CORRIDOR AND UTILITY STANDARD GUIDELINE

2020

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Terminologies

SOHAR: SOHAR Port and Freezone Company

FZ: SOHAR Freezone

ROW: Rights of Way

CR: Crossing

CL: Centerline

LV: Low Voltage

EHV: Electricity High voltage

SWRC: Seawater Retaining Channel.

Dia: Diameter

HH: Manholes

NOC: No Objection Certificate

Corridor and Utility Standard Guideline

Introduction

SOHAR Port and Freezone is rapidly developing as a world-class logistical pillar in the GCC region. Our developments complement Oman's long-term economic vision to create an economically diversified and sustainable nation. A part of that vision includes investing in modern, efficient and sustainable infrastructure as a foundation for stimulating further private investment and connecting vital industries and supply chains.

This has been the focus of our attention over the past years and our efforts have paid off following several recent additions to both our Port and Freezone. Within this process, we maintain our focus on meeting our tenants expectations in terms of utilities, which are mainly attributed to the direct support of all utilities' companies throughout all phases of our tenants' projects.

To better understand our tenants needs, we have studied the existing service corridors and their challenges to arrive at solutions that meet our integrated vision. The result are the first Corridor and Utility Standard Guideline.

SOHAR Port and Freezone

SOHAR Port and Freezone is a deep-sea port and free zone in the Middle East, situated in the Sultanate of Oman, 220km northwest of its capital Muscat. Located just outside the Strait of Hormuz, SOHAR Port and Freezone is an ideal location to conduct business, as it lies at the centre of global trade routes between Europe and Asia.

The Port houses three clusters: logistics, petrochemicals and metals. World-leading companies Vale, Air Liquid, Larsen & Toubro, Methanol Holding International and Jindal Power & Steel have been established at SOHAR Port and Freezone. Our independent terminals are operated by world-class companies, including C. Steinweg Oman for general cargo, a joint venture between Oiltanking and Odfjell for liquid cargo, and Hutchinson Whampoa for containers. The Freezone will further accentuate the Port's importance as a driver of economic growth in the Sultanate.

The development of the 4,500-hectare Freezone is planned in five phases. Due to its fit-to-suit incentives and value proposition, the Freezone is an ideal location for investors in the following clusters: semi-finished iron and steel products, plastics and rubber, chemicals, food and perishables, white goods and furniture and the automotive industry.

SOHAR Port and Freezone is a 50/50 joint venture between the government of the Sultanate of Oman, represented by the Ministry of Transport (MOT), and the Port of Rotterdam (Netherlands).

Corridor Guideline Objectives

The main objective of the guideline is to have unified corridors and ROW for all utilities by following best international practices. It is also to be used as guidance for future development at SOHAR Port and Freezone, to ensure tenants' utility requests are treated equally and consistently as per the guideline. It will also be useful for new engineers to gather data from day one, which will in turn help them gain technical experience in a short time frame. See Figure-1:

