

23RD ANNUAL



23RD LCI CONGRESS
OCTOBER 19-22

W2D Lean Learnings from Prefabrication at the Virgin Hotel New Orleans

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LEARN BY DOING FROM THOSE WHO DO

October 20th, 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 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!



Overview

- **Design-Build Perspective with Broadmoor LLC**
 - Lean tools and technology for success in prefabrication
- **Prefabrication with LGS**
 - Planning, fabrication, delivery and installation of metal stud walls
- **Mechanical Design Build with Pontchartrain Mechanical**
 - Designing to prefabrication with plumbing and HVAC



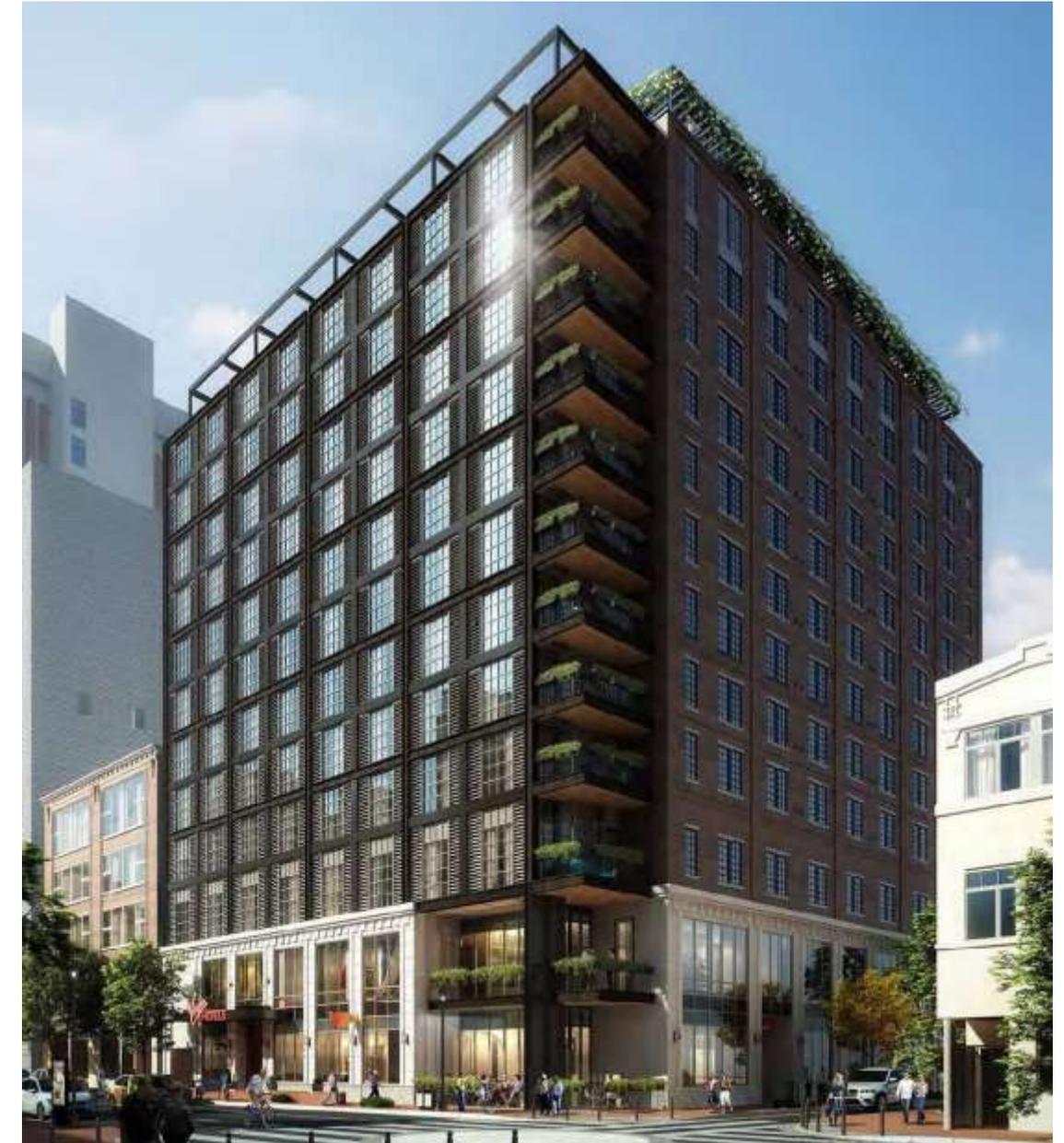
BROADMOOR Success

Project Goals

- **Budget:** \$52-\$55MM
- **Target Scope:** 225 Keys Minimum
- **Schedule:** 24 Month Construction Duration

Success

- **Budget:** \$54MM GMP (Guaranteed Maximum Pricing) Agreement
- **Target Scope:** Project has 238 Keys
- **Schedule:** 7/3/19, NTP – 6/30/21 Substantial Completion





