

Hope is not a Plan or Strategy

Fostering an early-eye on the Commissioning
Process during construction

AIA Quality Assurance



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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Learning Objectives

1. Minimize issues by proactively and collaboratively creating activities in a collaborative way with the GC.
2. Conduct a risk reduction framework workshop with the contractor.
3. Quickly identify and communicate integrations between systems to create a plan for resolving scope gaps.
4. Bridge the transition between design and construction by sharing unresolved design-phase issues.

Course Description

General contractors have at least two things in common with commissioning providers: we want functional testing to go smoothly, and we believe prevention is the best way to get there. Lena Dremonas and Lyn Gomes, MEP/Systems Coordinators for Clark Construction and DPR Construction respectively, have joined forces to share their secrets to preventing and resolving issues before they prevent successful testing. They'll cover it in two parts:

Part 1: strategize and create your plan. We'll spend the most our time on this because we, as contractors, believe in prevention too! Lena will cover a matrix to identify integrated systems, how they interact with each other, and who accepts the installation, including the CxP! Lyn will cover her framework for identifying and resolving integration and scope gaps that can lead to insurmountable problems.

Part 2: executing the plan. Key tasks include creating an action item list (in partnership with the CxP), tracking and closing them out (a BCxA essential attribute!), scheduling, and preparing for inspections.

Agenda

1. Transition from Design to Construction
2. Submittals
3. Integration
4. Pre-FPT & Trending: Automated Fault Detection

Transition from Design to Construction

- Stakeholder Changes
 - Addition or enhancement of GC Staff
 - Addition or enhancement of Trade Staff
 - Design staff changes to CA

Transition from Design to Construction

- Open Design Review Comments
 - Will they be incorporated into Design Documents
 - Have they been deferred to the contractors' Submittals?
 - Have they been transmitted to the GC & Trade Partner teams?

Transition from Design to Construction

Assure the OPR is Updated with Design Evolution!

Submittals

Why?

Best opportunity to catch things before equipment is released, installed, and/or programmed

Usually \$0 to fix things on paper

Submittals

- Kickoff meeting should align all reviewers
- CxA review should be concurrent to Design review to assure all comments get picked up before equipment release
- Submittal Platform and associated Workflow established

Integration

5 Mile Matrix

ON DRAWING



BY OTHERS

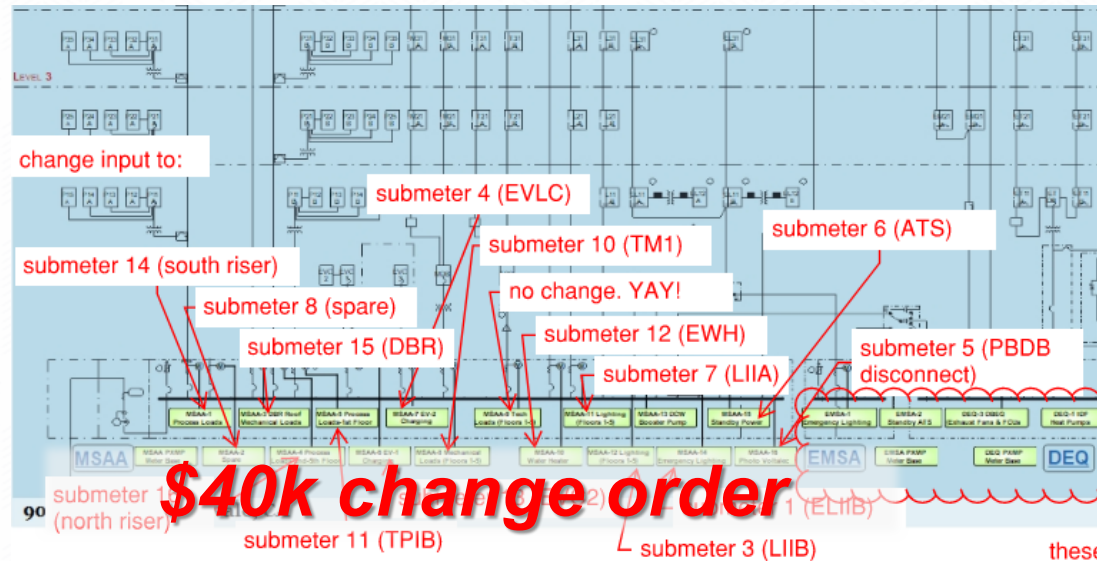
Integration

Risk Framework

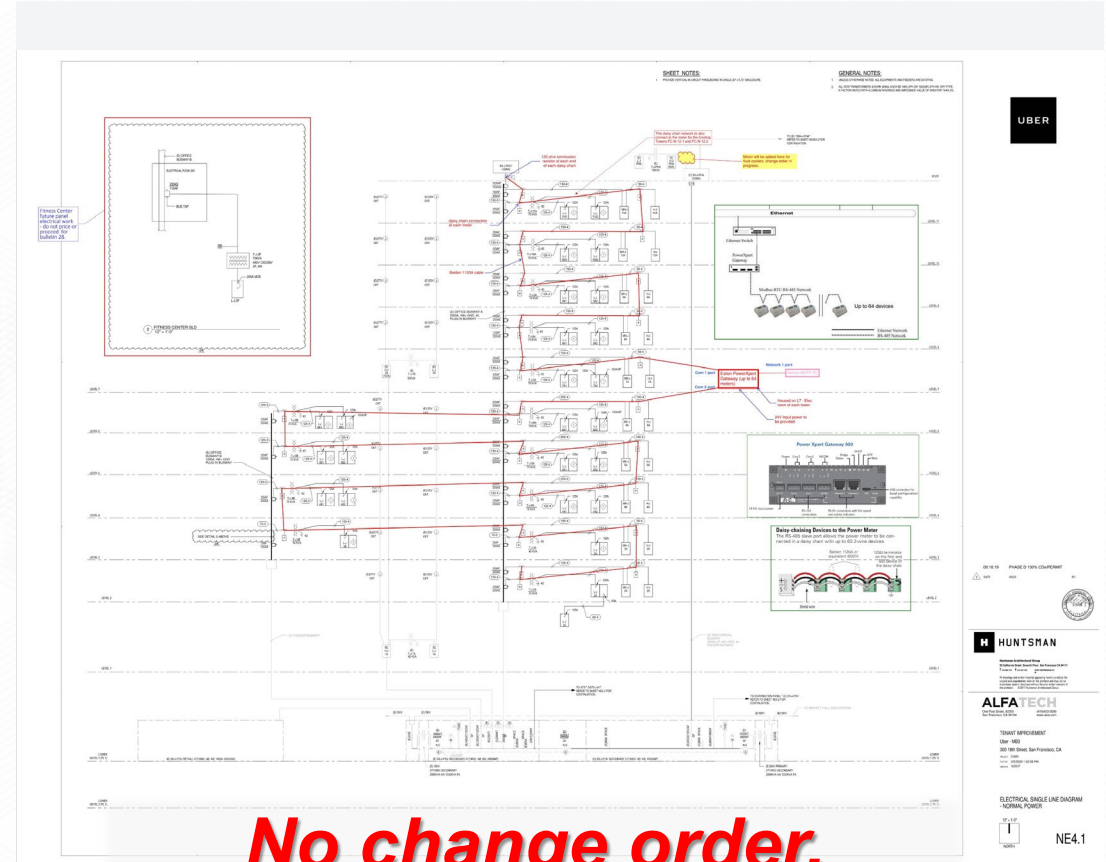
Risky systems transcend project boundaries. They could be inside or outside the building, or even on party boats.

