

Lancaster County Bible Church



Daniel Bellay

Lancaster County Bible Church

Structural Option

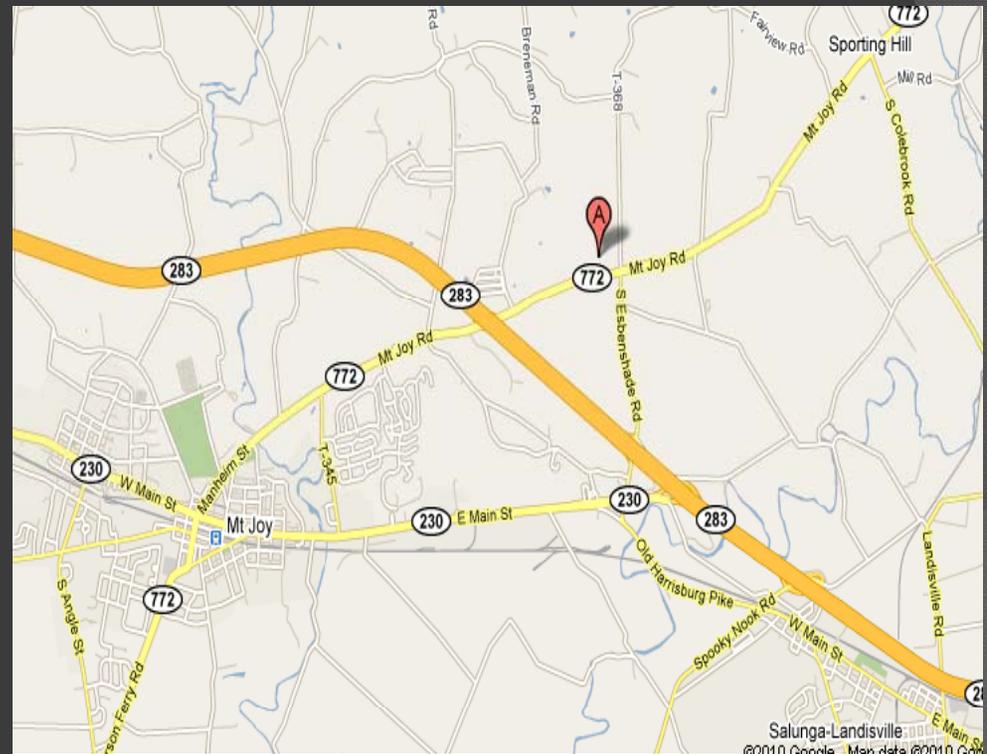
Outline

- *Overview of Existing*
- *Proposal*
- *Structural Depth Study*
- *Architectural Breadth Study*
- *Construction Management Breadth Study*
- *Summary/ Conclusions*
- *Acknowledgements*
- *Questions*

Overview of Existing

➤ Location

- 2392 Mount Joy Road
Manheim, PA 1754



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Overview of Existing

➤ Location

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Manheim, PA 1754



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Overview of Existing

➤ Location

➤ Use

- Business (B)
- Assembly (A-3)
- Educational (E)



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Structural Option

Overview of Existing

- Location
- Use
- Owners
 - Lancaster County Bible Church
 - Pastor David Ashcraft



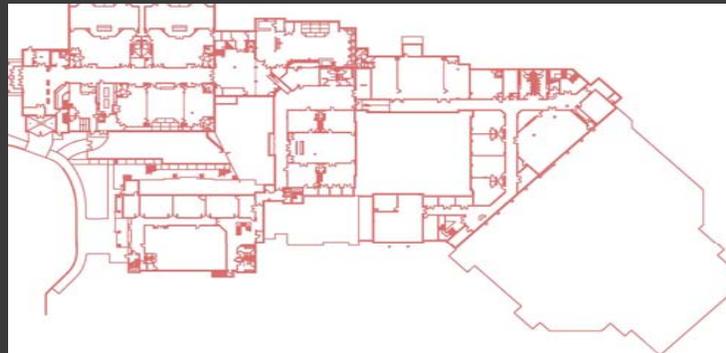
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Structural Option

