

HPR INTEGRATED DESIGN



Jeremy Heilman
CONSTRUCTION



Nico Pugliese
LIGHTING/ELECTRICAL



Josh Progar
STRUCTURAL



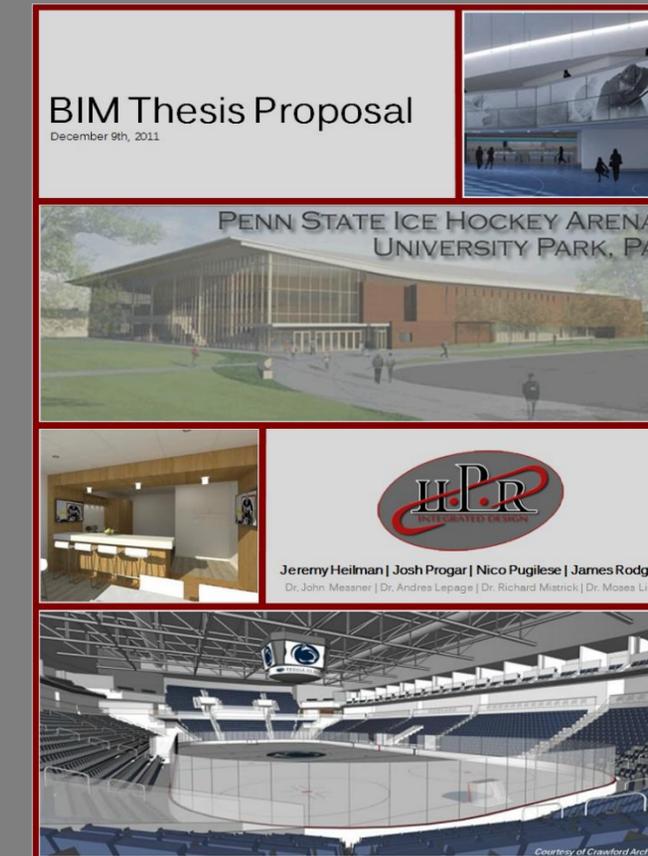
James Rodgers
MECHANICAL

Presentation #4: Proposal

Penn State Ice Hockey Arena
The Pennsylvania State University

Mission Statement:

HPR Integrated Design combines innovative, cutting edge concepts with a collaborative multi-disciplinary approach through the utilization of state-of-the-art BIM technologies to exceed owner expectations both in system efficiencies and the enrichment of the human experience within its aesthetic.



Agenda

BIM Uses



X	PLAN	X	DESIGN	X	CONSTRUCT	X	OPERATE
	PROGRAMMING	X	DESIGN AUTHORIZING		SITE UTILIZATION PLANNING		BUILDING MAINTENANCE SCHEDULING
	SITE ANALYSIS	X	DESIGN REVIEWS		CONSTRUCTION SYSTEM DESIGN		BUILDING SYSTEM ANALYSIS
		X	3D COORDINATION		3D COORDINATION		ASSET MANAGEMENT
		X	STRUCTURAL ANALYSIS		DIGITAL FABRICATION		SPACE MANAGEMENT / TRACKING
		X	LIGHTING ANALYSIS		3D CONTROL AND PLANNING		DISASTER PLANNING
		X	ENERGY ANALYSIS		RECORD MODELING		RECORD MODELING
		X	MECHANICAL ANALYSIS		OUT OF SCOPE OF THIS PROJECT		
			OTHER ENG. ANALYSIS				
		X	SUSTAINABILITY (LEED) EVALUATION				
			CODE VALIDATION				
X	PHASE PLANNING (4D MODELING)	X	PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)
	COST ESTIMATION	X	COST ESTIMATION		COST ESTIMATION		COST ESTIMATION
X	EXISTING CONDITIONS MODELING	X	EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING

Required by Contract
 Used for this Stage of design

- ### HPR Integrated Design's Project Touchstones for the Penn State Ice Arena
- Improve the Game Day experience for both the fans and players
 - Create an environment that fosters hockey excellence
 - Minimize the amount of energy the facility consumes
 - Create an architecturally recognizable facility
 - Maximize value with minimizing cost
 - Earn a LEED Gold rating





BIM Uses & Process

BIM PROCESS





Redesign Focuses

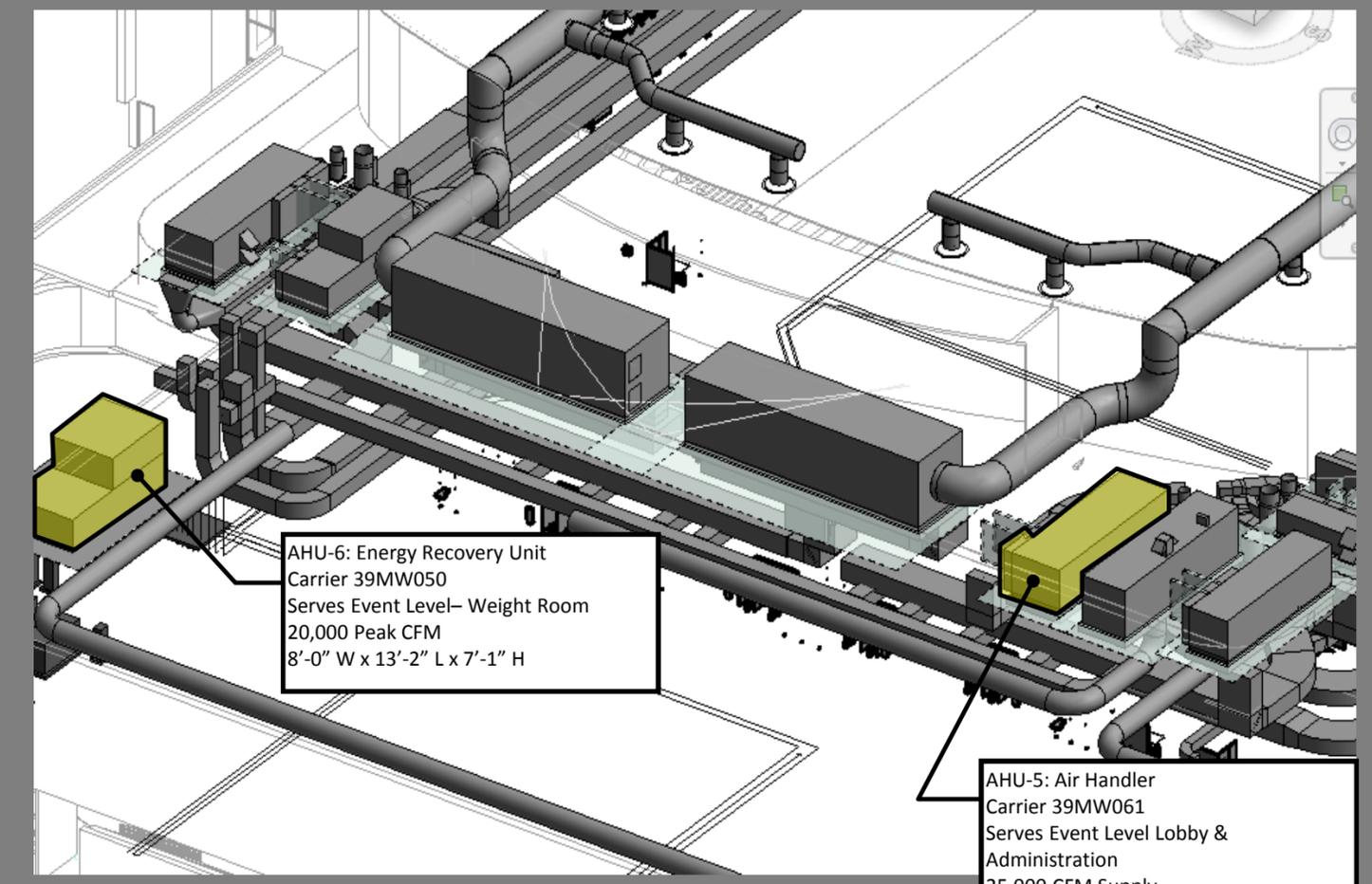
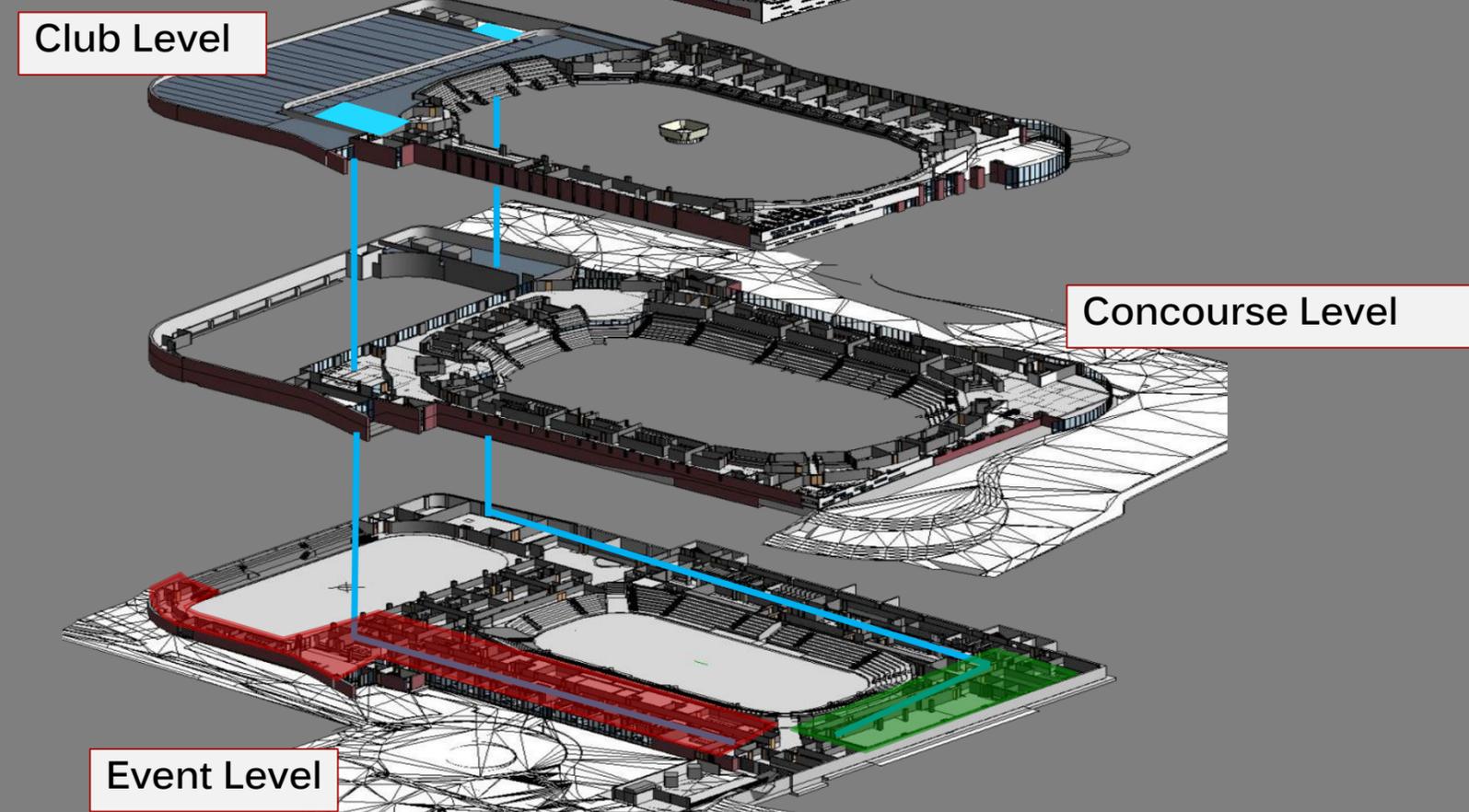
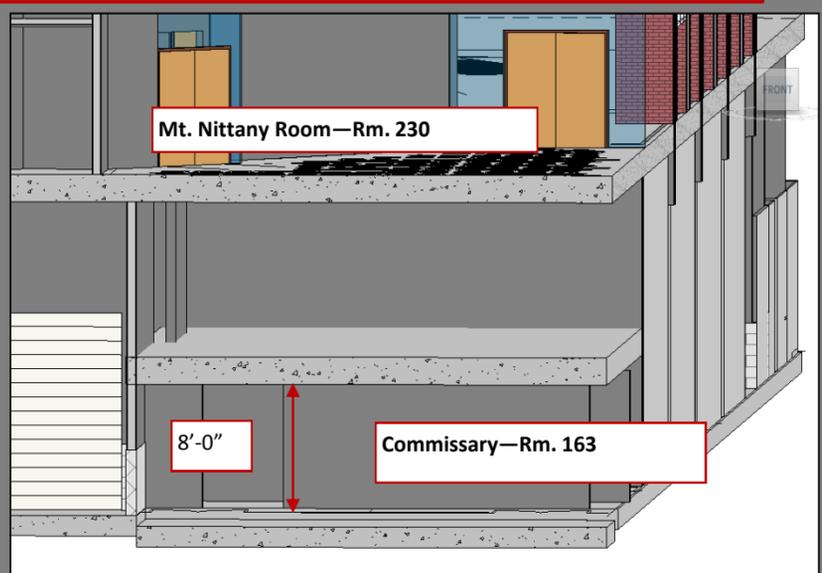
Air Handler Relocation and Event Level Redesign

