26TH ANNUAL

26TH LCI CONGRESS
OCTOBER 22-25, 2024

Intermediate Last Planner System® Practical Application

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SURFING THE WAVE OF LEAN DESIGN AND CONSTRUCTION

October 22, 2024

Lean Construction Institute
Immersive Education Program

"LCI would like to acknowledge and thank the work cluster for their leadership, work and collaboration to create this workshop. Learning opportunities like this exist because people like them engage to create them."

-Kristin Hill, LCI, Director, Education Programs

Christian Pikel,

Eric Lusis,

Houston Brown,

Rebecca Snelling,

Ryan Ring,

Perry Thompson

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LCI Course:
Intermediate Last Planner System®
Practical Application
8 CEU

Sign the sign-in sheet for credit

Rules of Engagement

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- This is a safe zone
- Everyone has equal status
- Speak up and share your ideas
- Actively listen to others
- One conversation at a time
- Use E.L.M.O.
- Silence phones
- Be focused and engaged
- Stay on time
- Have fun!

Learning Objectives

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Identify the essential foundational principles of each of the 5 connected conversations of LPS.

Engage in all of the connected conversations of LPS® from Milestone Planning to daily interaction through practical application.

Experience the process of constraint management to improve project workflow.

Gain practical insight to effectively use Percent Plan Complete (PPC) and variance to improve reliable project plan execution.

Introductions

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Meet your Table

- Name
- Role in organization
- Experience with LPS

5 minutes

Problem Statement

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Schedule and budget overruns are a universal challenge in the construction industry. To tackle this head on, projects often turn to the Last Planner System®….

But how successful are they at truly embedding these practices on a project and throughout an organization for long-term, systemic results?...

PROBLEM:
- Challenging Environment
- Supply chain disruption
- Skilled labor shortage
- Increased cost of capital

OPPORTUNITY:
- Energy transition $100 trillion through 2050
- Digital infrastructure $500 billion annually
- Build Paris every week / New York every month

Lean Journey to Mastery

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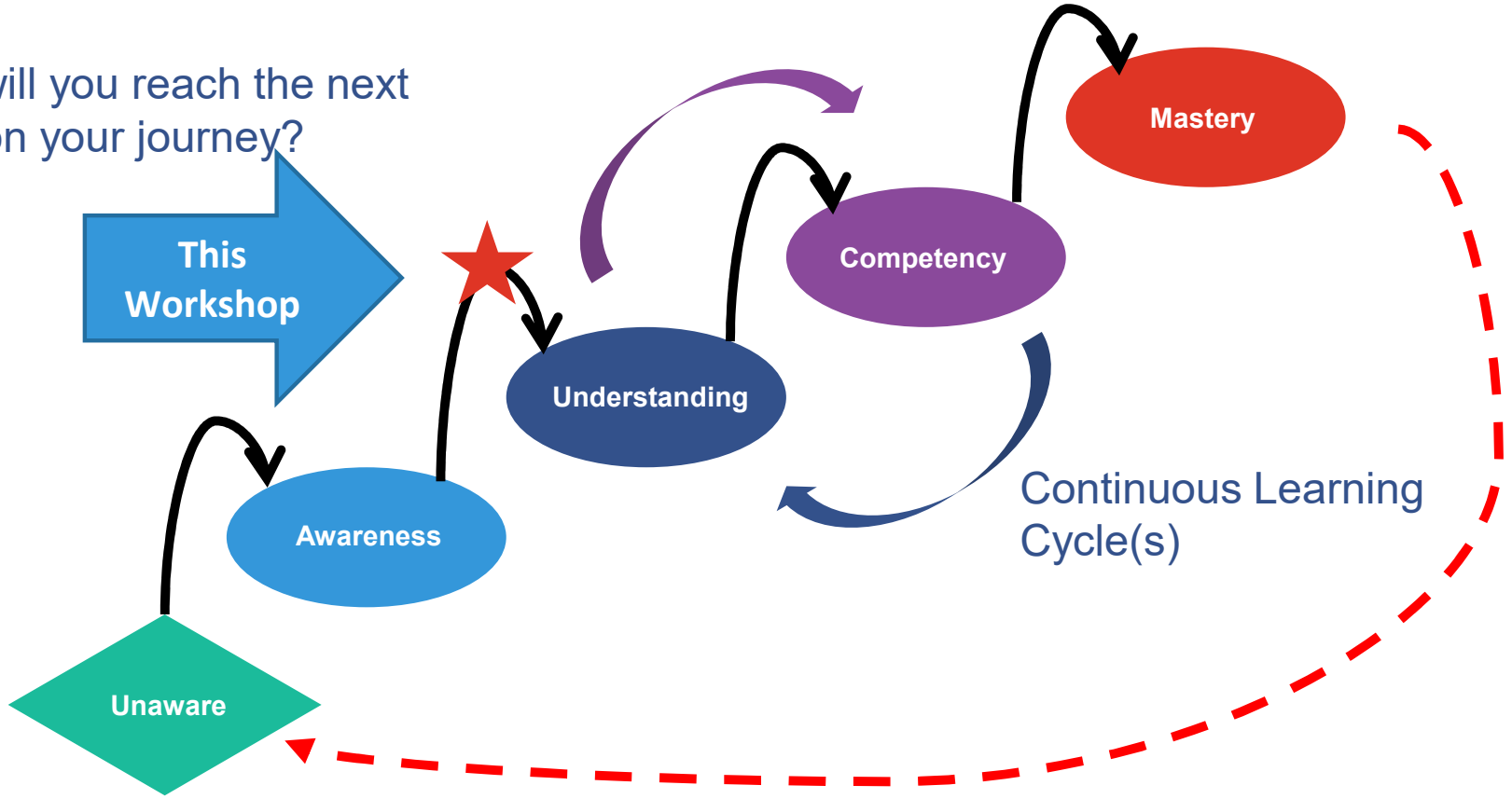
How will you reach the next level on your journey?



Definitions

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Lean:

A culture of respect and continuous improvement aimed at creating more *value for the customer* while identifying and eliminating waste.

Lean Project Delivery System:

An organized implementation of Lean Principles and Tools, *of which LPS is one*, combined to allow a team to operate in unison to create flow.

SIX TENETS OF LEAN CONSTRUCTION

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1 Respect for People

2 Optimize the Whole

3 Generate Value

4 Eliminate Waste

5 Focus on Flow

6 Continuous Improvement

Last Planner System Trademark

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The Last Planner System® is a registered trademark of the *Lean Construction Institute*:

- Last Planner System®
- LPS®
- Last Planner® (Reference to the person, not the system)
- “Pull Planning” ≠ Last Planner System®

Continuous Improvement

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Lean thinking demands a mindset of continuous improvement.

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

Where Can LPS Be Applied?

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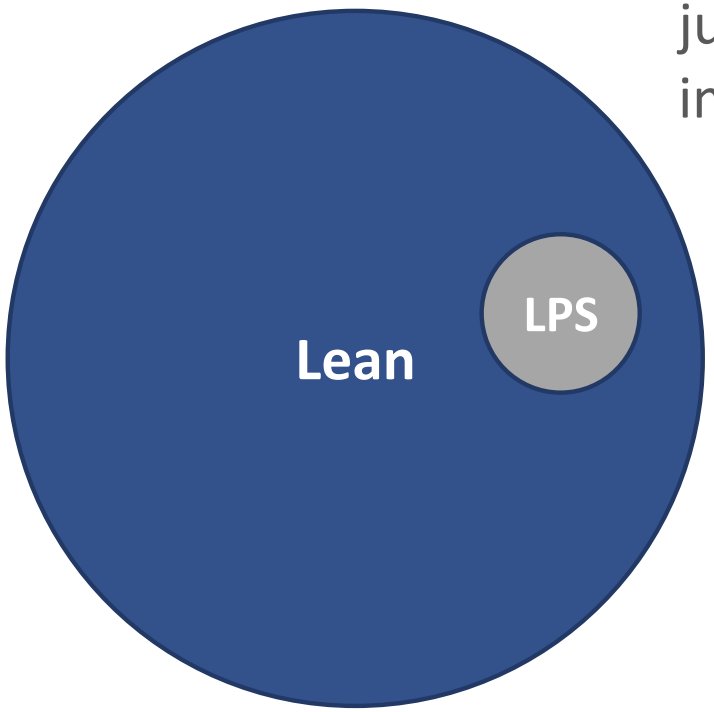
The Last Planner System supports a Lean Project *regardless* of the contract type or phase.



Lean is much more than just Last Planner System implementation.

Brief History of LPS

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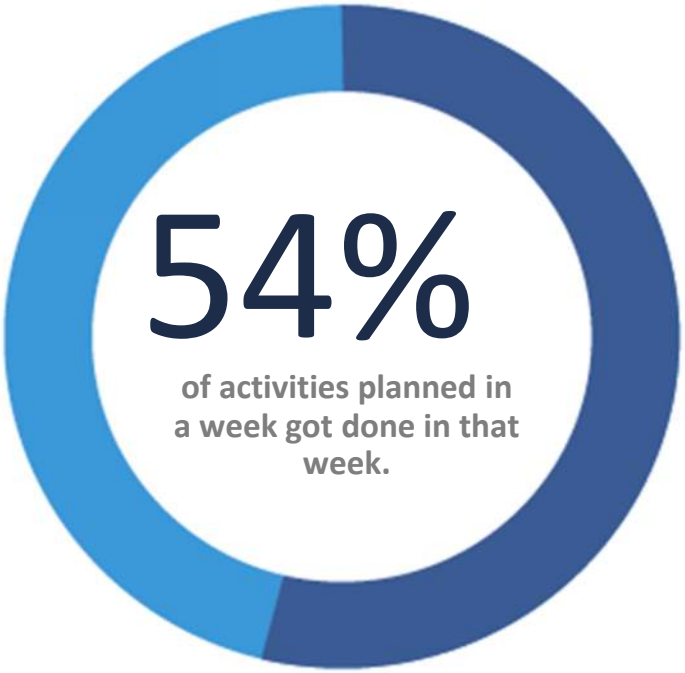

Why Status Quo Isn't Working

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- Traditional planning systems are unable to produce a predictable workflow.
- Workflow reliability directly affects system speed and cost.
- All plans are forecasts, all forecasts are wrong.
  - The further in advance, the more wrong.
  - The more detail, the more wrong.

Last Planner System Overview

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5 Connected Conversations

Benefits

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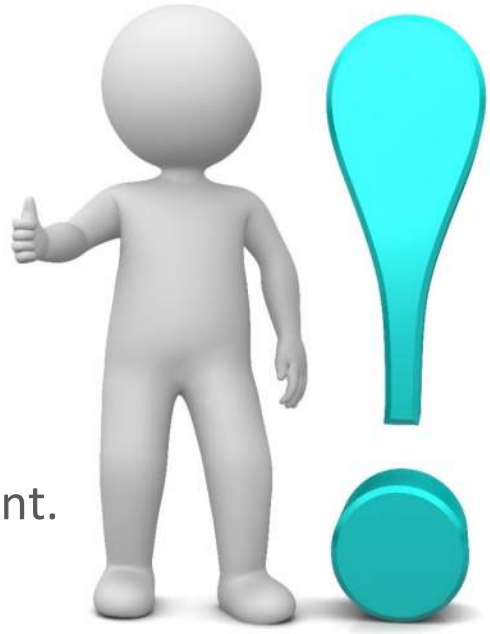
1. Improves communication & reliability.
2. Fosters an enjoyable environment, trust, and collaboration.
3. Promotes early stakeholder engagement.
4. Improves visibility of the project plan (transparency).
5. Creates team alignment.
6. Rapid learning through metrics, revealing areas for improvement.
7. Improves planning in both design & construction phases.



Project Elements

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Lean teams organize in a structure that leads to improved outcomes.

Lean can be implemented regardless of commercial terms.

A Lean Operating System is an organized implementation of Lean Principles and Practices combined to allow the People to operate in unison to create flow.

Last Planner System Defined

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The Last Planner System is a *production planning system* designed to produce *predictable workflow* and *rapid learning* in programming, design, construction and commissioning of projects.

Project Control vs. Production Control

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"…The word 'controls' is not the plural of the word 'control' … the two words have different meanings altogether. The synonyms for controls are "measurements" and "information".

The synonym for control is direction … Controls deal with facts, that is with events of the past. Control deals with expectations, that is, with the future"

- Peter Drucker

System Defined

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A system is a group of interacting or interrelated entities that form a unified whole.

System for Planning

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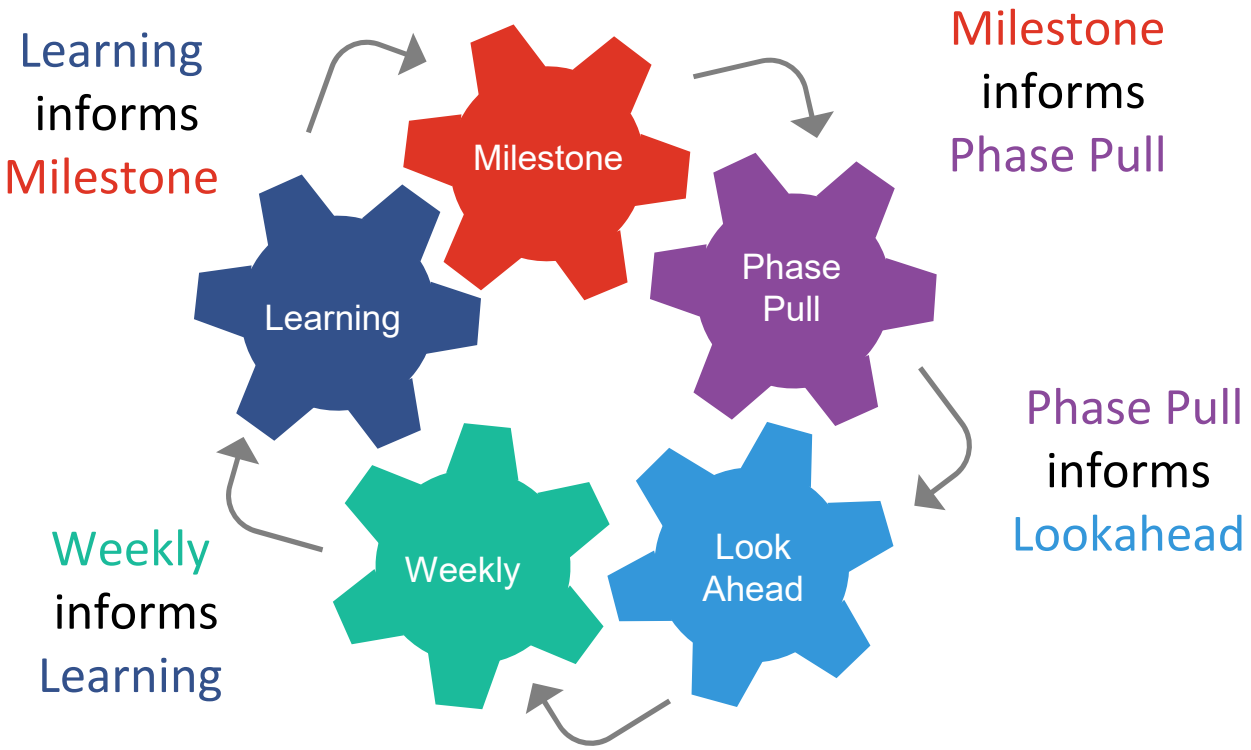

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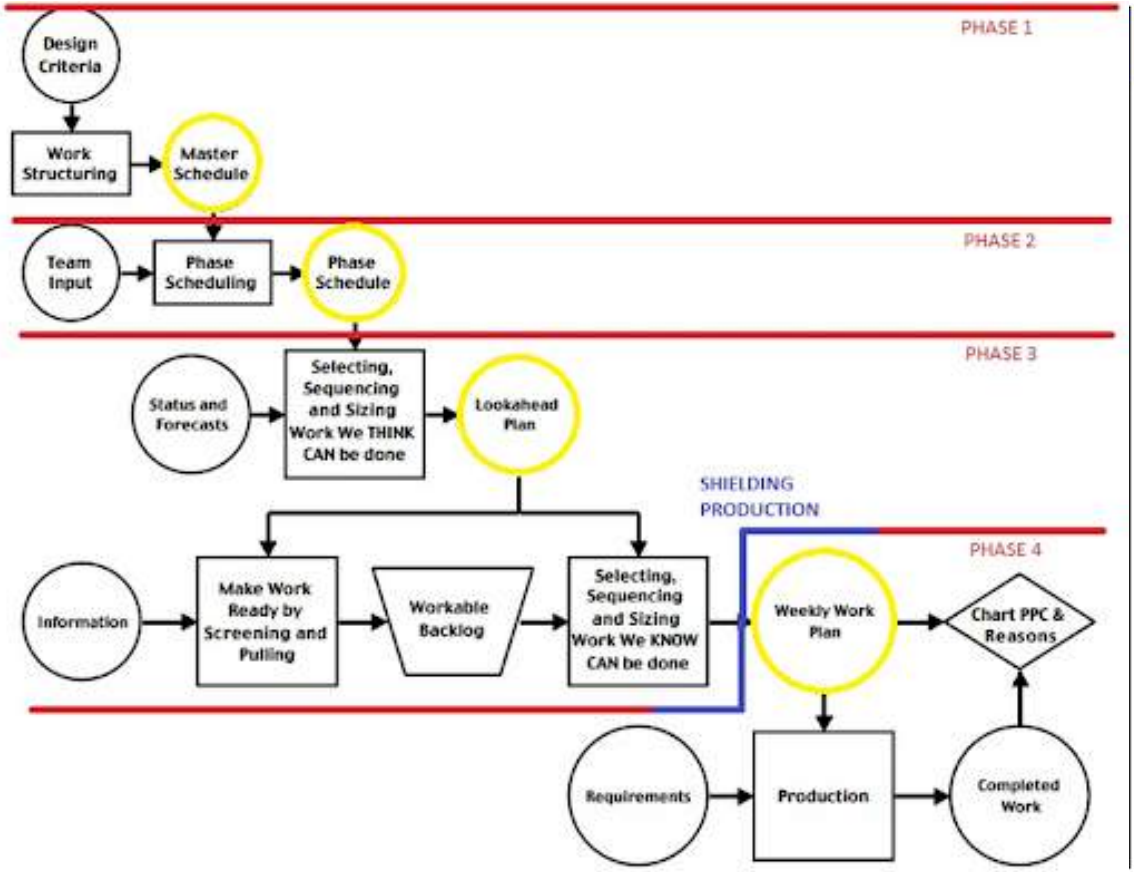
Is “Pull Planning” LPS?

- LPS vs. “Pull Planning”
- System vs. the components
- What do you mean when you say “Pull Planning?” All the parts (Master-level thru Did)?
- Revers Phase Scheduling = “One Level in LPS”



Who Is The Last Planner®?

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The *Last Planner®* is the person closest to work with the authority to make decisions regarding the schedule and to make reliable commitments to complete the work of their discipline.

Last Planners®

Discussion Question: Group

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Group Discussion

What struggles have you experienced or observed while implementing LPS?

10 minutes

Consider the Project As A Promise

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- All groups can be viewed as operating as a *network of promises* or commitments, whether done well or poorly.
- The goal is *improving the quality* of commitments and to *actively take responsibility* for managing them.
- LPS is a planning system based on developing a *network of promises*, then delivering on the commitments.

Elements Of A Promise

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- *The Customer:* The person making the request.
- *The Performer:* The person fulfilling the request.
- *Negotiated Conditions of Satisfaction (CoS):*
  - Are part of the language act of making a promise.
  - Are developed by the people involved in the request and promise.
  - Are mutually agreed to, measurable statements, that help to define the success of the project.
  - Inform the decision-making process.
  - Include a time frame.

