AMERICAN EAGLE OUTFITTERS Quantum II Corporate Headquarters

Michael Sandretto Spring – 2007 Structural Option

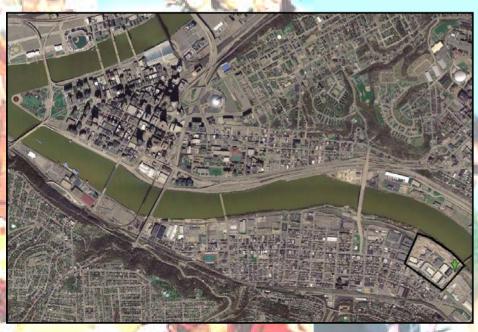
Presentation Outline

Building Description & Background

- Problem Statement & Proposed Solution
- Depth Study
 - Cross Braced Lateral System
- Breadth Study
 - Cost Analysis & Scheduling
 - Alternative Floor System
- Conclusions

Location & History The Old South Side Works

- One of many steel manufacturing facilities that made the region an industrial power.
- 2 ½ miles outside the city on the south shore of the Monongahela River.





Location & History The New South Side Works

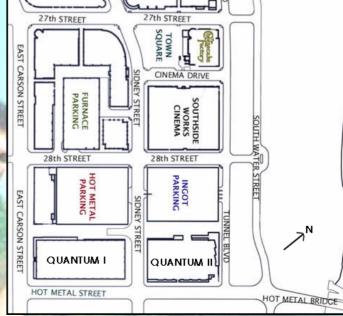
Opened in 2002

34 acre, multi-million dollar commercial development



Includes: retail, dining, offices, cinema, parking,
 & apartments.





Quantum II

6 story 186,000 square foot office.
Purchased by American Eagle Outfitters
Currently in tenant fit-out.
\$22.4 million



Project Team

- **Developer: Soffer Development**
- **Owner: American Eagle Outfitters**
- Base Building Architect: Davis Gardner Gannon Pope
- **Base Building Engineer: Watson Engineers**
- Fit-out Architect: The Design Alliance
- Fit-out Engineer: Atlantic Engineering Services
 - **Fit-out MEP: Tower Engineering**

Building Systems

- Mechanical
 CAV System
 18000 CFM Roof Top Unit
 7200 CFM Roof Top Unit
- Lighting / Electrical
 480/277V, 3 Phase, 4 Wire Primary System
 208/120V, 3 Phase, 4 Wire Secondary System



Gravity System

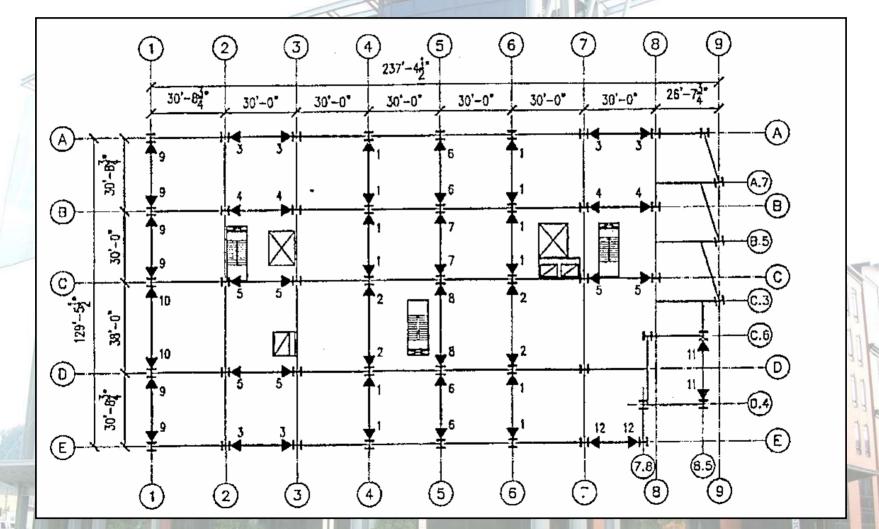
- Composite floor deck: 3" 4 ksi concrete over 3" 20 gauge metal deck
- ¾" diameter 4 ½" long shear studs
- 50 ksi steel members
- 3 rows of 30'x30' bays
- 1 row of 38'x30' bays

