

23RD ANNUAL



23RD LCI CONGRESS
OCTOBER 19-22

Project schedule optimization through team collaboration and elimination of silos

Reiner Holton – HCA Healthcare

Michelle Leonard & Payton McGuirk – Gilbane Building Company

Cheryl Saale – Gould Turner

LEARN BY DOING FROM THOSE WHO DO

October 21th, 2021

Health precautions to keep everyone as safe as possible at Congress:

- Wear masks at all times in indoor events.
- Complete your daily health screening on your phone and bring it with you when you enter the center each day.
- Practice social distancing to the extent possible. Seating at plenary sessions is being structured to help with this.
- If you feel ill at any time, please leave the conference and return to your room/consult a physician as necessary.
- Ultimately, our collective health and safety at Congress is up to all of us. Thanks for your support!





Reiner Holton
Sr. Construction Manager
HCA Healthcare



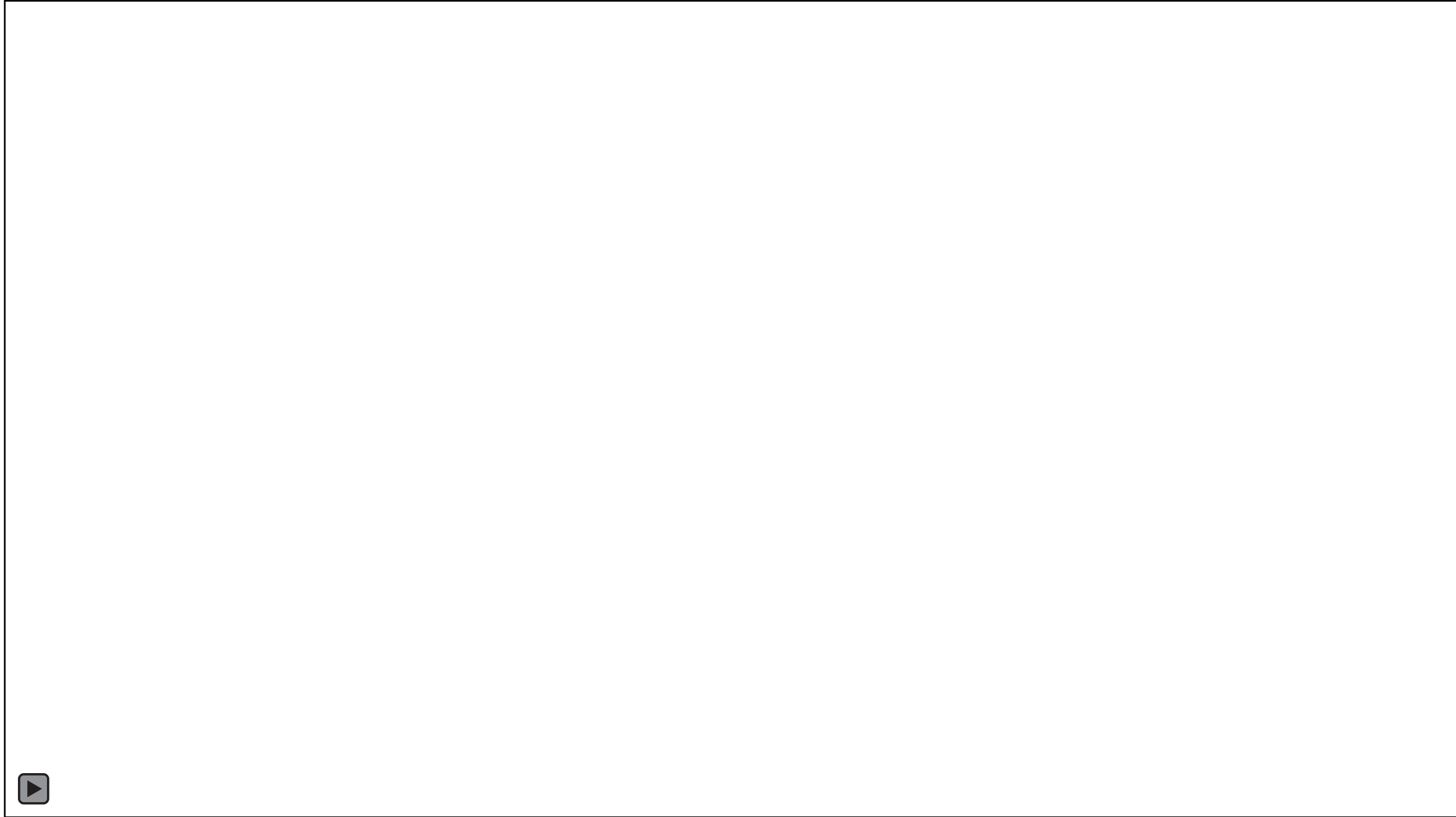
Cheryl Saale
Vice President
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Michelle Leonard
VDC Manager
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Payton McGuirk
Project Engineer
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Problem Statement:

HCA had a critical shortage of beds on the Oak Hill Hospital campus. The challenge was to improve the speed to market by utilizing prefabricated and modular components with the collaboration of EDI partners, design teams and construction management teams.

HCA Healthcare Lean Process

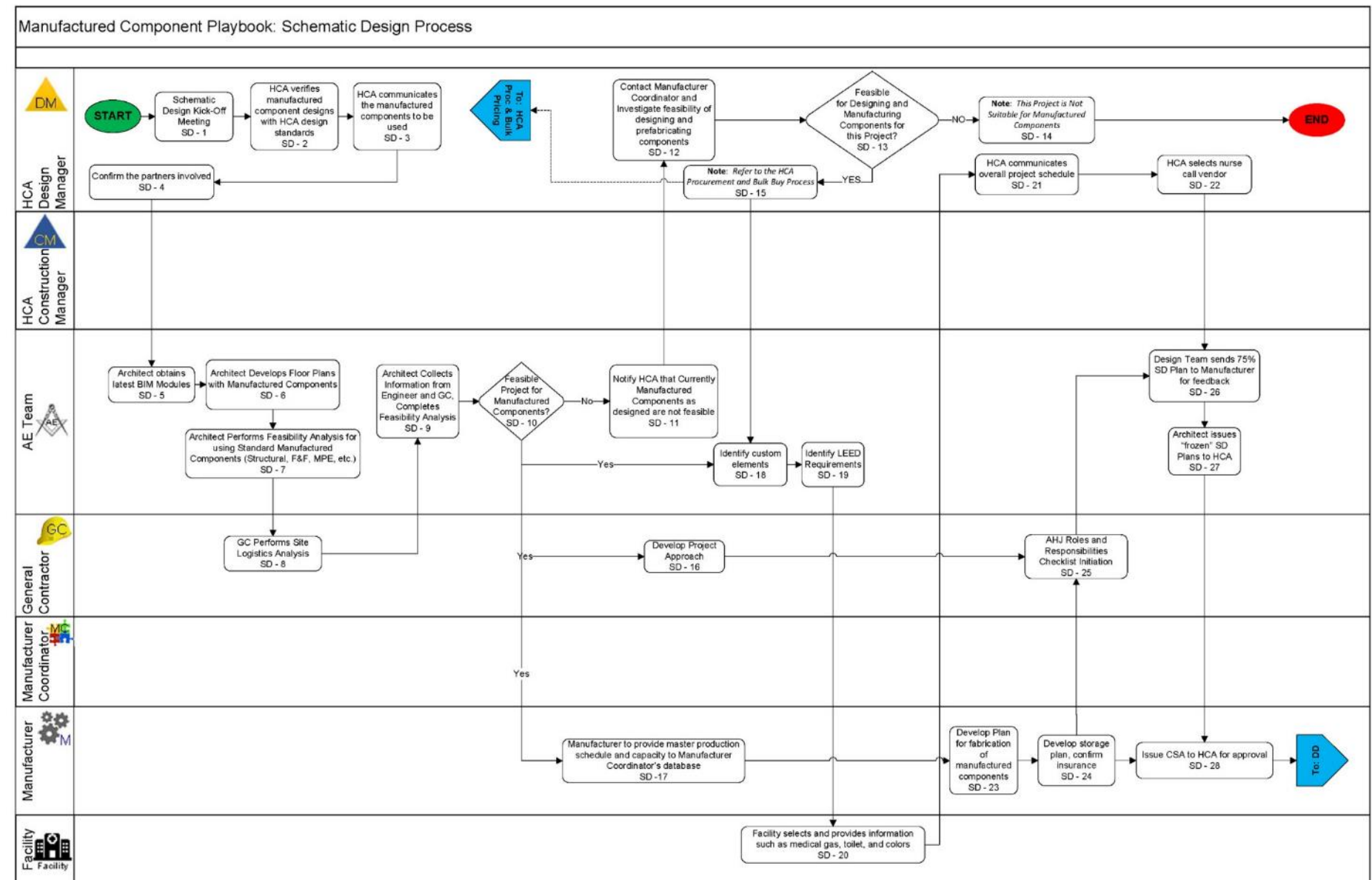
- Identification of Prefabrication Items
 - MEP Racks
 - Head Walls/Sink Walls/Foot Walls
 - Bathroom Pods
- Early Design Involvement (EDI) Program
 - Goal Setting
 - Timing of Partner Involvement
 - Holistic Project Schedule Approach
 - Collaboration
 - Process Optimization
 - Continuous Improvement



HCA Healthcare Lean Process

- Four Distinct Project Segments

- Team Selection
- Project Kick-off
- Integrated Design
- Construction



Internal Program Level Prefab Planning

- High level criteria is applied to project pipeline
 - Dollar value
 - Type of project
 - Location
 - Project goals
 - Delivery approach

Prefab is considered with the overall Lean project delivery approach

Review Date	Facility / Project Information	SF		General Information	Leadership Decisions:																		
7/3/2019 (Rev 1)	Facility: Sunny Side Hospital USA	New: 150,000 SF	Major Reno: 68,621 SF	Project Type: Horizontal Expansion	EDI/20%: <input type="checkbox"/> Y <input type="checkbox"/> N																		
	Project/eBuildID: New Tower / 3281900017	Shell: 0 SF	Minor Reno: 57,469 SF		LEED: <input type="checkbox"/> Y <input type="checkbox"/> N																		
	Funded Amount: \$50,000,000	Garage: 0 SF	Cosmetic: 0 SF	CEP: 2,930 SF																			
Scope: Component 1: 1st and 2nd Floor Expansion <ul style="list-style-type: none"> Powerhouse Addition 1st Floor <ul style="list-style-type: none"> Shell space Marketing/Volunteer Services business office relocation Conference Rooms Doctors Dining/Servery Relocation/Renovation Administration Expansion/Renovation 2nd Floor – Expansion/Renovation <ul style="list-style-type: none"> OR Expansion (8 ORs) <ul style="list-style-type: none"> 4 Heart ORs 2 Neuro ORs 1 General OR PACU Expansion (33 Bays) Prep/Staging Expansion (9) Doctor's Lounge and Lockers, Offices, Lab, Waiting & Support 3rd Floor <ul style="list-style-type: none"> Mechanical Rooms 																							
Recommendations: <table border="1"> <thead> <tr> <th colspan="6">Prefab: Patient Room Modules</th> </tr> <tr> <th>HW</th> <th>FW</th> <th>SW</th> <th>BATH</th> <th>CHART</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>						Prefab: Patient Room Modules						HW	FW	SW	BATH	CHART	TOTAL	0	0	0	0	0	0
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Analysis: <table border="1"> <thead> <tr> <th colspan="2">Prefab: Exterior Wall Panels</th> </tr> <tr> <th>Expansion Type</th> <th>Horizontal Expansion</th> </tr> </thead> <tbody> <tr> <td>Approx. SF</td> <td>150,000 SF</td> </tr> </tbody> </table>						Prefab: Exterior Wall Panels		Expansion Type	Horizontal Expansion	Approx. SF	150,000 SF												
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Team Resources DM: Wideman CM: Morgan GC: M/P Trade: Elec. Trade: Other:																							
Component 2: 1st Floor - CSS Expansion/Renovation and EVS Relocation Component 3: 2nd Floor – Existing Surgery/PACU/Staging Finish Renovation Component 4: 3rd Floor – Shell and 3rd Floor AHU Component 5: 3rd Floor – 3rd Floor ICU Bed Expansion (36) and Materials Management renovations Component 6: 4th Floor – Shell Component 7: 5th Floor – Shell Component 8: 4th Floor – Med/Surg. Beds (36) Component 9: 1st Floor Renovations <ul style="list-style-type: none"> Lab Relocation Pharmacy Expansion/Renovation Plant Ops Relocation Clean Linen and Soil Linen Relocation Biomed Relocation Lab AHU Relocation Dietary AHU Relocation 																							
Component 10: 1st Floor Kitchen Renovations <ul style="list-style-type: none"> Kitchen/ Main Servery/ Dining HIM Relocation Component 11: Loading Dock Expansion/Renovation Component 12: 2nd Floor ICU Finish Renovation Component 13: 2nd Floor Med/Surg Renovations																							

