HFI
Harrell-Fish Incorporated
Mechanical & Building Solutions

BIM for the Mechanical Contractor
From VDC Strategy to Coordination Success

www.harrell-fish.com | (812) 339-2579 |

My Timeline

2003
Start BCM

2004
MCA Purdue

2006
Married Julayne!

2007
Graduate

2007
Start my Career
APM

2008
PM

2013
Luke is Born!

2014
Director of VDC &
Fab Operations

2016
Fritz is Born!

2018
Leadership Team

2024
MEP Innovations Committee

2024
HFI Executive Team

2025
President



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Mechanical & Building Solutions



OUR PURPOSE:

Making a difference for our employees, clients, industry & community as a great enduring company.

Core Values

- We will do whatever it takes.
- We take pride in quality work.
- We believe in getting the job done.
- We will lead to make our teams better.
- We care about each other, our clients, and our partners.
- We look forward to the next big challenge.
- We are always looking to improve.
- We make safety personal.
- We believe in acting with professionalism, integrity, and honesty.

Brand Promises

- Deliver Results
- Provide Solutions
- Act with Urgency

Theme

Make A Difference

BHAG

Be the best in the Midwest by 2028!

Focused On:

- Safety
- Employee Satisfaction
- Client Satisfaction
- Community Engagement
- Industry Improvement
- Repeat Business
- Negotiated Work
- Profitability

Virtual Design & Construction (VDC)

Creating a virtual model of a construction project before physical work begins and then extracting this data to assist the physical work

VDC Tools

- **3D Modeling & Design**
- **BIM (Building Information Modeling) Coordination**
- **Fabrication Prep/Spool Drawings**
- **Robotic Total Station Layout**
- **3D Laser Scanning/Point Cloud Creation**

AGENDA

- BIM Phase I
- BIM Phase II
- Fabrication Train
- Best Practices
- MCAA VDC Flow Chart

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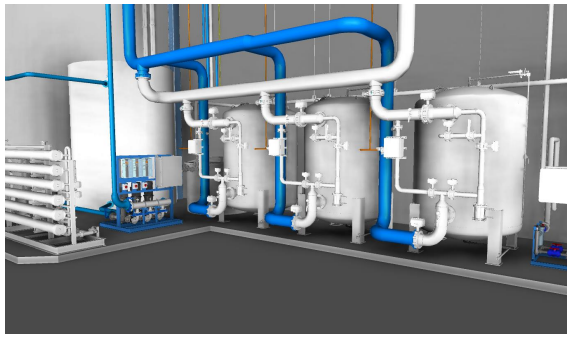
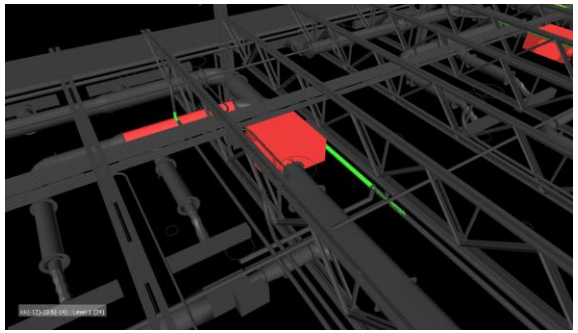
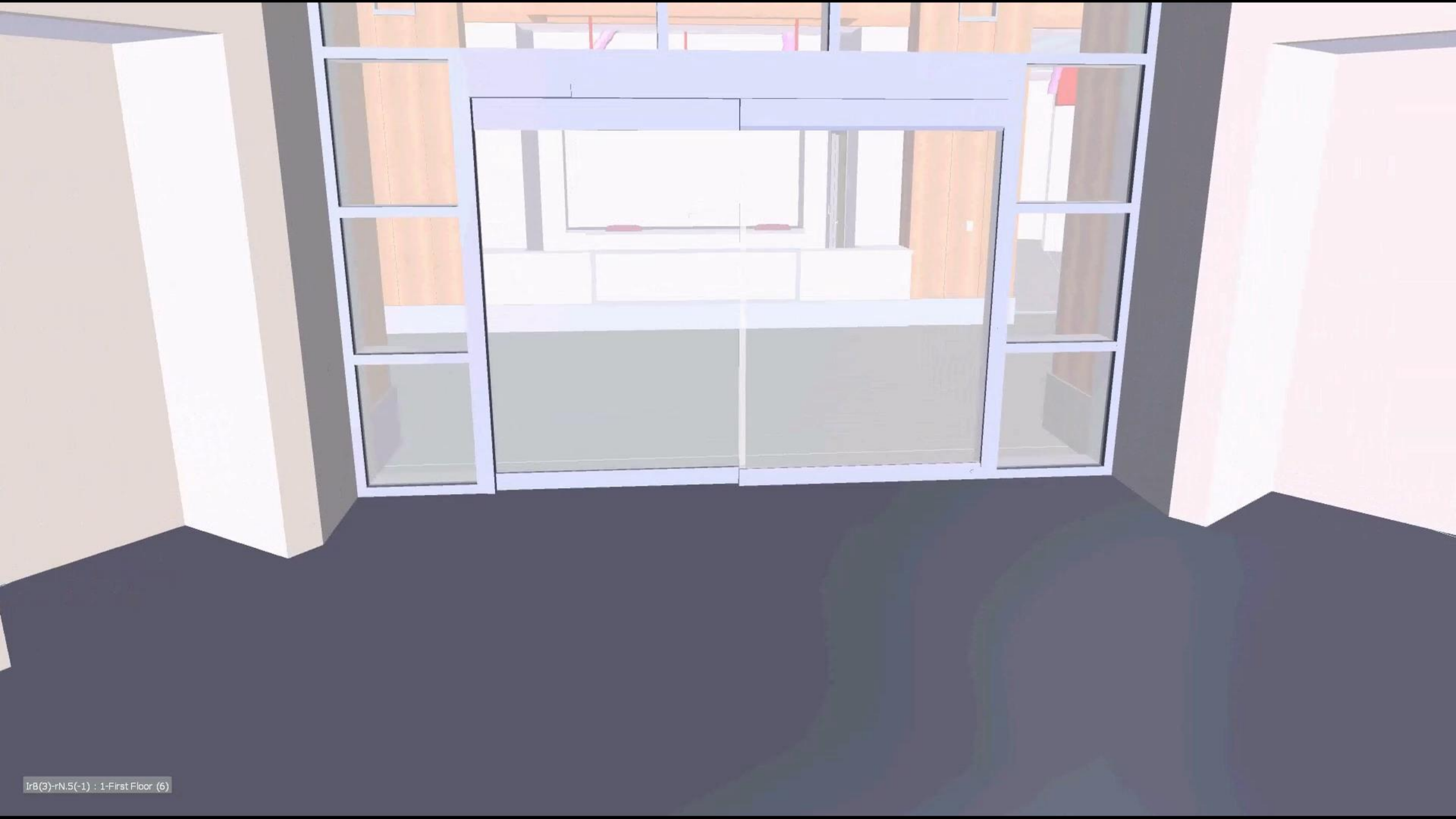
BIM Phase 1

