Trenchless Advisory Assistance

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TAA Introductory Brochure
&IndSTT Capability Statement

TRENCHLESS ADVISORY ASSISTANCE

A major national advisory capacity building initiative of
Indian Society for Trenchless Technology
to address subsurface infrastructure construction issues faced in the development & management of subsurface utility networks and appurtenant structures

CONTENTS

ASSISTANCE RANGE

Under this initiative, IndSTT provides advisory assistance for

Institutional Capacity Building,

(Operating Procedures, Specifications, Skilling &Qualifying Conditions)

Area/Region Development Assistance

(CDP, FS, DFR, DPR, Technology Selection)

Project Linked Advisory Assistance,

(FEED, Contracting, Third Party Assistance, Conclusion and Recordings, Arbitral)

1. Executive Summary

Trenchless technology involves the installation, replacement, or renewal of subsurface utilities and appurtenant structures with minimum excavation and surface disruption. For utility or public right of way owners, this technology provides Environmentally Sound Solutions for creating, maintaining, and managing buried utilities to transfer water, sewer, oil & petrochemicals, and conduits for power and telecom networks.

Primarily, construction methods that do not require excavation of continuous trenches are termed as trenchless. There are several construction techniques and methods that qualify as Trenchless, and their application requires adequate engineering inputs.

Trenchless technologies are used as a construction option in urbanized areas with heavy vehicular and pedestrian traffic and numerous existing underground utilities where open cut excavations are difficult or impossible at times. In addition, trenchless is an attractive option for crossing highways and other transportation corridors, and rivers and waterways. Trenchless is also an option to be used to work for subsurface construction in environmentally sensitive areas and locations where surface access may be restricted or prohibited even.

Trenchless technology applications are of the state-of-art in nature. Each project must be executed considering the project requirements and site conditions. Utility in question requires proper engineering inputs, suitable working methodology, capable equipment compliment, appropriate materials, and execution skills. Proper consideration of all these are essentials for the project success.

In the context of Indian needs, where about one sixth of the humanity resides, the benefits of using trenchless technology are numerous and varied. However, these could be accrued adequately, only if the project is properly executed.

Since these techniques are relatively young and their origins are normally offshore nations, inadequate sensitization, and often deficient working knowledge in executing Indian agencies are expected. Such

limitations, in turn, could result in application of unsuitable processes and methodologies leading to erroneous execution, and at times, project failures even.

Current need, therefore, is to provide adequate advisory support to executing agencies in three main areas: Institutional Capacity Building, (Operating Procedures, Specifications, Skilling & Qualifying Conditions), Area/Region Development Assistance, (CDP, FS, DFR, DPR, Technology Selection) Project Linked Advisory Assistance, (FEED, Contracting, Third Party Assistance, Conclusion and Recordings, Arbitral). It is expected that with these inputs in place the utility or the right-of-way owners could get their projects properly executed.

To cater to this need IndSTT is offering its advisory assistance services to utility owners jointly with its vast network of national and international expert associates. This advisory assistance evaluates every project on its own requirements and owner requirements, also the ground conditions, pre-existing utilities, topography, and other site requirements.

This document briefly discusses details about IndSTT**,** Advisory Service Range offered, IndSTT network, Memoranda of Understanding / agreements, IndSTT credentials, and CORE ADVISORY INPUTS available from IndSTT, and invites the reader to interact with IndSTT for these services.

2. About Indian Society for Trenchless Technology (IndSTT)

Indian Society for Trenchless Technology (IndSTT) is the apex organization to promote the application and nurture the growth of Trenchless Techniques in India. It was registered in 1998, as a direct sequel of the recommendations from a Committee of Ministry of Urban Affairs, Government of India in 1995.

It is governed by a Governing Council comprising of several ex-officio nominees from various Govt. departments and private sector. For more than two decades, we have been making relentless efforts in popularizing the trenchless technology in India and have been able to achieve enormous recognition and respect for its technology promotional efforts.

