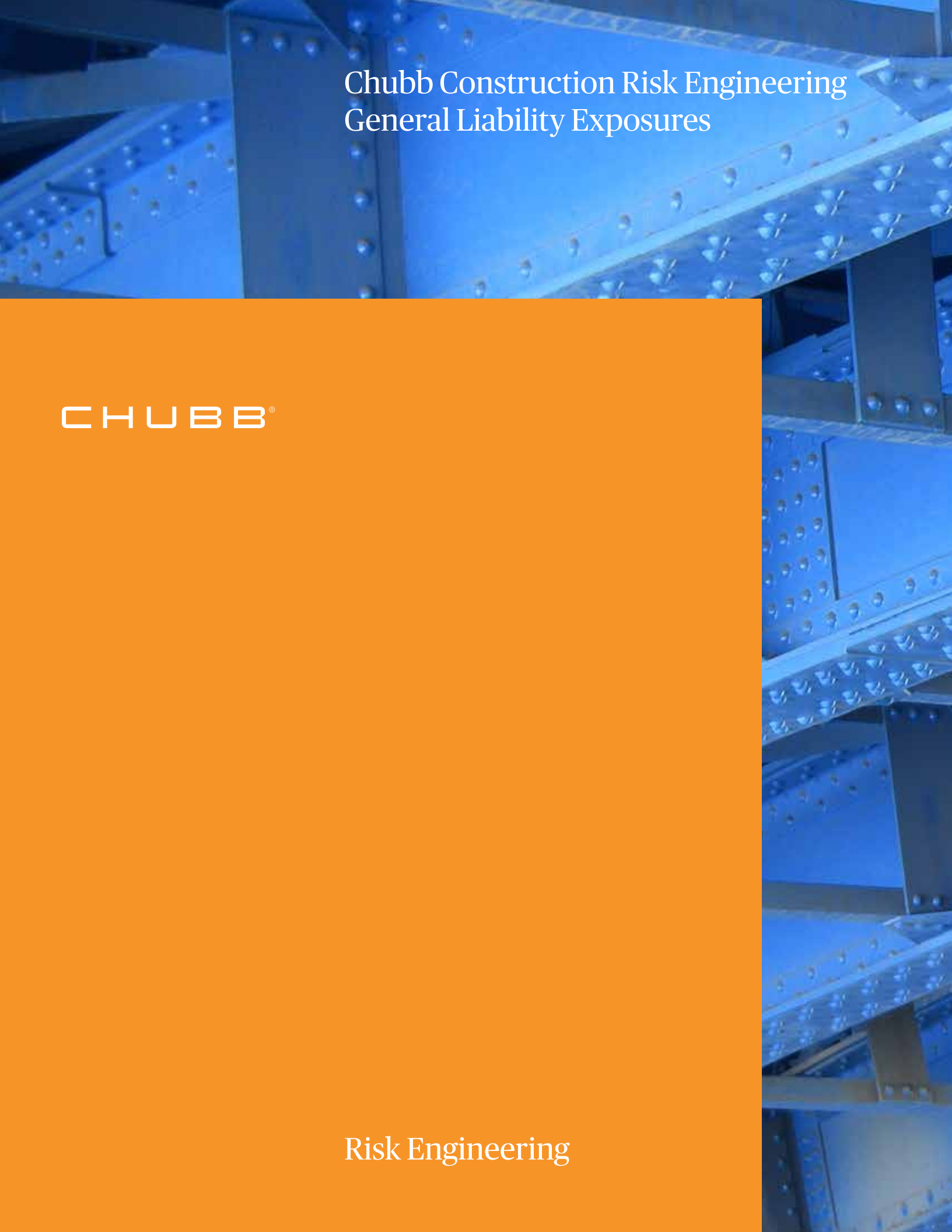

Chubb Construction Risk Engineering
General Liability Exposures

CHUBB®

Risk Engineering

General Liability Exposures

Overview

What is General Liability (GL) and a GL Policy?

A Commercial General Liability (CGL) Policy is a standard insurance policy issued to business organizations to protect them against liability claims for bodily injury (BI) and property damage (PD) arising out of premises, operations, products, and completed operations; and advertising and personal injury (PI) liability.[1]

In general, Workers Compensation exposures and OSHA safety standards are typically focused on by most construction workers. This is due in part as these are the most common issues and exposures workers face daily as they directly involve the actual tasks being performing such as; falls from height, eye injuries, cuts and abrasions, shoulder and back strains and sprains, etc.

As a result, General Liability (GL) exposures can be overlooked or given less attention by field staff and supervisors if they are not properly educated about these types of exposures, how they can affect the project and the company's bottom line and how they can control them. GL exposures come in many forms and can result in liability law suits and/or claims stemming from but certainly not limited too; damage to property, injuries to the general public, interruption of a place of business, injuries to subcontractor employees, and vendors or other visitors to a project.

In this Exposure Guide, the information will provide an understanding of many of the more common GL exposures that a contractor must deal with today, along with industry best practices to control them.

Know Where You Work

Just like in the construction process, you have controlled inspections based on design specifications which incorporate national and local building codes, knowing where you are building your project (Jurisdiction) and the legal climate of that location can play a significant role in how a GL claim and/or law suit can affect you.

In some states such as New York, where the Labor Laws are strict, GL claims are common and can become extremely costly. In this type of legal environment, the cost of doing business is much higher due to large GL loss settlements or judgments, increased costs of insurance and costs for the necessary additional resources within an organization and on a project to control these GL exposures.

A contractor or owner must know the GL environment in which they work in order to best understand the pro-active steps and resources that are needed to possibly prevent or minimize a GL loss.

Public Protection

In and around most construction project sites and in the day to day activities of a contractor's business, the general public is a direct exposure to your operations. Whether on busy city streets, sidewalks surrounding a job site, patients and staff in a hospital, students and faculty at a school or shoppers at a retail outlet, the general public must be protected from injury as a result of the construction operations.

