Construction Industry Institute®

PDRI

Project Definition Rating Index

Building Projects

CII

Implementation Resource 155-2
Version 4.0

This page is intentionally blank.

PDRI:
Project Definition Rating Index –
Building Projects

Prepared by the
PDRI for Building Projects Research Team

Updated by the
Support for Pre-Project Planning Research Team and
Front End Planning for Renovation and Revamp Research Team

Implementation Resource 155-2

Version 4.0

October 2013

Printed in the United States of America.

Version 3.0 (July 2008)

Version 3.1 (July 2009) – Corrected scoring weights in the spreadsheet, Section I, Categories D and E.

Version 3.2 (December 2009) – Added copyright statement to spreadsheet and updated references to the compact disc.

Version 4.0 (October 2013) – Corrected scoring totals in Section II, Category D, and Section III, Category K of the scoresheet; made significant changes to spreadsheet functions; and made stylistic revisions to match companion products.

Foreword

Welcome to the fourth edition of *PDRI: Project Definition Rating Index – Building Projects*. The first edition of this document was developed and written by the CII PDRI for Building Projects Research Team and published in 1999. In 2006, the Support for Pre-Project Planning Project Team reviewed and updated all CII front end planning documentation, including that first edition. The team drew upon materials from the National Institute for Standards and Technology (NIST) Security Study performed by CII and the collective knowledge of the research team members. The resulting update (the second edition) significantly clarified the methods for using the PDRI–Building Projects tool, discussed tool usage by both owner and contractor organizations, and referenced security and sustainability issues.

In 2009, the Front End Planning for Renovation/Revamp Research Team revisited the second edition to clarify its usage on renovation projects and to provide specific comments on needed front end planning efforts on renovation projects. In addition, the team developed a macro-enabled spreadsheet that allows the project team to score projects automatically. (This Excel™ file can be found on the compact disc/downloadable files that accompany this book.) The research team believed that, with these changes, the third edition significantly improved the usability of the PDRI–Building Projects tool.

In this most current version, the team corrected the scoring totals in Section II, Category D, and Section III, Category K of the scoresheet found in Appendix B. Along with these content changes, the team fixed minor bugs in the scoring software and made significant changes to the functionality of the spreadsheets, also reformatting them to match the features of subsequently released PDRIs for industrial and infrastructure projects.

Contents

1

What Is the PDRI?

The PDRI–Building Projects is a simple and easy-to-use tool for measuring the degree of scope development.

The Project Definition Rating Index (PDRI) – Building Projects is a powerful and easy-to-use tool that offers a method to measure project scope definition for completeness. It 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 detailed design and construction.

The PDRI is intended to be used during front end planning, which encompasses the project activities shown in Figure 1.1 up to Phase Gate 3 and includes feasibility, concept and detailed scope definition. Note that front end planning has many other terms associated with it, including front end loading, pre-project planning, programming, schematic design, design development, sanctioning, and others. Understand that the term front end planning is used in this document, but may be replaced to adapt to a particular business process. More information concerning timing and process is provided later in this document. The PDRI was originally intended to be used as a tool to decide whether to proceed with project execution at Phase Gate 3, but experience has shown that it should be used more than once prior to this gate.

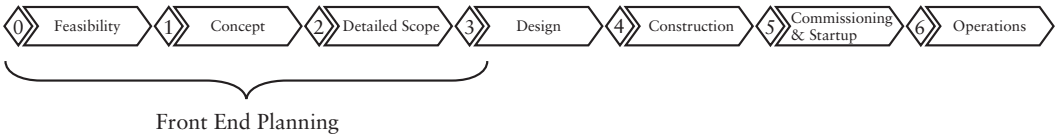


Figure 1.1. Project Life Cycle Diagram

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

Note: CII has developed three PDRI publications/tools. This book (IR 155-2) addresses building projects. The industrial projects version is IR 113-2. IR 268-2 focuses on infrastructure projects.

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 as described in Chapter 4.) Applicable 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
- government facilities.

PDRI–Industrial Projects (IR 113-2) is typically applied to the following types of facilities:

- oil/gas production facilities
- textile mills
- chemical plants
- pharmaceutical plants
- paper mills
- steel/aluminum mills
- power plants
- manufacturing facilities
- food processing plants
- refineries
- civil/industrial infrastructure
- plant upgrade/retrofit.

PDRI–Infrastructure Projects (IR 268-2) is typically applied to the following types of facilities:

People and freight:

- highways
- railroads
- access ramps
- tunnels
- airport runways
- security fencing

Energy:

- electricity transmission/ distribution
- fiber optic networks
- electrical substations/switch gears
- towers
- wide area networks

Fluids:

- pipelines
- aqueducts
- pumping and compressor stations
- locks, weirs
- reservoirs
- meters and regulator stations

Nodes/centralized facilities:

- dams
- power generation facilities
- steam or chilled water production
- marine, rail or air terminals
- water/waste water/solid waste processing
- refineries.

All three PDRIs include specific risk factors relating to new construction ("greenfield") projects and renovation-and-revamp ("R&R") projects. An R&R project is defined as one that is focused on an existing facility but does not involve routine maintenance activities. It includes the act, process, or work of replacing, restoring, repairing, or improving this facility with capital funds or non-capital funds. It may include additional structures and systems to achieve a more functional, serviceable, or desirable condition, including improvement in: profitability, reliability efficiency, safety, security, environmental performance, or compliance with regulatory requirements. R&R projects may be known by numerous other names, such as repair, upgrade, modernization, restoration and so forth. More details will be given later in this document about how to adapt the PDRI to R&R projects. (For more information on how to manage front end planning of R&R projects, see Implementation Resource 242-2, *Front End Planning of Renovation and Revamp Projects*.)

PDRI

The PDRI consists of three main sections, each of which is further divided into a series of categories. These categories also are divided into elements, as shown in Figure 1.2. A complete list of the PDRI's three sections, 11 categories, and 64 elements is given in Table 1.1 (next page).

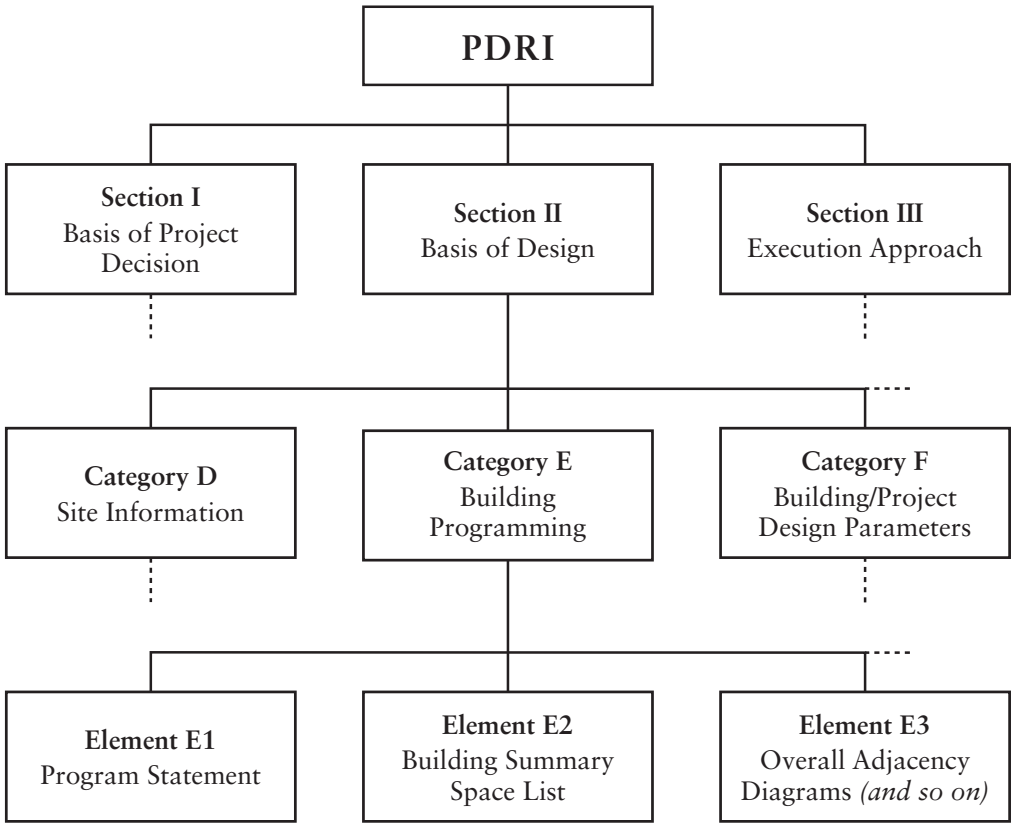


Figure 1.2. PDRI Partial Hierarchy

The PDRI should be used in conjunction with CII Implementation Resource 113-3, *Alignment During Pre-Project Planning*, to ensure that critical risk issues are addressed and that stakeholder interests are represented effectively in the front end planning process.

Table 1.1. PDRI–Building Projects Sections, Categories, and Elements

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

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

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

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 the project's use or type.

With a hybrid of industrial and building types, which PDRI score sheet should be used? In general, if the primary designers for 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. Figure 1.3 provides a mechanism for making the decision.

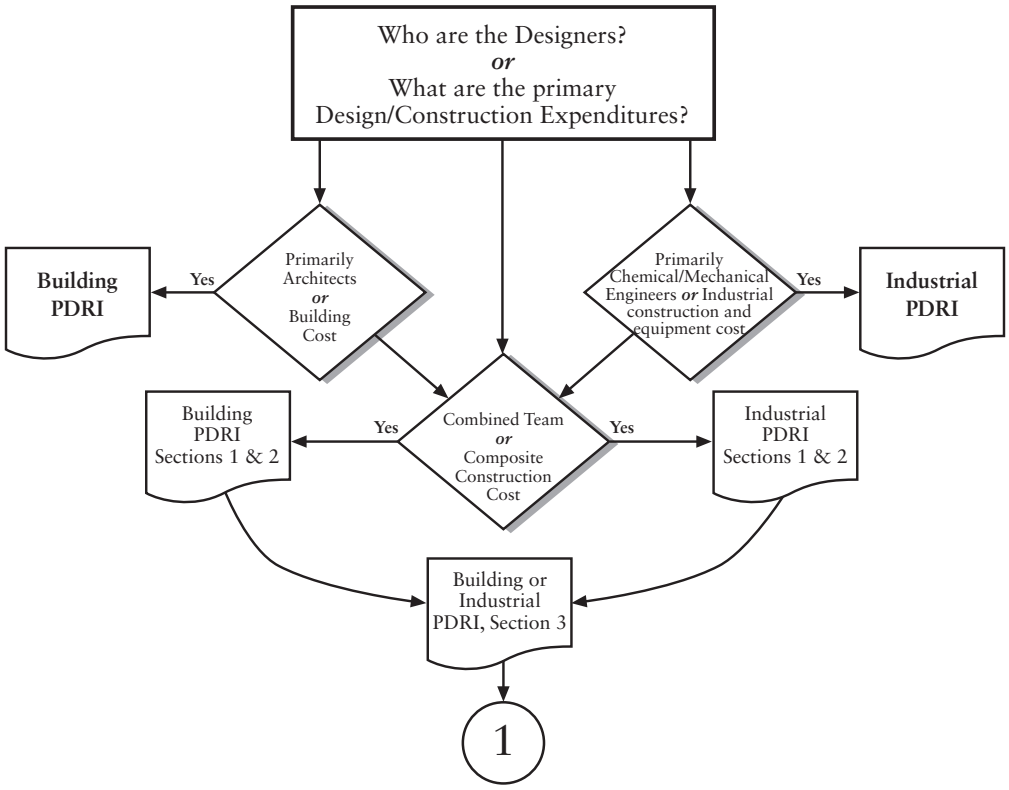


Figure 1.3. Flowchart for Deciding on PDRI Version

For example, many industrial facilities (chemical plants or refineries) require various types of buildings to support the operations and maintenance effort, such as the following:

- administration buildings
- warehouses
- control buildings
- maintenance facilities
- laboratories
- security facilities
- training centers.

In these cases, the Industrial PDRI should be used on the primary facility, but the team may want to use the Building PDRI on each type of building. Use the score sheet as a checklist if an entire assessment is not desirable.

