دبي للبترول
Dubai Petroleum

هيئة دبي للتجهيزات
Dubai Supply Authority

DUSUP Guidelines For
Protection of Polyethylene Pipelines

Approval

Note: This guideline was approved on 06-Sep-2022

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1 Introduction

Dubai Supply Authority (DUSUP) supplies Natural Gas to various clients in Emirate of Dubai through its pipeline network. Through the production of natural gas (which is processed into gas and condensate products), the purchase of pipeline gas and LNG (and its regasification), gas storage and the operation of the pipeline network, DUSUP plays a key role in the growth and development of Dubai.

DUSUP has assigned Dubai Petroleum Establishment (DPE) the responsibility for operating DUSUP assets and authorized DPE to manage all emergency events occurring on its own operated facilities, pipelines and assets within pipeline corridors in liaison with other governmental entities.

DPE-DUSUP designs operates and maintains DUSUP's onshore pipelines and related facilities to International Standards in order to ensure an uninterrupted flow of gas and other hydrocarbons across Dubai. The onshore hydrocarbon pipeline network consists of approximately 700 km of pipelines ranging from 48" high pressure gas pipelines down to 10" condensate lines. The gas pipelines operate at high-pressures up to 960-psig and transport highly explosive and flammable natural gas. DPE-DUDUP operate and maintains Polyethylene (PE) pipelines for distribution of gas to its clients. A number of jet fuel and fuel oil pipelines share the corridors with the gas and condensate pipelines.

The majority of the onshore hydrocarbon pipeline network is laid-out in designated DUSUP corridors that are secured by fences and controlled access gates. Parts of the onshore pipeline network run in the Right of way, Public way and in unfenced corridors - due to the close proximity of road infrastructure.

1.1 Purpose

Provide procedural guidance regarding the minimum protection required for the construction of non-metallic (Polyethylene, PE) pipelines and related asset within the DPE-DUSUP pipeline network. This guideline shall be read in conjunction with DUSUP Guidelines for Protection of New Pipeline, DP-OPSON-0150 [1].

1.2 References

1. DUSUP Guidelines for Protection of Hydrocarbon Pipelines, DP-OPSON-0150
2. DUSUP Guidelines for Road & Rail Infrastructure Crossing Pipelines, DP-OPSON-0152
3. DUSUP Guidelines for Road & Rail Infrastructure Parallel to Pipelines, DP-OPSON-0154
4. DUSUP NOC Standard Conditions - DP-OPSON-0056
5. DUSUP Guidelines for Land Use Planning - DP-OPSON-0144
6. DP-OPSON-0162, DUSUP Guidelines for NOC Management and Work Supervision
7. DUSUP Guidelines for NOC Management and Work Supervision
8. Gas Transmission and Distribution Piping Systems – ASME B31.8
9. Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids – ASME B31.4
10. Steel pipelines for high pressure gas transmission - IGEM/TD/1
11. Steel and PE pipelines for gas distribution - IGEM/TD/3
12. Safe Working Practices to Ensure the Integrity of Gas Assets and Associated Installations - IGEM/SR/18.

1.3 Abbreviations and Definitions

1.3.1 Abbreviations

Abbreviation	Description
DEL	Dolphin Energy Limited
DEWA	Dubai Electricity and Water Authority
DPE	Dubai Petroleum Establishment
DUSUP	Dubai Supply Authority
EGA	Emirates Global Aluminium(DUBAL)
EMARAT	Emirates General Petroleum Corporation
EMDAD	EMARAT, Air BP and Shell Joint Venture
EMT	Evisive Microwave Transmission
ENOC	Emirates National Oil Company
GCS	Gas Control Station
HDPE	High Density Polyethylene
MOP	Maximum Operating Pressure
MPR	Maximum Pressure Rating
NOC	No Objection Certificate
PE	Polyethylene
PTW	Permit to Work
ROW	Right of Way
RT	Radiography Testing
RTA	Roads and Transport Authority

1.3.2 Definitions

DPE	DPE is the government entities that operates DUSUP assets as Onshore Operations Team and has authority to manage all emergency events occurring on its own operated facilities, pipelines and all crisis occurring within pipeline corridors in liaison with other governmental entities.
DUSUP	DUSUP is the legal commercial entity that own Margham Field, Margham Plant Facilities, Gas Control Station, LNG Platform and Onshore Pipelines within pipeline corridors and has given to DPE full operatorship of all its facilities.
DUSUP Corridor	DUSUP Corridor is the land allocated by Dubai Municipality or other statutory government authority to DUSUP for the construction, operation and maintenance of gas and fuel pipelines in the emirates of Dubai.

Onshore Hydrocarbon Pipelines Network	Approximately 700 km of onshore hydrocarbon pipelines operating in Dubai. The network consist of gas, condensate, jet fuel and fuel oil pipelines. The gas pipelines operate at high-pressures up to 960-psig and transport highly explosive and flammable natural gas. The jet fuel and fuel oil pipelines operate at 653-psig share the same corridors. The condensate pipeline operate at 1000-psig and also share corridor with other pipeline.
Pipeline Owner	Owners or Owners designated Operator of the existing Gas / Liquid Fuel Pipelines in onshore hydrocarbon pipeline network (ENOC Group, EMDAD, DEL & DEWA).
No Go Zone	5.0 meters either sides of existing DUSUP/DPE pipelines.
No Objection Certificate (NOC)	A document issued by the Traffic and Roads Agency of RTA, authorizing the party to whom it has granted permission to implement works in the Right of Way or create Traffic Diversions.
Trenchless Crossing method /NDRC	Trenchless crossing method or Non-disruptive rod crossing (NDRC) is a subsurface crossing method for the installation of utilities under the existing infrastructure such as road, buildings or other utilities that requires minimum excavation at the ends or no continuous trenches. E.g. Micro Tunneling, Thrust boring, Horizontal directional drilling etc.,
Utility Owners	Owners of other utilities such as: drainage lines (DM), Electricity & Water(DEWA), ITS Services(RTA), Telephone(Etisalat, Du), Other communication cables(UAE Armed Forces), etc.,

2 General Requirements PE Pipeline

2.1 Design Parameters

Maximum design pressure for PE pipeline shall not exceed 125 psig for distribution pipelines installed in class 3 and 4 locations.

PE pipes shall not be used where pipeline operating temperature exceed 60°C or below -29°C. However appropriate de-rating factor shall be applied if operating temperature exceeds 20°C.

PE pipeline shall be designed and installed in accordance with IGEM/TD/3, Steel and PE pipelines for gas distribution [11]

2.2 Size of Pipeline

Pipe size shall not exceed 300mm and a design factor of 0.3 or less shall be used for establishing the required wall thickness. The wall thickness of plastic pipe shall not be less than 0.062 in (1.57 mm).

3 Installation of PE Pipeline

PE pipeline shall be installed below the ground level and shall be avoided above ground installations if practicable. However, PE pipeline can be installed above ground in following cases with a risk assessment:

- Uncased PE pipe may be temporarily installed above ground level under the following conditions:

  - Cumulative exposure of the pipe shall not exceed the manufacturer's recommended maximum period of exposure or 2 years, whichever is less.
  - The pipe shall be located such that it is protected from external forces otherwise pipe shall be protected against such forces.
  - The pipe shall resist ultraviolet light and high and low temperatures.
- PE pipe may be installed on bridges with following mitigations:
  - PE Pipe shall be installed in a metallic casing to avoid any mechanical damage
  - PE pipe shall protected from ultraviolet radiation and temperature fluctuations
  - Installation of shut-off valves on either side of the bridge shall be considered for isolating the pipeline in the event of failure.
- Plastic mains may terminate above ground level provided they comply with following mitigations:
  - The above ground level part of the main shall be protected against deterioration and external damage.
  - The main shall not be used for supporting external loads.

PE pipe that is installed in a vault or any other below grade enclosure must be completely encased in gas tight metal pipe and fittings that are adequately protected from corrosion.

PE pipe must be installed so as to minimize the shear or tensile stresses.

PE pipe that is directly buried must have an electrically conducting wire or other means of locating the pipe while it is underground. Tracer wire installed shall be 50 mm to 150 mm away from the pipe without direct contact. Tracer wire or other metallic elements installed for pipe locating purposes must be resistant to corrosion damage, either by use of coated copper wire or by other means. Typical details of tracer wire are provided in Appendix A.

Plastic pipe that is being encased must be inserted into the casing pipe in a manner that will protect the plastic. Plastic pipe that is being encased must be protected from damage at the entrance and the exit points of the casing. The leading end of the plastic must be closed before insertion.

3.1 Open Trench Details

Typical trench details are provided in Appendix A. PE pipe is considered flexible and will deform under external loads over burden loads. Backfilling shall be done so as to minimise the deformation or maintain the deformation within the acceptable limits.

Details of the pipe embedment materials are presented below:

Bedding - In addition to bringing the trench bottom to required grade, the bedding levels out any irregularities and ensures uniform support along the length of the pipe. Bending is required in hard rock areas.

