Construction Industry Institute

Project Definition Rating Index

Building Projects

Implementation Resource 155-2

PDRI

Project Definition Rating Index

for Building Projects

Prepared by the

Construction Industry Institute

PDRI for Building Projects Research Team

Implementation Resource 155-2

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Contents

Chapter 1
What Is the PDRI?

The PDRI is a simple and easy-to-use tool for measuring the degree of scope development on building projects.

The Project Definition Rating Index (PDRI) for Building Projects is a powerful and simple tool that helps meet this need by offering a method to measure project scope definition for completeness. It is adapted from the PDRI for Industrial Projects (CII Implementation Resource 113-2).

The PDRI offers a comprehensive checklist of 64 scope definition elements in an easy-to-use score sheet format. Each element is weighted based on its relative importance to the other elements. Since the PDRI score relates to risk, those areas that need further work can easily be isolated. (A PDRI score of 200 or less has been shown to greatly increase the probability of a successful project.)

The PDRI identifies and precisely describes each critical element in a scope definition package and allows a project team to quickly predict factors impacting project risk. It is intended to evaluate the completeness of scope definition at any point prior to the time a project is considered for development of construction documents and construction. Building type projects may include the following:

- Offices
- Schools (classrooms)
- Banks
- Research and laboratory facilities
- Medical facilities
- Nursing homes
- Institutional buildings
- Stores and shopping centers
- Dormitories
- Apartments
- Hotels and motels
- Parking structures
- Warehouses
- Light assembly and manufacturing
- Churches
- Airport terminals
- Recreational and athletic facilities
- Public assembly and performance halls
- Industrial control buildings

The PDRI consists of three main sections, each of which are broken down into a series of categories which, in turn, are further broken down into elements, as pictorially shown in Figure 1.1. Details of how the PDRI for buildings was developed, as well as a summary of the overall research effort are given in References 1 and 2. A complete list of the PDRI's three sections, 11 categories, and 64 elements is given in Table 1.1.

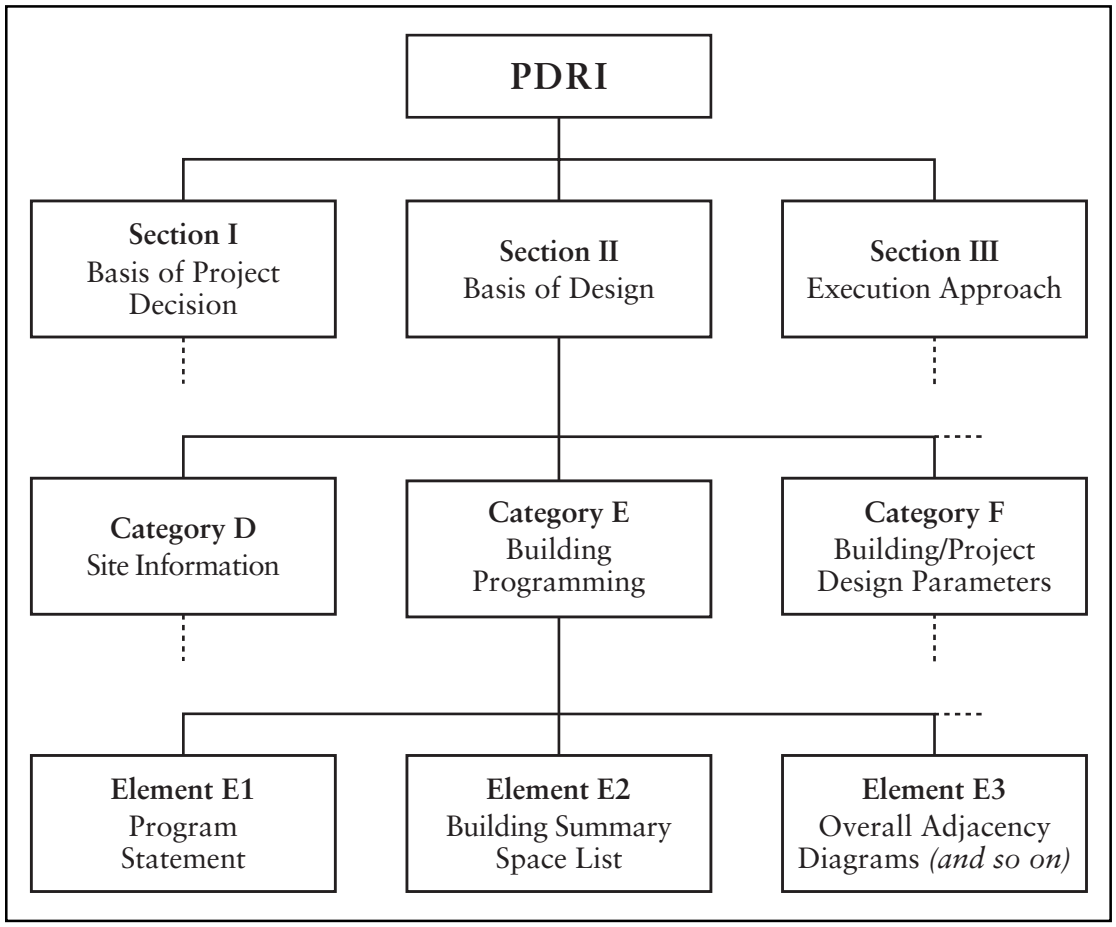

Figure 1.1. PDRI Partial Hierarchy

Table 1.1. PDRI Sections, Categories, and Elements

SECTION I.
BASIS OF PROJECT DECISION

A. Business Strategy
- A1. Building Use Requirements
- A2. Business Justification
- A3. Business Plan
- A4. Economic Analysis
- A5. Facility Requirements
- A6. Future Expansion/Alteration
- A7. Site Selection Considerations
- A8. Project Objectives Statement

B. Owner Philosophies
- B1. Reliability Philosophy
- B2. Maintenance Philosophy
- B3. Operating Philosophy
- B4. Design Philosophy

C. Project Requirements
- C1. Value-Analysis Process
- C2. Project Design Criteria
- C3. Evaluation of Existing Facilities
- C4. Scope of Work Overview
- C5. Project Schedule
- C6. Project Cost Estimate

SECTION II. BASIS OF DESIGN

D. Site Information
- D1. Site Layout
- D2. Site Surveys
- D3. Civil/Geotechnical Information
- D4. Governing Regulatory Requirements
- D5. Environmental Assessment
- D6. Utility Sources with Supply Conditions
- D7. Site Life Safety Considerations
- D8. Special Water and Waste Treatment

E. Building Programming
- E1. Program Statement
- E2. Building Summary Space List
- E3. Overall Adjacency Diagrams
- E4. Stacking Diagrams
- E5. Growth and Phased Development
- E6. Circulation and Open Space Requirements
- E7. Functional Relationship Diagrams/Room by Room
- E8. Loading/Unloading/Storage Facilities
- E9. Transportation Requirements
- E10. Building Finishes
- E11. Room Data Sheets
- E12. Furnishings, Equipment, & Built-Ins
- E13. Window Treatment Considerations

F. Building/Project Design Parameters
- F1. Civil/Site Design
- F2. Architectural Design
- F3. Structural Design
- F4. Mechanical Design
- F5. Electrical Design
- F6. Building Life Safety Requirements
- F7. Constructability Analysis
- F8. Technological Sophistication

Table 1.1. PDRI Sections, Categories, and Elements (continued)

G. Equipment
- G1. Equipment List
- G2. Equipment Location Drawings
- G3. Equipment Utility Requirements

SECTION III.
EXECUTION APPROACH

H. Procurement Strategy
- H1. Identify Long Lead/Critical Equipment and Materials
- H2. Procurement Procedures and Plans

J. Deliverables
- J1. CADD/Model Requirements
- J2. Documentation/Deliverables

K. Project Control
- K1. Project Quality Assurance and Control
- K2. Project Cost Control
- K3. Project Schedule Control Requirements
- K4. Risk Management
- K5. Safety Procedures

L. Project Execution Plan
- L1. Project Organization
- L2. Owner Approval Requirements
- L3. Project Delivery Method
- L4. Design/Construction Plan & Approach
- L5. Substantial Completion Requirements

Use the PDRI score sheet most closely related to your project's use or type.

If your project is a hybrid of industrial and building types, which PDRI score sheet should be used (building version or industrial version)? In general, if the designers who are driving the project are architects, then the PDRI for Buildings should be used. If the primary designers are process (chemical) engineers or industrial (mechanical) engineers, then the PDRI for Industrial Projects should be used. Alternatively, the team can look at the composition of the project in terms of work (design or construction expenditures) to make the decision. In some circumstances, the team may decide to use both in concert.

2
Benefits of the PDRI

Effective early project planning improves project performance in terms of both cost and schedule. The majority of industry participants recognize the importance of scope definition during the early stages of a project and its potential impact on project success. Until now, however, the building industry has been lacking a practical, non-proprietary method for determining the degree of scope development on a project. The PDRI for buildings is the first publicly available tool of its kind in this sector. It allows a project planning team to quantify, rate, and assess the level of scope development on projects prior to beginning development of construction documents.

A significant feature of the PDRI is that it can be utilized to fit the needs of almost any individual project, small or large. Elements that are not applicable to a specific project can be zeroed out, thus eliminating them from the final scoring calculation.

The PDRI is quick and easy to use. It is a "best practice" tool that will provide numerous benefits to the building industry. A few of these include:

- A **checklist** that a project team can use for determining the necessary steps to follow in defining the project scope
- A listing of **standardized scope definition terminology** throughout the building industry
- An industry standard for rating the completeness of the project scope definition package to facilitate **risk assessment** and prediction of escalation, potential for disputes, etc.
- A means to **monitor progress** at various stages during the front-end planning effort
- A tool that aids in **communication and promotes alignment** between owners and design contractors by highlighting poorly defined areas in a scope definition package
- A means for project team participants to **reconcile differences** using a common basis for project evaluation
- A **training tool** for organizations and individuals throughout the industry

- A **benchmarking tool** for organizations to use in evaluating completion of scope definition versus the performance of past projects, both within their organization and externally, in order to predict the probability of success on future projects

Who Should Use the PDRI?

Anyone who wishes to improve the overall performance on their projects should use the PDRI.

The PDRI can benefit owners, designers, and constructors. Owners can use it as an assessment tool for establishing a comfort level at which they are willing to move forward with projects. Designers and constructors can use it as a method of identifying poorly defined project scope definition elements. The PDRI provides a means for all project participants to communicate and reconcile differences using an objective tool as a common basis for project scope evaluation.

3
Instructions for Scoring A Project

Scoring a project is as easy as 1-2-3.

Individuals involved in front-end planning should use the Project Score Sheet shown in Appendices A and B when scoring a project. Note that two score sheets are provided—the first is simply an unweighted checklist in Appendix A. The second (in Appendix B) contains the weighted values and allows a front-end planning team to quantify the level of scope definition at any stage of the project on a 1000-point scale. The unweighted version should probably be used in the team scoring process to prevent bias in choosing the level of definition and in "targeting" a specific score. The team leader or facilitator can easily score the project as the weighting session is being held (using the score sheet in Appendix B). As shown in Figure 3.1, the PDRI can be used at varying times during the project's life cycle.

