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)

सत्यमेव जयते

क्षेत्रीय कार्यालय / REGIONAL OFFICE

ई-6/47, स्मृति परिसर, साईबोर्ड 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

NHAI/RO-Bhopal/PIU-BPL/MPMKVVCL/Raghogarh/2025/54917 Date - 30.07.2025

Invitation of Public Comments

Sub: 4-laning of Guna-Biaora Section from Km. 332.100 to Km. 426.100 of NH-46(Old NH-3) (Package-II) in the State of Madhya Pradesh on BOT (Toll) on DBFOT pattern under NHDP Phase IV - Regarding National Highway Crossing in the work to be done by Government of India in Guna District. under RDSS Scheme - **Public Comments - Reg.**

Ref: PD, PIU Bhopal e-file no. 289026 dated 28.07.2025.

1. PD, PIU Bhopal, NHAI vide e-file note dated 28.07.2025 has submitted the proposal for MPMKVVCL Raghogarh for permission of laying of 11KV underground NH line crossing at village Dehri-1, Awan, Dehri-2, Ramdi, Patondi, Ahirkhedi of Tehsil Raghogarh District Guna in the state of MP.

2. 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. 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 30.08.2025) 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:

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
E-mail ID: robhopal@nhai.org

4. This is being issued with the approval of Regional Officer cum Highway Administration.

30/07/2025
(Paras Bansal)
Manager (T)

Copy to:

(i) Web Admin, NHAI-HQ-with request for uploading on the NHAI website.
(ii) The Senior Technical Director, NIC, Transport Bhawan, New Delhi-110001 for uploading on Ministry's Website.
(iii) The Project Director, NHAI, PIU- Bhopal (M.P.) for information.
(iv) MPMKVVCL, Raghogarh (MP) (Email: mpczdgmraghogarh@gmail.com).

Application Details [20241123/1/5/33029/12632]	
Highway	NH46 [NH46]
Name of Highway Authority	**NHAI** Dwarka New delhi
Highway Administration Address	**Bhopal** Bhopal
Whether the Fuel Station is part of Rest-area complex	No
Name of Applicant/Oil Company	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited Address: NEAR OF NAGAR PALIKA RAGHOGARH GUNA MADHYA PRADESH, GUNA (MADHYA PRADESH), PIN: 473226 Phn: 9406913711 Email: ANISHRAJPUT.CZ@MP.GOV.IN
Application Category	Public Utility
Utility	Pipes
State	MADHYA PRADESH
Type	New
Remarks	11 KV Dehri Feeder UNDER GROUND HIGHWAY CROSSING
Submitted On	17 Jun 2025 18:04:13

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Details		
1. Length in Meters *		60
2. Width of available ROW		
I. Left side from center line towards increasing chainage OR km direction *		230.110
II. Right side from center line towards increasing chainage OR km direction *		230.110
3. Proposal to lay the utility		
I. Left side from center line towards increasing chainage OR km direction *		0
II. Right side from center line towards increasing chainage OR km direction *		0
4. Proposal to acquire the land		
I. Left side from center line *		0
II. Right side from center line *		0
5. Whether proposal is in the same side where land is not to be acquired *		No
If not then where to lay the cable *		NA HDD CROSSING
6. Details of already laid services if any along the proposed route *		N/A
7. Number of Existing lanes *		4 Lane
8. Proposed number of lanes *		4 Lane

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9. Service road Exists *		No
10. Proposed Service road		
Left side from center line		0
Right side from center line		0
11. Whether proposal to lay cable is after the service road or between the service road and main carriageway *		N/A
12. Whether carrying OFC Cable has been proposed on highway /bridges, If yes then mention the methodology proposed for the same *		N/A
13. Is crossing of the road involved? If Yes, is shall be either encased in pipes or through structure of conduits specially built for the purpose at the expense of the agency owing the line *		Yes, Enclosed in pipes
I. Whether the existing drainage structures are allowed to carry utility pipeline. *		N/A
II. Is it on a line normal to NH? *		No
III. What is the distance of crossing the utility pipelines from the existing structure? Crossings shall not be too near the existing structures on the National Highway, the minimum distance being 15 mtrs. *		0.00

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IV. The casing pipe (or conduit pipe in the case of electric cable) line carrying the utility line shall be of steel, cast iron or reinforced concrete and have adequate strength and be large enough to permit ready withdrawal of carrier pipe/cable Mention type of casting. *		Yes, GI PIPE
V. Ends of the casing/conduit pipe shall be sealed from outside, so that is does not act as a drainage path *		Yes
VI. The casing/conduit pipe should be as minimum extend from drain in cuts toe of slope in fills. *		Yes
VII. The installation of Casing pipe shall be as per attachment-1 of Ministry's Guidelines dated 22.11.2016 *		YES
VIII. Mention the methodology proposed for crossing of road for the proposed sewerage / gas pipeline crossing shall be boring method (HDD) (Trenchless Technology) specially where the existing road pavement is of cement concrete of dense bituminous concrete type. *		YES (HDD Method)
14. Whether the proposal satisfies the following:		

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I. Where the ROW is more than 45 M then the duct cable shall be laid at the edge of right of way within the utility corridor of 2 M width, duly keeping in view the future widening. *		N/A
II. Where land is yet to be acquired for 4 laning and the position of new carriageway has been decided then the cable shall be laid at the edge of right of way within the utility corridor of 2 M width, on that side of existing carriageway where extra land is not proposed to be acquired for 4 laning. *		N/A
III. Where the widening plan for 4 laning is not yet decided and available ROW is around 30 M or less, a judicious decision would need to be taken for permitting the laying of cable/duct. This could be within 1.5 M to 2m of utility corridor at the edge of existing ROW, duly keeping in view the possible widening plans. *		N/A

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IV. Where ROW is restricted and adequate only to accommodate the carriageway, central verge, shoulders and drains (e.g. Highways in cutting through hilly/rolling terrain), the cable shall be laid clear of the drain. *		N/A
V. Where land strip for utility corridor can't be conveniently earmarked (available ROW restricted to the toe of the embankment) for laying of cable/ducts, the permission may be refused. *		N/A
15. Document/Drawings enclosed with the proposal *		Yes
I. Cross section showing the size of trench for open trenching method (is it normal size of 1.2m (min.) deep x 0.3 wide) *		N/A
II. Cross section showing the size of pit and location of cable for HDD method *		YES
III. Strip plan/ Route plan showing the OFC, Chainage width of ROW, distance of proposed, cable from the edge of ROW, important mile stone, intersections, cross drainage works etc. *		Incorporated in the Drawing
IV. Methodology of laying of the Utility Pipeline/OFC *		Yes, Enclosed.

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V. 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 *		N/A
(a) The trench width should be at least 30 cms but not more than 60 cms wider than the outer diameter of the pipe *		N/A
(b) For filling of the trench, bedding shall be to a depth of not less than 30 cms. It shall consist of granular material, free of lumps, clods, cobbles and graded to yiled firm surface without sudden change in the bearing value, unsuitable soil and rock edges should be excavated and replaced by selected material *		N/A
(c) The backfill shall be completed in two stages, i) Side fill to the level of the top of the pipe and ii) Overfill to the bottom of the road crust *		N/A

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(d) The side fill shall consist of granular material laid in 15 cms, layers each consolidated by mechanical tampering and controlled addition of moisture to 95% of the proctor density. Overfill shall be compacted to the same density as the material that has been removed. *		N/A
(e) The road crust shall be built to the same strength as existing crust on either side of the trench. Care shall be taken to avoid the formation of a dip at the trench. *		N/A
(f) The excavation shall be protected by flagman, signs and barricades and red lights during night hours. *		N/A
(g) If required, a diversion shall be constructed at the expense of agency owing the utility line. *		N/A
VI. Horizontal Directional Drilling (HDD) Method *		YES
VII. Laying OFC through CD Works and Method of laying (Whether to be hung outside parapet). *		N/A
16. Draft license Agreement signed by two witnesses. *		Yes

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I. The license fee estimate as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016. *		Yes
17. Whether Performance Bank Guarantee is as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R, dated 22.11.2016. *		Yes
I. Confirmation of BG has been obtained as per MoRTH guidelines *		Yes
18. Affidavit/Undertaking from the Applicant for following is to be furnished		
a) Undertaking not to Damage to other utility, if damage then to pay the losses either to NHAI or the concerned agency. *		Yes
b) Undertaking Renewal of Bank Guarantee as and when asked by MoRTH. *		Yes
c) Undertaking Confirming all standard condition of Ministry's guidelines. *		Yes
d) Undertaking for indemnity against all damages and claims *		Yes
e) Undertaking for management of traffic movement during laying of utility line without hampering the traffic *		Yes

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f) Undertaking that if any claim is raised by the concessionaire/ contractor then the same has to be paid by the applicant. *		Yes
g) Undertaking that prior approval of the NHAI shall be obtained before undertaking any work of installation, shifting or repairs, or alteration to the utility located in the National Highway Right of Ways. *		Yes
h) Undertaking that expenditure is any incurred by NHAI for repairing any damage cause to the NH by laying, maintenance of shifting of the utility line will be borne by the applicant agency owing the line. *		Yes
i) Undertaking that text of the license deal is as per verbatim of format issued by MoRTH vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016 *		Yes
j) Undertaking for shifting of utility as and when asked by MoRTH/ NHAI. *		Yes
k) Certificate from the applicant in the following format		
l) We do undertake that I/we will relocate service road/approach road/utilities at my/our own cost not withstanding the permission granted within such time us will be stipulated by NHAI for future six laning or/any other development		

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19. Who will sign the agreement on behalf of Applicant agency? Power of Attorney to sign the agreement is available or not. *		DGM MPMKVVCL Raghogarh Guna
20. The Power of Attorney is in favour of authorized signatory? *		Yes

Locations

Sno	State	District	Highway /Stretch	Start Point	End Point	View
1	MADHYA PRADESH	GUNA	NH46 [NH46] (223-422) From Km: 230.11 To Km: 230.11	Chainage Point: 230.11 Lat: 24.564 Lng: 77.229	Chainage Point: 230.11 Lat: 24.565 Lng: 77.229	View

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Documents

Sno	Stage	Document	Mandatory	Action
1	Under Submission	Layout and Drawings	Yes	View
2	Under Submission	Any Other Supporting Document	No	--
3	Under Submission	Any Document to indicate commercial activities are allowed on the land.	No	--
4	Under Submission	Safety Clearance from Directorate of Electricity	No	--
5	Under Submission	Safety Clearance from Chief Controller of Explosives	No	--
6	Under Submission	Safety Clearance from Petroleum and Explosives Safety Organisation	No	--
7	Under Submission	Safety Clearance from Oil Industry Safety Directorate	No	--
8	Under Submission	Safety Clearance from State/Central Pollution Control Board	No	--
9	Under Submission	Any Other Statutory Clearance as applicable	No	--

Applicable Fee Details

Sno	Fee Head	Stage	Fee	Amount	Status
1	Utility Fees	Technical Approval	License Fees	0	

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Check List

S.No	Items	Information/Status	Remaks
1	General Information		
1.1	Name and Address of the Applicant / Agency	DGM MPMKVVCL, RAGHOGARH GUNA	
1.2	National Highyway Number	NH-46	
1.3	State	MADHYA PRADESH	
1.4	Location	11 KV DEHRI-1 FEEDER	
1.5	(Chainage in KM)	230+110 LHS , 230+110 RHS	
1.6	Length in Meters	60 m Acoss the Highway	
1.7	Width of avalible ROW	60m	
	a) Width Left side from center line	30m	
	b) Width Right side from center line	30m	
1.8	Proposal to lay undergrond Eletrical cable	Across the national highyway	
	a) Left side from the center line towards increasing chainage/ KM direction	-	
	b) Right side from the center line towards increasing chainage/ KM direction	-	
1.9	Proposal to aquire land	NA	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.11	Whether proposal is in the same side where land is not to be acquired	no acquistion of land required	
	If not then where to lay the pipelines	Across the national highyway	
1.12	Details of aready laid services,if any, along the proposed route	NA	
1.13	No of lanes (2/4/6/8 lanes)	4 lanes	
1.14	Services road existing or not	No services road exist	
	if yes then which side	No services road exist	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.15	Proposed service line		
	a) Left side from center line	-	
	b) Right side from center line	-	
1.16	Where proposed to lay eletrical pipeline is after the service road or between the service road and main carriageway	-	
1.17	Considered for approval / rejection based on the Ministry Circular mentioned as above	-	

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	a) Carring of eletrical pipeline on Highway bridges shall not be permitted as eletrical pipes can accelerate the process of corrosion thus being much more injurious	NA	
	b) Carrying of Eletrical pipelines on bridges shall also discouraged however if the Eletrical supply authorities seem to have no other viable alternative and approach the highway authority well in time before the design of the bridge in finalized they may be permitted to carrry the pipeline on independent super structure supported on extended portion of piers and abutments in such a manner that in the final arangement enough free spade around the super structure of the bridge remains available for inspection and repairs.	NA	
	c) Cost of required extension of the substructure as well as that of the supporting super structure shall be borne by the agency-in- charge of the utilities	NA	
	d) Services are not being allowed indiscriminately on the parapet/any of the bridges, safety of the bridge has to be kept in view while permitting various services along bridge. Appeovals to be accorded in this regard with the concurrence of the Ministries Project Cief Engineers only.	NA	
1.18	Whether crossing of the involved	Yes	
	If yes, it shall be either enclosed in pipes or through structure or conduits specially built for that purpose at the expensed of the agency owning the line.	Yes, Enclosed in pipes	
	a) Exiting drainage structure shall not be allowed to carry the lines	Yes	
	b) Is it on a line normal to NH	Yes	
	c)Crossing shall not to be too near the exixting structure on the national highway the minimum distance bring 15 meter	Yes more than 15 mtrs	

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	d) The casing pipes carriying the utility lines shall be of steel, case, iron or reinforced cement concrete and have adequate strength and be large enough to permit ready with drawl of the carrier pipe/ cable.	Yes	
	e) Ends of the casing/conduit pipes shall be sealed from the outside so that it does not act as a drainage path.	Yes	
	f) The casing/ conduit pipe should as minimum extend from drain to drain in cutsand toe of the slope in the fills	Yes	
	g) The top of the caing/ conduit pipe should be at least 1.20 meter below the surface of the road.	Yes	
	h) The casinf/conduit pipe shall be done by boring (HDD) or digging a trench. Installation by boring method shall be preferred.	Yes (HDD Method)	
2	Document/Drawing enclosed with proposal	Yes	
2.1	Cross section showing the size of trench for open trencing method (is it normal size of 1.2m x 0.3 wide)	NA	
	i) Should be greater that 60 cm wider than outer diameter of the pipe	NA	
	ii) Located as close to the extreme edge of the right 15 meter from the centre lines of the nearest carriageway.	NA	
	iii) Shall not be permitted to run along the national highways when the road formation is situated in double cutting. Nor shall these be laid over the existing culverts and bridges.	NA	
	iv) These should be so laid that their top is at least 0.6 meter below the ground level so as not to obstruct drainage of the road land.	NA	
2.2	Cross section showing the sixe pit and location of cable for HDD method	Yes	
2.3	Strip plan/ route plan showing Eletrical pipeline chainage, width of ROW, distance of proposed cable from the edge of ROW important mile stone, cross section etc.	Incorparated in the drawing	
2.4			

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2.4.1	Open trenching method (may be allowed in utility corriod only where pave ment is neither cement concrete nor dense bituminous concrete type.. If yes, methodology of refilling of trench	NA	
	a)Trench width should be at least 30 cm but not more than 60 cm wider than the outer diameter of the pipe.	NA	
	b) For thefilling 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 yeild a firm surfacewithout sudden change in the bearing value unsuitable soi and rock edged should be excavated and replaced by selected material.	NA	
	C) The side fill shall consist of granular material laid in 15 cm layers each consolidated by mechnival tampering and controlled addition of moisture of 95% of Proctor's Density. Over fill shall of compacted to the same density as the material that had been removed. Consolidation by saturation or pendingwill not be permitted.	NA	
	d) The road crust shall be built to the same strength as the existing crust on the either side of the trench care shall be taken to avoid the formation of a dip at the trench.	NA	
	e) The excavation shall be protected by flagman signs and barricades and red light during night hours.	NA	
	f) if Required a diversion shall be constructed at the expends of agency owing the utilityline.	NA	
2.4.2	Horizontal directional drilling (HDD) METHOD	yes	
3	Draft License Agreement signed by two witness	yes	

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4	Performance bank guarantee in favor of NHAI has to be obtained @Rs 200/- per running meter (parallel to NH) and Rs100000/- per crossing of NH for a period of one year initially (extendable if required till satisfactory completion of work) as a security for ensuring /making good the excavated trench for laying the cables/ducts by proper filling and compaction clearing Debris/loose earth produced due to execution of trenching at least 50 m away from the edge of the right of way. No payment shall be payable by the NHAI to the license for clearing debris/loose, earth.		
4.1	Performance BG as per above is to be obtained	YES	
4.2	Confirmation of BG has been obtained as per NHAI guidelines	YES	
5	Affidavit/undertaking from the application	YES	
5.1	Not to damage to other utility If damaged than pay the losses either to NHAI or to the concerned agency	YES	
5.2	Renewal of Bank Guarantee	YES	
5.3	Confirming all standard condition of NHAI'S guideline	YES	
5.4	Shifting of Electrical supply pipe line as and when required by NHAI at their own cost	YES	
5.5	Shifting due to 6 lanning/wedding of NII	YES	
5.6	Indemnity against all damages and alarms clause (xxiv)	YES	
5.7	Traffic movement during laying of Electrical supply 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 A	YES	
5.9	Prior approval of the NHAI shall be obtained before undertaking any work if installation shifting or repairs or alteration to the showing Electrical supply pipe line located in the National Highway rights or ways	YES	

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5.10.	Expenditure if any incurred by NHAI for repairing any damage caused to the National Highway by the laying maintenance or shifting of the Electrical supply pipe line will be borne by the agency owing the line.	YES	
5.11	If the NHAI considers it necessary in future to move the utility line for any work of improvement or repairs to the road it will be carried out as desired by the NHAI at the cost of the agency owning the utility line within a reasonable time not exceeding 60 days) of the intimation given	YES	
5.12	Certified from the application in the following format	YES	
	i) laying of Electrical supply pipe line will not have any deleterious effects on any of the bridge components and roadway safety for traffic	YES	
	ii) for 6-lanning we do undertake that will relocate service road/ utility at my own cost notwithstanding the permission granted with such time as will be stipulated by NHAI for future six lanning or any other development.	YES	
6	Who will sign the agreement on behalf of Electrical supply pipe line agency?	DGM MPMKVVCL, RAGHOGARH GUNA	
7	Certified from the Project Director		
7.1	Certified for confirming of all standard condition issued vide ministry circular no. F.NO. RW/NH-33044/29/2015/S&R 22/11/2016 Dated	YES	

Manager (Tech.)
NHAI, PIU-Bhopal

परियोजना निदेशक
Project Director
रा.रा.रा.प्रा. परि.क्रिया इकाई भोपाल
NHAI PIU-Bhopal (M.P.)

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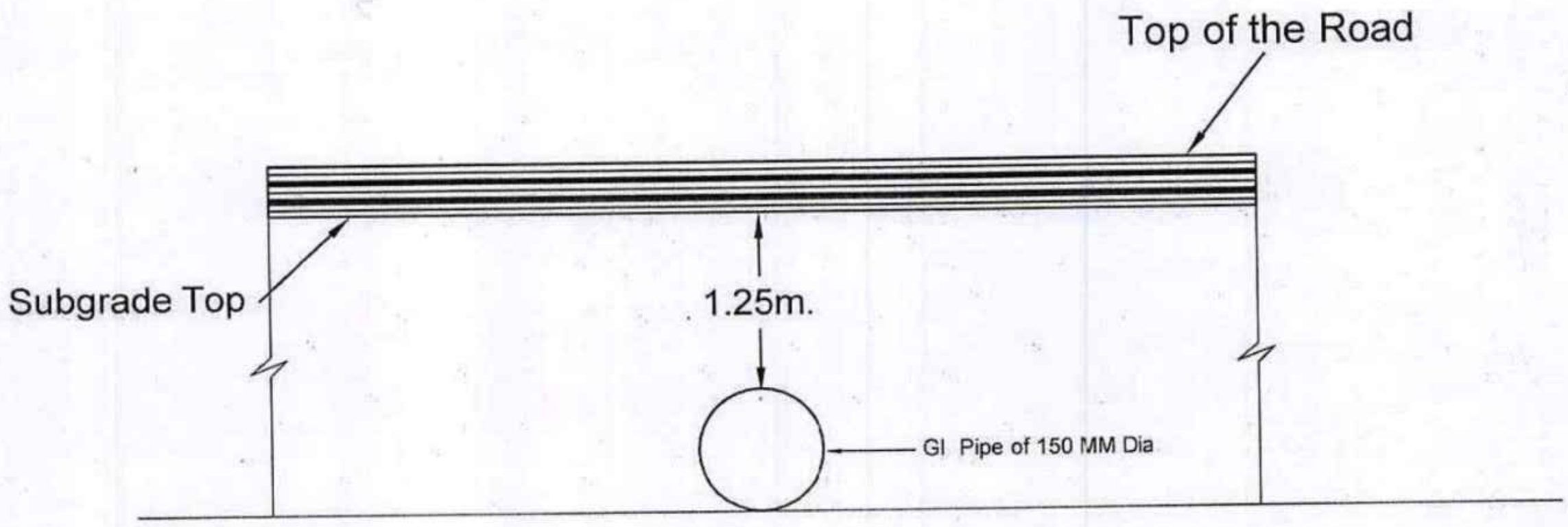
METHOD OF INSTALLATION OF CASING PIPE FOR CROSSING OF HIGHWAY



Cross section of HDD Crossing Pipe

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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 downhole 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 a 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.

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.

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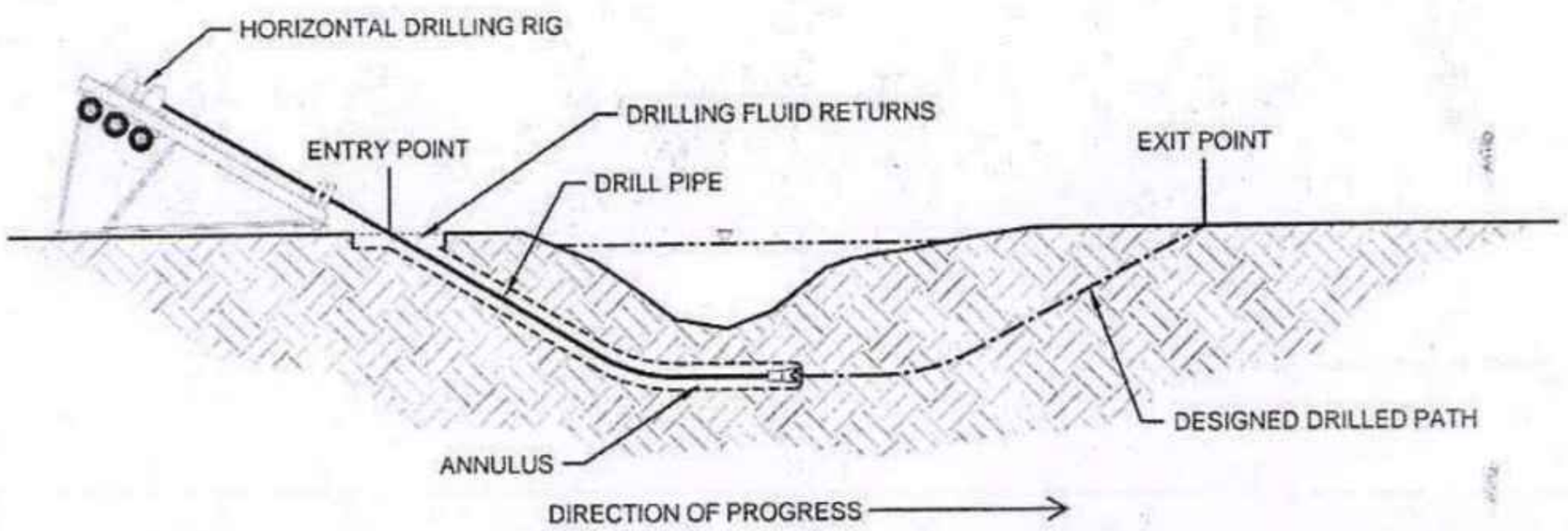
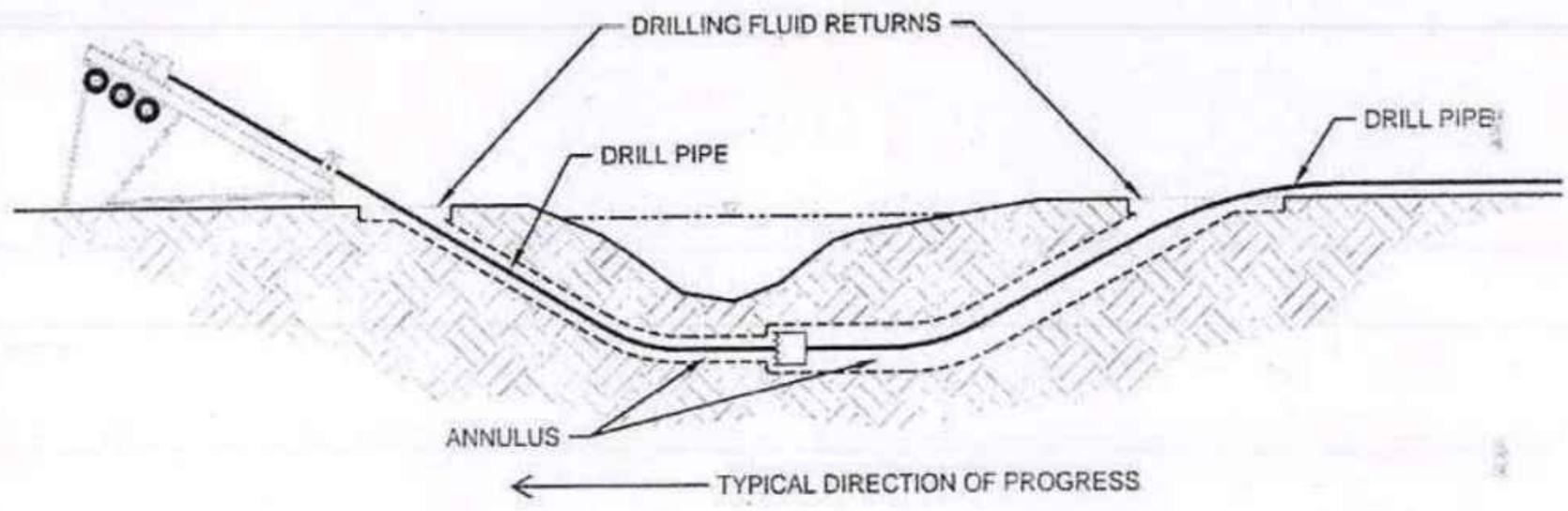
PILOT HOLE



PREREAMING



PULLBACK

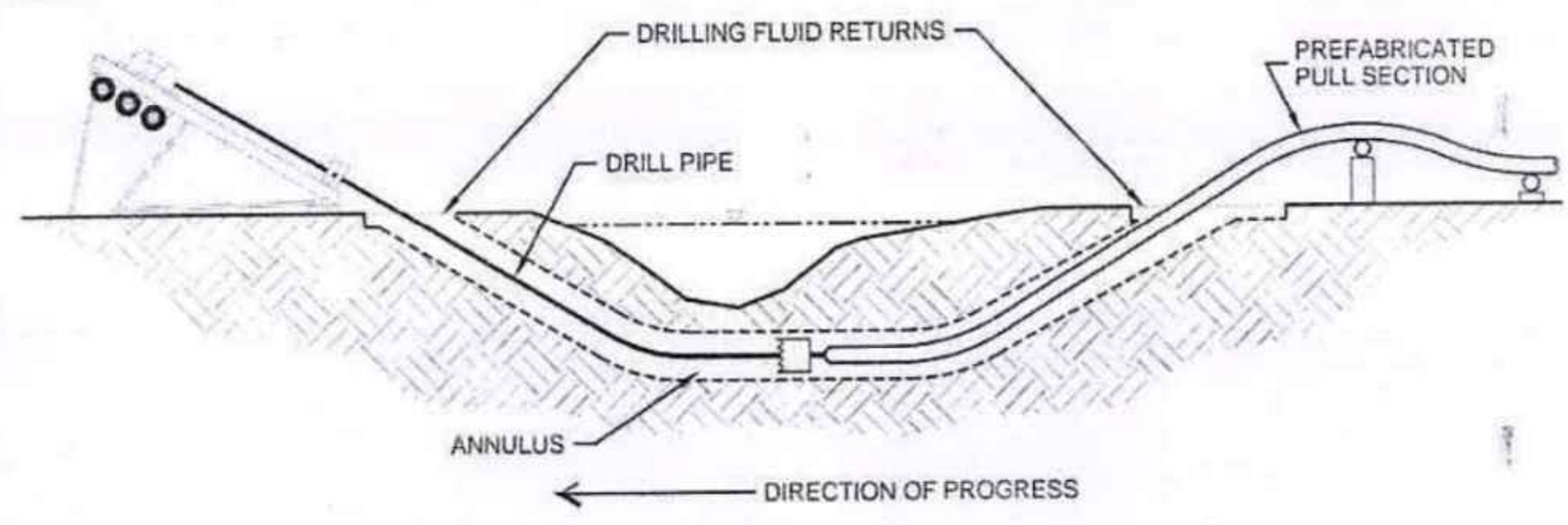


Figure 1
The HDD Process

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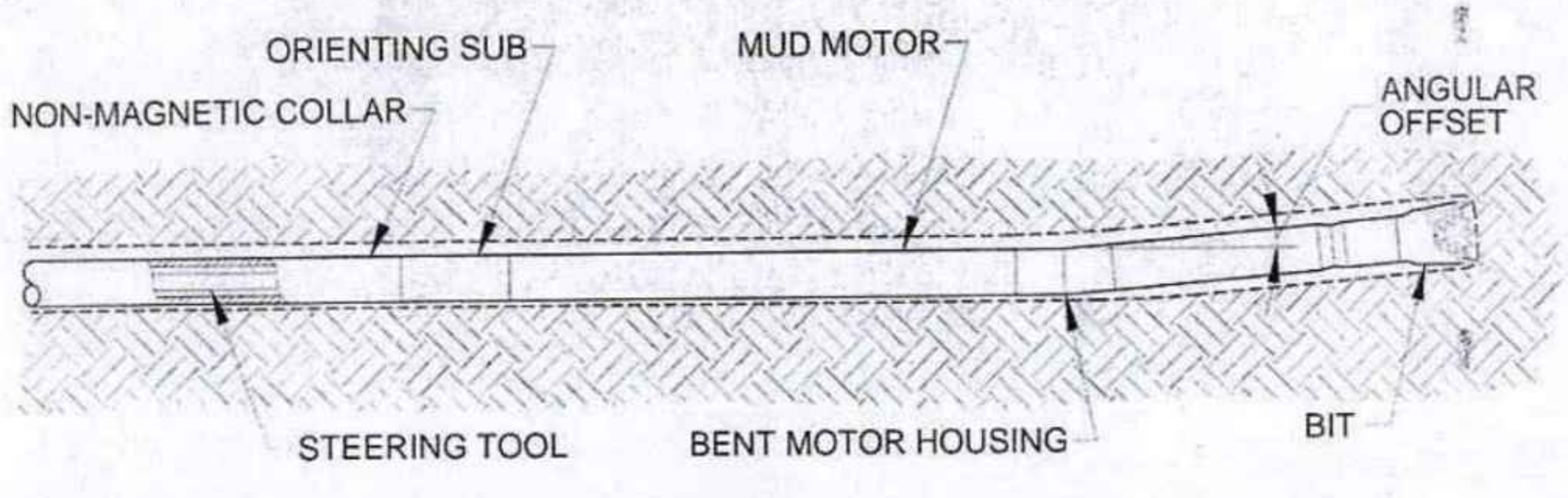

Figure 2
Bottom Hole Assembly

Downhole Motors

Downhole mechanical cutting action required for harder soils is provided by downhole hydraulic motors. Downhole 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.

