



# DEMOLITION FOR DISASTER RECOVERY



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# Introduction

Demolition is an involved process requiring extensive planning and coordination to execute safely. When it comes to disaster recovery, demolition is often necessary to give commercial properties that have undergone extensive damage a fresh slate from which to rebuild. It is also possible to use strategic demolition practices to preserve portions of salvageable facilities for use as the starting point for reconstruction.

This paper will outline statistics and facts about demolition in general, as well as the efficacy and suitability of recycling debris and other materials generated from demolition. It will outline what differentiates demolition due to a disaster from demolition that was planned. Insight on preparing for a demolition project and steps to be taken if demolition is needed due to a disaster will also be provided.



# Demolition Overview

Demolition was a \$9 billion industry in the United States in 2020, with nearly 5,000 firms conducting the work, according to an industry research report by IbisWorld. As an industry, demolition relies on firms with a localized presence to conduct the work, and every firm or contractor that does demolition work is subject to some of the strictest regulations in the construction and disaster recovery industry. Despite slow-downs on nonessential construction work in 2020 due to the COVID-19 pandemic, work for demolition contractors typically remained steady. Extreme weather conditions in 2021, most notably wildfires, tropical storms, and hurricanes, have created plenty of demand for disaster recovery demolition. Added to the standard commercial needs for the service, the demolition sector remains strong.



**THE CONSTRUCTION INDUSTRY, INCLUDING DEMOLITION, ADDED 110,000 JOBS IN MARCH 2021\***

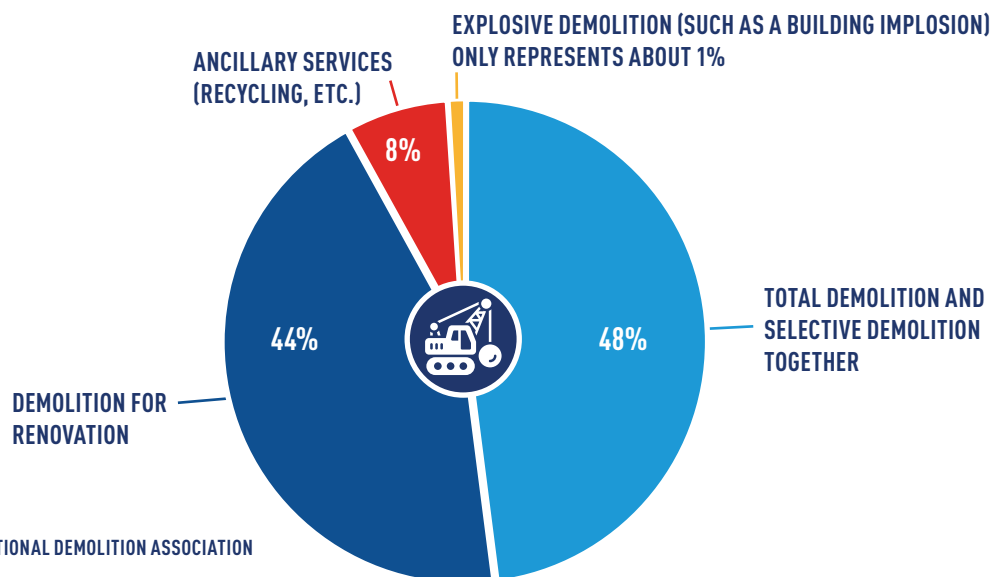
\*ASSOCIATED BUILDERS AND CONTRACTORS; US BUREAU OF LABOR STATISTICS



Property owners may not consider demolition as a topic of concern until a disaster strikes and their facility requires it. There are many aspects to this highly technical procedure, which requires the support of engineers to ensure it is done safely and efficiently.

