Modular Building Institute 2015 **World of Modular** Las Vegas, NV









Project Stakeholder Integration in Off-Site Construction: Challenges, Opportunities & Needs

Presenters



Laurie Robert

LEED AP
Vice President Sales & Marketing

NRB, Inc.



Sue Klawans
Director, Operational Excellence &
Planning
Gilbane Building Company

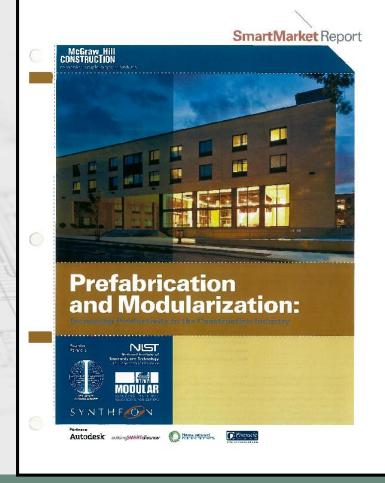


Thomas W. Gilbert, AIA,
REFP
President
Gilbert Architects Inc.

Session Overview

- 1. Defining off-site construction and permanent modular construction
- 2. Millmont Elementary School A Case Study
- 3. Challenges, Opportunities & Integration Needs from the Viewpoints
- of the Modular Builder
- of the Construction Manager/GC
- of the Architect
- 4. Crystal ball predictions
- 5. West Reading Elementary School A Case Study

- Prefabrication
- Modularization
- Off-site construction
- Modern methods of construction
- Sub-assemblies
- Permanent modular construction
- Volumetric modular construction
- What <u>defines</u> the "off-site construction" industry and moreover...



Why is this such a hot topic?



The Off-Site Construction Council (OSCC) of the National Institute of Building Sciences (NIBS)...has this definition:

Off-site construction is the planning, design, fabrication and assembly of building elements at a location other than their final point of assembly onsite. An integrated planning and supply chain optimization strategy characterizes off-site delivery.

www.nibs.org

Defining

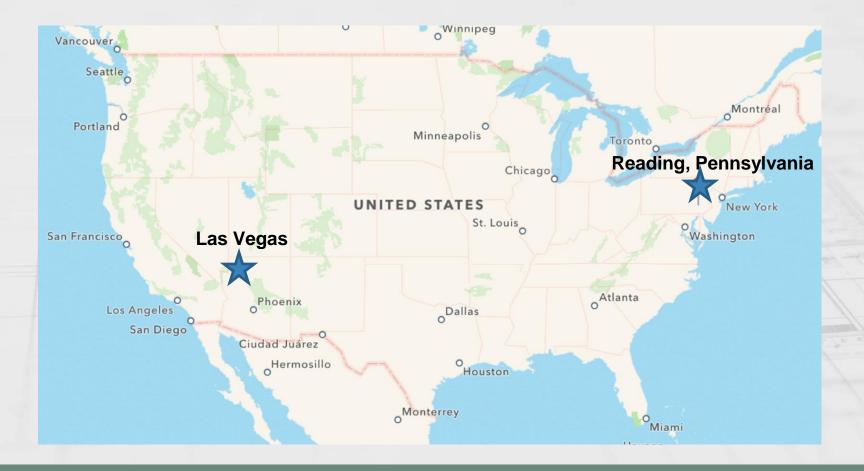
Permanent Modular Construction

- Permanent modular construction (PMC) is a large subset of the overall "off-site construction" industry, creating in 3D volumetric form, some or all of the building off site in a controlled environment.
- A process rather than product
- May be an entire building or an addition
- 10%, 50% or 100% of the project

