

25<sup>TH</sup> ANNUAL



25<sup>TH</sup> LCI CONGRESS  
OCTOBER 24-27, 2023

# Takt Planning for Large Pharmaceutical Construction

Brad Kraus, DPR Construction

Robert Dowling, DPR Construction

Yash Lalwani, DPR Construction

Khushal Gajjar, MidAtlantic Mechanical

**25 YEARS OF LEARNING: SUPERCHARGE YOUR LEAN JOURNEY IN THE MOTOR CITY**

11:15 AM WEDNESDAY, OCT 25<sup>TH</sup> 2023



# Introductions



**Brad Kraus**  
**Project Executive**  
**DPR Construction**



**Robert Dowling**  
**General Superintendent**  
**DPR Construction**



**Yash Lalwani**  
**Project Manager**  
**DPR Construction**



**Khushal Gajjar**  
**Project Manager**  
**MidAtlantic Mechanical**





# Agenda

- Problem Statement / The Why
- TAKT Planning
- Project(s) Overview
- Production Tracking
- MAM Prefabrication
- Lessons Learned
- Continuous Improvement



# Problem Statement

- Complicated & Long Dynamic Schedules
- Project effort and energy optimization
- Right balance of effort on the right things
- Benchmarking production – how reliable is our plan?
- Ever Forward - Lessons Learned





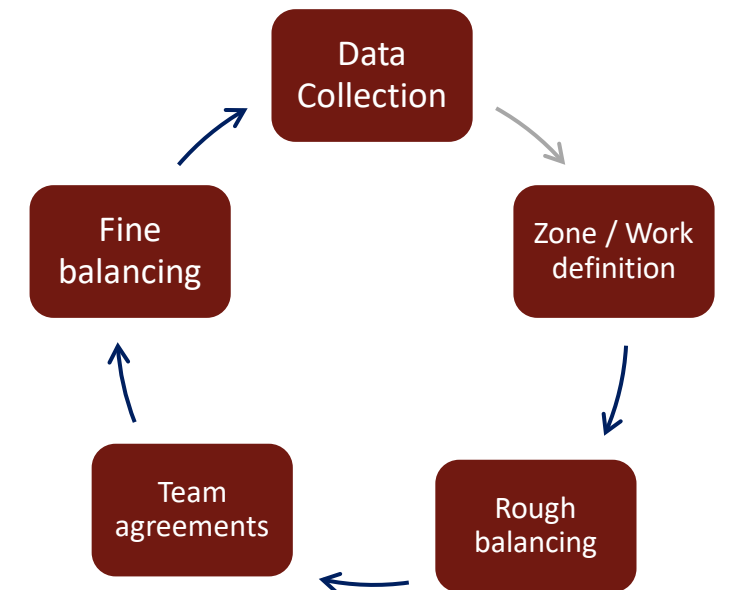
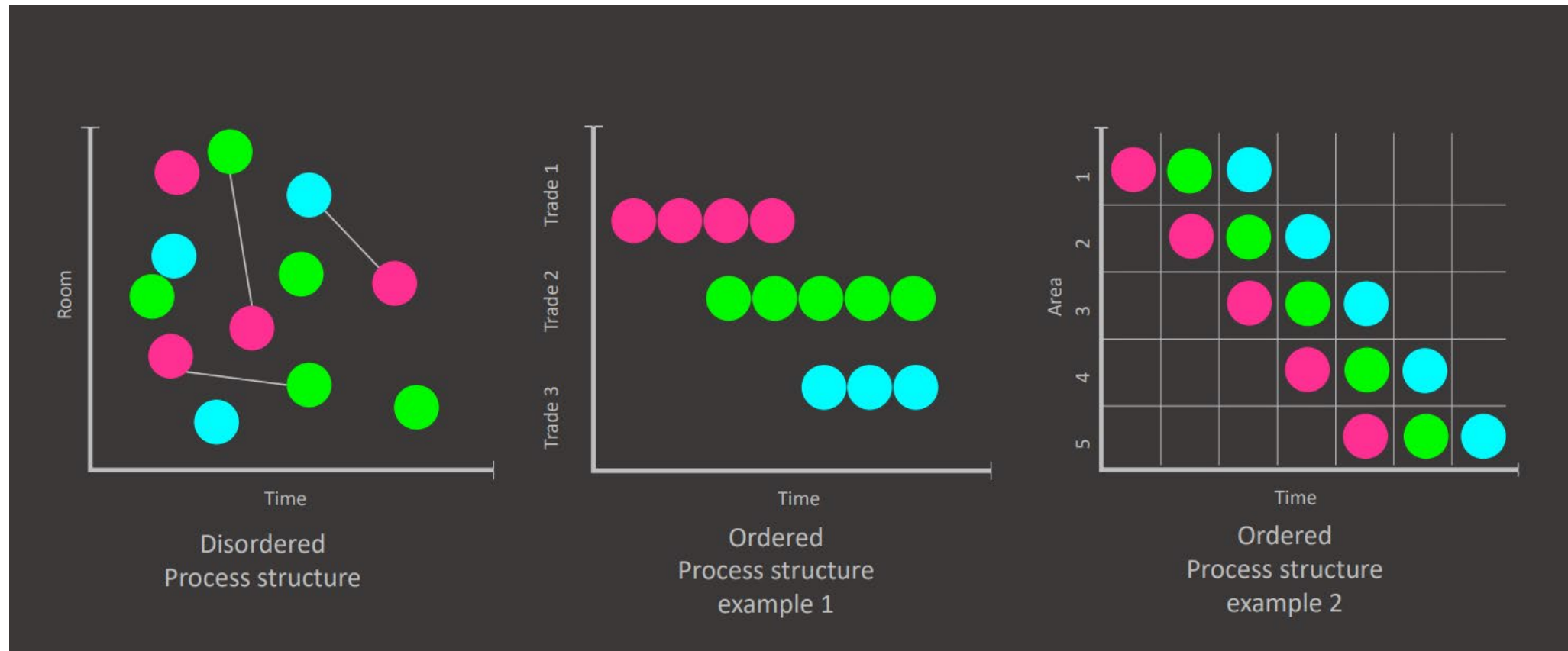
# Schedule/Planning – The Why

- Create the plan with the trades
- Translate our schedule/plan into a story
- The best story in the world is useless if people cannot understand it
- TAKT planning is an effort to tell that story within one page



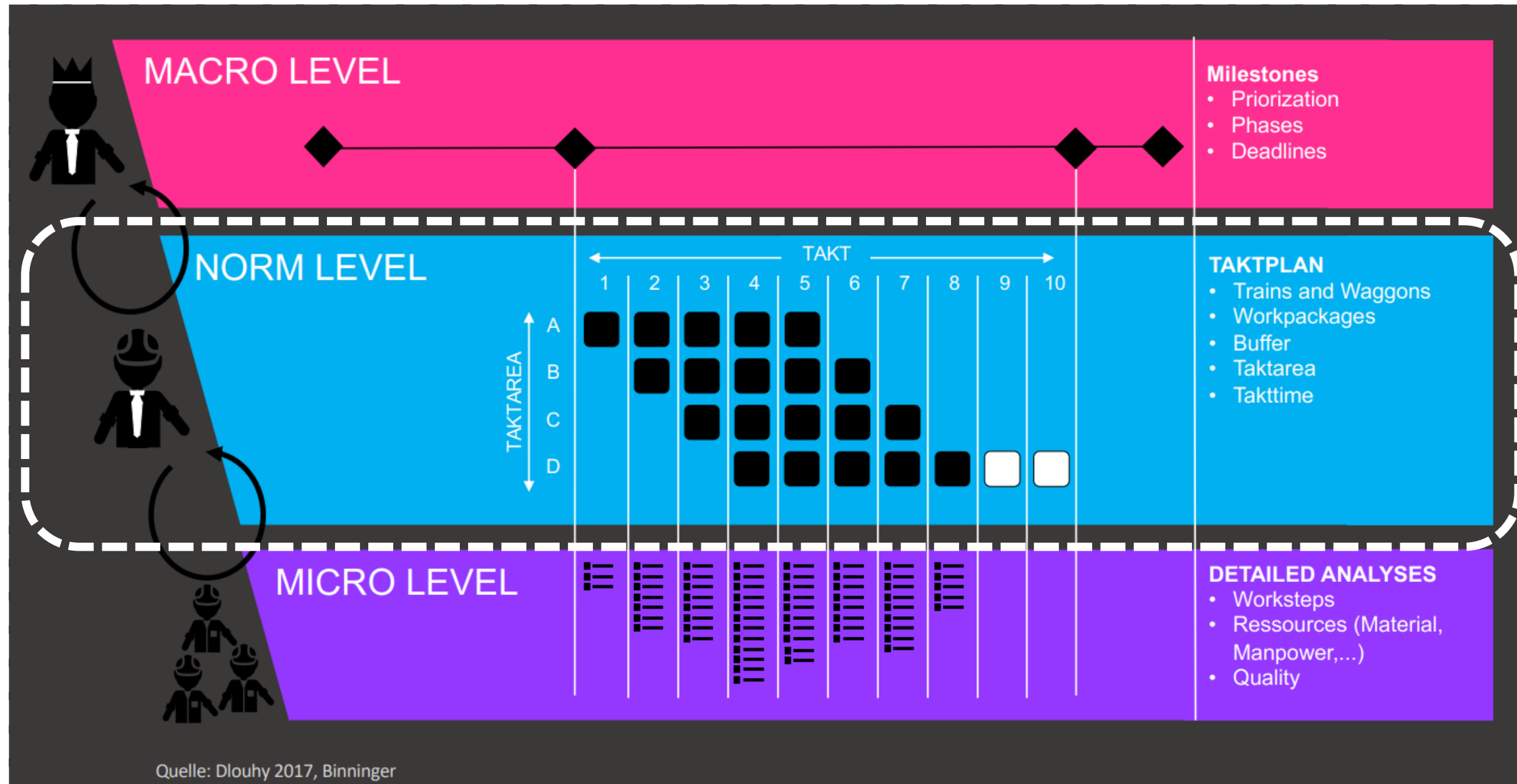


# PURPOSE & PROCESS OF TAKT





# LEVELS OF TAKT





# Setting up the project for predictable results





# MERCK BIOLOGICS DEVELOPMENT CENTER

## RAHWAY, NJ

Mixed use – lab and office space  
207,000 SF Structure (60,000 SF Footprint)

