

CONSTRUCTION PROJECT CLOSE-OUT

Don't Stop Short of the Finish Line



2021 Midwest Facility Masters Conference



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AGENDA

- 1. Punch List Walkthroughs**
- 2. HVAC System Proper Operation**
 - Testing & Balancing
 - Commissioning
 - M & V
 - First Heating Season & First Cooling Season
- 3. Staff Trainings on Systems & Equipment**
- 4. Proper Project Documentation**
 - As-Built Plans
 - Project Filing
 - O & M Documentations
- 5. Hazardous Materials**
- 6. Maintaining Adequate Attic Stock**
- 7. Warranties**

PUNCH LIST WALKTHROUGHS

- ▶ Architects/Engineers
- ▶ School District Staff
 - Facilities
 - School Operations, e.g. Principal, etc.
- ▶ Maintenance Experts
 - In-House
 - External Service Considerations
- ▶ Building Envelope Consultant(s)

Punch List Walkthrough Summary

- ✓ Look everywhere – roofs, all mechanical spaces, inside equipment & panels, etc.
- ✓ Document all findings – require CM/GC to document all fixes
- ✓ Warranty doesn't start until everything's complete

Punch List Walkthrough Examples

Clipped off corner of damper to run conduit



Punch List Walkthrough Examples

Unpatched penetration through fire wall



Punch List Walkthrough Examples

Wall was not cleaned after core drilling



Punch List Walkthrough Examples

Failed to remove dust cover from ductwork



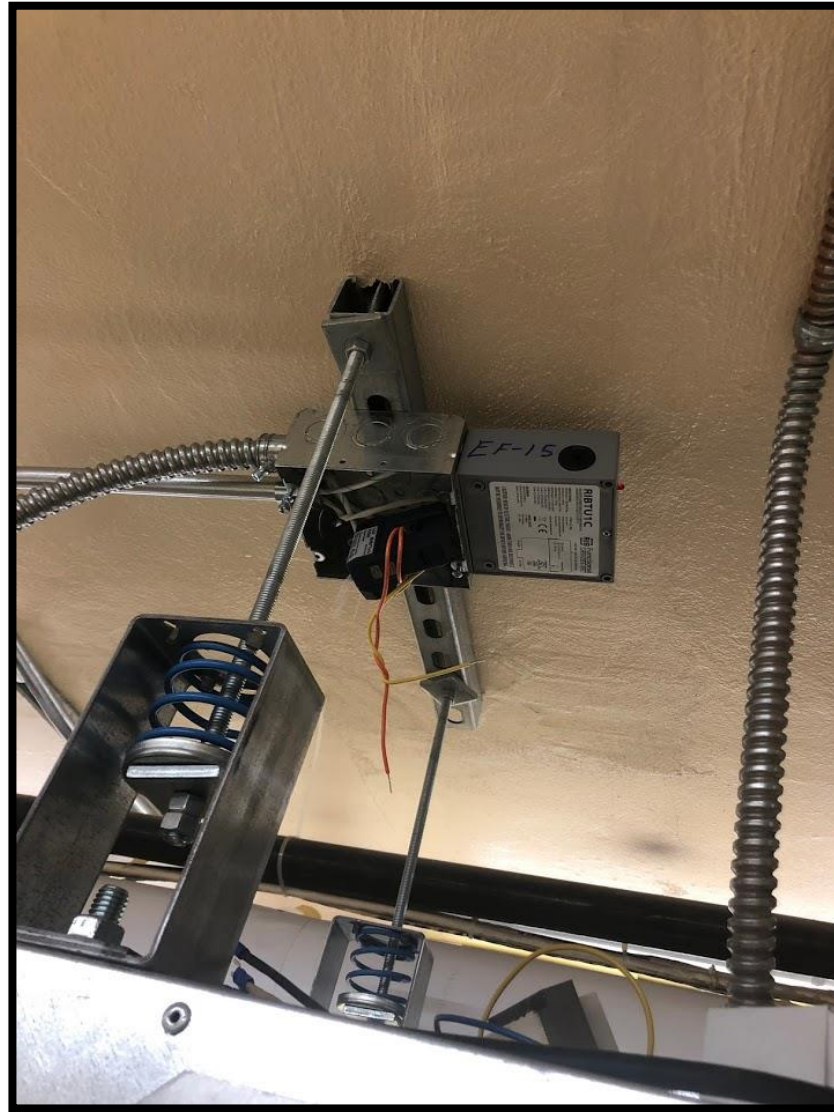
Punch List Walkthrough Examples

