

# Preconstruction Safety

*Plan for safety excellence*

**By Carmen Shafer**

**I**N THE AUTHOR'S EXPERIENCE, many construction companies still only address safety at the point of contact—in the field once a project has mobilized. However, safety does not begin in the field. It takes planning and forethought to be effectively implemented in the field. Therefore, the SH&E professional needs to be involved during a project's procurement and preconstruction phases. Safety personnel can also have a positive effect on the procurement process and the entire company if planning begins at the corporate level, before procurement activities are even initiated. To produce positive safety performance at the project level, planning and goal setting must take place on both the corporate and project levels.

This article examines goal setting and planning on the corporate level, discusses key safety input and considerations during the procurement and bidding stages of a project, outlines specific issues that must be addressed before project mobilization, and reviews project safety planning and daily planning activities.

## **Setting Goals**

Planning and goal setting are interrelated. Goals help encourage growth and identify where the company should focus its energies. On the corporate level, goal setting involves understanding the company's strategic plan and developing safety goals that correspond with that plan. Goal setting should also be incorporated into a project in order to achieve attainable project-specific safety objectives.

**Carmen Shafer, CSP, CHST**, is owner/president of Shafer Safety Solutions LLC, a construction safety consulting firm. Shafer has worked in the construction field for 10 years. She holds a B.S. in Building Construction Management from Purdue University and an M.S. in Occupational Safety Management from Indiana State University. Shafer is a member of ASSE's Northern West Virginia Chapter, a member of the Society's Construction Practice Specialty and a member of AGC of America's Safety and Health Committee's Steering Committee.

## **Corporate-Level Goal Setting**

In its Voluntary Protection Programs (VPP) requirements, OSHA considers goal setting for safety at the corporate level to be a key indicator of upper management's support of a company's safety program. SH&E professionals need to work with upper management to identify corporate goals and understand how they relate to

safety. What are the company's short- and long-term goals? Is it a small company looking to grow? Does the company plan to seek work in another facet of construction? Will the company increase self-performed work or delve into construction management? These goals should be identified by the company's executives and disseminated through the company's strategic plan.

How does this information affect safety planning and behavior on the job? Understanding the company's overall future plans greatly affects the SH&E professional's work activities and foci within the company. For example, suppose a company determines it can make more profit by increasing the amount of self-performed work. This could create a need for more safety training, additional funds for PPE and perhaps more safety staff. If a company plans to acquire work in a different region, state or country, then it must research potential safety and risk management impacts, such as varying safety regulations and insurance requirements.

Planning helps to establish an effective corporate safety program; it is addressed in both federal and international safety and health standards. ANSI/AIHA Z10-2005 discusses planning as a primary means to improve safety performance (ANSI/AIHA, 2005). Key planning issues addressed in the Z10 standard include identifying and prioritizing safety and health issues, and identifying risk reduction objectives (e.g., goals). The *Guidelines on Occupational Safety and Health Management Systems* (ILO, 2001) also identify planning as a key aspect in developing an occupational safety and health management system.

This planning is based on initial and subsequent reviews of the existing safety management system. It includes identifying the organization's safety and health objectives, preparing plans and assigning responsibility for achieving these objectives, deciding on a measurement system, and assigning appropriate resources to achieve these objectives.

In addition, OHSAS 18001:1999 addresses planning as it relates to setting company safety and health objectives and ongoing hazard identification,

risk assessment and risk control (BSI, 1999). Ongoing hazard identification and risk assessments must be planned to ensure that they are proactive, not reactive, activities. Furthermore, companies that participate in OSHA's VPP must have a safety management plan that includes goals and objectives for meeting those goals.

### **Project-Level Goal Setting**

In addition to corporate-level goals and objectives, planning and goal setting have their place on the project level. Project goals should be set and communicated with the entire project team before mobilization. To ensure that the process is effective, project team members, including subcontractors, should actively participate.

