22ND ANNUAL

22ND LCI CONGRESS
OCTOBER 19-23

Last Planner

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

October 22 ,2020

1. The Challenge

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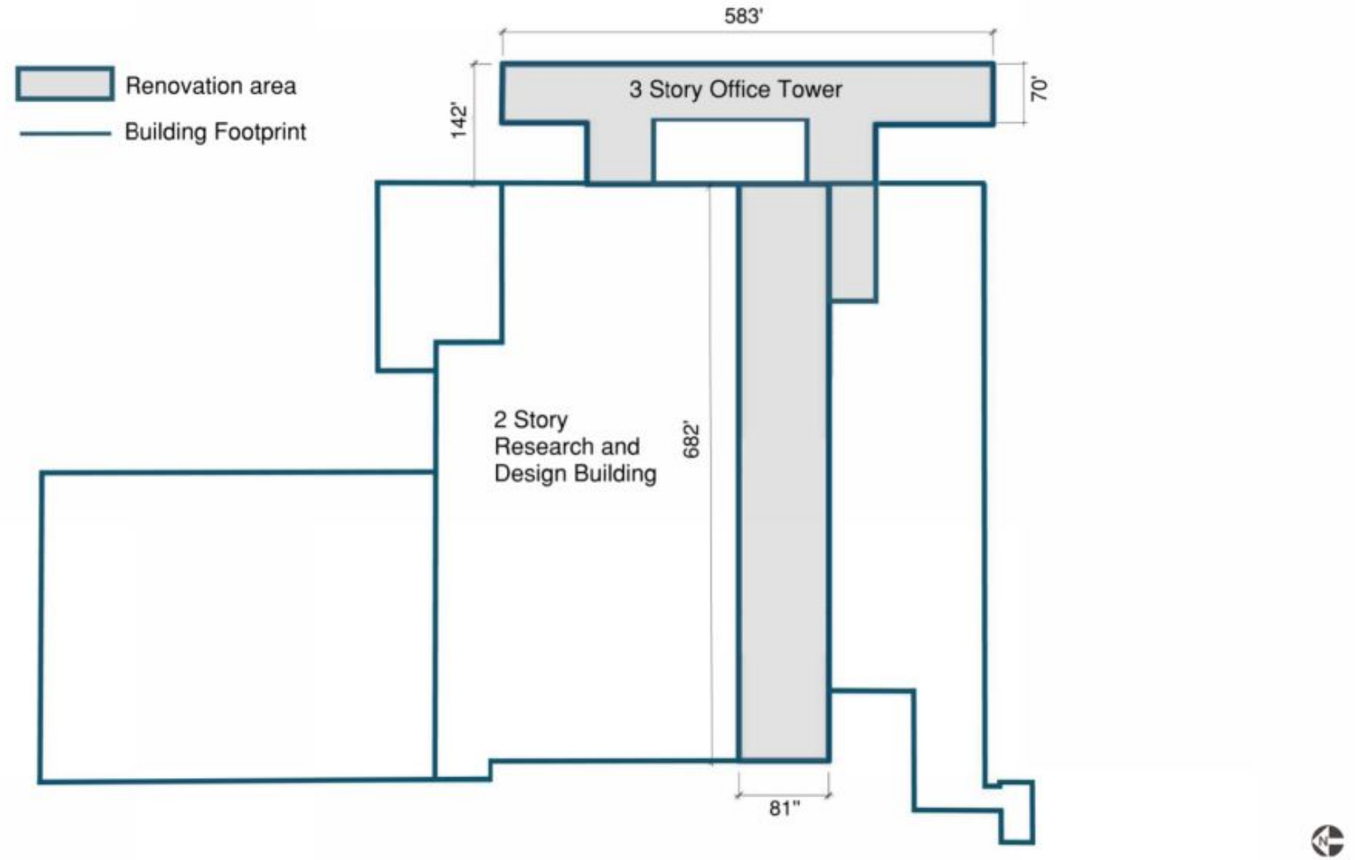
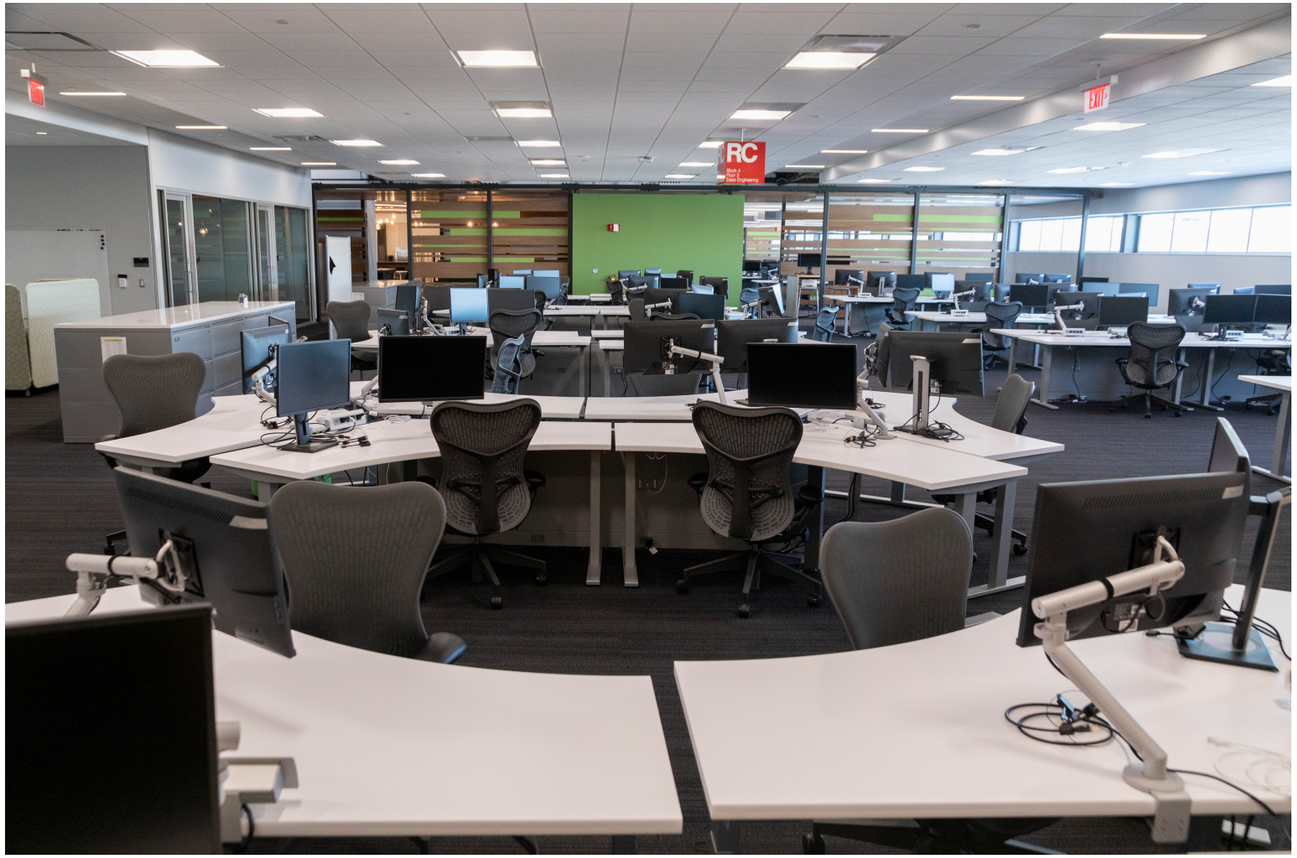
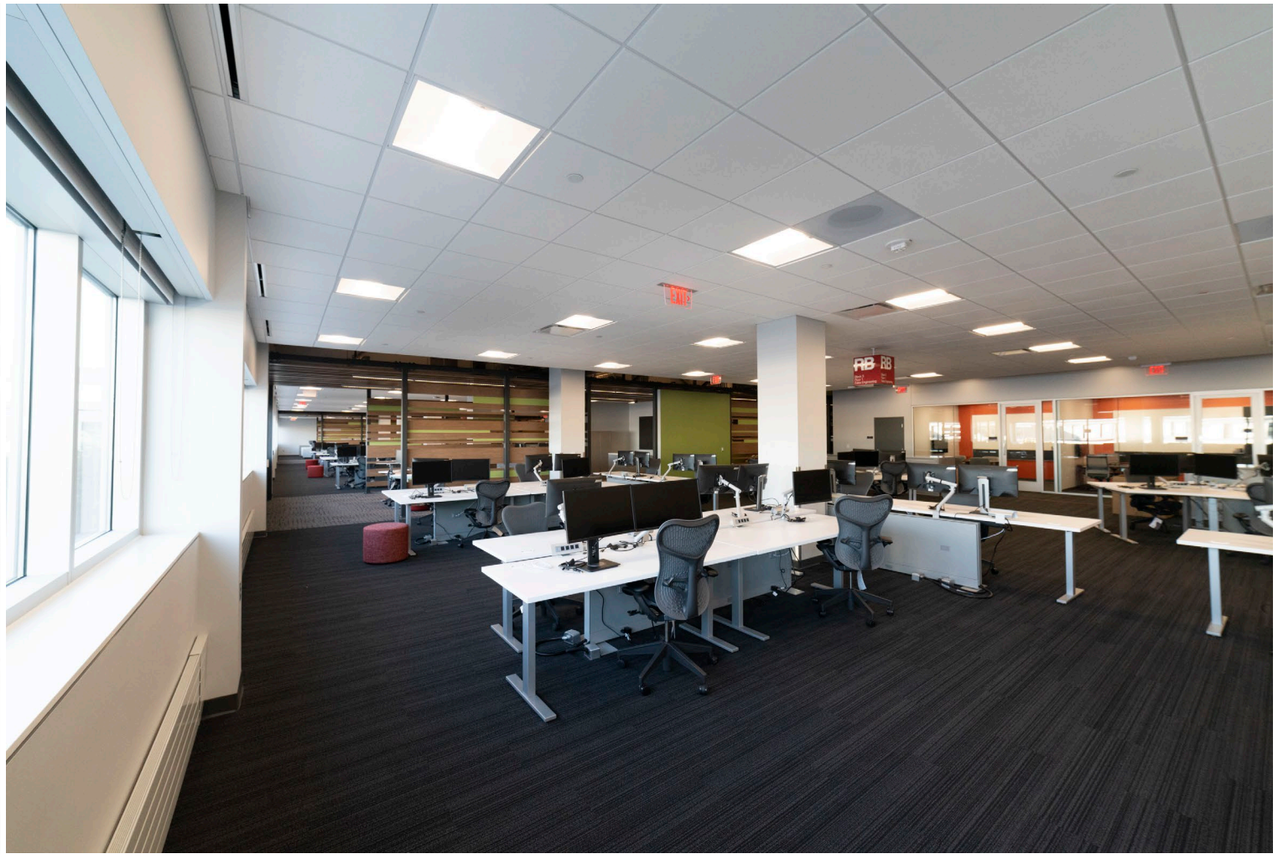
The Challenge | **Scope**



