

LAST PLANNER® SYSTEM

MINIMUM STANDARDS GUIDE



MASSACHUSETTS PORT AUTHORITY

CAPITAL PROGRAMS AND ENVIRONMENTAL AFFAIRS

in collaboration with  and 

CONSTRUCTIVE DISPUTE
RESOLUTIONS

The Massachusetts Port Authority's (Massport) decision to implement Lean approaches and tools represents a significant multi-year change in how Massport delivers its capital projects. Lean principles applied to the design and construction process focus on creating a culture of continuous improvement driven toward maximizing customer value and eliminating waste from the project delivery process.

One of the Lean tools that Massport has implemented on its major projects is the Last Planner[®] System (LPS)[™]. LPS is a collaborative process by which project teams (owner, designer, and constructor) plan and execute their work activities in a manner that ensures that work is done when and how it is needed to support efficient and cost-effective delivery of the project. LPS also promotes cross-functional/cross-organizational information flow, communication, and problem solving by "Last Planners", the people who do the work. Finally, LPS incorporates metrics for measuring continuous improvement, so that project teams can address challenges and become ever more productive.

This Last Planner[®] System Guide is intended to set forth Massport's expectations for project team implementation of LPS, adapted to Massport's project delivery system. We recommend that project teams at the start of each project review the LPS Guide to promote common understanding and consistency. Thereafter, project teams should periodically conduct LPS Retrospectives to gauge how it is working and make adjustments as needed—in the spirit of continuous improvement, we look forward to hearing from users of the LPS Guide as they implement LPS.

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A. Purpose of the Last Planner® System Guide

This Last Planner® System Minimum Standards Guide introduces the Last Planner® System, which the Lean Construction Institute (LCI) defines as a system of Lean construction principles that help increase the reliability of a planning system and thereby significantly improve project team performance. This guide is intended to introduce the Consultant or Contractor to the LCI Last Planner® System in general, and more specifically describe the minimum standards required by Massport for application on Massport projects.



B. Last Planner® System Background

B.1 LPS Components

The Last Planner® System (LPS) is a collaborative, commitment-based planning system that integrates SHOULD-CAN-WILL-DID planning by “Last Planners” (the people who will actually do the work). In general terms, the LPS focuses on identifying those tasks that can be done to move along a planned production path, and when that becomes constrained or not possible, determine alternative paths that accomplish the desired goals.

LPS involves action by multiple team members at many different levels, starting with the master schedule, followed by a detailed phase planning session, and carried out through look-ahead and weekly work planning efforts.

LPS follows a disciplined, step-by-step approach to production planning which includes the five following phases or elements as defined by the LCI:

A. Master Schedule Alignment

- **Occurs as needed;** focuses on identifying major milestones and the relationships between them, in order to help assess the pace at which the project should progress.

B. Phase Pull Planning

- **Occurs as needed;** focuses on breaking down the major milestones into manageable portions of work (generally eight to twelve week timeframe) into a task-by-task production plan which builds the sequence of work through emphasizing the promises and requests of each team member.

C. Make Ready Work Planning

- **Occurs weekly;** focuses the team members on looking ahead (generally three to six weeks) to ensure the previously-developed network of promises and requests is still valid and current.

D. Weekly Work Planning

- **Occurs weekly;** focuses the team members on identifying if those tasks set to be completed this week were, in fact, completed.

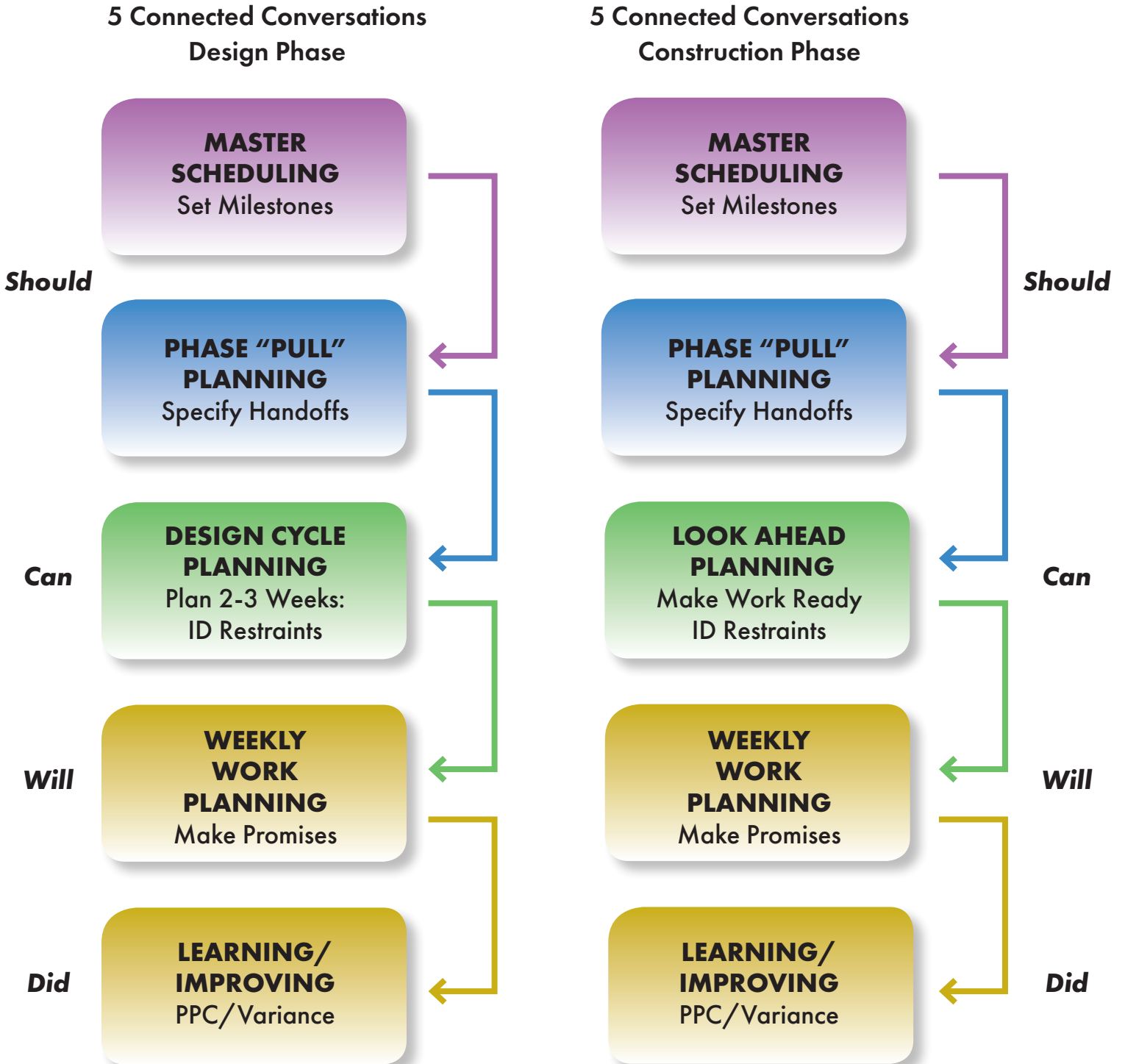
E. Continuous Improvement – Percent Plan Complete (PPC) and Variances

- **Occurs weekly;** focuses the team members on identifying the reasons for any variances from the team’s weekly work plan and also tracks the percentage of weekly planned tasks that were completed as planned.