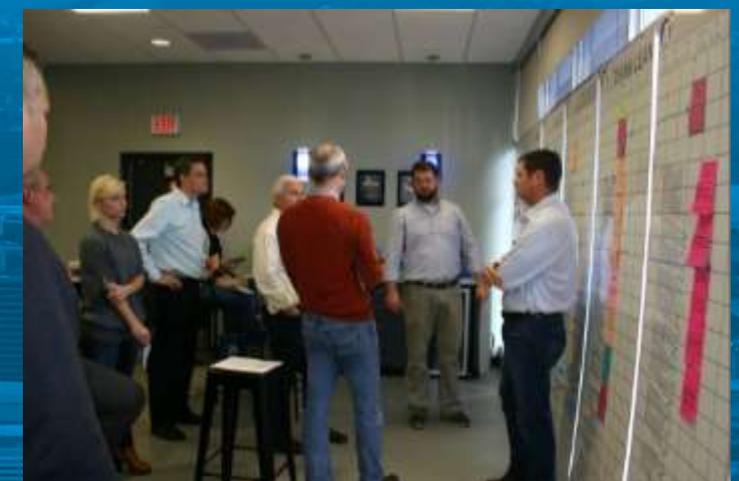
Keys to Success in Prefabrication



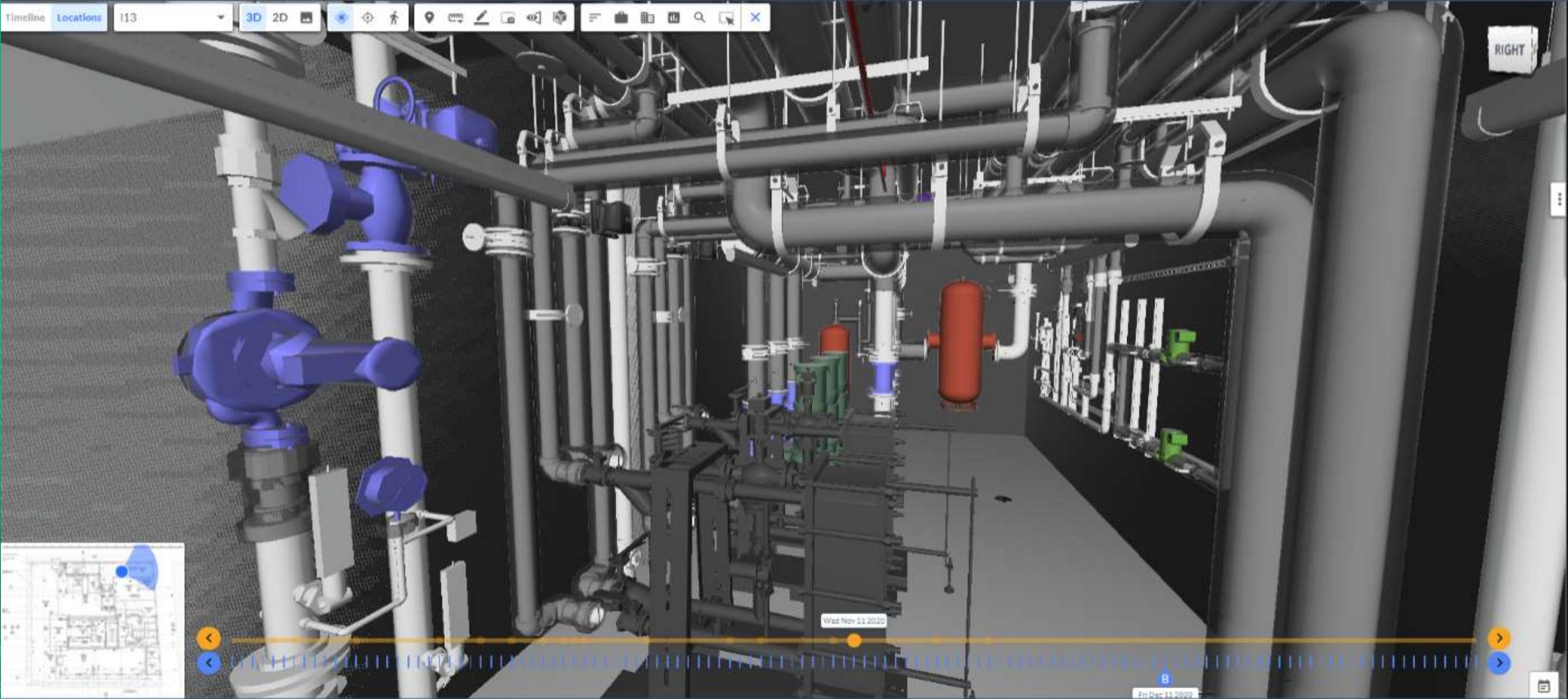
1. Plan for it as early as possible.
2. Identify all tolerances of building components that are touched.
3. BIM Coordination of all these components early.
 - Cannot allow one of the components to skip or shortcut the BIM process.
4. Constructability reviews with the trade partners involved.
5. Logistical planning for prefabricated building components.

