Why Trenchless Technology ?!

Dr.-Ing. Klaus Beyer
Executive Director

German Society of Trenchless Technology e.V. (GSTT)

GSTT

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Trenchless Indonesia
Underground Infrastructure

Trenchless Indonesia

Jakarta, Indonesia:
30 August 2017

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GSTT – German Society for Trenchless Technology e.V.

The German Society for Trenchless Technology advocates the pioneering trenchless technology that **combines economic efficiency and environmental protection.**

This **modern approach for installing underground supply** lines can be utilized for **drinking water, wastewater**, gas, heating, telecommunications or electricity lines.

GSTT's goal is to promote this modern technology that has been proven and tested worldwide since 30 years.

Together with international partners, GSTT is continuously working on advancing the science and the practice of trenchless technology **for the public and environmental benefit.**

Trenchless Indonesia Underground Infrastructure

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iSTT – International Society for Trenchless Technology

Approx. 3.500 members in approx. 55 countries (Societies in 28 regions)

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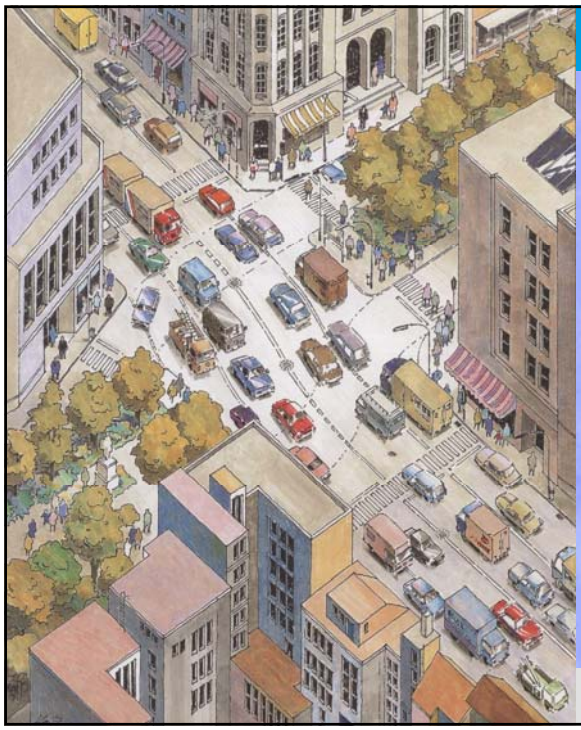

Why trenchless?!

What happens here if a pipeline has to be repaired?

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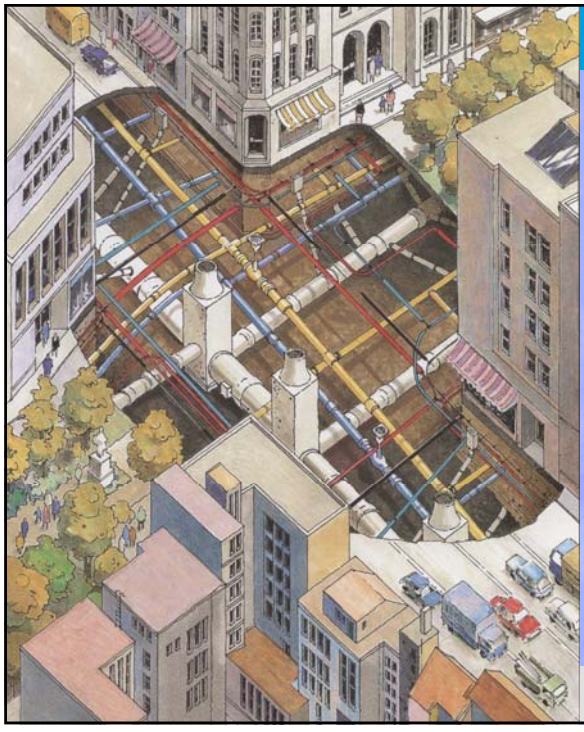

Why trenchless?!

A look into the underground.

A pipework like a spider´s web.

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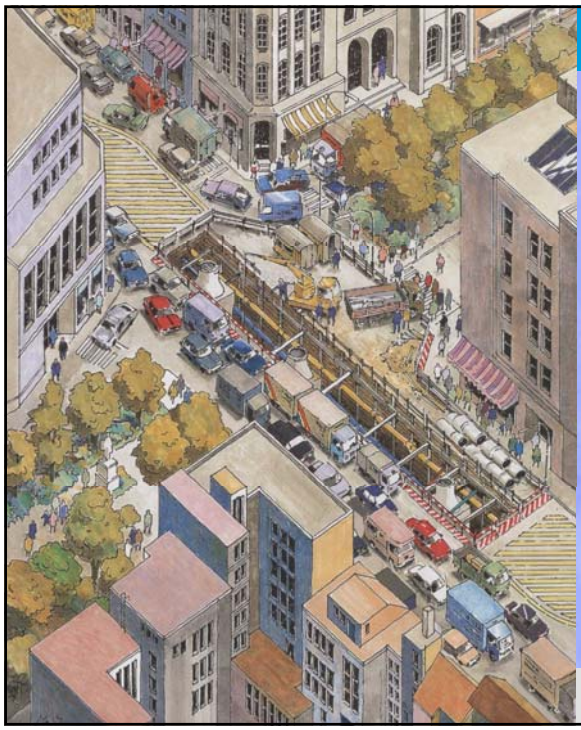


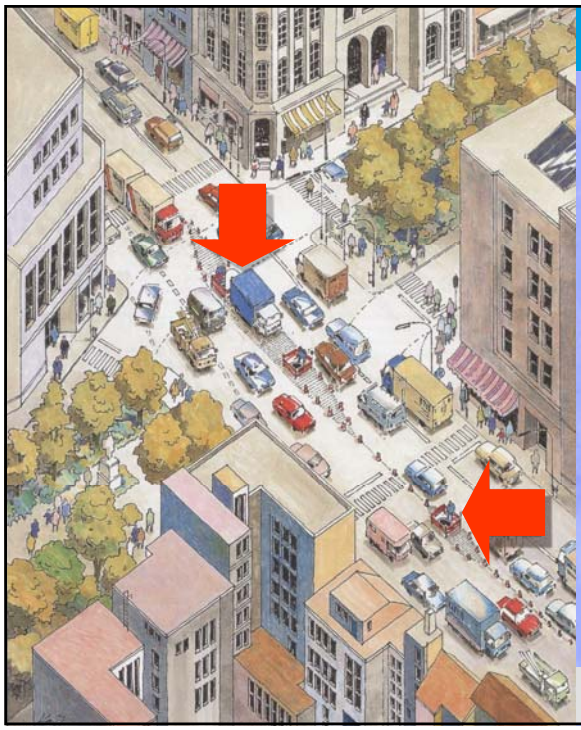
Why trenchless?!

worst case…….

….a big trench

….a big building site

…. a lot of traffic jam and environment pollution



Why trenchless?!

…or like this….

NO DIG technologies will be used!

why digging trenches.....

..if there are better solutions?!

Why trenchless?!

Advantages of trenchless method, direct costs:

- reduction of roadway rubble
- reduction of excavation an transportation of soil
- reduction of repositioning of other pipelines
- reduction of groundwater lowering

Economic savings, indirect costs:

- reduction of traffic jam
- reduction of noise- and CO_2-Emission
- reduction of risk of accidents
- reduction of risk to damage close-by buildings
- less influence of residents
- protection of vegetation and groundwater

Savings as a result from trenchless construction from 1984 bis 2016

Saving direct costs in new constructions in the sewer field in Berlin from 1984 - 2016:

74 Mio. € could be saved could be saved and thus invested in other projects

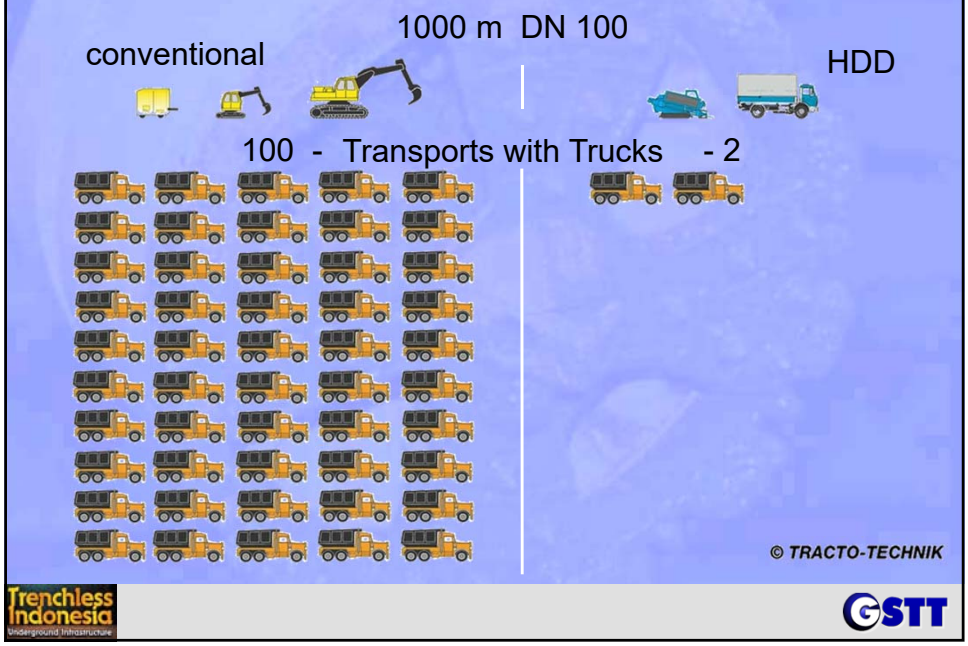
1,45 Mio. m² Road surface had to be not broken and therefore not restored

