October 4-6, 2022, Nationals Park, Washington DC

# Prevention, Dissension, and Extension:

## *A Case Study of the Project Control Life Cycle – Schedule through Dispute Resolution*


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2022

# Speakers

## Russell Wodiska, MBA, EVP

**President of Dispute Resolution**

- 13+ years in Dispute Resolution
- Testifying Expert
- Specialist in Delay, LoP, and Damages

## Michael Bograd, PSP

**Vice President of Planning & Scheduling**

- 16+ years in Project Controls
- Expert in Mega Projects
- Specialist in Data Centers

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# Objectives

1. Demonstrate Proper Planning and Scheduling
2. Effective Dispute Resolution
3. Managing Outcomes based on Analysis

# Project Summary

- Project:  3.8M SF distribution center
- General Contractor: RC Andersen
- Owner: Amazon
- Summary:
  - Rock pier foundation with slab on grade
  - Five-story steel and bar-joist warehouse with slab on metal decks
  - Five one-story steel bump outs
  - Precast on the lower levels and metal panel siding on the upper levels
  - The five bump outs include: a main office, three different loading docks, and a mixed-use area (containing the main distribution frame (MDF) room, the demarcation room, and the maintenance area)

# Key Dates


- Amazon required Early Access to red flagged areas
- Would assess liquidated damages against each of the milestones

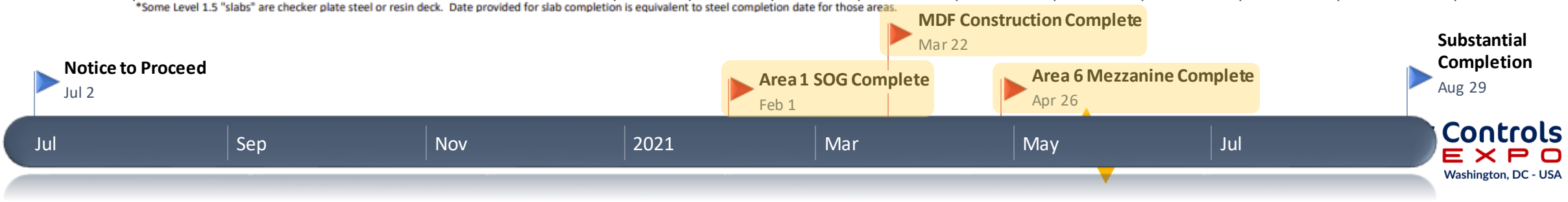
Legend:

- Construction work aligns with requested early access date
- Construction work is marginally different than the requested early access date
- Construction work does not complete before the early access date

## MILESTONE DATE ANALYSIS - EXPEDITE ENTIRE PROJECT

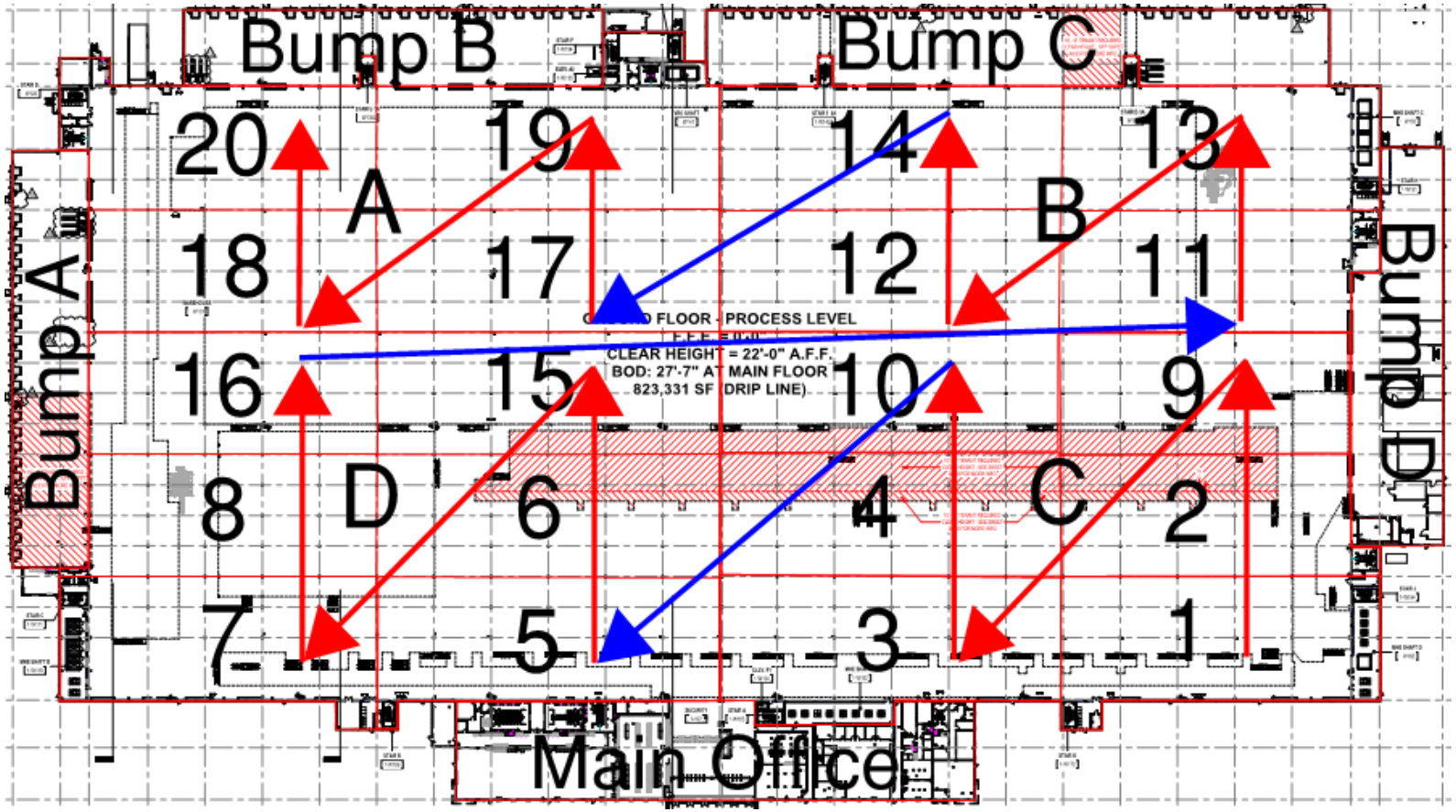
| Task Name | Early Access Date | Weeks Prior to First Receive | Slab Beneath | Slab on Level Above Complete | Roof Above Complete | Ext Walls (Adj) | MEP Complete | AR Fence Complete | All Tasks Complete relative to Early Access Request (weeks) |
|---|---|---|---|---|---|---|---|---|---|
| First Receive | 9/12/2021 | 0 | | | | | | | |
| Area 1: (Level 1) | 2/1/2021 | -32 | 11/10/2020 | 12/16/2020 | 11/10/2020 | 12/11/2020 | 2/10/2021 | | 1 |
| Area 2: Routing Sorter Platform (Level 1.5) | 2/8/2021 | -31 | 1/20/2021 | 2/12/2021 | 1/5/2021 | 1/15/2021 | 2/3/2021 | | 1 |
| Area 3: (Level 1) | 2/22/2021 | -29 | 12/28/2020 | 2/25/2021 | 1/5/2021 | 4/21/2021 | 4/14/2021 | | 8 |
| Area 3: AFE Platform North (Level 1.5) | 2/22/2021 | -29 | 12/28/2020 | 12/16/2020 | 11/10/2020 | 2/25/2021 | 1/12/2021 | | 0 |
| MHE Shaft D | 3/1/2021 | -28 | 11/10/2020 | 11/17/2020 | 11/10/2020 | 10/27/2020 | 2/4/2021 | | -4 |
| Area 4: (Level 1) | 3/8/2021 | -27 | 12/21/2020 | 3/31/2021 | 2/9/2021 | 3/12/2021 | 5/6/2021 | | 8 |
| Area 4: North SLAM (Level 1.5) | 3/8/2021 | -27 | 12/21/2020 | 1/21/2021 | 11/10/2020 | 2/25/2021 | 1/6/2021 | | -2 |
| Demarc Construction Complete | 3/8/2021 | -27 | 11/16/2020 | | 3/31/2021 | 2/25/2021 | 2/17/2021 | | 3 |
| MDF Construction Complete | 3/22/2021 | -25 | 11/16/2020 | | 3/31/2021 | 2/25/2021 | 3/22/2021 | | 1 |
| MHE Shaft A | 3/22/2021 | -25 | 1/25/2021 | 1/12/2021 | 11/10/2020 | 3/3/2021 | 3/3/2021 | | -3 |
| Area 5: (Level 1) | 3/29/2021 | -24 | 11/16/2020 | 2/12/2021 | 1/5/2021 | 4/21/2021 | 4/14/2021 | | 3 |
| Area 5: Bump D | 3/29/2021 | -24 | 11/16/2020 | | 3/31/2021 | 2/25/2021 | 5/25/2021 | | 8 |
| Area 5: AFE South (Level 1.5) | 3/29/2021 | -24 | 3/1/2021 | 2/12/2021 | 1/5/2021 | 4/21/2021 | 3/15/2021 | | 3 |
| Area 5: Shipping Sorter Platform (Level 1.5) | 3/29/2021 | -24 | 2/18/2021 | 4/26/2021 | 3/15/2021 | 4/21/2021 | 3/4/2021 | | 4 |
| Area 6: (Level 1) | 4/26/2021 | -20 | 12/24/2020 | 4/9/2021 | 3/15/2021 | 5/6/2021 | 6/16/2021 | | 7 |
| Area 6: South Slam (Level 1.5) | 4/26/2021 | -20 | 3/24/2021 | 2/12/2021 | 1/5/2021 | 4/21/2021 | 4/7/2021 | | -1 |
| Area 6: AR Sortation Mezz (Level 1.5) | 4/26/2021 | -20 | 4/9/2021 | 4/26/2021 | 3/15/2021 | 5/6/2021 | 6/28/2021 | | 9 |
| Area 6: Bump A | 4/26/2021 | -20 | 1/7/2021 | | 5/21/2021 | 4/21/2021 | 7/19/2021 | | 12 |
| MHE Shaft B and C | 5/3/2021 | -19 | 10/13/2020 | 1/12/2021 | 1/5/2021 | 1/15/2021 | 3/3/2021 | | -9 |
| Bump C | 5/10/2021 | -18 | 12/3/2020 | | 4/15/2021 | 3/12/2021 | 6/10/2021 | | 4 |
| Bump B | 5/24/2021 | -16 | 12/31/2020 | | 6/8/2021 | 5/6/2021 | 8/3/2021 | | 10 |
| Area 7: Office Block, Remote Break Rooms (Level 1) | 7/19/2021 | -8 | 1/25/2021 | | 1/28/2021 | 12/11/2020 | 6/9/2021 | | -6 |
| Area A: RSP Level 5 - East | 4/26/2021 | -20 | 1/12/2021 | | 1/5/2021 | 12/23/2020 | 8/3/2021 | 3/9/2021 | 14 |
| Area B: RSP Level 4 - East | 5/3/2021 | -19 | 1/12/2021 | 1/12/2021 | 1/5/2021 | 1/15/2021 | 4/14/2021 | 4/14/2021 | -3 |
| Area C: RSP Level 5 - West | 5/10/2021 | -18 | 3/16/2021 | | 3/15/2021 | 3/3/2021 | 5/10/2021 | 5/10/2021 | 0 |
| Area D: RSP Level 4 - West | 5/17/2021 | -17 | 4/13/2021 | 3/16/2021 | 3/15/2021 | 3/23/2021 | 5/17/2021 | 5/14/2021 | 0 |
| Area E: RSP Level 3 - East | 5/24/2021 | -16 | 3/3/2021 | 2/17/2021 | 1/5/2021 | 1/22/2021 | 4/28/2021 | 4/28/2021 | -4 |
| Area F: RSP Level 2 - East | 5/31/2021 | -15 | 2/12/2021 | 3/3/2021 | 1/5/2021 | 1/15/2021 | 4/7/2021 | 4/7/2021 | -8 |
| Area G: RSP Level 3 - West | 6/7/2021 | -14 | 4/15/2021 | 4/13/2021 | 3/15/2021 | 5/14/2021 | 6/7/2021 | 6/7/2021 | 0 |
| Area H: RSP Level 2 - West | 6/14/2021 | -13 | 4/26/2021 | 4/15/2021 | 3/15/2021 | 5/6/2021 | 6/10/2021 | 6/14/2021 | 0 |