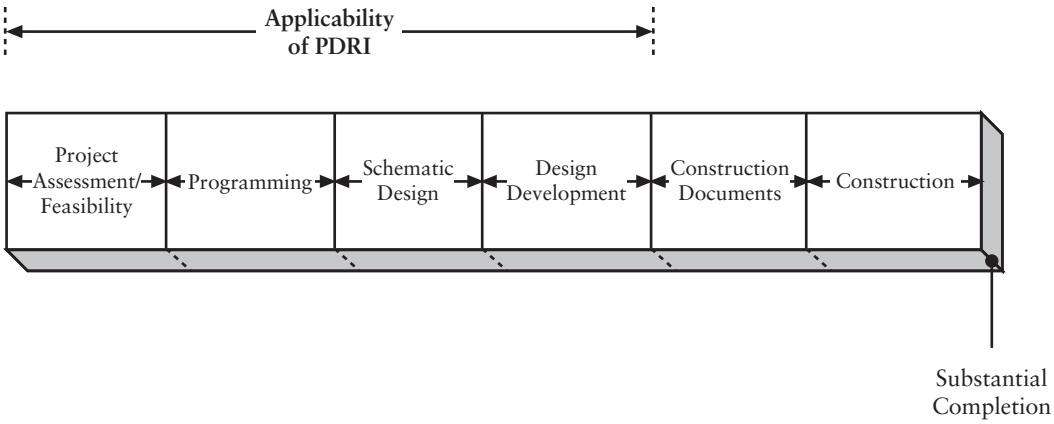

Figure 3.1. Applicability of PDRI in Project Life Cycle

The PDRI consists of three main sections that are broken down into 11 categories. The categories are further broken down into 64 elements. The elements are individually described in Appendix C, Element Descriptions. Elements should be rated numerically from 0 to 5. The scores range from 0 – not applicable, 1 – complete definition to 5 – incomplete or poor definition as indicated in the legend at the bottom of the score sheet. The elements that are as well defined as possible should receive a perfect definition level of "one." Elements that are not completely defined should receive a

"two," "three," "four," or "five," depending on their levels of definition as determined by the team. Those elements deemed not applicable for the project under consideration should receive a "zero," thus not affecting the final score. The definition levels are defined as follows:

Definition Levels

0 = Not Applicable

1 = Complete Definition

2 = Minor Deficiencies

3 = Some Deficiencies

4 = Major Deficiencies

5 = Incomplete or Poor Definition

To score an element, first refer to the Project Score Sheet in Appendix A. Next, read its corresponding description in Appendix C. Some elements contain a list of items to be considered when evaluating their levels of definition. These lists may be used as checklists. All elements have five pre-assigned scores, one for each of the five possible levels of definition. Choose only one definition level (0, 1, 2, 3, 4, or 5) for that element based on your perception of how well it has been addressed. Once you have chosen the appropriate definition level for the element, write the value of the score that corresponds to the level of definition chosen in the "Score" column. Do this for each of the 64 elements in the Project Score Sheet. Be sure to score each element.

Each of the element scores within a category should be added to produce a total score for that category. The scores for each of the categories within a section should then be added to arrive at a section score. Finally, the three section scores should be added to achieve a total PDRI score.

Scoring Example

Consider, for example, that you are a member of a planning team responsible for developing the scope of work for the renovation of an existing office building. Your team has identified major milestones throughout front-end planning at which time you plan to use the PDRI to evaluate the current level of "completeness" of the scope definition package. Assume that at the time of this particular evaluation the scope development effort is underway, but is not yet complete.

Your responsibility is to evaluate how well the project's non-core equipment requirements have been identified and defined to date. This information is covered in Category G of the PDRI as shown below and consists of three elements: "G1. Equipment List," "G2. Equipment Location Drawings," and "G3. Equipment Utility Requirements."

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
G. EQUIPMENT (Maximum Score = 36)							
G1. Equipment List	0	1	5	8	12	15	8
G2. Equipment Location Drawings	0	1	3	5	8	10	3
G3. Equipment Utility Requirements	0	1	4	6	9	11	11
CATEGORY G TOTAL							**22**

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

To fill out Category G, Equipment, follow these steps:

Step 1: **Read the description for each element in Appendix C.** Some elements contain a list of items to be considered when evaluating their levels of definition. These lists may be used as checklists.

Step 2: **Collect all data that you may need** to properly evaluate and select the definition level for each element in this category. This may require obtaining input from other individuals involved in the scope development effort.

Step 3: **Select the definition level for each element** as described below and shown on the next page.

Element G1: Requirements for food service, trash disposal, and material handling have been well-defined. However, process equipment for the laboratory has not been identified to your satisfaction. You feel that this element has *some deficiencies* that should be addressed prior to development of construction documents. **Definition Level = 3.**

Element G2: Your team decides that this element has been well done, including existing and new equipment rooms. You are a little concerned about the laboratory process equipment, but feel you have space available regardless of the requirements for your project. Therefore the team feels the element has *minor deficiencies*. **Definition Level = 2.**

Element G3: Although your team plans to clarify utility requirements for the equipment, it has not yet been done. This element is therefore *incomplete or poorly defined*. **Definition Level = 5.**

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
G. EQUIPMENT (Maximum Score = 36)							
G1. Equipment List	0	1	5	(8)	12	15	8
G2. Equipment Location Drawings	0	1	(3)	5	8	10	3
G3. Equipment Utility Requirements	0	1	4	6	9	(11)	11
CATEGORY G TOTAL							**22**

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

Step 4: For each element, **write the score that corresponds to its level of definition** in the "Score" column. If the team feels that any or all of the elements were not applicable for this project they would have had a definition level of "0" and been zeroed out.

Step 5: **Add the element scores to obtain a category score.** Repeat this process for each element in the PDRI. Add category scores to obtain section scores. Add section scores to obtain a total PDRI score. A completed PDRI score sheet for a dormitory project is included in Appendix D for reference.

Step 6: **Take Action.** In this example, Category G has a total score of 22 (out of 36 total points) and probably needs more work.

Philosophy of Use

Ideally, the project team conducts a PDRI evaluation at various points in the project. Experience has shown that the scoring process works best in a team environment with a neutral facilitator familiar with the process. The facilitator provides objective feedback to the team and controls the pace of team meetings. If this arrangement is not possible, an alternate approach is to have key individuals evaluate the project separately, then evaluate it together, ultimately agreeing on a final evaluation. Even using the PDRI from an individual standpoint provides a method for project evaluation.

Experience has shown that the PDRI is best used as a tool to help project managers (project coordinators, project planners) organize and monitor progress of the front-end planning effort. In many cases, a planner may use the PDRI prior to the existence of a team in order to understand major risk areas. Using the PDRI early in the project life cycle will usually lead to high PDRI scores. This is normal and the completed score sheet gives a road map of areas that are weak in terms of definition.

The PDRI provides an excellent tool to use in early project team meetings in that it provides a means for the team to align itself on the project and organize its work. Some PDRI users feel that the final PDRI score is less important than the process used to arrive at that score. The PDRI also can provide an effective means of handing off the project to other entities or helping maintain continuity as new project participants are added to the project.

If the organization has front-end planning procedures and building standards in place, many of the elements may be partially defined when the project begins front-end planning. An organization may want to standardize many of the PDRI elements to improve cycle time of planning activities.

PDRI scores may change on a day-to-day or week-to-week basis as team members realize that some elements are not as well-defined as initially assumed. It is important to score the elements honestly. The planning process is inherently iterative in nature

and any changes that occur in assumptions or planning parameters need to be resolved with earlier planning decisions. The target score (150 or 200 points) may not be as important as the team's progress over time in resolving issues that harbor risk.

The PDRI was developed as a "point in time" tool with elements that are as independent as possible. Most of the elements constitute deliverables to the planning process. However, a close review of the elements shows an imbedded logic. Certain elements must first be defined well in order for others to be defined.

Figure 3.2 outlines the logic at a "section" level. In general, Section I elements must be well-defined prior to defining Section II and III elements (Reference 1). Note that this is not a CPM-type logic in that certain elements are completed prior to the point when the next elements can start. Many times elements can be pursued concurrently. As information is gained down stream, elements already defined have to be revisited.

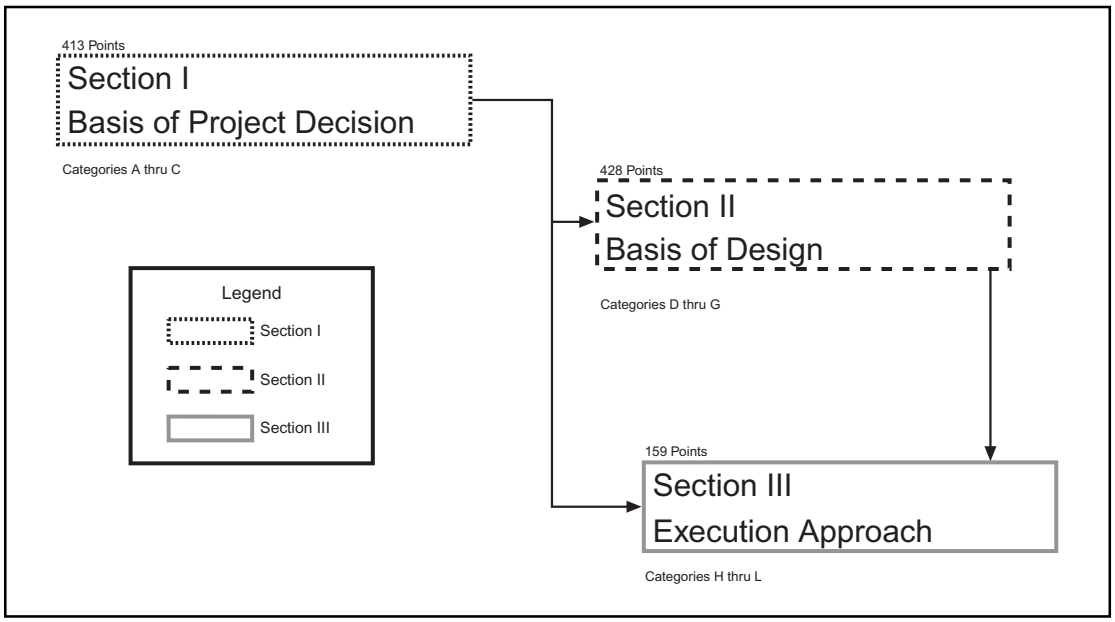

Figure 3.2. Section Logic Flow Diagram

Figure 3.3 outlines the general logic flow of the PDRI categories. (Note: the legend used in Figure 3.2 is carried forward to Figure 3.3) Again, the flow is not the traditional CPM logic paradigm. Indeed, there may be many ways to organize the work differently than the flow shown in this diagram. This logic flow diagram is provided as a guideline for planners to use in pursuing the planning process. For instance, if information gained in Category D, Site Information, is different than expected (assumed), then a planner should assess the impact of that difference on Categories A, B, and C.