Initial Backfill - This zone of backfill provides the primary support against lateral pipe deformation. To ensure such support is available, this zone should extend by a minimum of 150 above the pipe crown.

Final Backfill – Excavated local material can be utilised for final backfill and it should be free of large rocks, organic material, and debris. The material and compaction requirements for the final backfill should reflect sound construction practices and satisfy local ordinances and sidewalk, road building, or other applicable regulations.

The embedment (Bedding & Initial backfill) material should be a coarse grained soil, such as gravel or sand, or a coarse grained soil containing fines, such as a silty sand or clayey sand. The embedment should be placed in layers, or lifts, not exceeding 150 mm in thickness, followed by mechanical tamping to a level of at least 85% percent Standard Proctor Density, with a level of 95% under streets and roads.

3.2 Cover and Clearances

3.2.1 Depth of Soil Cover

Buried PE pipelines shall be installed with minimum depth of soil cover as given in Table 3.1. Maximum burial depth shall not exceed 2.0 m. Structural assessment shall be undertaken if depth of burial is to be exceeded by 2.0 m.

Table 3.1 : Minimum Depth of Cover

Location	Depth of Cover (m)
Road & Railway Crossings	1.20
Paved Footpaths	0.80
Verges	0.80

If depth of cover cannot be achieved, a risk assessment shall be carried out to determine whether additional protection is required. Commonly used forms of additional protection slabs including rebar details are provided in Appendix A.

3.2.2 Minimum Proximity to Buildings

The minimum proximity to occupied buildings shall be as specified in Table 3.2. Table 3.2 is based upon the design factor, f, which should not exceed 0.3. Risk assessment shall be under taken if higher design factor is to be used. In any case, the proximity shall not be less than 3 m.

Table 3.2: Minimum Proximity to Buildings

Location	Minimum Proximity (m)
PE uncased	6.0
PE cased	3.0

3.2.3 Minimum Separations between Existing and Proposed Pipeline

It is not expected to run both gas transmission pipelines and gas distribution pipelines in the same corridor. If it is inevitable, minimum horizontal clearance specified in Table 3.3 shall be maintained.

Table 3.3: Minimum Horizontal Clearance

Existing Pipeline	Horizontal Clearance (m)	
	PE Distribution PL	CS Transmission PL
PE Distribution PL	3.0	10.0
CS Transmission PL	10.0	As per DP –OPSON-0150

3.2.4 Minimum Separations with Utility Services

In case of utility services such as power cables, communication cables, water lines, sewage lines etc, sufficient clearance shall be maintained or mitigatory measures shall be installed between PE pipelines and various utility services or source of heat in order to maintain the temperature of such services from exceeding the temperature limits specified in section 2.1. Minimum required

clearances are specified in DP-OPSON-0150, DUSUP Guidelines for Protection of Hydrocarbon Pipelines [1].

3.3 Crossings

New PE pipeline may require crossing existing hydrocarbon pipelines, road & railway infrastructures etc., and the crossing requirements may vary as per the type of crossings. However, refer to DP-OPSON-0152 [2] for general guideline related to the road and rail crossings. Pipeline warning signs shall be installed in accordance with DP –OPSON-0150 [1].

3.3.1 Crossing of Existing Roads

PE pipeline constructed by open cut excavation must cross the road at minimum depth specified in Table 3.1. Typical road crossing details are provided in Appendix A. Minimum cover shall be maintained for entire width of the right-of-way (ROW). Tracer wire shall be laid continuously across the ROW and brought to the surface in a protective sleeve on each side of the ROW.

Concrete slabs as shown in Appendix A, Typical Additional Protections may be provided where additional protection is required. Additional protection shall extend 10.0m beyond the edge of the road shoulder or toe of the embankment whichever is greater.

Where pipeline and road crossing is not meeting the minimum depth requirement shall be installed in sleeve and ends of the sleeve shall be sealed with air tight end caps. Crossing sleeve / Casing of the proposed pipeline shall be extended minimum 5.0 meters beyond the edge of road or 1.5 m beyond the toe of the side slope or to where unrestricted maintenance access will be available in future. Tracer wire is not mandatory if road crossing is provided with metal sleeve.

Crossing of existing major road is typically permitted by trenchless (NDRC) methods. Due to the large anticipated pulling loads and potentially high external pressure, a careful analysis of the PE pipe in accordance with ASTM F1962 must be performed to verify or determine an appropriate SDR (Diameter to pipe wall thickness ratio).

In case of trenchless road crossing construction, tracer wire can be terminated on either side with a terminal post on either side.

3.3.2 Crossing Existing Railway/Metro:

Pipeline crossing at railway/metro shall be constructed using either uncased steel carrier pipe with suitable corrosion coating and cathodic protection or cased PE pipe with steel casing. Shut-off valves shall be provided within effective distances from rail crossing for sectional isolation in case of any rupture.

Typical uncased carrier pipe crossing details are provided in Appendix A.

3.3.3 PE Pipelines Parallel to Roads and Railway/Metro

PE pipelines shall not be laid under the roads. Distribution pipelines operating at 7 bar or less can be laid within the right-of-way but outside the carriage way subject to approval of local authorities. However, pipeline route shall be designed to avoid future conflict with road / rail expansion if possible. DP-OPSON-0154, Guidelines for Road & Rail Infrastructure Parallel to Pipelines [3] shall be referred for specific construction requirements for pipelines parallel to the road and railways.

PE pipe is flexible and ductile. It is fatigue resistant. Vibrations induced by railways does not pose a problem for a straight pipe. However, it is recommended to limit the Peak Particle Velocity (PPV) to 100 m/sec.

3.4 Crossing Existing Utilities

Refer to DP-OPSON-0152 [2] for general guideline related to the utility crossing and DP –OPSON-0150 [1] for pipeline warning signs. Typical and minimum clearances to be maintained at utility crossings are provided in Appendix A.

3.5 Overhead Power Line Crossing

Separate interface studies are not required in case of high voltage power line crossing over the PE pipeline; however minimum clearances and protection of PE pipelines as specified in Appendix A shall be considered.

3.6 Pipeline Berm

Where pipeline is not meeting the minimum depth requirements, pipeline shall be protected by means of protection slab. Providing additional berm for compensating the cover is not permitted for PE pipelines as the pipelines are for distribution and runs within the residential / industrial areas.

4 Pipeline Signs

Where a pipeline is buried below a highway, road, railway, canal or watercourse, a suitable warning sign should be permanently installed inside but within 300 mm of the edge of each side of the right-of-way to identify the existence of the buried pipeline. Temporary warning signs shall be used during construction while crossing facilities such as foreign pipelines or other utilities where permanent signs are impractical.

Warning signs shall be installed within 60 days of completion of construction or within a lesser period if clear evidence of construction no longer exists.

Signs should be installed beside buried pipe without causing damage to the pipeline.

Pipeline Markers shall be installed on the pipeline for every 100 meters and all horizontal turning points.

Pipeline warning signs and marker posts shall be in accordance with DP-OPSON-0150 [1].

5 Isolation Systems

Isolation valve assemblies may be either underground or above ground. Subject to type of construction and materials used, each facility shall be provided with:

a) Adequate structural support to prevent excessive stress on station and inlet/outlet piping.

b) A protective railing or fence or crash protection to prevent damage from farm or other machinery.

c) Security measures to prevent unauthorized operation of valves and other equipment.

d) Where appropriate, a suitable protective housing to prevent malfunction of control devices due to inclement weather conditions and to prevent accelerated corrosion of such devices.

Isolation valves shall be strategically located to permit damaged or ruptured segments of distribution pipeline to be isolated for repair without the need to shut down the entire distribution system. Selection of location of isolation valves shall consider following:

- The number and type of consumers who would be isolated from the supply
- Line-pack capability of the downstream system, and the terrain.

Considering greater flexibility of PE pipelines, the use of squeeze-off isolation procedure may be adopted since the isolated segment can be more restricted. However, the suitability of

selected pipe for squeeze-off procedure shall be assessed, if selected pipe is not sufficient to withstand the stresses imposed by the squeeze-off procedure and the use of isolation valves may be preferable in these cases.

Typical isolation valve assembly details are provided in Appendix A.

Crash protection, fencing, windsocks, access control, lighting and CCTV camera systems shall be in accordance with DP-OPSON-0150 [1]

6 Pipeline Safety and Risk Zones

Where PE pipelines run within designated DUSUP corridors, consideration shall be given to the impact these pipelines have on existing Land Use Planning and risk zoning (generated via Quantitative Risk Analysis (QRA) techniques). Further details of such risk zoning can be found in DUSUP Guidelines for Land Use Planning - DP-OPSON-0144 [5].

Where the pipeline runs outside of designated corridors in isolation i.e. 1 pipeline section per trench route, there is no requirement to apply the above Land Use Planning criteria. Low pressure PE pipelines may be permitted to be laid in the Right of way, Public way and in unfenced sections without the requirement of a QRA type analysis. However, should multiple PE pipeline sections (>1) be laid per trench route, DUSUP Technical Safety shall be consulted to determine if further risk analysis is required.

