Engineering Standard

SAES-T-928 28 May 2012

Telecommunications - OSP Buried Plant

Document Responsibility: Communications Standards Committee

Saudi Aramco DeskTop Standards

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Previous Issue: 20 May 2009 Next Planned Update: 11 April 2014

Revised paragraphs are indicated in the right margin

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1 Scope

This standard prescribes minimum mandatory requirements governing the direct burial of telecommunication outside plant facilities.

2 Conflicts and Deviations

Any deviations, providing less than the mandatory requirements of this standard require written waiver approval as per Saudi Aramco Engineering Procedure SAEP-302.

3 References

All referenced Specifications, Standards and Codes, Forms, Drawings and similar material shall be of the latest issue (including all revisions, addenda and supplements) unless stated otherwise. Listed below are applicable standards.

3.1 Saudi Aramco References

Saudi Aramco Engineering Procedure

SAEP-302	*Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Requirement*

Saudi Aramco Engineering Standards

SAES-B-008	*Restrictions to Use of Cellars, Pits and Trenches*
SAES-B-064	*Onshore and Nearshore Pipeline Safety*
SAES-B-068	*Electrical Area Classification*
SAES-L-450	*Construction of On-Land and Near-Shore Pipelines*
SAES-L-460	*Pipeline Crossings Under Roads and Railroads*
SAES-M-100	*Saudi Aramco Building Code*
SAES-Q-006	*Asphalt Concrete Paving*
SAES-T-018	*Telecommunications - Symbols, Abbreviations and Definitions*
SAES-T-624	*Telecommunications Outside Plant Fiber Optics*
SAES-T-629	*Communications - Buried Cable and Wire*
SAES-T-632	*Communications Cable Splicing*
SAES-T-634	*Cable Testing and Identification*

SAES-T-887	*Telecommunications Electrical Coordination Protection at Power Plant and Radio Stations*
SAES-T-903	*Telecommunications Outside Plant Electrical Protection & Grounding*
SAES-T-906	*Telecommunications - Structural Coordination*
SAES-T-911	*Communication Conduit and Manholes*
SAES-T-912	*Communications Feeder Cable*
SAES-T-914	*Communications Distribution Cable*
SAES-T-938	*Telecommunications: Outside Plant, Systems Design*

Saudi Aramco Standards Drawings

AA-036748	*Buried Telephone Cables/Distribution Wires - Installation Details*
AB-036897	*Buried/Underground Cable Route Marker Post and Signs*

Saudi Aramco General Instructions

GI-0002.100	*Work Permits*
GI-0002.710	*Mechanical Completion and Performance Acceptance of Facilities*
GI-0002.716	*Land Use Permit Procedure*
GI-0887.000	*Coordination of Saudi Aramco Projects with Non-Saudi Aramco Agencies*
GI-1021.000	*Street and Road Closure: Excavations, Reinstatement and Traffic Controls*

3.2 Industry Codes and Standards

American National Standards Institute

ANSI C2	*National Electrical Safety Code (NESC)*

National Fire Protection Association

NFPA 70	*National Electrical Code (NEC)*

National Electrical Manufacturers Association

NEMA TC 8	*Extra Strength PVC Plastic Utilities Duct for Underground Installation*

Rural Utility Service (formerly REA)

RUS PE-39	*Specification for Filled Telephone Cables*
RUS PE-89	*Specification for Filled Telephone Cables with Expanded Insulation*
RUS PE-90	*Specification for Totally Filled Fiber Optic Cable*

4 Definitions

Fixed Separations: Separation requirements established by the National Electrical Safety Code.

Random Separation: In random Separation, there is no planned separation between telecommunication facility and other utilities. Contact is permitted between telecommunication facility and other utilities.

Flush-Type Construction: Flush-type construction involves out of sight installation of all cables, closures, splices, service wires and loading coil cases.

Directional Drilling Method: Installing conduits for telecommunication systems by using surface operated drilling device. The device is angled into the ground from the surface and directed to its destination by remote control. The directional drilling method is using the HDPE (High Density Poly-Ethylene) pipes and allows for steering around existing obstacles (utilities in the vicinity of the crossing location) where the other method only allows straight paths.

5 General Requirements

5.1 Outside Plant (OSP) Designer Reference

The BICSI Outside Plant Design Reference Manual (current version) is hereby recognized as the referenced detailed design information. Design drawings shall use conventional symbols as specified in SAES-T-018 Telecommunications – Symbols, Abbreviations and Definitions and BICSI.

