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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

GUIDELINES ON PIPE LINE CROSSINGS UNDER RAILWAY TRACK

REPORT NO. BS – 105

OCTOBER-2009

ISSUED BY

B & S DIRECTORATE
RESEARCH DESIGNS AND STANDARDS ORGANISATION
LUCKNOW-226011

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FOREWORD

The subject of pipeline crossings under railway track was introduced as a new item in 72nd Bridge Standard Committee Meeting held in 2000 vide item No. 863 and Railway Board approved the Committee recommendation to prepare guidelines for pipeline crossings under railway track by RDSO. In 2003, draft guidelines on pipeline crossings under railway tracks were issued by RDSO vide letter No. CBS/DCP/1 dated 20.01.03 to Zonal Railways for comments and suggestions.

This item was discussed in the subsequent BSC meetings every year as a pending item. This subject was discussed as pending item No. 863 upto 78th BSC Meeting held in January 2009. Railway Board vide letter No. 2008/CE-I/BR/Seminar (BSC)2 dated 23.06.09 issued orders on Committee's recommendations on item No. 863 of the 78th Bridge Standard Committee meeting held in Jan. 2009, for RDSO to finalize the draft guidelines on pipeline crossings under railway track and issue to zonal railways.

Based on the criteria/ guidelines and instructions issued on the subject by Railway Board and RDSO and the suggestions of CBEs of Zonal Railways received by RDSO from time to time, the draft guidelines on pipeline crossings under Railway Track have been finalized by RDSO as Report No. BS-105.

Shri Pradip Kumar, Director/B&S/CB-II, Shri P.P.Singh, ADE/B&S/CB-II and Smt. Shweta Suman, JE/Design has made significant contributions to prepare these guidelines. It is expected that these guidelines shall serve as technical guidance for officials of Engineering Departments in the Indian Railways.

Lucknow
Date: 30.10.2009

(Pradeep Singh)
Executive Director/Structures
B&S Directorate
R.D.S.O.

GUIDELINES ON PIPELINE CROSSINGS UNDER RAILWAY TRACK

1.0 Scope :

1.1 Pipeline crossings are provided under railway track for conveyance of water, sewage, petroleum products etc. Broadly, pipeline crossings may be divided into following categories :-

(A) Pipeline crossing under Railway track :

(1) Carrying telephone wires/ TV cables/ Electrical cables /S&T cables, Optical Fibre cables etc.
(2) Conveying water, sewage, toxic content or other non-flammable substances without pressure.
(3) Conveying water or sewage, toxic content or other non-flammable substances under pressure.
(4) Conveying inflammable substances like petroleum, oil or gas etc. - Pipelines included under this category are those installed to carry oil, gas, petrol or other inflammable or highly volatile substances under pressure, or any substance, which from its nature or pressure might cause damage if escaping on, or in the vicinity of railway property.

(B) Pipelines conveying inflammable substances (like petroleum, oil and gas etc.), placed parallel to track on Railway Bridges.

1.2 These guidelines are general guidelines for technical guidance since it is not possible to cover all site conditions and scenarios in these. These are based upon the following guidelines and instructions issued to the Zonal Railways by RDSO and Railway Board from time to time:

(a) Criteria for pipeline crossing under railway track issued by RDSO in 1981 vide letter No CBS/CP/1 dated 18/21-04-1981.
(b) Criteria for pipeline crossing under railway track conveying natural gas issued by Director (Civil Engineering) Railway Board in 1985 vide letter No.85/W1/PL/1 dated 10-07-1985.
(c) Criteria for pipeline crossing under railway track carrying water under pressure issued by RDSO in 2000 vide letter No. CBS/DCP/1 dated 22/23-06-2000.
(d) Criteria for gas pipeline crossings of M/s Gas Transportation & Infrastructure Company Ltd. (GTIL) issued by EDCE(B&S), Railway Board vide letter No.-2003/CE-1(Br)/Seminar/1 Pt. dated 15.04.2005.
(e) Criteria for pipeline crossings across railway track by M/s Indian Oil Corporation Ltd. for three projects in Gujarat and Rajasthan, issued by EDCE (B&S), Railway Board vide letter No.-2003/CE-1(Br)/Seminar/1 Pt. Dated 19.10.2005.
(f) Draft Guidelines on pipeline crossings under railway track issued by RDSO vide letter No. CBS/DCP/1 dated 20.01.2003 and suggestions received from CBEs

of zonal railways from time to time with reference to item No. 863 on pipeline crossings under track of 72nd to 78th BSC meetings.

(g) Broad guidelines for optical fibre crossing under railway track by outside agency issued by Director(L&A), Railway Board vide letter No. 2001/LML/24/20 dated 16.08.2005 (Policy Circular No. RB/L&A No. 55/2005).

These guidelines are being issued by RDSO vide letter No. CBS/DCP/1 dated 30.10.2009 in compliance to Railway Board's orders issued vide letter No.2008/CE-I/BR/Seminar(BSC)2 dated 23.06.09 on Committee's recommendations on item No. 863 of the 78th Bridge Standard Committee meeting held in January, 2009 for RDSO to finalize the draft guidelines and issue to zonal railways.