AIHA/ANSI Z10-2005 emphasizes the need for employees to participate during the planning stage because they are "closest to the hazard" and "often have the most intimate knowledge of workplace hazards" (3.2 and E3.2). Some companies achieve employee buy-in by creating a safety charter that is signed by the entire project team, including all subcontractors. These goals can be as simple as "zero accidents" or they may encompass a more complex series of expectations to be upheld on the project. In any case, they need to be realistic, applicable to the project and attainable by the workforce.

Milestones help the project team work toward a goal, track progress and identify potential problems. Milestones set throughout the project lifespan may help prevent the loss of the entire program in the event that an accident occurs or the primary goal is otherwise compromised.

### **Bidding & Procurement Issues**

Bidding and procurement activities offer multiple opportunities for SH&E personnel to provide valuable input. For example, employees involved in bidding/procurement (e.g., estimators) should be educated to recognize potential safety issues such as hazards related to falls, electrical systems and confined spaces. This can be achieved by having these personnel complete safety training such as the OSHA 30-hour construction course. In addition, tools such as preconstruction or estimating safety checklists can be created to help the procurement team identify potential hazards.

Safety-related information can also be gleaned from prebid meetings and contract specification requirements. The client may have special safety concerns and requirements that must be factored into the bid. A hazard analysis created for the project based on this information can help identify particular safety issues that may have significant cost impact. Therefore, the bid and project budget should include separate line items for safety costs.

### **Safety Staffing/Project Team**

Some projects may be complex enough to require full-time safety staffing; others may not necessitate a full-time dedicated safety staff. Therefore, the project and its requirements should be

*Goal setting and planning, considering safety needs during the procurement and bidding stages, and before project mobilization, and recognizing daily safety planning activities can help ensure a successful construction project.*





*Project team members must understand the particular safety issues inherent in the type of project being bid.*

assessed while preparing the bid to determine safety staffing needs.

Safety staffing requirements may be contained in the specification section outlining the project team requirements, the safety and health requirements and/or the quality control requirements. Additional requirements may be scattered throughout the specifications, so they should be thoroughly reviewed during the bidding process.

While bidding a project, the need for a special scaffolding setup, engineered fall protection systems or certain excavation protection systems may be discovered. In such cases, one or more professional engineers may be required by law (or by the project specifications themselves) and should be considered when assembling the project team.

It is also important to carefully select a project team whose members are experienced enough to understand the particular safety issues inherent in the type of project being bid. Hazards inherent in building a bridge, water treatment plant, industrial facility or a commercial multistory building are significantly different. Similarly, work in occupied facilities, renovation and demolition projects differ greatly from ground-up construction. Team members must be knowledgeable enough to properly plan for and handle any hazards that may be present.

#### **Subcontractor Selection**

Subcontractors selected for a project are part of the project team and should be treated accordingly. The general or prime contractor should be wary of selecting subcontractors based on price alone. If a subcontractor works unsafely or has a cavalier attitude toward safety, the entire project may suffer because of hazards created and resources lost due to incidents or related problems. Other subcontractors may not have experience in the type of project they are bidding and, as a result, may be unaware of related hazards or special requirements.

Some form of subcontractor selection should occur before requests for bids are issued. Some companies use their own past experiences with a subcontractor to determine whether to accept its bid on certain projects. Others require prospective subcontractors to complete a prequalification form and provide information on issues such as OSHA citations or injury rates over a period of time, as well as their experience modification rate.

Occasionally, a client will dictate certain prequalification requirements that must be met before subcontractors can work on their properties. ILO-OSH 2001 Section 3.10.5 outlines several guidelines related to contracting activities and ensuring that selected contractors and subcontractors maintain a level of safety at least equal to that of the controlling entity. Additionally, AIHA/ANSI Z10-2005 Section 5.1.4 recommends that processes be established to identify, evaluate and control potential hazards relating to the use of contractors including the use of safety and health performance data.

