

# UK Government Construction Supplier Conference

April 2011



# **BIM: A Blinding Flash of the Efficient**



# Speaker's Perspective





# 38%

**of carbon emissions in the US are  
from buildings, not cars**

USGBC 2007 website



# 30%

**of projects do not make schedule  
or budget**

CMAA Industry Report 2007



# 92%

**of project owners said that  
architects drawings are typically  
not sufficient for construction**

CMAA Owners Survey 2005



# 37%

**of materials used in the construction  
industry become waste**

Movement for Innovation Industry Reports and  
Economist Magazine 2002



10%

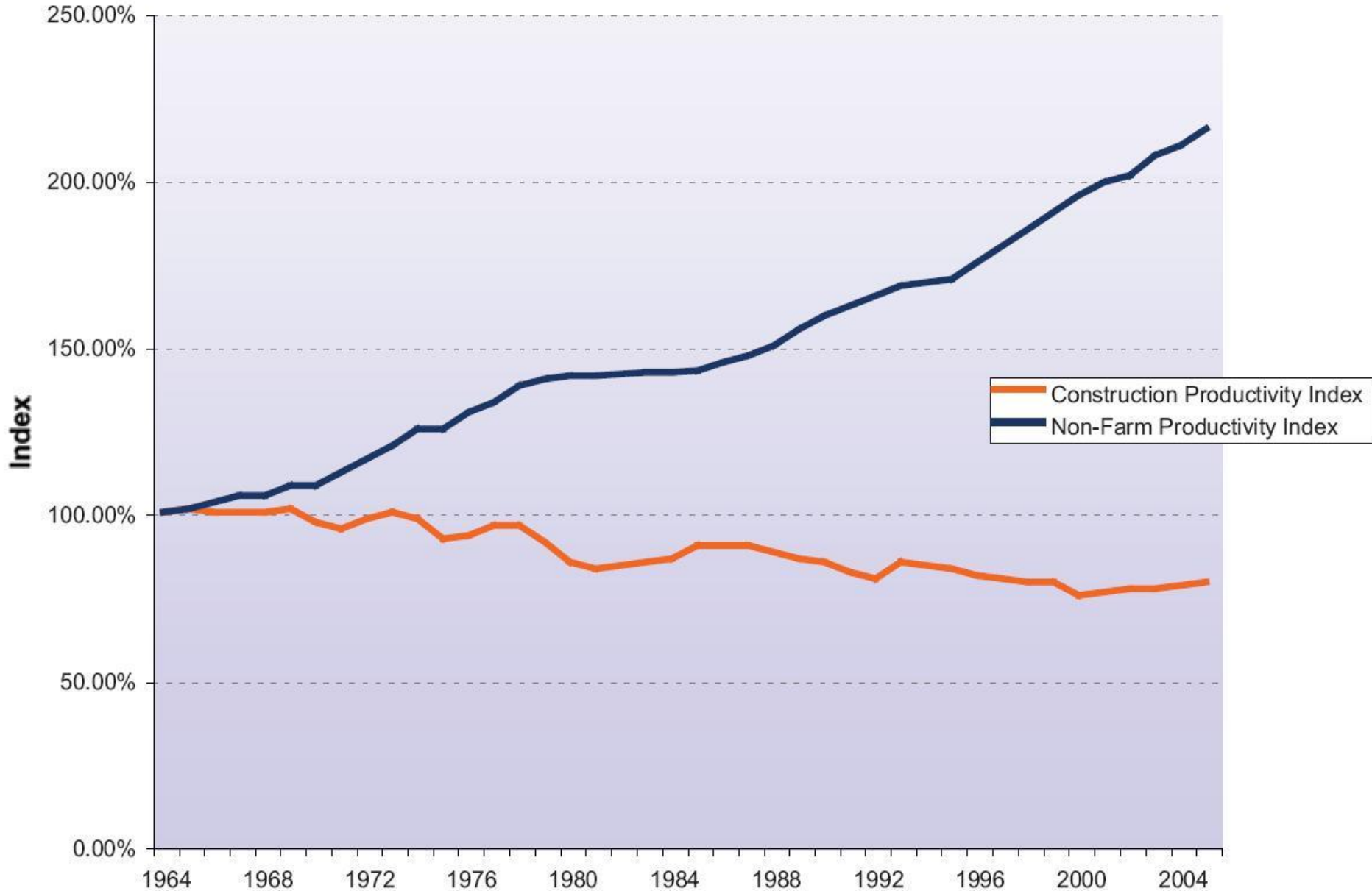
**of the cost of a project are change orders**

Construction Market Data

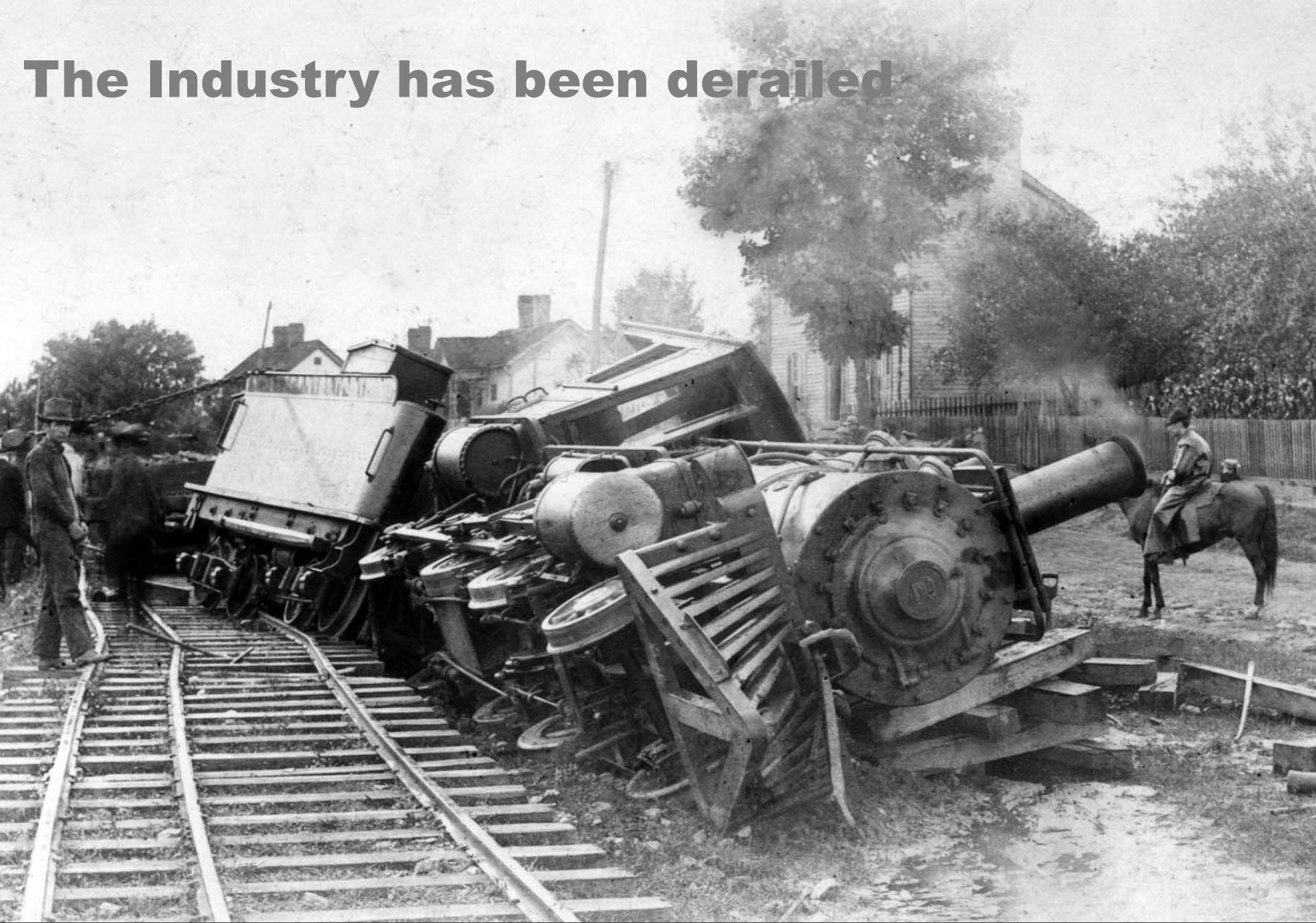


# Constant \$ of Contracts/Workhours of Hourly Workers

Sources: U.S. Dept. of Commerce, Bureau of Labor Statistics



# The Industry has been derailed

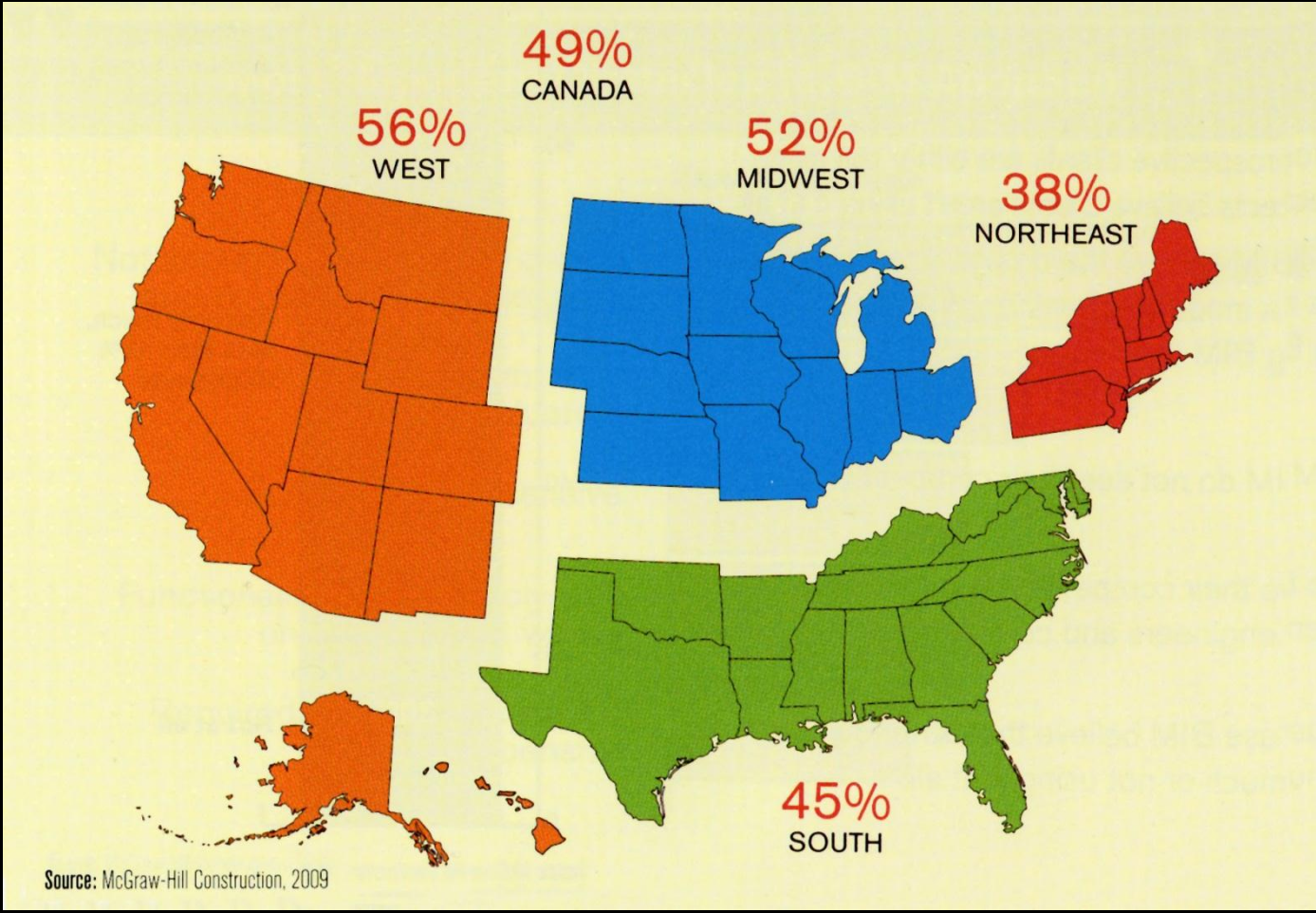


# Current BIM projects



# And...Every Project

# US BIM Adoption



# Why do this?



# Why BIM ... from the Contractor's perspective

1

2

3

4

# Stop Blaming Others

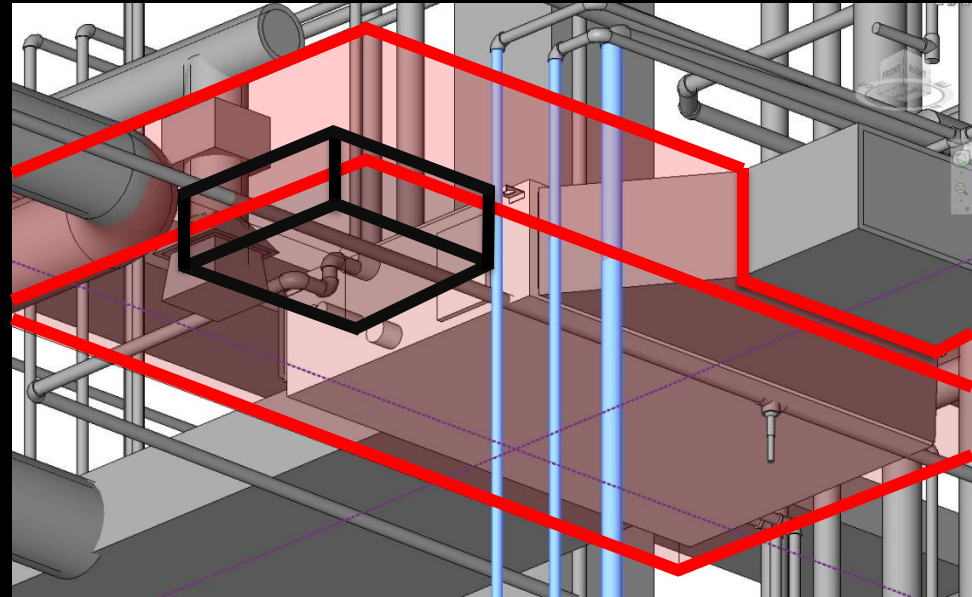
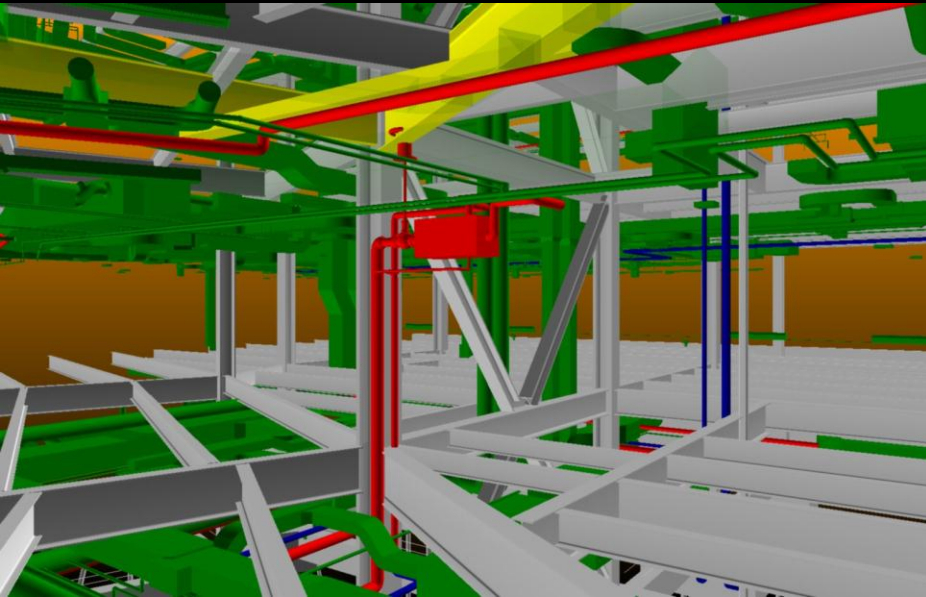




