



INFRASTRUCTURE



TECHNICAL MANUAL CUSTOMER MANUAL

FIRST
EDITION **2014**

For generations to come



HIS HIGHNESS SHEIKH KHALIFA BIN ZAYED AL NAHYAN,
PRESIDENT OF THE UNITED ARAB EMIRATES

“The UAE is striving to develop and boost its rich resources and expertise in the international energy markets and enhance its leading role as a world centre for renewable energy research and development.”



HIS HIGHNESS SHEIKH MOHAMMED BIN RASHID AL MAKTOUM

VICE PRESIDENT AND PRIME MINISTER OF THE UNITED ARAB EMIRATES AND RULER OF DUBAI

“Today the UAE is number one in the Middle East in terms of infrastructure, human development, technological development, knowledge economy, citizen happiness and satisfaction, renewable energy, safety, security, trade, tourism, and many other areas. We shall continue our pursuit of global excellence in all fields, for we are a nation that accepts nothing less than first place.”



HIS HIGHNESS SHEIKH HAMDAN BIN RASHID AL MAKTOUM

DEPUTY RULER OF DUBAI, FINANCE MINISTER OF THE UAE, PRESIDENT OF DUBAI ELECTRICITY AND WATER AUTHORITY

“DEWA’s projects are the life, essence and backbone of Dubai’s infrastructure. DEWA provides world-class services at the highest levels of reliability, quality and best international practices and technologies, to ensure uninterrupted supply of electricity and water services and achieve the sustainable development of the UAE.”



HIS EXCELLENCY SAEED MOHAMMED AL TAYER

MD & CEO OF DUBAI ELECTRICITY AND WATER AUTHORITY

Message from the MD & CEO of DEWA

Dubai has emerged as a leading regional business hub and the favourite place for investment in the Middle East because of its robust and vigorous infrastructure base.

In line with HH Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, to firmly positioning Dubai city as a global hub for finance, business and tourism, and to promote prudent use of power and water.

Dubai Electricity and Water Authority (DEWA) exert strenuous efforts on promoting the best practices and operational excellence across all aspects, through DEWA Vision to become a sustainable world-class utility and to support the sustainable development of Dubai.

This Infrastructure NOC Technical Manual has been developed specifically to support DEWA customers for swift obtaining of the infrastructure NOC submitted to the Infrastructure Information and Permits department (II&P).

It clearly demonstrates the highest standards of excellence, safety, and reliability in the various

activities undertaken by DEWA stakeholders/ customers on projects in DEWA's reservation or Right Of Way (ROW).

This manual deemed the technical reference to support DEWA achieving the planned goals by sharing the best construction practices with all stakeholders, consultants, contractors, and private developers.

Pursuant to HH Sheikh Mohammed bin Rashid Al Maktoum directions to support the Smart City initiative, DEWA will launch the infrastructure NOC Technical Manual as a digital web-based version that can be accessed and downloaded anytime, anywhere cost-free.

Following the guidelines specified in the infrastructure NOC technical manual will integrate the efforts to accomplish Dubai vision.

Best regards,

HE Saeed Mohammed Al Tayer

MD and CEO

Dubai Electricity and Water Authority

Introduction

DEWA Infrastructure NOC Technical Manual

“Today the UAE is number one in the Middle East in terms of infrastructure, human development, technological development, knowledge economy, citizen happiness and satisfaction, renewable energy, safety, security, trade, tourism, and many other areas. We shall continue our pursuit of global excellence in all fields, for we are a nation that accepts nothing less than first place.”

- HH Sheikh Mohammed Bin Rashid Al Maktoum.

Vice President and Prime Minister of the United Arab Emirates and Ruler of Dubai

Upon this inspiring note of declaration comes forth Dubai's success story,
for the world to readily witness.

Infrastructure in Dubai is one among the key sectors pledged in the Dubai Strategic Plan 2015 (DSP-15). It is the defining component besides the healthy economy that continuously scripts the Dubai success story.

The DSP framework was effectively developed to augment the city's world-renowned excellence model, evident in Dubai's legacy of urban development and prosperity. Right from the initial years of the Dubai establishment, infrastructure efficiently played a pivotal role in supporting the city's well-defined journey of highvalue growth. In accordance and to help support the momentum of progress, Dubai Electricity and Water Authority (DEWA) has responsibly played its part by ensuring a reliable electricity and water supply and distribution system in Dubai. The assurance proved conducive for economic activities of the city to further flourish, enabling the construction and infrastructural projects to correspondingly take forward the Dubai vision.

Upon the city having embarked on its well-charted course of development, fittingly the government of Dubai relentlessly strives for customer satisfaction across all its stakeholders. In like terms, it is a given deliverable from DEWA; a kind of governmental culture of provisioning excellence in service standards towards fulfilling stakeholder expectation. In this direction, the 'Infrastructure NOC Technical Manual is the latest endeavour from DEWA to boost stakeholders satisfactions.

The Infrastructure NOC Technical Manual will indeed serve as a helpful tool and reliable resource for Authorities, Consultants, Contactors and Developers when seeking NOCs from DEWA i.e. Infrastructure Information and Permits department - in a speedy, transparent and hassle-free.

DEWA leading the way

Considering the range of iconic initiatives and infrastructure that brand Dubai is delivering, apparently reflecting the city's strategic development agenda, an authentic resource and reference guide was the need of the hour to help facilitate the stakeholders, Developers, Consultants and Contractors to understand better the technical criteria related to Right of Way / DEWA Reservation. So that their operations will seamlessly progress; they could verify and ensure compliance to the stipulated technical specifications to prepare and submit appropriate matching documents when seeking 'No-Objection Certificate (NOC)' from DEWA (II&P department).

DEWA's Infrastructure NOC Technical Manual is a pioneering effort; it is the fruit of thousands of man hours meticulously put in. Well-defined research, data collection, compilation of facts

and their related validation have effectively gone into its making. Specialists representing various departments within DEWA and officials from external stakeholders, such as RTA, DM, ETISALAT, DU, EMPOWER and DUSUP were systematically consulted to ensure accuracy of manual contents.

The Infrastructure NOC Technical Manual will serve as a comprehensive reference guide for business partners and suppliers acquiring the necessary NOCs for carrying out their construction, operations, upgrades and other maintenance requirement.



Infrastructure NOC Technical Manual [Electricity] World class customer services

In line with DEWA's vision, "A sustainable world-class utility," and its strategic goal to drive the vision, which is to "Deliver reliable and quality services," the Infrastructure NOC Technical Manual objectives were carefully envisioned as follows:

- To provide a reference to DEWA Customers for DEWA's Technical Requirements.
- To reduce the duration for issuing the NOC applications.
- To release the NOC application from first submission
- To meet the customer satisfactions.

Consolidated, easy-to-use and reader-friendly

The Infrastructure NOC Technical Manual furnishes the Technical requirements for the projects working within the ROW/DEWA corridors in the Emirate of Dubai.

The design and development of the Infrastructure NOC Technical Manual was adequately benchmarked for making it reader-friendly and easy to refer. Upon this factor the technical contents are segmented into four classified chapters as noted below, each addressing a separate theme with a unique colour code and special-attention markings for quicker reference, and recall.

Chapter - 1 (Red) - Utilities

Chapter - 2 (Grey) - Road works

Chapter - 3 (Blue) - Structures

Chapter - 4 (Green) - General projects

In addition, the manual's content featuring 50 Nos. of NOC types is supported by explanatory notes, corresponding CAD drawings, 3D drawings, illustrations, tables and site photographs.

The infrastructure NOC Technical Manual considered the following:

- NOC applicants should follow the indicated clearances and protection details; whereas the indicated dimensions are the minimum dimensions unless and otherwise mentioned.
- In case the NOC applicant is not able to conform the Infrastructure NOC Technical Manual requirements,

hence the closest similar case to be followed in accordance with the site conditions. In such instances application will be studied on a case-to-case basis together with the concerned department(s).

- Any NOC type not included in the Manual will be studied according to the site conditions; subsequently appropriate action will thereof be taken.
- Special sections for Abbreviations, Definitions and References have also been included.
- The Infrastructure NOC Technical Manual implied the standard case of the service/utility installation and deemed it was laid/installed in the center of its corridor.
- Valve chambers and manholes will be considered in accordance to the site conditions
- No one is holding the right(s) to deprive any party to lay/install their services/utilities within their dedicated corridor.
- The stipulated technical details within the Infrastructure NOC Technical Manual were collaboratively obtained and approved from DEWA's relevant departments.

Infrastructure Information & Permits [II&P] Department-Activities at a glance

The department's core activity is: Issuing design and construction No Objection Certificate (NOC) for Infrastructure Projects (Roads/Network Services), General Projects & House Connections work to customers (Authorities/Consultants/Contractors & Developers) in order to work within the Right Of Way (R.O.W) limit or within DEWA Reservation/ DEWA Power Station.

The main objectives of issuing NOC are

- Saving DEWA Corridors (Electricity/Water) For Future Plans.
- Protect DEWA Existing Services from potential damages.
- Support ongoing DEWA Projects.
- Ensuring the security of DEWA assets

Areas of activities of Infrastructure Information & Permits department are:

- Provide a single window for Infrastructure Projects & General /House Connections NOCs within ROW.
- Provide support services for approving the shop drawing, cable diversion and ducts for Electricity NOCs only.
- Issuing services information and trial pits NOC for Electricity and Water.
- Estimate for HV Cables diversion under Road & Infrastructure projects.
- BOQ approval for DEWA-Electricity future ducts installation under RTA Road Projects.
- Issuance of Project Completion Certificate & As-Built approval for Road & Infrastructure Projects.
- Updating DEWA land base in GIS.

Information, excellence and innovation are imperative for sustainability

Dubai Electricity and Water Authority is a thought-leadership and strategy-focussed organisation, aspiring to be the best in the business and is professionally so committed to that goal. The Authority has acknowledged the notion that for corporate excellence to sustain, improvement on excellence and innovation is a continuous endeavour. In HH Sheikh Mohammed's wise words, "in the race for excellence, there is no finish line."



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CHAPTER 1

UTILITIES

1. Laying of Proposed Utilities - Electricity Low Voltage (LV) Cables

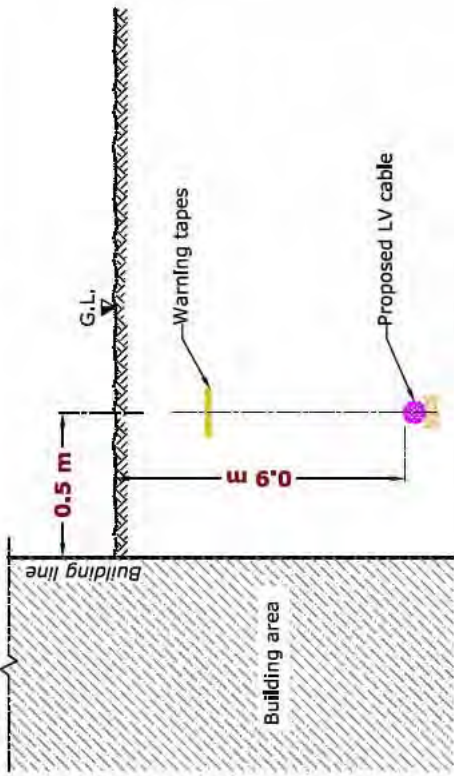

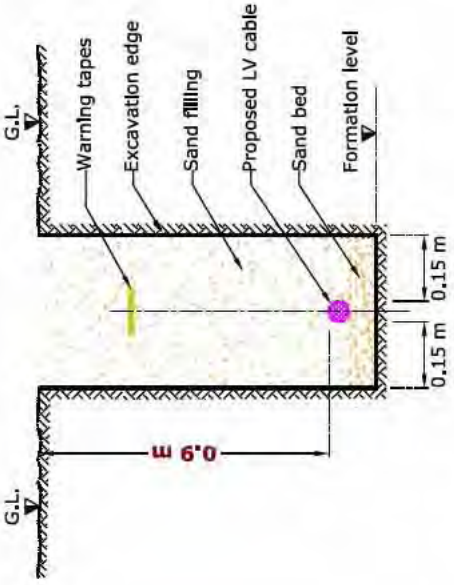

1

1.1 Introduction

These cables are carrying Low Voltage (LV) electrical power, in order to cater to the demand of house connection and street lights etc. Low voltage cables are produced using different materials such as Poly Vinyl Chloride (PVC), Cross Linked Poly Propylene (XLPE) insulation of Copper/Aluminum, armored and un-armored .

LV cables are laid in an aligned corridor at a specified depth, within Right Of Way. Therefore during laying activities it is required to protect DEWA existing assets as per specified standards.



TYPICAL SECTIONAL DETAILS	LAYING OF LV CABLE SITE PHOTOS
 <p style="text-align: center;"><u>LV CABLE LAYING DETAILS</u></p>	 <p style="text-align: center;"><u>LV CABLE</u></p>
 <p style="text-align: center;"><u>LV CABLE TRENCH DETAILS</u></p>	 <p style="text-align: center;"><u>WARNING TAPE</u></p>
<p><u>NOTE :</u> 1. Trench side protection may be required as per site and soil condition.</p>	

1.2 Avoid the following



1.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed laying of LV cable and existing DEWA Electricity LV cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	0.15 m	0.15 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 1.1, Case 1) Vertical clearance (Ref Fig: 1.1, Case 2)

Table Abbreviation

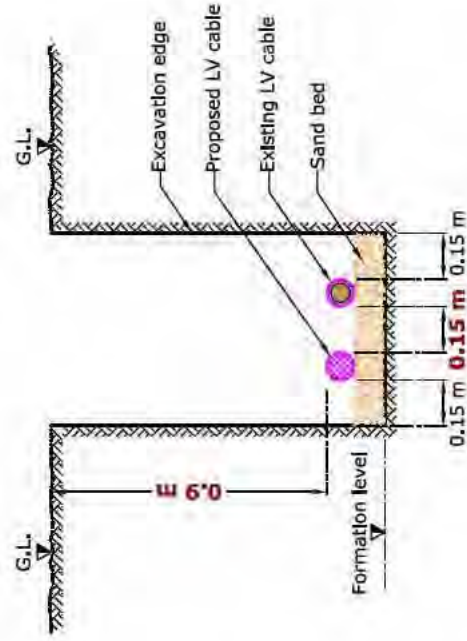
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



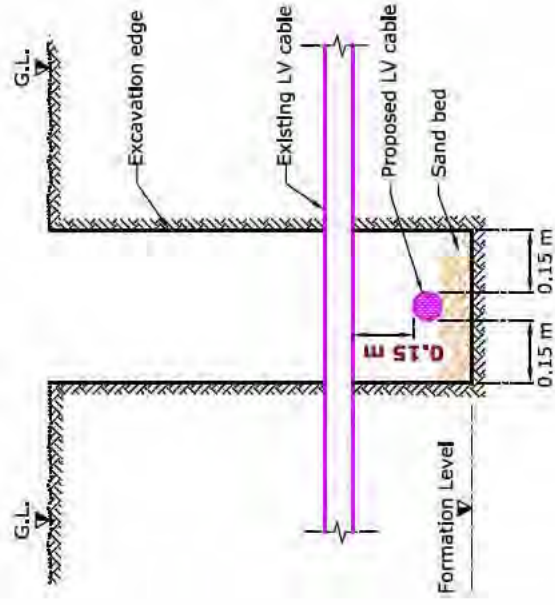
Fig: 1.1

HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED LV CABLES AND EXISTING LV CABLES

CASE 1 : Laying parallel to existing LV cable



CASE 2 : Crossing below the existing LV cable



NOTE :

1. Horizontal clearance is from the proposed LV cable edge to existing LV cable edge.
2. Vertical clearance is from the top of proposed LV cable to bottom of existing LV cable.
3. Trench side and existing LV cable protection may be required as per site and soil condition.

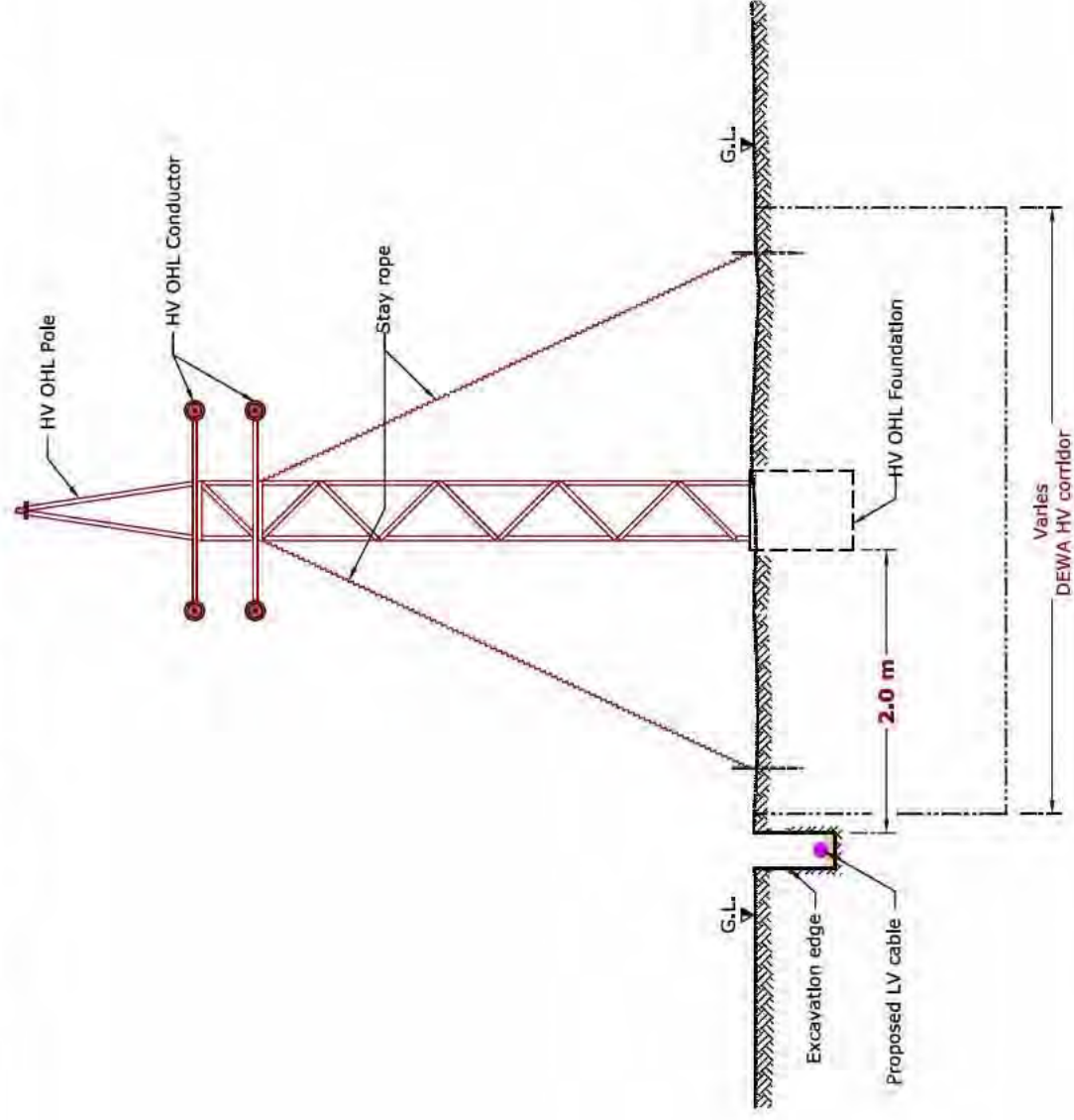
Table 2: Clearance & Protection details for proposed laying of LV cable and existing DEWA Electricity HV services						
Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	1.0 m	0.15 m	A/B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 1.2, Case1) Vertical clearance (Ref Fig: 1.3) Protection details (Ref Fig: 1.2, Case2)
HV (6.6/11/33 kV) Manhole		NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 1.2, Case1)
HV (6.6/11/33 kV) O.H.L	2.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 1.4)
Clearance & Protection details for access working under Existing HV OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 1.5) Vertical clearance (Ref Fig: 1.5) Protection details (Ref Fig: 1.5)
HV (33 kV) O.H.L.		3.5 m				<ul style="list-style-type: none"> Protection details (Ref Fig: 1.5)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<div>Fig: 1.2</div> <div>HORIZONTAL CLEARANCES & PROTECTION DETAILS BETWEEN PROPOSED LV CABLES AND EXISTING HV SERVICES</div>	<div> <div>CASE 1 : Laying parallel to existing HV services</div> <div> </div> </div> <div> <div>CASE 2 : Proposed LV cable crossing/ protection below existing HV cables</div> <div> </div> </div>	<div> <div>NOTE :</div> <div> <ol style="list-style-type: none"> Horizontal clearances are from the proposed LV cable edge to existing HV services edge. Vertical clearance is from the top of proposed LV cable to bottom of existing HV cable. HV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. Trench side and existing HV services protection may be required as per site and soil condition. </div> </div>
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Fig: 1.3	VERTICAL CLEARANCES & PROTECTION DETAILS BETWEEN PROPOSED LV CABLES AND EXISTING HV SERVICES
	<p>CASE 1 : Proposed LV cable crossing above existing HV cable</p> <div> </div>
	<p>CASE 2 : Crossing below the existing HV cable</p> <div> </div>
<ul style="list-style-type: none"> If sufficient cover (0.9 m) is available at crossing location, proposed LV cable can cross above the existing HV cable. 	<p>NOTE :</p> <ol style="list-style-type: none"> If existing HV cables slewed during the site activity, it should be placed back to actual position after completion of work. Trench side and existing HV cable should be protected as per site and soil condition. Proposed LV cable allowed to cross above or below the existing HV cable as per site condition subject to maintaining standard cover 0.9 m to the proposed LV cable.

Fig: 1.4 HORIZONTAL CLEARANCE DETAILS FOR PROPOSED LV CABLE AND EXISTING HV OHL (6.6/ 11/ 33 kV)



NOTE :

1. Horizontal clearance is from proposed excavation edge to existing HV OHL foundation edge.
2. Trench side and existing HV services protection may be required as per site and soil condition.

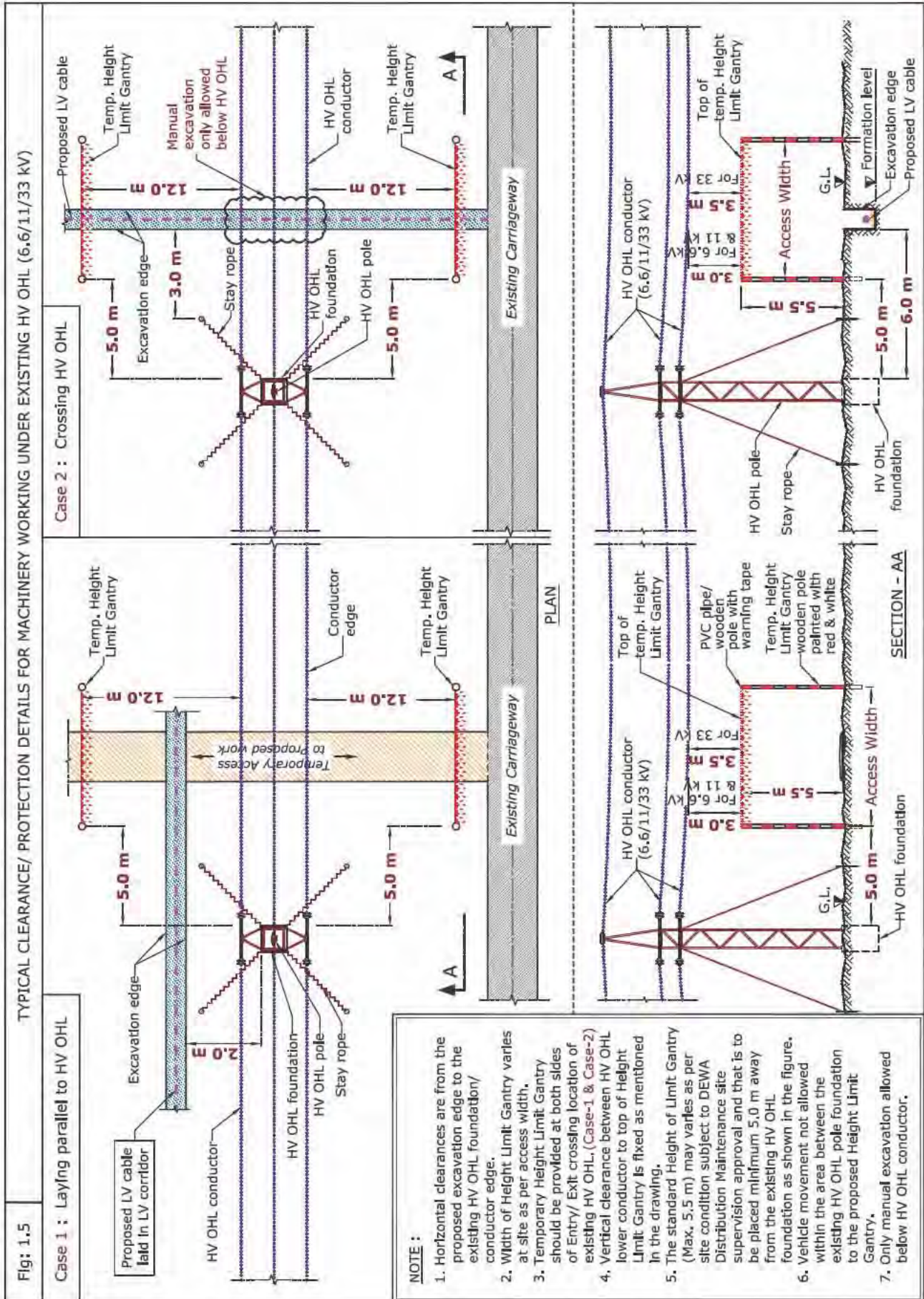


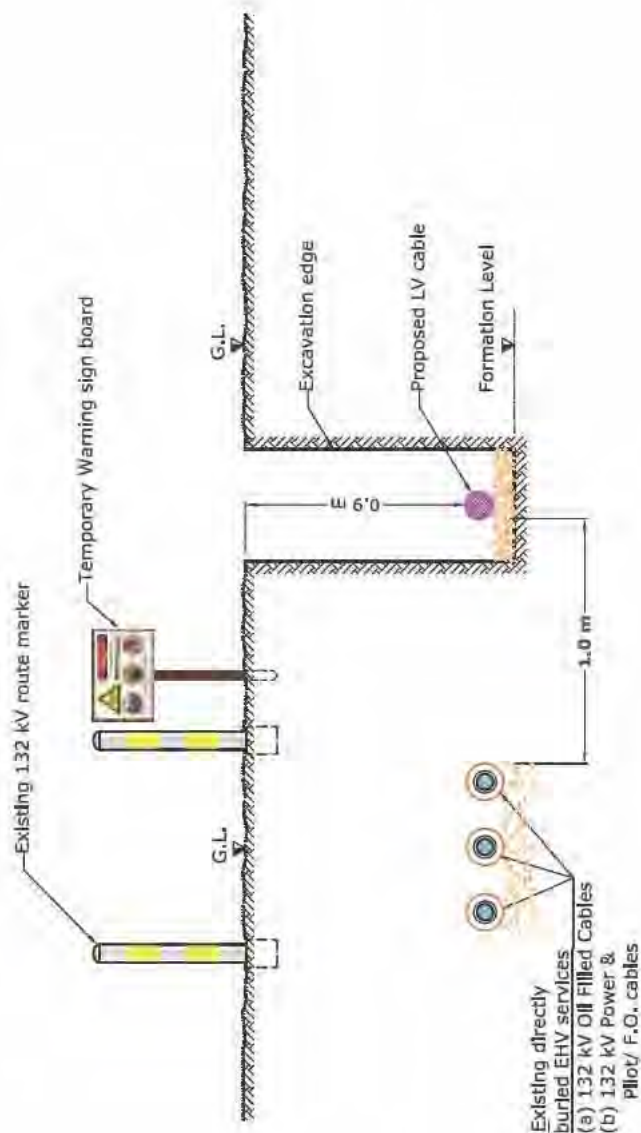
Table 3: Clearance & Protection details for proposed laying of LV cable and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 1.6)Vertical clearance (Ref Fig: 1.8)Protection details (Ref Fig: 1.8)
EHV (132 kV) Power/ Pilot/ F.O Cable (Directly Buried)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 1.6)Vertical clearance (Ref Fig: 1.8)Protection details (Ref Fig: 1.8)
EHV (132 kV) Trough	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 1.9)Vertical clearance (Ref Fig: 1.7)Protection details (Ref Fig: 1.7)
EHV (132 kV) Duct Bank	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 1.9)Vertical clearance (Ref Fig: 1.7)Protection details (Ref Fig: 1.7)
EHV (132 kV) Joint Bay/ Transition Joint	1.0 m	NA	-	-	-	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 1.10)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 1.13)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 1.11, Case1)Vertical clearance (Ref Fig: 1.11, Case 2 & 1.12)
		2.0 m	B	NDCM		
Clearance & Protection details for access and working under Existing EHV OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 1.13)Vertical clearance (Ref Fig: 1.13)Protection details (Ref Fig: 1.13)
EHV (400 kV) O.H.L		7.5 m				

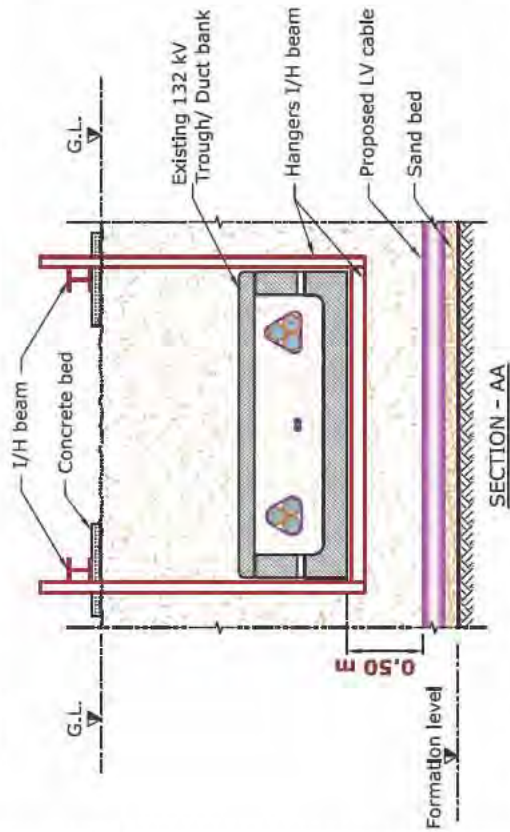
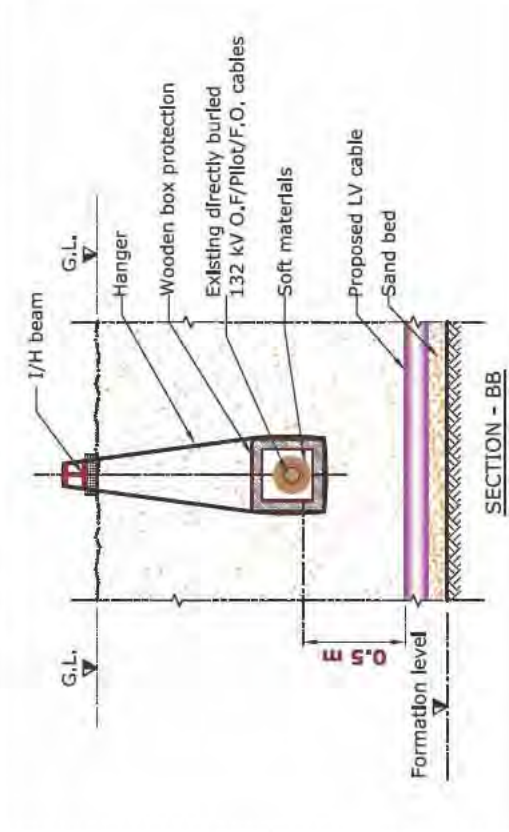
Table Abbreviation

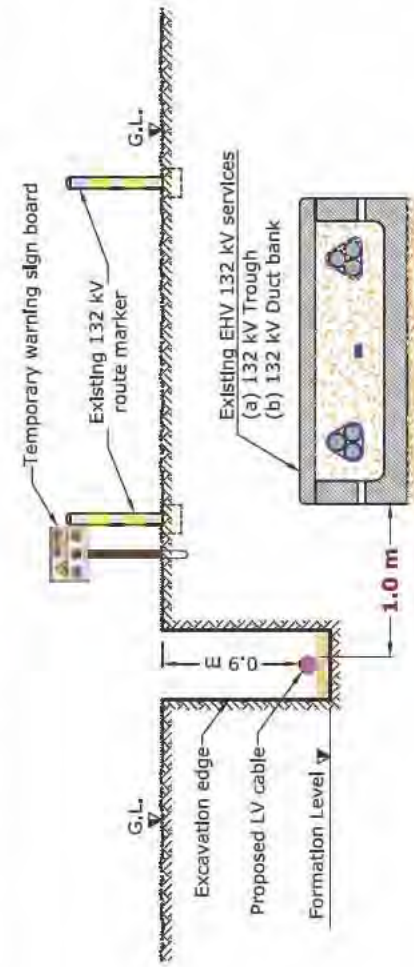
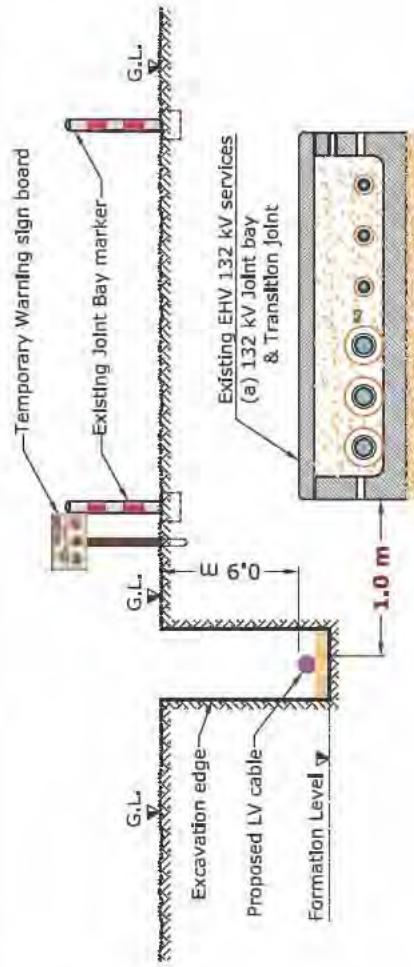
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

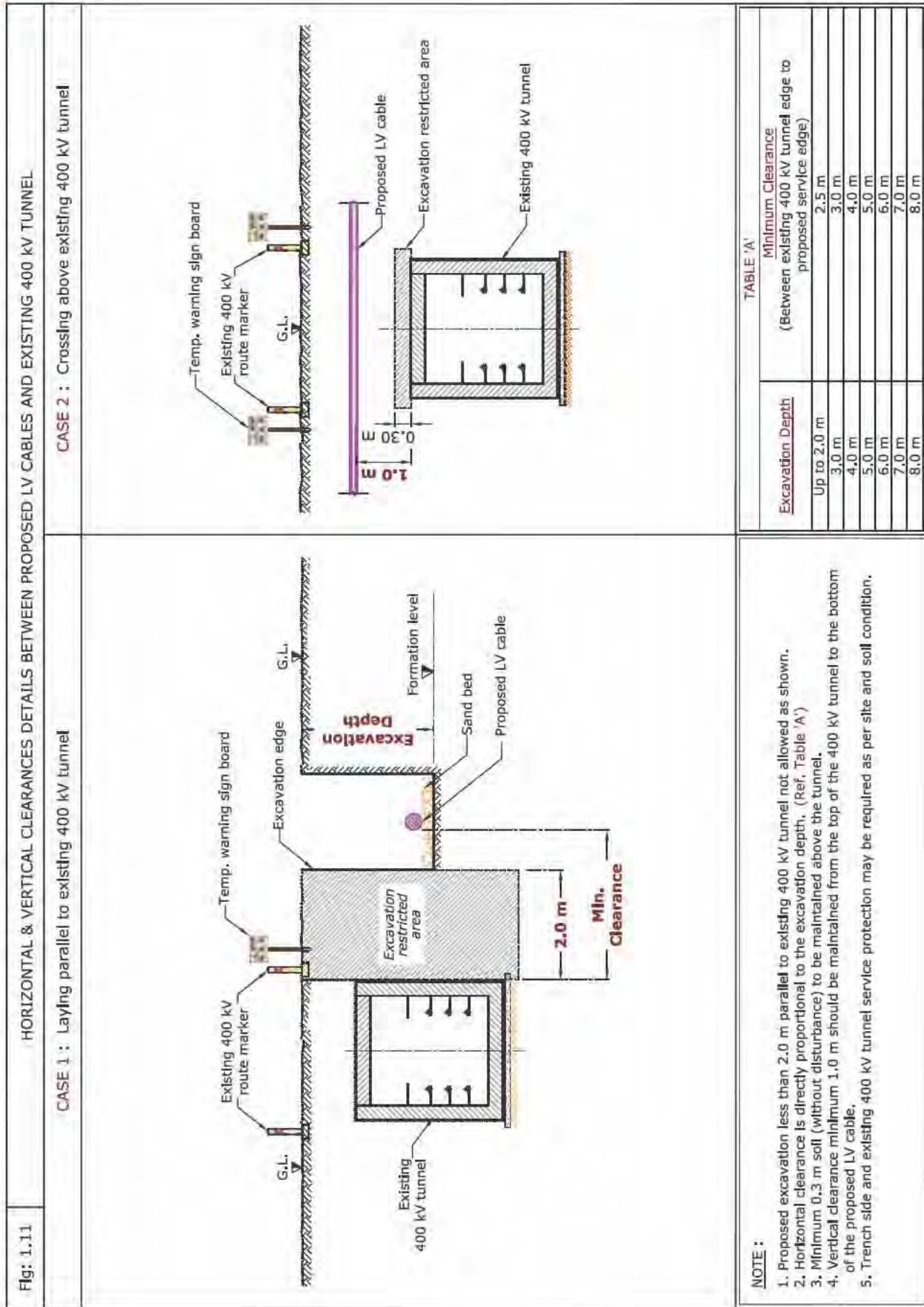
Fig: 1.6 HORIZONTAL CLEARANCE DETAILS FOR PROPOSED LV CABLE AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES

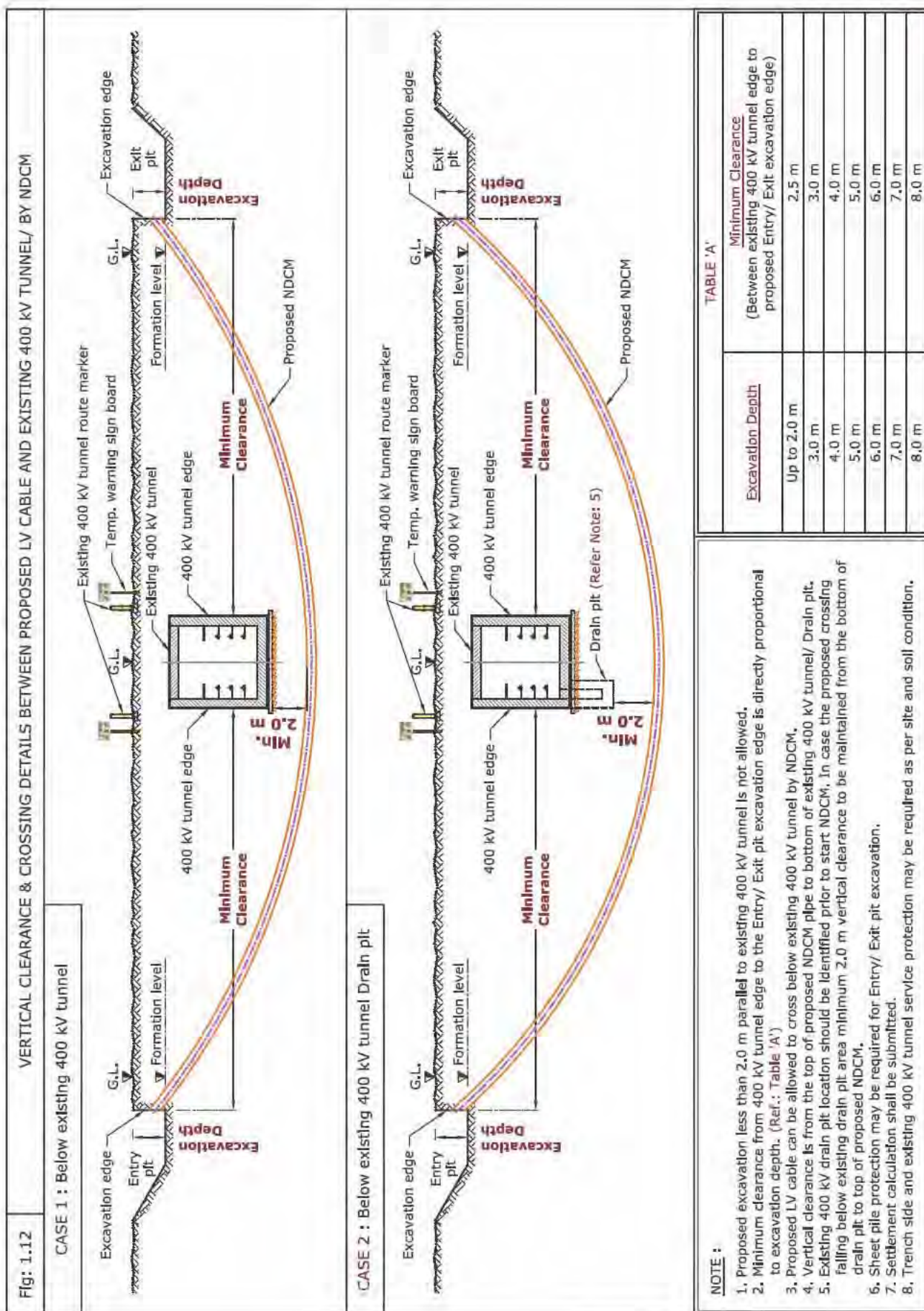


- NOTE :**
1. All horizontal clearances are from proposed LV cable edge to existing EHV 132 kV services edge.
 2. EHV Cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.
 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge .
 4. Trench side and existing EHV services protection may be required as per site and soil condition.

<p>Fig: 1.7</p>	<p>STANDARD PROTECTION DETAILS BETWEEN PROPOSED CROSSING LV CABLE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p> 	<p>Fig: 1.8</p>	<p>STANDARD PROTECTION DETAILS BETWEEN PROPOSED CROSSING LV CABLE AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ PILOT/ F.O. CABLES</p> 	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Proposed LV cable should cross below to the existing EHV services. 2. Trench side and existing EHV services protection may be required as per site and soil condition.
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<p>Fig: 1.9</p>	<p>HORIZONTAL CLEARANCE DETAILS FOR PROPOSED LV CABLE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p> 
<p>Fig: 1.10</p>	<p>HORIZONTAL CLEARANCE DETAILS FOR PROPOSED LV CABLE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed LV cable edge to existing EHV 132 kV services edge. 2. Existing EHV Cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge. 4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 	





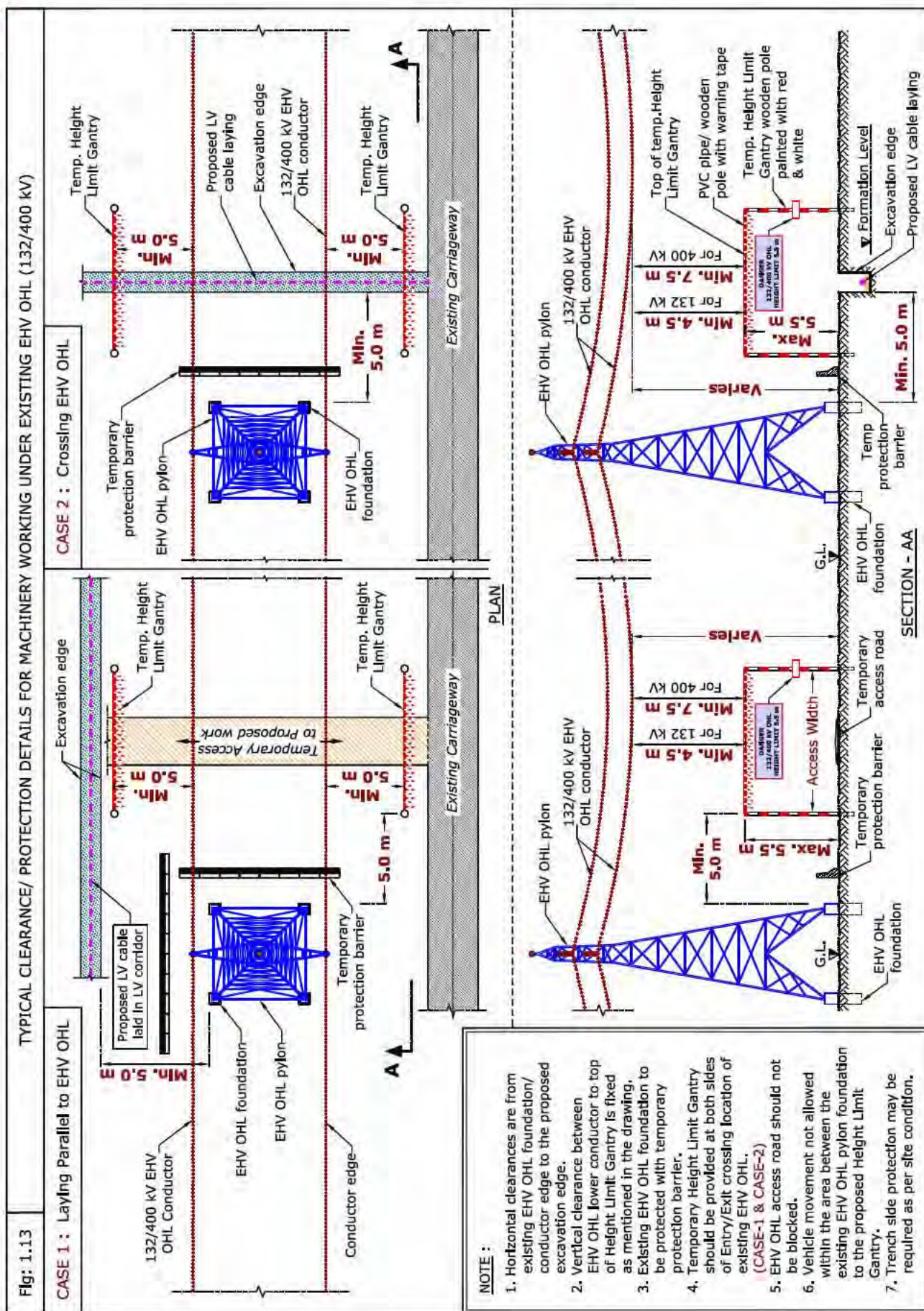


Table 4: Clearance & Protection details for Proposed LV cable laying and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	•Horizontal clearance (Ref Fig: 1.14)
Gas/Fuel Pipeline (All diameter)	10.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 1.14)

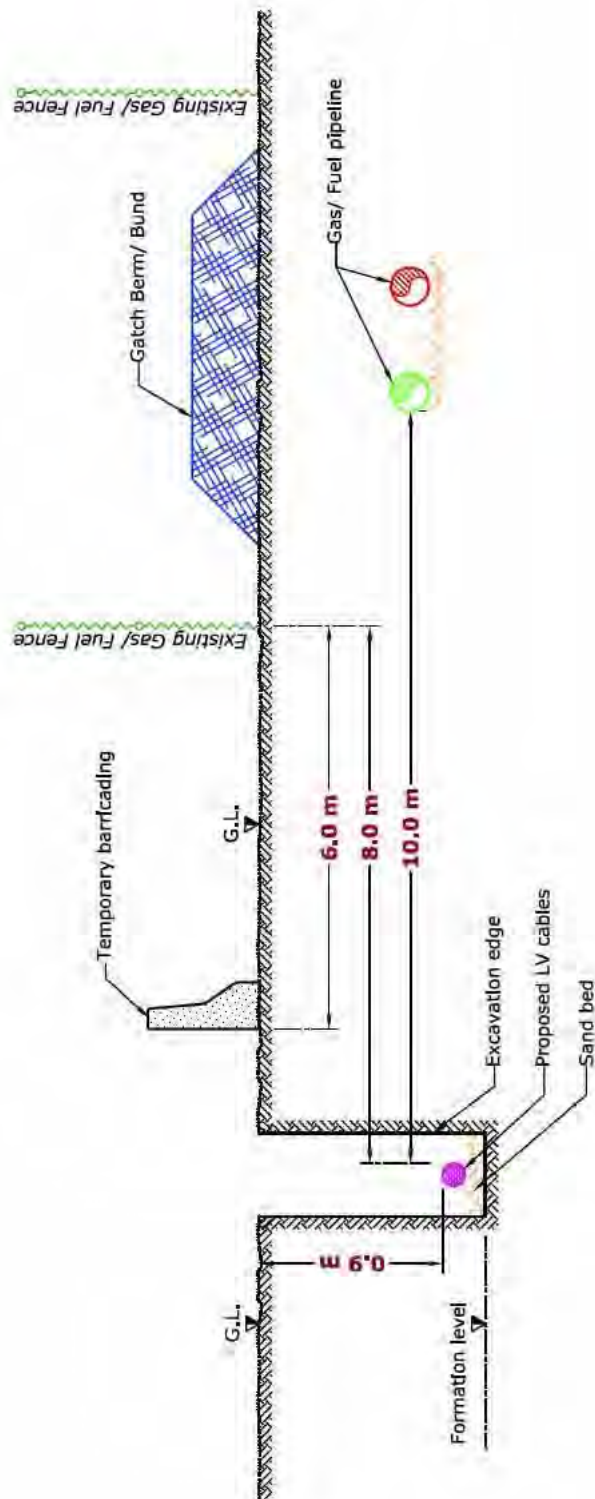
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 1.14

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LV CABLES AND EXISTING GAS/ FUEL SERVICES

**NOTE :**

1. Horizontal clearance 8.0 m from proposed LV cable edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed LV cable edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed LV cable allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
6. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

2. Laying of Proposed Utilities - Electricity High Voltage (HV) cables (6.6/11/33 kV Cables/Pilot Cables/Joints)

19

2.1 Introduction

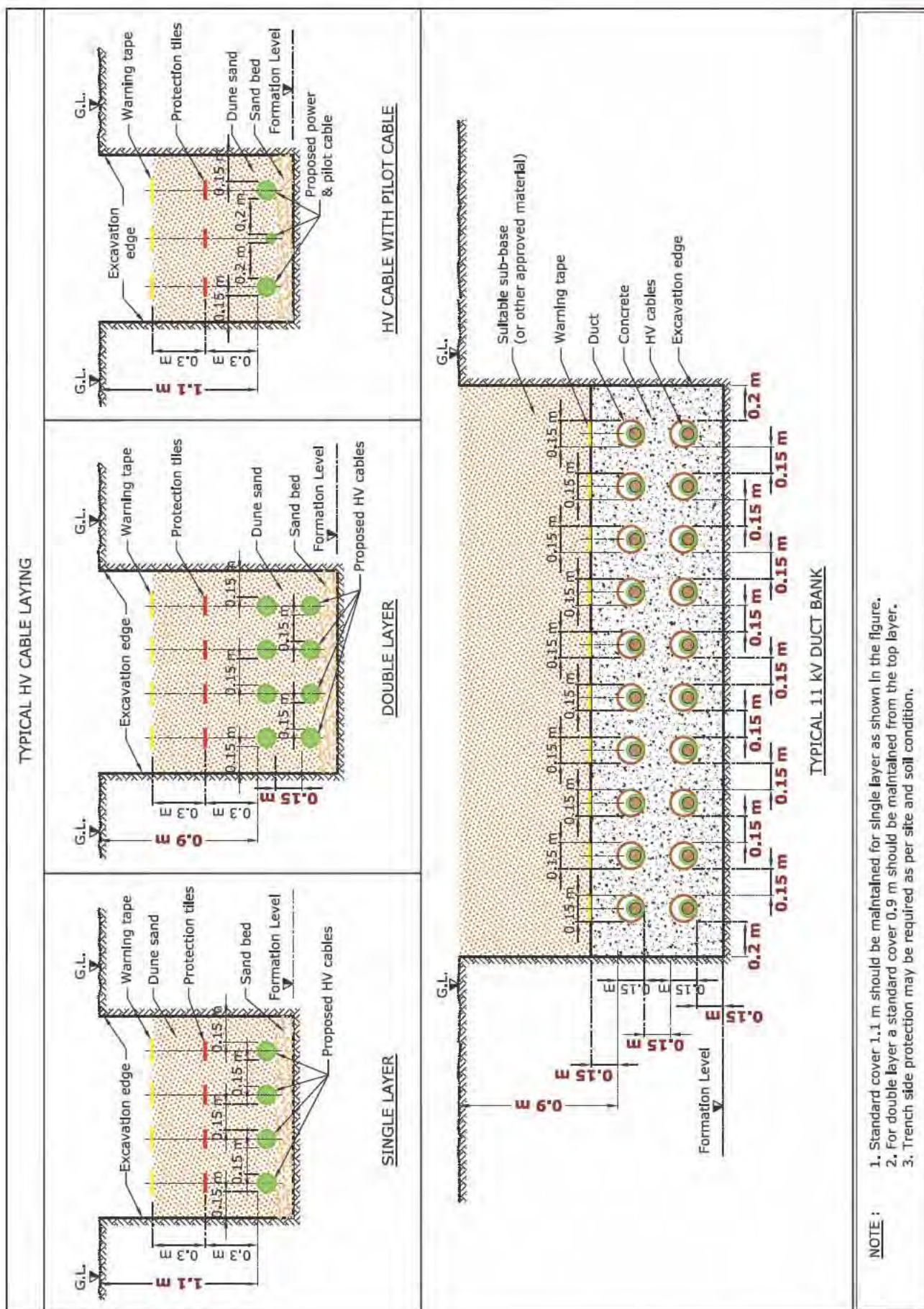
The great demand of energy requires high voltage (HV) cables to transmit electricity either from generation or transmission electrical lines/substations to pocket stations and finally to the end users, HV cables laid underground to accommodate different voltage

ranges 6.6 kV, 11 kV, and 33 kV to meet customers' needs. HV cables lay in approved corridor within Right Of Way, therefore during laying activities it is required to protect DEWA existing assets as per specified standards.



Laying of High Voltage (HV) Cables: Site Photos

TYPICAL TRENCH CROSS SECTIONAL DETAILS FOR HV CABLE LAYING	SAMPLE SITE PHOTOS FOR HV CABLE LAYING
<div></div> <div><p><u>HV 33 kV CABLE WITH PILOT CABLE</u></p></div>	<div></div> <div><p><u>HV CABLE</u></p></div> <div></div> <div><p><u>DUNE SAND BACKFILLING</u></p></div>
<div></div> <div><p><u>HV 6.6/ 11 kV CABLE</u></p></div>	<div></div> <div><p><u>PROTECTION TILE</u></p></div> <div></div> <div><p><u>WARNING TAPE</u></p></div>
<div><p><u>NOTE :</u> 1. Trench side protection may be required as per site and soil condition.</p></div>	



2.2 Avoid the following



1. Laying HV cable on the top of DEWA existing 132 kV Trough.
2. HV cable crossing below DEWA existing 132 kV Joint Bay.

2.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed laying of HV cable and existing DEWA Electricity LV cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.15 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 2.1, Case 1) • Vertical clearance (Ref Fig: 2.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



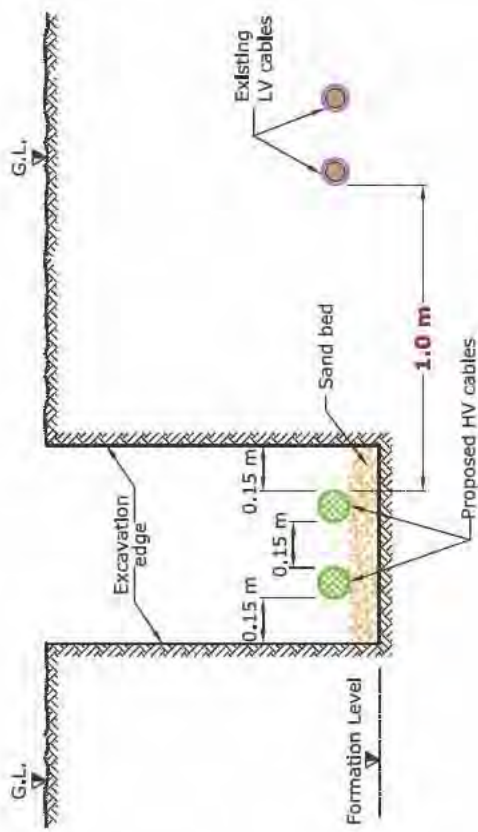
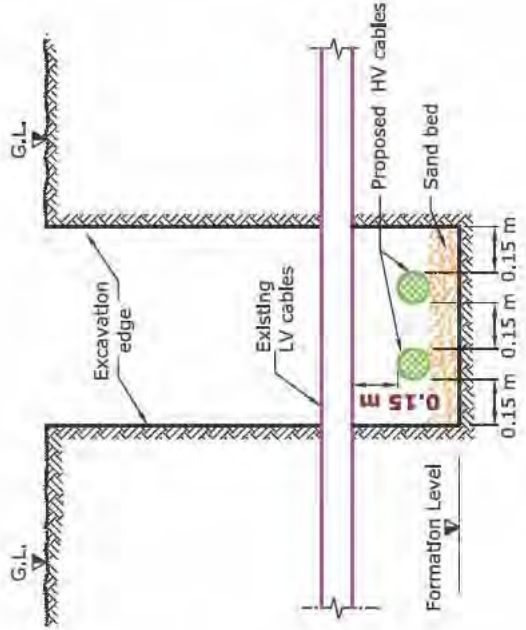
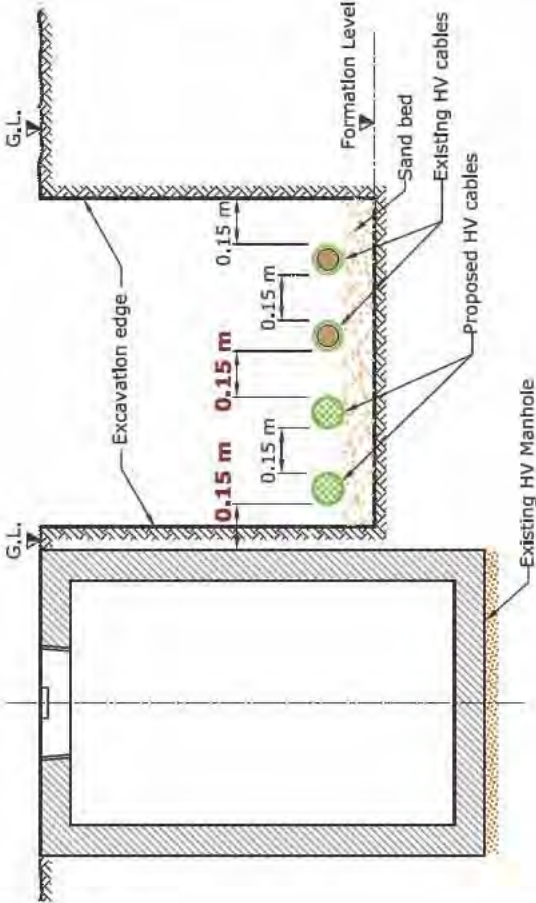
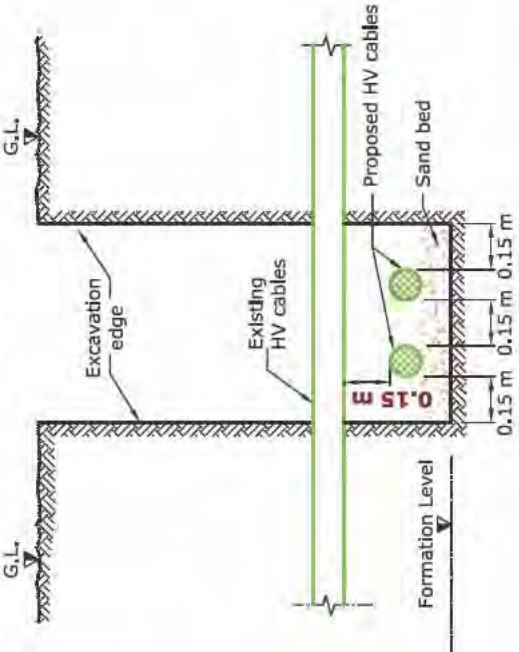
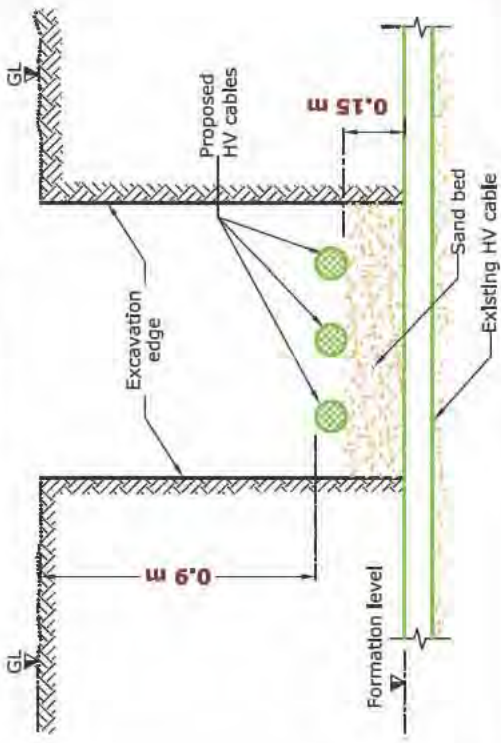
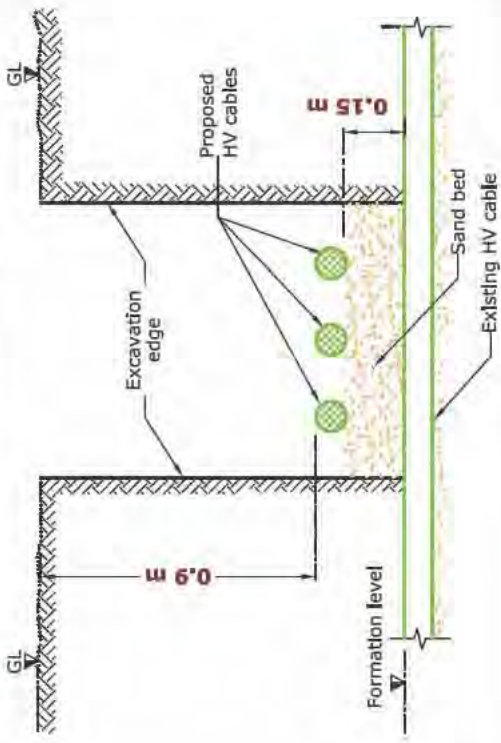
<p>Fig: 2.1</p>	<p>HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED HV CABLES AND EXISTING LV CABLES</p> <div> <p>CASE 1 : Laying Parallel to Existing LV Cables</p> </div>  <div> <p>CASE 2 : Crossing Below The Existing LV Cables</p> </div> 	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance Is from the proposed HV cable edge to existing LV cable edge. 2. Vertical clearance Is from the top of proposed HV cable to bottom of existing LV cable. 3. Trench side and existing LV cable protection may be required as per site and soil condition.
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Table 2: Clearance & Protection details for proposed laying of HV cable and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	0.15 m	0.15 m	A/B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 2.2, Case 1) Vertical clearance (Ref Fig: 2.2, Case 2 & 3) Protection details (Ref Fig: 2.5 & Photo 2.1)
HV (6.6/11/33 kV) Manhole		NA	-	-	NR	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 2.2, Case 1)
HV (6.6/11/33 kV) O.H.L	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 2.3)
Clearance & Protection details for access under Existing HV OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 2.4)
HV (33 kV) O.H.L		3.5 m				<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 2.4) Protection details (Ref Fig: 2.4)

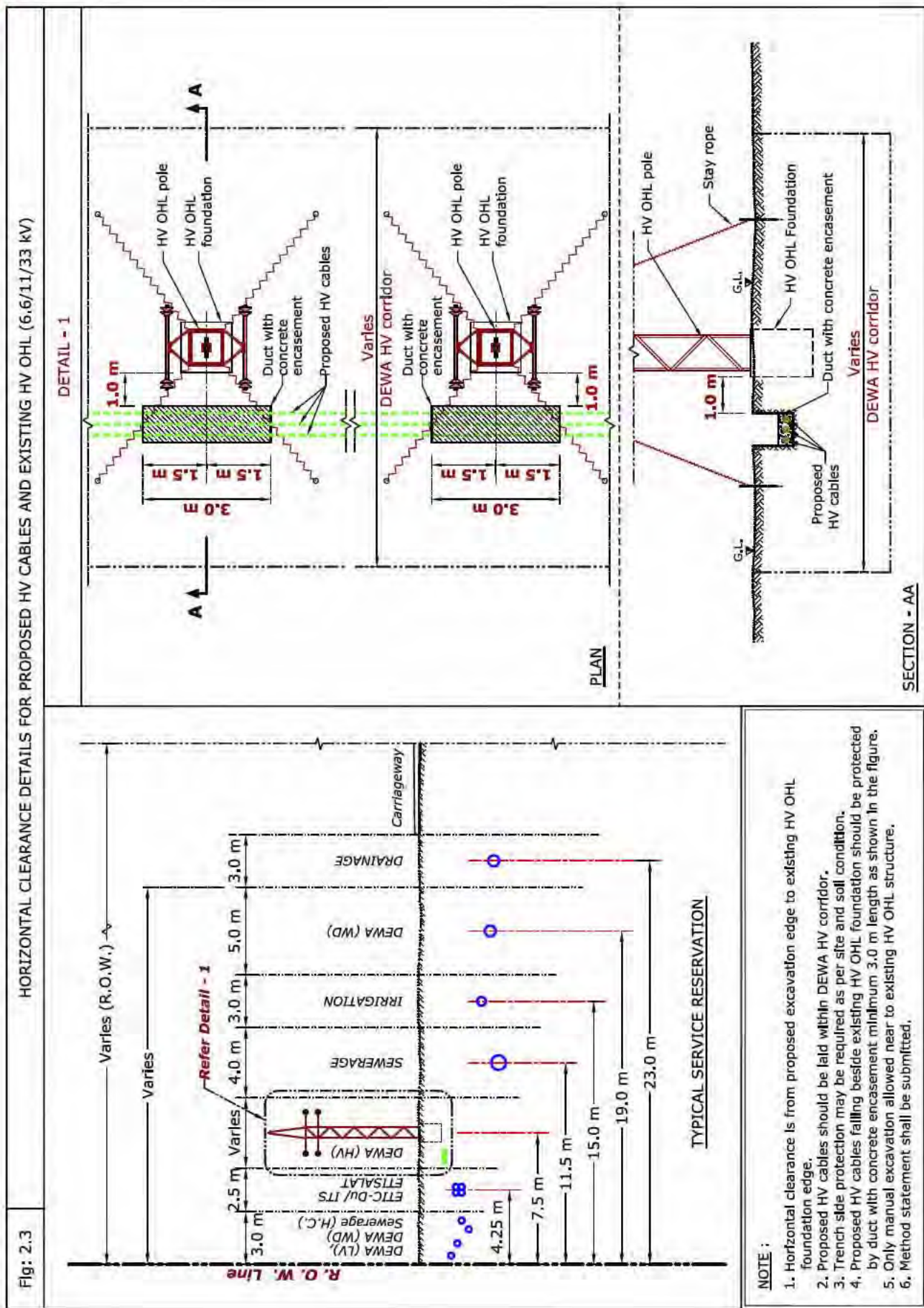
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 2.2	HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED HV CABLES AND EXISTING HV SERVICES
<p>CASE 1 : Laying parallel to existing HV cable/ Manhole</p> 	<p>CASE 2 : Crossing below the existing HV cables</p> 
<p>CASE 3 : Proposed HV Cables Crossing Above Existing HV Cables</p> 	<p>CASE 3 : Proposed HV Cables Crossing Above Existing HV Cables</p> 

NOTE :

1. Horizontal clearances are from the proposed HV cables edge to existing service edge.
2. Vertical clearance is from the top of proposed HV cables to bottom of existing HV cables.
3. Proposed HV cable allowed to cross above or below the existing HV cable as per site condition subject to maintaining standard cover 0.9 m to the top layer of HV cable.
4. Trench side and existing HV cable protection may be required as per site and soil condition.



