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Community for Business Advancement

Lean Construction Institute
Transforming the Built Environment

AWP + Lean: Exploring Opportunities

Better Together

Special Report 22-01a

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Lean and AWP

Lean Construction and Advanced Work Packaging (AWP) may have different process and framework descriptions, but they share the goal of improving the efficiency and quality of capital project delivery. Both approaches emphasize constraint management to ensure on-site and off-site productive construction-related activities including off-site fabrication and pre-assemblies. In addition, both have emphasis on broad stakeholder engagement and input during early planning to facilitate alignment and improve coordination. The management of constraints across the project lifecycle and the assurance of a smooth and timely flow of integrated work and associated deliverables (physical and information) are central goals of both Lean Construction and AWP. A clear commonality and key value between the two methodologies is the recognition that safety, health, and the well-being of the worker can be designed into the process.

That being said, Lean Construction and AWP are not identical. Primary differences are in their descriptions of approaches, and each approach has its unique methods. Lean Construction is based on the philosophy of developing a value-driven culture of mutual trust and respect to support production and leveraging a set of tools for deployment. AWP is described in a more structured context of additions and enhancements to typical execution in the industrial sector through defining and organizing constraint-free executable work packages.

Early Planning

Lean Construction emphasizes culture and collaboration, leveraging "Big Room"-style meetings where all stakeholders and participants gather to share information, establish and align plans for the project, and generally achieve project delivery alignment across stakeholders. In the context of early planning, these meetings are often used to facilitate "Target Value Delivery," a disciplined management practice that is used throughout the project to assure that the facility meets the operational needs and values of the users, is delivered within the allowable budget, and promotes innovation throughout the process to increase value and eliminate waste (as measured in time, money, human effort). In Lean Construction, Big Room meetings are an essential component to achieving the goals of increasing value and collaboration across project stakeholders.

AWP has similar interactive planning sessions involving all key stakeholders and disciplines to develop alignment. Interactive planning begins early in the project during early planning. These meetings and associated pre- and post-meeting process steps are directed to developing an integrated plan for project execution from design through construction, commissioning, and startup to turnover to the client. This plan generally involves establishment of Construction Work Areas (CWAs) and follows a Path of Construction (POC) that defines the overall execution sequence for the project. Closely linked to the POC is the development of Construction Work

Packages (CWPs) and Engineering Work Packages (EWPs), which have geographically aligned boundaries. Generation of aligned CWPs and EWPs is a key outcome of early planning in AWP. Management of CWPs and EWPs is then a central component of AWP through detailed design and procurement and into construction, where CWPs are available for look ahead planning and are translated into multiple Installation Work Packages (IWPs) for field execution.

Field/Yard Execution

Both AWP and Lean Construction have a strong emphasis on making the field more productive (including modular yard, offsite fabrication, and preassembly activities).

Lean Construction is strongly associated with constraint management and production shielding via the Last Planner System® methodology of planning, which shields production from work that is not ready by putting in place a process to identify and remove constraints (such as missing materials or unavailable equipment). A central concept within the Last Planner System is that the Foreman (frontline field supervision), who is the Last Planner®, is responsible for engaging the constraint management processes to organize and release work to the field with all constraints resolved.

Short-range production planning is also closely associated with Lean Construction and the Last Planner System to help prioritize work that is to be performed as well as constraint management efforts. Short interval planning is typically used to support decisions about which work to perform and to translate network plans into field work plans. Line of balance, pull-planning, and Takt planning are also often associated with the Lean/Last Planner System field management efforts to assure a steady cadence of field work and avoid overlaps or blockages across trades. All of these roles and concepts work to support creating and sustaining flow in the work.

AWP is similar to Lean insofar as it has a strong constraint management process for field execution: Workface Planning. Field work is bundled into IWPs, which are drawn from CWPs. IWPs are discipline-specific, small, logically discrete units of work (typically no more than a week or shift's worth of work for a crew). IWPs are released to the field when all constraints have been removed. Management of IWP execution and associated constraints is typically performed using a look ahead schedule and IWP Release Plan. IWPs are released to a structured plan, but flexibility is maintained to allow for changed conditions.

Responsibility for IWP definition and management is performed by a dedicated workface planner, a specialized role that is an adjunct to the traditional field supervision structure in place on projects. Ensuring the work is constraint-free, integrated, and properly executed, workface planners should be craft-knowledgeable and have the ability to work closely with foremen, general foremen, and superintendents, as well as any constraint owners in planning

and releasing field work. The role of the workface planner is seen as an aid to field supervisors, freeing up time for the supervisors to work as intended in the field with the crews. Note that, since IWPs are typically several days' worth of work, foremen are still deeply involved in planning and managing field construction within the scope of work assigned to the IWP.

Different Strengths

Lean Construction is well known as both an execution philosophy and a set of approaches and tools. A philosophy of respect for people lies at the heart of Lean culture. Regular "kaizen" (continuous improvement) events reflect the belief that "with every pair of hands comes a free brain." Underlying the inclusivity of Lean is the assumption that the most innovative ideas to enhance productivity can often be drawn from those who actually perform an activity. By contrast, the practice of engaging workers to help identify and develop creative ways to reinforce flows, add value, and reduce waste is generally not a primary part of the AWP conversation and holds untapped value for AWP practitioners.

Most Lean tools (e.g., The Last Planner System® of Production Control, Target Value Delivery, Set-Based Design, Choosing by Advantages) rely on team collaboration. Ideally, there are no "subcontractors" on Lean projects, but rather "trade partners." This culture of respect extends throughout a lean project's supply chain. Lean has been shown to improve not only the three-legged stool of time, cost, and quality, but safety and morale as well. It is the "respect for people" part of the lean philosophy—what values stakeholders not only for their labor, but also for their creative ideas—that is likely responsible for the morale boost often reported by those engaged in lean projects.

Adopting a Target Value Delivery approach for designing and delivering the project will assure that early planning activities are more effective at extending and expanding collaborative AWP processes earlier into planning and increasing value to the project. Lean production modeling and planning techniques could be added as overlays and additions to AWP processes to bring more value to production. Similarly, a focus on reducing waste from all sources could add additional value to AWP execution, particularly when mapping AWP processes to firms' work processes during implementation efforts.

AWP is heavily process-centric in its approach, giving a more end-to-end description of which actions a project should undertake to achieve its objectives. These processes are heavily built on some well understood practices within the industrial sector and also rely on demonstrated CII Best Practices, such as Front End Planning, Planning for Startup, and Constructability. Integrating detailed process descriptions into existing practices makes implementations more consistent and repeatable; translated to other sectors, these processes could enhance the programmatic value of Lean implementations.

Breaking the project into explicit and coordinated CWAs, CWPs, EWPs, and IWPs requires a level of discipline that exceeds typical design practices in the Lean world. Translation to CWPs and EWPs may help fast-track projects increase planning for design coordination with construction schedules and increase tracking for progressing against an integrated schedule. Work packages have also been shown to be compatible with BIM, so AWP can be associated with digital project delivery efforts.

Clearly, AWP practitioners can take advantage of proven Lean Construction techniques to further increase collaboration, reduce waste, and achieve better project outcomes. Likewise, Lean Construction practitioners can take advantage of the rigor of proven AWP techniques to introduce more structure to project delivery to increase planning and delivery capabilities. Furthermore, with ever-increasing use of technology, both groups could learn from each other to achieve an advantageous level of "industrialized" construction that considers all key People, Process, Technology, and Culture factors.

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