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Small Projects Toolkit

Prepared by the

Construction Industry Institute

Executing Small Capital Projects Research Team

Implementation Resource 161-2

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Reviewed by CII 3Feb04

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The University of Texas at Austin.

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Introduction

Since 40-50 percent of all industry capital budgets are now spent on small projects, successful small project execution is especially important. Small projects are typically focused on increasing production capacities, improving product quality, improving efficiencies, and maintaining functionality of a plant for continued operation and production.

The general definition of a small project varies significantly throughout the CII membership. Therefore, it is important that users of this *Small Projects Toolkit* understand that a small project is defined here as one with a total installed cost range of between \$100,000 and \$2,000,000.

Many of the success factors for execution of small projects are often factors for successful large projects. However, the small projects best practices contained in this guide will most likely require greater emphasis or importance, different timing of implementation, and/or some variation to those same general principles of successful large projects. The *Toolkit* is a supplement to successful project execution principles with emphasis on the different success factors for small project execution.

Chapter 1 - *Front-End Planning*

The purpose of this chapter is to review the front-end planning process as it applies to large construction projects and to determine how it differs when considering small projects.

1.0 Introduction

Pre-project planning, if done correctly, can:

- ❑ *Reduce project costs by as much as 20 percent.*
- ❑ *Lead to less project variability of cost, schedule, and operating characteristics.*
- ❑ *Increase the chance of projects meeting their operational, environmental, and social goals.*

A direct relationship exists between project success and the level of pre-project planning. Complete scope definition, which results from effective pre-project planning, improves project performance in relation to cost, quality, and operational characteristics.

Pre-project planning is defined as “the process of developing sufficient strategic information for owners to address risk and decide to commit resources to maximize the chance for a successful project.”



The objective of front-end planning is the same regardless of the size of the project: “to finalize, fix, and communicate project scope.”

2.0 Strategy

The objective of front-end planning is the same regardless of the size of the project: “to finalize, fix, and communicate project scope.” For small projects, however, front-end planning must be completed in an environment with a compressed timeframe, few dedicated project resources, and a variable funding process. Successful projects, both small and large, maximize their chances of success by obtaining early and effective input from all stakeholders.

A number of front-end planning issues can have a strong impact on small project success.

- ☐ ***Owner representative/leader*** with profound knowledge of the facility and plant personnel to facilitate scope definition and plant input and approval.
- ☐ ***Clear, succinct, detailed identification of project scope*** prior to funding to avoid continued design improvements to the end.
- ☐ ***Funding processes*** that are clear, dependable, and make sense.

3.0 Organization

When the front-end planning effort is finished, the project manager and team should have:

- ☐ *Addressed business requirements for the project.*
- ☐ *Selected critical technologies for the project.*
- ☐ *Chosen a site.*
- ☐ *Defined the scope of work to be accomplished.*
- ☐ *Determined the cost and schedule for the project.*
- ☐ *Assembled a project team with the proper expertise to lead the execution effort.*
- ☐ *Prepared project documentation so that the project can move smoothly into execution.*
- ☐ *Gained an intimate understanding of the project.*
- ☐ *Addressed the decision maker's needs and concerns in order to facilitate the decision.*
- ☐ *Gained commitment from all interested parties in terms of project scope, cost, schedule, and plan of execution.*
- ☐ *Investigated permit requirements.*

The small project funding process differs from that of large projects and has a direct impact on front-end planning.

Large projects have their own economic hurdles for approval, but in most instances once started, their funding is allocated through completion. Major projects allow for funding carryover and distribution of contingency over the entire project life. Plant budgets, on the other hand, can be modified mid-course depending on the product market and profitability.

