



# Massport Lean Program:

*Lean and Emerging Technologies*

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# Massport Capital Programs – Vision and Mission



## CAPITAL PROGRAMS & ENVIRONMENTAL AFFAIRS

### VISION

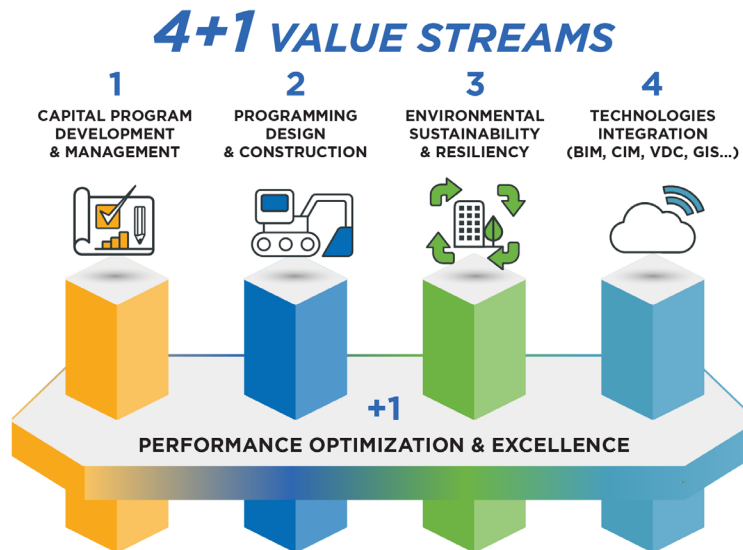
**Transform** our industry through innovation;

**create** value for our clients and

**deliver** “best-in-class” infrastructure projects  
for our customers.

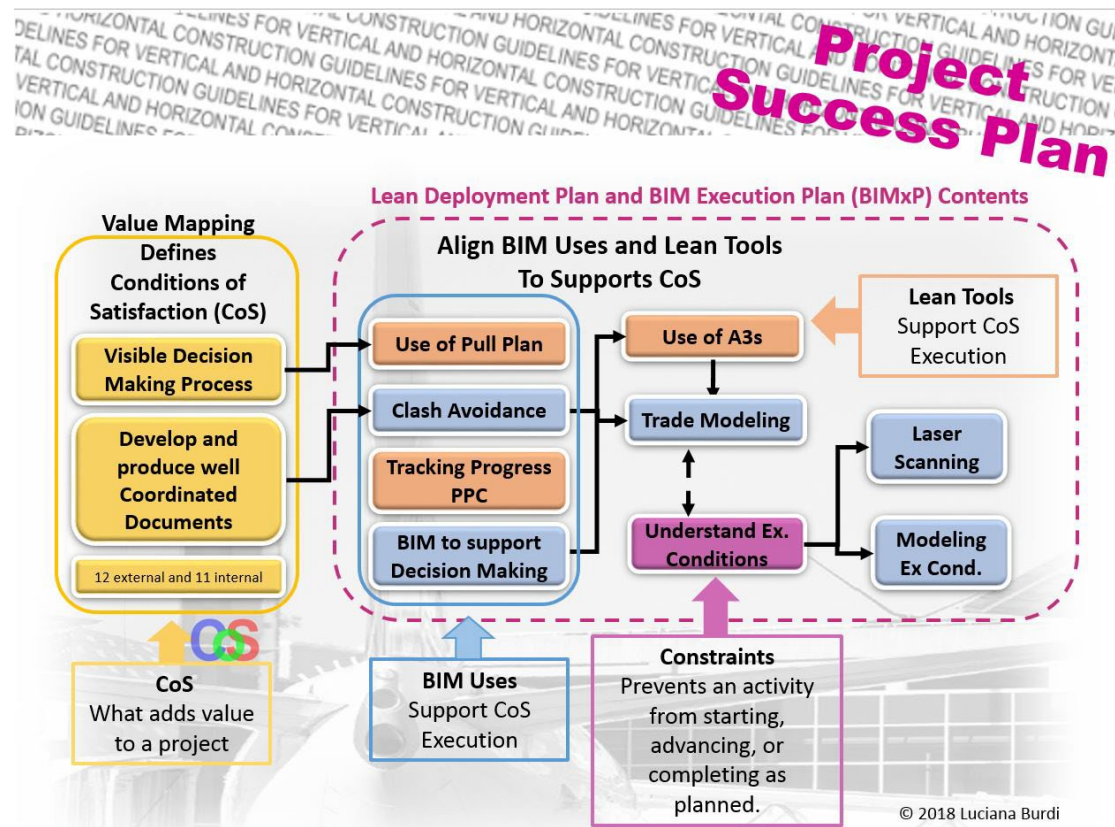
### MISSION

**Excel in delivering projects** that enhance our customers’  
experience by programming, designing and building  
safe, efficient and sustainable infrastructure. We commit  
to doing this by being **inclusive, leveraging technology**  
and finding opportunities to **continuously improve**  
in our project management and delivery.