5.2 Outside Plant (OSP) Designer Certification Requirements

All OSP telecommunications system designs by non-Aramco design offices (such as GES Contractor,LSTK, etc.) must be done under the design authority of a valid/current BICSI Registered Communications Distribution Design (BICSI RCDD and/or OSP Specialty) to ensure that a minimum level of competency has been provided in the telecommunications infrastructure and OSP cable system design. For external design contractors, the RCDD and/or OSP shall be a direct employee of that company. All related design drawings must be stamped by the

RCDD and/or OSP specialist before the package can be issued for Construction (IFC).

5.3 All cable splicing operation must be performed by a certified cable splicer. The cable splicer/technician shall have at least Saudi Aramco cable splicing certified or equivalent.

5.4 The random separation in joint buried trench method with power facilities is not permitted within Saudi Aramco; Table 2 highlights the required separation distance between the communications cable and other infrastructure components.

5.5 All other known or proposed subsurface utilities or structures shall be identified (By review of Saudi Aramco Drawings and Coordination with Utilities, etc.) and shown on the construction drawings during the engineering/design stage. Any subsurface utilities or structures not identified during the engineering/design stage, but identified during the excavation/construction stage shall be added to the as-built drawings. All telecommunication facilities shall be properly identified using Saudi Aramco SAES-T-018, Telecommunications - Symbols, Abbreviations and definitions.

5.5.1 Prior to the use of any land or right of way for the placement of buried cable, a Saudi Aramco Land Use Permit shall be processed in accordance with General Instruction GI-0002.716, "Land Use Permit Procedure" and approved by the Manager of the Facilities Planning Department. Prior to starting any work, all required work permits shall be obtained in accordance with GI-0002.100, "Work Permit System. Coordination with non Saudi Aramco agencies shall be handled in accordance with GI-0887.000, "Coordination of Saudi Aramco Projects with non Saudi Aramco Agencies".

5.5.2 The expected thermal, chemical, electrical, mechanical, and other environmental conditions or hazards at the location shall be identified and action taken to protect all telecommunication facilities from damage. Before engineering any facilities in or near a hydro carbon handling/processing plant, obtain electrical area classification maps. Refer to SAES-B-068 for more details.

5.6 All excavations and reinstatements in paved areas shall comply with SAES-Q-006 "Asphalt Concrete Paving" and with GI-1021.000, "Street and Road Closure: Excavations, Reinstatement and Traffic Controls". The trench detail area designated "Zone B" in this Saudi Aramco General Instruction shall be back filled with "clean sand" or "select fill material".

5.7 Shoring of excavation walls and other required safety precautions shall be implemented for trenches more than 1.2 m deep.

5.8 All direct buried cables and buried service wires shall be of the filled core type and comply with RUS PE-39 or RUS PE-89 or RUS PE-90. Air core cables shall not be used for direct burial purposes or sections installed in conduit.

5.9 Only appropriate material shall be used when preparing the cable for splicing. Petrochemical materials used as fuel (such as Kerosene or Gasoline) shall not be used for cleaning the cables. Refer to SAES-T-632 for more details.

6 Design

6.1 Buried Cable

Providing the procedures outlined in this standard are adhered to, it shall not be necessary to berm and stabilize buried cable trench routes. However, should the prevailing conditions at a particular location (i.e., active sand areas) indicate that the buried cable trench should be bermed or stabilized for retention of cover, the back-fill shall be stabilized with marl, other stable material, or weathered crude oil as outlined in SAES-L-450, "Construction of Offshore Pipelines".
In pipeline areas, stabilized pipeline berms could be used as an indication of where it may be necessary to consider stabilizing cable trench cover.

6.1.1 When rock is encountered, the excavation in rock shall be made to provide the minimum earth cover in accordance with paragraphs 6.5 & 6.6. For this purpose, rock is described as a material that requires special equipment, such as rock breakers, rock saws, etc., to do the excavation work. Refer to SAES-M-100, "Saudi Aramco Building Code".

6.1.2 The trench bottom shall be:

a) Cleared of rock, rock protrusions and other items that could damage the cable,

b) Uniformly graded and a minimum of 50 mm depth bed of clean sand (such as pure sand, sweet sand, fine sand or soft sand) shall be placed in all open (non-plowed) trench bottoms.

