FCIA @ MO/SIC ‘SHE’

Firestopping
Barrier Management Symposium™ Summary

Bill McHugh, FCIA

Details

- Emergency Exits
- Restrooms
- Mobile Phones…

Objective – Share Knowledge

- Barriers are for Safety – IF DIIM'D
  - Properly ***Designed*** and Specified
    - ***Tested and Listed Systems*** – Directories, Tables
    - *Specified*
  - Professional ***Installation*** Companies, Workforce
  - Properly ***Inspected*** – by Companies, Workforce
  - ***Maintained*** **– *Organizations, Workforce***
    - NFPA 101 - (TJC, CMS)
    - International Fire Code - IFC 2012 - 2015- Annually (Local)
- ***Effective Compartmentation for Fire & Life Safety***

Barrier Management Symposium

- **World Travelled Faculty – Summary Today**
  - Bill McHugh, FCIA
  - Rich Walke, UL , Testing, Glazing
  - Lennon Peake, Koffel Associates, Barriers
  - Nestor Sanchez, Gypsum Assoc., USG Corp.
  - Bill McHugh, FCIA – Firestopping
  - Laura Frye, DHI – Fire Doors
  - Marc Sorge, Greenheck – Fire & Smoke Dampers
  - Bill McHugh & Rich Walke, UL – Fire Rated Glazing
  - Bill McHugh, Barrier Management Systems
  - Don Murphy, FCIA

Barrier Management Symposium

. . .at no cost to the attendee . . .

“TOTAL FIRE PROTECTION”

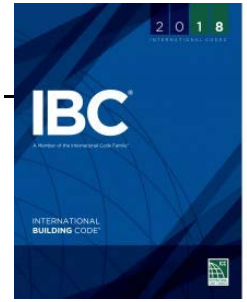
- Effective Compartmentation
  - Fire Barriers, Fire Walls/Floors, Smoke Barriers
  - Firestopping, Fire Dampers, Swinging and Rolling Fire Doors, Fire Rated Glazing
- Detection & Alarm Systems
- Sprinkler Suppression Systems
- Education & Egress–
  - Building Owners & Managers, Building Occupants and Firefighters

FCIA – Firestop Contractors International Association

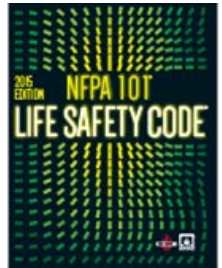
- FCIA Members
  - Firestop Contractors
  - Firestop Manufacturers
  - Firestop Consultants
  - Firestop Distributors, Reps, Friends
- FREE MOP/Spec - Specifiers @ AE, Independent
- FREE Life Safety Digest
- 3rd Party Contractor/Inspection Company Accreditation Programs
- Chair, ASTM Inspection Standards
- Tools for Specifiers

Building & Fire Code Requirements

- NFPA 5000 – 101- Chapter 8
- National Building Code – Canada
- UAE Fire and Life Safety Code – Chapter
- International Codes –
  - New and Existing Buildings International Building Code – Chapter 7
  - International Fire Code – Chapter 7



- ***Minimum requirements - Construction*** & ***Maintenance***



Building & Fire Code Requirements

- Compartmentation Codes – US –
  - **Fire Resistance –** Time, in minutes or hours that materials or assemblies have withstood a fire exposure as determined by tests, methods based on tests, or this code …. NFPA, Ch 8. **ICC adds… *"Systems"***

Building & Fire Code Requirements

- Compartmentation Codes – US –
  - ***Ch. 8 – NFPA & Ch. 7 IBC***
    - ***IBC & NFPA - ASTM E 119, UL 263 - Fire-resistance-ratings***
    - **IBC Ch. 7 - Fire Barrier –** Hourly Rated
    - **IBC Ch. 7 - Fire Wall –** Fire Rating, Structural independence
    - **Ch. 7 IBC – Fire Partition –** Rated, not continuous.
    - **Ch. 8 NFPA/NFPA 221–High Challenge Fire Walls**

Barrier Management Symposium

It’s about Effective Compartmentation

FIRE/SMOKE BARRIER FUNDAMENTALS FOR HEALTH CARE FACILITIES

Lennon Peake
Koffel Associates, Inc.
www.koffel.com
wkoffel@koffel.com

Objective

- Identify the different types of barriers used in health care facilities
- Identify the key characteristics for each barrier
  - Continuity
  - Protection of openings
- List at least three strategies that can be used to improve a barrier management program

Types of Wall Assemblies

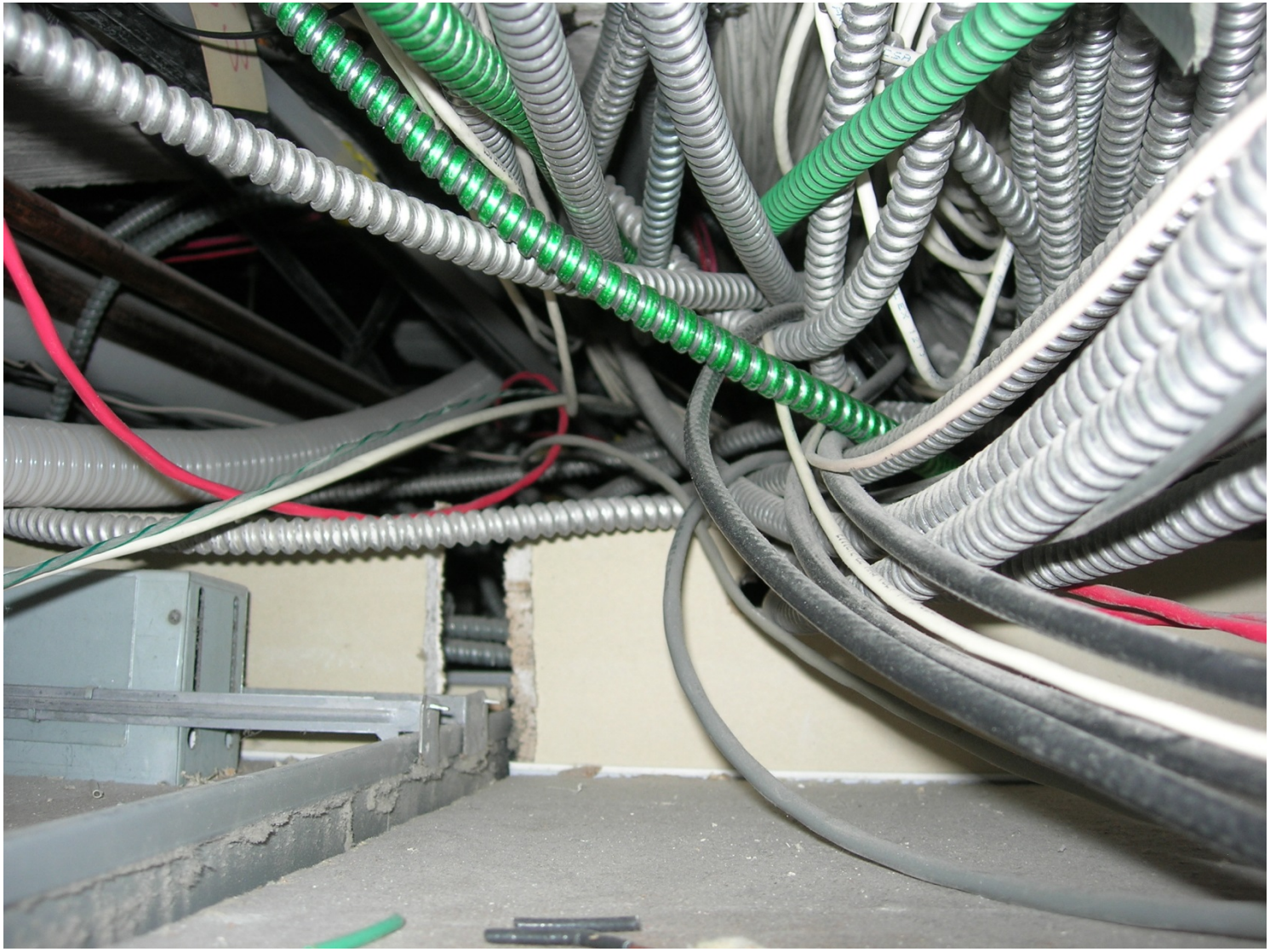
- Exterior walls
- Fire walls
- Fire barriers
- Fire partitions – No such assembly in NFPA
- Smoke barriers
- Smoke partitions

Fire Tested wall Assemblies

- In accordance with ASTM E119/UL263
- Resist passage of heat and hot gases
- Structural integrity during the test fire
- Have something left at the end of the test

Five Points

- Required fire-resistance rating
- Continuity
- Openings and penetrations
- Types of materials
- Structural robustness



Fire Barriers

- Fire barriers are used in the following applications:
  - Fire area separations
  - Mixed occupancy separations
  - Incidental use areas
  - Hazardous area separations
  - Exit enclosures
  - Shaft enclosures
  - Horizontal exits
  - Corridor walls – **NFPA only**

Support

- Supported by construction with the same fire-resistance rating as the fire barrier
- Some exceptions
  - Vary between NFPA and ICC

Summary of Fire Barriers

Issue	Requirement
Required Fire-Resistance Rating	Depends upon specific use
Required continuity	Floor/ceiling below to deck above
Openings	General: Aggregate glazing area (or width) <25% wall area/length; maximum size 120 sf. Specific: Rules based on use of barrier
Types of materials	As required for the type of construction
Robustness of structural system	If load bearing, fire tested with load

Smoke Barriers

- Smoke barriers are used in the following applications:
  - Group I-2
  - Group I-3
  - Areas or refuge
  - Other specific applications

Summary of Smoke Barriers

Issue	Requirement
Required Fire-Resistance Rating	1-hour with the exception that a construction of a minimum 0.1” thick steel in Group I-3 buildings is allowed
Required continuity	Horizontal: Outside wall to outside wall Vertical: Floor to slab or deck above, continuous through interstitial spaces Supporting construction may be required based upon the applicable codes
Openings	20 minutes – but not a true fire door in NFPA 101 Smoke- and draft-controlled doors tested in accordance with UL 1784 – IBC only
Types of materials	As required for the type of construction
Robustness of structural system	If load bearing, fire tested with load

Smoke Partitions

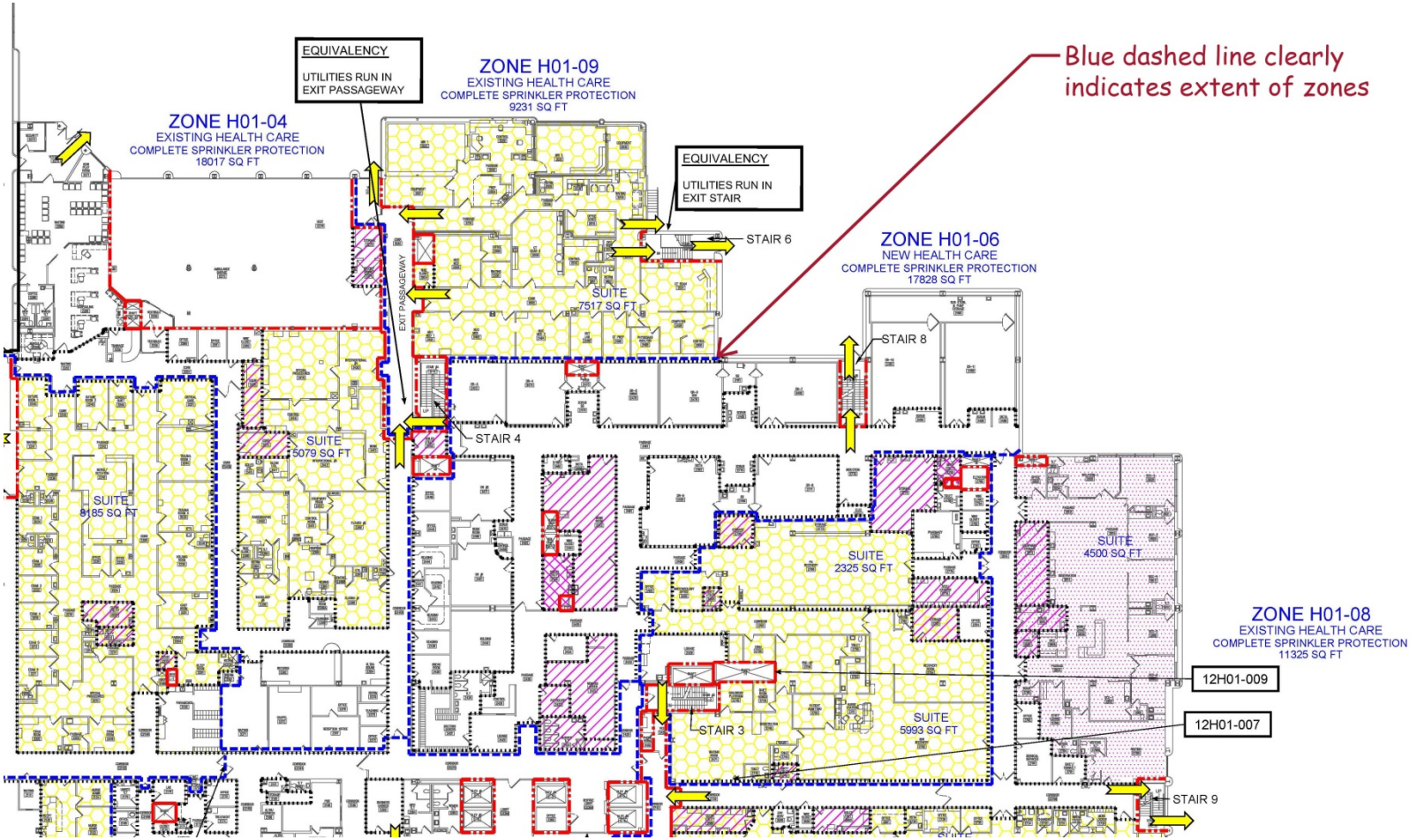
- Smoke partitions are used in the following applications:
  - Corridor walls in Group I-2 – IBC only
  - Sprinkler protected hazardous areas – NFPA