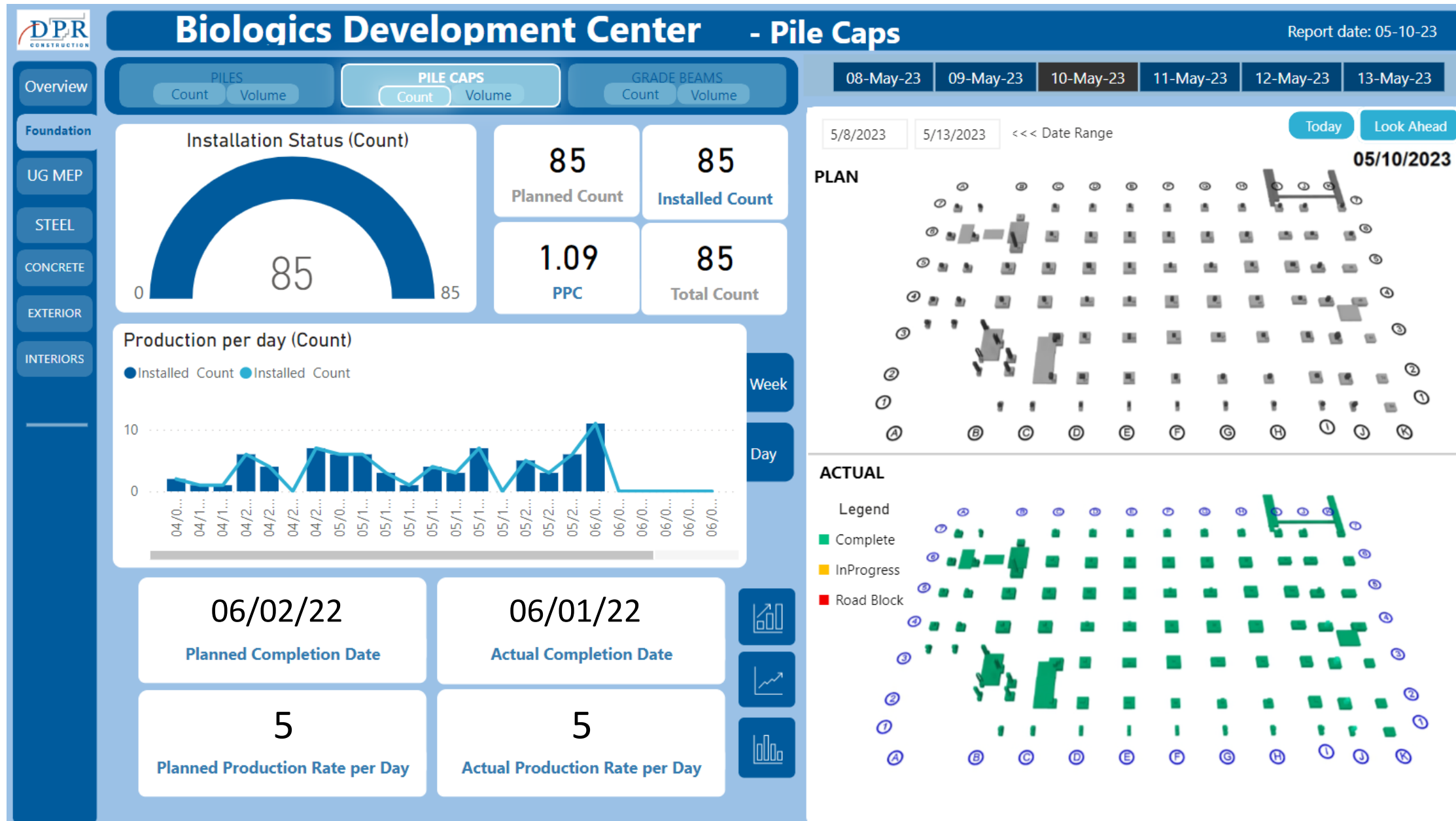
4 Floors 2 Floors – Mixed Lab/Office Use  
Ground Floor – Pilot Plant/GMP Suite & Process Equipment  
Mechanical Penthouse

76% Awarded Design Build Contract

Owner - Merck  
EPCM - DPR Construction  
Design Partner – Jacobs  
Trade Partners – MAM, Forest, DPR SPW, Bonland, Daldrop

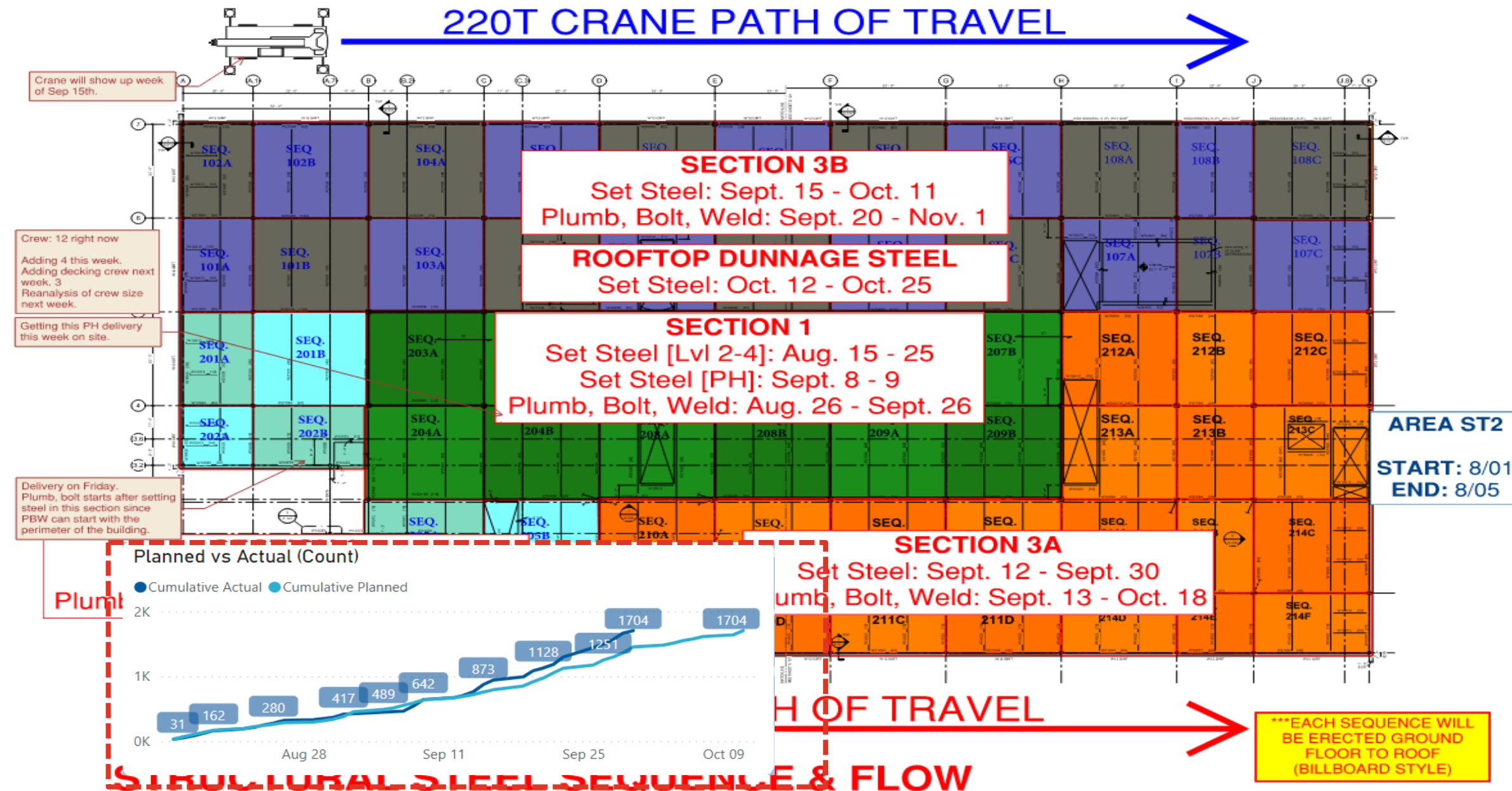


# VISUAL PLAN FOR SUBSTRUCTURE



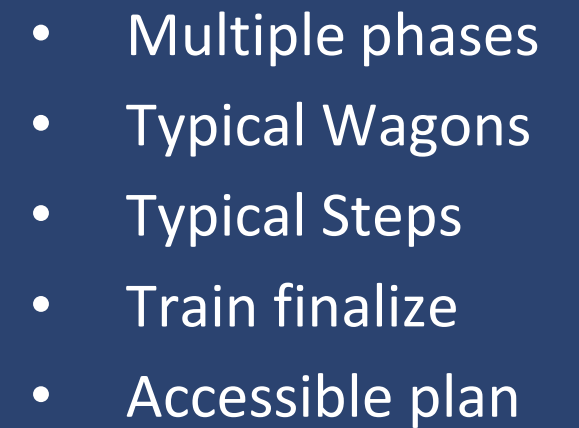
- Visual Plan
- Shows Flow
- Work Packaging
- Actualizing
- Tracking metrics

