote for the Professionals' Choice BIM Award winner.

The winner will be announced at **6:30pm ET** (immediately following the webinar). Find out the winner by following @AIA\_TAP on Twitter and engage in the conversation by using #AIAATAP.



**Attendees will earn 1.00 CEH**

*\*Note the webinar will be open 15 minutes prior for accessing the site and logistics, so that the webinar can begin at 3:30pm CT Sharp.*

**REGISTER NOW**

### Learning Objectives

1. Learn and discover award winning team dynamics, the people and process side of BIM and its influence on architectural practice
2. Identify what BIM is, and what its future could be, based on lessons learned from eight years of AIA TAP BIM awards
3. Recognize how sustainability can be enhanced and enabled using BIM
4. Identify the interface between BIM and Integrated Project Delivery (IPD) and Process Improvement



**Martin Fischer PhD**  
*Jury Chair*

Stanford CIFE  
Palo Alto, CA



**Boyd Black**  
Assistant VP Capital  
Project Delivery

University of Chicago  
Chicago, IL



**Peggy Deamer PhD**  
Professor

Yale School of  
Architecture  
New Haven, CT



**Roger Grant CSI, CDT**  
Program Director

NIBS  
Washington DC



**Dan Russell, CM-BIM**  
Leed AP

Sundt Construction  
Phoenix, AR

## 2012 AIA TAP BIM Awards Jury

Presented at 2012 AIA Convention BIM Awards Reception  
and Ceremony | Washington DC | May 16 2012



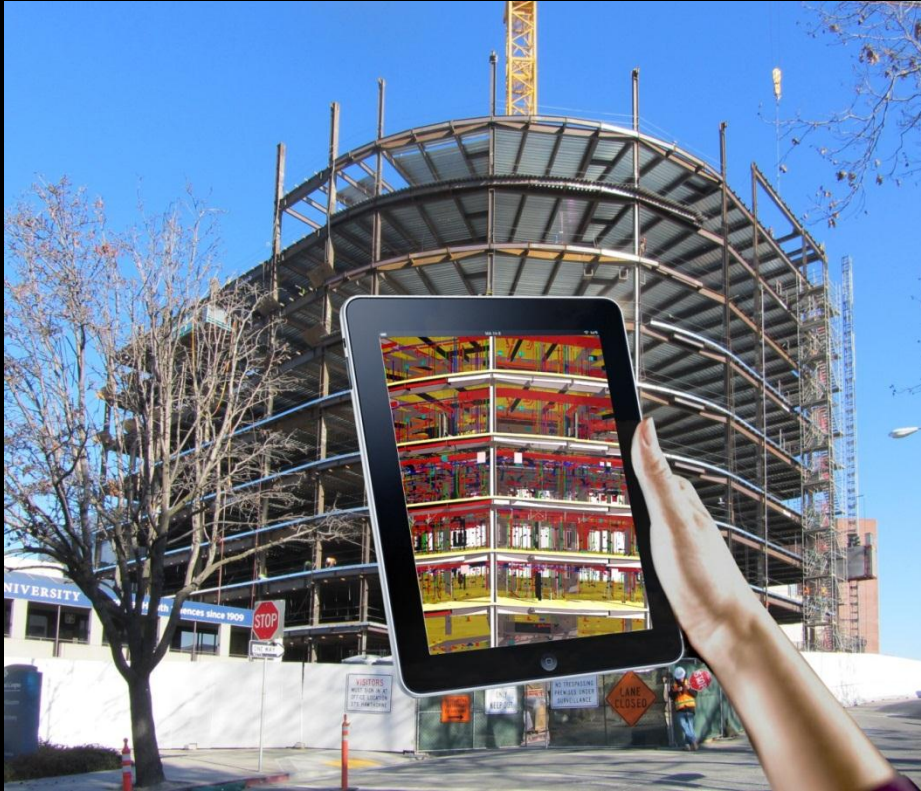
# 2012 BIMForum Professionals Choice BIM Award



## 5 Finalists for Professionals' Choice Award

- Alta Bates Summit Medical Center
- Edith Green-Wendell Wyatt Federal Building Modernization
- Institute for Systems Biology
- Maricopa County South Court Tower
- Warrior in Transition Barracks





## Alta Bates Summit Medical Center

Presented by

Dudley Campbell AIA, LEED AP Devenney Group Ltd., Architects



# Next Level Hospital Planning

Devenney Group, Ltd., Architects

DPR Construction





## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Aerial Rendering





## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Aerial Rendering





## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Building Entry



## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Building Entry





## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Patient Room Concept Rendering



## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Patient Room Concept Rendering





## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Lobby Concept Rendering





## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Nurse Station Concept Rendering



## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Elevator Lobby Concept Rendering





## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Family Waiting Room Concept Rendering

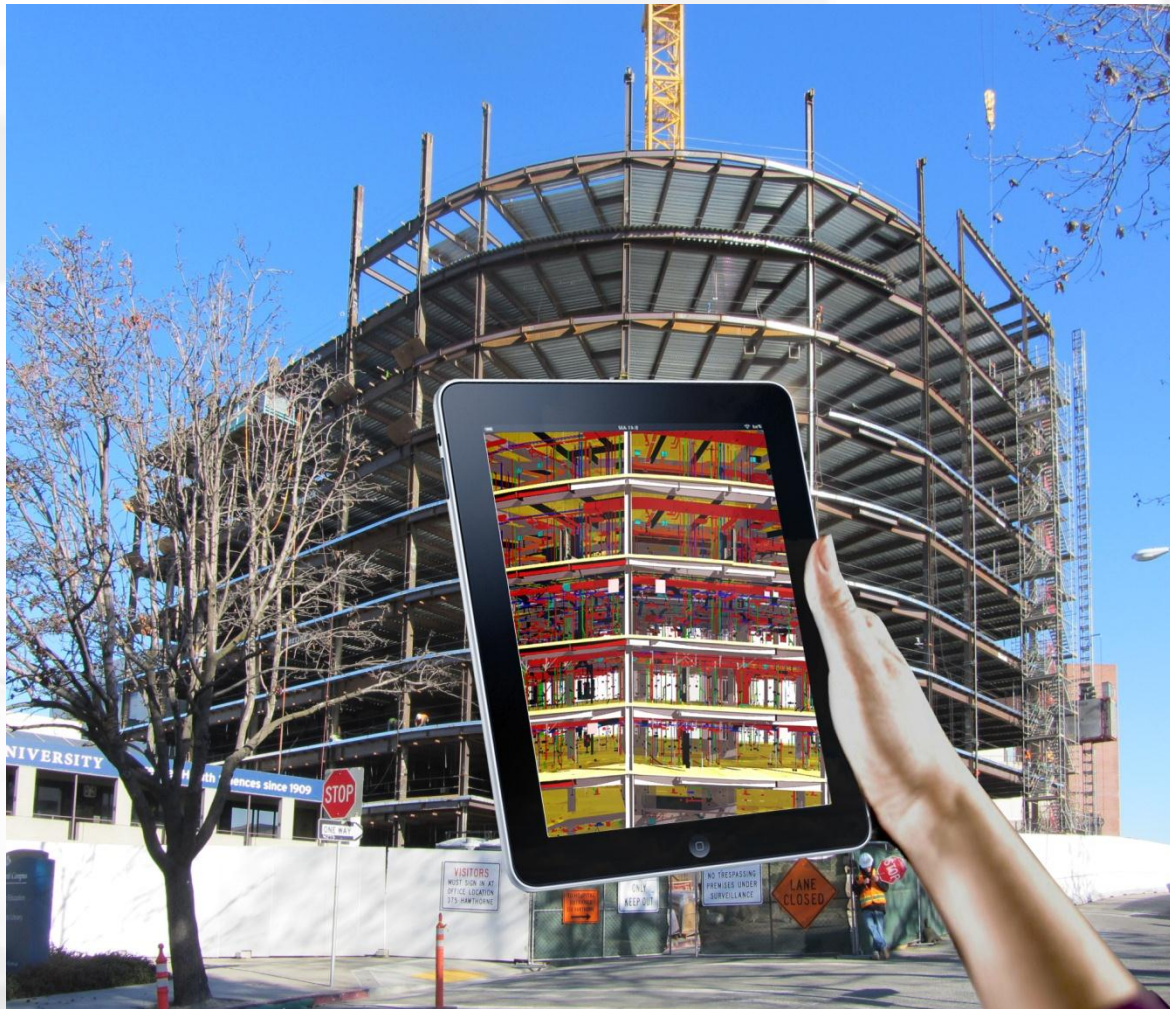




## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Computer Composite – BIM Model with Skin Rendering



## Project Introduction

Alta Bates Summit Medical Center – Patient Care Pavilion

Photo Composite – Photograph with BIM Overlay





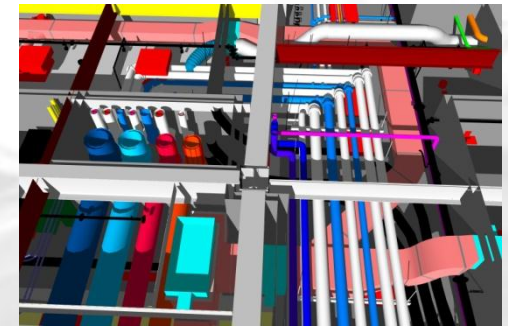
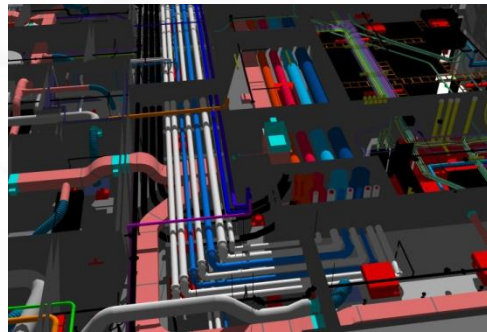
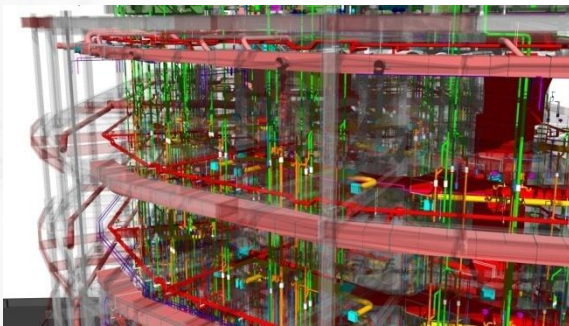
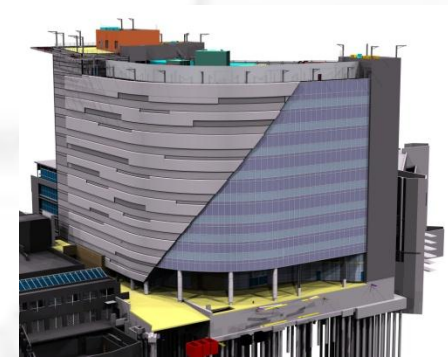
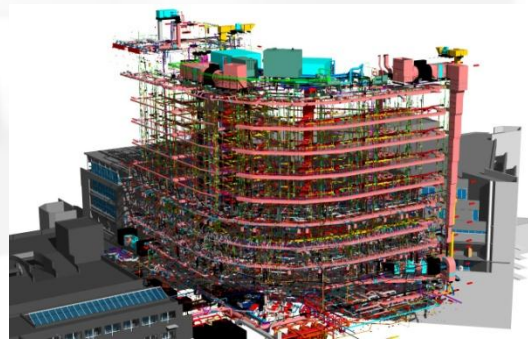
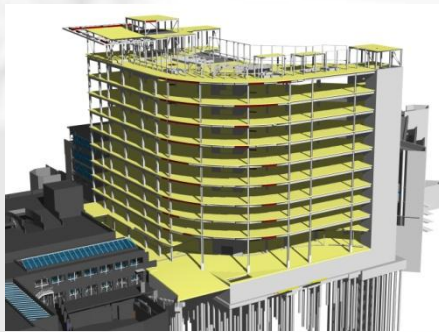
Process Mapping  
Constructability Reviews  
Model for Fabrication

110 Users  
42 Unique Companies  
3,055 Completed Tasks

## Project Process

Alta Bates Summit Medical Center – Patient Care Pavilion

Commitment Based Planning



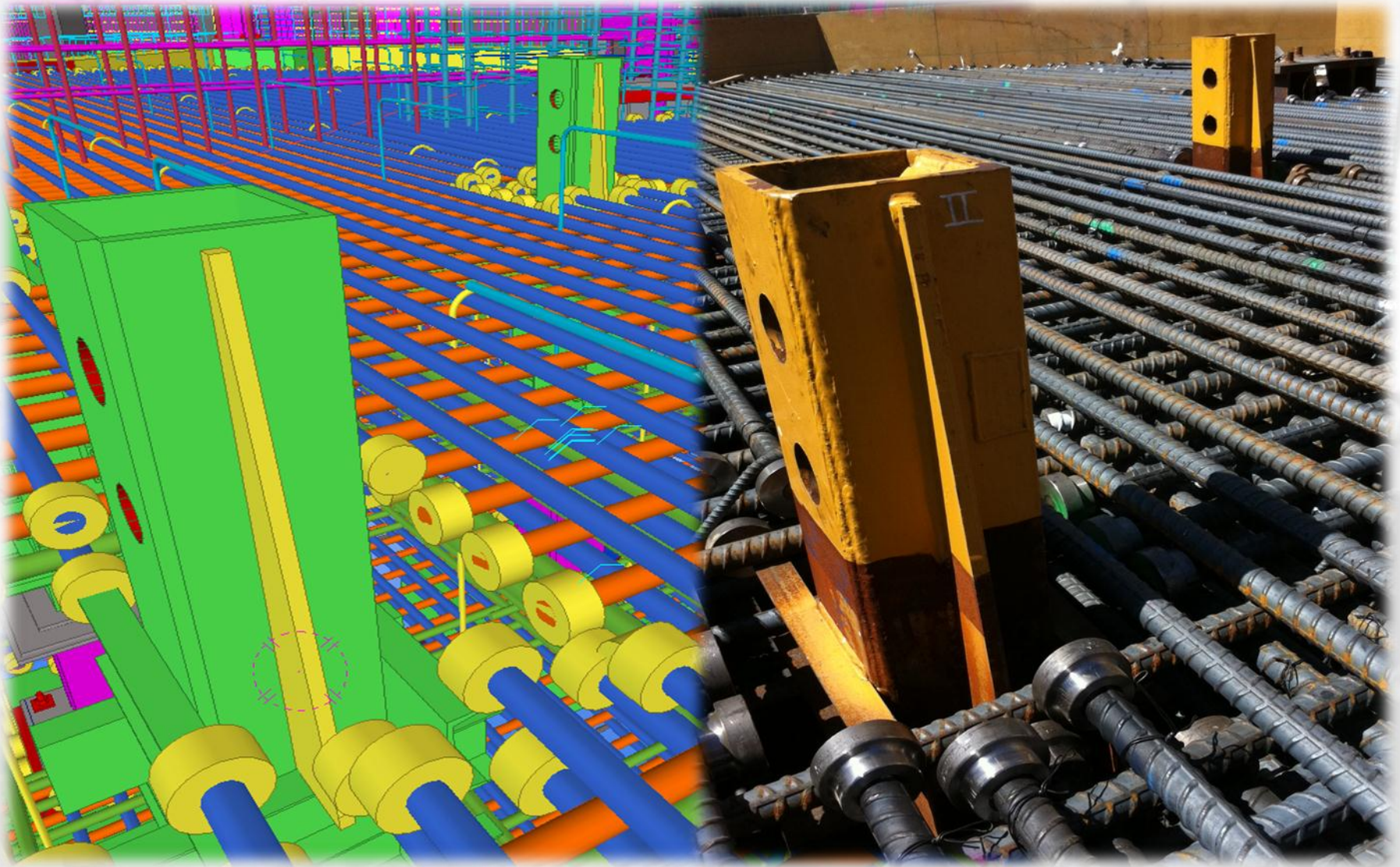
What we modeled  
 What we didn't model  
 Difference between interior and exterior

## Modeling - Design/Pre-Construction

Alta Bates Summit Medical Center – Patient Care Pavilion

What was modeled





## Modeling for Fabrication

Alta Bates Summit Medical Center – Patient Care Pavilion

Rebar Coordination



# Clash Free Model



## Clash Detection

Alta Bates Summit Medical Center – Patient Care Pavilion

Goal: Clash Free Model



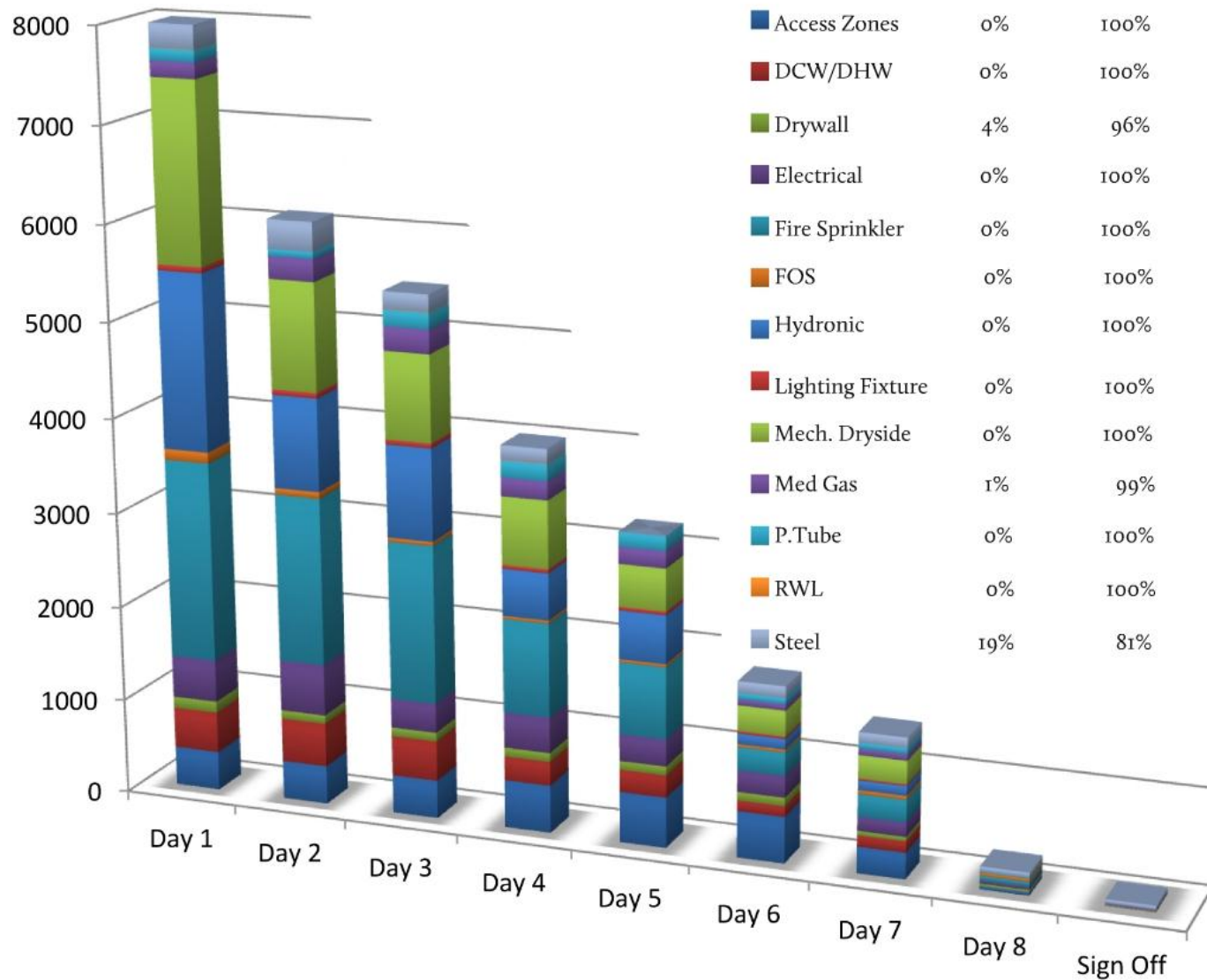
Min Clearances in Inches	Medium Pressure Supply	Low Pressure Supply	Exhaust Duct	Flex Duct	VAV Boxes and HeatCraft Coils	Fire Sprinkler piping	Hydronic Piping	DCW Piping	DHW Piping	Med Gas Piping	Waste Piping	Vent Piping	Rain Water Leaders	Conduits	Hangers	J Hooks	Misc Metals	Wall Bracing	King Studs for Doors/Drywall	Struct Steel	Seismic Bracing	Hangers	Access Zones
Fire Sprinkler Piping	1	1	1	1	1	X																	
Hydronic piping	1	1	1	1	1	1	X																
DCW Piping	1	1	1	1	1	1	1	X															
DHW Piping	1	1	1	1	1	1	1	1	X														
Med Gas Piping	2	2	2	2	2	2	2	2	2	X													
Waste Piping	1	1	1	1	1	1	1	1	1	1	X												
Vent Piping	1	1	1	1	1	1	1	1	1	1	1	X											
Rain Water Leaders	1	1	1	1	1	1	1	1	1	1	1	1	X										
Conduits	0	0	0	0	0	1	1	1	1	2	1	1	1	X									
Hangers	2	2	2	2	2	2	2	2	2	2	1	1	1	2	X								
J hooks (Actual)	2	2	2	2	2	2	2	2	2	2	1	1	1	2	2	X							
Misc Metals	1	1	1	1	1	1	1	1	1	2	1	1	1	0	2	2	X						
Wall Bracing	1	1	1	1	1	1	1	1	1	2	1	1	1	0	2	2	1	X					
King Studs for Doors	1	1	1	1	1	1	1	1	1	2	1	1	1	0	2	2	1	1	X				
Struct Steel	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	X			
Seismic Bracing	1	1	1	1	1	1	1	1	1	2	1	1	1	0	2	2	1	1	1	2	X		
Hangers						1	1	1	1	2	1	1	1	0	2	2	1	1	1	2	1	X	
Access Zones						0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	X

## Clash Detection

Alta Bates Summit Medical Center – Patient Care Pavilion

Designated Tolerances

# Measuring Coordination

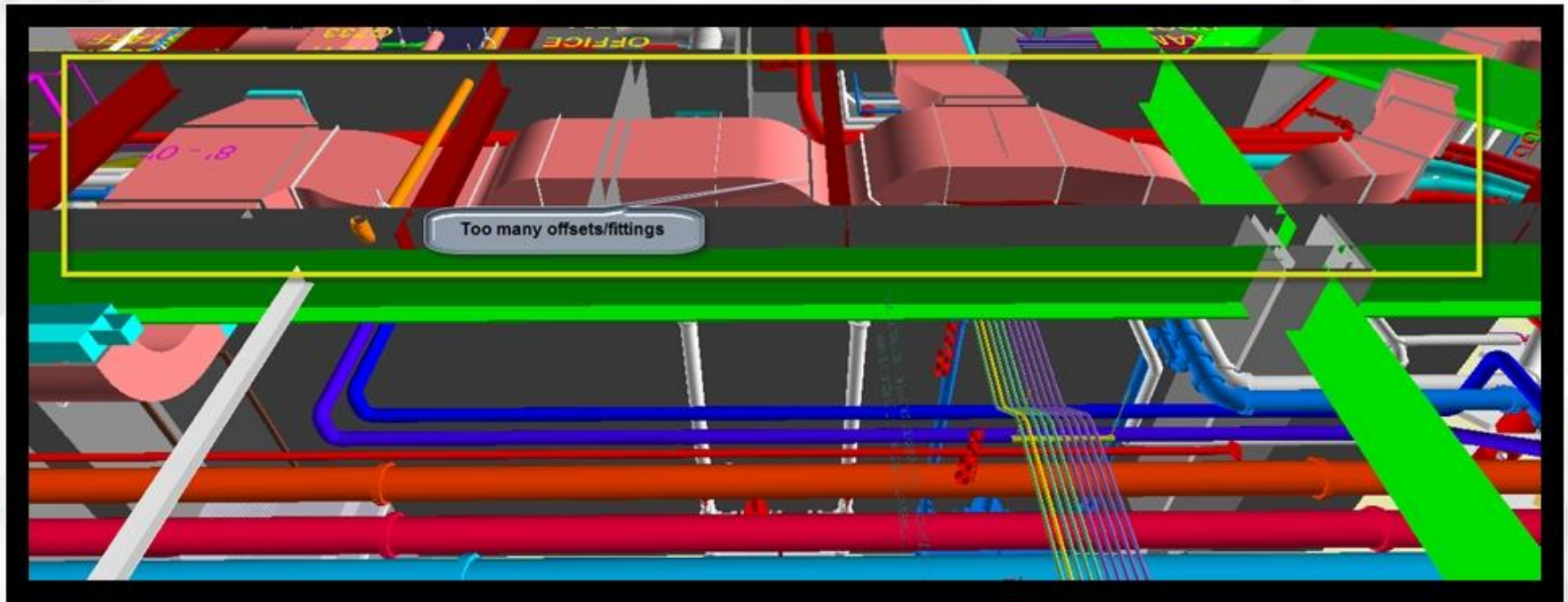


## Clash Detection

Alta Bates Summit Medical Center – Patient Care Pavilion

Designated Tolerances



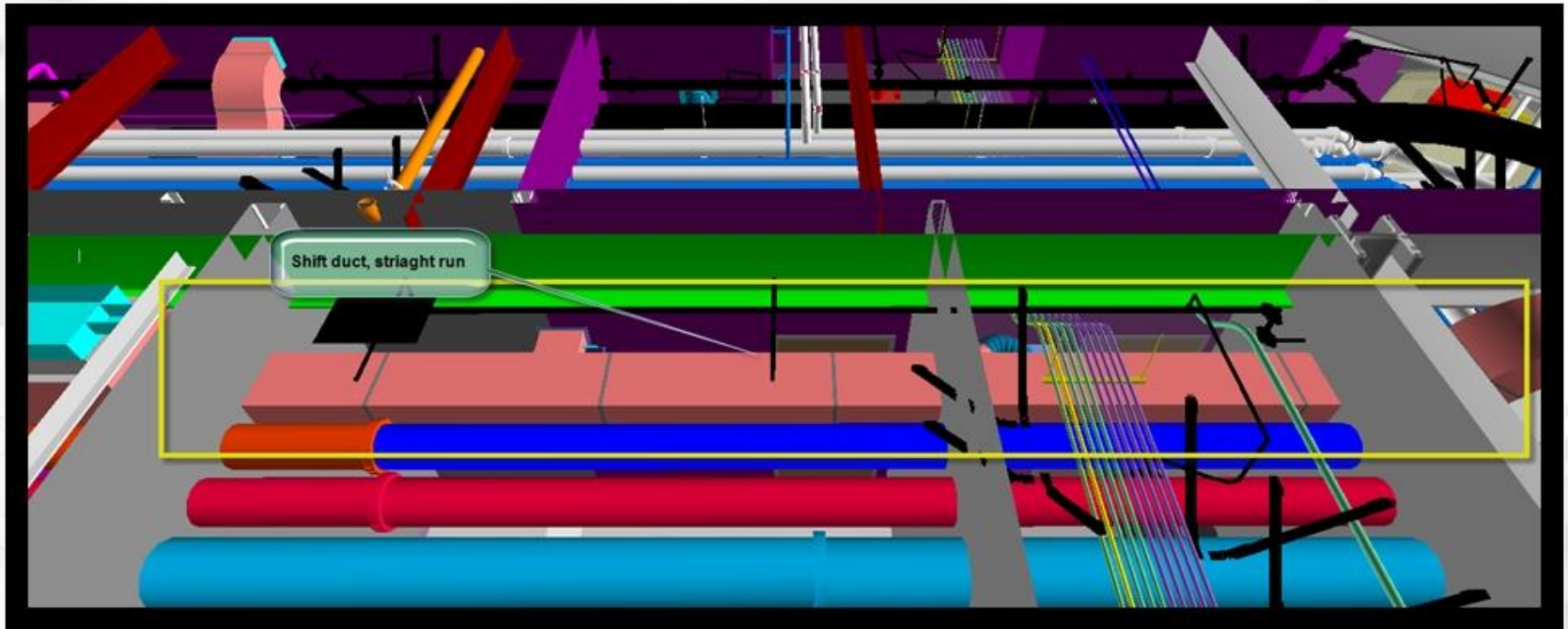


What we tried first...  
And Why we **FAILED**

## Clash Detection

Alta Bates Summit Medical Center – Patient Care Pavilion

Successes and Failures



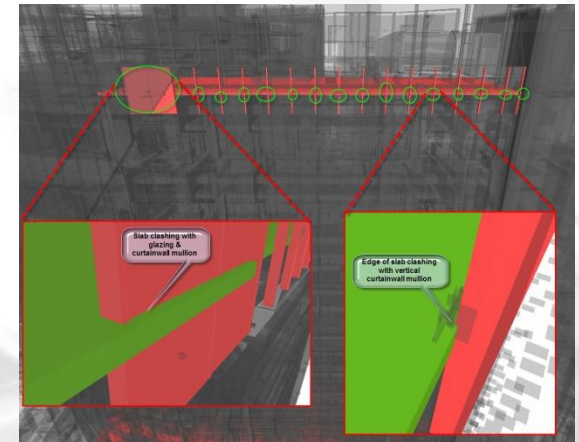
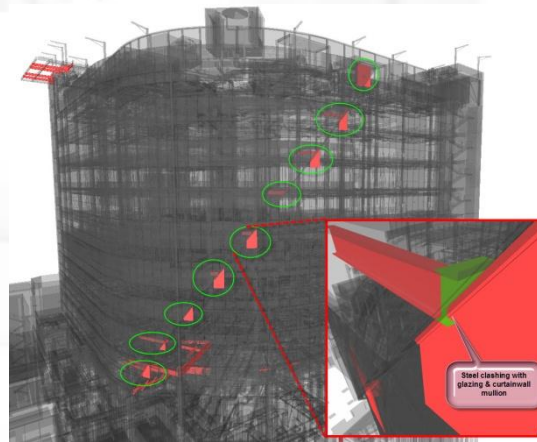
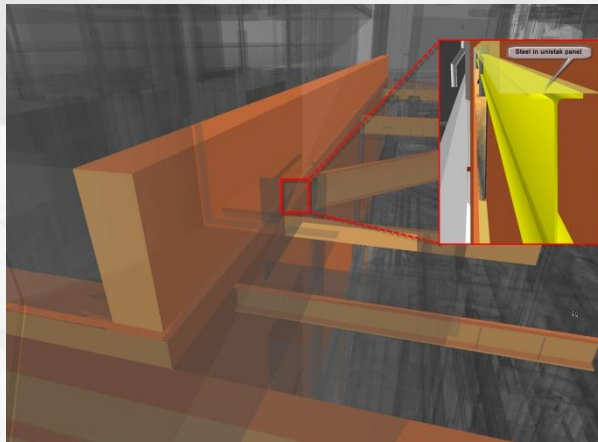
What we did next...  
And how we measured **SUCCESS**

