

# abaa 2026 building enclosure conference

## Trade Partner Success Depends on Quality Metrics and an Effective Quality Program

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**AECOM HUNT**



# Trade Partner Success Depends on Quality Metrics and an Effective Quality Program

*In today's environment, having the trade partners take responsibility for the quality of their work and coordination with other trade partners that affect their work is critical for a successful project. Keeping quality on track with trackable and quantifiable quality metrics and deliverables is what we have been able to use to keep the Cost of Quality at almost 10x less than industry average per industry reports. Making everyone accountable for Quality and at the same time provide them with a resource, learning experience during job site reviews, and provide a lessons learned program that is introduced at the right time during design, buyout or construction, will give everyone more confidence and acknowledging the Trade Partner is a Partner long term. Also, using AI technology along with quality metric results over many years, we now are able to assist with the choice towards the correct trade partner for the project along with the making sure that the trade partner will succeed at the specific project type. I have developed an extensive set of Quality metrics and Lessons Learned programs that is effective and definable for the Company and the individual trade partner teams.*



## Corey S Zussman

Forensic architect registered in several states, Corey Zussman has practiced in the construction industry for more than 30 years. He specializes in the building envelope, restoration, preservation, life safety, and interior finishes. While working on over 2000 projects, Corey conducts constructability reviews, pre-installation meetings, comprehensive envelope meetings, and construction observations. He has also become known for providing educational opportunities throughout the industry and has produced more than 200 "lessons learned". In addition, he has over 20 industry articles. He is also a frequent presenter at local and national conferences and associations with over 60 AIA accredited presentations.



# Learning Objectives

- 1. Define what a quality plan is and how it could help the trade partner and the entire construction team with expectations and accountability.**
- 2. Apply the understanding of the Trade Partner Quality Plan to the project to better manage the trade partner and overall project expectations.**
- 3. Leverage Quality metrics, how to measure, and how to make them useful for the Company, Subcontractor, A/E and Owner.**
- 4. Understand the importance of trade partnering and training verses acknowledging a transactional relationship**
- 5. Learn how to prevent constructability/compatibility issues prior to construction by using the job specific trade partner Quality Plan and Quality metrics.**

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# So why do we need a Quality Program

1. One small component – every step counts
2. Company lost focus
3. Ignored signs and failure to verify

*“Quality is like our health, we tend to take it for granted and only notice it when it fails”*



# Cincinnati Horseshoe Casino

- Collapse at a 60-ft-square bay, fell 25 ft under weight of wet concrete.
- 13 injured
- Investigation revealed:
  - 6 contractors did not take steps to ensure building was stable before pour
  - Not enough bolts in place at the double connections

***“The reported root cause was the lack of the proper number of fasteners installed in the Support structure prior to the pour.”***

***“The industry sometimes takes for granted that this work has been done and done adequately.”***

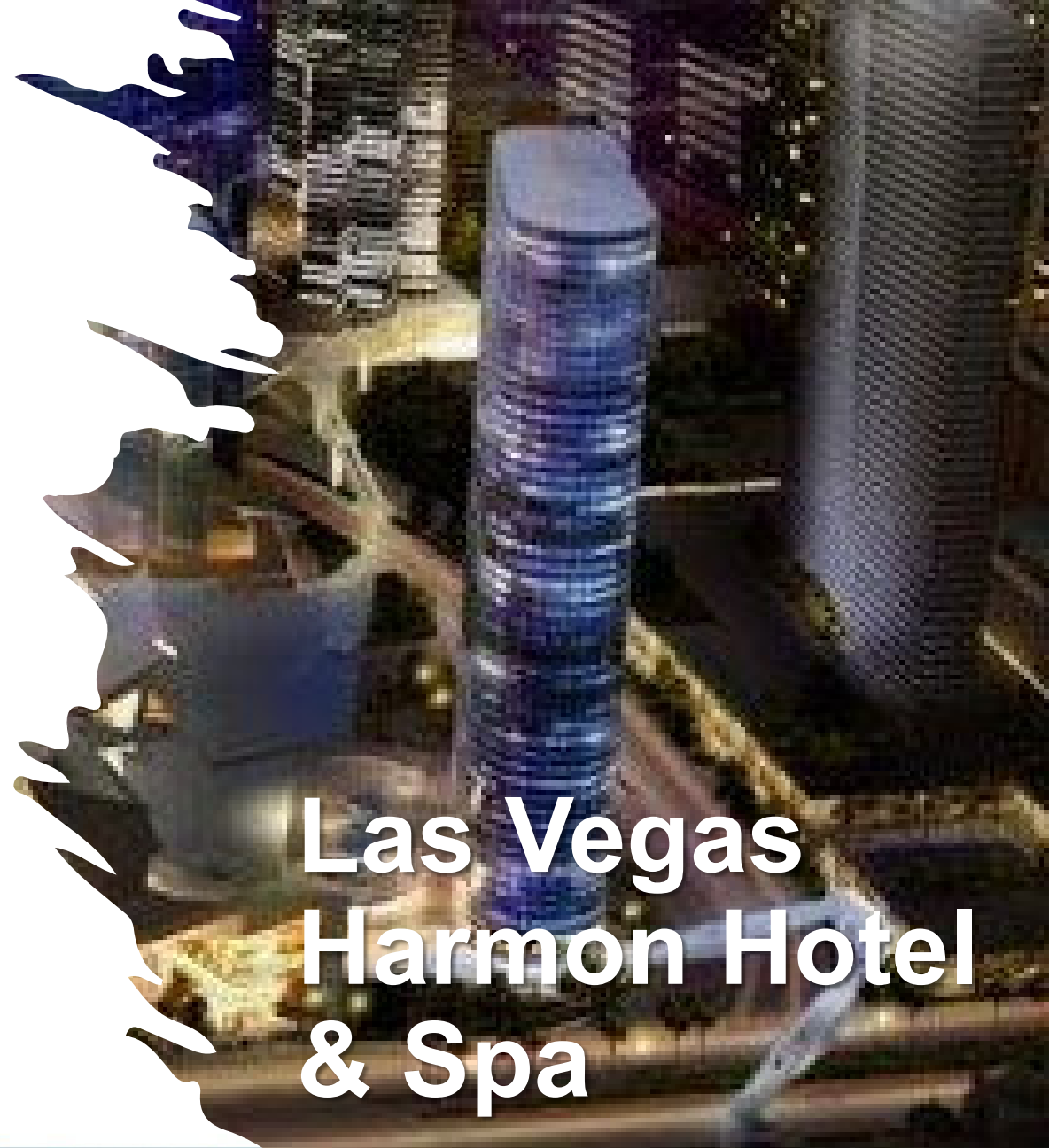
# Milwaukee O'Donnell Parking Garage



- ❑ Collapse of a 13-ton concrete panel
- ❑ Killed 15-year-old boy and injured two others
- ❑ Investigation revealed:
  - ❑ 2 contractors responsible.
  - ❑ 1.5%...4 out of 296 of the installed panels met original design specifications.
  - ❑ Pins used varied in length, material, and installed at varying depths.
  - ❑ Some pins terminated at the bottom of the precast panel with no embedment into the parapet.
- ❑ Epoxy coated rebar was used in lieu of specified stainless steel pins.
- ❑ No epoxy installed – fiction fit.
- ❑ Approximately 34% of the parapet walls within the complex showed similar signs of failure....70 total panels removed and replaced.



- Originally planned as a 49-story tower — topped off at 28 floors, canceling 200 planned condo units
- Rebar problems on 14 floors
- Investigation revealed:
  - Rebar spaced incorrectly and ties had been cut.
  - Inadequate concrete cover on reinforcing steel.
  - Missing or misplaced reinforcement throughout.
  - Reinforcing steel installed in wrong locations inside beams.
  - Some steel was badly positioned and stuck out of the concrete floor - was sawed off to conceal the mistake.



## Las Vegas Harmon Hotel & Spa

# There are only three causes of construction defects:

- **Faulty Materials**
  - *Wrong Material Choice*
  - *Value Engineering*
- **Faulty Workmanship**
- **Faulty Design**

*75% of defects involve water in some way*

**“Poor quality is costing the industry annually more than the combined profits of companies in the industry,”**

*said Adrian Montague, head of the CIOB Academy –  
“Crisis of Quality in UL Construction Survey” 02.28.2018*






# So, what is Quality?

Different for everyone ...

