सत्यमेव जयते

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण

(सड़क परिवहन एवं राजमार्ग मंत्रालय, भारत सरकार)

NATIONAL HIGHWAYS AUTHORITY OF INDIA

(Ministry of Road Transport and Highways, Govt. of India)

क्षेत्रीय कार्यालय / REGIONAL OFFICE

ई-6/47, स्मृति परिसर, सांईबोर्ड के पास, अरेरा कॉलोनी, भोपाल (म.प्र.)-462016

E-6/47, Smriti Parisar, Near Sai Board, Arera Colony, Bhopal (M.P.)-462016

दूरभाष/Phone: 0755-2426638, फैक्स/Fax: 0755-2426698, ई-मेल/E-mail ID: robhopal@nhai.org

भा.रा.रा.प्रा. / क्षे.का.–म.प्र. / पकाई–छिंदवाड़ा / एन.एच.–547 / 2024 / S2654 दिनांकः– 02.01.2025

सूचना / NOTICE

विषयः–मध्यप्रदेश राज्य के जिला छिंदवाड़ा में एन.एच.–547 (छिंदवाड़ा से अमरवाड़ा खण्ड) पर किमी. 98.600 से कि.मी. 124.500 (आर.एच.एस.) तक कुल लंबाई (लगभग 23.500 कि.मी.) एवं कुल 07 कसिंग चेनेज किमी 98.600, किमी 99.100, किमी 104.300, किमी 107.850, किमी 109.000, किमी. 117.700 एवं 123.000 में जल अपूर्ति हेतु पाइपलाइन बिछाने / कसिंग करने की अनुमति देने के लिए आवेदन।

Application for granting for the permission for laying/crossing pipeline for water supply along NH-547 (Chhindwara to Amarwada Section) from Km-98.600 to Km-124.500 (RHS), Total length (Approximate 23.5 km) & Crossings Chainages Km.98.600, Km, 99.100, Km.104.300, Km.107.850, Km 109.00, Km 117.700, Km-123.000 to Total Nos. of Crossing (07), District-Chhindwara, State-Madhya Pradesh-reg.

संदर्भः– पकाई छिंदवाड़ा का ई– फाईल नं. 267706

1. परियोजना निदेशक पकाई –छिंदवाड़ द्वारा ई– फाईल नं. 267706 के माध्यम से मध्यप्रदेश जल निगम, छिंदवाड़ा द्वारा मध्यप्रदेश राज्य के जिला छिंदवाड़ा में एन.एच.–547 (छिंदवाड़ा से अमरवाड़ा खण्ड) पर किमी. 98.600 से कि. मी. 124.500 (आर.एच.एस.) तक कुल लंबाई (लगभग 23.500 कि.मी.) एवं कुल 07 कसिंग चेनेज किमी 98.600, किमी 99.100, किमी 104.300, किमी 107.850, किमी 109.000, किमी. 117.700 एवं 123.000 में जल अपूर्ति हेतु पाइपलाइन बिछाने / कसिंग करने की अनुमति देने के लिए आवेदन के लिए प्रस्ताव प्रस्तुत किया है।

   PD, PIU Chhindwara, NHAI vide e-file no. 267706 has submitted the proposal for granting for the permission for laying/crossing pipeline for water supply along NH-547 (Chhindwara to Amarwada Section) from Km-98.600 to Km- 124.500 (RHS), Total length (Approximate 23.5 km) & Crossings Chainages Km.98.600, Km, 99.100, Km.104.300, Km.107.850, Km 109.00, Km 117.700, Km-123.000 to Total Nos. of Crossing (07), District-Chhindwara, State-Madhya Pradesh.

2. मंत्रालय के कार्यालय ज्ञापन संख्या RW/NH–33044 S&R (R) दिनांक 22.11.2016 के अनुसार, दावे और आपत्तियां (सार्वजनिक असुविधा, सुरक्षा और सामान्य सार्वजनिक हित के आधार पर) मांगने के लिए आवेदन को 30दिनों के लिए सार्वजनिक डोमेन में रखा जाएगा।

   As per Ministry vide OM No. RW/NH-33044 S&R (R) dated 22.11.2016, the application shall be put out in public domain for 30 days for seeking claims and objections (on ground of public inconvenience, safety and general public interest).

3. तदनुसार, दावे और आपत्तियां मांगने के लिए उपरोक्त प्रस्ताव (आवेदन की प्रति संलग्न) पर 30 दिनों के भीतर (यानी 02.02.2025 तक) सार्वजनिक पोर्टल (यानी MoRTH की वेबसाइट

(www.morth.nic.in)) पर जनता की टिप्पणियां आमंत्रित की जाती हैं, जिसके बाद किसी भी टिप्पणी पर विचार नहीं किया जाएगा। टिप्पणी आमंत्रित करने वाले प्राधिकारी का पता इस प्रकार है:–

Accordingly, the public comments are hereby invited on the above proposal (copy of application enclosed) for seeking claims and objections within 30 days (i.e. by 02.02.2025) on public portal (i.e. website of MoRTH (www.morth.nic.in)) beyond which no comments will be considered. The address of comments inviting authority is as under:

राजमार्ग प्रशासक, क्षेत्रीय अधिकारी कार्यालय भारतीय राष्ट्रीय राजमार्ग प्राधिकरण, ई–6/47, स्मृति परिसर, साईं बोर्ड अरेरा कॉलोनी के पास, भोपाल (मप्र)–462016	The Highway Administrator O/o Regional Officer, National Highways Authority of India E-6/47, Smriti Parisar, Near Sai Board Arera Colony, Bhopal (MP)-462016

यह पत्र राजमार्ग प्रशासक सह् क्षेत्रीय अधिकारी के अनुमोदन उपरान्त जारी किया जा रहा है।

Ramvi 02/01/2025

(रामविलास पटेल)
प्रबंधक (तक.)