Gravity System

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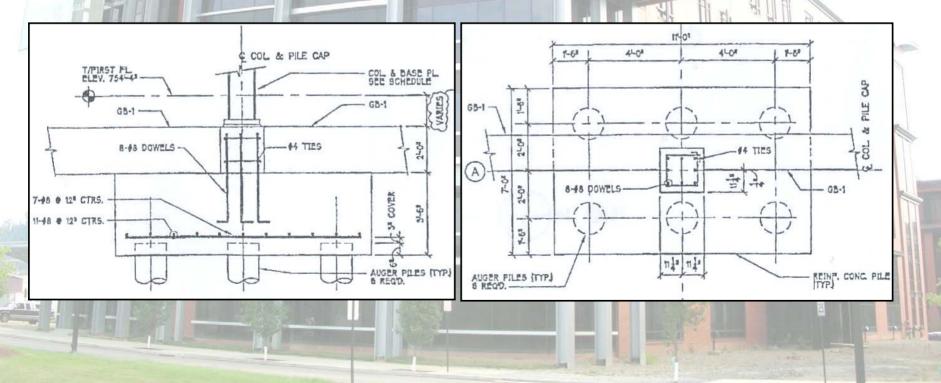
Lateral System



Moment framing plan

Foundation

- 45' concrete piles
- 3 ksi concrete with 60 ksi reinforcing steel
- Grade beams surround building perimeter