Prequalification requirements must be clearly communicated prior to the bid. Additionally, safety

expectations and requirements should be communicated to the subcontractor during the bid phase. For example, following a 100% fall protection requirement may cost the subcontractor more in materials and equipment costs, and the bid should reflect those costs. Some subcontractors may not have insurance coverage that matches what is required by their contracts or may not be willing to agree to the hold-harmless agreements included in a contract. A copy of the contract(s) used for a particular project should be included in the bid proposal in order to expedite the award and contracting process later.

#### **Prebid Meetings**

Valuable information regarding safety can be gleaned during prebid meetings. These meetings are an opportunity to meet with the client and to walk the site to identify conditions that could translate into safety hazards. Some of these conditions—such as nearby power lines, difficult site access or the presence of a school or playground nearby—may not be evident on project drawings.

During a prebid meeting, information such as the location and distance of emergency services as well as the client's existing emergency plans (if any) can be gathered. Some client facility layouts and work or maintenance activities may pose hazards that have not been assessed, such as the storage or use of hazardous chemicals on site and the presence of confined spaces. Additionally, the contractor can get an idea of the client's safety expectations and how those expectations are prioritized.

#### **Client Requirements**

Many clients have particular safety concerns and requirements, some of which exceed OSHA requirements (e.g., 100% fall protection at 6 ft, full-time safety staffing, rules concerning dust, noise, vibration and hot work, and special training or certification requirements). Occasionally, safety staffing requirements are identified in the quality control section of the specifications. For example, a client may require that a CSP or CIH be present during certain activities or be retained for the project's duration to conduct periodic inspections as a part of the project's quality assurance/control plan. In other cases, clients may require that a third-party inspector be retained for certain activities, such as abatement.

These requirements can affect the budget if not addressed when estimating the project. For example, suppose project specifications require the presence of a full-time CSP to supervise project safety. According to Brauer (2008), the average salary for a CSP is approximately \$99,244 per year. On a 12-month project with a \$5 million contract, that salary would be more than 2% of the contract amount when taking burden costs into account.

#### **Hazard Analysis**

A preliminary hazard analysis can be conducted after attending the prebid meeting, visiting the site to identify existing conditions and determine client needs and expectations, and reviewing project spec-

ifications and plans. This analysis can help the estimating team identify needs such as guardrail systems or other fall protection systems, stair towers for access, and special fire protection or emergency rescue considerations. Some contractors require sub-tier contractors to submit a hazard analysis with their bid. This then becomes part of the subcontractor selection process and is used as a means to fully evaluate the scopes of subcontractors' bids. In developing the overall project hazard analysis, it is useful to review similar projects and consider safety issues or incidents that occurred to make sure those items are addressed before procurement.

### **Line Item Safety (Bidding & Budgeting)**

Some companies simply assign a dollar value for safety in the bid based on a percentage of the total dollar value of a project or on a dollars-per-square-foot basis. While this approach assigns a value to safety in the bid, that value may be too small on some projects, possibly resulting in a budget gap, and too large on others, possibly resulting in the loss of a job in a low-bid situation. Some projects may require a larger safety expense because of special concerns such as public protection, ventilation, air monitoring and engineered fall protection systems.

Anticipated safety expenses should be broken into individual components such as staffing, safety equipment and fall protection installation. If these expenses are lumped together in a bid, the costs may get buried in contingency or overhead line items, which often are the first to be cut when trimming the bid. If line items are included in the bid, they are less likely to be eliminated when the estimating team attempts to cut costs in a low-bid situation. In a negotiated bid situation, the line-item costs can demonstrate to the client that the contractor has evaluated a project's safety needs, which may be seen as a value-added component and become an effective selling point.

On large projects, the estimating team must consider who is responsible for certain controls. For example, if guardrails are needed, who will build and maintain them? Who is responsible for traffic control? Who will clean mud off the streets? Often, contractors assume that someone else has included these costs in their bids, only to learn later that no one budgeted for them. Assigning responsibility for such activities early in the bidding process not only ensures that the cost is covered, it also prevents redundancies.