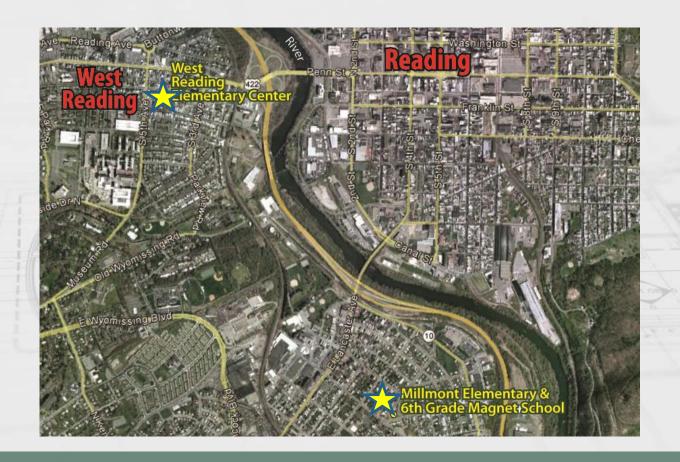




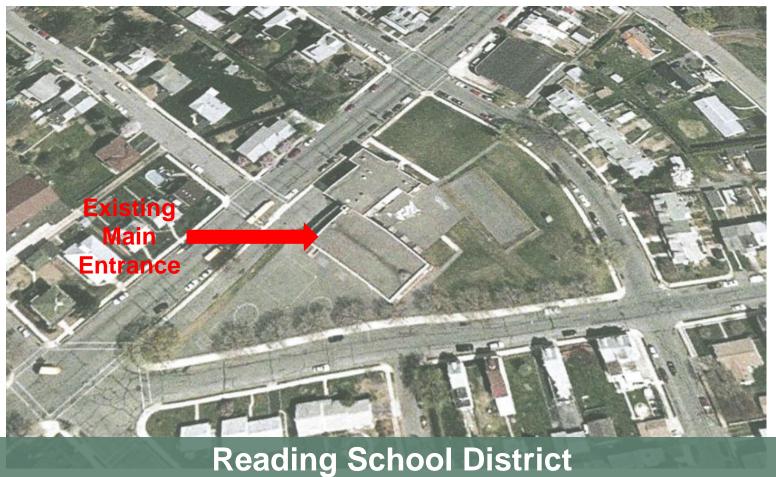
Reading School District - Millmont Elementary School



Reading, Pennsylvania



Reading, Pennsylvania



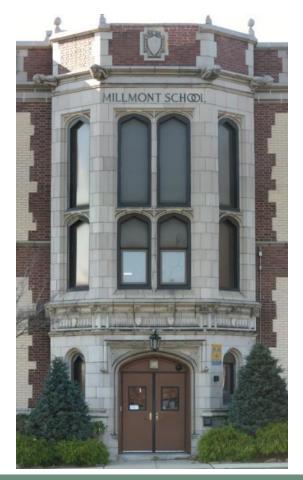
Existing Millmont Elementary School



Reading School District – Millmont Elementary School











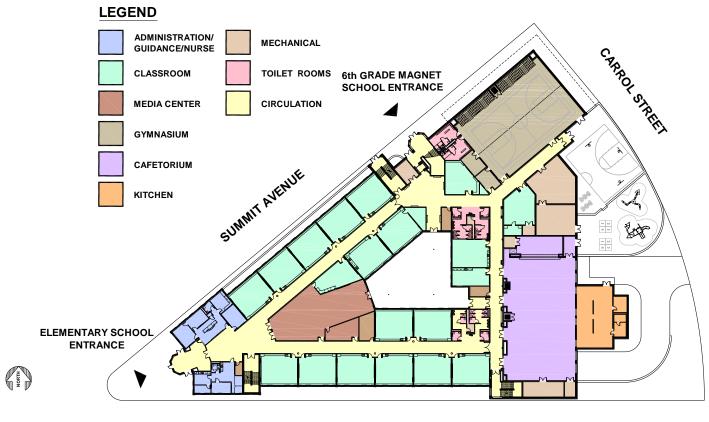
Reading School District – Millmont Elementary School



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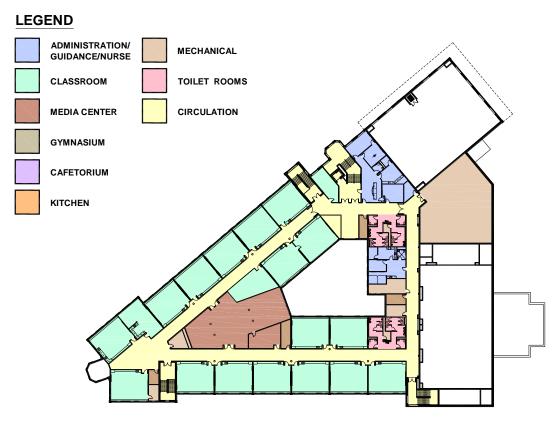
Reading School District – Millmont Elementary School



