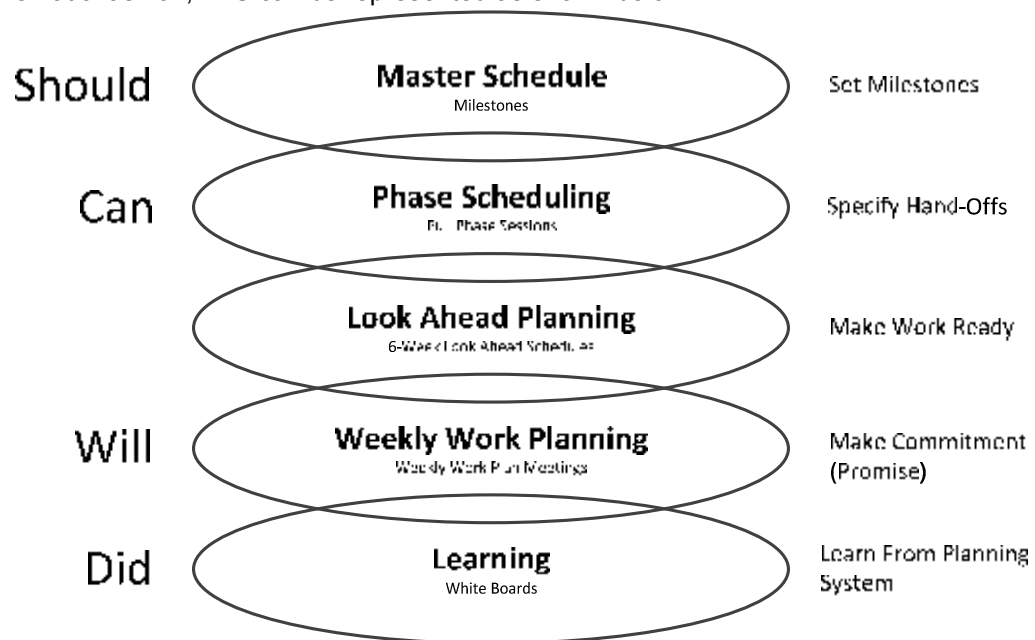


1. **Last Planner® System of Production Control**

1.1 The Last Planner System of Production Control or LPS is an important component of lean construction and the one that has been widely implemented. The LPS was developed to produce predictable workflow and rapid learning. This produces maximum value to the Owner and Contractors by eliminating waste caused by unpredictable workflow. Its use has enabled contractors to reduce the delivery time of the project and at the same time allowed specialty contractors to improve utilization of their resources.

1.2 The LPS requires team members to make and keep commitments based on their confidence that prerequisite work, design information, materials, labor and equipment will be ready so they can start and complete installations to meet Master Schedule milestones. Specialty contractor supervisors are expected to plan together with other trades in building a “Phase Schedule” for each major phase of work on the project in which they will be participating. In the Phase Planning Meeting, specialty subcontractor supervisors structure the flow of work and design the network of commitments by identifying hand-offs between trades. Each onsite supervisor is considered a “Last Planner” in the LPS, and has the responsibility to plan their activities six weeks ahead in a “Lookahead Schedule” and to identify crew assignments for the current and next week in a “Weekly Work Plan”. **Last Planners are asked to commit to performing work that they know can be made ready for their crews and to refuse to assign work they are not confident can be started and/or completed because it is not ready.** It is this cycle of planning and commitment coupled with learning from seeing the results which creates reliable workflow.

1.3 In schematic fashion, LPS can be represented as shown below:



1.4 As displayed in the above diagram, the LPS is based on milestones from the Master Schedule which are used to identify phases. The effort to determine work flow in the Phase Schedule takes place in a Phase

1.5 Planning Session involving the Last Planners and in most cases the Owner and designers. When this work flow plan is converted to a Gantt chart or CPM type schedule and reformatted/filtered to represent the next six week’s work, it becomes known as the Lookahead Schedule and is the basis of planning and constraint identification. It also identifies those activities that must be included in the Weekly Work Plan (WWP) - the commitment list for the work force. Typically the Lookahead Schedule is developed on the project scheduling system (MS Project, Suretrack, Primavera P5 or 6, etc.) and the WWP is based on an Excel spread sheet.

- 1.6 An important part of the LPS is the monitoring and reporting of the team's success in meeting their commitments and the learning developed when the failures are discussed and improvement strategies put in place.
- 1.7 Use of the LPS requires certain, specific behavior and actions on the part of specialty subcontractors which are described as follows:
 - 1.7.1 Onsite subcontractor (SC) supervisor or foreman must know and understand the latest information about the status of contract issues, submittals and shop drawings, material and equipment deliveries, RFI's and changes orders, safety training, labor and construction equipment availability.
 - 1.7.2 Onsite SC supervisor has the ability to plan work for his organization and authority to make commitments to the project in order to execute that plan.
 - 1.7.3 Onsite SC supervisor and/or his foremen will participate in Phase Planning Sessions that his company is involved in – typically slab on grade, foundations, steel erection, exteriors, etc.
 - 1.7.4 Onsite SC supervisor and/or his foremen will prepare and submit Weekly Work Plans as agreed by the project team.
 - 1.7.5 Onsite SC supervisor and/or his foremen will report and track task completions.
 - 1.7.6 Onsite SC supervisor and/or his foremen will attend and fully participate in Weekly Work Planning meetings (typically less than an hour) and Daily Shift Startup Meetings (typically less than 15 minutes, sometime during the day as chosen by the team – not necessarily at startup).
2. The Bid Schedule included in the RFP documents contains only a skeleton level of detail to create the framework from which Bidders can understand the overall schedule of the Work. Each milestone contains required predecessor activities including, but not limited to, system commissioning, OAT, vendor startup, test and balance, etc. These predecessor activities are required to complete these milestones and will be inserted into the schedule via this collaborative schedule approach and will drive the construction complete of any given system. Many systems contain multiple pieces of equipment that will require the project team to complete much of the equipment well in advance of the milestones to assure all elements can complete with enough time for other activities to complete to achieve any given milestone.
3. This schedule approach will also define the actual dates and durations for each portion of the Bidder's work in a collaborative approach with other subcontractors present such that the correct flow and sequence of the work can be achieved.