

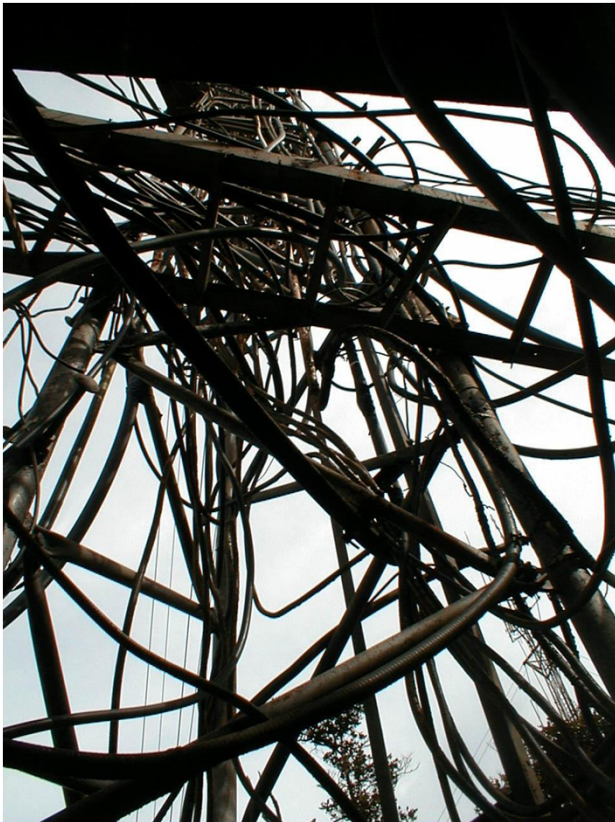


PROFESSIONALS EDUCATING PROFESSIONALS

***The Challenges for Contractors Working on Tier 1 Carrier Cell Sites:  
How to Ensure You Stay on the Air***

**Presented by: Joe Pfau  
Owner  
Quality Power Services, LLC**

# *The Challenges for the Contractor Working on Tier 1 Carrier Cell Sites: How to Ensure You Stay on the Air*



# *TOP SEVEN REASONS TO HIRE AN ELECTRICAL CONTRACTOR*

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7. They have carefully read your company standards and are always well prepared.
6. They know more about DC power than you do. Just ask them.
5. They don't need your help & guidance; their sure they already know everything.
4. They champion use of MOPs, and they can usually *write* better than plumbers.
3. They are famous for creative, lengthy and artistic conduit routing - especially between TVSS to Service Board.
2. They excel at buying your business (low bid) and have the unique ability to submit timely change orders.
1. If they are missing some materials for the job, not to worry - as they only take the very best shortcuts.

# QUALITY POWER, INC

- Bruce Fountain-BSEE
  - Member IEEE
  - Member NFPA
  - Certified Trainer
  - 25 years Telecom-Power & Grounding Engineer
- Joe Pfau-Principle
  - Associate Member IAEI
  - Associate Member IEEE
  - Licensed EC - AL/GA
  - Member NFPA



# *The Challenges for the Contractor Working on Tier 1 Carrier Cell Sites: How to Ensure You Stay on the Air*

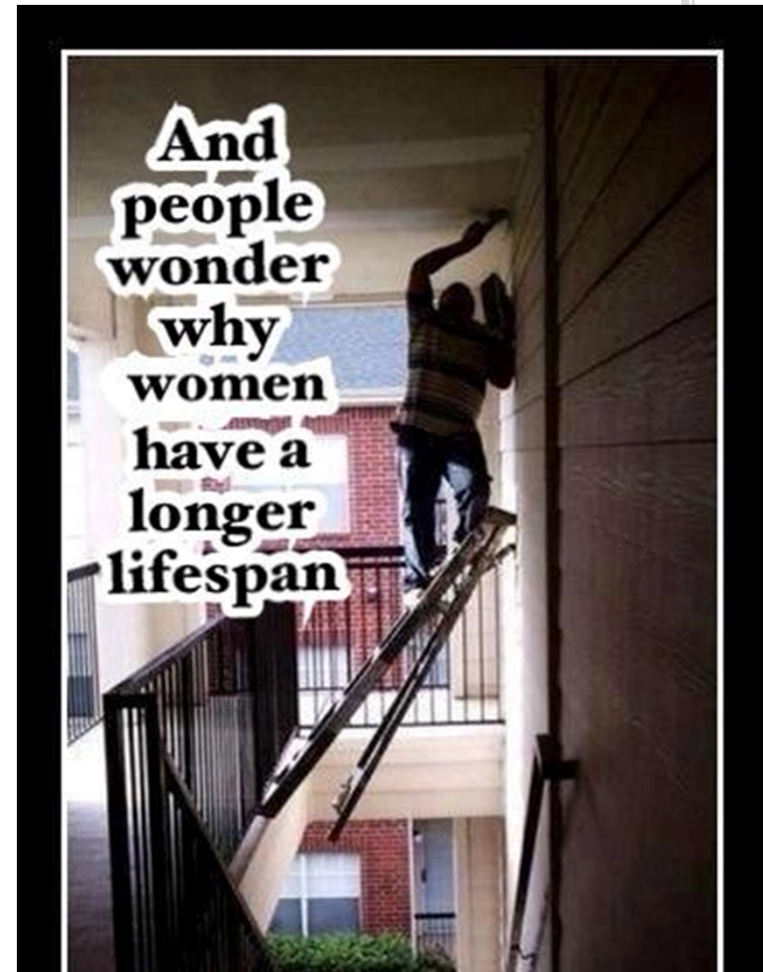
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- Overview
  - Contractor values
  - Tier 1 Carrier values
  - Dangers of low bid
  - Dangers of undefined Scope of Work
  - What defines a healthy relationship?
  - Case studies of contractor and carrier failure to define objectives and follow through
  - Is there a solution?

# What are the Challenges-Tier 1 Carrier Concerns

## Contractor Prerequisites

- Qualifications
- Experience
- Ethics
- Training
- Safety
- Execute
- Ownership
- Objectives
- = Values



# *What are the Challenges-Tier 1 Carrier Concerns*

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## **Thoughts....**

**The value of a good preconstruction walk is to identify work requirements to carry out the job, but also to inspect the site to ensure there are no major issues to prevent safe completion of work.**

**Site review reveals many related and unrelated issues that are reported back to customer – for customer decision on which items (if any) to address.**

**Customers may want to make corrective changes but budget allocations (not planned for) constrain them.**

# *What are the Challenges - Contractor Concerns*

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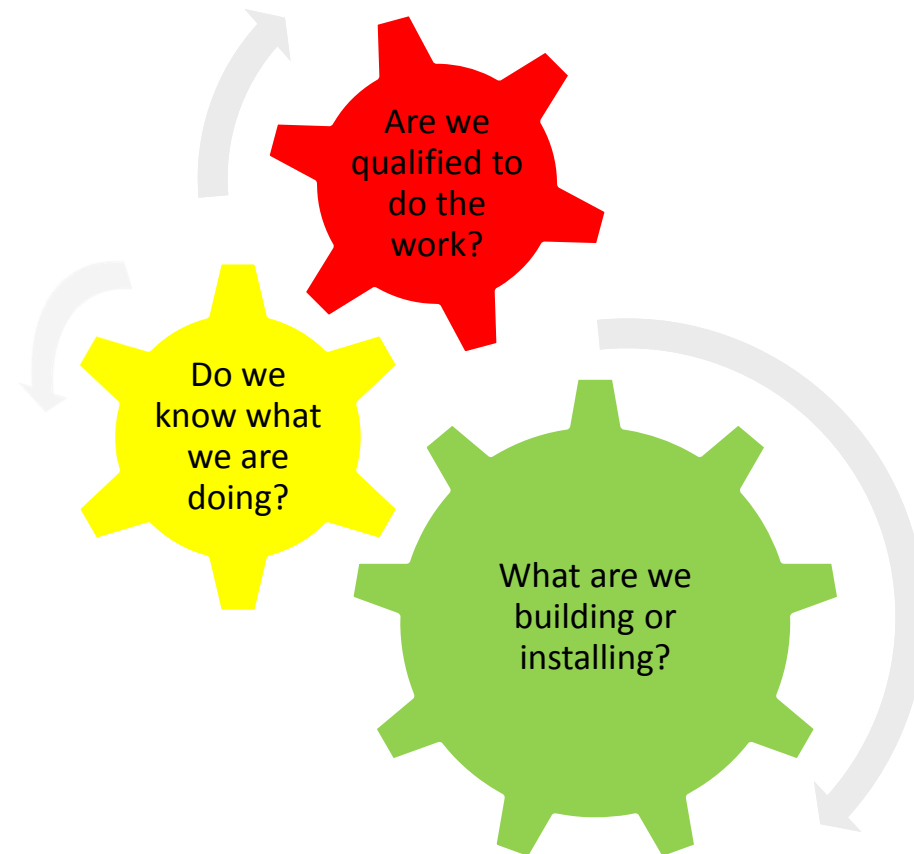
## **Carrier Prerequisites**