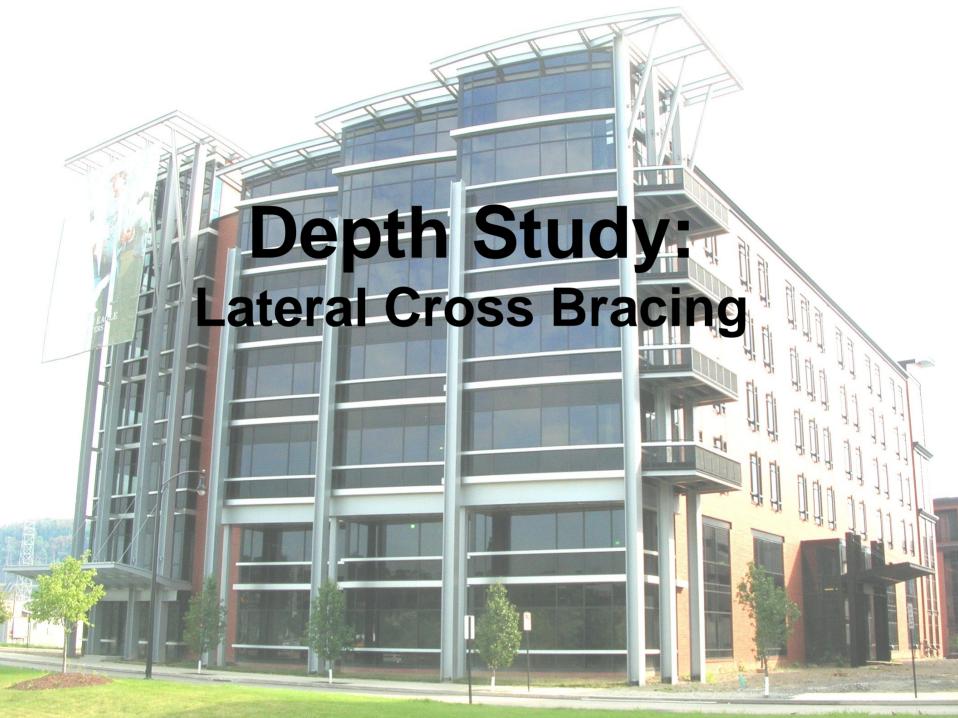


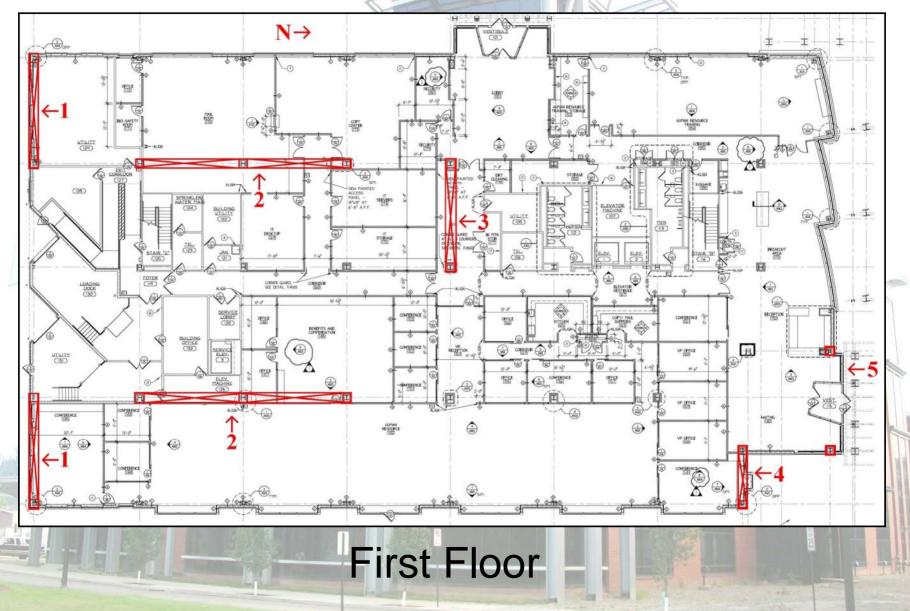
Problem Statement

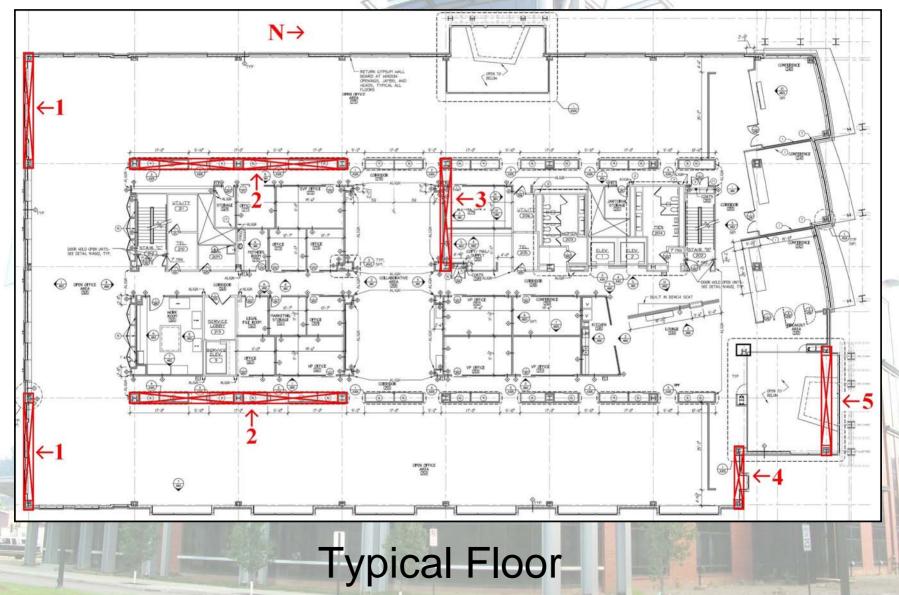
- Designed for maximum fit-out adaptability
- Lateral system unobtrusive to floor plan
- Required extensive moment frame system

