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FRONT END PLANNING:
BREAK THE RULES, PAY THE PRICE

Construction Industry Institute

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Front End Planning: Break the Rules, Pay the Price

**Prepared by
Construction Industry Institute
Support for Pre-Project Planning Research Team**

**Research Summary 213-1
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Executive Summary

Front end planning is often considered the single most important and valuable process in the capital project life cycle. Also known by such terms as pre-project planning and front end loading, it represents the critical underpinning to any capital project. It is focused on a strong, early link between the business or mission need, project strategy, scope, cost, and schedule and maintaining that link throughout the project life cycle.

CII formed the Support for Pre-Project Planning Research Team to investigate the importance and the value of the process, the resources required to perform the process effectively, and to outline key process “rules.” The research team compiled 17 case studies from projects worth over \$1.5 billion and analyzed project data in excess of \$35 billion. Its focus was on the effectiveness of front end planning, including how it relates to alignment as well as to the use of the popular CII tool, the Project Definition Rating Index (PDRI). The PDRI is a checklist scoring system that provides users a numerical score that reflects how well a project’s scope has been defined. A total score of less than 200 is highly desirable.

The research team found that upfront investment is required, but the resulting savings are more than worth the investment. The team also developed the following critical “rules” of front end planning:

- Develop and consistently follow a defined front end planning process.
- Ensure adequate scope definition prior to moving forward with design and construction.
- Use front end planning tools.
- Define existing conditions thoroughly.
- Select the proper contracting strategy early.
- Align the project team, including key stakeholders.
- Build the project team, including owner stakeholders and consultants.

- Include involvement from both owners and contractors.
- Staff critical project scoping and design areas with capable and experienced personnel.
- Identify and understand risks of new project types, technologies, or locations.
- Address labor force skill and availability during planning.
- Provide leadership at all levels for the front end planning process, including executive and project, owner and contractor.

Projects teams and organizations that break these “rules” will pay the price in terms of disappointing results.

Introduction

Front end planning is defined as “the process of developing sufficient strategic information with which owners can address risk and decide to commit resources to maximize the chance for a successful project.” CII research indicates that well performed front end planning can reduce costs, lead to less project variability in terms of cost, schedule, and operating characteristics, and increase the chance of meeting a project’s environmental and social goals.

Front end planning is arguably the single most important process in the facility project life cycle. It is focused on creating a strong, early link between the business or mission need, project strategy, scope, cost, and schedule and maintaining that link unbroken throughout the project life. Anecdotally, many companies admit that good front end planning is rare; however, it is required for every project.

Pre-project planning is a CII Best Practice. The research team, however, replaced that term with “front end planning” in this study because it believes that the planning process includes efforts performed during the project, not just before as “pre-project planning” implies. In addition, front end planning is more widely used across different industry sectors.

Typical activities and products of front end planning may include:

- Options analysis
- Scope definition and boundaries
- Life-cycle cost analysis
- Cost and schedule estimate
- Site investigation
- Environmental analysis

- Process design basis
- Initial equipment design
- Space planning, including room data sheets and stacking diagrams
- Site layout
- Project execution approach, including project control plan
- Procurement plan
- Architectural renderings
- Appropriation submittal package

Figure 1 illustrates the three sub-phases of front end planning in context of the typical life cycle of a project. The diamonds represent key decision gates that must be addressed prior to moving on to following phases.

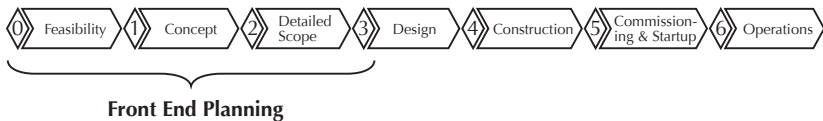


Figure 1. Front End Planning and the Project Life Cycle Diagram

Alignment, another CII Best Practice, also is an important factor during front end planning. Alignment is defined as “the condition where appropriate project participants are working within acceptable tolerances to develop and meet a uniformly defined and understood set of project objectives.”

CII has developed several tools to aid in front end planning, including the publications *Project Definition Rating Index (PDRI) for Industrial Projects*, *PDRI for Buildings*, and *Alignment During Pre-Project Planning*.

Other front end planning factors have been recognized as having an effect on project success. Since the design process begins during front end planning, expectations are that a higher percent design complete at the conclusion of front end planning should correlate to greater project success.