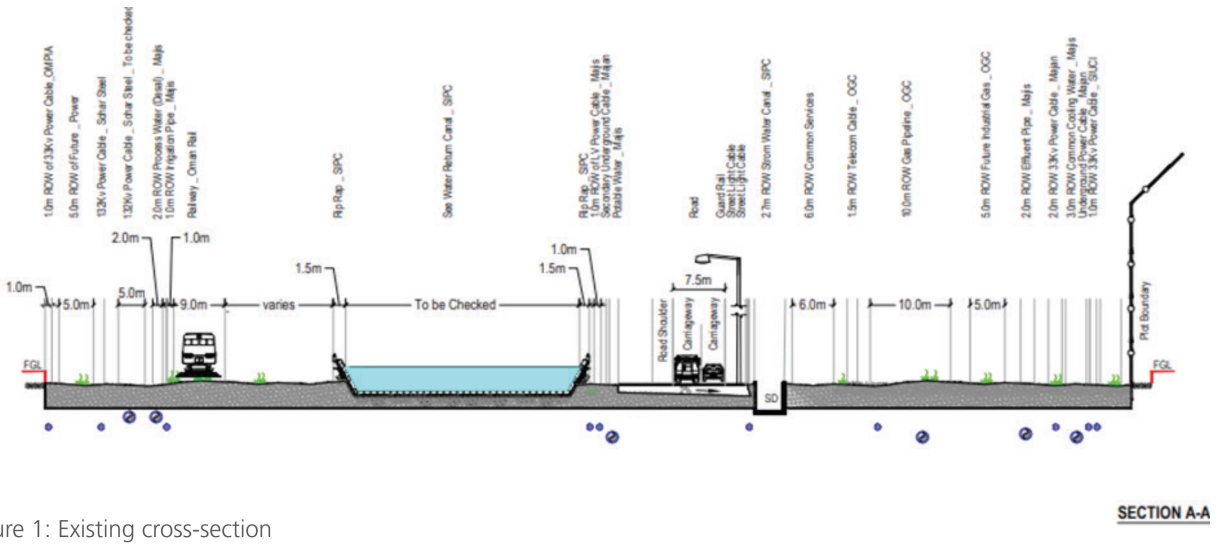

Figure 1: Existing cross-section

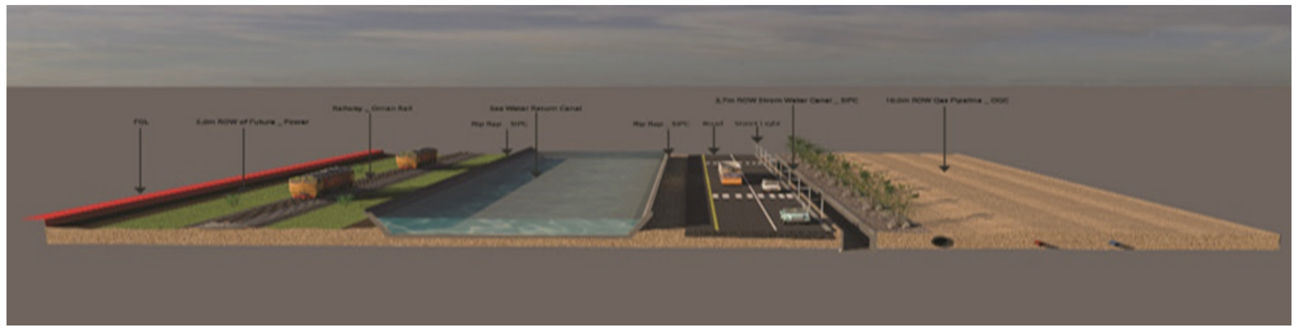

Figure 2: 3D design

Existing Corridor Definition

Corridors are defined as the spaces within the port area, excluding the individual tenant plots. Within each corridor, the defined rights of way are issued by SOHAR Port to utility providers or individual tenants to route the linear infrastructure that services the multiple plots within the port area. Each corridor within the port area has a unique alpha-numerical identifier. The types of utilities included within the SOHAR corridors are as follows:

Power	LV	11kv	33KV	132Kv	220 KV	400 Kv
Water	Potable	Irrigation	Cooling	Process	Influent	wastewater

Moreover, there are many product pipes corridor, natural gas, crude oil, telecom, fence, stormwater channel, seawater retaining channel and future railway corridor.

Rights-of-Way (ROW)

ROW is the passage along a specific route through the corridors, granted or reserved over land, for transportation, railway, canal, electrical transmission lines or oil and gas pipeline purposes.

Space Allocation

Normally, before any application, required data such as the number of cables or circuits /pipes, the diameter of each pipe, HH requirements, etc. must be sent in advance. In order to estimate the most conveniently required ROW, we follow the below table, which indicates the maximum and minimum recommended corridor width for each utility. See Table-1:

UTILITY TYPE	**Recommended /m**	
	Min	Max
Water		
Potable Waterpipe	0.5	1
Fire Waterpipe	0.5	1
Sewerage pipePipe	0.5	1
Irrigation pipePipe	0.5	1
Storm Drainage	1	1.2
Cooling pipePipe		(a)
Process Waterpipe	0.5	1
Telecom		
Fiber Optics	0.4	0.6
Power		
Street Lighting cable Cable (LV)	0.5	0.8
11 kv (b)	0.5 per circuit	1 per circuit
33 Kv(b)	0.5 per circuit 1 per circuit	1 per circuit
EHV 400 KV	1.5 m per circuit	
EHV 220 KV		
HV 132 KV		

Table 1

(a) Depends on pipe diametres. Example: if a pipe diametre is 1m, the ROW can be 2m and less.
(b) Depends on the number of cables

However, all utilities must be buried underground as per SOHAR Port and Freezone rules. There are exceptions in certain situations, provided that there are justifications that it needs to be above ground. Example of above-ground installation/structure is shown in Figure-1 (pipe rack with vertical and horizontal future expansion):