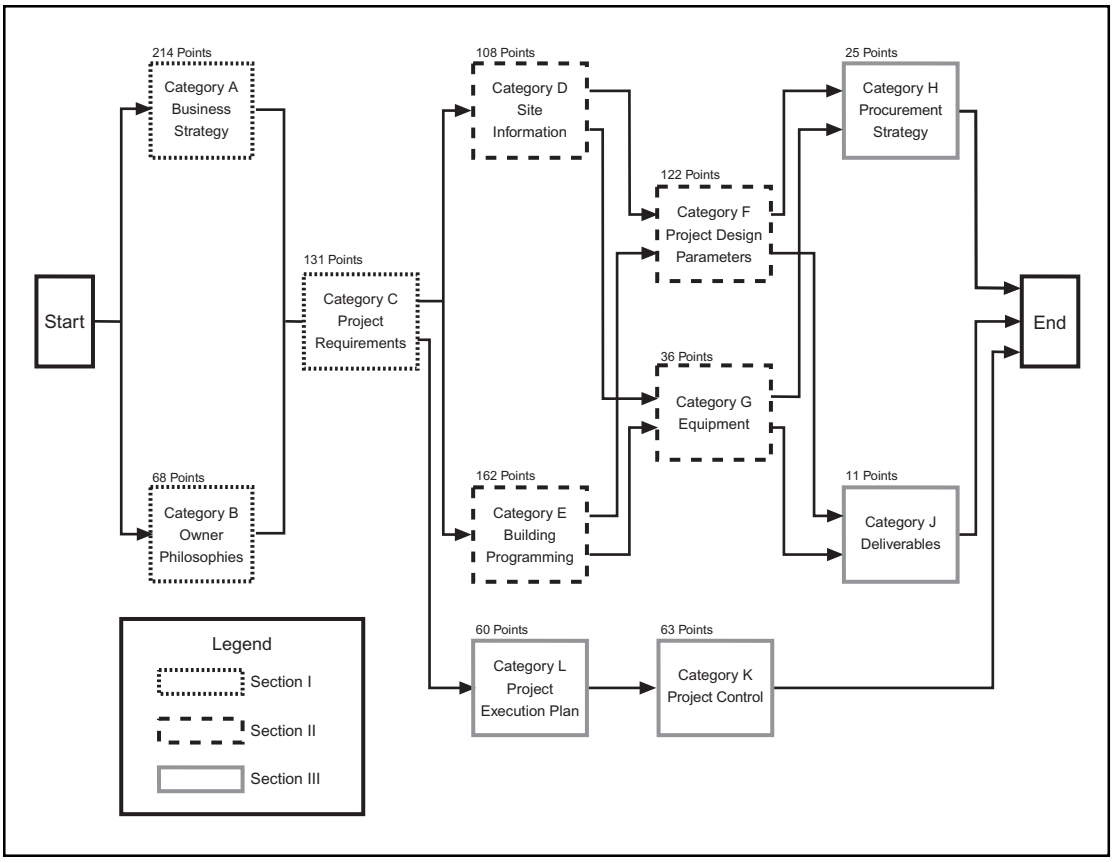

Figure 3.3. Category Logic Flow Diagram

These logic flow diagrams are provided to illustrate the interrelationship between various categories and elements of the PDRI. Your organization may want to standardize a front-end planning process. The logic presented in these diagrams could provide the basis for that development.

Color versions of Figures 3.2 and 3.3, as well as a detailed logic flow diagram that shows all PDRI elements, are provided in Appendix E.

Use of PDRI on Small or Renovation Projects

The PDRI can be customized to meet each organization's needs.

In recent years the U.S. construction industry has seen an increase in the number of long-term partnering (alliances) relationships between owners and design/construction contractors. Oftentimes, owners select these partners for performing design and/or construction on their renovation/upgrade improvement projects. These projects are small and frequent in nature as well as short in duration. On an individual basis, the scope of these projects may not encompass many of the elements contained in the PDRI. In particular, some of the Basis of Business Decision elements found in Section I of the PDRI may not be clearly defined on these projects. Although business planning is generally performed on an owner's overall program of small projects, it may be difficult to determine if specific business decisions directly apply to one individual project.

In these situations an organization wishing to incorporate the PDRI into their front-end planning program may need to customize it to fit the needs of their smaller projects. Since the PDRI was purposely developed to be generic in nature, an organization can delete any elements that specifically do not apply on certain types of projects.

If an organization decides to create a scaled-down version of the PDRI, it must be aware of the fact that this procedure will alter the maximum possible score from 1000 points to some lower number. Each time an element is deleted from the checklist, the maximum score for the project is reduced by that element's total weight. Further, not only will the maximum score be reduced, but the lowest possible score that can be achieved with complete definition also will drop from 70 points to some lower number.

Any organization choosing to create a scaled-down version of the PDRI must also determine a new target score at which they feel comfortable authorizing a project for detailed design and construction. Although a total score of 200 should be reached in order to improve the chances for project success, an organization using a scaled-down version of the PDRI will have to collect internal data and determine its own threshold score. For example, if the organization's scaled-down version has a maximum possible score of 752 (after certain elements are deleted from the score sheet), it may determine that a score of 120 must be reached before authorizing its small projects for design.

Renovation projects are increasing as inner-city neighborhoods are being revitalized. The PDRI can be used for these projects as well. Note that some elements may be "zeroed" as not applicable for these projects (e.g., Site Selection Considerations (A7), Civil/Geotechnical Information). A "not applicable" element essentially provides no risk to the project. Other elements may become more critical (e.g., Environmental Assessment (D5), Evaluation of Existing Facilities (C3)).

A word of caution should be given here. The PDRI was not developed to address small projects or renovations that have large numbers of non-applicable elements. Using the PDRI score sheet for this purpose should be done carefully or else elements that are more important for small projects may be given less emphasis than needed. The operative phrase for using the PDRI in these situations is "common sense."

4

What Does A PDRI Score Mean?

A low PDRI score represents a project definition package that is well-defined and, in general, corresponds to an increased probability for project success. Higher scores signify that certain elements within the project definition package lack adequate definition.

To validate the quality of the tool, it was tested on 30 projects representing approximately $860 million. For each of these projects, PDRI scores and project success criteria were computed. (Note: these projects were scored after the fact.) An analysis of these data yielded a strong correlation between low (good) PDRI scores and high project success. For more information on the validation sample and methodology, please see Reference 1.

The analysis revealed that a significant difference in performance between the projects scoring above 200 and the projects scoring below 200 prior to development of construction documents.

The validation projects scoring below 200 outperformed those scoring above 200 in three important design/construction outcome areas: cost performance, schedule performance, and the relative value of change orders compared to the authorized cost, as shown in Figure 4.1. In addition to cost and schedule differences, the projects scoring less than 200 performed better financially, had fewer numbers of change

Performance	PDRI Score <200	PDRI Score >200	Difference
Cost	1% below budget	6% above budget	7%
Schedule	1% behind schedule	11% behind schedule	10%
Change Orders	6% of budget (N=14)	10% of budget (n=16)	4%

Figure 4.1. Summary of Cost, Schedule, and Change Order Performance for the PDRI Validation Projects Using a 200-Point Cutoff

orders, had less turbulence related to design size changes during development of construction documents and the construction phase, and were generally rated more successful on average than projects scoring higher than 200.

Analyzing PDRI Scores — What to Look For

The PDRI is of little value unless the user takes action based on the analysis and uses the score in managing the project. Among the potential uses when analyzing the PDRI score are the following:

- Track project progress during front-end planning, using the PDRI score as a macro-evaluation tool. Individual elements, categories, and sections can be tracked as well. Remember that the method of scoring the project over time (whether individual or team-based) should be consistent because it is a subjective rating.
- Compare project to project scores over time to identify trends in developing scope definition within your organization.
- Compare different types of projects (e.g., R&D vs. medical vs. retail; or new vs. renovation) and determine your acceptable PDRI score for those projects and identify critical success factors from that analysis. The PDRI also can be used to compare projects for different clients or different size projects with the same client.
- Determine a comfort level (PDRI score) at which you are willing to authorize projects.

Depending on the nature of your business, your internal scope definition practices, and your requirements, you may wish to use a score other than 200 as a benchmark for beginning of construction document development.

- Look at weak areas of your project on a section, category, or element level for each project over time. For example, if 16 of the 64 elements rate 5 (no definition), 25 percent of the elements are not defined at all. By adding these element's scores, one can see how much risk they bring to the project relative to 1000 points. This provides an effective method of risk analysis since each

element, category, and section is weighted relative to each other in terms of potential risk exposure. Use the PDRI score to redirect effort by the project team.

- The individual element scores can be used to highlight the "critical few" elements for team focus—either through segregating by element score or definition level. Remember that the weights given in the score sheet were developed for a generic project. Your project may have unique requirements that must be met, therefore examine the level of definition in some amount of detail because the score may not be reflective of the project's complexity or makeup.

Market demand or other pressures to reduce project cycle times often may force a team to begin design and construction with underdeveloped definition. In these instances, the amount of time available for defining the scope of the project decreases. Thus, the ability to predict factors that may impact project risk becomes more critical. To minimize the possibility of problems during the detailed design, construction, and startup phases of a project, the front-end planning effort should focus on the critical few elements that, if poorly defined, could have the greatest potential to impact project performance. Figure 4.2 summarizes the 10 highest ranking PDRI elements

1. Building Use (A1)
2. Facility Requirements (A5)
3. Site Selection Considerations (A7)
4. Business Justification (A2)
5. Project Cost Estimate (C6)
6. Business Plan (A3)
7. Project Design Criteria (C2)
8. Evaluation of Existing Facilities (C3)
9. Future Expansion/Alteration Considerations (A6)
10. Architectural Design (F2)

TOTAL POINTS = 275 / 1000

Figure 4.2. Ten Highest Ranking PDRI Elements
(with corresponding element number in parentheses)

based on Category 5, incomplete or poor definition. (Remember, the higher the element weight, the more risk to the project.) Descriptions for these elements are given in Appendix C.

Potential PDRI Score Applications

You may wish to keep your own database of PDRI scores for various project sizes and types. As more projects are completed and scored using the PDRI, your ability to predict the probability of success on future projects should improve. The PDRI may serve as a gauge for your organization in deciding whether or not to authorize the development of construction documents and ultimately construction of a project. You may also wish to use it as an external benchmark for measurement against the practices of other industry leaders.

Once a PDRI score is obtained, it is important to correlate the score to a measurement of project success. In general, lower PDRI scores represent scope definition packages that are well-defined and correspond to higher project success. Higher PDRI scores, on the other hand, signify that certain elements in the scope definition package lack adequate definition and, if the project moves forward with development of construction documents, could result in poorer project performance and lower success.

You will probably want to track your project estimates minus contingency when plotting them versus the PDRI scores. The original estimates are then compared to the final outcome of the project to evaluate its success versus these goals. Plot these estimates to develop a curve for determining contingency allowance on future projects. An explanation of how to develop these curves is given in Reference 6, Appendix E.

5
Recommendations

The PDRI can benefit owners, developers, designers, and contractors. Facility owners, developers, and lending institutions can use it as an assessment tool for establishing a comfort level at which they are willing to move forward on projects. Designers and constructors can use it as a means of negotiating with owners in identifying poorly defined project scope definition elements. The PDRI provides a forum for all project participants to communicate and reconcile differences using an objective tool as a common basis for project scope evaluation. It also provides excellent input into the detailed design process and a solid baseline for design management.

Anyone who wishes to improve the overall performance on their building projects should use the PDRI.

How to Improve Performance on Future Projects

The following suggestions are offered to individuals or organizations who adopt the PDRI with the desire to improve performance on their building projects:

- **Commit to early project planning**. Effective planning in the early stages of building projects can greatly enhance cost, schedule, and operational performance while minimizing the possibility of financial failures and disasters.
- **Use the *Pre-Project Planning Handbook*.** This publication, developed by CII, outlines in detail all of the steps required for ensuring the successful execution of front-end planning on capital projects (Reference 7). The PDRI can be used at any point in the front-end planning process to monitor progress and redirect future scope definition efforts.
- **Gain and maintain project team alignment** by using the PDRI during front-end planning. Scope definition checklists are particularly effective in helping with team alignment.
- **Adjust the PDRI as necessary to meet the specific needs of your project.** The PDRI was designed so that certain elements considered not applicable on a particular project can be "zeroed out," thus eliminating them from the final scoring calculation.

- **Use the PDRI to improve project performance.** Build your own internal database of projects that are scored using the PDRI. Compute PDRI scores at the various times during scope development along with success ratings once projects are completed. Based upon the relationship between PDRI scores and project success, establish your own basis for the level of scope definition that you feel is acceptable for moving forward on future projects.
- **Use caution when beginning detailed design of projects with PDRI scores greater than 200.** A direct correlation exists between high PDRI scores and poor project performance.