संलग्नः– उपरोक्तानुसार

प्रतिलिपिः–

1. वेब एडमिन, भा.रा.रा.प्रा., मुख्यालय, नई दिल्ली की ओर सर्वजनिक टिप्पणियों के लिए भा.रा.रा. प्रा. की वेबसाइट पर अपलोड करने के अनुरोध के साथ।
2. वरिष्ठ तकनीकी निदेशक, एनआईसी, परिवहन भवन, नई दिल्ली की ओर सार्वजनिक टिप्पणियों के लिए सड़क परिवहन की वेबसाइट पर अपलोड करने के अनुरोध के साथ।
3. परियोजना निदेशक, पकाई, छिंदवाड़ा कर ओर सूचनार्थ प्रेषित ।
4. मध्यप्रदेश जल निगम, छिंदवाड़ा की ओर सूचनार्थ प्रेषित

CHECKLIST

Guidelines for Project Directors for processing the proposal for laying of water
Pipe line in the land along National Highway vested with NHAI .
Relevant circulars of ministry or road transport and highways
Circular No RW/NH – 33044/29/2015/S&R (R) dated 22.11.2016
Check list for getting approval for laying of water pipe line on NH land (to be filled by the PIU)

Check list for getting approval for laying approval for laying of water pipe line shall be considered for approval / Rejection base on the ministry circulars mentioned as above,

Carrying of water pipelines on highways bridges shall not be permitted as fumes /gasses pipes can accelerate the process of corrosion or may cause explosion, thus, being much more injurious than leakage of water.

Services are not being allowed indiscriminately on the parapet/any part of the brides, safety of the bridges has to be kept in view while permitting various services along bridge.

Check List for getting approval for installation of new Fuel Stations along National Highways

S.no	Item	Information Status	Remarks
1	General Information	Permission for Proposed laying of water supply pipeline	
1.1	Name and address of Applicant/Agency	Madhya Pradesh Jal Nigam Maryadit, Chhindwara, MP.	
1.2	National Highway Number	NH-547	
1.3	State	Madhya Pradesh	
1.4	Location	Chhindwara to Amarwara Road	
1.5	Change in KM	Start Point Km 97.500 (RHS) to End Point Km 123.672 (LHS) Total Length (Approx. 23.5 Km) & Crossings Chainages Km.97.500, Km,99.000, Km.104.365, Km.107.770, Km.109.000, Km 117.700, Km 123.170 Total No. Of Crossing (07)	
1.6	Length in Meters	23.5 KM Approx.	
1.7	Width of available ROW	24.00m	
	(a) Left side from centre line towards increasing changing / Km direction	12.00M	
	(b) Right Side from centre line towards increasing changing / Km direction	12.00M	

1.8	Proposal to lay underground pipe line.	Yes	
	(a) Left side from centre line towards increasing changing / Km direction	11M	Drawing Enclosed
	(b) Right side from centre line towards increasing changing / Km direction	11M	Drawing Enclosed
1.9	Proposal to acquire land	NO	As the laying of water pipeline is proposed in utility corridor at edge of the ROW
	(a) Left side from centre line	NO	
	(b) Right side from centre line	NO	
1.10	Whether proposal is in the same side where land is not be acquired	NA	
	If not then where to lay the Water pipe line	NA	
1.11	Details of already laid services, if any along the proposed route	Airtel OFC cable	
1.12	Number of existing lanes (2/4/6/8 lanes)	2 lane with PS	
1.13	Proposal Number of lanes (2 lane with paved shoulders 4/6/8 lanes	NA	
1.14	Service road existing centre line	NO	
	If yes then which side		
	(c) Right side from centre line	NA	
	(d) Right side from centre line	NA	
1.15	Proposed service Road	NA	
	(a) Left side from centre line	-	
	(b) Right side from centre line	-	
1.16	Whether proposed to lay water pipeline is after the service road or between the service road main carriageway	At the extreme edge of ROW	
1.17	Whether carrying of water pipeline has been proposed on highway Bridges. If yes, then mention the methodology proposed for the same.	NO	
1.18	Whether carrying of water pipeline has been proposed on the parapet/any part of the Bridges . If yes then mention the methodology proposed for the same .	NO	
1.19	If crossing of the road involved if Yes , it shall be either encased in pipes or through structure or conduits specially built for the agency owing the line	Yes, encased In pipe	HDD method

	(a) Whether existing drainages structures are allowed to carry water pipeline	No	
	(b) Is it on a line normal to NH	Yes	
	(c) What is the distance of crossing the water pipeline from the existing structures? Crossing shall not bne too near the existing structures on the National Highway, the minimum distance being 15 Meter	Yes more than 15m	
	(d) The casing pipe (or conduit pipe in the case of electric cable) carrying the utility line shall be of steel, cast iron, or reinforced strength and be3 large enough to permit ready withdrawal of the carrier pipe/cable. Mention type of casing.	Yes, Cast Iron Casing	
	(e) Ends of the casing/conduit pipe should, as minimum extend from the outside so that it does not act as a drainage path.	Yes, Agree	
	(f) The casing/conduit pipe should , as minimum extend from drain to drain in cuts and toe of slope in the fills .	Yes, Agree	
	(g) The top of the casing /conduit pipe should be at least 1.2 Meter below the surface of the road subject being at least 0.3 m below the drain inverts. Mention the proposed details.	Yes, Agree	
	(h) Mention the methodology proposed for crossing of road for the proposed water pipe line. crossing shall be by boring method (HDD) [trenchless Technology], specially where the existing road pavement is of cement concrete type.	Yes, Agree	
	(i) The casing / conduit pipe shall be installed with an even bearing throughout its length and in such a manner as to prevent the formation of a waterway along it.	Yes, Agree	
2	Document / drawings to be enclosed with the proposal.	Yes	
2.1	Cross section showing the size of trench for open trenching method (is it normal size of 1.2m deep X 0.3 m wide) (1) Should not be greater than 60cm wider than the outer diameter of the pipe (2) located as close to the extreme edge of the right-of-way as possible but not be permitted to run along the National Highway when the road formation is situated I double cutting. Nor shall these be laid over the existing culverts and bridges (4) these should be so laid that their top is at least 0.6 meter	Yes	Enclosed

A.M.E

General Manager
M.P. Jal
Project

LINE ENGINEERING CONSULTANTS PVT. LTD. PKG-II

NATIONAL HIGHWAYS AUTHORITY OF INDIA PIU CHHINDWARA (M.P.)