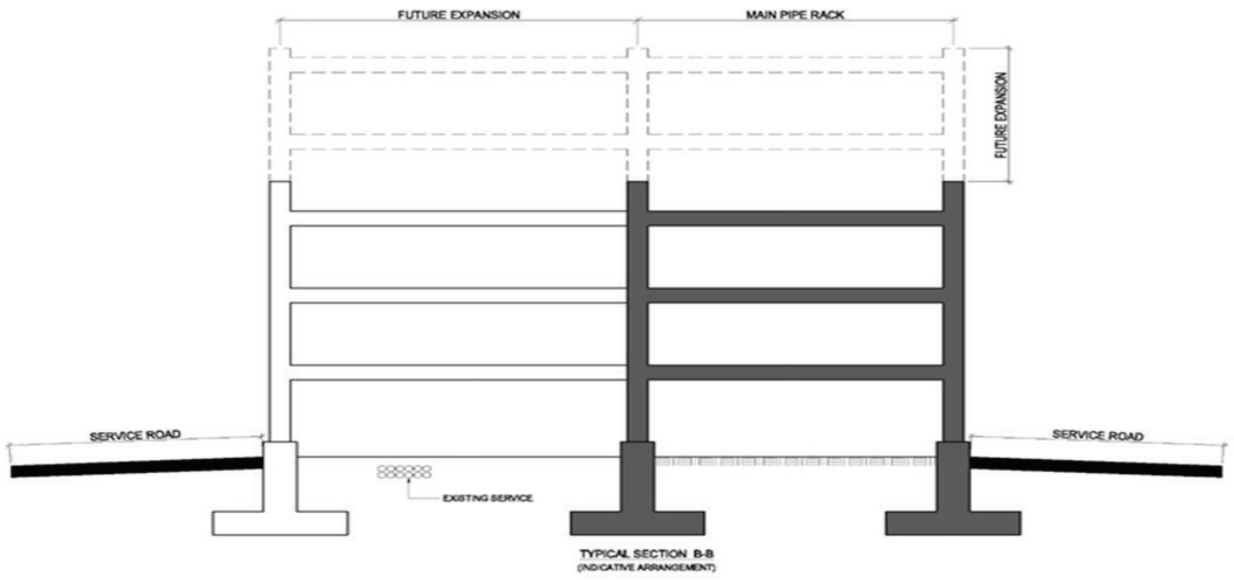

Figure 3: Horizontal Clearances for Cables

Direct Buried Cables

There is a minimum recommended allocation spacing for new services as mentioned in Table-1.

Horizontal Clearance	From any services/ structures	Trench width for Single Circuit Single Conductor per phase	From the Second Conductor group	Between Two Separate circuits	Trench width for Double Circuit / double conductor	From lower-rated cables
400kV	3m	1.3m	5m	5m	N/a	3m
220kV	3m	1.3m	5m	5m	N/a	3m
132kV Trefoil	3m	0.6m	3m	3m	2.65m	1m
132kV Flat	3m	1..1m	3m	3m	3.1m	1m
33kV Normal	3m from pipes	0.8m	0.6m	0.6m	1.2m	5m
33kV restricted	3m from pipes	N/a	0.3m	0.3m	0.6m	5m
11kV Normal	3m from pipes	0.6	0.5m	0.5m	1m	5m
11 kV restricted	3m from pipes	N/a	0.25m	0.25m	0.5m	5m
LV	3m from pipes	0.4m	0.4m	0.4m	0.8m	5m

Table 2

Corridor and Utility Standard Guideline

Horizontal clearance of cables is dependent on the type of installation, energy and number of circuits. Normally, service providers have their standards for clearance, which is used as a benchmark here. All tables reflect the used standard and common practice. However, when the client begins the collection, NOC's will be used for the requested depth that is needed to cross. However, these figures should not be used for the planning of new corridors. In special cases, normal standards might need to be increased, or in very specific circumstances, the relaxation of desirable clearance standards may need consideration of alternative installation methods. This can be carried out by the clustering of conductors in duct banks, cable troughs or tunnels. See Table-2 and 3.

Cables Installed in Ducts

Horizontal Clearance	From any services/ structures	Trench width for Single Circuit Single Conductor per phase	From Second Conductor group†	Between Two separate circuits	Trench width for Double Circuit / double conductor	From Trees
400kV	3.5m	1.8m	N/A (vertical separation)	6.5m	N/A	5m
220kV	3.5m	1.8m	N/A (vertical separation)	6.5m	N/A	5m
132kV – Trefoil	3m	0.9m	N/A (same trench)	3m	2.9m	5m
132kV – Flat	3m	1..45m	N/A (vertical separation)	3m	N/A	5m
33kV *	3m from pipes	N/A	N/A (vertical separation)	0.45m	2.3m	5m
11kV *	3m from pipes	N/A	N/A (vertical separation)	0.45m	0.6m	5m

Table 3

- Assume Cables ducts are in groups of 5, with 4 used and one spare. E.g. 4 separate circuits are available

† Second conductor group is installed vertically below the cables except for cables installed in Trefoil formation

Service Crossings (MINIMUM VERTICAL CLEARANCES):

In normal and ideal cases, the need to cross other tenant services as per the below Table-4 and in critical cases might need to be used. It is a case-to-case scenario, that needs to backed up with comprehensive study.