CII research has shown that the PDRI can effectively be used to improve the predictability of project performance. However, the PDRI alone will not ensure successful projects. When combined with sound business planning, alignment, and good project execution, it can greatly improve the probability of meeting or exceeding project objectives.

Appendix A:
Project Score Sheet (Unweighted)

SECTION I — BASIS OF PROJECT DECISION

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
A. BUSINESS STRATEGY							
A1. Building Use							
A2. Business Justification							
A3. Business Plan							
A4. Economic Analysis							
A5. Facility Requirements							
A6. Future Expansion/Alteration Considerations							
A7. Site Selection Considerations							
A8. Project Objectives Statement							
CATEGORY A TOTAL							
B. OWNER PHILOSOPHIES							
B1. Reliability Philosophy							
B2. Maintenance Philosophy							
B3. Operating Philosophy							
B4. Design Philosophy							
CATEGORY B TOTAL							
C. PROJECT REQUIREMENTS							
C1. Value-Analysis Process							
C2. Project Design Criteria							
C3. Evaluation of Existing Facilities							
C4. Scope of Work Overview							
C5. Project Schedule							
C6. Project Cost Estimate							
CATEGORY C TOTAL							
SECTION I TOTAL							

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION II — BASIS OF DESIGN

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
D. SITE INFORMATION							
D1. Site Layout							
D2. Site Surveys							
D3. Civil/Geotechnical Information							
D4. Governing Regulatory Requirements							
D5. Environmental Assessment							
D6. Utility Sources with Supply Conditions							
D7. Site Life Safety Considerations							
D8. Special Water and Waste Treatment Req'mts							
CATEGORY D TOTAL							
E. BUILDING PROGRAMMING							
E1. Program Statement							
E2. Building Summary Space List							
E3. Overall Adjacency Diagrams							
E4. Stacking Diagrams							
E5. Growth and Phased Development							
E6. Circulation and Open Space Requirements							
E7. Functional Relationship Diagrams/Room by Rm.							
E8. Loading/Unloading/Storage Facilities Req'mts							
E9. Transportation Requirements							
E10. Building Finishes							
E11. Room Data Sheets							
E12. Furnishings, Equipment, and Built-Ins							
E13. Window Treatment							
CATEGORY E TOTAL							

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION II — BASIS OF DESIGN (continued)

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
F. BUILDING/PROJECT DESIGN PARAMETERS							
F1. Civil/Site Design							
F2. Architectural Design							
F3. Structural Design							
F4. Mechanical Design							
F5. Electrical Design							
F6. Building Life Safety Requirements							
F7. Constructability Analysis							
F8. Technological Sophistication							
CATEGORY F TOTAL							
G. EQUIPMENT							
G1. Equipment List							
G2. Equipment Location Drawings							
G3. Equipment Utility Requirements							
CATEGORY G TOTAL							
SECTION II TOTAL							

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION III — EXECUTION APPROACH

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
H. PROCUREMENT STRATEGY							
H1. Identify Long-Lead/Critical Equip. and Materials							
H2. Procurement Procedures and Plans							
CATEGORY H TOTAL							
J. DELIVERABLES							
J1. CADD/Model Requirements							
J2. Documentation/Deliverables							
CATEGORY J TOTAL							
K. PROJECT CONTROL							
K1. Project Quality Assurance and Control							
K2. Project Cost Control							
K3. Project Schedule Control							
K4. Risk Management							
K5. Safety Procedures							
CATEGORY K TOTAL							
L. PROJECT EXECUTION PLAN							
L1. Project Organization							
L2. Owner Approval Requirements							
L3. Project Delivery Method							
L4. Design/Construction Plan and Approach							
L5. Substantial Completion Requirements							
CATEGORY L TOTAL							
SECTION III TOTAL							
PDRI TOTAL SCORE							

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

Appendix B:
Project Score Sheet (Weighted)

SECTION I — BASIS OF PROJECT DECISION

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
A. BUSINESS STRATEGY (Maximum = 214)							
A1. Building Use	0	1	12	23	33	44	
A2. Business Justification	0	1	8	14	21	27	
A3. Business Plan	0	2	8	14	20	26	
A4. Economic Analysis	0	2	6	11	16	21	
A5. Facility Requirements	0	2	9	16	23	31	
A6. Future Expansion/Alteration Considerations	0	1	7	12	17	22	
A7. Site Selection Considerations	0	1	8	15	21	28	
A8. Project Objectives Statement	0	1	4	8	11	15	
CATEGORY A TOTAL							
B. OWNER PHILOSOPHIES (Maximum = 68)							
B1. Reliability Philosophy	0	1	5	10	14	18	
B2. Maintenance Philosophy	0	1	5	9	12	16	
B3. Operating Philosophy	0	1	5	8	12	15	
B4. Design Philosophy	0	1	6	10	14	19	
CATEGORY B TOTAL							
C. PROJECT REQUIREMENTS (Maximum = 131)							
C1. Value-Analysis Process	0	1	6	10	14	19	
C2. Project Design Criteria	0	1	7	13	18	24	
C3. Evaluation of Existing Facilities	0	2	7	13	19	24	
C4. Scope of Work Overview	0	1	5	9	13	17	
C5. Project Schedule	0	2	6	11	15	20	
C6. Project Cost Estimate	0	2	8	15	21	27	
CATEGORY C TOTAL							
Section I Maximum Score = 413						**SECTION I TOTAL**	

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION II — BASIS OF DESIGN

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
D. SITE INFORMATION (Maximum = 108)							
D1. Site Layout	0	1	4	7	10	14	
D2. Site Surveys	0	1	4	8	11	14	
D3. Civil/Geotechnical Information	0	2	6	10	14	19	
D4. Governing Regulatory Requirements	0	1	4	8	11	14	
D5. Environmental Assessment	0	1	5	9	12	16	
D6. Utility Sources with Supply Conditions	0	1	4	7	10	13	
D7. Site Life Safety Considerations	0	1	2	4	6	8	
D8. Special Water and Waste Treatment Req'mts	0	1	3	6	8	11	
CATEGORY D TOTAL							
E. BUILDING PROGRAMMING (Maximum = 162)							
E1. Program Statement	0	1	5	9	12	16	
E2. Building Summary Space List	0	1	6	11	16	21	
E3. Overall Adjacency Diagrams	0	1	3	6	8	10	
E4. Stacking Diagrams	0	1	4	7	10	13	
E5. Growth and Phased Development	0	1	5	8	12	15	
E6. Circulation and Open Space Requirements	0	1	4	7	10	13	
E7. Functional Relationship Diagrams/Room by Rm.	0	1	3	5	8	10	
E8. Loading/Unloading/Storage Facilities Req'mts	0	1	2	4	6	8	
E9. Transportation Requirements	0	1	3	5	7	9	
E10. Building Finishes	0	1	5	8	12	15	
E11. Room Data Sheets	0	1	4	7	10	13	
E12. Furnishings, Equipment, and Built-Ins	0	1	4	8	11	14	
E13. Window Treatment	0	0	2	3	4	5	
CATEGORY E TOTAL							

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION II — BASIS OF DESIGN (continued)

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
F. BUILDING/PROJECT DESIGN PARAMETERS (Maximum = 122)							
F1. Civil/Site Design	0	1	4	7	11	14	
F2. Architectural Design	0	1	7	12	17	22	
F3. Structural Design	0	1	5	9	14	18	
F4. Mechanical Design	0	2	6	11	15	20	
F5. Electrical Design	0	1	5	8	12	15	
F6. Building Life Safety Requirements	0	1	3	5	8	10	
F7. Constructability Analysis	0	1	4	8	11	14	
F8. Technological Sophistication	0	1	3	5	7	9	
CATEGORY F TOTAL							
G. EQUIPMENT (Maximum = 36)							
G1. Equipment List	0	1	5	8	12	15	
G2. Equipment Location Drawings	0	1	3	5	8	10	
G3. Equipment Utility Requirements	0	1	4	6	9	11	
CATEGORY G TOTAL							
Section II Maximum Score = 428 **SECTION II TOTAL**							

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION III — EXECUTION APPROACH

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
H. PROCUREMENT STRATEGY (Maximum = 25)							
H1. Identify Long-lead/Critical Equip. and Materials	0	1	4	7	10	14	
H2. Procurement Procedures and Plans	0	1	3	6	9	11	
CATEGORY H TOTAL							
J. DELIVERABLES (Maximum = 11)							
J1. CADD/Model Requirements	0	0	1	2	3	4	
J2. Documentation/Deliverables	0	1	2	4	6	7	
CATEGORY J TOTAL							
K. PROJECT CONTROL (Maximum = 63)							
K1. Project Quality Assurance and Control	0	1	3	4	6	8	
K2. Project Cost Control	0	1	4	7	10	13	
K3. Project Schedule Control	0	1	4	8	11	14	
K4. Risk Management	0	1	6	10	14	18	
K5. Safety Procedures	0	1	3	5	7	9	
CATEGORY K TOTAL							
L. PROJECT EXECUTION PLAN (Maximum = 60)							
L1. Project Organization	0	1	3	5	8	10	
L2. Owner Approval Requirements	0	1	4	6	9	11	
L3. Project Delivery Method	0	1	5	8	12	15	
L4. Design/Construction Plan and Approach	0	1	4	8	11	15	
L5. Substantial Completion Requirements	0	1	3	5	7	9	
CATEGORY L TOTAL							
Section III Maximum Score = 159 **SECTION III TOTAL**							
PDRI Maximum Score = 1000 **PDRI TOTAL SCORE**							

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

Appendix C
Element Descriptions

The following descriptions have been developed to help generate a clear understanding of the terms used in the Project Score Sheets located in Appendices A and B. Some descriptions include checklists to clarify concepts and facilitate ideas when scoring each element. Note that these checklists are not all-inclusive and the user may supplement these lists when necessary.

The descriptions are listed in the same order as they appear in the Project Score Sheet. They are organized in a hierarchy by section, category, and element. The Project Score Sheet consists of three main sections, each of which is broken down into a series of categories which, in turn, are further broken down into elements. Scoring is performed by evaluating the levels of definition of the elements, which are described in this attachment. The sections and categories are organized as follows:

SECTION I: BASIS OF PROJECT DECISION

This section consists of information necessary for understanding the project objectives. The completeness of this section determines the degree to which the project team will be able to achieve alignment in meeting the project's business objectives.

Categories:

A - Business Strategy
B - Owner Philosophies
C - Project Requirements

SECTION II: BASIS OF DESIGN

This section consists of space, site, and technical design elements that should be evaluated to fully understand the basis for design of the project.

Categories:

D - Site Information
E - Building Programming
F - Building/Project Design Parameters
G - Equipment

SECTION III: EXECUTION APPROACH

This section consists of elements that should be evaluated to fully understand the requirements of the owner's execution strategy.

Categories:

H - Procurement Strategy
J - Deliverables
K - Project Control
L - Project Execution Plan

The following pages contain detailed descriptions for each element in the PDRI.

SECTION I: BASIS OF PROJECT DECISION

A. BUSINESS STRATEGY

A1. Building Use

Identify and list building uses or functions. These may include uses such as:

- ❑ Retail
- ❑ Institutional
- ❑ Instructional
- ❑ Medical
- ❑ Research
- ❑ Multimedia
- ❑ Office
- ❑ Light manufacturing
- ❑ Storage
- ❑ Food service
- ❑ Recreational

A description of other options which could also meet the facility need should be defined. (As an example, was renovating existing space rather than building new space considered?) A listing of current facilities that will be vacated due to the new project should be produced.