2,66 Mio. m³ Soil had to be excavated and not reinstalled or transported and disposed

220.000 Truckloads had not be transported through the city

235 Mio. m³ Groundwater had to be not promoted (~ water supply of Berlin for approximately 14 months)

Comparison equipment use



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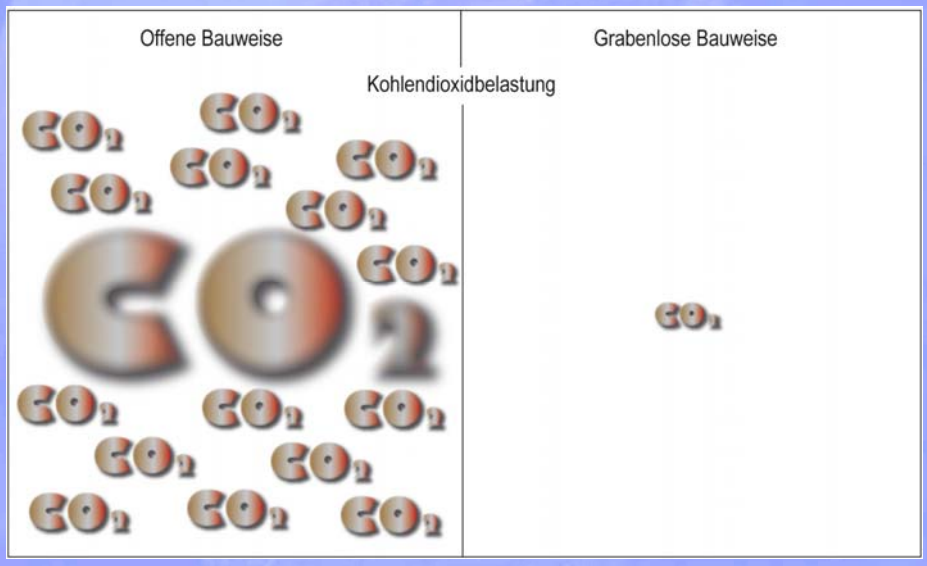
CO_2 Emission



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CO_2 Emission - Example

Project details:

Application:	main sewer
location:	city; 2 track road; left track; grass strip 3m
length:	250 m
depth:	4,50 m
breadth:	1,50 m
pipes:	DN 600
Geology:	gravel/clay (density 1,70 t/m³)
groundwater:	-

litre Petrol	2,33 kg CO_2 * / 2,37 kg CO_2 **
litre Diesel (total burning)	2,64 kg CO_2 * / 2,65 kg CO_2 **

Source:
*Umweltbundesamt
**Kraftfahrtbundesamt

CO_2 Emission - Example

conditions:

- site-condition: good
- 100% removal of excavated soil
- fuel consumption (litre/kWh) (from register of construction equipment)
- diesel consumption in l CO_2-Emision in kg
  3,154 kg CO_2/kg fuel x 0,82 kg/L (diesel) = 2,64 kg CO_2/litre
- treatment of asphalt: per 1 to ca. 7 - 8 l diesel

conventional method (70 days):

excavation + laying + backfilling + compaction: max. 4 m / day (without road surface)
Road finishing machine max. working breadth 2 m

trenchless (40 days):

capacity: ca. 4 pies (12 m) / day
Starting pit: DN 3000/DA 3600; target pit: 2x DN2500/DA3000
construction time: 30 h

CO_2 Emission – Example conventional method

register of construction equipment (conventional method)

Betriebsdaten	Beschreibung	BGL 2001	Leistung KW	Verbrauch Liter/kWh	Korrektur der Leistung	Betriebszeit gesamt h	Verbrauch Diesel in l pro Stunde	Verbrauch Diesel in l gesamt	CO^2 Ausstoß in kg kg / h	CO^2 Ausstoß in kg gesamt
offene Bauweise Bauzeit ca. 70 Tage										
Hydraulikbagger auf Rädern	(20t)	R.1.01.0100	100	0,16	0,8	650	12,8	8.320,0	33,8	21.964,8
LKW / Muldenkipper	(26t)	P.2.01.0260	200	0,14	0,8	501	22,4	11.222,4	59,1	29.627,1
LKW / Dreiseitenkipper	(25t)	P.2.01.0250	160	0,14	0,8	20	17,9	358,4	47,3	946,2
Radlader		D.3.10.0050	50	0,16	0,7	280	5,6	1.568,0	14,8	4.139,5
Straßenfräse		E.7.01.2030	370	0,16	0,9	6	53,3	319,7	140,7	844,0
Schwarzdeckenfertiger		E.3.80.0002	82	0,16	0,8	20	10,5	209,9	27,7	554,2
Tandem - Vibrationswalze		E.8.30.0400	30	0,16	0,8	40	3,8	153,6	10,1	405,5
Explosionsstampfer	(Benzin)	D.8.70.0065	2,7	0,16	1	130	0,4	56,2	1,0	130,9
Doppelvibrationswalze / handgeführt		D.8.21.0045	5	0,16	0,9	325	0,7	234,0	1,9	617,8
								Σ: 22.442,2		Σ: 59.229,9

CO_2 Emission – Example conventional method

register of construction equipment (conventional method)

59,23 t

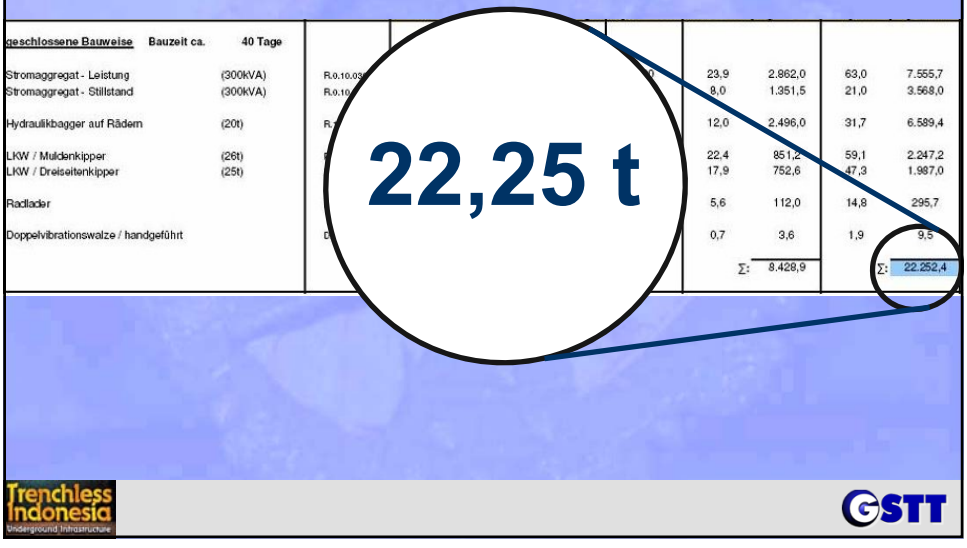
CO_2 Emission – Example trenchless method

register of construction equipment (trenchless)

Betriebsdaten	Beschreibung	BGL 2001	Leistung KW	Verbrauch Liter/kWh	Korrektur der Leistung	Betriebszeit gesamt h	Verbrauch Diesel in l pro Stunde	Verbrauch Diesel in l gesamt	CO² Ausstoß in kg kg / h	CO² Ausstoß in kg gesamt
geschlossene Bauweise Bauzeit ca.	40 Tage									
Stromaggregat - Leistung	(300kVA)	R.0.10.0300	265	0,15	0,6	120	23,9	2.862,0	63,0	7.555,7
Stromaggregat - Stillstand	(300kVA)	R.0.10.0300	265	0,15	0,2	170	8,0	1.351,5	21,0	3.568,0
Hydraulikbagger auf Rädern	(20t)	R.1.01.0100	100	0,15	0,8	208	12,0	2.496,0	31,7	6.589,4
LKW / Muldenkipper	(26t)	P.2.01.0260	200	0,14	0,8	38	22,4	851,2	59,1	2.247,2
LKW / Dreiseitenkipper	(25t)	P.2.01.0250	160	0,14	0,8	42	17,9	752,6	47,3	1.987,0
Radlader		D.3.10.0050	50	0,16	0,7	20	5,6	112,0	14,8	295,7
Doppelvibrationswalze / handgeführt		D.8.21.0045	5	0,16	0,9	5	0,7	3,6	1,9	9,5
							Σ:	8.428,9	Σ:	22.252,4

CO_2 Emission – Example trenchless method

register of construction equipment (trenchless)



CO_2 Emission - Example

trenchless method	22,2 tons CO_2
conventional method	59,2 tons CO_2

267 % more

CO_2 -Emission!