Overview of Existing

- Location
- Use
- Owners
- Size
 - 3-Story Low-Rise Building (45 ft.)
 - 200,000 s.f. (Total)
 - 78,000 s.f. (Addition)



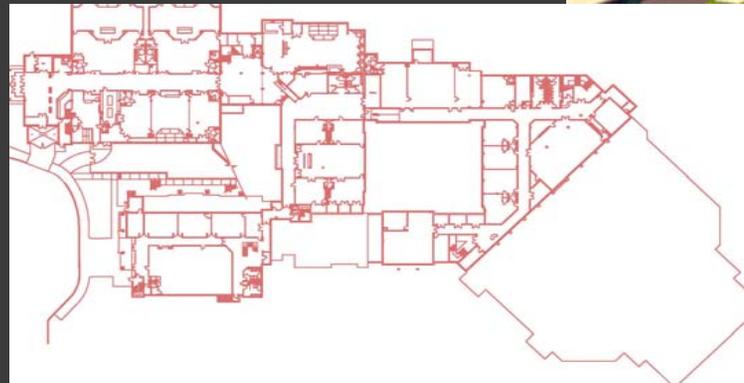
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Structural Option

Overview of Existing

- Location
- Use
- Owners
- Size
- Cost
 - Approximately \$15 Million



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Structural Option

Overview of Existing

➤ Structure

- W-Shaped Columns, Beams, Girders
- Open Web Steel Joist Flooring
- Tubular Steel Cross Bracing



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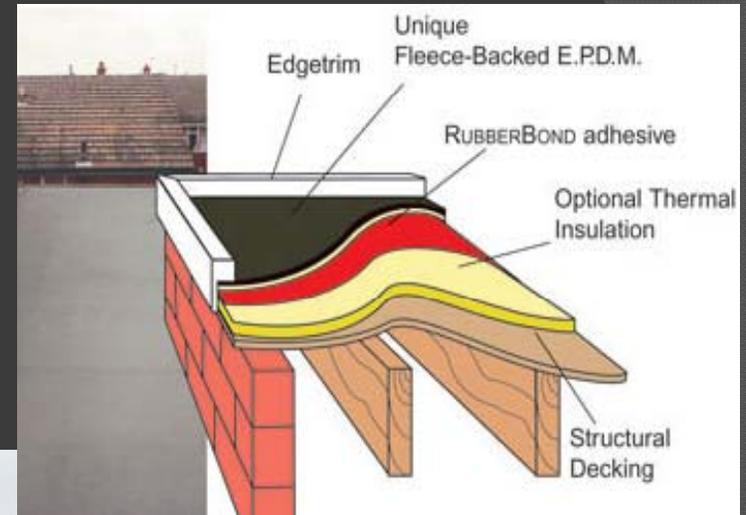
Structural Option

Overview of Existing

➤ Structure

➤ Exterior Finishes

- Façade: E.I.F.S. and Brick Veneer
- Roofing: Flat E.P.D.M.



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Proposal

- Structural Depth Study
 - Structural Re-design Using L.R.F.D.
 - Structural Re-design using Composite Steel Framing



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Structural Option

Proposal

- *Structural Depth Study*
- *Construction Management Breadth Study*
 - *Relative Cost Comparison of Different Framing Systems*
- *Architectural Breadth Study*
 - *Impact to Ceiling Layout due to Composite Steel Re-design*

Outline

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Structural Depth Study

- Existing Design Method
 - Allowable Stress Design (ASD)
- Proposed Design Method
 - Load and Resistance Factor Design

