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A Review of Applications of Trenchless Technology

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ABSTRACT:-Trenchless technologies cover a wide range of methods of installing new cables, pipes, ducts and small-diameter tunnels in the ground without open excavation between the start point and end point. For the smaller sizes, the installed structure is of circular cross-section, but for larger sizes in suitable ground conditions non-circular sections may be possible. The larger-size installations at substantial cover depth provide an alternative to conventional tunneling methods, while at shallow depths trenchless technologies usually compete with installation in open trench. For small-diameter pipes, techniques such as microtunneling and directional drilling provide the only economic methods of installation at depth. Trenchless technologies also include various methods of on-line replacement and renovation of existing pipes and ducts. A useful summary of the methods available is provided in Trenchless Technology Guidelines, produced by the International Society for Trenchless Technology (ISTT).

I.INTRODUCTION

Trenchless technology is the science of installing, repairing and renewing underground Pipes, ducts and cables using techniques which minimize or eliminate the need for excavation. It can reduce environmental damage, social costs and produce an alternative to open trench method of installation, renewal and repair.

Construction and repair work carried out from the surface inevitably disrupts traffic, business and other services. This disruption has a negative impact on the local environment in terms of air Sewer Line (Both Installation & Repair), Telecommunication Cables

•Gas Lines, Electric Lines, Water Lines and other service lines

quality, noise, and other pollution, as well as on local vegetation and buildings.

This, in turn, diminishes the quality of life for local residents. The provision and maintenance of safe and efficient utility services requires more environmentally sound technologies and approaches to ensure public support. Furthermore, trenchless technologies can take advantage of existing pipeline materials and can minimize wastes caused by earth and pavement excavation.

When there is a need for pipe rehabilitation in the middle of a busy intersection, trenchless technology allows you to repair the pipe without having to dig up the entire road.

Not only does this eliminate traffic problems, but it saves money because you do not need to repair the road that you would normally have dug up.

Trenchless technology is also used to minimize environmental damage and to reduce the costs associated with underground work. Trench less technology is basically making a tunnel below the surface and installing service lines like water or gas pipes, electric or telecommunication cables etc. without any disruption to the public.

II.APPLICATIONS OF TRENCHLESS TECHNOLOGY

•Sewer Line (Both Installation & Repair), Telecommunication Cables

•Gas Lines, Electric Lines, Water Lines and other service lines

•To install the utilities under rivers, canals and other obstacles with no disruption of flow

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- Gas Lines, Electric Lines, Water Lines and other service lines.
- To install the utilities under rivers, canals and other obstacles with no disruption of flow and with minimum or no damage to the environment & also across railway track, narrow lanes etc., when open trenching is impossible.

III.TRENCHLESS TECHNOLOGY APPLICATIONS: NEW CONSTRUCTION

➢ **Microtunnelling:-**

- Microtunnelling is a more advanced form Pipe jacking, using a separate miniature TBM and controlled from the surface.
- Specially designed pipes are jacked in behind the machine, which uses theleading pipe face to push forward as it cuts
- Initially used for large gravity sewers of 500mm diameter and upwards in Japan where a high degree of accuracy was required, the method has been further developed for the installation of PVC ducting down to 150mm diameter.
- Another recent development has made it possible for curved driving when using Microtunnelling

➢ **Pipe Jacking:-**

- There are many variants of Pipe jacking, in which the product pipe is forced into the ground by jacks mounted horizontally in a launch shaft. The run is completed when the pipe string reaches an exit shaft. Both shafts are often used later as service access points.
- The equipment used for Pipe jacking is sometimes termed Tunnel Boring Machine (TBM).
- TBMs can be categorised as: Auger TBM, in which the soil is removed by an auger through the incoming pipe. Slurry TBM, in which the soil and ground water are removed by pumping as slurry.

➢ **Horizontal Auger Boring:-**

- A technique for forming a bore from a drive pit to a reception pit, by means of a rotating cutting head. Spoil is removed back to the drive shaft by helically wound auger flights rotating in a steel casing.
- The equipment may have limited steering capability. See Guided Horizontal Auger Boring.

➢ **Pipe ramming:-**

- A technique for installing steel casing from a drive shaft to a reception shaft utilizing the dynamic energy from a percussion hammer attached to the end of the pipe.
- A continuous casing support is provided and over-excavation or water is not required.