CO_2 Emission - Example

CO_2 -emissions due to traffic jam, conventional method:
100 cars / duration 15 minutes

(2,48 kg CO_2 / l - 10 l / h fuel consumption)

→ 0,62 t CO_2 (100 cars / 15 min)

→ 2,48 t CO_2 (100 cars / h)

→ 14,88 t CO_2 (2 x 3 h / day)

→ 74,44 t CO_2 (2 x 3 h x 5 days)

→ 1.041,60 t CO_2 (2 x 3 h x 70 days)

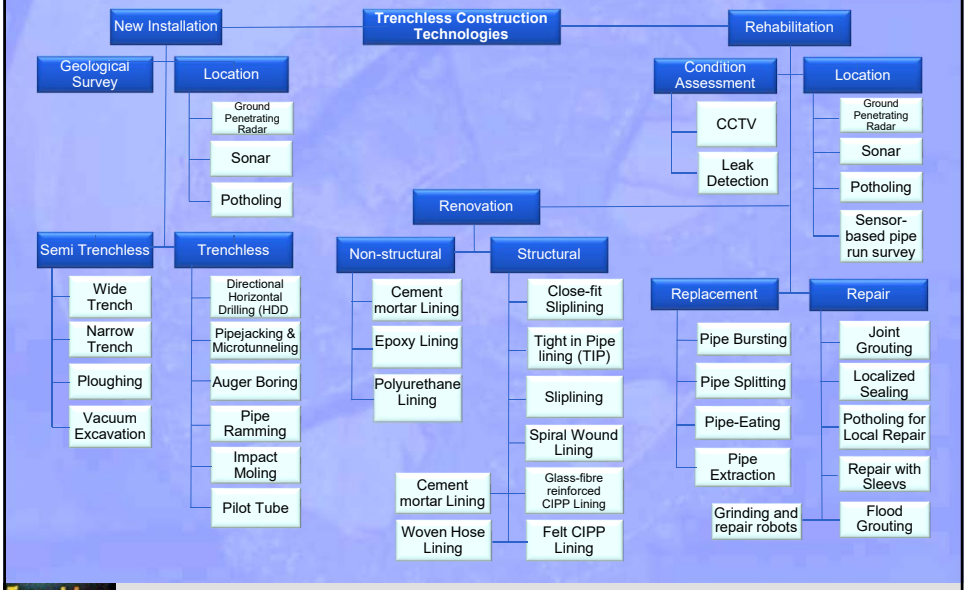
CO_2 Emission - Example

trenchless method	22,2 tons CO_2
conventional method	59,2 tons CO_2 + 1.041,60 tons CO_2

~ 5000 % more

CO_2 -Emission!

Overall view Trenchless Technologies



Why Trenchless Technology ?!

3 Examples of the plurality of trenchless techniques:

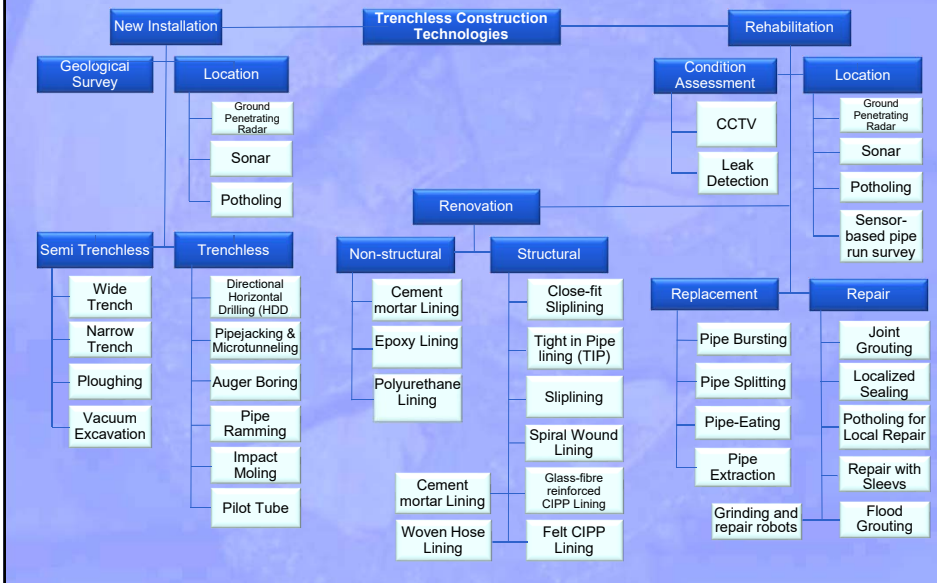
For New Construction:

- HDD - Horizontal Directional Drilling (DN 25 – DN 1800)
- Microtunnelling (DN 250 – DN 4200)

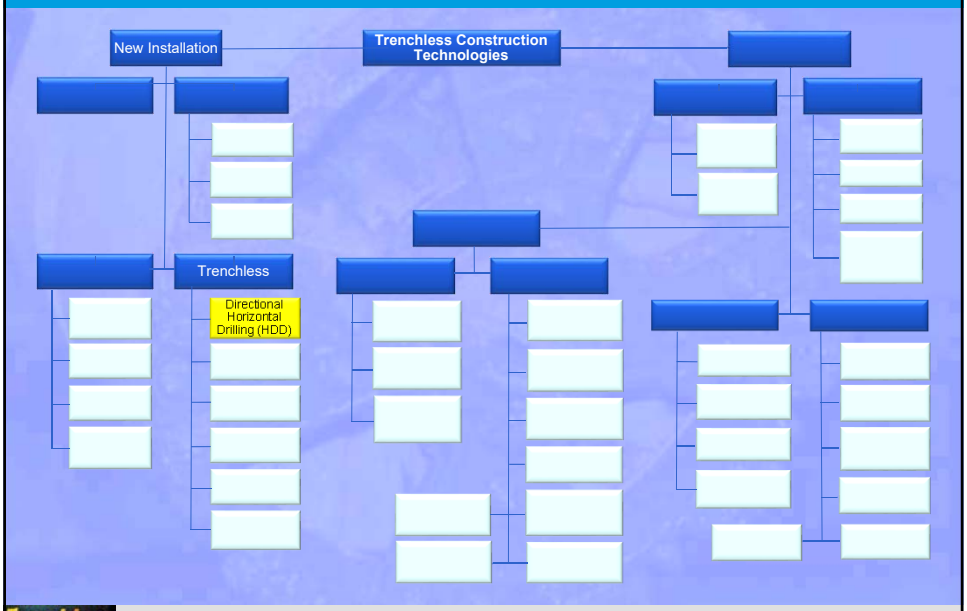
For Rehabilitation:

- CIPP - Cured-in-place pipe rehabilitation (DN 50 – DN 1800)

Overall view Trenchless Technologies



Overall view Trenchless Technologies



Horizontal Directional Drilling (HDD)

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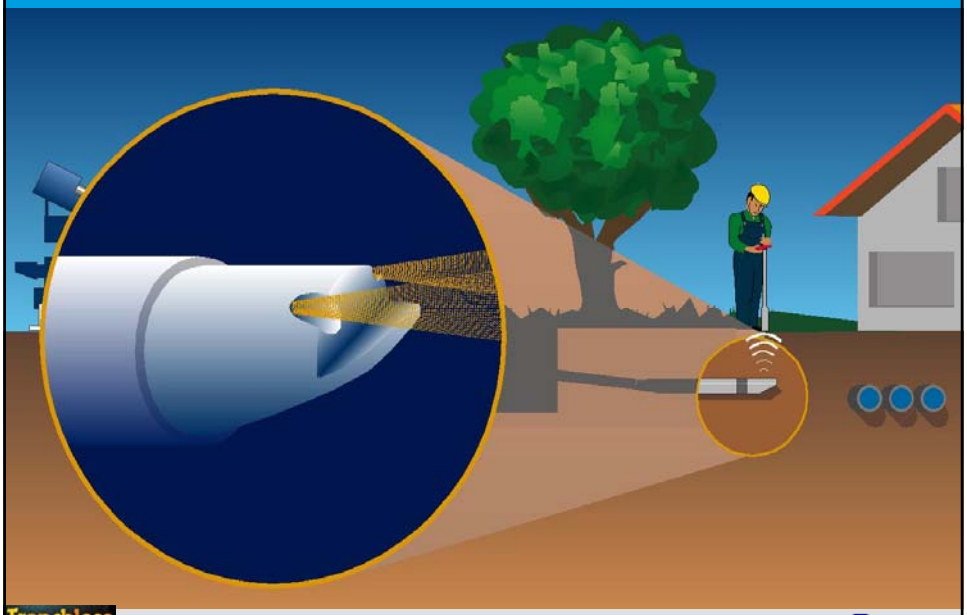