Downhole 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 downhole 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 downhole 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 downhole 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.

Surface Monitoring

The pilot hole path may also be tracked using a surface monitoring system. Surface monitoring systems determine the location of the probe downhole by taking measurements from a grid or point on the surface. An example of this is the TruTracker System. This system uses a surface coil of known location to induce a magnetic field. The probe senses its location relative to this

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induced magnetic field and communicates this information to the surface. This is shown schematically in Figure 3.

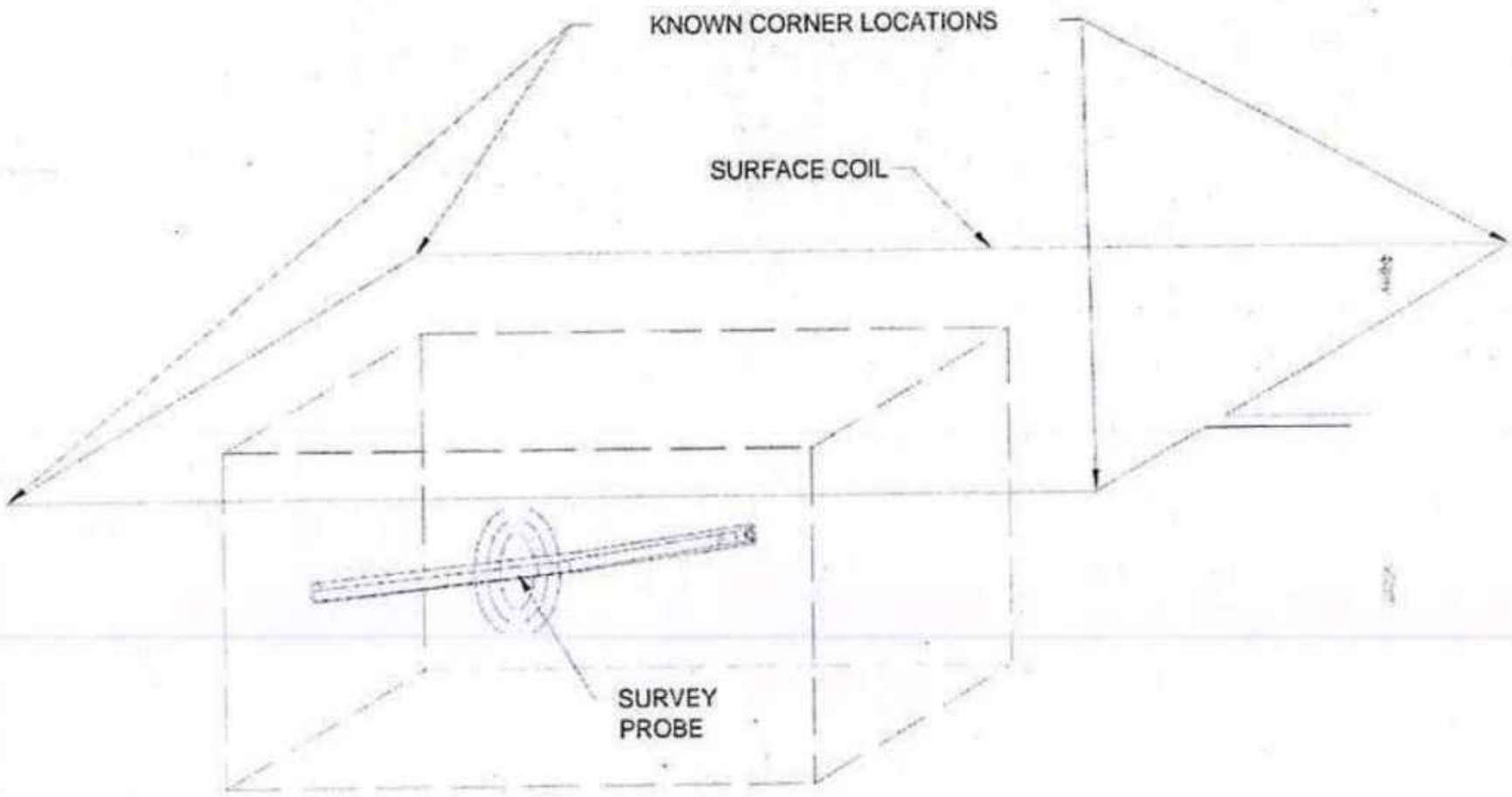

Figure 3
TruTracker Surface Monitoring System

Reaming & Pullback

Enlarging the pilot hole is accomplished using either prereaming 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.

Prereaming

Most contractors will opt to preream a pilot hole before attempting to install pipe. For a prereaming 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.

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 prereaming 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.

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 breakover 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 a 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.

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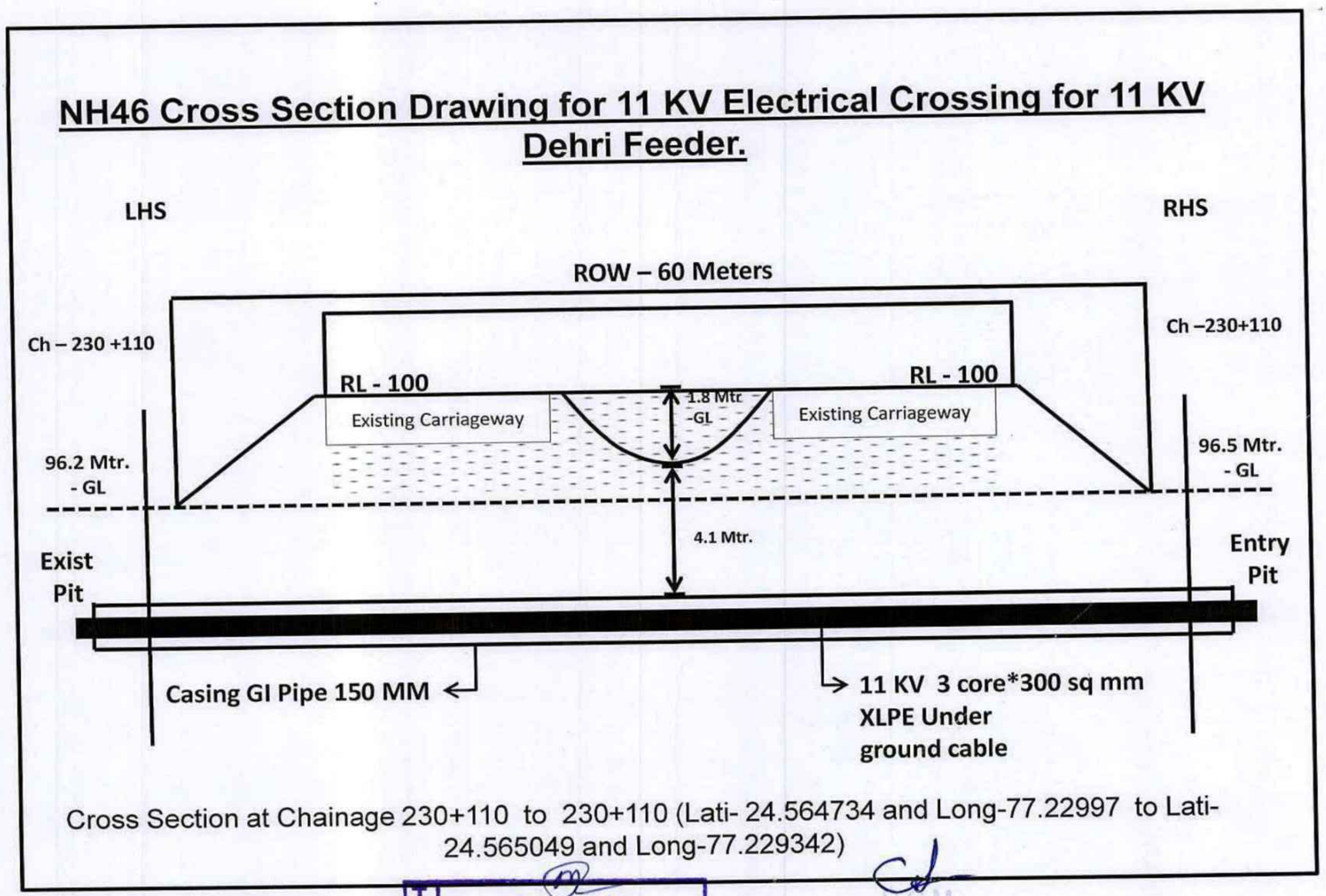
NH46 Cross Section Drawing for 11 KV Electrical Crossing for 11 KV Dehri Feeder.



Cross Section at Chainage 230+110 to 230+110 (Lati- 24.564734 and Long-77.22997 to Lati-24.565049 and Long-77.229342)

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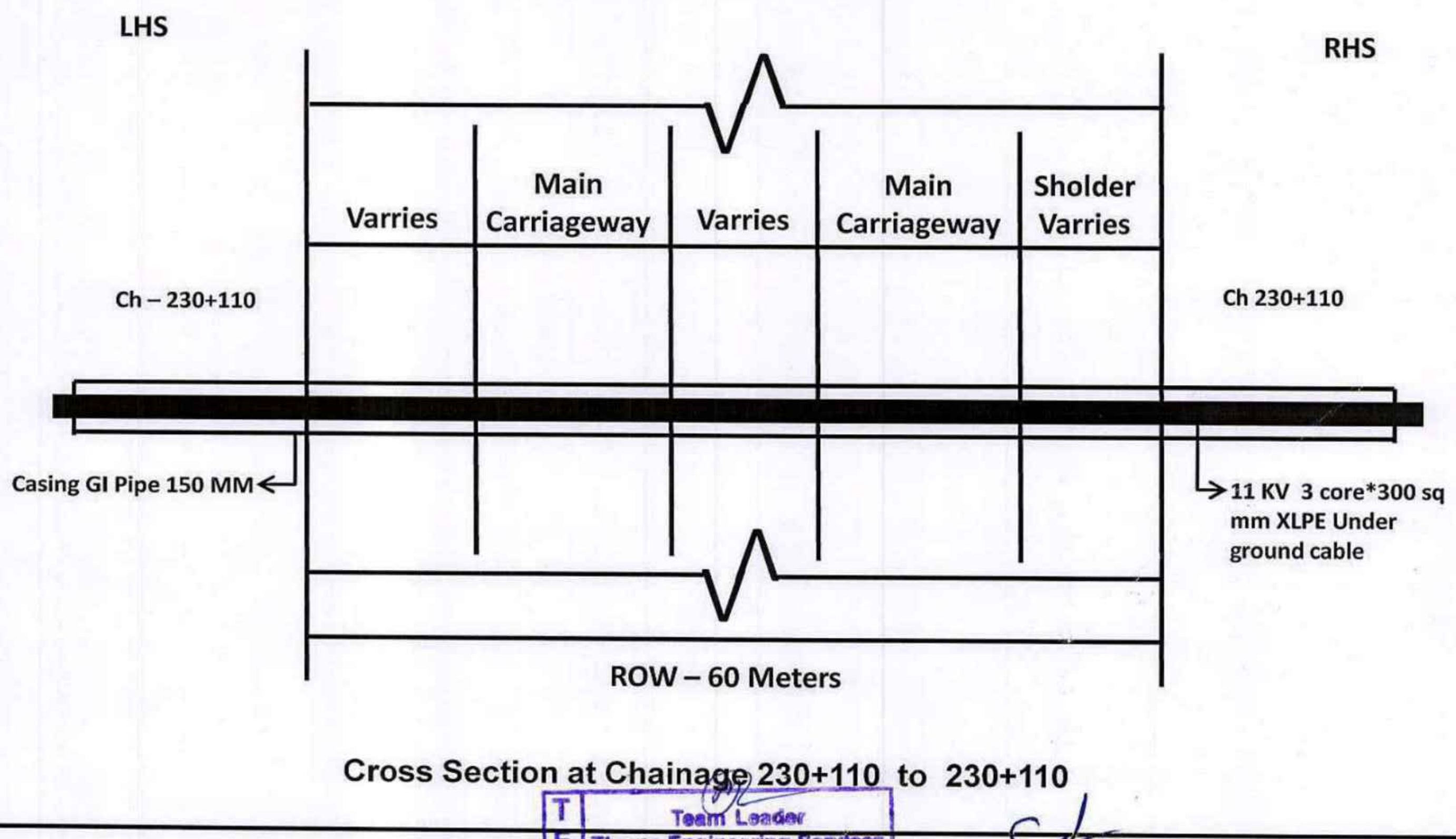
Plan of Highway Crossing at NH46 for 11 KV Electrical Crossing for 11 KV Dehri Feeder.



Cross Section at Chainage 230+110 to 230+110

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11 KV DEHRI FEEDER NHAI CROSSING - 2

Legend

24°32'30.34"N 77°11'54.74"E (B)

(B) 11 KV DEHRI FEEDER NHAI CROSSING -2

(B) 24°32'31.86"N 77°11'53.89"E

astralaya

Google Earth

N

Application Details [20241124/1/5/33029/12641]	
Highway	NH46 [NH46]
Name of Highway Authority	**NHAI** Dwarka New delhi
Highway Administration Address	**Regional Office- Jabalpur** Regional Office- Jabalpur
Whether the Fuel Station is part of Rest-area complex	No
Name of Applicant/Oil Company	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited Address: NEAR OF NAGAR PALIKA RAGHOGARH GUNA MADHYA PRADESH, GUNA (MADHYA PRADESH), PIN: 473226 Phn: 9406913711 Email: ANISHRAJPUT.CZ@MP.GOV.IN
Application Category	Public Utility
Utility	Pipes
State	MADHYA PRADESH
Type	New
Remarks	11 KV AWAN FEEDER HIGHWAY CROSSING UNDER GROUND
Submitted On	17 Jun 2025 19:10:23

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Details		
1. Length in Meters *		60
2. Width of available ROW		
I. Left side from center line towards increasing chainage OR km direction *		249.790
II. Right side from center line towards increasing chainage OR km direction *		249.790
3. Proposal to lay the utility		
I. Left side from center line towards increasing chainage OR km direction *		0
II. Right side from center line towards increasing chainage OR km direction *		0
4. Proposal to acquire the land		
I. Left side from center line *		0
II. Right side from center line *		0
5. Whether proposal is in the same side where land is not to be acquired *		No
If not then where to lay the cable *		NA HDD CROSSING
6. Details of already laid services if any along the proposed route *		0
7. Number of Existing lanes *		4 Lane
8. Proposed number of lanes *		4 Lane

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9. Service road Exists *		No
10. Proposed Service road		
Left side from center line		0
Right side from center line		0
11. Whether proposal to lay cable is after the service road or between the service road and main carriageway *		N/A
12. Whether carrying OFC Cable has been proposed on highway /bridges, If yes then mention the methodology proposed for the same *		N/A
13. Is crossing of the road involved? If Yes, is shall be either encased in pipes or through structure of conduits specially built for the purpose at the expense of the agency owing the line *		Yes, Enclosed in pipes
I. Whether the existing drainage structures are allowed to carry utility pipeline. *		N/A
II. Is it on a line normal to NH? *		No
III. What is the distance of crossing the utility pipelines from the existing structure? Crossings shall not be too near the existing structures on the National Highway, the minimum distance being 15 mtrs. *		0.00

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IV. The casing pipe (or conduit pipe in the case of electric cable) line carrying the utility line shall be of steel, cast iron or reinforced concrete and have adequate strength and be large enough to permit ready withdrawal of carrier pipe/cable Mention type of casting. *		Yes, GI PIPE
V. Ends of the casing/conduit pipe shall be sealed from outside, so that is does not act as a drainage path *		Yes
VI. The casing/conduit pipe should be as minimum extend from drain in cuts toe of slope in fills. *		Yes
VII. The installation of Casing pipe shall be as per attachment-1 of Ministry's Guidelines dated 22.11.2016 *		Yes
VIII. Mention the methodology proposed for crossing of road for the proposed sewerage / gas pipeline crossing shall be boring method (HDD) (Trenchless Technology) specially where the existing road pavement is of cement concrete of dense bituminous concrete type. *		YES (HDD Method)
14. Whether the proposal satisfies the following:		

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I. Where the ROW is more than 45 M then the duct cable shall be laid at the edge of right of way within the utility corridor of 2 M width, duly keeping in view the future widening. *		N/A
II. Where land is yet to be acquired for 4 laning and the position of new carriageway has been decided then the cable shall be laid at the edge of right of way within the utility corridor of 2 M width, on that side of existing carriageway where extra land is not proposed to be acquired for 4 laning. *		N/A
III. Where the widening plan for 4 laning is not yet decided and available ROW is around 30 M or less, a judicious decision would need to be taken for permitting the laying of cable/duct. This could be within 1.5 M to 2m of utility corridor at the edge of existing ROW, duly keeping in view the possible widening plans. *		N/A

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IV. Where ROW is restricted and adequate only to accommodate the carriageway, central verge, shoulders and drains (e.g. Highways in cutting through hilly/rolling terrain), the cable shall be laid clear of the drain. *		N/A
V. Where land strip for utility corridor can't be conveniently earmarked (available ROW restricted to the toe of the embankment) for laying of cable/ducts, the permission may be refused. *		N/A
15. Document/Drawings enclosed with the proposal *		Yes
I. Cross section showing the size of trench for open trenching method (is it normal size of 1.2m (min.) deep x 0.3 wide) *		N/A
II. Cross section showing the size of pit and location of cable for HDD method *		YES
III. Strip plan/ Route plan showing the OFC, Chainage width of ROW, distance of proposed, cable from the edge of ROW, important mile stone, intersections, cross drainage works etc. *		Incorporated in the Drawing
IV. Methodology of laying of the Utility Pipeline/OFC *		Yes, Enclosed.

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V. 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 *		N/A
(a) The trench width should be at least 30 cms but not more than 60 cms wider than the outer diameter of the pipe *		N/A
(b) For filling of the trench, bedding shall be to a depth of not less than 30 cms. It shall consist of granular material, free of lumps, clods, cobbles and graded to yiled firm surface without sudden change in the bearing value, unsuitable soil and rock edges should be excavated and replaced by selected material *		N/A
(c) The backfill shall be completed in two stages, i) Side fill to the level of the top of the pipe and ii) Overfill to the bottom of the road crust *		N/A

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(d) The side fill shall consist of granular material laid in 15 cms, layers each consolidated by mechanical tampering and controlled addition of moisture to 95% of the proctor density. Overfill shall be compacted to the same density as the material that has been removed. *		N/A
(e) The road crust shall be built to the same strength as existing crust on either side of the trench. Care shall be taken to avoid the formation of a dip at the trench. *		N/A
(f) The excavation shall be protected by flagman, signs and barricades and red lights during night hours. *		N/A
(g) If required, a diversion shall be constructed at the expense of agency owing the utility line. *		N/A
VI. Horizontal Directional Drilling (HDD) Method *		YES
VII. Laying OFC through CD Works and Method of laying (Whether to be hung outside parapet). *		N/A
16. Draft license Agreement signed by two witnesses. *		Yes

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I. The license fee estimate as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016. *		Yes
17. Whether Performance Bank Guarantee is as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R, dated 22.11.2016. *		Yes
I. Confirmation of BG has been obtained as per MoRTH guidelines *		Yes
18. Affidavit/Undertaking from the Applicant for following is to be furnished		
a) Undertaking not to Damage to other utility, if damage then to pay the losses either to NHAI or the concerned agency. *		Yes
b) Undertaking Renewal of Bank Guarantee as and when asked by MoRTH. *		Yes
c) Undertaking Confirming all standard condition of Ministry's guidelines. *		Yes
d) Undertaking for indemnity against all damages and claims *		Yes
e) Undertaking for management of traffic movement during laying of utility line without hampering the traffic *		Yes

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f) Undertaking that if any claim is raised by the concessionaire/ contractor then the same has to be paid by the applicant. *		Yes
g) Undertaking that prior approval of the NHAI shall be obtained before undertaking any work of installation, shifting or repairs, or alteration to the utility located in the National Highway Right of Ways. *		Yes
h) Undertaking that expenditure is any incurred by NHAI for repairing any damage cause to the NH by laying, maintenance of shifting of the utility line will be borne by the applicant agency owing the line. *		Yes
i) Undertaking that text of the license deal is as per verbatim of format issued by MoRTH vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016 *		Yes
j) Undertaking for shifting of utility as and when asked by MoRTH/ NHAI. *		Yes
k) Certificate from the applicant in the following format		
l) We do undertake that I/we will relocate service road/approach road/utilities at my/our own cost not withstanding the permission granted within such time us will be stipulated by NHAI for future six laning or/any other development		

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19. Who will sign the agreement on behalf of Applicant agency? Power of Attorney to sign the agreement is available or not. *		DGM MPMKVVCL Raghogarh Guna
20. The Power of Attorney is in favour of authorized signatory? *		Yes

Locations

Sno	State	District	Highway /Stretch	Start Point	End Point	View
1	MADHYA PRADESH	GUNA	NH46 [NH46] (145.000-445.000) From Km: 249.79 To Km: 249.79	Chainage Point: 249.79 Lat: 24.414 Lng: 77.146	Chainage Point: 249.79 Lat: 24.415 Lng: 77.146	View

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Documents				
Sno	**Stage**	**Document**	**Mandatory**	**Action**
1	Under Submission	Layout and Drawings	Yes	View
2	Under Submission	Any Other Supporting Document	No	--
3	Under Submission	Any Document to indicate commercial activities are allowed on the land.	No	--
4	Under Submission	Safety Clearance from Directorate of Electricity	No	--
5	Under Submission	Safety Clearance from Chief Controller of Explosives	No	--
6	Under Submission	Safety Clearance from Petroleum and Explosives Safety Organisation	No	--
7	Under Submission	Safety Clearance from Oil Industry Safety Directorate	No	--
8	Under Submission	Safety Clearance from State/Central Pollution Control Board	No	--
9	Under Submission	Any Other Statutory Clearance as applicable	No	--

Applicable Fee Details					
Sno	**Fee Head**	**Stage**	**Fee**	**Amount**	**Status**
1	Utility Fees	Technical Approval	License Fees	0	

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Check List

S.No	Items	Information/Status	Remaks
1	General Information		
1.1	Name and Address of the Applicant / Agency	DGM MPMKVVCL, RAGHOGARH GUNA	
1.2	National Highyway Number	NH-46	
1.3	State	MADHYA PRADESH	
1.4	Location	11 KV AWAN FEEDER	
1.5	(Chainage in KM)	249+790 LHS , 249+790 RHS	
1.6	Length in Meters	60 m Acoss the Highway	
1.7	Width of avalible ROW	60m	
	a) Width Left side from center line	30m	
	b) Width Right side from center line	30m	
1.8	Proposal to lay undergrond Eletrical cable	Across the national highyway	
	a) Left side from the center line towards increasing chainage/ KM direction	-	
	b) Right side from the center line towards increasing chainage/ KM direction	-	
1.9	Proposal to aquire land	NA	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.11	Whether proposal is in the same side where land is not to be acquired	no acquistion of land required	
	If not then where to lay the pipelines	Across the national highyway	
1.12	Details of aready laid services,if any, along the proposed route	NA	
1.13	No of lanes (2/4/6/8 lanes)	4 lanes	
1.14	Services road existing or not	No services road exist	
	if yes then which side	No services road exist	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.15	Proposed service line		
	a) Left side from center line	-	
	b) Right side from center line	-	
1.16	Where proposed to lay eletrical pipeline is after the service road or between the service road and main carriageway	-	
1.17	Considered for approval / rejection based on the Ministry Circular mentioned as above	-	

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	a) Carring of eletrical pipeline on Highway bridges shall not be permitted as eletrical pipes can accelerate the process of corrosion thus being much more injurious	NA	
	b) Carrying of Eletrical pipelines on bridges shall also discouraged however if the Eletrical supply authorities seem to have no other viable alternative and approach the highway authority well in time before the design of the bridge in finalized they may be permitted to carrry the pipeline on independent super structure supported on extended portion of piers and abutments in such a manner that in the final arangement enough free spade around the super structure of the bridge remains available for inspection and repairs.	NA	
	c) Cost of required extension of the substructure as well as that of the supporting super structure shall be borne by the agency-in-charge of the utilities	NA	
	d) Services are not being allowed indiscriminately on the parapet/any of the bridges, safety of the bridge has to be kept in view while permitting various services along bridge. Appeovals to be accorded in this regard with the concurrence of the Ministries Project Cief Engineers only.	NA	
1.18	Whether crossing of the involved	Yes	
	If yes, it shall be either enclosed in pipes or through structure or conduits specially built for that purpose at the expensed of the agency owning the line.	Yes, Enclosed in pipes	
	a) Exiting drainage structure shall not be allowed to carry the lines	Yes	
	b) Is it on a line normal to NH	Yes	
	c)Crossing shall not to be too near the exixting structure on the national highway the minimum distance bring 15 meter	Yes more than 15 mtrs	

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	d) The casing pipes carriying the utility lines shall be of steel, case, iron or reinforced cement concrete and have adequate strength and be large enough to permit ready with drawl of the carrier pipe/ cable.	Yes	
	e) Ends of the casing/conduit pipes shall be sealed from the outside so that it does not act as a drainage path.	Yes	
	f) The casing/ conduit pipe should as minimum extend from drain to drain in cutsand toe of the slope in the fills	Yes	
	g) The top of the caing/ conduit pipe should be at least 1.20 meter below the surface of the road.	Yes	
	h) The casinf/conduit pipe shall be done by boring (HDD) or digging a trench. Installation by boring method shall be preferred.	Yes (HDD Method)	
2	Document/Drawing enclosed with proposal	Yes	
2.1	Cross section showing the size of trench for open trencing method (is it normal size of 1.2m x 0.3 wide)	NA	
	i) Should be greater that 60 cm wider than outer diameter of the pipe	NA	
	ii) Located as close to the extreme edge of the right 15 meter from the centre lines of the nearest carriageway.	NA	
	iii) Shall not be permitted to run along the national highways when the road formation is situated in double cutting. Nor shall these be laid over the existing culverts and bridges.	NA	
	iv) These should be so laid that their top is at least 0.6 meter below the ground level so as not to obstruct drainage of the road land.	NA	
2.2	Cross section showing the sixe pit and location of cable for HDD method	Yes	
2.3	Strip plan/ route plan showing Eletrical pipeline chainage, width of ROW, distance of proposed cable from the edge of ROW important mile stone, cross section etc.	Incorparated in the drawing	
2.4			

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2.4.1	Open trenching method (may be allowed in utility corriod only where pave ment is neither cement concrete nor dense bituminous concrete type.. If yes, methodology of refilling of trench	NA	
	a)Trench width should be at least 30 cm but not more than 60 cm wider than the outer diameter of the pipe.	NA	
	b) For thefilling 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 yeild a firm surfacewithout sudden change in the bearing value unsuitable soi and rock edged should be excavated and replaced by selected material.	NA	
	C) The side fill shall consist of granular material laid in 15 cm layers each consolidated by mechnival tampering and controlled addition of moisture of 95% of Proctor's Density. Over fill shall of compacted to the same density as the material that had been removed. Consolidation by saturation or pendingwill not be permitted.	NA	
	d) The road crust shall be built to the same strength as the existing crust on the either side of the trench care shall be taken to avoid the formation of a dip at the trench.	NA	
	e) The excavation shall be protected by flagman signs and barricades and red light during night hours.	NA	
	f) if Required a diversion shall be constructed at the expends of agency owing the utilityline.	NA	
2.4.2	Horizontal directional drilling (HDD) METHOD	yes	
3	Draft License Agreement signed by two witness	yes	

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4	Performance bank guarantee in favor of NHAI has to be obtained @Rs 200/- per running meter (parallel to NH) and Rs100000/- per crossing of NH for a period of one year initially (extendable if required till satisfactory completion of work) as a security for ensuring /making good the excavated trench for laying the cables/ducts by proper filling and compaction clearing Debris/loose earth produced due to execution of trenching at least 50 m away from the edge of the right of way. No payment shall be payable by the NHAI to the license for clearing debris/loose, earth.		
4.1	Performance BG as per above is to be obtained	YES	
4.2	Confirmation of BG has been obtained as per NHAI guidelines	YES	
5	Affidavit/undertaking from the application	YES	
5.1	Not to damage to other utility If damaged than pay the losses either to NHAI or to the concerned agency	YES	
5.2	Renewal of Bank Guarantee	YES	
5.3	Confirming all standard condition of NHAI'S guideline	YES	
5.4	Shifting of Electrical supply pipe line as and when required by NHAI at their own cost	YES	
5.5	Shifting due to 6 lanning/wedding of NII	YES	
5.6	Indemnity against all damages and alarms clause (xxiv)	YES	
5.7	Traffic movement during laying of Electrical supply 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 A	YES	
5.9	Prior approval of the NHAI shall be obtained before undertaking any work if installation shifting or repairs or alteration to the showing Electrical supply pipe line located in the National Highway rights or ways	YES	

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5.10.	Expenditure if any incurred by NHAI for repairing any damage caused to the National Highway by the laying maintenance or shifting of the Electrical supply pipe line will be borne by the agency owing the line.	YES	
5.11	If the NHAI considers it necessary in future to move the utility line for any work of improvement or repairs to the road it will be carried out as desired by the NHAI at the cost of the agency owning the utility line within a reasonable time not exceeding 60 days) of the intimation given	YES	
5.12	Certified from the application in the following format	YES	
	i) laying of Electrical supply pipe line will not have any deleterious effects on any of the bridge components and roadway safety for traffic	YES	
	ii) for 6-lanning we do undertake that will relocate service road/ utility at my own cost notwithstanding the permission granted with such time as will be stipulated by NHAI for future six lanning or any other development.	YES	
6	Who will sign the agreement on behalf of Electrical supply pipe line agency?	DGM MPMKVVCL, RAGHOGARH GUNA	
7	Certified from the Project Director		
7.1	Certified for confirming of all standard condition issued vide ministry circular no. F.NO. RW/NH-33044/29/2015/S&R 22/11/2016 Dated	YES	

Team Leader
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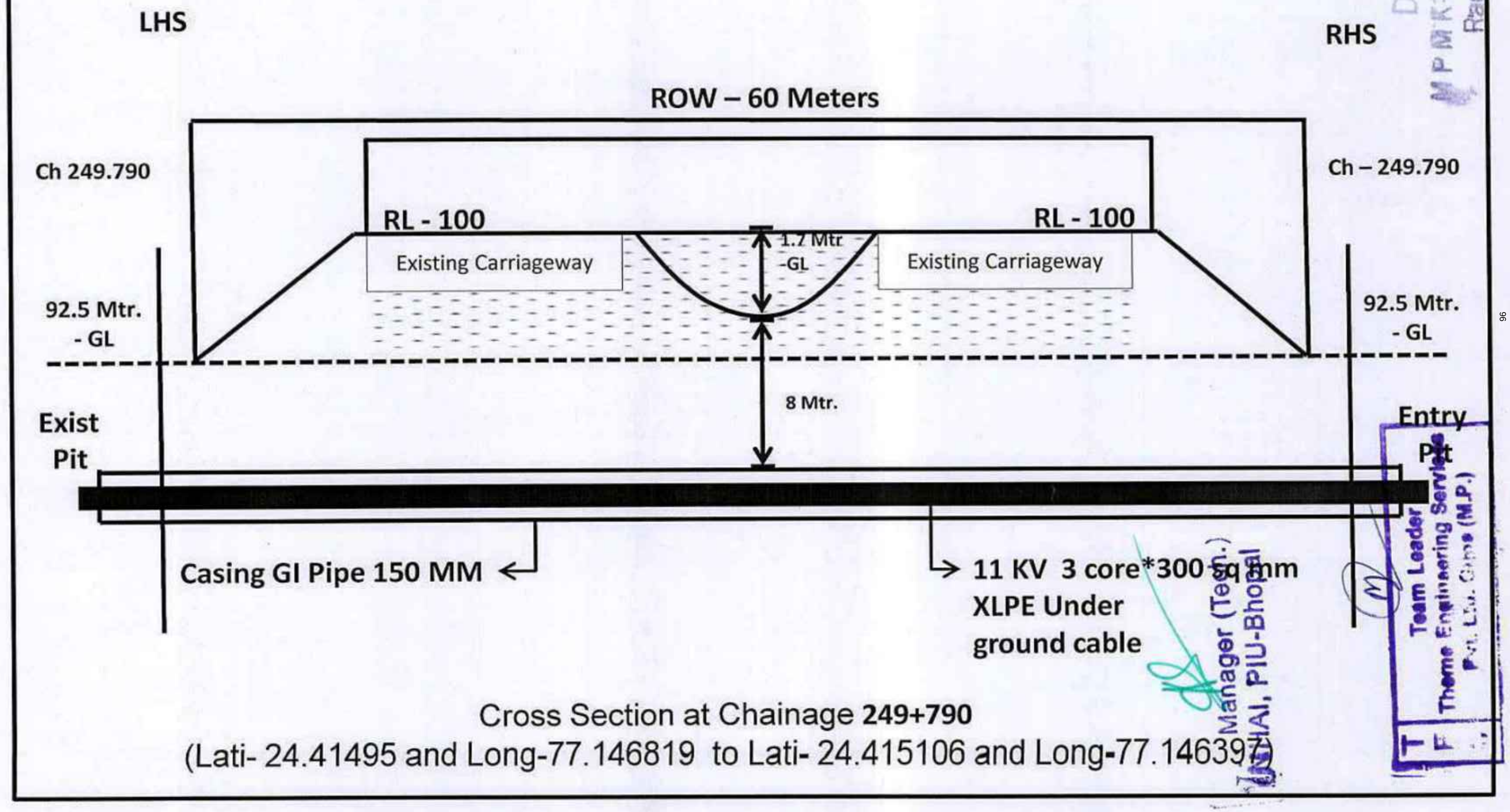
Manager (Tech.)
NHAI, PIU-Bhopal

Project Director
रा रा रा.प्रा परि.कियो इकाई भोपाल
NHAI PIU-Bhopal (M.P.)