The composition of IndSTT Governing Council is as follows:

Chairman, INDSTT	**Dr. P R Swarup** Director General, Construction Industry Development Council
Vice Chairman, INDSTT	**Lt Gen Harpal Singh** PVSM, AVSM, VSM, ADC Engineer-in-Chief, Army Headquarters
Treasurer, INDSTT	**Mr. Somnath Ghosh** Former CMD, NRDC
Director General	**Dr. Niranjan Swarup** Director General IndSTT

Members Governing Council, IndSTT

Dr. P S Rana Former CMD, HUDCO	**Mr. Divakar Garg** Former Director General, CPWD
Mr. K B Dubey Former Director (Projects) NTPC	**Mr. S M Kava** Proprietor, Urmi Enterprise, Engineers & Consultants
Mr. V. Suresh Principal Executive Officer HIRCO	**Mr. S.K. Chaudhary** Former CMD IRCON
Mr. Ehteshamul Haque Director – Asia Pacific Digital Control Inc.	**Dr. Sanjay Rana** Director PARSAN Overseas (P) Limited
Mr. V.K. Mangalik Consultant	**Mr. Gagan Aggarwal** Creative Entrepreneurs LLP

Mr. Rajesh Sharma M/s L.R. Sharma & Co.	**Mr. Saurin M. Patel** Director, Michigan Engineers Pvt. Ltd.,
Mr. V.S. Thind Retd. Chief Engineer, Delhi Jal Board,	**Mr. N. L. Garg** Director Gypsum Structural India Pvt. Ltd.
Mr. C.S. Prasad Chief Advisor, Engineering Projects (India) Ltd. Former Director General, CPWD	**Mr. Akhilesh Kumar Srivastava** Chief General Manager (Technical) National Highway Authority of India (NHAI)

Society has been established to work for the Technical Advancement of Trenchless Technology; Promote the use of Trenchless Technology; Professionalize Trenchless Technology sector; Sensitize Stakeholders about Trenchless Technology; Disseminate Information about Trenchless Technology; Support the Research & Development activities of the Sector; Promote Education in the Sector; Provide Platform for Networking and all other related activities.

Today the Society has various memoranda of associations with various organizations of the Industry both National as well as International. Prominent of them are MoUs with CURIE, University of Texas, US, IKT - Germany, ICC, CPWD, Construction Industry Development Council, Engineering Council of India, IRCON, SAARC CIC, and Louisiana Tech University, US, apart from others.

Since inception, IndSTT has taken several programmes for creating awareness amongst potential user departments and for adoption of Trenchless technology in India. It publishes the Schedule of Rates for Trenchless Technology regularly with the current edition being the 14th edition. These rates are adopted for most of the trenchless projects in India.

3. Advisory Service Range

Under the initiative we develop and offer tailored, innovative and comprehensive solutions for specific utility client requirements. Led by sector specific professionals, academicians, researchers, the main objective of offering trenchless advisory services is to bring more focus to the value proposition by delivering a broader range of advisory services and competencies. Our advisory assistance evaluates every project on its own requirements and client specifications, as well as ground conditions, existing utilities, topography and other asset owner requirements.

Under TAA, IndSTT offers a full range of services to help clients tackle challenges faced in substantial development and management of subsurface utilities. This advisory assistance addresses three main phases of the engineering of subsurface utilities, viz. Institutional Capacity Building, Area/Region Development Assistance, and Project Linked Advisory Assistance.

Institutional Capacity Building

Under this category the services are aimed at cultivating the institutional capabilities of the executing agencies. Through these services the utility or the right-of-way owners can create, maintain and upgrade their existing project management systems. Most common services in this segment include the following:

- Development of Standard Operating Procedures for various activities;
- Systems for defining specifications of works and structures;
- Systems for technology evaluation & selection;
- Technical Skilling of working engineers & other professionals serving the utility owners & their contractors; &
- Establishment of Project/Services Qualifying Conditions.