# VISUAL DASHBOARDS – EXTERIORS TRACKING

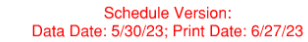


- Plan with Trades
- Quantity Counts
- Adaptable
- Accountable
- Course Correct



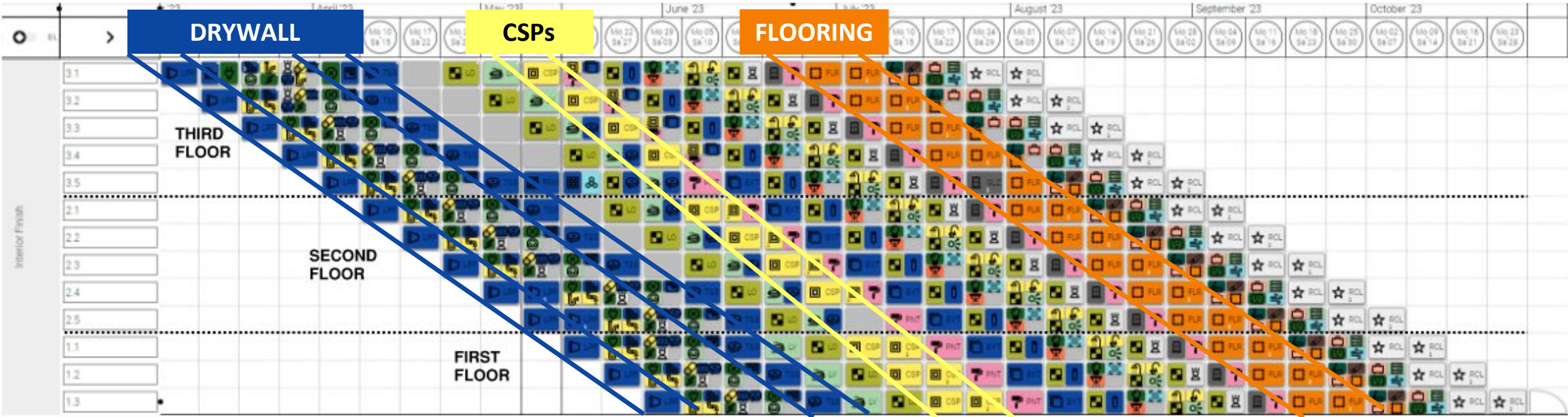








# TAKT PLAN – FINISHES MAIN FLOW ANALYSIS



## INTERIOR FINISH SYMBOL LEGEND

|                                                      |                                                    |                                                    |                                               |                                                       |                                                |                                           |                                                      |                                                                  |
|------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|-----------------------------------------------|-------------------------------------------------------|------------------------------------------------|-------------------------------------------|------------------------------------------------------|------------------------------------------------------------------|
| <b>DPR DRYWALL</b><br>LPP Lower Panelized Partitions | <b>DPR DRYWALL</b><br>STB Stick Built              | <b>FOREST</b><br>ERI Electrical Wall RI            | <b>MAM</b><br>PRI Plumbing Rough In           | <b>FOREST LV</b><br>WM Low Voltage Wire Management    | <b>FOREST</b><br>BHP Electrical Home Run       | <b>FOREST LV</b><br>AHJ inspection        | <b>MAM</b><br>IDW Insulate Domestic Water Bath Rm... | <b>DPR DRYWALL</b><br>BAT Sound Batt - DPR                       |
| <b>FOREST</b><br>LGT Electrical Lighting             | <b>BONLAND</b><br>GRD Grill, Registers & Diffusers | <b>GRFP</b><br>FFH Fire Protection Sprinkler Heads | <b>MAM</b><br>PLB Install Plbg Fixture & Trim | <b>MAM</b><br>CSP Connect PP to CSP & Lab...          | <b>NICHOLSON</b><br>ACT Select Clg Tile (copy) | <b>FOREST LV</b><br>LV Low Voltage Clg RI | <b>NICHOLSON</b><br>ACT ACT Clg Tile White Out       | <b>DPR DRYWALL</b><br>JOSLOFF Sound Batt - DPR SPW Sick Build... |
| <b>DPR DRYWALL</b><br>TSS Tape & Spackle             | <b>DPR DRYWALL</b><br>FRM Frame Diffuser           | <b>BONLAND</b><br>DLP Ductwork Low Pressure        |                                               |                                                       |                                                |                                           |                                                      | <b>GLZ</b> Glazing                                               |
| <b>DPR DRYWALL</b><br>TSS Tape, Spackle & Sand       | <b>FOREST</b><br>PCL Electrical Prefab Wall POC    | <b>DPR DRYWALL</b><br>CWL Closing Walls            | <b>NICHOLSON</b><br>LO Ceiling Layout         | <b>FOREST LV</b><br>LV Low Voltage Structured Cabling | <b>MAM</b><br>CSP Ceiling Service Panel        | <b>DPR DRYWALL</b><br>EXT Exterior Scope  | <b>FROMKIN</b><br>PNT Painter                        | <b>NICHOLSON</b><br>ACT ACT Clg Grid                             |
| <b>FROMKIN</b><br>FPT Final Paint                    | <b>FROMKIN</b><br>FLR Flooring and Base            | <b>CFI</b><br>FUR Furniture                        | <b>PRESTIGE</b><br>ML Millwork                | <b>LAB CHAFTERS</b><br>CSW Casework                   | <b>FOREST LV</b><br>LV Low Voltage             | <b>FOREST</b><br>ED Electrical Devices    | <b>BONLAND</b><br>TAB Test and Balance               | <b>MERCK/JACOBS</b><br>RCL Rolling Completion List               |
|                                                      |                                                    |                                                    |                                               |                                                       |                                                |                                           |                                                      | <b>DPR DRYWALL</b><br>HWT Heating Hot Water Coil Connections     |