The Challenge | **Before**

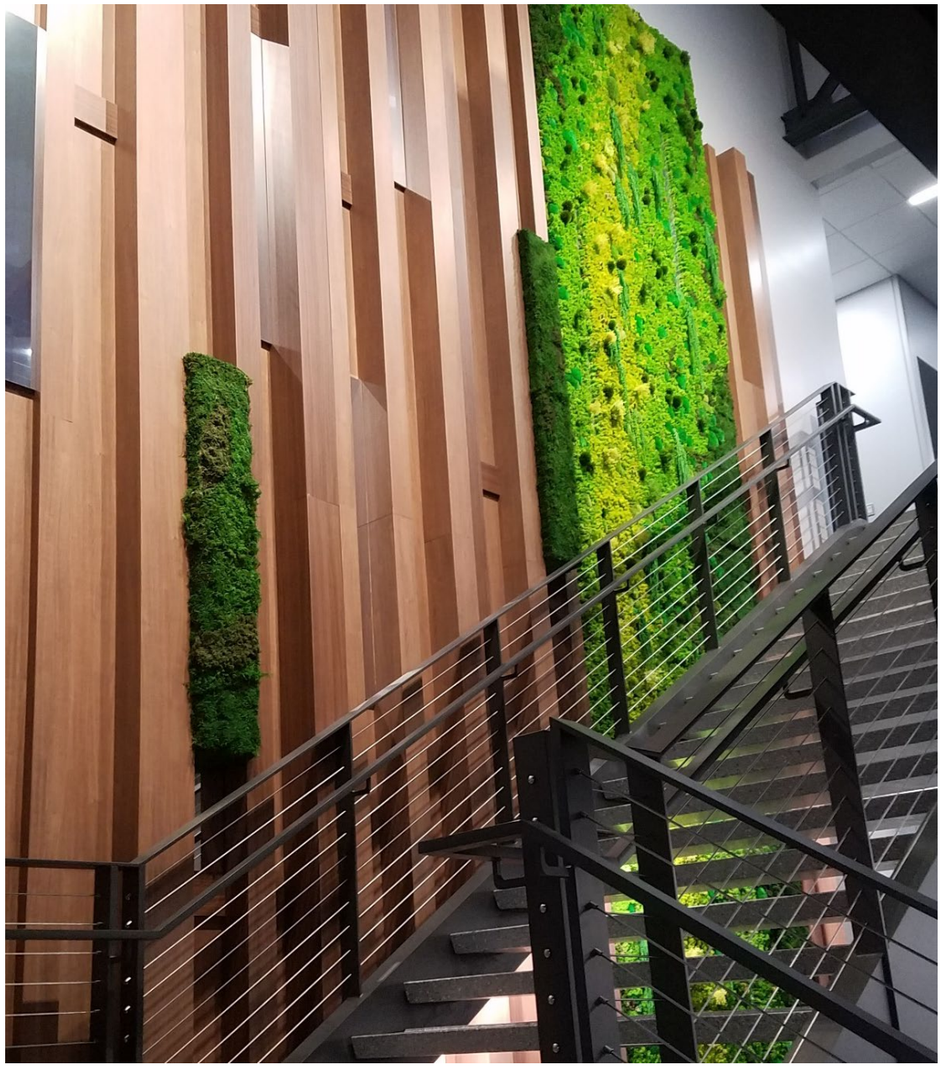
The Challenge | **After**

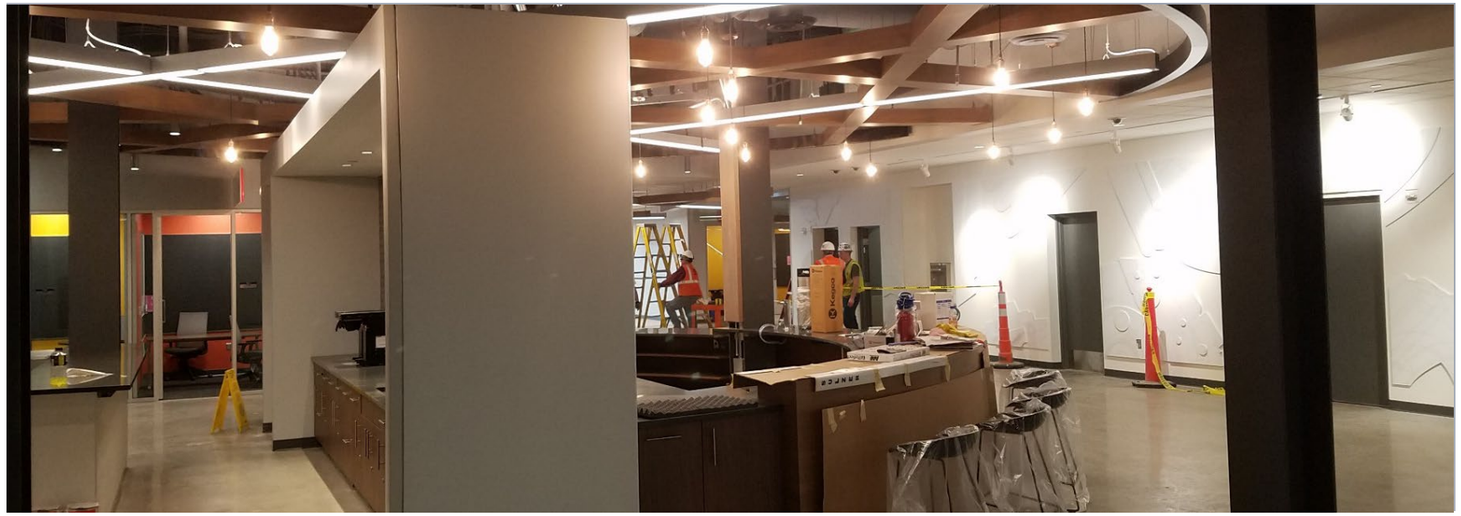


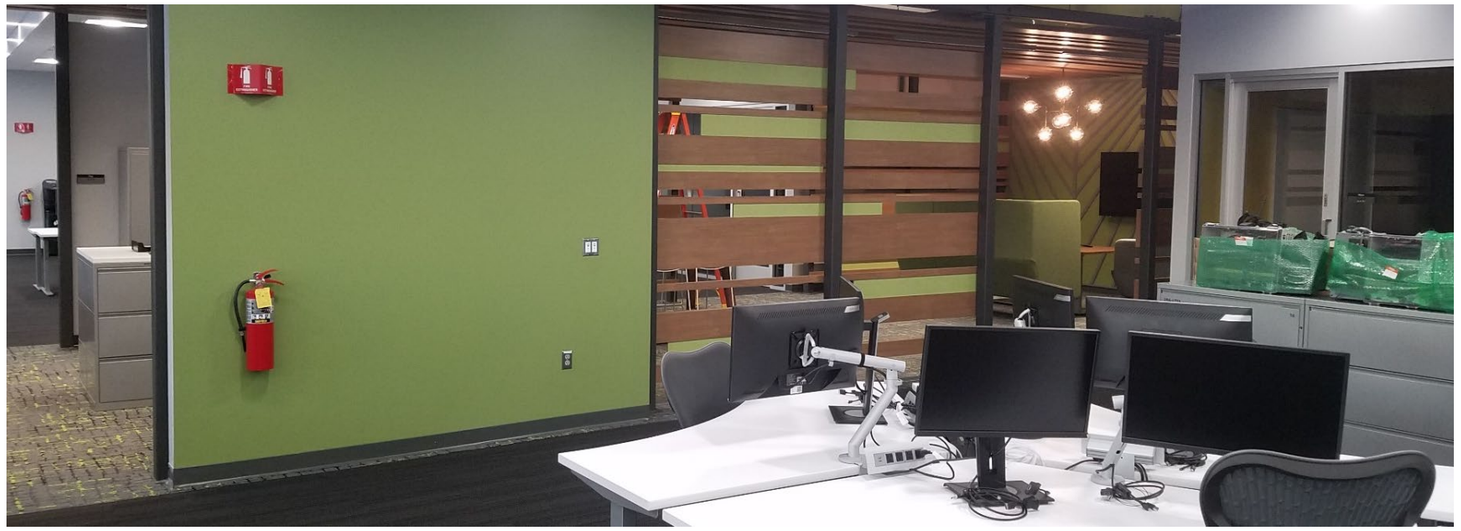


The Challenge | **Before**

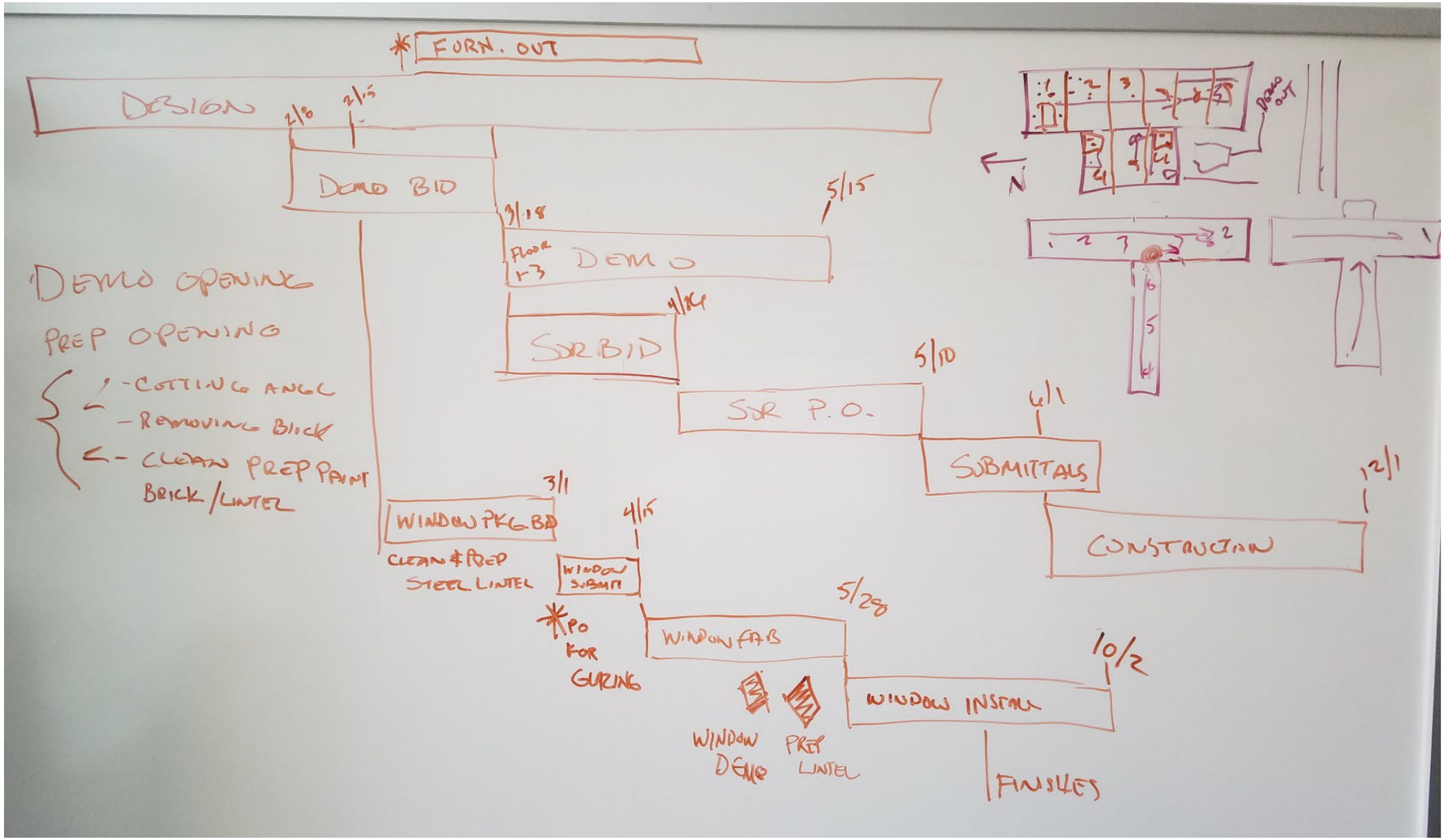
The Challenge | **After**



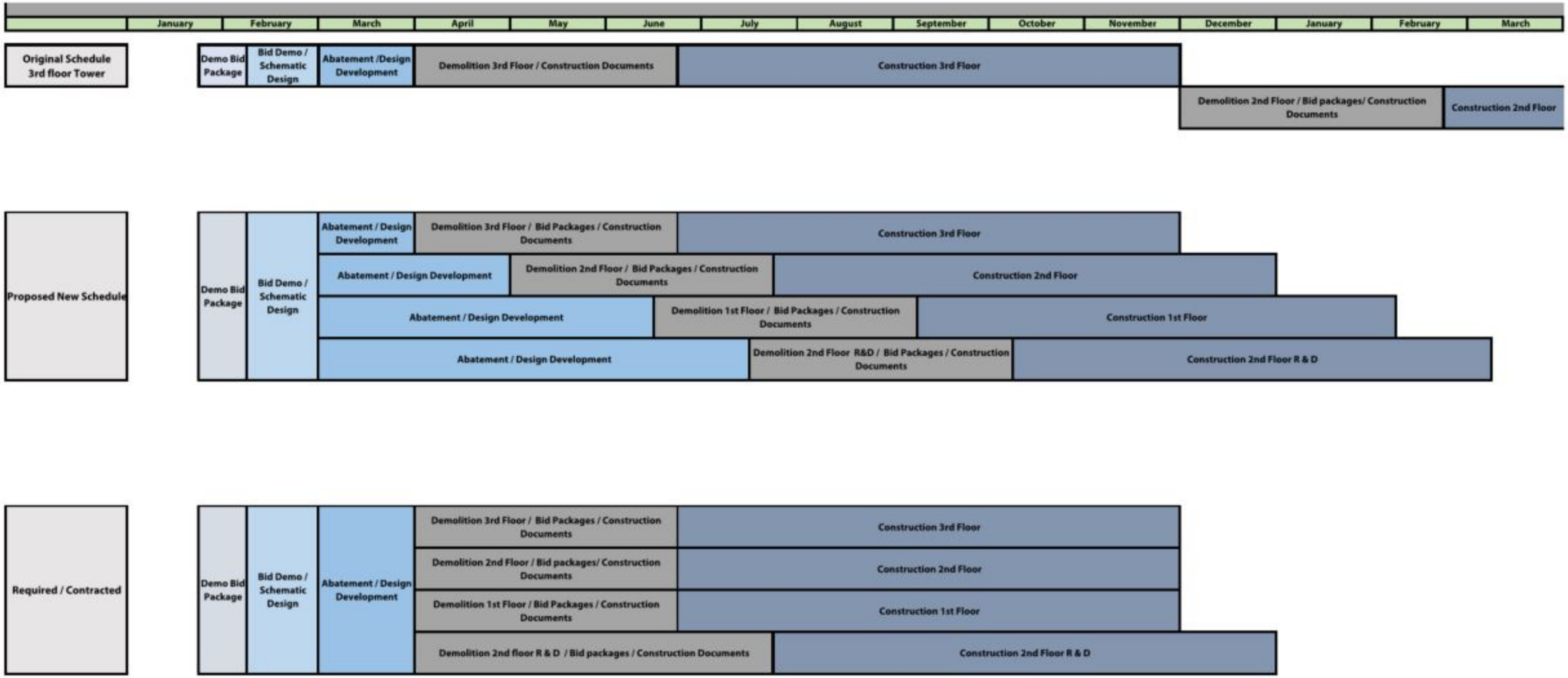




The Challenge



The Challenge | **Schedule Progression**



The Challenge | **During**

The Challenge | **During**

The Challenge | **After**

2. The Solution

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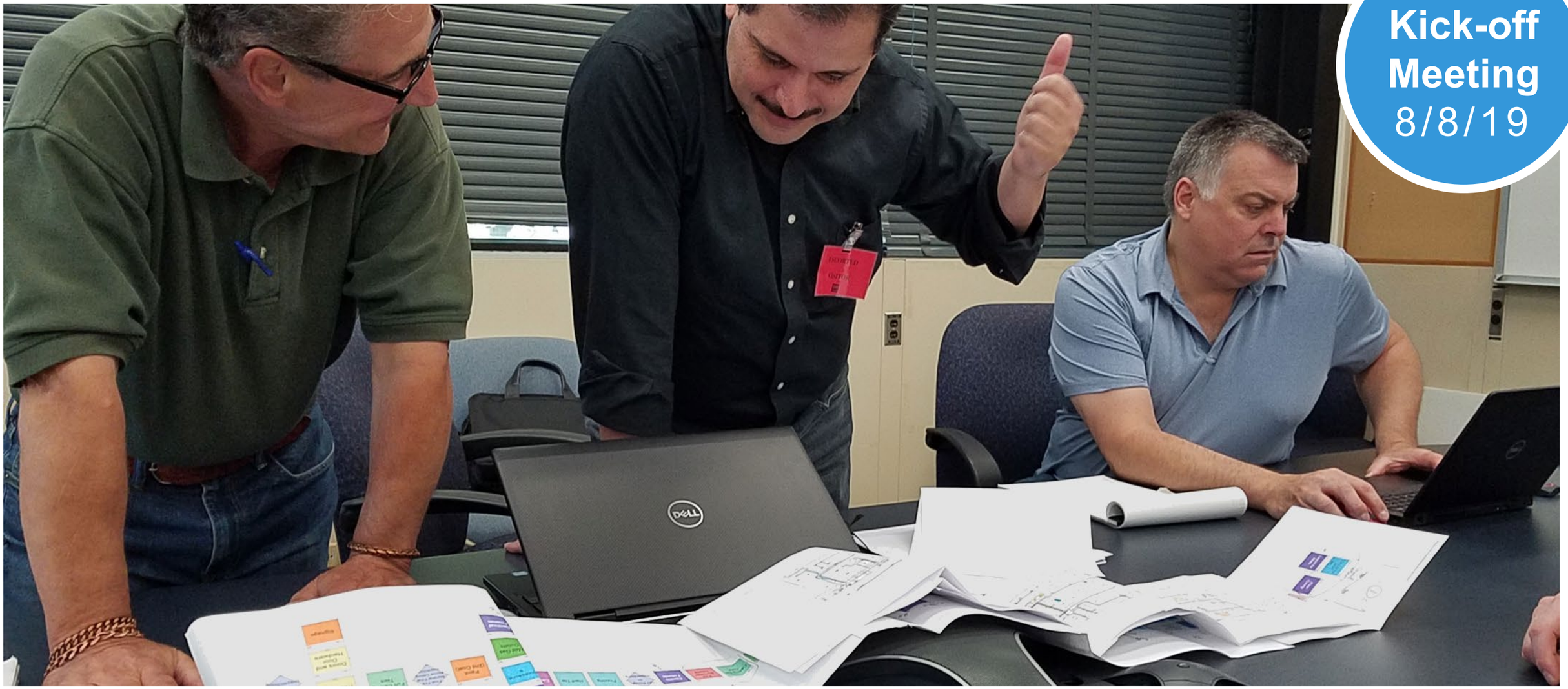
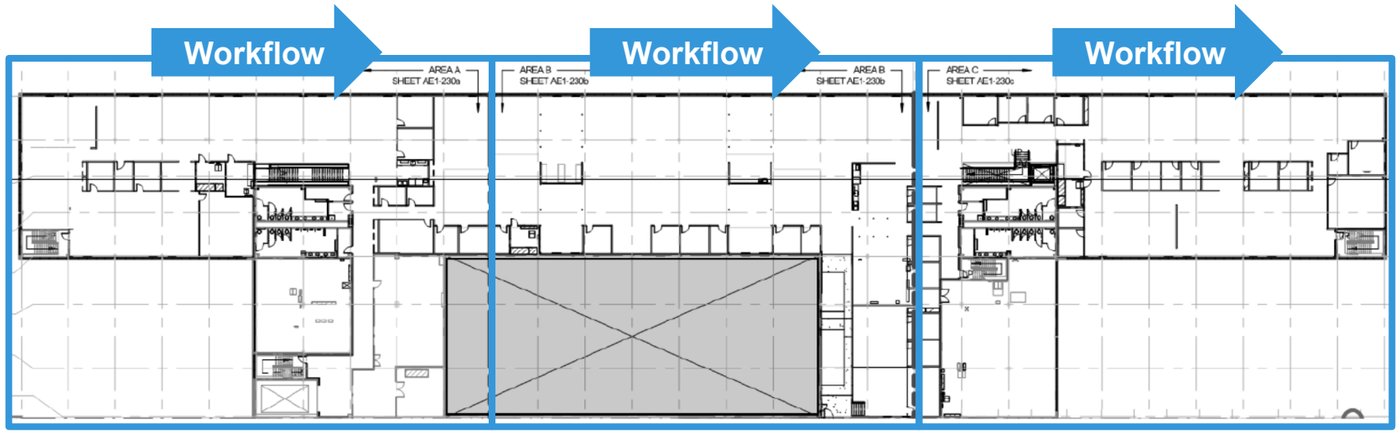
The Solution | **Last Planner**



Current State Assessment