PE Pipeline safety requirements shall instead prescriptively conform to the IGEM/SR/18 standard for Safe Working Practices to Ensure the Integrity of Gas Assets and Associated Installations [12]. This standard outlines the management procedures and safety precautions affecting the design, construction, maintenance and demolition of services, structures and other works in the vicinity of gas assets.

7 Pipeline Corridor /Corridor Fence

PE pipelines normally used for low pressure distribution network and run parallel to the local road network. Hence there will not be a defined dedicated pipeline corridor and fencing for the protection of pipeline. PE pipelines shall be installed outside the RoW unless otherwise approved by RTA for installing the pipelines within the RoW.

8 Pipeline Integrity Management

The integrity of PE pipeline shall be ensured by correct design, material selection, sound construction practices and appropriate programmes of operation, maintenance and monitoring. Similar to steel pipeline, the integrity management should be risk based with inspection strategy developed based on risk assessment and seeking guidance from manufacturer.

In general, PE pipelines are more vulnerable to mechanical damage caused by excessive soil induced stresses. Therefore, in geographic areas where poor soil stability and very wet soil conditions are present, pipe damage may pose a greater risk than in areas where flat and drier terrain is present.

Any pipe sections that have to be removed from the service shall be sent for destructive testing. Destructive test results in combination with risk analysis can be used for evaluating probability of failure and remaining life assessment.

Protection devices, including actuators, associated instrumentation and control systems should be checked to ensure adequate condition, verification of installation, accuracy of setting, adequacy of activation and the occurrence of any leaks.

8.1.1 Operating Envelop

Operating factors that can increase the risk of pipe deterioration for PE pipelines include:

- High temperature operation;
- Cyclic pressure operation;
- Higher pressure operation, with the presence of a small margin difference (i.e.<10%) between the operating pressure and the manufacturer's MPR.

The presence of routinely occurring pressure cycles in a pipeline system can lead to premature pipe degradation. Pipeline operator shall maintain the operating pressure / temperature envelop and pressure cycles within the limits specified the pipe manufacturer.

8.1.2 Non-destructive Testing

The options for non-destructive examinations of PE pipelines are limited than for steel pipelines. Pipeline Operator shall consider following tests in consultation with experts wherever possible for determination of condition of in-service pipeline without the need to perform cut-outs:

- Periodic radiography
- Evisive Microwave Transmission (EMT)

8.1.3 Pressure Testing

Pipeline operator shall consider periodic pressure test to verify the integrity of a PE pipeline using either N2 or service fluid at pressure less than the design pressure. If pipeline is tested using service fluid, associated risk must fully be evaluated.

8.1.4 Pipe Cut-outs

Any pipe sections that have to be removed should be sent for analysis of properties and appearance. Laboratory analysis should provide an indication of how the pipe is standing up to the service environment. Burst testing of removed pipe samples provides a method of integrity assessment. Additional testing of pipe samples to measure pipe properties allows a comparison of existing versus the specified new pipe properties. Existing properties can be used for estimating the probability of failure.

8.1.5 Patrolling

Patrolling schedule shall be such that entire network is inspected at least once in a day to observe surface conditions, construction activity, encroachments, soil wash outs and any other factors that may affect the safety and operation of the network.

8.1.6 Closed Visual Inspection

Closed visual inspection of all accessible points shall be carried out at least once a year.

8.1.7 Cathodic Protection (CP)

External corrosion protection is required where steel couplers or steel pipe risers are installed in combination with PE pipelines, which is typically accomplished by providing an external coating and by installing a sacrificial anode.

The ability to monitor the CP performance may not always be possible for underground couplers; however, this can be accomplished by installing CP test post.

8.1.8 Leakage Surveys

Operating company must have an effective method to identify and locate leakages in the system. Any one or combination of methods described in ASME B 31.8, Appendix M can be adopted based on their effectiveness for the specific areas. Highly congested areas shall be surveyed using gas detectors at least once in three months. Other less congested areas shall be surveyed at least once a year. Leakage Surveys using gas detectors shall be done in accordance with the requirements of ASME B 31.8. Gas detectors, duly calibrated, shall be available at all times in ready use conditions for emergency surveys and use.

8.1.9 Depth of Burial Survey

Depth of burial survey shall be carried out using metal detectors at least once for every two years or immediately after heavy rains for identifying soil washed-out areas.

8.1.10 Pipeline Emergency Repair

Damaged or defective plastic pipe shall be cut and replaced with new pipe. Repair of damaged plastic pipe by using repair patches is not permitted.

Location where squeezing and reopening is done once shall be marked appropriately to identify that the pipe has been squeezed and reopened. Squeezing of reopened pipe at the same location is not permitted. Minimum distance between consecutive squeeze-off locations shall not be less than 5 m.

Based on the risk assessment, sufficient quantity of emergency repair kits and spares along with pre-qualified jointing procedures shall be maintained in stock.

9 Pipeline NOC Management

DUSUP-DPE operates a No Objection Certificate (NOC) system across the Emirate of Dubai through Government of Dubai e-NOC portal operated by Roads and Transport Authority (RTA). The NOC System is in place in Dubai to review and pre-approve any work on a Public Way or in the Right of Way or to create any Traffic Diversions. The same system is also used to review, approve and set conditions for monitoring and controlling third parties activities in the vicinity of onshore pipelines.

For further details, refer to DP-OPSON-0162, DUSUP Guidelines for NOC Management and Work Supervision [6]

For new distribution networks off of DUSUPs-DPE transmission network, a Gas In / Commissioning NOC shall be included on top of the Information, Design and Construction NOCs as detailed in DP-OPSON-0162 [6]. The Gas In / Commissioning NOCs shall include but not be limited to the following:

- Scope of Commissioning
- Pre Start Up Safety Review
- Method Statement
- Risk Assessment (including QRA)

10 Pipeline Emergency Management

In the event of any emergency within the pipeline network, the affected pipelines owner shall be responsible for the coordination of the emergency response actions. It includes the following actions:

- Manage the emergency at the location,

- Coordinate the emergency response actions with government emergency departments,
- Inform DUSUP Gas Control Station.
- DUSUP GCS (Control room) will contact control rooms of pipelines owners having pipelines on the affected corridor and inform about the emergency situation.

For serious incident of any nature (medical, fire, gas release, spill, security, etc.) that requires personnel, equipment or resources to support the response from third party and government entities, DPE GCS (Control room) will contact control rooms of pipelines owners having pipelines on the affected corridor and inform about the emergency situation. The internal escalation shall be actioned according to each pipeline owner's internal procedure.

11 Dusup Guidelines

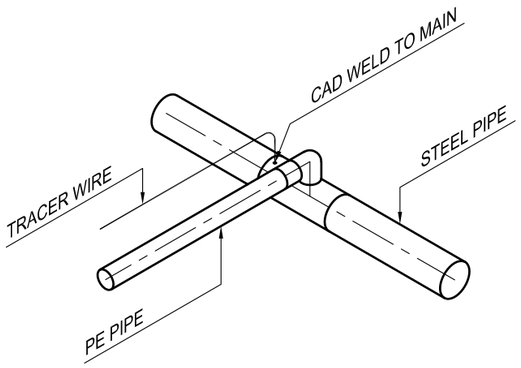
Various Guidelines for DUSUP/DPE Onshore pipelines are being developed for internal and external use. Reference is made to following publically available guidelines (www.dusup.ae):

- DUSUP Guidelines for Trial Pits, DP-OPSON-0148
- DUSUP Guidelines for Hydrocarbon Pipeline Protection, DP-OPSON-0150
- DUSUP Guidelines for Road & Rail Infrastructure Crossing Pipelines, DP-OPSON-0152
- DUSUP Guidelines for Road & Rail Infrastructure Parallel to Pipelines, DP-OPSON-0144
- DUSUP Guidelines for Utilities Crossings Hydrocarbon Pipelines DP-OPSON-0158
- DUSUP Guidelines for Land Use Planning Consultation Zone, DP-OPSON-0160
- DUSUP Guidelines for Structures Close to DUSUP Corridor, DP-OPSON-0188
- DUSUP Guidelines for Dewatering Works, DP-OPSON-0187
- DUSUP Guidelines for Hydrocarbon Pipeline Integrity Management, DP-OPSON-0148