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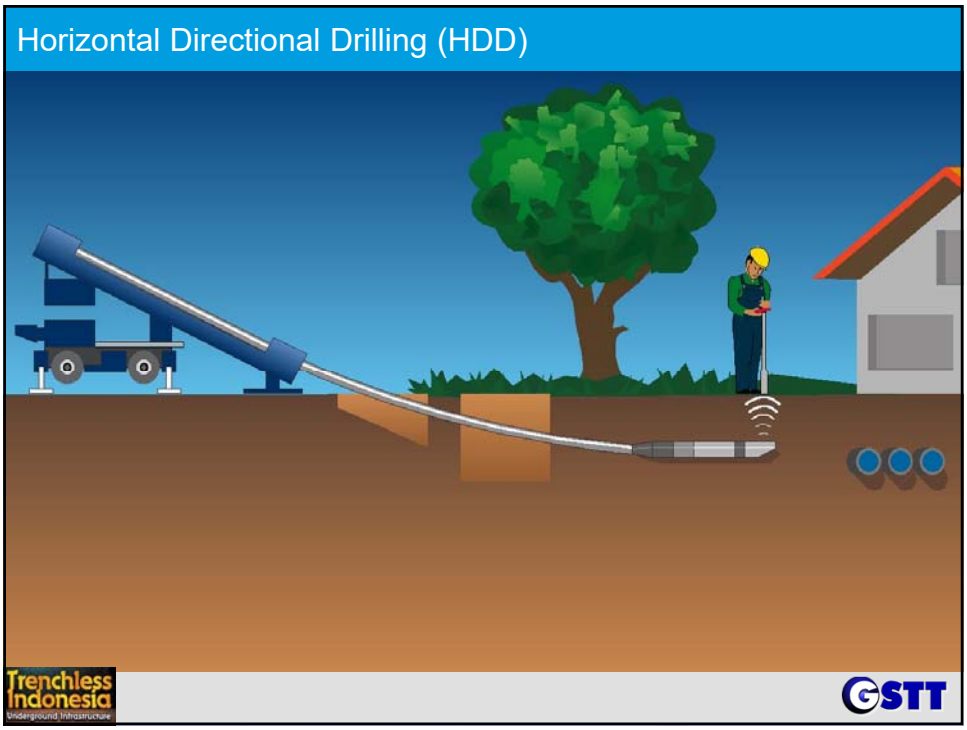

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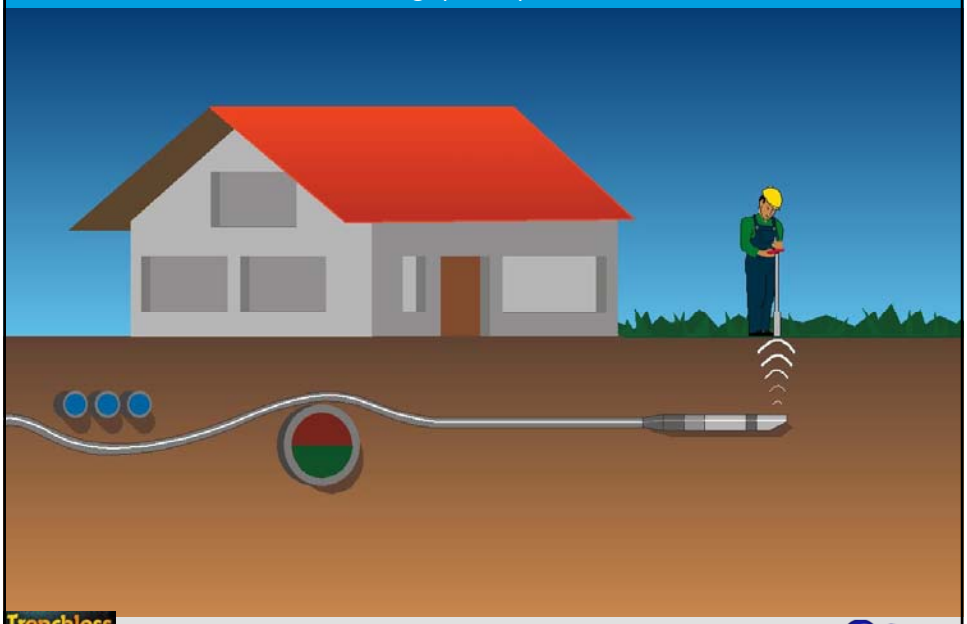

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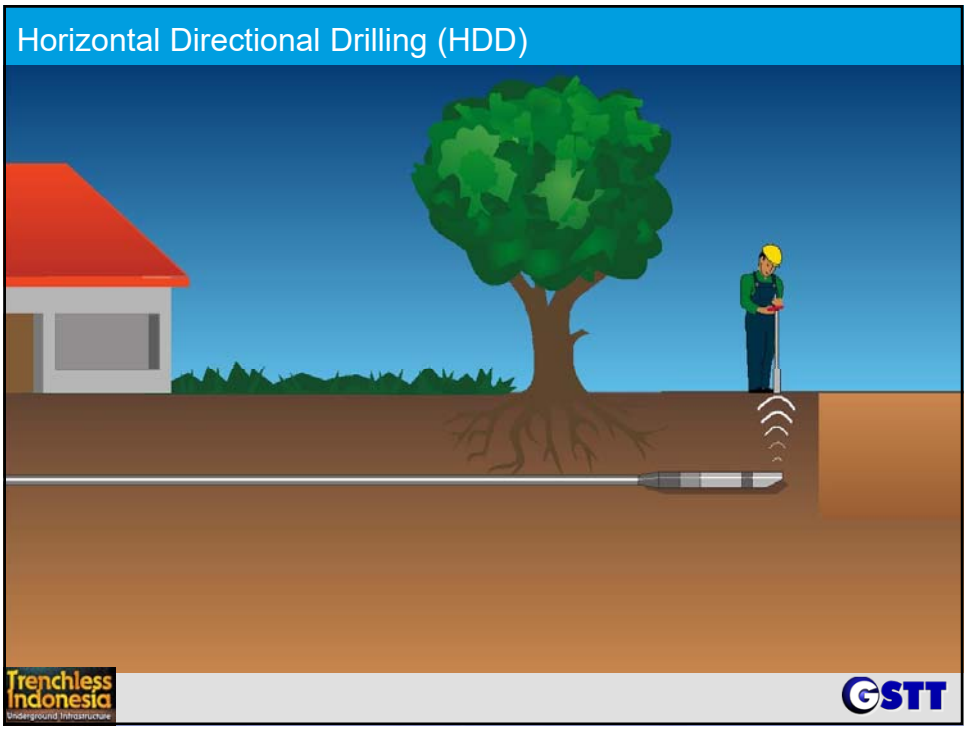

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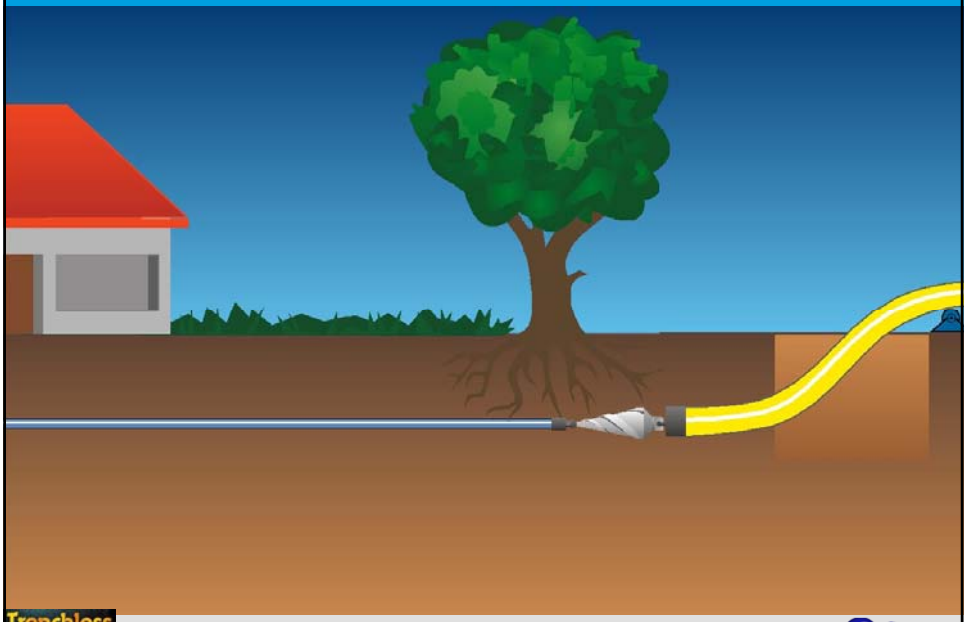

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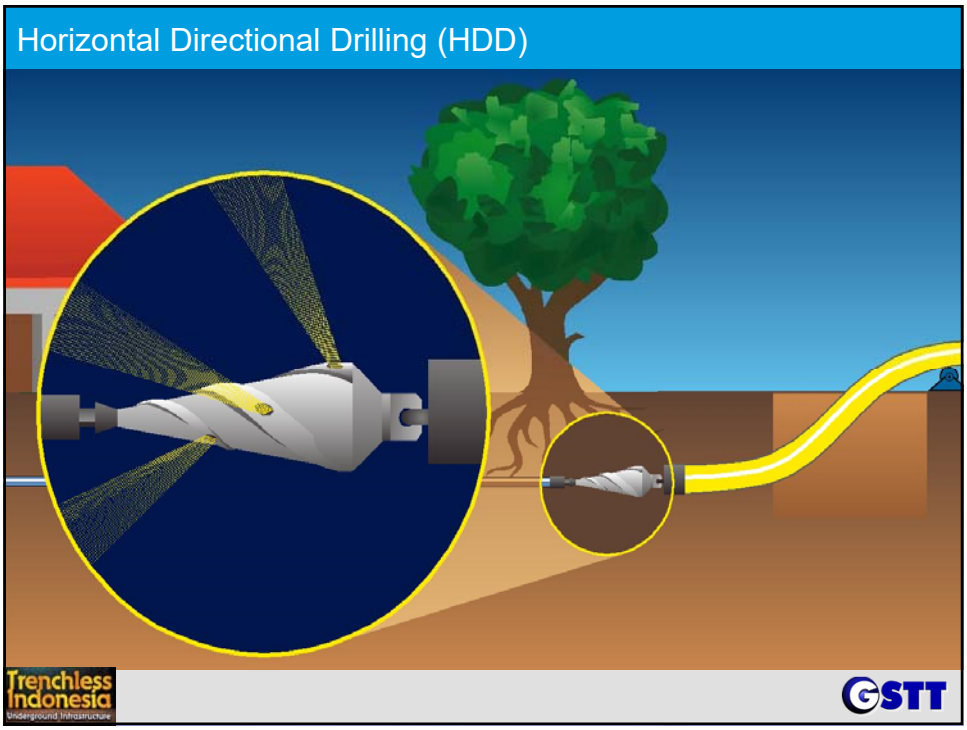