	below the ground level so as not to obstruct drainage of the road land.		
2.2	Cross section showing the size of pit and location of cable HDD Method.	Yes	Enclosed
2.3	Strip plan / Route plan showing water pipe line, changing width of ROW, distance of proposed water pipe line from the edge of ROW, important mile stone, intersection, crows drainage work etc.	Yes	Enclosed
2.4	Methodology for lying of water pipe line.	Yes	Enclosed
2.4.1	Open trenching method (may be allowed in utility corridor only where pavement is neither cement concrete nor dense bituminous concrete type. If yes, what is the methodology of refilling of trench	Yes	Enclosed
	(a) The trench width should be at least 30 cm, but not more than 60cm wider than the outer diameter of the pipe.	Yes	The typical cross section is enclosed.
	(b) For filling of the trench, bedding shall be to a depth of not less than 30 cm it shall consist of granular material, free of lumps, clods and cobbles and graded to yield a firm surface without sudden change in the bearing value. Unsuitable soil and rock edged should be /excavated and replaced by selected material.		Herewith.
	(c) The backfill shall be completed in two stage (1) side- fill to the level of the top of the pipe and (2) overfill to the bottom of the road crust.	Yes, Agree	
	(d) The side-fill shall consist of granular material laid in 15cm layers each controlled by mechanical tampering and controlled by mechanical tampering and controlled addition of moisture to 95% of the Proctors Density as the material that had been removed. Consolidation by saturation or pending will not be permitted.	Yes, Agree	
	(e) The road crust shall be built to the same strength as the existing crust on either side of the trench. Care shall be taken to avoid the formation of a dip at the trench.	Yes, Agree	
	(f) The excavation shall be protected by flagmen, signs and barricades, and red light during night hours.	Yes, Agree	All safety measures shall be followed as per norms of NHAI.

A.H.M.E

M.P. Jain
Project Director

LOCATION ENGINEERING CONSULTANTS PVT. LTD. PKG-II CHHINDWARA (M.P.)

NATIONAL HIGHWAYS AUTHORITY OF INDIA PIU CHHINDWARA (M.P.)

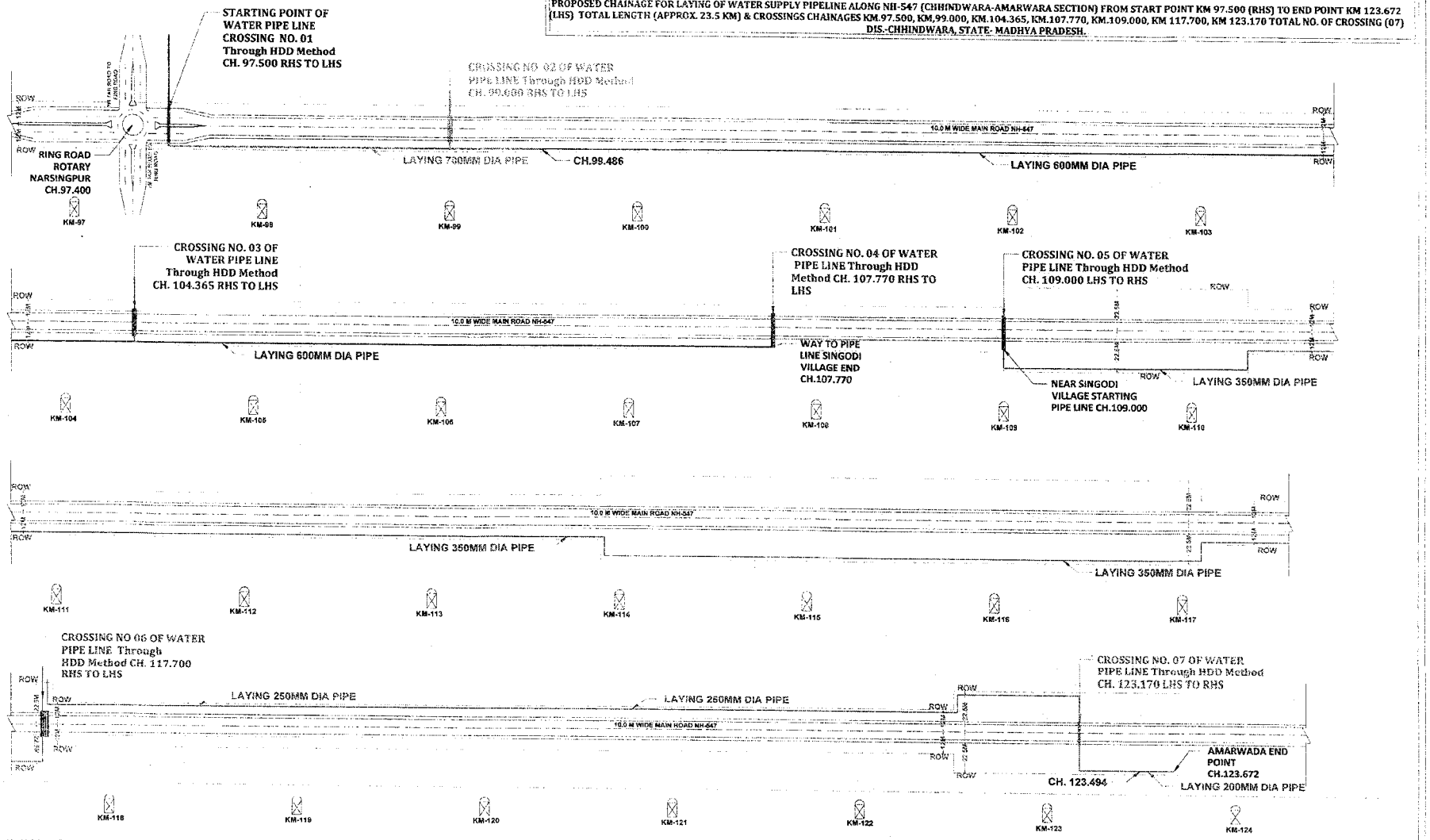
5.7	FOR traffic movement during laying of water pipe line to be managed by the applicant.	Yes	
5.8	If any claim is raised by the concessionaire then the same has to be paid by the applicant.	Yes	
5.9	Prior approval of the NHAI shall be obtained before undertaking any work of installation shifting or repairs, or alternations to the water pipe line/ any other utility located in the National Highway right –of- ways.	Yes	
5.10	Expenditure if any, incurred by NHAI for repairing any damages caused to the National Highway by the laying maintenance or shifting of the water pipeline will be borne by the applicant agency owning the line .	Yes	
5.11	If the NHAI considers it necessary in future to move the utility line for any work of improvement of repairs to the road, it will be carried out as desired by the NHAI at the cost of the agency owing the utility line within a reasonable given.	Yes	
5.12	Certificate from the applicant in the following format (1) Laying of water pipe line will not have any deleterious effects on any of the bridge. (2) "We do undertake that I /we will relocate service road/ approach road/ utilities at my/ our own cost notwithstanding the permission granted within such time as will stipulated by NHAI for future six-lanning or any other development"	Yes	
6	Who will sign the agreement on behalf of water pipe line agency?		
	Power of Attorney to sign the agreement is available or not	Yes	
7	The project director, will submit the following certificates		
7.1	Certificate for the proposal for confirming of all standard condition issued vide ministry of road transport and Highways circular No RW/NH-33044 /29/2015/S&R(R) dated 22.11.2016	Yes	
7.2	Certificates from PD in the following format (1) It is certified that any other location of the water pipe line would be extremely difficult and unreasonable costly and the installation of water pipe line within ROW will not adversely affect the design, stability & traffic safety of the highway not the likely future improvement such as	Yes	

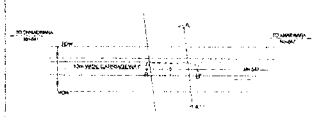
A.H.M.E.