Modeling/Population/Detailing → Coordination → Clash Resolution → Sign-off

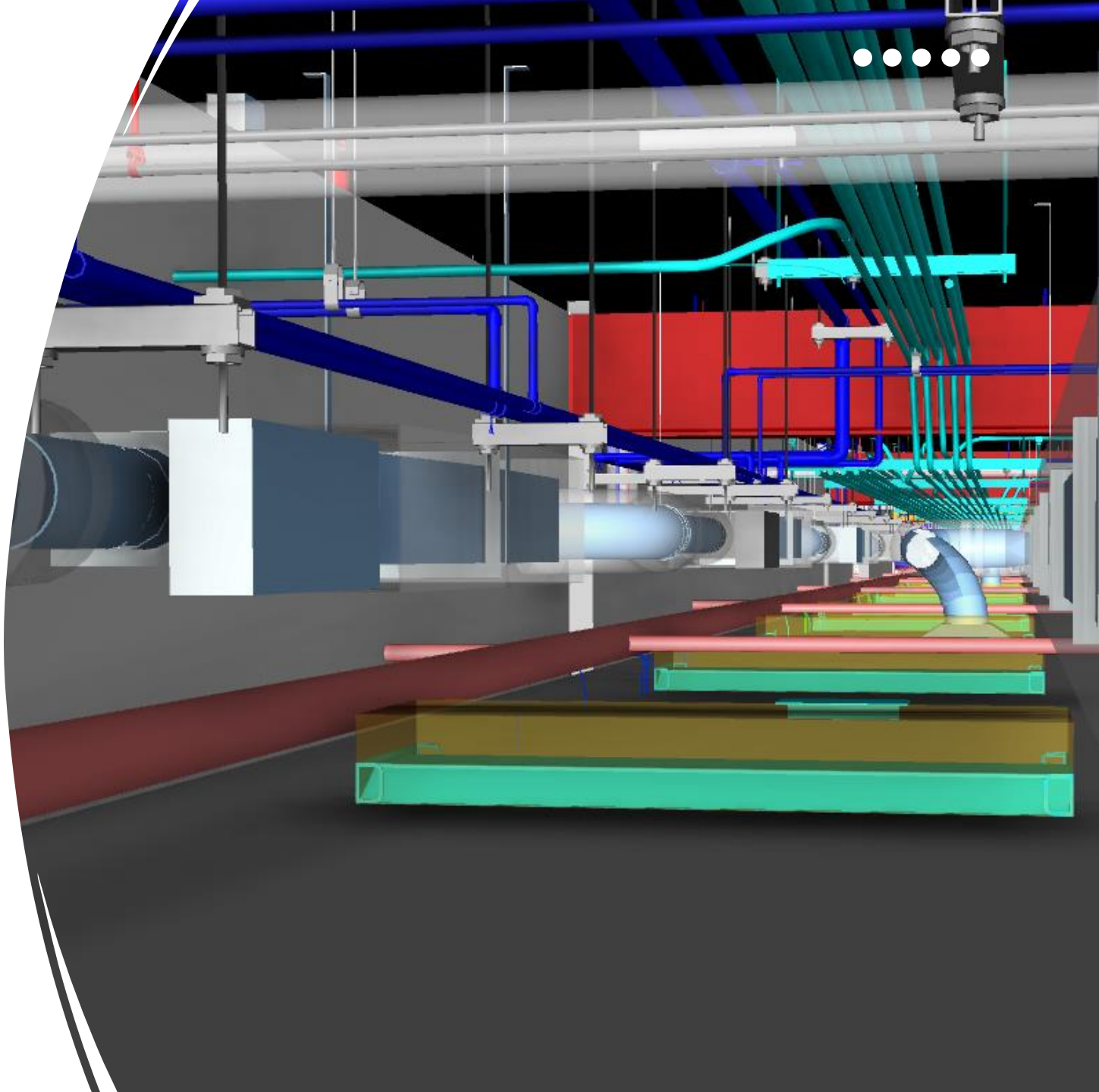


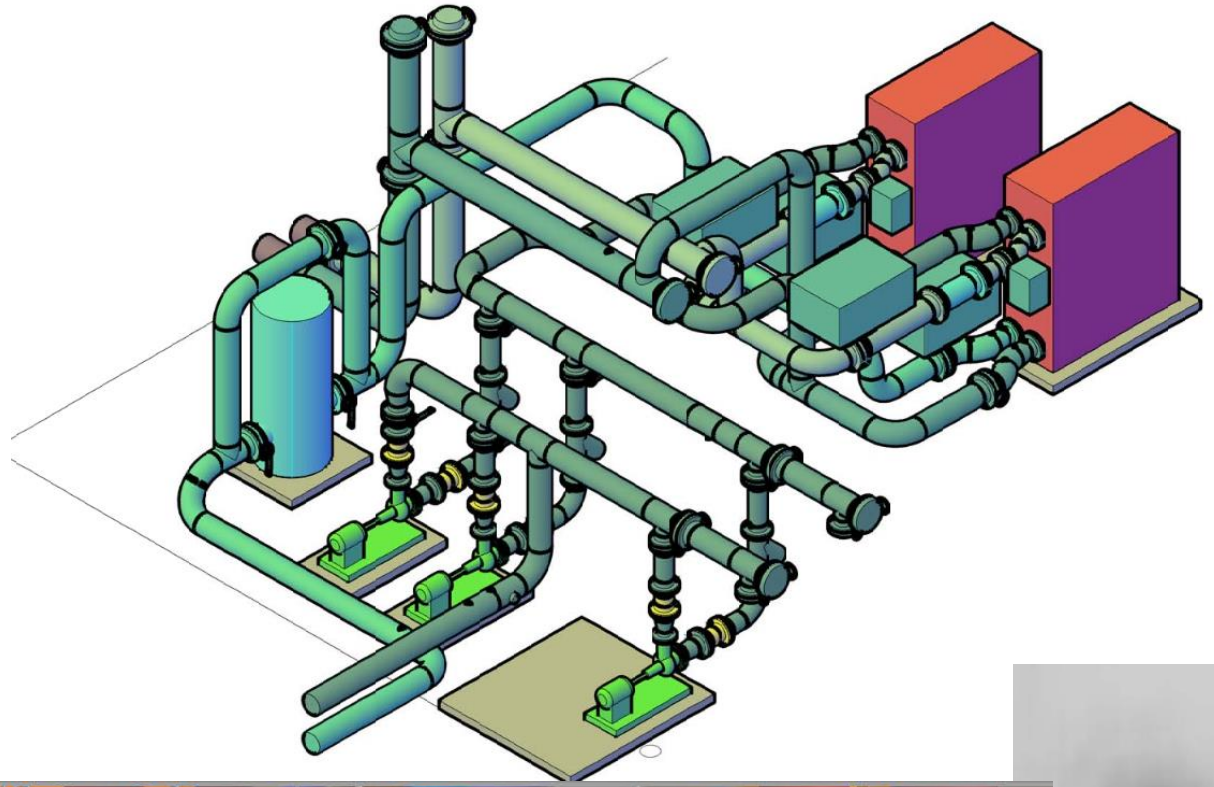


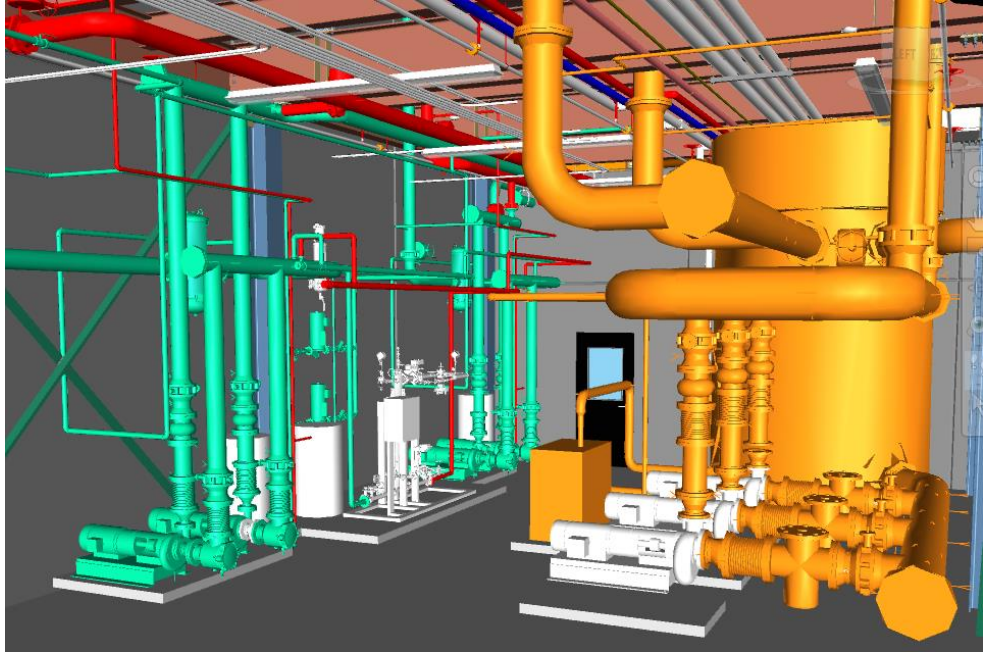

IrB(3)-rN.5(-1) : 1-First Floor (6)

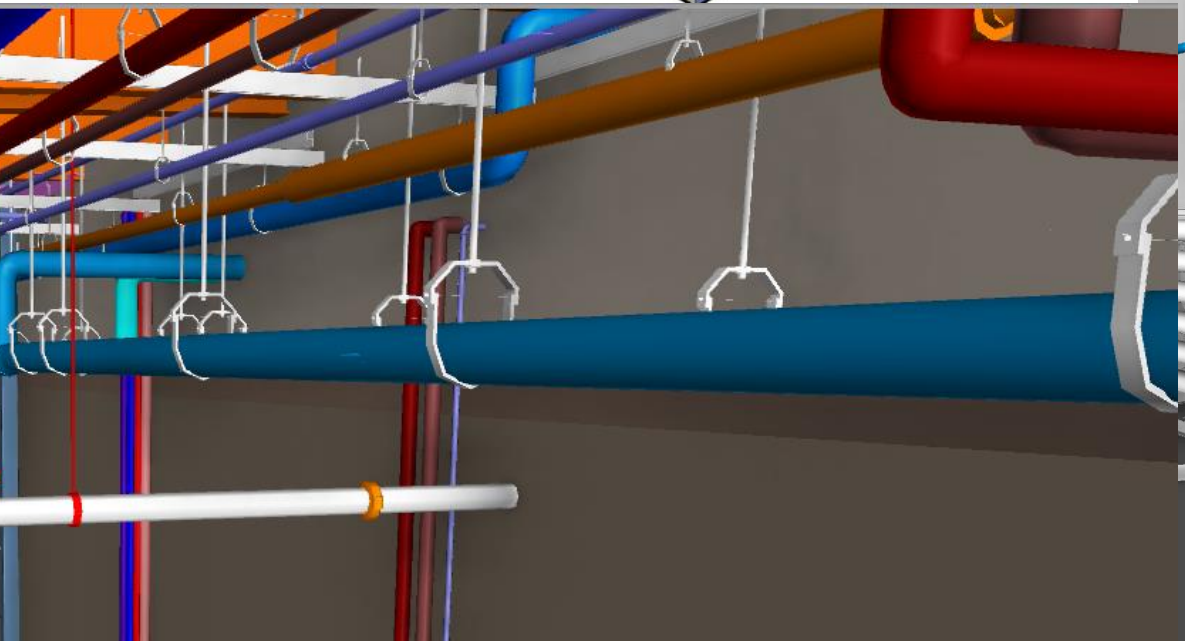
Model Content

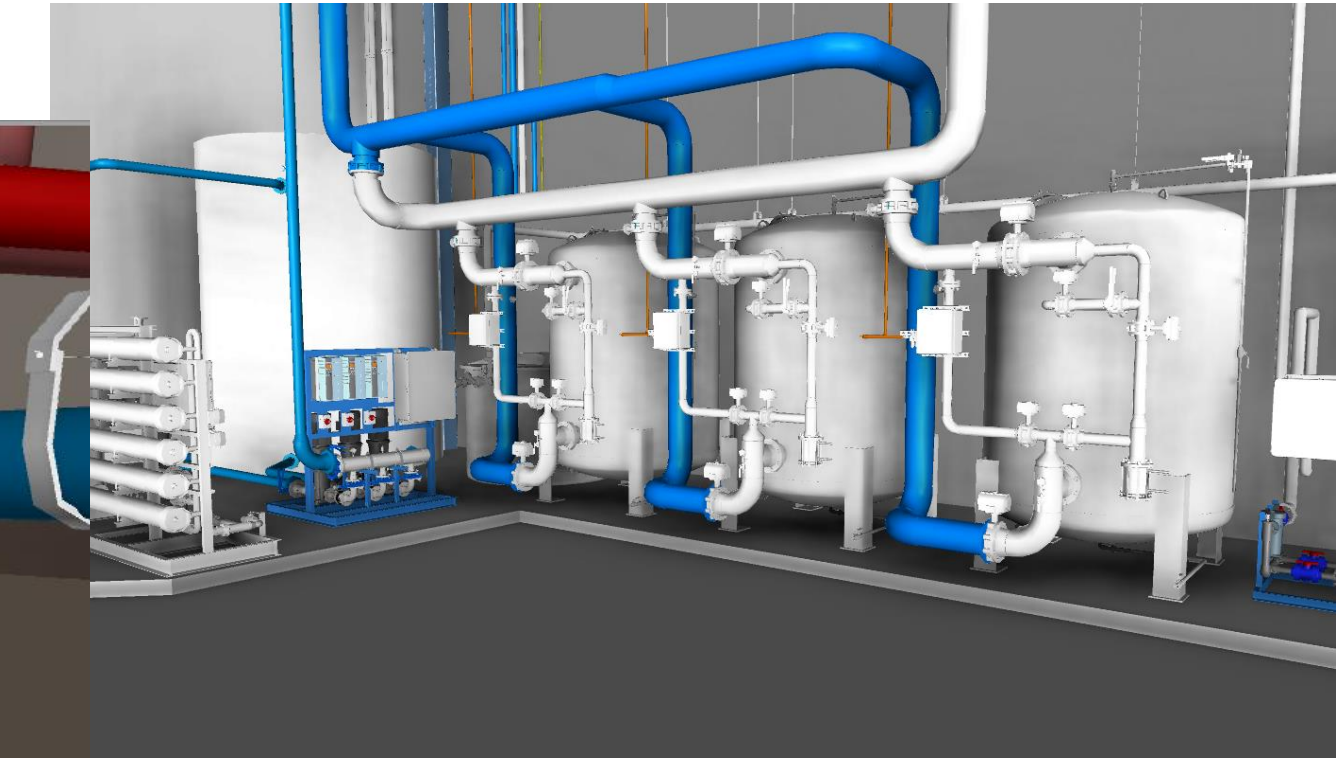
- All Trades Represented
- Insulation
- Supports
- Supplemental Steel
- Clearance zones
- Existing Conditions/Laser Scan
- Manufacturer Based Content











Autodesk Revit 2021.1.5 - 3999 U of E Freshman and Sophomore Dorm_MILLERJEFF2473 - Section: Section 9

MILLERJEFF2473

File | Architecture | Structure | Steel | Precast | Systems | Insert | Annotate | Analyze | Massing & Site | Collaborate | View | Manage | Add-Ins | Revizto 5 | SysQue® | SysQue® Tools | MSUITE Login | Procore | Modify | Place Component

Modify | Properties | Paste | Cope | Cut | Join | Clipboard | Geometry | Modify | View | Measure | Create | Load Family | Model In-place | Mode | SysQue | Model Based Estimating | Estimation MEP | BIMPro