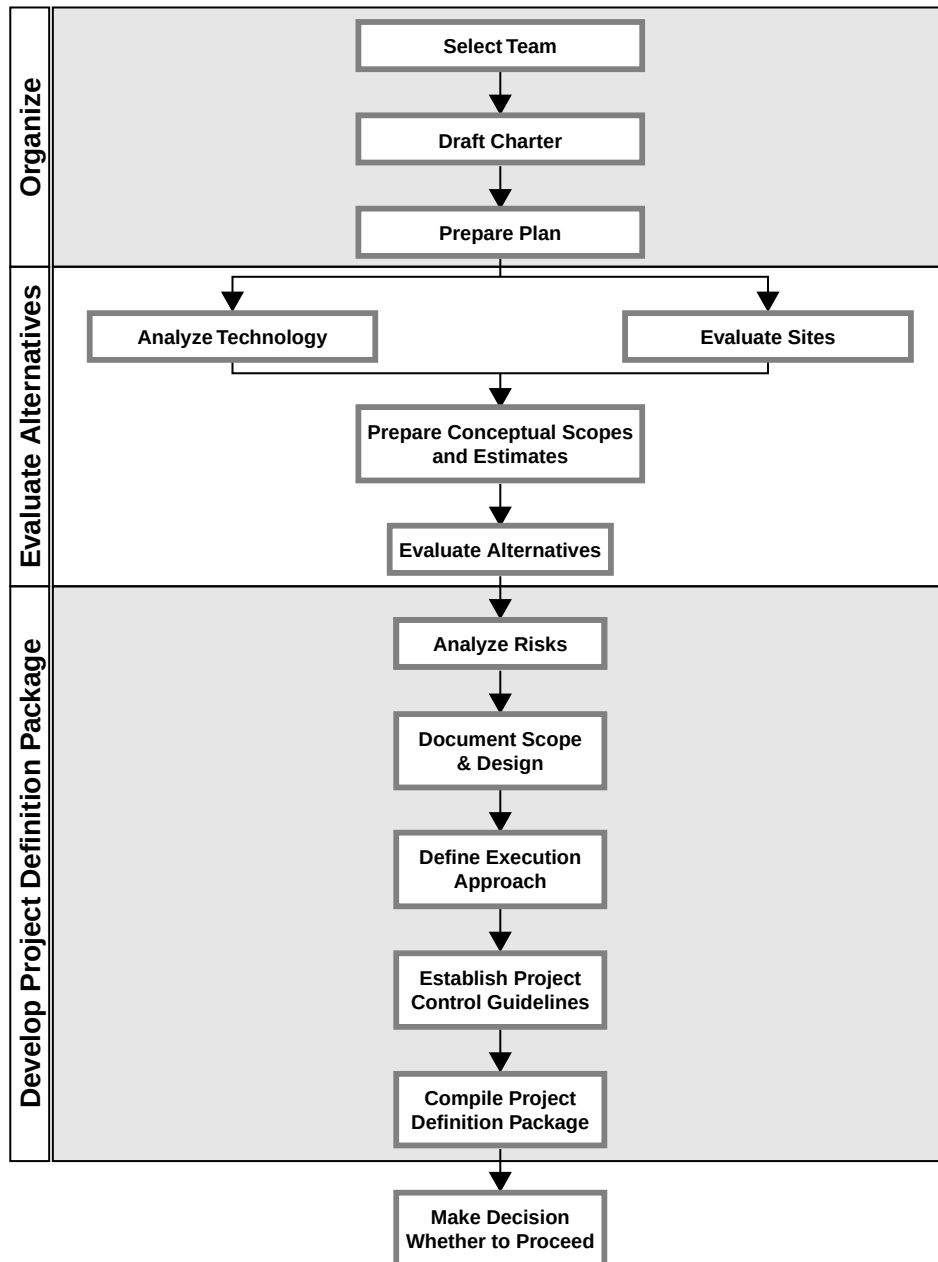
The small capital project program budget can vary each quarter. Budget increases can be as problematic as budget decreases. In some instances funds are released at the end of a successful third quarter for new fourth quarter initiatives. The resulting acceleration of work can create problems with front-end planning, design decisions, and staffing requirements. If the money is not spent during the quarter, there is usually no carryover. As a result, money for the project then must come from the budget for the next quarter or fiscal year. Large projects are seldom subject to this level of uncertainty in funding and workload.