# TAKT PLAN

Identifying potential  
workless takt areas



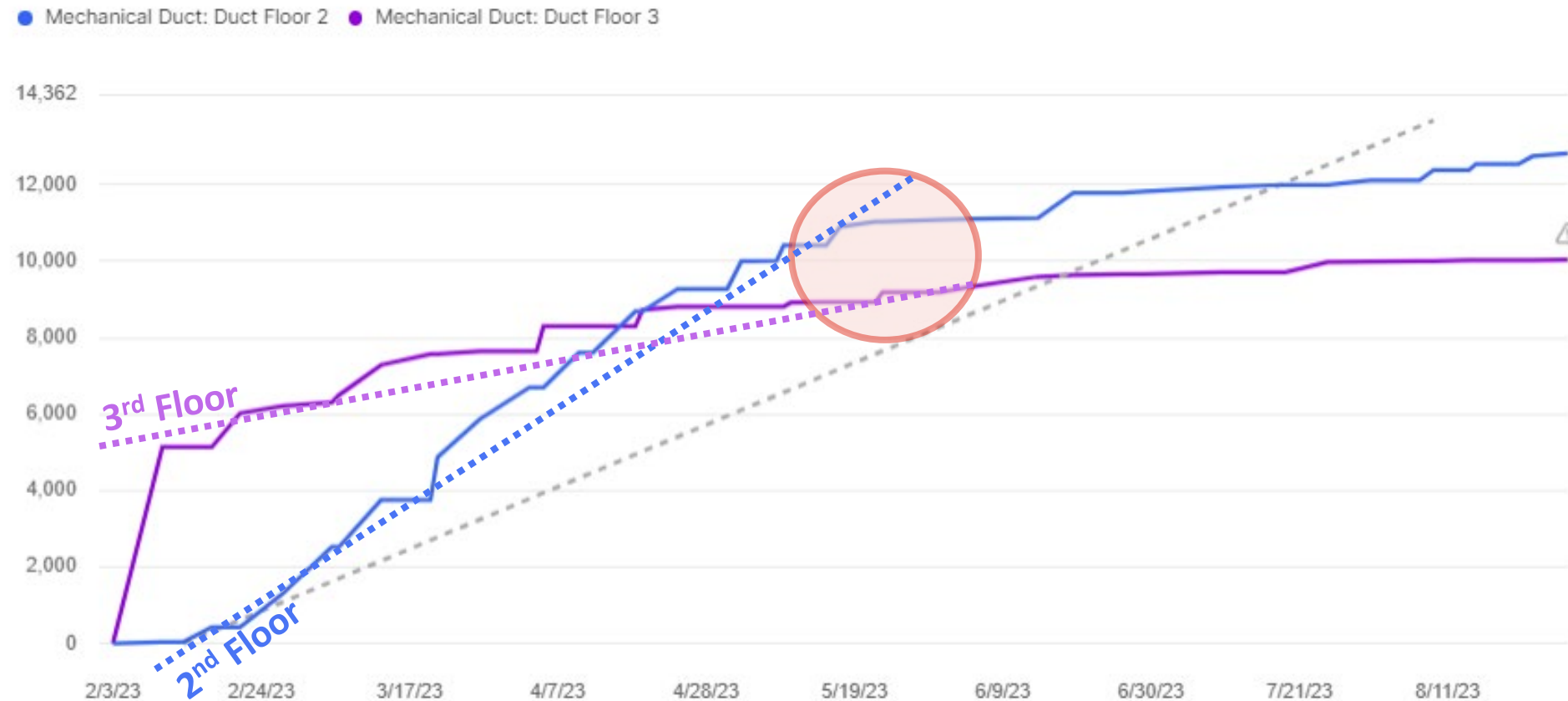
## INTERIOR FINISH SYMBOL LEGEND

|                                                      |                                                    |                                                    |                                               |                                                       |                                                    |                                                      |                                                      |
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| <b>FROMKIN</b><br>FPT Final Paint                    | <b>FROMKIN</b><br>FLR Flooring and Base            | <b>CFI</b><br>FUR Furniture                        | <b>PRESTIGE</b><br>ML Millwork                | <b>LAB CHAPTERS</b><br>CSW Casework                   | <b>FOREST LV</b><br>LV Low Voltage                 | <b>FROMKIN</b><br>PNT Painter                        | <b>NICHOLSON</b><br>ACT ACT Clg Grid                 |
|                                                      |                                                    |                                                    |                                               |                                                       |                                                    | <b>BONLAND</b><br>TAB Test and Balance               | <b>MERCK/JACOBS</b><br>RCL Rolling Completion List   |
|                                                      |                                                    |                                                    |                                               |                                                       |                                                    |                                                      | <b>MAM</b><br>HWW Heating Hot Water Coil Connections |



# FOLLOWING THE PLAN

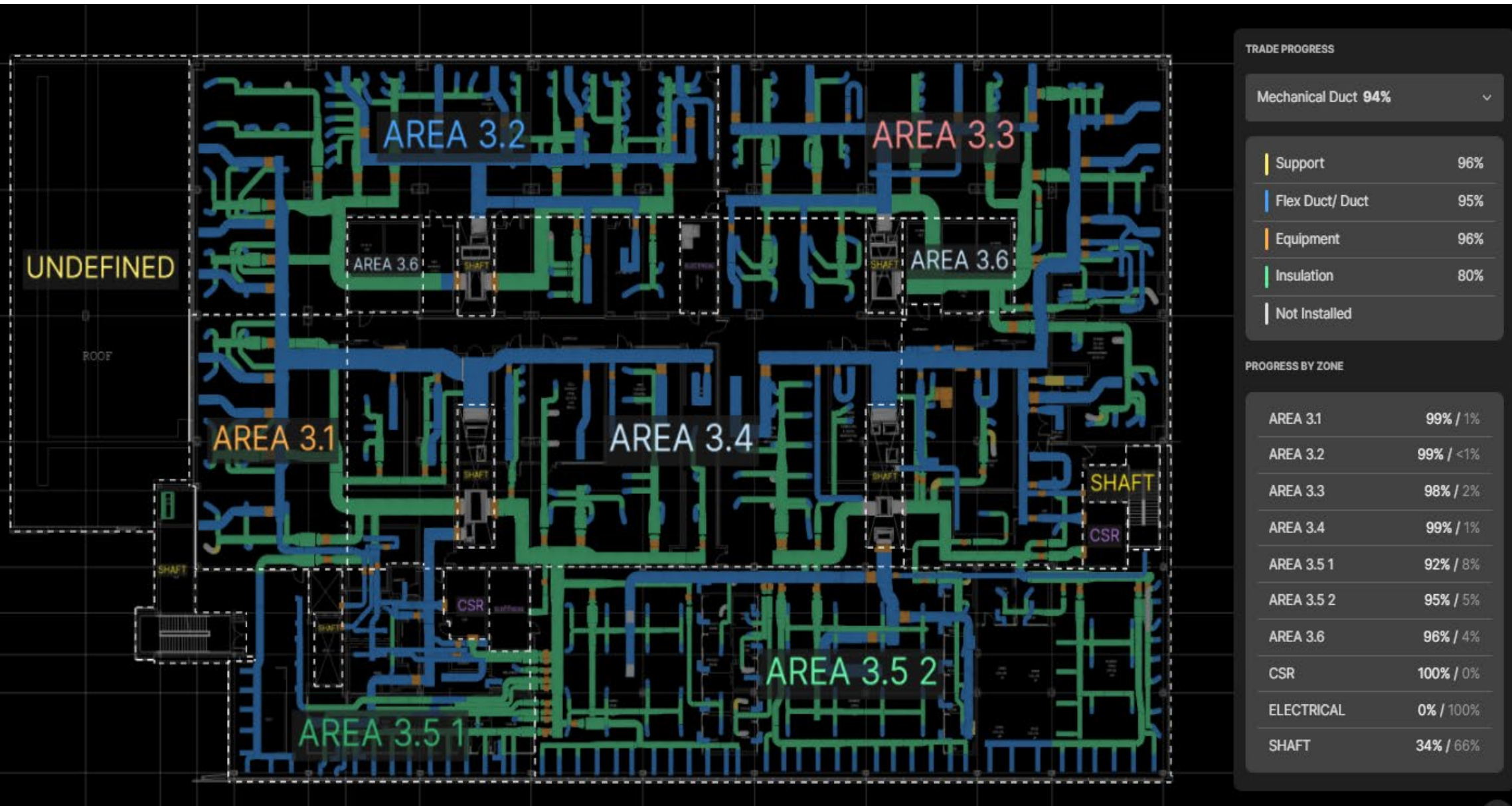
Production Trend



- Stick to the agreed plan
- Trust the process
- Production comparison

**25.22% improvement**  
**Utilizing TAKT zones**

# KEEPING SCORE - OBJECTIVELY



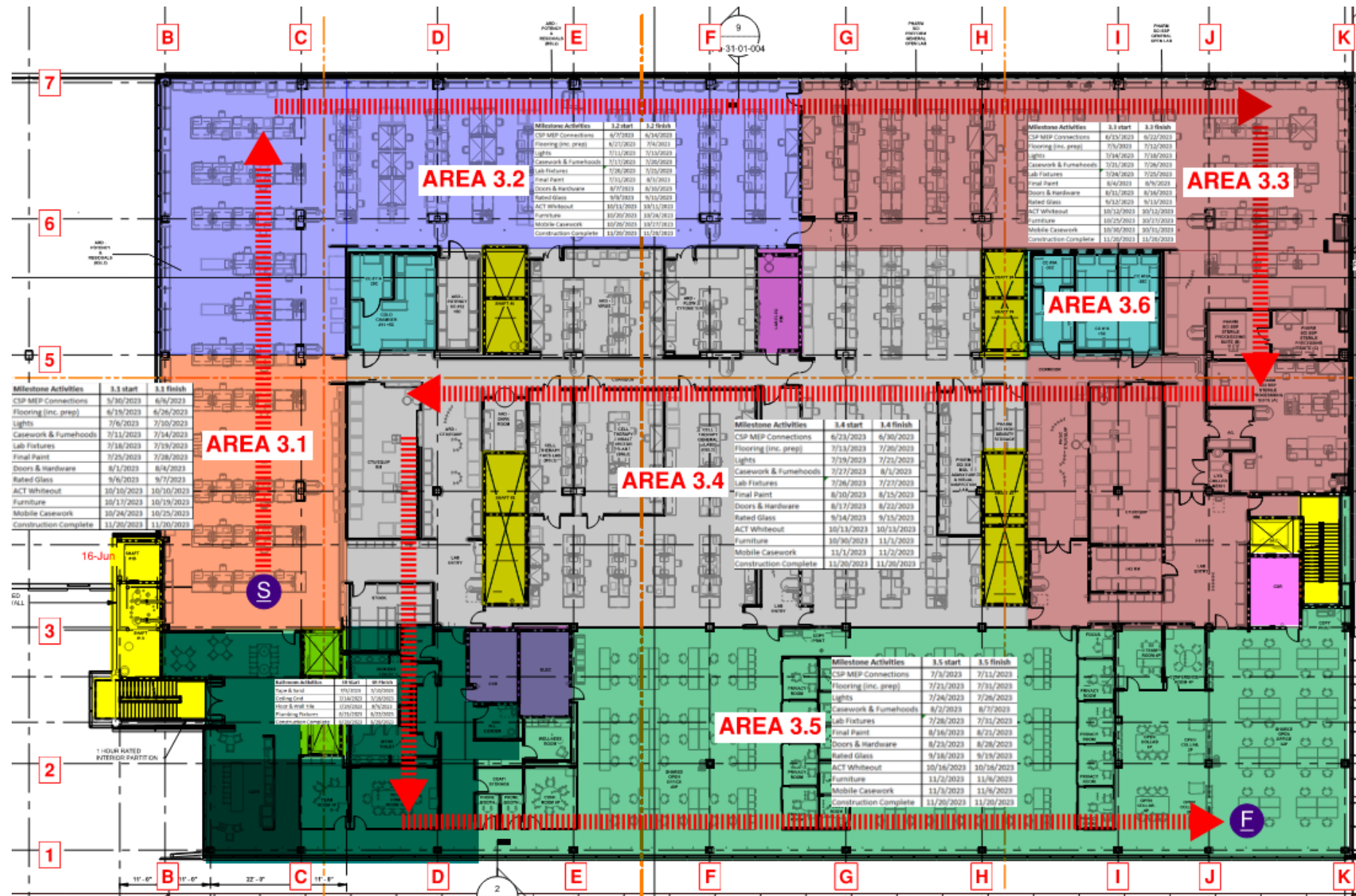
- TAKT Zone
- % by trade
- Weekly update
- AI/VL Tools



