2025 PARTNER EXCHANGE
35th Anniversary

Reduce Risk in the Field: A Key to Success in Mechanical Contracting

2025 Strategic Partner Exchange

May 2025

WAVES of INNOVATION
TOGETHER WE RISE

TRANE

Special Thanks to our Sponsors:

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Waves of Innovation

Chad Salge - Vice President
Virtual Design and Engineering

BRANDT®
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Rick Dustin - Vice President
Engineering Solutions Group

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Building A Higher Standard

What are YOUR risks and how do YOU mitigate them?

slido

- Scan QR code on left with your smartphone or tablet.
- You will be prompted to answer a question at a time.
- Q&A will also be available within the Slido throughout this session.
- We will address questions at end of presentation.

Agenda

I. Problem Statement and Session Goals

II. Understanding Contract Documents

III. BIM Coordination / Fabrication

IV. Field Productivity & Planning

V. Multi-trade Assemblies

VI. Field Training

VII. Questions

Problem Statement

- As contractors, **our biggest risk is labor in the field.**
- Scopes are getting larger and schedules are getting more and more compressed.
- Clients are expecting us to do more with less time on site.
- **How do we reduce our risk to ensure our success?**

Goals for This Session

- Walk away with tangible takeaways to address and control your risks on upcoming projects.
- Understand how fellow contractors are approaching these risks.
- Meet a few peers that can share what they are doing to address this opportunity.

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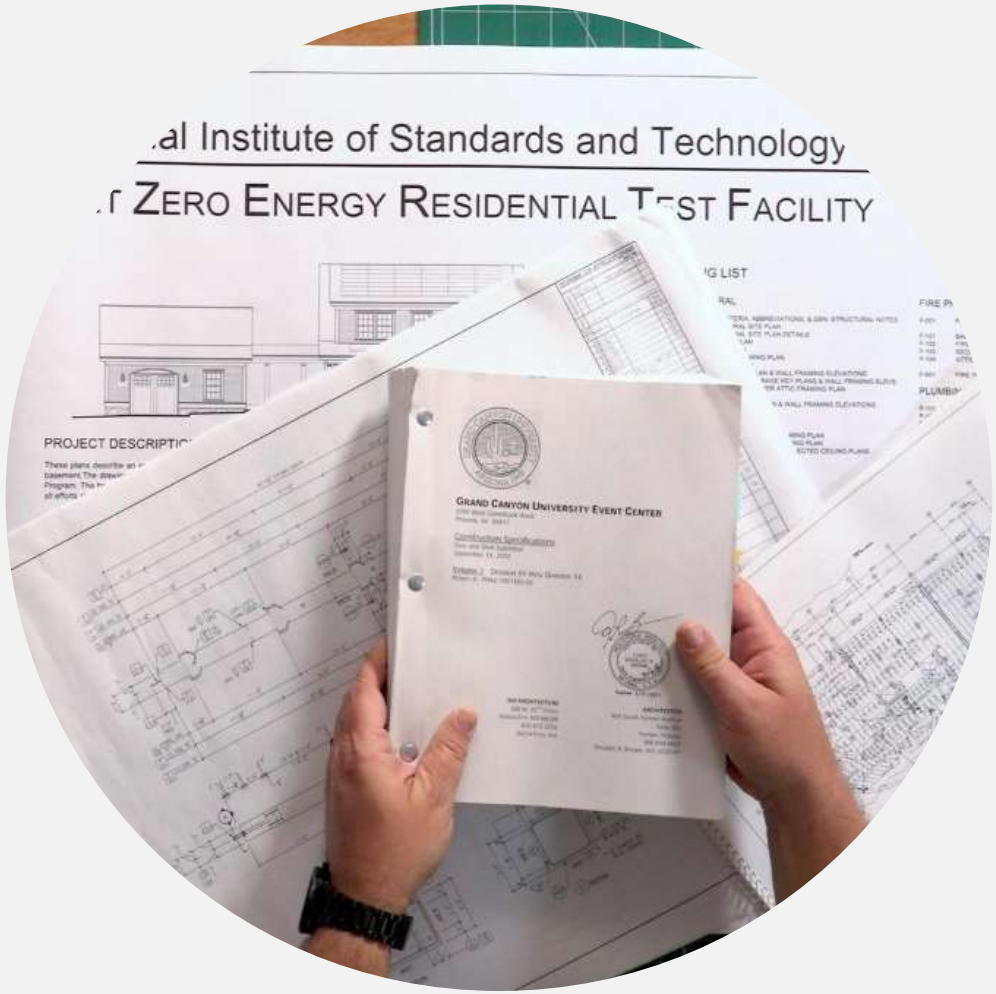
Understanding Contract Documents
(Project Specific Drawings and Specifications)

Contract Documents

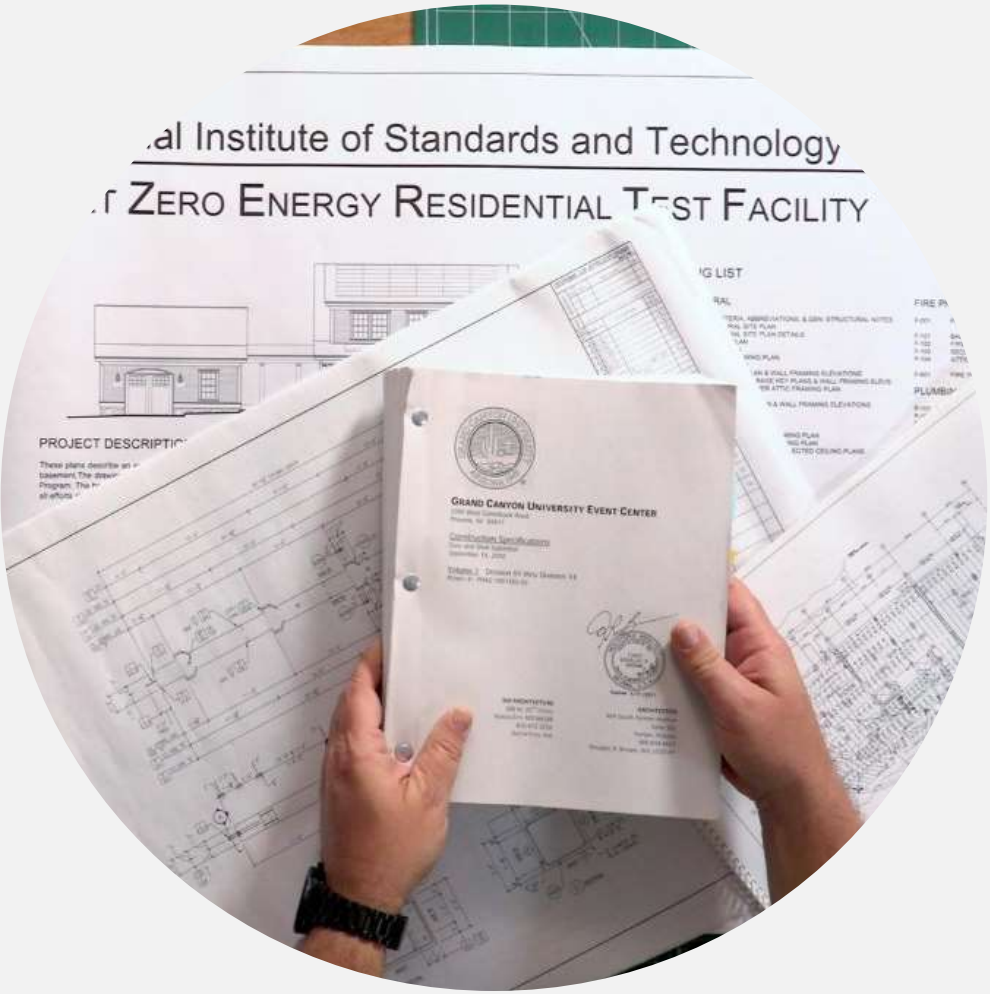
- *Contract Documents:*
  - *Define the cardinal scope of the project*
  - *Comprised of drawings and specifications.*
- *Typical Workflow:*
  - *Contract drawings converted into shop drawings by an installing contractor*
  - *Shop Drawings reviewed by the Engineer of Record.*