Ensure consistency in management and business practices.

# Massport Capital Programs – Project Success Plan



## Major Lean Items

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1. Introductory Retrospective/Expected Outcomes
2. Last Planner® System: Milestone and Phase Pull Planning
3. Last Planner® System: Lookahead, Weekly Work Planning and Dashboard
4. Last Planner® System: Learning/Improving
5. A3 Decision-Making Process
6. Choosing By Advantages



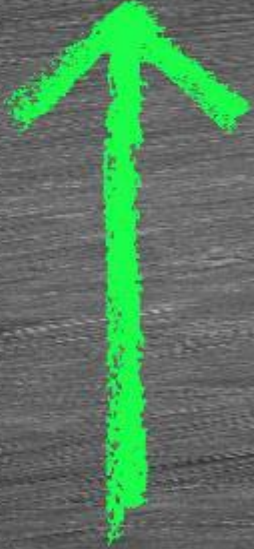
# LEAN INTRODUCTION, ORIGIN, AND BENEFITS



# EFFICIENCY



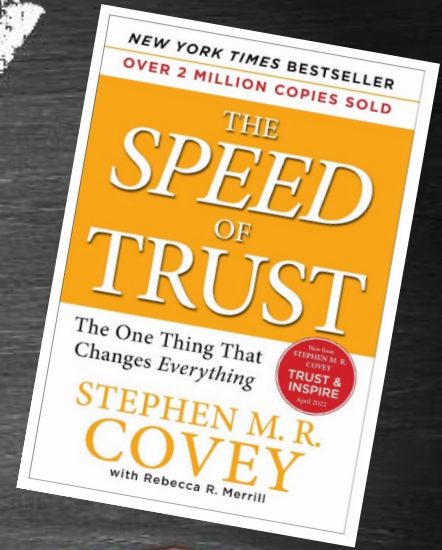
Speed



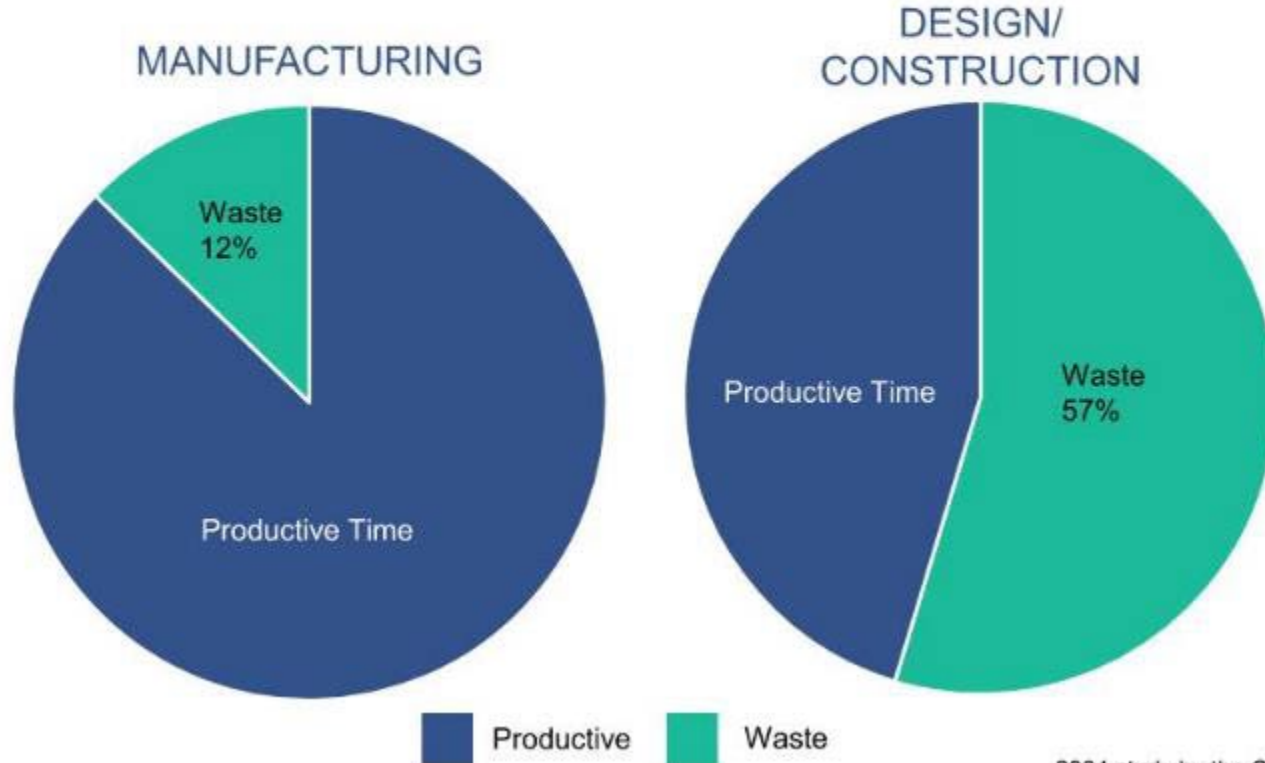
Quality



Costs



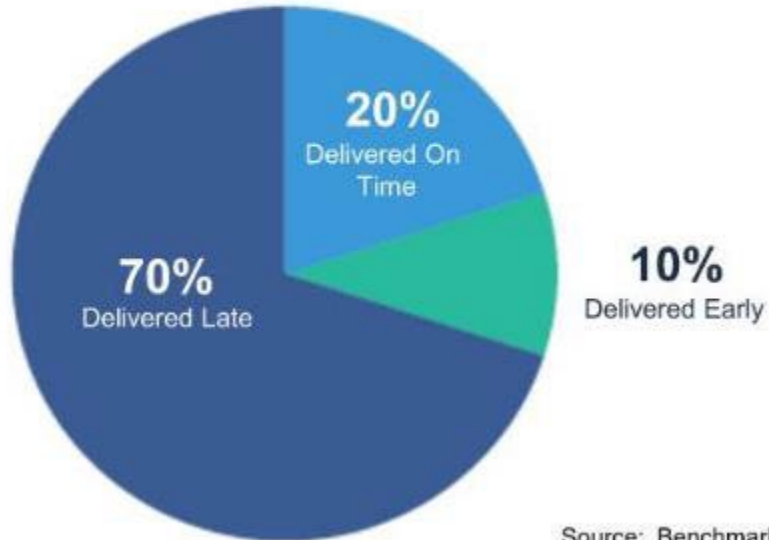
# The Opportunity...