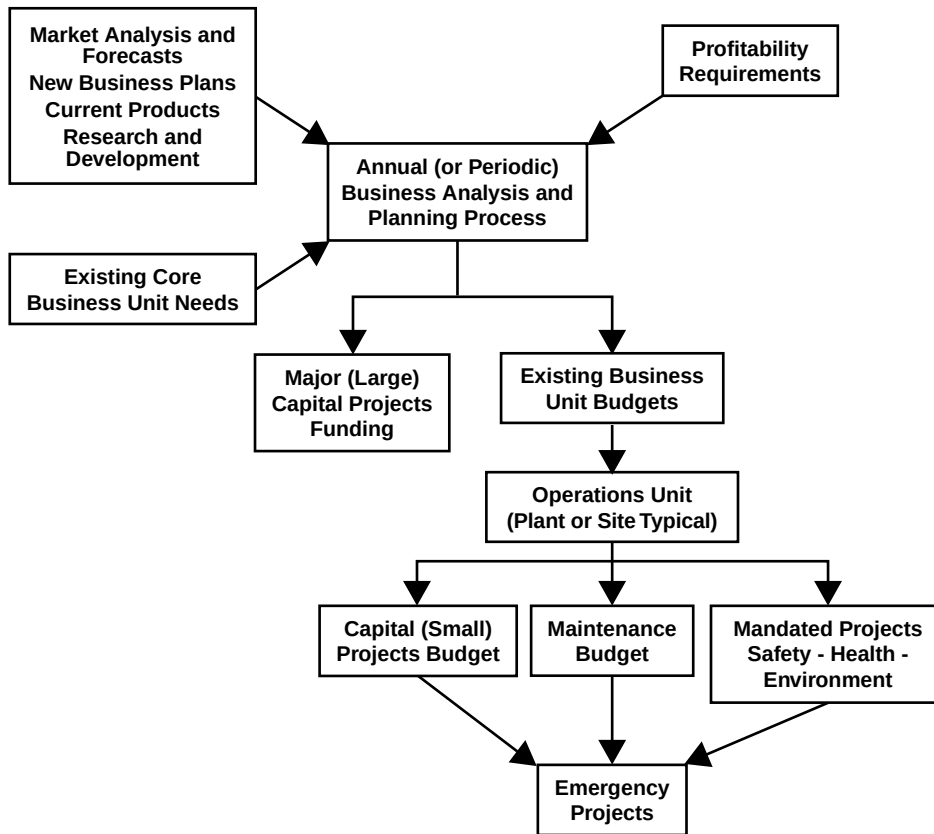
The small capital project program budget can vary each quarter. Budget increases can be as problematic as budget decreases.

4.0 Process

While companies may choose different approaches to pre-project planning, the underlying process can be diagrammed as follows:



A typical plant budgeting process is:



Given these typical processes for front-end planning and project funding, several “best practices” emerge:

Standardization

Owner organizations that standardize equipment and designs allow for a “cookie cutter” approach for many facilities in the plant. Standard platforms, eyewash stations, truck unloading bays, and tank storage facilities lend themselves to this approach. Significant savings in time and money can be found after the third and fourth identical facility.

Project Contingency

Since small projects have less room for budget error as a percent of total installed cost, it is common for small projects to have a larger percentage contingency as compared to large projects (often 2–5 percent more).

Project Checklists

A surprising result of the survey was the strong correlation between the use of project checklists and budget and schedule performance.

Small Project Program Team

Small project program teams allow for consistency and continual improvement from project to project and quarter to quarter. Chapter 7 (organization) describes the correlation between organizations with consistent core small project teams and project performance.

Front-End Planning Funding

Many organizations pay for front-end planning using project funds. This leads to a conflict of interest when front-end planning demonstrates that a project is not worth funding. Companies with the best practices have a general budget for funding front-end planning.

Dependable Project Funding

Consistent, dependable funding processes that a team can count on from one quarter to the next allows the team to dedicate resources and plan the work in a logical, effective manner.

Modified PDRI

The CII Project Definition Rating Index (PDRI) can be customized for small project execution. On an individual basis, the scope of these projects may not encompass many of the elements contained in the PDRI. In these situations an organization wishing to incorporate the PDRI into its front-end planning program may need to customize it to fit the needs of smaller projects. Since the PDRI is generic in nature, an organization can delete any elements that do not apply specifically to certain types of projects.

The PDRI was not developed to address small projects or renovations that have large numbers of non-applicable elements. It can be effective for small projects, however, when standardized from job to job and used as a program tool.

5.0 Summary

Most practitioners feel that small projects have less detailed front-end planning than large construction projects. This reduction in planning is primarily due to the shorter cycle time and limited resources dedicated to those projects.