- **Communication**
- **Accurate drawings (Any drawings?)**
- **Standards**
  - Provided and understood
- **Ownership**
- **Training**
  - Not done?
- **Safety**
  - Realistic schedule
- **Dedicated Time & Project Oversight**
- **Execute**
- **= Values**

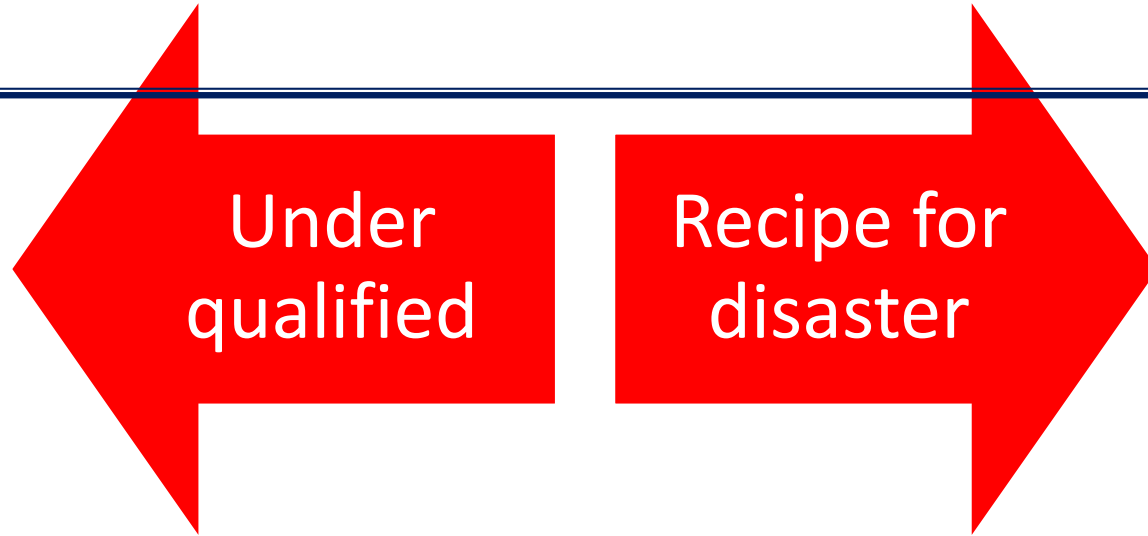


# What are the Challenges?

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# What are the challenges?



# What are the challenges?



- **Accountability?**
- **Whose job is it to police contractors?**

## CHALLENGES: The Danger of Low Bid (*typically* unknown by Telco Mgt)



- **Used/Inferior materials**
- **Poor workmanship**
- **Shortcuts (cutting costs)**
- **No Safety Procedures**

## Challenges: Use of under/non-trained

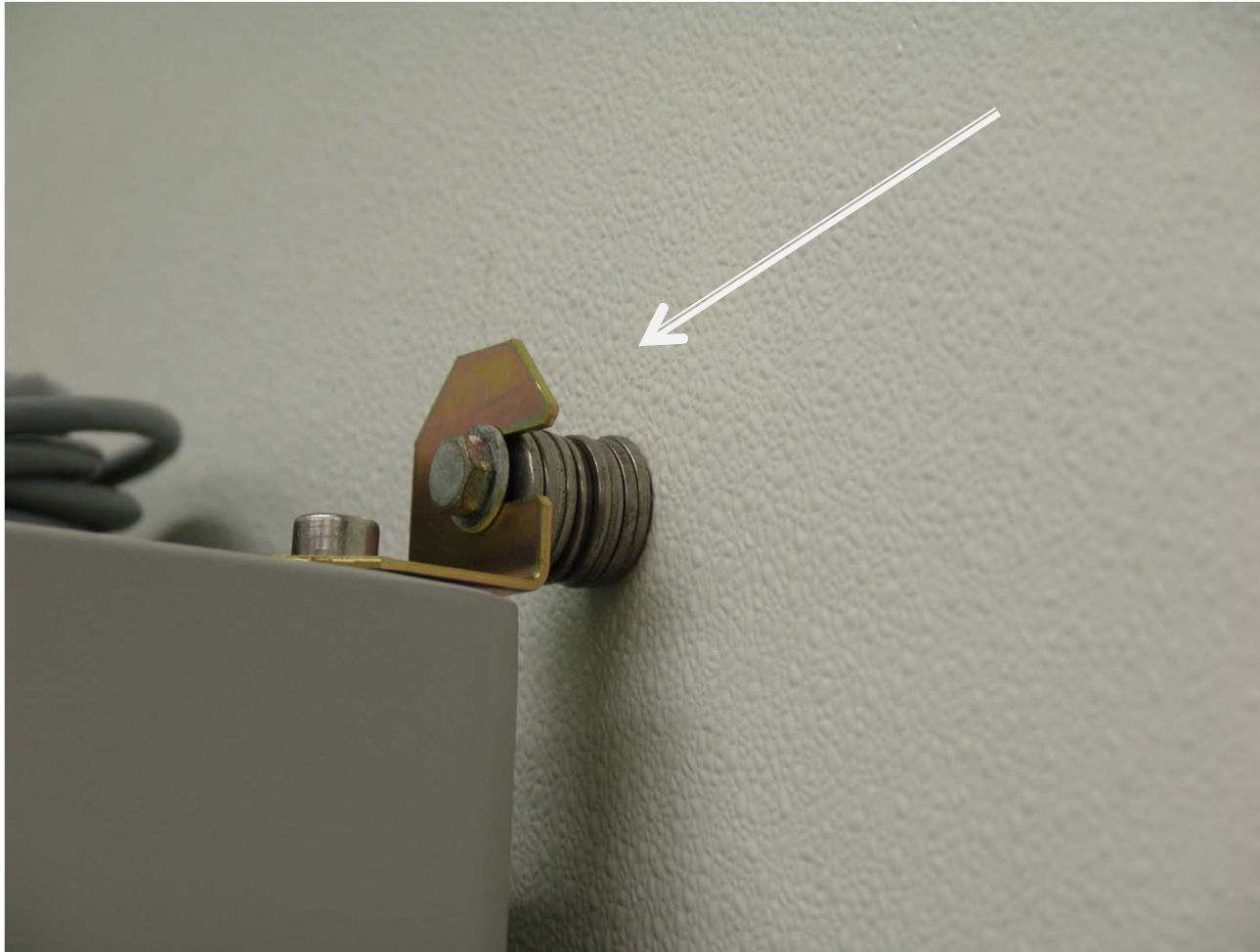
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- Many Pit falls
- Safety
- Damage to Equipment

## Brilliant (and typical) Installer Moments

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# Challenges: Issues Contractor Faces

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- **It Meets Code... What is a Standard anyway?**
  - **How does Telco insure contractor has read and understands standards and work guidelines?**
  - **How does the Telco provide simple, direct and easy to follow objectives?**
  - **How does Telco assure it's designs meet the objectives?**
  - **How does the Telco ensure the project has been completed properly (joint acceptance insp)**
  - **How does Telco mitigate problems once they are found after a project has been accepted?**

# Challenges: When Carriers Refuse to Listen or Police

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- Showing the customer items that are routinely seen and ignored by the carriers
- At a pre-bid site walk for a specific SOW, other issues are found (and reported); How does the carrier respond ?



