

Implementing the Last Planner® System into Cal Poly San Luis Obispo's Construction Management Curriculum

Breanne N. Forster, Student
California Polytechnic, San Luis Obispo
San Luis Obispo, California

The Last Planner System (LPS) is a method of scheduling created by the Lean Construction Institute. The purpose of this project is to introduce the LPS to current students by implementing this lean technique into a construction management lab at California Polytechnic State University, San Luis Obispo. Through discussions with construction professionals and college construction management professors as well as an in depth understanding of the Last Planner System, Forster has successfully created a lesson plan, complete with the necessary materials required in order to properly navigate students through the LPS. Forster is confident this exercise, when applied throughout the course of an entire quarter amid current assignments in a specialized construction lab, will positively influence students' perception of scheduling and will serve as a mechanism to introduce students to the prevalent lean techniques currently seen throughout the construction industry.

Keywords: Last Planner System, Pull Planning, Scheduling, Lean Construction, Construction Management Curriculum

Introduction and Background

As a graduating senior, Forster has competed in four construction management competitions, hosted by the Associated Schools of Construction organization. Two of these competitions were located in Downers Grove, Illinois with Region 3, and two of these competitions took place in Sparks, Nevada with Region 6 and Region 7. In all four competitions, Forster participated in the Preconstruction division.

The ASC Student Competitions encompass a wide range of student roles and responsibilities, while providing opportunity for personal advancement and growth. The Preconstruction division, specifically, is a broad category and requires its team members to be well-rounded and interested in many facets of construction, as the competition problems have ranged from a wastewater treatment plant in Utah to a five-star resort in Hawaii.

Each team member for the competition assumes a particular role, such as Project Manager or Superintendent. One open position for incoming team members on the Preconstruction team was Project Scheduler. Forster was unsure why this role was seen as daunting to the rest of the team. She decided to take on the task of acting as the Project Scheduler, and quickly learned the immense responsibilities attached.

Despite adequate attempts, Forster was unsatisfied with her ability to formulate a logical schedule, use scheduling software, and explain her reasoning for the sequence of her activities. She took it upon herself to discover real world scheduling methods, and came across the Last Planner System.

Forster was intrigued by the system, as the Last Planner System sacrifices the General Contractor's personal control of the schedule. The LPS allows for each subcontractor to provide realistic dates for his individual trade and what needs to be accomplished in order for these dates to be achieved. Each trade commits to the specified dates he has laid out for himself, keeping the subcontractor accountable, honest, and forward thinking. By building the schedule from right to left, rather than the traditional method of left to right, the schedule becomes as compact as possible. The Last Planner System facilitates conversation and discussion among trades and holds subcontractors accountable for their promises, which contributes to the success of this system.

Project Goals

The primary goal for Forster's project involves creating a lesson plan to be executed in a construction management lab. Forster wants to provide students the opportunity to learn about a current lean construction trend, as well as offer students a more hands-on application of scheduling, which would further enforce Cal Poly's "Learn by Doing" motto in the construction management department.

Steps and Process

In order to properly formulate a lesson plan that would convey the steps of the Last Planner System and prove its benefit to the department, Forster first contacted members of industry, in hopes of obtaining a complete understanding of the LPS. Greg Groleau, a Superintendent from Clark Construction, became Forster's primary source of contact. Groleau invited Forster to his current project, the Los Angeles U.S. Courthouse, to show her the LPS "in action". Forster met with Groleau on April 22, 2016. The project was near completion at this point in time, allowing Groleau to fully convey his opinion about and experience with the Last Planner System.

On this Design-Build project, the client, General Services Administration (GSA) required that the LPS be utilized. Groleau noted that prior to beginning the project, GSA hired The Realignment Group to coach and train the Clark team on the Last Planner System. In order to combat subcontractor's unwillingness to participate in the LPS, Groleau mentioned it is often written into their subcontract that they must take part in the LPS.

Groleau spoke highly of the LPS, and mentioned to Forster that he would prefer to work with subcontractors who have participated in the LPS before, or showed enthusiasm towards the method. Forster felt refreshed to meet a seasoned superintendent embracing, and enjoying, new techniques in construction.



Figure 1: Last Planner System "In Action"
Source: Clark Construction; Los Angeles U.S. Courthouse Project
Date Taken: April 22, 2016

Deliverables

Following her meeting with Groleau, Forster evaluated the current course schedule in CM 413 Jobsite Construction. Forster was enrolled in CM 413 with Professor Philip Barlow during the spring quarter of 2016, from the end of March to early June. Forster used the current layout and syllabus of the course, combined with her personal experience, to create a schedule that would integrate the Last Planner System into the curriculum. Forster also created a PowerPoint presentation, explaining the LPS in depth.

Course Schedule Breakdown

In week one of the course, the students will be introduced to the project for the quarter. For example, throughout the quarter in which Forster was enrolled, the students worked with the plans and specifications for the Simpson Strong Tie Materials Demonstration Lab, on the Cal Poly San Luis Obispo campus. Also in week one, the students will be assigned to an individual subcontractor role and will be asked to complete an assignment requiring each student to write a subcontract, making sure to include their acknowledgement of the mandatory use of the Last Planner System, and identification of scope inclusions and exclusions.

