AN UPDATE ON THE VALUE OF A BARRIER MANAGEMENT PROGRAM

Presented by:

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Saint Luke’s Health System
Kansas City, Missouri
Overview of Update

1. What is a Barrier Management System
2. Contractor Selection & Qualifications
3. System Selection Process
4. Survey Process
5. Lessons Learned
6. Integrated Project Delivery
7. Case Studies
Are you doing the RIGHT thing OR the WRONG thing for the RIGHT cost?

How the owner requested it
How the PM understood it
How the architect designed it
What the contractor bid
How marketing described it

How the contractor installed it
How the project was documented
How the owner was billed
How it was delivered
What the owner really wanted
What is a Barrier Management Program?

- Regulatory Compliance
- Prevent Escalation
- Exhibit Proactive Approach
- Prevent Property Loss
- Prevent Loss of Lives
Selecting a Barrier Management Program ??

✓ Proactive Approach to Maintaining Rated Wall Integrity
✓ Stop Annual Outlay of Capital for Deficiencies
✓ Document Barriers and Penetrations
✓ Provide Planned Pathways
✓ Create Ownership and Accountability
✓ Surpass Inspection/Accreditation Expectations
Selecting a Contractor

✓ FM 4991
✓ Assumes Ownership
✓ Team Approach
✓ Integrated Project Delivery
✓ Brings Solutions – NOT Problems
✓ Offers Cost Solutions
✓ Educated in Industry Requirements

Saint Luke’s Health System
Educational Opportunities

✓ ASHE (American Society of healthcare Engineers)

1. Educational Programs -
   a. HCC – Healthcare Construction Certificate Program
   b. Boot Camp for Healthcare Facility Managers
   c. Compliance with the Joint Commission Standards in the Physical Environment
   d. Healthcare Construction Project Management Program
   e. Infection Control

2. Certifications –
   Specific requirement to qualify
   Requires formal exam and recertification
   a. CHFM – Certified Healthcare Facility Manager
   b. CHC – Certified Healthcare Constructor

www.ashe.org
Educational Opportunities

✓ The Joint Commission Standards
  1. Life Safety Chapter (LS)
  2. Environment of Care (EC)
  3. Infection Prevention and Control (IC)
  4. Emergency Management (EM)
  www. Jointcommission.org

✓ Building Codes and Standards
Regulatory Compliance

The Joint Commission

CMS

Building Codes

Fire Marshall

Centers for Medicare and Medicaid Services

Building Inspection Services
Program: Hospital

Chapter: Life Safety

Standard: LS.02.01.10: Building and fire protection features are designed and maintained to minimize the effects of fire, smoke, and heat.

Rationale for LS.02.01.10:

A building should be designed, constructed, and maintained in order to minimize danger from the effects of fire, including smoke, heat, and toxic gases. The structural characteristics of the building, as well as its age, determine the types of fire protection features that are needed. The features covered in this standard include the structure, automatic sprinkler systems, building separations, and doors. Note: When remodeling or designing a new building, the hospital should also satisfy any requirements of other codes and standards (local, state, or federal) that may be more stringent than the Life Safety Code. Also, the Life Safety Code contains special considerations for minor and major renovation.

Introduction to LS.02.01.10:

N/A
<table>
<thead>
<tr>
<th>Description</th>
<th>MOS</th>
<th>CR</th>
<th>PFA</th>
<th>DOC</th>
<th>SC</th>
<th>ESP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Buildings meet requirements for height and construction type in accordance with NFPA 101-2000: 18/19.1.6.2.</td>
<td></td>
<td></td>
<td>PE</td>
<td>A</td>
<td></td>
<td>ESP-1</td>
</tr>
<tr>
<td>2 New buildings contain approved automatic sprinkler systems, and existing buildings contain approved automatic sprinkler systems as required by the construction type. (For full text and any exceptions, refer to NFPA 101-2000: 18.3.5.1 and 19.1.6.2)</td>
<td></td>
<td></td>
<td>PE</td>
<td>A</td>
<td></td>
<td>ESP-1</td>
</tr>
<tr>
<td>3 Walls that are fire rated for 2 hours (such as common walls between buildings and occupancy separation walls within buildings) extend from the floor slab to the floor or roof slab above and extend from exterior wall to exterior wall. (For full text and any exceptions, refer to NFPA 101-2000: 8.2.2.2)</td>
<td></td>
<td></td>
<td>PE</td>
<td>A</td>
<td></td>
<td>ESP-1</td>
</tr>
<tr>
<td>4 Openings in 2-hour fire-rated walls are fire rated for 1 1/2 hours. (See also LS.02.01.20, EP 3; LS.02.01.30, EP 1) (For full text and any exceptions, refer to NFPA 101-2000: 8.2.3.2.3.1)</td>
<td></td>
<td></td>
<td>PE</td>
<td>A</td>
<td></td>
<td>ESP-1</td>
</tr>
<tr>
<td>5 Doors required to be fire rated have functioning hardware, including positive latching devices and self-closing or automatic-closing devices. Gaps between meeting edges of door pairs are no more than 1/8 inch wide, and undercuts are no larger than 3/4 inch. (See also LS.02.01.30, EP 2; LS.02.01.34, EP 2) (For full text and any exceptions, refer to NFPA 101-2000: 8.2.3.2.3.1, 8.2.3.2.1 and NFPA 80-1999: 2-4.4.3, 2-3.1.7, and 1-11.4)</td>
<td></td>
<td></td>
<td>PE</td>
<td>C</td>
<td></td>
<td>ESP-1</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Doors that are fire rated do not have unapproved protective plates that are higher than 16 inches above the bottom of the door. Note: Doors for hazardous rooms may have nonrated protective plates that are placed no higher than 48 inches from the bottom of the door. (For full text and any exceptions, refer to NFPA 80-1999: 2-4.5 and NFPA 101-2000: 19.3.2.1)</td>
<td>PE</td>
<td>C</td>
<td>ESP-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Doors requiring a fire rating of 3/4 hour or longer are free of coverings, decorations, or other objects applied to the door face, with the exception of informational signs. (For full text and any exceptions, refer to NFPA 80-1999: 1-3.5)</td>
<td>PE</td>
<td>C</td>
<td>ESP-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Ducts that penetrate a 2-hour fire-rated separation are protected by dampers that are fire-rated for 1 1/2 hours. (For full text and any exceptions, refer to NFPA 101-2000: 8.2.3.2.4.1 and NFPA 90A-1999: 3-3.1)</td>
<td>PE</td>
<td>A</td>
<td>ESP-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>The space around pipes, conduits, bus ducts, cables, wires, air ducts, or pneumatic tubes that penetrate fire-rated walls and floors are protected with an approved fire-rated material. Note: Polyurethane expanding foam is not an accepted fire-rated material for this purpose. (For full text and any exceptions, refer to NFPA 101-2000: 8.2.3.2.4.2)</td>
<td>PE</td>
<td>C</td>
<td>ESP-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>The hospital meets all other Life Safety Code requirements related to NFPA 101-2000: 18/19.1.</td>
<td>PE</td>
<td>C</td>
<td>ESP-1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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## Table 1. Understanding the Icons in the CAMHC

Icons have been added to the requirements chapters for clarity and ease of use. The following icons can be found in this manual.

- **D** The “D” icon appears before a requirement if documentation is necessary.
- **A** This icon indicates situational decision rules apply.
- **A** This icon indicates direct impact requirements apply.
- **A** Indicates scoring category A requirement.
- **C** Indicates scoring category C requirement.
- **M** Indicates Measure of Success (MOS) is needed. An MOS is defined as a quantifiable measure, usually related to an audit, which can be used to determine whether an action has been effective and is being sustained.* Not every EP requires an MOS. EPs that do require an MOS are clearly marked in the standards and requirements chapters in this manual.

The first page of each requirements chapter contains a key explaining each icon.