vPlans Before

Three Areas A,B,C

(always something that is not done)

	Description	Subcontractor	Duration	Current Start	Current Finish
Third Floor - North Mechanical Room					
228	Install Prepurchased AHU - 009	S - Z	8	27-Jul	5-Aug
229	Install Prepurchased AHU - 032	S - Z	6	2-Aug	19-Aug
	Reroute Existing MEP	Electrical	2	13-Aug	14-Aug
	Demolition of Existing MEP	Demo	2	10-Aug	12-Aug
	Prepare Ductwork Shop Drawings	Partitions	7	17-Aug	24-Aug
	Approval of Ductwork Shop Drawings	Partitions	1	24-Aug	24-Aug
	Fabrication of Ductwork	Partitions	10	21-Sep	2-Oct
	Prepare Walls for Ductwork	Partitions	2	12-Aug	13-Aug
	Install Ductwork	Partitions	10	3-Oct	14-Oct
	Install/Final Connection of Chilled Water Piping	Piping	5	7-Oct	12-Oct
	Install Fire Protection Piping	FP	2	12-Oct	13-Oct
	Insulation of Ductwork and Piping	Mechanical	3	14-Oct	16-Oct
	Install Control Wiring and Devices	Controls	3	15-Oct	17-Oct
	Install Electrical Conduit and Panels	Electrical	7	16-Oct	22-Oct
	Final Electrical Connection to Mechanical Equip.	Electrical	3	21-Oct	23-Oct
230	Install Heat Transfer Unit	Piping	3	14-Sep	17-Sep
231	Install New Chilled/Hot Water Coil	Piping	12	2-Aug	15-Aug
348	Start up and Testing	All	12	28-Sep	11-Oct

Some work managed in spreadsheets

The team was using an electronic planning solution but was not able to make all the necessary logic ties between the various phases of work.