- Owner
- Architect / engineer
- General contractor
- Subcontractor
- Tradesman

*in the end...I believe it is  
delivering what was promised  
from the inside-out, every step  
of the process.*

# Accountability



**Define a Quality Plan and how it could help the trade partner the entire construction team with expectations and accountability**

# Anatomy of a Quality Program

- Program is to be preventative and proactive
- Procedures written to clearly describe processes
- Forms should be designed to be job specific and implemented in a continuous improvement process
- Provide regular site inspection/verification
- Use quality metric data to assist with improvement
- Provide proper quality metrics to identify trends and give the team an idea of progress
- Create Bulletins from trends for the team to share and use on this and future projects



# Communication

- Are we properly expressing what we expect?
- Are we talking to each other?
- Are we purposely leaving something out of the conversation?
- Are we getting the right players at the meetings?
- Are we talking enough?
- Are we sending the correct information over?
- Have the same agenda?

TOGETHER  
EVERYONE  
ACHIEVES  
MORE

# Benefits of Collaboration

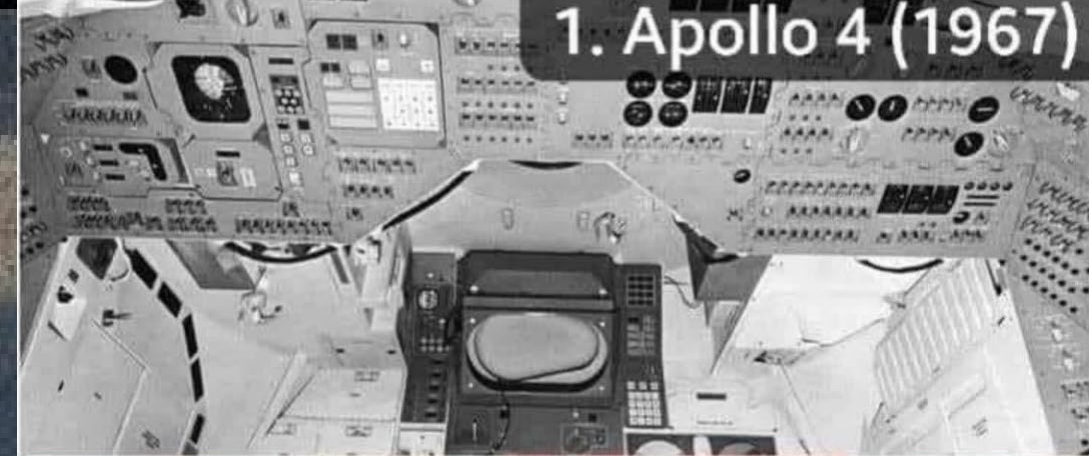
- Better Communication
- Mutually Beneficial for all members
- Focused process
- Early approach on difficult conditions
- Experiences sharing
- Better understanding of costs and time commitments from each member
- Better chance of On Time / On Budget construction



# Job Specific Trade Partner Quality Plan



**“WE HAVE ALWAYS  
DONE IT THAT WAY”**



**1. Apollo 4 (1967)**



**2. Space Shuttle (2002)**



**3. Crew Dragon (2020)**

*Why a job  
specific  
quality  
plan?*



**Confirm  
team's  
experience  
with products  
specified**

---

**Contract  
requirements  
and submittals**



**Identify  
substitutions**  
prior to  
submission and  
properly  
submitted...

**Try not to  
change  
between  
manufacturers**

**WHY?**



# What submittals are needed?

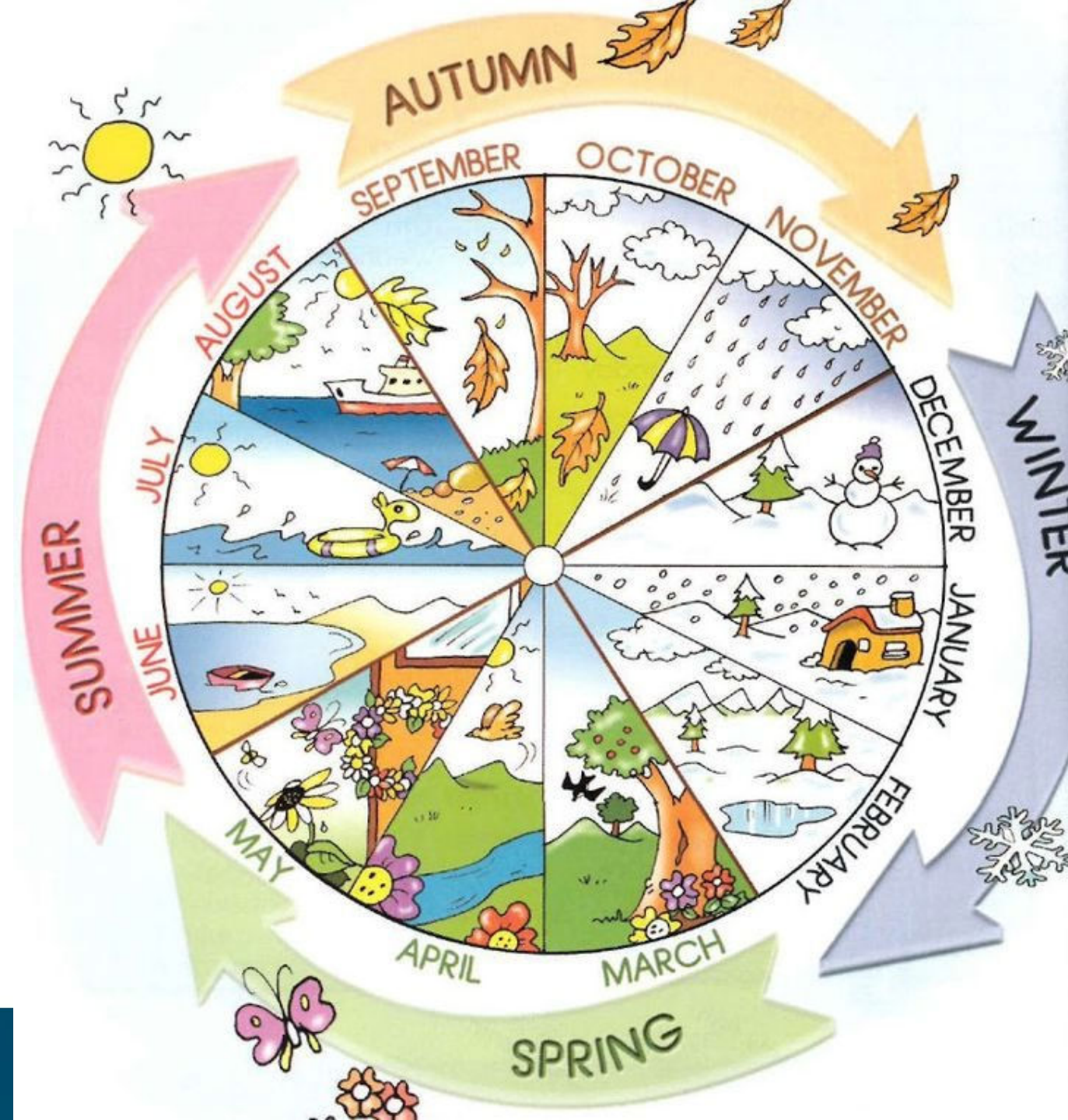


## Quality reporting procedures – metric reporting

- |  |                                      |
|--|--------------------------------------|
| • Product data                                     | • Installation Instruction           |
| • Latest Mfr tech Bulletins                        | • Hot/Cold weather requirements      |
| • Equipment to be used (& weight cut sheet)        | • Logistic Plans                     |
| • Manufacturer certifications                      | • Job specific details               |
| • Training certificates for each instiller         | • Testing protocols and requirements |
| • Testing equipment and calibration certifications |                                      |
| • End of day requirements                          | • Substrate prep review procedures   |

# Seasons & Weather

- Procedures for Seasons/Temperatures
- Min & Max temperatures
  - Hot/Cold Weather
  - Humidity / Fog
- Special Temperature Materials
- Maximum UV Exposure

