NetPoint and MassPort Logan Airport’s Terminal E

Leveraging Pull & Lean Planning

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Agenda

1. Massport Overview
2. Lean Principles
3. Project Overview: Terminal E Renovations & Enhancements
4. MPA Scheduling Requirement
5. Integration of CPM and Pull Planning Schedules
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MASSPORT
OVERVIEW

The Authority and the Innovation Initiatives
Massachusetts Port Authority (Massport)

Massport is a financially self-sustaining public authority whose transportation facilities generate more than $8 billion annually; no state tax dollars are used to fund operations or capital improvements.

Massport Port authority in the Commonwealth of Massachusetts

OWNS AND OPERATES:

- ✓ Boston Logan International Airport
- ✓ Hanscom Field
- ✓ Worcester Regional Airport
- ✓ Public terminals in the Port of Boston.
Technology and Project Management

A. Proactive Project Management
B. Value Added Service to Project Managers
C. Cost and Schedule Control
D. High Level of Data Integrity
E. Transparent and Easy Access to Project Data for all Program Stakeholders
F. Documenting Directives, Administering Contracts and Approvals
G. Utilizing Technology to Reduce Layers, Improve and Streamline Process
Project Systems – Terminal E Project

The following systems are currently being tested and or have been deployed.

<table>
<thead>
<tr>
<th>Function</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Management / Collaboration</td>
<td>PMWeb</td>
</tr>
<tr>
<td>Coordination / Design Review</td>
<td>BIM / Revit / Bluebeam</td>
</tr>
<tr>
<td>Clash Detection</td>
<td>BIM Glue / Navisworks</td>
</tr>
<tr>
<td>4D and 5D</td>
<td>Synchro</td>
</tr>
<tr>
<td>Risk Management</td>
<td>Acumen</td>
</tr>
<tr>
<td>CPM Schedule</td>
<td>P6</td>
</tr>
<tr>
<td>Pull Plan Schedules</td>
<td>NetPoint and TouchPlan</td>
</tr>
<tr>
<td>Estimating</td>
<td>TVD</td>
</tr>
</tbody>
</table>
LEAN PRINCIPLES
“Lean Construction is a set of ideas, practiced by individuals in the construction industry, based on the holistic pursuit of continuous improvements aimed at minimizing costs and maximizing value to clients in all dimensions of the built and natural environment: planning, design, construction, activation, operations, maintenance, salvaging, and recycling.”
Lean Project Delivery

Building Blocks

1. Intense focus on delivering value & eliminating waste

2. Shift in thinking and behaving supported by Lean Tools

3. Relentless improvement of processes
Lean Operating System

**TOOLS**
Last Planner System, Target Value Delivery, “Big Room”, BIMxP

**TEAM ORGANIZATION**
Leadership, Facilitation, Focus Group Structure

**COLLABORATIVE COMMUNICATION**
Trust, Conditions of Satisfaction, Declare Breakdowns, Root Cause Analysis

**LEAN FOUNDATION**
14 Principles, 8 Forms of Waste, Focus on Continuous Improvement
Industry Reliability Model

Lost Opportunity
Industry Wastes 40-50%

Construction Industry Norm

Start → Completion

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Lean Thinking seeks to eliminate schedule and cost waste so projects are delivered more effectively and efficiently.

- Define Client’s Value (Conditions of Satisfaction): Actively understand what is valuable in terms of budget, function, aesthetics, standards, and time.
- Map Value Stream: Identify the most effective sequence of activities to deliver the value.
- Achieve Value Flow: Eliminate unnecessary procedures to schedule and execute more work.
- Respond to Pull: Perform work only when needed.
- Seek Perfection: The continuous application of the four steps above.
Pull Planning – Last Planner ® System

Provides the production plan for project development
Responding to Pull

- Respond to pull by doing work at the last responsible moment
- Use Pull driven approach
  a. Define what is needed
  b. Create what is defined
  c. Not more
  d. Execute Flawlessly
Using Tools – Last Planner

When Reliability Increases

- LOS
- Saves Time (10-20%)
- Saves $ (3-10%)

Construction Industry Norm

Start

Completion

Time

90%

75%

50%

25%

10%
3

PROJECT OVERVIEW

Terminal E Renovations and Enhancements
Terminal E Renovations & Enhancements Project

Project Overview

Reconfiguration of Existing Terminal E Gates E3 (Old Gate E2), E10 (Old Gate E7B), E11 (Old Gate E8A) & E12 (Old Gate E8B)

- Reconfigure Gates E10, E11 & E12 for Dual Level Jet Bridge Boarding
- Relocate & Reconfigure Gate E3 for use by El Al Airlines
- Add Hold Room Capacity
- Add Level 4 Airline Club Shell Space
- Add Safe-Gate docking to all Terminal E gates
- Finishes & Passenger Experience Enhancements throughout Entire Terminal