Early intervention saves \$\$ and time!

late involvement



early involvement



What is a Risky System?

- *Risk is baked in*
 - *Known offender*
 - *Complicated*
 - *First-of-it's kind*
 - *Home Depot Special!*
- 3's a crowd
- Integration is required
- Look beyond
 - Resources/parties beyond our control
 - Project/building boundaries
 - "By Others!"
- Touches an existing system

Ask thoughtful questions

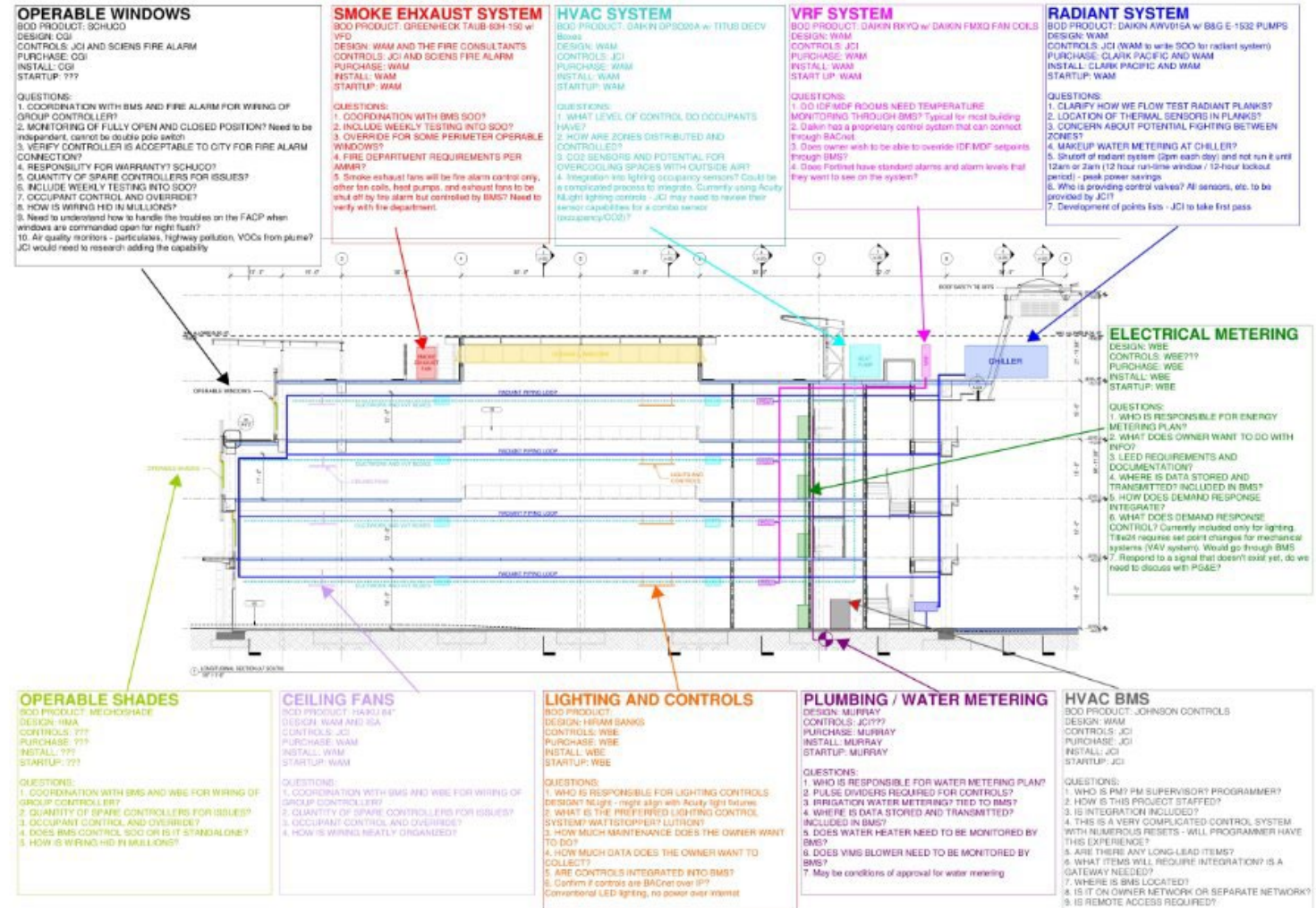
- Power
 - What kind of power does it need? Does it need to be in conduit? Who installs the conduit, pulls the wire, and terminates it?
- Communication
 - Who does the wiring? Does it need to be in conduit? Who terminates it & which terminal is it terminated on?
 - What's the protocol? Does it match the BMS (or wherever it is going to)?
 - Are the controllers capable of outputting/receiving the signal?
 - Will an IP backbone be needed? What are the IP addresses?

Ask thoughtful questions

- Configuration & Programming
 - Which systems?
 - Who will program it? How long does it take to schedule them? How long do they need?
 - Are graphics needed? What should they look like?
- Inspection, Testing, & Acceptance
 - At what point can the system be inspected and/or tested? Who tests it?
 - What standard will it be tested to? What is the testing procedure?
 - Are there safety considerations for testing?
 - Who accepts the installation?
 - Where does the documentation need to go?