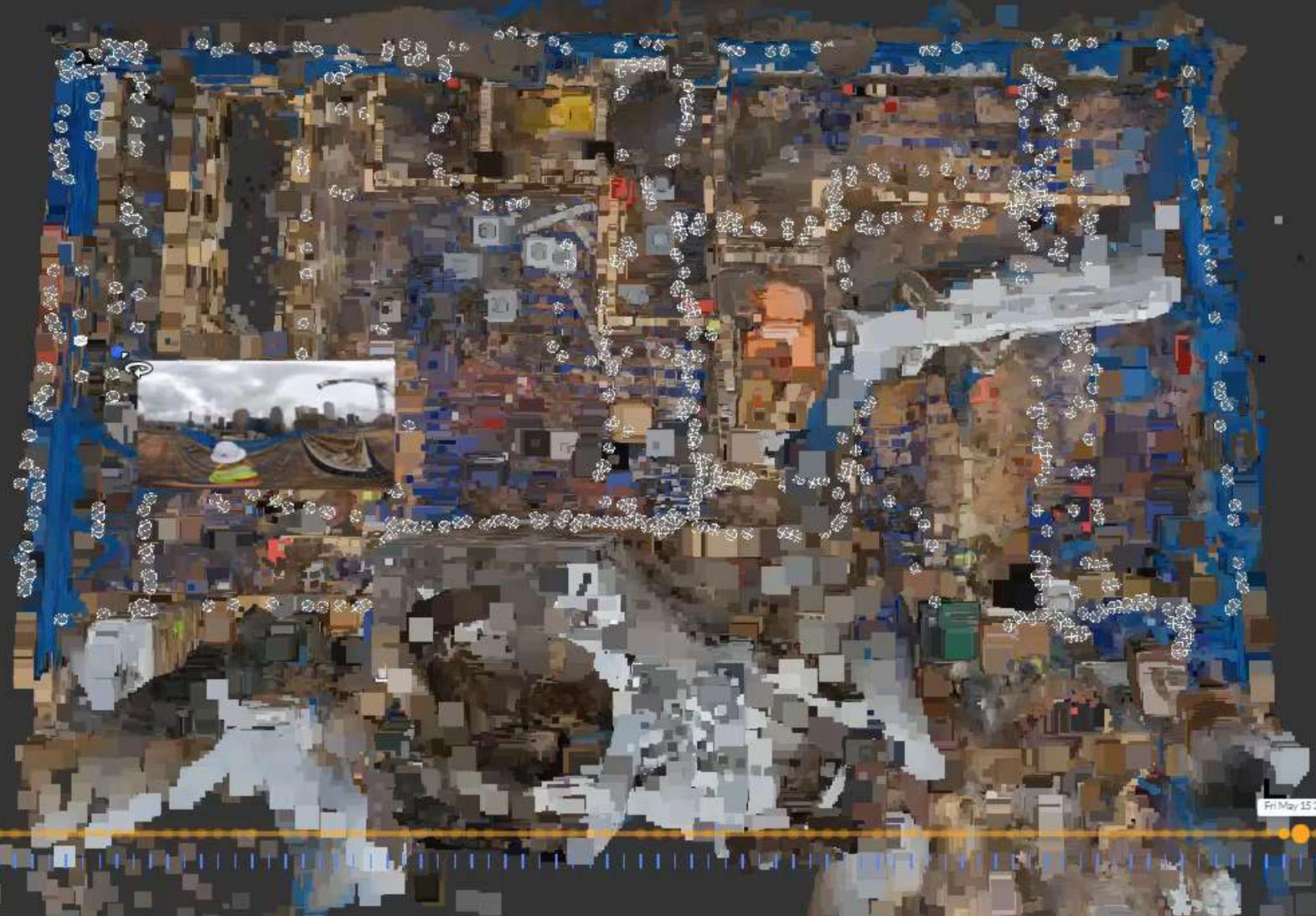


BIG ROOM PLANNING



Floor Height Adjustment





Reality ... [Eye]

Point Cloud [Dropdown]

Point Size [Slider]

Cameras ... [Eye]

Size [Slider]

Show Geolocated

BIM [Icon]

Timeline navigation: [Left Arrow] [Right Arrow] [Timeline Bar] [Left Arrow] [Right Arrow]

Timeline labels: Fri May 15 2020, Wed Nov 04 2020



RIGHT

Reality

Image

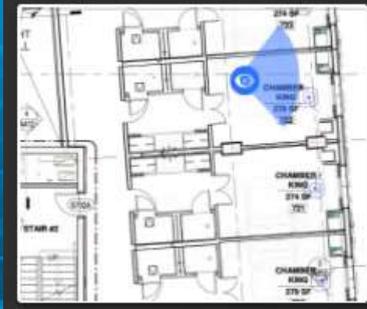
Visibility

Show BIM overlay

BIM

Full BIM

Visibility



Last Planner System

Collaborative planning in a Big Room setting.