Area/Region Development Assistance

Under this category of services, macro project implementation processes for a larger area/region linked with the master plan are addressed. These advisory services assist the utilities to prepare their long term plans and help them to engage in proactive maintenance activities. Most common services in this segment include the following:

- City Development Plans;
- Feasibility Studies;
- Detailed Feasibility Report;
- Detailed Project Report;
- Trenchless Technology Selection.

Project Linked Advisory Assistance

We offer advisory assistance during planning, contracting, execution, and conclusion stages of a project.

A. Planning Stage

These start with the Front End Engineering Design (FEED) and comprises of the following subsections:

Technology Selection
Feasibility Studies & Reporting
Detailed Project Report Development
Techno-Economic Analysis

B. Contracting Stage

Development of Contract Conditions/Bidding Documents
Managing/Participating in Bid Meetings/Negotiations
Award of Work Assistance

C. Execution Stage

Project Supervision
Third Party Inspection

D. Conclusion Stage

Project Conclusion & Contract Closure Assistance
Arbitration & ADR Assistance

4. Network

IndSTT has a vast network of members who are practicing in trenchless sector. It has understandings with several international and domestic Universities and Institutions engaged in major R&D activities in Trenchless sector. It is an integral part of the Indian Engineering Industry and works with the fraternity through its engineering network comprising of Engineering Council of India, Construction Industry Development Council, and International Council of Consultants apart from others. In addition to the members, IndSTT network spans the globe with most of the major trenchless technologists, manufacturers, and suppliers rendering their services and wares to Indian Subsurface construction markets being a part of NoDig India initiative of IndSTT. NoDig India initiative includes an annual networking event organized by IndSTT in India that assists the trenchless stakeholders, both Indian as well global and the utility owners to discuss their issues and workout technical/techno-commercial solutions.

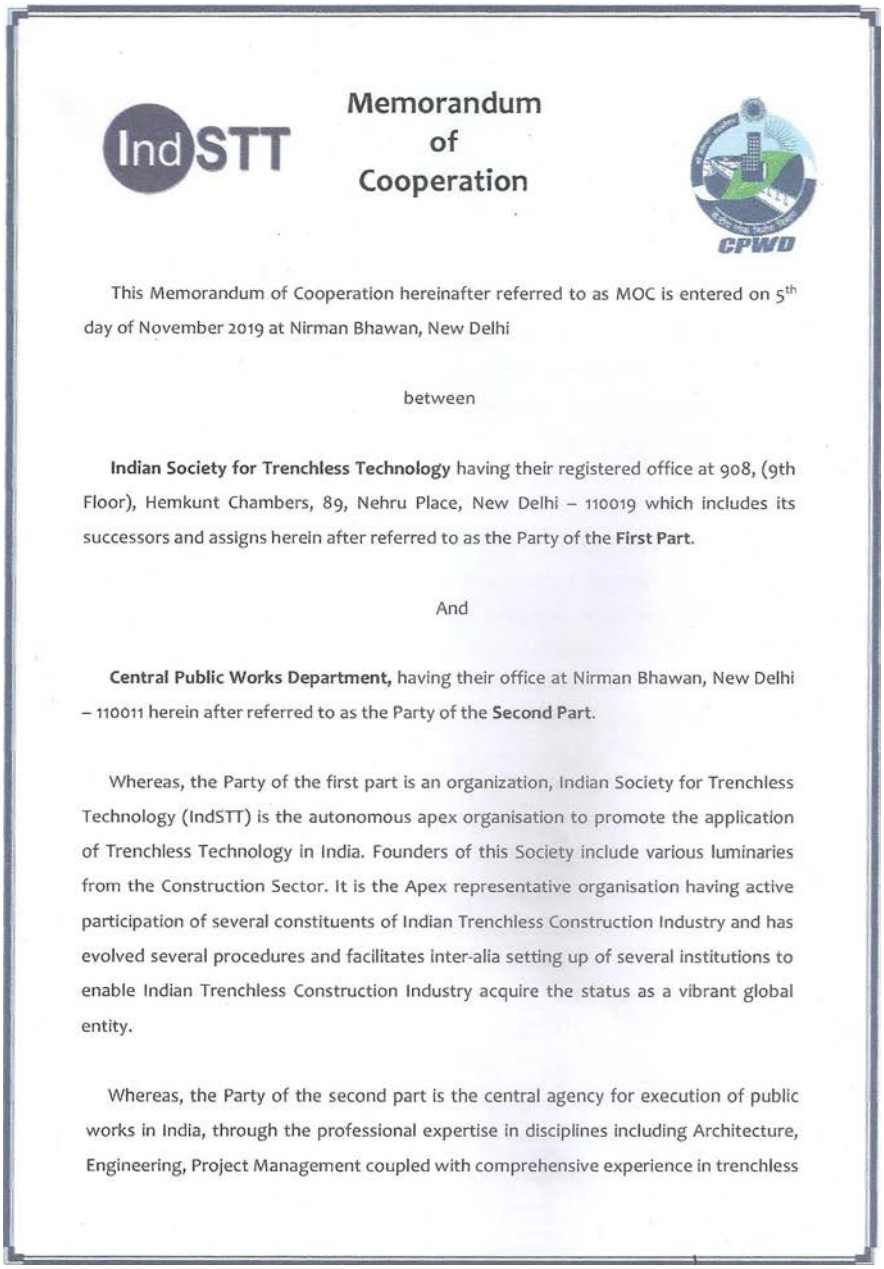
The TAA services are rendered both through in-house inputs as well as through the Global IndSTT Network.