Missing damper on OA intake hood



Punch List Walkthrough Examples

Unfinished wiring and enclosures



Punch List Walkthrough Examples

Hail guards on chiller not installed



Punch List Walkthrough Examples

Missing escutcheons on sprinklers



Punch List Walkthrough Examples

Missing isolation valve



Punch List Walkthrough Examples

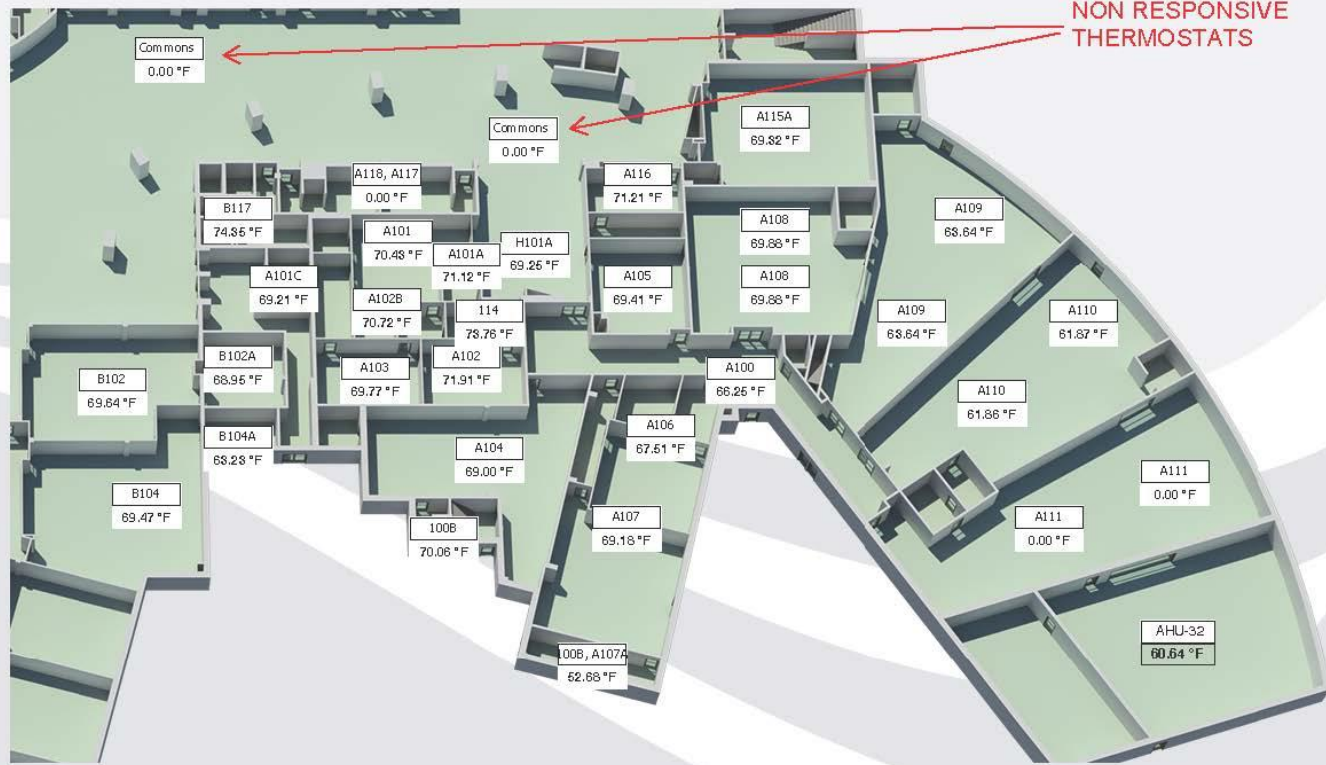
Non responsive thermostats



Home Lighting Floor Plans AHUs RTUs ERVUs MAUs Boiler System Exhaust Fans

Level 1 Area C

11-Feb-21 12:51 PM GMT
6.8 °F 0.00 %RH
0.0 Enthl 16.0 BTU/lb



Punch List Walkthrough Examples

Pipe labeling showing flow in wrong direction



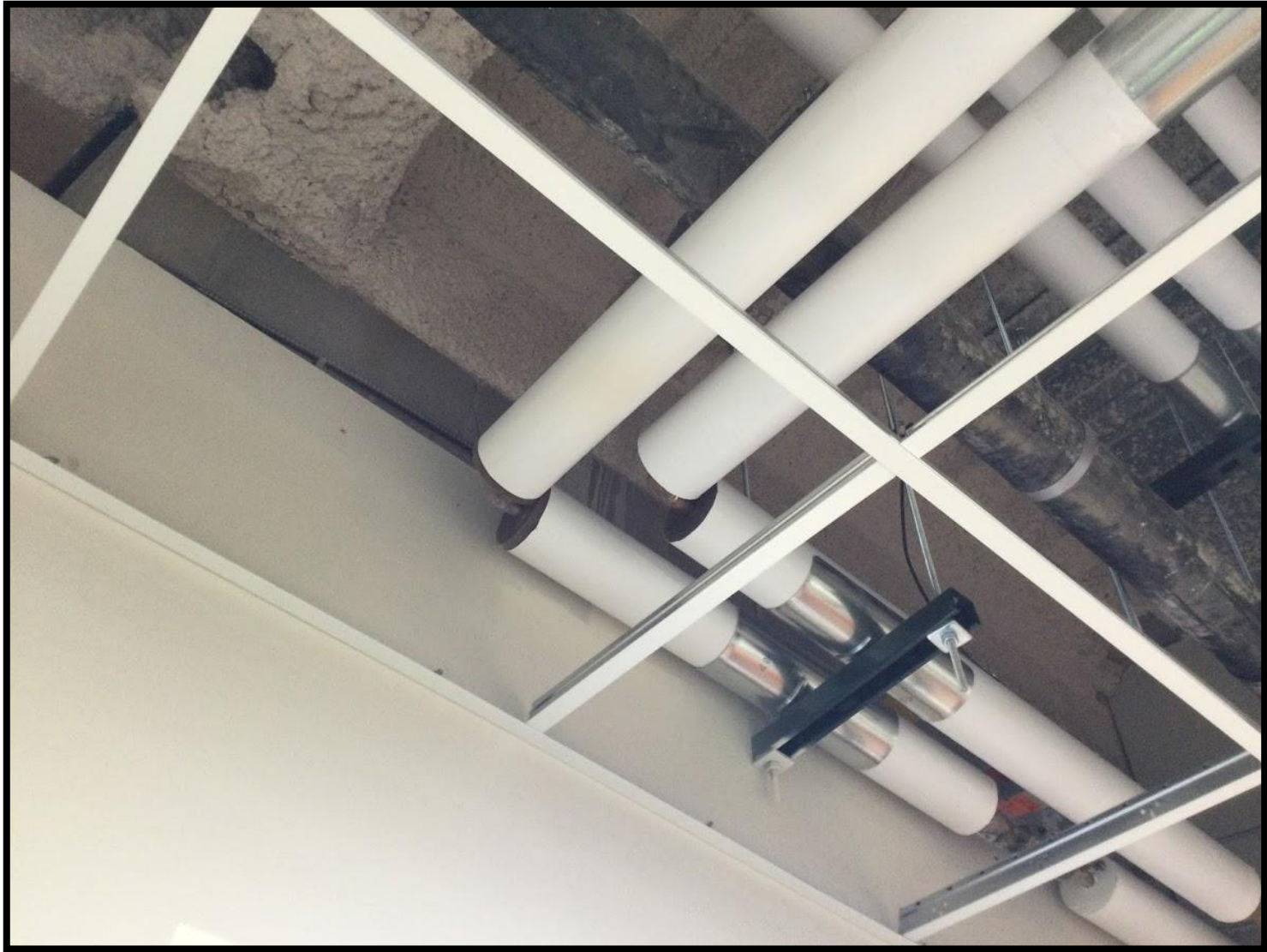
Punch List Walkthrough Examples

Pneumatic actuator with air line disconnected



Punch List Walkthrough Examples

Elbow insulation not installed



Punch List Walkthrough Examples

Sprinkler lines do not match up and are not connected



Punch List Walkthrough Examples

Piece of angle iron left on roof



Punch List Walkthrough Examples

Roof top unit enclosure opened and extension cord left in unit



Punch List Walkthrough Examples

Disconnect switch not installed



HVAC SYSTEM PROPER OPERATION

- ▶ Testing & Balancing
- ▶ Commissioning / M & V
- ▶ Getting Control Systems Finished & Working Properly
 - First Heating Season
 - First Cooling Season
 - Evaluate Utility Usage

Testing & Balancing

- Participate, stop-in, talk to T&B contractor → Spend time with them.
- They can do a great job; they can also race through and cut corners.
- If you have reports with a high percentage of actual air/water flow rates identical to design, you should be suspicious.

Commissioning / M & V

- 15 years ago, commissioning was viewed by many as a luxury – there weren't a lot of people trained and available, the cost was viewed as too much, etc.
- Now commissioning is a part of almost every large project, and although it still focuses on HVAC & controls, also includes other energy related areas especially in the electrical and plumbing trades
- M & V – Measurement and verification has become a component of the extended commission process using energy consumption to help verify proper operation of systems & components

Commissioning / M & V

Process can help identify things like:

- Sensors controlling the wrong piece of equipment or not hooked up at all
- Valves installed backwards
- Manufacturer's equipment controls not working properly
- Short cycling of equipment – namely pumps, boilers, or chillers
- Dampers not opening to proper positions or at all

STAFF TRAINING ON SYSTEMS & EQUIPMENT

- ▶ Custodial Staff
- ▶ Maintenance Experts
- ▶ Technology Staff
- ▶ Office Staff

Staff Trainings

- Any technology
- HVAC systems and controls
- Auditorium systems – lighting, sound, rigging, etc.
- Electrical generators
- Low volume systems – cameras, card access, fire alarm, phone/voice over IP, etc.