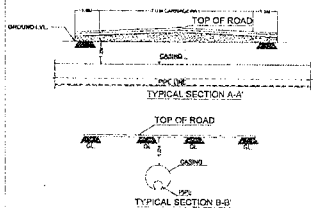
M.P. ...
Project ...

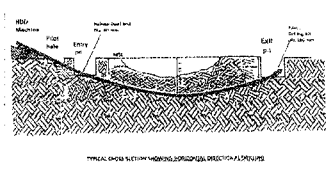
13	If any previous approval is accorded for laying of underground water pipe line then photocopy of register of records of permissions accorded as maintained by PD then copy be enclosed.	No	

PROPOSED CHAINAGE FOR LAYING OF WATER SUPPLY PIPELINE ALONG NH-547 (CHHINDWARA-AMARWARA SECTION) FROM START POINT KM 97.500 (RHS) TO END POINT KM 123.672 (LHS) TOTAL LENGTH (APPROX. 23.5 KM) & CROSSINGS CHAINAGES KM.97.500, KM,99.000, KM.104.365, KM.107.770, KM.109.000, KM 117.700, KM 123.170 TOTAL NO. OF CROSSING (07) DIS.-CHHINDWARA, STATE- MADHYA PRADESH.









COMPANY	MP JAL NIGAM MARYADIT PIU-CHHINDWARA
PROJECT	LAYING OF WATER PIPE LINE & CROSSING ON NH
DISTRICT	CHHINDWARA
STATE	MADHYA PRADESH
CHAINGE START	97.500 RHS (CROSSING 7 NOS.)
CHAINGE END	123.672 RHS
SIDE OF HIGHWAY	-
HIGHWAY TYPE	NATIONAL HIGHWAY
HIGHWAY NO.	NH-547
HIGHWAY AUTHORITY	PD, PIU, CHHINDWARA
SECTION OF ROAD	CHHINDWARA TO AMARWARA ROAD

कार्यालय महाप्रबंधक
मध्यप्रदेश जल निगम
(म.प्र. शासन का उपक्रम)
हर घर जल
जल जीवन मिशन
परियोजना क्रियान्वयन ईकाई, छिन्दवाड़ा

कार्यालय: सिगनेचर सिटी के सामने, सत्यमशिवम सुन्दरम कालोनी, कुकडा जगत छिन्दवाड़ा (म.प्र.) पिन–480001
Email:- gmchhindwa.jalnigam@mp.gov.in
रजि. कार्यालयः 8 अरेरा हिल्स ओल्ड जेल रोड़ भोपाल CIN U41000MP2012SGC028798

क्रमांक 271/म.प्र.ज.नि.मर्या./परि.क्रि.ईकाई/छिंदवाड़ा/2024, दिनांक– 13/12/2024

प्रति,

प्रोजेक्ट डायरेक्टर,
भारतीय राष्ट्रीय राजमार्ग प्राधिकरण,
(सड़क परिवहन और राजमार्ग मंत्रालय)
परियोजना, क्रियान्वयन इकाई एच.नं– 84
पौलीथीन फैक्ट्री के बाजू में स्वर्ण जयंति नगर
खजरी रोड फ्रेन्ड कॉलोनी छिंदवाड़ा (म.प्र.)

विषय :– माचागोरा ग्रामीण समूह जल प्रदाय योजना हेतु आ रहे भारतीय राष्ट्रीय राजमार्ग को क्रॉस करने एवं शोल्डर के सामानान्तर पाईप लाईन बिछाने की अनुमति हेतु आवश्यक पावर ऑफ अटर्नी प्रदान करने बावत्।

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उपरोक्त विषयांतर्गत निर्माणाधीन माचागोरा ग्रामीण समूह जल प्रदाय योजना हेतु आ रहे भारतीय राष्ट्रीय राजमार्ग को क्रॉस करने एवं शोल्डर के सामानान्तर पाईप लाईन बिछाने की अनुमति हेतु पावर ऑफ अटर्नी चाही गयी है।

अतः लेख है कि उक्त कार्य के लिये अधोहस्ताक्षरकर्ता "महाप्रबंधक जल निगम परियोजना क्रियान्वयन इकाई छिंदवाड़ा" स्वयं निर्माण कार्यों के अनुबंध निर्माण कार्यों की प्रक्रिया भुगतान एवं समस्त पत्राचार हेतु शासन द्वारा अधिकृत है।

संलग्नः– शून्य।

महाप्रबंधक
म.प्र. जल निगम
पी0आई0यू0 छिंदवाड़ा

METHEDOLOGY FOR CROSSING OF ROAD BY HORIZONTAL DIRECTIONAL DRILLING (HDD) METHOD

1. Non digging technology is a new technology of underground popping developed in the recent years. Using this technology, we can lay, fix change and detect the underground pipeline without digging. The technology has the advantages of no damage of environment, no dirt pollution, no interruption traffic, no break of payment structure, high laying precision, short working period and high safety of construction.

2. The technology can be widely used for laying, changing and detecting the underground canals, which go through payment (National Highway/Road) railway lines, river, lakes, streets and building. The available field includes Electricity, Telecommunication, water supply, sewage, cable TV, ADLS and other piping divisions.

3. Horizontal Directional Drilling (HDD) is trenchless technology that has the capacity to install a wide variety of pipe materials/ power cables into the ground. This technique allows for great and depth to avoid subsurface obstacle.

4. The Water pipeline shall be laid as per National Standards. The Water pipeline will be laid at al minimum cover depth of 2.50 to 3.0 meter through HDD method on order to avoid disruption of traffic and to avoid in convenience to public at large.

5. Proposed 1 Runs water pipe line.

6. Laying of the Water pipeline at a depth of 2.50 to 3.00 meter is envisaged for avoiding any kind of disruption to highway authority in case of any work as and when desired by the authority.