➢ **Horizontal directional drilling:-**

- A steerable system for the installation of pipes, conduits, and cables in a shallow arc using a surface launched drilling rig.
- Traditionally HDD is applied to large scale crossings such as rivers in which a fluid filled pilot bore is drilled without rotating the drill string, and this is then enlarged by a wash over pipe and back reamer to the size required for the product pipe.

IV.ADVANTAGES OF TRENCHLESS TECHNOLOGY

- It reduces the impact on the environment.
- It reduces damages of valuable surface.
- It saves underground space (pipe busting).
- It reduces the danger of improperly compacted excavations.
- It saves resources.
- Without disturbing the traffic and life on the surface, the lines can be laid below ground in a much shorter time by using this technology.
- It is accident free.
- It avoids traffic jam.
- It provides the hassle-free road surface.
- It makes the use of the line (track) of the old pipe possible
- Presence of a canal, pond, river etc. across the root poses no problems to the trench less technology systems.
- It is possible to lay service lines across railway track, narrow lanes etc., where open trenching is impossible.
- For replacement, repair and rehabilitation of old water and sewer lines in cities, it is very helpful to use trench less technology without disturbing the normal life on the surface (to replace defective pipelines).
- Transfers services from above ground to below ground.
- Increases existing network capacity.

V.CONCLUSIONS

a)Trenchless technology has therefore pushed back the boundaries of all forms of

underground work required to support human settlements. Where previous work was limited to the depth dictated by safe open cut methods, depth is no longer the limiting factor. Where services already exist, they can be refurbished; and where new services are required, they can be constructed beneath the existing infrastructure. The ability to "renew‖ and optimise rather than construct additional underground services has clear environmental advantages by retaining our available resources and there by keeping the earth unexcavated.

b)Heavy transmission losses:

When we look at old lines there is a high possibility that due to ageing or other factors they might have developed leaks leading to heavy transmission losses. This technology would prevent such a loss of substantial amount of treated water in ground due to leaking mains.

c)Sewer & Pollution Control:

Sewer lines again face the similar fate. The only difference in this case is that the infiltrated sewerage gets mixed-up with the precious ground water and making it contaminated. Trenchless technology would be an efficient tool to prevent such cases.

d)Power & Telecom:

Today the power transmission and distribution lines are being transferred from their over-ground locations to subsurface locations. By development of these networks by open cut excavations, can destroy the existing urban setting. Trenchless technology can be the best solution.

e)With all around developments in various fields like petrochemicals where conveyance of gas, crude and refined products over long distances is common, telecommunication and power, water supply and sewerage etc. and mushrooming growth of high- rise buildings in and around the cities is becoming increasingly necessary that these lines are laid underground leaving space above surface comparatively free. i.e., adoption of trench less technology is the only remedy.

f)Also if costs benefit analysis of the two systems (i.e. open trenching methods and trenchless technology methods) is conducted, considering both direct and indirect costs, it will help us make informed divisions on technology selection, under different circumstances.

g)There is an availability of a growing number of qualified and knowledgeable personnel at all levels. But there is both a lack of knowledgeable skilled people and no real formal system of training and education in the sector.

REFERENCE

[1]. Centre for Advancement of Trenchless Technologies (CATT), University of Waterloo, Ontario, Canada (Link: www.civil.uwaterloo.ca/catt).
[2]. Indian Society for Trenchless Technology (IndSTT), (Link: http://www.indstt.org).
[3]. IETC Urban Environment Series, ―Trenchless Technology Systems: An Environmentally Sound Technology for the Installation, Maintenance and Repair of Underground Utility
[4]. International Societyfor Trenchless Technology (ISTT), London, UK, (Link: www.istt.com).
[5]. Jagadish Chandra, ―Trenchless Technology in India: Need of the new millennium.‖ Civil Engineering and Construction Review October 2000- page 48.
[6]. Maninder Singh, ―Techniques of TrenchlessTechnology in Use in India.‖ Civil Engineering and Construction Review October 2004- page 43.
[7]. NeerajaLugani Sethi, ―Pre- Requisites for Trenchless Technology‖, Civil Engineering and Construction Review October 2000- page 21.
[8]. Najaf, Mohammad. 2005. Trenchless Technology, McGraw-Hill Professional.
[9]. Sarkar A.K, ―Trenchless Technology and INDSTT in India.‖ Civil Engineering and Construction Review October 2000- page 13.
[10]. Steve Orchad, ―Directional Drilling and Associated Technologies‖, No-Dig International Journal, November 2008.