# Lest We Forget, There is Always Mother Nature To Help Us With Our Craftsmanship

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# SOME CASE STUDIES

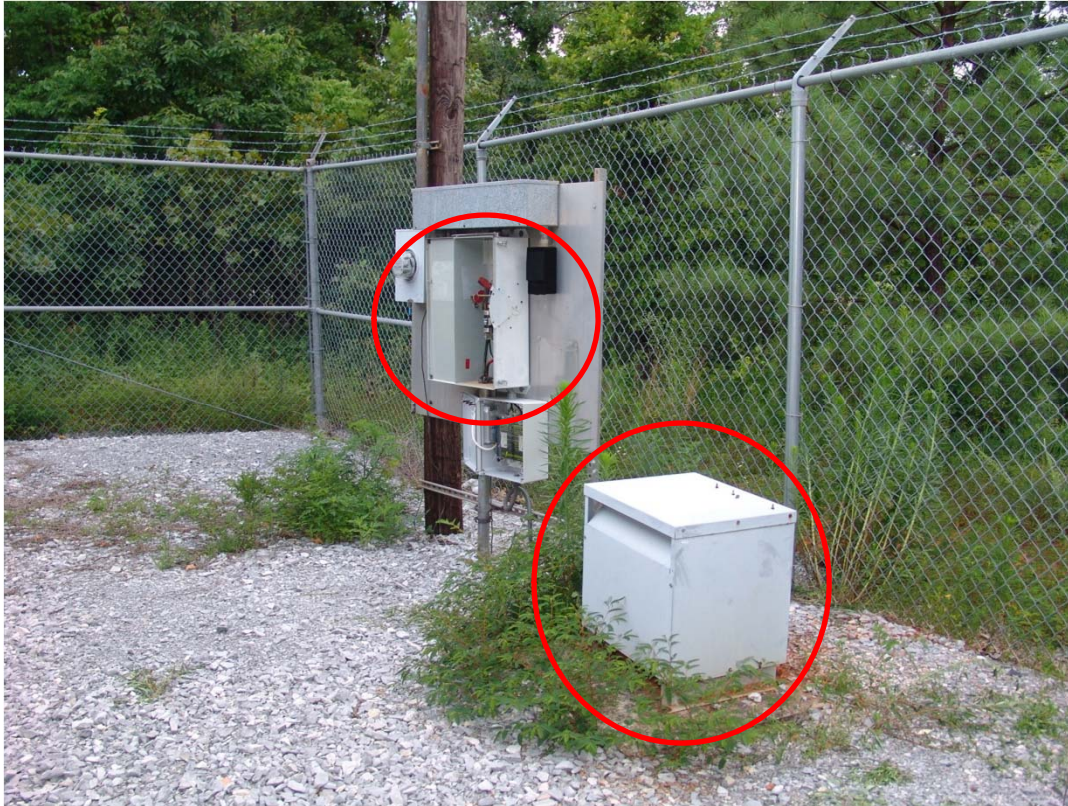
## *What are the Challenges*

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### **Concerns Neighbor of Cell Site Location**

- Home next to cell site (200' away) experienced numerous well pump losses due to lightning.
- Equipment lost in the residence, arcing was observed
- Problems did not occur before tower was built
- Utility distribution fed individual services at well house, residence, cell site, radio building (at end of line).
- Cell site carrier took steps to isolate its' site from utility.
- Radio station located inside compound and shared tower.
- Refused to install isolation means.
- House eventually caught fire.

## Case Study - House Fire



### Turning a Blind Eye-House Fire

- 240v feed to isolation transformer
- Neutral derived on secondary
- Primary and secondary supposed to be isolated

# Turning a Blind Eye-House Fire



- **Houston-we have a problem**
- **Aluminum back plate is also bonded to fence**
- **Circuit is complete**

# Turning a Blind Eye



- **Medium voltage distribution and step-down transformers**
- **Path complete on grounded neutral**
- **Home that had been struck numerous times and finally caught fire was one pole down to the left**

# Case Study-Cell Site Electrical Service



## What The Customer Wanted-and...

- Cell site was fed from MSC and was on standby generator
- Switching was moved to another city, generator went away
- Customer required new electrical service and standby generator

## *What are the Challenges*

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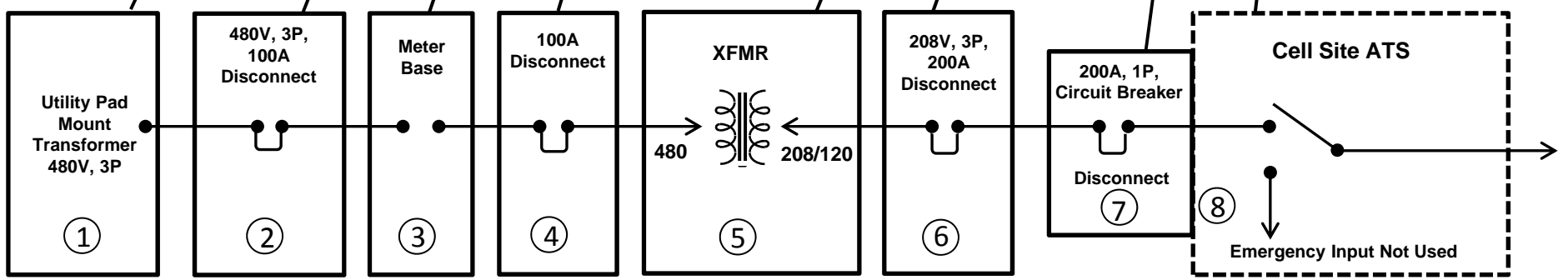
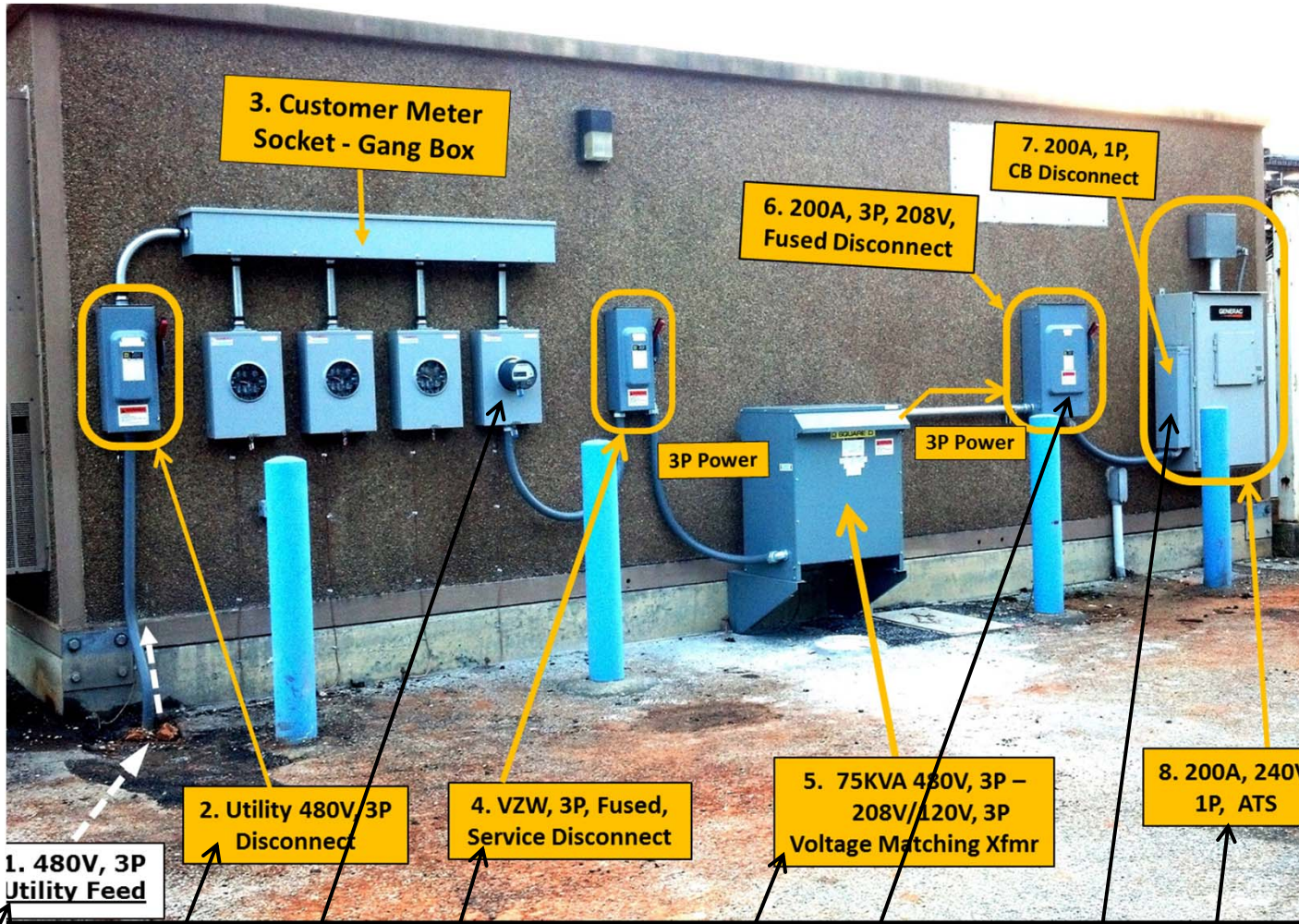
### **What the customer wanted**