A2. Business Justification

Identify driving forces for the project and specify what is most important from the viewpoint of the owner including both needs and expectations. Address items such as:

- ❑ Possible competitors
- ❑ Level of amenities
- ❑ Location
- ❑ Need date
- ❑ Target consumers
- ❑ Building utilization justification

- ❑ Sales or rental levels
- ❑ Market capacity
- ❑ Use flexibility
- ❑ Number of lessors/occupant types
- ❑ Support new business initiatives
- ❑ Facility replacement/consolidation

A3. Business Plan

A project strategy should be developed that supports the business justification in relation to the following items:

- ❑ Funding availability
- ❑ Cost and financing
- ❑ Schedule milestones (including known deadlines)
- ❑ Types and sources of project funds
- ❑ Related/resulting projects

A4. Economic Analysis

An economic model should be developed to determine the viability of the venture. The model should acknowledge uncertainty and outline the boundaries of the analysis. It should acknowledge items such as:

- ❑ Design life
- ❑ Building ownership
- ❑ Tax implications of investment including length of ownership
- ❑ Long-term operating and maintenance costs
- ❑ Resale/lease potential or in the case of institutional buildings, long-term use plans
- ❑ Analysis of capital and operating cost versus sales or occupancy and profitability

A5. Facility Requirements

Facility size requirements are many times determined by applicable code and are often driven by occupancy. Note that this analysis is at the macro level. Some considerations are listed below:

- ❑ Number of occupants
- ❑ Volume
- ❑ Net and gross square footage by area uses
- ❑ Support infrastructure
- ❑ Classroom size
- ❑ Linear feet of display space
- ❑ Number of laboratory stations
- ❑ Occupant accommodation requirements (i.e., number of hospital beds, number of desks, number of workstations, on-site child care, on-site medical care, cot space, etc.)

A6. Future Expansion/Alteration Considerations

The possibility of expansion and/or alteration of the site and building should be considered for facility design. These considerations consist of a list of items that will facilitate the expansion or evolution of building use including adaptability/flexibility. Evaluation criteria may include:

- ❑ Provisions for site space in case of possible future expansion up or out
- ❑ Technologically advanced facility requirements
- ❑ Are departments or functional areas intended to "grow in place" during the future phase?
- ❑ If there will not be a future expansion of the building, how will departments or areas expand?
- ❑ Are any functional areas more likely than others to move out of the building in the future to allow others to expand or move in?
- ❑ Who will occupy the building in five, 10, 15, 20 years?
- ❑ Flexibility or adaptability for future uses.
- ❑ Future phasing plan

A7. Site Selection Considerations

Evaluation of sites should address issues relative to different locations (i.e., global, country, or local). This evaluation may take into consideration existing buildings or properties, as well as new locations. The selection criteria include items such as:

- ❑ General geographic location
  - ❑ Access to the targeted market area
  - ❑ Local availability and cost of skilled labor (e.g., construction, operation)
  - ❑ Available utilities
  - ❑ Existing facilities
  - ❑ Economic incentive zones
  - ❑ Tax
- ❑ Land availability and developed costs
- ❑ Legal constraints
- ❑ Unusual financing requirements in region/locality
- ❑ Domestic culture vs. international culture
- ❑ Community relations
- ❑ Labor relations
- ❑ Government relations
- ❑ Political issues/constraints
- ❑ Education/training
- ❑ Safety and health considerations
- ❑ Environmental issues
- ❑ Symbolic and aesthetic
- ❑ Historic preservation
- ❑ Weather/climate
- ❑ Permitting Schedule

A8. Project Objectives Statement

This statement defines the project objectives and priorities for meeting the business strategy. It should be clear, concise, measurable, and specific to the project. It is desirable to obtain total agreement from the entire project team regarding these objectives and priorities to ensure alignment. Specifically, the priorities among cost, schedule, and value-added quality features should be clear. The objectives also should comply with any master plans if applicable.

B. OWNER PHILOSOPHIES

B1. Reliability Philosophy

A brief description of the project intent in terms of reliability should be defined. A list of the general design principles to be considered to achieve optimum/ideal operating performance from the facility/building should be addressed. Considerations may include:

- ❑ Critical systems redundancy
- ❑ Architectural/structural/civil durability
- ❑ Mechanical/electrical/plumbing reliability

B2. Maintenance Philosophy

A list of the general design principles to be considered to meet building maintenance requirements should be identified. This evaluation should include life cycle cost analysis of major facilities. Considerations may include:

- ❑ Daily occupancy loads
- ❑ Maximum building occupancy requirements
- ❑ Equipment monitoring requirements
- ❑ Energy conservation programs
- ❑ Selection of materials and finishes
- ❑ Requirements for building finishes

B3. Operating Philosophy

A list of the general design issues that need to be considered to support routine operations should be developed. Issues may include:

- ❑ Operating schedule/hours
- ❑ Provisions for building rental or occupancy assignments (i.e., by room, floor, suite) including flexibility of partitioning
- ❑ Future renovation schedule
- ❑ User finish out philosophy
- ❑ Flexibility to change layout

B4. Design Philosophy

A listing of design philosophy issues should be developed. These issues should be directed at concerns such as the following:

- ❑ Design life
- ❑ Aesthetic requirements
- ❑ Compatibility with master plan
- ❑ Theme
- ❑ Image
- ❑ Environmentally sustainable design (internal/external)
- ❑ Quality of life

C. PROJECT REQUIREMENTS

C1. Value-Analysis Process

A structured value analysis approach should be in place to consider design and material alternatives in terms of their cost effectiveness. Items that impact the economic viability of the project should be considered. Items to evaluate include issues such as:

- ❑ Discretionary scope issues
- ❑ Expensive materials of construction
- ❑ Life-cycle analysis of construction methods and structure

C2. Project Design Criteria

Project design criteria are the requirements and guidelines which govern the design of the project. Any design review board or design review process should be clearly articulated. Evaluation criteria may include:

- ❑ Level of design detail required
- ❑ Climatic data
- ❑ Codes and standards
  - ❑ National
  - ❑ Local
  - ❑ Owner specific
  - ❑ International
- ❑ Utilization of design standards
  - ❑ Owner's
  - ❑ Contractor's
  - ❑ Designer's
  - ❑ Mixed
  - ❑ Level of design detail required
- ❑ Donor or benefactor requirements
- ❑ Sole source requirements for equipment or systems
- ❑ Insurance underwriter requirements
- ❑ Cultural preferences

C3. Evaluation of Existing Facilities

If existing facilities are available, then a condition assessment must be performed to determine if they will meet facility requirements. Evaluation criteria may include:

- ❑ Capacity
  - ❑ Power
  - ❑ Utilities (i.e., potable water, gas, oil)
  - ❑ Fire water
  - ❑ Waste treatment/disposal
  - ❑ Sanitary sewer
  - ❑ Telecommunications
  - ❑ Security
  - ❑ Storm water containment system/ filtration

- ❑ Access
  - ❑ Rail
  - ❑ ADA or local standards
  - ❑ Roads
- ❑ Parking areas
- ❑ Type and size of buildings/structures
- ❑ Amenities
  - ❑ Food service
  - ❑ Ambulatory access
  - ❑ Medical facilities
  - ❑ Recreation facilities including public outdoor spaces
  - ❑ Change rooms
- ❑ Condition assessment of existing facilities and infrastructure
- ❑ Other

C4. Scope of Work Overview

This work statement overview is a complete narrative description of the project that is discipline-oriented and supports development of the project schedule and project cost estimate. It sets the limits of work by each involved party and generally articulates their financial, task, and contractual responsibilities. It clearly states both assumptions and exclusions used to define the scope of work.

C5. Project Schedule

Ideally, the project schedule should be developed by the project team (owner, A/E, and construction contractor). It should include milestones, unusual schedule considerations and appropriate master schedule contingency time (float), procurement of long-lead or critical pacing equipment, and required submissions and approvals.

C6. Project Cost Estimate

The project cost estimate should address all costs necessary for completion of the project. This cost estimate may include the following:

- ❑ Construction contract estimate
- ❑ Professional fees
- ❑ Land cost
- ❑ Furnishings
- ❑ Administrative costs
- ❑ Contingencies
- ❑ Cost escalation for elements outside the project cost estimate
- ❑ Startup costs including installation
- ❑ Miscellaneous expenses including but not limited to:
  - ❑ Specialty consultants
  - ❑ Inspection and testing services
  - ❑ Bidding costs
  - ❑ Site clearance
  - ❑ Bringing utilities to the site
  - ❑ Environmental impact mitigation measures
  - ❑ Local authority permit fees
  - ❑ Occupant moving and staging costs
  - ❑ Utility costs during construction (if paid by owner)
  - ❑ Interest on borrowed funds (cost of money)
  - ❑ Site surveys, soils tests
  - ❑ Availability of construction laydown and storage at site or in remote or rented facilities

SECTION II: BASIS OF DESIGN

D. SITE INFORMATION

D1. Site Layout

The facility should be sited on the selected property. Layout criteria may include items such as:

- ❑ Access (e.g., road, rail, marine, air)
- ❑ Construction access
- ❑ Historical/cultural
- ❑ Trees and vegetation
- ❑ Site massing and context constraints or guidelines (i.e., how a building will look in three dimensions at the site)
- ❑ Access transportation parking, delivery/service, and pedestrian circulation considerations
- ❑ Open space, street amenities, "urban context concerns"
- ❑ Climate, wind, and sun orientation for natural lighting views, heat loss/gain, energy conservation, and aesthetic concerns

D2. Site Surveys

The site should be surveyed for the exact property boundaries, including limits of construction. A topography map with the overall plot and site plan is also needed. Evaluation criteria may include:

- ❑ Legal property descriptions with property lines
- ❑ Easements
- ❑ Rights-of-way
- ❑ Drainage patterns
- ❑ Deeds
- ❑ Definition of final site elevation
- ❑ Benchmark control systems
- ❑ Setbacks
- ❑ Access and curb cuts

- ❑ Proximity to drainage ways and flood plains
- ❑ Known below grade structures and utilities (both active and inactive)
- ❑ Trees and vegetation
- ❑ Existing facility locations and conditions
- ❑ Solar/shadows

D3. Civil/Geotechnical Information

The civil/geotechnical site evaluation provides a basis for foundation, structural, and hydrological design. Evaluations of the proposed site should include items such as:

- ❑ Depth to bedrock
- ❑ General site description (e.g., terrain, soils type, existing structures, spoil removal, areas of hazardous waste, etc.)
- ❑ Expansive or collapse potential of soils
- ❑ Fault line locations
- ❑ Spoil area for excess soil (i.e., location of on-site area or off-site instructions)
- ❑ Seismic requirements
- ❑ Water table elevation
- ❑ Flood plain analysis
- ❑ Soil percolation rate and conductivity
- ❑ Ground water flow rates and directions
- ❑ Need for soil treatment or replacement
- ❑ Description of foundation design options
- ❑ Allowable bearing capacities
- ❑ Pier/pile capacities
- ❑ Paving design options
- ❑ Overall site analysis

D4. Governing Regulatory Requirements

The local, state, and federal government permits necessary to construct and operate the facility should be identified. A work plan should be in place to prepare, submit, and track permit, regulatory, re-zoning, and code compliance for the project. It should include items such as:

- ❑ Construction
- ❑ Unique requirements
- ❑ Environmental
- ❑ Structural calculations
- ❑ Building height limits
- ❑ Setback requirements
- ❑ Fire
- ❑ Building
- ❑ Occupancy
- ❑ Special
- ❑ Signage
- ❑ Historical issues
- ❑ Accessibility
- ❑ Demolition
- ❑ Solar
- ❑ Platting
- ❑ Air/water
- ❑ Transportation

The codes that will have a significant impact on the scope of the project should also be investigated and explained in detail. Particular attention should be paid to local requirements. Regulatory and code requirements may affect the defined physical characteristics and project cost estimate. The project schedule may be affected by regulatory approval processes. For some technically complex buildings, regulations may change frequently.

