

22ND ANNUAL



22ND LCI CONGRESS
OCTOBER 19-23

Transforming Chicago's Iconic Skyscraper with Design Assist Procurement – PANEL Discussion

THE ABC'S OF LEAN: TRANSFORMATION THROUGH ACTIONS, BEST PRACTICES AND COACHING

October 21, 2020



Lynda Leigh – Turner
Project Executive



Brad Benhart – Purdue University
Panel Facilitator



Nick Casaletto – Clayco
Senior Associate,
Enclosure Quality Manager



Seth Madole – Viracon
Director of Sales



Andrew Wright – Glass Solutions
Senior Project Manager

Turner / **CLAYCO**



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Outline



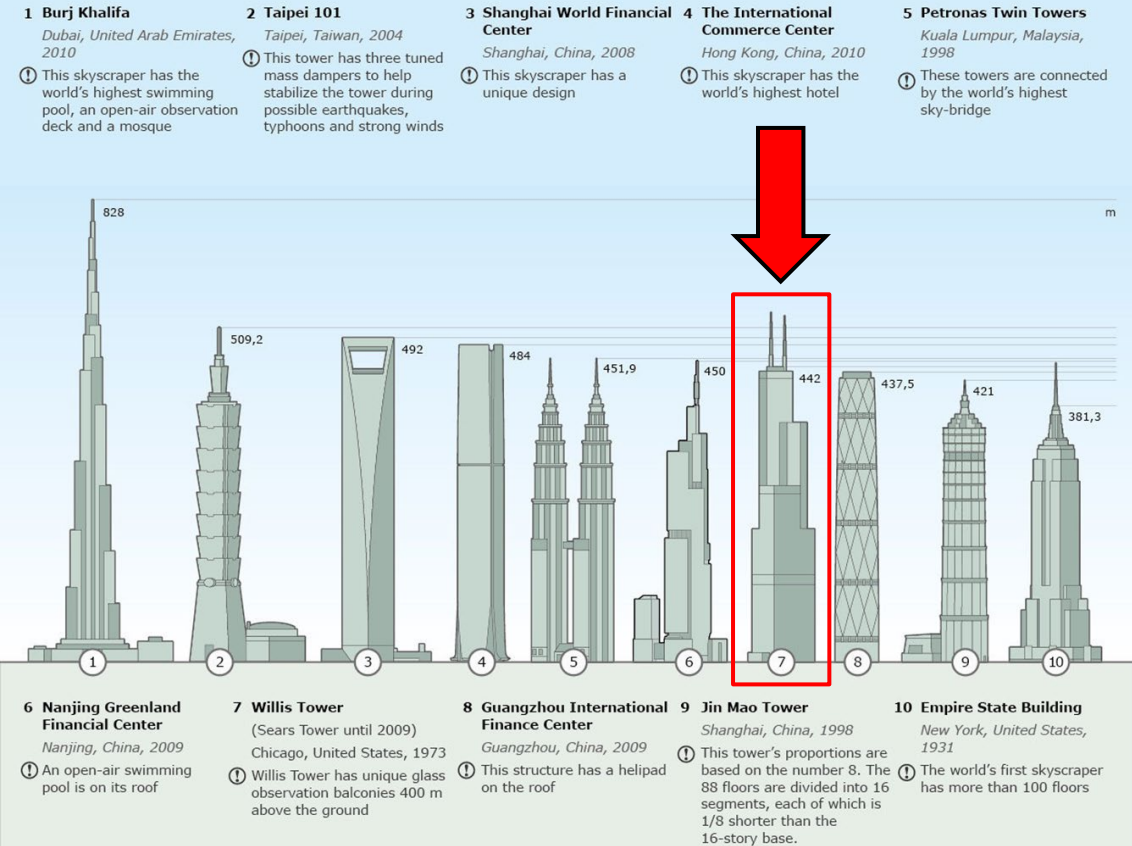
- Project History
- Budgeting Collaboration
- Site Logistics
- Design Assist & Value Engineering
- Material Procurement
- Manufacturing / Fabrication
- Installation of Work

History of the Willis (Sears) Tower

- 1970-73 original construction
- 110 stories, 4.4million sf office space
- 100 elevators
- 15,000-25,000 daily tenants
- Renamed in 2009 to Willis Tower as part of a building acquisition deal



The world's 10 tallest buildings



Willis Tower Now

- Skydeck on the 103rd floor; Ledge attraction brings over 1.7million visitors yearly
- 200,000 daily commuters circulating around jobsite
- Keeping existing building operational