FIRST FLOOR PLAN

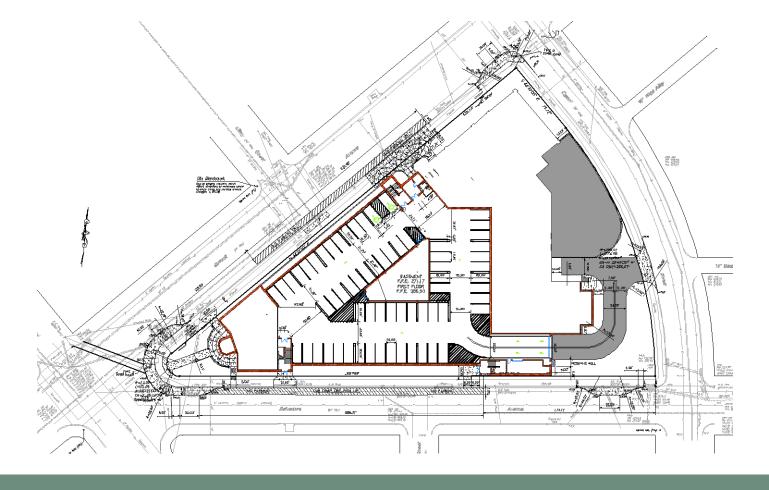
BELVEDERE STREET

Reading School District – Millmont Elementary School





SECOND FLOOR PLAN



Reading School District – Millmont Elementary School

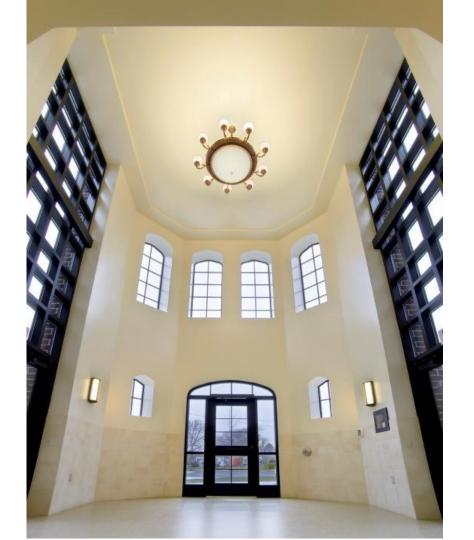


Reading School District – Millmont Elementary School



Reading School District – Millmont Elementary School





























Reading School District – Millmont Elementary School

Industry Challenges, Opportunities & Project Integration Needs

From the viewpoint of a Modular Builder



Industry Challenges and Opportunities

1. MARKET SHARE

Clearly the largest opportunity for the PMC industry is a gain in commercial construction market share in North America.

What are some barriers to entry and what can be done about them?

- In a recent industry stakeholder survey issued by the OSCC of NIBS, the question was asked:
- Rate the barriers to implementing off-site construction? Top three highest ranking:
 - 1. Design + Construction Culture
 - 2. Distance from factory to site/transportation
 - 3. Industry knowledge

Health + Safety Risks ranked lowest.



Industry Challenges and Opportunities

2. EDUCATING

- At the grass roots level of academia
- Of Owners and Design professionals
- Of Construction Managers and GC's



55780 Low Carbon Architecture: modular construction workshop for the 2015 AIA Convention.

Ryan E. Smith
University of Utah, Director
Integrated Technology in Architecture Center - ITAC

Industry Challenges and Opportunities

3. PERCEPTION

- That building off site limits design capabilities.
- That modular buildings are only intended for temporary use and cannot reach the complexity or sophistication of conventional