REASON:

- Reduce duct size and length
- Reduce fan energy and use smaller air handling units
- Limit the number of shafts and there sizes.



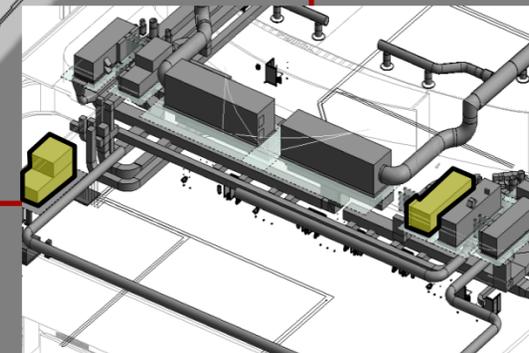
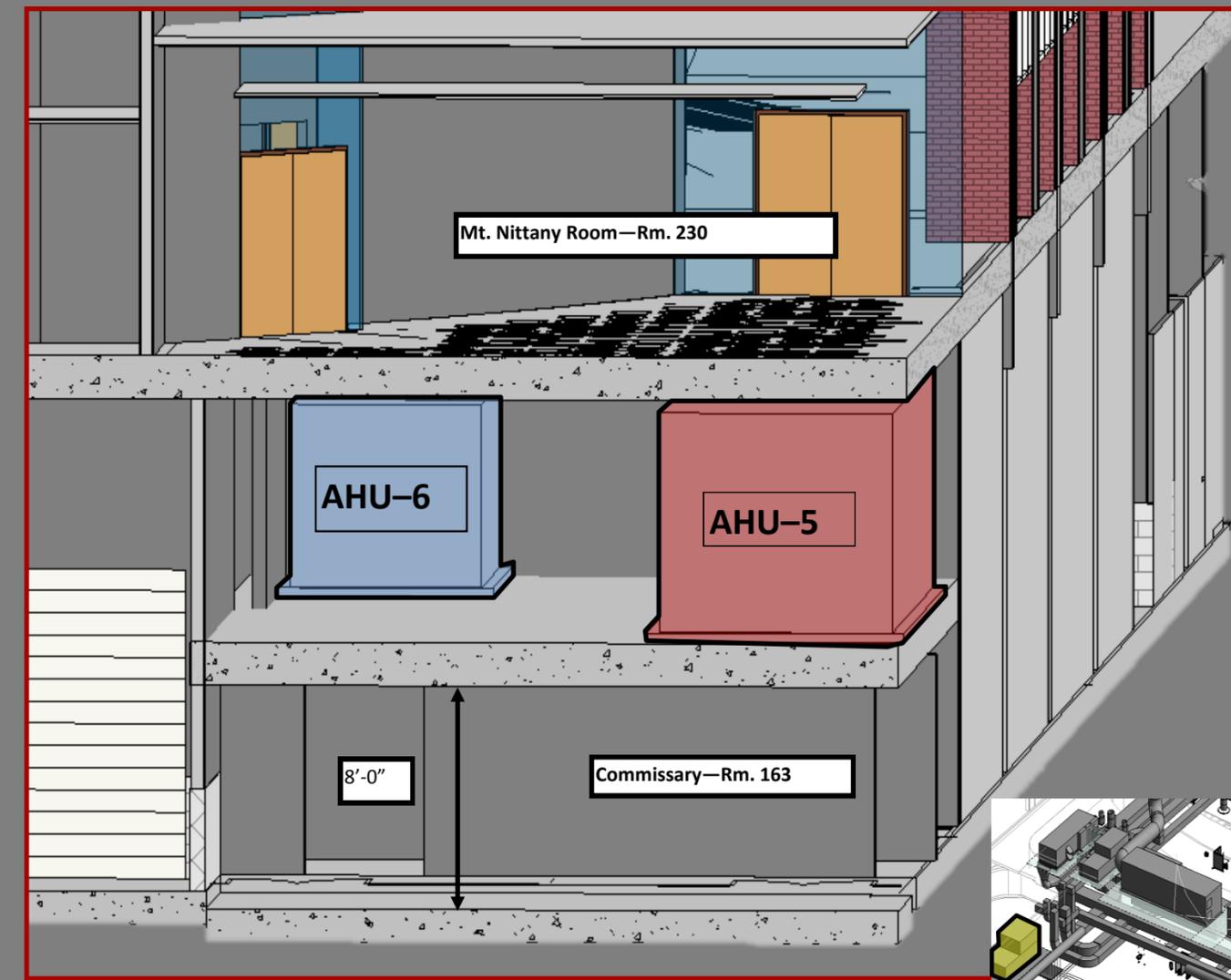
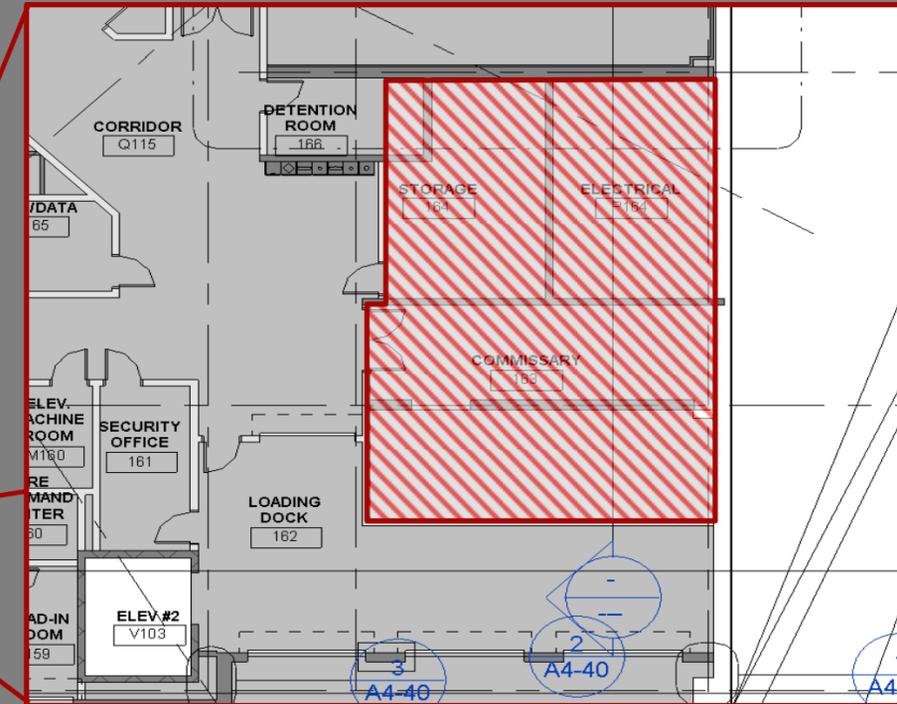
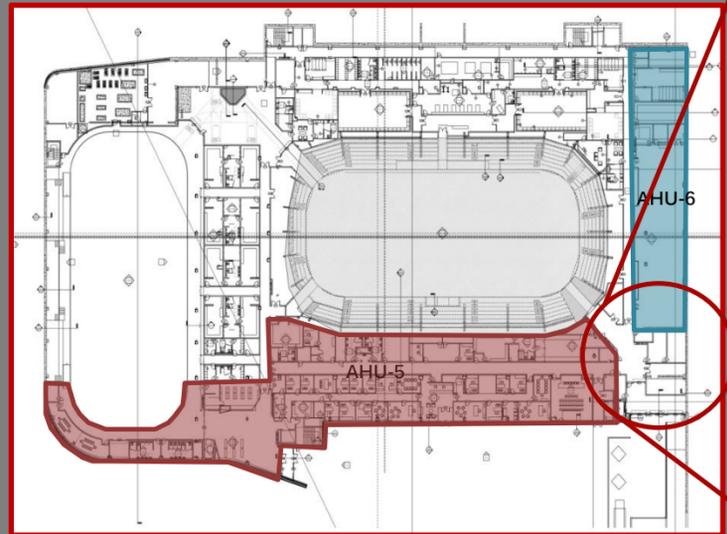
DESIGN CONSTRAINTS