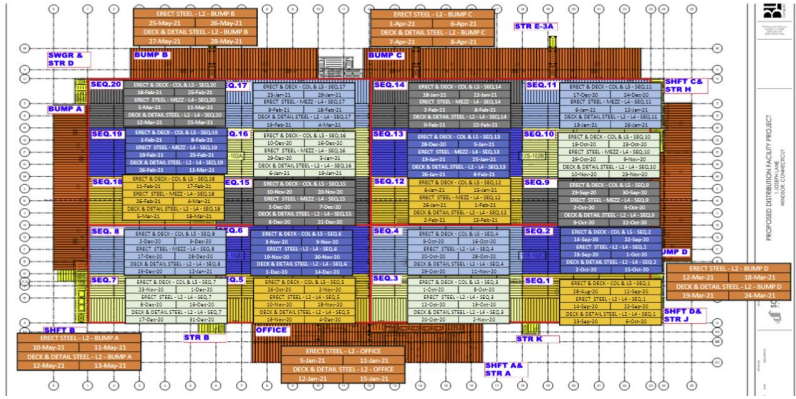
*Some Level 1.5 "slabs" are checker plate steel or resin deck. Date provided for slab completion is equivalent to steel completion date for those areas.



# Schedule Development

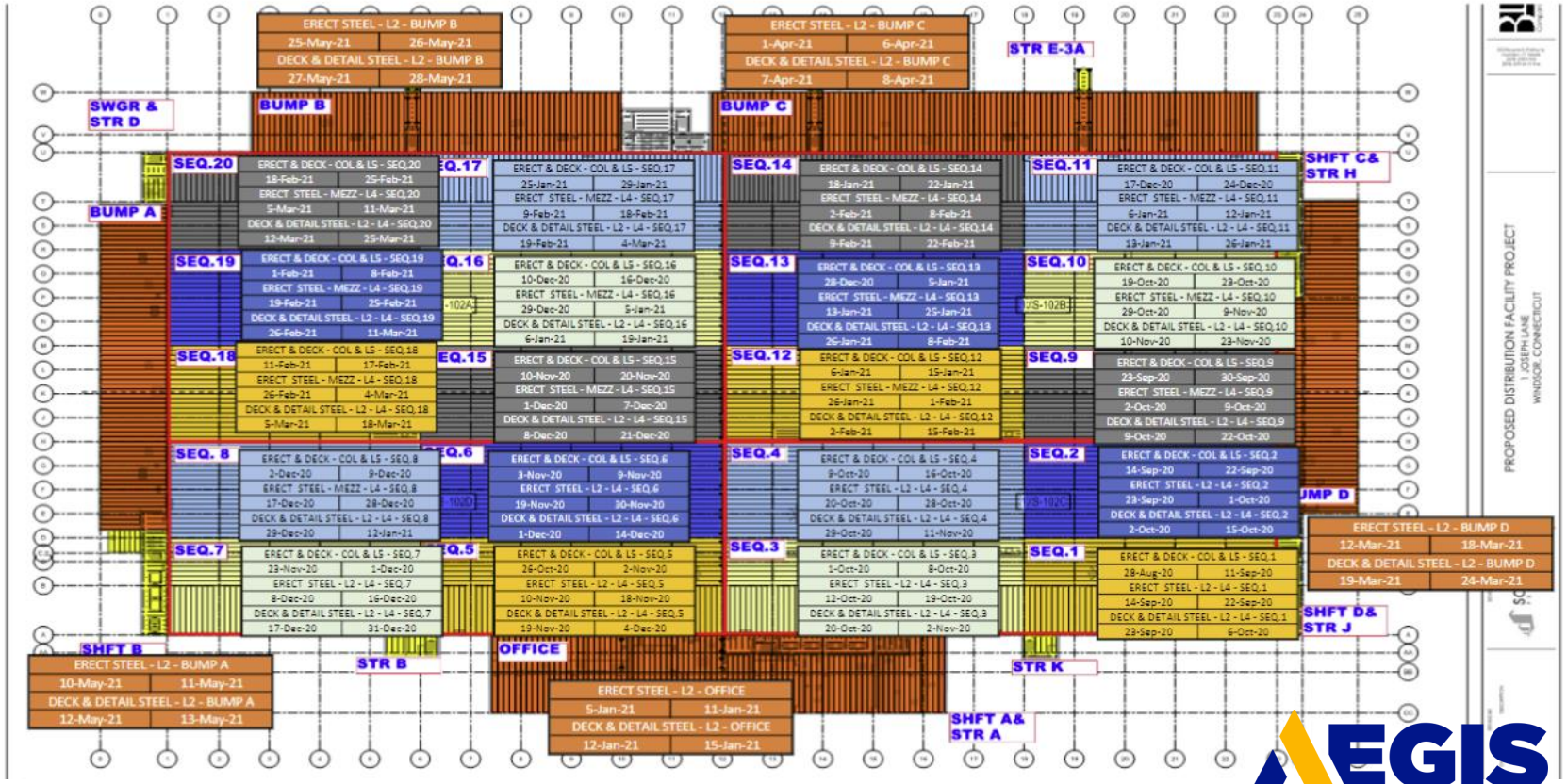
- Worked with key trades to capture the scope and create a low-risk construction sequence