Contract Documents

- *People are drawn to contract drawings to understand scope since they are diagrammatic in nature.*

- *Contract specifications tend to get neglected since the traditional form of delivery is a 1000-page book.*

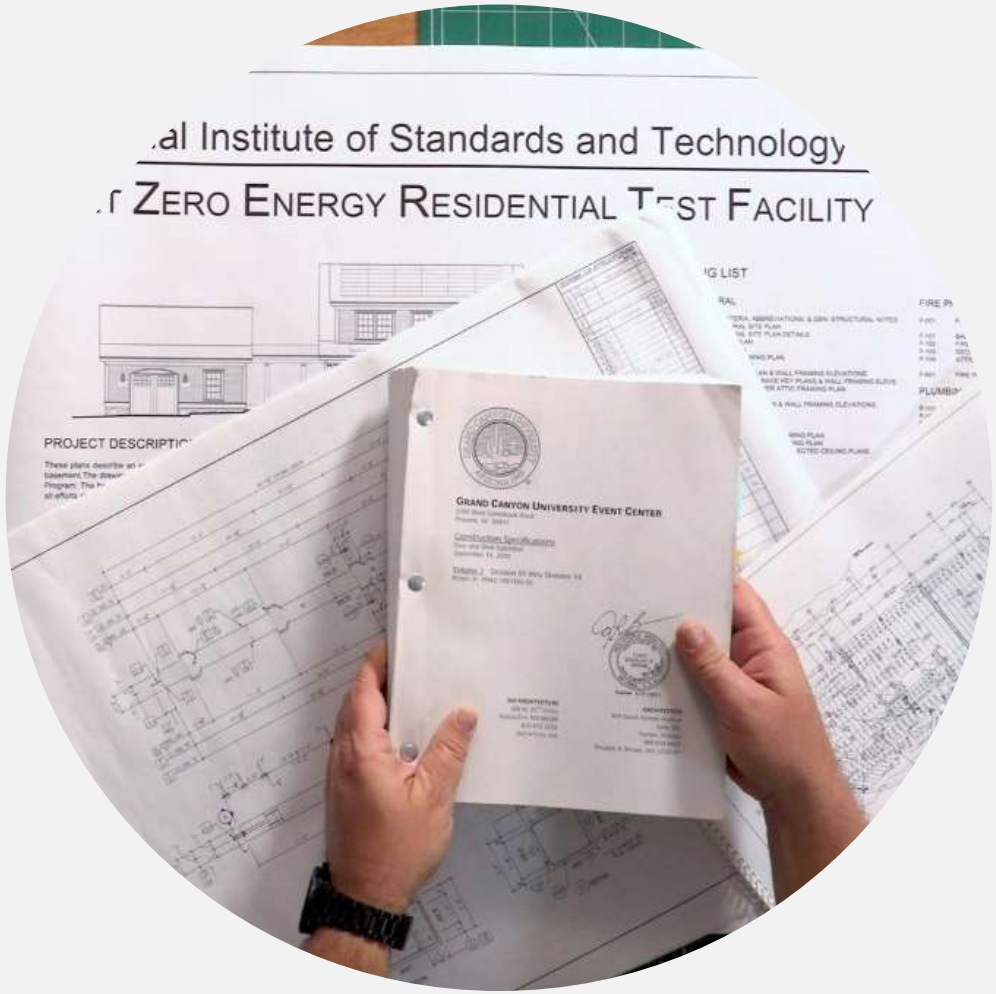


Specifications

- *A written document describing in detail the scope of work, materials to be used, methods of installation, and quality of workmanship for a parcel of work to be placed* ***<u>under contract</u>****; usually utilized in conjunction with working (contract) drawings in building construction.*

  ** Dictionary of Architecture and Construction

- **FOUNDATION FOR SUCCESS OR FAILURE**



Specifications of Today

- Fill Gaps in Design
- Shifts Liability

A. General:

1. Industry Practices: Install pipe, tube, and fittings in accordance with recognized industry practices which will achieve permanently leak-proof piping systems, capable of performing each indicated service without failure or degradation of service. Install each run with a minimum of joints and couplings, but with adequate and accessible unions or flanged

3. Expansion and Contraction: Install loops, offsets, sizing joints, and expansion joints, as necessary, to avoid strain resulting from expansion and contraction of piping systems on fixtures and equipment. Provide three (3) Victaulic grooved connections required by the application to

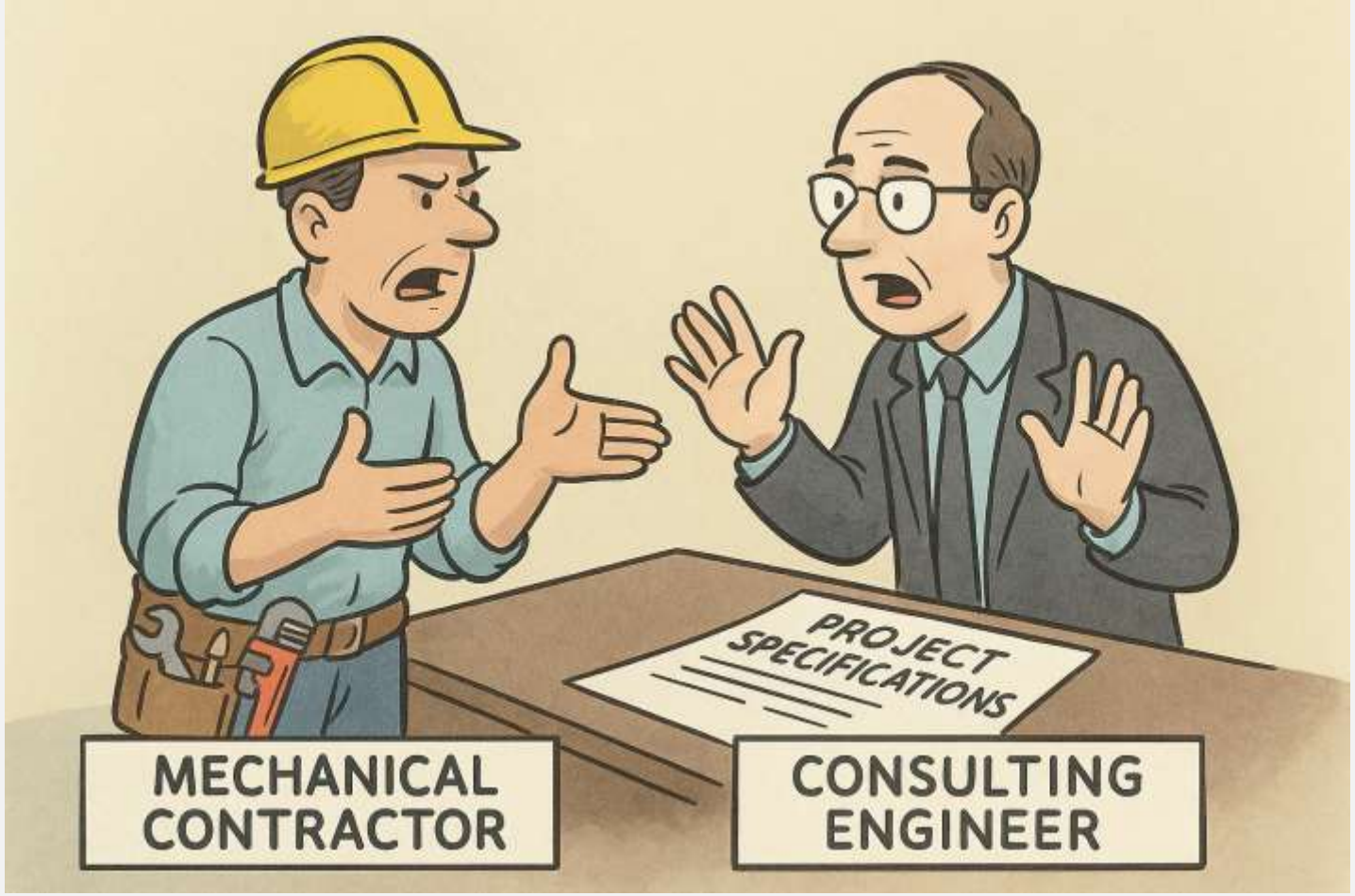
hangers. Provide fittings at changes in direction. Piping in finished areas shall be concealed, except in mechanical rooms. Where pipes of different sizes join, provide reducing elbows, tees, or couplings. Bushings will not be acceptable.