1.2.1 These guidelines do not cover following issues regarding grant of permission for laying pipeline crossings under railway track or under / across railway bridges:

(i) Issues connected to the usage of railway land, granting of permission to outside agencies and realization of charges there-of such as way leave facilities, licensing, leasing etc. for laying pipelines across track / bridges.

(ii) Issues regarding competent authority, procedure, departmental /interdepartmental responsibilities involved.

(iii) Issues connected to the requirement of Commissioner of Railway Safety (CRS) sanction stipulated under Para 1302 of Indian Railway Permanent Way Manual. The sanction of Commissioner of railway safety is to be taken in advance of execution of work wherever necessary by the zonal railway depending upon the site requirements of the work on case to case basis.

The instructions issued by Railway Board and Zonal Railways shall apply in these matters.

1.3 General guidelines for Pipelines crossings covered under categories A(1) to A (4) listed as in para 1.1 (A) :

1.3.1 Wherever possible, these pipeline crossings should not be arranged through an existing bridge. In case, pipeline crossing is allowed through existing bridges, CBE should consider flow of water, obstruction to causeway or any strengthening work on bridges, safety aspects etc before approving the proposal. However, if required, a new bridge can be built for the purpose of crossing.

1.3.2 The work will be done under the supervision of Railway Engineers under suitable speed restriction and precautions as may be stipulated by the Railways.

1.3.3 Except for pipeline crossings covered under category A(1) above, all pipes conveying water, sewerage, non inflammable or inflammable substances should be laid under the Railway track through a casing pipe of RCC, PSC or steel of adequate strength to facilitate their maintenance and renewals without causing interference to railway traffic. The nominal diameter of the casing pipe should be sufficiently large to permit easy withdrawal of the carrier pipe without disturbing the formation. Where carrier pipes are not used, for example telephone wires/TV cables etc as covered under category A(1), the casing pipe of suitable material and adequate size should be provided.

1.3.4 For carrier pipes of diameter 100mm or less, the casing pipe should not be less than 250mm in dia. For carrier pipes larger than 100mm in diameter casing pipe dia shall be at least 150 mm larger than carrier pipe diameter.

1.3.5 For steel casing pipes, the minimum thickness of the pipe to be provided, should be as given under Table –1

Table - 1

Nominal Diameter of Casing Pipe (mm)	Minimum Thickness of Casing pipe (mm)
250	5
300	5
350	5
400	6
450	7
500	8
600	8
700	10
800	12
900	12
1000	14
1100	16
1200	16
1300	18
1400	20
1500	20
1600	22
1700	22

(Note: The minimum requirement of thickness of casing pipe given in Table-1 is based on data indicated in Appendix – C of steel pipelines crossings for Rail-roads and Highways, Manufacturing Distribution and Marketing Department, API recommended practice 1102 Sixth Edition, April 1993.)

1.3.6 The maximum diameter of the casing pipe shall not exceed 1700mm. In case the length of crossing is 15m or more, carrier pipes of dia less than 350 mm should not normally be used.

1.3.7 For casing pipes greater than 1700mm dia, the crossing should be arranged through a new bridge of adequate size.

1.3.8 Cushion:

For pipelines covered under category A(1), the minimum cushion below bottom of sleeper will be 600 mm (minimum earth cushion should be 350 mm). However, for electrical cables higher cushion may be decided by the zonal railways on case to case basis after site verification in consultation with the concerned Electricity Board authorities considering the prevalent safety norms and requirements. In case of OFC cables with plastic casing pipe, the casing pipe should be minimum one meter below the formation level and 0.9m below the natural ground level and it should be placed using horizontal boring method.

For Pipelines crossing under category A(2) & A(3) a minimum cushion of 600 mm should be ensured for casing pipe of less than 700mm dia and that of 900 mm should be ensured for casing pipe of dia greater than 700mm and up to 1200mm. For dia of casing pipe greater than 1200mm, the casing pipe has to be minimum 1.2m below the formation level and 0.9m below the natural ground level.

For Pipeline crossings under category A(4), the casing pipe has to be minimum 1.2m below the formation level and 0.9m below the natural ground level.

1.3.9 The minimum clearance between two pipes in the same location of pipeline crossing should be 600 mm or 2d (where d is the dia of the larger casing pipe) whichever is greater except in case of OFC cables.

1.3.10 The alignment of pipeline should be so decided that it crosses track preferably nearest to right angle. The length of casing pipe should be upto the end of railway land boundary to accommodate laying of tracks in future. The casing pipe shall extend to 5 m plus depth of pipe below the natural ground level beyond the toe of slope of embankment subject to minimum of 14m from the centre of outside track. However, for higher embankment and where carrier pipe is not required otherwise to be buried in ground, casing pipe will be terminated similar to pipe culvert (Fig. 2). Crossing under any yard should be avoided, since it will involve crossing under a number of tracks.

1.3.11 Pipes should be inserted under the track using any trench less technology like pushing technique or auger boring technique etc. In case it is not practicable to use the trench less technique, the Railway can use the cut and cover or service span method.

1.3.12 The recommended safe distance of the edge of the push pit / catch pit from the outermost railway track centre will be equal to 3m plus twice the formation height plus the depth of catch/push pit. However, this distance will depend upon the local soil conditions and has to be decided by the executive at site after taking into consideration the type of soil and provision or non-provision of any shoring etc.