Market distinction Industry distinction





Project Integration Success

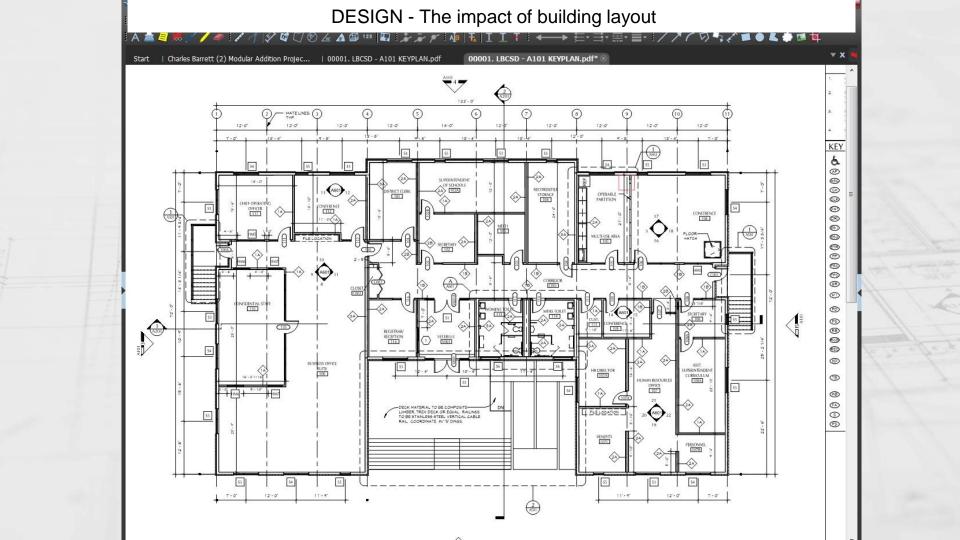
What are some of the primary considerations?

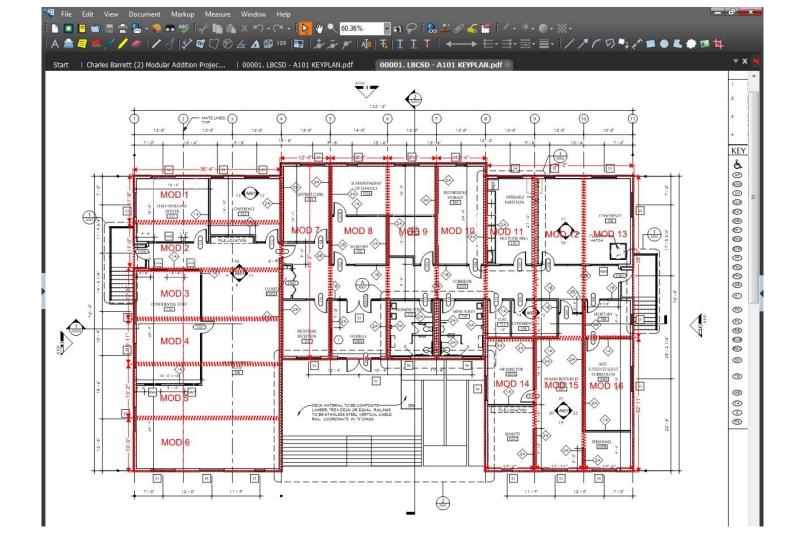
- Collaborative planning
- The importance of the modules
- Timing is everything
- Define the scope of work between parties.

Collaborative planning by stakeholders is key



Commit to the strategy at the concept stage of a project





Why does module layout matter?

The Module layout creates the most logical and cost effective way to achieve the desired outcome for the owner while considering all of the outside influences that impact, or are impacted by the design. These include..

- Foundations module layout dictates design
- Transportation from plant to site routing and dimensional limitations
- Access to and around the site staging areas
- Mechanical designs ceiling spaces
- Configuration to minimize site work



Site or road access influence module sizes





Module sizes affect foundation design







Steel and concrete modules are heavy and sizes can also be dictated by height and reach of delivery

Timing is everything!

Final Design and Approvals are more time sensitive.

- Project schedules should establish a reasonable but finite time for final design development and decision making
- Decisions must be made early and modular footprint frozen
- Turnaround time for approvals is shorter
- Changes during fabrication are costly and can be avoided with more collaboration between stakeholders.

Color choices are often needed before foundations are in!