PROPER PROJECT DOCUMENTATION

- ❑ Contact list for all contractors
- ❑ As-built plans – electronic & paper sets
- ❑ As-built specs
- ❑ Project filing system – electronic & paper
- ❑ O & M documentation
- ❑ Complete financial summary – will help you w/ any future large project referenda, budgeting, etc.
- ❑ Paint color draw downs

HAZARDOUS MATERIALS

1. Asbestos
2. Lead
3. Mercury
4. Mold
5. Other Hazardous & Universal Wastes



HazMat Project Close-Out Documentation - Asbestos

Submittals

- ▶ Submit the following documentation at completion of the work:
 - Final DNR Form 4500-113 (10 Day Notification for larger projects)
 - WDHS Notification-Any abatement project other than O&M
 - Copies of all WDHS Certification Cards for all employees that worked on the project
 - Copy of Daily Project Log as required by DHS 159.21(2)
 - Copy of Occupant Protection Plan as required by DHS 159.21(3)
 - Continue...



HazMat Project Close-Out Documentation - Asbestos

Submittals (continued)

- All waste manifests/Disposal Tickets signed by the accepting landfill
- Written certification that all work was conducted in complete compliance with all applicable Federal, State and Local Regulations
- Written certification that all asbestos containing materials specified for removal have been removed and disposed of properly
- Certificate of Insurance naming the owner as certificate holder
- Architect sign-off for AHERA

HazMat Project Close-Out Documentation - Lead

Submittals

- ▶ For Buildings Built prior to 1978 with children <6 years old; Submit the following documentation at completion of the work:
 - Lead Renovator Certification
 - Worker Training documentation
 - Firm lead certification
 - Pre-renovation education documentation
 - Daily project logs
 - Certificate of insurance
 - Continue...



HazMat Project Close-Out Documentation - Lead

Submittals (continued)

- Proof of final cleaning verification was completed, including the date of verifications, locations verified, number of wet and dry clothes used, results of verification and any dust clearances results, if performed.
- Written certification that all work was done in complete compliance with State Regulations, including the use of warning signs, preparation of the work areas, containment of waste while on-site and during transfer and final cleaning verification.

HazMat Project Close-Out Documentation - Mercury Flooring

Submittals

- ▶ Submit the following documentation at completion of the work:
 - Signed waste manifest for proper disposal of hazardous waste generated during project
 - Daily project logs
 - Air sample results



HazMat Project Close-Out Documentation - Mold Remediation

Submittals

- ▶ Submit the following documentation at completion of the work:
 - Copies of supervisory training certificates
 - Product data for items identified for use in Microbial remediation plan
 - Daily reports
 - Supervisor logs
 - Photographic logs
 - Continue...



HazMat Project Close-Out Documentation - Mold Remediation

Submittals (continued)

▶ Daily Logs

- Date
- Name of Microbial Remediation Supervisor
- Number of workers on site
- Equipment utilized
- Brief description of daily work activities
- List of any non-compliance noted, emergencies, exhaust system pressure differential recordings) and descriptions of any other significant events

HazMat Project Close-Out Documentation - Other Hazardous & Universal Wastes

Submittals

- ▶ Submit the following documentation at completion of the work:
 - Written proof of proper recycling, disposal or destruction of any universal wastes removed and discarded from the project.
 - For utilities or other services requiring removal or abandonment in-place, submit materials documenting completion of such work.
 - Submit record drawings



MAINTAINING ADEQUATE ATTIC STOCK

- ▶ Flooring
- ▶ Ceiling Tiles
- ▶ Wall Tile
- ▶ Fire Alarm Devices
- ▶ Lighting Fixtures
- ▶ Door Hardware
- ▶ Auditorium Seat Cushions, Backs, etc.

WARRANTIES

- ▶ Typical is 2-year wall-to-wall with extended durations on specific systems and components
- ▶ Don't start warranty at substantial completion – start when commissioning is complete and all punch-list items have been fixed
- ▶ Warranty walkthrough – 90 days before warranty expires; document and verify fixes (involve school staff – have them make lists in advance)

QUESTIONS?

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- ▶ **Cell: 262-945-2129**