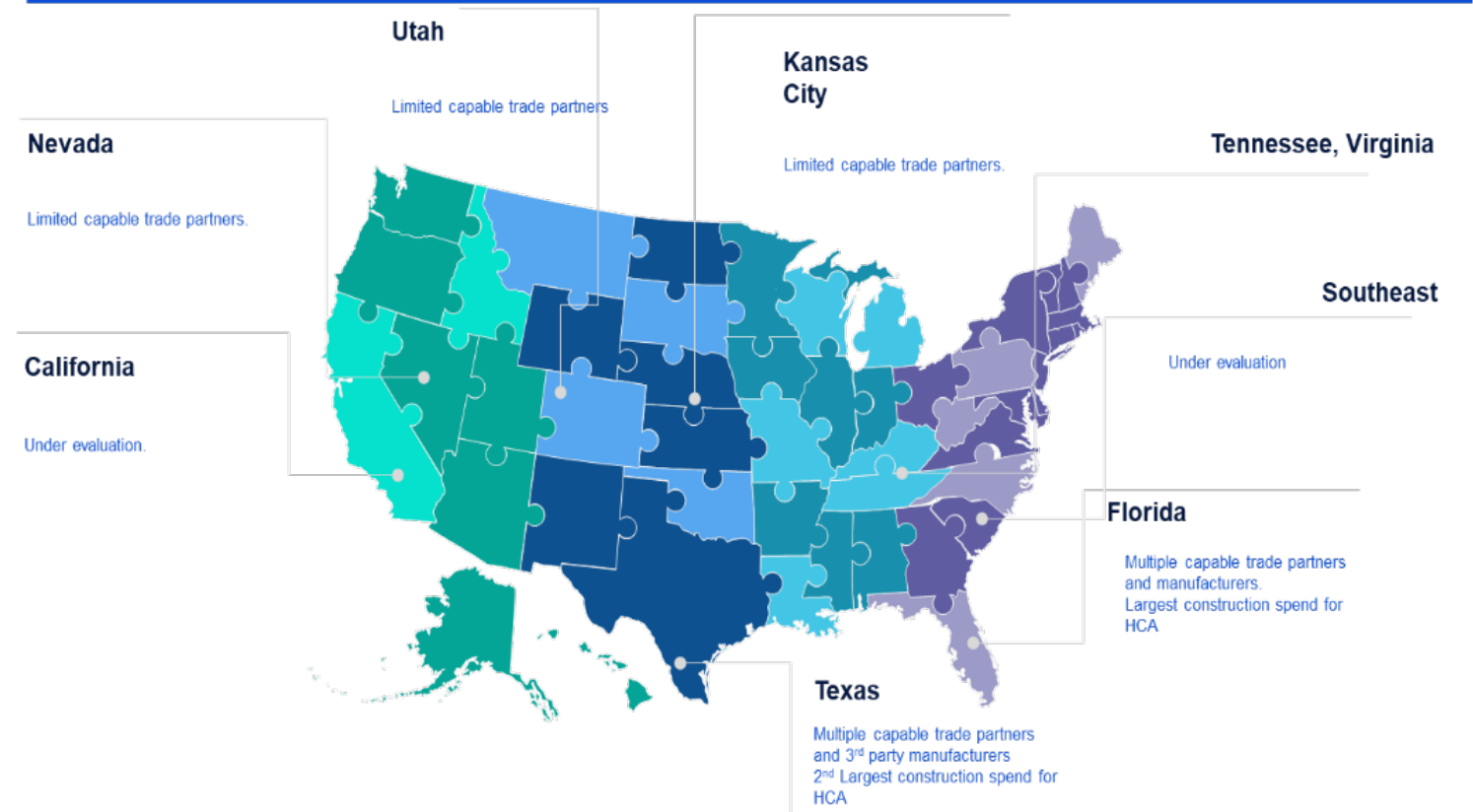
Sample only – not an actual project

Internal Program Level Prefab Planning

- CM/DM project level planning for prefab
 - BCIP – High level milestones
 - Prefab partner involvement timing
 - Specific goals and levels of prefab are developed
 - Evaluation of market and available resources

A prefab strategy for each project is developed before design starts

Evaluating and Building Prefab Capabilities by Market



CM evaluate supply chain in area for prefab
Qualified 3rd party and trade partners
Local labor market – availability and cost

Oak Hill Hospital Expansion Project Overview

- Project Overview:

- Addition of approximately 58,000 SF
- 4th Floor (34 Patient Rooms) & 5th Floor (Shell) & Mechanical Penthouse & Completed 5th Floor Beds
- I-2 Occupancy and Construction Type 1A, Essential Facility
- Brooksville, FL – Risk Category IV- Wind Zone 3 (150 mph)
- \$25,000,000 Construction, 24-month schedule included Early-release Steel Package

- Project Challenges:

- Tight Project Schedule
- Additional 5th Floor Build-Out
- MEP Rack Supports
- NICU Conversion 4th Floor

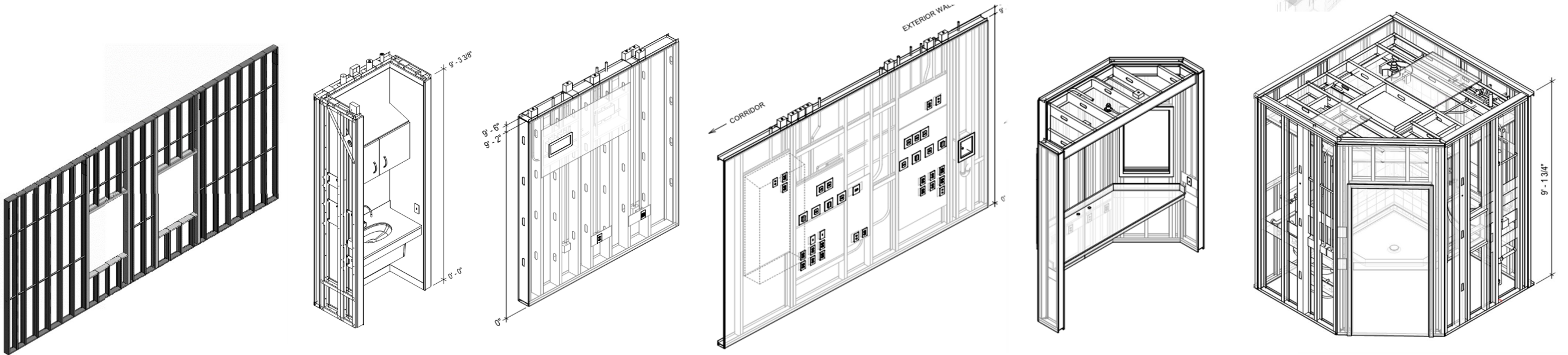
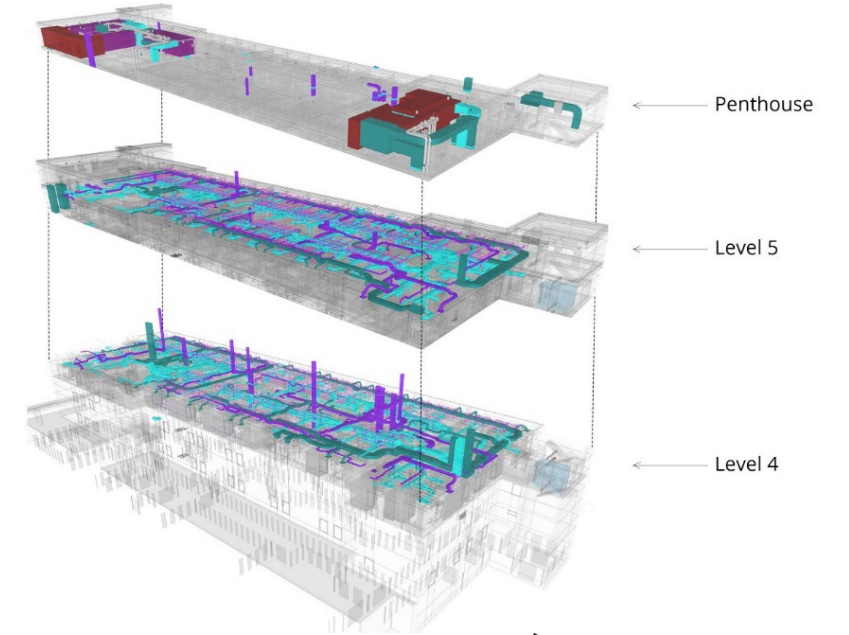
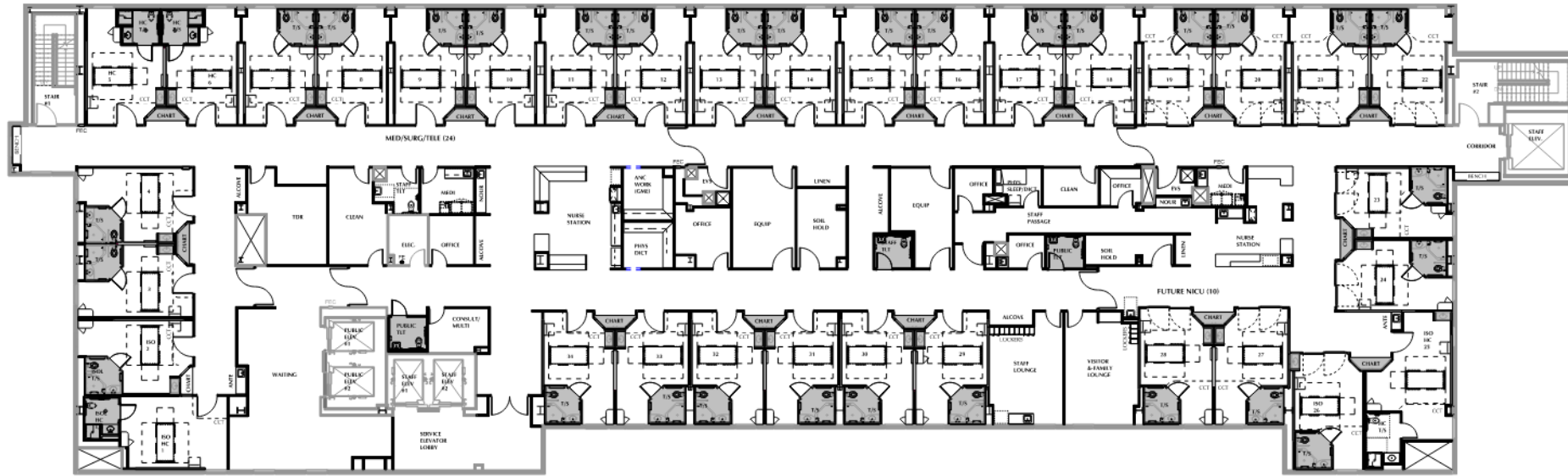


