

PIPELINES CONSTRUCTION MANAGEMENT

PIPELINE CONSTRUCTION MANAGEMENT

Activities of Pipeline construction

PROCEDURE

- ✦ **Right of Way clearing and grading**
- ✦ **Delivery, Transportation, Handling, Hauling, Stringing of pipes**
- ✦ **Trenching Normal & Rock**
- ✦ **Bending**
- ✦ **Lining up and Welding**
- ✦ **Radiographic Inspection**

PIPELINE CONSTRUCTION MANAGEMENT

Activities of Pipeline construction

- ✦ **Application of Joint Coating**
- ✦ **Lowering & back filling**
- ✦ **Tie-ins**
- ✦ **River and Road crossings**
- ✦ **Cleanup and Restoration of ROW**
- ✦ **Air Pigging cleaning and Gauging**
- ✦ **Hydrostatic testing**

PIPELINE CONSTRUCTION MANAGEMENT

Activities of Pipeline construction

- ✦ **De watering cleaning and Swabbing**
- ✦ **Golden Tie ins**
- ✦ **Valve installation**
- ✦ **Caliper survey and dent repairs**
- ✦ **Line Preservation**

PIPELINE CONSTRUCTION MANAGEMENT

WORK PROCEDURE

Purpose:

The purpose of work procedure is to stipulate the method that shall be used for a particular activity covering even minute steps in details.

- The work procedure is to be prepared by agency responsible for execution of work.**
- The work procedure is examined critically and approved by owner/owner representative.**
- No deviation from work procedure is accepted.**

PIPELINE CONSTRUCTION MANAGEMENT

NEED FOR WORK PROCEDURE

It helps:

- 1. In clearly defining the procedure to be adopted in execution of activity.**
- 2. In establishing QAP a tool for inspection.**
- 3. In developing records for future reference.**
- 4. In case of any dispute arising at later stage.**

PIPELINE CONSTRUCTION MANAGEMENT

Work Procedure - A typical format

- 1. Purpose***
- 2. Reference***
- 3. Equipment / Material***
- 4. Procedure***
- 5. Safety precautions, if any***
- 6. QAP***
- 7. Format for daily report and inspection report***

PIPELINE CONSTRUCTION MANAGEMENT

Document Number	TITLE/Remarks
XX/WP/100	Survey, Clearing & Grade
XX/WP/101	Trench
XX/WP/102	Blasting
XX/WP/103	Pipe Handling And Stringing
XX/WP/104	Bending
XX/WP/105	Concrete coating by casting procedure
XX/WP/106	Tie-in
XX/WP/107	NDT Procedure for Mainline Welding
XX/WP/108	Applications of Heat shrinkable sleeves
XX/WP/109	Lowering in and rock shield applications
XX/WP/110	Backfill
XX/WP/111	Cathodic protection installation
XX/WP/112	Pre testing of Pipeline crossings

PIPELINE CONSTRUCTION MANAGEMENT

Document Number	TITLE/Remarks
XX/WP/113	Pipeweld numbering
XX/WP/114	Casting and placing of precast weights
XX/WP/115	Concrete coating of pipes impingement method
XX/WP/116	handling over coated pipes at Coating yard
XX/WP/117	Cased crossings
XX/WP/118	Repair of accidental arc strikes
XX/WP/119	TCP
XX/WP/120	Ultrasonics
XX/WP/121	DP & MPI
XX/WP/122	final cleanup and restoration
XX/WP/123	Open cut Crossings
XX/WP/124	Major River crossings

PIPELINE CONSTRUCTION MANAGEMENT

ROW Clearing and Grading

Centre line of ROW is marked based on IP and TP fixed during detailed route survey

Wooden pegs are put on either side of the center line at a distance of 9 meters for 18 m ROW.

ROW width is kept as 6 m on left of Pipeline for storing the excavated soil and 12 m on right side for movement of equipments.

PIPELINE CONSTRUCTION MANAGEMENT

ROW Clearing and Grading

Dozer with flat front blade is used to clear the vegetation and trees

Prior information to land owners to clear the land of their crops before entering

PIPELINE CONSTRUCTION MANAGEMENT

Transportation Handling and Stringing of the Pipes

To prevent transit damage nylon rope rings are tied at every three meter distance

Profiled wooden supports are required to place first layer of the pipes on the trailer

To avoid damage to pipe bevel, though the bevel protectors are provided on pipe ends, crane hooks shall be provided with rubber pads for additional safety.

Careful stacking of pipes over sand bags, visual inspection of bevel ends to avoid welding defects.

PIPELINE CONSTRUCTION MANAGEMENT

TRENCHING

In cultivable land, to strip top soil (30 cm depth) & store separately along ROW for replacement on top of backfilled ditch.

Provide suitable crossings across open ROW for land owners/ public.

Width of trench : Pipe OD + 300 mm.

Depth of trench to be measured from original ground/ graded surface/ top of road/ bottom of rail, whichever is lower.

PIPELINE CONSTRUCTION MANAGEMENT

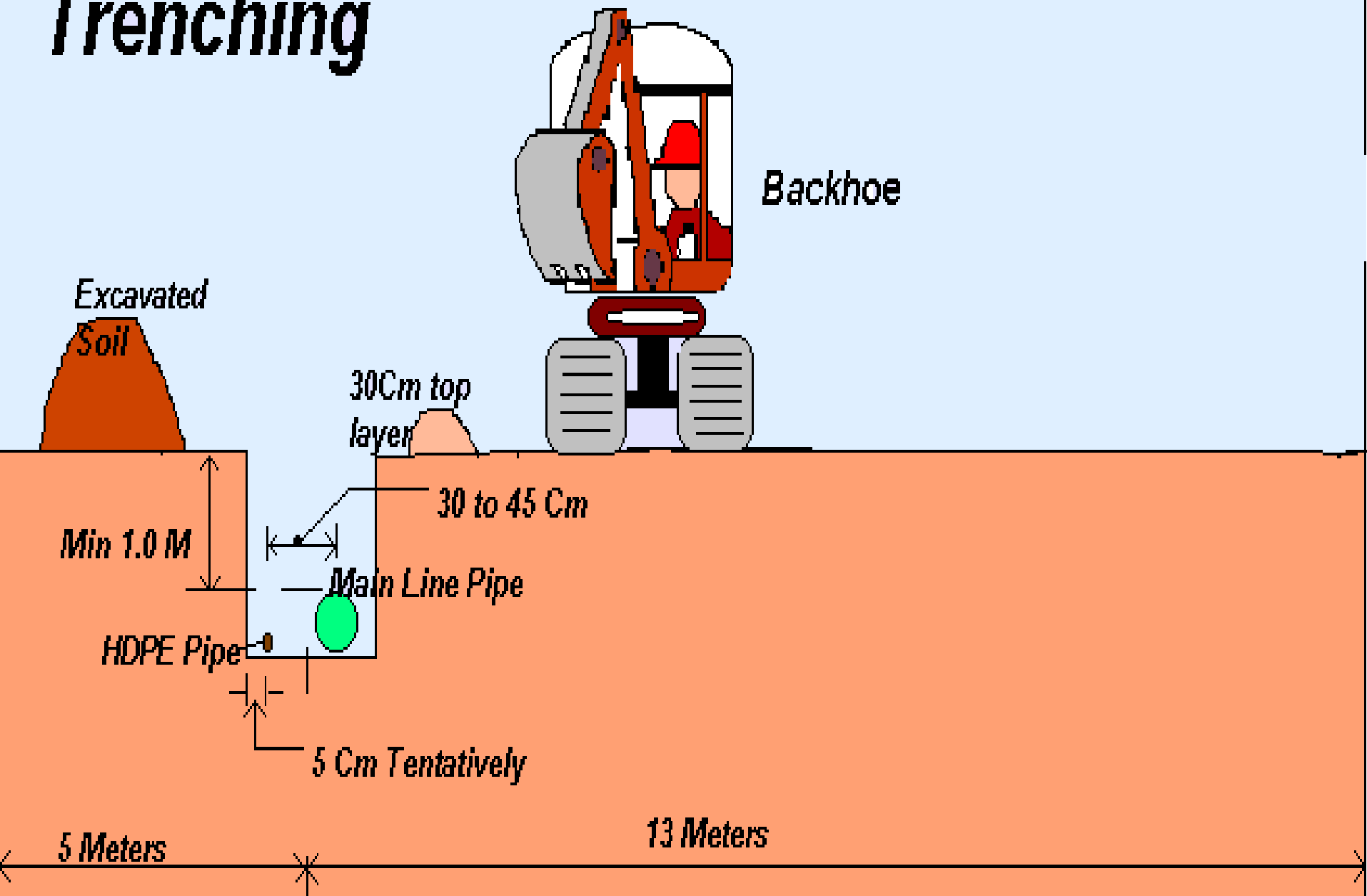
TRENCHING

- Provide 300 mm additional cover where pipeline is within 15 m of private dwelling, industrial buildings or public places.**
- Provide temp. diversions/ bridges at road crossings to allow passage of normal traffic with min. inconvenience.**
- Provide warning/ traffic signs, lights, barricades, fencing, watchmen as required by local authorities.**
- Provide extra depth to fit min. radius of bend at crossings.**

COVER TO PIPELINE

Sl. No.	Location	Min. Cover (m)
1	Industrial, Commercial, Residential Areas (Normal Terrain)	1.25
2	Uncased/ Cased Road Crossings & Cart-Track Crossings	1.25
3	Railway Crossings	1.70
4	Normal Terrain / Drainage ditches at Railways, Highways etc.	1.20
5	Minor Water Course Crossings	1.50
6	Marshy Areas/ Water reservoir Areas/ Ponds	1.50
7	Submerged River Crossings	2.50
8	Rocky Areas	1.00

Trenching



PIPELINE CONSTRUCTION MANAGEMENT

BENDING

Cold field bends for change of vertical & horizontal alignment by using bending machine & mandrel.