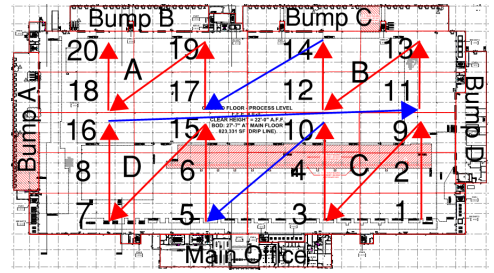


# Schedule Development

- Worked with key trades to capture the scope and create a low-risk construction sequence



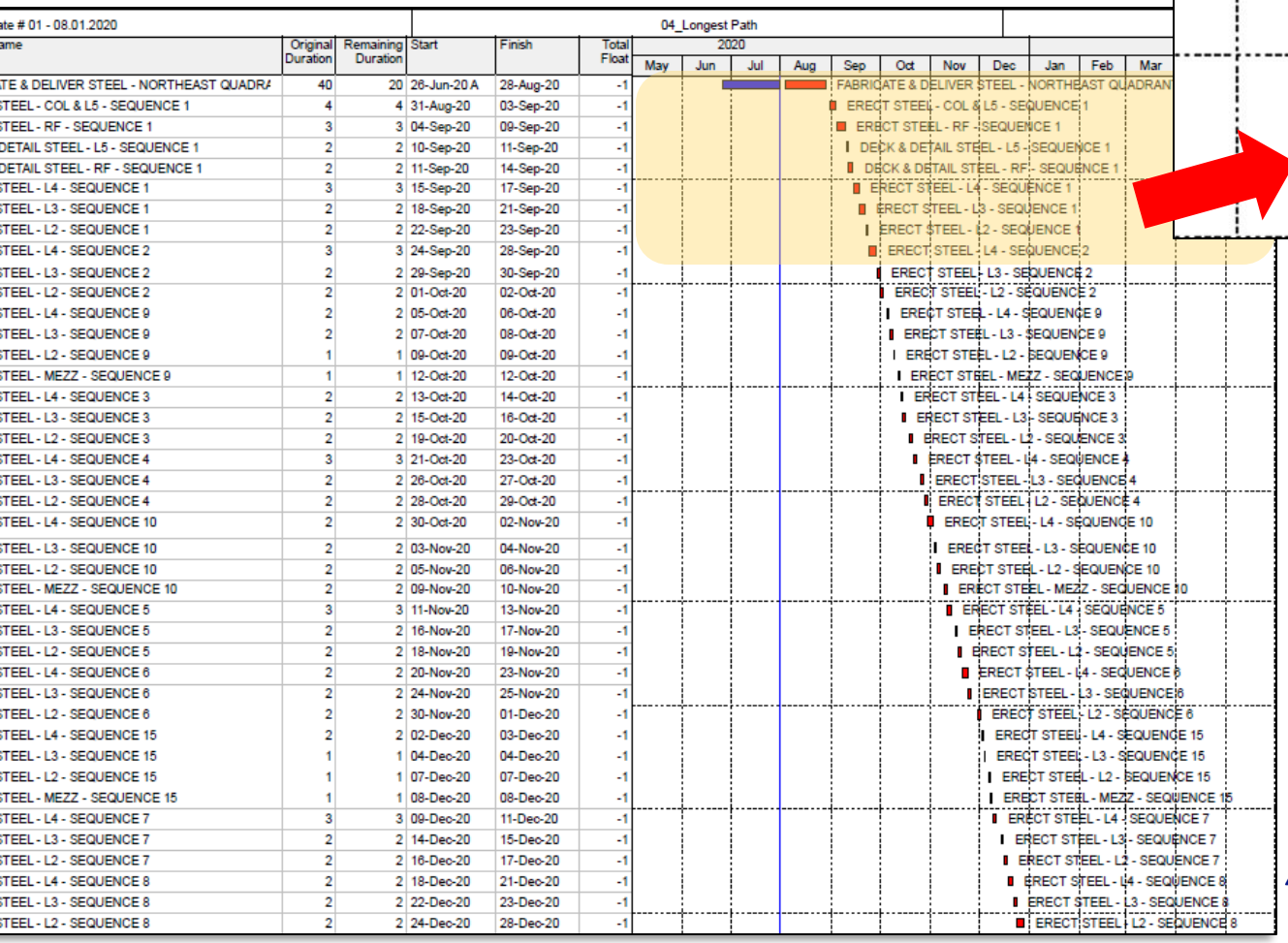



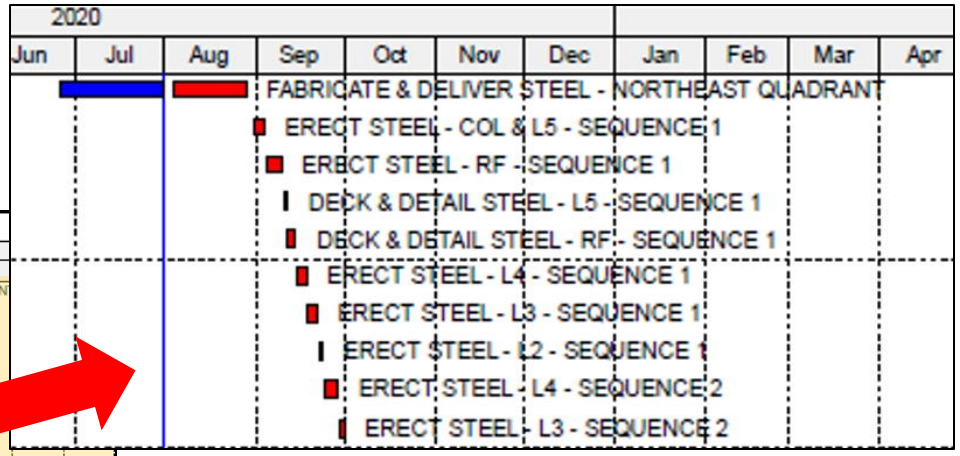
# Schedule Development

- Validated the critical path

Project Warrior - BLD4 - Update # 01 - 08.01.2020 | 04_Longest Path

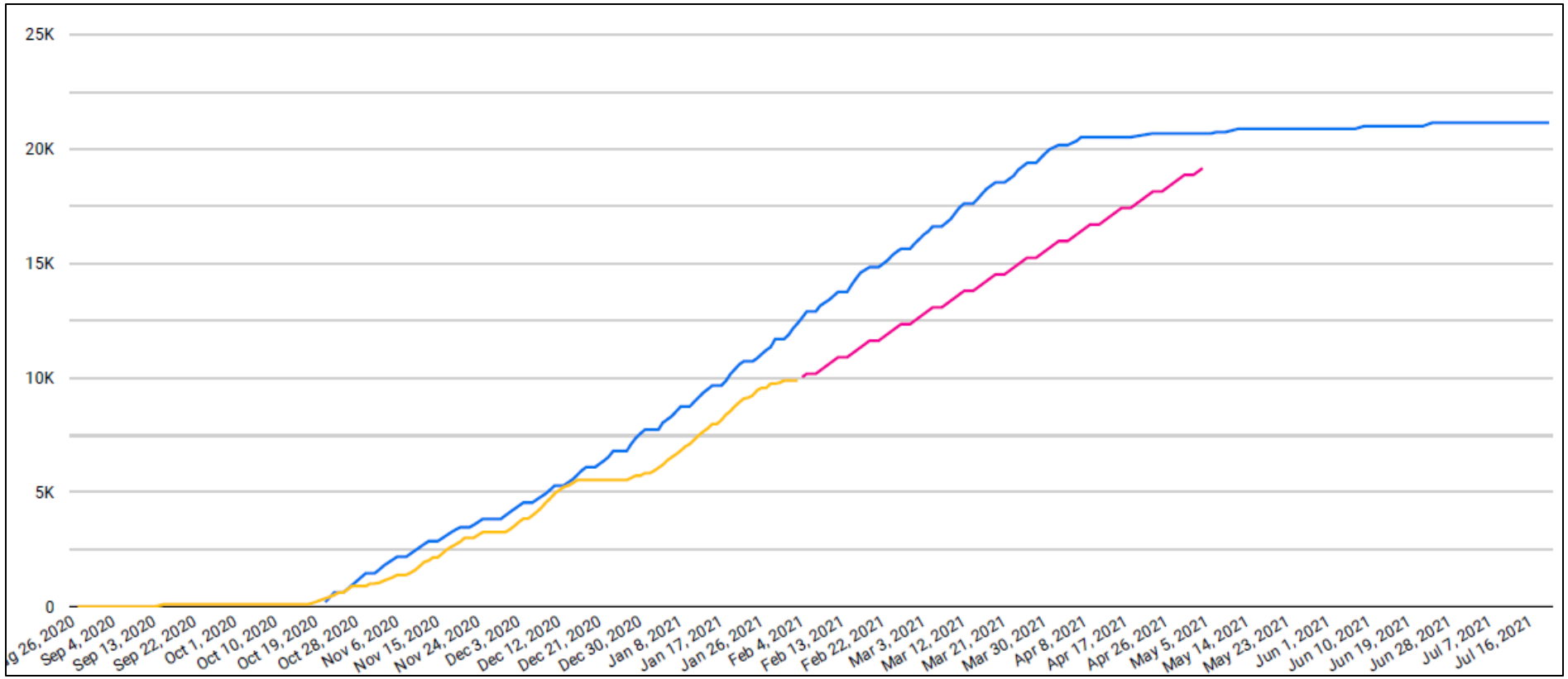
| Activity ID | Activity Name | Original Duration | Remaining Duration | Start | Finish | Total Float |
|---|---|---|---|---|---|---|
| DIV05-1030 | FABRICATE & DELIVER STEEL - NORTHEAST QUADRA | 40 | 20 | 26-Jun-20 A | 28-Aug-20 | -1 |
| SSTL-NE-2040 | ERECT STEEL - COL & L5 - SEQUENCE 1 | 4 | 4 | 31-Aug-20 | 03-Sep-20 | -1 |
| SSTL-NE-2050 | ERECT STEEL - RF - SEQUENCE 1 | 3 | 3 | 04-Sep-20 | 09-Sep-20 | -1 |
| SSTL-NE-2250 | DECK & DETAIL STEEL - L5 - SEQUENCE 1 | 2 | 2 | 10-Sep-20 | 11-Sep-20 | -1 |
| SSTL-NE-2060 | DECK & DETAIL STEEL - RF - SEQUENCE 1 | 2 | 2 | 11-Sep-20 | 14-Sep-20 | -1 |
| SSTL-NE-2070 | ERECT STEEL - L4 - SEQUENCE 1 | 3 | 3 | 15-Sep-20 | 17-Sep-20 | -1 |
| SSTL-NE-2080 | ERECT STEEL - L3 - SEQUENCE 1 | 2 | 2 | 18-Sep-20 | 21-Sep-20 | -1 |
| SSTL-NE-2090 | ERECT STEEL - L2 - SEQUENCE 1 | 2 | 2 | 22-Sep-20 | 23-Sep-20 | -1 |
| SSTL-NE-2120 | ERECT STEEL - L4 - SEQUENCE 2 | 3 | 3 | 24-Sep-20 | 28-Sep-20 | -1 |
| SSTL-NE-2130 | ERECT STEEL - L3 - SEQUENCE 2 | 2 | 2 | 29-Sep-20 | 30-Sep-20 | -1 |
| SSTL-NE-2140 | ERECT STEEL - L2 - SEQUENCE 2 | 2 | 2 | 01-Oct-20 | 02-Oct-20 | -1 |
| SSTL-NW-2070 | ERECT STEEL - L4 - SEQUENCE 9 | 2 | 2 | 05-Oct-20 | 06-Oct-20 | -1 |
| SSTL-NW-2080 | ERECT STEEL - L3 - SEQUENCE 9 | 2 | 2 | 07-Oct-20 | 08-Oct-20 | -1 |
| SSTL-NW-2090 | ERECT STEEL - L2 - SEQUENCE 9 | 1 | 1 | 09-Oct-20 | 09-Oct-20 | -1 |
| SSTL-NW-2150 | ERECT STEEL - MEZZ - SEQUENCE 9 | 1 | 1 | 12-Oct-20 | 12-Oct-20 | -1 |
| SSTL-NE-2170 | ERECT STEEL - L4 - SEQUENCE 3 | 2 | 2 | 13-Oct-20 | 14-Oct-20 | -1 |
| SSTL-NE-2180 | ERECT STEEL - L3 - SEQUENCE 3 | 2 | 2 | 15-Oct-20 | 16-Oct-20 | -1 |