Define the scope of work

Define and Delineate the Project Scope of Work

- During pre-bid phase establish a scope of work document that best suits the requirements of the stakeholders
- Clearly communicate to avoid scope creep/overlap or scope gaps

Industry Challenges, Opportunities & Project Integration Needs

From the viewpoint of a Construction Manager



Up to 35%



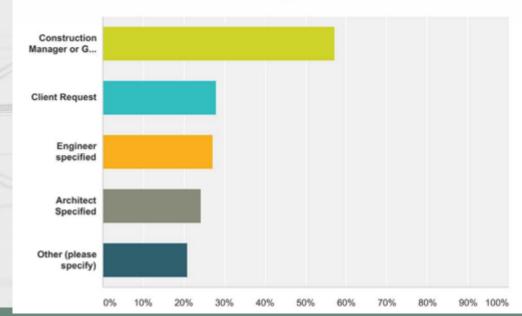






Q4 During project planning phase for this project, who was responsible for the decision to use off-site? (select all that apply)

Answered: 301 Skipped: 10





Opportunities Will There Be Value-Add?

- Schedule benefit
- Concurrent Work
- Complex Site/Foundation
- Site constraints
- Logistics benefit
- Workforce availability
- Site constraints
- Crane time ("hook time")
- Manpower stacking

Opportunities Will There Be Value-Add?

- Productivity benefit
- Profitability
- Best People

Opportunities

Will There Be Value-Add?

- Reducing Uncertainty
- Schedule
- Budget
- Management
- Doing more with less?
- Safety
- Will the work be safer for those doing it?
- Quality
- Will quality be improved and reliable?

Industry Challenges

- Lack of Awareness
- Client Procurement Requirements
- Maximizing Modular Requires Early Team Buy-In and Collaboration
- The Right People on the Bus
- Doing More with Less?
- Client Decision-Making Moves Upstream

Industry Challenges

- Mapping and Covering the Risk Management and Legal Issues
- Pay Terms, Ownership
- Redirects Leadership Effort
- Project Management Skill Sets Expand
- Perceptions: Labor; Regulatory; Risk of Unknown
- Is There Appropriate Competition?
- Sufficient Capacity
- Data, Proof, Lack of Consistent Voice, Lack of Rapid Learning Cycle

Project Integration Success

What are some of the primary considerations?

Project Integration - Considerations

Strong Project Management System – Lean!

- "Conductor" with Orchestra
- Collaborative Team
- Commitment
- Project Management System
- Process, Process
- Upstream, Upstream, Upstream
- Decision Making
- Flow
- Measurement



Project Integration Results – Case 1

- Time Savings
- Cost Savings
- Profitability
- Best People
- Safer
- Repeat Work
- References
- Growth

	Target Cost	Final
Budget	\$61,306,277	\$60,573,174
Owner Change Orders Adding Scope	N/A	0
Contingency used for Base Project Scope	0	0

	Initial Schedule	Final Schedule
Site Development	4 months	3 months
Construction	16 months	13 months

Project Integration Results – Case 2

- Time Savings
- Cost Savings
- Profitability
- Best People
- Safer
- Repeat Work
- References
- Growth

- Cost: create reliability
 - Lowered mechanical/plumbing bids by more than 1%
 - One change order for \$3,000 on \$40M in MEP work
 - Project delivered 7% under client's budget
 - Vs. other 9 "like" projects: 10% lower cost
- Safety: think differently
 - Dramatically reduced first aid incidents
 - Dramatically reduced "hot work" onsite welding, cutting, soldering
 - 447,000 manhours with no lost time incidents

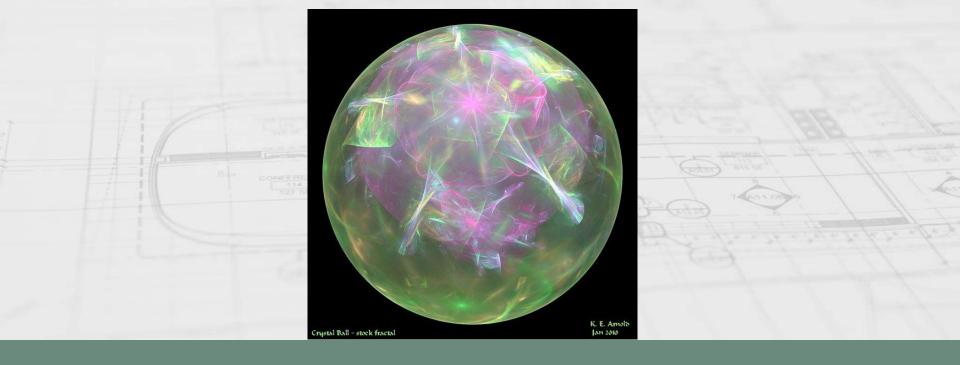


Industry Challenges, Opportunities & Project Integration Needs

From the viewpoint of an Architect



Crystal Ball Predictions?