Basic Action Workflow Of A Promise

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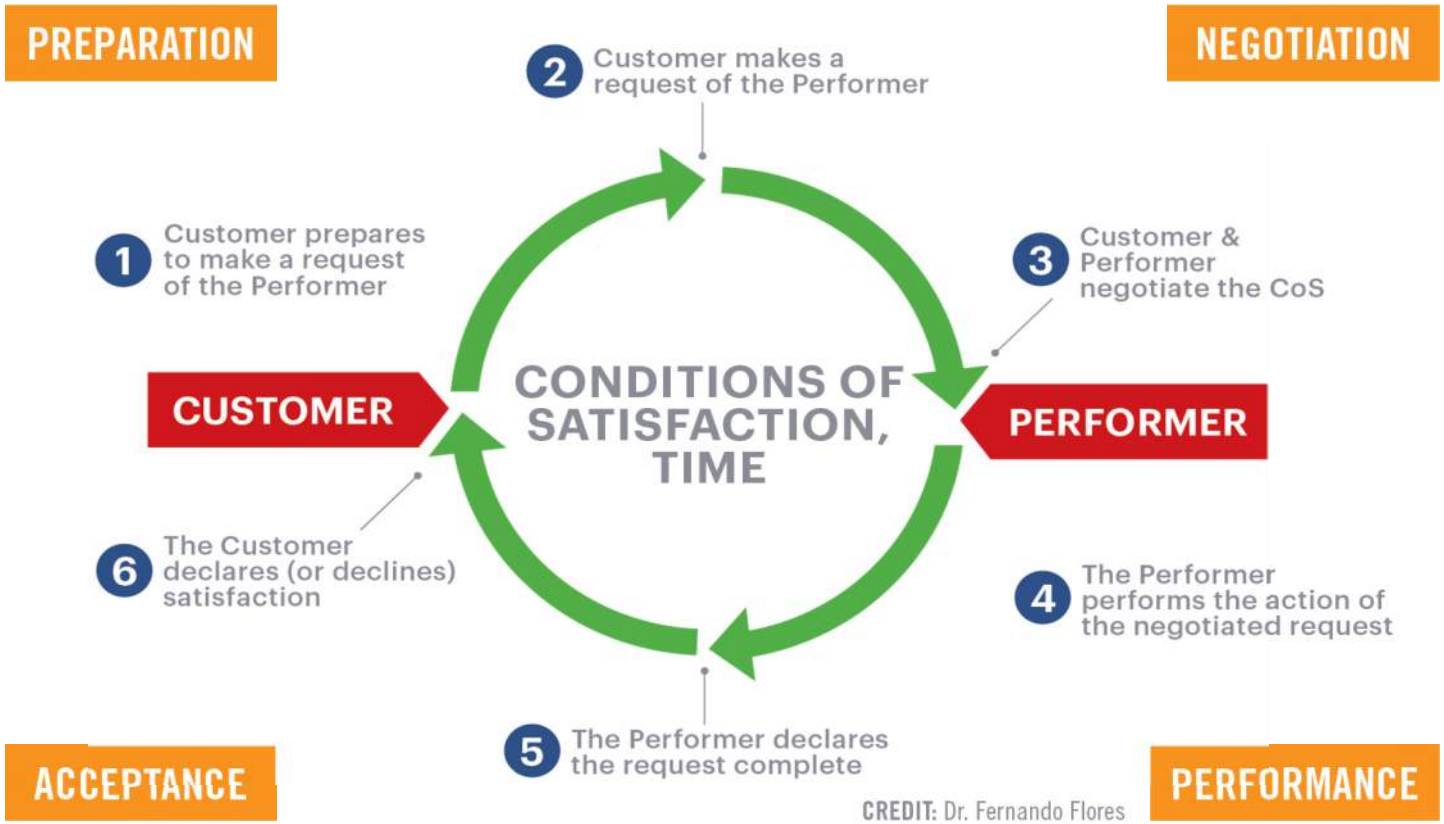

Reliable Promises

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I can do it when…

- I have the ability to say “no”
- I am able to perform the work
  - Or I supervise performers
- I estimate how long hands-on it will take
- I have the capacity & I’ll allocate it
- I am not having a private unspoken conversation in conflict with the promise
- I will be responsible (clean up the mess)

Commitment processes are conversation acts

Reliable Promising

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Which of these are promises?

- I will do…
- Maybe I will…
- I'll try, we'll see what happens…
- Yes, I will do… if…
- I could probably do it
- No, I cannot do it
- Sure, I'll try to do…

& which of these are useful?

Reliable Promising

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& which of these are useful?

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Reliable Commitments = Increase Trust

Speed of Trust Formula

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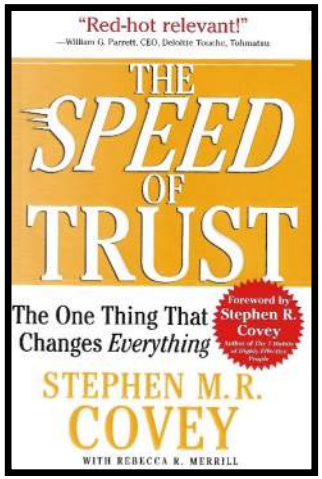

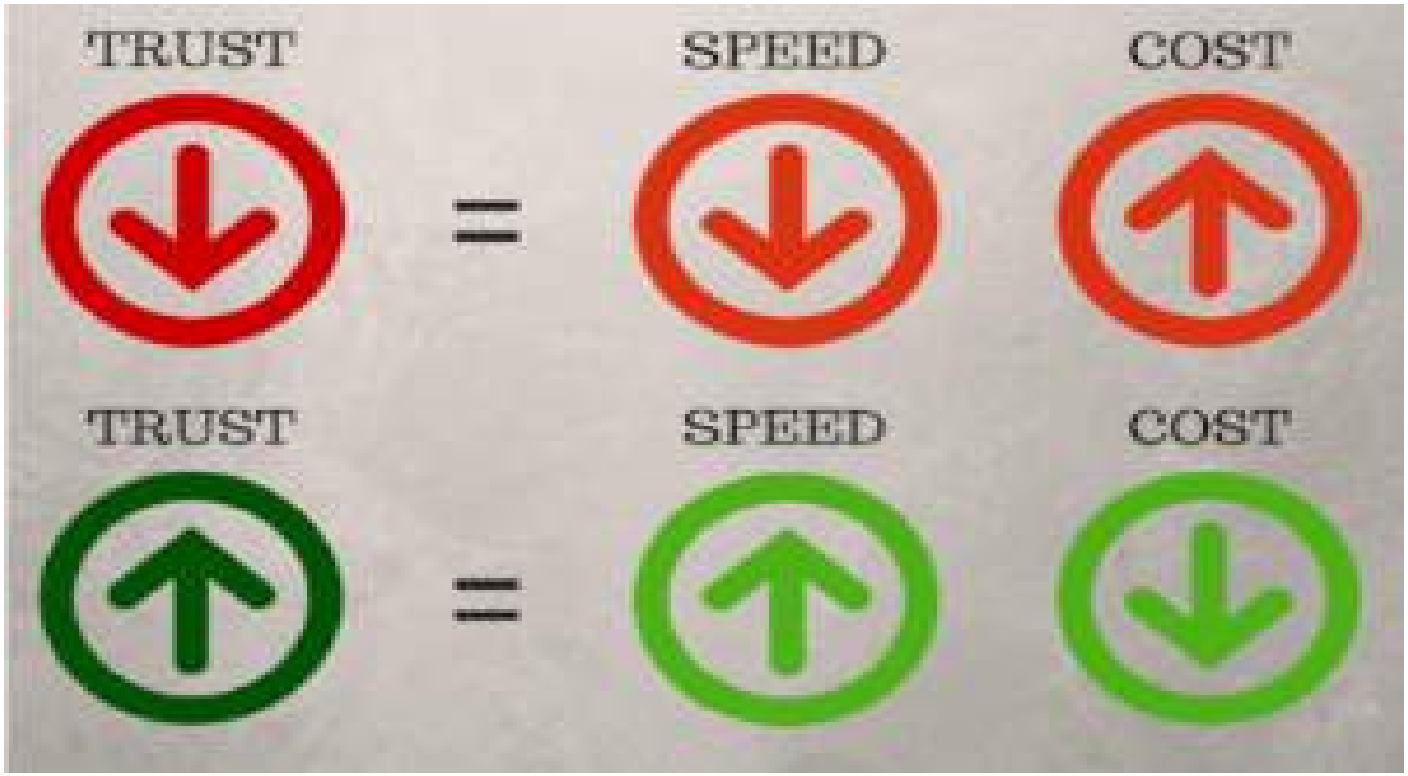

5 Connected Conversations of LPS

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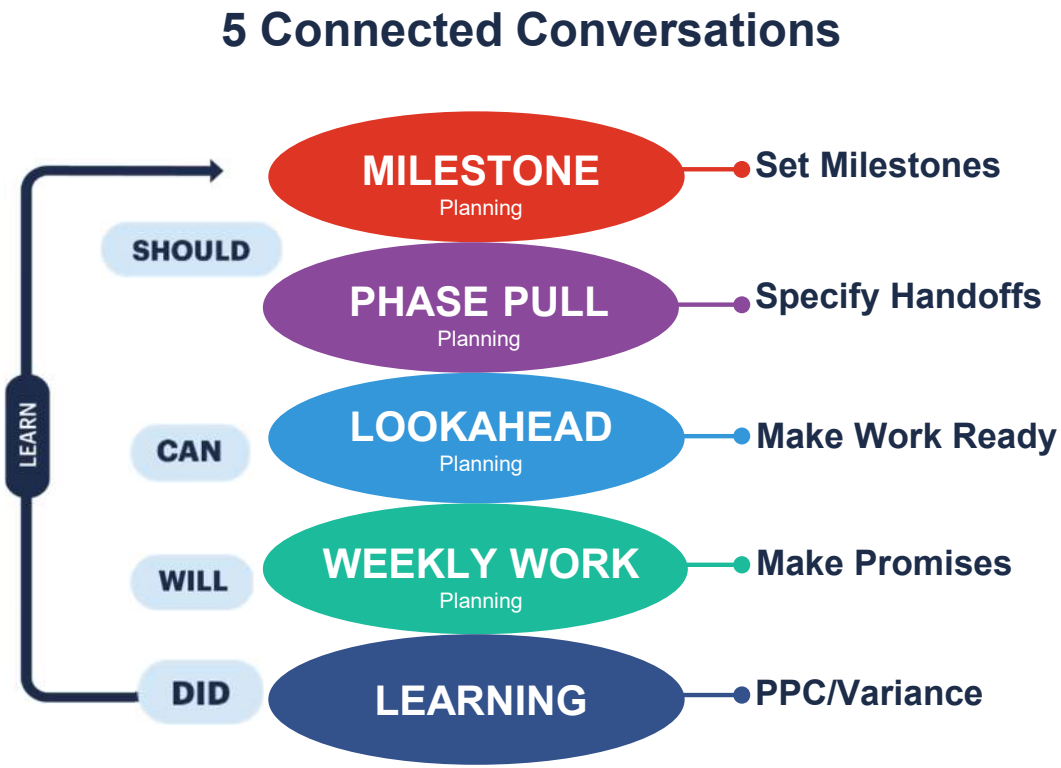
The LPS is a commitment-based system integrating 5 connected planning conversations:

1. Milestone Planning (Should)
2. Phase Pull Planning (Should)
3. Lookahead Planning (Can)
4. Weekly Work Planning (Will)
5. Learning (Did/Learn)



Last Planner System Overview

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5 Connected Conversations

Collaborative Planning

As - Needed

Work Management
Continuous Improvement

Weekly

LEARN

SHOULD

CAN

WILL

DID

MILESTONE Planning — Set Milestones

PHASE PULL Planning — Specify Handoffs

LOOKAHEAD Planning — Make Work Ready

WEEKLY WORK Planning — Make Promises

LEARNING — PPC/Variance

The Project – Tiny Home Development

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For the remainder of this workshop, we will be using a *fictitious project* to practice application of each conversation in Last Planner System.

The Project – Tiny Home

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The Project – Tiny Home

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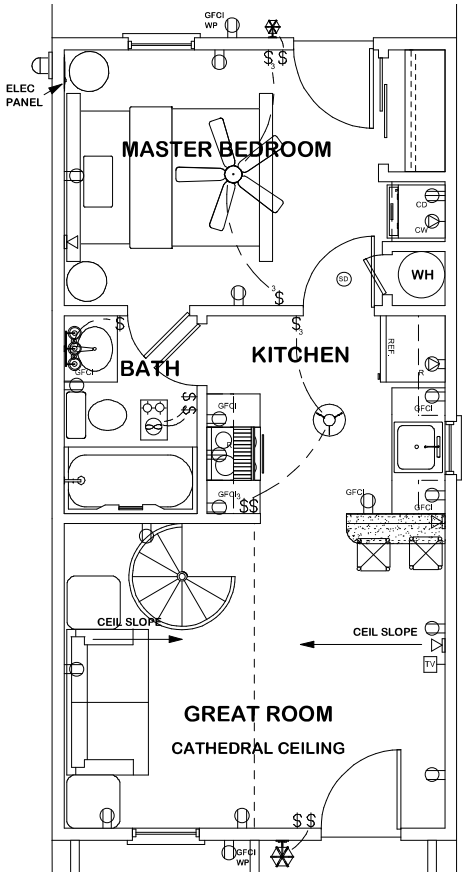
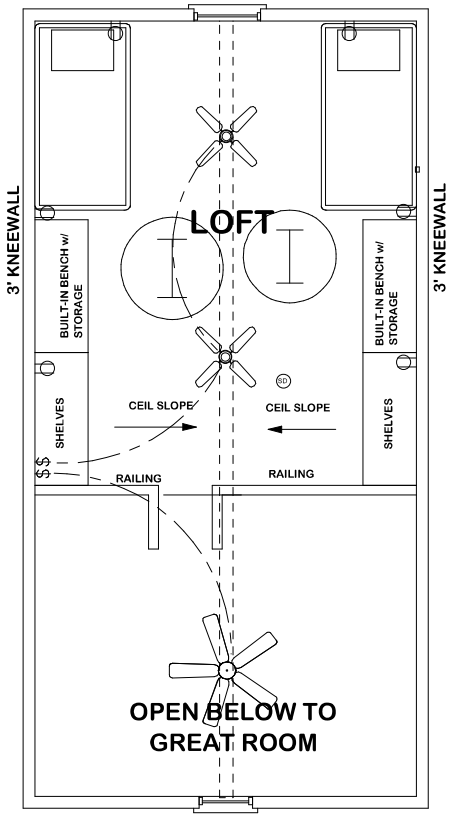
First Floor





Loft

Home Specifications

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- 1 bedroom and 1 bath, as well as a sleeping loft
- 8'-0" ceilings on first floor and loft cathedral ceiling
- The house is 15'-0" wide x 30'-0" deep
- 6' rear deck and 4' front porch
- Gable metal roof with a main roof pitch of 10:12
- Hip roof over porch with a pitch of 6:12
- Vinyl or hardi plank siding
- Pier and beam foundation

Square Footage:

- First Floor: 450
- Loft: 270
- **Total Heated Living: 720**
- Porch: 60
- Total Area Under Beam: 780

- Prefabricated steel spiral staircase
- Dual zone split system heat pump HVAC with ductless cassette indoor units and pumped condensate drain
- Kitchen & Bath Exhaust with through wall vents
- Finishes:
  - Wood Plank Vinyl Flooring
  - LED Lighting
  - Energy Start & Low Consumption fixtures/appliances
- Low-E Glazing

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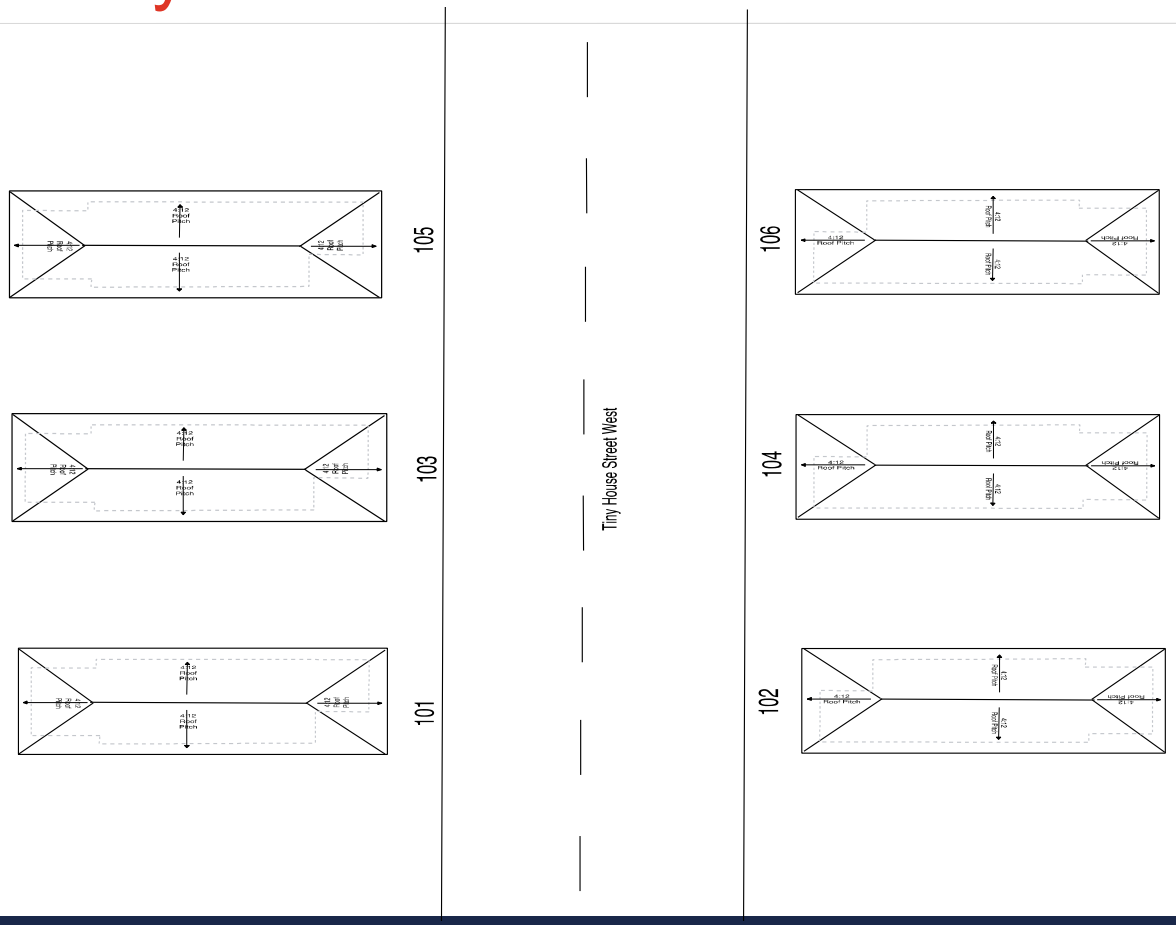
The Project – Tiny Home



Activity: Team Member Trade Assignments

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Trade Assignments:

- 1) Concrete
- 2) Site & Landscape
- 3) Framing & Drywall
- 4) Envelope
- 5) M&P
- 6) Electrical
- 7) Interior Finishes

Activity: Role Assignment

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Assign Roles

Decide who will represent each project role

5 minutes

Trade Assignments:

- 1) Concrete
- 2) Site & Landscape
- 3) Framing & Drywall
- 4) Envelope
- 5) M&P
- 6) Electrical
- 7) Interior Finishes

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Milestone Planning

The first conversation of LPS is *Milestone Planning*

Milestone Planning

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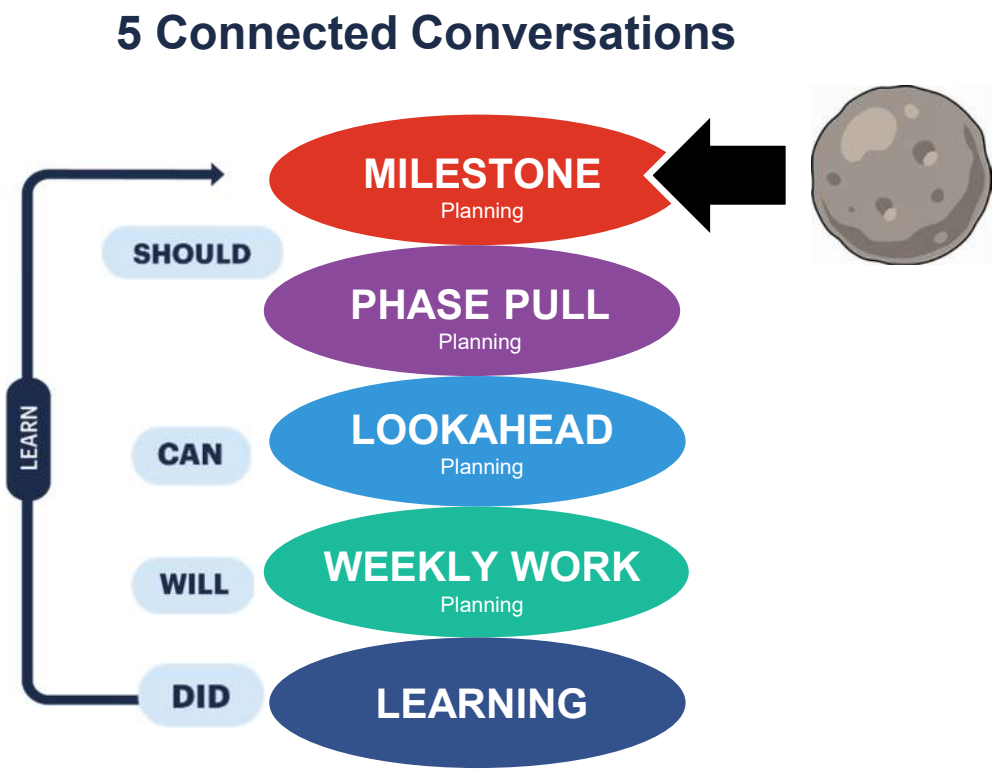
The goal of Milestone Planning is for the team to align with and *set the milestones* for the project.

This starts the we *"should"* be able to do conversation.



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Milestone Definition

Project Milestones are a significant event which *releases* work in another major phase or trade.

Milestones should be *broken down by each trade* for their interim milestones to support the project requirements.