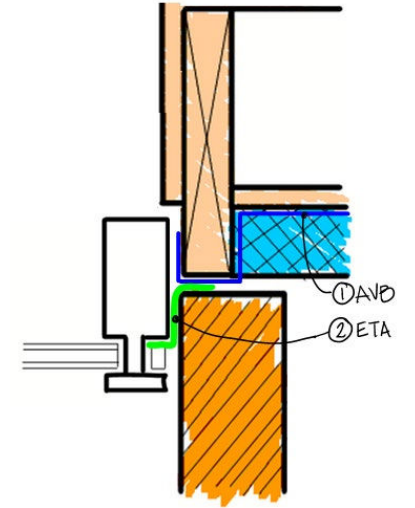
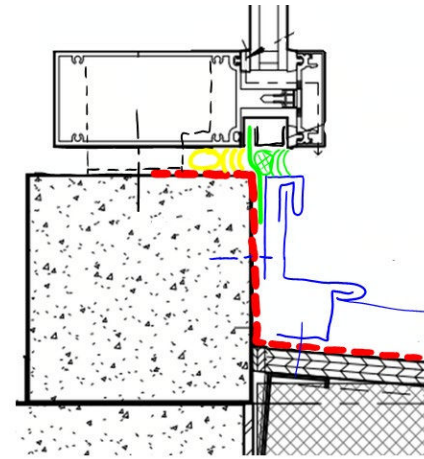
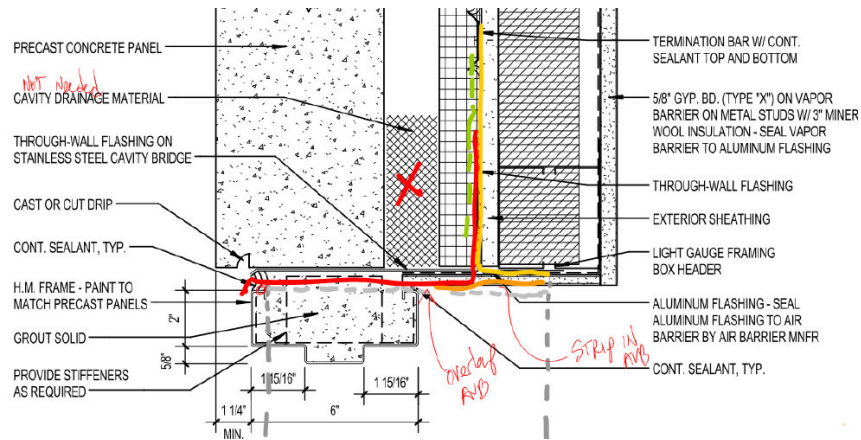
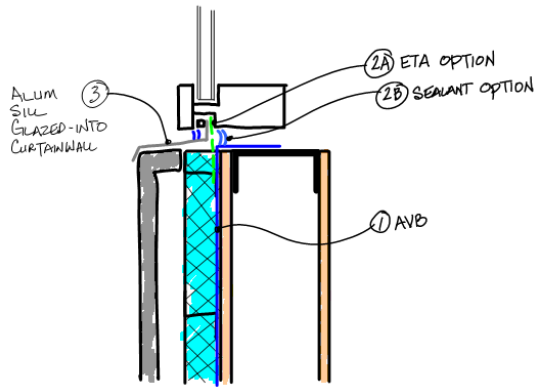


Review  
protection  
needed and  
define scope &  
responsibility

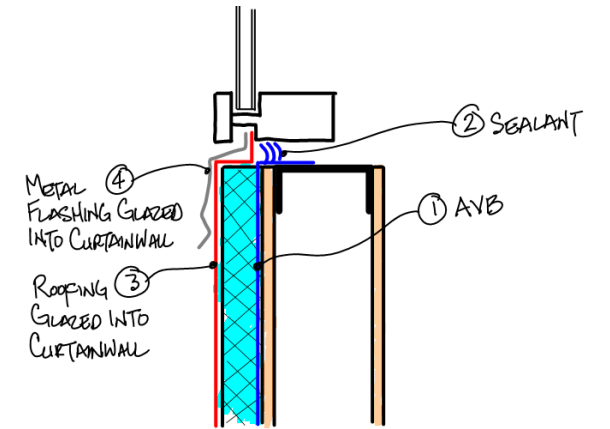
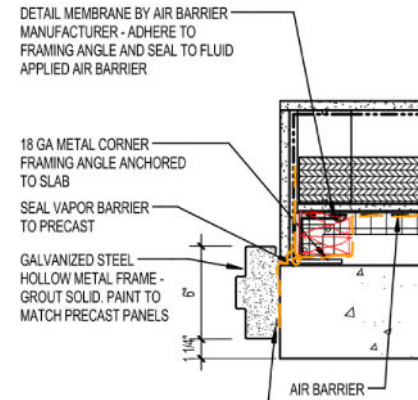
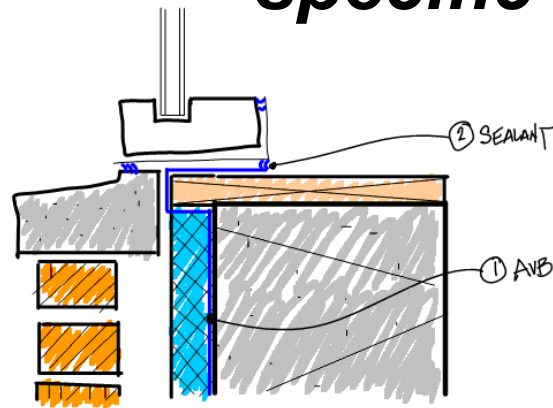
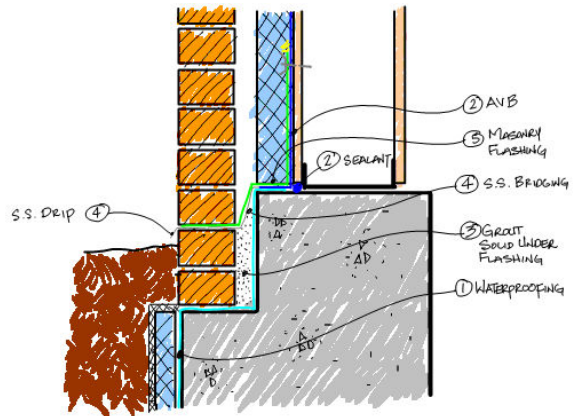
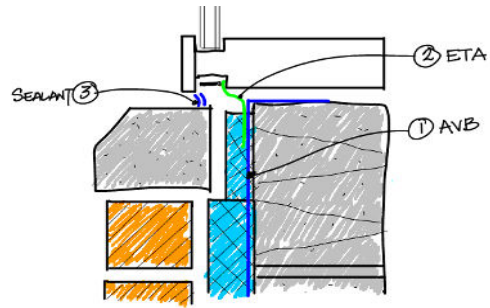