2004 study by the Construction Industry Institute

# Why Use Last Planner System®?

**Time —**  
70% were delivered late



**Cost —**  
73% were over budget



Source: Benchmarking the Government Client Stage Two Study December 1999



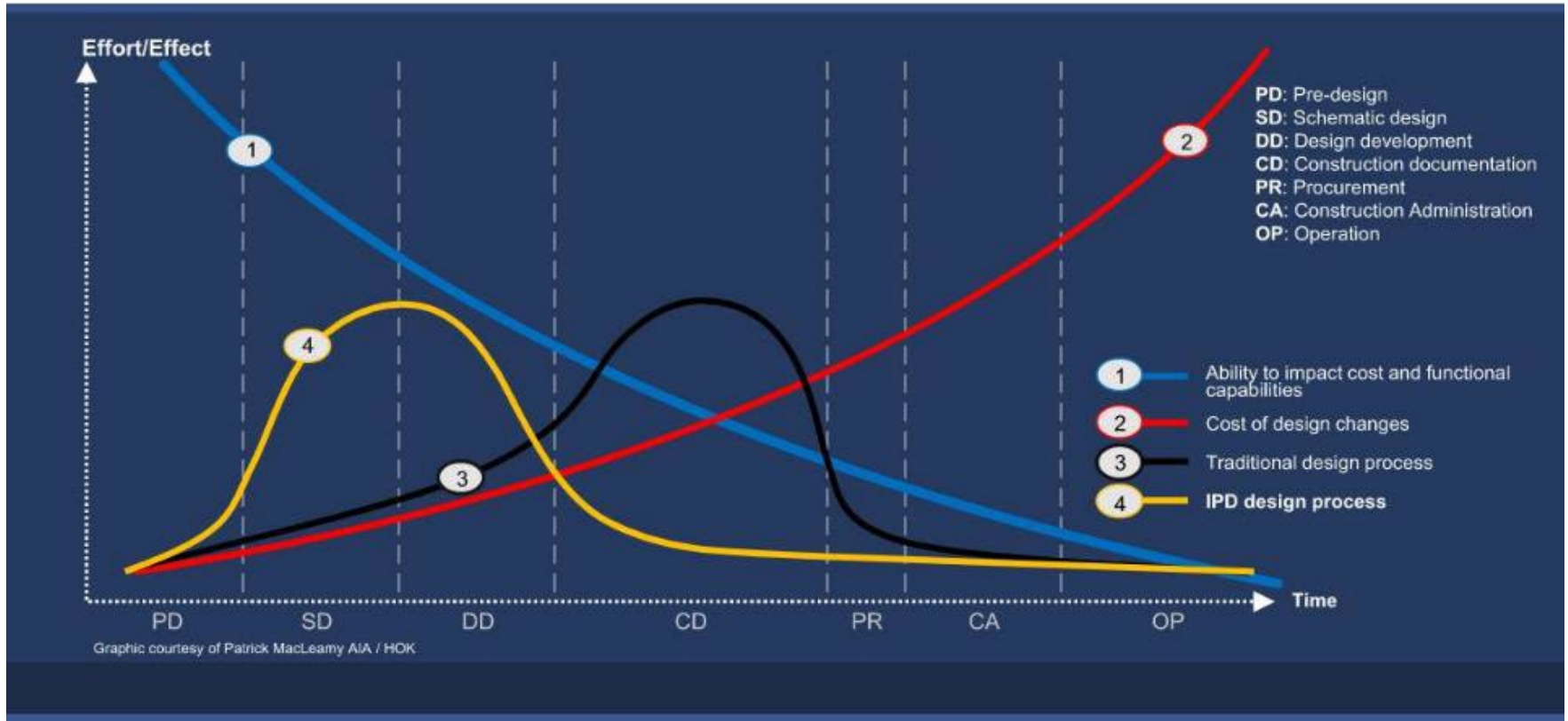


**“What if we don’t change at all ...  
and something magical just happens.”**

# Lean

Lean project delivery creates value, efficiency, and effectiveness through streamlined workflow and continuous improvement.

# Early Team Involvement



# LCI Tenets

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## TYPES OF LEAN TOOLS INTRODUCTION