LPS follows a disciplined step-by-step approach to production planning, illustrated as follows:

Last Planner® System



.....

B.2. Pull Planning as a Part of LPS

Pull Planning, an element of LPS, is a tool for project teams to collaboratively develop production plans for effective and efficient delivery of Massport capital projects. Instead of the conventional approach of “pushing” a project through activities to completion, “pull” planning establishes what is necessary to pull activities toward completion of a target milestone.

The goal of pull planning is to create a production plan that defines who does what, when, where and how. It usually breaks work into pieces (known as “work structuring”) needed to support production of deliverables or meet defined milestones. The purpose of work structuring is to promote flow and optimize system throughput by focusing on handoffs and opportunities for moving more manageable smaller batches of work (known as “small batching”) through the production system.

Pull planning uses the following methodology:

- *The goal of pull planning is for the team to create a production plan (not a “schedule” in the CPM/P6 sense) that the team can follow in performing and measuring its work flow needed to complete a phase of work.*
- *A “**request**” from the Customer signals that work is needed – it is “**pulled**” from the Performer as and when it is needed for the Customer to perform its work.*
- *A Customer’s “**request**” comprises its “**Conditions of Satisfaction**” —the specific request(s) that must be met in order to deliver the Performer’s “promise”.*
- *The work flow is based on a coherent set of reliable commitments (“**promises**” and “**requests**”) that coordinate the actions of the participants effectively and efficiently for the phase of work covered by the production plan.*

Design Pull Planning and Construction Pull Planning are similar in general concept, practice, and methodology. However, it is important to note that Design Pull Planning is generally a more fluid, iterative process that requires flexibility in its approach to LPS and LPS metrics; Construction Pull Planning is generally a more linear, predictable process that focuses more on advance activity planning and efficiency in repetitive work.



C. Applying LPS Principles and Process on Massport Projects

Although Massport follows the basic elements of the LCI LPS process, there are some differences in the Massport approach because of the unique environment in which Massport Capital Programs & Environmental Affairs (CP&EA) delivers projects. In executing design and construction, CP&EA project teams must account for: “legacy” facilities; an operating airport; numerous stakeholders; and a fast track building environment. Therefore, CP&EA allows its project managers (PMs) and their project teams some flexibility in applying LPS, while still maintaining the basic structure and general intent of the LCI LPS approach.

The graphic below illustrates the basic LPS system to be applied by CP&EA project teams. Details of each element are explained in the sections below:

HOW WE WORK TOGETHER AND HOW WE PLAN OUR WORK



C.1 Master Schedule Alignment

As briefly described earlier in this Guide, a Master Schedule Alignment (MSA) should be carried out (usually at project or major phase outset) to identify major milestones and the relationships between them, in order to help assess the general sequence by which the project should progress. Project Managers from any significantly interfacing/adjacent projects should also be present to participate in this session as well.

HOW WE WORK TOGETHER AND HOW WE PLAN OUR WORK



In the MSA session, the project team (with appropriate stakeholders in attendance) collaboratively develops and reviews a proposed overall schedule that identifies major events or milestones anticipated on a project. These can typically include consideration of:

- Preliminary Design
- Design Package Phasing
- Long Lead Delivery Components
- Final Design and Bid Package Documents
- Permitting
- Contractor Procurement and On-Boarding
- Trade/Subcontractor Bid Packages
- Field Mobilization
- Construction Phasing
- Completion for Use and Occupancy
- Commissioning
- Handover
- Closeout

Generally speaking, the expected outcome of a Master Schedule Alignment is for the project team and key interfacing stakeholders to gain alignment on:

MSA Expected Outcomes & Deliverables

- Basic Approach to the Work
- Major Activities/Durations/Dependencies Shown in High-Level Master Project Schedule (See Figure 1)
- Identification of any Major Challenges or Schedule Gaps
- Identification of Major Constraints & Risks
- Alignment that the Overall Timeframe appears Reasonably Achievable
- Identification of Phase Pull Plan to Develop Production Plan

The expected deliverable of an MSA is a high-level master project schedule, illustrated by the following example:

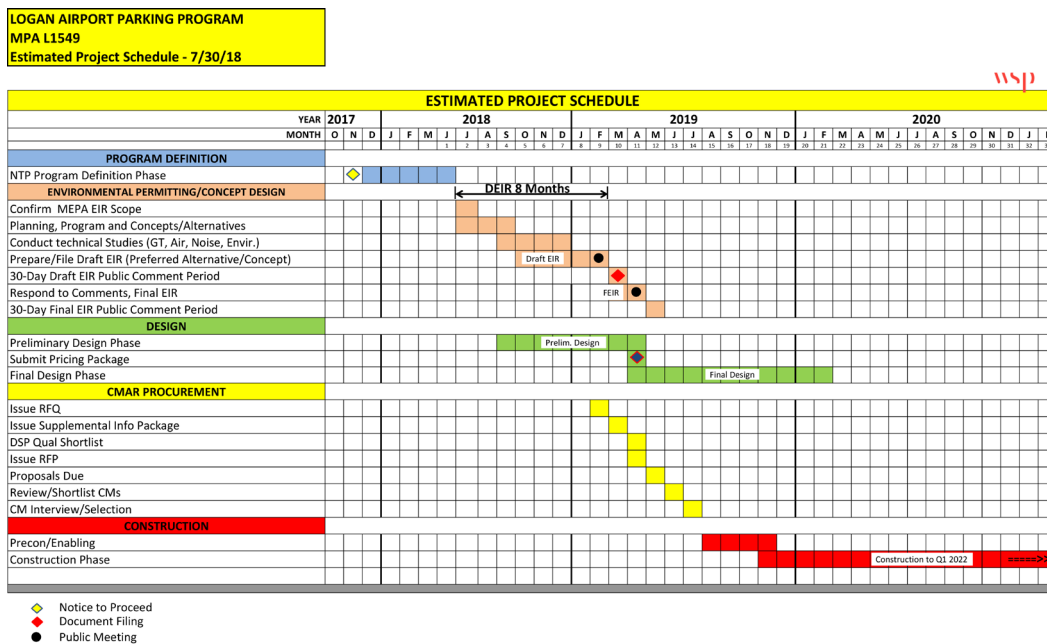


Figure 1: Sample Master Schedule Alignment Deliverable

Appendices A.1, A.2, and A.3 provide samples of Master Schedule Alignment Expected Outcomes Agenda, MSA Facilitator Checklist, and MSA Facilitator Preparation Guidelines.