1.3.13 Sumps should be provided wherever necessary to facilitate cleaning of pipes such as those conveying irrigation water. Minimum slope in casing pipe i.e. 1 in 40 towards downstream should be provided with a sump on downstream end for drainage of any leakage or flood water entry.

1.3.14 Route markers for categories A(1) and A(4) crossings are to be provided within railway boundary at railway boundary locations and at toe of the embankment and at an interval of maximum 10m.

1.3.15 Pipes should be designed to withstand latest approved Railway loading standard, as defined in IRS Bridge Rules. The casing pipes will be installed with even bearing throughout its length. The section should also be checked for the construction load i.e., stresses which will arise during pushing of the pipe.

1.4 A&C Slip No.26 dated 26-12-2007 to Indian Railway Bridge Sub-Structures and Foundation Code (Revised -2004) stipulates the following new clause No. 2.15 under clause no.2 titled `Terminology `:-

"Any opening across the track formation for discharge of water, vehicles, men or for similar purposes should be considered as bridge. All conduits provided across track for the passage of cables, pressurized or non pressurized fluids should be considered as track crossings and not bridges. Details and system of annual assessment and documentation of health of such track crossings should be maintained."

1.5 An agreement with the pipeline owning companies be finalized by the Railways in consultation with Law Officer and Accounts regarding rental, maintenance, interest charges, claims arising out of damage/loss of life or property of railway men, railway user and others due to mishap on account of faulty working during laying/operation of pipeline crossing and suitable third party comprehensive liability insurance at its own cost etc.

1.6 Organizations laying pipeline crossing may be allowed to lay pipeline under railway supervision as per extant rules within railway area using their own equipment. Passing of pipelines by pipe pushing / auger boring/ direction drilling would also be done under suitable speed restriction and observation of all safety precautions. The track formation should be kept under careful observation for a few days after laying of pipeline crossing.

2.0 Category A(1) – Pipeline crossings under Railway track or under Railway bridge carrying telephone wires/ TV cables/ electrical cables / S&T cables/ Optical fibre cables etc :

2.1 The casing pipe size of this type of crossing should be limited to the requirement and preferably not more than 350 mm.

2.2 Reinforced Cement Concrete (RCC), Pre-stressed Concrete (PSC) or Steel Pipes of adequate size and strength may be used for carrying telephone wires, cables etc.

2.3 In case of single Optical fibre cables inserted by horizontal drilling method, plastic casing pipe of dia. not less than 50 mm and Up to 100 mm may be permitted. For multiple cables, the distance between two pipes should be minimum 300 mm. Bunching of cables/pipes should be avoided or cables should be taken through a casing pipe.

2.4 Pipeline should be suitably insulated in case of electrical wire crossings depending upon the voltage and current etc.

2.5 Both sides of the steel pipe should be treated with suitable anti corrosive paints.

2.6 Reinforced Concrete pipes conforming to IS: 458 may be used.

2.7 Broad guidelines to be followed for optical fibre cable crossing by an outside agency:

(i) The crossing shall be permitted only when no convenient route other than crossing the track is available.

(ii) As far as possible, cable crossing shall make use of any existing culverts, subways etc.

(iii) It shall be ensured that it would be possible to withdraw the cable for repairs or replacement without disturbing the railway track formation.

(iv) If the underground cable is armoured, the armour shall be earthed by independent earths at the two sealing ends of the cable. No further earthing of the armouring of the cable shall be done within 500 meter of the electrified track. The scheme and method of earthing shall be approved by the Railways.

3.0 Category A(2) - Pipeline crossings under Railway track conveying water, sewage, toxic content or other non-flammable substances without pressure :

3.1 Reinforced Cement Concrete (RCC), Pre-stressed Concrete (PSC) or Steel Pipes of adequate size and strength should be used for conveying water, sewage etc. without pressure and these pipes should be laid to proper grade to ensure smooth flow. For steel pipes, the pipes should be of mild steel fabricated as per IS: 3589 from steel plates conforming to IS:2062. For Reinforced Concrete pipes, pipes conforming to IS: 458 may be used.

3.2 The effect of corrosion due to sewage or any other substances should be considered in design and laying of pipes.

3.3 For a carrier pipe of dia 200 mm or less and a steel casing pipe, both sides of the steel carrier/casing pipes shall be treated with suitable anti corrosive paints.

3.4 In case a carrier pipe of dia more than 200 mm is used with a steel casing pipe, corrosion protection as per clause 4.7 will have to be done.

3.5 Suitably designed RCC box culvert may be used, if necessary for pipeline crossings under track.

4.0 Category A(3) – Pipeline crossings under Railway track conveying water, sewage, toxic content or other non-flammable substances under pressure :

4.1 A general diagram of such crossings is enclosed as Figure 1 & 2. These Pipeline crossing should not be located in close vicinity of existing bridges, buildings and other type of structures. Care should be taken to isolate the pipeline crossing installation from overhead electrical wires and it should be suitably insulated from underground conduits carrying electrical wires.

4.2 Casing pipe should be provided with minimum 50 mm diameter vent pipe (G.I), as shown in the Fig.1. The vent at low end of the casing pipe should be connected with the side or bottom of the casing and the vent pipe at high end

should be connected with the top of the casing. The top of the vent pipe should be fitted with a down turned elbow properly screwed. The ends of casing pipe should be suitably sealed. This will provide information regarding any leakage in carrier pipe.