Bends to be made without causing wrinkles, buckles, stretching & damage to pipe coating.

Bending procedure to be established including step length & max. degree per pull per foot (0.9550 for 18" OD pipes).

Over bends to be made to clear high points of the trench bottom.

PIPELINE CONSTRUCTION MANAGEMENT

BENDING

Sag bends to fit the bottom of the trench.

Side bends to leave min. clearance to trench wall.

Radius of curvature $> 40 D$ upto 18" OD & $> 60 D$ for above 18" OD pipes.

End of bend should not be closer than 2 m from girth weld or pipe end.

Bends to be installed by positioning longitudinal welds in upper quadrant.

PIPELINE CONSTRUCTION MANAGEMENT

BENDING

Ovality of bent pipe < 2.5 % of nominal dia. at any point; to be checked by passing a gauge consisting of two discs of 95% nominal pipe internal dia.

To layout pipes in such a way that Nos. of pieces cut off less than 2 m are held min.

No Mitre bends are permitted.

Hot pulled bends may be used in unavoidable circumstances.

PIPELINE CONSTRUCTION MANAGEMENT

MAINLINE WELDING

STANDARDS/CODES.

WELDING TECHNIQUES.

WELDING PROCEDURES.

WELDER'S QUALIFICATION TEST.

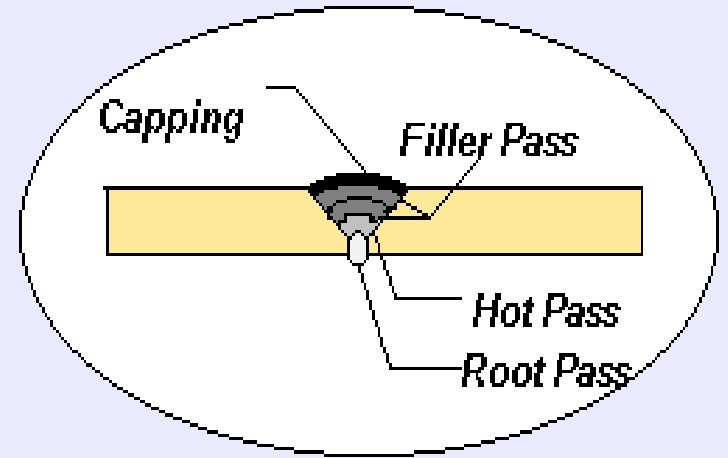
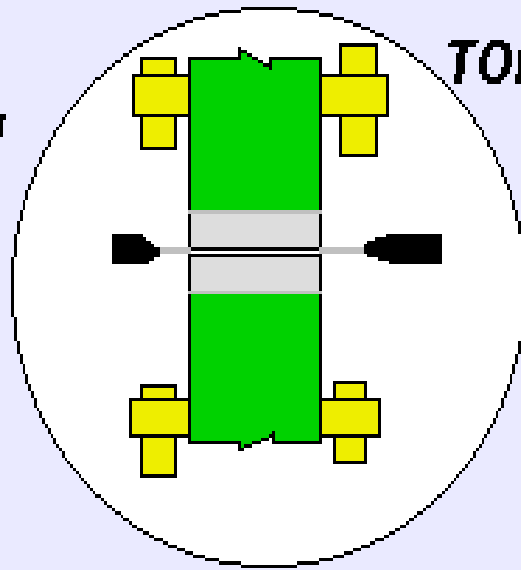
PIPELINE CONSTRUCTION MANAGEMENT

STANDARDS/CODES

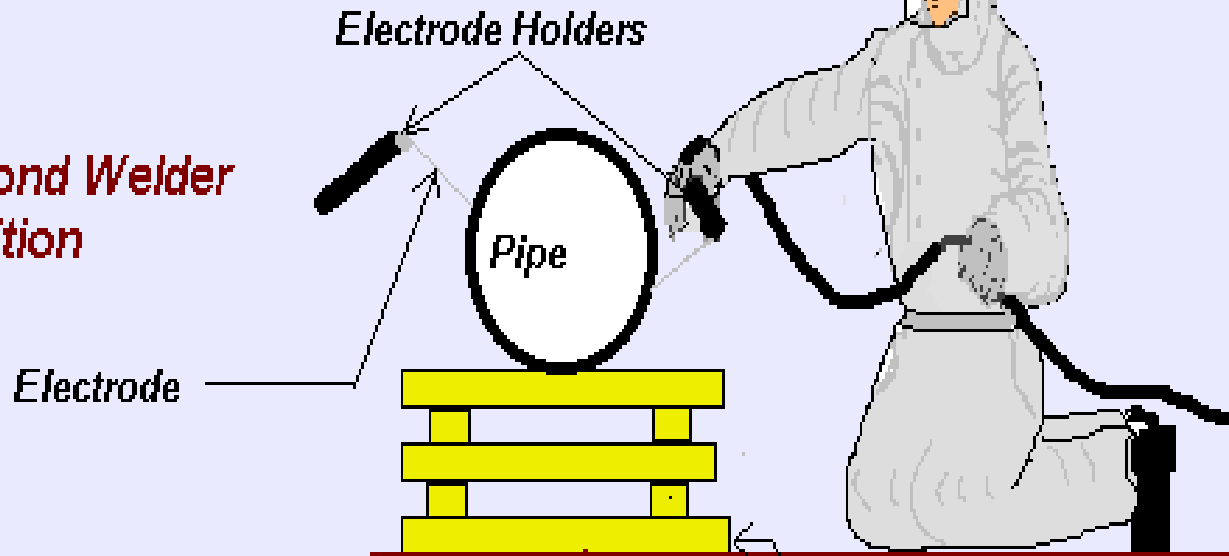
FOLLOWING STANDARDS/CODES ARE REFERRED IN INSPECTION & TESTING OF WELD.

- **API 1104, Welding of pipelines and related facilities.**
- **ASME Sec IX, Boiler & Pressure vessel Code.**

SMAW Welding



Second Welder
Position



ROW

Wooden Logs

PIPELINE CONSTRUCTION MANAGEMENT

Destructive Test

- A) Tensile strength test
- B) Nick break test
- C) Root, face and side bend test

PIPELINE CONSTRUCTION MANAGEMENT

Radiography

Scope of work includes 100% Radiographic inspection of all joints for the initial 1 Km of the pipeline in each spread. For balance portion of the pipeline ,20% of all joints shall be radio-graphically inspected except for specific crossings and tie-ins which need 100% radio-graphic inspection

Visual Examination Of weld

- 1. Weld is acceptable if it is free from cracks, inadequate penetration, burn through etc.*
- 2. Check the external undercutting(Under cutting adjacent to the final bead on the out side of the pipe shall not be more than 1/32" deep or 12.5% of wall thickness, whichever is smaller. There shall not be under cutting of more than 2" length at a stretch in any continuous 12" length weld.*
- 3. Having neat workman like appearance*

PIPELINE CONSTRUCTION MANAGEMENT

JOINT COATING

**COATING CLEARANCE IS AVAILABLE FROM
RADIOGRAPHY CREW.**

**HUMIDITY <85%, IF BETWEEN 75% TO 85% PREHEAT
BEFORE BLASTING.**

**CLEANING OF JOINT AREA AND ADJACENT COATING
DONE UPTO 100MM ON CTE COATING ON BOTH
PIPES**

**CHAMFER THE PIPE COATING TO AN ANGLE<30
PREHEAT THE WELDED JOINT AREA TO 60-80 C**

PIPELINE CONSTRUCTION MANAGEMENT

JOINT COATING

**SANDBLASTING IS DONE UPTO 100 MM ON CTE
COATING ON BOTH PIPES**

**ENTIRE SAND BLAST SURFACE IS FREE FROM
MOISTURE.**

**THE ROUGHNESS OF SAND BLASTED SURFACES IS
BETWEEN 50-70 MICRON AS MEASURED BY
PRESS-O-FILM/ELCOMETER.**

**PART A(60_±10ml)PRIMER & PART B(30_±10ml) EPOXY
IS MIXED FOR MIN 30 SEC**

**PREHEATING OF PIPE TO A TEMPERATURE OF 60-80°
C DONE.**

PIPELINE CONSTRUCTION MANAGEMENT

JOINT COATING

THE OVERLAP POSITION OF THE SLEEVE IS AT 2 OR 10 'O' CLOCK.

WET FILM THICKNESS OF PRIMER IS BETWEEN 50-70 MICRONS.

SIDE OF OVERLAP PORTION HEATED & PRESSED WITH SILICON ROLLERS.

THE CLOSURE PATCH IS HEATED, PRESSED & SEALED ON THE SLEEVE.

DIRECTION OF FLAME IS CIRCULAR & FROM ONE END TO OTHER END.

THE SLEEVE IS COMPLETELY SHRUNK AND CONFORMS TO PIPE

PIPELINE CONSTRUCTION MANAGEMENT

JOINT COATING

**SLEEVE IS FREE FROM WRINKLES, COLD SPOTS,
ENTRAPPED AIR IS EXPELLED BY HEATING &
PRESSING WITH ROLLER OR BY HAND.**

**THICKNES OF SLEEVE ON WELD SEEM IS MIN 1.7MM
AND ON PARENT METAL IS MIN 2MM.**

**PEEL TEST DONE ONE IN EVERY 100 JOINTS OR
DAY'S PRODUCTION WHICHEVER IS LOWER ON
SUBSEQUENT MORNING.**

PIPELINE CONSTRUCTION MANAGEMENT

JOINT COATING

PEEL TEST PROCEDURE

PEEL SIZED 1" BY 8" PEEL CUT UPTO BARE PIPE

**ANY LOCATION- AT WELDED SEAM, ON PIPE AND
ON CTE COATING**

**FAILS IF PEEL OF FORCE IS LESS AT OBSERVED
TEMP. OR ADHESIVE LAYER OF SLEEVE IS PEELED
OFF FROM PIPE.**

PEEL TESTED PORTION IS REPAIRED.