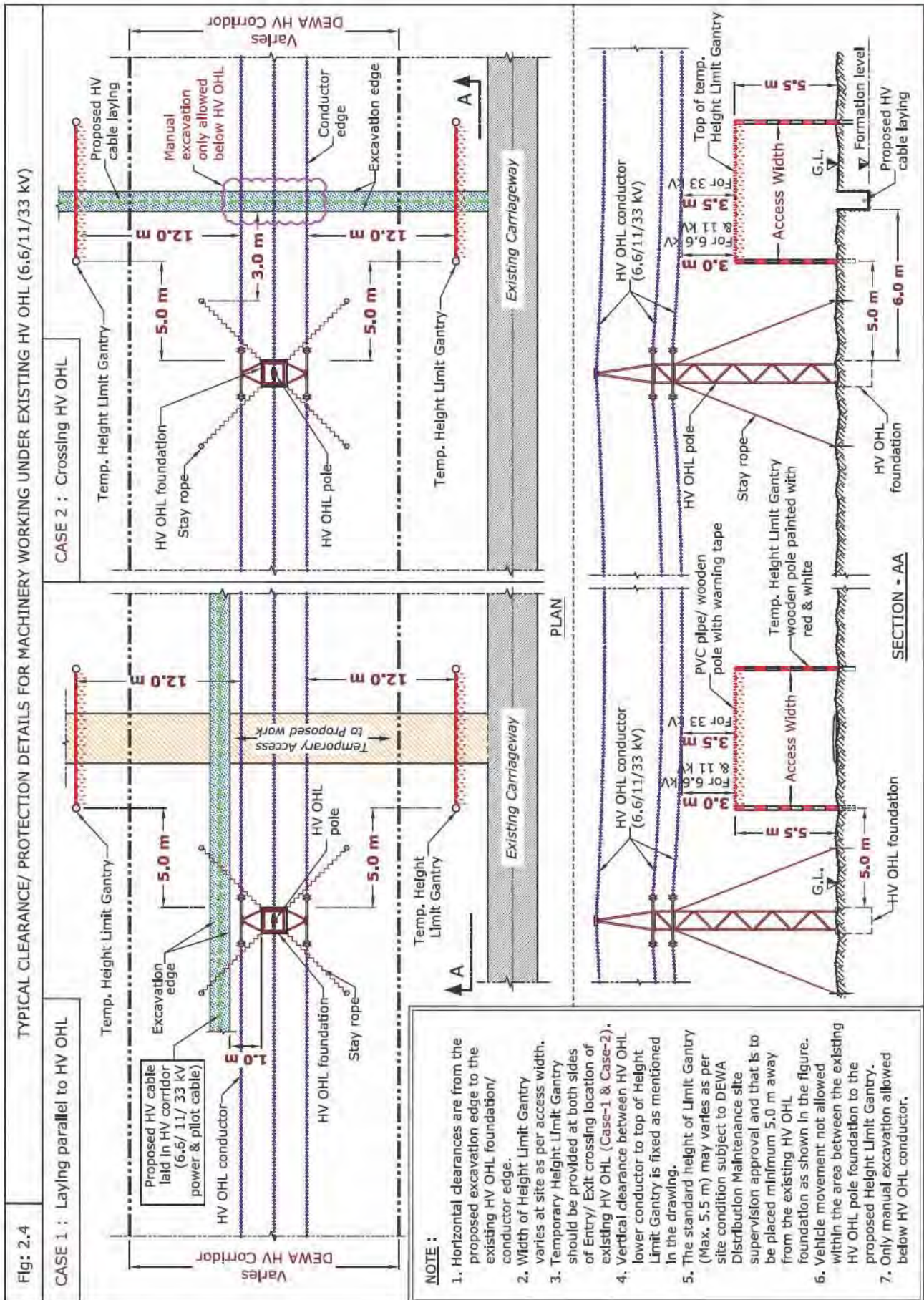
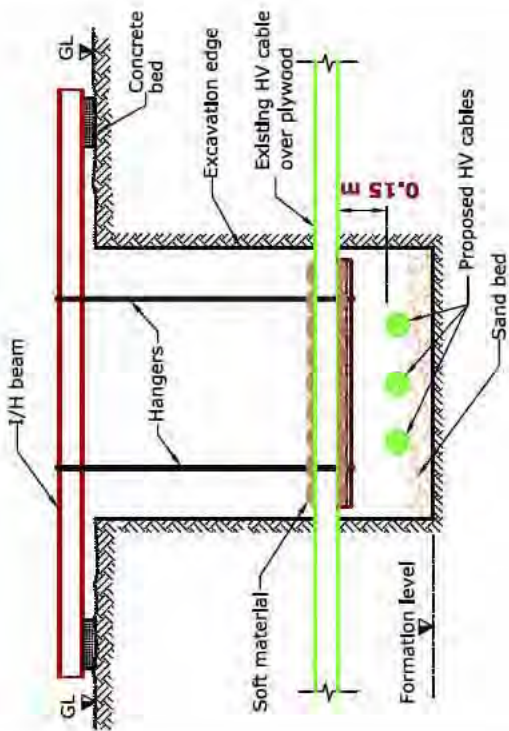
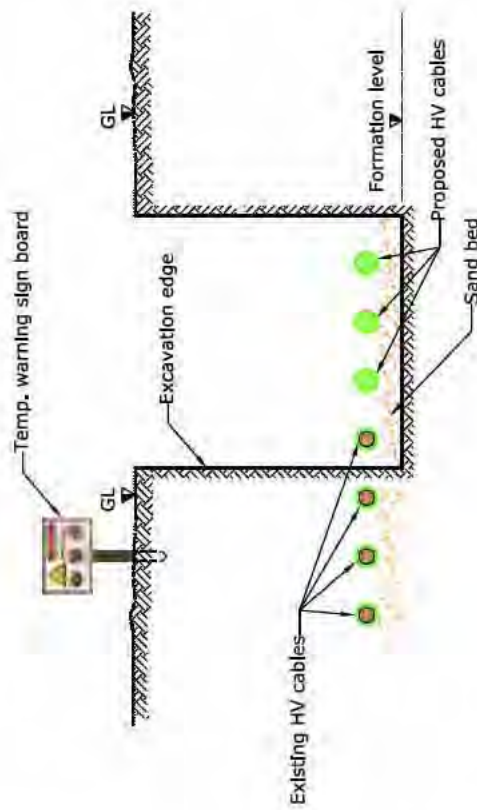


Fig: 2.5	STANDARD PROTECTION DETAILS FOR HV SERVICES (6.6/11/33 kV)
CASE 1 : Proposed HV cables crossing below existing HV cables	
CASE 2 : Warning sign board for existing HV cables falling parallel to the proposed excavation	
<p>NOTE :</p> <ol style="list-style-type: none"> 1. If existing HV cables slewed during the site activity, it should be placed back to actual position after completion of work. 2. Trench side and existing HV cable should be protected as per site and soil condition. (Case-1) 3. HV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. (Case-2) 	

WARNING SIGN BOARDS PLACED ALONG THE EXISTING HV CABLE ROUTE NEAR TO PROPOSED HV CABLE LAYING

Photo: 2.1

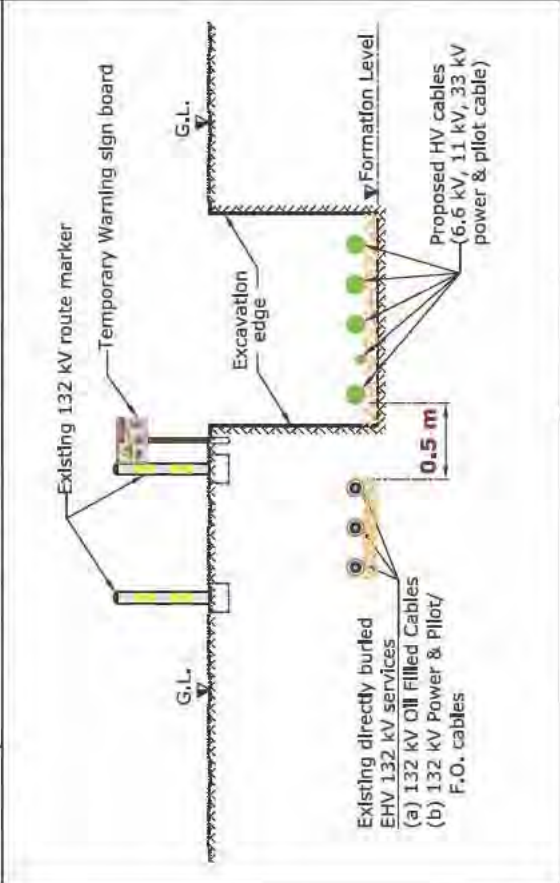
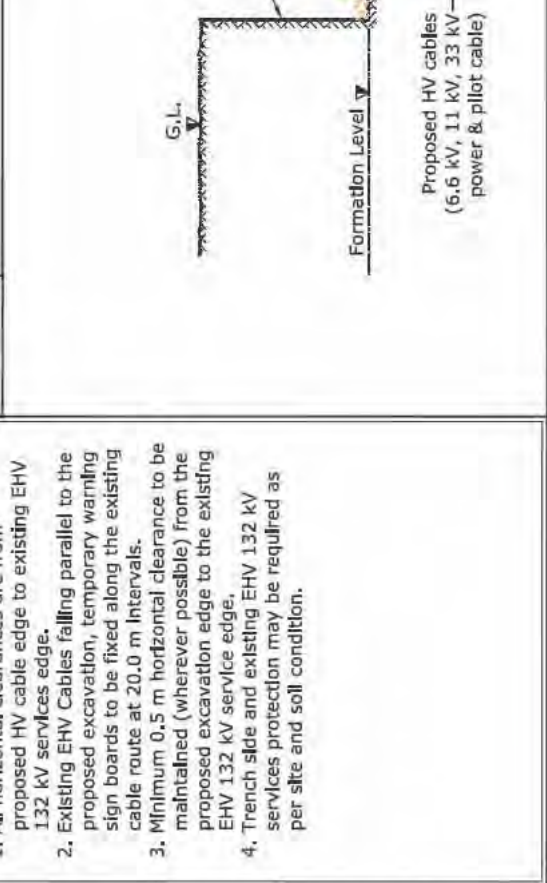


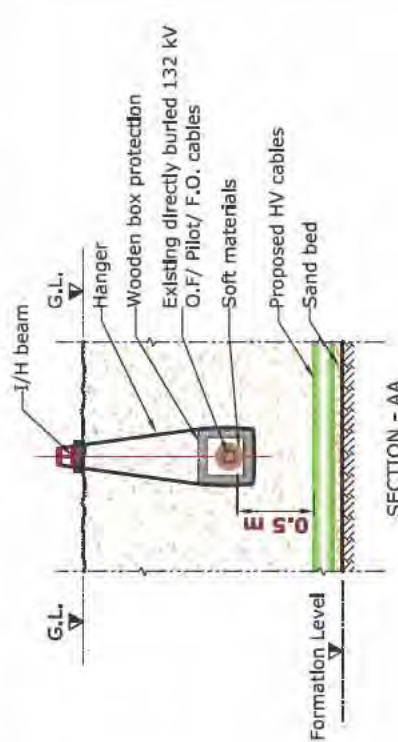
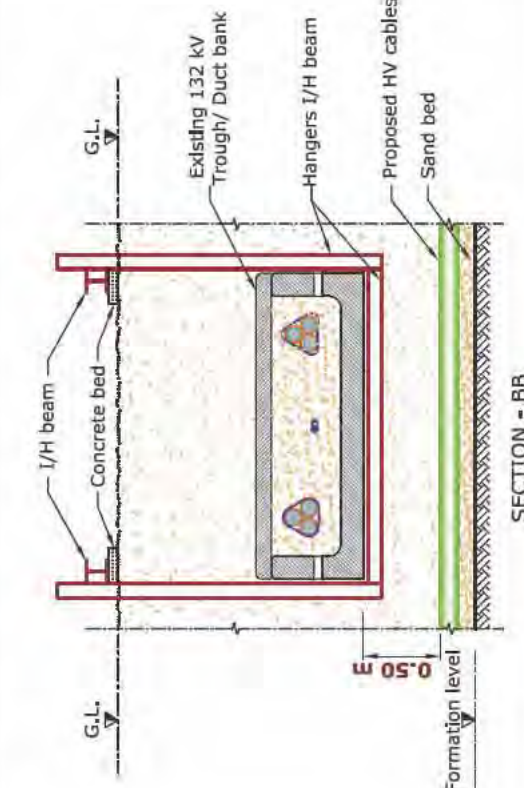
Table 3: Clearance & Protection details for proposed laying of HV cable and existing DEWA Electricity EHV services

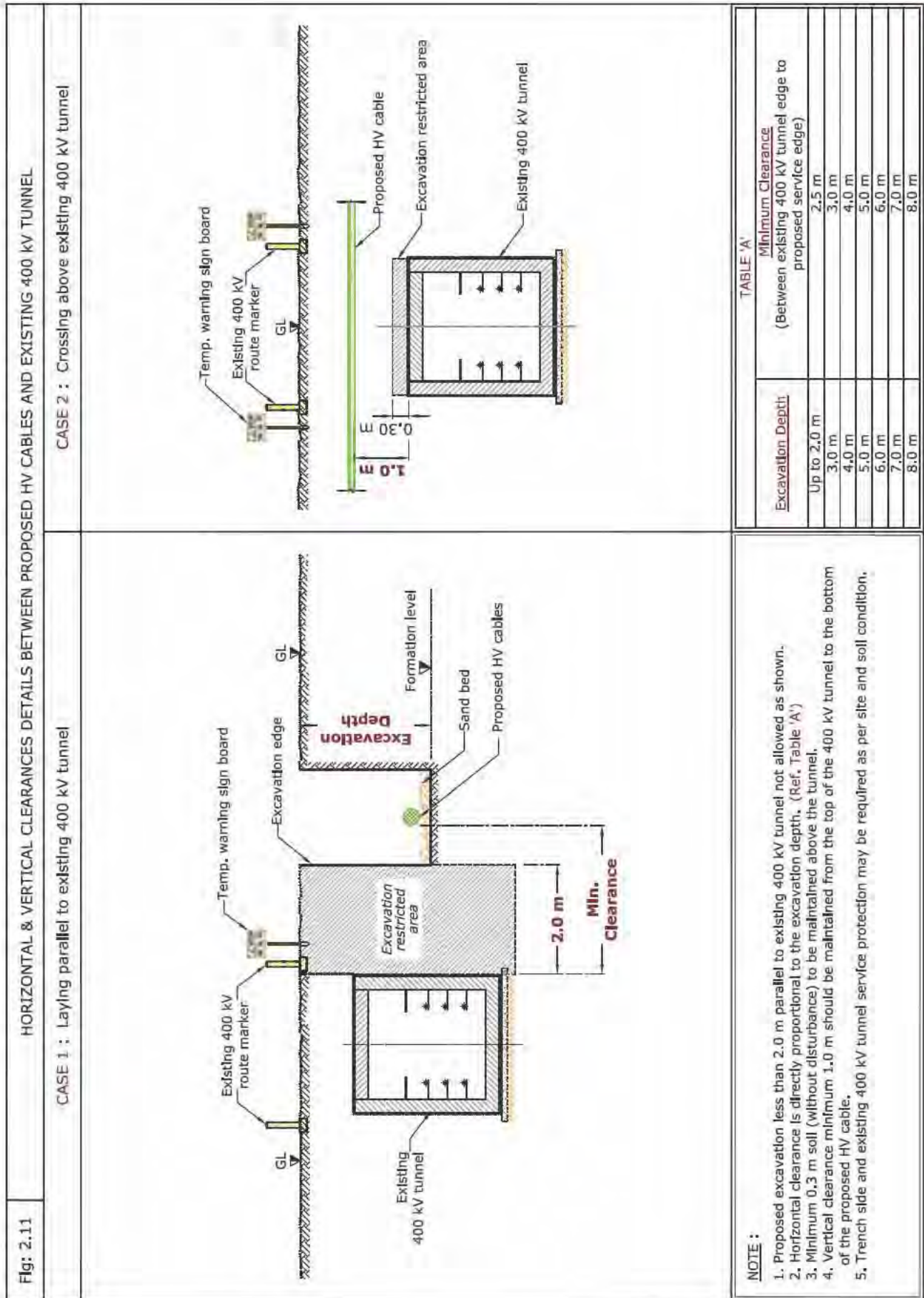
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 2.6)Vertical clearance (Ref Fig: 2.9)Protection details (Ref Fig: 2.9)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 2.6)Vertical clearance (Ref Fig: 2.9)Protection details (Ref Fig: 2.9)
EHV (132 kV) Trough	0.3 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 2.7)Vertical clearance (Ref Fig: 2.10)Protection details (Ref Fig: 2.10)
EHV (132 kV) Duct Bank	0.3 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 2.7)Vertical clearance (Ref Fig: 2.10)Protection details (Ref Fig: 2.10)
EHV (132 kV) Joint Bay/ Transition Joint	1.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 2.8)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 2.13)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 2.11, Case 1)Vertical clearance (Ref Fig: 2.11, Case 2)
		2.0 m	B	NDCM		<ul style="list-style-type: none">Vertical clearance (Ref Fig: 2.12)
Clearance & Protection details for access and working under Existing EHV OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 2.13)Vertical clearance (Ref Fig: 2.13)Protection details (Ref Fig: 2.13)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 2.6	HORIZONTAL CLEARANCE DETAILS FOR PROPOSED HV CABLES AND EXISTING BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	Fig: 2.7	HORIZONTAL CLEARANCE DETAILS FOR PROPOSED HV CABLES AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed HV cable edge to existing EHV 132 kV services edge. 2. Existing EHV Cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance to be maintained (wherever possible) from the proposed excavation edge to the existing EHV 132 kV service edge. 4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 		<p>Fig: 2.8</p>	
		<p>Fig: 2.8</p>	<p>HORIZONTAL CLEARANCE DETAILS FOR PROPOSED HV CABLES AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>

<p>Fig: 2.9</p>	<p>STANDARD PROTECTION AND CROSSING DETAILS BETWEEN PROPOSED HV CABLES AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ PILOT/ F.O. CABLES</p>  <p>SECTION - AA</p>
<p>Fig: 2.10</p>	<p>STANDARD PROTECTION AND CROSSING DETAILS BETWEEN PROPOSED HV CABLES AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>  <p>SECTION - BB</p>
<p>NOTE :</p> <ol style="list-style-type: none"> Existing EHV 132 kV services should be protected in the proposed Entry/ Exit pit area. Proposed HV cables should cross below to the existing EHV 132 kV services. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 	



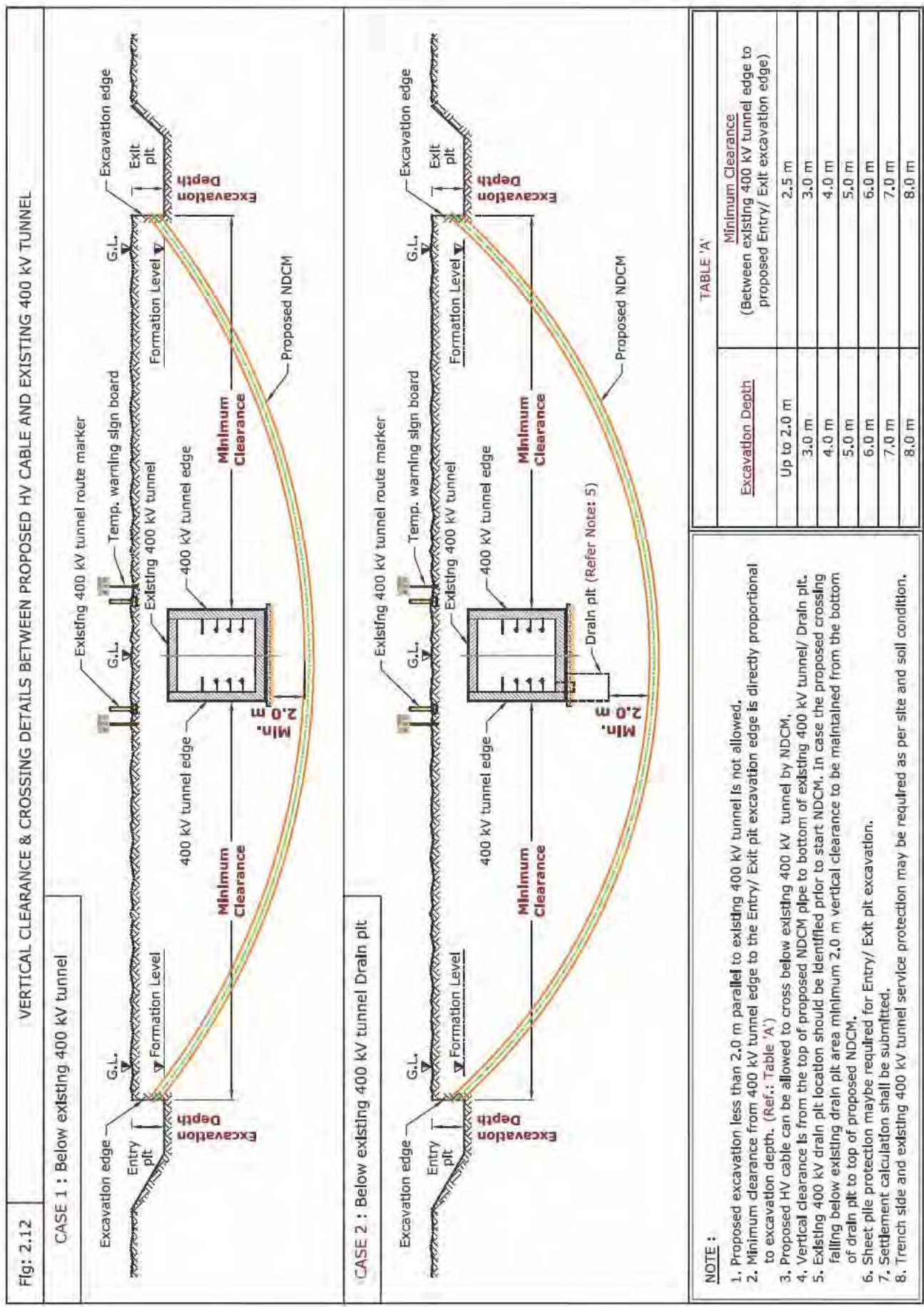


TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Entry/ Exit excavation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

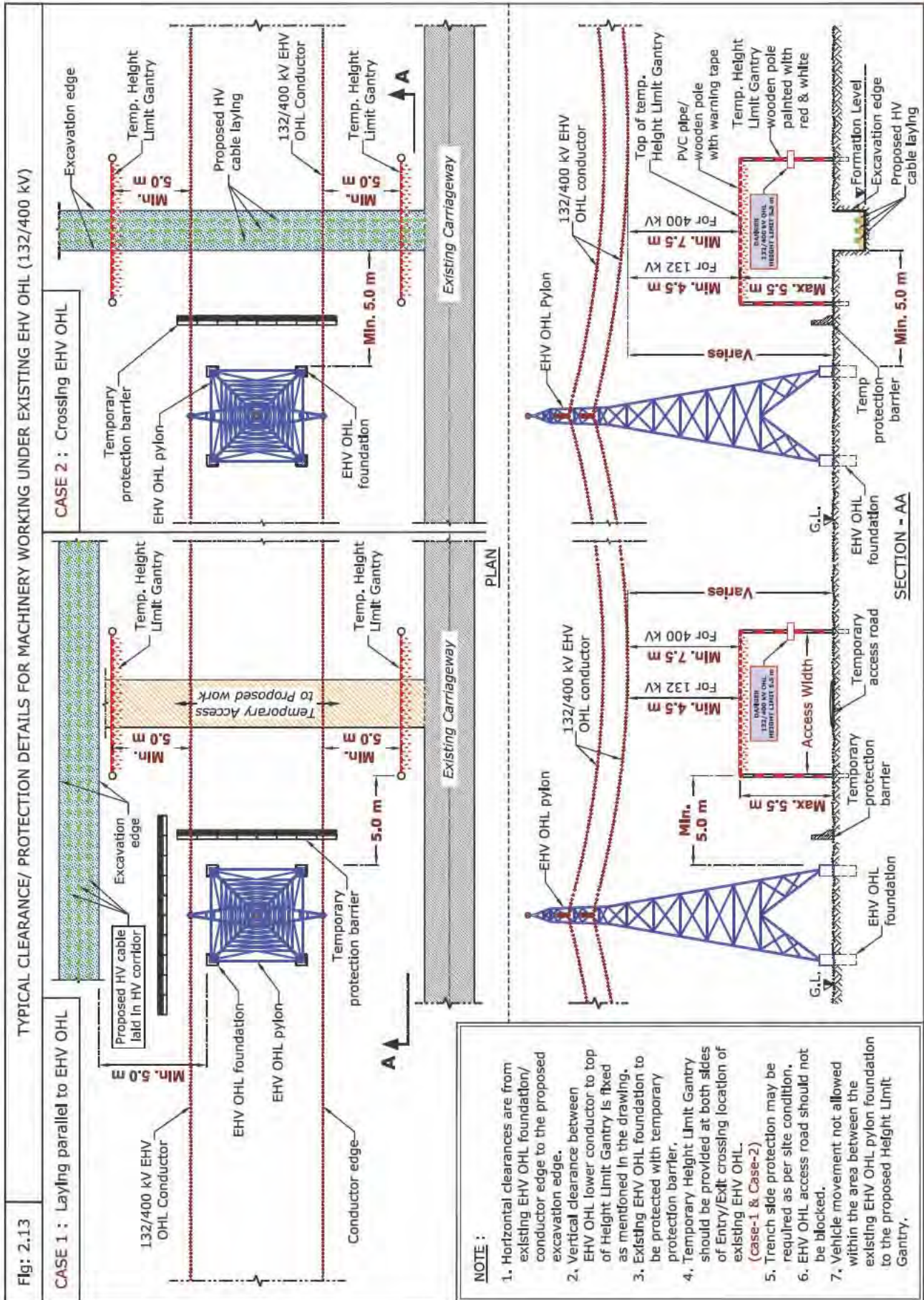


Table 4: Clearance & Protection details for Proposed HV cable laying and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 2.14)
Gas/Fuel pipeline (All diameter)	10.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 2.14)

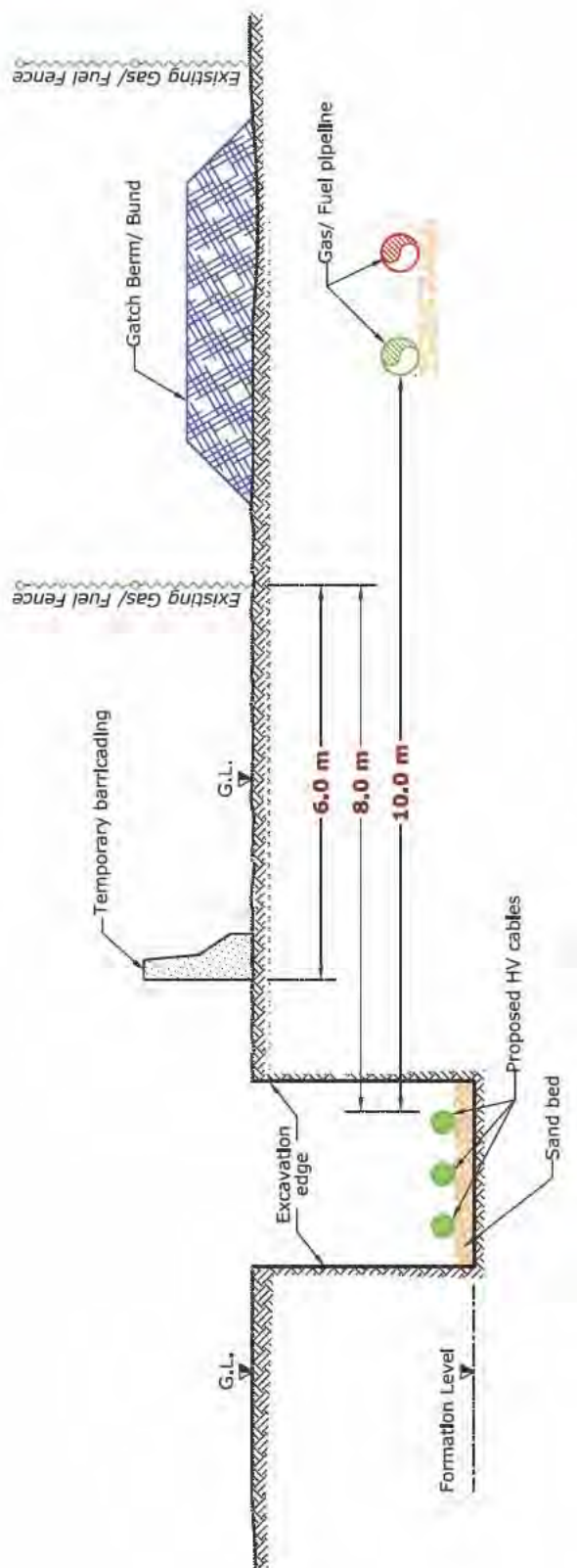
Table Abbreviation

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B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 2.14

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HV CABLES AND EXISTING GAS/ FUEL SERVICES

**NOTE :**

1. Horizontal clearance 8.0 m from proposed HV cable edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed HV cable edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 5.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed HV cable allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
6. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

3. Installation of Proposed OHL - Electricity HV (6.6/11/33 kV)

3.1 Introduction

The great demand of energy requires high voltage (HV) cables to transmit electricity either from generation or transmission electrical lines/substations to pocket stations and finally to the end users, HV OHL cables are installed on overhead structures i.e. wooden or steel

poles constructed on concrete foundations to transmit HV power for long distances. HV OHL lines are utilized in approved corridor within Right Of Way, therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



Steel Tower for HV OHL



Wood Pole for HV OHL

3.2 Avoid the following



1. Proposed HV OHL crossing EHV OHL.
2. Proposed 132 kV joint bay beside HV OHL foundation

3.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed installation of HV -OHL and existing DEWA Electricity LV cables

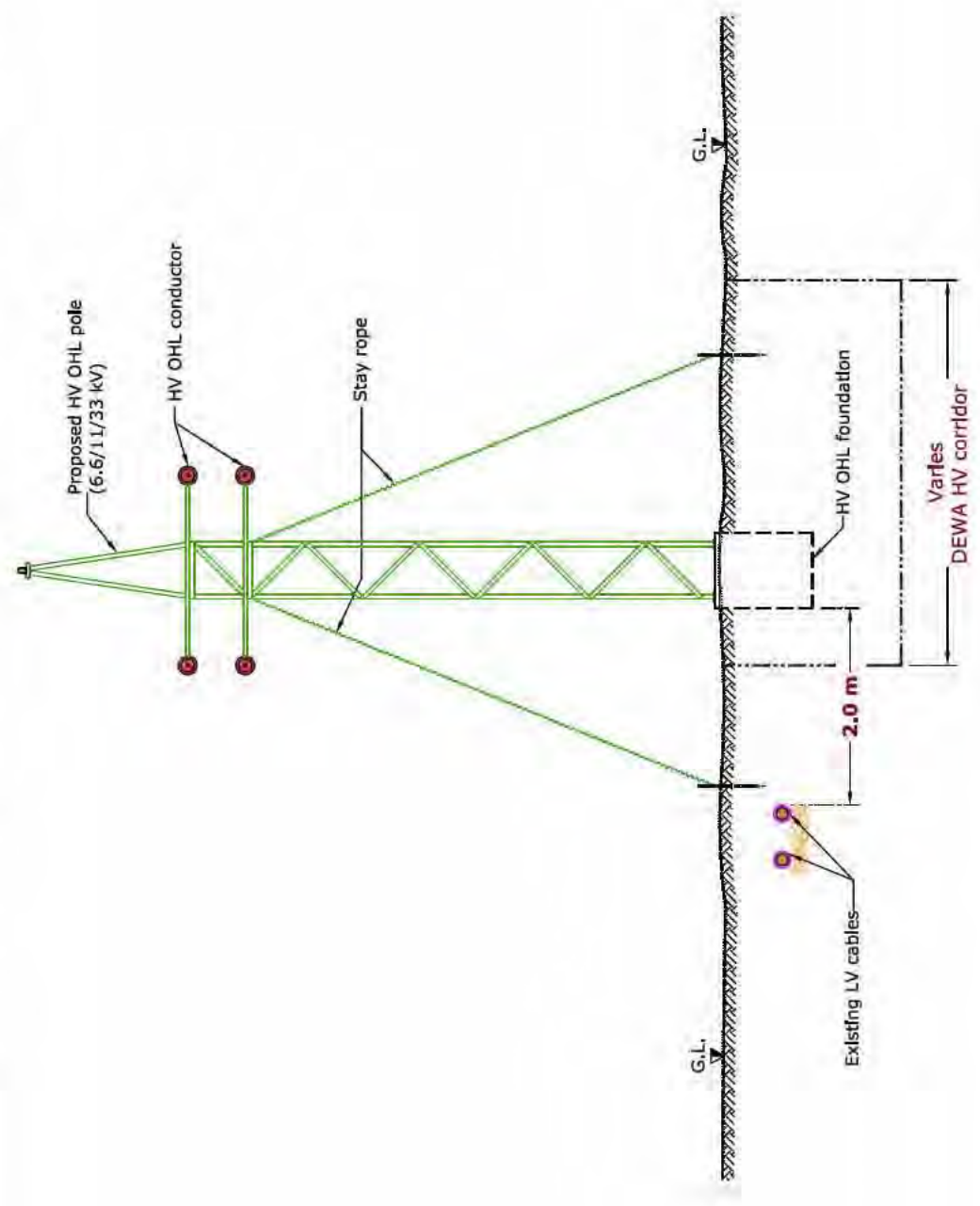
Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	2.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 3.1)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 3.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HV OHL (6.6/11/33 kV) AND EXISTING LV CABLES



- NOTE :**
1. Horizontal clearance is from the proposed HV OHL foundation edge to existing LV cable edge.
 2. Proposed HV OHL should be installed in approved HV corridor.
 3. Trench side and existing LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed Installation of HV-OHL and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.2)
HV (6.6/11/33 kV) Manhole	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.2)
HV (6.6/11/33 kV) O.H.L	-	-	-	-	-	-
Clearance & Protection details for access working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	• Horizontal clearance (Ref Fig: 3.3)
HV (33 kV) O.H.L		3.5 m				• Vertical clearance (Ref Fig: 3.3) • Protection details (Ref Fig: 3.3)

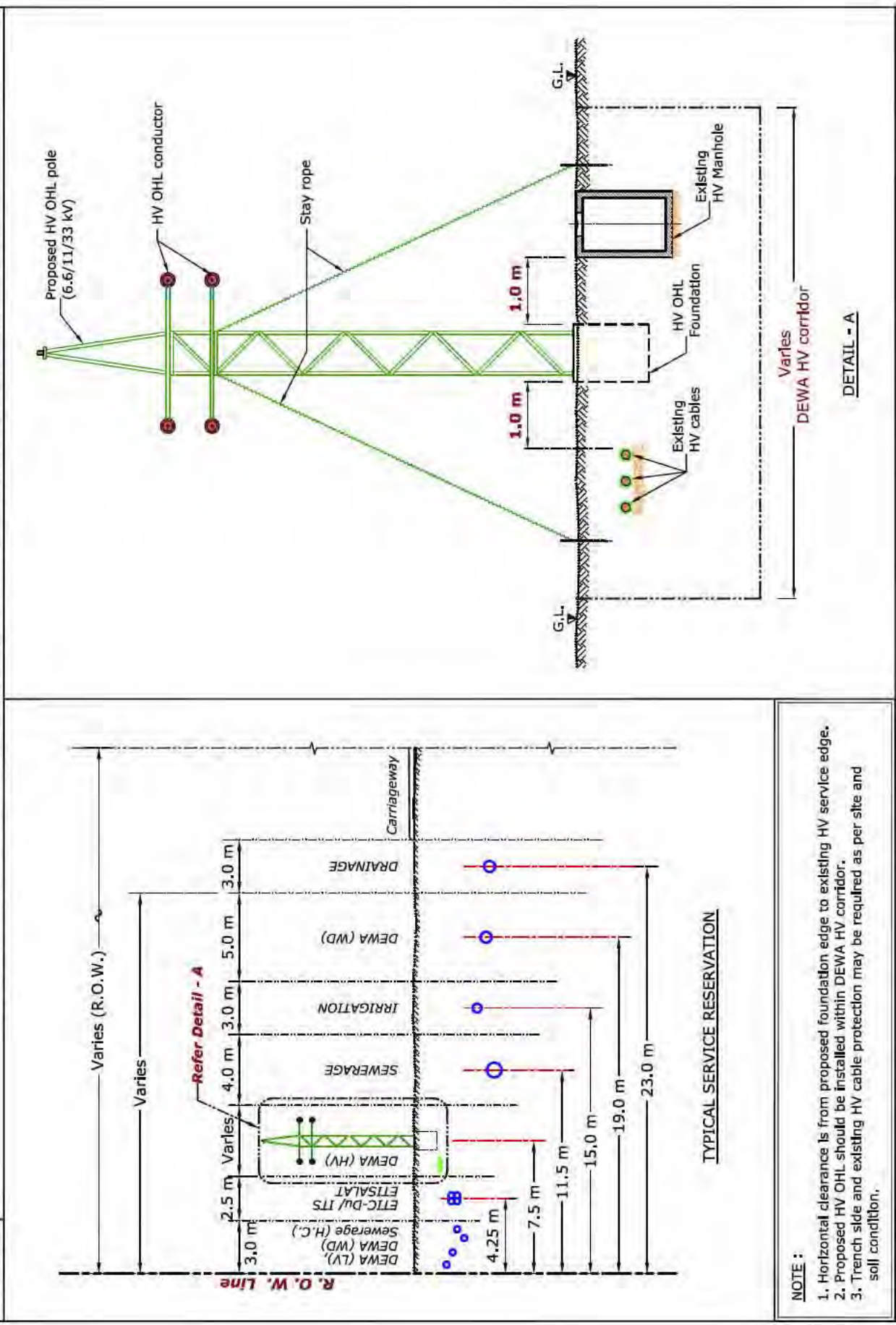
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
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A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



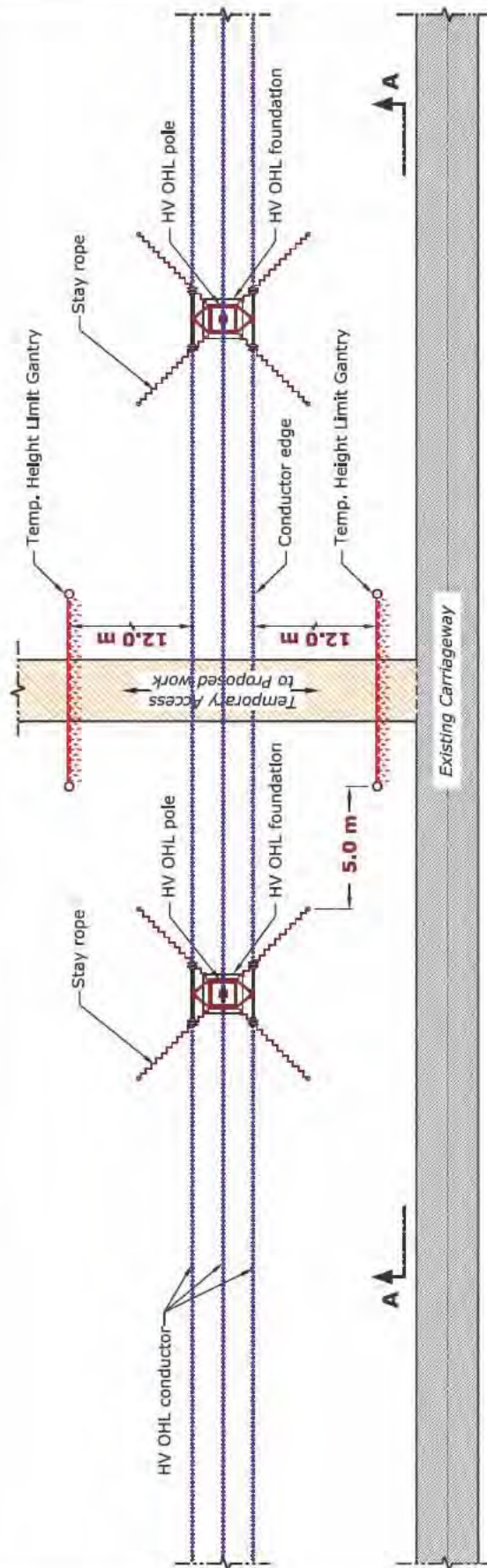
Installation of Proposed OHL - Electricity HV (6.6/11/33 kV)

Fig: 3.2 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HV OHL (6.6/11/33 kV) AND EXISTING HV SERVICES

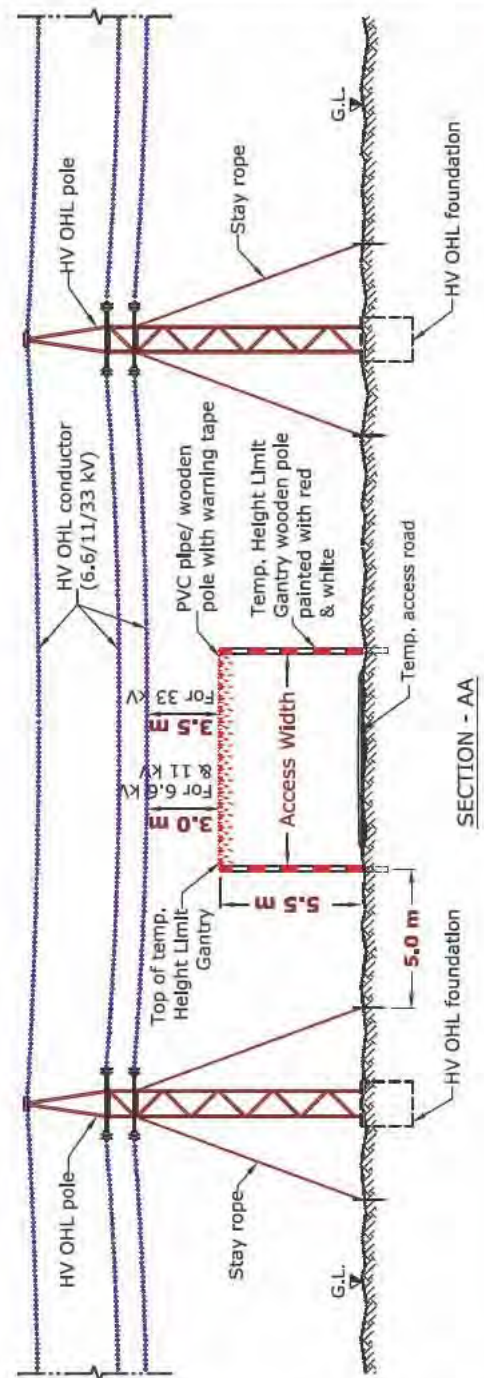


- NOTE :**
1. Horizontal clearance is from proposed foundation edge to existing HV service edge.
 2. Proposed HV OHL should be installed within DEWA HV corridor.
 3. Trench side and existing HV cable protection may be required as per site and soil condition.

Fig: 3.3 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)



PLAN



SECTION - AA

NOTE :

1. Proposed HV OHL should be installed within DEWA HV corridor.
2. Width of Height Limit Gantry varies at site as per access width.
3. Temporary Height Limit Gantry should be provided at both sides of Entry/ Exit crossing location of existing HV OHL.
4. Vertical clearance between HV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
5. The standard height of Limit Gantry (Max. 5.5 m) may vary as per site condition subject to DEWA Distribution Maintenance site supervision approval.
6. Vehicle movement not allowed within the area between the existing HV OHL pole foundation to the proposed Height Limit Gantry.

Table 3: Clearance & Protection details for proposed Installation of HV-OHL and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.4, Case 1)
EHV (132 kV) Cable & Pilot/F.O (Directly Buried)	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.4, Case 1)
EHV (132 kV) Trough	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.4, Case 2)
EHV (132 kV) Duct Bank	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.4, Case 2)
EHV (132 kV) Joint Bay/Transition Joint	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.4, Case 2)
EHV (132/400 kV) O.H.L	20.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 3.6)
EHV (400 kV) Tunnel	6.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 3.5)

Clearance & Protection details for access working under Existing EHV-OHL

EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	• Horizontal clearance (Ref Fig: 3.7)
EHV (400 kV) O.H.L		7.5 m				• Vertical clearance (Ref Fig: 3.7) • Protection details (Ref Fig: 3.7)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

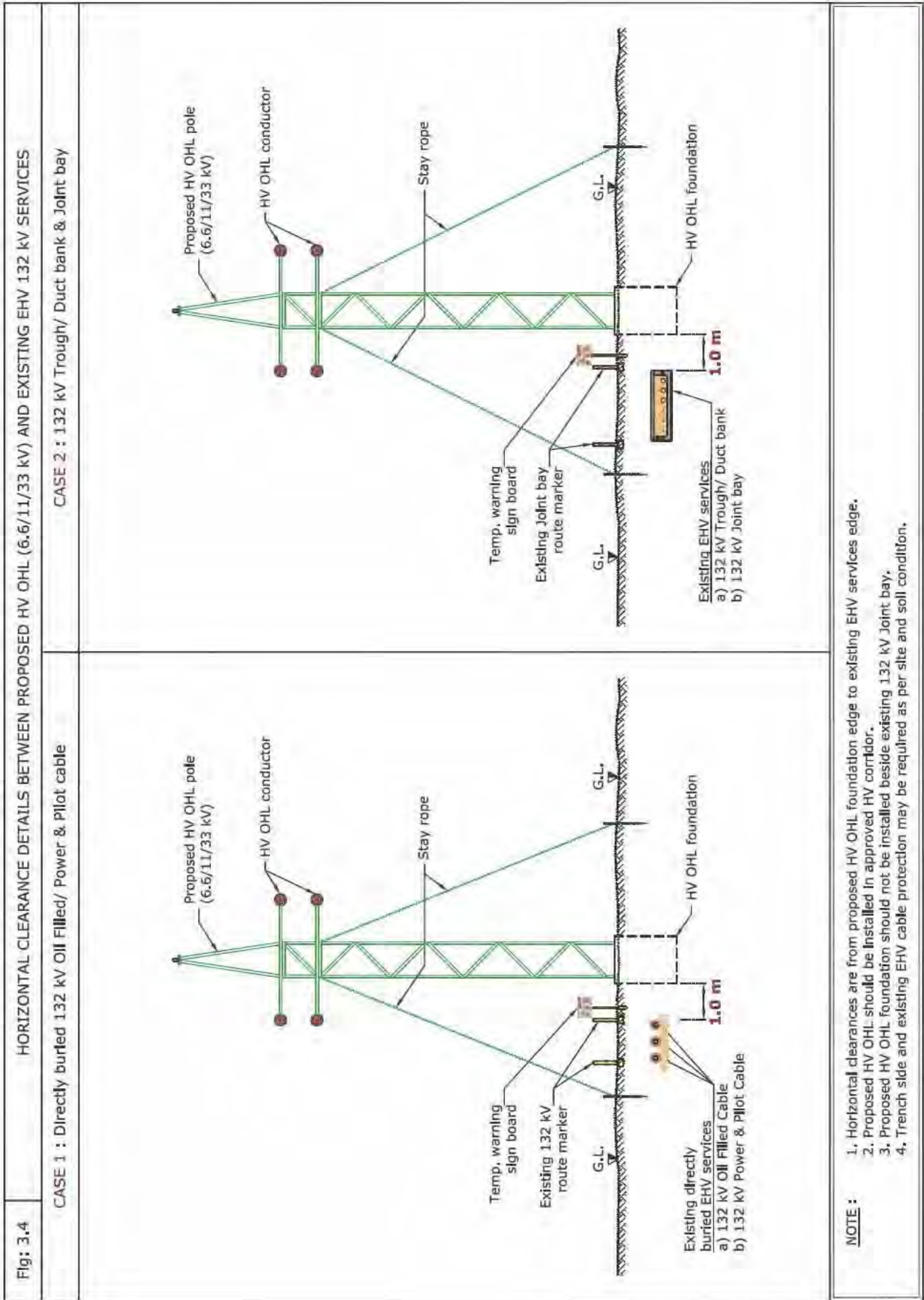
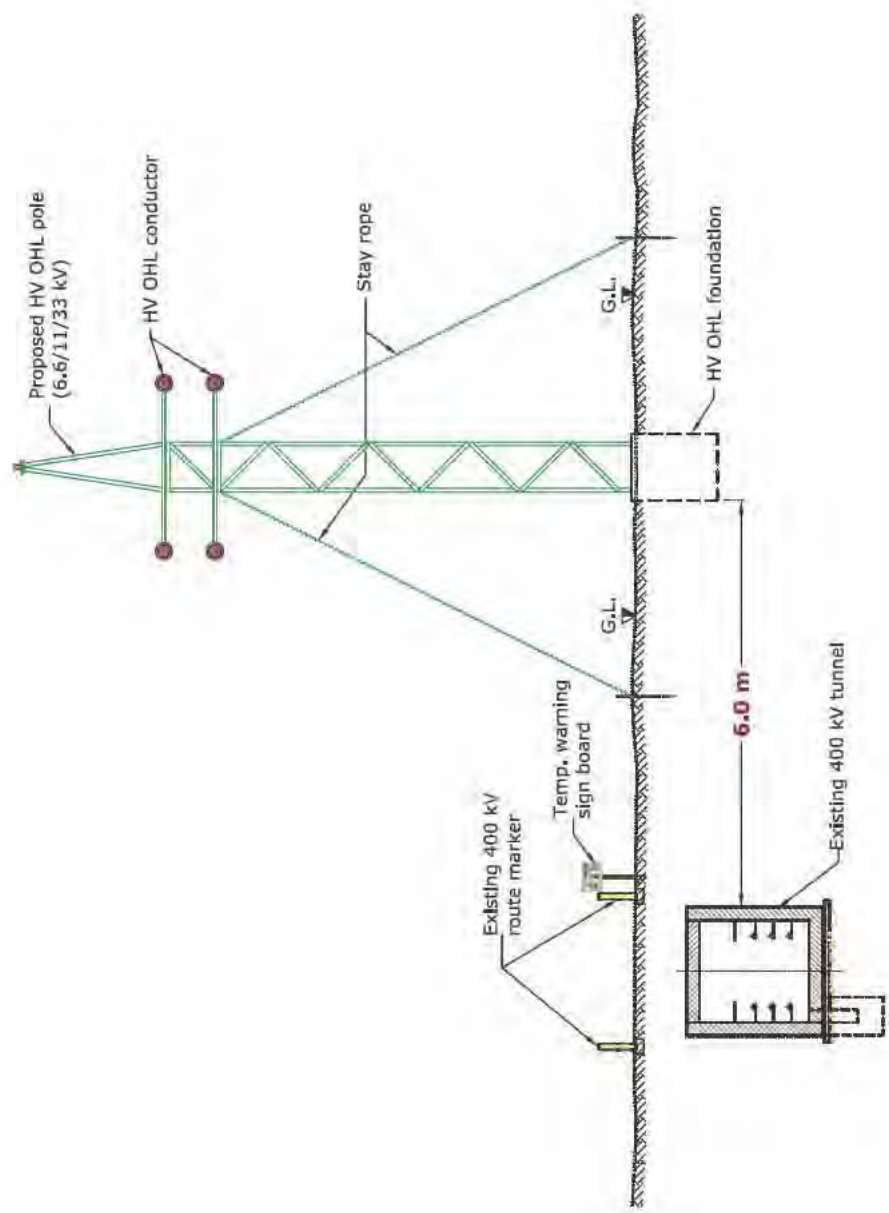
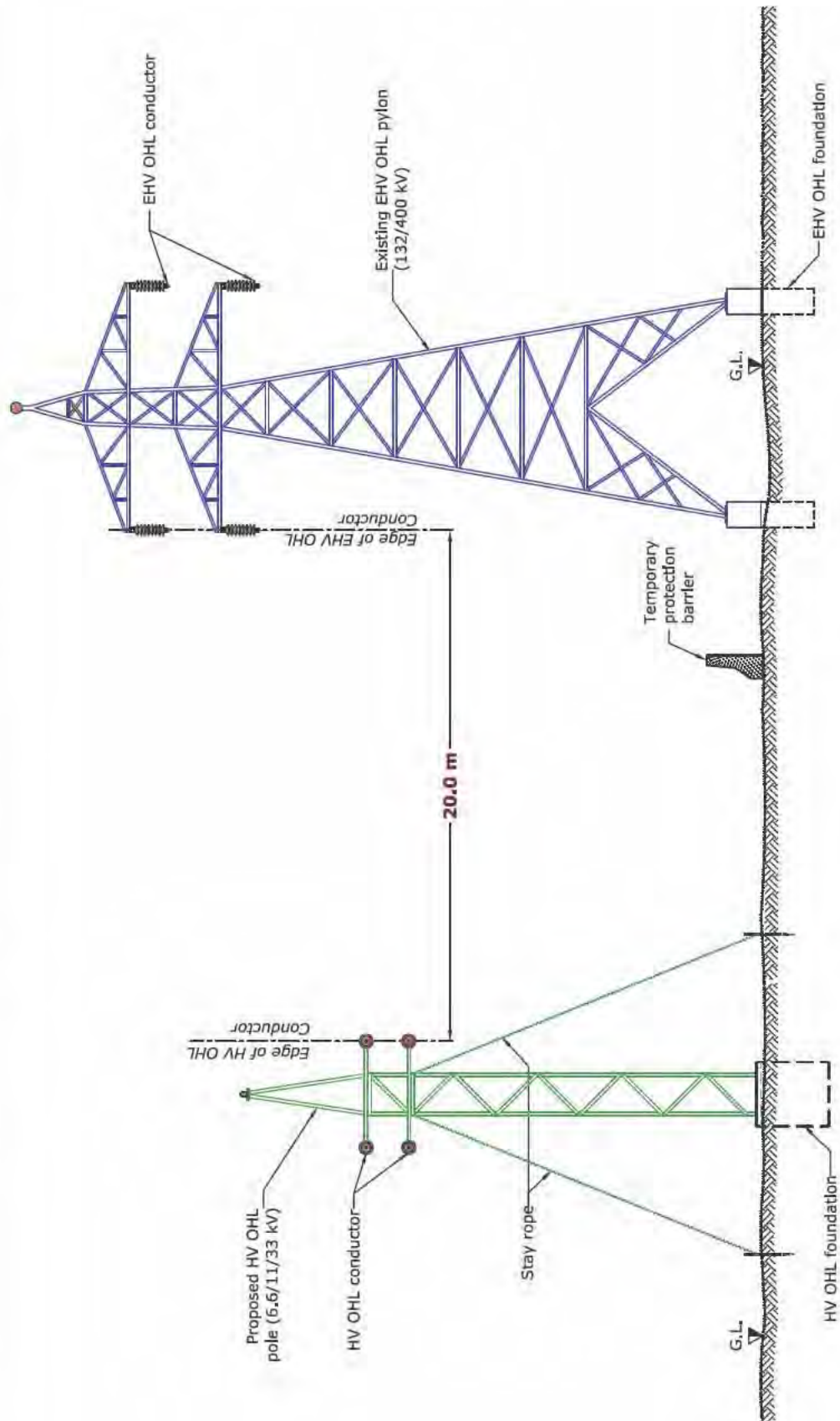


Fig: 3.5 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HV OHL (6.6/11/33 kV) AND EXISTING 400 kV TUNNEL



- NOTE :**
1. Horizontal clearances are from proposed HV OHL foundation edge to existing EHV services edge.
 2. Proposed HV OHL should be installed in approved HV corridor.
 3. Trench side and existing EHV cable protection may be required as per site and soil condition.

Fig: 3.6 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HV OHL (6.6/11/33 kV) AND EXISTING EHV OHL (132/400 kV)



- NOTE :**
1. Horizontal clearance is from proposed HV OHL conductor edge to existing EHV OHL conductor edge.
 2. Standard falling clearances are 5.0 m from 132 kV conductor, 6.0 m from 400 kV conductor & 1.0 m from EHV OHL foundation.
 3. Existing EHV OHL foundation to be protected with temporary protection barrier.
 4. Proposed HV OHL are not allowed crossing existing EHV OHL services.

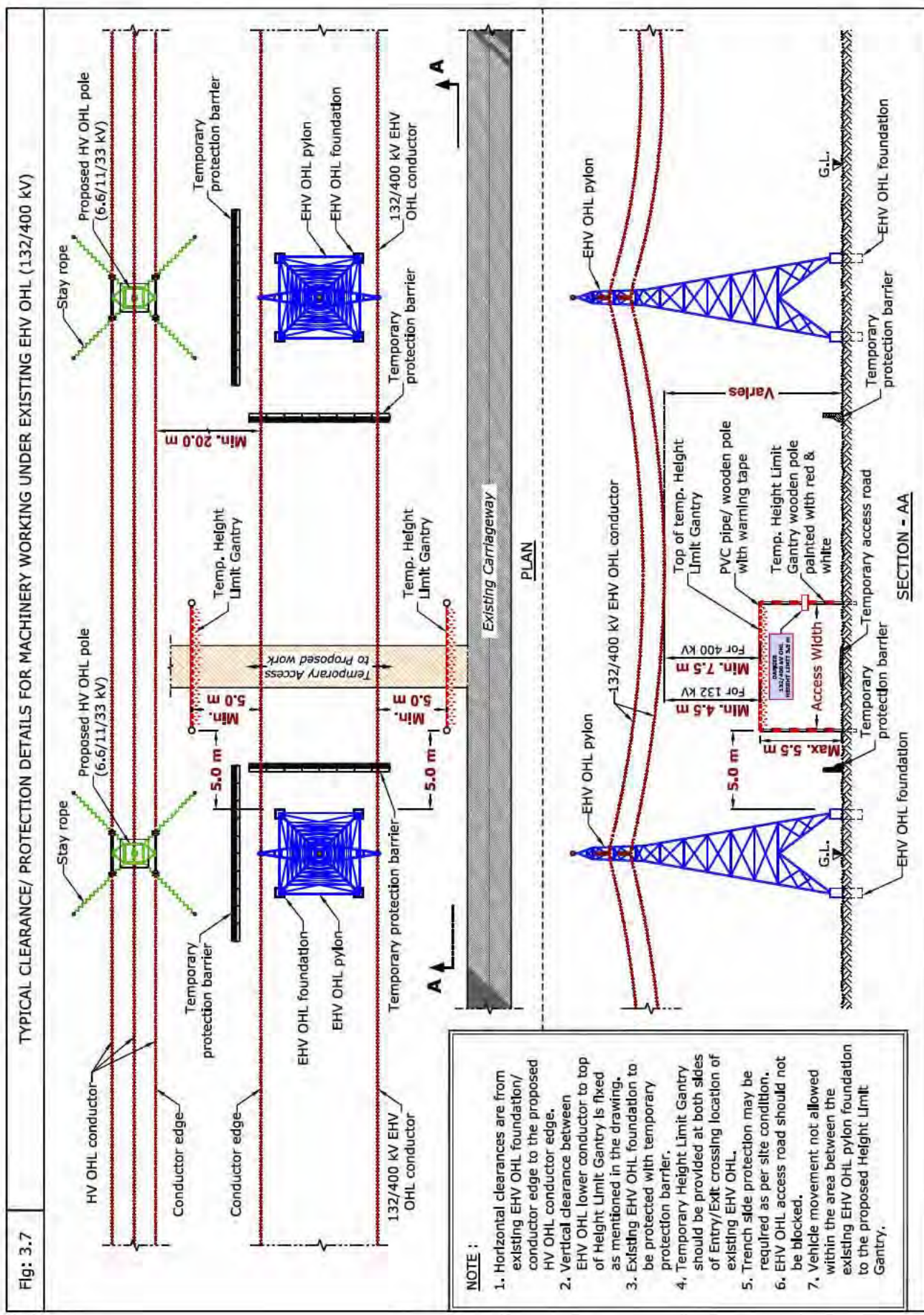


Table 4: Clearance & Protection details for proposed Installation of HV-OHL and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.8)
Gas/Fuel pipeline (All diameter)	10.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 3.8)

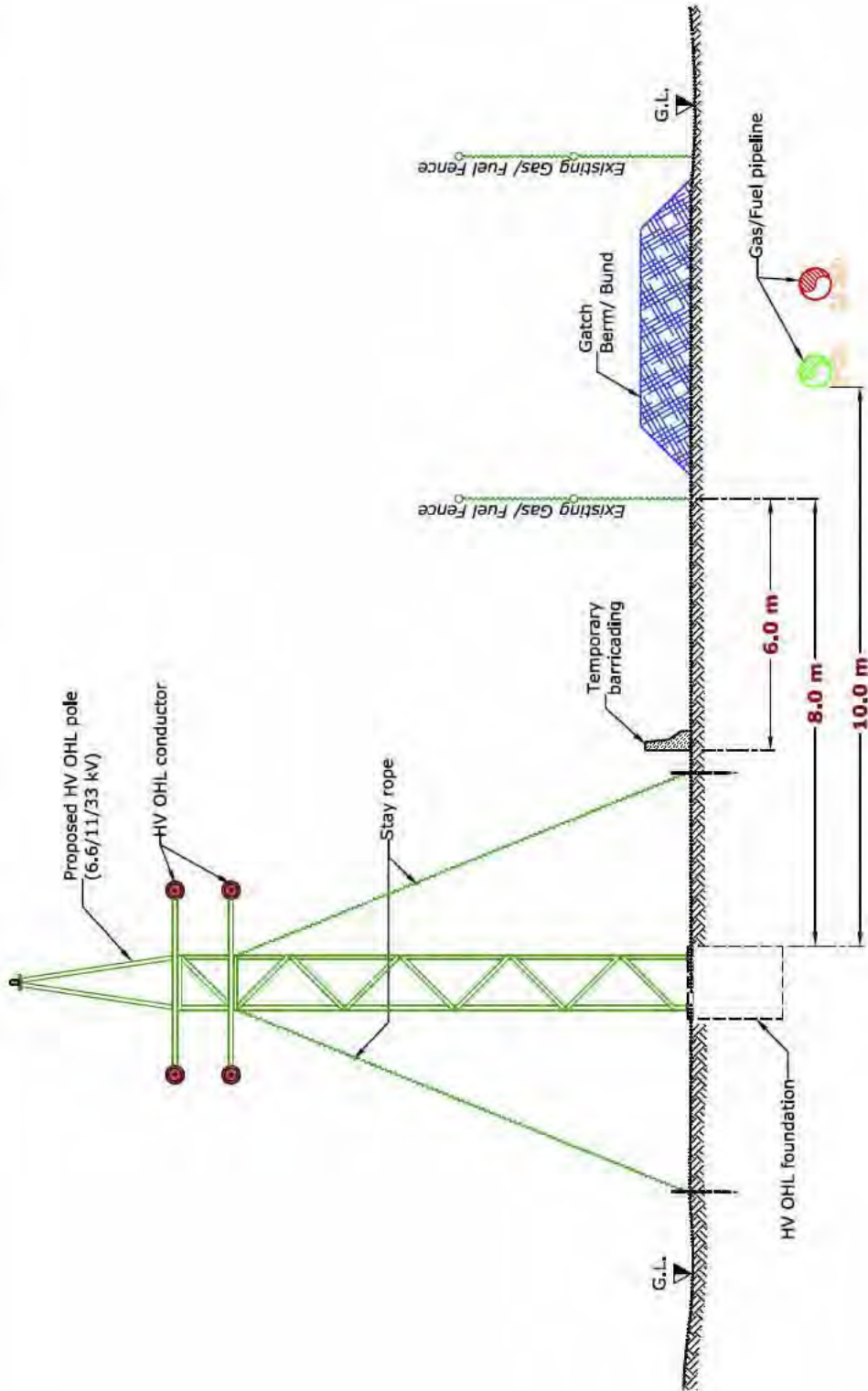
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Installation of Proposed OHL - Electricity HV (6.6/11/33 kV)

Fig: 3.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HV OHL (6.6/11/33 kV) AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed HV OHL foundation edge to existing Gas/ Fuel Fence.
 2. Horizontal clearance 10.0 m from proposed HV OHL foundation edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

4. Laying of Proposed Utilities – Electricity 132 kV Trough

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4.1 Introduction

EHV cables have unique properties of transmitting power from generation power plant to substations.

Directly buried cables are at high risk of damages due to different site activities. EHV cables are designed to emit no electric and magnetic fields to minimise power losses, and for the purpose of supporting sustainability of power supply

132 kV cables which are laid inside concrete trough covered with concrete slab. The concrete troughs and slabs are designed to withstand certain loads and protect the power cables from damages. 132 kV Trough is laid within Right Of Way. Therefore, during construction activities DEWA existing assets to be protected as per specified standard.



132 kV POWER & F.O./PILOT CABLE INSIDE TROUGH

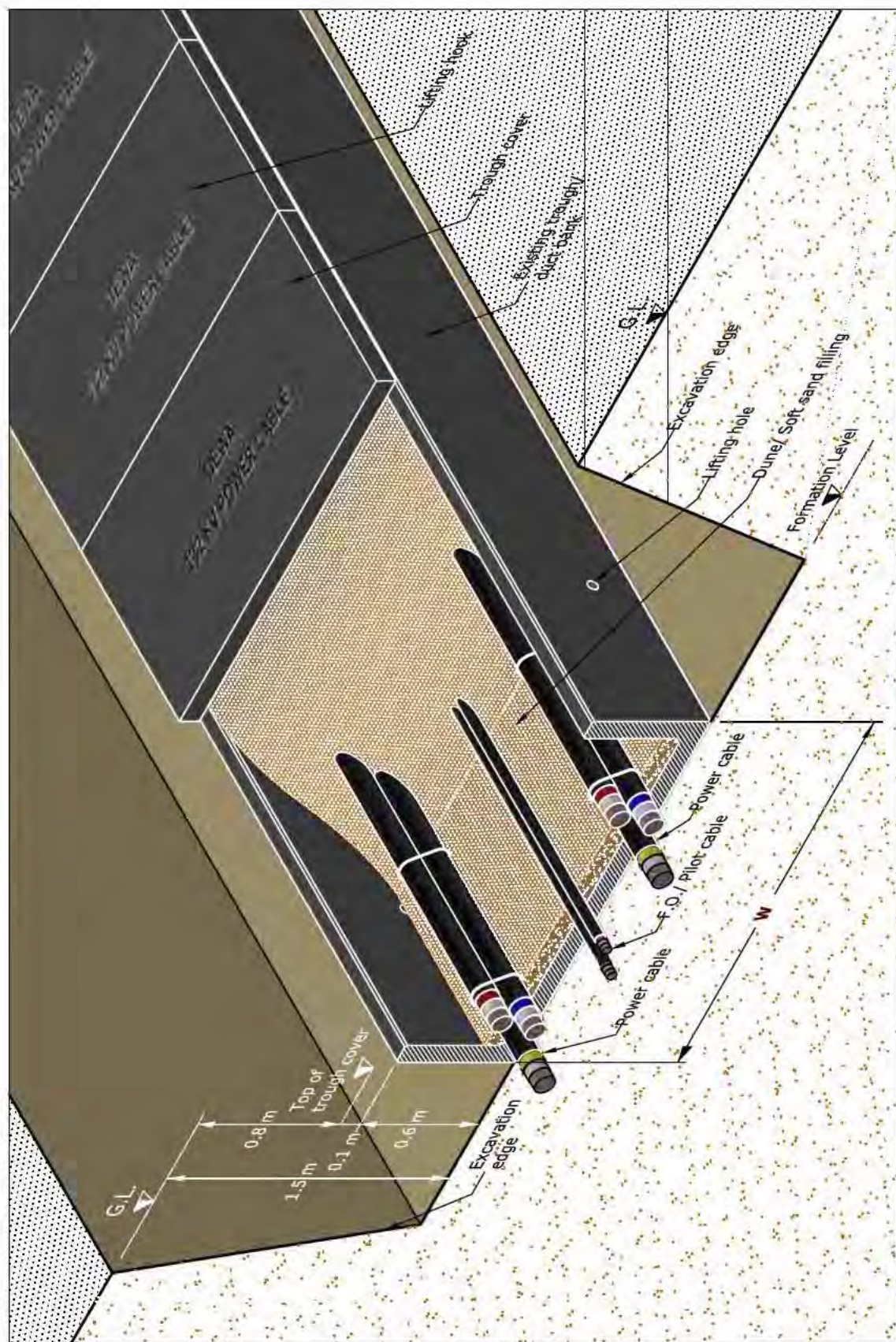


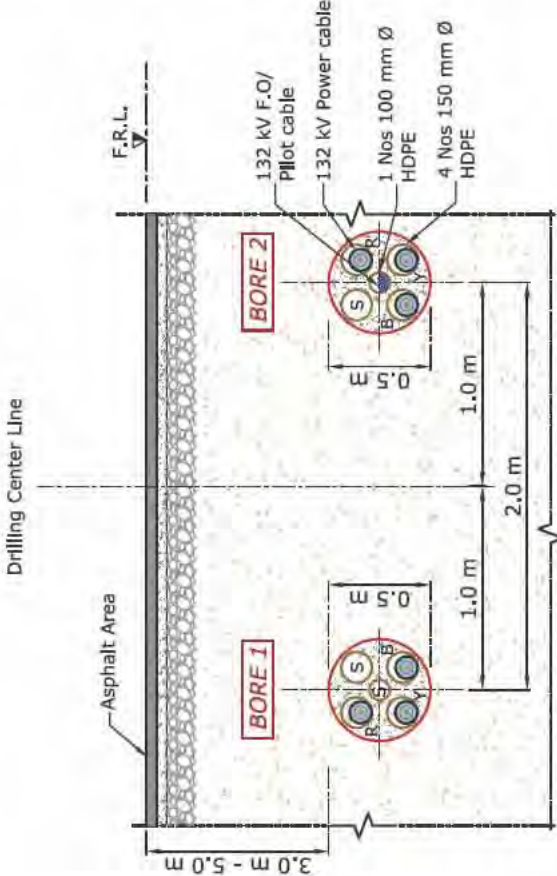
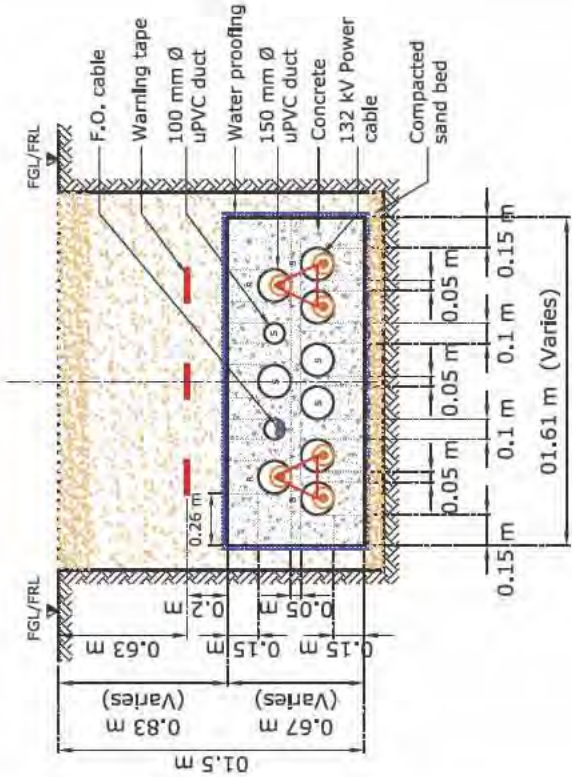


Photo: 132 kV Trough Laying



Photo: 132 kV Cable laying inside Trough

TYPICAL DETAILS OF 132 kV TROUGH LAYING IN UNMADE AREA/ INTERLOCK PARKING	
2.0m Width Trough for 132 kV Power/ Pilot/ F.O cable	
0.5 m Width Trough for 132 kV F.O/ Pilot cable	
TYPICAL DETAILS OF 132 kV TROUGH LAYING IN ROAD (ASPHALT/ INTERLOCK) AND ASPHALT PARKING	
NOTE : 1. Excavated Trench should be backfilled with suitable excavated soil. 2. Trench side protection may be required as per site and soil condition.	

<p>TYPICAL DETAILS OF 132 kV POWER/ PILOT/ F.O. CABLES (ROAD CROSSING BY NDCM)</p>	 <p style="text-align: center;">HDD</p>	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Excavated Trench should be backfilled with suitable excavated soil. 2. Trench side protection may be required as per site and soil condition.
<p>TYPICAL DETAILS OF 132 kV POWER/ PILOT/ F.O. CABLES (ROAD CROSSING BY OPEN CUT)</p>	 <p style="text-align: center;">DUCT BANK</p>	

4.2 Avoid the following



1. Propose 132 kV trough cross existing 400 kV tunnel by open cut method.
2. Propose 132 kV trough cross existing 132 kV joint bay.
3. Propose 132 kV trough cross existing HV manhole/Valve chambers/SCADA Unit.

4.3 Standard Clearance & Protection details

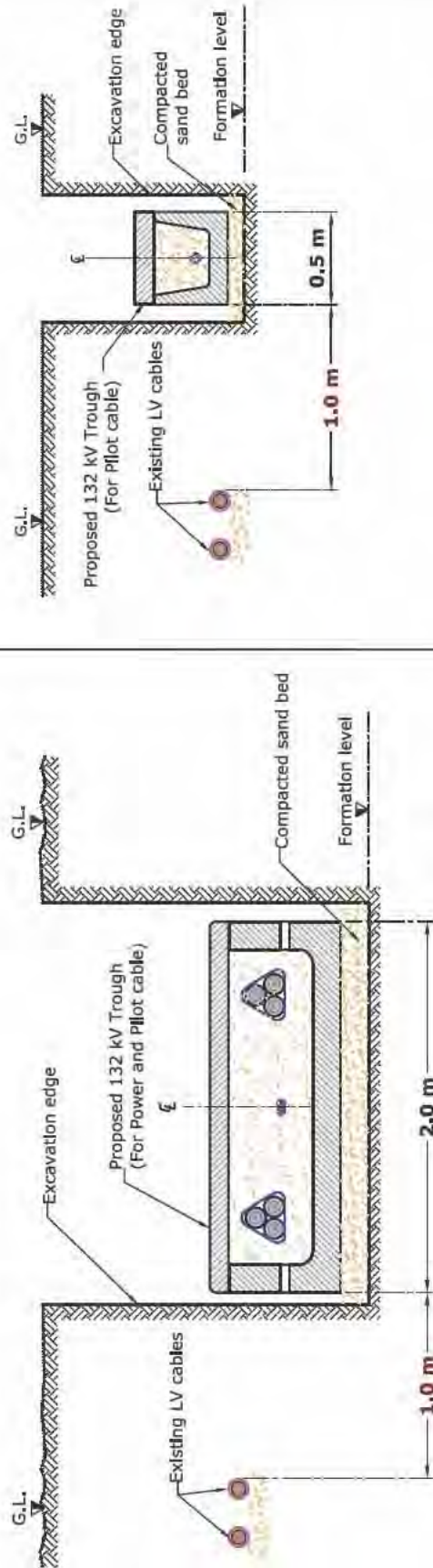
Table 1: Clearance & Protection details for proposed laying of 132 kV Trough and existing DEWA Electricity LV cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 4.1) • Vertical clearance (Ref Fig: 4.2) • Protection details (Ref Fig: 4.2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

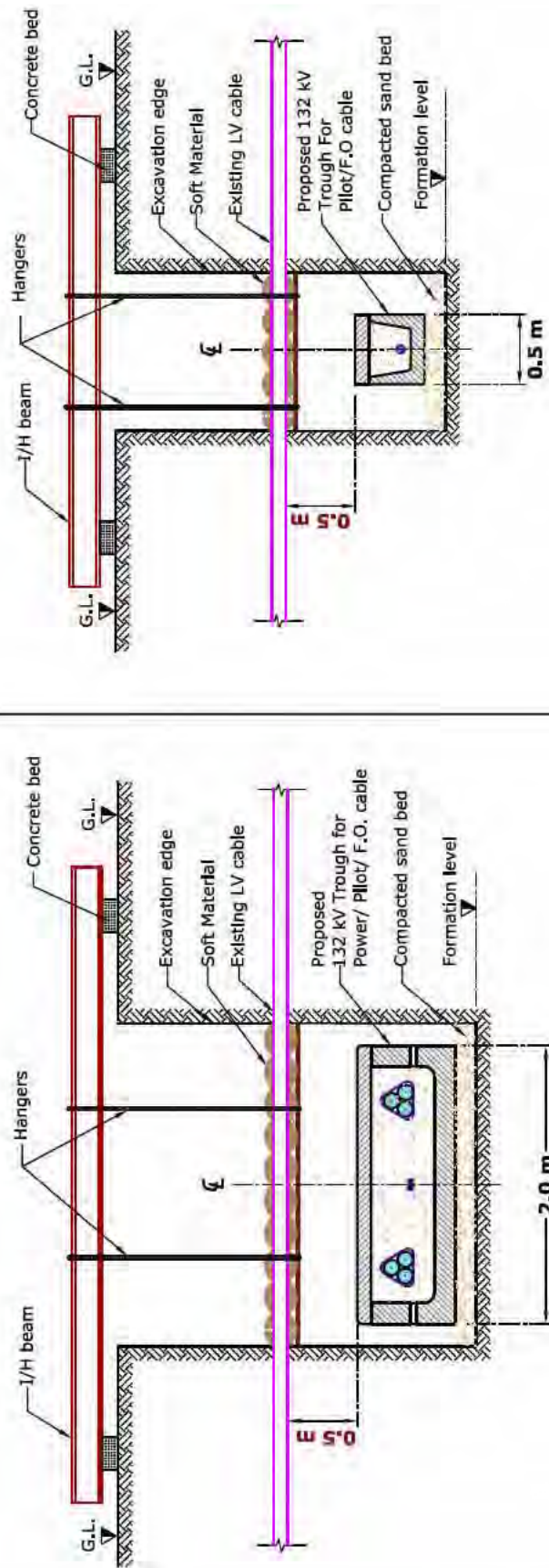
Fig: 4.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV TROUGH AND EXISTING LV CABLES



NOTE :

1. Horizontal clearance is from the proposed 132 kV trough edge to existing LV cable edge.
2. Trench side and LV cable protection may be required as per site and soil condition.

VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV TROUGH AND EXISTING LV CABLES



NOTE :

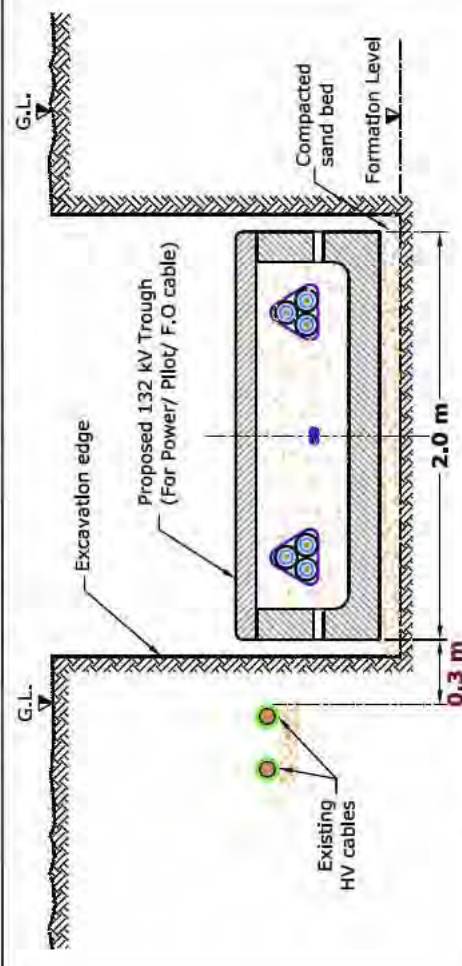
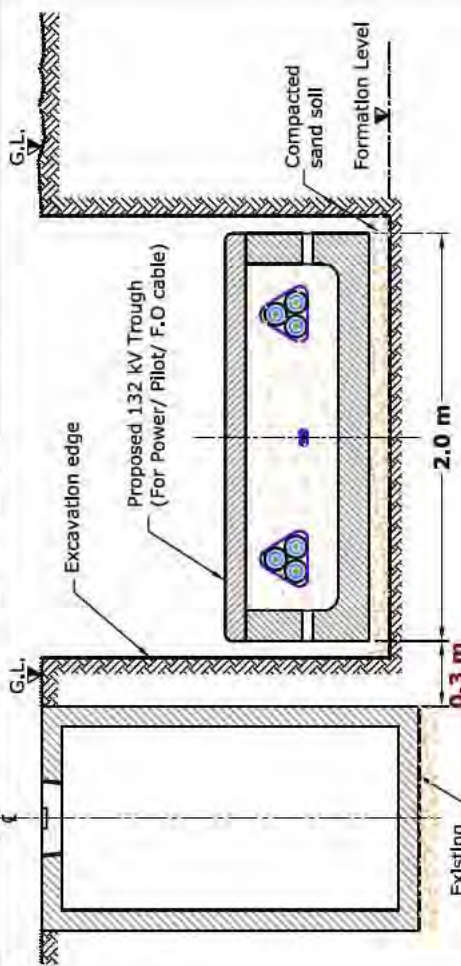
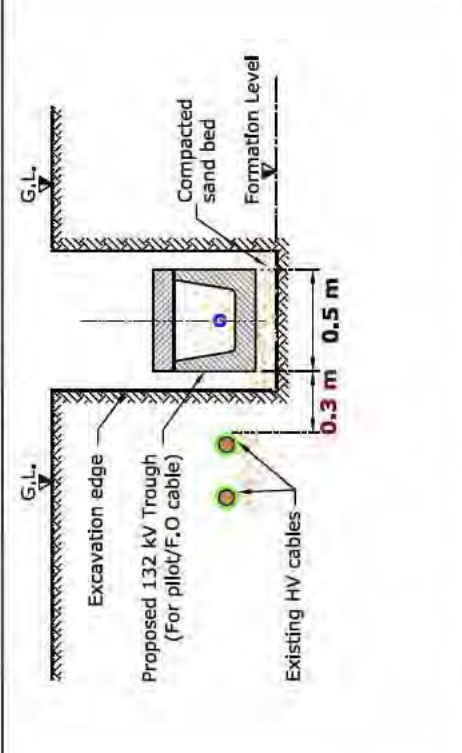
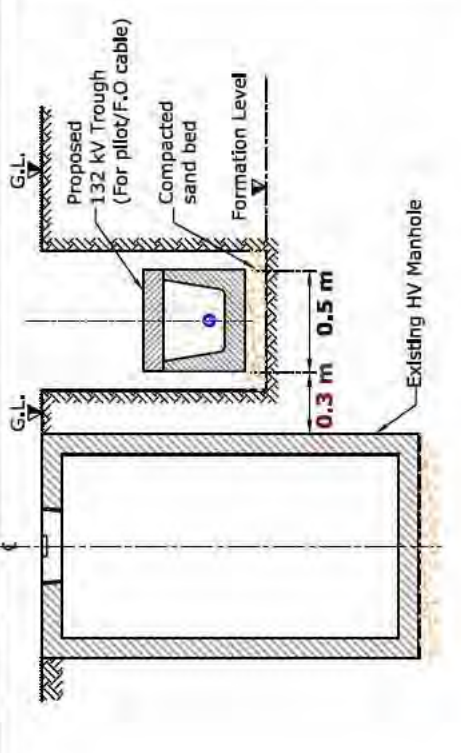
1. Vertical clearance is from the top of proposed 132 kV trough to the bottom of the LV cables.
2. Trench side and LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed laying of 132 kV Trough and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ pilot Cable and Joints	0.3 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 4.3) • Vertical clearance (Ref Fig: 4.4, Case 2) • Protection details (Ref Fig: 4.4)
HV (6.6/11/33 kV) Manhole	0.3 m	NA	-	-	-	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 4.3)
HV (6.6/11/33 kV) O.H.L	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 4.5)
Clearance & Protection details for access under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 4.6) • Vertical clearance (Ref Fig: 4.6) • Protection details (Ref fig: 4.6)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 4.3	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132kV TROUGH AND EXISTING HV SERVICES	
	<p>Proposed 132 kV 2.0 m Trough and existing HV cables</p> 	<p>Proposed 132 kV 0.5 m Trough and existing HV Manhole</p> 
	<p>Proposed 132 kV 0.5 m Trough and existing HV cables</p> 	<p>Proposed 132 kV 0.5 m Trough and existing HV Manhole</p> 

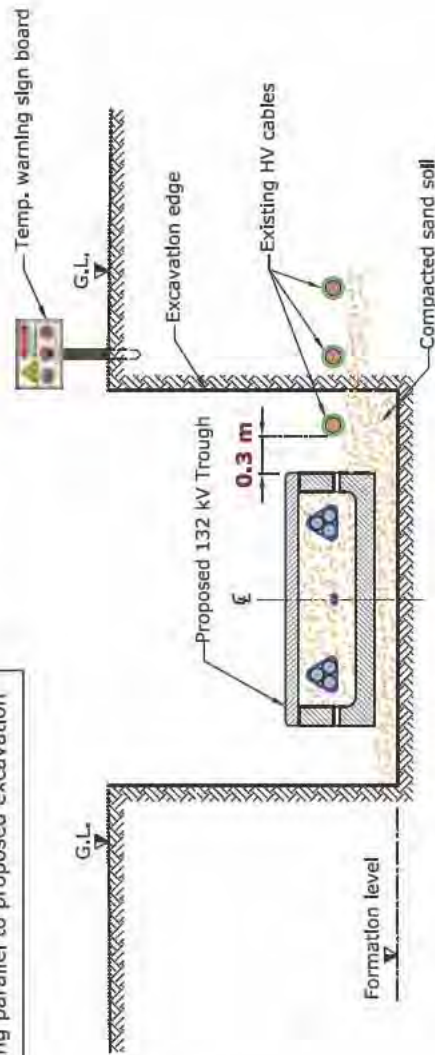
NOTE :

1. Horizontal clearance from the proposed 132 kV Trough edge to existing HV services edge.
2. Proposed 132 kV Trough can be allowed to cross below existing HV cables.
3. Proposed 132 kV Trough not allowed to cross existing HV Manhole.
4. Trench side and existing HV services protection may be required as per site and soil condition.

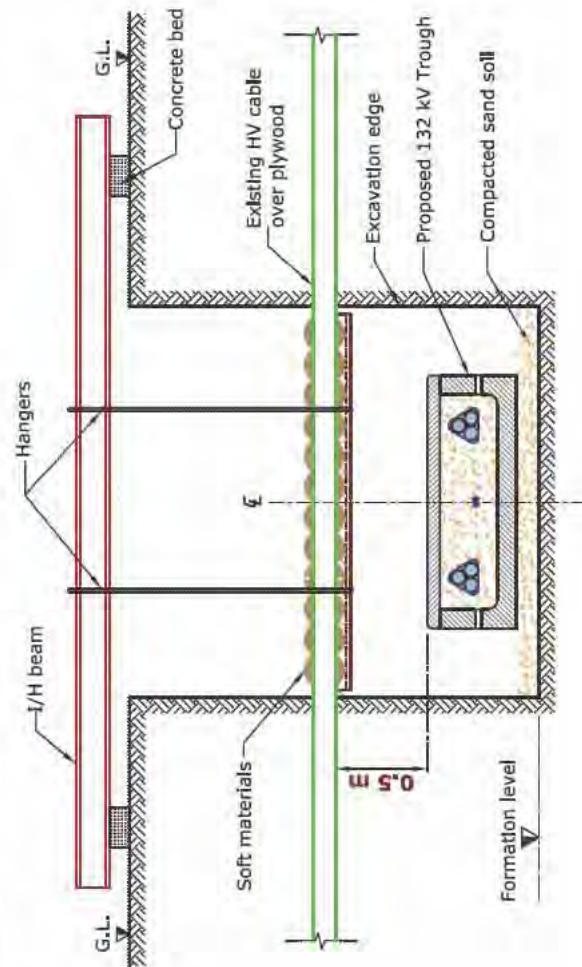
STANDARD PROTECTION AND CROSSING DETAILS FOR HV SERVICES (6.6/11/33 kV)

Fig: 4.4

CASE 1 : Existing HV cables falling parallel to proposed excavation

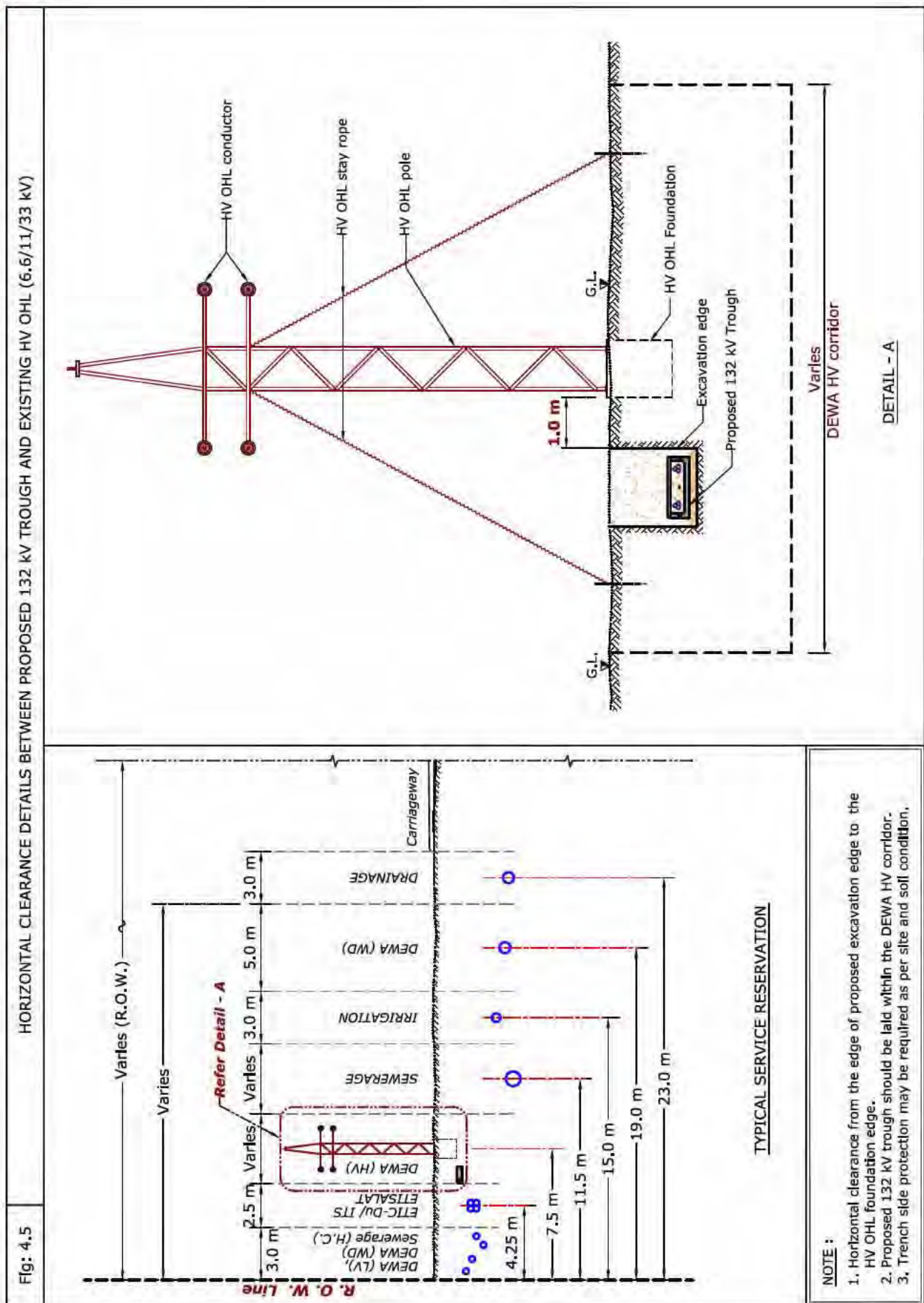


CASE 2 : Existing HV cables crossing the proposed excavation



NOTE :

1. Vertical clearance from the top of the proposed 132 kV Trough to the bottom of existing HV services
2. If HV cables are slewed due to site activity, then it should be placed back to actual position after completion of work.
3. Temporary warning sign board to be fixed at 20.0 m intervals to indicate the existing HV cables falling parallel proposed excavation. (Case-1)
4. Existing HV cables falling in the proposed excavation should be protected as per site condition. (Case-2)
5. Proposed 132 kV Trough allowed to cross below existing HV cables.
6. Trench side protection may be required as per site and soil condition.



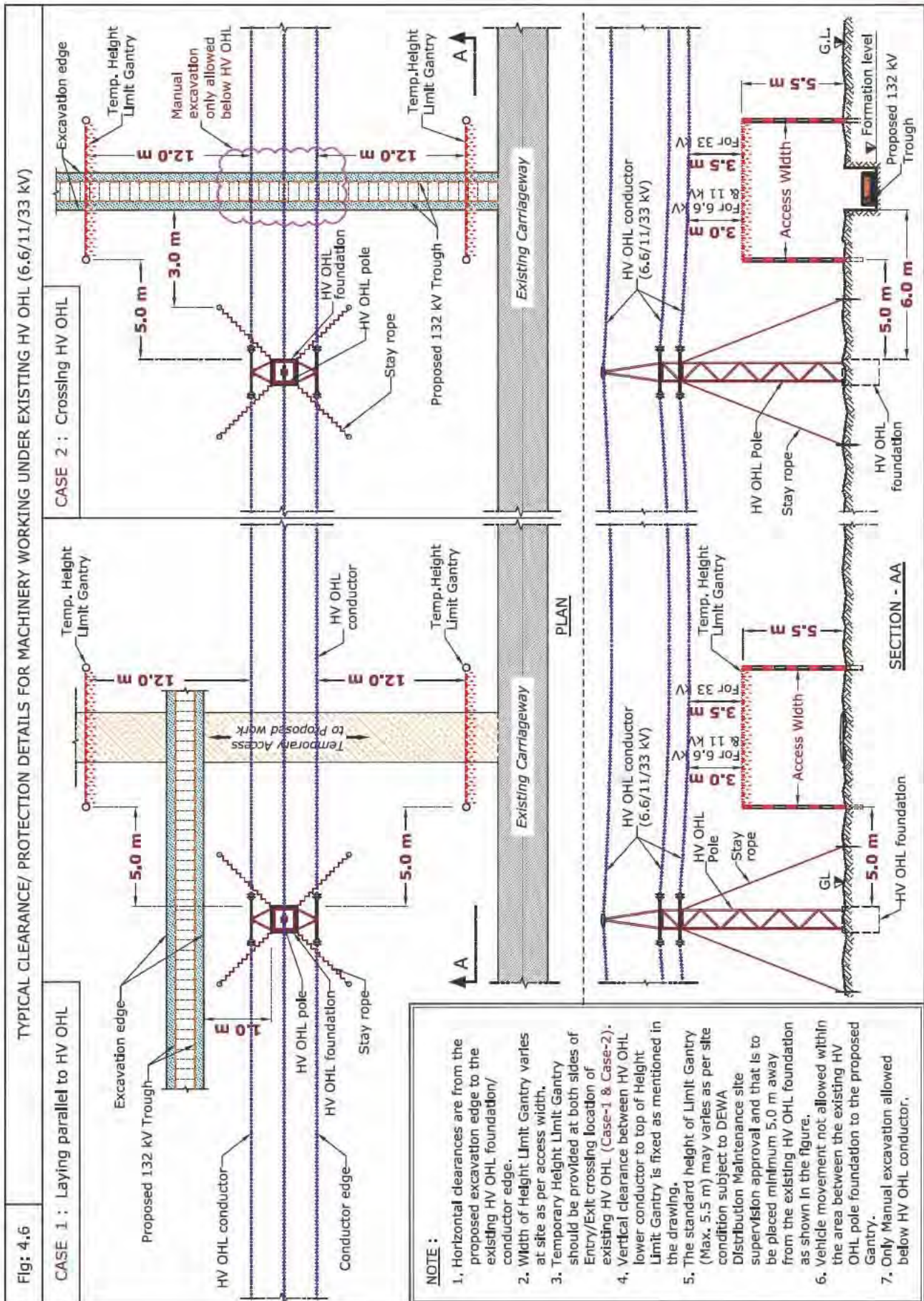


Table 3: Clearance & Protection details for proposed laying of 132 kV Trough and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 4.7, Case 1) Vertical clearance (Ref Fig: 4.11) Protection details (Ref Fig: 4.11)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 4.7, Case 1) Vertical clearance (Ref Fig: 4.11) Protection details (Ref Fig: 4.11)
EHV (132 kV) Trough	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 4.8) Vertical clearance (Ref Fig: 4.9) Protection details (Ref Fig: 4.9)
EHV (132 kV) Duct Bank	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 4.8) Vertical clearance (Ref Fig: 4.10) Protection details (Ref Fig: 4.10)
EHV (132 kV) Joint Bay/ Transition Joint	0.3 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 4.7, Case 2)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 4.12)
EHV (400 kV) Tunnel	2.5 m	2.0 m	B	NDCM	-	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 4.13) Vertical clearance (Ref Fig: 4.14)
Clearance & Protection details for access under Existing EHV - OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 4.12) Vertical clearance (Ref Fig: 4.12) Protection details (Ref Fig: 4.12)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 4.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV TROUGH AND EXISTING EHV SERVICES

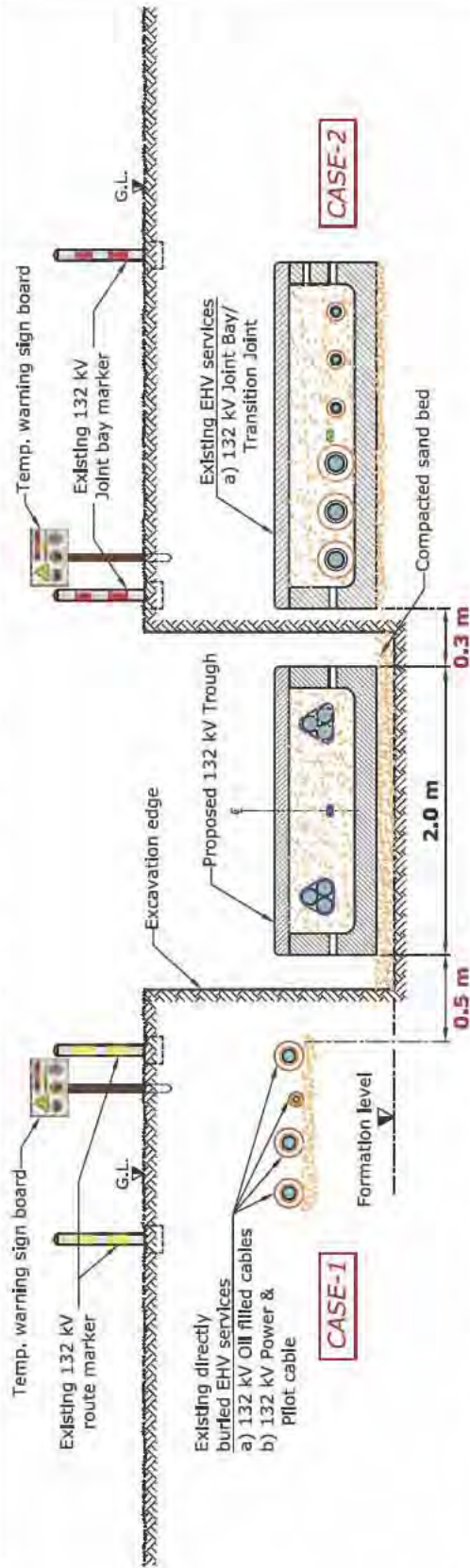
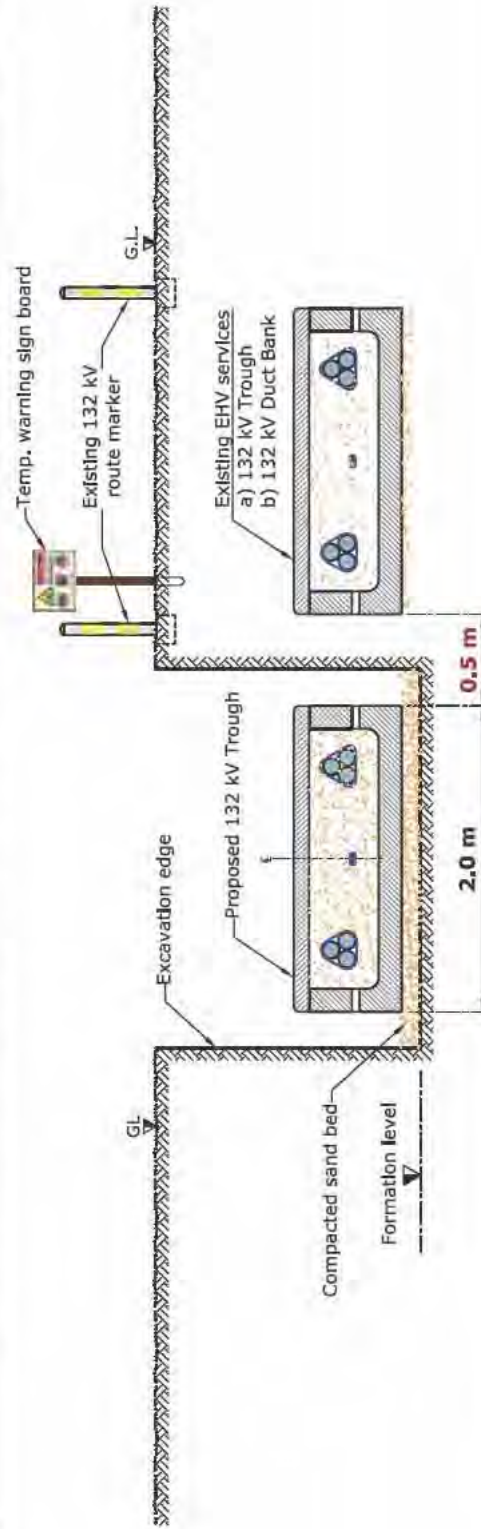
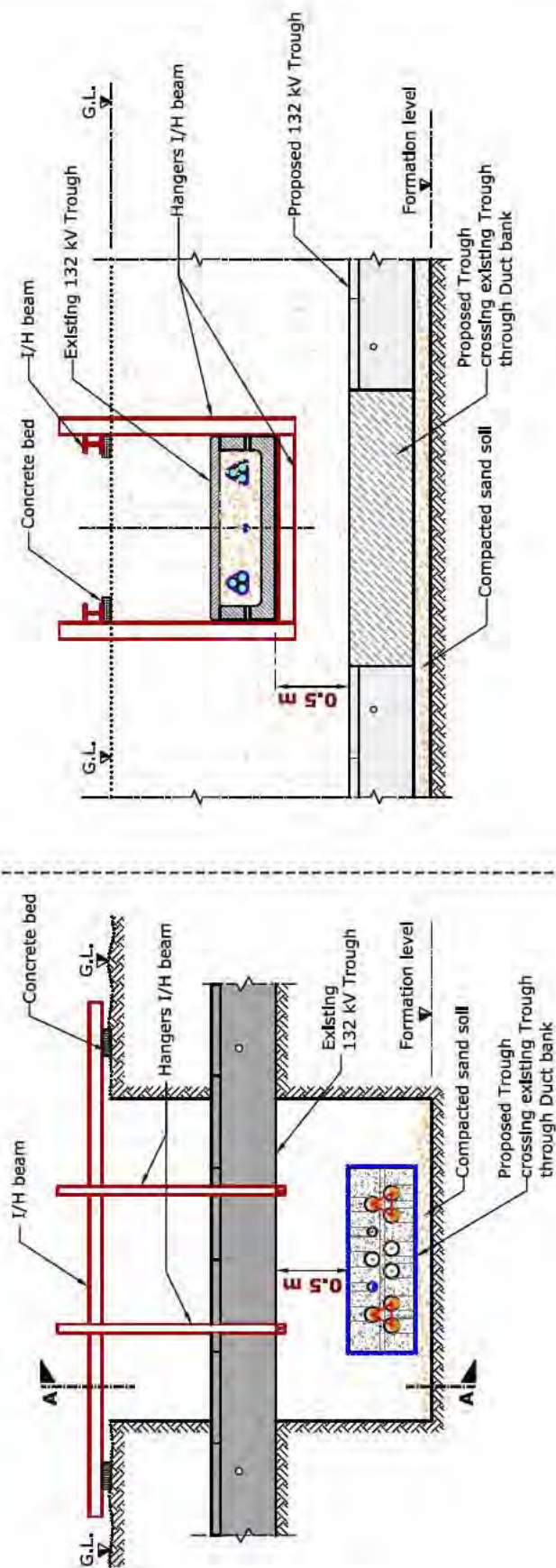


Fig: 4.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV TROUGH AND EXISTING EHV 132 kV TROUGH/ DUCT BANK

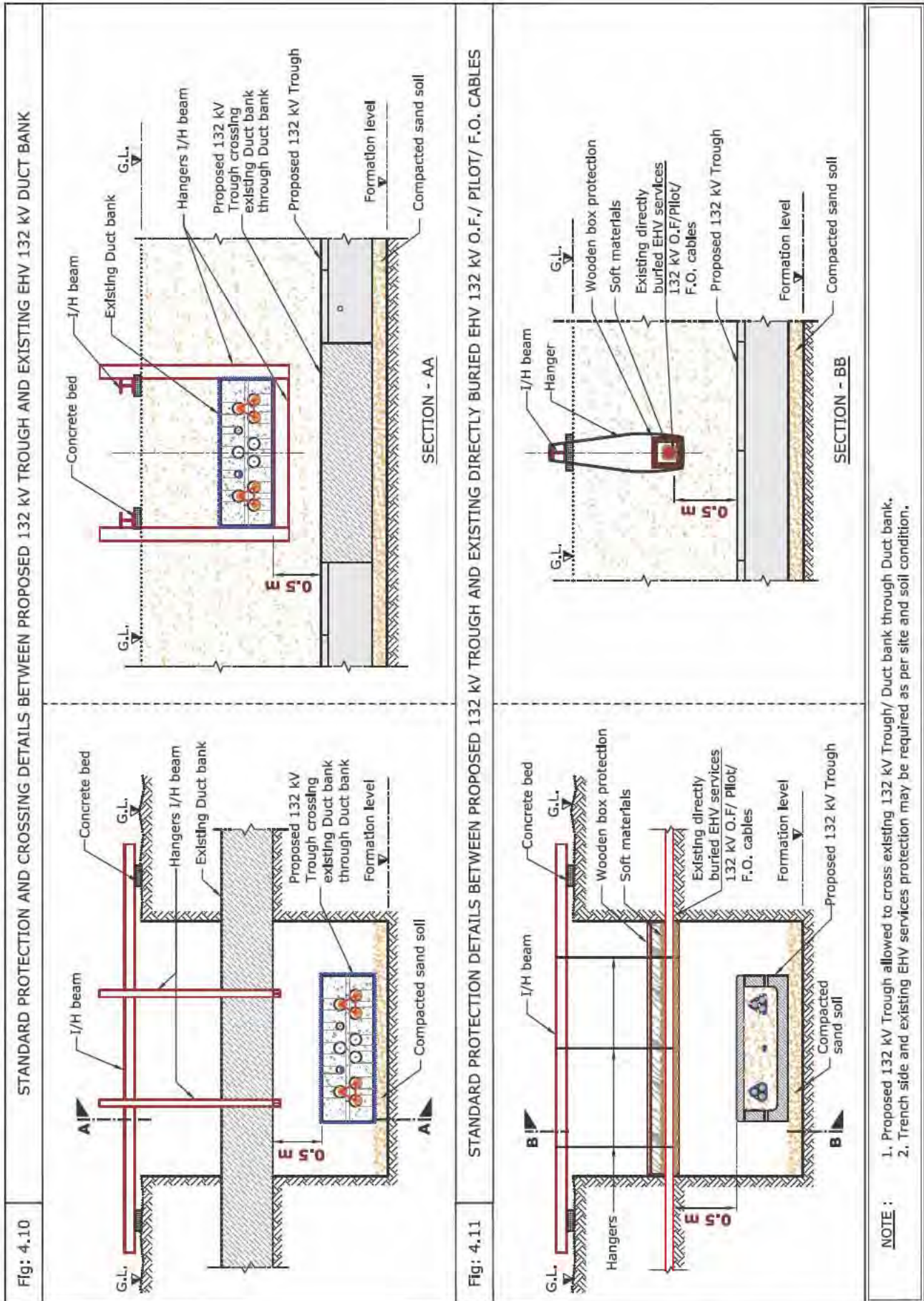


- NOTE :**
1. Horizontal clearance from the proposed 132 kV Trough edge to existing EHV services edge.
 2. Existing Link box cable should be protected through split duct and concrete surround.
 3. Trench side and existing EHV services protection may be required as per site and soil condition.



SECTION - AA

- NOTE :**
1. Vertical clearance from the top of proposed 132 kV Trough to the bottom of the existing 132 kV Trough.
 2. Proposed 132 kV Trough allowed to cross existing 132 kV Trough through Duct bank.
 3. Trench side and existing 132 kV Trough protection required as per site and soil condition.



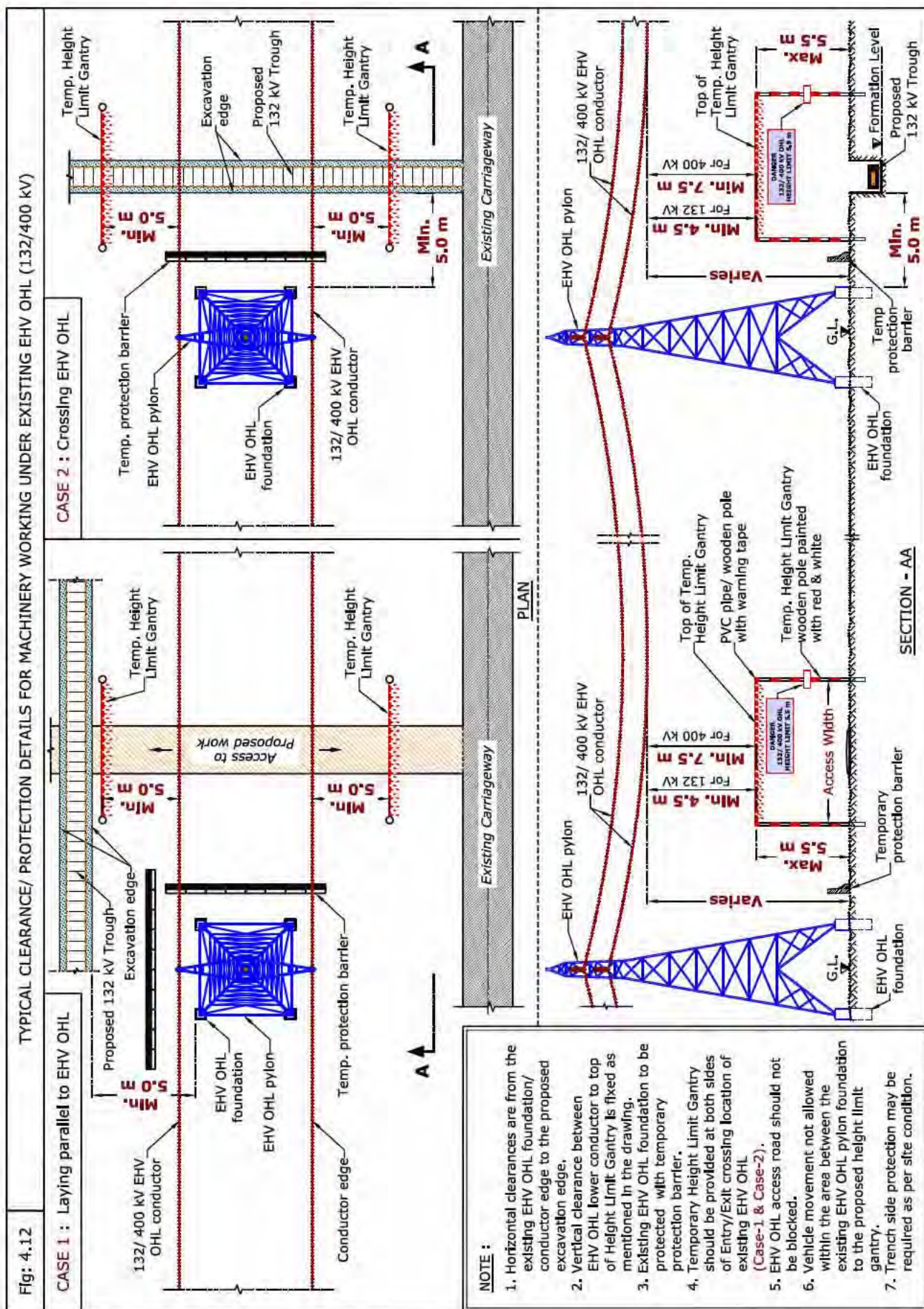
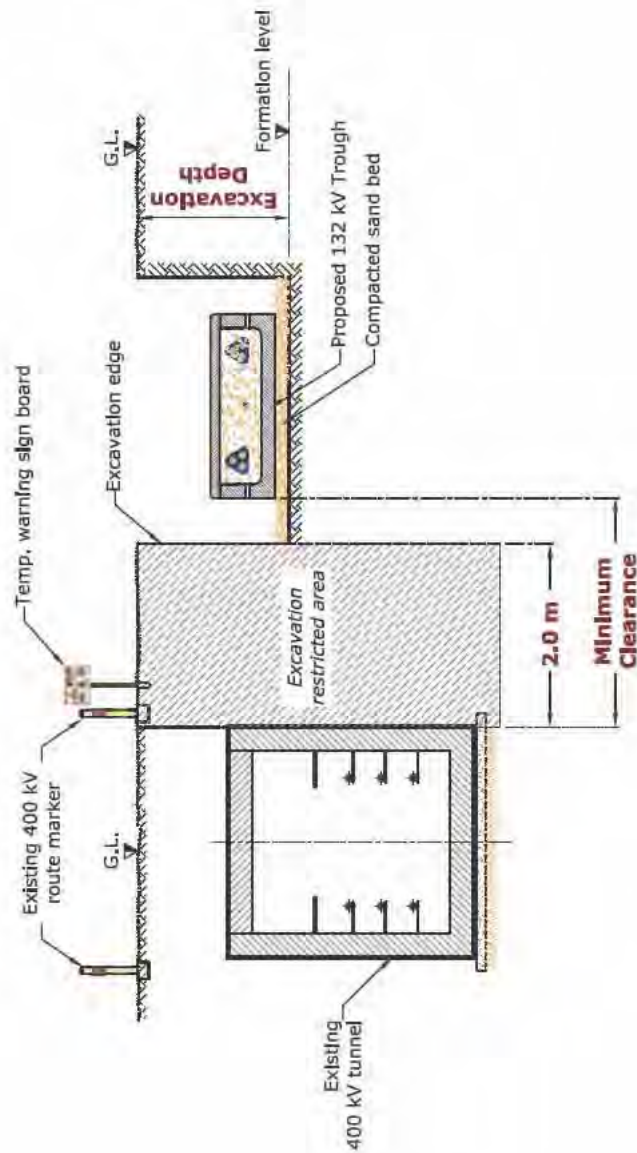


Fig: 4.13

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132kV TROUGH AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
2. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A').
3. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV Tunnel edge to proposed 132 kV Trough edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

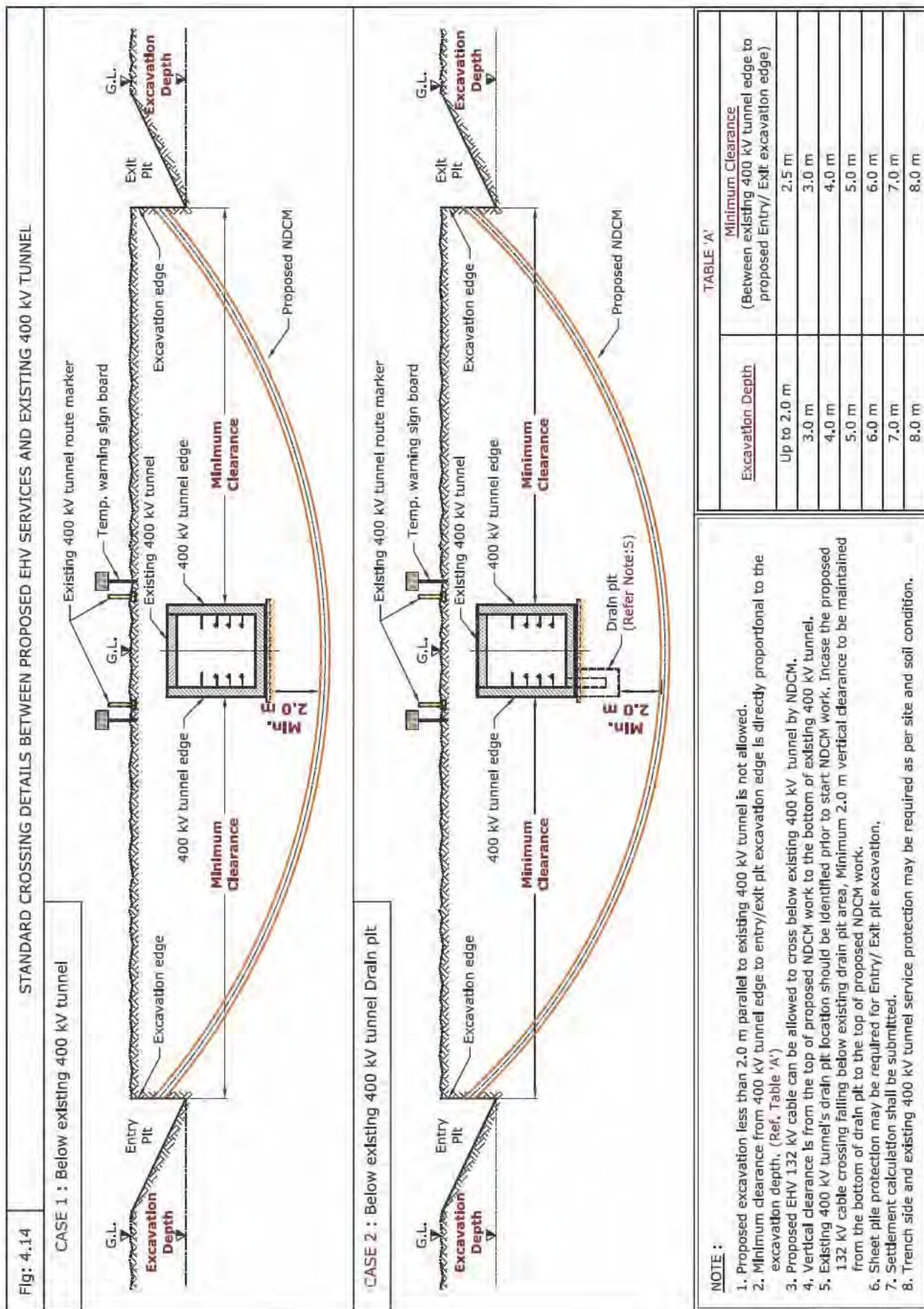


Table 4: Clearance & Protection details for proposed laying of 132 kV Trough and existing DEWA Gas/Fuel services

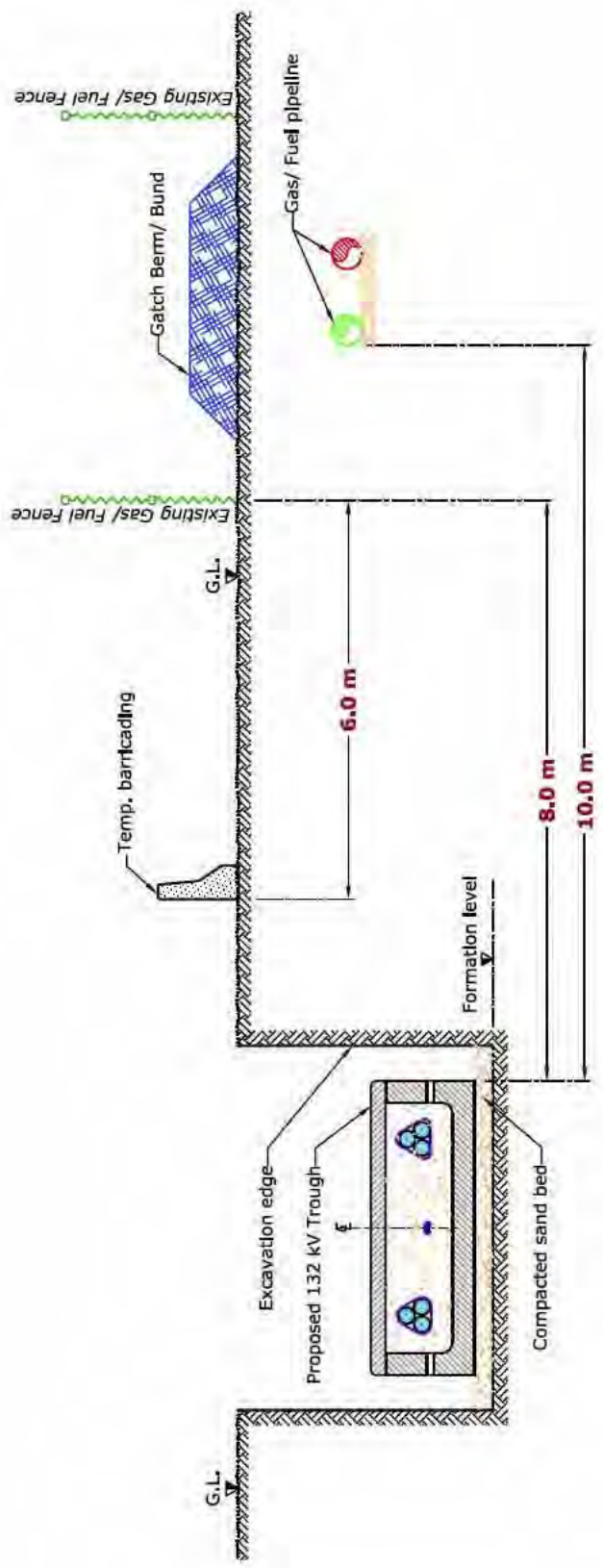
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 4.15)
Gas/Fuel pipeline (All diameter)	10.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 4.15)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 4.15 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV TROUGH AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from the proposed 132 kV Trough edge to the existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from the proposed 132 kV Trough edge to the existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing DEWA Gas/ Fuel fence.
 4. Proposed 132 kV Trough can be allowed to cross existing Gas/ Fuel pipeline by NDCM.
 5. Existing Gas/ Fuel pipeline should be protected in the Entry/ Exit pit as per site condition

5. Laying of Proposed Utilities - Electricity 132 kV Duct Bank (For crossing existing Roads/Services)

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5.1 Introduction

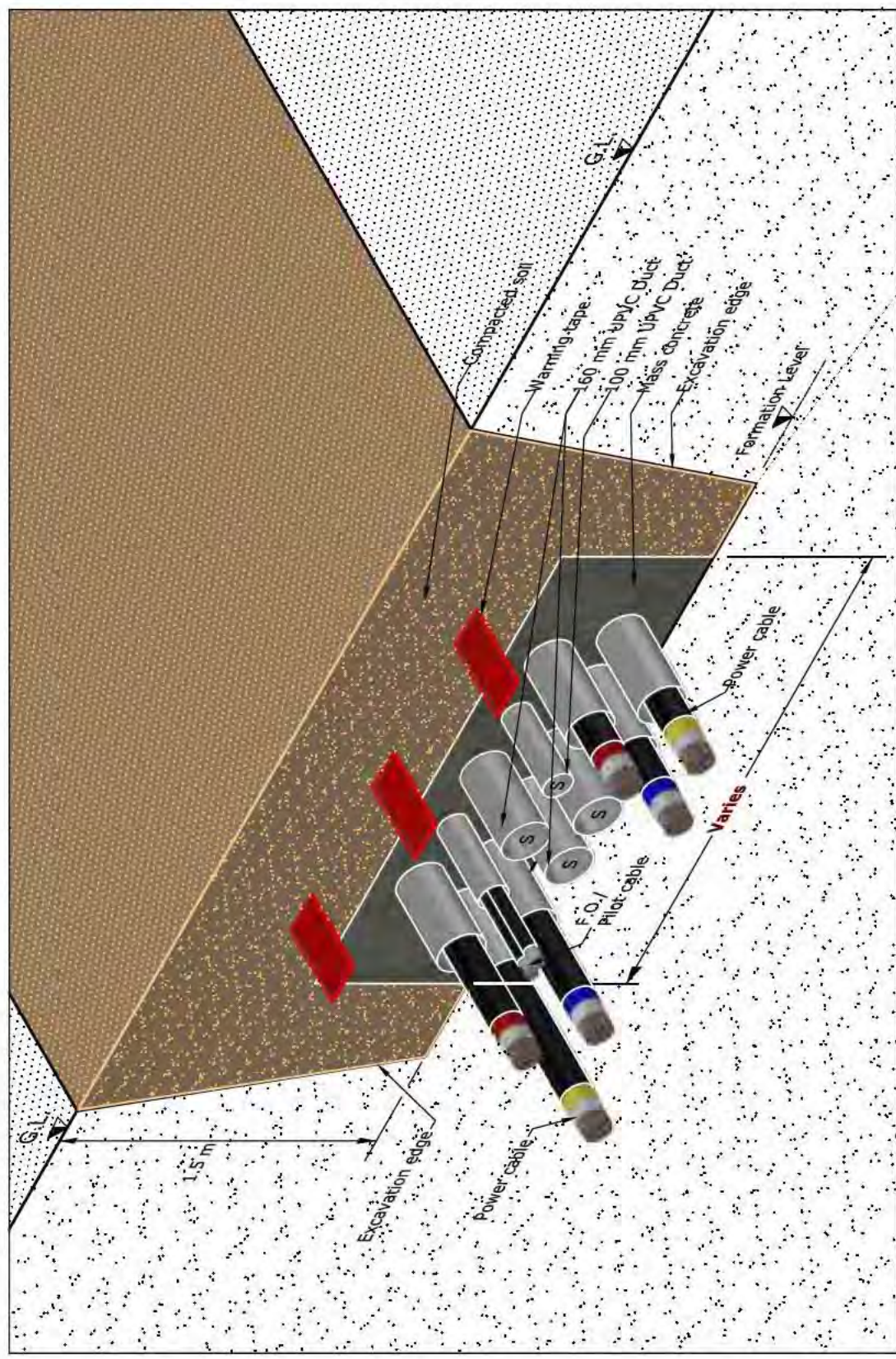
It is a process to install approved number of ducts in encased concrete. This arrangement is designed to accommodate ducts to cross existing services and/or roads. Duct Bank is carried out by the open cut method

and involves various construction activities at site; therefore it is required to protect DEWA existing assets as per specified standards.



Laying of Proposed Utilities - Electricity 132 kV Duct Bank

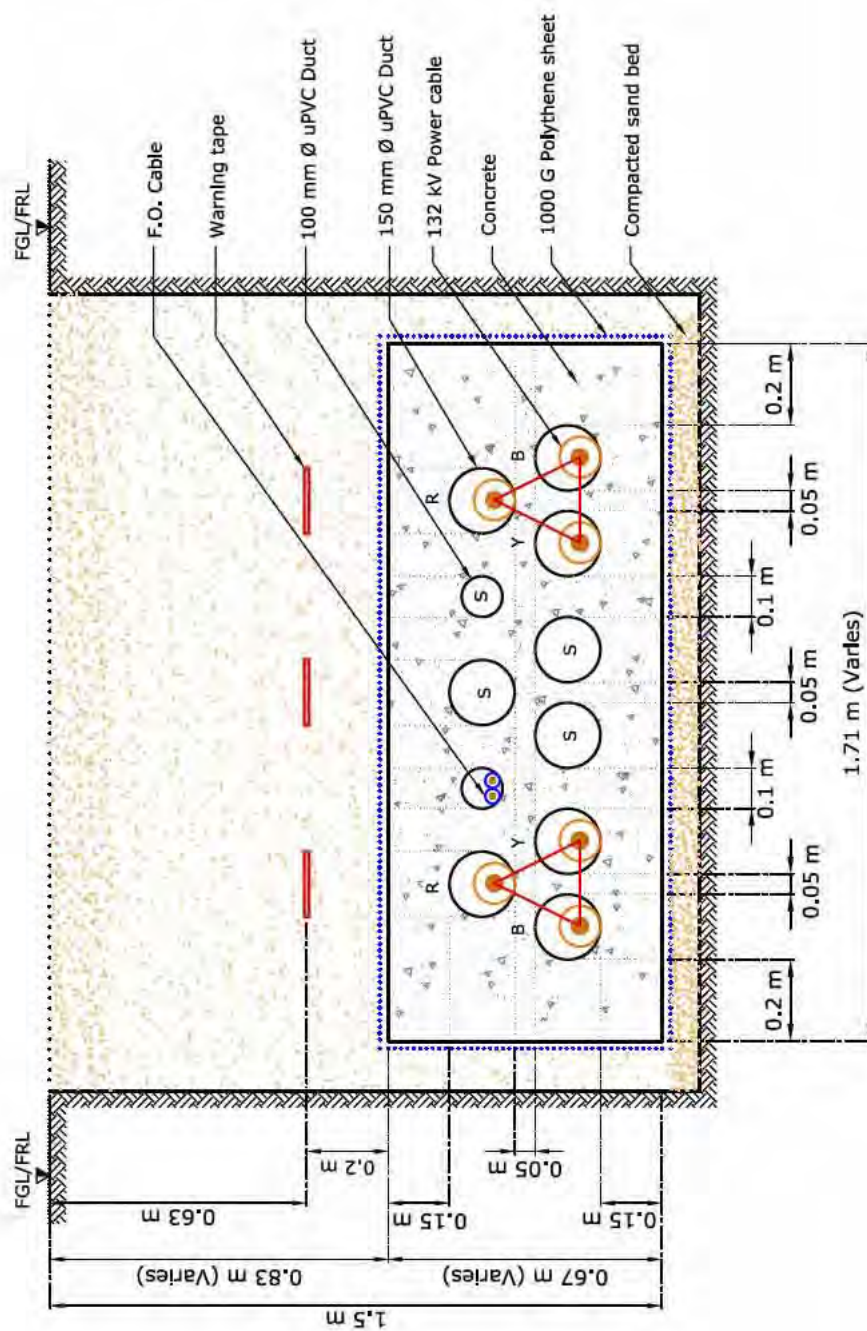
GENERAL ARRANGEMENT OF 132 KV DUCT BANK





132 kV Duct Bank work at site

TYPICAL ARRANGEMENTS OF 132 KV DUCT BANK (FOR OPEN CUT METHOD)

**NOTE :**

1. Number of Ducts may varies as per site requirement.
2. Spacing between ducts may vary as per site condition.
3. Excavated trench should be backfill with suitable excavated soil.
4. Trench side protection may be required as per soil and site condition.

5.2 Avoid the following



1. Proposed 132 kV duct bank crossing 400 kV tunnel by open cut.
2. Proposed 132 kV duct bank crossing 132 kV Joint bay/Transition joint.
3. Crossing existing HV manholes/Valve chambers/SCADA Unit.

5.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed laying of 132 kV Duct Bank and existing DEWA Electricity LV cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 5.1) • Vertical clearance (Ref Fig: 5.1) • Protection details (Ref Fig: 5.1)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

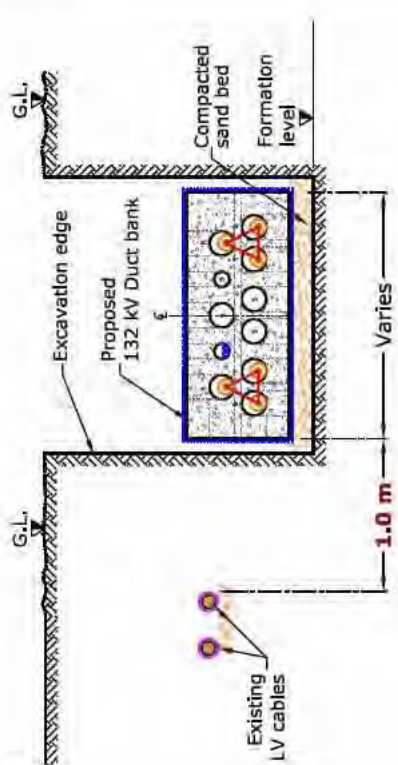
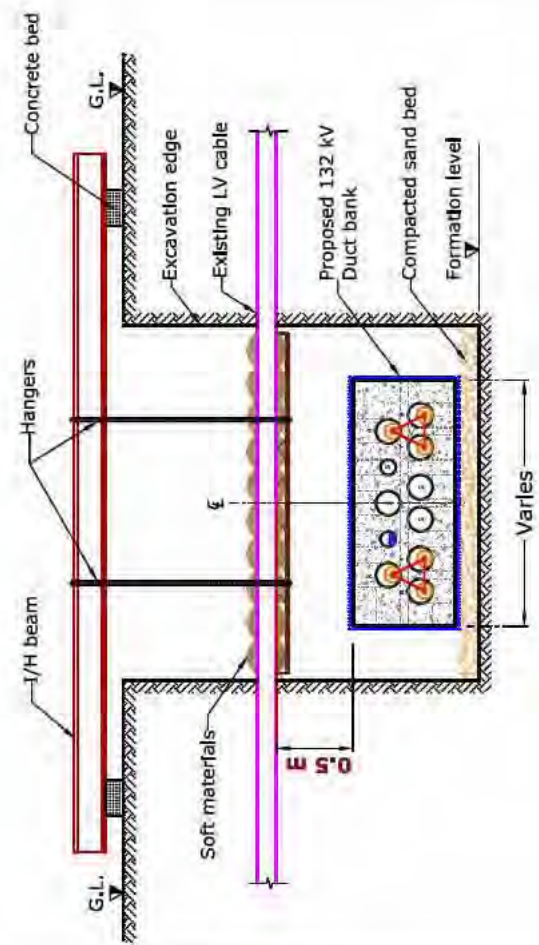
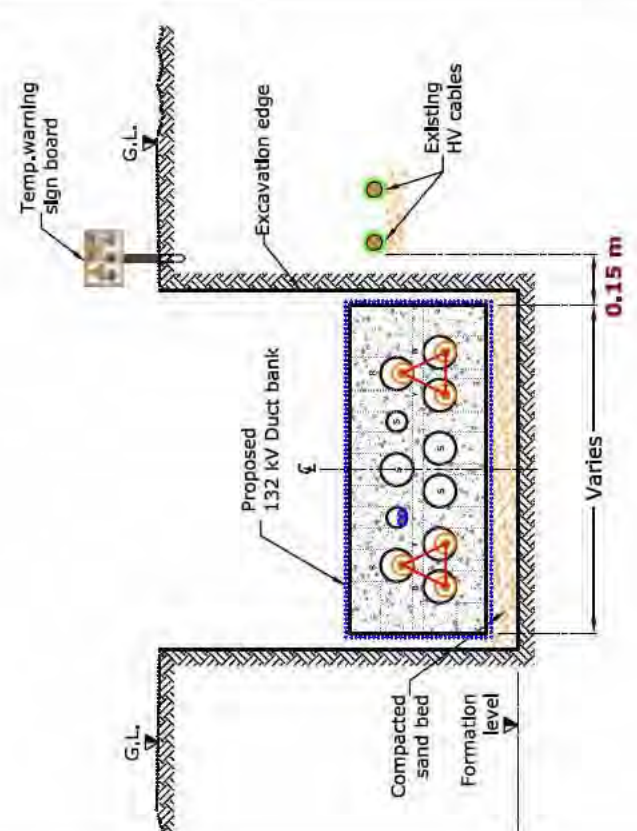
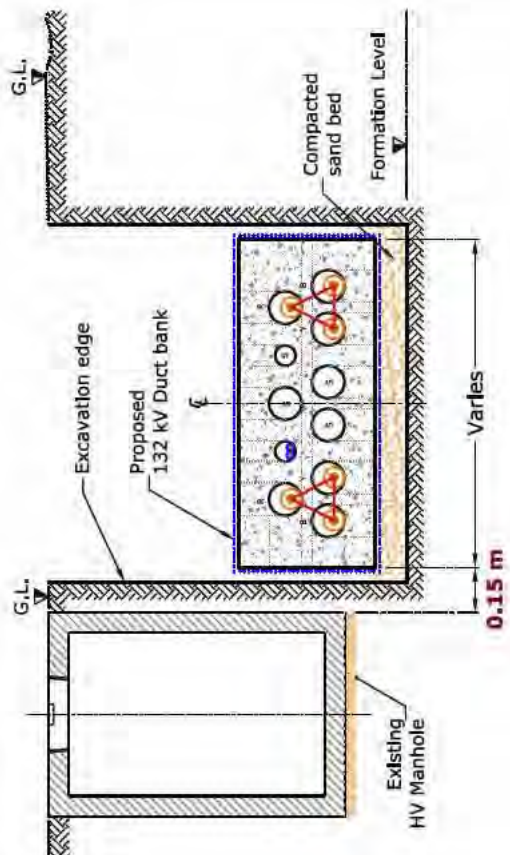
Fig: 5.1	HORIZONTAL/ VERTICAL CLEARANCES AND PROTECTION DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING LV CABLES
Horizontal clearance details for existing LV cables	Vertical clearance and protection details for existing LV cables
	
<p>NOTE :</p> <ol style="list-style-type: none">1. Vertical clearance is from the top of proposed 132 kV Duct bank to the bottom of the existing LV cables.2. Horizontal clearance is from the proposed 132 kV Duct bank edge to existing LV cable edge.3. Trench side and LV cable protection may be required as per site and soil condition.	

Table 2: Clearance & Protection details for proposed laying of 132 kV Duct Bank and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ pilot Cables and Joints	0.15 m	0.15 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 5.2, Case 1) • Vertical clearance (Ref Fig: 5.3, Case 1) • Protection details (Ref Fig: 5.3, Case 1 & 2)
HV (6.6/11/33 kV) Manhole	0.15 m	NA	-	-	-	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 5.2, Case 2)
HV (6.6/11/33 kV) O.H.L	-	-	-	-	-	-
Clearance & Protection details for access under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	-	-	-	-	-	-
HV (33 kV) O.H.L		-				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 5.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING HV SERVICES
<p>CASE 1 : Horizontal clearance between proposed 132 kV Duct bank and existing HV cables</p>	
<p>CASE 2 : Horizontal clearance between proposed 132 kV Duct bank and existing HV Manhole</p>	
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance from the proposed 132 kV Duct bank edge to existing HV services edge. 2. Proposed 132 kV Duct bank can be allowed to cross below existing HV Cables. 3. Proposed 132 kV Duct bank not allowed to cross existing HV Manhole. 4. Trench side and HV services protection may be required as per site and soil condition. 	

<p>Fig: 5.3</p>	<p>STANDARD PROTECTION & CROSSING DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING HV SERVICES (6.6/11/33 kV)</p>
<p>CASE 1 : Existing HV cables falling within/ crossing proposed excavation</p>	<p>CASE 2 : Existing HV cables falling parallel to proposed excavation</p> <p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance from the top of the proposed 132 kV Duct bank to the bottom of existing HV services. 2. If HV cables are slewed due to site activity, then it should be placed back to actual position after completion of work. 3. HV cables crossing proposed excavation should be protected as per site condition. (Case-1) 4. HV cables falling beside excavation temporary warning sign board to be fixed at 20.0 m intervals to indicate the HV existing HV cables. (Case-2) 5. Trench side and existing HV cable protection may be required as per site and soil condition.

Table 3: Clearance & Protection details for proposed laying of 132 kV Duct Bank and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 5.4) Vertical clearance (Ref Fig: 5.8) Protection details (Ref Fig: 5.8)
EHV (132 kV) Power/ Pilot/ F.O Cable (Directly Buried)	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 5.4) Vertical clearance (Ref Fig: 5.8) Protection details (Ref Fig: 5.8)
EHV (132 kV) Trough	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 5.5) Vertical clearance (Ref Fig: 5.6) Protection details (Ref Fig: 5.6)
EHV (132 kV) Duct Bank	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 5.5) Vertical clearance (Ref Fig: 5.7) Protection details (Ref Fig: 5.7)
EHV (132 kV) Joint Bay/ Transition Joint	NR	NA	-	-	-	-
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	-	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 5.9) Vertical clearance (Ref Fig: 5.9) Protection details (Ref Fig: 5.9)
EHV (400 kV) Tunnel	2.5 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 5.10)
Clearance & Protection details for access under Existing EHV - OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 5.9) Vertical clearance (Ref Fig: 5.9) Protection details (Ref Fig: 5.9)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

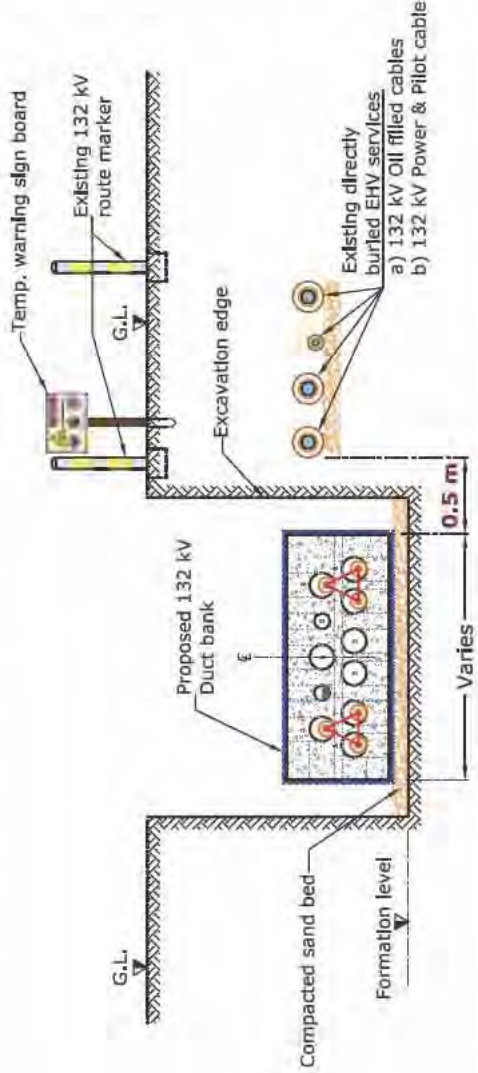
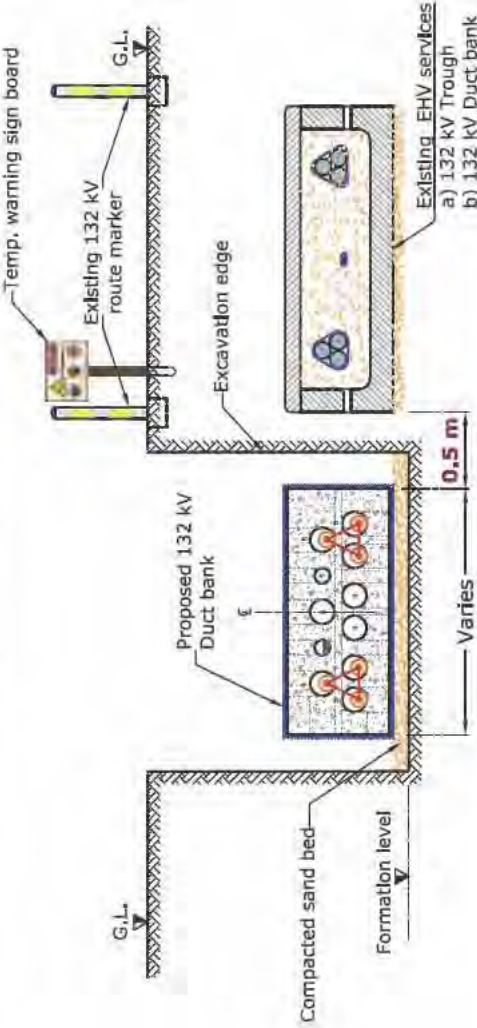
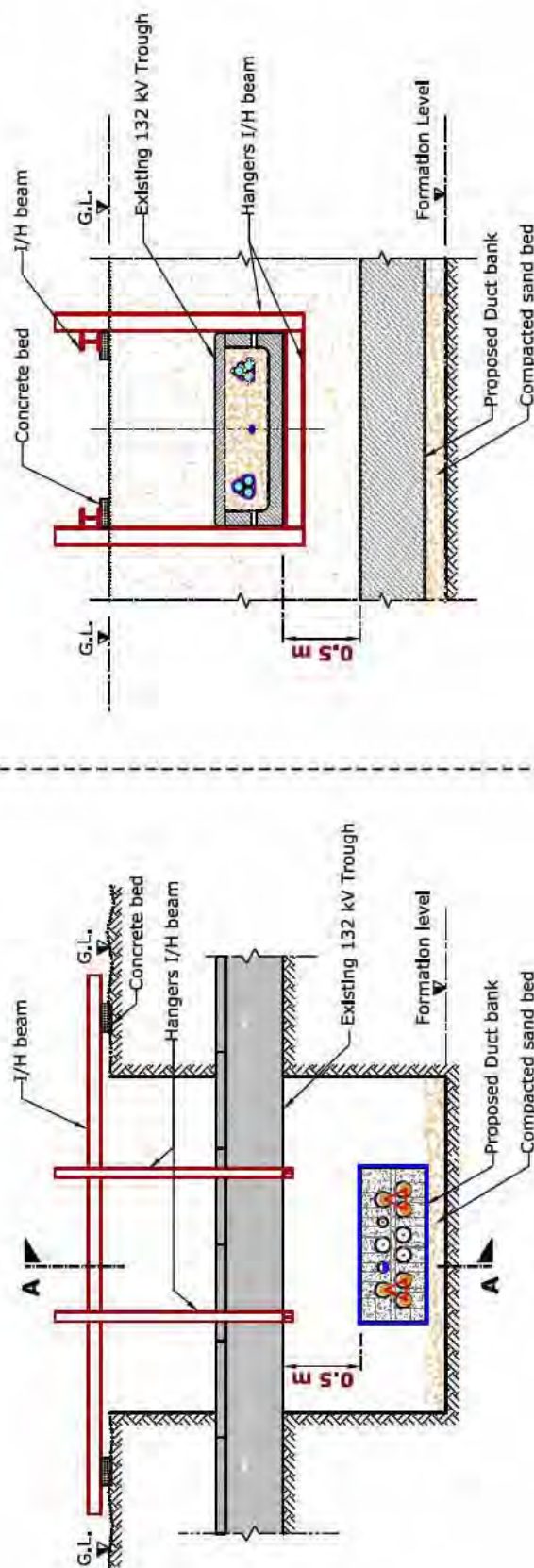
Fig: 5.4	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ POWER/ PILOT CABLES</p> 
Fig: 5.5	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p> 
NOTE :	<p>1. Horizontal clearance from the proposed 132 kV Duct bank edge to existing EHV services edge. 2. Trench side and existing EHV services protection may be required as per site and soil condition .</p>

Fig: 5.6 STANDARD PROTECTION & CROSSING DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING EHV 132 kV TROUGH



PLAN

SECTION - AA

- NOTE :**
1. Vertical clearance from the top of proposed 132 kV Duct bank to the bottom of the existing 132 kV Trough.
 2. Trench side and existing 132 kV Trough protection may be required as per site and soil condition.