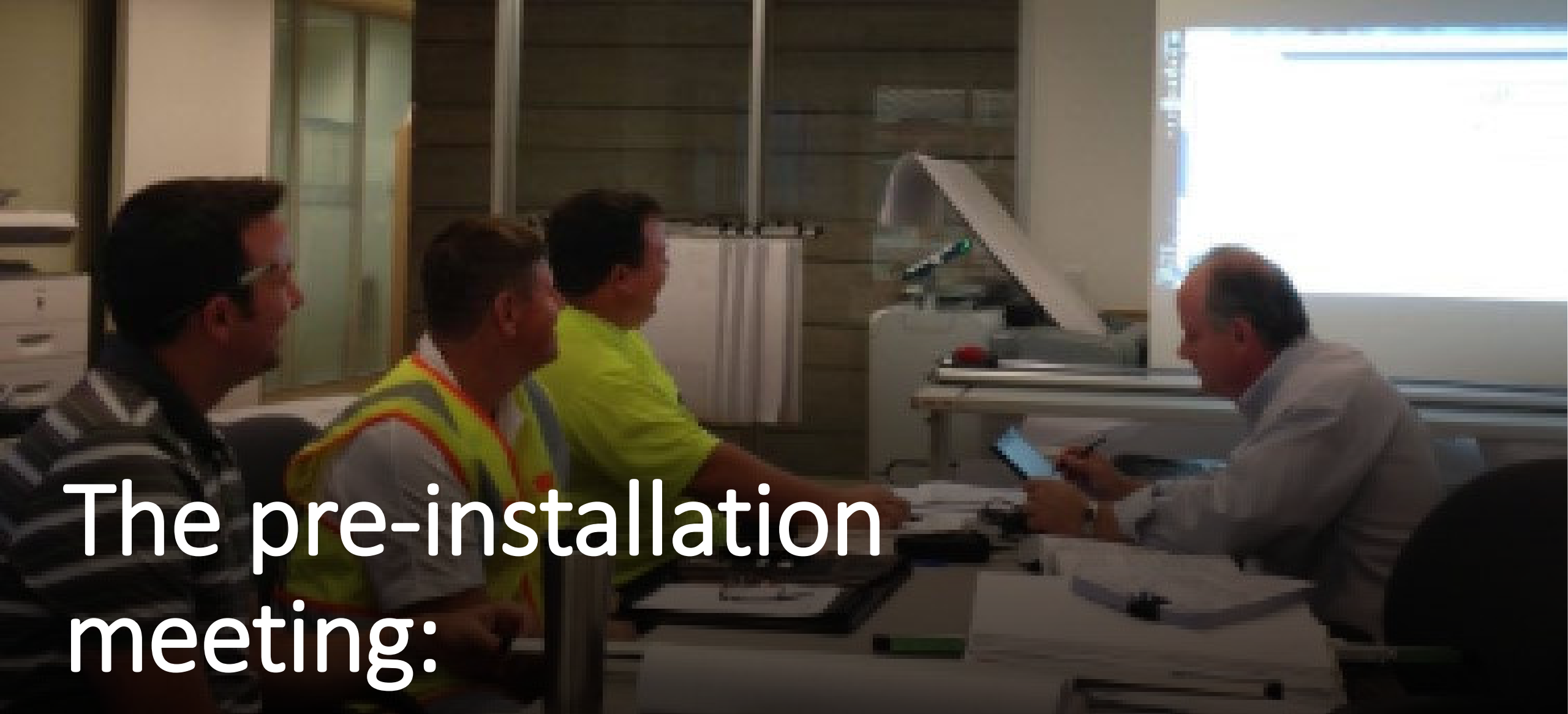
***Any smells to  
worry about?***

***Do we need any  
ventilation due to  
smells?***



# Confirm assumptions by providing job specific details



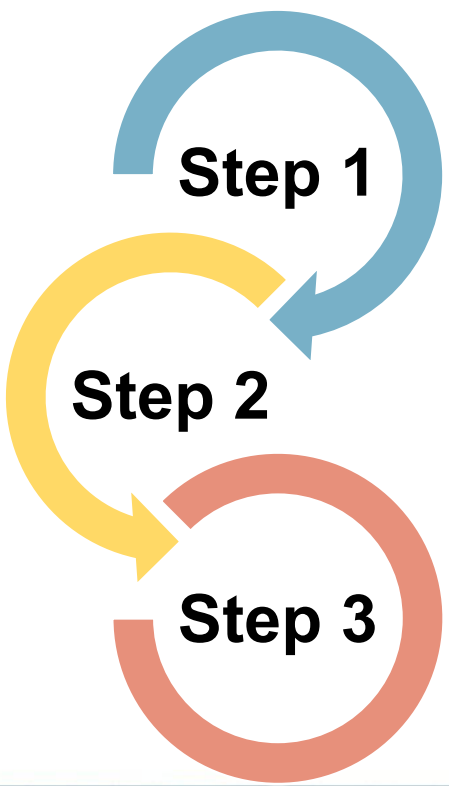


# The pre-installation meeting:



"I'm here about the details."

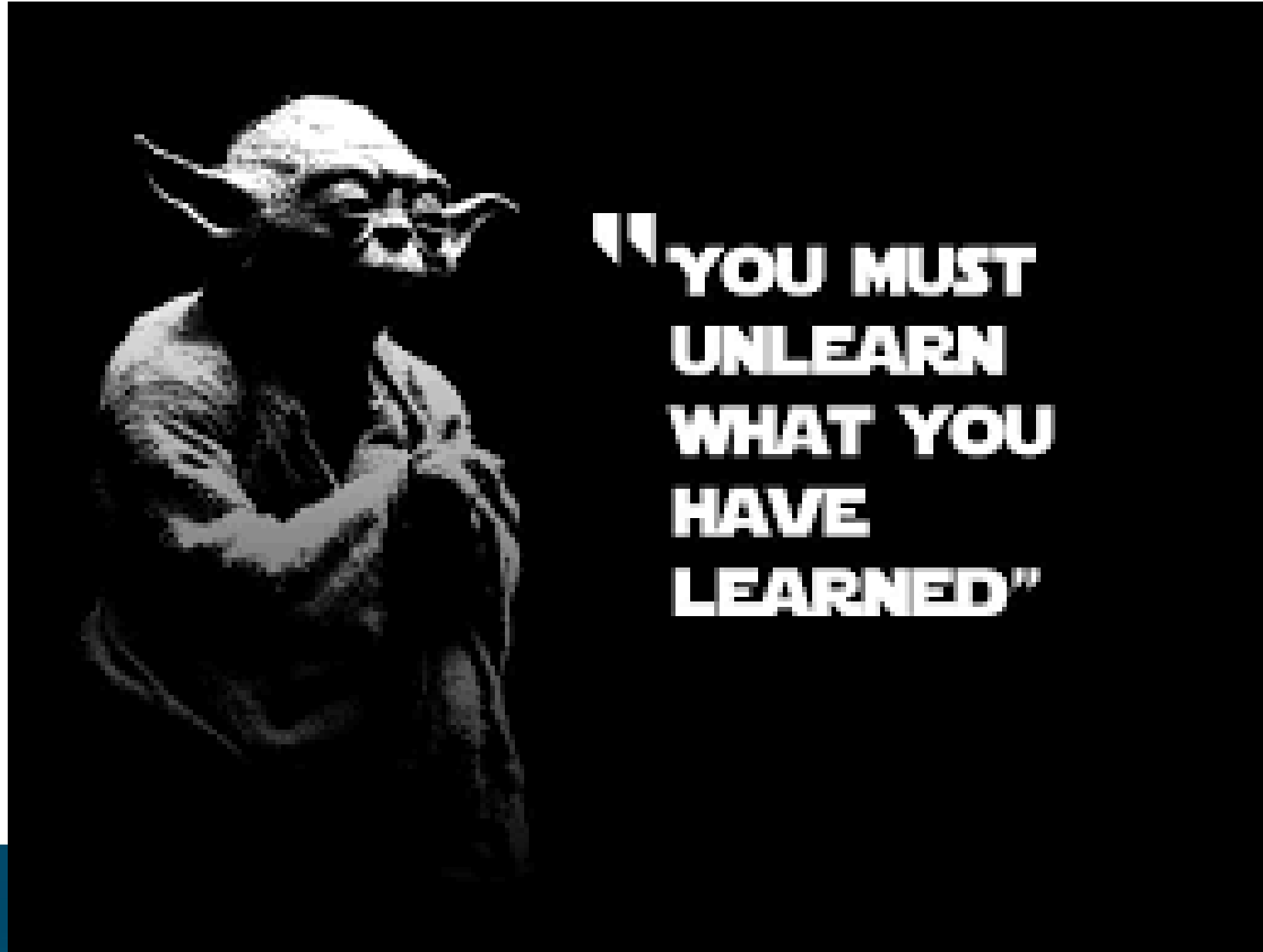
# Take the time to Review and understand the details