## Clash Detection

Alta Bates Summit Medical Center – Patient Care Pavilion

Successes and Failures



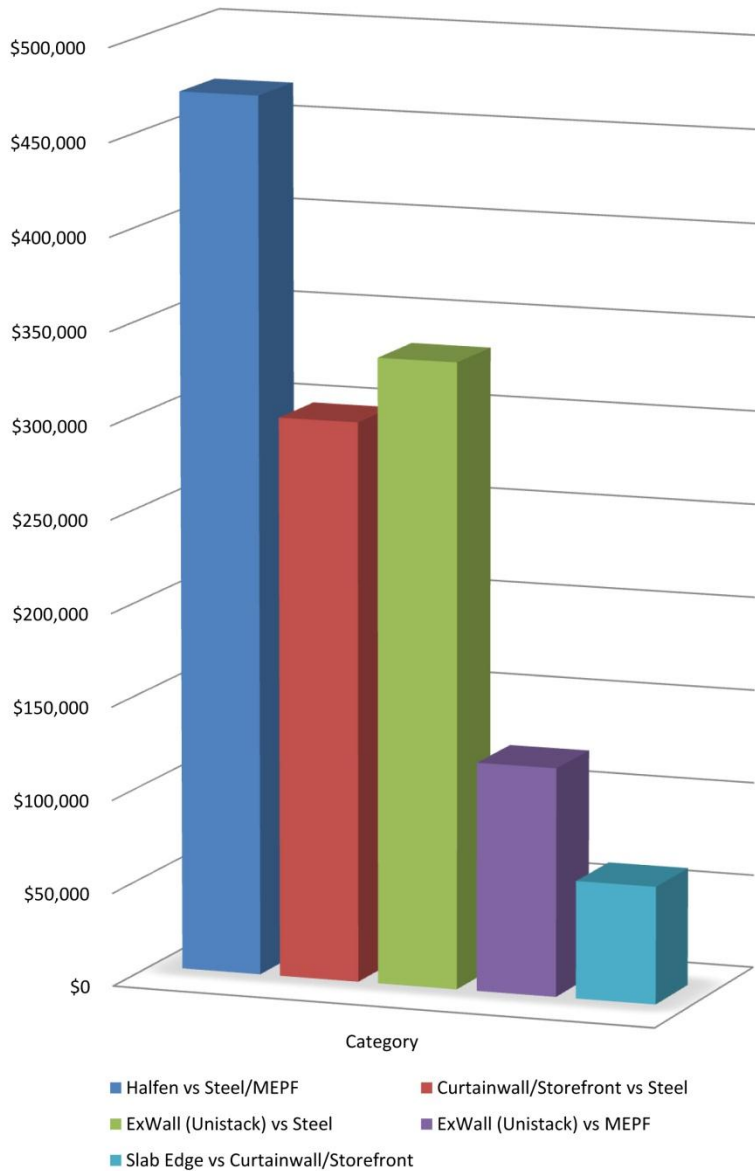


Modeling Effort (above and beyond) Required:  
 (\$100/Hour) x 100 Hours = \$10,000

## Early Metrics

Alta Bates Summit Medical Center – Patient Care Pavilion

Measuring what it's worth



## Top 16 Clashes Analyzed In 5 Separate Clash Batches

### Early Metrics

Alta Bates Summit Medical Center – Patient Care Pavilion

Measuring what it's worth



Category	Item	Cost	Quantity	ROI
Halfen vs Steel/MEPF	Halfen vs Steel issue	\$1,500	310	\$465,000
Halfen vs Steel/MEPF	Halfen vs MEPF	\$1,100	5	\$5,500
<b>Total</b>				<b>\$470,500</b>
Curtainwall/Storefront vs Steel	006-DGL/DEG/CDC - Steel penetrating curtainwall at cut, roof level.	\$25,000	1	\$25,000
Curatinwall/Storefront vs Steel	001-DGL/DEG global issue - steel clash with curtainwall at cut.	\$25,000	6	\$150,000
Curatinwall/Storefront vs Steel	002-DGL/CDC/DEG - Slope wall clash btw steel and mullons	\$50,000	1	\$50,000
Curatinwall/Storefront vs Steel	005- DGL/CDC provide detail for cantilevered steel and curtainwall penetration at canopy, typical.	\$15,000	1	\$15,000
Curatinwall/Storefront vs Steel	007-Steel Clash with storefront	\$20,000	1	\$20,000
Curatinwall/Storefront vs Steel	008-Steel Clash with storefront	\$20,000	1	\$20,000
Curatinwall/Storefront vs Steel	009-Steel Clash with storefront	\$10,000	1	\$10,000
Curatinwall/Storefront vs Steel	010-Steel Clash with storefront	\$10,000	1	\$10,000
<b>Total</b>				<b>\$300,000</b>
ExWall (Unistack) vs Steel	001-Centria panel not needed in interior of snorkel. Make the interior of snorkel shaftwall. Carmel to provide credit for reduction of Unistack scope.	\$25,000	1	\$25,000
ExWall (Unistack) vs Steel	003-A1/DEG/CAS/DGL - how does this unistack attach to the steel? Detail 1/ AY-107CE shows embeds, there is no slab in this area. Need attachment detail.	\$40,000	1	\$40,000
ExWall (Unistack) vs Steel	005-Why is there steel in the unistack wall? Does this wall need to shift out? How it supported?	\$250,000	1	\$250,000
ExWall (Unistack) vs Steel	007-How is this centria panel supported? How are all centria panels below L2 supported. There are no AY drawings for below level 2.	\$20,000	1	\$20,000
<b>Total</b>				<b>\$335,000</b>
ExWall (Unistack) vs MEPF	Penetrations	\$350	350	\$122,500
<b>Total</b>				<b>\$122,500</b>
Slab Edge vs Curtainwall/Storefront	001- Mullion clash with slab edge	\$63,000	1	\$63,000
<b>Total</b>				<b>\$63,000</b>
			<b>Total</b>	<b>\$1,291,000</b>

## Early Metrics

Alta Bates Summit Medical Center – Patient Care Pavilion

Measuring what it's worth

- The Coordination Effort Paid for Itself
- Ownership of Project – “Skin in the Game”
- Unprecedented Body of Knowledge
- Team Members that Provide Value
- 3d Capable – Most Effective
- Submittal vs. Construction
- Too Many Fingers in the Pot
- Permitted and Built from 2d Drawings
- Closer Location = Closer Collaboration

## Lessons Learned

Alta Bates Summit Medical Center – Patient Care Pavilion

What we've learned and are continuing to learn



Demolition Time Lapse:

<http://www.youtube.com/watch?v=MkjNqUevL94>

4DScheduling:

<http://www.youtube.com/watch?v=RriV1PuMmAU>

Project Fly Thru:

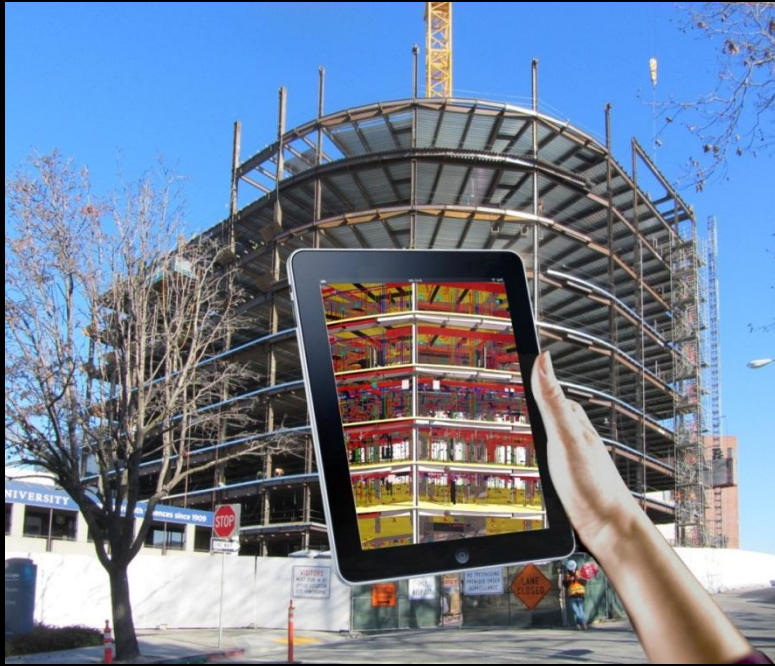
<http://www.youtube.com/watch?v=eJOuKdKKRqg>

# Questions?

## Additional Media

Alta Bates Summit Medical Center – Patient Care Pavilion

Fun Videos



## Alta Bates Summit Medical Center

Presented by

Dudley Campbell AIA, LEED AP Devenney Group Ltd., Architects





## Edith Green-Wendell Wyatt Federal Building Modernization

Presented by

Jim Riley, Sera Architects

# EDITH GREEN WENDELL WYATT FEDERAL BUILDING

**BIM FORUM  
APRIL 24, 2012**

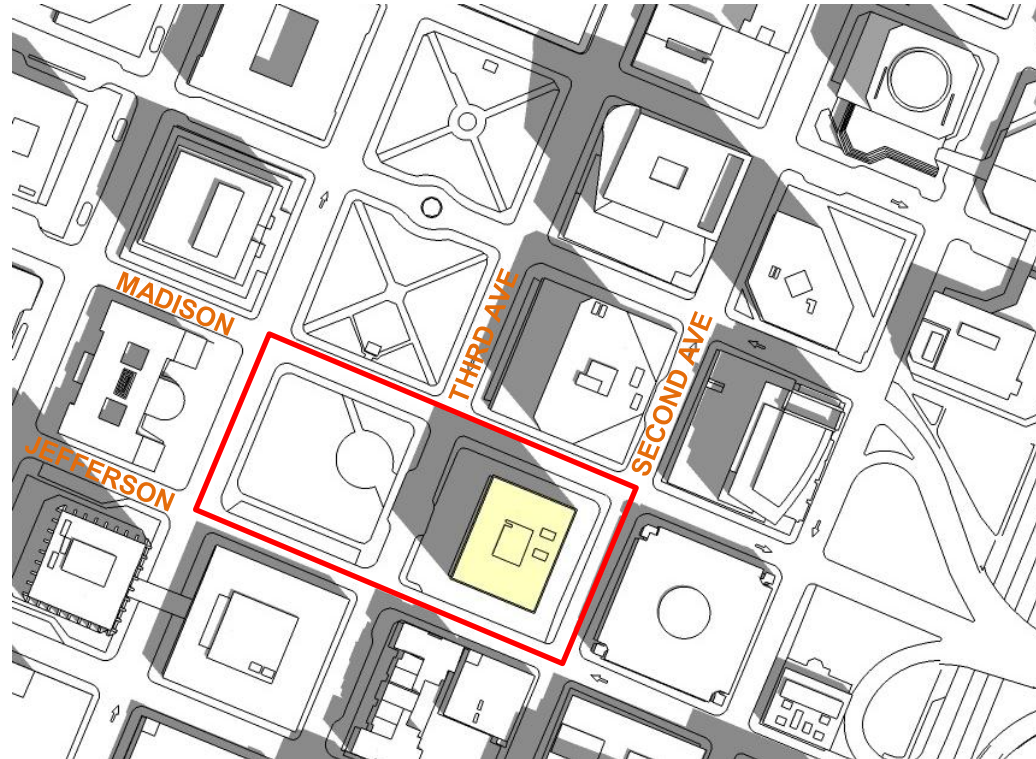


**EDITH GREEN-WENDELL WYATT  
FEDERAL BUILDING MODERNIZATION**





# RECOVERY ACT MODERNIZATION PROJECT



*Transform a 525,421 square foot, 18-story, 1974 office building into a LEED Platinum cornerstone of GSA's green building portfolio.*

**BUDGET: \$ 141,000,000**

# MODERNIZATION GOALS



## UPGRADE BUILDING SYSTEMS

- Seismic upgrade.
- New mechanical, electrical, voice data telecom systems.
- New fire and smoke control system.
- New plumbing system with low flow fixtures for water conservation.

## UPDATE WORK ENVIRONMENT

- Optically advanced electric lighting systems.
- Optimized daylighting.
- Improved indoor air quality.

## IMPROVE ACCESSIBILITY

- New code compliant egress stairs.
- Accessible entries and rest rooms.
- Modern, energy efficient elevators.
- Revised site layout and new landscaping.



# MINIMUM PERFORMANCE CRITERIA

## ARRA and EISA

### Energy Star Requirements

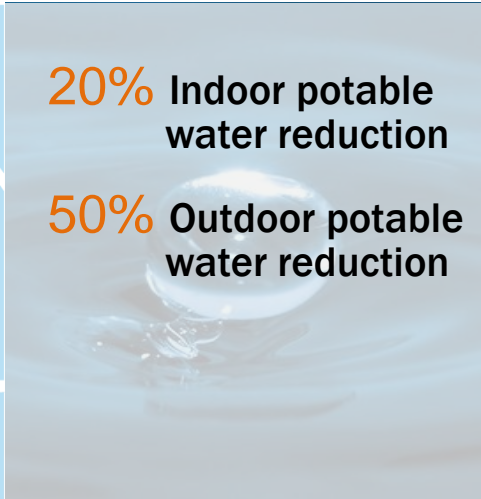
Score goal: **97**



### Water Conservation Requirements

**20%** Indoor potable water reduction

**50%** Outdoor potable water reduction

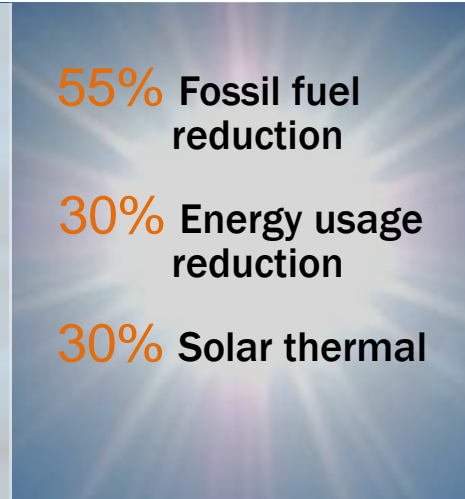


### Energy Conservation Requirements

**55%** Fossil fuel reduction

**30%** Energy usage reduction

**30%** Solar thermal



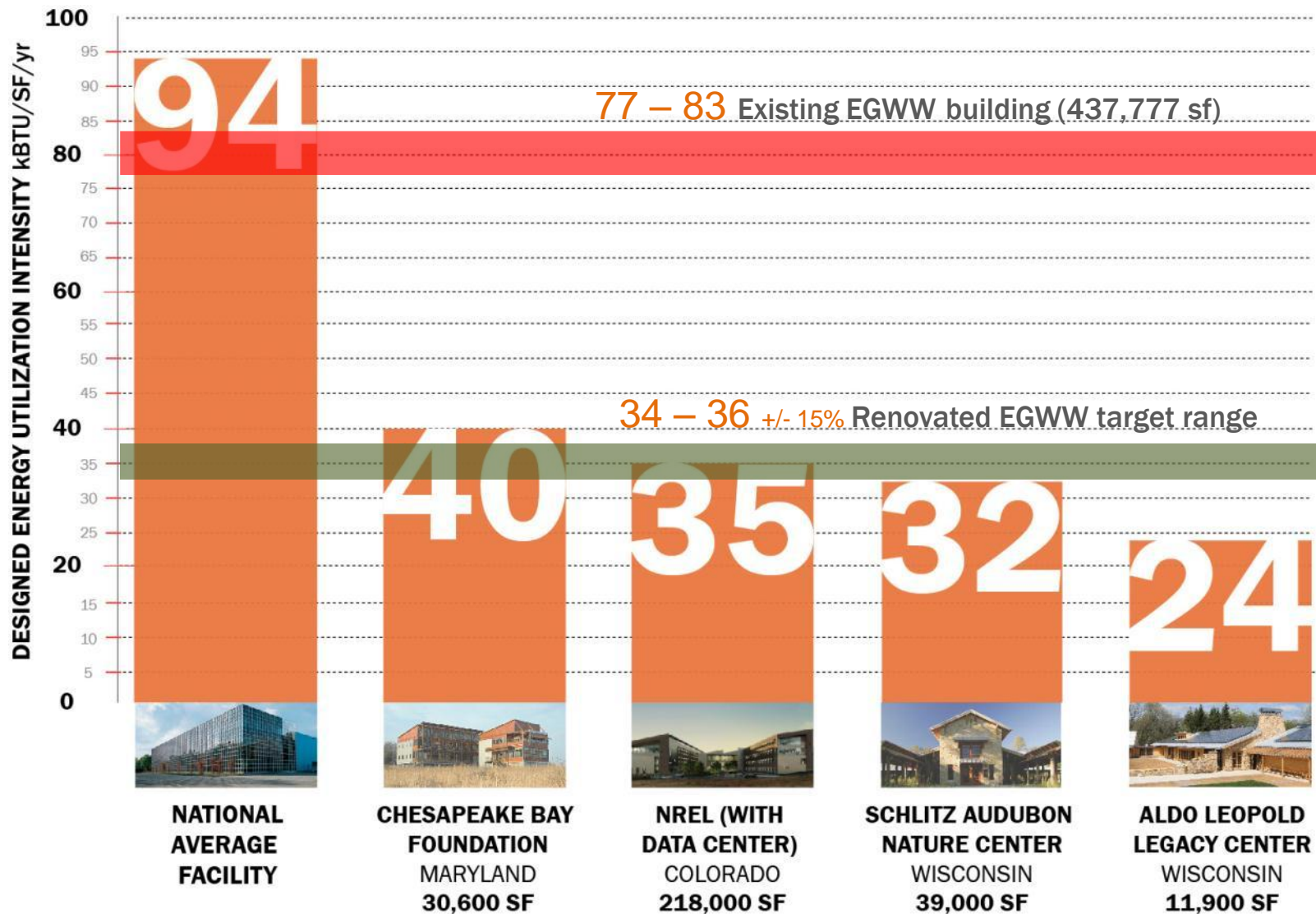
### LEED Requirements

**Gold Required**

**Platinum Goal**



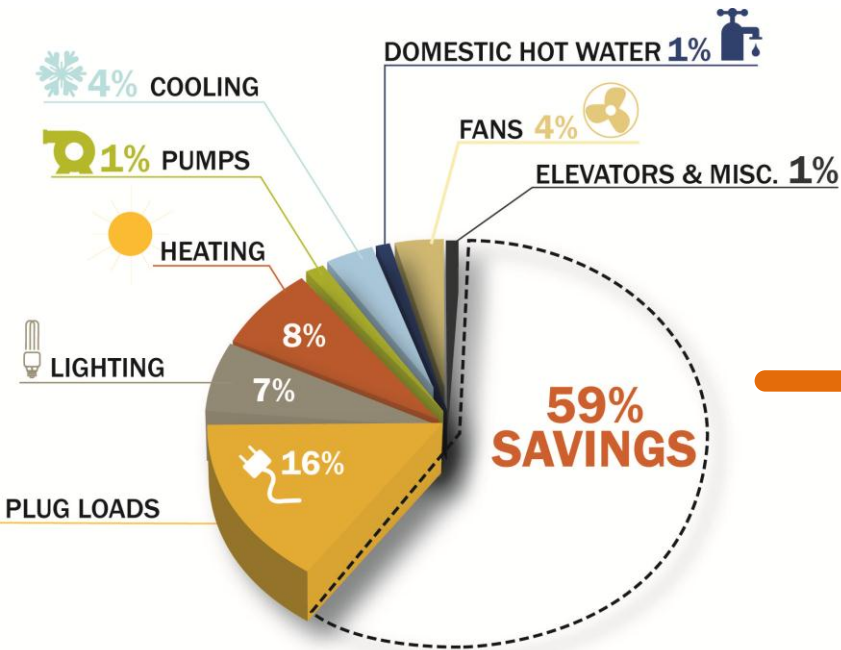
# ENERGY GOAL



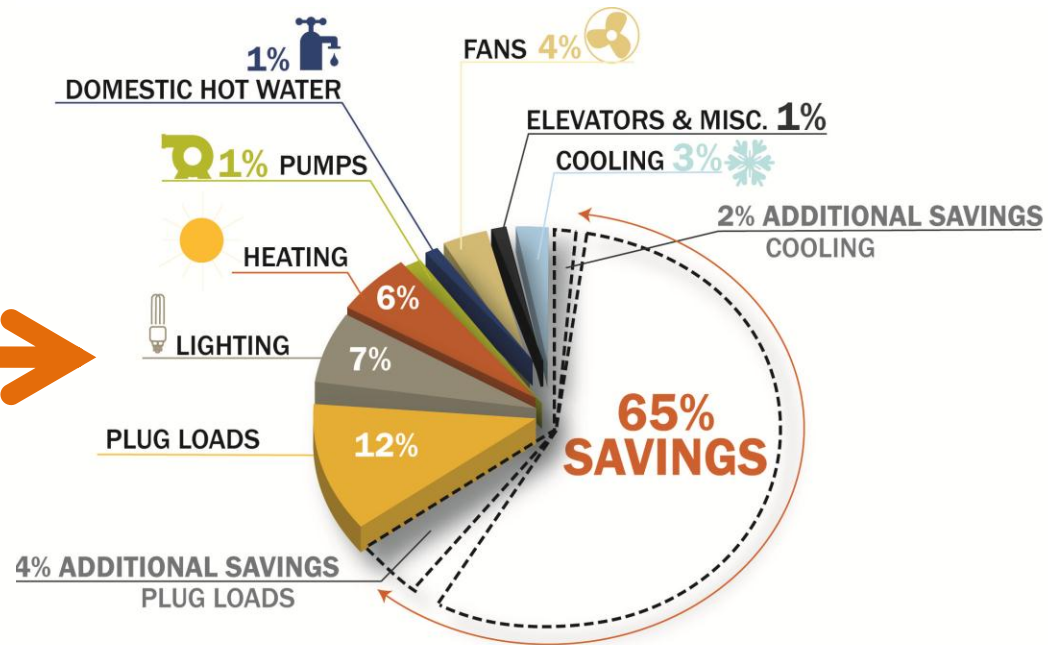


# TENANT ENGAGEMENT

## ENERGY CONSERVATION MEASURES

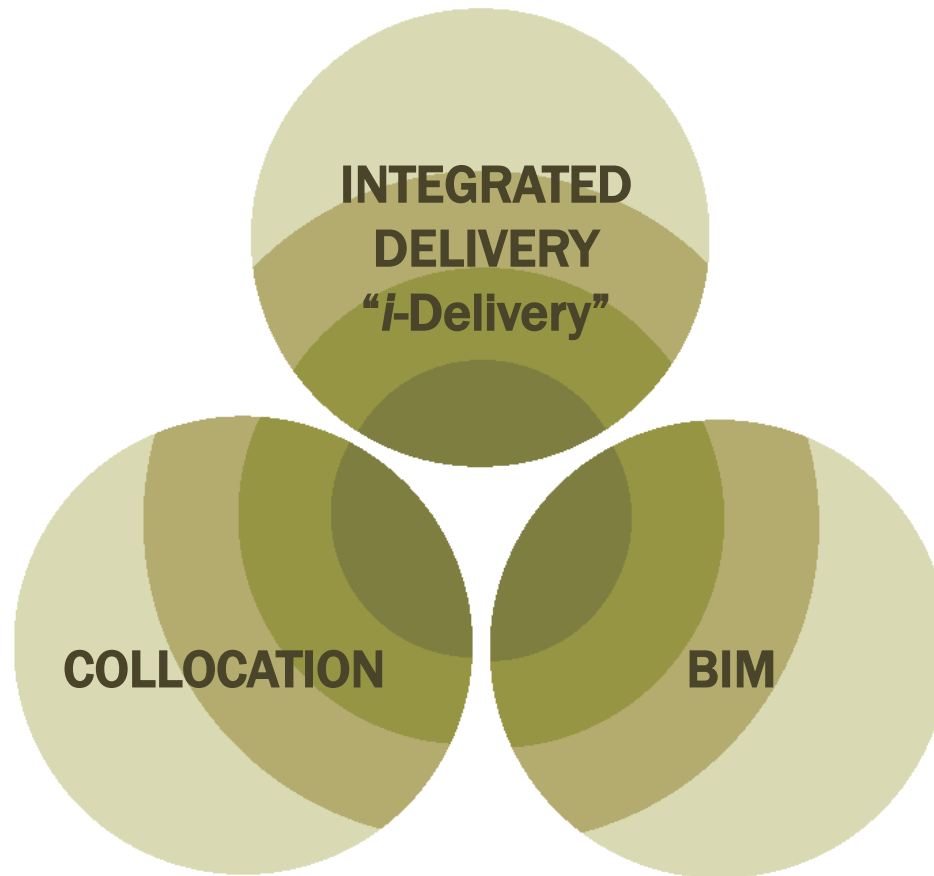


**POTENTIAL ENERGY SAVINGS**  
Without Tenant ECMS



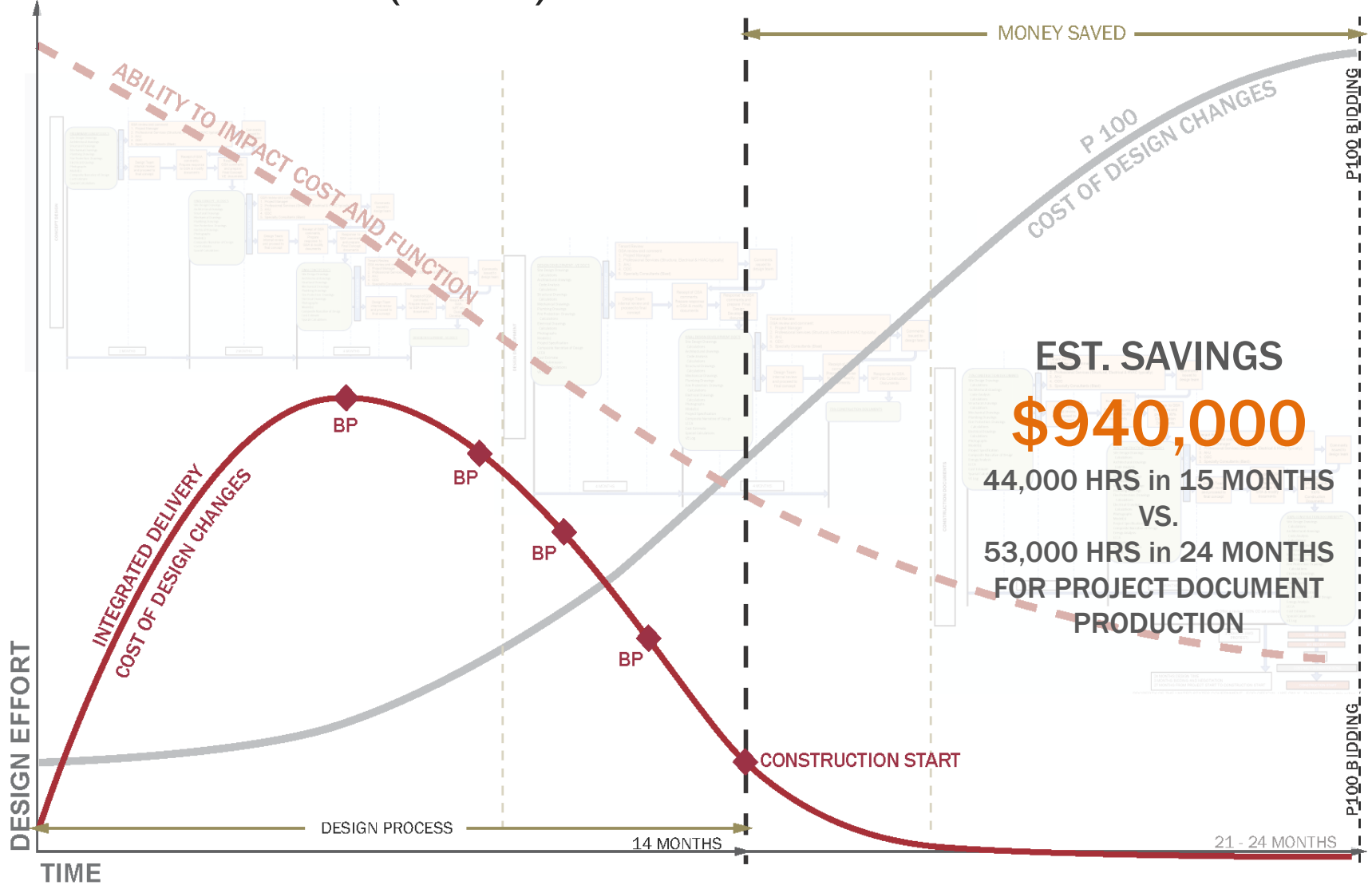
**ENERGY SAVING GOAL**  
With Tenant ECMS

# PROJECT DELIVERY METHODOLOGY



# i-DELIVERY

## GSA STANDARD (P-100) VS. INTEGRATED





# COLLOCATION BENEFITS

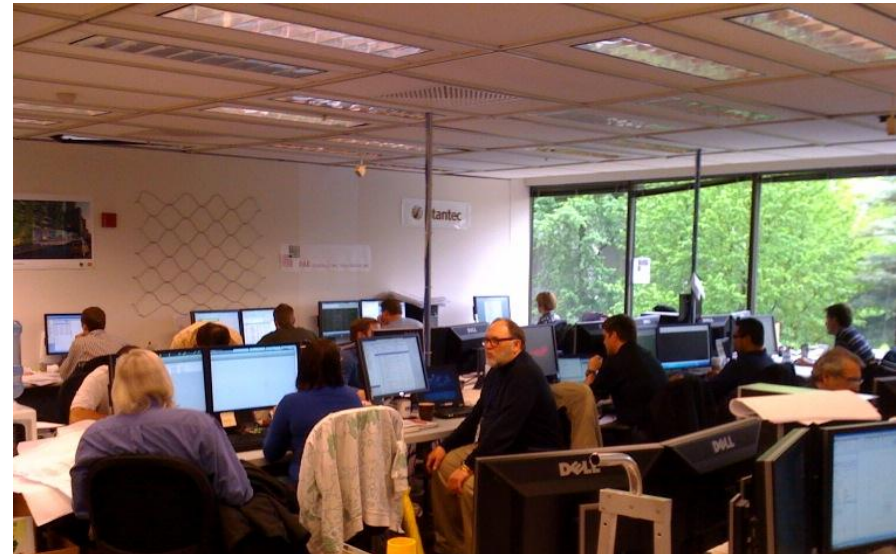
## BETTER COMMUNICATION

- Highly coordinated overall design.
- Fewer assumptions made by disconnected design team members.
- More spontaneous design coordination discussions.
- Better understanding of other disciplines' work flows and design problems.