Falling Objects - There are a number of construction operations and / or conditions that can create potential falling objects that, if planned for and monitored, can be controlled. Falling objects can range from bolts, small tools, and construction debris to large objects such as plywood, metal pan decking, lumber, panes of window glass, structural steel, rebar or other building materials. A falling object can become a deadly projectile if it strikes a person below or can cause serious damage to property.

During the course of construction, there are a number of actions that should be considered in your efforts to limit falling object potential; these include but are not limited too; pre-planning operations, monitoring weather conditions, utilizing only qualified riggers and signalmen, inspecting and use of appropriate rigging and rigging techniques, inspection and maintenance of hoisting equipment and inspection and monitoring of perimeter protection.

Perimeter Protection - Depending on the location of the work and state of the project, there are different methods that can be used to create physical barriers along the perimeter of a structure to capture and control loose materials, tools and debris such as vertical and horizontal netting, toe boards, scaffolding and building enclosures such as a cocoon system.

Perimeter protection can be installed along with the guardrails and depending on state or local requirements, the protection type, such as netting, may be required to be installed up to a specific height and/or be made of a specific strength material.

- Toe boards are the most common and probably well-known type of falling object protection. A toe board is installed at the floor level and spans between the guardrail stanchions as a means to prevent smaller items from falling from the structure. If materials are taller than or stacked above the toe board height, the toe boards must be evaluated and raised accordingly to capture/hold back the potential falling objects.

- Vertical netting is used to create a fuller physical barrier at the edge preventing objects from being able to roll or be blown off of the structure. The netting typically seen as orange material, spans the full height and width of the guardrail system (unless otherwise required by state or local authorities) and provides a much more encompassing protection screen.
- Horizontal netting is a system that extends out and away from the structure and is supported by an anchoring system to the structure, steel pipe supports, and a rope perimeter. These systems are used to catch materials, tools or other debris that does manage to become lose and fall from the structure.
- Then there are scaffolding and cocoon systems that enclose the perimeter of the structure as a means for fall protection as well as falling object protection. There are scaffolding and concrete form companies who have designed cocoon type systems.

- **Material Storage** – Coordinating material deliveries can aid in limiting the amount of construction materials and debris on a floor. This will help to control where it is placed and how much needs to be broken open for use. When a floor becomes congested due to large amounts of stored materials, it can tend to creep closer the structures edge. Materials should be kept a safe distance back from the edge so as not to create the potential to fall or be blown off of the floor. In addition, limiting storage amounts on a floor will aid in housekeeping, trip and fall and fire hazards, as there will not be as much loose items and packaging material (plastic wraps, Styrofoam, metal straps etc.) which can be blown off the floor as well provide clear pathways for the workers to evacuate if there is an emergency.

- **Tethering of Tools** – Dropping tools from a bag, bucket, pocket or tool belt can be a serious concern as tasks bring workers in close proximity and up to the edge of a structure, mechanical or elevator shafts, stairwells, and other openings. Uncontrolled tools can fall and strike a worker or pedestrian below. Tethering of the tools to secure locations whether it is to a belt, a piece of equipment, or the structure; for example bolt buckets, can prevent the potential for these to fall to working levels or the ground below.

- **Monitoring weather conditions** – Until a building is enclosed or if working on a roof or other structure exposed to weather such as scaffolding, concrete forms, or when crane and steel erection operations are taking place, there is the potential for wind conditions that can adversely disrupt construction operations and lead to personal injury and property damage. If unprepared, wind conditions can cause materials, tools, PPE, etc., to be blown around, cranes can be structurally damaged or collapse/topple, suspended loads can be lost or become uncontrollable, scaffolding can collapse, or a structure damaged. Any of the above can lead to serious injuries to workers and the public, and/or to damage to equipment and property.

Weather/wind conditions should be routinely monitored throughout the day and weather forecasts reviewed so appropriate measure can be planned for. When there is the potential for adverse wind conditions, the following examples should be considered:

- Crane operations (see crane section) may need to be suspended
- Relocate and /or secure lose materials
- Shore up structures where needed to prevent collapse
- Halt working in affected areas to protect workers and the public
- Scaffolding falling object protection (netting) should be designed so as not to create a sail affect which can cause the scaffold to be severely damaged or collapse

The project should be prepared to address any potential wind and weather conditions that are typical for its geographical area.

• Sidewalks and overhead protection – Depending on the project location and ability to close or relocate pedestrian traffic, there may be the need for additional overhead protection such as a sidewalk shed. These may be needed for situations where for example, a project is unable to detour a sidewalk, the project is a renovation where patrons of the building must still be allowed to enter and exit without disruption, or if required by state or local authorities.

These temporary structures are generally constructed using a designed system of scaffold components, metal or wood joists, and roofing materials. They are designed to protect those who must pass by the structure from falling objects through a structural canopy system. These sidewalk sheds can extend the full length of a block, surround an entire building, or be erected at a specific location such as at an entryway. Sidewalk sheds sit on a foundation made of baseplates and sills as well as tie backs and can also have temporary lighting for nighttime or low light conditions. These sheds in many cases such as in the City of NY, are subject to permits and inspection by the Department of Buildings.

Once constructed, the sidewalk shed and walkway must be monitored daily and as needed and maintained so those passing through it are not subjected to

slip, trip and fall as well as other potential hazards from for example the temporary lighting or protruding scaffolding/shed components. Hazards can be the result of but not limited to:

- Weather conditions (snow and ice, water accumulation)
- Debris and trash accumulation
- Faulty or damaged lighting causing difficulty to see in low light conditions
- Vandalism/damage
- Uneven transitions when entering/ exiting the walkway
- Baseplates and the shed frame sections protruding into the walkways

If necessary to construct ramps and a transition within the shed walkway, these should be designed and constructed under the supervision of a qualified person to ensure they will perform as needed without failure. Additional warning signs, markings and slip resistant coatings or tape may also be needed.

Project Security and Protection

Site security and Trespass - construction projects can be an attraction to children who find the equipment and project interesting, as well as for criminals who are looking to steal tools, equipment and materials or to vandalize and those who may inadvertently wonder onto a project site. In either case, it is important that means and methods are implemented to prevent these unauthorized parties access to the project site and protect them and others from their actions.