4.3 The sluice valves should be provided away from Railway land, to facilitate the closure of flow of water supply, whenever required.

4.4 Carrier pipe and joints should be of approved type of material and construction. Joints for carrier pipe should be of mechanical or welded type. Reinforced Concrete pressure pipes conforming to IS: 458 may be used as carrier pipes for pressure below 7 kg/cm^2. Pipelines should be pressure tested to 110% designed pressure.

4.5 Casing pipe and joints should be of leak proof construction, capable of withstanding current railway loading as defined in IRS Bridge Rules. The section should also be checked for the construction load i.e. stresses which will arise during pushing of the pipe.

4.6 For steel pipes (both carrier and casing) the pipes should be of mild steel fabricated as per IS: 3589 from steel plates conforming to IS: 2062. The field welds should be tested cent percent radio graphically as per IS: 1182.

4.7 For provision of steel casing pipes larger than 350 mm dia, one of the following anti corrosive systems should be provided.

4.7.1 System with Cathodic Protection :

4.7.1.1 No coating is desired on the exterior of the casing pipe.

4.7.1.2 Interior of the casing pipe shall be grit blasted to Sa $2\frac{1}{2}$ to ISO: 8501-1 followed by application of 100% elastomeric Polyurethene coating to AWWA-C222-1999 (American Water Works Association) specifications to 1000μ dry film thickness.

4.7.1.3 Touch up painting may be done with the same Polyurethene coating wherever the coating gets damaged due to improper handling/construction work.

4.7.1.4 Exterior and Interior of the carrier pipe to be grit blasted to Sa $2\frac{1}{2}$ to ISO: 8501-1 followed by application of 100% elastomeric Polyurethene coating to AWWA-C222-1999 specifications to 1000μ dry film thickness.

4.7.1.5 Suitable size spacers made of high density Polyethylene or similar materials have to be installed between the casing pipe and the carrier pipe to avoid metallic contact.

4.7.1.6 Suitable Cathodic protection system is to be provided only for the casing pipe.

4.7.1.7 The choice of sacrificial anodes for the cathodic protection depends upon the soil resistivity values. If this value is within 1000 Ohms-cm, Zinc anodes will be used and if the value is between 1000-7500 Ohms-cm, Mg anodes will be used.

4.7.1.8 The pipe cable joints for cathodic protection shall be Epoxy encapsulated using M/s BECK's or equivalent Epoxy pack.

4.7.1.9 The acceptance limit for cathodic protection system is 0.85V with respect to $Cu/CuSO_4$ reference electrodes.

4.7.2 System without Cathodic Protection :

4.7.2.1 Another casing pipe shall be inserted after pushing the main casing pipe in the soil and the annular space between the two casing pipes be filled with cement concrete slurry. The nominal diameter of the second casing pipe shall be 150mm – 200mm less than the nominal diameter of the external casing pipe.

4.7.2.2 The Exterior/ Interior of the second casing pipe to be grit blasted to Sa $2\frac{1}{2}$ to ISO: 8501-1 followed by application of 100% elastomeric Polyurethene coating to AWWA-C222-1999 specifications to 1000μ dry film thickness.

4.7.2.3 The Exterior/ Interior of the carrier pipe to be grit blasted to Sa $2\frac{1}{2}$ to ISO: 8501-1 followed by application of 100% elastomeric Polyurethene coating to AWWA-C222-1999 specifications to 1000μ dry film thickness.

4.7.2.4 Suitable size spacers made of high density Polyethylene or similar materials have to be installed between the casing pipe and the carrier pipe to avoid metallic contact.

4.8 Where providing steel casing pipes are not feasible or found cumbersome, RCC pipes (carrier and / or casing) or RCC box shall be provided. Alternatively a new bridge may be constructed.

5.0 Category A(4) – Pipeline crossings under railway track conveying inflammable substances like petroleum, oil and gas etc :

5.1 In this case, the casing pipe shall be so manufactured so as to prevent leakage of any material inside the Railway boundary except at ends where the ends are left open. The pipe should be installed with sufficient slack so that it is not in tension. Expansion joints are not recommended.

5.2 The pipeline crossing the railway track will comply with the provisions of AREMA, ANSI/ASME B Codes as amended, ANSI/ASME B 31.4 Code for pressure piping – Liquid Petroleum Transportation Piping Systems; ANSI-B 31.8 Code for pressure piping – Gas Transmission and Distribution Piping Systems.

Casing pipe thickness shall be checked with respect to external loads as per API 1102/AREMA Manual Pt 5 (2002). The casing pipe shall be designed to latest approved Railway Loading standards of IRS Bridge Rules to cover the future loading in service life. Casing pipe shall pipe checked for construction stage stresses also. The detailed design calculations should also be submitted.

5.3 Pipeline crossing should not be located in close vicinity of existing bridges, buildings and other type of structures and should be minimum 14m away from these. Care should be taken to isolate the pipeline crossing installation from

aerial electrical wires and it should be suitably insulated from underground conduits carrying electrical wires. Pipelines, casing pipes and vent pipes should be at least 1.2m away (vertically) from aerial electric wires.