## LESS WASTED TIME

- Less time spent waiting for answers from email and voicemail.

EGWW saved an estimated **\$82,000** in travel time to meetings for consultants who were collocated.



# BIM BENEFITS

## BETTER BUILDINGS

- Better cost certainty
- Enhanced AE coordination & QC
- Ability to generate more visualizations for client comprehension
- Models become collaborative tools for problem solving across disciplines
- Early identification of system clashes before they get out into the field

## LESS WASTE

- Minimizes redundancy

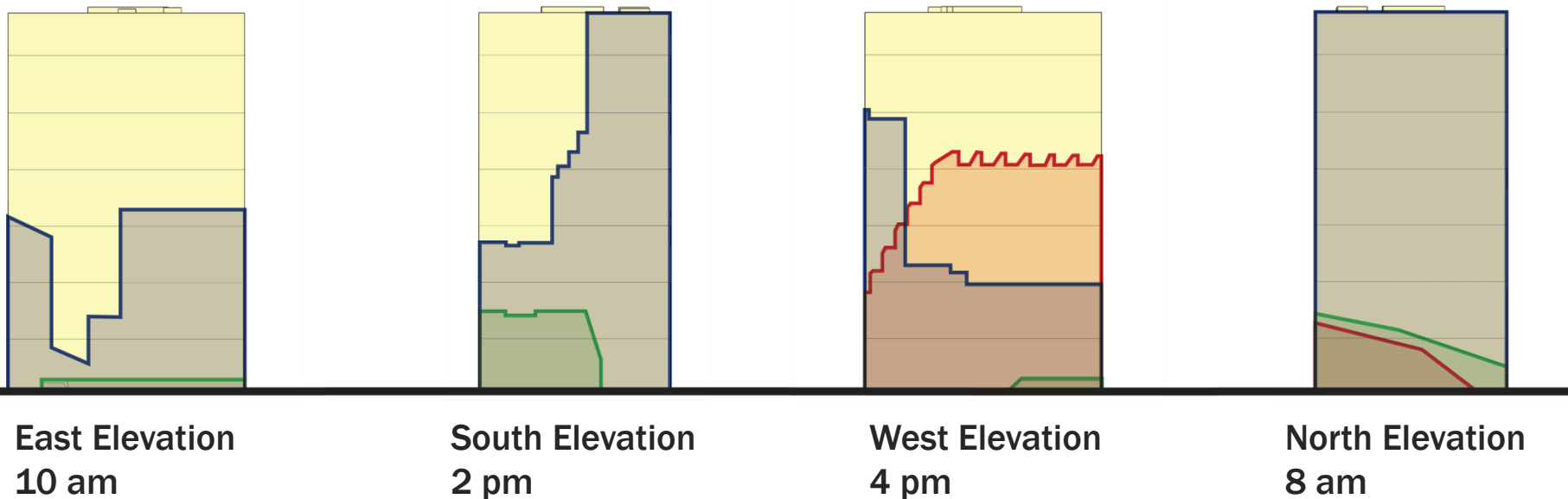


6 REVIT MODELS, 2 CAD DISCIPLINES  
OVER 30 SOFTWARE PROGRAMS  
28 ARCHITECTS, ENGINEERS AND MODELERS

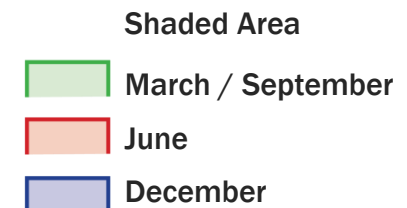
# WORK FLOW WITH BIM TOOLS

## ENVELOPE DESIGN EXAMPLE

### SITE STUDY



1. Numerous daylight studies were conducted to determine the limitations and opportunities available for the project

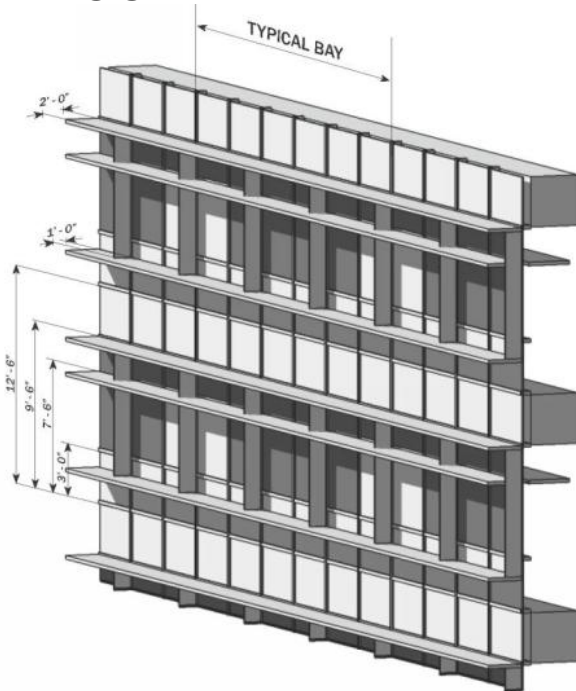




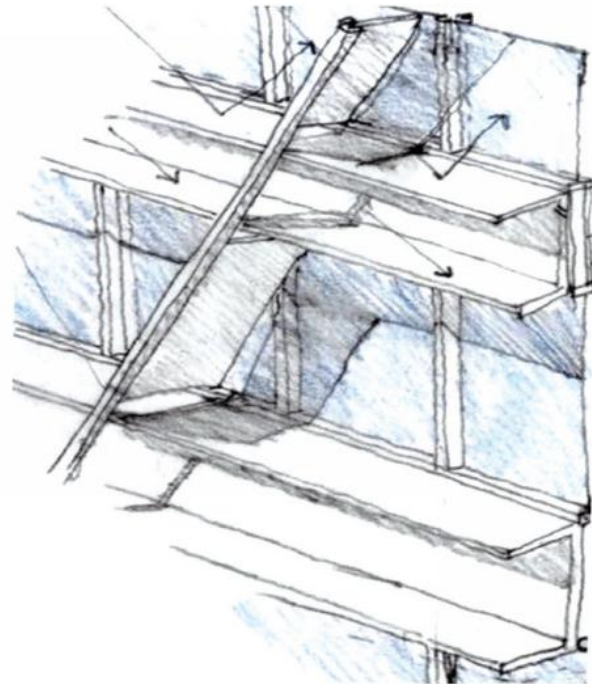
# WORK FLOW WITH BIM TOOLS

## ENVELOPE DESIGN EXAMPLE

### ANALYSIS



### DESIGN



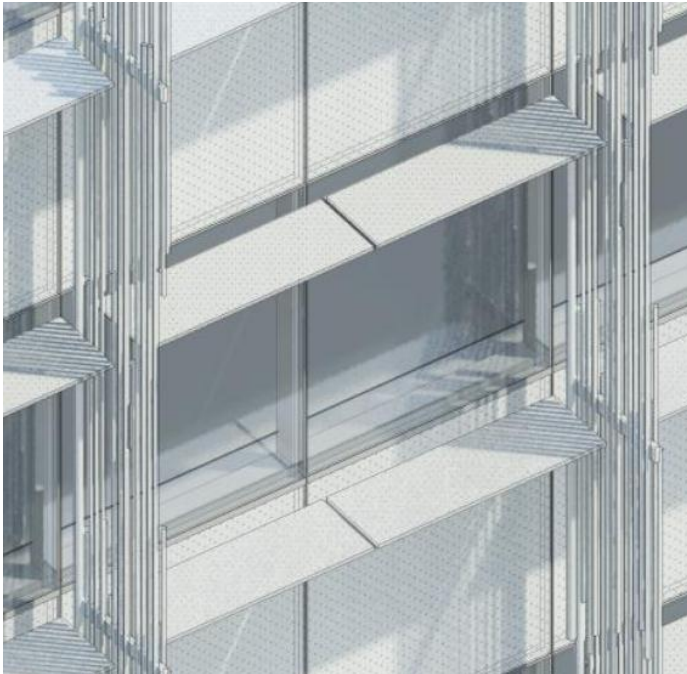
2. Daylight optimization study first established the size and position of the shading devices and light reflectors. This engineering analysis occurred prior to design architect commencing work.

3. The design architect began work, translating the engineering criteria to architectural form

# WORK FLOW WITH BIM TOOLS

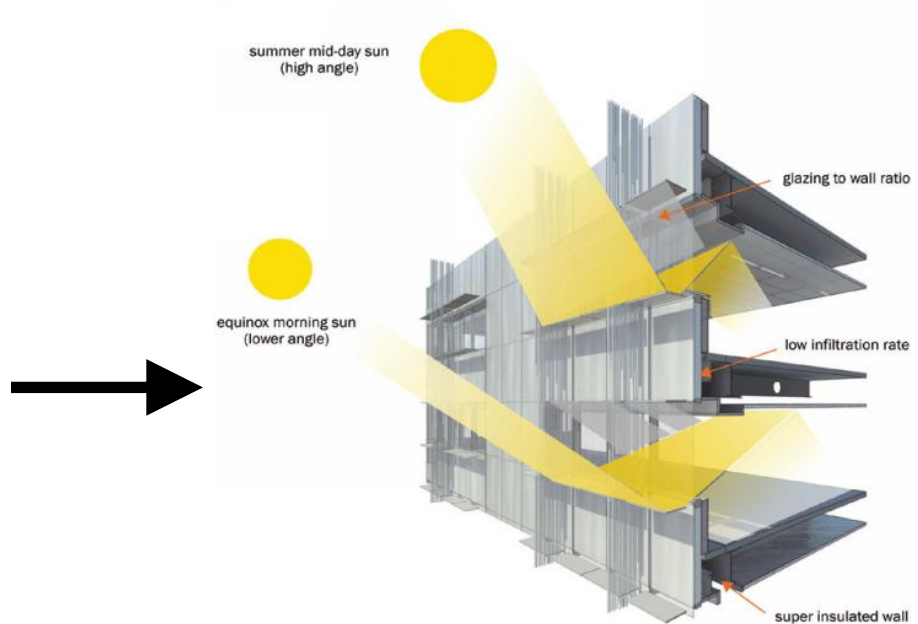
## ENVELOPE DESIGN EXAMPLE

### DETAIL MODELING



4. Budget constrains further refined the form, substituting vertical reeds for the solid vertical shades.

### VALIDATION

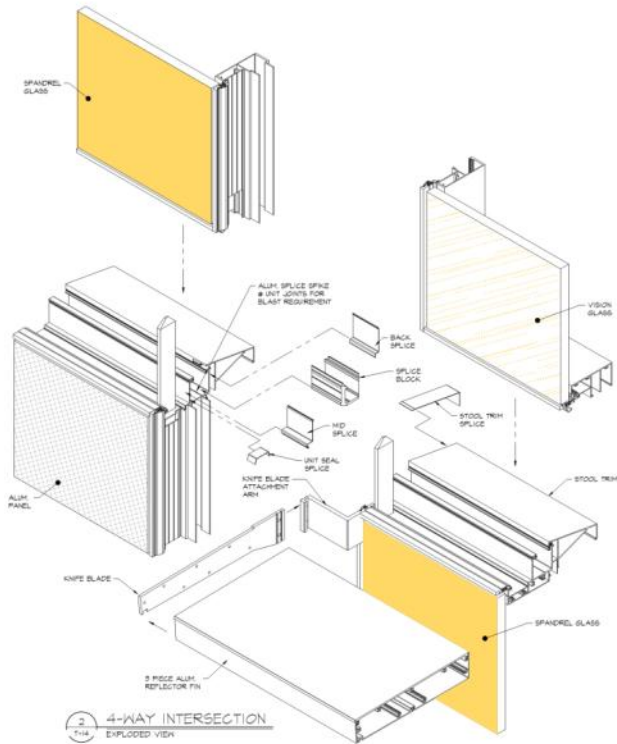


5. the final design was then refined to verify all criteria are met.

# WORK FLOW WITH BIM TOOLS

## ENVELOPE DESIGN EXAMPLE

### DETAILING



### CONSTRUCTION



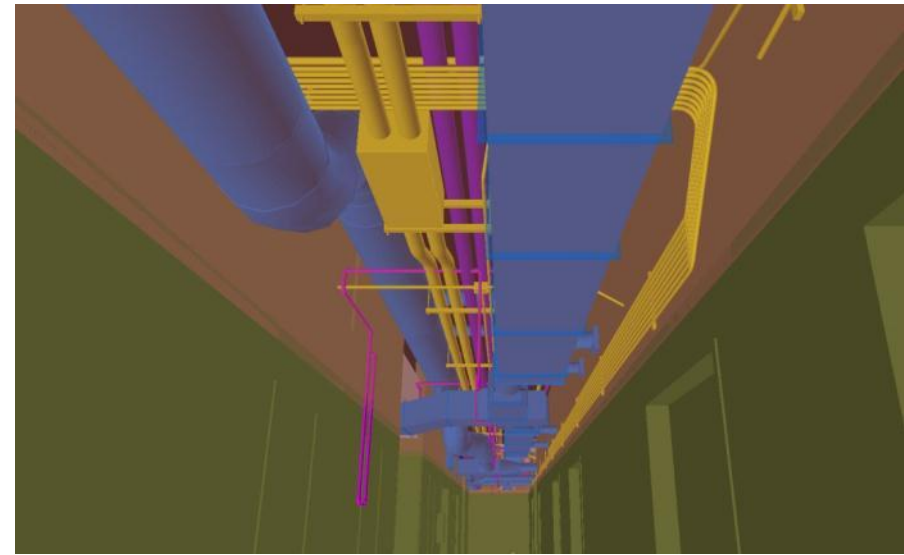
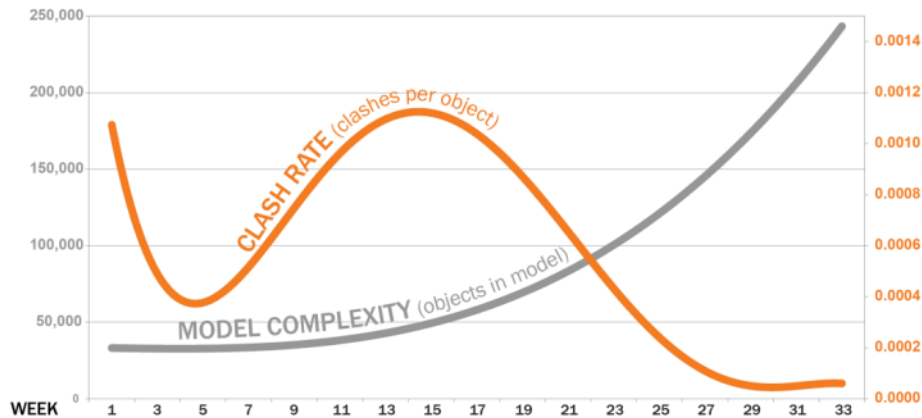
6. Detailing and shop drawing process commenced with model used for coordination review and detailing refinement.



# BIM CLASH DETECTION

## DESIGN-SIDE CLASH ANALYSIS

CONTINUOUS IMPROVEMENT: As model complexity increases, number of clashes decreases



Basement corridor model



Basement corridor installed

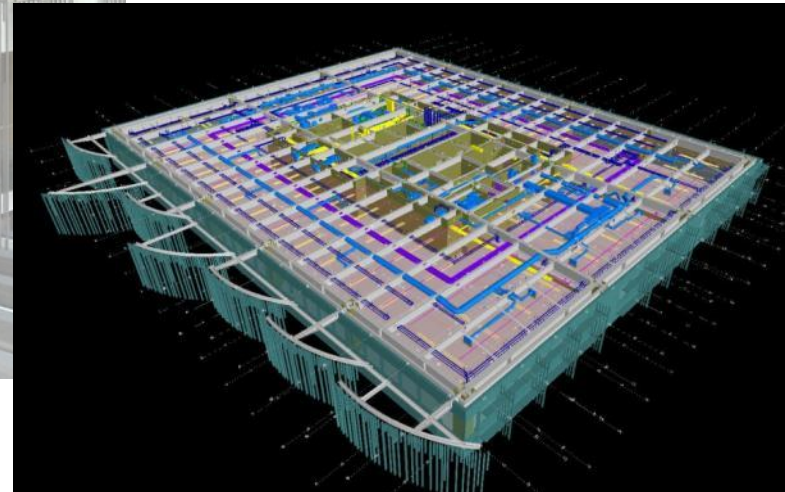
# BIM CLASH DETECTION



PERFORMING SYSTEMS COORDINATION  
WITH CLASH SOFTWARE PROVIDED

**~ 300%**

RETURN ON INVESTMENT

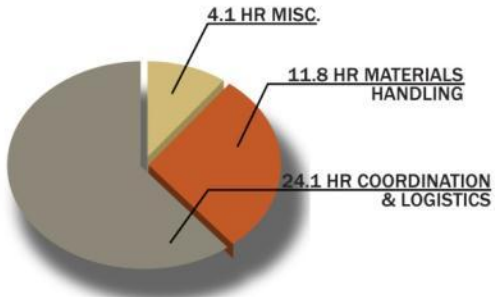




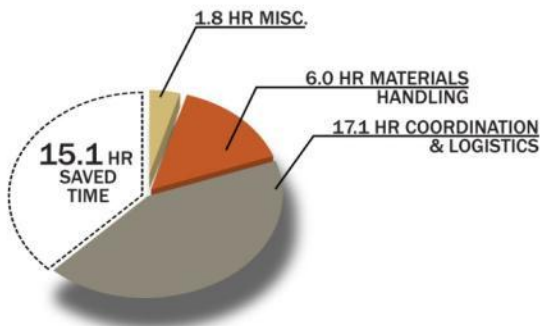
# BIM

## TIME AND COST SAVINGS

### TIME & COST SAVINGS THROUGH PREFABRICATION MECHANICAL SYSTEMS "MODULAR SKIDS" PREFAB METHOD



ON-SITE FAB. HOURS IN 40-HR WEEK



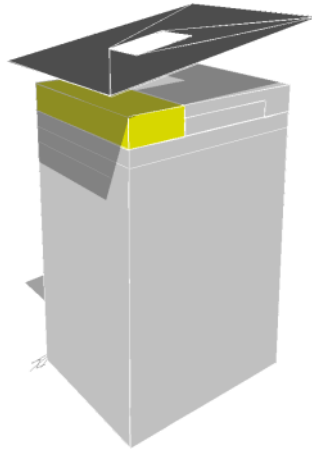
EQUIVALENT USING PRE-FAB METHODS

**38% REDUCTION IN FABRICATION TIME**





# BIM VISUALIZATION



# BIM

## CONSTRUCTION AND POST OCCUPANCY

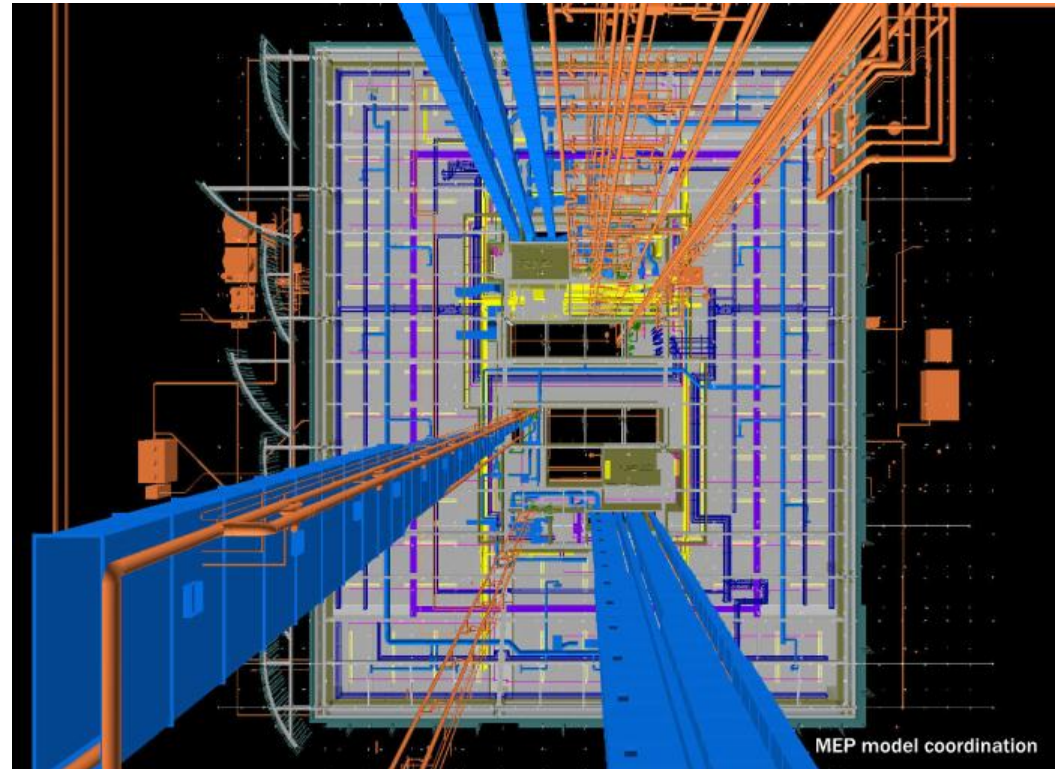
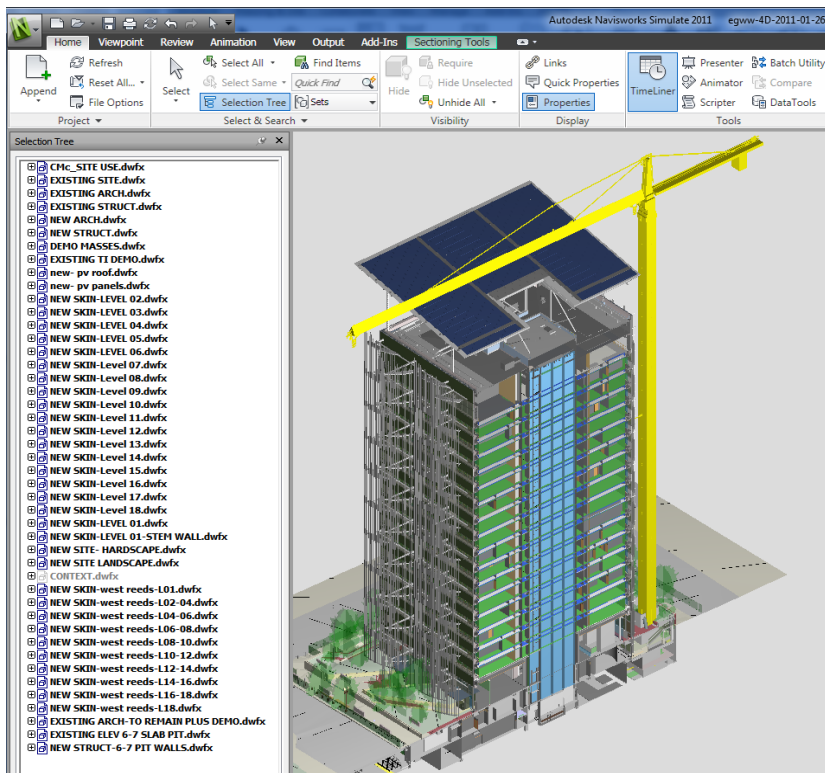
- Quantity Takeoff for Cost Estimating
- Virtual Huddle
- 4-D Scheduling
- Project Phase Planning, Site Logistics
- Laser Scanning and Model Adjustments
- Operations and Maintenance





# BIM

## Sequence clash detection





# BIM

## Construction Completion



View from east side Ground Level corridor



View west towards Exit and Security

# BIM



On 1



On 1

# EDITH GREEN WENDELL WYATT FEDERAL BUILDING THANK YOU







## Edith Green-Wendell Wyatt Federal Building Modernization

Presented by

Jim Riley, Sera Architects



## Institute for Systems Biology

Presented by

Andrew Marsters and Justin Porter | BNBuilders



# INSTITUTE FOR SYSTEMS BIOLOGY

2012 AIA TAP / BIM AWARDS



# Project Highlights

- Lab “Tenant Improvement” for non-profit research institute
  - GMP delivery, completed in 2011
  - \$12M
  - 90,000 sf in 4-story shell
  - 8 mo construction schedule, 14 mo total project schedule
- Program
  - Labs and vivarium
  - Lab support spaces
  - Core facilities
  - Open offices
  - Office support spaces: conference rooms, coffee bars, informal break-out spaces
- Goals/Considerations
  - LEED CI Platinum
  - Preserve much of existing lab support spaces , conference rooms, offices
  - Extensive reuse of doors, windows, ceiling grid, lighting
  - Significant MEP system replacement
  - Systems integrating/fitting around remaining systems for remaining 2<sup>nd</sup> floor tenant
- Design Intent
  - Inviting, fun, and open work environment
  - Light, vibrant, bold color palette and environmental graphics reflecting tenant’s brand
  - Feature stairs as focal point of project

**INSTITUTE FOR SYSTEMS  
BIOLOGY**

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THE USE OF  
BIM ALLOWED  
THE DESIGN  
TEAM TO  
RAPIDLY  
ADAPT TO THE  
CHANGING  
PROGRAM  
NEEDS OF  
THE CLIENT  
WHILE  
MAINTAINING  
THE DESIGN  
INTENT

## A ARCHITECT'S STATEMENT

- Used *Revit* and shared model with contractor
- Tools allowed rapid adaptation to changing program while maintaining design intent
- Custom *Revit* “families” aided coordination and documentation