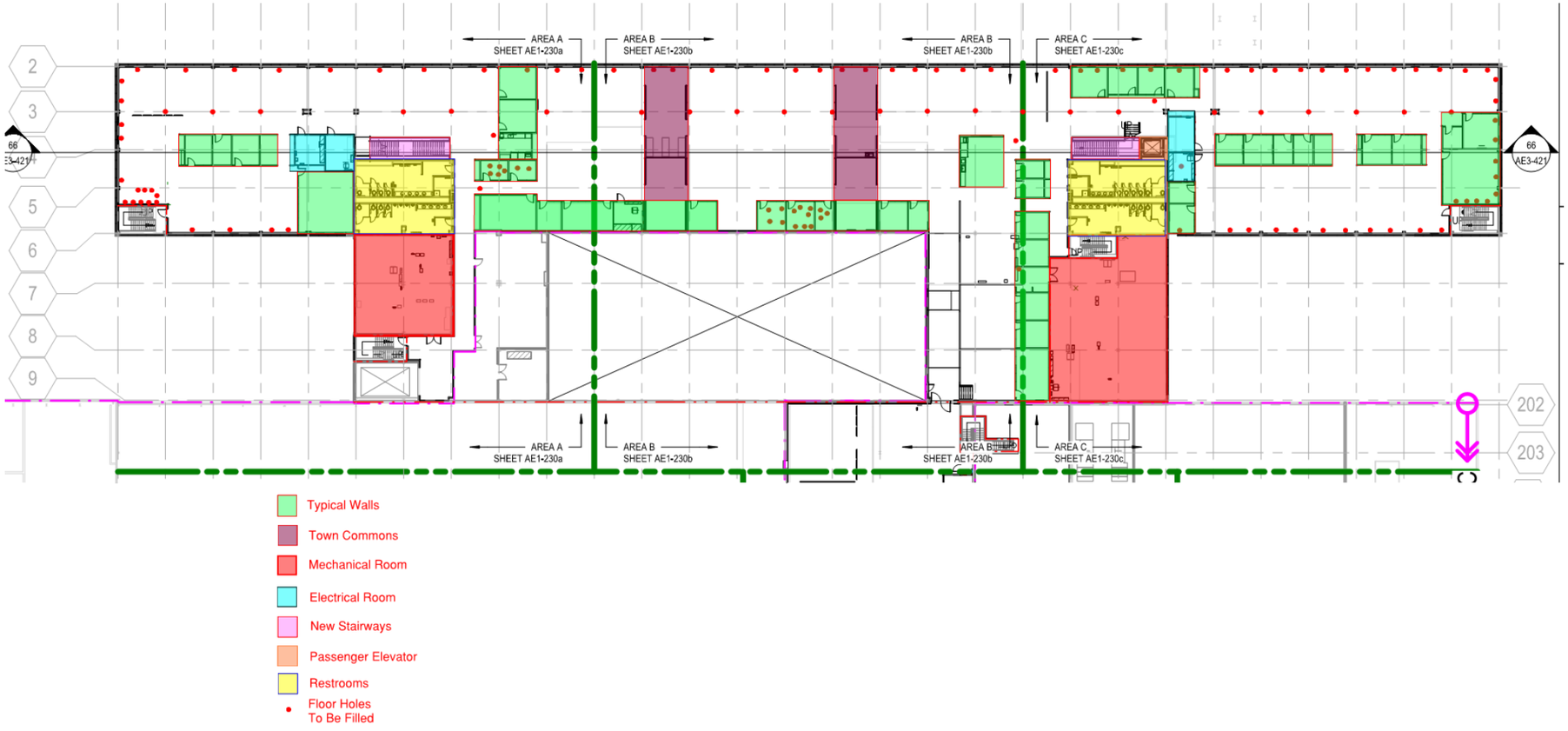
Solution | **Last Planner & Visual Management**

1. Visual Management
2. Work Areas
3. Information Flow
4. Collaboration
5. Improvements
6. Utilization
7. Completion
8. Reporting

Last Planner | **Takt Areas**

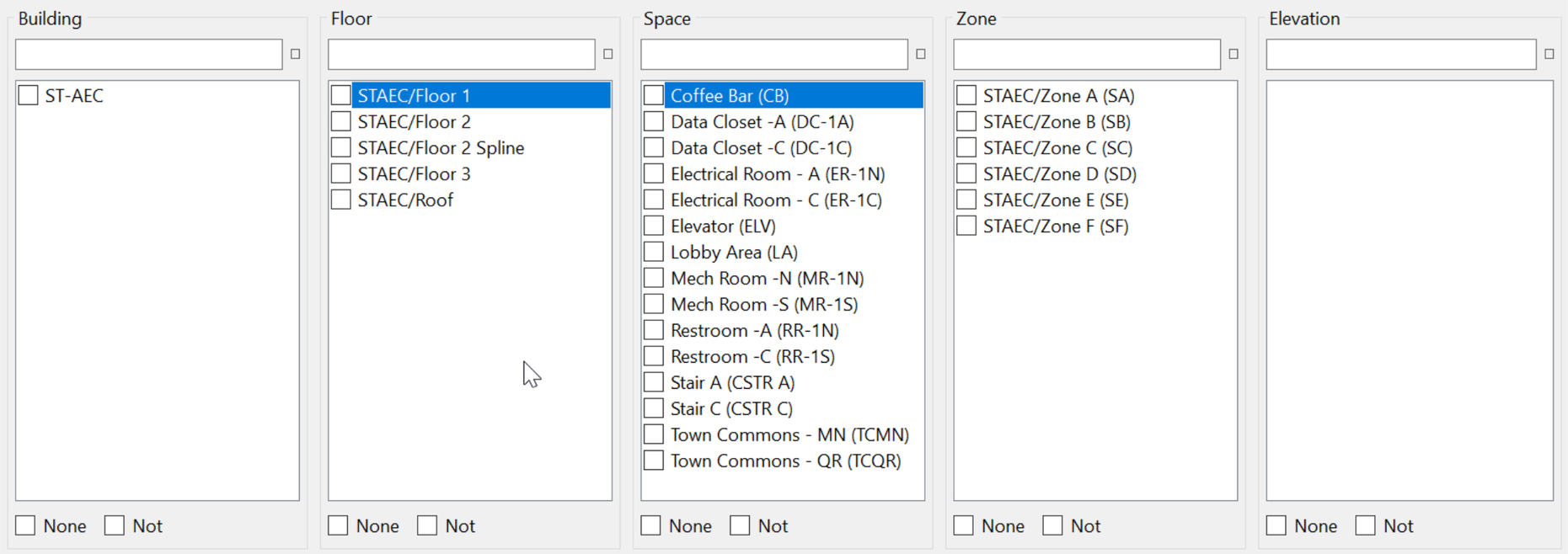
vPlan after shows unique work vs similar work in more detail.

Each color Represented an Area Type (made it easier to control the work)



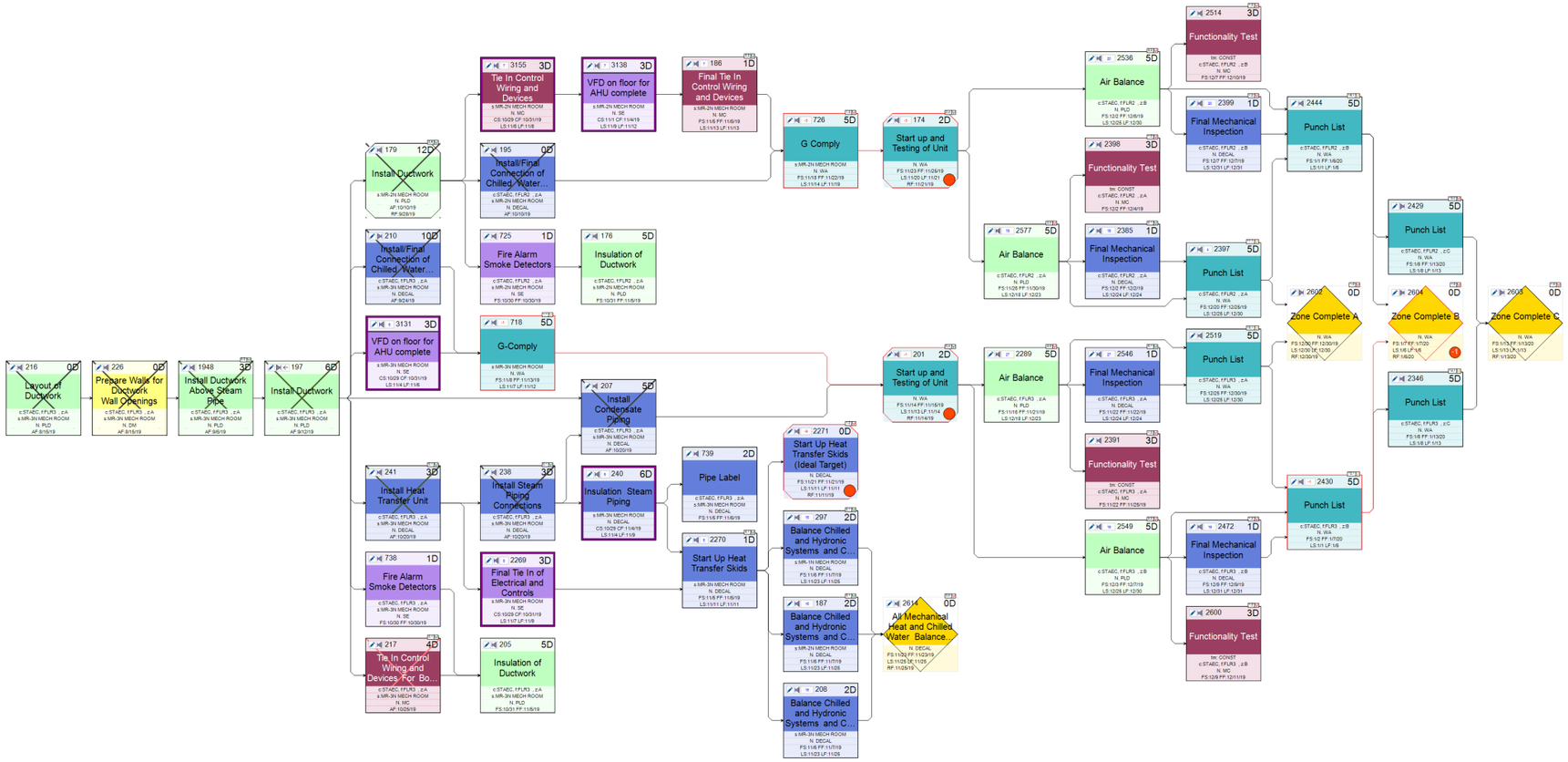
Last Planner | **Adapted for Recovery Planning**

Project re-organized into clearly defined locations. Pull Plans produced for each area type starting with the least complete.