# Types of Lean Tools Introduction

## Lean Tool Box - Focuses on Three Areas



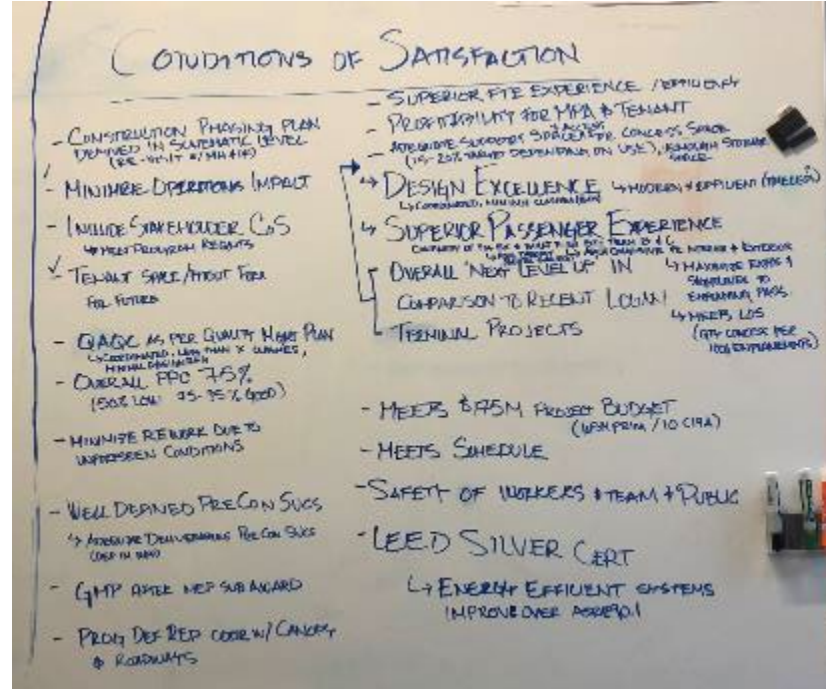
# Types of Lean Tools Introduction

**Collaborative  
Work Planning**

**Decision Making**

**Continuous  
Improvement**

## Conditions of Satisfaction



## Types of Lean Tools Introduction

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### Last Planner® System



### Pull Planning





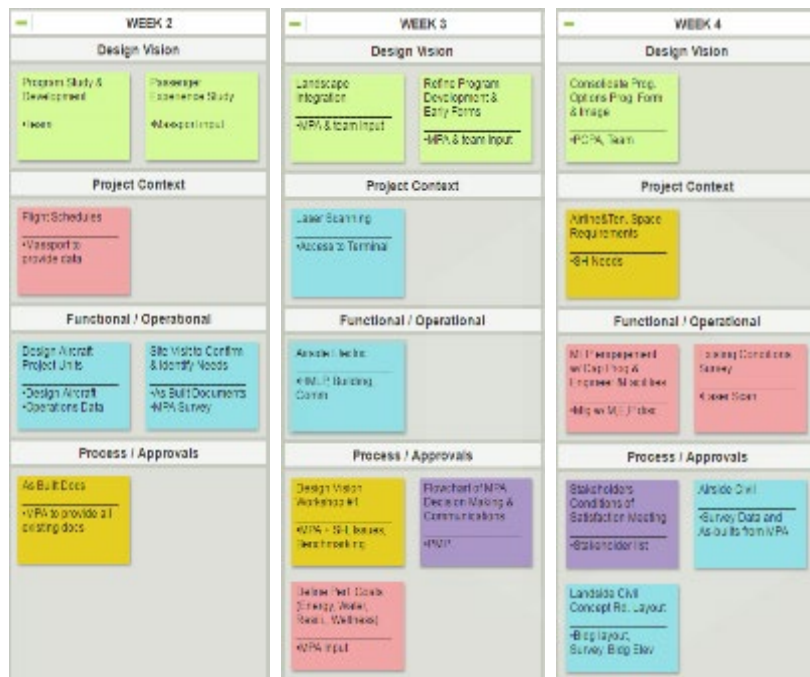
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## Weekly Work Plan