Select

Modify | Place Component | Rotate after placement

Properties

Flex Hose SS SMP Pumpsaver Flex Connector FlgdxFlgd
Flex Hose SS

New Pipe Accessories | Edit Type

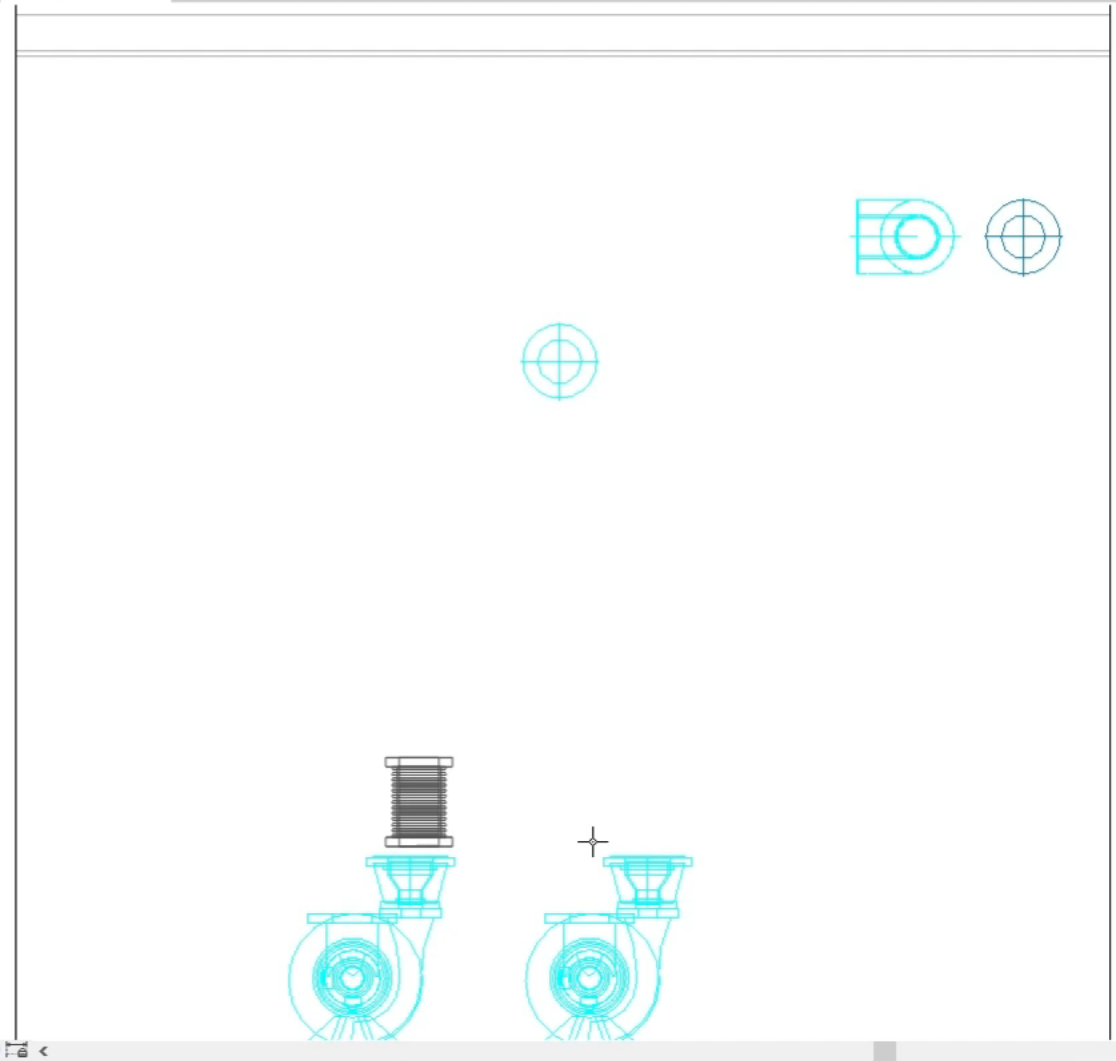
Constraints	
Male2	☑
Male1	☑
Allow Slope Adjustm...	☐
Level	Level 1
Elevation from Level	0' 0"
Text	
PurchasedFitting	☐
Dimensions	
Diameter2	16"
Diameter1	16"
Size	
Bottom Of Hanger	
Pipe Insulation Size	
Added Rod Extension	

Properties help | Apply

Project Browser - 3999 U of E Freshman and Sop...

- HVAC
  - Floor Plans
    - 1 - Mech
    - 1 - Mech Room U of E
    - 2 - Mech
  - Ceiling Plans
  - 3D Views
  - Elevations (Building Elevation)
- Plumbing
- Legends
- Schedules/Quantities (Schedule Organizatio
  - ???
    - 3999-Pipe
    - Bill of Materials - Pipe
    - Bill of Materials - Pipe -Chilled Water
    - Bill of Materials - Pipe Accessory
    - Bill of Materials - Pipe Accessory - Chill
    - Bill of Materials - Pipe Fitting
    - Bill of Materials Fittings- Chilled Water
    - Hanger Fab Schedule Template
    - Space Outdoor Air Schedule

0 - Starting View | 1 - Mech Room U of E | Section 9 | Section 8



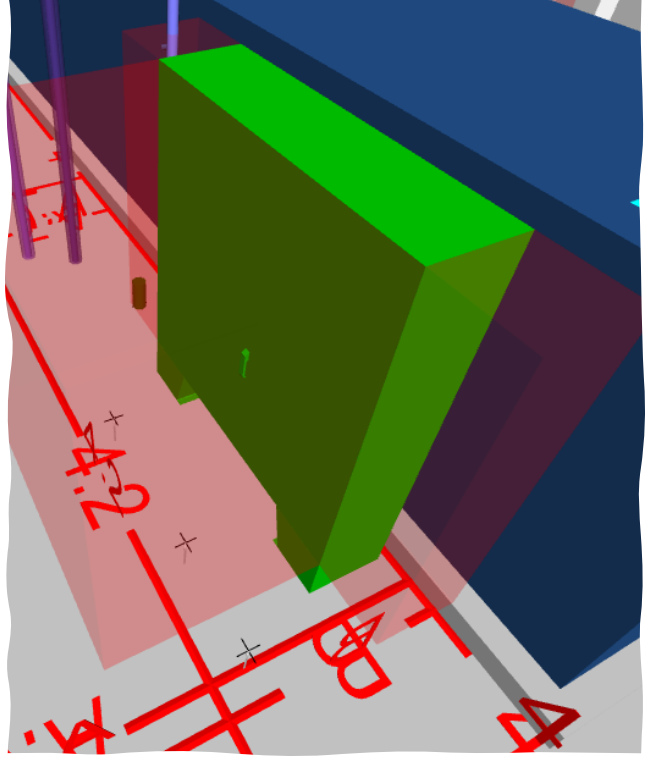
1/4" = 1'-0"

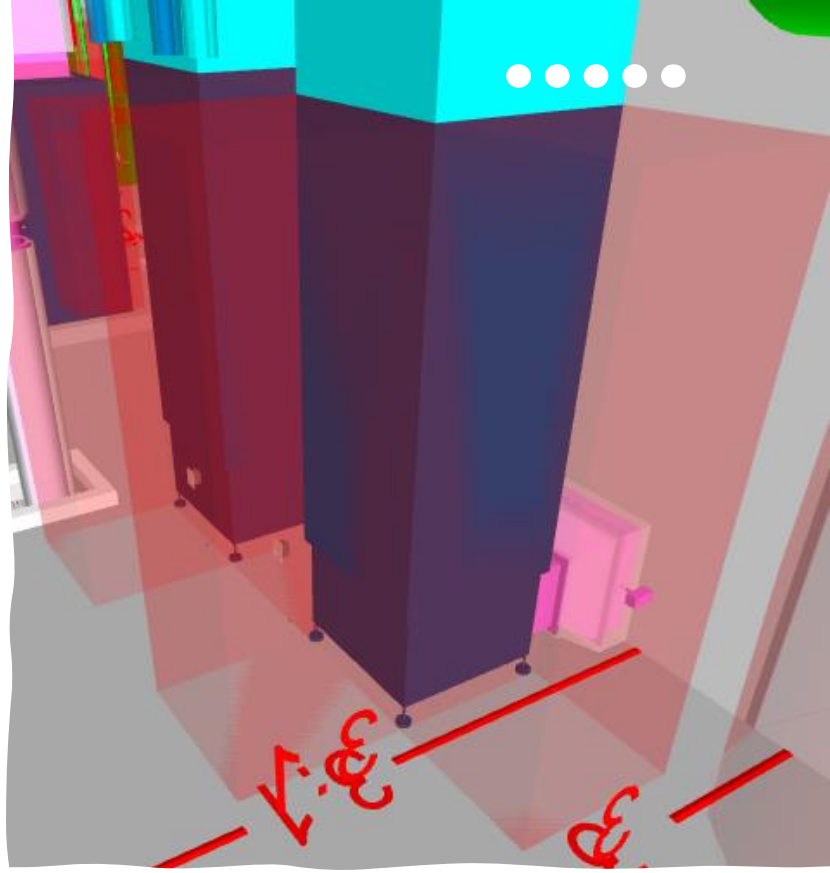
Click to place a free instance (Space Bar to Rotate)

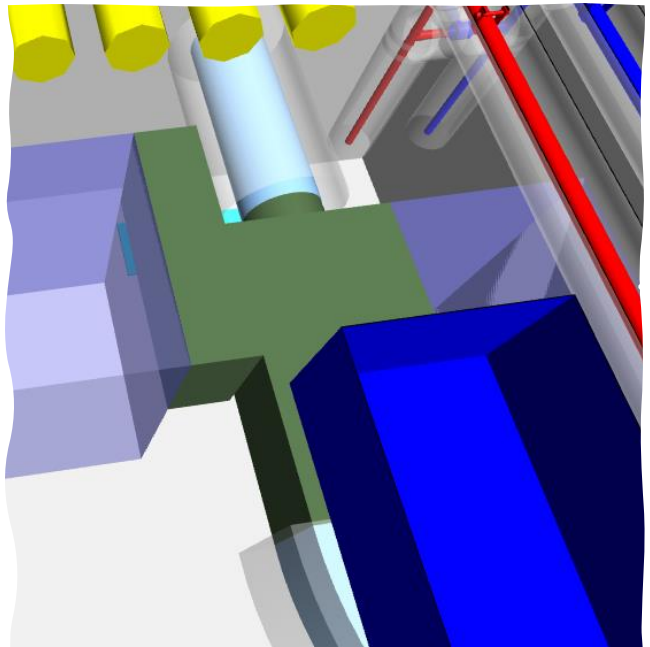
Workset1 (Not Editable) | Main Model

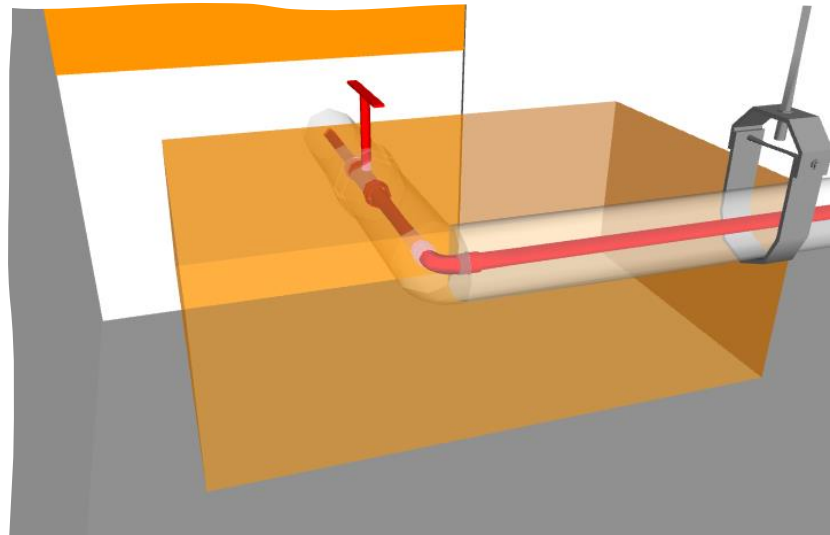
Space Management

- Stratification
- Future Projects
- **Maintenance**
  - **Clearance Zones – Coil Pulls**
  - **Clearance Zones – Maintenance Access**
  - **Clearance Zones – Electrical Clearances**
  - **Access to Valves**
  - **Access to Pull Boxes**
  - **Access to Cable Trays**