Often the deliverables for small projects consist of the general scope, budget, and schedule. The primary focus of these deliverables remains the same for small and large projects: to finalize, fix, and communicate the project scope.

The most consistent difference between large and small project front-end planning is the size and use of project staff. The team responsible for small project planning is smaller than the corresponding large project team. Typically, specialized planning activities for small projects, such as estimating and scheduling, are performed by the same team member(s)



Typically, specialized planning activities for small projects, such as estimating and scheduling, are performed by the same team member(s) responsible for project execution.

responsible for project execution. In addition, small project team members may be responsible for multiple small projects in different phases, e.g., planning, execution, start-up, and closeout. Resource sharing is commonplace.

Small projects generally are allocated a higher contingency. In some situations, small projects are funded and managed as an overall program. This allows project management to reallocate funds between small projects as required to meet contingency requirements.

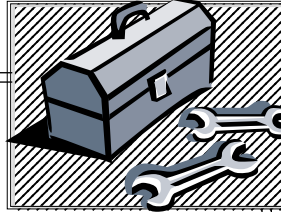
Pre-project planning is a critical component for success for small projects. Well performed front-end planning should:

- ☐ *Reduce project costs.*
- ☐ *Lead to less project variability in terms of cost, schedule, and operating characteristics.*
- ☐ *Increase the chance of projects meeting their operational, environmental, and social goals.*

6.0 Best Practices

- ☐ *Standardize designs, especially “in-kind” replacements.*
- ☐ *Increase project contingency funds two to five percent over a typical large project.*
- ☐ *Use small project checklists to standardize and speed up the engineering & construction process.*
- ☐ *Fund and manage small projects as a program instead of as individual projects.*
- ☐ *Establish a front-end source of funding for pre-planning small projects.*
- ☐ *Use a modified PDRI to evaluate the front-end planning process for small projects.*

Tools



PDRI Industrial Projects (Appendix B from CII IR 113-2)

PDRI Building Projects (Appendix A from CII IR 155-2)

Chapter 2 - Design

The objective of this chapter is to list the key differences in design for small projects versus large projects. Various tools and best practices are described to improve small project execution.

1.0 Introduction

Organizing and executing the design effort on small projects can be done in various ways. The key to completing small project design successfully includes selecting the proper design team for the given project, and making available and utilizing unique design tools specifically for the small project environment. Using these tools consistently on small projects will have a substantial impact on cost reductions and will condense project schedules.

2.0 Strategy

The mission of the design function for performing small projects is to provide the level of design appropriate to the requirements of the project to ensure that the project is executed effectively with respect to performance, cost, and schedule.

3.0 Organization

Listed below are three basic methods used to organize small projects design groups:

- ❑ By engineering discipline: this is generally where the same organization designs both small and large projects.

Advantage: permits specialization

Disadvantage: small projects get lower priority

- ❑ By project: the team is assembled from the overall organization on an “ad hoc” basis for the life of the project.

Advantage: effective use of staffing

Disadvantage: star performers may be taken already; little room for specialization



Design deliverables are generally similar for small and large projects.

On small projects, there is greater use of hand-sketches and arm-waving.

Permanent core small project design teams create nucleus of special design expertise.

- ❑ Combination of the above: a permanent Core Small Projects Design Team with specialized resources added as dictated by the needs of the project.

Advantage: creates and maintains a nucleus of small project design expertise.

4.0 Processes

Listed below are specific areas related to design where small projects differ from large projects.

Design Scope & Deliverables

The key is to select items from the menu of standard project design deliverables that will best fit the small project at hand. It is important to establish the right depth to get the job done without under-designing or over-designing.

Team Size and Composition

The design team should be small in number, with members who can handle more than one discipline. For instance, one person might handle architectural, structural, and civil engineering, another might handle HVAC, mechanical utilities, and process piping, and yet another might be responsible for electrical engineering, instrumentation, and control. During certain phases of the design, the core team might need to consult with design experts in a specialized area. Overall, instead of 30-100 engineers, designers, and detailers on a large project, one might have 5-20 on a small project. Refer to Chapter 6 – People for related information.