In any case, one must scrutinize the language of the scope of the subcontractor's bid. Is the subcontractor bidding an entire scope of work or did it overlook something? Did the subcontractor exclude a major safety-related item such as fall protection, additional client-required training, time for safety meetings or air monitoring? In some cases, the lowest bids are those that exclude some significant portion of the work.

After winning the job, while buying out the job and setting up a budget, it is important to assign safety costs as one or more line items. Some projects may call for multiple safety line items—for example, one for PPE, another for air quality control, another for special training. As noted, by identifying these

various costs as line items they are less likely to be cut indiscriminately.

In the author's experience, some upper management executives have been known to say "there is no budget for safety." To these executives, this means they put no limits on funding for needed safety items. In other words, if guardrails are needed, then guardrails are installed, regardless of the budget.

Unfortunately, the project team may see it another way. Often, they interpret "no budget for safety" to mean no money is available to spend on safety items, so they go without rather than break the budget. To avoid these misunderstandings, budgets should be agreed upon by all parties and the policy regarding safety spending should be clearly communicated at all levels.

### **Premobilization**

Once a project is awarded, many things must occur before work commences. Contracts must be negotiated, a project-specific safety plan, schedule and site and facilities plans must be developed, and a preconstruction meeting must be held. On many projects, training must also be scheduled in order to prepare for certain tasks. Safety has an important place in each of these preconstruction activities.

### **Contract Language**

Safety expectations and requirements must be communicated in the contract language. Many companies include specific safety requirements in the scope of work as well as in the body of the contract itself. Some companies limit the language to include only federal, state and local requirements, a practice that can leave much room for interpretation. Or, a company may have safety requirements that are stricter than the OSHA regulations. If this is the case, those requirements should be included in subcontract language in order to ensure that all workers have the same protection and are following the same rules. This is particularly important where multiple trades are involved, as one trade may create a hazard (and potentially a violation) for another.

Contracts must be written for any work on a project that involves labor since most basic purchase orders do not provide the contractor with the same protection as a full contract. Insurance requirements must also be appropriate to the work location and the work being performed, and must be clearly communicated in the contract language. Insurance requirements for a project may include general liability, umbrella policies, workers' compensation, builder's risk and professional liability. Contract language should also include references to indemnification as permitted by the state where the work is conducted. An attorney should review the contract to ensure that the stated requirements are legally enforceable. A signed contract and certificates of insurance should be required and obtained before work commences.

### **Project-Specific Safety Plans**

Every project should have a project-specific safety plan (PSSP). This plan is also called a job-specific



*Evaluating a project's safety needs may be seen by clients as a value-added component and become an effective selling point.*

safety plan, site-specific safety plan or a construction accident prevention plan. The PSSP differs from the corporate safety plan in that it includes all local requirements, client requirements and items identified in the preliminary job hazard analysis (JHA).

The PSSP should only address site issues, so items in the corporate safety plan that are not applicable to that project are not included. For example, a company may have a blasting plan as a component of its corporate safety plan that would be left out of the PSSP if no blasting will occur.

A key component of a PSSP is the site's emergency action plan, as required by 29 CFR 1926.50 and covered in OHSAS 18001:1999 (Clause 4.4.7), AIHA/ANSI Z10-2005 (Section 5.1.5) and ILO-OSH 2001 (Section 3.10.3). Many clients require a PSSP—and it is often one of the first documents prepared and delivered to the client. The PSSP should be sent to each subcontractor with a copy of the contract, which in turn should reference the PSSP. This plan is a good place to incorporate all safety-related forms and checklists that are expected to be in use on the project as well.

Additionally, a PSSP should include project-related requirements and specific expectations on topics such as attendance at regular safety meetings, coordination meetings, training requirements, inspection and accident investigation procedures, documentation of safety activities, enforcement procedures and competent person requirements. During the preconstruction meeting, the PSSP should be discussed with and distributed to subcontractor site personnel. Copies of the plan must be kept at the jobsite for reference and review.