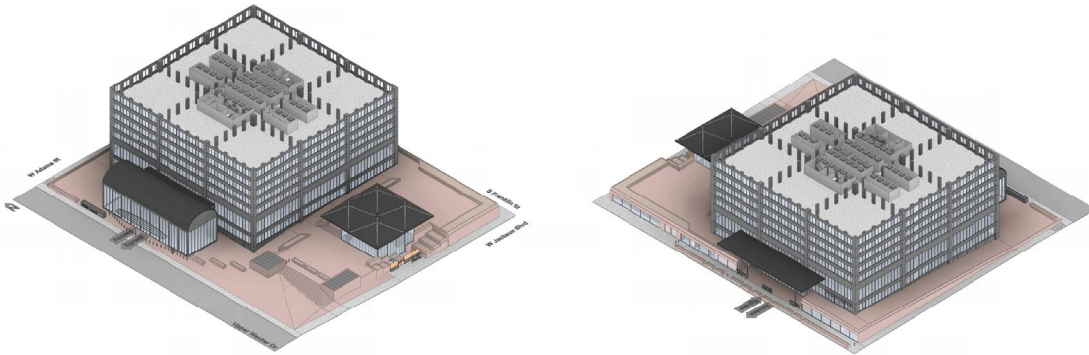


Repositioning Project

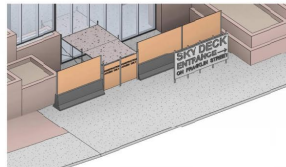


Repositioning Project

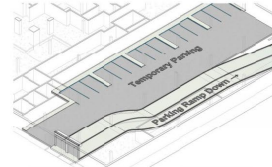
- Adaptive (and sometimes ephemeral) phasing