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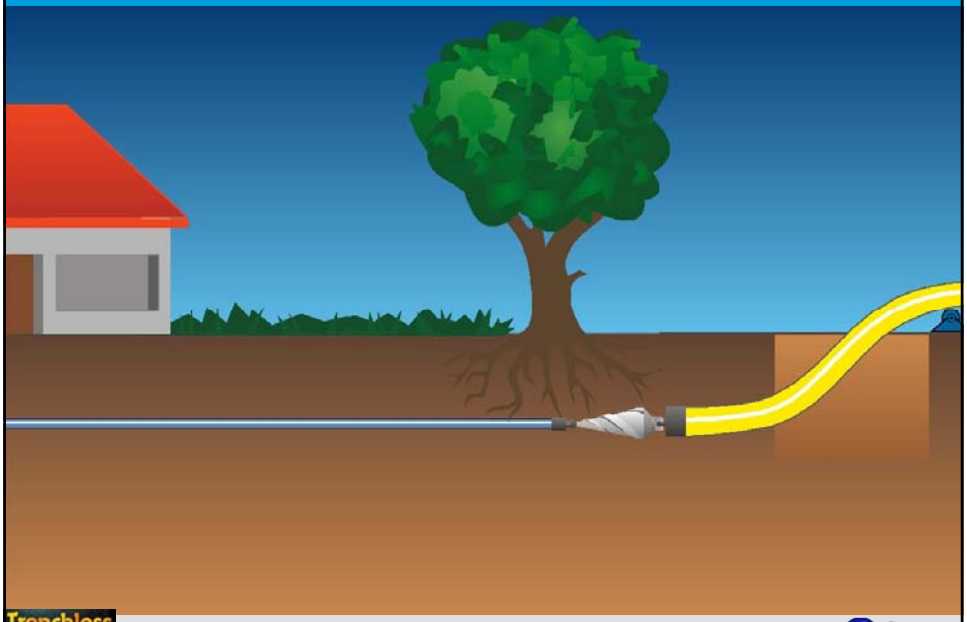

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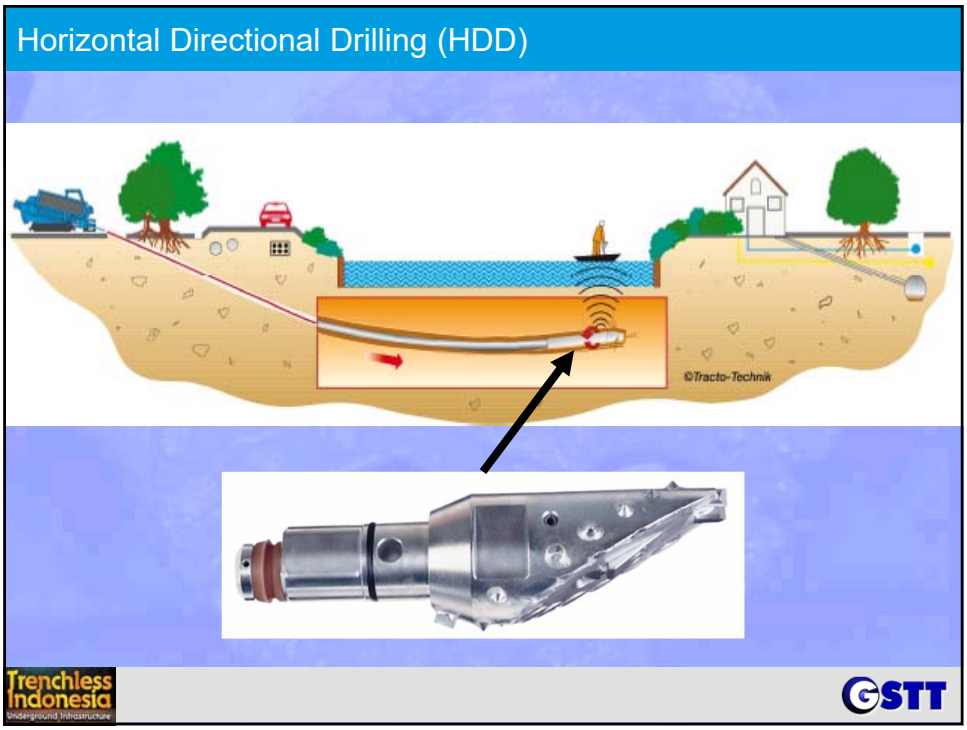

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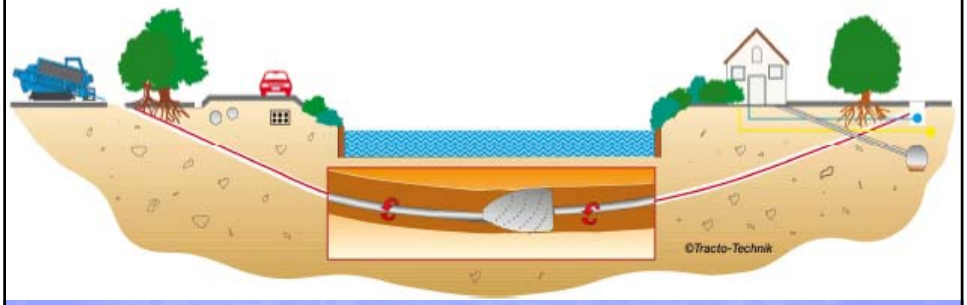

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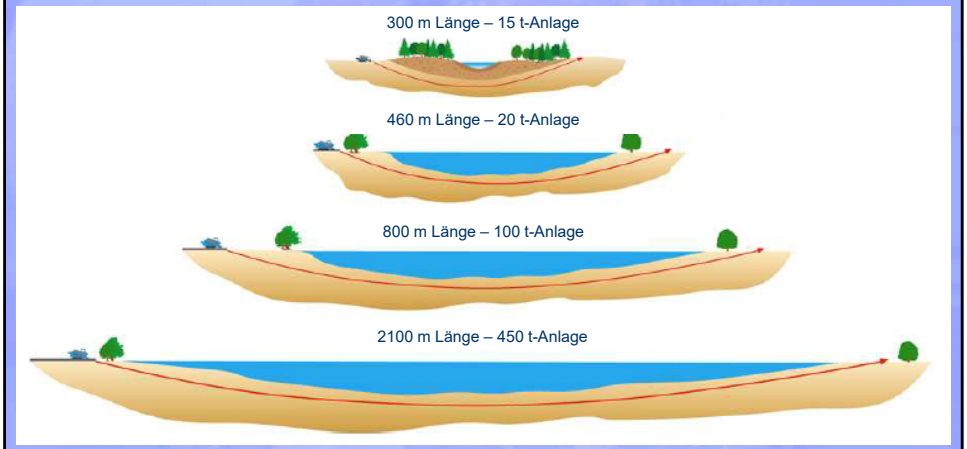

QUELLE: Tracto Technik

Horizontal Directional Drilling (HDD)

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Horizontal Directional Drilling (HDD)

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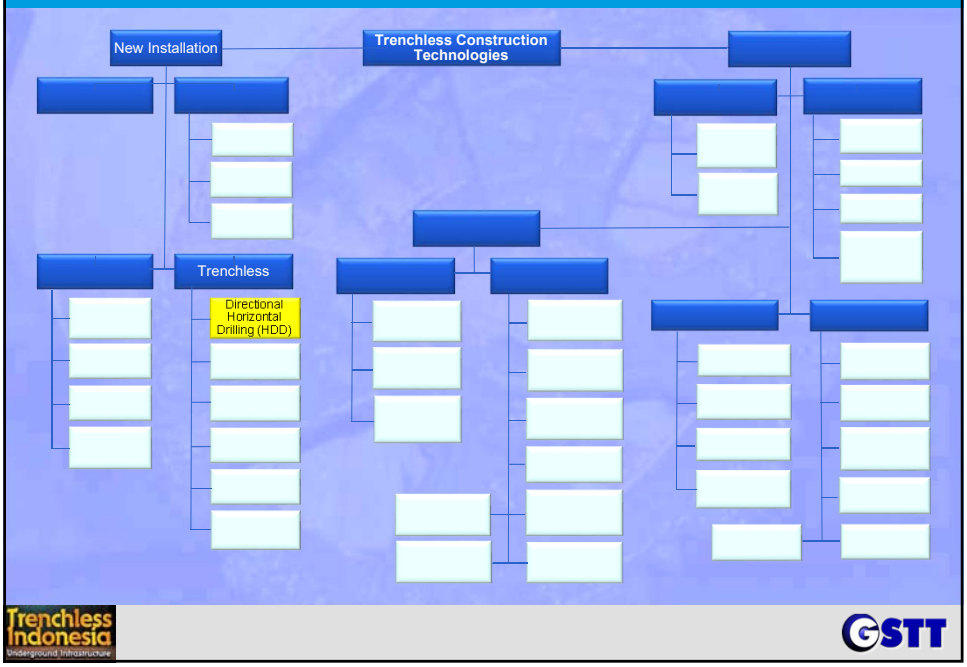
Overall view Trenchless Technologies