C.2. Phase Pull Planning

As briefly described earlier in this Guide, Phase Pull Planning shall be carried out to break down the major milestones defined by the MSA into manageable portions of work (generally eight to twelve week timeframes) into a task-by-task production plan which will focus on the promises and requests of each team member.

HOW WE WORK TOGETHER AND HOW WE PLAN OUR WORK



At project outset and early in the Design Phase, generally the team members participating in the Phase Pull Planning session will be Massport and Design Team members. However, as the project progresses, the Contractor/Construction Manager (and any trade subcontractors) will also be required to participate in order to identify discipline/trade-specific tasks and team decisions that are required in order to meet a given milestone. A typical ‘phase of work’ during Design could be a period of the project where a specific design milestone or design decision is being approached and planned for, such as issuance of major design packages. During Construction, a typical ‘phase of work’ could be a length of time when a specific group of activities is scheduled to be accomplished, such as enabling foundation and site activities required to facilitate steel erection on-site.

A project team may also want to carry out “**Micro Pulls**” as a subset of a phase pull. Micro Pulls are collaborativework sessions to develop a detailed production plan focused on a short-term, condensed, time-critical particular work activity or deliverable. They are intended to be more focused and the tasks more granular than a phase pull session. A Micro Pull, for example, could be utilized to plan a power outage during a weekend.

The following example is a “wall map” that can be used in a pull planning session:

L1548-01 TERMINAL C CANOPY AND UPPER DECK (BEST TEAM EVER) PULL PLAN 20 MARCH 2022											
MONTH	March			April			May			MONTH	
WEEK DATE	19-25 MAR	26-Mar-1 APR	2-8 APR	9-15 APR	16-22 APR	23-29 APR	30-6 MAY	7-13 MAY	14-20 MAY	21-27 MAY	28-MAY-1 JUN
WEEK NO.	1	2	3	4	5	6	7	8	9	10	11
KEY MEETINGS	Pub plan to DCA	Utilities Meeting	Design Review of Task	Threats/Redshift	Task Review of Task		Task Review of Task	Threats/Redshift	Task Review of Task		Task Review of Task
KEY DELIVERABLES / MEETING TOPICS			Design Package Final Permit to Construct		Design Issue - M&E/RF		CRK of cost estimates		Draft C&MFP outline		Final 11 May 2022 DCA/MSA/DP/CP Deliverables and ERF
MASSPORT	Massport										MASSPORT
PROJECT MANAGEMENT / OPERATIONS	Gender / Gender										PROJECT MANAGEMENT / OPERATIONS
ARCHITECTURE	Gender										ARCHITECTURE
VERTICAL TRANSPORTATION	Lucah Bates										VERTICAL TRANSPORTATION
LIGHTING DESIGN	M&B										LIGHTING DESIGN
UTILITIES/UTILITIES	Stavros										UTILITIES/UTILITIES
GEOTECH	Jacobs										GEOTECH
ENVIRONMENTAL / TRAFFIC	VIB										ENVIRONMENTAL / TRAFFIC
ROADWAY STRUCTURAL	Jacobs										ROADWAY STRUCTURAL
CANOPY STRUCTURAL	WSP										CANOPY STRUCTURAL
MEFP	WSP										MEFP
COST ESTIMATING	WSP										COST ESTIMATING

Figure 2: Sample Phase Pull Planning Template Board





Figure 3: Phase Pull Planning Session in Progress

The expected outcome of a phase pull is a collaborative production plan for making reliable hand-offs to deliver activities and achieve deliverables needed for that phase of work. This production plan will be used as a living document comprising a network of requests and promises that defines the planned workflow of the project team. This living document can be maintained in a way that is best suited to support the team, but must be agreed to by Massport and the rest of the team and described in the team’s Lean Deployment Plan. Depending on the team and phase, production plans may be maintained in a Kanban web-based platform, a living document Excel sheet, or a production planning software. Examples of production plans are shown below in Figure 4, Figure 5, and Figure 6.

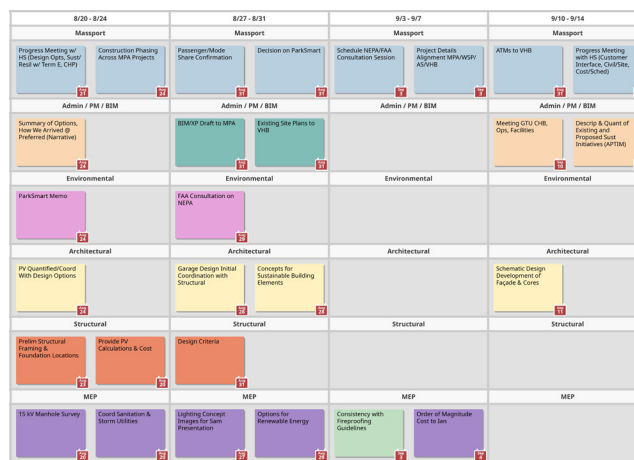


Figure 4: Phase Pull Production in Web-Based Software

19-Feb	WSP/VHB	Submit Pedestrian Volumes for Terminal C TNC for Elevator Study	ON TRACK
21-Feb	GENSLER	Prep Agenda and Banner for 2/22 Pull Plan	ON TRACK
22-Feb	VHB	Submit Scope and Fee Proposal for TNC Garage Changes	ON TRACK
22-Feb	WSP - MEP	Prep Materials for 3/4 Plumbing Inspector Meeting	ON TRACK
22-Feb	GENSLER	Request and Secure TVPs for Lint Roller Site Visit	ON TRACK
22-Feb	GENSLER	Prep for Biweekly Meeting	ON TRACK
22-Feb	WSP - MEP	IT Meeting w/ MPA for West & Central Garage	ON TRACK
22-Feb	MPA	Progress Meeting with HS	ON TRACK

