EXCAVATOR SAFETY…
HOW THEY WORK AND THEIR HAZARDS

COURSE OUTLINE

- **It's important to fully understand the machines that you're working with before you operate them.**
  - The more you know about how they function, the better you can identify the hazards that you can encounter when using them.

- **When you're working on a big project and need to move large quantities of soil, gravel, or similar material… chances are you'll use an excavator.**

- **They are often used…**
  - To dig out trenches, swimming pools and graves.
  - To handle and haul various materials.
  - In mines.
  - To load trucks.
  - To dredge rivers.

- **Excavators have four main components…**
  - Cab.
  - Bucket.
  - Boom.
  - Tracks.

- **The cab is where you'll find the …**
  - Driver's seat.
  - Controls.
  - Roll Over Protective System (ROPS).
  - Falling Object Protective System (FOPS).

- **ROPS and FOPS are reinforcements that are built into the cab.**
  - They provide you with protection from falling objects or the impact of a rollover accident.
  - Most are made from steel or aluminum.

- **The bucket is the steel container that is attached to the boom with something called a "dipper".**

  - It digs, lifts and handles the materials you're working with.

- **The boom raises and lowers the dipper, allowing you to maneuver the bucket.**

- **The tracks are interlinked steel or rubber plates under the cab that can move over the tough terrain of a jobsite.**
  - Rubber is generally used more frequently, since it has better traction than steel.

- **Some excavators have wheels instead of tracks.**
  - Called "wheeled" excavators, they are
  - good for moving between jobsites and short-term, fast-paced projects that take place on level and stable ground.

- **Because every construction project is different, there are also some other types of excavators you can choose from to suit your project, including…**
  - "Dragline" excavators.
  - "Mini" excavators.
  - "Long-reach" excavators.

- **"Dragline" excavators are one of the biggest types of heavy machinery in the world.**
  - They are typically used on large-scale projects like port construction, pond and canal dredging, and mining.

- **"Mini" excavators, on the other hand, are much smaller than the standard excavator.**
  - They are ideal for tight jobsites like small landscaping jobs.

- **But some of these projects may have spaces that a mini excavator can't reach.**
  - That's where "long-reach" excavators come in.
  - They're the same size as a standard excavator, but have an extended arm and boom for reaching hard-to-get-to areas.
  - Many long-reach excavators have a working range of 60-100 feet, while standard excavators typically have only half of that.

- **These are just some of the types of excavators that exist and each one has its own operating characteristics.**
  - So before you start to use one, you need to identify what type of excavator it is and how it works.

- **You also need to remember that there can be many types of equipment on a jobsite.**
  - You don't want to get them "mixed up".

- **For example, many people mistake excavators for backhoes, since they both have booms with a bucket and are used for digging.**

- **The major differences are their sizes and rotation ranges.**
  - Excavators are typically much larger than backhoes and have a wider rotation range, which can make them better for bigger construction jobs.

- **Knowing the difference between backhoes and excavators, as well as other equipment on your jobsite is important.**
  - All construction equipment has unique hazards.
  - So you should always know what you're working with.

- **Some of the most common excavator accidents on construction sites are "tip overs".**
  - When an excavator falls over, it doesn't just put the operator in danger, but any workers who are in the vicinity as well.

- **"Tip over" accidents occur when an excavator becomes unstable.**

- **To prevent these accidents, you need to pay attention to…**
  - The "ground conditions" you're working on.
  - The excavator's movement and capacity.

- **Potholes, debris, and uneven surfaces can jeopardize an excavator's stability.**
  - So you should always survey your site before you start working on it, and do what you can to avoid poor conditions.

- **Never rush when you're using an excavator.**
  - Moving too fast or suddenly can also cause your excavator to become unstable.
  - You should also be careful to never overload an excavator.

- **You can guard against this by determining its "bucket capacity" before you start to use it.**
  - This is the volume of material that your excavator's bucket can safely carry at one time.

- **You can find this information in the operator's manual or on labels inside the cab.**
  - Some excavators also come with charts that show their capacity based on the type of material that's being lifted.