Oak Hill Hospital Expansion Project Overview

- Owner Involvement:
 - HCA's "Manufactured Components Playbook"
 - Design Managers
 - Construction Managers
- Design Team Involvement: Consulting Engineers Collaboration and Coordination
 - MEP toilets not on beams
 - Structural Engineer frame
 - Variation of centerlines
 - 4" and 6" exterior wall depths
- Contractor Involvement: EDI
 - When to engage Vendors
 - Existing structure - decide panels
 - MEP Racks by Vendor or Contractor off-site



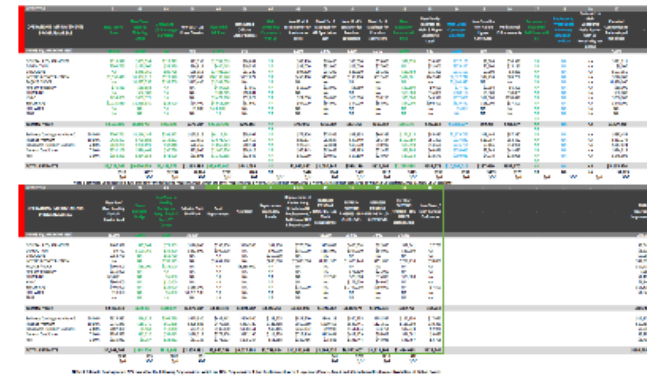
Oak Hill Hospital Expansion Project Overview



Setting the Stage for Success



Harnessing a Lean Approach



Target Value Design



Design-Assist



Prefabrication



Pull Planning TAKT



BIM & Virtual Project Coordination



Quality Control / Continuous Improvement

VALUE CREATION
IS OUR CORE
OBJECTIVE

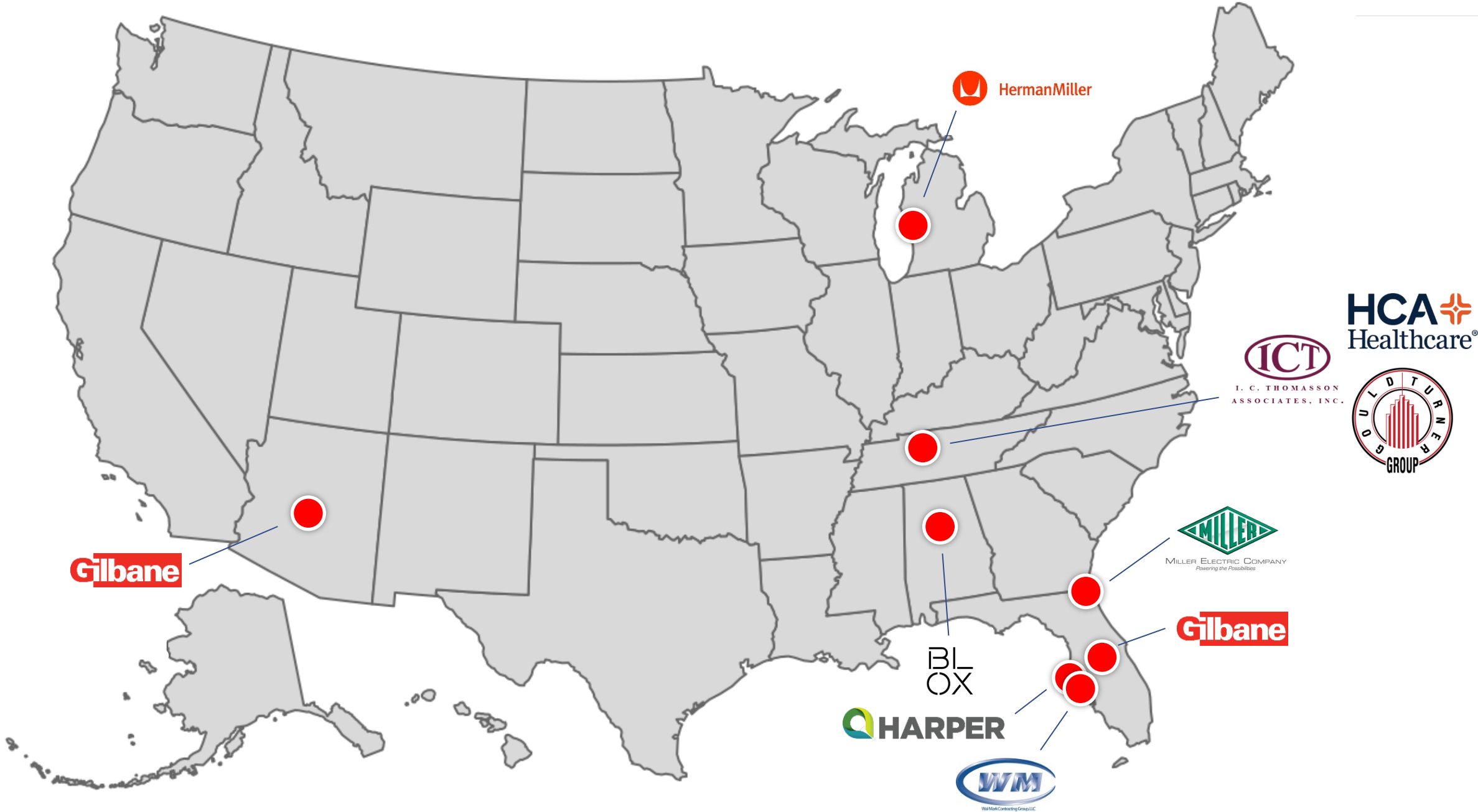
Collaboration of Team Members

- A Commitment to **Building Lean**
- Three Key Collaboration Factors for Success of the Project:
 - Time/Schedule
 - Coordination
 - Quality

**Agree upon Goals and Create
Buy-in from All Project Stakeholders!**

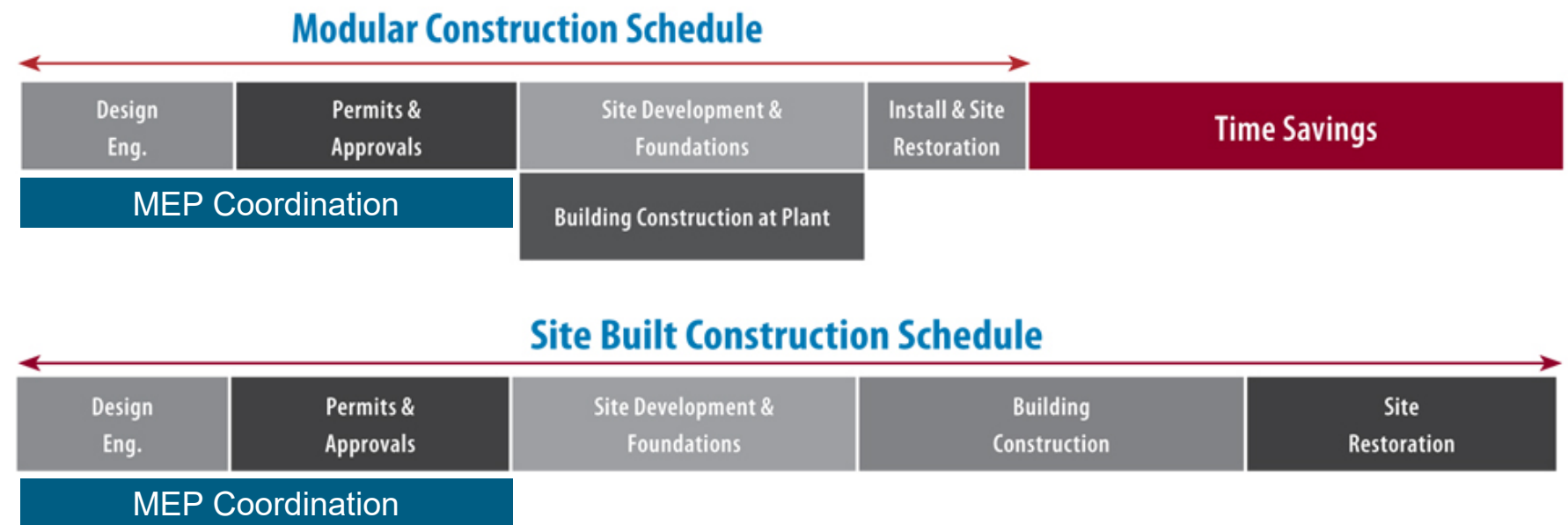
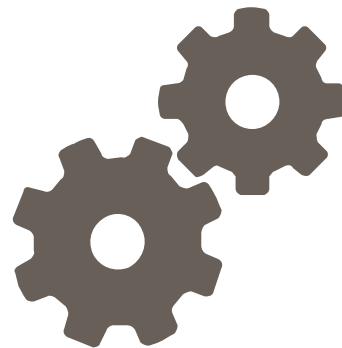


Key Prefab & Coordination Enablers



Coordination Schedule Overview

- HCA Development Package (included Prefab): May 2017 (Issued)
- Design: Apr-18 to Sept-18 5 Months
- Design Coordination : Jun-18 to Aug-18 3 Months
 - Design Assist Initiated Corridor MEP Racks
- Trade Coordination: Nov-18 to Jun-19 6 Months
- Construction Duration: Dec-18 to Feb-20 (Passed AHCA) 14 Months
 - MEP Rack Fabrication
 - MEP Rack Installation