NH46 Cross Section Drawing for 11 KV Electrical Crossing for 11 KV AWAN Feeder.



Cross Section at Chainage **249+790**

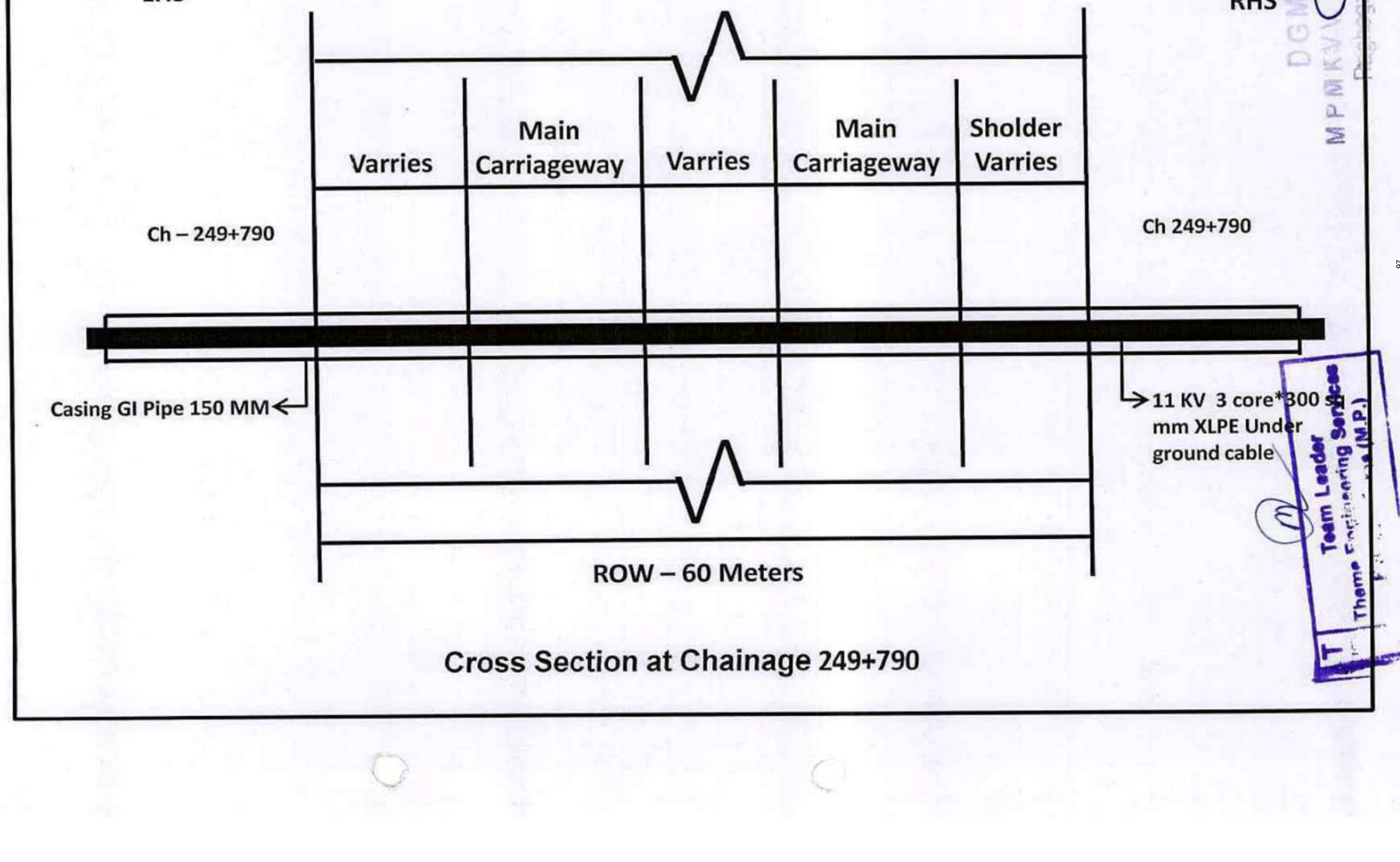
(Lati- 24.41495 and Long-77.146819 to Lati- 24.415106 and Long-77.146397)

DGM MPMKVVCL LTD Rajgarh

Manager (Tech.) JUNAI, PIU-Bhopal

Team Leader Thorne Engineering Services Pvt. Ltd. Satna (M.P.)

Plan of Highway Crossing at NH46 for 11 KV Electrical Crossing for 11 KV AWAN Feeder.



Cross Section at Chainage 249+790

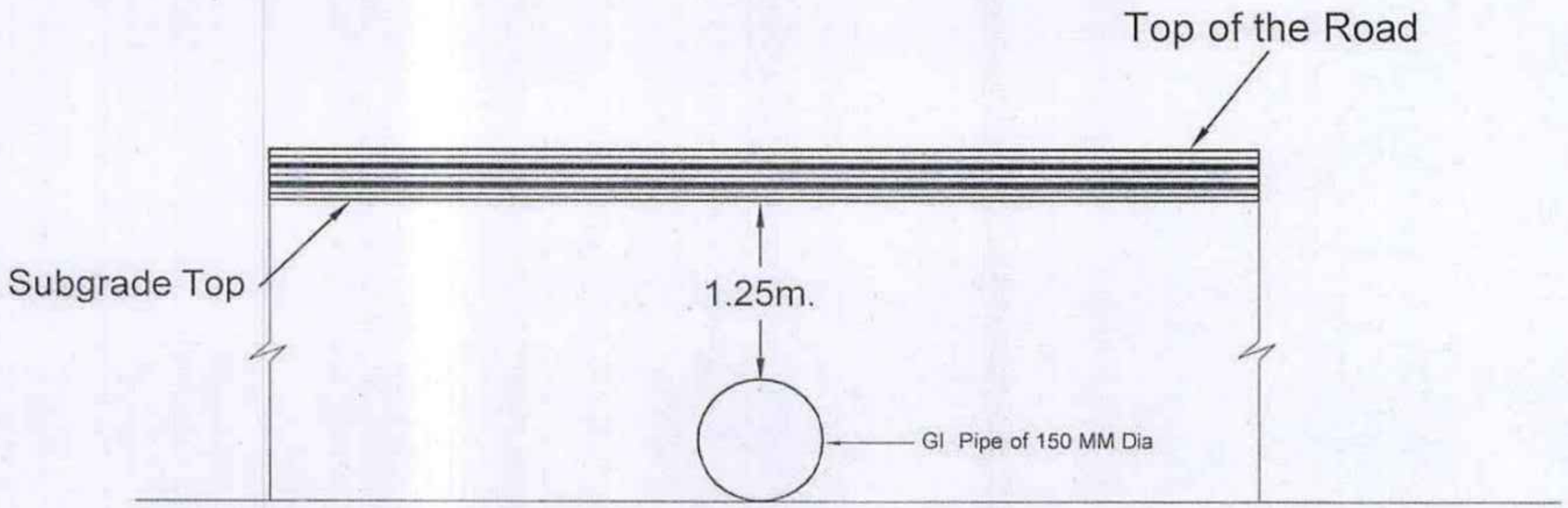
DGM MPMKVVCO Ltd Bhopal

Team Leader Thema Engineering Services (M.P.)

97

11 KV AWAN FEEDER NHAI CROSSING

METHOD OF INSTALLATION OF CASING PIPE FOR CROSSING OF HIGHWAY



Cross section of HDD Crossing Pipe

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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 downhole 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.

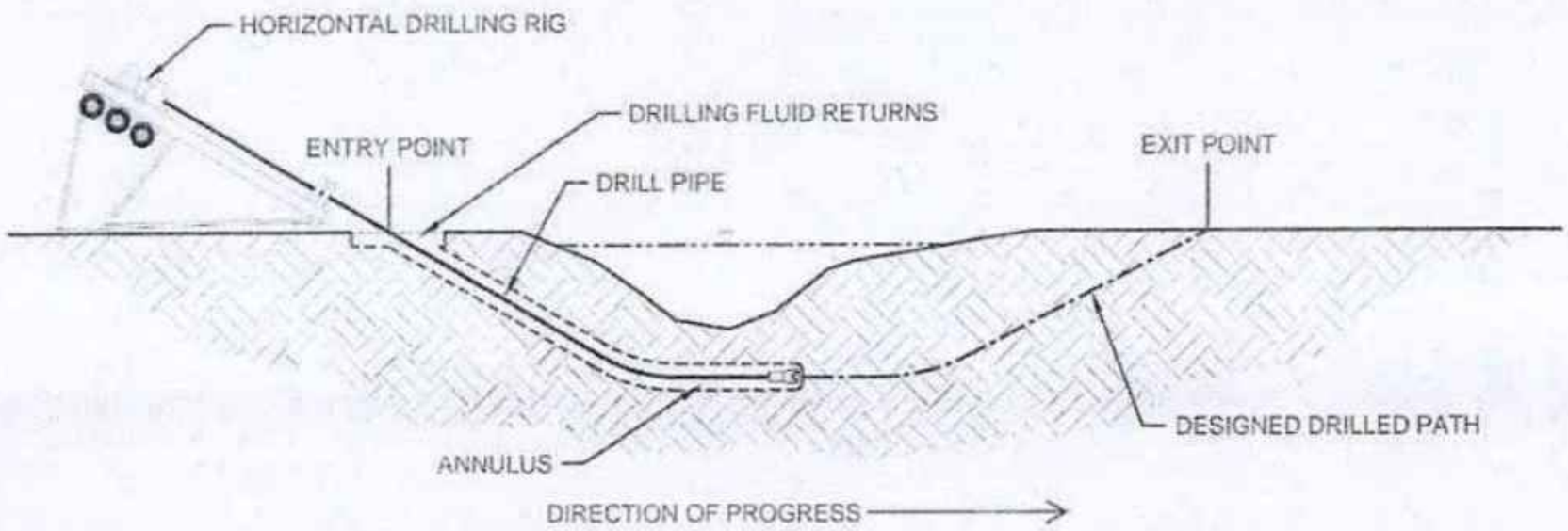
Installation of a pipeline by HDD is generally accomplished in three stages as illustrated in Figure 1. The first stage consists of directionally drilling a small diameter pilot hole along a designed directional path. The second stage involves enlarging this pilot hole to a diameter suitable for installation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

Pilot Hole Directional Drilling

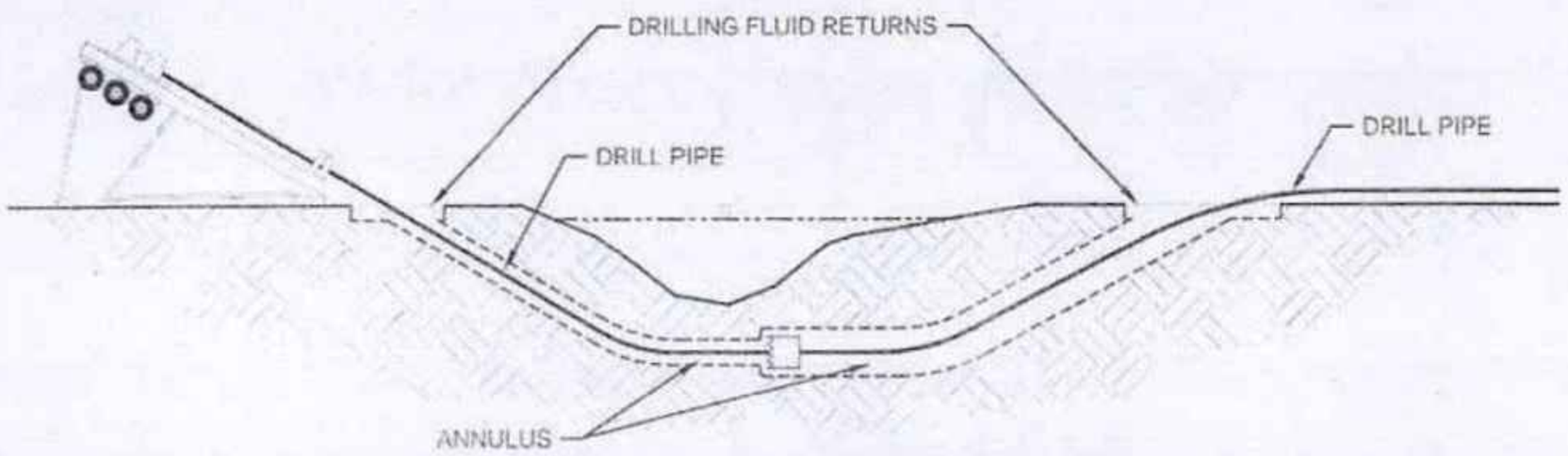
Pilot hole directional control is achieved by using a non-rotating drill string with an asymmetrical leading edge. The asymmetry of the leading edge creates a steering bias while the non-rotating aspect of the drill string allows the steering bias to be held in a specific position while drilling. If 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

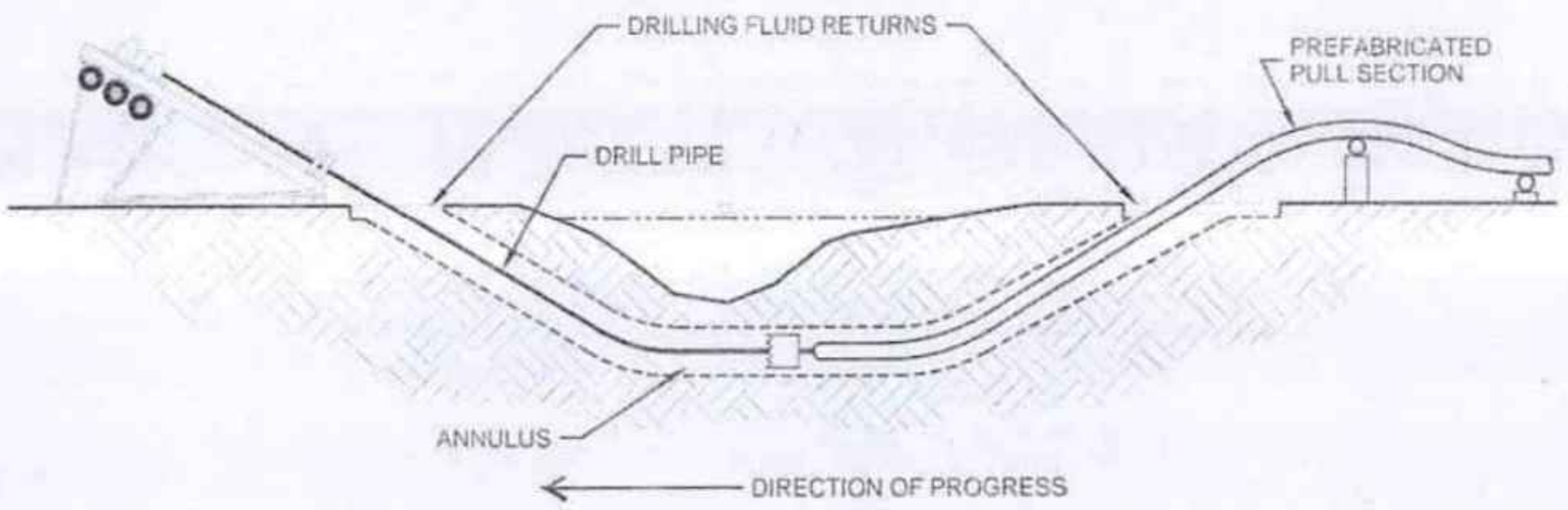


Figure 1
The HDD Process

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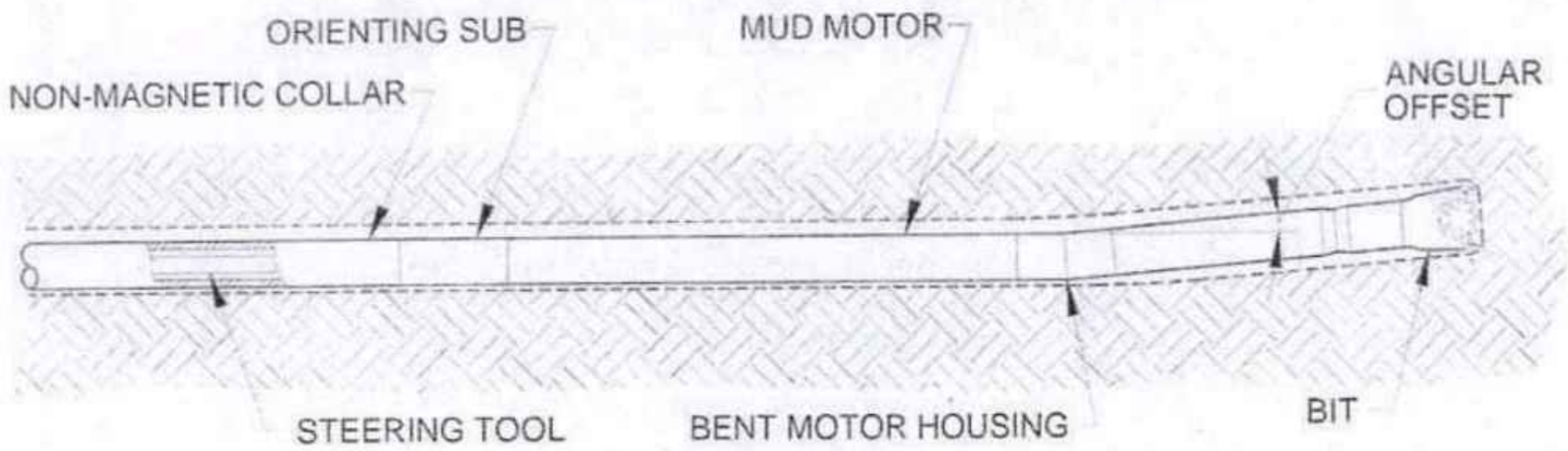

Figure 2
Bottom Hole Assembly

Downhole Motors

Downhole mechanical cutting action required for harder soils is provided by downhole hydraulic motors. Downhole 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.

Downhole 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 downhole 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 downhole 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 downhole 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.

Surface Monitoring

The pilot hole path may also be tracked using a surface monitoring system. Surface monitoring systems determine the location of the probe downhole by taking measurements from a grid or point on the surface. An example of this is the TruTracker System. This system uses a surface coil of known location to induce a magnetic field. The probe senses its location relative to this

induced magnetic field and communicates this information to the surface. This is shown schematically in Figure 3.

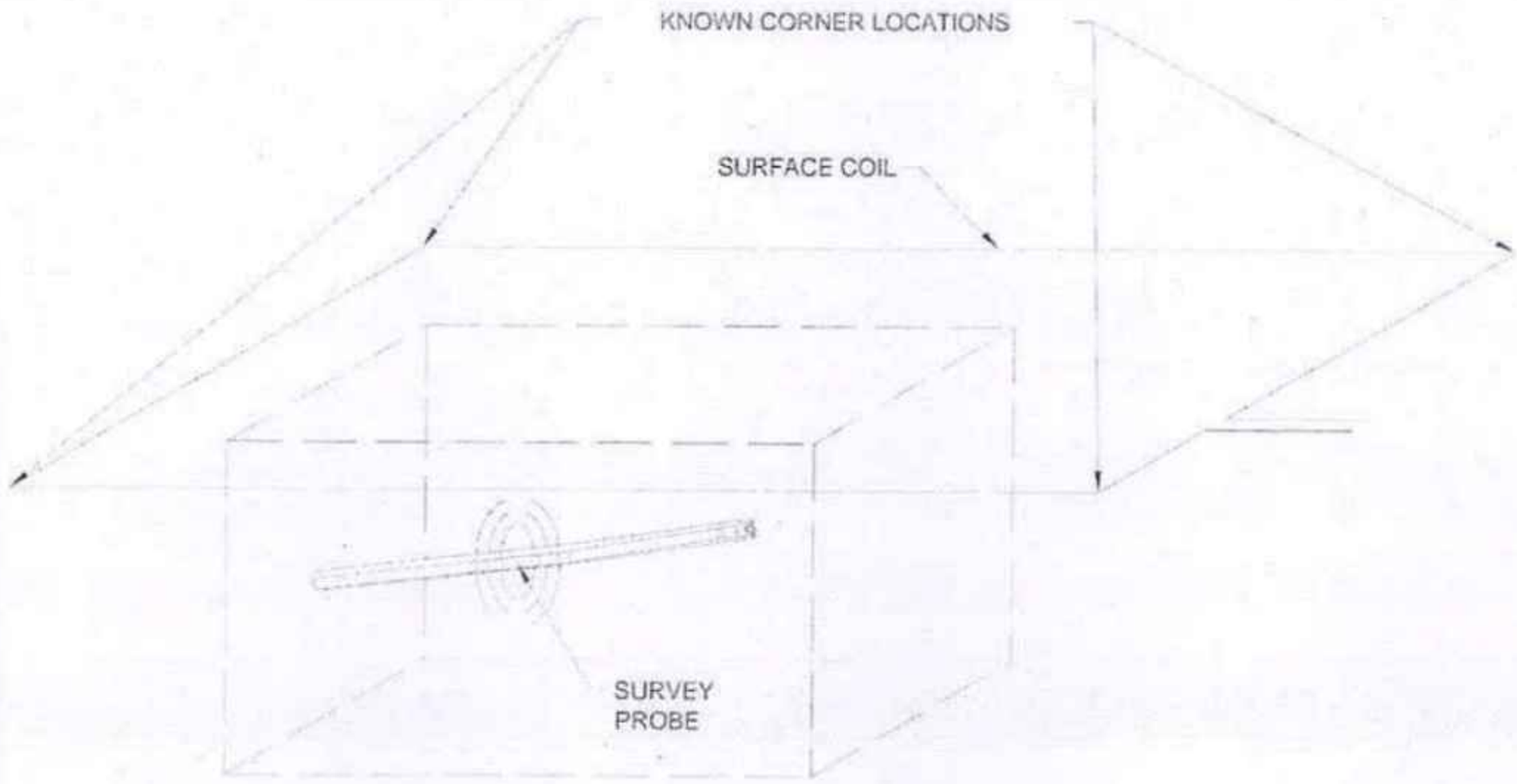

Figure 3
TruTracker Surface Monitoring System

Reaming & Pullback

Enlarging the pilot hole is accomplished using either prereaming 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.

Prereaming

Most contractors will opt to preream a pilot hole before attempting to install pipe. For a prereaming 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.

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 prereaming 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.

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 breakover 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 a 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.

Application Details [20241119/1/5/33029/12585]	
Highway	NH46 [NH46]
Name of Highway Authority	NHAI Dwarka New delhi
Highway Administration Address	Regional Office- Jabalpur Regional Office- Jabalpur
Whether the Fuel Station is part of Rest-area complex	No
Name of Applicant/Oil Company	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited Address: NEAR OF NAGAR PALIKA RAGHOGARH GUNA MADHYA PRADESH, GUNA (MADHYA PRADESH), PIN: 473226 Phn: 9406913711 Email: ANISHRAJPUT.CZ@MP.GOV.IN
Application Category	Public Utility
Utility	Pipes
State	MADHYA PRADESH
Type	New
Remarks	11KV Dohri Feeder II Underground Highway Crossing Work
Submitted On	17 Jun 2025 17:55:38

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Raghogarh

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Team Leader
Theme Engineering Services
Pvt. Ltd. Guna (M.P.)