- **Customer wanted to provision service for future co-locate tenants**
- **Spec called for 1Ø, 200 Amp, 120/240v services**
- **Customer PM awarded project with no Scope of Work and no understanding of what they wanted/needed.**

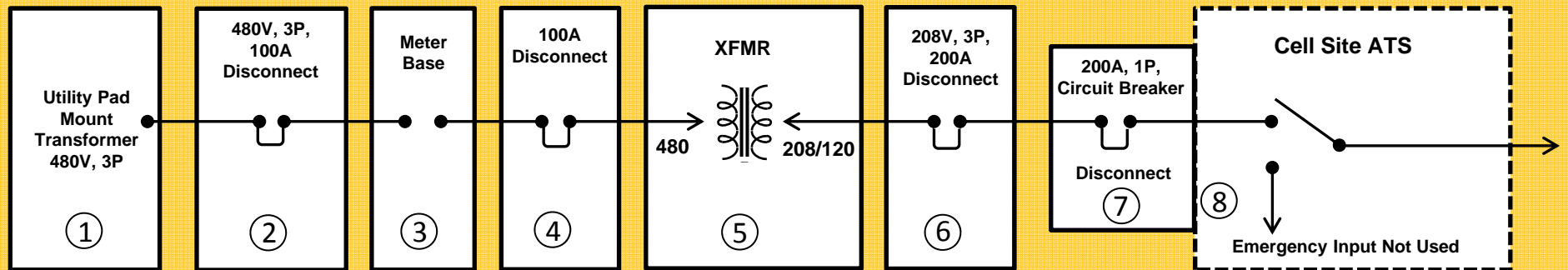
### **What the customer got**

- **Contractor did not follow specs (installed 3P 480V), used poor construction methods w/numerous NEC violations**
- **End result customer has installation that will not meet customer objectives, with open unresolved safety issues**





# OBSERVATIONS & SAFETY PROBLEMS



- ① & ② Utility Power Service & Disconnect: 480V, 3P, 100A Utility Feed to the facility is undersized. Limit is 100A.  
**Impact:** Insufficient power capacity to add new tenants. The manual disconnect unsecure, power could be shut off by anyone. Utility required disconnect, but customer is responsible
- ③ Meter Gang Box: Power to Meter Gang is 480V, 3P, 100A.  
**Impact:** 100A power insufficient for adding tenants. Additionally, in the current power configuration, carrier must provision a new 480 / 240 Step Down Transformer and service disconnect for each new tenant customer (~\$15K per).
- 
- ④ Service Disconnecting Means is confused with multiple disconnects, and presents electrical coordination problems; No Selective Coordination, Safety hazard, Several code requirements unmet. Utility required disconnect but refuses to seal.  
**Impact:** Electrical Reconfiguration work required.
- ⑤ Cannot provision new 3P Generator to support 1P tenant needs . 480V 3P, 100A insufficient/un- useable power  
**Impact:** No Backup power for tenants
- ⑥ N-G bonding in cell site service entrance is unsafe (neutral not bonded) and does not meet NEC.  
**Impact:** MUST reconfigure.
- ⑦ Numerous NEC violations. Incorrect PVC, strapping, bonding bushing  
**Impact:** MUST reconfigure.

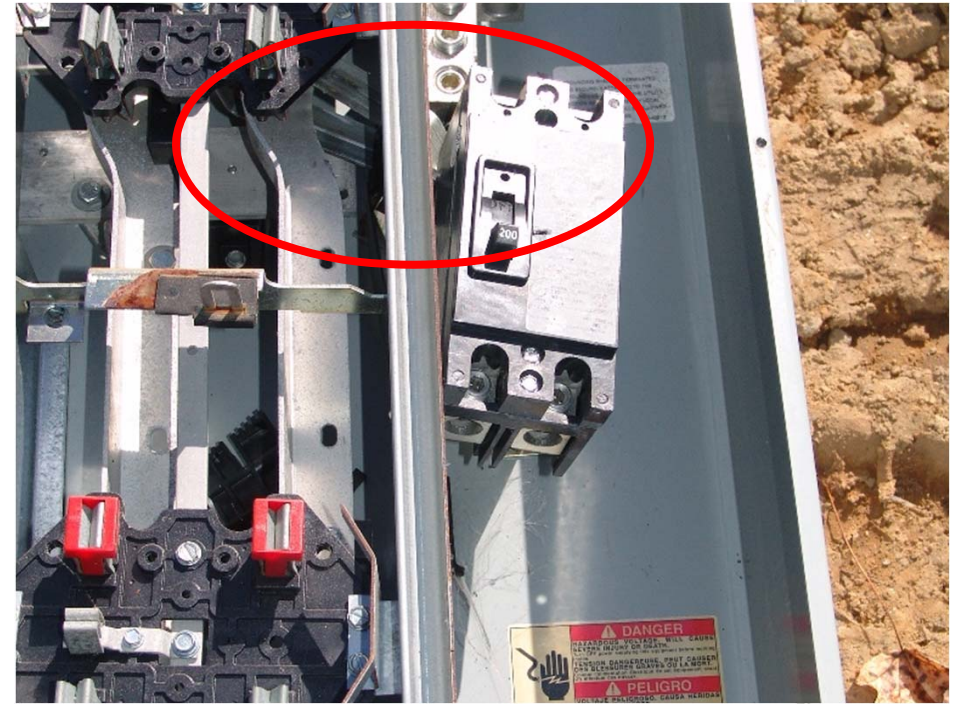
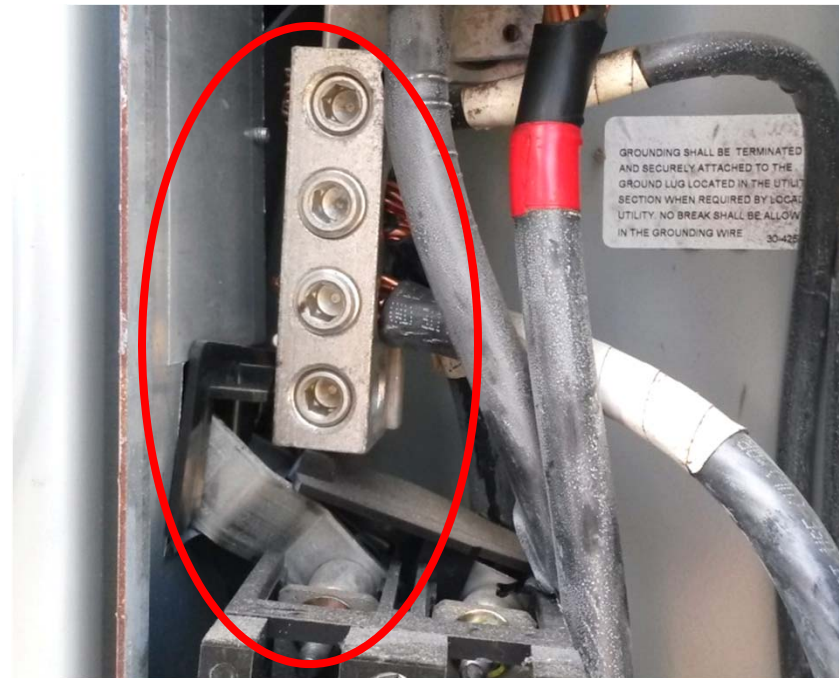
# Case Study-Decommission