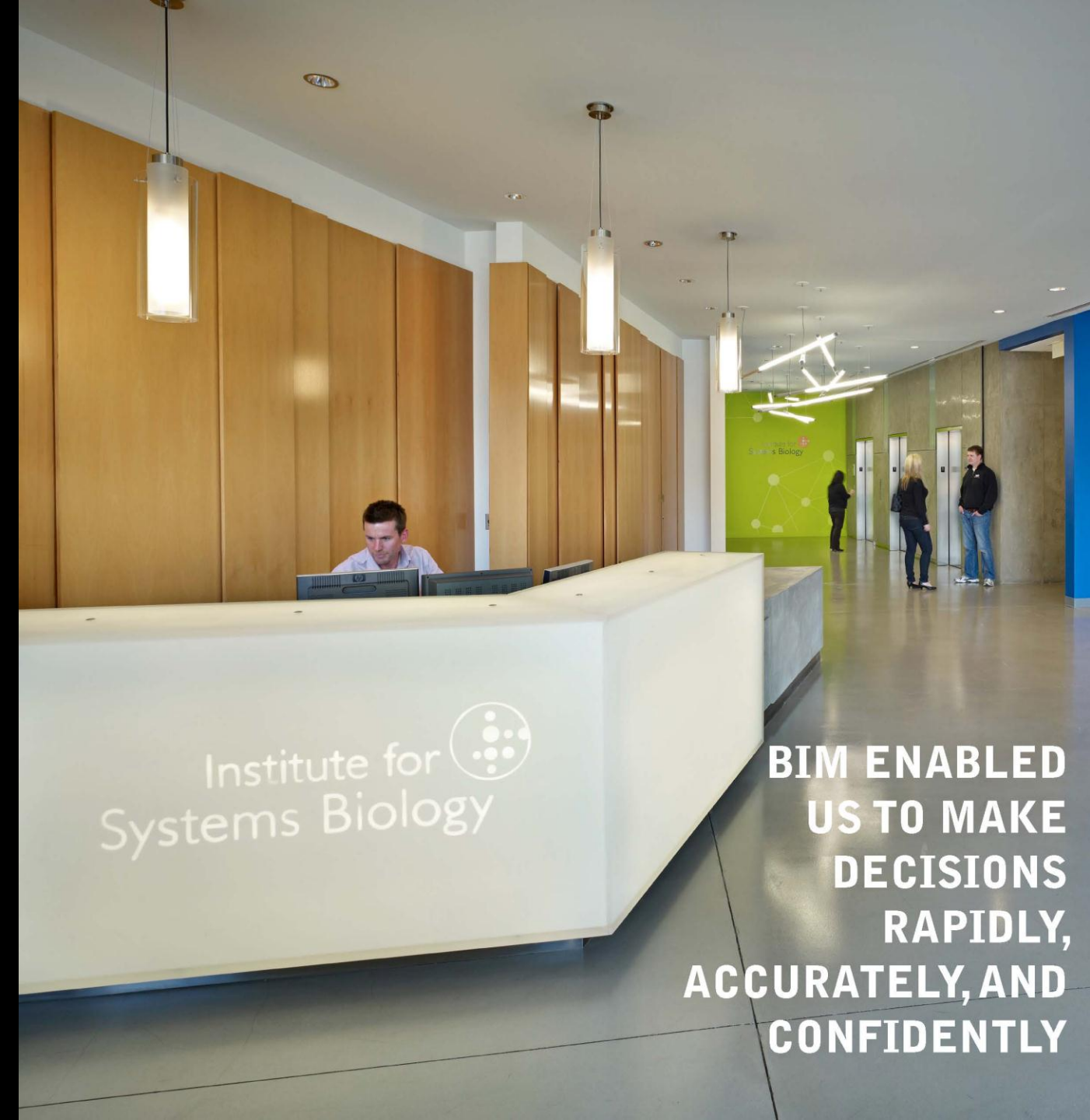


# THE COLLABORATIVE NATURE OF THE TEAM ALSO FOSTERED INNOVATION THROUGHOUT THE PROJECT

## C CONTRACTOR'S STATEMENT

- Leveraged BIM in nearly every aspect of the project
- Free exchange of model *source* data between all parties ensured the most accurate, reliable documentation of design intent
- Strong emphasis on collaboration and innovation





Institute for  
Systems Biology

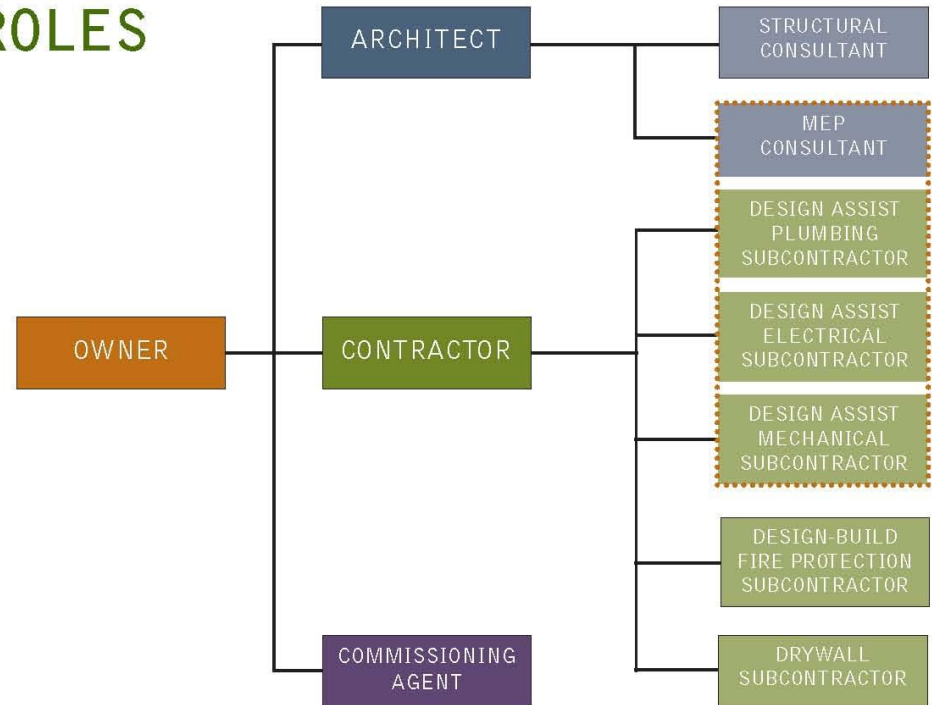
**BIM ENABLED  
US TO MAKE  
DECISIONS  
RAPIDLY,  
ACCURATELY, AND  
CONFIDENTLY**

## 0 OWNER'S STATEMENT

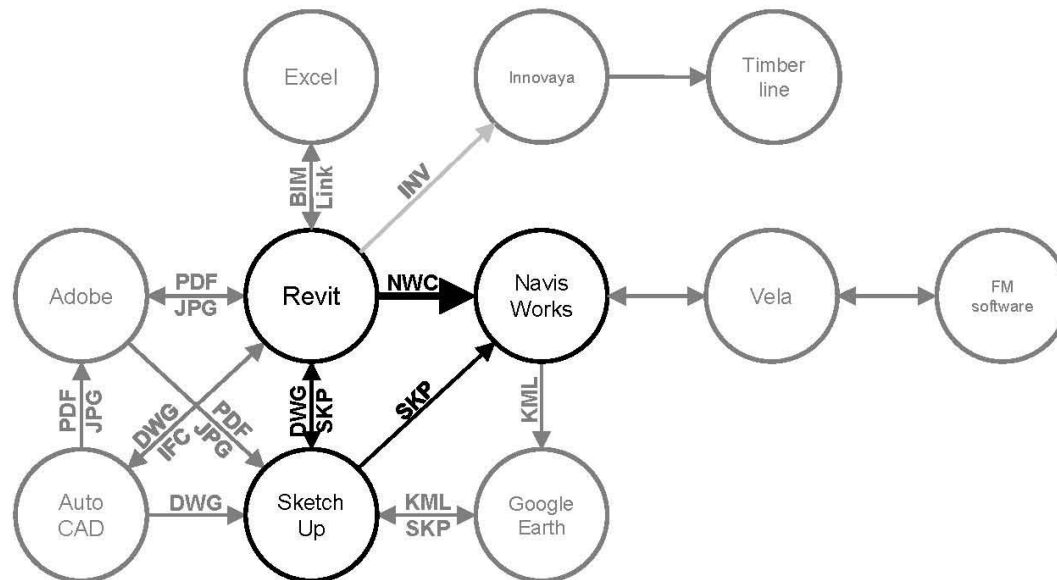
- Goal to leverage BIM to generate and manage lifecycle data
  - Design
  - Construction
  - Facilities management
- Accelerated the schedule, pushed the team to enable rapid, accurate, and confident decision-making
- Integrating handover model with facilities management system

**THE TEAM READILY  
EMBRACED  
INNOVATIVE  
PROCESSES AND  
TOOLS ACROSS THE  
ENTIRE PROJECT  
LIFE CYCLE**

## ROLES



## INFORMATION EXCHANGES

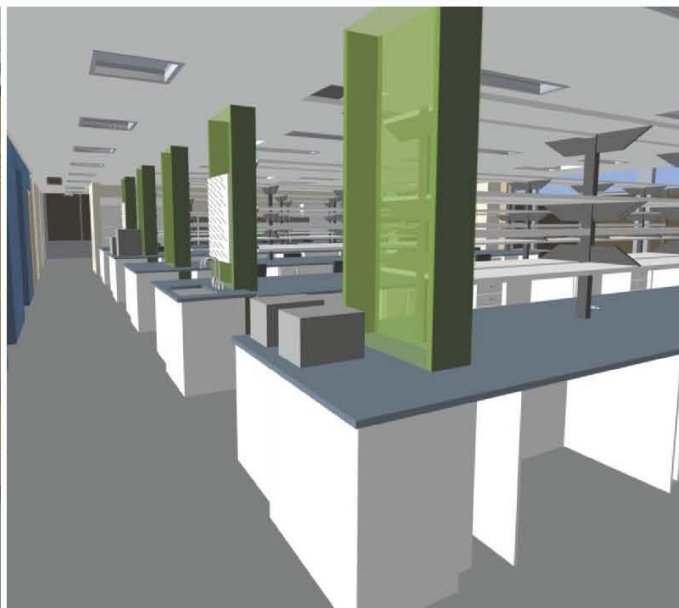
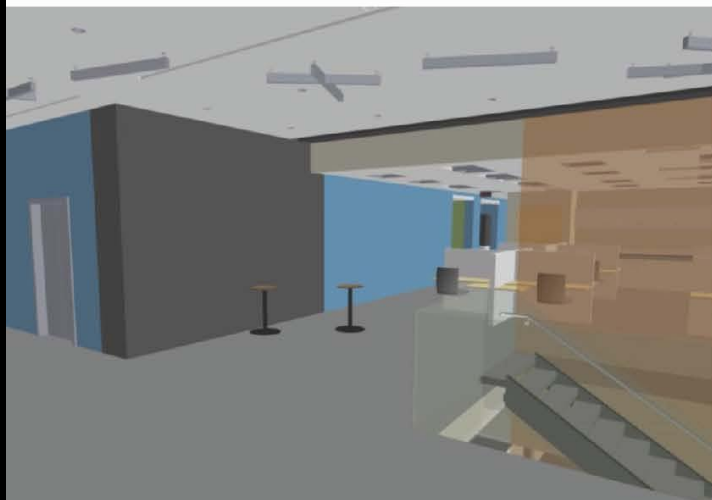


**THROUGHOUT  
THE ENTIRE  
PROJECT THE BIM  
WAS UPDATED  
CONTINUOUSLY BY  
THE PROJECT TEAM**



**THROUGH THE USE  
OF BIM, THE DESIGN  
TEAM WAS ABLE TO  
QUICKLY GENERATE  
DESIGN OPTIONS FOR  
THE CLIENT, WHICH  
SAVED TIME AND  
MINIMIZED DELAYS  
TO THE SCHEDULE**

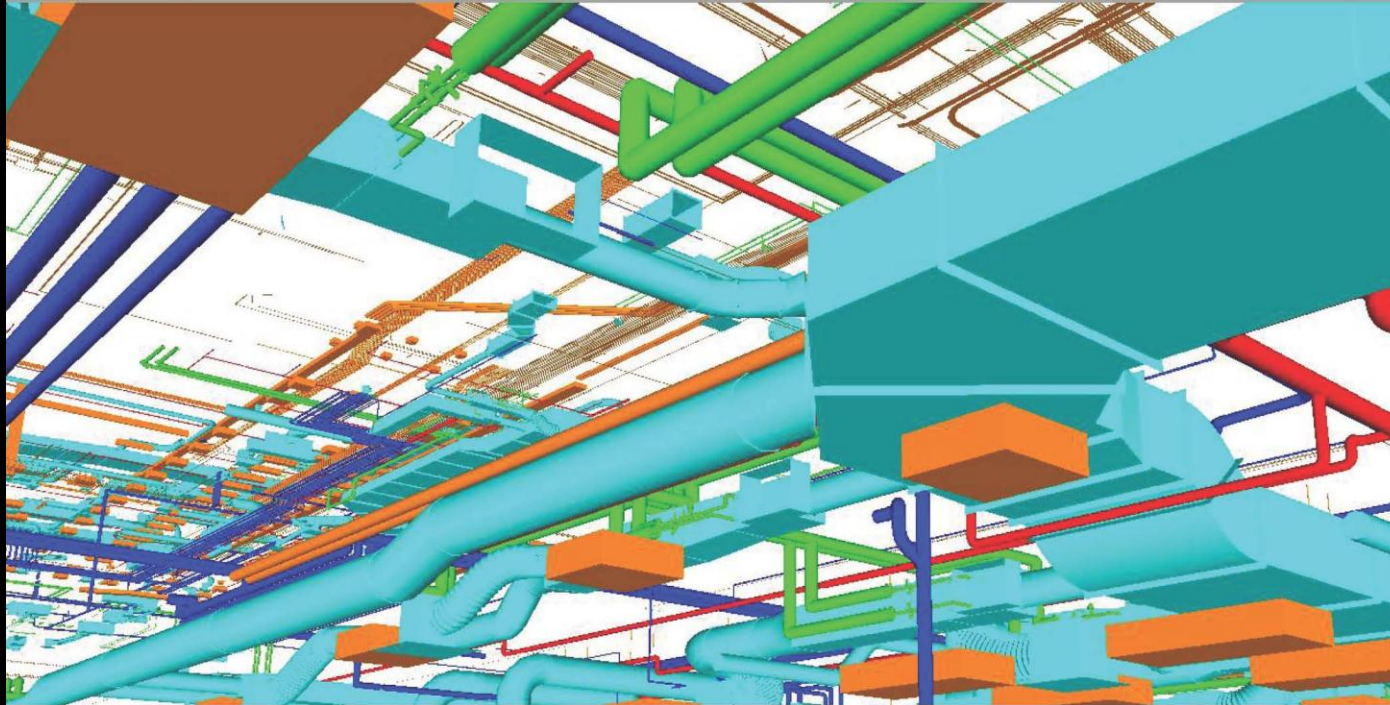
## REAL-TIME VISUALIZATION



## 1 DESIGN AUTHORING & VISUALIZATION

- Parametric capabilities and “design options” in *Revit* allowed design team to adapt to changing program
- Parametric families for lab equipment and “lightsaber” light fixtures to track and locate 100’s of types
- Real-time, stereoscopic 3-D walkthrough to 300+ people at off-site staff retreat

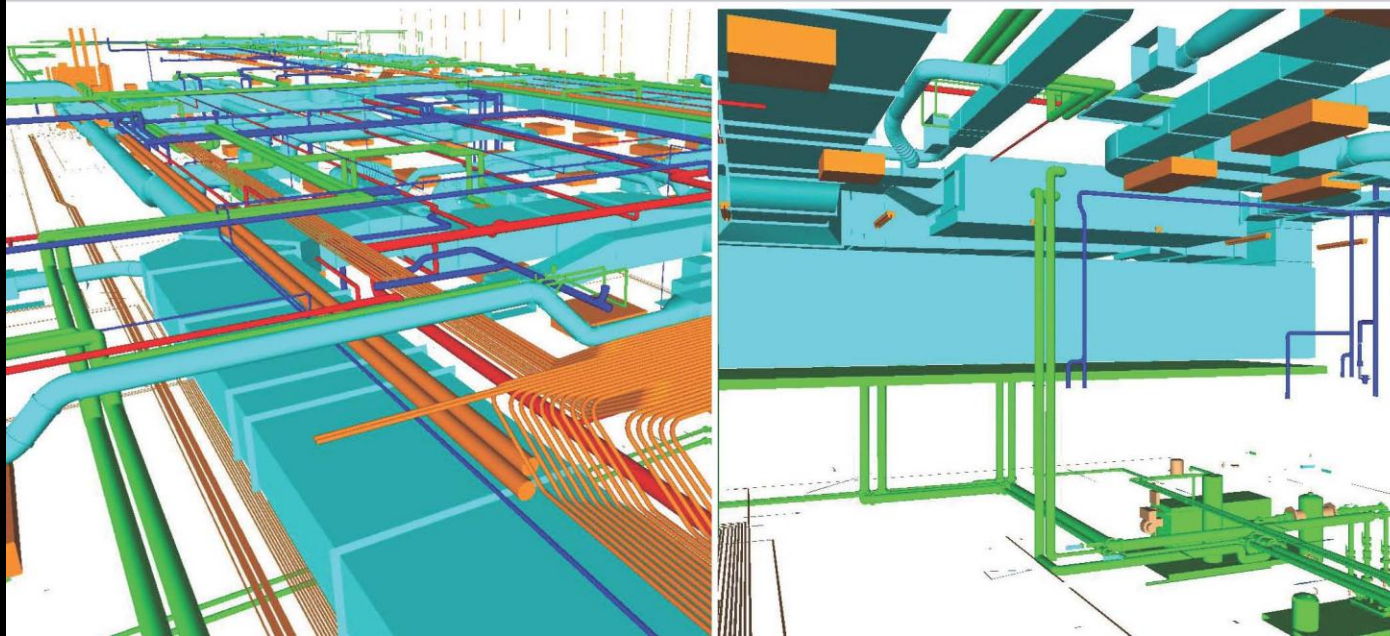




## 2 SYSTEM COORDINATION

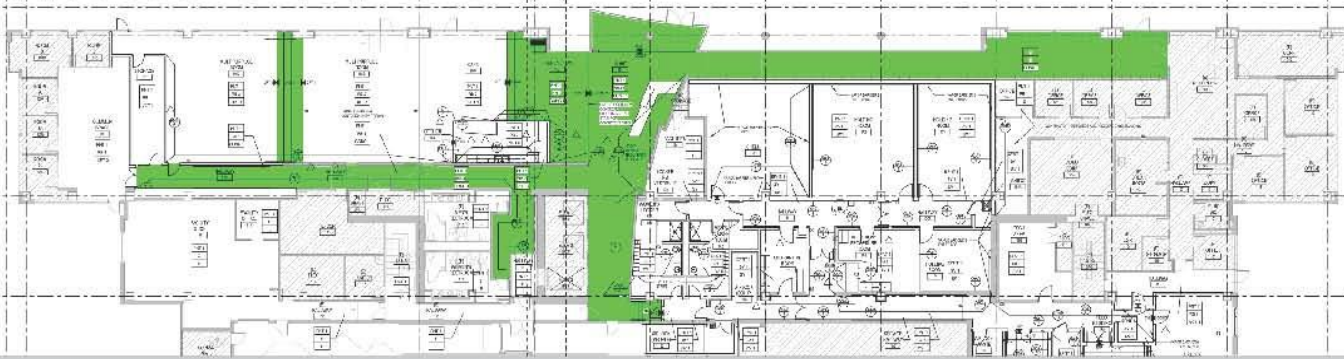
- Coordination of MEP systems vital to complex nature of lab TI
- Intense coordination led to direct reduction of total number of RFIs

### MEP CLASH DETECTION



**THE PROJECT TEAM WAS ABLE TO DETECT AND RESOLVE NEARLY 2000 CLASHES BEFORE CONSTRUCTION STARTED**





## QUANTITY TAKE-OFFS - STAINED CONCRETE

[illegible]

## LEED DOCUMENTATION

### 3 QUANTITY TAKE-OFFS

- Material schedules and custom views
- Submit estimate options to client in half the time

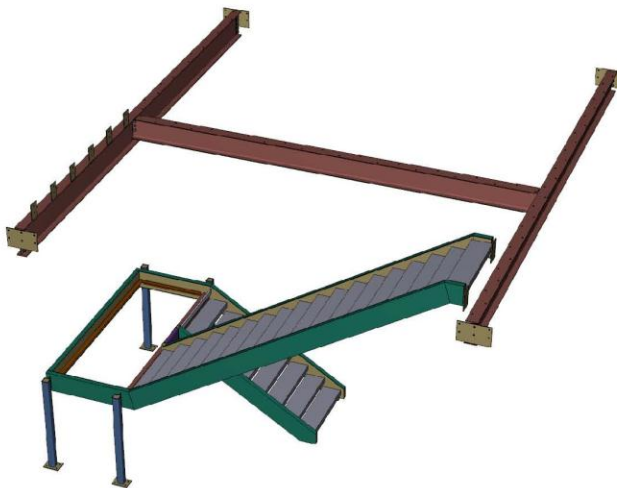
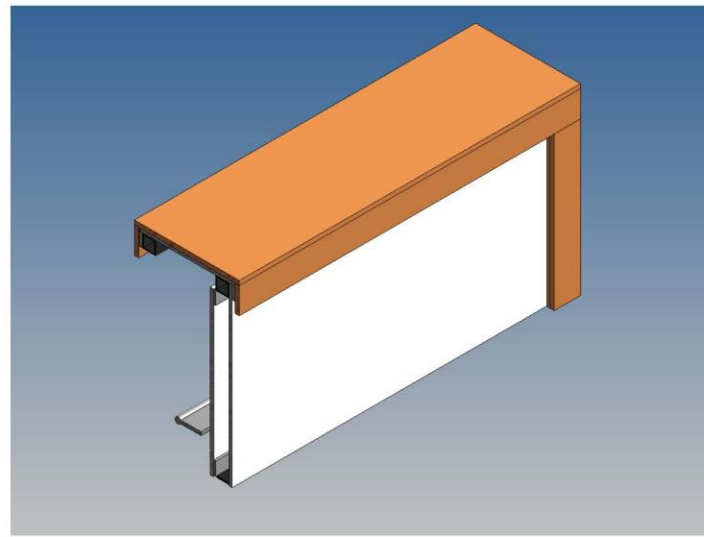
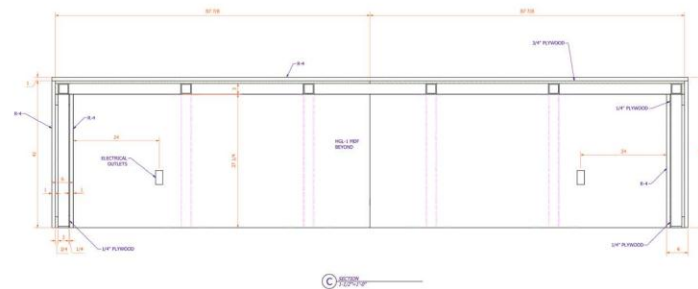
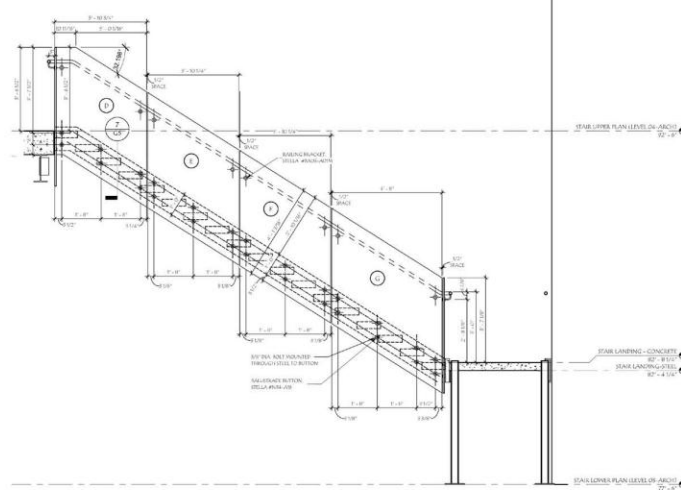
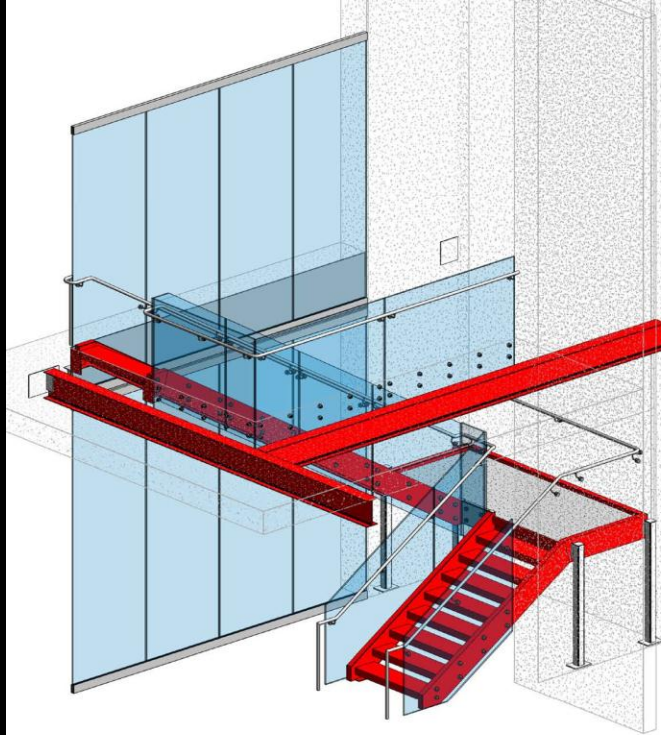
LEED  
DOCUMENTATION

- LEED “Building Reuse” Credit
  - Significant documentation of reused walls, ceilings, doors, casework
- *Revit* phases and filters to generate custom views and schedules
- Complete QTO in just two hours, compared to days or weeks by hand

## 4 SHOP DRAWINGS

- Model-based shop “drawings” allowed efficient review and comments
- Fabricators *automated* details, takeoffs, and drawings from the model

**MODELING  
THE DETAILS  
HELPED CUT  
THE REVIEW  
PROCESS  
TIME BY AS  
MUCH AS 50%**

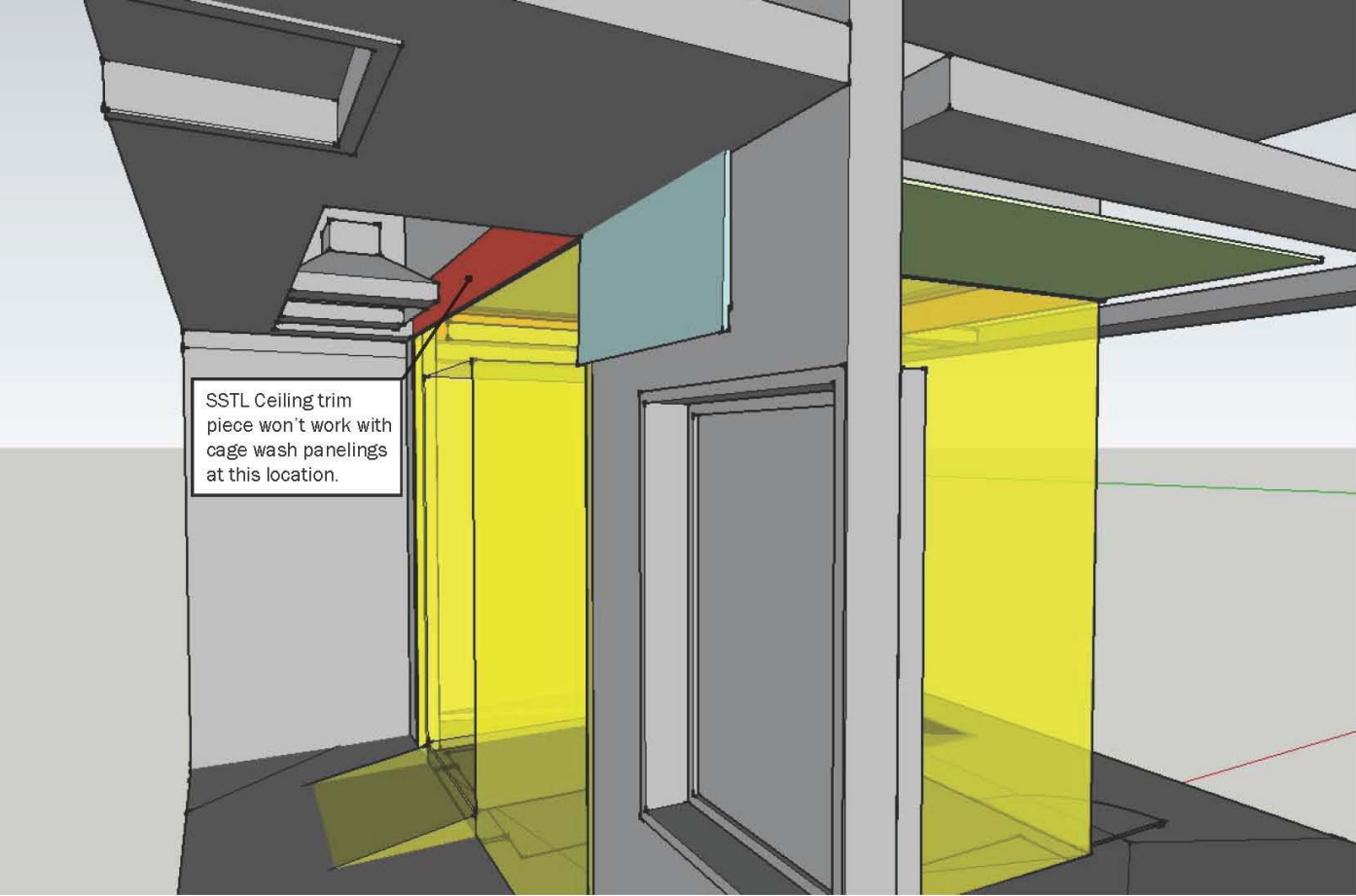




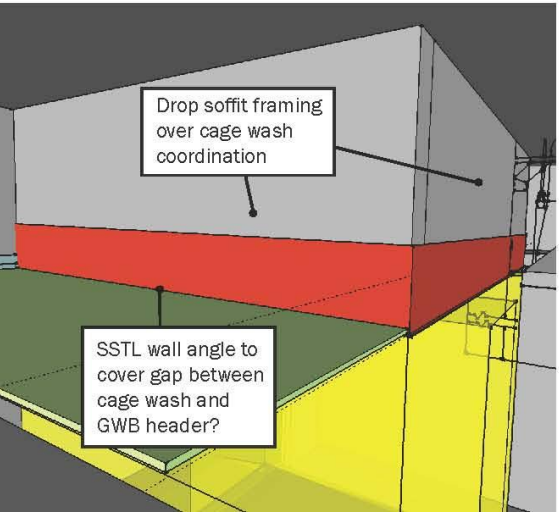
## 5 CONSTRUCTABILITY REVIEW

- *SketchUp* model as collaboration tool to clarify design intent
- Detail and visualize the “enclosure” around cage-rack washer rooms

**WE WERE ABLE  
TO FINALIZE  
UNRESOLVED  
MATERIAL  
TRANSITIONS,  
WHICH KEPT  
CONSTRUCTION  
MOVING  
FORWARD**



SSTL Ceiling trim piece won't work with cage wash panelings at this location.