Details		
1. Length in Meters *		60m
2. Width of available ROW		
i. Left side from center line towards increasing chainage OR km direction *		234+240
ii. Right side from center line towards increasing chainage OR km direction *		234+240
3. Proposal to lay the utility		
i. Left side from center line towards increasing chainage OR km direction *		
ii. Right side from center line towards increasing chainage OR km direction *		
4. Proposal to acquire the land		
i. Left side from center line *		
ii. Right side from center line *		
5. Whether proposal is in the same side where land is not to be acquired *		~~Yes~~ NA
If not then where to lay the cable *		HDD Crossing
6. Details of already laid services if any along the proposed route *		
7. Number of Existing lanes *		4 Lane
8. Proposed number of lanes *		4 Lane
9. Service road Exists *		
10. Proposed Service road		
Left side from center line		
Right side from center line		
11. Whether proposal to lay cable is after the service road or between the service road and main carriageway *		
12. Whether carrying OFC Cable has been proposed on highway /bridges, If yes then mention the methodology proposed for the same *		
13. Is crossing of the road involved? If Yes, is shall be either encased in pipes or through structure of conduits specialy built for the purpose at the expense of the agency owing the line *		Yes encased in Pipe
i. Whether the existing drainage structures are allowed to carry utility pipeline. *		
ii. Is it on a line normal to NH? *		Yes

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III. What is the distance of crossing the utility pipelines from the existing structure? Crossings shall not be too near the existing structures on the National Highway, the minimum distance being 15 mtrs. *		
IV. The casing pipe (or conduit pipe in the case of electric cable) line carrying the utility line shall be of steel, cast iron or reinforced concrete and have adequate strength and be large enough to permit ready withdrawal of carrier pipe/cable Mention type of casting. *		Yes CI pipe
V. Ends of the casing/conduit pipe shall be sealed from outside, so that is does not act as a drainage path *		yes
VI. The casing/conduit pipe should be as minimum extend from drain in cuts toe of slope in fills. *		yes
VII. The installation of Casing pipe shall be as per attachment-1 of Ministry's Guidelines dated 22.11.2016 *		
VIII. Mention the methodology proposed for crossing of road for the proposed sewerage / gas pipeline crossing shall be boring method (HDD) (Trenchless Technology) specially where the existing road pavement is of cement concrete of dense bituminous concrete type. *		Yes (HDD method)
14. Whether the proposal satisfies the following:		
I. Where the ROW is more than 45 M then the duct cable shall be laid at the edge of right of way within the utility corridor of 2 M width, duly keeping in view the future widening. *		
II. Where land is yet to be acquired for 4 laning and the position of new carriageway has been decided then the cable shall be laid at the edge of right of way within the utility corridor of 2 M width, on that side of existing carriageway where extra land is not proposed to be acquired for 4 laning. *		

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III. Where the widening plan for 4 laning is not yet decided and available ROW is around 30 M or less, a judicious decision would need to be taken for permitting the laying of cable/duct. This could be within 1.5 M to 2m of utility corridor at the edge of existing ROW, duly keeping in view the possible widening plans. *		
IV. Where ROW is restricted and adequate only to accommodate the carriageway, central verge, shoulders and drains (e.g. Highways in cutting through hilly/rolling terrain), the cable shall be laid clear of the drain. *		
V. Where land strip for utility corridor can't be conveniently earmarked (available ROW restricted to the toe of the embankment) for laying of cable/ducts, the permission may be refused. *		
15. Document/Drawings enclosed with the proposal *		Yes
I. Cross section showing the size of trench for open trenching method (is it normal size of 1.2m (min.) deep x 0.3 wide) *		
II. Cross section showing the size of pit and location of cable for HDD method *		
III. Strip plan/ Route plan showing the OFC, Chainage width of ROW, distance of proposed, cable from the edge of ROW, important mile stone, intersections, cross drainage works etc. *		
IV. Methodology of laying of the Utility Pipeline/OFC *		Yes Enclosed
V. 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 *		
(a) The trench width should be at least 30 cms but not more than 60 cms wider than the outer diameter of the pipe *		

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(b) For filling of the trench, bedding shall be to a depth of not less than 30 cms. It shall consist of granular material, free of lumps, clods, cobbles and graded to yiled firm surface without sudden change in the bearing value, unsuitable soil and rock edges should be excavated and replaced by selected material *		
(c) The backfill shall be completed in two stages, i) Side fill to the level of the top of the pipe and ii) Overfill to the bottom of the road crust *		
(d) The side fill shall consist of granular material laid in 15 cms, layers each consolidated by mechanical tampering and controlled addition of moisture to 95% of the proctor density. Overfill shall be compacted to the same density as the material that has been removed. *		
(e) The road crust shall be built to the same strength as existing crust on either side of the trench. Care shall be taken to avoid the formation of a dip at the trench. *		
(f) The excavation shall be protected by flagman, signs and barricades and red lights during night hours. *		
(g) If required, a diversion shall be constructed at the expense of agency owing the utility line. *		
VI. Horizontal Directional Drilling (HDD) Method *		Yes
VII. Laying OFC through CD Works and Method of laying (Whether to be hung outside parapet). *		
16. Draft licenes Agreement signed by two witnesses. *		Yes
I. The license fee estimate as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016. *		Yes
17. Whether Performance Bank Guarantee is as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R, dated 22.11.2016. *		Yes
I. Confirmation of BG has been obtained as per MoRTH guidelines *		Yes
18. Affidavit/Undertaking from the Applicant for [illegible] to be furnished		

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a) Undertaking not to Damage to other utility, if damage then to pay the losses either to NHAI or the concerned agency. *		Yes
b) Undertaking Renewal of Bank Guarantee as and when asked by MoRTH. *		Yes
c) Undertaking Confirming all standard condition of Ministry's guidelines. *		Yes
d) Undertaking for indemnity against all damages and claims *		Yes
e) Undertaking for management of traffic movement during laying of utility line without hampering the traffic *		Yes
f) Undertaking that if any claim is raised by the concessionaire/ contractor then the same has to be paid by the applicant. *		Yes
g) Undertaking that prior approval of the NHAI shall be obtained before undertaking any work of installation, shifting or repairs, or alteration to the utility located in the National Highway Right of Ways. *		Yes
h) Undertaking that expenditure is any incurred by NHAI for repairing any damage cause to the NH by laying, maintenance of shifting of the utility line will be borne by the applicant agency owing the line. *		Yes
i) Undertaking that text of the license deal is as per verbatim of format issued by MoRTH vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016 *		Yes
j) Undertaking for shifting of utility as and when asked by MoRTH/ NHAI. *		Yes
k) Certificate from the applicant in the following format		
i) We do undertake that I/we will relocate service road/approach road/utilities at my/our own cost not withstanding the permission granted within such time as will be stipulated by NHAI for future six laning or/any other development		
19. Who will sign the agreement on behalf of Applicant agency? Power of Attorney to sign the agreement is available or not. *		
20. The Power of Attorney is in favour of authorized signatory? *		Yes

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Team Leader
Theme Engineering Services Pvt. Ltd. Guna (M.P.)

Locations

Sno	State	District	Highway /Stretch	Start Point	End Point	View
1	MADHYA PRADESH	GUNA	NH46 [NH46] (146.000-445.000) From Km: 234.24 To Km: 234.24	Chainage Point: 234.24 Lat: 24.541 Lng: 77.198	Chainage Point: 234.24 Lat: 24.542 Lng: 77.198	View

Documents

Sno	Stage	Document	Mandatory	Action
1	Under Submission	Layout and Drawings	Yes	View
2	Under Submission	Any Other Supporting Document	No	--
3	Under Submission	Any Document to indicate commercial activities are allowed on the land.	No	--
4	Under Submission	Safety Clearance from Directorate of Electricity	No	--
5	Under Submission	Safety Clearance from Chief Controller of Explosives	No	--
6	Under Submission	Safety Clearance from Petroleum and Explosives Safety Organisation	No	--
7	Under Submission	Safety Clearance from Oil Industry Safety Directorate	No	--
8	Under Submission	Safety Clearance from State/Central Pollution Control Board	No	--
9	Under Submission	Any Other Statutory Clearance as applicable	No	--

Applicable Fee Details

Sno	Fee Head	Stage	Fee	Amount	Status
1	Utility Fees	Technical Approval	License Fees	792.00	

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TES Team Leader Thema Engineering Services Pvt Ltd. Guna (M.P.)

Check List

S.No	Items	Information/Status	Remaks
1	General Information		
1.1	Name and Address of the Applicant / Agency	DGM MPMKVVCL, RAGHOGARH GUNA	
1.2	National Highway Number	NH-46	
1.3	State	MADHYA PRADESH	
1.4	Location	11 KV DEHRI-2 FEEDER	
1.5	(Chainage in KM)	234+24 LHS , 234+24 RHS	
1.6	Length in Meters	60 m Acoss the Highway	
1.7	Width of avalible ROW	60m	
	a) Width Left side from center line	30m	
	b) Width Right side from center line	30m	
1.8	Proposal to lay undergrond Eletrical cable	Across the national highyway	
	a) Left side from the center line towards increasing chainage/ KM direction	-	
	b) Right side from the center line towards increasing chainage/ KM direction	-	
1.9	Proposal to aquire land	NA	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.11	Whether proposal is in the same side where land is not to be acquired	no acquistion of land required	
	If not then where to lay the pipelines	Across the national highyway	
1.12	Details of aready laid services,if any, along the proposed route	NA	
1.13	No of lanes (2/4/6/8 lanes)	4 lanes	
1.14	Services road existing or not	No services road exist	
	if yes then which side	No services road exist	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.15	Proposed service line		
	a) Left side from center line	-	
	b) Right side from center line	-	
1.16	Where proposed to lay eletrical pipeline is after the service road or between the service road and main carriageway	-	
1.17	Considered for approval / rejection based on the Ministry Circular mentioned as above	-	
	a) Carring of eletrical pipeline on Highway bridges shall not be permitted as eletrical pipes can accelerate the process of corrosion thus being much more injurious	NA	

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	b) Carrying of Eletrical pipelines on bridges shall also discouraged however if the Eletrical supply authorities seem to have no other viable alternative and approach the highway authority well in time before the design of the bridge in finalized they may be permitted to carrry the pipeline on independent super structure supported on extended portion of piers and abutments in such a manner that in the final arangement enough free spade around the super structure of the bridge remains available for inspection and repairs.	NA	
	c) Cost of required extension of the substructure as well as that of the supporting super structure shall be borne by the agency-in- charge of the utilities	NA	
	d) Services are not being allowed indiscriminately on the parapet/any of the bridges, safety of the bridge has to be kept in view while permitting various services along bridge. Appeovals to be accorded in this regard with the concurrence of the Ministries Project Clef Engineers only.	NA	
1.18	Whether crossing of the involved	Yes	
	If yes, it shall be either enclosed in pipes or through structure or conduits specially built for that purpose at the expensed of the agency owning the line.	Yes, Enclosed in pipes	
	a) Exiting drainage structure shall not be allowed to carry the lines	Yes	
	b) Is it on a line normal to NH	Yes	
	c)Crossing shall not to be too near the exixting structure on the national highway the minimum distance bring 15 meter	Yes more than 15 mtrs	
	d) The casing pipes carriying the utility lines shall be of steel, case, iron or reinforced cement concrete and have adequate strength and be large enough to permit ready with drawl of the carrier pipe/ cable.	Yes	
	e) Ends of the casing/conduit pipes shall be sealed from the outside so that it does not act as a drainage path.	Yes	
	f) The casing/ conduit pipe should as minimum extend from drain to drain in cutsand toe of the slope in the fills	Yes	
	g) The top of the caing/ conduit pipe should be at least 1.20 meter below the surface of the road.	Yes	

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NHAI, PIU-Bhopal

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Thante Engineering Services Pvt. Ltd. Guna (M.P.)

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	h) The casinf/conduit pipe shall be done by boring (HDD) or digging a trench. Installation by boring method shall be preferred.	Yes (HDD Method)	
2	Document/Drawing enclosed with proposal	Yes	
2.1	Cross section showing the size of trench for open trencing method (is it normal size of 1.2m x 0.3 wide)	NA	
	i) Should be greater that 60 cm wider than outer diameter of the pipe	NA	
	ii) Located as close to the extreme edge of the right 15 meter from the centre lines of the nearest carriageway.	NA	
	iii) Shall not be permitted to run along the national highways when the road formation is situated in double cutting. Nor shall these be laid over the existing culverts and bridges.	NA	
	iv) These should be so laid that their top is at least 0.6 meter below the ground level so as not to obstruct drainage of the road land.	NA	
2.2	Cross section showing the sixe pit and location of cable for HDD method	Yes	
2.3	Strip plan/ route plan showing Eletrical pipeline chainage, width of ROW, distance of proposed cable from the edge of ROW important mile stone, cross section etc.	Incorparated in the drawing	
2.4			
2.4.1	Open trenching method [may be allowed in utility corriod only where pave ment is neither cement concrete nor dense bituminous concrete type.. If yes, methodology of refilling of trench	NA	
	a]Trench width should be at least 30 cm but not more than 60 cm wider than the outer diameter of the pipe.	NA	
	b) For thefilling 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 yeild a firm surfacewithout sudden change in the bearing value unsuitable soi and rock edged should be excavated and replaced by selected material.	NA	
	C) The side fill shall consist of granular material laid in 15 cm layers each consolidated by mechnival tamp cring and controlled addition of moisture of 95% of Proctor's Density. Over fill shall of compacted to the same density as the material that had been removed. Consolidation by saturation or pendingwill not be permitted.	NA	

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	d) The road crust shall be built to the same strength as the existing crust on the either side of the trench care shall be taken to avoid the formation of a dip at the trench.	NA	
	e) The excavation shall be protected by flagman signs and barricades and red light during night hours.	NA	
	f) if Required a diversion shall be constructed at the expends of agency owing the utilityline.	NA	
2.4.2	Horizontal directional drilling (HDD) METHOD	yes	
3	Draft License Agreement signed by two witness	yes	
4	Performance bank guarantee in favor of NHAI has to be obtained @Rs 200/- per running meter (parallel to NH) and Rs100000/- per crossing of NH for a period of one year initially (extendable if required till satisfactory completion of work) as a security for ensuring /making good the excavated trench for laying the cables/ducts by proper filling and compaction clearing Debris/loose earth produced due to execution of trenching at least 50 m away from the edge of the right of way. No payment shall be payable by the NHAI to the license for clearing debris/loose, earth.		
4.1	Performance BG as per above is to be obtained	YES	
4.2	Confirmation of BG has been obtained as per NHAI guidelines	YES	
5	Affidavit/undertaking from the application	YES	
5.1	Not to damage to other utility If damaged than pay the losses either to NHAI or to the concerned agency	YES	
5.2	Renewal of Bank Guarantee	YES	
5.3	Confirming all standard condition of NHAI'S guideline	YES	
5.4	Shifting of Electrical supply pipe line as and when required by NHAI at their own cost	YES	
5.5	Shifting due to 6 lanning/wedding of NII	YES	
5.6	Indemnity against all damages and alarms clause (xxiv)	YES	
5.7	Traffic movement during laying of Electrical supply 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 A	YES	
5.9	Prior approval of the NHAI shall be obtained before undertaking any work if installation shifting or repairs or alteration to the showing Electrical supply pipe line located in the National Highway rights or ways	YES	

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5.10.	Expenditure if any incurred by NHAI for repairing any damage caused to the National Highway by the laying maintenance or shifting of the Electrical supply pipe line will be borne by the agency owing the line.	YES	
5.11	If the NHAI considers it necessary in future to move the utility line for any work of improvement or repairs to the road it will be carried out as desired by the NHAI at the cost of the agency owning the utility line within a reasonable time not exceeding 60 days) of the intimation given	YES	
5.12	Certified from the application in the following format	YES	
	i) laying of Electrical supply pipe line will not have any deleterious effects on any of the bridge components and roadway safety for traffic	YES	
	ii) for 6-lanning we do undertake that will relocate service road/ utility at my own cost notwithstanding the permission granted with such time as will be stipulated by NHAI for future six lanning or any other development.	YES	
6	Who will sign the agreement on behalf of Electrical supply pipe line agency?	DGM MPMKVVCL, RAGHOGARH GUNA	
7	Certified from the Project Director		
7.1	Certified for confirming of all standard condition issued vide ministry circular no. F.NO. RW/NH-33044/29/2015/S&R 22/11/2016 Dated	YES	

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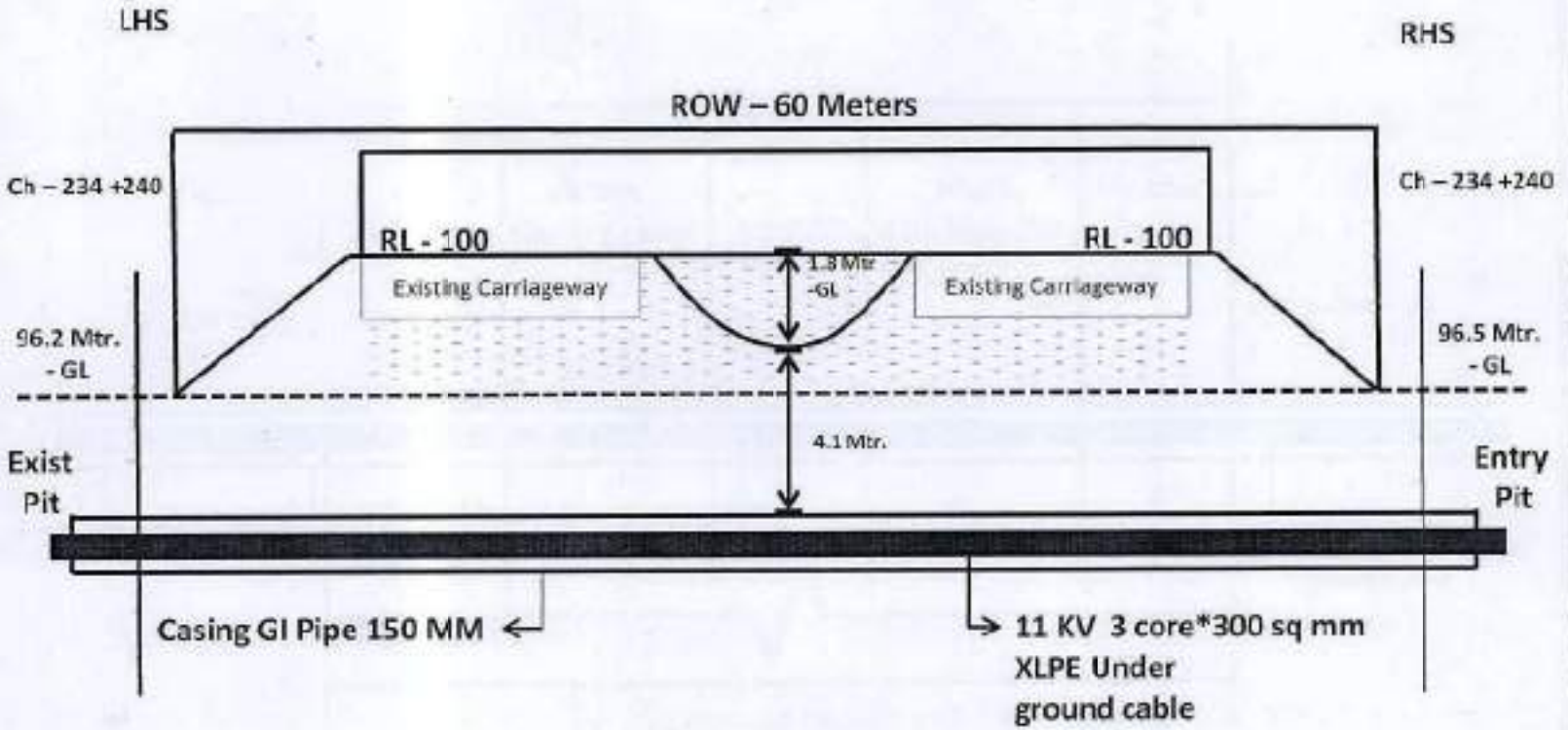
NH46 Cross Section Drawing for 11 KV Electrical Crossing for 11 KV Dehri Feeder. -2



Cross Section at Chainage **Ch 234 +240** to **234 +240**
(24.54221, 77.19938)

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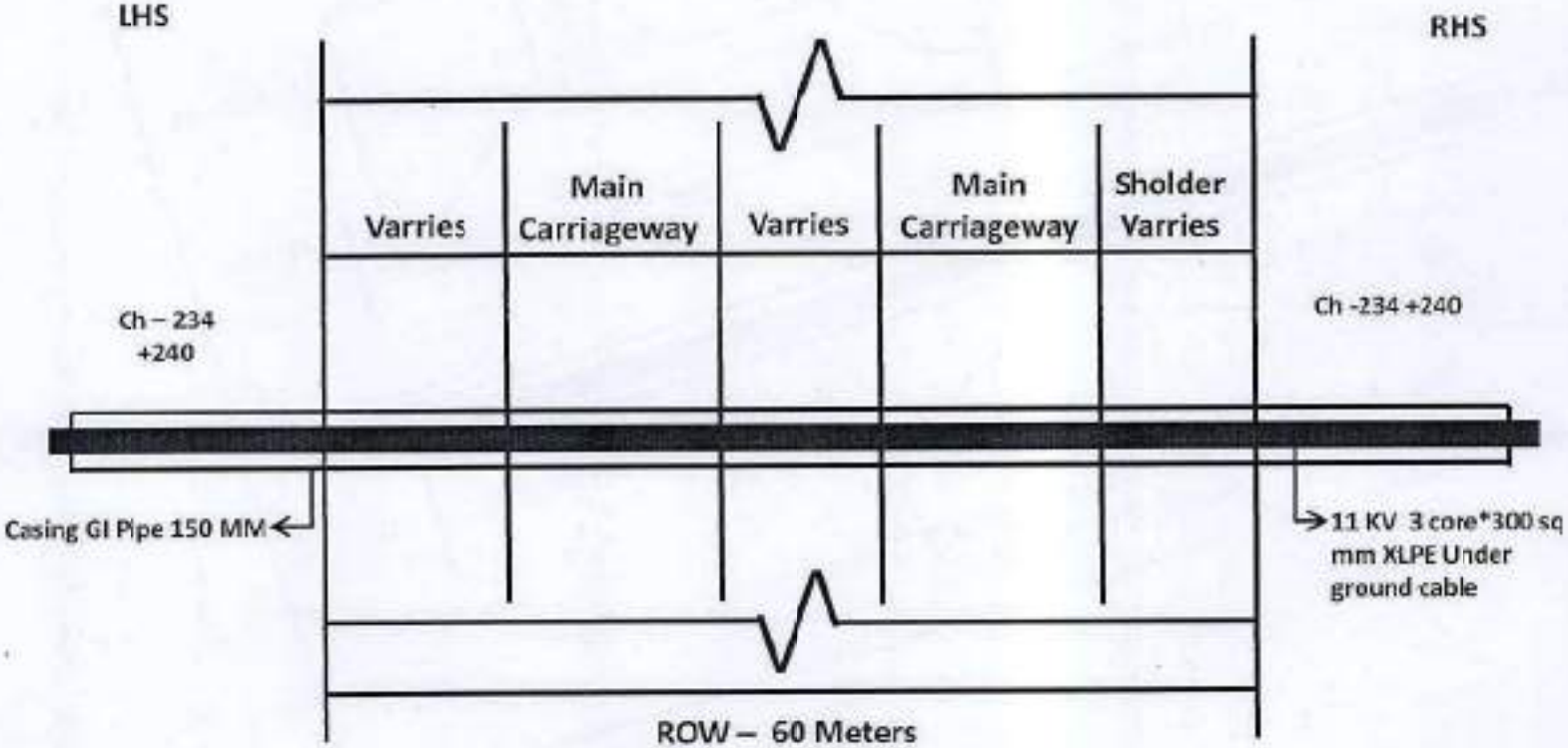
Plan of Highway Crossing at NH46 for 11 KV Electrical Crossing for 11 KV Dehri Feeder-.2



Cross Section at Chainage 234 +240

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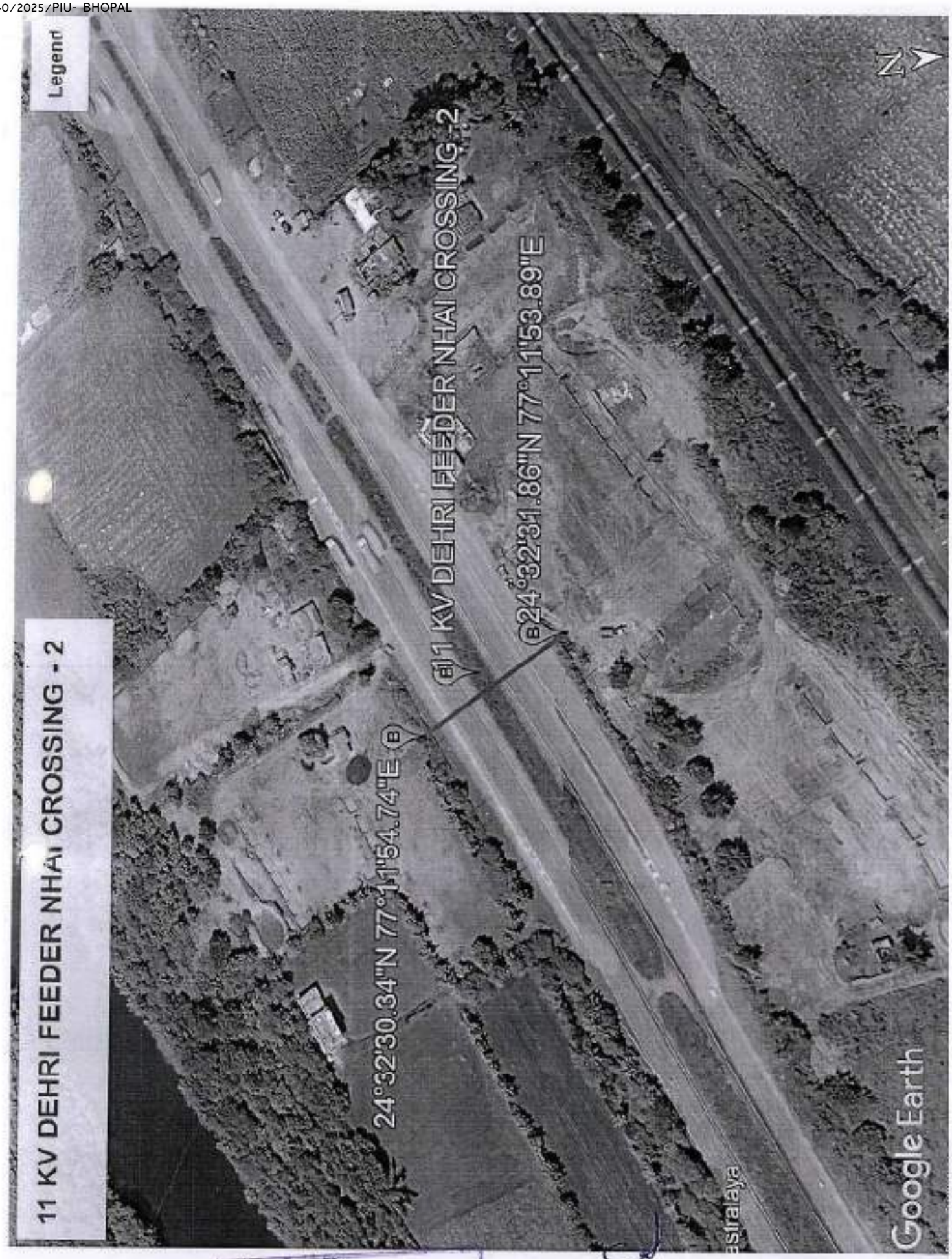

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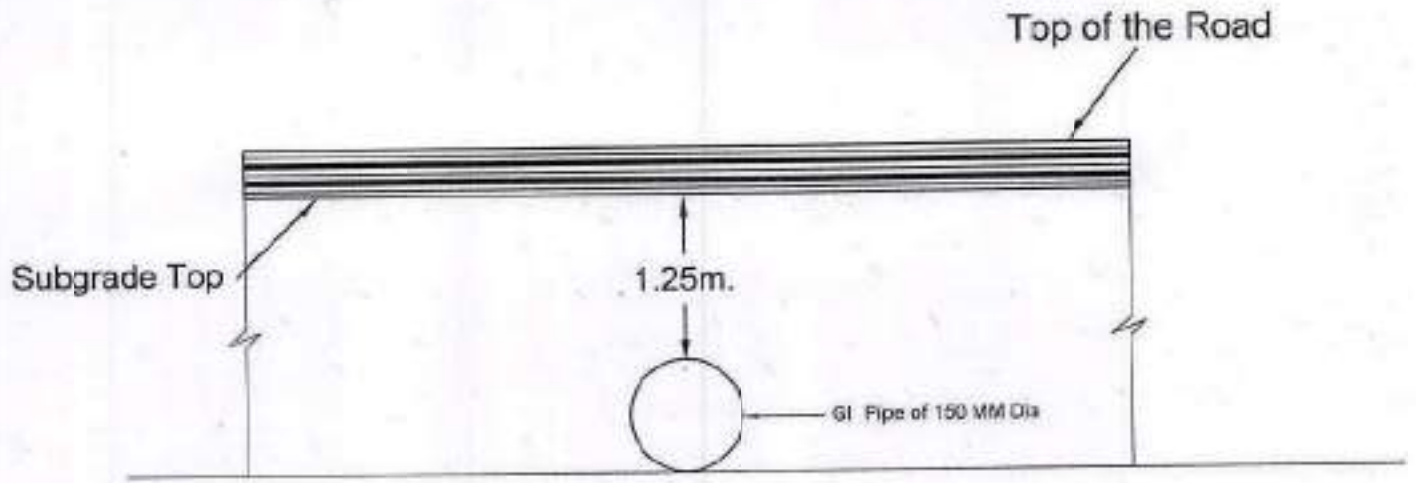
METHOD OF INSTALLATION OF CASING PIPE FOR CROSSING OF HIGHWAY



Cross section of HDD Crossing Pipe

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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 downhole 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 a 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.

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.

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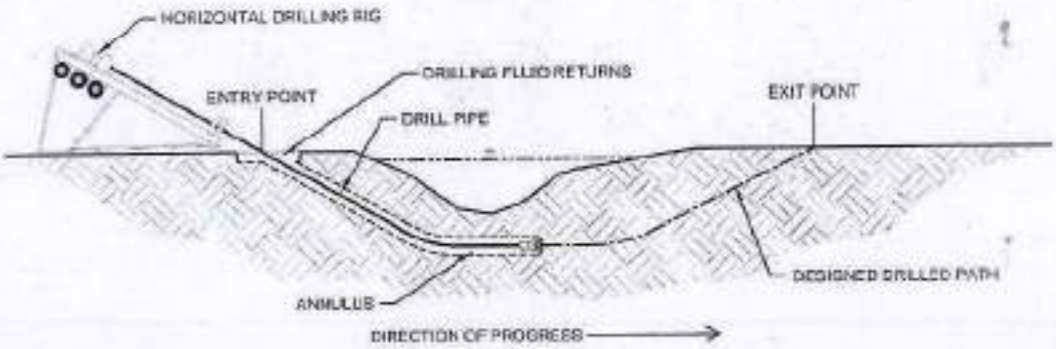
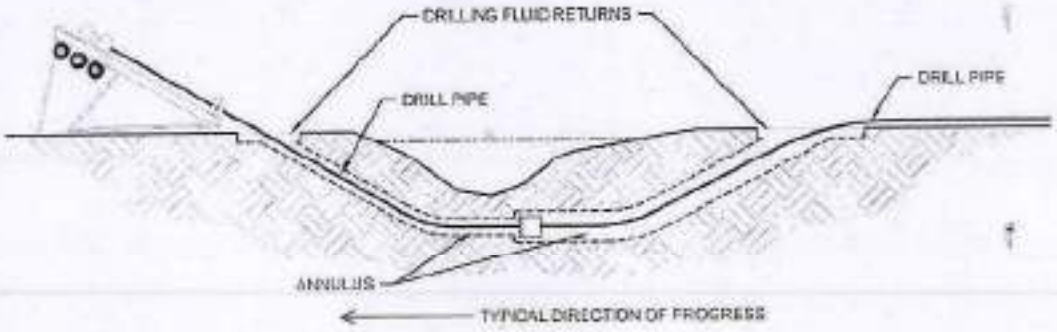
PILOT HOLE



PREREAMING



PULLBACK

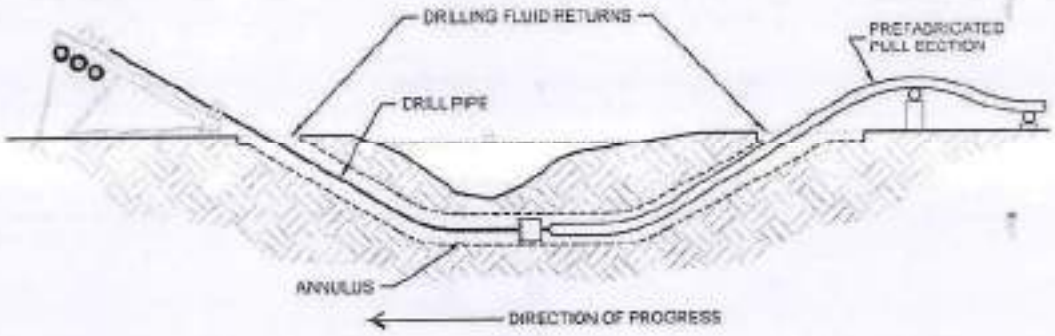


Figure 1
The HDD Process

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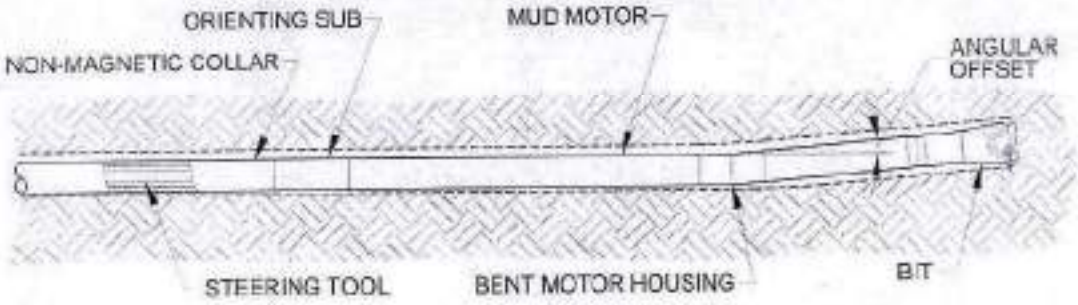

Figure 2
Bottom Hole Assembly

Downhole Motors

Downhole mechanical cutting action required for harder soils is provided by downhole hydraulic motors. Downhole 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.