Another example would be that of a building used for research or office space. Some of the space in the facility may be designated for production, including engineered equipment, process flows, and dedicated utility requirements. The Building PDRI would be used to plan the major portion of the facility, but the Industrial PDRI could be used to help plan the production space. At a minimum, the Industrial PDRI could be used as a checklist in this situation.

In addition, the user should determine whether the project is a renovation or revamp project, and use the additional descriptions provided in the tool to further address critical R&R issues during front end planning. Figure 1.4 provides a decision diagram to determine this further effort. Note, if the project includes a shutdown/turnaround/outage scenario, it is highly recommended that the project planning team also use the Shutdown Turnaround Alignment Readiness (STAR) front end planning tool provided in Implementation Resource 242-2, *Front End Planning of Renovation and Revamp Projects*, to help with the unique issues associated with these types of events.

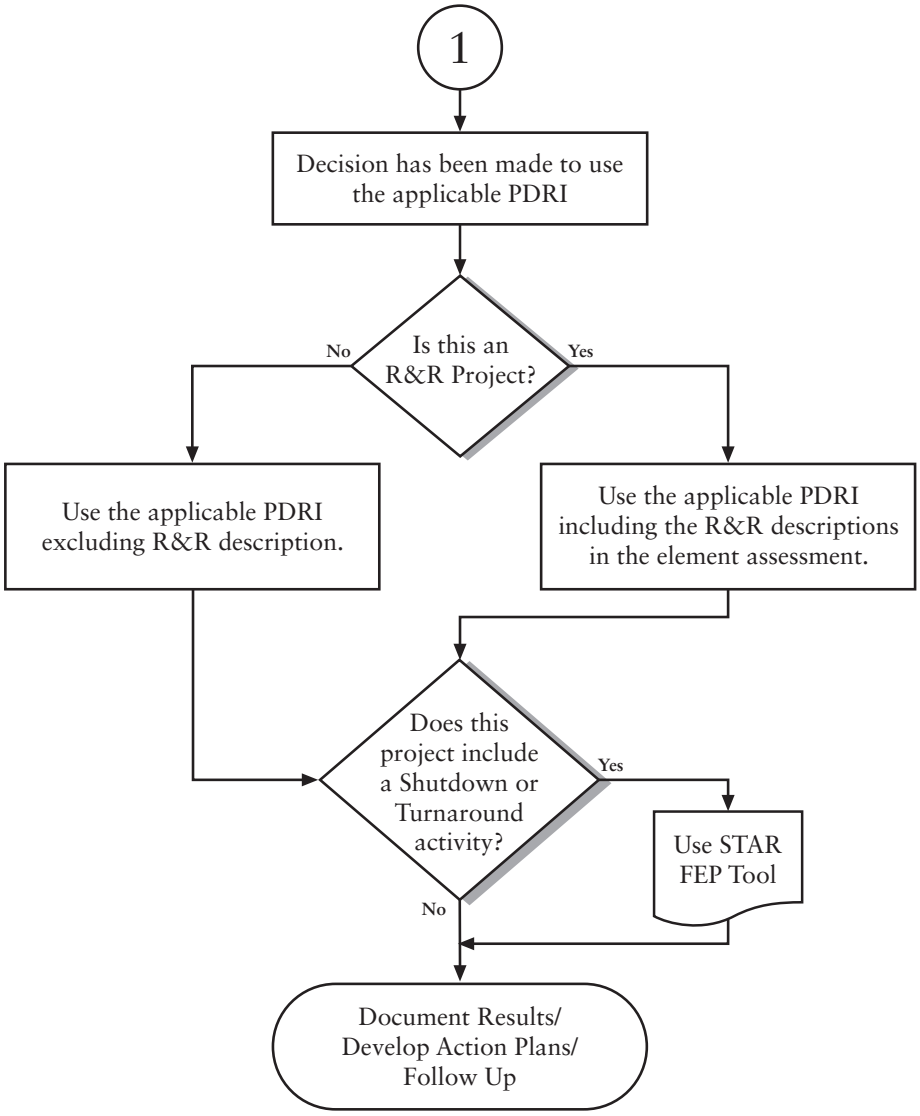


Figure 1.4. Use of Additional Tools to Supplement PDRI

2

Benefits of the PDRI

Effective front end planning improves project performance in terms of both cost and schedule, reinforcing the importance of early scope definition and its impact on project success. The PDRI allows a project planning team to quantify, rate, and assess the level of scope definition on projects prior to detailed design and construction.

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 provides the following:

- 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** for building projects
- an industry standard for rating the completeness of the project scope definition package to facilitate **risk assessment** and prediction of escalation, potential for disputes
- 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.

Use Among CII Membership

A survey from previous CII research regarding the PDRI indicates extensive usage among the membership. A 2004 questionnaire, distributed when the CII membership level was 92 (70 member companies responded to the survey), indicated 43 CII member organizations (18 of 34 contractors and 25 of 36 owners who responded) were using the PDRI on capital projects. PDRI–Industrial had been used for an average of 4.3 years, and PDRI–Buildings had been used for an average of 2.7 years. Figure 2.1 provides usage by type, while Table 2.1 details PDRI usage within the responding CII organizations.

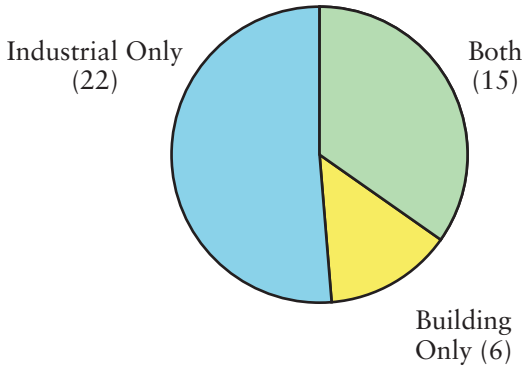


Figure 2.1. PDRI Usage by Type (N=43) (CII 2004)

Table 2.1. Frequency of Use Among Organizations Using PDRI (N=43)

The PDRI is used:	Frequency
As a planning checklist in early project development	81%
As a "gate" check before moving to project execution	72%
In conjunction with other front end planning measurement methods (i.e., prepare for third party evaluations, internal measures)	72%
As a means of measuring or benchmarking front end planning process performance	70%
More than once on most projects	42%
As an audit tool	42%
In a modified form for small or unusual projects	33%
To help capture lessons-learned	28%
With the help of an outside facilitator	29%

Who Should Use the PDRI?

Any organization wishing to improve the overall performance on its 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 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.

Owners should use the tool as a formal checklist of items that need to be clearly defined and communicated to ensure that the design team fully understands the project business objectives and drivers. Initially, owners should focus on Section I, the Basis of Business Decision elements. Accurate definition of these items will provide the best payback for the design team to make future decisions. These items should be well-defined at Phase Gate 2. As the project passes through the other phases, the owners should participate in the PDRI assessment sessions to ensure that the design team has correctly understood its requirements and is meeting the owner team expectations. This provides an opportunity for the owner stakeholders, including operations and maintenance, to question the design team for understanding and compliance. Communication is essential to ensure the design team is proceeding to meet the expectations and requirements of the owner stakeholders.

Contractors may become involved in projects at various points of the front end planning process and should use the PDRI to organize their work. Contractors should use the PDRI as an alignment tool to understand and participate in the development of the owner's business objectives and drivers, facilitating the design team's understanding of the elements defined in Section I, the Basis of Project Decision. The team will utilize this criterion to make decisions concerning cost, quality, and schedule as the project progresses through the scope definition stage and into Execution. As front end planning progresses, the PDRI helps the contractor clarify requirements outlined in Sections I and II (Basis of Design) of the PDRI, and ensures the right input from key owner stakeholders representing operations and maintenance, process engineering, research and development,

manufacturing, and business among others. The PDRI also assists in coordination and execution planning in conjunction with the owner organization as outlined by elements contained in Section III, Execution Approach.

Contractors are often given a request for proposal (RFP) on a project that has had all or a portion of the project scope defined by the owner, or the owner has utilized a third party engineering firm to develop the scope definition package. In these instances it is imperative that the contractor perform a PDRI as a risk assessment to determine the degree of definition and identify the potential weaknesses/areas of concern before responding to the RFP. The contractor should make every attempt to get as many of the project stakeholders as possible involved in the PDRI assessment session to assure that the team is making the correct evaluations and assumptions before proceeding to the next stage.

Contractors also may use the PDRI to determine if the work within their control is ready to move to the next step. Many contractors spend a portion of the project performing design, procurement, and constructability prior to the work starting in the field. The PDRI can be used to determine, for instance, if prior to start of underground work or selection of a subcontractor to perform the work, sufficient definition exists to minimize schedule and/or cost impacts that may trigger mitigating strategies. This can also be done prior to other major activities starting at the construction site.

3

Instructions for Assessing a Project

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

Individuals involved in front end planning should use the Project Score Sheets 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 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 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 assessment session is being held. If the project includes renovation work, the team should use the "supplemental issues to consider" provided in selected element descriptions.

When to Use PDRI

PDRI is a powerful tool that should be used at points throughout front end planning to ensure continued alignment, process checkups, and a continual focus on the key project priorities. Many companies find value in utilizing this tool at various points in the early project planning process.

Project size, complexity, and duration will help determine the optimum times that the PDRI tool should be used. To aid in the expanded use of this tool, Figure 3.1 illustrates four potential application points where PDRI could be useful.

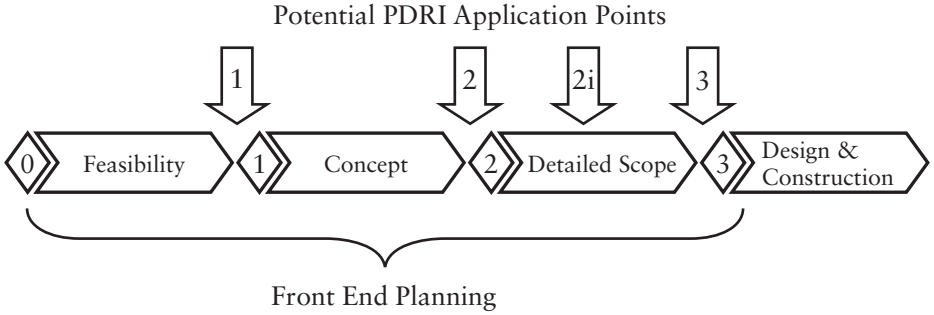


Figure 3.1. Employing the PDRI, Application Points

Regardless of the timing for the PDRI assessment, utilize the same checklist/descriptions and conduct the evaluation according to the guidelines outlined below.

PDRI 1 Review – This is a high level assessment of the project following Feasibility prior to Phase Gate 1 and is part of the decision criteria for proceeding to the next phase. This assessment is typically held for projects at the initial kickoff meeting when bringing an architect/engineer firm on board early in the project. The PDRI 1 Review should focus on the following areas:

- aligning the team with project objectives
- ensuring good communication between business/sponsor to project/contractor team
- highlighting stakeholder expectations to facilitate reasonable engineering estimates.

Typical PDRI scores at this assessment will be in the range of 550–800.

PDRI 2 Review – This is a high level assessment of the project following the Concept Development phase of the project, or Phase Gate 2, and is part of the decision criteria for proceeding to the next phase. PDRI Section I, the Basis of Project Decision, should be well-defined (with a low relative PDRI score) at the end of this phase. For small or relatively simple projects, this assessment may not be necessary. In addition, the PDRI 2 Review should focus on the following areas:

- aligning project objectives and stakeholders needs
- identifying high priority project deliverables that need to be completed
- helping to eliminate late project surprises
- facilitating communication across the project team and stakeholders.

Typical PDRI scores at this phase of the project may be in the range of 450–600. The assessment will highlight the areas where resources need to be focused during the next phase of front end project.

PDRI 2i Review – This is an intermediate (i) assessment of the project during the Detailed Scope phase of a project, and typically should be held midway through this phase. Section II, Basis of Design, and Section III, Execution Approach, should be well-defined during this phase of the project. The PDRI 2i Review should focus on the following areas:

- assuring alignment of project objectives and stakeholders needs
- confirming that resources are properly deployed to get the largest value for the time and effort being applied
- verifying scope in relation to the original project goals
- identifying and planning remaining activities to achieve the level of detail necessary to complete front end planning in preparation for Phase Gate 3.

Typical PDRI scores at this phase of the project may be in the range of 300–450.