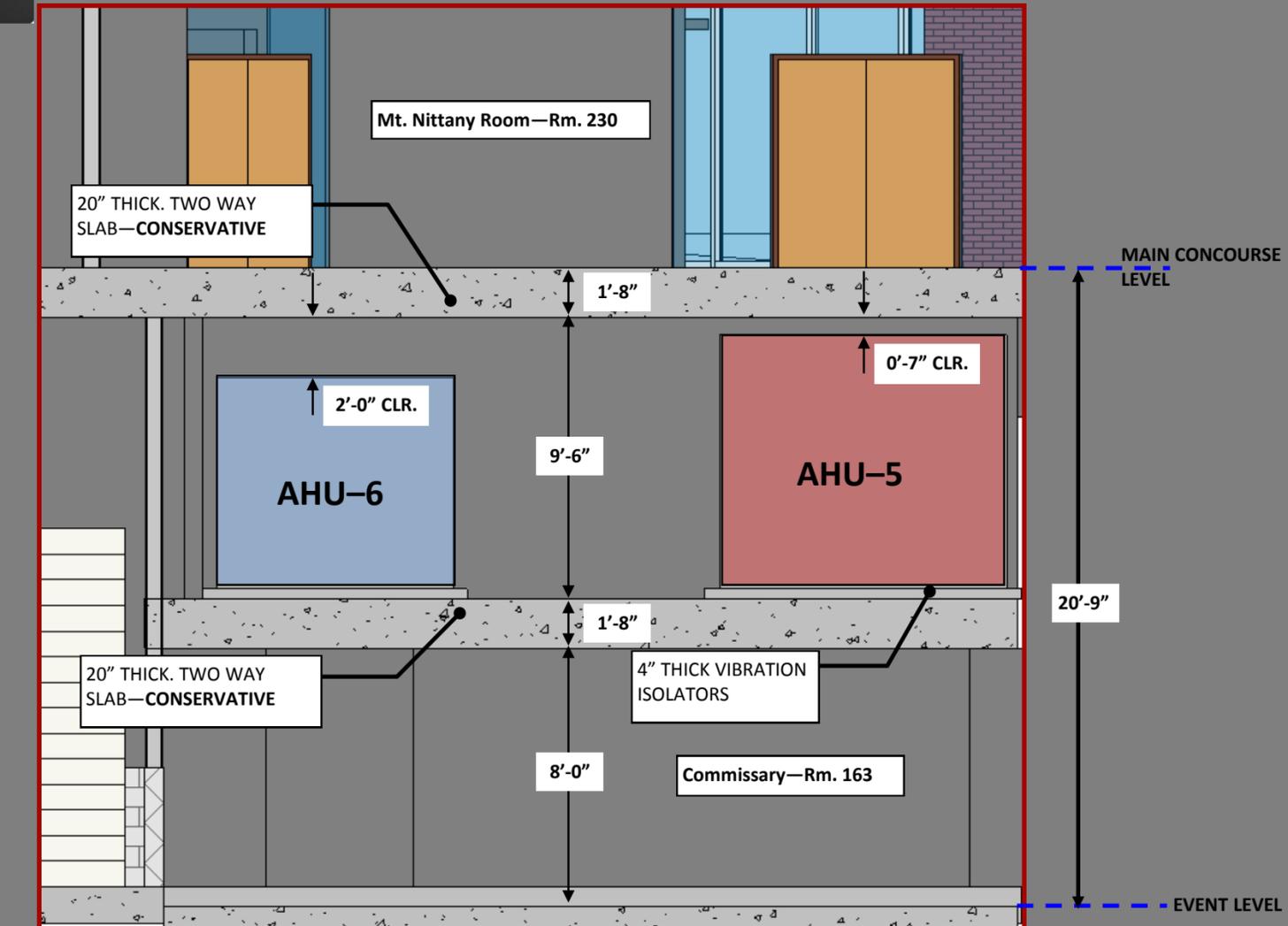
[RE]DESIGN



Air Handler Relocation and Event Level Redesign



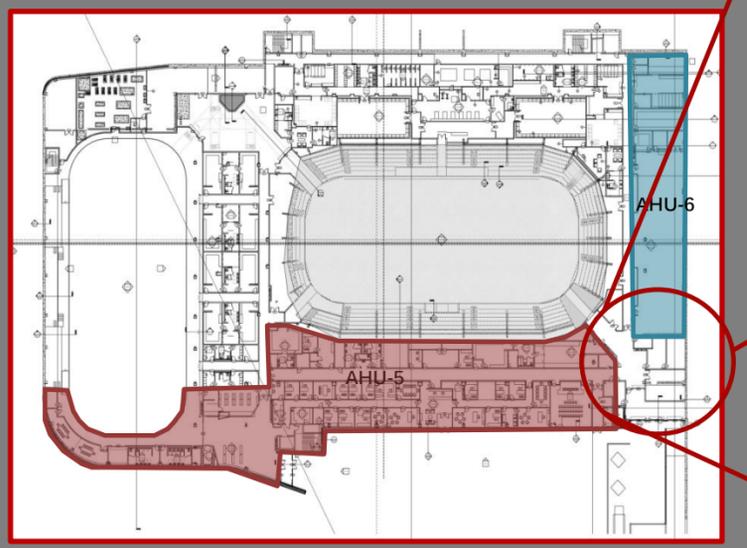
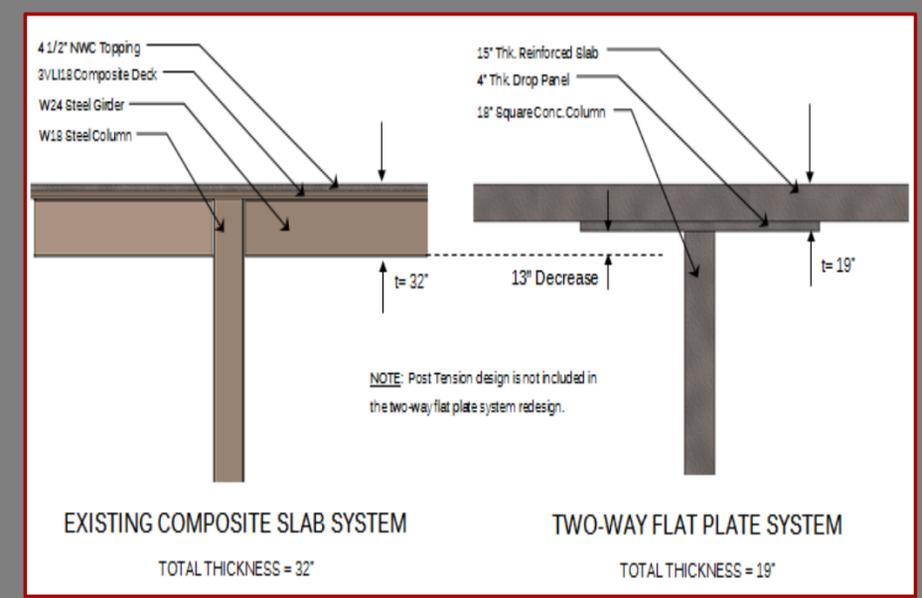
APPROACH