Milestone Examples

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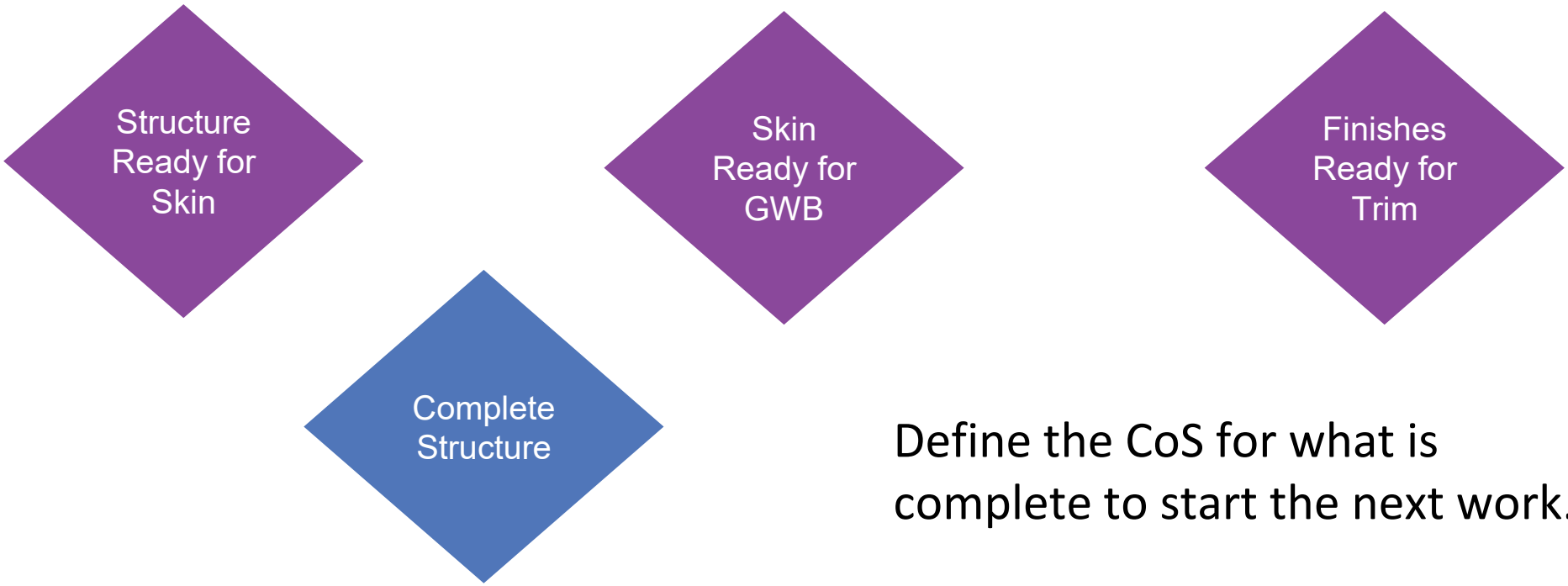

Define the CoS for what is complete to start the next work.

Milestone Planning: WHY

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Teams that skip Milestone Planning/Alignment risk:

- Disconnect in the LPS Conversations.
- Misaligned prioritization of work.
- Delivering too large a batch for milestone completion versus just what is required to release the next phase/trade.
- Loss of visual management control of overall project road map.

Milestone Planning: WHEN

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- As *early* in the project as possible.
- Can be done even *before we know the building design.*
- Should form the basis of continuing *onboarding as trades* engage in the project
- Should set the *schedule for Phase Pull Planning* events.
- May be *conceptual* early on to provide a framework.

Milestone CoS: "Definition of Done"

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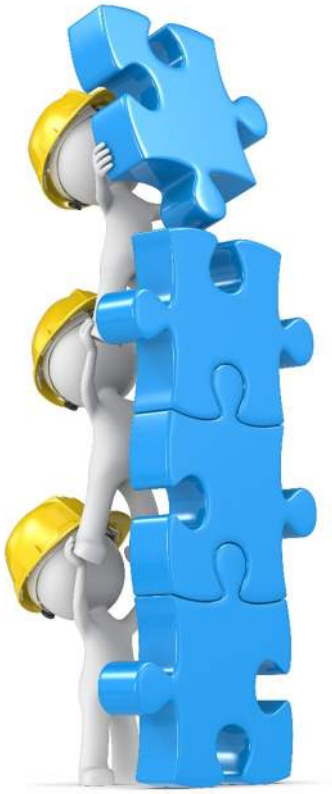
- Team aligns on a clear description of the *work included* in the milestone by each trade.
- What is *essential* to satisfy the pull of the released phase.
- *High level*, don't get bogged down in minute activities.



Creating the Milestone Plan

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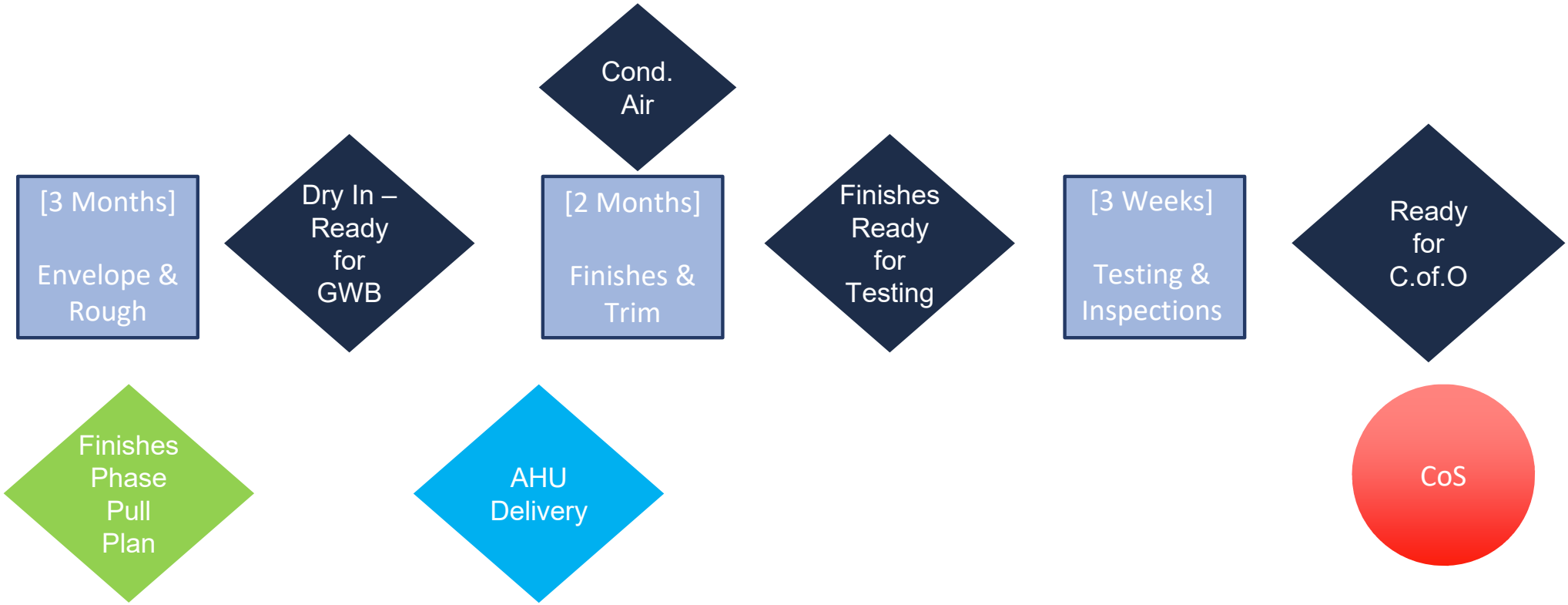

Creating the Milestone Plan

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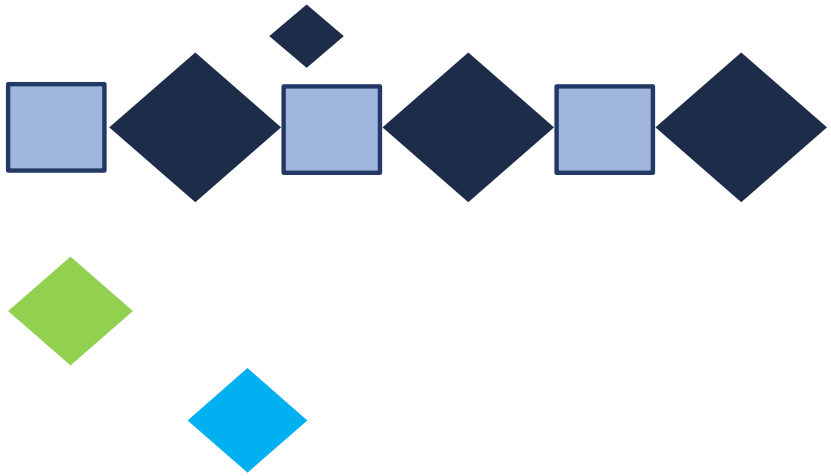

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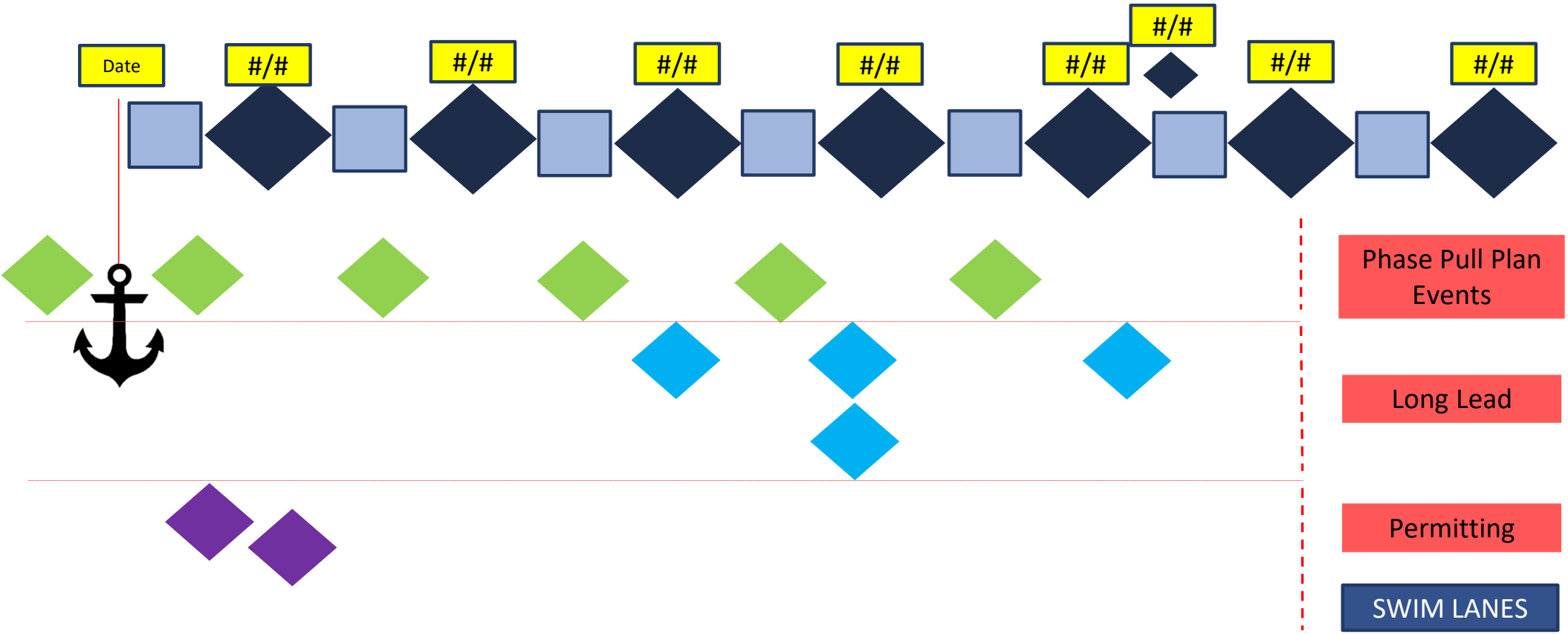

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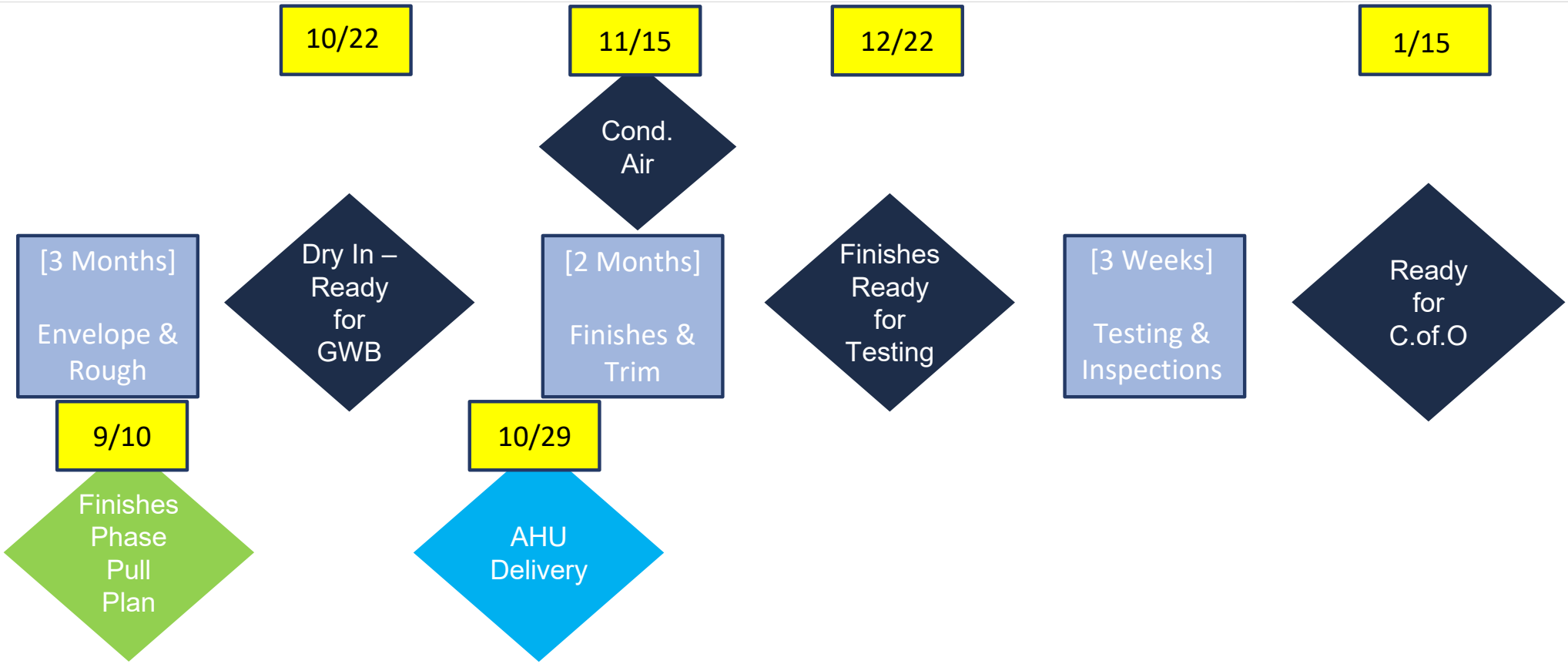
Creating the Milestone Plan



Milestone Planning In Action

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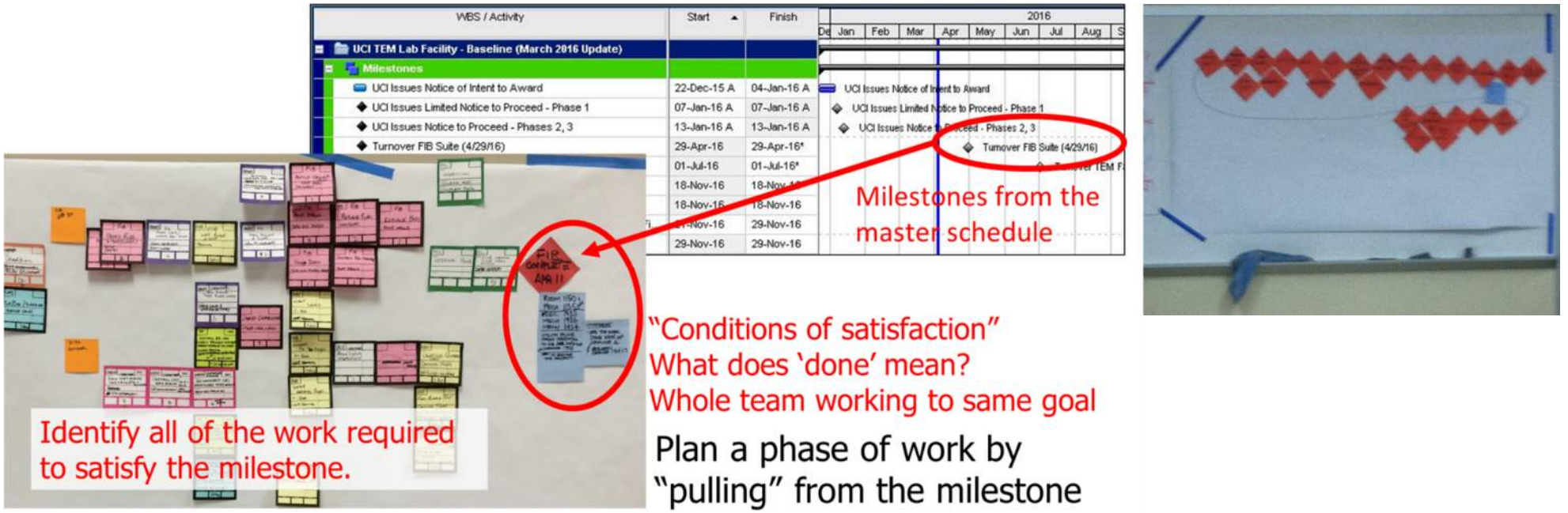

Milestone Planning In Action

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Courtesy of: Landis Construction

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Milestone Planning In Action

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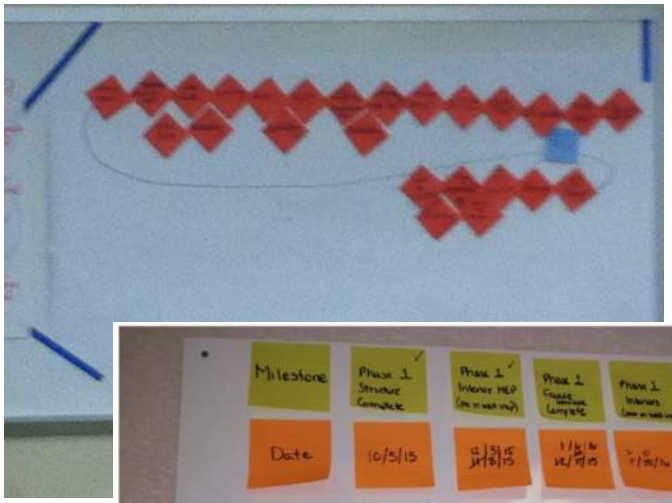

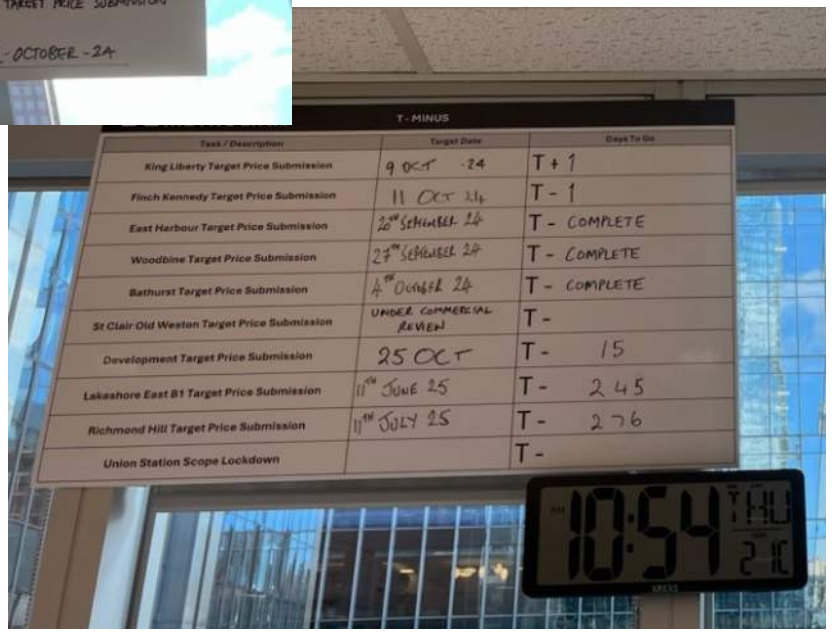

Activity: Tiny Home Project Milestone Plan

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Activity Description:

- Use blank paper, post-its and sharpies
- Start with final milestone
- Create construction milestone structure and flow
- Estimate phase durations
- Arrive at the beginning: 1 Week from 'Permit in Hand'
- Populate dates forward

35 Minutes

Report-out: Milestone Planning

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1. How did it go?
2. Any aha moments?

5 Minutes


TIME FOR A BREAK

Phase Pull Planning

The second conversation of LPS is *Phase Pull Planning.*

LPS and Pull Planning: Can you tell the difference?