5. Understanding / Agreements

Today the Society has various memoranda of associations with various organizations of the Industry both National as well as International. Prominent of them are MoUs with CURIE, University of Texas, US, IKT - Germany, ICC, CPWD, Construction Industry Development Council, Engineering Council of India, IRCON, SAARC CIC, and Louisiana Tech University, US, apart from others.

Apart from these MoU's society has number of Student Chapters of engineering institution acting as the point of contact and research works for the society as and when required.



IndSTT

Memorandum of Cooperation

CPWD

This Memorandum of Cooperation hereinafter referred to as MOC is entered on 5th day of November 2019 at Nirman Bhawan, New Delhi

between

Indian Society for Trenchless Technology having their registered office at 908, (9th Floor), Hemkunt Chambers, 89, Nehru Place, New Delhi – 110019 which includes its successors and assigns herein after referred to as the Party of the **First Part**.

And

Central Public Works Department, having their office at Nirman Bhawan, New Delhi – 110011 herein after referred to as the Party of the **Second Part**.

Whereas, the Party of the first part is an organization, Indian Society for Trenchless Technology (IndSTT) is the autonomous apex organisation to promote the application of Trenchless Technology in India. Founders of this Society include various luminaries from the Construction Sector. It is the Apex representative organisation having active participation of several constituents of Indian Trenchless Construction Industry and has evolved several procedures and facilitates inter-alia setting up of several institutions to enable Indian Trenchless Construction Industry acquire the status as a vibrant global entity.

Whereas, the Party of the second part is the central agency for execution of public works in India, through the professional expertise in disciplines including Architecture, Engineering, Project Management coupled with comprehensive experience in trenchless

6. Credentials

IndSTT has rendered technical advisory assistances to several projects. Prominent of those include the following:

1. Kohima Bulk Water Transmission Project
2. Airport Runway Lighting projects for various Indian Airports
3. Standard Operating Procedure for Road Cutting Permission, PWD, New Delhi
4. Trivandrum Stormwater Drainage Project
5. Bandra Kurla Carshed Railway Crossing
6. Ta-Prohm Temple, Angkor Wat, Stormwater Drainage Project
7. Trunk Sewer, BRT Corridor, Indore Project
8. Economic Feasibility of Subsea Pipeline Project
9. Shrirangam Temple Drainage Project
10. Dal Lake Sewer Project
11. Indrayani River Crossing, Chakan, Pune
12. Technical assistance and advisory services for North Eastern Electric Power Corporation Limited (NEEPCO) for the rehabilitation of Penstocks of Kameng HE Project, Kimi, Arunachal Pradesh