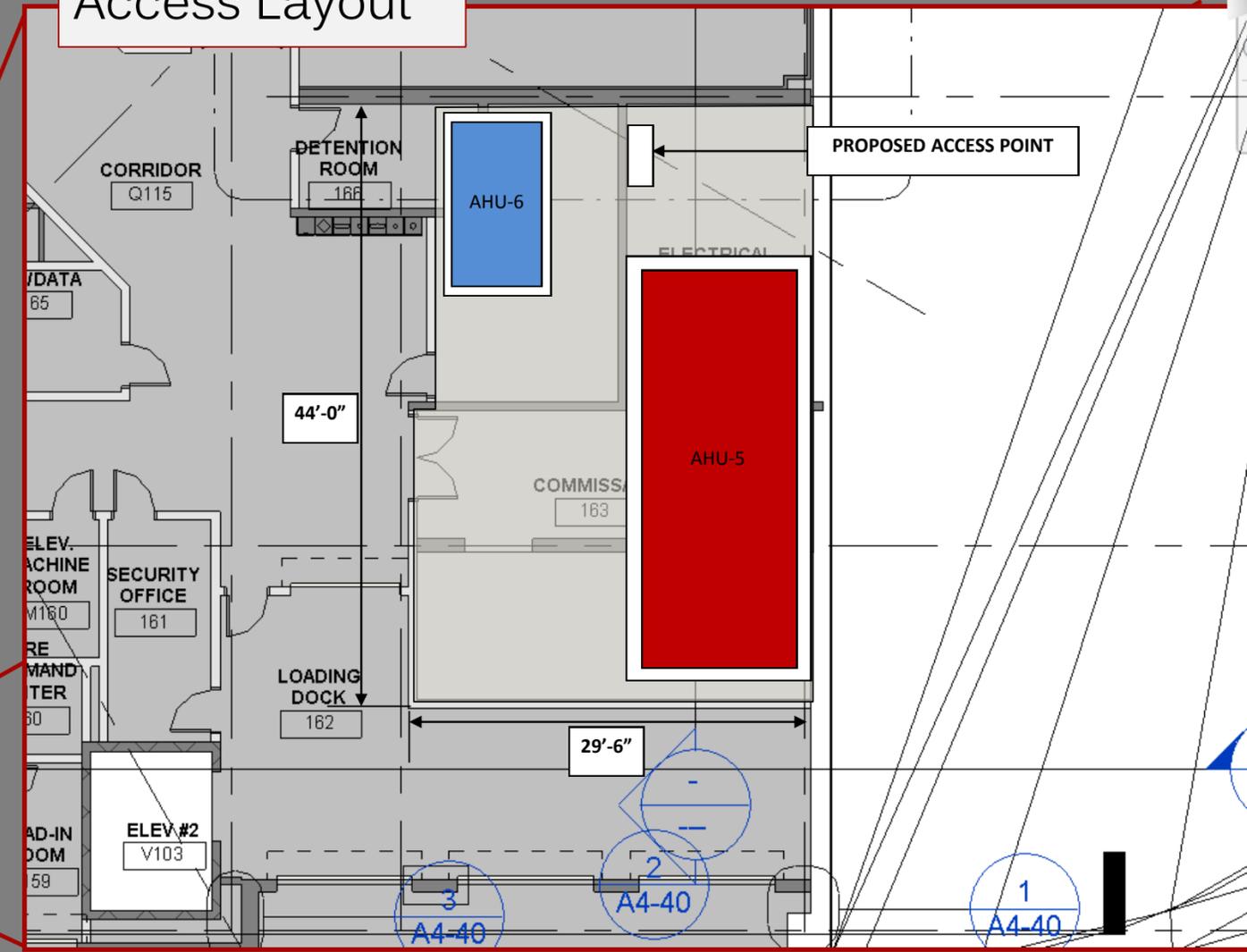
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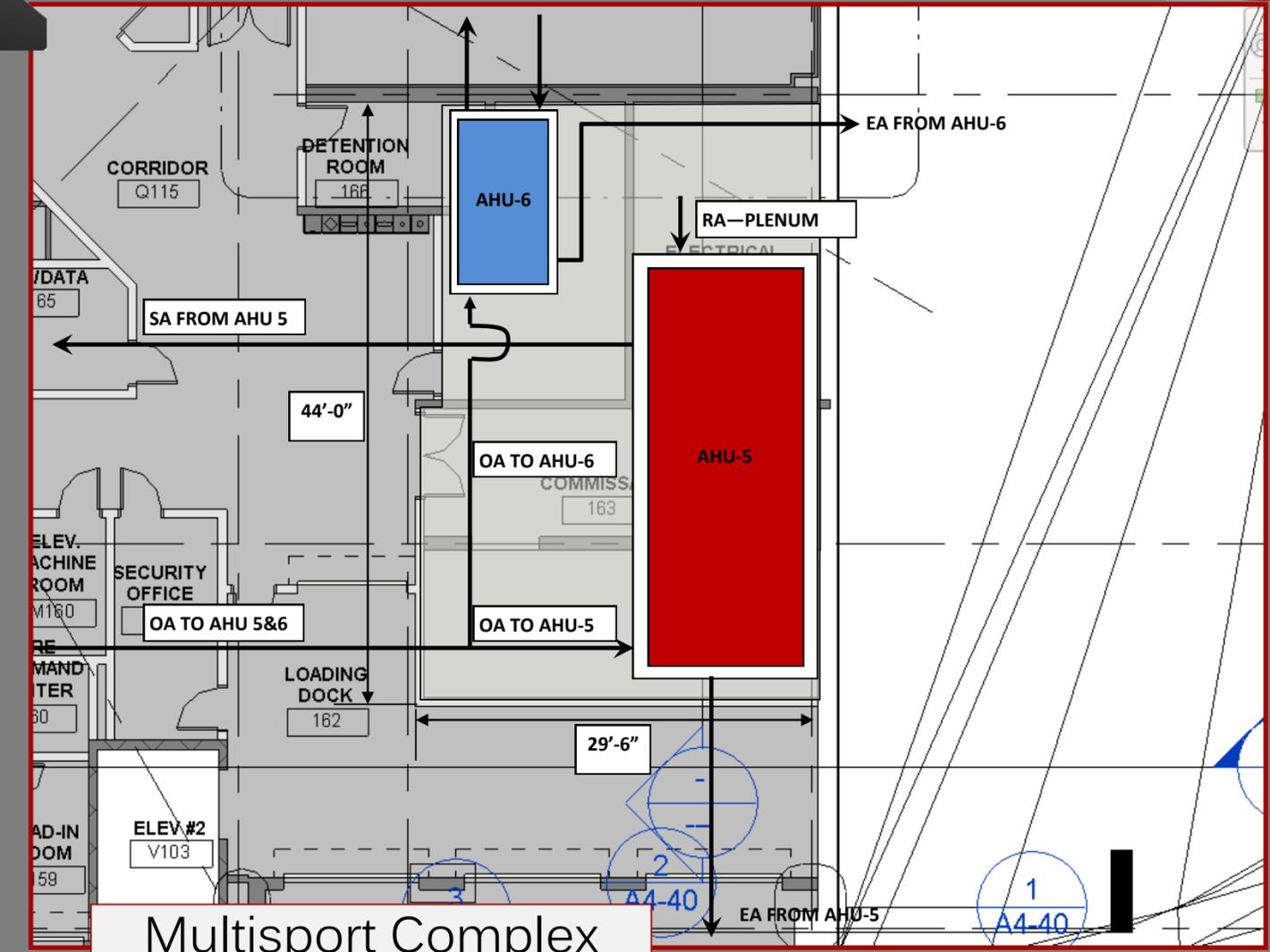
Air Handler Relocation and Event Level Redesign



Access Layout



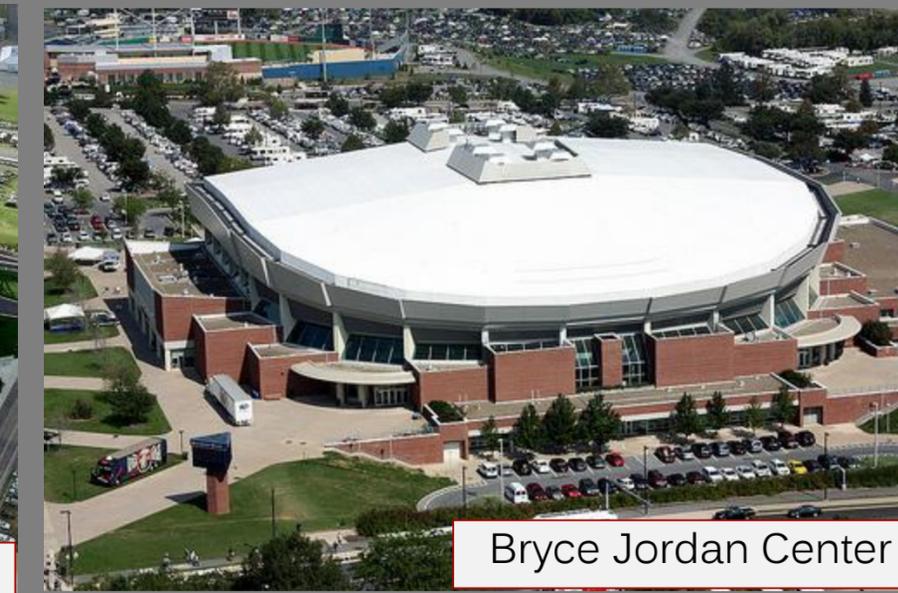
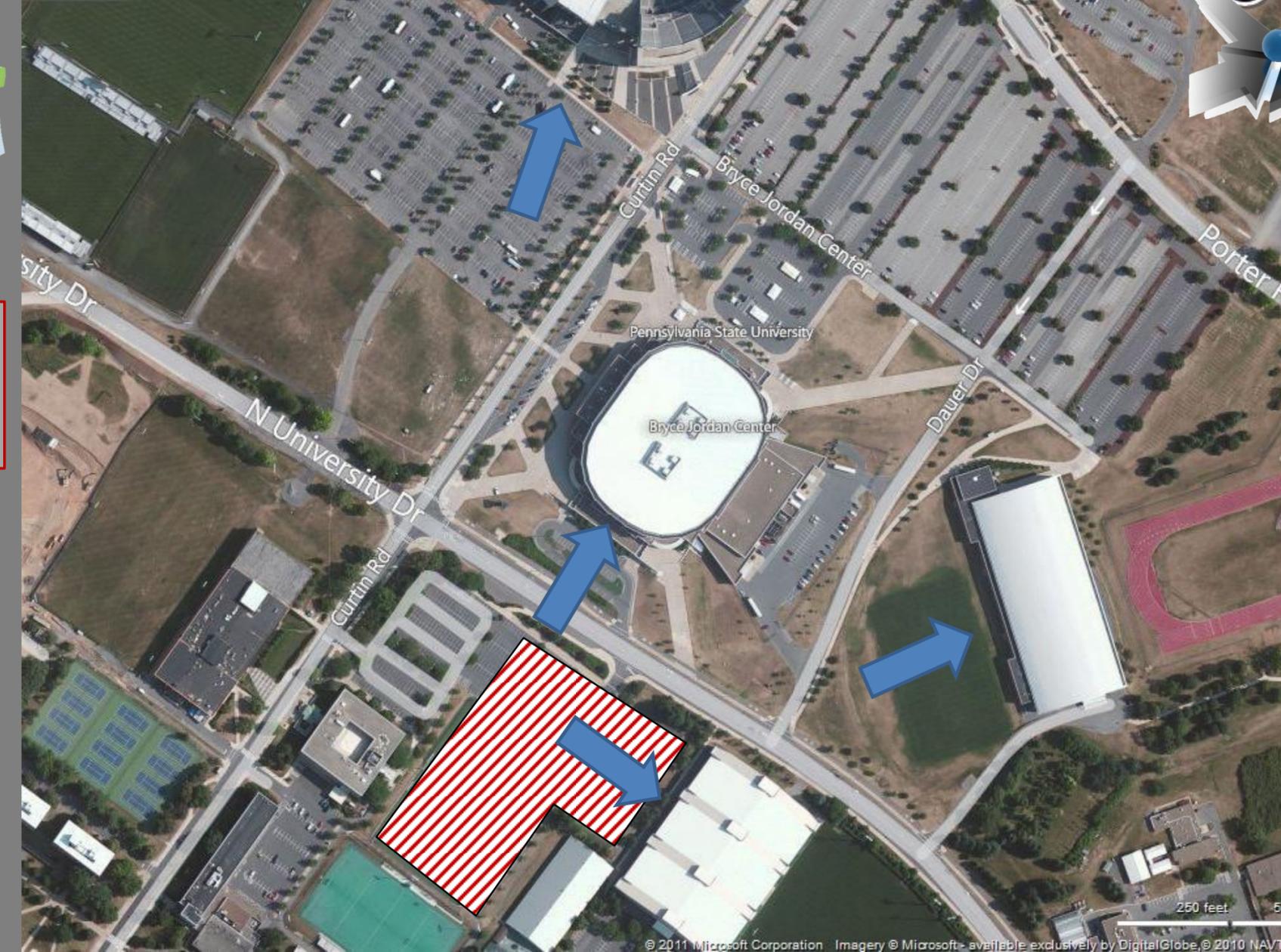
APPROACH