Summary of Smoke Partitions

Issue	Requirements
Required Fire-Resistance Rating	Not required (unless otherwise required)
Required continuity	Floor/ceiling below to deck above or tight to underside of ceiling membrane in ceiling membrane designed to limit passage of smoke - Difference between NFPA/ICC for ceiling tiles
Openings	Windows: Sealed to resist free passage of smoke Doors: No louvers Air leakage rated (UL 1784) – IBC??? Self closing, or automatic closing by smoke detectors
Types of materials	As required for the type of construction
Robustness of structural system	If load bearing, fire tested with load

.

LS Drawing Information



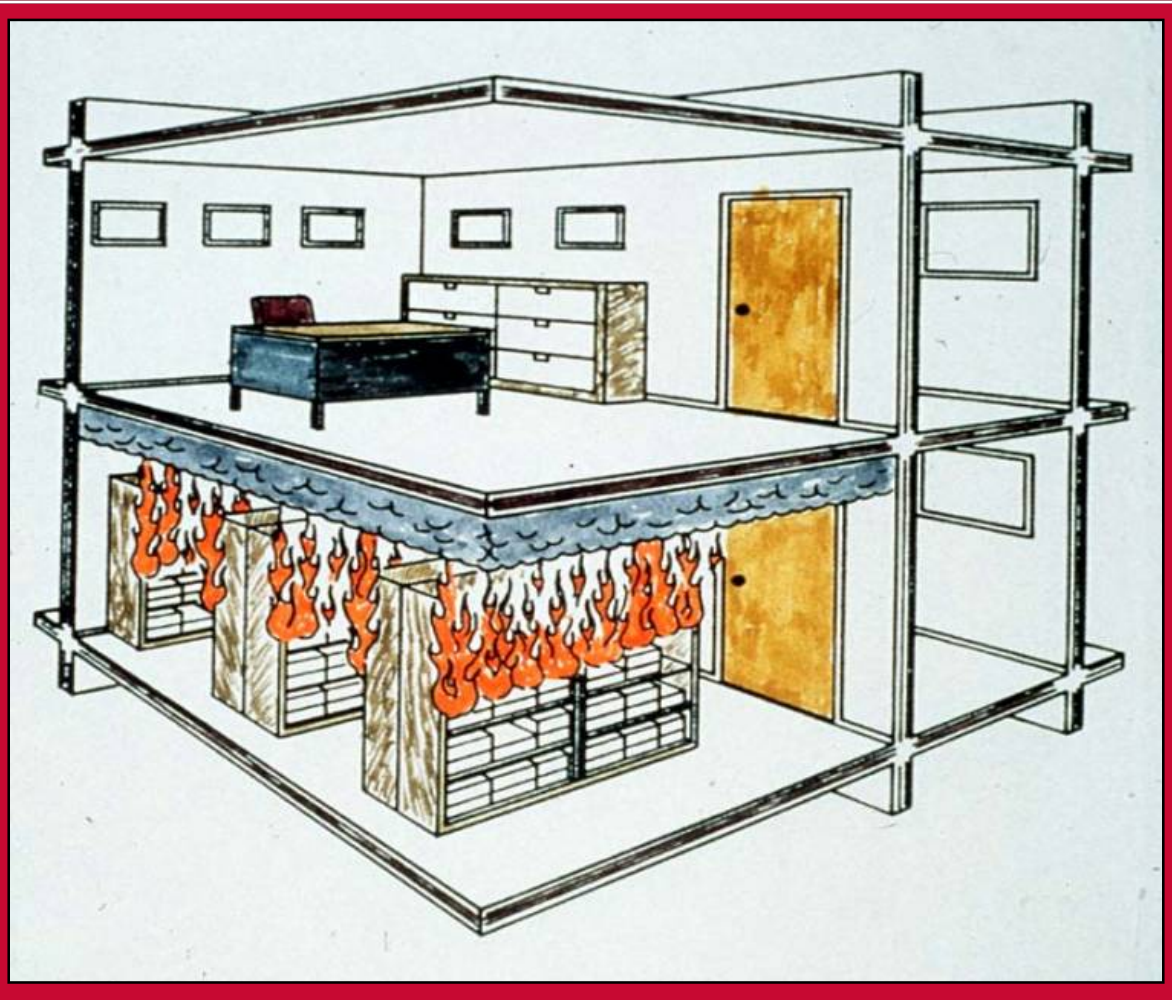
Build it correctly!!

Testing of Fire Resistance and Smoke Resistant Assemblies

Rich Walke

UL Codes and Advisory Services

Fire-Resistance-Rated Construction

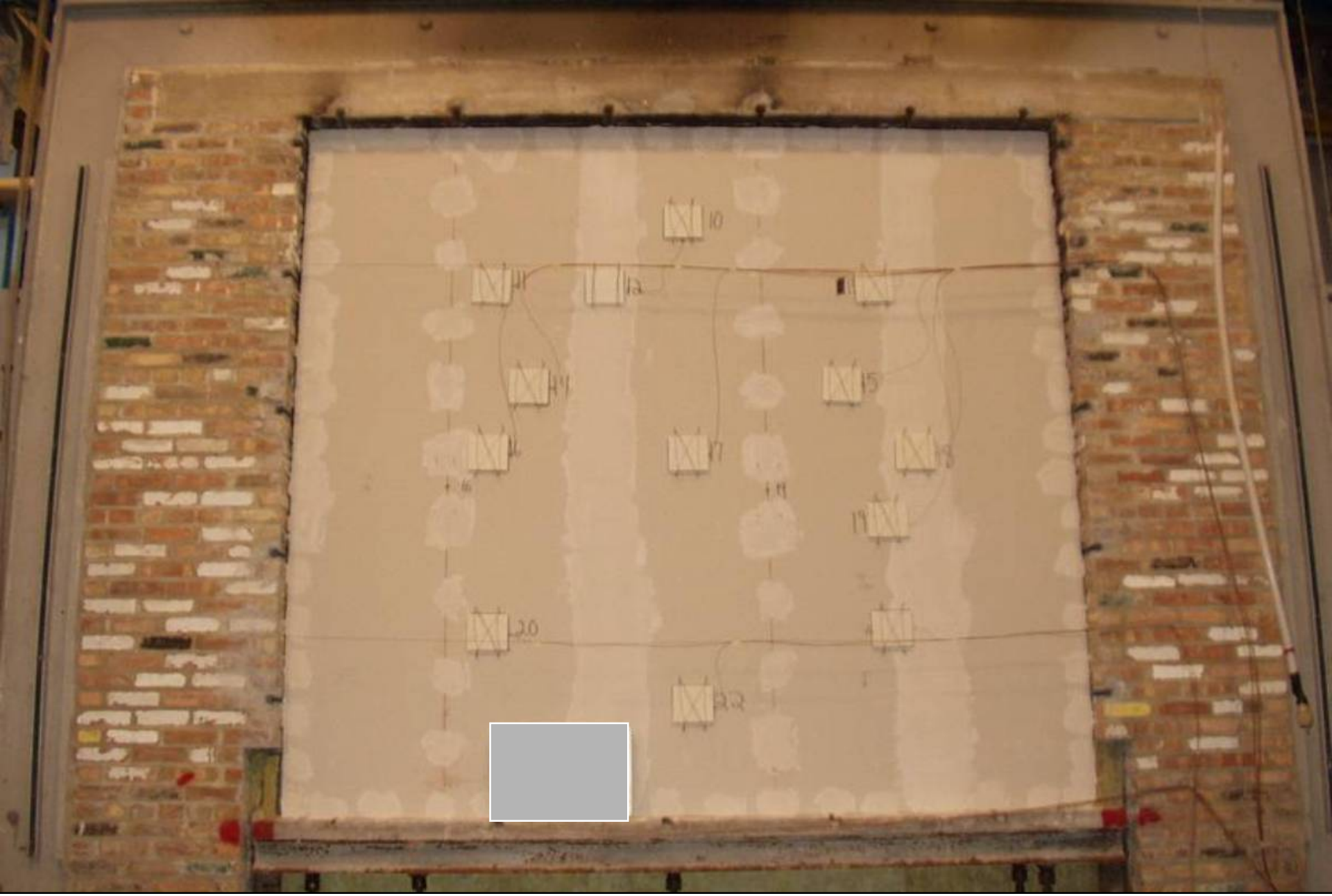


Code Requirements

- IBC Section 703.2 – Fire-resistance ratings shall be determined in accordance with ANSI/UL 263 or ASTM E119
- LSC 8.2.3.1 – The fire resistance of structural elements and building assemblies shall be determined in accordance with test procedures set forth in NFPA 251 (i.e. ANSI/UL 263 or ASTM E119)

Fire Resistance

- Expressed as an Hourly Time Period
- Ratings range from 1/2 to 4 hours
- Containment of Fire to Room or Floor of Origin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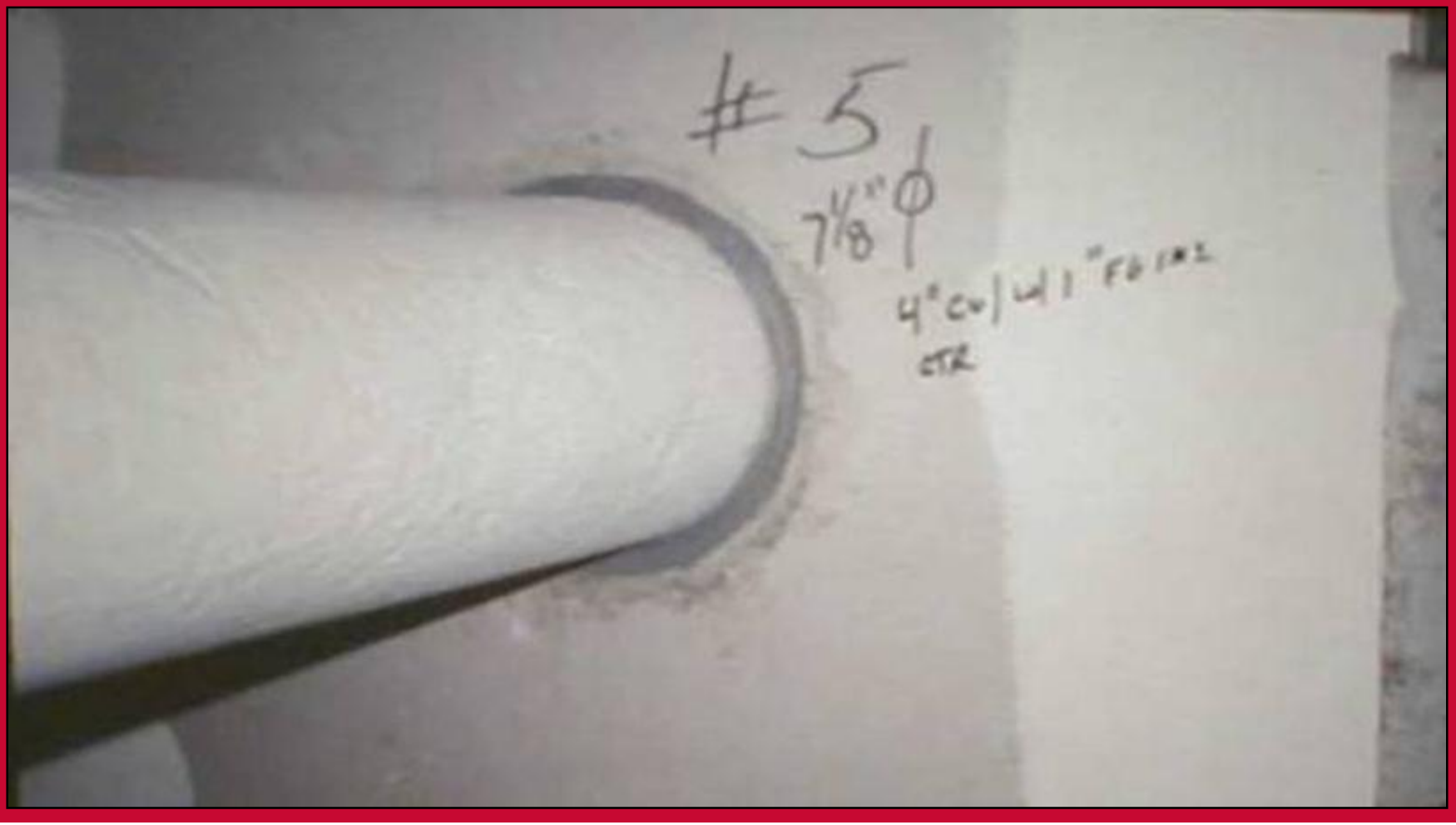
Through- and Membrane-Penetration Firestop Systems