Last Planner System

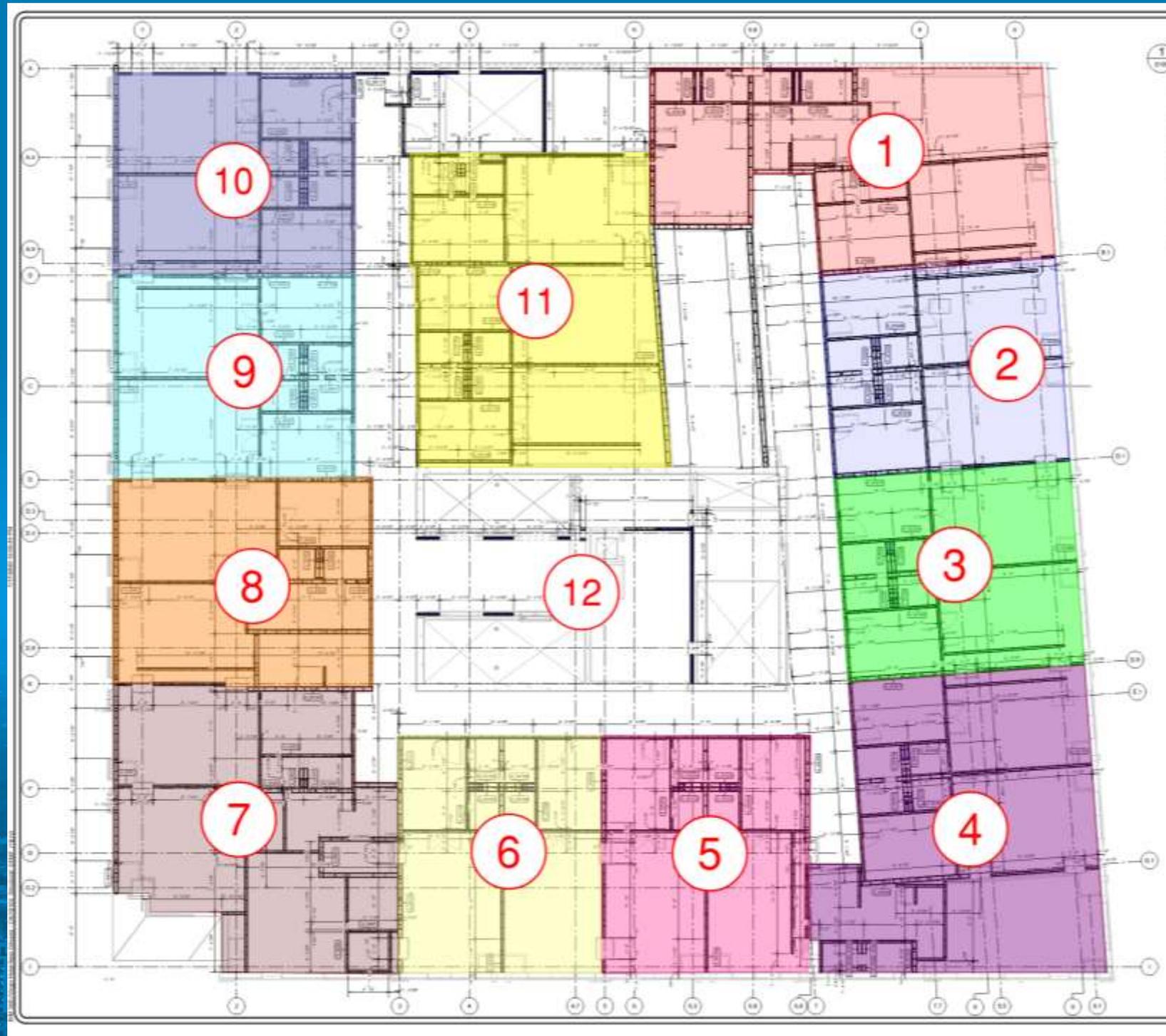
Milestone Schedule



Pull Planning



Takt Time Zones



Takt Time Activity Description

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11
Top Out, Close exterior wall, Walls in shower, Demising Wall	Tape Top out	Install FCU, DW and Duct	Detail Framing, Install Furdown and Grid, Close ceilings		Rough in ceilings rooms and corridors, Rough in Smeg and FCU	Shower Waterproofing	Shower Mud Bed	Drying time	Shower Tile	Shower Grout
Frame shower ceiling	Fire Caulk top out, etc.	Shower Lights	T/F Showers	F/P Showers		Grill Installation				
	Install Valves	Connect FCU Plumbing, Shower Heads								
Top out (with moisture resistant gyp) for ceilings in rooms, corridor. Close exterior wall, demising wall @ FCU, and shower walls. Frame shower ceilings	Tape and fire & sound caulk all gyp board available - ceiling top out, furr down top out, and exterior wall. Install valves	Install exhaust duct to exterior wall, install FCU and duct to exterior. Connect FCU Plumbing, Install shower lights. Install shower head	Frame furdown, FCU closet, and smeg unit. Close shower ceilings. Hang Grid in corridors and rooms, frame shower bench, cement board on bench, Frame baths. T/F Showers	F/P Showers.	All remaining ceiling electrical rough in - rooms and corridors. Rough in at SMEG and FCU enclosure.	Install waterproofing at shower room. Install grills in water closets and hallway	Install mud bed at shower room	Test mud bed	Install tile at shower room. Tile at this point in the sequence to minimize traffic on surfaces	Grout shower room tiles





Exterior Skin Prefabrication & Coordination



Alley Precast Erected with Tower Crane



Coordination with Elevated Formwork



LEAN GEMBA WALKS



GEMBA WALK

OBSERVE

- Walk With a Purpose
- Not a Time to Instruct
- Seek to Understand

ENGAGE

- Leaders Ask Questions
- Create Safe Sharing Environment
- Uncover Chances for Improvement

IMPROVE

- Understand the Process
- Look For Waste
- Allow Solutions to Come From Those Involved



"If You Don't Know How To Ask the Right Questions, You Discover Nothing."
-W. Edwards Deming

RESPECT & CHALLENGE PEOPLE
DOES WORK FLOW?
ARE HANDOFFS RELIABLE & EFFICIENT
RAISE ACCOUNTABILITY

BROADMOOR
To Honorably Serve Our Communities

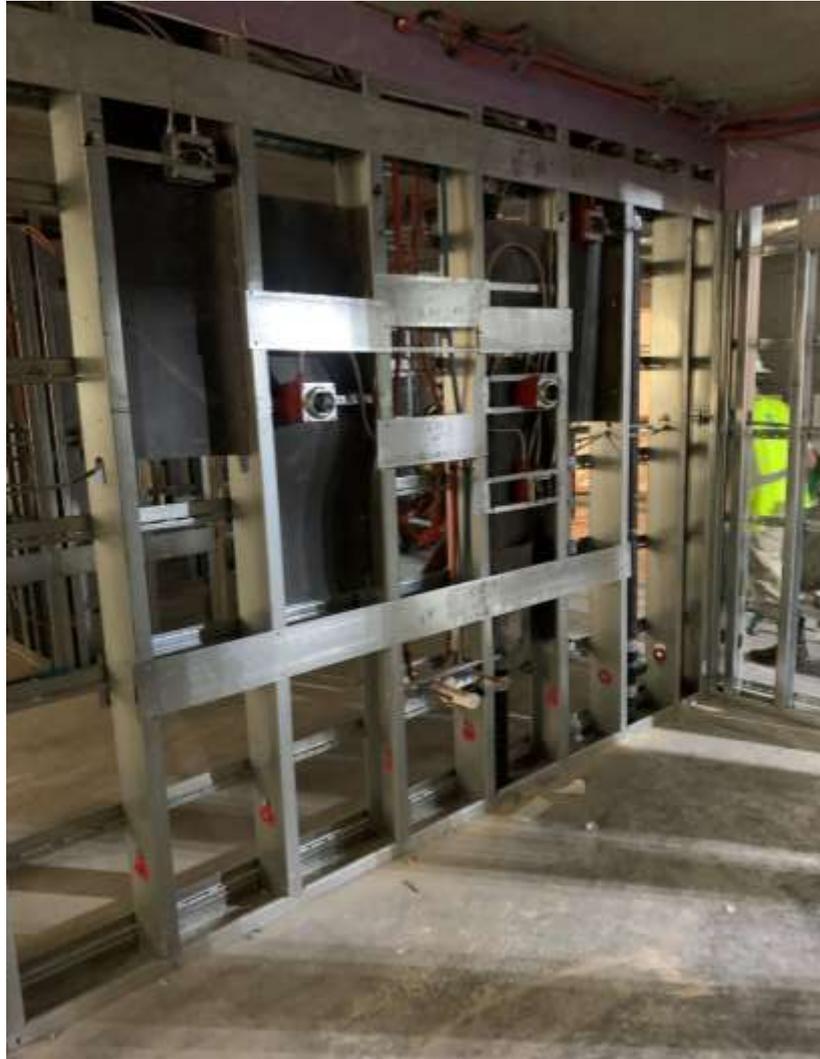




PANELIZATION THROUGH DIGITAL DESIGN



Thoughtful design + BIM + CNC = precision coordination



Our process and technology accommodates the penetrations for plumbing, mechanical, & electrical system components.

System elements are engineered to maintain alignment from panel to panel for ease of installation in the field or in our manufacturing facility.