Children have been known to play in equipment causing injury to themselves and /or damage to the project or other property. Children have also been known to use a project site to play games such as hide and seek and climb in and around underground drainage pipe, culverts and excavations. Criminal activities such as theft or vandalism also occur and can result in fire, loss of materials, tools and equipment as well as damage to the structure, equipment or adjacent properties.

All construction projects should be evaluated to determine the potential for unauthorized access and as a result of the findings, plan for and implement security measures to control it. A number of factors can determine the level of security needed for a project to include but not limited too;

- Proximity to schools, residential communities
- Local poverty levels
- Local crime information

A construction site needs to be protected and secured to prevent trespass, especially by children.

Some precautions that can be taken are:

- Installing perimeter fencing around accessible work areas with lockable gates.
- Locking out and making otherwise immobile, all construction vehicles and equipment at the end of the day.
- Placing warning and no trespassing signs at regular intervals around the project site.
- Marking, fencing, covering or otherwise protecting open excavations or other at or below grade structures that persons can slip, trip or fall into or access.
- Providing security lighting and cameras.
- Notifying local authorities of construction work schedules to enable off-hours monitoring.
- Hiring security personnel to monitor during off-hours.

Work Zones

Work zones are a part of many construction projects, both large and small and can vary in size such as locations where vehicles and equipment enter and exit a project to large scale roadway reconstruction projects that can be several miles long. Regardless of the size, there are exposures to the general public as well as the workers that you need to be aware of and take the necessary steps to control.

If you are the contractor responsible for the work zone and an accident occurs, you are likely assumed responsible until proven otherwise. Legal counsel for the injured parties will look to the contractor to pay for all or part of the costs related to the accident. If found that the Temporary Traffic Control (TCC) in place was inadequate or inappropriate for the conditions, you may be found liable.

Objective of work zone safety control - Provide a safe and pro-active environment for the traveling public and construction workers. Minimize inconvenience and impact on the traveling public and the neighborhoods where the work is being performed. Facilitate a timely and unimpeded completion of a quality construction project.[2]

Always plan ahead for the worst scenario and never take work zone safety for granted.

[2]Applicable standards - The most widely recognized standard is the Manual on Uniform Traffic Control Devices (MUTCD), Part VI. This document sets national standards for temporary traffic control in work zones and for all Traffic Control Devices (TCDs) installed on any street, highway or bicycle trail open to public travel. It describes the application of traffic control devices but the ultimate

decision as to whether or not to use a device at a particular location should be made on the basis of either a documented engineering study or the application of engineering judgment.[2]

Be aware that state and local authorities may have their own standards regarding temporary traffic control. These requirements can be more stringent and detailed than the MUTCD, but the MUTCD will be the minimum standard for them. It is critical that in addition to following the MUTCD when creating your traffic control plans and setting up and maintaining your work zones, that you also find out what additional measures you must take to ensure compliance with the local and state authorities.

In addition to the MUTCD, the Occupational Safety and Health Administration (OSHA) Construction standard, 29 CFR 1926.200 Subpart G, has four sections that pertain to work zone safety: The subpart is called Signs, Signals, and Barricades and sections 1926.200, 201 and .202 "incorporate by reference" the MUTCD.

"Incorporate by reference" means, where standards, practices or references are already established and considered the safest, most practical means, OSHA will "incorporate by reference" within the federal standards so employers are required to follow them and if found in violation, can be cited.

Highway construction projects can have numerous types of subcontractors performing operations from site work and clearing, underground utilities, signage and lighting to maintenance and protection of traffic (M&PT). Subcontracting the M&PT is a common occurrence in highway construction today. There are many companies which specialize in this type of work, however, even if this aspect of the operation is subcontracted to another party, overall responsibility for work zone safety cannot be delegated.

Evaluating a potential subcontractor's safety performance and history is a critical component that needs to be part of the risk management process. The work is not done once the subcontractor has been selected, but rather, it has only just begun. There are many proactive steps that can be taken to ensure that the subcontractors you hire meet and live up to your expectations and criteria. At a minimum, a good subcontractor management program should be established which contains policies and procedures for prequalification, accountability, preplanning, routine and regular inspections of the work areas, effective contractual risk transfer language and a review of the subcontractor's safety program. (See Subcontractor Management Section Below.)

Working within a work zone is very hazardous and simple mistakes or a lack of preplanning can lead to serious loss. Always ensure your work zone is properly designed and installed according to either a documented engineering study or the application of engineering judgment and based in part on the specific characteristics of the area, work zone operations, seasonal weather and local and state requirements.

Do everything in your power to ensure that the general public as well as the workers, who enter your work zone, exit safely!

Sidewalks and other pedestrian crossings – Your work zone exposures may be limited to the sidewalks surrounding the project property and/or the entry ways if the project involves an occupied structure such as a school, hotel, hospital, shopping center, etc. But even in these limited cases, you must take appropriate steps to protect those walking past the site. As noted in the Falling Object section of this guide, overhead protection may be necessary through the construction of a sidewalk shed but other alternatives to remove the pedestrians from the exposure altogether may be the best approach.

Rather than providing overhead protection which still allows the pedestrians to walk in close proximity of the project, the sidewalk could be closed and pedestrians re-routed across the street or through a channelizing section of barricades to take them away from the project. These sidewalk detours must be preplanned and in many cases a permit and approval is required by the municipality. If a sidewalk detour is permitted, the route should be clearly marked and appropriate signage in place guiding the general public though the detour. If not, the persons you are trying to re-route may become confused and walk into the roadways and active traffic, or may walk around the detour and near the project. In all of these cases, there is the potential for them to be injured.

A sidewalk detour should be monitored for its effectiveness, any slip, trip and fall hazards and barricades or other channelizing devised are clean and maintained. Ice, snow or other debris as well as the walking surface should be maintained at all times.

Use of Flaggers – Depending on the operation/task and location, you may need the use of trained flaggers to assist you in your effort to safely guide the general public or construction traffic in and around your project. Flaggers can be a critical aspect to your project safety efforts to control GL exposures as they can effectively keep those not associated

with the project and construction persons and equipment from coming into contact with each other.