Multisport Complex

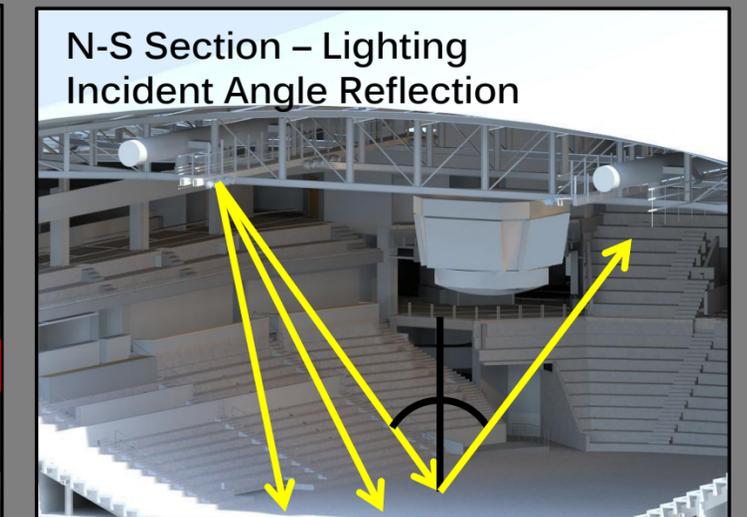
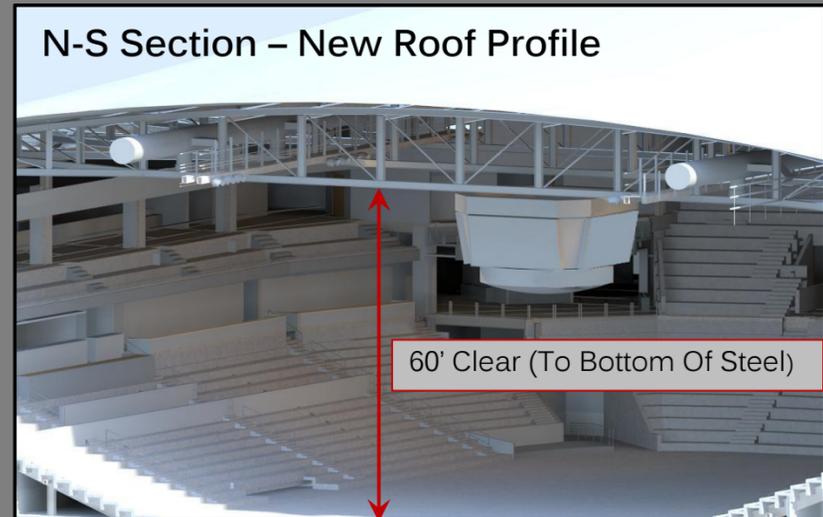
[RE]DESIGN : \$

Roof Profile Redesign



REASON:

- Maximize the efficiency of the structural system to reduce cost
- Integrate the mechanical, lighting, and catwalk systems to optimize the performance of each
- Create a clean and attractive ceiling area



DESIGN CONSTRAINTS

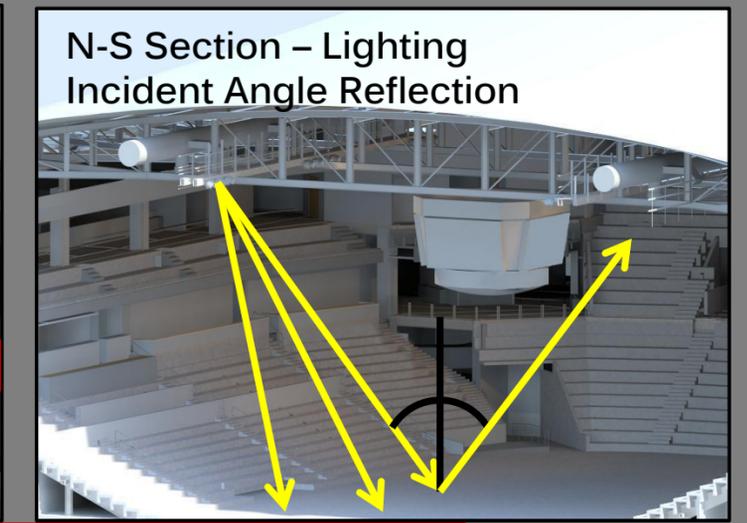
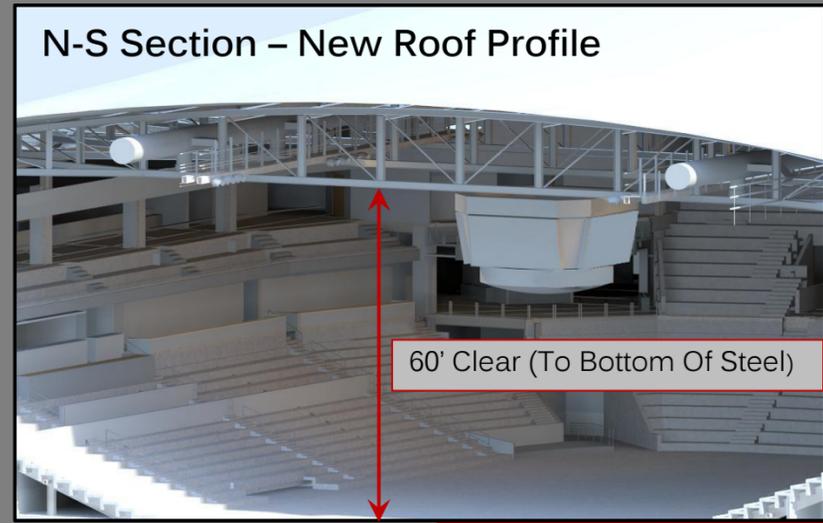
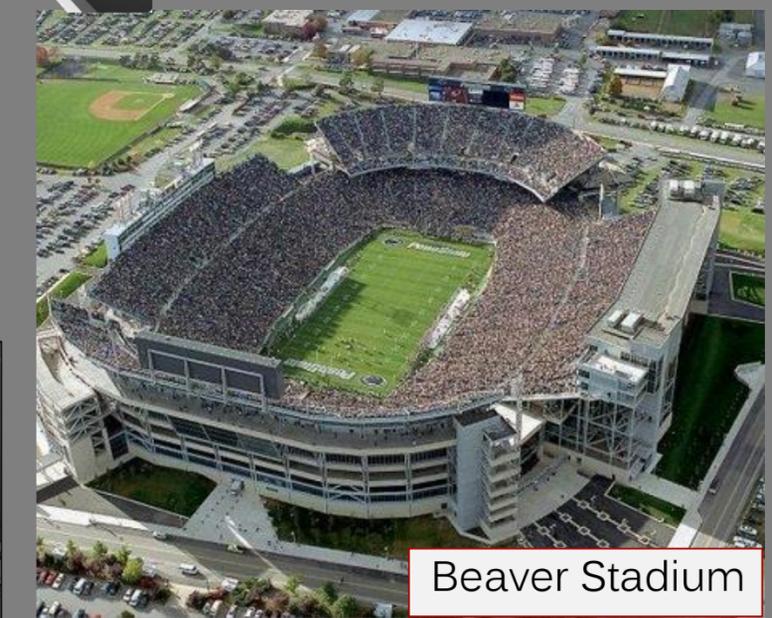
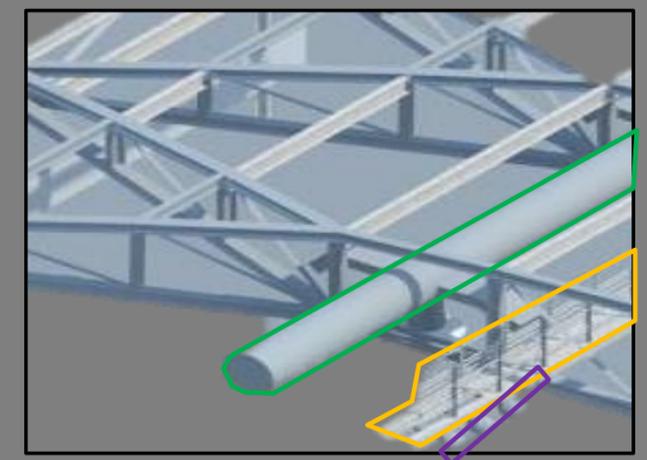
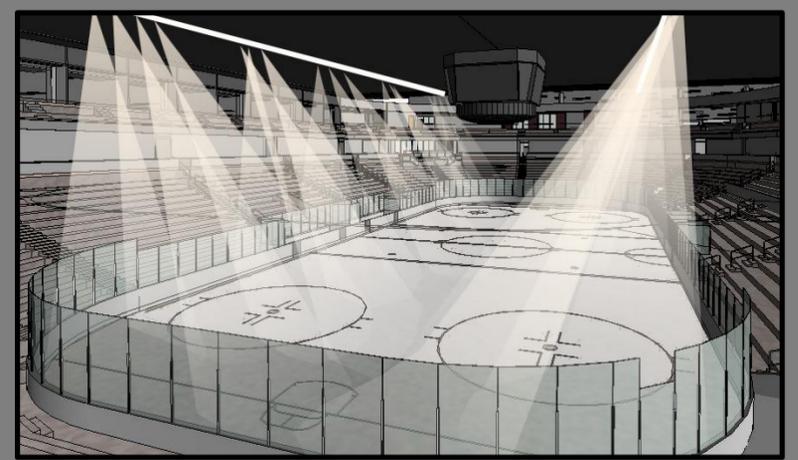
[RE]DESIGN :