Fire-Resistance-Rated Construction

Establishing an L Rating

Opening Protectives

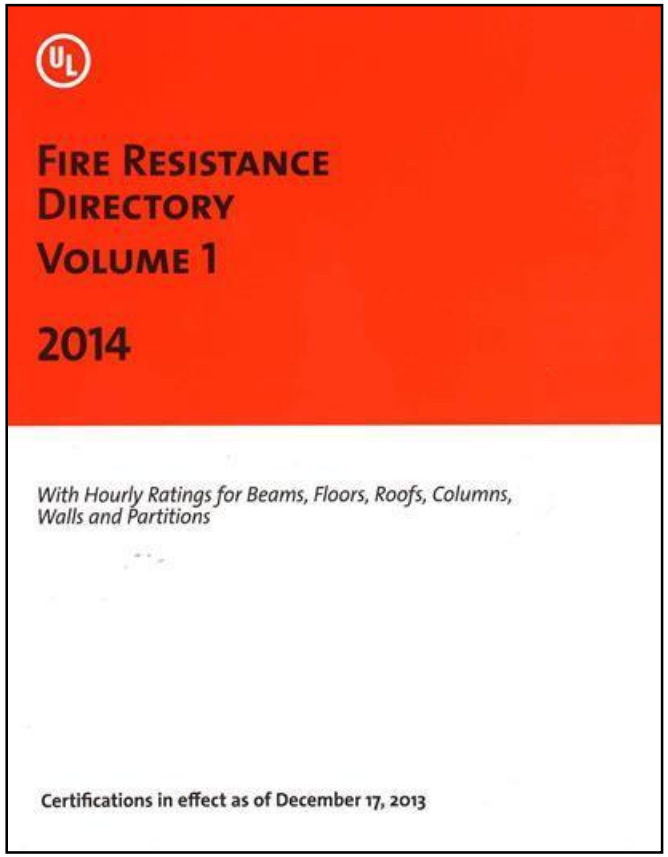
- Fire Door Assemblies
- Fire Window Assemblies

Conditions of Acceptance – Walls

- Flame passage
- 250ºF / 325ºF
- Support load
- Hose stream

Where Are Listings Found?

Hard Copy



CD-ROM

Online

Successful strategies

- **BUILD IT CORRECTLY**
  - **Thorough plan review process**
  - **Contractor qualifications**
  - **Commissioning systems and buildings**
    - **NFPA 3, NFPA 4, ASHE documents, pending ICC std.**
  - **Complete SOC documentation while contractor still on site**
  - **Use of certified special inspectors**

Building & Fire Code Requirements

- Fire Barriers
  - Fire Area Separations
  - Mixed Use Occupancies
  - Incidental Uses
  - Hazardous Area Separations
  - Exit Enclosures
  - Shaft enclosures
  - Horizontal Exits
  - Corridor Walls - NFPA

Building & Fire Code Requirements

- Smoke Barriers
  - Healthcare
  - Other Occupancies

- NFPA 101 – Smoke Resistance & Firestops
  - Ch. 8 NEW Addition
  - NOT in Occupancy Chapters …. yet
- IBC – Ch. 7
  - Quantified L Rating for Firestops

Building & Fire Code Requirements

- Compartmentation Codes – US
  - **Smoke Barrier – Firestopping for Continuity**
    - IBC – Hourly Rated, "L" Rating, Ambient, 400F
      - <5cfm/sf (IBC 2006) … OR…
      - < 50 cfm, 100sf of Wall Area (IBC 2009)
    - **NFPA –** … 'restricting the passage of smoke'…
      no quantified "L" Rating … YET
      - Continuous, Barrier to Barrier, … through concealed spaces,
      - Not always fire-resistance-ated.
  - **Smoke Partition**
    - IBC – Continuous barrier, not rated…'retard'.
    - NFPA – Continuous membrane that is designed to form a barrier to ***limit the transfer of smoke***….

Building & Fire Code Requirements

- ***Build it Right***
  - **Walls / Horizontal Assemblies – Continuity**
    - Firestop Products Become Firestop Systems
      - Penetrations
      - Joints – Head /Bottom of Wall – Perimeter Joints
    - Fire & Smoke Damper Duct Systems
    - Fire Doors and Hardware Systems
      - Rolling & Swinging
    - Fire Rated Glazing

Continuity

Effective Compartmentation Features

Barrier Management Symposium

April 14, 2015

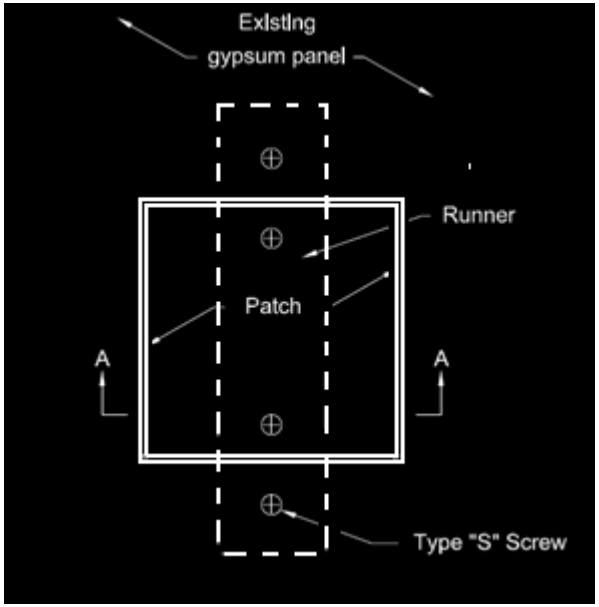
Nestor Sanchez, USG Corporation

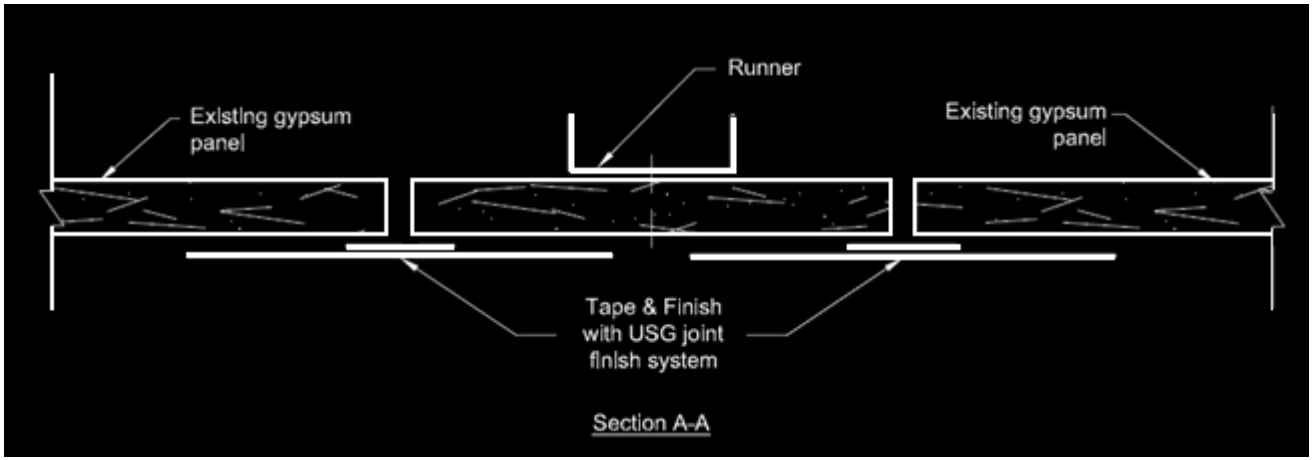
1. Explore the gypsum mineral and its impact on fire resistance in a systems basis
2. Understand the different types of gypsum core and their relation to fire resistance
3. Determine recognized methods for repair installed gypsum panels
4. Innovative Technology

Three (3) Types of Gypsum Cores

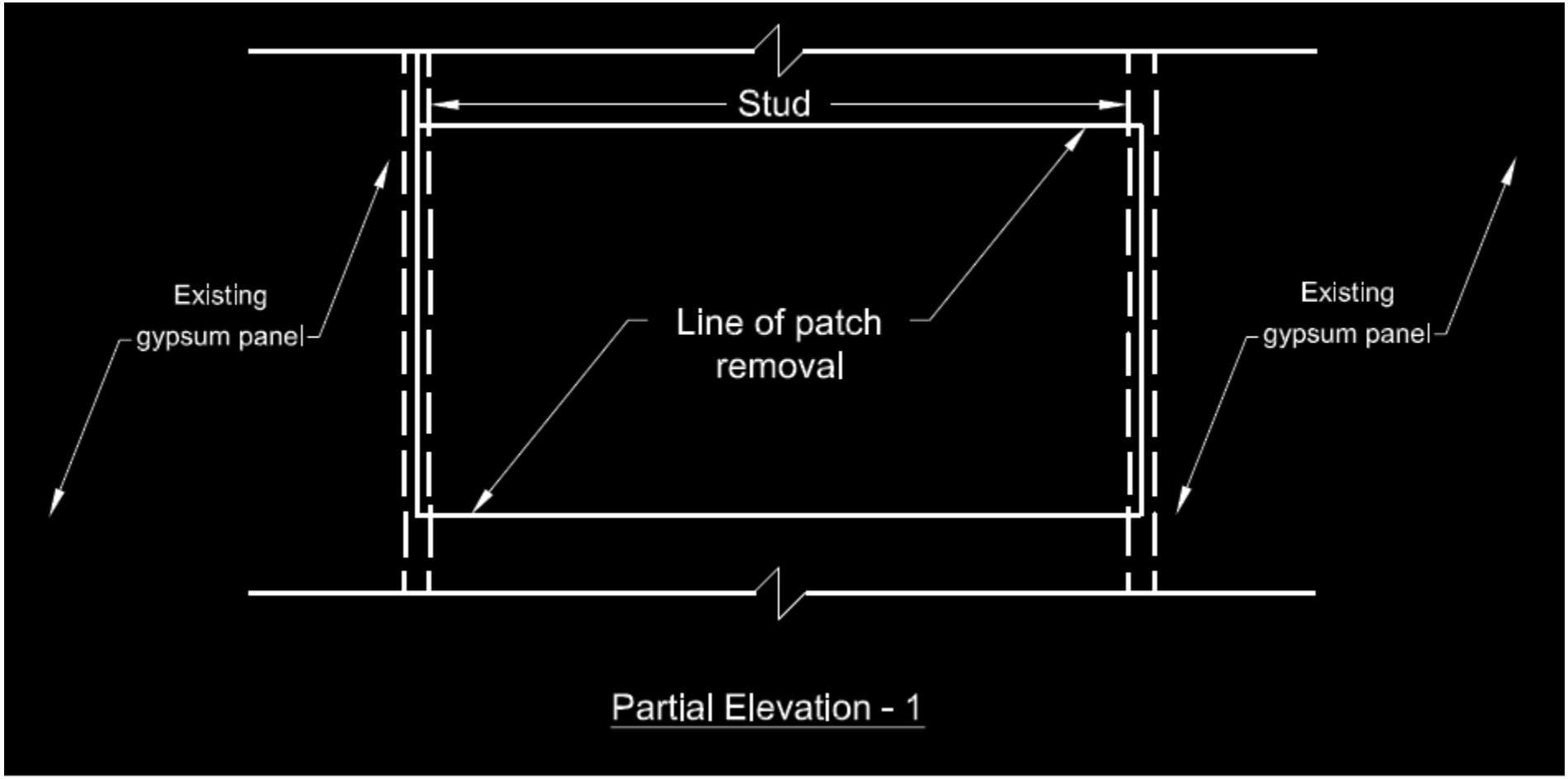
- **Regular Core**
- **Type X**
- **Type C**