An important element to consider when developing a PSSP is enforcement. If the contractor does not plan to enforce a particular rule or policy, such as 100% eye protection or daily safety meetings, then it does not belong in the plan.

### **Scheduling**

The project scheduler should ensure that safety-related activities are appropriately accounted for in the project schedule. Activities such as installation of fall protection systems, design of protective systems for excavation and construction of protective enclosures can take a significant amount of time.

Additionally, some activities should not be conducted while other contractors or members of the public are in the vicinity. For example, painting may introduce hazardous vapors into the work area. Especially noisy operations may need to be isolated from other activities. Activities that can impact public right-of ways usually require extra time to set up, may require a permit and often are restrictive concerning times of day or dates when the work is allowed to be performed.

In addition, work activities and materials delivery should be scheduled thoughtfully. For example, drywall delivered too far in advance of installation or drywall installed before the building is significantly enclosed can be exposed to moisture, which may present mold problems in the future.

### **Site Planning**

Site plans should be reviewed for emergency egress needs, traffic flow, materials handling and crane setup locations. This process will continue throughout the project as the site changes. Storage locations should be identified early on to minimize double-handling, damage to materials due to moisture or weather, and impact on the project's emergency egress routes. Sites located adjacent to highways or runways can present different problems. For example, if tarps or caution tape are not properly secured, a strong gust of wind could result in an injury to the public.

### **Preconstruction Meetings**

The preconstruction meeting is when the contractor sets the tone for the project and communicates safety performance expectations. During this meeting, the safety charter, if used, will also likely be addressed. Copies of the contract, specifications, plans and PSSP should be available during this meeting should any attendees be unfamiliar with these documents. Often, the person who signs the contract is not the one performing the work, and details concerning safety and contract requirements are not always well communicated with on-site personnel.

During this meeting, any remaining questions and concerns should be discussed. For example, perhaps a subcontractor has identified a potential safety issue that was not noted during the bid. Key project stakeholders can now discuss and address the issue before it becomes a major concern in the field where it could cause delays and add costs.

### **Education & Training**

Before the project begins, some members of the project team may need additional education or training on hazards inherent to a project. Areas such as confined spaces, lockout/tagout, HazMat, air quality issues and fall protection needs often require project-specific training before work begins.

One approach is to conduct a site-specific safety orientation with each employee of each contractor before work begins. A well-developed orientation can help new contractors and employees adjust more quickly to working conditions on the site and give them an opportunity to ask questions prior to work. ANSI/AIHA Z10-2005 Section 5.2 provides some guidelines related to training employees on hazard identification and PPE. In addition, OSHA requires certain types of training before employees are exposed to hazards; these include HazCom, fall protection, scaffolding use, ladder use, confined space entry, steel erection and forklift operation.

### **Project Planning Activities**

Once the project is mobilized and work begins, safety must remain in the forefront. Before a particular work activity starts, an activity hazard analysis should be conducted by the contractor that will be performing the work. Regular coordination and progress meetings are a good place to disseminate information concerning new hazards or changes to

site plans. Additionally, daily hazard analyses are used by each crew to ensure that the workers are aware of the hazards they may face on that particular day and how to avoid them.

### **Job & Activity Hazard Analyses**

Each contractor on site should conduct its own JHA addressing its work on the project. Some activities, such as steel erection, critical lifts, control of hazardous energy and confined space entry, require a detailed JHA in order to mitigate inherent hazards before work begins. OSHA requires plans and hazard analyses for many work activities before they are performed, including confined space entry, lockout/tagout and certain steel erection procedures. Similar hazard analyses are required under OHSAS 18001:1999 Clause 4.3.1.

Completing a JHA for review by the general contractor before work activity can be a challenge for contractors that are not familiar with the process or that do not know how to construct useful analyses. As a result, safety personnel for the prime/general contractor may be asked to create a JHA for the subcontractor. While this practice may fulfill job requirements, it is not as effective in controlling hazards because there is less buy-in by the subcontractor and it may involve direction of means and methods.