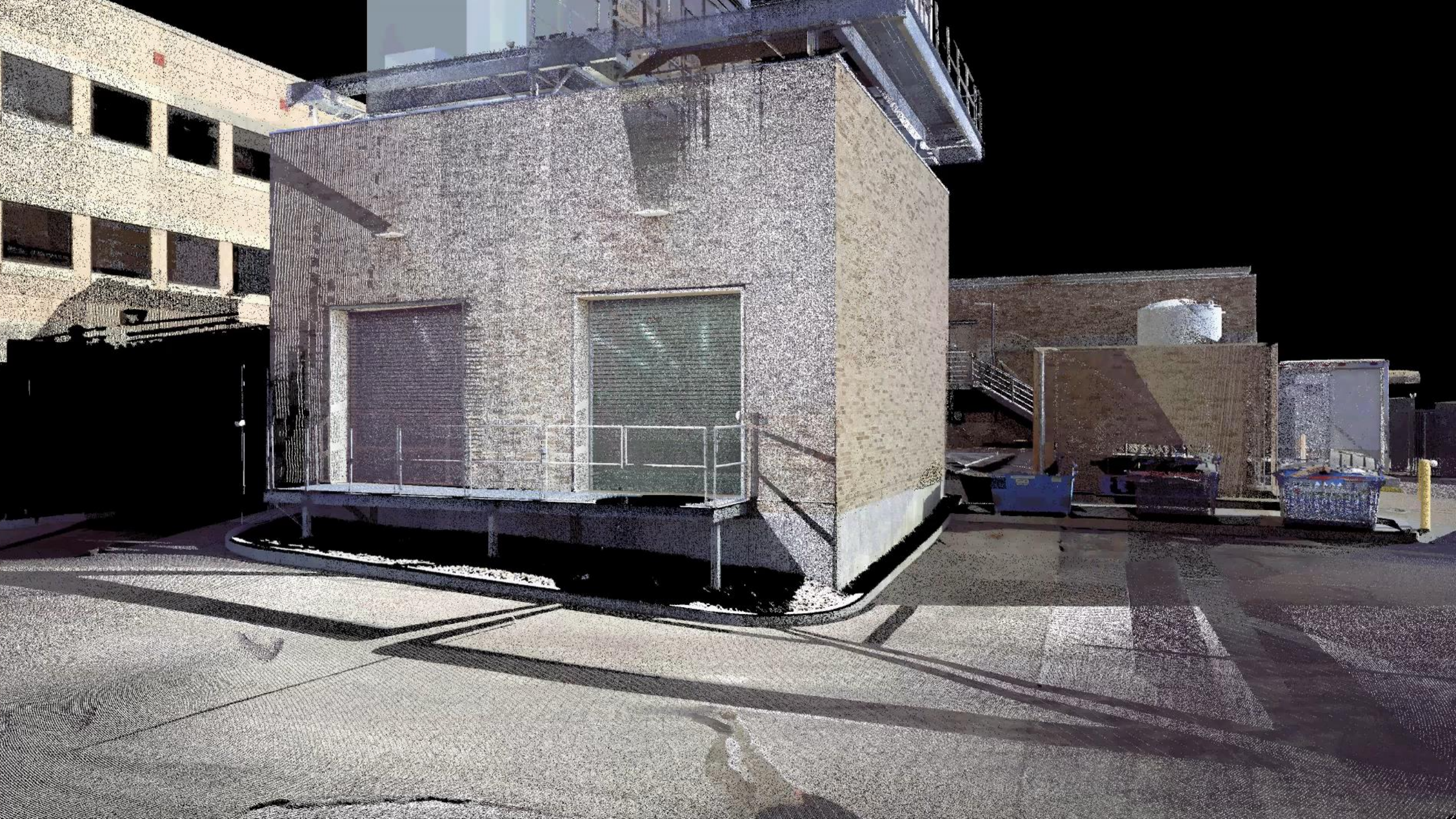








Laser Scanning



BIM Phase 2

- TFL/Field Layout Files
- Bill of Materials (BOM's)
- Fabrication Iso's for foremen input
- Spool Sheets & Hanger Schedules
- Spool Maps & Shop Drawings/Install Drawings

Bill of Materials

<2558 - 12E - BOM - Pipe>

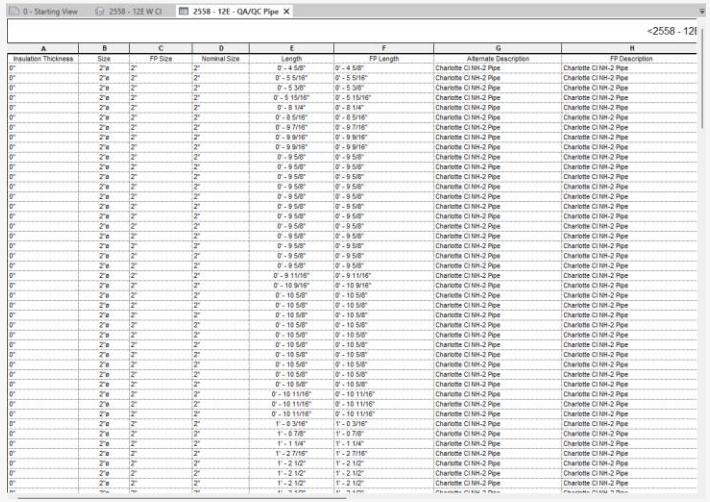
A	B	C	D	E	F	G
Size	Length	Material Description	Package Id	Package Name	Shipping Info	System Type
2"ø	242' - 5 7/8"	Charlotte CI NH-2 Pipe	2558	12E W Cast Iron		Sanitary
3"ø	6' - 7 3/8"	Charlotte CI NH-2 Pipe	2558	12E W Cast Iron		Sanitary
4"ø	115' - 9 1/2"	Charlotte CI NH-2 Pipe	2558	12E W Cast Iron		Sanitary

<2558 - 12E - BOM - Fitting>

A	B	C	D	E	F	G	H
Count	Nominal Size	Alternate Description	Element Package Id	Element Package Nam	Shipping Info	System Type	Family and Type
25	2"	Charlotte CI NH-4 Quarter Bend NHxNH	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-4 Quarter Bend NHxNH: Charlotte CI
41	2"	Charlotte CI NH-12 45° Elbow	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-12 Eighth Bend NHxNH: Charlotte CI
2	3"	Charlotte CI NH-12 45° Elbow	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-12 Eighth Bend NHxNH: Charlotte CI
36	4"	Charlotte CI NH-12 45° Elbow	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-12 Eighth Bend NHxNH: Charlotte CI
1	2"	Charlotte CI NH-14 22.5° Elbow	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-14 Sixteenth Bend NHxNH: Charlotte CI
16	4"	Charlotte CI NH-16 Short Sweep NH x NH	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-16 Short Sweep NHxNH: Charlotte CI
16	4"x4"x2"	Charlotte CI NH-20 Reducing Wye	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-20 Reducing Wye NHxNHxNH: Charlotte CI
1	4"	Charlotte CI NH-20 Wye	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-20 Wye NHxNHxNH: Charlotte CI
17	4"	Charlotte CI NH-22 Combination	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-22 Combination NHxNHxNH: Charlotte CI
1	3"x3"x2"	Charlotte CI NH-22 Reducing Combination	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-22 Reducing Combination NHxNHxNH: Charlotte CI
16	4"x4"x2"	Charlotte CI NH-22 Reducing Combination	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-22 Reducing Combination NHxNHxNH: Charlotte CI
16	2"	Charlotte CI NH-28 Sani-Tee	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-28 Sanitary Tee NHxNHxNH: Charlotte CI
1	3"x2"	Charlotte CI NH-40A Short Reducer	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-40A Short Reducer NHxNH: Charlotte CI
2	4"x2"	Charlotte CI NH-40A Short Reducer	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-40A Short Reducer NHxNH: Charlotte CI
17	2"	Charlotte CI NH-42 P-Trap	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-42 P-Trap NHxNH: Charlotte CI
15	4"	Charlotte CI NH-50 Blind Plug	2558	12E W Cast Iron		Sanitary	Charlotte CI NH-50 Blind Plug NH: Charlotte CI
39	2"	Fernco Qwik Cap	2558	12E W Cast Iron		Undefined	Fernco PVC Qwik Cap CU NH: Fernco PVC
236	2"	Mission C-HW Coupling	2558	12E W Cast Iron		Sanitary	Mission Rubber C-HW Heavy Weight Cplg NHxNH: Mission Rubber
6	3"	Mission C-HW Coupling	2558	12E W Cast Iron		Sanitary	Mission Rubber C-HW Heavy Weight Cplg NHxNH: Mission Rubber
208	4"	Mission C-HW Coupling	2558	12E W Cast Iron		Sanitary	Mission Rubber C-HW Heavy Weight Cplg NHxNH: Mission Rubber

<2558 - 12E - BOM - Pipe Accessories>

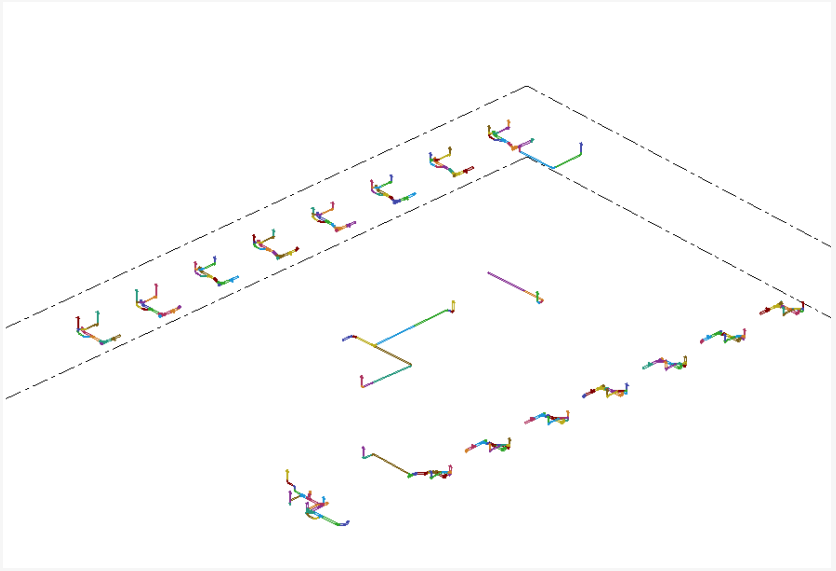
A	B	C	D	E	F	G	H
Count	Nominal Size	Alternate Description	Element Package Id	Element Package N	System Type	Family and Type	Shipping Info
39	2"	Anvil CS Fig-261 Riser Clamp	2558	12E W Cast Iron	Undefined	Anvil CS Fig-261 Riser Clamp Plain Finish: Anvil CS	