systems integration

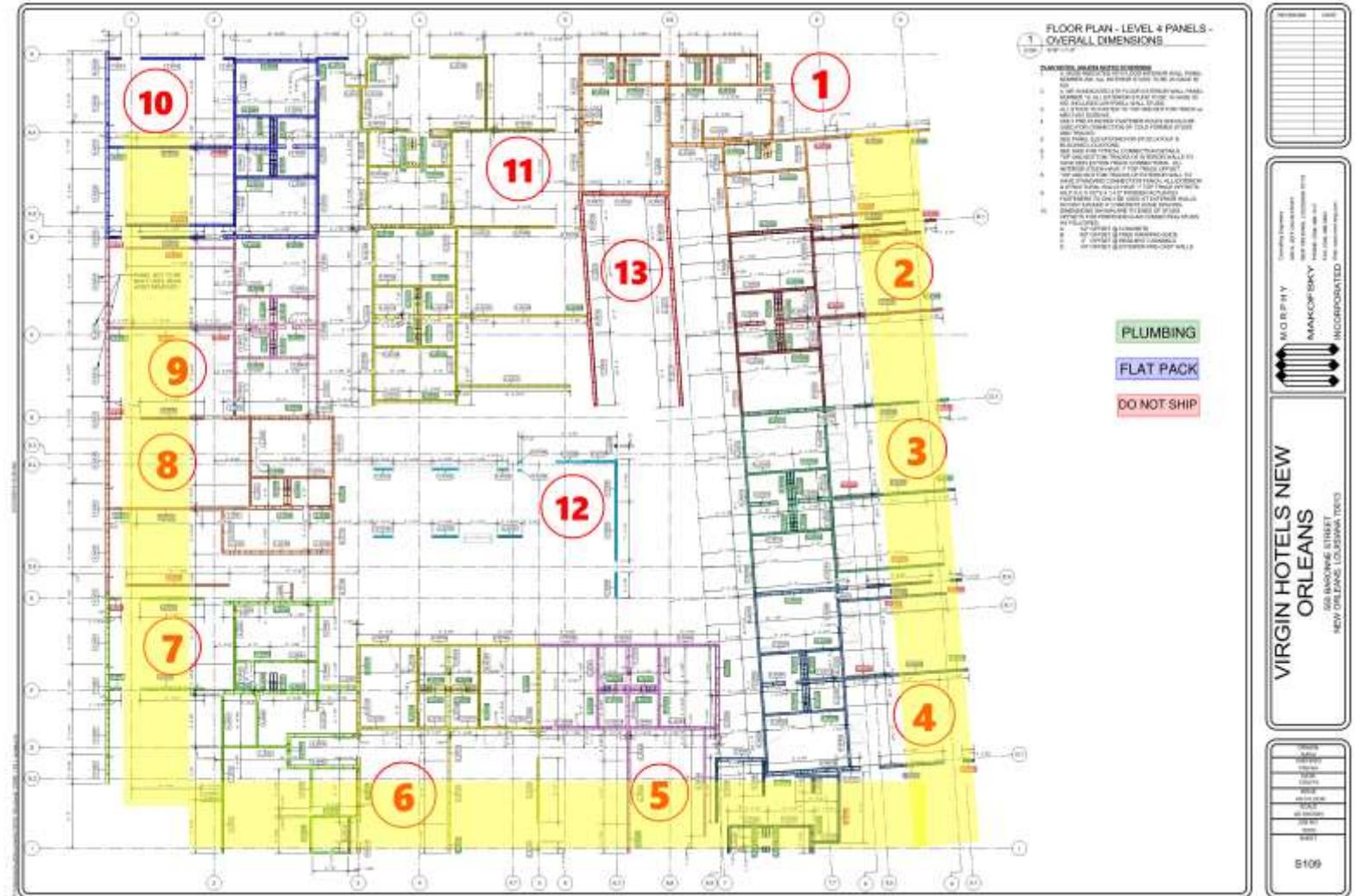




The controlled environment affords better quality assemblies built faster and with fewer touches.