# MidAtlantic Mechanical leading the field



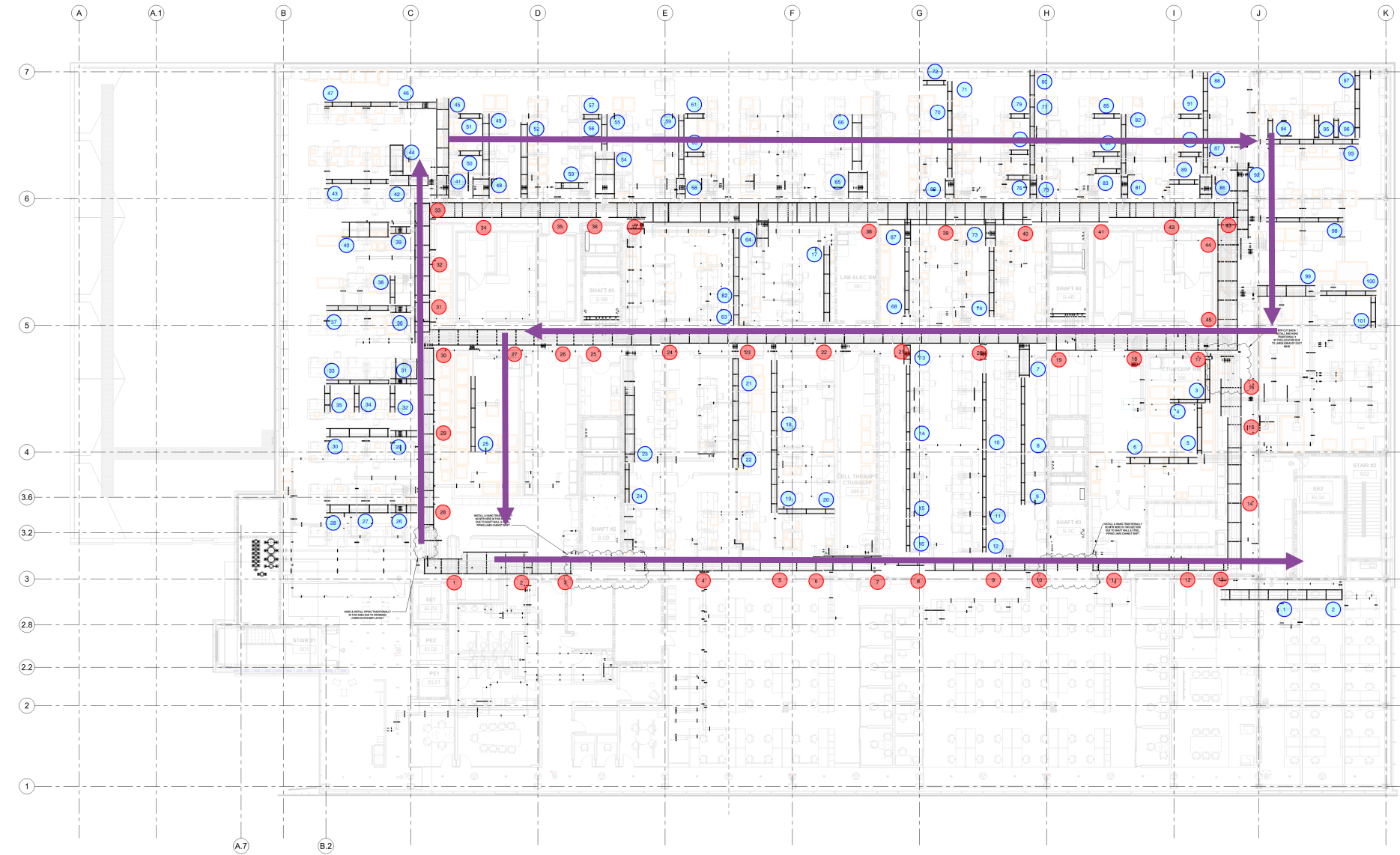
# DELIVERING PER TAKT ZONE



- PREFAB SCHEDULED TO MATCH TAKT FLOW
- CLEAR DATES ALLOWED US TO FABRICATE IN THE CORRECT SEQUENCE
- SPOOL SHEETS TO MATCH MAIN PRODUCTION FLOW THROUGH THE FLOOR