Repair Small Holes





Repair Large Holes



Barrier Continuity SYSTEMS

- **Products Become Systems – Spec References**
  - **Fire & Smoke Barriers** - ASTM E 119, UL 263
  - **Firestopping** - ASTM E 814 / UL 1479, ULC-S-115, UL 2079, E-1966, E-2307, **E-2837, …**test method…"
  - **Fire/Smoke Dampers** - UL 555, UL 555S
  - **Swing/Rolling Fire Doors** - UL 10B, 10C
  - **Fire Rated Glazing** - UL 9
- **SYSTEM Testing = Suitability statement for use of a product in a specific *system* application**

Firestopping for Continuity

Products become SYSTEMS

- After Installation…
- **‘Field Erected Construction…Tested to…’**
  - Standards - ASTM E814/UL 1479–UL 2079, ASTM E 1966, ASTM E 2307, ULC S-115, FM 4990
  - **F Rating - Flame**
  - T Rating – Temperature
  - H Rating – Hose
  - **L Rating – Smoke**
  - W Rating – Water

Graphics – 3M

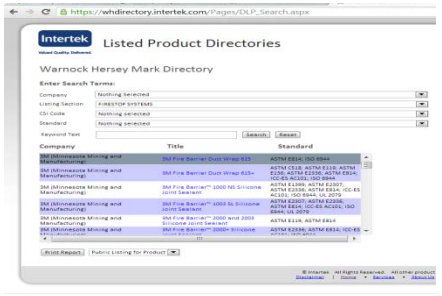
Products become Systems
Hose Stream = Shock Test

Barrier Continuity
Products become SYSTEMS

- **Fire Rated Systems Directories –**
  - **FM Approvals**
  - **Intertek**
  - **UL Fire Resistance Directory**

Systems Selection & Analysis…Not as easy as it looks…

ApprovalGuide™



Engineering Judgments/EFRRA

- Variances to Systems at Site ? – Now What…
  - **First Action in Process**
    - **Find another system** – Same Manufacturer
    - **Find another system –** Different Manufacturer
    - **If no system exists in either case**….
  - **Second Action –**
    - ***Engineering Judgment* – "EJ"**
    - ***Equivalent Fire Resistance Rated Assembly – "EFRRA"***
  - ***Based on engineering, IFC Protocol***

International Firestop Council – Manufacturers – firestop.org

IFC Guidelines for Evaluating Engineering Judgment Guidelines

‘Construction industry professionals, building officials, fire officials, firestop contractors and other stakeholders need appropriate guidelines for evaluating and using such judgments.

As such, IFC developed *Recommended IFC Guidelines for Evaluating FireStop Systems in Engineering Judgments*.

IFC EJ Guidelines - Engineering Judgments for firestop systems should:

1. Not be used in lieu of tested systems when available;

2. Be issued only by a firestop manufacturer's qualified technical personnel or in concert with the manufacturer by a knowledgeable registered Professional Engineer, Fire Protection Engineer, or an independent testing agency that provides listing services for firestop systems;

3. Be based upon interpolation of previously tested firestop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the judgment is to be given. Additional knowledge and technical interpretations based upon accepted engineering principles, fire science and fire testing guidelines (e.g. ASTM E 2032 – Standard Guide for Extension of Data from Fire Endurance Tests, ULC Subject C263E – Criteria for Use in Extension of Data from Fire Endurance Tests, or ASTM E2750 – Standard Guide for Extensions of Data for Penetration Seals) may also be used as further support data;

IFC EJ Guidelines

Engineering Judgments for firestop systems should:

4. Be based upon full knowledge of the elements of the construction to be protected, the understanding of the probable behavior of that construction and the recommended firestop system protecting it were they to be subjected to the appropriate Firestop Standard Fire Test method for the rating indicated on the Engineering Judgment;

5. Be limited only to specific conditions and configurations upon which the engineering judgment was rendered and should be based upon reasonable performance expectations for the recommended firestop system under those conditions;

6. Be accepted only for a single, specific job and project location and should not be transferred to any other job or project location without thorough and appropriate review of all aspects of the next job or location's circumstances.

IFC EJ Guidelines - Basic Presentation Requirements

Proper EJ's should:

1. Be presented in appropriately descriptive written form with or without detail drawings where appropriate;

2. Clearly indicate that the recommended firestop system is an EJ;

3. Include clear directions for the installation of the recommended firestop system;

4. Include dates of issue and authorization signature as well as the issuer's name, address and telephone number;

5. Reference tested system(s) upon which design (EJ) is based on;

6. Identify the job name, project location and firm EJ is issued to along with the non-standard conditions and rating supported by the EJ;

IFC EJ Presentation Guidelines – What's Seen?

7. Have proper justification (i.e. UL, Intertek or other independent laboratory system(s) and or opinions);

8. Provide complete descriptions of critical elements for the firestop configuration. These should include, but not be limited to the following:

a. Basic, Common

- **Type(s) of assembly used or being penetrated;**
- **Rating supported by the EJ.**

b. Through Penetrations

- **Penetrating item(s) (type, size, etc.);**
- **Annular space requirements, (minimum, maximum, actual, nominal, etc.)**
- **Opening size;**
- **Firestop product(s) to be used, type and amount (thickness if applicable);**
- **Accessory items(s) (i.e. anchors, backing material, etc.)**

c. Joints

- **Joint Width (installed width, nominal)**
- **Movement Capability;**
- **Movement Class (thermal wind sway, seismic);**
- **Accessory item(s) (i.e. insulation type, thickness and compression, etc.)**

IFC EJ Presentation Guidelines – What's Seen?

d•Duct Enclosure Systems – SEE www.Firestop.org

e• Firestop System – annular space dimensions, floor/wall construction, design number, components, installed thickness.

f. Perimeter Fire Barrier Systems –

- Type(s) of assembly used or being penetrated;

- Hourly Rating required

- Closest Listed System upon which the EJ is based

- Joint Width

- Static or Dynamic

- Safing Insulation Types), thickness and compression, etc.

- Five Basic Principles

1. Mechanical Attachment of the Spandrel Insulation

2. Protection of the Mullions

3. Compression Fitting and Orientation of the Safing Insulation

4. Installation of a Reinforcement Member(s), stiffener, at the safe-off area behind the spandrel insulation.

5. Firestop Coating, type, thickness,

IFC EJ Presentation Guidelines – What's Seen?

f• Continuity Head-of-Wall Joints

- ***Joint Width, (installed width, nominal)***
- ***Movement Capability***
- ***Movement Class – (thermal, wind sway, seismic)***
- ***Accessory Item(s) (i.e. insulation type, thickness, compression, etc.)***

IFC recommends that these guidelines be considered when evaluating whether any firestop system engineering judgment meets minimal requirements. Questions concerning the EJ request should be addressed to the initiator of the judgment.

INSTALL FIRESTOP SYSTEM
Firestop Sealant, MW installation to Tested and Listed System Limits
= Firestop System

Pack

1

Apply Sealant

2

Tool/Smooth

3

Walls - BOTH SIDES

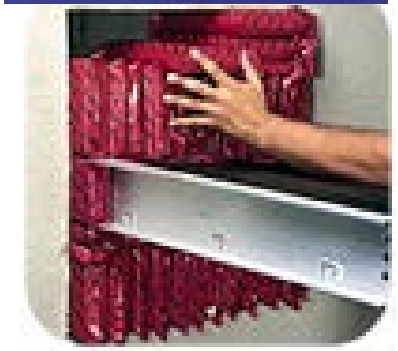
STI Graphic

Firestopping for Continuity Firestop Products

- **Sealants**
  - Silicone, Latex, Intumescent
- **Wrap Strips**
  - “Thick, Thin, Wide, Less Wide”
- **Putties**
- **Pillows**
- **Composite Sheets**
- **Bricks / Plugs**
- **Pre Fabricated Kits**
- **Mortar**
- **Spray Products**







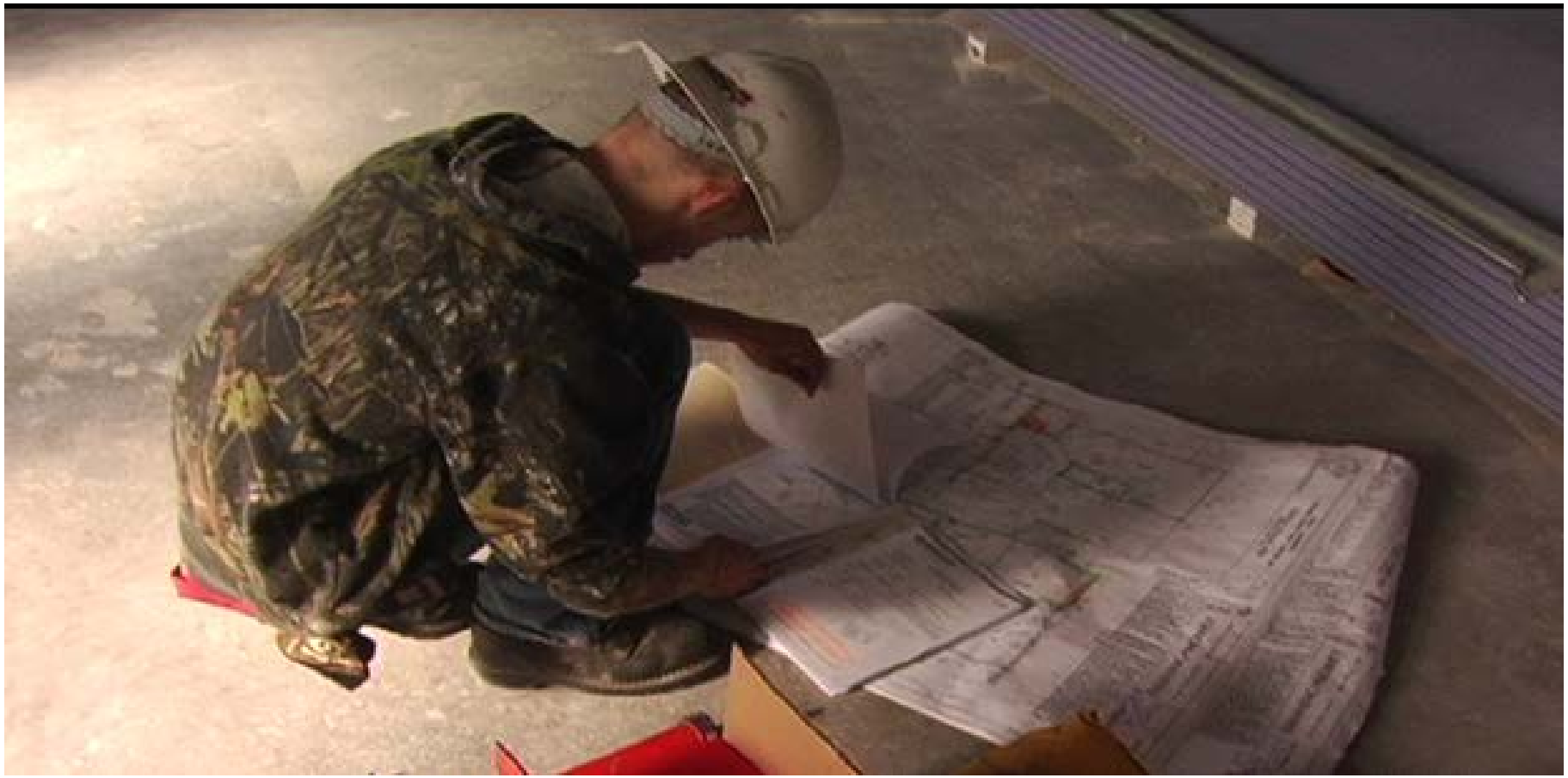

Graphics, STI,3M, AD, HILTI, Nelson

Firestop Materials, Systems Physical Properties Needed

- **Serve Building Needs**
  - **Smoke**
  - **Germs**
  - **Chemical Resistance – Cleaning?**
  - **Chemical, Biological, Radiation?**
- **Product Types**
  - **Intumescent, Latex, Silicone**
  - **Ablative**
  - **Endothermic**