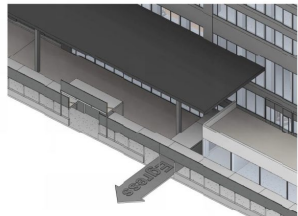
Field office 2nd floor Southeast corner



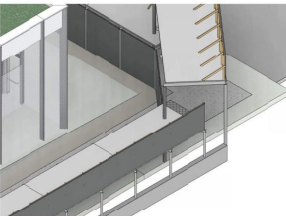
SkyDeck entrance relocation & signage



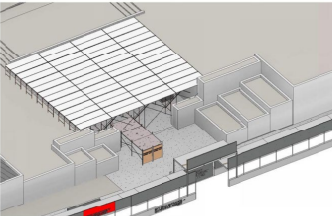
Temporary Parking Lower Level 1



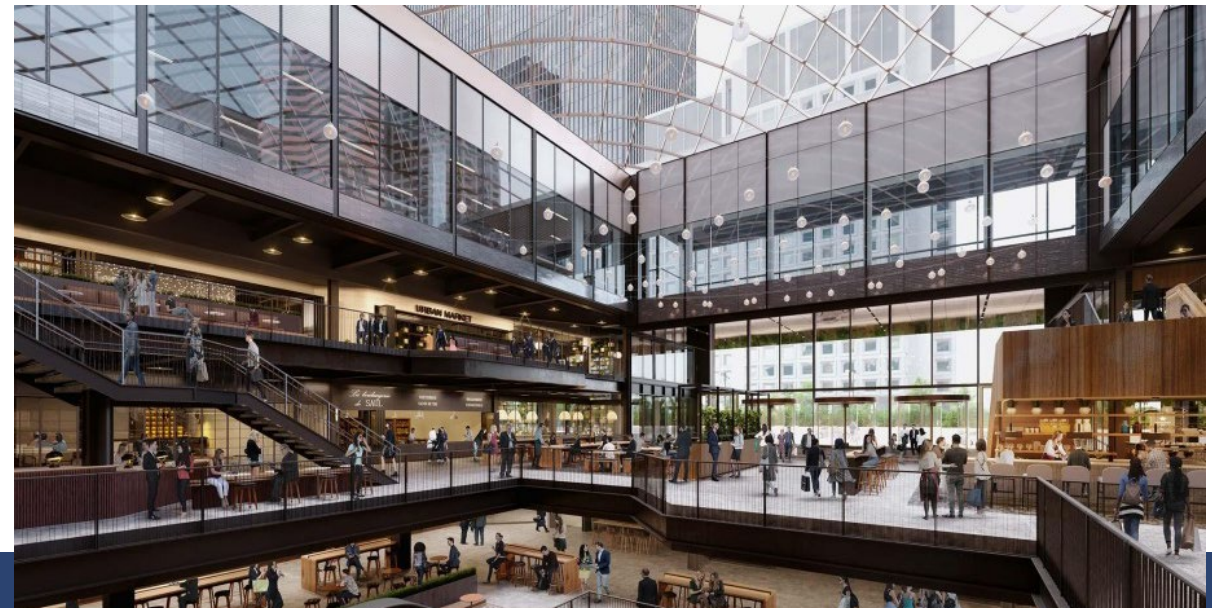