Structural Depth Study

➤ *Open Web Steel Joists*

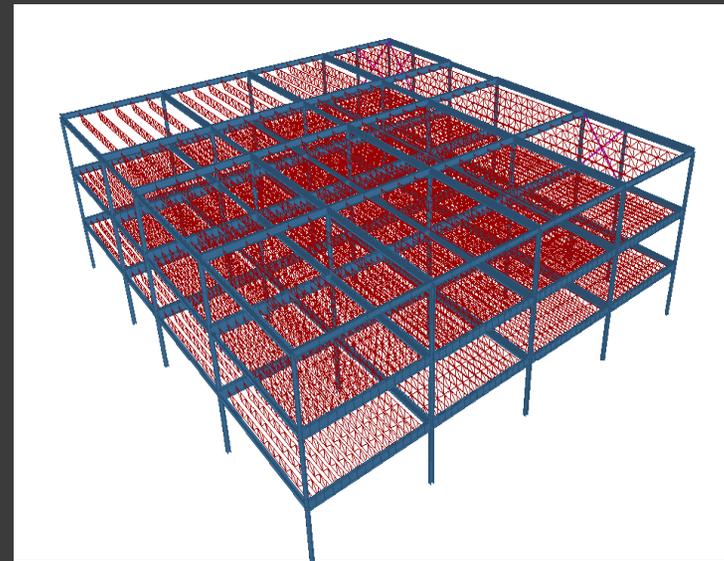
- *No Reduction*

➤ *Beams*

- *No Reduction*

➤ *Girders*

- *% 6.02 Reduction Achieved*



Structural Depth Study

- Existing Flooring System
 - Open Web Steel Joist
- Proposed Composite Floor System
 - 3" USD Metal Deck w/ 4 ½" N.W.C.

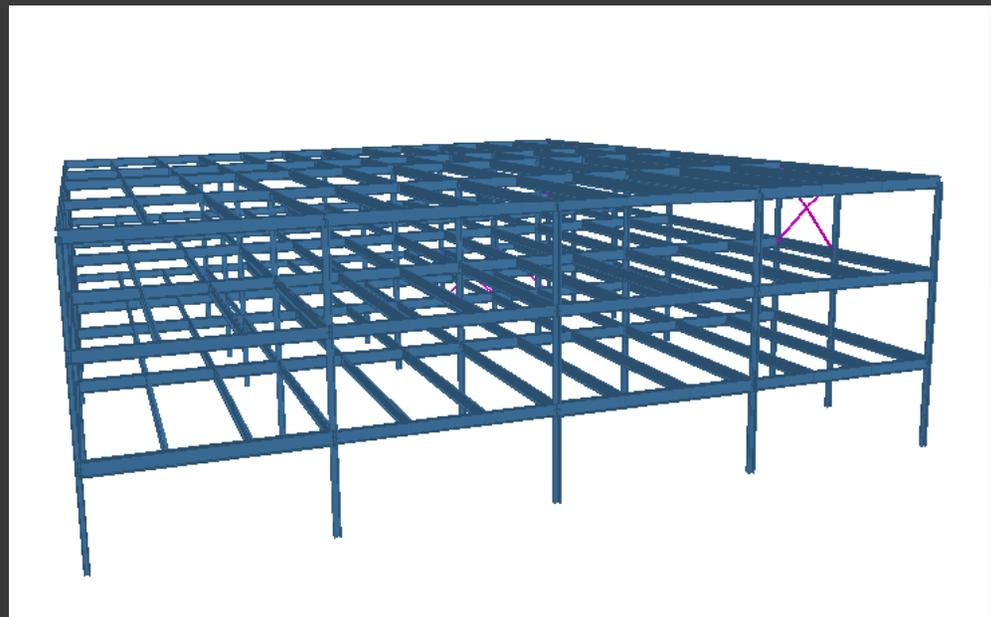
Structural Depth Study

➤ In-fill Beams

- W 21x55 (76)
- W 16x26 (22)