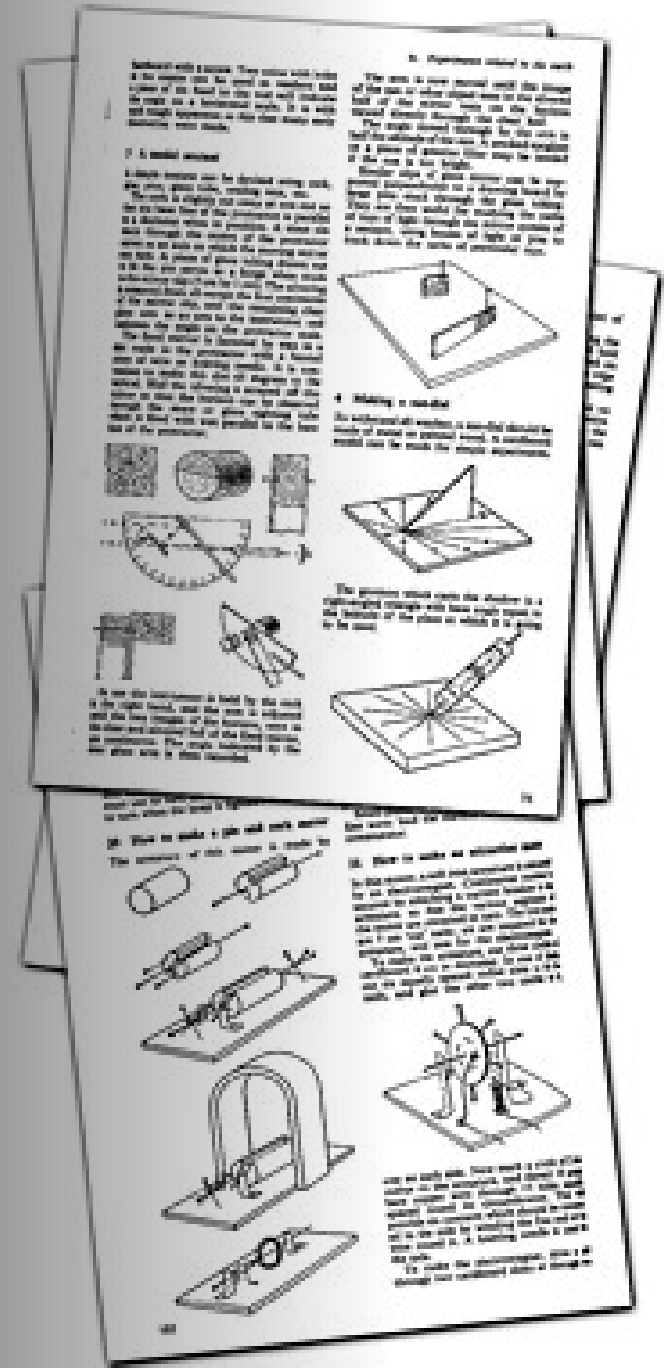
# Preconceived Ideas

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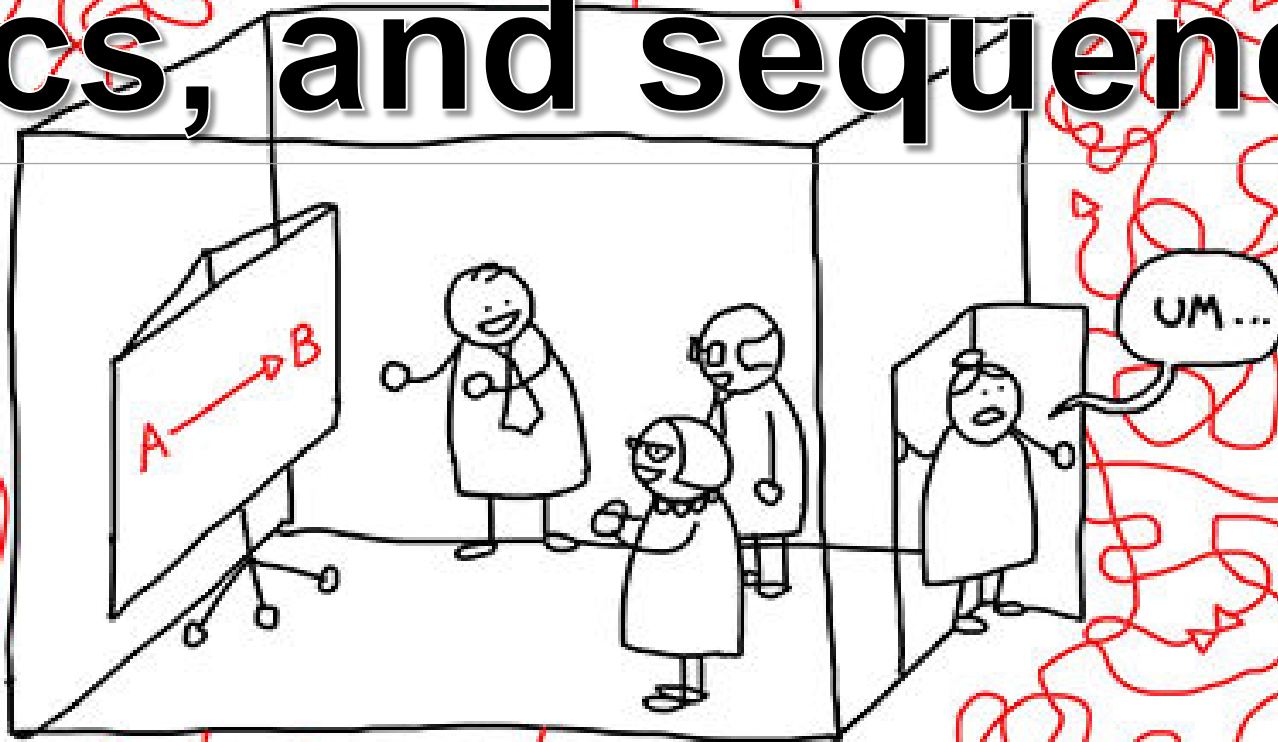
*The team must be open to understanding the requirements, sometimes new, for the exact product that is being installed or being installed adjacent too...*



# Review Installation Instructions & Specifications Section 3



# Discuss initial complexities, logistics, and sequencing



VIRPI/BUSINESSILLUSTRATOR.COM

# Open discussion on material limitations and expectations



# Mock-up(s)

Purpose

Size/Configuration

Sequence

Inspections

Visual or Destructive

Setting expectations  
and understandings



What have you  
LEARNED?

# Get a sign-off of foreman & Quality Champion

(each time a new foreman comes on site)

they have reviewed the job specific quality plan and the job specific


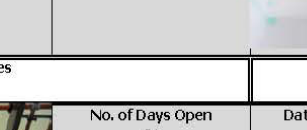
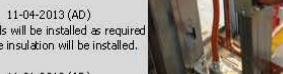

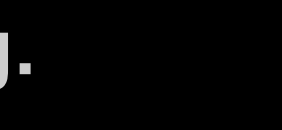
pre-installation meeting minutes



**Review Critical  
Definable  
Features of Work**

**1<sup>st</sup> Work in Place &  
continuous Review**



#	OBSERVATION(S) Location	Action Required	Non-Compliance Photo	Action Taken/Projected Completion Dates	Compliance Photo/Date	Closed	Repeat
1	Date of Observation 10/14/2013	Weighted Value 0	<b>N/A</b>	No. of Days Open 0	Date of Compliance 10/14/2013	yes	
	Contractor 15-Plumber	Reference Spec Section			<i>Provide a photo of</i>		
	The plumbing lines are properly being installed with insulation that runs through the wall, as required.	N/A		N/A			
	Location 1st Floor	Approx. Cost to Correct \$0.00		Preventative Measures	Root Cause Compliant Issue		
9	Date of Observation 10/28/2013	Weighted Value 3		No. of Days Open 24	Date of Compliance 11/21/2013	yes-n	<b>REPEAT</b>
	Contractor 15-Mechanical	Reference Spec Section			<i>Provide a photo of</i>		
	The water pipes are currently installed less than 1.25" from the face of the studs.  Also, If the hot water is recirculation type...insulation is required per code.  Verify if the specifications require pipe insulation on all water piping in the wall...	Install a stud guard on the studs at all locations where the water line crosses the studs.  Also, please verify if pipe insulation is required...		11-04-2013 (AD) Nail guards will be installed as required and pipe insulation will be installed.  11-21-2013 (AD) Nail guards were installed.			
	Location Ground Floor	Approx. Cost to Correct \$200.00		Preventative Measures	Root Cause Training Issue		
77	Date of Observation 2/10/2014	Weighted Value 5		No. of Days Open 1	Date of Compliance	no	
	Contractor 15-Mechanical	Reference Spec Section			<i>Provide a photo of</i>		
	The pipe threaded rod is going through the fire rated wall.	Remove the rod and re-install the drywall and potentially the fire stopping at the head-of-wall.					
	Location 1st Floor - Next to Elevator	Approx. Cost to Correct \$1,500.00		Preventative Measures	Root Cause Coordination		
	Date of Observation 2/10/2014	Weighted Value 3		No. of Days Open 1	Date of Compliance		
	Contractor 06-Panel Systems	Reference Spec Section			<i>Provide a photo of</i>		