| SSTL-NE-2190 | ERECT STEEL - L2 - SEQUENCE 3 | 2 | 2 | 19-Oct-20 | 20-Oct-20 | -1 |
| SSTL-NE-2220 | ERECT STEEL - L4 - SEQUENCE 4 | 3 | 3 | 21-Oct-20 | 23-Oct-20 | -1 |
| SSTL-NE-2230 | ERECT STEEL - L3 - SEQUENCE 4 | 2 | 2 | 26-Oct-20 | 27-Oct-20 | -1 |
| SSTL-NE-2240 | ERECT STEEL - L2 - SEQUENCE 4 | 2 | 2 | 28-Oct-20 | 29-Oct-20 | -1 |
| SSTL-NW-2120 | ERECT STEEL - L4 - SEQUENCE 10 | 2 | 2 | 30-Oct-20 | 02-Nov-20 | -1 |
| SSTL-NW-2130 | ERECT STEEL - L3 - SEQUENCE 10 | 2 | 2 | 03-Nov-20 | 04-Nov-20 | -1 |
| SSTL-NW-2140 | ERECT STEEL - L2 - SEQUENCE 10 | 2 | 2 | 05-Nov-20 | 06-Nov-20 | -1 |
| SSTL-NW-2160 | ERECT STEEL - MEZZ - SEQUENCE 10 | 2 | 2 | 09-Nov-20 | 10-Nov-20 | -1 |
| SSTL-SE-2070 | ERECT STEEL - L4 - SEQUENCE 5 | 3 | 3 | 11-Nov-20 | 13-Nov-20 | -1 |
| SSTL-SE-2080 | ERECT STEEL - L3 - SEQUENCE 5 | 2 | 2 | 16-Nov-20 | 17-Nov-20 | -1 |
| SSTL-SE-2090 | ERECT STEEL - L2 - SEQUENCE 5 | 2 | 2 | 18-Nov-20 | 19-Nov-20 | -1 |
| SSTL-SE-2120 | ERECT STEEL - L4 - SEQUENCE 6 | 2 | 2 | 20-Nov-20 | 23-Nov-20 | -1 |
| SSTL-SE-2130 | ERECT STEEL - L3 - SEQUENCE 6 | 2 | 2 | 24-Nov-20 | 25-Nov-20 | -1 |
| SSTL-SE-2140 | ERECT STEEL - L2 - SEQUENCE 6 | 2 | 2 | 30-Nov-20 | 01-Dec-20 | -1 |
| SSTL-SW-2070 | ERECT STEEL - L4 - SEQUENCE 15 | 2 | 2 | 02-Dec-20 | 03-Dec-20 | -1 |
| SSTL-SW-2080 | ERECT STEEL - L3 - SEQUENCE 15 | 1 | 1 | 04-Dec-20 | 04-Dec-20 | -1 |
| SSTL-SW-2090 | ERECT STEEL - L2 - SEQUENCE 15 | 1 | 1 | 07-Dec-20 | 07-Dec-20 | -1 |
| SSTL-SW-2150 | ERECT STEEL - MEZZ - SEQUENCE 15 | 1 | 1 | 08-Dec-20 | 08-Dec-20 | -1 |
| SSTL-SE-2170 | ERECT STEEL - L4 - SEQUENCE 7 | 3 | 3 | 09-Dec-20 | 11-Dec-20 | -1 |
| SSTL-SE-2180 | ERECT STEEL - L3 - SEQUENCE 7 | 2 | 2 | 14-Dec-20 | 15-Dec-20 | -1 |
| SSTL-SE-2190 | ERECT STEEL - L2 - SEQUENCE 7 | 2 | 2 | 16-Dec-20 | 17-Dec-20 | -1 |
| SSTL-SE-2220 | ERECT STEEL - L4 - SEQUENCE 8 | 2 | 2 | 18-Dec-20 | 21-Dec-20 | -1 |
| SSTL-SE-2230 | ERECT STEEL - L3 - SEQUENCE 8 | 2 | 2 | 22-Dec-20 | 23-Dec-20 | -1 |
| SSTL-SE-2240 | ERECT STEEL - L2 - SEQUENCE 8 | 2 | 2 | 24-Dec-20 | 28-Dec-20 | -1 |