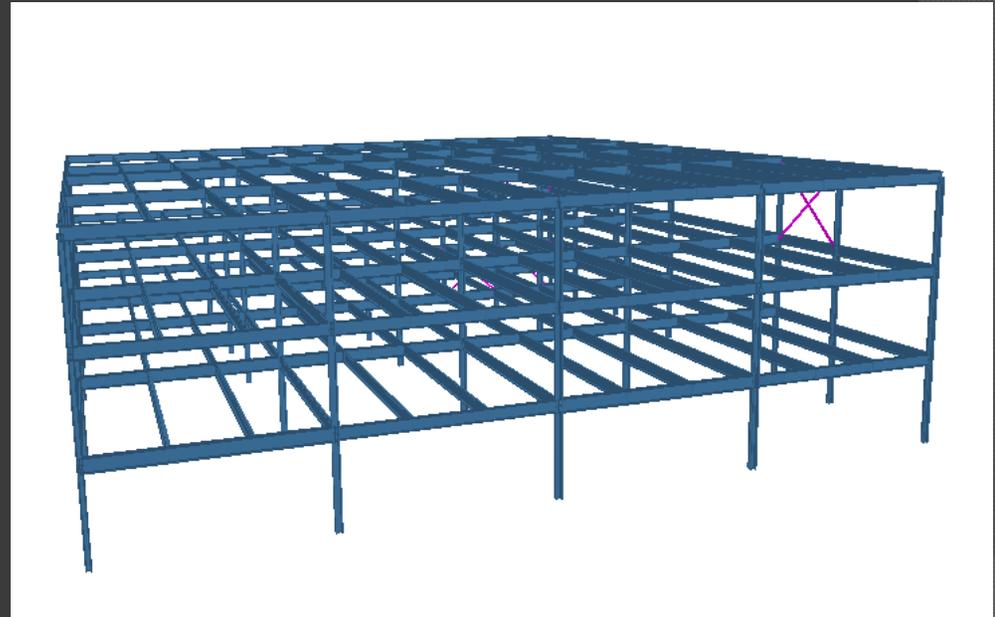
➤ Girders

- W 24x76 (60,102)



Structural Depth Study

- Structural Steel
 - 23.3 % Weight Reduction
- Metal Decking
 - Increased 2.14 (# / s.f.)
 - Total 115,000 (pounds)
- Shear Studs
 - 11,420 (5", $\frac{3}{4}$ " \varnothing)

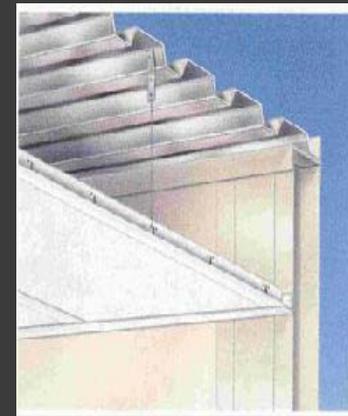


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Architectural Breadth Study

- Existing Ceiling
 - Exposed
- Proposed Ceiling
 - Drop Acoustical Panel



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Construction Management Breadth Study

➤ *Cost*

- *\$1.54 Million (Existing System)*
- *\$2.08 Million (Composite Redesign)*

➤ *Schedule*

- *Longer Construction Time*
- *Fewer Members*
- *Original Schedule Difficult to Maintain*

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Summary/Conclusions

- *Structural*
 - *LRFD more Efficient ASD*
 - *Composite Design not most Efficient System*
- *Architectural*
 - *Ceiling Impact Minimal*
 - *Maintained Overall Architectural Program*
- *Construction Management*
 - *Higher Cost*
 - *Original Schedule Difficult to Maintain*

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Acknowledgements

- Warren Mann and Michael Hughes of Mann-Hughes Architecture
- Pastor David Ashcraft
- AE Faculty and Staff
- My Family

Thank You!

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Structural Option

Questions

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