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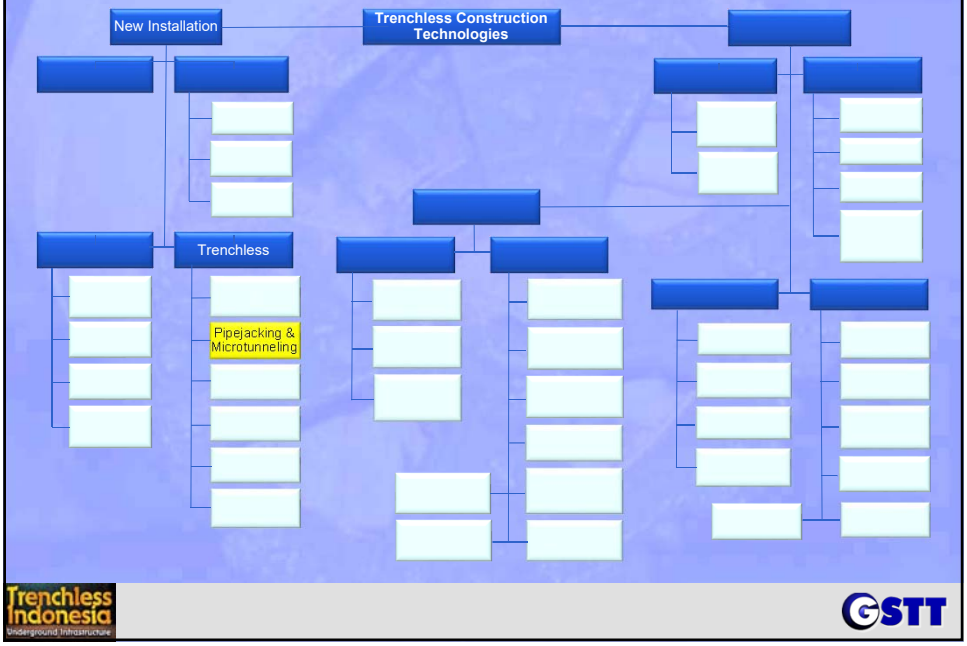
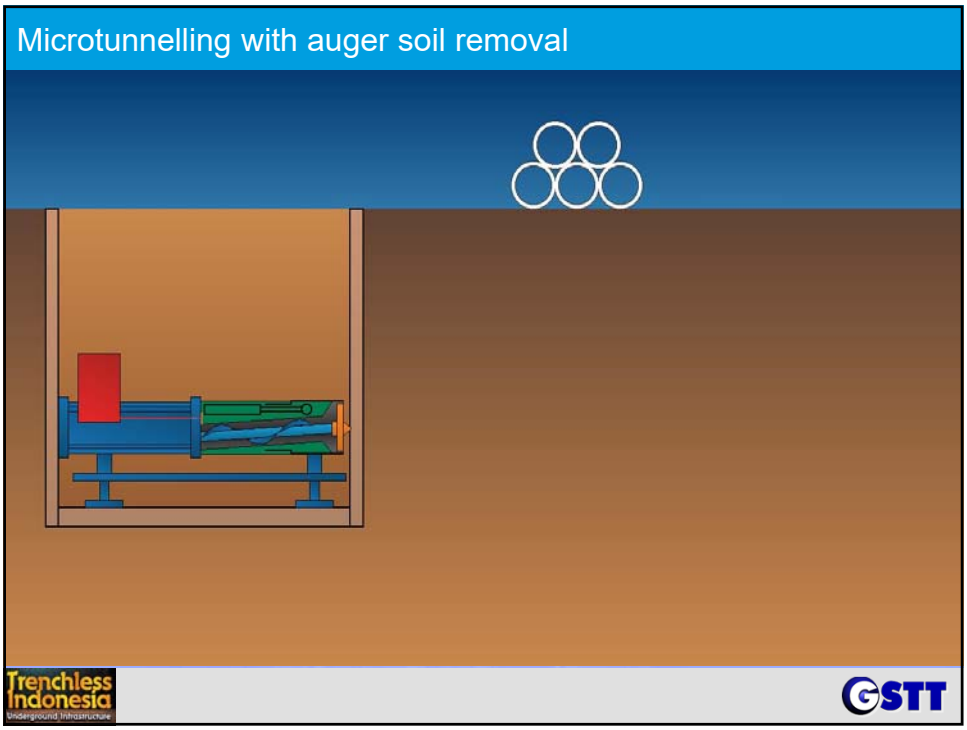


Microtunnelling with auger soil removal



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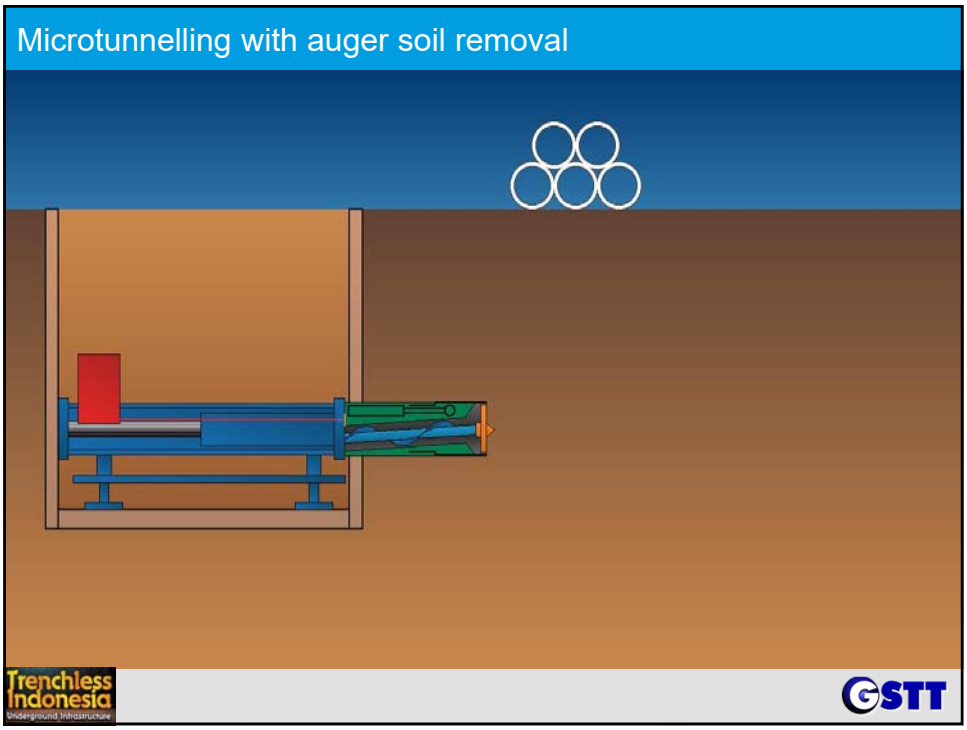