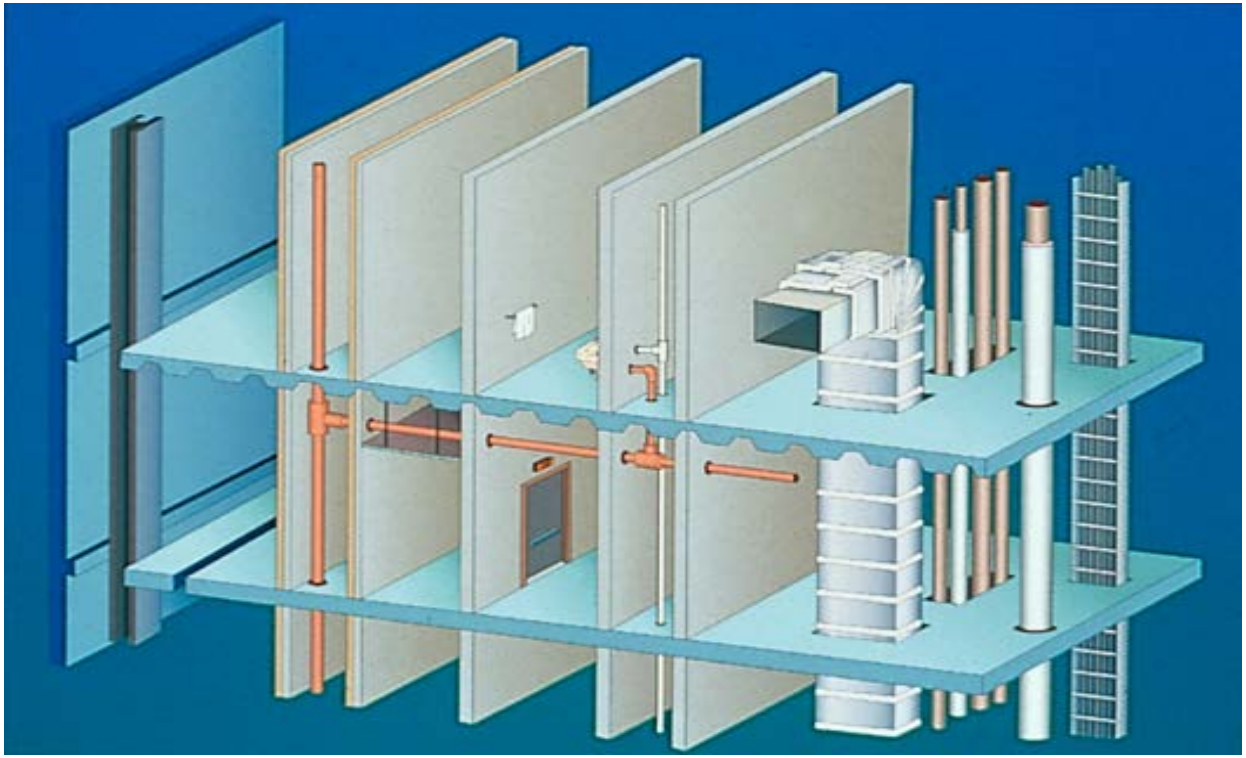
Graphics – 3M, STI, Nelson

Barrier Continuity
I – Installation – Listed Systems



I- Installation

Who’s Responsible, How to Choose???



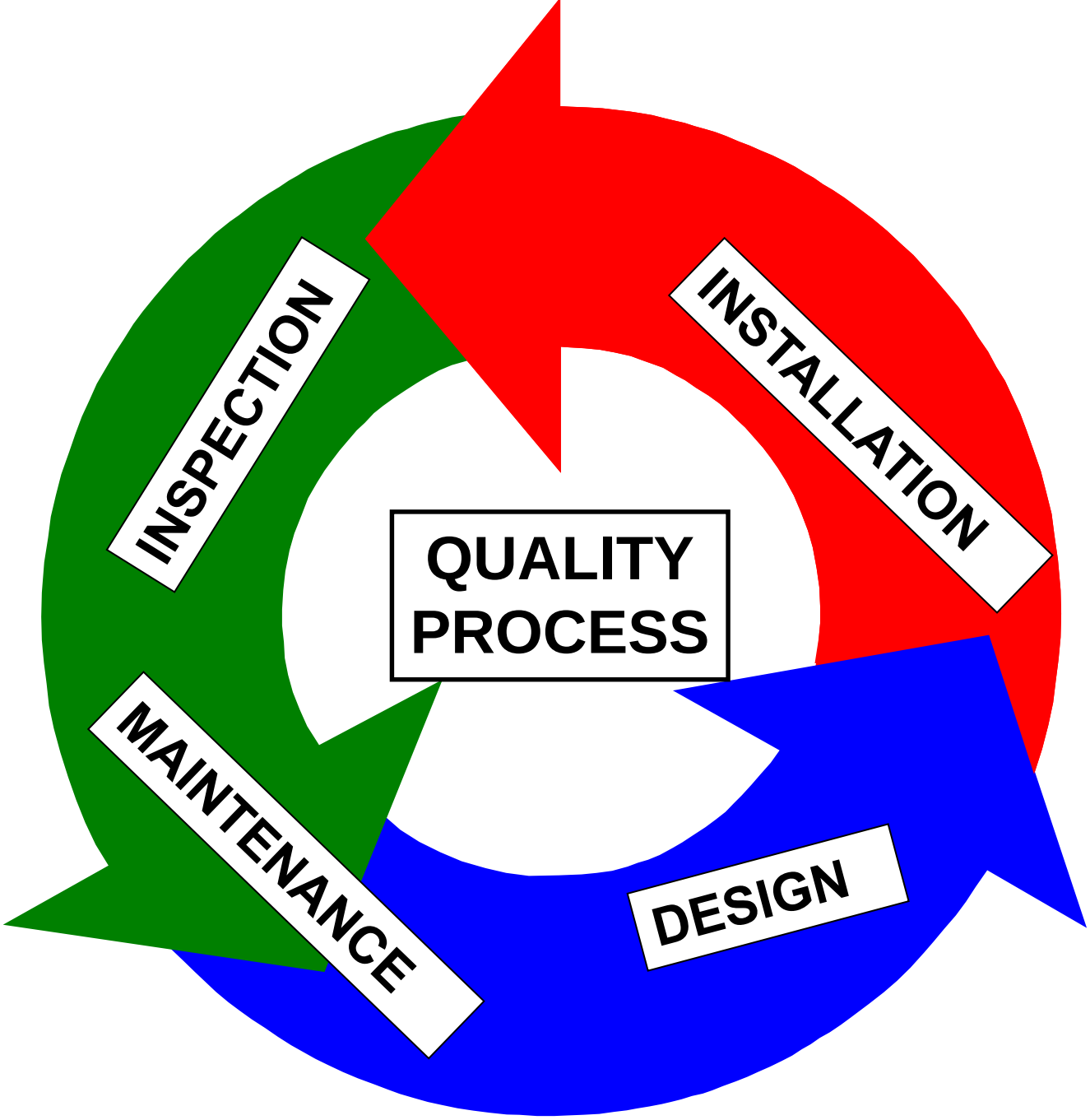
Graphics – STI

Spec Contractor Qualifications

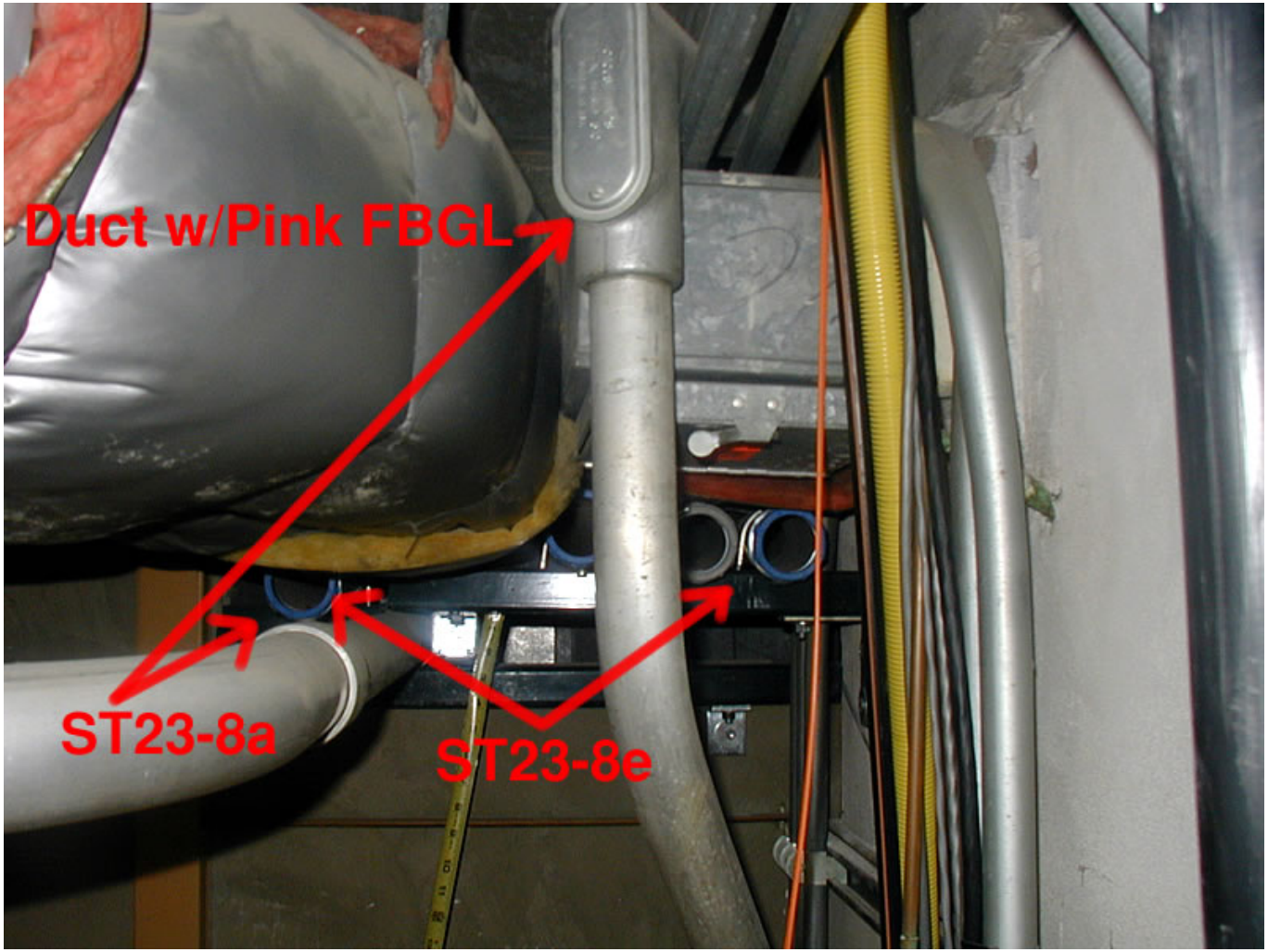
- **Any Company**
- **FCIA Member**
- **FM 4991 – Standard for the Approval of Firestop Contractors**
- **UL Qualified Firestop Contractors**
- **Other Industries???**
- ***FM 4991/UL-ULC CONTRACTORS UNDERSTAND SYSTEMS & DOCUMENTATION***

Why Contractor Qualifications?

- **Built right the first time…**
- **Documentation**
- **SYSTEMS Selection, Analysis, As-Builts**
  - **F, T, L, W Rated Systems**
  - **Tolerances - Annular Space Sizes, Angles**
  - **Gap Sizes - Undercuts - Framing**
  - **Anchors - Spacing – Hardware**
  - **Closers - Activation Sensors, more…**


INSPECTION
INSTALLATION
QUALITY
PROCESS
MAINTENANCE
DESIGN

Installation & Inspection

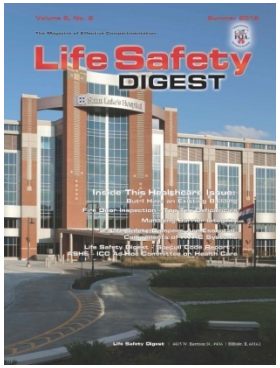


I – Inspection – Options

- **Contractor Self Inspection**
  - Verify Management System validity
- **Manufacturer Inspection?**
  - Does not exist … Survey, maybe
- **Special Inspection/Commissioning**
  - Independent 3rd Party
  - Destructive, Non Destructive
  - Specified Frequency
  - Inspection Agency Accreditation – IAS AC 291

M–Barrier Management Systems Starts @ NEW CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www. FCIA .org**
- **Part I – Focus on**
  - **Systems**
  - **Not Products**
  - **Manufacturers**



- **“Single Manufacturer to the greatest extent possible” – EJ’s**

M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www. FCIA .org**
- **Part II – Qualifications**
  - **FCIA Member in Good Standing, AND**
  - **FM 4991, Standard for the Approval of Firestop Contractors, OR**
  - **UL Qualified Firestop Contractor Program**
  - **AND**
  - **Manufacturer Accredited, Approved, Trained**

M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www. FCIA .org**
- **Part II – Qualifications – Special Inspection**
  - **Special Inspection Agency –**
    - **IAS AC 291 Accredited Special Inspection Agencies**
  - **Special Inspector Qualifications**
    - **FM Firestop Exam**
    - **UL Firestop Exam**
    - **AND**
    - **IFC Exam – ASTM E 3038**