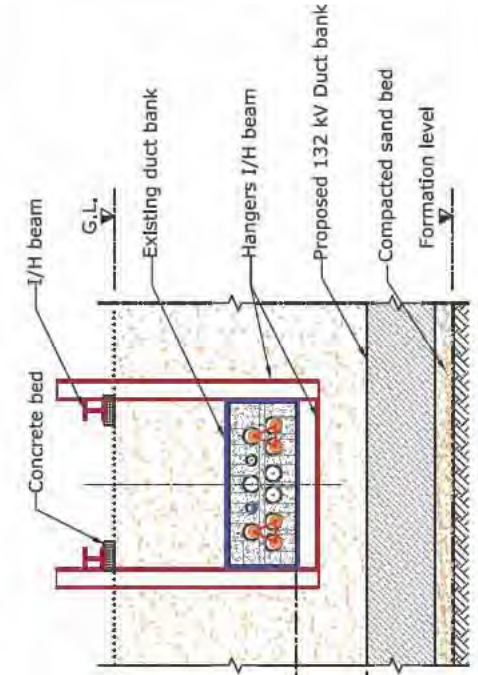
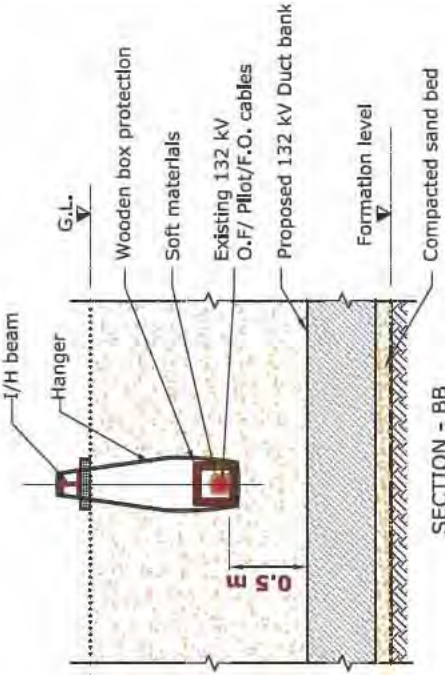
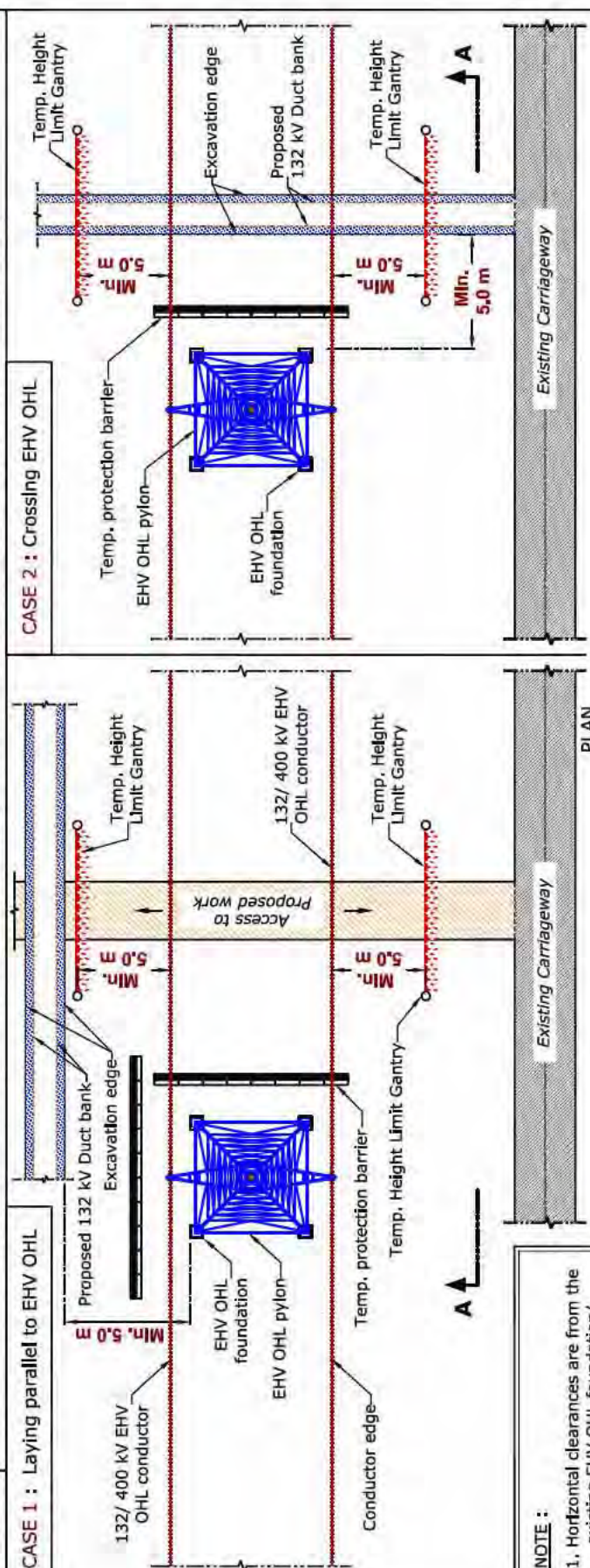
<p>Fig: 5.7</p>	<p>STANDARD PROTECTION & CROSSING DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING EHV 132 kV DUCT BANK</p>  <p>SECTION - AA</p>
<p>Fig: 5.8</p>	<p>STANDARD PROTECTION & CROSSING DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING DIRECTLY BURIED EHV 132 kV O.F/ PILOT/ F.O CABLES</p>  <p>SECTION - BB</p>
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance is from the top of proposed 132 kV Duct bank to the bottom of existing 132 kV services. 2. Trench side and existing EHV services protection required as per site and soil condition. 	

Fig: 5.9



NOTE :

1. Horizontal clearances are from the existing EHV OHL foundation/ conductor edge to the proposed excavation edge.
2. Vertical clearance between EHV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
3. Existing EHV OHL foundation to be protected with temporary protection barrier.
4. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing EHV OHL (Case-1 & Case-2).
5. EHV OHL access road should not be blocked.
5. Vehicle movement not allowed within the area between the existing EHV OHL pylon foundation to the proposed height limit gantry.
7. Trench side protection may be required as per site condition.

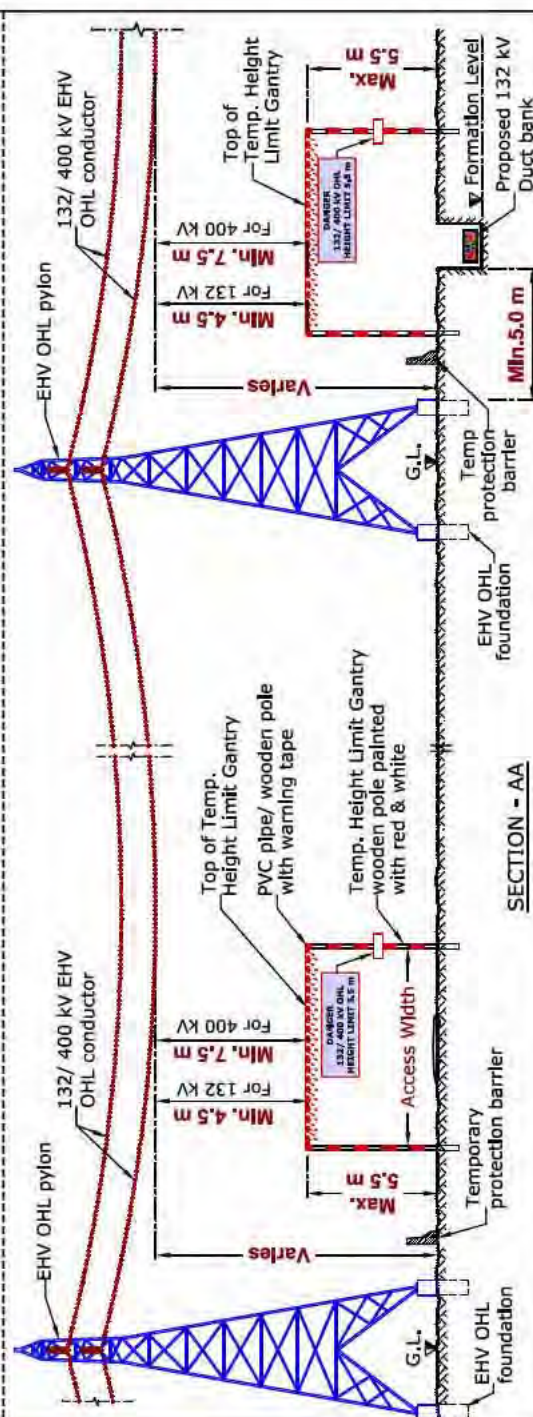
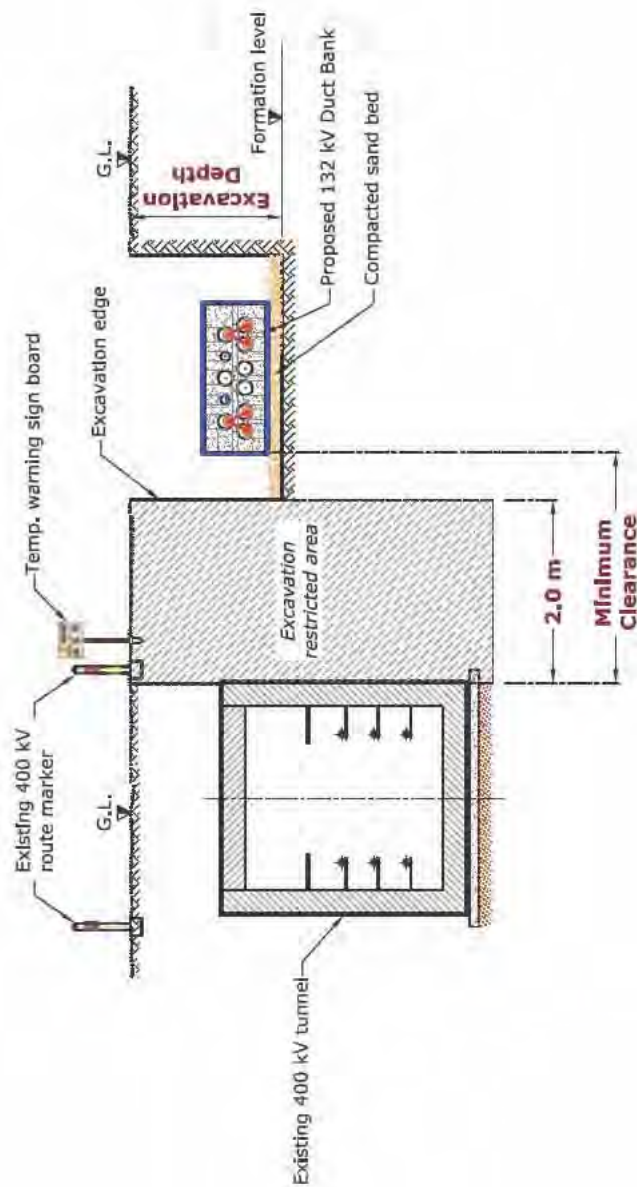


Fig: 5.10

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
2. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
3. Trench side and existing 400 kV Tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed 132 kV Duct bank edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

Table 4: Clearance & Protection details for proposed laying of 132 kV Duct Bank and existing DEWA Gas/Fuel services

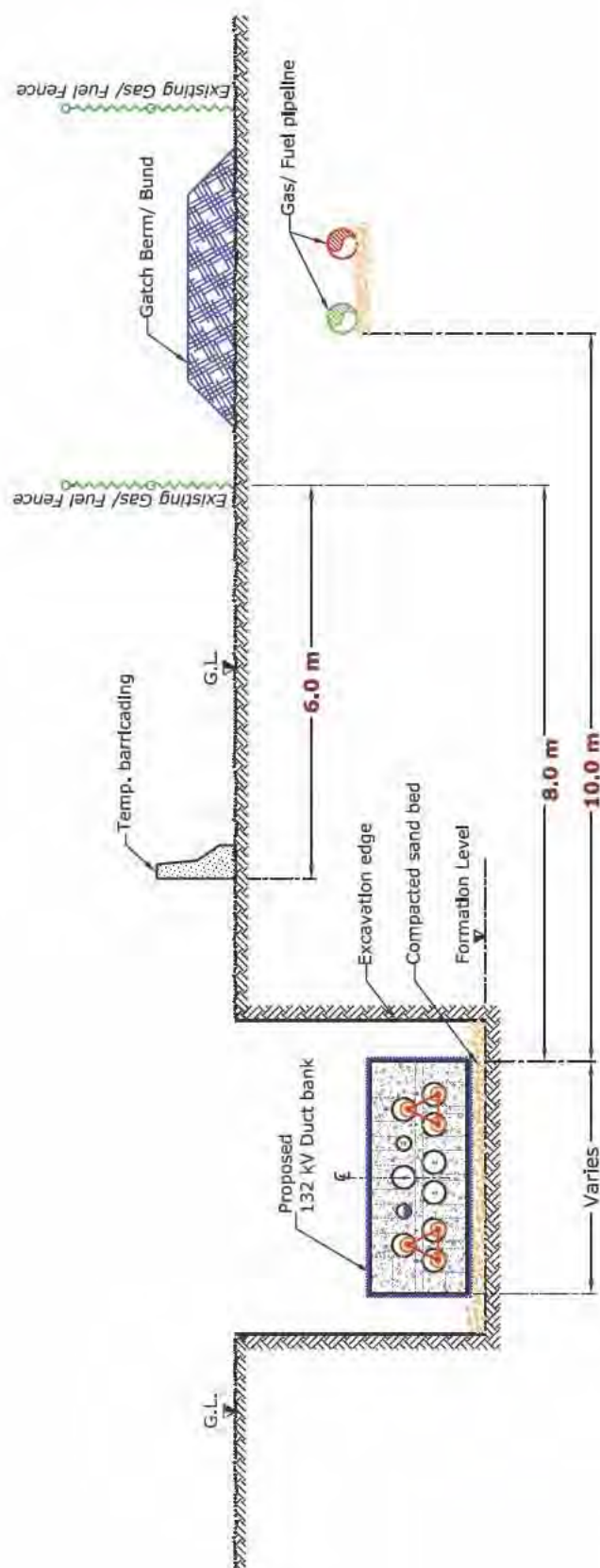
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 5.11)
Gas/Fuel pipeline (All diameter)	10.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 5.11)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 5.11 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV DUCT BANK AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from the proposed 132 kV Duct bank edge to the existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from the proposed 132 kV Duct bank edge to the existing Gas/ Fuel pipeline edge.
 3. Barrfcading for working 6.0 m horizontally away from existing DEWA Gas/ Fuel fence.
 4. Proposed 132 kV Duct bank crossing existing DEWA Gas/ Fuel pipeline by NDCM.
 5. Existing Gas/ Fuel pipeline should be protected In the Entry/Exit pit as per site condition.
 6. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

6. Laying of Proposed Utilities - Electricity 132 kV Joint Bay/Transition Joint

90

6.1 Introduction

Cables are always supplied in standard lengths which usually don't cover the full proposed route length therefore the cable route direction needs to be changed; hence Joint is required to interconnect two cables to ensure the electrical circuit continuity.

To protect Joints from damages, they are accommodated in a concrete joint bay/transition

joint covered with concrete slab and directly buried and surrounded by sand. Joint bay/transition joints are laid within Right Of Way therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



TYPICAL ARRANGEMENTS OF 132 kV JOINT BAY

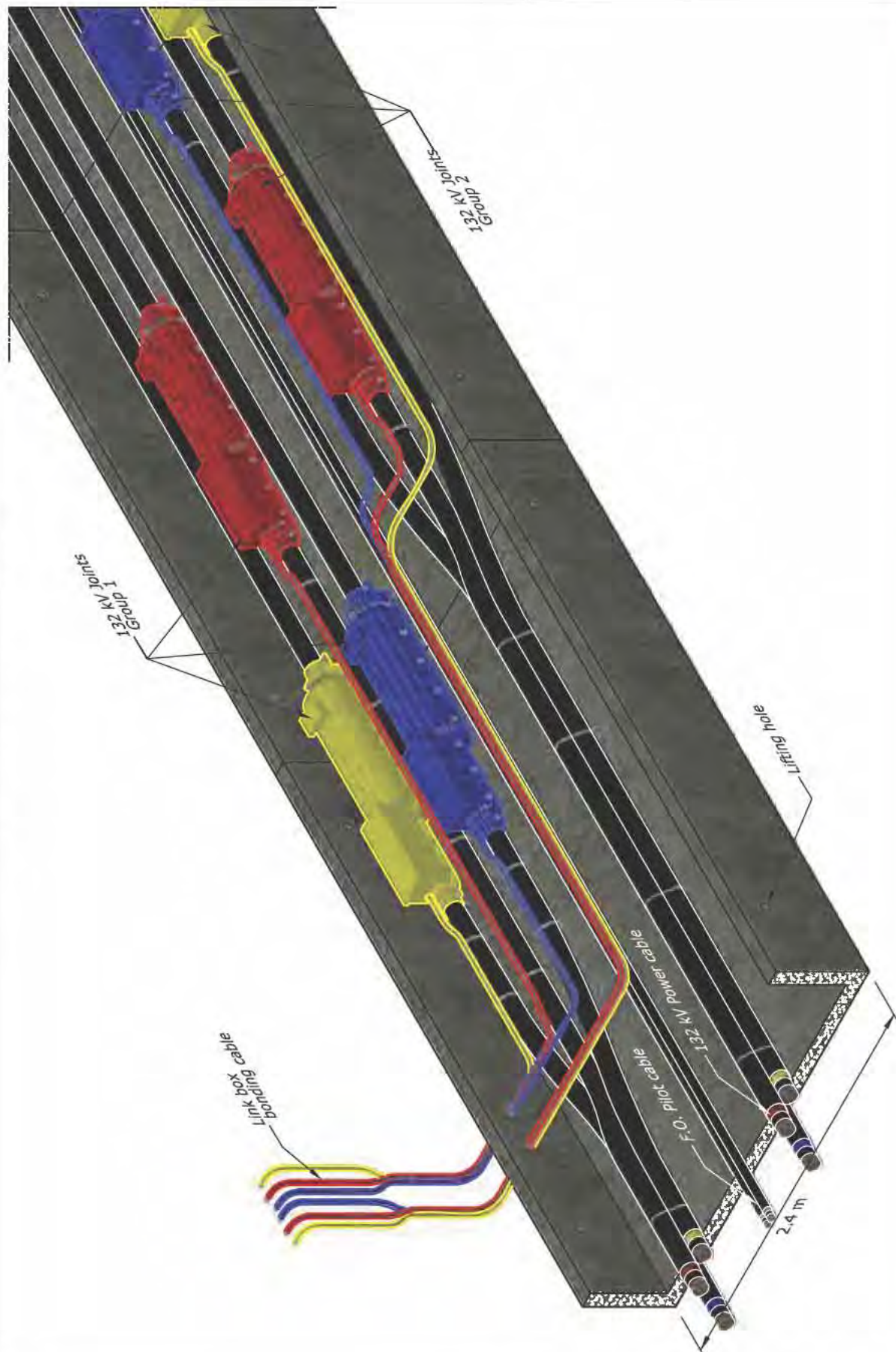




Photo: 132 kV Joint Bay



132 kV Link Box and Control Switch.



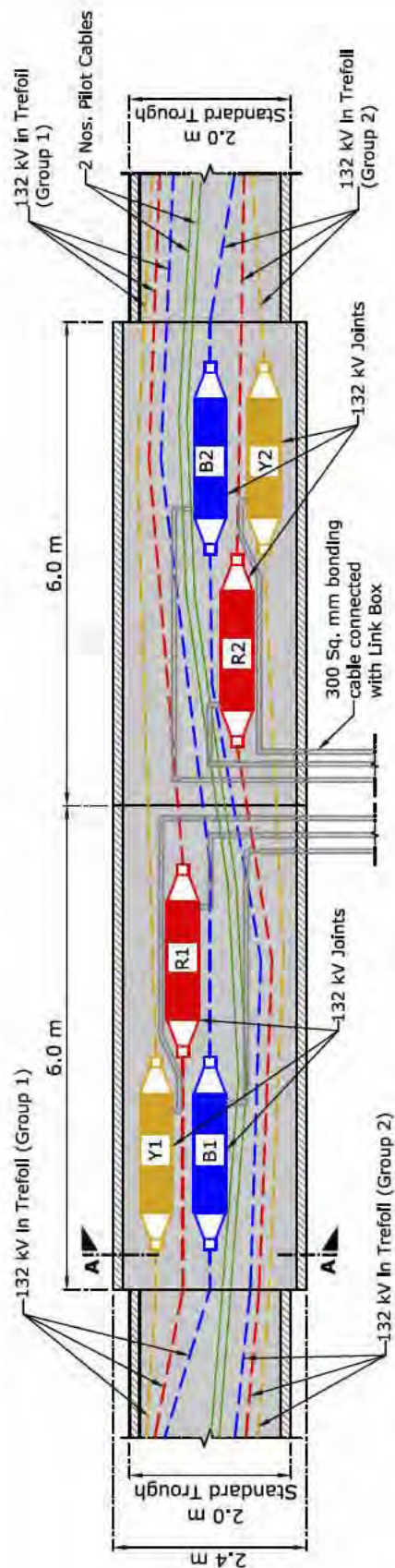


132 kV Link box - Bonding Cable

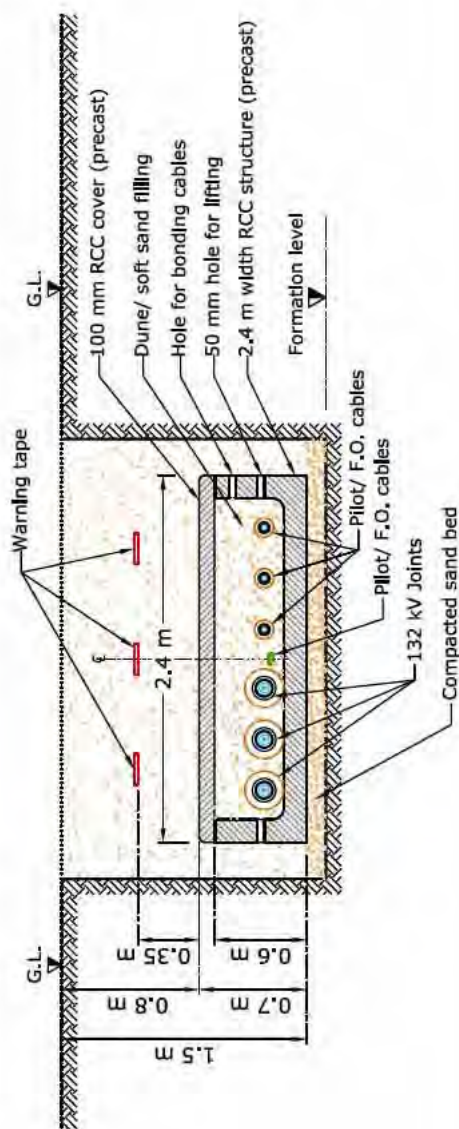


132 kV Joint Bay with Markers and Link Box

TYPICAL DETAILS OF 132 kV JOINT BAY



PLAN



SECTION - AA

- NOTE :**
1. Excavated trench should be back filled with suitable excavated soil.
 2. Trench side protection may be required as per site condition.

6.2 Avoid the following



1. Proposed 132 kV Joint bay/Transition joint crossing below any existing services.
2. Propose 132 kV Joint bay with distance less than 100 m from existing 132 kV Joint bay.
3. Propose 132 kV Joint bay/Transition joint parallel to existing 132 kV Joint bay/Transition joint.
4. Propose 132 kV Joint bay/Transition joint parallel besides existing HV OHL foundation.

6.3 Standard Clearance & Protection details

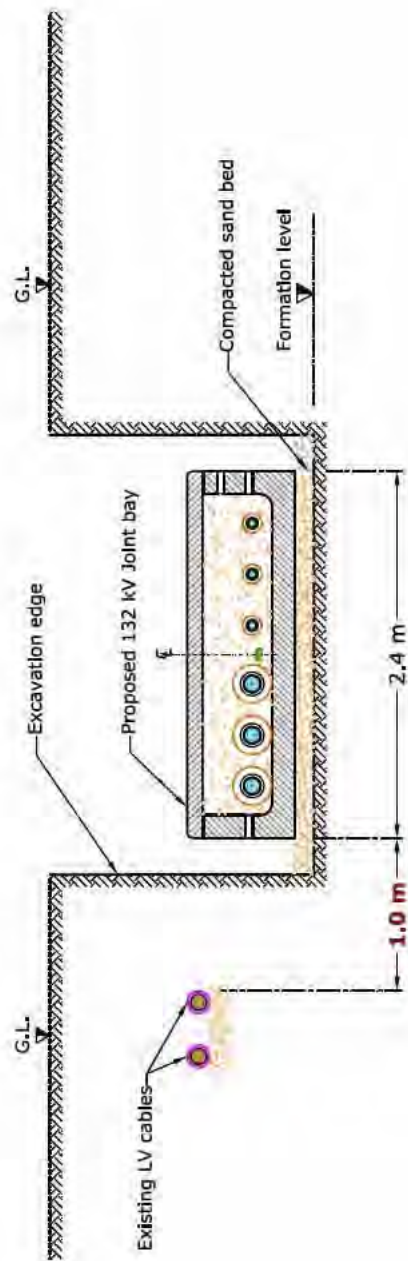
Table 1: Clearance & Protection details for proposed 132 kV cable Joint bay/Transition Joint and existing DEWA Electricity LV cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 6.1)

Table Abbreviation

A - Above existing DEWA services.	DC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 6.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV JOINT BAY AND EXISTING LV CABLES



- NOTE :**
1. Horizontal clearance is from the proposed 132 kV Joint bay edge to existing LV cable edge.
 2. Proposed 132 kV Joint bay/ Transition joint not allowed to lay/cross below existing LV services.
 3. Proposed Link box cables should be protected through duct with concrete surround.
 4. Trench side and LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed 132 kV cable Joint bay/Transition Joint and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	0.3 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 6.2, Case 1) • Protection details (Ref Fig: 6.2)
HV (6.6/11/33 kV) Manhole	0.3 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 6.2, Case 2)
HV (6.6/11/33 kV) O.H.L.	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 6.3)
Clearance & Protection details for access under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 6.4) • Vertical clearance (Ref Fig: 6.4) • Protection details (Ref Fig: 6.4)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

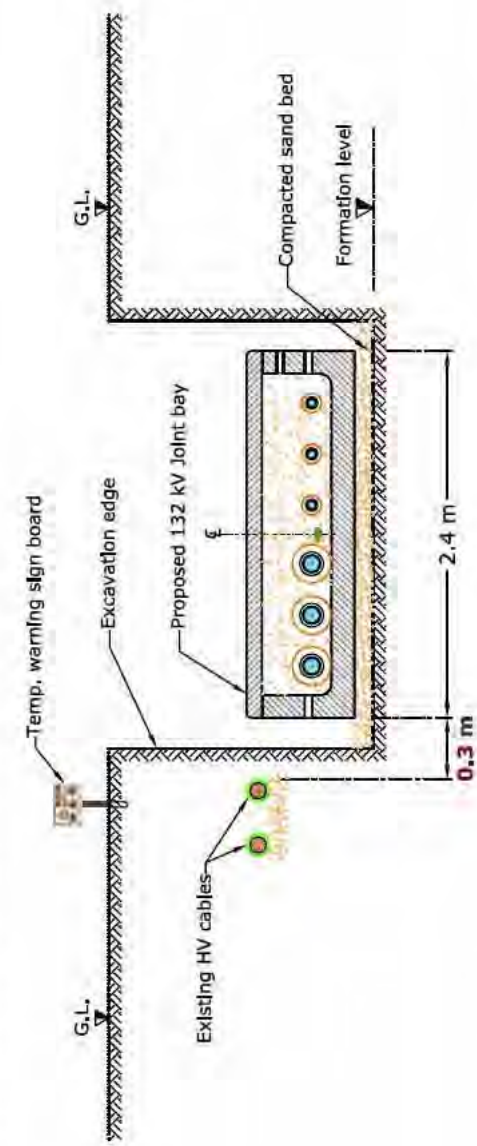
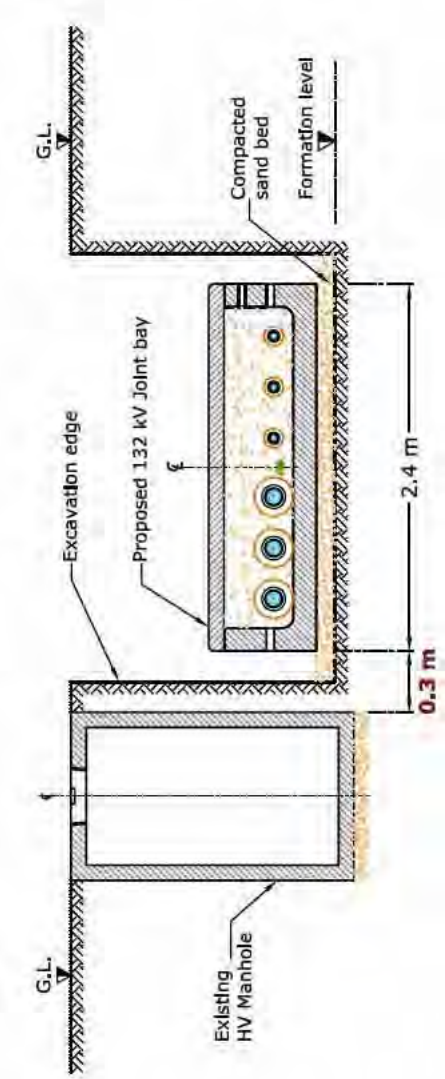
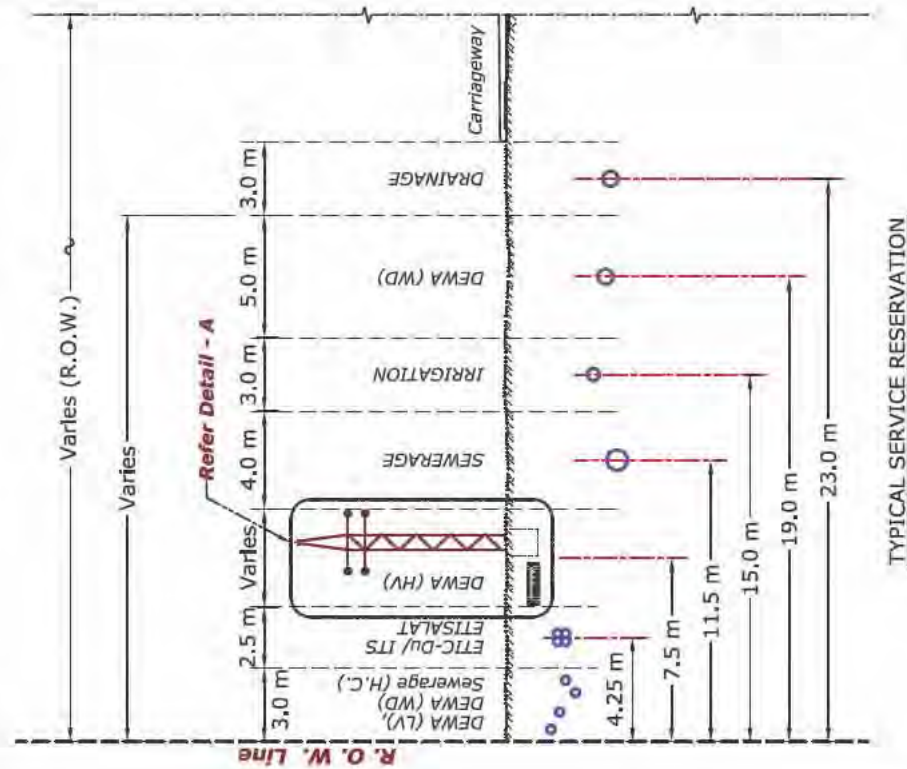
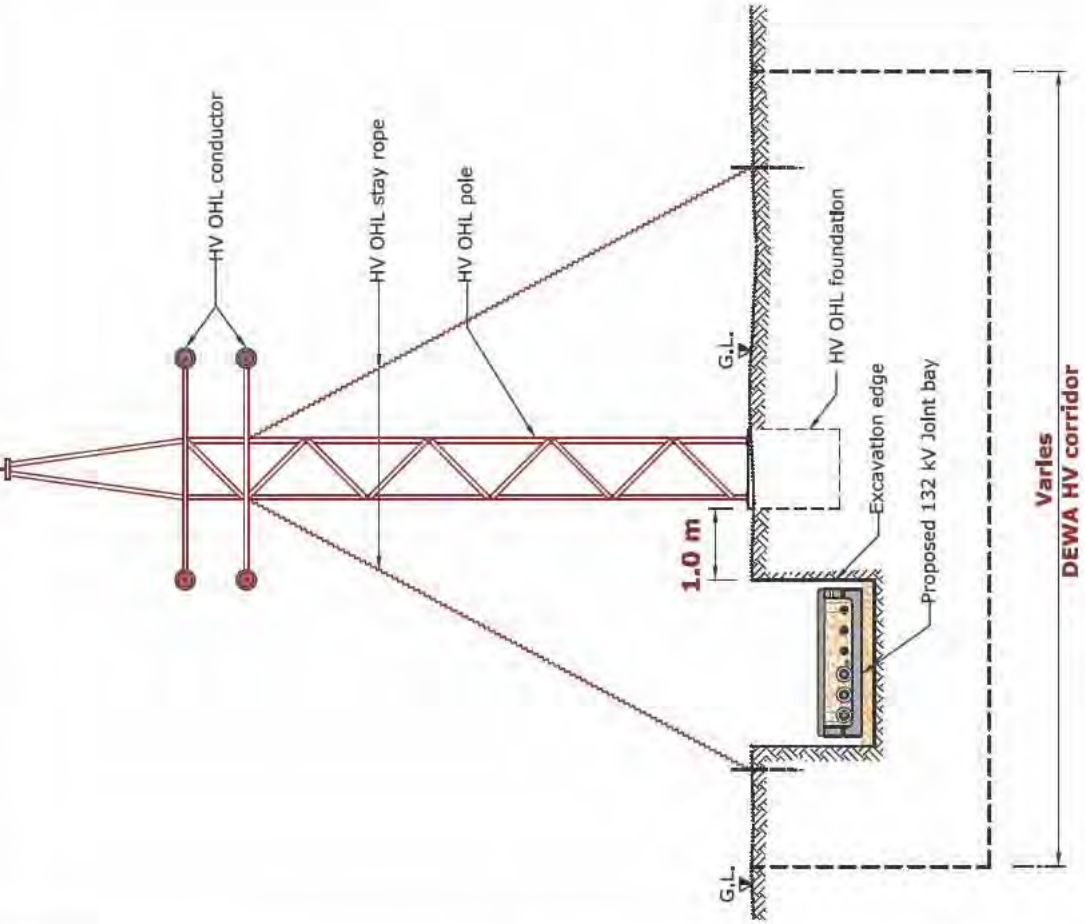
<p>Fig: 6.2</p>	<p>HORIZONTAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED 132 kV JOINT BAY AND EXISTING HV SERVICES</p>
<p>CASE 1 : Laying of Proposed 132 kV Joint bay parallel to existing HV cables</p>	
<p>CASE 2 : Laying of Proposed 132 kV Joint bay parallel to existing HV Manhole</p>	 <div> <p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed 132 kV Joint bay edge to existing HV services edge. 2. Proposed 132 kV Joint bay not allowed to lay/cross below existing HV services. 3. If HV cables are slewed due to site activity, then it should be placed back to actual position after completion of work. 4. Existing HV cables falling in the proposed excavation should be protected as per site condition. 5. Temporary warning sign board to be fixed at 20.0 m intervals to indicate the existing HV cables falling parallel to proposed excavation. 6. Proposed link box cables should be protected through duct with concrete surround. 7. Trench side protection may be required as per site and soil condition. </div>

Fig: 6.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV JOINT BAY AND EXISTING HV OHL (6.6/11/33 kV)



NOTE :

1. Horizontal clearance from the edge of proposed excavation edge to the HV OHL foundation edge.
2. Proposed 132 kV Joint bay should be laid within the DEWA HV corridor.
3. Proposed link box cables should be protected through duct with concrete surround.
4. Proposed 132 kV Joint bay should not be laid beside HV OHL foundation.
5. Trench side protection may be required as per site and soil condition.

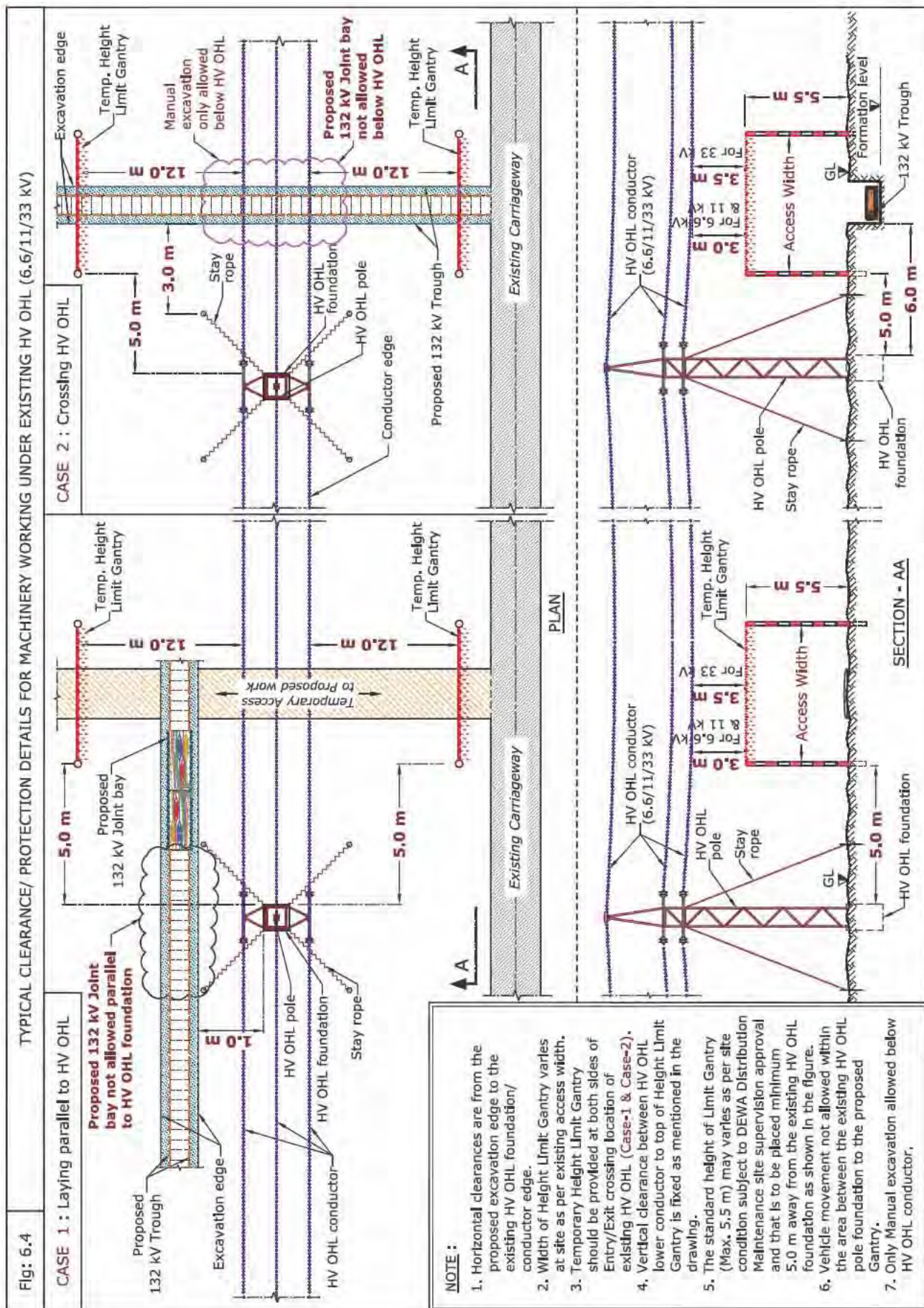
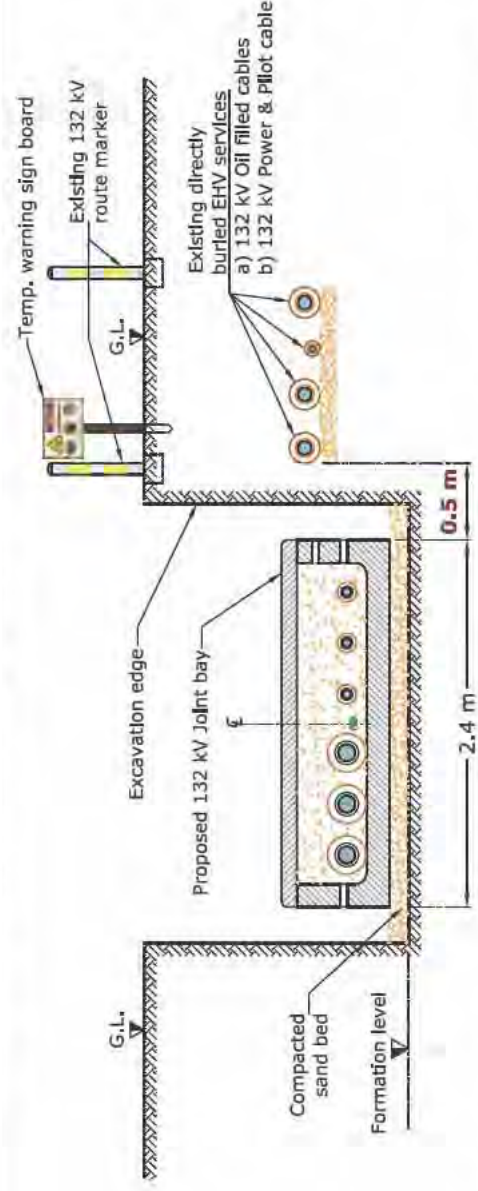
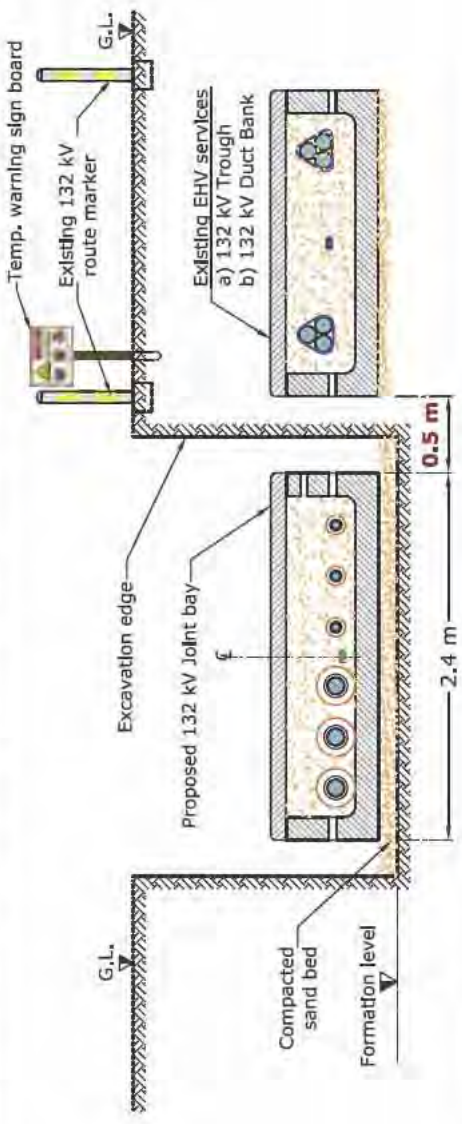


Table 3: Clearance & Protection details for proposed 132 kV cable Joint bay/Transition Joint and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	0.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 6.5) Protection details (Ref Fig: 6.5)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	0.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 6.5) Protection details (Ref Fig: 6.5)
EHV (132 kV) Trough	0.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 6.6) Protection details (Ref Fig: 6.6)
EHV (132 kV) Duct Bank	0.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 6.6) Protection details (Ref Fig: 6.6)
EHV (132 kV) Joint Bay/ Transition Joint	NA	NA	-	-	R	-
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 6.7)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 6.8)
Clearance & Protection details for access under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 6.7) Vertical clearance (Ref Fig: 6.7) Protection details (Ref Fig: 6.7)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 6.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV JOINT BAY/ TRANSITION JOINT AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ POWER & PILOT CABLES</p> 
<p>Fig: 6.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV JOINT BAY/ TRANSITION JOINT AND EXISTING 132 kV TROUGH/ DUCT BANK</p> 
<p>NOTE :</p>	<ol style="list-style-type: none"> 1. Horizontal clearance from the proposed 132 kV Joint bay edge to existing 132 kV services edge. 2. Proposed link box cables should be protected through duct with concrete surround. 3. Proposed 132 kV Joint bay/ Transition Joint not allowed to lay/ cross below existing 132 kV services. 4. Trench side and existing EHV services protection may be required as per site and soil condition.

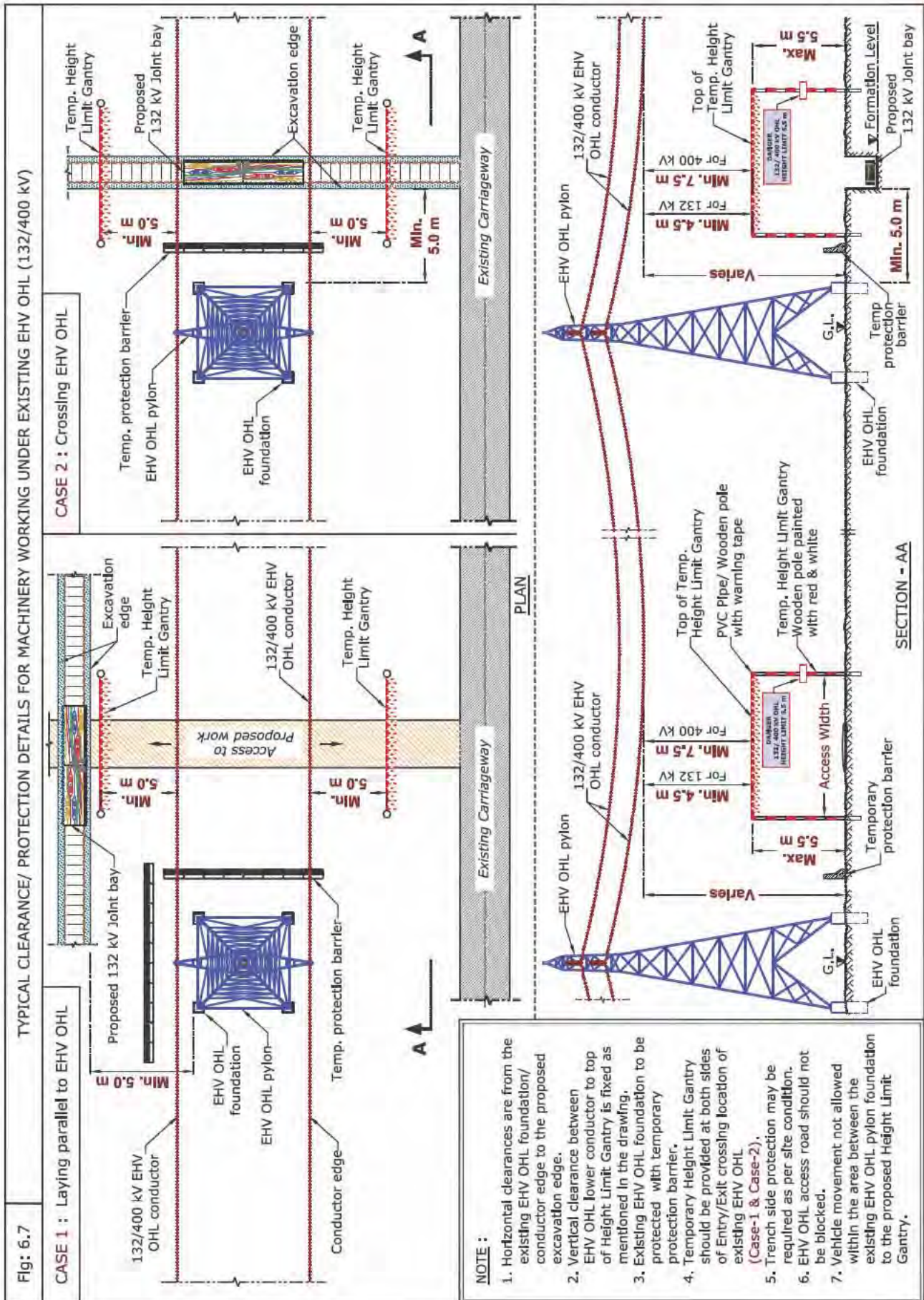
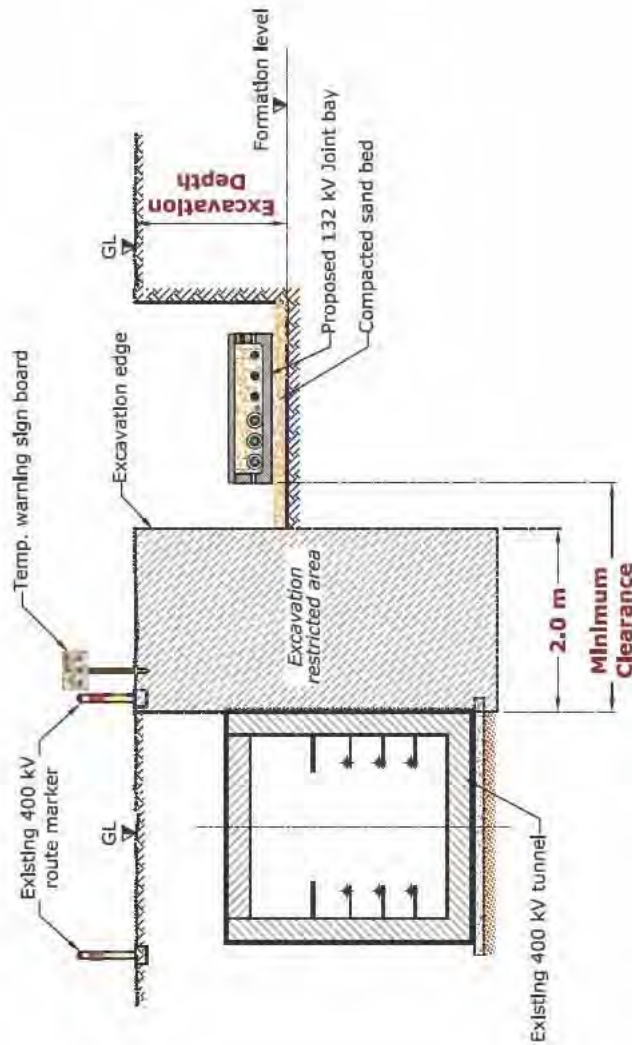


Fig: 6.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV JOINT BAY AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
2. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
3. Proposed link box cables should be protected through duct with concrete surround.
4. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV Tunnel edge to proposed 132 kV Joint bay edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

Table 4: Clearance & Protection details for proposed 132 kV cable Joint bay/ Transition Joint and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 6.9)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 6.9)

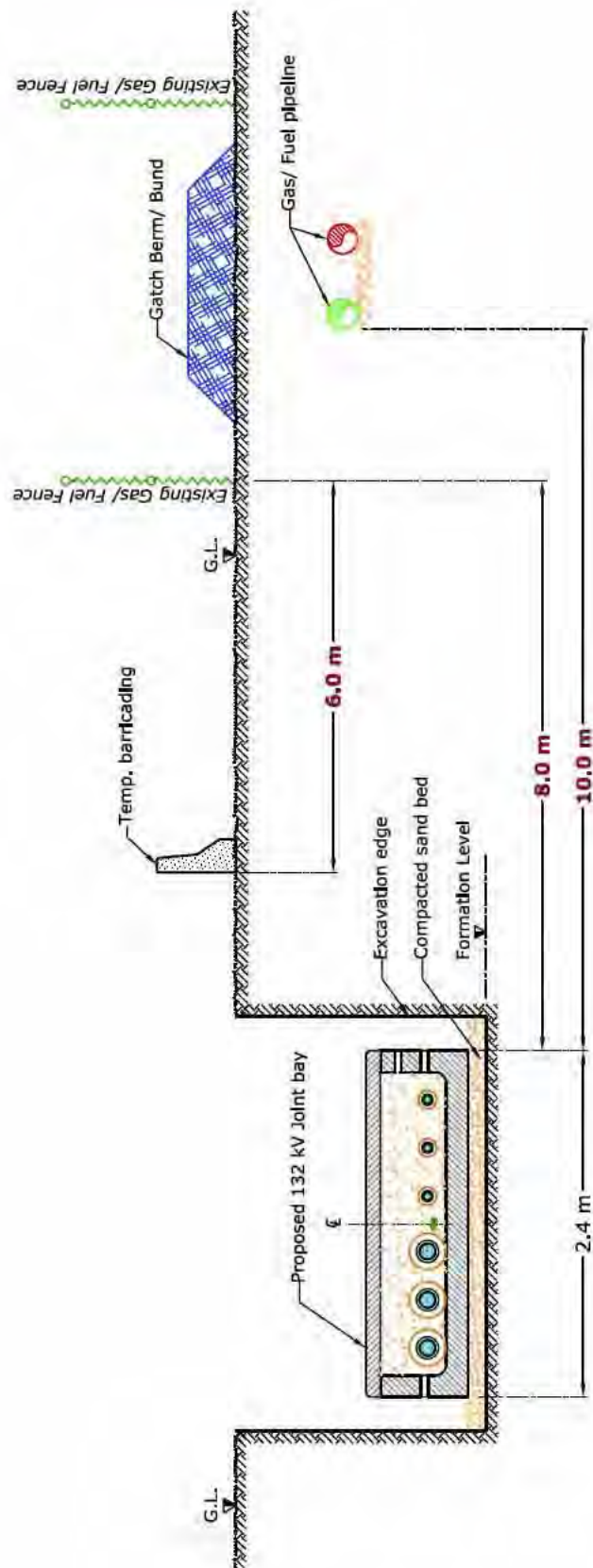
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Laying of Proposed Utilities - Electricity 132 kV Joint Bay/Transition Joint

Fig: 6.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED 132 kV JOINT BAY AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from the proposed 132 kV Joint bay edge to the existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from the proposed 132 kV Joint bay edge to the existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing DEWA Gas/ Fuel fence.
 4. Proposed 132 kV Joint bay not allowed to lay/ cross below existing DEWA Gas/ Fuel pipeline.
 5. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

7. Installation of Proposed OHL - Electricity EHV (132/400 kV)

7.1 Introduction

An overhead power line is a structure constructed within DEWA Over Head Line corridor/special reservation and made of a steel structure which is supported by a concrete foundation. An EHV Over Head Line is used to operate and ensure the efficient electric power transmission for large distances and consists of suspended conductors over steel towers (Pylons). DEWA Extra High Voltage (EHV) Over Head Lines are two types 132 kV & 400 kV Lines.

To maintain integrity, safety of the structure and personnel during various construction activities it is required to maintain adequate clearances between energised conductor/Pylons and proposed work as per specified standards.



Photo: EHV Over Head Line

7.2 Avoid the following



1. Proposed EHV OHL crossing existing HV OHL.

7.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Installation of EHV-OHL and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	5.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 71)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



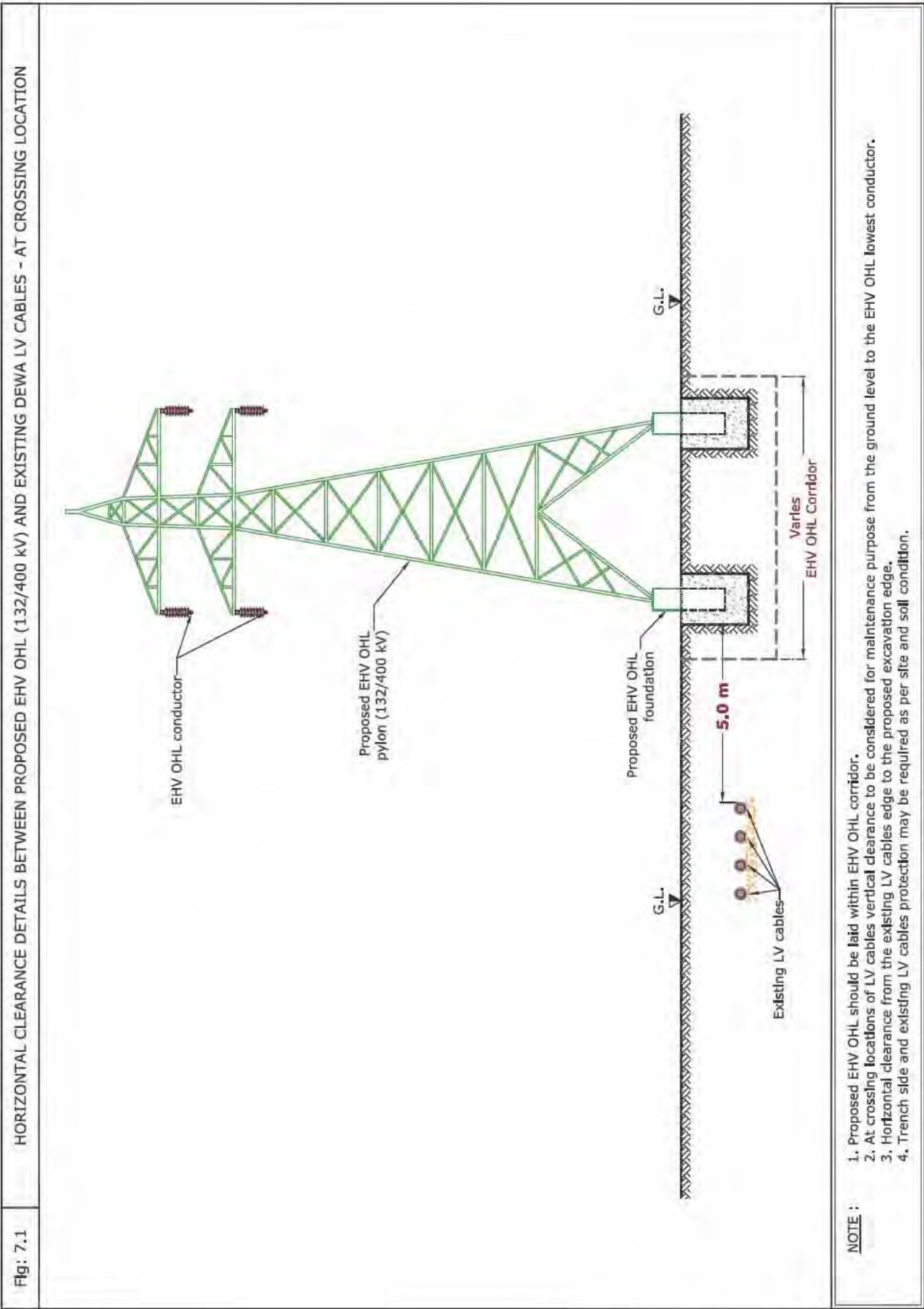


Table 2: Clearance & Protection details for proposed Installation of EHV-OHL and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 7.2) • Protection details (Ref Fig: 7.2)
HV (6.6/11/33 kV) Manhole	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 7.2)
HV (6.6/11/33 kV) O.H.L	20.0 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 7.2)
Clearance & Protection details for access under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 7.3) • Vertical clearance (Ref Fig: 7.3) • Protection details (Ref Fig: 7.3)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

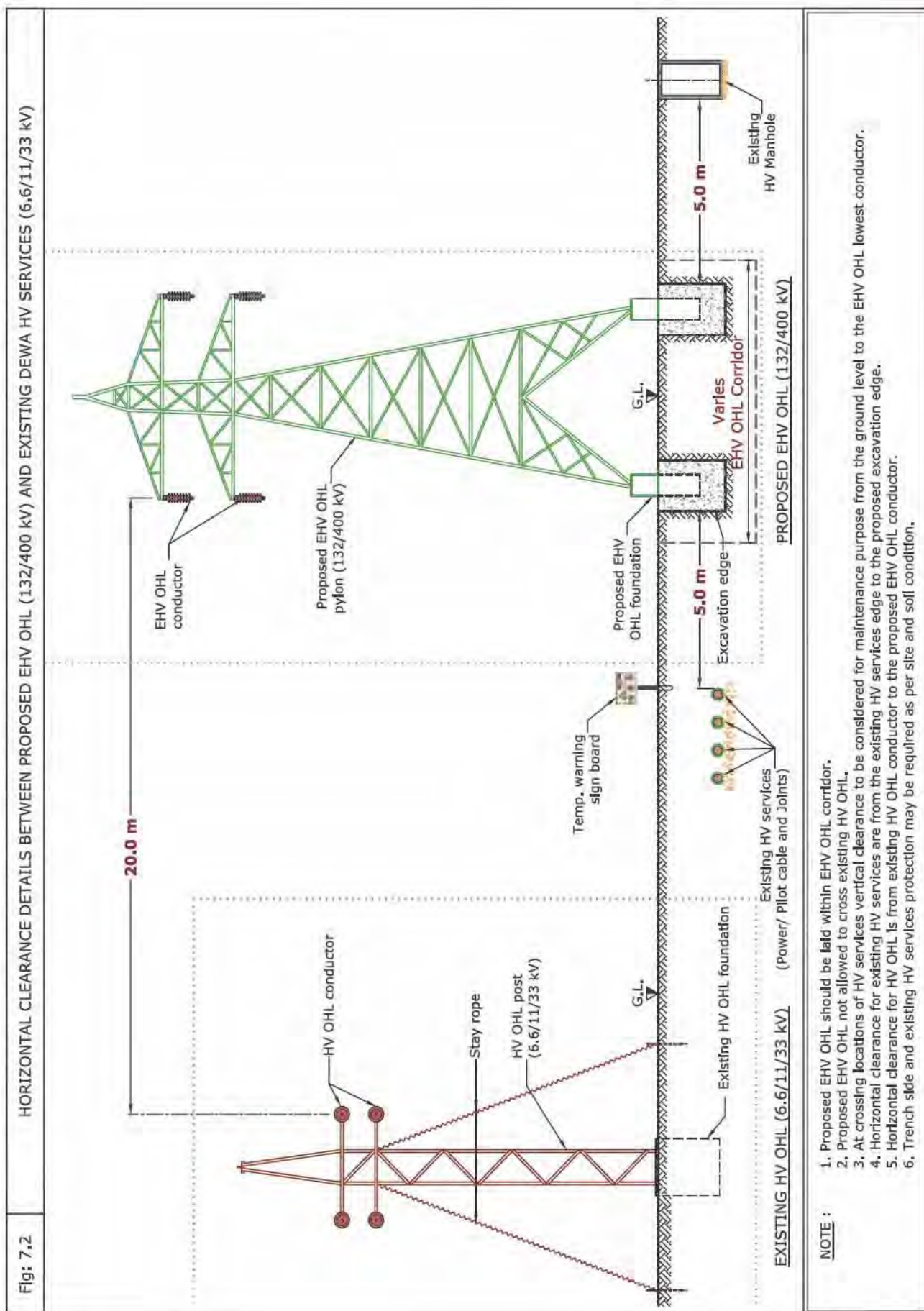


Fig: 7.3 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

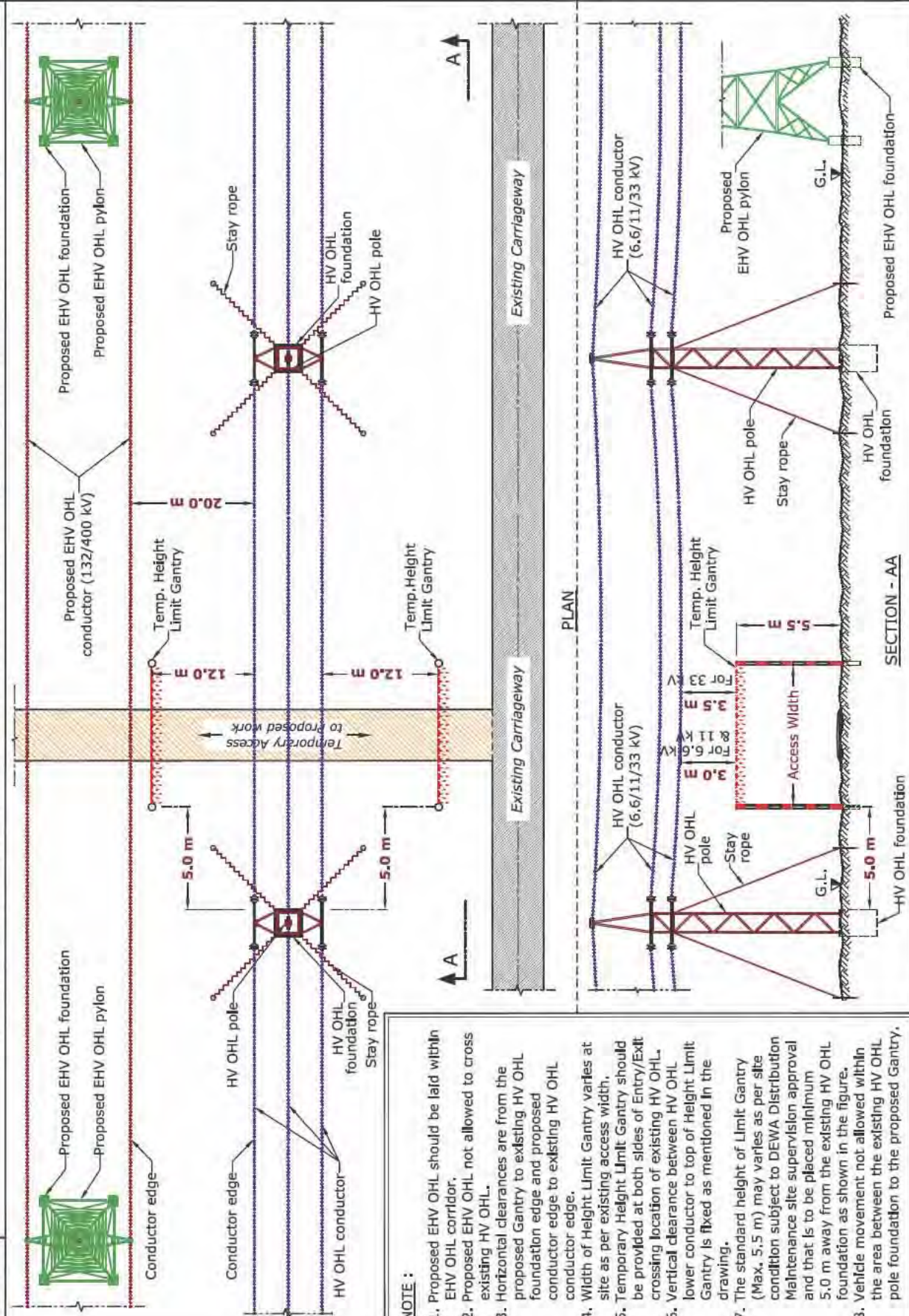
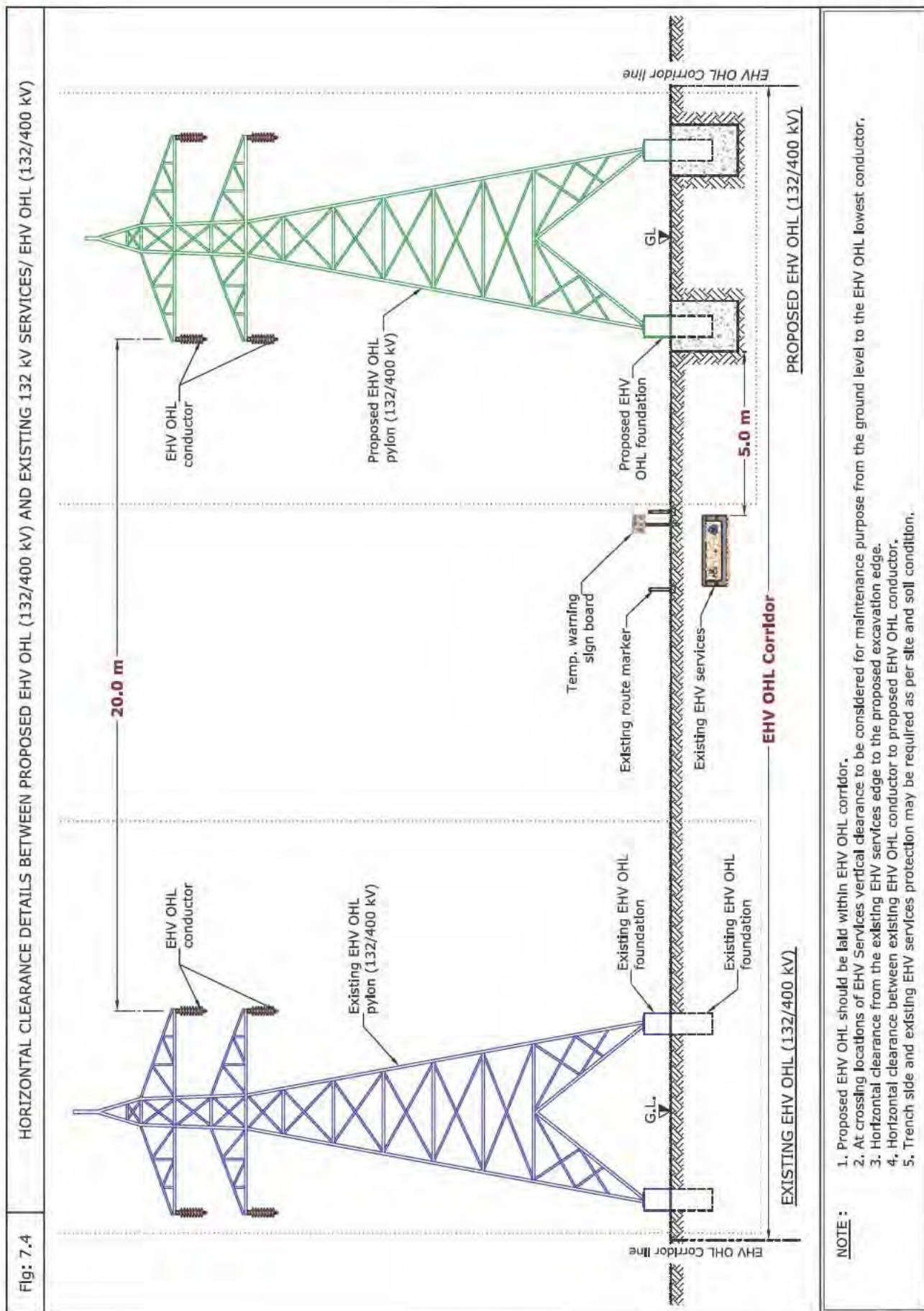


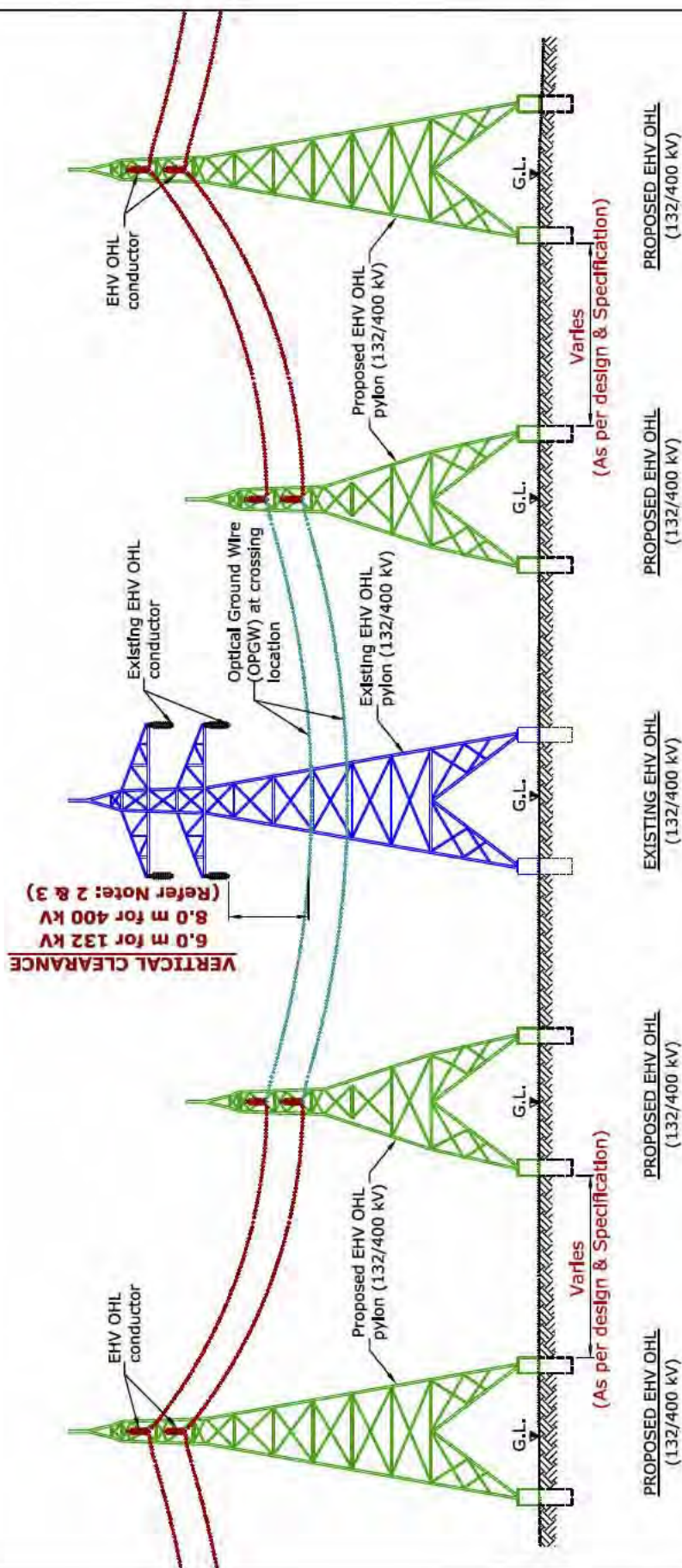
Table 3: Clearance & Protection details for proposed Installation of EHV-OHL and existing DEWA Electricity EHV services						
Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 7.4) Protection details (Ref Fig: 7.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 7.4) Protection details (Ref Fig: 7.4)
EHV (132 kV) Trough	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 7.4) Protection details (Ref Fig: 7.4)
EHV (132 kV) Duct Bank	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 7.4) Protection details (Ref Fig: 7.4)
EHV (132 kV) Joint Bay/Transition Joint	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 7.4) Protection details (Ref Fig: 7.4)
EHV (132 kV) O.H.L	20.0 m	6.0 m	A/B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 7.4) Vertical clearance (Ref Fig: 7.5 & photo 7.1)
EHV (400 kV) O.H.L		8.0 m				
EHV (400 kV) Tunnel	20.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 7.7)
Clearance & Protection details for access under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 7.6) Vertical clearance (Ref Fig: 7.6) Protection details (Ref Fig: 7.6)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



- NOTE :**
1. Proposed EHV OHL should be laid within EHV OHL corridor.
 2. At crossing locations of EHV Services vertical clearance to be considered for maintenance purpose from the ground level to the EHV OHL lowest conductor.
 3. Horizontal clearance from the existing EHV services edge to the proposed excavation edge.
 4. Horizontal clearance between existing EHV OHL conductor to proposed EHV OHL conductor.
 5. Trench side and existing EHV services protection may be required as per site and soil condition.