PIPELINE CONSTRUCTION MANAGEMENT

PIPELINE LOWERING IN TRENCH

Before lowering of pipeline in the trench,

To clear the trench of all debris, stones, pipe cut pieces, welding rods, hard clods, skids etc. before lowering of pipeline.

To drain out water from the trench (if any) to avoid floatation.

To carry out complete check by full circle holiday detector.

PIPELINE CONSTRUCTION MANAGEMENT

PIPELINE LOWERING IN TRENCH

Before lowering of pipeline in the trench,

To repair all coating damages.

To provide sand padding (150 mm thick) free from gravel/ pebbles in rocky areas.

Pipeline to be lifted & laid by using non-abrasive material (Teflon) coated hooks.

PIPELINE CONSTRUCTION MANAGEMENT

PIPELINE LOWERING IN TRENCH

Before lowering of pipeline in the trench,

No sling to be put around field joint coating.

Adequate Nos. of side booms to be used for holding the pipeline in gentle S-curve maintaining elastic bend radius.

Pipeline not to be laid in tension. Trench to be rectified (if required) so that the pipeline fits the excavation and rests on the trench bed.

To avoid movement of pipeline in the trench.

PIPELINE CONSTRUCTION MANAGEMENT

PIPELINE LOWERING IN TRENCH

BACKFILLING OF PREVIOUS SECTION HAS BEEN COMPLETED.

LOWERING CLEARANCE FROM JOINT COATING SITE IS AVAILABLE.

RADIOGRAPHY CLEARANCE FOR LEFT OUT JOINTS IS AVAILABLE.

COATING CHECKED VISUALLY FOR DEFECTS AND REPAIRS DONE, IF REQUIRED.

HOLIDAY DONE AT 15 KV

**DEPTH AT 4 LOCATIONS IS CHECKED AND FOUND
.1.5 M**

PIPELINE CONSTRUCTION MANAGEMENT

PIPELINE LOWERING IN TRENCH

**WIDTH CHECKED AT BOTTOM OF TRENCH AT 4
LOCATIONS AND FOUND . 1.2 m**

**TRENCH BOTTOM IS FREE FROM ROCKY STRATA
SOFT PADDING ON THE BOTTOM OF TRENCH
DONE**

**NIGHT CAPS ARE PROVIDED ON OPEN ENDS OF
PIPE SECTION.**

**SLING OF SIDE BOOM IS NOT BE ON FIELD JOINT
COATING.**

**PIPE IS LOWERED IN THE RIGHT SIDE OF THE
TRENCH.**

**DISTANCE OF HDPE PIPE FROM MAIN PIPE IS
400MM.**

PIPELINE CONSTRUCTION MANAGEMENT

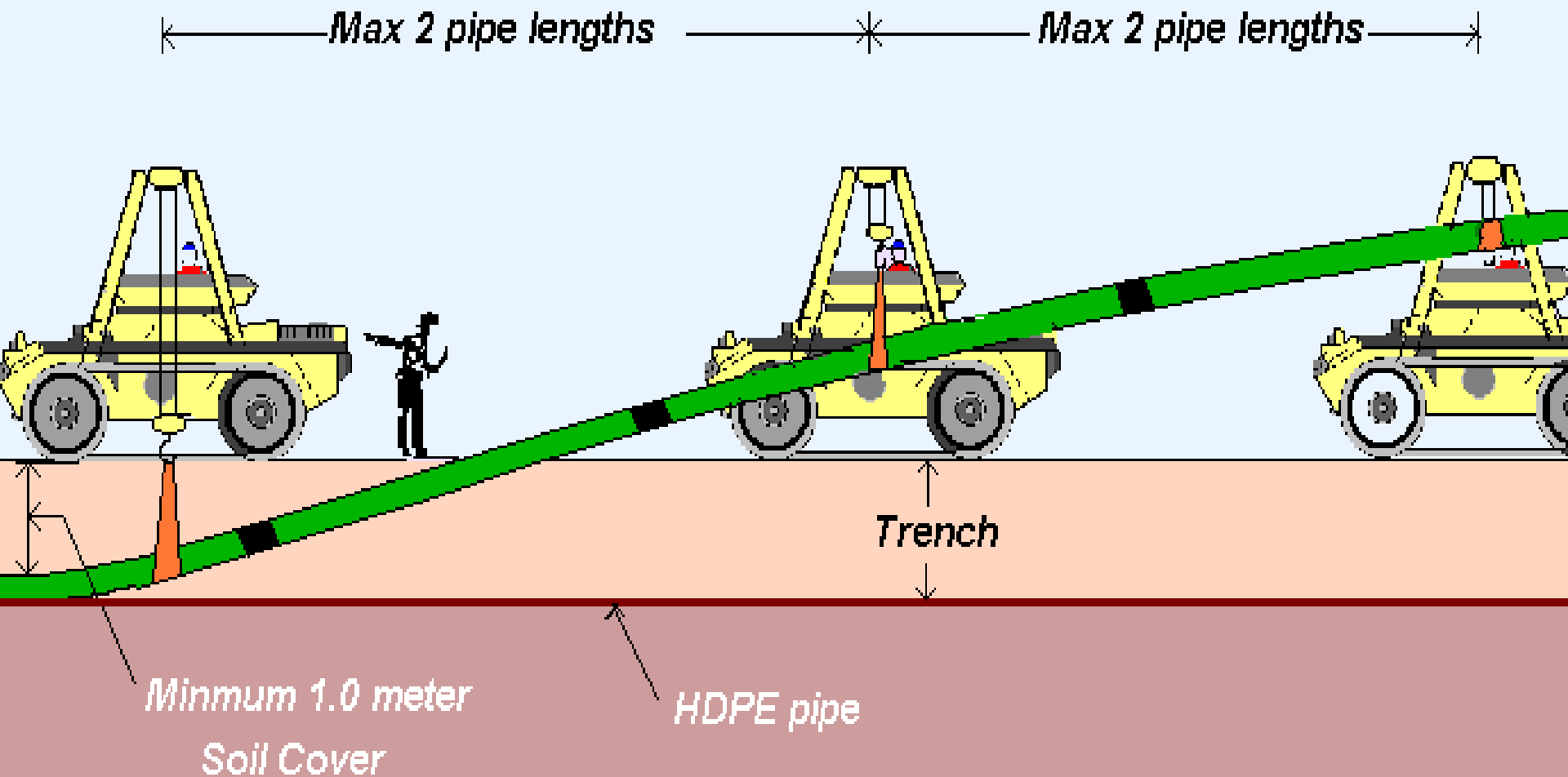
PIPELINE LOWERING IN TRENCH

**SPIKES PROVIDED AT 10 M INTERVAL ALONG THE
ROUTE OF HDPE PIPE.**

SPIKE REMOVED AFTER PADING.

**WARNING TAPE IS LAID AT 400 MM ABOVE HDPE
PIPE**

Lowering



PIPELINE CONSTRUCTION MANAGEMENT

Tie- Ins

The gaps which are left out during mainline welding due to road/railway crossing, canal/river crossings etc are connected in the form of Tie-in joints

PIPELINE CONSTRUCTION MANAGEMENT

TYPES OF CROSSINGS

- 1. Cased crossings for Railways & Highways (NH/ SH)**
Casing pipe: 24" OD x 0.281" WT API 5L Gr. B
Carrier Pipe: 18" OD x 0.250" WT API 5L X65
- 2. Uncased crossings (open cut) for minor roads/ cart – tracks using heavy wall pipe (18" OD x 0.281" WT API 5L X65).**
- 3. Minor water course crossings (open cut) using normal pipe (18" OD x 0.250" WT API 5L X65)**

PIPELINE CONSTRUCTION MANAGEMENT

TYPES OF CROSSINGS

4. **Submerged river crossings (open cut) using heavier wall pipe (18" OD x 0.375" WT API 5L X65) with concrete coating/ HDD XING**
5. **Crossings for existing underground facilities like pipelines, cables using normal pipe (18" OD x 0.250" WT API 5L X65) with min. clearance of 500 mm.**

Crossings at Sl. No. 2, 3 & 5 above are part of mainline item.

Cased and submerged river crossings are separate items.

PIPELINE CONSTRUCTION MANAGEMENT

CROSSINGS

Execute crossing work as per concerned Statutory Authority permission conditions.

Highways, main roads, rail roads & their verges and banks of water courses not to be used for loading, unloading or stacking of materials or equipment.

Roads or water courses not to be closed or diverted without prior permission of concerned Statutory Authority.

Before execution of cased and submerged river crossings, detailed methodology to be submitted by contractor containing:

Time schedule,

Working method,

Equipment to be deployed

Test procedure

Manning

Soil Investigations.

PIPELINE CONSTRUCTION MANAGEMENT

CASED CROSSINGS

To be executed by horizontal boring technique.

Casing pipe to be 6" larger in dia. than carrier pipe.

Carrier pipes to be 3 LPE coated. No coating of casing pipes.

Ground water table (if encountered) over length of boring to be lowered up to at least 0.5 m below bottom of the pipeline.

PIPELINE CONSTRUCTION MANAGEMENT

CASED CROSSINGS

Dia. of bored hole to be almost same as casing pipe OD.

Vent pipes to be provided on both ends of casing in such a way that there is no contact with carrier pipe.

100% radiographic inspection of weld joints of carrier pipes.

PIPELINE CONSTRUCTION MANAGEMENT

CASED CROSSINGS

Prior to installation, hydrostatic pre-testing of the carrier pipeline section to be carried out at a pressure corresponding to 95% SMYS of pipe material (120.62 kg/cm² for SSPL) . Test pressure to be maintained for min. 4 hrs.

Insulators to be securely fastened to carrier pipes @ 1 m c/c.

PIPELINE CONSTRUCTION MANAGEMENT

CASED CROSSINGS

At both ends of casing, double set of insulators to be installed.