## No Prep, No Mop, Unqualified Personnel = Disaster

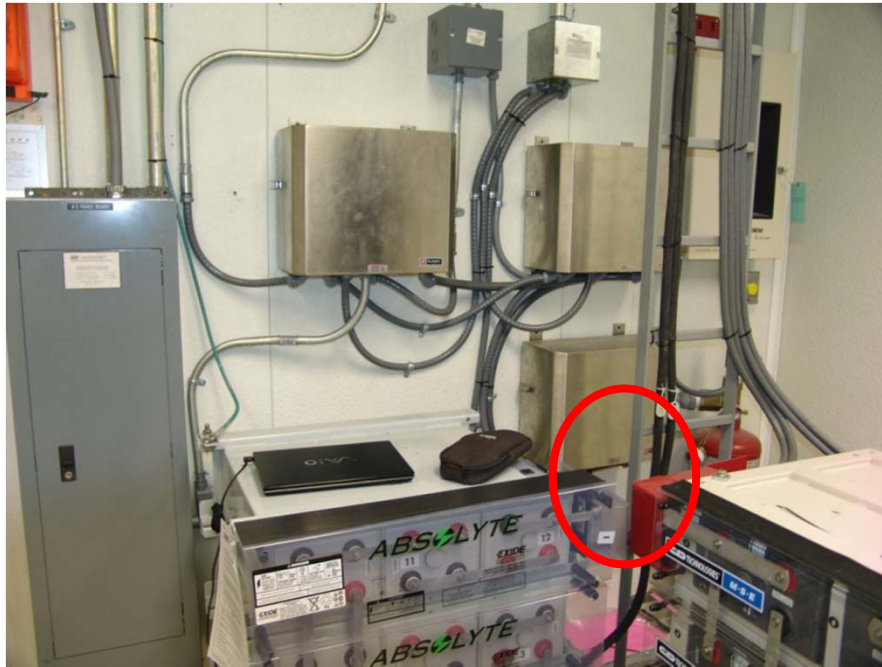
- Contractor was removing carrier shelter and equipment with Track-hoe
- No one bothered to check conduit that was connected to H-frame
- Contractor pulled conduit with conductors still attached to breaker

# Result = Disaster

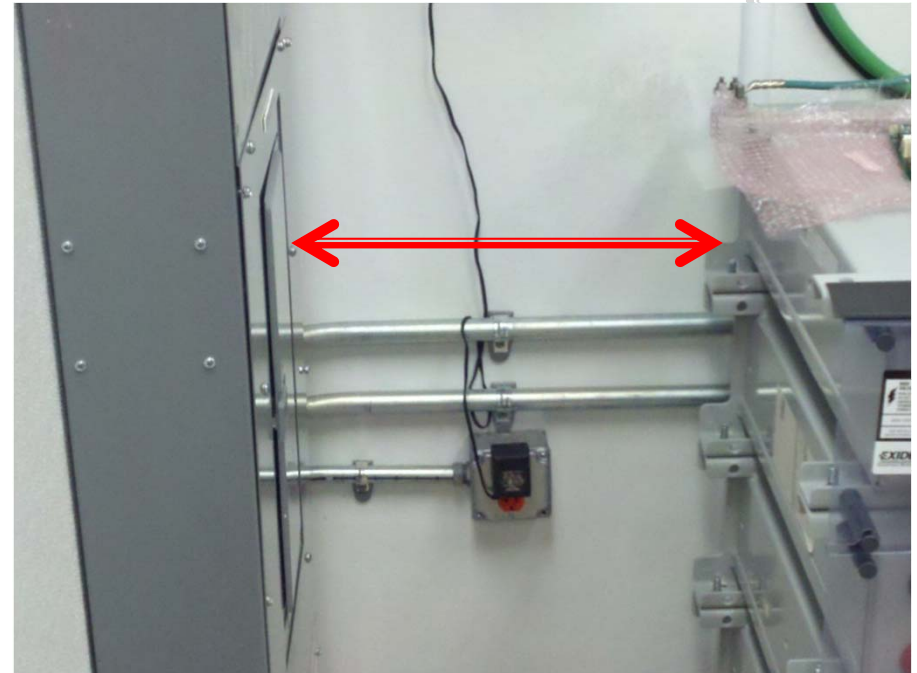


- What happens when you have untrained persons that do not know or understand the task they have been assigned?
- Create 3 carrier outage that destroys H-frame

# Projects Lacking Proper Design

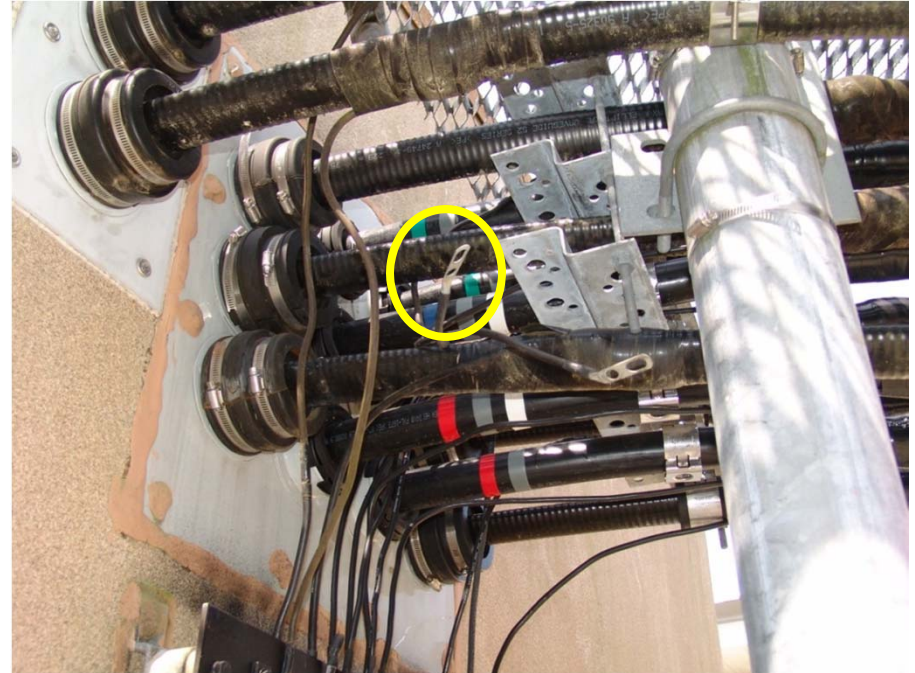


- Working space issues
- Battery blocking direct access to panel
- No room to service tower light controllers