# DELIVERING PER TAKT ZONE

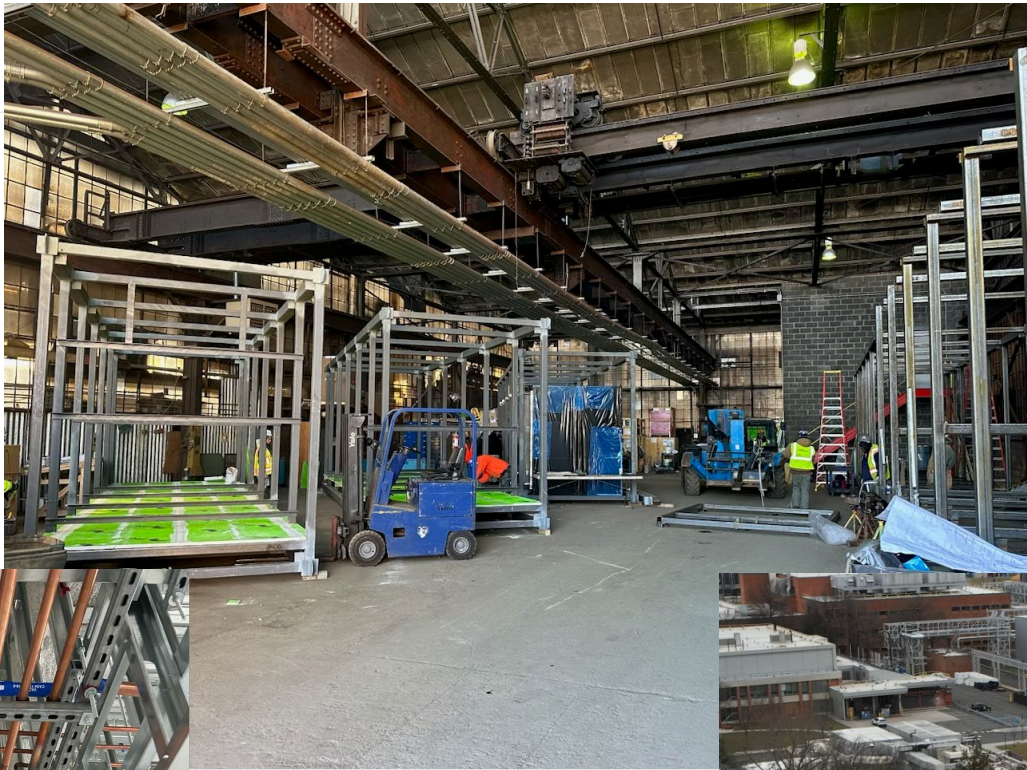


- SHOP RACK DRAWING
- EXAMPLE OF SEQUENCE OF FABRICATION

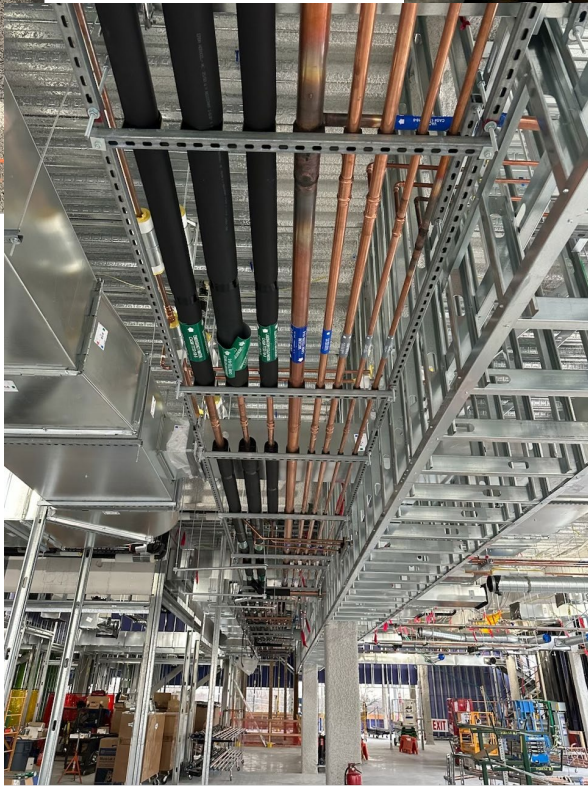




HORIZONTAL TRADE RACK OFFSITE



VERTICAL TRADE RACK OFFSITE



HORIZONTAL TRADE RACK ONSITE



VERTICAL TRADE RACK ONSITE



# BY THE NUMBERS

21,000 HRS

Typical: 10%  
Merck BDC: 23%

OFFSITE HOURS

7,500 HRS

Typical: 2-3%  
Merck BDC: 6%

VDC HOURS

308

Prefabricated Horizontal  
Rack

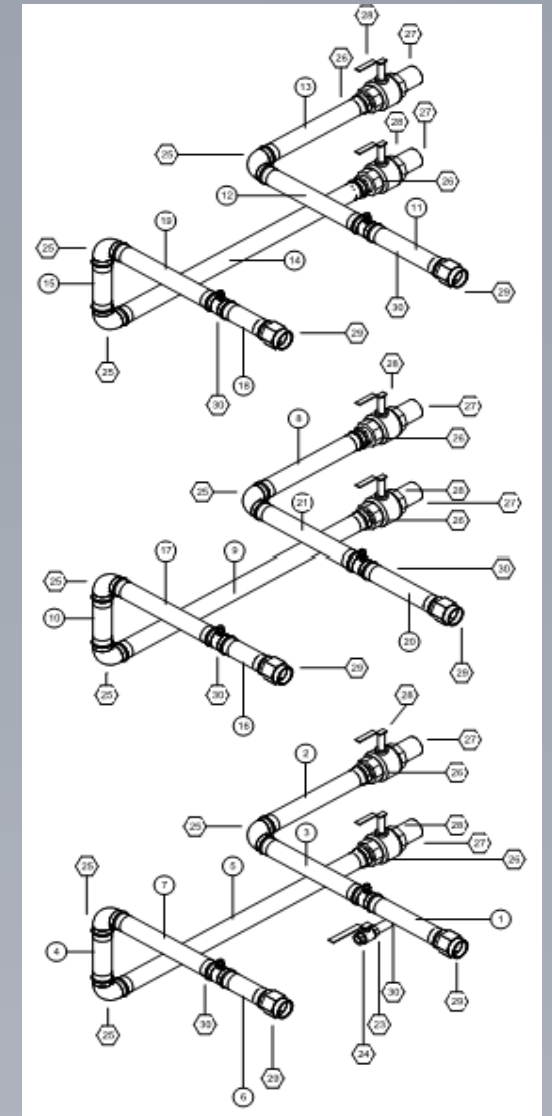
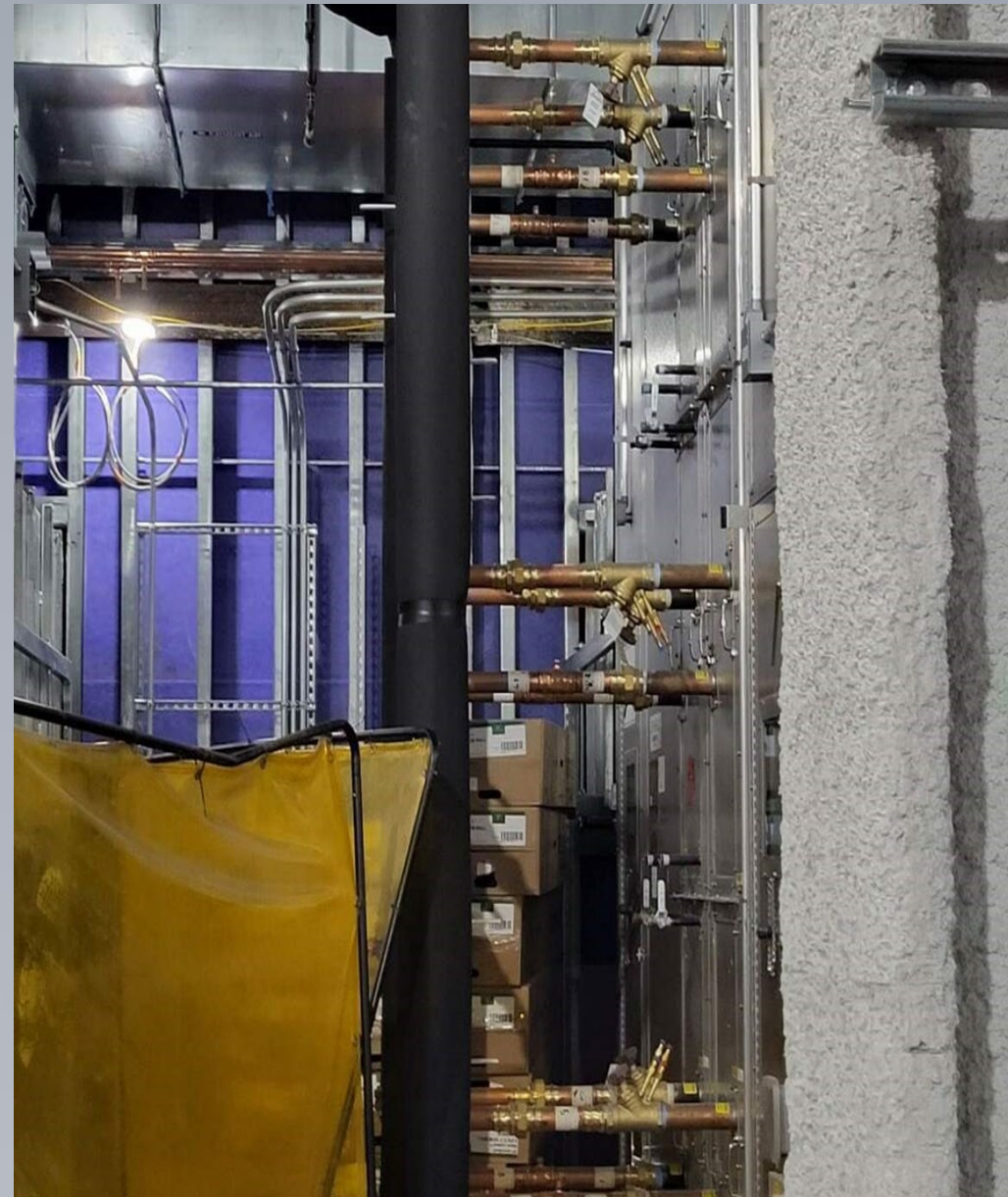
Prefab