Existing Service:

	Potable Water	Wastewater	Treated Effluent	Power (HV)	Power (LV)	Telecom	Seawater (Pipeline)	Oil & Gas	Notes:
New Service:	Minimum Vertical Clearance Note (9)								
Potable Water / Fire	0.5m	0.5m Note (1)	0.5m	0.5m Note (2) (12)	0.5m Note (2)	0.5m Note (2)	0.5m	1m Note (2)	(1) Potable to be laid above wastewater, otherwise concrete encasement of water main 3m either side of the sewer line (2) Water service to be laid below the existing service (3) New sewer to be laid below power, telecom cables, water mains, surface drains, culverts and other public utilities. Otherwise protection as per (1) (4) Top cable(s) to be laid in duct(s). Duct(s) to be encased in concrete encasement 2m either side of <600mm dia. water service and 3m either side of >600mm water service (5) Telephone cables crossing power cables shall be protected by PVC duct overcrossing to the length of 1m (6) Large diameter pipeline (7) Due to site condition if minimum separation is not feasible jointing and encasement for a pipeline to be to the approval of the Engineer (8) Minimum vertical clearances to be verified in light of pipe material selection, and potential electrical interference from electrostatic coupling, electromagnetic inductive and conductive effects (9) Vertical clearances are for guideline purposes. Detailed crossing arrangement design of each crossing to be considered on a case-by-case basis considering the depth of existing service, materials, adjacent services, location, durability requirements, site constraints etc. (10) Vertical clearances for New services to be determined and agreed on a case by case basis (11) Installation by Horizontal Directional Drilling (12) 220-400kV cable to be encased in concrete at the crossing location
	0.5m Note (7)	0.5m Note (7)	0.5m Note (7)	0.3m for 33-132kV 0.5 for 220-400kV Note (12)	0.3m	0.3m	0.5m Note (7)	1m	
Treated Effluent	0.5m	0.5m	0.5m	0.5m Note (2) (12)	0.5m	0.5m Note (2)	0.5m	1m Note (2)	
Power (HV)	33KV: 0.5m (<50mm dia.) 1m (<0.1m dia.) 1.5m (0.1-0.3m dia.) 2m (0.3-0.6m dia.) 3m (>0.6m dia.) 132KV 2m (<0.6m dia.) 3m (>0.6m dia.) Note (2) (4) (8) 220-400KV: 2m Note (11)	33KV: 0.5m (<50mm dia.) 1m (<0.1m dia.) 1.5m (0.1-0.3m dia.) 2m (0.3-0.6m dia.) 3m (>0.6m dia.) 132KV 2m (<0.6m dia.) 3m (>0.6m dia.) Note (2) (4) (8) 220-400KV: 2m Note (11)	33KV: 0.5m (<50mm dia.) 1m (<0.1m dia.) 1.5m (0.1-0.3m dia.) 2m (0.3-0.6m dia.) 3m (>0.6m dia.) 132KV 2m (<0.6m dia.) 3m (>0.6m dia.) Note (2) (4) (8) 220-400KV: 2m Note (11)	Normal: 0.5m (11KV-11KV) 0.55m (11KV-33KV) 0.6m (33KV-33KV) Constrained: 0.25m (11KV-11KV) 0.3m (11KV-33KV) 0.3m (33KV-33KV) Note (4) (12) (11) 132-400KV: 2m Note (11)	Normal: 0.45m (11KV) 0.5m (33KV) Constrained: 0.25m (11KV) 1.3m (33KV) Note (4)	1.4 m (11KV) 1.5 m (33KV) Note (5) (8)	0.3m Note (2) (4) (7) (8)	1m Note (8)	
Power (LV)	0.5m (<50mm dia.) 1m (<0.1m dia.) 1.5m (0.1-0.3m dia.) 2m (0.3-0.6m dia.) 3m (>0.6m dia.) Note (4)	0.5m (<50mm dia.) 1m (<0.1m dia.) 1.5m (0.1-0.3m dia.) 2m (0.3-0.6m dia.) 3m (>0.6m dia.) Note (4)	0.5m (<50mm dia.) 1m (<0.1m dia.) 1.5m (0.1-0.3m dia.) 2m (0.3-0.6m dia.) C 3m (>0.6m dia.) Note (4)	Normal: 0.45m (11KV) 0.5m (>=33KV) Constrained: 0.25m (11KV) 0.3m (33KV) Note (4) (12)	Normal: 0.4m Constrained: 0.2m Note (4)	0.3m Note (4)	0.3m Note (2) (4) (7) (8)	1m Note (8)	
Telecom	0.5m Note (2) (4)	0.5m Note (2) (3)	0.5m Note (2) (3)	0.4m (11KV) 0.5m (>=33KV) Note (4)	0.3m Note (4)	0.3m Note (4)	0.3m Note (2) (3)	1m	
Seawater (Pipeline)	Note (10)	Note (10)	Note (10)	Note (10)	Note (10)	Note (10)	Note (10)	Note (10)	
Oil and Gas	Note (10)	Note (10)	Note (10)	Note (10)	Note (10)	Note (10)	Note (10)	Note (10)	

Table 4

Crossing of Seawater Return Canal

Among the several facilities located within SOHAR Port, the seawater return canal (SWRC) is considered to be a critical infrastructure to the operation of all heavy industries within the industrial zone. Heavy industries tenants use the canal to discharge their return cooling seawater back to the sea.