6.1.3 Orange colored marker/identification tape shall be placed in the trench above the cable and the specification shall be in accordance with Standard Drawing AA-036748, "Buried Telephone Cable/Distribution Wire - Installation Details". The following black legend shall be printed on the tape in both Arabic and English: "CAUTION! - TELECOMMUNICATION CABLE BELOW)". Marker posts and signs

shall be placed in accordance with Standard Drawing AB-036897, "Buried/Underground Cable Route Marker Posts and Signs".

6.1.4 On long straight runs of buried cable, marker posts shall be placed no further than 100 meters apart. This is to clearly indicate the route and to warn the public and other workmen of the presence of the buried cable. Marker posts shall be placed at the ends of conduits used at roads, railroad, pipeline, and utility crossings, and at changes of direction and at 30 meters spacing within plant areas.

Commentary Note:

Marker posts may be placed every 300 meters providing that the adjacent marker shall be seen from any post.

6.1.5 Four inch (4 in.) PVC conduit (NEMA TC 8, type DB) as specified by SAES-T-911 shall be placed at all road or street crossings, and at railroad crossings. Each end of the conduit shall extend a minimum distance of one meter beyond the edge of pavement and must be sealed/plugged in accordance with SAES-T-628. A minimum of one spare conduit (for maintenance and repair purposes) shall be placed at each crossing.

Commentary Note:

Roads here means all paved roads and maintained dirt roads.

6.1.6 Direct buried cable shall be placed in a four inch (4 in.) PVC conduit (NEMA TC 8, type DB) below concrete or asphalt that has been placed for driveways, alleyways, pedestrian traffic ways, soil stabilized locations (banks & trenches), paved parking areas, material laydown areas and plant areas. A spare conduit may be placed in addition to the initial conduit if specified by the design engineer. It shall extend one (1) meter beyond the edge of the pavement or concrete at each end. This conduit shall be placed as specified by SAES-T-911. All conduit ends must be sealed/plugged in accordance with SAES-T-628.

6.1.7 Buried feeder cables, if used, shall be sized in accordance with SAES-T-912 and SAES-T-938.

6.1.8 Buried distribution cables shall be sized to meet the ultimate or maximum expected requirements in accordance with SAES-T-914 and SAES-T-938.

6.1.9 Loops in excess of 5.5 km shall be loaded. The H-88 cable loading system is used on Saudi Aramco standard exchange cables. The following standard spacing accuracy applies:

a) The average load coil spacing shall be within 2% of the standard spacing 1830 m for H-88.

b) Each individual deviation shall be less than 2% of the average spacing.

c) The average of the individual deviations from the average spacing shall be less than 0.5% of the average spacing.

A transmission data sheet showing transmission calculations shall be included with all designs involving loaded cables.

6.1.10 Bonding, grounding and protection of buried telecommunication cable facilities shall be in accordance with, SAES-T-903.

6.1.11 Bonding and grounding requirements and all other construction details necessary to meet transmission and protection (Electrical Stress Exposure, etc.) requirements shall be specified on the construction drawings.

6.2 Roadways Crossing

Where it is not possible to provide an open trench, when constructing a conduit system, such as at crossings of railroads and major highways or freeways, etc., thrust bore method or directional drilling method shall be used.

6.2.1 Thrust Bore Method

Four four-inch (4 in.) PVC conduits (NEMA TC-8, type DB) shall be placed in a steel casing (pipe) pushed through the ground to facilitate the cable at the crossing (Refer to Table-1 below). Upon completion of the conduit installation, the casing must:

a) Be filled with fine sand, blown in under air pressure,

b) Have the inside of both casing ends sealed with a minimum of 75 mm wall of concrete.

6.2.2 Casing Wall Thickness

The minimum wall thickness of the casing shall be as required by the highway or railroad proponent but never less than three-sixteenths inch.

6.2.3 Number of Conduits per Casing

Table #1 provides an indication of the number of conduits that can be installed inside different casing sizes. The minimum cover over the casing in railroad crossings shall be 1.4 m as specified in SAES-L-460, "Pipeline Crossings under Roads and Railroads", unless greater cover is required by the high or railroad proponent. (Refer to SAES-T-906 also).

6.2.4 Concrete Encasement with Other Utilities

Telecommunication cables/service wires shall not be placed inside the same concrete encasement with power facilities or other underground utilities.