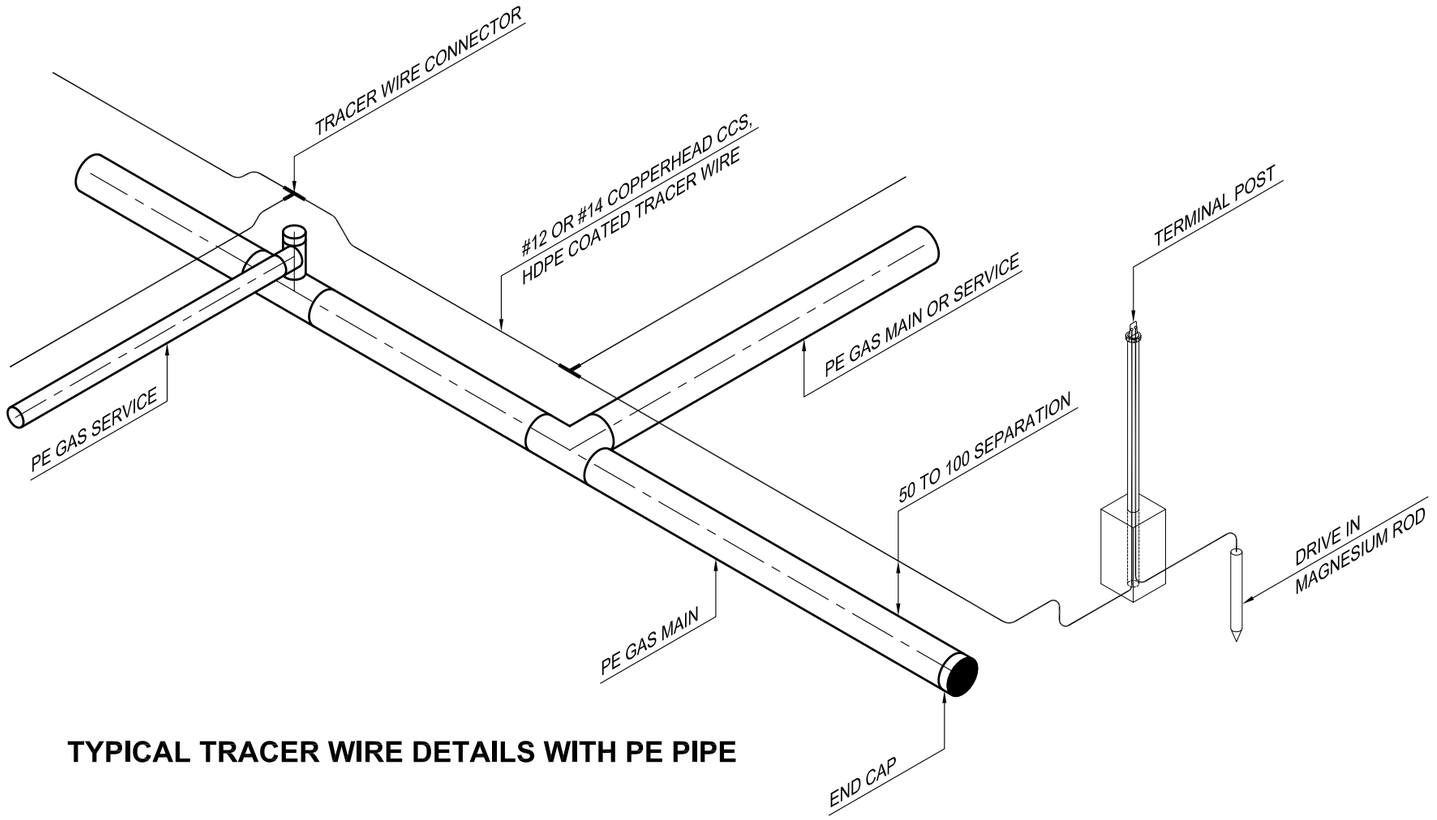
Reference can be made to following internal guidelines also:

- DUSUP Guidelines for NOC Management and Work Supervision, DP-OPSON-0148
- DUSUP Guidelines for Hydrocarbon Pipeline Patrolling, DP-OPSON-0170

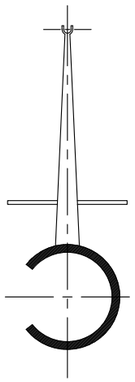
APPENDIX A: STANDARD / TYPICAL DRAWINGS



TYPICAL STEEL TO PE CONNECTION NETAILS



TYPICAL TRACER WIRE DETAILS WITH PE PIPE



TYPICAL SPACER

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. INSTALL TRACER WIRE ALONG THE PIPE ABOVE OR TO THE SIDE OF THE PIPE. CONTACT WITH THE PIPE IS ALLOWED BUT SHALL BE MINIMIZED. SPACER SHOWN IN FIGURE OR ANY OTHER ARRANGEMENT CAN BE FOLLOWED TO MAINTAIN THE GAP.
3. TRACER WIRE MUST BE PROPERLY GROUNDED AT ALL DEAD ENDS. GROUNDING SHALL BE ACHIEVED BY USE OF 1KG DRIVE-IN MAGNESIUM GROUND ROD WITH A MINIMUM OF 6M OF LEAD WIRE.
4. SPACER DIMENSIONS TO BE VERIFIED WITH MANUFACTURER.

Rev.	Date	Revision Description	Drawn	Checked	Approved
0	18.08.2022	First Issue	BV	RRN	RRN

Dubai Supply Authority

STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL LAYOUT DETAILS OF TRACER WIRE

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
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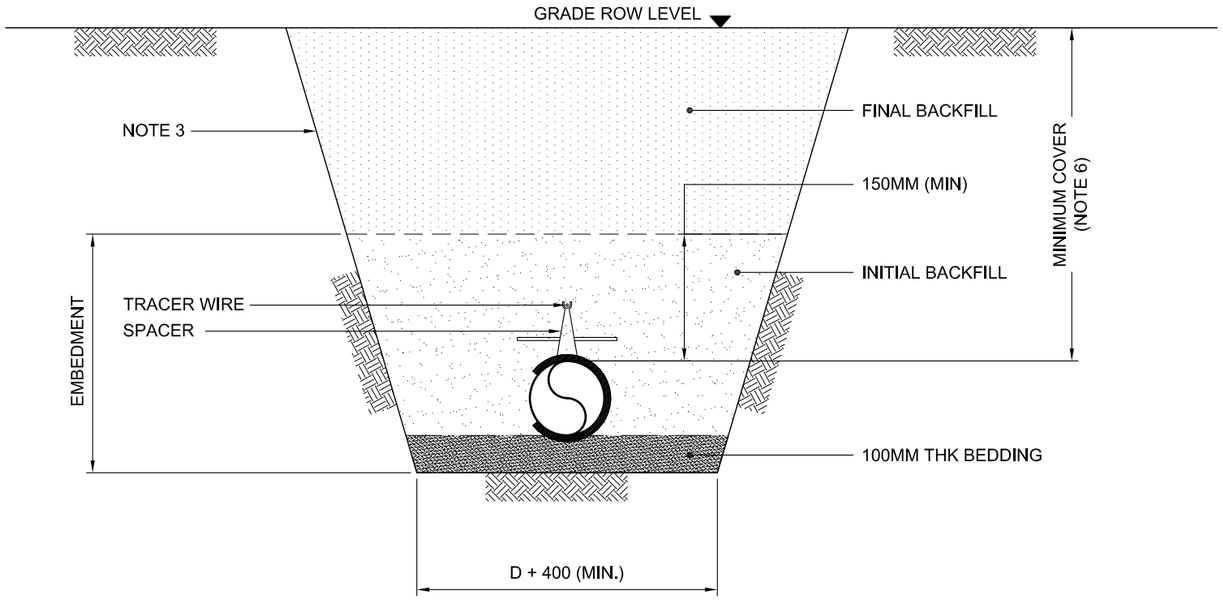

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. BEDDING IS NOT REQUIRED IN CASE OF SOFT SOILS.
3. SLOP OF THE TRENCH SHALL BE ON LOCAL SOIL CONDITIONS AND SAFETY REQUIREMENTS.
4. UNIFORMLY GRADED SAND SHALL BE USED FOR INITIAL BACKFILLING.
5. LOCAL EXCAVATED SOIL MAY BE USED FOR FINAL BACKFILLING.
6. MINIMUM COVER SHALL BE AS PER TABLE 3.1 OF DUSUP GUIDELINE/ SPECIFICATION

Rev.	Date	Revision Description	Drawn	Checked	Approved
0	18.08.2022	First Issue	BV	RRN	RRN

Dubai Supply Authority

STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL OPEN TRENCH

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
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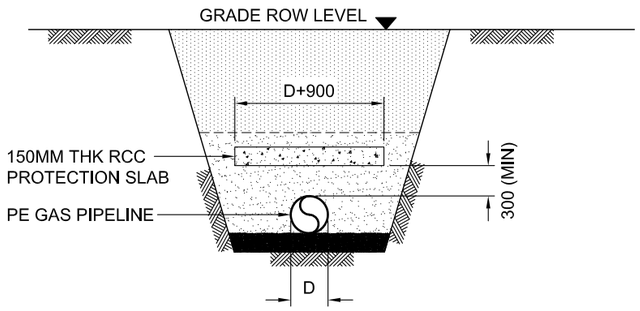
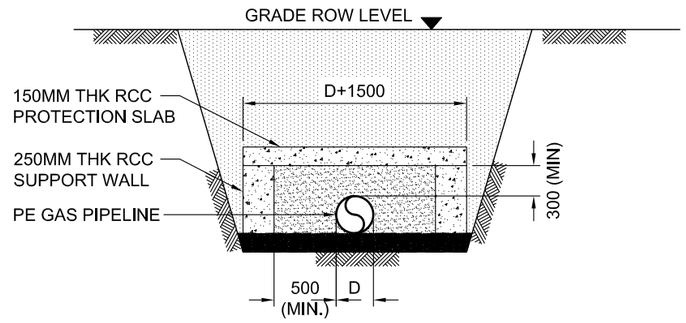
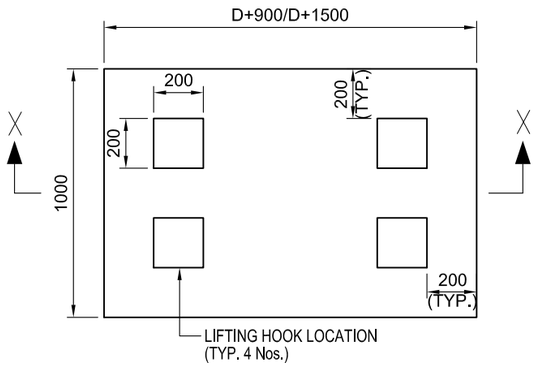