MEP+ System Review

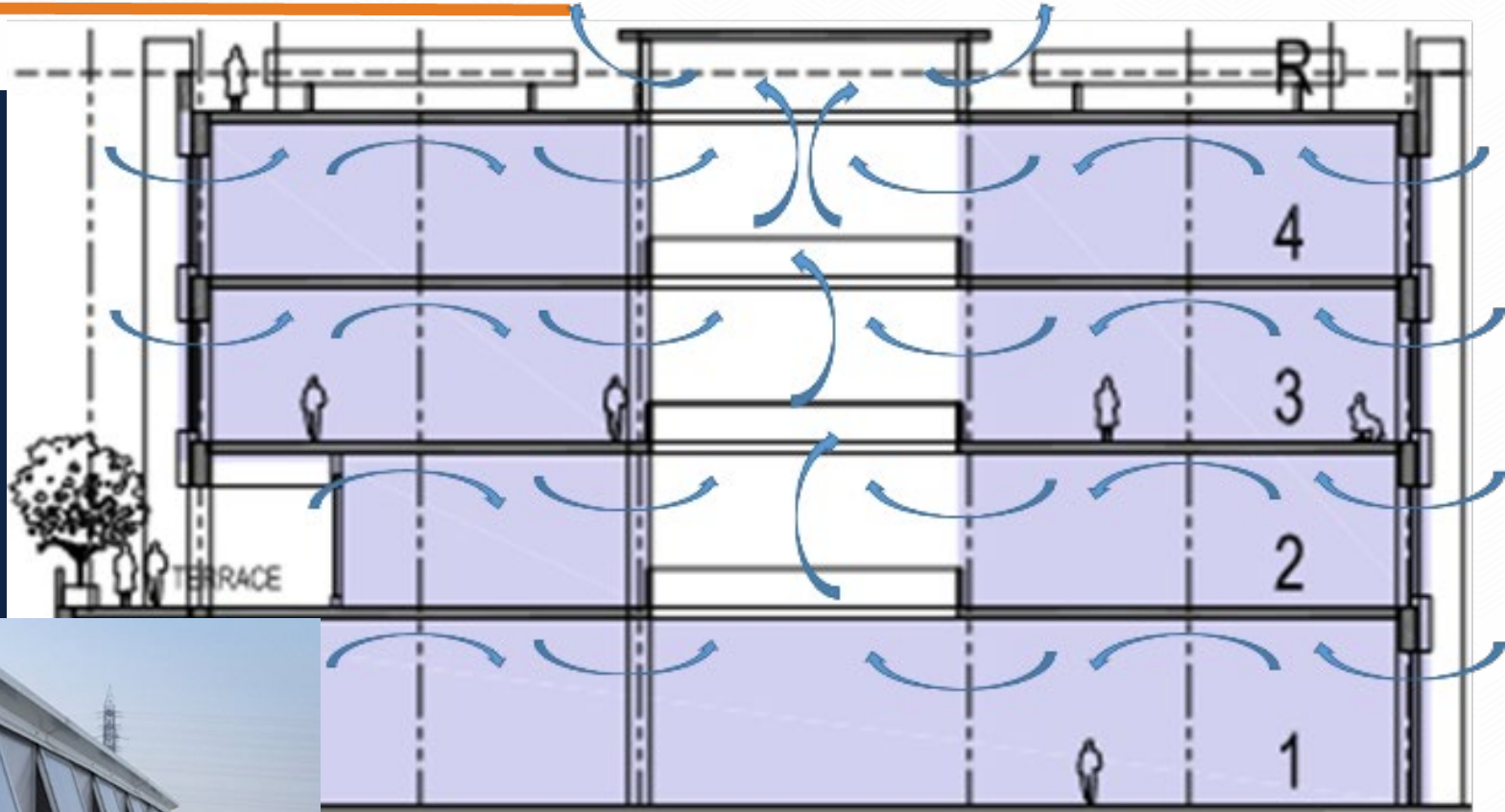
- Identify “risky” systems
- Define scope + identify scope gaps
- Helpful documentation (IOMs, PICS, etc)
- Get the right people in the room
- Create a visual



Motorized windows

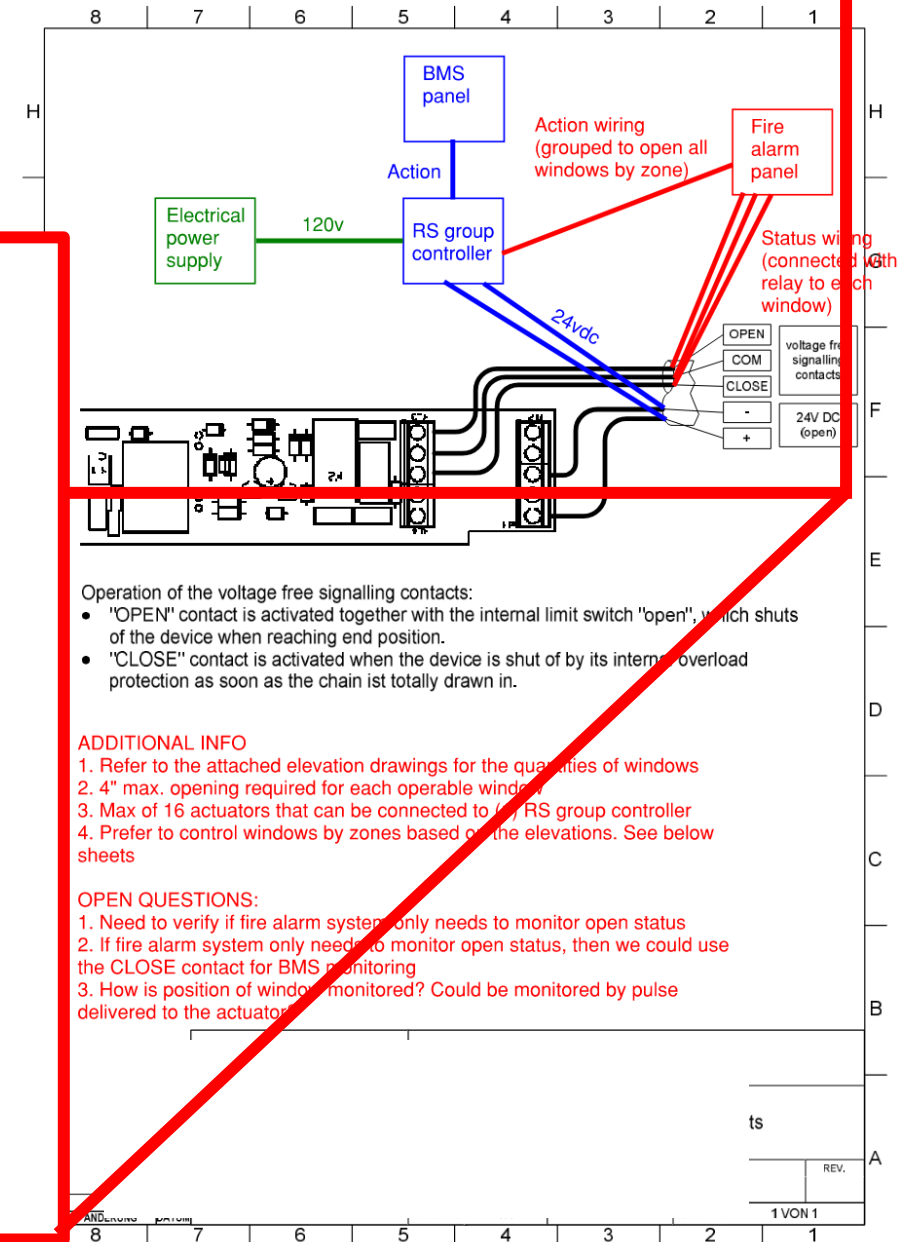
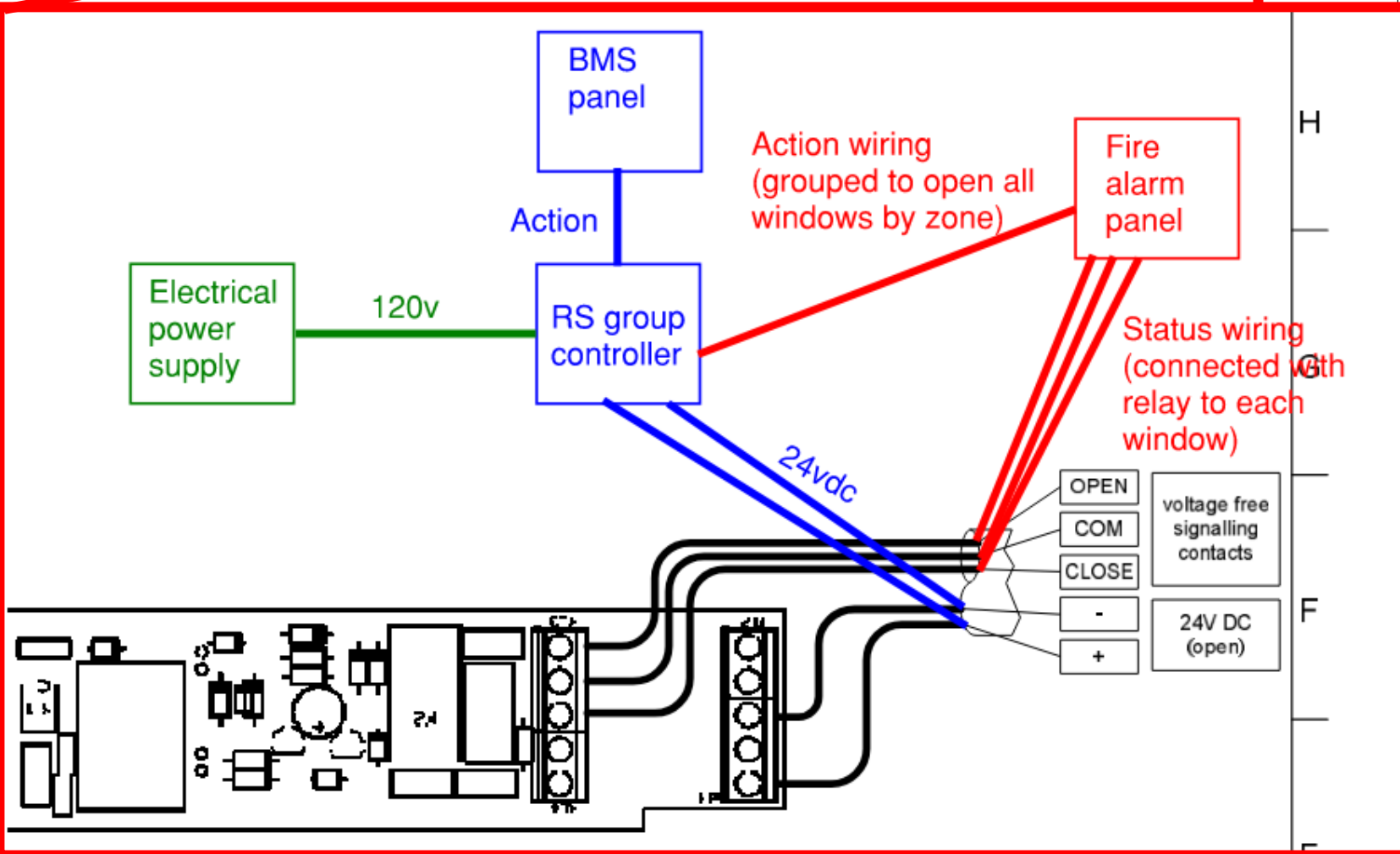
Concept:

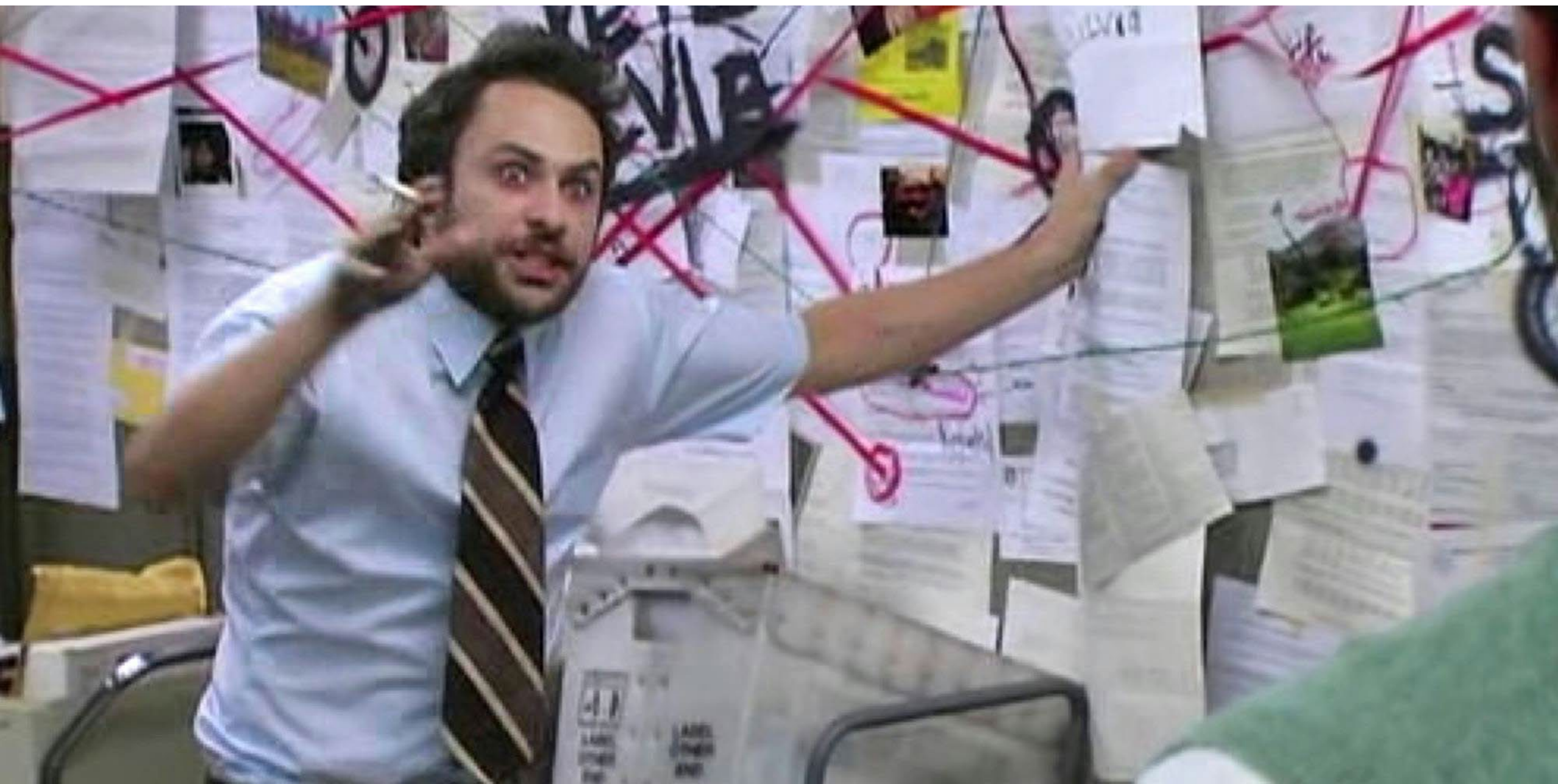
- natural ventilation & night flush
- free cooling
- smoke control