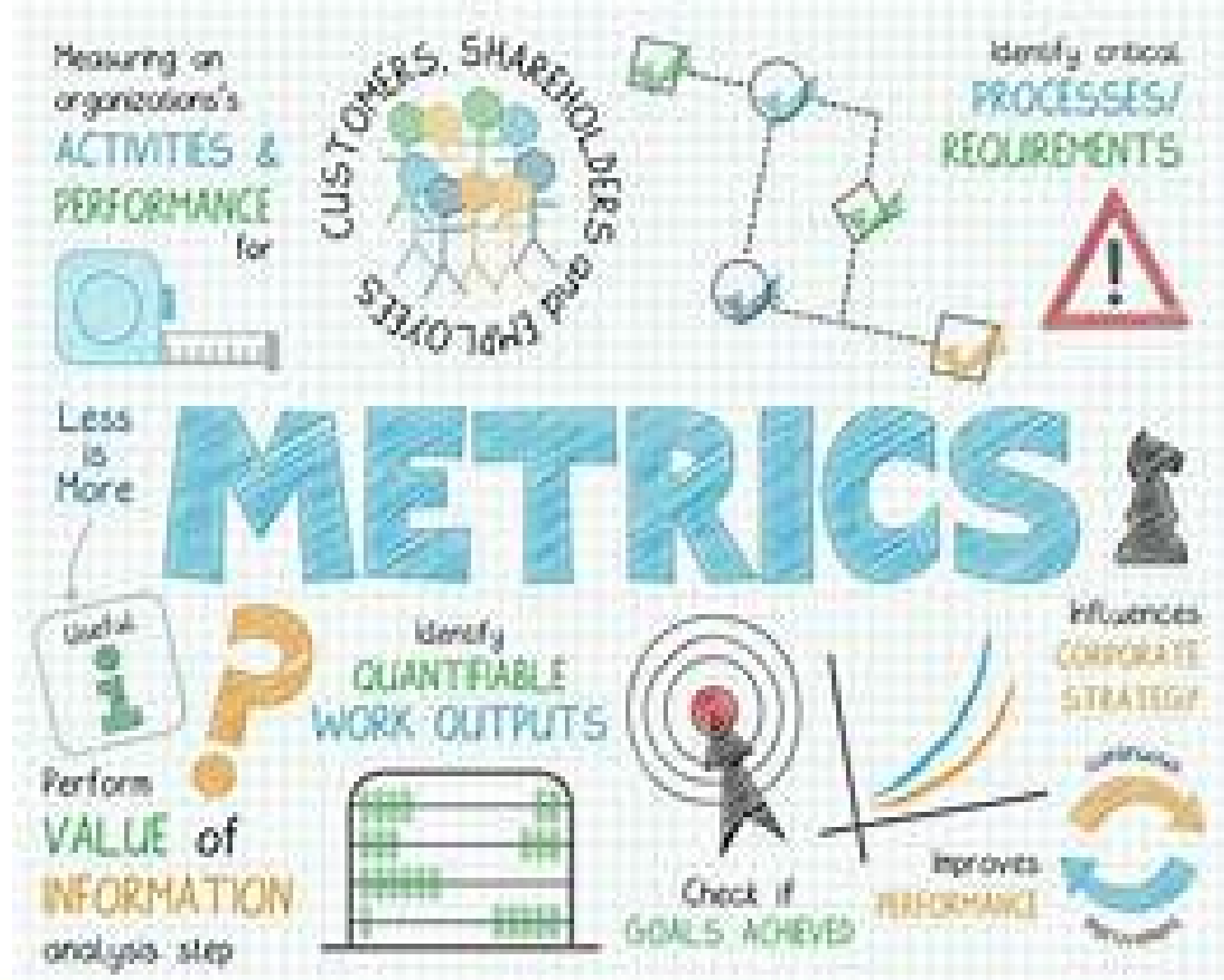
Job site review is the start of the construction metric tracking.

This could be done by the Contractor and/or GC.

Best data is from honest data from the Contractor

# Leverage Quality Metrics

And how to make them useful for the everyone



# Cost of rework for Construction

3.0%

INDUSTRY AVERAGE  
REWORK RATE (CII)

Cost of rework (CII 2005 & Josephson and Hammarlund 1999): 3% - 12%



**What is the  
goal with  
tracking?**

***(will be different  
with every  
contractor)***



## Accountability

- **Contractor**
- General Contractors
- Architects / Engineers

## Continuous Improvement

- **Lessons Learned**
- Pre-Defined Pre-Installation Meetings
- Save time and money

## Proactively Become Efficient

- **Stop incorrect or typically misunderstood details**
- Spend less time specifically addressing items of concern
- Targeted approach

# My quality Metric journey



Year 1

- **Track a few items in Microsoft Word**
- Hand count items and create reports
- Lagging indicators

Year 2-9

- **Track 10 items in Microsoft Excel**
- Automate Job specific limited reports
- Create Lessons Learned and start to develop leading indicators

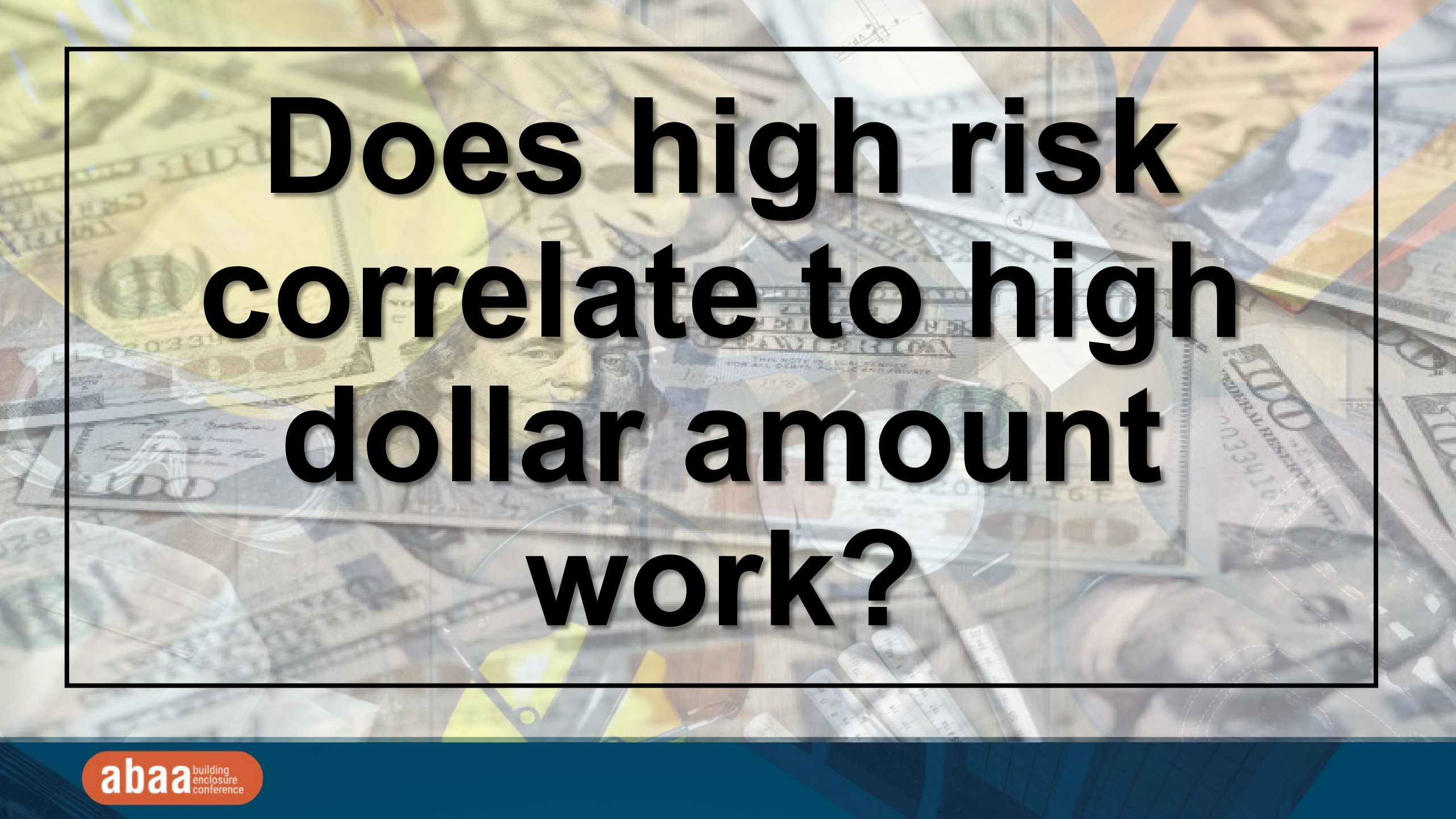
Year 10-present

- **Track 100's of items in Web-based custom program**
- Automate Job specific and Company wide reporting
- Lessons learned, leading indicators, and proactive decision-making reporting

***With twenty years of quality data, I can be proactive with our Quality metrics...***



- **Forecasting time spent doing rework based on project complexity, dynamics, and duration.**
- **Identifying repeat issues in construction and developing construction bulletins to produce better construction outcomes.**
- **Understanding construction trends and knowing what items to exclude or include into the project specifications for less rework.**

The background is a collage of various elements related to construction and finance. It includes several US dollar bills (100, 20, and 10), architectural blueprints with technical drawings and text, a yellow hard hat, a pair of safety glasses, and various construction tools like a pencil, a ruler, and a compass. The entire scene is overlaid with a semi-transparent white box containing the main text.