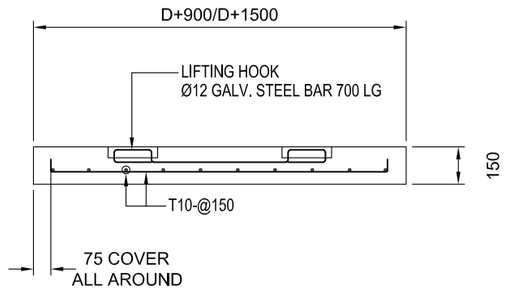
PROTECTION - SLABS



PROTECTION - SLABS WITH SUPPORTS



PROTECTION SLAB DETAILS



SECTION X-X

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. SLAB REINFORCEMENT DETAILS ARE TYPICAL. CONTRACTOR SHALL VERIFY BASED ON LOADS ACTING THE LOCATION.
3. REINFORCEMENT IS NOT REQUIRED FOR VERTICAL STUBS.

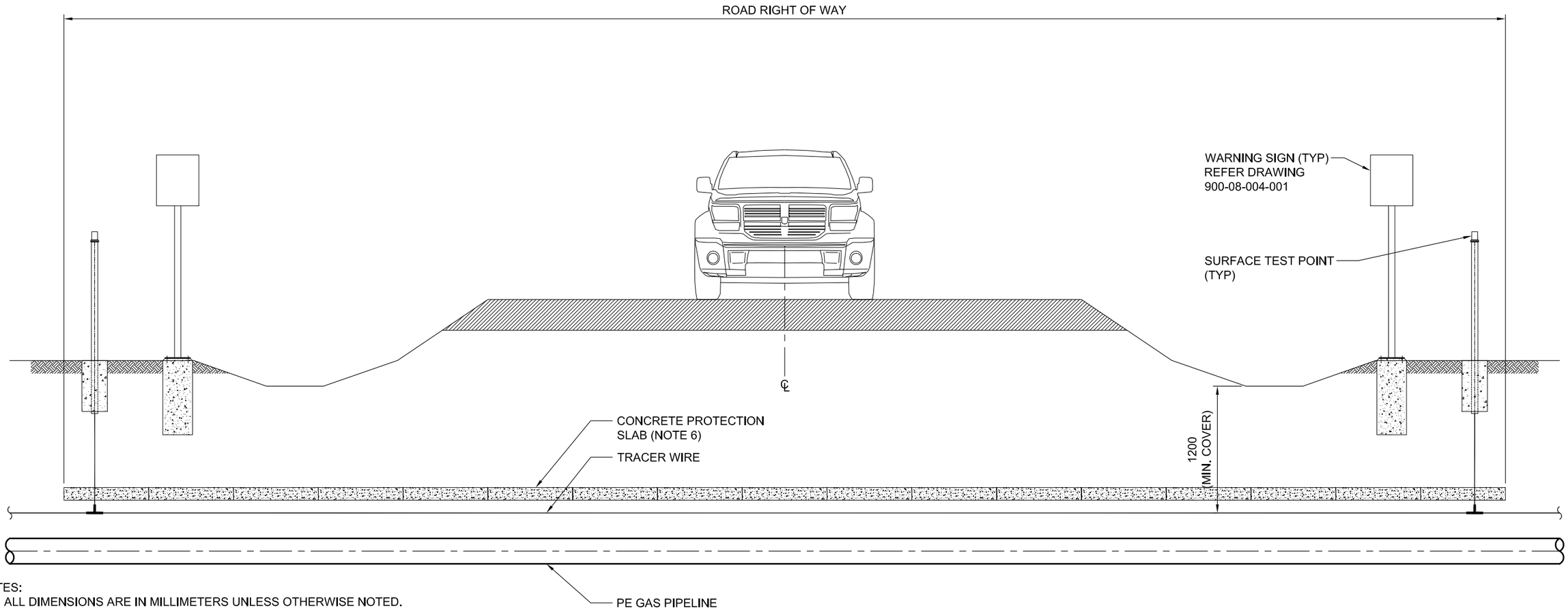
Rev.	Date	Revision Description	Drawn	Checked	Approved
0	18.08.2022	First Issue	BV	RRN	RRN

Dubai Supply Authority

STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL ADDITIONAL PIPELINE PROTECTIONS

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
900-08-070-001-R0 TYPICAL ADDITIONAL PIPELINE PROTECTIONS - SLABS.DWG	A3	AS SHOWN	900	08	070	001	001	0

AutoCAD® File Location : R:\900 - General\08 Civil, Structural, Buildings\900-08-070-001-R0 Typical Additional Pipeline Protections - Slabs.dwg
Printed By : varghb August 18, 2022 - 9:29am



NOTES:

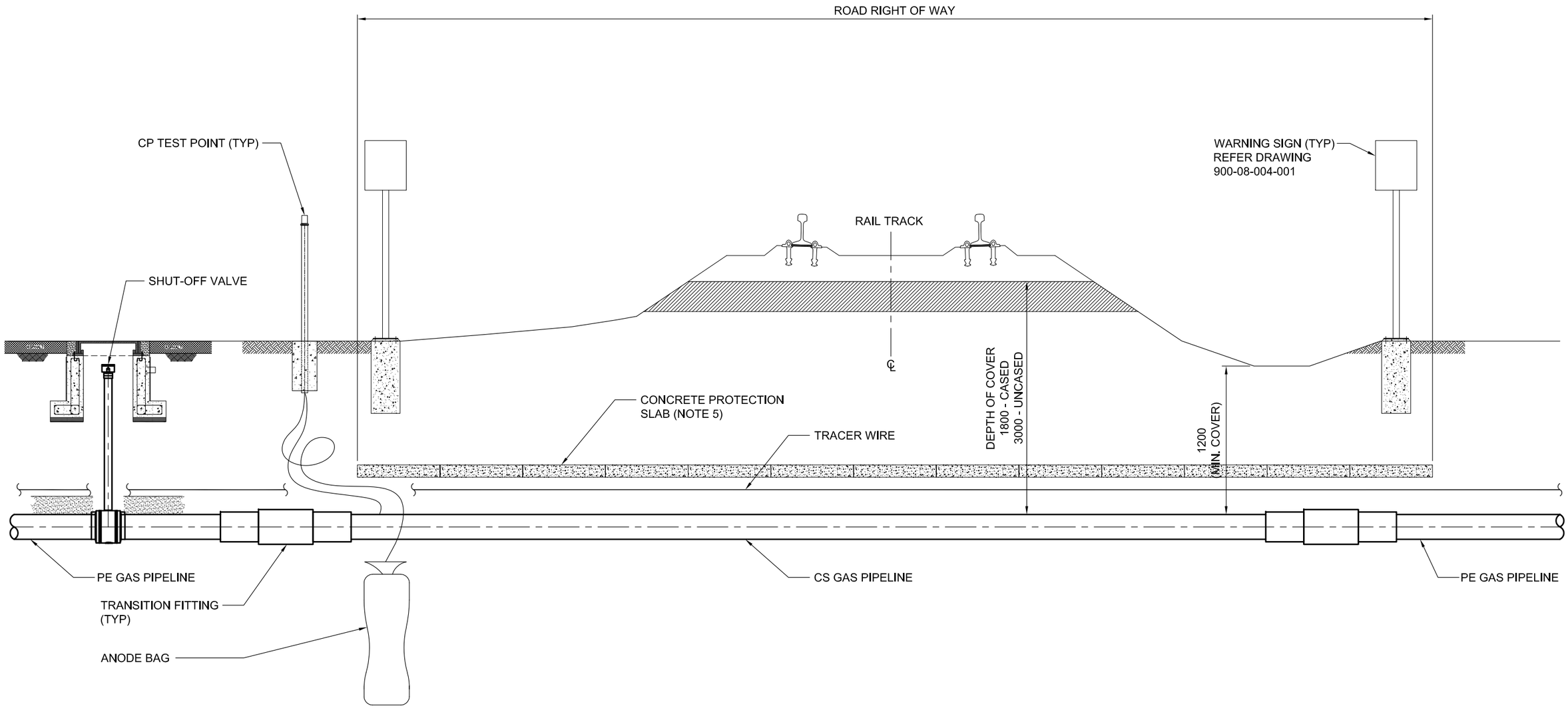
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. MINIMUM COVER AS PER TABLE 3.1 OF DUSUP GUIDELINE/ SPECIFICATION SHALL BE MAINTAINED FOR ENTIRE WIDTH OF RIGHT OF WAY (ROW)
3. TRACER WIRE SHALL BE LAID CONTINUOUSLY ACROSS THE ROW AND WHERE PRACTICAL, CAN BE BROUGHT TO THE SURFACE IN A PROTECTIVE SLEEVE ON ONE SIDE OF THE ROW.
4. TRACER WIRE IS NOT A MANDATORY REQUIREMENT IF ROAD CROSSING IS PROVIDED WITH METAL SLEEVE.
5. TRACER WIRE CAN BE TERMINATED ON EITHER SIDE OF THE ROAD WITH A TERMINAL BOX / TEST POST IF A ROAD CROSSING IS CONSTRUCTED BY NDRC TECHNIQUE.
6. REFER TO 900-08-070-001 FOR TYPICAL CONCRETE SLAB DETAILS. CONTRACTOR SHALL REVIEW THE DESIGN AND SLAB DETAILS SHALL BE MODIFIED TO ENSURE THE PROTECTION OF PIPELINE