Downhole 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 downhole 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 downhole 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 downhole 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.

Surface Monitoring

The pilot hole path may also be tracked using a surface monitoring system. Surface monitoring systems determine the location of the probe downhole by taking measurements from a grid or point on the surface. An example of this is the TruTracker System. This system uses a surface coil of known location to induce a magnetic field. The probe senses its location relative to this

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induced magnetic field and communicates this information to the surface. This is shown schematically in Figure 3.

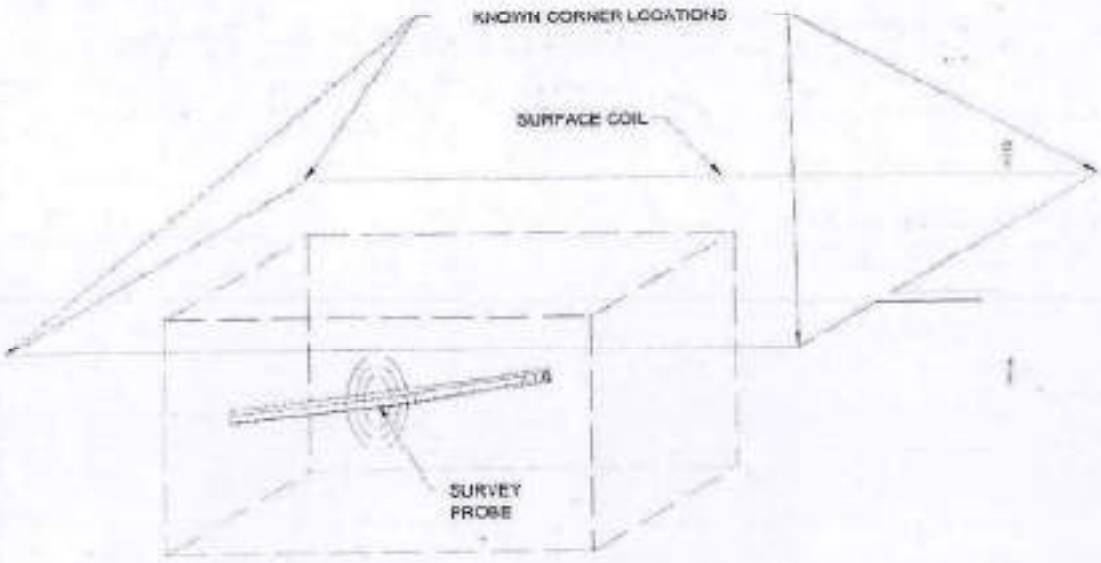

Figure 3
TruTracker Surface Monitoring System

Reaming & Pullback

Enlarging the pilot hole is accomplished using either prereaming 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.

Prereaming

Most contractors will opt to preream a pilot hole before attempting to install pipe. For a prereaming 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.

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 prereaming 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.

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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 breakover 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 a 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.

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Application Details [20241124/1/5/33029/12643]	
Highway	NH46 [NH46]
Name of Highway Authority	**NHAI** Dwarka New delhi
Highway Administration Address	**Regional Office- Jabalpur** Regional Office- Jabalpur
Whether the Fuel Station is part of Rest-area complex	No
Name of Applicant/Oil Company	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited Address: NEAR OF NAGAR PALIKA RAGHOGARH GUNA MADHYA PRADESH, GUNA (MADHYA PRADESH), PIN: 473226 Phn: 9406913711 Email: ANISHRAJPUT.CZ@MP.GOV.IN
Application Category	Public Utility
Utility	Pipes
State	MADHYA PRADESH
Type	New
Remarks	11 KV RAMDI FEEDER UNDER GROUND HIGHWAY CROSSING
Submitted On	18 Jun 2025 11:26:23

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Details		
1. Length in Meters *		60
2. Width of available ROW		
I. Left side from center line towards increasing chainage OR km direction *		269.980
II. Right side from center line towards increasing chainage OR km direction *		269.980
3. Proposal to lay the utility		
I. Left side from center line towards increasing chainage OR km direction *		0
II. Right side from center line towards increasing chainage OR km direction *		0
4. Proposal to acquire the land		
I. Left side from center line *		0
II. Right side from center line *		0
5. Whether proposal is in the same side where land is not to be acquired *		No
If not then where to lay the cable *		HDD Crossing
6. Details of already laid services if any along the proposed route *		N/A
7. Number of Existing lanes *		4 Lane
8. Proposed number of lanes *		4 Lane

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9. Service road Exists *		No
10. Proposed Service road		
Left side from center line		0
Right side from center line		0
11. Whether proposal to lay cable is after the service road or between the service road and main carriageway *		N/A
12. Whether carrying OFC Cable has been proposed on highway /bridges, If yes then mention the methodology proposed for the same *		N/A
13. Is crossing of the road involved? If Yes, is shall be either encased in pipes or through structure of conduits specially built for the purpose at the expense of the agency owing the line *		Yes, Enclosed in pipes
I. Whether the existing drainage structures are allowed to carry utility pipeline. *		N/A
II. Is it on a line normal to NH? *		No
III. What is the distance of crossing the utility pipelines from the existing structure? Crossings shall not be too near the existing structures on the National Highway, the minimum distance being 15 mtrs. *		0.00

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IV. The casing pipe (or conduit pipe in the case of electric cable) line carrying the utility line shall be of steel, cast iron or reinforced concrete and have adequate strength and be large enough to permit ready withdrawal of carrier pipe/cable Mention type of casting. *		Yes, GI PIPE
V. Ends of the casing/conduit pipe shall be sealed from outside, so that is does not act as a drainage path *		Yes
VI. The casing/conduit pipe should be as minimum extend from drain in cuts toe of slope in fills. *		Yes
VII. The installation of Casing pipe shall be as per attachment-1 of Ministry's Guidelines dated 22.11.2016 *		YES
VIII. Mention the methodology proposed for crossing of road for the proposed sewerage / gas pipeline crossing shall be boring method (HDD) (Trenchless Technology) specially where the existing road pavement is of cement concrete of dense bituminous concrete type. *		Yes, (HDD method)

14. Whether the proposal satisfies the following:

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I. Where the ROW is more than 45 M then the duct cable shall be laid at the edge of right of way within the utility corridor of 2 M width, duly keeping in view the future widening. *		NA
II. Where land is yet to be acquired for 4 laning and the position of new carriageway has been decided then the cable shall be laid at the edge of right of way within the utility corridor of 2 M width, on that side of existing carriageway where extra land is not proposed to be acquired for 4 laning. *		N/A
III. Where the widening plan for 4 laning is not yet decided and available ROW is around 30 M or less, a judicious decision would need to be taken for permitting the laying of cable/duct. This could be within 1.5 M to 2m of utility corridor at the edge of existing ROW, duly keeping in view the possible widening plans. *		N/A

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IV. Where ROW is restricted and adequate only to accommodate the carriageway, central verge, shoulders and drains (e.g. Highways in cutting through hilly/rolling terrain), the cable shall be laid clear of the drain. *		N/A
V. Where land strip for utility corridor can't be conveniently earmarked (available ROW restricted to the toe of the embankment) for laying of cable/ducts, the permission may be refused. *		N/A
15. Document/Drawings enclosed with the proposal *		Yes
I. Cross section showing the size of trench for open trenching method (is it normal size of 1.2m (min.) deep x 0.3 wide) *		N/A
II. Cross section showing the size of pit and location of cable for HDD method *		YES
III. Strip plan/ Route plan showing the OFC, Chainage width of ROW, distance of proposed, cable from the edge of ROW, important mile stone. Intersections, cross drainage works etc. *		Incorporated in the Drawing
IV. Methodology of laying of the Utility Pipeline/OFC *		Yes, Enclosed.

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V. 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 *		N/A
(a) The trench width should be at least 30 cms but not more than 60 cms wider than the outer diameter of the pipe *		N/A
(b) For filling of the trench, bedding shall be to a depth of not less than 30 cms. It shall consist of granular material, free of lumps, clods, cobbles and graded to yiled firm surface without sudden change in the bearing value, unsuitable soil and rock edges should be excavated and replaced by selected material *		N/A
(c) The backfill shall be completed in two stages, i) Side fill to the level of the top of the pipe and ii) Overfill to the bottom of the road crust *		N/A

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(d) The side fill shall consist of granular material laid in 15 cms, layers each consolidated by mechanical tampering and controlled addition of moisture to 95% of the proctor density. Overfill shall be compacted to the same density as the material that has been removed. *		N/A
(e) The road crust shall be built to the same strength as existing crust on either side of the trench. Care shall be taken to avoid the formation of a dip at the trench. *		N/A
(f) The excavation shall be protected by flagman, signs and barricades and red lights during night hours. *		N/A
(g) If required, a diversion shall be constructed at the expense of agency owing the utility line. *		N/A
VI. Horizontal Directional Drilling (HDD) Method *		YES
VII. Laying OFC through CD Works and Method of laying (Whether to be hung outside parapet). *		N/A
16. Draft license Agreement signed by two witnesses. *		Yes

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I. The license fee estimate as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016. *		Yes
17. Whether Performance Bank Guarantee is as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R, dated 22.11.2016. *		Yes
I. Confirmation of BG has been obtained as per MoRTH guidelines *		Yes
18. Affidavit/Undertaking from the Applicant for following is to be furnished		
a) Undertaking not to Damage to other utility, if damage then to pay the losses either to NHAI or the concerned agency. *		Yes
b) Undertaking Renewal of Bank Guarantee as and when asked by MoRTH. *		Yes
c) Undertaking Confirming all standard condition of Ministry's guidelines. *		Yes
d) Undertaking for indemnity against all damages and claims *		Yes
e) Undertaking for management of traffic movement during laying of utility line without hampering the traffic *		Yes

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f) Undertaking that if any claim is raised by the concessionaire/ contractor then the same has to be paid by the applicant. *		Yes
g) Undertaking that prior approval of the NHAI shall be obtained before undertaking any work of installation, shifting or repairs, or alteration to the utility located in the National Highway Right of Ways. *		Yes
h) Undertaking that expenditure is any incurred by NHAI for repairing any damage cause to the NH by laying, maintenance of shifting of the utility line will be borne by the applicant agency owing the line. *		Yes
i) Undertaking that text of the license deal is as per verbatim of format issued by MoRTH vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016 *		Yes
j) Undertaking for shifting of utility as and when asked by MoRTH / NHAI. *		Yes
k) Certificate from the applicant in the following format		
l) We do undertake that I/we will relocate service road/approach road/utilities at my/our own cost not withstanding the permission granted within such time us will be stipulated by NHAI for future six laning or/any other development		

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19. Who will sign the agreement on behalf of Applicant agency? Power of Attorney to sign the agreement is available or not. *		DGM MPMKVVCL Raghogarh Guna
20. The Power of Attorney is in favour of authorized signatory? *		Yes

Locations

Sno	State	District	Highway /Stretch	Start Point	End Point	View
1	MADHYA PRADESH	GUNA	NH46 [NH46] (145.000-445.000) From Km: 269.98 To Km: 269.98	Chainage Point: 269.98 Lat: 24.254 Lng: 77.060	Chainage Point: 269.98 Lat: 24.254 Lng: 77.060	View

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Documents

Sno	Stage	Document	Mandatory	Action
1	Under Submission	Layout and Drawings	Yes	View
2	Under Submission	Any Other Supporting Document	No	--
3	Under Submission	Any Document to indicate commercial activities are allowed on the land.	No	--
4	Under Submission	Safety Clearance from Directorate of Electricity	No	--
5	Under Submission	Safety Clearance from Chief Controller of Explosives	No	--
6	Under Submission	Safety Clearance from Petroleum and Explosives Safety Organisation	No	--
7	Under Submission	Safety Clearance from Oil Industry Safety Directorate	No	--
8	Under Submission	Safety Clearance from State/Central Pollution Control Board	No	--
9	Under Submission	Any Other Statutory Clearance as applicable	No	--

Applicable Fee Details

Sno	Fee Head	Stage	Fee	Amount	Status
1	Utility Fees	Technical Approval	License Fees	0	

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Check List

S.No	Items	Information/Status	Remaks
1	General Information		
1.1	Name and Address of the Applicant / Agency	DGM MPMKVVCL, RAGHOGARH GUNA	
1.2	National Highway Number	NH-46	
1.3	State	MADHYA PRADESH	
1.4	Location	11 KV RAMDI FEEDER	
1.5	(Chainage in KM)	269+980 LHS , 269+980 RHS	
1.6	Length in Meters	60 m Acoss the Highway	
1.7	Width of avalible ROW	60m	
	a) Width Left side from center line	30m	
	b) Width Right side from center line	30m	
1.8	Proposal to lay undergrond Eletrical cable	Across the national highyway	
	a) Left side from the center line towards increasing chainage/ KM direction	-	
	b) Right side from the center line towards increasing chainage/ KM direction	-	
1.9	Proposal to aquire land	NA	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.11	Whether proposal is in the same side where land is not to be acquired	no arquistion of land required	
	If not then where to lay the pipelines	Across the national highyway	
1.12	Details of aready laid services,if any, along the proposed route	NA	
1.13	No of lanes (2/4/6/8 lanes)	4 lanes	
1.14	Services road existing or not	No services road exist	
	if yes then which side	No services road exist	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.15	Proposed service line		
	a) Left side from center line	-	
	b) Right side from center line	-	
1.16	Where proposed to lay eletrical pipeline is after the service road or between the service road and main carriageway	-	
1.17	Considered for approval / rejection based on the Ministry Circular mentioned as above	-	
	a) Carring of eletrical pipeline on Highway bridges shall not be permitted as eletrical pipes can accelerate the process of corrosion thus being much more injurious	NA	

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	b) Carrying of Eletrical pipelines on bridges shall also discouraged however if the Eletrical supply authorities seem to have no other viable alternative and approach the highway authority well in time before the design of the bridge in finalized they may be permitted to carrry the pipeline on independent super structure supported on extended portion of piers and abutments in such a manner that in the final arangement enough free spade around the super structure of the bridge remains available for inspection and repairs.	NA	
	c) Cost of required extension of the substructure as well as that of the supporting super structure shall be borne by the agency-in- charge of the utilities	NA	
	d) Services are not being allowed indiscriminately on the parapet/any of the bridges, safety of the bridge has to be kept in view while permitting various services along bridge. Appeovals to be accorded in this regard with the concurrence of the Ministries Project Cief Engineers only.	NA	
1.18	Whether crossing of the involved	Yes	
	If yes, it shall be either enclosed in pipes or through structure or conduits specially built for that purpose at the expensed of the agency owning the line.	Yes, Enclosed in pipes	
	a) Exiting drainage structure shall not be allowed to carry the lines	Yes	
	b) Is it on a line normal to NH	Yes	
	c)Crossing shall not to be too near the exixting structure on the national highway the minimum distance bring 15 meter	Yes more than 15 mtrs	
	d) The casing pipes carriying the utility lines shall be of steel, case, iron or reinforced cement concrete and have adequate strength and be large enough to permit ready with drawl of the carrier pipe/ cable.	Yes	
	e) Ends of the casing/conduit pipes shall be sealed from the outside so that it does not act as a drainage path.	Yes	
	f) The casing/ conduit pipe should as minimum extend from drain to drain in cutsand toe of the slope in the fills	Yes	

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	g) The top of the caing/ conduit pipe should be at least 1.20 meter below the surface of the road.	Yes	
	h) The casinf/conduit pipe shall be done by boring (HDD) or digging a trench. Installation by boring method shall be preferred.	Yes (HDD Method)	
2	Document/Drawing enclosed with proposal	Yes	
2.1	Cross section showing the size of trench for open trencing method (is it normal size of 1.2m x 0.3 wide)	NA	
	i) Should be greater that 60 cm wider than outer diameter of the pipe	NA	
	ii) Located as close to the extreme edge of the right 15 meter from the centre lines of the nearest carriageway.	NA	
	iii) Shall not be permitted to run along the national highways when the road formation is situated in double cutting. Nor shall these be laid over the existing culverts and bridges.	NA	
	iv) These should be so laid that their top is at least 0.6 meter below the ground level so as not to obstruct drainage of the road land.	NA	
2.2	Cross section showing the sixe pit and location of cable for HDD method	Yes	
2.3	Strip plan/ route plan showing Eletrical pipeline chainage, width of ROW, distance of proposed cable from the edge of ROW important mile stone, cross section etc.	Incorparated in the drawing	
2.4			
2.4.1	Open trenching method (may be allowed in utility corriod only where pave ment is neither cement concrete nor dense bituminous concrete type.. If yes, methodology of refilling of trench	NA	
	a)Trench width should be at least 30 cm but not more than 60 cm wider than the outer diameter of the pipe.	NA	
	b] For thefilling 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 yeild a firm surfacewithout sudden change in the bearing value unsuitable soi and rock edged should be excavated and replaced by selected material.	NA	

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	C) The side fill shall consist of granular material laid in 15 cm layers each consolidated by mechnival tampering and controlled addition of moisture of 95% of Proctor's Density. Over fill shall of compacted to the same density as the material that had been removed. Consolidation by saturation or pendingwill not be permitted.	NA	
	d) The road crust shall be built to the same strength as the existing crust on the either side of the trench care shall be taken to avoid the formation of a dip at the trench.	NA	
	e) The excavation shall be protected by flagman signs and barricades and red light during night hours.	NA	
	f) If Required a diversion shall be constructed at the expends of agency owing the utilityline.	NA	
1.2	Horizontal directional drilling (HDD) METHOD	yes	
3	Draft License Agreement signed by two witness	yes	
4	Performance bank guarantee in favor of NHAI has to be obtained @Rs 200/- per running meter (parallel to NH) and Rs100000/- per crossing of NH for a period of one year initially (extendable if required till satisfactory completion of work) as a security for ensuring /making good the excavated trench for laying the cables/ducts by proper filling and compaction clearing Debris/loose earth produced due to execution of trenching at least 50 m away from the edge of the right of way. No payment shall be payable by the NHAI to the license for clearing debris/loose, earth.		
4.1	Performance BG as per above is to be obtained	YES	
4.2	Confirmation of BG has been obtained as per NHAI guidelines	YES	
5	Affidavit/undertaking from the application	YES	
5.1	Not to damage to other utility if damaged than pay the losses either to NHAI or to the concerned agency	YES	
5.2	Renewal of Bank Guarantee	YES	
5.3	Confirming all standard condition of NHAI'S guideline	YES	
5.4	Shifting of Electrical supply pipe line as and when required by NHAI at their own cost	YES	

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5.5	Shifting due to 6 lanning/wedding of NII	YES	
5.6	Indemnity against all damages and alarms clause (xxiv)	YES	
5.7	Traffic movement during laying of Electrical supply 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 A	YES	
5.9	Prior approval of the NHAI shall be obtained before undertaking any work if installation shifting or repairs or alteration to the showing Electrical supply pipe line located in the National Highway rights or ways	YES	
5.10.	Expenditure if any incurred by NHAI for repairing any damage caused to the National Highway by the laying maintenance or shifting of the Electrical supply pipe line will be borne by the agency owing the line.	YES	
5.11	If the NHAI considers it necessary in future to move the utility line for any work of improvement or repairs to the road it will be carried out as desired by the NHAI at the cost of the agency owning the utility line within a reasonable time not exceeding 60 days) of the intimation given	YES	
5.12	Certified from the application in the following format	YES	
	i) laying of Electrical supply pipe line will not have any deleterious effects on any of the bridge components and roadway safety for traffic	YES	
	ii) for 6-lanning we do undertake that will relocate service road/ utility at my own cost notwithstanding the permission granted with such time as will be stipulated by NHAI for future six lanning or any other development.	YES	
6	Who will sign the agreement on behalf of Electrical supply pipe line agency?	DGM MPMKVVCL, RAGHOGARH GUNA	
7	Certified from the Project Director		
7.1	Certified for confirming of all standard condition issued vide ministry circular no. F.NO. RW/NH-33044/29/2015/S&R 22/11/2016 Dated	YES	

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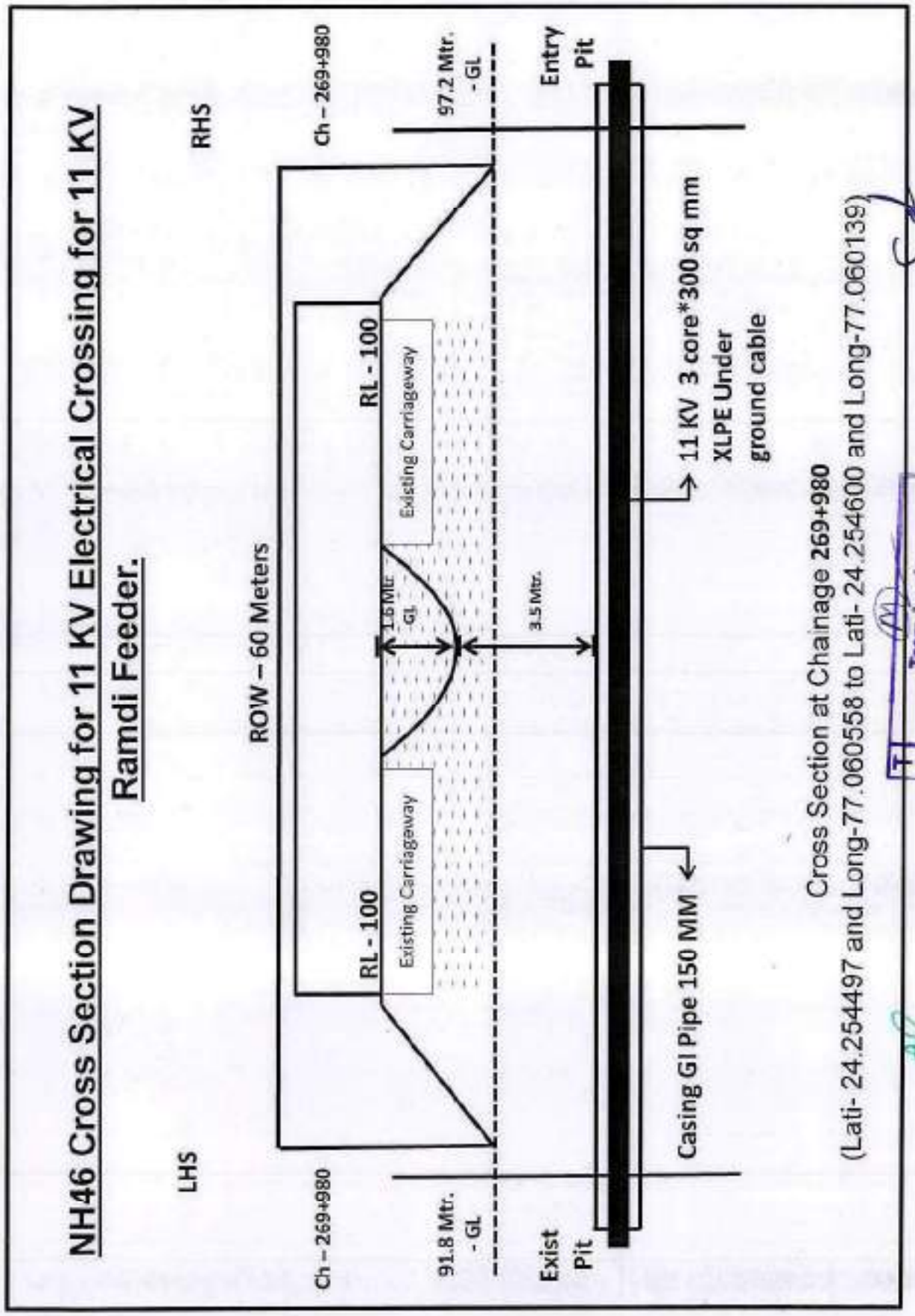
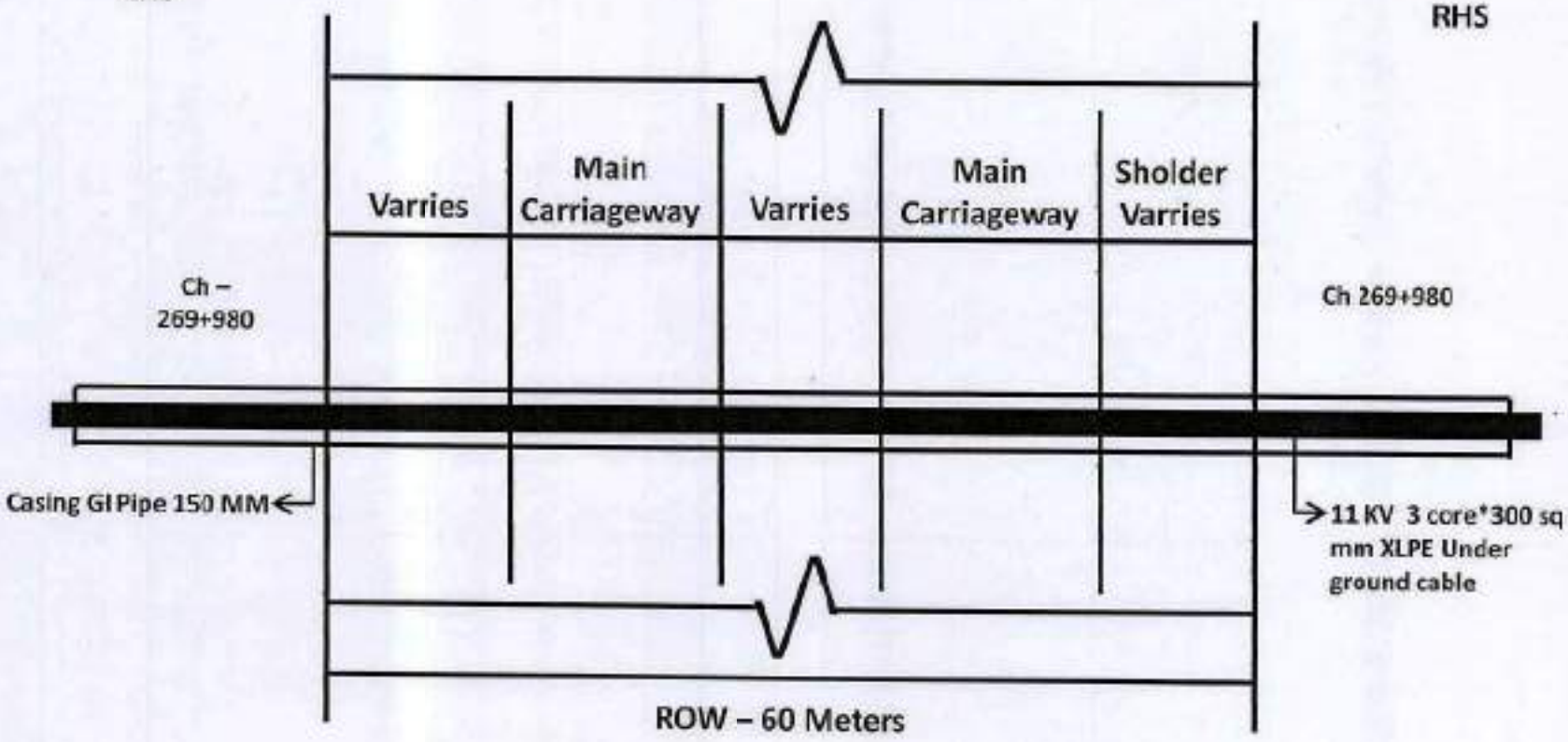
Project Director



Plan of Highway Crossing at NH46 for 11 KV Electrical Crossing for 11 KV Ramdi Feeder.



Cross Section at Chainage 269+980

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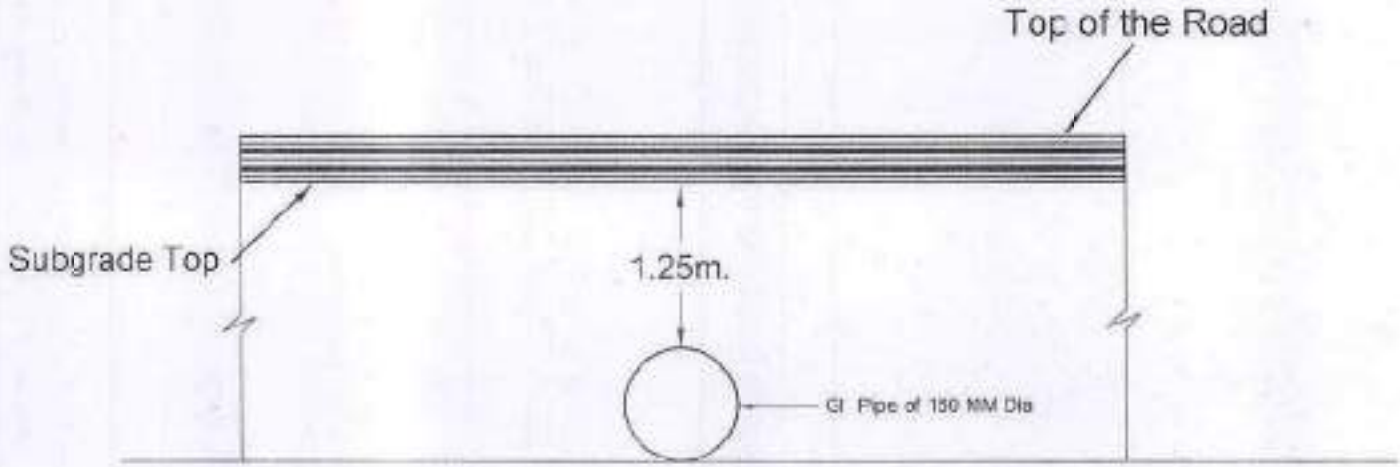
METHOD OF INSTALLATION OF CASING PIPE FOR CROSSING OF HIGHWAY



Cross section of HDD Crossing Pipe

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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 downhole 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 a 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.

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.