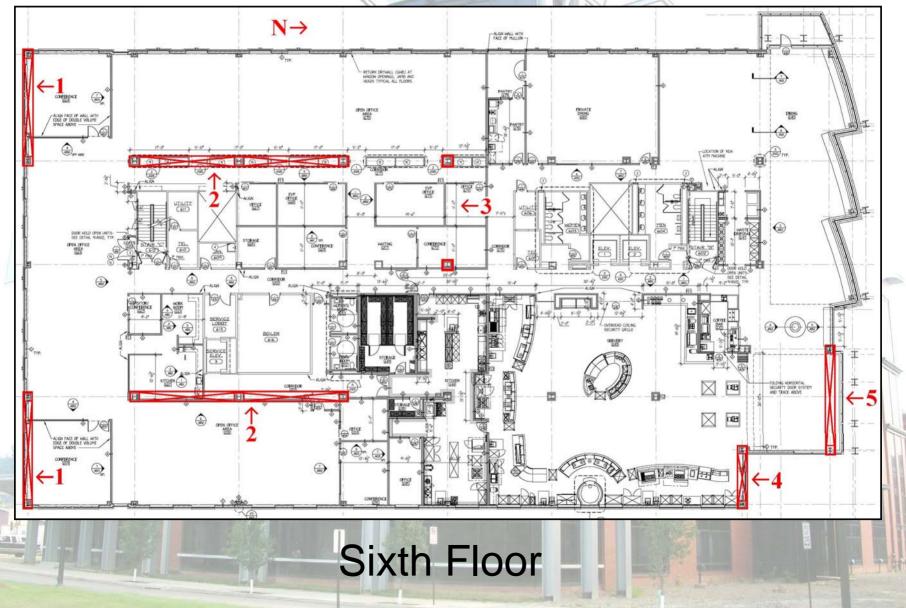
Proposed Solution

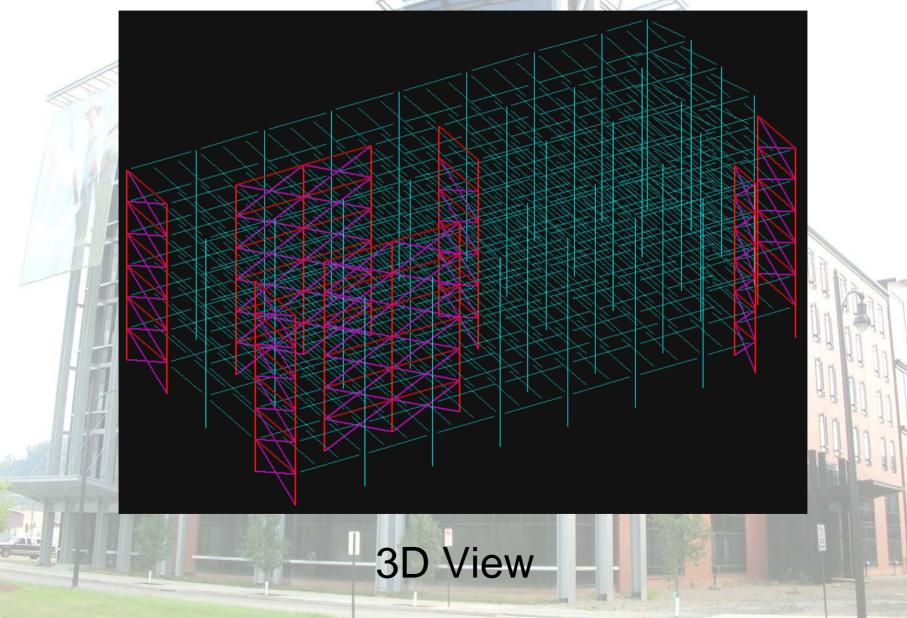
- Replace existing lateral system
- Employ diagonal steel cross bracing
- Utilize final architectural plans to retro-fit structure with cross bracing without obstructing floor plan
- Design assisted by RAM Steel











Loads: Gravity

Dead Loads

- Typical Floor Slab 57 psf
 Roof
- Roof Slab
 57 psf
 All Floors
- Exterior Curtin Wall 20 psf
- MEP 10 psf
- Miscellaneous