Rev.	Date	Revision Description	Drawn	Checked	Approved
0	05.09.2022	First Issue	BV	RRN	RRN

Dubai Supply Authority

STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL ROAD CROSSING DETAILS (OPEN CUT)

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
900-08-071-001-R0 TYPICAL ROAD CROSSING DETAILS.DWG	A3	AS SHOWN	900	08	071	001	001	0



NOTES:

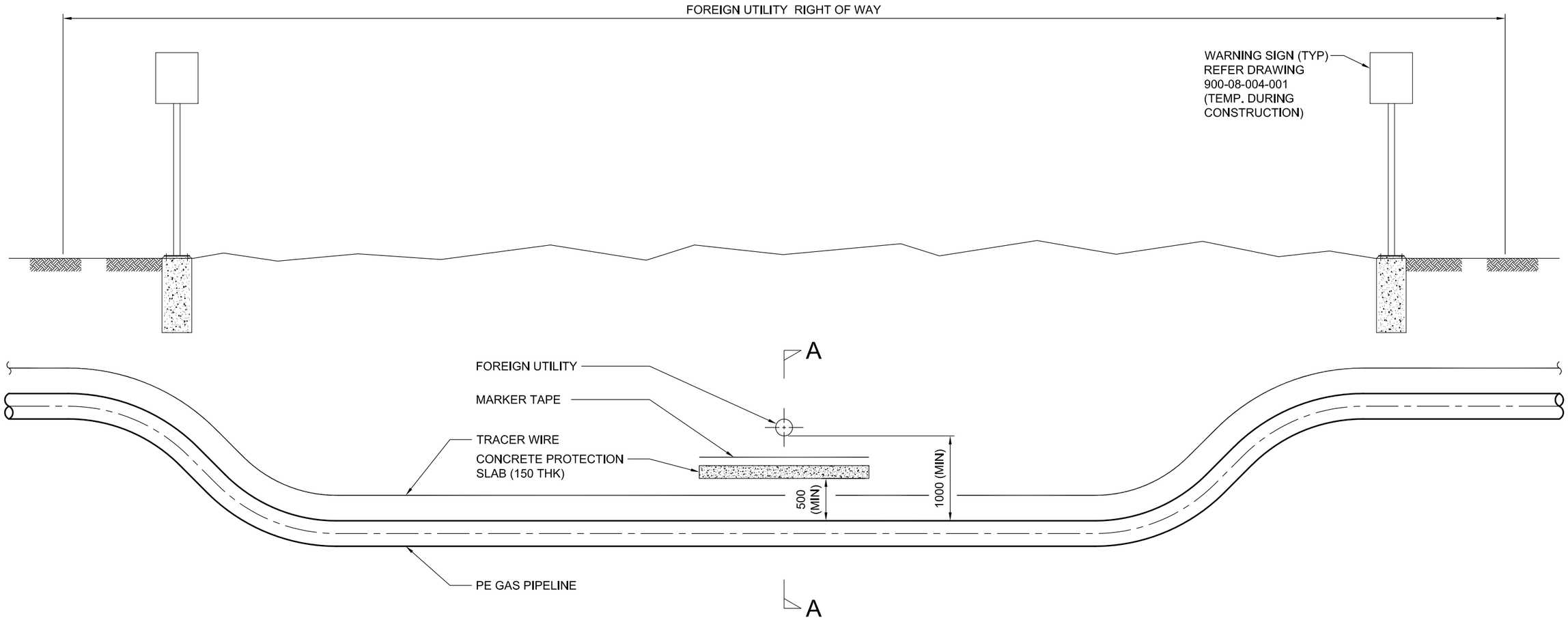
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. CROSSING MATERIALS MAY BE EITHER UNCASED STEEL CARRIER PIPE COVERED WITH SUITABLE COATING AND CATHODIC PROTECTION OR CASED PE WITH STEEL CASING. MATERIALS TO BE SPECIFIED IN CONSULTATION WITH RAILWAY OWNER.
3. SHUT-OFF VALVES ARE TO BE LOCATED WITHIN EFFECTIVE DISTANCES FROM RAIL CROSSING FOR EMERGENCY SHUT-DOWNS.
4. REFER TO DRAWING 900-08-077-001 FOR TYPICAL VALVE CHAMBER DETAILS
5. REFER TO 900-08-070-001 FOR TYPICAL CONCRETE SLAB DETAILS. CONTRACTOR SHALL REVIEW THE DESIGN AND SLAB DETAILS SHALL BE MODIFIED TO ENSURE THE PROTECTION OF PIPELINE

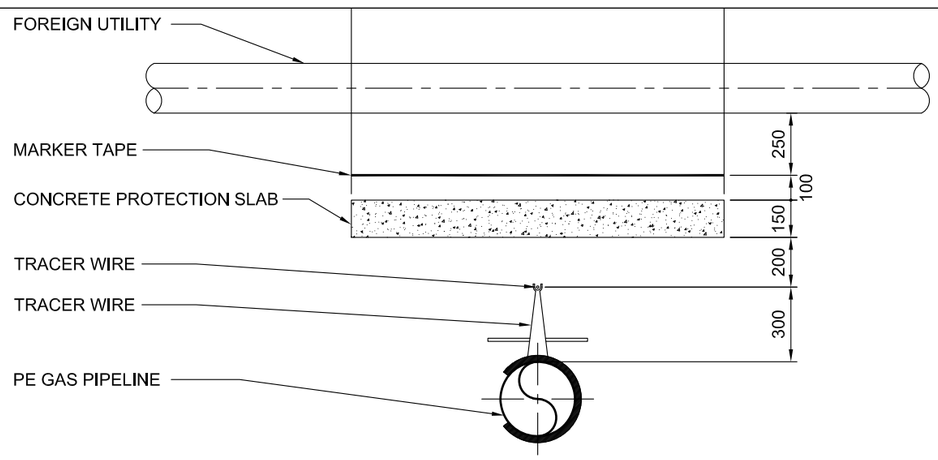
Rev.	Date	Revision Description	Drawn	Checked	Approved
0	05.09.2022	First Issue	BV	RRN	RRN

Dubai Supply Authority

STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL RAIL CROSSING DETAILS

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
900-08-072-001-R0 TYPICAL RAIL CROSSING DETAILS.DWG	A3	AS SHOWN	900	08	072	001	001	0





SECTION A-A
SCALE=1:25

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

Rev.	Date	Revision Description	Drawn	Checked	Approved
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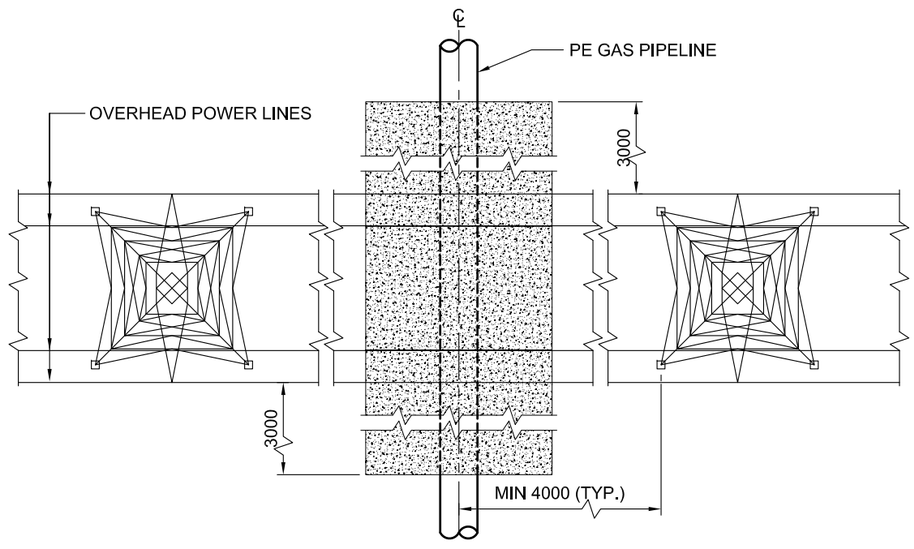
Dubai Supply Authority

