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Construction Project Management

The Engineer/Contractor/Management Relationship

By William J. Pyznar, PE

Successful construction projects require a blend of expertise and skills, combined with effective communication among professionals and client representatives. This article discusses this issue in detail, by explaining the typical roles and responsibilities of the:

- Engineer
- Contractor
- Association Manager
- Project Manager/Project Team.

Engineer

Typically, the Engineer is hired to prepare a plan and specification for the work to be completed. During this project phase, the Engineer's role is to design a plan and specification tailored to the client's needs with respect to function, economics, and long-term durability. An Engineer is usually hired because the:

- Municipality or another government entity (county, state, etc.), insurer, lender, etc., sets this as a project requirement
- Association (client) wants to ensure that prospective contractors will be bidding on a consistent scope of work.

There are other reasons a client elects to engage an Engineer, such as:

- Uncertainty regarding the extent of work required
- Desire to obtain an unbiased third-party professional opinion
- Prudence in obtaining professional services to advocate for the Association in the case of a construction defect, design deficiency or other issue that may arise from the project.

The plans and specifications prepared by the Engineer are based on a combination of factors, including:

1. The Engineer's field experience
2. Published industry standards
3. Code requirements
4. Project-specific design requirements.

After the Engineer has submitted the plans and specifications to the client for review, along with a cost estimate for the proposed work, the plans approved by the client are then typically sent to Contractors for bidding. Upon reviewing the bids, the Engineer will provide a comparison of the bids to the client for selection of a Contractor.

Contractor

The Contractor is obviously hired to implement the specified scope of work, and is responsible for completing the work within the terms of the contract, including coordinating the delivery and installation of materials, disposal of debris, and all ancillary work.

The Contractor is also responsible for obtaining permits and coordinating approval from the local and state authorities.

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Transition Inspections continued...

Association/Manager

The Association and Property Manager are the most familiar with the everyday operations of any given site and play a vital part in the synchronization of any project. Communication and coordination with the Association Manager is fundamental to the project's success. Some of the many crucial roles Management plays in the process include:

- Issuing payments and related administration
- Organizing or facilitating traffic pattern changes
- Providing guidance with respect to other on-going site projects and operations, including those projects' history (and related problems)
- Communicating potentially sensitive issues within the community to minimize quality of life disruptions (i.e. important holidays, appropriateness of locations for refuse, storage or staging) that impact the individual homeowner.

For many large projects, it is not the Property Manager's responsibility to manage the project; however regular communication (and documentation) between the Engineer and the Property Manager ensures that all issues are clarified, addressed and resolved on a timely basis.

Project Manager/Project Team

The Project Manager is generally the Engineer or their employee. The Project Manager's role is to work with the Contractor, to ensure adherence to all specifications, that any additional work and associated materials are properly documented and approved, and that invoices are reviewed for accuracy as part of the approval process. The Project Manager is also responsible for daily/frequent project status reports to the client, and communicating potential circumstances which might impact the project. Additionally, the Project Manager must work closely with the client to ensure the project proceeds according to plan.

On every successful project, the Contractor, Engineer and Property Manager are a team and individually and collectively, work for the same client, with a singular goal; completing the specified work, on time. If the team fails to collaborate effectively, the project will be subject to delays and conflicts, inevitably resulting in an unhappy and dissatisfied client. This set of circumstances has economic consequences; poor project results can provide the basis for delayed payments to contractors or professionals, and in the most severe circumstances, serve as a catalyst for litigation. When the project is not completed successfully, the client only remembers the team members and will assign blame accordingly. They will not remember the causes of project failure, or related explanations.

An Engineer and Property Manager can encounter many complex and difficult issues and considerations in the course of a major project, including:

- *Failure of the Contractor/their personnel to read and fully understand the content of the specification prior to starting the project* – The specifications and plans delineate procedures, schedules and materials for project completion. After the bid has been accepted, any deviation from these specifications must be provided by the contractor in writing to the Project Manager, who must then determine if these variations can/should be approved

- *Approval of extra/change orders* – All contracts are designed to deal with extras-that is-the need for additional work and associated material which can reasonably occur during the course of the project – virtually every construction project has "unknowns". The Project Manager must document the appropriateness/applicability of extras and quantify them for approval. Communication between the Contractor's foreman and the Project Manager on a daily basis eliminates misunderstandings; otherwise, these issues can be "deferred" until the end of the project. For example, it is not sufficient for a contractor to provide a receipt for materials purchased – the actual quantity installed in the field must be verified so that a complete report can be provided by the project manager to the client