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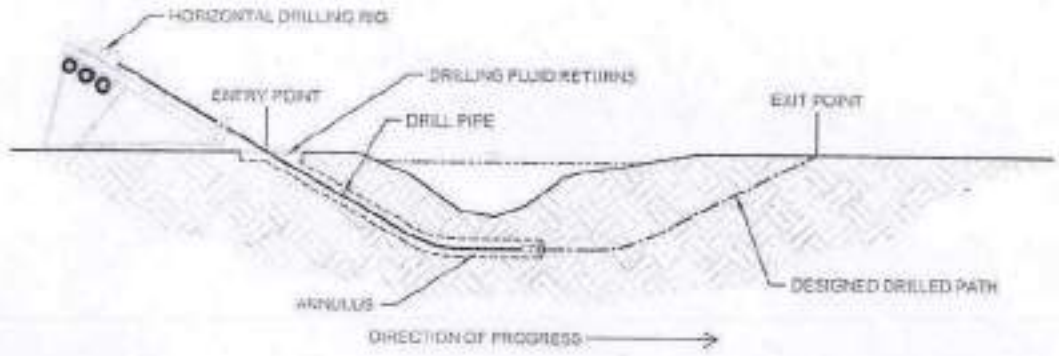
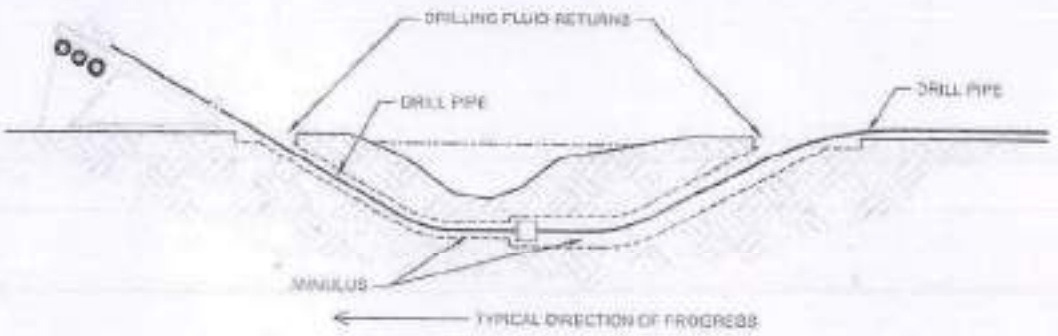
PILOT HOLE



PREREAMING



PULLBACK

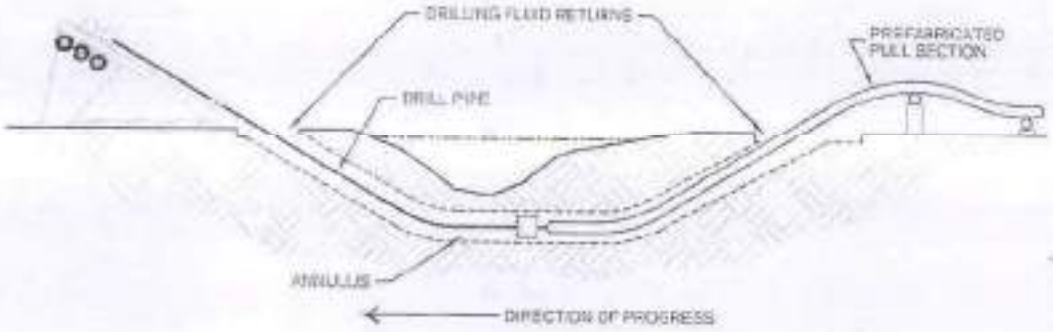


Figure 1
The HDD Process

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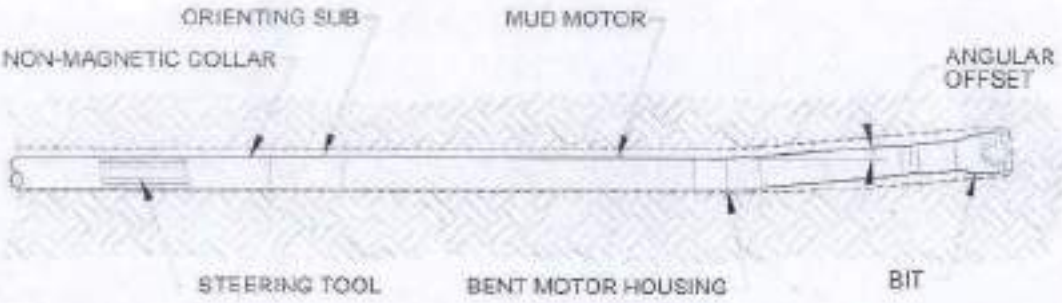

Figure 2
Bottom Hole Assembly

Downhole Motors

Downhole mechanical cutting action required for harder soils is provided by downhole hydraulic motors. Downhole 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 sinuscidal 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.

Downhole 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 downhole 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 downhole 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 downhole 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.

Surface Monitoring

The pilot hole path may also be tracked using a surface monitoring system. Surface monitoring systems determine the location of the probe downhole by taking measurements from a grid or point on the surface. An example of this is the TruTracker System. This system uses a surface coil of known location to induce a magnetic field. The probe senses its location relative to this

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induced magnetic field and communicates this information to the surface. This is shown schematically in Figure 3.

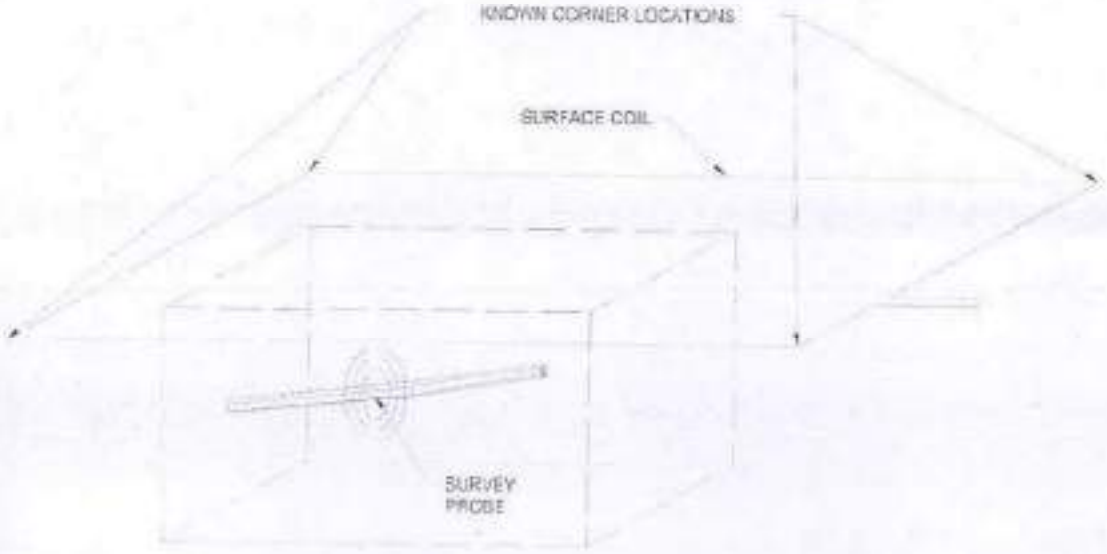

Figure 3
TruTracker Surface Monitoring System

Reaming & Pullback

Enlarging the pilot hole is accomplished using either prereaming 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.

Prereaming

Most contractors will opt to preream a pilot hole before attempting to install pipe. For a prereaming 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.

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 prereaming 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.

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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 breakover 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 a 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.

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Application Details [20241124/1/5/33029/12642]	
Highway	NH46 [NH46]
Name of Highway Authority	**NHAI** Dwarka New delhi
Highway Administration Address	**Regional Office- Jabalpur** Regional Office- Jabalpur
Whether the Fuel Station is part of Rest-area complex	No
Name of Applicant/Oil Company	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited Address: NEAR OF NAGAR PALIKA RAGHOGARH GUNA MADHYA PRADESH, GUNA (MADHYA PRADESH), PIN: 473226 Phn: 9406913711 Email: ANISHRAJPUT.CZ@MP.GOV.IN
Application Category	Public Utility
Utility	Pipes
State	MADHYA PRADESH
Type	New
Remarks	11 KV PATONDI FEEDER UNDER GROUND HIGHWAY CROSSING
Submitted On	18 Jun 2025 11:12:10

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Pvt. Ltd. Guna (M.P.)

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Details		
1. Length in Meters *		60
2. Width of available ROW		
I. Left side from center line towards increasing chainage OR km direction *		273.120
II. Right side from center line towards increasing chainage OR km direction *		273.120
3. Proposal to lay the utility		
I. Left side from center line towards increasing chainage OR km direction *		0
II. Right side from center line towards increasing chainage OR km direction *		0
4. Proposal to acquire the land		
I. Left side from center line *		0
II. Right side from center line *		0
5. Whether proposal is in the same side where land is not to be acquired *		No
If not then where to lay the cable *		NA HDD CROSSING
6. Details of already laid services if any along the proposed route *		N/A
7. Number of Existing lanes *		4 Lane
8. Proposed number of lanes *		4 Lane

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9. Service road Exists *		No
10. Proposed Service road		
Left side from center line		0
Right side from center line		0
11. Whether proposal to lay cable is after the service road or between the service road and main carriageway *		N/A
12. Whether carrying OFC Cable has been proposed on highway /bridges, If yes then mention the methodology proposed for the same *		N/A
13. Is crossing of the road involved? If Yes, is shall be either encased in pipes or through structure of conduits specially built for the purpose at the expense of the agency owing the line *		Yes, Enclosed in pipes
I. Whether the existing drainage structures are allowed to carry utility pipeline. *		N/A
II. Is it on a line normal to NH? *		No
III. What is the distance of crossing the utility pipelines from the existing structure? Crossings shall not be too near the existing structures on the National Highway, the minimum distance being 15 mtrs. *		0.00

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IV. The casing pipe (or conduit pipe in the case of electric cable) line carrying the utility line shall be of steel, cast iron or reinforced concrete and have adequate strength and be large enough to permit ready withdrawal of carrier pipe/cable Mention type of casting. *		Yes, GI PIPE
V. Ends of the casing/conduit pipe shall be sealed from outside, so that is does not act as a drainage path *		Yes
VI. The casing/conduit pipe should be as minimum extend from drain in cuts toe of slope in fills. *		Yes
VII. The installation of Casing pipe shall be as per attachment-1 of Ministry's Guidelines dated 22.11.2016 *		YES
VIII. Mention the methodology proposed for crossing of road for the proposed sewerage / gas pipeline crossing shall be boring method (HDD) (Trenchless Technology) specially where the existing road pavement is of cement concrete of dense bituminous concrete type. *		Yes (HDD Method)

14. Whether the proposal satisfies the following:

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P. Ltd. Dewas (M.P.)

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I. Where the ROW is more than 45 M then the duct cable shall be laid at the edge of right of way within the utility corridor of 2 M width, duly keeping in view the future widening. *		NA
II. Where land is yet to be acquired for 4 laning and the position of new carriageway has been decided then the cable shall be laid at the edge of right of way within the utility corridor of 2 M width, on that side of existing carriageway where extra land is not proposed to be acquired for 4 laning. *		N/A
III. Where the widening plan for 4 laning is not yet decided and available ROW is around 30 M or less, a judicious decision would need to be taken for permitting the laying of cable/duct. This could be within 1.5 M to 2m of utility corridor at the edge of existing ROW, duly keeping in view the possible widening plans. *		N/A

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IV. Where ROW is restricted and adequate only to accommodate the carriageway, central verge, shoulders and drains (e.g. Highways in cutting through hilly/rolling terrain), the cable shall be laid clear of the drain. *		N/A
V. Where land strip for utility corridor can't be conveniently earmarked (available ROW restricted to the toe of the embankment) for laying of cable/ducts, the permission may be refused. *		N/A
15. Document/Drawings enclosed with the proposal *		Yes
I. Cross section showing the size of trench for open trenching method (is it normal size of 1.2m (min.) deep x 0.3 wide) *		N/A
II. Cross section showing the size of pit and location of cable for HDD method *		YES
III. Strip plan/ Route plan showing the OFC, Chainage width of ROW, distance of proposed, cable from the edge of ROW, important mile stone, intersections, cross drainage works etc. *		Incorporated in the Drawing
IV. Methodology of laying of the Utility Pipeline/OFC *		Yes, Enclosed.

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Pvt. Ltd. Gurgaon (M.P.)

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V. 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 *		N/A
(a) The trench width should be at least 30 cms but not more than 60 cms wider than the outer diameter of the pipe *		N/A
(b) For filling of the trench, bedding shall be to a depth of not less than 30 cms. It shall consist of granular material, free of lumps, clods, cobbles and graded to yiled firm surface without sudden change in the bearing value, unsuitable soil and rock edges should be excavated and replaced by selected material *		N/A
(c) The backfill shall be completed in two stages, i) Side fill to the level of the top of the pipe and ii) Overfill to the bottom of the road crust *		N/A

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(d) The side fill shall consist of granular material laid in 15 cms, layers each consolidated by mechanical tampering and controlled addition of moisture to 95% of the proctor density. Overfill shall be compacted to the same density as the material that has been removed. *		N/A
(e) The road crust shall be built to the same strength as existing crust on either side of the trench. Care shall be taken to avoid the formation of a dip at the trench. *		N/A
(f) The excavation shall be protected by flagman, signs and barricades and red lights during night hours. *		N/A
(g) If required, a diversion shall be constructed at the expense of agency owing the utility line. *		N/A
VI. Horizontal Directional Drilling (HDD) Method *		YES
VII. Laying OFC through CD Works and Method of laying (Whether to be hung outside parapet). *		N/A
16. Draft license Agreement signed by two witnesses. *		Yes

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l. The license fee estimate as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016. *		Yes
17. Whether Performance Bank Guarantee is as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R, dated 22.11.2016. *		Yes
l. Confirmation of BG has been obtained as per MoRTH guidelines *		Yes
18. Affidavit/Undertaking from the Applicant for following is to be furnished		
a) Undertaking not to Damage to other utility, if damage then to pay the losses either to NHAI or the concerned agency. *		Yes
b) Undertaking Renewal of Bank Guarantee as and when asked by MoRTH. *		Yes
c) Undertaking Confirming all standard condition of Ministry's guidelines. *		Yes
d) Undertaking for indemnity against all damages and claims *		Yes
e) Undertaking for management of traffic movement during laying of utility line without hampering the traffic *		Yes

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f) Undertaking that if any claim is raised by the concessionaire/ contractor then the same has to be paid by the applicant. *		Yes
g) Undertaking that prior approval of the NHAI shall be obtained before undertaking any work of installation, shifting or repairs, or alteration to the utility located in the National Highway Right of Ways. *		Yes
h) Undertaking that expenditure is any incurred by NHAI for repairing any damage cause to the NH by laying, maintenance of shifting of the utility line will be borne by the applicant agency owing the line. *		Yes
i) Undertaking that text of the license deal is as per verbatim of format issued by MoRTH vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016 *		Yes
j) Undertaking for shifting of utility as and when asked by MoRTH/ NHAI. *		Yes
k) Certificate from the applicant in the following format		
l) We do undertake that I/we will relocate service road/approach road/utilities at my/our own cost not withstanding the permission granted within such time us will be stipulated by NHAI for future six laning or/any other development		

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19. Who will sign the agreement on behalf of Applicant agency? Power of Attorney to sign the agreement is available or not. *		DGM MPMKVVCL Raghogarh Guna
20. The Power of Attorney is in favour of authorized signatory? *		Yes

Locations

Sno	State	District	Highway /Stretch	Start Point	End Point	View
1	MADHYA PRADESH	GUNA	NH46 [NH46] (145.000-445.000) From Km: 273.12 To Km: 273.12	Chainage Point: 273.12 Lat: 24.228 Lng: 77.049	Chainage Point: 273.12 Lat: 24.228 Lng: 77.049	View

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Documents

Sno	Stage	Document	Mandatory	Action
1	Under Submission	Layout and Drawings	Yes	View
2	Under Submission	Any Other Supporting Document	No	--
3	Under Submission	Any Document to indicate commercial activities are allowed on the land.	No	--
4	Under Submission	Safety Clearance from Directorate of Electricity	No	--
5	Under Submission	Safety Clearance from Chief Controller of Explosives	No	--
6	Under Submission	Safety Clearance from Petroleum and Explosives Safety Organisation	No	--
7	Under Submission	Safety Clearance from Oil Industry Safety Directorate	No	--
8	Under Submission	Safety Clearance from State/Central Pollution Control Board	No	--
9	Under Submission	Any Other Statutory Clearance as applicable	No	--

Applicable Fee Details

Sno	Fee Head	Stage	Fee	Amount	Status
1	Utility Fees	Technical Approval	License Fees	792.00	

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Check List

S.No	Items	Information/Status	Remaks
1	General Information		
1.1	Name and Address of the Applicant / Agency	DGM MPMKVVCL, RAGHOGARH GUNA	
1.2	National Highway Number	NH-46	
1.3	State	MADHYA PRADESH	
1.4	Location	11 KV PATAUDI FEEDER	
1.5	(Chainage in KM)	273+120 LHS , 273+120 RHS	
1.6	Length in Meters	60 m Acoss the Highway	
1.7	Width of availble ROW	60m	
	a) Width Left side from center line	30m	
	b) Width Right side from center line	30m	
1.8	Proposal to lay undergrond Eletrical cable	Across the national highyway	
	a) Left side from the center line towards increasing chainage/ KM direction	-	
	b) Right side from the center line towards increasing chainage/ KM direction	-	
1.9	Proposal to aquire land	NA	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.11	Whether proposal is in the same side where land is not to be acquired	no acquistion of land required	
	If not then where to lay the pipelines	Across the national highyway	
1.12	Details of aready laid services,if any, along the proposed route	NA	
1.13	No of lanes (2/4/6/8 lanes)	4 lanes	
1.14	Services road existing or not	No services road exist	
	if yes then which side	No services road exist	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.15	Proposed service line		
	a) Left side from center line	-	
	b) Right side from center line	-	
1.16	Where proposed to lay eletrical pipeline is after the service road or between the service road and main carriageway	-	
1.17	Considered for approval / rejection based on the Ministry Circular mentioned as above	-	
	a) Carring of eletrical pipeline on Highway bridges shall not be permitted as eletrical pipes can accelerate the process of corrosion thus being much more injurious	NA	

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	b) Carrying of Eletrical pipelines on bridges shall also discouraged however if the Eletrical supply authorities seem to have no other viable alternative and approach the highway authority well in time before the design of the bridge in finalized they may be permitted to carrry the pipeline on independent super structure supported on extended portion of piers and abutments in such a manner that in the final arangement enough free spade around the super structure of the bridge remains available for inspection and repairs.	NA	
	c) Cost of required extension of the substructure as well as that of the supporting super structure shall be borne by the agency-in- charge of the utilities	NA	
	d) Services are not being allowed indiscriminately on the parapet/any of the bridges, safety of the bridge has to be kept in view while permitting various services along bridge. Appeovals to be accorded in this regard with the concurrence of the Ministries Project Clef Engineers only.	NA	
1.18	Whether crossing of the involved	Yes	
	If yes, it shall be either enclosed in pipes or through structure or conduits specially built for that purpose at the expensed of the agency owning the line.	Yes, Enclosed in pipes	
	a) Exiting drainage structure shall not be allowed to carry the lines	Yes	
	b) Is it on a line normal to NH	Yes	
	c)Crossing shall not to be too near the exixting structure on the national highway the minimum distance bring 15 meter	Yes more than 15 mtrs	
	d) The casing pipes carrlying the utility lines shall be of steel, case, iron or reinforced cement concrete and have adequate strength and be large enough to permit ready with drawl of the carrier pipe/ cable.	Yes	
	e) Ends of the casing/conduit pipes shall be sealed from the outside so that it does not act as a drainage path.	Yes	
	f) The casing/ conduit pipe should as minimum extend from drain to drain in cutsand toe of the slope in the fills	Yes	

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	g) The top of the caing/ conduit pipe should be at least 1.20 meter below the surface of the road.	Yes	
	h) The casinf/conduit pipe shall be done by boring (HDD) or digging a trench. Installation by boring method shall be preferred.	Yes (HDD Method)	
2	Document/Drawing enclosed with proposal	Yes	
2.1	Cross section showing the size of trench for open trencing method (is it normal size of 1.2m x 0.3 wide)	NA	
	i) Should be greater that 60 cm wider than outer diameter of the pipe	NA	
	ii) Located as close to the extreme edge of the right 15 meter from the centre lines of the nearest carriageway.	NA	
	iii) Shall not be permitted to run along the national highways when the road formation is situated in double cutting. Nor shall these be laid over the existing culverts and bridges.	NA	
	iv) These should be so laid that their top is at least 0.6 meter below the ground level so as not to obstruct drainage of the road land.	NA	
2.2	Cross section showing the sixe pit and location of cable for HDD method	Yes	
2.3	Strip plan/ route plan showing Eletrical pipeline chainage, width of ROW, distance of proposed cable from the edge of ROW important mile stone, cross section etc.	Incorparated in the drawing	
2.4			
2.4.1	Open trenching method (may be allowed in utility corriod only where pave ment is neither cement concrete nor dense bituminous concrete type.. If yes, methodology of refilling of trench	NA	
	a)Trench width should be at least 30 cm but not more than 60 cm wider than the outer diameter of the pipe.	NA	
	b) For thefilling 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 yeild a firm surfacewithout sudden change in the bearing value unsuitable soi and rock edged should be excavated and replaced by selected material.	NA	

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	C) The side fill shall consist of granular material laid in 15 cm layers each consolidated by mechnival tampering and controlled addition of moisture of 95% of Proctor's Density. Over fill shall of compacted to the same density as the material that had been removed. Consolidation by saturation or pendingwill not be permitted.	NA	
	d) The road crust shall be built to the same strength as the existing crust on the either side of the trench care shall be taken to avoid the formation of a dip at the trench.	NA	
	e) The excavation shall be protected by flagman signs and barricades and red light during night hours.	NA	
	f) If Required a diversion shall be constructed at the expends of agency owing the utilityline.	NA	
2.4.2	Horizontal directional drilling (HDD) METHOD	yes	
3	Draft License Agreement signed by two witness	yes	
4	Performance bank guarantee in favor of NHAI has to be obtained @Rs 200/- per running meter (parallel to NH) and Rs100000/- per crossing of NH for a period of one year initially (extendable if required till satisfactory completion of work) as a security for ensuring /making good the excavated trench for laying the cables/ducts by proper filling and compaction clearing Debris/loose earth produced due to execution of trenching at least 50 m away from the edge of the right of way. No payment shall be payable by the NHAI to the license for clearing debris/loose, earth.		
4.1	Performance BG as per above is to be obtained	YES	
4.2	Confirmation of BG has been obtained as per NHAI guidelines	YES	
5	Affidavit/undertaking from the application	YES	
5.1	Not to damage to other utility If damaged than pay the losses either to NHAI or to the concerned agency	YES	
5.2	Renewal of Bank Guarantee	YES	
5.3	Confirming all standard condition of NHAI'S guideline	YES	
5.4	Shifting of Electrical supply pipe line as and when required by NHAI at their own cost	YES	
5.5	Shifting due to 6 lanning/wedding of NH	YES	
5.6	Indemnity against all damages and alarms clause (xxiv)	YES	

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5.7	Traffic movement during laying of Electrical supply 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 A	YES	
5.9	Prior approval of the NHAI shall be obtained before undertaking any work if installation shifting or repairs or alteration to the showing Electrical supply pipe line located in the National Highway rights or ways	YES	
5.10.	Expenditure if any incurred by NHAI for repairing any damage caused to the National Highway by the laying maintenance or shifting of the Electrical supply pipe line will be borne by the agency owing the line.	YES	
11	If the NHAI considers it necessary in future to move the utility line for any work of improvement or repairs to the road it will be carried out as desired by the NHAI at the cost of the agency owning the utility line within a reasonable time not exceeding 60 days) of the intimation given	YES	
5.12	Certified from the application in the following format	YES	
	i) laying of Electrical supply pipe line will not have any deleterious effects on any of the bridge components and roadway safety for traffic	YES	
	ii) for 6-lanning we do undertake that will relocate service road/ utility at my own cost notwithstanding the permission granted with such time as will be stipulated by NHAI for future six lanning or any other development.	YES	
6	Who will sign the agreement on behalf of Electrical supply pipe line agency?	DGM MPMKVVCL, RAGHOGARH GUNA	
7	Certified from the Project Director		
7.1	Certified for confirming of all standard condition issued vide ministry circular no. F.NO. RW/NH-33044/29/2015/S&R 22/11/2016 Dated	YES	

Project Director
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T E S Team Leader Therne Engineering Services Pvt. Ltd. Guna (M.P.)

Manager (Tech.)
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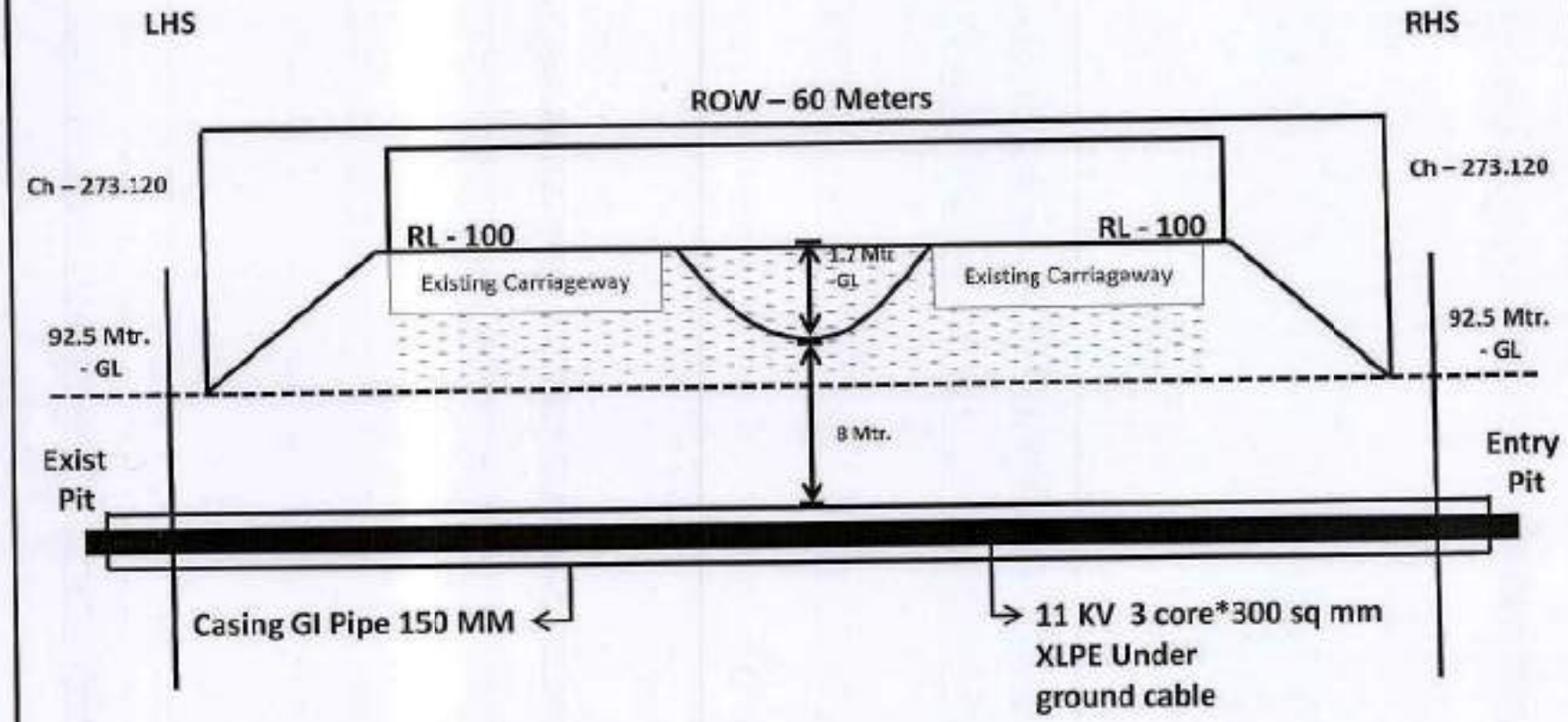
NH46 Cross Section Drawing for 11 KV Electrical Crossing for 11 KV Pataudi Feeder.



Cross Section at Chainage 273.120 (Lati- 24.228108 and Long-77.049403 to Lati- 24.228208 and Long-77.049025)

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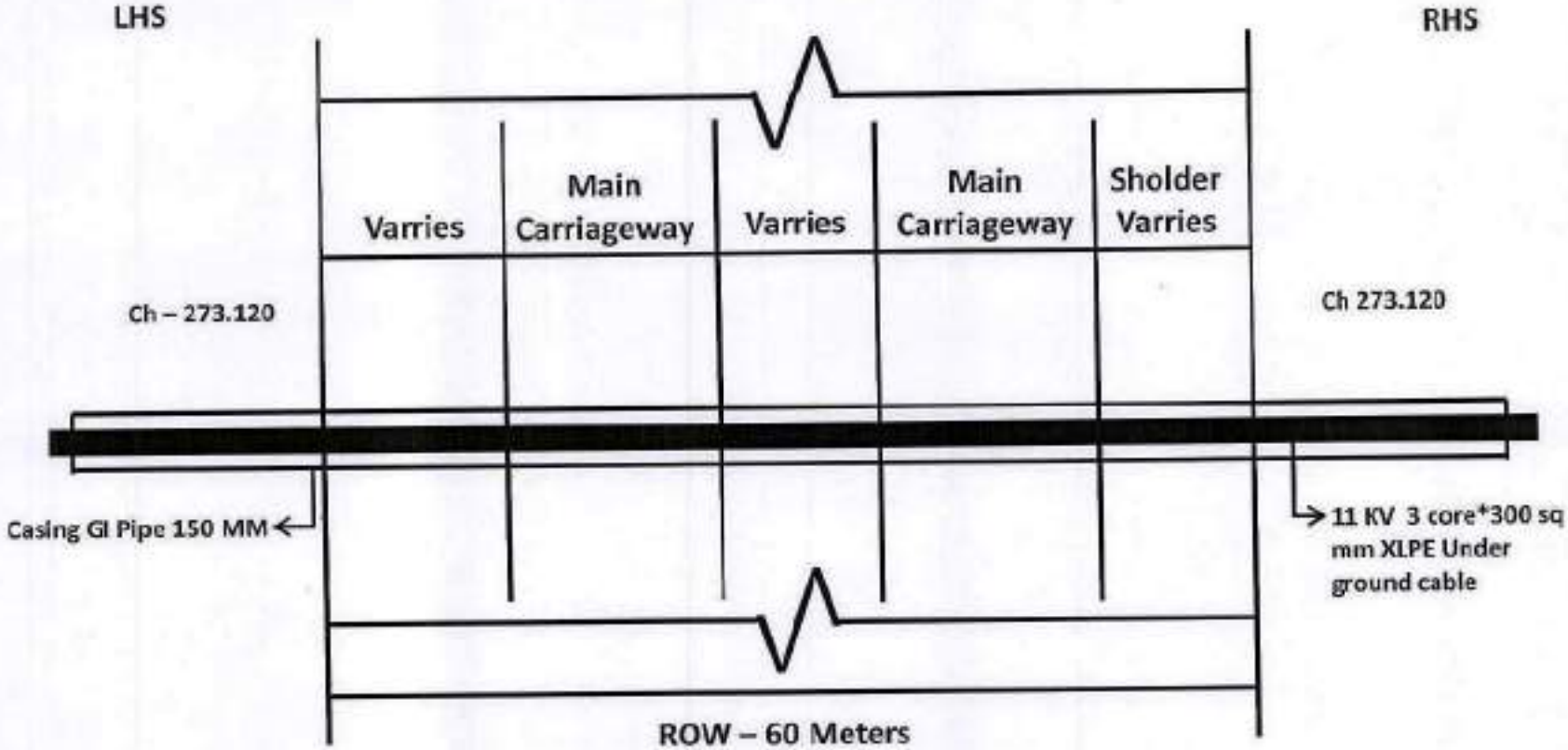
Plan of Highway Crossing at NH46 for 11 KV Electrical Crossing for 11 KV Pataudi Feeder.