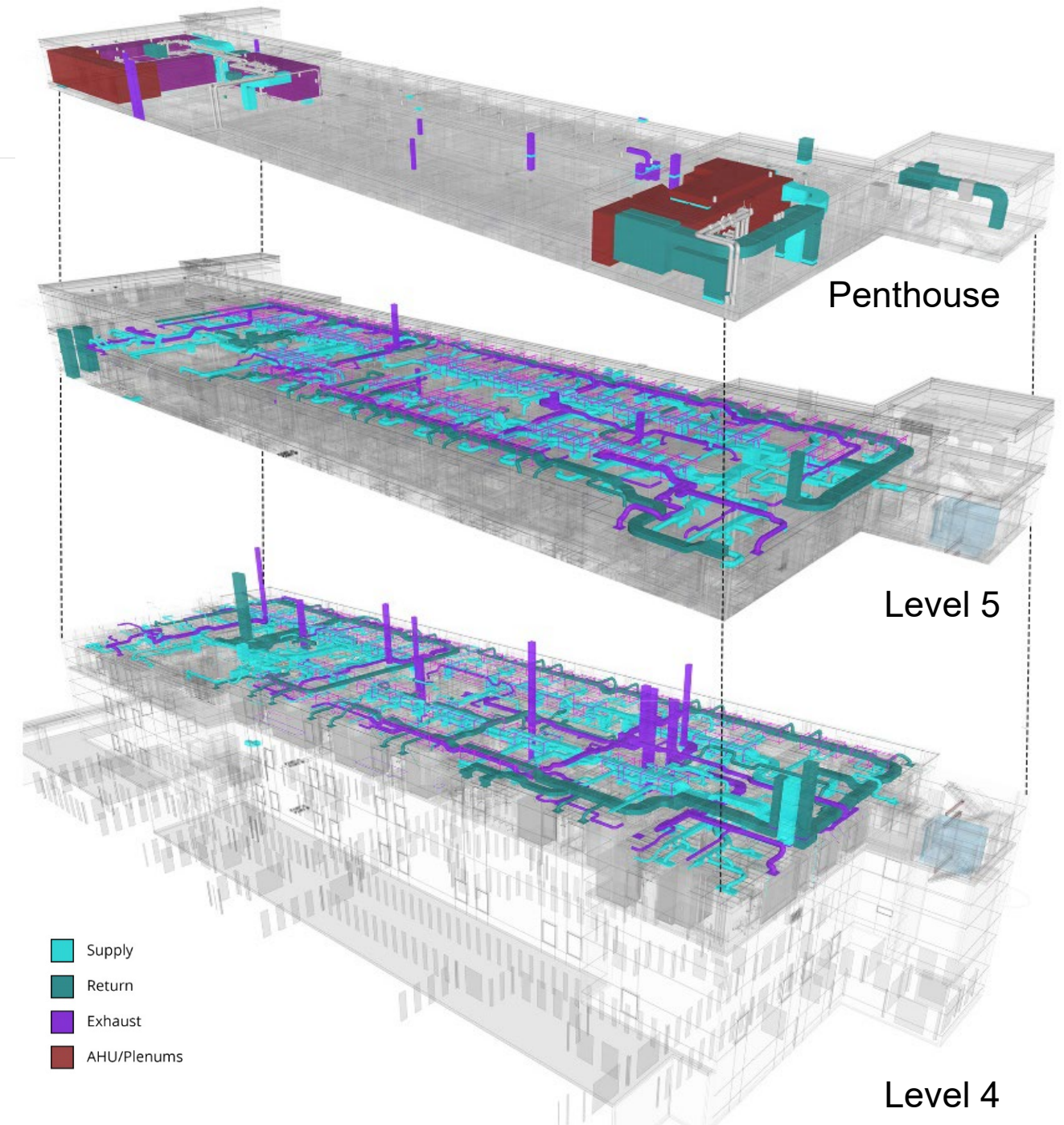


Coordination/Team Collaboration

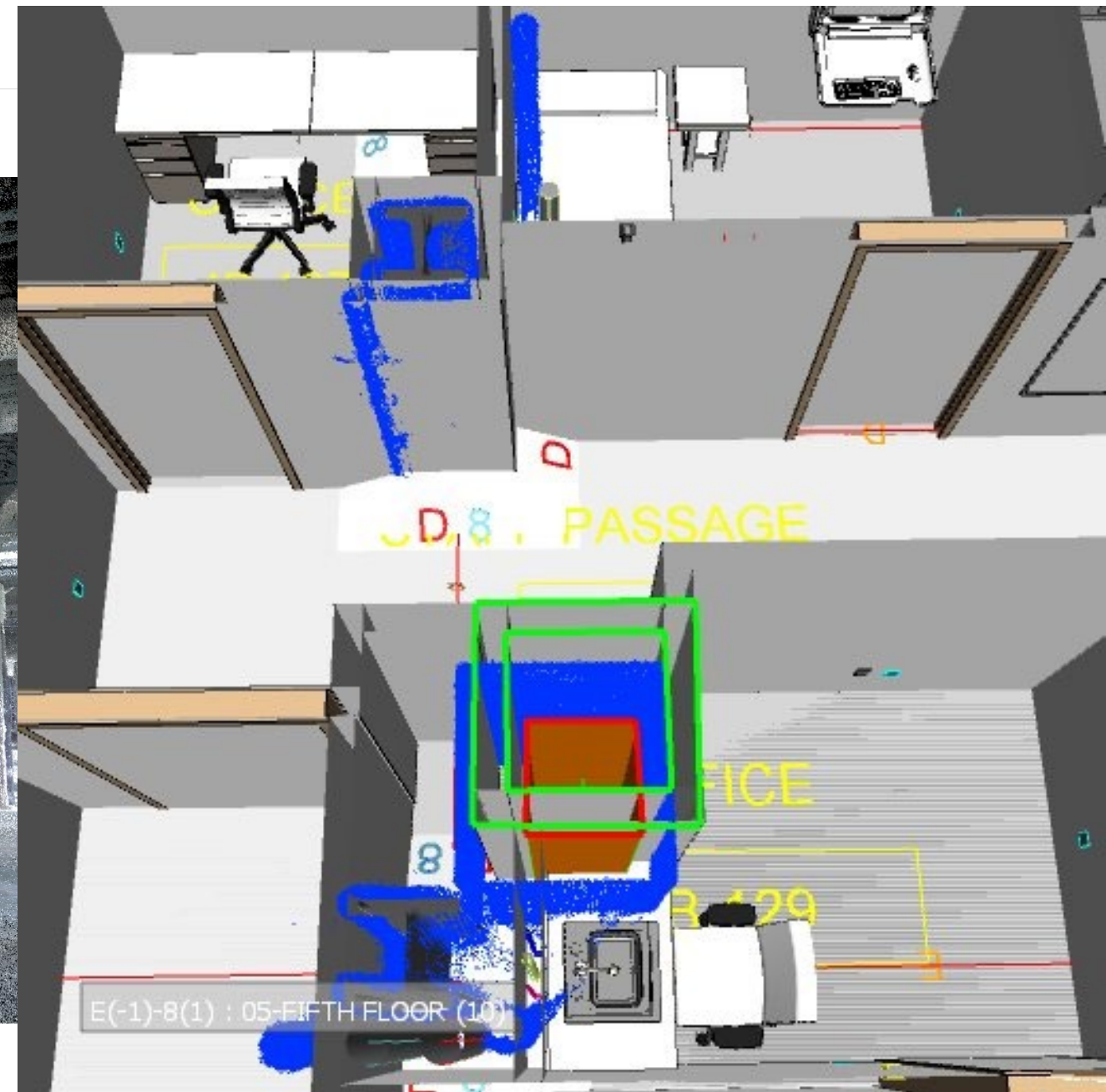
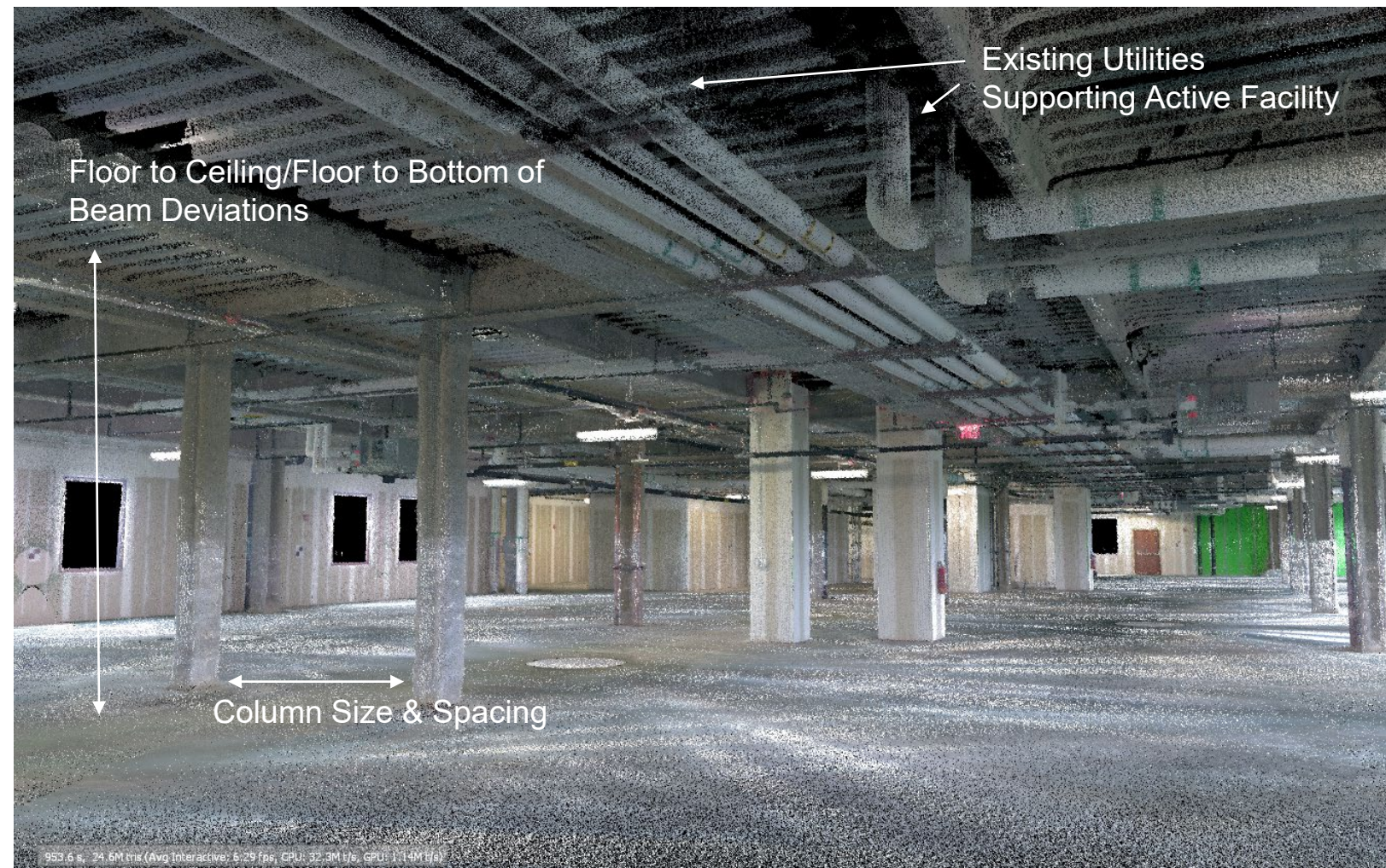


Team Collaboration Highlights

1. Laser Scanning
 - Building is Not Square
 - Plumbing riser location discrepancies
2. Exterior Skin & Panel Coordination
 - Connection detail of EFIS panel was iterated to maximize flexibility
 - Top rail on building and steel on panel achieved a 3 ¼" adjustment with design of L-Bracket
3. Utility Racks
 - Coordinated after design phase
 - Enable accelerated schedule
 - Set runs for racks enabled wall framing to begin earlier

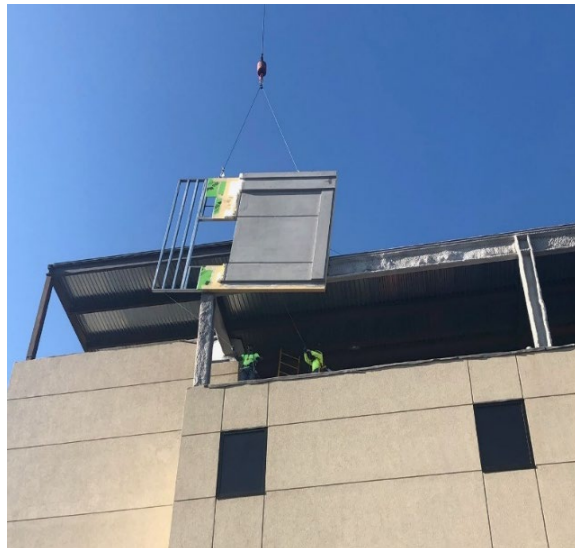
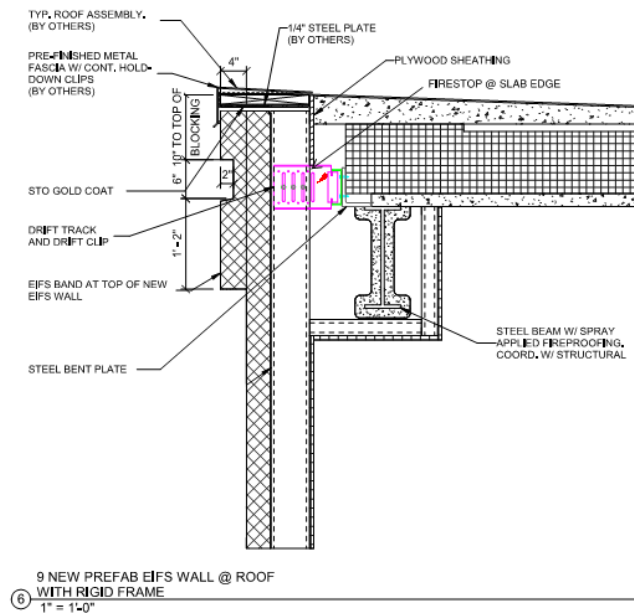


Ensure Accurate As-Builts:

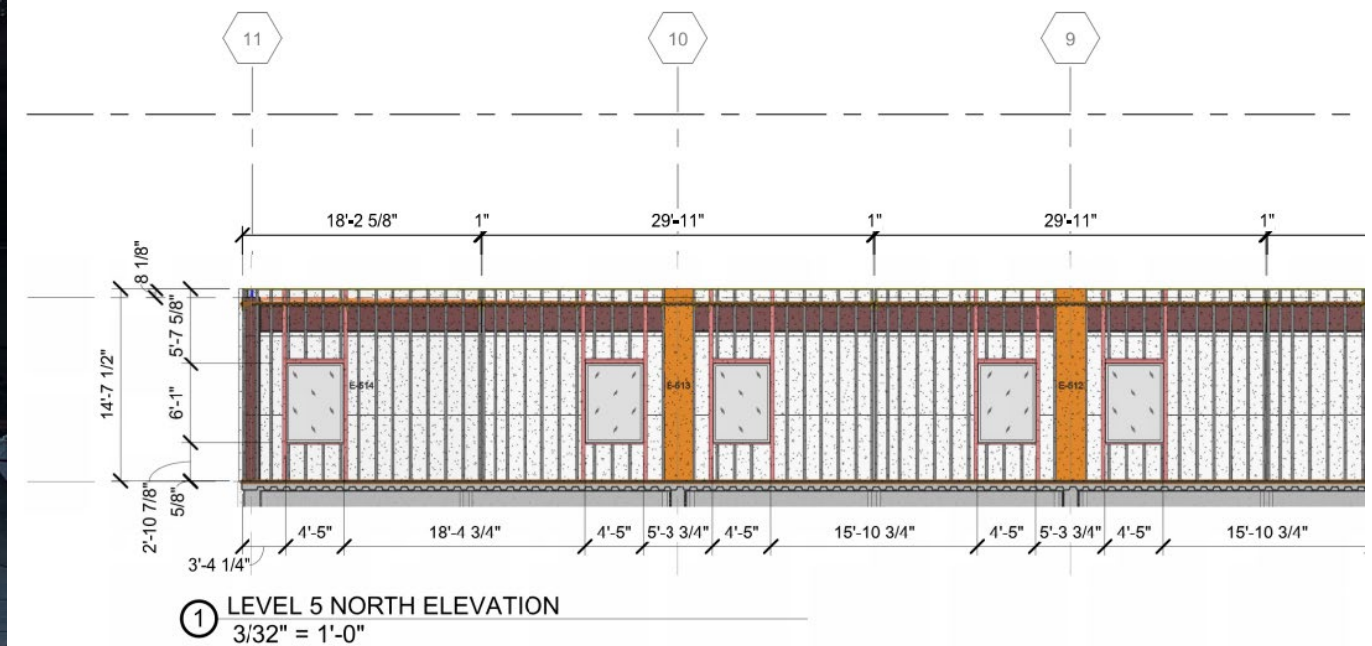


Will it fit the first time? Are our planning tools reliable? What controls are driving our design documents?

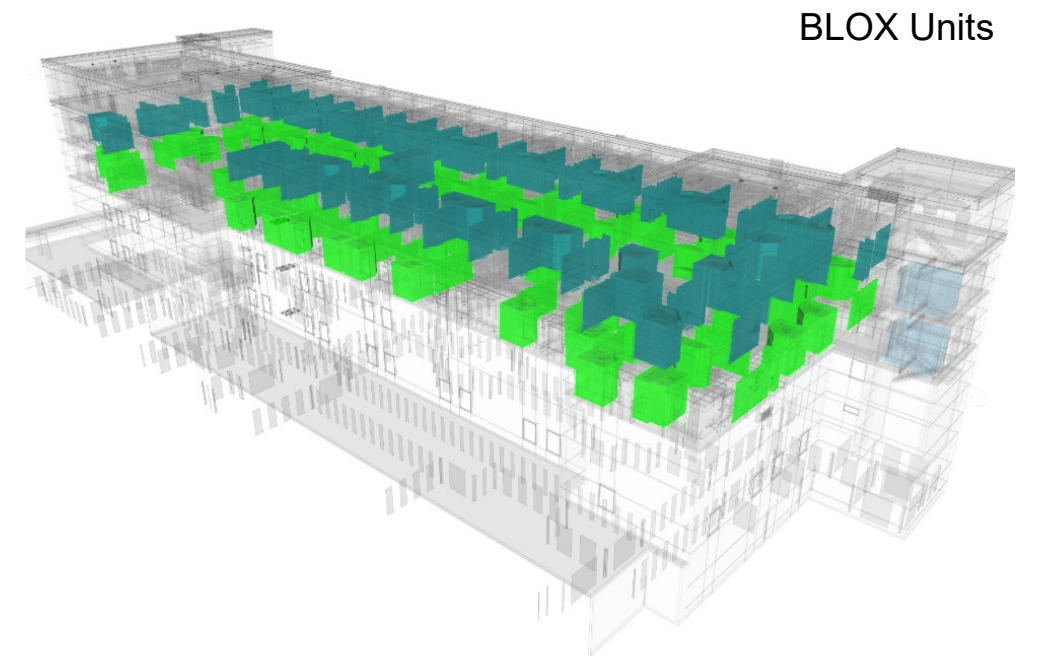
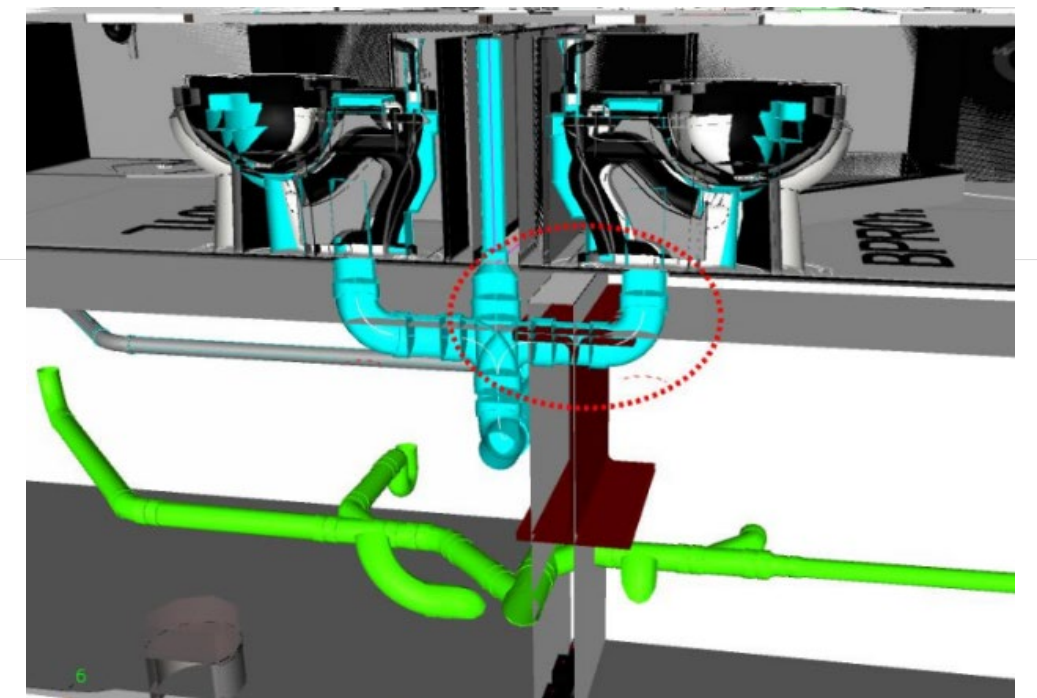
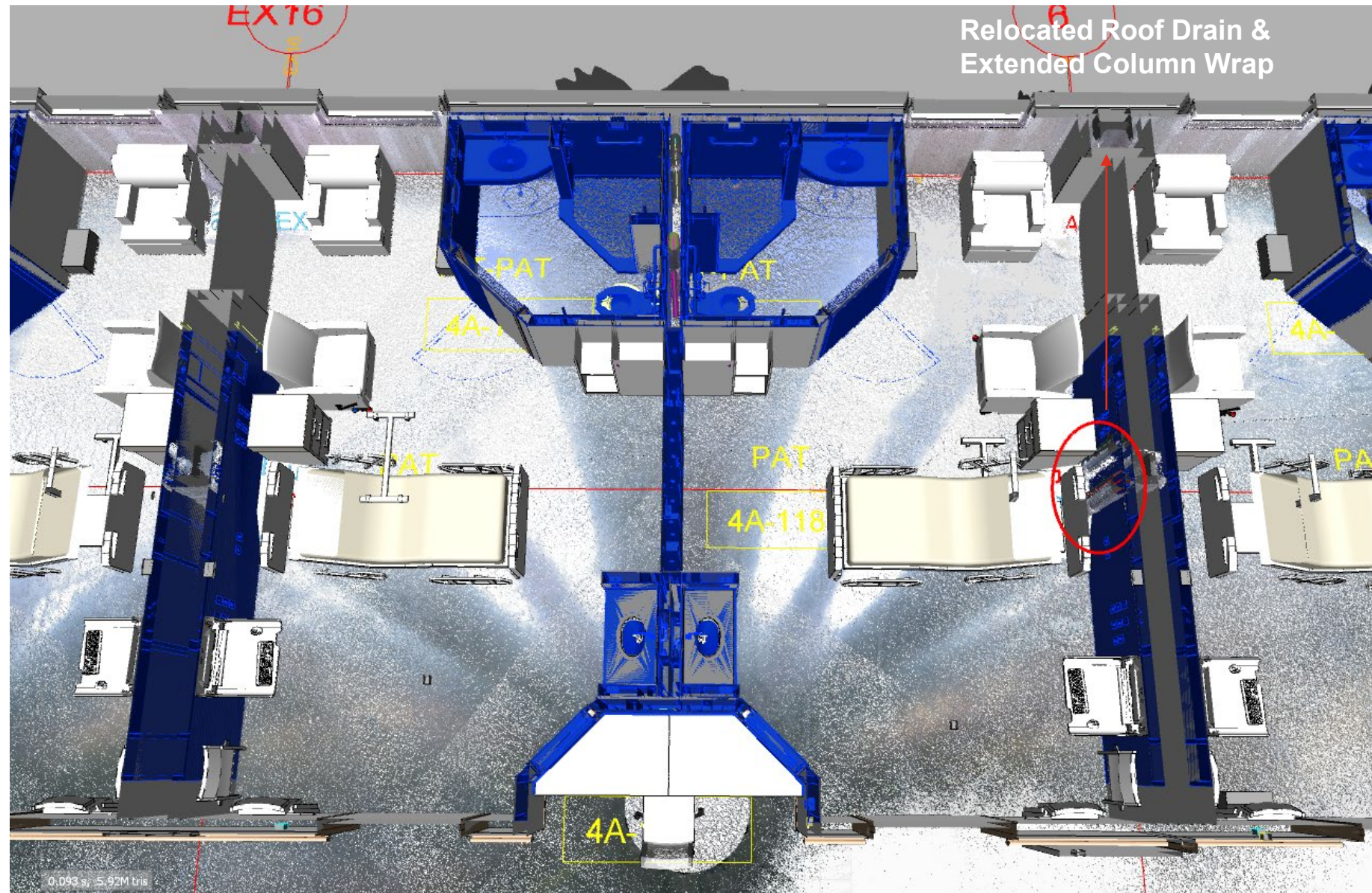
Maximize Flexibility in Prefabricated Connections