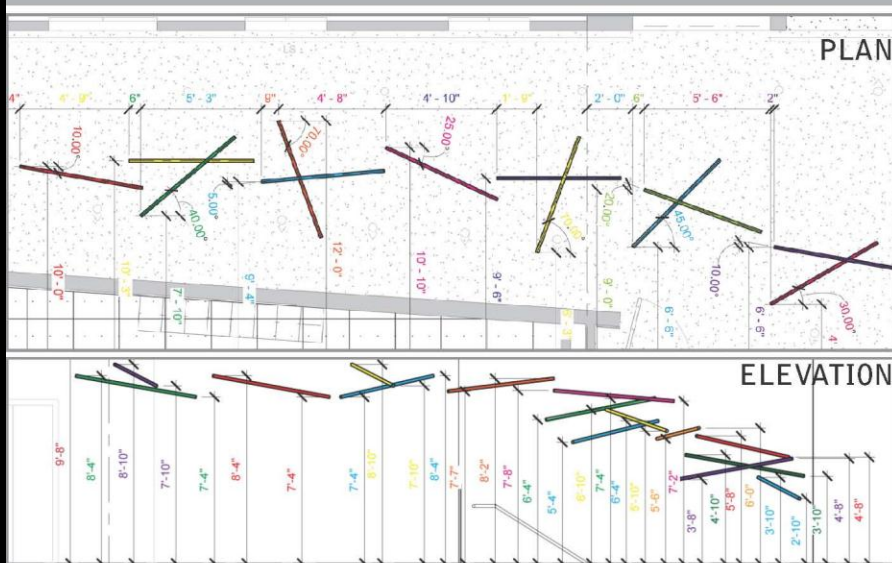
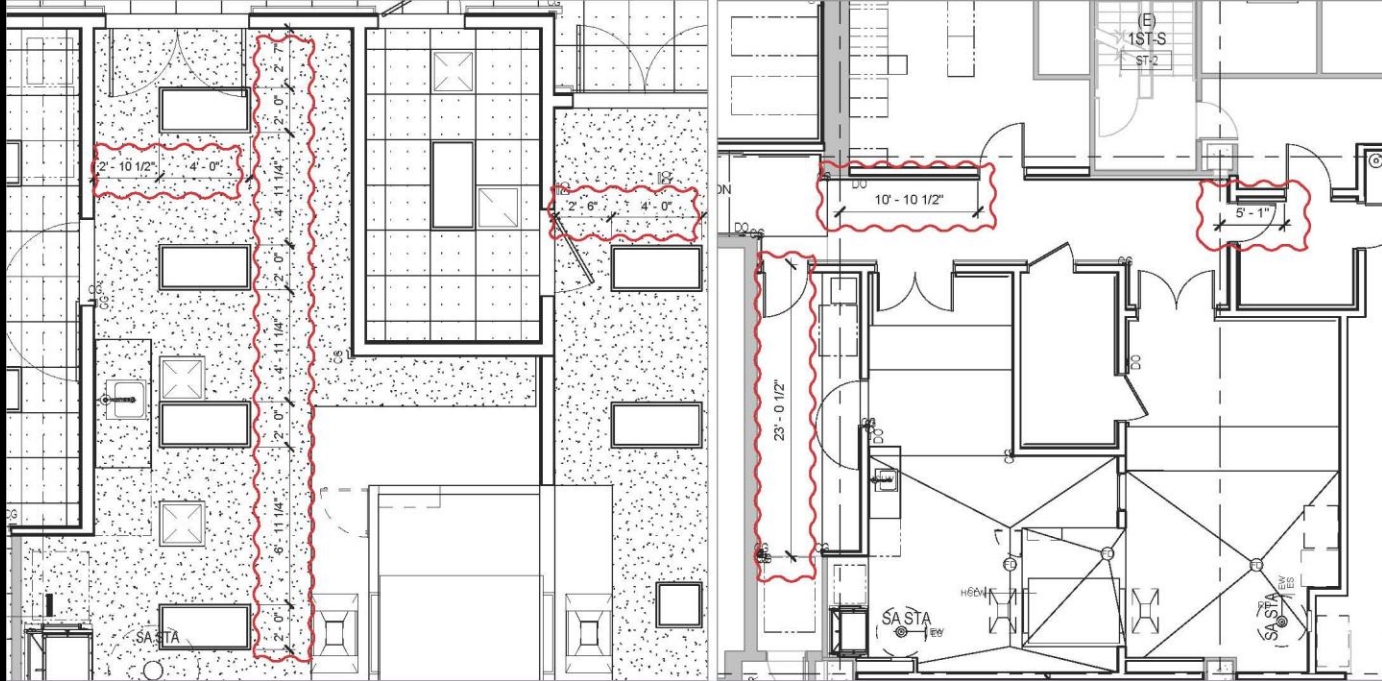
Drop soffit framing over cage wash coordination

SSTL wall angle to cover gap between cage wash and GWB header?

## 6 LAYOUT DRAWINGS

- Vivarium to be turned over one month sooner than planned
- Custom wall, ceiling, and lighting layout drawings for self-perform work
- Colored diagrams for precise communication with field
- Contractor adds detail and information to, *but doesn't change,* architects contract documents

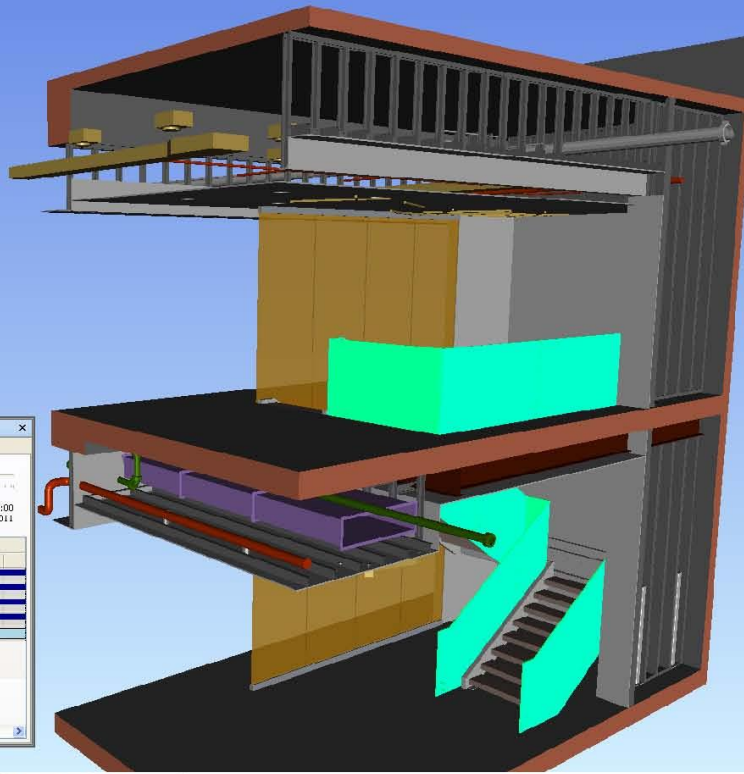
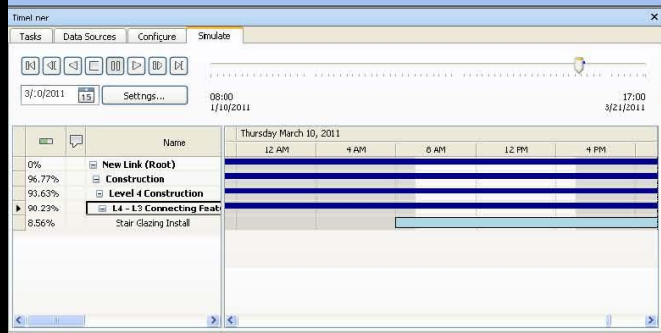
### VIVARIUM - CUSTOM LAYOUT DRAWINGS



**THE LAYOUT  
TIME WAS  
CUT BY 75%**

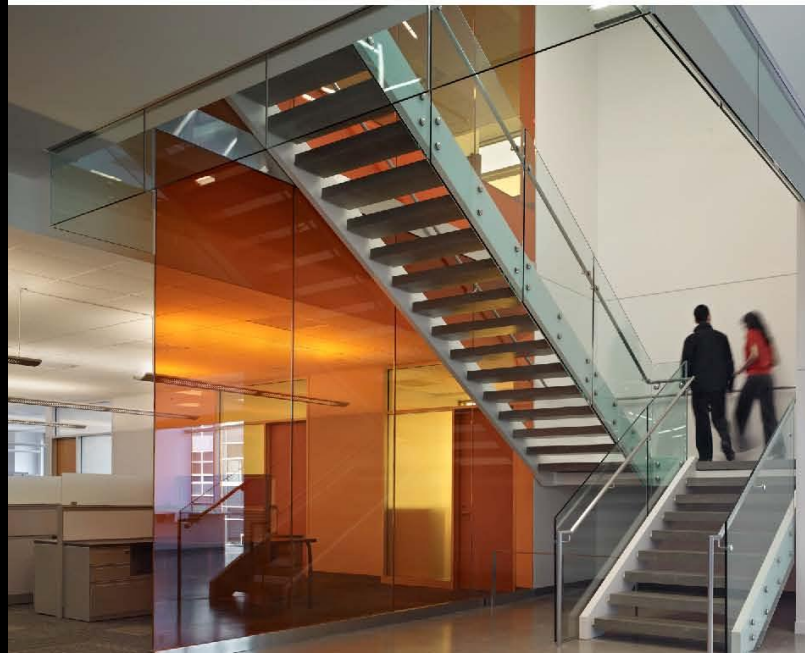
### "LIGHT-SABER" FIXTURES - CUSTOM LAYOUT DRAWINGS





## 7 4-D SEQUENCING

- Complex feature stairs with unorthodox sequencing
  - Field welds adjacent to already-installed feature glass
- Integrated models from detailers and subcontractors
- 4-D scheduling in *Navisworks* "Timeliner"
  - Study and communicate sequencing
  - Optimize schedule
  - Visualize the work



BY RELYING ON  
 4-D, THE PROJECT  
 TEAM PERFORMED  
 THE NECESSARY  
 LAYOUT AND  
 INSTALLATION  
 FLAWLESSLY AND  
 ON SCHEDULE



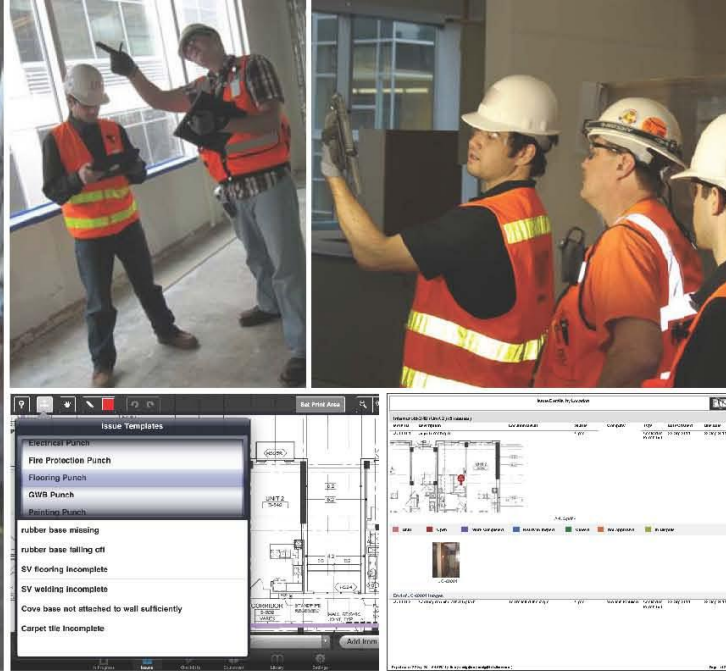
**WE MITIGATED THE RISK AND EXECUTED  
FLAWLESSLY USING AR AS A TOOL TO GET THE  
RICHEST SET OF BIM DATA IN THE HANDS OF THE  
PEOPLE WHO NEEDED IT MOST.**

## 8 AUGMENTED REALITY

- Co-locate digital and physical data in single medium
- Craft workers can literally get their heads into virtual details
- Tool to get the richest set of BIM data into the hands of the people who need it the most
- Immediate value
  - Understand proposed design intent
  - Gain confidence to perform the work



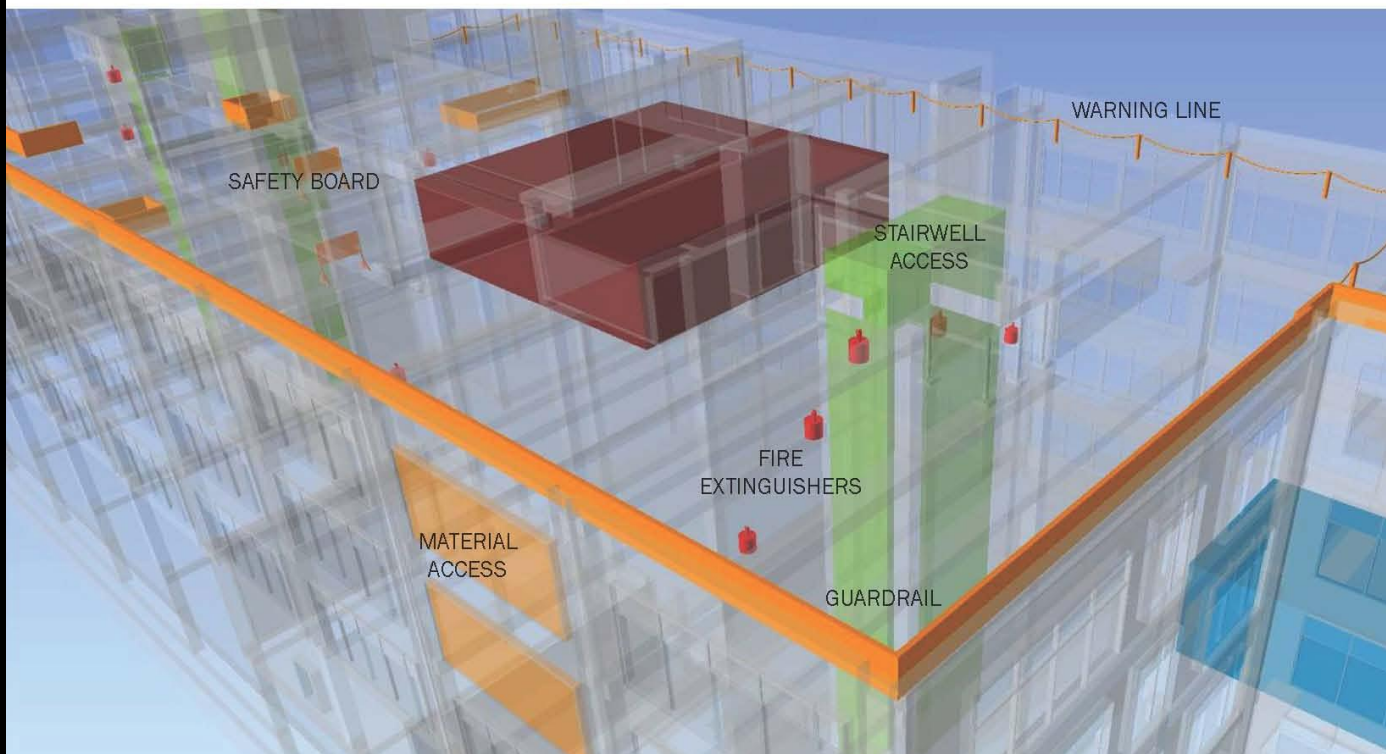
**WE COULD IDENTIFY  
MORE QUALITY ISSUES  
THAN EVER BEFORE ON  
A PROJECT, AND RESOLVE  
THEM FASTER**



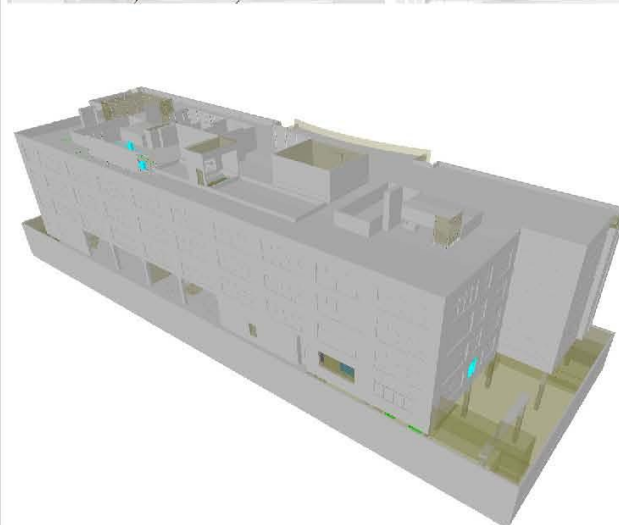
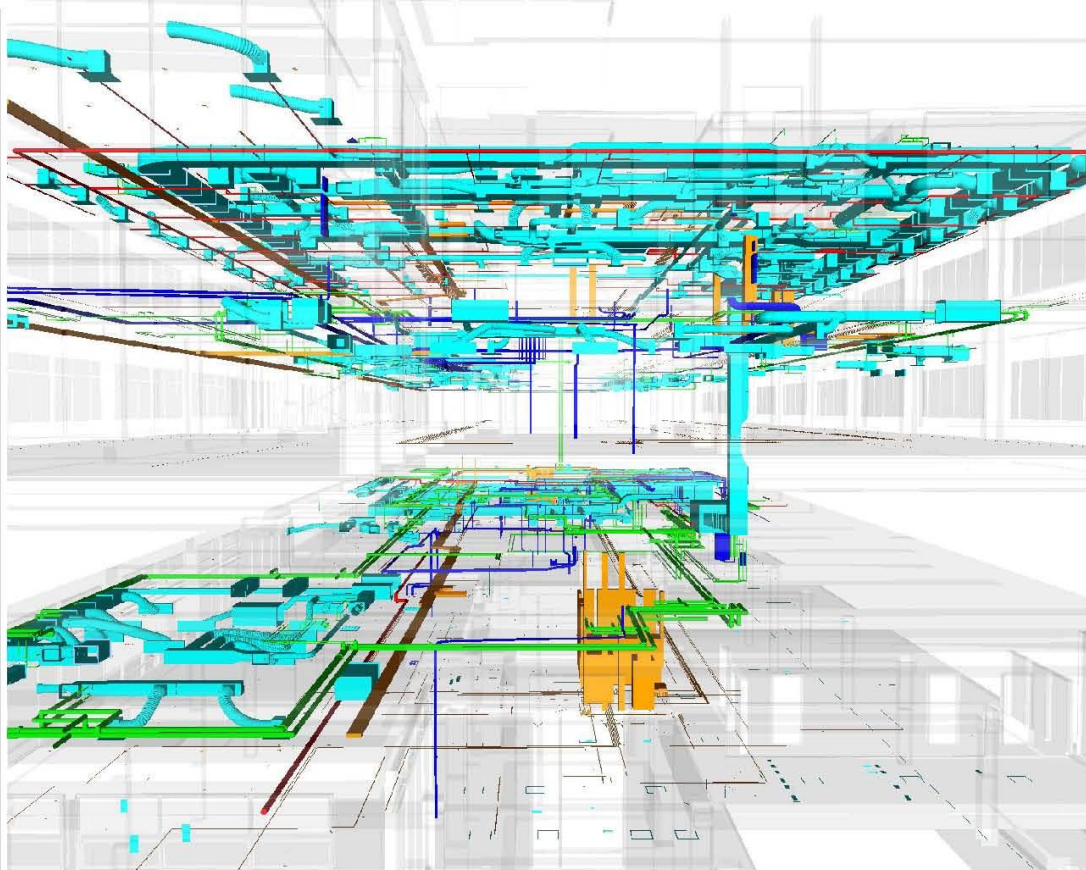
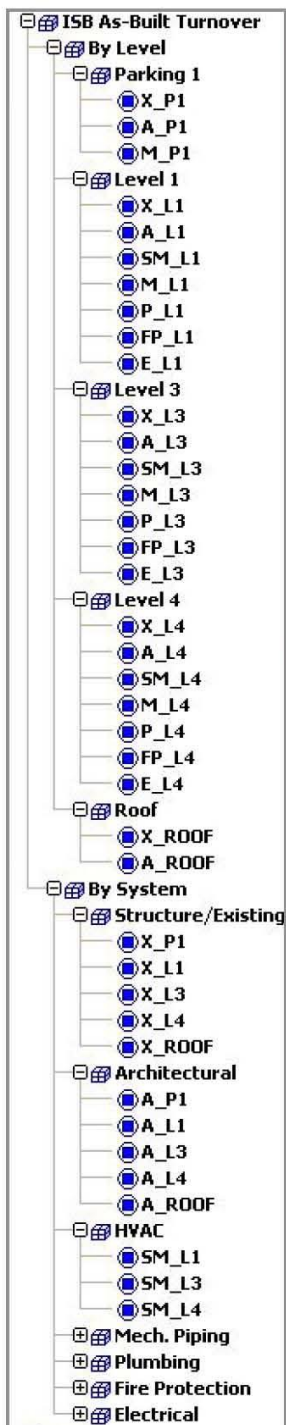
- ## 9 QUALITY CONTROL
- Vela field management software and *Navisworks* on ruggedized tablet PC's
  - Quality control and verify conditions in the model

## SAFETY

- Site specific safety plan developed with design background model
- Valuable tool to safely plan hazardous work on roof
- Used at safety orientations







**THIS VISUAL  
AID ASSISTED  
IN BEING ABLE  
TO QUICKLY AND  
EFFECTIVELY  
UNDERSTAND  
THEIR BUILDING  
INSIDE AND OUT**

## 10 AS-BUILT DOCUMENTATION

- BIM continuously updated by project team
  - Architects
  - Contractor
  - Subs
- As-built model turned over at project completion
- *Navisworks* selection sets used to simplify access to complex BIM database
- Building engineers refer to model to support facilities maintenance





# INSTITUTE FOR SYSTEMS BIOLOGY

2012 AIA TAP / BIM AWARDS



## BIM Award Team Credits

- Institute for Systems Biology
- Perkins + Will
- BNBuilders

# Institute for Systems Biology

Presented by

Andrew Marsters and Justin Porter | BNBuilders

# Maricopa County South Court Tower

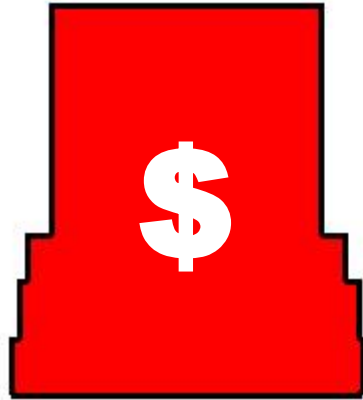
Presented by

John Tocci Jr, Gilbane Companies

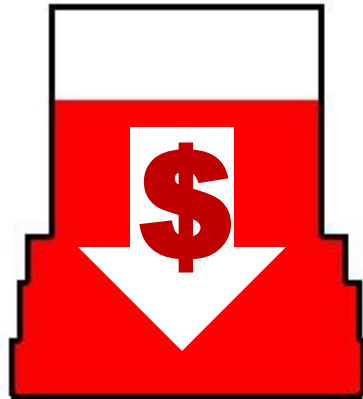


## The team

- Jim Miller
- Greg Buchanan
- Scott Adams
- Logan Dorrell
- Peter Kennedy
- Sue Klawans



problem:  
meet a strict **schedule**  
and **budget** without  
compromising  
**performance**

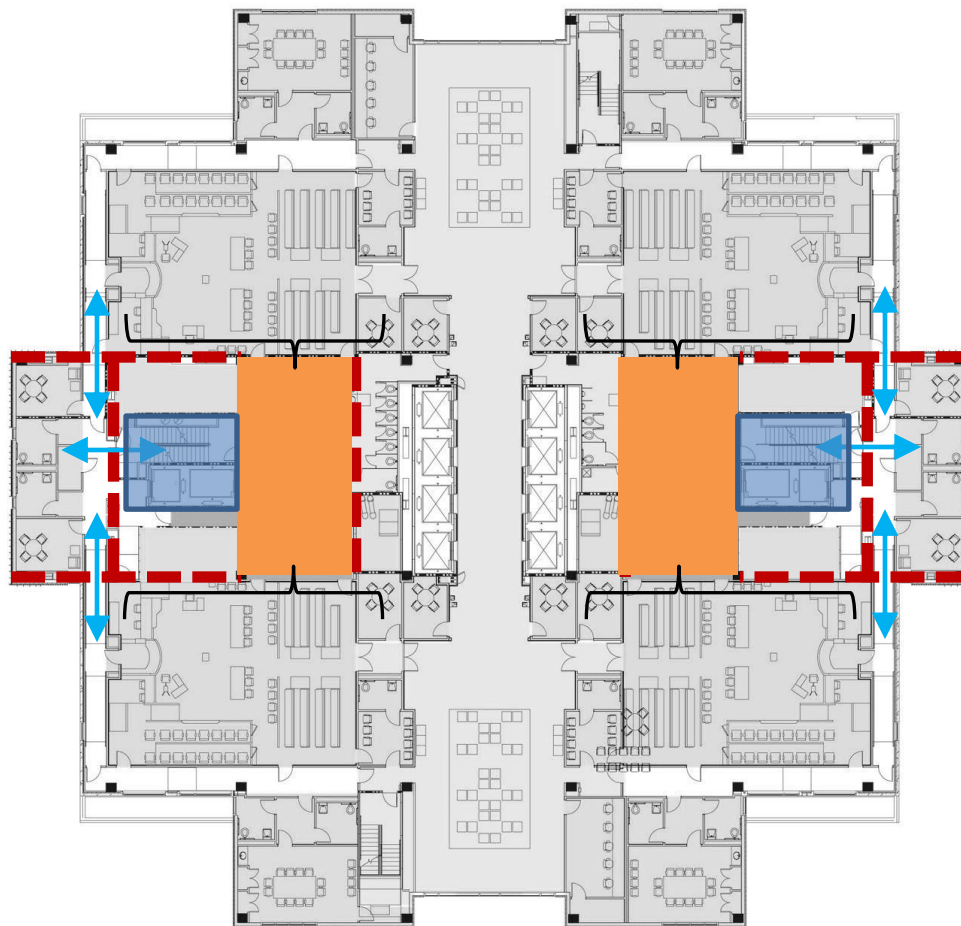


solution:

**reduce building area**  
by 15% and deliver the  
building 18 months early

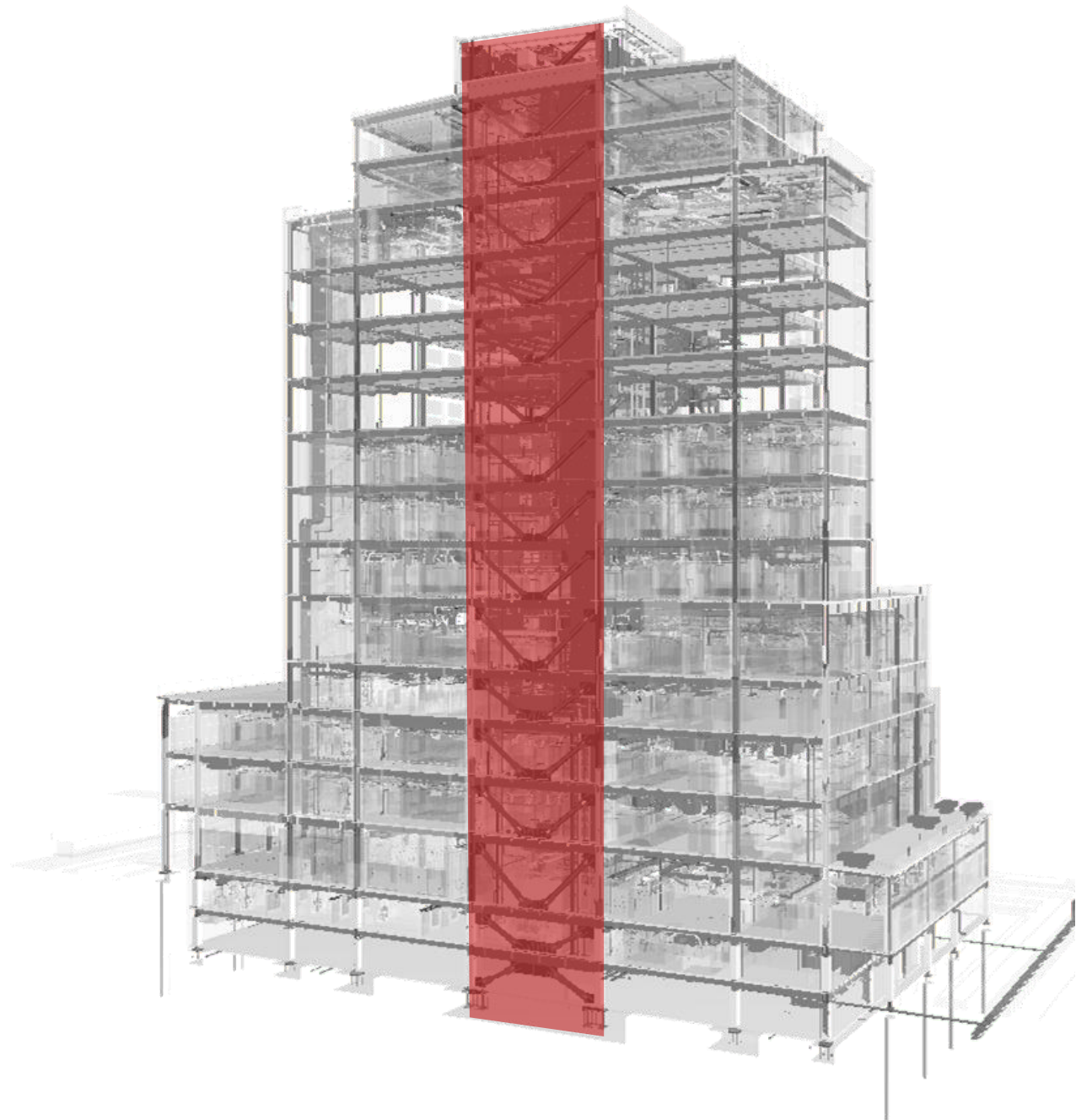


## Structure: Courtroom Mockup



structural  
coordination:  
**maximize plan  
efficiency**  
through  
highly coordinated  
multi-use cores