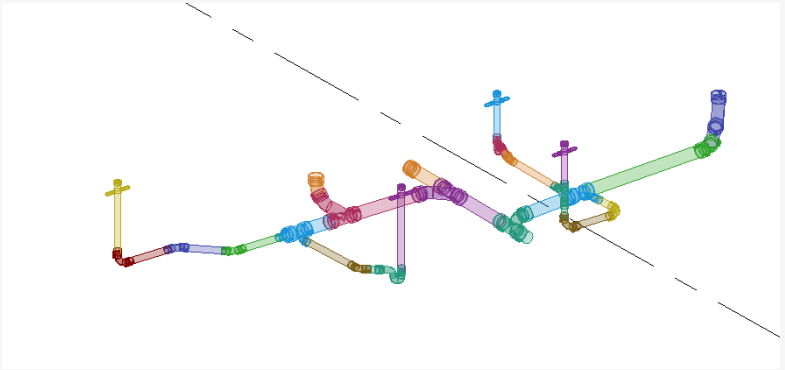


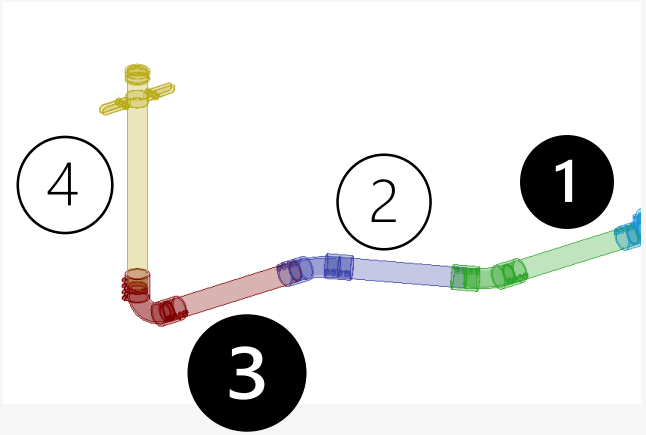
Spooling

Foreman input is critical

- Weight
- Dimensions
- Logistics – how is it getting in the building

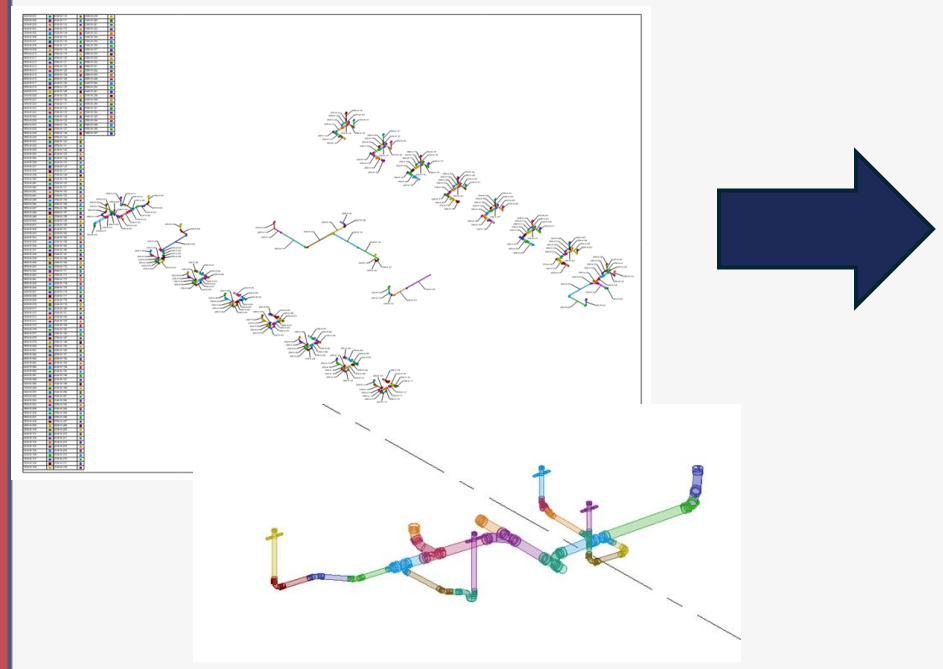






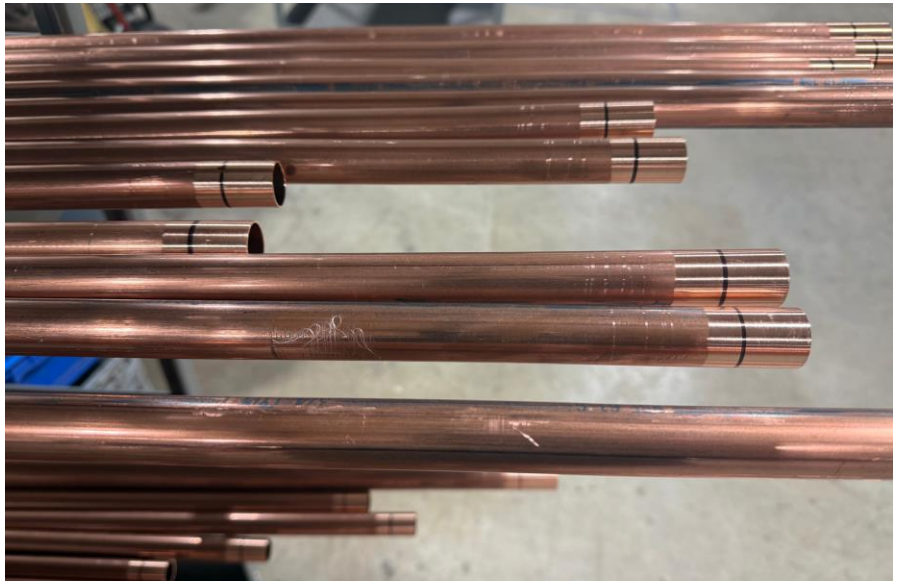
Spooling = LEGO

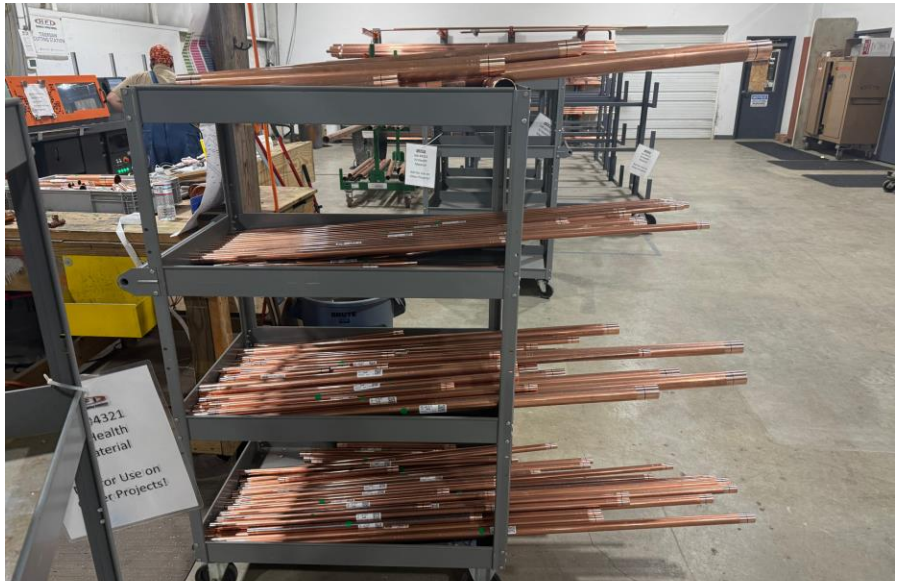
Building something big, piece by piece



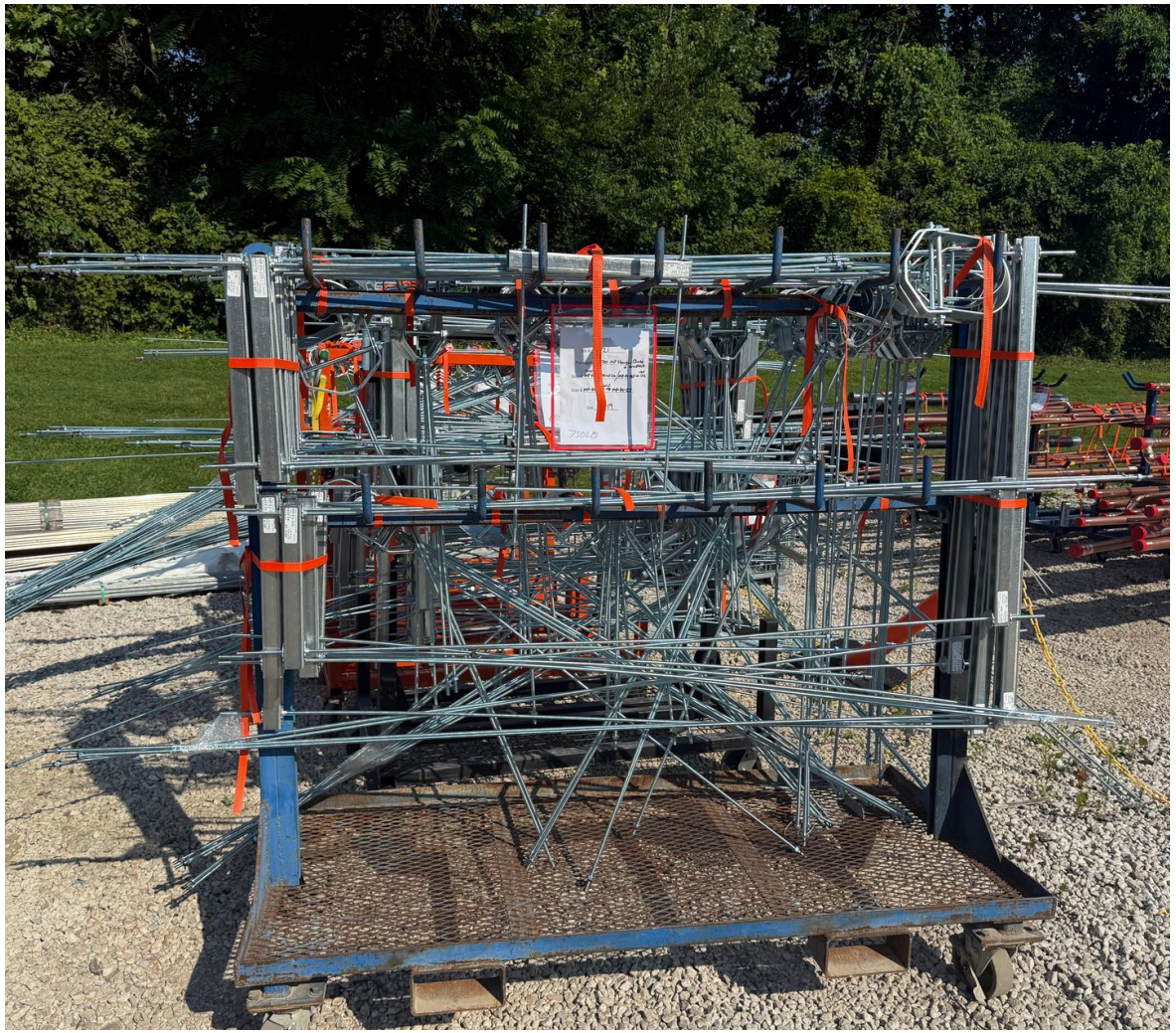
Fabrication Train

- Material Ordering
- Material Receiving
- Fabrication
- Ship to the jobsite
- Just in time delivery to the jobsite