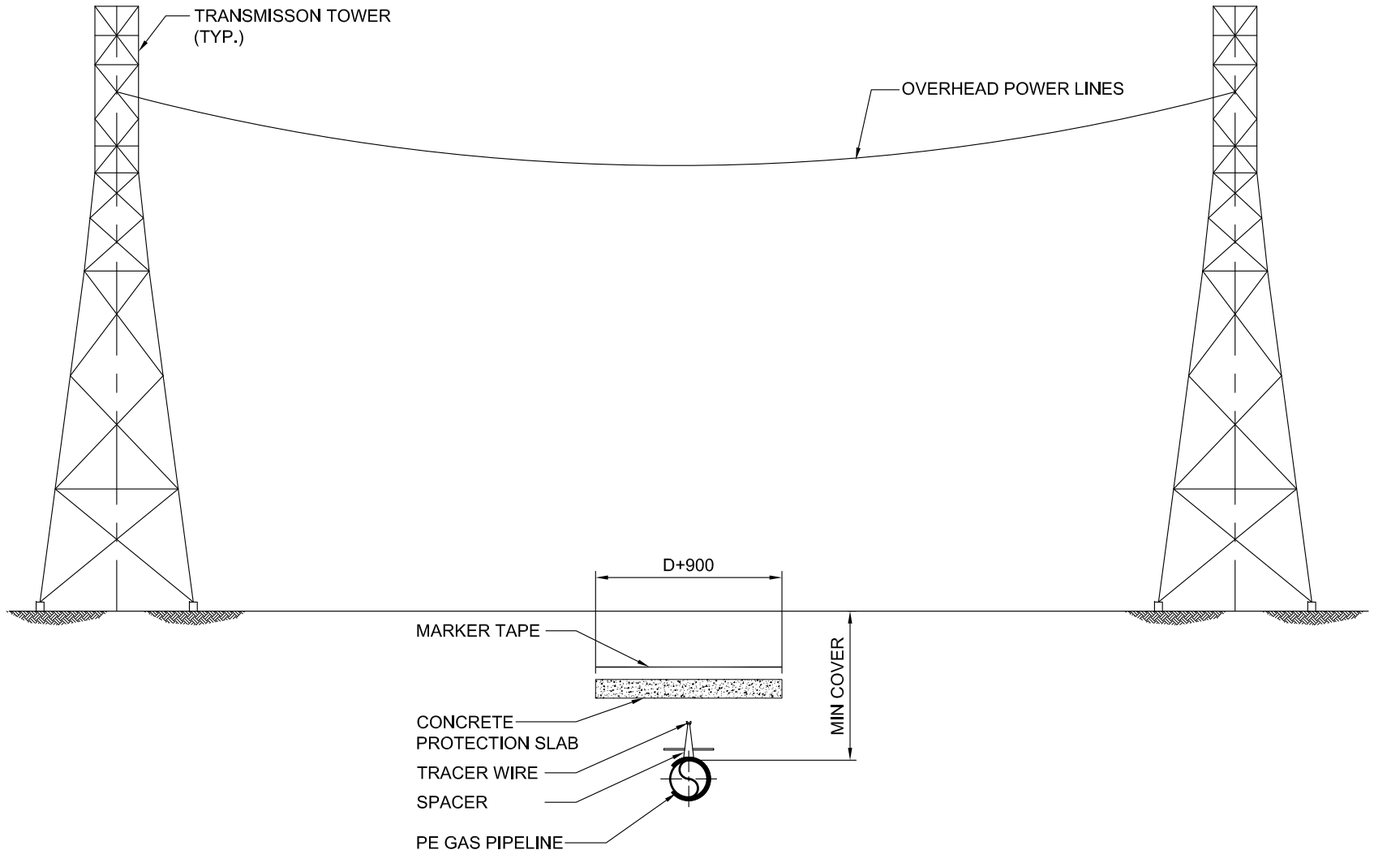
STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL CROSSING DETAILS AT UTILITIES

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
900-08-073-001-R0 TYPICAL CROSSING AT UTILITIES.DWG	A3	1:50	900	08	073	001	001	0

AutoCAD®File Location : R:\900 - General\08 Civil, Structural, Buildings\900-08-073-001-R0 Typical Crossing at Utilities.dwg
Printed By : varghb August 19, 2022 - 12:47pm



PLAN VIEW



SECTIONAL VIEW

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. REFER TO 900-08-070-001 FOR TYPICAL CONCRETE SLAB DETAILS.
3. MINIMUM COVER SHALL BE AS PER TABLE 3.1 OF DUSUP GUIDELINE/ SPECIFICATION

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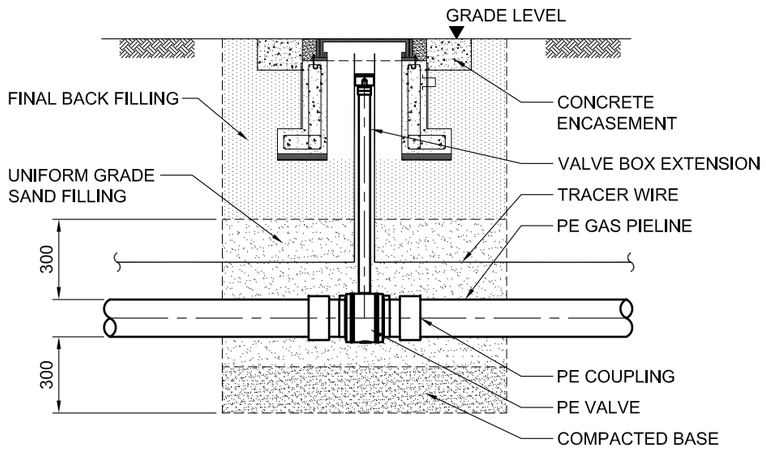
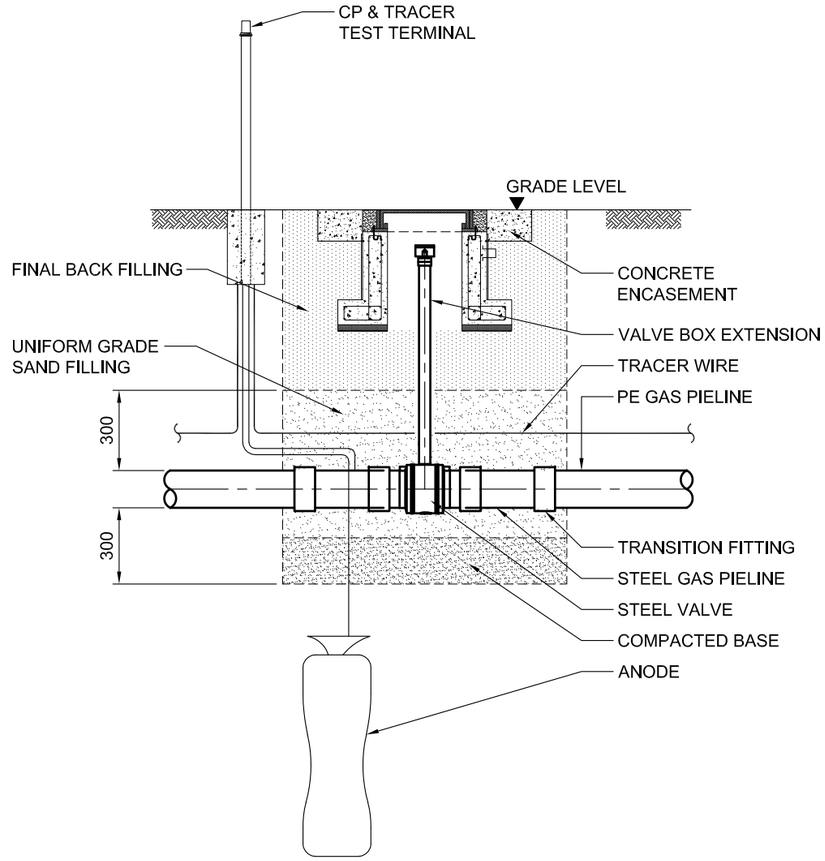
Dubai Supply Authority

STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL OVERHEAD POWER CABLE CROSSINGS

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
900-08-074-001-R0 TYPICAL OVERHEAD POWER CABLE CROSSINGS.DWG	A3	1:50	900	08	074	001	001	0



UNDERGROUND PE VALVE



UNDERGROUND STEEL VALVE

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. SAND PADDING ABOVE PIPELINE SHALL BE PROVIDED
3. CONCRETE SLAB IS REQUIRED FOR LARGER VALVES ONLY.
4. REFER TO DRAWING 900-08-077-001 FOR TYPICAL VALVE CHAMBER DETAILS