West Reading Elementary School Reading, Pennsylvania A Case Study



Main

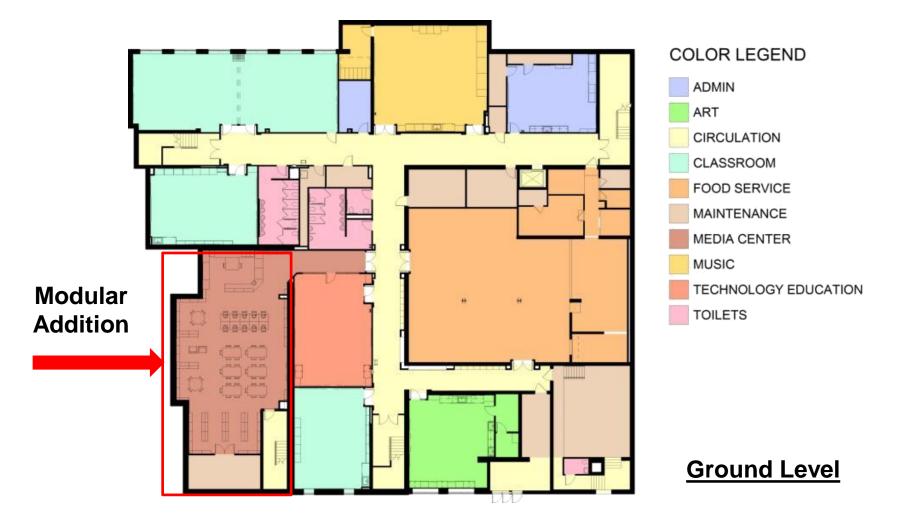
Wyomissing Area School District West Reading Elementary School

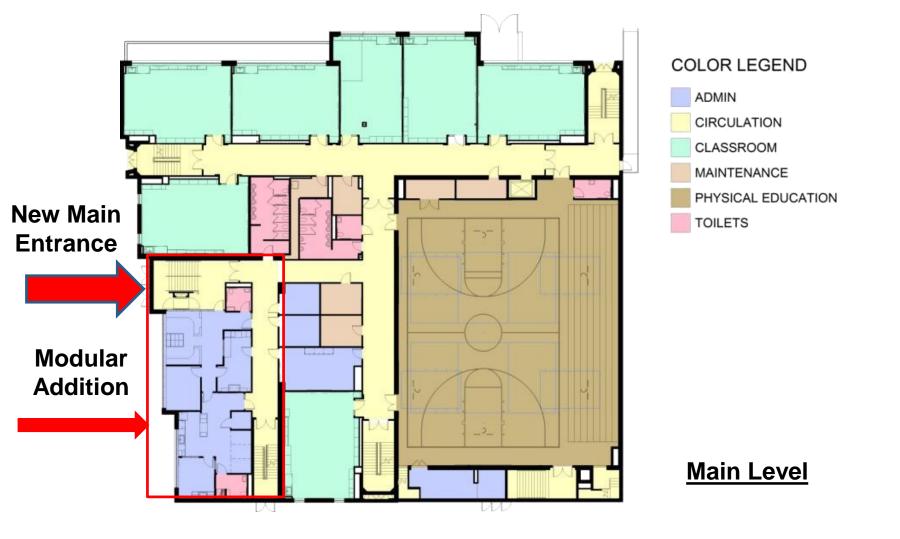


Wyomissing School District
West Reading Elementary School

















































Project Costs

Budget: Total project cost \$13,000,000
Actual construction cost including asbestos abatement \$9,031,419
50,150 s.f. renovations; 8,698 s.f. new

Schedule

Hired: January 2010

Bid opening: October 2010

School opened: August 2011 – 10 months

Download this presentation www.gilbertarchitects.com/blog









Thank You!