ADA compliant egress on Franklin



Maintain access for ComEd on Adams

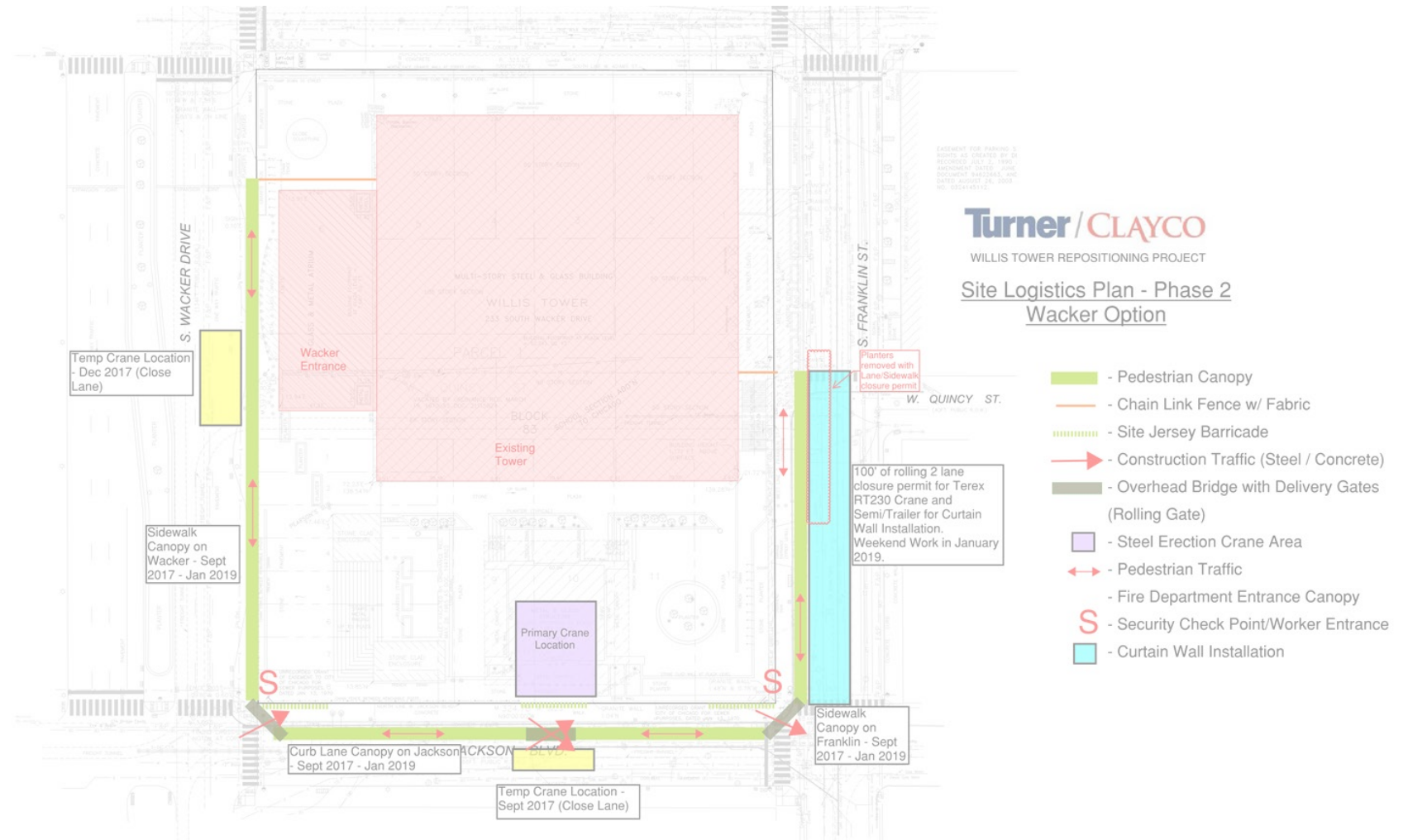


Demolition and weather proof covering



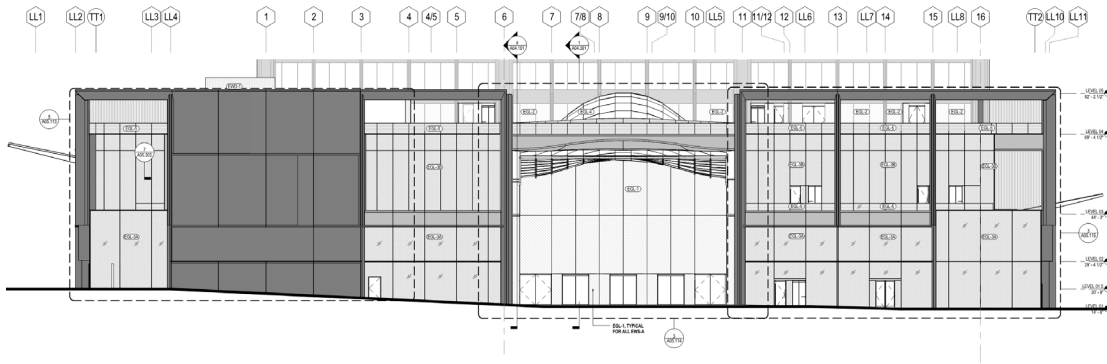
Site Logistics

- Perimeter Access
- Pedestrian Management
- Overhead Canopies
- Phasing
- Curtain Wall Activities