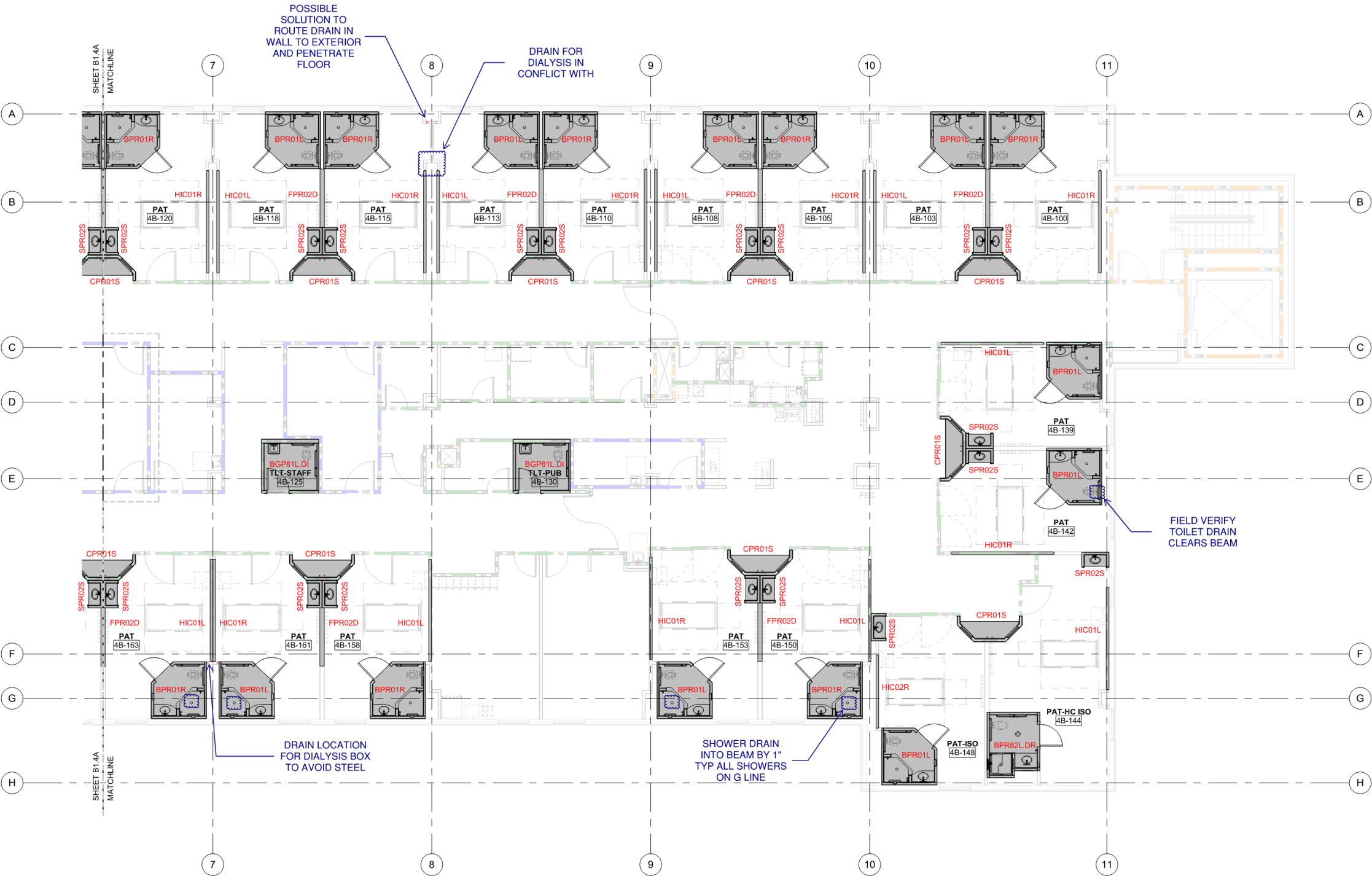


- ✓ Level 5 Dry-in: 6 Days
- ✓ Laser Scanning for existing dimensions
- ✓ Panel Joint coordination with architect
- ✓ Panel attachment design coordination



Respond to Existing Conditions:





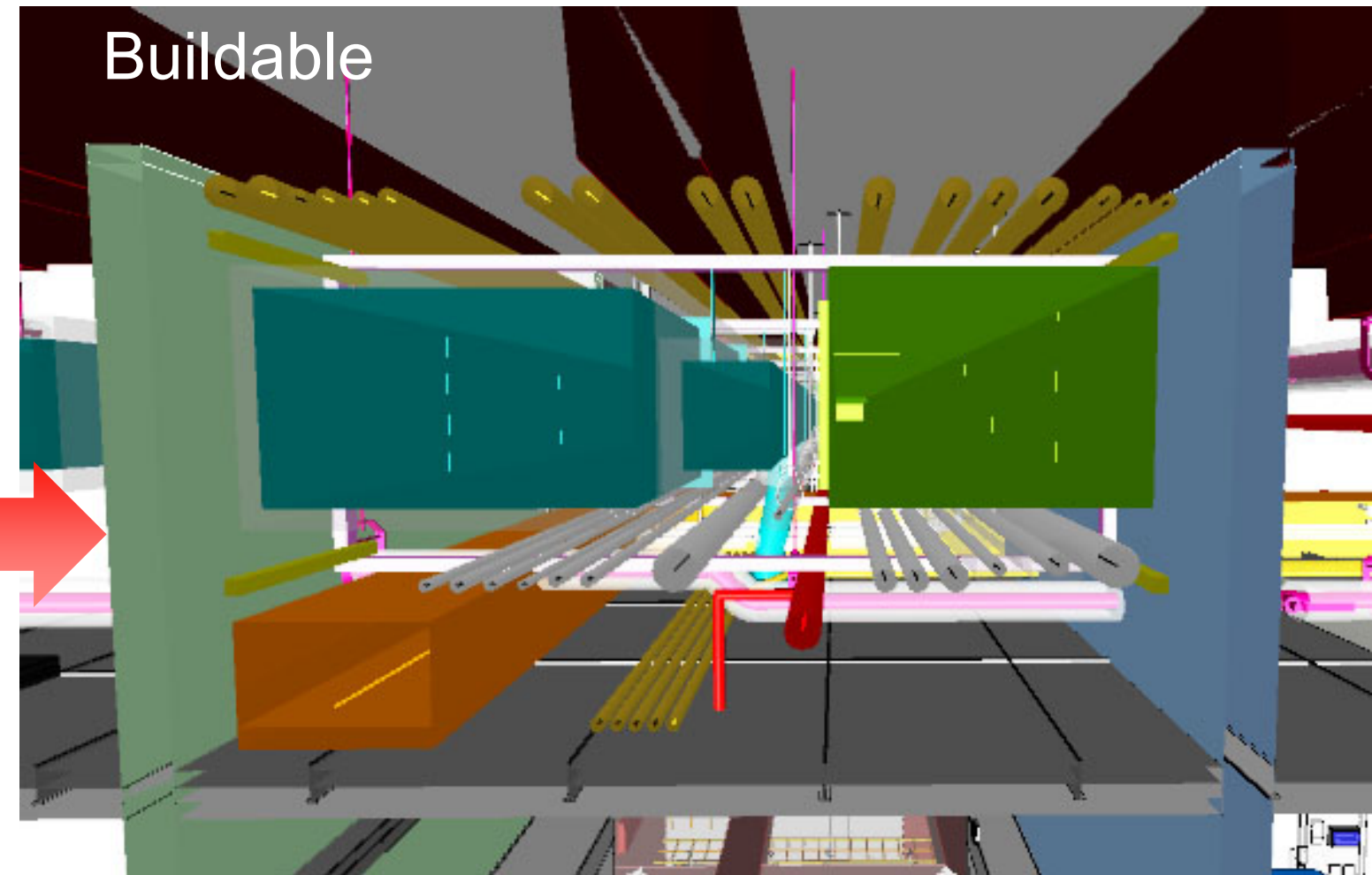
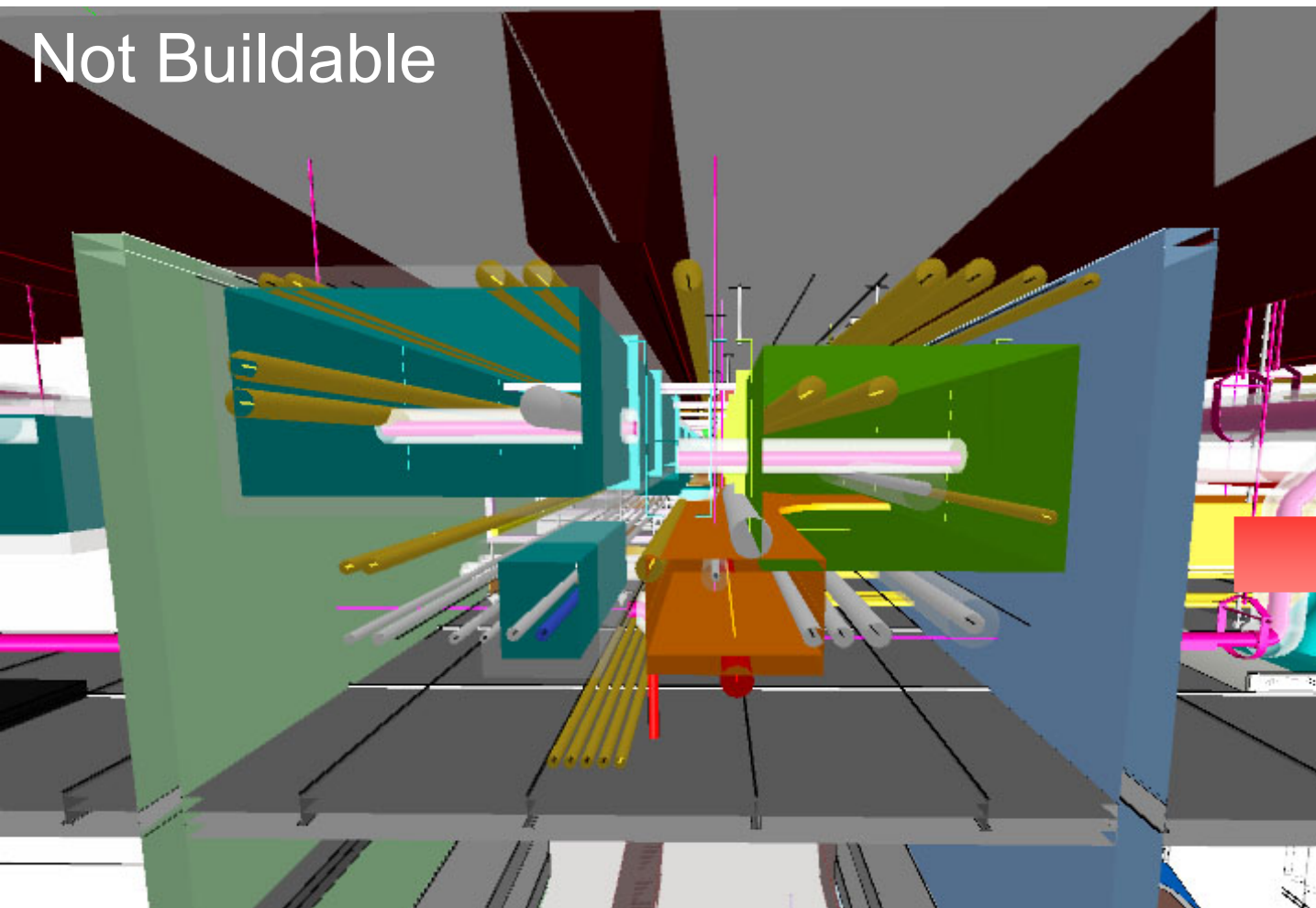
Advanced Sequencing for Just in Time Delivery

		7:00 AM	7:05 AM	7:10 AM	7:15 AM	7:20 AM	7:25 AM	7:30 AM	7:35 AM	7:40 AM	7:45 AM	7:50 AM	7:55 AM	8:00 AM	8:05 AM	8:10 AM	8:15 AM	8:20 AM	8:25 AM	8:30 AM	8:35 AM	8:40 AM	8:45 AM	8:50 AM	8:55 AM	9:00 AM	9:05 AM	9:10 AM	9:15 AM	9:20 AM	
BLOX	1	Inst																													
	2																														
Team 1	1	Stretch & Flex / Start Of Day	Bathroom Pod BPR01L										Bathroom Pod BPR01R																		
	2																														
	3																														
	4																														
Team 2	5	Stretch & Flex / Start Of Day	Sink Wall SW 1-3		Sink Wall SW 4-6		Sink Wall SW 7-8		Sink Wall SW 9-10		Charti Statio CS 01-																				
	6																														
	7		Trailer 5																												
	8																														
Team 3	9	Stretch & Flex / Start Of Day	Sink Wall SW 4-6		Sink Wall SW 7-8		Sink Wall SW 9-10		Charting Station Chart 01-02		Charti Statio Chart 0																				
	10																														
	11		Trailer 5													Trailer 6															