<table>
<thead>
<tr>
<th>Project Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A/E</strong></td>
</tr>
<tr>
<td><strong>CM</strong></td>
</tr>
<tr>
<td><strong>Cost</strong></td>
</tr>
<tr>
<td><strong>Duration</strong></td>
</tr>
<tr>
<td><strong>Completion</strong></td>
</tr>
</tbody>
</table>
1. LEED Gold Certification

2. Adequate support space to house and maintain MEP’s

3. Meet/exceed peak load of three A380’s baggage makeup and claim, hold rooms, CBP, TSA, curbs & taxi pool

4. Install automated self-docking at all Terminal E gates (Safe-Gate)

5. Allocate proper concession space

6. Renumber all Terminal E gates

7. Provide airside loading dock

8. Integrate one-stop into CBP program

9. Integrate existing space with new space

10. Provide back of house service corridors to club space

11. Total asbestos removal

12. Lifeline systems installed above design flood level

13. No equipment installed which requires a worker to ascend a ladder
Landside View at Night
Interior Rendering
Synchro video

5/31/2016

Earned Value Graph

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MASSPORT SCHEDULING REQUIREMENTS

Terminal E Renovations and Enhancements
## CPM Schedules – Detail Levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Name</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| I     | Executive Summary / Project Master Schedule Information               | • Major milestones / Typically one page  
• Highlights major project activities, milestones, and key deliverables |
| II    | Management Summary / Summary Master Schedule Information              | • Summary of the Project Coordination Schedule(s)  
• Depicts the overall project broken down into its major components by area |
| III   | Project Coordination Schedule Information                              | • Includes all major milestones, major elements of design, engineering, procurement, construction, testing, commissioning and/or start-up |
| IV    | Execution Schedule / Working Level Schedule Information               | • Detailed Information by each work package (Design, Procurement and Commissioning)               |
| V     | Detailed Schedule Information                                        | • Detailed tasks needed to coordinate day to day work in a specific areas                          |
MPA-CPM Schedule Requirements

→ MPA Standard Front End Specifications were modified from requiring **Level IV or V CPM** schedules to requiring **Level II or III** schedules.

→ Use of **Primavera Project Planner P6 or later** version software to prepare, maintain, and revise CPM (Critical Path Method) schedules using precedence diagramming methods.

→ The Construction Manager shall **load all costs at the buy package level** into a Cost loaded Schedule for the entire Project.
MPA-CPM Schedule Requirements

→ Updates should reference variances from baseline schedule and previous month’s schedule.

→ Added Reference to Pull Plan Schedules:

The Contractor shall have the capability of coordinating with the CPM schedule process any production plans developed through the Last Planner™ System, including, but not limited to, phase pull planning, look ahead planning, weekly work planning, and performance measurement.”
LEVERAGING NETPOINT DURING THE PULL PLANNING PROCESS

Terminal E Renovations and Enhancements
### Initial Pull Plan Milestones

#### Crescent

<table>
<thead>
<tr>
<th>Pull Milestone</th>
<th>Activity ID</th>
<th>Activity Name</th>
<th>Target Date</th>
<th>Target Pull Plan Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piles Caps Complete Derrick 1</td>
<td>Z7-PH1-1120</td>
<td>F/R/P Pile Caps CL P’ to J’</td>
<td>11-19-15</td>
<td>10-08-15</td>
</tr>
<tr>
<td>Piles Complete (Derrick 2)</td>
<td>Z7-PH1-1110</td>
<td>Piles CL J’ to C’</td>
<td>12-17-15</td>
<td>11-05-15</td>
</tr>
<tr>
<td>Foundation Complete (Derrick 1 &amp; 2)</td>
<td>Z7-PH1-1170</td>
<td>F/R/P Pile Caps CL J’ to C’</td>
<td>02-02-16</td>
<td>12-22-15</td>
</tr>
<tr>
<td>Topping Off Phase 1</td>
<td>Z7-PH1-1680</td>
<td>Structure Lvl 5 CL J’ to C’</td>
<td>03-15-16</td>
<td>02-02-16</td>
</tr>
<tr>
<td>Slabs Complete</td>
<td>Z7-PH1-1960</td>
<td>F/R/P Slab Lvl 5 CL J’ to C’</td>
<td>04-20-16</td>
<td>03-09-16</td>
</tr>
<tr>
<td>Façade Complete Derrick 1</td>
<td>Z7-PH1-4500</td>
<td>Metal Panel Lvl 4 to 5 CL P’ to J’ (Clubs)</td>
<td>05-25-16</td>
<td>04-13-16</td>
</tr>
<tr>
<td>Building Weathertight</td>
<td>Z7-PH1-2420</td>
<td>Curtainwall Derrick 2 CL J’ to C’</td>
<td>06-30-15</td>
<td>05-19-15</td>
</tr>
<tr>
<td>Rough MEP Complete</td>
<td>Z7-PH1-2900</td>
<td>GWB Walls CL J’ to C’ (Club)</td>
<td>08-15-16</td>
<td>07-04-16</td>
</tr>
<tr>
<td>Flooring Complete Lvl 3</td>
<td>Z7-PH1-3070</td>
<td>Install Carpet Lvl 3 J’ to C’ (Departure)</td>
<td>10-03-16</td>
<td>08-22-16</td>
</tr>
<tr>
<td>TCO</td>
<td>Z7-PH1-3160</td>
<td>Commissioning</td>
<td>11-25-16</td>
<td>10-14-16</td>
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</table>