Figure 5: Phase Pull Production Plan in Excel

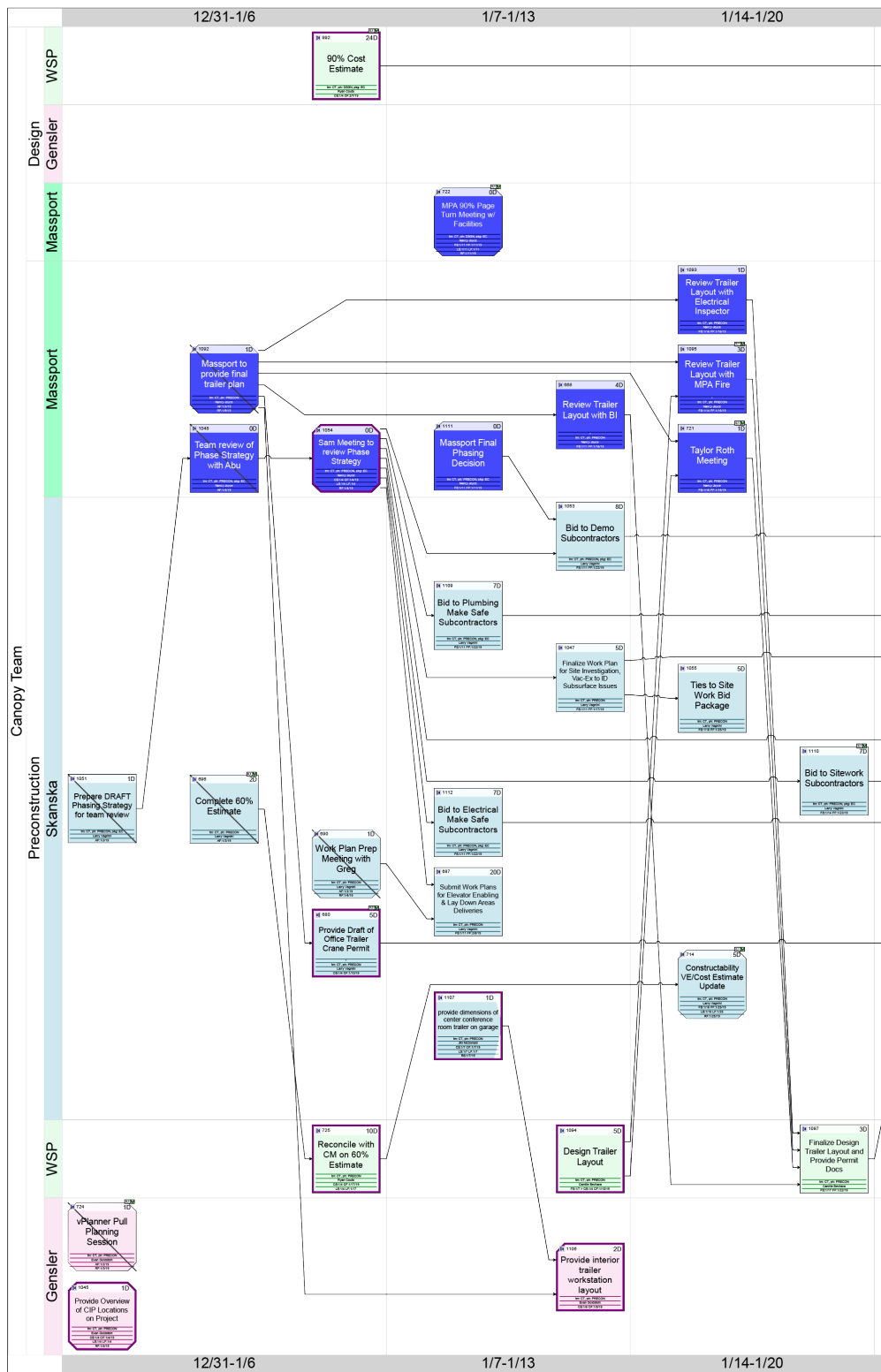


Figure 6: Phase Pull Production Plan in Production Planning Software

Attachments B.1, B.2, B.3, and B.4 are Phase Pull Expected Outcomes Agenda, Phase Pull Instructions to Attendees, Phase Pull Facilitator Checklist, and Phase Pull Facilitator Guidelines.



C.3. Weekly Work Plan and Make-Ready/Look Ahead Planning

After the team develops its production plan through Phase Pull Planning, the next step then becomes maintaining the collaborative momentum throughout the team’s workflow. Our Massport project teams do this through focused Make-Ready/Look Ahead Planning and Weekly Work Planning.

While the Last Planner® System treats this as two separate steps, generally our Massport project teams have been able to hold **one weekly check-in meeting that has two purposes:**

HOW WE WORK TOGETHER AND HOW WE PLAN OUR WORK



1. **Weekly Work Planning** – Review the current week’s and the next week’s tasks from the production plan, and confirm they have been (current week) or will be (next week) completed. If not, adjust durations/dates and track variance reasons.
2. **Make-Ready Work Planning** – Look ahead to upcoming weeks to ensure the previously developed phase network of promises and requests is still valid and current. If not, adjust durations/dates. In the Design Phase, the look ahead period may be two to three weeks out; in the Construction Phase the look ahead period may be as many as six to eight weeks out.

The intent of this weekly dual-purpose check-in is solely to update/adjust the tasks in that week’s and the upcoming weeks’ production plan, and should take **no longer than 15 to 30 minutes**. To ensure efficiency of the weekly check-in, all participating members of the project team should have access to the production plan at all times to ensure alignment in the team’s work flow and all team members should come prepared to the check-in with the current status of their items.

The Make Ready Work Planning part of the check-in also should take **no longer than 10 to 15 minutes**. When reviewing the results of the Make-Ready Work Planning, the project team should also check whether any interim milestone dates (in the P6 schedule) will be impacted by any changes to the phase production plan. As needed, the project team every few sessions can extend the session to “advance the plan”, that is fill in more detail for weeks coming into the Look Ahead period during the phase that was initially pulled in the Phase Pull Planning.

Attachment C.1 is a set of Weekly Work Plan Facilitator Preparation Guidelines.



C.4. Continuous Improvement

With Continuous Improvement being a fundamental principle of Lean Design and Construction and inherent to LPS, Massport’s project teams actively work towards continuous improvement by tracking three metrics or measures when maintaining their production plan efforts: Percent Plan Complete (PPC), Constraint Log, and Variance Log.

- Percent Plan Complete (PPC):** PPC is a basic measure of how well the team’s production planning is working – it is calculated as the number of assignments completed as planned for that week divided by the total number of planned activities for that week. It simply measures the percentage of assignments that are entirely complete as planned (there is no “partially” complete—an action is either fully complete or it is not considered complete).

18-Dec	MPA	Meeting w/ IT to Review Temp. Trailers	YES
18-Dec	MPA	PM Web Meeting for Team w/ Irena	YES
18-Dec	GENSLER	Perform 90% QA/QC Review and Provide Comments to Consultants	YES
18-Dec	GENSLER	Update Site Furniture Plan and Send to Stantec	YES
19-Dec	TEAM	vPlanner Production Plan Meeting	YES
19-Dec	BSI	Deliver Survey/CAD Files - Addition	YES
19-Dec	SKANSKA	Office Trailer Crane Permit Info to Greg	NO
20-Dec	GENSLER	Receive 90% Set from Consultants	YES
20-Dec	GENSLER	Perform Garage Site Visit and Prep Restroom Layout	YES
20-Dec	GENSLER	Update Work Order 02 - Amendment 01	YES
20-Dec	GENSLER	Develop ETFE Off-Site Mockup Drawing and Spec	YES
21-Dec	JACOBS	Provide Sketches for Precast Plank in lieu of CIP Roadway Decking	YES
21-Dec	MPA	Review Trailer Layout with MPA Fire/BI	YES
21-Dec	MPA	Feedback from LB & HS about Lean Scope	YES
21-Dec	GENSLER	90% Elevator & Canopy Documents to MPA and WSP-Cost	YES
21-Dec	SKANSKA	File FAA 7460 Permit	NO

$$\text{Weekly PPC} = \frac{\# \text{ Completed Activities}}{\# \text{ Planned Activities}} = \frac{14}{16} = 87.5\%$$