The canal was built during 2004 – 2006, with a design life of 50 years and a maximum design flow capacity of 719,000 m3/hr. Regular planned maintenance and inspections to check the functionality of the canal are being undertaken by SOHAR Port and Freezone. In order to maintain its integrity and sustainability, the channel-cross mechanism requires good engineering solutions. See Table-5:

Service	Recommended types of crossing / Considerations	Requirements
Small diameter pipeline / Duct	Horizontal Directional Drilling (HDD)	• Maximum diameter limitations • Soils; Pressure grouting control; Impact on existing structures during construction • Material selection for the installation method, duty & environment • Calculations demonstrating the adequacy of minimum clearance provided from the seawater canal. (depends on the method of installation, ground conditions, the diameter of bore)
	Pipe Bridge	• Use of existing pipe bridges • Material selection for duty & installation environment
Large diameter pipeline / Ducts	Pipe Bridge	• Detailed Engineering Surveys • Detailed structural interaction studies (Dead load, live loads, transient and load combinations
	Utility Tunnel / Sleeve	• Selection of appropriate tunneling technique Impact on the existing structure during construction
Transportation alignment (Rail / Conveyor)	Bridge	• Detailed Engineering Surveys • Detailed structural interaction studies (Dead load, live loads, transient and load combinations)

Table 5

Example HDD Crossing of Canal

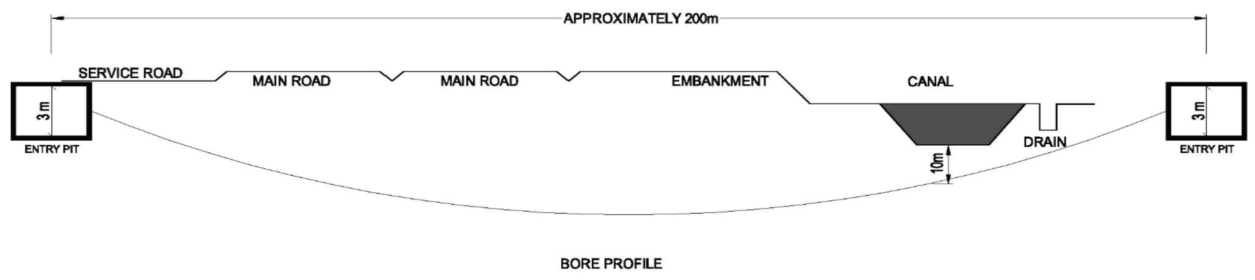

Figure 4

Note: Indicative clearance from the underside of the canal is only shown. Design clearance to be determined by detailed engineering analysis of soil conditions, construction method and detailed design.

Pipe Material

A buried pipe and the soil surrounding it are interactive structures. The extent of the interaction, and hence the magnitude of the pipe loads arising, depends on the relative stiffness between the pipe, the pipe bedding, and native soil. Pipes are generally classed into rigid, semi-rigid or flexible, depending on the degree of this interaction.

Rigid pipes are those where, due to the nature of the pipe material, only very small diametrical deflections are possible before a fracture occurs at a well-defined limiting load. These deflections are too small to develop significant lateral passive pressure in the pipe zone fill material, due to external vertical loading. Thus, all the external load is taken by the pipe itself and bending moments are induced in the pipe wall. The design of rigid pipes is based upon the concept of a maximum loading at which failure occurs. An example of a rigid pipe is the reinforced concrete pipe. "A Guide to Design Loadings for Buried Rigid Pipes", TRRL1987, can be considered as an applicable design guide for rigid pipes, whilst in other conditions BS EN 1295-1:1998 "Structural design of buried pipelines under various conditions of loading" is applicable.

Semi-rigid pipes are capable of being distorted sufficiently without failure to transmit a part of the vertical load to the pipe zone fill material, thus mobilising a measure of lateral passive support from the surrounding soil, with the pipe wall continuing to take the remainder of the load in bending. Resistance to vertical loading is thus shared between the pipe wall itself and the lateral support from the pipe zone fill material. The proportions of this distribution depend upon the relative stiffness of the pipe and the surrounding soil. Some examples of semi-rigid pipe are ductile iron (DI) and cylinder type pre-stressed concrete.