M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
- **Part III – Execution**
  - **Special Inspection**
    - **ASTM E 2174 - Penetrations**
    - **ASTM E 2393 - Joints**

Built Right = Maintain Right WHEN SPECIFIED

- **Reference 01-78-00 Closeout Submittals**
  - **01 78 13 Completion and Correction List**
  - **01 78 19 Maintenance Contracts**
  - **01 78 23 Operation and Maintenance Data**
  - **01 78 23.13 Operation Data**
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  - **01 78 23.19 Preventative Maintenance Instructions**

Built Right = Maintain Right WHEN SPECIFIED

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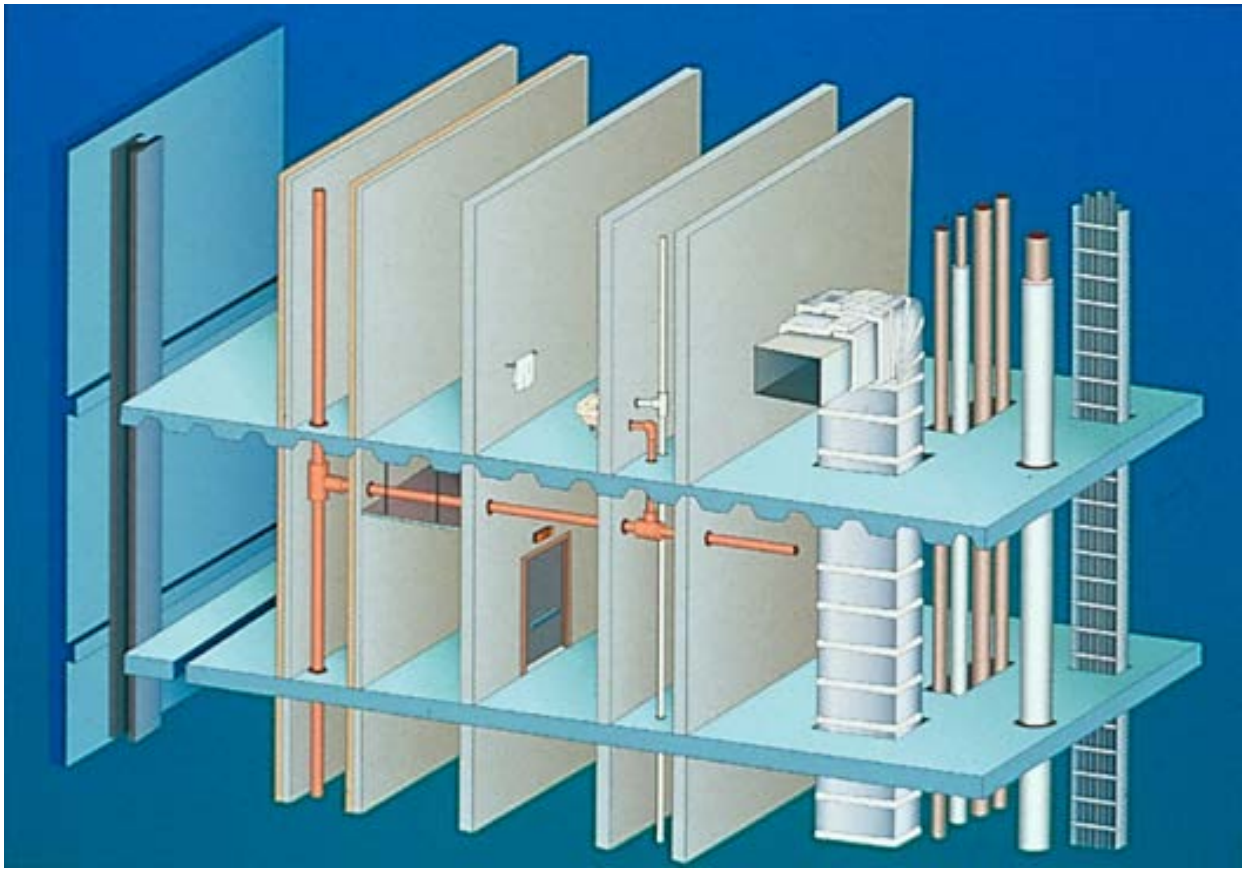
M – Maintenance
(& Management)



Fire Code Requires Fire & Smoke Resistance Maintenance

- **International Fire Code**
- **NFPA 101**
- **National Building Code of Canada**
- **UAE Fire and Life Safety Code of Practice**

- **Minimum Requirements Stated**

- **Frequency**

National Fire Protection Association - NFPA 101-2012

- **SECTION 4.5.8 Maintenance, Inspection, and Testing.**
- **4.5.8.1** **Whenever or wherever any device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature **is required for compliance** with the provisions of this Code, **such device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or other feature ***shall thereafter be continuously maintained*** in accordance with applicable NFPA requirements or requirements developed as part of a performance-based design, or as directed by the AHJ. [101:4.6.12.1]

National Fire Protection Association - NFPA 101-2012

- **4.5.8.2 No existing life safety feature *shall be removed or reduced*** where such feature is a requirement for new construction. [101:4.6.12.2]
- **4.5.8.3*** **Existing life safety features obvious to the public, if not required by the Code, *shall be either maintained or removed*.** [101:4.6.12.3]
- **4.5.8.4 Any device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature **requiring periodic testing, inspection, or operation** to ensure its maintenance ***shall be tested, inspected, or operated*** as specified elsewhere in this Code or as directed by the AHJ. [101:4.6.12.4]
- **4.5.8.5 Maintenance, inspection, and testing *shall be performed under the supervision of a responsible person who shall ensure*** that testing, inspection, and maintenance ***are made at specified intervals*** in accordance with applicable NFPA standards or as directed by the AHJ. [101:4.6.12.5]

International Fire Code Maintenance

SECTION 703
FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance. The required fire resistance rating of fire-resistance rated construction (including walls, fire stops, shaft enclosures, partitions, smoke barriers, floors, fire resistive coatings and sprayed fire resistant materials applied to structural members and fire resistive joint systems) ***shall be maintained***. Such elements shall be ***visually inspected by the owner annually*** *and* properly repaired, restored or replaced when damaged, altered, breached or penetrated.

Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings, **and holes** made for any reason ***shall be protected with approved methods*** capable of resisting the passage of smoke and fire.

2015 International Fire Code Maintenance

SECTION 703
FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance. The required *fire-resistance rating* of fire-resistance-rated construction, including, but not limited to, walls, firestops, shaft enclosures, partitions, *smoke barriers*, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems, shall be maintained. Such elements **shall be visually inspected by the *owner* annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated**. **Records** of inspections and repairs shall be maintained..

2015 International Fire Code Maintenance

SECTION 703
FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance. (continued) Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason **shall be protected with *approved* methods** capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of *approved* construction meeting the fire protection requirements for the assembly.

2015 International Fire Code Maintenance

SECTION 703
FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance. (continued) 703.1.1 Fireblocking and draftstopping. Required *Fireblocking* and draftstopping in combustible concealed spaces shall be maintained to provide continuity and integrity of the construction.

703.1.2 Smoke barriers and smoke partitions. Required *smoke barriers* and smoke partitions shall be maintained to prevent the passage of smoke. Openings protected with *approved* smoke barrier doors or smoke dampers shall be maintained in accordance with NFPA 105.

703.1.3 Fire walls, fire barriers and fire partitions. Required *fire walls*, *fire barriers* and *fire partitions* shall be maintained to prevent the passage of fire. Openings protected with *approved* doors or fire dampers shall be maintained in accordance with NFPA 80.

FCAC F113-16
2018 International Fire Code

- **701 General – ALL Fire Resistance**
  701.6 Owner's responsibility. The owner shall maintain an inventory of all required *fire-resistance-rated and smoke resistant* construction, and the construction included in Sections 703 through 707 and such construction shall be visually inspected by the *owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated.*

FCAC F113-16
2018 International Fire Code

- **701.6, Continued…PC2**
- **Records of inspections and repairs** shall be maintained. Where concealed, such elements shall not be required to be visually inspected by the *owner unless the concealed space is accessible by the removal or movement of a panel*, *access door*, *ceiling* tile or similar movable entry to the space.

FCAC F113-16
2018 International Fire Code

- **703.1 Maintaining protection. Materials and firestop systems used to protect membrane- and through-penetrations in fireresistance-** rated construction and construction installed to resist the passage of smoke shall be maintained.

FCAC F113-16
2018 International Fire Code
Documentation Required

- **703.1 … Continued. PC 1**
  The materials and firestop systems shall be securely attached to or bonded to the construction being penetrated with no openings visible through or into the cavity of the construction. Where the system design number is known, the system shall be inspected to the listing criteria and manufacturer's installation instruction.

UAE Fire and Life Safety Code of Practice Maintenance & Management

Chapter 1, SECTION 21
Firestopping

21.15.2 **The required fire resistance rating of installed firestop systems shall be *visually inspected by the owner or owner's inspection agency annually.* Damaged, altered or breached firestop systems shall be properly repaired, restored or replaced to comply with applicable codes as per the guidelines of Civil defense.**

21.15.3 **Any new Openings made therein for the passage of through penetrants, shall be protected with approved firestop system to comply with applicable codes as per the guidelines of Civil defense.**

National Fire Code of Canada

National Fire Code of Canada

- ***Division B – Part 2, Building and Occupant Fire Safety***
  2.2.1.2 – Damage to Fire Separations – where *fire separations* are damaged so as to affect their integrity, they shall be repaired so that the integrity of the *fire separation* is maintained…

- **FCIA Manual of Practice – Appendix, Maintenance**
  FCIA recommends Barrier Management for Effective Compartmentation and Structural Protection

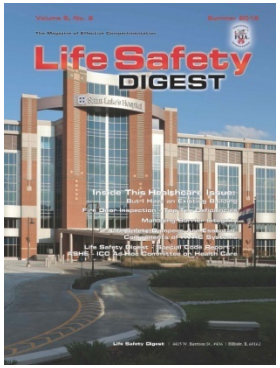
Firestop Maintenance

- **Maintenance**
  - **Code Required**
  - **How??**

- **How to keep Track – Barrier Management Initiative**
  - **Paper**
  - **Software**
  - **Labeling**

M–Barrier Management Systems Starts @ NEW CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www. FCIA .org**
- **Part I – Focus on**
  - **Systems**
  - **Not Products**
  - **Manufacturers**



- **“Single Manufacturer to the greatest extent possible” – EJ’s**

M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www. FCIA .org**
- **Part II – Qualifications**
  - **FCIA Member in Good Standing, AND**
  - **FM 4991, Standard for the Approval of Firestop Contractors, OR**
  - **UL Qualified Firestop Contractor Program**
  - **AND**
  - **Manufacturer Accredited, Approved, Trained**

M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www. FCIA .org**
- **Part II – Qualifications – Special Inspection**
  - **Special Inspection Agency –**
    - **IAS AC 291 Accredited Special Inspection Agencies**
  - **Special Inspector Qualifications**
    - **FM Firestop Exam**
    - **UL Firestop Exam**
    - **AND**
    - **IFC Exam – ASTM E 3038**

M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
- **Part III – Execution**
  - **Special Inspection**
    - **ASTM E 2174 - Penetrations**
    - **ASTM E 2393 - Joints**

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Built Right = Maintain Right WHEN SPECIFIED

- **Why Specifications Division 01-78-00?**
  - **Fire Resistance Inventory REQUIRED -**
  - **F-113-16 – 2018 International Fire Code**
  - **Section 703.1 becomes 701.1**
    - **Fire Rated Walls & Floors**
    - **Firestop Systems**
    - **Fire & Smoke Dampers**
    - **Fire Rated Rolling & Swinging Doors**
    - **Fire Rated Glazing**

M–Barrier Management Systems

- **Why Manage Barriers?**
- **International Fire Code**
- **International Property Maintenance Code**

M–Barrier Management Systems ICC's IPMC

IPMC SECTION 703

[F] 703.1 Fire-resistance-rated assemblies. The required fire-resistance rating of fire-resistance-rated walls, fire stops, shaft enclosures, partitions and floors shall be maintained.

[F] 703.2 Opening protectives. Required opening protectives shall be maintained in an operative condition. Fire and smokestop doors shall be maintained in operable condition. Fire doors and smoke barrier doors shall not be blocked or obstructed or otherwise made inoperable.

