Control Demolition to Control your Claim

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While a building may meet the classic definition of a "total loss," very often the at-grade and subgrade elements can be retained and put back into use. This is especially true when considering repairs or replacement of a building or elements in like kind and quality. These elements may include the car park pavements, sidewalks, kerbs, slabs, and foundations and typically, they are largely undamaged by most loss scenarios. However, collateral damage from uncontrolled demolition and site clearance activities required to remove the damaged building framing and debris could put these elements at risk for replacement in their entirety. Therefore, controlling demolition in a loss scenario can have significant impacts on the costs to repair property damage and shorten the period of restoration that affects the value of lost business income.

What you need to know to save building foundations

In many loss scenarios, a building's below-grade elements, such as foundations, remain undamaged and can be retained. In order to maintain the continuity of the repaired structure from the new girders, beams, and columns through the existing foundations, it is important that certain parts of a building need to be left intact following any type of demolition. These include all or parts of the concrete columns, holding-down bolts, and reinforcing steel, particularly at or near the interface with the foundations.

To understand what that looks like and why it's important, you must first understand the fundamentals of building foundations, which generally fall into two major groups, deep foundations and shallow foundations.

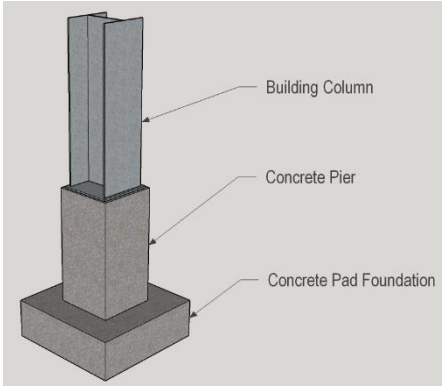
Deep Foundations

Deep foundations are generally used for mid-rise and high-rise buildings, or where near-surface soils conditions are unsuitable. They include caissons and piles that can extend significant depths into the earth. Deep foundations are usually joined together, well below grade, with a concrete raft-slab or tied together in a series of smaller groups with concrete pile caps that support the building's columns. Due to the depths, intricacy, and costs of construction for deep foundations, these systems are generally not at risk for wholesale replacement in a typical loss scenario. However, the connection and structural continuity of the building's columns can be similar to the shallow foundation scenarios below and are still subject to increased costs of repair and extended periods of restoration resulting from uncontrolled demolition.

Shallow Foundations

Shallow foundations are the most common foundation type, used for low-rise buildings from at least one-storey tall to a few stories, and generally consist of one or more individual concrete pads, grade beams, and relatively narrow continuous foundations (strip footings) generally located within approximately three metres of the surface, depending on the soil conditions.

Pad foundations (or spread footings) are a type of shallow foundation which are individual concrete pads typically located under each building column and connected with grade beams at the lateral-force resisting locations. Shallow continuous (strip) foundations are relatively narrow and short concrete bands typically located around the building's perimeter. Due to varying ground conditions, shallow foundations can be set up to a few metres below the building's subgrade or column bearing elevation, and the offset distance between the two is often made up with smaller concrete piers that act as mini-columns between the pad foundation and the building columns above.



Framing

In a loss scenario where damaged building framing and columns have to be removed, it is important to keep in mind that continuity from the building framing into and through the foundations needs to be maintained or re-established during the repair and replacement work.

Typically, foundations only experience vertical downward loads due to gravity, but in certain lateral-loading scenarios, such as earthquakes or high-wind, some foundations may experience vertical uplift loads from the building columns. For these lateral foundations, the weight of the foundation is used to resist the uplift from the columns and therefore, the columns have to be able to try and “pick-up” the foundations. All of those uplift forces go through the holding-down bolts for steel columns or the rebar for concrete columns. The uplift is the primary reason it is critical to reinstate continuity between the repair or replacement columns and the existing foundations. If you can’t adequately reconnect the new columns to the existing foundations, the bolts or rebar may break at the column or foundation interface during a future lateral loading event and potentially lead to building collapse.

What happens if framing or columns need removal?