7. The laying of Water pipeline including testing and commissioning will be carried out by us in accordance with the specification.

8. Restoration of HDD pit shall be carried out as per its original conditions and after desired settlement of the pit soil.

METHEDOLOGY FOR HDD

1. The Horizontal Directional Drilling Process

The tools and techniques used in the horizontal directional drilling (HDD) process are an outgrowth of the oil well drilling industry. The components of a horizontal drilling rig used for pipeline construction are similar to those of an oil well drilling rig with the major exception being that a horizontal drilling rig is equipped with an inclined ramp as opposed to a vertical mast. HDD pilot hole operations are not unlike those involved in drilling a directional oil well. Drill pipe and down-hole tools are generally interchangeable and drilling fluid is used throughout the operation to transport drilled spoil, reduce friction, stabilize the hole, etc. Because of these similarities, the process is generally referred to as drilling as opposed to boring.

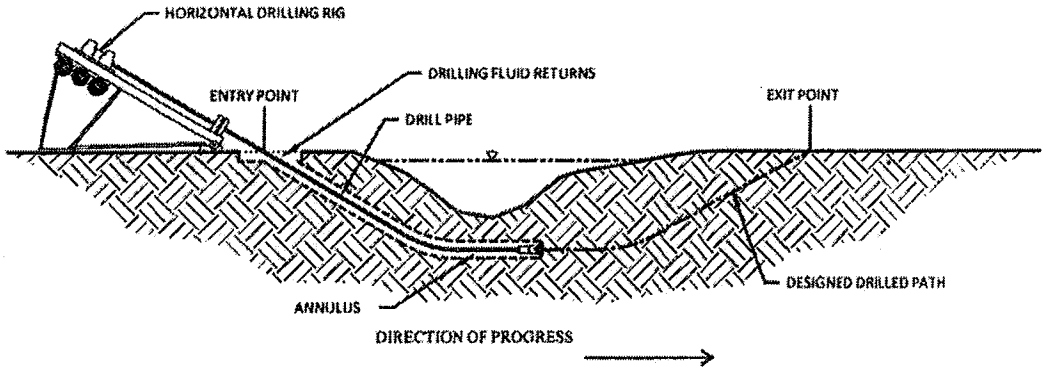
Installation of a pipeline by HDD is generally accomplished in three stages as illustrated in Figure 1. The first stage consists of directionally drilling a small diameter pilot hole along designed directional path. The second stage involves enlarging this pilot hole to a diameter suitable for installation of the pipeline. The third stage consists of pulling the pipeline back into the enlarged hole.

2. Pilot Hole Directional Drilling

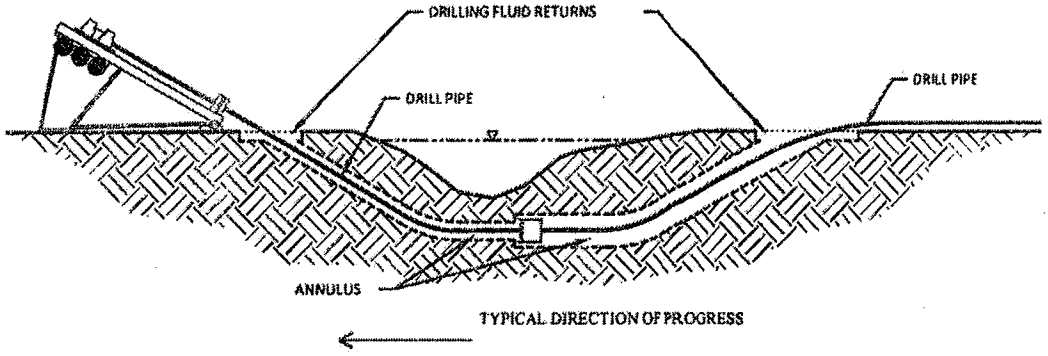
Pilot hole directional control is achieved by using a non-rotating drill string with an asymmetrical leading edge. The asymmetry of the leading edge creates a steering bias while the non-rotating aspect of the drill string allows the steering bias to be held in a specific position while drilling. If a change in direction is required, the drill string is rolled so that the direction of bias is the same as the desired change in direction. The direction of bias is referred to as the tool face. Straight progress may be achieved by drilling with a series of offsetting tool face positions. The drill string may also be continually rotated where directional control is not required. Leading edge asymmetry can be accomplished by several methods. Typically, the leading edge will have an angular offset created by a bent sub or bent motor housing. This is illustrated schematically in Figure 2.

It is common in soft soils to achieve drilling progress by hydraulic cutting with a jet nozzle. In this case, the direction of flow from the nozzle can be offset from the central axis of the drill string thereby creating a steering bias. This may be accomplished by blocking selected nozzles on a standard roller cone bit or by custom fabricating a jet deflection bit. If hard spots are encountered. the drill string may be rotated to drill without directional control until the hard spot has been penetrated.