Fig: 7.5
HORIZONTAL/VERTICAL CLEARANCE & CROSSING DETAILS BETWEEN PROPOSED EHV OHL (132/400 kV) AND EXISTING EHV OHL (132/400 kV)



NOTE :

1. Horizontal clearance between proposed Pylon to Pylon varies as design and specifications.
2. Vertical clearance from the existing EHV OHL lowest conductor to the top of proposed EHV OHL conductor. (Ref Photo:7.1)
3. Optical Ground wire (OPGW) should be used at EHV OHL crossing locations or as per contract specification.

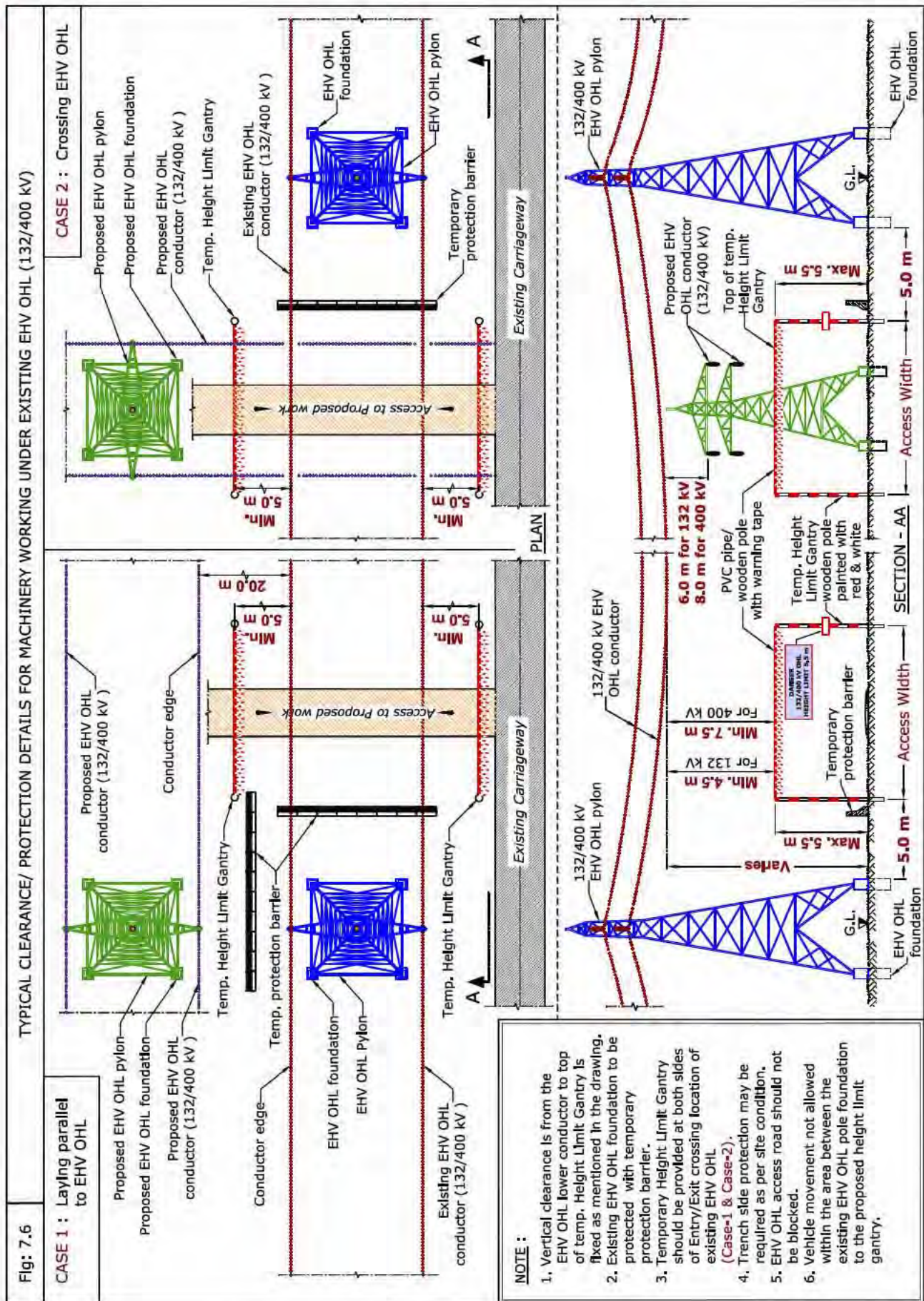
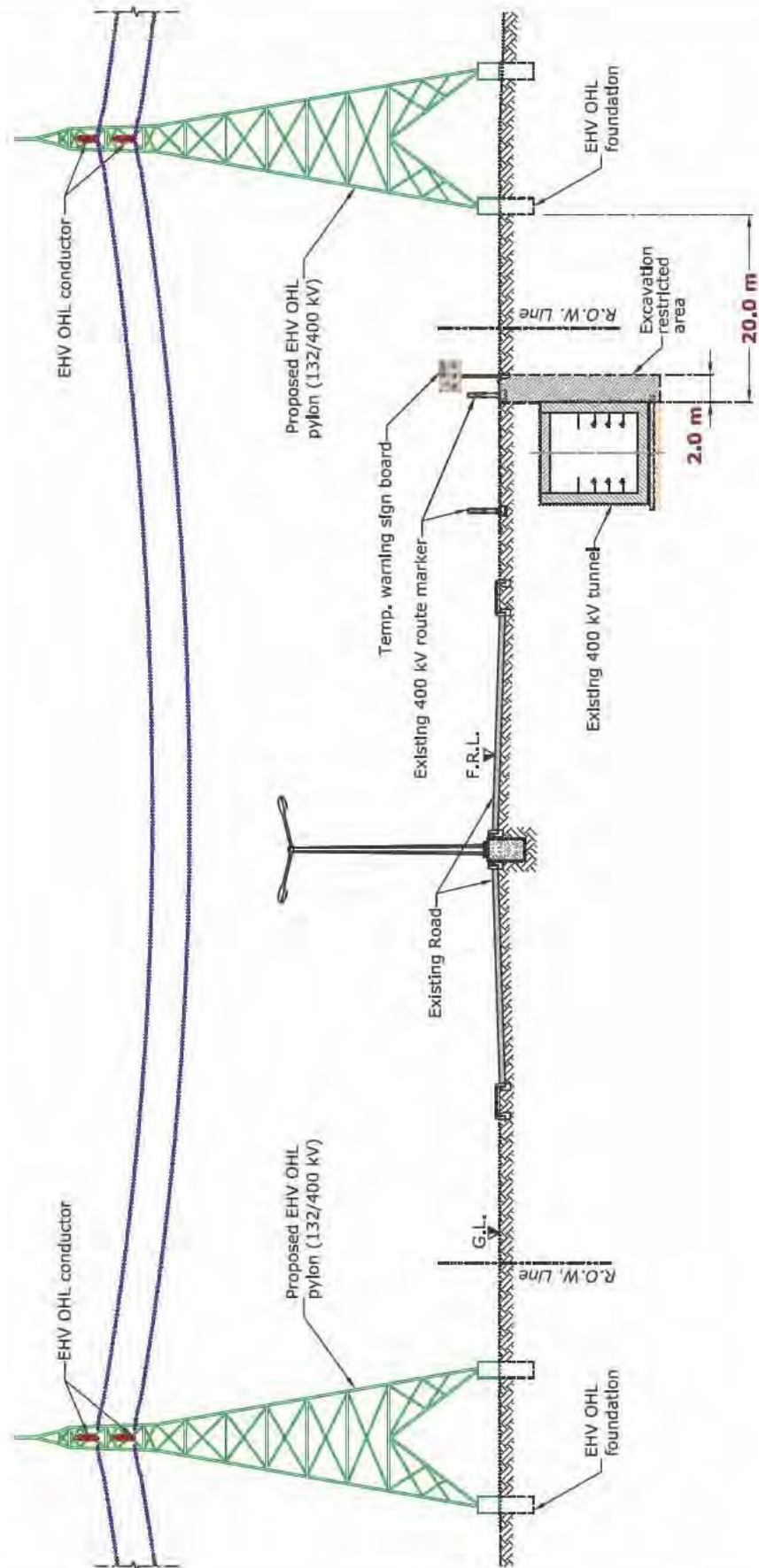


Fig: 7.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED EHV OHL (132/400 kV) AND EXISTING 400 kV TUNNEL



- NOTE :**
1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
 2. Horizontal clearance is from proposed Pylon to the existing 400 kV tunnel.
 3. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED EHV OHL AND EXISTING EHV OHL

Photo : 7.1



Table 4: Clearance & Protection details for proposed Installation of EHV-OHL and existing DEWA Gas/Fuel services

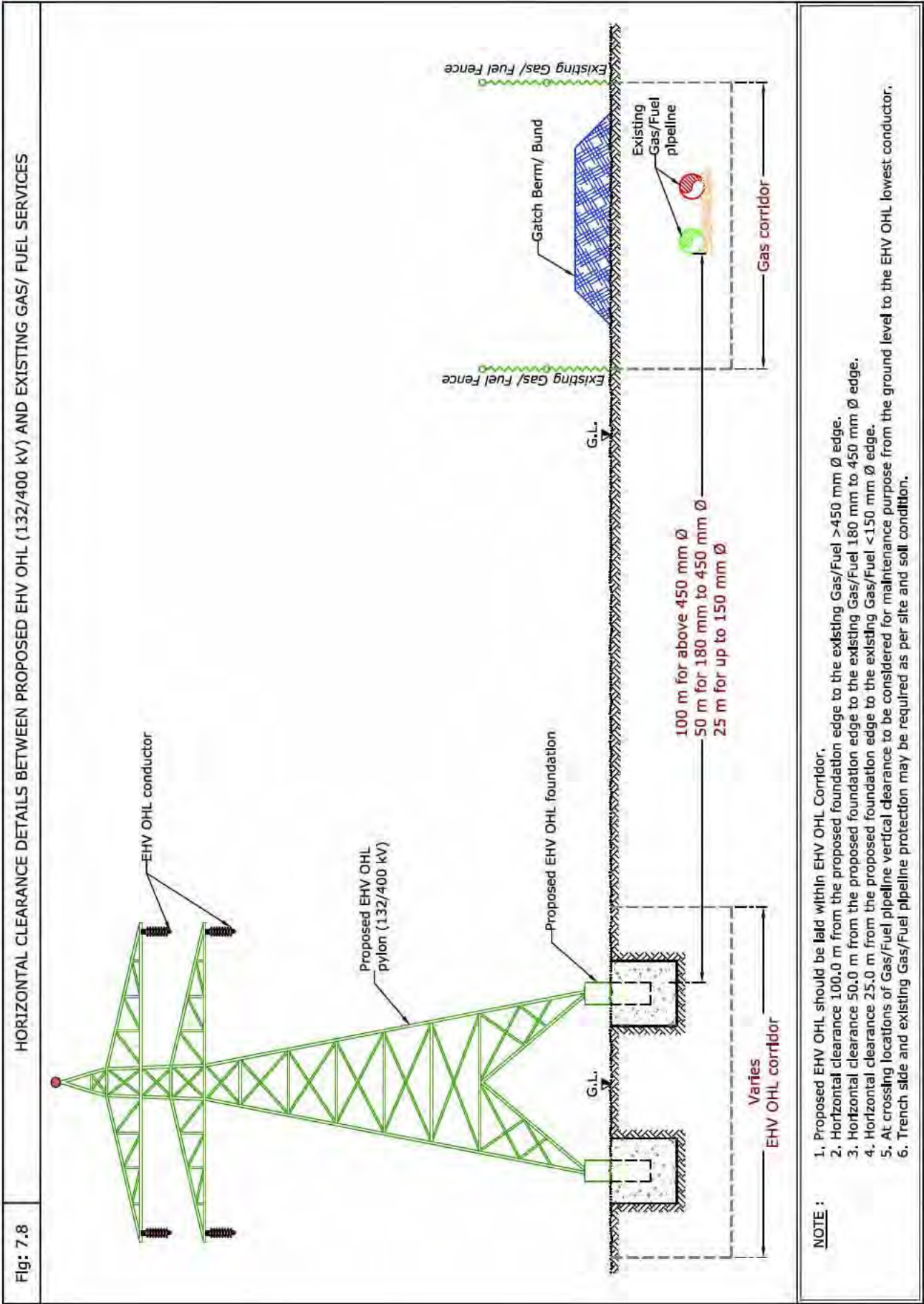
Gas/Fuel Existing Services	Diameter	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Gas/Fuel pipeline	Above 450 mm ø	100.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 7.8)
	180 to 450 mm ø	50.0 m	NR	-	-		
	Up to 150 mm ø	25.0 m	NR	-	-		

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Installation of Proposed OHL - Electricity EHV (132/400 kV)



8. Laying of Proposed Utilities - Water Distribution Pipelines (100 mm to 450 mm Dia)

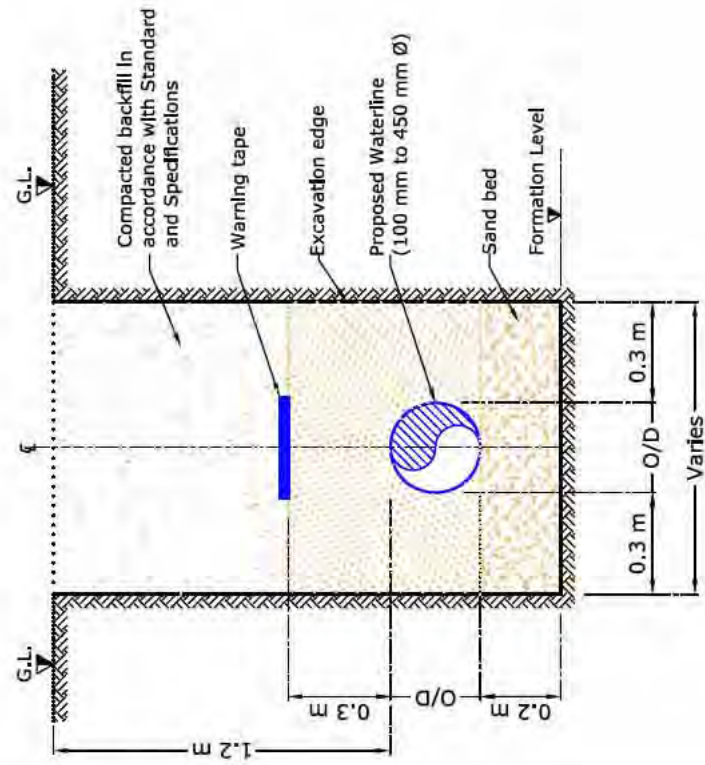
8.1 Introduction

Distribution system is used to carry potable water from transmission network/storage tanks to the end users; it consists of distribution pipelines, valve chambers etc. Distribution pipelines are always pressurised to transmit potable water through various pipeline diameters which vary from 100 mm to 450 mm, and are laid with different types of pipelines materials (i.e. FC, AC, GRP, GRE, HDPE, .etc).

These lines are laid in specific corridors within Right Of Way; therefore during laying activities it is required to protect existing DEWA assets as per specified standards.



Water Distribution Line



NOTE :

1. Excavated trench should be backfilled with suitable soil.
2. Trench side protection may be required as per site and soil condition.

8.2 Avoid the following



1. Crossing existing 132 kV Joint Bay/Transition joint.
2. Crossing existing HV Manholes/Valve chambers/SCADA Unit.

8.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Distribution Water pipeline (100 mm to 450 mm Dia) and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 8.1, Case 1) • Vertical clearance (Ref Fig: 8.1, Case 2) • Protection Details (Ref Fig: 8.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



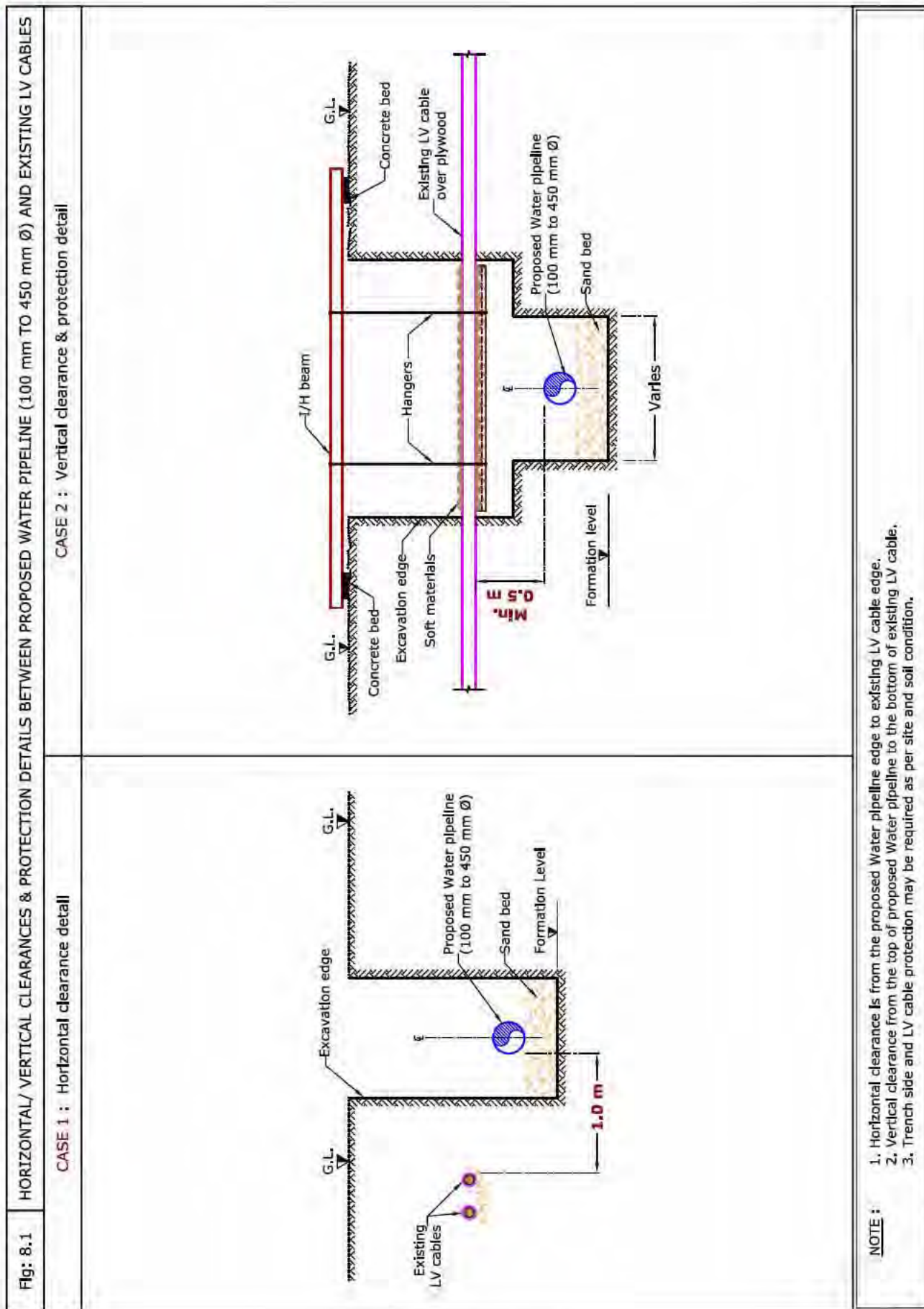

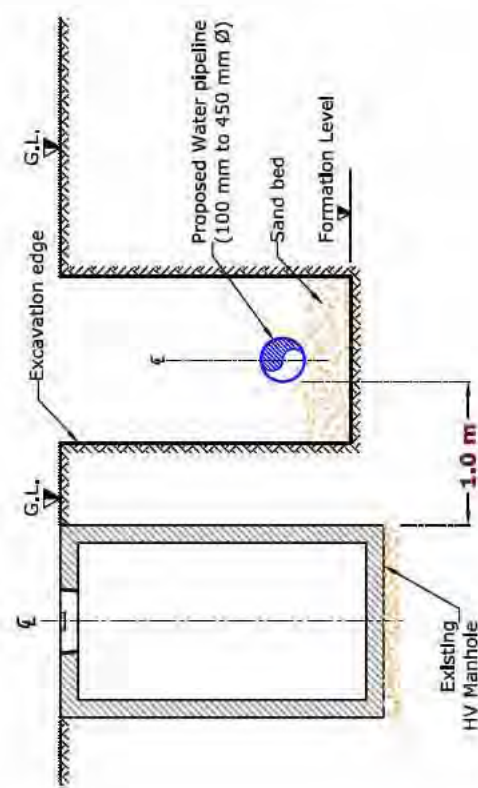
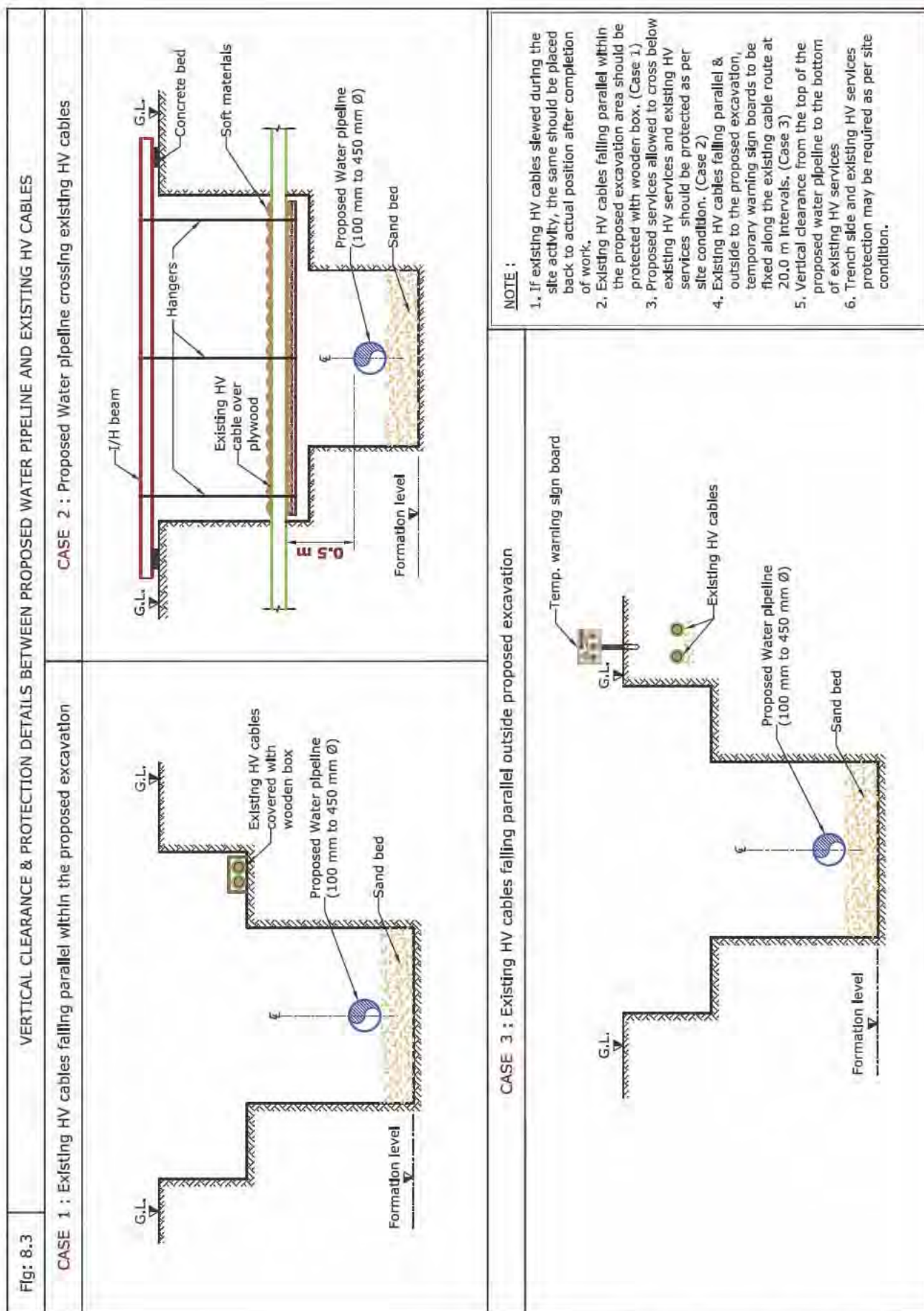


Table 2: Clearance & Protection details for proposed Distribution Water Pipeline (100 mm to 450 mm Dia) and existing DEWA Electricity HV services						
Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 8.2, Case 1) Vertical clearance (Ref Fig: 8.3, Case 2) Protection details (Ref Fig: 8.3)
HV (6.6/11/33 kV) Manhole	1.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 8.2, Case 2)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 8.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 8.4) Vertical clearance (Ref Fig: 8.4) Protection details (Ref Fig: 8.4)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 8.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING HV SERVICES
<p>CASE 1 : Horizontal clearance between proposed Water pipeline and existing HV cables</p>	<p>CASE 2 : Horizontal clearance between proposed Water pipeline and existing HV Manhole</p>  
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Water pipeline edge to existing HV cable edge. 2. Proposed Water pipeline allowed to cross below existing HV cables. 3. Proposed Water pipeline not allowed to cross existing HV Manhole. 4. Trench side and HV cable protection may be required as per site and soil condition. 	



NOTE :

1. If existing HV cables slewed during the site activity, the same should be placed back to actual position after completion of work.
2. Existing HV cables falling parallel within the proposed excavation area should be protected with wooden box. (Case 1)
3. Proposed services allowed to cross below existing HV services and existing HV services should be protected as per site condition. (Case 2)
4. Existing HV cables falling parallel & outside to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. (Case 3)
5. Vertical clearance from the top of the proposed water pipeline to the bottom of existing HV services
6. Trench side and existing HV services protection may be required as per site condition.

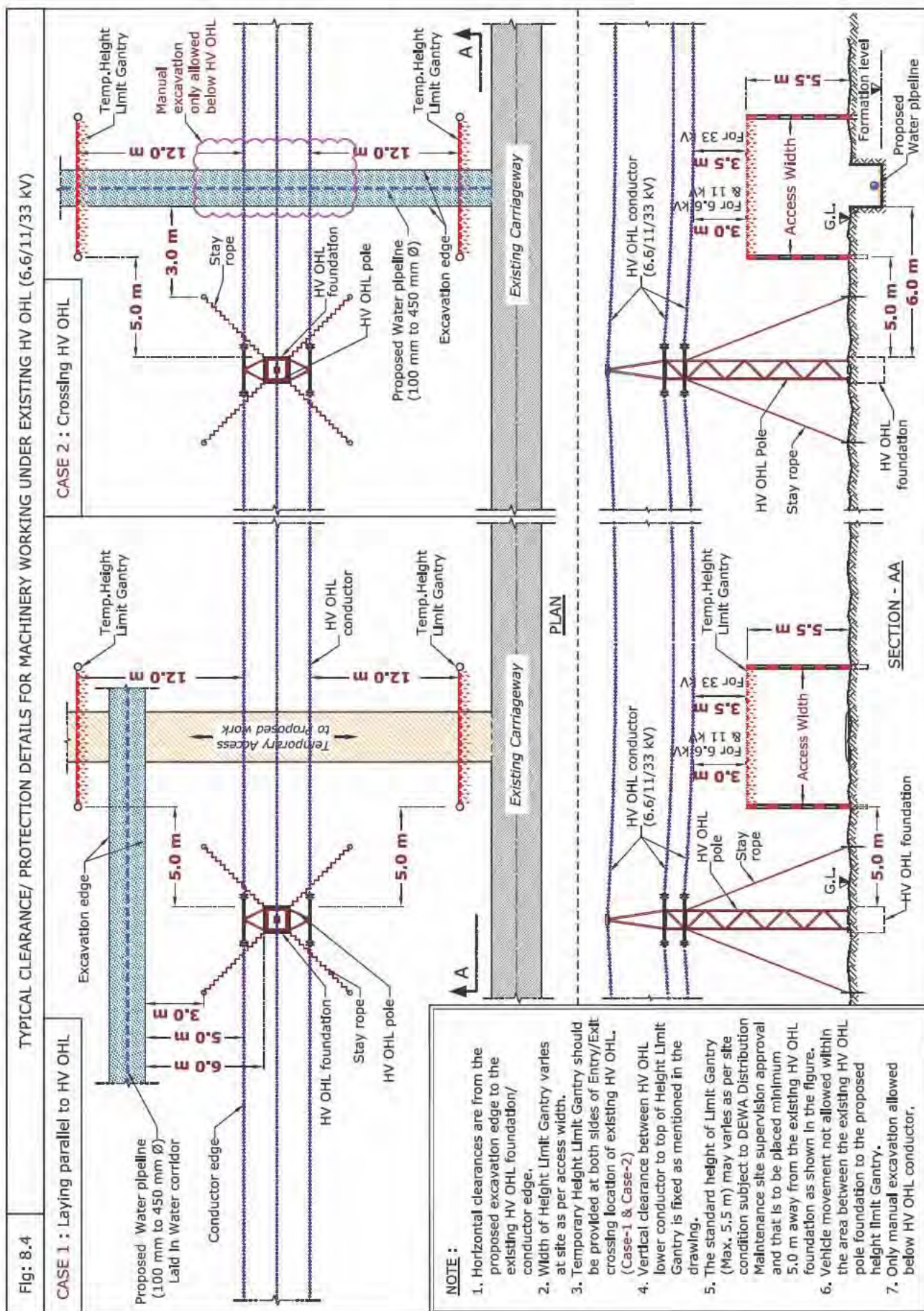
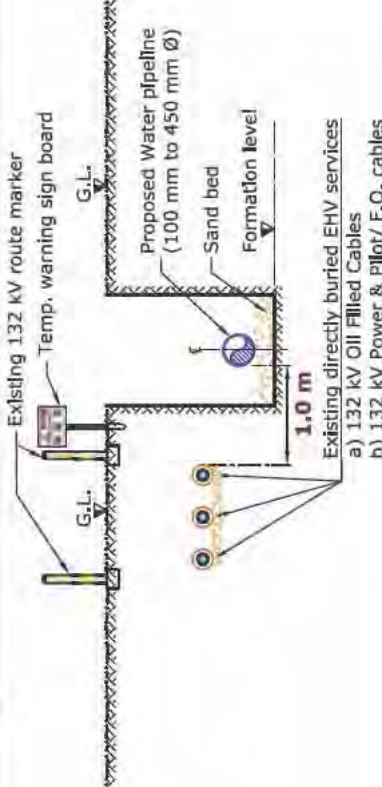
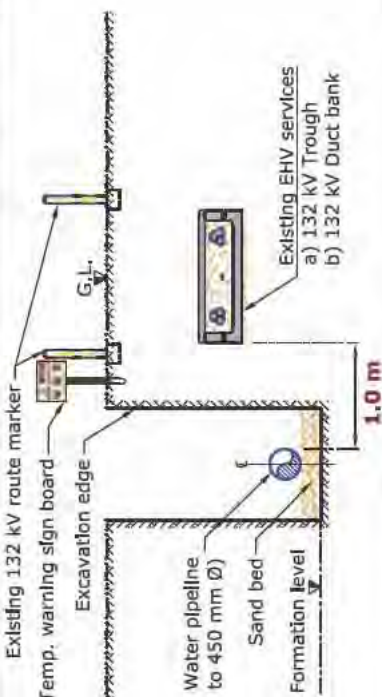
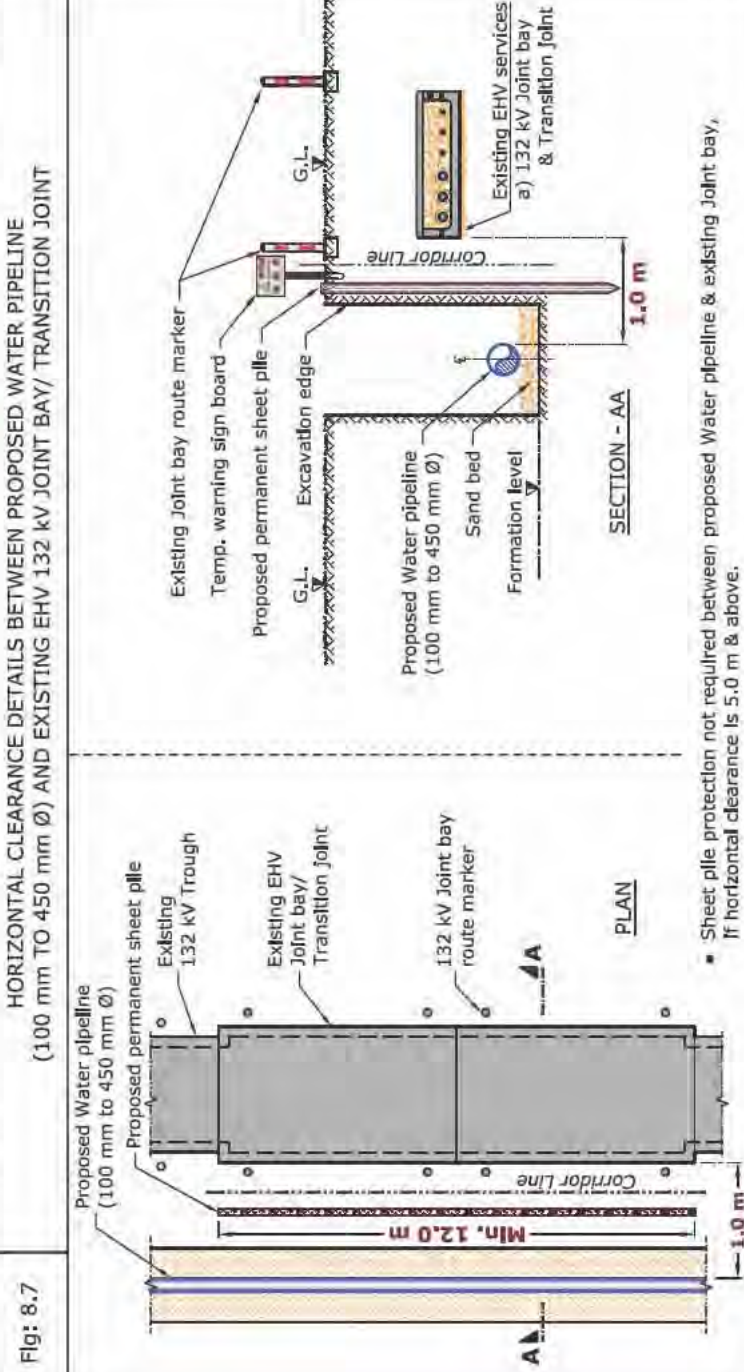


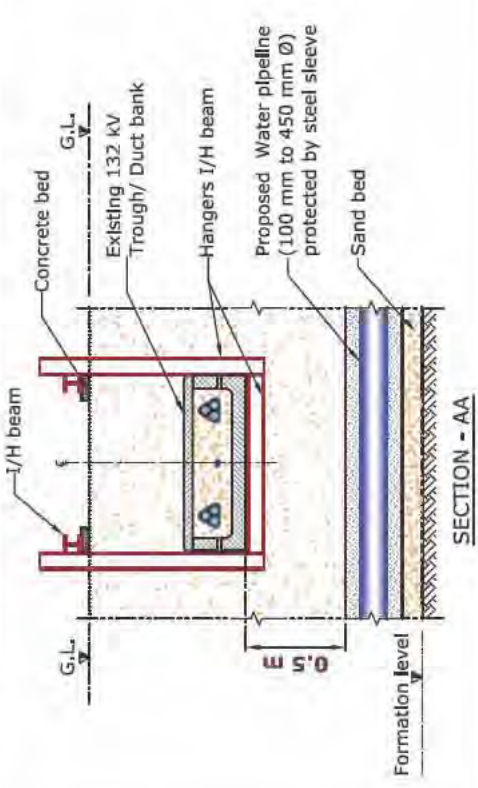
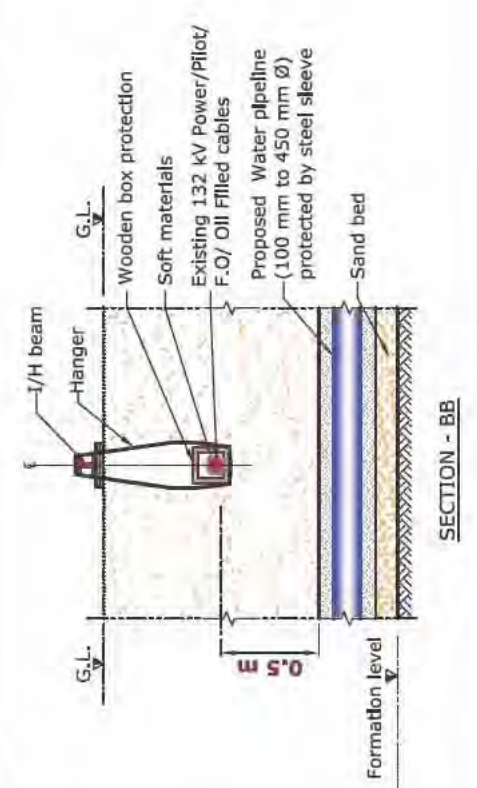
Table 3: Clearance & Protection details for proposed Distribution Water Pipeline (100 mm to 450 mm Dia) and existing DEWA Electricity EHV services

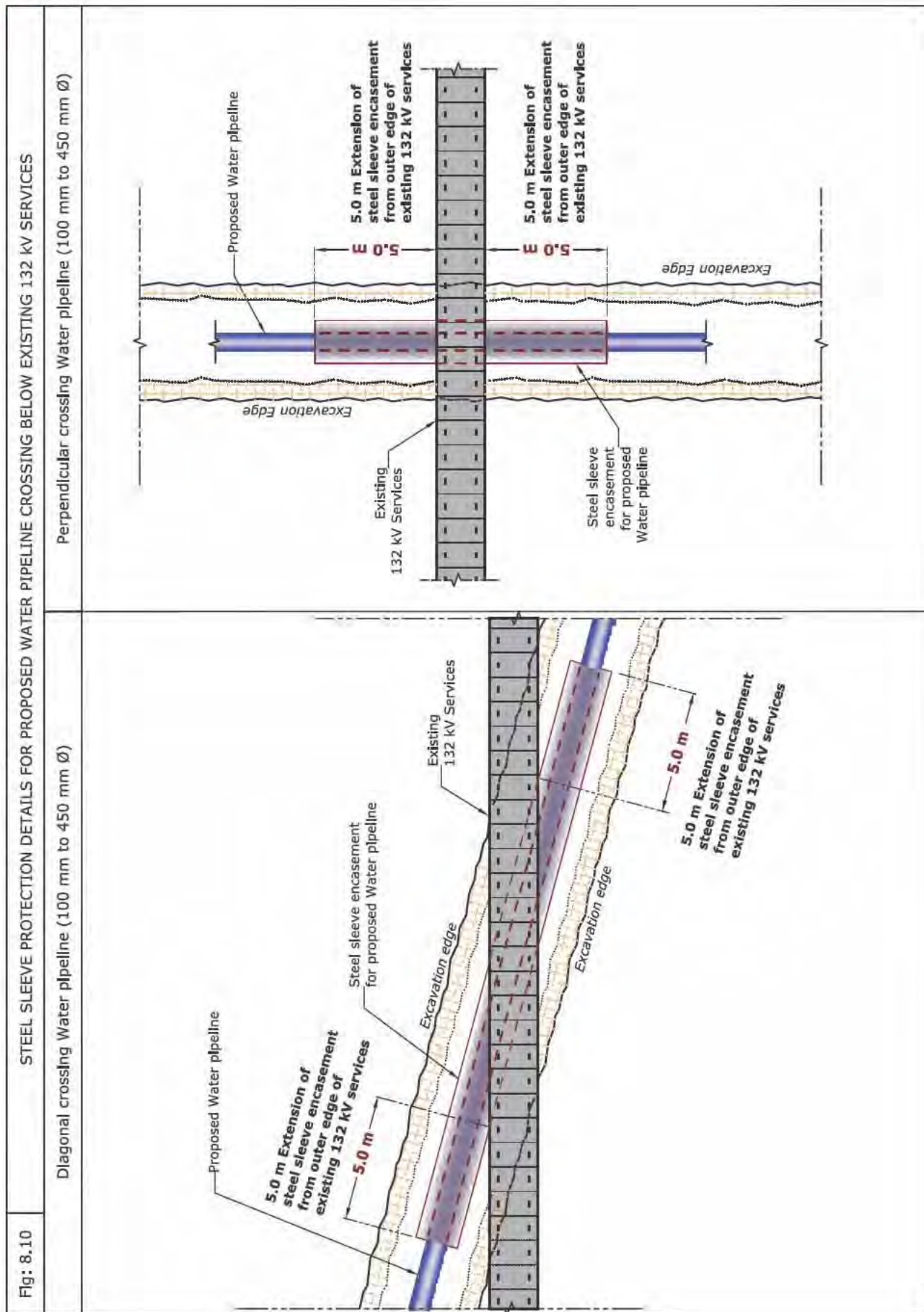
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 8.5)Vertical clearance (Ref Fig: 8.9)Protection details (Ref Fig: 8.9 & 8.10)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 8.5)Vertical clearance (Ref Fig: 8.9)Protection details (Ref Fig: 8.9 & 8.10)
EHV (132 kV) Trough	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 8.6)Vertical clearance (Ref Fig: 8.8)Protection details (Ref Fig: 8.8 & 8.10)
EHV (132 kV) Duct Bank	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 8.6)Vertical clearance (Ref Fig: 8.8)Protection details (Ref Fig: 8.8 & 8.10)
EHV (132 kV) Joint Bay/ Transition Joint	1.0 m	NA	-	-	-	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 8.7)Protection Details (Ref Fig: 8.7)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig:8.14)Protection details (Ref Fig: 8.14)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 8.11)Vertical clearance (Ref Fig: 8.12)Protection details (Ref Fig: 8.12)
		2.0 m	B	NDCM		<ul style="list-style-type: none">Vertical clearance (Ref Fig: 8.13)Protection details (Ref Fig: 8.13)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 8.14)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">Vertical clearance (Ref Fig: 8.14)Protection details (Ref Fig: 8.14)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 8.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	Fig: 8.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed water pipeline outer edge to existing EHV 132 kV services edge. 2. Existing EHV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing EHV service edge. 4. Permanent sheet pile should be provided between existing 132 kV Joint bay/ Transition joint (Minimum 12.0 m length) and proposed excavation as shown. 5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 	<p>Fig: 8.7</p> <p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>  <p>■ Sheet pile protection not required between proposed Water pipeline & existing Joint bay, If horizontal clearance is 5.0 m & above.</p>

<p>Fig: 8.8 VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING 132 kV TROUGH/ DUCT BANK</p>	 <p>SECTION - AA</p>
<p>Fig: 8.9 VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING EHV 132 kV SERVICES</p>	 <p>SECTION - BB</p>
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance from the top of proposed Water pipeline to the bottom of the existing 132 kV services. 2. Proposed Water pipeline not allowed to cross existing 132 kV Joint bay/Transition joint. 3. Proposed Water pipeline allowed to cross below existing 132 kV services. 4. Proposed Water pipeline should be protected by steel sleeve at the crossing locations of 132 kV Trough/ O.F. cables. (Ref: Fig: 8.10) 5. Trench side and existing 132 kV services protection required as per site and soil condition. 	



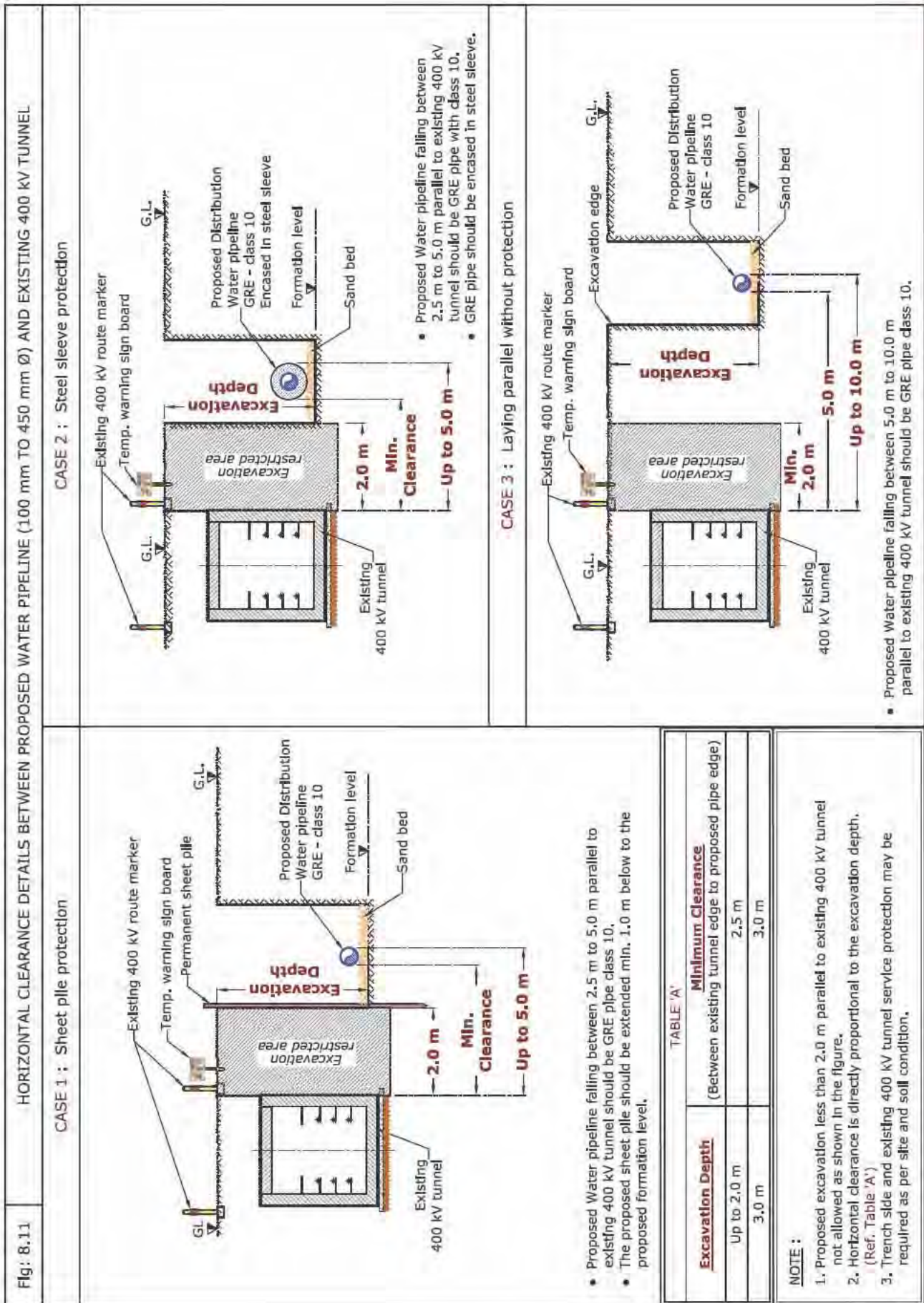
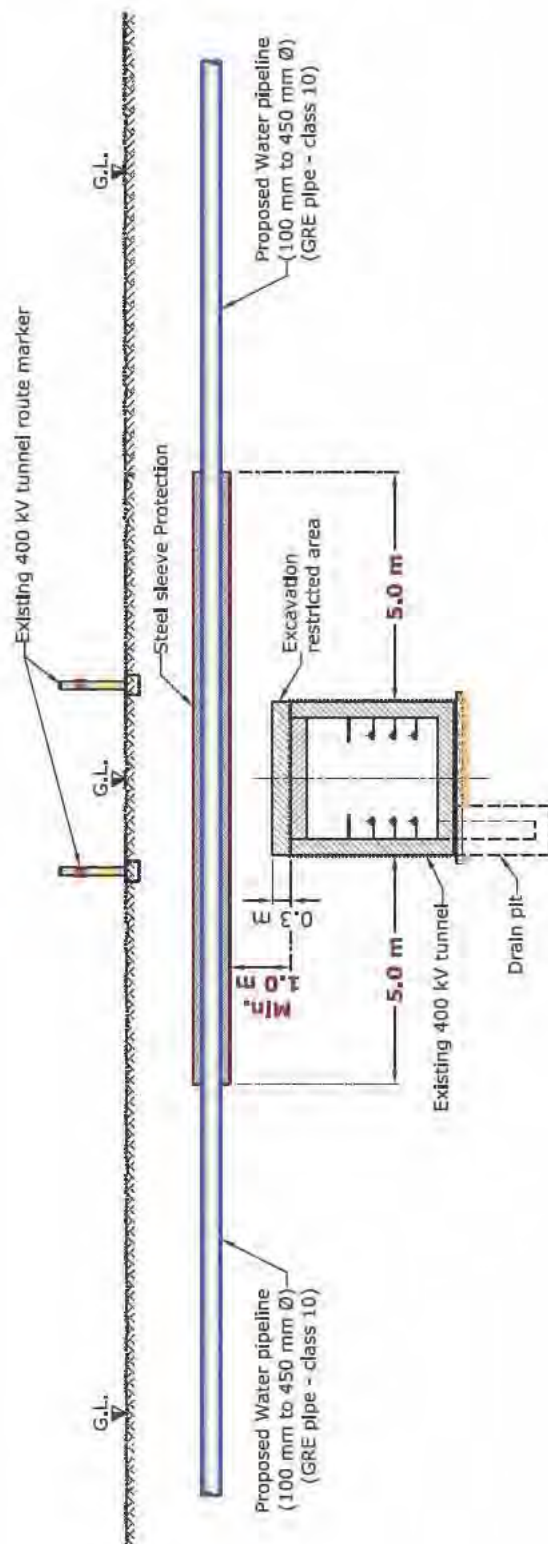


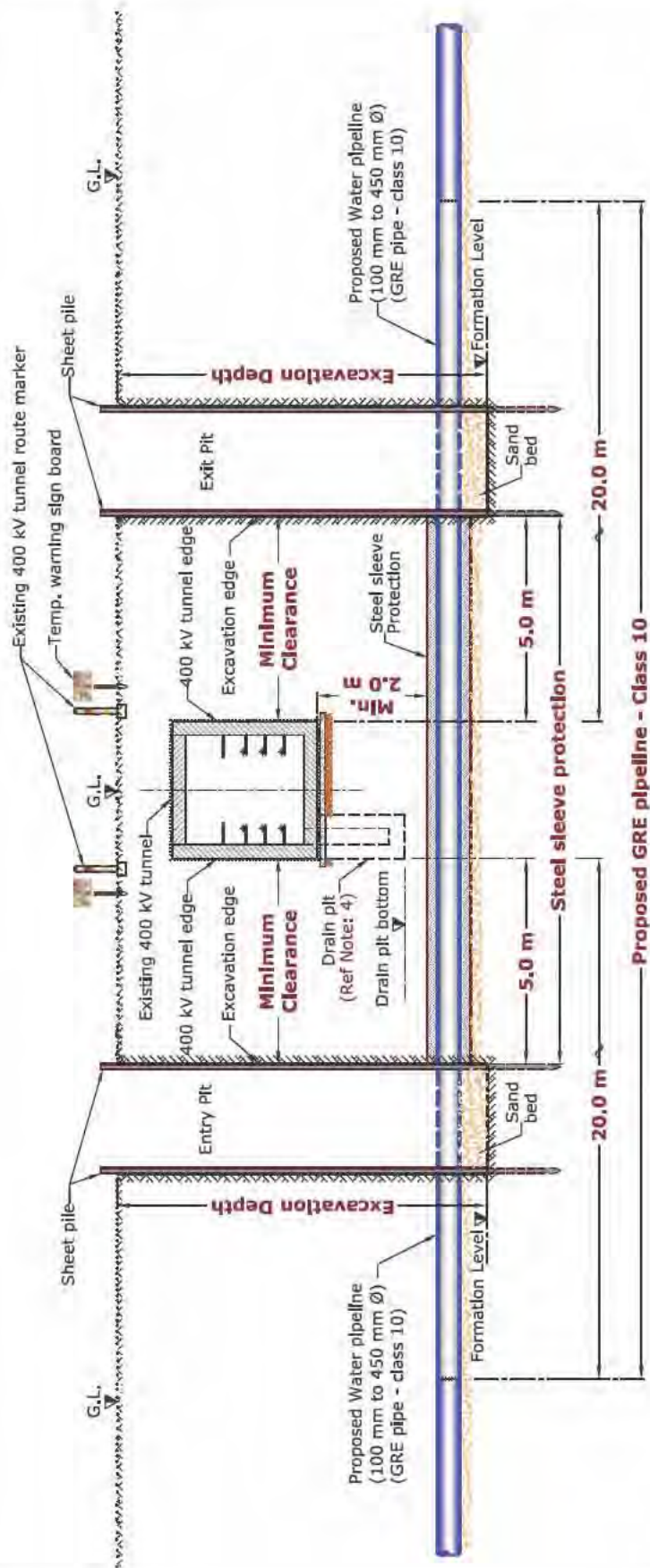
Fig: 8.12 STANDARD PROTECTION & CROSSING (ABOVE) DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed Water pipeline up to 450 mm Ø can be allowed to cross above existing 400 kV tunnel with respect to available vertical clearance.
2. Vertical clearance is from the bottom of proposed steel sleeve to the top of existing 400 kV tunnel.
3. Proposed Water pipeline crossing above existing 400 kV tunnel should be GRE pipeline Class 10 and protected with steel sleeve as shown in the figure.
4. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel is not allowed.
2. Minimum clearance from 400 kV tunnel edge to entry/exit pit excavation edge is directly proportional to the excavation depth. (Ref. Table 'A')
3. Vertical clearance is from the top of proposed NDCM work to the bottom of existing 400 kV tunnel.
4. Existing 400 kV tunnel's drain pit location should be identified prior to start NDCM work. Increase the proposed water distribution pipe crossing falling below existing drain pit area. Minimum 2.0 m vertical clearance to be maintained from the bottom of drain pit to the top of proposed NDCM work.
5. Proposed water distribution pipeline crossing below existing 400 kV tunnel should be GRE pipeline Class 10 and protected with steel sleeve as shown in the figure.
6. Sheet pile protection may be required for Entry/ Exit pit excavation.
7. Settlement calculation shall be submitted.
8. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

<u>Excavation Depth</u>	<u>Minimum Clearance</u> (Between existing 400 kV tunnel edge to proposed Entry/Exit pit Excavation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

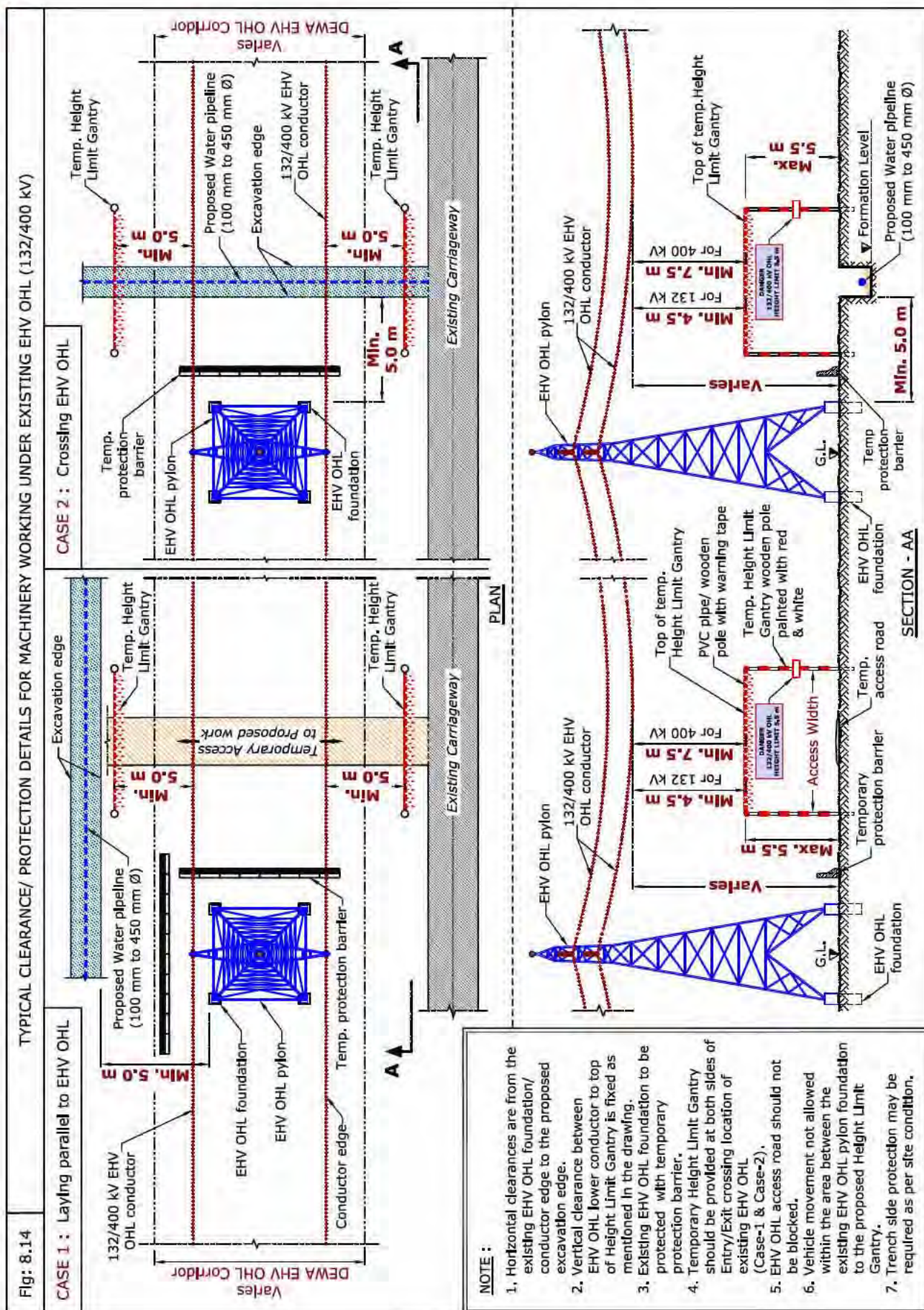


Table 4: Clearance & Protection details for proposed Distribution Water Pipeline (100 mm to 450 mm Dia) and existing Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 8.15)
Gas/Fuel pipeline (All diameter)	10.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 8.15)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

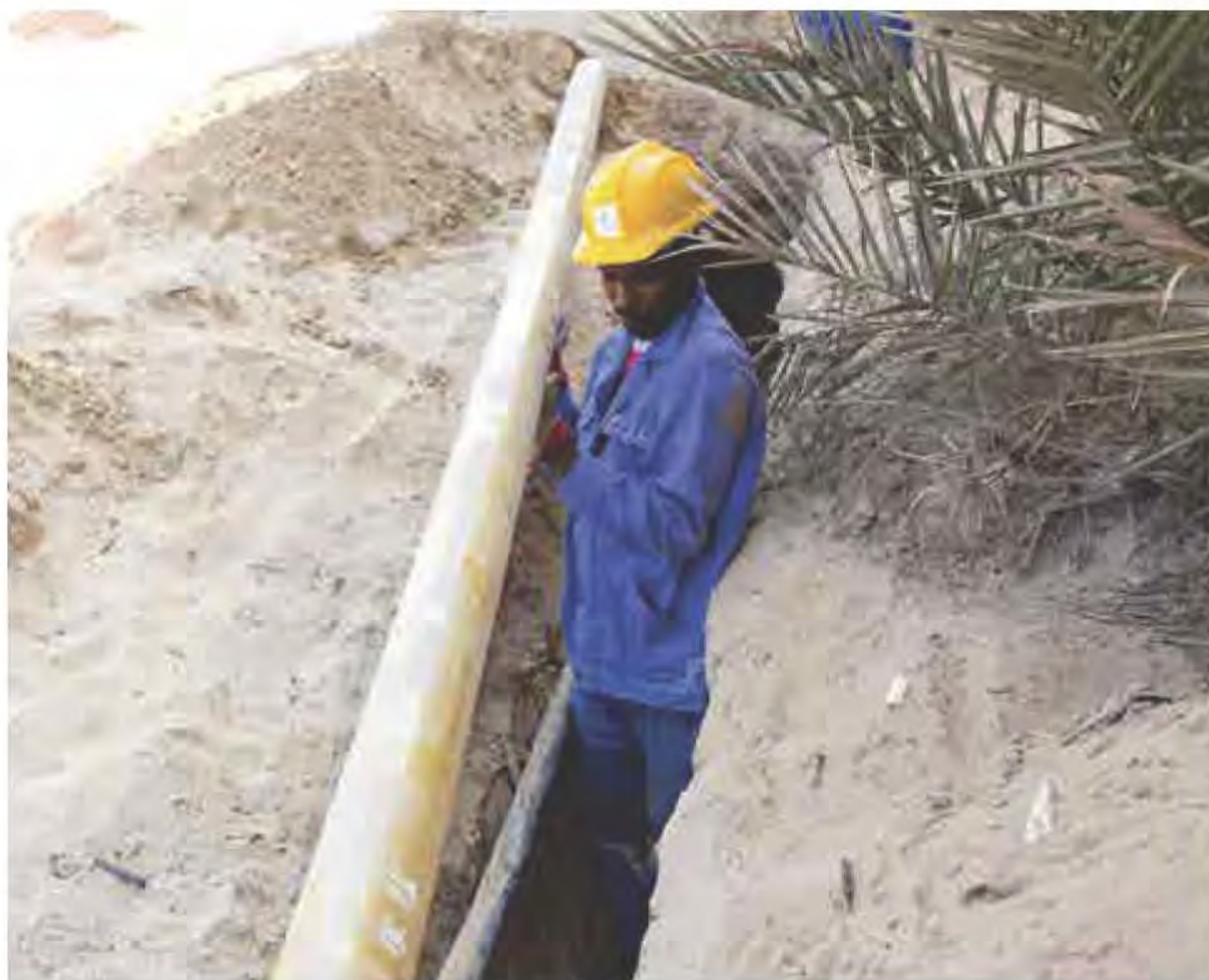
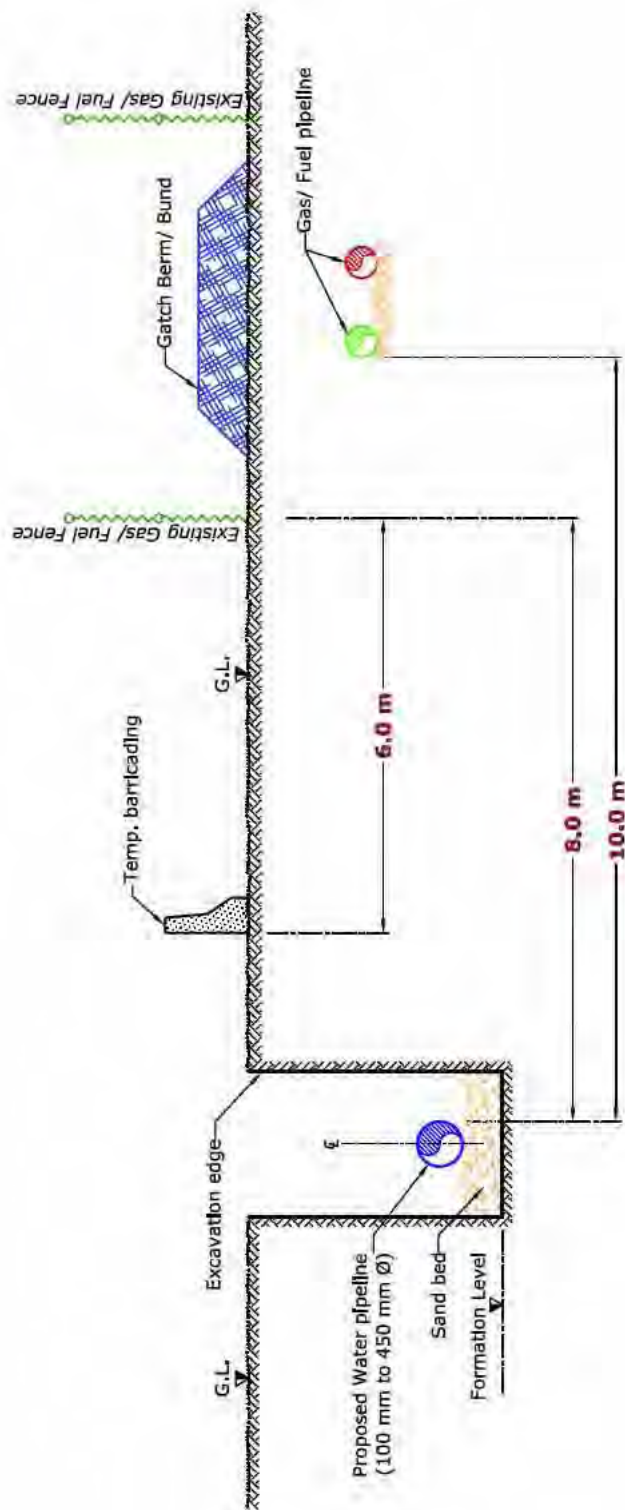


Fig: 8.15 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (100 mm TO 450 mm Ø) AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from the proposed Water pipeline edge to the existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from the proposed Water pipeline edge to the existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing DEWA Gas/ Fuel fence.
 4. Proposed Water pipeline can be allowed to cross existing Gas/ Fuel pipeline by NDCM.
 5. Existing Gas/ Fuel pipeline should be protected In the Entry/ Exit pit as per site condition.

9. Laying of Proposed Utilities - Water Transmission Pipelines (500 mm to 1200 mm Dia.)

9.1 Introduction

Transmission system is used to carry bulk quantity of potable water for long distances from generation/ water treatment plant/reservoir to distribution system and/or storage reservoir; it consists of transmission pipelines, valves, chambers etc. Transmission pipelines are pressurised to transmit potable water through various pipeline diameters varies from 500 mm, 550 mm, 600 mm, 700 mm, 900 mm and 1200 mm,

and laid with different types of pipelines materials (i.e. FC, AC, GRP, GRE, HDPE, .etc).

These lines are laid in specific corridors within Right Of Way/ utility reservation; therefore during laying activities it is required to protect existing DEWA assets as per specified standards.



Transmission Water Pipeline

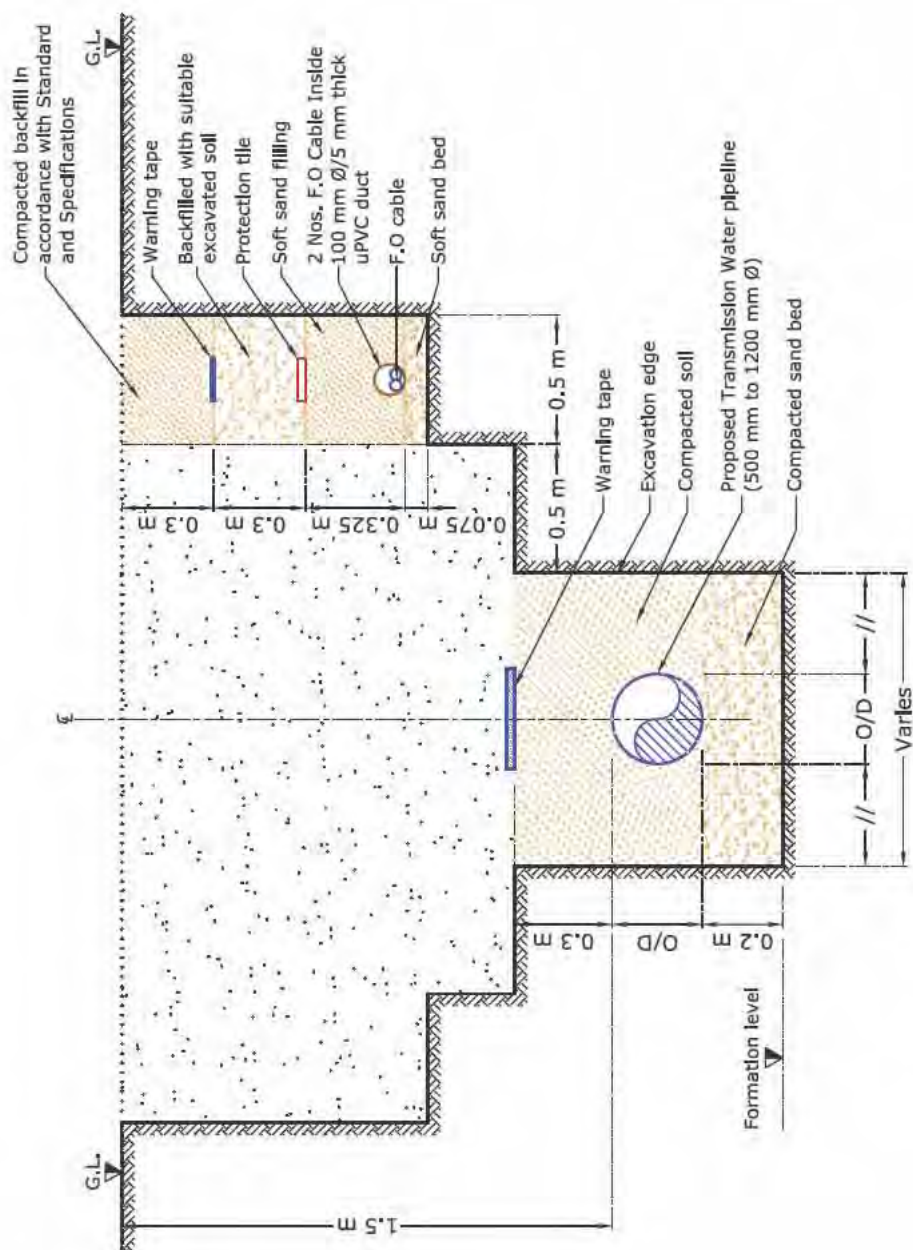


Valve Chamber



Transmission Water Line with Valve chamber, RTU and Antenna.

TYPICAL TRENCH DETAILS FOR WATER PIPELINE (500 mm to 1200 mm Ø)



9.2 Avoid the following



1. Crossing 132 kV Joint bay/Transition joint.
2. Crossing Existing 400 kV tunnel by open cut method.
3. Crossing existing HV manholes/Valve chambers/SCADA Unit.