- *Plans and specifications may sometimes be stricter than codes and industry standards* – Not every method will be defined in the specification. When an Engineer or Project Manager is on a project, they are authorized by the client to prescribe and/or approve how certain detailing or installations must be addressed in order to comply with these codes and standards. However, ultimately, the Engineer must approve the work. It is not enough that a municipal authority accepted the work. Under New Jersey law, municipal authorities do not have liability for construction projects. It's possible that a facet of a project could meet a code but still present a potential issue for the Association that could ultimately lead to litigation. For example, the code requires that flashing must be installed to keep water out of a building; *however, the code does not specifically address* the materials or provide guidelines for their installation. If the proper materials and corresponding installation methods are not specified and followed, water may enter the building shortly after construction, damaging the structure and potentially breeding mold. Were these circumstances to occur, the client would certainly seek remedies, which may include litigation, to address the situation. Additionally, work that is typically acceptable, as defined by the contractor, is not **always** acceptable if it does not comply with the specifications

• *All subcontractors and foremen should be made aware of, and have the opportunity to review the plans and technical portion of the specifications* - if possible before construction begins (and in a "perfect world"- as part of the Contractor's bidding process). Often work is repeated or materials are brought to the site that do not comply with the specifications simply because the Contractor or foreman did not effectively coordinate/communicate requirements, scheduling, roles or specifications

• *Substitute materials must be approved in writing, by the Engineer prior to the project's inception.* Delays often occur at the beginning of the project because the wrong materials were delivered to the site; somebody assumed that they are 'good enough' or equal to those required by the specifications

• *In the event of delays caused by an outside source (e.g. materials supplier), it is the foreman's responsibility to notify the Project Manager in writing when these delays occur.* This:

- Eliminates attempts for the interested parties to try to place approximate dates (which may need to be changed) on project completion
- Facilitates approaches to minimize delays
- Prevents assignment of blame and separates reasonable and unavoidable delays from those that were controllable and avoidable
- Protects the Contractor from being penalized for related schedule overruns.

In summary, a competent, well-coordinated professional team that collaborate effectively is the key to the success of any project. A weak link at any level will leave a poor legacy of the project in the client's mind and can be followed by years of attempts at resolution and sometimes even costly litigation- at nobody's gain and everyone's expense. A successful project is defined as a satisfied client who receives a finished product that ***exceeds*** what they expected; this ensures everyone's personal satisfaction and ideally, enhancement of professional reputations.

De-icers and concrete…Oil & Water?

(Note: This article originally appeared in our Special Winter newsletter in 2003. With winter again upon us, we felt it would be appropriate to re-visit this important topic.)

By Andrew Amorosi, PE, RS

Each season presents unique weather-related challenges to property owners and managers. With winter, those challenges relate to minimizing snow and ice-related hazards. But, the classic question is: "If I use salt to melt ice, don't I damage my sidewalks or pavement?" This article is intended to help answer that question.

Material Information

Concrete has high strength when it is compressed, or 'squeezed'. However, it is extremely weak when it is subjected to tension, or 'pulled'. By outward appearance and because it is so hard to the touch, concrete may seem like a very dense material. However, in reality, it is like a sponge. It can, and does, absorb water. This can be easily observed on a summer day. Pour water on a sidewalk, and you may actually observe the water penetrate (be absorbed by) the surface of the concrete. This may seem that the concrete is defective but in fact the opposite is true. High quality concrete should contain air voids that allow an appropriate degree of moisture penetration. (Note: The discussion of "how much is appropriate" is beyond the scope of this article.)

De-Icers: Material Impact?

Generally, all ice melters (de-icers) work in the same way: They depress the freezing point of ice or snow and turn the mixture into a liquid or semi-liquid slush. Solid chemical salts bore through ice or snow and form a strong brine solution. This brine spreads under the ice or hard-packed snow and breaks the bond to the surface. Once loose, the ice or snow is easily removed mechanically with a plow or shovel. Or, in many cases, users apply the material in anticipation of ice or snow. This prevents the ice or snow from bonding to the concrete surface and melts the snow or ice as it comes in contact with the brine.