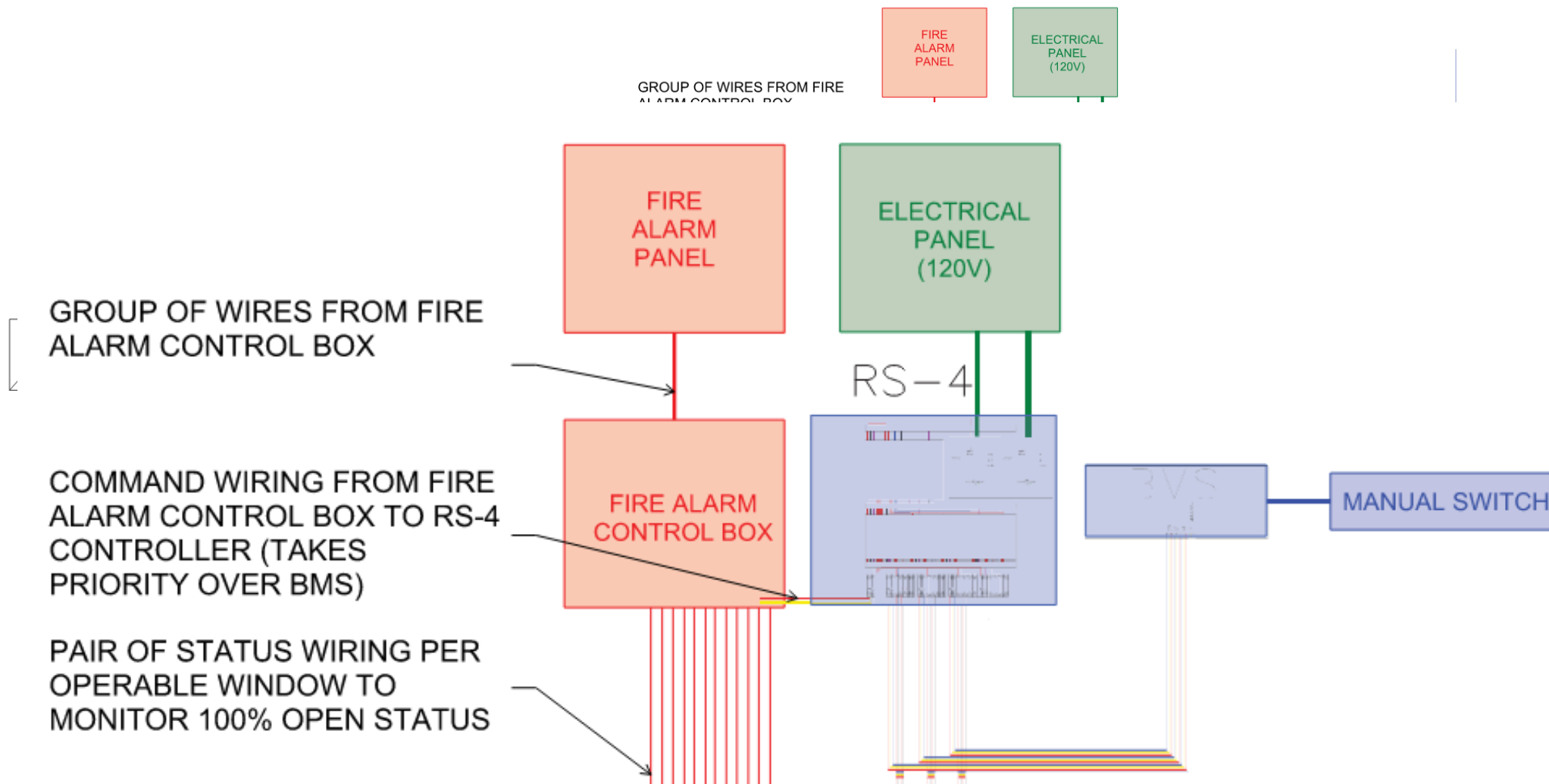


Motorized windows

Start with the O&M Manual







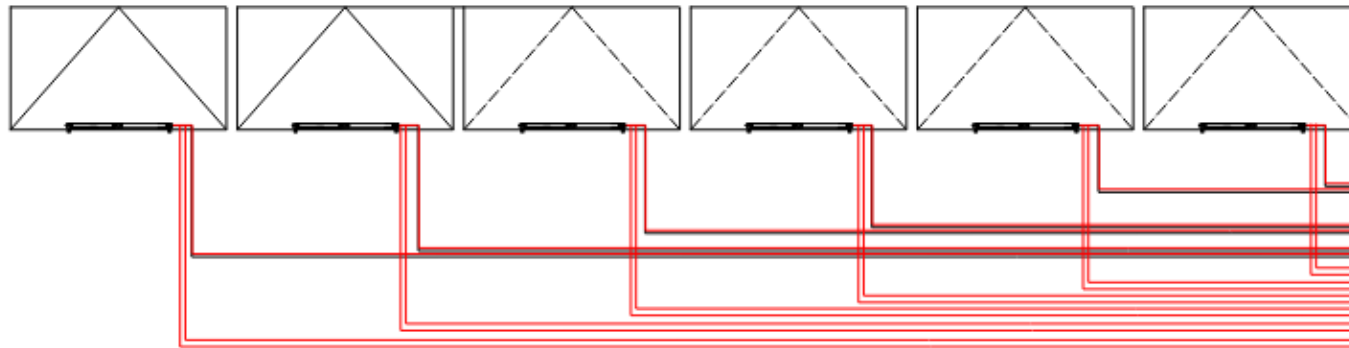
OPERABLE WINDOW POWER AND STATUS WIRING DIAGRAM