For both construction and disaster recovery, demolition can refer to several different specific kinds of work:

- **Dismantling:** The careful deconstruction of a structure, in part or as a whole. The dismantling technique is used to preserve historic buildings and to salvage materials for reuse on site. It is a labor intensive form of demolition and can require special training or equipment depending on the materials involved.
- **Total:** When an entire structure is demolished under the supervision of engineers. This can be done in several ways, such as controlled collapse, floor by floor, or a process known as a “trip” of the building. These terms will be defined further below.
- **Selective:** Where the building’s shell is preserved, but the inside is gutted entirely. This is typically done as a cost-saving measure when the structure itself is still viable.
- **Interior Demolition for Renovation:** When a facility is altered, such as tearing out walls to reconfigure an internal layout, or for site decontamination efforts such as stripping out hazardous materials like asbestos and lead. This can also be a way to refer to a smaller-scale selective demolition project.
- **Structural:** Industrial scale total demolition, geared towards high rises and other large multistory buildings.
- **“Surgical” (Precision):** Delicate demolition or dismantling work that can be extremely difficult to accomplish successfully, often done in active facilities or to remove small or specific portions of a structure without damaging the overall integrity of a structure.
- **Industrial:** A specialized form of demolition that focuses on industrial settings, such as power plants, chemical processing plants, or refineries. Often includes mitigating intense environmental hazards such as lead, asbestos, or hazardous chemicals on sites referred to as brownfield or superfund sites. Designation as brownfield or superfund depends on the size of the contaminated area and the levels of contamination present. Only 20-30% of demolition firms are equipped, trained, and certified to handle industrial demolition work, according to estimates from industry experts.



\*SOURCE: NATIONAL DEMOLITION ASSOCIATION

Demolition often relies on specialized equipment, procedures, and training. The use of heavy equipment such as cranes, large excavators, loaders, and unique attachments for more common machinery all require training and licensing that can vary state to state. The use of explosives requires intense certification and training to utilize safely and usually requires an engineer to oversee the project.

Some common terms for processes of demolition include:

- **Implosion:** Implosions use explosives to cause a building to collapse in on itself for a swift and efficient demolition. It requires licensed professionals, specifically engineers, who are certified in the use of explosives and are trained to plan the implosion to avoid any damage to surrounding structures. Implosions represent a very small but dramatic portion of the work done in the demolition sector.
- **Trip:** “Tripping” a building or structure is when underlying supports are destroyed or removed mechanically, causing the building to collapse in on itself. This is done with less or no use of explosives compared to an implosion. Strategies for engineering a trip depend on the stability of the structure, how it was designed, and the materials used to anchor and support it at or below ground level.
- **Controlled collapse:** Another term for either an implosion or a trip is controlled collapse. It refers to the process of managing the total collapse of the structure through the engineering principles involved in the given method.
- **Floor-by-floor:** This is a method of demolition that takes down a building within its footprint from the top-down, minimizing disturbance to surrounding structures. It comes with less risk than a controlled collapse and more precision to stop the demolition at a specific floor if needed.
- **High reach:** This refers to both the process and the specialized equipment used to conduct floor-by-floor deconstruction and demolition. High reach is designed to accommodate structures of up to 20 stories utilizing units with long boom arms and specialized hydraulic attachments mounted on excavator platforms.
- **Demolition robots/robotics:** Specialized high-power, low-weight equipment, often controlled remotely, for tackling projects in an unsafe working environment. Also can be used in tandem with more traditional methods when standard demolition machinery is too heavy. This is often necessary for an area with a precarious or dangerous load-bearing capacity, but human work alone is insufficient.