International Existing Building Code

M–Barrier Management Systems Policies

- **Barrier Management Policy**
  - **Inventory**
  - **Monitor**
  - **Permits**
  - **Management**
  - **Request Budget to Meet Code Requirements**
  - **Implement Maintenance**
    - **In House (Rules)**
    - **Outside Contractor (Rules)**

M–Barrier Management Systems Policies

- **Barrier Management Policy**
  - **Inventory - Items to Survey**
  - **Fire-Resistance-Rated Walls and Floors**
    - **Breaches for Penetrations, Joints, Doors, etc.**
    - **Wall not completed at new construction?**
    - **Wall removed above ceiling?**

M–Barrier Management Systems Policies

- “Where concealed, such elements shall not be required to be visually inspected by the *owner* ***unless*** **the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar** movable entry to the space.
- **[IFC 2015, 703.1]**

M–Barrier Management Systems Starts with CONSTRUCTION

- **Fire-Resistance-Rated Walls & Floors**
  - **Walls - U, V 400, 900 Designs**
  - **Floors – P Designs**
  - **Calculated Fire Resistance**
  - **Code Defined Fire Resistance - 720**
    - **Firestop Systems**
    - **Fire & Smoke Dampers**
    - **Fire Rated Rolling & Swinging Doors**
    - **Fire Rated Glazing**

M–Barrier Management Systems Operations

- **Items to Survey**
- **Fire-Rated Doors – Annually – NFPA 80**
  - **Close and Latch**
  - **Holes**
  - **Attach at Frame**
  - **Undercut & Astragals**
  - **Labels Legible**
  - **Labels recertified, requirements of 3rd party certification agency**

M–Barrier Management Systems Operations

- **Firestop Systems – Not Concealed Only**
- **Through & Membrane Penetrations**
  - **Joints**
    - **Wall to Wall**
    - **Floor to Floor**
    - **Head – Bottom of Wall**
    - **Continuity Head of Wall**
  - **Perimeter Fire Containment**

M–Barrier Management Systems Operations

- **Firestop Systems – SYSTEMS**
  - **Visibly Comply with System**
  - **Visibly ‘sealed’**
  - **Without openings**
  - **Firestop Materials & Systems**
  - **Securely Attached**

M–Barrier Management Systems Items to Survey

Fire & Smoke, Ceiling, Radiation Dampers

- **NFPA 80 –**
- **Initial Installation**
- **At 1 year, each 4 years,**
- **6 years healthcare**
    - **Fire Dampers**
    - **Smoke Dampers**
    - **Combination Fire/Smoke Dampers**
    - **Ceiling Dampers**

M–Barrier Management Systems Items to Survey

- **Fire Rated Glazing**
  - **Verify it's still fire rated**
  - **Glazing / Frame Attachment**
  - **Frame attached to wall**
  - **Glazing Marking as Built**

M–Barrier Management Systems Items to Survey

- **Fire Resistance Inventory Systems**
  - **Paper & Files**
  - **Spreadsheets**
  - **Software**

M–Barrier Management Systems Building Operational

- **Barrier Management Policy**
  - **Repairs**
    - **As originally permitted and *approved***
    - ***As required by Fire Code, Existing Building Code***
    - **If SYSTEMS required, SYSTEMS REPAIRS**
    - **If no Systems, original materials.**
    - **Fire Official**
    - **Insurance Company**

M–Barrier Management Systems

- **Now it's your building….**

- **Gleeson Powers Graphic**

M–Barrier Management Systems

- **Barrier Management**
  - **Issues…Budget???**
  - **Other Occupancies---Big Problem**
  - **Constant issues**
  - **Control?**
  - **Staff?**
  - **Manage?**

Barrier Management HUB

- **The HUB is Facility Director!**
- **HUB Controls Actions**
  - **C-Suite Execs – Budgeted Yearly**
  - **Construction –**
    - **In House Crews**
    - **Outside Contractors**
  - **I-T Department –**
    - **In House Crews & Outside Contractors**

Barrier Hub = Facility Director?

- **YOU answer to…**
  - **Other AHJ's**
  - **C-Suite**
  - **Occupants, Students, Faculty, Patients**
  - **Building Official, Fire Marshal**
  - **Insurance Company**
  - **The Joint Commission**
  - **CMS Inspectors**

Barrier Management Policy Contents

- *Annual Line Item Budget*
- Rules of Engagement in Contracts
  - Internal Contracts
  - External Contracts
- Pre Construction Meetings
- Barrier Warnings - Markings
- Violation Consequences
- Ongoing Management
- Staff - Occupant Education

Barrier Management Policy Tool

- **Contracts = Rules**
  - **Internal Contracts -**
    - **In House Departments similar to Outside Contractors**
  - **External Contracts**
    - **AIA Contract**
    - **Marked Fire - Smoke Barrier Actions**
    - **Barrier Permits**
    - **Documentation Systems**
    - **Report**

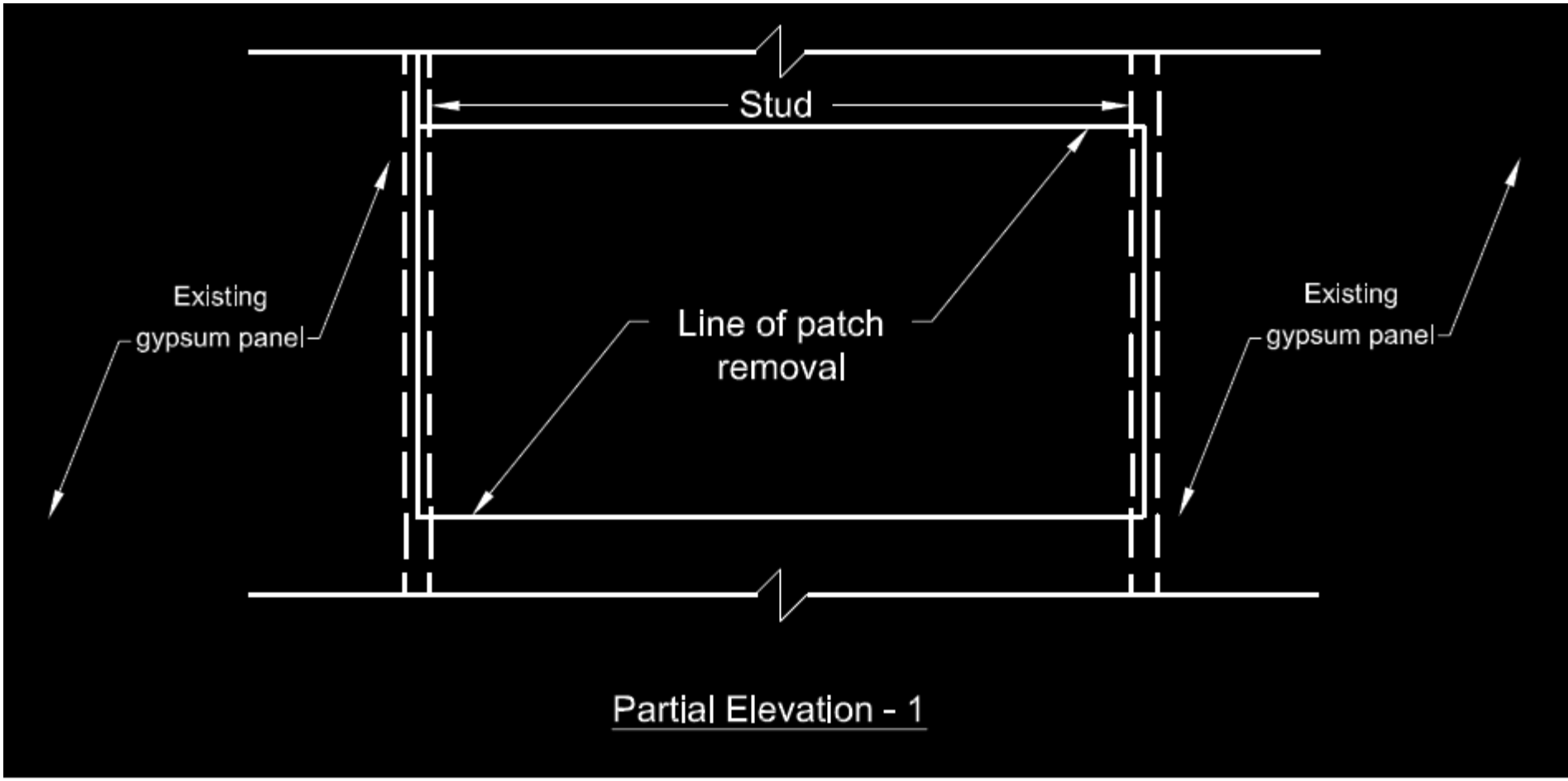
M–Barrier Management Systems

- **Barrier Inventory Elements**
  - **Life Safety Drawings**
  - **Existing Conditions Documented**
  - **Ongoing Survey Records**
  - **Deficiency Reports**
  - **Systems Documentation Control, Retrieval**
- **ALL FIRE PROTECTION FEATURES**

M–Barrier Management Systems

- **Barrier Repair Examples**

Gypsum Wallboard Repair Large Holes

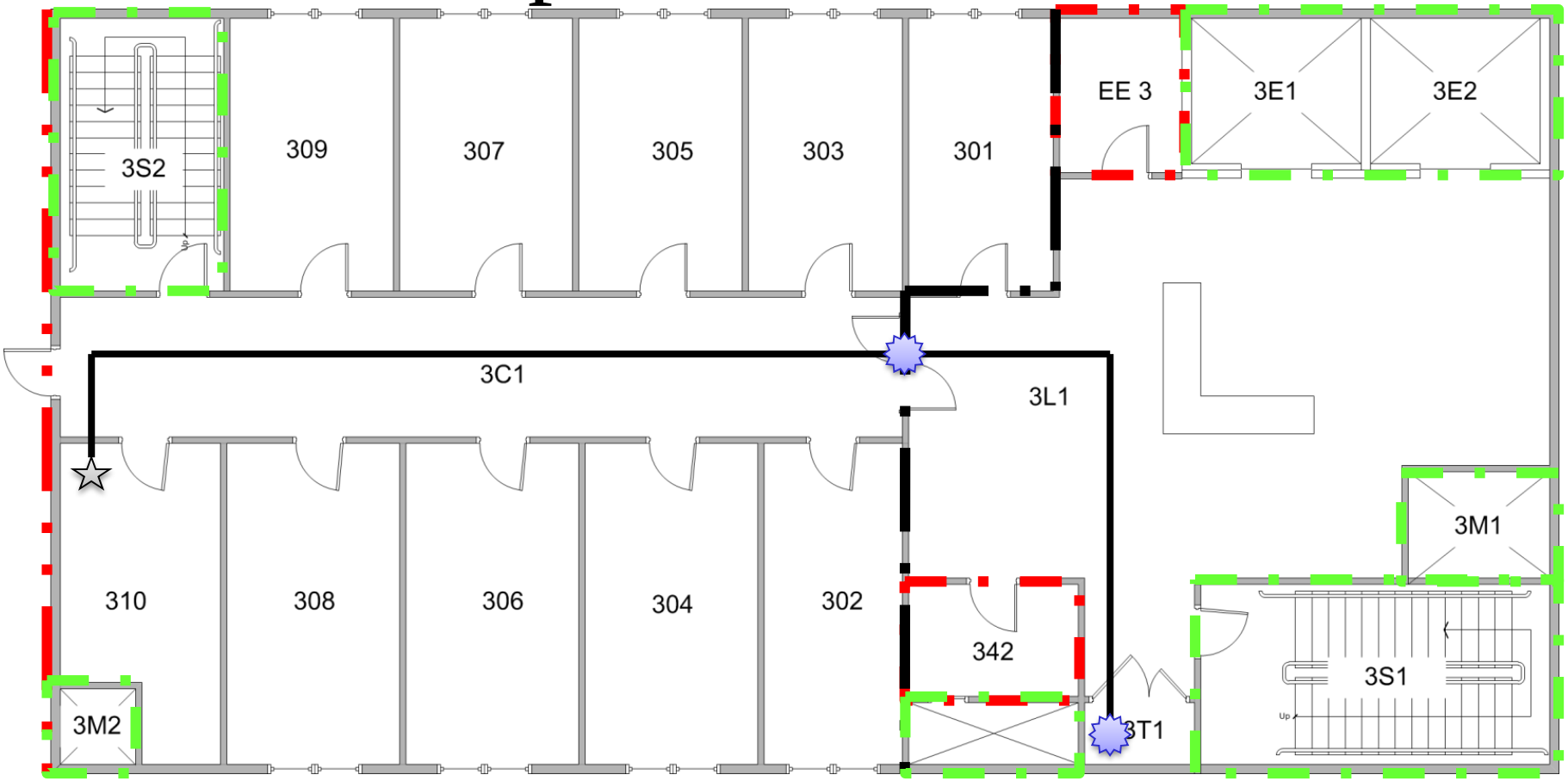


- USG Photo

M–Barrier Management Systems

- **Electronic Best Practice Elements**
  - **Action Oriented**
    - **Projects - Specifications**
    - **Ongoing Surveys – FCIA RPPS 2010-1**
  - **Action Reminders**
  - **In Process Status**
  - **Record Retrieval**