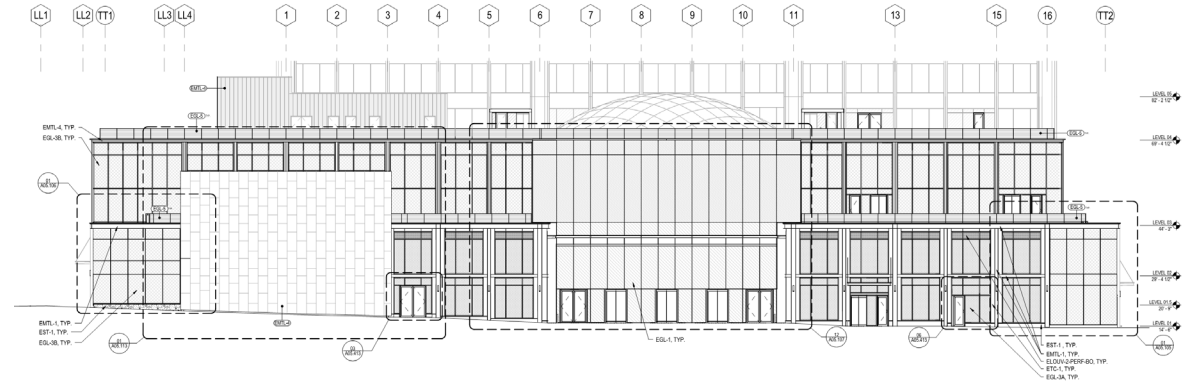


Budget Collaboration

ORIGINAL BUDGET = \$22M
SCHEMATIC DESIGN PRICE =
\$34.5M



ORIGINAL BUDGET = \$22M
SCHEMATIC DESIGN PRICE = \$21.9M
FINAL CONTRACT PRICE = \$22.2M



Design-Assist Collaboration

1. Weekly Meetings
2. All Parties Present
3. Specific Agenda ea. Week
4. Task Lists
5. Use Champions for Tasks
6. Make Decisions



Willis Tower Repositioning Design Assist Matrix

Mtg #	Date	Topics							
1	10/3/2017	Walk through Gensler/TT bulletin issued on 10/2/17	Discuss Wacker/Franklin typical Punched Openings System Size	Discuss Wacker/Franklin typical Curtain Wall System Size	Review Potential Cost Impacts of Bulletin and Update VE Matrix	Discuss Glass Types and Metal Finishes	Discuss Visual Mock-Up's and Performance Mock-Up's		
2	10/10/2017	Review GSI Comments of 10/02/17 bulletin	Discuss upcoming release of Corner 4-SSG façade.	Review VE Matrix Options	Review Slab edge location / face of glass	Discuss Performance Criteria of exterior façade			
3	10/17/2017	Submit Wacker/Franklin typical Punched Openings Profile Dwgs	Discuss vestibules in typical Franklin/Wacker CW	Review Corner 4-SSG Façade Bulletin	Review VE Matrix Options	Discuss louvers and perforated panels	Review transition details of PO's (membrane and thermal)	Discuss Glass Types and Metal Finishes	
4	10/24/2017	Review GSI comments of Corner 4-SSG Façade Bulletin	Review of Wacker/Franklin typical Punched Openings Profile Dwgs	Submit Wacker/Franklin typical Curtain Wall Profile Drawings	Finalize Slab edge location / face of glass	Review VE Matrix Options	Review Performance requirements for the exterior façade.	Final Decision on Visual Mock-Up's and Performance Mock-Up's	
5	10/31/2017	Submit Corner 4-SSG Profile Dwgs	Review VE Matrix Options	Discuss louvers and cost impacts of perforated panels	Review transition details of PO's (membrane and thermal)	Finalize Glass Types and Metal Finishes	Submit Wacker/Franklin typical PO Profile Dwgs for Approval	Review of Wacker/Franklin typical Curtain Wall Profile Drawings	Discuss vestibules in typical Franklin/Wacker CW
6	11/7/2017	Review VE Matrix Options	Review Comments on 4-Corner 4-SSG Profile Dwgs	Discuss Entrances (Franklin, Jackson, Wacker and Adams)	Discuss levels 1.5 & 4 Handrail Detail	Receive Approval of Wacker/Franklin typical PO Profile Dwgs	Submit Wacker/Franklin typical Curtain Wall Profile Drawings		
7	11/14/2017	Discuss louvers and cost impacts of perforated panels	Finalize transition details of PO's (membrane and thermal)	Submit 4-SSG Corner Profile Dwgs for Approval	Receive Approval of Wacker/Franklin typical CW Profile Drawings	Make final selection of VE Options for Main Walls	Review Gensler Sketches of \ Entrances		
8	11/21/2017	Discuss levels 1.5 & 4 Handrail Detail	Discuss intent of canopies over entrances	Review Doors & Hardware at Entrances and Typ Walls	4-SSG Corner Profile Dwgs Approved				
9	11/28/2017	Submit Glass Types and Metal Finishes for Approval	Discuss Demising Wall Detail	Submit Entrance Profile Drawings for Review	Finalize Louvers and perforated panels				
10	12/5/2017	Submit Preliminary Details of canopies over entrances	Discuss modifications to existing façade at Wacker/Jackson	Submit Glass and Finish samples for Handrail	Define Hardware Intent at Entrances	Review Entrance Profile Drawing Comments	Submit Louver Product Data and Spec Sheet		
11	12/12/2017	Receive Approval of Glass Types and Metal Finishes	Review Demising Wall Detail	Gensler to Provide Sketches of Wacker/Jackson Mods	Submit Entrance Profile Drawings for Approval				
12	12/19/2017	Receive Approval of Glass and Finish samples for Handrail	Finalize Details of canopies over entrances	Receive Approval of Entrance Profile Drawings	Review modifications to existing façade at Wacker/Jackson				