Small project design assignments are generally made by the project or design leader. Often on a small project, the design team leader also has hands-on design responsibility for a core discipline. Staffing must be based on the design deliverables agreed upon, the budget, and schedule constraints. Depending on the level of field experience in the design team, it is sometimes effective to have the small project design engineer oversee in the field construction and commissioning. Besides the leveraging of resources, this affords the added benefits of continued accountability for the design and broadening of the design team's perspective and expertise.

According to several design department managers, while they may not have a formally defined small projects group, there is generally informal knowledge and consensus as to which members of the group excel at small project work. These individuals seem to gravitate to small project assignments and vice versa.

Equipment Design

Small project designs, to be efficient, need to "Keep It Simple." They should favor the following equipment design approaches in descending order of preference:

- ☐ *standard "off-the-shelf" equipment*
- ☐ *standard equipment modified to fit the need*
- ☐ *custom-built equipment*



On small projects, the decision-making structure tends to be more loosely defined.

Staffing is based on design deliverables and budget and schedule constraints.



Keep small project design simple.

Design Tools

Like the design deliverables, design tools should be selected strictly on the basis of merit and applicability to the individual small project. Use the tools only if they fit the needs, not simply because they're available. It is best to avoid "test-piloting" a new design tool on a critical small project. A good example is 3D CAD, where most systems are cumbersome and expensive to set up and work with, but have tangible benefits. Key questions in this case are:

- ☐ *Can we get the job done effectively with 2D CAD or even hand drawings?*
- ☐ *Can we use standard designs/details that are already available?*
- ☐ *Does this small project involve physical systems that are already on 3D CAD? If so, it probably makes sense to design from the same platform.*



Review meetings should be conducted weekly.

Resource Allocation

On a small project, the amount of design effort typically is large relative to the cost of the project. Also, the design effort spent on updates of existing systems is considerably larger in proportion to the total. This is because the small project is often a retrofit to an existing system, where the documentation may not be up to date and many undocumented changes may have been made. It is important to allocate sufficient staffing and time on small project designs to:

- ☐ *complete design updates before the new part of the design can be started.*
- ☐ *ensure that design scope is defined and scope "creep" is controlled.*
- ☐ *track progress of the design effort.*

Project Design Controls

Listed below are the tools that best fit small project design:

- ❑ *Design Team Directory* – names, phone, fax numbers, addresses, mail, e-mail, responsibilities, other interacting team members – generated by design team leader.
- ❑ *List of Design Deliverables* – generated by design team, approved by client, procurement, construction – refer to attached list of Design Deliverables.
- ❑ *Design Schedule* – Gantt chart approved by client, procurement, and construction.
- ❑ 2D CAD, e.g., AutoCAD, Unigraphics
- ❑ 3D CAD, e.g., Intergraph, PASCE, if necessary
- ❑ Design Metrics:
 - Design hours/cost – budget versus actual
 - Engineering as percentage of TIC (Total Installed Cost)
 - Rework cost – design
 - Rework cost – construction due to design errors.

Management of Design, Design Reviews, and Design Changes

Management of the design phase of a project includes consideration, use, and review of:

- ☐ *Safety*
- ☐ *Constructability*
- ☐ *Maintainability*
- ☐ *Value Engineering*
- ☐ *Operability*
- ☐ *Reliability (refer to the attached CII Design Review for Maintainability checklist)*
- ☐ *Process Industry Practice (PIP) Standards*

In the execution of small project design, the systems used to manage changes are more streamlined and less structured. Instead of a large team meeting, the change may be discussed over the phone and documented via a short memo or phone conversation report.



Two key best practices:

- ☐ ***good scope definition***
- ☐ ***early scope freeze***

In the interests of speed, the project leader may delegate authority to approve design changes up to a predetermined level or cost or other impact to team members. Change, however, remains a detriment to performance, cost, and schedule on projects of any size, and therefore it is important to communicate the change promptly to the members of the team affected by the change.

Design Document Control

Small projects entail simpler design document control. Review, check, and approval processes might be easier and faster via a combination of fewer steps, shorter approval routings, and concurrent reviews. For example, a small project bid specification can be electronically sent to three or four reviewers for concurrent review, comment, and approval instead of a large project's 20 reviewers at one or two different levels.

Typically, the same infrastructure for document control is used on both small and large projects. The basic differences are the volume of information handled being substantially smaller and the methods of communication less formal for small projects.