PILOT HOLE



PREREAMING



PULLBACK

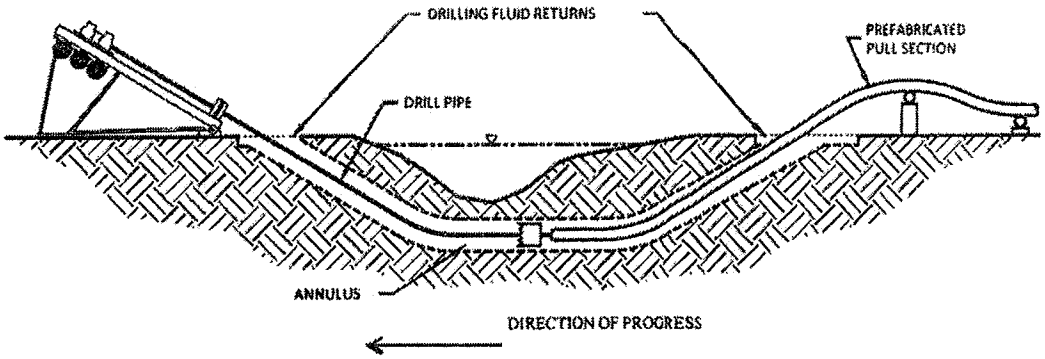


Figure 1
The HDD Process

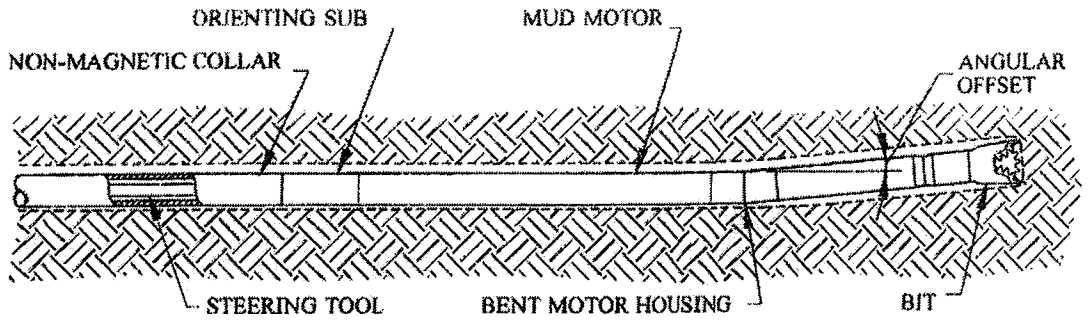


Figure 2 Bottom Hole Assembly

3. Down hole Motors

Down hole mechanical cutting action required for harder soils is provided by down hole hydraulic motors. Down hole hydraulic motors, commonly referred to as mud motors, convert hydraulic energy from drilling mud pumped from the surface to mechanical energy at the bit. This allows for bit rotation without drill string rotation. There are two basic types of mud motors; positive displacement and turbine, Positive displacement motors are typically used in HDD applications. Basically, a positive displacement mud motor consists of a spiral-shaped stator containing a sinusoidal shaped rotor. Mud flow through the stator imparts rotation to the rotor which is in turn connected through a linkage to the bit.

In some cases, a larger diameter wash pipe may be rotated concentrically over the non- rotating steerable drill string. This serves to prevent sticking of the steerable string and allows its tool face to be freely oriented. It also maintains the pilot hole if it becomes necessary to withdraw the steerable string.

4. Down hole Surveying

The actual path of the pilot hole is monitored during drilling by taking periodic readings of the inclination and azimuth of the leading edge. Readings are taken with an instrument, commonly referred to as a probe, inserted in a drill collar as close as possible to the drill bit Transmission of down hole probe survey readings to the surface is generally accomplished through a wire running inside the drill string. These readings, in conjunction with measurements of the distance drilled since the last survey, are used to calculate the horizontal and vertical coordinates along the pilot hole relative to the initial entry point on the surface.

Azimuth readings are taken from the earth's magnetic field and are subject to interference from down hole tools, drill pipe, and magnetic fields created by adjacent structures. Therefore. the probe must be inserted in a non magnetic collar and positioned in the string so that it is adequately isolated from down hole tools and drill pipe.

The combination. of bit, mud motor (if used), subs, survey probe, and non magnetic collars is referred to as the Bottom Hole Assembly or BHA. A typical bottom hole assembly is shown as Figure 2.

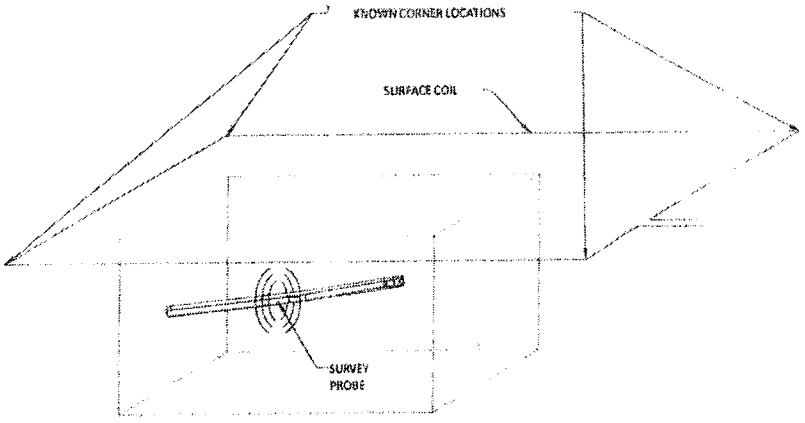


Figure 3
Tru-Tracker Surface Monitoring System

6. Reaming & Pullback

Enlarging the pilot hole is accomplished using either pre-reaming passes prior to pipe installation or simultaneously during pipe installation. Reaming tools typically consist of a circular array of cutters and drilling fluid jets and are often custom made by contractors for a particular hole size or type of soil.

7. Pre-reaming

Most contractors will opt to pre-ream a pilot hole before attempting to install pipe. For a pre- ramming pass, reamers attached to the drill string at the exit point are rotated and drawn to the drilling rig thus enlarging the pilot hole. Drill pipe is added behind the reamers as they progress toward the drill rig. This insures that a string of pipe is always maintained in the drilled hole. It is also possible to ream away from the drill rig. In this case, reamers fitted into the drill string at the rig are rotated and thrust away from it.

8. Pullback

Pipe installation is accomplished by attaching the prefabricated pipeline pull section behind a reaming assembly at the exit point and pulling the reaming assembly and pull section back to the drilling rig. This is undertaken after completion of pre-reaming or, for smaller diameter lines in soft soils, directly after completion of the pilot hole. A swivel is utilized to connect the pull section to the leading reaming assembly to minimize torsion transmitted to the pipe. The pull section is supported using some combination of roller stands, pipe handling equipment, or a flotation ditch to minimize tension and prevent damage to the pipe.

9. Buoyancy Control

Uplift forces resulting from the buoyancy of larger diameter lines can be very substantial. High pulling forces may be required to overcome drag resulting from buoyancy uplift. Therefore, contractors will often implement measures to control the buoyancy of pipe 30 inches or over in diameter. The most common method of controlling buoyancy is to fill the pipe with water as it enters the hole. This requires an internal fill line to discharge water at the leading edge of the pull section (after the break over point). An air line may also be required to break the vacuum which may form at the leading edge as the pull section is pulled up to the rig. The amount of water placed in the pipe is controlled to provide the most advantageous distribution of buoyant forces. Some contractors may choose to establish constant buoyancy. This can be accomplished by inserting a smaller diameter line into the pull section and filling the smaller line with water. The smaller line is sized to hold the volume of water required per lineal foot to offset the uplift forces.

OPEN TRENCH METHOD

GENERAL:

SUMMARY

A. Includes:

1. Excavating trenches for site utility lines including domestic water lines.
2. Compacted fill from top of utility bedding to top of trench.
3. Backfilling and compaction of trenches.