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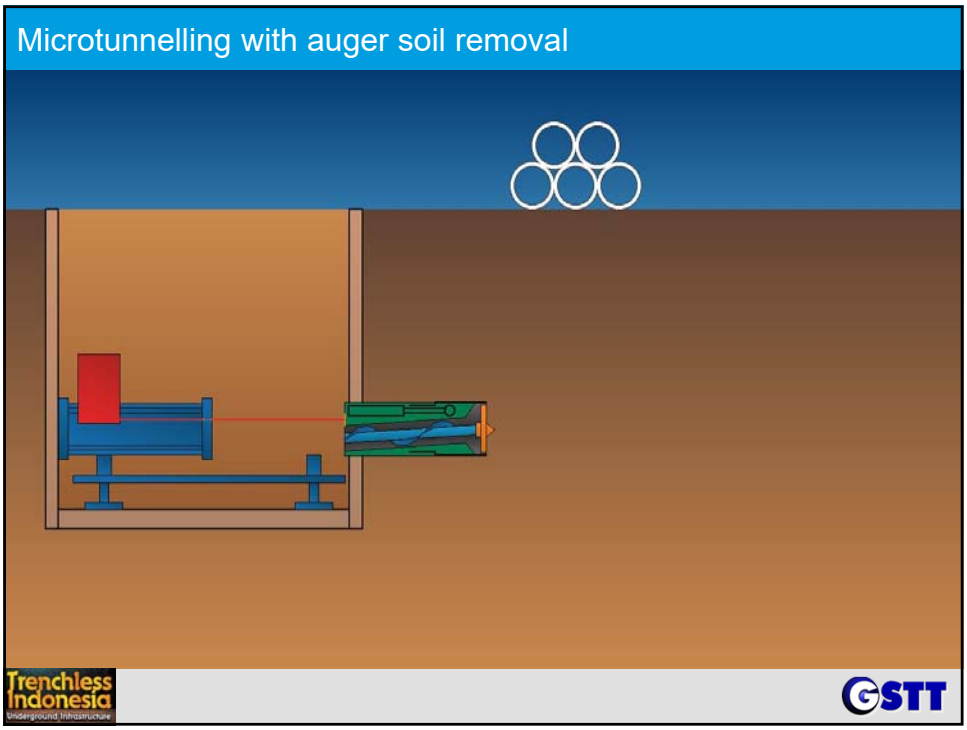
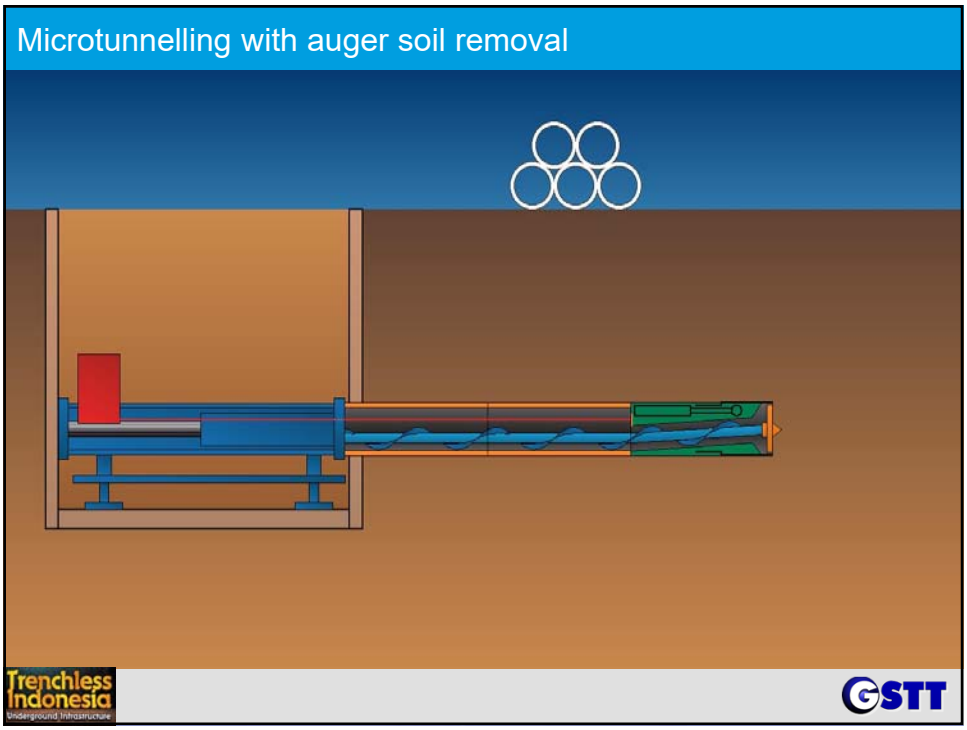
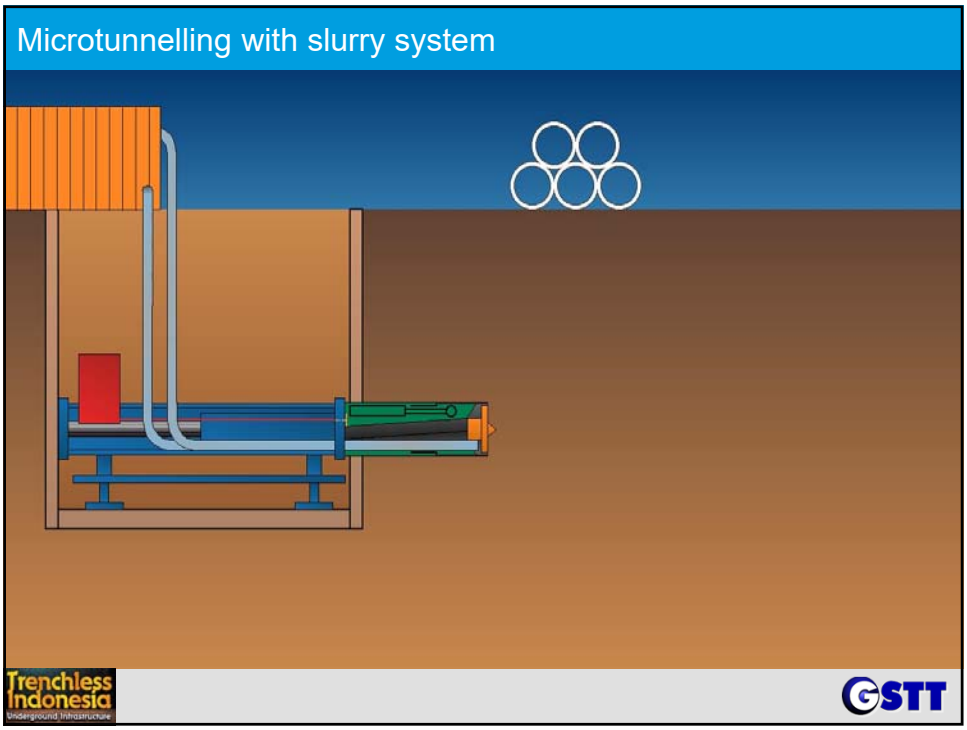


Microtunnelling with auger soil removal



Microtunnelling with slurry system



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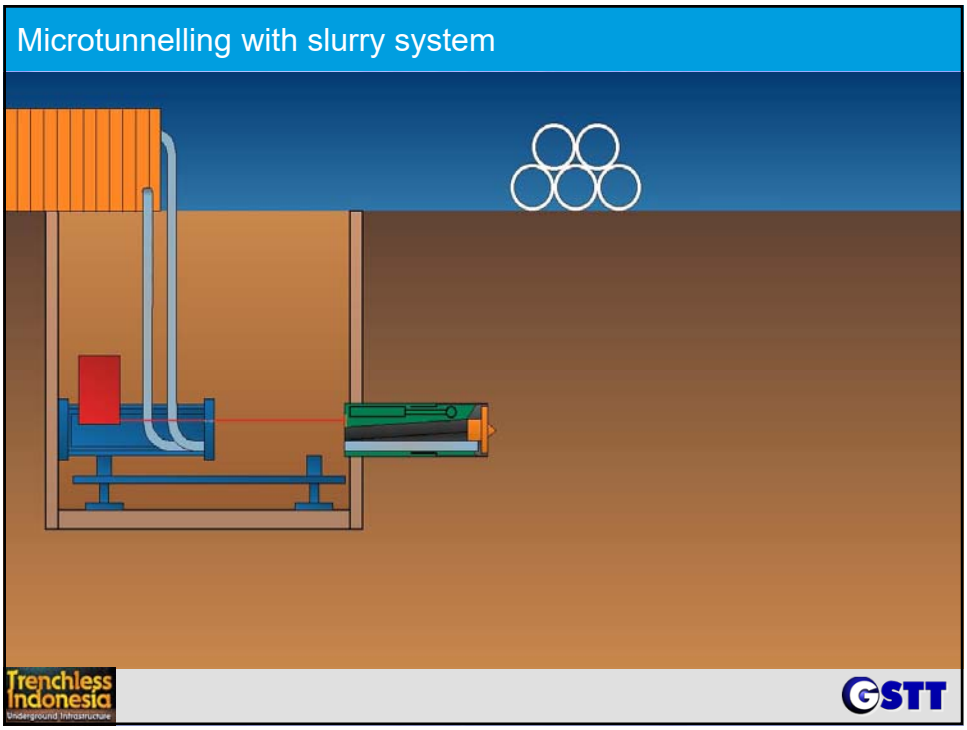
Microtunnelling with slurry system



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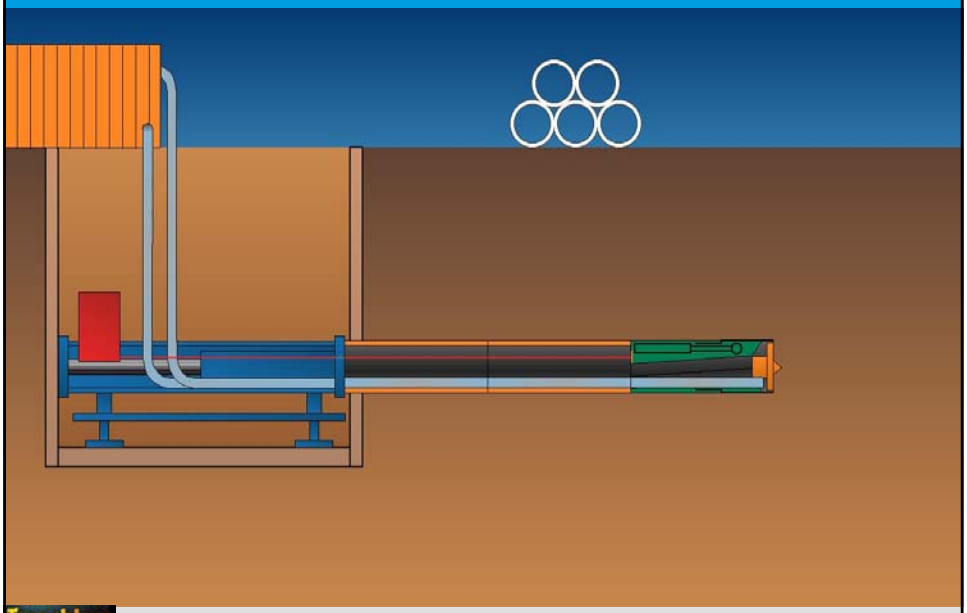
Microtunnelling with slurry system