- **Trying to lift more than your excavator can handle could lead to a tip over, potentially injuring you and anyone around you.**
  - So make sure that you are familiar with an excavator's limits before you start using it.

- **Another thing that can increase the risk of tipping an excavator over is operating it on a slope.**
  - So if you're going to be operating on a slope, always determine the slope's angle first and apply the "70% rule".
  - Excavators should not be operated on slopes that are steeper than 70% (35°).

- **If you can safely operate on it, keep the excavator's front attachment low to the ground as you travel up the slope, to keep the weight on the "high side".**
  - As always, take your time and move carefully.

- **If your excavator does start to tip, do not try to jump from the cab.**
  - More people are killed trying to escape tipping accidents than from the accidents themselves.
  - Instead, make sure your seatbelt is still securely fastened, and stay where you are until help arrives.

- **When you use any kind of heavy equipment, you need to be aware of the hazards that come with it.**
  - Excavators are no exception.
  - While excavators can make construction jobs go faster, if you don't know what hazards to look out for when you're using them, a lot can go wrong.

- **Some of the most common hazards associated with operating an excavator include…**
  - "Struck-by" accidents.
  - "Crushing".
  - "Collisions" with other equipment and structures.

- **“Struck-by” accidents occur when an excavator’s bucket or its load hits you or a coworker.**
  - This can lead to serious injuries, and in some cases even be fatal.

- **When you are operating an excavator, you always need to be aware of your surroundings.**
  - If you spot someone in your path, stop immediately.
  - Don’t start moving again until they are completely out of your way.

- **If you are working anywhere near an excavator, you should…**
  - Wear a high visibility vest.
  - Know where the excavator is at all times.

- **Following these rules can also help you to avoid “crushing” accidents.**
  - These occur when you or a coworker are “run over” or “pinned against” something by an excavator.
  - This can be even more catastrophic than a “struck-by” accident.

- **“Crushing” typically happens when an excavator is moving in reverse.**
  - So if you’re operating an excavator and are going to be backing up, always look around you and sound your horn before starting off.
  - You should also make sure its “back-up” alarm is working if it has one.

- **Similarly, when an excavator operator isn’t paying attention or doesn’t have a clear view of their path, it can lead to collisions with other vehicles or structures.**
  - So when you’re operating an excavator, move slowly and carefully around the jobsite.
  - Remember that loaded equipment always has the right of way.

- **Be especially careful when you are dealing with overhead or underground utilities.**
  - Hitting an underground gas, water, or electric line, or an overhead power line, can be disastrous.

- **You should mark their locations before you start excavating and stay as far away from them as possible as you work.**
  - You can consult databases like the Department of Transportation’s National Pipeline Mapping System (NPMS) to find information about gas and water lines, as well as hazardous liquid lines around your jobsite before you start a project.

- **If the excavator you are operating does come into contact with power lines, stay inside.**
  - As long as you remain in the cab, the wires can't touch you, so the current will flow through the excavator itself.

- **Getting out of the cab could cause the current to change course and flow through you instead.**
  - So stay put, stay calm, and call for help.
  - The only time you should try and get out of the cab is if the excavator catches fire.

- **If you see an excavator come in contact with power lines while you're on the ground, do not approach it.**
  - This will only put you at risk, too.
  - Instead, talk to the driver by phone or radio if you can and tell them to stay where they are.
  - Then, call for help.

*** * * SUMMARY * * ***

- **Excavators typically have a cab, bucket, boom, and "track" system, but some do have wheels instead of tracks.**

- **There are many types of excavators, including standard, dragline, long-reach and mini excavators.**

- **When excavators are overloaded or operated on "unsafe" ground, they can tip over. So you need to know your excavator's limits before you operate it.**

- **You should always drive with an excavator's bucket on the "high side" when going up a hill.**

- **"Struck-by" and "crushing" accidents, as well as "collisions" are all common hazards associated with working with excavators.**

- **Now that you understand how excavators work and the hazards you can encounter when using them… you and your coworkers can go home safe at the end of every day.**