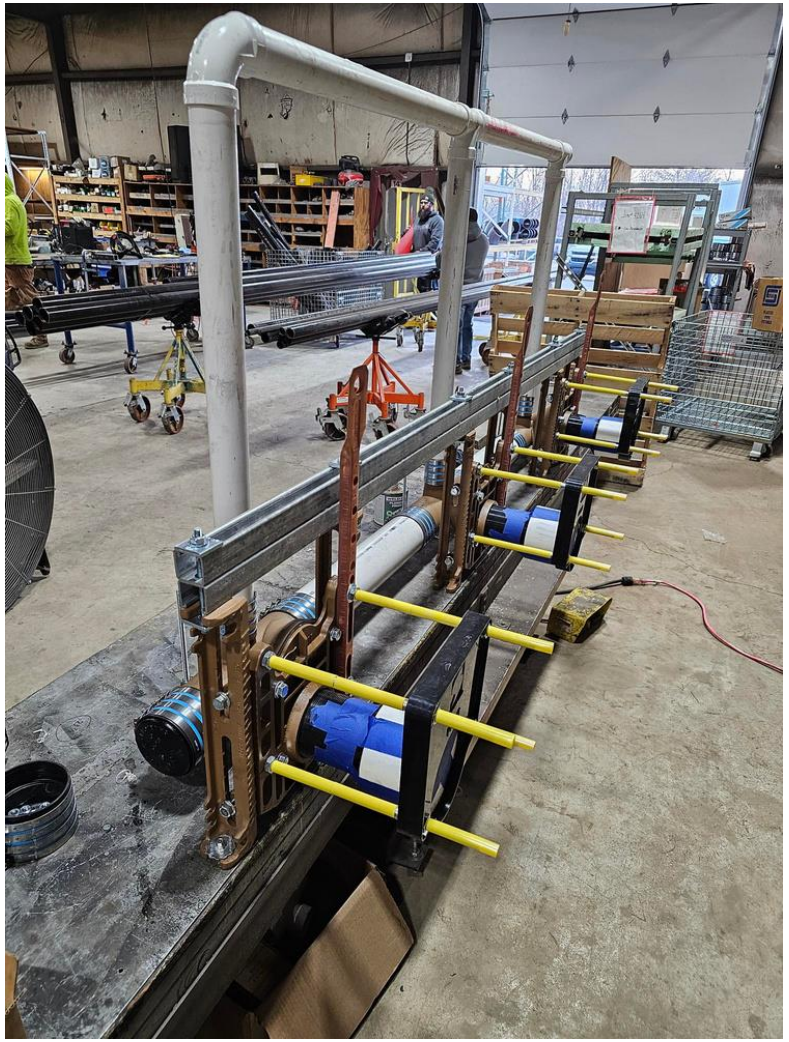

C-CART
229



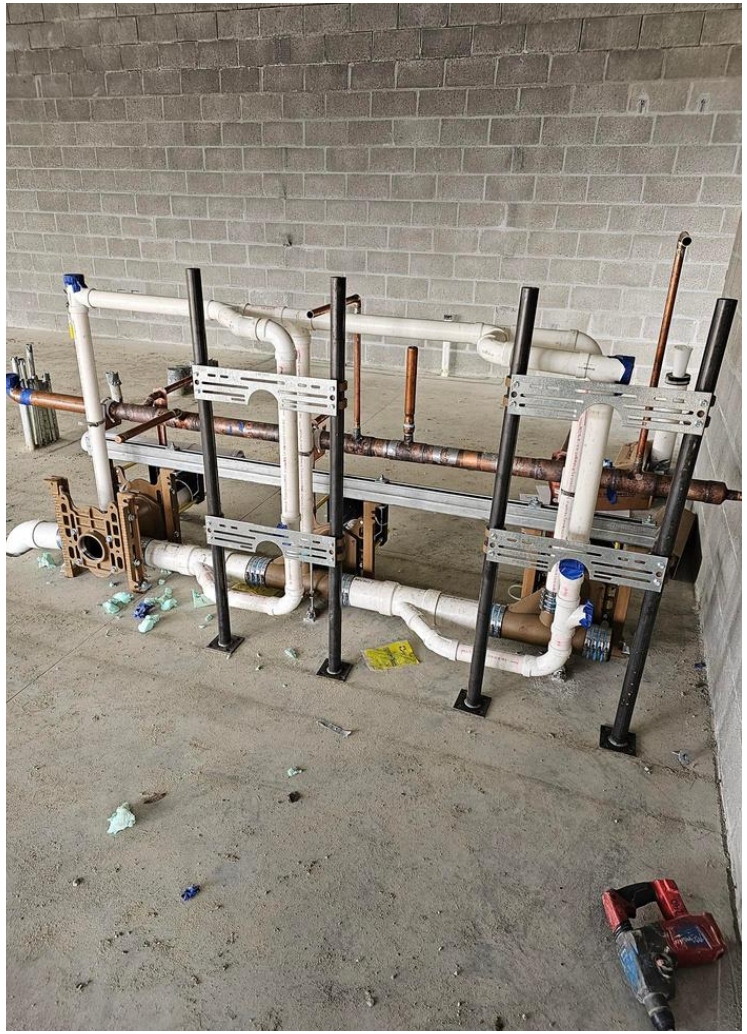

1 of 1
Hangers
Job # 4436
Package# 2627-1B PR1 Hanger Clevis/Unistrut
Side A: PR1-1B-5 → PR1-1B-69 (clevis)
Side B: PR1-1B-1 → PR1-1B-51 (strut)
Del. 8-13
800 lbs


MP1-1B-57
13' - 10 1/8"


BRI-MAR




KNAACK




3
33
31

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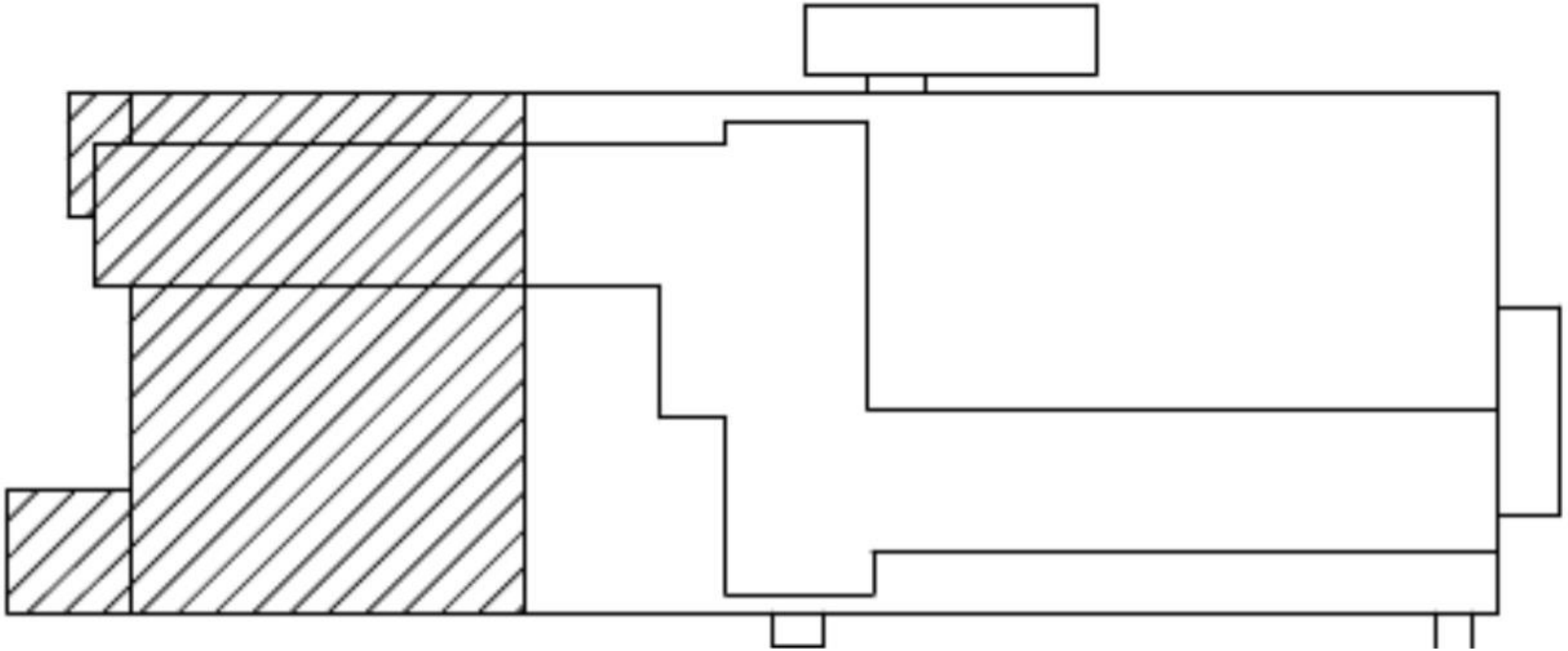
Best Practices

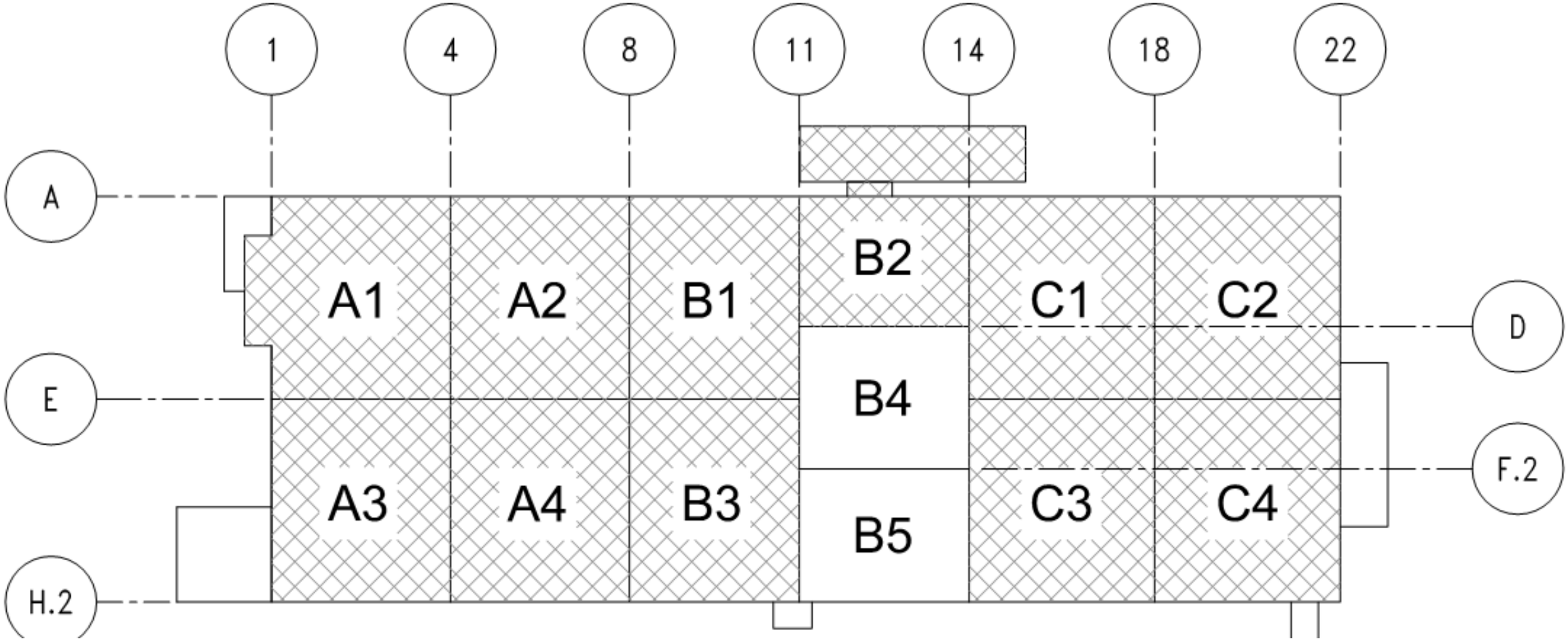
- Face to face meeting with onsite CM management
  - Explain BIM Phase 1, BIM Phase 2, and Fabrication Train
  - How are we going to construct the building?
  - Sequencing
    - Time for layout of sleeves/imbeds prior to mesh/rebar
    - Time for layout of cores/hangers prior to priority wall framing
    - Main distribution fabrication install prior to wall framing
- Manageable Sequence Areas
  - Fire Hose vs Garden Hose
  - Work with the CM to incorporate the smaller sequences into the project schedule
- BIM Coordination Team Structure
- Mechanical Contractor Team Structure
- Daily/Weekly coordination with the internal jobsite team (Foreman, PM, VC)

Schedule Alignment

FABRICATION TRAIN IS CONTINUOUS. IT DOESN'T STOP.