Throughout week two of the course, the professor will present Forster's PowerPoint, which discusses the Last Planner System and provides students with an overview of the process. In week two, the class will have their first LPS meeting and discussion, where the class as a whole will participate in step one of the Last Planner System, master planning. Here, the students and professor will recognize project milestones, phase out the project, and identify subcontractors in each phase. This week, students will be asked to identify individual constraints for their trade, and will need to formulate a trade specific schedule, preferably through Primavera P6, as it is more widely accepted in industry. Students will also be split into "General Contractor" (GC) groups, being sure that no students in GC Group 1 have a subcontractor role in the final phase, no students in GC Group 2 have a role in the second to final phase, and so on.

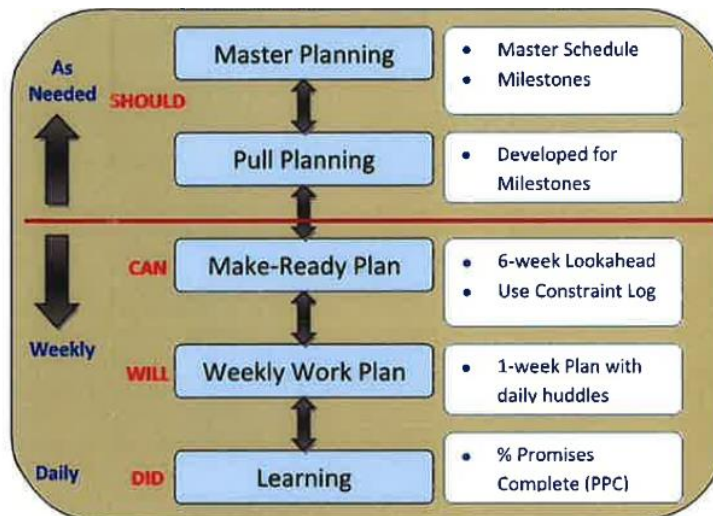


Figure 2: Last Planner System Flow-Chart

Source: Lean Construction Institute

Week three of the course will introduce the second step of the LPS, pull or phase planning. GC Group 1 will hold a pull-planning session with the subcontractors in the final phase, while the remainder of the class will act as spectators. The subcontractors will be asked to come to class with each of their activities written on individual “Post-It” notes. The GC and subcontractors will work from the final milestone of the project backwards to the milestone which begins the final phase in order to build the schedule. Here, the professor will also provide the GC Group of the week with a “curveball” directly effecting the schedule, in which they must come up with a solution to keep the project on track. The GC Group of the week will then compile the activities at the end of the session into a schedule which will be passed from GC Group to GC Group weekly. This process will continue until the project schedule is complete.

In roughly week eight, or after the project schedule is complete, the class will re-create the final step of the LPS, the learning step. Here the class will identify what obstacles they have encountered throughout the course, if the obstacles were recurring, and will create a way to prevent these issues or “constraints” in the future.

Last Planner System Summary Schedule
Week 1: Introduce students to project; Assign subcontractor roles; DUE: Subcontract assignment
Week 2: LPS PowerPoint presentation; Set project milestones and project phase as a class; DUE: Constraint identification & trade specific schedule
Weeks 3-7: Pull-planning sessions starting with final phase & ending with first phase; DUE: Participation in Last Planner Session; Activities written on “Post-It” notes; GC Group deliverables
Week 8: Lessons learned; Compare LPS to traditional scheduling; DUE: Reflection on experience

Figure 3: Last Planner System Implementation
Source: Breanne Forster; Deliverable

New Knowledge

Through this experience, Forster discovered and became more familiar with a current real-world trend. Meeting with Groleau was an extremely beneficial experience for Forster. Groleau helped her gain confidence in her own skills, and commended her for dedication to make herself a stronger scheduler and better incoming member of industry. Forster feels that her colleagues should also be exposed to this lean type of construction, a primary goal of her project. This new knowledge should be passed from Forster to her classmates, and one day coworkers to help edge them above the rest.

This approach to scheduling may also be considered a type of new knowledge gained through this experience. Traditional scheduling builds a project schedule from left to right, however the Last Planner System is progressive in its approach. Working backwards allows the schedule to become as compact as possible, and allowing the subcontractors to take the lead shows trust in them and recognition of their talent and knowledge. Being exposed to the LPS will help students understand that talking to and learning from one’s subcontractors is necessary for a successful job.

This project helped Forster gain new knowledge regarding her aspirations for the future. Forster hopes to return to Cal Poly San Luis Obispo to become a professor in the construction management department. This process has allowed Forster to obtain experience in formulating a lesson plan and implementing a way to properly express the lesson to the students. While this process proved to be difficult, Forster believes that being a current student provided her with a different outlook to teaching, when compared with long-term professors. This lesson plan was created by a student, for students, in turn making it relatable and simple to understand.

Application to the Construction Industry

As a construction management student herself, Forster feels that the introduction of this knowledge to her colleagues will positively influence their perception of scheduling and will increase students' reliance on and realization of the need for subcontractors' input to create a successful project. Groleau confirmed that he strongly feels the LPS should be introduced in all construction management programs. Groleau agreed with Forster that teaching this technique would better prepare students for industry, and may push more students towards the superintendent route of construction, where there is a lack of interest. Implementation of the Last Planner System creates an opportunity for students, and professors, to gain knowledge about a current real-world trend, growing rapidly.