Figure 7: Weekly Percent Plan Complete (PPC) Example

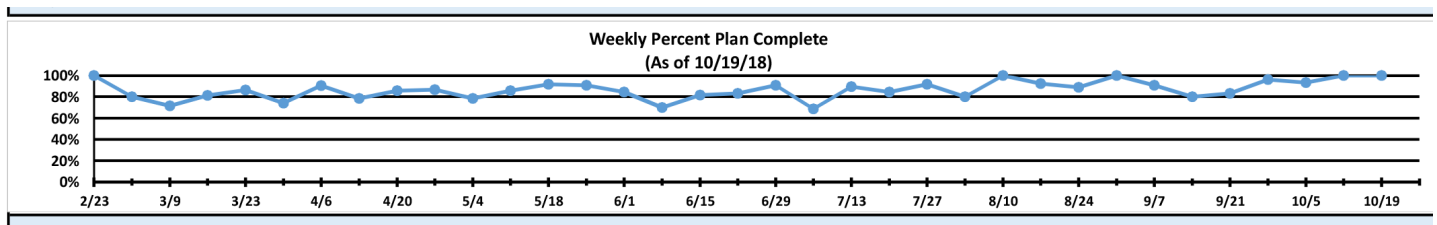


Figure 8: Sample Weekly PPC Tracking

- **Variance Log:** For each planned activity that is NOT completed as planned, the team shall track the “**variance,**” which is the factor that prevented an activity from being completed as planned/promised. The variances are intended to be used by the project team to promote learning about the reasons why the team’s production plan has not produced a predictable and reliable workflow. Project teams identify the variances for any missed activities each week, and shall maintain a Variance Log for purposes of continuous improvement in future production planning efforts.

The standard Variance Codes for Massport projects are shown below. Project teams may add other Variance Codes depending on the nature of the project, but are cautioned not to make the Codes so numerous that the importance/meaning of each becomes diluted.

Variance Code Number	Reason for Variance
1	Over-Committed
2	Miscommunication
3	Previous Work Incomplete
4	Change in Work Plan
5	Outside Constraint
6	Resources Unavailable
7	Materials/Equipment Unavailable
8	Safety Concern
9	Work Not Authorized by Contract
10	Unforeseen Existing Conditions

Figure 9: Weekly Percent Plan Complete (PPC) Example

- **Constraint Log:** During phase pull planning or make ready work planning, the team may identify “**constraints,**” which are defined as project issues/elements that may prevent activities in the team’s production plan from being performed as planned. The purpose of the Constraint Log is for the team to assure that the work will be ready to be performed in the week an activity week is planned and to identify and acknowledge potential constraints that could impact the team’s ability to deliver on its plan and incorporate appropriate mitigation measures in the production plan.

The Constraint Log should (1) identify the Constraint; (2) identify when and how it will impact work if not removed; (3) map out a mitigation plan with “who, what, when” will be done to remove or mitigate the Constraint; and (4) disposition the Constraint/Risk when it is resolved. The Constraint Log is reviewed and updated by the project team regularly to ensure the team is planning its work accordingly and continually improving its performance.

Constraint Log							
Description	Impact	Action Plan	Resp.	Date Added	Impact Date	Resolved On	
1 Availability/timing of Vac-X	Design progress	Schedule in Advance	BSI	10/30/2018	12/19/2018	12/19/2018	
2 Decisions on Construction Phasing & Hours of Operation	Construction Mobilization	Stakeholder Decisions	SKANSKA	12/4/2018	1/2/2019		
3 Engaging Stakeholders/Entities to Mobilize Trailers	Construction Mobilization	Stakeholder Decisions	SKANSKA	12/4/2018	1/2/2019		
4 Decisions on Ch 149A	Construction Mobilization	Stakeholder Decisions	MPA	12/4/2018	1/2/2019	12/7/2018	
5 Holidays & Vacations - Stakeholders & Project Team	Construction Mobilization	Work Planning	TEAM	12/4/2018	1/2/2019	1/2/2019	
6 Decision on Permitting Deliverables (Stamped?)	Construction Mobilization	Stakeholder Decisions	MPA	12/4/2018	1/2/2019	12/7/2018	

Figure 9: Sample Constraint Log



D. Project Dashboard

Following each weekly work planning session, the Project Dashboard is updated and distributed to the project team and Massport management. The purpose of the dashboard is to concisely summarize the status of the project in a single 11"x17" sheet of paper while holding project team members accountable for commitments made during pull planning sessions. The basic Dashboard format and content is described below. While the intent of the Project Dashboard is to generally align the project team members across four key project elements: **Actions, Variances, Percent Plan Complete,** and **Constraints,** the Project Dashboard will differ slightly depending if the project is in Design or Construction.