Flaggers can be used in a number of situations and not only limited to highway work zones. Flaggers should be considered anytime there is the need to make the general public aware of construction activities and to communicate and direct both the walking, running as well as driving public. Flaggers are responsible for public safety and for highway work and make the greatest number of contacts with the public. All flaggers if utilized should be properly trained in safe traffic control practices and public contact techniques. You should always avoid simply grabbing a worker, giving him or her a reflective vest and flag, and send them out into the street to direct traffic. Not only do you run the risk of the untrained flagger improperly directing the traffic and potentially causing serious accidents, but you also run the risk of this flagger becoming injured.

Many state and local agencies have flagger training requirements where specific flagger training course content must be taught, there may be minimum in-class and practical application time, and the training is provided by an approved training organization. For example; your state's Dept. of Transportation may require your flaggers be trained through either the American Traffic Safety Services Association (ATSSA) or the National Safety Council (NSC) flagger training Courses.

Cranes and Rigging

Cranes often are the most valuable single piece of equipment on a construction project. It is critical that, if a crane is operating on your job site, you are aware of its fundamental operation, so that it can and will be used properly and safely. It also is critical that qualified professionals be part of the process and that proper training and certification be required.

Experience demonstrates that without review, design, engineering, and pre-planning of the hoisting operations, together with a qualified crane operator and thorough inspection processes, cranes can be improperly utilized and operated over the course of a job, a year or lifetime. Ultimately the improper utilization and operation of the equipment is not always immediately visible to the operator or even qualified mechanics unless, among other things, routine and thorough inspections occur.

With any piece of equipment or machinery, there is the potential for personal injury or property damage due in part to improper maintenance or misuse. This is even more relevant when referring to cranes, due to their size, handling capacity and potential for catastrophic loss. Those who are tasked with operating the cranes, rigging the loads and crane oversight must understand the correct way in which these pieces of equipment should be operated and maintained.

Another aspect of crane operations is whether or not the crane operations are subcontracted out in lieu of the contractor performing the work itself? If so, the General Contractor (GC) or any other tier contractor who does so needs to ensure the hired contractor is performing those crane operations properly and safely. Accidents that occur resulting from subcontractor's activity can result in potential third party claims against the hiring and/or General Contractor. In states such as New York, the labor law states that the GC has a duty to supply a safe work place that cannot be delegated. In this case, a subcontractor's employee injured on the job site may not be able to sue his/her employer since they are covered by workers compensation, but they do have the ability to sue the GC. This should be reviewed with your insurance broker and legal counsel.

Accidents resulting from the actions of a subcontractor whether related to site workers or the general public can become general liability claims, which can be costly and result in an economic hardship for the GC. It is important that the hiring contractor take the necessary steps to properly protect itself against this exposure.

Proactive crane management elements include but are not limited to:

- Crane operators are required to be licensed, certified for the specific crane they are assigned to operate and documentation is on hand
- Employees engaged in rigging and/or hoisting operations are qualified and trained in proper rigging techniques and documentation is on-hand
- At a minimum, all structural elements including welds are inspected on a continuous, on-going basis for strength, quality and completeness
- For each crane used, the weights of every load, including ancillary loads, are determined to ensure hoisted loads are within safe working capacities based on the specific crane's load charts
- A logistics plan is created that includes; type and size of crane, location, erection areas, transport routes in and out of the project, material lay down areas and determine any obstructions around crane(s) picking axis
- P.E. drawings and calculations have been submitted / approved addressing tower crane or other engineered base foundations

- At the completion of the cranes erection, the services of an independent third party crane engineering/inspection firm is used to perform a thorough inspection of the crane to ensure all work and components comply with requirements set forth in mfr.'s specs and /or approved engineering drawings
- All cranes are being inspected by competent and qualified personnel knowledgeable in the field of the type of crane and documentation is available at the site

For additional information, ACE Construction Risk Engineering has Crane Resource Guide, Critical Lift Guide and Form and Mobile and Tower "Installation and Verification" forms that be obtained by your Risk Engineer to assist you in your efforts in managing your crane exposures.

Air Quality

Depending on the project scope or individual task being performed, there may be potential for noxious smells, dusts, fumes and other contaminants such as, silica, carbon monoxide, lead, asbestos, and mold to be generated. These are not only health concerns affecting the construction workers in and around the project, but if taking place in an occupied structure such as a hospital, school, office building, retail outlets etc., these contaminants can pose health concerns for the general public as well.

If your project involves working in an existing structure, it is important that an evaluation within the affected areas of the structure is completed to identify any health hazards/contaminants. If any are found such as the structure contains asbestos, lead based paint or mold (see water intrusion and mold section of this guide), the owner(s) of the structure should be notified immediately and appropriate steps taken to hire licensed abatement contractors to remove and dispose of the materials. Work should not be allowed where known contaminants are located until after they are properly abated or effectively encapsulated. All work in or around known or potential contaminants needs to be completed under the supervision of qualified persons which includes at a minimum but not limited to; implementation of administrative and engineering controls, workers are trained/certified to work in and around the known or potential contaminants and any and all required PPE is provided and utilized.

There are the contaminants which can be generated as a result of the construction process itself that must be managed such as; Carbon Monoxide (CO), silica, noxious smells, dust and fumes. Since these are known to be created during the construction process, the tasks involved can be evaluated, pre-planned and controls and processes implemented to address these concerns to protect workers and the public.