5.4 Casing pipe should be provided with minimum 50 mm dia vent pipe (G.1), extending not less than 1.2 m above the ground level as shown in Fig.1. The vent at low end of the casing pipe should be connected with the side or bottom of the casing and the vent pipe at high end should be connected with the top of the casing. The top of the vent pipe should be fitted with a down turned elbow properly screwed. The ends of casing pipe should be suitably sealed.

5.5 Shut off valves on either side of railway crossing is not recommended. Installation of these valves introduce hazards not consistent with good pipeline operating practices.

5.6 Casing pipe should be capable of withstanding a pressure equal to that of the main carrier pipe, with a safety factor of 3. However, a safety factor of 3 may not be required if the pipe owning organization agrees for the following tests :

(i) All welds of carrier pipes are 100% tested by X-ray.

(ii) Carrier pipe hydro tested pre and post installation.

(iii) Carrier pipe is again tested along with rest of main pipeline.

5.7 Casing pipe and joints should be of leak proof construction, capable of withstanding latest approved railway loading as defined in IRS Bridge Rules. The section should also be checked for the construction load i.e. stresses which will arise during pushing of the pipe.

5.8 For steel pipes (both carrier and casing) the pipes should be of mild steel fabricated as per IS: 3589 from steel plates conforming to IS: 2062. Where screwed or coupled joints are used, the joints should be welded, to the pipes at both ends along the circumference as a seal to prevent leak through the threads. The field welds should be tested cent percent radio graphically as per IS: 1182.

5.9 Clause 4.7.1.5 to 4.7.1.9 shall be followed for supplementing the corrosion protection system of carrier and casing pipeline at crossing location with cathodic protection system.

5.10 For provision of steel casing pipes, two-component epoxy coating for internal surface will be used.

5.11 Carrier pipe to have external three-layer high performance poly-urethane coating. Internal coating can be solvent free epoxy coating.

5.12 Pipe owning organization will submit detailed specifications for the pipeline in document form to concerned Railways. This shall include the enumeration of monitoring system and details of pipeline Integrity Management System. This will also enumerate the system of periodic testing and submission of certificate of inspection and integrity of pipeline crossing annually to concerned Railways for each crossing. A system of annual joint inspection, sharing of monitoring data and allowing access to concerned Railways to the monitoring facility shall be enumerated by pipe owning organization. This amount will be part of agreement and pipe-owning organization will bear all cost.

6.0 Category (B) – Pipelines conveying petroleum, oil and gas over Railway bridges :

6.1 The pipe line should be laid below deck level .The pipe line should not infringe with maximum moving dimensions for the rolling stock Wherever it is not possible to so lay the pipe line the necessity for installing a roof type plate guard of plate thickness 7 mm to protect the pipeline, shall be carefully examined.

6.2 The pipeline should be designed for the specific work and thermal stresses and stresses induced on the bridge should be provided for in the design. The pipeline on the bridge should be thicker than the pipe elsewhere.

6.3 Manually operated shut off valves should be installed to close off the flow in case of a leak in the pipeline.

6.4 Adequate arrangements should be made for continuously guarding such Railway bridges so that the possibility of damage by sabotage is eliminated. The expenditure on the staff posted to guard the pipeline will be borne by oil companies on the mutually agreed terms.

6.5 A periodic ultrasonic testing of the pipe at the bends where the pipe approaches the bridge crossing be carried out. Periodicity may be 4 years subjected to observance of following conditions :

a) The oil companies should associate a representative of the concerned Railway Administration during the testing. For this purpose, intimation should be given to the Railway concerned well in advance, to enable them to depute the representative for the testing.

b) The results of the ultrasonic testing and the thickness of the pipeline determined from the ultrasonic testing, should be furnished by the oil companies to the concerned Railway Administration, along with necessary calculations demonstrating the safety of the pipelines taking into account the reduction in the thickness of the pipeline, if any.

c) The Railway Administrations would satisfy themselves that the thickness of the pipeline is not less than the thickness arrived at from the following criteria:

i) The pipeline should have enough thickness left to withstand various forces like dead load, live load, fluid pressure, effect of hammer blow, wind load, earthquake load, etc. as per the appropriate Code. The thickness should not be less than any minimum limit laid down in the appropriate Code.

ii) The pipeline on the bridge should be thicker than the pipeline elsewhere.