Small project designs differ also in the specific pieces of design documentation and the existing system that must incorporate those elements into the "big picture." For instance, if hand-sketches are used in the field on a small project piping design, they may need to be scanned into an existing database to maintain the integrity of the as-built documentation.



Instead of large, team meetings, changes may be:

- ☐ ***discussed via telephone***
- ☐ ***discussed during hallway chats***
- ☐ ***documented in short memos.***

5.0 Summary

In project execution, an emphasis on the proper level of design as part of front-end loading can reap rich dividends in lower project costs and reduction in overall project schedule.

6.0 Best Practices

- ☐ Establish and freeze scope early.
- ☐ Select design deliverables that best fit project objectives.
- ☐ “Piggyback” on existing large project design tools.
- ☐ Do not skimp on the design budget/schedule.
- ☐ Find the right level of design depth and “formality.”
- ☐ Staff with multi-discipline design team members.
- ☐ Staff with people who are very familiar with job site.
- ☐ Provide “specialist” help where needed.
- ☐ KISS design philosophy; replicate/modify/do not re-invent
- ☐ Weekly review meetings.
- ☐ Communicate design changes to everyone promptly — small projects are more time-critical.
- ☐ Select a few simple, goal-driven controls and use them.

Trends

- ☐ Use of three-dimensional CAD design.
- ☐ Use of electronic communications to transmit design information – equipment specifications, dimensions, layout drawings.
- ☐ Use of lasers and photogrammetry to design retrofit project work.

Chapter 3 - Procurement

The objective of this chapter is to provide key differences for procurement of equipment and materials for “small projects” versus “large projects.” Various tools and best practices are described to improve small project execution.

1.0 Introduction

The procurement of materials and equipment is often more critical to success of small projects than of large projects. On small projects, it is imperative that items show up on the jobsite when they are needed, where they are needed, and without quality problems. There are fewer items, so there are fewer opportunities to work around if one does not get to the job site as required. Items are usually ordered on a “just in time” basis with little room for error. Due to the short duration of most small projects, errors and omissions in the procurement process have a magnified impact. Lack of materials at the job is the most frequent cause of construction delays.



Procurement practices on small projects are the same or very similar to large-project procurement practices.

2.0 Strategy

Procurement Effectiveness

Overall effectiveness stems from proper planning during front end loading. Effective procurement practices begin with clear communication of the owner's expectations and philosophies to the engineer and constructor regarding the procurement function. A written procurement plan should be a part of the overall contracting strategy and include a responsibility matrix, work flow diagram, and written descriptions of each individual's duties. However, the process used for large project procurement is not likely to be suited to small projects.

Streamlining of the review and approval process on small projects provides large benefits. Reducing the number of review and approval signatures required for a purchase order will reduce and shorten the time necessary to place a purchase order and expedite delivery regardless of which organization performs procurement.



Utilizing plant standards may limit the choices of equipment to purchase.

Since equipment lead time is usually the factor driving the small project schedule, a great deal of effort is spent early on to nail down the equipment specifications and order it as early as possible after the small project has been kicked off. This is often required even before the final process design is complete. To make matters worse, each piece of equipment has a cost that is a significant percentage of the overall cost of the project. As a result, this decision is that much more critical to the overall success of the project. It is not a decision to hurry through and take lightly.

Bulk and consumable material procurement strategies vary. In many cases owner organizations prefer that these materials be purchased by the project, although it is often not clear what is going to be required until it is too late to order and receive it before the constructor mobilizes. Often these materials are on site, available through the owner's maintenance warehouse, and many organizations use these materials.

The bid, evaluate, and award cycle is not well suited for small projects. It is another process that can extend the small project schedule day for day. Most owner and contractor organizations have set up preferred supplier relationships so they can eliminate the cycle and order material with a requisition.

Expediting

Expediting responsibilities for engineered equipment should remain with the engineering firm due to critical need of certified data for timely design release to the constructor. The expediting responsibilities of bulk materials and consumables should be the responsibility of the construction team because it is impacted the most by shipment dates. The division in expediting responsibility highlights the need for clear and frequent communication of the delivery status of materials and equipment.

Delivery

On small projects, the additional cost for quick delivery of an item by a supplier will often be excessive in comparison to the item cost. Balance must be achieved between cost and delivery, leading to dynamic relationships with suppliers. Supplier response to both performance and results must be continuously measured and feedback provided to them by the owner/engineer/constructor.