3. Expansion and Contraction: Install loops, offsets, sizing joints, and expansion joints, as necessary, to avoid strain resulting from expansion and contraction of piping systems on fixtures and equipment. Provide three (3) Victaulic grooved connections required by the application to

HVAC PIPING 06/08/18 232113- 4

Specifications of Today

Platform for
“Trading” Costs.



Specifications of Today

Matrix Format (Material Standard)

- Place on contract drawings to condense spec book
- Provide expedited understanding of materials and methods of installation.

SAMPLE JOB | VERSION 1.0 | REV0

PVF MATERIAL STANDARDS

SYSTEM	U/G (BURIED)	A/G (HANGING)	QUALIFIER	ID	SIZE (INCH) MIN	SIZE (INCH) MAX	PIPE	FITTINGS	JOINT	INSULATION THICKNESS (SEE NOTE 0)	LETTERED NOTES (SEE KEY) DOMESTIC: NOT REQ'D	DOMESTIC: PIPE	DOMESTIC: FITTINGS	DOMESTIC: ORIGIN	BRANCHES: FITTINGS	BRANCHES: O-LETS	BRANCHES: SADDLES	BRANCHES: PULLED TEE	BRANCHES: PEX	WELDS/MTR: ASME B31.9	WELDS/MTR: ASME B31.3	WELDS/MTR: ASME B31.1	WELDS/MTR: SHOP WELD	WELDS/MTR: FIELD WELD	WELDS/MTR: INSPECT	WELDS/MTR: MTR REQ'D	Numbered Notes (See Key)
SANITARY DRAIN U/G STORM DRAIN U/G	X		DWV System	PVCDWV	1-1/4	16	PVC PIPE SCH40 (CHARLOTTE)	PVC SCH40 SOLVENT WELD (CHARLOTTE)	PVC SCH40 SOLVENT WELD COUPLING #100 DWV (CHARLOTTE)	NONE	X				X												10
CHILLED WATER CONDENSER WATER HEATING HOT WATER		X	NONE	(CUNRW) 2	1/4	2	CU PIPE TYPE L HARD STD PE (GENERIC)	COPPER WROT SOLDERED (NIBCO)	SOLDERED 600 DB CxC COUPLING (NIBCO)	CHW: ≤ 3" PIPE = 1-1/2" INS. (E2); ≥ 4" PIPE = 2" INS. (F1)	X				X												
					2-1/2	28	CS PIPE A53 ERW STD BLK BE (GENERIC)	CS STD WEIGHT BUTT WELD (GENERIC)	BUTT WELD (GENERIC)	CW: 1-1/2" INS. ALL PIPES (E2,E1); HHW: ≤ 1-1/4" PIPE = 1-1/2" INS. (E2); ≥ 1-1/2" PIPE = 2" INS. (F2,F1)	X				B	B		X			M	S			1
					28	48	CS PIPE API-5L SAWL STD BLK BE (GENERIC)																				
NATURAL GAS		X	NONE	(NGPG X BW) 2	1/2	2	CS PIPE A53 ERW STD BLK BE (GENERIC)	MEGAPRESS FITTINGS (VIEGA)	MEGAPRESS PXP COUPLING (VIEGA)	NONE	X				X												1, 12, 17
					2-1/2	10		CS STD WEIGHT BUTT WELD (GENERIC)	BUTT WELD (GENERIC)		X				X			X			M	S			1, 12
SANITARY WASTE & VENT STORM & OVERFLOW DRN GREASE WASTE & VENT		X	NONE	(NH) STD	2	4	NHCI PIPE (TYLER)	NHCI FITTINGS (TYLER)	NH COUPL, 2 BAND (TYLER)	HORIZONTAL STORM DRAIN ONLY GETS 1" INS. (D3)	X				X												7, 19, 20
					5	10			NH COUPL, 4 BAND (TYLER)																		
					12	15			NH COUPL, 6 BAND (TYLER)																		

Submittal Approval

Does an Approved Submittal alleviate Responsibility from Us?

- The verbiage in the submittal stamp has contractual implications.

☐ No Exception Taken
☐ Revise and Resubmit
☐ Make Corrections Noted
☐ Rejected
☐ Submitted Specified Item
☒ Submittal Receipt Acknowledged

Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject of the requirements of the plans and specification. Contractor is responsible for dimensions which shall be confirmed and correlated at the job site; fabricated process and techniques of construction; coordination of his work with that of all other trades and the satisfactory performance of his work.

X	Approved	Fabrication/installation may be undertaken. Approval does not authorize changes to the Contract Sum or Contract Time.
	Approved as noted	
	Revise and resubmit	Fabrication and/or installation MAY NOT be undertaken.
	Rejected	

Contract conditions place the responsibility for dimensions, coordination and compliance with Contract Documents on the Contractor.

By: RCG Date: 03/31/2017

BIM Coordination / Fabrication

Workflows

Workflows

- Utilizing "planning workflows" like BIM Coordination and Fabrication allow you to minimize risk at an early stage in the project lifecycle.
- If you have in-house design and BIM resources, it will allow you to model with a constructability mindset from the onset of design.
- This level of planning makes for robust scope development and a lesser chance for "gotchas" (risk) in the field.

