Rockville Metro Plaza II

Rockville, Maryland

John M. Vais | Structural Option

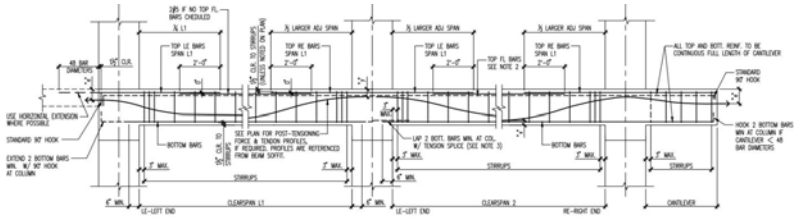
Tech III – Floor Systems

Background Information

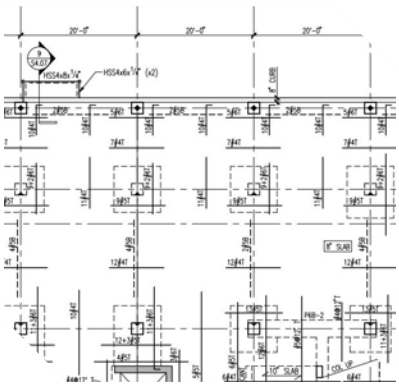
- Location - Rockville, MD
- Function - Office/Retail/Parking
- Size
  - 10 Stories Tall
  - 323,000 s.f. (gross)
- Developer - Foulger Pratt
- Structural Engineer - Cagley & Assoc.

As-Built Structural System

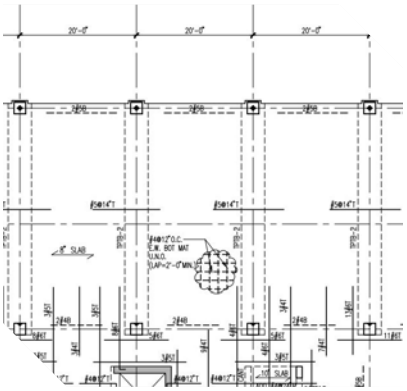
- One-Way Floor Slab – Office Levels
- Cast-in-Place Post-Tensioned Beams
- Two-Way Floor Slab – Retail/Parking Levels
- Drop Panels
- Concrete Shear Walls



As-Built System – Typical Bay



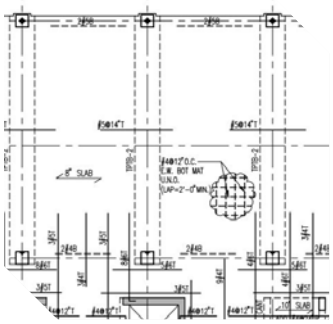
Typical Garage Bay



Typical Office Bay

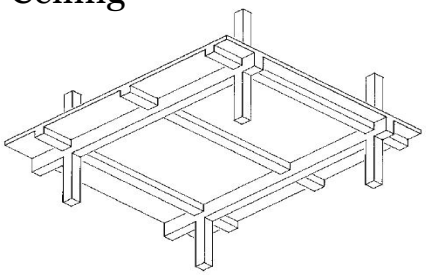
Spot Checks – As-Built System

- One-Way Slab
  - Positive Reinforcing
  - Negative Reinforcing
  - Deflection
- PT Beam Capacity
- Typical Column Capacities
  - Interior, Exterior, Garage
- Footings (Min. Size)



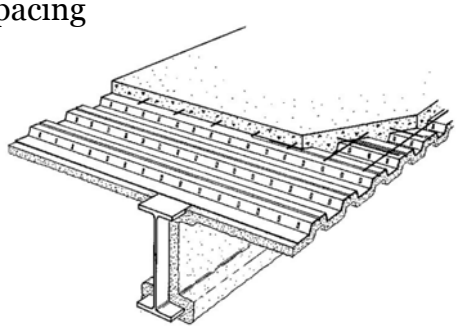
Selection of Alternatives - Office

- Maintain Minimal Floor Depths
- Maintain Open Floor Plan
  - Keep Current Bay Dimensions
  - Avoid Adding Columns if Possible
- Allow for MEP Access in Ceiling
- Cost per Square Foot
- Weight per Square Foot



Alt. Sys. 1 – Non Composite Steel

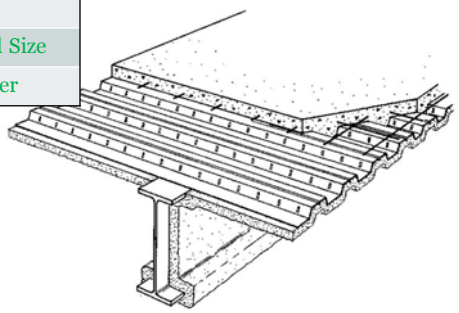
- Decking – 2C20 (Vulcraft)
- Topping – 3 ¼" LWC (3ksi)
  - Fire-Proofing
  - Minimize Floor Depth
- Beams –40' Span, 6 2/3' Spacing
  - W21x48
- Girders – 20' Span
  - W21x48 (interior)
  - W16x36 (exterior)