A number of tools are at the disposal of project management and safety to assist in the evaluation and control of potential air quality issues, such as, but not limited to:

- Use of qualified 3rd party environmental contractors to complete necessary evaluations, and any related air monitoring, and material sampling and analysis. Findings and recommendations should be incorporated into task planning and procedures and maintained in the project records.
- Use of air monitoring/sampling devices for dusts, and other contaminants. These can be available locally; can be purchased by the organization or rented and utilized by project personnel. Air monitoring or sampling completed by in-house staff, should be limited to staff who have been properly trained in the equipment to be used, as well as the proper technique and processes to complete the tasks. Always use a certified and accredited lab when sending samples to be evaluated.
- Use of the contractor or owner insurance carrier Risk Control as a resource for environmental evaluations, monitoring and consulting.
- Safety Data Sheets (SDS) contain the information to determine if a material/ product poses a health hazard and what personal protective equipment or other protection may be needed to keep workers safe when being used or applied.
- Adherence with Fed/state/local environmental safety and health rules, regulations and codes and Industry Best Practices. These can provide means and methods to isolate construction areas from the public / occupied areas of a structure as well as ways to control air borne contaminants. Examples include;
- Infection Control Risk Assessment (ICRA) barriers and processes to seal off (Healthcare) construction areas, and where required, create a Negative Pressure within the construction area to keep dust, fumes, smells and other contaminates from seeping into the structure
- Sealing off active Heating, Ventilation, Air Conditioning (HVAC) duct returns so existing ventilation systems do not transport air contaminants from the construction process throughout the structure
- Relocating ventilation intakes away from construction activities
- Utilizing adequate ventilation/air cleaning systems to capture and remove air contaminants
- Coordinating and locating operations away from occupied areas

- Using High Efficiency Particulate Air (HEPA) filter equipped vacuums and ventilation equipment. These filters are design to remove 99.97% of airborne particles measuring 0.3 micrometers or greater in diameter passing through it. Pre-filters can also be used in addition to the HEPA filters.

Water Intrusion and Mold Prevention

Water intrusion – is a condition where unwanted water or moisture enters a structure. If gone unnoticed or uncontrolled, it can lead to significant damage to building materials, the structure, carpeting, fixtures, electronic equipment, mold and other damage. These damages can lead to serious construction defect claims made by the building owners and/or tenants.

There are many reasons why water intrusion can occur such as:

- Faulty design of the building envelope allowing excessive moisture to enter.
- Poorly designed plumbing, mechanical, HVAC, drainage and roofing systems.
- Improper application of flashing, caulking, vapor barriers, water proofing, Exterior Insulation Finishing System (EIFS) /Stucco, or other building components.
- Leaking and sweating pipes, balconies, patios, windows, exterior siding, garages, and retaining walls, drain pans, or other areas where there are penetrations in the exterior of the structure.

Additionally, water intrusion may be more likely to occur in locations where the climate and geography lend itself to excessive moisture. The type of building materials used (wood frame versus masonry and steel) and the building materials used can also contribute to the likelihood of water intrusion. All of these items need to be considered when assessing the potential for water intrusion.

Indicators of Water Intrusion – Both during and after the construction process, it is important to know some key indicators that may lead to water intrusion problems. Knowing these may help to avoid prolonged exposure to excessive moisture, reducing the likelihood of damage to the building and property as well as the growth of mold.

Some indicators that a water intrusion problem may exist are:

- Visible formation of water or moisture on exposed surfaces (interior windows, desks, counters, carpets, etc.)
- Drippings from pipes, valves, equipment or other surfaces
- Discoloration or water lines on interior walls, ceiling tiles
- White lines and patches, chalky substance on basement/foundation walls
- Visible mold/fungus or mildew on interior surfaces
- Damp/musty orders
- Damp and humid environment even in conditioned spaces

What if Water Intrusion is found – The presence of mold, water damage, or musty odors should be addressed immediately. Regardless of the situation, the underlying cause of water accumulation must be rectified or property damage and fungal growth will recur. All sources of water intrusion must be eliminated, the extent of water damage determined and damaged materials should be dried and repaired.

Any initial water infiltration should be stopped and cleaned immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit property damage and mold growth.

Microbial Contamination (Mold)

What is Mold – Molds are microbial organisms that produce tiny spores in order to reproduce. The mold spores are released into the air and travel both indoors and outdoors. When mold spores come into contact with damp locations, they can begin to grow. Molds can be found almost anywhere. They can grow on virtually any substance, providing moisture is present. For food they will digest whatever it is they are growing on. There are many types of molds which can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, there is the potential for mold growth to occur. This even more so if the water intrusion/moisture problem is not discovered or remediated in a timely manner. Since mold spores float through the air and found both in and out of doors, it is impractical to eliminate all molds and mold spores in the environment. The most effective way to prevent mold growth is to control water intrusion/moisture.

Health Effects – Some people are sensitive to molds. In some people, molds can cause symptoms such as nasal stuffiness, eye irritation, wheezing, or skin irritation. Severe reactions may occur among workers exposed to large amounts of molds in occupational settings or to those who have severe allergies to molds. Severe reactions may include fever, shortness of breath and asthma. People with chronic lung illnesses, such as obstructive lung disease, may develop mold infections in their lungs.

If You Suspect Mold Is Present – If you suspect mold is present, an environmental assessment should be conducted. If extensive contamination exists, particularly in heating, ventilating, air conditioning (HVAC) systems or large occupied spaces, the assessment should be conducted by experienced health and safety professionals and remediated by personnel with training and experience handling environmentally contaminated materials.

Lesser areas of contamination can usually be assessed and remediated by building maintenance personnel. Specific methods of assessing and remediating fungal contamination should be based on the extent of visible contamination and underlying damage. The simplest and most expedient remediation that is reasonable, and properly and safely removes fungal contamination, should be used.

Excavation and Trenching

When an operation is undertaken and involves excavating soils, whether in a narrow trench or in a larger mass excavation for a building foundation, the removal of that soil creates a void. This void if not supported properly, weakens the walls of the adjacent soils allowing the potential for movement and collapse which can seriously injure workers in the excavation. This weakness now present, has the potential to allow buried utilities, adjacent sidewalks, roads, retaining walls, structures such as buildings, tunnels, and underground vaults, etc., to move and shift; potentially compromising their structure and stability.

Anytime an excavation is planned, regardless of size, the area in which the excavation will be located should be evaluated by Qualified Persons and if necessary, appropriate engineering studies and analysis completed to ensure all surface and underground encumbrances have been identified and the potential risks to each determined. Only then can appropriate planning and controls be put into place to protect the workers, public and affected property.

