Ball State University
College of Architecture and Planning
Dept. of Architecture
5th Year Thesis

Design-Build
How Efficiencies Affect Quality in Design

Professors:
Studio: Jack Wyman
Advisor: Tony Costello
Advisor: Olen F. Dotson
Table of Contents

2 Abstract
3 Issues and Positions
4 Organization
5 Program
6-8 Existing Site
9-12 Context Images
13-18 Planning Studies
19-22 Concepts
23 Proposed Site
24 Site Sections
25 Landscape Plan
26-27 Site Elevations
28 Building Plan
29 South Elevation
30 Building Section
31-32 Sun / Shade Intensities
33 HVAC Diagram
34 Wall Section
35-37 Structures Diagrams and Details
38-44 The Procession (Perspectives)
Abstract

In modern day society, there is a misconception about Design-Build as a project delivery system. This misconception is that the quality of design must be sacrificed due to the constraints of time and/or money. In some cases it can be proven that this is true, but how and why, and can it be altered to improve the quality, instead of hinder it? In my thesis, I have studied previous design-build projects and pulled apart what about the designs were sacrificed and why. In studying their downfalls of design, I then recovered their benefits, whether it be time management, money, or other. These studies helped me in developing a design-build project for thesis. The benefits will be in quality, time efficiency, cost efficiency, material and site efficiency, etc...

The project I have chosen to develop my thesis topic is a church and dedicated worship space for a small catholic community here in Muncie, IN. The parish of St. Francis of Assisi is located on the Northeast corner of New York and Riverside. Their current status is that of expansion, both of community and gathering space. This expansion could entail an addition to the existing building, or development of a new church.

This type of delivery system—“Design - Build,” has become very common with the private sector of religious spaces. Their funding comes solely from the community, so cost efficiency becomes a major issue. Also, because of such a close community, we find that most want to become a part of the building, be more involved by offering their assistance, especially in the construction. This contribution of community labor will help it the development of cost efficiency. Design-build is the most effective type of delivery system for this type of community project, and creates a number of issues to be addressed. The quality of design, cost effectiveness, and time management, will create cohesion of parts, to develop a well-managed building, from design to construction. Instead of one aspect of design-build hindering the other, a synergistic effect is achieved, and all aspects are positive.
Issues and Positions

Looking back to the days of Palladio and Alberti, architects were master craftsmen and construction managers, as well as head architects who worked on site. They saw and participated in the development of a building from beginning to end. They had the opportunity to be on site for the entire construction process. Thinking back to some of those buildings, mainly the gothic cathedrals, there is a great sense of quality and greatness about the architecture. From the preliminary design, to the development of the last detail, the architect had the final touch. If such quality was achieved during such a technology-deprived time, compared to current times, why is that today's design-build architecture develops such poorly designed structures. We have advanced so significantly with technology, that time efficiency should help cost and let quality be the driving factor.

My thesis topic deals with this concept. I believe we have become so dependant on the efficiency of time and money in Design-Build, that the whole essence of architecture is lost. My feeling about the idea of 'design-build' both as a concept and a delivery system is that both quality and quantity drive the design. The cohesion of both to develop a design is more effective, architecturally, than forcing quantity over quality, or vise versa.
Organization

In Design-Build there are many ways to structure the organization of involved parties; mainly the Architect, Owner and Contractor. For my thesis I have studied many ways around the liabilities, responsibilities, quality control, etc... and the best way to facilitate this design-build project is to have me as the architect and the contractor. Relying solely on my construction background helps me act as contractor, and then my studies at Ball State help facilitate the architecture.