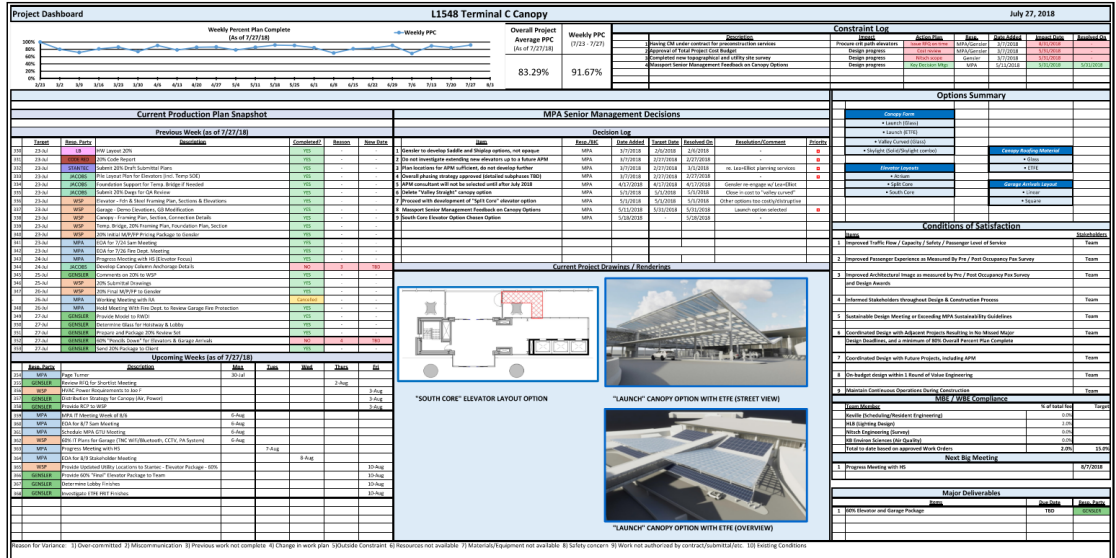
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## Dashboard



# Types of Lean Tools Introduction

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## A3 Decision Making Process

A3 No	Title	Revision	Champion	Date Started	Collaborators	Reviewer	Approved by	Approved date	Status
4	L1428 FAA NEXGEN ATCT Tower	2	R. Couto, WSP	08/16/2019	D. Ericson, WSP	R. Couto	S. Harris Long, MPA	08/16/2019	<input checked="" type="checkbox"/> Development <input checked="" type="checkbox"/> Collaborative review <input checked="" type="checkbox"/> Implementation

### Section 1 – Background

The Massport-operated and FAA-leased Control Tower at Logan International Airport plans to upgrade the existing air traffic control equipment to NEXGEN equipment. In order to accommodate the NEXGEN equipment, the study team assessed the feasibility of meeting the following:

**Baseline Condition of Satisfaction**

- 600 SF of additional equipment space

**Additional Considerations for Future Value**

- Expand administrative and training spaces
- Relocate the existing simulator space
- Consolidate employee spaces from adjacent buildings to the vicinity of the Control Tower

### Section 2 – Problem Statement/Current State

WSP | PB's team performed the following:

- Review of all available existing documentation of the Control Tower Structure and the adjacent Central Garage Structure, including all renovations and additions
- Several field visits to the Control Tower, the Central Garage, the FAA Equipment Rooms, and the FAA Office Space
- Internal meetings on a regular basis to produce viable options to meet Massport's goals and to coordinate our investigation and analysis efforts
- Weekly meetings with the Massport Project Manager

### Section 3 – Target State/Conditions of Satisfaction

- Cost:** Cost excluded from initial advantage assessment. Included in analysis for reference only.
- Schedule:** Shorter schedule duration is more desirable.
- Construction Logistics/Phasing:** Less construction phasing complexity is more desirable.
- Permitting/Code:** Less code complexity is more desirable.
- Feasibility & Technical Complexity:** Less technical complexity is more desirable.
- Impacts to Tenants:** Less impact to tenants is more desirable.
- Potential for Program Growth:** (beyond Baseline Conditions of Satisfaction) Higher square footage is more desirable.
- Unknowns/Risk:** Less risk/unknowns is more desirable.