Brief details of each project are presented hereafter:

1. Kohima Bulk Water Transmission Project –

SIPMIU, Kohima, Government of Nagaland had assigned the Detailed Project Report (DPR) preparation of ADB financed Bulk Water Supply Project for Kohima. IndSTT assistance is focussed developing an optimum solution of tunnelling works for transmitting bulk water from Dzukou River to Kohima city under a mountain range. The tunnel proposed in the feasibility report was of 4.1 m dia as the identified technique was TBM initially. Since the Japfu Range separates the river intake and the water stilling tank that needed to be crossed by pipeline of 500mm dia. The larger dia was superfluous and had to be optimized. This anomaly was rectified by changing the technique to Horizontal Directional Drilling. This change also afforded the project owner in reducing the construction duration from 4 years to 18 months and related costs substantially.

2. Airport Runway Lighting Projects for various Indian Airports –

The TATA Power Company Ltd., Strategic Electronics Division, engaged Indian Society for Trenchless Technology (IndSTT) for developing the Working Methodology for Creation of Subsurface Cavities for Airport Runway Illumination system through trenchless technology. Subsurface housing for power supply cables, developed through conventional cut and cover duct installation process, as attempted earlier, had been leading to the damage of the surface of the runways. To avoid this damage and consequential apron repair costs, and mitigate the future risks, IndSTT proposed using Horizontal Boring technique with special state-of-art alterations to meet the Airport owners' requirements without inflicting much damage on the runway structure.

3. Standard Operating Procedure for Road Cutting Permission, PWD, New Delhi –

Public Works Department, Delhi Government (PWD) engaged IndSTT for developing the Standard Operation Procedure for granting Road Cutting Permissions for Trenchless Projects on the roads under its maintenance. PWD had observed that after completion of works by Trenchless Technology, roads at many places settled / caved-in, resulting in damage to the road structure, due to improper execution and lack of supervision. Faults identified were application of unapproved techniques, application of faulty estimation systems, engagement of untrained or under-trained operators, faulty operational activities, and lack of adequate supervision and As-build documentation. IndSTT developed the standard operating procedure to address such faults through Standardized Trenchless operations.

4. Trivandrum Stormwater Drainage Project –

Trivandrum city receives significant rainfall during monsoon season and the capacity of existing storm water drainage system has become inadequate now. In order to meet the storm water loading requirements and upgrade existing drainage system in the city, Kerala Sustainable Urban Development Project, sought support of IndSTT in technique selection, project parameter identification, work specifications, schedule, and pre-qualification and bidding condition development, and promoting the project to the trenchless service providers for their "Storm Drainage - Phase II, Improvements to PazhavangadiThodu and Thampanoor Area and Diversion Works". As per the requirements tender documents for 2500mm ID Microtunneling and Pipe Jacking were prepared.

5. Bandra Kurla Carshed Railway Crossing –

Indian Railways was assisting Municipal Corporation of Greater Mumbai for the work of widening of existing nallah by providing 5 nos. of 1800mm dia RCC pipe by Microtunneling&Pipejacking under railway tracks at Kurla. Due to conflicting requirements of pipe invert levels, Indian Railways & MCGM needed technical advice. IndSTT provided the same and the solution proposed was Inverted Siphon.

6. Ta-Prohm Temple, Angkor Wat, Stormwater Drainage Project –

WAPCOS Ltd. under the commission of Archaeological Survey of India, appointed IndSTT to prepare the tender documents and execution plan of drainage system for Ta Prohm Temple Complex, Phase-1, Angkor Wat, Siem Reap, Cambodia by trenchless technology method. Project was aimed at relieving the temple complex of long bouts of water logging experienced during the rainy season due to absence or non-functioning of existing drainage system. Project challenges included the site inaccessibility, lack of maneuverable space, collapse of historic drainage system, growth of rubber plants and their roots clogging the subsurface region, and the client's requirement of protecting the entire environment. To overcome these challenges, IndSTT selected the Forward Reaming variant of Horizontal Directional Drilling technology and prepared the tender documents.