Cross Section at Chainage 273.120

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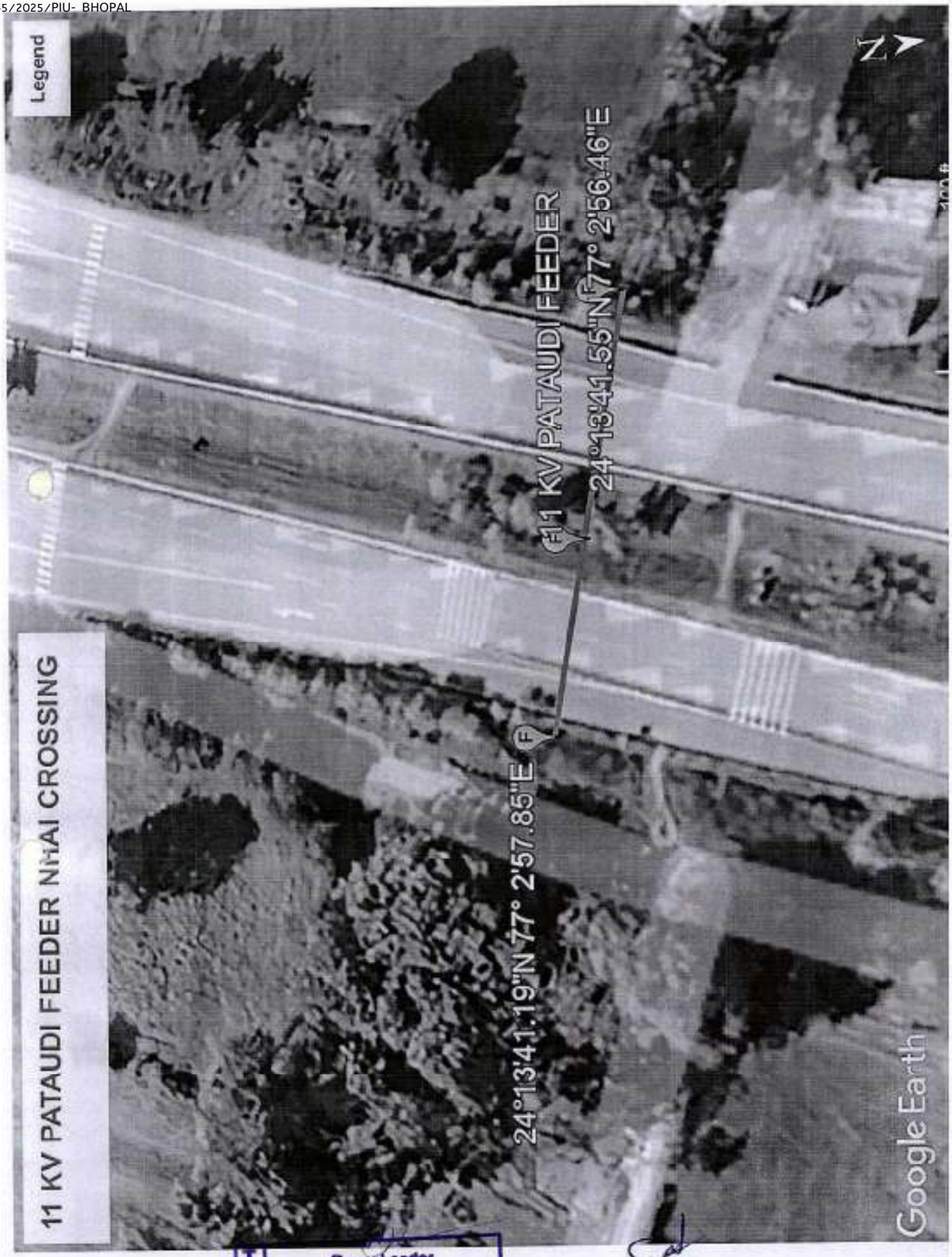

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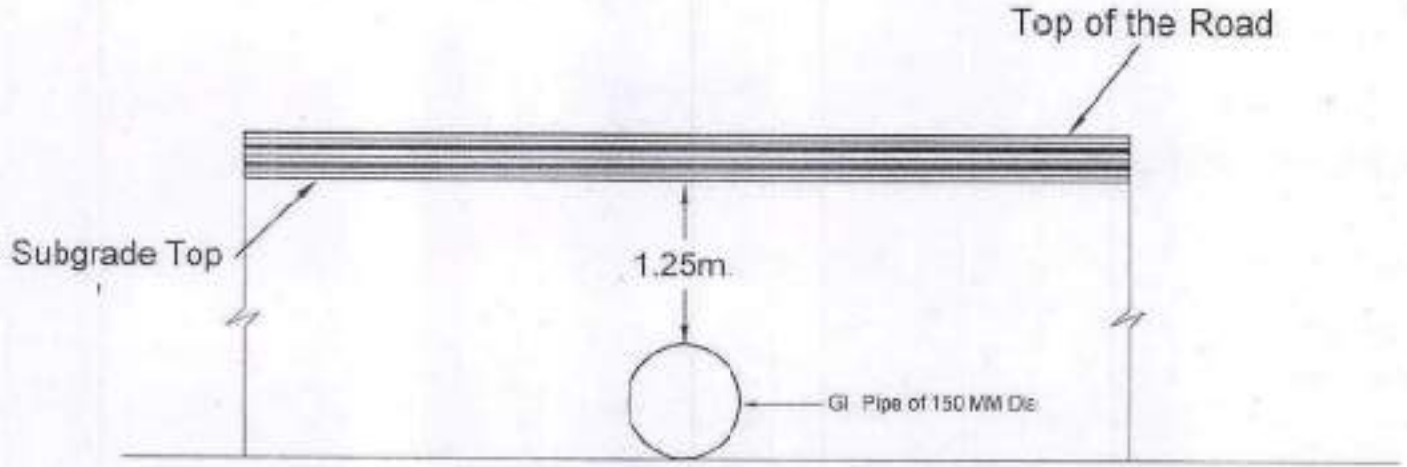
METHOD OF INSTALLATION OF CASING PIPE FOR CROSSING OF HIGHWAY



Cross section of HDD Crossing Pipe

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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 downhole 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 a 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.

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.

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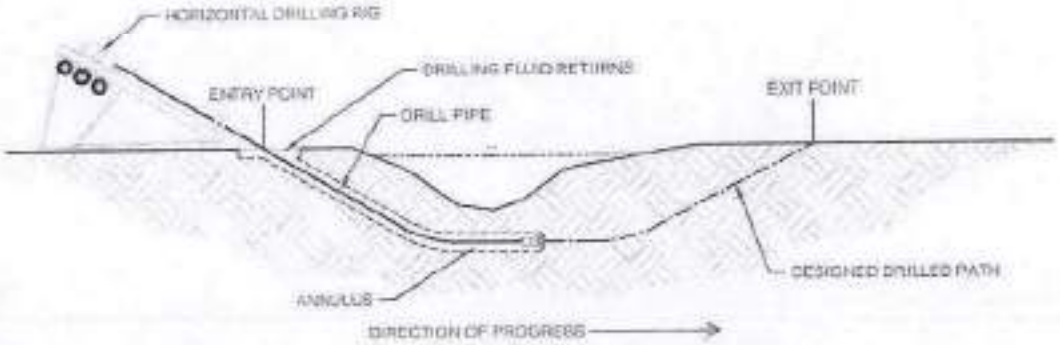
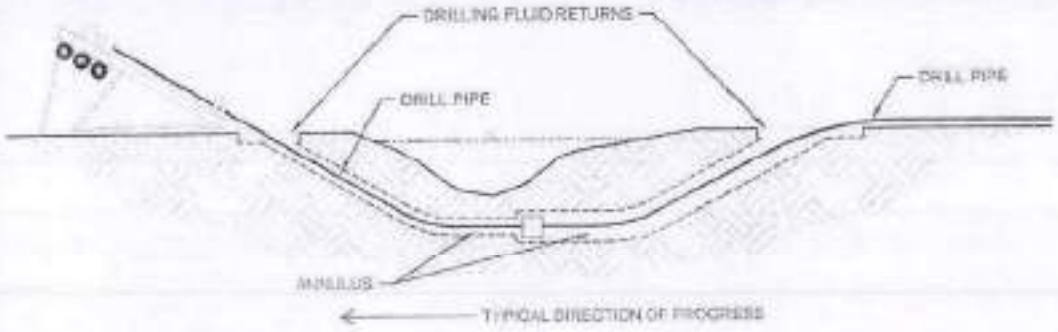
PILOT HOLE



PREREAMING



PULLBACK

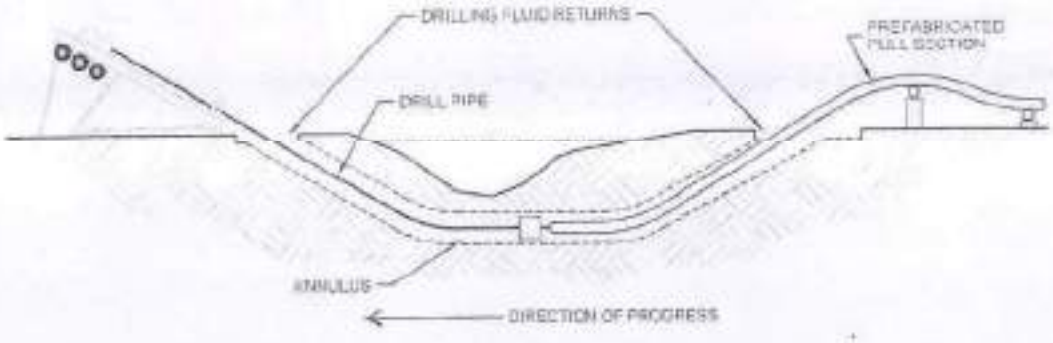


Figure 1
The HDD Process

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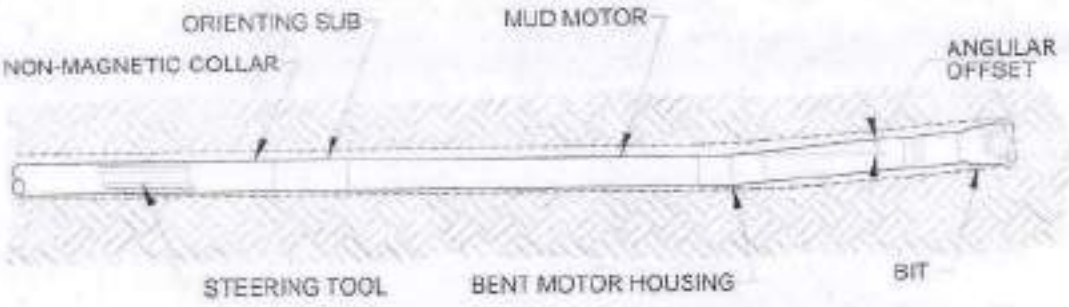

Figure 2
Bottom Hole Assembly

Downhole Motors

Downhole mechanical cutting action required for harder soils is provided by downhole hydraulic motors. Downhole 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.

Downhole 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 downhole 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 downhole 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 downhole 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.

Surface Monitoring

The pilot hole path may also be tracked using a surface monitoring system. Surface monitoring systems determine the location of the probe downhole by taking measurements from a grid or point on the surface. An example of this is the TruTracker System. This system uses a surface coil of known location to induce a magnetic field. The probe senses its location relative to this

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induced magnetic field and communicates this information to the surface. This is shown schematically in Figure 3.

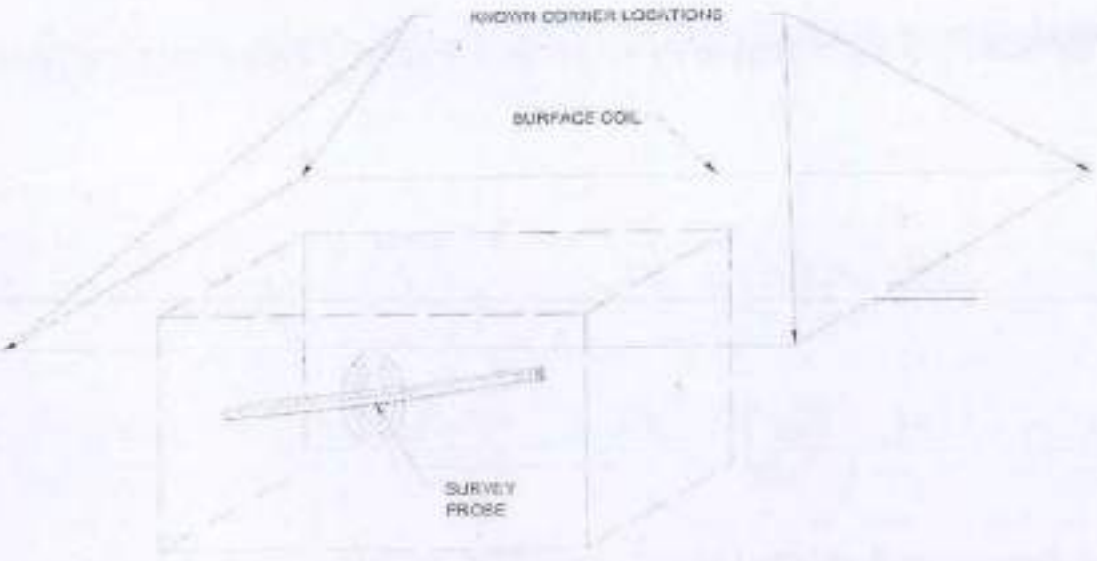

Figure 3
TruTracker Surface Monitoring System

Reaming & Pullback

Enlarging the pilot hole is accomplished using either prereaming 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.

Prereaming

Most contractors will opt to preream a pilot hole before attempting to install pipe. For a prereaming 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.

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 prereaming 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.

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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 breakover 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 a 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.

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Application Details [20241124/1/5/33029/12640]	
Highway	NH46 [NH46], NH46 [NH46]
Name of Highway Authority	**NHAI** Dwarka New delhi
Highway Administration Address	**Regional Office- Jabalpur** Regional Office- Jabalpur
Whether the Fuel Station is part of Rest-area complex	No
Name of Applicant/Oil Company	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited Address: NEAR OF NAGAR PALIKA RAGHOGARH GUNA MADHYA PRADESH, GUNA (MADHYA PRADESH), PIN: 473226 Phn: 9406913711 Email: ANISHRAJPUT.CZ@MP.GOV.IN
Application Category	Public Utility
Utility	Pipes
State	MADHYA PRADESH
Type	New
Remarks	11 KV AHIRKHEDI FEEDER UNDER GROUND HIGHWAY CROSSING
Submitted On	17 Jun 2025 18:41:12

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Details		
1. Length in Meters *		60
2. Width of available ROW		
I. Left side from center line towards increasing chainage OR km direction *		248.390
II. Right side from center line towards increasing chainage OR km direction *		248.390
3. Proposal to lay the utility		
I. Left side from center line towards increasing chainage OR km direction *		0
II. Right side from center line towards increasing chainage OR km direction *		0
4. Proposal to acquire the land		
I. Left side from center line *		0
II. Right side from center line *		0
5. Whether proposal is in the same side where land is not to be acquired *		No
If not then where to lay the cable *		NA HDD CROSSIN
6. Details of already laid services if any along the proposed route *		N/A
7. Number of Existing lanes *		4 Lane
8. Proposed number of lanes *		4 Lane

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9. Service road Exists *		No
10. Proposed Service road		
Left side from center line		0
Right side from center line		0
11. Whether proposal to lay cable is after the service road or between the service road and main carriageway *		N/A
12. Whether carrying OFC Cable has been proposed on highway /bridges, if yes then mention the methodology proposed for the same *		N/A
13. Is crossing of the road involved? If Yes, is shall be either encased in pipes or through structure of conduits specially built for the purpose at the expense of the agency owing the line *		YES Encased IN PIPES
I. Whether the existing drainage structures are allowed to carry utility pipeline. *		N/A
II. Is it on a line normal to NH? *		No
III. What is the distance of crossing the utility pipelines from the existing structure? Crossings shall not be too near the existing structures on the National Highway, the minimum distance being 15 mtrs. *		0.00

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IV. The casing pipe (or conduit pipe in the case of electric cable) line carrying the utility line shall be of steel, cast iron or reinforced concrete and have adequate strength and be large enough to permit ready withdrawal of carrier pipe/cable Mention type of casting. *		YES GI PIPE
V. Ends of the casing/conduit pipe shall be sealed from outside, so that is does not act as a drainage path *		YES
VI. The casing/conduit pipe should be as minimum extend from drain in cuts toe of slope in fills. *		YES
VII. The installation of Casing pipe shall be as per attachment-1 of Ministry's Guidelines dated 22.11.2016 *		YES
VIII. Mention the methodology proposed for crossing of road for the proposed sewerage / gas pipeline crossing shall be boring method (HDD) (Trenchless Technology) specially where the existing road pavement is of cement concrete of dense bituminous concrete type. *		YES (HDD METHOD)
14. Whether the proposal satisfies the following:		

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Theme Engineering Consultants
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I. Where the ROW is more than 45 M then the duct cable shall be laid at the edge of right of way within the utility corridor of 2 M width, duly keeping in view the future widening. *		N/A
II. Where land is yet to be acquired for 4 laning and the position of new carriageway has been decided then the cable shall be laid at the edge of right of way within the utility corridor of 2 M width, on that side of existing carriageway where extra land is not proposed to be acquired for 4 laning. *		N/A
III. Where the widening plan for 4 laning is not yet decided and available ROW is around 30 M or less, a judicious decision would need to be taken for permitting the laying of cable/duct. This could be within 1.5 M to 2m of utility corridor at the edge of existing ROW, duly keeping in view the possible widening plans. *		N/A

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IV. Where ROW is restricted and adequate only to accommodate the carriageway, central verge, shoulders and drains (e.g. Highways in cutting through hilly/rolling terrain), the cable shall be laid clear of the drain. *		N/A
V. Where land strip for utility corridor can't be conveniently earmarked (available ROW restricted to the toe of the embankment) for laying of cable/ducts, the permission may be refused. *		N/A
15. Document/Drawings enclosed with the proposal *		Yes
I. Cross section showing the size of trench for open trenching method (is it normal size of 1.2m (min.) deep x 0.3 wide) *		N/A
II. Cross section showing the size of pit and location of cable for HDD method *		YES
III. Strip plan/ Route plan showing the OFC, Chainage width of ROW, distance of proposed, cable from the edge of ROW, important mile stone, intersections, cross drainage works etc. *		INCORPORATED IN THE DRAWING
IV. Methodology of laying of the Utility Pipeline/OFC *		YES ENCLOSED

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V. 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 *		N/A
(a) The trench width should be at least 30 cms but not more than 60 cms wider than the outer diameter of the pipe *		N/A
(b) For filling of the trench, bedding shall be to a depth of not less than 30 cms. It shall consist of granular material, free of lumps, clods, cobbles and graded to yiled firm surface without sudden change in the bearing value, unsuitable soil and rock edges should be excavated and replaced by selected material *		N/A
(c) The backfill shall be completed in two stages, i) Side fill to the level of the top of the pipe and ii) Overfill to the bottom of the road crust *		N/A

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(d) The side fill shall consist of granular material laid in 15 cms, layers each consolidated by mechanical tampering and controlled addition of moisture to 95% of the proctor density. Overfill shall be compacted to the same density as the material that has been removed. *		N/A
(e) The road crust shall be built to the same strength as existing crust on either side of the trench. Care shall be taken to avoid the formation of a dip at the trench. *		N/A
(f) The excavation shall be protected by flagman, signs and barricades and red lights during night hours. *		N/A
(g) If required, a diversion shall be constructed at the expense of agency owing the utility line. *		N/A
VI. Horizontal Directional Drilling (HDD) Method *		YES
VII. Laying OFC through CD Works and Method of laying (Whether to be hung outside parapet). *		N/A
16. Draft license Agreement signed by two witnesses. *		YES

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l. The license fee estimate as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016. *		YES
17. Whether Performance Bank Guarantee is as per Ministry's guidelines issued vide circular no. RW/NH/33044/29/2015/S&R, dated 22.11.2016. *		Yes
l. Confirmation of BG has been obtained as per MoRTH guidelines *		Yes
18. Affidavit/Undertaking from the Applicant for following is to be furnished		
a) Undertaking not to Damage to other utility, if damage then to pay the losses either to NHAI or the concerned agency. *		Yes
b) Undertaking Renewal of Bank Guarantee as and when asked by MoRTH. *		Yes
c) Undertaking Confirming all standard condition of Ministry's guidelines. *		Yes
d) Undertaking for indemnity against all damages and claims *		Yes
e) Undertaking for management of traffic movement during laying of utility line without hampering the traffic *		Yes

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f) Undertaking that if any claim is raised by the concessionaire/ contractor then the same has to be paid by the applicant. *		Yes
g) Undertaking that prior approval of the NHAI shall be obtained before undertaking any work of installation, shifting or repairs, or alteration to the utility located in the National Highway Right of Ways. *		Yes
h) Undertaking that expenditure is any incurred by NHAI for repairing any damage cause to the NH by laying, maintenance of shifting of the utility line will be borne by the applicant agency owing the line. *		Yes
i) Undertaking that text of the license deal is as per verbatim of format issued by MoRTH vide circular no. RW/NH/33044/29/2015/S&R dated 22.11.2016 *		Yes
j) Undertaking for shifting of utility as and when asked by MoRTH/ NHAI. *		Yes
k) Certificate from the applicant in the following format		
l) We do undertake that I/we will relocate service road/approach road/utilities at my/our own cost not withstanding the permission granted within such time us will be stipulated by NHAI for future six laning or/any other development		

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19. Who will sign the agreement on behalf of Applicant agency? Power of Attorney to sign the agreement is available or not. *		DGM MPMKVVCL RAGHOGARH GUNA
20. The Power of Attorney is in favour of authorized signatory? *		Yes

Locations

Sno	State	District	Highway /Stretch	Start Point	End Point	View
1	MADHYA PRADESH	GUNA	NH46 [NH46] (145.000-445.000) From Km: 248.39 To Km: 248.39	Chainage Point: 248.39 Lat: 24.426 Lng: 77.152	Chainage Point: 248.39 Lat: 24.426 Lng: 771152.00	View
2	MADHYA PRADESH	GUNA	NH46 [NH46] (145.000-445.000) From Km: 248.39 To Km: 248.39	Chainage Point: 248.39 Lat: 24.426 Lng: 77.152	Chainage Point: 248.39 Lat: 24.426 Lng: 77.152	View

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Documents

Sno	Stage	Document	Mandatory	Action
1	Under Submission	Layout and Drawings	Yes	View
2	Under Submission	Any Other Supporting Document	No	--
3	Under Submission	Any Document to indicate commercial activities are allowed on the land.	No	--
4	Under Submission	Safety Clearance from Directorate of Electricity	No	--
5	Under Submission	Safety Clearance from Chief Controller of Explosives	No	--
6	Under Submission	Safety Clearance from Petroleum and Explosives Safety Organisation	No	--
7	Under Submission	Safety Clearance from Oil Industry Safety Directorate	No	--
8	Under Submission	Safety Clearance from State/Central Pollution Control Board	No	--
9	Under Submission	Any Other Statutory Clearance as applicable	No	--

Applicable Fee Details

Sno	Fee Head	Stage	Fee	Amount	Status
1	Utility Fees	Technical Approval	License Fees	0	

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TES Team Leader Theme Engineering Services Pvt. Ltd. Guna (M.P.)

Check List

S.No	Items	Information/Status	Remaks
1	General Information		
1.1	Name and Address of the Applicant / Agency	DGM MPMKVVCL, RAGHOGARH GUNA	
1.2	National Highway Number	NH-46	
1.3	State	MADHYA PRADESH	
1.4	Location	11 KV AHIRKHEDI FEEDER	
1.5	(Chainage in KM)	248+390 LHS , 248+390 RHS	
1.6	Length in Meters	60 m Acoss the Highway	
1.7	Width of avalible ROW	60m	
	a) Width Left side from center line	30m	
	b) Width Right side from center line	30m	
1.8	Proposal to lay undergrond Eletrical cable	Across the national highyway	
	a) Left side from the center line towards increasing chainage/ KM direction	-	
	b) Right side from the center line towards increasing chainage/ KM direction	-	
1.9	Proposal to aquire land	NA	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.11	Whether proposal is in the same side where land is not to be acquired	no acquistion of land required	
	If not then where to lay the pipelines	Across the national highyway	
1.12	Details of aready laid services,If any, along the proposed route	NA	
1.13	No of lanes (2/4/6/8 lanes)	4 lanes	
1.14	Services road existing or not	No services road exist	
	If yes then which side	No services road exist	
	a) Left side from center line	NA	
	b) Right side from center line	NA	
1.15	Proposed service line		
	a) Left side from center line	-	
	b) Right side from center line	-	
1.16	Where proposed to lay eletrical pipeline is after the service road or between the service road and main carriageway	-	
1.17	Considered for approval / rejection based on the Ministry Circular mentioned as above	-	
	a) Carring of eletrical pipeline on Highway bridges shall not be permitted as eletrical pipes can accelerate the process of corrosion thus being much more injurious	NA	

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	b) Carrying of Eletrical pipelines on bridges shall also discouraged however if the Eletrical supply authorities seem to have no other viable alternative and approach the highway authority well in time before the design of the bridge in finalized they may be permitted to carry the pipeline on independent super structure supported on extended portion of piers and abutments in such a manner that in the final arangement enough free spade around the super structure of the bridge remains available for inspection and repairs.	NA	
	c) Cost of required extension of the substructure as well as that of the supporting super structure shall be borne by the agency in- charge of the utilities	NA	
	d) Services are not being allowed indiscriminately on the parapet/any of the bridges, safety of the bridge has to be kept in view while permitting various services along bridge. Appeovals to be accorded in this regard with the concurrence of the Ministries Project Clef Engineers only.	NA	
1.18	Whether crossing of the involved	Yes	
	If yes, it shall be either enclosed in pipes or through structure or conduits specially built for that purpose at the expensed of the agency owning the line.	Yes. Enclosed in pipes	
	a) Exiting drainage structure shall not be allowed to carry the lines	Yes	
	b) Is it on a line normal to NH	Yes	
	c)Crossing shall not to be too near the exixting structure on the national highway the minimum distance bring 15 meter	Yes more than 15 mtrs	
	d) The casing pipes carriying the utility lines shall be of steel, case, iron or reinforced cement concrete and have adequate strength and be large enough to permit ready with drawl of the carrier pipe/ cable.	Yes	
	e) Ends of the casing/conduit pipes shall be sealed from the outside so that it does not act as a drainage path.	Yes	
	f) The casing/ conduit pipe should as minimum extend from drain to drain in cutsand toe of the slope in the fills	Yes	
	g) The top of the caing/ conduit pipe should be at least 1.20 meter below the surface of the road.	Yes	
	h) The casinf/conduit pipe shall be done by boring (HDD) or digging a trench. Installation by boring method shall be preferred.	Yes (HDD Method)	

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2	Document/Drawing enclosed with proposal	Yes	
2.1	Cross section showing the size of trench for open trencing method (is it normal size of 1.2m x 0.3 wide)	NA	
	i] Should be greater that 60 cm wider than outer diameter of the pipe	NA	
	ii) Located as close to the extreme edge of the right 15 meter from the centre lines of the nearest carriageway.	NA	
	iii) Shall not be permitted to run along the national highways when the road formation is situated in double cutting. Nor shall these be laid over the existing culverts and bridges.	NA	
	iv) These should be so laid that their top is at least 0.6 meter below the ground level so as not to obstruct drainage of the road land.	NA	
2.2	Cross section showing the sixe pit and location of cable for HDD method	Yes	
2.3	Strip plan/ route plan showing Eletrical pipeline chainage, width of ROW, distance of proposed cable from the edge of ROW important mile stone, cross section etc.	Incorparated in the drawing	
2.4			
2.4.1	Open trenching method (may be allowed in utility corriod only where pave ment is neither cement concrete nor dense bituminous concrete type.. if yes, methodology of refilling of trench	NA	
	a)Trench width should be at least 30 cm but not more than 60 cm wider than the outer diameter of the pipe.	NA	
	b) For thefilling 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 yeild a firm surfacewithout sudden change in the bearing value unsuitable soi and rock edged should be excavated and replaced by selected material.	NA	
	C) The side fill shall consist of granular material laid in 15 cm layers each consolidated by mechnival tampering and controlled addition of moisture of 95% of Proctor's Density. Over fill shall of compacted to the same density as the material that had been removed. Consolidation by saturation or pendingwill not be permitted.	NA	

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	d) The road crust shall be built to the same strength as the existing crust on the either side of the trench care shall be taken to avoid the formation of a dip at the trench.	NA	
	e) The excavation shall be protected by flagman signs and barricades and red light during night hours.	NA	
	f) If Required a diversion shall be constructed at the expends of agency owing the utilityline.	NA	
2.4.2	Horizontal directional drilling (HDD) METHOD	yes	
3	Draft License Agreement signed by two witness	yes	
4	Performance bank guarantee in favor of NHAI has to be obtained @Rs 200/- per running meter (parallel to NH) and Rs100000/- per crossing of NH for a period of one year initially (extendable if required till satisfactory completion of work) as a security for ensuring /making good the excavated trench for laying the cables/ducts by proper filling and compaction clearing Debris/loose earth produced due to execution of trenching at least 50 m away from the edge of the right of way. No payment shall be payable by the NHAI to the license for clearing debris/loose, earth.		
4.1	Performance BG as per above is to be obtained	YES	
4.2	Confirmation of BG has been obtained as per NHAI guidelines	YES	
5	Affidavit/undertaking from the application	YES	
5.1	Not to damage to other utility If damaged than pay the losses either to NHAI or to the concerned agency	YES	
5.2	Renewal of Bank Guarantee	YES	