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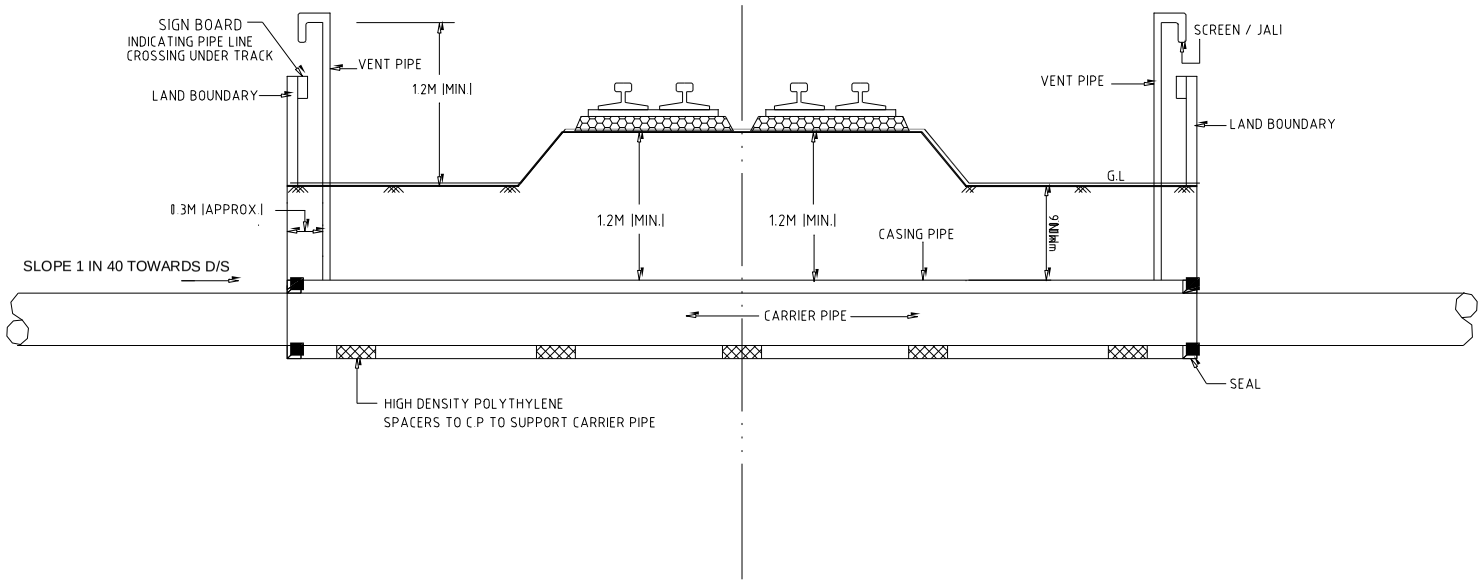
CASE-1 : FOR LOW EMBANKMENT PIPE BURIED IN GROUND



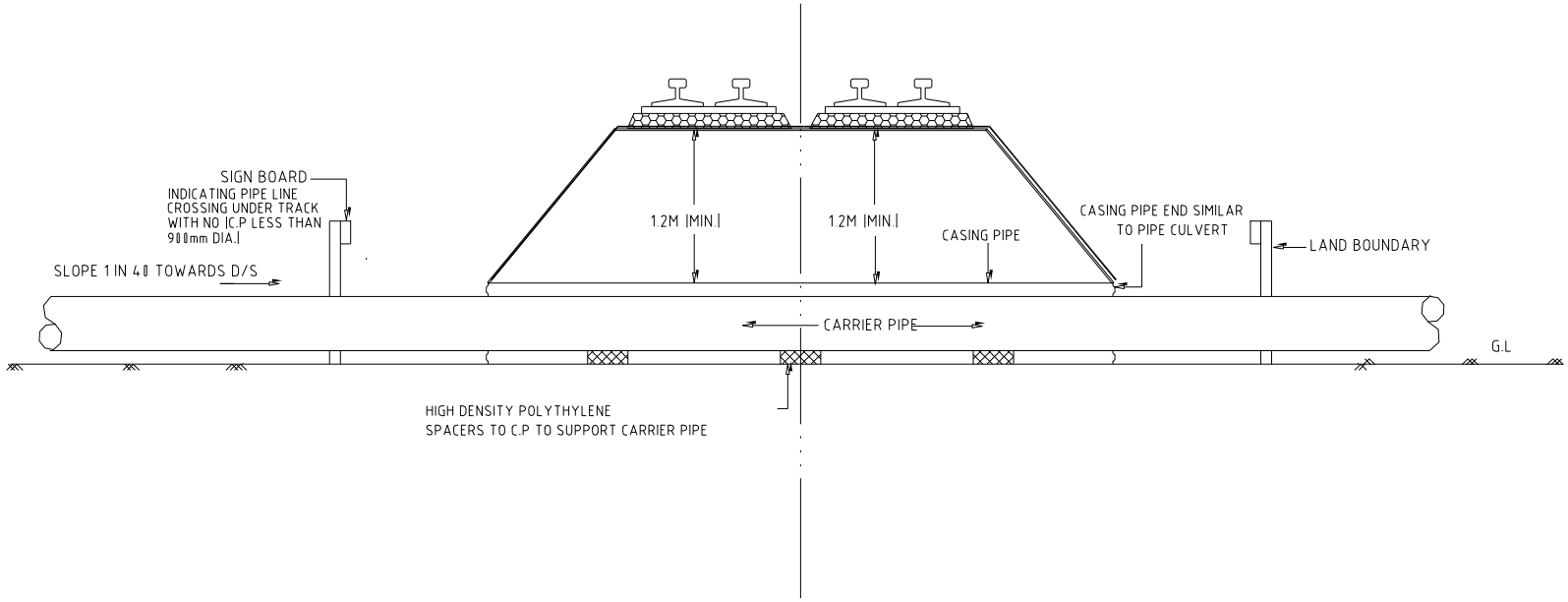
NOTE :

1. CASING PIPE TO EXTEND UP TO RAILWAY BOUNDARY.

PIPE LINE CROSSING UNDER RAILWAY TRACK CARRYING WATER, SEWAGE OR ANY OTHER FLUID SUBSTANCES UNDER PRESSURE

Fig. 1

CASE-2 : FOR HIGH EMBANKMENT PIPE BURIED ABOVE GROUND



NOTE :

C.P. = Casing Pipe.

