

Cover

Urban Outfitters Corporate Offices
Existing Building - Philadelphia Naval Shipyard Building #25



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Existing Building

- Philadelphia Naval Shipyard Building #25
- Two (2) story, 53,000 SF
- Used for manufacturing of metal fabrications for the boilers and fittings for ships
- Structural steel building with brick masonry bearing walls
- Existing lateral force resisting system is the masonry walls
- Historically significant building with State Historic Preservation Office (SHPO) interest

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New Headquarters for Free People Division



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Proposed Adaptive Reuse

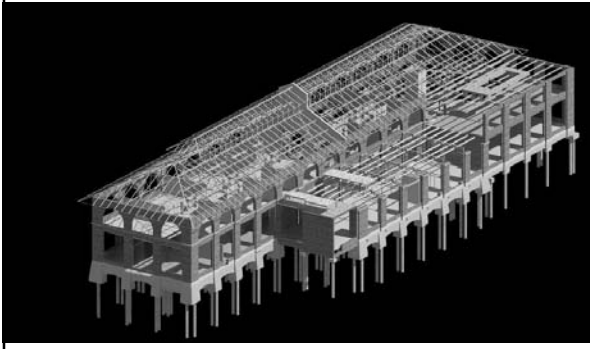
- Conversion to corporate office space
- A nearly identical shipyard building (#12) was previously retrofitted by Urban Outfitters with a complete retrofit of the existing structure to meet current seismic and wind loads
- Cost for Seismic Retrofit of Building #12 was \$2.5 M
- Partial wall removals desired for architectural program

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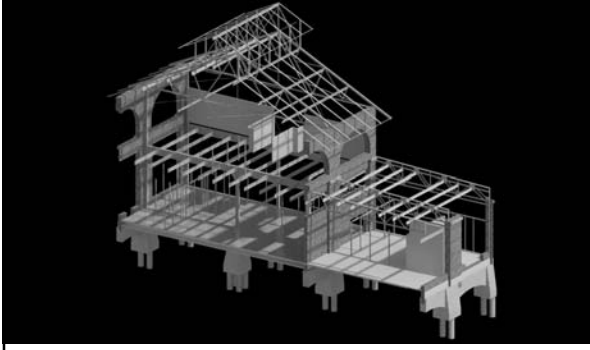
Investigation

- Had some existing steel fabrication drawings to make analysis and determination of existing conditions easier
- Surveyed existing structure sizes and layout through high definition laser scans
- Scans imported into BIM model
- Condition assessment of both façade and structure for deficiencies from years of abandonment and neglect
- SHPO required re-use of existing clay tile roof

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Approach

- Utilize International Existing Building Code (IEBC)
 - *Do not increase stresses in any single building element by more than 10% for seismic loads or 5% for any other loading*
- Model structure for interactive and multiple studies to determine various structural options with regard to wall removal
- Architectural programming MUST BE integral with structural "options"
- Significant remediation required
- Roof replacement necessary because of deterioration



Basic Code Questions

- Does the repair, addition, alteration or change in use need to meet current building code requirements?

- Does it need to meet current seismic design requirements?

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Solutions

- Removal of unnecessary “heavy” elements allowed a “load swap” to accommodate code stress limitations
 - *“Heavy” steel purlin, metal deck and tile substrate was dismissed and replaced with “lighter” wood purlins and plywood decking*
- Limited removal of shear walls to “select” locations
- Keep main framing and cut needed floor holes around existing structure with new bracing
- Provided repairs of deterioration with renovation

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The Philosophy of Adaptive Re-Use

- Green Building (NTHP fact sheet)
 - *"The greenest building is the one already built."*
 - Constructing a new 50,000 SF commercial building takes the same energy as driving a car 20,000 miles a year for 730 years
 - It takes about 65 years for an energy efficient new building to save the amount of energy lost in demolishing an existing building
 - As a group, buildings constructed before 1920 are more energy efficient than those constructed from 1920 through 1999

The Philosophy of Adaptive Re-Use

Preserving & repurposing landmarks within communities

- *Catalyst for localized urban renewal*
- *Affording opportunity for future generations to experience these important buildings*

Issues to Consider with Existing Buildings

Change Over Time

- Building code design loads and requirements
 - *Live loads*
 - *Seismic design in the last 20+ years*
 - *Wind design since the 1930's*
- Construction methods and structural systems
- Materials and materials strengths
- Material design codes
- Structural analysis and design methods

Historic Floor Live Load Comparisons

- | | |
|--|---|
| <ul style="list-style-type: none">• Pre-1914<ul style="list-style-type: none">• <i>Hotels</i><ul style="list-style-type: none">• 70 psf – Philadelphia 1913• 60 psf - Baltimore 1908• 50 psf - Chicago 1911• <i>Offices</i><ul style="list-style-type: none">• 100 psf – Philadelphia 1913• 100 psf - Boston 1912• 50 psf - Chicago 1911 | <ul style="list-style-type: none">• IBC 2009<ul style="list-style-type: none">• <i>Hotels</i><ul style="list-style-type: none">• 40 psf Private Rooms• 100 psf Public• <i>Offices</i><ul style="list-style-type: none">• 50 psf Offices• 100 psf Lobby/1st Floor Corridors• 80 psf Corridors above 1st Floor |
|--|---|

Live Load Reduction

- Typical Pre-1940s
 - *Reduction taken only on columns*
- IBC 2009
 - *Larger reduction allowed on columns and also allowed on specific floor framing members*
- Post placard with existing structural capacity

**Changes in Materials
and Material Strengths Over Time**

- **Wood** – *reduction in strength*
- **Concrete** – *2 to 3 times stronger*
- **Steel** – *1.5 to 2 times stronger*
- **Masonry** – *improved strength & technology*
- **Terra cotta** – *no longer in use*

**Methods to Determine Existing
Structural Capacity**

Testing Techniques

- *Steel coupons*
- *X-ray for reinforcing in concrete*
- *Cut masonry prisms*
- *Load testing*

**Creative Solutions to Minimize
Structural Costs**

- **Load Swap**
 - *Existing Column/Foundations – Existing and new floor live loads*
 - *Seismic – Heavy façade/new floor and mezzanine loads (lighter weight new construction)*
- **Analysis Techniques**
 - *Ultimate strength vs. allowable stress*
 - *Live load reduction*
 - *Composite design*

Preferred Approach to Adaptive Re-Use Projects

- Condition Assessment
 - *Initial non-invasive (visual) assessment of building structure and façade*
 - *Estimate material strengths based on age of structure*
 - *Review of existing building documentation, if available*
 - *Code analysis to determine structural requirements for existing structure*
 - *Report initial findings to owner*
- Detailed investigation including invasive probing and sampling and testing where required

Preferred Approach to Adaptive Re-Use Projects

- Repair and renovation documentation
 - *Design and preparation of construction documents*
- Code interpretation is based on best method for the project
- Do not just jump to retrofit the existing structure
 - *Retrofit in most cases is expensive*
 - *In many cases retrofit to meet current code is not necessary*

Approach to Adaptive Re-Use of Existing Buildings

Conclusions

- **Don't Assume Full Building Retrofit**
- **Investigation Stage is Crucial**
- **Be Creative**
- **Develop Options**
- **Integrate Structure with New Program**

Thank you!

DFS - Business Card for Presentation
