

# Mitigating Challenges to Make the Most of Trenchless Installations

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Organizations installing pipelines, conduit and electrical cables in dense urban environments are increasingly leveraging trenchless methods to minimize project impacts. While there are numerous benefits to be gained, trenchless technologies come with their own challenges and risks. Engineers experienced with trenchless technologies can plan and design ways to mitigate the complications.



The majority of trenchless installations in the electrical cable sector occur in urban areas, where the density of buildings and infrastructure makes traditional trenching methods especially difficult and disruptive. Trenchless methods such as horizontal directional drilling (HDD) and pipe jacking are often used to install electrical cable in densely populated areas because these methods minimize the amount of excavation required and reduce the potential impact on existing infrastructure.

Trenchless cable installation can be used for both new construction and upgrades of existing systems. For new construction, trenchless methods can be used to install cables in areas where traditional trenching would be difficult, such as under roads and rail tracks, and in areas with high existing utility density. For upgrades of existing systems, trenchless methods avoid or minimize disrupting existing infrastructure or services.

Additionally, trenchless technologies can be used to install cables in environmentally sensitive areas such as wetlands, cultural sites, and other areas where traditional trenching methods would have a negative impact on the ecosystem.

Applications of trenchless technologies are becoming increasingly popular because it enables efficient, cost-effective and nondisruptive installation of electrical cable in urban and environmentally sensitive areas. That doesn't mean it's easy; installation of pipelines or conduits can still run into difficulties, but those challenges can be overcome.

## Addressing Urban Complexities

Installing pipelines or conduits in congested areas using trenchless technology can be challenging for a few reasons. There might be limited access to the installation site due to the density of buildings and critical infrastructure. This can make it difficult to bring in equipment and materials and can impose limits on the space available for excavation and installation. Additionally, it can be complex to locate existing underground utilities and avoid potential conflicts during the installation process. Soil conditions in urban areas can be highly variable and less predictable than in rural areas, making it challenging to select the appropriate trenchless technology for the job. Finally, urban population density can create multiple logistical challenges in terms of traffic control, noise and dust control during installation.

There are several ways to mitigate these challenges, including:

- Careful **planning and coordination** with local authorities and utility companies can help identify potential conflicts and access issues before construction begins.
- Conducting thorough **site investigations** can help identify issues with soil conditions, underground utilities and other factors that could impact the installation process.
- Utilizing **noninvasive methods** such as HDD or pipe jacking can minimize how much excavation is required and reduce the potential impact on existing infrastructure.
- Implementing a **traffic management** plan can minimize disruptions to traffic flow and reduce the impact on local businesses and residents.
- **Communicating** with residents, businesses and local authorities about the project can help mitigate objections to noise and dust during construction.
- **Selecting the most appropriate trenchless technology** based on the soil conditions, site constraints and other specific requirements of the project can help improve the likelihood of success.
- Properly **managing environmental impacts** such as soil erosion and water quality can help to minimize how the project affects the local ecosystem.

## HDD Risks and Resolutions

Using HDD beneath streams, roadways and rail offers significant advantages over traditional trenching methods, but it also comes with several risks.

HDD drilling fluid and cuttings can potentially spill and be released into nearby streams, rivers or wetlands, with negative impacts on water quality and wildlife. The drilling could cause surface subsidence, which can damage roadways, rail tracks and other surface infrastructure. There are other environmental risks in less urban environments, such as habitat destruction and impact on local wildlife. HDD drilling might require additional permits and compliance with environmental regulations, increasing the cost and complexity of the project.

Damage to underground utilities, such as gas and water lines, is possible and could pose safety hazards or cause service disruptions. Drill bit deviation from the intended path can make it difficult to successfully complete an installation. There is also potential for a cross-bore, which is when a drill hole intersects with an existing underground utility, which also can cause safety hazards or disrupt service.

HDD advantages can come at a price: The drilling can take longer and can be more expensive than other trenchless methods, and it may cause delays in the construction process.

It is important to have a detailed assessment of the site, soil conditions and other factors that may impact the project — as well as to implement appropriate safety and environmental measures during drilling — to minimize these risks.

Having an engineer experienced with trenchless technology involved during the feasibility, design and construction phases can help reduce the risks. An experienced trenchless engineer can:

- **Conduct a thorough site investigation:** This will identify potential issues with soil conditions, underground utilities and other factors that could impact the installation process and minimize the risks.
- **Select the appropriate technology:** Choosing the most appropriate HDD installation method for the job — based on the soil conditions, site constraints and specific requirements of the project — will minimize the risk of drill bit deviation.
- **Develop a detailed drill plan:** The plan should include measures to minimize the risk of fluid and sediment spills, damage to underground utilities, and surface subsidence.
- **Implement appropriate safety measures:** This is essential to reduce the risk of accidents and injuries.
- **Achieve compliance with regulations:** The engineer will see that the project complies with relevant regulations, including environmental regulations, and can help obtain the necessary permits.
- **Communicate and coordinate:** Open dialogue with local authorities and utilities will minimize potential conflicts and disruptions during installation.
- **Monitor and manage the construction:** An experienced trenchless engineer can help to monitor and manage the construction process to see that all safety and environmental measures are being followed and to identify and address issues that arise during the installation.
- **Troubleshoot and solve problems:** When issues arise during the construction process, an experienced professional can help reduce delays and additional costs.

The trenchless engineer will bring knowledge and skills that can reduce risks and clear a path toward a successful installation while protecting the environment and the community.

## Putting Heads Together

Coordination between the engineer and the contractor early in the design process offers many benefits when trenchless technology is being applied.

Potential issues can be identified and addressed early in the design process. Whether the issues involve soil conditions, underground utilities or other factors that may impact the installation process, early identification can facilitate cost-effective solutions, reducing the potential for change orders and additional costs.

Improved communication between the parties helps keep everyone on the same page about the project requirements, schedule and budget. It gives the contractor better understanding of the project requirements and constraints, which helps reduce the risk of delays and additional costs.

Early coordination enables better use of each party's specialized knowledge as the engineer and the contractor work together to identify the optimal solution for the project. Overall project management is enhanced through better planning, coordination and communication. The results are successful installation and a more efficient, cost-effective project.

It is important to note that trenchless crossing designs can be complex and challenging projects that require a high level of knowledge and experience to attain successful completion. If a project is not designed and executed properly, it can lead to a number of problems similar to those previously listed, including:

- Drill bit deviation
- Damage to underground utilities
- Surface subsidence
- Environmental impacts
- Cost and time overruns
- Permit noncompliance

A well-designed and executed trenchless crossing will minimize these risks. An engineer experienced with trenchless installations can help identify potential issues early on, then design and execute the crossing in a way that reduces risks and increases the chances of a successful outcome.

## Conclusion

Using trenchless technology has become an increasingly popular method for installing pipelines and conduits in congested urban areas, as well as in environmentally sensitive areas. Options such as HDD and pipe jacking can minimize the amount of excavation required and reduce the potential impact on existing infrastructure. However, installing pipelines or conduits in congested urban areas using trenchless technologies can be challenging because of limited access to the installation site, the presence of existing underground utilities and infrastructure, and the high population density in urban areas.

Having an experienced trenchless engineer involved during feasibility, design and construction phases can help mitigate these challenges and minimize the associated risks to help complete the project in a safe, efficient and cost-effective way that also protects the environment and the community.

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