# Schedule Development

- Assigned Resources to all activities




**Structural Steel**

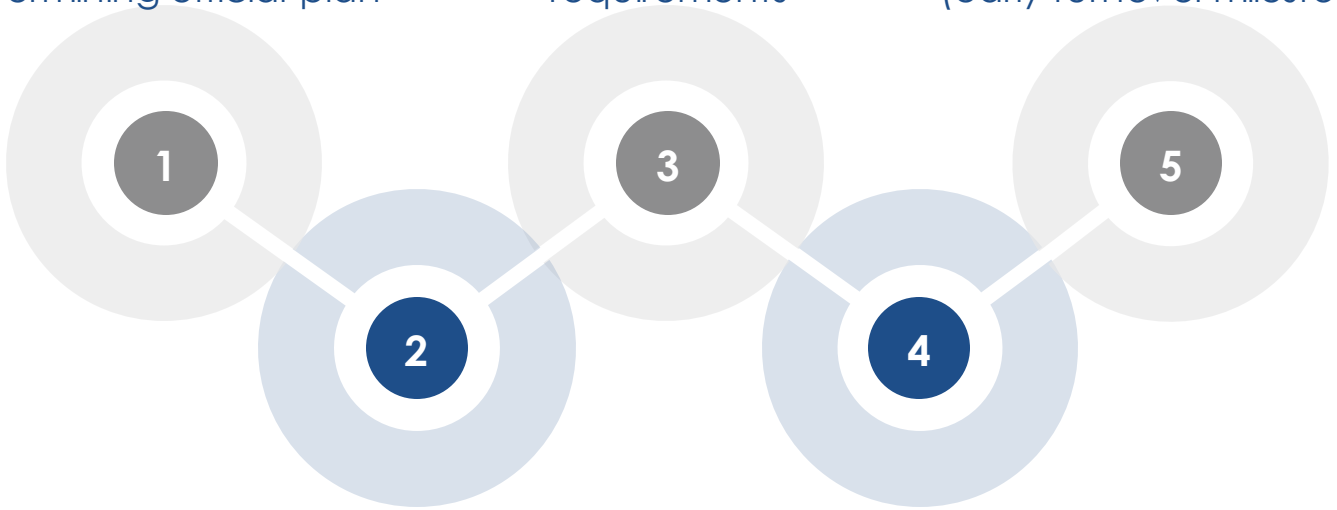
Current Projected Finish Date:
**May 4, 2021**

Required Daily SS Pieces Erected to Finish On Time:
**196**

SS Pieces Erected Per Day (Avg):
**145**

# Risk Management during Schedule Development

1. **Created** multiple "what if" baselines before determining official plan
2. **Developed** production rates with key subcontractors (based on prev. projects)
3. **Established** a daily tracker of installation requirements
4. **Generated** graphic schedules from the outset
5. **Identified** risk factors and mitigation plans as needed (early turnover milestones)



# The Main Issue

**Issue:**
Delayed and out-of-sequence steel erection by the steel subcontractor

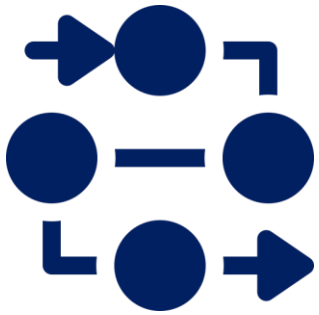
**Impacts:**

- Disrupted numerous follow-on trades (concrete, roofing, loading elevators, fit-out, and building enclosure)
- Required the Project to substantially revise the work plan to an extent where the original plan was no longer recognizable
- Other trades incurred greater costs by working inefficiently and in a significantly greater number of areas than originally planned
- Some trades required different or additional equipment and materials to complete their work (IE: metal panels)

# Methodology

- Aegis performed a disruption analysis by comparing the original Project's plan to the As-Built sequence.
- This methodology demonstrates the disruptive impacts that the steel erection delays and subsequent out-of-sequence installation had on the Project.
- Addresses the discrete cause and effect of the impacts associated with the steel