Carrier pipe to be pulled/ pushed into casing in such a way that insulators are not disturbed.

Annular space between casing and carrier pipes at both ends to be packed tightly with jute and bitumen before fixing end seals in order to prevent ingress of moisture/ water.

PIPELINE CONSTRUCTION MANAGEMENT

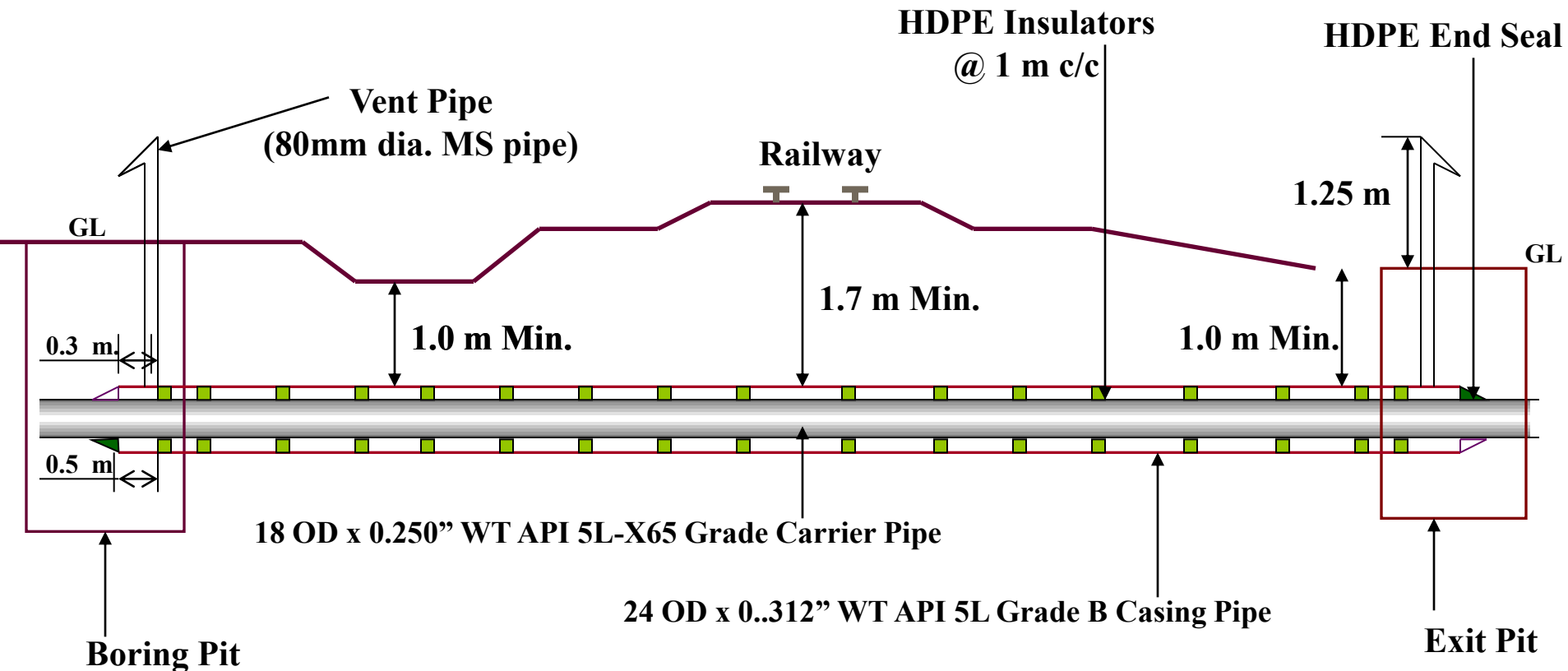
CASED CROSSINGS

After installation, electrical test to be conducted to determine resistance between carrier pipe & casing pipe or carrier pipe & soil, which should be min. 1 mega ohm.

The earth to be properly compacted up to a distance of 3 m from end of casing pipe on both sides to avoid uneven settlement of carrier pipe.

PIPELINE CONSTRUCTION MANAGEMENT

TYPICAL CASED RAILWAY CROSSING



PIPELINE CONSTRUCTION MANAGEMENT

Clean-Up and Restoration

Clear the site by removing all rubbish, broken skids, empty canes, pieces of electrodes and other construction material

Restore ROW to the satisfaction of farmers and obtain NOC from them

Restore cut roads, canals, river banks etc and obtain NOC from concerned Government Department

PIPELINE CONSTRUCTION MANAGEMENT

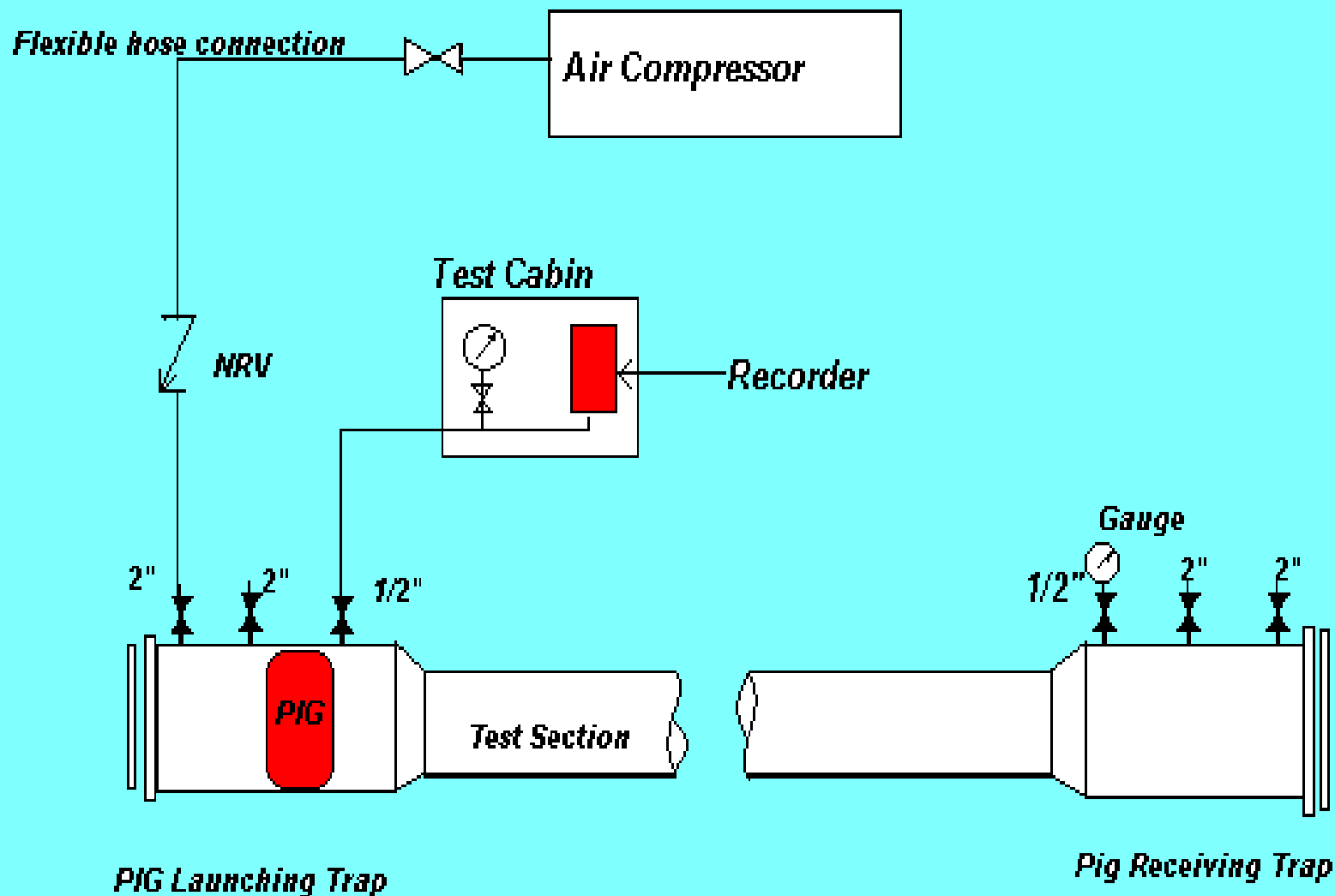
Air pigging cleaning and Gauging

Cleaning with compressed air with the help of series of brush pigs

Gauge plate of softer metal like Al of 95% of ID of highest wall thickness pipe is fastened to pig

Retrieved gauge plate is analyzed and preserved

Cleaning and Gauging Operation



PIPELINE CONSTRUCTION MANAGEMENT

Hydrostatic Testing

MECHANICAL CLEARANCE IS AVAILABLE. (Pipe book completed)

INSTRUMENTS AND EQUIPMENT TO BE USED ARE WITH VALID CALIBRATION AND OF REQUIRED RATING.

WATER TESTING CERTIFICATE AND CORROSION INHIBITOR DOSAGE RECOMMENDATION AVAILABLE.

PIPELINE CONSTRUCTION MANAGEMENT

Hydrostatic Testing

GAUGE PLATE OF 95% ID AND 10 MM THICKNESS SHALL BE PASSED THROUGH THE SECTION AFTER CLEANING OF THE PIPE.

GAUGE PLATE WITH < 2 MM SCRATCH ON SIDE WALL AND WITH NO DENT IS ACCEPTABLE.

CHECKING THE CONDITION AND SEQUENCE OF PIGS IN THE HYDROSTATIC HEADER.

PIPELINE CONSTRUCTION MANAGEMENT

Hydrostatic Testing

ONLY QUALIFIED WELDER IS ALLOWED TO PERFORM WELDING OF HEADER.

CHECK RATING AND CONDITION OF HEADER FITTINGS.

USE THE FILLING WATER FROM TESTED WATER SOURCE ONLY.