B. Related Sections:

1. Aggregate.
2. Water Distribution: Site water lines including domestic waterlines.

REFERENCES

A. Department of Transportation:

B. Standard Specifications for Road and Bridge Construction.

C. Testing and Materials:

1. Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. Standard Test Method for Laboratory Compaction Characteristicsof Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
3. Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).
4. Standard Test Method for Density of Soil in Place by the Sand-Cone Method.

DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

SUBMITTALS

A. Obtain Excavation Permit prior to any excavation.

B. Excavation Protection Plan: as required by applicable codes, laws, and standards.

C. Materials Source: imported fill materials suppliers.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

QUALITY ASSURANCE

A. Perform Work in accordance with industry standards.

B. Maintain one copy of each required document on site.

QUALIFICATIONS

A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed.

FIELD MEASUREMENTS

A. Verify field measurements prior to work.

COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higherelevation utilities.

B. Verify locations, types, and sizes of existing facilities that will be integrated with projectWork.

PRODUCTS:

FILL MATERIALS

A. Road Base: Type Class 6 as specified.

B. Stabilizing Material: Minimum of 1 ½ inch, uniformly graded, clean rock, or as directedby Engineer.

C. Blended Aggregate: This backfill shall be allowed under new streets in approved sub divisions. A geotechnical engineer shall design all backfill. The developer's engineer shall provide oversight of installation and compaction including compaction testing. Native soil shall be allowed for the top 2 foot of trench backfill when trench is under an open drainage/irrigation channel for the purpose of sealing the channel and minimizing leakage.

D. Flow-Fill As specified.

EXECUTION:

LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use staking for alignment and elevation of water mains to establish lines and grades.

PREPARATION

A. Identify required lines, levels, contours, and locations.

B. Protect plant life, lawns, rock outcropping and other features remaining as portion of finallandscaping.

C. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

D. Maintain and protect above and below grade utilities indicated to remain.

E. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

F. Prior to excavation in paved areas, the pavement shall be cut in such a manner as to effecta smooth, straight edge and a vertical face 6 inches minimum beyond the trench wall.

TRENCHING

A. Excavate subsoil by open cut to the depth required, unless written permission is given byEngineer to do otherwise, for utilities at the required locations.

B. Remove lumped subsoil, boulders, and rock.

C. When rock or hard clay is encountered, the trench shall be over-excavated 6 inches.

D. Excavation performed within 24 inches of existing utility service shall be done inaccordance with utility's requirements.

E. Do not advance open trench more than 200 feet ahead of installed pipe, unless Engineer determines a shorter length is necessary for the safety of the public.

F. Cut trenches to the width necessary to permit the pipe to be laid, jointed properly, inspected, and backfilled properly. No trench shall have a width of less than the diameterof the pipe plus 12 inches. The maximum clear trench width, measured 1 foot above the top of the pipe barrel shall not be greater than that shown in the following table unless otherwise specified:

Pipe Diameter (inches)	Maximum Trench Width (inches)
6	26
8	28
10	30
12	32
16	36
20	44
24	48
30	56
36	64

G. When maximum trench widths are exceeded and Engineer determines that the design load limits of the pipe are exceeded, the Contractor will be required to either cradle thepipe in concrete or to use a pipe of a stronger class.

H. Remove water or materials that interfere with Work. Contractor shall provide and maintain at all times ample means and devices to promptly and properly dispose of all water entering trench excavation. Water shall be disposed of in a suitable manner without damage to adjacent property or without a menace to public health and convenience. Unless authorized, in writing, trench water shall not be allowed to enterany water or sewer lines. Protect pipeline against damage from water in the event of astorm or pump failure.

I. Excavate trenches to depth indicated on Drawings. The trench shall be excavated to a depth below the established grade equal to 1/8 the outside diameter of the pipe, but not less than 4 inches. Provide uniform and continuous bearing and support for bedding material and pipe. A continuous trough shall be excavated to receive the bottom quadrant of the pipe barrel and bell ends. Excavate adequate space for required restraints, valves, and fittings prior to placing pipe in trench.

J. Do not interfere with the bearing soil of foundations of existing structures.

K. When Project conditions permit, slope side walls of excavation starting 1 foot above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.

L. When subsurface materials at bottom of trench are loose, soft, or otherwise unsuitable, excavate to greater depth as directed by Engineer until suitable material is encountered. It shall be replaced, as directed by Engineer, with approved backfill material and methods to provide a suitable foundation for the pipe, which may include 1 ½ inch clean rock.

M. Trim excavation. Remove loose matter.

N. Correct areas over-excavated with compacted backfill as specified for authorizedexcavation as directed by Engineer.

O. Remove excess subsoil, not intended for reuse, from site. Top soil shall be removed and piled separately for use in finish grading the site. Excavated material that is suitable for backfilling shall be piled in an orderly manner, a sufficient distance from the trench to avoid over-loading and to prevent slides or cave-ins.

Boring, Tunneling, and Jacking

A. May be required under existing sidewalk, curb and gutter, or other structures,where depth of trench and soil conditions permit.

B. Written permission by Engineer is required.

C. Tunneling will not be permitted for distances greater than 10 feet.

D. When jacking is required, only persons experienced in such work, using suitable equipment, shall perform the operation.

E. Flow-fill shall be used as backfill under any structure that has had material excavated from beneath them, been jacked, or for any tunnel.

SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Design sheeting and shoring to be removed at completion of excavation work.

C. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement offilled excavations or adjacent soil.

D. Repair damage to new and existing Work from settlement, water or earth pressure orother causes resulting from inadequate sheeting, shoring, or bracing.

BEDDING

A. Bedding installation and material shall be in accordance to the utility's specifications.All water lines shall be bedded in Class 6 material

BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen, non-organic, or otherwise suitable fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact in accordance Standard Detail. Flow-fill may be used from 4 inches above the pipe barrel to thetop of the trench.

D. Compact backfill material to 95 percent, maximum dry density, except for the top 4 feet of the trench, which shall be compacted to 97 percent, maximum dry density, Standard Proctor.

E. Lifts will not exceed 8 inches in depth unless a sheep's foot compactor or a hydraulic plate compactor (headshaker) mounted on excavation equipment of adequate size is used. Lift size may be increased by using this compaction equipment when it is demonstrated that compaction requirements can be met. Engineer will make final determination on thethickness of each lift in the field. Only equipment designed for the purposes of compaction shall be used.

F. Employ placement method that does not disturb or damage utilities in trench, and otherexisting structures or facilities.

G. Maintain optimum moisture content, plus or minus (±) 2 percent, of fill materials to attain required compaction density.