6.2.5 Directional Drilling Method

6.2.5.1 Directional drilling shall be using the HDPE (High Density Poly-Ethylene) pipes with 4.0-inches inside diameter.

6.2.5.2 The pipes at the crossing will not be connected to other underground communications conduit system.

6.2.5.3 HDPE pipes shall be Mandrel testing in both directions.

6.2.5.4 The pipes at the crossing shall be placed with a minimum cover of 1200 mm.

6.3 Separation from Power Lines

6.3.1 Buried cable installations shall be designed in all cases so that power induced voltages in the metallic member telecommunication cable do not exceed recognized safety and operation margins. For design information, refer to SAES-T-887.

6.3.1.1 Where buried metallic member telecommunication cables run parallel or cross under aerial power lines, the same induced voltage limitation as in paragraph 6.3.1 shall apply.

6.3.1.2 In addition, when metallic member buried cables cross under aerial power lines (as near as possible to 90 degree angle) which exceed 15 kV (phase to phase) the design shall be such that the cable shall be protected for the worst case power fault condition. Refer to SAES-T-887.

6.3.2 Telecommunication cables and power cables shall not be directly buried together in the same trench by the "Random Separation" method. Fixed separation as specified in Table 2 and paragraph 6.3.2.1 is required.

6.3.2.1 Separations between buried power facilities (power cable, power pedestals etc.) and metallic member telecommunication cables shall not be less than 300 mm of well tamped earth. In areas where this is not possible, 75 mm of concrete or 100 mm of masonry is required. Concrete and masonry separation shall have a width of 400 mm and extended 500 mm beyond each side of the cable trench line. The cable should cross as near as possible to 90 degree angle.

6.3.2.2 Where the power exposure at the crossing is greater than 15 kV phase to phase, buried metallic member telecommunication cables shall be placed inside a buried (4 in.) NEMA TC 8 DB conduit. Each end of the conduit shall extend a minimum distance of 1.5 meter from the power cable.

6.3.2.3 When a metallic member telecommunications cable is buried under aerial power lines having a phase to phase voltage of more than 15 kV, the cable must be placed in a buried 4 in. NEMA TC 8 DB conduit under the aerial power line. The conduit shall extend for a distance of 2-times the power line height on each end of the crossing.

6.3.2.4 Telecommunication cables shall not be in the same trench with a power cable having a phase-to-ground voltage of more than 20 kV.

6.4 Separation from Other Subsurface Utilities

6.4.1 Separation between subsurface facilities or structures (water, gas, sewer, CATV, etc.) and buried telecommunication cables when paralleling shall be 300 mm.

6.4.2 Minimum separations at crossing shall be 150 mm.

6.5 Minimum Cover Requirements for Copper Buried Cables

All direct buried telecommunication cables (except fiber optic cables see 5.8 and SAES-T-624) shall be placed not be less than 600 mm from the top of the cable. In the latter situation, it is required that a minimum of 50 mm bed of "clean sand" be placed in the bottom of the trench. The cable shall be placed on the sand bed, and covered with either 150 mm of additional "clean sand" or with

"select fill material" as defined in SAES-M-100, "Saudi Aramco Building Code". The top 100 mm of the trench shall then be filled with 3000 psi concrete. Refer to Saudi Aramco Standard Drawing AA-036748 for further details.

6.6 Minimum Cover Requirements for Fiber Optic Cables

Direct buried fiber optic cables shall be placed with a minimum cover of:

a) 1200 mm, when placed with no added protection.

b) 250 mm to 760 mm, in rock areas, when placed inside concrete encased conduit (refer to SAES-T-911 and Standard Drawing AA-036748).

6.7 Separation from Oil Field Pipelines

Pipelines as referenced in this section means hydrocarbon pipelines and other oil field pipelines (pipelines located outside plant area fences) used in the operation of the oil business.

6.7.1 Crossing Pipeline Corridors

All telecommunication cables that are installed across pipeline corridors shall be placed below the pipes inside concrete encased buried conduits which have been installed in accordance with SAES-B-064, SAES-T-911 and this standard:

a) The minimum vertical distance between the bottom of any pipe and the top of the concrete encased conduit bank shall be 1.0 m.

b) The concrete encased conduits shall be continuous and at the same elevation with respect to the natural grade across the entire width of the pipeline corridor.

c) The conduit system shall be identified by placing an orange marker tape above the conduit concrete encasement surface. The marker tape is to be located 300 mm minimum below grade and 300 mm minimum above the conduit system upper surface.