# Clash Detection



# Clash Detection ... and more



# HD Laser Scanning





**Visualize ... people can't read**



2

# Driving Cost Down







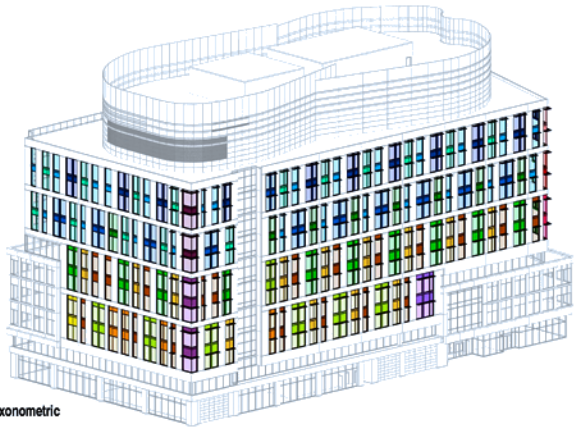
**UK Government Construction Supplier Conference**

April 4, 2011 BIM: A Blinding Flash of the Efficient

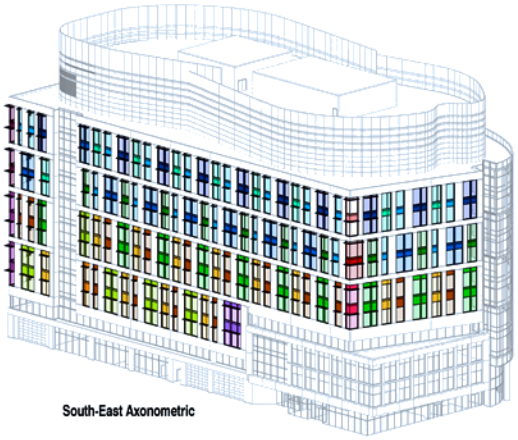
c o o l c a l m constructed



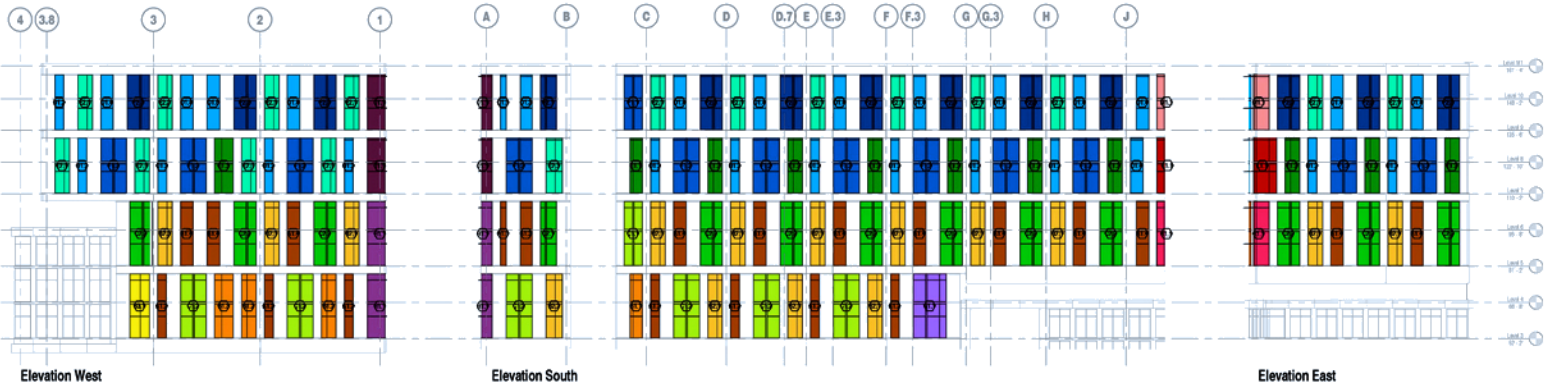




West-South Axonometric



South-East Axonometric



Elevation West

Elevation South

Elevation East

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
A1.1	Level 5	A - 2'-8"	Yes	2'-8"			26'-0"
A1.2	Level 3	A - 3'-10"	No	3'-10"			26'-0"
A1.2	Level 3	A - 3'-10"	Yes	3'-10"			26'-0"
A1.3	Level 5	A - 5'-0"	Yes	5'-0"			26'-0"
A1.4	Level 5	A - 5'-4"	No	5'-4"			26'-0"
A1.4	Level 5	A - 5'-4"	Yes	5'-4"			26'-0"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
D1.1	Level 9	D - 2'-8"	Yes	2'-8"			22'-4"
D1.2	Level 7	D - 3'-10"	No	3'-10"			22'-4"
D1.2	Level 9	D - 3'-10"	No	3'-10"			22'-4"
D1.2	Level 9	D - 3'-10"	Yes	3'-10"			22'-4"
D1.3	Level 9	D - 5'-0"	Yes	5'-0"			22'-4"
D1.4	Level 9	D - 5'-4"	No	5'-4"			22'-4"
D1.4	Level 9	D - 5'-4"	Yes	5'-4"			22'-4"
D1.4	Level 9	D - 5'-14"	No	5'-5 1/4"			22'-4"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
F2.2	Level 9	F2 - 9'-2"	No	9'-2"			22'-4"
F2.2	Level 9	F2 - 9'-2"	Yes	9'-2"			22'-4"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
G1.1	Level 3	G - 13'-5"	Yes	13'-5"			26'-0"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
H1.1	Level 3	H1 - 7'-8" x 4'-8"	Yes	4'-8"	7'-8"		26'-0"
H1.1	Level 5	H1 - 7'-8" x 4'-8"	Yes	4'-8"	7'-8"		26'-0"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
J1.1	Level 7	J1 - 7'-8" x 4'-8"	No	4'-8"	7'-8"		22'-4"
J1.1	Level 9	J1 - 7'-8" x 4'-8"	No	4'-8"	7'-8"		22'-4"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
K1.1	Level 5	K1 - 7'-8" x 4'-8"	Yes	4'-8"	7'-8"		26'-0"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
L1.1	Level 7	L1 - 3'-4.25" x 5'-6.625"	Yes	5'-6 5/8"	3'-4 1/4"		22'-6"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
M1.1	Level 9	M1 - 3'-4.25" x 5'-6.625"	Yes	5'-6 5/8"	3'-4 1/4"		22'-6"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
B1.1	Level 3	B1 - 5'-4"	Yes	5'-4"			26'-0"
B1.2	Level 3	B1 - 6'-2"	No	6'-2"			26'-0"
B1.3	Level 3	B1 - 7'-9 1/4"	No	7'-9 1/4"			26'-0"
B2.1	Level 5	B2 - 6'-2"	No	6'-2"			26'-0"
B2.1	Level 5	B2 - 6'-2"	Yes	6'-2"			26'-0"
B2.2	Level 3	B2 - 6'-10"	Yes	6'-10"			26'-0"
B2.2	Level 5	B2 - 6'-3/4"	No	6'-0 3/4"			26'-0"
B3.1	Level 3	B3 - 8'-2"	No	8'-2"			26'-0"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
E1.1	Level 7	E1 - 5'-4"	Yes	5'-4"			22'-4"
E1.2	Level 7	E1 - 6'-2"	No	6'-2"			22'-4"
E1.2	Level 7	E1 - 6'-2"	Yes	6'-2"			22'-4"
E1.3	Level 7	E1 - 7'-9 1/4"	No	7'-9 1/4"			22'-4"
E1.3	Level 7	E2 - 6'-2"	No	6'-2"			22'-4"
E2.1	Level 9	E2 - 6'-2"	No	6'-2"			22'-4"
E2.1	Level 9	E2 - 6'-2"	Yes	6'-2"			22'-4"
E2.2	Level 9	E2 - 6'-3/4"	No	6'-0 3/4"			22'-4"
E2.3	Level 7	E2 - 6'-10"	Yes	6'-10"			22'-4"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
F1.1	Level 9	F1 - 7'-8"	Yes	7'-8"			22'-4"
F1.2	Level 7	F1 - 10'-8"	No	10'-8"			22'-4"
F1.2	Level 7	F1 - 10'-8"	Yes	10'-8"			22'-4"
F2.1	Level 9	F2 - 6'-10"	Yes	6'-10"			22'-4"

660 Main Street  
Woburn, MA 01801  
P: 781.935.5500  
F: 781.935.1888

100 Binney Street  
CAMBRIDGE,  
MASSACHUSETTS

© 2010 Tocci Building Corporation

REVISIONS

NOTES

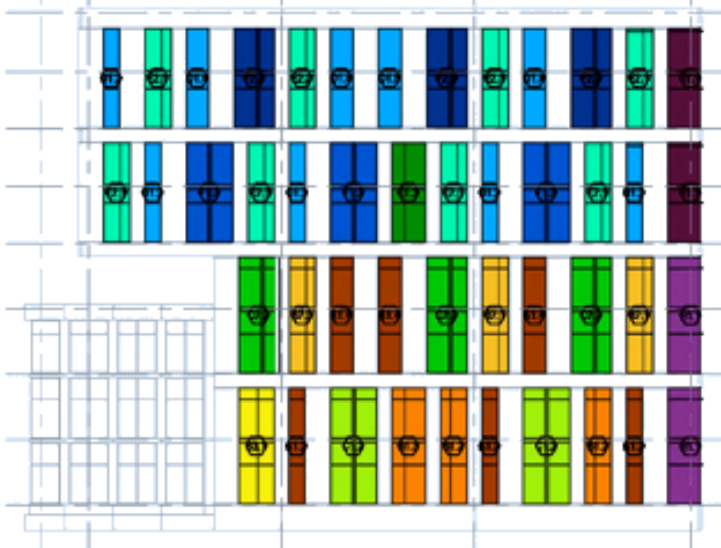
PROJECT NUMBER	
DATE	07/28/2010
DRAWN BY	PR
CHECKED BY	LH
SCALE	As indicated

**EXTERIOR WINDOWS  
PANEL SCOPE**

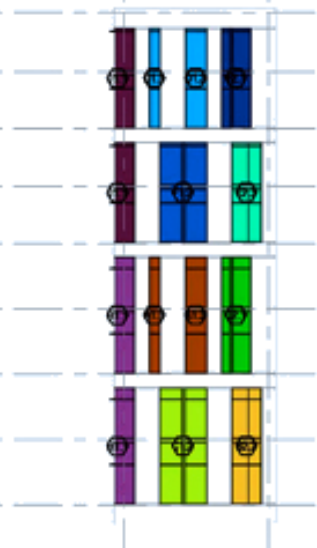
NOTES:  
- All level 3-4 and 5-6 Windows have 26" height. All level 7-8 and 9-10 Windows have 22-4" height.  
- External shading devices are on south facing windows.

**ABM  
B2020-1**

# Advanced Bill of Materials



Elevation West



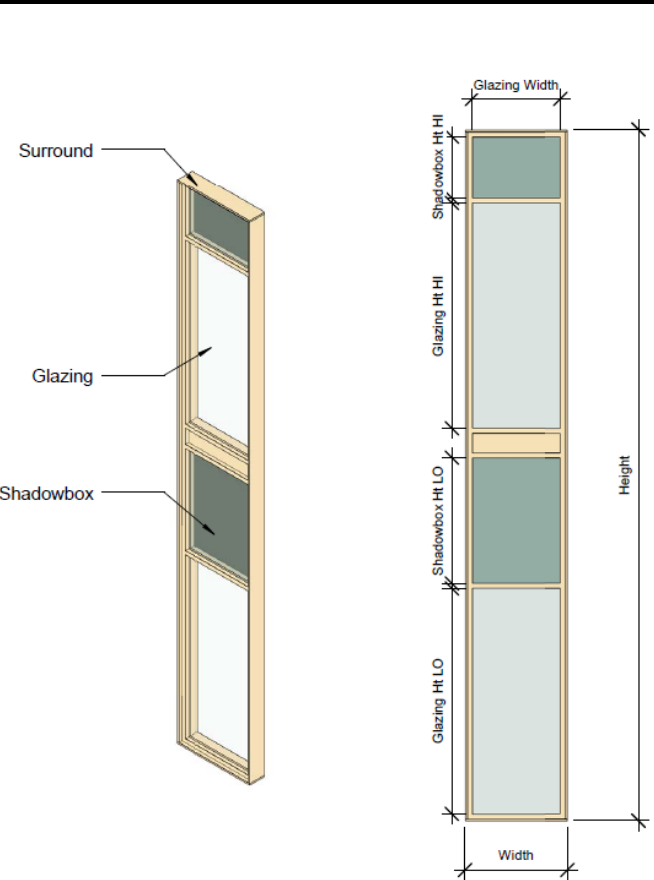
Elevation South

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
A1.1	Level 5	A - 2'-8"	Yes	2' - 8"			26' - 0"
A1.2	Level 3	A - 3'-10"	No	3' - 10"			26' - 0"
A1.2	Level 3	A - 3'-10"	Yes	3' - 10"			26' - 0"
A1.3	Level 5	A - 5'-0"	Yes	5' - 0"			26' - 0"
A1.4	Level 5	A - 5'-4"	No	5' - 4"			26' - 0"
A1.4	Level 5	A - 5'-4"	Yes	5' - 4"			26' - 0"
B1.1	Level 3	B1 - 5'-4"	Yes	5' - 4"			26' - 0"
B1.2	Level 3	B1 - 6'-2"	No	6' - 2"			26' - 0"
B1.3	Level 3	B1 - 7'-9 1/4"	No	7' - 9 1/4"			26' - 0"
B2.1	Level 5	B2 - 6'-2"	No	6' - 2"			26' - 0"
B2.1	Level 3	B2 - 6'-2"	Yes	6' - 2"			26' - 0"
B2.1	Level 5	B2 - 6'-2"	Yes	6' - 2"			26' - 0"
B2.2	Level 3	B2 - 6'-10"	Yes	6' - 10"			26' - 0"
B2.3	Level 5	B2 - 6'-3/4"	No	6' - 0 3/4"			26' - 0"
B3.1	Level 3	B3 - 8'-2"	No	8' - 2"			26' - 0"
C1.1	Level 5	C1 - 7'-8"	Yes	7' - 8"			26' - 0"
C1.2	Level 3	C1 - 10'-8"	No	10' - 8"			26' - 0"
C1.2	Level 3	C1 - 10'-8"	Yes	10' - 8"			26' - 0"
C2.1	Level 5	C2 - 6'-10"	Yes	6' - 10"			26' - 0"
C2.2	Level 5	C2 - 9'-2"	No	9' - 2"			26' - 0"
C2.2	Level 5	C2 - 9'-2"	Yes	9' - 2"			26' - 0"

Type Mark	Level	Type	Shading	Width	Width RT	Width LF	Height
D1.1	Level 9	D - 2'-8"	Yes	2' - 8"			22' - 4"
D1.2	Level 7	D - 3'-10"	No	3' - 10"			22' - 4"
D1.2	Level 9	D - 3'-10"	No	3' - 10"			22' - 4"
D1.2	Level 7	D - 3'-10"	Yes	3' - 10"			22' - 4"
D1.3	Level 9	D - 5'-0"	Yes	5' - 0"			22' - 4"
D1.4	Level 9	D - 5'-4"	No	5' - 4"			22' - 4"
D1.4	Level 7	D - 5'-4"	Yes	5' - 4"			22' - 4"
D1.4	Level 9	D - 5'-4"	Yes	5' - 4"			22' - 4"
D1.5	Level 9	D - 5'-5 1/4"	No	5' - 5 1/4"			22' - 4"
E1.1	Level 7	E1 - 5'-4"	Yes	5' - 4"			22' - 4"
E1.2	Level 7	E1 - 6'-2"	No	6' - 2"			22' - 4"
E1.2	Level 7	E1 - 6'-2"	Yes	6' - 2"			22' - 4"
E1.3	Level 7	E1 - 7'-9 1/4"	No	7' - 9 1/4"			22' - 4"
E2.1	Level 7	E2 - 6'-2"	No	6' - 2"			22' - 4"
E2.1	Level 9	E2 - 6'-2"	No	6' - 2"			22' - 4"
E2.1	Level 9	E2 - 6'-2"	Yes	6' - 2"			22' - 4"
E2.2	Level 9	E2 - 6'-3/4"	No	6' - 0 3/4"			22' - 4"
E2.3	Level 7	E2 - 6'-10"	Yes	6' - 10"			22' - 4"
F1.1	Level 9	F1 - 7'-8"	Yes	7' - 8"			22' - 4"
F1.2	Level 7	F1 - 10'-8"	No	10' - 8"			22' - 4"
F1.2	Level 7	F1 - 10'-8"	Yes	10' - 8"			22' - 4"
F2.1	Level 9	F2 - 6'-10"	Yes	6' - 10"			22' - 4"