FILL 500 MTRS. OF WATER BEFORE FIRST PIG AND 1000 MTR WATER BETWEEN FIRST AND SECOND PIG.

FINAL FILLING SHALL BE DONE WITH FILL RATE OF 2 KM/HRS.

PIPELINE CONSTRUCTION MANAGEMENT

Hydrostatic Testing

**AFTER RECEIPT OF PIGS AT RECIVER MINIMUM 2
HRS. WATER FLUSHING SHALL BE ENSURED.**

**TURBINE METER READING RECORDING SHALL BE
PRESERVED.**

**THERMAL STABILIZATION FOR 24 HRS. SHALL BE
DONE AND SECTION IS SAID TO BE THERMALLY
STABILIZED IF DIFFERENCE NOT HIGHER THAN
1 DEGREE IS ATTAINED BETWEEN THE
AVERAGE VALUE OF SOIL TEMPERATURE
READINGS**

PIPELINE CONSTRUCTION MANAGEMENT

Hydrostatic Testing

**PRESSURISE THE SECTION NOT MORE THAN 2
BAR/MIN RATE.**

FOLLOWING THE SEQUENCE MENTIONED BELOW:-

- a) PRESSURE THE PIPE SECTION TO 50% HOLD FOR 1 HR.**
- b) DROP 0.5 BAR DO AIR VOLUME CALCULATION.**
- c) DROP PRESSURE TO STATIC +1 BAR.**
- d) FOLLOW B & C FOR 75% PRESSURISATION.**
- e) IF AIR VOLUME CALCULATION VALUE IS BETWEEN 1
TO 1.06, THEN FILLING IS ACCEPTED.**

PIPELINE CONSTRUCTION MANAGEMENT

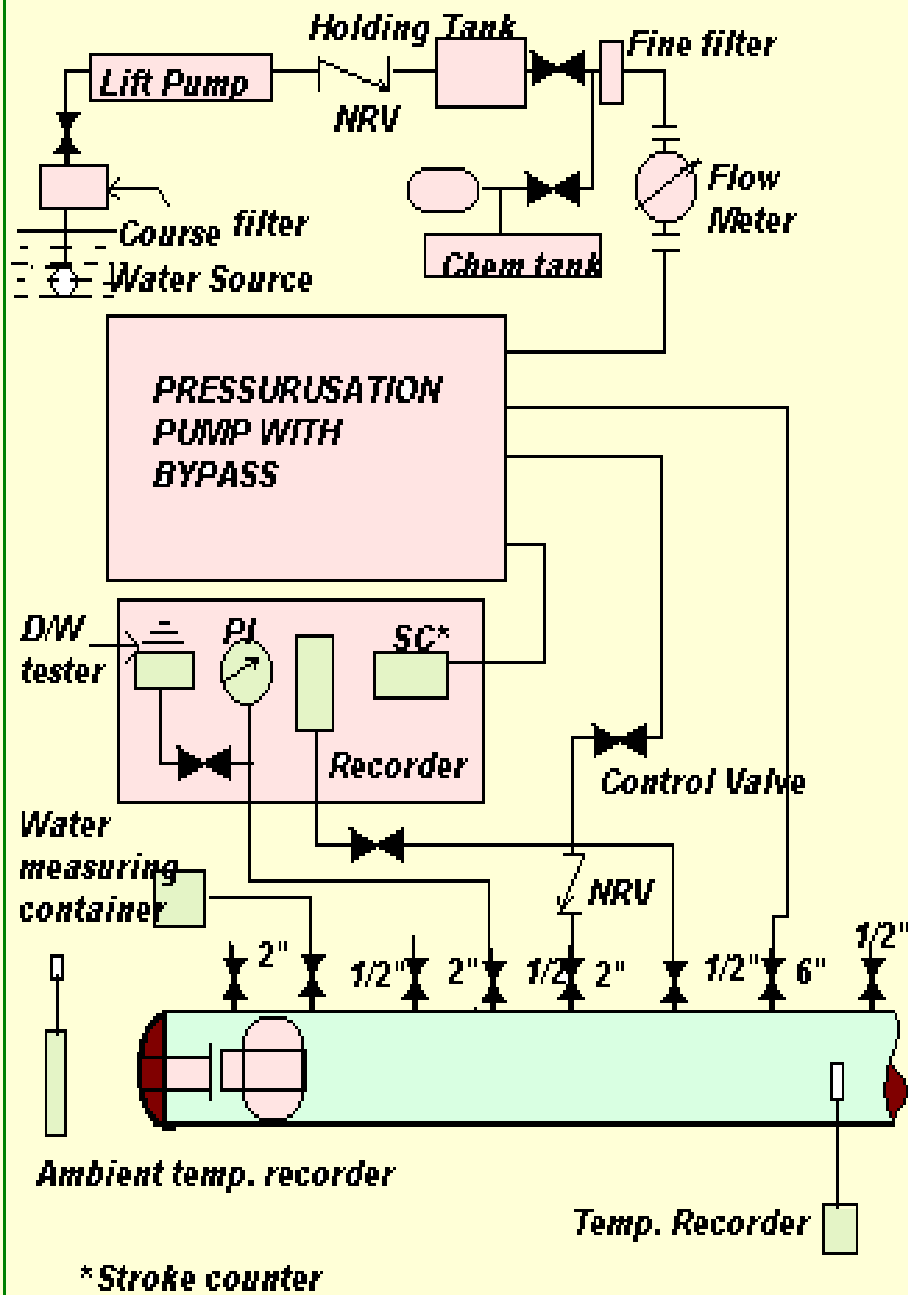
Hydrostatic Testing

**PRESSURE THE PIPE TO 125.18 TO 118.55 KG/CM²
(DEPENDING UPON PIPE SECTION PROFILE) AND
HOLD IT FOR 24 HRS.**

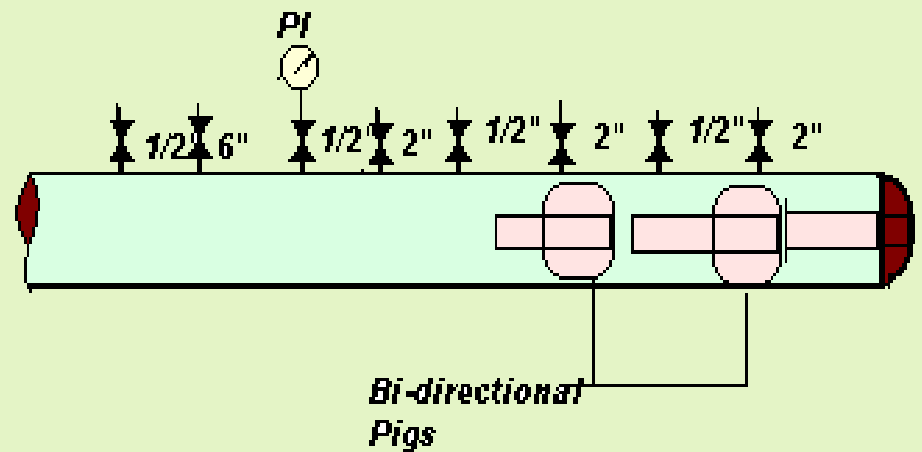
**USE DWT AND RECORDING SYSTEM DURING
TESTING.**

**THE TEST IS CONSIDERED ACCEPTABLE IF
DIFFERENCE IS LESS OR EQUAL TO 0.3 BAR IN
CASE OF DOUBT TESTING PERIOD SHALL BE
EXTENDED.**

Hydrostatic Test



PIG LAUNCHING TRAP



PIG RECEIVING TRAP

PIPELINE CONSTRUCTION MANAGEMENT

Cleaning and Gauging Operation

Need of cleaning and gauging

Cleaning with compressed air with the help of series of brush pigs

Gauge plate of softer metal like Al of 95% of ID of highest wall thickness pipe is fastened to pig

Retrieved gauge plate is analyzed and preserved

PIPELINE CONSTRUCTION MANAGEMENT

Markers and Valve Installation

Boundary Pillars (A set at every 250 m)

Kilometer post

Turning Point marker

Direction Marker(Before and after a TP 200m)

Warning Sign

Valve Installation:

Pre tested valves are installed at designated locations after completion of hydrotest

PIPELINE CONSTRUCTION MANAGEMENT

Caliper Survey

To establish a benchmark of internal conditions of pipeline viz dents, ovalities for future references and surveys

Dewatering by foam pigging

Cleaning by brush pigging

Magnetic pigging

Programmed caliper pigging

Downloading and interpretation

PIPELINE CONSTRUCTION MANAGEMENT

Line Preservation

To preserve the line from internal corrosion for a prescribed period due to non-commissioning

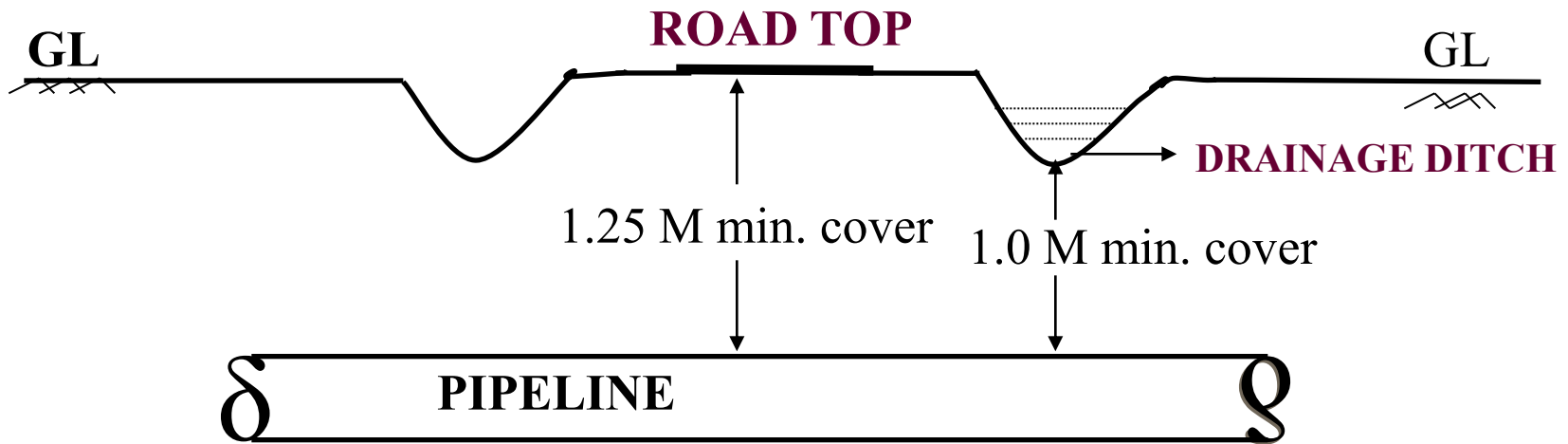
Pressurize pipe with inhibited water

Dosage of inhibitor depending on duration of preservation monthly, half yearly, yearly etc and Quality of water to be filled