Commentary Note:

The directional drilling method may be used to place communications HDPE conduit system for installation of cables under pipelines corridors. The minimum vertical distance between the bottom of any pipeline in the corridor and the top of the HDPE pipes shall be 1.2 m. A written approval from Saudi Aramco, Pipeline Operations Engineering Superintendent and Saudi Aramco, Communications Engineering Division of IT is required.

6.7.2 New Pipelines Crossing Existing Cables

When new pipelines cross existing telecommunication cables or conduits, the telecommunications cable(s)/conduits shall be provided the same mechanical protections and separations as outlined above. Coordinate with the Saudi Aramco, Communications Engineering Division of IT to get prior approval.

6.7.3 Cables Crossing Over Pipelines

In situations where it is impractical to place telecommunication cables below pipelines as required above, telecommunication cables may be buried on top of the pipeline provided:

a) One meter separation [may be reduced to no less than 300 mm if approved per item c) below] is maintained between the top of all subsurface pipelines and the bottom of the buried concrete encased telecommunications conduit structure,

b) The standard ground cover can be maintained above the buried concrete encased telecommunication conduit structure, and

c) This design variation is approved in writing by the Saudi Aramco, Pipeline Operations Engineering Division Superintendent and the Saudi Aramco, Communications Engineering Division of IT.

6.7.4 Coordination

When a buried cable design involves the installation of a telecommunication cable across or inside a Saudi Aramco pipeline corridor, the design and installation of the cable shall be coordinated with Saudi Aramco, Pipelines Operations Engineering Division, Cathodic Protection Unit. Construction in other areas, which have cathodic protection systems, shall also be coordinated with the proponent of the cathodic protection system.

6.7.5 Where it is necessary to install sections of conduit, they shall be installed in accordance with conduit standards, SAES-T-911.

6.7.6 Paralleling Pipeline

a) Service point (manhole, pedestal, buried splice, etc.) shall not be closer than 25 m to any pipeline in the corridor (refer to SAES-B-064). When locating service points, the engineer must be sure to take into consideration the location of proposed or future

pipelines as determined by coordination with the pipeline's proponent.

b) Telecommunications cables shall not be closer than 5 m to any pipeline when crossing roads, streets, wadi and railroads.

Exception:

Where pipeline corridors have not been established, telecommunication cables shall be placed a minimum distance of 3 meter from the pipeline.

6.7.7 Cables Crossing Wadi

A Telecommunication cable (e.g., copper twisted pair, fiber optic, coaxial) route shall be designed and constructed such that the cable will be protected from disturbances (e.g., washout, displacement, damage) as a result of the wadi becoming active due to the flow of water and debris. Consideration shall be given to the design and construction of wadi(s) cable route crossing to avoid disturbances to other structures that support soil erosion and flood control systems.

The protection provided (e.g., additional depth, concrete encased conduit, cover with grid wire and large aggregate or using the Directional Drilling Method) to the cable route shall be designed and constructed on a case-by-case basis to insure that each cable route crossing is protected for the life of the cable. The cable route crossing shall be designed in such a manner as not to create a hindrance to the natural water shed of the wadi and the surrounding area.

The cable depth shall be maintained as specified in paragraph 6.6 "Minimum Cover Requirements for Fiber Optic Cables" above.

6.8 Exchange Buried Facilities - Flush Construction

In cases where flush construction method is needed, the cable installation shall also be in accordance with the other portions of this SAES as well as the rest of the SAES-T Series.

6.9 Exchange Buried Facilities - Terminal/Pedestal Installation

6.9.1 Bonding Terminal Housings

Where a terminal housing/pedestal is located within 3 m of an electrical supply terminal or transformer housing, a minimum of No. 6 AWG (16 mm^2) solid copper wire shall be used to bond the telecommunication terminal housing to the equipment ground. The connection to the

equipment ground shall be made by the Power Distribution Department personnel. Refer to Saudi Aramco Standard Drawing AA-036748.