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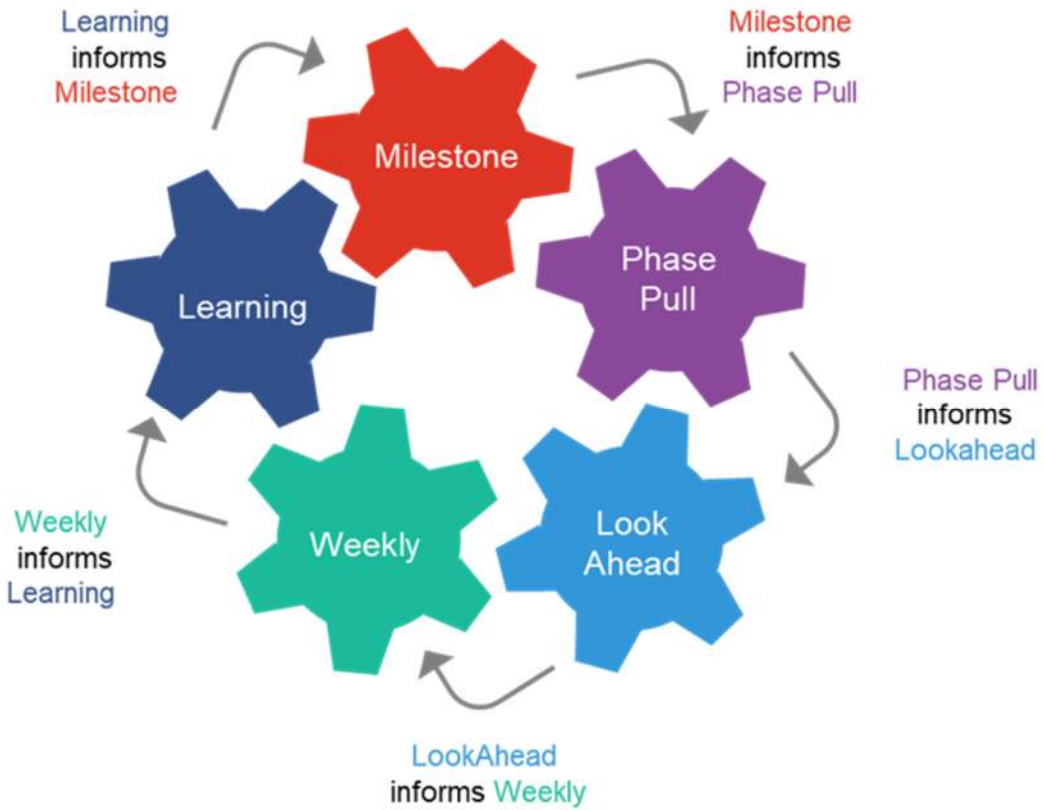

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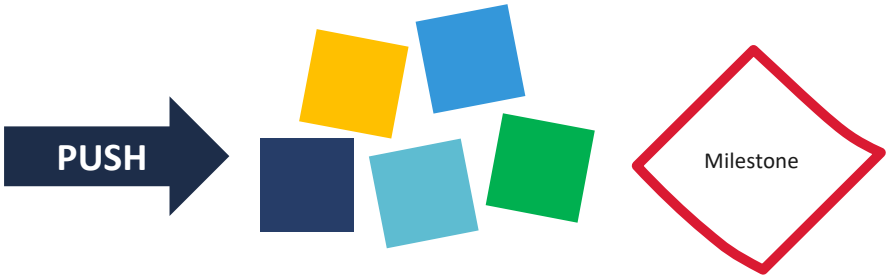
Push vs. Pull

Push:

- Advancing work based on central schedule.
- Releasing materials, information, or directives possibly according to a plan, but irrespective of whether the downstream process is ready to utilize them.



Pull:

- Advancing work when the next in line customer is ready.
- A “Request” from the customer signals that the work is needed and is “pulled” from the performer.

Phase Pull Planning

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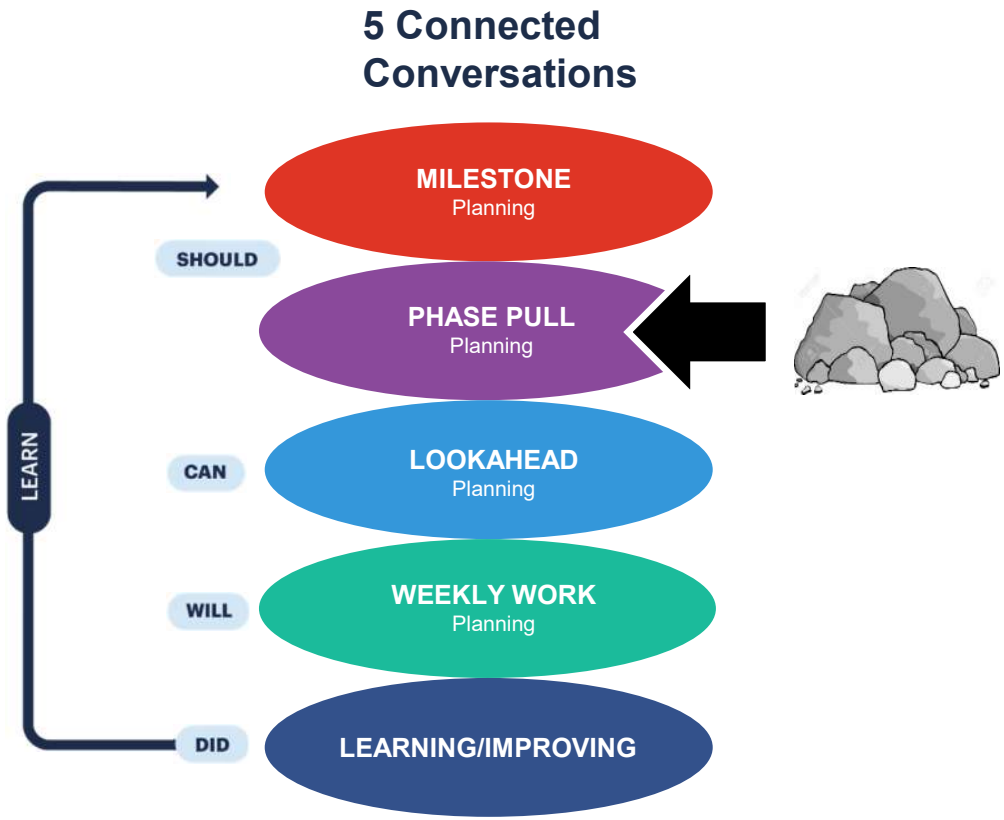
The goal of Phase Pull Planning is for the team to determine the key *handoffs* of work or information needed to deliver a milestone.

This continues the *we "should" be able* to do conversation.

Pull may validate or change the sequence in Milestone Planning output.

Milestone planning is a pre-requisite.



Phase Pull Planning: "Should"

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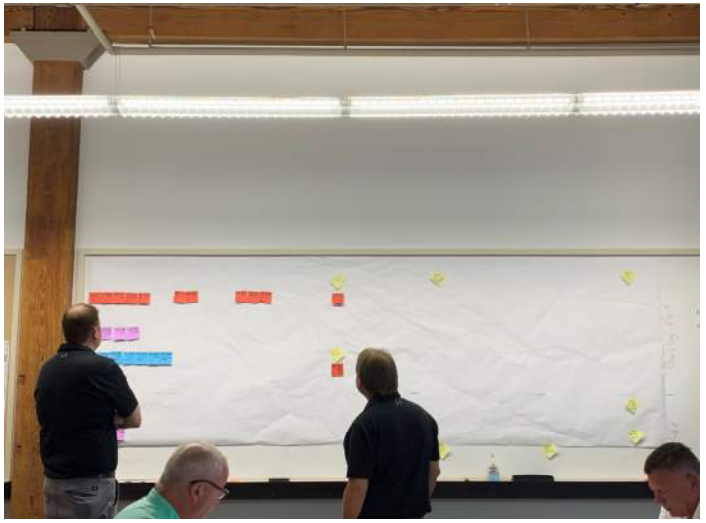
Phase Pull is performed to *plan the work for each milestone*.

- Examples: Structure Ready for Skin, Dry-In Ready for Gypsum Board

The Phase Pull Plan is a high-level view of what the team *"should" be able to do*, breaking  into 

Avoid *excessive detail* to minimize planning rework.



Courtesy of: Landis Construction

Phase Definition

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Phase:

A period of the project, where a *specific group of activities* is scheduled to be accomplished.

A phase can be either a time period or a group of activities leading to the *accomplishment of a defined goal/milestone.*

Courtesy of: Brasfield & Gorrie

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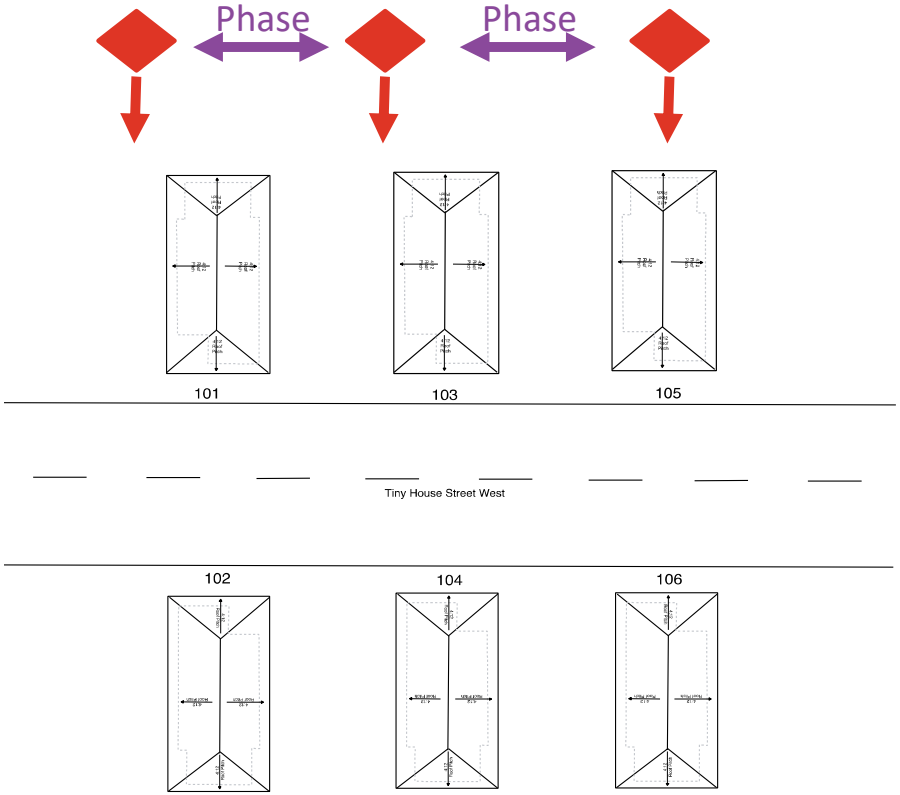

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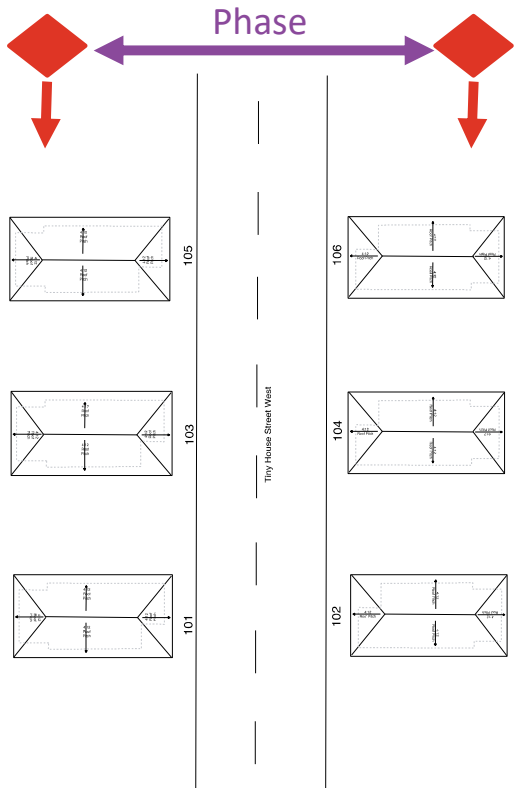

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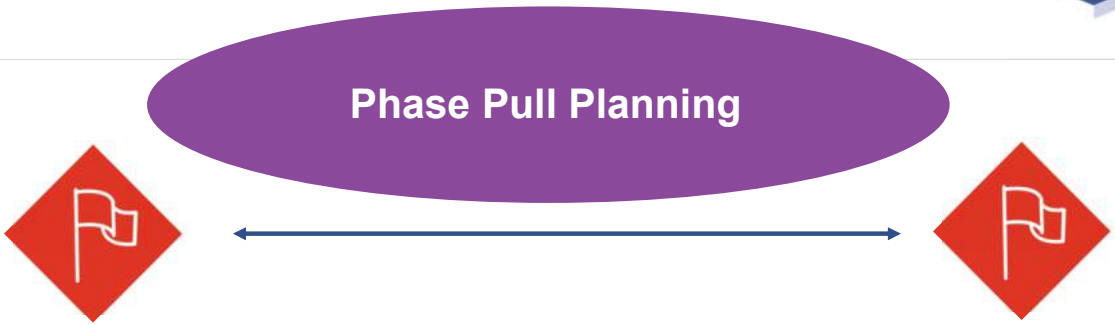

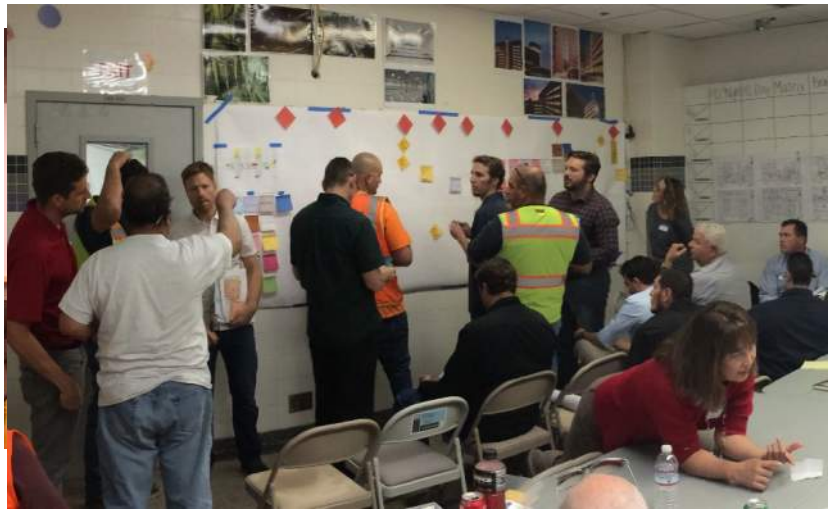

Courtesy of: PCL Construction

Phase of the work scaled per the milestone size to be an appropriate batch size

Informed by the *Milestone Plan*

Work out the structure and durations

After – add dates and transfer to the *Look Ahead Plan*

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Phase Pull Plan: Start at End

Identify the work of each Trade for that Milestone

Pull: Creating Flow

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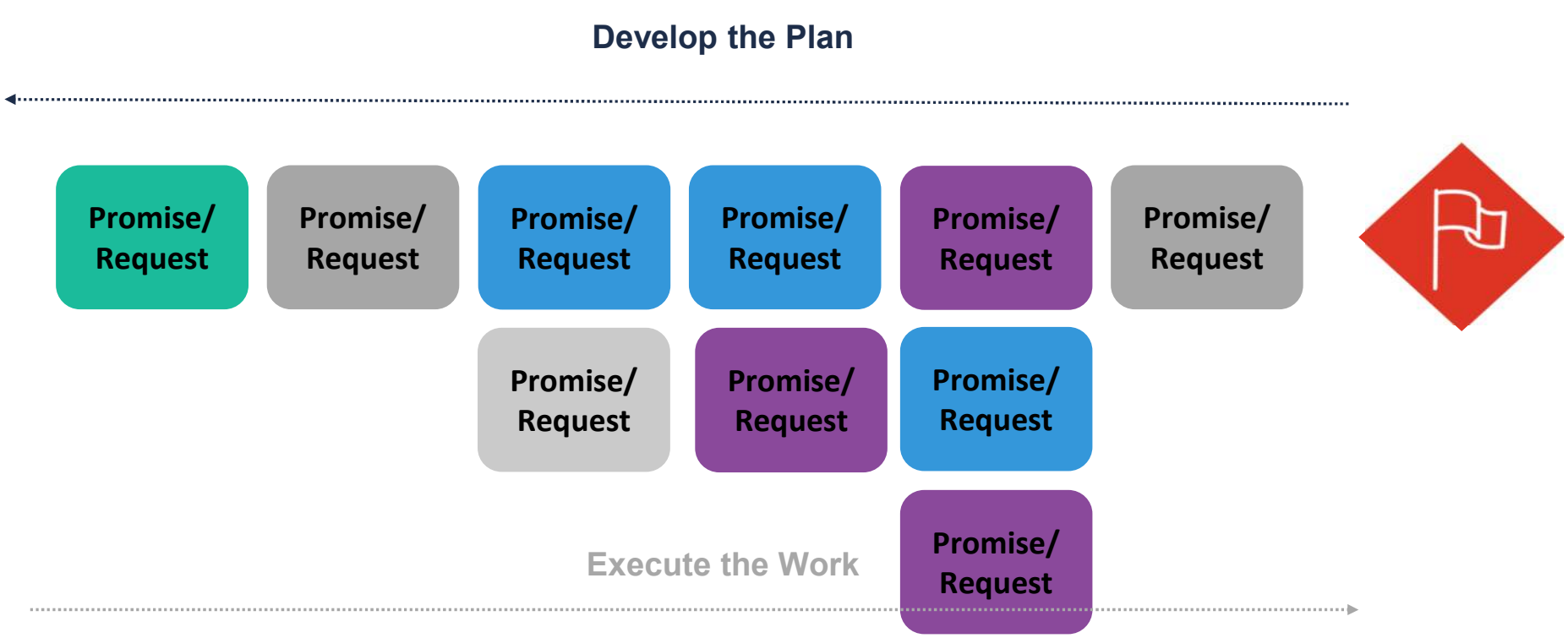

Phase Pull Planning: WHY Collaborate

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- Tap into the knowhow of the people that will do the work.
- Ensure the Last Planners can achieve the original promise date of the milestone.
- Better understand each others' needs between handoffs.
- Align to a plan as a team - 'our plan' vs 'their plan'.
- When work is made to flow, everyone benefits.

Courtesy of: Landis Construction

Phase Pull Planning: Preparation

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Identify Milestone and 'Conditions of Satisfaction'

- Identify Milestone the team will pull from.
- Determine work areas and batch sizes.
- Phases should be no more than a 2-3 month batch size.
- Break longer duration phases into interim milestones.
- "Conditions of Satisfaction" (CoS): Create a definition of Done for the Milestone.
- Align on the flow of work direction for all trades.

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Example: Work Area/Batch Plan

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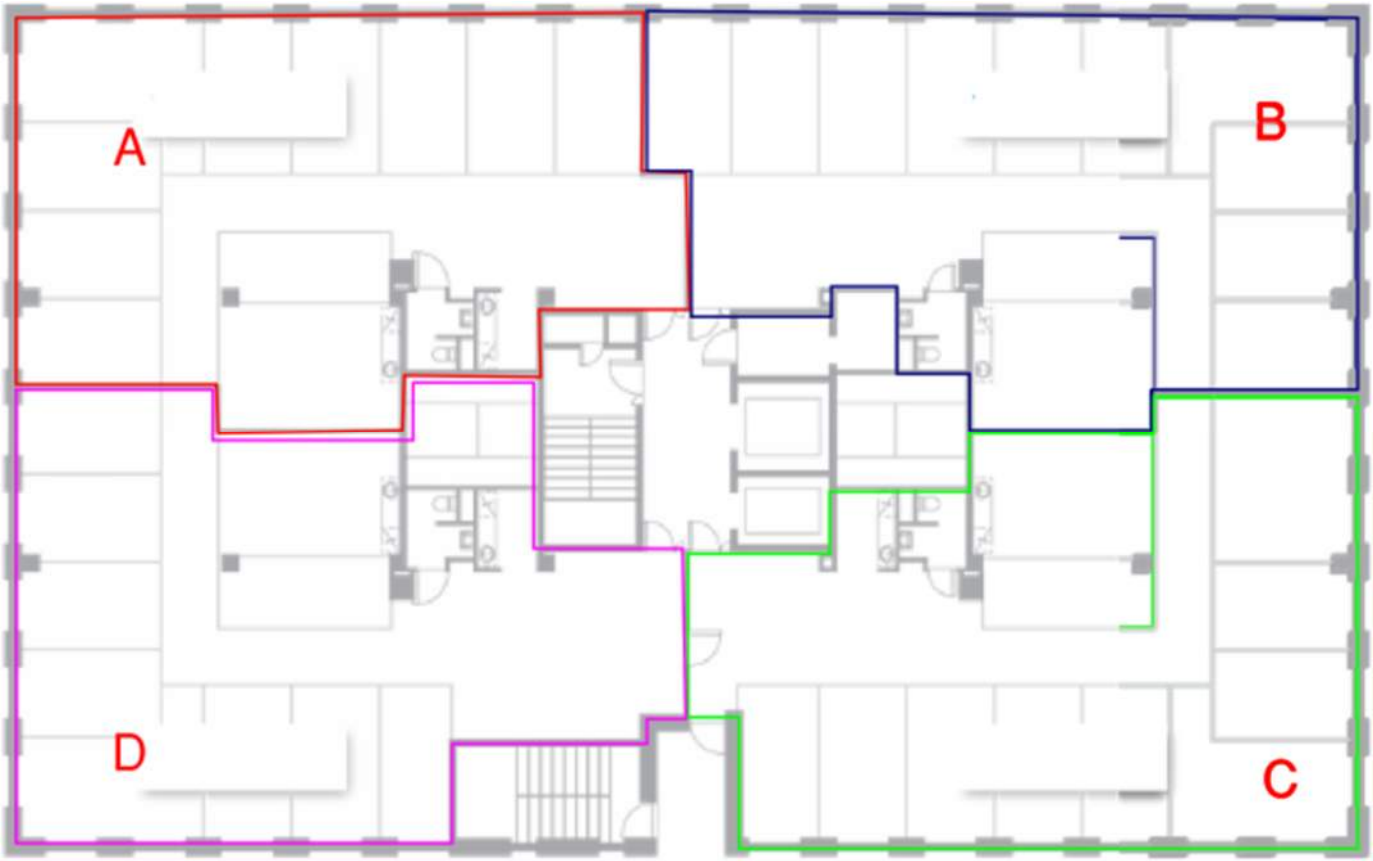
Example: Work Area/Batch Plan