Type Mark	Level	Type
F2.2	Level 9	F2 - 9'-2"
F2.2	Level 9	F2 - 9'-2"
G1.1	Level 3	G - 13'-5"
H1.1	Level 3	H1 - 7'-8"
H1.1	Level 5	H1 - 7'-8"
J1.1	Level 7	J1 - 7'-8"
J1.1	Level 9	J1 - 7'-8"
K1.1	Level 5	K1 - 7'-8"
L1.1	Level 7	L1 - 3'-4" 5'-6.625"
M1.1	Level 9	M1 - 3'-4" 5'-6.625"





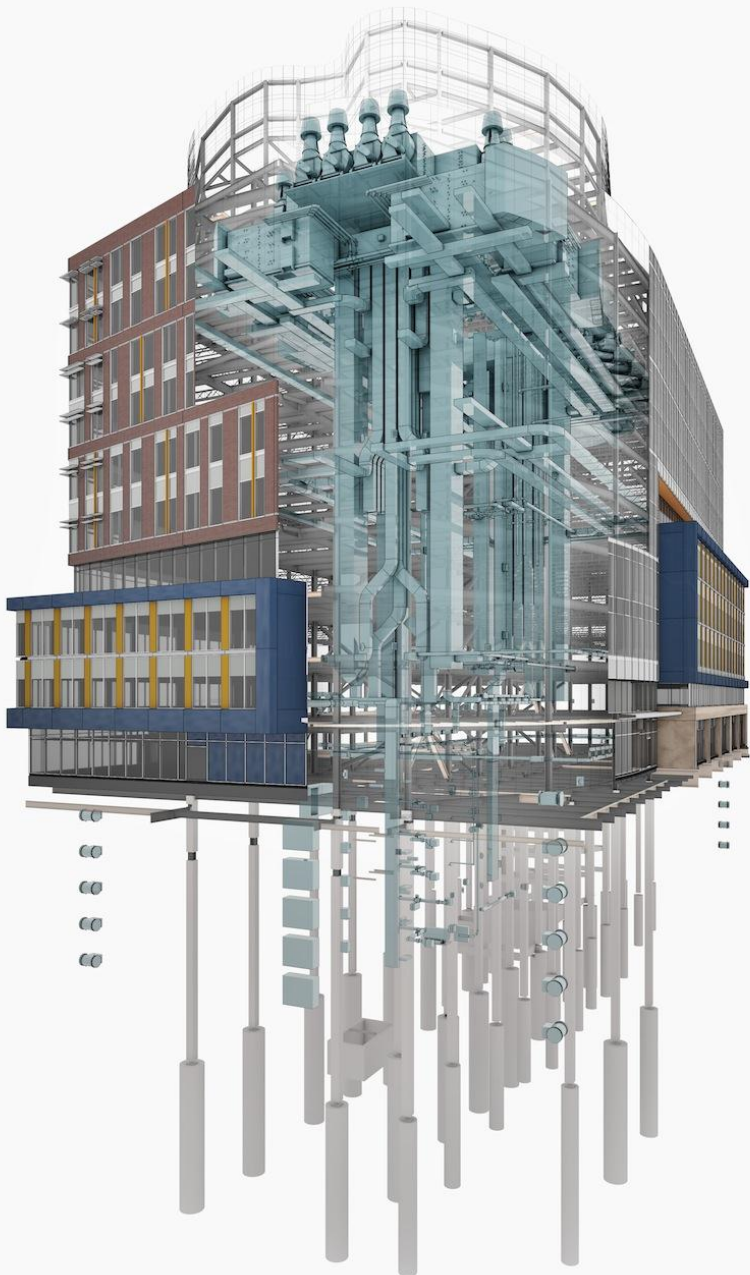
Window A

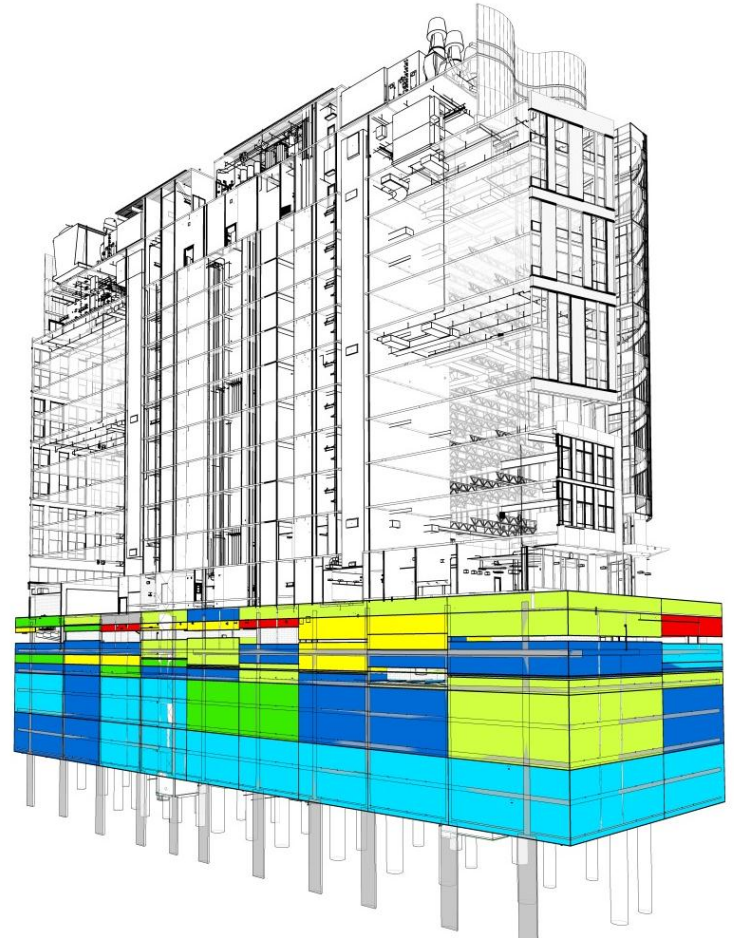
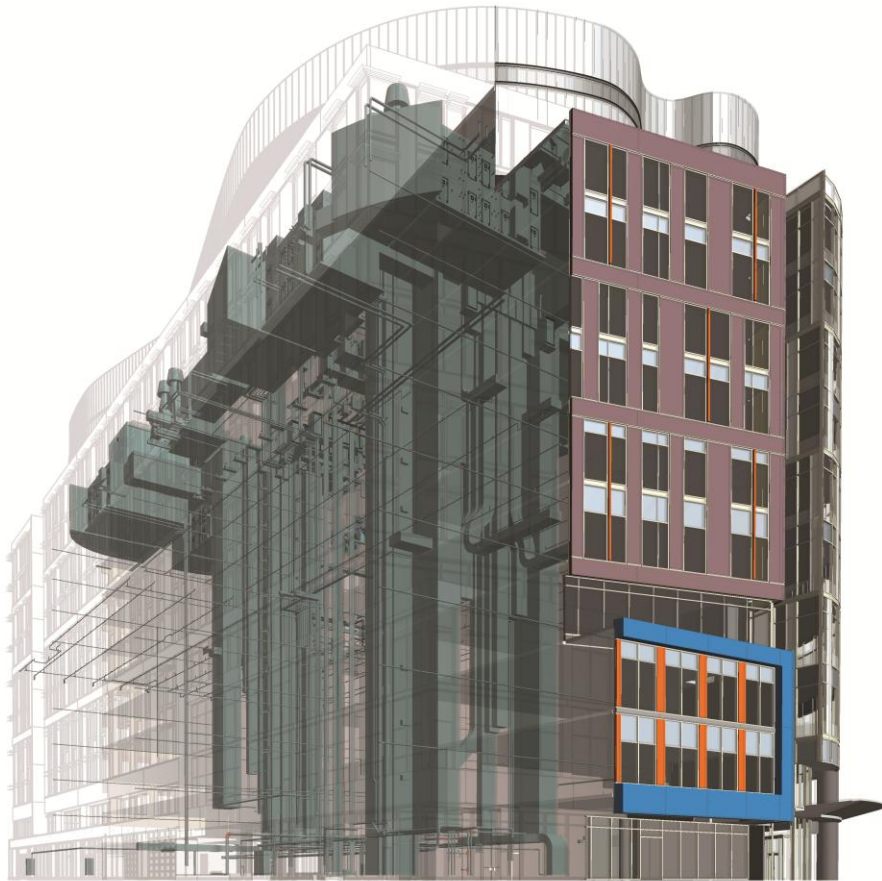
	A	B	C	D	E	F	G	H
1	<a href="#">click here &gt; Index</a>							
2	<b>B Shell</b>							
3								
4								
5	B20 Exterior Enclosure - Glazed Systems (D8)	Sum of Count	Sum of Area	Sum of System Perimeter	Count of Solar Shade count	Count of Shade (LF)	Sum of Shade Bottom (SF)	
6	[-] Tower	641	86,534	1,973	94	235	1,973	
7	[-] Curtainwall System	375	36,809	0			0	
8	[-] Window Box System	83	9,429	0		83	0	
9	[-] Window Panel System	152	25,468	1,973	94	152	1,973	
10	[-] Type A	21	2,559	183	14	21	183	
11	A1.1	1	69	5	1	1	5	
12	A1.2	7	697	49	5	7	49	
13	A1.3	1	130	9	1	1	9	
14	A1.4	12	1,663	120	7	12	120	
15	[-] Type B	20	3,294	240	12	20	240	

# So What Happened?

- **January 2010** Estimated \$ (core & shell) **159 mill**
- **August 2010** Estimated \$ Market true up **149 mill (6.3%)**
- **October 2010** BIM driven RFP **133 mill (10.7%)**

DETAIL







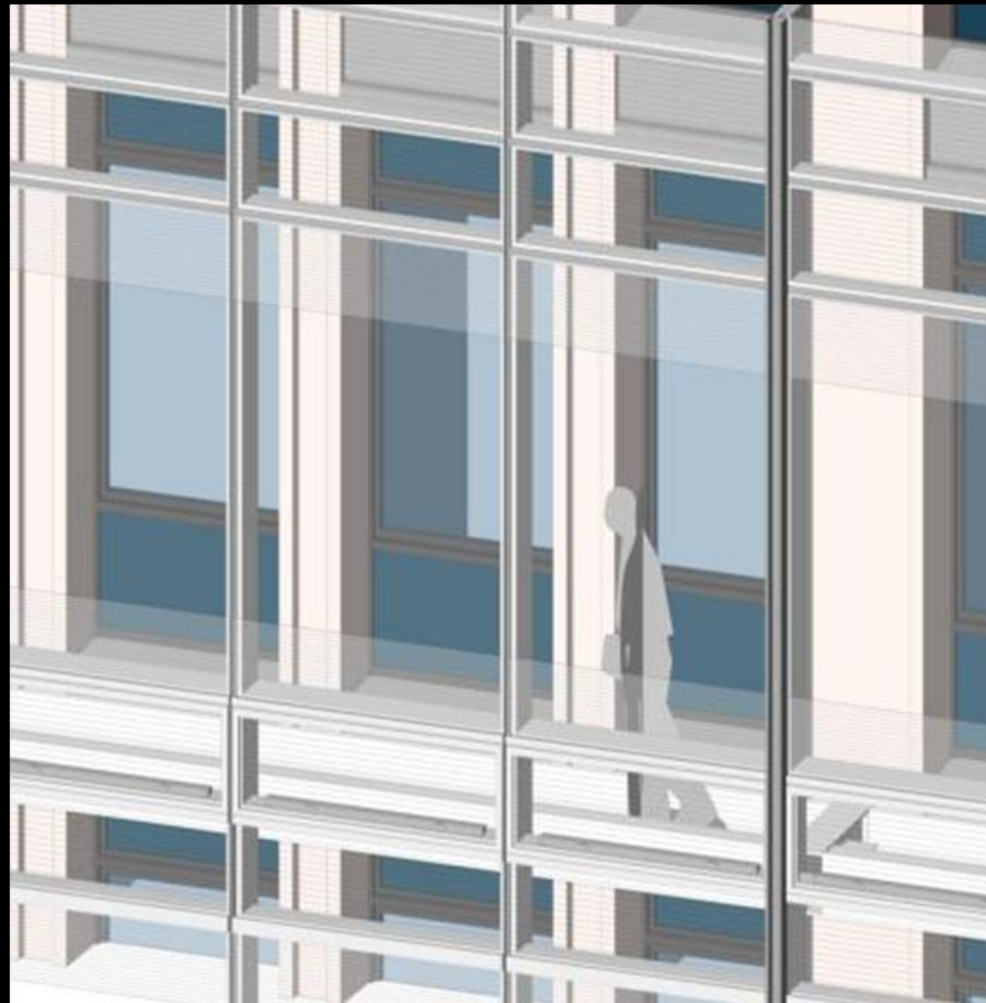
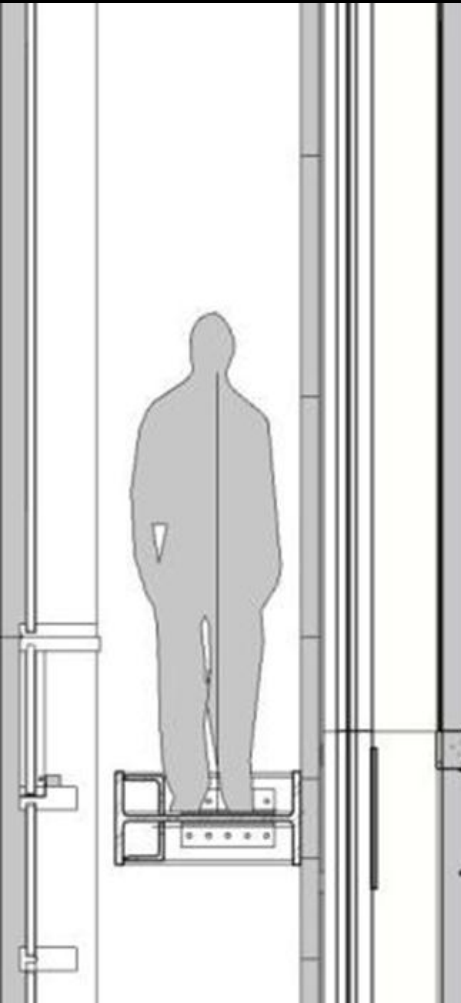
3