With every excavation there is the possibility for but not limited to: the need for dewatering, underpinning and shoring, relocation of underground utilities or surface encumbrances, mitigation/control of hazardous atmospheres, hazardous soil removal and removal of rock though blasting.

Underpinning systems – Construction excavation activities which occur in close proximity of an existing structure may create conditions that require an engineered support system to strengthen / shore up a fo0undation wall, adjacent roadways, utilities or other structures.

An evaluation by a qualified person (engineer) should be completed to determine whether or not a protective system is necessary as well as the type and design of the system for the specific location. This is no time for guess work.

Types of underpinning could include:

- Jet grouting
- Micro-piles
- Mass concrete
- Beam and Base (Needle Beam, cantilever beam)

Shoring systems – Shoring may be necessary for the protection of the excavation walls and depending on the location, these shoring systems may also support an adjacent structure. Excavations can be shored up using a variety of different systems that can be purchased or there is the option for timber shoring. The competent person should evaluate the excavation to determine the type of soil, site conditions, and other factors that could affect the integrity of the excavation and choose an appropriate shoring system. Systems to be used in excavations greater than 20 feet in depth must be designed by a registered professional engineer.

There are larger scale shoring systems that may be necessary depending on the size / depth of the excavation for example; a mass foundation excavation alongside a roadway may have a system designed which includes drilled reinforced concrete caissons, soldier piles and wood lagging. As the excavation depth progresses the piles are exposed and lagging is placed between the piles. This system may also require wales and tie back anchors for additional support. As with underpinning systems above, if the shoring is used to provide structural support for an existing facility or structure, it should be evaluated and design by a qualified person.

Underground Utility Strikes – Prior to excavating, it is necessary to determine what potential hazards and obstructions lie below the ground. Obstructions may be as simple as an old light pole foundation or can be as dangerous and explosive as buried natural gas or high voltage electrical lines. Underground utility strikes can be extremely dangerous and potentially deadly for the workers involved as well have potentially catastrophic consequences for businesses and persons affected by the result of the strike. Workers have been electrocuted, gas lines have been cut and exploded, fiber optic lines cut disabling computer and other essential systems and electrical lines cut resulting in a loss of power to businesses, homes, hospitals and other facilities. If you strike underground utilities, you can be subjected to the

liability losses resulting from the worker injuries or deaths, fire and explosion, damages to property, loss of business (business interruption), and injuries or loss of life to other parties due to loss of life safety or patient care systems.

A number of things can be done to identify what lies below and assist you in your efforts to carefully and safely excavate when there is doubt or uncertainty.

- First, contact your local "One Call" utility locating service to have them complete a mark-out of the excavation boundary. Do not expect the locating service to be able to locate all buried utility services; many must be marked out by the utility owner/provider themselves so it is important that you do your homework and understand all of the parties your need to contact in this effort.
- If on a property where an existing facility is located requests should be made to obtain construction plans and As-Built drawings showing the final placement of underground structures and utilities. With older facilities, several renovations and expansions may have occurred and these drawings could help identify utilities on the property.
- Once you have the mark-out completed and documented, you should always be prepared to excavate using alternative means and methods. There are alternative means and methods used to provide controlled excavating as well as additional safety when the exact location of or potential for unknown buried utilities is a concern. Alternative means and methods include:

  - Use of a vacuum truck
  - Hand digging with non-conductive tools
  - Use of Hydro excavating
  - Use of ground penetrating radar, and other scanning/imaging systems

Surcharging

When a project or operation is in close proximity to another structure, whether above or below ground, the additional weight / excessive load or burden, known as Surcharge, exerted on those structures can cause potential damage.

The extent of the potential damage can vary for example; small cracks in buried conduit to large scale cracking, crushing or movement to foundations, buried vaults, footings or other utility services. Surcharge can result from but not limited to: excavation spoil piles, placement of cranes or other heavy equipment, vehicle travel ways across a property, or storage of project materials in a lay down area.

Before work begins, a preconstruction survey should be completed, both above and below ground, of the site and adjacent properties (if affected). This survey is to identify existing and adjacent properties that should be evaluated further for potential exposures due to surcharge. Once the final evaluation is completed, the location for excavation spoils, laydown areas, placement of the cranes etc. can be planned so as not to cause any damage.

Vibration Damage

Vibration caused by construction operations can also become a serious concern if not evaluated and pre-planned. Depending on the subsurface geology of the site, vibration intensity is transferred through the ground and can cause damage to adjacent or underground structures and facilities. Factors that can affect the potential damage level and liability faced caused by vibration can include:

- Age and composition - how old the structure is will have a role in what materials were used to build the structure, as well as the existing condition and integrity of those materials
- There may be structures of historic designation and as such there may be specific protections you must employ to avoid potential damage, fines and other liability

Sensitivity of an adjacent structure's contents – A building may be home to an antique or fine glassware retailer and vibration, even minor, may cause objects to move, fall, or strike each other. If in a residential neighborhood, any vibration, regardless of severity, can become a nuisance for the home owners and in turn they can become angry and frustrated which may lead to additional claims and complaints filed to the local municipality. Even what may not seem to be a major operation; for example excavating for a utility relocation, can cause vibration to be felt in buildings located across the street.

Both Surcharge and Vibration can become costly and result in damages and other liabilities. Third party surveys should be conducted when buildings or structures are located within areas where these issues may cause damages. Surveys of adjacent structures should include documentation of existing interior and exterior conditions (written reports, photos, videos, etc.) Vibration monitoring should be completed of existing / surrounding structures whenever blasting, underpinning, shoring or pile driving operations are taking place.

Dewatering and Subsidence

Dewatering – occurs on many projects and can be completed using small, low volume pumps for minor issues related

to weather conditions or minor water infiltration. For work that is subjected to high water table, is in or around water ways, ponds, lakes etc., there may be the need for large scale drilled well points and heavy duty pumps. Dewatering is a necessary process in construction but can lead to other hidden problems beneath the surface.

Subsidence – defined as "the gradual sinking of landforms to a lower level as a result of earth movements, mining operations, etc." and in this case; construction.