Flexible pipes are capable of being distorted sufficiently without failure to transmit virtually all vertical load to the surrounding pipe zone fill material for lateral support; the proportion of the load resisted by the pipe wall itself is very small. Flexible pipes are designed based on maximum acceptable deflection or strain induced in the pipe wall and resistance to buckling under load. The ability of the pipe zone material to provide support is a function of its stiffness or modulus of reaction. Some common flexible types of pipe are PVC-U pipe, polyethylene (PE) pipe, GRP pipe, and glass-reinforced epoxy (GRE) pipe.

The selection of the proper type of bedding and surround material is important in the long-term integrity and performance of both rigid and flexible pipes. See Table-6:

SN	Service	Application	Sizes (mm)	Material	
				Below Ground	Above Ground
1	Wastewater	Gravity & Rising Main	200 to 250	uPVC (for gravity only)	GRP, SS, DI
			300 and above	HDPE, GRP	GRP, SS, DI
2	TSE	Transmission & Distribution	All	HDPE, GRP, DI	DI
3	Potable / Fire Water	Distribution	110 to 300	HDPE	DI, HDPE, GRP
			Above 300	DI	
		Transmission	Up to 600	DI	
			Above 600	HDPE, GRP, MS	
4	Fire Protection	Transmission & Distribution		HDPE, GRP, DI, GRE, MS	
	Industrial Water			Non-Metallic pipe (PE, PVC, PP, GRP)	
	Potable Water				
	Seawater Cooling Water			HDPE, GRP, GRE	
	Demineralised Cooling Water			HDPE, GRP, GRE	
	Line Pipe for Non-sour Service			Carbon Steel	
	Line Pipe for Sour Service			Carbon Steel	
5	Ducts	Cabling	Small	uPVC	N/A
			Large	HDPE	N/A
6	Trenchless Pipe	rossings	-	Concrete encased GRP, PCP, GRP (CC)	

Table 6

Key:

DI – Ductile Iron

GRP – Glass Reinforced Plastic

GRP (CC) – Glass Reinforced Plastic (Centrifugally Cast)

GRE – Glass Reinforced Epoxy

HDPE – High-Density Polyethylene MS – Mild Steel
uPVC – Un-plasticised Polyvinyl Chloride

PCP – Pre-stressed Concrete Pipe

PP – Polypropylene

PRC – Polymer Resin Concrete

PVC – Polyvinyl Chloride

PE – Polyethylene
TSE – Treated Sewage Effluent

Corridor and Utility Standard Guideline

Common Service Clearance

Water services pipes and power cables are one of the basic services in public corridors. Water service pipes have been mentioned the pipe materials in the table-6 above and the table-7 below will explain some other main factors:

Type	Pressure	Min Gradient	Depth of Burial	Clearance	Valves/ Manholes	Material
Potable water	Limit: 16bar Max: 6bar Min: 1.5bar	1:500 in direction of flow 1:300 against flow	Pipe Cover Min: 1m Max: 3.5m	Horizontal Min: 1m (standard) Min: 3m (gas/ wastewater) Vertical Min: 500mm/300mm	AV: every 1.5km	HDPE PN10 for Transmission
Wastewater	-	-	Minimum Cover: Line inside property: 600mm Collector Sewers: 1300mm Trunk Sewers: 1500mm Force Mains: 1300mm	Horizontal: Max 3000mm Min 500 mm between parallel runs Sewer and potable should not be installed in the same trench. Vertical: Located below power, Omantel cables, water mains, surface drains, culverts and other public utilities. Sewer to Potable: 450mm crown to bottom Otherwise: Concrete encasement of water main for 3m either side of the sewer line.	Every 125m on straight runs	Gravity: Up to 600mm dia: uPVC >600mm dia: HDPE Force Main: GRP / HDPE

Table 7

Power Cables vary in term of spacing, depth of buried, clearance and crossing see table-8 :