controlled environment

coordinated deliveries & installation





Safety & Sustainability

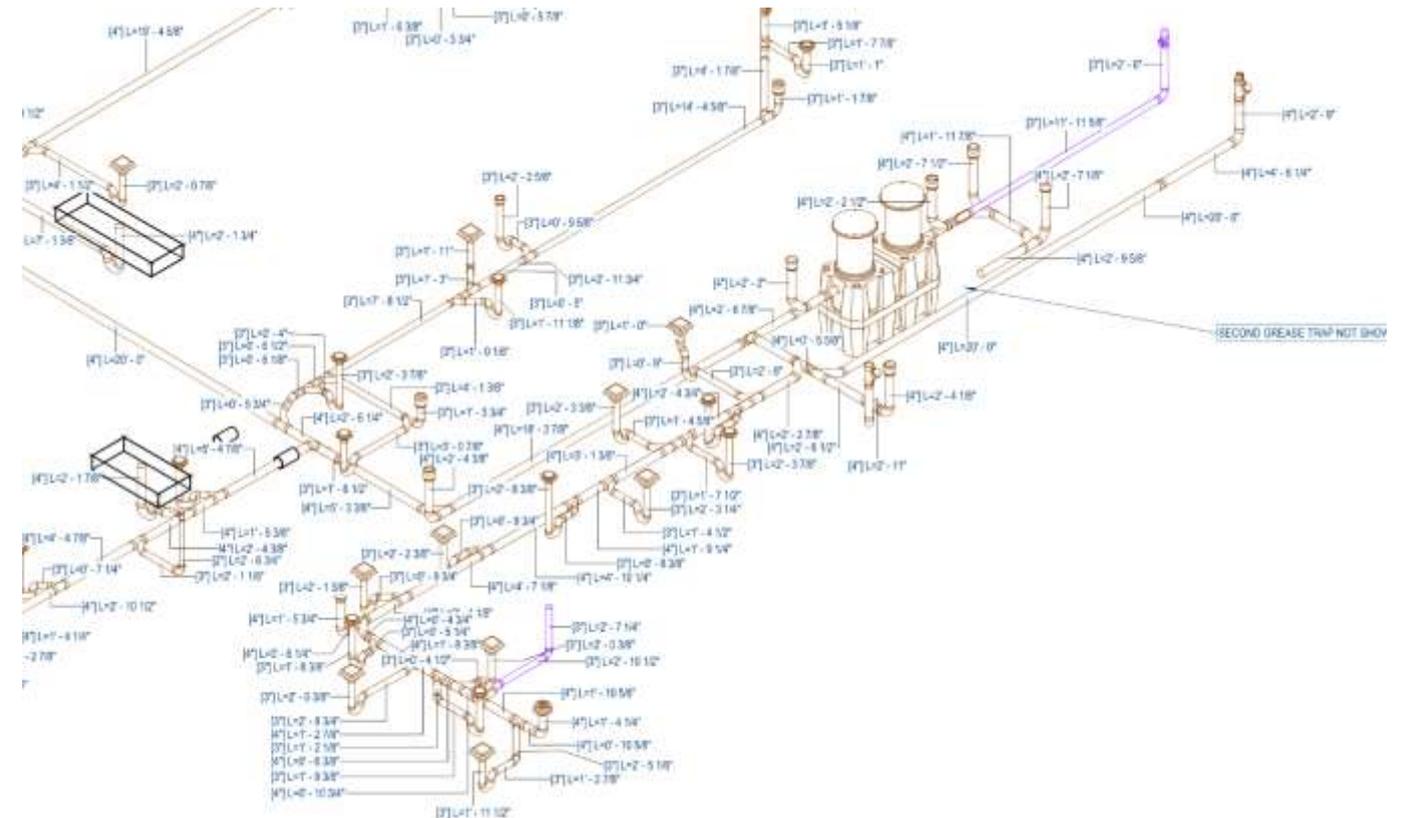
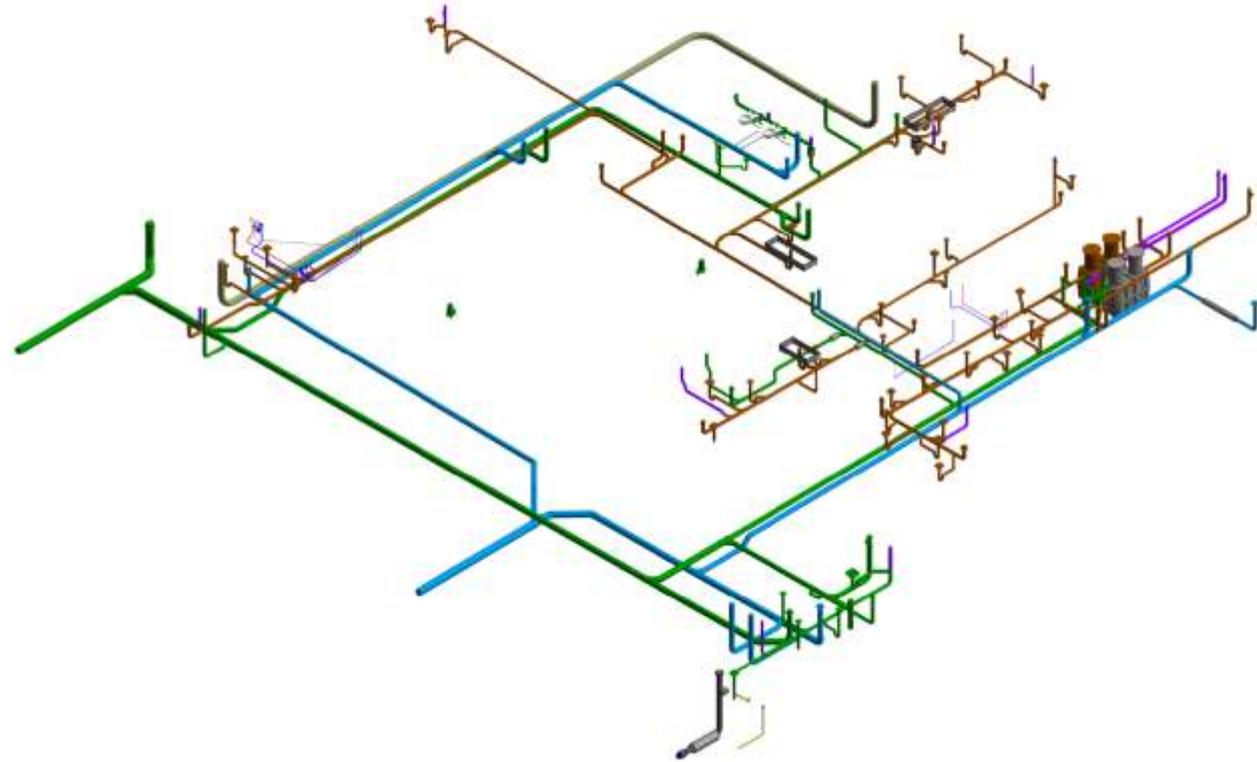
- Our material is 100% recyclable
- Our process reduces waste to 2% or less.



Prefabrication & Planning



Underground Prefabrication



- Last Planner coupled with BIM Coordination helped us see the whole picture.
- Coordinating with other trades forced redesign of the system to simplify staging of installation.
- Breaking down the piping into systems & areas allowed us to “kit” the piping for the delivery to site based on need.

Underground Prefabrication



- “Kits” consist of cutting pipe to length with as many joints installed in the fab shop as possible.
- Existing conditions changed the plan, but we were still able to meet initial milestone.