Material Procurement

- Unloading times
- Safety
- Waste
- Flexibility



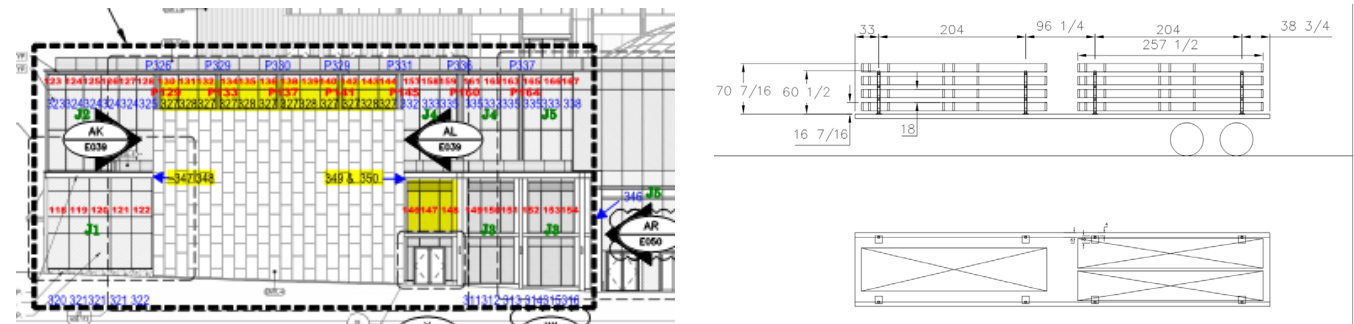
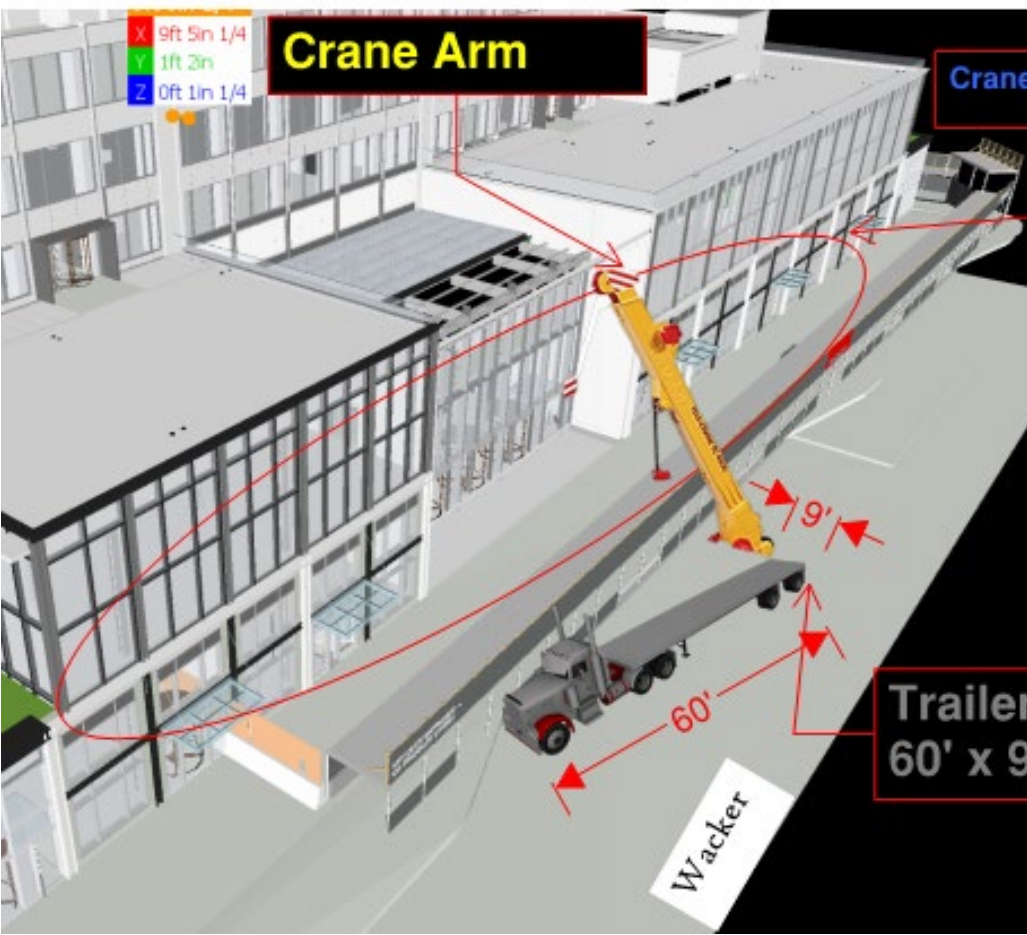
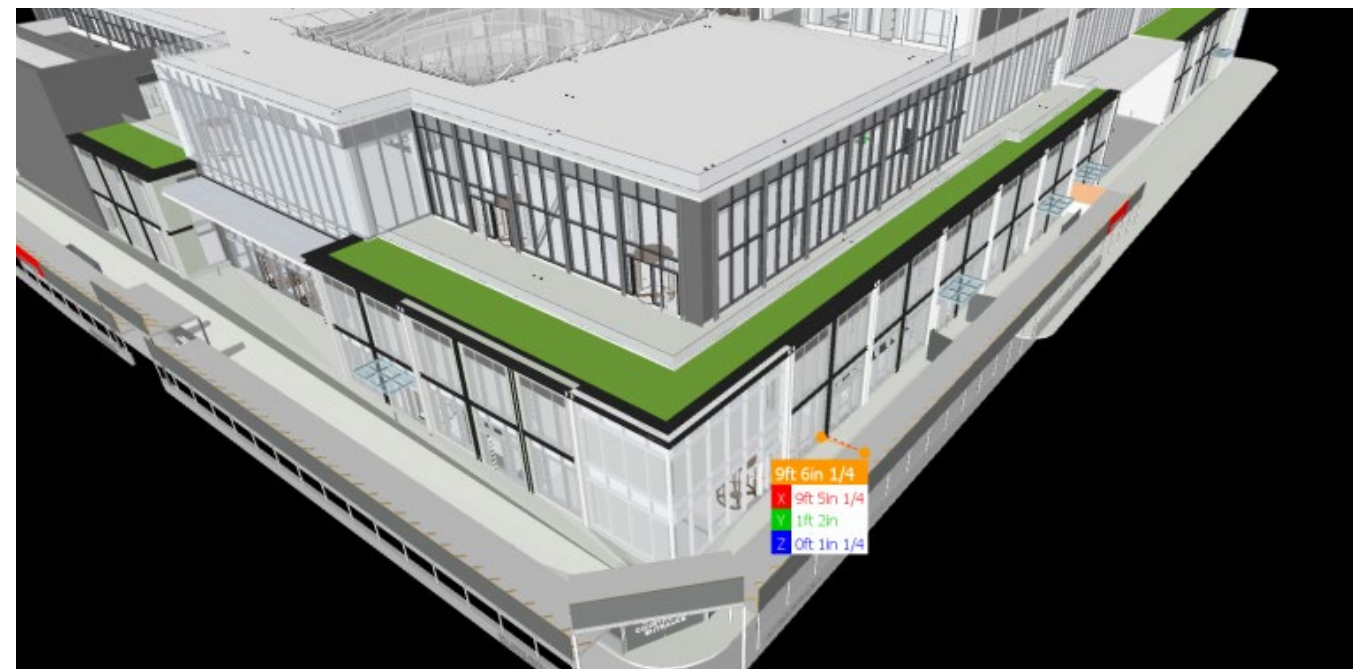
Visual Mock-ups