PDRI 3 Review – This is typically the final assessment of the project at the end of front end project planning prior to Phase Gate 3. The PDRI 3 assessment should be conducted for all projects. At this stage, risk issues have been identified and mitigation plans are in place or are being developed. Typical scores for this review are 150 to 250, with a target of typically 200 or below.

In addition to the four PDRI reviews outlined above, the tool can be used at other points. For instance, it can be used early in Feasibility as a checklist to help organize work effort or during the design phase (after Phase Gate 3) to verify the design before moving on to construction. It has been used effectively as an alignment tool during the kickoff of design/build projects.

As noted earlier, the PDRI consists of three main sections that are subdivided into 11 categories. The categories are further subdivided 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 1. Elements that are not completely defined should receive a 2, 3, 4, or 5, depending on their levels of definition as determined by the team. Those elements deemed not applicable for the project under consideration should receive a 0, thus not affecting the final score.

The basis for determining the level of definition is focused on developing the overall project scope of work such that the project has a higher probability of achieving a cost or schedule estimate at the ±10 percent level at Phase Gate 3. This level of definition roughly relates to approximately 25–30 percent of design completion for the entire project.

Figure 3.2 outlines a method of assessing the level of definition of an element at a given point in time. For those elements that are completely defined, no further work is needed during front end planning. For those elements with minor deficiencies, no further work is needed during the front end planning phase and the issue will not impact cost and schedule performance; however, the minor issues identified will need to be tracked and addressed as the project proceeds into the design phase. For those elements that are assessed as having some or major deficiencies, or are incomplete, further mitigation will need to be performed during front end planning prior to moving through Phase Gate 3.

The relative level of definition of a PDRI element is also tied to its importance to the project at hand. The flexibility of the PDRI allows the project team some leeway in assessing individual element definitions. For instance, if the issues missing from the scope documentation of a particular PDRI element are integral to project success (and reduction of risk), the team can rate the issue perhaps at a definition level 3 or 4. On a different project, the absence of definition of these same issues within a PDRI element may not be of concern and the team might decide to rate the element as a definition level 2. As the old saying goes, "Do not turn off your brain" when you are using this tool.

Assessing a PDRI Element

To assess an element, first refer to the Project Assessment Sheet in Appendix A or B. 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. Additional issues may be applicable for renovation projects. All elements have six pre-assigned scores, one for each of the six possible levels of definition.

Choose only one definition level (0, 1, 2, 3, 4, or 5) for that element based on the perception of how well it has been addressed. The suggested method for making this determination is through open discussion among the project team members. Ensure understanding of the element issues by all participants and promote a

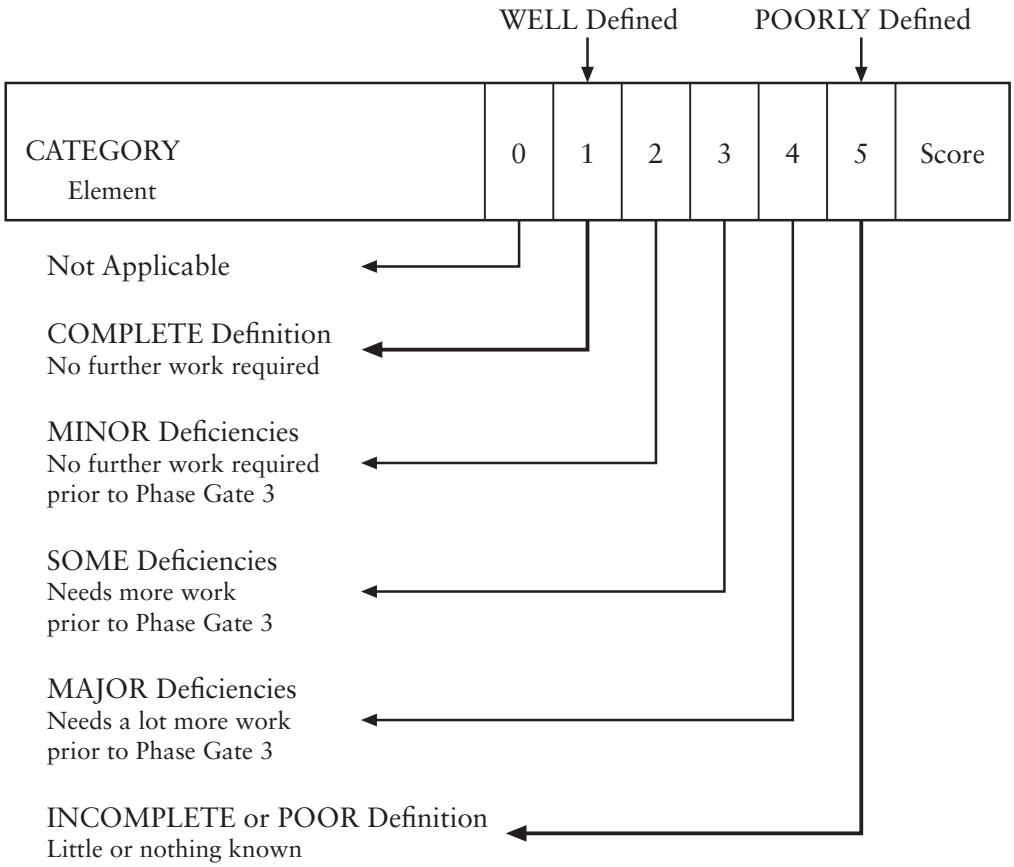


Figure 3.2. PDRI Definition Levels vs. Further Work Required During Front End Planning

common understanding of the work required to achieve complete definition. Defer to the most knowledgeable team members (for example, storm water issues are deferred to the civil and environmental discipline leads) while respecting the concerns of the other team members. As the discussion unfolds, capture action items or "gaps." An example action item list is given in Appendix G.

Once the appropriate definition level for the element is chosen, write the value of the score that corresponds to the level of definition in the "Score" column. Do this for each of the 64 elements in the Project Score Sheet. Be sure to assess 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.

Assessment Example

Consider, for example, that you are a member of a front end 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." It is recommended to use the unweighted assessment sheet when evaluating a project in a team setting, but the weighted version is given in this example to illustrate the scoring methodology.

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.

CATEGORY Element	Definition Level						Score
	0	1	2	3	4	5	
G. EQUIPMENT							
G1. Equipment List							
G2. Equipment Location Drawings							
G3. Equipment Utility Requirements							

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

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.

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. Also, some of the existing equipment may need to be modified and refurbished. These requirements have not been defined. **Definition Level = 3.**

Element G2: Your team decides that this element has been well done, including existing and new equipment rooms. You are concerned about the laboratory process equipment, but feel you have space available regardless of the requirements for your project. Existing equipment and systems have been identified in terms of their final location. 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						Score
	0	1	2	3	4	5	
G. EQUIPMENT							
G1. Equipment List				X			
G2. Equipment Location Drawings			X				
G3. Equipment Utility Requirements						X	

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

Be sure to capture action items/comments as the discussion progresses for reference in Step 6. This list is referred to as a "gap" list in that it identifies those issues that need to be addressed to move the project forward and identifies a gap in the planning activities.

Step 4: For each element, **circle the score that corresponds to its level of definition.** 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.** The weighted score sheet is given below. Circle the chosen definition levels for the assessed elements.

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	
G2. Equipment Location Drawings	0	1	(3)	5	8	10	
G3. Equipment Utility Requirements	0	1	4	6	9	(11)	
						CATEGORY G TOTAL	

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

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.

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 **2 = Minor Deficiencies** **4 = Major Deficiencies**
1 = Complete Definition **3 = Some Deficiencies** **5 = Incomplete or Poor Definition**

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. Use the gap list to identify issues that need additional attention.

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. See Appendix F for details of facilitation. 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 is 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. Experienced 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 execution standards and deliverables in place, many PDRI 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 assess the elements honestly. Any changes that occur in assumptions or planning parameters need to be resolved with earlier planning decisions. The target score 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 3.3 outlines the logic at a "section" level. In general, Section I elements must be well-defined prior to defining Section II and III elements. Note that this is not a Critical Path Method (CPM) logic in that certain elements are completed prior to the point where the next elements start. Many times elements can be pursued concurrently. As information is gained downstream, elements already defined must be revisited.

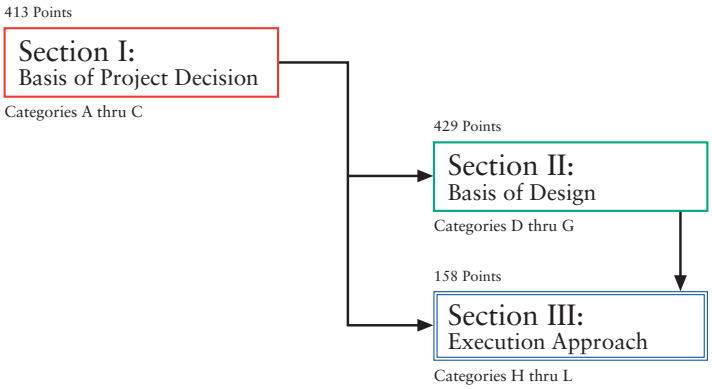


Figure 3.3. Building PDRI Section Logic Flow Diagram

Figure 3.4 outlines the general logic flow of the PDRI categories. Again, the flow is not traditional CPM. Many other ways are available to organize the work differently than the flow shown in this diagram, which is provided as a guideline. 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.

If an organization wants to standardize its front end planning process, the logic presented in these diagrams could provide the basis for that development. Color versions of Figures 3.3 and 3.4, as well as a detailed logic flow diagram that shows all PDRI elements, are provided in Appendix E.

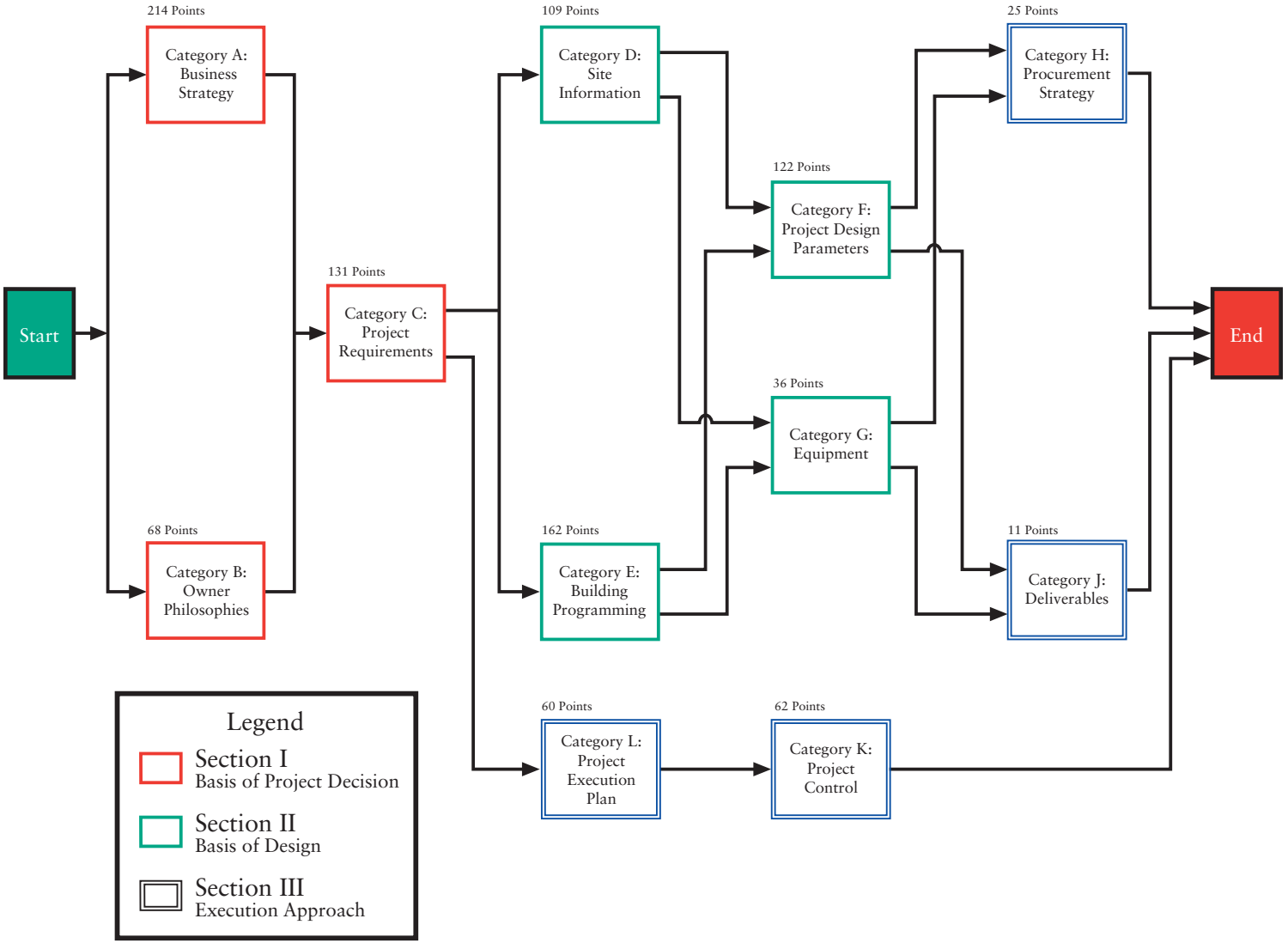


Figure 3.4. Building PDRI Category Logic Flow Diagram

Use of PDRI on Small or Renovation Projects

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

Small or renovation/upgrade projects can also benefit from using the PDRI. Projects such as these may be driven by environmental regulations or by the need to keep a facility in repair or operation. Projects may also be focused on restoring a historically significant building or relocating a business function.

