Pile breaking involves demolition of old concrete piles in order to make way for driving of new piles and subsequent building of new structures. Demolition of concrete piles is quite a challenge due to the presence of steel reinforcement bars and using conventional methods of can be quite cumbersome and time-consuming.

In construction project involving pile foundations, one of the most cumbersome and time consuming activity is the crushing of top portion of the Cast-in-Situ Piles /Precast Piles as required to remove the weak top concrete and expose the reinforcement to be used for further construction. Pile breakers solve the problem by crushing such overhangs in a speedy and precise way. The reinforcement bars are left intact facilitating the rebuilding work. The breaking down of concrete piles is an essential part of the construction process and a subject that is often not given sufficient early thought in the planning of the piling works. The adoption of a suitable pile breaking method can result in financial savings for the project and most importantly will address and reduce potential health and safety issues in relation to this phase of the works.

Normally, by use of conventional methods of chipping either by electric/ pneumumatic a maximum of 2 piles can be chipped per day by one set of breakers. In most cases pneumatic breakers are not allowed for fear of developing micro cracks in the balance pile. There are several viable alternatives to this procedure that remove or significantly reduce these risks. In many cases, these innovations have been fully developed and are readily available. Yet, the Indian building & construction industry continues to follow the old, traditional ways. In fact, not more than 10% of the Indian market
uses the modern equipment available for pile breaking. This is sadly due to the lack of awareness about the advantages of the modern pile breaking/crushing equipment.

The most basic method of cutting pile heads is to use either hand held or plant mounted pneumatic breakers. This type of pile breaking can increase the risk of integrity test failures, especially if work is not done properly. The breaker shouldn't penetrate vertically into pile as it can cause pile splitting and cracks below a cut off level. It should be started from the perimeter to the center of the pile. Whilst this method is perhaps the easiest to specify and takes no initial planning, it can produce unacceptable health and safety issues and cause unnecessary damage, particularly to small diameter piles, if not carefully controlled. This method also carries a high risk of hand arm vibration syndrome (HAVS) caused by regular exposure to vibration.

Hydraulic pile breaking utilizes special equipment provided by various manufacturers. Hydraulic pile breakers cater to a wide range of concrete pile shapes and sizes, both cast in place and precast, including contiguous wall piles and small secant wall piles. These pile breakers are very advanced, efficient and time saving systems for trimming concrete foundation piles. This process results in a good horizontal finish, undamaged reinforcement and no cracks below the cut off level. These ‘Pile Breakers’ are available in a range of sizes and capability in the marketplace. These systems are not appropriate for some of the larger pile diameters or for use on diaphragm walls. Varshitha Concrete has revolutionised this system in India. The capacity available is up to 1600 mm diameter piles. In a hydraulic pile breaker, the pile breaker is made of extendable jack modules starting from 4 modules (for piles below 500 mm diameter) and upto 9 modules (for piles upto 1600 mm diameter). The pile crushing unit is attached to a regular excavator and connected to existing hydraulic system of the excavator. These pile crushers can also be mounted onto telescopic arms/cranes/Hydra etc., and powered by external hydraulic power source. The pile is crushed before we bat an eyelid.
one can crush 40 to 50 piles in a day as against 4-5 piles per day using conventional methods.

There are several other different approaches to pile breaking. One of this is the Elliott method wherein PVC sleeves are used with debonding agent such as polyurethane foam on pile rebar above cut-off level. It is expected that the introduction of some de-bonding agent between concrete and reinforcement above the pile cut-off level can help in reducing the bond of reinforcement with concrete. After breaking the pile at cut-off level, it is expected that the pile head can be simply and easily removed. This pile breaking method is expected to work on all diameters of piles from 300mm to 3000mm and on all types of cast in situ concrete piles bored piles, CFA piles, diaphragm walls and barrettes. However, this approach may not be very economical.

Other pile breaking include the 'recepieux' system which relies on inducing a horizontal crack by introducing chemicals into the pile through carefully positioned delivery ducts to expansion chambers positioned at cut-off level. Another innovative method uses water pressure to crack the pile at cut-off level using a carefully designed system of crack inducing pipes, placed in the pile at cut-off level, integral with the reinforcement cage. Hydro-demolition methods for the breaking down of piles uses extremely high pressure water jets capable of removing concrete without damaging the reinforcing bars. Hand held lances are typically used, but specialist remote controlled plant has been developed utilizing a ring of water jets placed around the pile connected to a small tracked base unit. In theory, these methods can be adopted for all types of bearing and wall piles and diaphragm walls. However, it may be difficult to implement them practically and may end up being quite economical.

It does not make business sense for users to buy/own pile breaking equipment as it ranges anywhere from INR 25-50 lakhs per equipment based on its sophistication. In addition, there will be the cost of the excavator and maintenance cost of the entire equipment. Besides, it does not make any economic sense if there are only a few piles to break. Instead, it is better the use sub-contracts the work to a company that specializes in pile breaking. Hiring pile breakers may not only make economic sense, specialized companies like Varshitha Concrete can provide the pile breaking equipment as well as a full contracting crew to carry out the pile breaking on the user's behalf. Users will also be relieved of headaches like hiring/organizing skilled manpower/operators for managing the pile breaking process, availability of spare parts and maintenance.

Pile breaking is still an unsophisticated process in our country. Most of them are not aware about the technical progress in this area and struggle with pile breaking using conventional methods that can end up breaking only 5-6 piles a day. Hydraulic pile breaking can allow one to break around 100 piles at one go and make pile breaking a matter of minutes and not days if one can properly plan and expose the piles.