### Section 4 – Investigations and Analyses

WSP | PB's team performed the following:

- Review of all available existing documentation of the Control Tower Structure and the adjacent Central Garage Structure, including all renovations and additions
- Several field visits to the Control Tower, the Central Garage, the FAA Equipment Rooms, and the FAA Office Space
- Internal meetings on a regular basis to produce viable options to meet Massport's goals and to coordinate our investigation and analysis efforts
- Weekly meetings with the Massport Project Manager

### Section 5 – Proposal/Options Considered

**OPTION 1**

- Interior Renovation Only
- Reallocates Tower Space at Levels 17 & 19
- Meets Baseline Condition of Satisfaction

**OPTION 2A**

- Buildout of Tower Walkways
- Reallocates Tower Space at Levels 17 & 19
- Exceeds Baseline Condition of Satisfaction by ~500 SF Equipment Space at Level 3 and ~1000 SF Office Space at Level 2
- Add Alternate: Potential for additional ~750 SF Equipment Space at Level 1 & 4

**OPTION 2B**

- Buildout of Tower Walkways
- Exceeds Baseline Condition of Satisfaction by ~750 SF Equipment Space at Levels 2 & 3
- Add Alternate: Potential for additional ~750 SF Equipment Space at Level 1 & 4

**OPTION 3**

- Constructs New Elevated Level Between the Pylons
- Reallocates Tower Space at Levels 17 & 19
- Exceeds Baseline Condition of Satisfaction by ~2000 SF Programmable Space at New Elevated Level

**OPTION 4A**

- Exceeds Baseline Condition of Satisfaction by ~7500 SF Programmable Space at Garage Level 4

**OPTION 4B**

- Exceeds Baseline Condition of Satisfaction by ~7400 SF Programmable Space above Garage Level 4

### Section 6 – Impact Summary and/or Recommended Actions

ARCHITECTURAL IMPACT SUMMARY										CODE IMPACT SUMMARY			
Option	Program	Equipment	Office	Training	Simulator	FAA	FAA	FAA	FAA	As-built	Specialty Systems	Resiliency	Permitting
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

**Recommended Option: OPTION 2B**

### Section 7 – Follow Up

- Publish A3 Decision Summary internally to Project Team and to Massport
- Coordinate with Architecture, Structural, MEP, Scheduling, Estimating, and Code disciplines to incorporate appropriate changes into design.

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Continuous  
Improvement

## Choosing By Advantages Decision Making Process

Factor	Criterion	Option 1	Option 2A	Option 2B
Cost	Construction, base cost, envelope, all expenses. Noted here for reference only.	\$1,451,993 TOTAL \$388.5 F	\$2,430,020 TOTAL \$388.5 F	\$1,617,419 TOTAL \$318.9 F
		Adv: \$1,451,993 Imp: 365	Adv: \$2,430,020 Imp: 310	Adv: \$1,617,419 Imp: 390
Schedule	Shorter schedule translates to more desirable advantage	APPROX. 5 MONTHS	APPROX. 6.5 MONTHS	APPROX. 5 MONTHS
		Adv: 3.5 months Imp: 365	Adv: 2 months Imp: 30	Adv: 5.5 months Imp: 390
Construction Logistics/Phasing	Less construction phasing complexity is more desirable advantage	Work zone occurs within existing tower footprint and envelope	Work zone occurs within existing tower, existing non-parking area of garage, but larger area than 1 and 2B	Work zone occurs within existing tower, existing non-parking area of garage, but larger area than 1
		Adv: More predictable phasing Imp: 365	Adv: More predictable phasing Imp: 30	Adv: More predictable phasing Imp: 390
Permitting/Code	Less code complexity is more desirable advantage	Minimal code impact	Slightly more complex, due to larger projection	Minimal code impact, but larger area than 1
		Adv: More predictable code imp. Imp: 365	Adv: Slightly more predictable code imp. Imp: 30	Adv: More predictable code imp. Imp: 390
Feasibility & Technical Complexity	Less technical complexity is more desirable advantage	Minimal	Basic build-out of tower, walkway structure	Basic build-out of tower, walkway structure, larger footprint than 2A
		Adv: More technically predictable Imp: 66	Adv: More technically predictable Imp: 50	Adv: Technically complex Imp: 48
Impacts to Tenants	Less impact to tenants is more desirable advantage	Relocation from L17 to Temporary Trailers	Option constructs swing space without relocating FAA, but still requires modifications to 17th and 19th floors	Option constructs swing space without relocating FAA
		Adv: No Imp: 0	Adv: Marginal/less impacts Imp: 30	Adv: Less impacts Imp: 65
Potential for Program Growth*	Higher space/floor is more desirable advantage*	Meets baseline condition of relocation	Adds office and telecon floor area, 2350 SF	Adds telecon floor area, 750 SF
		Adv: No Imp: 0	Adv: Some potential for program growth Imp: 30	Adv: Some potential for program growth Imp: 25
Unknowns/Risk	Less unknowns is more desirable advantage	Minimal	Requires build-out of tower, concrete walkways	Requires build-out of tower, concrete walkways, but additional telecon space
		Adv: Least risk involved Imp: 365	Adv: Slightly less risk involved Imp: 22	Adv: Marginally less risk involved Imp: 22
MOST PREFERRED ATTRIBUTE		Option 1	Option 2A	Option 2B
LEAST PREFERRED ATTRIBUTE		Total Importance of Advantages	Total Importance of Advantages	Total Importance of Advantages
NEUTRAL/TRANSITIONAL ATTRIBUTE		Imp: 365	Imp: 310	Imp: 390