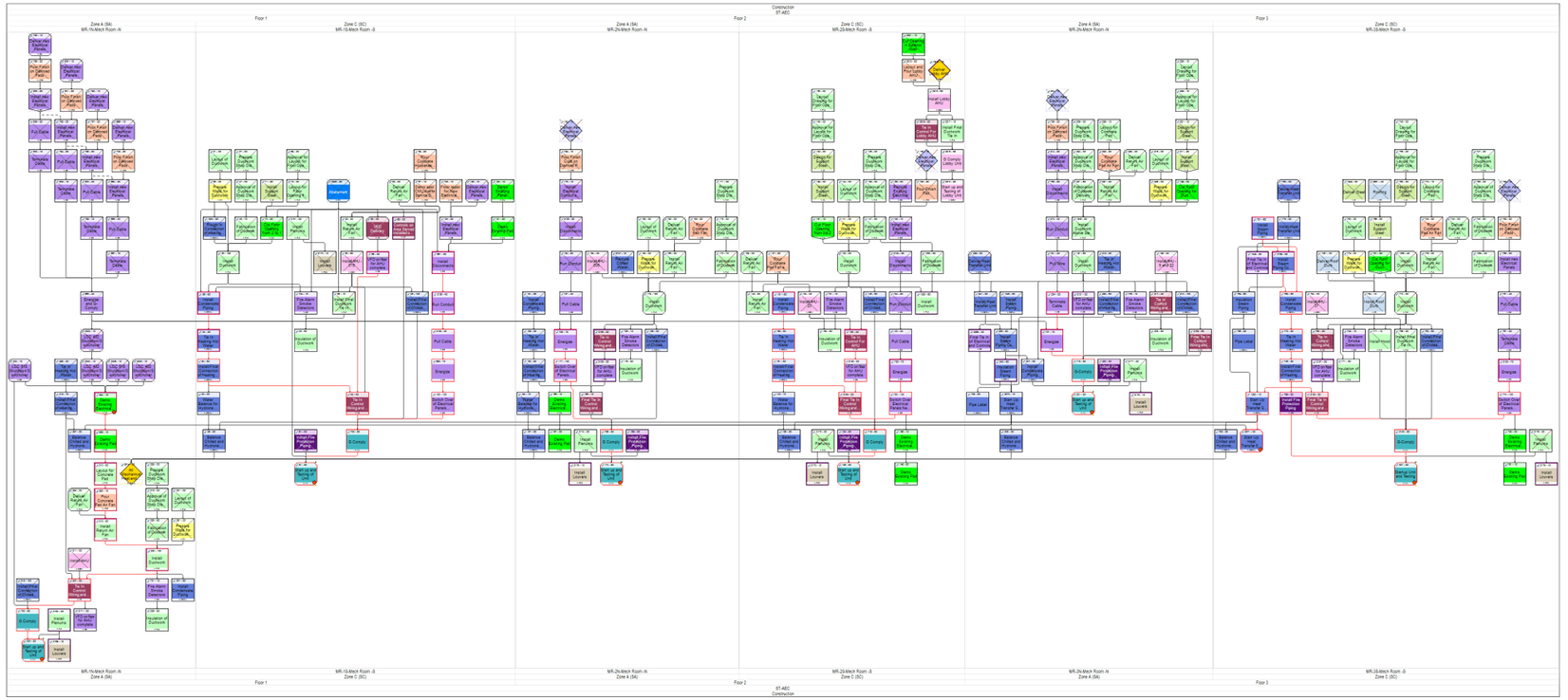
Last Planner | **Adapted for Recovery Planning**

Created a Detailed Pull Plan in collaboration with the trades to identify the sequence of handoffs to complete each unique area and any constraints.



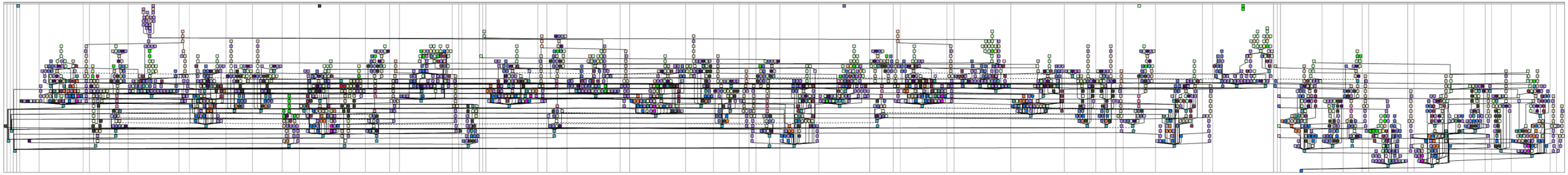
Visual Management | Work Areas | Information Flow | **Collaboration** | Improvements | Utilization | Completion | Reporting

Last Planner | **Application of Standard Work / Takt**



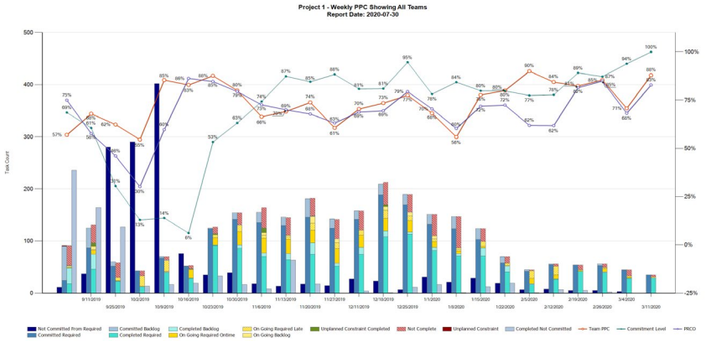
Replicated the sequence to all applicable locations, adapted to current progress and defined crew flow.

Last Planner | **Application of Standard Work / Takt**

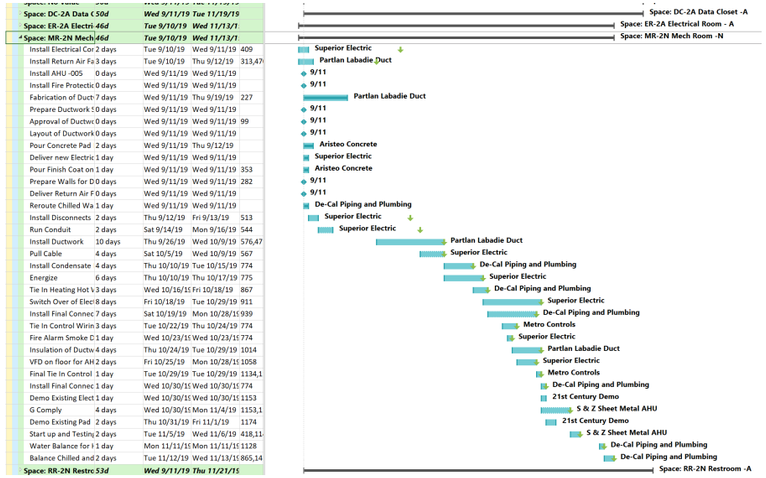


Last Planner | **Application of Standard Work / Takt**

- Pull Plans for the entire project completed in about 3 weeks (about 1.5 days per week)
- Identified bottleneck areas
- Crews began to gain efficiency by performing similar work
- Much easier to track constraints and completion status
- Identified crew requirements / discussed with the trades
- Pull plans exported to produce a detailed CPM schedule that matched the remaining work



Walbridge	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Superior Electric	2	6	6	64	26	34		36	60	60	70	54	54		36	50	50	54	56	46
Aristeo Concrete	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Ideal Steel	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Alpha / Continental Flooring	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Trend Milworks	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Partlan Labadie Duct	0	3	11	8	9	7		12	16	11	15	25	35		32	34	20	40	40	43
De-Cal Piping and Plumbing	0	0	0	2	2	4		0	2	0	0	2	2		2	4	4	4	8	6
Metro Controls	0	0	0	3	3	0		0	4	4	4	4	0		0	8	12	12	12	4
Regis Construction Carpenters	0	0	0	24	20	22		2	4	4	4	2	12		13	33	22	29	37	29
Madias Painting	0	0	0	0	0	0		0	14	0	2	2	0		0	2	0	4	4	2
21st Century Demo	0	0	0	0	0	0		0	0	0	0	0	0		0	0	5	0	0	0
SmithGroup	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
John-E Green FP	0	0	0	14	0	0		0	0	0	0	0	0		0	5	5	5	5	0
Dixon Masonry	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Kone Elevators	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Royal Roofing	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
S & Z Sheet Metal AHU	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Boston Tile	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
Modern Mirror Store Front	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0
vPlanner Support	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0



Visual Management | Work Areas | Information Flow | Collaboration | Improvements | Utilization | **Completion** | **Reporting**