Keep line in air tight condition by monitoring pressure

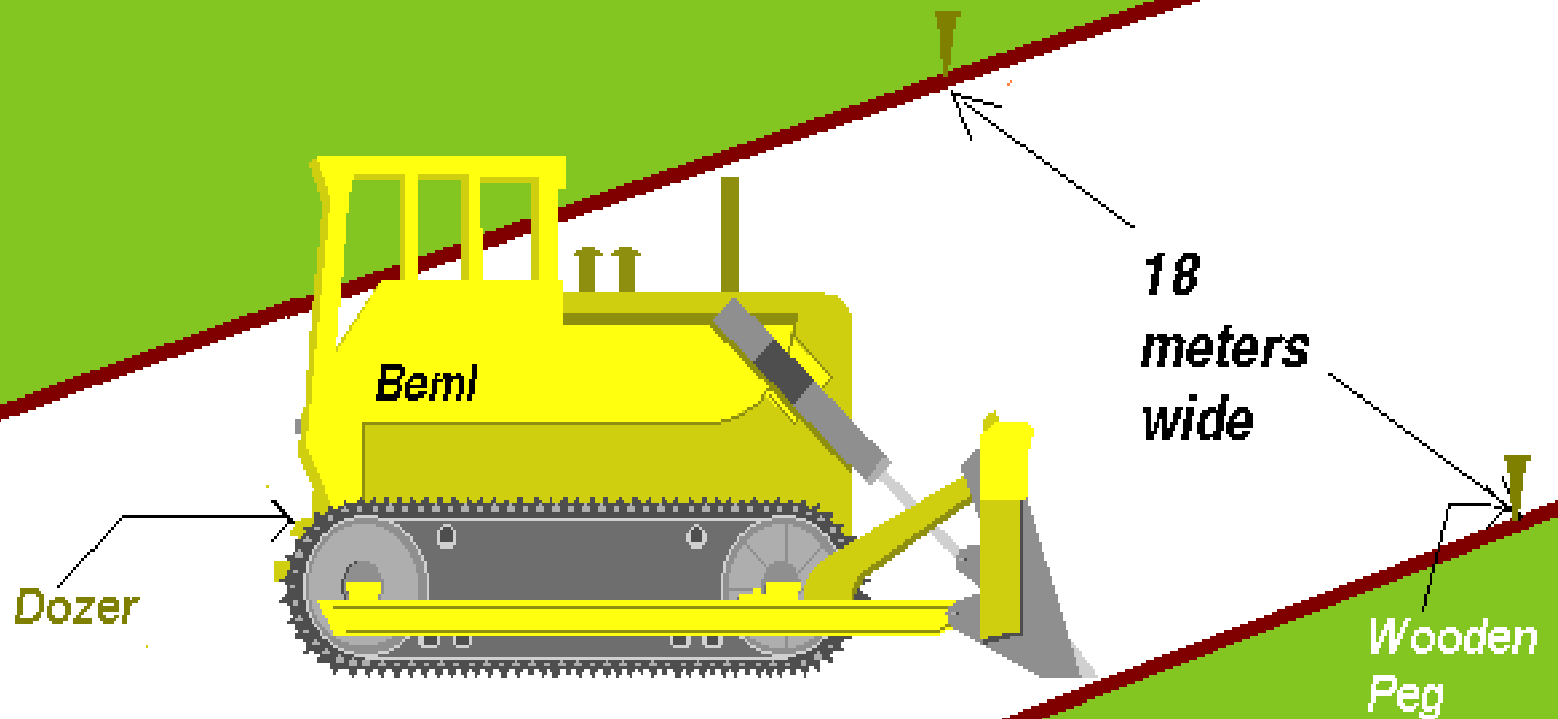
PIPELINE CONSTRUCTION MANAGEMENT

TYPICAL HEAVY WALL PIPE ROAD CROSSINGS



PIPELINE CONSTRUCTION MANAGEMENT

Right of Way



ROW







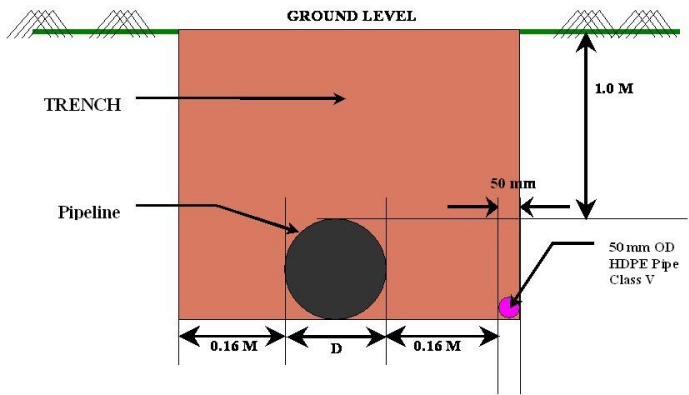
Stringing







**TYPICAL SKETCH OF OFC
IN PIPELINE TRENCH BOTTOM**











03/04/2004

Weld Bead

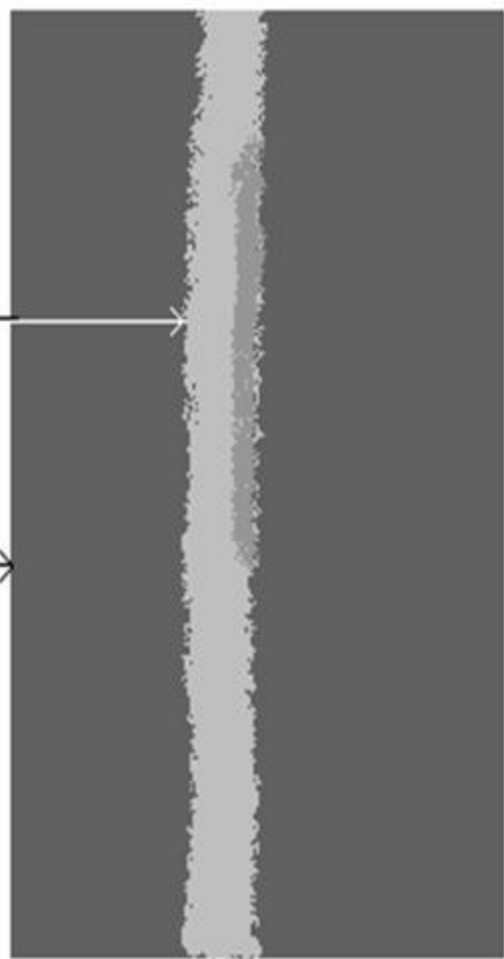


Radiograph

Weld



Parent Metal



Offset or mismatch with lack of penetration (LOP)