# Impacts



Required Resequencing of Work

Additional Equipment

Labor Inefficiencies

Additional Protection

# Impacts – Resequencing of Work

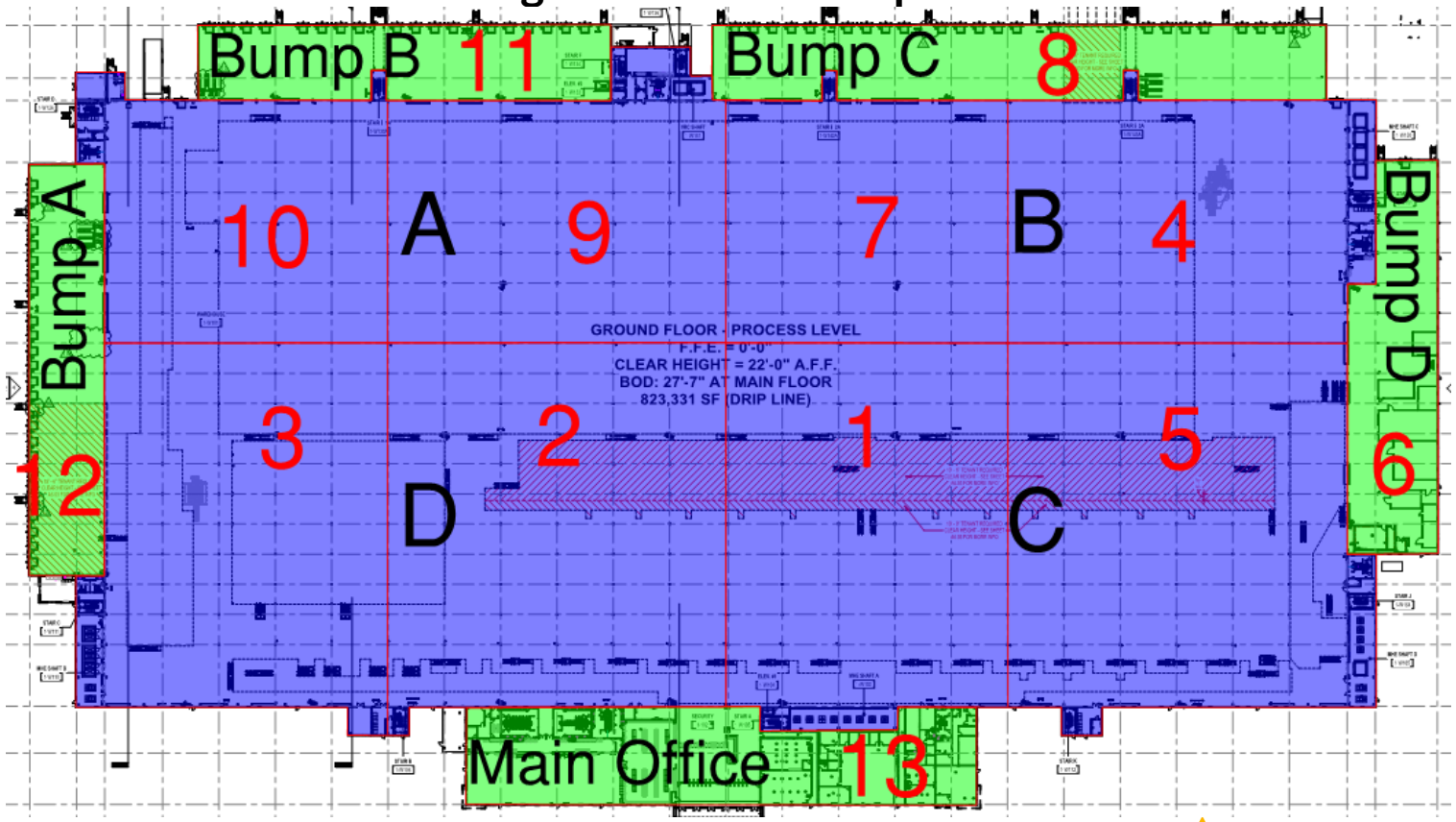
Required Resequencing of Work

Additional Equipment

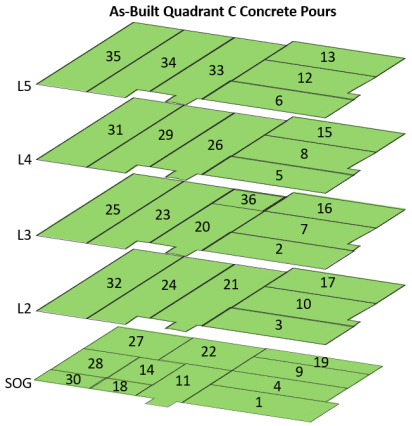
Labor Inefficiencies

Additional Protection

## Original Concrete Sequence




## Revised Concrete Sequence



# Impacts – Resequencing of Work

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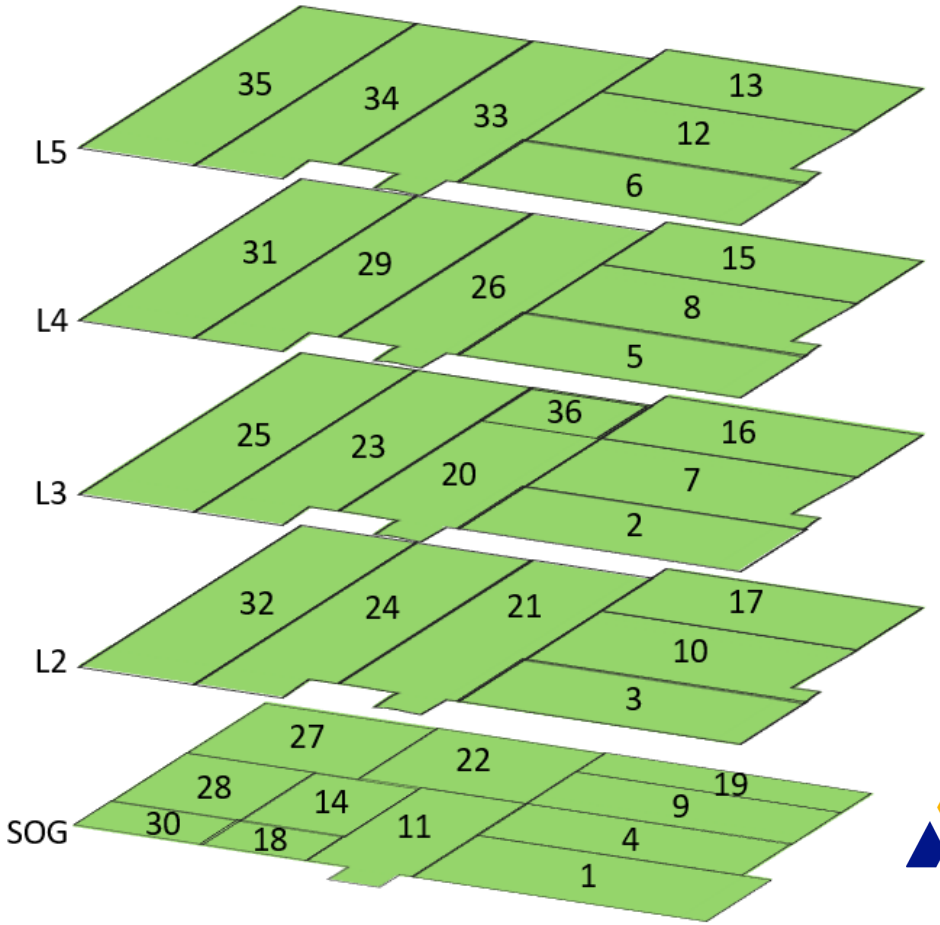
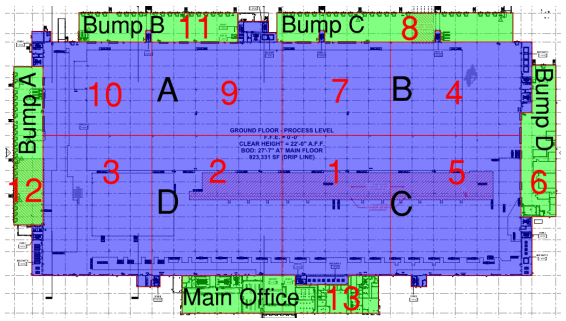
## Revised Concrete Sequence