9.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Transmission Water Pipeline (500 mm to 1200 mm Dia) and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	2.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.1, Case 1) Vertical clearance (Ref Fig: 9.1, Case 2) Protection details (Ref Fig: 9.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

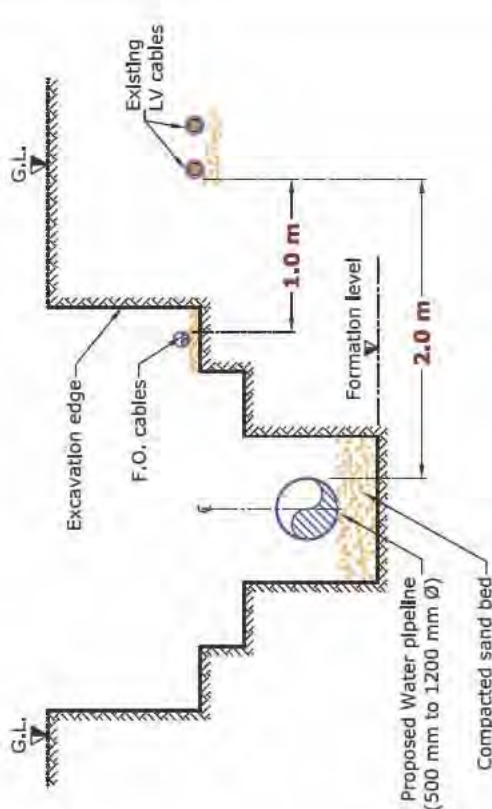
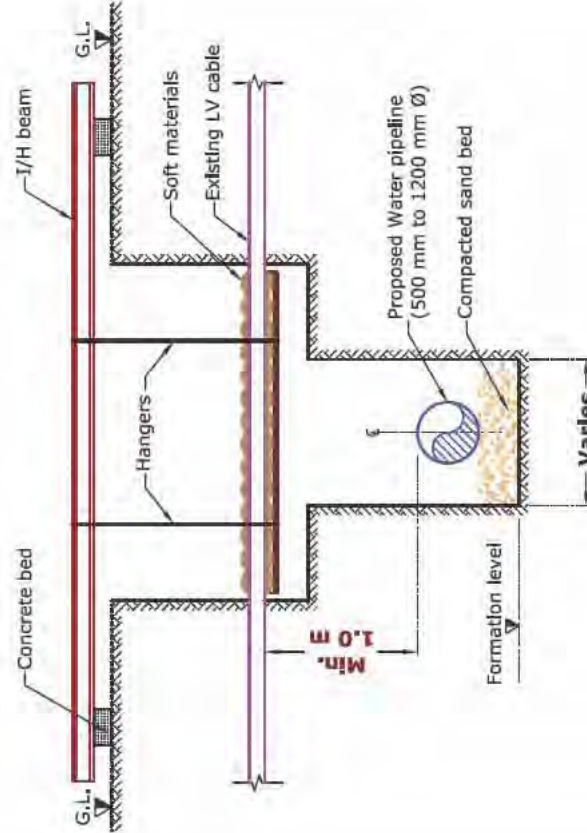
Fig: 9.1	HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm TO 1200 mm Ø) AND EXISTING LV CABLES
CASE 1 : Horizontal clearance details for existing LV cable	
CASE 2 : Vertical clearance & protection details for crossing existing LV cable	
NOTE :	<ol style="list-style-type: none">1. Horizontal clearance is from the proposed Water pipeline edge to existing LV cable edge.2. Vertical clearance from the top of proposed Water pipeline to the bottom of existing LV cable.3. Proposed Water pipeline allowed to cross below existing LV cables.4. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing LV cable edge.5. Trench side and LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed Transmission Water Pipeline (500 mm to 1200 mm Dia) and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	2.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.2) Vertical clearance (Ref Fig: 9.4, Case 2) Protection details (Ref Fig: 9.4)
HV (6.6/11/33 kV) Manhole	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.3)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.5)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.5) Vertical clearance (Ref Fig: 9.5) Protection details (Ref Fig: 9.5)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

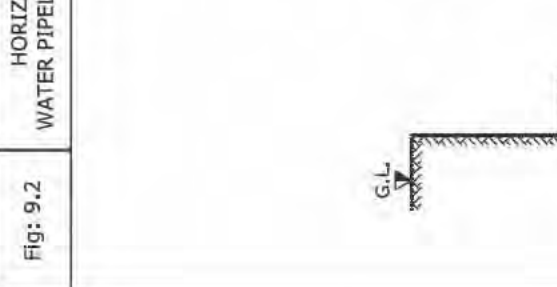
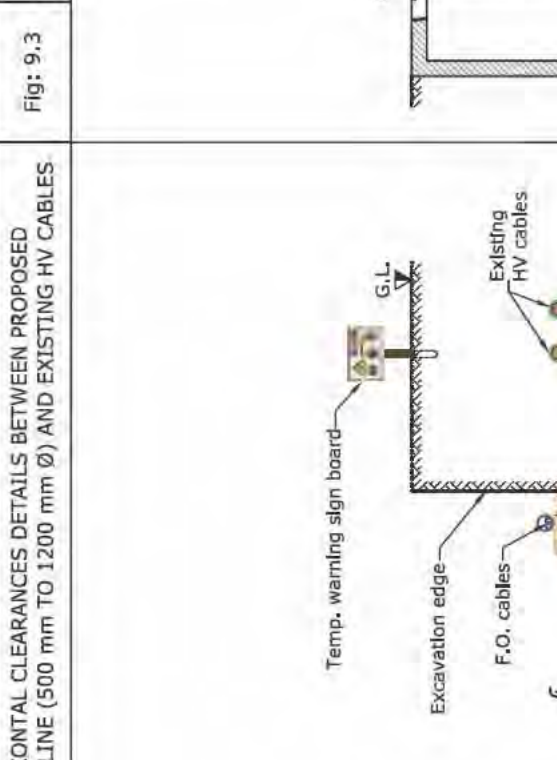
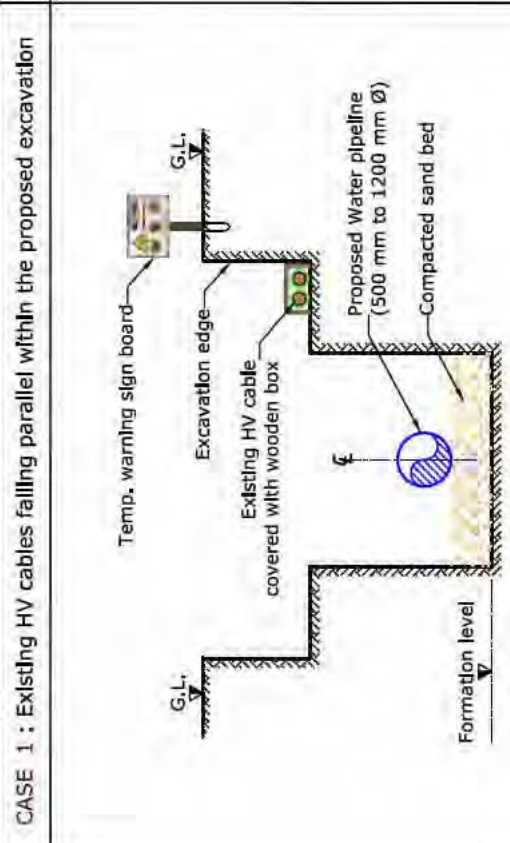
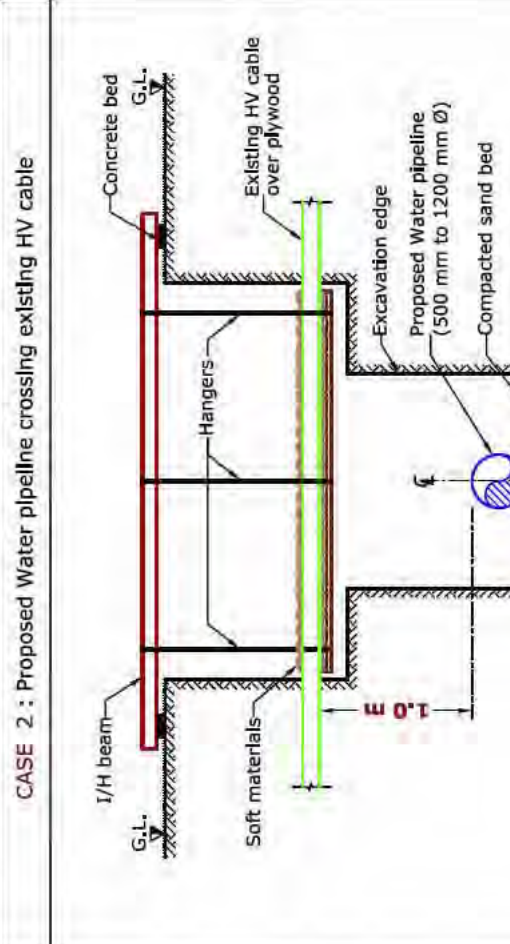
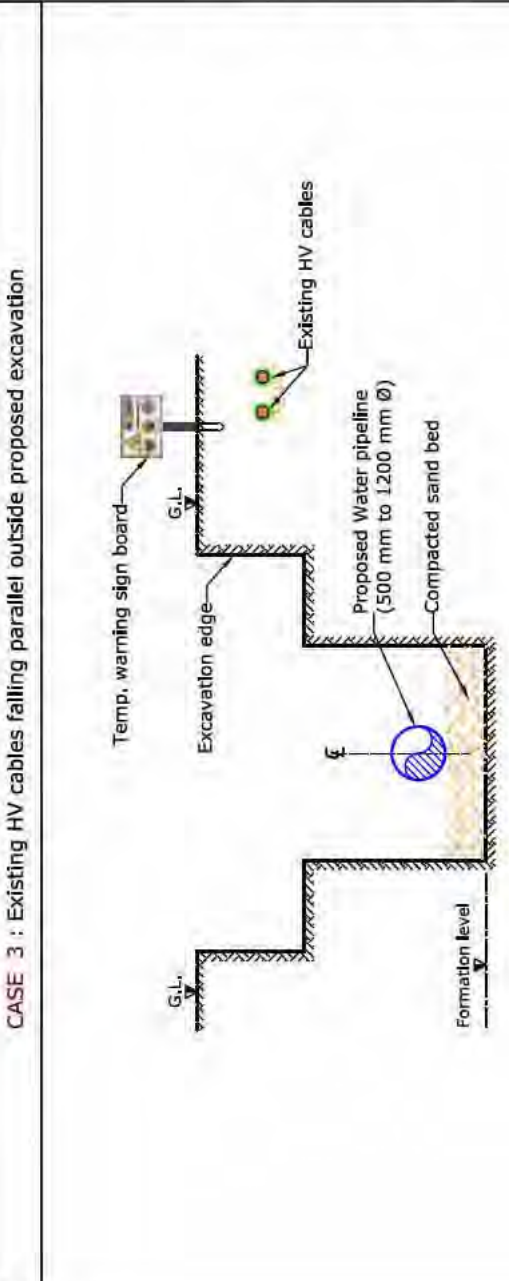
Fig: 9.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm TO 1200 mm Ø) AND EXISTING HV CABLES.	Fig: 9.3	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm TO 1200 mm Ø) AND EXISTING HV MANHOLE
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Water pipeline edge to existing HV cable edge. 2. Proposed Water pipeline allowed to cross below existing HV cables. 3. Proposed Water pipeline not allowed to cross existing HV Manhole. 4. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing HV cable edge. 5. Trench side and existing HV cable protection may be required as per site and soil condition. 	

Fig: 9.4	VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm to 1200 mm Ø) AND EXISTING HV SERVICES
<p>CASE 1 : Existing HV cables falling parallel within the proposed excavation</p> 	<p>CASE 2 : Proposed Water pipeline crossing existing HV cable</p> 
<p>CASE 3 : Existing HV cables falling parallel outside proposed excavation</p>	<p>NOTE :</p> <ol style="list-style-type: none"> 1. If existing HV cables slewed during the site activity, the same should be placed back to actual position after completion of work. 2. Existing HV cables falling parallel within the proposed excavation area should be protected with wooden box. (Case 1) 3. Proposed services allowed to cross below existing HV services and existing HV services should be protected as per site condition. (Case 2) 4. Existing HV cables falling parallel & outside to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. (Case 3) 5. Vertical clearance from the top of the proposed Water pipeline to the bottom of existing HV services. 6. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing HV cable edge. 7. Trench side and existing HV services protection may be required as per site condition. 

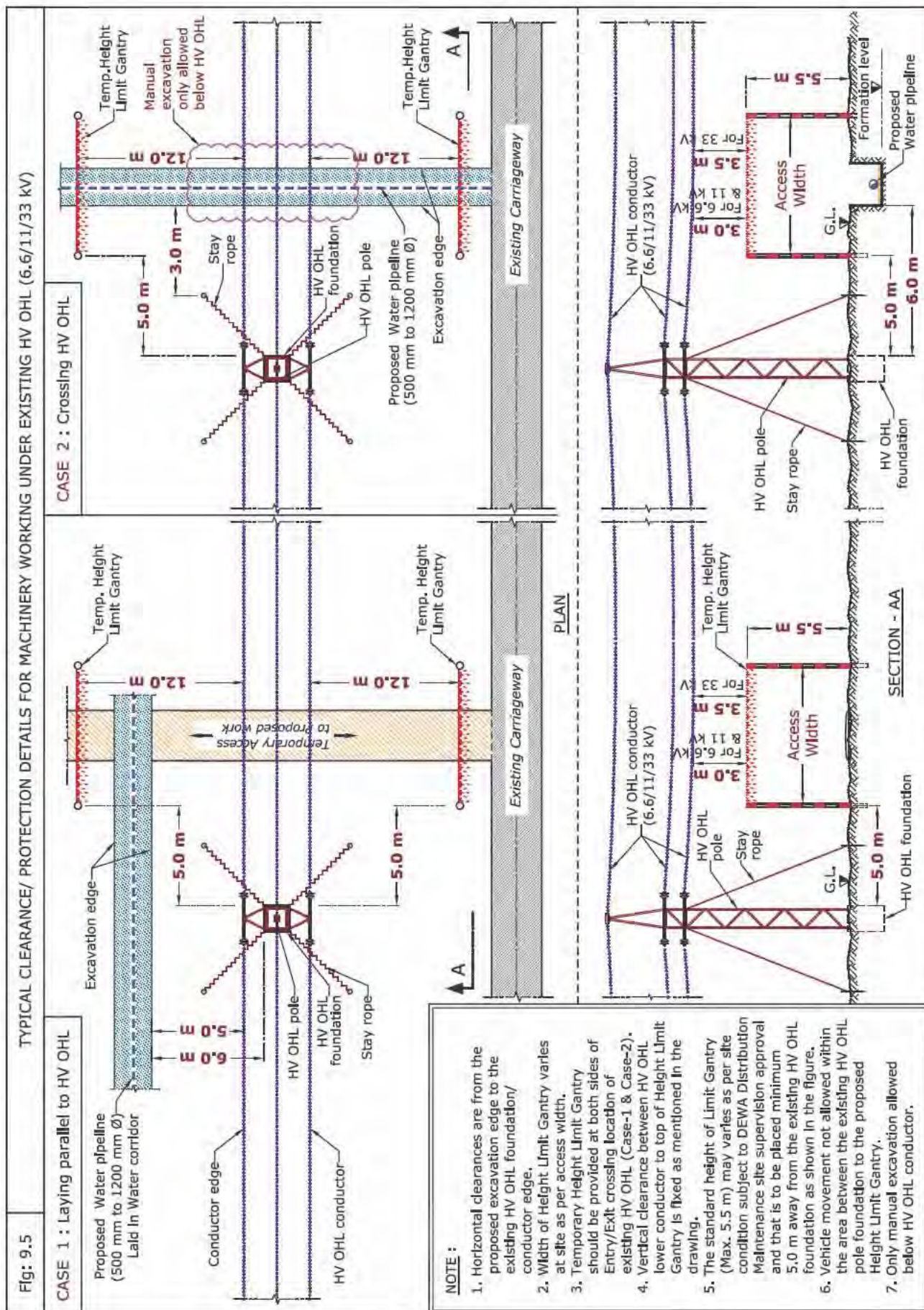


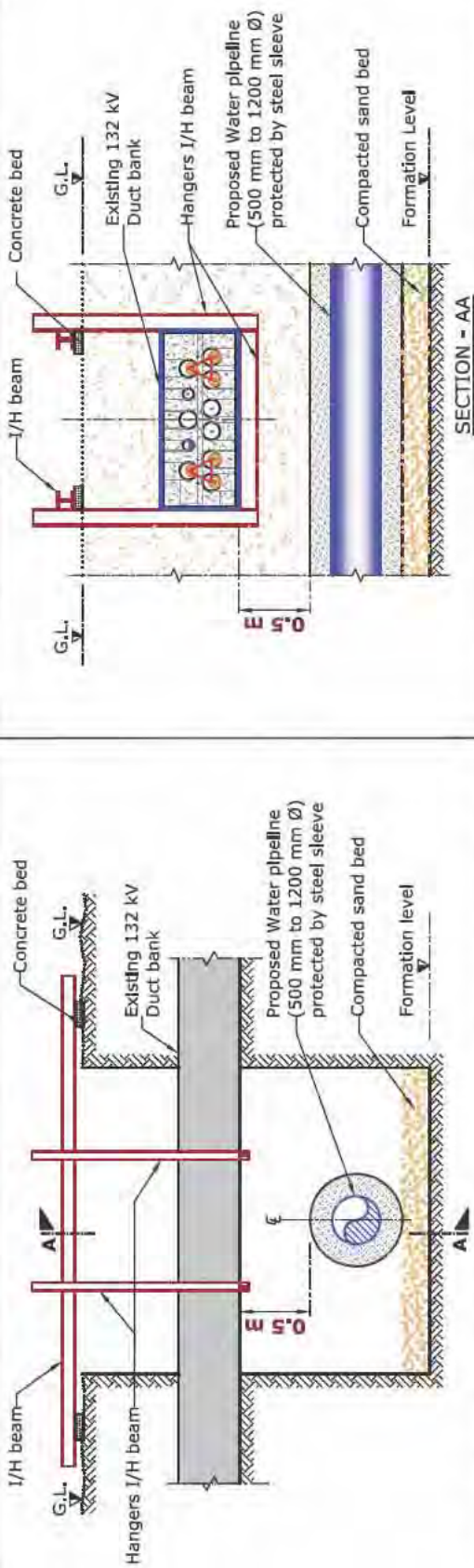
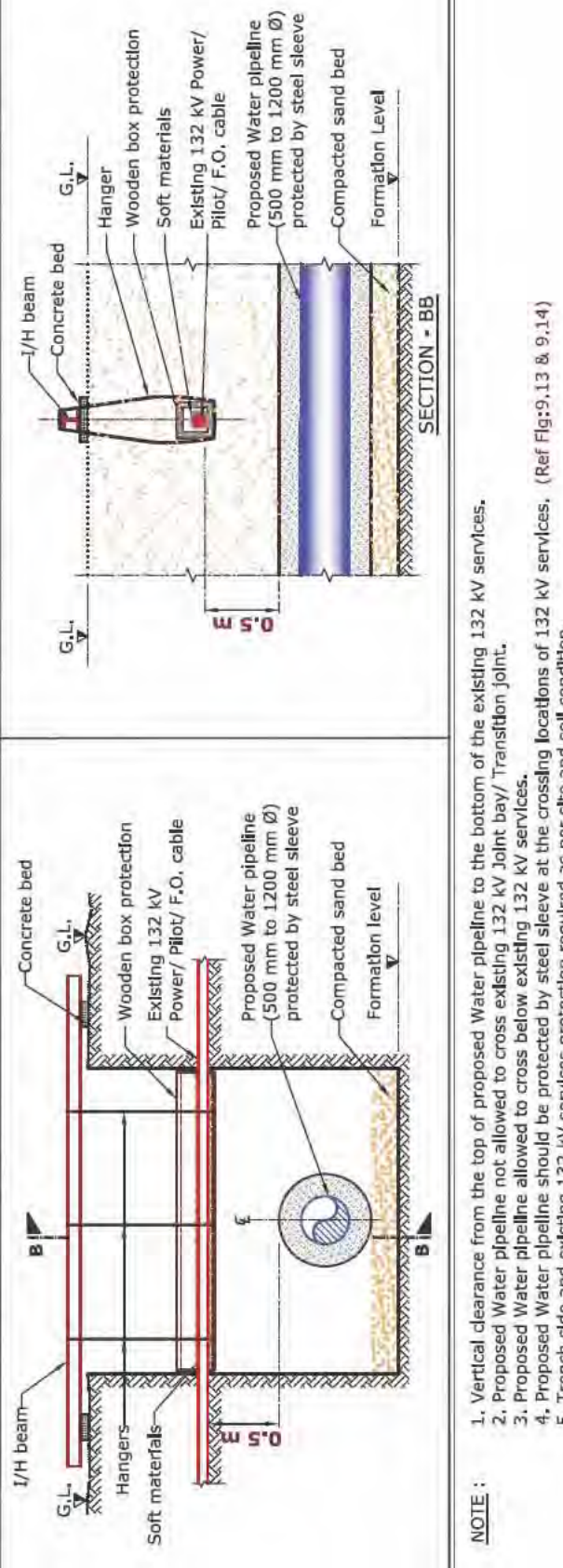
Table 3: Clearance & Protection details for proposed Transmission Water Pipeline (500 mm to 1200 mm Dia) and existing DEWA Electricity EHV services

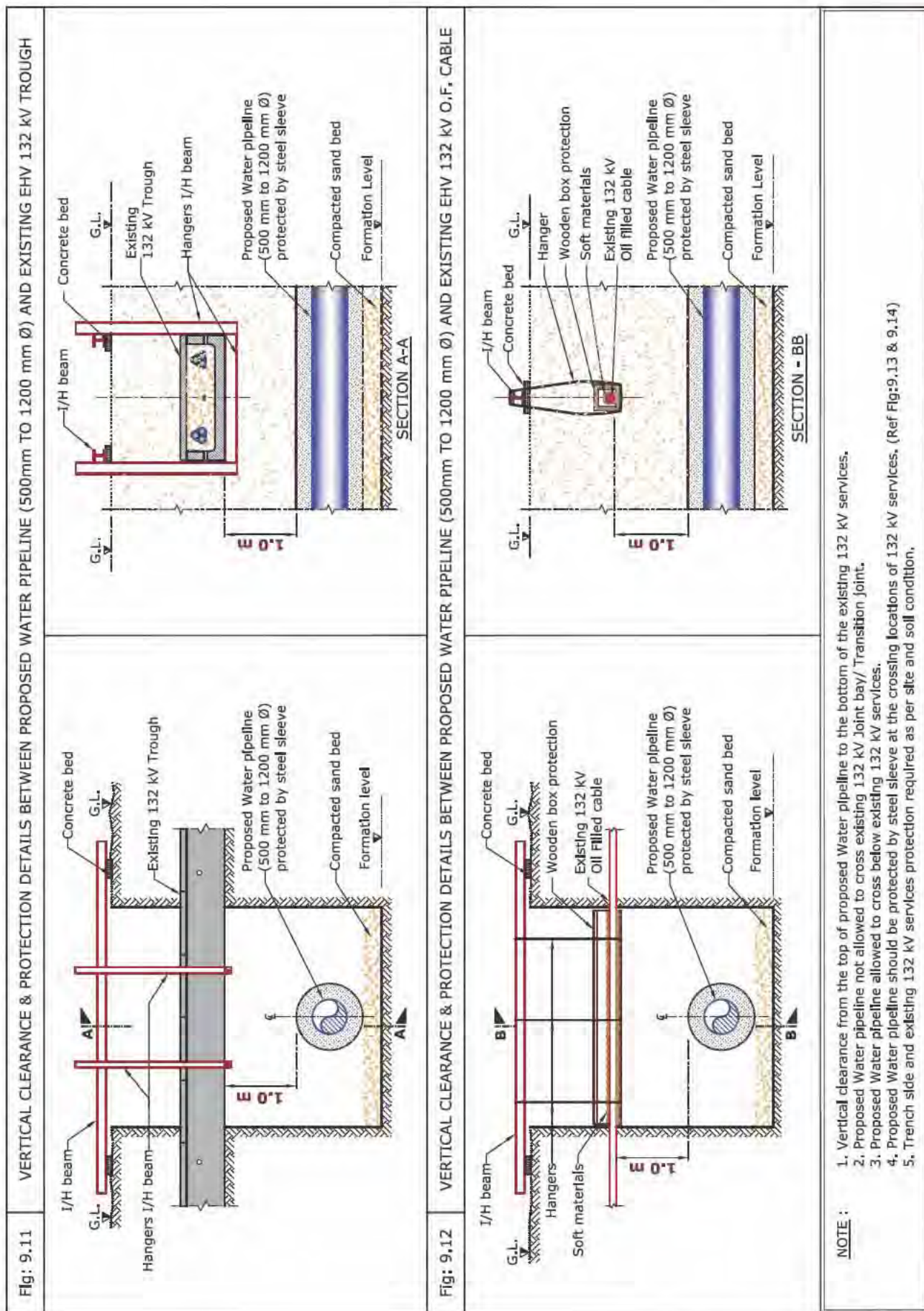
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.6) Vertical clearance (Ref Fig: 9.12) Protection details (Ref Fig: 9.12)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.6) Vertical clearance (Ref Fig: 9.10) Protection details (Ref Fig: 9.10)
EHV (132 kV) Trough	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.7) Vertical clearance (Ref Fig: 9.11) Protection details (Ref Fig: 9.11)
EHV (132 kV) Duct Bank	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.7) Vertical clearance (Ref Fig: 9.9) Protection details (Ref Fig: 9.9)
EHV (132 kV) Joint Bay/ Transition Joint	3.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.8) Protection Details (Ref Fig: 9.8)
EHV (132/400 kV) O.H.L	10.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.17)
EHV (400 kV) Tunnel	2.5 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.15) Vertical clearance (Ref Fig: 9.16) Protection details (Ref Fig: 9.16)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 9.17)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 9.17) Protection details (Ref Fig: 9.17)

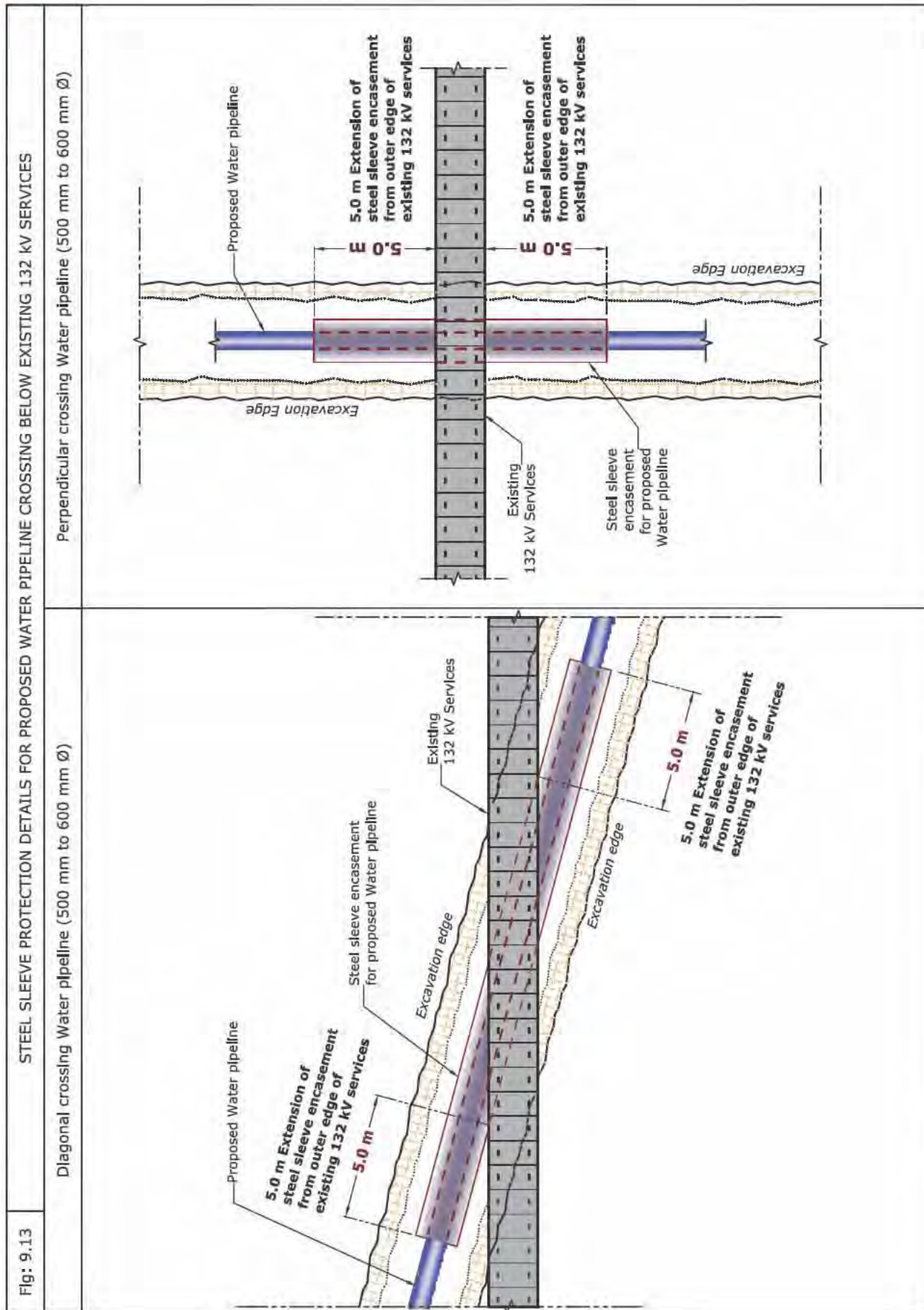
Table Abbreviation

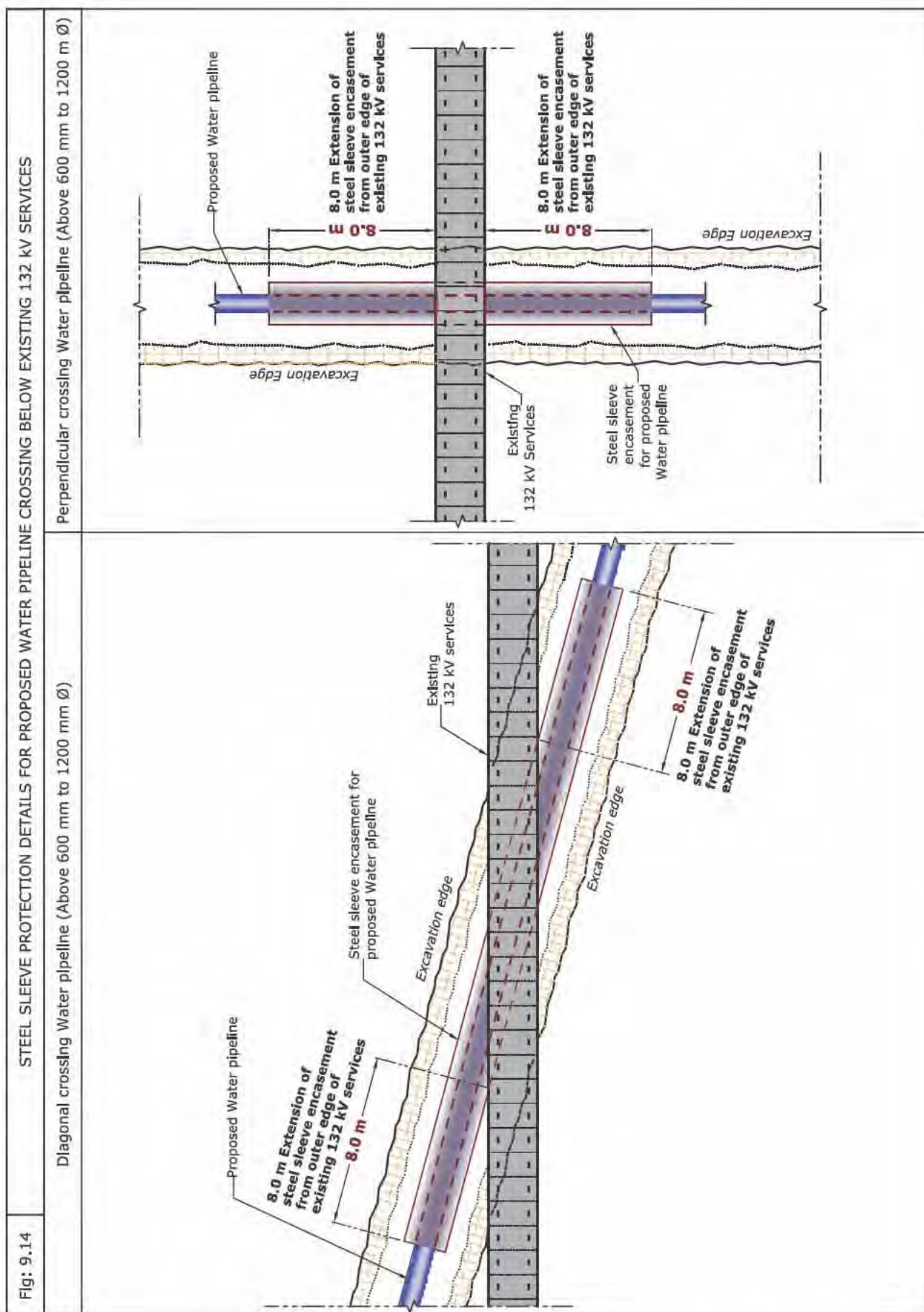
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 9.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm TO 1200 mm Ø) AND EXISTING EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>	<p>Fig: 9.7</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm TO 1200 mm Ø) AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>
<p>Fig: 9.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm TO 1200 mm Ø) AND EXISTING EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>	<p>Fig: 9.8</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm TO 1200 mm Ø) AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p> <p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Water pipeline outer edge to existing EHV 132 kV services edge. 2. Existing EHV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing EHV service edge. 4. Permanent sheet pile should be provided between existing 132 kV Joint bay/ Transition joint (Minimum 12.0 m length) and proposed excavation as shown. 5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. <p>PLAN</p> <p>SECTION - AA</p> <p>• Sheet pile protection not required between proposed Water pipeline & existing Joint bay, If horizontal clearance is 5.0 m & above.</p>

<p>Fig: 9.9</p>	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED WATER PIPELINE (500mm TO 1200 mm Ø) AND EXISTING EHV 132 kV DUCT BANK</p>  <p>Labels: I/H beam, G.L., Concrete bed, Existing 132 kV Duct bank, Hangers I/H beam, Proposed Water pipeline (500 mm to 1200 mm Ø) protected by steel sleeve, Compacted sand bed, Formation Level, 0.5 m, SECTION - AA</p>
<p>Fig: 9.10</p>	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED WATER PIPELINE AND EXISTING EHV 132 kV POWER/ PILOT/ F.O. CABLES</p>  <p>Labels: I/H beam, G.L., Concrete bed, Hanger, Wooden box protection, Soft materials, Existing 132 kV Power/ Pilot/ F.O. cable, Proposed Water pipeline (500 mm to 1200 mm Ø) protected by steel sleeve, Compacted sand bed, Formation Level, 0.5 m, SECTION - BB</p>
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance from the top of proposed Water pipeline to the bottom of the existing 132 kV services. 2. Proposed Water pipeline not allowed to cross existing 132 kV Joint bay/ Transition joint. 3. Proposed Water pipeline allowed to cross below existing 132 kV services. 4. Proposed Water pipeline should be protected by steel sleeve at the crossing locations of 132 kV services. (Ref Fig:9.13 & 9.14) 5. Trench side and existing 132 kV services protection required as per site and soil condition. 	







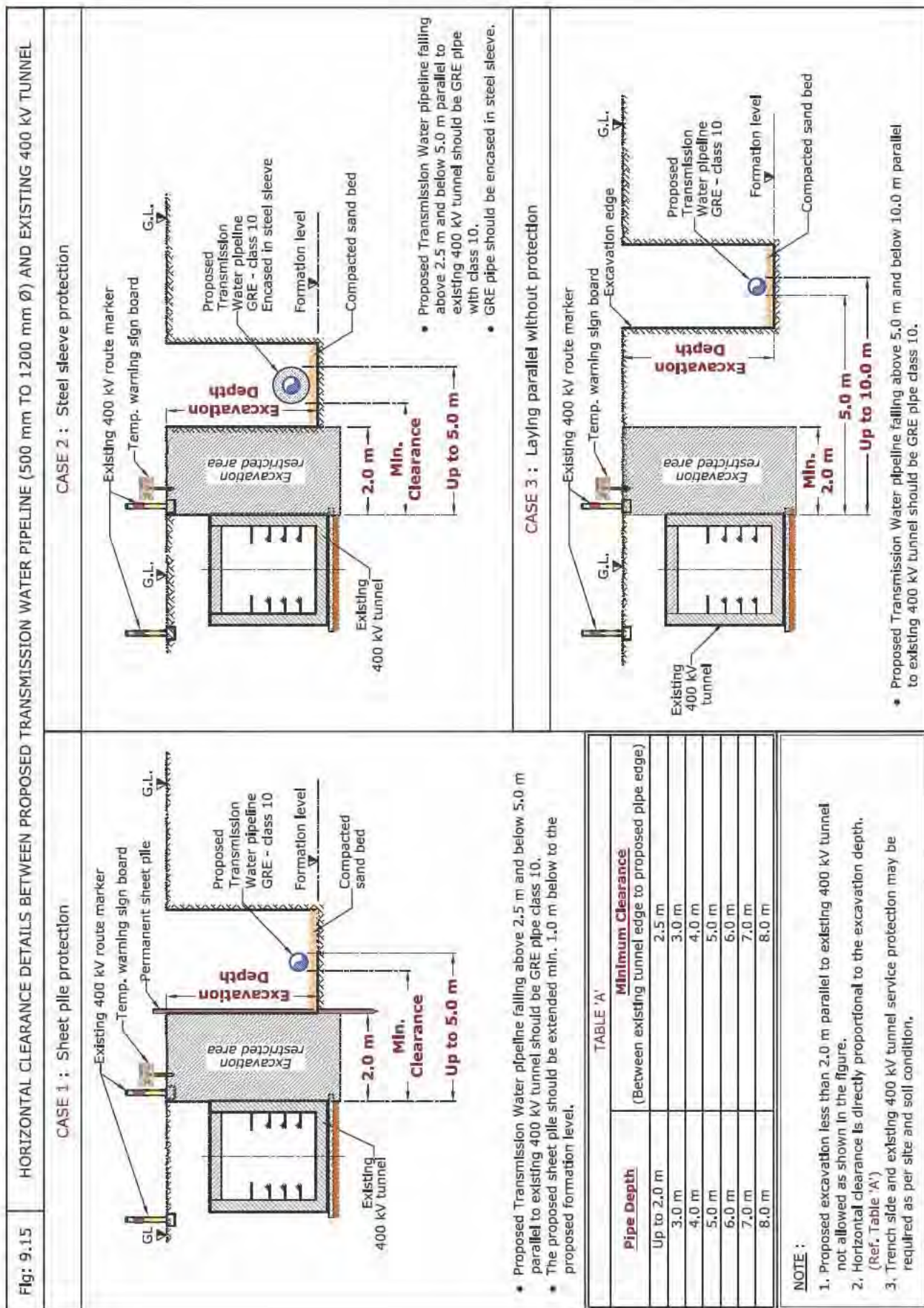
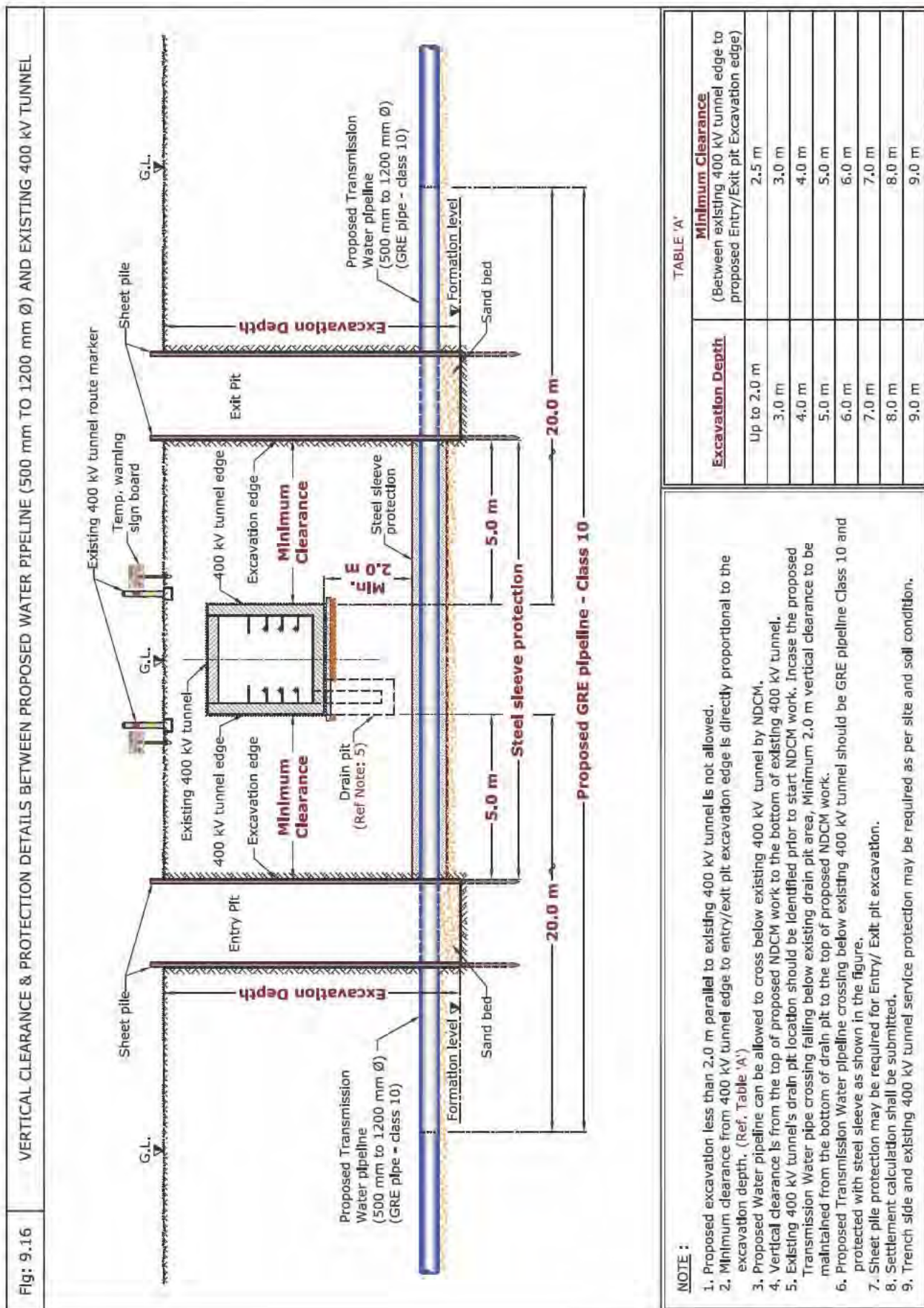


TABLE 'A'

Pipe Depth	Minimum Clearance (Between existing tunnel edge to proposed pipe edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

NOTE :

- Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
- Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
- Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.



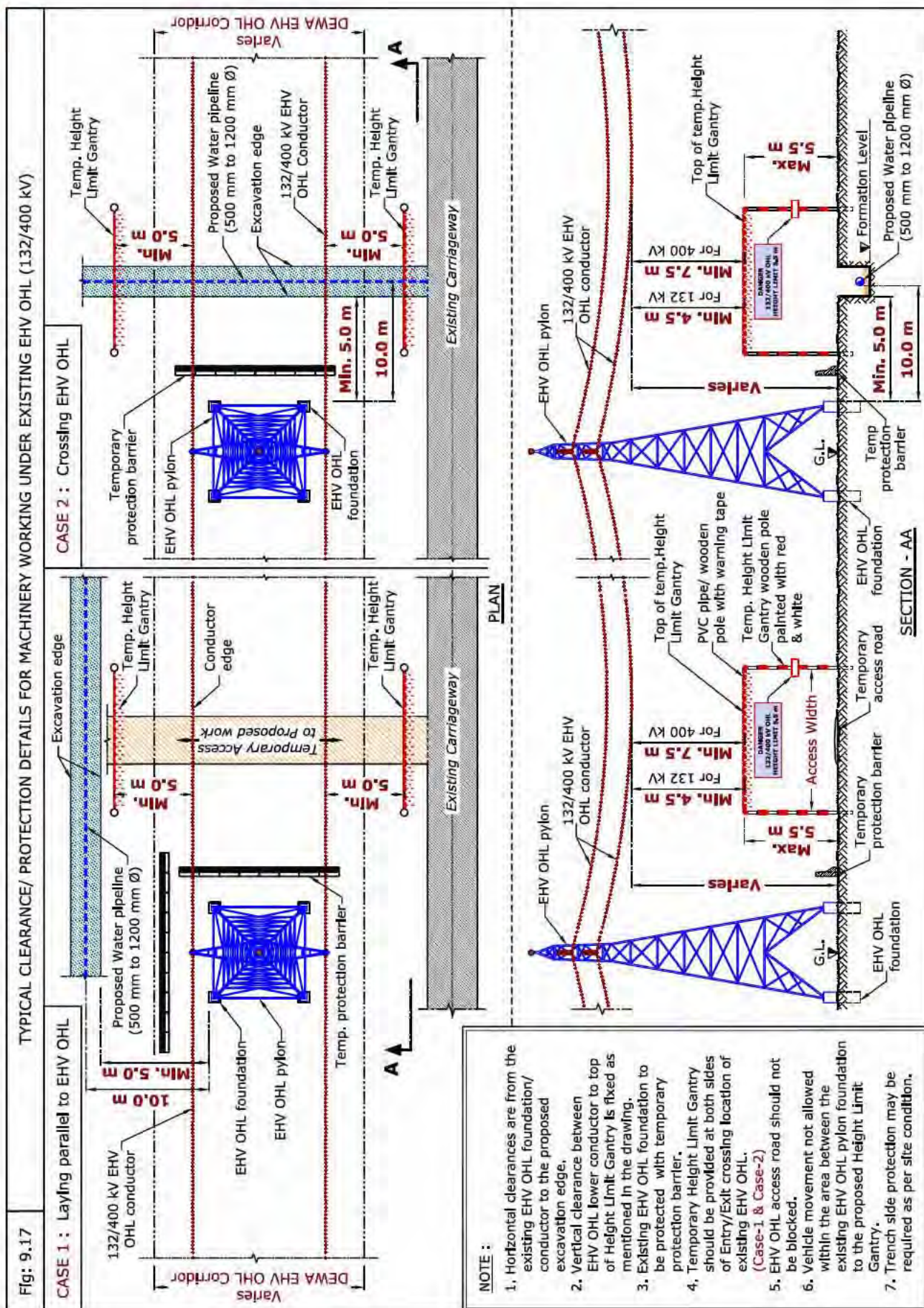


Table 4: Clearance & Protection details for proposed Transmission Water Pipeline (500 mm to 1200 mm Dia) and existing DEWA Gas/Fuel services

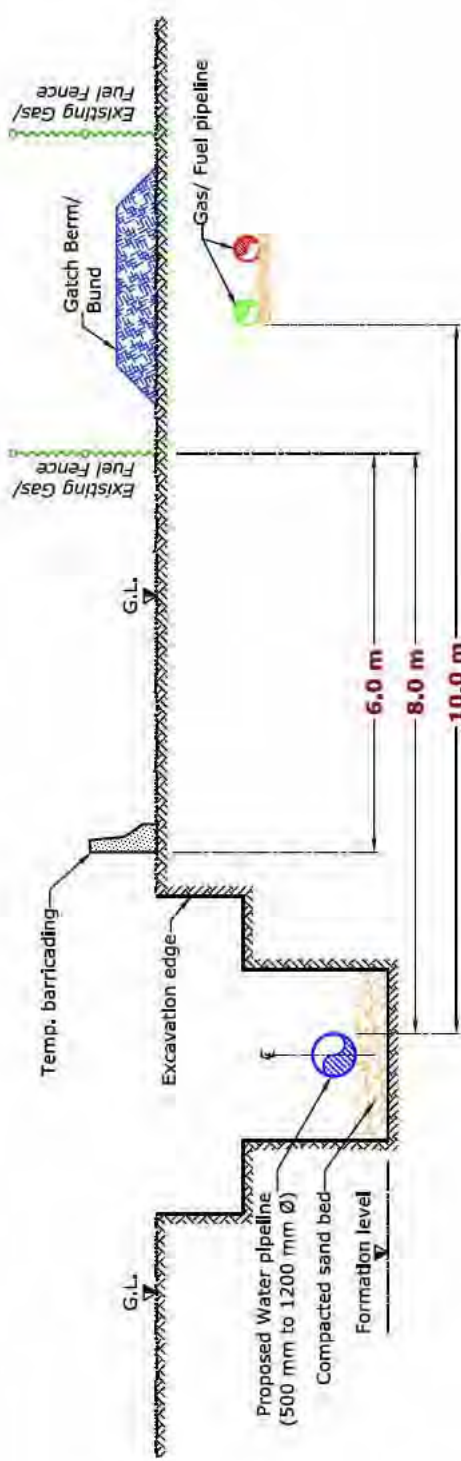
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 9.18)
Gas/Fuel pipeline (All diameter)	10.0 m	Ref Note Below	B	NDCM	R	• Horizontal clearance (Ref Fig: 9.18)

Note: Minimum vertical clearance shall be 2.0 m or 1.5 times of proposed utility/sleeve diameter, whichever is greater.

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 9.18	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WATER PIPELINE (500 mm TO 1200 mm Ø) AND EXISTING GAS/ FUEL SERVICES
	
NOTE :	<ol style="list-style-type: none"> 1. Horizontal clearance 8.0 m from the proposed Water pipeline edge to the existing Gas/ Fuel fence. 2. Horizontal clearance 10.0 m from the proposed Water pipeline edge to the existing Gas/ Fuel pipeline edge. 3. Barricading for working 6.0 m horizontally away from existing DEWA Gas/ Fuel fence. 4. Proposed Water pipeline can be allowed to cross existing Gas/ Fuel pipeline by NDCM. 5. Minimum vertical clearance for crossing existing Gas/Fuel pipeline shall be minimum 2.0 m or 1.5 times of proposed utility/ sleeve diameter, whichever is greater. 6. Existing Gas/ Fuel pipeline should be protected in the Entry/ Exit pit as per site condition. 7. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

10. Laying of Proposed Utilities - Sewerage Gravity Pipelines

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10.1 Introduction

The purpose of Sewerage system is to receive and transport waste water (effluents) coming from residential, commercial and industrial areas through underground sewerage pipelines to the dedicated sewerage treatment plant. It consists of a network of gravity and pressure pipelines of various diameters. The gravity lines have a large network of underground pipes with branches and manholes and these pipelines

are laid at a certain depth in order to meet the gravity gradients.

Gravity pipelines are laid in dedicated corridors within Right Of Way, therefore during laying activities it is required to protect DEWA assets as per specified standards.



Laying Sewerage Gravity line

10.2 Avoid the following



1. Crossing existing EHV Joint Bay/Transition Joint.
2. Proposal for sewerage pipeline/manhole within DEWA corridor.

10.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Sewerage Gravity Pipeline and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 10.1, Case 1) • Vertical clearance (Ref Fig: 10.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

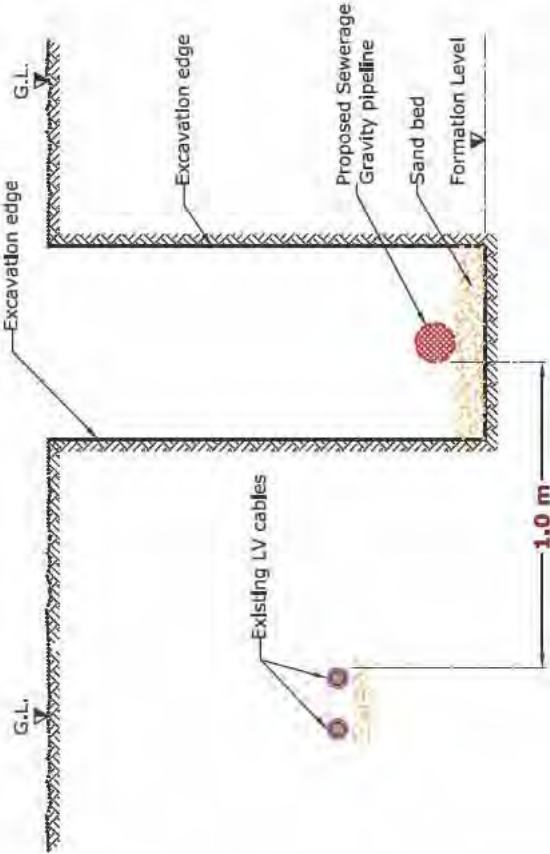
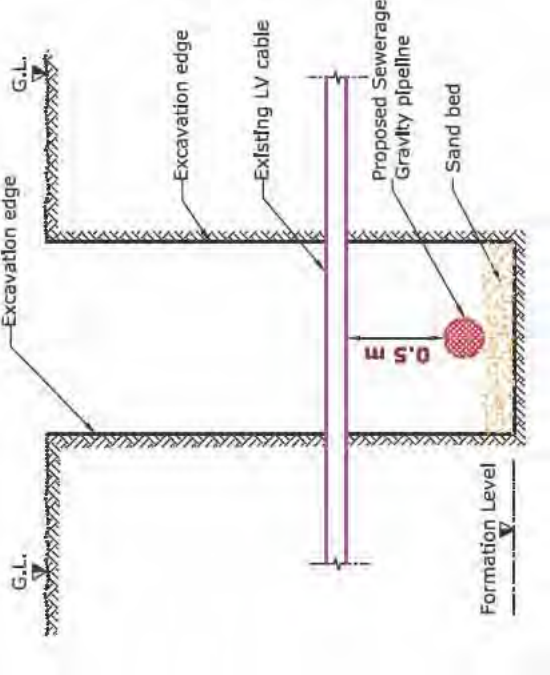
Fig: 10.1	HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED SEWERAGE GRAVITY PIPELINE AND EXISTING LV CABLES
	<p>CASE 1 : Laying parallel to existing LV cables</p>  <p>CASE 2 : Crossing below the existing LV cables</p> 
	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Sewerage Gravity pipeline edge to existing LV cable edge. 2. Vertical clearance is from the top of proposed Sewerage Gravity pipeline to bottom of existing LV cable. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing LV service edge. 4. Trench side and existing LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed Sewerage Gravity Pipeline and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 10.2, Case1) • Vertical clearance (Ref Fig: 10.2, Case 2) • Protection details (Ref Fig: 10.3)
HV (6.6/11/33 kV) Manhole	1.0 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 10.2, Case1) • Protection details (Ref Fig: 10.3)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 10.4) • Protection details (Ref Fig: 10.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 10.4) • Vertical clearance (Ref Fig: 10.4) • Protection details (Ref Fig: 10.4)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

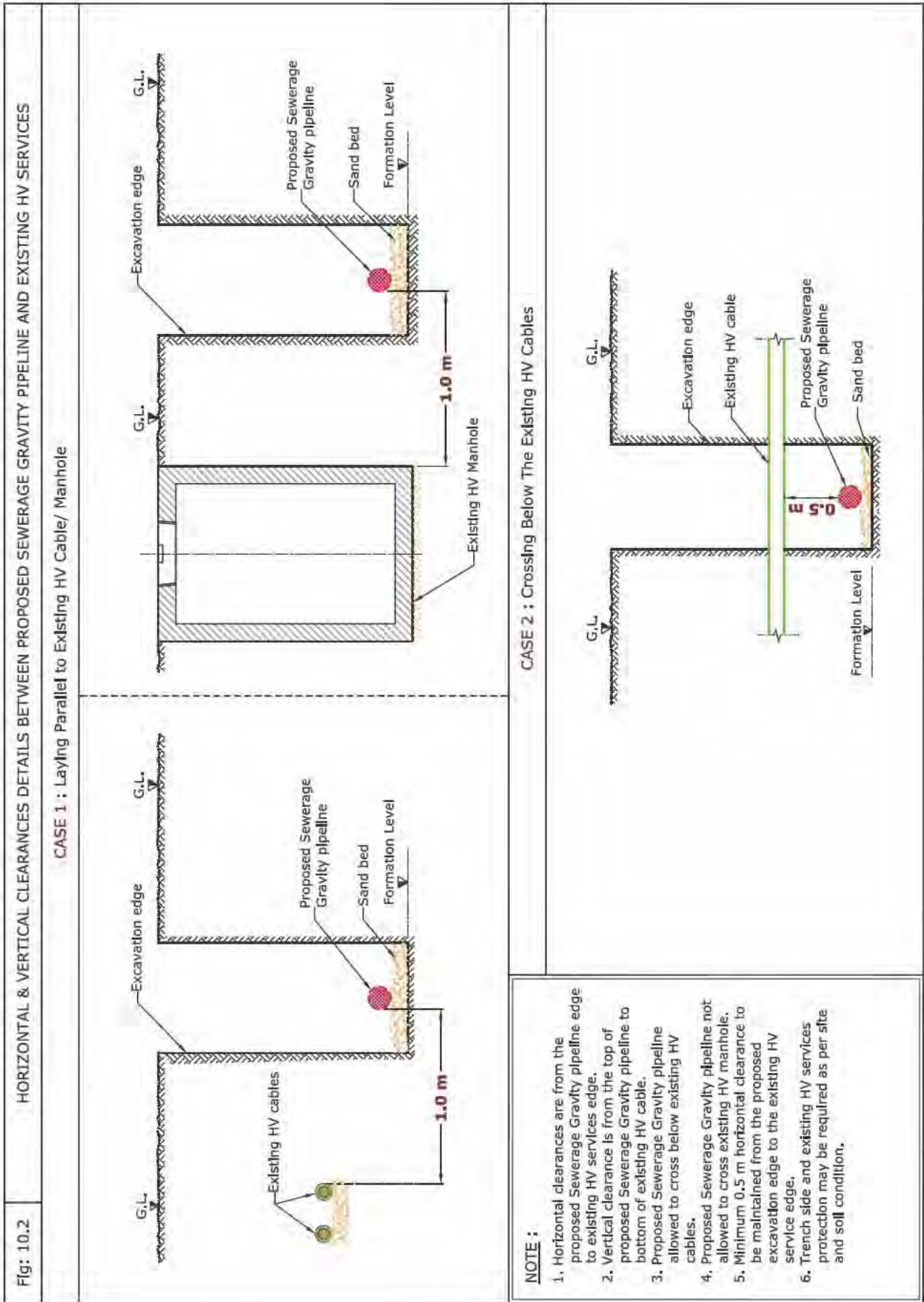
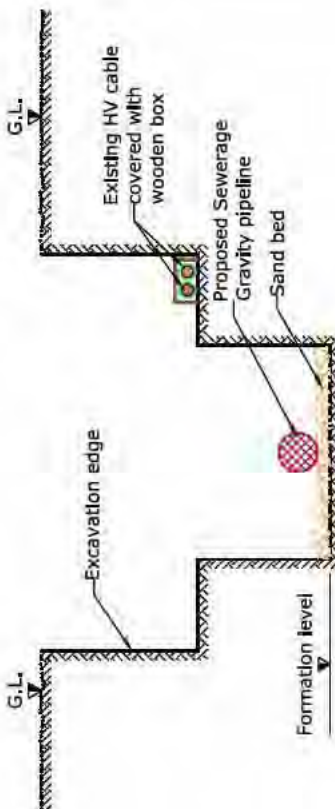
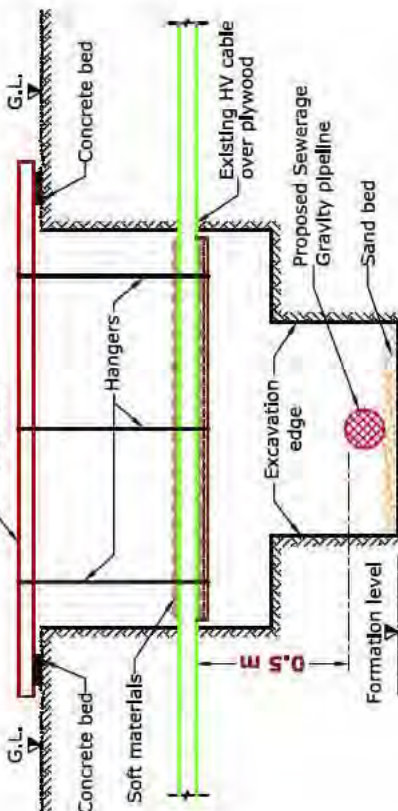
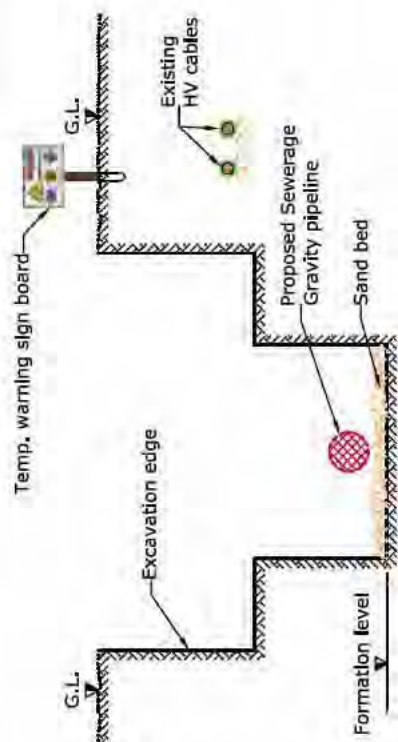


Fig: 10.3	STANDARD PROTECTION DETAILS FOR EXISTING HV CABLES
	<p>CASE 1 : Proposed protection for existing HV cables falling parallel within the deep trench</p> 
	<p>CASE 2 : Proposed Sewerage Gravity pipeline crossing existing HV cable</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. If existing HV Cables slewed during the site activity, the same should be placed back to actual position after completion of work. 2. Existing HV cables falling parallel within the proposed excavation area should be protected with wooden box. (Case-1) 3. Proposed services allowed to cross below existing HV cables and the existing HV services should be protected as per site condition. (Case-2) 4. Existing HV cables falling parallel & outside the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m Intervals. (Case-3) 5. Vertical clearance is from the top of proposed Sewerage Gravity pipeline to the bottom of existing HV services. 6. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge. 7. Trench side and existing HV services protection may be required as per site condition. 	<p>CASE 3 : Warning sign board for HV cables falling parallel and outside working area</p> 

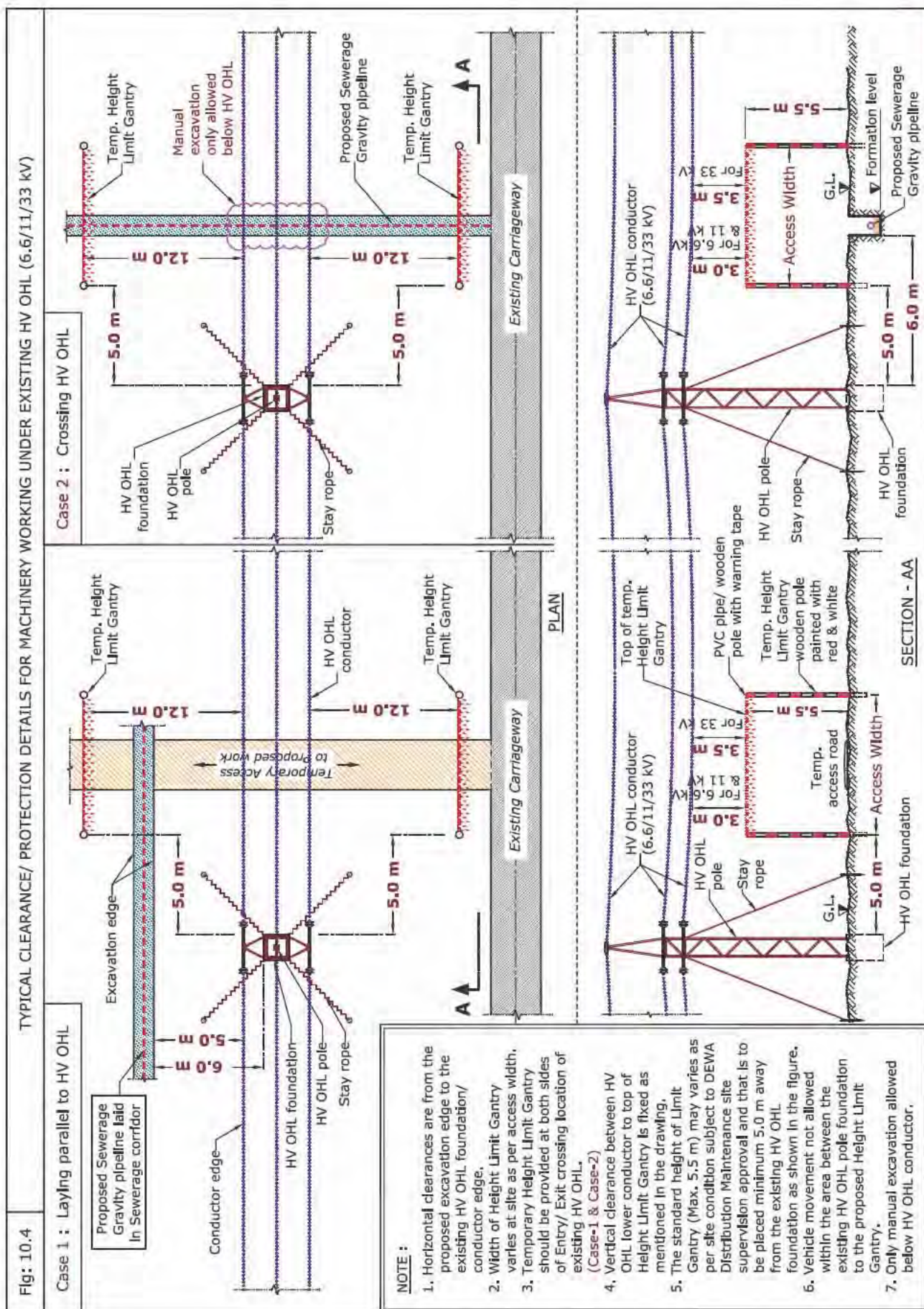
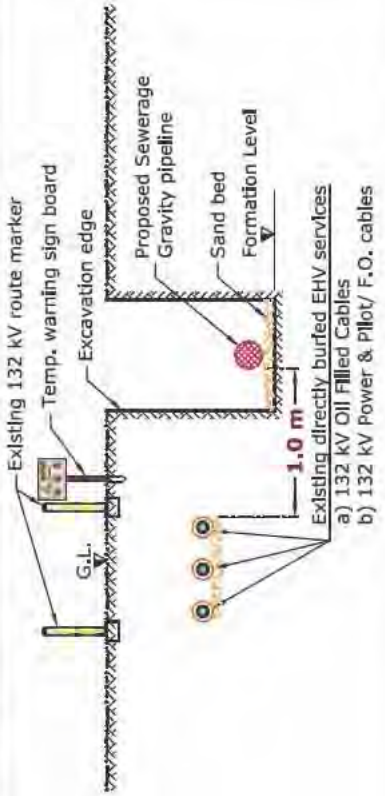
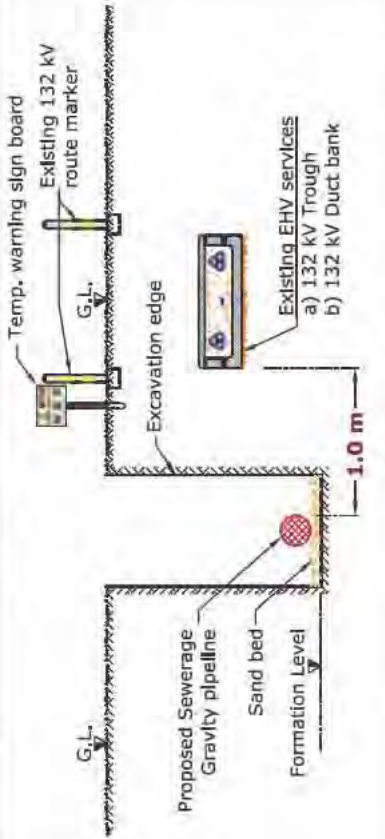
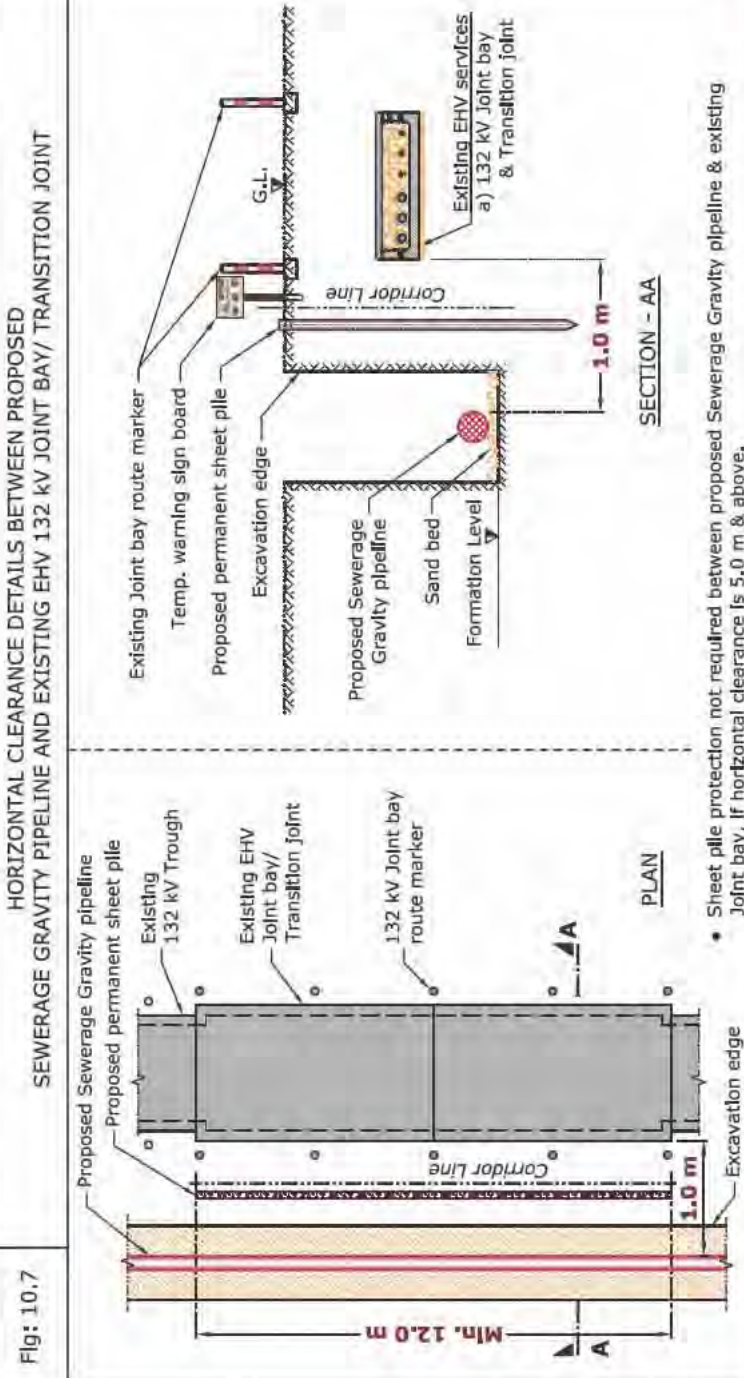


Table 3: Clearance & Protection details for proposed Sewerage Gravity Pipeline and existing DEWA Electricity EHV services

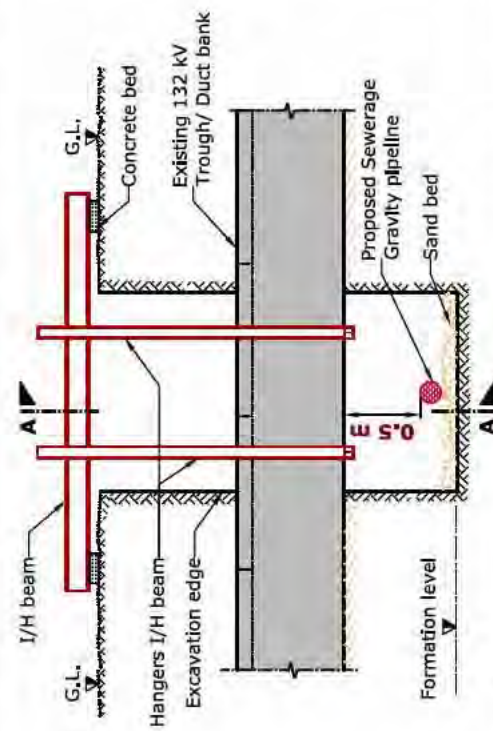
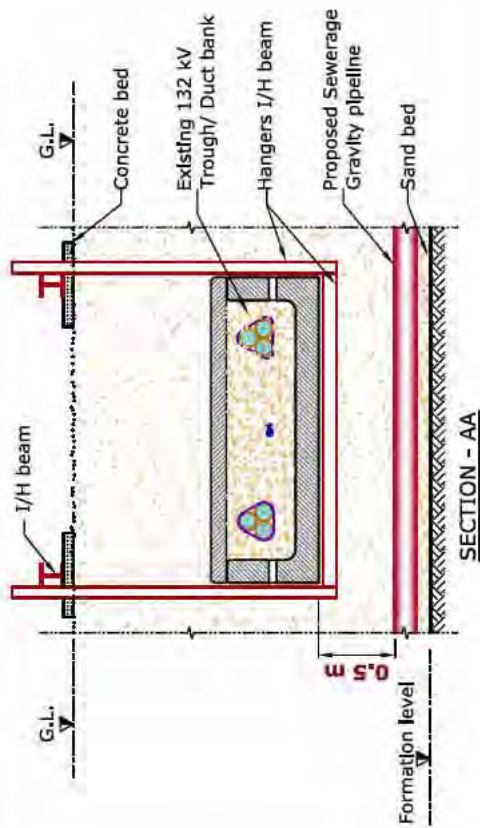
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 10.5)Vertical clearance (Ref Fig: 10.9)Protection details (Ref Fig: 10.9)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 10.5)Vertical clearance (Ref Fig: 10.9)Protection details (Ref Fig: 10.9)
EHV (132 kV) Trough	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 10.6)Vertical clearance (Ref Fig: 10.8)Protection details (Ref Fig: 10.8)
EHV (132 kV) Duct Bank	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 10.6)Vertical clearance (Ref Fig: 10.8)Protection details (Ref Fig: 10.8)
EHV (132 kV) Joint Bay/ Transition Joint	1.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 10.7)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 10.13)Protection details (Ref Fig: 10.13)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 10.10)Vertical clearance (Ref Fig: 10.11)Protection details (Ref Fig: 10.11)
		2.0 m	B	NDCM		<ul style="list-style-type: none">Vertical clearance (Ref Fig: 10.12)Protection details (Ref Fig: 10.12)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 10.13)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">Vertical clearance (Ref Fig: 10.13)Protection details (Ref Fig: 10.13)

Table Abbreviation

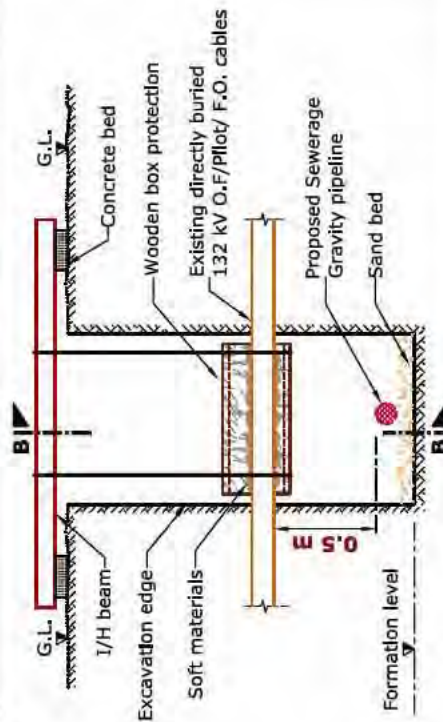
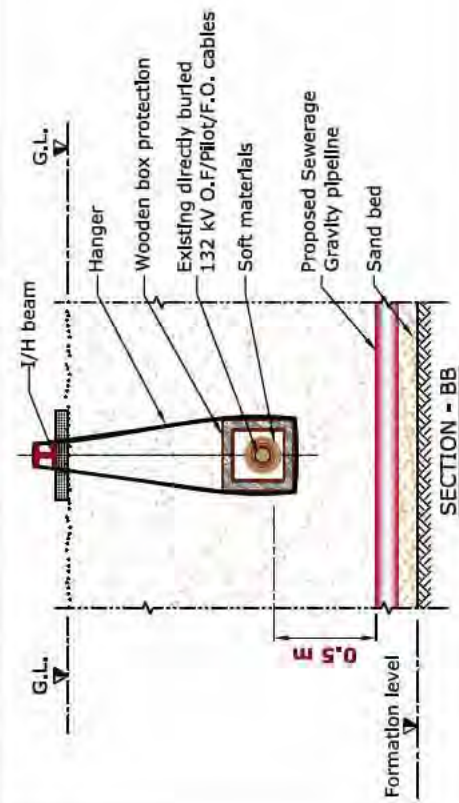
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 10.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SEWERAGE GRAVITY PIPELINE AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	Fig: 10.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SEWERAGE GRAVITY PIPELINE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
			
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Sewerage Gravity pipeline outer edge to existing EHV 132 kV services edge. 2. Existing EHV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV service edge. 4. Permanent sheet pile should be provided between existing 132 kV Joint bay/ Transition joint (Minimum 12.0 m length) and proposed excavation as shown. 5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 	<p>Fig: 10.7</p> <p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SEWERAGE GRAVITY PIPELINE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>  <p>• Sheet pile protection not required between proposed Sewerage Gravity pipeline & existing Joint bay, if horizontal clearance is 5.0 m & above.</p>		

VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED SEWERAGE GRAVITY PIPELINE AND EXISTING EHV 132 KV TROUGH/ DUCT BANK



VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED SEWERAGE GRAVITY PIPELINE AND EXISTING DIRECTLY BURIED 132 KV OIL FILLED/ PILOT/ F.O. CABLES



- NOTE :**
1. Proposed Sewerage Gravity pipeline not allowed to cross existing 132 kV Joint bay/ Transition joint.
 2. Proposed Sewerage Gravity pipeline should cross below to the existing EHV services.
 3. Trench side and existing EHV services protection may be required as per site and soil condition.