Because of the inherent weakness of concrete, use of de-icers can cause havoc and potentially serious damage to the material. Why? The melting action of the de-icer and the permeability of the concrete combine to allow water to enter the concrete; however, this rarely occurs without any other temperature change. To follow our example, the de-icer has melted the snow and ice to either create water or slush, which would begin seeping into the concrete. If the temperature drops (like making ice cubes in a freezer), the water expands as it turns to ice. Realize that this is happening at, and under, the surface of the sidewalk; so, as the water/slush re-freezes, the expanding or growing ice crystals can explode the concrete surface. This surface defect is commonly referred to as spalling or scalling. It may be visible to you as deterioration of the sidewalk, either in the formation of cracks or uneven surface area.

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De-icers and concrete continued...

Practical Considerations-Just Add Salt

The "practical" lowest temperature limit for de-icing materials is defined as **effective** (it melts the ice) within 15-20 minutes of application. The first measure of a de-icer's effectiveness is the range of temperatures in which it can provide deicing action (in a reasonable time period). This helps us determine which compounds may be potentially less damaging to concrete. For example, the most commonly available (and best known) de-icer is *Sodium Chloride* (Rock salt). Its effectiveness is only to temperatures of 20 degrees F°, which results in a higher potential of freeze/thaw to occur, thereby facilitating the crystal growth/expansion discussed in the previous paragraph, should temperatures fluctuate above and below 20°.

Rock salt in particular, is often harmful to concrete surfaces, and more frequently, it is harmful on lower grades of concrete. During the first winter following a new concrete installation, de-icers **should not** be used on concrete, because the concrete may still be curing. In practical terms, this means the concrete already contains excess water and as such, it has less air voids to absorb additional water. (This can be challenging for example, when rock salt is used to de-ice pavement and splashes onto curbs and sidewalks, or when salt adheres to tires, which carry the salt across a sidewalk or onto a concrete driveway. (This may be partially mitigated when road crews use a mixture of Calcium Chloride spray, with other salts, to minimize the amount of salt on the road surface.) The additional absorption of water from the ice freeze/thaw cycle may be just enough to cause a problem, because the still-curing concrete has air voids that are already full, thereby accelerating the process of ice crystal explosion and resultant concrete damage. Even when the concrete has cured, depending upon the mix (discussed below), a reaction between the concrete and de-icer may occur when rock salt is used. Some damage to plants can occur from excessive use of this material and care should be taken when applying it.

Given this knowledge, are there suitable substitutes? It should be understood that sooner or later, any of these materials can contribute to concrete deterioration; however, some are better choices than others to achieve a balance between safety and maintaining the sidewalk in good condition.

Calcium Chloride is effective to temperatures to –25° F. it is typically sold in the small pellets. This material is much more costly than rock salt, however, the concrete damage is less aggressive because calcium chloride is effective at much lower temperatures, minimizing the freeze/thaw cycle and resulting damage to concrete. However, some damage to plants can occur from excessive use of Calcium Chloride and care should be taken when applying it.

Potassium Chloride is much like Calcium Chloride and is similar in cost. This material is actually less damaging to concrete than either rock salt or Calcium Chloride, however, this material can also harm plants and metals (although less then the other materials) so care should be used when distributing it.

It should also be noted that some commercial de-icing compounds contain ammonium nitrite, nitrate or sulfate (fertilizers). You should **never use** these de-icing compounds since there is a moderate to rapid chemical reaction between these chemicals and almost all concrete.

Alternatively, sand can be used; it won't melt the snow and ice, but it will provide better traction for improved safety.

We are proud to share 2 milestones reflecting our continuing commitment to *Higher Standards*:

Admission to membership in the U.S. Green Building Council – facilitating our access to best practices, standards, and programs that promote projects and communities that are built to be environmentally and socially responsible, healthy and prosperous.

Recognition with a Merit Award from the New Jersey Concrete and Aggregate Association and the New Jersey Chapter of the American Concrete Institute-for our Engineering role in the repair and restoration of the *Wildwood Ocean Towers* in Wildwood, NJ.

What's New?

Congratulations to our employees for their well-deserved promotions:

David Chesky, Regional Vice President, Northern New Jersey/Hudson Valley

Anthony Volpe, Regional Vice President, New York Metro/Jersey Gold Coast

Terry Foeldvari, Vice President, Operations

Janet Piatkowski, Assistant Project Manager

Welcome to the employees who have joined us at our New Jersey Headquarters:

Rod Blouch, PE, Senior Professional Engineer

Allen Campbell, Project Manager-Construction Inspection and Analysis

Peter Lepski, Project Manager Construction Inspection and Analysis

Andrew Varsi, Project Manager Construction Inspection and Analysis

Nicole Smith, CAD Manager-AutoCAD design and Management of our Design Team.

Jennifer Hiers, Project Administrator