Manage the Model in the Cloud

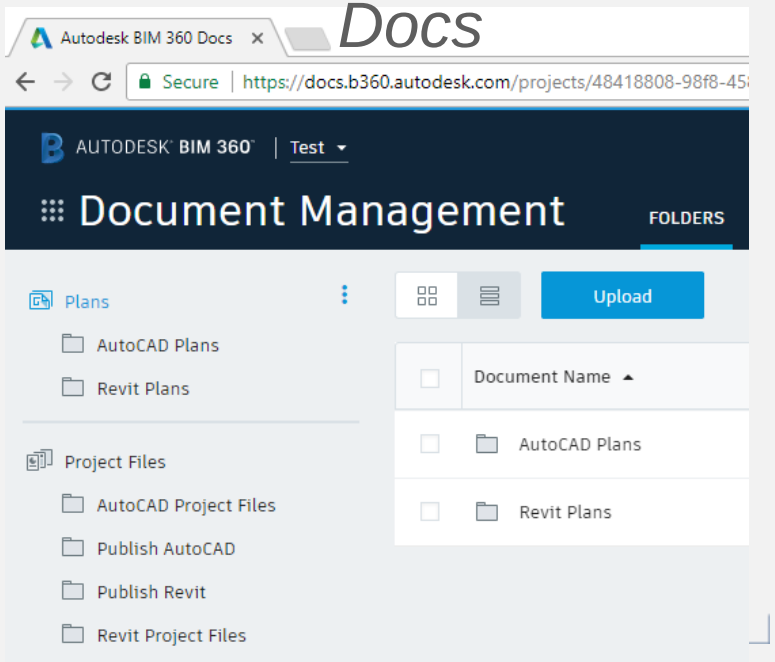
FABRICATION

STRATUS

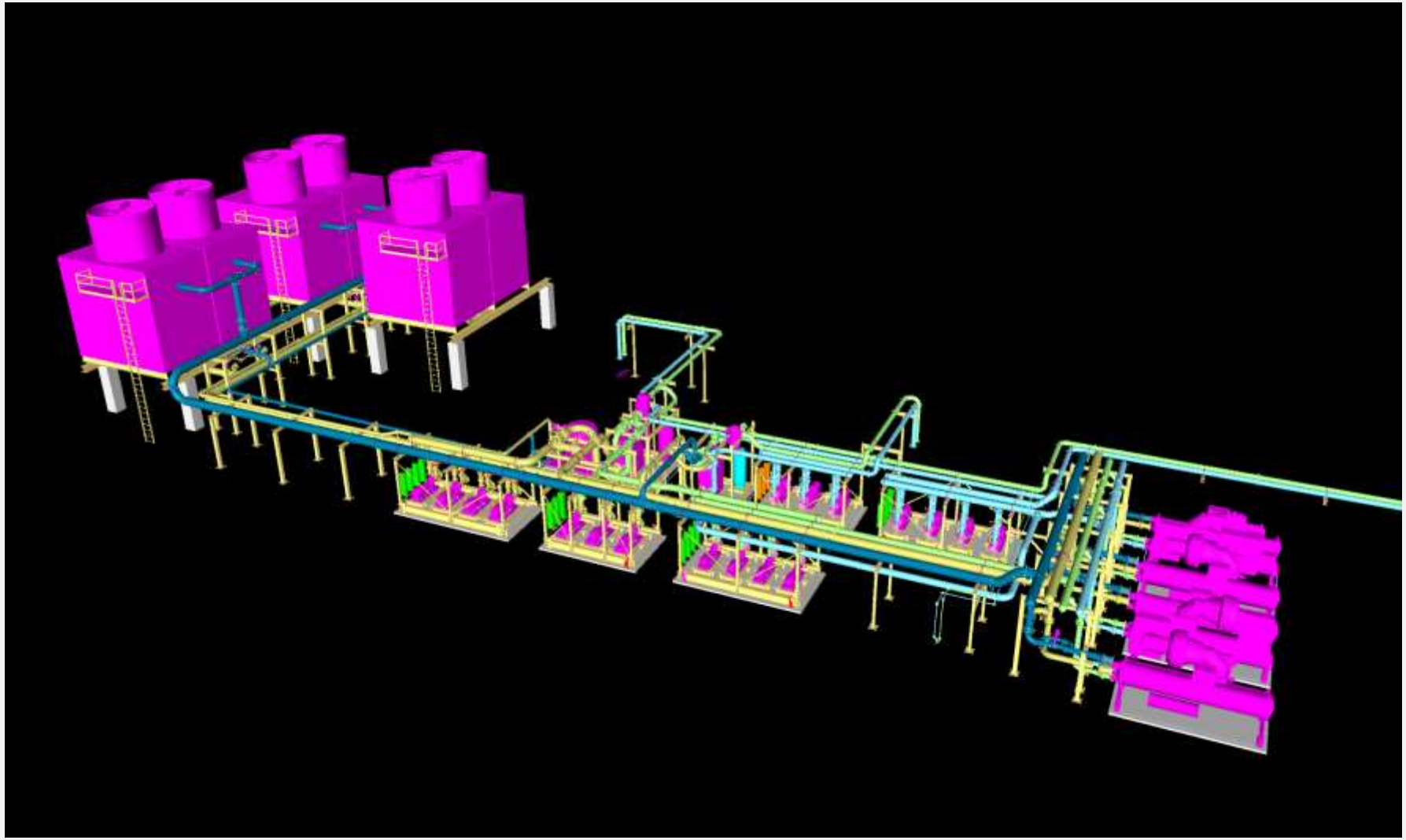
Bi-Directional

Shop Fabrication and Site Install

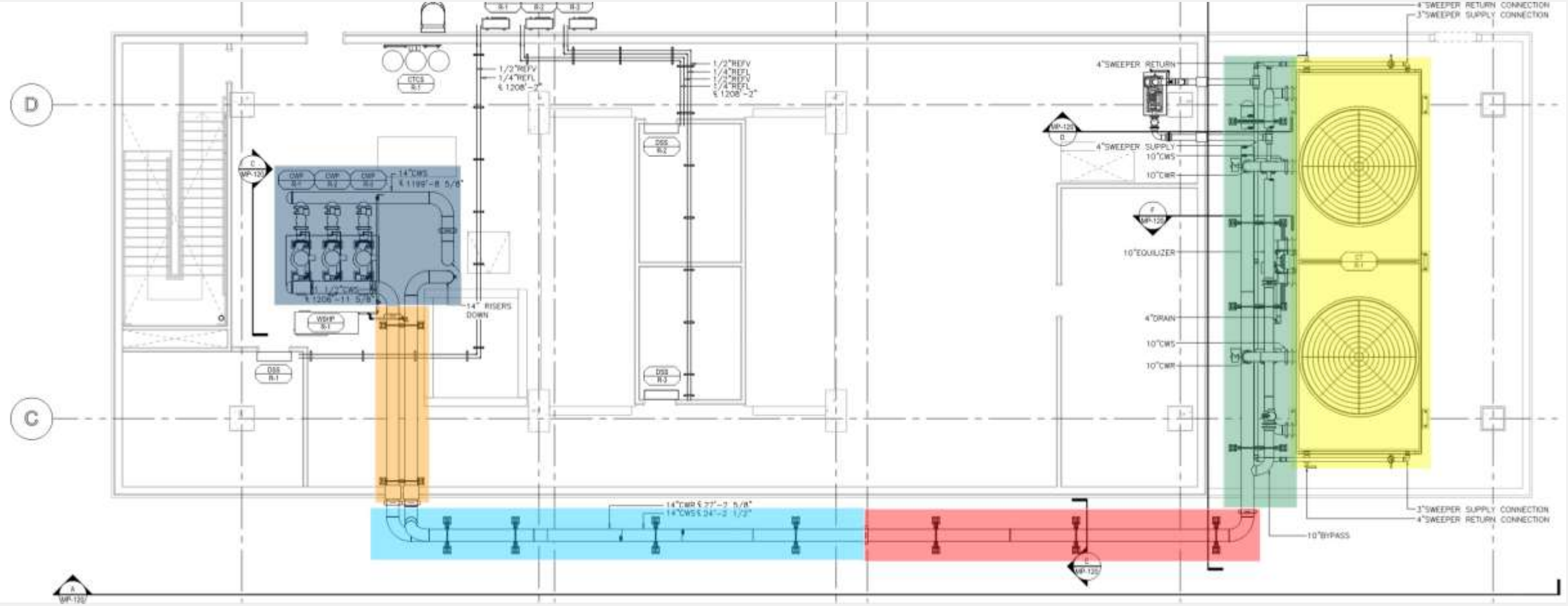
Models and Docs Shared Thru 360 Docs



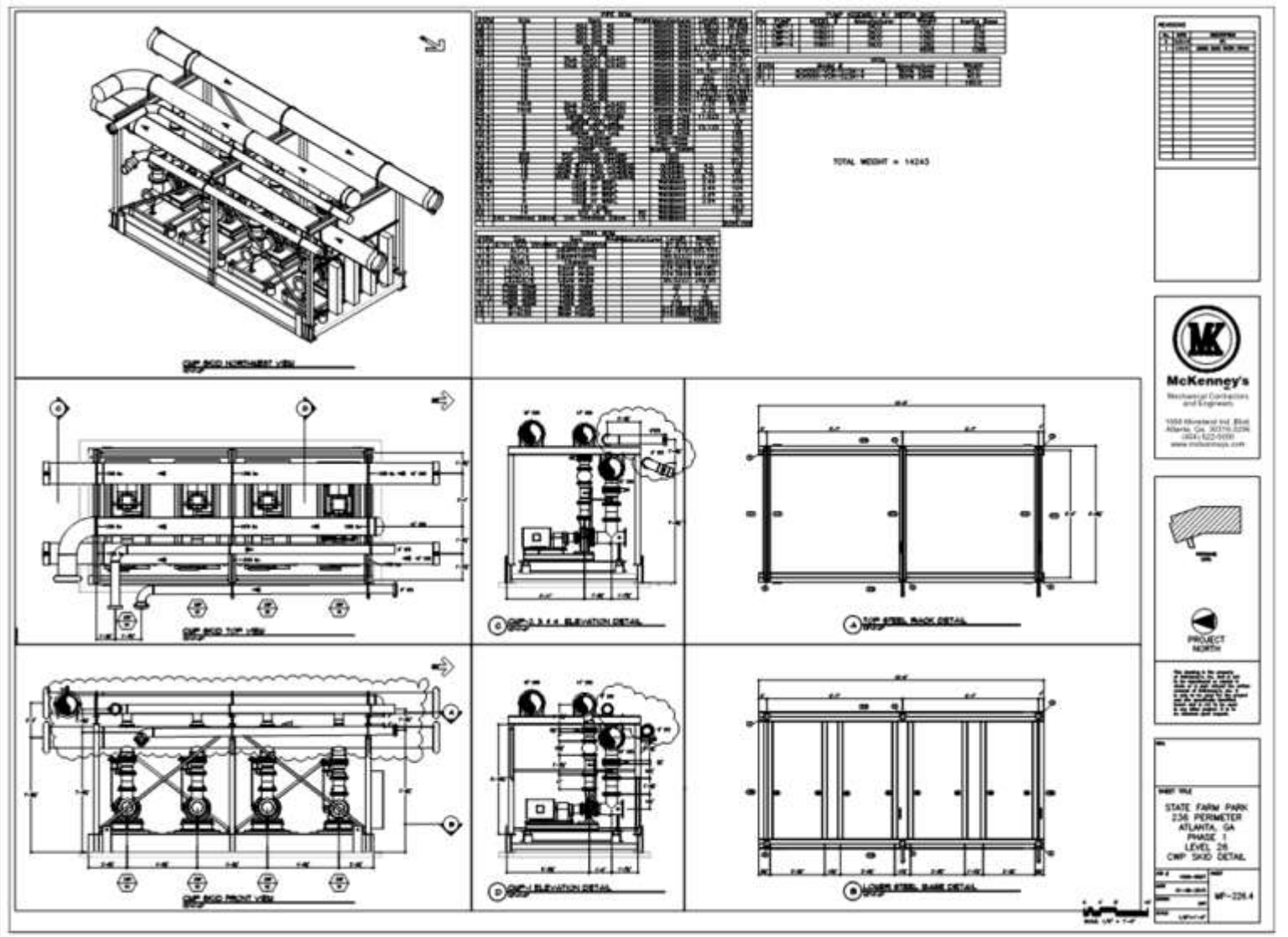
Design Rendering: Complete Penthouse Piping