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5.3	Confirming all standard condition of NHAI'S guideline	YES	
5.4	Shifting of Electrical supply pipe line as and when required by NHAI at their own cost	YES	
5.5	Shifting due to 6 lanning/wedding of NII	YES	
5.6	Indemnity against all damages and alarms clause (xxiv)	YES	
5.7	Traffic movement during laying of Electrical supply 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 A	YES	
5.9	Prior approval of the NHAI shall be obtained before undertaking any work if installation shifting or repairs or alteration to the showing Electrical supply pipe line located in the National Highway rights or ways	YES	
5.10.	Expenditure if any incurred by NHAI for repairing any damage caused to the National Highway by the laying maintenance or shifting of the Electrical supply pipe line will be borne by the agency owing the line.	YES	
5.11	If the NHAI considers it necessary in future to move the utility line for any work of improvement or repairs to the road it will be carried out as desired by the NHAI at the cost of the agency owning the utility line within a reasonable time not exceeding 60 days) of the intimation given	YES	
5.12	Certified from the application in the following format	YES	
	i) laying of Electrical supply pipe line will not have any deleterious effects on any of the bridge components and roadway safety for traffic	YES	
	ii) for 6-lanning we do undertake that will relocate service road/ utility at my own cost notwithstanding the permission granted with such time as will be stipulated by NHAI for future six lanning or any other development.	YES	
6	Who will sign the agreement on behalf of Electrical supply pipe line agency?	DGM MPMKVVCL, RAGHOGARH GUNA	
7	Certified from the Project Director		
7.1	Certified for confirming of all standard condition issued vide ministry circular no. F.NO. RW/NH-33044/29/2015/S&R 22/11/2016 Dated	YES	

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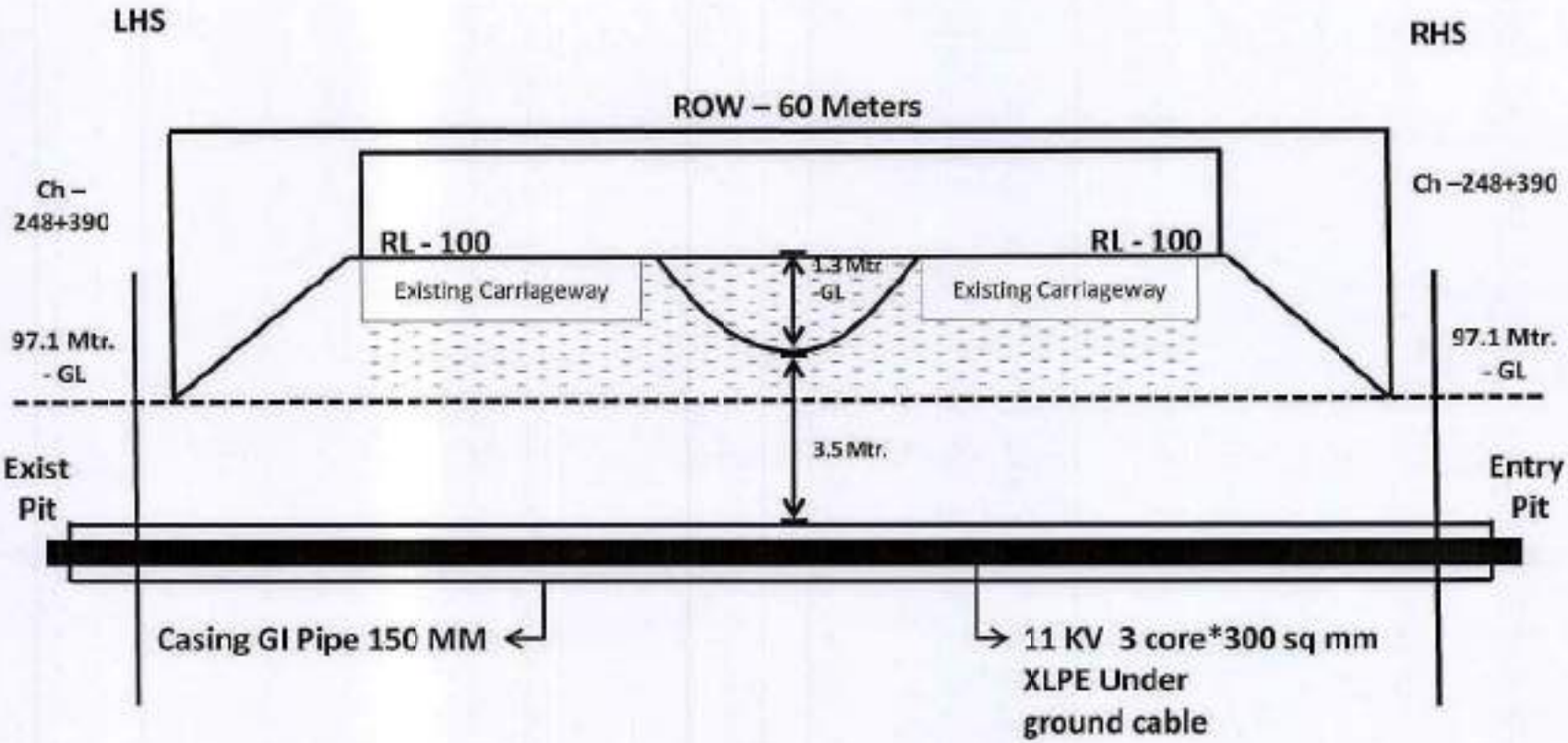
Team Leader
Thems Environment Services
Pvt Ltd. Guna (M.P.)

Project Director
NHAI PIU-Bhopal (M.P.)

NH46 Cross Section Drawing for 11 KV Electrical Crossing for 11 KV Ahirkhedi Feeder.



Cross Section at Chainage 247 to 248 (Lati- 24.426321 and Long-77.152775 to Lati- 24.426527 and Long-77.152344)

Team Leader Engineering Services M/s L&T Gurgaon (M.P.)

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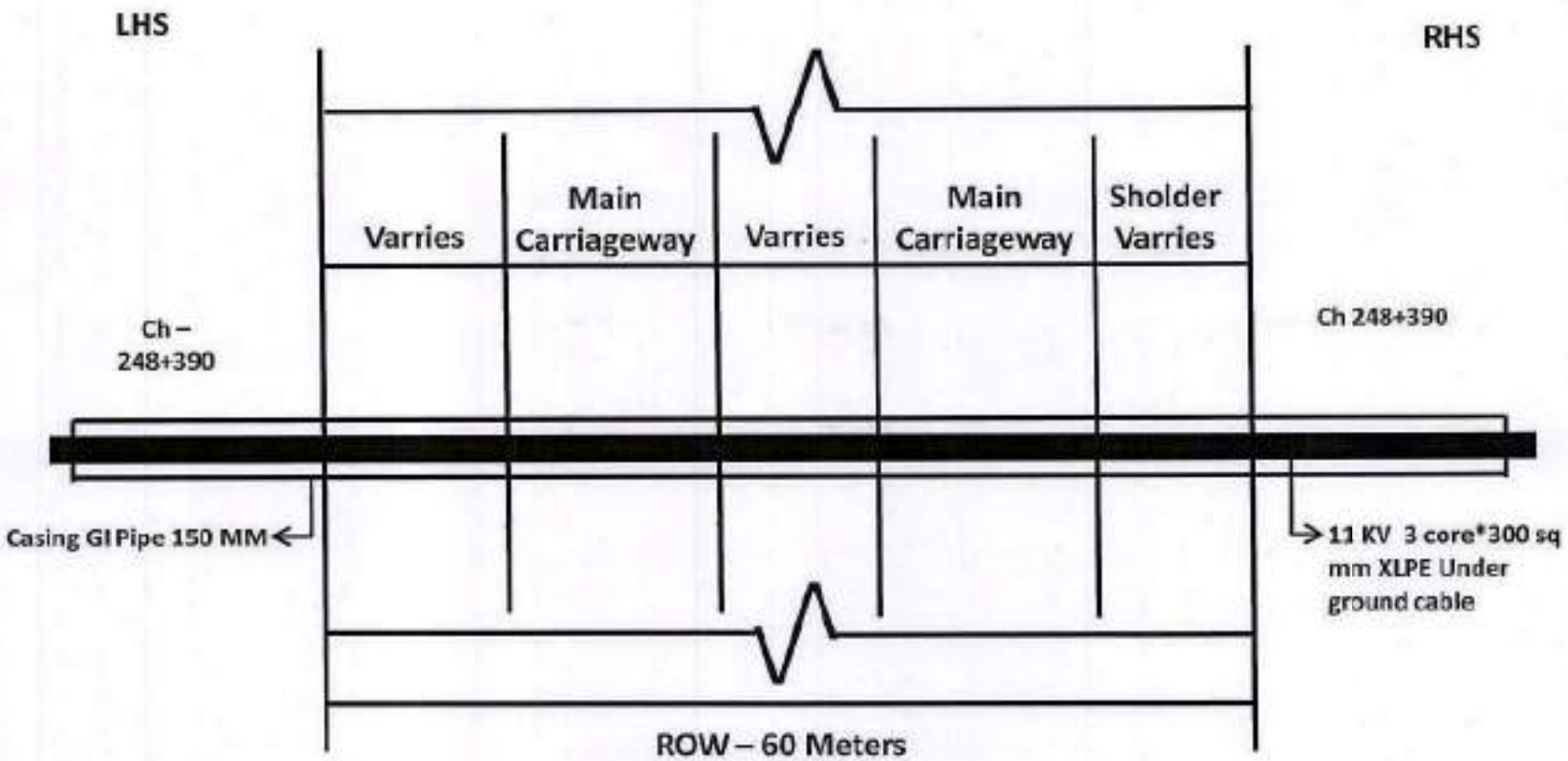
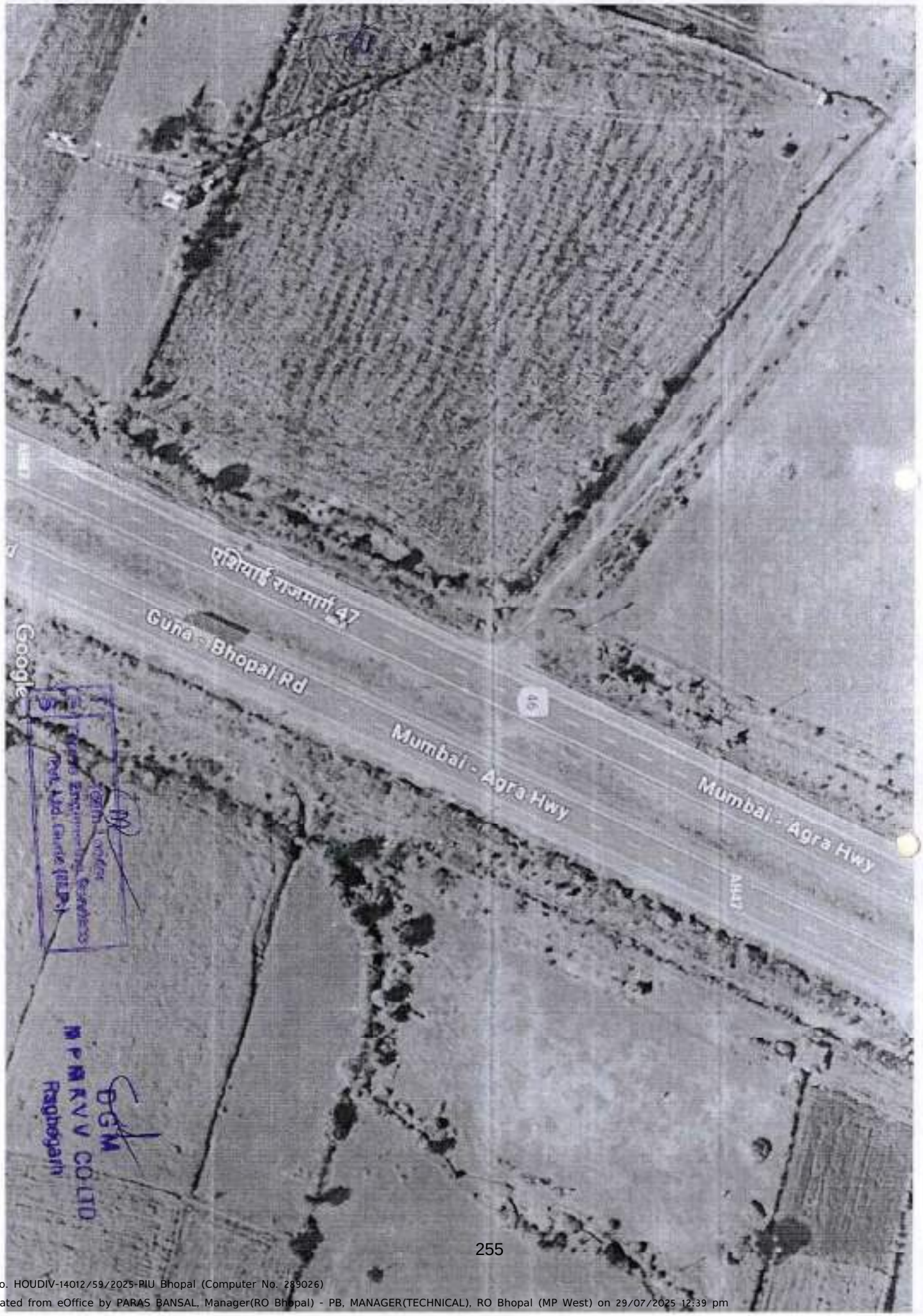
Plan of Highway Crossing at NH46 for 11 KV Electrical Crossing for 11 KV Ahirkhedi Feeder.



Cross Section at Chainage 248+390 to 248+390


एशियाई राजमार्ग 47
Guna - Bhopal Rd
Mumbai - Agra Hwy
Mumbai - Agra Hwy
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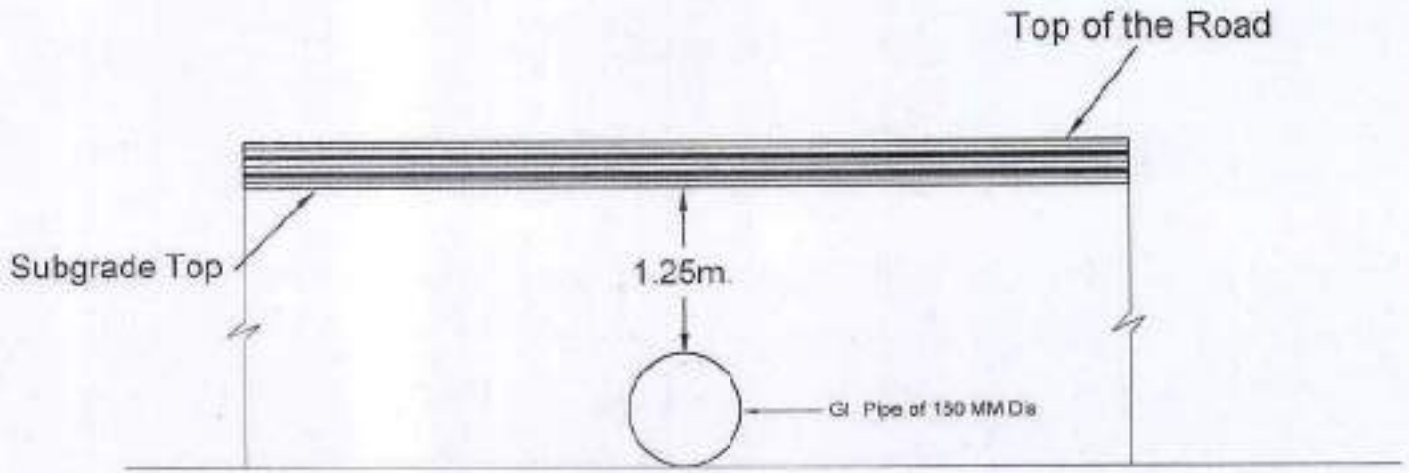
METHOD OF INSTALLATION OF CASING PIPE FOR CROSSING OF HIGHWAY



Cross section of HDD Crossing Pipe

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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 downhole 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 a 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.

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.

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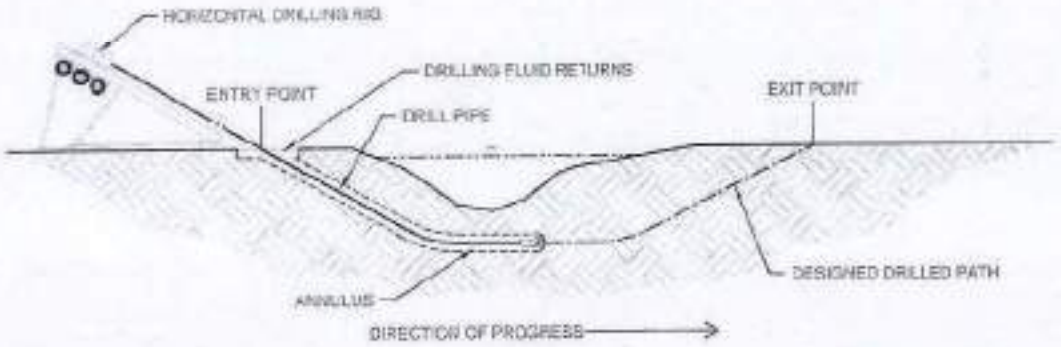
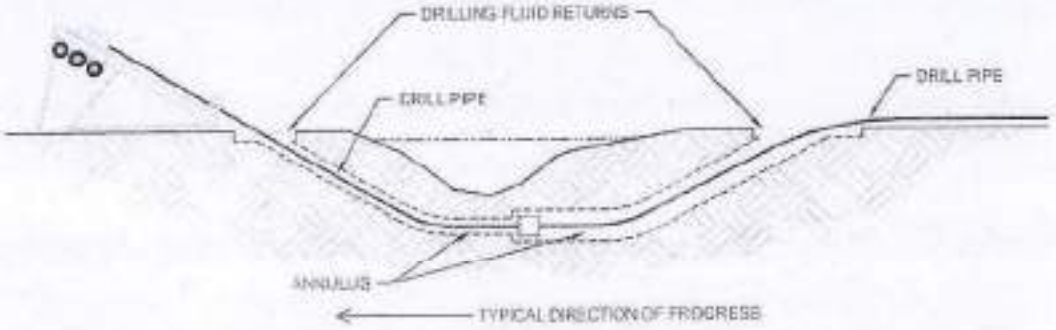
PILOT HOLE



PREREAMING



PULLBACK

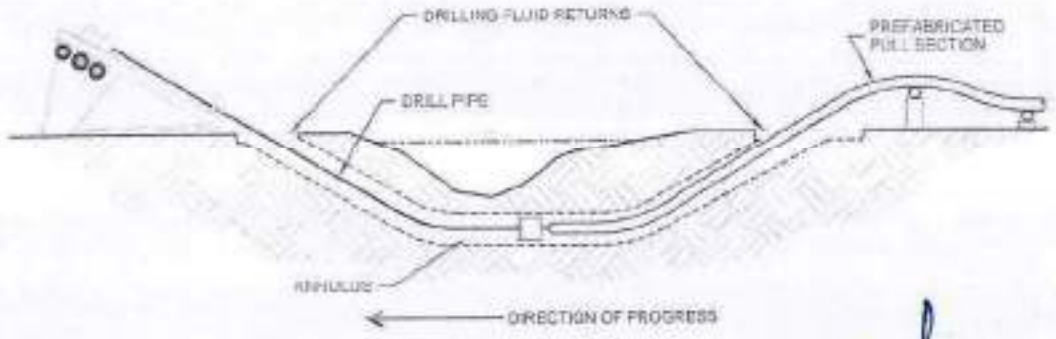


Figure 1
The HDD Process

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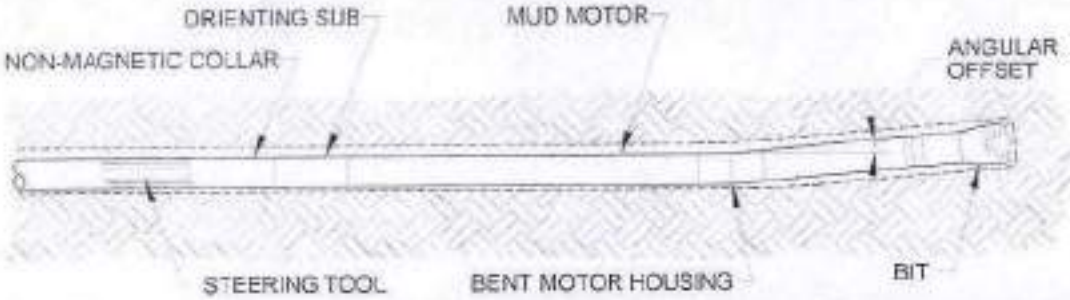

Figure 2
Bottom Hole Assembly

Downhole Motors

Downhole mechanical cutting action required for harder soils is provided by downhole hydraulic motors. Downhole 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.

Downhole 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 downhole 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 downhole 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 downhole 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.

Surface Monitoring

The pilot hole path may also be tracked using a surface monitoring system. Surface monitoring systems determine the location of the probe downhole by taking measurements from a grid or point on the surface. An example of this is the TruTracker System. This system uses a surface coil of known location to induce a magnetic field. The probe senses its location relative to this

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induced magnetic field and communicates this information to the surface. This is shown schematically in Figure 3.

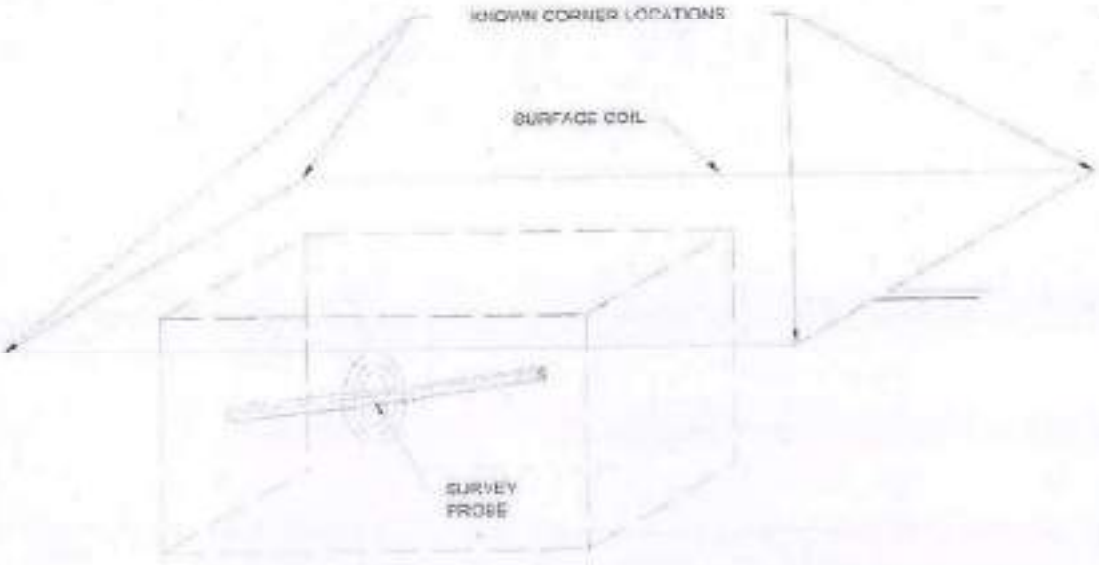

Figure 3
TruTracker Surface Monitoring System

Reaming & Pullback

Enlarging the pilot hole is accomplished using either prereaming 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.

Prereaming

Most contractors will opt to preream a pilot hole before attempting to install pipe. For a prereaming 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.

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 prereaming 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.

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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 breakover 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 a 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.

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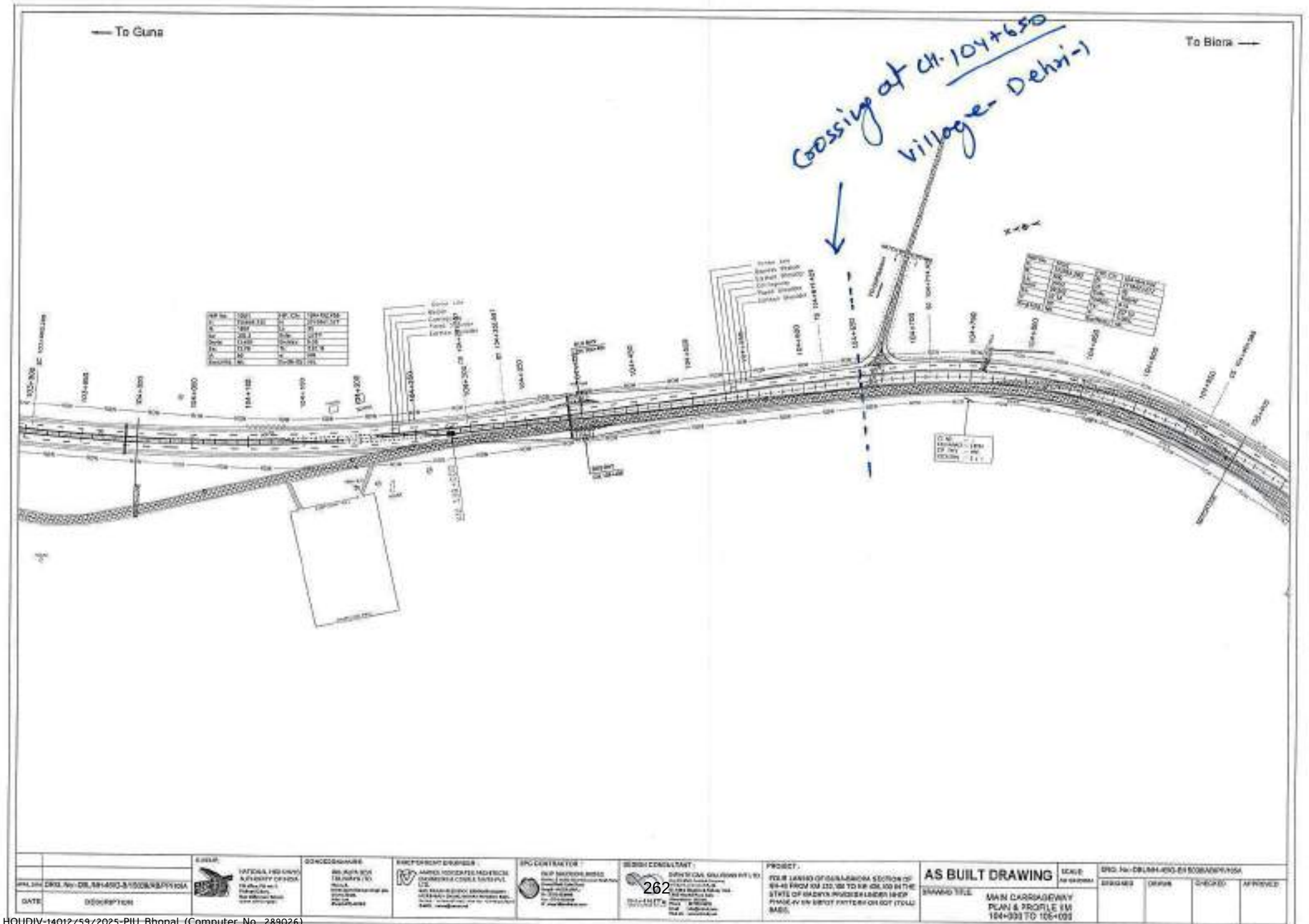

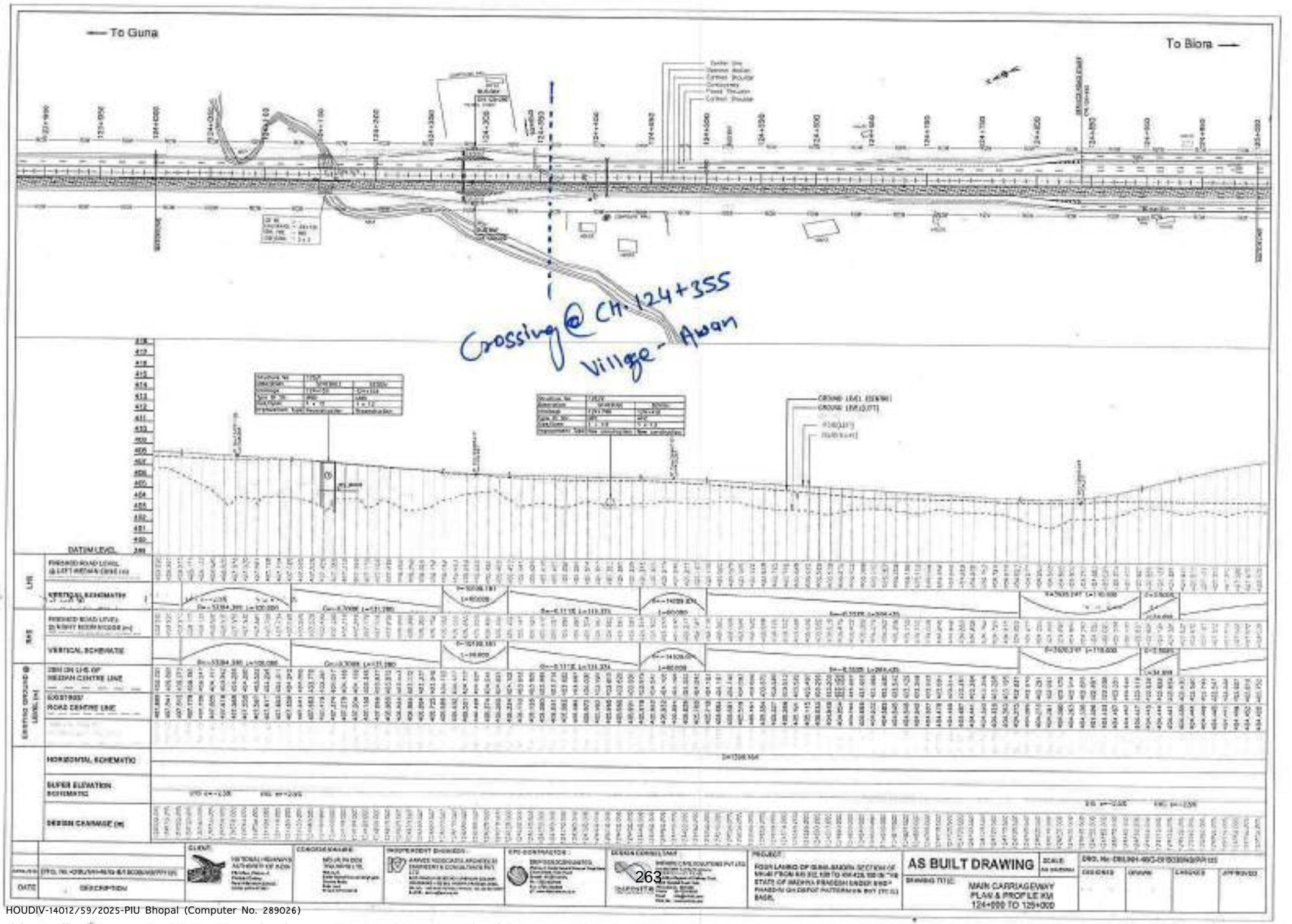
To Guna
To Biora
Crossing @ Ch. 124+355
Villge - Awan
AS BUILT DRAWING
MAIN CARRIAGEWAY
PLAN & PROFILE KM
124+000 TO 125+000