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Rate-based

- Scored “2” - one or no occurrences
- Scored “1” - two occurrences
- Scored “0” - three or more occurrences

* If NOT a “2” or “3”, then Indirect Impact

Yes - score “2”
No - score “0”
Firestopping Scoring

1. Category “C” - based upon the number of times that EP is not met

2. EP’s (Element of Performance) evaluated on a 3-point scale
   2 - one or no occurrences of non-compliance (satisfactory compliance)
   1 - two occurrences (partial compliance)
   0 - three or more occurrences (insufficient compliance)
Firestopping Scoring

3. “Criticality” of a category “C” is considered as an **Indirect Impact**

4. Indirect impact requirements - ESC (Evidence of Standards Compliance) due within **60 days** of survey

5. RFI (Requirement for Improvement) - must be submitted
Firestopping Scoring Escalation

1. Firestopping findings can be elevated to a **Direct Impact**

2. Direct impact requirements - ESC (Evidence of Standards Compliance) due within **45 days** of survey

3. Can be rolled-up to either
   - Leadership finding
   - Safety of Environment finding
     - Necessary resources are not being allocated for corrections
     - evidence of importance is not exhibited
Typically, deficiencies are identified and corrected using scheduled rounds. A method proven to be effective for tracking and managing these deficiencies is the Building Maintenance Program (BMP). The program involves a scheduled process for inspecting, identifying, and correcting certain Life Safety Code deficiencies through maintenance activities. Although organizations are encouraged to use this program, it will not exempt them from receiving RFIs for deficiencies identified during the on-site survey.

The BMP consists of the following:
- Written strategies to manage the items covered in the program
- A documented schedule for the frequency of inspecting the items
- Processes for evaluating the effectiveness of the program
Deficiencies that can be managed using this program include the following:

- Non-functioning positive latching devices, self-closing or automatic-closing devices, and excessive gaps and undercuts on fire-rated doors (LS.02.01.10, EP 5)
- Non-functioning self-closing or automatic-closing devices and excessive gaps and undercuts on smoke barrier doors (LS.02.01.30, EP 23)
- Non-functioning latching devices and excessive gaps and undercuts on corridor doors (LS.02.01.30, EP 11)
- Penetrations in corridor walls and smoke barrier walls and corridor walls (LS.02.01.30, EPs 6 and 18)
- Non-functioning egress illumination devices and exit signs (LS.02.01.20, EPs 28 and 31)
- Means of egress with accumulated snow and ice (LS.02.01.20, EP 13)
- Non-functioning positive latching devices and self-closing or automatic-closing devices on inlet and outlet doors in linen or trash chutes (LS.02.01.50, EP 9)
- Dirty grease-producing devices, including exhaust hoods, exhaust duct systems, and grease removal devices (LS.02.01.35, EP 10)
Why a Barrier Management Program?

Evidence of a Barrier Management Program will:
1. Prevent escalation
2. Exhibit to surveyor proactive approach

Focus on most hazardous areas first:
1. Fire barriers
2. Non-sprinkled areas
Rated Barrier Surveys

✓ Existing Buildings - Annual
✓ New Construction – end of project prior to occupancy
✓ Firestop Contractor to provide all above ceiling surveys
✓ Include other regulatory compliance (i.e. open junction boxes)
Lessons Learned

✓ Strong Owner Directive & Leadership
✓ Ownership by Firestop Contractor
✓ General Contractor Buy-In
✓ Subcontractor Education
✓ Design Team Education
✓ Above Ceiling Permit Process
✓ IPD Methodology
✓ Survey & Resurvey Process
Above Ceiling Permit Process

✔ A MUST HAVE for ALL HOSPITALS
Above Ceiling Permit Process

✓ Must be in-place prior to construction completion
Above Ceiling Permit Process

✓ General Contractor and Subcontractor Buy-in
Above Ceiling Permit Process

Purpose

- To Record all final projects in one location
- To record locations where walls are disturbed on floor footprint
- To allow firestopping and inspections to be systematically completed

Process

- Complete the eBMP ACP data form
- Submit to eBMP Coordinator
- A permit will be issued with a blank floor footprint of the work location
  - One permit per floor even if work ticket is for several floor locations
- Complete the assigned work Permit MUST be on display
- Clearly mark the drawings with the locations where walls were disturbed
- Return the Permit with the floor plan attached (in tray at Call Center Desk)
### Above Ceiling Permit Process – Simple Permit