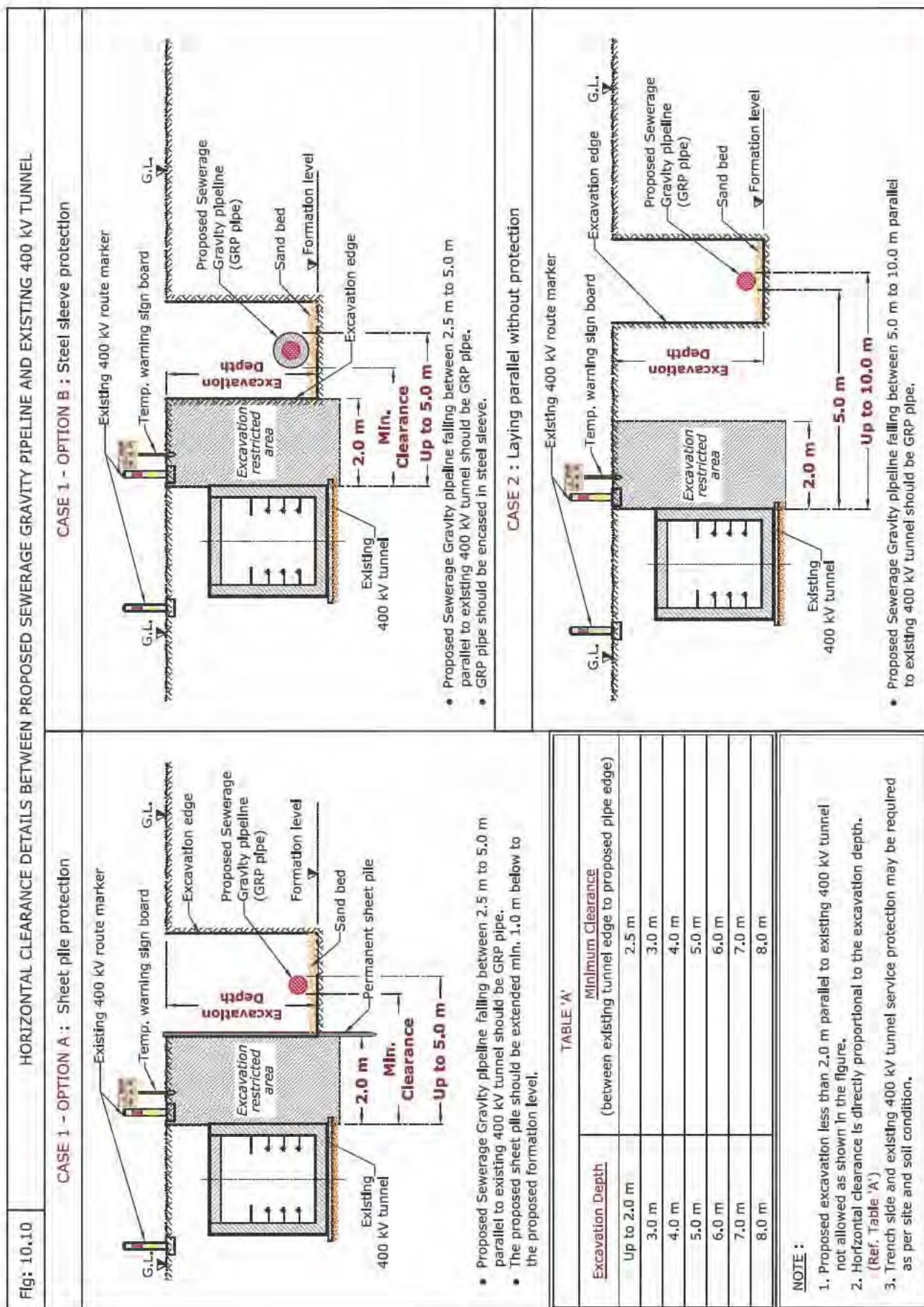
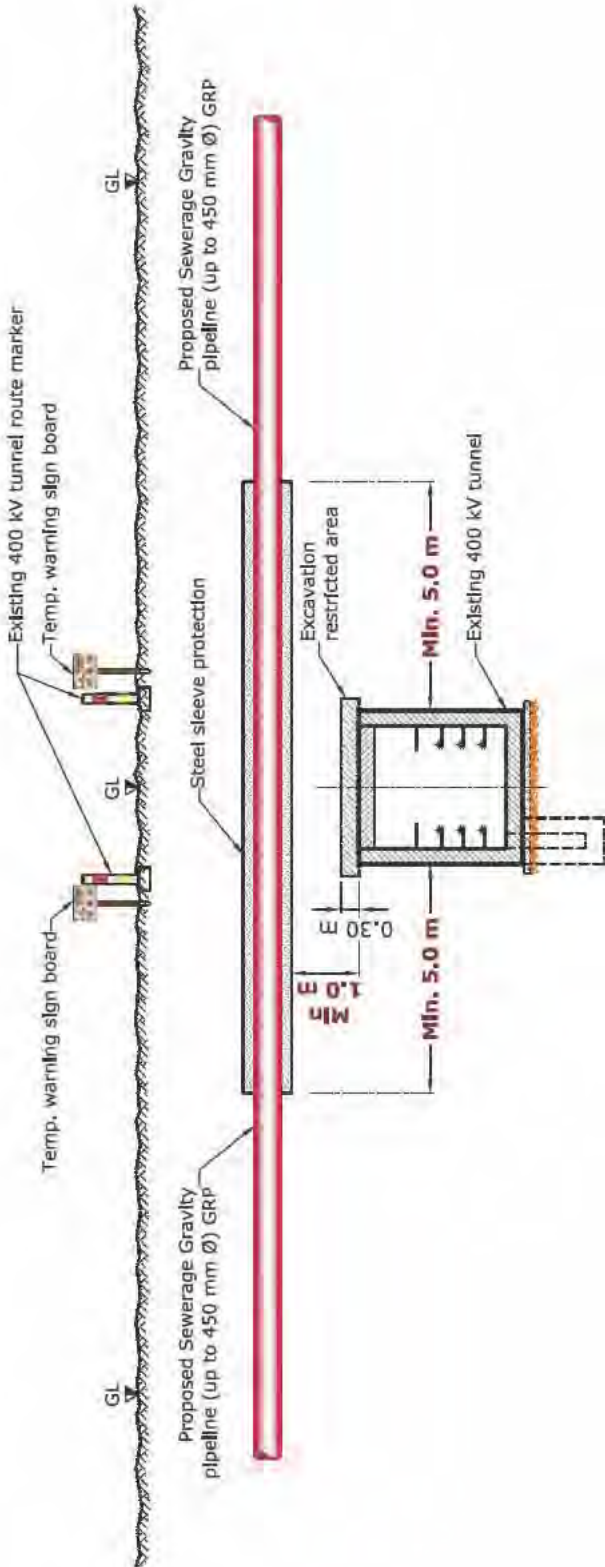


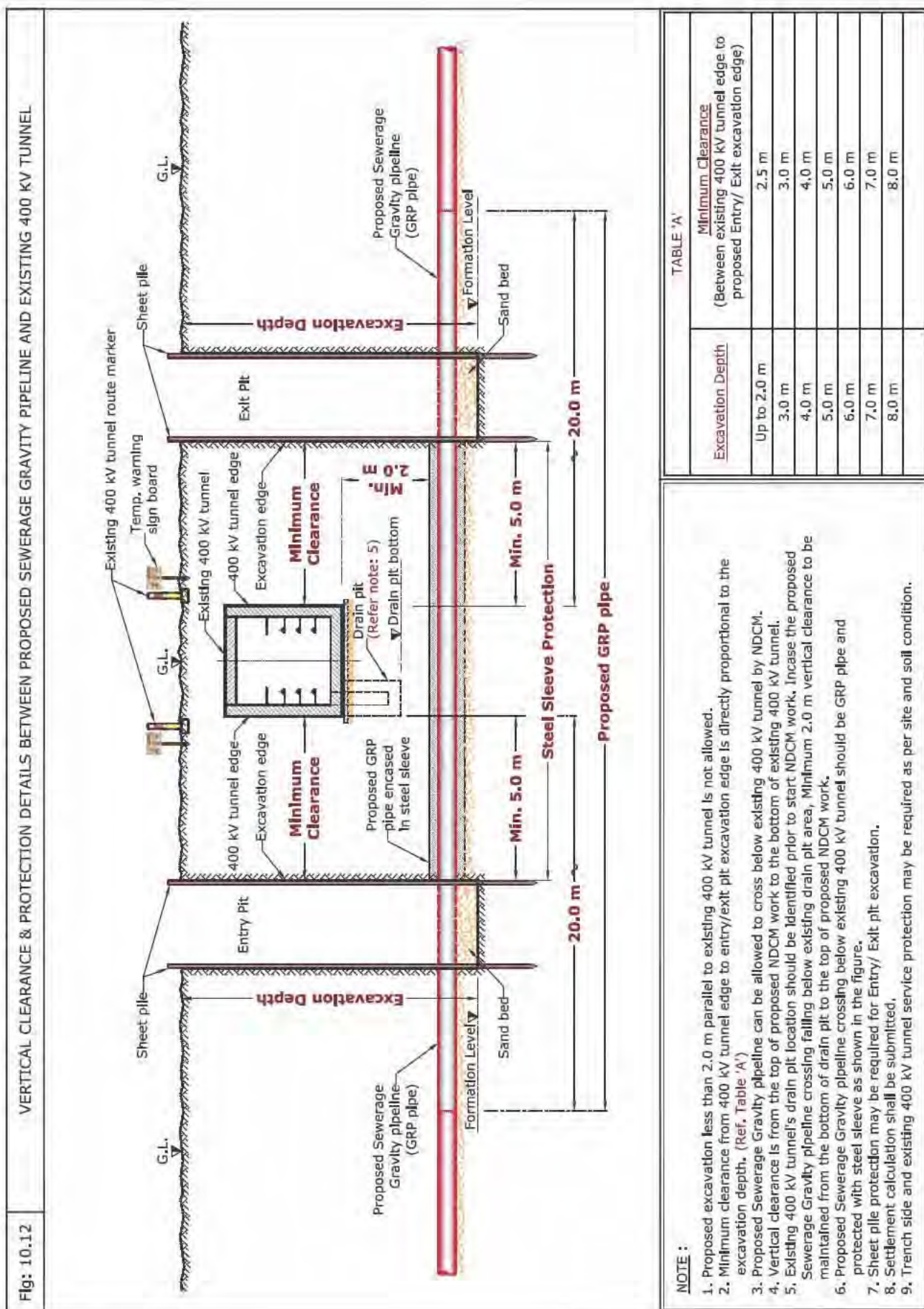
TABLE 'A'

Excavation Depth	Minimum Clearance (between existing tunnel edge to proposed pipe edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

NOTE :

- Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
- Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
- Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Fig: 10.11	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED SEWERAGE GRAVITY PIPELINE AND EXISTING 400 KV TUNNEL</p> 
NOTE :	<ol style="list-style-type: none"> 1. Proposed Sewerage Gravity pipeline up to 450 mm Ø can be allowed to cross above existing 400 kV tunnel with respect to available vertical clearance. 2. Vertical clearance is from the bottom of proposed steel sleeve to the top of existing 400 kV tunnel. 3. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel. 4. Proposed Sewerage Gravity pipeline crossing above existing 400 kV tunnel should be GRP pipe and protected with steel sleeve as shown. 5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.



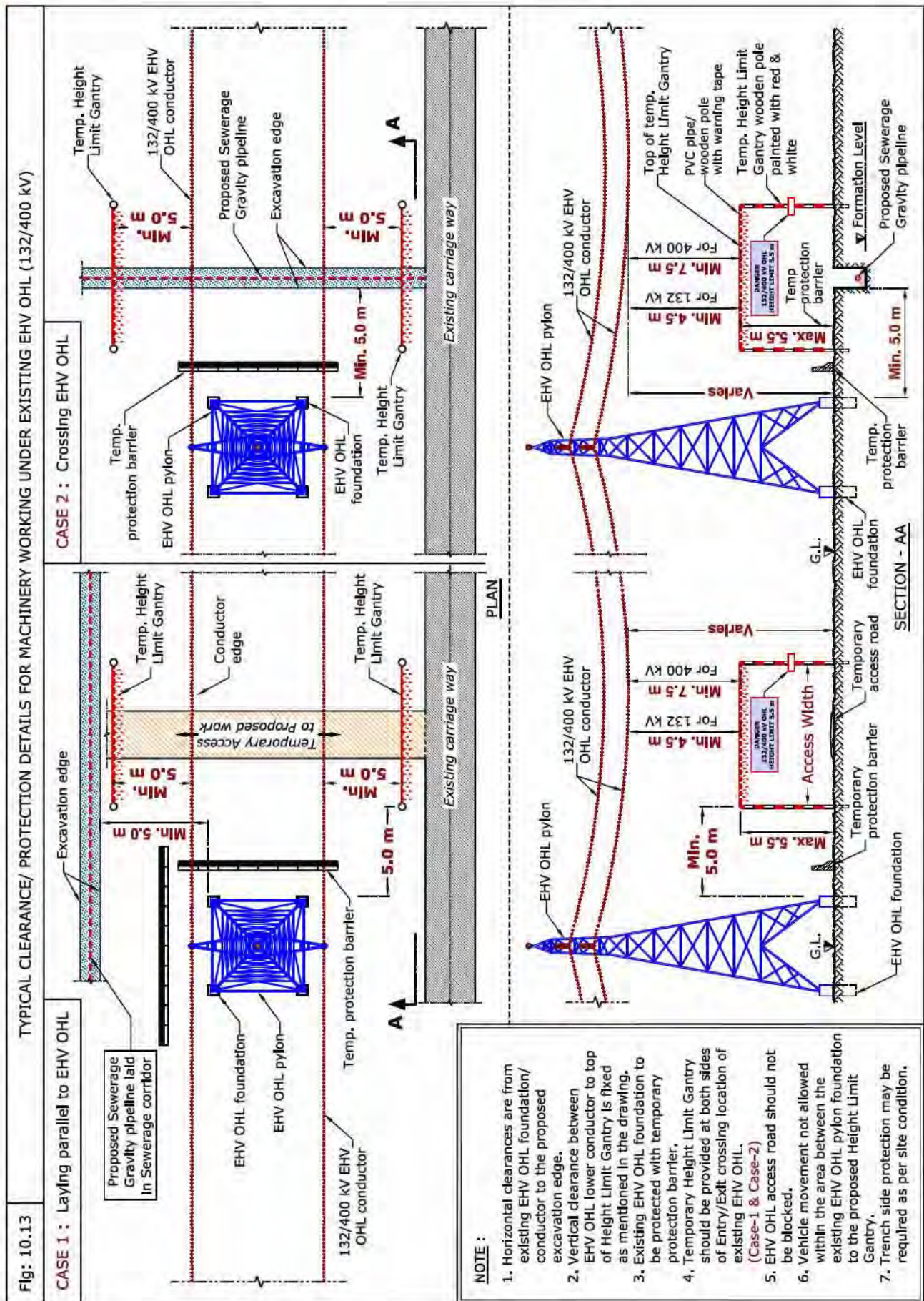


Table 4: Clearance & Protection details for proposed Sewerage Gravity Pipeline and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 10.14)
Gas/Fuel pipeline (All diameter)	10.0 m	(Refer below Note)	B	NDCM	R	• Horizontal clearance (Ref Fig: 10.14)

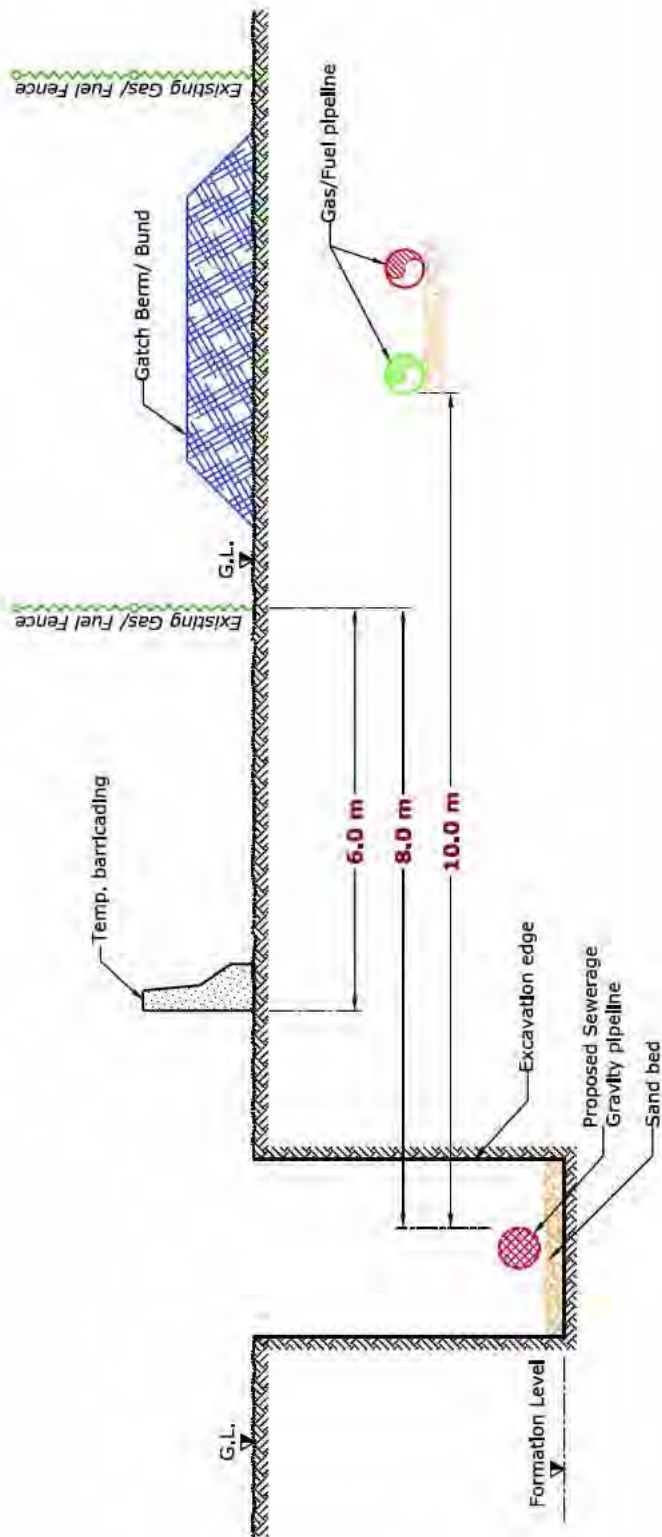
Note: Minimum vertical clearance shall be 2.0 m or 1.5 times of proposed sewerage pipeline/sleeve diameter whichever is greater.

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 10.14 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SEWERAGE GRAVITY PIPELINE AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Sewerage Gravity pipeline edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Sewerage Gravity pipeline edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 5.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed Sewerage Gravity pipeline allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Minimum vertical clearance for crossing existing Gas/ Fuel pipeline shall be 2.0 m or 1.5 times of proposed Sewerage Gravity pipeline/ Sleeve diameter whichever is greater.
6. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
7. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

11. Laying of Proposed Utilities - Sewerage Pressure Pipelines

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11.1 Introduction

The prime elements of Sewerage system are receiving and draining waste water (effluents) away from residential and industrial areas and such raw sewerage water transported to the dedicated treatment plant. The sewer system consists of pipe network of the gravity line as well as the pressure line.

Sewer pressure lines are connected to sewerage pumping station which regulates at a desired pressure to transmit the effluent to the treatment plant.

Generally pressure lines are transmission lines which carry effluent for longer distance to the treatment plant and will have lifting station/pumping station in the network depending on the ground profiles. The sewerage lines are a large network of underground pipes, usually laid in greater depth. The sewer pressure pipeline lays in an approved corridor within Right Of Way; therefore it is required to protect DEWA existing assets during laying activities as per specified standard.



Laying of Sewerage Pipeline

11.2 Avoid the following



1. Crossing existing EHV Joint Bay/Transition Joint.
2. Proposal for Sewerage Pipeline/Manhole/Valve Chambers within DEWA corridor.

11.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Sewerage pressure pipeline and existing DEWA Electricity LV cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	2.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 11.1, Case 1) Vertical clearance (Ref Fig: 11.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

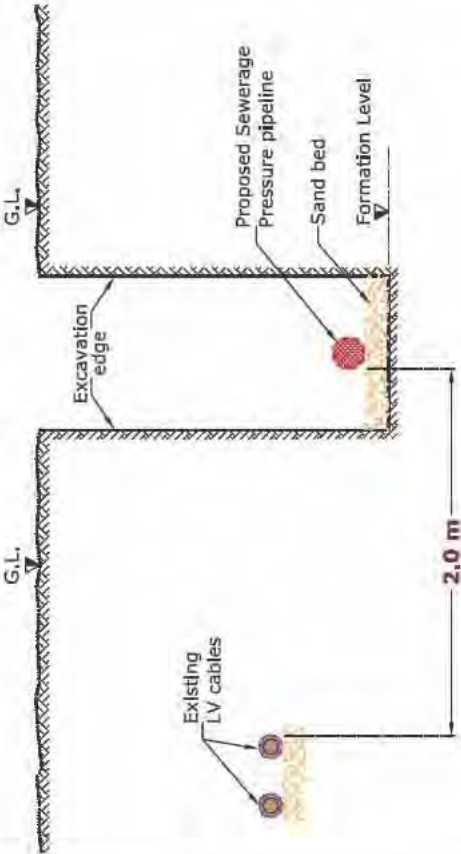
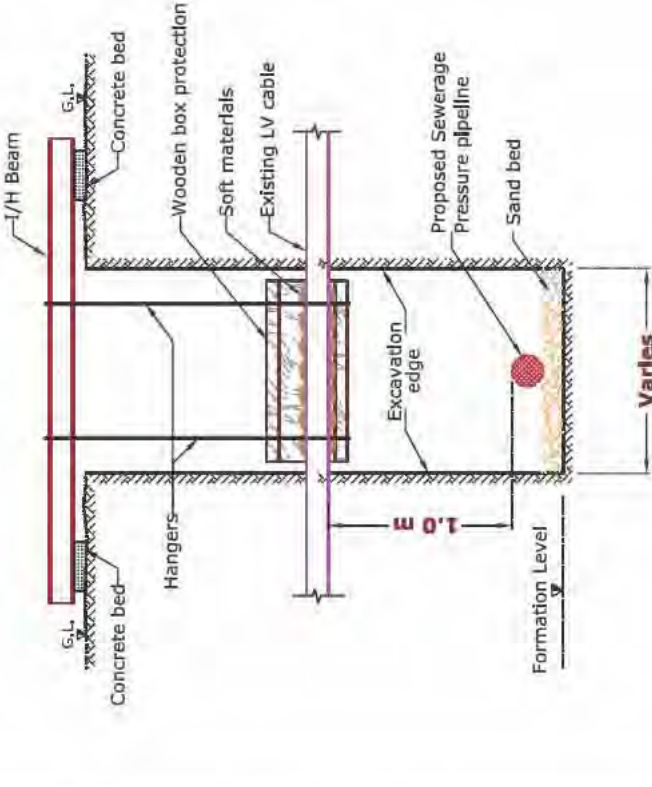
<p>Fig: 11.1</p>	<p>HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED SEWERAGE PRESSURE PIPELINE AND EXISTING LV CABLES</p> <div> <p>CASE 1 : Laying Parallel to Existing LV Cables</p>  </div> <div> <p>CASE 2 : Crossing Below the Existing LV Cables</p>  </div>	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Sewerage Pressure pipeline edge to existing LV cable edge. 2. Vertical clearance is from the top of proposed Sewerage Pressure pipeline to bottom of existing LV cable. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing LV service edge. 4. Trench side and existing LV cable protection may be required as per site and soil condition.
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Table 2: Clearance & Protection details for proposed Sewerage pressure pipeline and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	2.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 11.2, Case 1) • Vertical clearance (Ref Fig: 11.3, Case 2) • Protection details (Ref Fig: 11.3)
HV (6.6/11/33 kV) Manhole	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 11.2, Case 2)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 11.4) • Protection details (Ref Fig: 11.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 11.4) • Vertical clearance (Ref Fig: 11.4) • Protection details (Ref Fig: 11.4)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

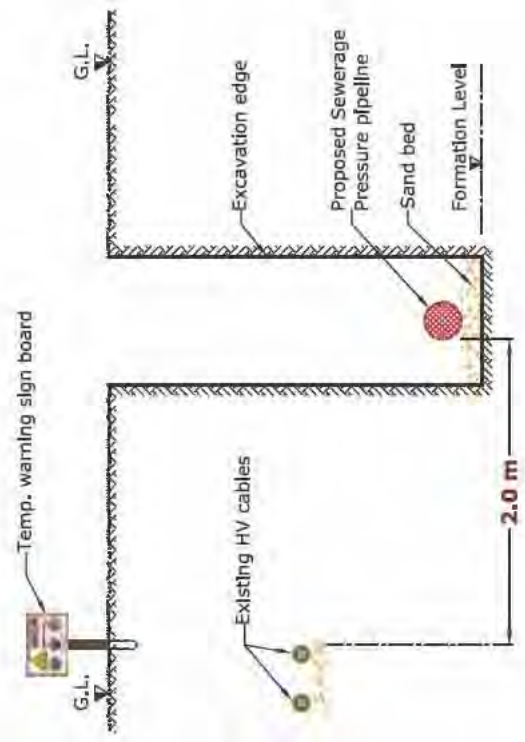
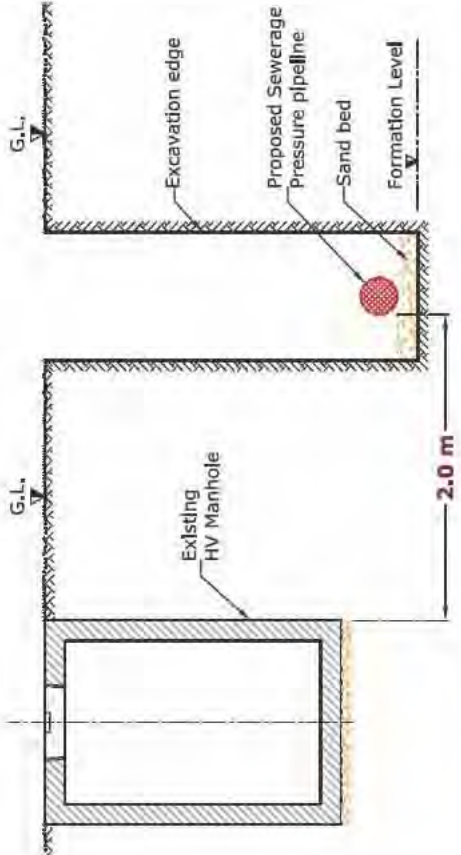
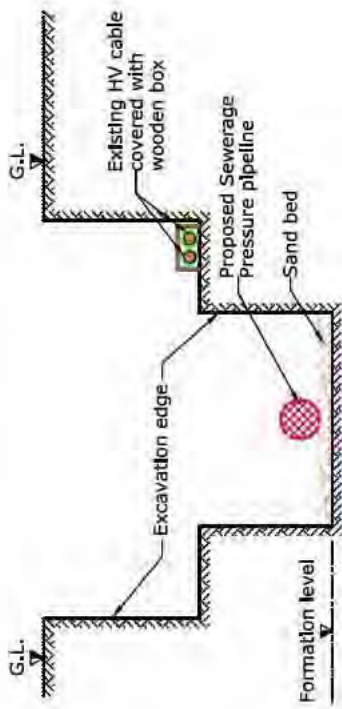
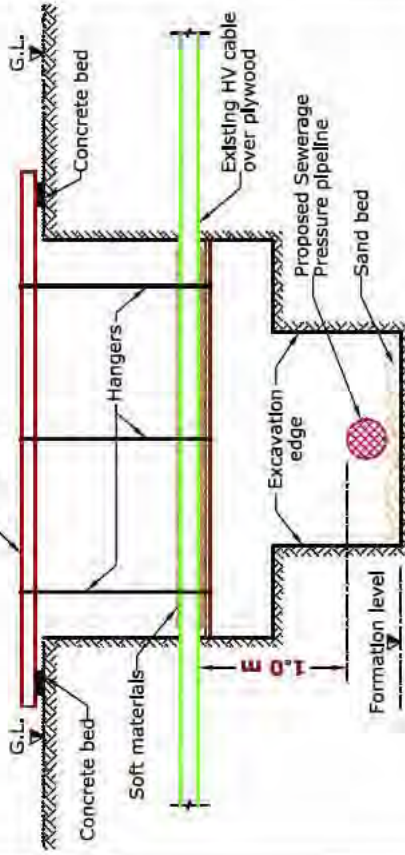
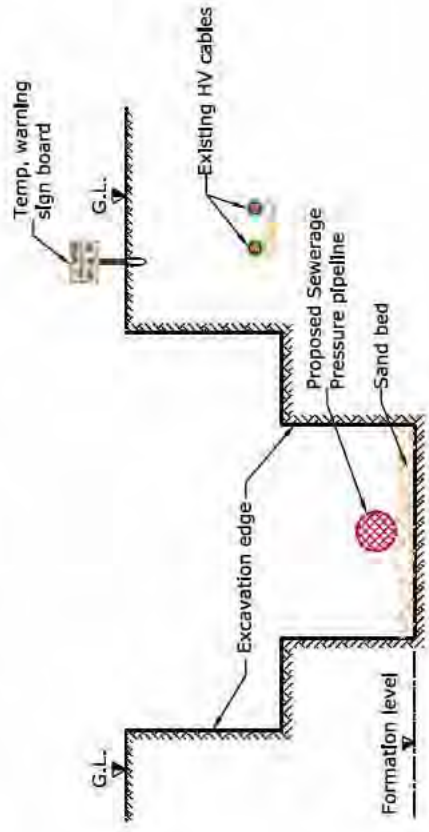
Fig: 11.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED SEWERAGE PRESSURE PIPELINE AND EXISTING HV SERVICES
	<p>CASE 1 : Laying parallel to existing HV cables</p>  <p>CASE 2 : Laying parallel to existing HV Manhole</p> 
	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearances are from the proposed Sewerage Pressure pipeline edge to existing HV services edge. 2. Proposed Sewerage Pressure pipeline allowed to cross below existing HV cables. 3. Proposed Sewerage Pressure pipeline not allowed to cross existing HV Manhole. 4. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge. 5. Trench side and existing HV services protection may be required as per site and soil condition.

Fig:11.3	STANDARD PROTECTION DETAILS FOR EXISTING HV CABLES	
CASE 1 : Proposed protection for existing HV cables falling parallel within the deep trench		
<p>NOTE :</p> <ol style="list-style-type: none"> 1. If existing HV cables slewed during the site activity, the same should be placed back to actual position after completion of work. 2. Existing HV cables falling parallel within the proposed excavation area should be protected with wooden box. (Case 1) 3. Proposed services allowed to cross existing HV services and the existing HV services should be protected as per site condition. (Case 2) 4. Existing HV cables falling parallel & outside the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. (Case 3) 5. Vertical clearance is from the top of proposed Sewerage Pressure pipeline to the bottom of existing HV services. 6. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge. 7. Trench side and existing HV services protection may be required as per site condition. 	<p>CASE 3 : Warning sign board for HV cables falling parallel and outside working area</p> 	

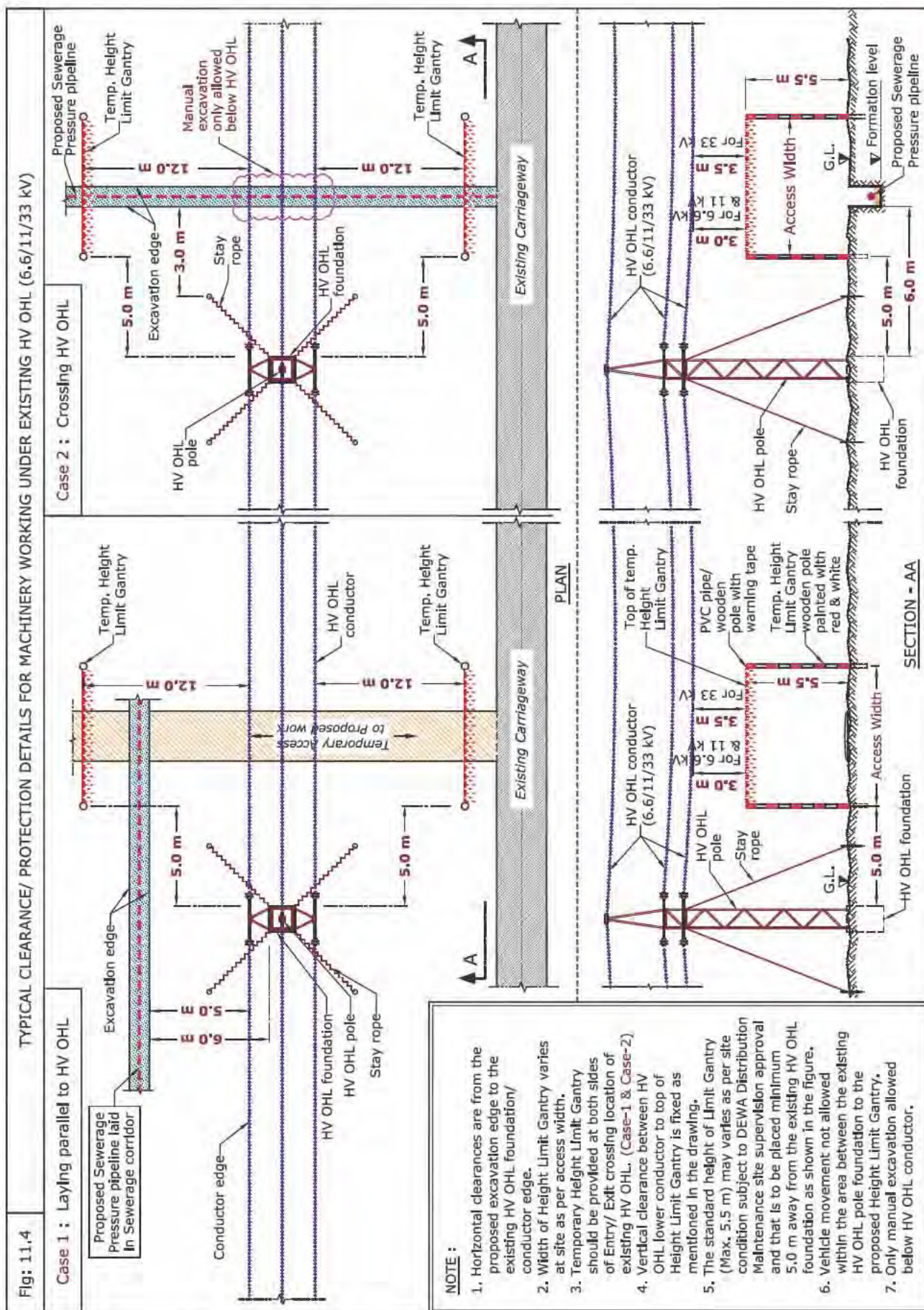


Table 3: Clearance & Protection details for proposed Sewerage pressure pipeline and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 11.5)• Vertical clearance (Ref Fig: 11.10)• Protection details (Ref Fig: 11.10)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 11.5)• Vertical clearance (Ref Fig: 11.9)• Protection details (Ref Fig: 11.9)
EHV (132 kV) Trough	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 11.6)• Vertical clearance (Ref Fig: 11.11)• Protection details (Ref Fig: 11.11, 11.12 & 11.13)
EHV (132 kV) Duct Bank	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 11.6)• Vertical clearance (Ref Fig: 11.8)• Protection details (Ref Fig: 11.8)
EHV (132 kV) Joint Bay/ Transition Joint	3.0 m	NA	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 11.7)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 11.17)• Protection details (Ref Fig: 11.17)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 11.14)• Vertical clearance (Ref Fig: 11.15)• Protection details (Ref Fig: 11.15)
		2.0 m	B	NDCM		<ul style="list-style-type: none">• Vertical clearance (Ref Fig: 11.16)• Protection details (Ref Fig: 11.16)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 11.17)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">• Vertical clearance (Ref Fig: 11.17)• Protection details (Ref Fig: 11.17)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

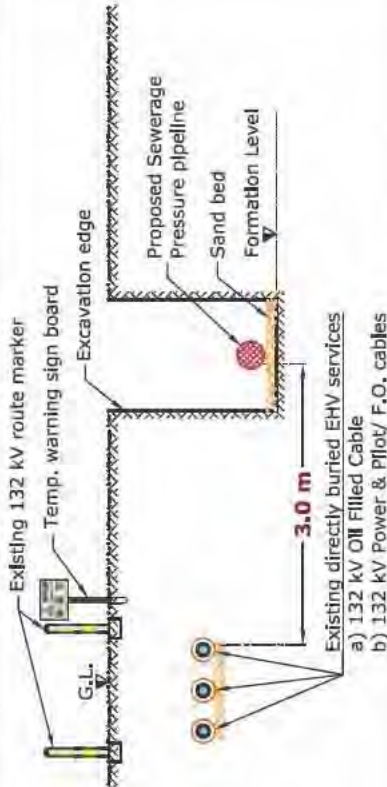
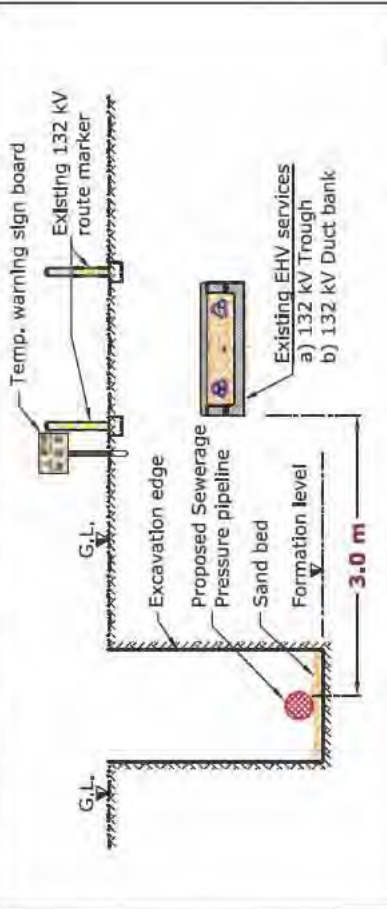
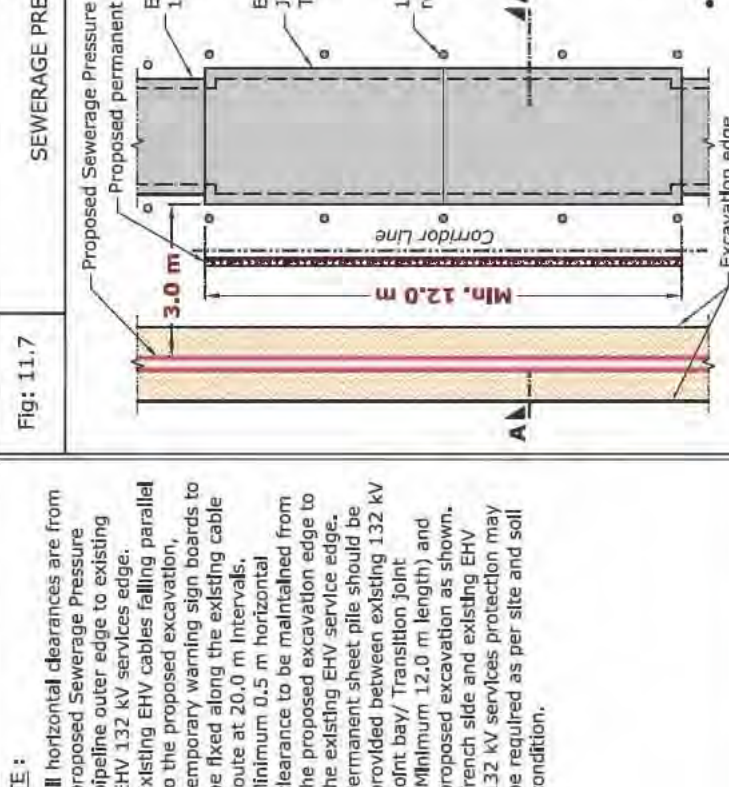
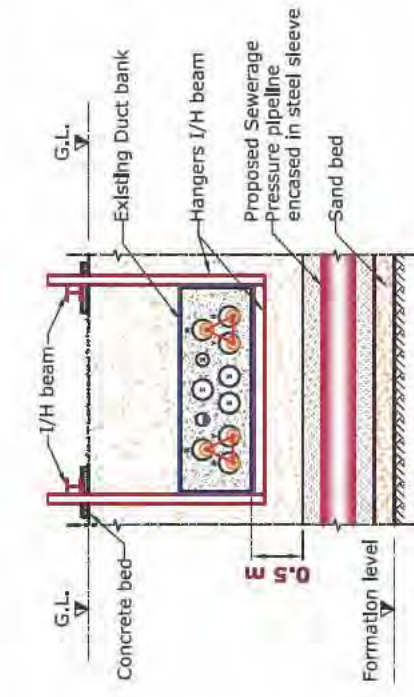
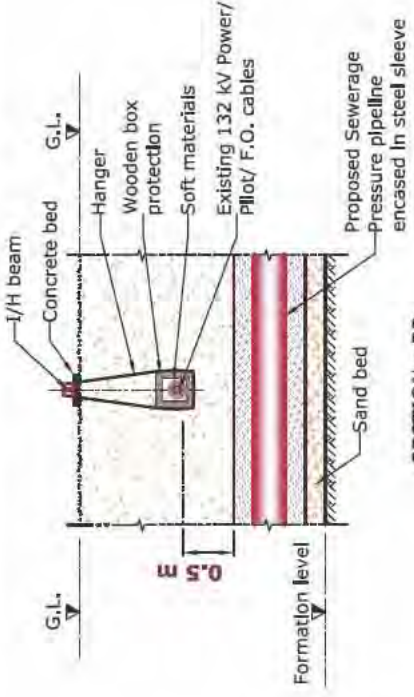
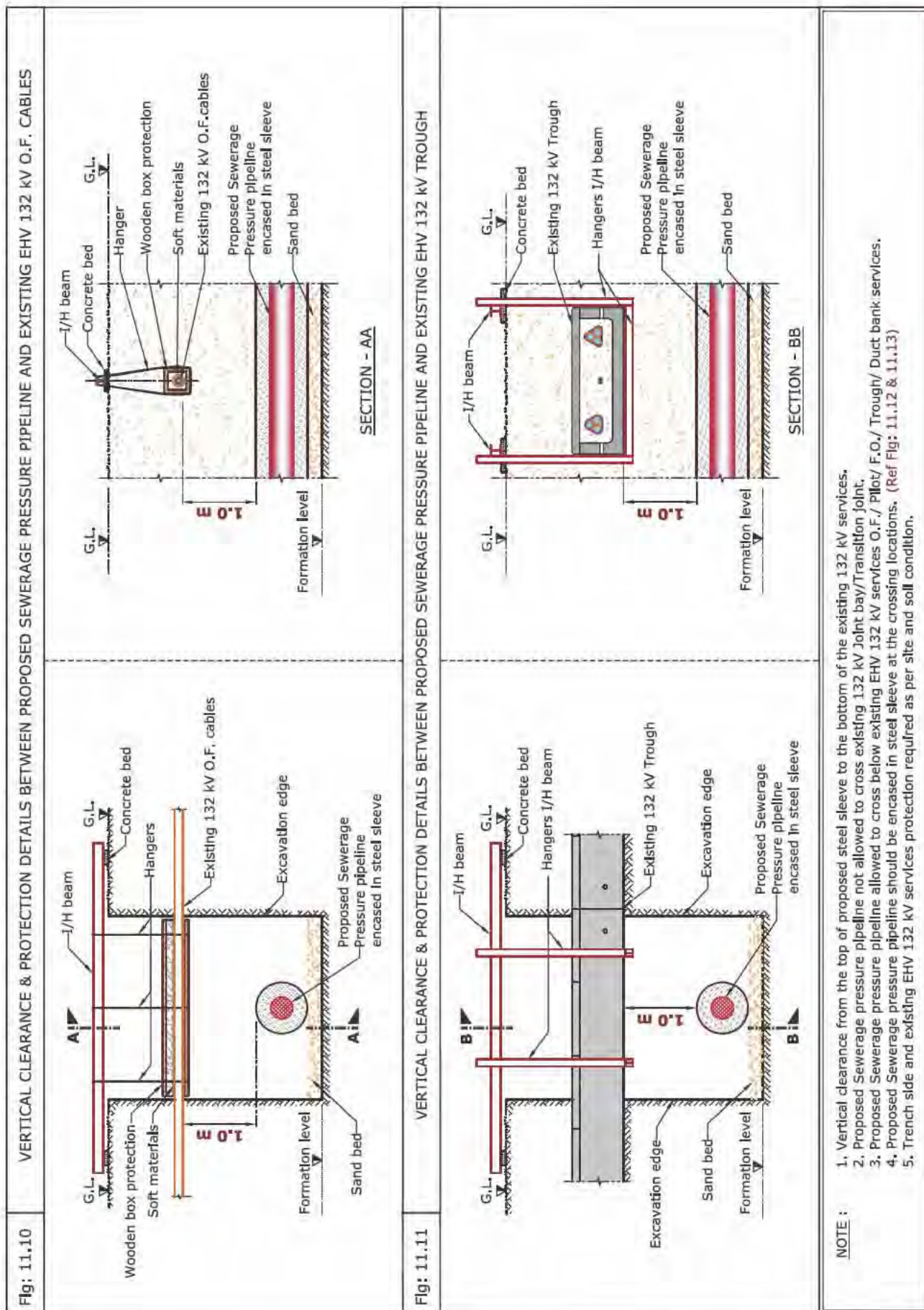
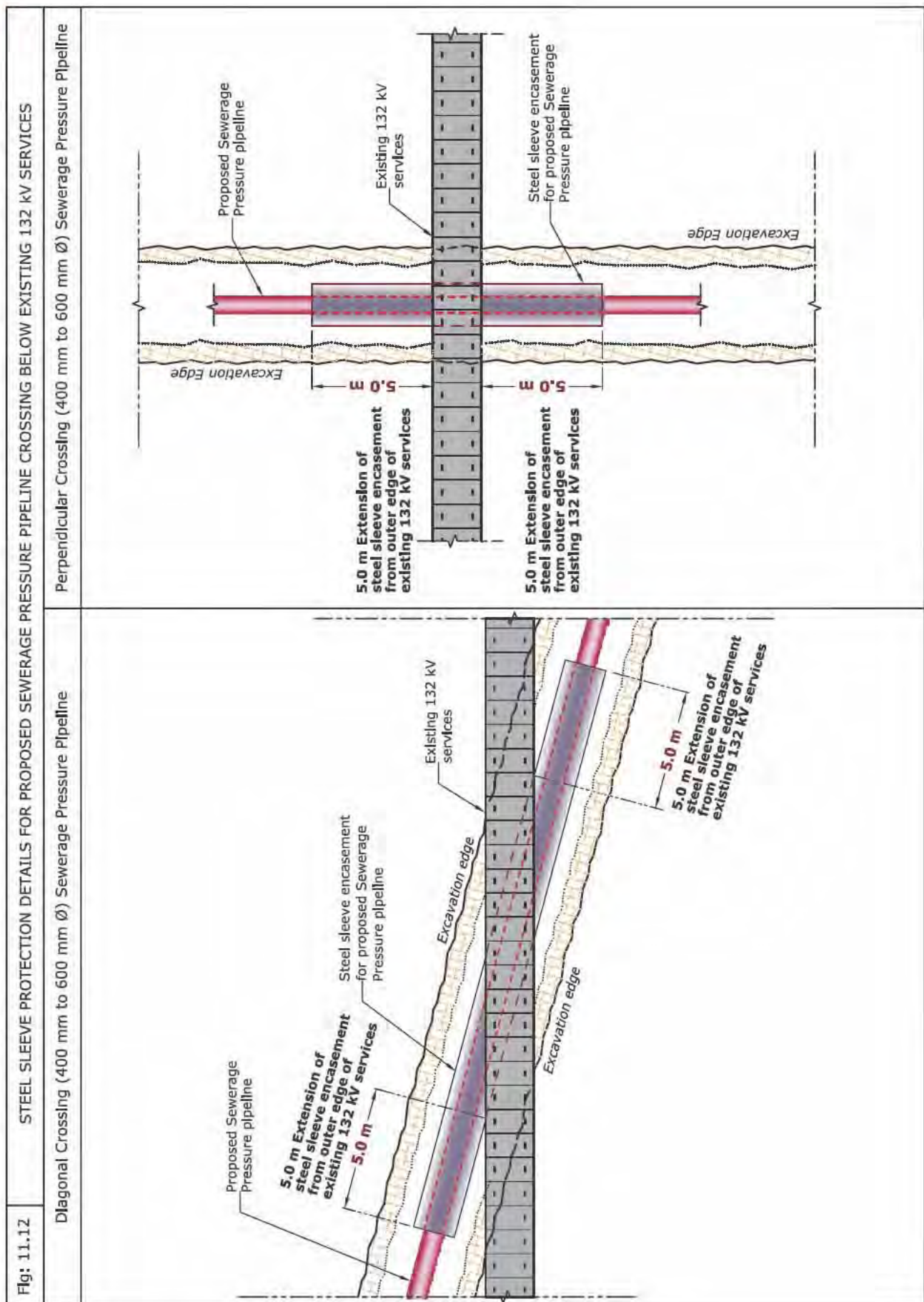
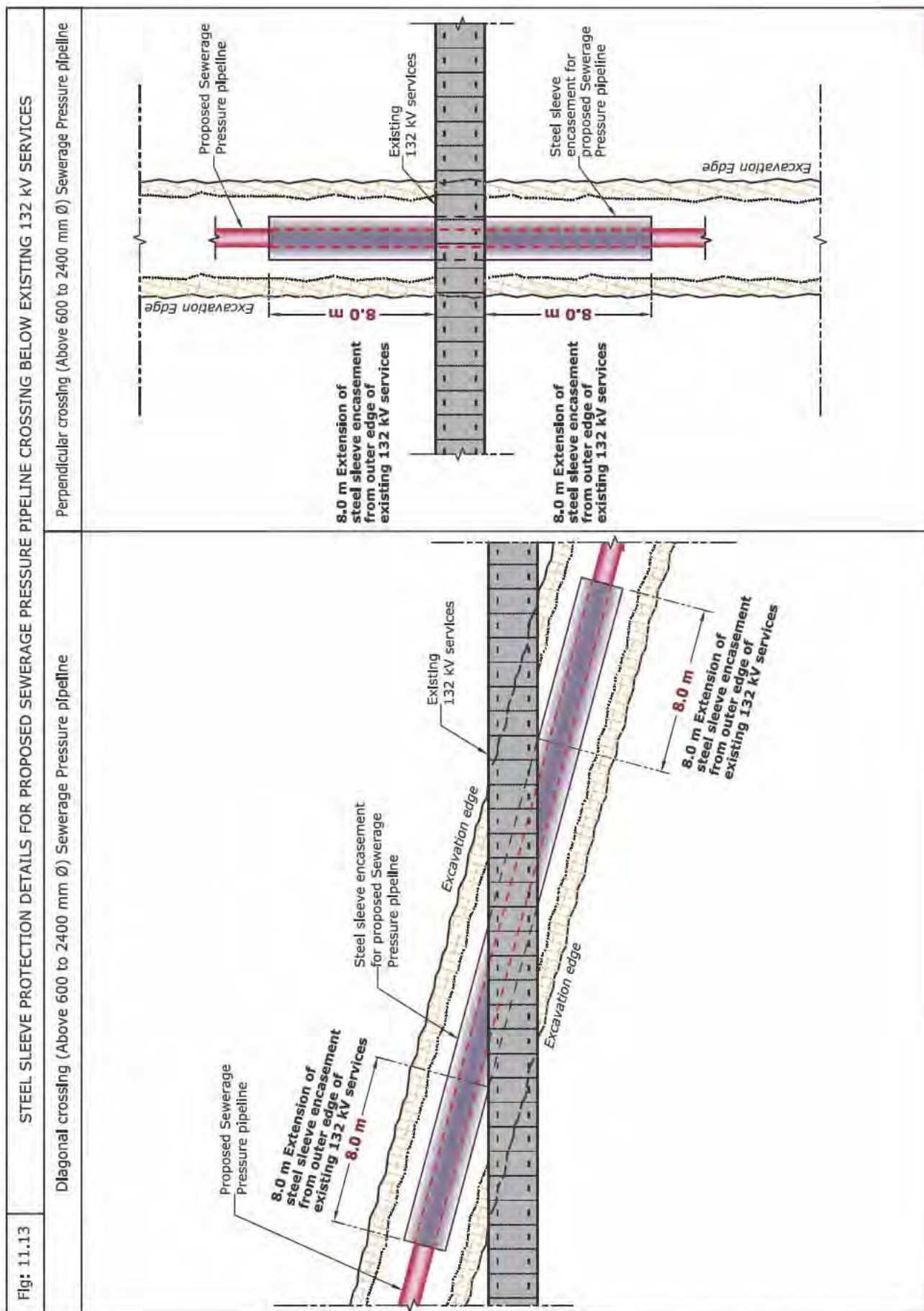
Fig: 11.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SEWERAGE PRESSURE PIPELINE AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	
Fig: 11.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SEWERAGE PRESSURE PIPELINE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK	

Fig: 11.7	SEWERAGE PRESSURE PIPELINE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT	
<p>NOTE :</p> <ol style="list-style-type: none">1. All horizontal clearances are from proposed Sewerage Pressure pipeline outer edge to existing EHV 132 kV services edge.2. Existing EHV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV service edge.4. Permanent sheet pile should be provided between existing 132 kV Joint bay/ Transition joint (Minimum 12.0 m length) and proposed excavation as shown.5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. <p>• Sheet pile protection not required between proposed pipeline & existing Joint bay, If horizontal clearance is 5.0 m & above.</p>		

<p>Fig: 11.8</p>	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED SEWERAGE PRESSURE PIPELINE AND EXISTING EHV 132 kV DUCT BANK</p>  <p style="text-align: center;">SECTION - AA</p>
<p>Fig: 11.9</p>	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED SEWERAGE PRESSURE PIPELINE AND EXISTING EHV 132 kV POWER/PILOT/F.O. CABLE</p>  <p style="text-align: center;">SECTION - BB</p>
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance from the top of proposed steel sleeve to the bottom of the existing 132 kV services. 2. Proposed Sewerage Pressure pipeline not allowed to cross existing 132 kV Joint bay/ Transition Joint. 3. Proposed Sewerage Pressure pipeline allowed to cross below existing 132 kV O.F./ Power/ Pilot/ F.O./ Trough/ Duct bank. 4. Proposed Sewerage Pressure pipeline should be encased in steel sleeve at the crossing locations of 132 kV services. (Ref Fig: 11.12 & 11.13) 5. Trench side and existing 132 kV services protection may be required as per site and soil condition. 	







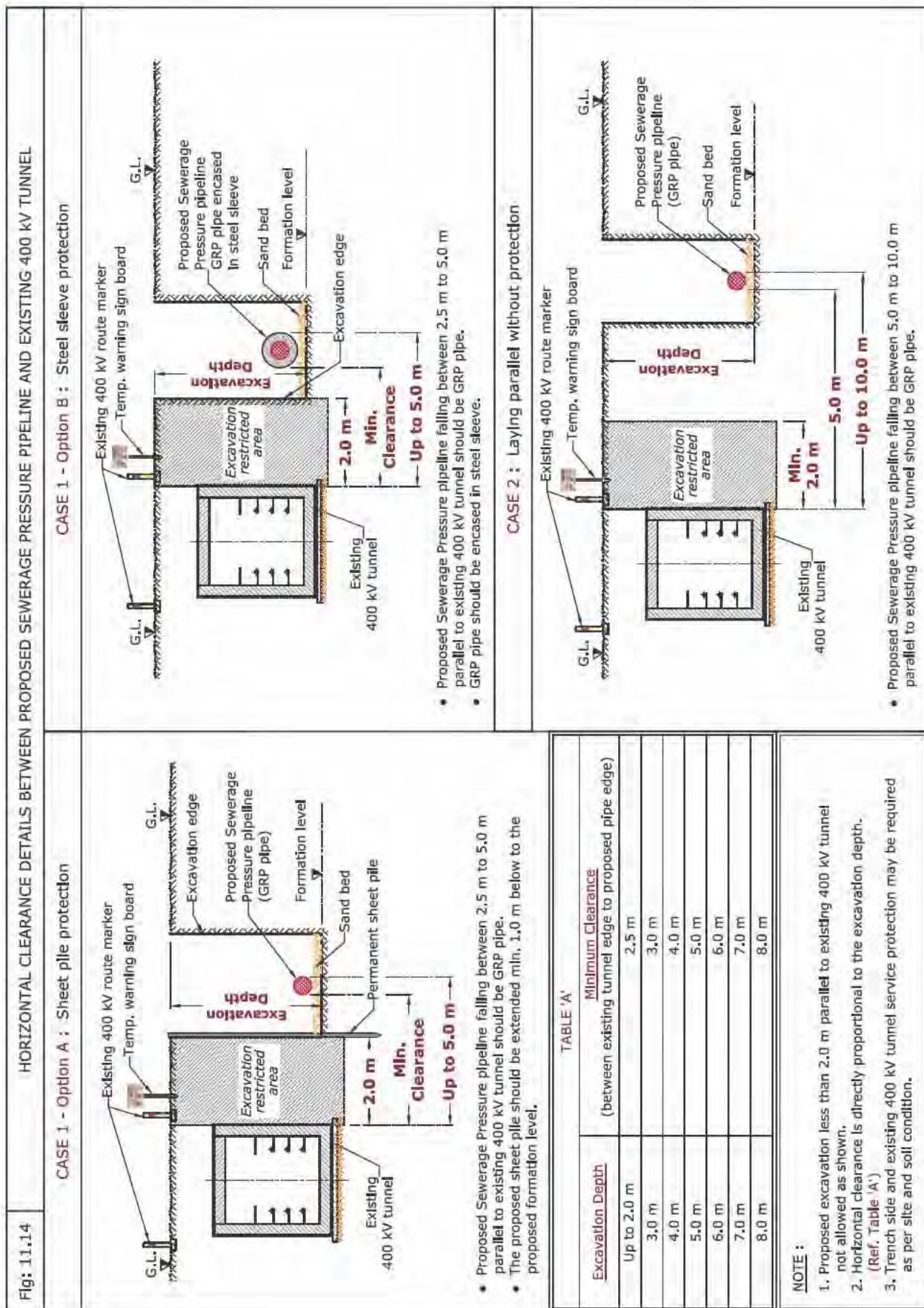
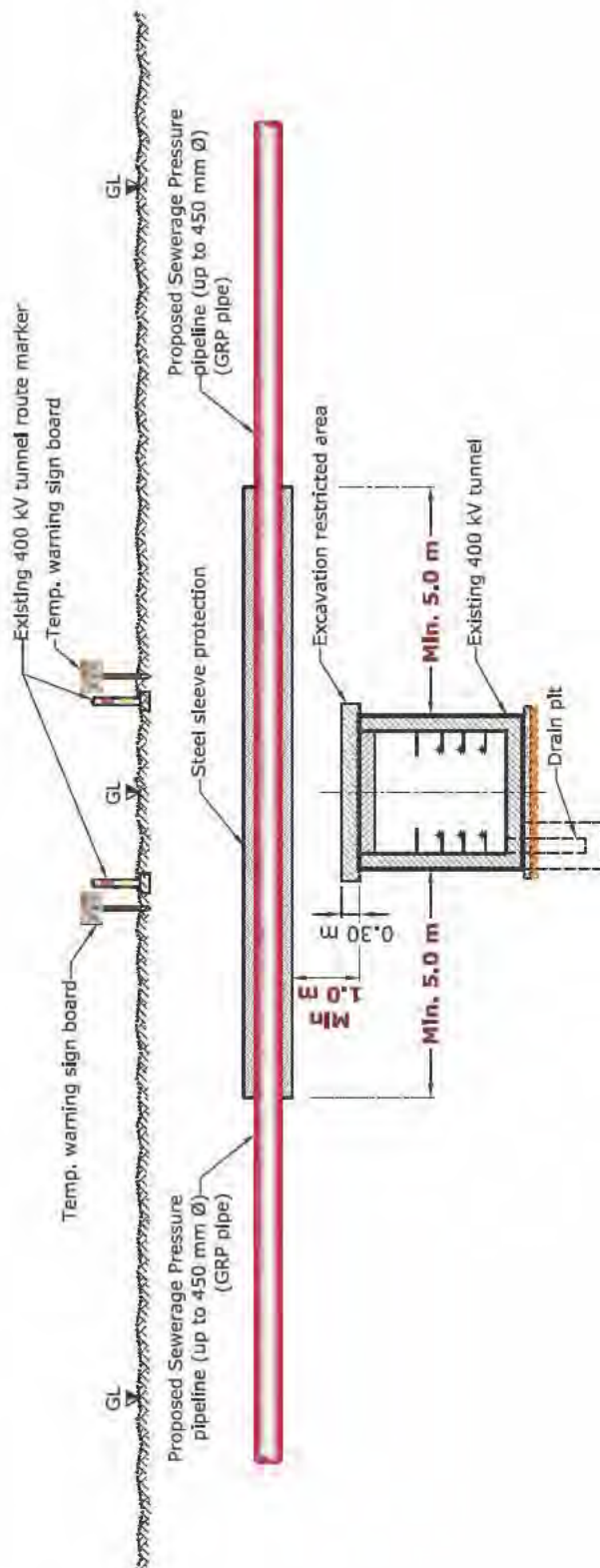


TABLE 'A'	
Excavation Depth	Minimum Clearance (between existing tunnel edge to proposed pipe edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

NOTE :

- Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
- Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
- Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED SEWERAGE PRESSURE PIPELINE AND EXISTING 400 KV TUNNEL



- NOTE :**
1. Proposed Sewerage Pressure pipeline up to 450 mm Ø can be allowed to cross above existing 400 kV tunnel with respect to available vertical clearance.
 2. Vertical clearance is from the bottom of proposed steel sleeve to the top of existing 400 kV tunnel.
 3. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
 4. Proposed Sewerage Pressure pipeline crossing above existing 400 kV tunnel should be GRP pipe and protected with steel sleeve as shown.
 5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Fig: 11.16

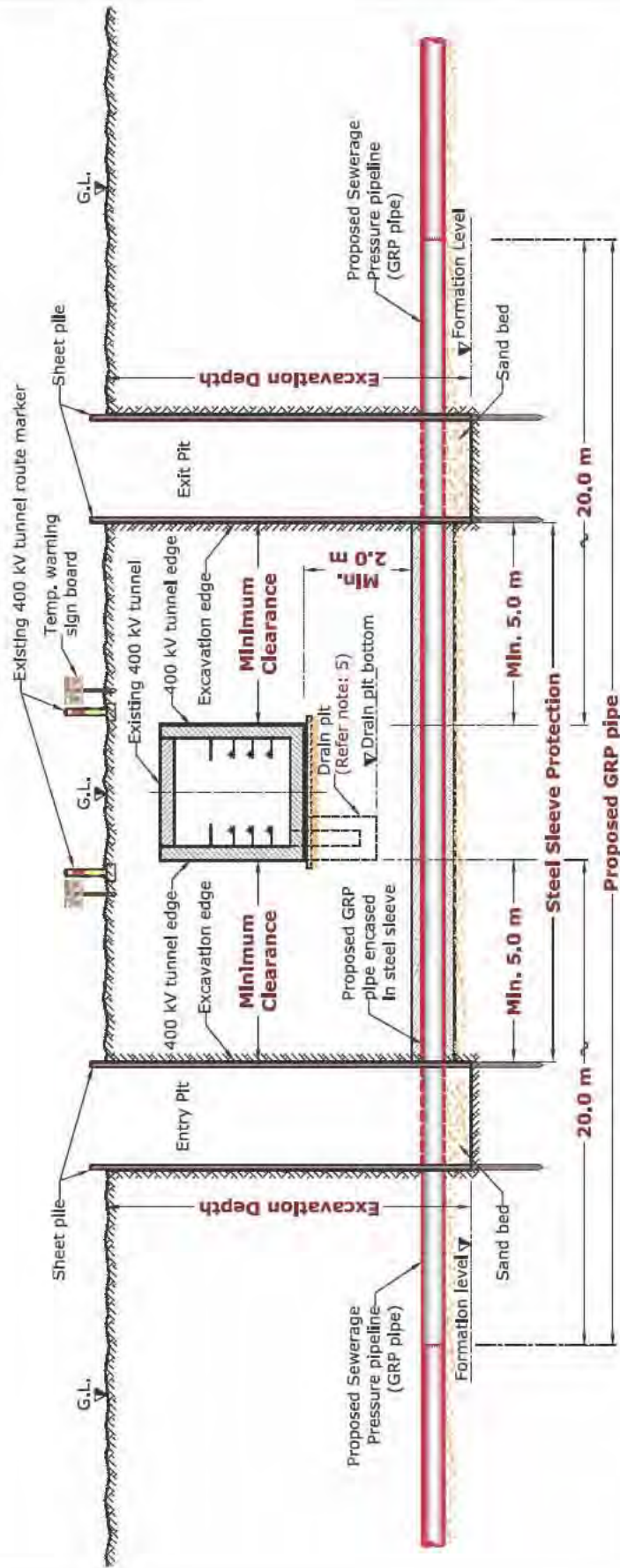


TABLE 'A'

<u>Excavation Depth</u>	<u>Minimum Clearance</u> (Between existing 400 kV tunnel edge to proposed Entry/ Exit excavation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel is not allowed.
2. Minimum clearance from 400 kV tunnel edge to entry/exit pit excavation edge is directly proportional to the excavation depth. (Ref. Table 'A')
3. Proposed Sewerage Pressure pipeline can be allowed to cross below existing 400 kV tunnel by NDCM.
4. Vertical clearance is from the top of proposed NDCM work to the bottom of existing 400 kV tunnel.
5. Existing 400 kV tunnel's drain pit location should be identified prior to start NDCM work. Increase the proposed Sewerage Pressure pipeline crossing falling below existing drain pit area, minimum 2.0 m vertical clearance to be maintained from the bottom of drain pit to the top of proposed NDCM work.
6. Proposed Sewerage Pressure pipeline crossing below existing 400 kV tunnel should be GRP pipe and protected with steel sleeve as shown in the figure.
7. Sheet pile protection may be required for Entry/ Exit pit excavation.
8. Settlement calculation shall be submitted.
9. Trench slide and existing 400 kV tunnel service protection may be required as per site and soil condition.