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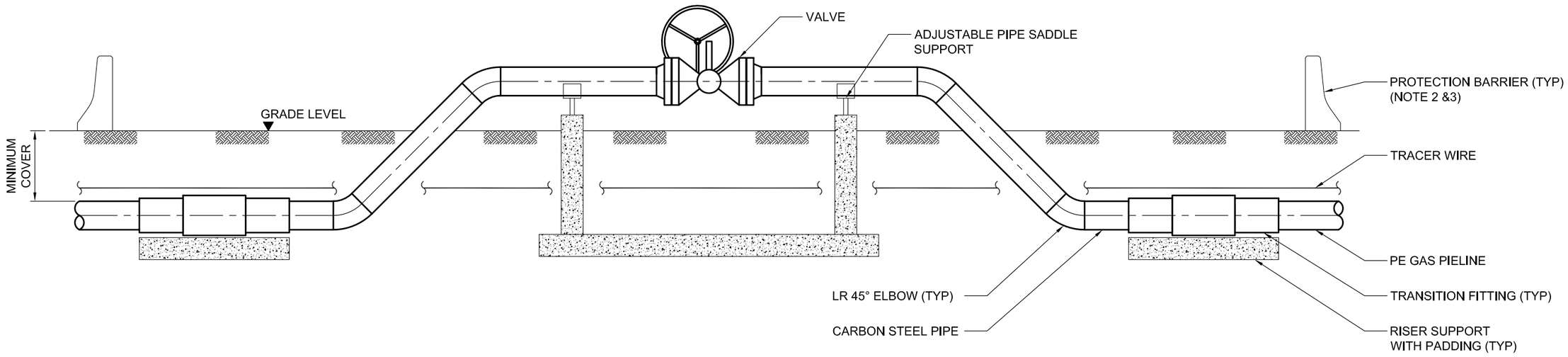
Dubai Supply Authority

STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL U/G ISOLATION VALVE ASSEMBLY

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
900-08-075-001-R0 TYPICAL UG PE ISOLATION VALVE ASSEMBLY.DWG	A3	AS SHOWN	900	08	075	001	001	0



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. ADEQUATE BARRIER /FENCE PROTECTION SHALL BE PROVIDED TO ABOVEGROUND INSTALLATIONS BASED ON THE LOCATION AND RISK ASSESSMENT.
3. REFER TO 900-08-024-001 FOR TYPICAL VEHICLE PROTECTION BARRIER DETAILS.
4. MINIMUM COVER SHALL BE AS PER TABLE 3.1 OF DUSUP GUIDELINE/ SPECIFICATION.
5. REQUIREMENT OF ABOVE GROUND SUPPORTS DEPENDS ON SIZE OF VALVE AND STRESS ANALYSIS.

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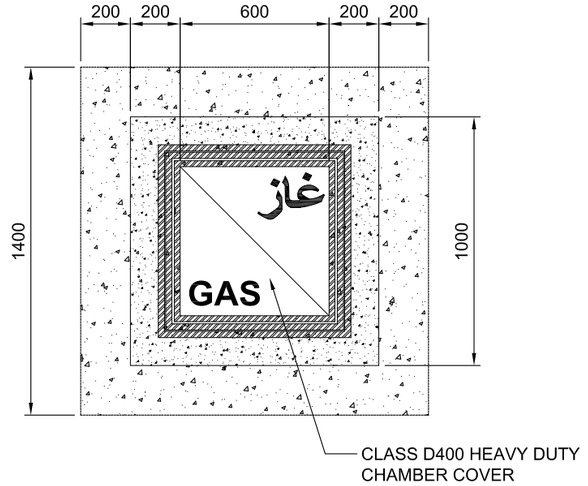
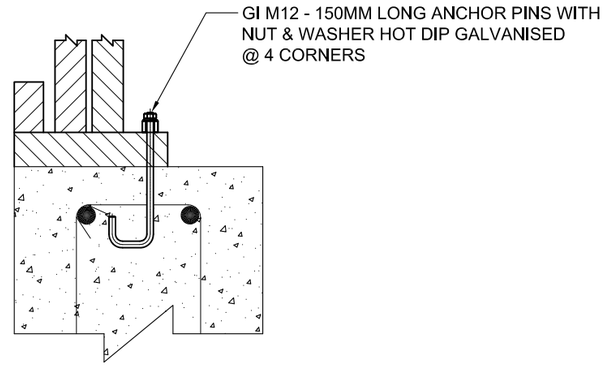
Dubai Supply Authority

STANDARD DRAWING
PROTECTION OF PE PIPELINES
TYPICAL A/G STEEL ISOLATION VALVE ASSEMBLY

CAD File Name	Size	Scale	Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
900-08-076-001-R0 TYPICAL AG STEEL ISOLATION VALVE ASSEMBLY.DWG	A3	AS SHOWN	900	08	076	001	001	0

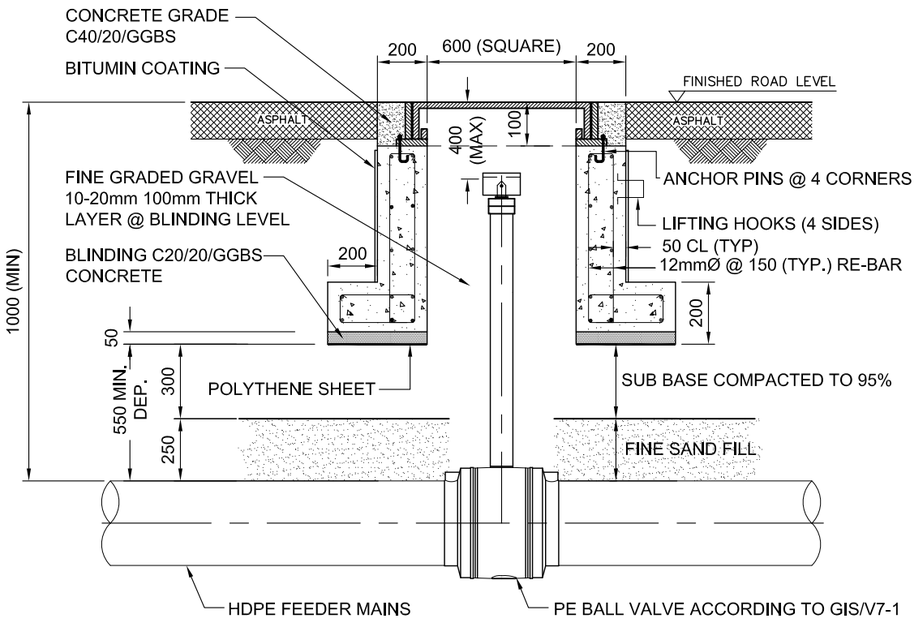


VALVE CHAMBER LAYOUT



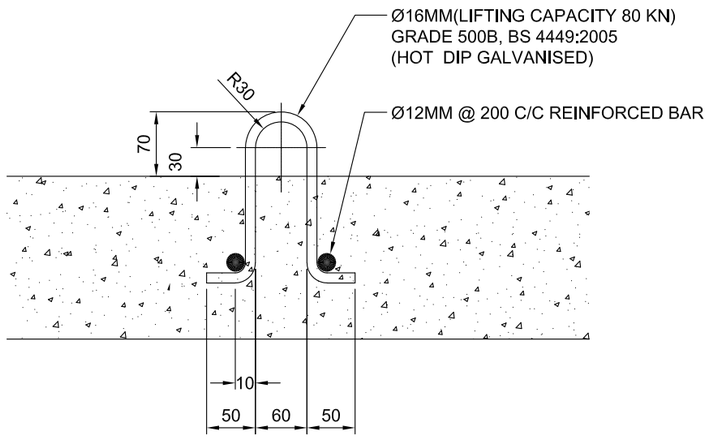
DETAIL-1

(ANCHOR PIN ENLARGE VIEW)



SECTION

(TYPICAL PE-BALL VALVE INSTALLATION AT MAINS / SERVICES
Ø125MM PE100 SDR11 PIPE)



DETAIL-2

(LIFTING HOOKS DETAIL)

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. DESIGN CALCULATION FOR VALVE PIT WAS SUBMITTED SEPARATELY.
3. DETAIL OF GAS CHAMBER COVER AS PER MATERIAL SUBMITTAL.
4. CONCRETE PROTECTION FOR THE VALVE WALL ARRANGEMENT IS AS PER GEOTECHNICAL REPORT RECOMMENDATION.

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Dubai Supply Authority

CAD File Name	Size	Scale
900-08-077-001-R0 PE VALVE CHAMBER DETAILS.DWG	A3	AS SHOWN

STANDARD DRAWING
TYPICAL PE VALVE CHAMBER
INSTALLATION DETAILS

Area Code	Doc Code	Serial No.	Sheet of	Sheets	Rev. No.
900	08	077	001	001	0

AutoCAD®File Location : R:\900 - General\08 Civil, Structural, Buildings\900-08-077-001-R0 PE Valve Chamber Details.dwg
Printed By : varghb August 19, 2022 - 10:37am