Every good design deserves to  
be built twice ®

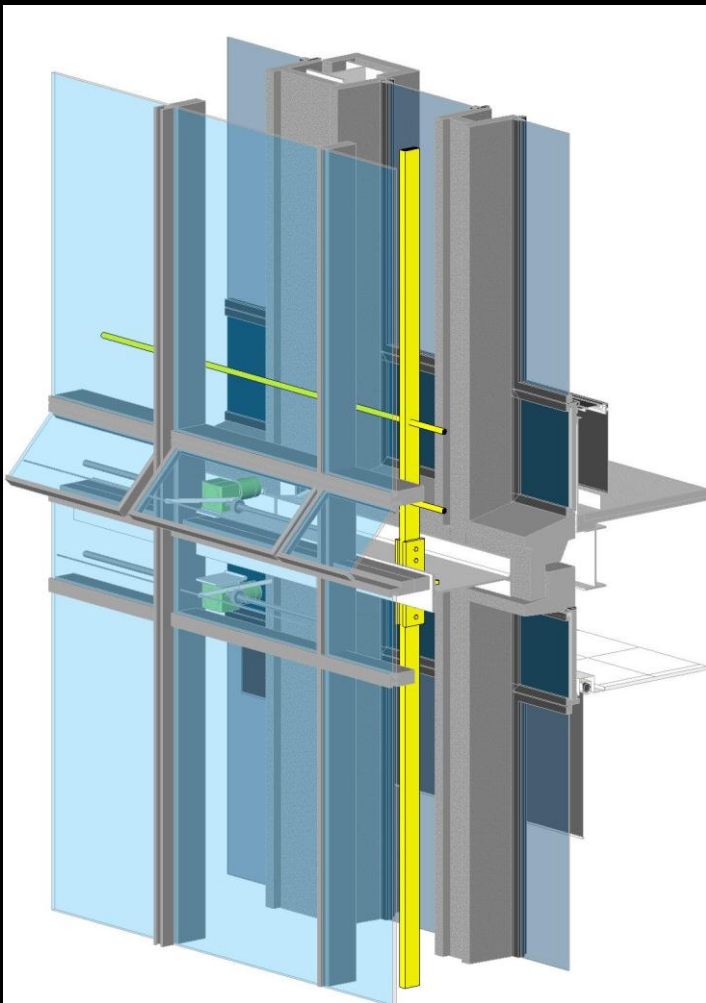




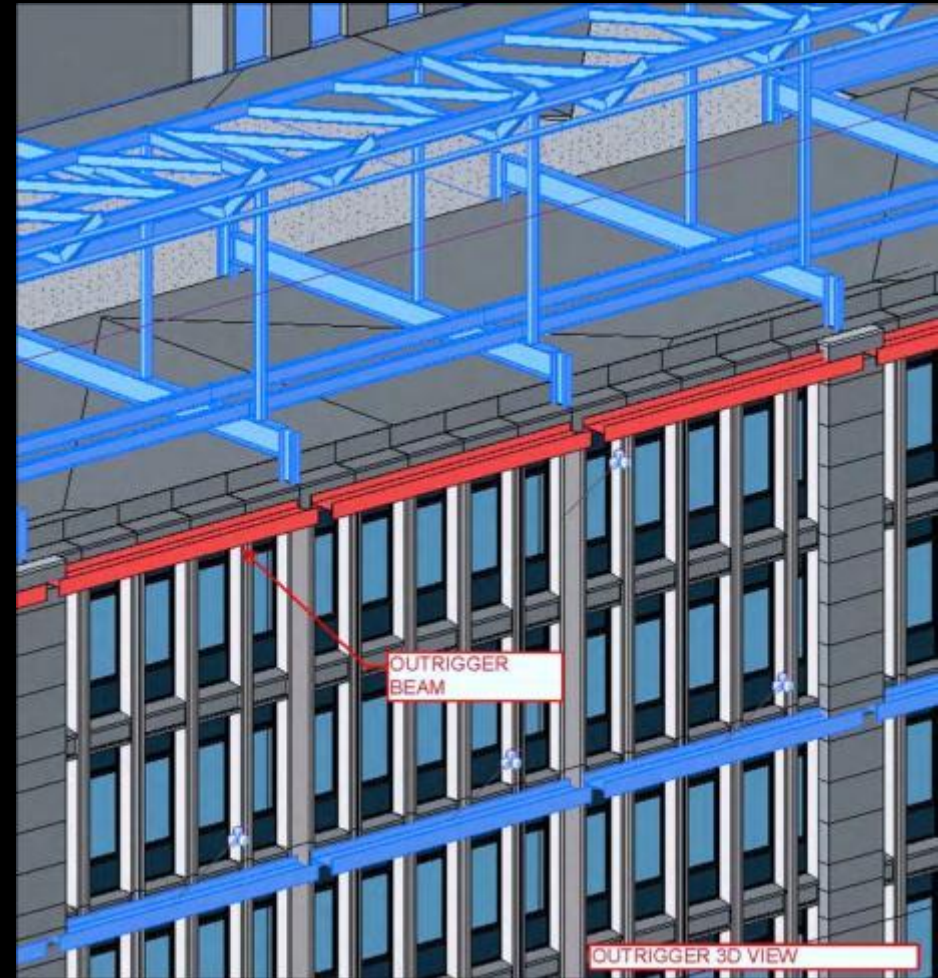
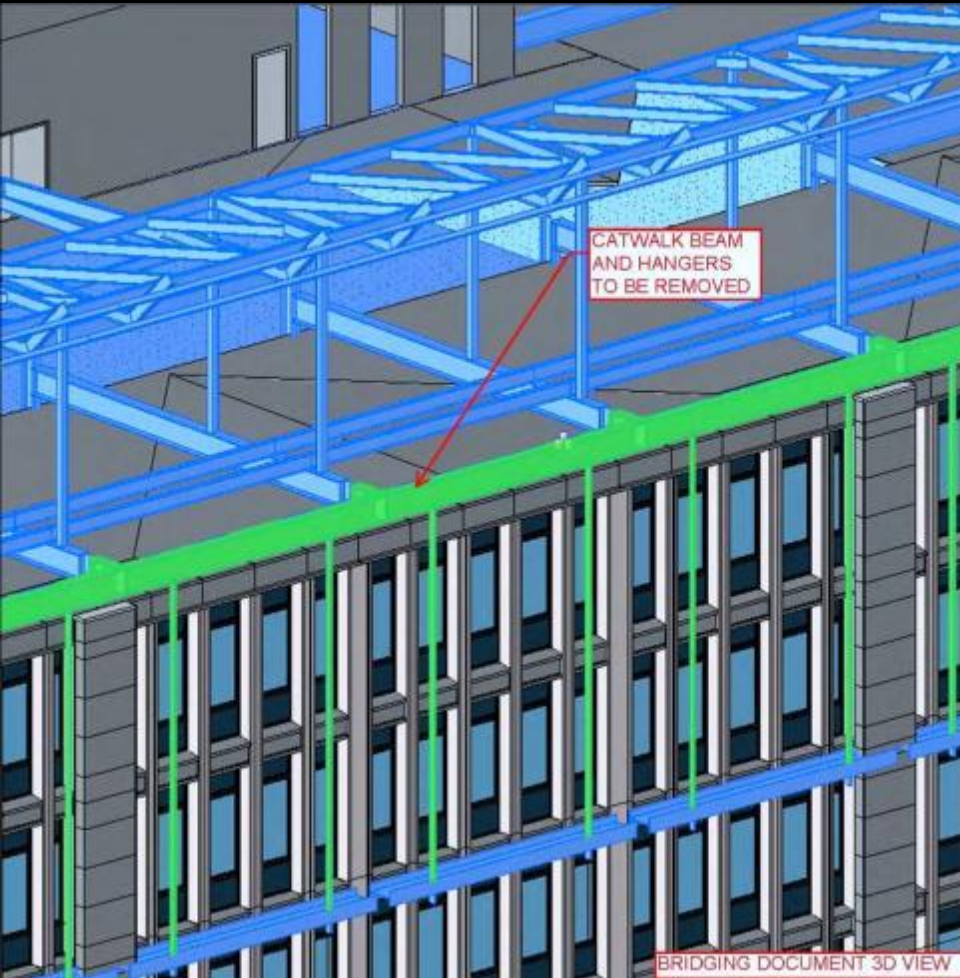
# Modeling Safety

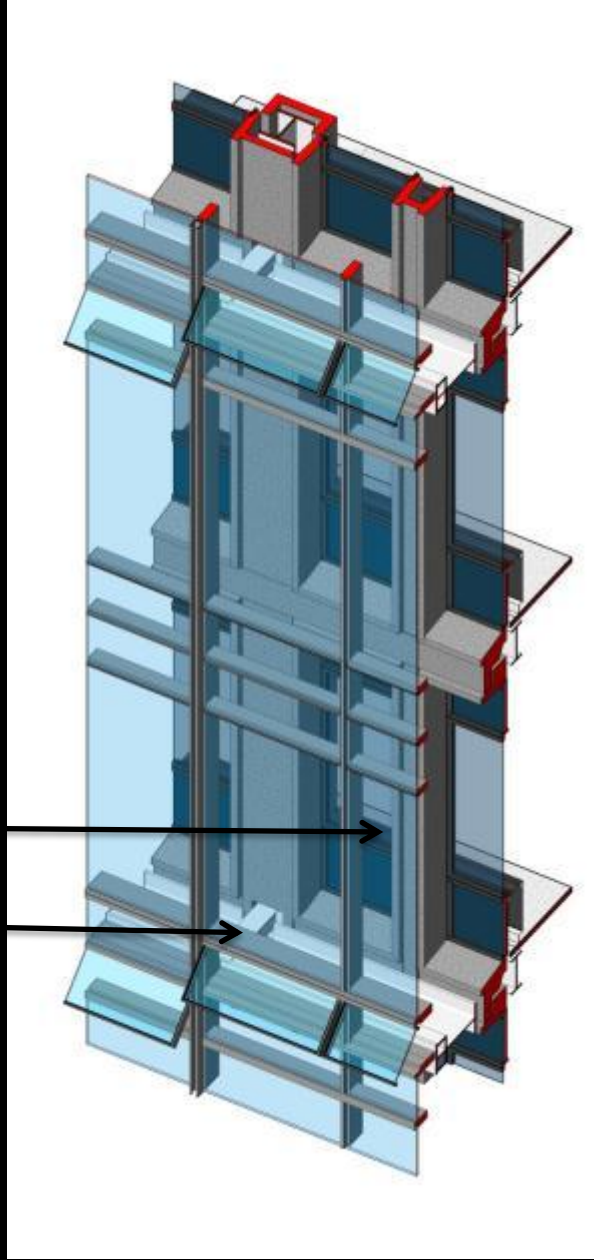
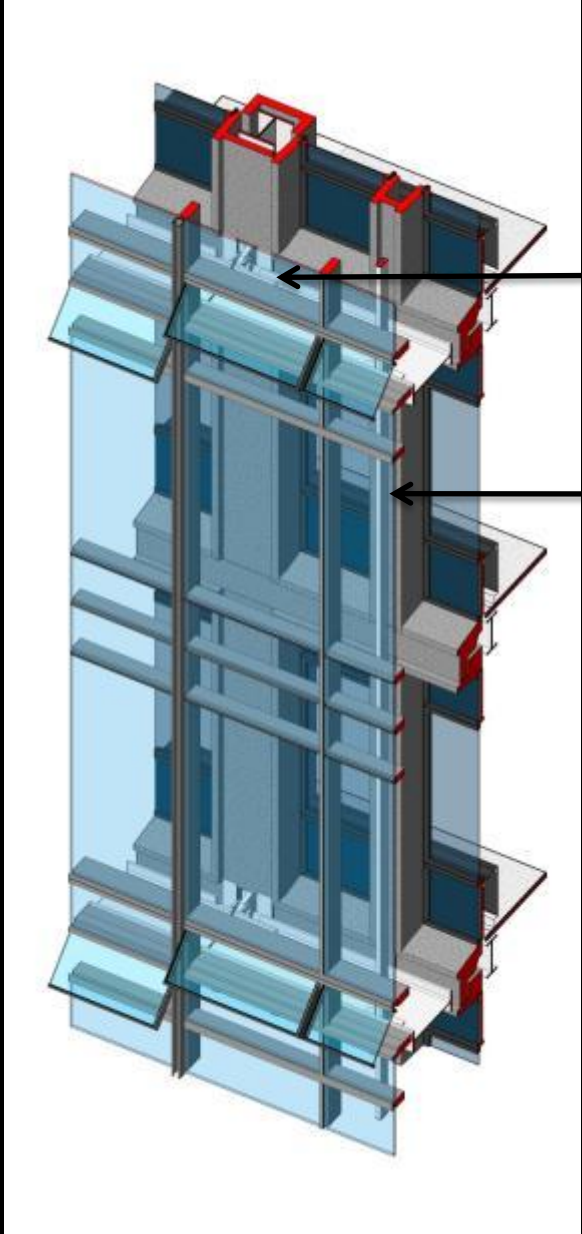


# Modeling Safety

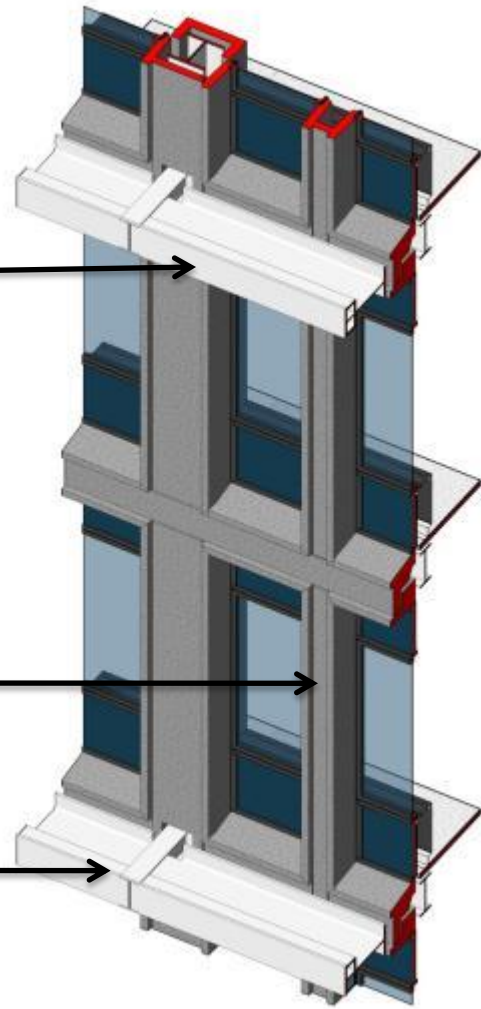
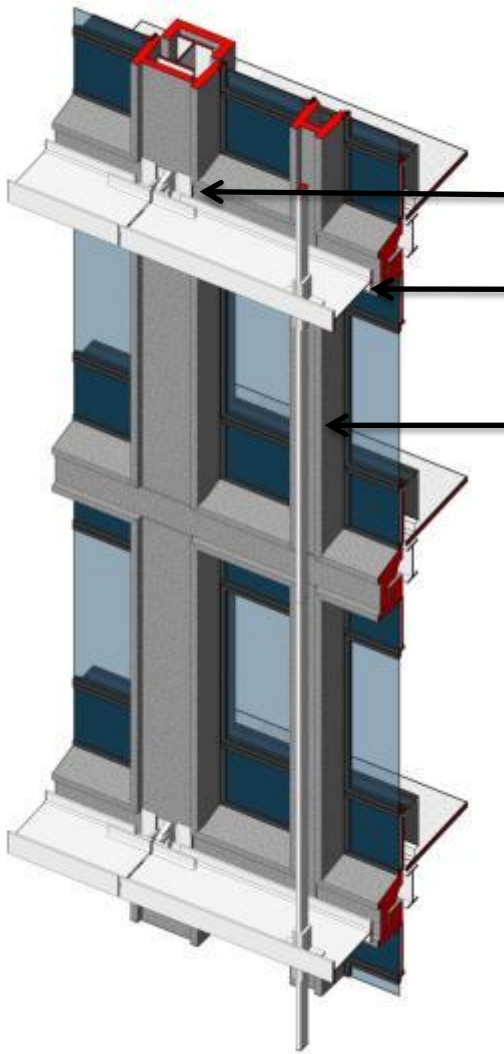