# Structure: Brace Frame Coordination





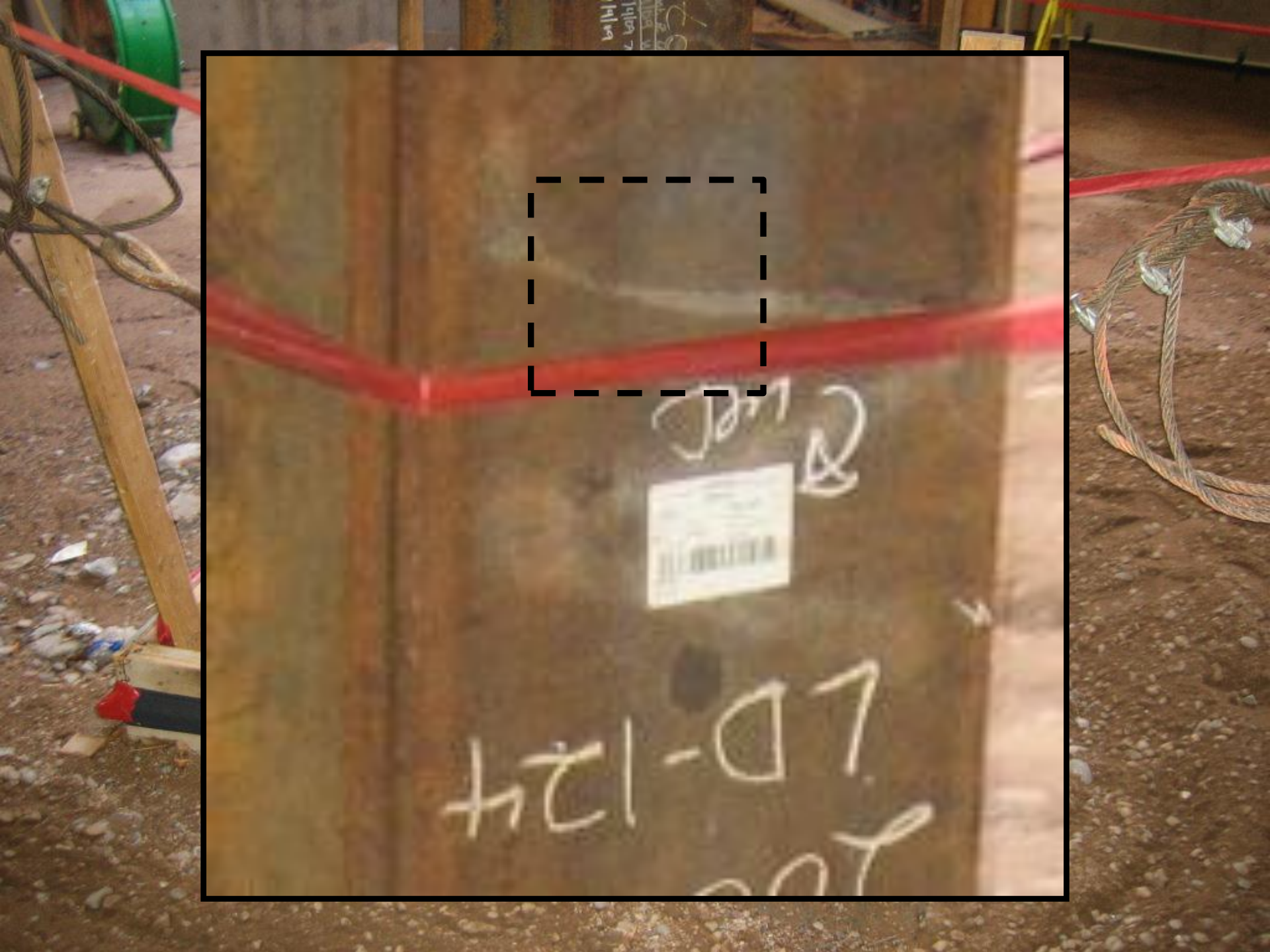






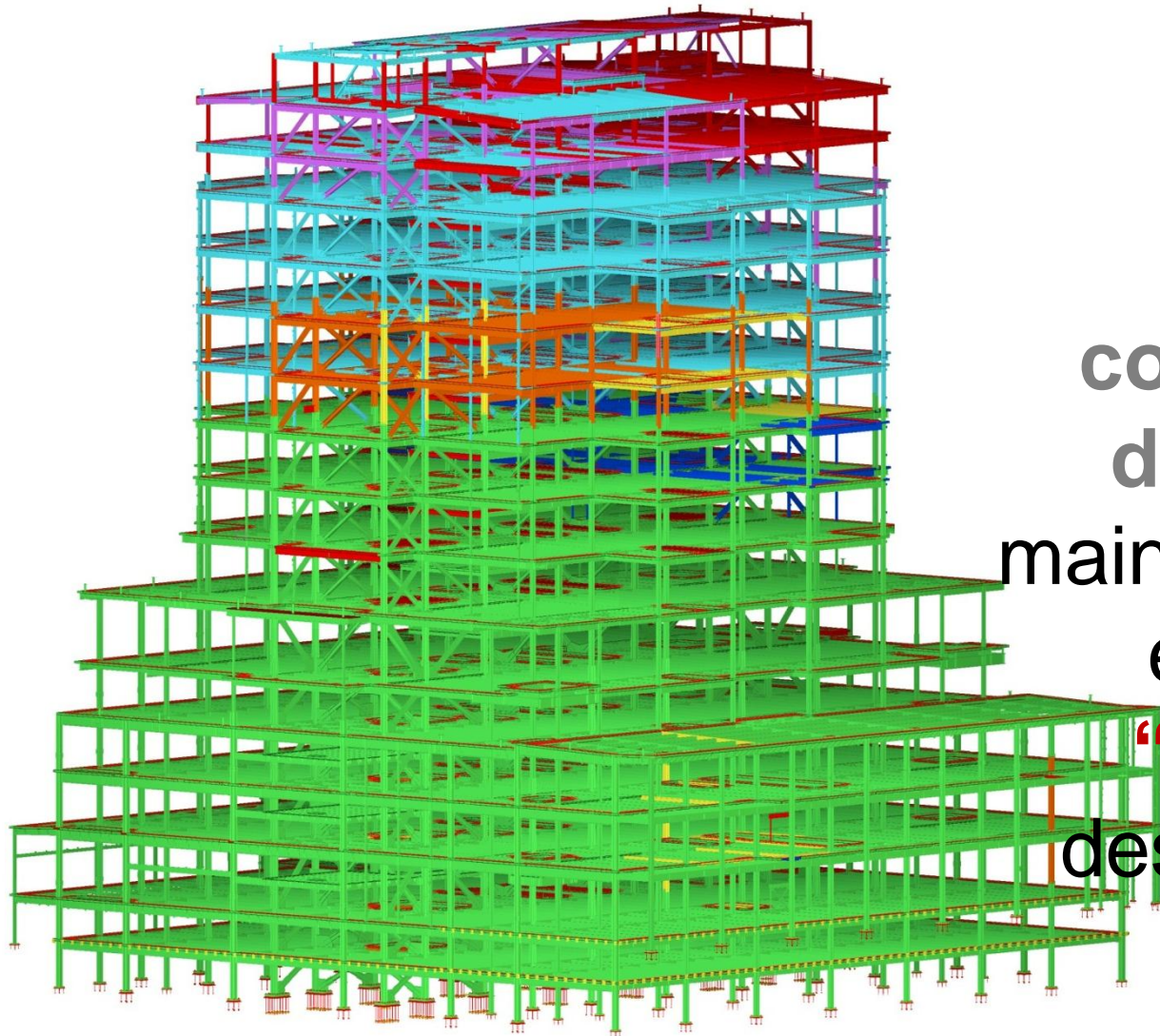
DANGER  
STAY AWAY  
WATCH FOR  
FALLING OBJECTS





LD-124

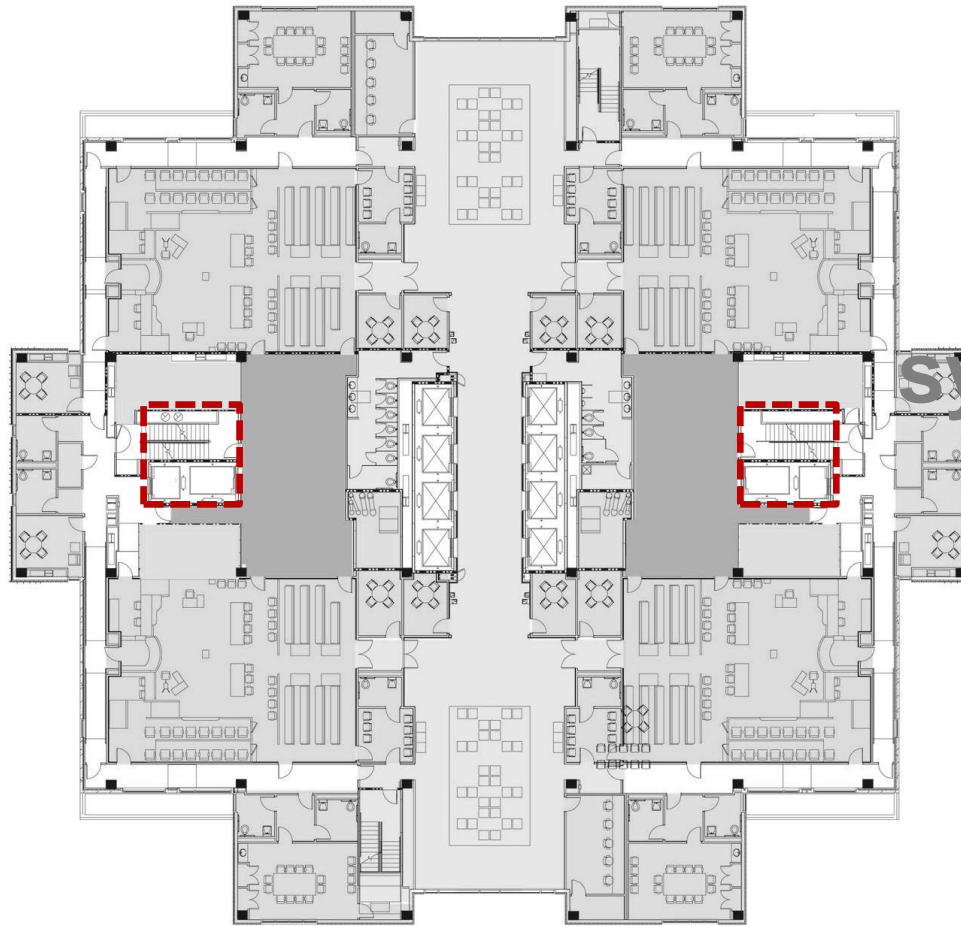
## Structure: Courtroom Mockup



structural  
coordination &  
design assist:  
maintain schedule  
efficiency with  
**“just-in-time”**  
design feedback

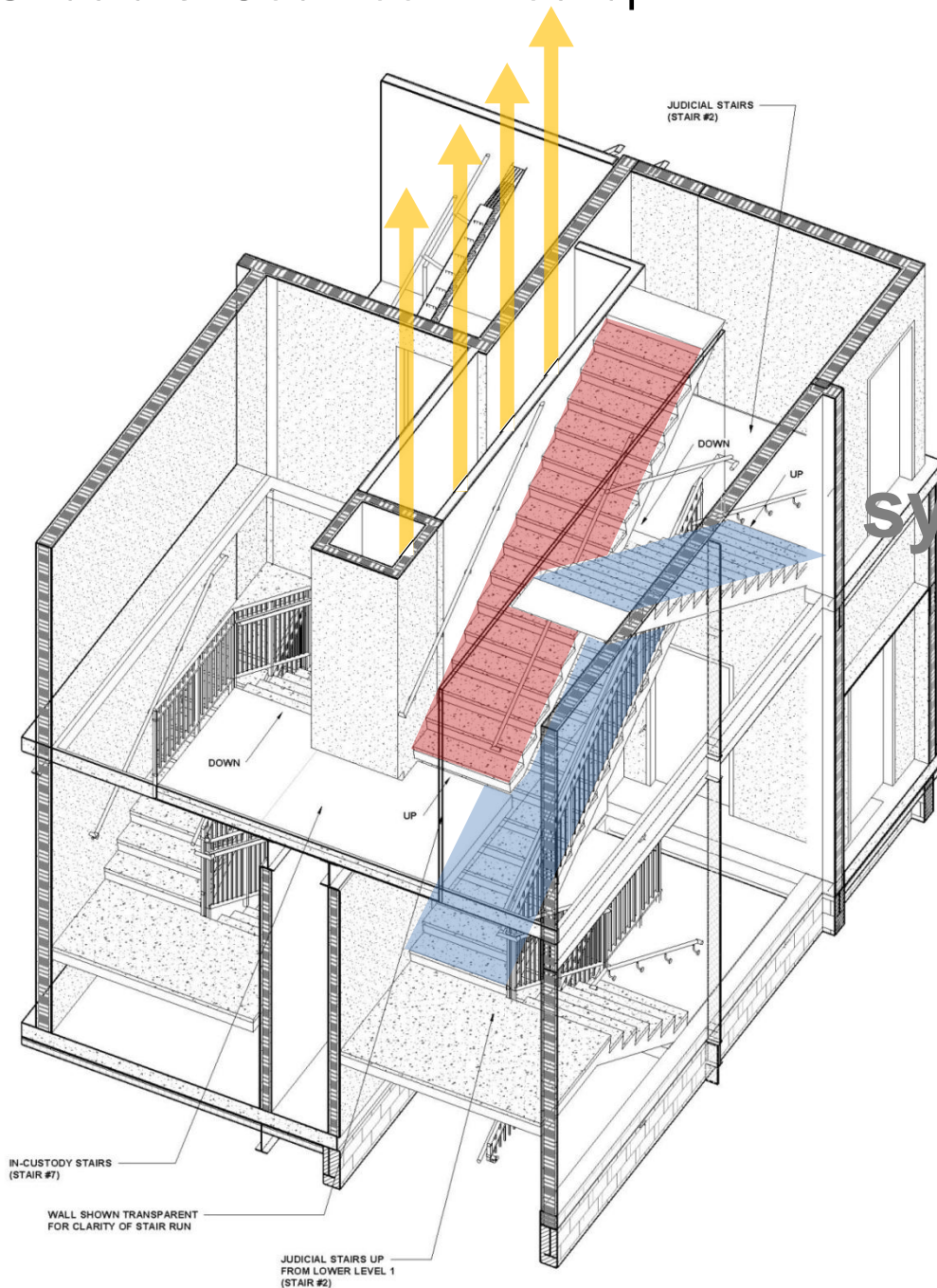


# Structure: Courtroom Mockup



systems coordination :  
**reduce building area**  
through  
highly coordinated  
multi-use cores

# Structure: Courtroom Mockup



systems coordination :  
**reduce building area**  
through  
highly coordinated  
multi-use cores

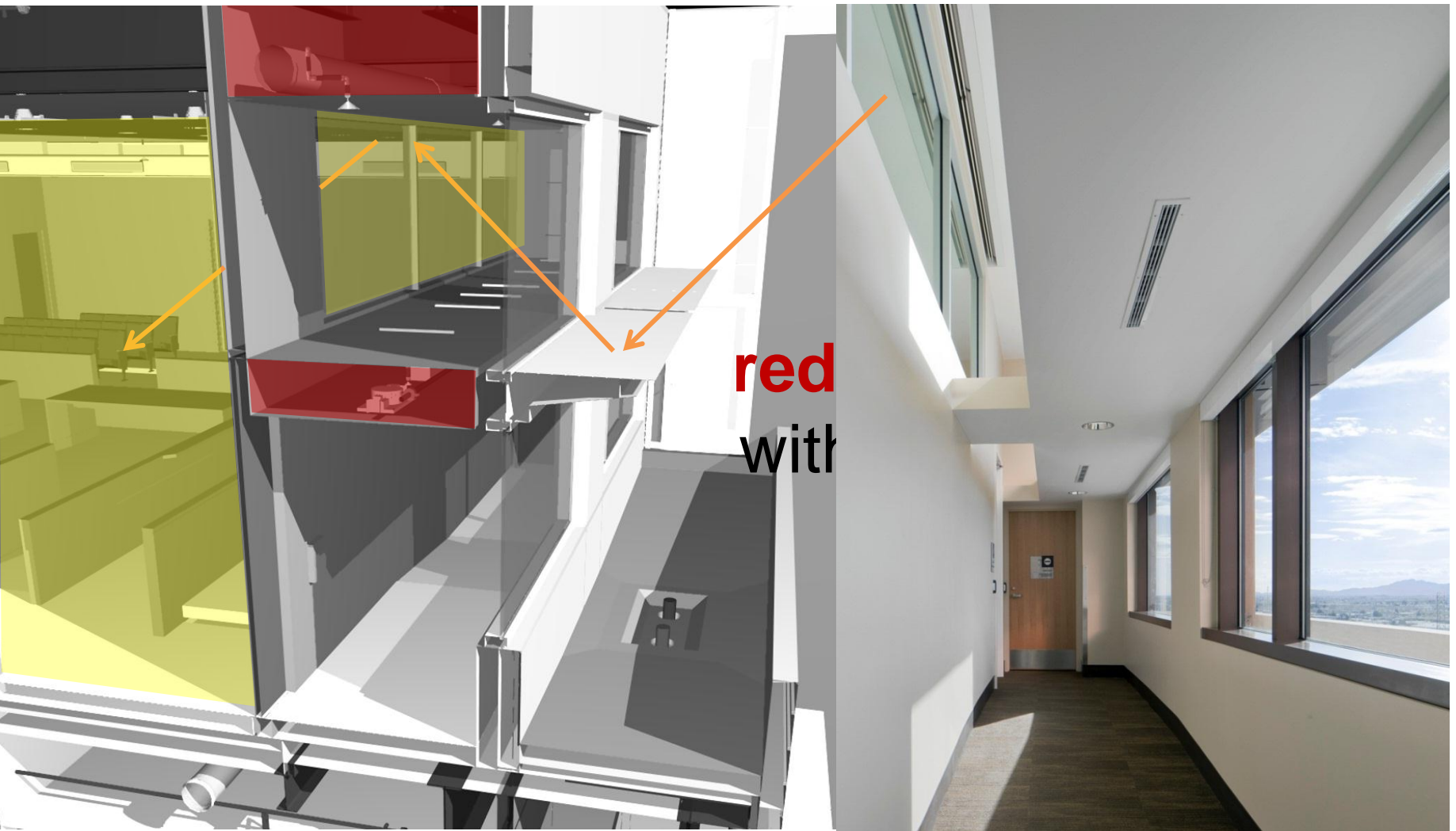








# Structure: Courtroom Mockup

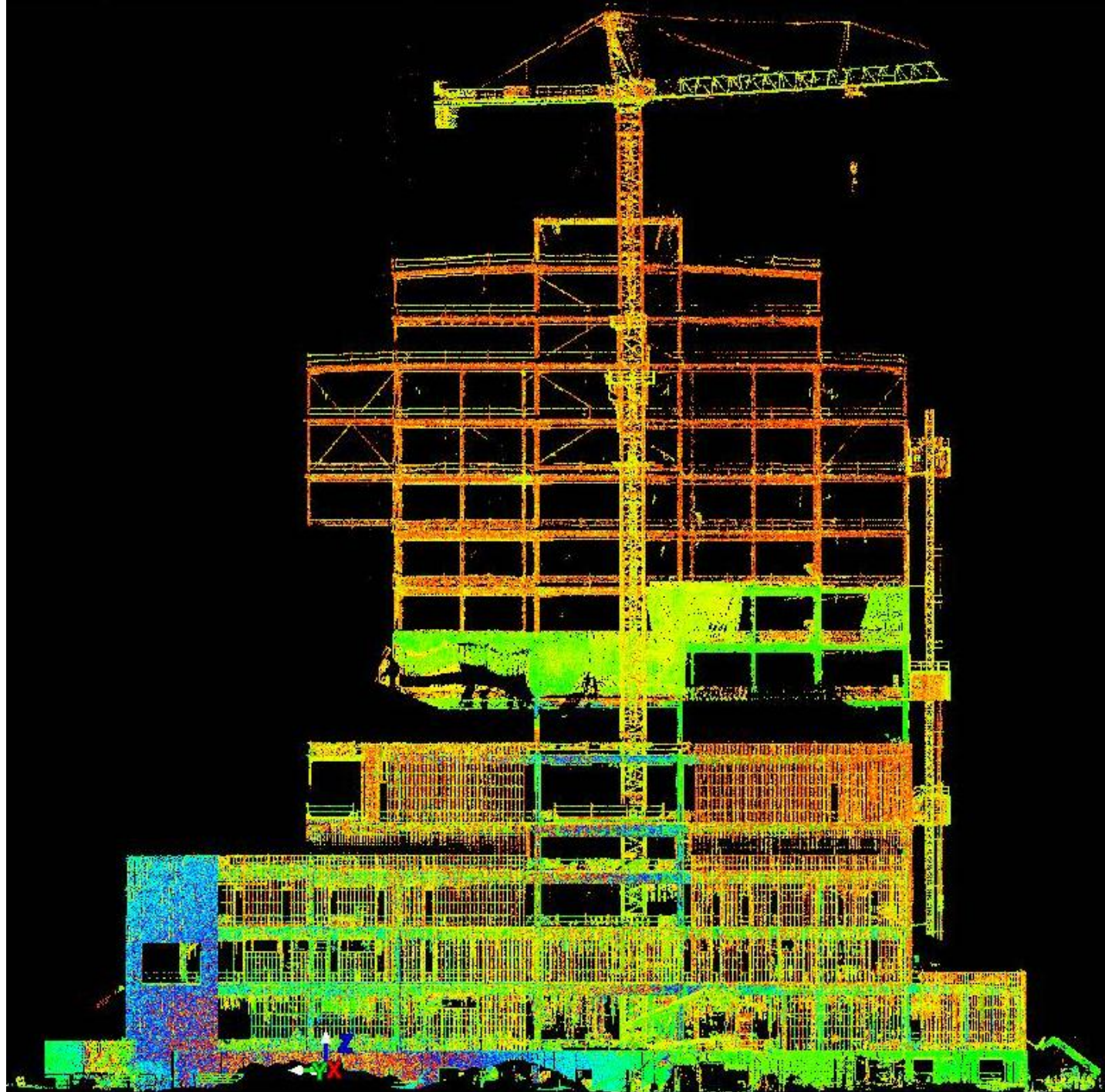




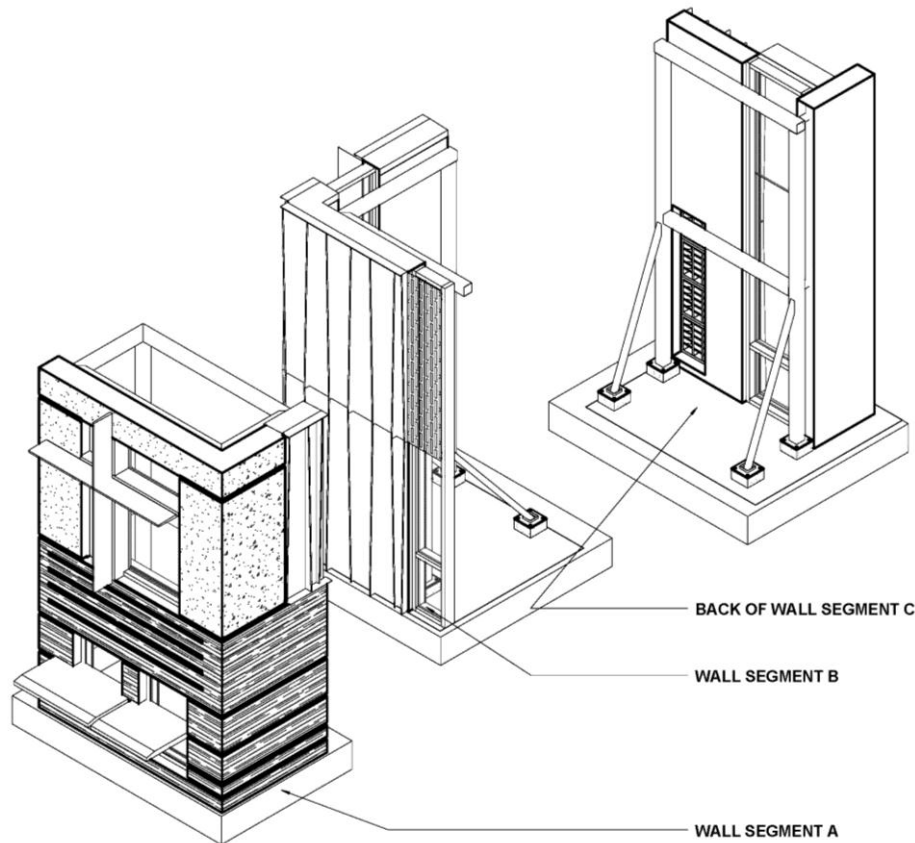












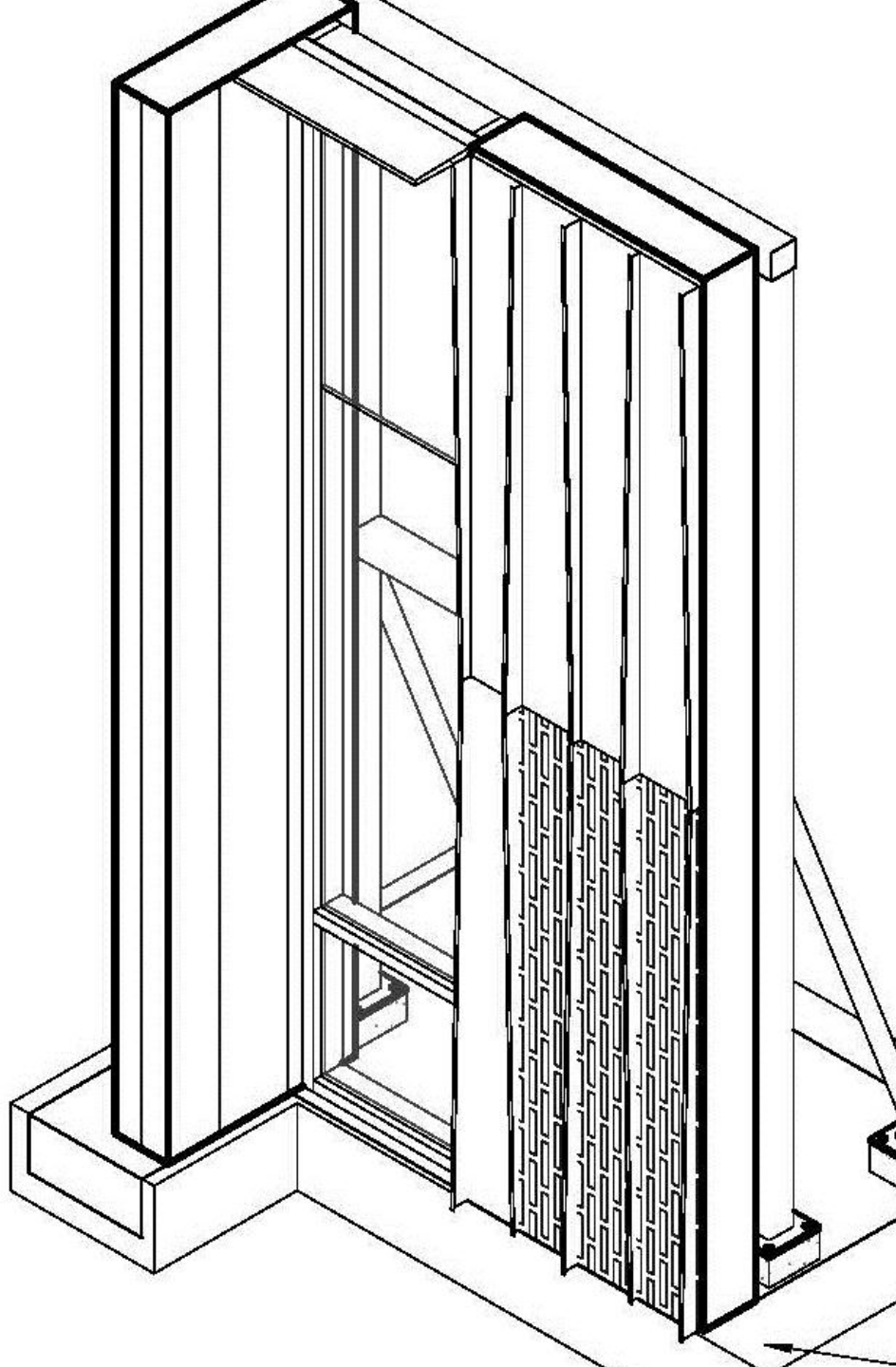
11

NWISO

NOT TO SCALE









Structure: Courtroom Mockup

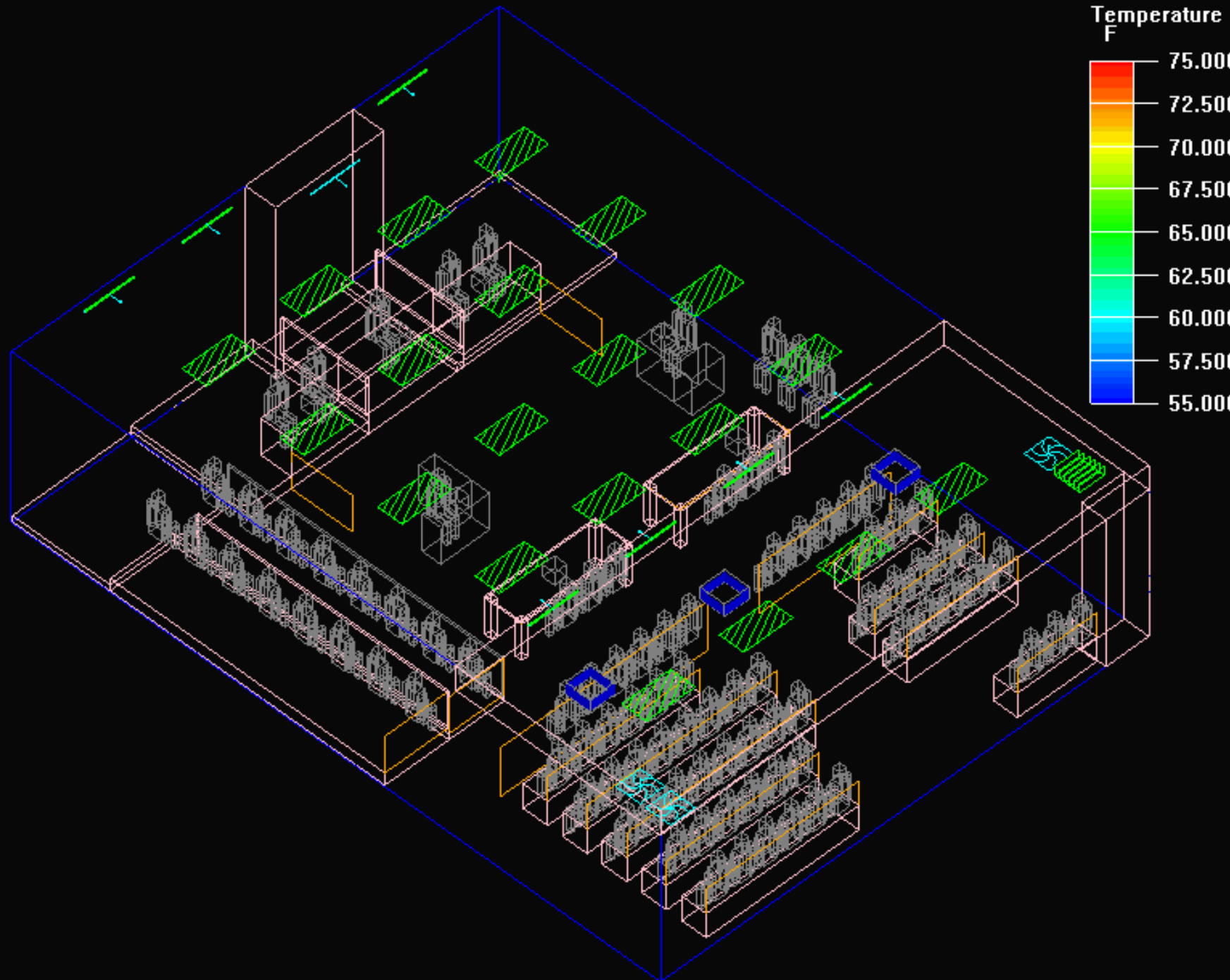
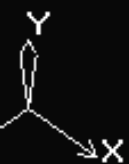
design assist:  
test building  
performance  
through  
**courtroom mock-**  
**ups** design  
feedback