D5. Environmental Assessment

An environmental assessment should be performed for the site to evaluate issues that can impact the cost estimate or delay the project. These issues may include:

- ❑ Archeological
- ❑ Location in an EPA air quality non-compliance zone
- ❑ Location in a wet lands area
- ❑ Environmental permits now in force
- ❑ Existing contamination
- ❑ Location of nearest residential area
- ❑ Ground water monitoring in place

- ❑ Downstream uses of ground water
- ❑ Existing environmental problems with the site
- ❑ Past/present use of site
- ❑ Noise/vibration requirements
- ❑ Air/water discharge requirements and options evaluated
- ❑ Discharge limits of sanitary and storm sewers identified
- ❑ Detention requirements
- ❑ Endangered species
- ❑ Erosion/sediment control

D6. Utility Sources with Supply Conditions

The availability/non-availability of site utilities needed to operate the facility with supply conditions of quantity, temperature, pressure, and quality should be evaluated. This may include items such as:

- ❑ Potable water
- ❑ Drinking water
- ❑ Cooling water
- ❑ Fire water
- ❑ Sewers
- ❑ Instrument air
- ❑ Facility air
- ❑ Heating water
- ❑ Gases
- ❑ Steam
- ❑ Electricity (voltage levels)
- ❑ Communications (e.g., data, cable television, telephones)
- ❑ Special requirement (e.g., deionized water or oxygen)

D7. Site Life Safety Considerations

Fire and life safety related items should be taken into account for the selected site. These items should include fire protection practices at the site, available firewater supply (amounts and conditions), and special safety requirements unique to the site. Evaluation criteria may include:

- ❑ Wind direction indicator devices (e.g., wind socks)
- ❑ Fire monitors and hydrants
- ❑ Flow testing
- ❑ Access and evacuation plan
- ❑ Available emergency medical facilities
- ❑ Security considerations (site illumination, access control)

D8. Special Water and Waste Treatment Requirements

On-site or pretreatment of water and waste should be evaluated. Items for consideration may include:

- ❑ Wastewater treatment
  - ❑ Process waste
  - ❑ Sanitary waste
- ❑ Waste disposal
- ❑ Storm water containment and treatment

E. BUILDING PROGRAMMING

E1. Program Statement

The program statement identifies the levels of performance for the facility in terms of space planning and functional relationships. It should address the human, physical, and external aspects to be considered in the design. Each performance criteria should include these issues:

- ❑ A performance statement outlining what goals are to be attained (e.g., providing sufficient lighting levels to accomplish the specified task safely and efficiently)
- ❑ A measure that must be achieved (e.g., 200 foot-candles at surface of surgical table)
- ❑ A test which is an accepted approach to establish that the criterion has been met (e.g., using a standard light meter to do the job)

E2. Building Summary Space List

The summary space list includes all space requirements for the entire project. This list should address specific types and areas. Possible space listings include:

- ❑ Building population
- ❑ Administrative offices
- ❑ Lounges
- ❑ Food Service Cafeteria
- ❑ Conference rooms
- ❑ Vending alcoves
- ❑ Janitorial closets
- ❑ Elevators
- ❑ Stairs
- ❑ Loading docks
- ❑ Dwelling units
- ❑ Special technology considerations
- ❑ Classrooms
- ❑ Laboratories
- ❑ Corridors
- ❑ Storage facilities
- ❑ Mechanical rooms
- ❑ Electrical rooms
- ❑ Parking space
- ❑ Entry lobby
- ❑ Restrooms
- ❑ Data/computer areas

A room data sheet should correspond to each entry on the summary space list. Room data sheets are discussed in element E11. The room data sheet contains information that is necessary for the summary space list. This list is used to determine assignable (usable) and non-assignable (gross) areas.

E3. Overall Adjacency Diagrams

The overall adjacency diagrams depict the layout of each department or division of the entire building. They show the relationship of specific rooms, offices, and sections. The adjacency diagrams must adequately convey the overall relationships between functional areas within the facility. Note that these diagrams are sometimes known as "bubble diagrams" or "balloon diagrams." They are also commonly expressed in an adjacency matrix.

E4. Stacking Diagrams

A stacking diagram portrays each department or functional unit vertically in a multi-story building. Stacking diagrams are drawn to scale, and they can help establish key design elements for the building. These diagrams are easily created with space lists and adjacency (or bubble) diagrams. Critical vertical relationships may relate to circulatory (stairs, elevators), structural elements, and mechanical or utility shafts.

Stacking diagrams can establish building elements such as floor size. This type of diagram often combines functional adjacencies and space requirements and also shows how the project is sited.

E5. Growth and Phased Development

Provisions for future phases or anticipated use change must be considered during project programming. A successful initial phase necessitates a plan for the long term phases. The following phasing issues may be addressed.

- ❑ Guidelines to allow for additions (i.e., over-design of structural systems, joist layout, column spacing)
- ❑ Technology needs as facility grows and expands or changes (e.g., mechanical systems, water demands)
- ❑ Compare the additional costs involved with making the building "expandable" versus the probability of the future expansion occurring as envisioned.
- ❑ Provisions for infrastructure that allow for future expansion

E6. Circulation and Open Space Requirements

An important component of space programming is common-area open spaces, both interior and exterior. These areas include the items listed and considerations such as:

- ❑ Exterior
  - ❑ Service dock areas and access
  - ❑ Circulation to parking areas
  - ❑ Passenger drop-off areas
  - ❑ Pedestrian walkways
  - ❑ Courtyards, plazas, or parks
  - ❑ Landscape buffer areas
  - ❑ Unbuildable areas (e.g., wetlands or slopes)
  - ❑ Sidewalks or other pedestrian routes
  - ❑ Bicycle facilities
  - ❑ Lobbies and entries
  - ❑ Security considerations (e.g., card access or transmitters)
  - ❑ Snow removal plan
  - ❑ Postal and newspaper delivery
  - ❑ Waste removal
  - ❑ Fire and life-safety circulation considerations
- ❑ Interior
  - ❑ Interior aisle ways and corridors
  - ❑ Vertical circulation (i.e., personnel and material transport including elevators and escalators)
  - ❑ Directional and location signage

E7. Functional Relationship Diagrams/Room by Room

Room by room functional relationship diagrams show the structure of adjacencies of a group of rooms. With these adjacency diagrams (also known as bubble diagrams),

the architect can convert them into a floor plan with all the relationships. Each space detail sheet should have a minimum of one functional relationship diagram. Rooms are often represented by circles, bubbles, squares, or rectangles. Larger rooms are represented with bigger symbols. They are also commonly expressed in an adjacency matrix.

E8. Loading/Unloading/Storage Facilities Requirements

A list of requirements identifying materials to be unloaded and stored and products to be loaded along with their specifications. This list should include items such as:

- ❑ Storage facilities to be provided and/or utilized
- ❑ Refrigeration requirements and capabilities
- ❑ Mail/small package delivery
- ❑ Recycling requirements

E9. Transportation Requirements

Specifications for implementation of facility transportation (e.g., roadways, conveyers, elevators) as well as methods for receiving and shipping of materials (e.g., air, rail, truck, marine) should be identified. Provisions should be included for items such as:

- ❑ Facility access requirements based on transportation
- ❑ Drive-in doors
- ❑ Extended ramps for low clearance trailers
- ❑ Rail car access doors
- ❑ Service elevators
- ❑ Loading docks
- ❑ Temporary parking

E10. Building Finishes

Levels of interior and exterior finishes should be defined for the project. For example, the finishes may include categories such as:

Interior Schedule:

- ❑ Type A
  - ❑ Floor: vinyl composition tile
  - ❑ Walls: painted
- ❑ Type B
  - ❑ Floor: direct glue carpet
  - ❑ Walls: vinyl wall covering
- ❑ Type C
  - ❑ Floor: carpet over pad
  - ❑ Walls: wood paneling

Exterior Schedule:

- ❑ Type 1
  - ❑ Walls: brick
  - ❑ Trim: brick
- ❑ Type 2
  - ❑ Walls: overlapping masonry
  - ❑ Trim: cedar

Finishes and local design standards are further defined in category F.

E11. Room Data Sheets

Room data sheets contain the specific requirements for each room considering its functional needs. A room data sheet should correspond to each room on the building summary space list. The format of the room data sheet should be consistent. Possible issues to include on room data sheets are:

- ❑ Critical dimensions
- ❑ Technical requirements (e.g., fireproof, explosion resistance, X-ray)
- ❑ Furnishing requirements
- ❑ Equipment requirements
- ❑ Audio/visual (A/V) data and communication provisions
- ❑ Lighting requirements
- ❑ Utility requirements
- ❑ Security needs including access/hours of operation
- ❑ Finish type
- ❑ Environmental issues
- ❑ Acoustics/vibration requirements
- ❑ Life-safety

E12. Furnishings, Equipment, and Built-Ins

All moveable furnishings, equipment, and built-ins should be listed on the room data sheets. Moveable and fixed in place equipment should be distinguished. Building modifications, such as wide access doors or high ceilings, necessary for any equipment also need to be listed. Long delivery time items should be identified and ordered early. It is critical to identify the utility impact of equipment (e.g., electrical, cooling, special water or drains, venting, radio frequency shielding). Examples may include:

- ❑ Furniture
- ❑ Kitchen equipment
- ❑ Medical equipment
- ❑ Material handling
- ❑ Partitions

New items and relocated existing items must be distinguished in the program. The items can be classified in the following categories.

New Items:

- ❑ Contractor furnished and contractor installed
- ❑ Owner furnished and contractor installed
- ❑ Owner furnished and owner installed

Existing Items:

- ❑ Relocated as is and contractor installed
- ❑ Refurbished and installed by contractor
- ❑ Relocated as is and owner installed
- ❑ Refurbished and installed by owner

E13. Window Treatment

Any special fenestration window treatments for energy and/or light control should be noted in order to have proper use of natural light. Some examples include:

- ❑ Blocking of natural light
- ❑ Glare reducing windows
- ❑ Exterior louvers
- ❑ Interior blinds

F. BUILDING/PROJECT DESIGN PARAMETERS

F1. Civil/Site Design

Civil/site design issues should be addressed to provide a basis for facility design. Issues to address may include:

- ❑ Service and storage requirements
- ❑ Elevation and profile views
- ❑ High point elevations for grade, paving, and foundations
- ❑ Location of equipment
- ❑ Minimum overhead clearances
- ❑ Storm drainage system
- ❑ Location and route of underground utilities
- ❑ Site utilities
- ❑ Earth work
- ❑ Subsurface work
- ❑ Paving/curbs

- ❑ Landscape/xeriscape
- ❑ Fencing/site security

F2. Architectural Design

Architectural design issue should be addressed to provide a basis for facility design. These issues may include the following:

- ❑ Determination of metric (hard/soft) versus Imperial (English) units (Note: The term "hard" metric means that materials and equipment are identified on the drawings and have to be delivered in metric-sized unit dimensions such as 200mm by 400mm. "Soft" metric means that materials and equipment can be delivered using sizes that approximate the metric dimensions given on the drawings, such as three-inch length instead of eight cm. It is important to set these dimensions and not "mix and match.")
- ❑ Requirements for building location/orientation horizontal and vertical
- ❑ Access requirements
- ❑ Nature/character of building design (e.g., aesthetics)
- ❑ Construction materials
- ❑ Acoustical considerations
- ❑ American with Disabilities Act requirements or other local access requirements
- ❑ Architectural Review Boards
- ❑ Planning and zoning review boards
- ❑ Circulation considerations
- ❑ Seismic design considerations
- ❑ Color/material standards
- ❑ Hardware standards
- ❑ Furniture, furnishings, and accessories criteria
- ❑ Design grid
- ❑ Floor to floor height