On small projects, the scope may not encompass many of the elements contained in the entire PDRI. In particular, some of the Basis of Project Decision elements found in Section I of the PDRI may not be clearly defined. 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. Long-term use has shown that customizing the PDRI to reflect each individual project is highly beneficial.

After the release of the initial PDRI in 1999, many companies attempted to customize the elements to fit the needs of smaller projects. The current edition of the PDRI has modified language that should make it more applicable to smaller or renovation projects. Experience has proven that gathering the project team around a well understood and customized PDRI can save time, money, and frustration.

Small projects may range in size from $50,000 to $5,000,000 in total project costs. Some may consist of one or two disciplines such as the following:

- environmental project to improve drainage and capture storm runoff
- instrument upgrade project
- replacing a roof.

In any of the above projects, the PDRI can be a helpful tool in highlighting gaps. The following are some guidelines when using the PDRI on small or single-discipline projects:

1. Delete all elements that clearly do not apply.

   Example: A storm water or drainage improvement project may not have any instrumentation or architectural requirements. Simply draw a line through the Technological Sophistication (element F8), Architectural Design (F2), and other elements prior to the assessment session. Note: if there is any doubt regarding an element, then leave it in until the team has had time to discuss it.

2. Convene the project team and assess the project using only the PDRI elements that remain to be assessed, including especially those elements specifically designated for renovation projects if applicable. At the conclusion of the PDRI assessment session, have representatives of each discipline sign off, signifying their agreement with the definition of the project.
3. Revert to the normalized score (percentage) as a basis for determining how well the project is defined.
4. Since some of the most heavily weighted items of Section I could receive a score of 0, the facilitator should make the team aware of the elements that have the most impact on the final score. Other elements may become more important to predicting project success.
5. Alternatively, the tool can be used strictly as a checklist to identify issues that need to be addressed to develop a good scope. Use of the PDRI as an early checklist can have a great influence on the project and will serve to focus the project team toward a common goal. If the project is a renovation, pay particular attention to those issues that have been identified for these types of projects.

Normalizing the Score

If an organization decides to create a scaled-down version of the PDRI, 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. Not only will the maximum score be reduced, but the lowest possible score that can be achieved with complete definition will drop from 70 points to some lower number.

For example, on a building renovation project, the PDRI can be used effectively for these projects with some modification. Some elements may be "zeroed" as not applicable for these projects (e.g., Site Selection Considerations (A7), Civil/Geotechnical Information (D3)). A "not applicable" element essentially provides no risk (no potential negative impact) to the project. Other elements may become more critical (e.g., Environmental Assessment (D5), Evaluation of Existing Facilities (C3)). After the assessment, if the organization's scaled-down version has a maximum possible score of 752 (after certain elements are given a not applicable in the score sheet), it may determine that a score of 120 (16 percent of the total applicable points) must be reached before authorizing its small projects for design.

When using the PDRI on small projects, the team must determine a new target score at which it feels comfortable when authorizing a project for detailed design and construction. Each organization should develop an appropriate threshold range of scores for the particular phase of front end planning. The threshold is dependent upon the size, type, and complexity of the project.

Caution: Using the PDRI 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." An experienced facilitator can help in this regard.

Implementation across the Organization

The first requirement for implementation of the PDRI across any organization (i.e., using it on all projects) is the unwavering support of upper management. Upper management must create a procedure that lists the utilization of the PDRI as a requirement prior to authorizing a project to proceed with the execution phase.

Many successful organizations require a PDRI report as a part of their project approval to proceed checklist. Some organizations require a specific score of 200 or less for a project to be approved for the next phase. There is some danger in too much focus on scoring. Some smaller, maintenance projects may be fully acceptable at a much higher PDRI score as long as the project risks have been defined and a mitigation plan is in place to control the project. As stated before, common sense should prevail when reviewing PDRI results from a project. Requiring teams to reach a specific score could result in a team artificially adjusting the score so that project can be executed (to the detriment of the organization, project, and team participants). In most cases, it is more beneficial for the sponsor to have a PDRI assessment (at the PDRI 3 review) with a score above 200 along with identified risk issues (gap list) and corresponding mitigation steps than to have a PDRI assessment with a lower score and no commentary. Sponsors should focus on the gap list generated in the assessment session, not just the PDRI score. Placing too much emphasis on the score can lead to use of the tool as an administrative exercise.

The second requirement for implementation across an organization is a local champion. This person is an enthusiastic supporter of the application of this tool. He or she is in contact with other organizations using the PDRI and fosters widespread application of the tool.

The third requirement for implementation is training. Several facilitators should be trained, and the number will vary by organization and the projects that require approval. The objective is to ensure that every project has access to a trained facilitator in a timely manner. The facilitator should NOT be a member of that project team. In many organizations, project managers are trained as facilitators for their peer's projects.

In addition to a cadre of facilitators, all key members of the organization should understand the PDRI. In most cases, this is accomplished with just-in-time training. The facilitator will brief the participants on the purpose and their role to make the session a success, and then will comment on specific behaviors as they progress through the assessment session.

If the PDRI is implemented across an organization, its use should be monitored. Many organizations have modified PDRI element descriptions to add discussion concerning proprietary concerns, lessons-learned, or specific terminology based on the business environment.

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.

The PDRI has been used on hundreds of projects representing billions of dollars in investment. A large number of projects was recently evaluated with the PDRI by CII. 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, see Reference 7.)

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.

Table 4.1 compares project performance for a sample of 108 building projects worth $2.3 billion using a 200-point PDRI score cutoff. These data show the mean performance for the projects versus execution estimate for design and construction and the absolute value of changes as a percentage of total project cost. Projects with a PDRI score under 200 (a lower score is better) statistically outperformed projects with a PDRI score above 200 in terms of cost, schedule,

Table 4.1. Comparison of Projects with PDRI–Building Projects Scores Above and Below 200

	PDRI Score	
Performance	< 200	> 200
Cost	3% above budget	9% above budget
Schedule	5% behind schedule	21% behind schedule
Change Orders	8% of budget (N=25)	11% of budget (N=83)

and change orders. The PDRI score was determined just prior to the beginning of detailed design and the differences in performance parameters are statistically significant.

A similar evaluation was performed on a sample of 129 industrial projects representing approximately $6.7 billion. Table 4.2 summarizes the project performance and PDRI score using the same 200-point PDRI score cutoff. Again, projects with better scope definition (lower PDRI score) outperformed projects with poorly defined scope in terms of cost performance at the 95 percent confidence level.

Table 4.2. Comparison of Projects with PDRI–Industrial Projects Scores Above and Below 200

Performance	PDRI Score	
	< 200	> 200
Cost	4% below budget	4% over budget
Schedule	4% behind schedule	10% behind schedule
Change Orders	7% of budget (N=75)	8% of budget (N=54)

The projects used in these samples were voluntarily submitted. The Building PDRI sample includes data from 24 organizations, including office, control building, recreation, institutional, and research facilities. Project sizes ranged from approximately $630,000 to $251 million with an average cost of approximately $22 million. The Industrial PDRI sample included data from 53 organizations and represents heavy and light industrial projects including chemical, pharmaceutical, power, pulp and paper, refining, and metals facilities. Project size ranged from $120,000 to $635 million with an average of approximately $53 million.

The evaluations provided here are valid for the samples as given. These samples may or may not be indicative of projects in a specific organization and the samples may be biased because of the size and types of projects making up the sample. However, the results are convincing in terms of performance predictability.

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 assessment to identify and mitigate risk for 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.
- 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; chemical vs. product assembly; or new vs. renovation) and determine a threshold 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.

Depending on the nature of your business, your internal scope definition practices, and your requirements, you may wish to determine a comfort level (range of PDRI scores) at which you are willing to move from phase to phase.

- Look at weak areas of the project on a section, category, or element level. For example, if any element has a definition level of 3, 4, or 5, further define this element or develop a risk mitigation strategy. 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. The identification of the project's weak area is critical as the project team continues its progress toward execution and should provide "path forward" action items.
- Another method of evaluation is to look at the score of each section or category as a percentage of its maximum score in order to focus attention on critical items for the project. For example, if Section I, Basis of Project Decision, is 200 points, then it is roughly 50 percent of its potential maximum score (413). The elements in this section would then need much more work.
- Section III, Execution Approach, does not have as much weighting as the other two PDRI Sections. Do not underestimate the importance of this section. Procurement strategy (Category H), project control (Category K), particularly the project control requirements and project execution plan (Category L) including project delivery method, design construction plan

and approach, and substantial completion requirements are important. These issues can significantly impact the project in regard to schedule performance.

- Sometimes project teams are pressured to develop a scope of work in a short period of time. To streamline the process, the team could focus on the top 10 elements. These elements comprise almost 30 percent of the total score. When addressing smaller projects, the team may want to select a different "top 10" depending on the circumstances. See Appendix C for description of each of the top 10 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 4.1. Ten Highest Ranking PDRI Elements

Historical PDRI Scores

Keeping a corporate or organizational database of PDRI scores for various project sizes and types may be desirable. As more projects are completed and scored using the PDRI, the ability to predict the probability of success on future projects should improve. The PDRI may serve as a gauge for an organization in deciding whether to authorize the development of construction documents and ultimately construction of a project. Another use for PDRI is as an external benchmark for measurement against the practices of other industry leaders.

5

Concluding Remarks

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 can help those 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.
- **Gain and maintain project team alignment** by using the PDRI throughout front end planning. Discussions around the scope definition checklists are particularly effective in helping with team alignment.
- **Use the CII Front End Planning Toolkit.** This interactive Toolkit has been developed to guide the project team through the front end planning process, including where and how to employ the PDRI. Encourage its usage across the organization.
- **Be especially cognizant of specific scope elements on renovation and revamp projects.** Use the specific R&R issues identified in the PDRI element descriptions. Also, use CII Implementation 242-2, *Front End Planning of Renovation and Revamp Projects*, if your project is an R&R project and especially if it includes a shutdown/turnaround/outage scenario.

- **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 and compare versus project success. Based upon the relationship between PDRI scores and project success, establish a basis for the level of scope definition that is acceptable for moving forward from phase to phase.
- **Use caution when beginning detailed design of projects with PDRI scores greater than 200.** CII data has shown 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:
Unweighted Project Score Sheet

An Excel™ version of this matrix is on the compact disc that accompanies this book.

SECTION I – BASIS OF PROJECT DECISION							
CATEGORY	Definition Level						
Element	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							
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							

Definition Levels

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

SECTION II – BASIS OF DESIGN							
CATEGORY	Definition Level						
Element	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							
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/Rm. 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							

Definition Levels

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

SECTION II – BASIS OF DESIGN (continued)							
CATEGORY	Definition Level						
Element	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							
G. EQUIPMENT							
G1. Equipment List							
G2. Equipment Location Drawings							
G3. Equipment Utility Requirements							

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

SECTION III – EXECUTION APPROACH							
CATEGORY	Definition Level						
Element	0	1	2	3	4	5	Score
H. PROCUREMENT STRATEGY							
H1. Identify Long Lead/Critical Equip. & Mat'ls							
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							
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 and Approach							
L5. Substantial Completion Requirements							

Definition Levels

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

Appendix B:
Weighted Project Score Sheet

An Excel™ version of this matrix is on the compact disc that accompanies this book.