- **Depends on effective organization**
- **Requires accurate incorporation of bulletins and changes**
- **Depends on high-quality and prompt information**




1
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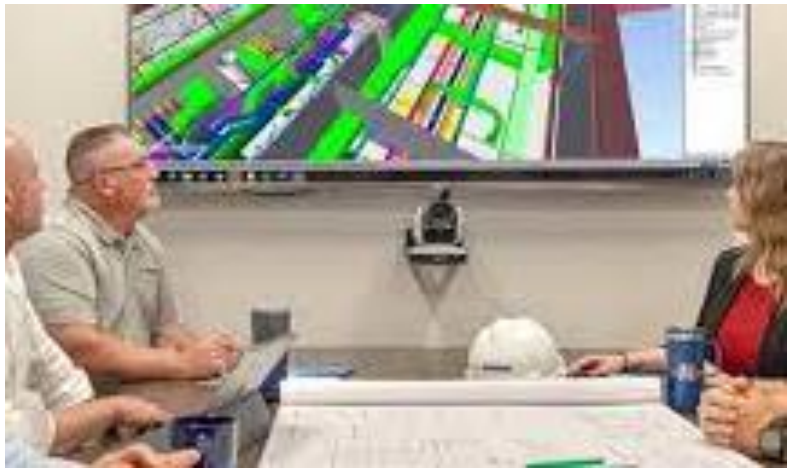
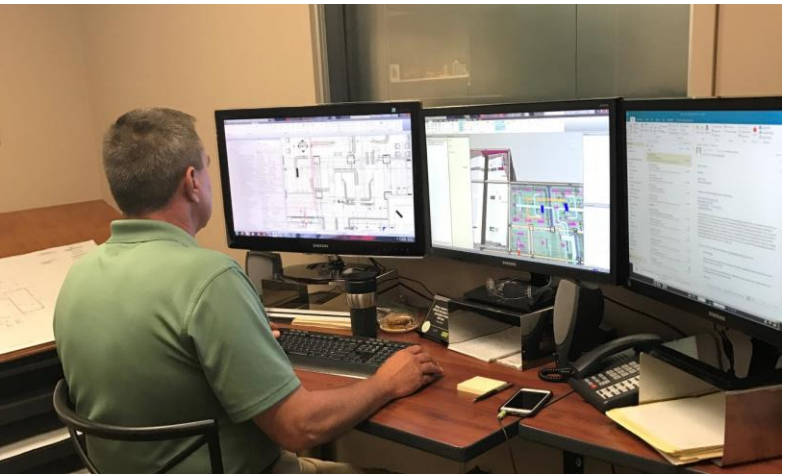
A3
A4
B3
B5
C3
C4





BIM Coordination Team

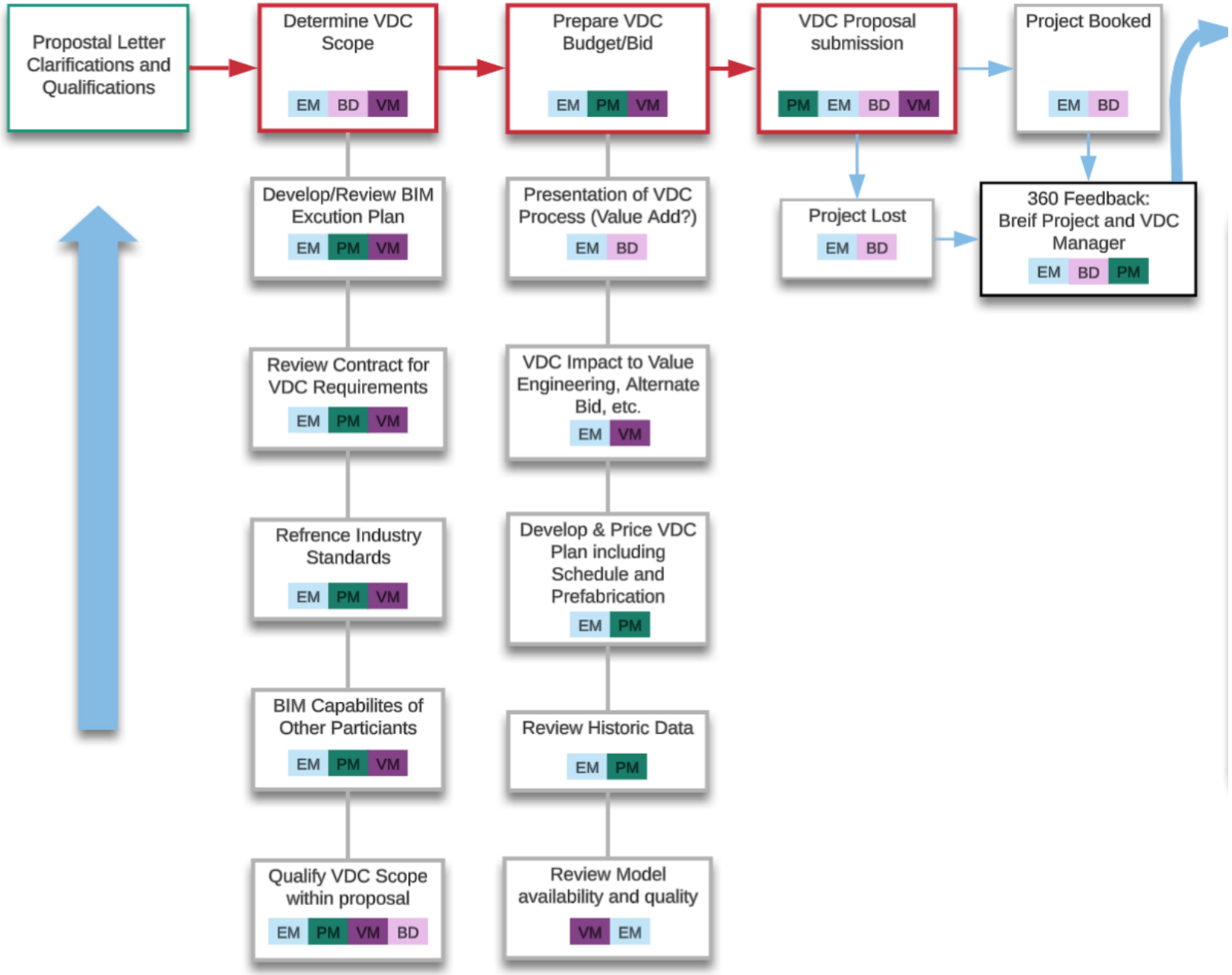
- BIM Coordination Lead
- BIM Detailers for all Trades
- Project Managers
- Superintendents/Foremen
- Architect/Engineer Team
- Owner Group (Construction & Maintenance)

Mech Project Team

- Superintendents/Foremen
- Project Manager
- VDC/BIM Lead
- Fabrication Team
- Procurement Team
- Logistics Team

Call In	Job #	Job Name	Package Name	Package ID	OM eceived	BOM Due Date	Drawing Due Date	Install Drawing Comple...	Fabrication Due Date	% Complete	Jobsite Delivery Due Date	Har
	4321	IUH 345 MP	9E PP CW SS	1834	☐	07/31/25	08/07/25	☐	08/21/25	100%	08/22/25	
	4321	IUH		1746	☐	07/31/25	08/07/25	☐	08/21/25		08/22/25	
	4321	IUH 345 MP	LVL5-O12NC SAV TCV	1824	☑	02/06/25	02/13/25	☐	02/27/25	100%	02/28/25	
			Core Locations	4430	☑	05/23/25	05/30/25	☐	06/13/25		06/16/25	
	4443	Needmore	Needmore Coil Pack Fabricatio	Needmore	☐	06/12/25	06/19/25	☐	07/03/25	99%	07/04/25	
	4443	Shawswick	Shawswick Coil Pack Fabricatic	Shawswic	☐	06/12/25	06/19/25	☐	07/03/25	99%	07/04/25	
	4321	IUH 345 MP	LVL14-T12C VAV TCV	2400	☐	06/16/25	06/23/25	☐	07/07/25	87%	07/08/25	
	4321	IUH 345 MP	LVL14-T12N VAV TCV	2401	☐	06/16/25	06/23/25	☐	07/07/25	84%	07/08/25	
	4321	IUH 345 MP	LVL14-T12S VAV TCV	2402	☐	06/16/25	06/23/25	☐	07/07/25	82%	07/08/25	
	4430	Simtra Greenl	BFP Stands	2580	☐	07/09/25	07/16/25	☐	07/30/25		07/31/25	
	4430	Simtra Greenl	1D PP2 Hangers	2622	☑	07/15/25	07/22/25	☐	08/05/25	100%	08/06/25	1
	4457	NAF R.O Tank		Erik H Fat	☐	07/17/25	07/24/25	☐	08/07/25		08/08/25	
	4471	TMMI		Hangers	☐	07/17/25	07/24/25	☐	08/07/25		08/08/25	
	4321	IUH 345 MP	16E MP Copper	2324	☑	11/21/25	11/28/25	☐	12/12/25	100%	12/13/25	
	4321	IUH 345 MP	PHB MP CD	2610	☐	07/24/25	07/31/25	☐	08/14/25	100%	08/15/25	
	4321	IUH 345 MP	PHB MP Copper	2526	☐	07/24/25	07/31/25	☐	08/14/25	100%	08/15/25	
	4321	IUH 345 MP	PHD MP Copper	2528	☐	07/24/25	07/31/25	☐	08/14/25	100%	08/15/25	
	4321	IUH 345 MP	PHF MP Copper	2529	☑	07/24/25	07/31/25	☐	08/14/25	100%	08/15/25	
	4321	IUH 345 MP	PH D PP CW Copper	2530	☑	07/24/25	07/31/25	☐	08/14/25	100%	08/15/25	
	4321	IUH 345 MP	PH D PP HW Copper	2531	☑	07/24/25	07/31/25	☐	08/14/25	100%	08/15/25	
	4321	IUH 345 MP	PH F PP CW Copper	2532	☐	07/24/25	07/31/25	☐	08/14/25		08/15/25	
	4321	IUH 345 MP	PH F PP HW Copper	2533	☐	07/24/25	07/31/25	☐	08/14/25		08/15/25	
	25-0141760	Service		Water Boi	☐	07/25/25	08/01/25	☐	08/15/25		08/18/25	
	4321	IUH		Level 15 D	☐	07/25/25	08/01/25	☐	08/15/25		08/18/25	

Project Acquisition



Planning for Success

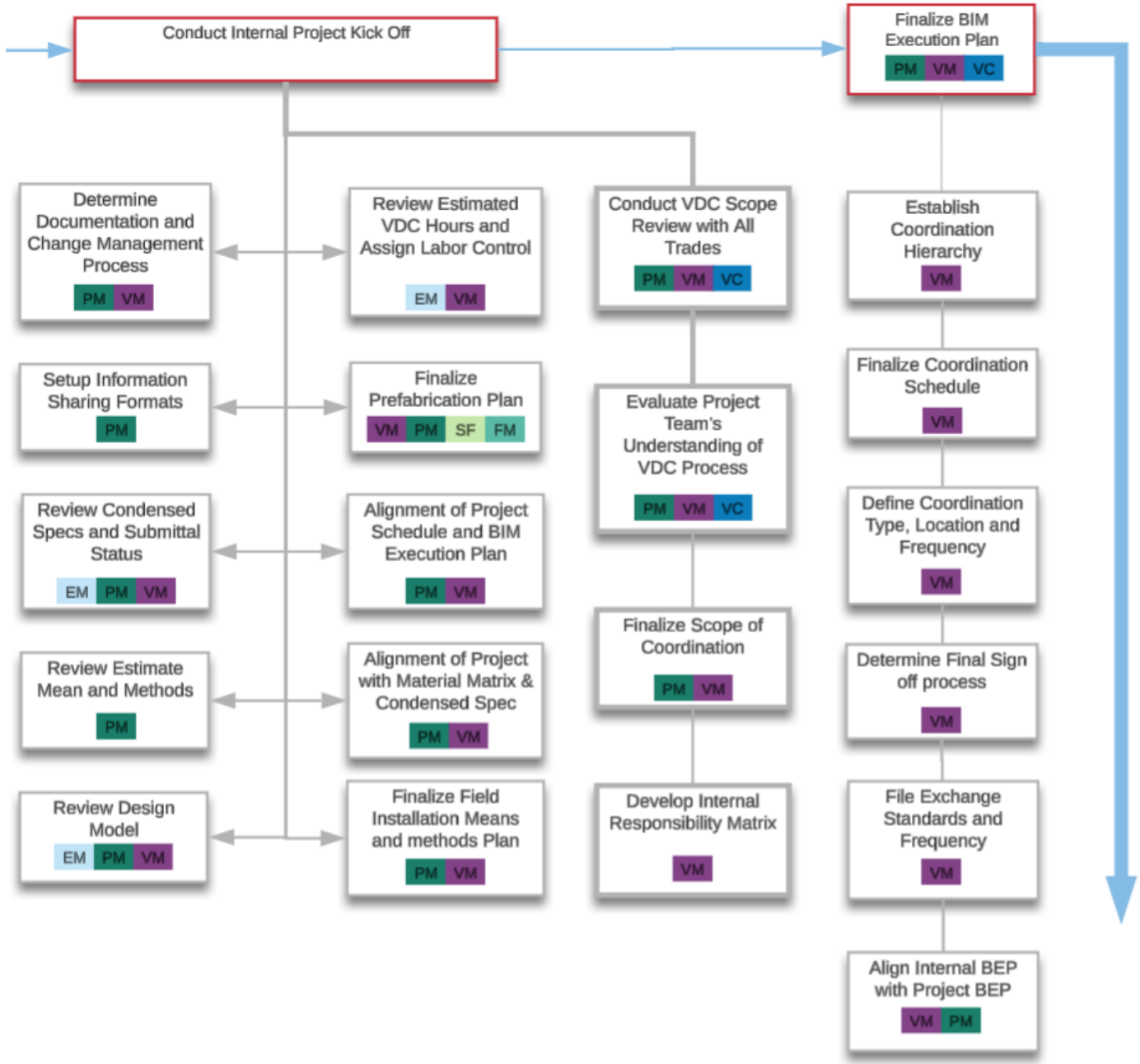
1. Do not start planning /condensed specifications without approved material submittals.

