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Gilbane Building Co.

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Outline

Background
Solar Panels
- Electrical Breadth

BIM for Façade
Prefabrication
- Mechanical Breadth

Conclusions
Questions

Building Statistics:

- 154,000 SF
- 5 floors + penthouse
- $74 million
- Outpatient diagnostic and treatment center
- Apr. 2008 – Dec. 2010
- Design-Bid-Build

Architecture:

- Consolidate existing services into one building
- Offices, exam rooms, linear accelerators, radiation/oncology
- 4th floor expansion
- Entrance Lobby

Mechanical System:

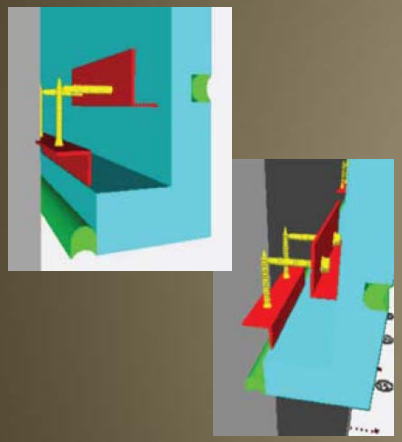
- All air, local reheat in each room
- 4 main AHU's
- 288 air terminal units

Electrical System:

- 23 local transformers
- 83 panel boards
- 65 different light fixtures, fluorescent

Building Envelope:

- Brick veneer, stone, and curtain wall
- EPDM single-ply roof membrane w/ white acrylic coating
- Roof garden



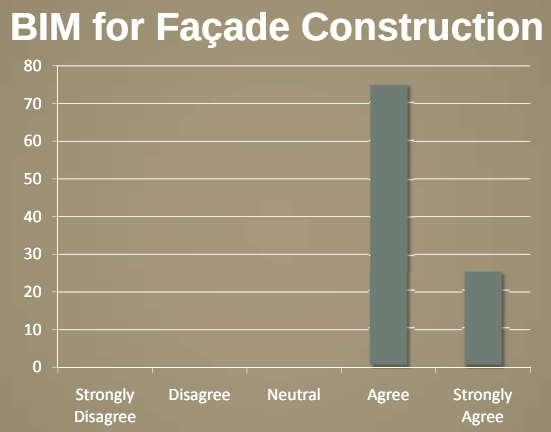
BIM for Façade Construction

Possible Limitations:
- Learning curve
- Technology
- Experience

Possible Benefits:
- Quicker construction
- Better coordination
- Shorter schedule

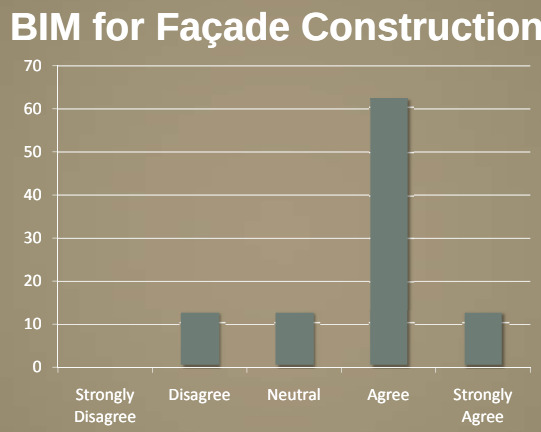
Survey Results:

- Increase Constructability?
- Yes
  - Structural analysis
  - Coordination
  - Details



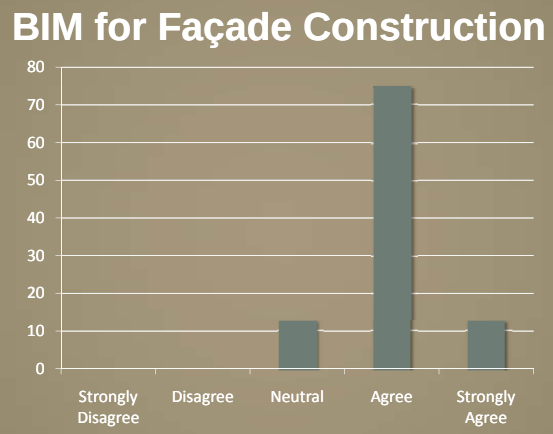
Survey Results:

- Increase Productivity?
- Yes
  - Communication
  - Plan execution



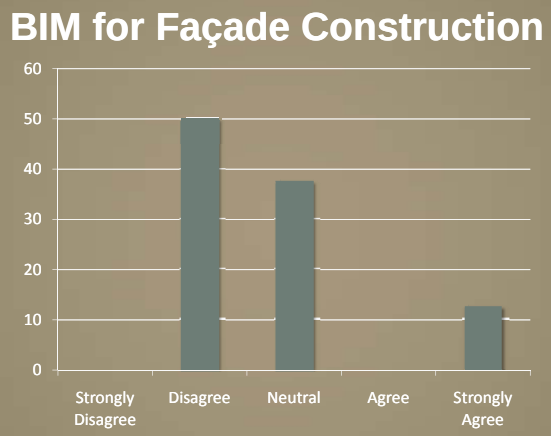
Survey Results:

- Beneficial for Façade Analysis/ Coordination?
- Yes
  - Quantifying materials
  - Understanding water infiltration and energy loss



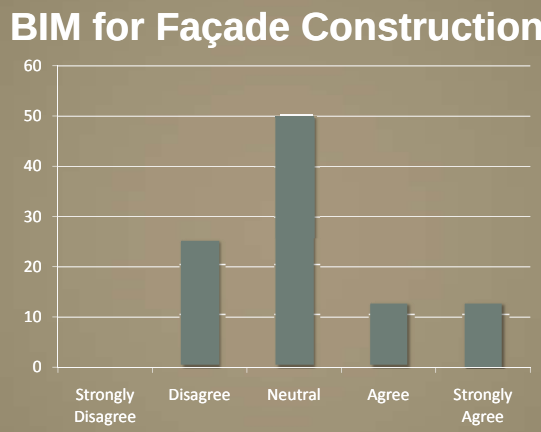
Survey Results:

- Learning curve = negative affects?
- No
  - Find right people



Survey Results:

- Reduce cost of façade construction?
- Neutral
  - Saves on errors
  - Increase in productivity



BIM for Façade Construction

Survey Results:

- Most difficult parts:
  - Level of details
  - Training
  - Subcontractors
- Most beneficial parts:
  - Increase field productivity
  - Managing costs
  - Coordination

BIM for Façade Construction

Conclusion:

- Use for mock ups
- Not for complete model

Prefabrication of Brick Facade

Advantages:

- Shorter schedule
- Better quality
- Possibly cheaper
- constructability

Disadvantages:

- Possibly more expensive
- Storage

Prefabrication of Brick Facade

Brick Facade:

- Area = 33,472 SF
- Schedule = 244 days
- Original cost = $1.8 million

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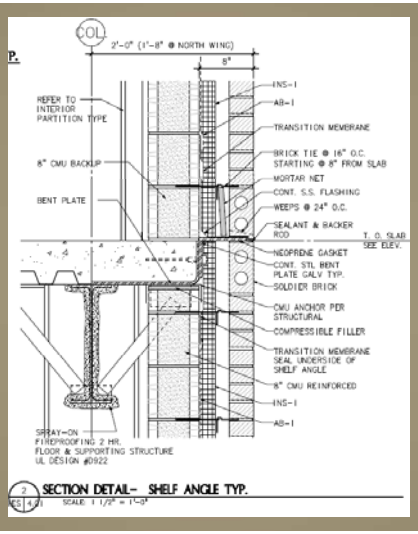
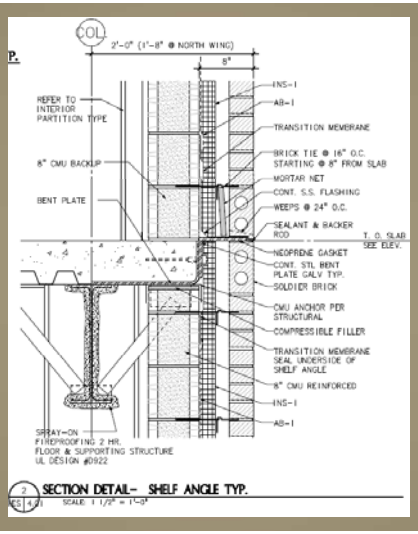
Materials:
- 8” CMU Backup
- 2” Insulation
- Mortar Net
- Weeps
- Brick Veneer



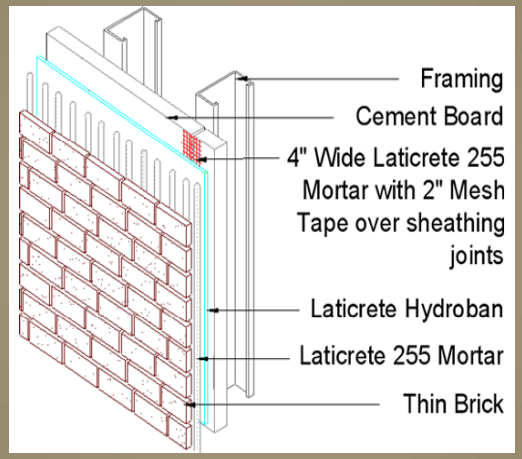
Materials Excluded with Prefab:

- Mortar Net
- Weeps
- Air Cavity
- Steel Plates
- CMU Backup



Thin Brick Prefab System:

- Cold formed structural stud: 6" 16 ga. 1-5/8" @ 16" o.c.
- 5/8" sheathing
- WP membrane
- Z
- 5/8" sheathing
- Lath
- Scratch coat
- Laticrete
- Thin brick



Prefabrication of Brick Facade

New Advantages:

- Shorter schedule
- Better quality
- No air cavity, no leaks
- Constructability

New Disadvantages:

- More expensive

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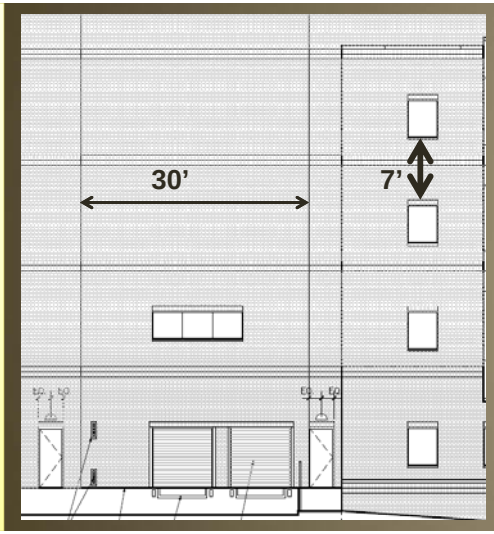


Prefabrication of Brick Facade

Panel Calculations:

- Panel Area = 30’ x 7’ = 210 SF
- # of panels = 33,472 SF / 210 SF= 159 panels
- Days = 159 panels / 8 panels per day = 20 days

Prefabrication of Brick Facade

Comparison:

- Original:
  - Cost = $1.8 million
  - Schedule = 244 days
- Prefabricated:
  - Cost = $3.2 million
  - Schedule = 178 days

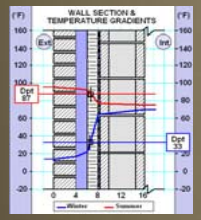
Prefabrication of Brick Facade

Conclusion:

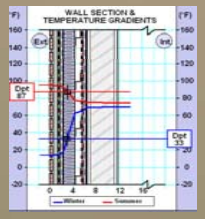
- Too expensive
- Not a fast track schedule

Mechanical Breadth

Original Wall Properties:
- R-value = 10.63
- U-value = 0.094
- Thickness = 16”



Prefab Wall Properties:
- R-value = 13.28
- U-value = 0.075
- Thickness = 11”



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BIM for Façade Prefabrication
- **Mechanical Breadth**

Conclusions
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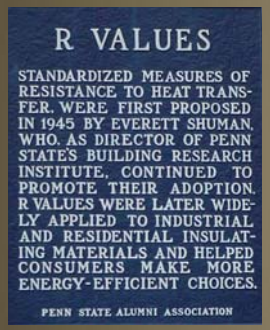
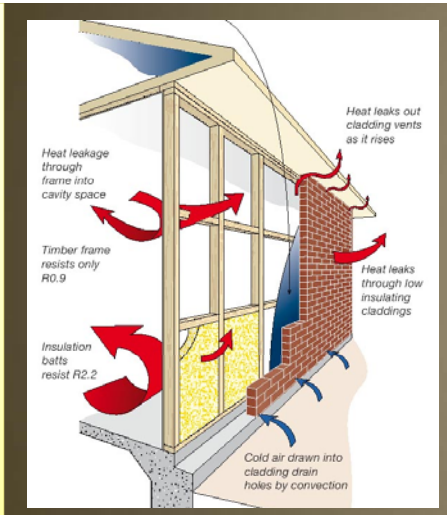


Mechanical Breadth

Heat Loss:

- Original Design
  - 176,384 BTU/HR
- Prefab Design
  - 141,145 BTU/HR
  - 19.9% better



Mechanical Breadth

Conclusion:

- Prefab has better mechanical properties
- Still too expensive

Conclusions

- Solar panels not economical
- BIM should have been used for mockups
- Prefab definitely shortens the schedule and adds quality, but too expensive

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BIM for Façade Prefabrication
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Questions?