Integration Example – Operable Windows

TERMINAL BLOCK WIRING DETAIL



TYPICAL BAY OF WINDOWS

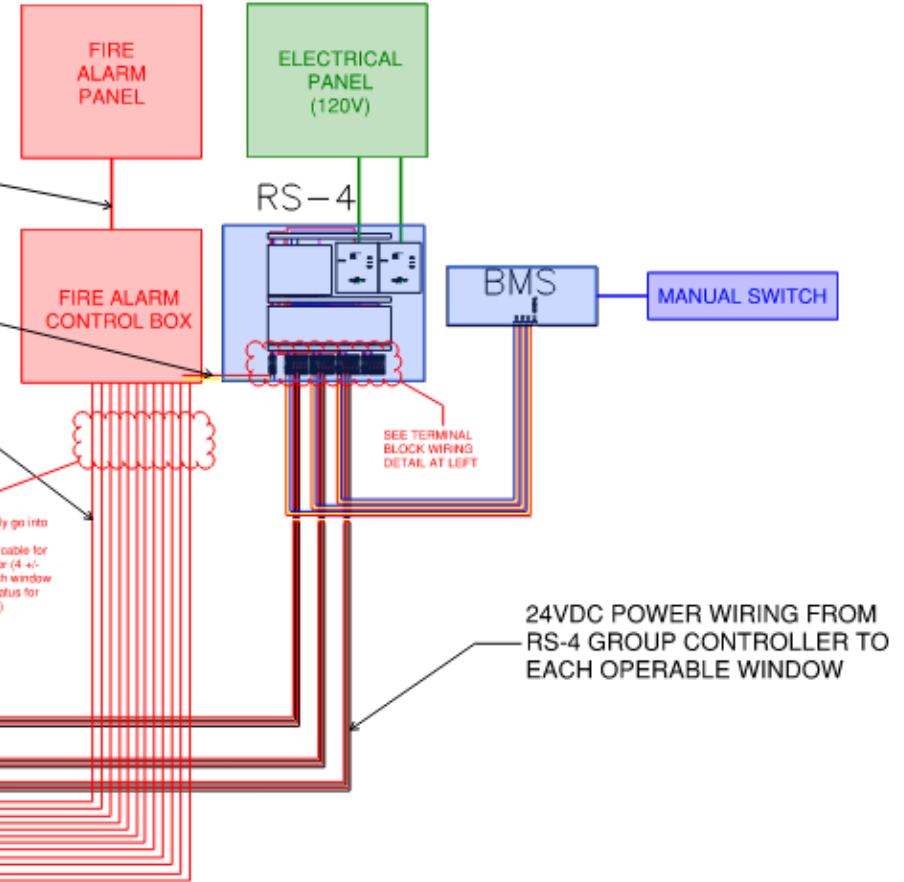


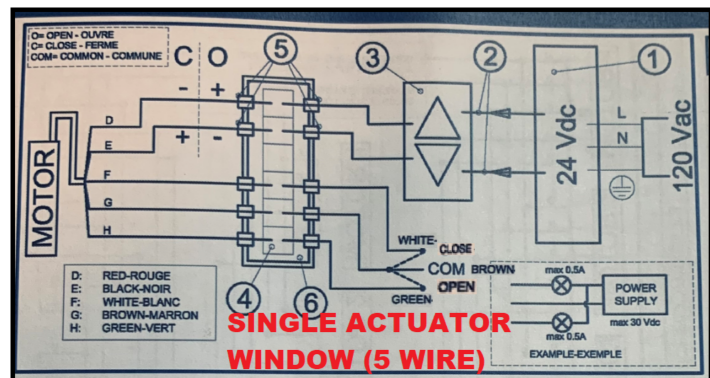
GROUP OF WIRES FROM FIRE ALARM CONTROL BOX

COMMAND WIRING FROM FIRE ALARM CONTROL BOX TO RS-4 CONTROLLER (TAKES PRIORITY OVER BMS)

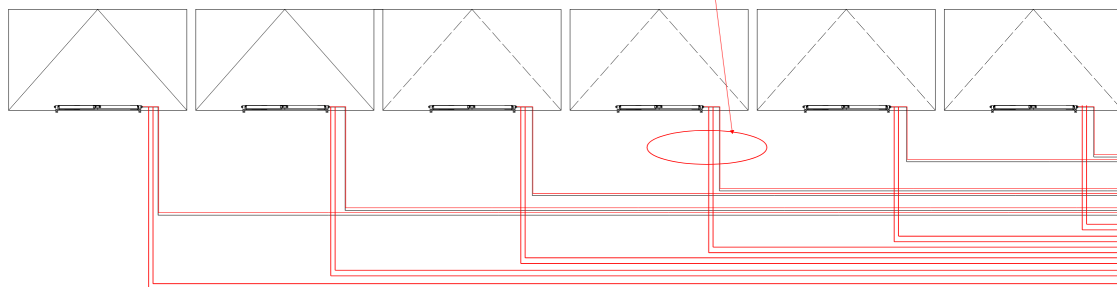
PAIR OF STATUS WIRING PER OPERABLE WINDOW TO MONITOR 100% OPEN STATUS

these actually go into RS-4 5 conductor cable for each actuator (4 +/- pairs for each window motor + 1 status for open/close?)





TYPICAL BAY OF WINDOWS



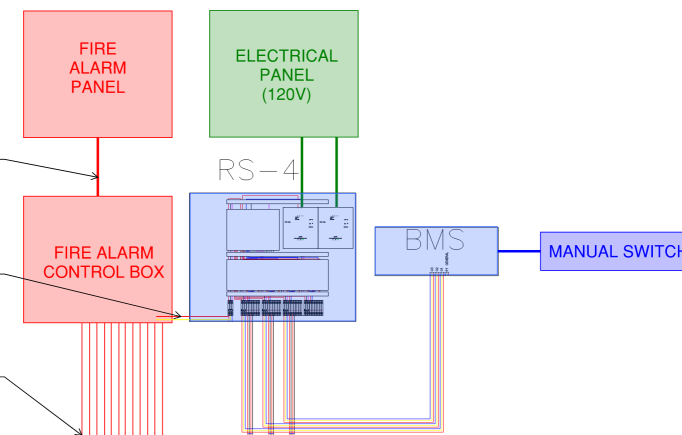
GENERAL NOTES:

FIRE ALARM CONTROL BOX HAS A DIRECT WIRING CONNECTION TO THE RS-4 GROUP CONTROLLER. FIRE ALARM SIGNALS SENT THROUGH THIS DIRECT CONNECTION SHALL OVERRIDE ANY BUILDING MANAGEMENT SYSTEM COMMAND AND TAKE PRIORITY FOR OPERATION OF THE OPERABLE WINDOWS.

GROUP OF WIRES FROM FIRE ALARM CONTROL BOX

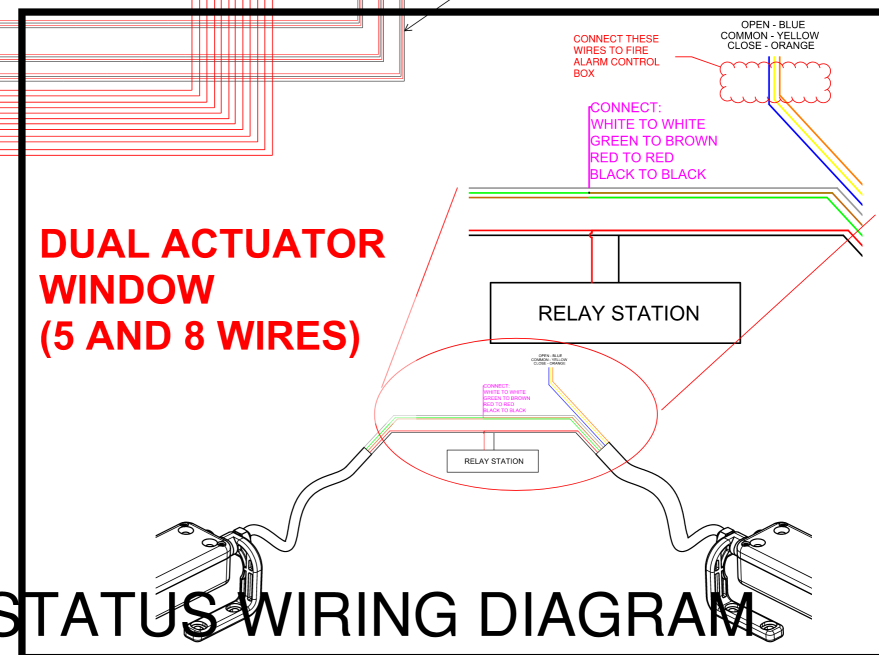
COMMAND WIRING FROM FIRE ALARM CONTROL BOX TO RS-4 CONTROLLER (TAKES PRIORITY OVER BMS)