2. Project Manager needs to facilitate collaboration through the understanding of VDC process, BIM tools, planning personnel, as well as BIM scope, schedule, deliverables and deadlines. PM to take an active role in managing BIM labor.

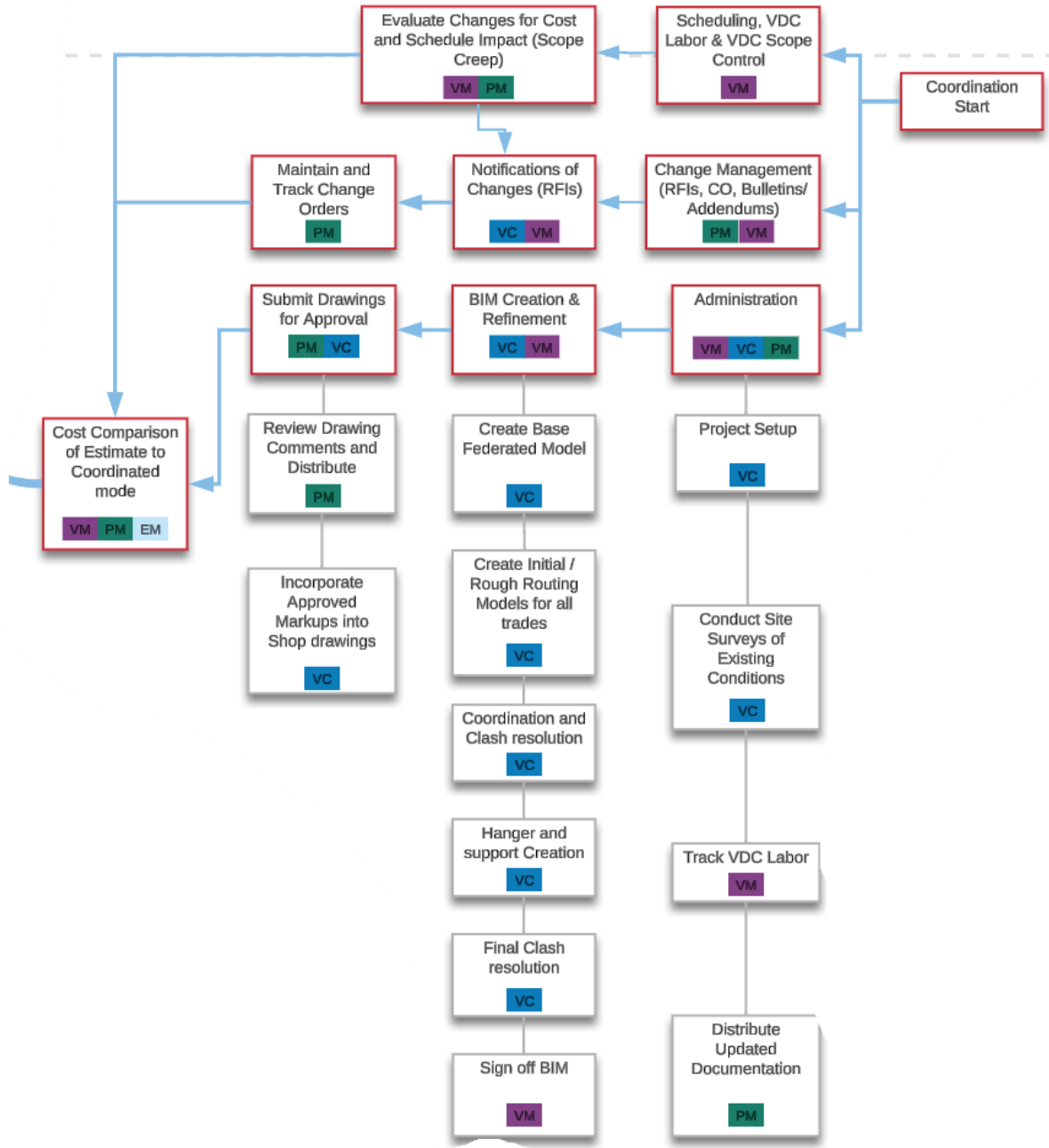
3. Do Project requirements align with the teams skill set or will additional support/ training be needed?

4. Early review contract documents for issues that go beyond the VDC scope for Coordination, and therefore Identify potential Change orders.

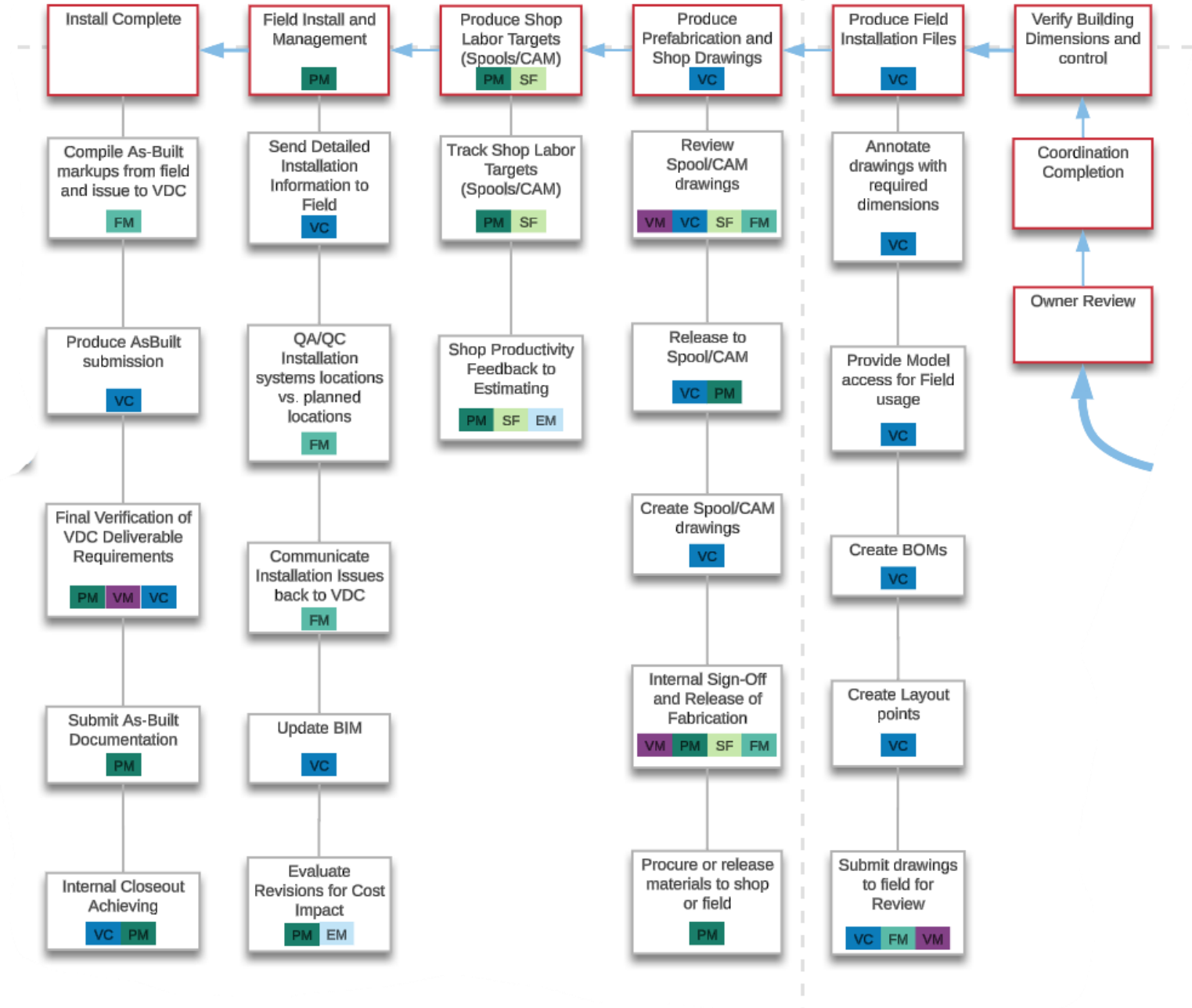
Pre-Construction



Planning/Coordination



Drawing Production, Pre-Fabrication & Installation



Post Job Review

360 Feedback:

Conduct Post-Mortem Meeting

These are the suggested Agenda topics and discussion points to be addressed. The following questions can help guide discussion and analysis of the project.

- How did final costs compare to estimated costs?
- What major assumptions were used in estimating the job? Were they accurate?
- What major variances occurred? What caused them?
- How did the time spent on VDC compare to the estimate?
- What factors affecting VDC hours should be considered for future planning?
- Did the VDC process follow the original schedule?
- How good were company relations with the following INTERNAL groups?
    - Estimating Manager
    - Operations Manager
    - Project Manager
    - Project Engineers
    - Purchasing Manager
    - Shop Foreman/Superintendent
    - Field Foreman/Superintendent
    - Safety Director
- How good were company relations with the following EXTERNAL groups?
    - Project Owner/Owner Rep.
    - Design Professionals
    - General Contractor or Construction Manager
    - Subcontractors
    - Other project Trades
    - Suppliers and Manufactures
- How well did the GC/CM treat the company during the VDC process in terms of:
    - Scheduling of meetings
    - Clash Detection/Resolution
    - Compared to other trades
    - Communication during installation
- Did the project team follow through with goals and procedures established during the pre-planning, particularly those for:
    - VDC Execution and Scope
    - Document controls and Submittals
    - Prefabrication and Shop drawings
- What were the project team's overall strengths
- What would the project team do differently on future projects

Why VDC?

- Increased Pre-planning
  - Reduction in risk for contractor and client
  - Reduction in schedule impacts due to identifying conflicts early

- Increased Fabrication Opportunity
  - Major safety impact
    - Reduction of crew size on the job site.
    - Work done in safe environment and at safe height
  - Increased efficiency due to tooling and ergonomics
  - Increased ability to hit schedule

- Positive side effects may include:
  - Increased project performance
  - Increased client satisfaction
  - Increased repeat business

Without VDC/FAB

Q & A

Resources

Successful VDC Management Flowchart

Achieving Spatial Coordination through BIM – A Guide for Specialty Contractors.