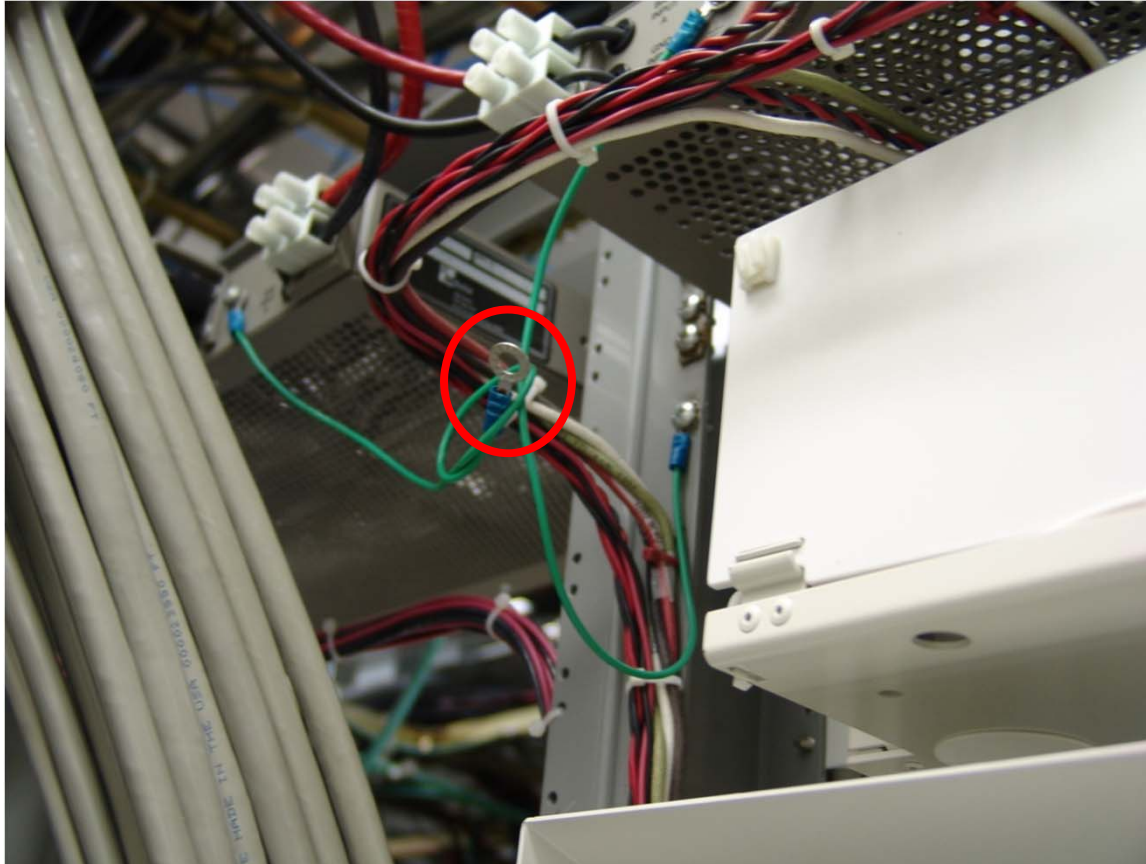
- NEC Working space violation.
- Only 18" clearance between panel board & battery frame

# Carrier Operations Apathy



- Transformer covered with gravel
- Ventilation blocked
- Very high operating temperature
- Coax left ungrounded

## *Contractor Installation?*



### **Unfortunate Installer Moments**

- Chassis ground left floating

# Ground Connection

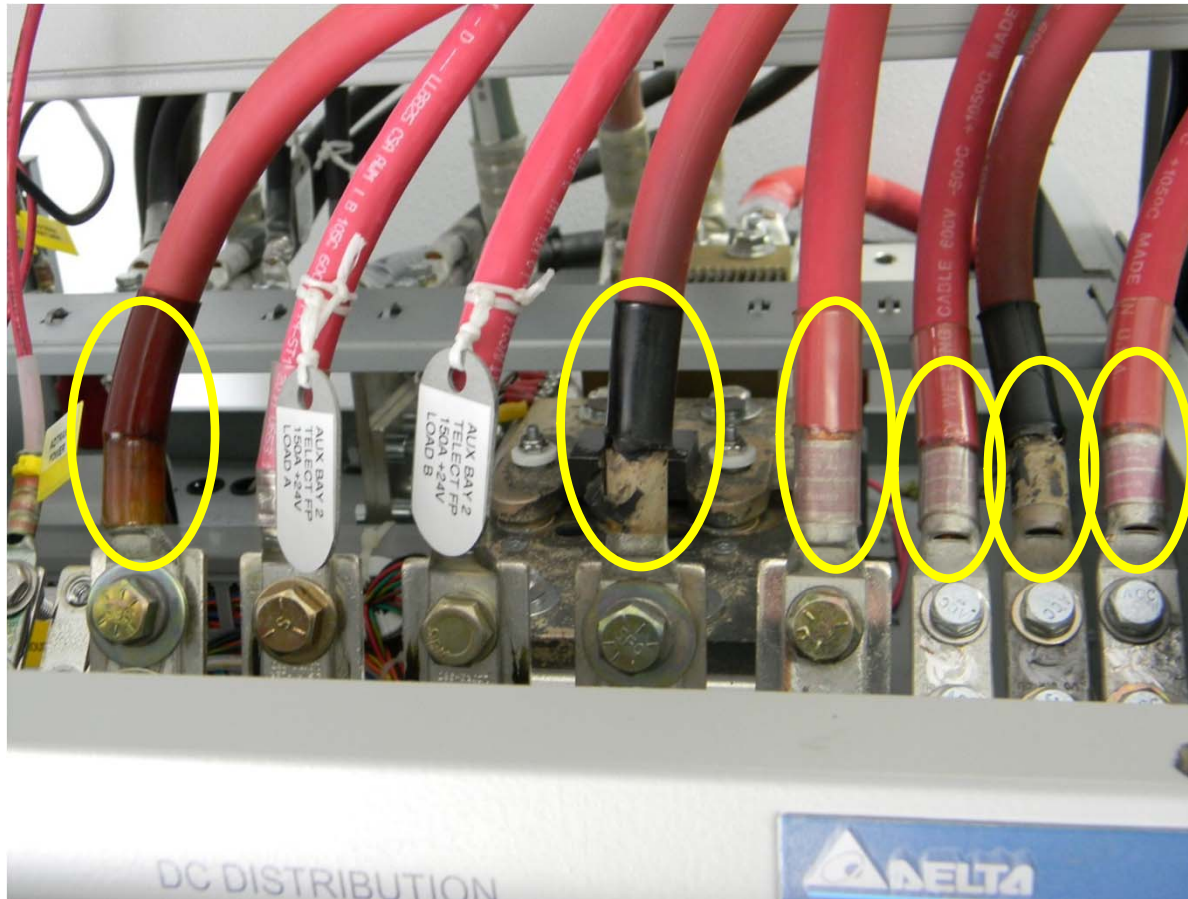


## TRULY A WIRELESS SITE

- AL: New RF ground bar for upgrade was installed
- Contractor never connected discharge lead to buried ring
- Customer did not perform acceptance
- Outage due to lightning



# LTE Installation



- Contractors did not follow proper methods and LTE went off the air.
- Found lugs had been installed but not crimped
- Heat shrink had been placed over the lugs