Supplier Installation

A large percentage of small projects involve retrofits or enhancements to existing facilities, and therefore require the purchase of items that are identical to existing. In other situations small projects can involve specialized equipment items with short schedule durations. It may be more cost and schedule effective for the supplier to install the equipment rather than the contractor. To make a value judgment, the engineer should ask the supplier for an installed cost option.

Supplier Shop-Testing and Inspection

Small projects often consist of installing new or additional equipment items. In many cases the equipment is an in-kind replacement item. Due to the short project duration of most small projects, it is often best for the equipment to be tested at the factory. On large projects there is more time after delivery to test all equipment in the field.

The benefits of factory acceptance testing for small project equipment are:

- ☐ Reduces testing time in the field.
- ☐ Reduces rework performed in the field.
- ☐ Reduces the risk of equipment not functioning after it is installed.
- ☐ Places responsibility on the manufacturer to ensure the quality of the equipment.



When existing equipment is being replaced, it is a common practice for the owner to select the supplier prior to final design and release it to the constructor to expedite deliveries.

In some situations, the owner and engineering contractor are both involved in equipment and supplier selections.



A best practice is to eliminate purchasing customized equipment where possible.

- ❑ Eliminates the development of QC documents in the field.
- ❑ Ensures that specialized tools and trained labor is available to correct any deficiencies.
- ❑ Communicates the owner's expectations.



Constructors commonly purchase bulk materials and consumable materials, but are also key members in procurement of equipment requiring supplier field services.

It is important on small projects to perform in-progress inspection to eliminate errors that would otherwise be detected at the last minute. There is no time to correct deficiencies in the field. Supplier trips to inspect equipment before it ships are valuable.

Spare Parts

The majority of small projects do not require the procurement of spare parts for equipment items since most small projects procure "plant standard" equipment. The manufacturing area maintenance representative on the project team normally will ensure that appropriate spare parts exist in the supply system inventory. In situations where spare parts are required, the project team needs to identify and order them at the time of the initial inquiry.



Discounts are typically less for small projects than for large projects due to smaller volumes and capital costs involved.

3.0 Organization

A typical small project procurement organization includes the following:

Purchasing functions — one local site person to write purchase requisitions, monitor deliveries, approve invoices as required. The firm's centralized purchasing group will issue POs, track progress and delivery, obtain quotes and bids, and write change orders as required.

QA/QC functions — Clear designation of responsibility is important. Small projects typically do not have a dedicated QA/QC resource, thus this responsibility is assigned to various team members.

Roles and Responsibilities

The procurement strategies for both small and large projects are similar. The major difference for small projects is that only a few people will be filling all of the following roles:

Owner — responsible for:

- ☐ Suppliers list
- ☐ Participating in bid package cycle

Purchasing — responsible for:

- ☐ Coordinating quotes
- ☐ Negotiating required contracts
- ☐ Processing purchase orders
- ☐ Tracking progress of order until delivery
- ☐ Arranging shipping requirements
- ☐ Obtaining required supplier data

Construction Management — responsible for:

- ☐ Creating site labor bid packages
- ☐ Ensuring contractor/supplier meets companies safety, health, and environmental guidelines
- ☐ Approving field change orders during construction installation

Project Design — responsible for:

- ☐ Specifying equipment as required to obtain quotes/bids
- ☐ Initiating purchase requisitions
- ☐ Providing input for equipment labeling
- ☐ QA/QC on received items
- ☐ Distributing supplier data

Project Manager — responsible for:

- ☐ Releasing requisitions to purchasing
- ☐ Coordinating all team members
- ☐ Final cost of purchased equipment, materials, and services
- ☐ Monitoring costs as dictated



The use of preferred alliances and a focus on purchasing items compatible with existing systems are common practices on small projects.

Site Logistics

An advantage of an alliance relationship between the owner and constructor is that the plant can operate as a central receiving point for small projects. Small projects are usually undertaken within the owner's operating facility. Since there is normally no specific receiving/laydown area for each small project, the owner will often allow the constructor to use its facility as the site receiving system. For this reason, both the owner and constructor must clearly understand what owner's staff and owner's equipment can be utilized. The owner may direct the constructor to get the bulk of the materials from the owner's warehouse, use the owner's material handling equipment, and receive materials by the owner's dock personnel. While different from the large project scenario, these differences reduce the need for additional personnel and limit the congestion within the facility.