KPI 64-M-36-W-I-1312

301
340
320
311

01/06/2004

MISCELL
MR. P. R. ...
1000





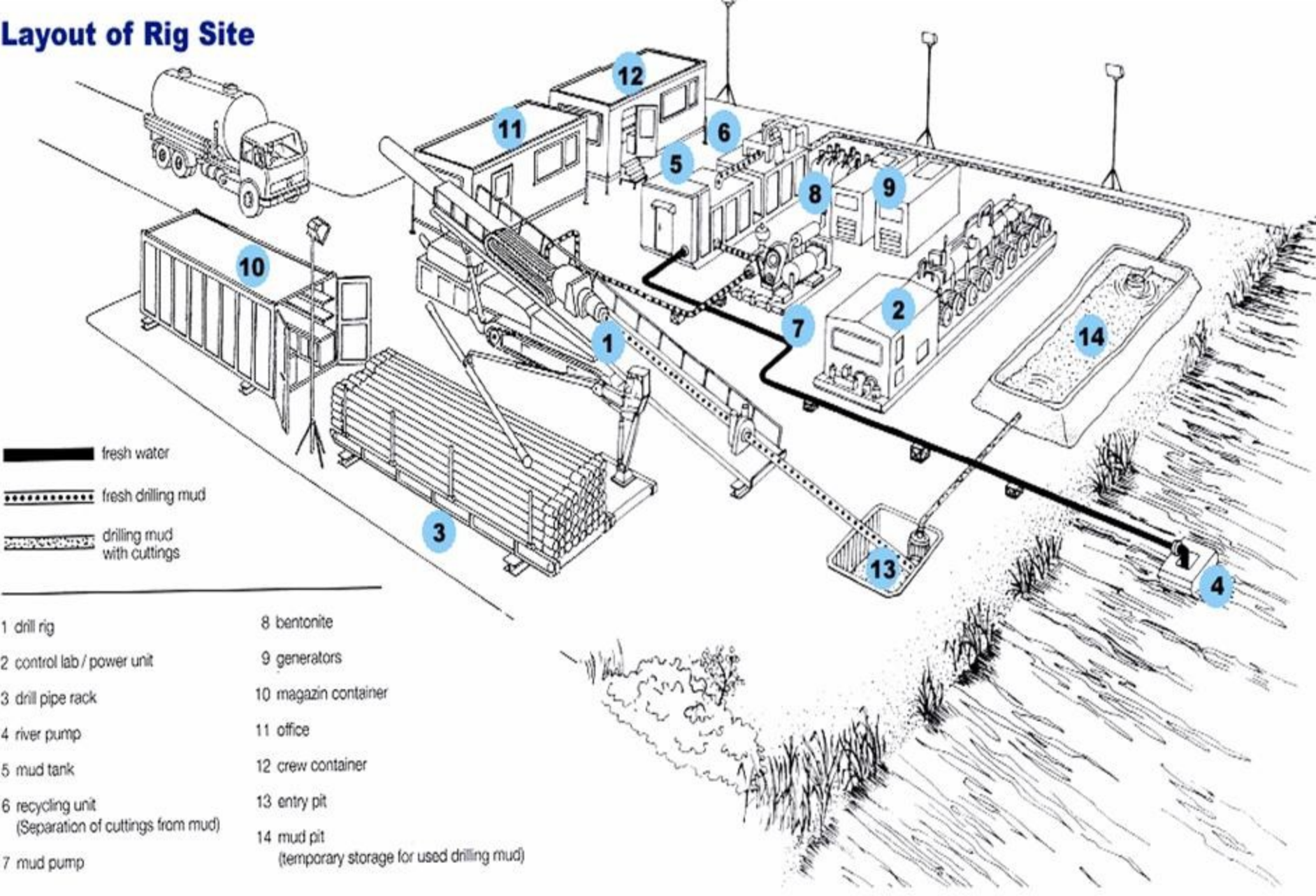
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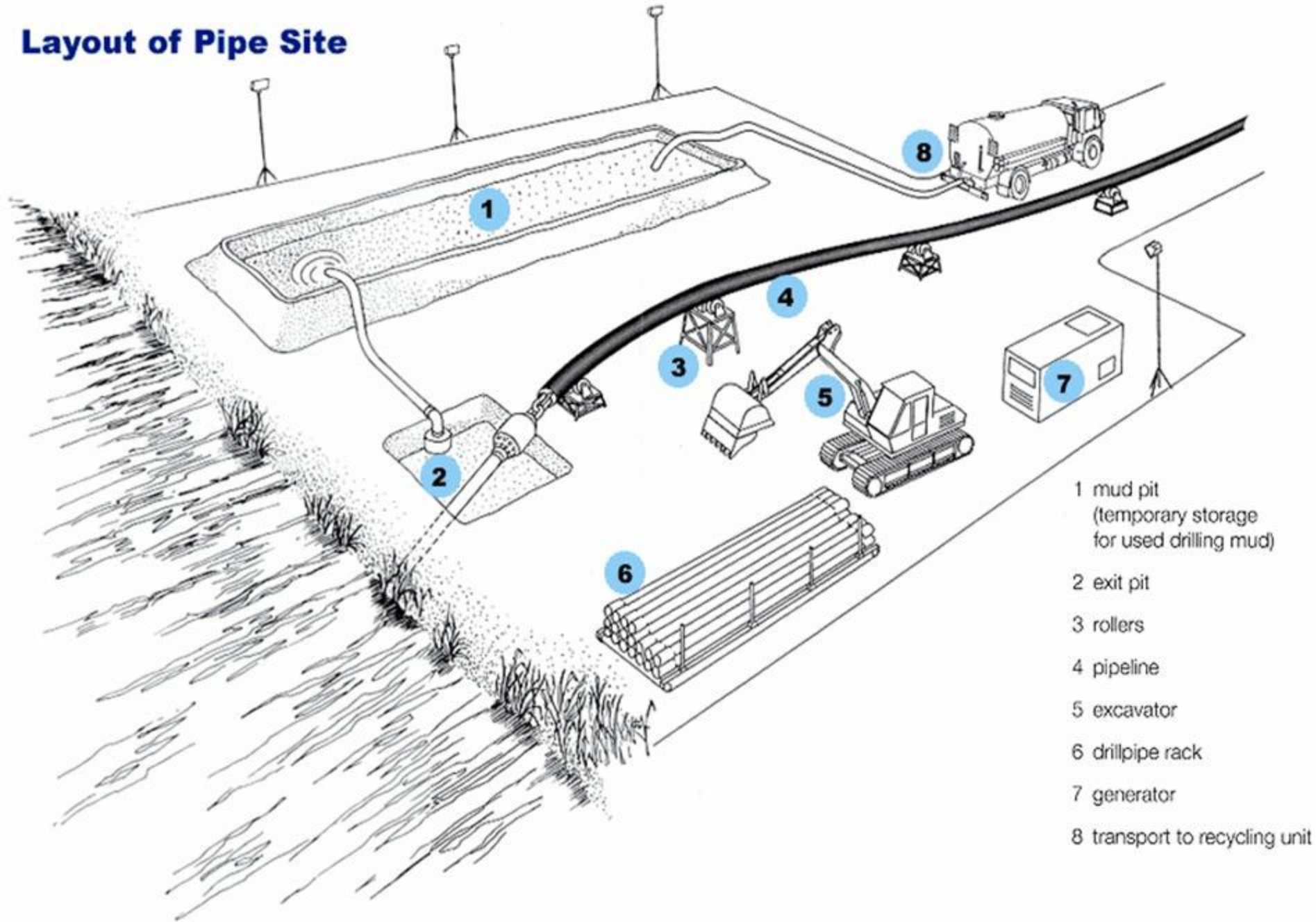
Layout of Rig Site