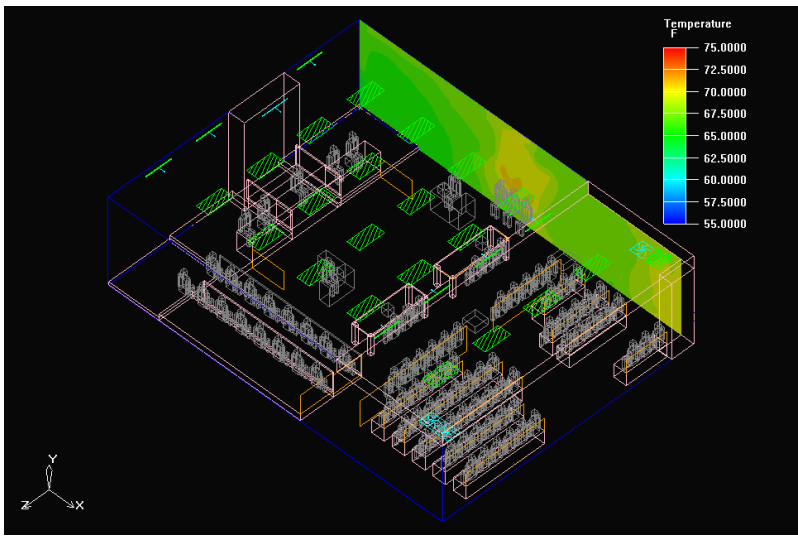
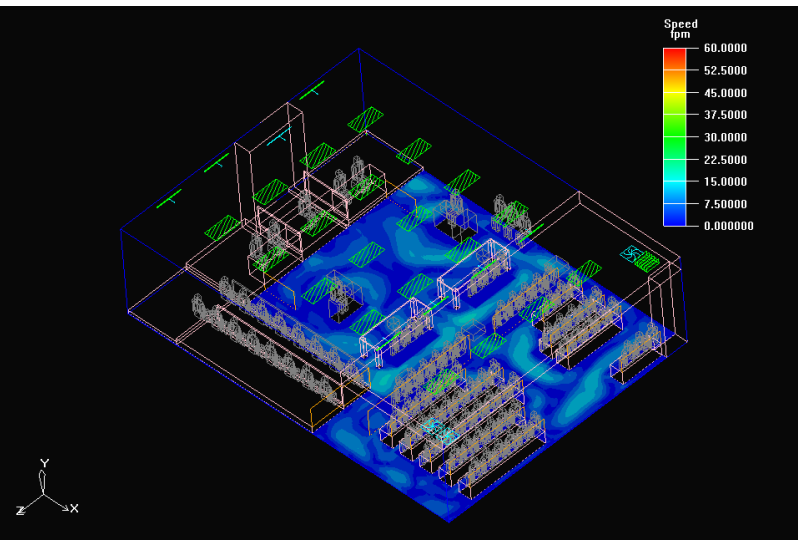
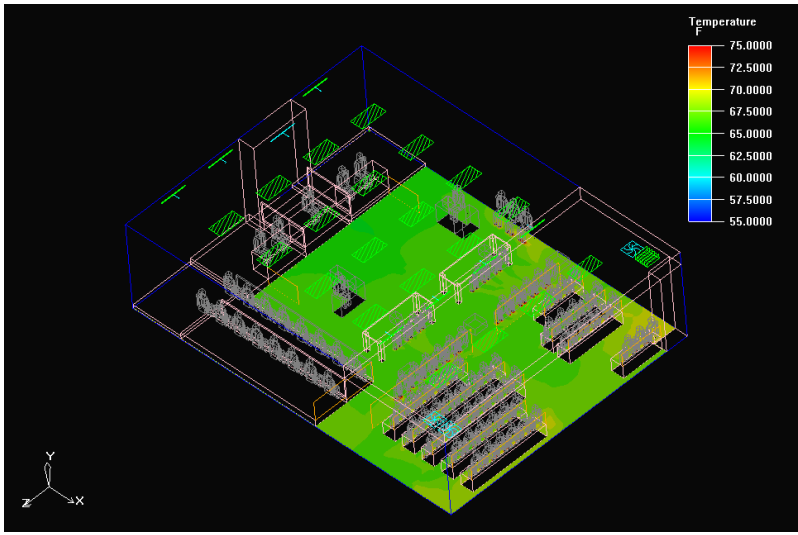
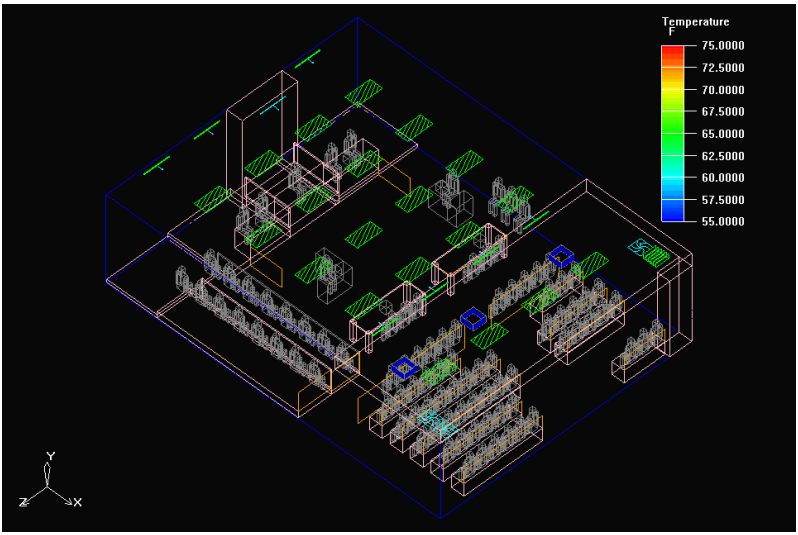






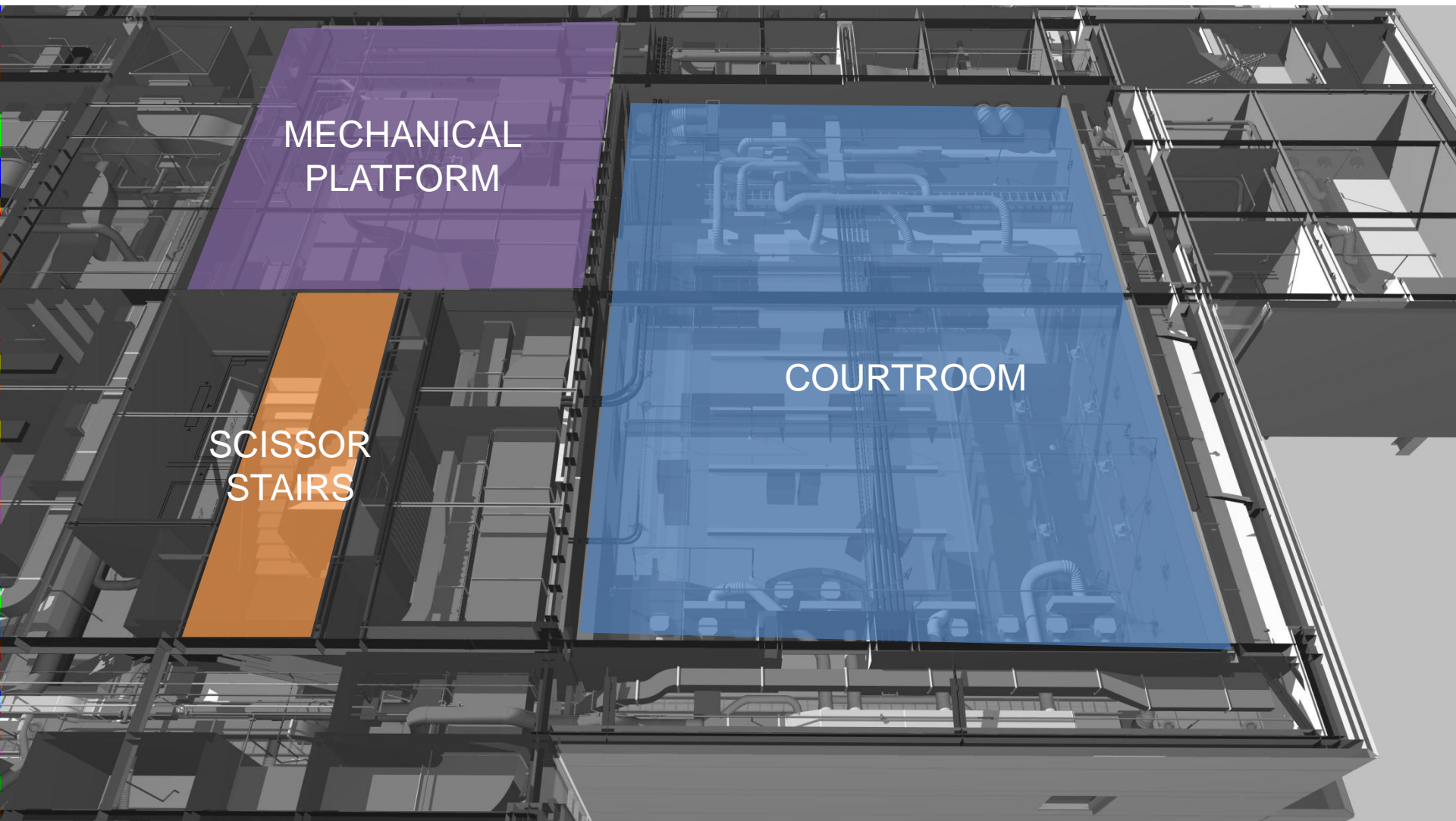


# Architecture & MEP: CFD

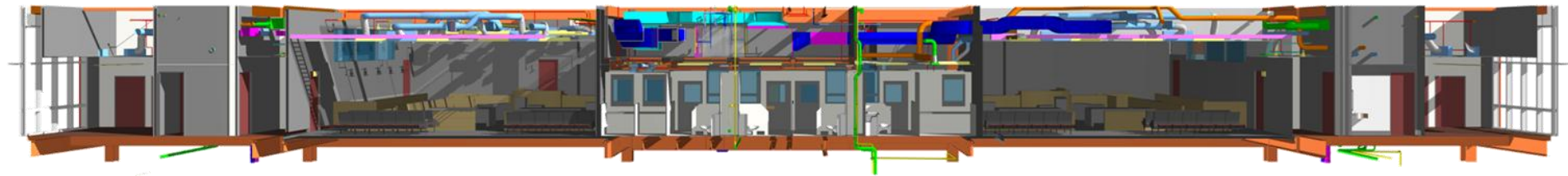




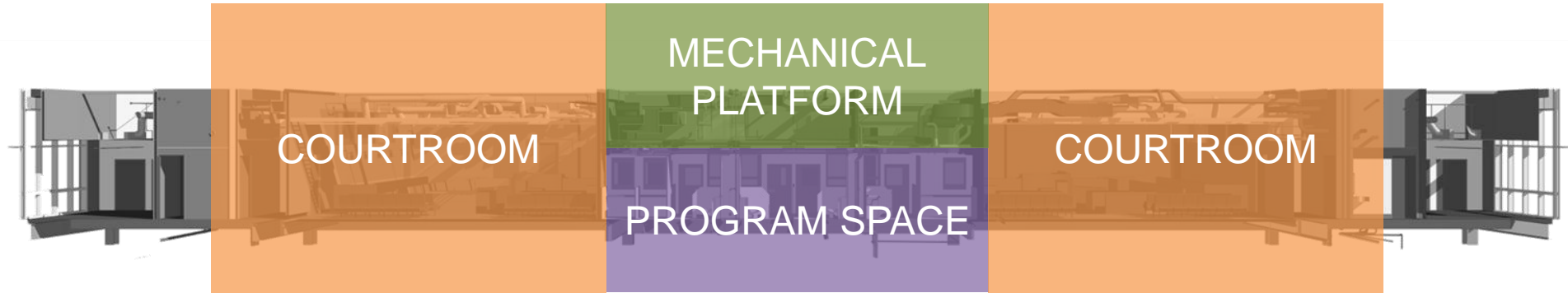
# Architecture & MEP



# Mechanical Platforms

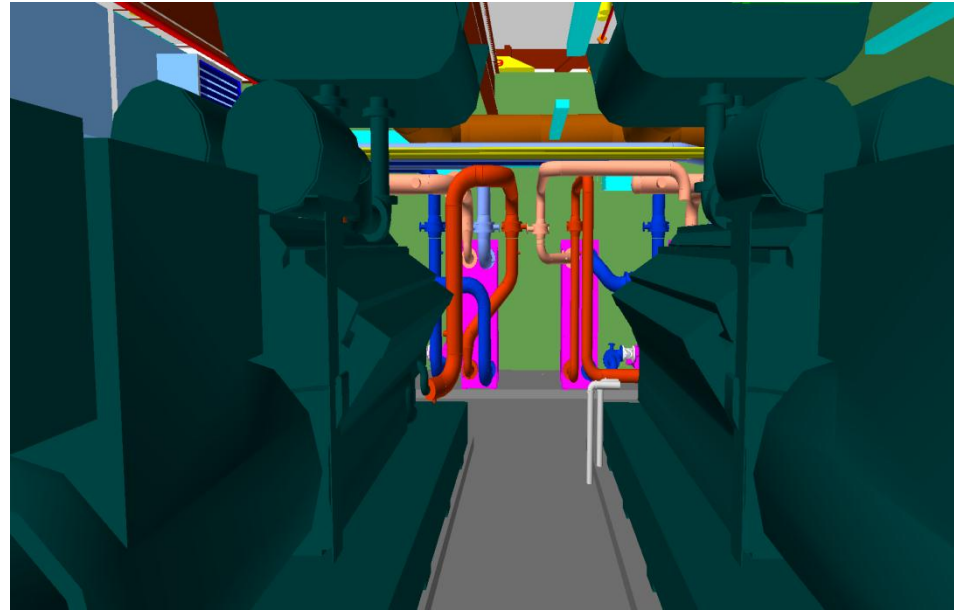


# Mechanical Platforms

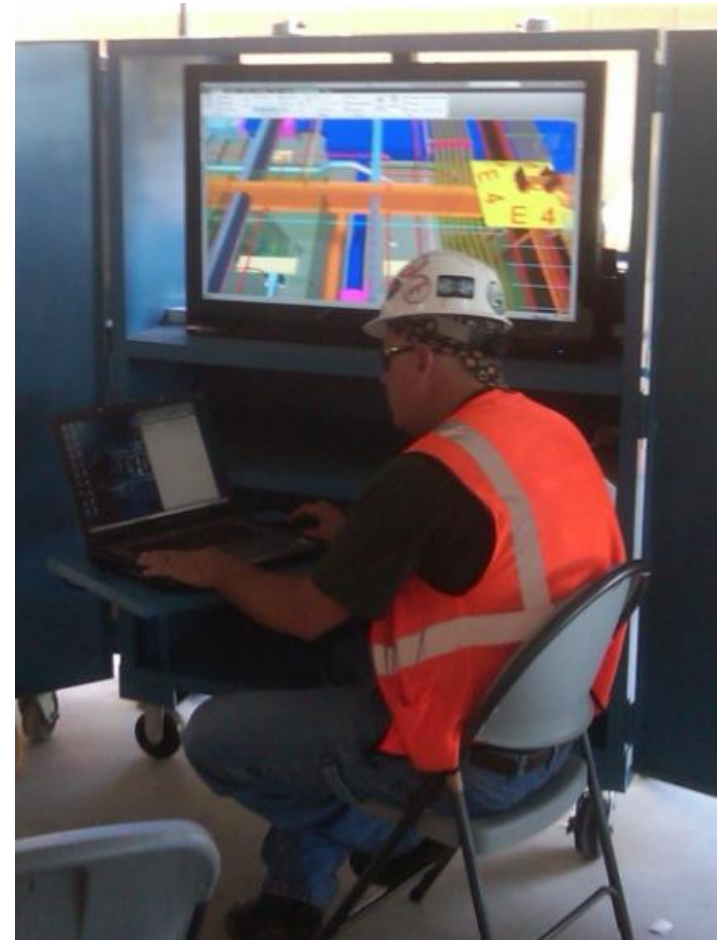
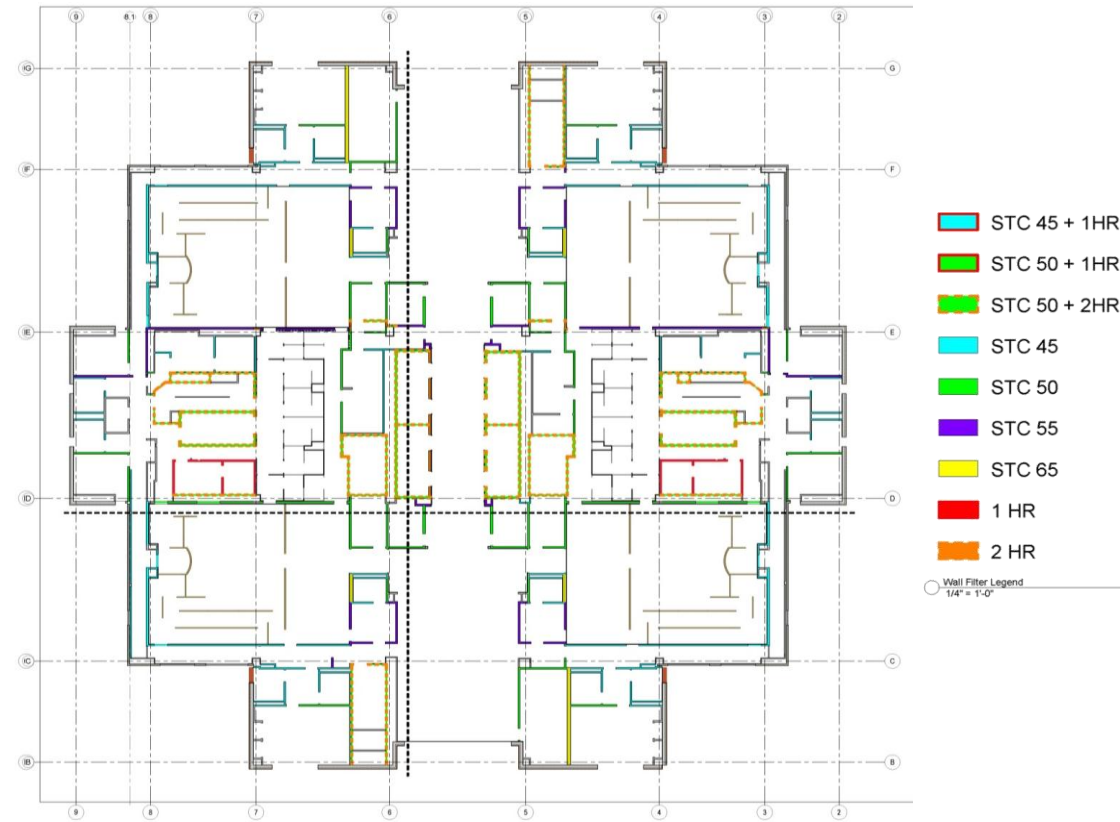




# MEP: Design Assist Coordination



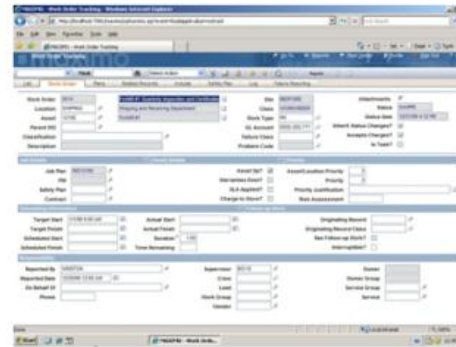
# Construction: Field BIM



BIM

Maximo

On-Base





Justin Ulrich	Christian Wozni	Gina Poppo
John Imbriak	Joshua Wozniak	Ashley Smith
Victor Imbriak	Gregory West	Alan Smith
Taddy Imbriak	Billy West	Steve Valle
Angel Urbaniak	Robert Westfall	Steve Vukich
Ramon Urbaniak	Dan Wheeler	Anthony Womack
Pedro Urbano	Laundon Whitaker	Kevia Wynn
Mardoqueo Uribe	Michael Whitaker	Nora Adams
Danaldo Uribe	Zachariah White	Scott Adams
Brian Vance	George White	Brian Bouch
Joan Valdez	John Whitford	Nelson Clark
Guillermo Valdez	David Whitehead	Brian Conner
Franco Valdez	Brandon Whitehouse	Andy Cripps
Juan Valencia	Jackson Whitlock	Paul Dana
Ken Valencia	Steven Whitton Jr.	Tom Donaghy
Oscar Valencia	Shawn Whitehouse	Chris Eberly
Robert Valencia	Steven Whitton	Greg Glick
Paul Valencia	Charles Whitton	Fernando Gonzalez
Jesse Valenzuela	Lyfe Wilkerson	Michael Grubbs
Ken Valenzuela	Charles Widdridge	Michael Hall
Santiago Valle	Richard Williams	Victor history
Felix Valle	Dion Wilkey	Kari Jandura
Jose Valle	Jonathan Williams	Steven Kubit
Armando Vallejo	Howard Williams	Steve Lichtingberg
Chris Van Durnen	Sean Williams	Henry Pitts
Robert Vance	Billy Williamson	Brent Pitzer
Ronald Vance	Rick Williamson	Mike Puddy
William Vandenberg	Robert Willis	Tina Vuletta
Irene Vandenberg	Martin Willis	Oz Wagner
Brad Vandenberg	Key Willis	Craig Waller
David Vandenberg	Jeffrey Wilson	Barry Williams
Samuel Vaneberg	Parker Wilson	David Sison
Brett Vaneberg	Brian Wilson	Deanna Fong
Fernan Varela	Dan Wilson	Sharon Gerv
Victor Varela	David Wilson	Anna H. Kittingburg
Victorio Vargas	David Wilson	Burtch E. Kittingburg
Christopher Vazquez	Bryan Wilson	Bo J. Sampson
Mario Vazquez	Chris Windighigh	Charles A. Faraca
Santos Vazquez	Thomas Wingo	Christopher R. Far
Phillip Vazquez	Chris Wile	Daniel J. Garavito
Joan Vazquez	Krista Winmaler	Erica Blumenc
Christopher Vazquez	Janet Wisniewski	Gary A. Brennes
Arthur Vazquez	Shane Wise	David R. Hartford
Adrian Vazquez	Steve Witkowski	Garold R. Hartford
Martin Vazquez	Greg Wilkins	Albin Gonzalez
Mariano Vazquez	Kyle Widdoff	James Baltazar
Salvador Vazquez	Greg Wolfe	Jeff Ballo
Alfredo Vega	Janett Wolford	Joel J. Patey
Jeremy Vega	Tony Womack	Joey J. Patey
Martin Vega	Tim Wood	John R. Patey
Jose Vega	Timothy Wood	John A. Pomonaka
Salvador Velazquez	Aaron Wood	Kristopher Pomonaka
Saador Velazquez	Daniel Wood	Logan C. Pomonaka
Mario Velazquez	Thomas Woodh	Mark D. Starnes
Luís Velazquez	Ustad Wood	Mauro Vitoia
Julio Velazquez	Janetun Woolley	Michael J. Wilson
Javier Velazquez	John Workman	Nick Sparks
Tom Vembay	Orsak Whitt	Paul K. Ericson
John Ventura	No Tallego	Ramona C. Riccio
Eli Vera	Henry Tate	Robert R. Riccio
Daniel Verthugue	Orlando Tanes	Robert R. Watz
Jose Verdu	Jose Tanez	Robert R. Watz
Angel Verdugo	Mark Yankavich	Rodolfo R. Keapler
John Verdugo	John Tanez	Rodolfo R. Keapler
John Verdugo	Victor Tanez	Steven M. Tradin
Sonia Verga	Willis Tazze	Deank Anderson
Timothy Verheysen	Earlson Tazze	Benjamin Gies
Alejandro Vidal	Willis Tazze	Benjamin Gies
Luis Vidio	Karlyn Tazze	Robert Giff
Thomas Vidora	Jeramy Tazze	Francis Hock
Jerry Vig	Benjamin Tazze	John Kaiser
Robert Vig	Harold Tazze	Thomas Tracy

# The Team

Success is defined by...