## *Case Study-Leak Detection*

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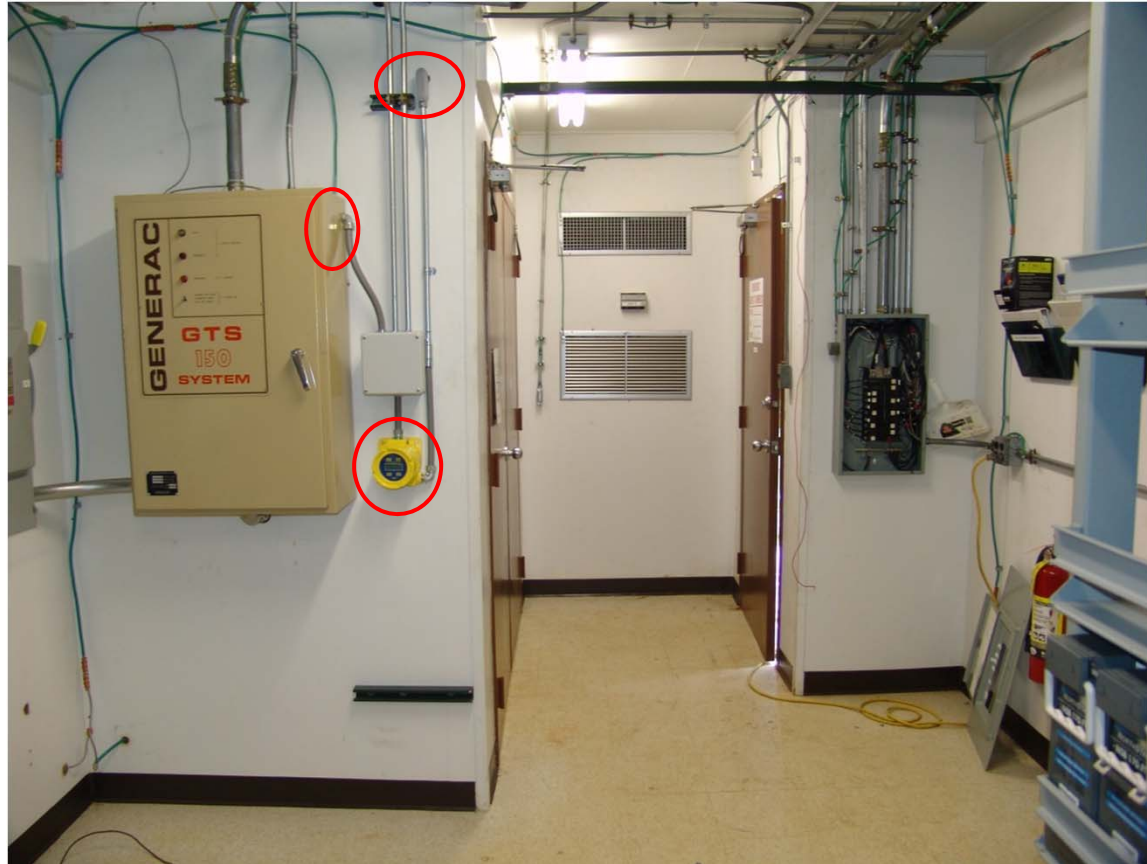
### **What the customer wanted**

- **Customer mandate that a gaseous fuel valve be outside of the shelter to prevent explosive atmosphere inside.**
- **Customer misunderstood what their directive was and the objective for the SOW**
- **Relied on the contractor to be the expert**

### **What the customer got**

- **Installed system that did not meet directive**
- **Sensor output de-energized run circuit to generator, not to a shut off valve outside**
- **Dangerous condition still exists**

# Leak Detection



- System designed to shut down source of gaseous fuel source (Propane) in case of leak.
- Sensor mounted in generator room on other side of wall
- Control wiring goes to ATS

# Leak Detection



- Regulator vent required to have 10' clearance from sources of ignition
- Clever underground PVC vent

# Winter Storm Pax

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## *Case Study-Disaster Recovery*

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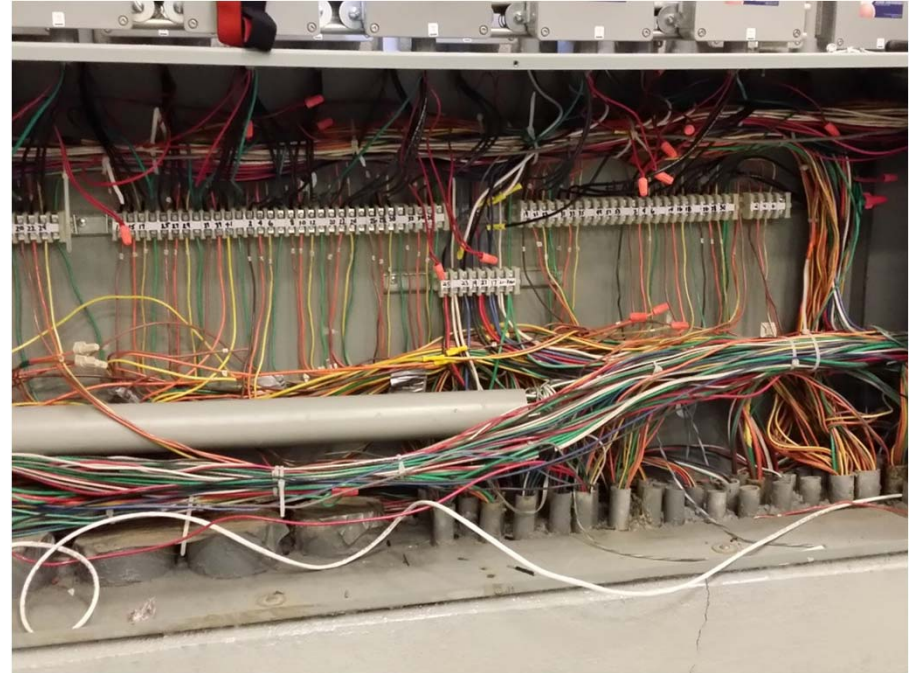
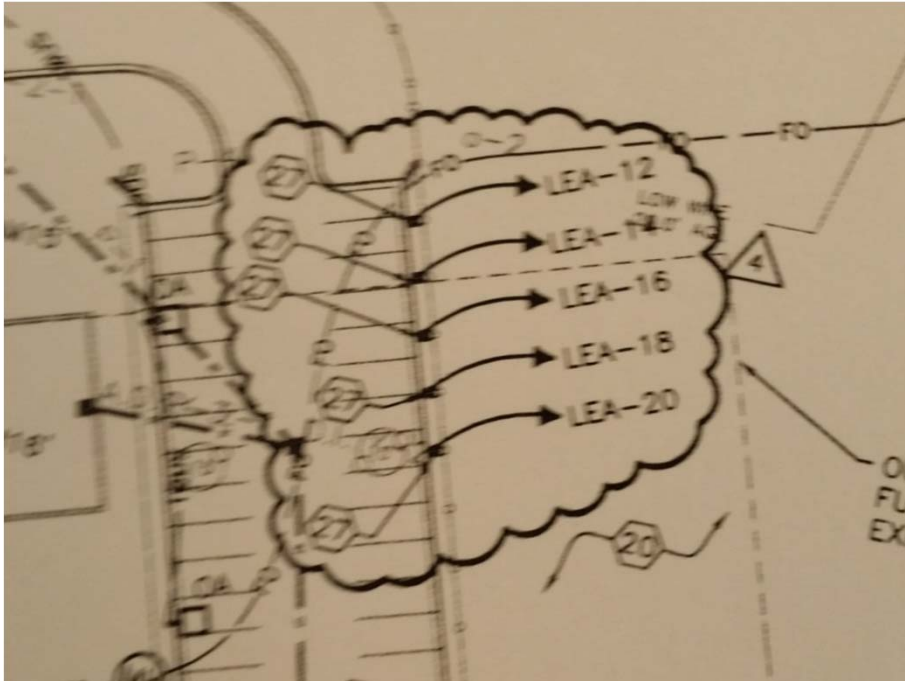
### **Existing Scenario**

- **Winter Storm in Southeast required deployment of portable generators**
- **Batteries in portable generators were dead and had to be replaced**
- **Staging area had no power to keep float charge**

### **Required Action**

- **Customer required 120v receptacles to be repaired/replaced**
- **During project, uncovered numerous problems affecting the repair work**

# Generator 120v Receptacles



- Engineer designed 20A circuits fed from panel LEA
- Circuits did not exist in panel LEA-had to be traced
- Discovered wiring violations (single neutral and EGC for 5 circuits)
- Underground conduit is damaged (crushed) and conductors cannot be replaced
- If left in place, it will result in future failure
- Resolution: Has not been determined due to choices affecting load and costs