# FIELD VS. PREFAB COMPARISON

**Field (Stick Build):**  
46 Hours Total

**Field (Prefab):**  
Fabrication of Spools – 8 Hours  
Installation of Spools – 16 Hours

**Efficiency Increase:**  
52%



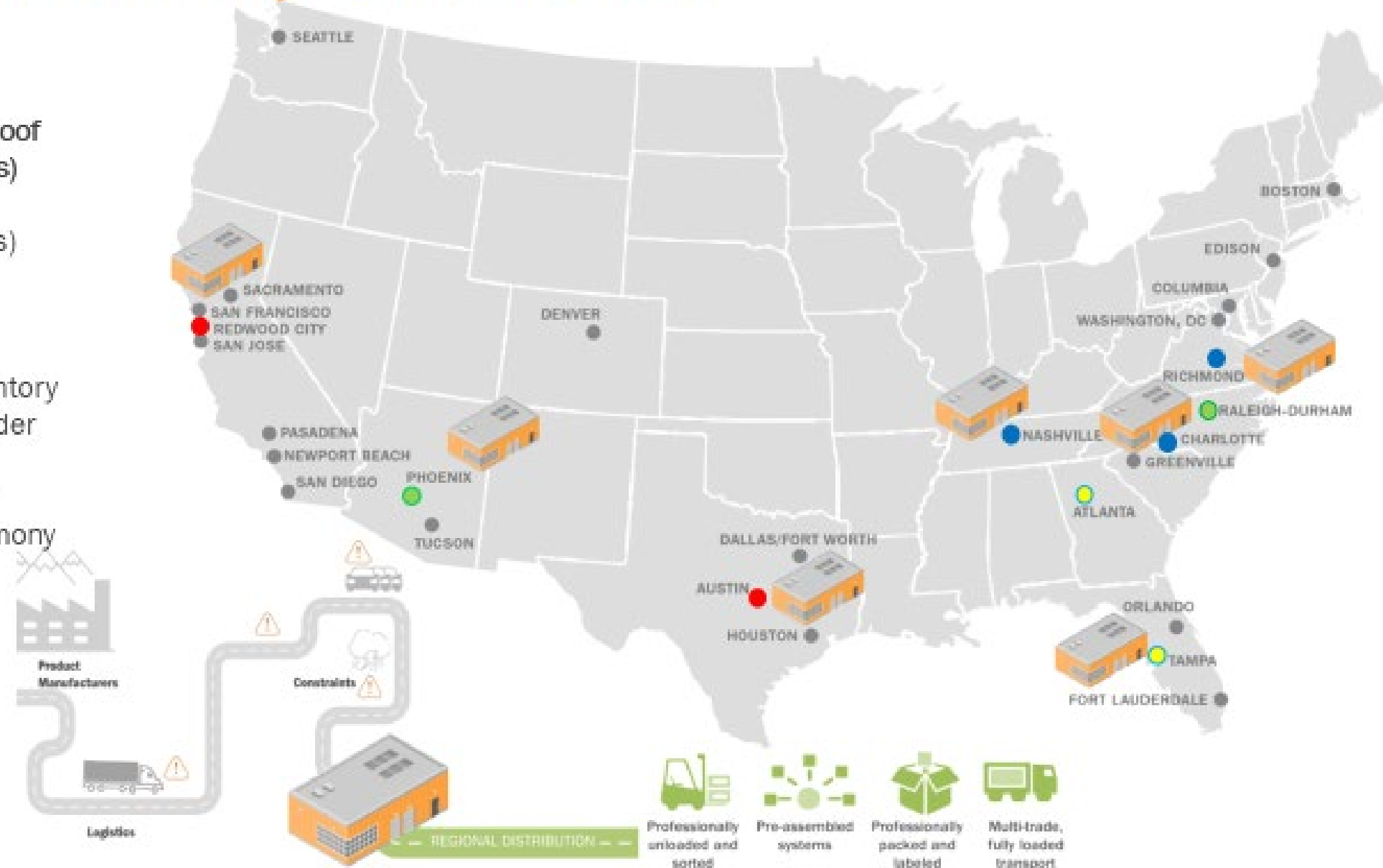
Glycol Unit Tie-In (Spool Drawing)



# Prefab Assembly Facilities

## OUR STANDARDS

- Balance our labor
- Not Construction Under Roof
- No Downtime (15 Minutes)
- Never Sacrifice Quality
- No Downtime (15 Minutes)
- Never miss a ship date
- No Food or Drink on the manufacturing floor
- 90-day Max material inventory
- Never be construction under Roof
- Welcome the community
- Man and Machine in Harmony
- Move with Purpose



# How can you apply this tomorrow?

- *Focus on creating zones and maintaining key trade flow*
- *Create a plan that works for the project not just one trade*
- *Leverage BIM Coordination & Model Based Planning/Tracking*
- *Communicate the plan/story via Visual Schedules*
- *Translate to TAKT format to analyze overall trade and project flow*
- *Link between TAKT and P6 at a milestone level*
- *Define Critical Success Factors, then track and display*
  
- *Or ... Start today and also go to the following presentation @ 4:30pm:*
  - *"Transformation: The Journey to Mindset to Solutions to Science"*





Ever Forward...



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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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**Robert Dowling**

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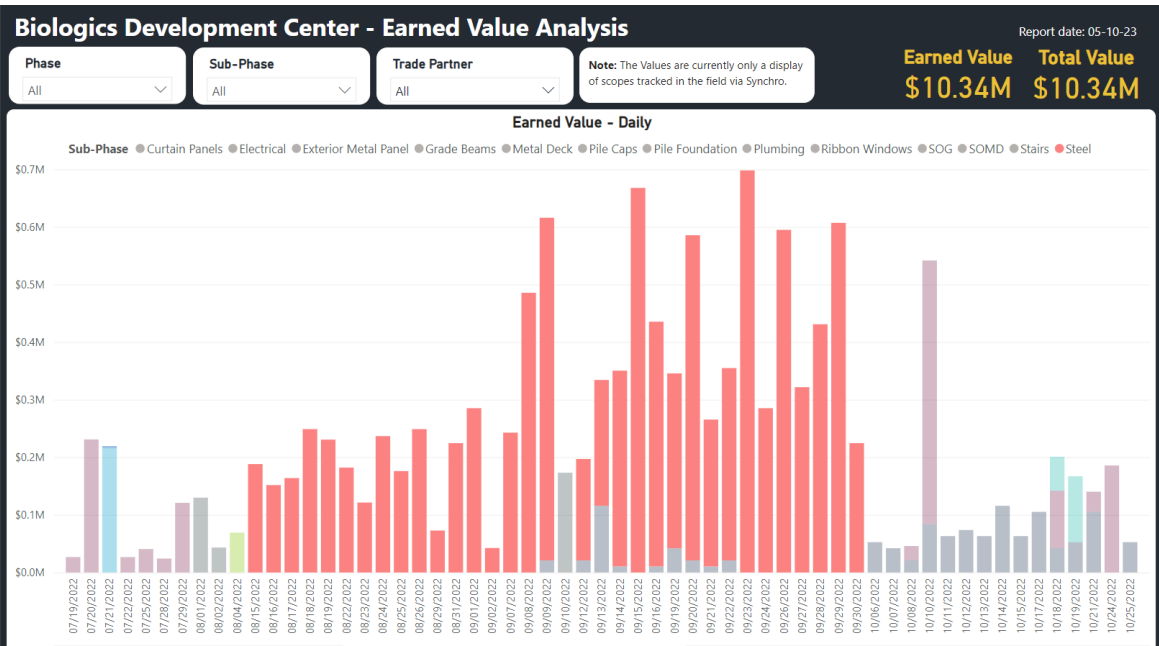
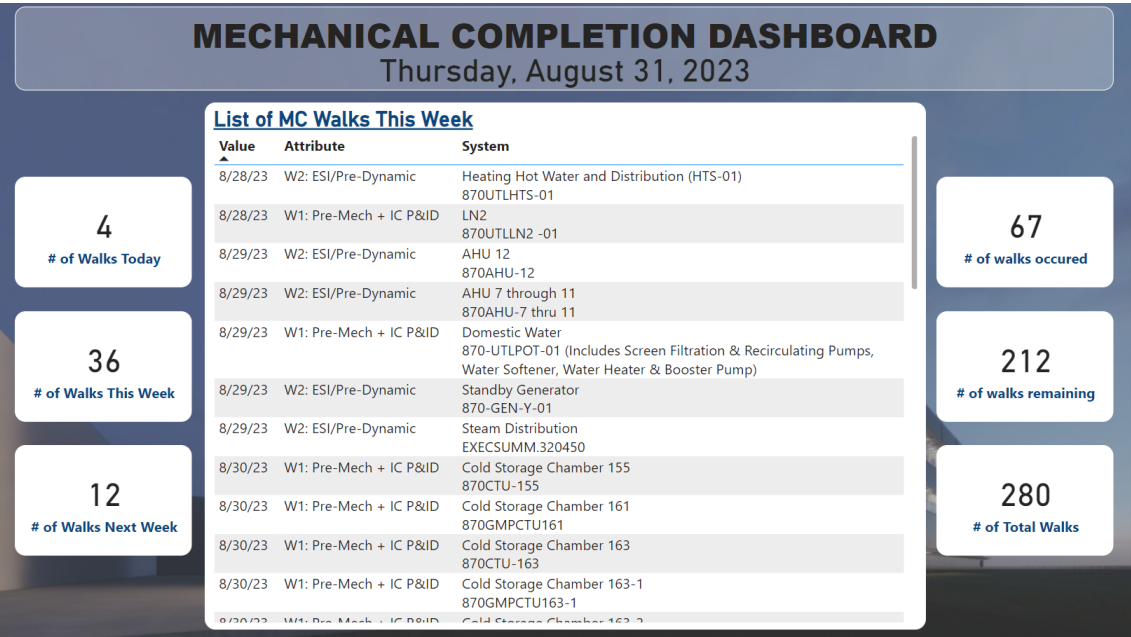
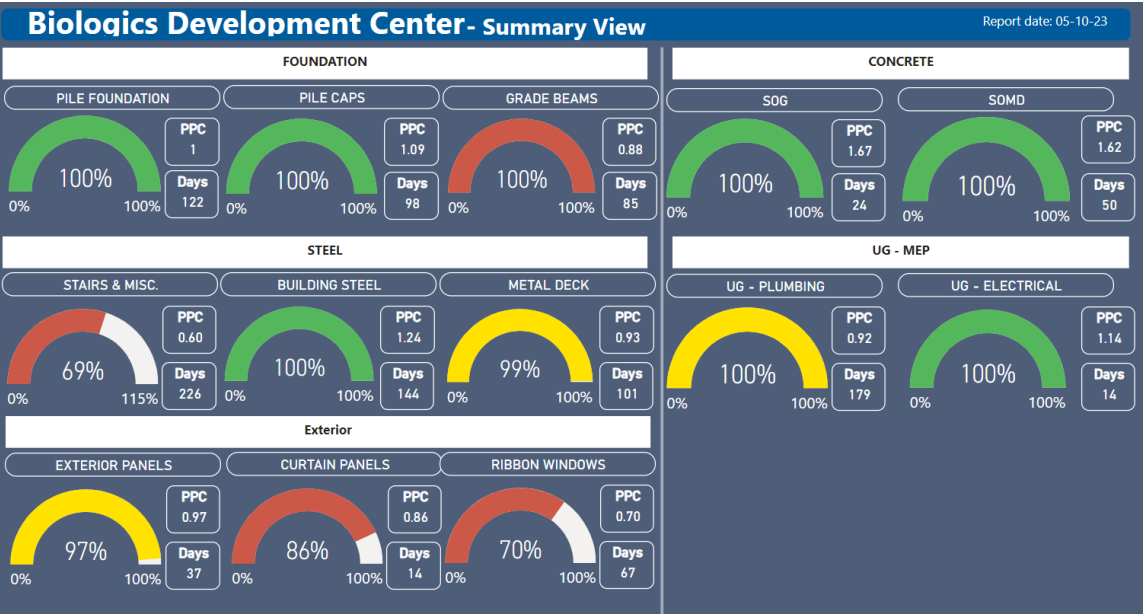
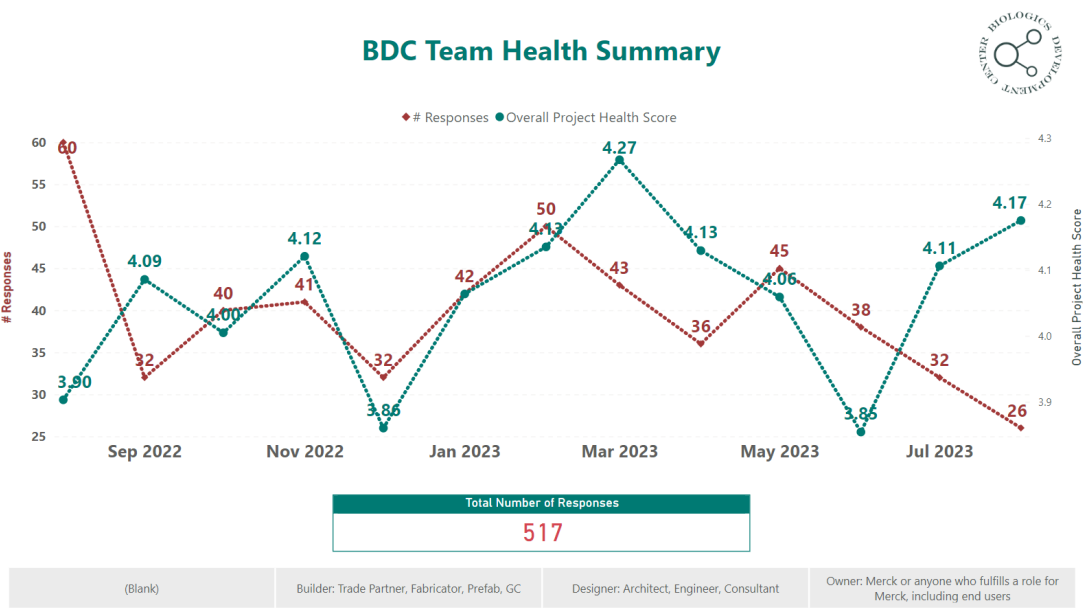
Thank you for attending this presentation. Enjoy the rest of the 25<sup>th</sup> Annual LCI Congress!