10 psf 5 psf Stairs

Balconies
Flat Roof Snow

Live Loads

30 psf

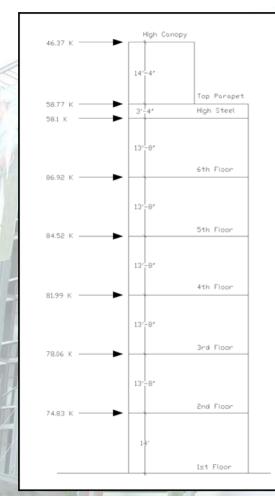
100 psf

100 psf

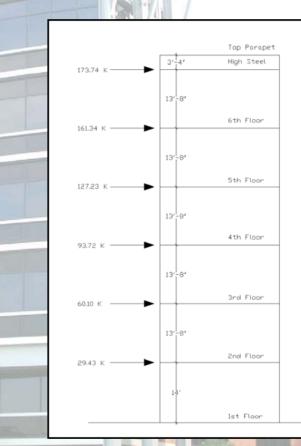
100 psf

21 psf

Loads: Lateral



Wind Force Diagram



Seismic Force Diagram



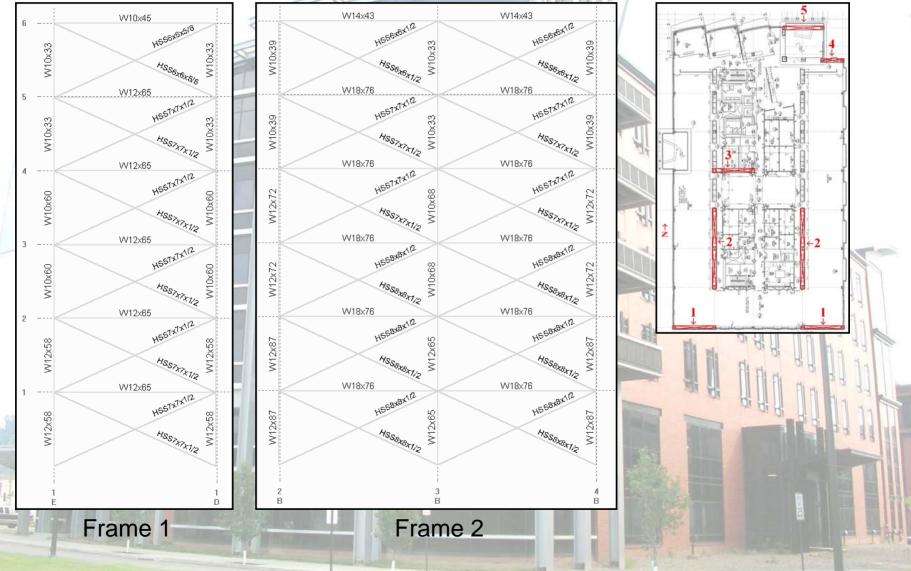
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Lateral

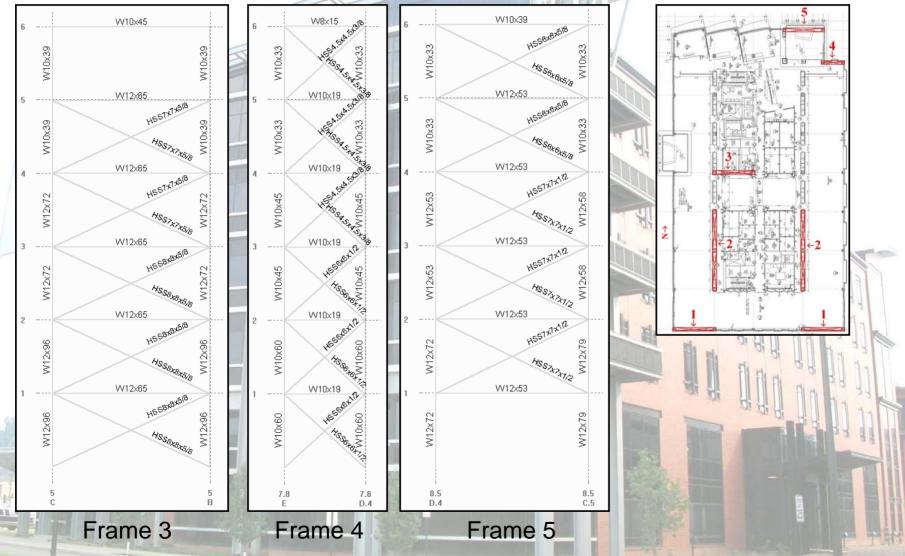
- Square HSS shapes used in bracing
- Sized to withstand wind & seismic
- Drift kept within $\Delta = L/400$