Quality

The vital element in the small project quality program is to clearly define who, by name, is responsible to ensure compliance with the QA/QC programs. This function is clearly defined on large projects, but becomes a "secondary" job to a team member on a small project. Third party or company inspections of major equipment are still required. This includes, but is not limited to reviews, compliance with standards and specifications, metallurgical inspections, hydro-testing, positive material identification, and field verification of proper and complete installation of major equipment, including cold and hot alignments and initial run-in.

Preferred Suppliers

If the owner only plans one or two small projects a year, there potentially will not be enough volume of material and equipment to establish and maintain a preferred supplier relationship. In this instance, there should be sufficient planning and scheduling time to implement a competitive bid process. In other cases, even when a low volume of small capital projects are available, the owner may have preferred suppliers for maintenance activities.



Preferred suppliers reduce the risk of late deliveries.

Electronic Procurement

Electronic procurement (e-procurement), or the purchasing of materials using the Internet, is becoming more popular in the construction industry. Buyers hope this type of purchasing will eliminate errors, make it easier to track orders, and provide better pricing than conventional methods. On-line purchases in the industry currently amount to no more than 0.5 percent of the \$1.2 trillion total, but some specialists expect that total will top 10 percent of the market soon. Some specialists estimate that the real savings from e-procurement could be three to four percent. Other benefits are: reduced paper-handling, error omissions, importing bills of materials into RFQs, attaching drawings, easing bid analysis, and automating the process of issuing purchase orders.

Business to business e-commerce is the current wave affecting equipment and product manufacturers and suppliers. Project collaboration and product procurement are the two primary areas of focus. This will have a radical impact on the purchase and delivery functions within the supply chain. Consolidation within this segment of the industry will continue and in some cases the number of standard brands will decrease, but this activity is likely to have a very favorable impact on the procurement process for small projects.



Many companies use a multiple party or team approval/selection review process.

4.0 Processes

It is critical that a representative performing the procurement function be an active participant on the project team. Their involvement from the beginning of the project and participation in decisions about procurement strategy, bid package requirements, tracking purchase orders, and the critical paths in the procurement cycle are vital. They can better contribute to the team's goals if they understand their specific responsibilities on each project.

Consultation with the construction manager should occur during early stages of the project so that all parties can assess the schedule and cost impacts. Some small project environments call for the expediting responsibilities of bulk materials and consumables to be directed by the construction team because it is impacted the most by the shipment dates. Expediting of the engineered equipment should remain with the engineer company, however, due to critical need of certified data for timely design release.

Streamlining of the review and approval process on small projects provides large benefits. Reducing the number of review and approval signatures required for a purchase order will reduce the time necessary to place a purchase order and expedite delivery. Eliminating the process altogether by using preferred suppliers or materials already in the warehouse on site saves even more time.

Appropriate construction personnel should be trained to effectively manage some procurement activities in the field. Decentralized purchasing in the field may be the most efficient procurement method for bulk and consumable materials, and for last-minute items that have been forgotten, damaged, or lost.

5.0 Best Practices

- ☐ Communicate owner procurement expectations, rules, and philosophies to the team at the beginning of the small project or program of small projects.
- ☐ For a program of small projects, a written procurement plan should be developed.
- ☐ Gather construction procurement and constructability feedback in the pre-design phase.
- ☐ Use preferred suppliers.
- ☐ Use on-site receiving, warehousing, and materials.

6.0 Summary

Procurement on small projects is somewhat different from large projects. The differences lie in the degree of impact that the procurement function has on the success of each small project and the lack of a large procurement team to support the execution effort.

Streamlining the procurement process function is critical to the success of each small project. Decisions are often made quickly with regard to cost vs. schedule impacts. The use of e-procurement will change the way materials and equipment will be purchased. However, there are few shortcuts that can be taken to successfully procure the materials and equipment needed.

Success comes from a detailed plan, established supplier relationships, prompt payment, quick approval, and coordination between owner, engineer, and constructor. No matter what procurement program is implemented, it is important that all parties understand the importance of this function on every small project.