While the industry has accepted that front end planning is an important factor in determining a project's success, little research has quantified what organizations are spending on front end planning. Many barriers exist to the implementation of front end planning. Schedule and budget limitations often pressure those in the industry to eliminate time and expense on a project. Business stakeholders often look at front end planning as an optional process and may not realize the value that well designed and executed front end planning offers.

Data Collection and Results

The purpose of this research was to offer support to the case for performing adequate front end planning on projects. This objective was achieved through a three-phased data collection approach as well as tool development activities by the research team. First, a survey was conducted involving all CII member organizations concerning their usage of the PDRI. Second, statistical data analysis of the front end planning process using completed project data was performed, and third, a structured series of case study analyses was conducted.

The survey of CII member organizations resulted in 70 responses, providing insight into the usage of the PDRI for front end planning. In addition, the survey (see CII Research Report 213-11) provided information about other aspects of front end planning.

Using data collected by CII Benchmarking and Metrics over the past 10 years, the research team first analyzed the front end planning phase costs as a percent of total project cost for small and large projects. Second, the research team updated previous research performed comparing PDRI scores to project performance metrics with new project data. Third, the research team compared percent design complete at the end of front end planning to project performance metrics and PDRI scores. Fourth, the researchers compared the CII pre-project planning index to performance metrics. Finally, the researchers compared the alignment index to performance metrics. The scope of this study was limited to projects included in the CII Benchmarking and Metrics database and other projects used in previous research.

The third phase of data analysis involved 17 case studies. This allowed the research team to study how various forms of front end planning practices affect project success. Patterns were revealed that link project success to specific front end planning activities. The case studies were intended to supplement the statistical analysis by allowing managers to identify with the projects, situations, and decisions. Another advantage of the case study analysis was seeing the inputs and outputs of front end planning that are tangible but difficult to quantify. For example, strong leadership – easily recognized in the case study analysis – would have been difficult to identify without direct discussions with project participants.

The research team, in addition to the three-phase data analysis, prepared new editions of three CII front end planning publications, *PDRI–Buildings*, *PDRI–Industrial Projects*, and *Alignment During Pre-Project Planning*. The team also developed a new web-based tool, *Front End Planning Toolkit*.

Data Analysis to Support Front End Planning

Front-End Planning Phase Cost Analysis

The front end planning phase cost is the amount of money spent on a project prior to authorization. Typical cost elements during front end planning include:

- Planning team personnel expenses
- Conceptual and detailed design costs
- Consultant fees and expenses
- Environmental permitting costs
- Project manager/construction manager fees
- Licensor fees

For this analysis, the front end planning phase cost, also known as the front end planning budget factor, is defined as “the percent of the total project cost spent on front end planning.” This is expressed as:

$$\frac{\text{Actual Front End Planning Phase Cost}}{\text{Actual Total Project Cost}}$$

Sample projects used in this analysis came from the CII Benchmarking and Metrics program. The phase cost data were categorized according to three criteria: project type, project size, and respondent type. The project types included building projects, heavy industrial projects, light industrial projects, and infrastructure projects with only building projects reported in this publication. The project sizes ranged from small to large, with small projects being defined as those less than \$5 million. Respondents included both owners and contractors and represented 607 sample projects worth over \$28 billion. See Table 1 (next page) for the average owner front end planning phase costs.

Table 1. Average Owner Front End Planning Phase Costs
for All Project Types

Project Types	Owner		
	<\$5MM	≥\$5MM	All
All Projects	5.7%	3.4%	4.0%
Buildings	4.8%	2.0%	3.0%
Heavy Industrial	6.7%	3.9%	4.7%
Light Industrial	4.3%*	3.0%	3.2%
Infrastructure	2.2%*	2.5%	2.4%

* Sub-sample size less than 20 projects, use caution

In this analysis, small projects spent more on front end planning as a percentage of total project cost compared to larger projects. This is probably due to the higher design and construction costs that dilute the front end planning budget compared to total cost on larger projects. In other words, economies of scale are realized for front end planning for this sample.

Overall, owners and contractors can expect to spend from approximately two to five percent on front end planning, with an average of three percent for the projects in this sample.

Many in the industry have asked, “How long does front end planning last or how long should it last?” This is an excellent question, but one that is difficult to answer. The time required is dependent upon the level of effort required, the complexity of the project, the familiarity that the participants have with the project type, and the procedures and processes used by the organizations involved.