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Example: Work Area/Batch Plan

Example: Work Area/Batch Plan

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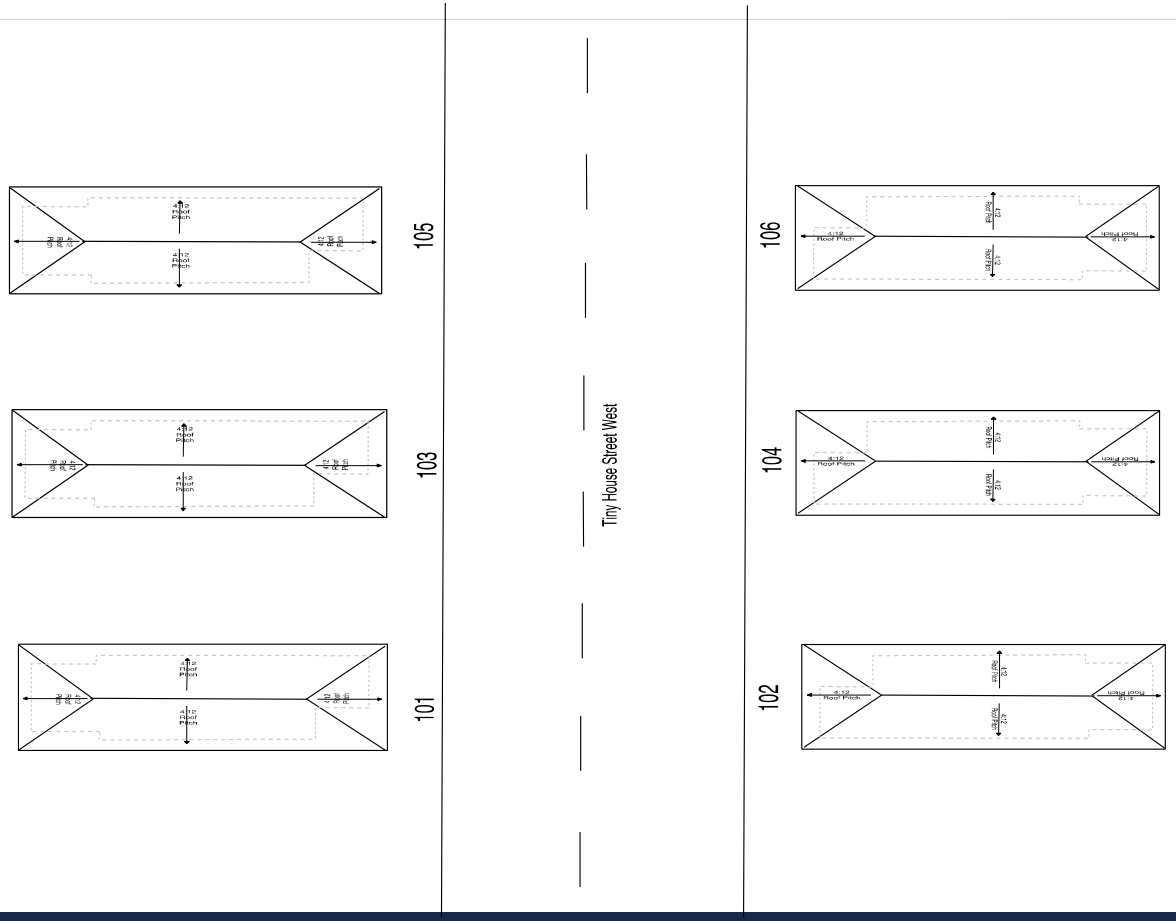
PHASE ONE
PHASE TWO
PHASE THREE
PHASE FOUR
PHASE FIVE

Courtesy of: Landis Construction

Tiny Home Batch & Flow



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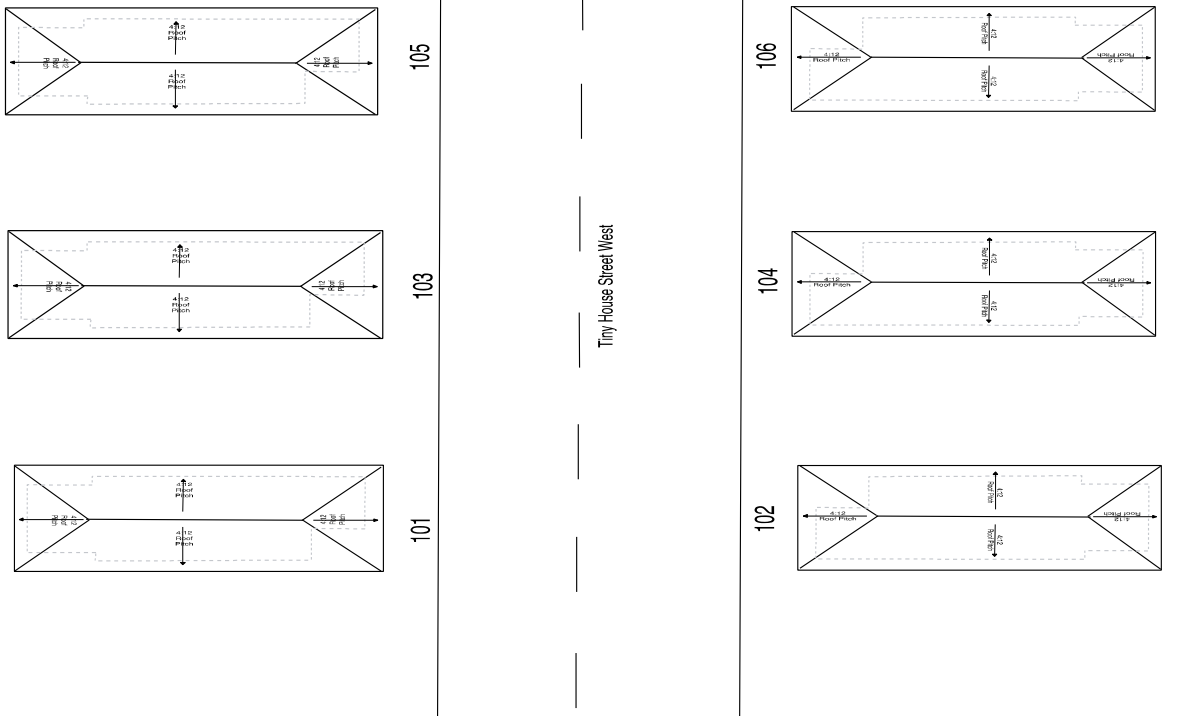
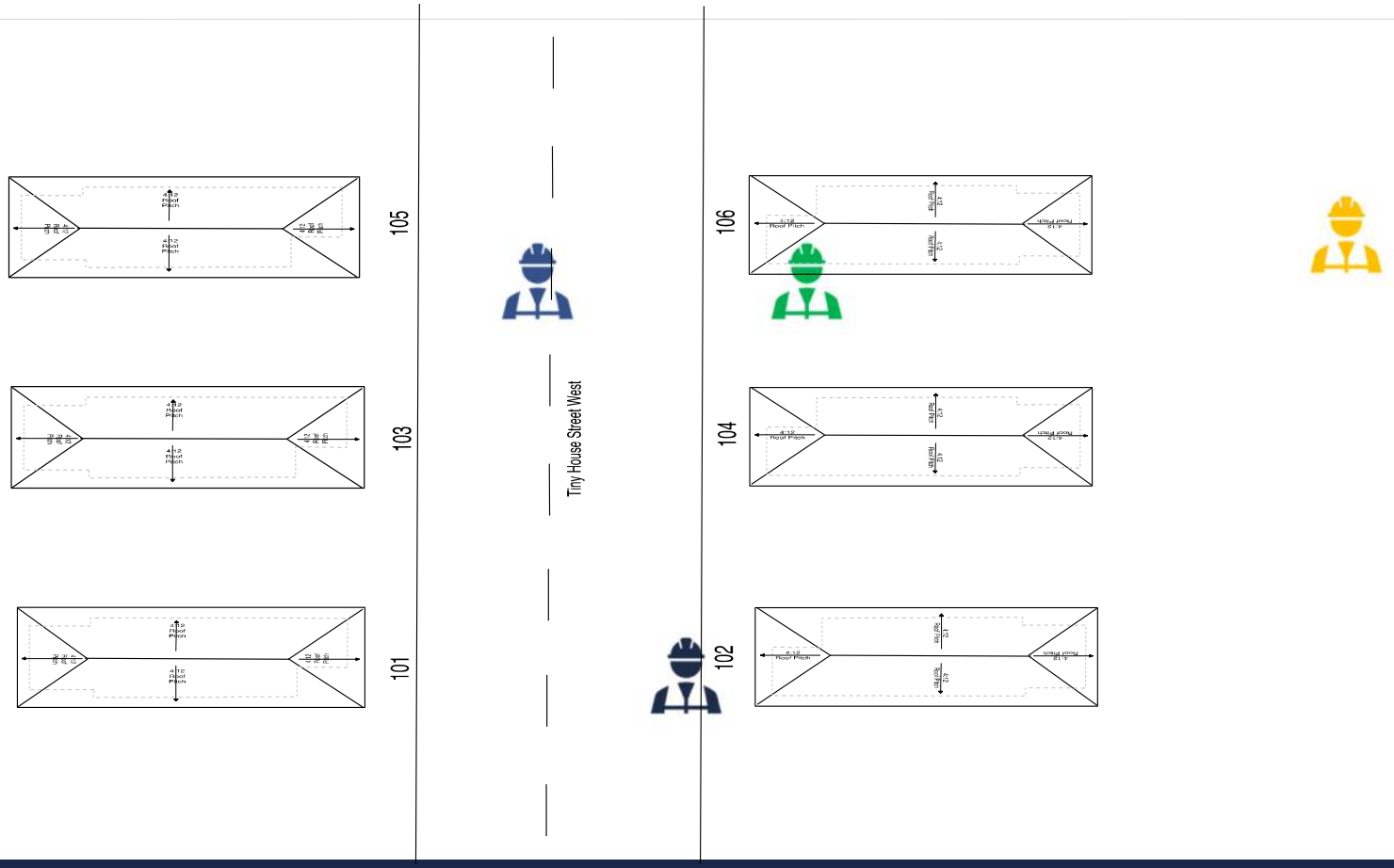
Why Batch Size Matters



Why Batch Size Matters



Why Batch Size Matters: Math doesn't lie

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Phase Pull Planning: HOW

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Last Planners Create Tags:

- Create a legend of color tags by trade.
- Include location/area to create flow of work.
- Breakdown duration estimates by area.
- Break up the work that is longer than ~5-10 days.
- Understand what you need from other trades to release your work.

Courtesy of: The ReAlignment Group

Phase Pull Planning: Example Tag

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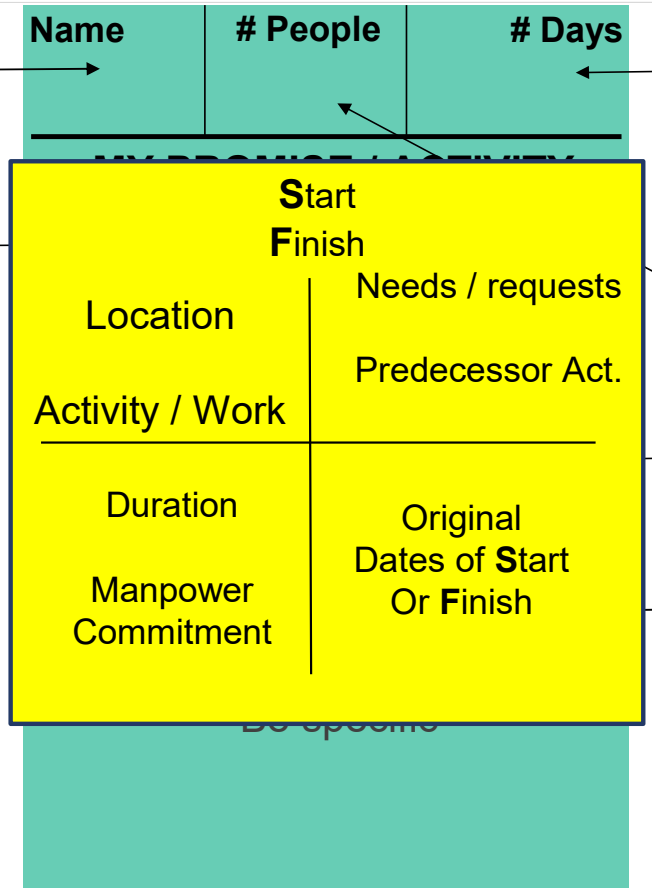
Name of person making the commitment

Description of the activity

- Format tag to best fit your team needs
- Add more information as valued
- Color code by trade or discipline



Duration of the work in days

No more than 5 Day Durations

# of People for the work

Work zone or area

Description of the predecessor activity or work that releases the start of your activity

Phase Pull Planning: Example Tag

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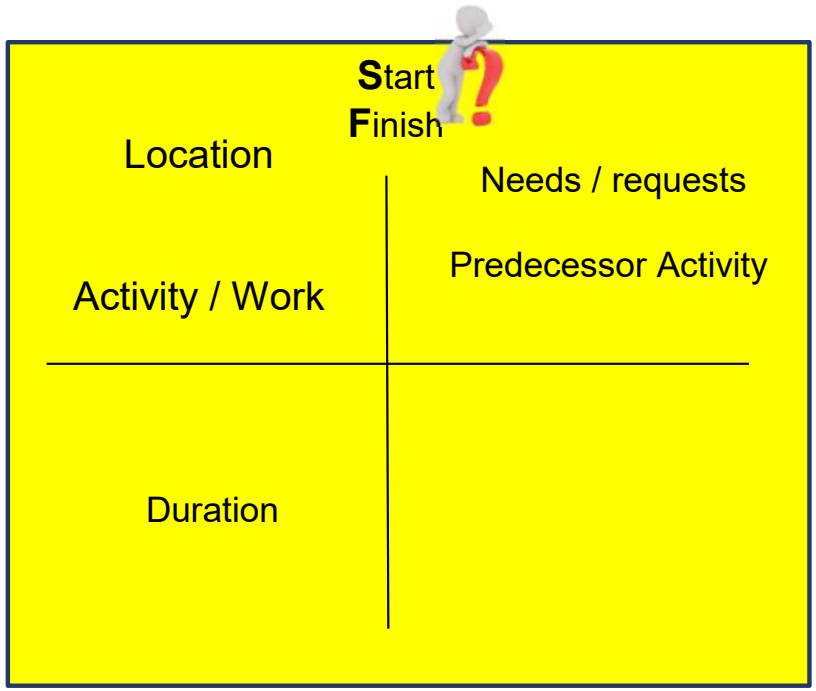

Avoid *excessive detail* to minimize planning rework.

Phase Pull Planning: Example Tag

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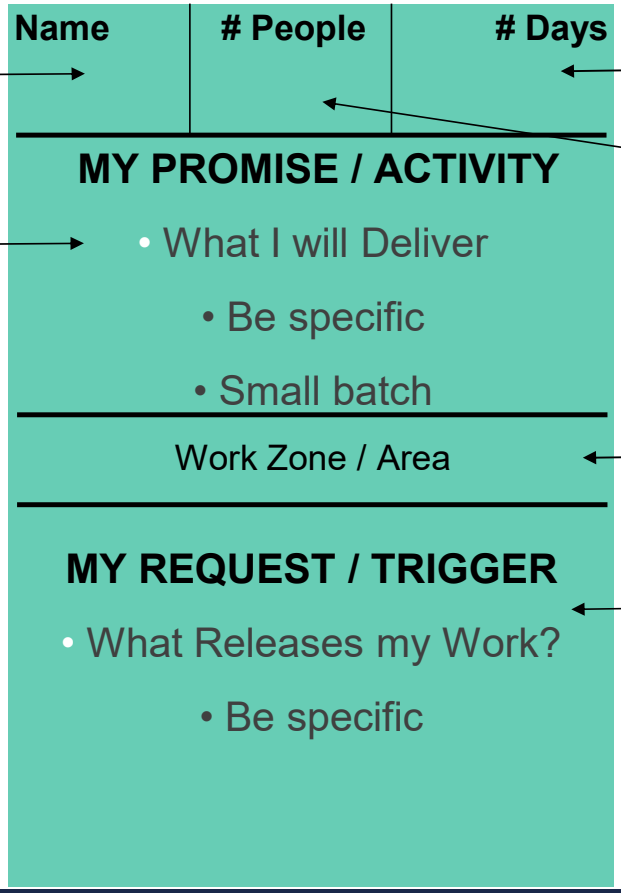
Name of person making the commitment

Duration of the work in days

# of People for the work

Description of the activity



Work zone or area

Description of the predecessor activity or work that releases the start of your activity

- Format tag to best fit your team needs
- Add more information as valued
- Color code by trade or discipline

Phase Pull Example

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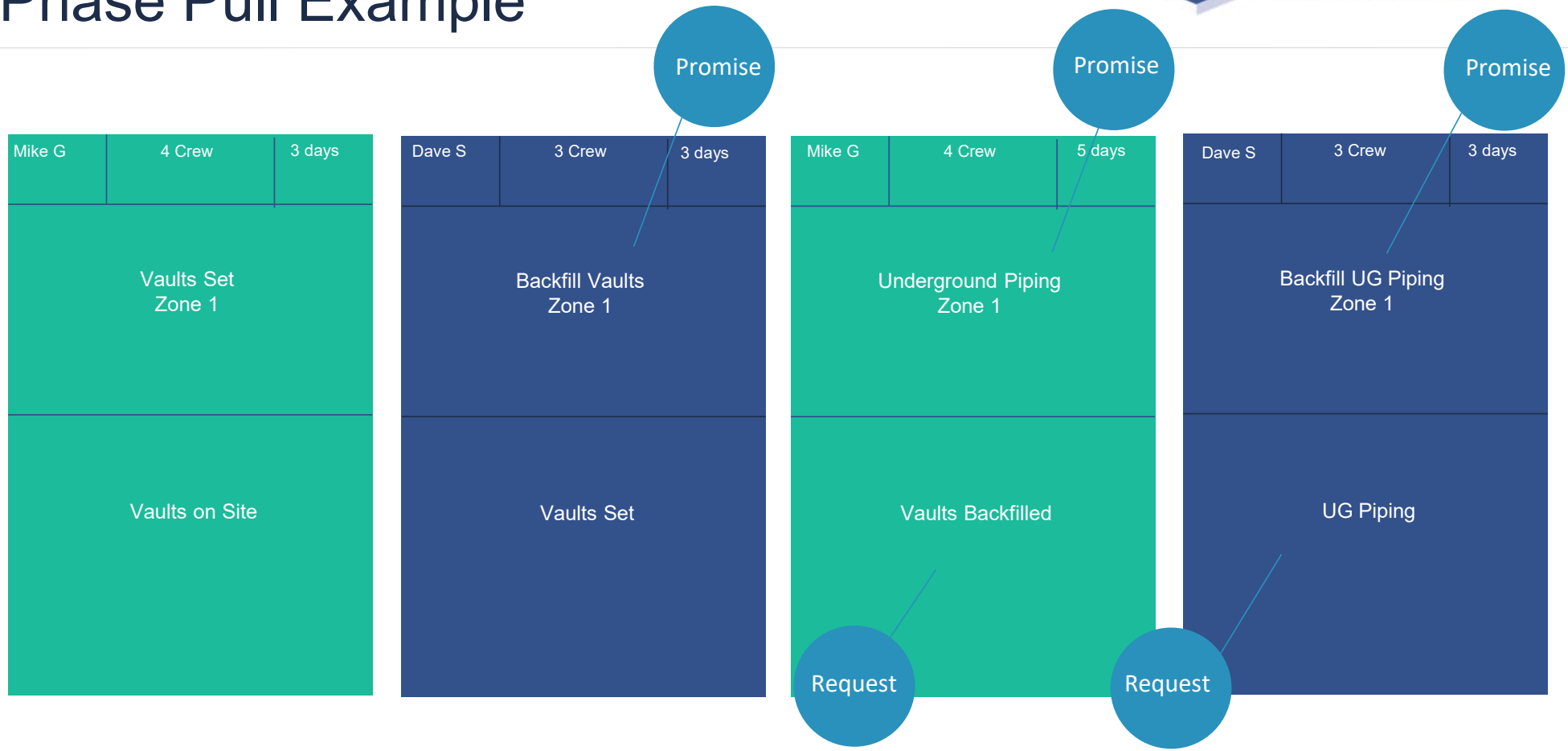

Phase Pull Planning: HOW

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Create the Pull:

- Place the Milestone tag at the right end of the paper.
- Work backwards from the phase completion milestone.
- Begin with the last activity needed to complete the milestone and work backwards.
- Last Planners placing pull tags with ‘Requests’ must ask the other trade to meet the need by placing the corresponding tag.
- Gradually the team builds a network of commitments that satisfy each step in the process.