#### East End

<table>
<thead>
<tr>
<th>Pull Milestone</th>
<th>Activity ID</th>
<th>Activity Name</th>
<th>Target Date</th>
<th>Target Pull Plan Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubes Removed</td>
<td>EE-LVL2-1070</td>
<td>Demo Corridor Tube</td>
<td>12-09-15</td>
<td>10-28-15</td>
</tr>
<tr>
<td>New Doghouse Complete</td>
<td>EE-LVL1-1050</td>
<td>Construct New Dog House for Stair to Basement</td>
<td>01-19-16</td>
<td>12-08-15</td>
</tr>
<tr>
<td>New Escalators Set</td>
<td>EE-LVL2-1180</td>
<td>Set and Adjust Escalators</td>
<td>02-22-16</td>
<td>01-11-16</td>
</tr>
<tr>
<td>Finish Rotunda Terrazzo</td>
<td>EE-LVL2-2060</td>
<td>Plane and Finish Terrazzo Floor</td>
<td>03-25-16</td>
<td>02-12-16</td>
</tr>
<tr>
<td>East End Connectivity</td>
<td>EE-LVL2-1270</td>
<td>Install Glass Rail at Bottom of New Escalator</td>
<td>05-05-16</td>
<td>03-24-16</td>
</tr>
<tr>
<td>North Holdroom Complete</td>
<td>EE-LVL2-1480</td>
<td>Install Soft Seating</td>
<td>05-20-16</td>
<td>04-08-16</td>
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<tr>
<td>Elevator Installed</td>
<td>EE-LVL3-1380</td>
<td>Elevator Complete</td>
<td>06-16-16</td>
<td>05-05-16</td>
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</table>

#### Zones 1 - 6

<table>
<thead>
<tr>
<th>Pull Milestone</th>
<th>Activity ID</th>
<th>Activity Name</th>
<th>Target Date</th>
<th>Pull Plan Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Key Trades Involved

**Site work**
- The Dow Company

**Concrete**
- Liberty Concrete

**Pile Driving**
- Vynorius Pile Driving

**Demolition**
- JDC Demo
Module Breakout
### Sticky Design Template

<table>
<thead>
<tr>
<th>Company</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promise</td>
<td>Task Description</td>
</tr>
<tr>
<td>Request</td>
<td>Predecessor</td>
</tr>
</tbody>
</table>
A. Define the phasing of the work

*Preferably completed before the pull plan date*

B. Determine completion dates for the phases (or milestones/benchmarks)

C. Develop the network of activities required to complete the phase working backward from the completion date

D. Apply durations to each activity with no contingency or float in the estimates

E. Re-examine logic to try to shorten the duration

F. Determine the earliest practical start date
Setting up NetPoint file – Pre Pull

1. **Start with template activities**
   - Module Code
   - Company Code
   - Activity Color by Company

2. **Set up Calendar Dates**
   - 2-3 Days beyond estimated milestone date
   - 7-10 days before estimated start date
     - This allows for room if the pull goes longer than expected

3. **Set up Project Dates**
   - We started with the same start and finish dates in the CM’s schedule
During the Pull

1. **Schedule backwards from the finish benchmark**
   - Copy and paste from the template activities
   - Adjust durations
   - Organize activities into logical groups

2. **Create logic ties as you go to the best of your ability**
   - Ties between company
   - Ties between module
Layout Manager Video
NetPoint Pull Schedule Post “Cleanup”
Using NetPoint

✓ Allows you to schedule activities using their finish dates
✓ Allows for instant review of the pull plan
✓ Adjustments to be made the same day

Eliminating the need for a review meeting after the pull plan has been integrated into the CPM schedule

✓ Import directly into the P6 project schedule
Next Steps & Process Improvements

1. Improvements during the second pull (Steel)
   ✓ Displayed the NetPoint schedule on a TV screen
   ✓ Ran the layout manager immediately
   ✓ Adjusted some durations & sequencing

2. Further Improvements
   ✓ Pre load activities
     Send out template to be populated by trade contractors -or- Import CPM schedule
Next Steps & Process Improvements (cont’d)

3. Eliminate Sticky’s

4. Interactive pull plan on a smart board

5. Update P6 project schedule directly from NetPoint
   - Report on Percent Plan Complete (PPC) within NetPoint
   - Options to update P6
     - Tie finish benchmarks to finish milestones -or- have the % complete of a NetPoint hammock update LOE activities
Suggested NetPoint Improvements

A. Improve Visual Displays

Make task bar look more like sticky note -or- create a report that makes the schedule look more like a pull plan

B. Automate updates from NetPoint to P6
Thank You!