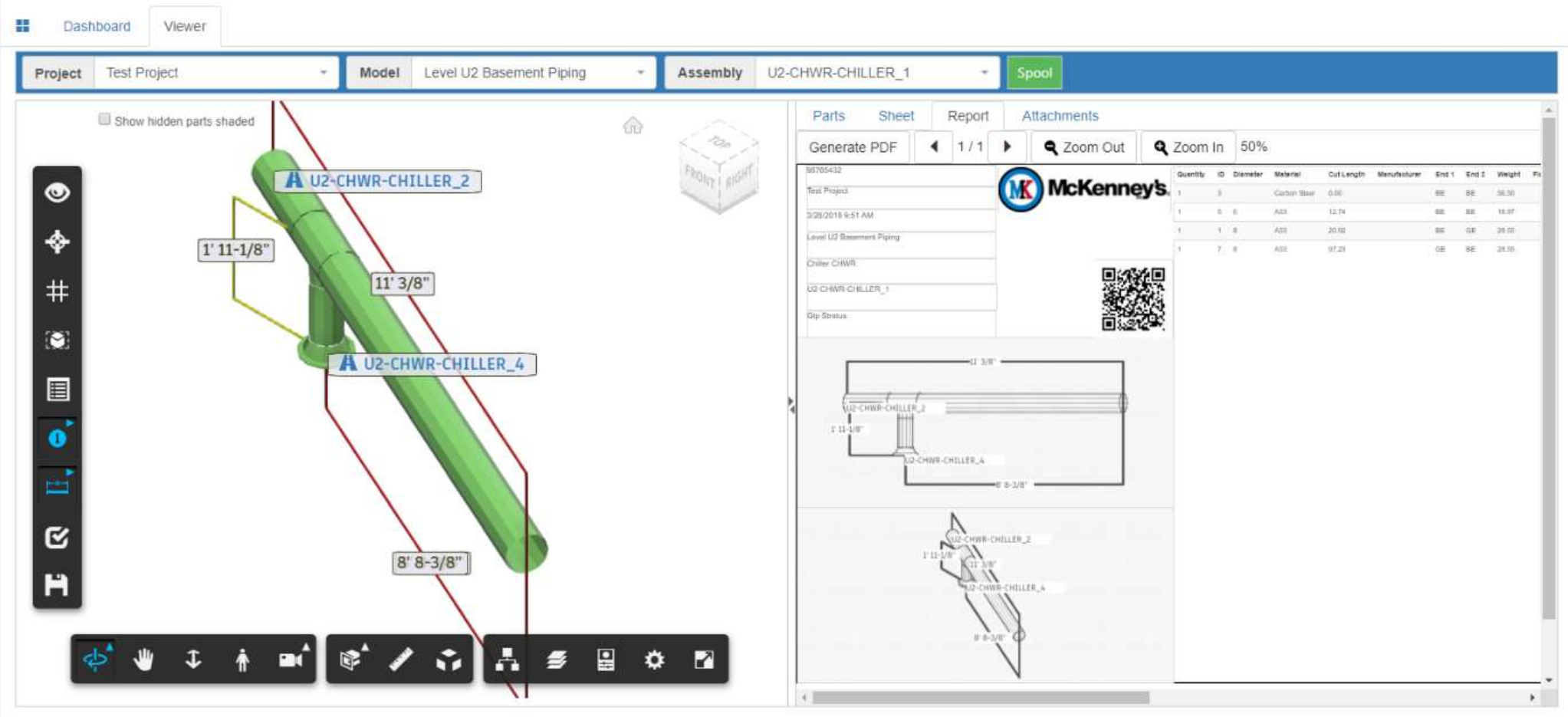
Real Life Example



Cooling Tower Rack



Spool View in Stratus



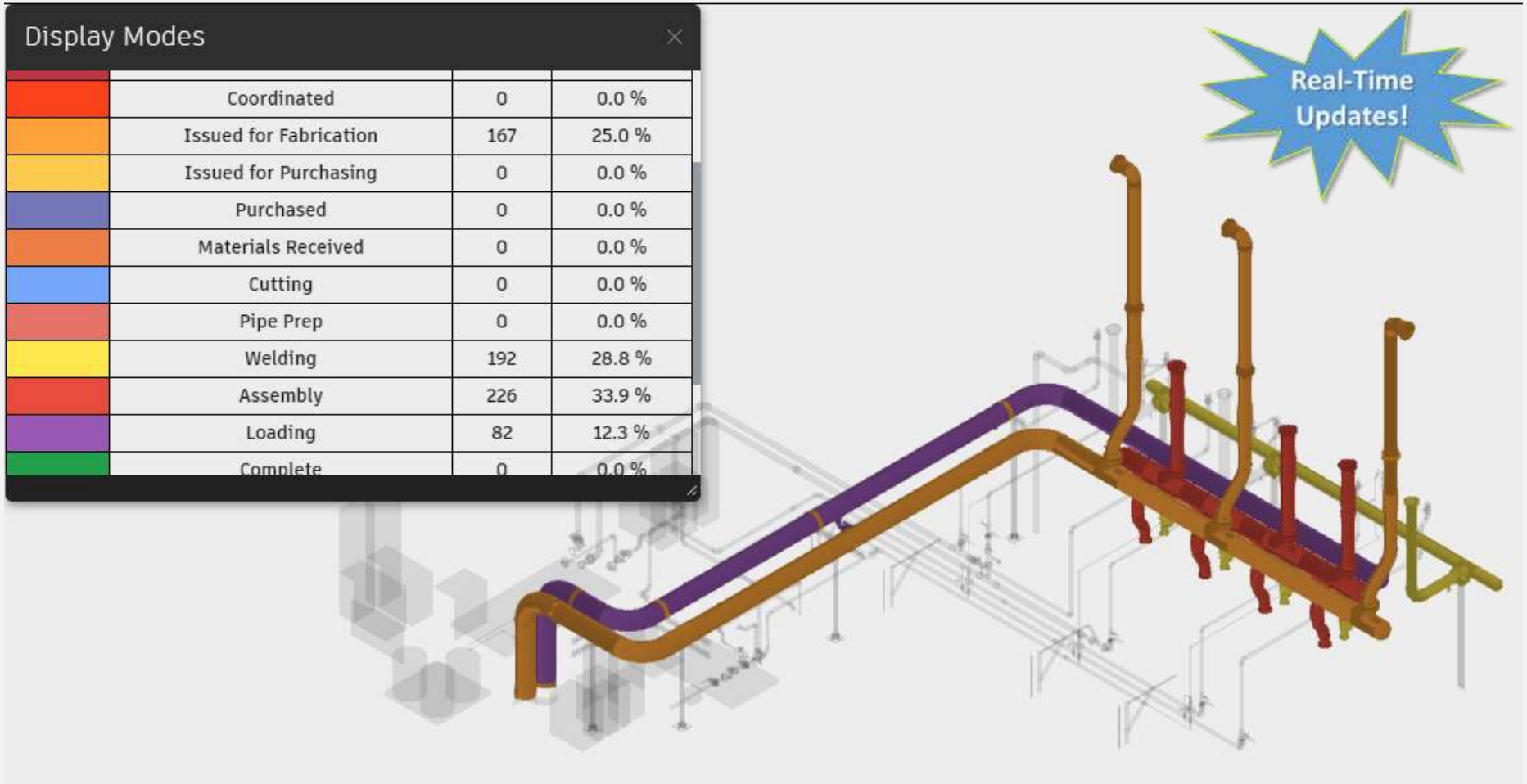
Cooling Tower Rack

Pump Skid

Pipe Rack

Production Model

Real-Time Updates!



Productivity and Planning

Stratus Progress Dashboard

Packages | + New Package | Import CSV | Status: Active | Report: Progress Tracking Dashboard

Show 10 Entries | CSV | Excel

Drawing	Package Name	Cost Code	Pieces	Weight	Length	1.0 Installation Hours	Hanging Factor	Adjusted Installation Hours	Material Cost	Status	Last Status Change	Parts Installed	Parts Ready to Install
Project Warehouse-PLB-R21	Package - SUPPORT		10	181	5'-5"	8	0.90	7	$368	Installed	5/24/2022	10	0
Project Warehouse-PLB-R21	Package - SWV		208	3724	374'-7"	191	0.90	172	$6520	Spooled	5/24/2022	173	28
Project Warehouse-PLB-R21	Package - WASTE		80	1589	277'-3"	108	0.90	97	$0	Installed	5/24/2022	80	0
Project Warehouse-PLB-R21	Package - TRAP PRIMERS		46	88	100'-3"	15	0.90	13	$258	Installed	5/24/2022	46	0