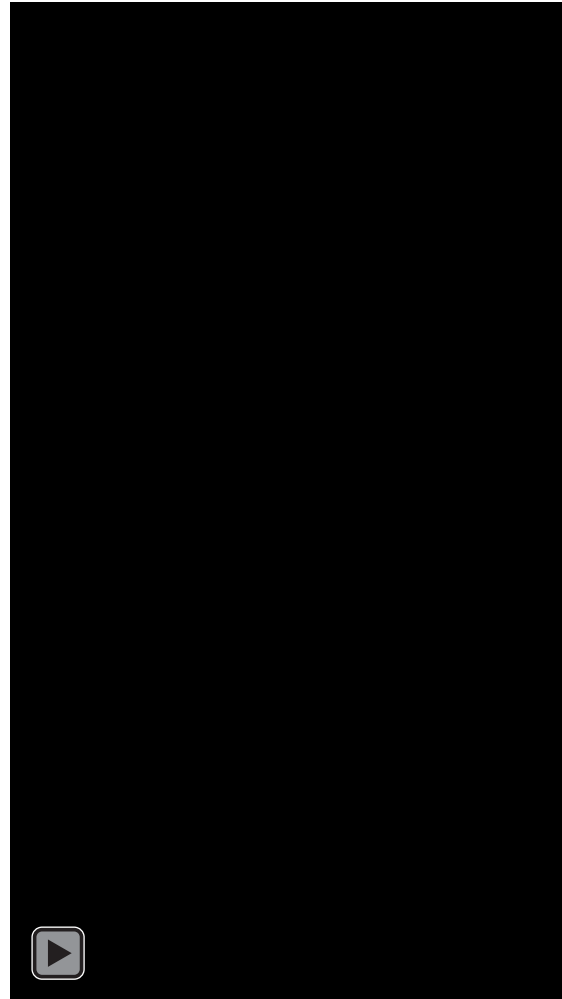
Manufacturing



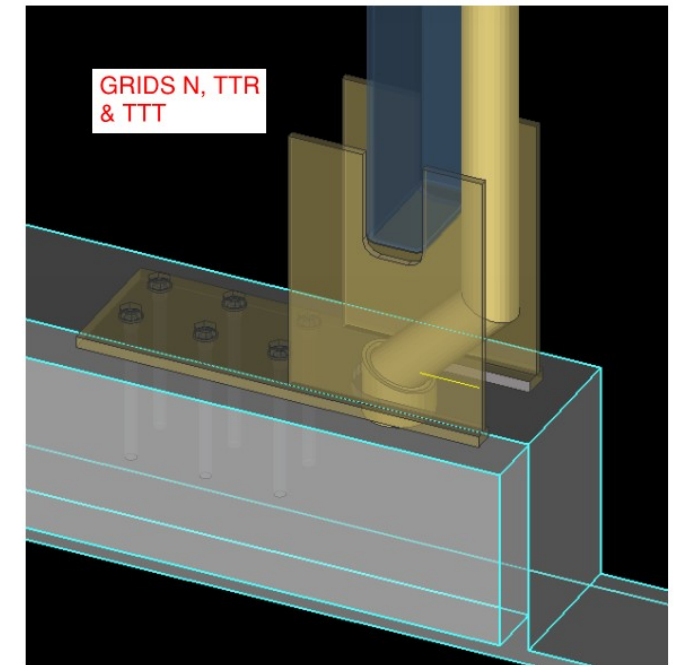
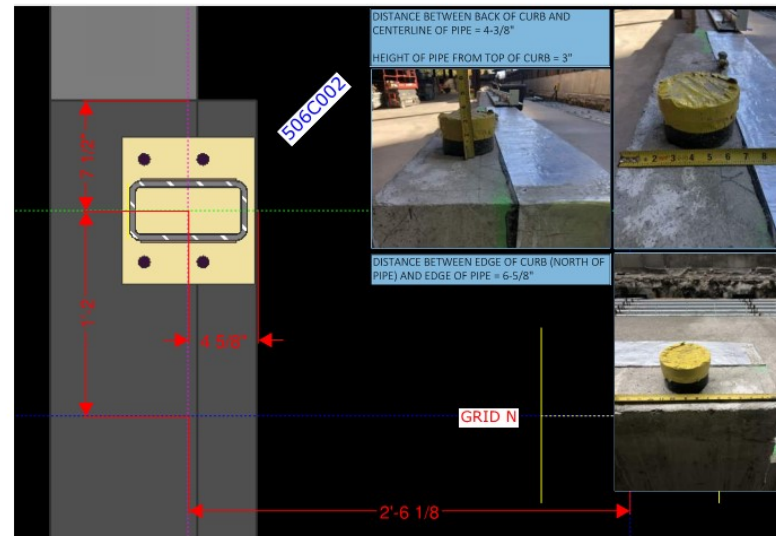
Material Installation



Material Installation



Quality Control = Boots in the Field



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Diagram illustrating the assembly of a window frame, showing the relationship between the frame, glass, and surrounding structure.

BELLWETHER AXON DETAIL

Technical drawing showing a cross-section of a window frame assembly. Key dimensions and labels include: 2" DIA. DOWNSPOUT INVERT 5-3/8" FROM TOP EDGE OF STEEL PLATE, CENTERLINE OF DOWNSPOUT INVERT 2-1/8" FROM SIDE EDGE OF STEEL PLATE, MINIMUM 1/4" GAP, and MINIMUM 1/4" GAP.

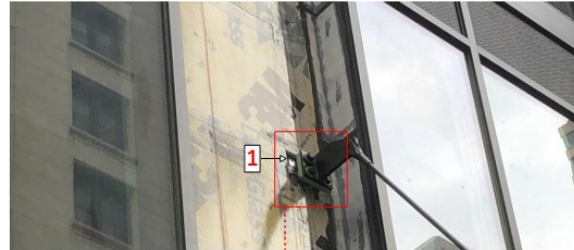
ZALK SHOP DRAWING

Technical drawing showing a plan view of a window frame assembly. Key dimensions and labels include: 1-1/2", 3/4", 1/2", 1/4", 1/8", 1/16", 1/32", 1/64", 1/128", 1/256", 1/512", 1/1024", 1/2048", 1/4096", 1/8192", 1/16384", 1/32768", 1/65536", 1/131072", 1/262144", 1/524288", 1/1048576", 1/2097152", 1/4194304", 1/8388608", 1/16777216", 1/33554432", 1/67108864", 1/134217728", 1/268435456", 1/536870912", 1/1073741824", 1/2147483648", 1/4294967296", 1/8589934592", 1/17179869184", 1/34359738368", 1/68719476736", 1/137438953472", 1/274877906944", 1/549755813888", 1/1099511627776", 1/2199023255552", 1/4398046511104", 1/8796093022208", 1/17592186044416", 1/35184372088832", 1/70368744177664", 1/140737488355328", 1/281474976710656", 1/562949953421312", 1/1125899906842624", 1/2251799813685248", 1/4503599627370496", 1/9007199254740992", 1/18014398509481984", 1/36028797018963968", 1/72057594037927936", 1/144115188075855872", 1/288230376151711744", 1/576460752303423488", 1/1152921504606846976", 1/2305843009213693952", 1/4611686018427387904", 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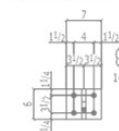
Quality Control = Boots in the Field