As-Built Quadrant C Concrete Pours




Original Concrete Sequence



# Impacts – Additional Equipment

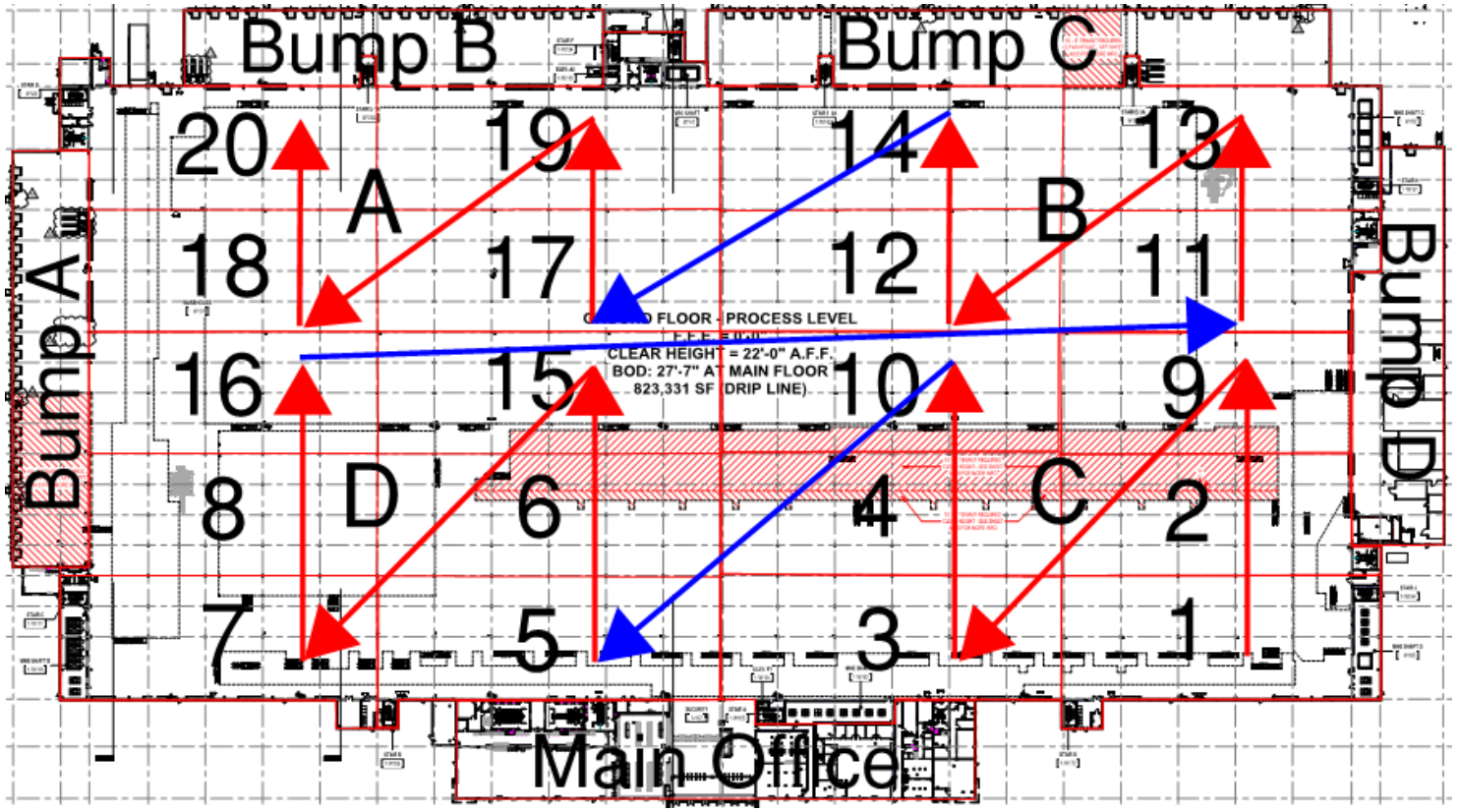
Required Resequencing of Work

**Additional Equipment**

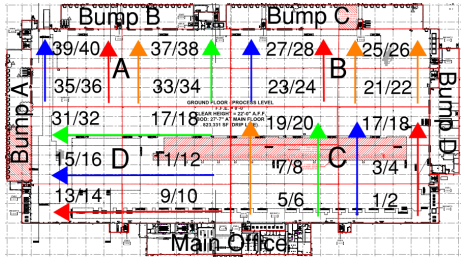
Labor Inefficiencies

Additional Protection

## Original Steel Sequence




## Revised Steel Sequence



# Impacts – Additional Equipment

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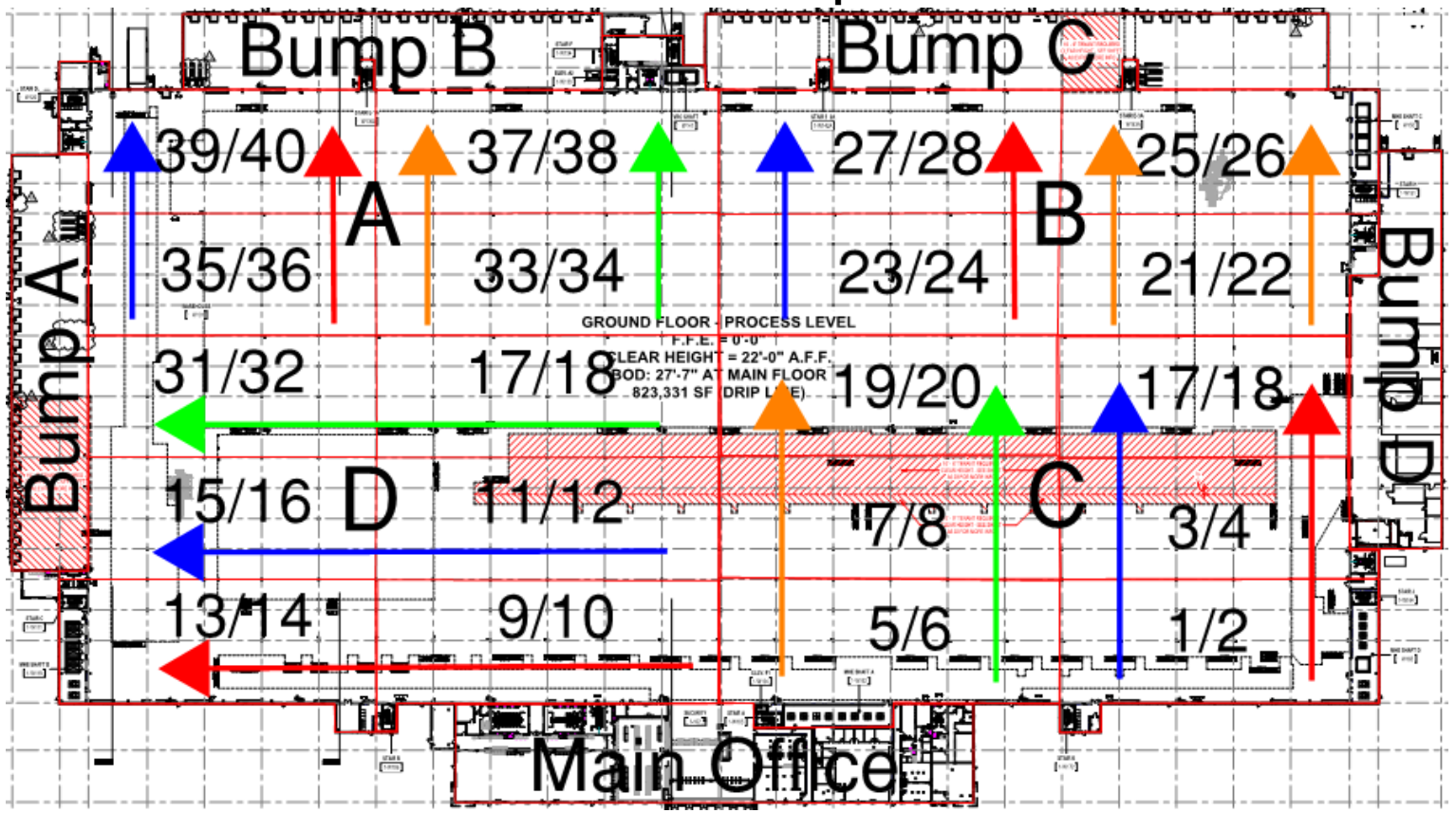
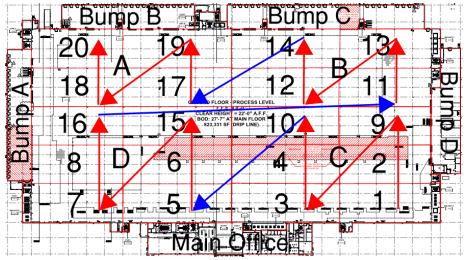
## Revised Steel Sequence