Hanger Factor Editable by Package/Cost Code

Package Status Progress

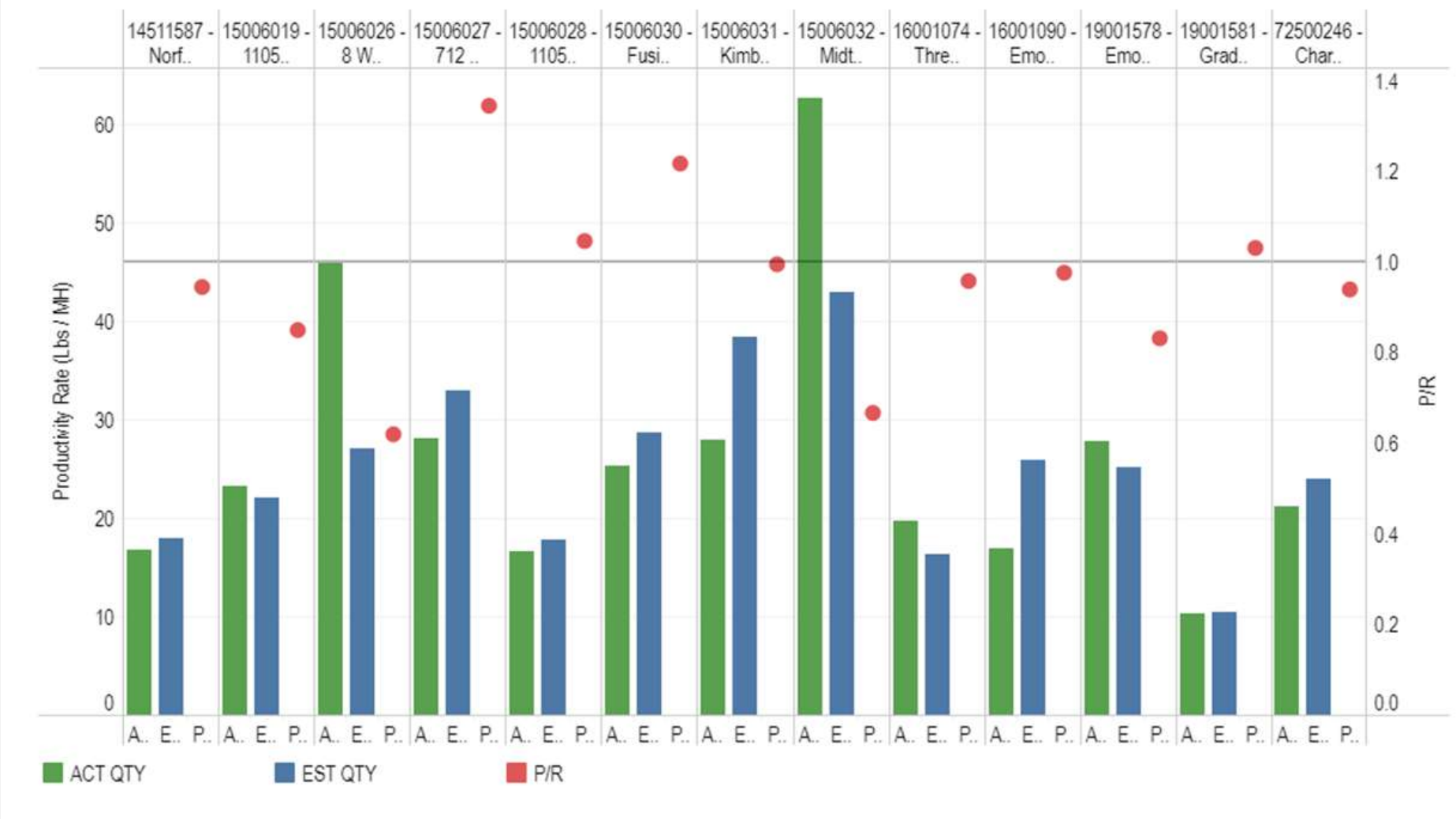
Installation Tracker

Project Comparison – Sheet Metal

Ductwork Installation Comparison

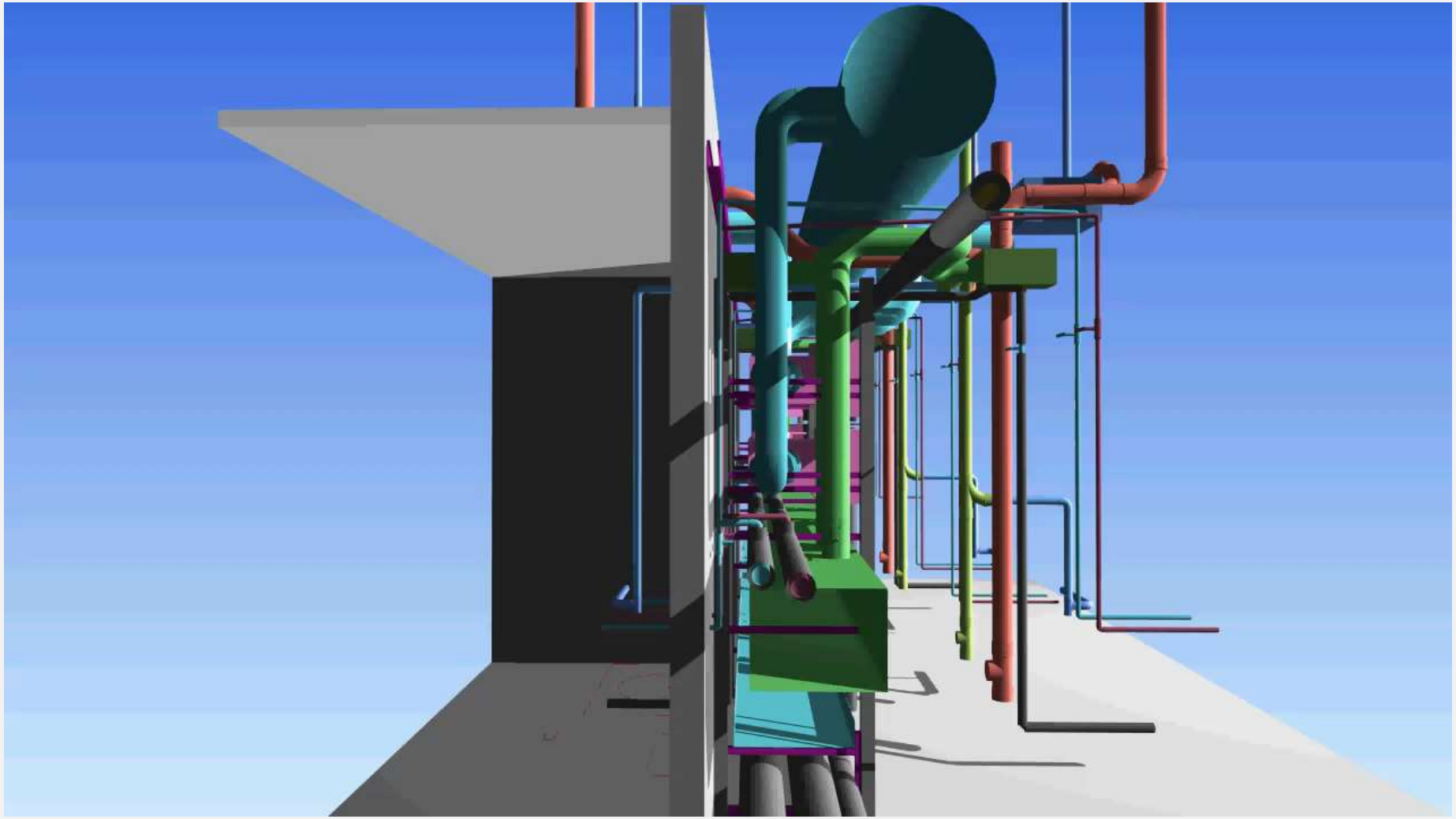
		Estimated P..	Actual Prod..	Quantity	Installed Qu..	Pieces	Installed Pi..
Sheet Metal Field	14511587 - Norfolk Fusion Tenant	18.0	16.8	133,915	112,197	32,744	0
	15006019 - 1105 West Peachtree Office Park..	22.0	23.3	256,956	228,731	19,118	0
	15006026 - 8 West	27.1	45.9	58,706	58,706	2,906	2,906
	15006027 - 712 West Peachtree	33.0	28.1	160,668	160,668	5,338	5,338
	15006028 - 1105 West Peachtree Hotel	17.8	16.7	15,490	15,490	2,176	2,176
	15006030 - Fusion	28.7	25.3	215,221	215,221	13,130	13,130
	15006031 - Kimball Bridge Office and Parkin..	38.4	28.0	79,715	65,611	2,032	0