D.1 Project Dashboard for the Design Phase

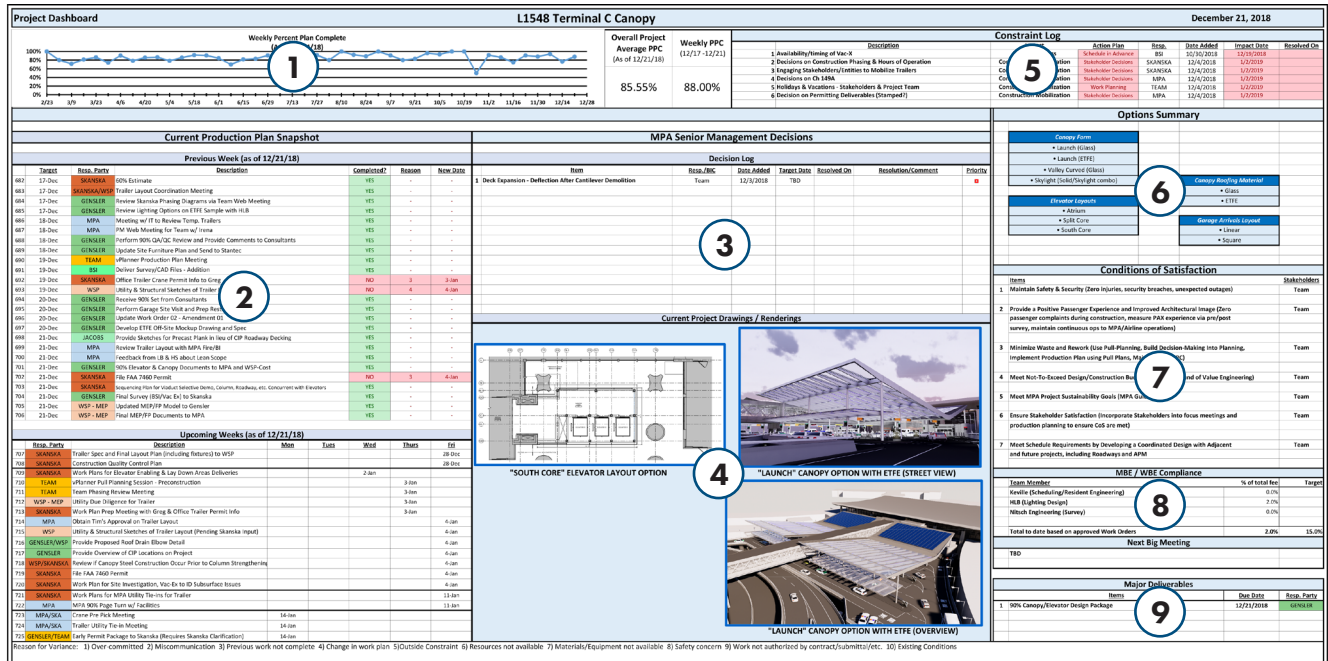


Figure 10: Weekly Design Dashboard Example

The contents of the Design Dashboard can be summarized as follows:

- 1 **Weekly Percent Plan Complete (PPC):** A graph of the PPC, shown in greater detail in Figure 8, is displayed at the top of the dashboard to demonstrate how well the team is following its production plan.
- 2 **Current Production Plan Snapshot:** The tasks for the current week are listed. If a task was not completed, it is assigned a variance code and new date here. Below the current week, the tasks for the upcoming weeks are listed. This list reflects any changes that may have been made during the Make-Ready Work Planning step of the session.
- 3 **MPA Senior Management Decisions:** Any pending MPA decisions that may impact the production plan are listed here, along with the responsible party and target date.
- 4 **Current Project Drawings/Renderings:** The most recent project renderings provide a visual of the current status of the project design.
- 5 **Constraint Log:** The constraint log is shown in greater detail in Figure 9.
- 6 **Options Summary:** The current design options are shown in the dashboard in a concise summary.
- 7 **Conditions of Satisfaction:** The Conditions of Satisfaction defined at the project outset are summarized in the dashboard in order to keep them fresh in the minds of everyone on the project team as they plan their work.
- 8 **MBE/WBE Compliance:** The status of the project's success in meeting the Massport goal of 15% MBE/WBE is tracked in a table in the Dashboard.
- 9 **Major Deliverables:** The upcoming major deliverables driving the weekly workplan are listed, along with due date and responsible party.



D.2 Project Dashboard for the Construction Phase

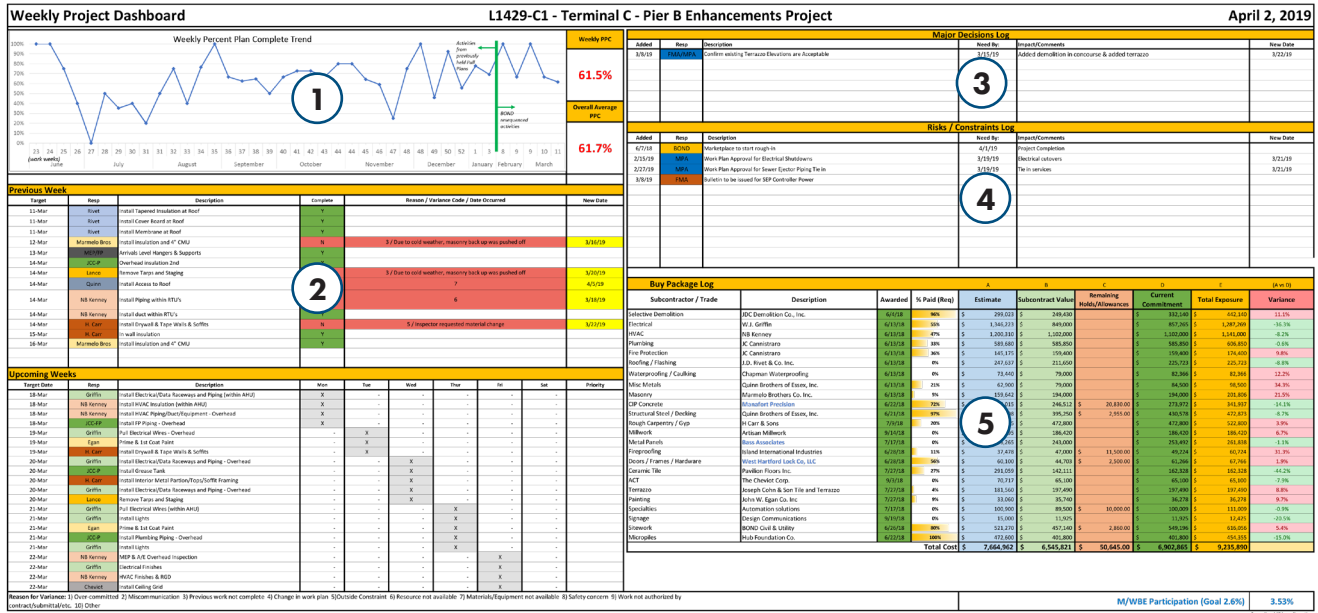


Figure 11: Weekly Construction Dashboard Example

The intent of the contents of the Construction Dashboard are generally similar to that of the Design Dashboard, but are meant to be geared more towards construction activities and indicators. One key element in the Construction Dashboard is the Buy Package Log.

- 1 **Weekly Percent Plan Complete (PPC):** A graph of the PPC, shown in greater detail in Figure 8, is displayed at the top of the dashboard to demonstrate how well the team is following its production plan.
- 2 **Current Production Plan Snapshot:** The tasks for the current week are listed. If a task was not completed, it is assigned a variance code and new date here. Below the current week, the tasks for the upcoming weeks are listed. This list reflects any changes that may have been made during the Make-Ready Work Planning step of the session.
- 3 **MPA Senior Management Decisions:** Any pending MPA decisions that may impact the production plan are listed here, along with the responsible party and target date.
- 4 **Constraint Log:** The constraint log is shown in greater detail in Figure 9.
- 5 **Buy Package Log:** This table presents a financial status of the project to the Massport management. It is intended to indicate the status of all the trades that the Contractor or Construction Manager has engaged or will engage on the project.

A blurred background image of a business meeting. In the foreground, a hand holds a black fountain pen over a document featuring blue bar charts and a pie chart. To the right, there is a stack of papers with yellow sticky notes. In the background, a person in a blue checkered shirt is visible, and another person's hands are seen typing on a laptop. The overall scene is brightly lit and has a professional, collaborative atmosphere.

Attachments

ATTACHMENT A.1 – MSA Expected Outcomes Agenda

Massport Capital Programs & Environmental Affairs
XYZ Project
Master Schedule Alignment Expected Outcomes Agenda
[DATE]
11:00 a.m. to 1 p.m.

I. Introduction/Review Expected Outcomes (11:00-11:05)

Expected Outcome: Alignment on Expected Outcomes for this session.