One contractor addresses this problem by creating boilerplate JHAs that include a blank column where corrective action items are identified. This contractor meets with the subcontractor to tailor the boilerplate document to the specific work activity, and the subcontractor then fills in the corrective action column to identify how it will avoid particular hazards. If an incident occurs during the course of work, the JHA should be reviewed as a part of the incident investigation. This review will identify any flaws in the hazard analysis that should then be revised to prevent recurrence.

### **Coordination & Progress Meetings**

Coordination and progress meetings allow all parties to work together to plan and coordinate future activities. Safety is often the first topic of discussion in these meetings. The safety discussion should be applicable to current and future activities, and all affected contractors should provide input regarding their needs. Changes to the emergency plan and site access plan should be discussed in these meetings as the project progresses. Hazards that one contractor may create must be communicated to other affected contractors in order to minimize exposure to all affected employees.

### **Daily Activity Hazard Analyses**

Most work crews start the day with a huddle. During this short meeting, the supervisor reviews the day's activities, telling the crew where they will be working, what needs to be accomplished that day, what tools they need and what hazards may be present. This meeting can be boiled down to a short, written, activity hazard analysis that can be reviewed with and signed by workers. If conducted

effectively, a daily hazard analysis may eventually take the place of a toolbox talk.

Reviewing the plan each day keeps safety fresh in the workers' minds. It also allows changing work conditions to be addressed and clearly communicated. The information delivered is applicable to the work employees are performing and reinforces expectations. One tool that can be used is a pocket-sized card which summarizes these reviews and is carried by each worker throughout the day.

If the plan for the day changes—for example, if a crane breaks down midmorning and the crew will be assigned to a different activity—then another huddle meeting should be held before the alternate tasks are performed. In addition, each worker should be empowered to stop work and call a huddle if s/he identifies a hazard not previously addressed or if s/he feels that the initial plan is failing.

### **Conclusion**

Planning is critical to construction safety. Goal setting at the corporate level involves understanding the company's strategic plan and developing safety goals which correspond with that plan. Goal setting should also be used at the project level to identify project-specific safety objectives.

Safety review and involvement during bidding and procurement helps to ensure that safety activities are incorporated into project plans and budgets. The SH&E professional can provide valuable input by ensuring that the employees involved in these processes are trained on and aware of safety issues affecting the project. In addition, safety-related information can be gleaned from prebid meetings, contract specifications and clients themselves, and this information can be used to create a project hazard analysis.

Once the project is mobilized and work begins, safety becomes a daily issue. Activity hazard analyses can be performed by contractors before their work activities begin. Hazard information and plan changes should be communicated during regular coordination and progress meetings. In addition, daily hazard analyses are used by each crew to ensure that workers are aware of hazards and associated preventive measures. ■

### **References**

- ANSI/AIHA. (2005). Occupational health and safety management systems (Z10.2005). Fairfax, VA: Authors.
- Brauer, R. (2008). Career success: lessons learned from a new CSP salary and demographic survey. *Proceedings of 2008 ASSE Professional Development Conference*, Las Vegas, NV, USA.
- British Standards Institution (BSI). (1999). Occupational health and safety management systems: Specifications (OHSAS 18001:1999). London: Author.
- Furst, P.G. (2006). Managing risk through preoperational planning. Dallas, TX: International Risk Management Institute. Retrieved Oct. 21, 2008, from <http://www.irmi.com/Expert/Articles/2006/Furst09.aspx>.
- International Labor Organization (ILO). (2001). Guidelines on occupational safety and health management systems (ILO-OSH 2001). Geneva, Switzerland: Author.
- Nash, J.L. (2005, May). For contractors, safety means planning. *Occupational Hazards*, 67(5), 29-32.
- OSHA. Construction industry regulations (29 CFR 1926). Washington, DC: U.S. Department of Labor, Author.