Sample Permit – Area



Demo Hospital

Permit No.: 2011-005

Area (*): 3C1/3L1 Side 1: 3C1 Side 2: 3L1

LSR ID: LST-B1-03-007 Compliance Status: Non-compliant

Survey ID: LSR Group:

Life Safety Details | Surveys | Photos | Floor Plan Diagrams

	LSR Deta...	Status	Latest Ph...	Detail Description	Life Safety T...	Life Safety Sub ...	Letters	Numbers	LSR Count	Notes
>	001	Non-com...		Firestopping Through Wall Penetration - Firestop	Firestopping	Through Wall Pe...	WL	1000-1999	1	
	002	Compliant		Firestopping Through Wall Penetration - Firestop	Firestopping	Through Wall Pe...	WL	1000-1999	0	
	003	Compliant		Firestopping Through Wall Penetration - Firestop	Firestopping	Through Wall Pe...	WL	5000-5999	1	
	004	Compliant		Firestopping Through Wall Penetration - Firestop	Firestopping	Through Wall Pe...	WL	3000-3999	1	EZ Path

Add New Life Safety Detail Entry | Edit Selected Life Safety Detail Entry

Edit | Save | Save & Add Another | Save & Close | Delete Record | Cancel

Edit Selected Permit | Delete Selected Row | View/Print Permit | Close Form

admin | Client: Life Safety Tracker Demo | Beta | v1.3.13.9

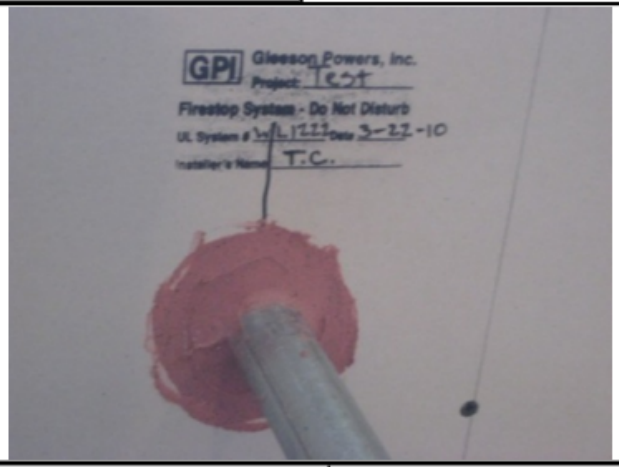
Corrective Action Report

	Building\Floor\Area: Building 1 \ 3rd Floor \ 3C1/3L1	LSR # - Detail#: LST-B1-03-007 - 001
Life Safety Type: Firestopping	Life Safety Sub Type: Through Wall Penetration - Firestop Systems	
Penetration Type: EMT or Conduit	Penetration Size: Max 1"	Annular Space: MIN: 0 to .50", MAX:
Wall Rating Type:		
Date Completed: May-02-2011	Classified System:	Survey #: Survey / Survey Date:
Deficiency Description: No firestopping	Suggested CA Notes: Install UL Listed Firestopping System at penetration/joint	
Survey Notes:	CA Notes:	

Survey Photo

Side: 37296 | Photo ID: 37296

Corrective Action Photo



Side: 1: 3C1	Photo Notes:
Photo ID: 37298	

Survey Photo

Side: 2: 3L1 | Photo ID: 37297

Corrective Action Photo

Side: 2: 3L1	Photo Notes:
Photo ID: 37299	

Barrier Management Policy Code Guidance

703.7 Marking and identification. ***Fire walls, fire barriers,*** *fire partitions, smoke barriers and smoke partitions or any* other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:

1. Be located in accessible concealed floor, floor-ceiling or *attic spaces;*
2. Be located within 15 feet (4572 mm) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition; and
3. Include lettering **not less than 3 inches (76 mm) in height with a minimum 3/8 inch (9.5 mm) stroke** in a contrasting color incorporating the suggested wording.

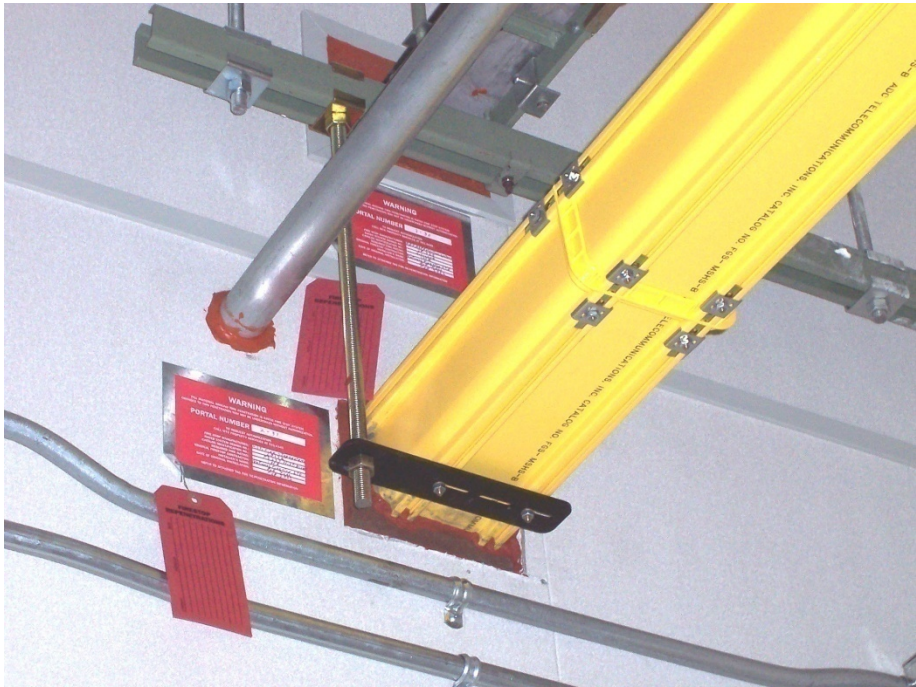
“FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS”

or other wording.

Exception: Walls in Group R-2 occupancies that do not have a removable decorative ceiling allowing access to the concealed space.

Barrier Management Policy Tool

- Barrier Warnings on ASSEMBLIES
- International Building Code – 2009++



Barrier Management Policy Tool

- **Pre Construction Meetings - Education**
  - **Barrier Markings Mean…**
  - **Actions when at Barriers Required...**
    - **Permit required – Above Ceiling, Barrier Hole…**
    - **Infection Control Rules**
    - **Healthcare facility Rules**

Barrier Management
Policy = Tool

Barrier Management Policy Tool

- **Violation Consequences**
  - **In House –**
    - **2 strikes & work reassignment to cleaning…**
    - **Others…**
  - **Outside Contractors**
    - **2 strikes & not allowed to work above ceilings**
    - **Others…**

Barrier Management Policy Tool

- **Find Violators….**
  - **Staff Awards**

Barrier Management Policy Tool

- **Ongoing Management**
  - **Engineering Staff Reviews**
  - **User Staff Reviews**
  - **Inside Construction**
  - **Outside Contractor**

Barrier Management Policy Tool

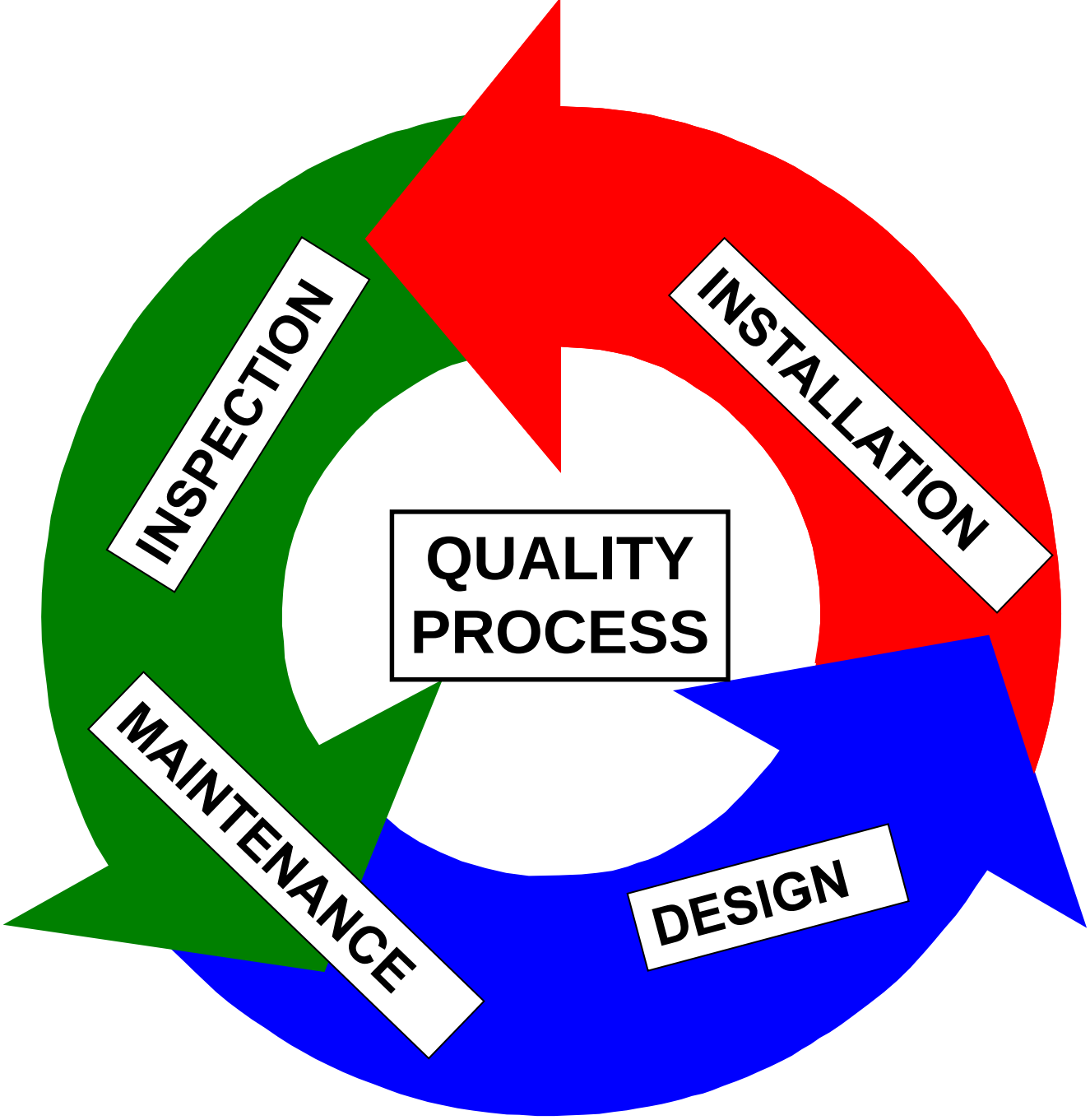
- **Education - Staff Repairs – Simple??**
  - **Fire Doors & Hardware – Simple things…**
    - **Close & Latch**
    - **Holes in Door**
  - **Ladder = ?? Permit Sticker?**
  - **Fire Rated Walls - Holes**
    - **Accidental**
    - **Workers**

Barrier Management Policy Tool

- **Budgets…**
  - **Sprinkler Maintenance**
  - **Alarms Maintenance**
  - **Security**
  - **Fire and Smoke Resistant Assemblies**
    - **Doors**
    - **Dampers**
    - **Firestops**
    - **Glazing**
    - **Walls/Floors**

“TOTAL FIRE PROTECTION”

- Effective Compartmentation
  - Fire Barriers, Fire Walls/Floors, Smoke Barriers
  - Firestopping, Fire Dampers, Swinging and Rolling Fire Doors, Fire Rated Glazing
- Detection & Alarm Systems
- Sprinkler Suppression Systems
- Education & Egress–
  - Building Owners & Managers, Building Occupants and Firefighters


INSPECTION
INSTALLATION
QUALITY
PROCESS
MAINTENANCE
DESIGN

“DIIM”

- Barriers are for Safety – DIIM
  - Properly ***Designed*** and Specified
    - ***Tested and Listed Systems*** – Directories,
  - Professional ***Installation*** - Companies
  - Properly ***Inspected*** – Commissioned
  - ***Maintained*** - Annually –
    - NFPA 101
    - International Fire Code
    - International Property Maintenance Code
    - It’s required by Code
    - Minimize Liability
    - Protect Occupants

Effective Compartmentation is a SYSTEM

Contacts

Firestop Contractors International Association

Hillside, IL – +1-708-202-1108 - office

Bill McHugh – bill @ fcia.org

FCIA @ MOSHE/SICHE

Firestopping
Barrier Management Symposium™ Summary

Bill McHugh, FCIA