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Microtunnelling

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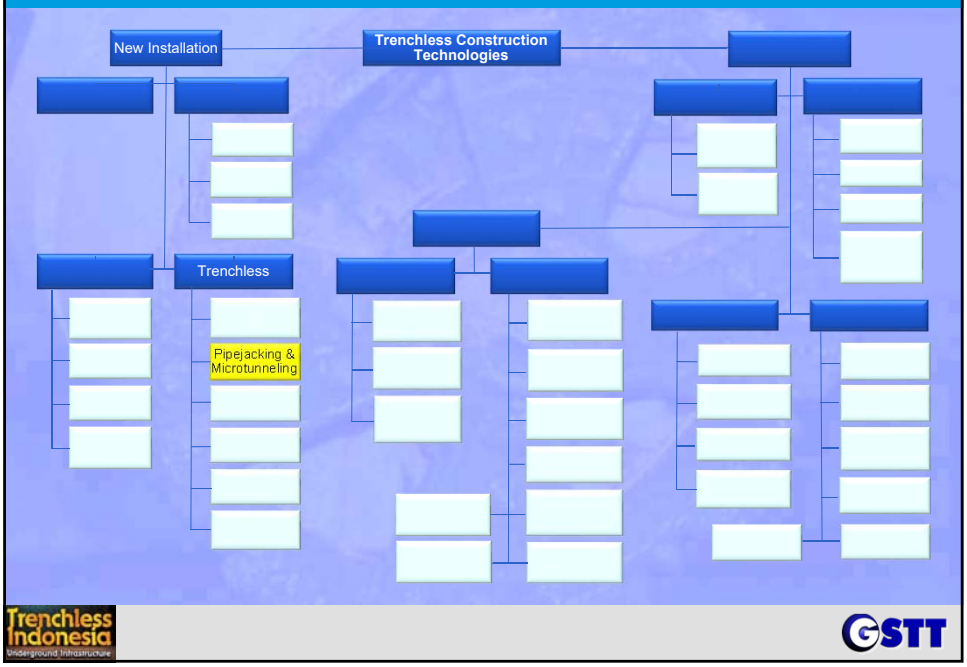
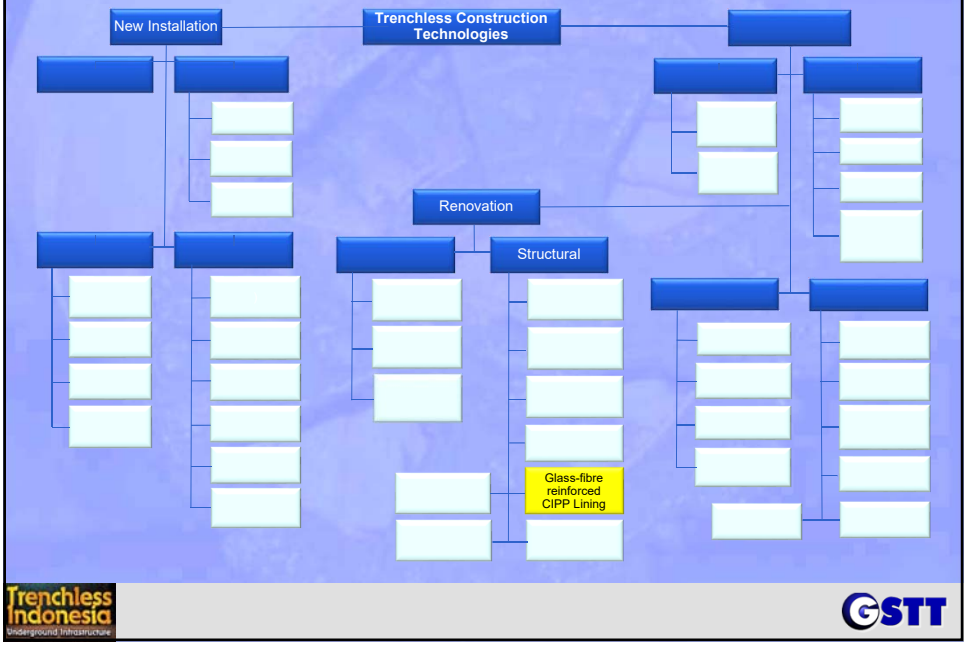
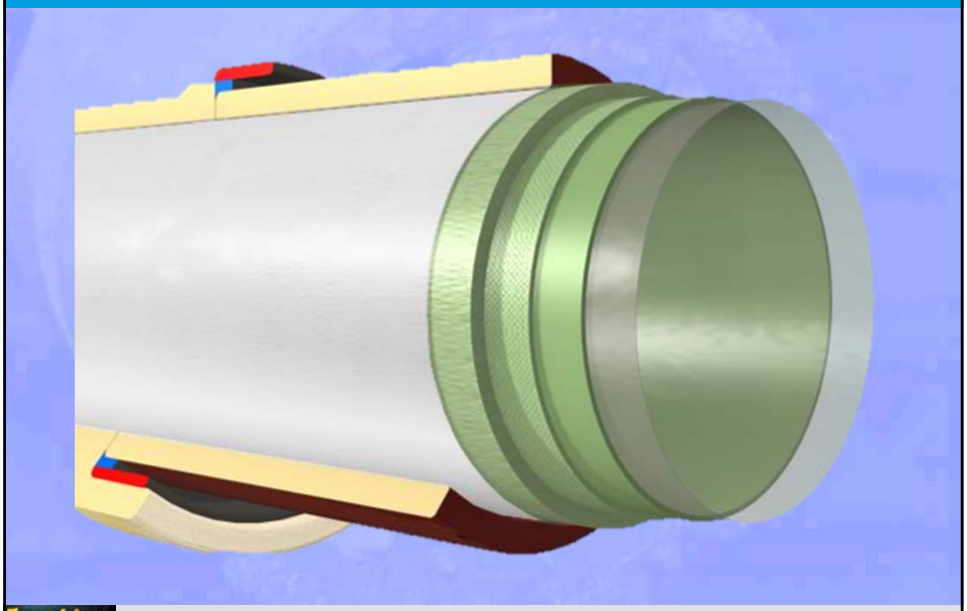
Overall view Trenchless Technologies



Overall view Trenchless Technologies



CIPP - Cured-in-place pipe rehabilitation - Glas-Fibre-Liner Design



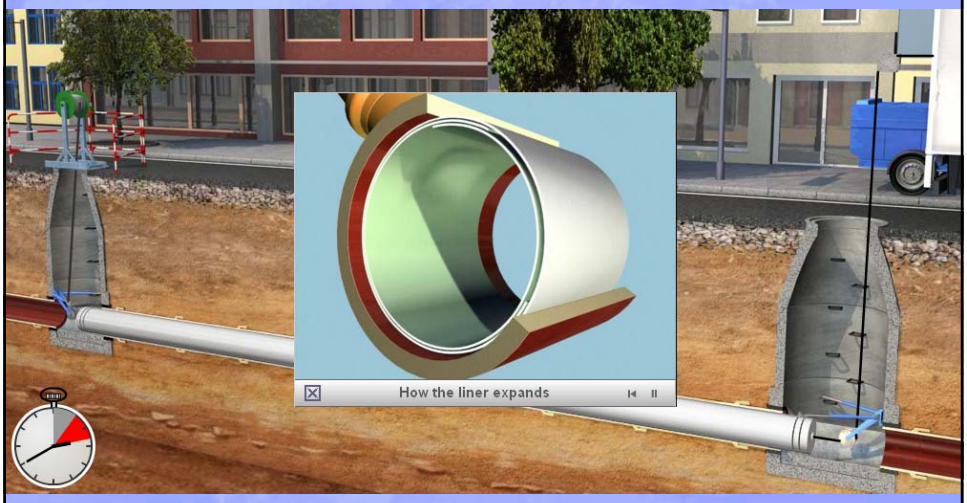
CIPP - Setup of the building site and preparation works

CIPP - Setup of the building site and preparation works

CIPP - Pull-in of the pre-liner

CIPP - Pull-in of the Glas-Fibre-Liner

CIPP - Expansion of the Glas-Fibre-Liner



CIPP - UV-light train

CIPP - Preparation for curing process

CIPP - Curing process with UV-light train

CIPP - Cured-in-place pipe rehabilitation

WASSER BERLIN INTERNATIONAL / NO DIG BERLIN 2017

Symposium and Exhibition
26 – 28 March 2019
www.**NODIGBERLIN**.com
Fairground Berlin

Sitevisiting at 2017-03-30:
approx. 500 visitors visit
approx. 12 construction sites with
Trenchless Technologies

GSTT – German Society for Trenchless Technology e.V.

Thank you for your attention

Dr.-Ing. Klaus Beyer
Executive Director

German Society of Trenchless
Technology E.V. (GSTT)

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