F3. Structural Design

Structural design considerations should be addressed to provide a basis for the facility design. These considerations may include the following:

- ❑ Structural system (e.g., construction materials, constraints)
- ❑ Seismic requirements
- ❑ Foundation system
- ❑ Corrosion control requirements/required protective coatings
- ❑ Client specifications (e.g., basis for design loads, vibration, deflection)
- ❑ Future expansion/flexibility considerations
- ❑ Design loading parameter (e.g., live/dead loads, design loads, collateral load capacity, equipment/material loads, wind/snow loads, uplift)
- ❑ Functional spatial constraints

F4. Mechanical Design

Mechanical design parameters should be developed to provide a basis for facility design. Items to consider include:

- ❑ Special ventilation or exhaust requirements
- ❑ Equipment/space special requirements with respect to environmental conditions (e.g., air quality, special temperatures)
- ❑ Energy conservation and life cycle costs
- ❑ Acoustical requirements
- ❑ Zoning and controls
- ❑ Air circulation requirements
- ❑ Outdoor design conditions (e.g., minimum and maximum yearly temperatures)
- ❑ Indoor design conditions (e.g., temperature, humidity, pressure, air quality)
- ❑ Building emissions control

- ❑ Utility support requirements
- ❑ System redundancy requirements
- ❑ Plumbing requirements
- ❑ Special piping requirements
- ❑ Seismic requirements

F5. Electrical Design

Electrical design parameters provide the basis for facility design. Consider items such as:

- ❑ Power sources with available voltage and amperage
- ❑ Special lighting considerations (e.g., lighting levels, color rendition)
- ❑ Voice, data, and video communications requirements
- ❑ Uninterruptable power source (UPS) and/or emergency power requirements
- ❑ Energy consumption/conservation and life cycle cost
- ❑ Ability to use daylight in lighting
- ❑ Seismic requirements
- ❑ Lightning/grounding requirements

F6. Building Life Safety Requirements

Building life safety requirements are a necessity for building operations. They should be identified at this stage of the project. Possible safety requirements are listed below:

- ❑ Fire resistant requirements
- ❑ Explosion resistant requirements
- ❑ Area of refuge requirements in case of catastrophe
- ❑ Safety and alarm requirements
- ❑ Fire detection and/or suppression requirements
- ❑ Eye wash stations
- ❑ Safety showers

- ❑ Deluge requirements and foam
- ❑ Fume hoods
- ❑ Handling of hazardous materials
- ❑ Isolation facilities
- ❑ Sterile environments
- ❑ Emergency equipment access
- ❑ Personnel shelters
- ❑ Egress
- ❑ Public address requirements
- ❑ Data or communications protection in case of disaster or emergency
- ❑ Fall hazard protection
- ❑ Gas hazard detection

F7. Constructability Analysis

CII defines constructability as, "the optimum use of construction knowledge and experience in planning, design, procurement, and field operations to achieve overall project objectives. Maximum benefits occur when people with construction knowledge and experience become involved at the very beginning of a project."

Is there a structured approach for constructability analysis in place? Have provisions been made to provide this on an ongoing basis? This would include examining design options and details of construction that minimize construction costs while maintaining standards of safety, quality, and schedule. Elements of constructability during pre-project planning include:

- ❑ Constructability program in existence
- ❑ Construction knowledge/experience used in project planning
- ❑ Early construction involvement in contracting strategy development
- ❑ Developing a construction-sensitive project schedule
- ❑ Considering major construction methods in basic design approaches

- ❑ Developing site layouts for efficient construction
- ❑ Early identification of project team participants for constructability analysis
- ❑ Usage of advanced information technologies

F8. Technological Sophistication

The requirements for intelligent or special building systems should be evaluated. Examples of these systems may include:

- ❑ Video conferencing
- ❑ Internet connections
- ❑ Advanced audio/visual (A/V) connections
- ❑ Personnel sensing
- ❑ Computer docking stations
- ❑ "Smart" heating or air-conditioning
- ❑ Intercommunication systems
- ❑ Security systems
- ❑ Communication systems
- ❑ Conveyance systems

G. EQUIPMENT

G1. Equipment List

Project-specific equipment should be defined and listed. (Note: Building systems equipment is addressed in element F4 – Mechanical Design and F5 – Electrical Design). In situations where owners are furnishing equipment, the equipment should be properly defined and purchased. The list should define items such as:

- ❑ Process
- ❑ Medical
- ❑ Food service/vending
- ❑ Trash disposal
- ❑ Distributed control systems

- ❑ Material handling
- ❑ Existing sources and characteristics of equipment
  - ❑ Relative sizes
  - ❑ Weights
  - ❑ Location
  - ❑ Capacities
  - ❑ Materials of construction
  - ❑ Insulation and painting requirements
  - ❑ Equipment related access
  - ❑ Vendor, model, and serial number once identified
  - ❑ Equipment delivery time, if known

G2. Equipment Location Drawings

Equipment location/arrangement drawings identify the specific location of each item of equipment in a project. These drawings should identify items such as:

- ❑ Plan and elevation views of equipment and platforms
- ❑ Location of equipment rooms
- ❑ Physical support requirement (e.g., installation bolt patterns)
- ❑ Coordinates or location of all major equipment

G3. Equipment Utility Requirements

This evaluation should consist of a tabulated list of utility requirements for all major equipment items such as:

- ❑ Power and/or all utility requirements
- ❑ Flow diagrams
- ❑ Design temperature and pressure
- ❑ Diversity of use
- ❑ Gas
- ❑ Water

SECTION III: EXECUTION APPROACH

H. PROCUREMENT STRATEGY

H1. Identify Long-lead/Critical Equipment and Materials

Identify engineered equipment and material items with lead times that will impact the design for receipt of supplier information or impact the construction schedule with long delivery times.

H2. Procurement Procedures and Plans

Procurement procedures and plans include specific guidelines, special requirements, or methodologies for accomplishing the purchasing, expediting, and delivery of equipment and materials required for the project. Evaluation criteria may include:

- ❑ Who will perform procurement?
- ❑ Listing of approved vendors, if applicable
- ❑ Client or contractor purchase orders
- ❑ Reimbursement terms and conditions
- ❑ Guidelines for supplier alliances, single source, or competitive bids
- ❑ Guidelines for engineering/construction contracts
- ❑ Who assumes responsibility for owner-purchased items?
  - ❑ Financial
  - ❑ Shop inspection
  - ❑ Expediting
- ❑ Tax strategy
  - ❑ Depreciation capture
  - ❑ Local sales and use tax treatment
  - ❑ Investment tax credits
- ❑ Definition of source inspection requirements and responsibilities

- ❑ Definition of traffic/insurance responsibilities
- ❑ Definition of procurement status reporting requirements
- ❑ Additional/special owner accounting requirements
- ❑ Definition of spare parts requirements
- ❑ Local regulations (e.g., tax restrictions, tax advantages)
- ❑ Incentive/penalty strategy for contracts
- ❑ Storage

J. DELIVERABLES

J1. CADD/Model Requirements

Computer Aided Drafting and Design (CADD) requirements should be defined. Evaluation criteria may include:

- ❑ Software system required by client (e.g., AutoCAD, Intergraph)
- ❑ Will the project be required to be designed using 2D or 3D CADD? Will rendering be required?
- ❑ If 3D CADD is to be used, will a walk-through simulation be required?
- ❑ Owner/contractor standard symbols and details
- ❑ How will data be received and returned to/from the owner?
  - ❑ Disk
  - ❑ Electronic transfer
  - ❑ Tape
  - ❑ Reproducibles
  - ❑ Full-size mock-ups

Physical model requirements depend upon the type needed for analysis, such as study models or design checks.

J2. Documentation/Deliverables

Documentation and deliverables required during project execution should be identified. If electronic media are to be used, format and application packages should be outlined. The following items may be included in a list of deliverables:

- ❑ Drawings and specifications
- ❑ Project correspondence
- ❑ Permits
- ❑ Maintenance and operating information/startup procedures
- ❑ Facility keys, keying schedules, and access codes
- ❑ Project data books (quantity, format, contents, and completion date)
- ❑ Equipment folders (quantity, format, contents, and completion date)
- ❑ Design calculations (quantity, format, contents, and completion date)
- ❑ Spare parts and maintenance stock (special forms)
- ❑ Procuring documents/contract documents
- ❑ Record (as-built) documents
- ❑ Quality assurance documents
- ❑ Project signage
- ❑ Guarantees/warranties
- ❑ Inspection documents
- ❑ Certificates of inspection
- ❑ Shop drawings and samples
- ❑ Bonds
- ❑ Distribution matrix

K. PROJECT CONTROL

K1. Project Quality Assurance and Control

Quality assurance and quality control procedures need to be established. Responsibility for approvals needs to be developed. Electronic media requirements should be outlined. These issues may include:

- ❑ Responsibility during design and construction
- ❑ Testing of materials and workmanship
- ❑ ISO 9000 requirements
- ❑ Submittals and shop drawing approach
- ❑ Inspection reporting requirements
- ❑ Progress photos
- ❑ Reviewing changes and modifications
- ❑ Communication documents (e.g., RFIs, RFQs)
- ❑ Commissioning tests
- ❑ Lessons-learned feedback

K2. Project Cost Control

Procedures for controlling project cost need to be outlined and responsibility assigned. Electronic media requirements should be identified. These may include cost control requirements such as:

- ❑ Financial (client/regulatory)
- ❑ Phasing or area sub-accounting
- ❑ Capital vs. non-capital expenditures
- ❑ Report requirements
- ❑ Payment schedules and procedures
- ❑ Cash flow projections/draw down analysis
- ❑ Cost code scheme/strategy

- ❑ Costs for each project phase
- ❑ Periodic control check estimates
- ❑ Change order management procedure, including scope control

K3. Project Schedule Control

The project schedule is created to show progress and ensure that the project is completed on time. The schedule is necessary for design and construction of the building. A schedule format should be decided on at the beginning of the project. Typical items included in a project schedule are listed below.