Underground Prefabrication

KEYS TO SUCCESS

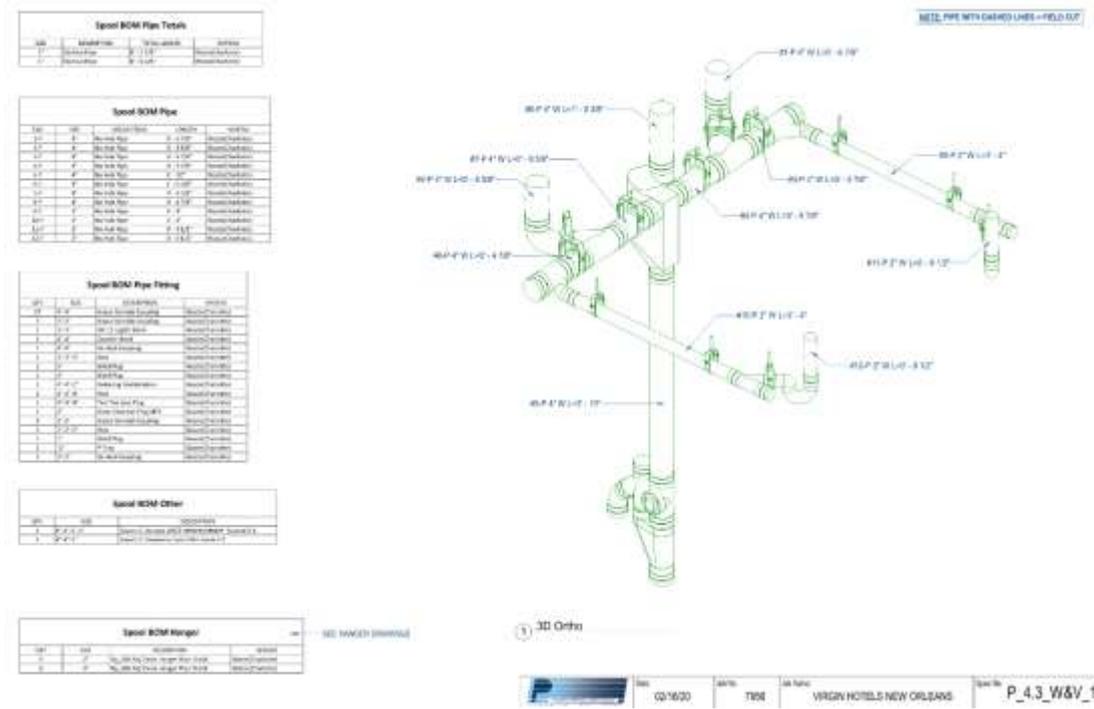
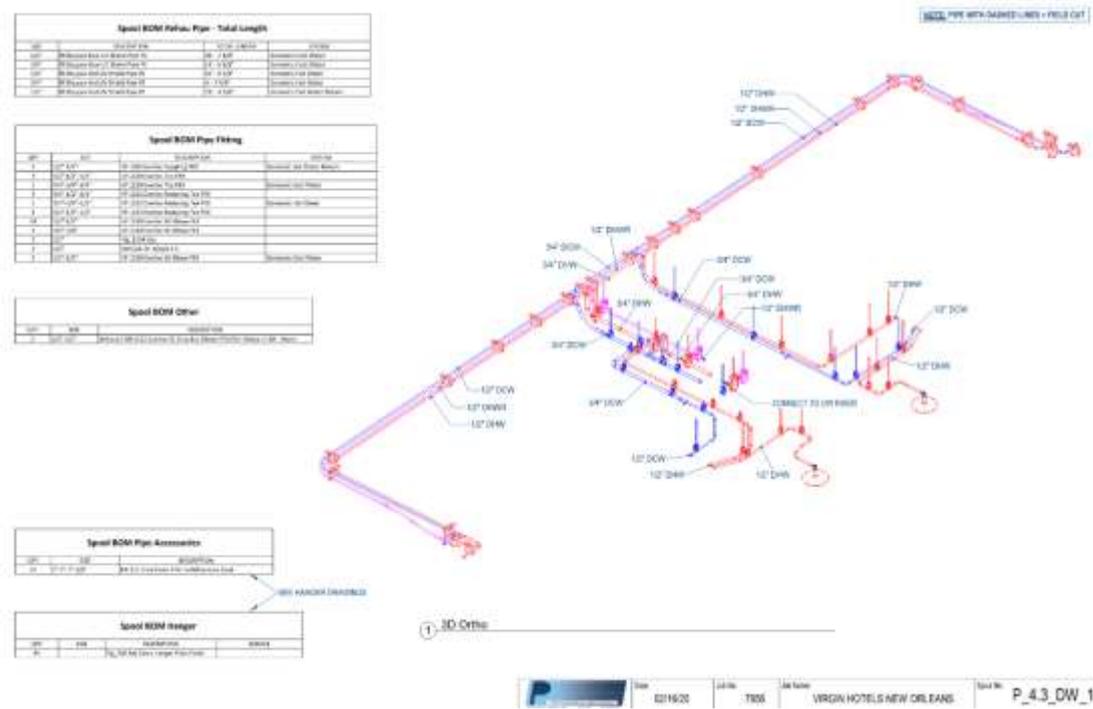
- Use BIM modeling to coordinate with structure & Electrical/IT trades.
CORRECT CONTENT IS KEY!
- Use Last Planner to create workflows for all teams with proper sequence.
- Adjust Design based on field crew's input to allow for partial testing & inspection.
- Use Robotic Layout tools to minimize reliance on string lines.
- **HAVE A BEST-IN-CLASS FIELD CREW!**



LESSONS LEARNED

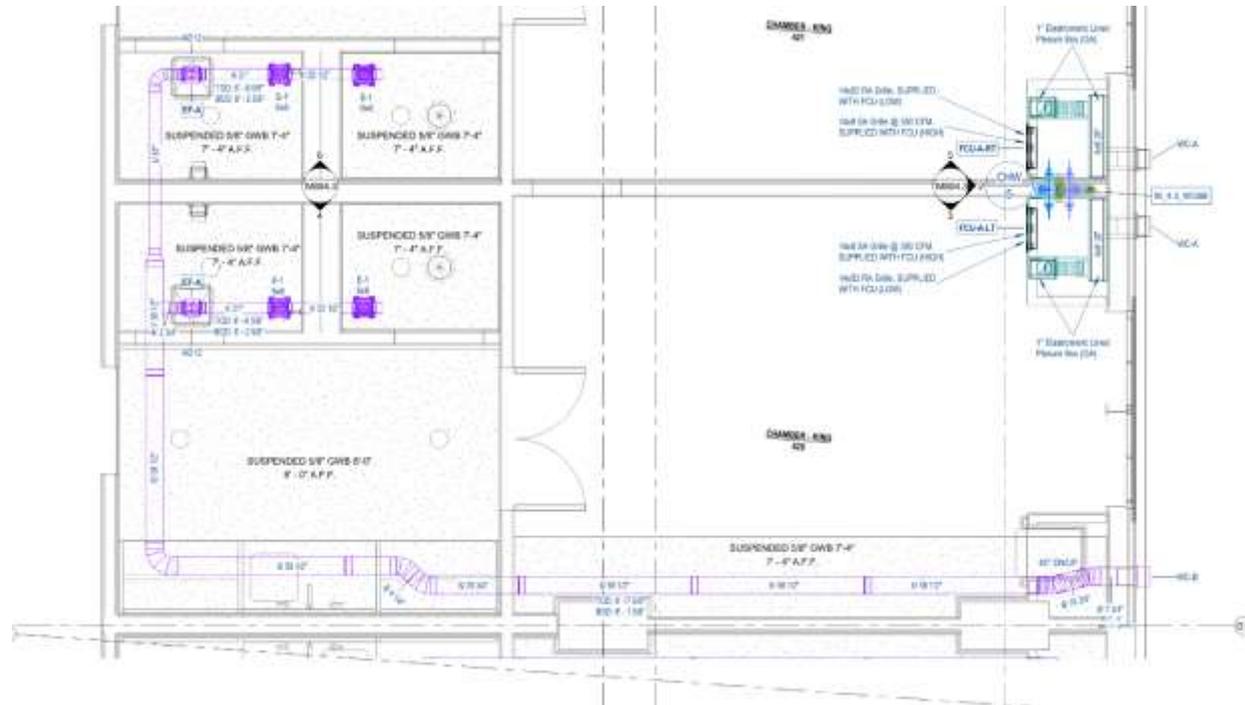
- Make an adaptable plan.
- Pray to rain gods.
- Precut & glue as much piping as possible.
- Avoid gluing 6" and larger piping since it makes assembly harder in field.