# Modeling Safety ... delivering value

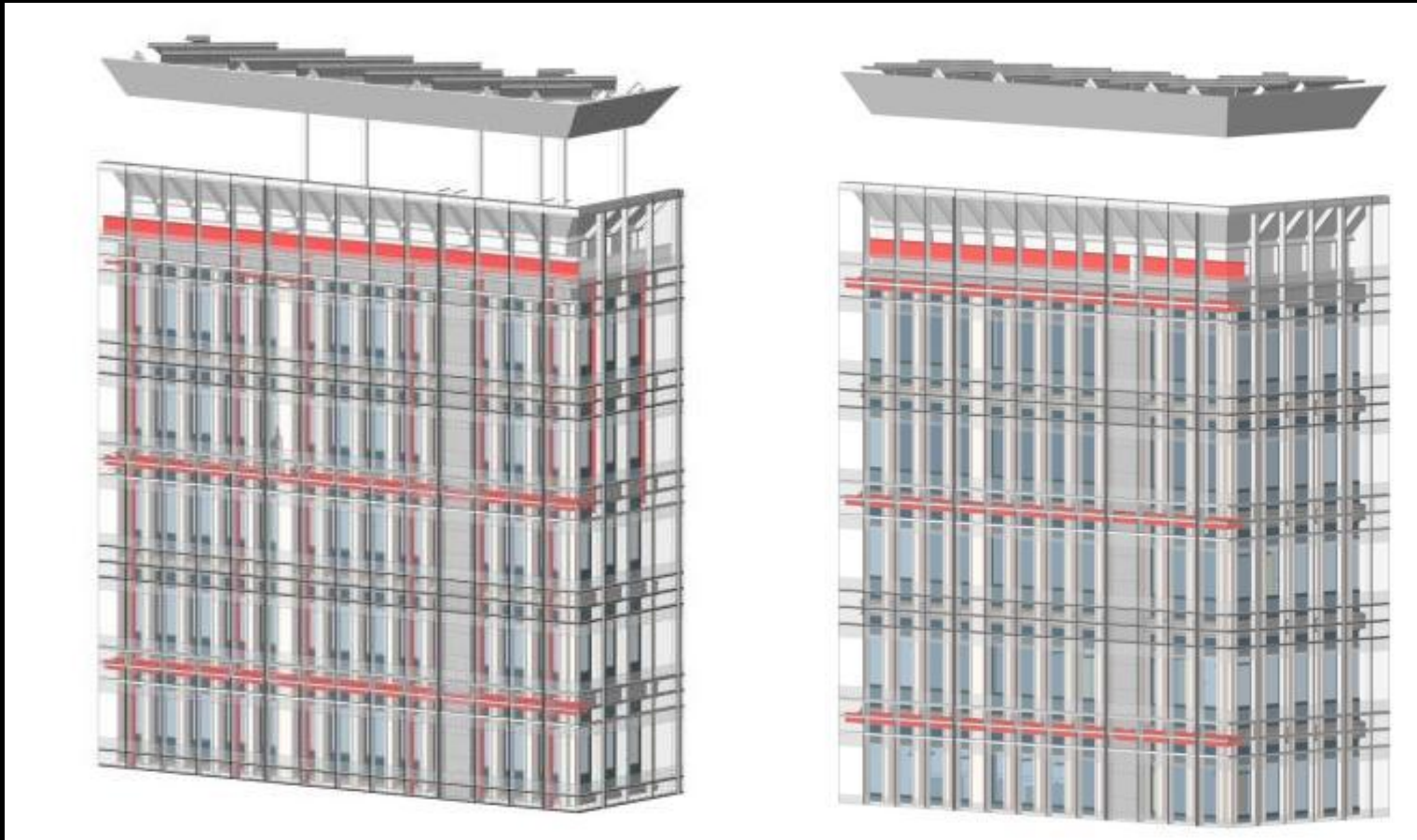




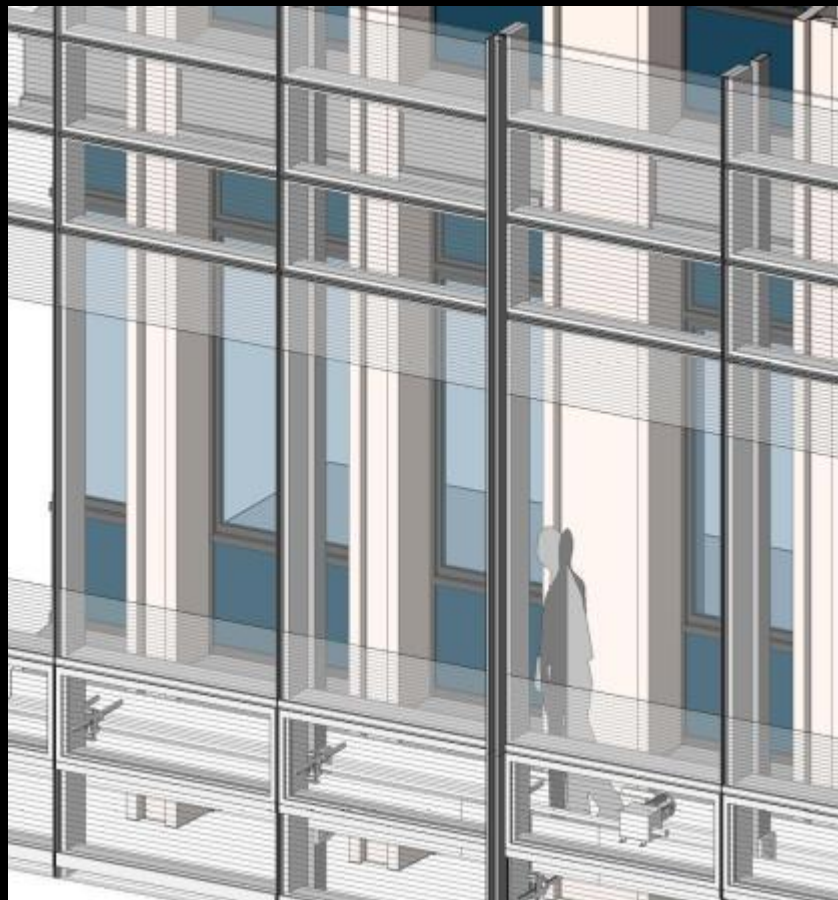
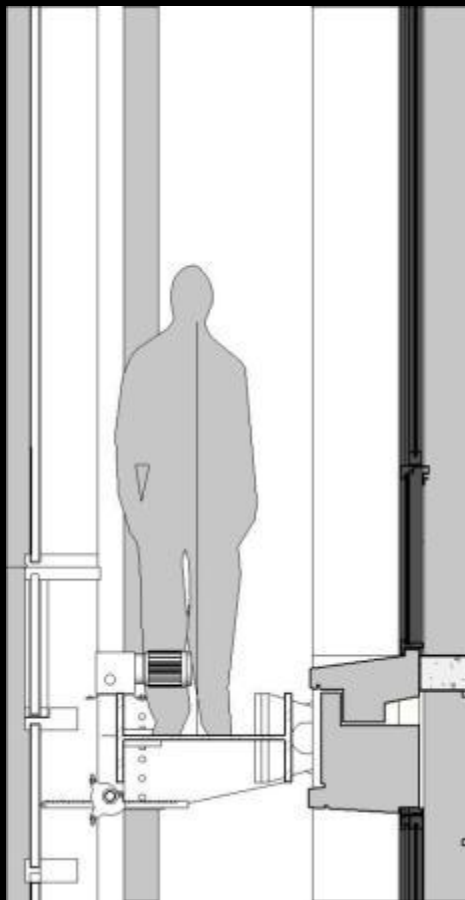
# Overclad View : Pin



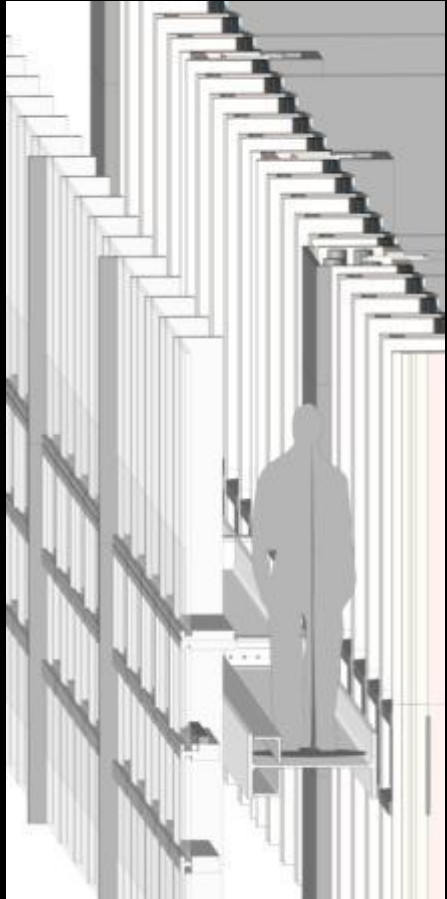
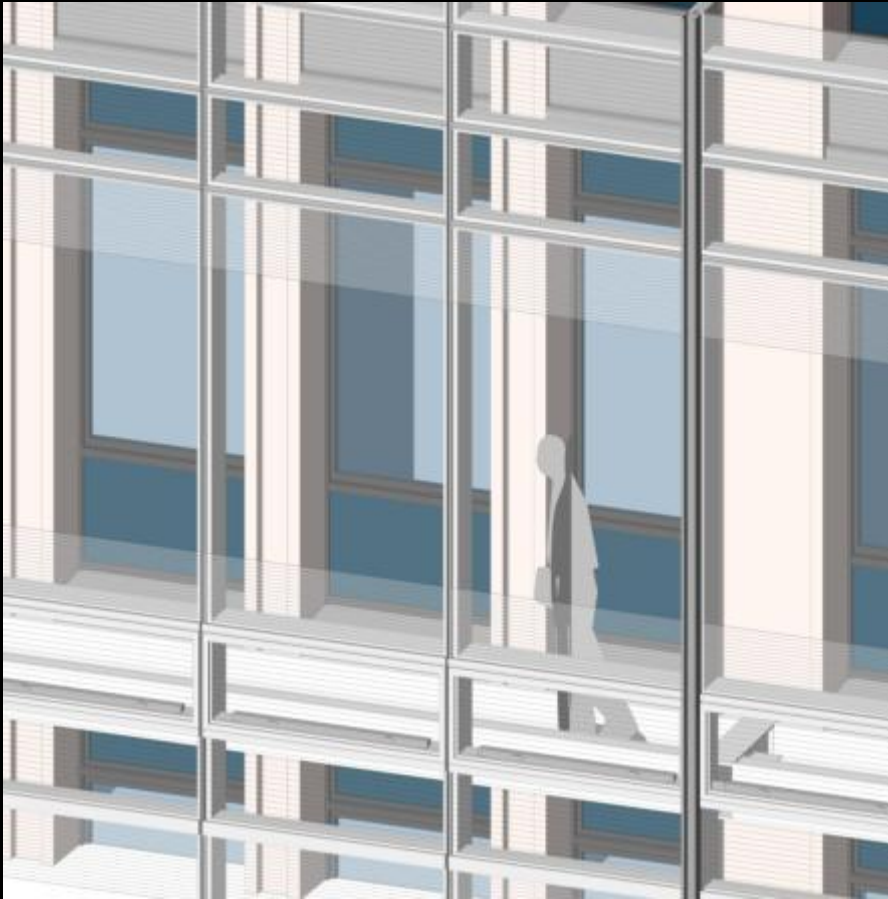
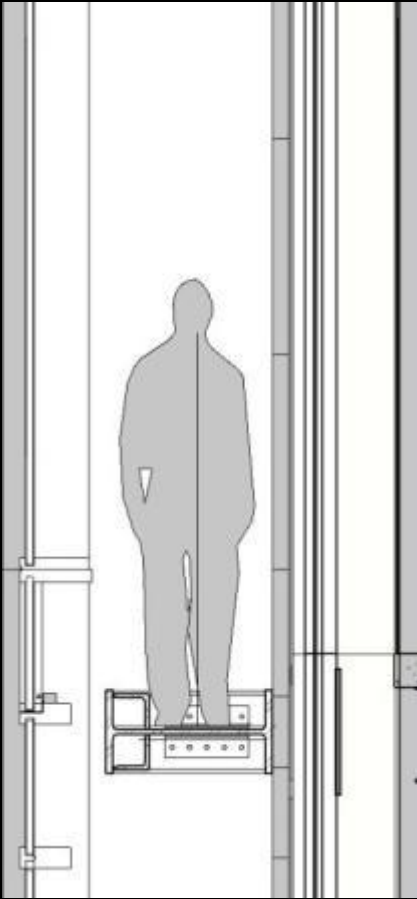
# Comparison



# Finding “invisible” design problems early



# Fixing them without the drama







**NEW STREET  
RESIDENCES  
87 NEW STREET  
CAMBRIDGE, MA**

**REVISIONS**

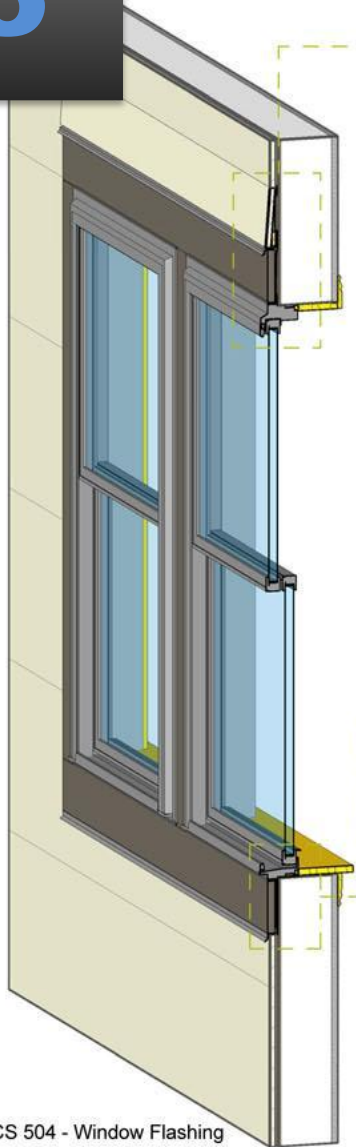
NO.	DESCRIPTION

**NOTES**

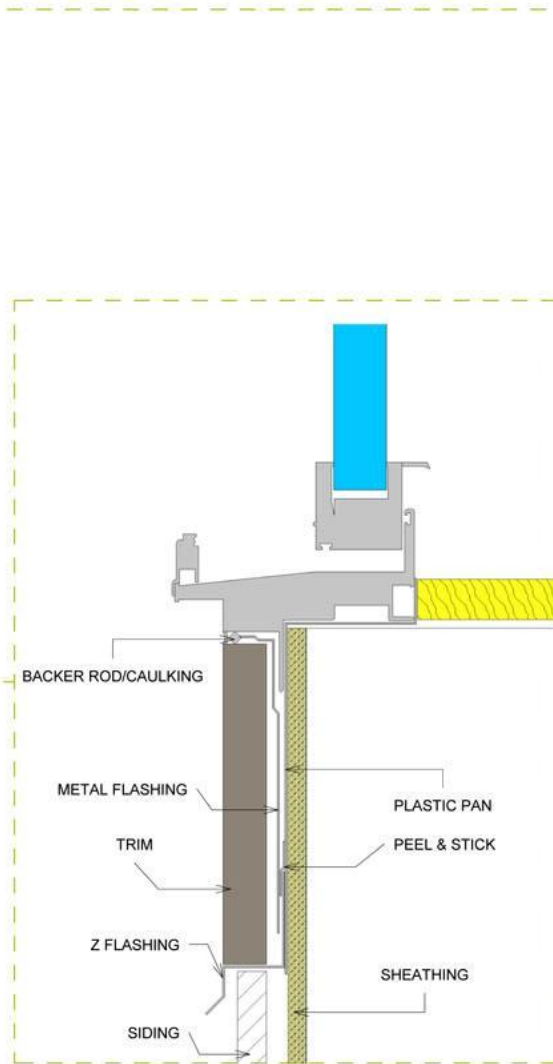
1)	Details need to be updated for as-built conditions.
2)	Order of operations need to be listed.