**Does high risk  
correlate to high  
dollar amount  
work?**

# I will argue that it is...

Job Specific

Contractor  
Specific

History  
Dependent

Reputation  
Concerns

Complexity of  
Project

Contract  
Document  
Quality



# TRACK DATA



**Tracking even  
low-cost items  
can have a  
beneficial result  
of awareness  
and results**

# So what is at high risk?

**NEW CONTRACTORS**

**NEW MATERIALS**

**GC | CONTRACTOR | ARCHITECT**

**DIFFICULT TO GO BACK TO ITEMS**

**FINANCIAL CONCERNS**

**OWNER | CONTRACTOR | ARCHITECT**

**LIFE SAFETY ITEMS**

**COULD CREATE EXCESSIVE DAMAGE**

**WATER TRADES**

**AVB | WINDOWS/DOORS | SKYLIGHT**

**ROOFING | WATERPROOFING**

**PLUMBING | FIRE PROTECTION |**

**HVAC | POOLS | BATHROOMS |**

**TRAFFIC COATING | SEALANT**



**What  
about  
low  
value  
items...**



Tracking even low-cost items can have a beneficial result of awareness and results

—  
Low-cost items often have a ripple effect...so *pay attention!*

# What to Track

# When to Track

# *How Often to Track*




# ***SAMPLE***

- **Project cost and duration**
- **Foreman team name**
- **Date of issue, date of closure, days to complete**
- **Severity of issue (0-5)**
- **Estimated cost to correct**
- **Root cause (general buckets)**
- **Foreman at the Preinstall**



- **Building square footage and size (categories) – for comparison**
- **Structure type and interior and / or exterior construction – for comparison**
- **Construction type & building category – for comparison**
- **Current open items per tradesman and days**
- **Items per foreman / tradesman**
- **Repeat items per foreman / tradesman /cost impact**
- **Compare items to pre-installation meeting with & w/o foreman**
- **Cost per foreman / tradesman**
- **Cost of other foreman / tradesman influence**
- **Comparative data per contractor/division**
- **Better/worse than averages**
- **Quality score per foreman / tradesman**



# **Cost of Errors: Data Granularity**

# Sample collected data and output that could be generated

Report Date:	11/13/20
Total Est. Cost to Correct:	\$20,250
Total Est. Hours to Correct:	202
Direct Quality Cost:	\$3,850
Direct Quality Hours Spent:	38
<b>Total</b>	<b>\$24,100</b>
Average Cost Per Item	\$618
Total Repeated Items:	7
Total Prior talk Items:	36

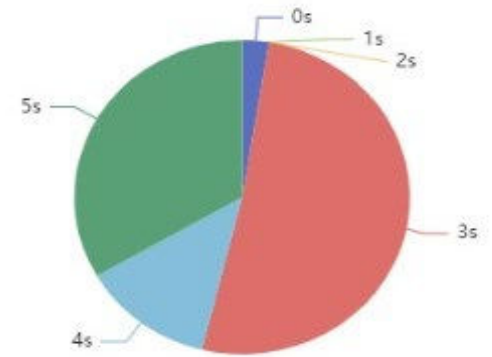
	contractor	Sub Cost%		Cost%	Total
Cost of Repeat Items	\$5,900	29.14%	\$700	18.18%	\$6,600
Cost of Prior Talk Items:	\$18,650	92.1%	\$3,500	90.91%	\$22,150

Total Weeks	Week #	Percent Complete	Cost to Date
48	36	75%	\$5,685,000

Cost of Quality/Construction Cost:	0.4239%
Cost of Quality/Construction Cost for	0.2046%
% Better or Worse	-207%



Quantity Of Issue Severity



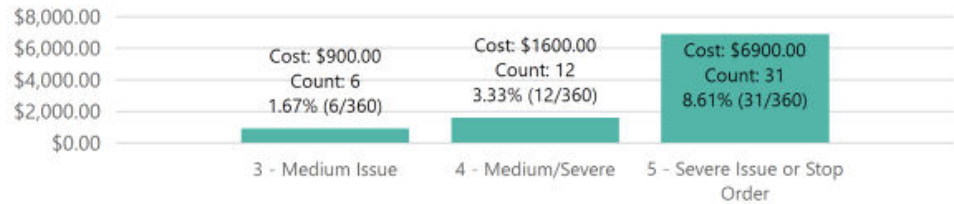
## Summary of Issues

Total # of Items: 39  
 Total # of Issues(1-5 Severity): 38  
 Total # of 0s --- 1 (2.56%)  
 Total # of 1s --- 0 (0%)  
 Total # of 2s --- 0 (0%)  
 Total # of 3s --- 20 (51.28%)  
 Total # of 4s --- 5 (12.82%)  
 Total # of 5s --- 13 (33.33%)

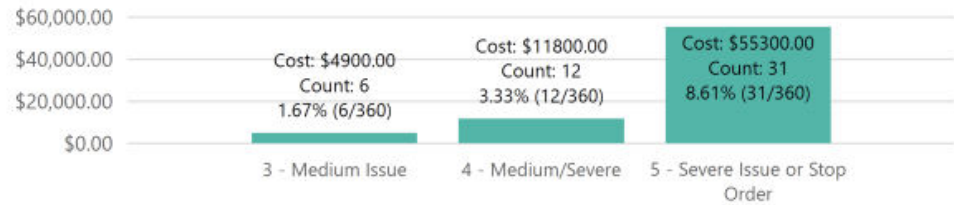
# Foreman Comparable Data

Severity	Count	Count%	PCC SUM	PCC SUM%	SUB SUM	SUB SUM%	PCC+SUB SUM	PCC+SUB SUM %
3 - Medium Issue	6	1.67%	\$900.00	1.31%	\$4,900.00	0.90%	\$5,800.00	0.94%
4 - Medium/Severe	12	3.33%	\$1,600.00	2.33%	\$11,800.00	2.16%	\$13,400.00	2.18%
5 - Severe Issue or Stop Order	31	8.61%	\$6,900.00	10.03%	\$55,300.00	10.14%	\$62,200.00	10.13%
<b>Total # of Issues with "Yes"</b>	<b>49</b>	<b>13.6%</b>	<b>\$9,400.00</b>	<b>13.66%</b>	<b>\$72,000.00</b>	<b>13.21%</b>	<b>\$81,400.00</b>	<b>13.26%</b>

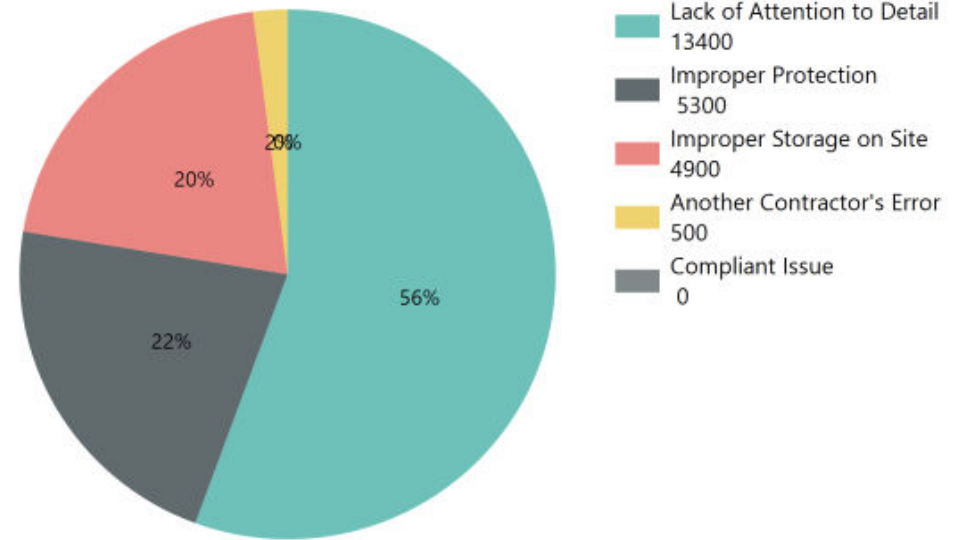
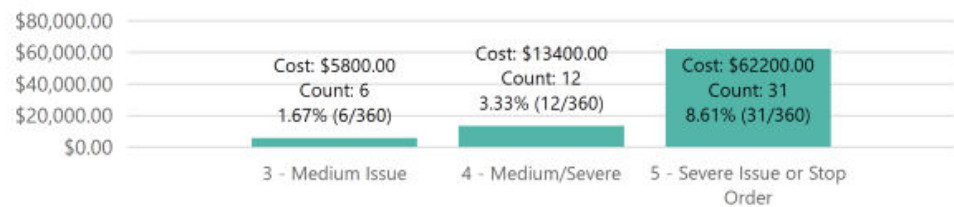
PCC SUM & Repeated=Yes