Phase Pull Planning: HOW – "Should"

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Step1: Define "Done" – the CoS for completion

In-Wall
Ready For
Gyp
Area A1

Phase Pull Planning: HOW – “Should”

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Phase Pull Planning: HOW – “Should”

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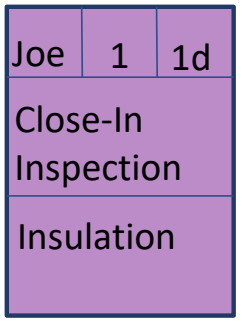

Phase Pull Planning: HOW – "Should"

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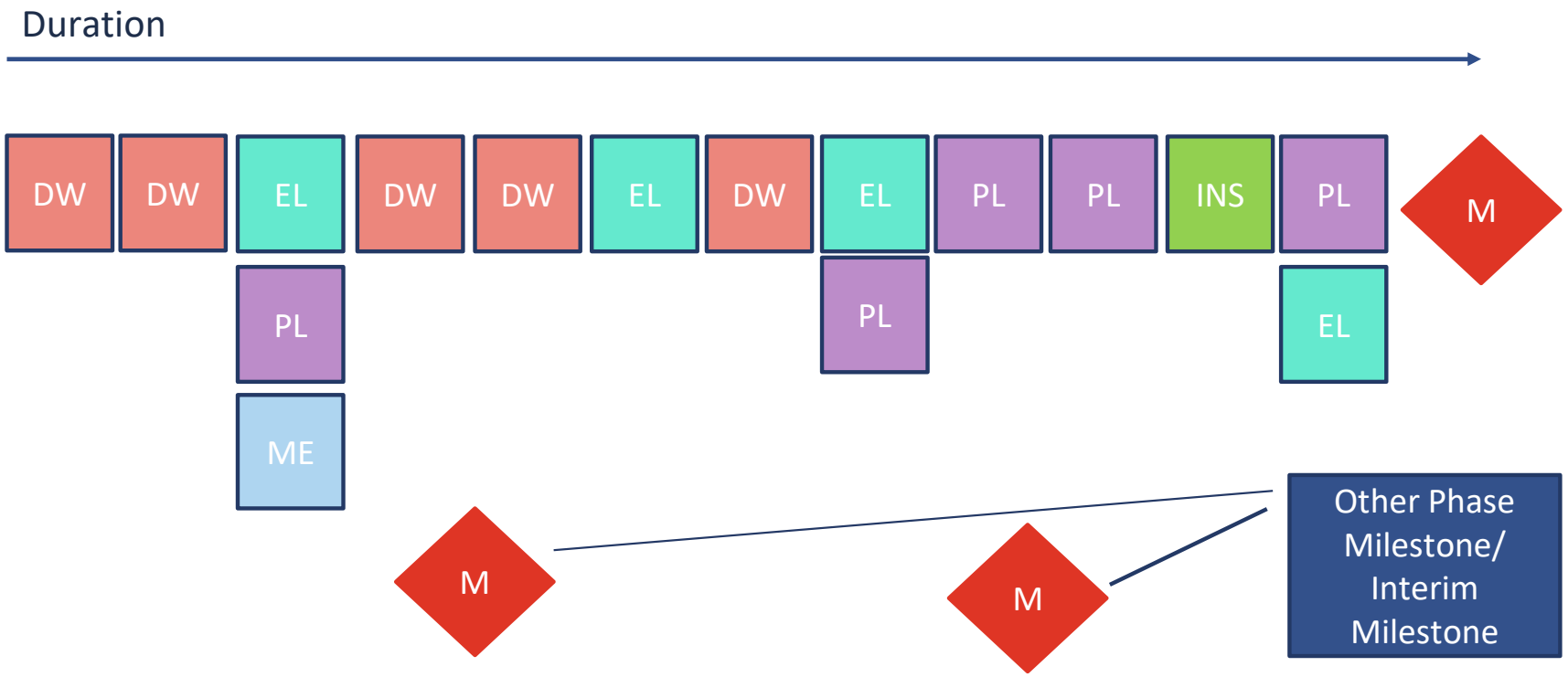

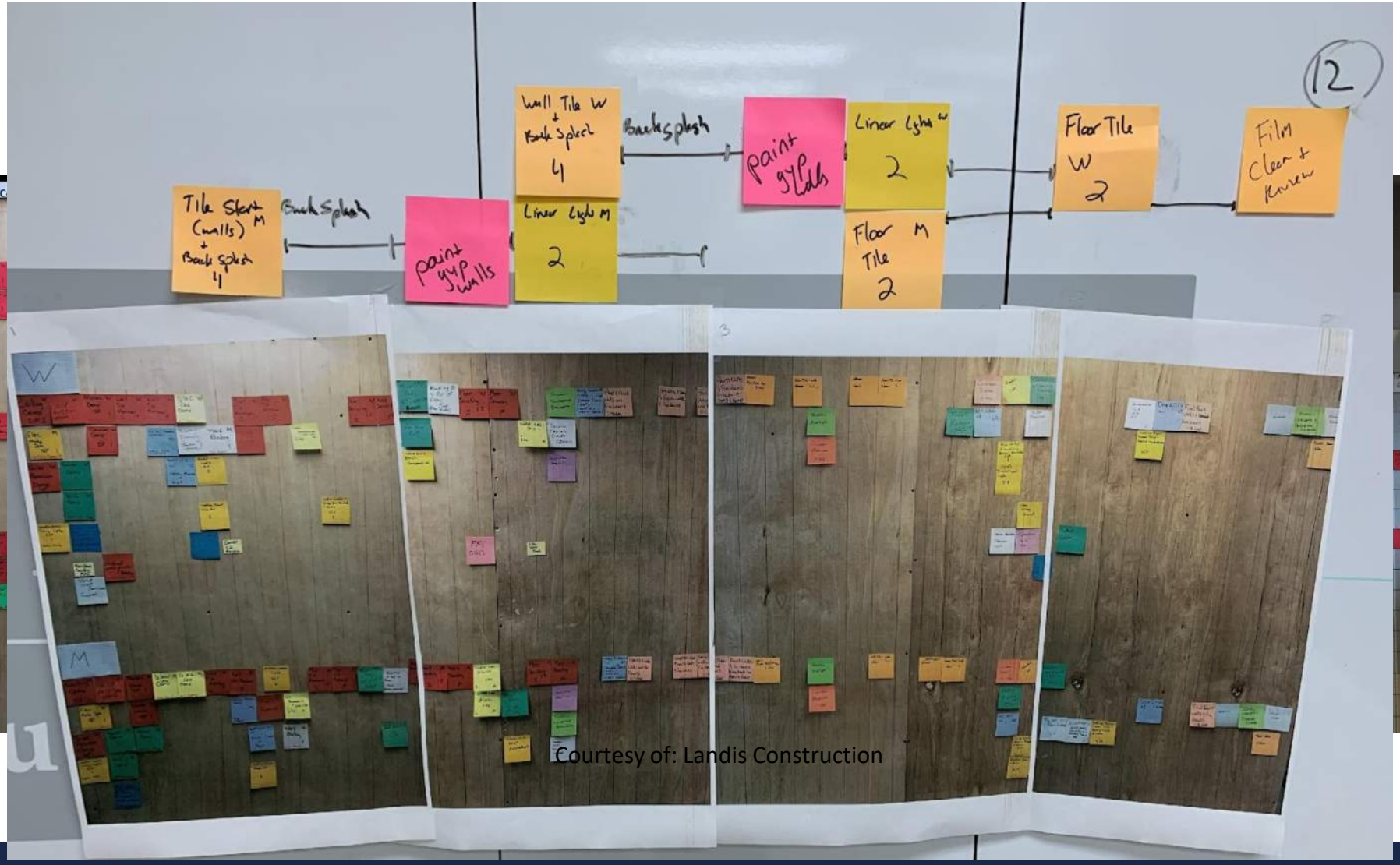

Courtesy of: Landis Construction

Phase Pull Planning: Agenda

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Step 1 - Identify milestones and define “conditions of satisfaction”

Step 2 - Last planners break down their work into tasks

Step 3 - Pull from the milestone backwards to build a network of commitments

Step 4 - Forward pass, check and adjust

Step 5 - Optimize the whole

Step 6 - Record the plan

Phase Pull Planning: HOW Wrap-up

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Forward Pass Check:

- When most of the tasks are on the board, do a *forward pass* through the network.
- The group actively listens/talks through the sequence.
- Make sure all the needed information is on the tags.

Validate Phase Duration:

- Count days on the longest path(s).
- If the duration exceeds requirement, the Phase Pull Plan is incomplete.

Record the Plan (options):

- Photograph the results and share with the team.
- Update to P6/Master Schedule.
- Implement digital LPS tools.
- Keep a living Phase Pull Plan in the planning area.

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Activity: Tiny Home Phase Pull Plan

- Preparation – 15 Min
  - Select Milestone
  - Define CoS
  - Create Area/Batch & Flow Plan
- Trade Preparation – 10 Min
  - Activities & Duration Estimates
- Create Phase Pull Plan – 20 Min
  - Pull Activities
  - Validate Plan

45 Minutes

Tiny Home Batch & Flow

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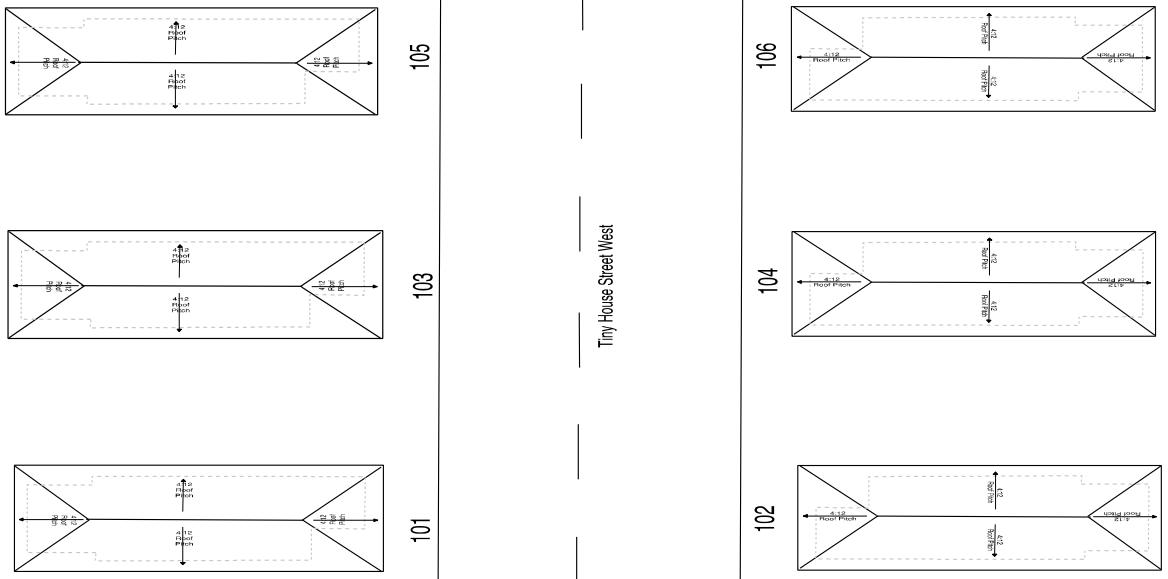

Report-out: Phase Pull

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1. How did it go?
2. Any aha moments?

15 Minutes

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Weekly Planning Meetings

Weekly planning activities and tools that encompass the remaining conversations of LPS – Can, Will, Did and Learning.

Last Planner System Overview

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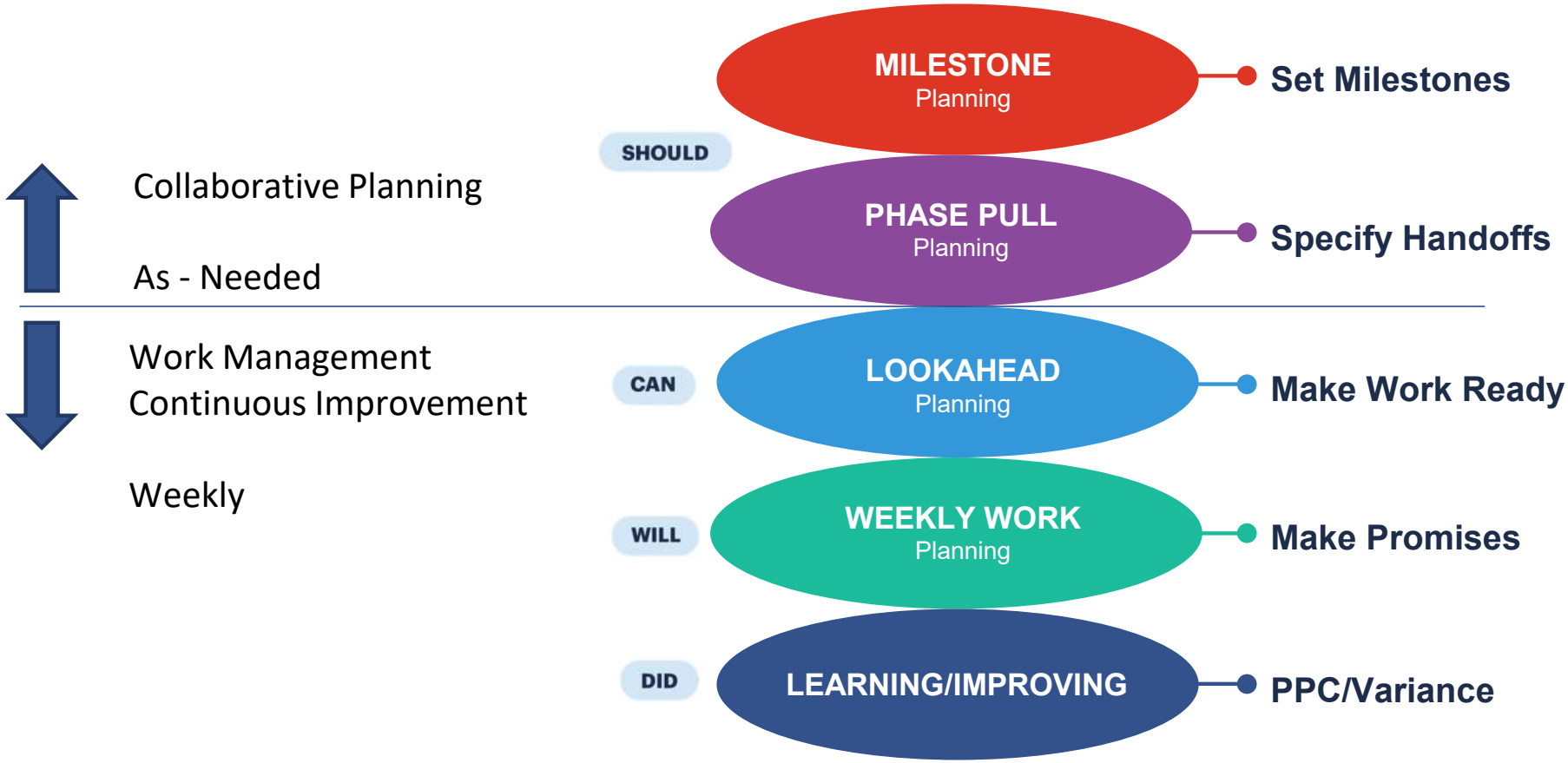

Weekly Planning Conversations

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- Lookahead Planning
- Weekly Work Planning
- Learning & Improving
- Celebrating Wins
- Building Trust

Courtesy of: Aecon

Lookahead Planning

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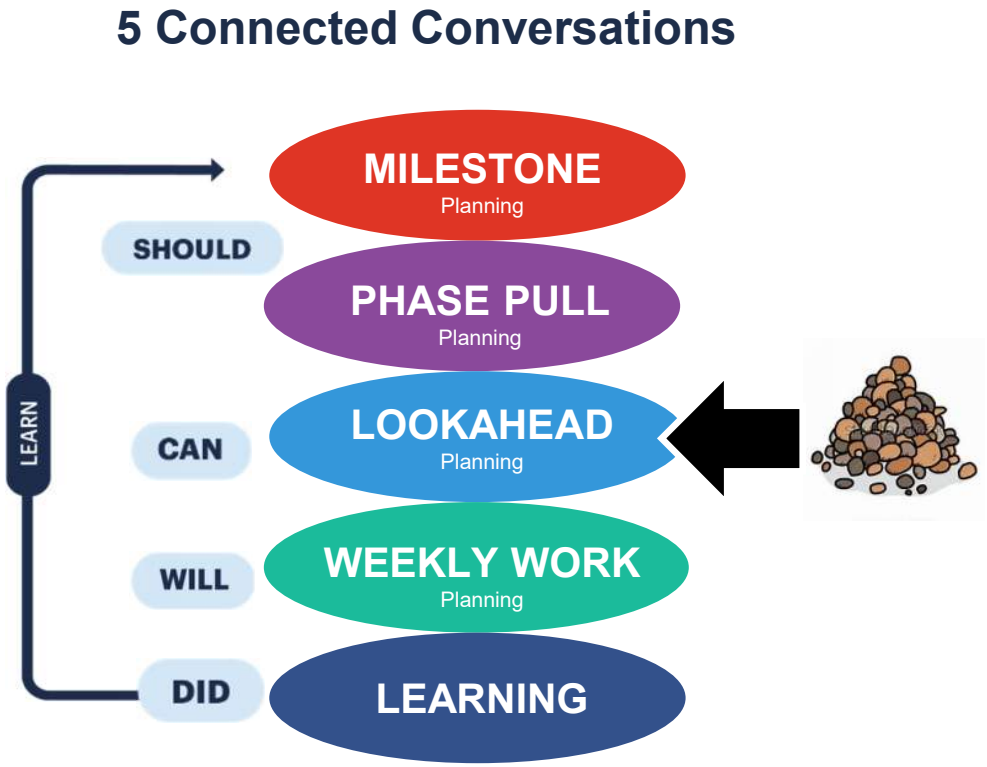
The third conversation of LPS is *Lookahead Planning. (LAP)*

This level focuses on making work ready or assuring that the work that *should* be done, *can* be done by identifying and ***removing constraints*** in advance of need.

The conversation is we *"can"* do this.



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LookAhead Planning

Constraint Number	Activity Number	Constraint Description	RFI No.	Responsible Person	Responsible Company	Date Identified	Date Need Resolution	Date Resolution Promised	Actual Date Resolved

Constraint Log

- Transferred from the *Phase Pull Plan* to a plan with dates/weeks.
- Boards, P6 or other software documentation.
- Rolling (4- 6 weeks) LookAhead to "make work ready".
- Discussion/Action for:
  - *Risk Log*
  - *Constraint Log*
  - Informs the *Weekly Work Plan*

Constraint Log Example

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Project: Project No.: Responsible Person:									
Constraint Number	Activity Number	Constraint Description	RFI No.	Responsible Person	Responsible Company	Date Identified	Date Need Resolution	Date Resolution Promised	Actual Date Resolved

CONSTRAINT DESCRIPTION

RESPONSIBLE PERSON & CO

DATE IDENTIFIED

DATE NEEDED

DATE PROMISED

DATE RESOLVED

Constraint Defined

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Constraint:
An item or requirement that **will prevent an activity** from starting, advancing or completing as planned.