<b>PROJECT NUMBER</b>	09-204
<b>DATE</b>	02/22/10
<b>DRAWN BY</b>	JG
<b>CHECKED BY</b>	BT
<b>SCALE</b>	6" = 1'-0"

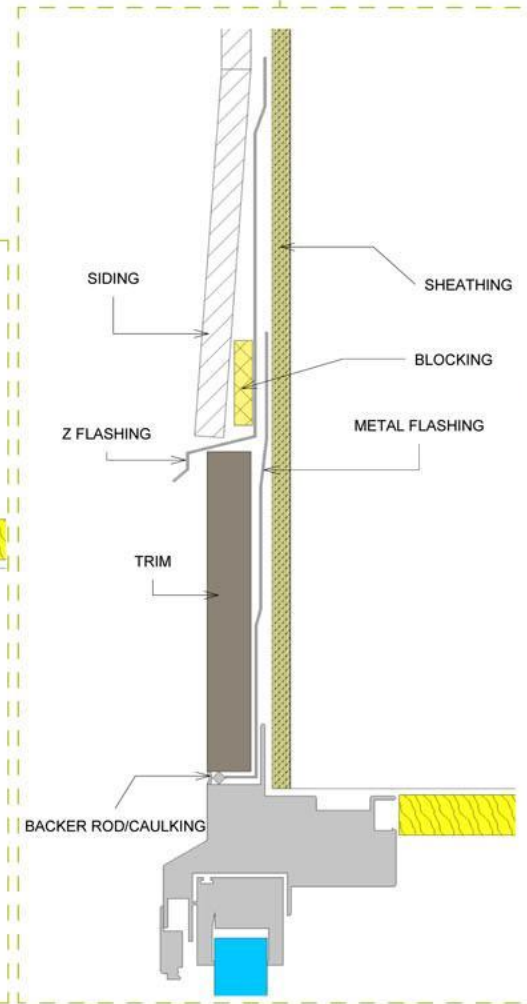
**WINDOW  
FLASHING  
CS - 504**



① CS 504 - Window Flashing



② TBC BOTTOM FLASHING SCHEME  
6" = 1'-0"



③ TBC TOP FLASHING SCHEME  
6" = 1'-0"





## Capitol Cove Providence, RI

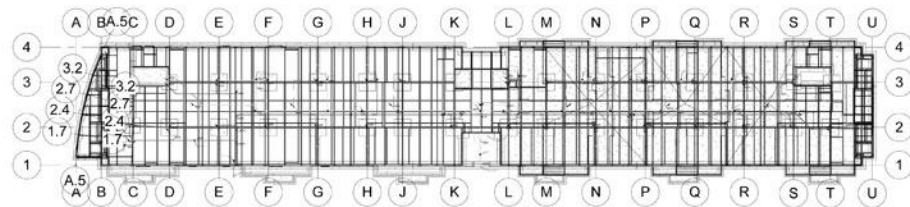
### Revisions

Project Number 05.99  
Date 01-17-08  
Drawn By J. MacFall  
Checked By J. Ferolito  
Scale 1" = 30'-0"

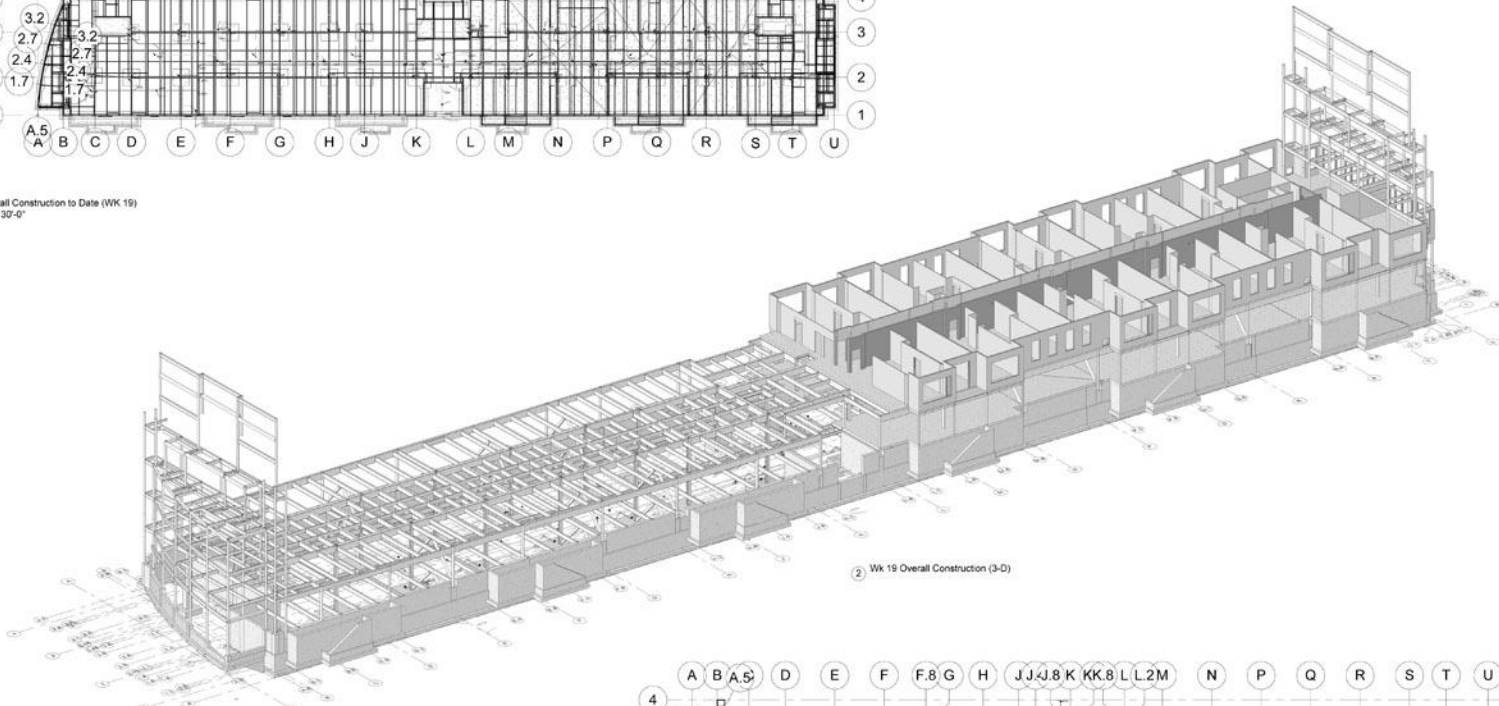
01.28.08-02.01.08

# WK19-1

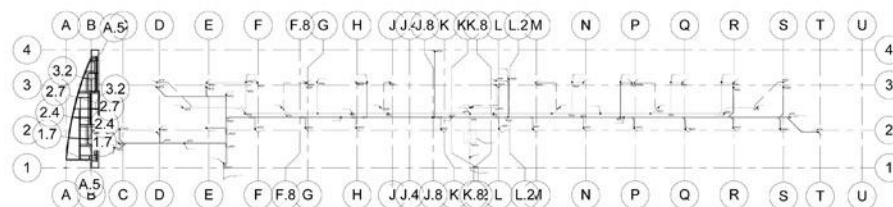
c o o l c a l m c o n s t r u c t e d



1 Overall Construction to Date (WK 19)  
1" = 30'-0"



2 Wk 19 Overall Construction (3-D)

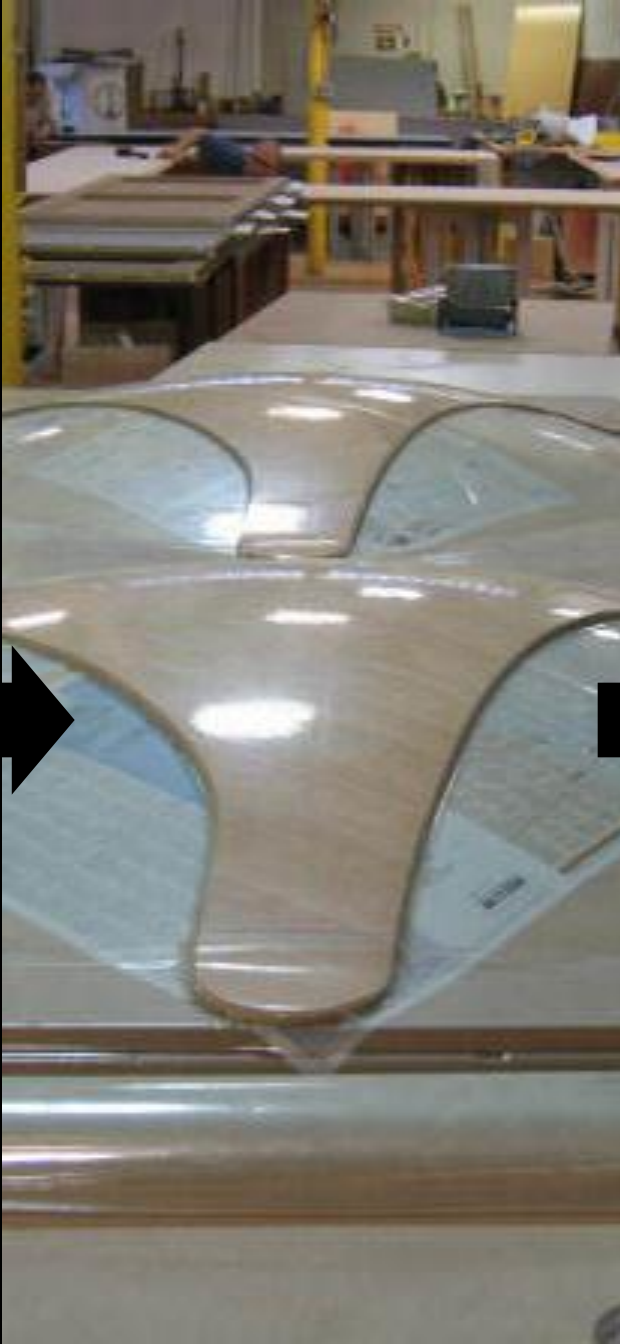
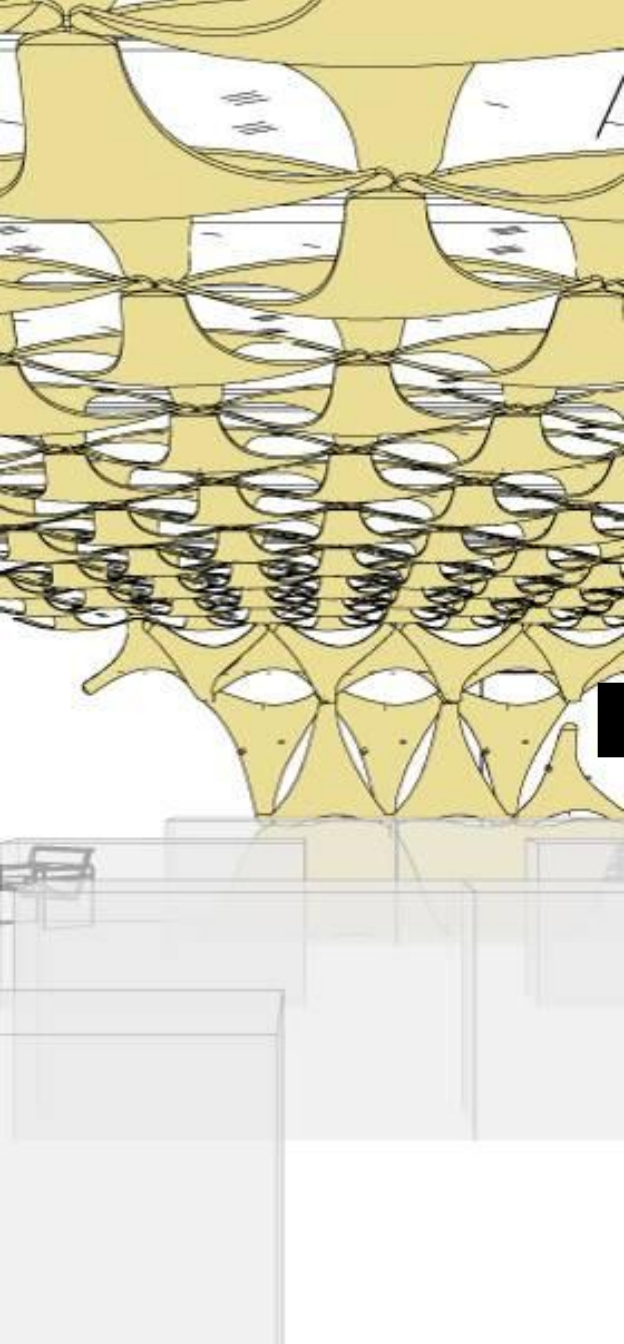


3 Week 19 Construction  
1" = 30'-0"

Wk 19 Steel			
Family	Type	Material Description	Count
HSS 12 x 6 x 3/8"	HSS 12 x 6 x 3/8"	Steel ASTM A500	1
HSS-Hollow Structural Section	HSS10X6X.375	Steel ASTM A500	4
HSS-Hollow Structural Section	HSS12X6X.375	Steel ASTM A500	12
HSS-Hollow Structural Section-Column	HSS6X6X.250	Steel ASTM A500	2
HSS-Hollow Structural Section-Column	HSS6X6X.375	Steel ASTM A500	14
HSS-Hollow Structural Section-Column	HSS6X6X.500	Steel ASTM A500	13
HSS-Hollow Structural Section-Column	HSS6X6X.625	Steel ASTM A500	1
Steel ASTM A500	47		
W-Wide Flange	W8X10	Steel ASTM A992	12
W-Wide Flange	W10X12	Steel ASTM A992	44
W-Wide Flange	W12X14	Steel ASTM A992	42
W-Wide Flange	W12X19	Steel ASTM A992	4
W-Wide Flange	W12X26	Steel ASTM A992	23
W-Wide Flange	W12X30	Steel ASTM A992	10
W-Wide Flange	W12X35	Steel ASTM A992	3
W-Wide Flange	W14X30	Steel ASTM A992	5
W-Wide Flange	W16X57	Steel ASTM A992	2
Steel ASTM A992	145		

Wk 19 Concrete Material			
Family	Type	Material Description	Material Volume







**What are the benefits?**

**Good**

**Stuff**

not cheap though...

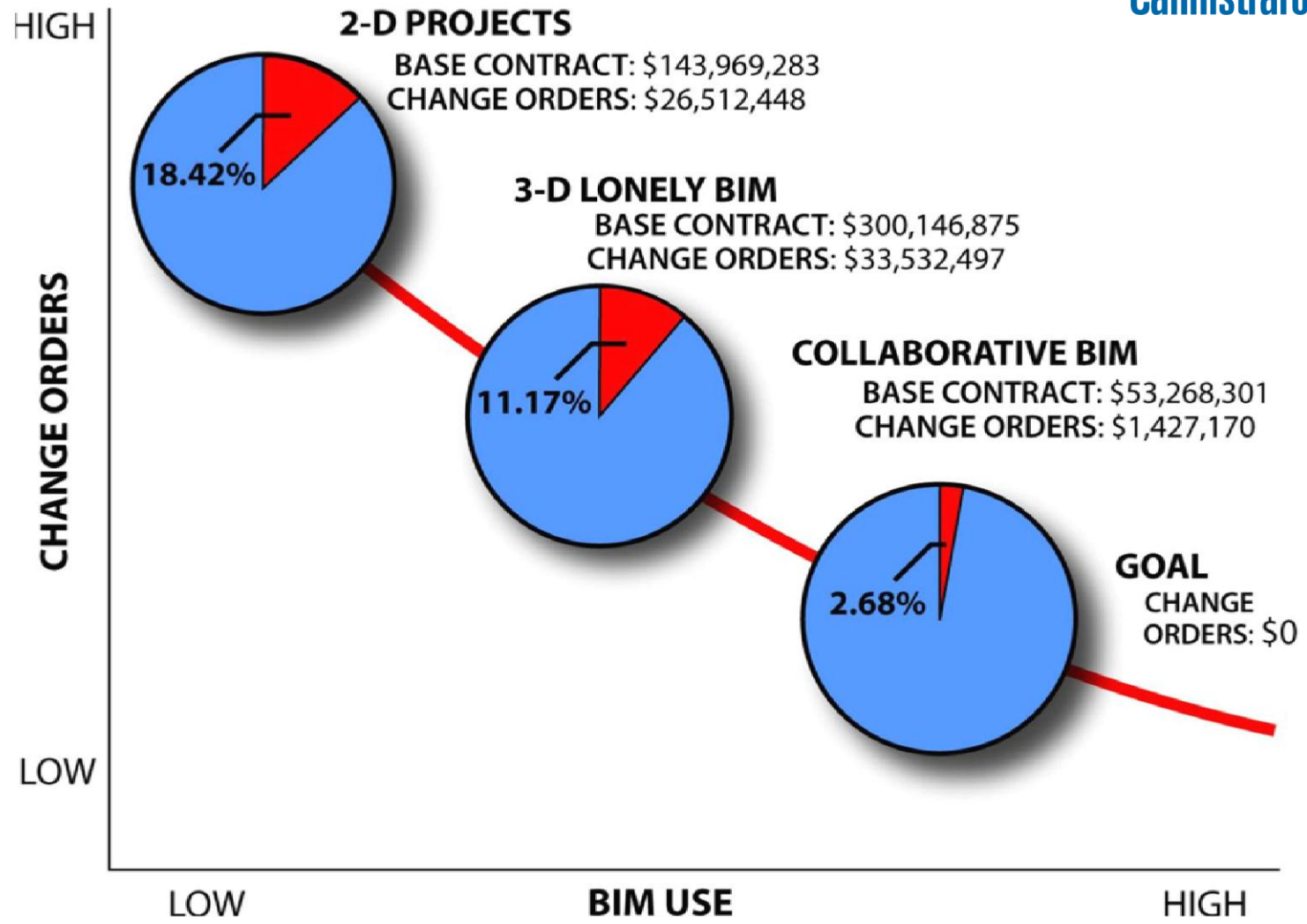
# What are the benefits?

