

Engineer's Corner

Early Construction Packages For Your Project?

In today's marketplace, more projects are considering or requiring early construction packages, particularly as rising costs erode project budgets established well in advance of construction.

The answer to the question of whether a project will benefit from an early construction package depends to a large extent on the size of the project, the work that must be accomplished in order for construction of the main building to get under way and the method of project delivery. Assuming in broad terms a project team consists of an owner, contractor, and design team, the relative advantages and disadvantages of early packages depend on the vantage point of each stakeholder. Projects with early packages require experienced personnel from all team members with the ability to make competent decisions early in the design process based on a thorough understanding of project requirements. Since many of the items typically included in an early package would, in a more conventionally planned and executed project, be shaped by factors identified in later design phases, the design process becomes somewhat reversed. Early decisions must be accompanied by close coordination among stakeholders, combined with continual communication between the contractor and the design team and a willingness by the owner to abide by early decisions in order to minimize the expense of changing course after the results of those early decisions get "baked in" to the design and actual construction.

There are a number of advantages to one or more early construction packages, nearly all of them tied to allowing complex projects to begin earlier than otherwise might be possible if all design work needed to be complete prior to construction start. For certain building types like health care, labs and other facilities that involve complex systems, an early start may be crucial to help offset the extended design times required for these building types. If an existing facility occupying the project site needs to be gutted or demolished, an early start can prepare the way for the new building and

expose unforeseeable conditions that the design process may address more proactively than if a condition is made known after design documents are complete and construction underway.

Other operations regularly incorporated into early construction packages include installation of new or relocated site utilities, road and walkway relocations and project access, geotechnical monitoring or remediation, tree protection and mass grading in preparation for building construction. Particularly on tight urban sites, it may be necessary to complete these operations early in order to provide contractors with a staging area.

Beyond site preparation, sites with complex and/or deep foundations can benefit from an early foundation package consisting of excavation, excavation support (sheeting, shoring, and underpinning), and the actual building foundations. Often the foundation package can be issued for construction soon after the design has reached Design Development, about halfway through the design process. Advance information is required from the project team for proper coordination of foundation construction. Typically foundations are designed after the loads imposed by the upper structure are known and the framing design is nearly complete. However, if an early foundation package is required, the design process may need to be reversed to some extent to allow the foundation design to be completed before all aspects of the upper levels are finalized.

A building superstructure package may be part of a larger first construction package or because it may embody mechanical, electrical and plumbing rough-ins, it may be a standalone intermediate, but nevertheless "early" package. For a structural steel project this early package allows the contractor the ability to begin work with a steel fabricator in advance of the complete design package. The building superstructure or shell package can often save weeks of time in the overall project schedule.

For all the advantages of early construction packages, potential challenges should be acknowledged. While

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significant time may be taken off the end of the project schedule by beginning construction operations earlier, quite frequently that is offset to some extent by the time required to work through more complex design and permit approval processes. Depending on the contents of the early package, each phase may need to be set up, reviewed, and approved as a “mini-project”. This is particularly true of grading, sediment control and stormwater management approvals. Time gained by seeking approval for the limited scope of an early package may be lost again by having to go through the full review and approval process for each mini-project.

Further, from a design consultant’s standpoint early packages add considerable complexity to the design process and to the production of the design documents. The multiple drawing sets required to separate the overall construction into discrete packages begets a need to determine exactly what features and work belong in which set of drawings. The BIM/CAD programs most commonly used today are not terribly good at dealing with multiple phases in a single project. To be sure, there are features built into the software that attempt to address this and ways to set up projects to produce deliverables in separate phases, but because every project is unique, the out-of-the-box features frequently fall short, and designers have to develop workarounds. This is particularly the case when the need arises to properly display temporary features that will be constructed and removed in early phases as distinguished from permanent features. As the design process comes to a close, the early construction package work is completed, and the main part of the project is well underway, owners usually desire “conformed” documents that integrate all the project phases into a single set of drawings. Depending on the methods used to produce the separate packages, integrating them into a conformed set requires time and clarity. For these reasons, the increased time required to set up, manage, and deliver multiple document packages using BIM/CAD processes may translate to higher design fees.

Lastly, project teams, and particularly owners, need to assess the potential risks associated with early construction packages. In general, the risks and disadvantages born of increased complexity multiply as more scope is added to an early package. Since it

is, at best, difficult and expensive to reconfigure pre-installed work, each additional feature or construction operation requires coordination among other facets of the project as the design contained in the later packages is produced. Later phases must completely coordinate with constructed early package work and it is important to integrate contractor as-built information into the plans. A package or set of packages that includes new building electrical and plumbing rough-ins obviously requires a great deal more front and back end coordination than an early package consisting only of demolition and site preparation. This may limit design flexibility. Another perhaps less apparent risk is that projected costs for later packages may exceed the project budget, but after early package construction is in place and the associated funds have been expended there is no longer an opportunity to value engineer the in-place construction leaving only the unbuilt features open for cost reductions. In the end, this may lead to desired project features being eliminated forever or left for a future time when finances permit them to be incorporated into the project

In the end, each project and every project team is unique. Even corporations that have one or a small hand full of standard building designs adaptable to most common situations find that the site and building permit approval processes required at any given location do not match others. The whole project and all its requirements need to be understood by the entire project team in order for a decision to be made about the scope and merits of an early construction package.

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to design functional and pleasing sites, with construction documents for all project delivery methods, including early packages for complex projects such as the Health Sciences Facility III at University of Maryland, Baltimore and the Edward St. John Learning Center currently under construction at University of Maryland, College Park.