As water is removed from below the surface due to dewatering, it can also draw water and lose soils that lay outside of the intended affected area and adjacent properties. When this water is drawn out of the soil it leaves voids that now become filled with the surrounding soils. This movement of material from one location to another can result in shifting of soils over a larger area casing sink holes, buried structures and utilities can become undermined and existing structures can move, sink and shift.

A dewatering system should be evaluated to determine its potential effects on the project, and if needed, adjacent properties as well to ensure that it does not cause subsidence issues that can affect and damage existing structures. Dewatering system inspections should be completed to verify compliance with approved drawings and specifications. Any water released is permitted, contained & monitored according to local, state & federal regulations. Also use of a Piezometer to measure pressure or the compressibility of the site and adjacent property subsurface during dewatering should be required.

Subsidence can be caused by construction operations to include by not limited to excavation and tunneling and should be considered when any movement of the soils is associated with the project. A larger scale example is tunneling; when using a Tunnel Boring Machine (TBM), as the machine cuts, removes the material and moves though its alignment, it creates a void in which the soils above will drop. Extensive examination and engineering goes into predicting, based on the type of soil, the extent of potential subsidence that may occur. Due to the settling, any structures (buildings, utilities, subway tunnels, water tunnels, etc.) can move causing cracks, misalignment of track, leaks in utilities, etc. As a result of this potential, controls preventing consolidation and settling of soils under adjacent properties should be evaluated and implemented.

Subcontractor Management

Key components to controlling losses due to the performance by a subcontractor is to use reputable, qualified, experienced and when possible, licensed contractors. Subcontractors should be hired based on sound practices and not simply by the lowest bid price.

Subcontracts (Hold Harmless / Indemnification) – Generally speaking, if you subcontract work to other parties, you should require that subcontractor to obtain and carry a specified minimum amount of general liability insurance before they are allowed to perform the work. In addition, require protection in the form of Blanket Additional Insured Coverage which extends a contractor's existing liability insurance to other entities as required in contract agreements.

Insurance companies insuring contractors often work diligently with risk managers to ensure proper risk transfer language is drafted into the contracts that general contractors exercise with their subcontractors. This form of agreement is known as "hold harmless" or indemnity agreement.

In such an agreement, one party promises to reimburse the other against claims or suits brought by a third party. Properly written hold harmless and indemnity agreements will afford the general contractor (GC) the right to collect from the subcontractor's action. From a risk control prospective, this is a reactive rather than pro-active measure. The questions that should be addressed are, "Why did the actions of the subcontractor that resulted in a Construction Defect (CD) claim occur in the first place?" "Where was the break down in quality that resulted in the defect and did it occur because of the subcontractor's lack of attention, experience or training?

It is important that all contractors take into consideration the policies and programs you as the CM or GC are requiring. Including requirements such as substance abuse testing, job hazard analysis, 100 percent fall protection, quality assurance and control programs, minimum insurance requirements etc., into the bid specifications, ensures that those contractors who choose to participate in the process are:

- Including the costs associated with those programs into their bid price, leveling the playing field.
- Acknowledging the requirement to have those programs in place while working on the project.
- Provides a means to hold the contractors accountable in the event they violate the terms of the contract by not complying with the project specifications.

Pre-qualification – All contractors should be pre-qualified before they are selected for the job. It is important that whether you are a general contractor, construction manager or trade contractor, you perform due diligence to ensure -- as much as possible -- that the contractors ultimately hired for the job are knowledgeable, experienced and have a proven track record of completing the work they are contracted to perform.

Pre-qualification should include but not be limited to:

- Evaluate and assess the contractors safety culture to include but not limited too; last three years E.M.R., OSHA history, management's commitment and philosophy
- Verify experience of the contractor: Have they performed this operation in the past. Were they successful?
- For high risk applications such as EIFS, Stucco and roofing: Is the contractor trained and certified by the product manufacturer to install it?
- Does the contractor hire workers who are skilled and trained? Are their workers trained in the specific products they are installing?
- What is the claims history for the contractor? Have they had previous CD claims filed against them?
- Does the contractor have a formalized QA/QC program in place? Is there a designated supervisor who will perform quality inspections and oversee operations?

Pre-Job Planning – Pre-job planning may be the most important tool of any safety program. This allows for a proactive rather than reactive approach towards safety to take place. It requires the subcontractor to demonstrate they have planned their work in advance, identified the exposures and have given sufficient consideration as to how to control the exposures.

Subcontractors should be required to submit a Job Safety Task Analysis (JSTA) to the contractor prior to the start of their work. Once the subcontractor submits the JSTA, a meeting should be held between the GC/CM and the subcontractor where the subcontractor reviews the plan and is provided feedback. The JSTA should outline the scope of work involved with the subcontractors activities, equipment that will be utilized to facilitate the work (e.g. scaffolding, cranes), identification of potential exposures associated with their work to both workers and the general public, identification of controls that will be implemented and enforced to eliminate and/or control these exposures, and identification of necessary safety equipment required to perform work.

Once the JSTA has been reviewed and approved, the subcontractor should be required to review the JSTA with each member of their crew prior to the start of work. The subcontractor should be required to submit the signature of each employee that attended the JSTA review to document that workers received pre-planning instructions.

Project Management Responsibilities (Safety and Quality)

Contractor's Field Management Responsibility – The contractor's project superintendent/project manager (S/PM) is ultimately responsible for the overall progress and performance of the project. These individuals are empowered with the challenging task of completing the project on time and on budget. This is accomplished by functions including but not limited to value engineering, project scheduling, and coordinating and monitoring the project activities and progress. Most of these activities require working closely with and directing the work of subcontractors.

The S/PM must monitor and be responsible for both the safety and quality performance of the project. Every subcontractor must be responsible to ensure that they are implementing and enforcing the safety requirements set forth on the project and that their employees are in compliance with these requirements. When dealing with General liability exposures, these subcontractors must think beyond the typical understanding of workplace safety as it relates to workers and extend it to also determining how do their operations potentially affect those not associated with the project; pedestrians, store patrons, medical staff and patients, school faculty and students.