Alt. Sys. 1 – Non Composite Steel

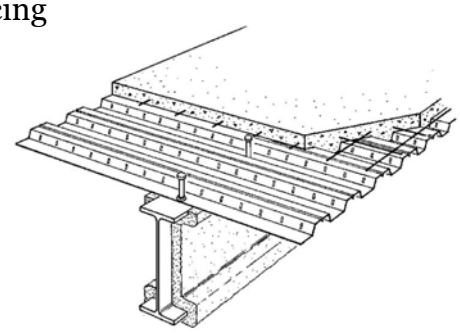
	Alternative System	Relative to Original Design
Weight	46.8 psf	Lighter
Depth	26.25"	More
Cost	$14.66	Less
Fire Rating	2HR*	-
Foundation	-	Reduced Size
Lateral	Brace/Moment	Lighter

Notes:
- Fire Proofing on Beams
- Vibration Issues Possible
- More MEP Coordination Required



Alt. Sys. 2 – Composite Steel

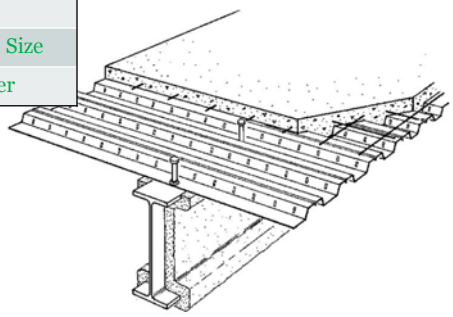
- Decking – 2VLI20 (Vulcraft)
- Topping – 3 ¼" LWC (3ksi)
  - Fire-Proofing
  - Minimize Floor Depth
- Beams –40' Span, 10' Spacing
  - W18x35
- Girders – 20' Span
  - W18x35 (interior)
  - W16x26 (exterior)



Alt. Sys. 2 – Composite Steel

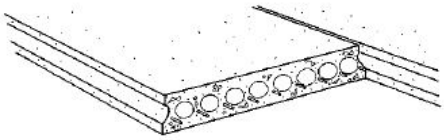
	Alternative System	Relative to Original Design
Weight	48.6 psf	Lighter
Depth	23.25"	More
Cost	$13.54	Less
Fire Rating	2HR*	-
Foundation	-	Reduced Size
Lateral	Brace/Moment	Lighter

Notes:
- Fire Proofing on Beams
- Vibration Issues Possible
- More MEP Coordination Required



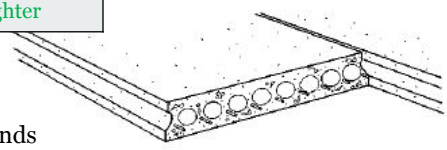
Alt. Sys. 3 – Hollow Core Slab

- Planks – 4'-0" x 6" (66-S, PCI Handbook)
  - f'c = 5 ksi
  - f_{pu} = 270 ksi (six 3/8" φ strands)
- Topping – 2" NWC (5ksi)
  - Meets 2HR Fire Rating
  - Large Floor Depth
- Girders – 40' Span
  - W30x90



Alt. Sys. 3 – Hollow Core Slab

	Alternative System	Relative to Original Design
Weight	82.9 psf	Lighter
Depth	38.0"	More
Cost	$25.77	More
Fire Rating	2HR*	-
Foundation	-	Reduced Size
Lateral	Brace/Moment	Lighter



Notes:
- Fire Proofing on Beams
- Fire Rating Assumes Restrained Ends
- Non-Uniform Geometries - Complex
- Vibration Issues Possible
- More MEP Coordination Required

Comparison of Systems

Criteria		Existing	Alternatives		
		One-Way Slab with PT Beams	Non-Composite Steel	Composite Steel	Hollow Core Planks
General					
	Weight (PSF)	129.4	46.8	48.6	82.9
	Slab Weight (PSF)	100.0	38.9	38.9	74.0
	Overall Depth	20"	26.25"	23.25"	38"
	Slab Depth	8"	5.25"	5.25"	8"
	Cost ($/SF)	16.87	14.66	13.54	25.77

Comparison of Systems

Criteria		Existing	Alternatives		
		One-Way Slab with PT Beams	Non-Composite Steel	Composite Steel	Hollow Core Planks
Architectural					
	Fire Rating	2HR	2HR - Beams Protected	2HR - Beams Protected	2HR - Beams Protected
	Add. Fireproofing	Not Required	Required	Required	Required
	MEP Coordination	Easy	Moderate	Moderate	Difficult
	Other Considerations	-	Reduced Floor-to-Ceiling Height	Reduced Floor-to-Ceiling Height	Non-Rectangular/ Geometry Difficult

Comparison of Systems

Criteria		Existing	Alternatives		
		One-Way Slab with PT Beams	Non-Composite Steel	Composite Steel	Hollow Core Planks
Structural					
	Gravity	-	Reduce needed column capacity	Reduce needed column capacity	Reduce needed column capacity
	Foundation	-	Large reduction of footing size	Large reduction of footing size	Reduction of footing size
	Lateral	Moment Frame/ Shear Wall	Moment Frame/ Braced Frame	Moment Frame/ Braced Frame	Moment Frame/ Braced Frame
Serviceabitity					
	Vibration	Minimal	Likely	Likely	Likely
Construction					
	Formwork	Yes	Minimal	Minimal	Minimal
	Constructability	Medium	Easy	Easy	Easy
	Lead Time	Standard	Standard	Standard	Long
Further Investigate					
	Feasible	-	No	Yes	No

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