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### Plus | Delta

+	Δ
<ul style="list-style-type: none"><li>- synergy</li><li>- real team ID of project issues</li><li>- preparation</li><li>- accomplished goal (partially)</li><li>- efficient for first attempt at lean<ul style="list-style-type: none"><li>→ good stepping stone</li><li>- good</li></ul></li></ul>	<ul style="list-style-type: none"><li>- overtime</li><li>- More time defining milestone</li><li>- More space</li><li>- adjusting pull outlook (100 DAYS TOO LONG)</li></ul>

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## Retrospective

START DOING			
Issue	Action	Responsible Party	
		Primary Resp.	Secondary Resp.
1- Develop & share RMP (Risk Management Plan)	Formalize RMP and incorporate in PMP	Consultant	MPA PM
2- Establish Lean principles and tools and obtain buy-in	Develop LDP (Lean Deployment Plan) template	LB	-
3- Obtain Prior Approval on Program Changes	PM to provide written approval for any add'l scope investigation or program/schedule change	Consultant	MPA PM
4- Track Weekly Schedule, Budget, Issues, Risks	Ledger to be kept by Consultant as part of weekly agenda items with MPA PM	Consultant	MPA PM
5- Track conflict and issue resolution plans	Implement in PMP	Consultant	-
6- Upper Mgmt. Buy-in & Commitment on Lean Process	Present Production Plan to Senior Mgmt.	Consultant	MPA PM
7- Develop meeting schedule with specific agenda, expected outcome & list of key individuals that must attend	Set meeting schedule at the beginning of the project	Consultant	MPA PM
	Incorporate meetings in Prod. Plan with key attendees & topics	MPA PM	Consultant
	Share Agenda 48hrs ahead of every mtg.	MPA PM	Consultant
	Incorporate in Consultants Manual	LB	-
8- Perform Plus/Delta at each meeting	-	ALL	-

KEEP DOING
1- Analyze & Mitigate Risks
2- Work Orders: PD, Design, CA, RE

STOP DOING			
Issue	Action	Responsible Party	
		Primary Resp.	Secondary Resp.
1- Communicating design and budget changes late	-	-	-
2- Performing additional scope prior to written approval	Obtain written (email) approval by PM (including Ledger)	Consultant	-