# How to Prepare for Demolition

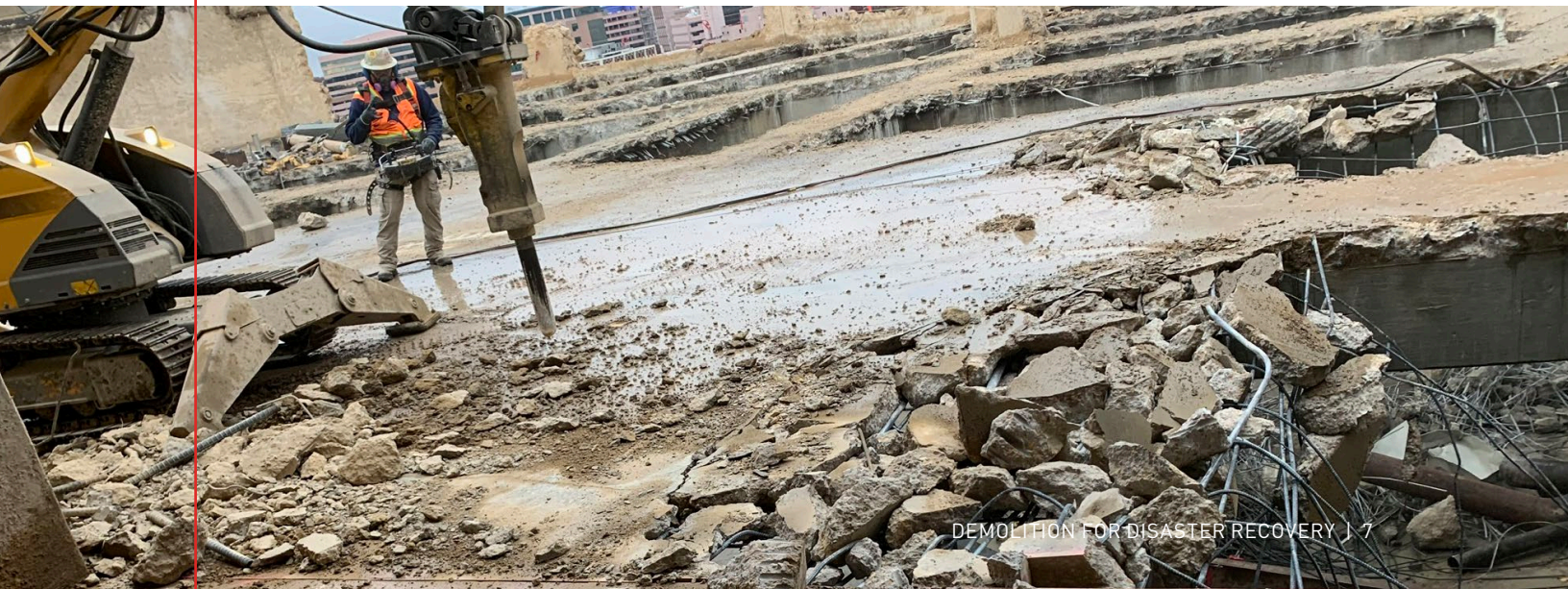
Demolitions require extensive planning. Your building and the surrounding property can contain hazards unseen to the naked eye. Prior to demolishing anything, professionals will evaluate your property and its surroundings to determine the best techniques and ensure the demolition plan is safe.

Providing a set of as-built drawings for the structure will streamline the work for the engineer and can reduce the time it takes to prepare for demolition, potentially saving money as well. As-built drawings are also crucial in disaster preparedness, should demolition or other structural information needs arise. BNi Building News Construction Dictionary defines the word as “a set of drawings prepared by the general contractor, which include any revision in the working drawings and specification during construction, indicating how the project was actually constructed.” This information gives behind the scenes information on what is structurally happening in the building to allow engineers to make informed decisions on how to best approach the job.

For building interiors, pipes for water or gas and live wires are tucked behind walls. A demolition professional must track the location of mechanical, electrical, and plumbing (MEP) systems and turn off all functions of the space before beginning work. This will ensure the safety of those in the demolition as well as the safety of the rest of the building’s occupants if the demolition is selective. Columns and beams that may be in the path of destruction could be structural, also referred to as load-bearing. If you do not have as-built drawings with a structural set of documents, a professional will need to do an extensive evaluation of the space to identify building loads.

On the exterior, and typically only for large demolition projects, underground utilities feed your building water, power, and fiber. Before any large demolition, you must work with the city to disconnect utility lines or mark areas of the property to avoid. It is also critical you work with neighboring properties that potentially share utility lines, a task that can be completed by a professional demolition contractor.

Another consideration is planning for lead times if hiring heavy machinery and equipment is needed. Cranes, excavators, high reach excavators, skid steers, and skid loaders are examples of machinery that can be in high demand. Cranes, in particular, are notorious for being in short supply depending on construction and demolition work that is ongoing in a region. Demand for machinery will increase in the event of a natural disaster, such as a hurricane or tornado, increasing lead times and potentially impacting project timelines.



## Recycling & Salvage Options

The largest byproduct of any type of demolition is the debris. Often referred to simply as C&D debris, for construction and demolition, the materials that are cleared away from a demolished structure have several possible fates after they are removed. According to the Environmental Protection Agency (EPA), over 455 million tons of C&D debris were directed to recycling or reuse, and just under 145 million tons were sent to landfills, per an agency study from 2018. That is a significant improvement from past eras of demolition and construction work. According to a survey conducted by the National Demolition Association, 90% of survey participants indicated that they recycle everything possible from a demolition site.