	15006032 - Midtown Union	42.9	62.7	246,325	197,288	8,670	0
	16001074 - Three Ballpark Center	16.3	19.8	53,177	53,177	3,214	3,214
	16001090 - Emory Rollins School of Public H..	25.9	17.0	99,015	65,436	5,852	0
	19001578 - Emory Musculoskeletal MOB	25.1	27.8	246,208	203,887	20,898	0
	19001581 - Grady Ponce De Leon Center	10.5	10.3	23,020	18,400	4,396	0
	72500246 - Charlotte Metro	24.0	21.1	269,298	159,697	13,227	0
Grand Total		25.6	25.2	1,857,715	1,554,511	133,701	0

Project Comparison – Sheet Metal



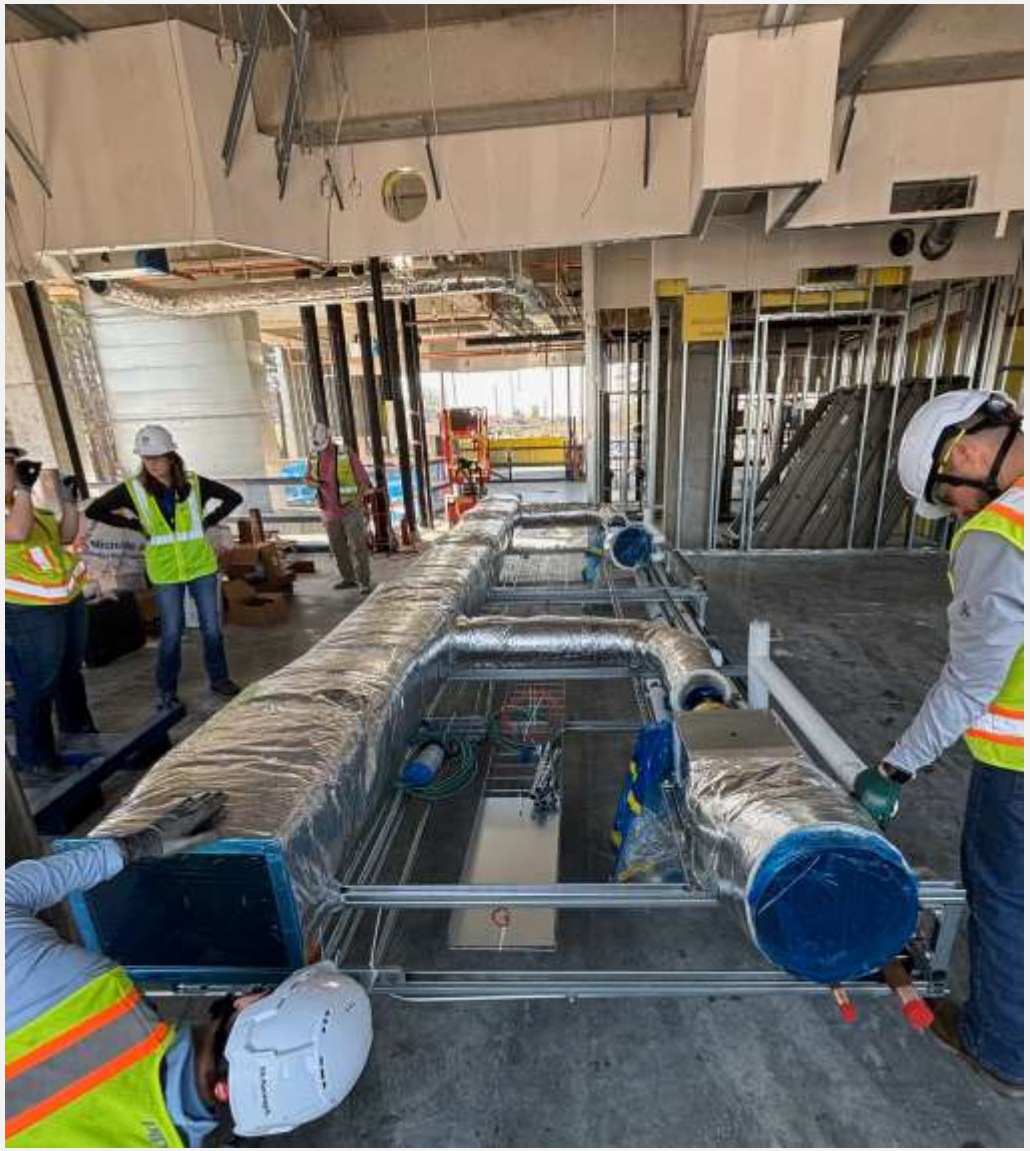
Mult-trade Assemblies/Racks

Utility Corridor Rack



Utility Corridor Rack

Healthcare Patient Tower Corridor



First-of-Kind (FOK) Inspections

What Are They?

Complex or Repetitive Work

Why Perform Them?