SECTION I – BASIS OF PROJECT DECISION							
CATEGORY	Definition Level						
Element	0	1	2	3	4	5	Score
A. BUSINESS STRATEGY (Maximum Score = 214)							
A1. Building Use Requirements	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 Score = 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 Score = 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	Definition Level						
Element	0	1	2	3	4	5	Score
D. SITE INFORMATION (Maximum Score = 109)							
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 Score = 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/Rm. 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 **2 = Minor Deficiencies** **4 = Major Deficiencies**
1 = Complete Definition **3 = Some 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 Score = 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 Score = 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 = 429 **SECTION II TOTAL**							

Definition Levels

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

SECTION III – EXECUTION APPROACH							
CATEGORY	Definition Level						
Element	0	1	2	3	4	5	Score
H. PROCUREMENT STRATEGY (Maximum Score = 25)							
H1. Identify Long Lead/Critical Equip. & Mat'ls	0	1	4	7	10	14	
H2. Procurement Procedures and Plans	0	1	3	6	9	11	
CATEGORY H TOTAL							
J. DELIVERABLES (Maximum Score = 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 Score = 62)							
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 Score = 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 = 158	**SECTION III TOTAL**						

PDRI TOTAL SCORE
Maximum Score = 1000

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 a series of categories that have elements. Scoring is performed by evaluating the levels of definition of the elements. Note that some of the elements have issues listed that are specific to projects that are renovations and revamps and are identified as "Additional items to consider for Renovation & Revamp projects." Use these issues for discussion if applicable. The sections, categories, and elements 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 Requirements

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

- ❑ Retail
- ❑ Institutional
- ❑ Instructional
- ❑ Medical
- ❑ Storage
- ❑ Food service
- ❑ Recreational
- ❑ Research
- ❑ Multimedia
- ❑ Office
- ❑ Light manufacturing
- ❑ Multi-family dwellings
- ❑ Gaming/resort facilities
- ❑ Mass transit facilities
- ❑ Other

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. Specifically note any changes to building use if the project is a renovation or revamp.

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:

- ❑ Need date
- ❑ Target consumers
- ❑ Building utilization justification
- ❑ Possible competitors
- ❑ Level of amenities
- ❑ Location
- ❑ Sustainability considerations, including possible certification (for example, by the U.S. Green Building Council).
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Modification to building or infrastructure to meet existing or anticipated regulatory requirements

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
- ❑ Other

A4. Economic Analysis

An economic analysis should be developed to determine the viability of the venture and evaluate the various alternatives to meet the project requirement. The analysis should clearly show multiple equivalent alternatives and acknowledge the uncertainties of the analysis. The analysis should also consider the economic impact of early or late project delivery. Each month of late delivery at the project end equates to what kind of negative impact on the operating revenue for the business. The analysis should also indicate what "certification" level of environmental sustainability is being targeted. 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
- ❑ End of life termination/salvage value or cost
- ❑ Analysis of capital and operating cost versus sales or occupancy and profitability
- ❑ Incentive packages available from governmental agencies
- ❑ Capital cost of sustainability implementation versus the operating cost savings
- ❑ Other

A5. Facility Requirements

Facility size requirements are many times determined by applicable code, circumstance, or site conditions and are often driven by occupancy. Note that this analysis is at the macro level at this point. Security and anti-terrorism are critical considerations. Ongoing security operations during the construction phase and in the operation of the completed facility should be carefully planned in coordination with the responsible entity during this early planning cycle. Additionally, early adoption and identification of anti-terrorism standards is critical to the design phase because multiple tradeoffs exist for all facility systems that can satisfy anti-terrorism requirements. Some considerations are listed below:

- ❑ Sales or rental levels
- ❑ Market capacity
- ❑ Use flexibility
- ❑ 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
- ❑ Compare project to current business sector benchmarks
- ❑ Occupant accommodation requirements (i.e., number of hospital beds, number of desks, number of workstations, onsite child care, on-site medical care, cot space)
- ❑ Identify operational security system requirements for both facility infrastructure and human assets.
- ❑ Identify any anti-terrorism standards that are applicable to the project or as adopted by the owner.
- ❑ Other

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
- ❑ "Grow in place" intentions for departments or functional areas during the future phase
- ❑ Identify functional areas that are more likely to move out of the building in the future to allow others to expand or move in
- ❑ Future building occupants in five, 10, 15, or 20 years
- ❑ Flexibility or adaptability for future uses
- ❑ Future phasing plan
- ❑ Consideration of future expansion of the building or functions with the master plan
- ❑ Other

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
- ❑ Historical/archaeological considerations
- ❑ Weather/climate
- ❑ Permitting schedule
- ❑ Sustainability analysis (such as Leadership in Energy and Environmental Design (LEED) Certification)
- ❑ Security and anti-terrorism analysis
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Change in intended use of Building
- ❑ Zoning, permitting or other regulatory changes brought about by R&R

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 plan documents. To ensure the project is aligned to the applicable objectives, the following should be considered:

- ❑ Stakeholder's understanding of objectives, including questions or concerns
- ❑ Constraints or limitations placed on the project
- ❑ Typical objectives:
  - ❑ Safety
  - ❑ Quality
  - ❑ Cost
  - ❑ Schedule
  - ❑ Technology usage
  - ❑ Capacity or size
  - ❑ Startup or commissioning
  - ❑ Communication
  - ❑ Operational performance
  - ❑ Maintainability
  - ❑ Security
  - ❑ Sustainability
  - ❑ Other

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. The reliability and criticality of the facility itself should also be agreed to by the team. Considerations may include:

- ❑ Critical systems redundancy
- ❑ Architectural/structural/civil durability
- ❑ Mechanical/electrical/plumbing reliability
- ❑ Security and anti-terrorism
- ❑ Other

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 by area
- ❑ Maximum building occupancy requirements
- ❑ Equipment monitoring requirements
- ❑ Energy conservation programs
- ❑ Selection of materials and finishes
- ❑ Requirements for building finishes
- ❑ Commissioning plans, including owner's project requirements and training
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Maintenance impact of renovation projects:
  - ❑ Common/spare parts (repair vs. replace existing components)
  - ❑ Interruptions to existing and adjacent facilities during R&R work
- ❑ Compatibility of maintenance philosophy for new systems and equipment with existing use and maintenance philosophy

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
- ❑ Uncontrolled access to the area immediately around the building for cars and trucks should be carefully considered.
- ❑ User finish out philosophy
- ❑ Flexibility to change layout
- ❑ Other

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:
  - ❑ Theme or style [such as gothic, Victorian, or modern]
  - ❑ Image (character of occupants or function portrayed to public by the building, i.e., welcome, power, or nature)
- ❑ Compatibility with master plan
- ❑ Environmentally sustainable design (internal/external) and level of certification, if applicable
- ❑ Quality of life
- ❑ Requirements of any adopted anti-terrorism design standards
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Design impact of Renovation projects
  - ❑ Compatibility of new Design with existing Design (equipment, egress, etc.)
  - ❑ Match existing features and/or materials
- ❑ Preservation efforts – cultural & architectural

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, including sustainability considerations. 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 materials, methods, and structure
- ❑ Economic cost and socioeconomic benefits of a sustainable design
- ❑ Other

C2. Project Design Criteria

Project design criteria are the requirements and guidelines which govern the design of the project. Security and Anti-Terrorism standards need to be identified early-on in order for the designer to have maximum flexibility when evaluating trade-offs between materials, systems, and the physical configuration of the facility. Any design review board or design review process should be clearly articulated. Evaluation criteria may include:

- ❑ Level of design detail required
- ❑ Codes and standards:
  - ❑ National
  - ❑ Owner specific
  - ❑ Local
- ❑ International
- ❑ Security operations
- ❑ Anti-terrorism
- ❑ Level of design detail required
- ❑ Donor or benefactor requirements
- ❑ Insurance underwriter requirements

- ❑ Sole source requirements for equipment or systems
- ❑ Climatic data
- ❑ Utilization of design standards:
  - ❑ Owner's
  - ❑ Contractor's
  - ❑ Designer's
  - ❑ Mixed
- ❑ Cultural preferences
- ❑ Environmental sustainability certification
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Clearly define controlling specifications, especially where new codes and regulations will override older requirements
- ❑ Ensure that specifications support replacement of any obsolete systems or equipment

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. Modification to the existing facility may require modifications to codes or permits. If the existing facility is to be removed, portions of the facility may be recycled into the new facility (brick, structural steel). Evaluation criteria may include:

- ❑ Capacity:
  - ❑ Power Utilities (i.e., potable water, gas, oil)
  - ❑ Fire water
  - ❑ Waste treatment/disposal
  - ❑ Sanitary sewer
  - ❑ Telecommunications
  - ❑ Security
  - ❑ Stormwatercontainment system/filtration
- ❑ Access:
  - ❑ Rail accessibility 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
- ❑ Historic/archeological survey
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Complete condition assessment of existing facilities and infrastructure
- ❑ As-Built accuracy and availability (update/verify as-built documentation prior to project initiation)
- ❑ Worksite availability and access for R&R activities
- ❑ Existing space available to occupants during renovation work
- ❑ Uncertainty of "as-found" conditions, especially related to:
  - ❑ Structural integrity: steel/concrete/timber loading
  - ❑ Piping capacity/ integrity/ routing
  - ❑ Location, condition, and capacity of electrical systems components
- ❑ Investigation tools to assist in the documentation of existing conditions:
  - ❑ Photographs/video
  - ❑ Remote inspection
  - ❑ Laser scanning
  - ❑ Infrared scanning
  - ❑ Non-destructive Testing
    - ❑ Ground Penetrating Radar
    - ❑ Ultrasonic Testing
  - ❑ Other

C4. Scope of Work Overview

A complete narrative description of the project laying out the major components of work to be accomplished, generally discipline oriented, should be developed. This narrative should be tied to a high level Work Breakdown Structure (WBS) for the project. Items to consider would include:

- ❑ Sequencing of work
- ❑ Interface issues for various contractors, consultants, contracts, or work packages
- ❑ Other

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. This schedule should involve obtaining early input from:

- ❑ Owner/Operations
- ❑ Architects/Engineers
- ❑ Construction
- ❑ Procurement
- ❑ Other

R&R projects require a high level of planning to minimize risk because they interface with existing operations and are many times performed in conjunction with other on-going projects.