<table>
<tr><td>Power</td><td></td></tr>
<tr><td>Cable Spacing</td><td>Standard:
<table>
<tr><td></td><td>LV</td><td>11KV</td><td>33KV</td></tr>
<tr><td>LV</td><td>400mm</td><td>450mm</td><td>500mm</td></tr>
<tr><td>11KV</td><td>450mm</td><td>500mm</td><td>550mm</td></tr>
<tr><td>33KV</td><td>500mm</td><td>550mm</td><td>600mm</td></tr>
</table></td></tr>
<tr><td></td><td>Space Restriction:
<table>
<tr><td></td><td>LV</td><td>11KV</td><td>33KV</td></tr>
<tr><td>LV</td><td>200mm</td><td>250mm</td><td>300mm</td></tr>
</table>
<table>
<tr><td>11KV</td><td>250mm</td><td>250mm</td><td>300mm</td></tr>
<tr><td>33KV</td><td>300mm</td><td>300mm</td><td>300mm</td></tr>
</table></td></tr>
<tr><td>Depth Buried</td><td>11KV: 80cm; Trench: 50cm
600V: 60cm; Trench: 40cm
33KV: 100cm; Trench: 60cm</td></tr>
<tr><td>Laying Clearance</td><td>Telecom & Power cables:
<table>
<tr><td></td><td>Telecom Clearance</td></tr>
<tr><td>LV</td><td>300mm</td></tr>
<tr><td>11KV</td><td>400mm</td></tr>
<tr><td>33KV</td><td>500mm</td></tr>
</table>
Sewage Pipes & Water Pipes (33KV power):
<table>
<tr><td></td><td>33KV</td><td>132KV</td></tr>
<tr><td>50mm dia. pipe></td><td>500mm</td><td rowspan="4">2000mm</td></tr>
<tr><td>100mm dia. pipe></td><td>1000mm</td></tr>
<tr><td>to 300 dia. pipe 100</td><td>1500mm</td></tr>
<tr><td>to 600 dia. pipe 300</td><td>2000mm</td></tr>
<tr><td>dia. pipe 600<</td><td>3000mm</td><td>3000mm</td></tr>
</table></td></tr>
<tr><td>Crossings</td><td>Water services:
Minimum clearance: 500mm below the power cable. Power cable to be installed in a 150/200mm duct.
Duct to be encased in concrete to 2m on both sides of crossing for <600mm dia, 3m on both sides of crossing for >600mm dia.
Cable tiles, warning tape and cable markers to be fixed over the duct. Hand excavation at point of crossing.
Power cables:
Top cable to be installed in 150/200mm duct overcrossing for 2m. Crossing clearance to be as per laying clearance.
Communication/GTO cables:
Crossing clearance to be as per laying clearance.
Telephone cables to be protected by PVC duct overcrossing for 1m. Cable markers to be installed at crossing showing arrangement.</td></tr>
</table>

Table 8

Marine Standards and Procedures

Burial

Marine pipelines and cables are usually routed on the surface of the seabed in deep water. Installation for shallow water and shore approaches must take into consideration the following listed criteria. Assessment using a risk-based methodology is recommended to determine the need and extent of burial and/or protection measures for the pipeline/cable:

- Seabed stability
- Geotechnical conditions
- Pipeline vertical stability
- Wave loading
- Environmental factors
- Long term shore profile stability
- Tidal variations
- Fishing activity
- Shipping activity (anchors)
- Other facilities

Accidental loading due to trawling and dragging ship anchors are the most common causes of incidents or failure of marine pipelines. Burial up to 2m below seabed is recommended for areas where the risk of incidents is determined to be high.

Installation Methods

Shore approaches can be constructed by either:

- Trench
- Dredging
- Jetty
- Trussed beam support
- A horizontal directional drilled guide tube
- Cofferdam
- Tunnel
- Combinations of the above

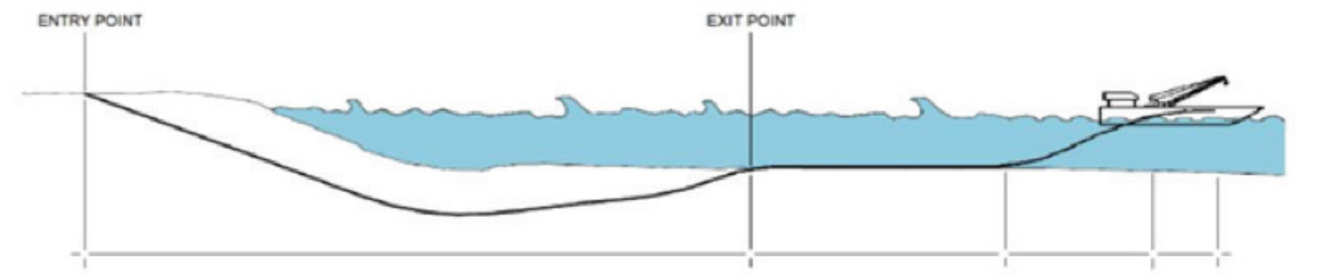

Figure 5

Typical corridor reservations

Two typical corridor sketches for industrial areas showing preferred reservations are provided. Note corridor width and reservations must be reviewed and amended for particular utility demand requirements for the associated master-planned zone.