6.9.2 When telecommunication cables are buried parallel to buried power facilities (in a joint or separate trench) with fixed separation (one meter or less), and, where there is no requirement for a telecommunications pedestal/terminal, a telecommunication cable may be buried past distribution power transformers/terminals etc., without placing a telecommunications pedestal/terminal solely for the purpose of bonding the cable shield to the power ground. However, ensure that the ground potential rise (GPR) exposure does not exceed 50% of the cable core-to-sheath dielectric rating and no point on the cable is more than 150 m from a bond to the power ground.

6.9.3 In areas where a terminal housing/pedestal is subject to disturbance/damage from vehicles, etc., it shall be protected with a pedestal guard. These have typically been constructed of steel pipe. Where pedestal guards are constructed of steel pipe or other metallic materials they shall be bonded to the pedestal with a No. 6 AWG (16 mm^2) solid copper wire. The copper ground wire shall be attached to a metallic post of the pedestal guard (using cadweld method or an approved mechanical connector) at a point 50-75 mm above the concrete encasement of the metallic post base.

6.9.4 In terminal housings, splice closures, pedestals, etc., the shields and armors of all cables and service wires shall be bonded together, grounded, and be continuous throughout. Refer to SAES-T-903 for bonding and grounding details.

6.10 Length Restriction for Buried Service Wire (BSW)

6.10.1 The length of an individual buried service wire shall (see paragraph 6.9.2) not exceed 150 m.

6.10.2 On the occasions where there is a legitimate reason for placing a longer buried service wire, lengths up to 300 m are permitted provided it is included in the loop resistance/transmission calculations (refer to SAES-T-938). Cable shall be used when the distance exceeds 300 m.

7 Installation

Buried telecommunication cables shall be installed in accordance with the requirements of this standard, SAES-T-629 and other applicable codes and standards as referenced in Section 3 above. Construction in or near Hazardous or Classified areas shall comply with SAES-B-008, SAES-B-068, ANSI C2 (NESC), NFPA 70 (NEC), and other

applicable codes and standards. The Saudi Aramco Construction Safety Manual, the SAES-B & O Series, GTE 603 series and, in general all safety and security requirements shall be complied with. In addition, the installation of all cables shall comply with general requirements related to land use, clearances, road or pipeline crossings, etc.

8 Testing and Inspection

8.1 The testing and acceptance of buried telecommunication cables shall be done in accordance with SAES-T-634. Quality assurance inspections shall be performed during all phases of construction by an Saudi Aramco Inspection Department Inspector.

8.2 Inspection Department Notification: The Saudi Aramco Inspection Department shall be notified two working days prior to beginning any construction or testing so that all necessary inspections can be scheduled. The Inspection Department shall be notified two working days prior to backfilling any trenches or starting any acceptance testing.

9 As-Built Drawings

As-Built drawings shall be updated daily by field installation forces. As-Built drawings and acceptance tests results shall be provided to and approved by the Saudi Aramco Communications Engineering Division of IT before the Mechanical Completion Certificate (MCC) is approved.

Revision Summary

11 April 2009	Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor changes.
28 May 2012	Editorial revision to change the primary contact.

Table 1 – Casing Size Requirements, when 4-Inch Conduits are Used

Number of Conduits to be placed	Casing Size Required Inside Diameter (In Inches)
4	13
6	16
7	16
8	20
9	20
10	22
11	22
12	22
13	24
14	26
15	26
16	26
17	26
18	26
20	30

Table 2 – Minimum Separation Chart

	Buried Telecommunication Cables	
Between	**Parallel**	**Crossing**
Buried Power	300 mm of well-tamped soil, 75 mm of concrete, or 100 mm of masonry	300 mm of well-tamped soil, 75 mm of concrete, or 100 mm of masonry
Water and Sewer Lines; CATV & Instrumentation Cables, etc.	300 mm	150 mm clearance with supports on each side of crossing under
Oil Field Pipelines (Outside Of Plant Areas)	Telecommunications service point (manhole, pedestal, buried splice, etc.) shall not be closer than 25 m to any pipeline in the corridor. Parallel separation for cables in pipeline corridors will be per proponent approval via land use permits.	1000 mm below in concrete encased conduit
	Telecommunications cables shall not be closer than 5 m to any pipeline when crossing roads, streets, wadi and railroads.	
(Where pipeline corridors are not established)	Telecommunication cables shall not be closer than 1 m to any Pipeline	1000 mm below in concrete encased conduit
Oil Pipelines (Inside of Plant Areas)	300 mm minimum of well tamped soil	300 mm minimum of well tamped soil