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, to include mitigation and/or set asides
- ❑ Furnishings
- ❑ Administrative costs

- ❑ Contingencies
- ❑ Cost escalation for elements outside the project cost estimate
- ❑ Startup costs including installation
- ❑ Capitalized overhead
- ❑ Safety
- ❑ Site-specific insurance requirements
- ❑ Incentives
- ❑ 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
  - ❑ Sureties
- ❑ Type and size of buildings/structures
- ❑ Labor productivity/prevailing wage rates
- ❑ Taxes:
  - ❑ Depreciation schedule
  - ❑ Capitalized/expensed
  - ❑ Tax incentives
  - ❑ Sales vs. contractors tax
- ❑ 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
- ❑ Installation of the operational security system
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Allocate costs for identifying existing conditions (preferably in front end planning)
- ❑ Additional contingency or reserves for unknowns of existing conditions

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)
- ❑ Nearby mass transit
- ❑ 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
- ❑ Other

D2. Site Surveys

The site should be surveyed for the exact property boundaries, including limits of construction. A topographical 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
- ❑ Wetlands locations
- ❑ Location of mass transit
- ❑ Other

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)
- ❑ Expansive or collapse potential of soils
- ❑ Fault line locations
- ❑ Spoil area for excess soil (i.e., location of on-site area or offsite 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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Vibration control/ monitoring associated with existing facilities & infrastructure
- ❑ Capacity of existing foundations for new loading criteria

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, including responsibility for permitting process. 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
- ❑ Anti-terrorism standards
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Original intent of codes and regulations and any "grandfathered" requirements
- ❑ Environmental permitting specifically required for R&R projects
- ❑ Disposal/recycling/abatement for renovation projects
- ❑ Special permitting/certification related to meeting code requirements for R&R
- ❑ Impact of current codes and regulations (e.g. accessibility, seismic, environmental and legal considerations) on elements of historical or cultural significance
- ❑ Integrating contemporary mechanical, electrical, security, and other systems sensitively and effectively into historical structures or environments
- ❑ Permitting requirements for demolition work clearly defined and understood

The codes that will have a significant impact on the scope of the project should also be investigated and explained in detail. Pay particular attention 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 a sensitive air quality 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
- ❑ Brownfield development alternatives and impacts
- ❑ Other

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:

- ❑ Non-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)
- ❑ Other

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 (including during construction)
- ❑ Available emergency medical facilities
- ❑ Security considerations (site illumination, access control)
- ❑ Onsite medical care
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Interruption to any existing fire and life safety systems
- ❑ Disarming existing safety systems for renovation work (with appropriate contingency planning)

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
- ❑ Water re-use
- ❑ Other

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
- ❑ 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)
- ❑ Other

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
- ❑ Conference rooms
- ❑ Vending alcoves
- ❑ Janitorial closets
- ❑ Elevators
- ❑ Stairs
- ❑ Loading docks
- ❑ Dwelling units
- ❑ Special technology considerations
- ❑ Classrooms
- ❑ Laboratories
- ❑ Corridors
- ❑ Storage facilities
- ❑ Mechanical rooms
- ❑ Lounges
- ❑ Food service cafeteria
- ❑ Electrical rooms
- ❑ Parking space
- ❑ Entry lobby
- ❑ Restrooms
- ❑ Data/computer areas
- ❑ Gaming areas
- ❑ Portes cocheres
- ❑ Ticketing areas
- ❑ Gate areas
- ❑ Baggage claim
- ❑ Inter-modal transportation area
- ❑ Other

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. Anti-terrorism standards should use adjacency diagrams to confirm that configuration and setback distances have been met.

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
  - ❑ Entry
  - ❑ Security considerations (e.g., card access or transmitters)
  - ❑ Snow removal plan
  - ❑ Postal and newspaper delivery
  - ❑ Waste removal
  - ❑ Fire and life-safety circulation considerations
  - ❑ Other
- ❑ Interior:
  - ❑ Lobbies
  - ❑ Interior aisle ways and corridors
  - ❑ Vertical circulation (i.e., personnel and material transport including elevators and escalators)
  - ❑ Ambient lighting
  - ❑ Directional and location signage
  - ❑ Other

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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Availability and access to secure storage for materials, laydown yards, etc. for R&R projects

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
- ❑ Refrigeration requirements and capabilities
- ❑ Rail car access doors
- ❑ Service elevators
- ❑ Loading docks
- ❑ Temporary parking
- ❑ Dumpster requirements
- ❑ Detailed traffic/routing plan for oversize loads
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Coordinate equipment removal and delivery for renovation work with Operations requirements
- ❑ Clearly identify delivery gates/docks/doors and receiving hours to be used by contractors for R&R work

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
- ❑ Finish type
- ❑ Environmental issues
- ❑ Audio/visual (A/V) data and communication provisions
- ❑ Lighting requirements
- ❑ Utility requirements
- ❑ Security needs including access/hours of operation
- ❑ Acoustics/vibration requirements
- ❑ Life-safety
- ❑ Other

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
- ❑ Resident company logo
- ❑ Resident company equipment
- ❑ Other

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
  - ❑ Other
- ❑ Existing Items:
  - ❑ Relocated as is and contractor installed
  - ❑ Refurbished and installed by contractor
  - ❑ Relocated as is and owner installed
  - ❑ Refurbished and installed by owner
  - ❑ Other

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
- ❑ Other

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
- ❑ Other

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
- ❑ Accessibility 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
- ❑ Anti-terrorism standards
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Consider how renovation project alters existing architectural design assumptions
- ❑ Potential reuse of existing equipment, fixtures, materials and systems for renovation project

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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Consider how renovation project alters existing structural design assumptions
- ❑ Impact of structural loads and restrictions encountered during construction including sequencing of work

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
- ❑ Fire protection systems requirements
- ❑ Environmentally-friendly HVAC systems
- ❑ Alternate energy systems
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Consider how renovation project alters existing architectural design assumptions
- ❑ Potential reuse of existing equipment and systems for renovation project

F5. Electrical Design

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

- ❑ Power sources with available voltage/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
- ❑ Outdoor lighting requirements
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Consider how renovation project alters existing architectural design assumptions
- ❑ Potential reuse of existing equipment and systems for renovation project

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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Impact of selective demolition on facility operations, as well as safety and security systems
- ❑ Limited access/ constrained environments/ concealed spaces for R&R projects

F7. Constructability Analysis

A structured process is in place for 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." Provisions have been made to provide this on an ongoing basis. This process includes examining design options that minimize construction costs while maintaining standards of safety, security, quality, and schedule. This process should be initiated in the front end planning process during concept or detailed scope definition.

Elements of constructability during front end 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
- ❑ Other

F8. Technological Sophistication

The requirements for intelligent or special building systems should be evaluated. Identify new technology or development efforts, including software development requirements. 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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Integration of new technology with existing systems, including interface issues
- ❑ Safety systems potentially compromised by any new technology

G. EQUIPMENT

G1. Equipment List

Project-specific equipment should be defined and listed. (Note: Building systems equipment is addressed in elements 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
- ❑ Operations and equipment that will need to function to provide continuing operations in a secure mode.
- ❑ Other

Training requirements have been defined and responsibility established. Training has been identified in areas such as:

- ❑ Control systems
- ❑ Information systems and technology
- ❑ Equipment operation
- ❑ Maintenance of systems
- ❑ Training materials and equipment (e.g., manuals, simulations)
- ❑ Safety
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Identify systems and equipment as new, existing – relocate, existing – in place, remove, etc.
- ❑ Clearly define any modifications to existing systems and equipment

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
- ❑ Major equipment positioned to allow for maintainability
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Clearly identify existing systems and equipment to be removed or rearranged, or to remain in place

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
- ❑ Other

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:

- ❑ Identify 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
- ❑ Responsibility for owner-purchased items, including:
  - ❑ Financial
  - ❑ Shop inspection
  - ❑ Expediting
- ❑ Tax strategy, including:
  - ❑ Depreciation capture
  - ❑ Local sales and use tax treatment
  - ❑ Investment tax credits
  - ❑ Write-offs of existing facilities and equipment
- ❑ 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 (including consideration to match existing)
- ❑ Local regulations (e.g., tax restrictions, tax advantages)
- ❑ Incentive/penalty strategy for contracts
- ❑ Storage
- ❑ Operating manual requirements and training
- ❑ Restricted distribution of construction documents for security and anti-terrorism reasons
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Availability of procurement support during time-constrained R&R work, especially where expedited material services are required

J. DELIVERABLES

J1. CADD/Model Requirements

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

- ❑ Application software preference (e.g., 2D or 3D CADD, application service provider (ASP)), including licensing requirements
- ❑ Configuration and administration of servers and systems documentation defined
- ❑ For 3D CADD, go/no-go on walk-through simulation for operation's checks, interference checks, construction planning and scheduling
- ❑ Owner/contractor standard symbols and details
- ❑ Handling of life cycle facility data including asset information, models, and electronic documents
- ❑ Information technology infrastructure to support electronic modeling systems, including uninterruptible power systems (UPS) and disaster recovery
- ❑ Security and auditing requirements defined
- ❑ Physical model requirements
- ❑ Other

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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Requirements to update existing (legacy) documentation and as-built drawings

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., Requests for Information, Requests for Qualifications)
- ❑ Commissioning tests
- ❑ Lessons-learned feedback
- ❑ Other

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, including methodology used to support earned value analysis
- ❑ 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 and interface with information systems
- ❑ Other

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
- ❑ Required submissions and/or approvals
- ❑ Required documentation/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
- ❑ Unusual schedule considerations
- ❑ 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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Transition plan/swing space for people, materials, and processes
- ❑ Integrated schedule with operations input
- ❑ Schedule constraints/working hours
- ❑ Coordinate schedule of multiple R&R and maintenance projects (with multiple stakeholders) if applicable
- ❑ Coordinate pace of planning with schedule for R&R projects
- ❑ Impact of site and facility access restrictions on renovation schedule

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
- ❑ Security
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Security clearance/ access control in operating areas during project execution
- ❑ Safety of occupants during emergency conditions related to renovation activities
- ❑ Use of photographs, video records, etc. in scope documents to ensure existing conditions clearly defined
- ❑ Physical identification of extent of demolition to clearly define limits
- ❑ Unforeseen issues related to the unique characteristics of renovation projects (i.e., hazardous materials, unknown underground structures or utilities, or other)

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

Additional items to consider for Renovation & Revamp projects

- ❑ Access to emergency equipment in existing facility during construction, including eye-wash stations, safety showers, etc.
- ❑ Worker and occupant safety issues/exposure and monitoring during R&R for:
  - ❑ Lead
  - ❑ Asbestos
  - ❑ PCB
  - ❑ Radiation
  - ❑ Chromium (stainless steel welding)
  - ❑ Hazardous or toxic chemical/ biological contamination
  - ❑ Fluorescent tubes/mercury and heavy metals
- ❑ Access control, traffic control plans and existing material flows during renovation activities
- ❑ Permitting plans/ coordination of responsibility for working in and around operating equipment and occupied spaces
- ❑ Scaffolding design and permitting when erecting in existing or operating areas
- ❑ Lockout/tagout procedures defined and enforced
- ❑ Decommissioning and decontamination procedures in place to ensure safety
- ❑ Segregation of demolition activities for R&R projects from new construction

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
- ❑ Other

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
- ❑ Other

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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Flexible contracting arrangements for renovation projects such as a combination of unit price, cost reimbursable and lump sum
- ❑ Contingency for unforeseen conditions
- ❑ Specialized contractors for R&R activities, such as hazardous abatement or tenant moving

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
- ❑ Other

Additional items to consider for Renovation & Revamp projects

- ❑ Responsibility for critical maintenance activities in the existing facility (i.e., routine maintenance during construction)
- ❑ Occupied space requirements/ impacts (e.g. noise, dust, and odor control)

L5. Substantial Completion Requirements

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

- ❑ Specific requirements for SC responsibilities developed and documented
- ❑ Warranty, permitting, insurance, and tax implication considerations
- ❑ Commissioning
- ❑ Technology start-up support on-site, including information technology and systems
- ❑ Equipment/systems startup and testing
- ❑ Occupancy phasing
- ❑ Final code inspection
- ❑ Calibration
- ❑ Verification
- ❑ Documentation (including final As-Builts)
- ❑ Training requirements for all systems
- ❑ 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	Definition Level						
Element	0	1	2	3	4	5	Score
A. BUSINESS STRATEGY (Maximum Score = 214)							
A1. Building Use Requirements	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 Score = 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 Score = 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 **2 = Minor Deficiencies** **4 = Major Deficiencies**
1 = Complete Definition **3 = Some 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 Score = 109)							
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 Score = 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/Rm. 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 **2 = Minor Deficiencies** **4 = Major Deficiencies**
1 = Complete Definition **3 = Some 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 Score = 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 Score = 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 = 429	**SECTION II TOTAL**						**130**

Definition Levels

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

SECTION III – EXECUTION APPROACH							
CATEGORY	Definition Level						
Element	0	1	2	3	4	5	Score
H. PROCUREMENT STRATEGY (Maximum Score = 25)							
H1. Identify Long Lead/Critical Equip. & Mat'ls	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 Score = 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 Score = 62)							
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 Score = 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 = 158	**SECTION III TOTAL**						**39**

PDRI TOTAL SCORE
Maximum Score = 1000 300

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

Appendix E:

Logic Flow Diagrams

Section Diagram

413 Points

Section I:
Basis of Project Decision

Categories A thru C

429 Points

Section II:
Basis of Design

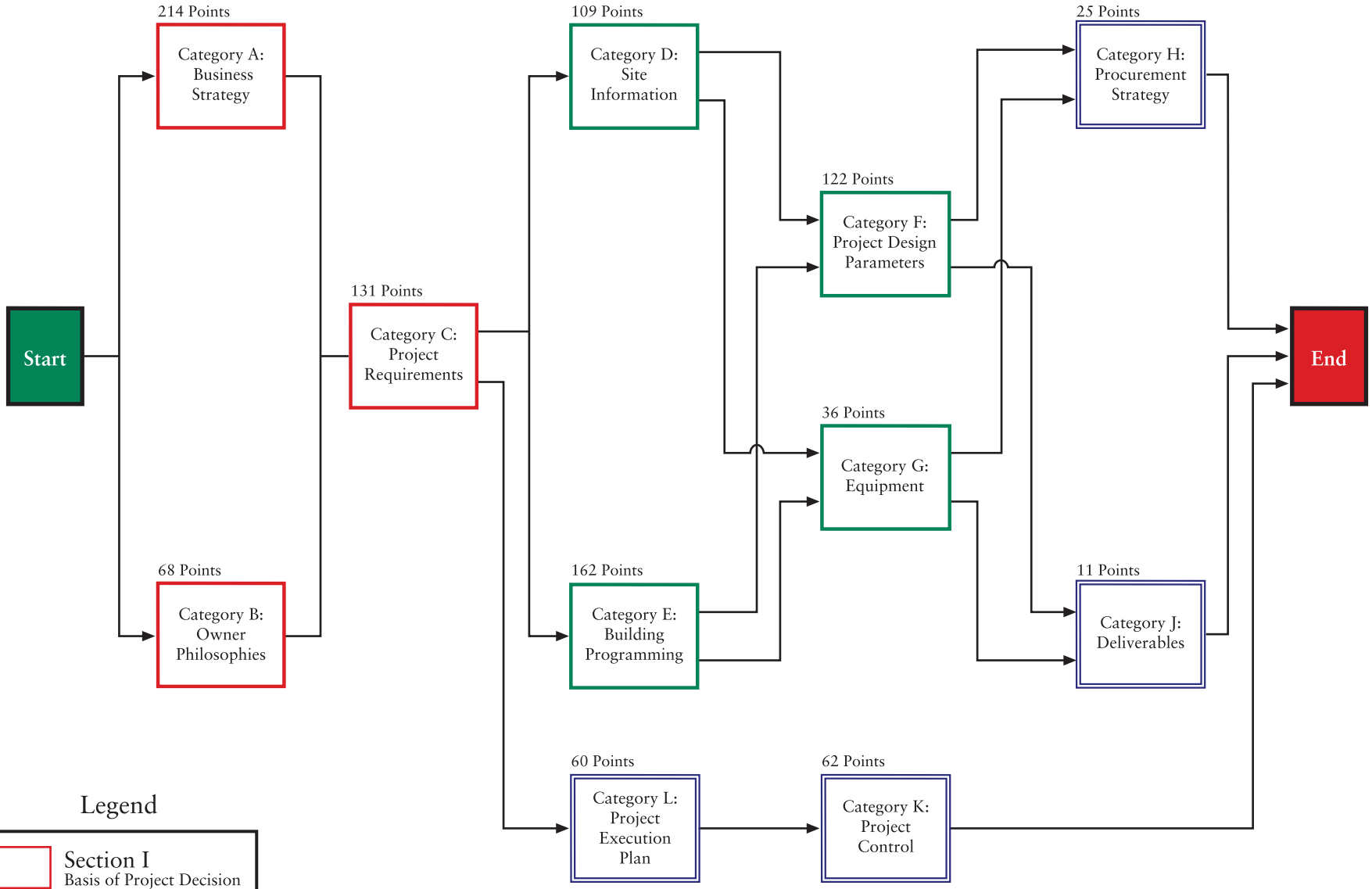
Categories D thru G

158 Points

Section III:
Execution Approach

Categories H thru L

Category Diagram



Logic Flow Diagrams Project Definition Rating Index (PDRI) for Building Projects	
October 2013	Rev. 1 Page 2 of 3

Element Diagram

Start

15 Points
A8: Project Obj. Statement

44 Points
A1: Building Use Requirements

27 Points
A2: Business Justification

26 Points
A3: Business Plan

28 Points
A7: Site Selection Considerations

18 Points
B1: Reliability Philosophy

16 Points
B2: Maintenance Philosophy

15 Points
B3: Operating Philosophy

19 Points
B4: Design Philosophy

21 Points
A4: Economic Analysis

31 Points
A5: Facility Requirements

22 Points
A6: Expansion/ Alteration

19 Points
C1: Value-Analysis Process

24 Points
C2: Proj. Design Criteria

24 Points
C3: Eval. of Exist'g Facilities

17 Points
C4: Scope of Work Overview

20 Points
C5: Project Schedule

27 Points
C6: Project Cost Estimate

14 Points
D2: Site Surveys

19 Points
D3: Civil/Geotech Information

14 Points
D4: Governing Reg. Requirements

16 Points
D5: Environmental Assessment

13 Points
D6: Utility Sources

8 Points
D7: Site Life Safety Considerations

11 Points
D8: Water & Wastewater

14 Points
D1: Site Layout

16 Points
E1: Program Statement

21 Points
E2: Bldg. Summary Space List

13 Points
E6: Circulation Requirements

8 Points
E8: Load/Unload Storage Facil.

9 Points
E9: Transportation Requirements

13 Points
E11: Room Data Sheets

10 Points
E3: Overall Adj. Diagrams

13 Points
E4: Stacking Diagrams

10 Points
E7: Functional Rel. Diagrams by Rm.

15 Points
E5: Growth & Phased Dev.

15 Points
E10: Building Finishes

14 Points
E12: Furnishings, Eqpt., Built-ins

5 Points
E13: Window Treatment

15 Points
L3: Proj. Delivery Method

10 Points
L1: Project Organization

11 Points
L2: Owner Approval Requirements

15 Points
L4: Design/Constr. Plan, Approach

9 Points
L5: Substantial Completion

14 Points
F1: Civil/Site Design

22 Points
F2: Architectural Design

18 Points
F3: Structural Design

20 Points
F4: Mechanical Design

15 Points
F5: Electrical Design

10 Points
F6: Building Life Safety Req'ts

14 Points
F7: Constructability Analysis

9 Points
F8: Technological Sophistication

15 Points
G1: Equipment List

10 Points
G2: Equip. Location Drawings

11 Points
G3: Equip. Utility Requirements

8 Points
K1: Project QA and Control

13 Points
K2: Project Cost Control

14 Points
K3: Proj. Schedule Control

18 Points
K4: Risk Management

9 Points
K5: Safety Procedures

14 Points
H1: Identify Long Lead/Critical Equip. & Mat'ls

11 Points
H2: Procurement Proc. & Plans

4 Points
J1: CADD/Model Requirements

7 Points
J2: Documentation/ Deliverables

End

LEGEND

Example Element

Element's weighted value → # Points

X#: Description

The color of the border denotes Section

X designates Category

is the element counter in the particular Category

Element name

Section Guide

- Section I — Basis of Project Decision
- Section II — Basis of Design
- Section III — Execution Approach

Category Guide

- A Business Strategy
- B Owner Philosophies
- C Project Requirements
- D Site Information
- E Building Programming
- F Building/Project Design Parameters
- G Equipment
- H Procurement Strategy
- J Deliverables
- K Project Control
- L Project Execution Plan

Logic Flow Diagrams
Project Definition Rating Index
(PDRI) for Building Projects

October 2013

Appendix F:

Facilitation Instructions

From observation, an external facilitator (a person who is not directly involved with the project) has proven to be an essential ingredient in ensuring that the PDRI assessment session is effective. The facilitator, who may be internal to the organization or an outside consultant, should be experienced in front end planning of the type of facility under consideration and have excellent facilitation skills. The following issues should be addressed by the facilitator for to prepare for and conduct the PDRI assessment.

Pre-meeting Activities

The facilitator should establish a meeting with the project manager/engineer to receive a briefing on the nature and purpose of the project to be evaluated. The objective of this meeting is to learn enough about the project to ask intelligent/ probing questions of the project team members while conducting the session. Many times, the "open ended" discussions concerning key elements provides the most value when conducting a PDRI assessment. Therefore, it is the responsibility of the facilitator to ask the types of questions that will result in an open discussion. Gaining some insight prior to the assessment helps in this regard.

This meeting also serves as a good time to preview the PDRI elements to see if some of them do not apply to the project at hand. This is especially true for smaller renovation projects. In some cases, it is obvious that some of the elements do not apply and these can be removed in advance to save the team some time in the assessment.

The facilitator should inform the project manager that this is her/his opportunity to listen to the team members to see how well they understand the scope of work. The project manager should work with the facilitator to probe the planning team and the owner to ensure clear two-way understanding of scope requirements and expectations. If the project manager dominates the discussion, and subsequent scoring, the rest of the design team will quickly "clam up" and fall in line. This will result in a PDRI assessment that reflects the understanding of the project manager, not the team members.

The facilitator should remind the project manager that the PDRI assessment session is an opportunity to team build and align the team members on the critical requirements for the project. Experience has shown that serving food (perhaps lunch or breakfast) can help to increase participation as well as interaction between team members.

The facilitator and project manager should discuss the key stakeholders who should attend the session. Ensure that all key stakeholders are in attendance. Reducing the number of attendees will make the session go more efficiently, but this may compromise the true value of the PDRI assessment. Work with the project manager to send out meeting notices in time for the major stakeholders to be able to attend.

Logistics

The facilitator should ensure that the facilities are large enough to accommodate the key project stakeholders in comfort. One method of assessment is to utilize a computer projector to keep score as assessment progresses. Therefore, a room with a screen, computer, and projector is a plus. The PDRI can be conducted manually as well. When conducting manually, each participant will require a copy of the score sheet and Element Definitions so they can follow along.

The assessment session takes approximately two to four hours per project. An inexperienced team, or a very complex project, may well take the full four hours. As teams within an organization get accustomed to the PDRI sessions, the time will drop to around two hours. However, it is the discussion occurring during the assessment session that is perhaps its most important benefit. Do not allow an artificial time limit to restrain the open communications between team members.

Some organizations conduct the sessions over an extended lunch period. In these situations, it is best to start with a short lunch period as an ice breaker, then conduct the session. The facilitator should ensure that the room is set up in advance.

- ❑ Make sure the computer, projector, and programs are functioning.
- ❑ Make sure a flip chart is available.
- ❑ Set up the notes and Action Items pages
- ❑ Make sure all participants have the proper handouts

- ❑ When using the automated PDRI Scoring Programs, make sure the operator is skilled. Lack of computer skills and preparation can lead to ineffectiveness.
- ❑ Ensure the programs are loaded and working prior to the session.
- ❑ Identify a scribe to capture actions on a flip chart as the session progresses.

Participants

Suggested attendees of the assessment session may include:

- ❑ Engineering Team Discipline Leads and Support Services as required
- ❑ Project Manager/Project Engineer(s)
- ❑ Owner Engineering Project Representatives
- ❑ Owner Business Sponsor
- ❑ Owner Operations – Key Personnel
- ❑ Owner Support Services – Maintenance, Construction, Safety, Environmental, Logistics, QA/QC, Procurement
- ❑ Contractors if possible.

It is important that all assessment session participants come prepared to actively engage in the assessment. Typically this can be facilitated by sending the PDRI assessment sheets and element descriptions out ahead of time with a pre-reading assignment. Expectations of participants include:

- ❑ All should be prepared to discuss their understanding and concerns of the elements that apply to them.
- ❑ Design/engineering should be prepared to explain what they are doing in regards to each PDRI element.
- ❑ Owner representatives should voice their expectations, and question the design team to ensure understanding.

Roles and responsibilities during the assessment session should include:

- ❑ The project manager should assist the facilitator to probe the team members for answers and insight.
- ❑ The facilitator will ensure that everyone has an opportunity to voice their opinions and concerns.

Conducting the session:

- ❑ The facilitator should provide the team members with a short overview of the PDRI.
- ❑ The facilitator or project manager should define the purpose of the assessment session.
- ❑ The project manager should give a quick update of the project and its status, including progress supporting the estimate and plan.
- ❑ The facilitator should explain the scoring mechanism (definition levels 0, 1, 2, 3, 4, and 5), and explain that the evaluation is not a democratic exercise, rather it is a consensus activity.
- ❑ The facilitator should explain that certain elements may apply more to certain team members or stakeholders. Make sure that these key stakeholders have the greatest say in deciding on level of definition.
- ❑ The facilitator should keep the session moving and not allowing the participants to "bog down." Many times the participants want to "solve the problem" during the assessment session. Do not allow this to happen. Remember, the session is to perform a detailed assessment only, and actions can be performed later.
- ❑ The facilitator should always challenge assumptions and continue to ask the question, "Is the material in writing?"