II. Current Status of Project (11:05-11:15)

Expected Outcome: Team alignment on current status of design/
construction on the project

III. Major Risks/Constraints (11:15-11:30)

Expected Outcome: Identify major risks/constraints for project
("major"=material impact to cost or schedule)

IV. Master Schedule Alignment (11:30-12:50)

Expected Outcome: Master Schedule review to establish/verify the
following interim and final milestones:

- X Milestone [DATE]
- Y Milestone [DATE]
- Z Milestone [DATE]
- Substantial Completion [DATE]

V. Action Plan/Next Steps (12:50-12:55)

Expected Outcome: Agreed upon action plan (what, when, who)
to follow up from this session (including planned pull sessions)

VI. Plus/Delta (12:55-1:00)

ATTACHMENT A.2 – MSA Facilitator Checklist

Planning for Master Schedule Alignment Session (MSA) (at least 2 weeks before actual session date)

- Assign leader of MSA session
- Prepare EOA and get project team concurrence
- Decide who needs to be present for effective MSA based on the EOA (typically this will be the core project team, plus key Massport internal stakeholders)
- Send “save the date” invite with at least the EOA; if EOA/Master Schedule not ready, state “details to follow”
- Have Consultant circulate (preferably with the EOA) its high level overall schedule for the project

Preparation for MSA (at least 5 business days before session)

- Send EOA to invitees (if not sent already with original invite)
- Send preparation instructions to invitees
- Send Master Schedule to invitees (if not sent already)
Confirm actual attendees
- ID “stand ins” for parties that will not be there
- Get props ready for pull session—copy of Master Schedule printed large size—key schematics from Project Definition Report
- Confirm logistics (room, supplies, wall map, food, etc.)

MSA Session (EOA Implementation)

- Confirm EOA with attendees
- Do project status update
- Define the milestones & confirm level of detail for MSA (high level only)
- ID Major Constraint/Risks (define “Major”)
- Give example of stickies for MSA (color code, activity, duration)
- Have the party responsible for a phase (or stand in, for example, for CM) “talk its tags”
- Identify approximate timing of phase pulls needed to support MSA
- Review Action Plan (including scope and timing of first phase pull)
- Close out Constraints/Risks List
- Do Plus/Delta

MSA Session Follow Up

1. Consultant should circulate to project team an updated Master Schedule and get affirmative concurrence from the team
2. Project team should agree on how/when Master Schedule will be updated
3. Project team should agree on date for first pull session and identify who has the lead to set it up
4. Master Schedule should include tentative pull session dates/time period

ATTACHMENT A.3 – MSA Facilitator Preparation Guidelines

1. Consultant prepares high level schedule of major activities and interim milestones to project completion—it should include anticipated phasing, such as early packages.
2. Each phase is assigned a separate color (for example, design; permitting; procurement; construction; commissioning; handover; closeout).
3. Wall map is prepared in advance with: overall timeline (can be with or without dates initially, but make sure it is long enough to accommodate overall project schedule assuming monthly date ranges); use red diamonds for interim milestones; use 4X4 stickies with colors assigned for major work activities/deliverables in each phase; each sticky should have basic work activity with approximate duration).
4. Swim lanes can be created for phasing—for example, early packages may be called out.
5. At session, begin by having Consultant briefly review current project status and explain overall phases/plan
6. Then facilitator leads discussion on Major Constraints/Risks—put those on large post-its, but avoid “problem solving” discussions at this point; optional: can include “Opportunities” sheet for ideas that might improve Master Schedule (again, keep it high level at this point)--define “Major” as being those Constraints/Risks that could have a material impact to scope, schedule or budget.
7. Keep separate “Action Plan” (what, when, who columns) sheet for actions identified that are not part of the Master Schedule (avoid the temptation to start listing actions that should be stickies on the Master Schedule); keep separate “Parking Lot” sheet for issues that are identified but not critical to overall schedule or that do not require immediate action.
8. When done with Major Risks/Constraints, have a proponent for each phase explain basic phases/milestones as reflected on stickies and discuss the following: definition of interim/final milestones; key activities; key deliverables; approximate durations (usually at “months” level); phasing approach; long leads—add/subtract stickies as needed.
9. Add dates as needed (unless already done due to “hard” milestones).
10. When done with high level phase discussion, ask group if anything major missing--go back over Constraints/Risks to verify that they have been addressed--confirm general alignment on the Master Schedule and whether it is reasonably achievable.
11. Agree on what phase pulls need to be done and proposed dates for same (at least far enough out to keep design team on track and prepare for CM on-boarding); add those to the Action Plan or the MSA re-cap.
12. Go over Action Plan to confirm understanding and agree on how work product from the session will be memorialized, circulated and re-confirmed by all parties.
13. Do Plus/Delta on session.

NOTES:

- Do MSA update as soon as CM is on-boarded and has enough knowledge of the project to phase its work and give meaningful input on design package phasing and its own construction phasing plan
- An additional option is to do an MSA update after the CM baseline schedule is submitted—again, keep it at a high level, as details will be filled in with phase pulls
- MSA updates can also be done based on major events, changes, or achievement of interim milestones

MSA Update sessions can follow the same basic planning/implementation steps of the original MSA session

ATTACHMENT B.1 – Sample Phase Pull Expected Outcomes Agenda

Massport Capital Programs & Environmental Affairs
XYZ Project
Phase Pull Planning Session Expected Outcomes Agenda
[Date]
8:00 a.m. to 10:00 a.m.

I. Introduction/Review Expected Outcomes (8:00-8:05)

Expected Outcome: Alignment on Expected Outcomes for this session

II. Last Planner System/Dashboard Overview (8:05-8:20)

Expected Outcome: High Level Understanding of Last Planner System, including:

- Phase Pull
- Production Plan
- Make Ready Work Planning
- Weekly Work Planning
- Constraint & Variance Logs/PPC
- Dashboard

III. Master Schedule Overview (High Level) (8:20-8:45)

Expected Outcome: Review of current Master Schedule (based on MSA Session)

IV. Phase Pull (8:45-9:55)

Expected Outcome: define Milestone to be pulled; identify major risks/constraints for Milestone; prepare production plan to meet Milestone

V. Action Plan/Next Steps (9:55-10:00)

Expected Outcome: Agree on action plan (what, when, who) to follow up from this session; agree on weekly work planning/look ahead/reporting process to be implemented; agree on Dashboard implementation


Plus/Delta

ATTACHMENT B.2 – Sample Phase Pull Instructions to Attendees

To make the pull session as productive as possible, please prepare your stickies or come to the session with a list of your work activities and needs (requests), as follows:


- Know your scope and deliverables. Have you clearly defined your deliverables (based on what your customer needs)? How much time do you need to produce your deliverables? How much time will you need for submittal/review, comment resolution/sign off, and QC/QA of your deliverables?
- Know what you can deliver on. What resources do you have available? What kind of production pace is reasonable for you? Can you make reliable commitments to others? What risks or constraints to your work do you foresee?
- Know what you need from others (your requests). What information or decisions do you need to release your work? If there is missing information regarding existing conditions, drawings, specs, what are they and when do you need information or answers? How will you integrate/coordinate your work with other project team members? What do you need from Massport stakeholders and how will they be integrated into the production plan? Do you have long lead items that require external coordination and/or approvals?