Prefab Utility Rack Collaboration

Design SD-DD	5 Months
Design Coord.	3 Months
Trade Coord.	6 Months
Construction	14 Months

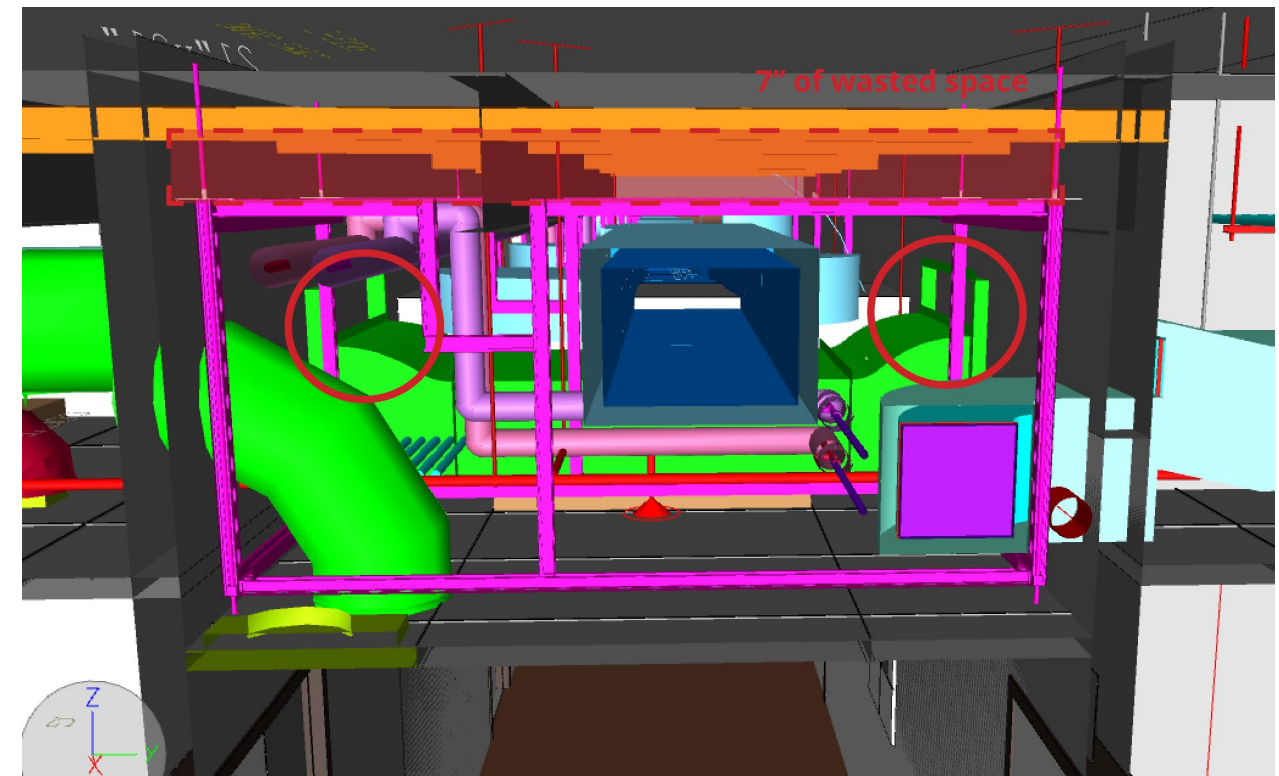
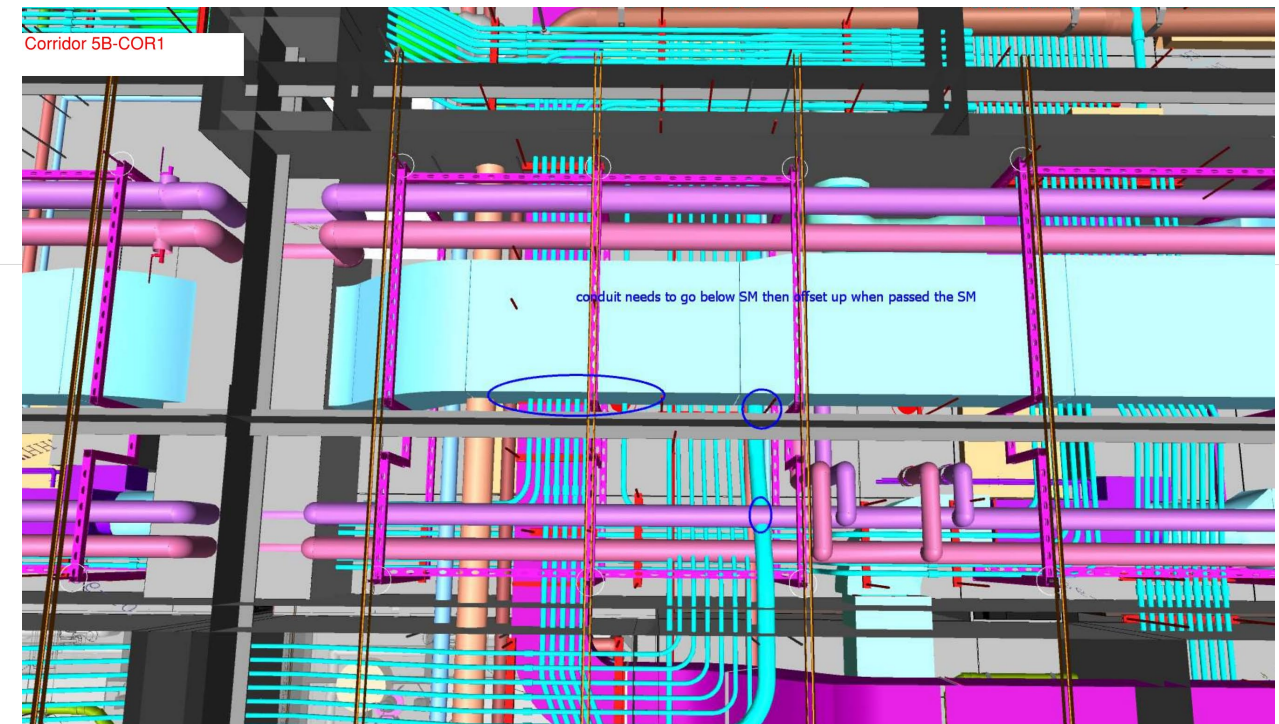


Prefab Utility Rack Collaboration

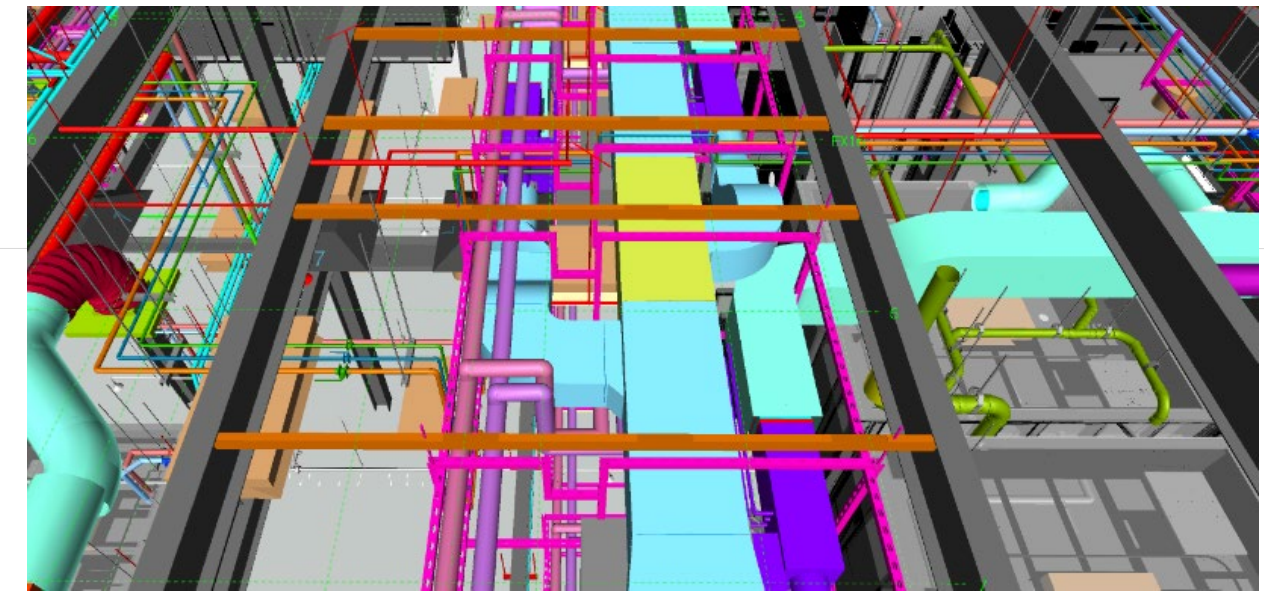
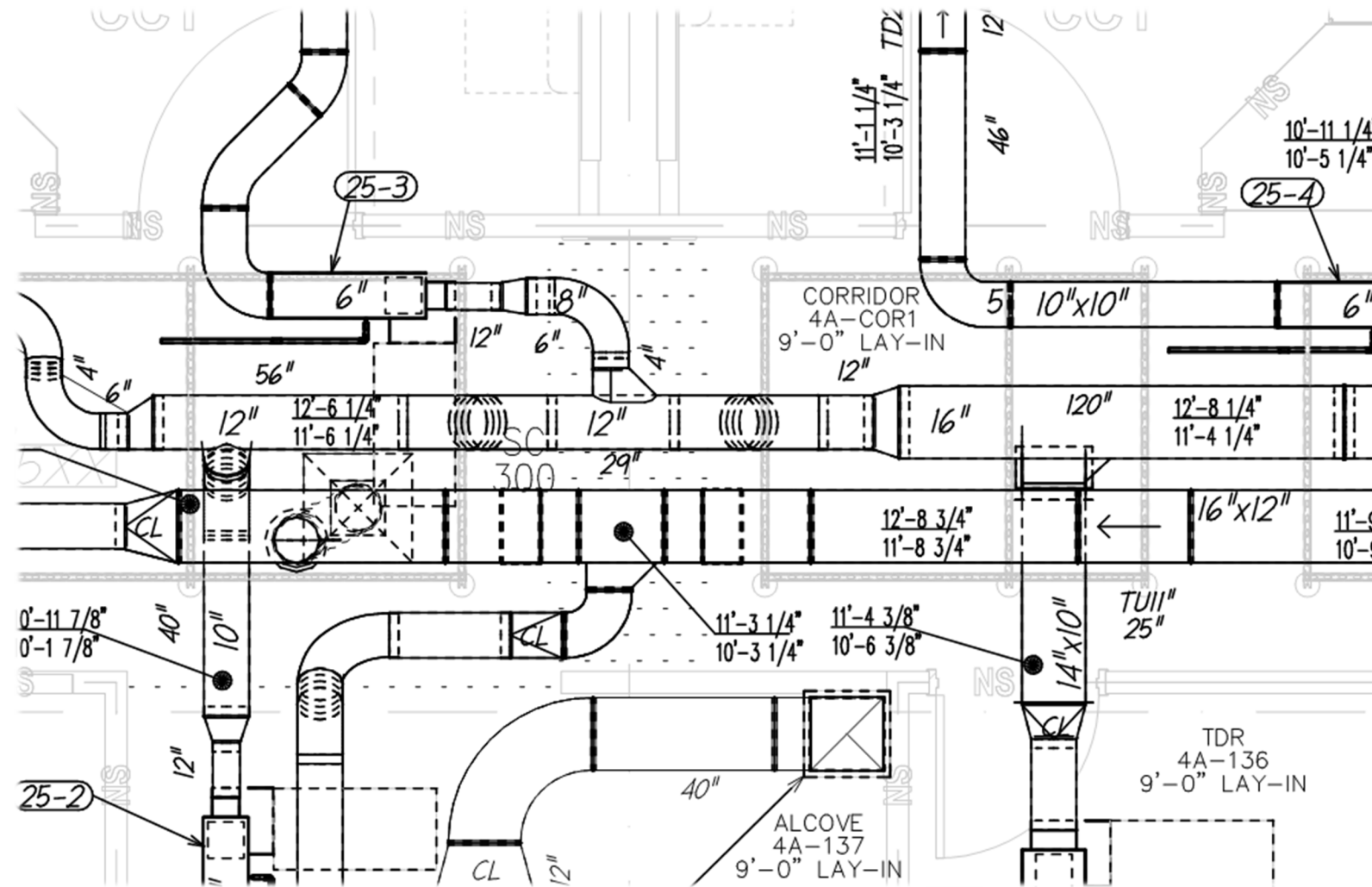
Issue: Mech Rack lowering in corridors, branch lines cannot cross without trapping water if lowered below rack

Proposed Solution: Introduce additional fire mains on north and south sides of level 5 above patient rooms to avoid crossing corridors.