Assessment Session Objectives:

1. Capture the degree of definition for each element.
2. Capture significant comments from open discussions.
3. Capture Action Items, assign responsibility and due dates (either at the end of the session, or shortly thereafter).
4. Ensure that the team understands the notes captured and agrees with the path forward.
5. Create alignment among the session attendees.

Roles and responsibilities/expectations:

- ❑ Post-session activities: The facilitator should ensure that the PDRI notes, action items, and score card are published within 48 hours of the sessions. The ideal target is 24 hours.
- ❑ The facilitator should stay engaged with the team if possible to ensure that all Action Items are completed as required to support the scope definition process.
- ❑ The project manager should ensure that the actions are addressed.

Small Project Considerations:

- ❑ Small retro-fit projects or single discipline projects may have several elements that do not apply.
- ❑ As previously mentioned, the facilitator and project manager can meet ahead of time to identify some of these elements.
- ❑ Assigning a zero to a significant number of PDRI elements can greatly affect the score. It is best to use the normalized score in this case. In these cases, less significant elements can have a more significant impact on the overall score. Be careful in interpretation of this score.

The PDRI was originally designed to evaluate the definition of an entire unit, building or facility. On smaller retro-fit projects, the facilitator may have to "make the leap" from an entire facility to a small component of an existing facility. For example, a project to install a new substation, may not have a product, technology, or require process simplification. It does, however, have a design capacity that it is expected by the owner/operators.

Experience has shown that the smaller retro-fit projects do not get the same level of attention from owner operations that a larger project might receive. In many cases, the PDRI may be the very first time the design team has met with the owner operations personnel to discuss the expectations of the project. The facilitator must be fully aware of these situations before conducting the session and make a special effort to ensure:

1. The owner's operation personnel attend the session.
2. Open discussions take place to ensure understanding.

Alliance-Planned Projects

Many of the smaller projects may be conducted by an alliance design firm. These firms act as the design/engineering capability for the facility owner and may execute numerous small projects per year. Many of the PDRI elements refer to location, standards, stress requirements, hazard analysis, deliverables, accounting, and other repetitive requirements. In these types of projects, the facilitator will merely have to question, "Is there anything different or unusual about this project for this element?" It is also a good time to ask if there is any opportunity for improvement in any of these areas that would improve this project and other projects to follow.

Appendix G:
Example Action List

Project title/date:

(Sorted in order of PDRI element)

Item #	**PDRI Element(s)**	**Level of Definition**	**PDRI Element Score**	**Item Description**	**Date Completed**	**Responsible**

Project Assessment Session Action Items, June 22, 200x						
(Sorted in order of PDRI element)						
Item #	**PDRI Element(s)**	**Level of Definition**	**PDRI Element Score**	**Item Description**	**Date Completed**	**Responsible**
1	D1	2	4	Resolve city pedestrian traffic routing issue (safety)	July 1, 200x	John Ramos
2	D3, F1	1, 2	6	Verify location of existing utilities through "pot-holing"	July 1, 200x	Jake Blinn
3	D4	3	8	Address city and ASHRAE site development permits/issues	July 1, 200x	Sue Howard
4	D6, F6	2	9	Verify fire water pressure and resolve fire life safety plan and design; Finalize plans for fire water and fire alarm system; Address detectors, speakers vs. horn, corridor smoke detectors	July 15, 200x	Jose Garcia
5	F4	3	11	Resolve mechanical design criteria: • ASHRAE • Filter maintenance • Box power (24 v vs. 120 v) • Controller location • Follow-up meeting with O&M	Ongoing	Jake Blinn
6	F5	2	5	Finalize lighting plan, coordinate electrical with HVAC	July 31, 200x	Tina Towne
				And so on…..		

References

1. *Alignment During Pre-Project Planning*. Implementation Resource 113-3, Version 4.0, Construction Industry Institute, Austin, Texas, 2013.

2. *Best Practices for Project Security*. BMM2004-10, Construction Industry Institute, Austin, Texas, 2004.

3. Cho, C. S., J. Furman, and G. E. Gibson. "Project Definition Rating Index (PDRI) for Buildings." Research Report 155-11, Construction Industry Institute, Austin, Texas, 1999.

4. *Implementing Project Security Practices*. Implementation Resource BMM-3, Construction Industry Institute, Austin, Texas, 2005.

5. *Pre-Project Planning Tool: PDRI for Buildings*. Research Summary 155-1, Construction Industry Institute, Austin, Texas, 1999.

6. *PDRI: Project Definition Rating Index – Industrial Projects*. Implementation Resource 113-2, Version 4.0, Construction Industry Institute, Austin, Texas, 2013.

7. Ray, M. P., G. E. Gibson, and W. A. Lyons. "Data Analysis to Support Front End Planning Implementation." Research Report 213-11, Construction Industry Institute, Austin, Texas, 2005.

8. *Front End Planning: Break the Rules, Pay the Price*. Research Summary 213-1, Construction Industry Institute, Austin, Texas, 2006.

9. *Front End Planning for Renovation and Revamp: An Overview*. Research Summary 242-1, Construction Industry Institute, Austin, Texas, 2008.

10. *Front End Planning for Renovation and Revamp*. Implementation Resource 242-2, Version 4.0, Construction Industry Institute, Austin, Texas, 2013.

11. *PDRI: Project Definition Rating Index – Infrastructure Projects*, Implementation Resource 268-2, Version 4.0, Construction Industry Institute, Austin, Texas, 2013.

PDRI for General Building Projects Research Team

(1998–99)

George Abikhaled, The University of Texas System

Dennis Bayon, NASA

Chung-Suk Cho, The University of Texas at Austin

Ronald P. DiLustro, NASA

* G. Edward Gibson, Jr., The University of Texas at Austin

Mark Hanchar, ADP Marshall, Inc.

Thomas R. Hodges, U.S. Department of State

Schiller Liao, The University of Texas System

Tom Lyons, H. B. Zachry, Chairman

Ezel Silver, Jr., U.S. Department of State

Gary T. Steinmetz, General Motors

Other Contributing Participants:

Gary M. Boyd, 3D/International

Sidney L. Henson, BECK Program Management

Robert D. Morris, 3D/International

Ron Ohm, HC BECK

John A. Oualline, 3D/International

Past Membership:

James A. Broaddus, The University of Texas System

Jerry Pitzrick, M. A. Mortenson Co.

Walter W. Morton, Metric Constructors, Inc.

* Primary author

Editor: Rusty Haggard

Support for Pre-Project Planning Research Team

(2004–06)

Timothy Albrecht, 3M

Chris Booth, WorleyParsons

Frank Boyda, Rohm and Haas

Daniel Buswell, Zurich

Don Cooley, CH2M HILL/Lockwood Greene

Michael L. Cowser, Fluor Corporation

Joe Dollar, Anheuser-Busch

David Dykes, Yates Construction

John R. Fish, Ford, Bacon & Davis

* G. Edward Gibson, Jr., The University of Texas at Austin

Dave Hall, Intel

Christopher S. Haynes, Bechtel National, Inc.

Marcus Herbert, U.S. Department of State

Josephine Hurtado, Zachry Construction

Kyle Irons, The University of Texas at Austin

Robert P. Kehoe, NASA

James Livermore, Weyerhaeuser

Judson J. McIntire, Smithsonian Institution

Paul Menne, Burns & McDonnell

Youssef Mouzaya, Amgen, Chair

John Pinho, Intel

Michael Ray, The University of Texas at Austin

Sam Scucci, The Shaw Group

Gerald B. Wall, U.S. General Services Administration

Dick Westbrook, Mustang Engineers & Constructors

Gary Wilkes, Mustang Engineers & Constructors

* Coordinating author

Editor: Rusty Haggard

Front End Planning for Renovation and Revamp Research Team

(2006–08)

Bill Barnett, BE&K

Ken Bryson, U.S. Department of Health & Human Services/
Centers for Disease Control and Prevention

Daniel Buswell, Zurich

Eskil Carlsson, CSA Group

Dennis Chastain, Mustang Engineers & Constructors

Don Cooley, CH2M Hill

Charles Craig, Dresser-Rand

Qingbin Cui, The University of Alabama

John R. Fish, S&B Engineers & Constructors, Chair

* G. Edward Gibson, Jr., The University of Alabama

Joel Guess, Harper Industries

Chris Holcomb, Eastman Chemical Company

Suzanne Howard, The University of Alabama

John Moore, Ontario Power Generation

William Pew, DuPont

Neil Platt, Shell Oil Products

Faron Rollins, Ontario Power Generation

Stanley Scofield, U.S. Department of State

C. Robert Seay, Tennessee Valley Authority, Co-Chair

Mark Swanson, Burns & McDonnell

William Thorsen, General Motors Corporation

James Vicknair, WorleyParsons

Donald Whittington, The University of Alabama

Kwong Wong, U.S. Steel

* Coordinating author

Editor: Rusty Haggard

CII Member Organizations

Abbott
Air Products and Chemicals
Ameren Corporation
American Transmission Company
Anglo American
Anheuser-Busch InBev
Aramco Services Company
ArcelorMittal
Architect of the Capitol
BP America
CITGO Petroleum Corporation
Cameco Corporation
Cargill
Chevron
ConocoPhillips
Consolidated Edison Company of New York
DTE Energy
The Dow Chemical Company
DuPont
Eastman Chemical Company
Ecopetrol
Eskom Holdings
ExxonMobil Corporation
General Electric Company
General Motors Corporation
GlaxoSmithKline
Global Infrastructure Partners
Huntsman Corporation
International Paper
Irving Oil Limited
Kaiser Permanente
Koch Industries
Eli Lilly and Company
Linde North America
LyondellBasell
Marathon Oil Corporation
National Aeronautics & Space Administration
NOVA Chemicals Corporation
Occidental Petroleum Corporation
Ontario Power Generation
Petroleo Brasileiro S/A - Petrobras
Petroleos Mexicanos
Petroliam Nasional Berhad
Phillips 66
Praxair
The Procter & Gamble Company
Public Service Electric & Gas Company
Reliance Industries Limited (RIL)
SABIC - Saudi Basic Industries Corporation
Sasol Technology
Shell Global Solutions US
Smithsonian Institution
Southern Company
Statoil ASA
SunCoke Energy
TNK-BP
Teck Resources Limited
Tennessee Valley Authority
TransCanada Corporation
U.S. Army Corps of Engineers
U.S. Department of Commerce/NIST/
Engineering Laboratory
U.S. Department of Defense/Tricare Management
Activity
U.S. Department of Energy
U.S. Department of Health and Human Services
U.S. Department of State
U.S. Department of Veterans Affairs
U.S. General Services Administration
Vale
The Williams Companies

AMEC
AZCO
Alstom Power
Audubon Engineering Company
Baker Concrete Construction
Barton Malow Company
Bechtel Group
Bentley Systems
Bilfinger Industrial Services
Black & Veatch
Burns & McDonnell
CB&I
CCC Group
CDI Engineering Solutions
CH2M HILL
CSA Central
Coreworx
Day & Zimmermann
Dresser-Rand Company
eProject Management
Emerson Process Management
Faithful+Gould
Fluor Corporation
Foster Wheeler USA Corporation
GS Engineering & Construction Corporation
Gross Mechanical Contractors
Hargrove Engineers + Constructors
Hatch
Hilti Corporation
IHI E&C International Corporation
IHS
Industrial Contractors Skanska
International Rivers Consulting
JMJ Associates
JV Driver Projects
Jacobs
KBR
Kiewit Corporation
Kvaerner North American Construction
Lauren Engineers & Constructors
Leidos Constructors, LLC
Matrix Service Company
McCarthy Building Companies
McDermott International
Midwest Steel
Parsons
Pathfinder
POWER Engineers
Quality Execution
Richard Industrial Group
The Robins & Morton Group
S&B Engineers and Constructors
SKEC USA
SNC-Lavalin
Technip
Tenova
TOYO-SETAL Engenharia
URS Corporation
Victaulic Company
Walbridge
Wanzek Construction
Wilhelm Construction
Willbros United States Holdings
Wood Group Mustang
WorleyParsons
Yates Construction
Zachry Holdings
Zurich