- Design Information
- Approved Submittal
- Permits
- Owner Decisions
- Change Orders
- Space Access
- Labor
- Equipment
- Safety Considerations
- Material Procurement

Activity

Weekly Planning Cycle

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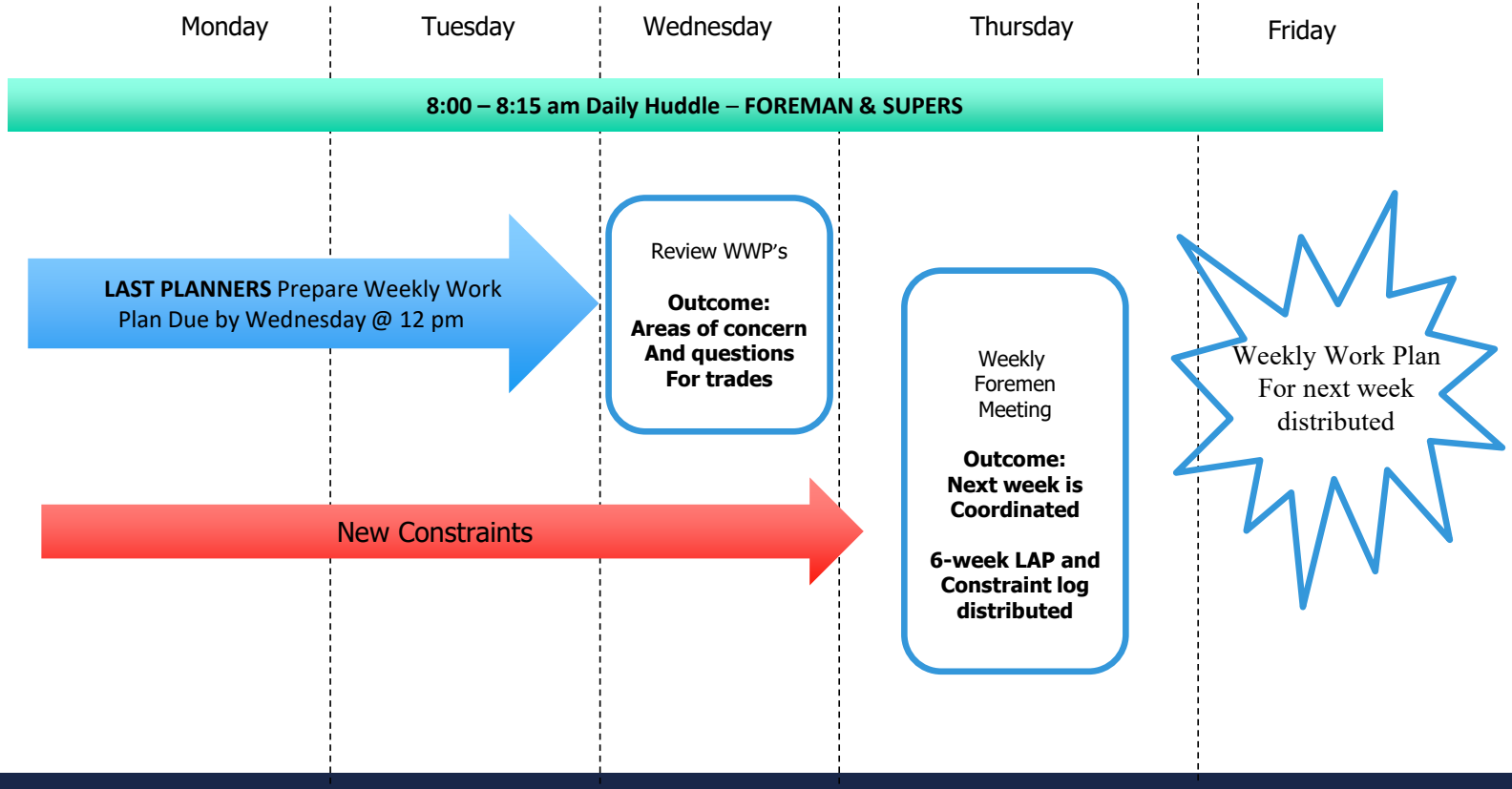


TIME FOR A LUNCH

Weekly Planning Meeting: Round 1 Agenda

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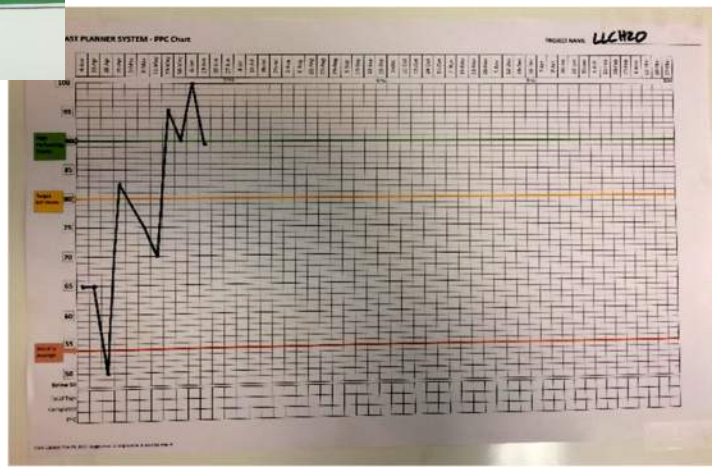
- ~~General announcements~~
- Look Ahead Plan Update
  - Rotate and add new activities
  - Update existing constraints
  - Identify new constraints
- ~~Last Week's PPC/ Variances~~
- ~~Weekly Work Plan created/negotiated for next week~~
- Round Robin to address any new issues not covered
- ~~Plus/Delta~~



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Activity: Tiny Home Look Ahead Plan

- Create Look Ahead Boards
  - Swim lanes by area
  - Follow color legend
  - 4-6 Weeks of activities
  - More detailed than Phase Pull Plan
- Setup Constraint Log

30 Minutes

Activity: Tiny Home Constraint Log Update

- Review Look Ahead Plan
  - Activity Starts – Make Ready
  - Set a date out 6 weeks
- Identify Constraints
  - For each activity start, deal a 'Constraint Card'
  - Record any constraints on the log
  - Correlate to look ahead plan with dots

Weekly Work Planning

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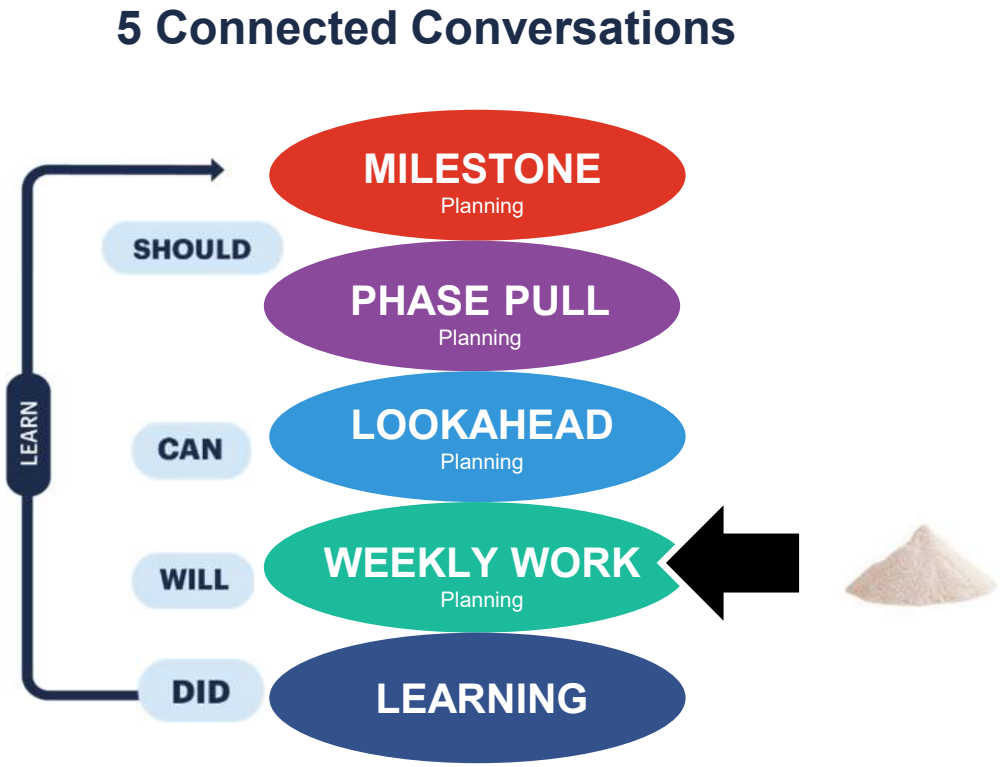
The fourth conversation of LPS is *Weekly Work Planning. (WWP)*

The goal of this level is for the Last Planners to *establish the plan* for the upcoming week at the daily level.

The conversation is I *"will"* do this.



Weekly Work Planning

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This is the level that the team identifies the *promised task completions* agreed upon by the *Performers* for the upcoming week.

The WWP is used to determine the *success* of the planning effort and to determine what *factors limit performance*. And is the basis of measuring PPC (Percent Plan Complete).

Courtesy of: Landis Construction

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Weekly Work Planning

- Informed by the Look Ahead Plan
- Detail work by trade at the Daily Level
- Detailing of the next week
- Informs the Daily Huddle
- Take to the field

WEEKLY WORK PLAN

Area:		CATEGORY* OF PLAN FAILURE				TOTAL ACTIVITIES	10
Contractor:		1 Coordination	5 Prerequisite Work	9 Submittals	13 Space	ACTIVITIES COMPLETED	5
Shift:		2 Design	6 Labor	10 Approvals	14 Site Conditions	PERCENT PLAN COMPLETE (PPC)	50%
Last Planner:		3 Owner Decision	7 Materials	11 Equipment	15		
		4 Weather	8 Contracts/COs	12 RFIs	16		

Activity ID	ASSIGNMENT DESCRIPTION (Sufficiently Defined · Sound · Proper Sequence · Right Size · Able to Learn)	Responsible Person	Start Date: 05-Oct-09 Mon	Tue	Wed	Thu	Fri	Sat	Sun	DONE? YES	NO	LEARNING: REASONS FOR PLAN FAILURE	Category
	Column Grid A1 - G8												
	Joes Framing	Bill											
7055	Top Track Install		4	4						1			
7060	Framing Walls			4	4					1			
7065	Backing Install				4	4					0	IOR not available	10
	Sparky's Electrical	Jim											
5605	Rough in Walls			2	2	2	2			1			
5610	Rough in Ceilings					2	2	2			0	Need grid elevation layout	5
	Acme Mechanical												
5305	Plumbing - in wall rough in - Install				2						0	Walls not inspected	10
5310	Plumbing - ceiling rough in - Install					2					0		
	Column Grid G9 - J 32 Kitchen servery												
	Joes Framing	Bill											
7055	Top Track Install						4			1			
7060	Framing Walls							4		1			
7065	Backing Install							2			0	room not available	1
	Workable Backlog (My "Plan B": What work can I do without affecting other trades if above plan breaks down?)									5			

Weekly Work Planning Example

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"What, Where, Who & When"

WEEKLY WORK PLAN

Work Beginning:

Area:		CATEGORIES OF PLAN FAILURE				TOTAL ACTIVITIES	31
Contractor:		1 Coordination	5 Prerequisite Work	9 Submittals	13 Space	ACTIVITIES COMPLETED	
Shift:		2 Eng/Design	6 Labor	10 Approvals	14 Site Conditions	PERCENT PLANNED COMPLETE	0%
Last Planner:		3 Owner Decision	7 Materials	11 Equipment	15		
		4 Weather	8 Contracts/COs	12 RFIs	16		

Activity ID	Commitment Description Safe - Defined - Sound - Proper Sequence - Right Size - Able to Learn	Responsible Person	Start Date 1\28 Mon	Tue	Wed	Thu	Fri	Sat	Sun	DONE? YES	NO	LEARNING REASONS FOR PLAN FAILURE	Category
1	Pour new moat floor on the south side of the building	B.A.M	4	4									
2	Adjust (4) down spouts on the south side of the building	B.A.M	2	2	2								
3	Patch masonry around 6 conducter boxes on the roof	B.A.M	1	1	1	1	1						
4	Install base on 2nd floor in the south side class rooms	B.A.M		3	3	3	3						
5	Install wainscoting on the first floor north side	B.A.M		4	3	4							
6													
7													
8	Pull wire for Chiller	Ryan	5										
9	Security rough-in on all floors	Ryan	3	3	3	3	3						
10	Basement rough-in complete	Ryan	4	4	4	4	4						
11													
12	Hang and finish all rated chases	Fred			3	3							
13	Reframe and hang dry wall in hallway 121	Fred	4	4	4	3	5						
14	Sand dry wall in hallway 139	Fred	2	2									
15	Finish dry wall in west class room 107,144	Fred	3	3	3	3							
16													
17													
18	Rough-in media center ceiling	Troy	5										
19	Get fresh air duct inspected in attic	Troy				6							
20	Get north west chase duct inspected	Troy				6							
21	Insulate north west chase duct	Troy			4								
22	Tie in vav boxes in the attic	Troy	3	3	3								
23	Start tying in vav boxes in the east wing 1st and 2nd floors	Troy	4	4	4	4							

What & Where?

Crew Size?

Who?

When will it be done?

Weekly Planning Meeting: Round 1 Agenda

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- ☑ General announcements
- ☑ Look Ahead Plan Update
  - Rotate and add new activities
  - Update existing constraints
  - Identify new constraints
- ~~Last Week's PPC/ Variances~~
- ➡ Weekly Work Plan created/negotiated for next week
- ➡ Round Robin to address any new issues not covered
- ~~Plus/Delta~~

Weekly Work Planning: Preparation

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Questions to ask when preparing for the WWP:

- Will I have the appropriate amount of staff on site to perform the work?
- Do I have the material needed?
- Is it the right sequence?
- Is it safe?
- Are there any open constraints that need to be resolved?
- Do the tasks tie directly to look ahead plan? If no, ask why?

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Activity: Tiny Home Weekly Work Plan Week 1

- Setup Weekly Work Plan Template
- Pick 1 week from Look Ahead Plan
- Detail weekly planning activities on WWP
- Ensure no constrained activities
- Check for missing activities
- Round Robin
- +/Delta

25 Minutes

Report-out: Weekly Work Plan

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1. How did it go?
2. Any aha moments?

5 Minutes

Weekly Work Planning *Discussed Daily*

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Weekly Work Plan *Informs* the Daily Huddle

Courtesy of: PCL Construction

Courtesy of: Turner/DPR JV

Daily Huddle

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1. What *did* I complete?
2. What *will* I complete?
3. What needs to be *re-planned*?
4. How can we *improve* future planning?

Photo Courtesy of: KHS&S

Daily Huddle-15 MINUTES

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1. What did I complete?
2. What will I complete today?
3. Are you on track with the Plan
4. Needs from the Group
5. Questions for Trade Leader from the group

PLAN THE WORK…WORK THE PLAN

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Daily Huddle: How

- Superintendents/Foremen huddle every day
- Status Weekly Work Plan Daily
- Held in front of Weekly Work Plan Boards
  - Or with Weekly Work Plan in hand
- Be respectful time
  - 10-15 minutes
- Each Superintendent/Foreman report out their work

Daily Huddle

Photos Courtesy of: Brasfield & Gorrie

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Activity: Tiny Home - Work the Plan

- Perform 1 week of Daily Huddles to process your WWP
- For each day, trades with activities draw ‘variance’ cards
- For activities completed as planned, record ‘Yes’
- For impacted activities, record ‘No’ and reason for the variance
- Are there things we can do today adjust for variances that may reoccur tomorrow?

15 Minutes

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Learning While Doing

Executing the weekly work plan, variances and tracking plan reliability.

Learning/Improving

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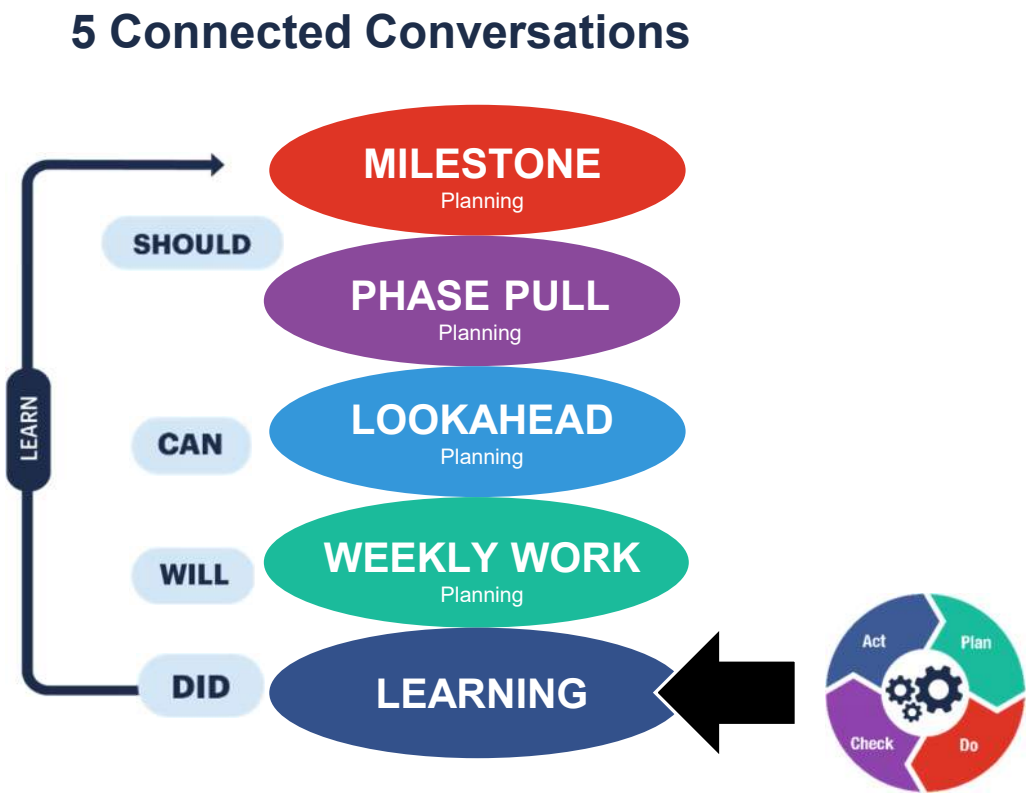
The fifth conversation is *Learning/Improving*.

The goal is for the team to *learn* from the cycle and take *actions for improving* going forward fulfilling PDCA.

The conversation is what we *"Did"* and *"Learned"*.



The Importance of PPC

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The *Percent Plan Complete* (PPC) is calculated for the period or week.

PPC is the basic measure of how well the *planning system is working*

Percent Plan Complete (Plan Percent Complete)

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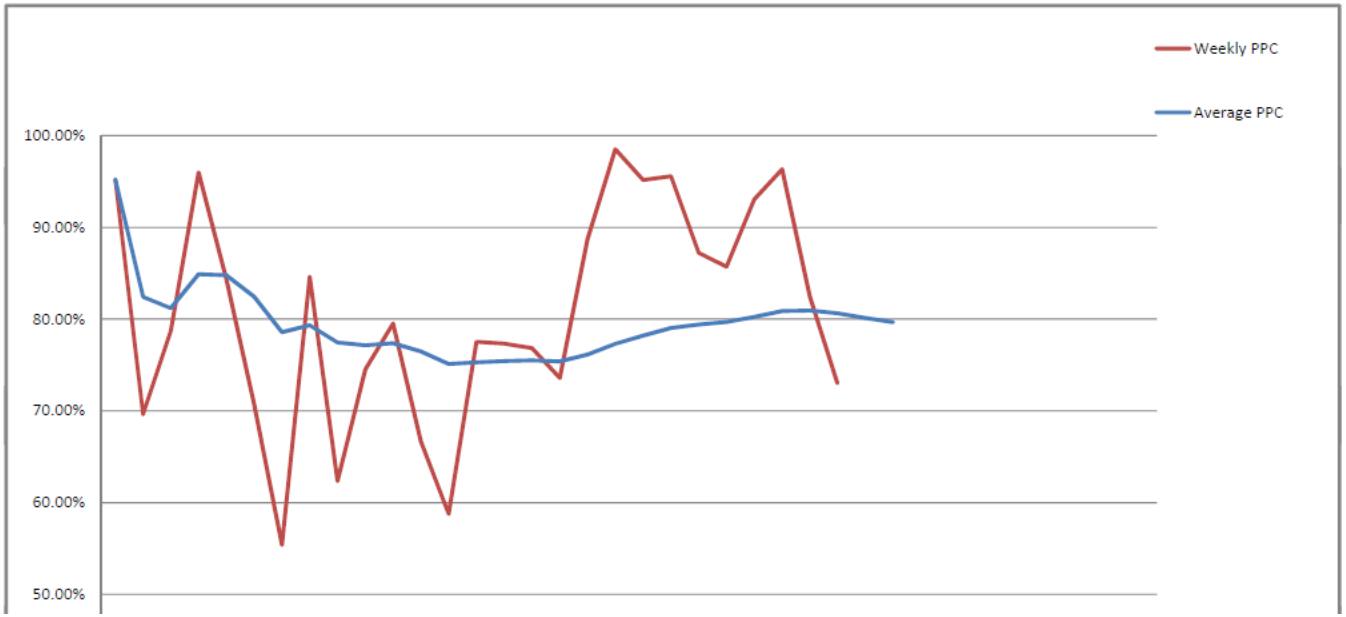
OVERALL PLAN PERCENT COMPLETE

PROJECT AREA
THEATERS

Current Overall PPC = 79.67%
As of: 6/1/2014

Week #	Week Ending	Number of Tasks	Number Completed	PPC	Average	Tasks Not Done
1	11/17/2013	21	20	95.24%	95.24%	1
2	11/24/2013	79	55	69.62%	82.43%	24
3	12/1/2013	47	37	78.72%	81.19%	10
4	12/8/2013	50	48	96.00%	84.90%	2
5	12/15/2013	83	70	84.34%	84.78%	13
6	12/22/2013	99	70	70.71%	82.44%	29
7	12/29/2013	65	36	55.38%	78.57%	29
8	1/5/2014	52	44	84.62%	79.33%	8
9	1/12/2014	85	53	62.35%	77.44%	32
10	1/19/2014	98	73	74.49%	77.15%	25
11	1/26/2014	83	66	79.52%	77.36%	17
12	2/2/2014	66	44	66.67%	76.47%	22
13	2/9/2014	97	57	58.76%	75.11%	40
14	2/16/2014	89	69	77.53%	75.28%	20
15	2/23/2014	97	75	77.32%	75.42%	22
16	3/2/2014	82	63	76.83%	75.51%	19
17	3/9/2014	106	78	73.58%	75.39%	28
18	3/16/2014	80	71	88.75%	76.13%	9
19	3/23/2014	67	66	98.51%	77.31%	1



Percent Plan Complete

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Last Planner System® Interactive Percent Plan Complete (PPC) Chart

Building Smarter

Project

Date (Weekly Work Planning) Months	1/Jan/23	8/Jan/23	15/Jan/23	22/Jan/23	29/Jan/23	5/Feb/23	12/Feb/23	19/Feb/23	26/Feb/23	5/Mar/23	12/Mar/23	19/Mar/23	26/Mar/23	Three	2/Apr/23	9/Apr/23	16/Apr/23	23/Apr/23	30/Apr/23	7/May/23	14/May/23	21/May/23	28/May/23	4/Jun/23	11/Jun/23	18/Jun/23	Six	25/Jun/23	2/Jul/23	9/Jul/23	16/Jul/23	23/Jul/23	30/Jul/23	6/Aug/23	13/Aug/23	20/Aug/23	27/Aug/23	3/Sep/23	Nine	10/Sep/23	17/Sep/23	24/Sep/23	1/Oct/23	8/Oct/23	15/Oct/23	22/Oct/23	29/Oct/23	5/Nov/23	12/Nov/23	19/Nov/23	26/Nov/23	Twelve	3/Dec/23	10/Dec/23	17/Dec/23	24/Dec/23
Percent Plan Complete	##	##	##	81%	##	##	##	##	##	##	##	##	##	##	##	##	##	##	91%	##	##	##	##	##	##	91%	##	##	##	##	##	##	##	##	91%	##	##	##	##	##	##	91%	##	##	##	##	##	##	##	##	##	##	##	##	##	91%	##
Total Planned Activities [FILL IN]	120	130	95	105	115	110	85	98	107	123	101	93	85	130	68	120	110	115	127	97	87	103	135	120	98	105	117	89	104	78	86	95	113	101	115	141	97	113	123	127	107	100	105	113	94	75	105	92	122	109	128	130
Completed Activities [FILL IN]	95	115	85	85	110	75	79	91	93	111	79	65	79	109	57	95	101	105	111	87	73	91	111	101	89	65	97	73	72	73	73	91	101	92	102	101	81	101	117	113	95	90	101	104	83	71	92	83	101	91	117	119

Reasons for Variance [FILL IN USING CHECK BOXES]	
Prerequisite Work	10
Design Changes/Issues	3
Scope Modification	5
Unclear Information	7
Failed Inspection	7
Labour Constraint	31
Material Constraint	24
Submittals/Contract Docs	3
Unforeseen Conditions	7
Weather	0

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Reasons For Variance

- Factors that prevented a task from being completed as promised.
- Assigned a category of variance.
- Enable a team to identify those areas of recurring failure that require additional reflection and analysis.