1. Reduce cost not profit
2. 5-15% schedule reduction
3. Offsite Prefabrication with confidence
4. Improved Safety
5. Buildings that actually work
6. Restoration of respect and repeat work

# Eliminating Claims with BIM

## Subcontractor Study : J.C. Cannistraro Co.

- 6 year period
- 408 Contracts for Mechanical Trades
- \$558,858,974.00 Total for one trade





# Delivering in less Time

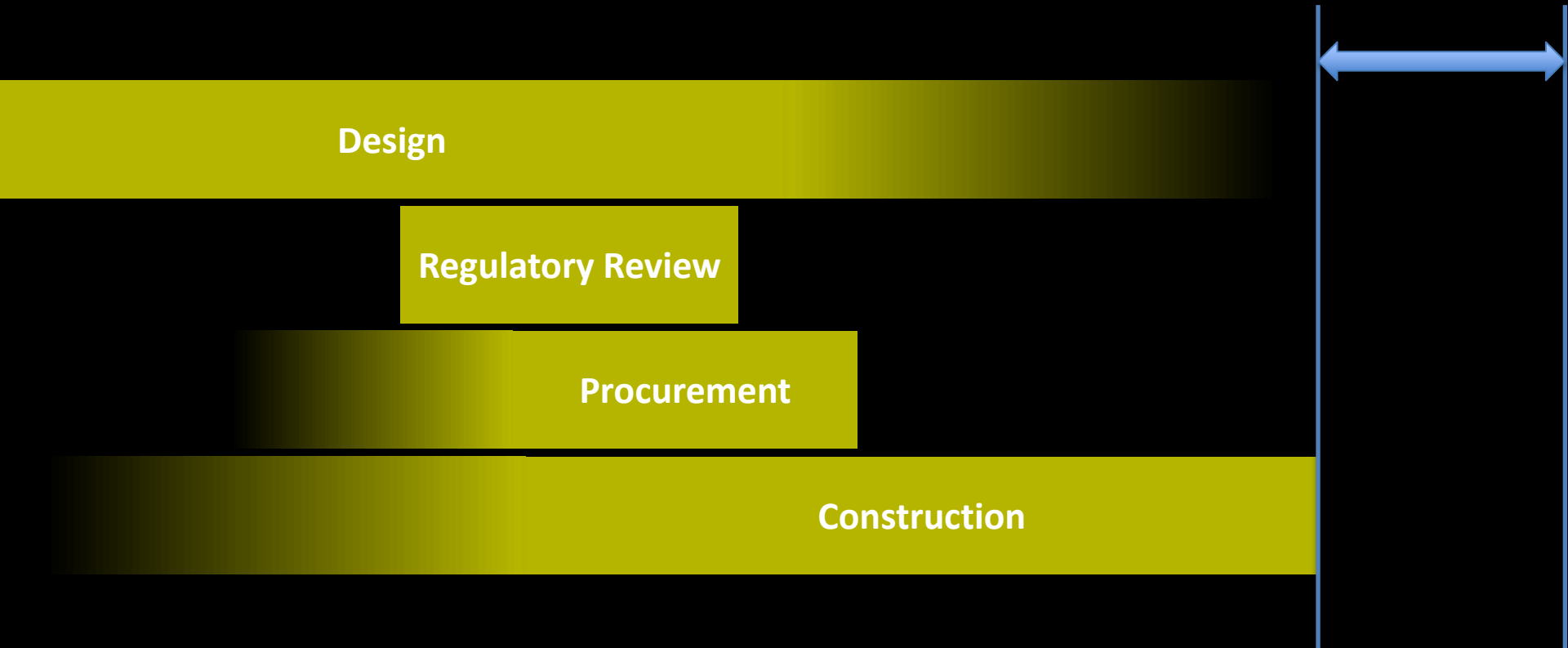
Design

Regulatory Review

Procurement

Construction

# Delivering in less Time



# Offsite Prefabricication ... with confidence



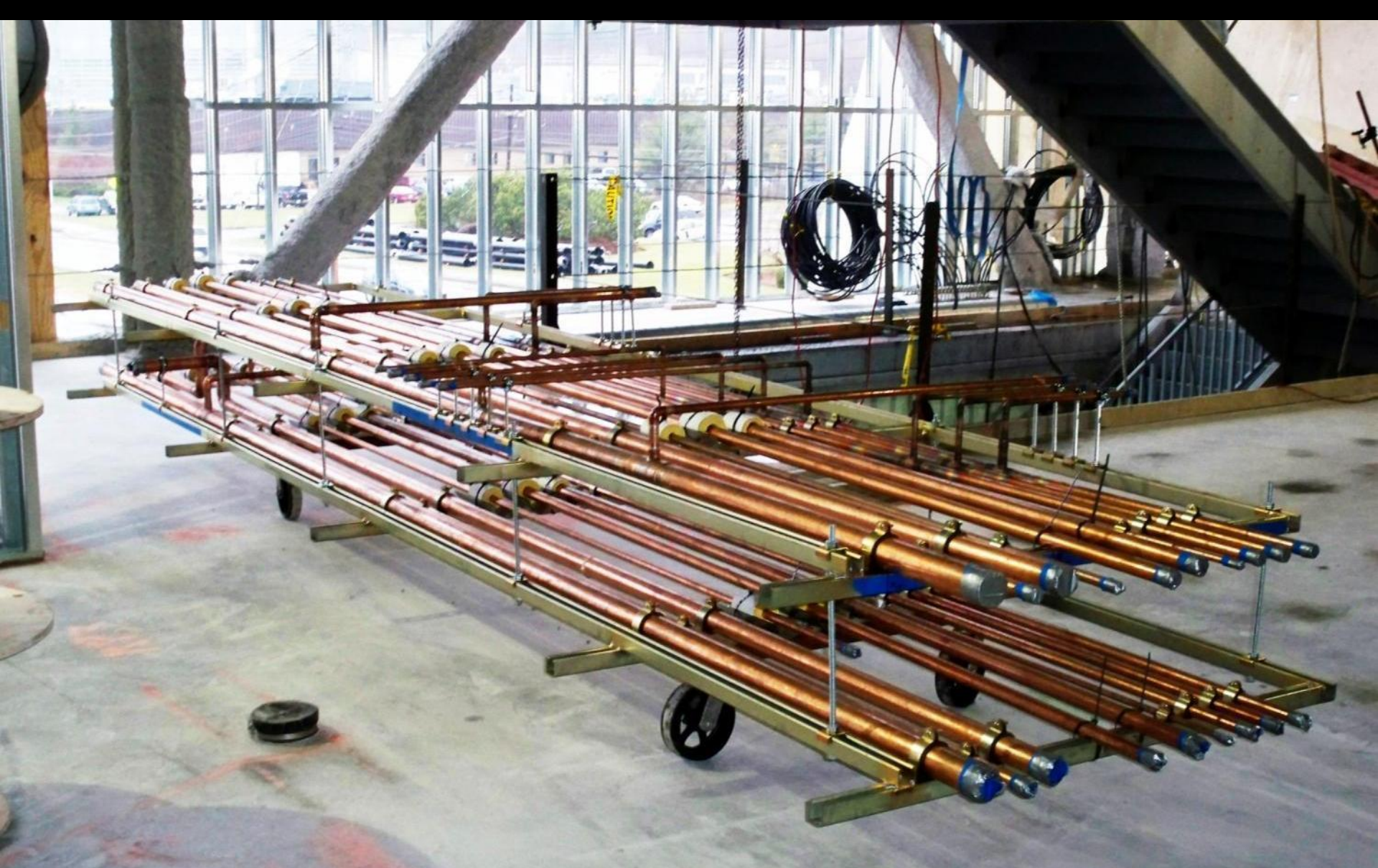
Models and images courtesy of  
JC Cannistraro Mechanical Contractors



# Prefabricated Utility Racks



# Just-in-Time Delivery



# Prefabricated Utility Rack



# Installed Utility Rack

# Added Metrics in process

- 25% reduction in waste and rework (25% of the 37% = 9%)
- Virtual elimination of design coordination error
- Direct fabrication from BIM : 0 errors, 12-16 week savings
- Increased investor/lender confidence
- Verified Return on Investment (ROI) range = 3:1 to 12:1
- 70% Claim reduction (so far)



# Retooling our World (US Construction)

... what does it take?



# What Contractors want to do...

BIM

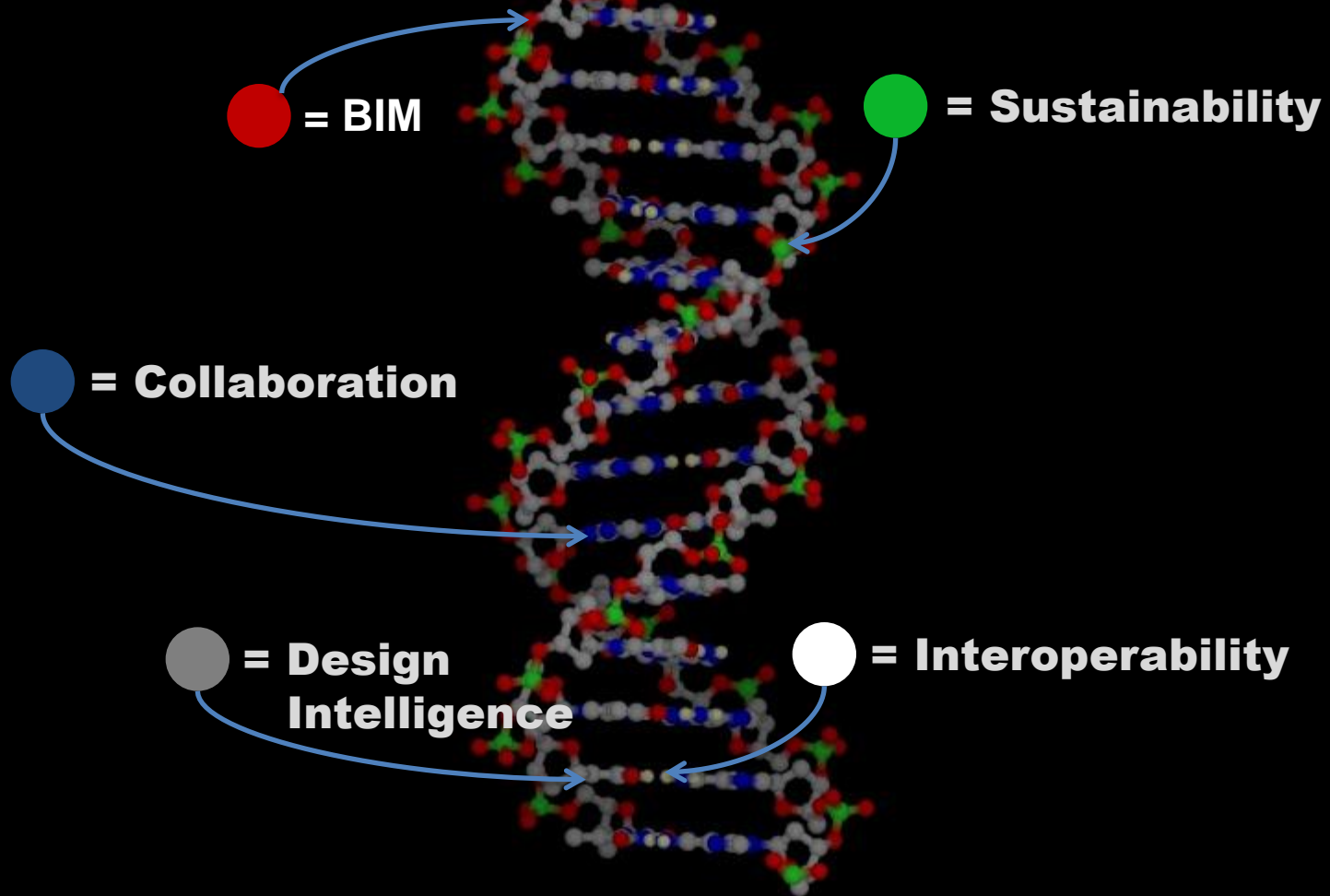
Clash  
Detection

LEED

QTO

IPD

# What they need to do...



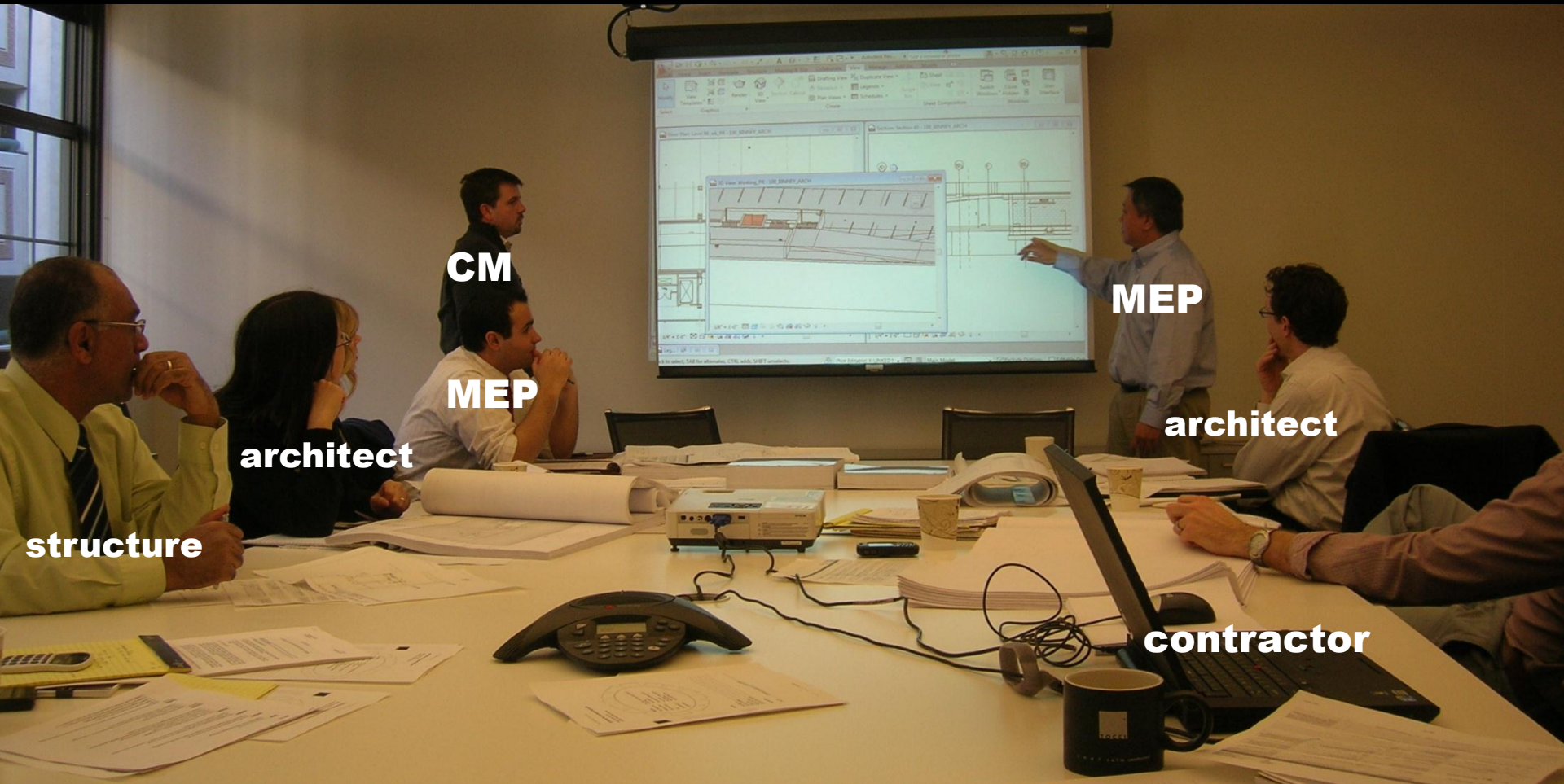
# Hold your friends close and your...