3. Lessons Learned

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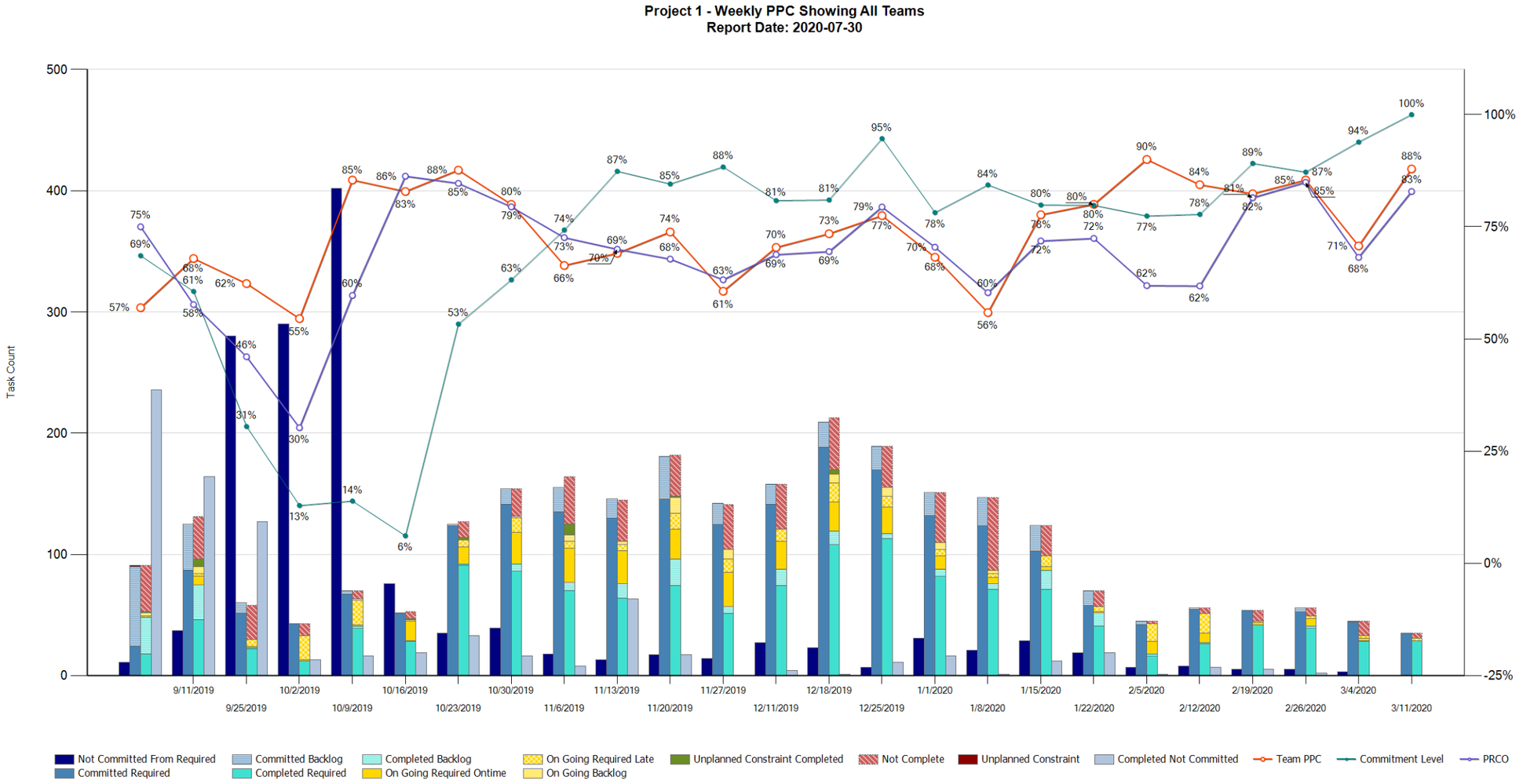
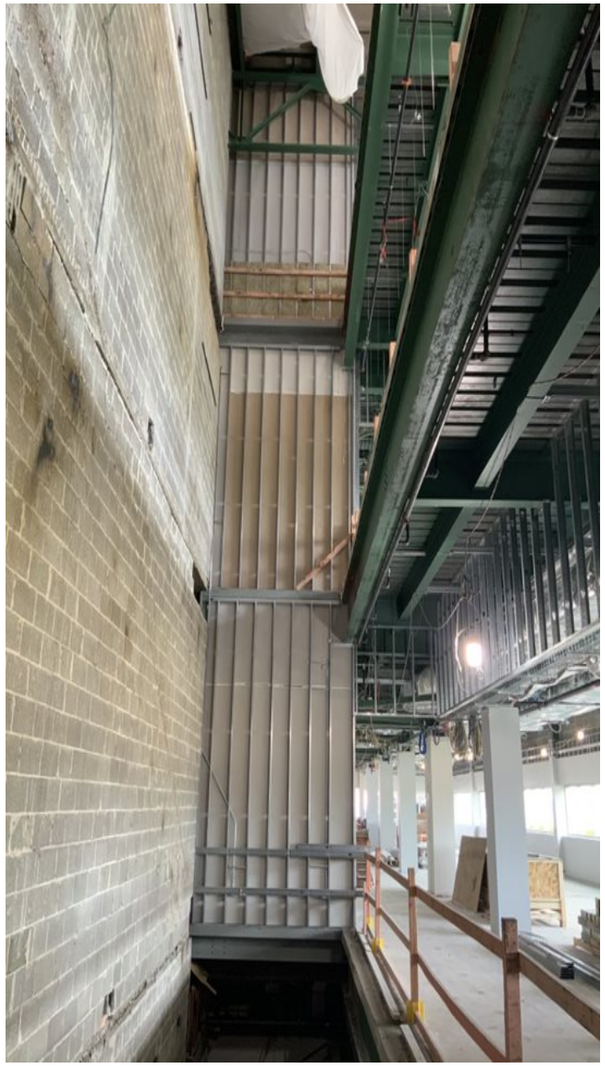
Last Planner