**eBMP Above Ceiling Permit**

<table>
<thead>
<tr>
<th>Project Name</th>
<th>MAHI Tower Close Out Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Description and Location</td>
<td>ASI 586 Telephone Drops Floors 3,4,5</td>
</tr>
<tr>
<td>Target Start Date</td>
<td>10/23/11</td>
</tr>
<tr>
<td>Target Finish Date</td>
<td>10/25/11</td>
</tr>
<tr>
<td>Project Contact Person</td>
<td>Mike Hutchison 816.215.1266</td>
</tr>
<tr>
<td>Vendor Name</td>
<td>Shaw Electric</td>
</tr>
</tbody>
</table>

**Coordinators**

- Malcolm Sparling 816.421.0909 (Off) 816.985.8606 (Cell)
- Roger Brooks 816.564.1010 (Cell)
- Login Wilkin 816.853.5183 (Cell)
# Above Ceiling Permit Process

## eBMP System Permit

### Permit Holder
- Name: Matt Schnick
- Company: Shaw Electric

### Vendor Information

<table>
<thead>
<tr>
<th>Vendor Contact</th>
<th>Phone</th>
<th>Email</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No primary vendor contact assigned to this vendor.</td>
<td></td>
<td></td>
<td>10/24/2011</td>
<td>11/11/2011</td>
</tr>
</tbody>
</table>

### Project Information

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>New Mohi Tower Finish Projects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Contact Name</th>
<th>Project Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ken Mussett</td>
<td>(o) 816-918-6981(c)</td>
</tr>
</tbody>
</table>

### Permit Information

- **Permit Date**: 10/24/2011
- **Permit Title**: ASL 504 Exit Lights and Phones & Level

<table>
<thead>
<tr>
<th>Facility Contact</th>
<th>Phone</th>
<th>Email</th>
<th>Work Order #</th>
<th>Work Order Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roger Brooks</td>
<td></td>
<td><a href="mailto:rogerb@mtscontracting.com">rogerb@mtscontracting.com</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Permitted Work

**Type**: Electrical
**Description**: Add exit lights and phones in various locations on A Level Mohi Tower.

### Sealing Instructions

All involved penetrations to be left SEALED

### QC & Photo Requirements

**Name of Designated Facility Representative for QC, Issues & Inspection**: Logan Wilden
- **Phone**: 816-853-5183

**Inspection Instructions**
- All penetration/point must be inspected by designated facility representative after completion before being closed in

**Special Instructions for QC or Photos**
- Picture required if to illustrate an issue area.
- Picture required if to illustrate an issue area.
- Picture required if to illustrate an issue area.
Wish List

✔ Early Involvement
✔ Tie-in to Computerize Maintenance Management
✔ Implement Cost into Maintenance Budget
Integrated Project Delivery

✓ Team brings SOLUTIONS, NOT PROBLEMS

✓ Installation ONE time, reducing cost

✓ Identify cost-saving systems prior to installation

✓ Assist in training facilities personnel, contractors and subcontractors to reduce installations that increase cost

✓ All parties have a vested interest

“Stop digging! The plans were upside down!”
GOALS + CHALLENGES

• Improve Patient Experience (Compare to brand new 5th floor)

• Larger Patient Rooms

• Higher Corridor Ceilings

  • Larger Patient Rooms + Higher Ceilings = Reduced Plenum Area above corridor ceilings

  • Finish Design and Construction in 10 months to open along with the rest of the MAHI (already under construction) at the Grand Opening on October 8, 2011

• Finish Design, Coordination, Shop Drawing Review + Construction without delays

• Improve Project Delivery

  • Reduce RFI's / ASI's, Change Orders, Construction Delays

  • Enhance Coordination, Collaboration, Increase Efficiency
COLLABORATIVE APPROACH
EMBRACE PRINCIPLES OF IPD

• Early Involvement of Key Project Participants in Design Process
• Streamline Detailing / Coordination Process (Non-Traditional MEP+FP Detailing)
• Use BIM for Coordination and Communication
• Kick-off Partnering Session with Key Participants
  • Identify Owner Goals
  • Identify Efficiency Improvements
  • Clearly Explain Team Expectations
  • Create Team Synergy
CONSTRUCTION DOCUMENTS + COORDINATION

- Full participation in Coordination Process (including Fire Sprinkler)
- Fabrication Level of Detail reached during Design
- Early knowledge of Coordinated Locations allows for Early Field Planning
- Enhanced Conflict Recognition and Resolution
- Reduced Review time and Construction Administration time
- Improved Conflict Resolution
CONFLICT RESOLUTION
TRADITIONAL PROJECT ENVIRONMENT