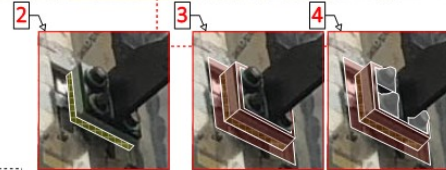
THIS PROPOSED SOLUTION CAME FROM SITE DISCUSSIONS WITH GENSLER/TTTF/TCV ON FACADE FIELD WALK 5/28/19, AND WILL BE IMPLEMENTED IN ONE LOCATION FOR AN IN-PLACE FINAL REVIEW



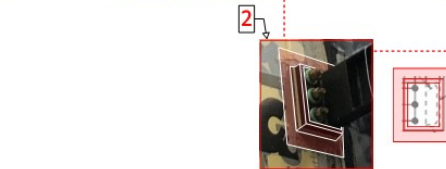
SITE PHOTO 5/28/19



ZALK SHOP DRAWING DETAIL



SITE PHOTO 5/28/19



STEP 1 - REINSTALL ANY SHEATHING AND 3M 3015 WEATHER BARRIER THAT WAS REMOVED IN ORDER TO MAKE THE BOLTED CONNECTIONS **(APPLIES TO UPPER AND LOWER LOCATIONS)**. INSTALL 3M 3015 WEATHER BARRIER UP TO PERIMETER OF CONNECTION PLATES

STEP 2 - UPPER: INSTALL SEMI-RIGID INSULATION BETWEEN SHEATHING AND BACKSIDE OF CONNECTION PLATE TO SUPPORT 3M 3015 WEATHER BARRIER BETWEEN CONTACT SURFACES

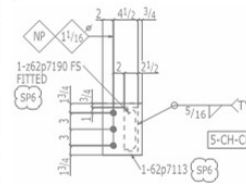
STEP 3 - UPPER: INSTALL 3M 3015 WEATHER BARRIER UP THE SIDES OF THE CONNECTION AND ONTO THE FACE OF THE PLATE 3/4", STOPPING SHORT OF THE BOLTS AND PROJECTING KNIFE PLATE

STEP 4 - UPPER: INSTALL SEALANT AND 3M WALL FLASHING MEMBRANE AROUND BOLT HEADS / NUTS; EXCESS BOLT THREADS WILL BE CUT FLUSH PRIOR TO INSTALLATION. START INSTALL FROM BOTTOM BOLT LOCATION SO ANY FLASHING MEMBRANE OVERLAP WILL BE SHINGLED



STEP 2 - LOWER: INSTALL 3M 3015 WEATHER BARRIER UP THE SIDES OF THE CONNECTION AND ONTO THE FACE OF THE PLATE 3/4", STOPPING SHORT OF THE BOLTS AND PROJECTING BEAM

STEP 3 - LOWER: INSTALL SEALANT AND 3M WALL FLASHING MEMBRANE AROUND BOLT HEADS / NUTS; EXCESS BOLT THREADS WILL BE CUT FLUSH PRIOR TO INSTALLATION. START INSTALL FROM BOTTOM BOLT LOCATION SO ANY FLASHING MEMBRANE OVERLAP WILL BE SHINGLED

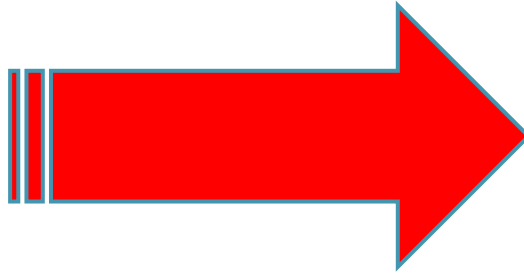


ZALK SHOP DRAWING DETAIL

Quality Control = Boots in the Field



How much time was shifted from the field to the shop?



If you could go back,
what would you do
differently?



Things to Remember

- Simplify, Simplify, Simplify
- Wholistic Collaboration
- Know Your Role
- Boots in the Field





22ND LCI CONGRESS
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Lynda Leigh – Turner
Project Executive



Brad Benhart – Purdue University
Panel Facilitator



Nick Casaletto – Clayco
Senior Associate,
Enclosure Quality Manager



Seth Madole – Viracon
Director of Sales



Andrew Wright – Glass Solutions
Senior Project Manager



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Thank you for attending this presentation. Enjoy the rest of the 22nd Annual LCI Congress!