# Additional Backup Slides

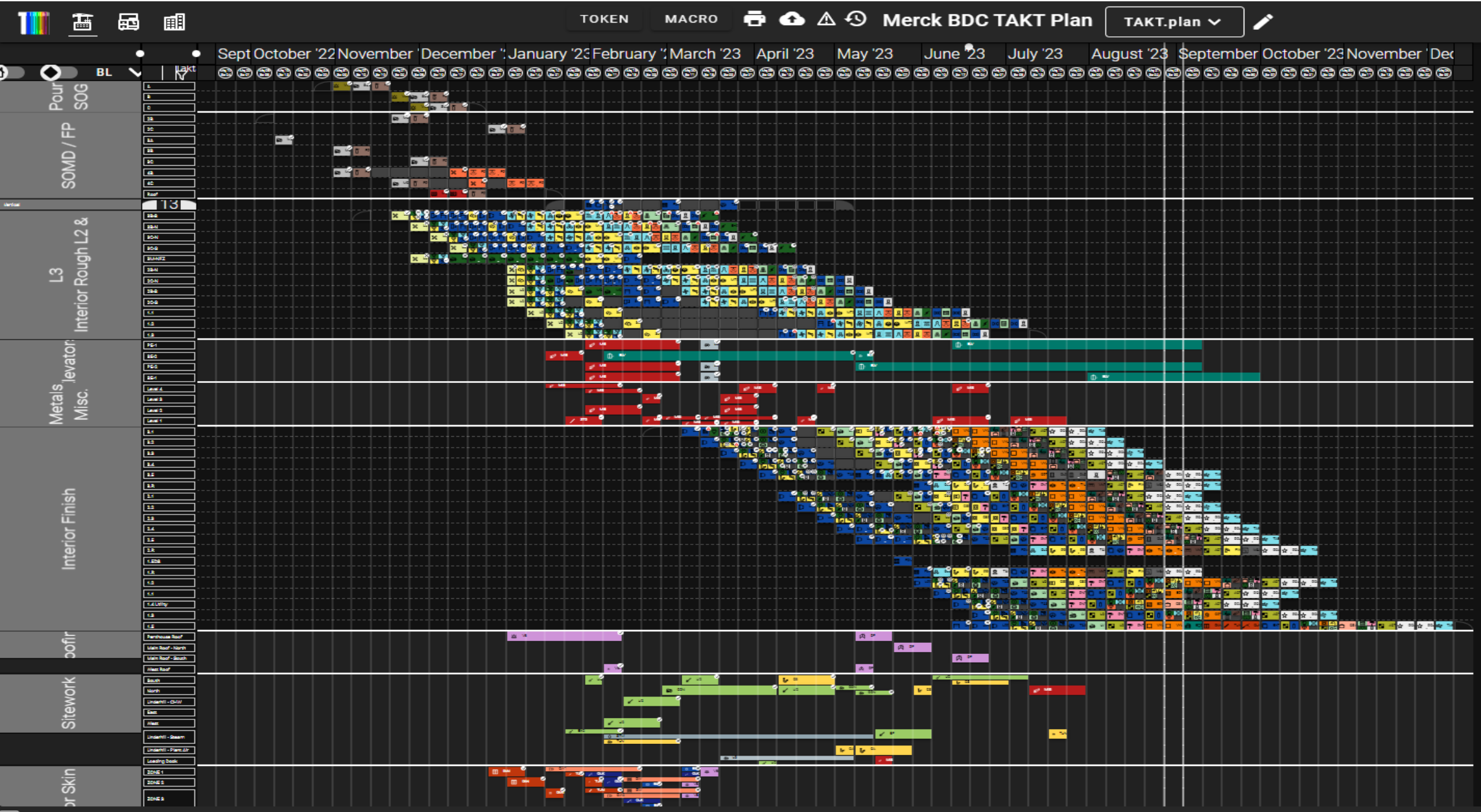


# VISUAL COMMUNICATIONS





# OVERALL TAKT PLAN



# DETAILED TAKT PLANNING





# Presentation Style Guide

- Make sure guides are turned on. Click “View” on top ribbon then select guides
- Use the Provided Template Layouts and Arial font
- The Font color for text is Grey. Minimum font size = 28.
- Plan to spell out acronyms the first time they are used in your presentation
- Insert an image to each slide
- Keep each bullet at no more than 15 words
- Provide a glossary of acronyms from your presentation in the back
- Make sure to delete any unused slide layouts

# Icon Library

- These icons can be used throughout your presentation



Plan | Value  
Generation



Do



Check



Act | Safety



Continuous  
Improvement



Respect for  
people | Team



Removal of  
Waste



Process  
and Flow



Optimize the  
Whole



Built  
Environment



Tools



Resources



Training



Research



Collaboration



Emphasis





# SIX TENETS OF LEAN CONSTRUCTION

- 1 Respect for People
- 2 Optimize the Whole
- 3 Generate Value
- 4 Eliminate Waste
- 5 Focus on Flow
- 6 Continuous Improvement



# Continuous Improvement

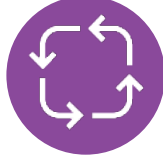
Lean thinking demands a mindset of continuous improvement.

This requires an environment where we can discuss what's not working well and find fixes.





# Eight Types of Waste

-  Over/Under Production
-  Waiting
-  Unnecessary Transportation
-  Over Processing
-  Excess Inventory
-  Unnecessary Motion
-  Defects
-  Unused Creativity of Team Members  
(Not listening/Not speaking up)

# Title Goes Here

---

- Keep it **short**
- Keep it **focused**
- Keep it **concise**
- Keep it **powerful**

Use this text format for callouts, quotes, stats, or to draw attention to important text.





- PLAN WITH TRADE PARTNERS