PAIR OF STATUS WIRING PER OPERABLE WINDOW TO MONITOR 100% OPEN STATUS



24VDC POWER WIRING FROM RS-4 GROUP CONTROLLER TO EACH OPERABLE WINDOW

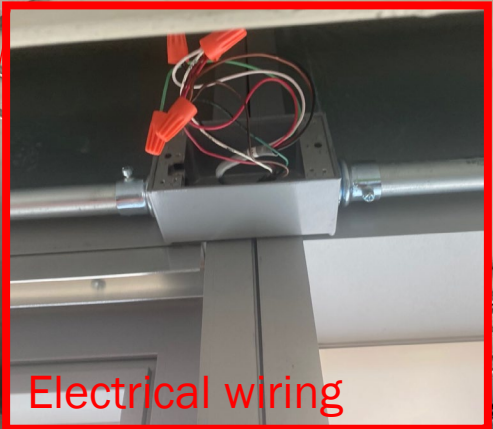
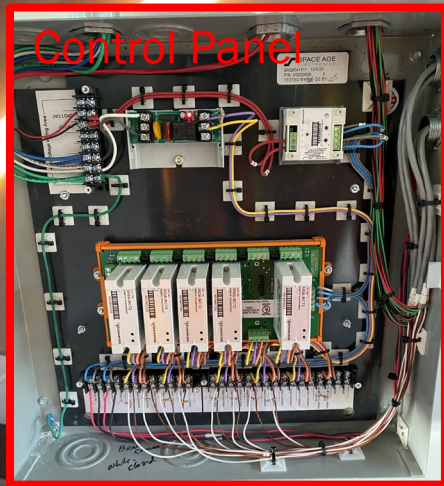
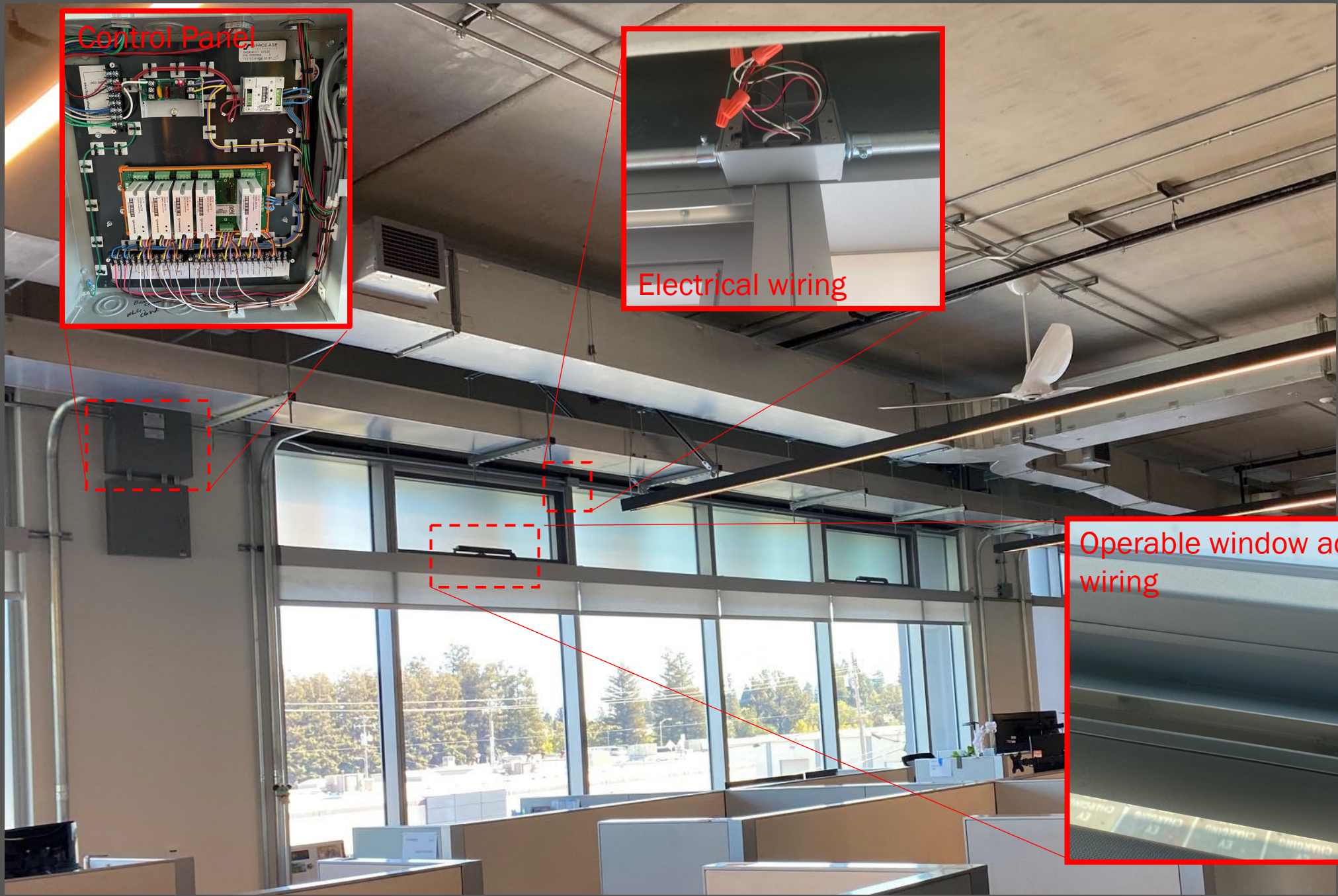
DUAL ACTUATOR WINDOW (5 AND 8 WIRES)



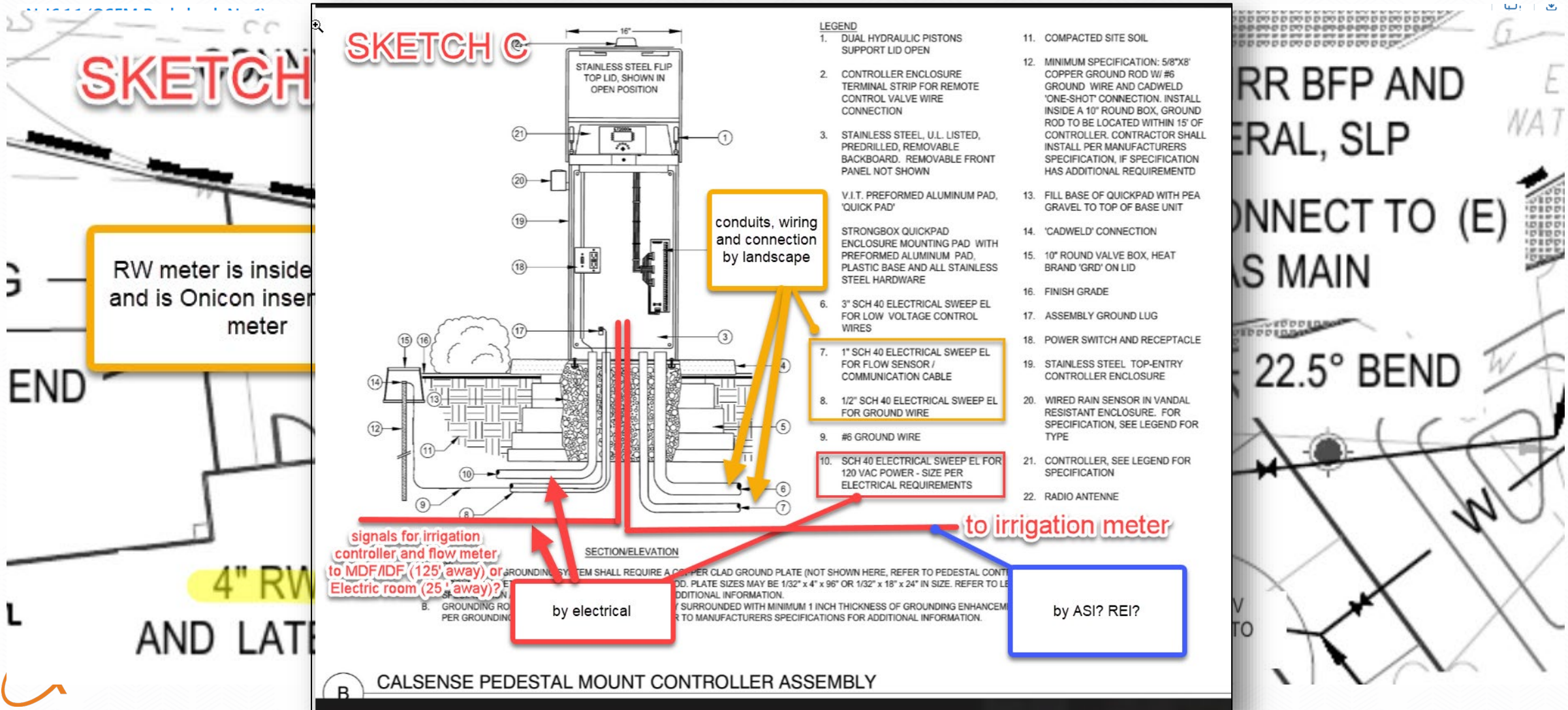
OPERABLE WINDOW POWER AND STATUS WIRING DIAGRAM