Roof Profile Redesign



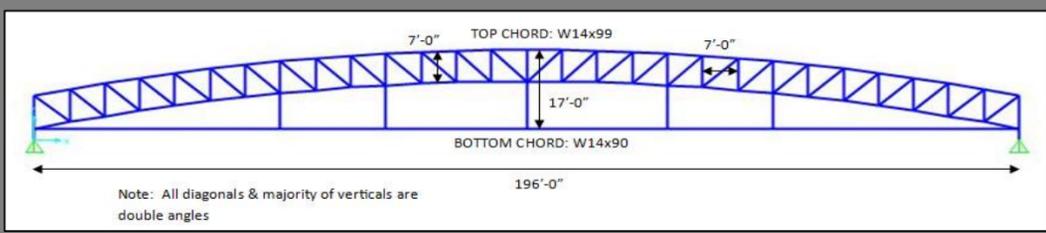
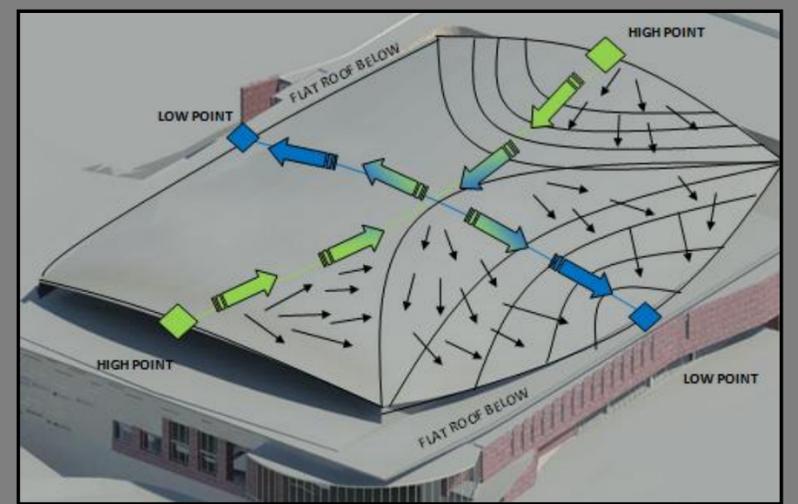
REASON:

- Maximize the efficiency of the structural system to reduce cost
- Integrate the mechanical, lighting, and catwalk systems to optimize the performance of each
- Create a clean and attractive ceiling area



60' Clear (To Bottom Of Steel)

DESIGN CONSTRAINTS

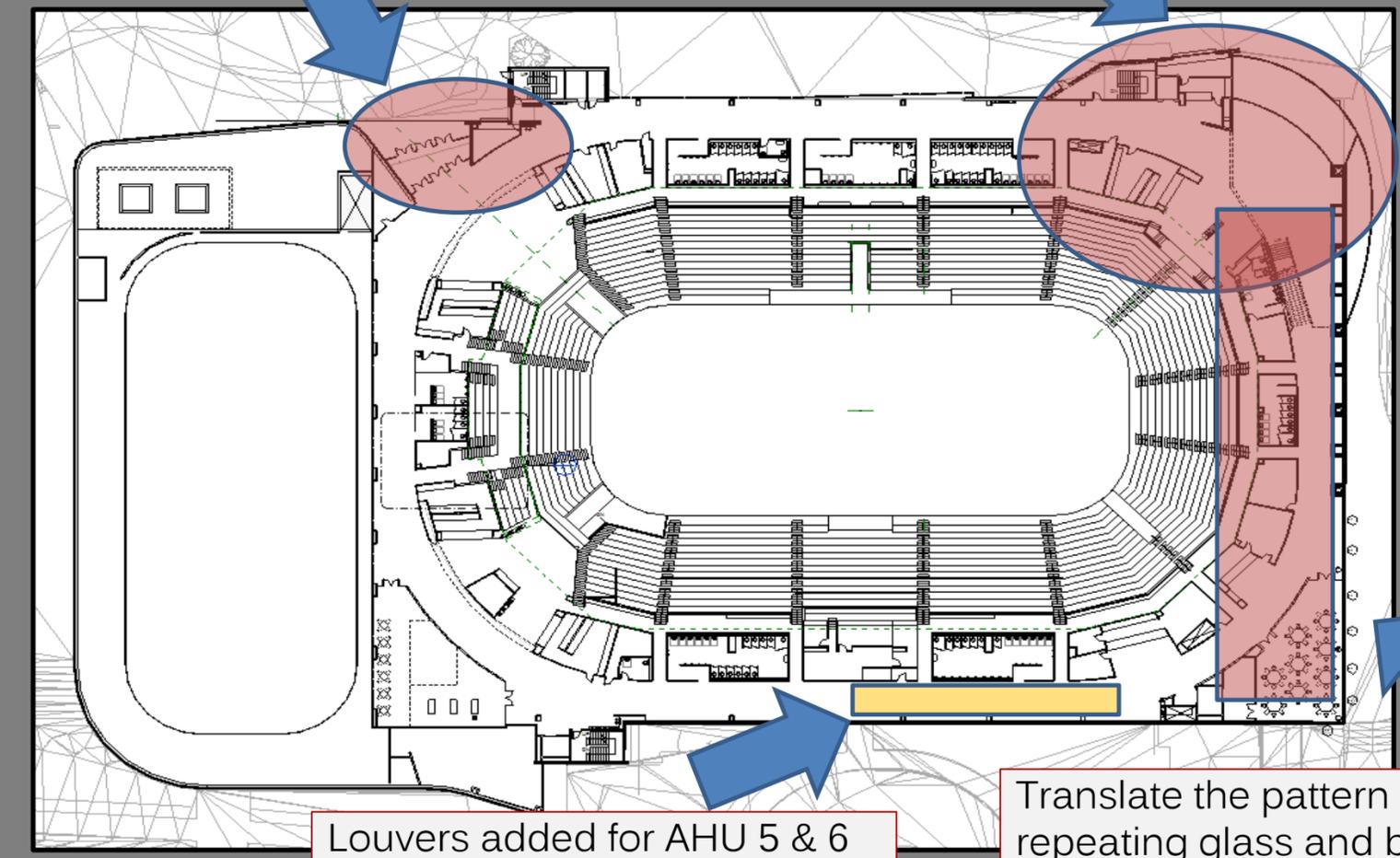
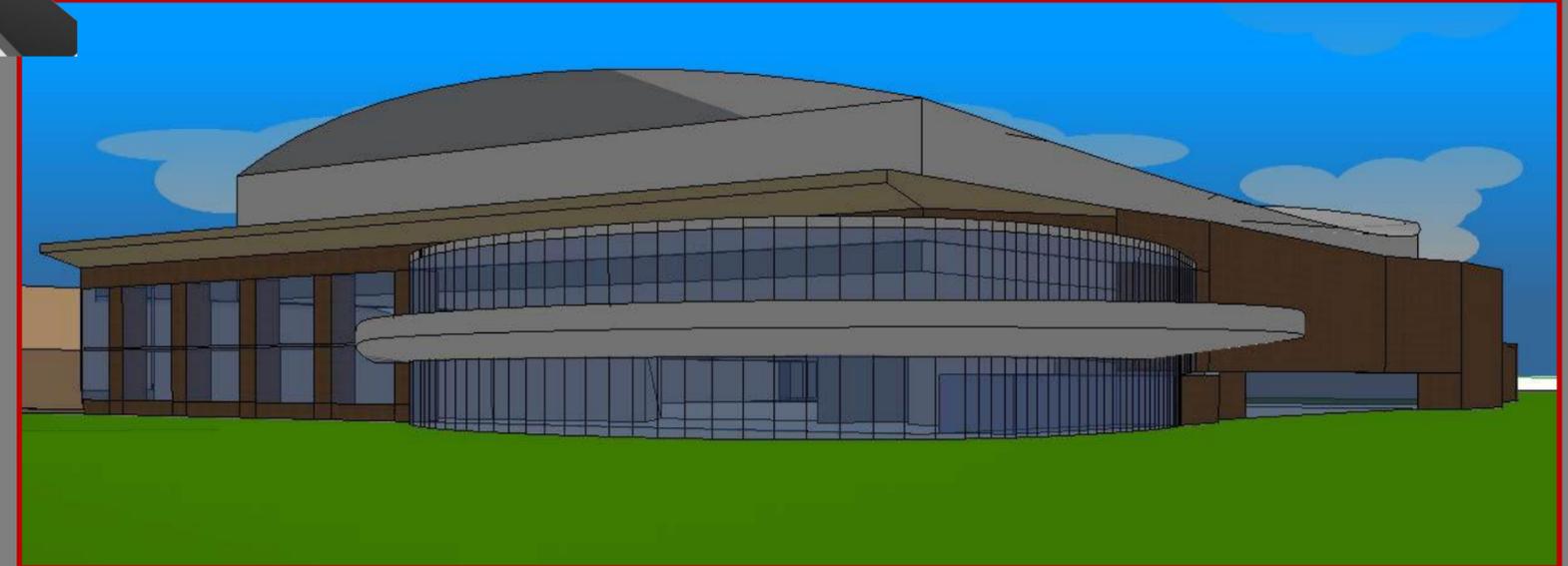




APPROACH

Create a prominent entrance (Globe)

Enhance student entrance



Translate the pattern of repeating glass and brick

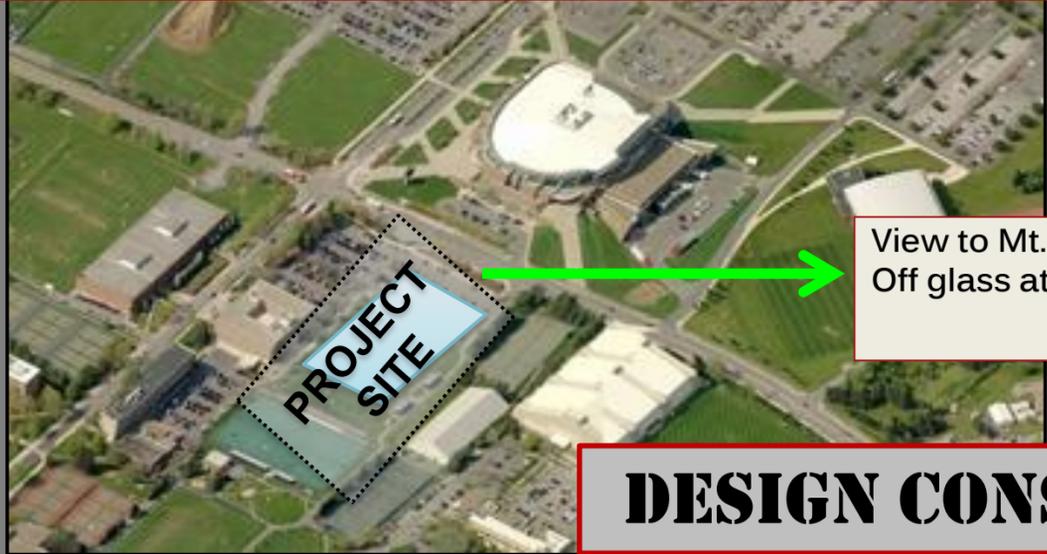
Louvers added for AHU 5 & 6



[RE]DESIGN

Façade Redesign

REASON: We believe we can maintain the original intent of the east façade (to create an impressive view from University Drive as well as a view out to Mt. Nittany and the Bryce Jordan Center) while enhancing the prominence of the entrances as well as reducing thermal loads and cost.