- Industrial Area typical corridor sketches (90m, 55m)

Typical 90m Corridor:

4.75 m CLEAR SPACE
5 m WIDE ROW FOR DISTRICT COOLING
1 m CLEAR SPACE
6 m WIDE ROW FOR STORM WATER CHANNEL
1 m CLEAR SPACE
37.9 m WIDE ROAD ROW
2,25 m WIDE ROW FOR FIRE & POTABLE WATER PIPE
1 m CLEAR SPACE
10 m WIDE ROW FOR GAS
2.8 m CLEAR SPACE
1,5 m WIDE ROW FOR TELECOMMUNICATION
0.5 m CLEAR SPACE
3 m WIDE ROW FOR POWER
0,5 m CLEAR SPACE
2,5 m WIDE ROW FOR SEWERAGE
2 m CLEAR SPACE

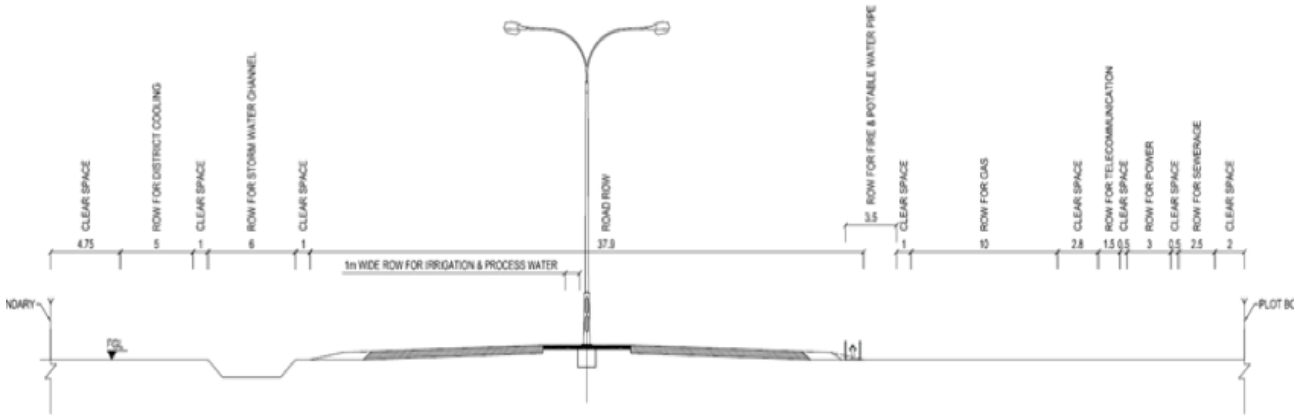

Figure 6

Typical 55m Corridor

4.75 m CLEAR SPACE
5 m WIDE ROW FOR DISTRICT COOLING
1 m CLEAR SPACE
6 m WIDE ROW FOR STORM WATER CHANNEL
1 m CLEAR SPACE
37.9 m WIDE ROAD ROW
2,25 m WIDE ROW FOR FIRE & POTABLE WATER PIPE
1 m CLEAR SPACE
10 m WIDE ROW FOR GAS
2.8 m CLEAR SPACE
1,5 m WIDE ROW FOR TELECOMMUNICATION
0.5 m CLEAR SPACE
3 m WIDE ROW FOR POWER
0,5 m CLEAR SPACE
2,5 m WIDE ROW FOR SEWERAGE
2 m CLEAR SPACE

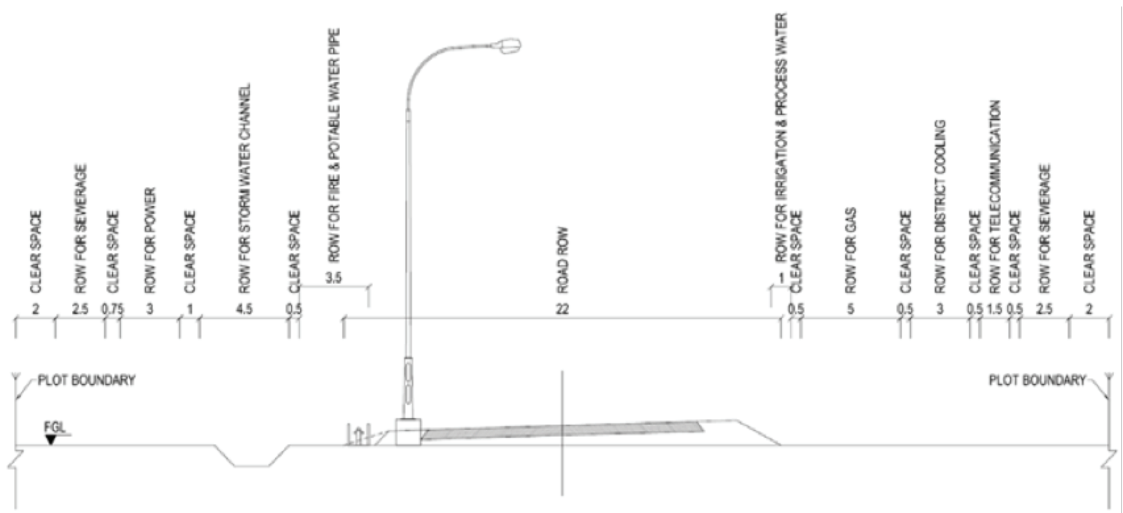

Figure 7

Reference:

- Re-planning of SOHAR Port Corridor, 2017.

www.soharportandfreezone.com