H. Do not leave more than 25 feet of trench open at end of working day.

I. Protect open trench to prevent danger to the public.

SURFACE RESTORATION

A. Pavement (either asphalt or concrete), curb and gutter, sidewalks, drainage culverts, headwalls, etc., or other improved surfaces that have been removed during the course of work shall be restored to a condition as equal to or better than that prior to removal and tothe same elevation and alignment.

B. The subgrade for all restored surfaces shall be thoroughly compacted by mechanical orhand tampers weighing not less 20 pounds, by vibratory rollers, or by other means of compaction approved by Engineer.

C. Surface restoration shall be per current applicable Specifications and Standard and subject to review by Engineer.

D. Where excavation occurs in paved areas, the pavement shall be repaired.

FIELD QUALITY CONTROL

A. Compaction Testing: In accordance.

B. When tests indicate Work does not meet specified requirements, remove Work, replace,compact, and retest

C. Compaction Testing for Bedding and Backfill:
   1. Contractor is required to hire an independent, licensed engineer experienced in soil analysis and evaluation to perform required compaction tests in accordance

with Standard. Copies of all Proctor curves and test results showing exact location of sample collection and test sites must be furnished to Engineer. Engineer shall be informed prior to testing and he may designate areas of testing.

2. Performed by City personnel or Contractor at option of Engineer in accordance.

3. Testing is to be done at various elevations in trench, which may require excavation by Contractor after backfill is installed.

4. Frequency of Compaction Tests will be specified by Engineer in field but shall be no less than every 200 feet at every 1 foot of depth of the trench or anytime the means and methods of compaction change.

5. For trenches greater than 4 feet in depth, compaction effort shall be visually observed based on an initial test to determine a best means and methods of compaction that can subsequently be used for trench side observation. A new initial test shall be performed whenever backfill materials or means and methods of compaction change.

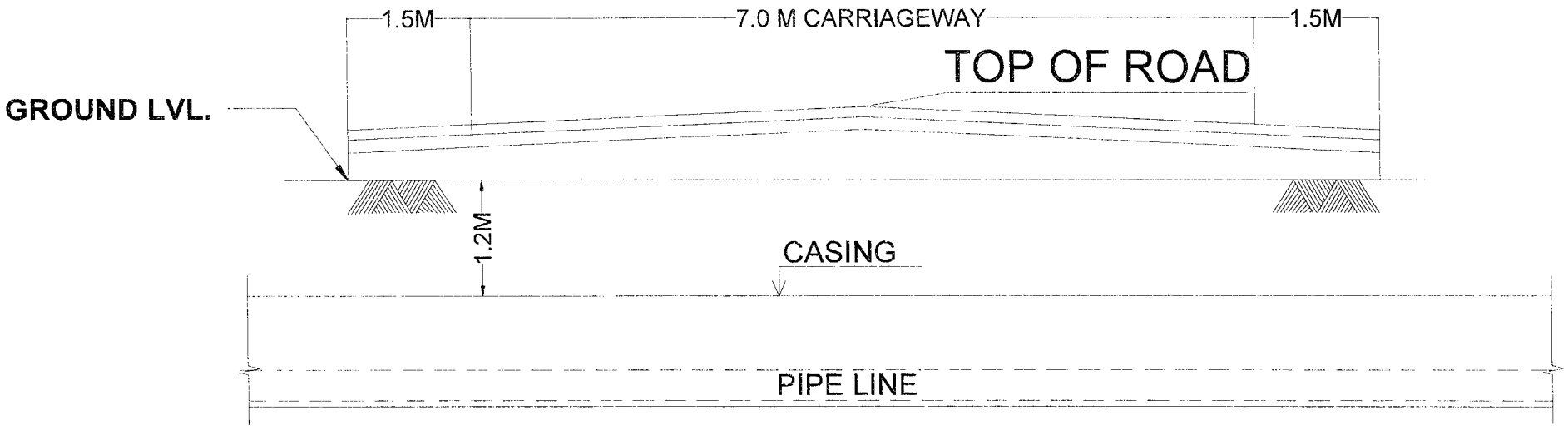
6. Testing shall use the Standard Proctor method. Alternatives such as Modified Proctor or Relative Density based on necessity due to material type may be used with the permission of the Engineer so long as the necessary conversion data, testing, and information has been completed and submitted prior commencement of the work.

PROTECTION OF FINISHED WORK

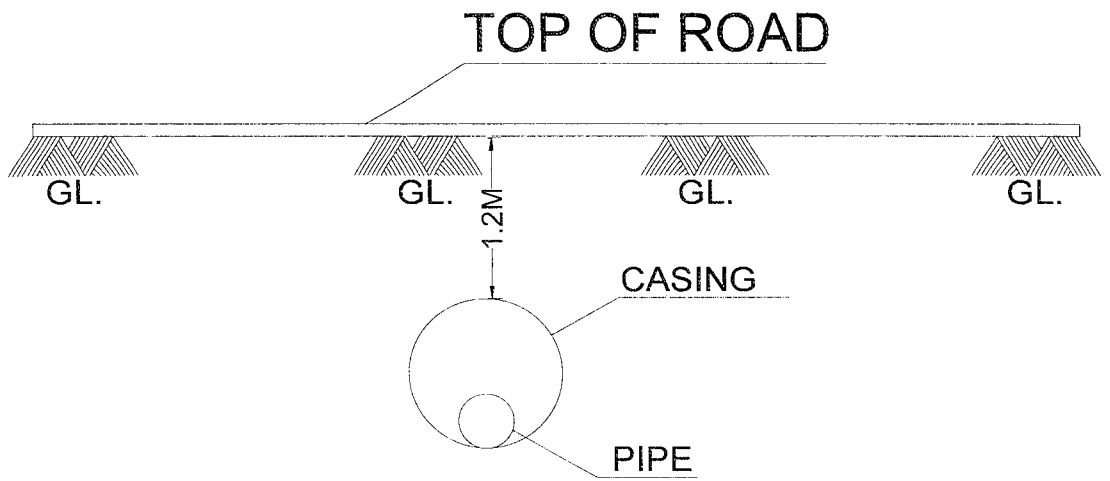
A. Reshape and re-compact fills subjected to vehicular traffic during construction.

B. All areas showing signs of settlement shall be filled and maintained by Contractor during all construction phases and for a period of 2 years following the date of final acceptance.

C. When Contractor is notified by the City or Engineer that any backfill is hazardous, the condition shall be corrected at once.



TYPICAL SECTION A-A'



TYPICAL SECTION B-B'