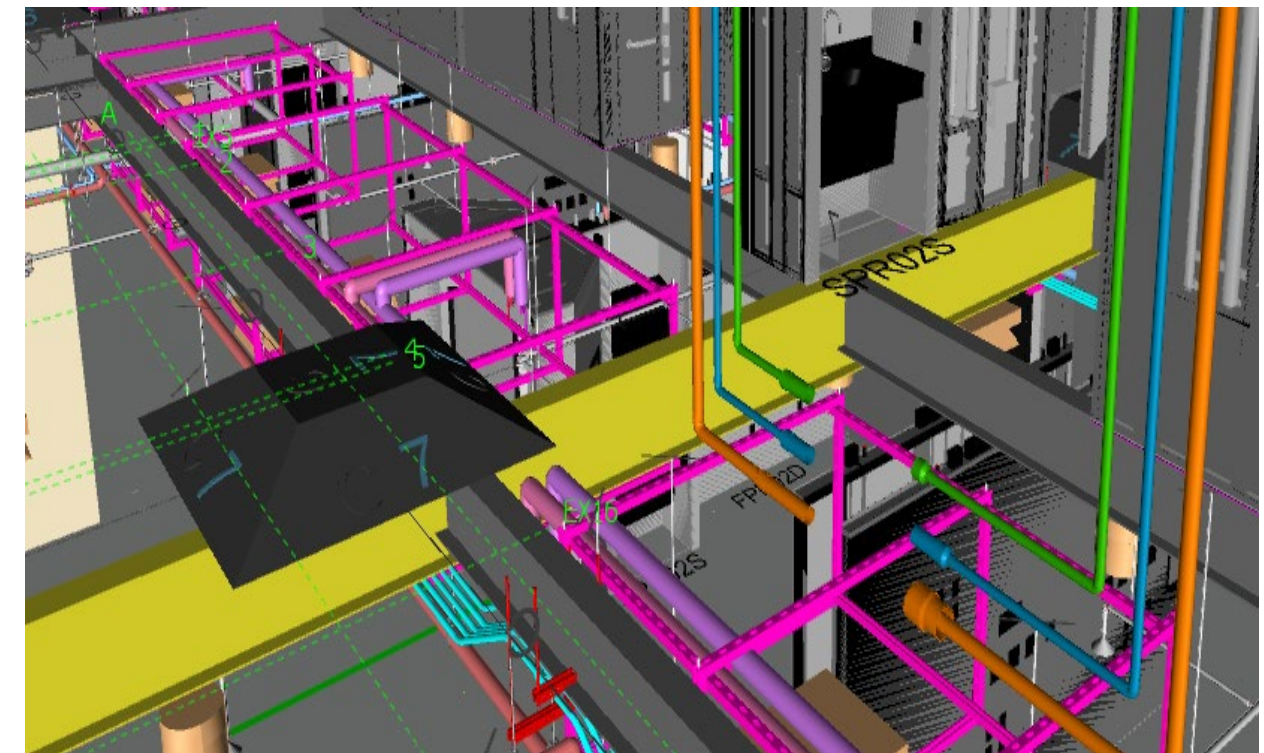
Current Fire main needs to be routed around light fixtures and diffusers down center of L5



Prefab Utility Rack Coordination

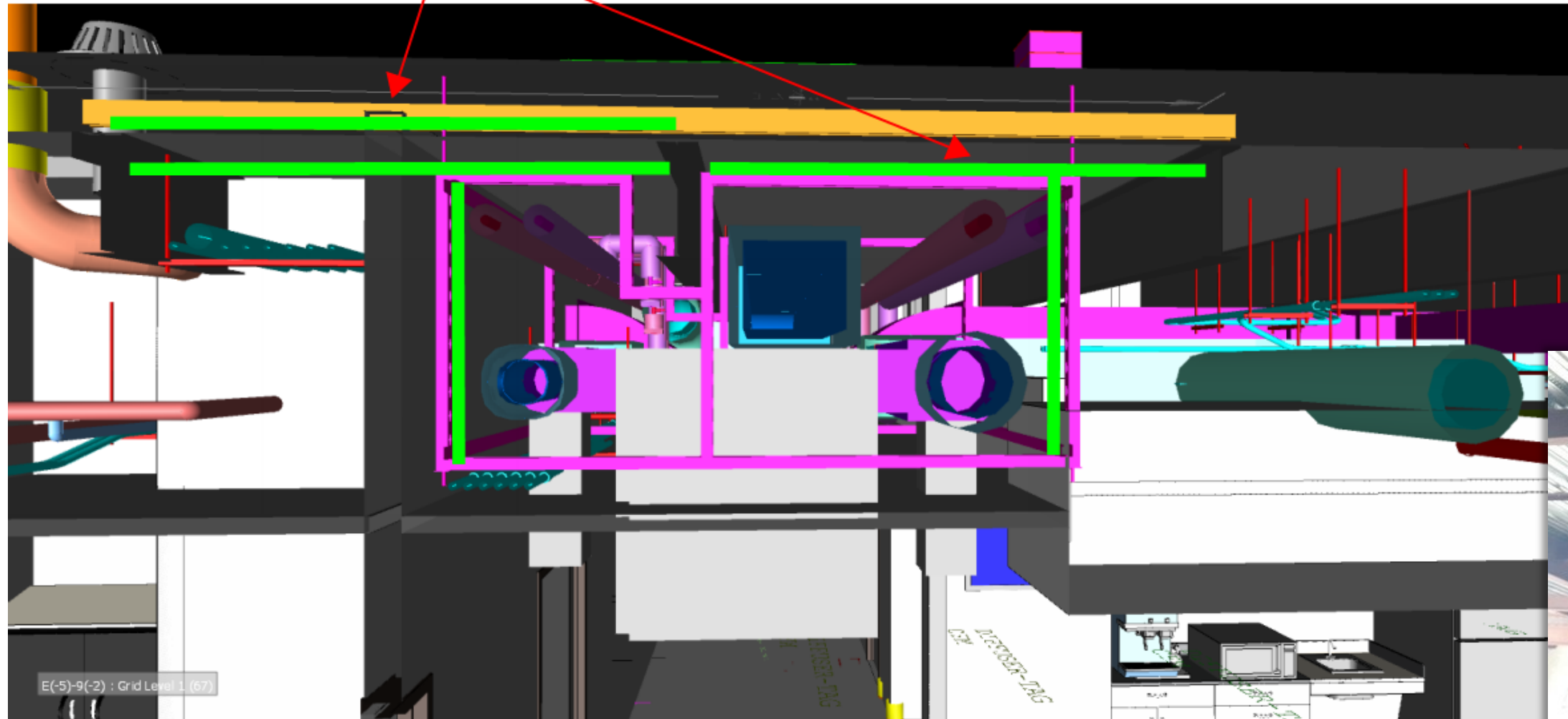
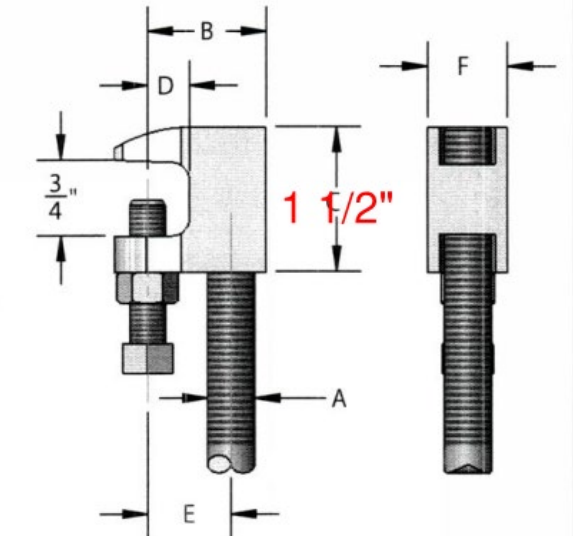


Level 5: Racks Required to Hang from Structural Beams



Level 4: Racks Supported by Slab Above

To span between Beams for corridor utilities there will be additional steel supports penetrating the corridor walls every 5'.



Solution Summary



Schedule Impact of Prefabricated Items

- RFP baseline duration = 22 months
- Prefab Consolidated schedule = 14.25 months
- Total offsite manhours = 59,740 (30%)
- Roughly 10 months of total offsite prefab work
- All MEP racks installed in 2 weeks vs. 2 months
- Project in total would have been 24+ months

HCA Oak Hill - Expansion - Compare Proposal Const Baseline		
Activity ID	Activity Name	Original Duration
HCA Oak Hill - Expansion - Compare Proposal & Con		302
SUMMARY BARS		192
MM-1000	***FI4 Interior Construction Duration****	192
MM-1010	***FI5 Interior Construction Duration****	148
PRE-FABRICATION		135
Flr 4 Pre-Fab		120
PRF-100	Flr 4 - Pre-Fab Assemblies	120
Flr 5 Pre-Fab		135
PRF-110	Flr 5 - Pre-Fab Assemblies	120
FL5a-1150	Flr 5- 1st Deliver and Install of Blox	5
FL5b-1150	Flr 5- 2nd Deliver and Install of Blox	5
FL5d-1150	Flr 5- 3rd Deliver and Install of Blox	5
TOWER EXPANSION		282
Interior Roughs		170
MEP Tie-in 3rd to 4th Floor		84
Floor 4 - Framing & Roughs		80
Floor 5 - Framing & Roughs		65
Flr 5 Roughs - Section 1 - South Blox		35
Flr 5 Roughs - Section 2 - North Blox		25
Flr 5 Roughs - Section 3 - Center Area		25
Flr 5 Roughs - Section 4 - Area @ Existing AHU-21		25
Interior Finishes		123
Floor 4 - Drywall & Finishes		78
Floor 5 - Drywall & Finishes		83
Flr 5 Finishes - Area 1 - South Blox Units		74
Flr 5 Finishes - Area 2 - North Blox up to Buck Hoist		55
Flr 5 Finishes - Area 3 - Center Area		63
Flr 5 Finishes - Area 4 - Area @ Existing AHU-21		53
Final Inspection, Final Punch & Occupancy		88

Value Add



- 8 patient rooms framed out in a week
- Late NICU conversion successfully sequenced with work ongoing
- Accelerated inspection process / 3rd party certified elements
- Waste on project reduced – Less clutter
- Significantly less manpower on site – Experienced skilled labor on site
- Quality of the end product improved
- Risk of failure reduced

Solution Summary

- Beds were delivered to the community 8 months early
 - From 22 months to 14 months
- Overall project savings of \$1.2 Million
 - \$200,000 was reallocated for a 10 bed NICU conversion without adding time to schedule



How can you apply this tomorrow?



How can you apply this tomorrow?

- Early involvement of major stakeholders
- Flexibility of team members removes silos
- Keep the end goal in mind (beds to the community)
- Embrace innovative tools and technologies that deliver more effective collaboration
- Continuous planning & detailed sequencing
- Kudos to an owner that champions the lean process



23RD LCI CONGRESS
OCTOBER 19-22



In the spirit of continuous improvement, we would like to remind you to complete this session's survey! We look forward to receiving your feedback.

Contact Us



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Thank you for attending this presentation. Enjoy the rest of the 23rd Annual LCI Congress!