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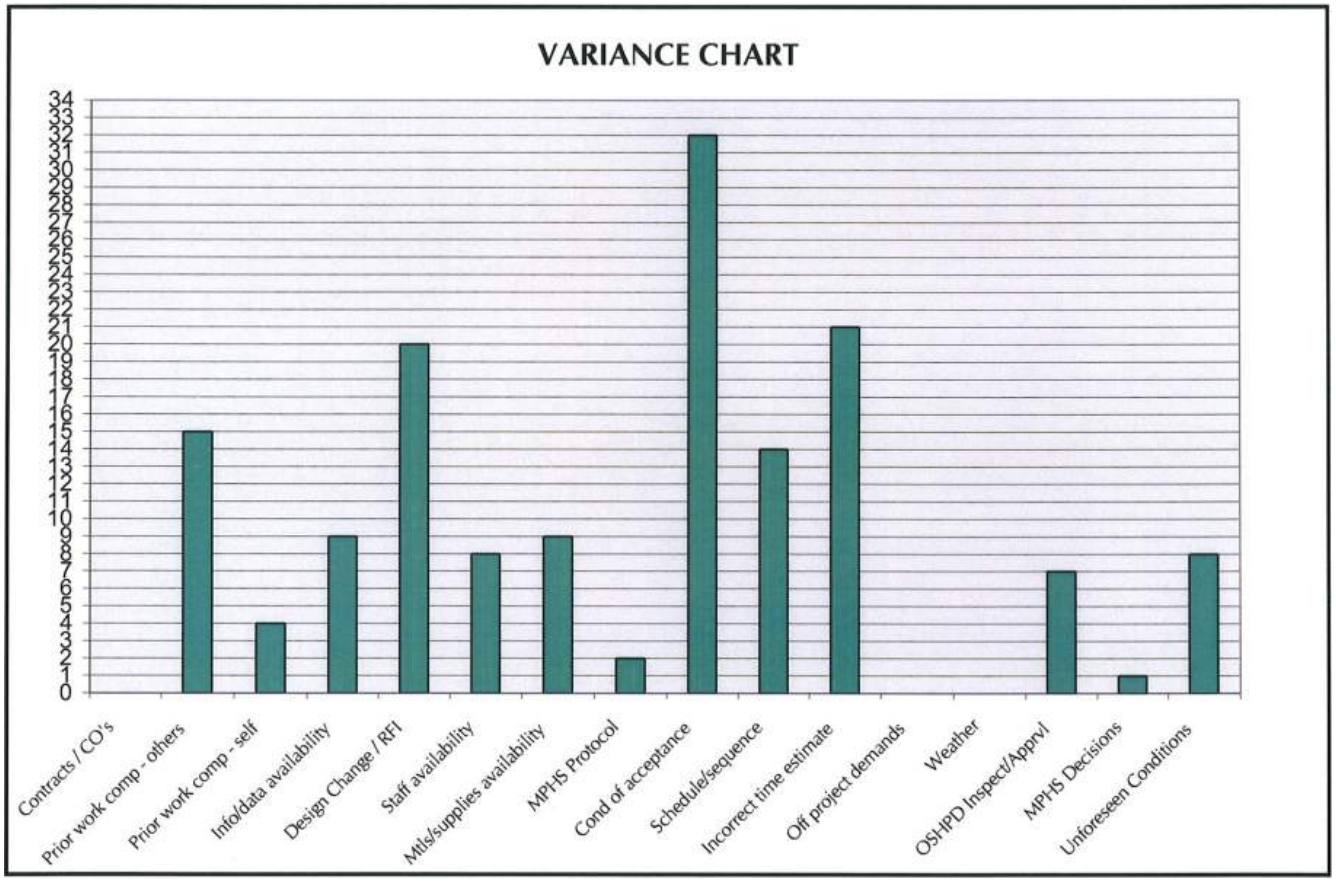
Taking Action For Variance

When a variance or failure occurs, the team must *discuss the likelihood* of it occurring again and determine *actions to mitigate such.*



Successful Weekly Planning Meetings

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- *Consistency* is key
  - Start on time/ end on time.
  - Assign a timekeeper.
  - Everyone in the room that needs to be there.
  - Same expectations for everyone.
- Everyone's voice is heard.
- Last Planners talk more than the facilitator.
- LAP distributed weekly, up to date, and aligns with master schedule and WWP.
- Use Parking lot.

Activity: Tiny Home - Weekly Work Plan Week 2

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Follow Agenda for Weekly Planning Meeting

- Update Variance/PPC Chart
- Discuss weekly work plan variances and PPC – what can we change to improve?
- Observe team dynamic – who is disengaged?
- Have fun!
- Take photos of your planning wall – you're done!

20 Minutes

Weekly Meeting 2 Agenda

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- ☑ Review Plus/ Delta
- ☑ General announcements
- ☑ Last Weeks PPC/ Variances
- ☑ Current WWP Check-in
- ☑ Look Ahead Plan Update
  - Rotate and add new activities
  - Update existing constraints
  - Identify new constraints
- ☑ Weekly Work Plan created/negotiated for next week
- ☑ Round Robin to address any new issues not covered
- ☑ Plus/Delta

Benefits of LPS

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1. Improves communication & reliability.
2. Fosters an enjoyable environment, trust, and collaboratior
3. Promotes early stakeholder engagement.
4. Improves visibility of the project plan (transparency).
5. Creates team buy in.
6. Rapid learning through metrics, revealing areas for improvement.
7. Improves planning in both design & construction phases.

Discussion Question: All

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Discussion

What questions do you have from the activities?

15 minutes

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Table Activity: Each Table Assigned 1

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Pick One, Share One

1. How would a trade partner use LPS, even if the GC does not?
2. What should you do when the plan fails in a big way?
3. What can you do to help create “aha” moments to get others on board?
4. How might you scale the system for a small project? A large project?
5. What would you expect to see, feel and hear on a high performing project?

10 Minutes + 5 Minutes (Report to All)

Other LPS Considerations…

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Transforming Design and Construction

Master Schedule & Technology Integration

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What the Tech.?

Choosing By Advantages Study for Selection of Digital LPS Software

LEGEND
Underline Least Preferred Attribute
Yellow Highlight = Most Important Advantage in Factor
1 = No Advantage Circle = Paramount Advantage

	FACTORS	CRITERIA		Alternative 1 Touchplan		Alternative 2 Oracle		Alternative 3 Spiekerpoint		Alternative 4 Hoylu		Alternative 5 QJean		Alternative 6 vPlanner		Alternative 7 Nialli	
1	Integration with other software	More integration with PowerBI is better	Attribute	PowerBI - import		PowerBI - live link		PowerBI - live link		PowerBI - no live link		PowerBI - live link		PowerBI - live link		PowerBI - live link	
			Advantage	Better BI integration	57	Twice the BI integration	80	Twice the BI integration	80	1	0	Twice the BI integration	80	Twice the BI integration	80	Twice the BI integration	80
2	Integration with other software	More integration with P6 is better	Attribute	P6 - export		P6 - live link		P6 - Import/Export		P6 - import		P6 - import		P6 - import/export		P6 - import (view) / Export (Dictation)	
			Advantage	1	0	Less integration	53	Two way integration	92	1	0	1	0	Two way integration	92	2	1
3	Ability to create workplans from the pull plan	More ability to filter, sort, and produce a variety of workflow outputs derived from the logical sequence of dependencies is better	Attribute	Partial automation for transition between levels of LPS		Partial automation for transition between levels of LPS		Partial automation for transition between levels of LPS		Re-automated transition between levels of LPS		Partial automation for transition between levels of LPS		Automated transition between levels of LPS		Partial automation for transition between levels of LPS	
			Advantage	Partially Automated	45	Partially Automated	45	Partially Automated	45	1	0	Partially Automated	45	Fully Automated	90	Partially Automated	45
4	Pull Plan as a Sequence of Commitments	More ability to link individual tasks within the plan to create dependencies to other tasks such that the plan maintains the project logic through ongoing planning, re-planning, forecasting, constraint identification, critical path, and testing of alternate set-based design scenarios is better	Attribute	Shows problem		Shows problem		Shows problem		Shows problem		Shows problem (not author)		Shows problem, impact with option to logically reorganize		Shows problem	
			Advantage	Better Solution	44	Better Solution	44	Better Solution	44	Better Solution	44	1	0	Much Better Solution	88	Better Solution	44
5	Reporting - in Software Tracking	More in software tracking for PPC, constraint, variance is better	Attribute	Basic in software tracking		Extensive in software tracking		Extensive in software tracking		Moderate in software tracking		Basic in software tracking		Extensive in software tracking		Basic in software tracking	
			Advantage	1	0	Extensive tracking	84	Extensive tracking	84	Moderate tracking	42	1	0	Extensive tracking	84	1	0
6	Reporting - Task Filtering and Viewing Options	More in software filtering for tasks (individual, company, area, etc)	Attribute	Basic task filtering and viewing options		Moderate task filtering and viewing options		Moderate task filtering and viewing options		Basic task filtering and viewing options		Basic task filtering and viewing options		Extensive task filtering and viewing options		Moderate task filtering and viewing options	
			Advantage	1	0	Moderate filtering	45	Moderate filtering	45	1	0	1	0	Extensive filtering	90	Moderate filtering	45
7	Ease of use - Mobile Use	More functionality of mobile app is better	Attribute	Moderate mobile use		Basic mobile use		Moderate mobile use		Basic mobile use		Moderate mobile use		Moderate mobile use		Basic mobile use	
			Advantage	Moderate mobile use	70	1	0	Moderate mobile use	70	1	0	Moderate mobile use	70	Moderate mobile use	70	1	0
8	Ease of use - Transition from Digital to Physical Big Room	More capability to create new information via touch and have a more flexible view (longer duration) is better	Attribute	Extensive - capability to create new information via touch and have a more flexible view (longer duration)		Moderate - interactive touch with display		Moderate - interactive touch with display		Moderate - interactive touch with display		Basic - shows the display on the work area		Extensive - capability to create new information via touch and have a more flexible view (longer duration)		Extensive - capability to create new information via touch and have a more flexible view (longer duration)	
			Advantage	Much better transition	70	Better transition	50	Better transition	50	Better transition	50	1	0	Much better transition	70	Much better transition	70
9	Ease of use - is it easy to operate?	More user approachability with ease of manipulation and functionality is better	Attribute	good = looks very approachable + has great functionality and is easily maintained		Not user friendly		good = looks very approachable + has great functionality and is easily maintained		Semi-Proven very approachable, software installation required		Not user friendly		Semi-Proven very approachable, software installation required		good = looks very approachable + has great functionality and is easily maintained	
			Advantage	Much easier to operate	639	1	0	Much easier to operate	639	Easier to operate	64	1	0	Easier to operate	64	Much easier to operate	639
10	Archival retention	More ability to capture and retain a record of previous plans, versioning both live (potential to revert to a previous plan) and archival, in addition to change history is better	Attribute	Supports Snapshots that can be made to be primary		Supports Snapshots that can be made to be primary		Can Easily roll back to specific time/date		Moderate		Supports Snapshots that can be made to be primary		Supports Snapshots that can be made to be primary		Supports Snapshots that can be made to be primary	
			Advantage	Better Archival Retention	61	Better Archival Retention	61	Much better archival retention	78	1	0	Better Archival Retention	61	Better Archival Retention	61	Better Archival Retention	61
11	Value adds	More technical support is better	Attribute	There is live user support and a customer success rep is assigned to the project		Technical support is available		Technical support is available		Limited tech support		Technical support is available		Ongoing technical support is available however there may be a lag in answering. Sales wrote the program and is an industry expert in last planner and cons		All manuals or tutorials, training documentation, support is included	
			Advantage	More better tech support	56	Better tech support	22	Better tech support	22	1	0	Better tech support	22	Better tech support	22	Better tech support	22
12	Value adds	Touch enabled is better	Attribute	Touch enabled		Touch enabled		Touch enabled		Touch Optimized		Touch enabled		Touch enabled		Touch Optimized	
			Advantage	Touch enabled	68	Touch enabled	68	Touch enabled	68	1	0	Touch enabled	68	Touch enabled	68	1	0
13	Value adds	More inclusive training is better	Attribute	Advanced training		Basic training		Advanced training		No formalized training		Basic Training		Basic training included		Basic Training	
			Advantage	Much better training	58	Better Training	31	Much better training	58	1	0	Better Training	31	Better Training	31	Better Training	31
14	Security & Guaranteed Uptime	More adherence to standard security protocols and SLA is better	Attribute	Adheres to industry standard security protocols but no SLA		Adheres to industry standard security protocols and SLA		Adheres to industry standard security protocols and SLA		Adheres to industry standard security protocols and SLA		Adheres to industry standard security protocols		*		Adheres to industry standard security protocols and SLA	
			Advantage	Much better security	28	Much better security	28	Much better security	28	Much better security	28	Better Security	28	1	0	Much better security	28
15	Security & Guaranteed Uptime	More regular updates is better	Attribute					Regular updates to software						Regular updates to software		Regular updates to software	
			Advantage	1	0	1	0	Better updates	28	1	0	1	0	Better updates	28	Better updates	28
	Total Advantage Points			Touchplan	488	Oracle	415	Spiekerpoint	898	Hoylu	260	QJean	413	vPlanner	936	Nialli	814

What the Tech.?

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Group Discussion

How does Technology support our LPS Efforts?

5 minutes

Planning Cycles & Benefits

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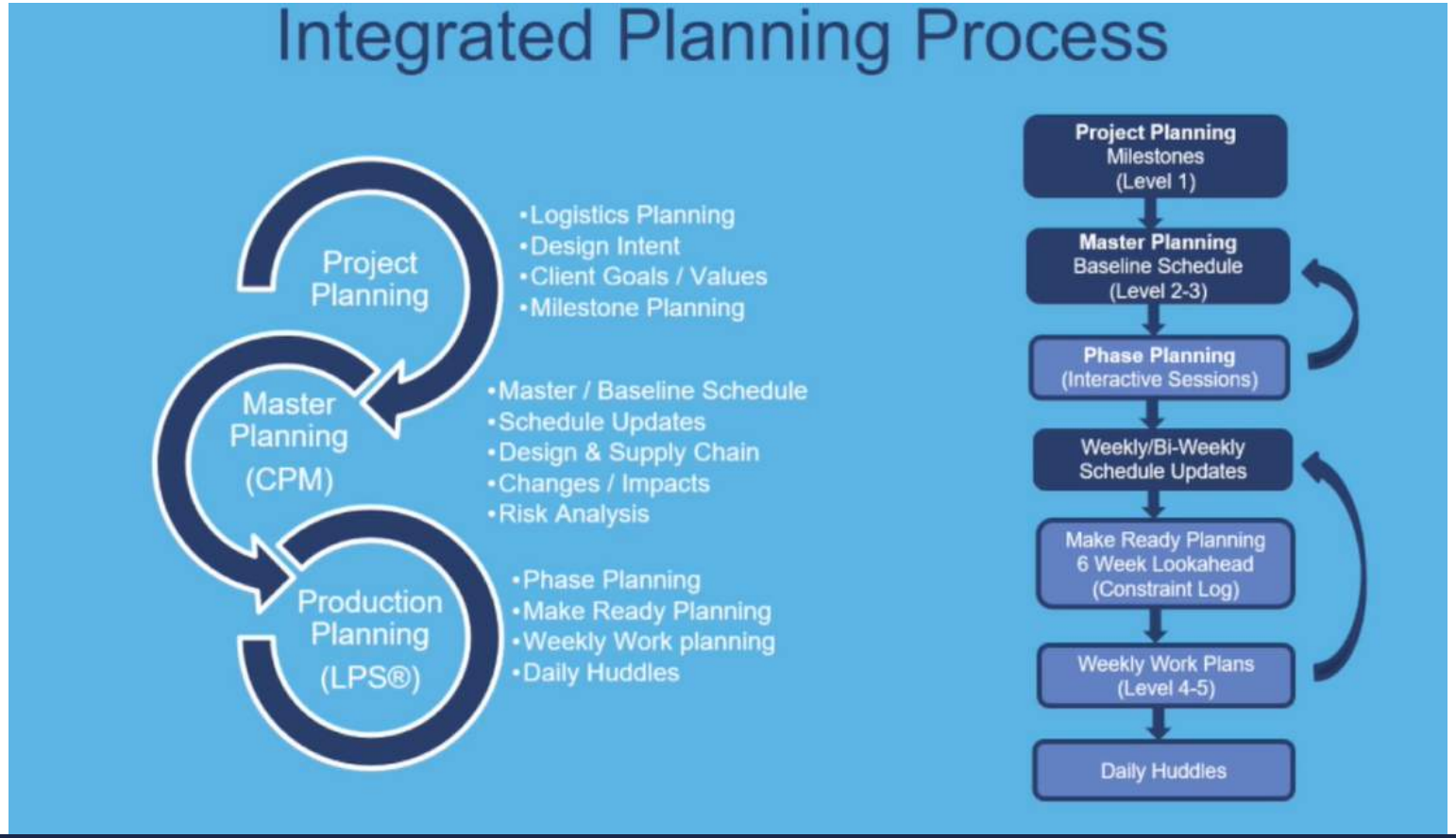

Managing by Means vs. by Results

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IN THE OFFICE

Modern Management:

- Authority
- Results
- Give answers
- Plans
- Formal education
- Staffs improve processes
- Decisions made remotely with data
- Standardization by staff
- Go fast to go slow
- Vertical focus
- Focus on KPIs

Lean Management:

- Responsibility
- Process
- Ask questions
- Experiments
- Workplace learning
- Line mgrs. and teams do
- Decisions made in workplace with facts
- Standardization by line mgrs.
- Go slow to go fast
- Horizontal focus
- Focus on people

AT THE PLACE VALUE IS CREATED

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Remember…..

- Your Boards/Format/Forms and other artifacts may *look different* from what we showed you today. Or even different from project to project.

- That is not a problem – as long as you are staying true to the *foundational principles of LPS* – the right people having the right conversations in order to make and keep reliable commitments.

- Likewise the forms and artifacts don't make the system work. It's the *conversations coupled with continuous improvements* that make the system work.

Revisit Flip Chart – Key Take-Aways

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Revisit Flip Chart from the day:

What have you seen or learned that will influence your approach to LPS and Last Planners.

- **Discuss remaining questions**
- What next actions will you take to continue to implement your learning today?

Learning Objectives Reviewed

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Identify the essential foundational principles of each of the 5 connected conversations of LPS.

Engage in all of the connected conversations of LPS® from Milestone Planning to daily interaction through practical application.

Experience the process of constraint management to improve project workflow.

Gain practical insight to effectively use Percent Plan Complete (PPC) and variance to improve reliable project plan execution.

LPS Benchmark

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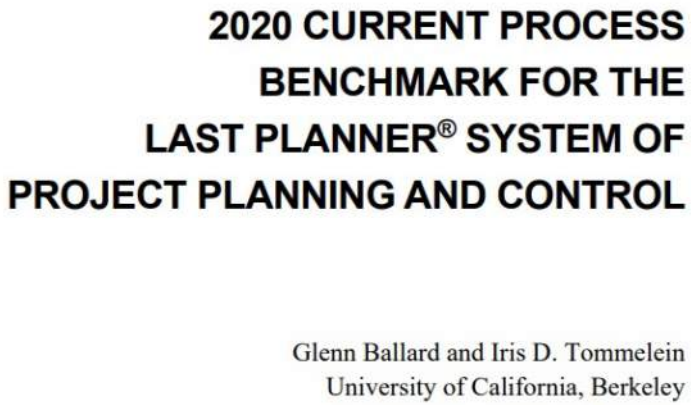
P2SL

https://p2sl.berkeley.edu/wp-content/uploads/2021/03/Ballard_Tommelein-2021-LPS-Benchmark-2020-2.pdf



2020 CURRENT PROCESS BENCHMARK FOR THE LAST PLANNER® SYSTEM OF PROJECT PLANNING AND CONTROL

Glenn Ballard and Iris D. Tommelein
University of California, Berkeley

Lean Construction Institute
Immersive Education Program

+ What went well?

- ...

△ What would you change?

- ...

26TH LCI CONGRESS
OCTOBER 22-25, 2024

In the spirit of continuous improvement, we would like to remind you to complete this session's survey! We look forward to receiving your feedback.

26TH LCI CONGRESS
OCTOBER 22-25, 2024

Thank you for attending this presentation. Enjoy the rest of the 26th Annual LCI Congress!