## Original Steel Sequence



# Impacts – Labor

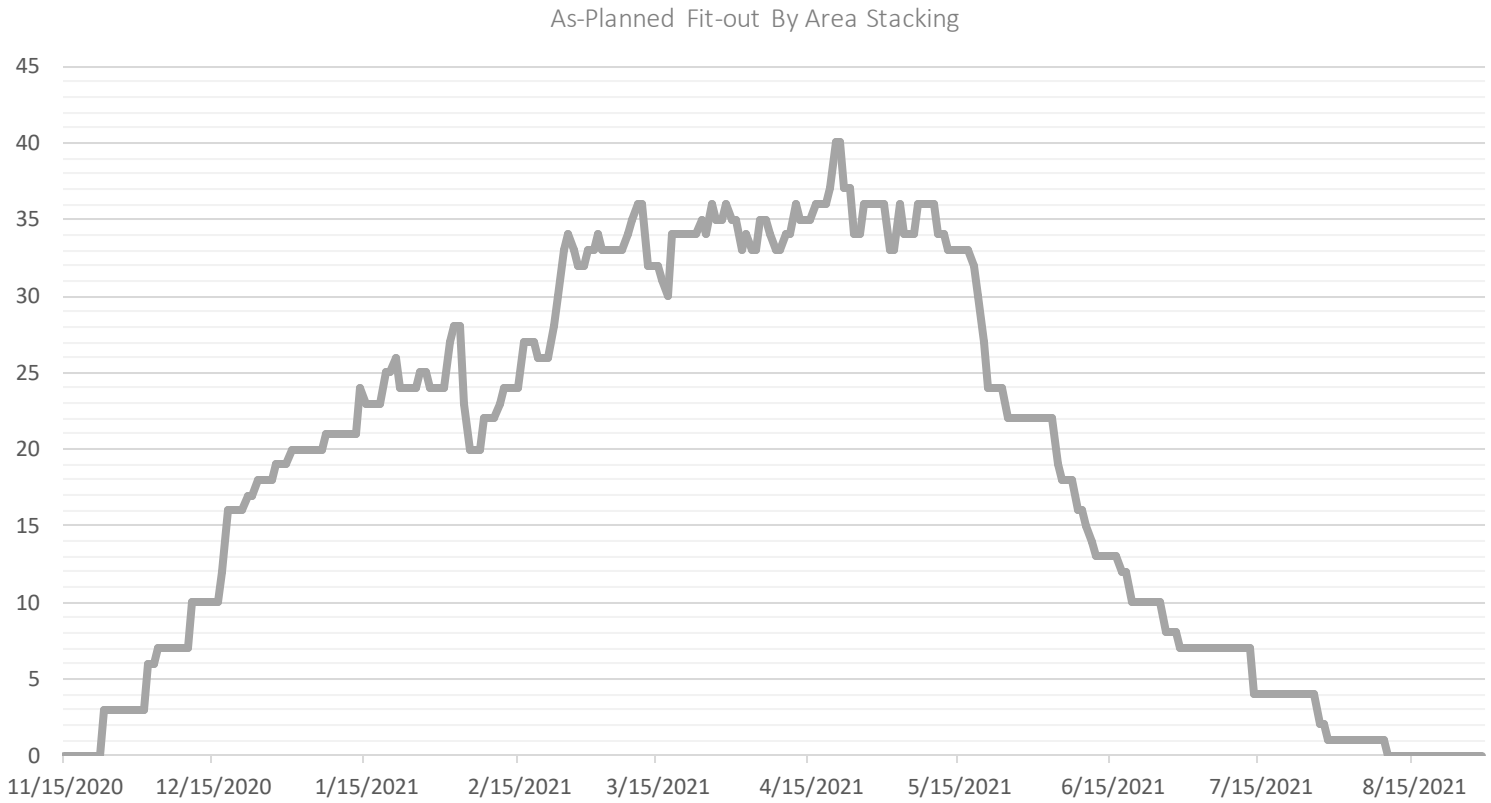
Required Resequencing of Work

Additional Equipment

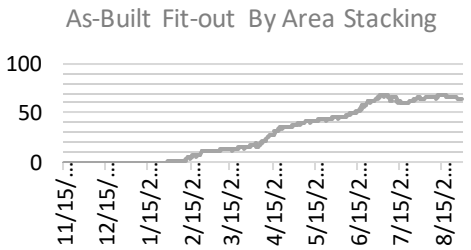
**Labor Inefficiencies**

Additional Protection

## As-Planned Fit Sequence




Revised Concrete Sequence



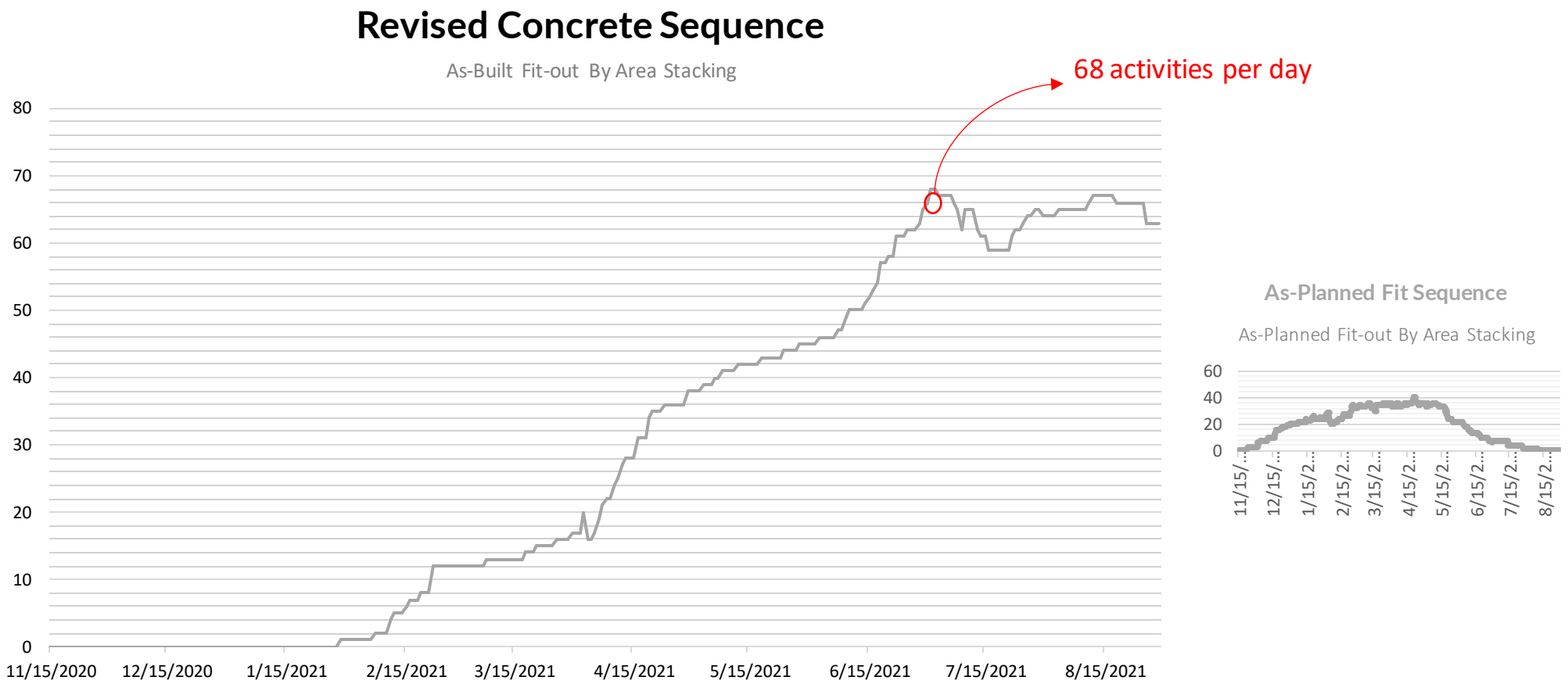
# Impacts – Labor

Required Resequencing of Work

Additional Equipment

**Labor Inefficiencies**

Additional Protection



# Additional Protection

Required Resequencing of Work

Additional Equipment

Labor Inefficiencies

**Additional Protection**

# Cause and Effect

## Steel Delay Impact

1

Steel delays had a significant impact on the entire project which led to:

- Initial delay to critical path activities
- Revisions to the steel erection sequence due to the use of an alternative steel erection company

## Mitigation Efforts

2

Significant mitigation efforts were undertaken to reduce these delays, these efforts were spread across:

- Concrete work
- Roofing installation
- Elevator install
- Fit-out
- Bump-out installation
- Enclosure + Weathertight

## Material Storage

3

The steel delay also caused the need for both onsite and offsite material storage

# Conclusion

Upfront planning allows for a meaningful dispute resolution analysis

Fair outcome was achieved through stakeholder buy-in of schedule analysis

| Steel Completion Delays | | | |
|---|---|---|---|
| Steel Activity | Planned Finish (UP 01) | Actual Finish (As-Built) | Delay (CD) |
| Area C – Level 2 | 11/20/20 | 02/18/21 | -90 |
| Area C – Level 3 | 11/18/20 | 02/18/21 | -92 |
| Area C – Level 4 | 11/13/20 | 02/18/21 | -97 |
| Area C – Level 5 | 10/26/20 | 02/20/21 | -117 |
| Area C – Roof | 10/26/20 | 02/22/21 | -119 |
| Area D – Level 2 | 01/18/21 | 03/26/21 | -67 |
| Area D – Mezzanine | 01/13/21 | 04/12/21 | -89 |
| Area D – Level 3 | 01/14/21 | 03/26/21 | -71 |
| Area D – Level 4 | 01/11/21 | 03/26/21 | -74 |
| Area D – Level 5 | 12/17/20 | 03/26/21 | -99 |
| Area D – Roof | 12/17/20 | 04/15/21 | -119 |
| Area B – Level 2 | 02/19/21 | 04/24/21 | -64 |
| Area B – Mezzanine | 02/23/21 | 04/23/21 | -59 |
| Area B – Level 3 | 02/17/21 | 04/24/21 | -66 |
| Area B – Level 4 | 02/12/21 | 04/28/21 | -75 |
| Area B – Level 5 | 01/25/21 | 05/03/21 | -98 |
| Area B – Roof | 01/25/21 | 06/08/21 | -134 |
| Area A – Level 2 | 03/24/21 | 06/07/21 | -75 |
| Area A – Mezzanine | 03/26/21 | 05/29/21 | -64 |
| Area A – Level 3 | 03/22/21 | 05/26/21 | -65 |
| Area A – Level 4 | 03/17/21 | 06/07/21 | -82 |
| Area A – Level 5 | 02/25/21 | 06/03/21 | -98 |
| Area A – Roof | 02/25/21 | 07/02/21 | -127 |
| Main Office | 01/21/21 | 03/10/21 | -48 |
| Bump D | 03/24/21 | 04/01/21 | -8 |
| Bump C | 04/08/21 | 06/18/21 | -71 |
| Bump A | 05/14/21 | 06/22/21 | -39 |
| Bump B | 06/01/21 | 06/30/21 | -29 |
| **Average Delay** | | | **-80** |

# Questions?

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