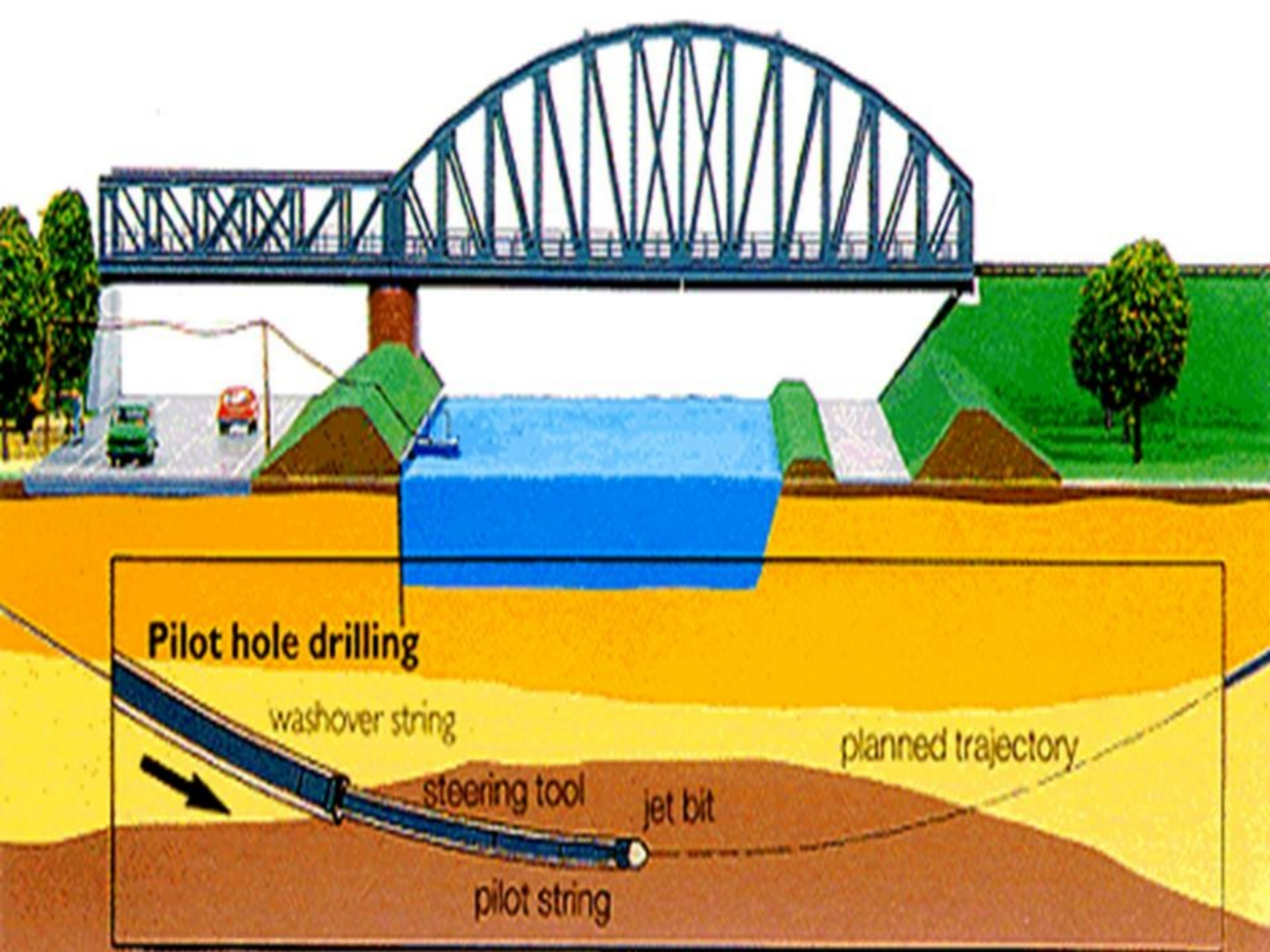


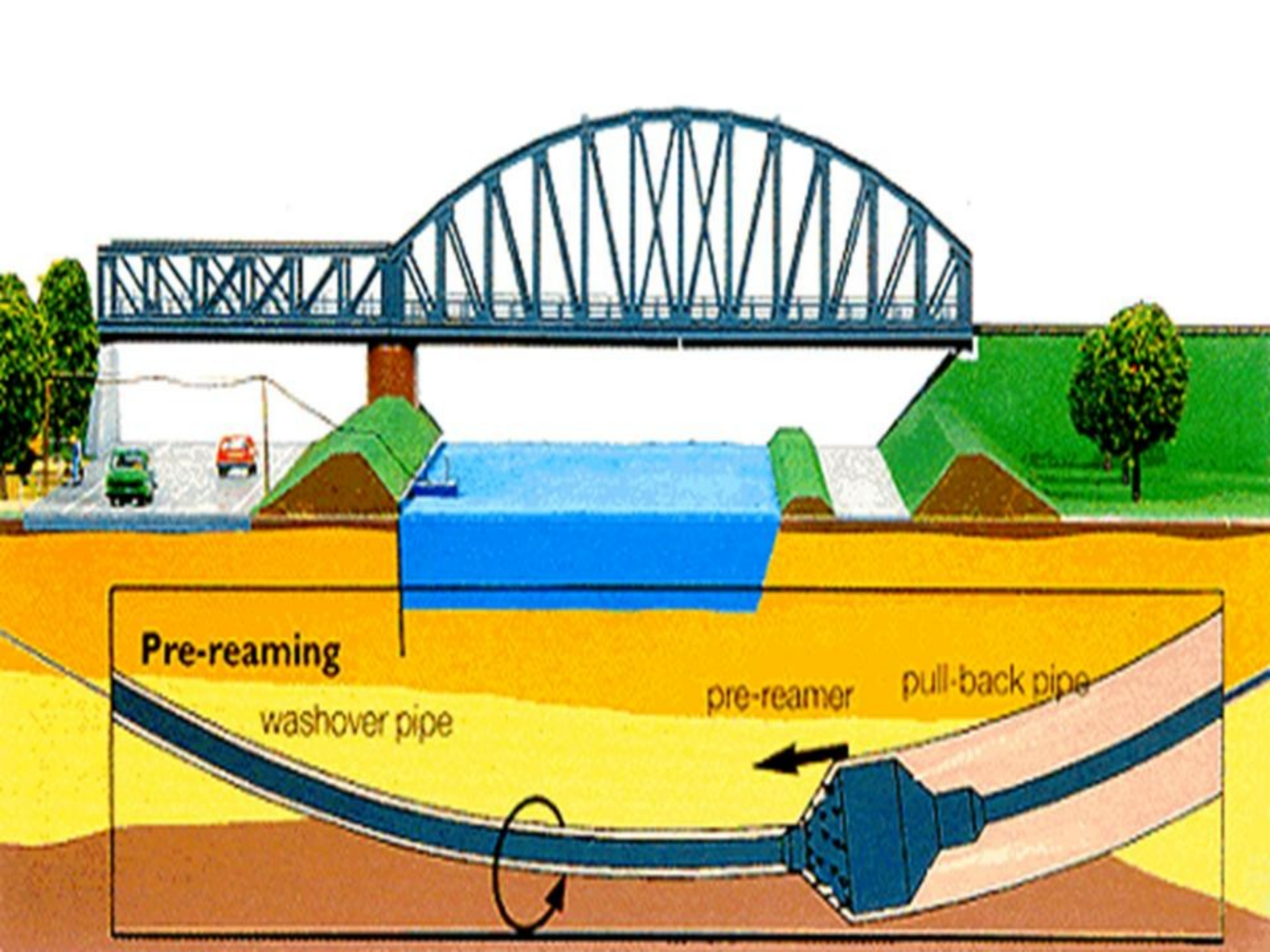
 fresh water
 fresh drilling mud
 drilling mud with cuttings

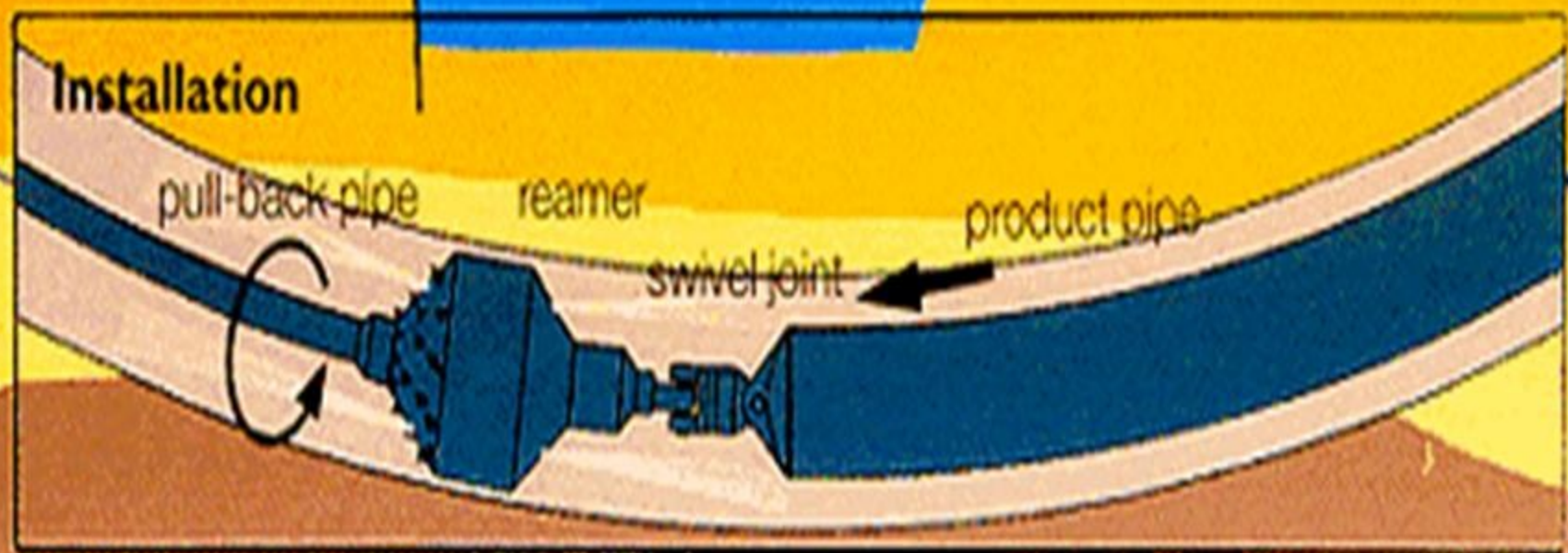
- | | |
|---|---|
| 1 drill rig | 8 bentonite |
| 2 control lab / power unit | 9 generators |
| 3 drill pipe rack | 10 magazin container |
| 4 river pump | 11 office |
| 5 mud tank | 12 crew container |
| 6 recycling unit
(Separation of cuttings from mud) | 13 entry pit |
| 7 mud pump | 14 mud pit
(temporary storage for used drilling mud) |

Layout of Pipe Site











100 Ton



250 Ton



250Ton

PILOT BIT

RIGHT ANCHORING

MUD INJECTING NOZZLE

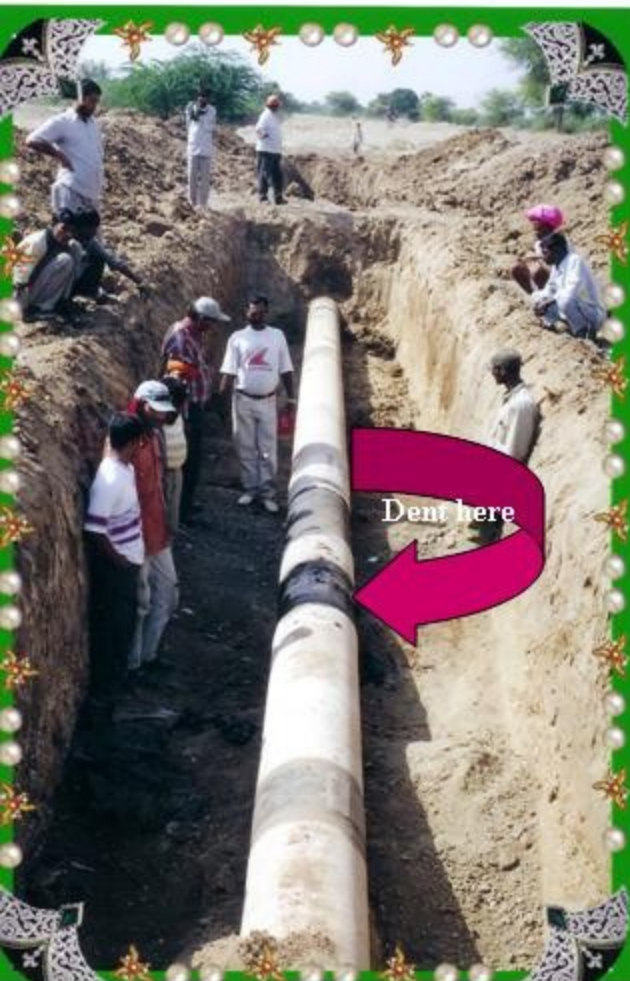
CUTTING EDGES





icap

SPREAD I Section 449.141 to 426.355 Dent1





15/09/2004







[HOME](#)



17/09/2004

AIR-VOLUME CALCULATION

AIR-VOLUME RATIO=Vi/Vp (Acceptable limit is 1.06 at 75% of test pressure cycle)

Vi=Actual volume of water drained to drop pressure by 0.05 Kg/Cm²

Vp=(0.884 ri / ti+A)X10⁻⁶ X Vt X P X K

Vp=Computed water amount required to raise by P the pressure in the section to be tested (M³)

Vt=Geometrical volume of the section (M³)

ri=Nominal inner radius of the pipe (mm)(Average)

ti=Nominal wall thickness of the pipe (mm)(Average)

A=Isothermal compressibility value for water at the pressurization temperature in the P range (bar⁻¹)x10⁶.

Ref graph.

P=Pressure Raise (bar)

K=A dimensionless coefficient that is equal to 1.02 for longitudinally welded pipe.