Field photos





Water meters: 8 parties, 13 people, 3 hours

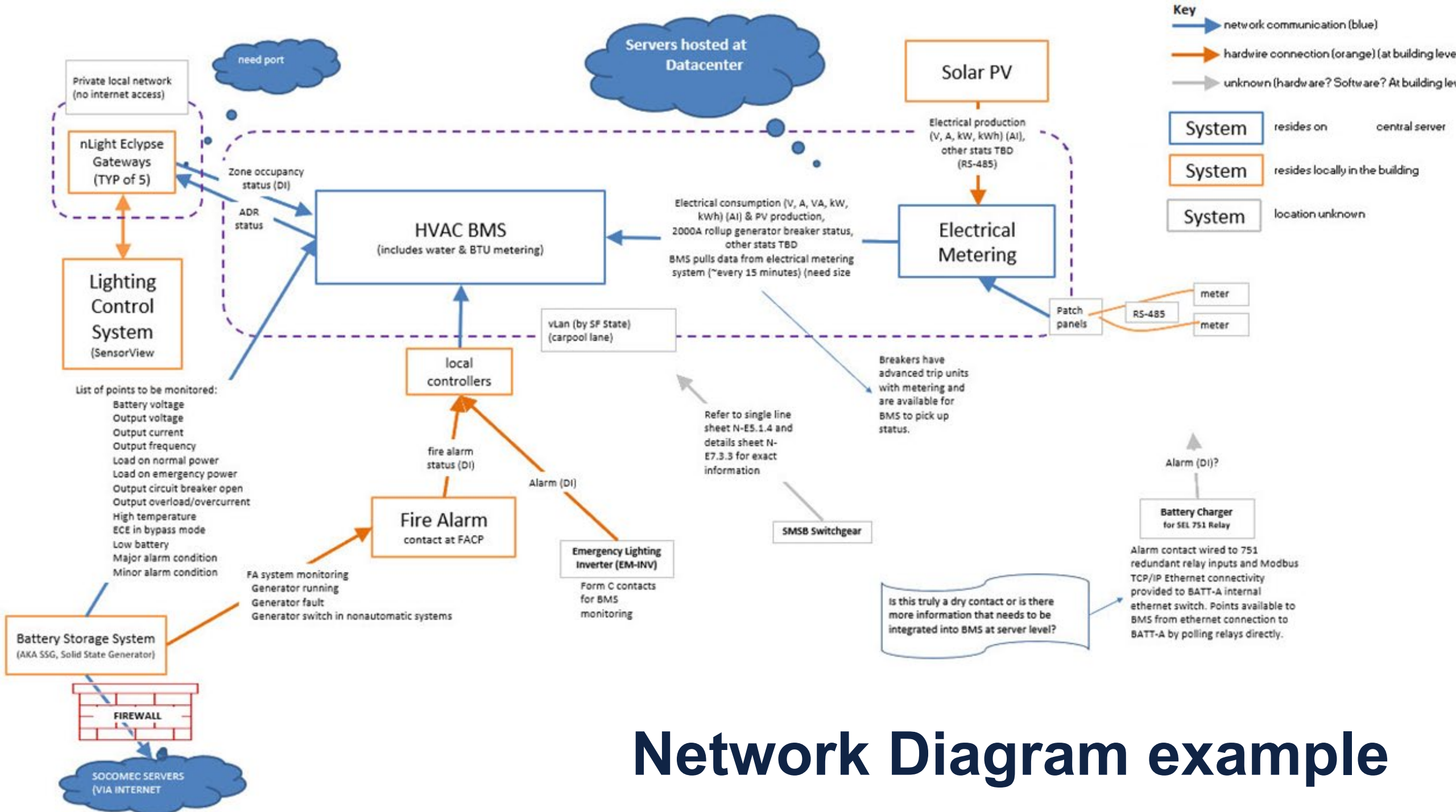


Doing Integration Right – advanced concepts



- *Know why you're doing it*
- *Investigate capabilities of the system/equipment*
 - *PICS**
 - *Technical Bulletin*
 - *IOM (aka O&M Manual)*
- *Describe responsibilities*
 - *Details*
 - *Specs*
 - *Coordinate with other disciplines*
- *Describe control sequences*
- *Create a network diagram*

* *PICS = Protocol Implementation Conformance Statement*



Network Diagram example

Pre-FPT & Trending

Why: thorough Pre Functional Performance Testing by the contractor team assures first-time pass rates.

Reduces Schedule

Reduces Issues Log (and management thereof!)

Pre-FPT & Trending

- Automated Fault Detection: Yes there are real benefits!
- Allows computers to be computers and humans to be humans
- Running AFD's when team is "hands-off:" overnight for example
- Focused list of what equipment is not behaving so talent can spend time troubleshooting and fixing issues rather than searching for them
- Assists troubleshooting by showing whole landscape of the system during fault events

Final Thoughts

- Early and proactive collaboration with the GC will minimize issues during FPTs
- The 5-mile matrix sets you on your risk mitigation journey
 - Identify integrated systems
 - Describe how they interact with each other,
 - Identify who accepts the installation
- Resolve open design issues
- Delve into the details with the risk mitigation framework
 - Power
 - Communication
 - Configuration and Programming
 - Testing and Acceptance
- Follow through and execute your plan

QUESTIONS?

Lyn Gomes, CCP, PE, Senior Commissioning/MEP

Coordinator - **DPR**

Lena Dremonas, Systems Executive

Clark Construction Group