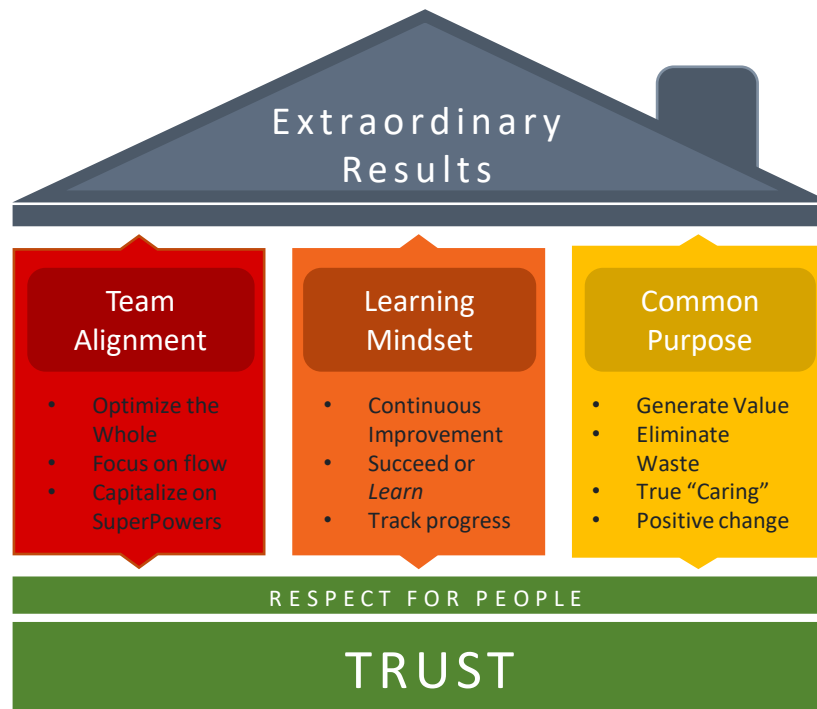
# HIGH-PERFORMING TEAM FORMATION

# High-Performing Team

## Framework

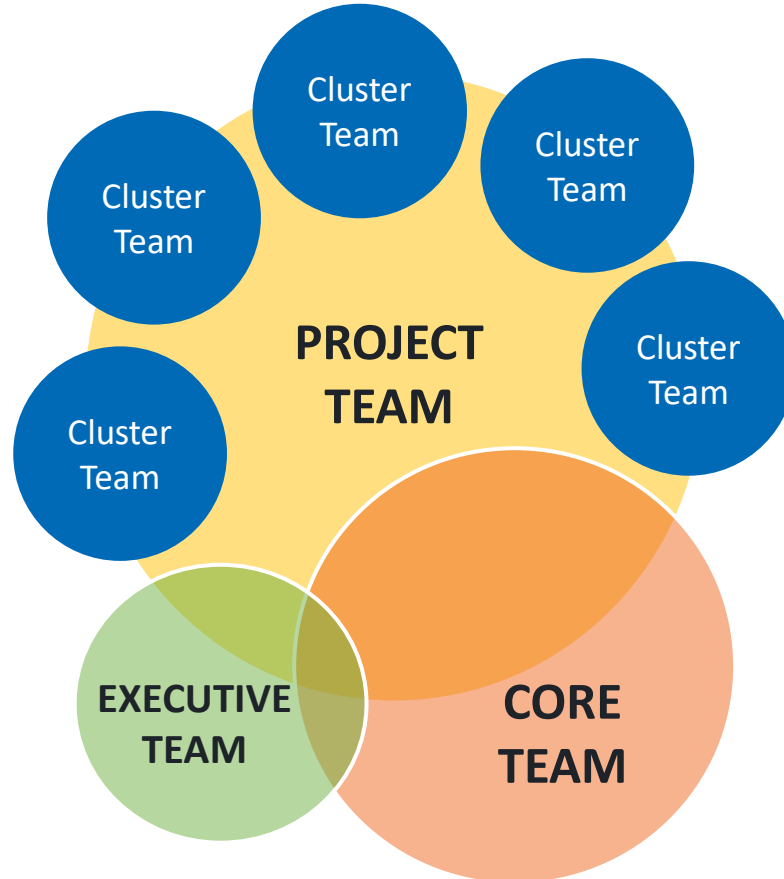
Creating High-Performing teams is crucial for success.

Cultivating a *culture of excellence*, will deliver Innovation, Creativity and Extraordinary Results.

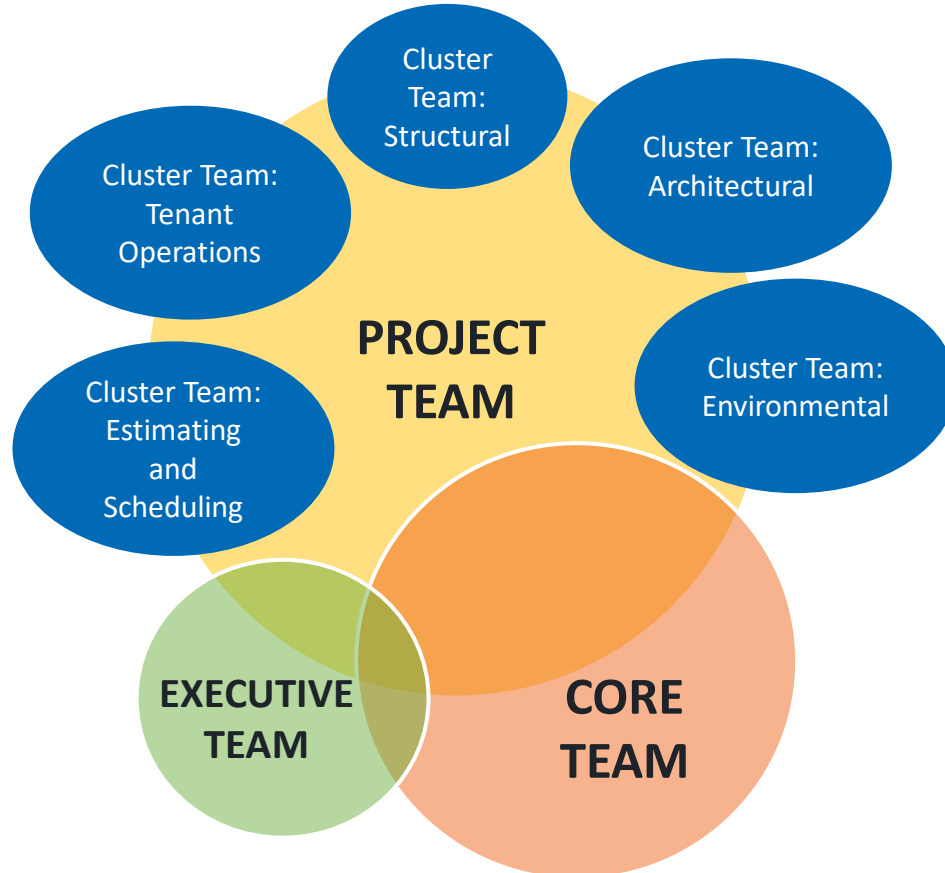




# Recommended Team Structure:



### Sample Team Structure:



## SESSION Q&A AND PLUS-DELTA

# Plus | Delta

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Plus	Delta