Company / Name	Duration	Delivery Date
My Promise (What I will deliver -- Be specific!)		
PROMISE		
My Requests (What I need from others -- Be specific!)		
What	Needed from/ By When	



Design

Company / Name	Resources	Duration <small>(5 days or less)</small>
My Promise (What I will deliver -- Be specific!)		
PROMISE		
My Requests (What I need from others -- Be specific!)		
What	Needed from/ By When	



Construction

ATTACHMENT B.3 – Phase Pull Facilitator Checklist

Planning for LPS Session (at least 2 weeks before actual session date)

- Assign leader of LPS session
- Prepare EOA and get project team concurrence
- Decide who needs to be present for effective LPS based on the EOA (typically this will be the core project team, plus key Massport subconsultants (Design) or trade/ subcontractors (Construction))
- Send “save the date” invite with at least the EOA; if EOA not ready, state “details to follow”
- Have CONSULTANT or CM circulate (preferably with the EOA) current schedule for the phase to be pulled

Preparation for LPS (at least 5 business days before session)

- Send EOA to invitees (if not sent already with original invite)
- Send LPS preparation instructions to invitees
- Send phase schedule to invitees (if not sent already)
- Confirm actual attendees
- ID “stand ins” for parties that will not be there
- Get props ready for pull session—copy of Master Schedule printed large size—copy of phase schedule-- key schematics from Project Definition Report or Preliminary Design
- Confirm logistics (room, supplies, wall map, food, etc.)

LPS Session (EOA Implementation)

- Confirm EOA with attendees
- Do project status update
- Define the milestones & confirm level of detail for phase pull (weekly, daily?)
- ID Major Constraint/Risks (define “Major”)
- Give example of tags (color code, promise, request/CoS, duration, delivery date)
- Explain wall map layout (incl. swim lanes and placement of tags based on finish date)
- Have participants prepare tags—encourage conversations
- Once tags are on wall map, the party responsible for a phase (or stand in) should “talk its tags”
- When complete, do forward pass to confirm production plan
- Review Action Plan (including scope and timing of next planned phase pull)
- Close out Constraints/Risks List
- Do Plus/Delta

LPS Session Follow Up

1. Consultant or CM should circulate phase production plan and get affirmative concurrence from the team
2. Phase production plan should be added to Make Ready Planning and Weekly Work Planning process

ATTACHMENT B.4 – Phase Pull Facilitator Preparation Guidelines

1. It is vital to confer in person with the senior management team when preparing the EOA to define: the milestone/phase to be pulled; the level of detail expected; the participants needed; the information that needs to be disseminated in advance; and the reference materials needed at the session. For example, as reference documents the Consultant or CM may have P6 schedule for phase to be pulled, or a phase/sequencing plan, or a plan view of the project segment to be pulled—all of these can be reference documents on the wall at the pull session.
2. Massport CP&EA typically uses swim lanes for each major actor/discipline/trade. See example “wall map” in the Lean Guide. This should be printed on plotter size paper—check the room in advance for logistical constraints on wall size, access, obstructions, etc.
3. The wall map can be prepared in advance with: phase timeline (can be with or without dates initially, but make sure it is long enough to accommodate the phase to be pulled; use red diamonds for interim milestones; use 6X4 stickies with colors assigned for major work activities/deliverables in each phase—see Lean Guide for format, noting that Design and Construction Phases have different formats.
4. At the session, begin by having PM briefly review current project status and explain overall phases/plan for the project.
5. Then facilitator leads discussion on Major Constraints/Risks—put those on large post-its, but avoid “problem solving” discussions at this point; optional: can include “Opportunities” sheet for ideas that might improve Master Schedule (again, keep it high level at this point)--define “Major” as being those Constraints/Risks that could have a material impact to scope, schedule or budget.
6. Keep separate “Action Plan” (what, when, who columns) sheet for actions identified that are not part of the Master Schedule (avoid the temptation to start listing actions that should be stickies on the phase pull plan; keep separate “Parking Lot” sheet for issues that are identified but not critical to overall schedule or that do not require immediate action.
7. When done with Major Risks/Constraints, go over the phase to be pulled:
 - definition of milestone
 - level of detail
 - format of stickies
 - placement of stickies (finish date)
 - use of swim lanes
8. After participants have filled out their stickies, select a “driver” swim lane to go first. Each “owner” of a swim lane talks their stickies, and facilitator guides through “promises” and “requests”, checking off both as you go. It is important for the swim lane owner to talk his/her stickies and answer questions/add or subtract stickies as they go. Enforce the rule that only the owner of the sticky can move it, to reinforce ownership.
9. As stickies are talked, proponent can add dates as needed (unless already done due to “hard” milestones).
10. When done with phase pull, Facilitator can do “forward” pass to verify work flow--ask group if there is anything major missing
11. Go back over Constraints/Risks to verify that they have been addressed--confirm general alignment on the phase production plan and whether it is reasonably achievable.
12. Agree on what additional phase pulls (or micro pulls) need to be done and proposed date for next one--add those to the Action Plan or the MSA re-cap.
13. Go over Action Plan to confirm understanding and agree on how work product from the session will be memorialized, circulated and re-confirmed by all parties.
14. Do Plus/Delta on session.

ATTACHMENT C.1 – Weekly Work Plan Facilitator Preparation Guidelines

Make Work Ready Planning (“Can”)

1. Review 6 (or more) weeks ahead on the phase pull (or Master Schedule if look ahead time period is beyond phase milestone that has been pulled)
2. Identify any upcoming Constraints that could impact production plan
3. Agree on actions to address Constraints or adjust production plan to address them
4. Check current Constraint Log and actions; update as needed

Weekly Work Planning (“Will”)

1. Go over plan for the next week (What, Who, When) and current week
2. Re-affirm promises (reliable commitments?) and requests (CoS clear?)
3. Record that is 100% done and accepted (CoS met)
4. Review PPC
5. Identify Variances—discuss as needed
6. Adjust production plan as needed
7. For Construction Phase, develop workable backlog

Daily Huddles [OPTIONAL]

1. At end of day, check on activities completed and discuss plan for next day
2. Daily Huddles can be in-person or by phone, as needed to maximize participation
3. Daily Huddles are “stand up” sessions limited to a few minutes in duration

NOTE: Some project teams prefer to do the Daily Huddle at the beginning of each work day

LAST PLANNER® SYSTEM

MINIMUM STANDARDS GUIDE



MASSACHUSETTS PORT AUTHORITY
CAPITAL PROGRAMS AND ENVIRONMENTAL AFFAIRS

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