- BIM+FM integration that eliminated 2-5 years of building turnover work
- Zero change orders for MEP/FP coordination
- 8 Major BIM-based Prefab Trades
  - Structural Steel, M/P, FP, Electrical, Precast, Curtain Wall, Copper, Detention Systems
- 2,000,000 safe work hours (Gilbane record)
- BIM Enabled Solutions Saved \$30M
- **Additionally:** Added Scope & Returned Money
  - \$7M in enhanced vertical transportation
  - \$4.75M in contingency returned @ 65% completion

- Accelerated Schedule 18 Months
- Returned Money, Added Scope
- Wasn't a contract requirement





## Warrior in Transition Barracks

### Presenters:

David Stone - Mortenson Construction (GC) | Glen Andres - Transystems (Architect)



# Warrior In Transition Barracks

Fort Carson, CO

## VDC Expedites Soldiers' Road to Recovery







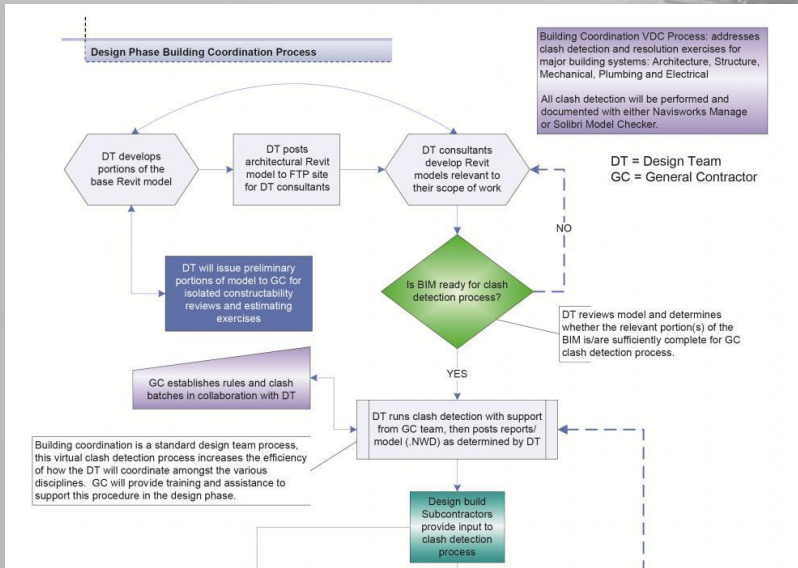
## Project Narrative

The client's program for this barracks facility sought to provide a healing and recuperative environment for wounded soldiers returning from combat, and replace outdated and insufficient facilities currently being used. To meet the rising demand, the team was tasked with the challenge of completing the entire design and construction process within 18 months of project award. Under a traditional construction schedule, much of the structural frame and exterior closure work would be occurring in the middle of the winter months

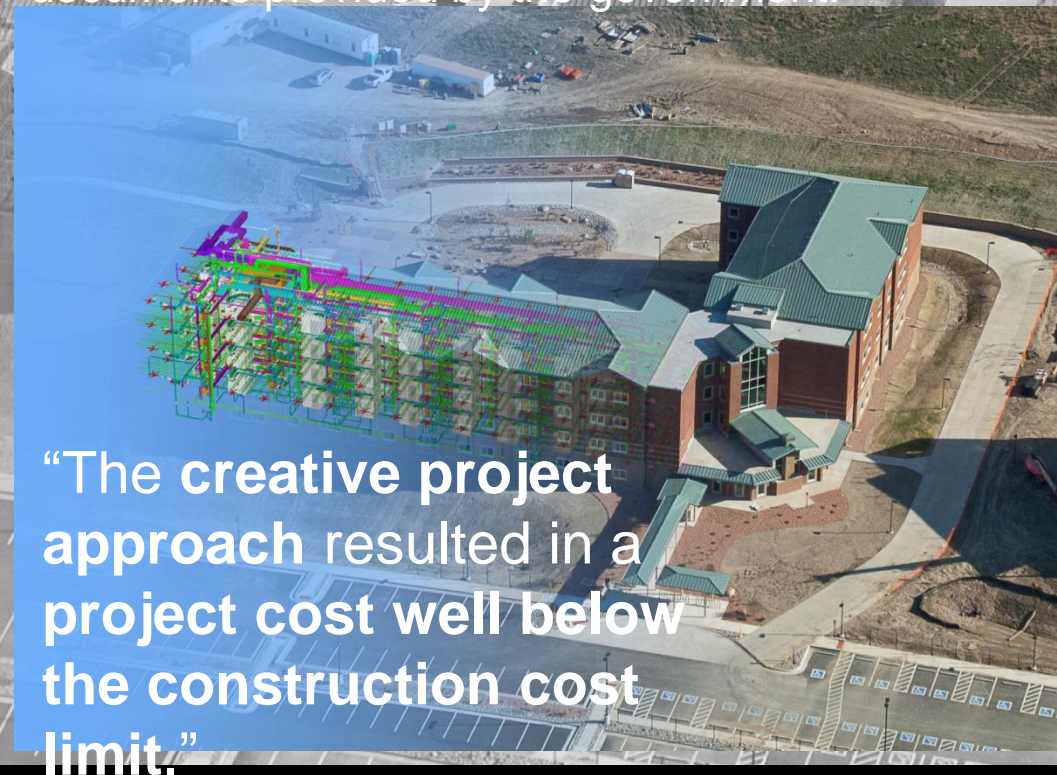




# Collaborative Design Build Approach



This project exemplifies the team's outstanding use of BIM technologies to facilitate a collaborative project delivery method, while meeting an aggressive design and construction completion schedule. The project was awarded as a design-build contract based on bridging documents provided by the government.



**“The creative project approach resulted in a project cost well below the construction cost limit.”**

Warrior In Transition Barracks  
Fort Carson, Colorado

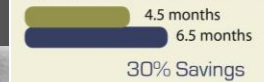


# Benefits and Results:

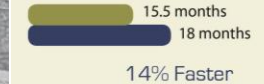
- A compressed design phase of just 4-1/2 months (vs. 6.5).
- The project was fully enclosed with completed bathrooms in the building just 5 months after foundations.
- General conditions costs were saved by not having to enclose and heat for winter masonry work. Savings were used to provide additional scope in the building.
- Project quality was enhanced. The high quality in the bathrooms and in the precast masonry due to Prefabrication. Punch list was reduced by 50% in comparison to traditional approaches.
- Significant labor was transferred off-site due to prefabrication, reducing the project's safety risk, resulting in an overall project Recordable Injury Rate of 0.83.
- Overall project waste was reduced due to the efficiency of factory processes vs. job-site processes in the precast panels and modular bathrooms.

## Schedule Savings

Design Schedule Savings (Actual vs Typical)



Construction Schedule Savings (Actual vs Contract)



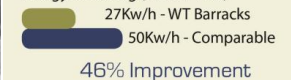
## Sustainability Enhancements

PV Array (added via project savings)  
Geothermal Field  
Solar Hot Water  
Waste Reduction  
LED Lighting  
Energy Modeling

Waste Reduction



Energy Modeling (Per SF/Year)



## Safety Results

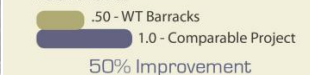
Safety - Recordable Incident Rate  
(Project vs Contractor vs Industry Average)



Field Labor Risk Reduction (Drywall/MEP)

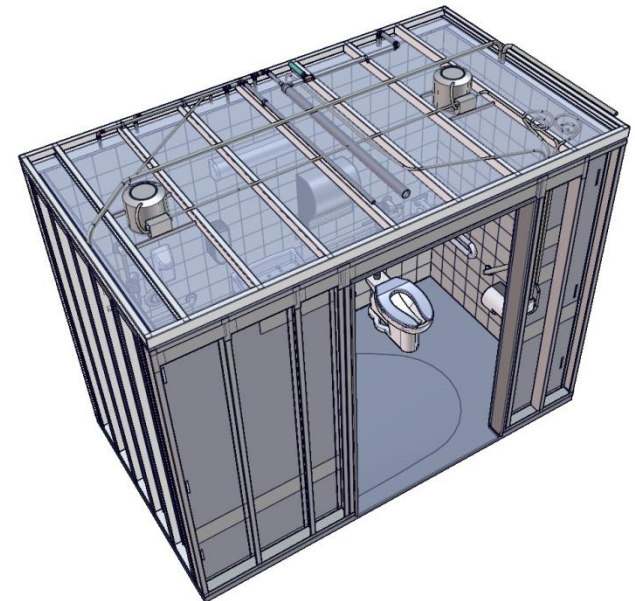
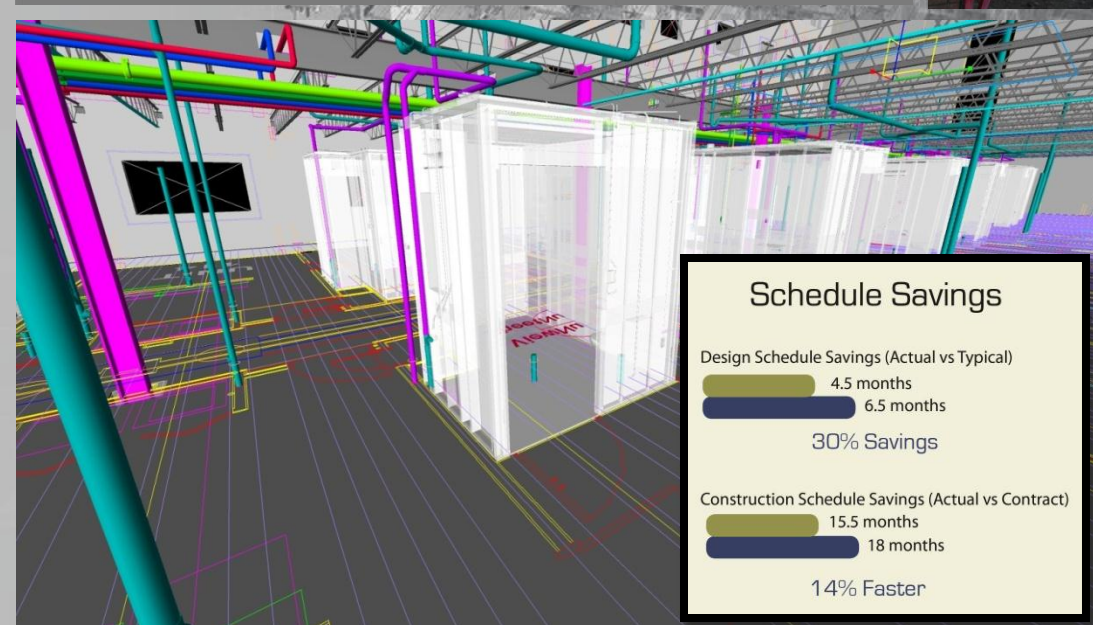


Field Punchlist



# Driving Schedule and Quality - Prefabrication

“Project completed a full **10 weeks ahead** of the government’s **schedule.**”



Warrior In Transition Barracks  
Fort Carson, Colorado



# Owner Statement

“...the creation of the model proved to be an invaluable tool during both the design of the facility and then into the construction phase. The model minimized conflicts eliminating related change orders, allowing us to leverage cost saving to upgrade the quality of the project. The contractor used new building methods and superior energy-saving design to make this LEED facility a model for others across the Army. The renderings produced from the BIM models were excellent and reflected the true representation of the finished project. They also promoted a real sense of anticipation from soldiers for the completed facility.”

## Prefab Animation



# Driving Quality and Sustainability – Precast Walls



## Sustainability Enhancements

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LED Lighting  
Energy Modeling

### Waste Reduction

.65 - WT Barracks  
1.0 - Comparable Project

35% Reduction in Landfill Waste

### Energy Modeling (Per SF/ Year)

27Kw/h - WT Barracks  
50Kw/h - Comparable

46% Improvement

Warrior In Transition Barracks  
Fort Carson, Colorado



# Architect Statement

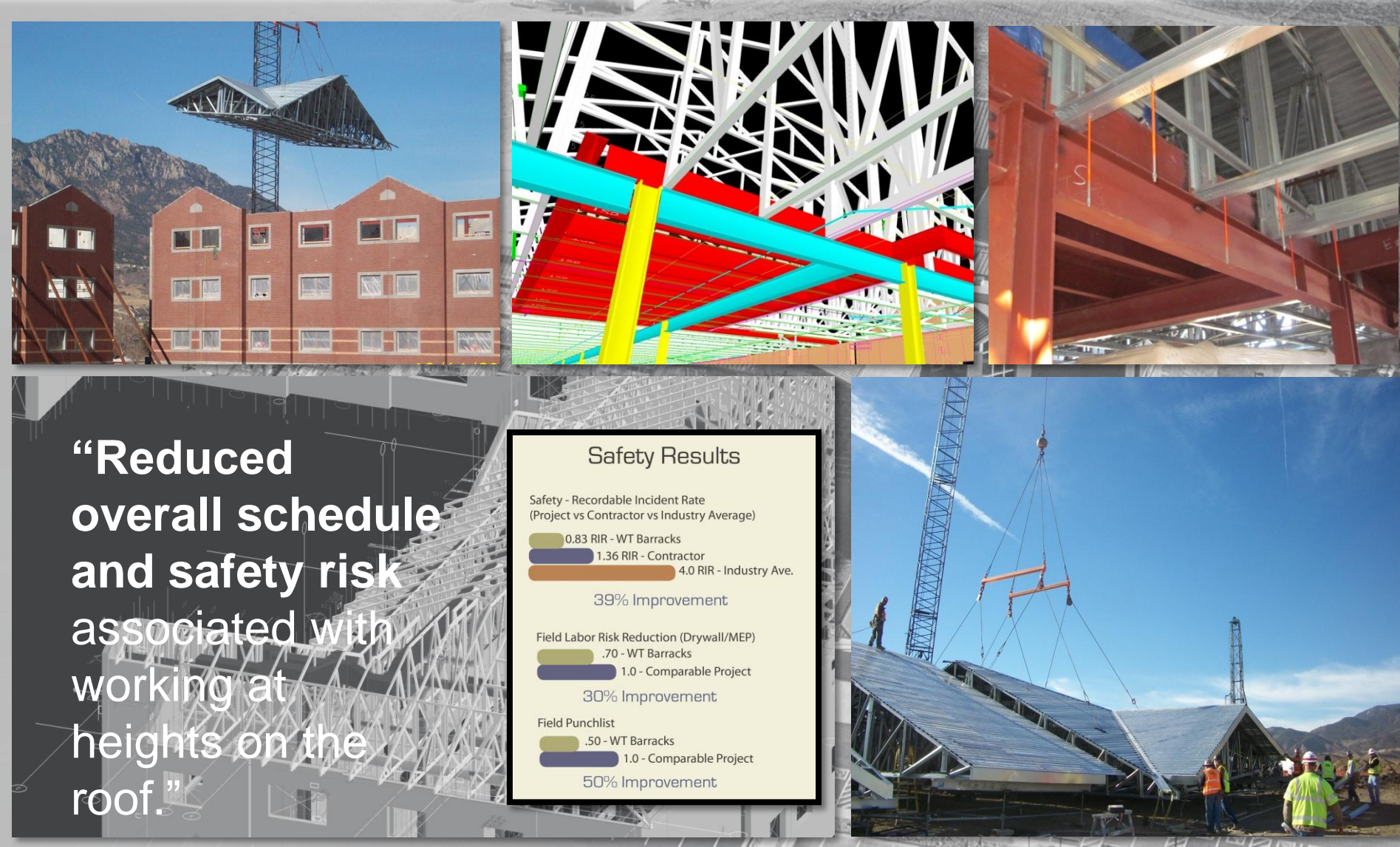
“...the success of the project required utmost commitment from every team member, from the owner’s representative, contractor, architect and engineers, product suppliers to the foreman at the site. Having an efficient manner to share and update project information with the entire team was paramount to achieving this success. Our team was able to do that through the innovative use of Virtual Design and Construction. Our Building Information Model provided a collaborative platform to be created and used by all team members within a very short period of time, and conflicts were resolved long before they could hinder the construction schedule.”



Warrior In Transition Barracks  
Fort Carson, Colorado



# Prefabrication Driven Results - Safety



Warrior In Transition Barracks  
Fort Carson, Colorado





# Warrior In Transition Barracks

Fort Carson, CO

Thank You!







# Warrior In Transition Barracks

Fort Carson, CO

**VDC Expedites Soldiers' Road to  
Recovery**







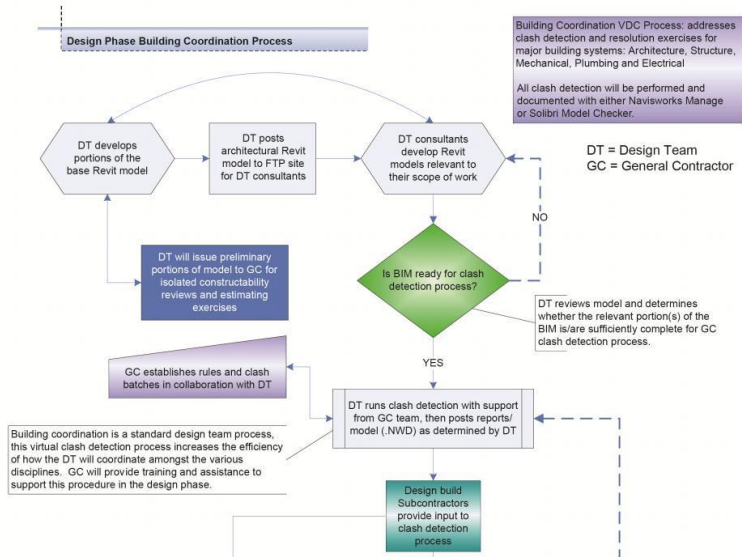
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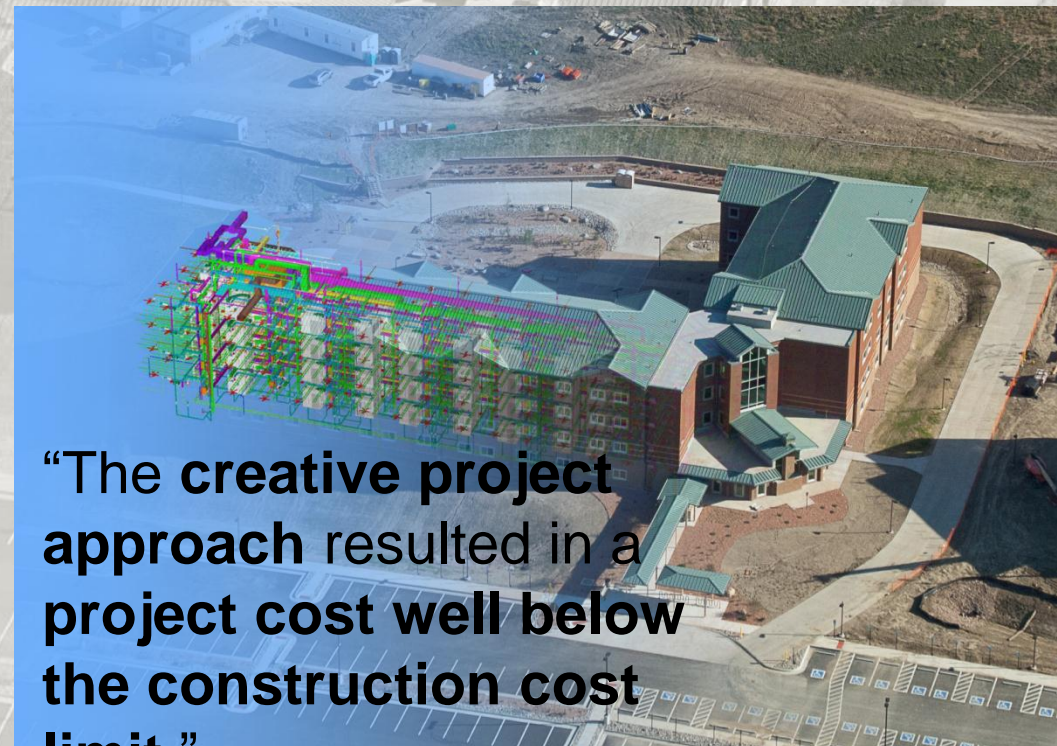




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Warrior In Transition Barracks  
Fort Carson, Colorado



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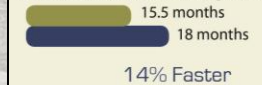
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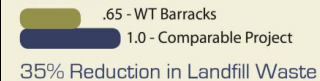
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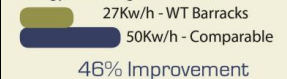
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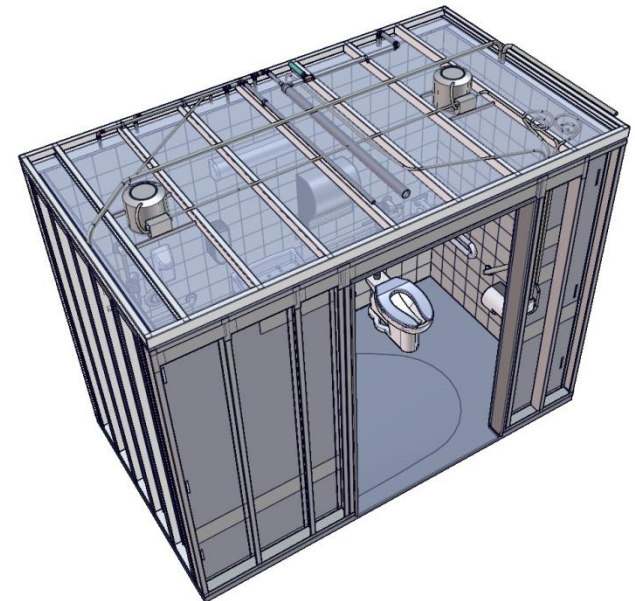
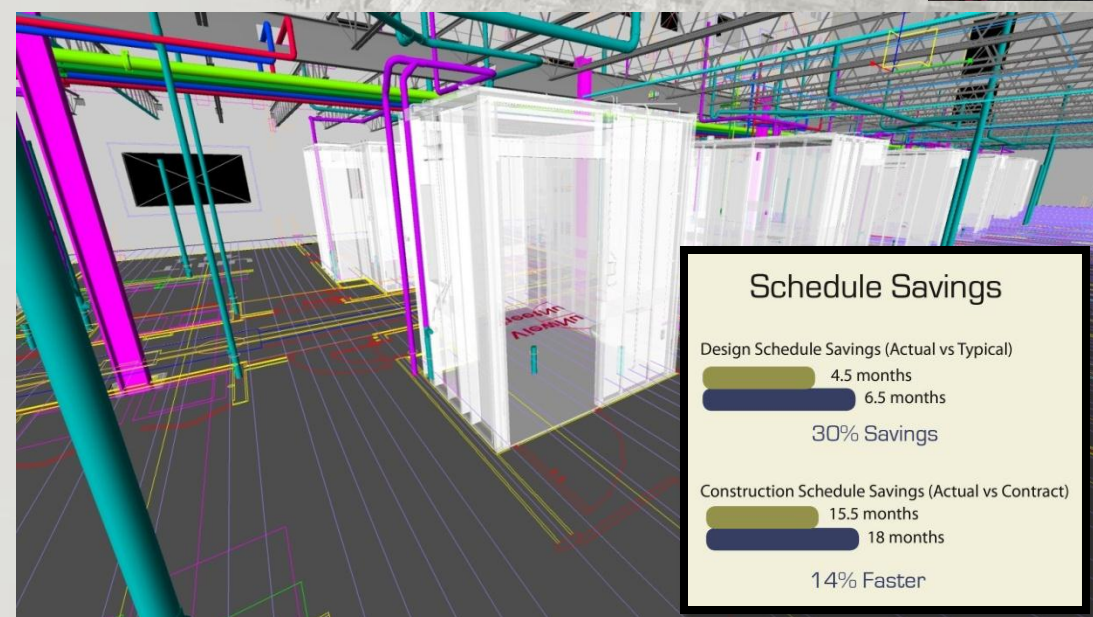


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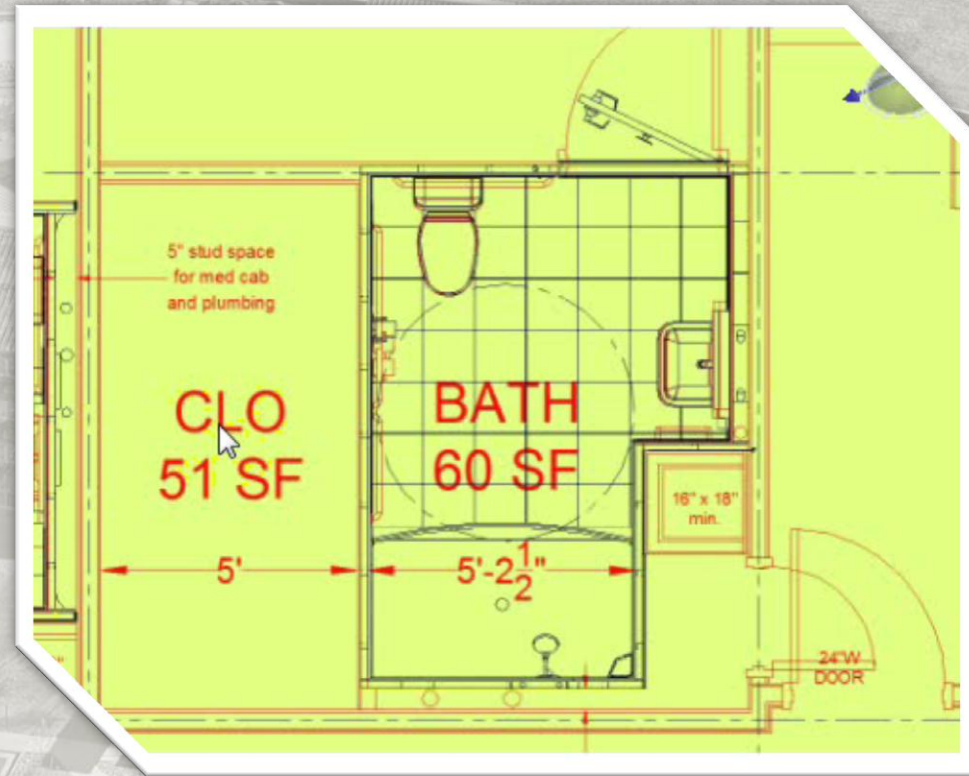
Warrior In Transition Barracks  
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Fort Carson, Colorado



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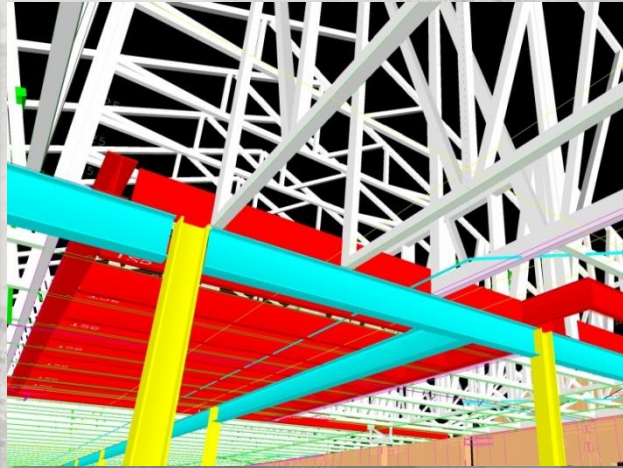
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Warrior In Transition Barracks  
Fort Carson, Colorado



# Prefabrication Driven Results - Safety



**“Reduced overall schedule and safety risk associated with working at heights on the roof.”**



Warrior In Transition Barracks  
Fort Carson, Colorado





# Warrior In Transition Barracks

Fort Carson, CO

Thank You!





## BIM Award Team Credits

- 1
- 2
- 3
- 4

## Warrior in Transition Barracks

### Presenters:

Mortenson Construction (GC) - David Stone | Transystems (Architect) - Glen Andres



# THANK YOU!!

- BIMForum
- AIA TAP
- COAA
- The Five Finalist Firms!
- YOU!!!

# Acknowledgements



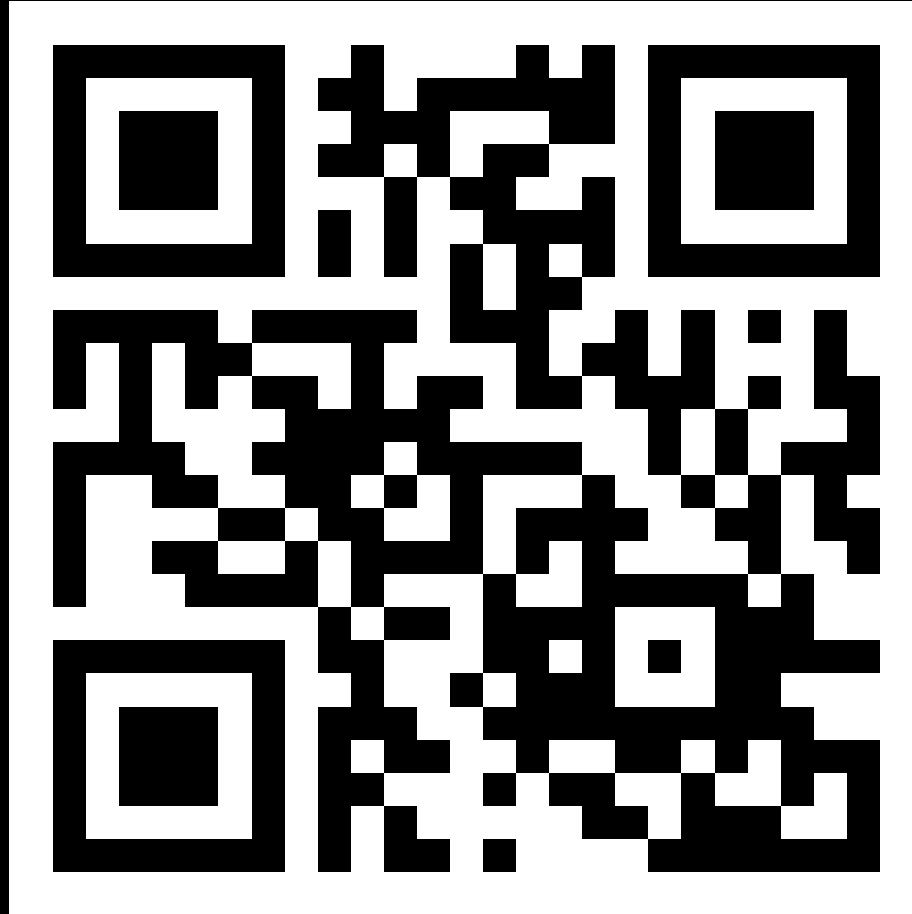
*Building what's next.*





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- Alta Bates Summit Medical Center
- Edith Green-Wendell Wyatt Federal Building Modernization
- Institute for Systems Biology
- Maricopa County South Court Tower
- Warrior in Transition Barracks



**2012 Professionals Choice  
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