Panelized Walls & Guestroom Sequence Kits



- Kitting & packaging of overhead work into carts with wheels allowed us to work from our shop instead of jobsite during the early stages of the COVID outbreak.

Panelized Walls & Guestroom Sequence Kits



- Exhaust duct prefabrication for guestrooms.

Panelized Walls & Guestroom Sequence Kits

KEYS TO SUCCESS

- All components need to be defined & modeled for wall panelization to add value. The small details make or break the plan.
- Use Last Planner to create workflows for all teams with proper sequence.
- Use Robotic Layout tools & shared control points to make sure all trades are laying out the same way.
- **HAVE A BEST-IN-CLASS FIELD CREW!**



LESSONS LEARNED

- Minor details are major details when panelizing walls.
- Rework with panelized walls is more difficult than conventional framing.
- Field tolerances need to be accounted for in the planning effort.
- Delivery & Lifting of wall panels/prefab kits requires some logistics & planning.
- Pre-rock needs to be defined in early stages of planning.
- Rolling carts & kit delivery were very valuable.

Overhead Pipe Kits



- Making as many joints as possible offsite helps reduce time for installation onsite.

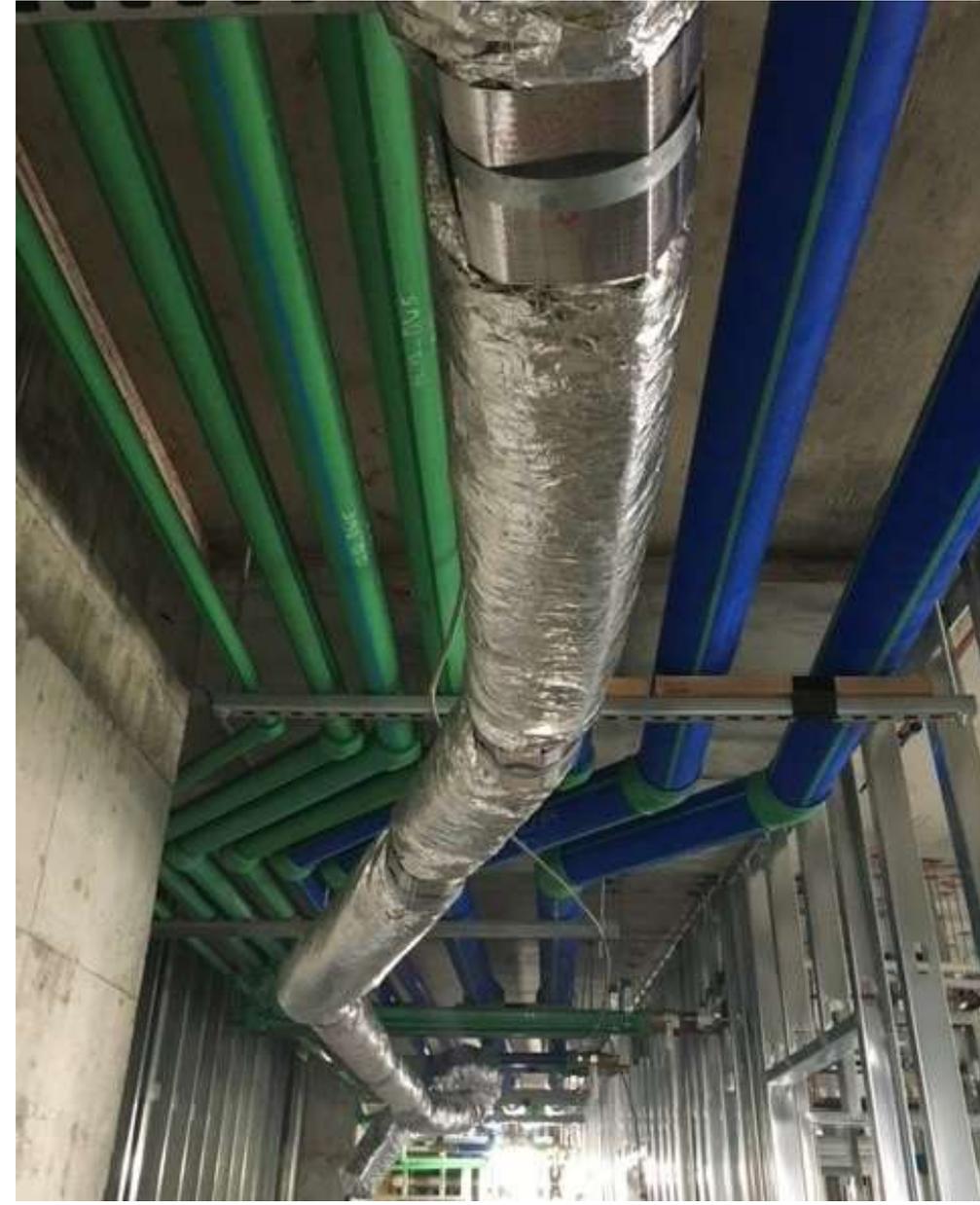
LEARN BY DOING FROM THOSE WHO DO

Overhead Pipe Kits



LEARN BY DOING FROM THOSE WHO DO

Overhead Pipe Kits



Pipe Kits & Component Prefabrication

KEYS TO SUCCESS

- BIM Coordination & modeling make it work.
- Organization & naming of work packages is important to make sure all teammates “speak the same language”
- **HAVE A BEST-IN-CLASS FIELD CREW!**



LESSONS LEARNED

- Garbage in = Garbage out
- How we sort, label, & deliver piping bundles to the jobsite makes a big difference.
- Smaller component prefab helps remove risk of errors in the field.

Project Photos



Project Photos



Virgin Hotel Grand Opening





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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!