Subs
Discover Issue

G.C.
Process RFI

Design Team
Answer RFI
(Issue ASI)

G.C.
Process RFI / ASI

Subs
Distribute
Conflicts Resolution
Traditional Project Environment

Subs
Discover Issue

G.C.
Process RFI

Design Team
Answer RFI
(Issue ASI)

G.C.
Process RFI / ASI

Subs
Distribute

Saint Luke’s Health System
Keys to Success

- Owner as Active Participant in Process
- Open Dialogue
- Full Buy-in from all parties at project onset

RESULTS

- Improved Patient Experience
- 80% Reduction of RFI’s and 90% Reduction of ASI’s (compared to 5th Floor)
- Zero RFI’s or ASI’s related to Overhead Coordination
- Completed for the Grand Opening
Study of Low Voltage “Super Highway”

4” conduit sleeve
- 50% fill
- requires firestopping each time cables are run in/out
- ongoing cost for life of building

Cable sleeve
- fill until full
- no guesswork
- no cost for cables in/out
- pays for itself within 4 – 5 times of re-firestopping conduit
- 12 - 4” conduits = 7 cable sleeves

Super highway cost for New MAHVI & Women’s Center - $.71/SF

[Image]
New Saint Luke’s Hospital
425,000 SF
Total Budget $330,000,000

- 1557 total (22’s, 33’s, 44’s)
- EZ-Path 33 above the door of every patient room
- 37 data communication cables and various other types of low volt wire
- Minimum of 5 EZ-Path 44’s in every electrical and mechanical on each floor
- Each of the mechanical chases on each floor are multiple banks of 7- 33 EZ-Paths
- Peet Center 1st - 65 (33’s, 44’s)
- Womens Center 1st and 2nd floor - 125 (33’s, 44’s)
# New Saint Luke’s Hospital Firestopping Costs

<table>
<thead>
<tr>
<th>Project</th>
<th>Hard Const Cost</th>
<th>Firestopping Cost</th>
<th>% of Const. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women's Cardiac Center</td>
<td>4,165,095.69</td>
<td>39,869.06</td>
<td>0.96%</td>
</tr>
<tr>
<td>Visitor Parking Garage</td>
<td>10,580,197.30</td>
<td>75,000.00</td>
<td>0.71%</td>
</tr>
<tr>
<td>Tunnels &amp; Energy Center Connections</td>
<td>25,999,872.98</td>
<td>45,010.39</td>
<td>0.17%</td>
</tr>
<tr>
<td>MAHI Tower</td>
<td>162,662,640.28</td>
<td>2,044,223.38</td>
<td>1.26%</td>
</tr>
<tr>
<td>Women's Center</td>
<td>11,216,118.69</td>
<td>75,816.52</td>
<td>0.68%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>214,623,924.94</strong></td>
<td><strong>2,279,919.35</strong></td>
<td><strong>1.06%</strong></td>
</tr>
</tbody>
</table>

| Total Area: 425,000 SF | $505.00 | $5.36 /SF |
Cost Study of Head of Wall Conditions

Cost if system was determined during design development
- mineral wool w/ elastomeric spray
- requires 2” joint
- maximum ½” movement
- $7.18/LF Installed

Cost for alternate system once construction in place
- speed flex w/ elastomeric spray
- requires 3/4” joint
- maximum ¾” movement
- $13.24/LF Installed

**MEP penetrations through head of wall cost due to EJ’s**
2 x the cost for lack of knowledge and planning

Saint Luke’s Health System
Proactive Approach to Head of Wall Conditions

- Check structural design criteria for movement prior to start of construction
- Movement and joint dimension dictate UL system
- Slip track vs. standard track
- Include system on drawings and specifications
- No excuse for IT holes in walls with super highway installation
- IT utilized pathways identified on drawings
- NO penetrations through head of wall (MEP Contractors)
Budgeting

Maintenance/Existing Buildings
✓ $/sf
✓ Annual budget

BMP vs. Annual Capital Expenditures

(Stop the Bleeding!!!)
Overview of Update

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QUESTIONS???

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