The following charts comparatively represent the difference between traditional practice and the benefits up front with the design-build delivery system, not to mention the deletion of lines of red tape. This is the method of delivery for my thesis. (Conceptually)
### Program

<table>
<thead>
<tr>
<th>Room</th>
<th>Sq. Ft / Seating Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanctuary</td>
<td>500 person max. seating- 10 sq. ft. per 400 sq. ft.</td>
</tr>
<tr>
<td>Altar</td>
<td>20 person max. seating- 10 sq. ft. per 200 sq. ft.</td>
</tr>
<tr>
<td>Daily Chapel</td>
<td>200 sq. ft.</td>
</tr>
<tr>
<td>Sacristy</td>
<td>250 sq. ft.</td>
</tr>
<tr>
<td>Vestry</td>
<td>450 sq. ft.</td>
</tr>
<tr>
<td>Bridal Room</td>
<td>100 sq. ft.</td>
</tr>
<tr>
<td>Music Rehearsal / storage</td>
<td>six fixtures total - 300 sq. ft.</td>
</tr>
<tr>
<td>Maintenance closet / storage</td>
<td>1,000 sq. ft.</td>
</tr>
<tr>
<td>M / W Restrooms</td>
<td>10% - 810 sq. ft.</td>
</tr>
<tr>
<td>Narthex / Entry</td>
<td>15% - 1,200 sq. ft.</td>
</tr>
<tr>
<td>Circulation</td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td></td>
</tr>
</tbody>
</table>

Total: 10,246.5 sq. ft.
Context

Muncie, Indiana
Context Images

Existing worship space

Existing drive

Adjacent Apartments

Adjacent Apartments
Context Images

Newman Center

Proposed Lot

Presbyterian Church

Newman Center
Context Images

Existing worship space

View from new worship space

Existing worship space

View into atnum space
Context Images

Houses across Riverside

Adjacent Apartments

Adjacent Apartments

Adjacent Apartments
Planning Studies

Vehicular Traffic
Planning Studies

Pedestrian Traffic
Planning Studies

Site Drainage
Planning Studies

Filters
Planning Studies - Additions

Add to Existing Worship Space
- adapting to existing systems
- outdated / undersized systems
- application of dedicated spaces
Placement of New Structure

- Seclusion from existing buildings - atrium space
- Efficient for Design-Build
- Transition of old space into Kitchen / Reception Hall
Conceptual Layout
Conceptual Layout

- Apartments
- Gallagher Center
- Newman Center
- Parking
- Drop-off
- Riverside
Massing
Concepts - Details
Proposed Site
Site Sections

Site Section - Looking North

Site Section - Looking West
South Elevation
West Elevation
South Elevation
Section

Building Section- Looking West
Sun-Shade Intensities on South Facing Curtain Wall
Sun-Shade Intensities on South Facing Curtain Wall
HVAC Diagram

(2) 4 ton Air units
Hot/Chilled Water

-Multiple Supply in False column chase
-Single Return under Altar
Wall Section

Standing Seam Metal Roof

EIFS Cornice

Stone trim
Brick Veneer

Stone Band

CMU Cavity Wall

16" Conc. Foundation

1' x 5'
Spread Footing
Axon of Integrated Box Truss

Cruciform Shaped
Detail of Box Truss

Heavy Timber Construction
with Light Framing

- Simple Geometry
- Simple Connections
- Nominal sized lumber / timber

Doubled up
2x8's

8x8 post
connectors

12x12 timber
columns

4x12 Glue-Lam
Beams

Steel Shear
Plates

Steel Rod
Tension

Thru-Bolt
Connections

Design Build

Page 37
The procession starts as you leave your vehicle, walking away from man's possessions.

The concept of the procession though space symbolizes the series of events Jesus took in the stations of the cross. Each new space is unique from the others and needs to be experienced in sequence to capture the effect.
The Procession

Exterior Colonnade
The Procession

Just as the Narthex acts as the starting point into this worship space, the first seven stations of the cross act as the stepping stones into the beginning of Mass. They are located on the columns to the right. The last seven stations are exposed as you make your way back through the procession, after mass is complete.
The Procession

Entry along baptismal font
The Procession

View into worship space
The Procession

View from rear of the church
After mass is complete, you return through the spaces and experience the last stations of the cross to remind you that prayer shouldn’t end when mass is over, it is ongoing.

The End