Verify Compliance to Documents

Refine Installation Methods

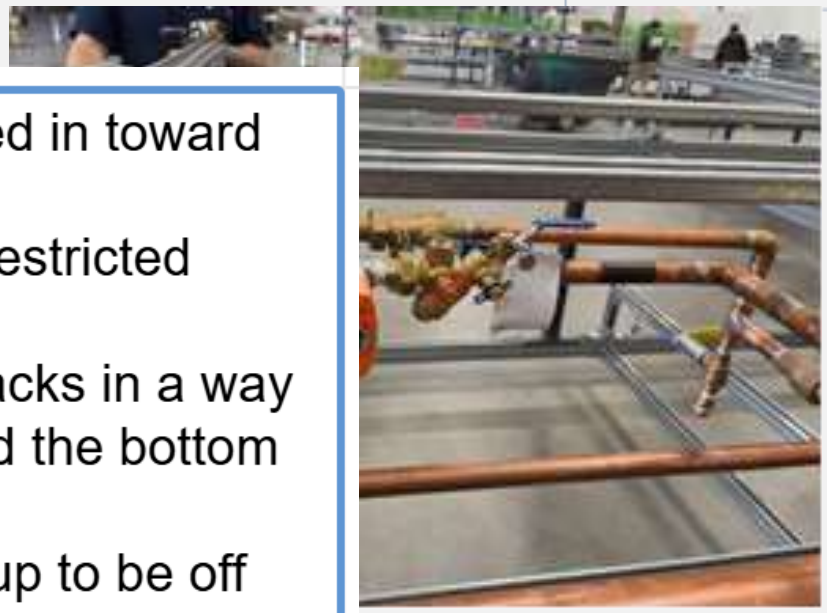
Identify/Correct Quality Concerns

First-of-Kind (FOK) Inspections

Focus of the Inspections:

- *Goal*: to build all 56 identical skids offsite and perform crane lift to set them in place using less time
- Confirm design compliance and dimensional layout and arrangement for connection to thermal storage and chillers
- Establish conformity for repeatable production
- Serviceability of control valves, control devices and strainers
- Maintaining clearance for pipe and equipment insulation
- Verify rigging points for safe handling in the shop, loading and delivery, and onsite for crane lift
- Verify final connections to tanks and chillers

First-of-Kind (FOK) Inspections



1. Verify T&B can access PT ports, some are turned in toward adjacent pipe
2. Verify gripple cable can pull through and is not restricted where unigrip does not line up with a strut hole
3. Ensure Inglett and rigging teams are handling racks in a way to prevent damage to the drain the extends beyond the bottom strut.
4. Longitudinal 13/16” strut is causing a pipe stub up to be off center and will not allow for full insulation. Strut may need to be removed in this section after setting on floor. Additionally this strut was added after modeling so confirm it does not generate any unforeseen clashes.

Reality Capture

Reality Capture – LIDAR Scanning

Image above is a point cloud file that can be incorporated into your modeling software.

- Scanning technologies facilitate a planning workflow that allows you to identify existing obstacles, tie-in points, etc. So that you can BIM and fabricate with a higher level of accuracy.
- This technology can be incorporated in Existing Building renovation projects and Greenfield projects.

Reality Capture – Photogrammetry

Image above is a floor plan created from scanning an existing facility with a Matterport scanner.

- Photogrammetry is technology used to create virtual walkthroughs by stitching millions of photos from a scanner together.
- This technology can be used to get a sense for the risks that you will encounter on a job site.

Reality Capture – 360 Camera

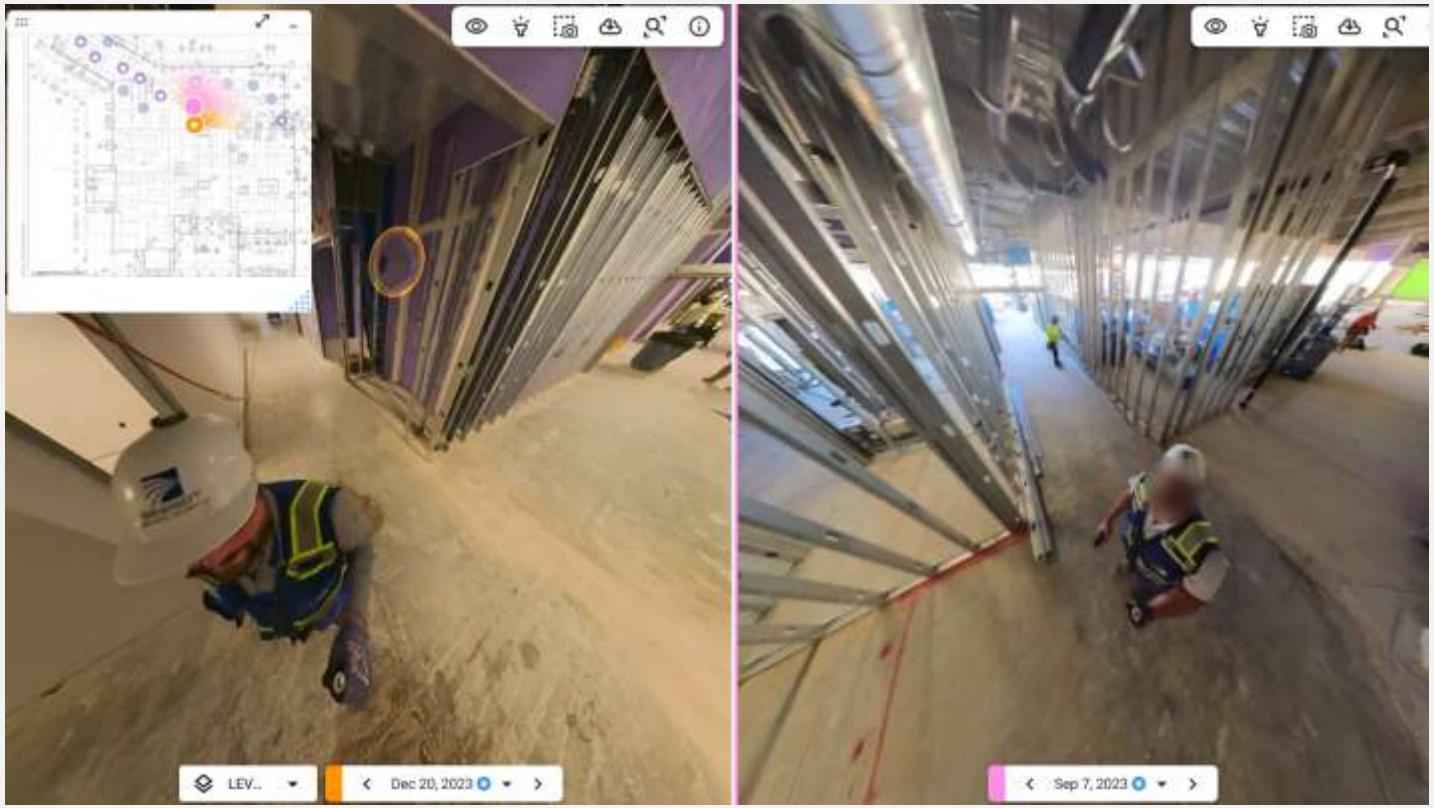


Image above is a timeline comparison of two capture dates on site as construction was progressing.

- 360 degree cameras are utilized to produce 3D walkthroughs of spaces.
- This technology can be used to track construction progress and tie milestones in schedule to actual progress. BIM can be tied to this technology to track linear feet of install and understand productivity in the field.
- This is also an effective way to track damages on a project.

Field Training

Targeted Field Training – Sheet Metal Excellence

TDF Station

- Sealing of Duct
- Gasketing
- Corner bolts/screws
- TFD Clip Installation

Round Taps

- Cutting of Openings
- Attachments
- Proper Sealing

per Installations

uired Framing
tion in Wall
tachments / Angles

250+ Team Members Trained

Targeted Field Leadership Training

- Level Up training conducted by regional training resources for over 400 employees. Focus was on leadership skills in the field in order to enhance influence by supervision and reduce incidents and altercations.

- Training consisted of the following elements:

  - Emotional Intelligence
  - Building Relationships
  - Effective Communication
  - Managing Conflict
  - Situational Leadership
  - Decision Making and Problem Solving
  - Safety and Risk Management

Questions

Thank you!

If you would like to receive PDH credit for this session, please be sure to provide your feedback in the applicable session survey.
(Also available via the event App!)

**Surveys close 6/4/25*

Breakout Workshops

2025 PARTNER EXCHANGE
35th Anniversary