This contractor's S/PM, has the overall responsibility to ensure that each subcontractor on their project is in compliance with the safety and quality requirements and it living up to the expectations and culture set forth on the project. Superintendents/Project Managers walk the project throughout the course of the work day, observing the work in progress, and planning upcoming activities. S/PMs should walk the project regularly, observing the work in progress and making sure that safety activities are taking place. This could include for example:

- Safety cables and vertical netting are in place along the edge of the building
- Materials are stored a safe distance back from open sides so as not to blow off
- Workers working within an excavation have appropriate shoring, mark outs, lane closures, etc.
- A worker exposed to a fall greater than six feet has required fall protection in place
- Sidewalks and perimeter fencing are cleaned and maintained
- Noise and dusts are controlled

Do not assume these exposures are the actions of a subcontractor and do not affect your employees, other employees or the public. And don't wait for someone else to address the issue. Either stop the operation immediately and require that corrective action be taken or contact the supervisor of the subcontractor whose employees are involved.

Make sure every subcontractor who works on your project understands from the first day that they walk onto the site that deviations from stated safety and quality requirements will not be tolerated, and that they will be held accountable for failure to comply.

Construction Defect (CD)

A Construction Defect is a flaw or design mistake that reduces the value of the building or structure and/or causes a dangerous condition. Construction defects can be identified during the construction process, however, many are not as obvious and not identified until years later after the building or structure has been completed.

There are many factors that can lead to construction defects, including:

- Improper use of or inferior materials.
- Poor workmanship/construction techniques.
- Improper design of mechanical, HVAC and electrical systems.
- Improper design and engineering analysis of site location, soil conditions, support structures, landscaping and drainage.
- Improper design and installation of building envelope systems like roofing, weatherproofing, Exterior Insulation Finishing System (EIFS), flashing, veneers, etc.

Depending on when CDs are first identified and how quickly they are corrected can affect a project and the company as a whole in many ways, including production, costs associated with the defect and subsequent repairs and builder's reputation.

Quality Assurance (QA) - is the process established that assures an expected level of quality in the products and services delivered by the contractor.

Quality assurance should include a means for continual improvement of the construction process so the level of quality continues to increase. This in turn will enhance quality, increase productivity and in the end, deliver a high level of customer satisfaction that can lead to repeat client work and additional customers.

Quality Assurance sets the standards for the enforcement of the Quality Control processes and procedures.

Quality Control (QC) - is the processes and procedures established to monitor operational activities to control the quality of the product or service.

A quality control program must be suited to the characteristics of the organization, considering its size, complexity, activities, culture, exposures, and potential for damage resulting from climate, soil or other inherent conditions.

Contractors should not rely on building code enforcement (controlled inspections) alone to ensure project quality standards are achieved. As with an effective safety program, an effective QA/QC plan must have the support of senior management and contain key elements proven to be part of proactive and successful programs.

Elements of a proactive QA/QC program include but are not limited to:

- Roles and responsibilities for all employees including management.
- Subcontractor pre-qualification requirements (See Subcontractor Management section above).
- An Accountability program -- to include all subcontractors – that requires and enforces adherence to established project quality standards, process and procedures.
- Materials selection procedures that take into account design specifications, building code requirements, product performance capabilities and limitations and compatibility of systems.
- Ensure quality materials are used, installation methods are proper and workmanship is of the highest quality.
- Preconstruction, scheduled and post construction inspections are conducted at each stage of the construction process.
- Accurate documentation of all decisions, assumptions, and recommendations is completed and retained in the project files.
- A formalized records retention program is in place and takes into account the statute of limitation durations for each state in which a project is undertaken.
- Communication policy which provides for clear decisions and constant supervision by experienced individuals.
- Subcontractor prequalification procedures that include a review of their safety record, quality control procedures, Experience Modification Rate (EMR), construction defect claims history and experience and manufacturer' certifications.
- Consult with manufacturers on installation and application of products and materials and install them according to specifications.

- Use of independent third party consultants for design review and installation inspections.
- Material storage and inspection procedures (protect materials before installation). Plan includes a water intrusion/mold prevention and remediation program.
- An owner training/turnover program that educates owner/staff on mechanical systems and equipment operations and locations and provides warrantees, maintenance/repair and operating instructions, etc.
- A formalized documentation and retention program that includes maintaining building documentation, operation inspections, approved change orders, approved design changes, sub-contractor agreements, material purchase agreements and specifications and other issues that pertain to building design and construction. This includes written inspection reports, videos and photographs (including any pre-existing conditions).

A key component to controlling construction defect loss is to use reputable, qualified, experienced, and when necessary, licensed contractors. Subcontractors should be selected on qualities such as these, and not just on the lowest bid. Evaluating a potential subcontractor's quality performance and history is a critical component that needs to be part of the risk management process. The work is not done once the subcontractor has been selected; it has only just begun. There are many proactive steps that can be taken to ensure that the contractors you hire will live up to your expectations and criteria. At a minimum, a good subcontractor management program should be established and contain; policies and procedures for prequalification, accountability, preplanning, routine and regular inspections of the work areas, effective contractual risk transfer language and a review of the subcontractor's quality assurance and control program.

Avoiding construction defect claims can best be accomplished by assuring subcontractors have an effective quality control program. A requirement for this program should be included in the bid specifications and contract documents and also include the elements noted above.

References/Acknowledgements

For additional information regarding these and other exposures, please visit the Chubb Construction Risk Engineering Portal or contact your Risk Engineer for access.

Chubb Risk Control Resources related to this guide include:

- Water Intrusion Mold Prevention Resource Guide
- Pro-Active Safety Culture Resource Guide
- Managing Subcontractors Resource Guide
- Cranes and Rigging Resource Guide
- Crane Critical Lift Guide and Form
- Mobile and Tower Crane Installation and Verification Forms
- Construction Defect Resource Guide
- Work Zone Safety Resource Guide
- OSHA Inspections Resource Guides

1. The Manual on Uniform Traffic Control Devices MUTCD, (Part VI) Occupational Safety and Health Administration (OSHA) 29CFR 1926

About Chubb

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