# *IS THERE A SOLUTION?*

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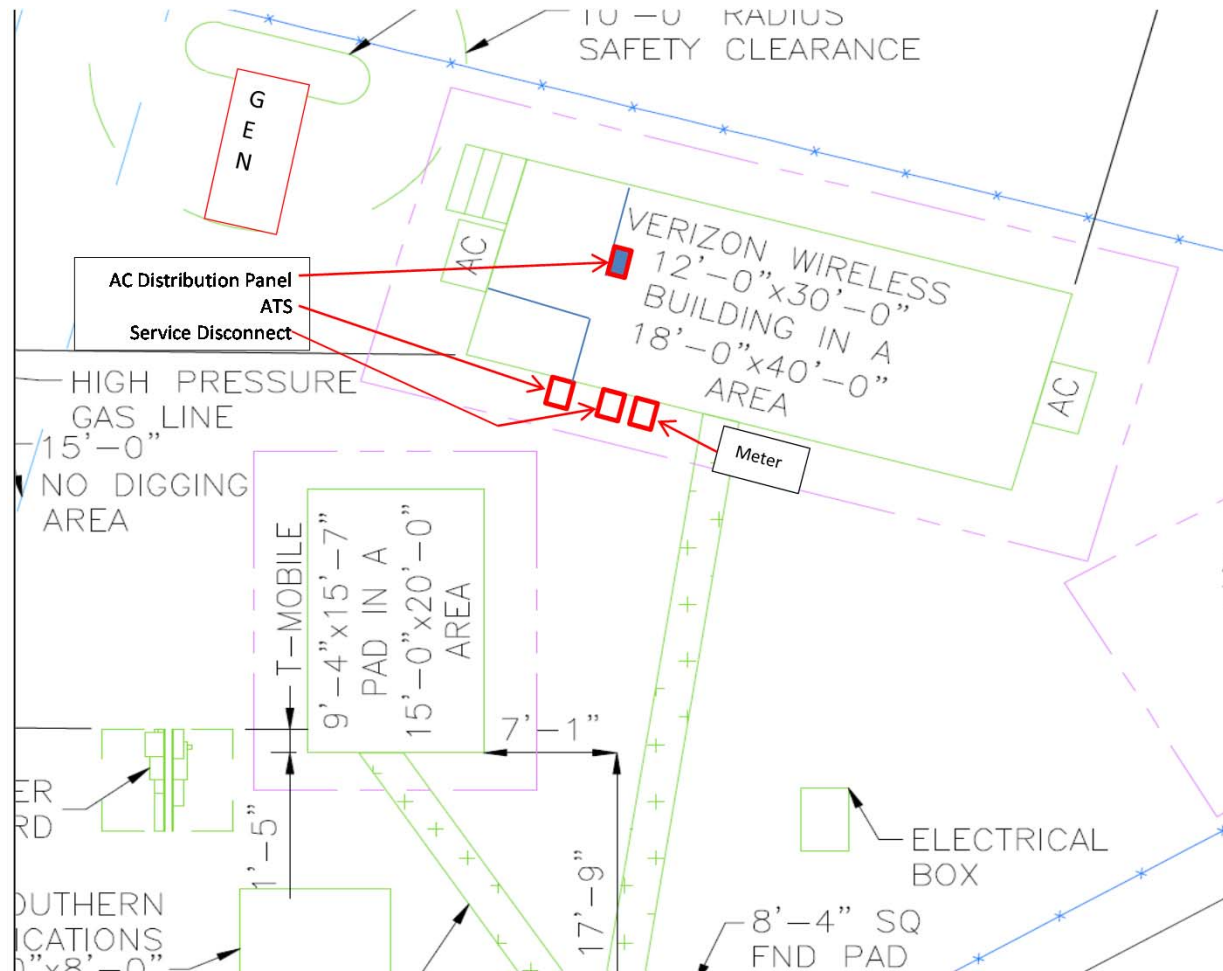


## *Pre-construction Objectives*

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- **Understand Scope of Work**
- **Provide thorough Pre-walk/Investigation**
- **Provide Report of items that may change the SOW**
- **Provide solutions**
- **Execute the project**

# Pre-Construction Objectives



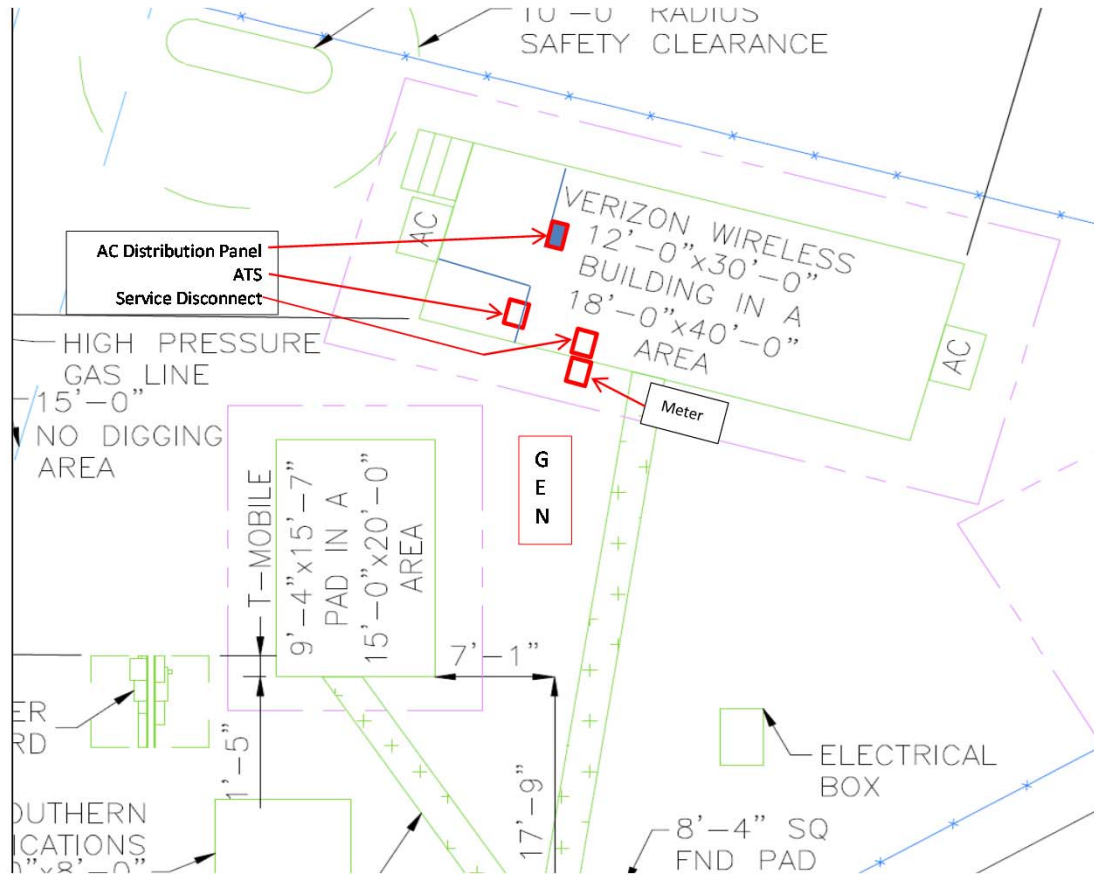
- **Understand the scope of work**
  - **Customer provided Construction Drawings**
  - **Customer Specified preferred location for generator**

# Pre-Construction Objectives



- Provide Thorough Pre-work walk / investigation
- Visit to site revealed proposed location is on border of HP gas line
- Exposed possible safety issue by requiring technician to cross ditch
- Discovered service is undersized

# Pre-Construction Objectives



- **Provide Recommendations to customer**
  - **Move generator location**
  - **Upgrade service to 200 Amp**

# Construction Objectives-Met



- **Generator project complete**
  - **Generator installed**
  - **Service disconnect replaced**

# *SUMMARY*

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- **Experience has shown that inadequate communication is major reason for project issues. Must be a conscientious effort with all parties involved.**
- **Carrier must invest more resources to manage the project, develop contractor knowledge to insure mutual success.**
- **Contractors must be held accountable and take ownership of their work.**
- **Good relationships build trust**

# *QUESTIONS*

# *THANK YOU!*

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Joe Pfau, Principal

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