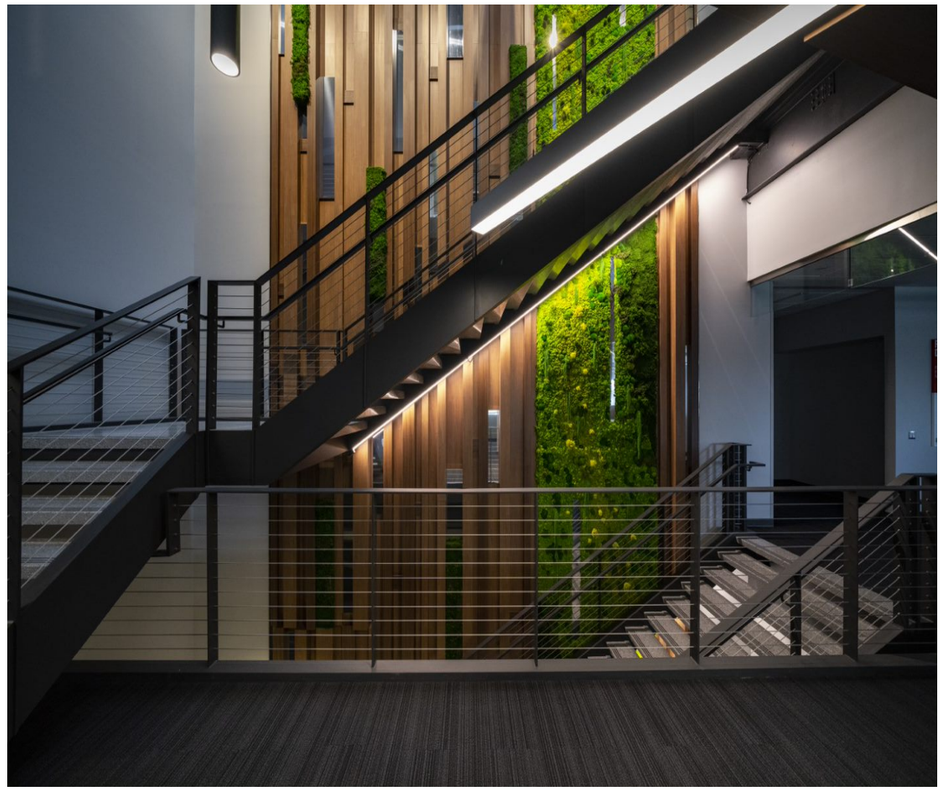


Last Planner | **Risk Identification**

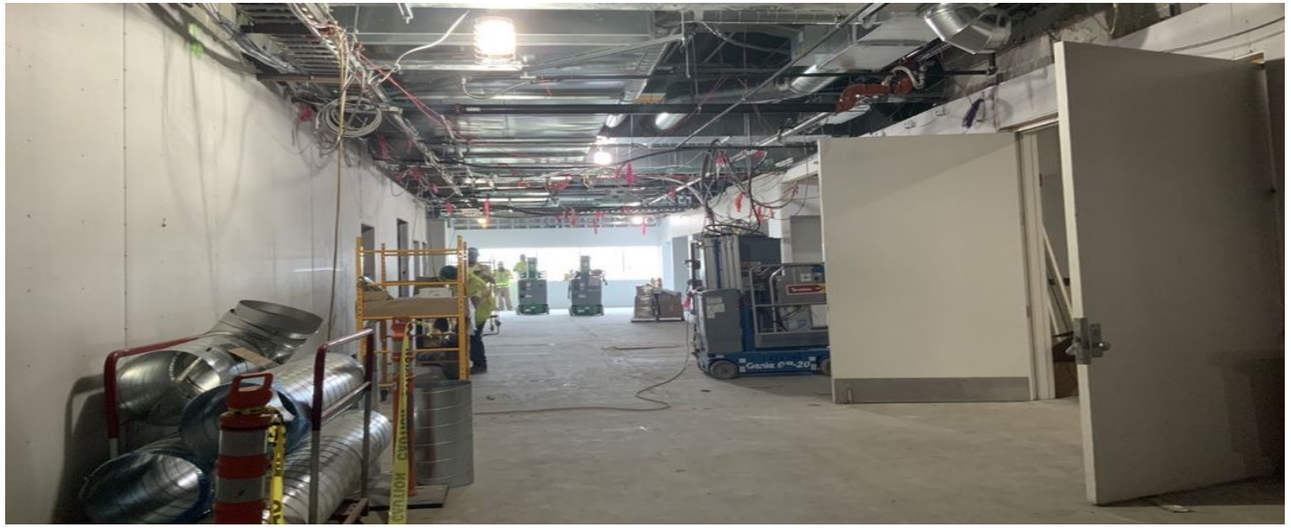
- Heating the building (not enough time to have heat in the building to start finishes)
- Lead time on stairs – the main stairs will need to be delivered after carpet is installed – no clear path to get them into the building
- Artwork install sequence conflicts with timing of stair construction – design change required
- Complex sequences for electrical switch over from old to new almost doubled the time for completion of mechanical rooms
- Tiling the bathrooms is a bottle neck
- Resource demands

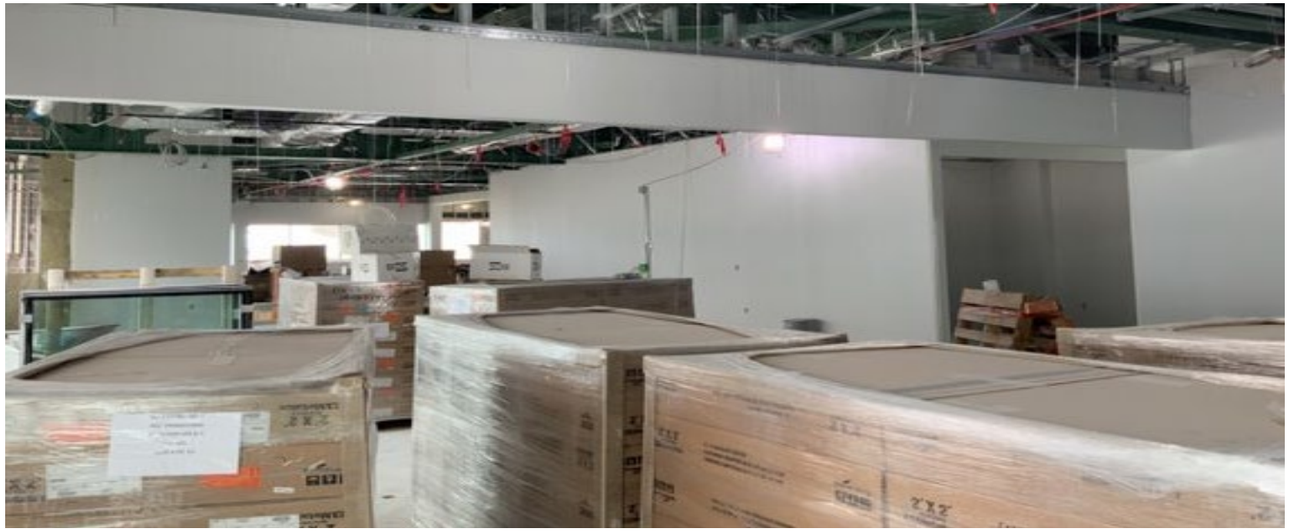
Lessons Learned





Lessons Learned

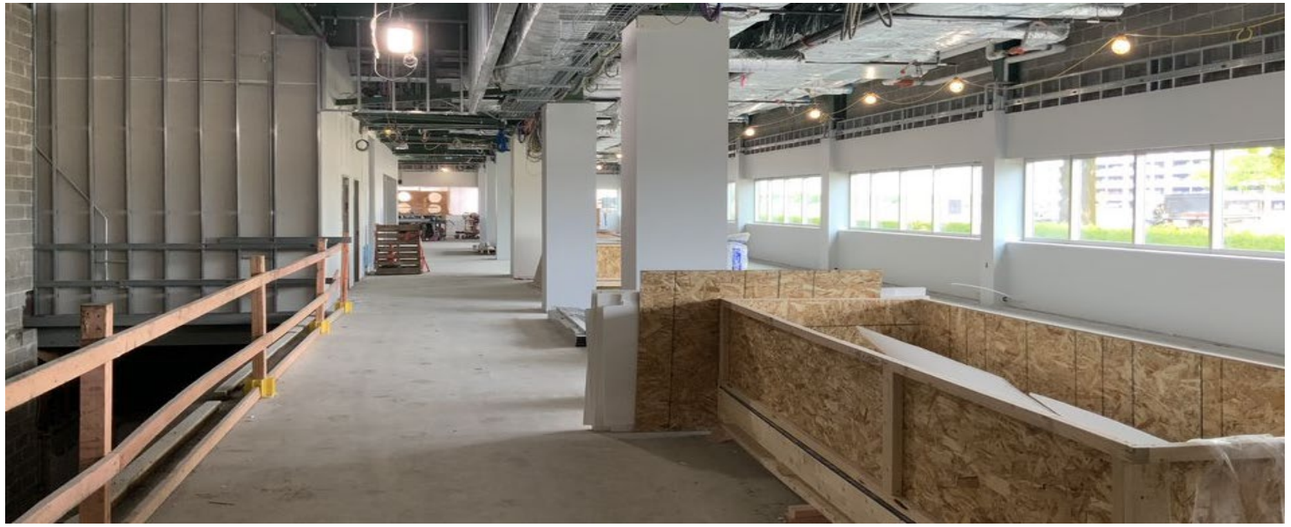


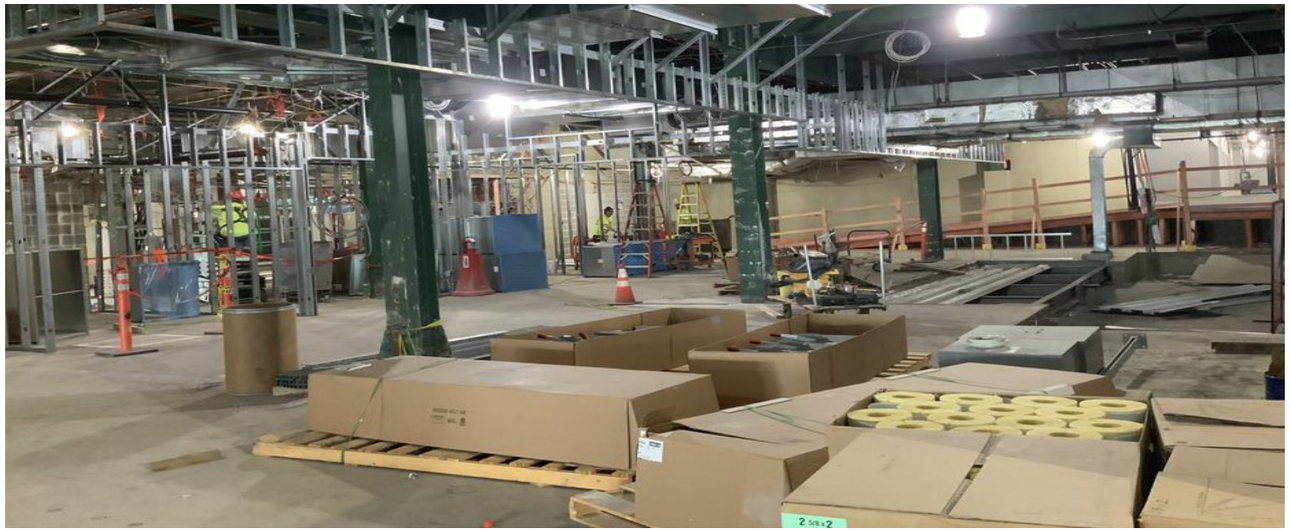


- Begin this process as soon as possible, it's never too early to start the process.
- Information is only as good as what the tradesmen give you
  - You cannot go any faster than they can go
- The trades need to collaborate together to fully understand where the issues are
  - Began doing this on a daily basis
  - The sequence became the most important to nail down, not focusing on the dates

Lessons Learned

Lessons Learned





- Tradesman issues - biggest factor
  - Experience labor is running thin
  - Lack of manpower
  - Too many similar tasks requiring experience manpower
- Last Planner allowed for critical path planning based on manpower and sequence
- Last Planner showed where second shifts or extra weekend work was needed
- Long lead time constraints and scheduling conflicts

Conclusion

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