# Moving in with Architects



# Again... and again



# And architects with contractors



**MEP**

**Building  
Systems**

**Contractor**

**architect**

**architect**

**architect**





# Field staff move in...



# Subcontractors move in



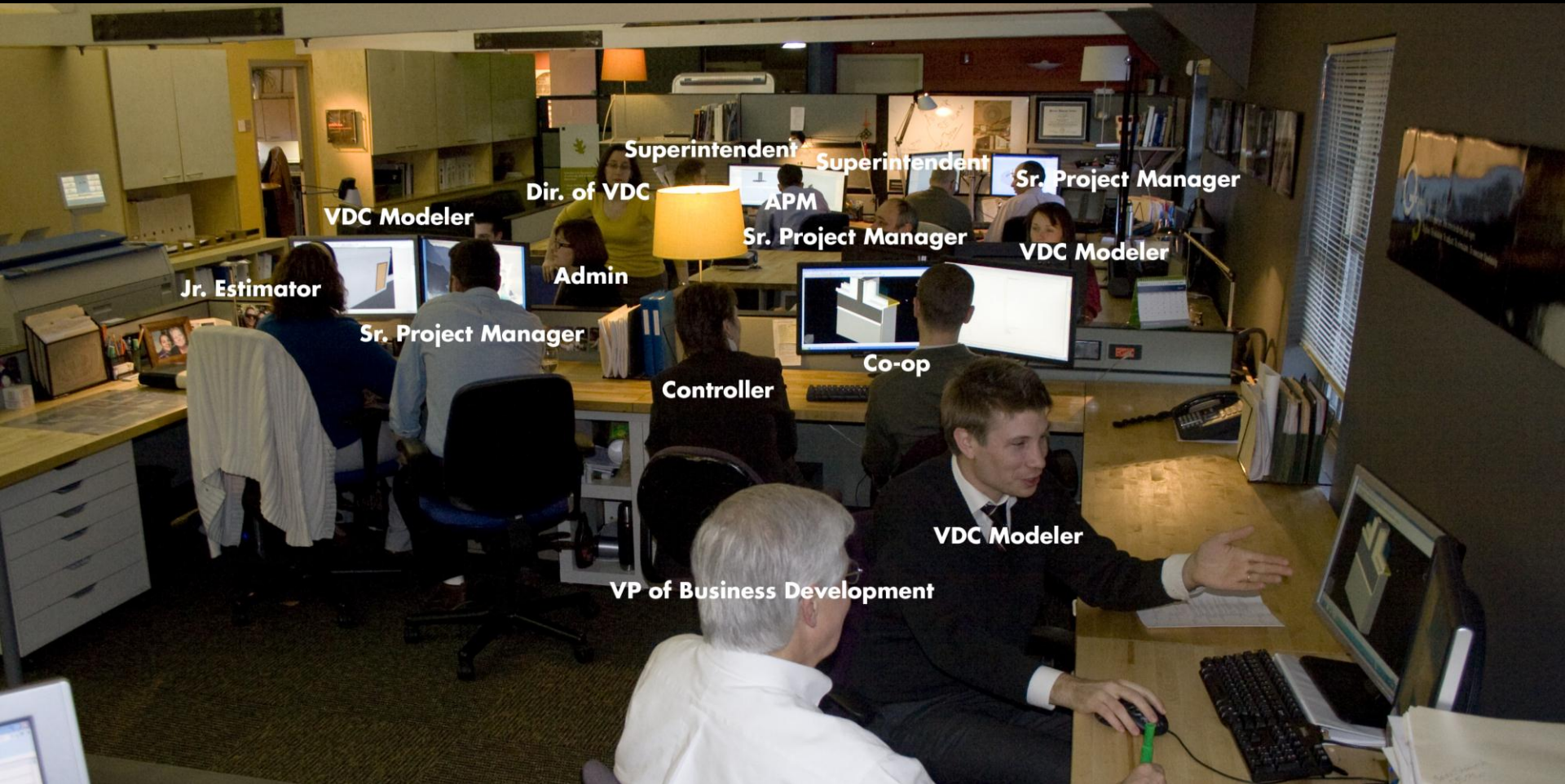
# Everybody's moving in



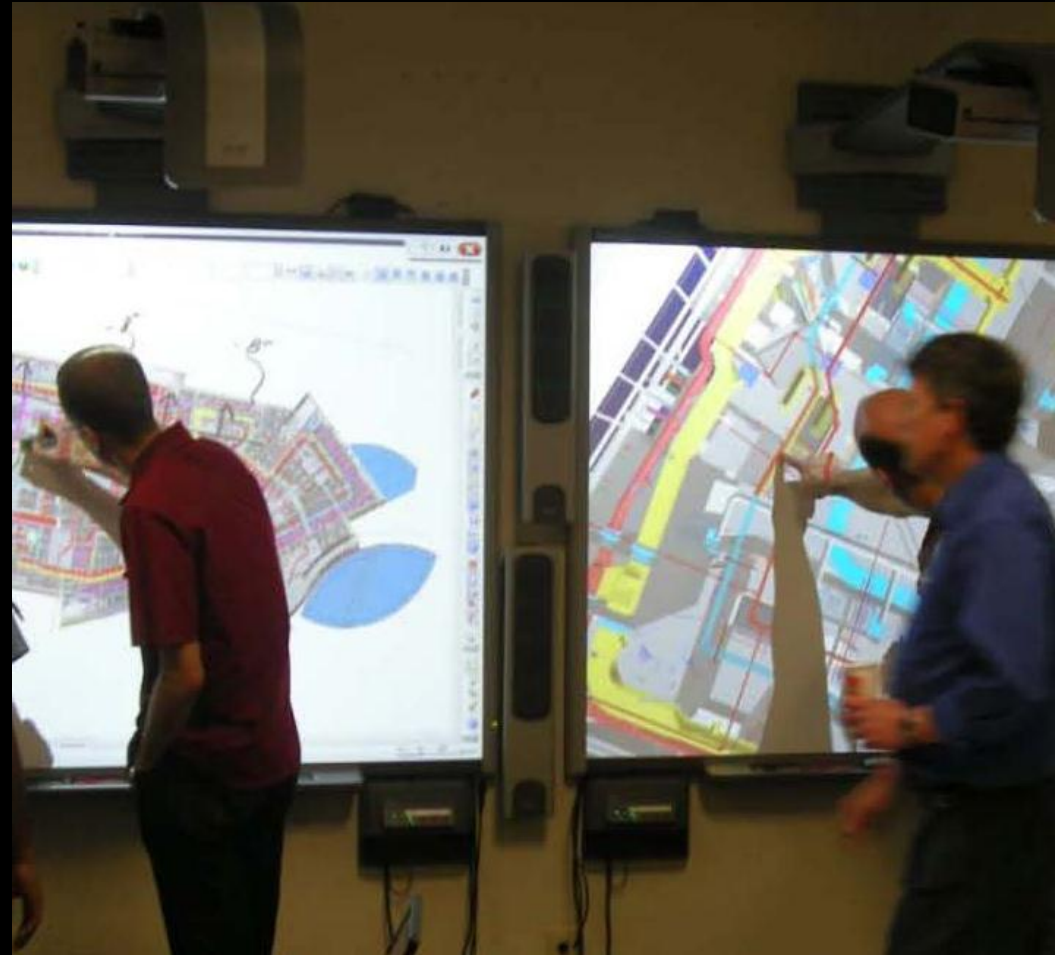
# Software and Process Training



# And more... 1 on 1



# Transformed Field Offices



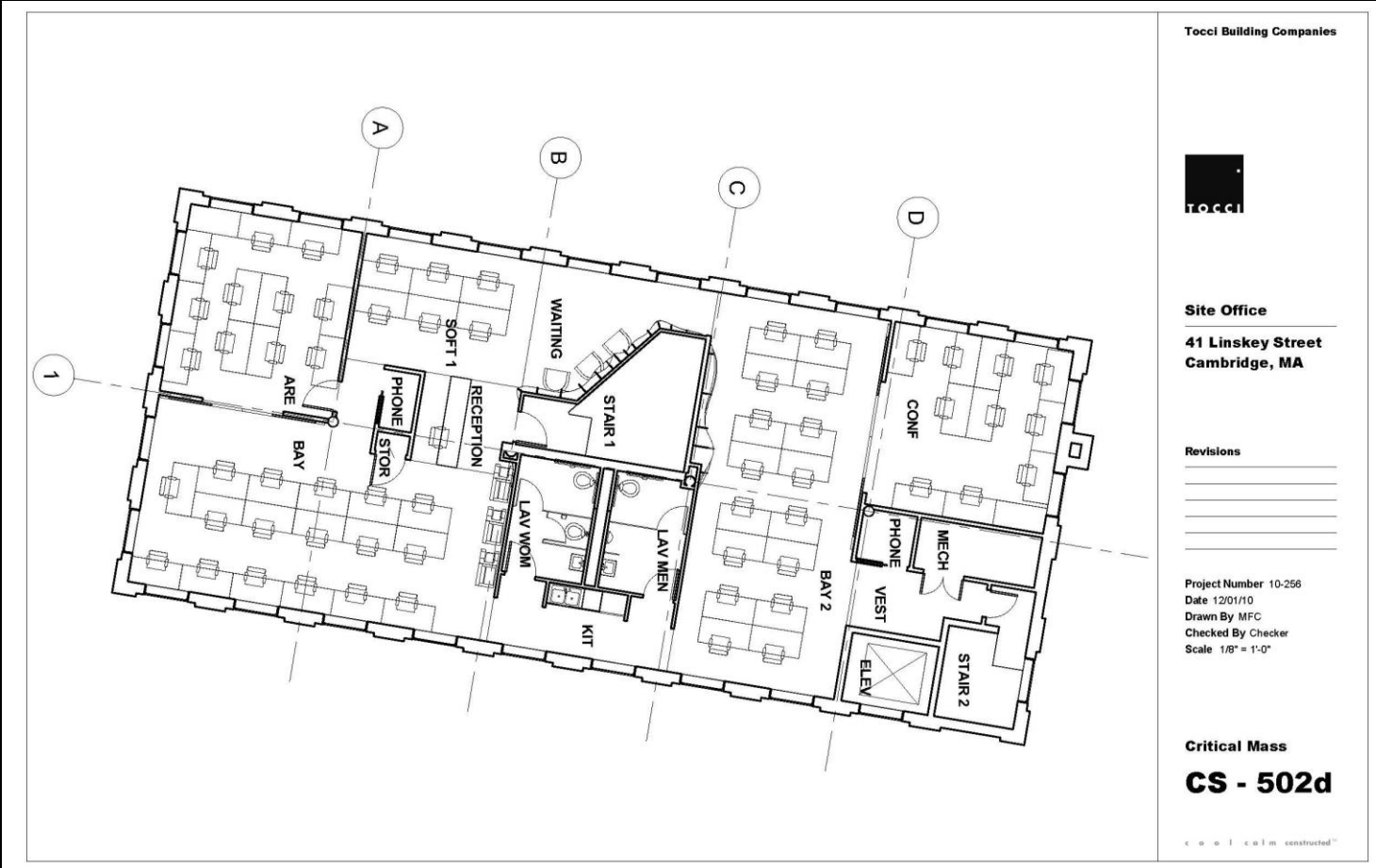
Sutter Medical Center, California  
DPR Construction

# Temporary “Big Rooms”



Hospital Project  
Tarleton Construction St.Louis

# Full Time “Big Rooms”



Tocci Building Companies



**Site Office**  
**41 Linskey Street**  
**Cambridge, MA**

Revisions


Project Number 10-256  
 Date 12/01/10  
 Drawn By MFC  
 Checked By Checker  
 Scale 1/8" = 1'-0"

**Critical Mass**  
**CS - 502d**

c o o l c a l m constructed™







# Constant on-site BIM

3

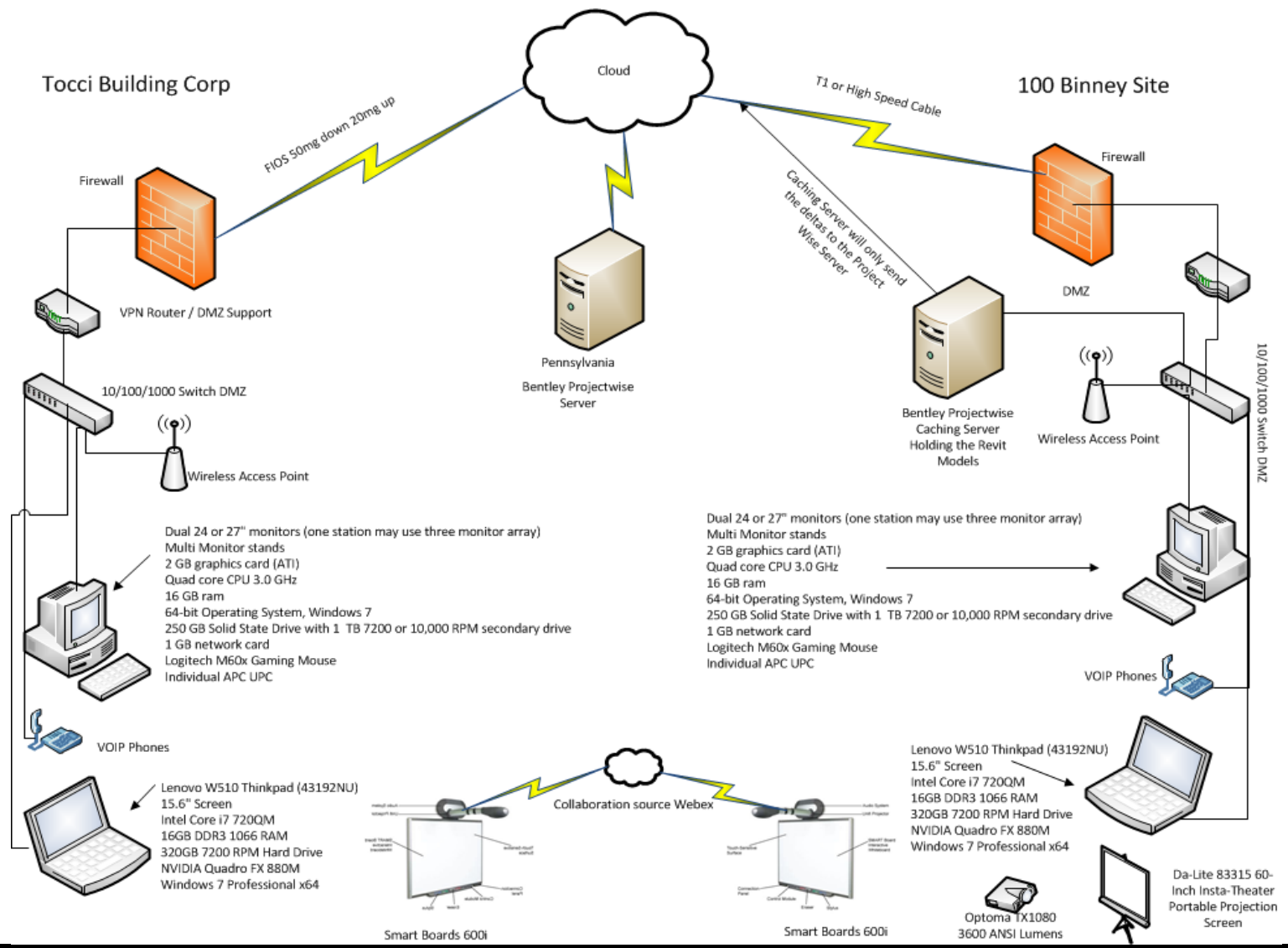


# Subcontractor BIM-in-a-box



Maricopa County Court House  
Gilbane Company

# On-Site BIM Information Systems



BIMFORUM

# The BIM Forum 2011

## History of the BIMForum

John Tocci // January 11, 2011

# BIMFORUM

chair// John Tocci vice chair// Jan Reinhardt

Leaders

Subforums

Leaders at Large

Designers

Sub-Contractors

Builders

Civil and Industrial

Owners

Legal

Technology

Deliverables

Emerging Leaders

Insurance

Academic

Phil Bernstein  
Jonathan Widney  
Laura Handler

Davis Chauviere  
Will Ikerd  
Jan Reinhardt

David Morris  
Chris Fischer

Rodd Merchant

Dan Russel  
Dan Klancnik

Maureen McDonough  
Maureen Massa

Pat O'Connor  
Carl Bundschuh

Lew Reed  
Stacy Scopano  
John Tocci Jr

Jeff Yoders

Greg Bundschuh

Michael Puddicombe

Guillermo Salazar

Sarah Mekasy

ization//Scope Clarification//Partial Tr

sign Validation//Construction Sequencing//Planning/Phasing//Plans/Logistics//Marketting/Research

## Secondary Benefits

# Other Goodness



# Integrated Project Delivery



# Attracting the smart young professional



\*photo shoot was their spoof on the TV Series "Madmen"

# Better clients



©2009 Jeff Goldberg/ESTO

# Secondary Benefits



# “Secondary” Benefits

- Real teamwork... not campfire songs
- Early, reliable and rational project outcomes
- Ability to enter into “no-change-order” contracts (IPD)
- Penetrate high barrier-to-entry markets
- Attract top quality partners
- Not looking at the back side of your competitors
- And....

# “Secondary” Benefits

Delivering what we promise...

Priceless



**Risk**

4

From this...



4

To this...





4

To this...



4

and finally to this!



# And **ULTIMATELY** to this...





c o o l c a l m c o n s t r u c t e d