In a loss scenario where damaged building framing and columns have to be removed, it is important to keep in mind that this continuity needs to be maintained or re-established during the repair and replacement work. Therefore, it is often necessary to leave a portion of the concrete columns, rebar, or holding-down bolts sticking up above the surface of the existing slab to provide a suitable link for connecting the replacement elements and maintain the load path continuity.

When holding-down bolts and reinforcing steel are *not* left with enough stick-up to connect new pieces, such as when the holding-down bolts or rebar are cut flush with the slab surface during uncontrolled demolition, it places the previously undamaged slabs and foundations at risk for wholesale replacement. This is due to the invasive and destructive measures often needed to break out the slab to expose the foundation and install new rebar or holding-down bolts. Where the rebar or holding-down bolts extend a significant distance into the pier foundation, it may be impractical to drill in new, deep holes in a relatively narrow pier that is already crowded with the original, and now useless, rebar or holding-down bolts. Where it is not possible to repair the connections, it may be required to replace the concrete piers and pad foundations in their entirety in order to reinstate the necessary load path. This requires even further breakout and replacement of the slab to facilitate the

associated excavation and may make it impractical or futile to save an increasingly small portion of the original undamaged slab. In addition to increasing the direct costs of replacement associated with break-out and replacement of holding-down bolts and rebar, these activities can significantly increase the period of restoration and impact the business interruption side of the claim as well.

The Do's and Don'ts of Demolition

Demolition is an inherently dirty and dangerous activity, and it should be assumed that some additional collateral damage from demolition will be sustained by undamaged elements. This is unavoidable. The elements may include the building car parks and driveways where heavy machinery access the site, stage materials, and approach the damaged building. In addition, the perimeter sidewalks, kerbs, and interior building slab also have the potential to sustain additional damage due to the cutting, dropping, scraping, and dragging operations commonly used to clear site debris and destruct structural elements. However, limiting entry to the site, establishing a limited number of access points, and designating specific drop-and-drag lanes into and within the structure can all help mitigate the amount of collateral damage sustained by demolition activities.

Where demolition is required on or above suspended floor elements, such as elevated concrete slabs, planks, or precast double tee beams, it is necessary to limit the use of heavy machinery and take additional care when dropping and dragging building debris so that the flooring elements are not overloaded or impact-damaged. In addition, uncontrolled access to the site and undefined staging areas can allow heavy equipment to drive over and damage vulnerable underground service conduits that may also put them at risk for replacement when otherwise undamaged by the loss.

So, what can be done?

One or more of the following could be considered to control the demolition process and retain the integrity of the undamaged elements to remain and thereby, the repair and replacement costs.

1. Be proactive and prescribe the criteria for elements to remain, such as structural hold-down elements, slabs, foundations, or parking areas. These can be as simple as a pre-demolition meeting where the parties agree to leave columns and anchor bolts a certain level above the slab, limiting, or designating specific drive and drag lanes in and out of the structure, and staging areas throughout the property. These performance-based criteria may be more formally specified and incorporated into the construction and demolition documents.

2. Request review and approval of the demolition statement and construction documents related to the demolition. Provide, in writing, expectations regarding the state of undamaged elements to remain following demolition and get acknowledgement or agreement from the contractors when possible.
3. Provide clerk of the works monitoring during demolition activities that can provide real-time feedback to alert for uncontrolled demolition or other activities that may adversely affect the reinstatement potential of elements meant to remain.

When prescribing demolition criteria or monitoring the works, it is important these actions of a third party do not amount to directing the means and methods of demolition. In any of these scenarios, it should be memorialized in writing that the means and methods of demolition remain the sole responsibility of the demolition contractor.

When damage calls for the removal and replacement of part or all of a structure, it is imperative to gain early control over the demolition process or otherwise risk the replacement of entire systems that were previously undamaged, or minimally damaged, such as car park pavements, sidewalks, kerbs, slabs, and foundations. While some collateral damage from demolition is expected, and at times unavoidable, being proactive and setting clear criteria for elements to remain can result in significantly reduced repair costs and schedule.