As the world trends toward more eco-friendly options, certifications like Leadership in Energy and Environmental Design, or LEED, become more and more vital to meeting regulations and code requirements. Eco-friendly practices are often necessary for securing the most cost-effective outcome for a structure that requires construction, reconstruction, or renovation. Accounting for what happens to C&D debris is required for a successful demolition project, and making sure those considerations meet requirements like those mandated by LEED certifications is part of that process.

**DEMOLITION REPRESENTS MORE THAN 90 PERCENT OF TOTAL C&D GENERATION, WHILE CONSTRUCTION REPRESENTS LESS THAN 10 PERCENT.\***

\*SOURCE: EPA





Recycling and salvage after demolition is often geared toward the contractor selling the scrap and raw materials from a site, like copper wire, shreddable or thin metals, plate steel, structural steel, or galvanized steel. Selling these materials to scrap yards or other facilities and calculating estimated returns from these sales are part of how demolition firms can structure their bid on a competitive demolition project to keep it affordable.

Materials like concrete are often crushed on site to be used as aggregate and backfill as needed, which is most cost effective. When that is not necessary or appropriate, such materials are shipped off-site to be processed appropriately. Ideally, that means these materials are recycled or reused elsewhere to help meet LEED and other environmentally conscious requirements.

The general trend is that materials are sent to a landfill as a final option or when they are a hazard and are required to be disposed of in that manner, such as materials containing asbestos or other materials that are not considered recyclable or reusable. A responsible demolition contractor or disaster recovery firm that handles demolition will recycle every material possible.

Salvaging material for reuse in reconstruction after demolition is often a specialized process that can be quite costly. It is typically reserved for projects that are required to do so, such as demolition and reconstruction of a historic building. If a project requires specific salvage and reuse of materials on site, it is crucial to have a clear understanding of the labor and equipment costs needed to complete the work.



# Catastrophe & Emergency Service Demolition

When disaster strikes, it is imperative for business owners to get their facilities back in working order quickly to minimize downtime and return to operations. The cost of loss of business can often be more expensive than the cost of addressing the damages from a catastrophe. Utilizing demolition services to facilitate disaster recovery is often necessary when structural damage to a facility cannot be easily, quickly, or affordably repaired. Sometimes, starting from a fresh slate makes more sense from both a financial and timeline standpoint.

It is necessary to bring an engineer on board who can assess the damages to the site and compare the situation in reality to the “as-built” drawings and blueprints for the facility. This allows the engineer to map out load ratings for the surviving parts of the buildings, look for further cracks and stresses, and make a plan to address demolition and recovery. This will allow demolition crews to quickly shore up salvageable areas of a facility and clear away ruined areas to prevent further damage.

In standard demolition, the engineer will guide the process, carefully determining the type of demolition needed and that the work is conducted to minimize or avoid damage to preserved areas where applicable. During disaster recovery, demolition needs are reactionary and time is ticking, both to prevent mounting damages and to allow a swift return to business.

Specialized heavy equipment is often needed to get a demolition project safely underway. Cranes are in high demand after a disaster as they can reduce the weight on overloaded but salvageable areas of a structure by removing debris from the top down. This is often required to make a site safe for ground crews and to clear space for the use of other necessary equipment. The high demand for equipment during a natural disaster can cause costly delays in a demolition project and should be factored into the scope of work.

Implementing an Emergency Response Agreement (ERA) with a disaster recovery firm that handles demolition can help a commercial property receive preferential service in the event of a widespread catastrophe in a region, such as a hurricane or a wildfire. Oftentimes several different demolition firms compete to utilize the same limited number of specialty equipment like cranes. Having an ERA in place can prioritize your project once a disaster recovery firm has access to such equipment. This minimizes downtime and allows a business to return to being operational faster.



## Conclusion

Demolition can be a dramatic process. Whether a property has the luxury of planning a demolition or needs the services in response to a disaster, the right partner will yield incredible results. If there is a structure that your company needs to have demolished, regardless of the style of demolition needed, it is necessary to determine the best course of action with a professional demolition contractor to get the work done safely and correctly. Planning for lead times on hiring the necessary equipment and providing engineers with as-built documents will streamline the process. Ensuring your contractor responsibly follows environmental protection guidelines when disposing of C&D debris, like those mandated for LEED certification requirements, is also necessary for a successful demolition. Understanding some of the fundamental aspects of demolition will help you make a sound decision when selecting a demolition firm.





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