7. Trunk Sewer, BRT Corridor, Indore Project –

Indore Development Authority had planned to lay of sewerage main trunk under BRTS, Indore. At many of the locations, planned conventional open-cut method was unable deliver due to several impediments like hard rock, illegal occupation by squatters, heavy & continuous traffic movement at road junctions, presence of existing underground utilities etc. IDA sought support of IndSTT in finding solutions for such

impediments. After a detailed site analysis, IndSTT proposed Microtunneling & Pipe Jacking, &HDD with several other trenchless methodologies for cavity creation and Plasma Rock Breaking for removal of hard rock patches.

8. Economic Feasibility of Subsea Pipeline Project –

One of the major international oil company requisitioned services of IndSTT for conducting a desktop study for evaluating comparative economic impact of application of different trenchless technologies for subsea pipeline projects. IndSTT prepared the detailed feasibility report for installing proposed pipeline through Microtunneling & Pipe Jacking method from the designated place on shore to the required locations in offshore. In the study, option of HDD also was proposed and considered to the extent possible keeping in view of the limitation for adopting HDD for the higher diameter of the pipeline. The report covered the cost and time required for tunnelling in varied draughts & geotechnical conditions.

9. Shrirangam Temple Drainage Project –

Sri Ranganathaswamy Temple, Srirangam, Tiruchirappalli, Tamilnadu, is a major pilgrimage destination and one of the largest temple complexes in India. Temple and its surrounding have ancient open drainage system confined by seven majestic Rampart Walls. Foundations of temple rampart wall are getting corroded due to caustic action of effluent being drained. For wall protection, drain coverage has become a necessity as the wall cladding is experiencing successive collapsing. Chennai Municipal Administration and concerned Urban Local Bodies sought guidance of IndSTT for a trenchless solution to convert the open drains to underground sewerage system since conventional construction methods were not possible due to risks and dense urban agglomeration around the temple complex. Based on project requirements, IndSTT proposed 4 different trenchless methods to suit the specific site condition.

10. Dal Lake Sewer Project –

IndSTT provided the contractual assistance for bidding of the work of Construction of Trunk Drain, Main Drain, Sub Mains, Pipe Jacking and Drainage Road Crossing along National Highway Bypass Srinagar being executed by J&K Economic Reconstruction Agency. The project was aimed toward reducing the pollution in Dal Lake.

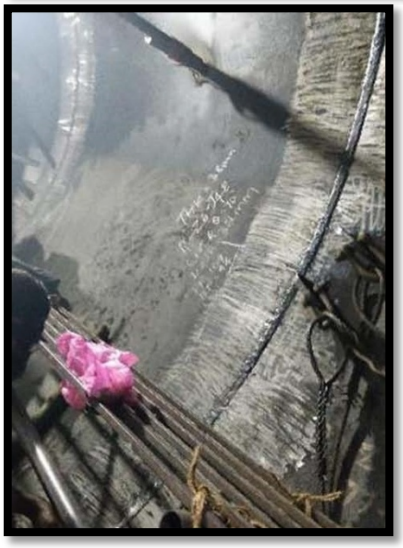
11. Indrayani River Crossing, ChakThean, Pune –

Under the direction of Hon. High Court of Maharashtra, Pune Bench, IndSTT provided the dispute resolution assistance to the trenchless contractors and the utility owners for their trenchless project related disputes. After inspecting the project site, where HDD crossing of 10" NB gas pipeline and associated works for Indrayani River, Chakan, Pune, had been executed, and receiving the rejoinders from both the parties, IndSTT submitted its opinion to concerned arbitrator and the parties.