- ❑ Milestones
- ❑ Unusual schedule considerations
- ❑ Required submissions and/or approvals
- ❑ Required documentation and responsible party
- ❑ Baseline vs. progress to date
- ❑ Long-lead or critical pacing equipment delivery
- ❑ Critical path activities
- ❑ Contingency or "float time"
- ❑ Permitting or regulatory approvals
- ❑ Activation and commissioning
- ❑ Liquidated damages/incentives

The owner must also identify how special project issues will be scheduled. These items may include:

- ❑ Selection, procurement, and installation of equipment
- ❑ Design of interior spaces (including furniture and accessory selection)
- ❑ Stages of the project that must be handled differently than the rest of the project
- ❑ Tie-ins, service interruptions, and road closures

K4. Risk Management

Major project risks need to be identified, quantified, and management actions taken to mitigate problems developed. Pertinent elements may include:

- ❑ Design risks
  - ❑ Expertise
  - ❑ Experience
  - ❑ Work load
  - ❑ Teamwork orientation
  - ❑ Communication
  - ❑ Integration and coordination
- ❑ Construction risks
  - ❑ Availability of craft labor and construction materials
  - ❑ Weather
  - ❑ Differing/unforeseen/difficult site conditions
  - ❑ Long-lead item delays
  - ❑ Strikes
  - ❑ Inflation
  - ❑ Scope growth
- ❑ Management risks
  - ❑ Availability of designers
  - ❑ Critical quality issues
  - ❑ Bidders
  - ❑ Human error
  - ❑ Cost and schedule estimates
  - ❑ Timely decisions
  - ❑ Team chemistry
- ❑ Insurance considerations

K5. Safety Procedures

Safety procedures and responsibilities must be identified for design consideration and construction. Safety issues to be addressed may include:

- ❑ Hazardous material handling
- ❑ Interaction with the public
- ❑ Working at elevations/fall hazards
- ❑ Evacuation plans and procedures
- ❑ Drug testing
- ❑ First aid stations
- ❑ Accident reporting and investigation
- ❑ Pre-task planning
- ❑ Safety orientation and planning
- ❑ Safety incentives
- ❑ Other special or unusual safety issues

L. PROJECT EXECUTION PLAN

L1. Project Organization

The project team should be identified including roles, responsibilities, and authority. Items to consider include:

- ❑ Core team members
- ❑ Project manager assigned
- ❑ Project sponsor assigned
- ❑ Working relationships between participants
- ❑ Communication channels
- ❑ Organizational chart
- ❑ Approval responsibilities/responsibility matrix

L2. Owner Approval Requirements

All documents that require owner approval should be clearly defined. These may include:

- ❑ Milestones for drawing approval by phase
  - ❑ Comment
  - ❑ Approval
  - ❑ Bid issues (public or private)
  - ❑ Construction
- ❑ Durations of approval cycle compatible with schedule
- ❑ Individual(s) responsible for reconciling comments before return
- ❑ Types of drawings/specifications
- ❑ Purchase documents/general conditions and contract documents
  - ❑ Data sheets
  - ❑ Inquiries
  - ❑ Bid tabulations
  - ❑ Purchase orders
- ❑ Supplier information

L3. Project Delivery Method

The methods of project design and construction delivery, including fee structure should be identified. Issues to consider include:

- ❑ Owner self-performed
- ❑ Designer and constructor qualification selection process
- ❑ Selected methods (e.g., design/build, CM at risk, competitive sealed proposal, bridging, design-bid-build)
- ❑ Contracting strategies (e.g., lump sum, cost-plus)
- ❑ Design/build scope package considerations

L4. Design/Construction Plan and Approach

This is a documented plan identifying the specific approach to be used in designing and constructing the project. It should include items such as:

- ❑ Responsibility matrix
- ❑ Subcontracting strategy
- ❑ Work week plan/schedule
- ❑ Organizational structure
- ❑ Work Breakdown Structure (WBS)
- ❑ Construction sequencing of events
- ❑ Site logistics plan
- ❑ Safety requirements/program
- ❑ Identification of critical activities that have potential impact on facilities (i.e., existing facilities, crane usage, utility shut downs and tie-ins, testing)
- ❑ Quality assurance/quality control (QA/QC) plan
- ❑ Design and approvals sequencing of events
- ❑ Equipment procurement and staging
- ❑ Contractor meeting/reporting schedule
- ❑ Partnering or strategic alliances
- ❑ Alternative dispute resolution
- ❑ Furnishings, equipment, and built-ins responsibility

L5. Substantial Completion Requirements

Substantial Completion (SC) is defined as the point in time when the building is ready to be occupied. The following may need to be addressed:

- ❑ Have specific requirements for SC responsibilities been developed?
- ❑ Have warranty, permitting, insurance, and tax implications been considered?

- ❑ Commissioning
  - ❑ Equipment/systems startup and testing
  - ❑ Occupancy phasing
  - ❑ Final code inspection
  - ❑ Calibration
  - ❑ Verification
  - ❑ Documentation
  - ❑ Training
  - ❑ Acceptance
- ❑ Landscape requirements
- ❑ Punchlist completion plan and schedule
- ❑ Substantial completion certificate

Appendix D
Example Project

Project Type:	Dormitory-Student Housing Project
Facility Uses:	Lodging, food service, meeting rooms, computer facility
Budget:	Approximately $52 million
Scheduled Completion:	December 2000
Date Scored:	November 11, 1998, 2:40 p.m. – 4:50 p.m.
Objectives of the Meeting:	Define potential problems using the PDRI Define current project status
Methodology:	Individuals evaluated each element Discussed each element as a group Reached a common (consensus) definition level for each element
Project Status:	100% complete with Programming 30% complete with Schematic Design Scoring session took place at the kickoff meeting of the design/build project team — five attendees.

Major Findings/Areas for Further Study:

Problems with site analysis (Category D-project was sited in a flood plain and other site problems); existing facilities not evaluated (C3); confusion over facility capacity (A5); no owner approval process (L2);

SECTION I — BASIS OF PROJECT DECISION

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
A. BUSINESS STRATEGY (Maximum = 214)							
A1. Building Use	0	(1)	12	23	33	44	1
A2. Business Justification	0	1	(8)	14	21	27	8
A3. Business Plan	0	(2)	8	14	20	26	2
A4. Economic Analysis	0	2	6	(11)	16	21	11
A5. Facility Requirements	0	2	(9)	16	23	31	9
A6. Future Expansion/Alteration Considerations	0	(1)	7	12	17	22	1
A7. Site Selection Considerations	0	1	(8)	15	21	28	8
A8. Project Objectives Statement	0	(1)	4	8	11	15	1
CATEGORY A TOTAL							**41**
B. OWNER PHILOSOPHIES (Maximum = 68)							
B1. Reliability Philosophy	0	1	(5)	10	14	18	5
B2. Maintenance Philosophy	0	(1)	5	9	12	16	1
B3. Operating Philosophy	0	(1)	5	8	12	15	1
B4. Design Philosophy	0	1	6	10	(14)	19	14
CATEGORY B TOTAL							**21**
C. PROJECT REQUIREMENTS (Maximum = 131)							
C1. Value-Analysis Process	0	(1)	6	10	14	19	1
C2. Project Design Criteria	0	1	7	13	(18)	24	18
C3. Evaluation of Existing Facilities	0	2	7	13	(19)	24	19
C4. Scope of Work Overview	0	1	(5)	9	13	17	5
C5. Project Schedule	0	2	6	(11)	15	20	11
C6. Project Cost Estimate	0	2	8	(15)	21	27	15
CATEGORY C TOTAL							**69**
Section I Maximum Score = 413						**SECTION I TOTAL**	**131**

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION II — BASIS OF DESIGN

CATEGORY / Element	Definition Level 0	1	2	3	4	5	Score
D. SITE INFORMATION (Maximum = 108)							
D1. Site Layout	0	1	(4)	7	10	14	4
D2. Site Surveys	0	1	4	8	11	(14)	14
D3. Civil/Geotechnical Information	0	2	6	10	14	(19)	19
D4. Governing Regulatory Requirements	0	1	(4)	8	11	14	4
D5. Environmental Assessment	0	1	5	9	(12)	16	12
D6. Utility Sources with Supply Conditions	0	1	4	7	(10)	13	10
D7. Site Life Safety Considerations	0	1	(2)	4	6	8	2
D8. Special Water and Waste Treatment Req'mts	0	1	3	(6)	8	11	6
CATEGORY D TOTAL							**71**
E. BUILDING PROGRAMMING (Maximum = 162)							
E1. Program Statement	0	(1)	5	9	12	16	1
E2. Building Summary Space List	0	(1)	6	11	16	21	1
E3. Overall Adjacency Diagrams	0	(1)	3	6	8	10	1
E4. Stacking Diagrams	0	(1)	4	7	10	13	1
E5. Growth and Phased Development	0	(1)	5	8	12	15	1
E6. Circulation and Open Space Requirements	0	1	(4)	7	10	13	4
E7. Functional Relationship Diagrams/Room by Rm.	0	(1)	3	5	8	10	1
E8. Loading/Unloading/Storage Facilities Req'mts	0	(1)	2	4	6	8	1
E9. Transportation Requirements	0	1	(3)	5	7	9	3
E10. Building Finishes	0	(1)	5	8	12	15	1
E11. Room Data Sheets	0	(1)	4	7	10	13	1
E12. Furnishings, Equipment, and Built-Ins	0	1	(4)	8	11	14	4
E13. Window Treatment	(0)	0	2	3	4	5	0
CATEGORY E TOTAL							**20**

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION II — BASIS OF DESIGN (continued)

CATEGORY Element	Definition Level 0	1	2	3	4	5	Score
F. BUILDING/PROJECT DESIGN PARAMETERS (Maximum = 122)							
F1. Civil/Site Design	0	1	4	7	(11)	14	11
F2. Architectural Design	0	1	7	(12)	17	22	12
F3. Structural Design	0	(1)	5	9	14	18	1
F4. Mechanical Design	0	(2)	6	11	15	20	2
F5. Electrical Design	0	1	(5)	8	12	15	5
F6. Building Life Safety Requirements	0	1	(3)	5	8	10	3
F7. Constructability Analysis	0	(1)	4	8	11	14	1
F8. Technological Sophistication	0	(1)	3	5	7	9	1
CATEGORY F TOTAL							**36**
G. EQUIPMENT (Maximum = 36)							
G1. Equipment List	0	(1)	5	8	12	15	1
G2. Equipment Location Drawings	0	(1)	3	5	8	10	1
G3. Equipment Utility Requirements	0	(1)	4	6	9	11	1
CATEGORY G TOTAL							**3**
Section II Maximum Score = 428 — **SECTION II TOTAL**							**130**

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

SECTION III — EXECUTION APPROACH

CATEGORY / Element	Definition Level 0	1	2	3	4	5	Score
H. PROCUREMENT STRATEGY (Maximum = 25)							
H1. Identify Long-lead/Critical Equip. and Materials	0	(1)	4	7	10	14	1
H2. Procurement Procedures and Plans	0	(1)	3	6	9	11	1
CATEGORY H TOTAL							**2**
J. DELIVERABLES (Maximum = 11)							
J1. CADD/Model Requirements	0	0	(1)	2	3	4	1
J2. Documentation/Deliverables	0	1	(2)	4	6	7	2
CATEGORY J TOTAL							**3**
K. PROJECT CONTROL (Maximum = 63)							
K1. Project Quality Assurance and Control	0	(1)	3	4	6	8	1
K2. Project Cost Control	0	(1)	4	7	10	13	1
K3. Project Schedule Control	0	1	(4)	8	11	14	4
K4. Risk Management	0	1	6	(10)	14	18	10
K5. Safety Procedures	0	(1)	3	5	7	9	1
CATEGORY K TOTAL							**17**
L. PROJECT EXECUTION PLAN (Maximum = 60)							
L1. Project Organization	0	1	3	(5)	8	10	5
L2. Owner Approval Requirements	0	1	4	6	(9)	11	9
L3. Project Delivery Method	0	(1)	5	8	12	15	1
L4. Design/Construction Plan and Approach	0	(1)	4	8	11	15	1
L5. Substantial Completion Requirements	0	(1)	3	5	7	9	1
CATEGORY L TOTAL							**17**
Section III Maximum Score = 159							**SECTION III TOTAL** **39**
PDRI Maximum Score = 1000							**PDRI TOTAL SCORE** **300**

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

Appendix E
Logic Flow Diagrams

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4. *Pre-Project Planning Tools: PDRI and Alignment*, Research Summary 113-1, Construction Industry Institute, Austin, TX, August 1997.

5. *Alignment Handbook*, Implementation Resource 113-3, Construction Industry Institute, Austin, TX, December 1997.

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7. *Pre-Project Planning Handbook*, Special Publication 39-2, Construction Industry Institute, Austin, TX, April 1995.

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