PIPE LINE CROSSING UNDER RAILWAY TRACK CARRYING WATER, SEWAGE OR ANY OTHER FLUID SUBSTANCES UNDER PRESSURE

Fig. 2

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

GUIDELINES ON PIPELINE CROSSINGS UNDER RAILWAY TRACK
(Report No. BS: 105)

ISSUED: October 2010

ADDENDUM & CORRIGENDUM SLIP No. 1 Dated 23.11.2010

i) ***Delete existing para 1.3.6 and insert as under:***

"1.3.6 The maximum diameter of the casing pipe shall not exceed 1700mm."

ii) ***Insert new para 3.6 as under:***

"3.6 In case the length of crossing is 15m or more, carrier pipes of dia less than 300mm shall not normally be used."

BY ORDER

LUCKNOW
Dated: 23.11.2010

23.11.10.

(Parmeshwar Funkwal)
Executive Director/Structures
B&S Directorate
R.D.S.O/Lucknow.

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

GUIDELLINES ON PIPELILNE CROSSING
UNDER RAILWAY TRACK
(Report No. BS: 105)

ISSUED: November 2012

ADDENDUM & CORRIGENDIM SLIP No. 2 Dated 07.11.2012

Delete existing para 5.5 and insert as under:

5.5 Accessible emergency shut off valves shall be installed within effective distance each side of the railway as mutually agreed to by the engineer and the pipeline company in accordance with latest provisions given in relevant ASME codes (i.e. ASME B31.4-2009: Pipeline Transportation System for liquid Hydrocarbons and other Liquids; and ASME B31.8-2010: Gas Transmission and Distribution Piping System).

5.5.1 In case of main pipelines carrying gas, Railway operations should be considered as Location Class 4 and maximum spacing should be kept as 8km. In case of city gas pipelines maximum spacing should be kept to 3km (steel distribution mains) and 1km (plastic distribution mains).

5.5.2 Mainline block valves should be installed prior to crossing on the upstream side along with block or check valve after pipeline crossing carrying liquid hydrocarbons and other inflammable liquids.

5.5.3 These valves should be marked with sign for identification. Where pipelines are provided with automatic control stations at locations and within distances approved by the engineer, no additional valves shall be required.

5.5.4 Valves shall not be located within the railway boundary.

BY ORDER

LUCKNOW
Dated: 07.11.2012

H.K.Singh 08/11/2012

(H.K.Singh)
Executive Director/B&S
B&S Directorate
R.D.S.O/Lucknow.

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

GUIDELLINES ON PIPELILNE CROSSINGS UNDER RAILWAY TRACK
(Report No. BS: 105)

ISSUED: May 2013

ADDENDUM & CORRIGENDIM SLIP No. 3 Dated 10.05.2013

Delete existing sub para 2.2 and insert as under:

2.2 Reinforced Cement Concrete (RCC), Pre-stressed Concrete (PSC), Cast Iron (CI) or Steel Pipes of adequate size and strength may be used for carrying telephone wires, cables etc.

BY ORDER

10/5/2013

(Rajesh Agarwal)
Executive Director/Structures
B&S Directorate
R.D.S.O/Lucknow.

LUCKNOW
Dated: 10.05.2013

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

GUIDELINES ON PIPELINE CROSSING UNDER RAILWAY TRACK
(Report No. BS: 105 of October, 2009)

ADDENDUM & CORRIGENDUM SLIP No. 4 dated 08.04.2014

1. ***Delete existing para 5.5 with sub paras and insert as under:***

5.5 Accessible emergency shut off valves shall be installed on the pipeline as mutually agreed to by the engineer and the pipeline company in accordance with latest provisions given in relevant PNGRB Regulations and ASME codes (i.e.ASME B31.4: Pipeline Transportation Systems for liquid Hydrocarbons and other Liquids; and ASME B31.8: Gas Transmission and Distribution Piping Systems).

5.5.1 In case of pipelines carrying gas, Railway operations should be considered equivalent to Location Class 4 for design of carrier pipe thickness. Design factor of 0.4 shall be used for calculating wall thickness of carrier pipes within railway land and upto a distance of risk radius (as per ASME B31.8S) outside the railway boundary on either side. Valves shall not be located in railway land and upto a distance of risk radius outside the railway boundary on either side.

5.5.2 In case of pipelines carrying liquid hydrocarbons and other inflammable liquids, valves shall not be located within railway boundary.

5.5.3 These valves should be marked with sign for identification. Where pipelines are provided with automatic control stations and/or valves that are remotely operated, no additional valves are required at the crossing.

2. ***Delete existing para 5.8 and insert as under:***

5.8 For steel casing pipes, the pipes should be of mild steel fabricated as per IS: 3589 from steel plates conforming to IS: 2062 or as per API-1102. Carrier pipes should be as per API 5L prescribed in PNGRB Regulations/ASME codes.