12. Technical assistance and advisory services for Rehabilitation of Penstocks

North Eastern Electric Power Corporation Limited (NEEPCO) engaged IndSTT for providing advisory services for the rehabilitation of Penstocks of Kameng HE Project, Kimi, Arunachal Pradesh. The penstocks of the powerhouse had developed cracks due to high pressure and were unable to hold and convey water to the hydro-generators. Dimensions of the penstocks, both length as well as the diameter were extremely

high, and the number of ruptures was again huge. A rehabilitation process to cater internal pressures of 9 bars made the requirements too difficult and the solution proposed was to adopt the Carbon Fibre Reinforced liners application.



7. Core Advisory Inputs

IndSTT, in the last twenty years, has emerged as one of the major technical organizations of the nation. In trenchless sector, it is one of the leading global organizations with 7 Codes of Practice, 29 technical reference books, 5 operation manuals, substantial number of technical papers & presentations to its credit. In addition, it is involved in developing and promoting more books & materials on the subject. Our Schedule of Rates for Employing Trenchless Technology is being widely used by various public and private sector institution for their project cost estimation. It is also adopted by many Government/Public agencies prominent of those include Delhi Jal Board, and National Mission for Clean Ganga apart from others. Such publications include the following:

1. Basics of Trenchless Technology
2. HDD Good Practices Guidelines
3. Microtunneling & Pipe Jacking Good Practices Guidelines
4. Rehabilitation Methods
5. Replacement Methods
6. Trenchless Technology & Subsurface Construction (SSTT)
7. Subsurface Asset Development Guidelines (SSAD)
8. Subsurface Asset Administration (SSAA)
9. Subsurface Asset Termination (SSAT)
10. Safety Issues in Subsurface Networks Development & Management
11. Waste Management & Trenchless Technology
12. Pipeline Condition Assessment
13. Training Manual for HDD Operation
14. Training Manual for Microtunneling Operation
15. Training Manual for Moling Operation
16. Training Manual for Pipe Bursting Operation
17. Training Manual for Pipe Ramming Operation
18. Code of Practice for Cured in Place Pipe Technique Suiting Indian Conditions (2nd Revised Edition)
19. Code of Practice for Pipe Bursting Suiting Indian Conditions (2nd Revised Edition)
20. Code of Practice for Horizontal Directional Drilling Suiting Indian Conditions (3rd Revised Edition)
21. Code of Practice for Microtunneling & Pipe Jacking Suiting Indian Conditions (2nd Revised Edition)
22. Code of Practice for Glass Reinforced Pipe Technique Suiting Indian Conditions (2nd Revised Edition)
23. Code of Practice for Subsurface Utility Engineering Suiting Indian Conditions
24. Code of Practice for Machine Wound Spiral Lining Technique Suiting Indian Conditions
25. Model Consultancy Contract for HDD Crossing (MCC-HDD)
26. General Conditions of Contract Document for Horizontal Directional Drilling (GCC-HDD)
27. Introduction to Pipeline Rehabilitation
28. Trenchless Technology Selection Guidelines
29. Trenchless Technology Scope of Works Manual
30. Trenchless Technology Risk Mitigation Manual 2011 Edition
31. Standard Operating Procedures for Application of Trenchless Technology 2nd Revised Edition
32. Standard General Conditions of Contract for Construction Contracts Employing Trenchless Technology, 2nd revised Edition*
33. Guidelines for Application of Special Condition of Contract in Construction Contract Employing Trenchless Technology, 2nd Revised Edition*
34. Schedule of Rates for Construction Contracts Employing Trenchless Technology 2022 (14th Edition)*
35. Manual of Trenchless Project Supervision
36. Manual of Standard Method Statements for Trenchless Projects
37. Manual of Site Investigations for Trenchless Projects
38. Manual of Trenchless Project Management
39. Third Party Inspection Manual
40. Trenchless Arbitral Procedures and Dispute Resolution Systems

The TAA being provided by IndSTT primarily uses inputs from these publications coupled with the inputs from project requirements and client specifications, as well as ground conditions, existing utilities, topography and other asset owner requirements.

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