SUB SUM & Repeated=Yes



PCC+SUB SUM & Repeated=Yes



Root Id	Root Cause	Count	%Count	PCC SUM total	%PCC SUM	SUB SUM total	% SUB SUM	PCC+SUB SUM	% PCC +SUB SUM
1	Another Contractor's Error	1	2.56%	\$100.00	2.6%	\$400.00	2.0%	\$500.00	2.1%
2	Compliant Issue	1	2.56%	\$0.00	0.0%	\$0.00	0.0%	\$0.00	0.0%
9	Improper Protection	7	17.95%	\$700.00	18.2%	\$4,600.00	22.7%	\$5,300.00	22.0%
10	Improper Storage on Site	6	15.38%	\$600.00	15.6%	\$4,300.00	21.2%	\$4,900.00	20.3%
13	Lack of Attention to Detail	24	61.54%	\$2,450.00	63.6%	\$10,950.00	54.1%	\$13,400.00	55.6%
	<b>Total</b>	<b>39</b>	<b>100%</b>	<b>\$3,850.00</b>	<b>100%</b>	<b>\$20,250.00</b>	<b>100%</b>	<b>\$24,100.00</b>	<b>100%</b>



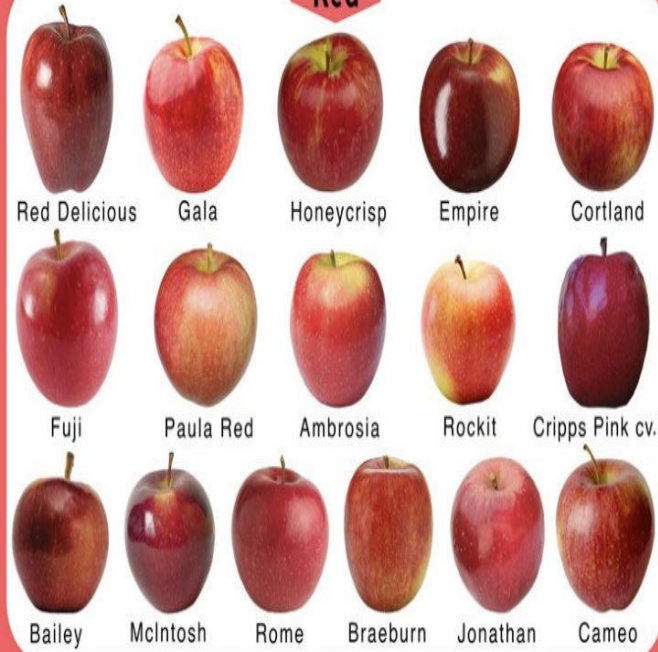
**Heathy  
competition  
between Teams  
foster company  
wide  
improvement  
when backed up  
with real data,  
not just guesses  
and assumptions**



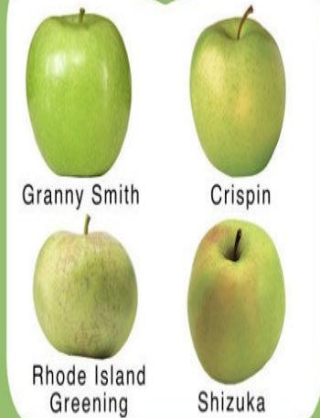
**So, once again, what can you do with all of this data?**

# Types of Apples

## Red



## Green



## Yellow



Determine which Foreman is right for a very specific project/Architect/GC, etc..

Issue Count	# of Projects	Severity 2-5 count	% per Project	Rank
Foreman A	4	36	9.09%	1
Foreman B	4	63	15.91%	2

Issue Cost	# of Projects	Severity 2-5 cost	% per Project	Rank
Foreman A	4	\$102,600.00	8.21%	1
Foreman B	4	\$209,700.00	16.79%	2

Repeated Count	# of Projects	Repeated Count	% per Project	Rank
Foreman B	4	1	2.50%	1
Foreman A	4	9	22.50%	2

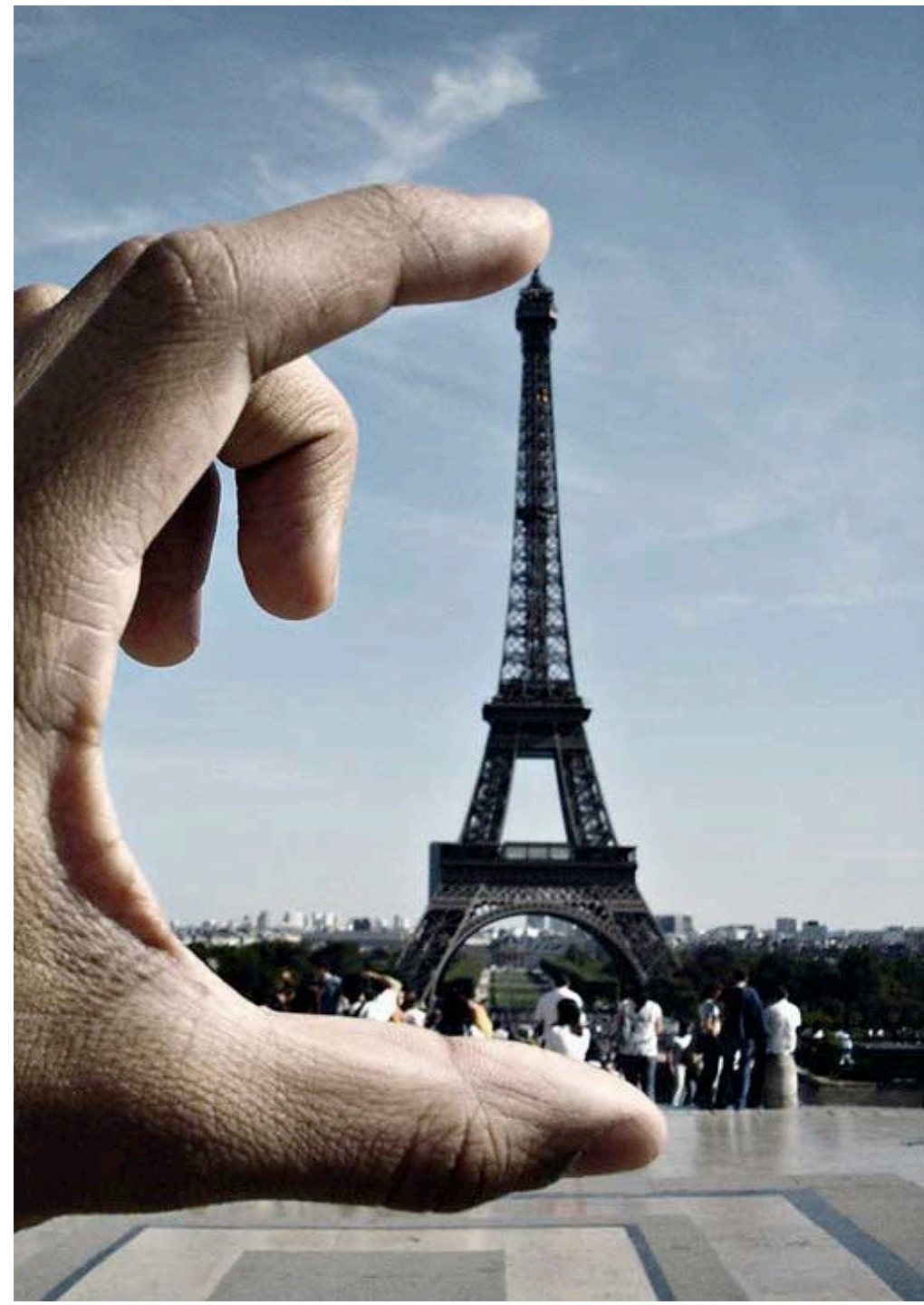
Repeated COST	# of Projects	Repeated COST	% per Project	Rank
Foreman A	4	\$900.00	3.57%	1
Foreman B	4	\$5,400.00	21.43%	2



**Problems/ concerns  
might initially  
appear very large in  
the beginning of the  
conversation...**

**At the end of the  
meeting, the  
concerns are  
typically small and  
manageable**

**Its all about  
perspective and  
openness to  
conversation...**





# THANK YOU

**Corey S Zussman**

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"I'm here about the details."



**abaa 2026** building  
enclosure  
conference