-2.52"











Breadth: Cost Analysis & Scheduling Alternative Floor

Breadth: Cost Analysis

Cost data taken from RS Means

Exist	ting Syste	em
Typical Floo	r (x5) \$	351,851
Roof	\$	298,701
Columns	\$	360,112
A starter	Total \$	2,418,068

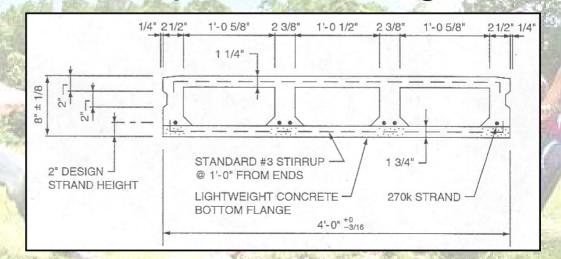
Redesigned System Typical Floor (x5) 265,690 S 207,827 Roof \$ Columns 238,602 \$ 168,848 Bracing \$ Total 1,943,727 \$

Breadth: Construction Schedule

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ID	Task Name	Duration		Month 1					onth 2			Mont		
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2	1st Floor Bracing	1 day												
3	2nd Floor Beam	5 days		*										
4	2nd Floor Deck	10 days												
5	2nd Floor Studs	3 days												
6	2nd Floor Slab	2 days												
7	2st Floor Col.	1 day			Ť.									
8	2nd Floor Bracing	1 day												
9	3rd Floor Beam	5 days												
10	3rd Floor Deck	10 days												
11	3rd Floor Studs	3 days					h							
12	3rd Floor Slab	2 days					_							
13	3rd Floor Col.	1 day				Ť.								
14	3rd Floor Bracing	1 day					T h							
15	4th Floor Beam	5 days					_ *							
16	4th Floor Deck	10 days						1						
17	4th Floor Studs	3 days												
18	4th Floor Slab	2 days												
	4th Floor Col.	1 day						Ĕ.						
20	4th Floor Bracing	1 day						Ľ.						
21	5th Floor Beam	5 days												
22	5th Floor Deck	10 days												
23		3 days												
24	5th Floor Slab	2 days							\perp					
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27		5 days												
		10 days												
		3 days												
30		2 days									\downarrow			
31		1 day									ĨĻ.			
32	6Th Floor Bracing	1 day									Ĕ,			
33	Roof Beam	6 days									*			
		10 days										-		
		2 days												
36	Roof Slab	2 days												

Breadth: Alternative Floor

8" Hollow Core Concrete Planks
Longer span capability – reduces beams
Self weight = 57 psf – minimal impact on slab weight & seismic loads
Unable to utilize composite framing



Breadth: Alternative Floor

W21x44	W24x55	W21x44	W21x44
W21x44 X55	W24x55	W21x44	W21x44 W21x55
W21x44	- H W24x55	W21x44	W21x44

Hollow Core PI	ank	System
Steel	\$	33,844
Slab	\$	36,826
Total	\$	70,670

	Redesigned	Syst	em
Steel		\$	21,862
Slab		\$	13,452
	Total	\$	35,314

Conclusions