View to Mt. Nittany
Off glass at 15°



DESIGN CONSTRAINTS

PROJECT SITE



Team & Individual Focus Schedules



KEY MILESTONES:

January 27th, 2012:
Initial Architectural Modeling Completed

February 13th, 2012:
Air Handler Relocation & Event Level Design Completed

March 2nd, 2012:
Initial Clash Detection & Value Engineering

DISCIPLINE	TASK	ACTIVITY	Milestone 1		Milestone 2		Milestone 3		Milestone 4		Proj Due	Present.
			1/27/2012	2/13/2012	2/6/2012	2/13/2012	2/20/2012	2/27/2012	3/5/2012	3/12/2012	3/19/2012	3/26/2012
Architectural	Air Handler Relocation & Event Level Redesign	Relocate Air Handlers	█	█								
	Event Level Redesign	Site Considerations	█	█								
	Main Arena Roof System	Finalize Main Arena Roof Design		█								
Structural	Facade Redesign	Redesign Façade - address East façade views										
	Air Handler Relocation & Event Level Redesign	Design Two Way Flat Plate System w/ & w/o Post-Tensioning		█	█							
	Main Arena Roof System	Column Design/Redesign; Column Foundations		█	█							
Mechanical	Event Level Redesign	Long Span Truss Alt. Research & Opt.	█	█	█							
	Main Arena Roof System	Long Span Truss Design; Misc. Steel Members for Roof	█	█	█							
	Facade Redesign	Exterior Columns, Exterior Glazing Panels										
Electrical	Air Handler Relocation & Event Level Redesign	Event Level Load Calcs, Concept Design ERV for train facilities	█	█								
	Main Arena Roof System	Select AHU & Determine Structural Load, Locate/Size Duct Press	█	█								
	Facade Redesign	Finalize Design, Size/Locate Low Press duct/diff, Reflect Cell										
Lighting / Daylighting	Air Handler Relocation & Event Level Redesign	Volume Calcs, Size Ducts, Locate Diffusers										
	Main Arena Roof System	Life Safety Systems (Sprinkler & Smoke Exhaust)										
	Facade Redesign	Trace-Load & Energy Analysis										
CM	Air Handler Relocation & Event Level Redesign	Plug Load Research, Load Calcs, Early Coord issues	█	█								
	Main Arena Roof System	Locate Panels, Load Calcs, Conduit & Wire Sizing & Routing	█	█								
	Facade Redesign	Finalize Design										
Team	Air Handler Relocation & Event Level Redesign	Rigging Load Research, Load Calcs, Size Conduit/Wire										
	Main Arena Roof System	Finalize Design										
	Facade Redesign	Finalize Design										
Team	Air Handler Relocation & Event Level Redesign	Plug Load Research, Load Calcs	█	█								
	Main Arena Roof System	Locate Panels, Size Conduit & Wiring, Conduit Route	█	█								
	Facade Redesign	Finalize Design										
Team	Air Handler Relocation & Event Level Redesign	Daylight Analysis										
	Main Arena Roof System	Light study Ev Lvl Rms, Calcs, Integrate Daylight, Lum Select, Controls										
	Facade Redesign	Finalize Design, Lighting Layout, Reflect Cell										
Team	Air Handler Relocation & Event Level Redesign	Arena Lighting Research	█	█								
	Main Arena Roof System	Calculations, Controls, Aiming Diagrams, Lighting Layout	█	█								
	Facade Redesign	Atrium, Concourse, Mt. Nittany Rm, Club Dining Light Research	█	█								
Team	Air Handler Relocation & Event Level Redesign	3DS Modeling for best shading analysis										
	Main Arena Roof System	Space Daylight Utilization Analysis, Daylight Harvest Controls										
	Facade Redesign	Integrate Daylight Controls with Lighting										
Team	Air Handler Relocation & Event Level Redesign	Luminaire Select, Calcs, Energy Analysis, Code Comp, Check										
	Main Arena Roof System	Aiming Diagram, Lighting Layout, Finalize Cut Sheets										
	Facade Redesign	Existing Condition Estimate										
Team	Air Handler Relocation & Event Level Redesign	Schedule Analysis, Create Schedule	█	█								
	Main Arena Roof System	Analysis of LEED Score Card	█	█								
	Facade Redesign	Update Estimate, Schedule, & LEED Score Card										
Team	Air Handler Relocation & Event Level Redesign	Perform 3D Coordination, Clash Detection, 4D Modeling										
	Main Arena Roof System	Perform Crane Analysis										
	Facade Redesign	Site Utilization Analysis										
Team	Air Handler Relocation & Event Level Redesign	Update Cost, Schedule, & LEED Score Card										
	Main Arena Roof System	Perform 3D Coordination, Clash Detection, 4D Modeling										
	Facade Redesign	Complete Architectural Report										
Team	Air Handler Relocation & Event Level Redesign	Complete Air Handler Relocation & Event Level Redesign Report										
	Main Arena Roof System	Complete Main Arena Roof System Redesign Report										
	Facade Redesign	Complete Façade Redesign Report										

Team Schedule

March 26th, 2012:
All Redesign Focuses Completed.

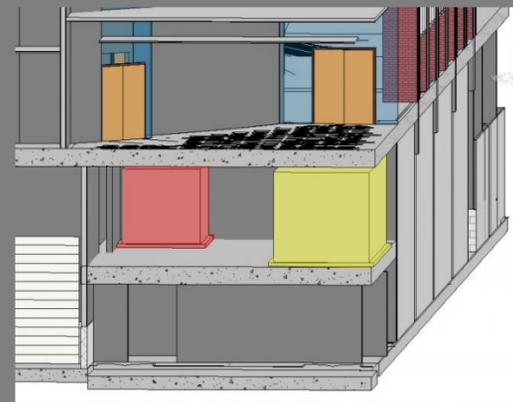
April 4th, 2012:
Final Report Submission

April 9th, 2012:
Final Presentation



Scheduled Timeline

MILESTONE: Architectural Modeling Completed



Progress



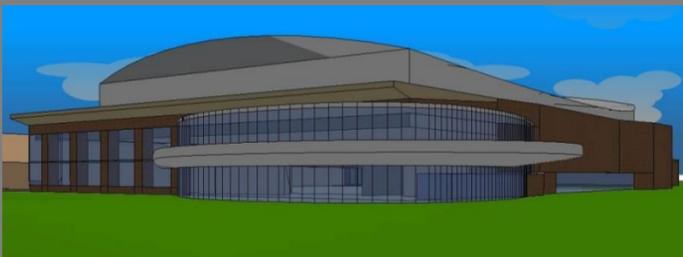
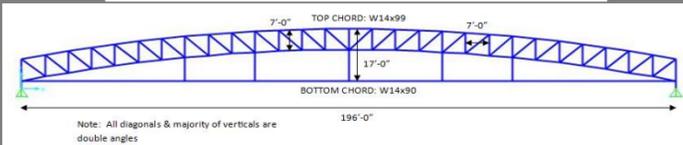
Air Handler Relocation



Arena Roof Systems



Façade Redesign



Team Schedule																			
Milestone Date:	Milestone 1: 1/27/2012			Milestone 2: 2/13/2012			Milestone 3: 3/2/2012			Milestone 4: 3/26/2012			Project Due: 4/4/2012	Presentations: 4/9/2012					
Weeks:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
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Focus																			
	Air Handler Relocation and Event Level	Preliminary loads and system Design			Systems design & coordination			3D & 4D review & design authoring											
	Main Arena Roof System Redesign	Preliminary loads and system Design			Systems design & coordination			3D & 4D review & design authoring											
	Façade Redesign	Preliminary daylighting design			Daylighting integration			Systems design & coordination			Preliminary loads and system Design								
						3D & 4D review & design authoring													



Two Way Flooring Redesign & Arena Roof Modeling



Event Level Daylighting & Electrical Load Calculations



Event Level Load Calcs, AHU & Ductwork Sizing



Existing Conditions Estimate & Scheduling Analysis

SOFTWARE



MAJOR BIM USE(S)

Design Authoring, Structural Analysis

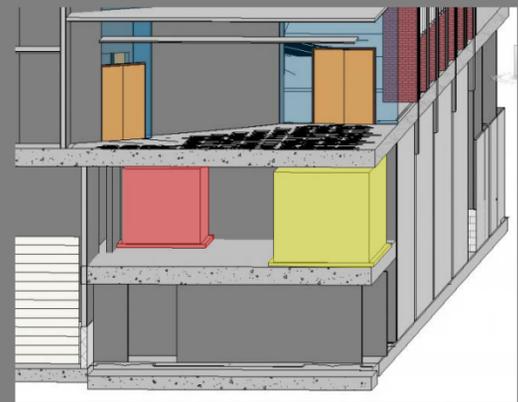
Design Authoring, Lighting Analysis

Design Authoring, Mechanical Analysis

Cost Estimation, 4D Modeling

Friday, January 27th, 2012

MILESTONE: Air Handler Relocation Completed



Progress



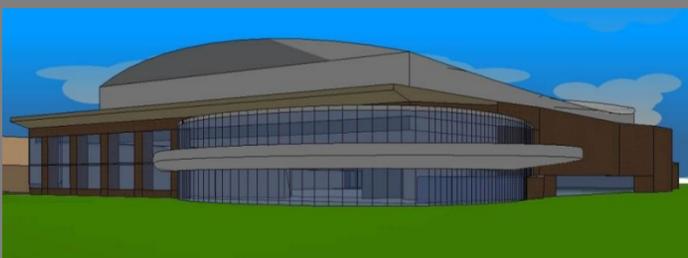
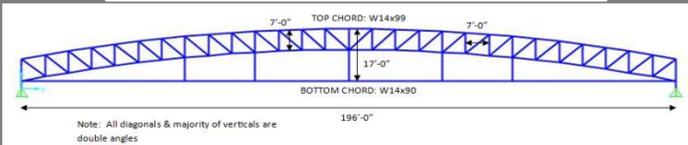
Air Handler Relocation