Where screwed or coupled joints are used, the joints should be welded, to the pipes at both ends along the circumference as a seal to prevent leak through the threads. The field welds should be tested cent percent radiographically as per IS:1182 or API-1104.

3. ***Delete existing para 5.11 and insert as under:***

5.11 Carrier pipe to have external three-layer polyethylene (3LPE) or equivalent coating as per PNGRB Regulations. Internal coating can be solvent free epoxy coating.

BY ORDER

LUCKNOW
Dated: 08.04.2014

08/04/2014

(Ashok Kumar)
Executive Director/Structures
B&S Directorate
R.D.S.O., Lucknow

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

GUIDELINES ON PIPELINE CROSSINGS UNDER RAILWAY TRACK

(Report No. BS-105 of October, 2009)

ADDENDUM & CORRIGENDUM SLIP No.5 dated 10.04.2017

(1) Add the following sub para in existing para no. 1.3.3.

1.3.3.1 Alternatively, for crossings under category A(2) to A(4), Horizontal Directional Drilling (HDD) Method without casing pipe may be used duly following the safety precautions as mentioned below:

i. Written plan shall be developed for all directionally drilled crossings or for when directionally drilling is selected as a pipeline method. Plans will include the following:

a. Before taking up the HDD work, area to be scanned by suitable methods like GPR etc. to check for any underground utilities such as signalling cables etc. which may get damaged. Suitable action to be taken to avoid such incidents. Accordingly, crossing plan and profile drawings to be developed showing all pipelines, utilities, cables, and structures that cross the drill path, are parallel to and within 30m of the drill path, and that are within 30m of the drilling operation, including mud pits and bore pits.

b. Damage prevention plan to reduce or avoid the likelihood of damage to adjacent underground facilities, including pipelines, utilities, cables, and other subsurface structures. The plan shall consider the accuracy of the method to be employed in locating existing structures and in tracking the position of the pilot string during drilling. Consideration should be given to having an auxiliary location system to include manual excavation to ensure that the drilling bit or reamer is following the projected path and does not encroach upon crossing or parallel lines. The damage prevention plan should provide specific instructions regarding the notification of affected parties including the participation in one-call systems where applicable.

c. Written safety plan to include contingency plans in the event the drilling string impacts subsurface facilities. The safety plan should identify facilities and resources to be utilized in the event of an emergency or any personnel injuries. The safety plan shall be reviewed on site with all construction personnel prior to the commencement of drilling operations.

d. Plan for containment and disposal of drilling fluids, if used.

e. Hydrostatic test plan that should consider pretesting of the fabricated string(s) prior to installing the crossing.

f. Testing plan be agreed upon and measures like Cathodic protection, periodic inspection be outlined and Supplementary extra thickness of pipe be ensured to compensate for corrosion.

g. Pipeline laying agencies such as IOCL etc. to submit annual certificates of inspection.

ii. The following publications provide guidance on design of directionally drilled crossings:

a. American Gas Association PR-227-9424"Installation of Pipelines by Horizontal Directional Drilling, an Engineering Design Guide".

b. American Society of Civil Engineering, Practice No. 89 — "Pipeline Crossings Handbook"

c. Directional Crossing Contractors Association publications "Guidelines For a Successful Directional Crossing Bid Package," "Directional Crossing Survey Standards," and "Guidelines for Successful Mid-Sized Directional Drilling Projects"

(2) Add the following after the last sub-para of existing para no. 1.3.8:

In case of using HDD technique for crossings under category A(2) to A(4), the pipe must be at least 7 metres below the ground level throughout railway land width in embankment and also at least 7 metres below formation level in cutting throughout the railway land width.

BY ORDER

10.04.17

(Kailash Singh)
Executive Director/Structures
B&S Directorate
R.D.S.O., Lucknow

LUCKNOW
Dated: 10.04.2017

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

GUIDELINES ON PIPELINE CROSSINGS
UNDER RAILWAY TRACK
(Report No. BS – 105 of October - 2009)

ADDENDUM & CORRIGENDUM SLIP No.6 dated: 15.11.2017

Delete the existing para 2.3 and insert as under-

2.3 In case of optical fibre cables inserted by Horizontal Directional Drilling (HDD) method, casing pipe of dia upto 100mm may be permitted which may accommodate one or more OFC cables with or without HDPE duct as the case may be.

In case of muitiple casing pipes, distance between two pipes should not be less than 300mm and bunching of pipes should be avoided.

BY ORDER

LUCKNOW
Dated: 15.11.2017

15.11.17

(Kailash Singh)
Executive Director/Structures
B&S Directorate
R.D.S.O., Lucknow

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

GUIDELINES ON PIPELINE CROSSINGS UNDER RAILWAY TRACK
(Report No. BS – 105 of October 2009)

ADDENDUM & CORRIGENDUM SLIP No.7 dated: 24.11.2017

Add the following note in existing para no. 1.3.7

Note: To facilitate proper inspection & maintenance, size of box culvert should be kept such that the minimum vertical clearance above carrier pipe is not less than 900 mm and the minimum horizontal clearance in either side of carrier pipe is not less than 600 mm.

BY ORDER

24.11.17

(Kailash Singh)
Executive Director/Structures
B & S Directorate
R.D.S.O., Lucknow

LUCKNOW
Dated: 24.11.2017