Arena Roof Systems



Façade Redesign



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							3D & 4D review & design authoring											



Gravity Column Redesign & Long Span Truss Design



Façade Daylighting Controls & Finalize Event Lvl. Design



Finalize Event Level Designs & AHU Relocations



LEED Analysis & Crane Placement Study

SOFTWARE



MAJOR BIM USE(S)

Structural Analysis

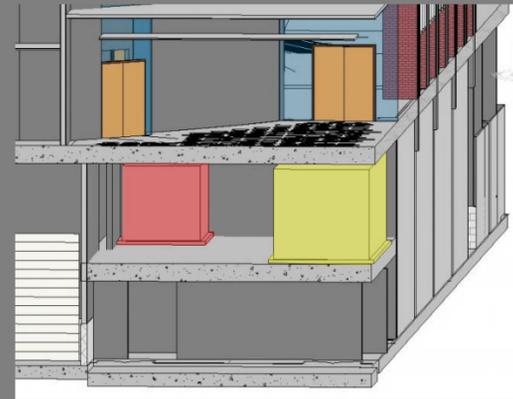
Design Authoring, Lighting Analysis

Design Authoring, Mechanical Analysis

Site Utilization, LEED Analysis

Tuesday, February 13th, 2012

MILESTONE: Initial Clash Detection & Value Eng.



Progress



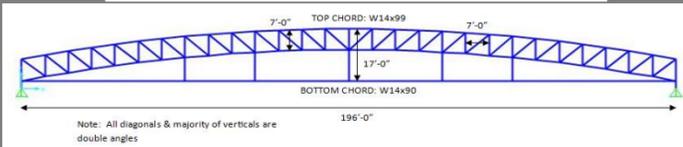
Air Handler Relocation



Arena Roof Systems



Façade Redesign



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							3D & 4D review & design authoring												



Long Span Truss Design & Façade Glazing Analysis



Arena Lighting Layout & Finalize Electrical Redesign



Main Arena Mechanical Design & Coordination



Update Cost, Schedule & Perform Clash Detection

SOFTWARE



MAJOR BIM USE(S)

Design Authoring, Structural Analysis, 3D Coordination

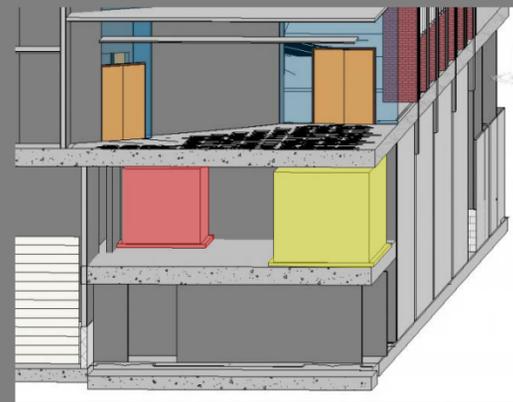
Design Authoring, Lighting Analysis

Design Authoring, Mechanical Analysis, 3D Coordination

3D Coordination, Cost Estimation, 4D Modeling

Friday, March 2nd, 2012

MILESTONE: Redesign Focuses Completed



Progress



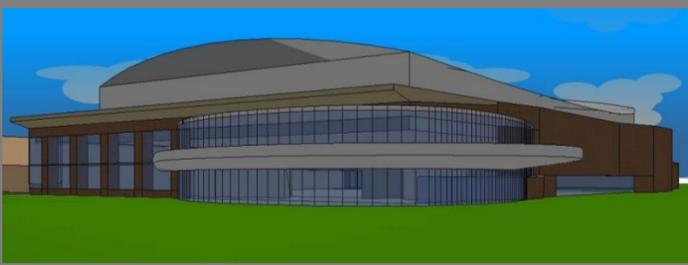
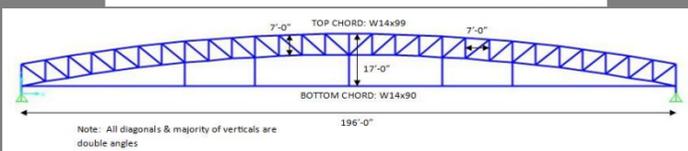
Air Handler Relocation



Arena Roof Systems



Façade Redesign



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Column Analysis & Façade Analysis/Redesign



Finalize Arena Lighting Design & Façade Redesign



Main Arena Mechanical & Life Safety Designs



Finalize Cost Estimates, Schedule & LEED Analysis

SOFTWARE

MAJOR BIM USE(S)

Structural Analysis, 3D Coordination

Design Authoring, Lighting Analysis

Design Authoring, Mechanical Analysis, 3D Coordination

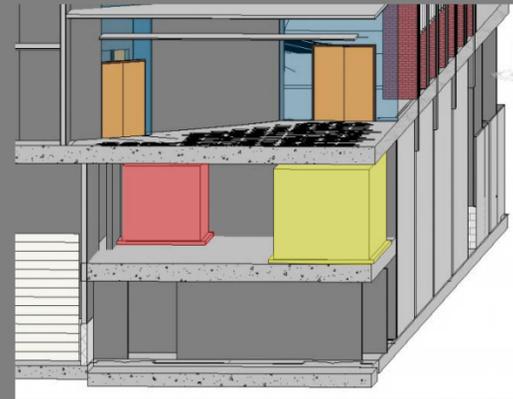
3D Coordination, Cost Estimation, 4D Modeling

Monday, March 26th, 2012

MILESTONE: Final Report Submission



Team Schedule																					
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Progress



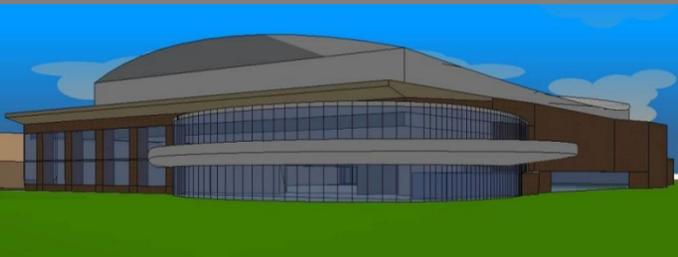
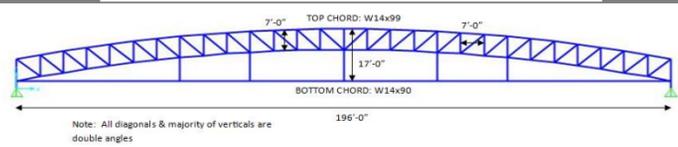
Air Handler Relocation



Arena Roof Systems



Façade Redesign



Finalize Final Report



Finalize Final Report



Finalize Final Report



Finalize Final Report

SOFTWARE



MAJOR BIM USE(S)

None.

None.

None.

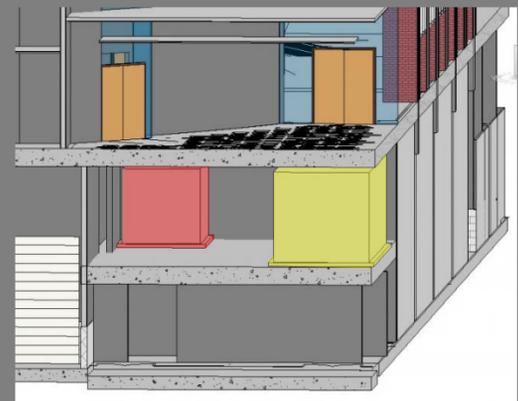
None.

Wednesday, April 4th, 2012

MILESTONE: Final Presentation



Team Schedule																				
Milestone Date:	Milestone 1: 1/27/2012			Milestone 2: 2/13/2012			Milestone 3: 3/2/2012			Milestone 4: 3/26/2012		Project Due: 4/4/2012	Presentations: 4/9/2012							
Weeks:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
	1/9/2012	1/16/2012	1/23/2012	1/30/2012	2/6/2012	2/13/2012	2/20/2012	2/27/2012	3/5/2012	3/12/2012	3/19/2012	3/26/2012	4/2/2012	4/9/2012	4/16/2012	4/23/2012	4/30/2012	5/7/2012		
Focus	Air Handler Relocation and Event Level	Preliminary loads and system Design			Systems design & coordination			3D & 4D review & design authoring												
	Main Arena Roof System Redesign	Preliminary loads and system Design			Systems design & coordination			3D & 4D review & design authoring												
	Façade Redesign	Preliminary daylighting design			Daylighting integration			Systems design & coordination			Preliminary loads and system Design									
					3D & 4D review & design authoring															



Progress



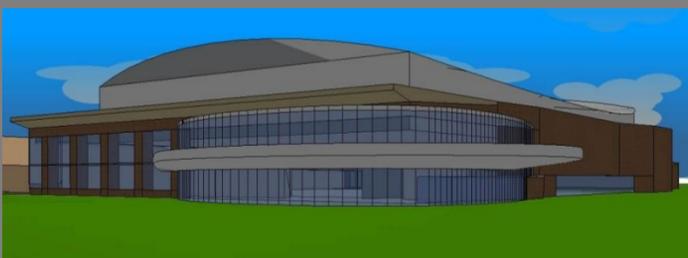
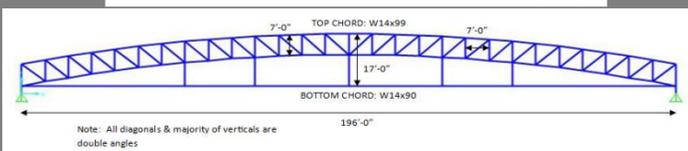
Air Handler Relocation



Arena Roof Systems



Façade Redesign



Finalize & Practice Final Presentation



Finalize & Practice Final Presentation

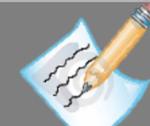
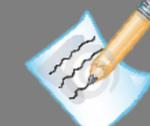


Finalize & Practice Final Presentation



Finalize & Practice Final Presentation

SOFTWARE



MAJOR BIM USE(S)

None.

None.

None.

None.

Monday, April 9th, 2012