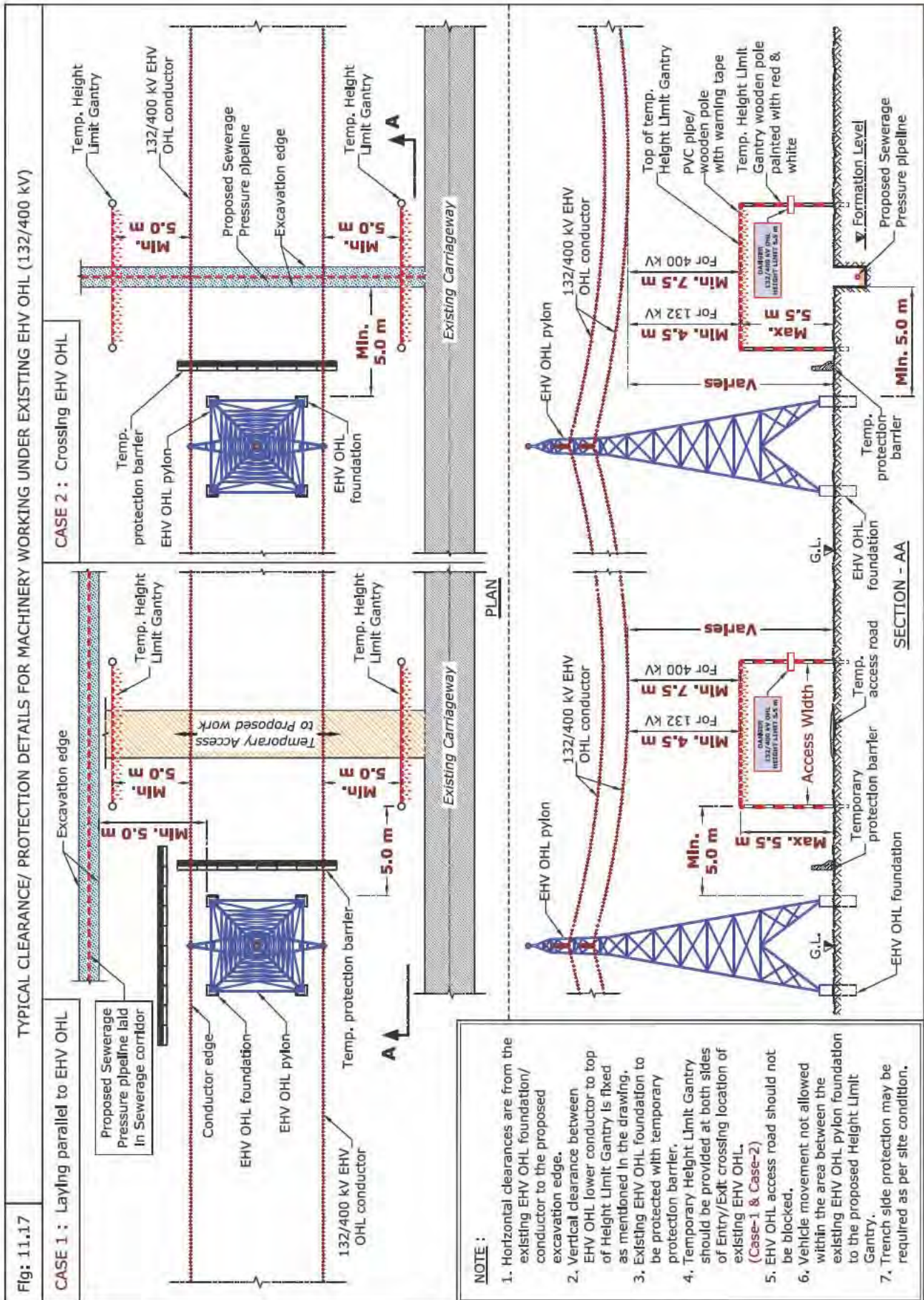


Table 4: Clearance & Protection details for proposed Sewerage pressure pipeline and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 11.18)
Gas/Fuel pipeline (All diameter)	10.0 m	(Refer below Note)	B	NDCM	R	• Horizontal clearance (Ref Fig: 11.18)

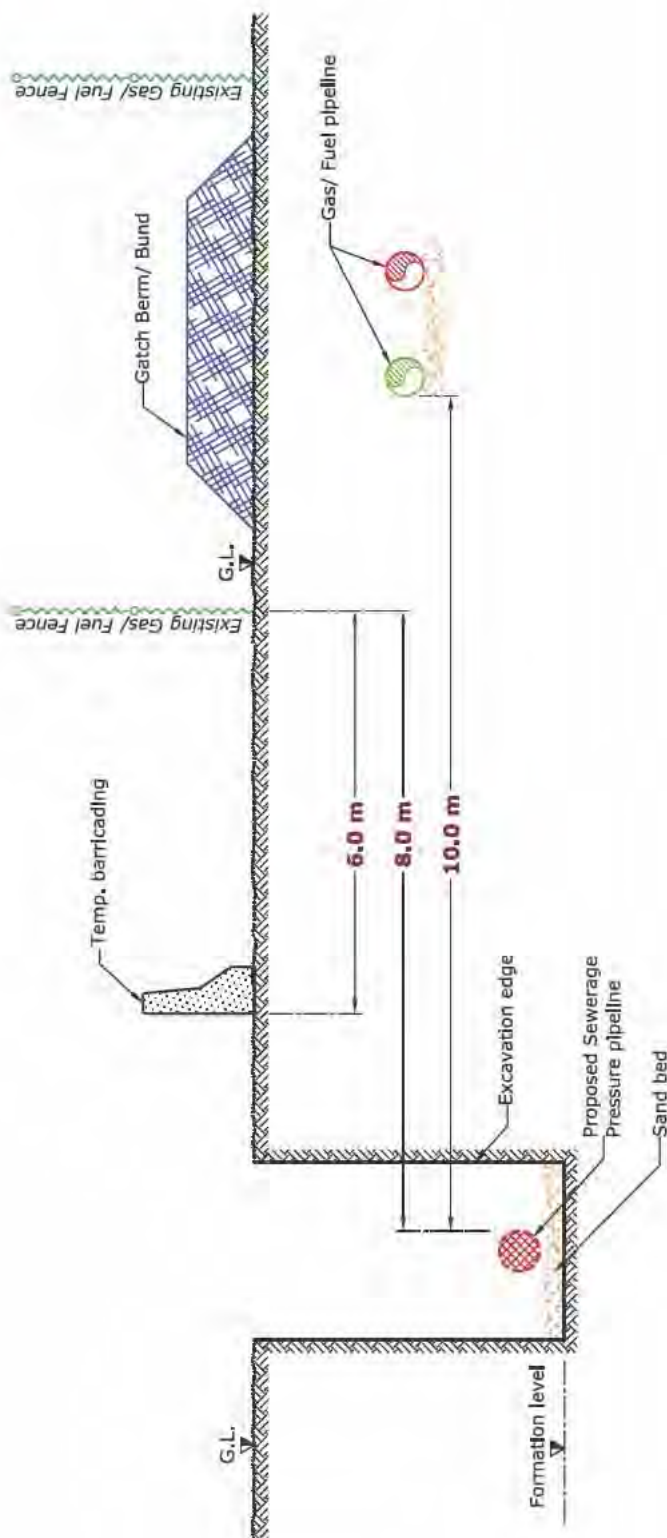
Note: Minimum vertical clearance shall be 2.0 m or 1.5 times of proposed sewerage pipeline/sleeve diameter whichever is greater.

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 11.18 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SEWERAGE PRESSURE PIPELINE AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Sewerage Pressure pipeline edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Sewerage Pressure pipeline edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 5.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed Sewerage Pressure pipeline allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Minimum vertical clearance for crossing existing Gas/ Fuel pipeline shall be 2.0 m or 1.5 times of proposed Sewerage Pressure pipeline/ Sleeve diameter whichever is greater.
6. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
7. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

12. Laying of Proposed Utilities- Drainage Gravity Pipelines

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12.1 Introduction

The purpose of drainage system is to receive and transport storm of water coming from rain fall to prevent flooding along internal and external city roads that ensure smooth and safe traffic flow. The underground drainage gravity network comprises of pipelines, drop inlets, catch basins, junction manholes and gullies etc. Storm water is usually discharged to the lake and/or sea through the drainage networks.

The drainage gravity networks are laid in a dedicated corridor within Right Of Way; therefore it is required to protect DEWA existing assets during laying activities as per specified standards.



Laying of Drainage Gravity pipeline

12.2 Avoid the following



1. Crossing existing EHV Joint Bay/Transition Joint.
2. Proposal for Drainage Pipeline/Manhole/Valve Chamber in DEWA corridor.

12.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Drainage Gravity Pipeline and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 12.1, Case 1) Vertical clearance (Ref Fig: 12.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

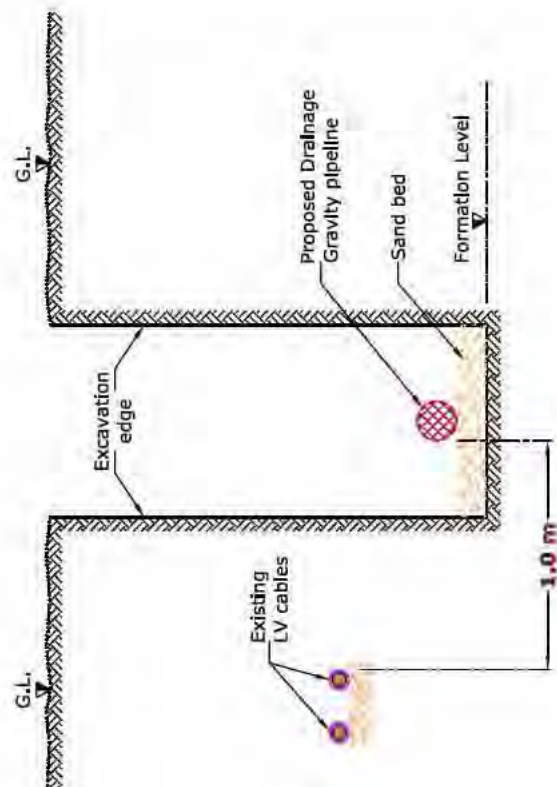
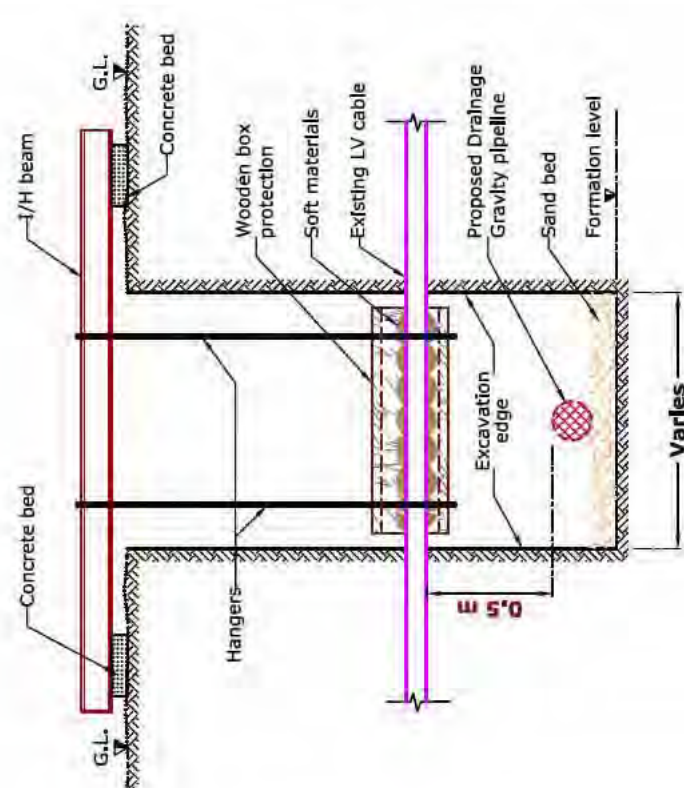
<p>Fig: 12.1</p>	<p>HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED DRAINAGE GRAVITY PIPELINE AND EXISTING LV CABLES</p>	<div> <p>CASE 1 : Laying parallel to existing LV cables</p> </div>  <div> <p>CASE 2 : Crossing below the existing LV cables</p> </div> 	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Drainage Gravity pipeline edge to existing LV cable edge. 2. Vertical clearance is from the top of proposed Drainage Gravity pipeline to bottom of existing LV cable. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing LV service edge. 4. Trench side and existing LV cable protection may be required as per site and soil condition.
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Table 2: Clearance & Protection details for Proposed Drainage Gravity Pipeline and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 12.2, Case 1) • Vertical clearance (Ref Fig: 12.3, Case 2) • Protection details (Ref Fig: 12.3)
HV (6.6/11/33 kV) Manhole	1.0 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 12.2, Case 2)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 12.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 12.4) • Vertical clearance (Ref Fig: 12.4) • Protection details (Ref Fig: 12.4)
HV (33 kV) O.H.L		3.5 m				<ul style="list-style-type: none"> • Protection details (Ref Fig: 12.4)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

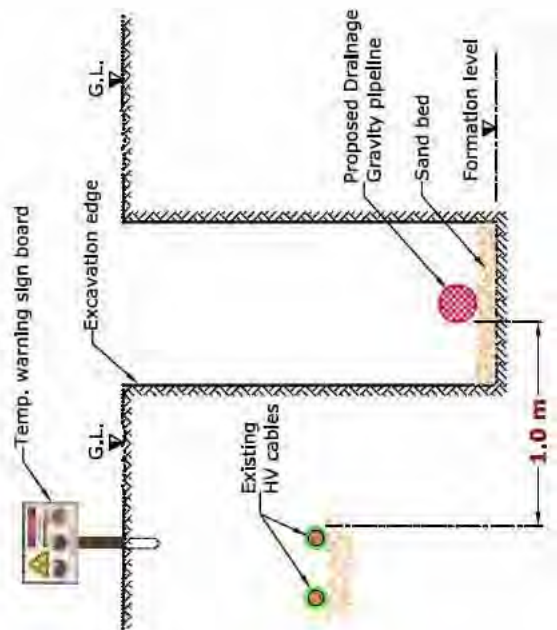
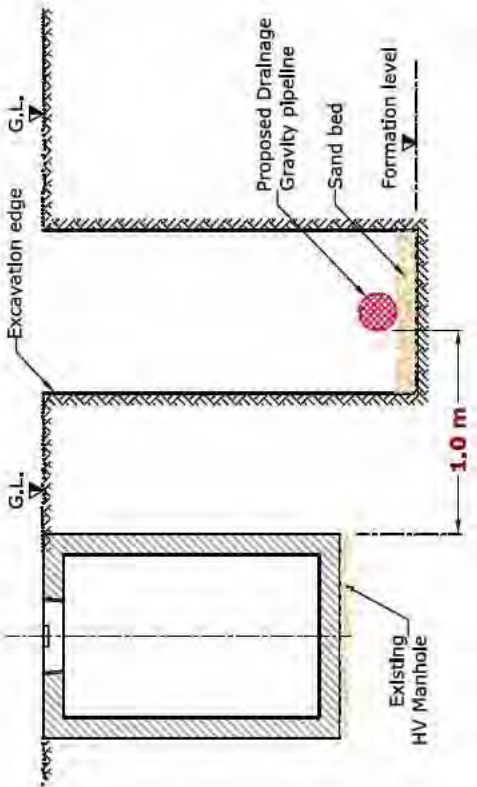
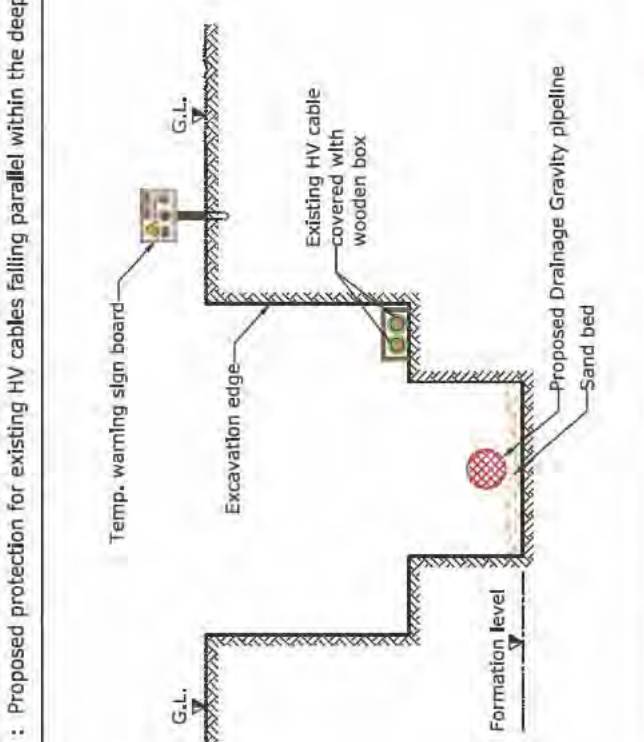
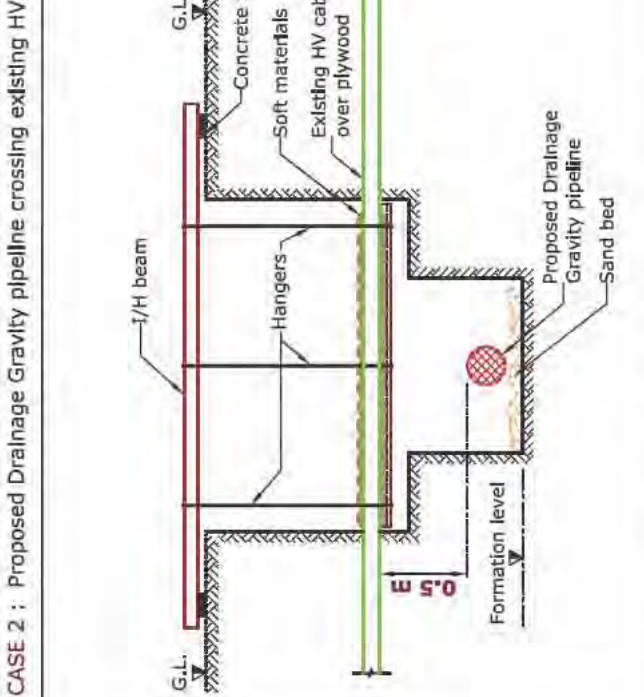
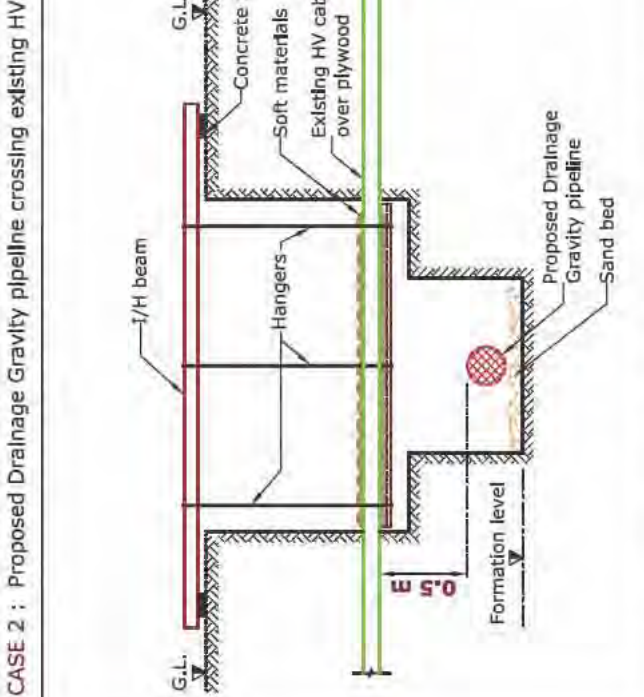
Fig: 12.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED DRAINAGE GRAVITY PIPELINE AND EXISTING HV SERVICES
	<p>CASE 1 : Laying parallel to existing HV cables</p> 
	<p>CASE 2 : Laying parallel to existing HV Manhole</p> 
	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearances are from the proposed Drainage Gravity pipeline edge to existing HV services edge. 2. Proposed Drainage Gravity pipeline allowed to cross below existing HV cables. 3. Proposed Drainage Gravity pipeline not allowed to cross existing HV manhole. 4. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge. 5. Trench side and existing HV services protection may be required as per site and soil condition.

Fig: 12.3	VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED DRAINAGE GRAVITY PIPELINE AND EXISTING HV CABLES
CASE 1 : Proposed protection for existing HV cables falling parallel within the deep trench	
CASE 2 : Proposed Drainage Gravity pipeline crossing existing HV cable	
NOTE :	<ol style="list-style-type: none"> 1. If existing HV cables slewed during the site activity, the same should be placed back to actual position after completion of work. 2. Existing HV cables falling parallel within the proposed excavation area should be protected with wooden box (CASE 1). 3. Proposed services allowed to cross existing HV services and the existing HV services should be protected as per site condition. (CASE 2) 4. Existing HV cables falling parallel & outside the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. (CASE 3) 5. Vertical clearance is from the top of proposed Drainage Gravity pipeline to the bottom of existing HV services. 6. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge. 7. Trench side and existing HV services protection may be required as per site condition.
CASE 3 : Warning sign board for HV cables falling parallel and outside working area	

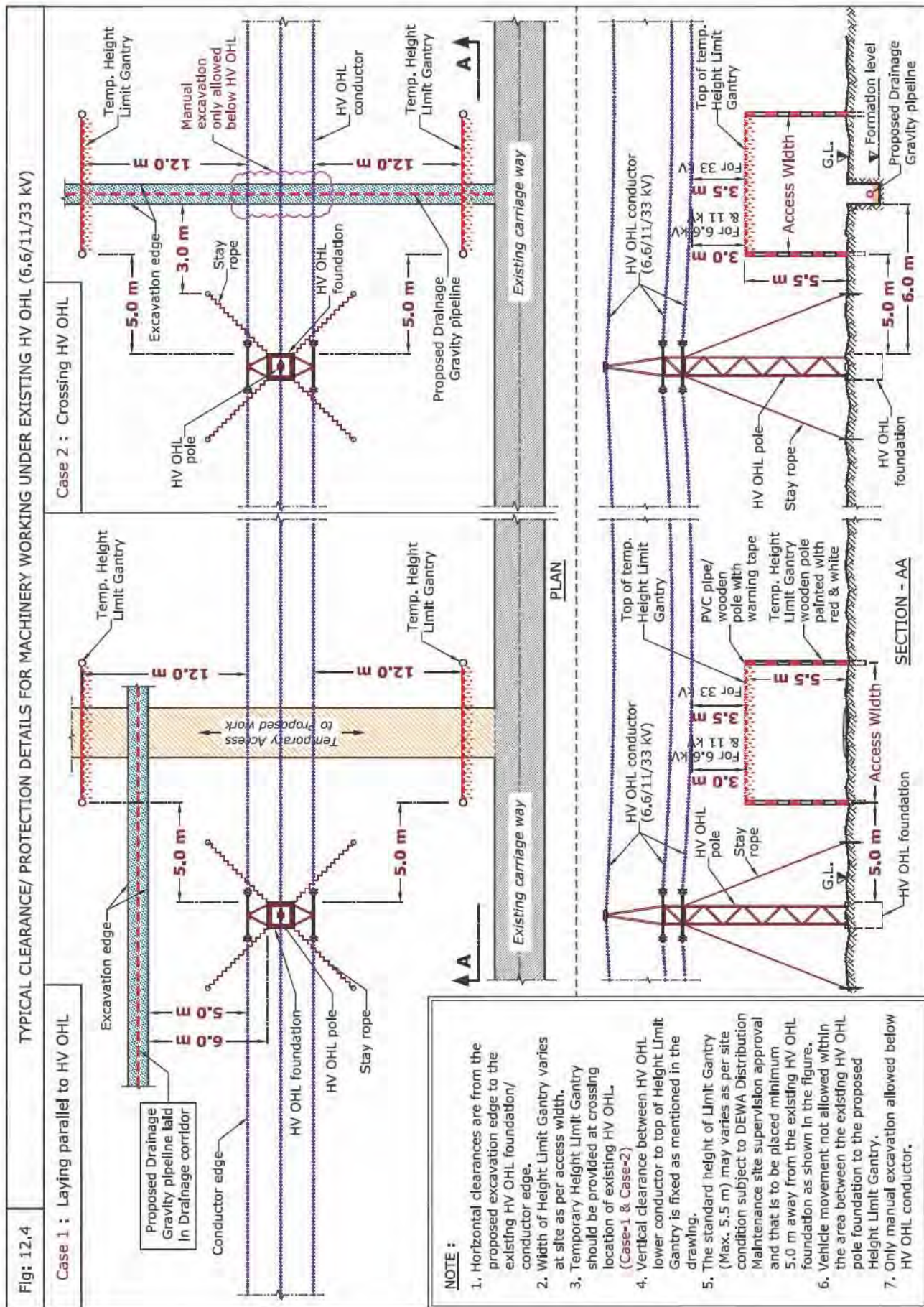


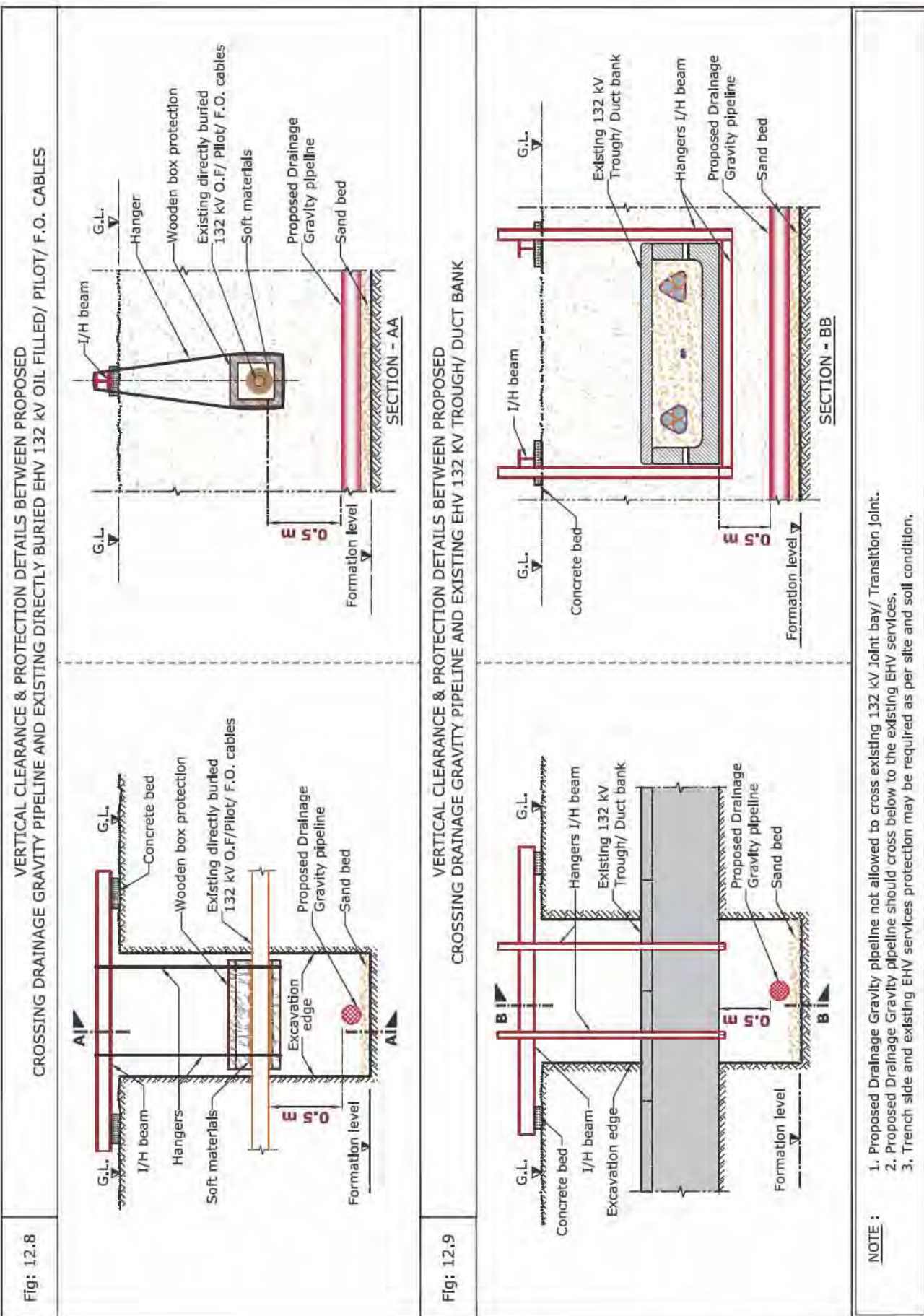
Table 3: Clearance & Protection details for proposed Drainage gravity pipeline and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 12.5)• Vertical clearance (Ref Fig: 12.8)• Protection details (Ref Fig: 12.8)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 12.5)• Vertical clearance (Ref Fig: 12.8)• Protection details (Ref Fig: 12.8)
EHV (132 kV) Trough	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 12.6)• Vertical clearance (Ref Fig: 12.9)• Protection details (Ref Fig: 12.9)
EHV (132 kV) Duct Bank	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 12.6)• Vertical clearance (Ref Fig: 12.9)• Protection details (Ref Fig: 12.9)
EHV (132 kV) Joint Bay/ Transition Joint	1.0 m	NA	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 12.7)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 12.13)• Protection details (Ref Fig: 12.13)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 12.10)• Vertical clearance (Ref Fig: 12.11)• Protection details (Ref Fig: 12.11)
		2.0 m	B	NDCM		<ul style="list-style-type: none">• Vertical clearance (Ref Fig: 12.12)• Protection details (Ref Fig: 12.12)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 12.13)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">• Vertical clearance (Ref Fig: 12.13)• Protection details (Ref Fig: 12.13)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 12.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE GRAVITY PIPELINE AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>	<p>Fig: 12.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE GRAVITY PIPELINE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Drainage Gravity pipeline outer edge to existing EHV 132 kV services edge. 2. Existing EHV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV service edge. 4. Permanent sheet pile should be provided between existing 132 kV Joint Bay/ Transition Joint (Minimum 12.0 m length) and proposed excavation as shown. 5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 			
<p>Fig: 12.7</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE GRAVITY PIPELINE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>		
<p>• Sheet pile protection not required between proposed Drainage Gravity pipeline & existing Joint bay, if horizontal clearance is 5.0 m & above.</p>			



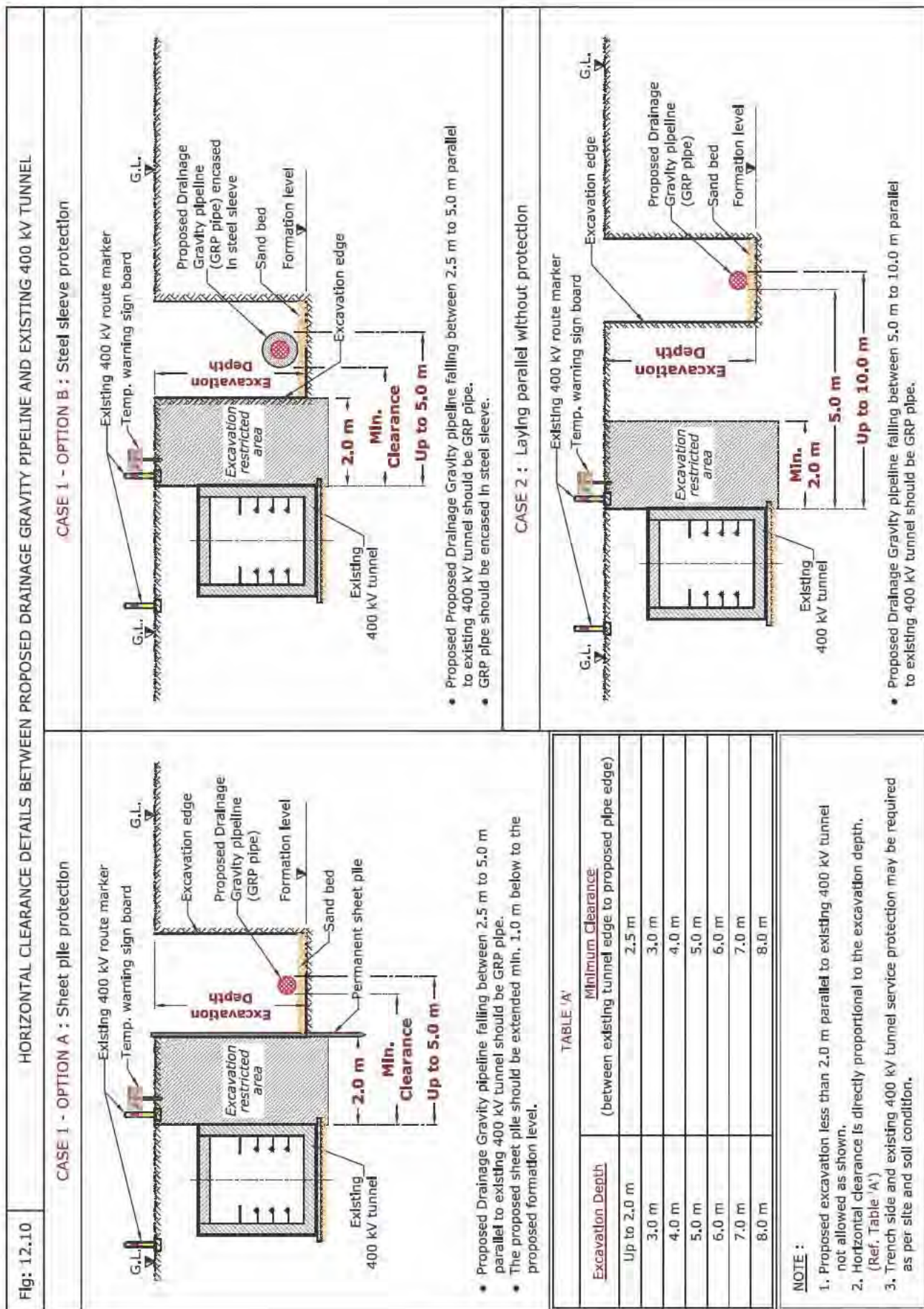


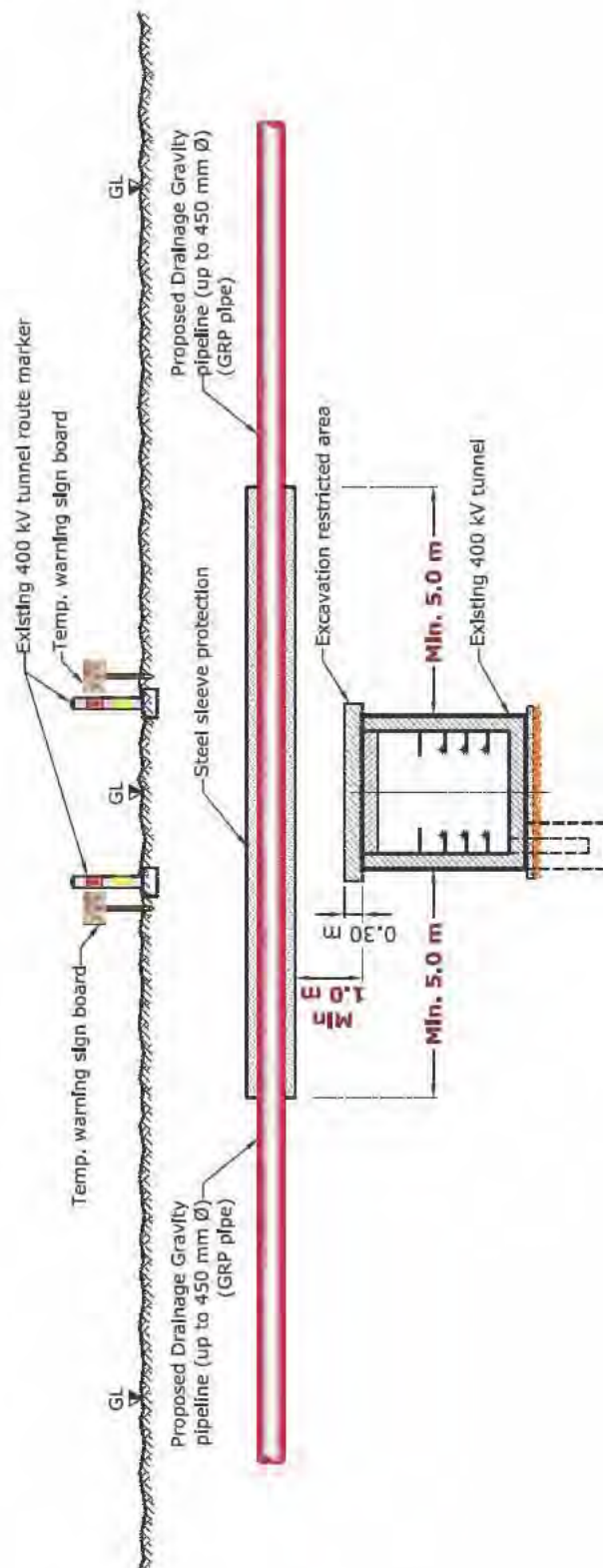
TABLE 'A'

Excavation Depth	Minimum Clearance (between existing tunnel edge to proposed pipe edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

NOTE :

- Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
- Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
- Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED DRAINAGE GRAVITY PIPELINE AND EXISTING 400 kV TUNNEL



- NOTE :**
1. Proposed Drainage Gravity pipeline up to 450 mm Ø can be allowed to cross above existing 400 kV tunnel with respect to available vertical clearance.
 2. Vertical clearance is from the bottom of proposed steel sleeve to the top of existing 400 kV tunnel.
 3. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
 4. Proposed Drainage Gravity pipeline crossing above existing 400 kV tunnel should be GRP pipe and protected with steel sleeve as shown.
 5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Flg: 12.12

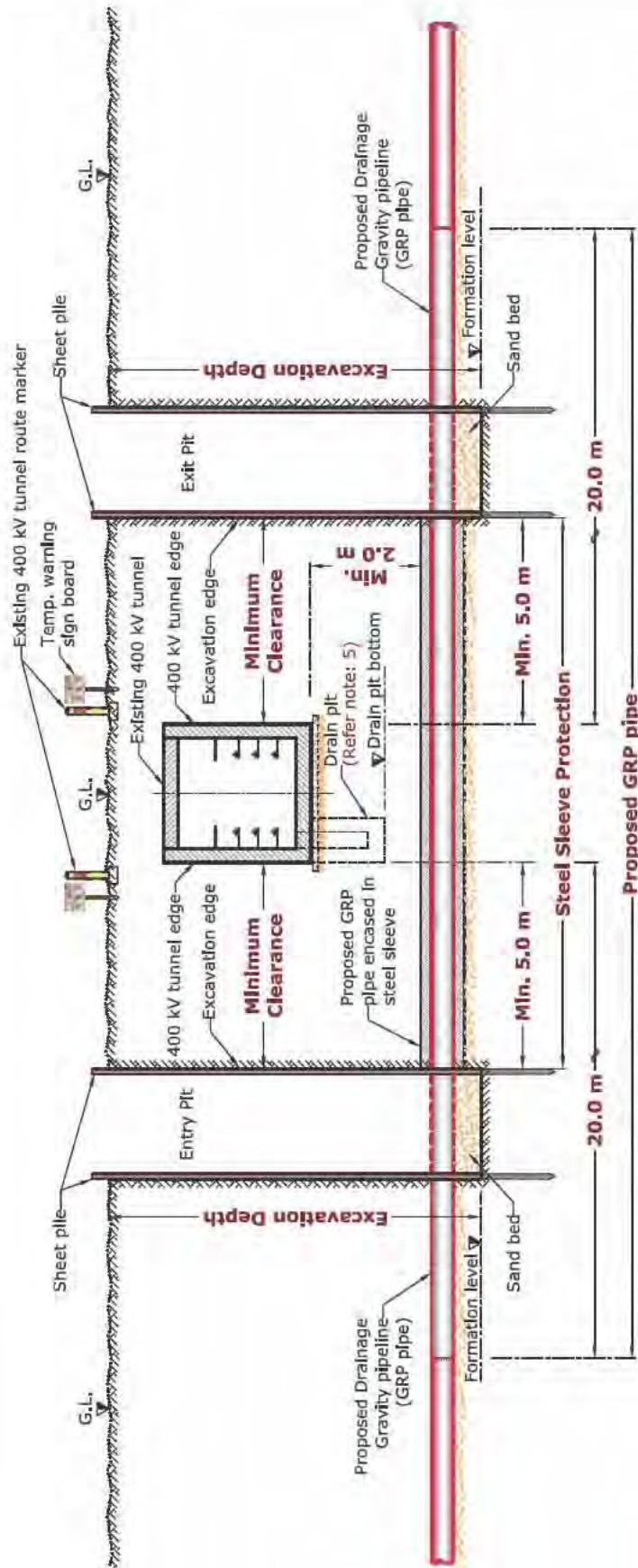


TABLE 'A'

	<u>Excavation Depth</u>	<u>Minimum Clearance</u> (Between existing 400 kV tunnel edge to proposed Entry/ Exit excavation edge)
1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel Is not allowed.		
2. Minimum clearance from 400 kV tunnel edge to entry/exit pit excavation edge is directly proportional to the excavation depth. (Ref. Table 'A')		
3. Proposed Drainage Gravity pipeline can be allowed to cross below existing 400 kV tunnel by NDCM.	Up to 2.0 m	2.5 m
4. Vertical clearance Is from the top of proposed NDCM work to the bottom of existing 400 kV tunnel.	3.0 m	3.0 m
5. Existing 400 kV tunnel's drain pit location should be identified prior to start NDCM work. In case the proposed Drainage Gravity pipeline crossing falling below existing drain pit area, minimum 2.0 m vertical clearance to be maintained from the bottom of drain pit to the top of proposed NDCM work.	4.0 m	4.0 m
6. Proposed Drainage Gravity pipeline crossing below existing 400 kV tunnel should be GRP pipe and protected with steel sleeve as shown in the figure.	5.0 m	5.0 m
7. Sheet pile protection may be required for Entry/ Exit pit excavation.	6.0 m	6.0 m
8. Settlement calculation shall be submitted.	7.0 m	7.0 m
9. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.	8.0 m	8.0 m

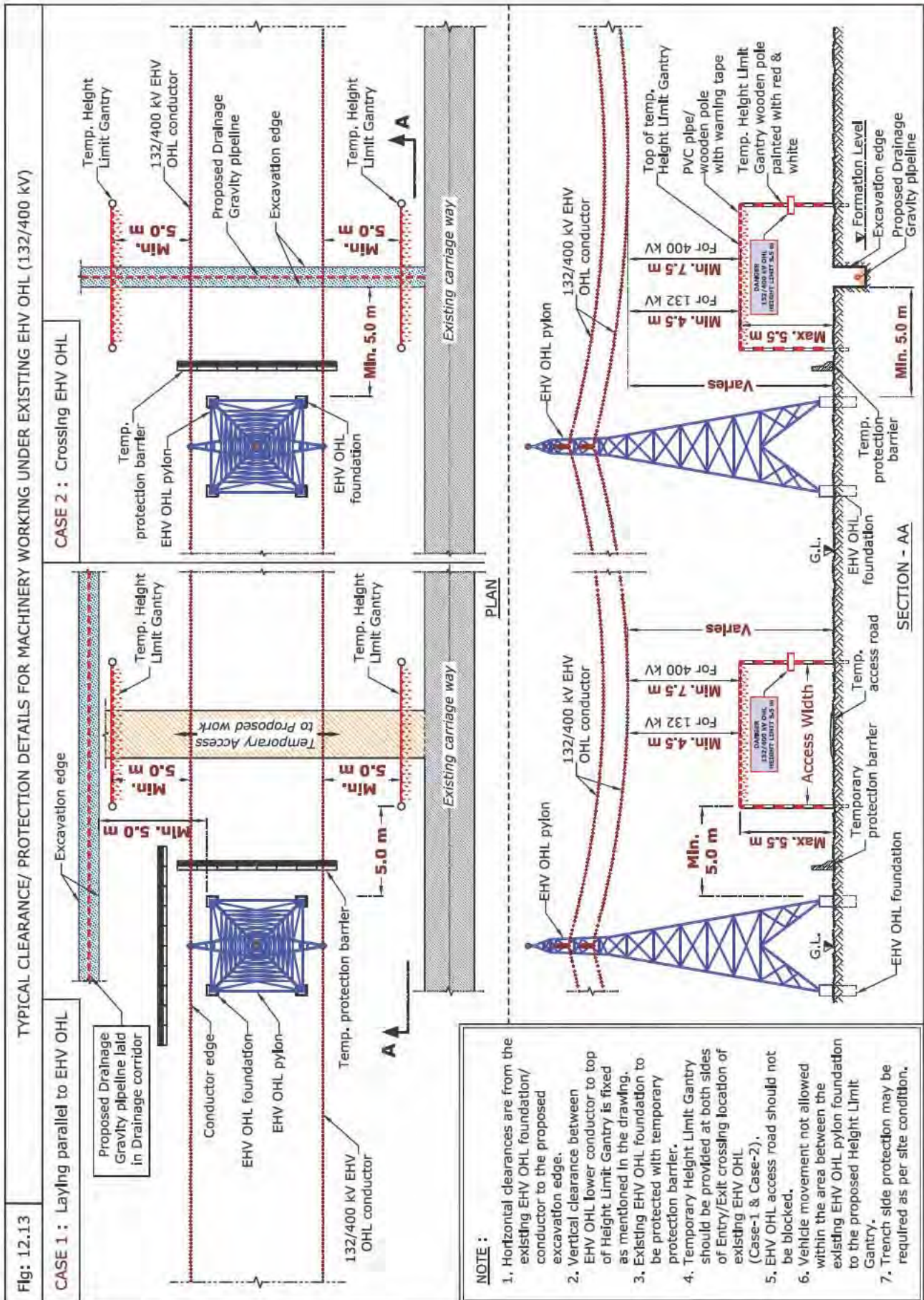


Table 4: Clearance & Protection details for Proposed Drainage Gravity Pipeline and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 12.14)
Gas/Fuel pipeline (All diameter)	10.0 m	(Refer below Note)	B	NDCM	R	• Horizontal clearance (Ref Fig: 12.14)

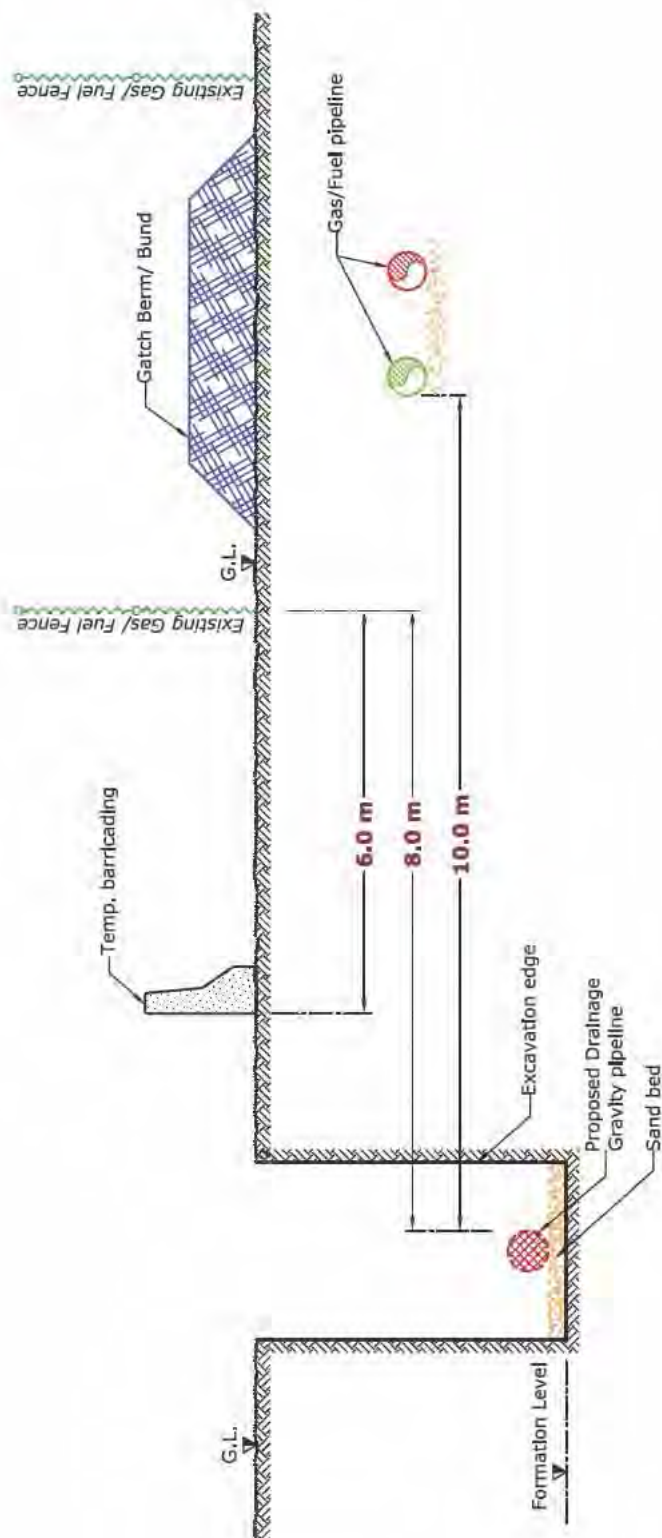
Note: Minimum vertical clearance shall be 2.0 m or 1.5 times of proposed drainage pipeline/sleeve diameter whichever is greater.

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 12.14 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE GRAVITY PIPELINE AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Drainage Gravity pipeline edge to existing Gas/ Fuel Fence.
2. Horizontal clearance 10.0 m from proposed Drainage Gravity pipeline edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed Drainage Gravity pipeline allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Minimum vertical clearance for crossing existing Gas/ Fuel pipeline shall be 2.0 m or 1.5 times of proposed Drainage Gravity pipeline/ Sleeve diameter whichever is greater.
6. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
7. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

13. Laying of Proposed Utilities - Drainage Pressure Pipelines

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13.1 Introduction

The purpose of the pressure drainage system is to collect and transport storm water received from the gravity drainage system to prevent flooding along city internal and external roads and to ensure smooth and safe traffic flow. The pressure network system comprises of a Pumping station, pipelines/ valve

chambers and the storm water, generally discharging to lake and/or sea through the drainage networks.

This system is laid in a dedicated corridor within Right Of Way. Therefore, during laying activities it is required to protect DEWA assets as per specified standards.



Laying of Drainage Pressure line

13.2 Avoid the following



1. Crossing existing EHV Joint Bay/Transition Joint.
2. Proposal for Drainage Pipeline/Manhole/Valve Chambers in DEWA corridor.

13.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Drainage pressure pipeline and existing DEWA Electricity LV cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	2.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 13.1, Case 1) • Vertical clearance (Ref Fig: 13.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

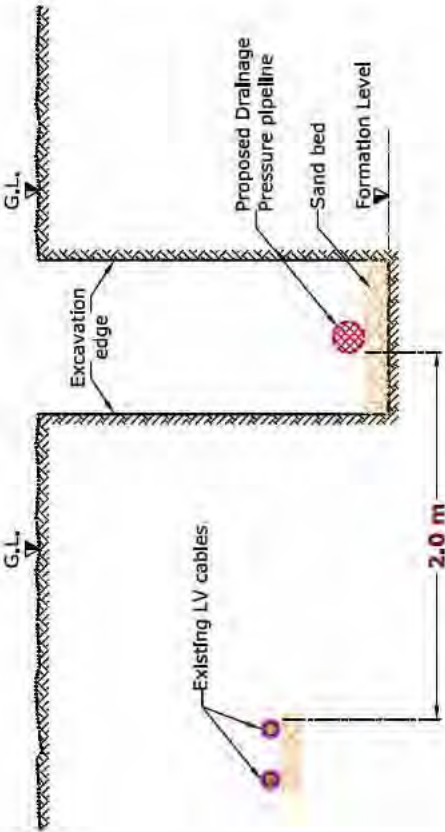
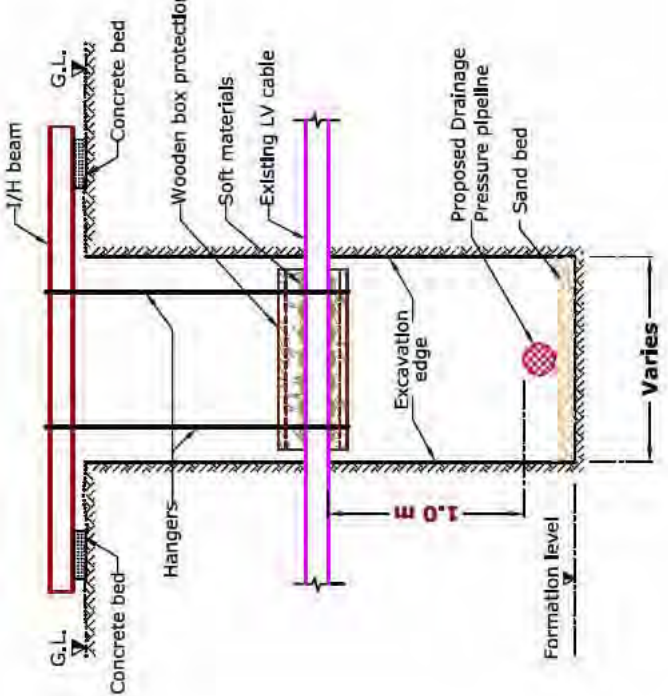
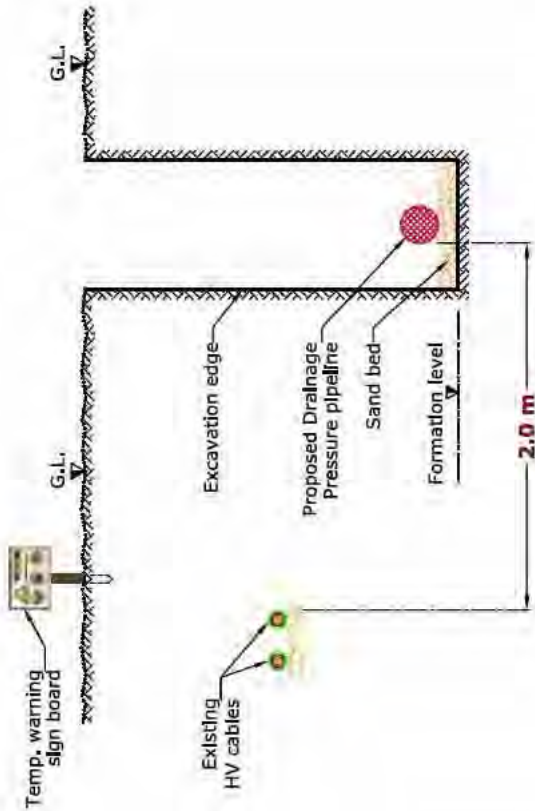
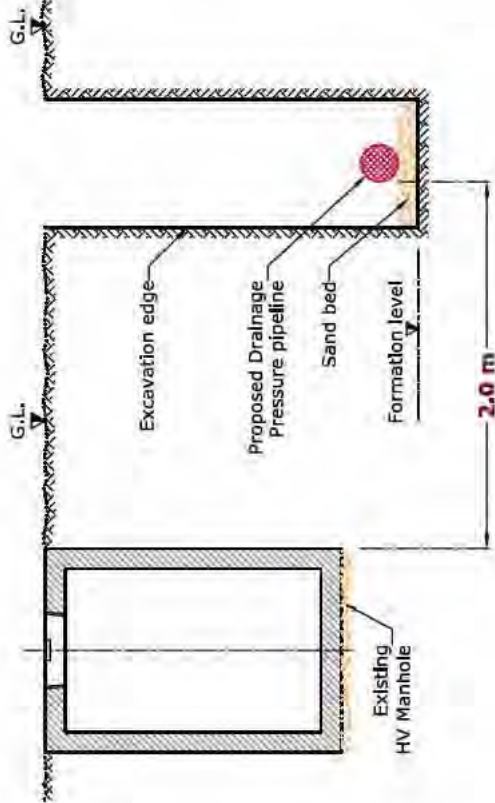
<p>Fig: 13.1</p>	<p>HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING LV CABLES</p> <div> <p>CASE 1 : Laying Parallel To Existing LV Cables</p>  </div> <div> <p>CASE 2 : Crossing Below The Existing LV Cables</p>  </div>	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Drainage Pressure pipeline edge to existing LV cable edge. 2. Vertical clearance is from the top of proposed Drainage Pressure pipeline to bottom of existing LV cable. 3. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing LV service edge. 4. Trench side and existing LV cable protection may be required as per site and soil condition.
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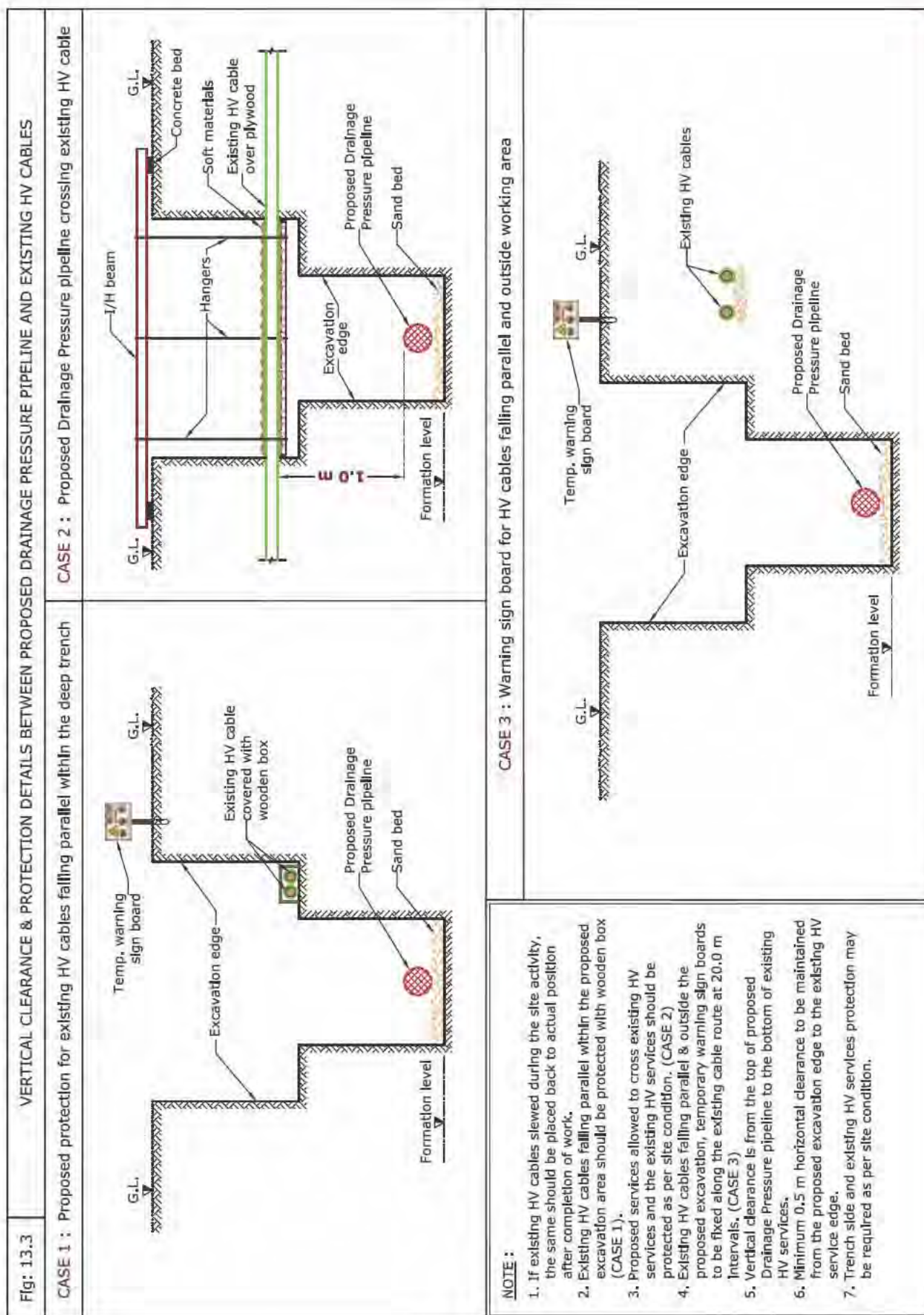
Table 2: Clearance & Protection details for proposed Drainage pressure pipeline and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	2.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 13.2, Case 1) Vertical clearance (Ref Fig: 13.3, Case 2) Protection details (Ref Fig: 13.3)
HV (6.6/11/33 kV) Manhole	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 13.2, Case 2)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 13.4) Protection details (Ref Fig: 13.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 13.4) Vertical clearance (Ref Fig: 13.4) Protection details (Ref Fig: 13.4)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 13.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING HV SERVICES
CASE 1 : Laying parallel to existing HV cables	
CASE 2 : Laying parallel to existing HV Manhole	
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearances are from the proposed Drainage Pressure pipeline edge to existing HV services edge,2. Proposed Drainage Pressure pipeline allowed to cross below existing HV cables,3. Proposed Drainage Pressure pipeline not allowed to cross existing HV Manhole,4. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge.5. Trench side and existing HV services protection may be required as per site and soil condition.	



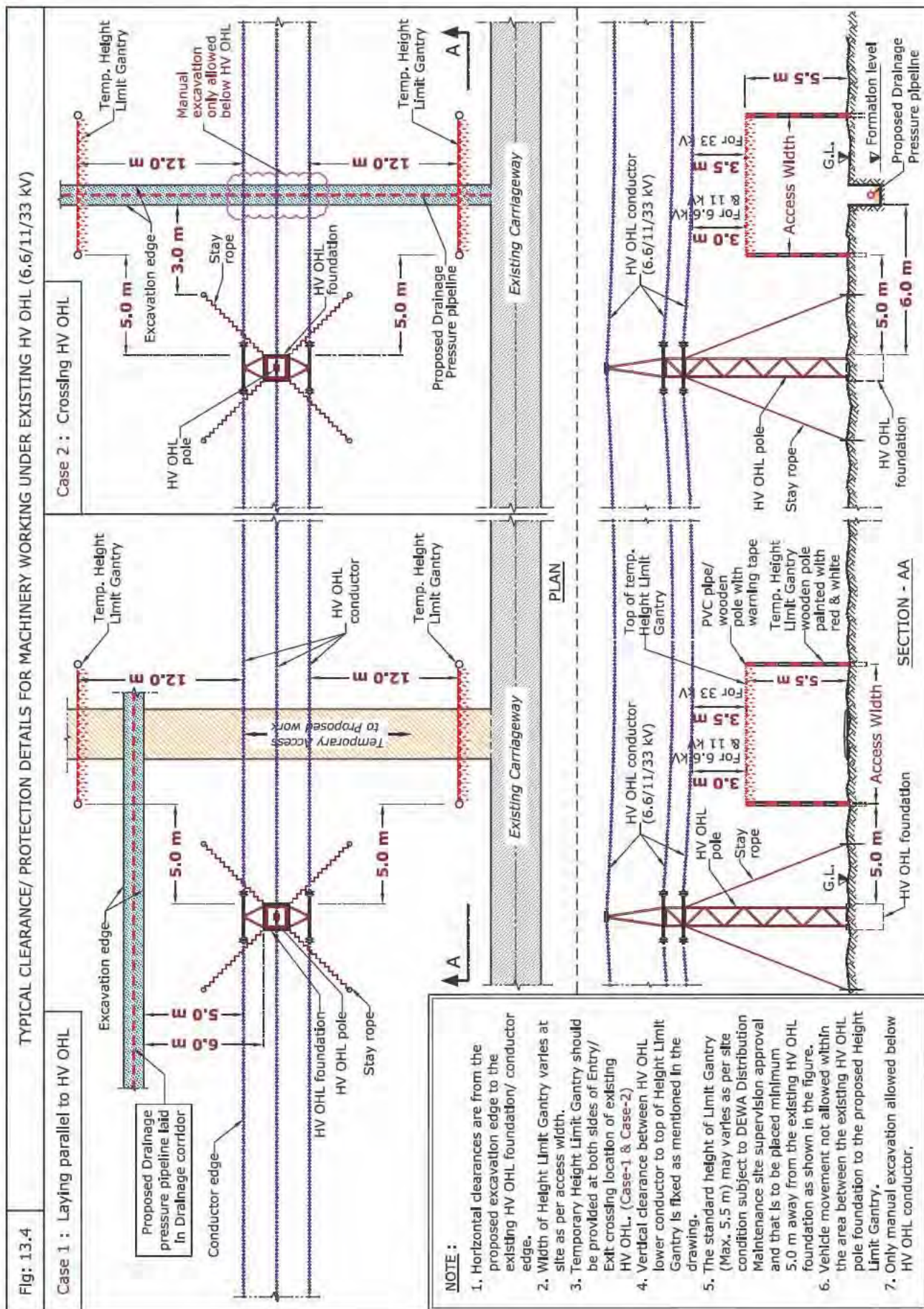
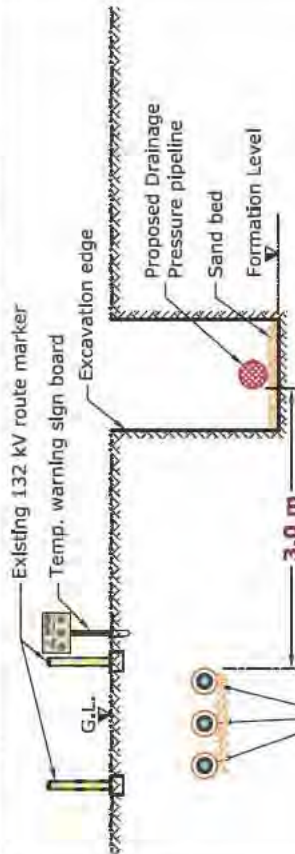
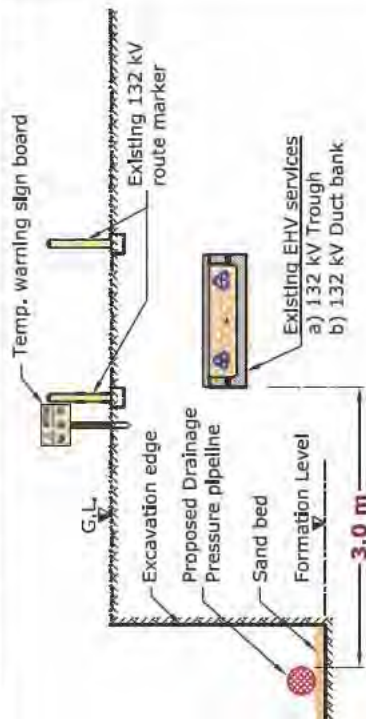
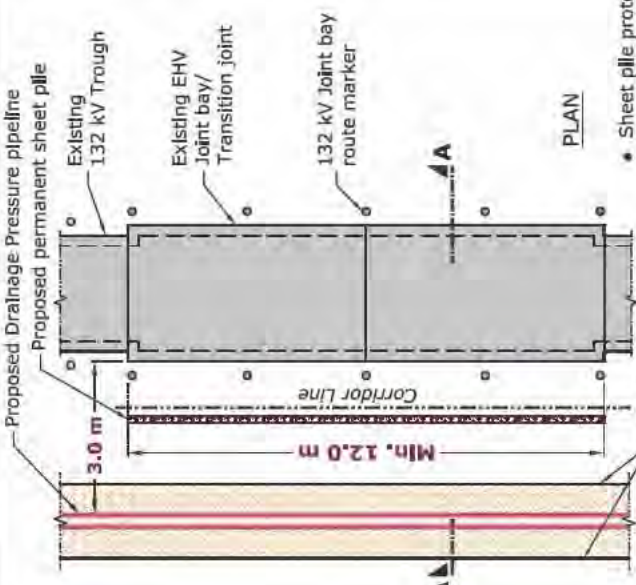
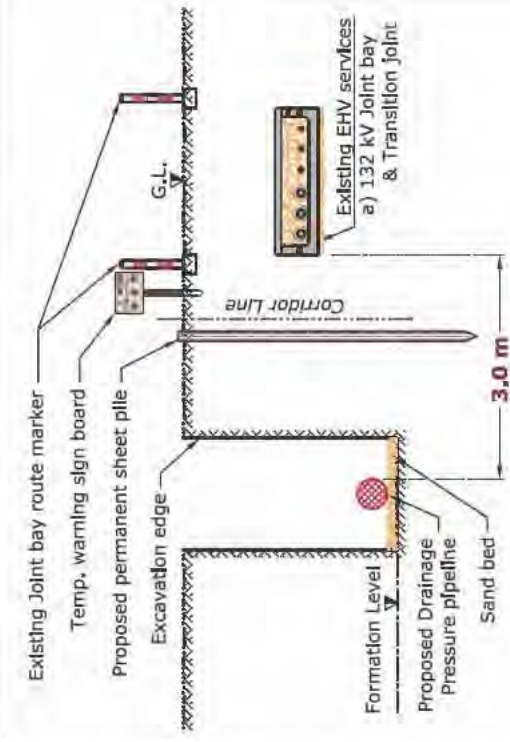


Table 3: Clearance & Protection details for Proposed Drainage Pressure pipeline and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 13.5)• Vertical clearance (Ref Fig: 13.10)• Protection details (Ref Fig: 13.10)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 13.5)• Vertical clearance (Ref Fig: 13.9)• Protection details (Ref Fig: 13.9)
EHV (132 kV) Trough	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 13.6)• Vertical clearance (Ref Fig: 13.11)• Protection details (Ref Fig: 13.11, 13.12 & 13.13)
EHV (132 kV) Duct Bank	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 13.6)• Vertical clearance (Ref Fig: 13.8)• Protection details (Ref Fig: 13.8)
EHV (132 kV) Joint Bay/ Transition Joint	3.0 m	NA	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 13.7)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 13.17)• Protection details (Ref Fig: 13.17)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 13.14)• Vertical clearance (Ref Fig: 13.15)• Protection details (Ref Fig: 13.15)
		2.0 m	B	NDCM		<ul style="list-style-type: none">• Vertical clearance (Ref Fig: 13.16)• Protection details (Ref Fig: 13.16)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 13.17)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">• Vertical clearance (Ref Fig: 13.17)• Protection details (Ref Fig: 13.17)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 13.5	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>  <p>Existing 132 kV route marker</p> <p>Temp. warning sign board</p> <p>G.L.</p> <p>Excavation edge</p> <p>Proposed Drainage Pressure pipeline</p> <p>Sand bed</p> <p>Formation Level</p> <p>3.0 m</p> <p>Existing directly buried EHV services</p> <p>a) 132 kV Oil Filled cables</p> <p>b) 132 kV Power & Pilot/ F.O. cables</p>	Fig: 13.6	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>  <p>G.L.</p> <p>Excavation edge</p> <p>Temp. warning sign board</p> <p>Existing 132 kV route marker</p> <p>Proposed Drainage Pressure pipeline</p> <p>Sand bed</p> <p>Formation Level</p> <p>3.0 m</p> <p>Existing EHV services</p> <p>a) 132 kV Trough</p> <p>b) 132 kV Duct bank</p>
<p>NOTE :</p> <ol style="list-style-type: none">1. All horizontal clearances are from proposed Drainage Pressure pipeline outer edge to existing EHV 132 kV services edge.2. Existing EHV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV service edge.4. Permanent sheet pile should be provided between existing 132 kV Joint Bay/ Transition Joint (Minimum 12.0 m length) and proposed excavation as shown.5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.	<p>Fig: 13.7</p> <p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>  <p>Proposed Drainage Pressure pipeline</p> <p>Proposed permanent sheet pile</p> <p>Existing 132 kV Trough</p> <p>Existing EHV Joint bay/ Transition joint</p> <p>132 kV Joint bay route marker</p> <p>Corridor Line</p> <p>Excavation edge</p> <p>3.0 m</p> <p>Min. 12.0 m</p> <p>PLAN</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>  <p>Existing Joint bay route marker</p> <p>Temp. warning sign board</p> <p>Proposed permanent sheet pile</p> <p>Excavation edge</p> <p>Formation Level</p> <p>Proposed Drainage Pressure pipeline</p> <p>Sand bed</p> <p>G.L.</p> <p>Existing EHV services</p> <p>a) 132 kV Joint bay & Transition joint</p> <p>3.0 m</p> <p>SECTION - AA</p>	<p>• Sheet pile protection not required between proposed Drainage Pressure pipeline & existing Joint bay, if horizontal clearance is 5.0 m & above.</p>

- Sheet pile protection not required between proposed Drainage Pressure pipeline & existing Joint bay, if horizontal clearance is 5.0 m & above.

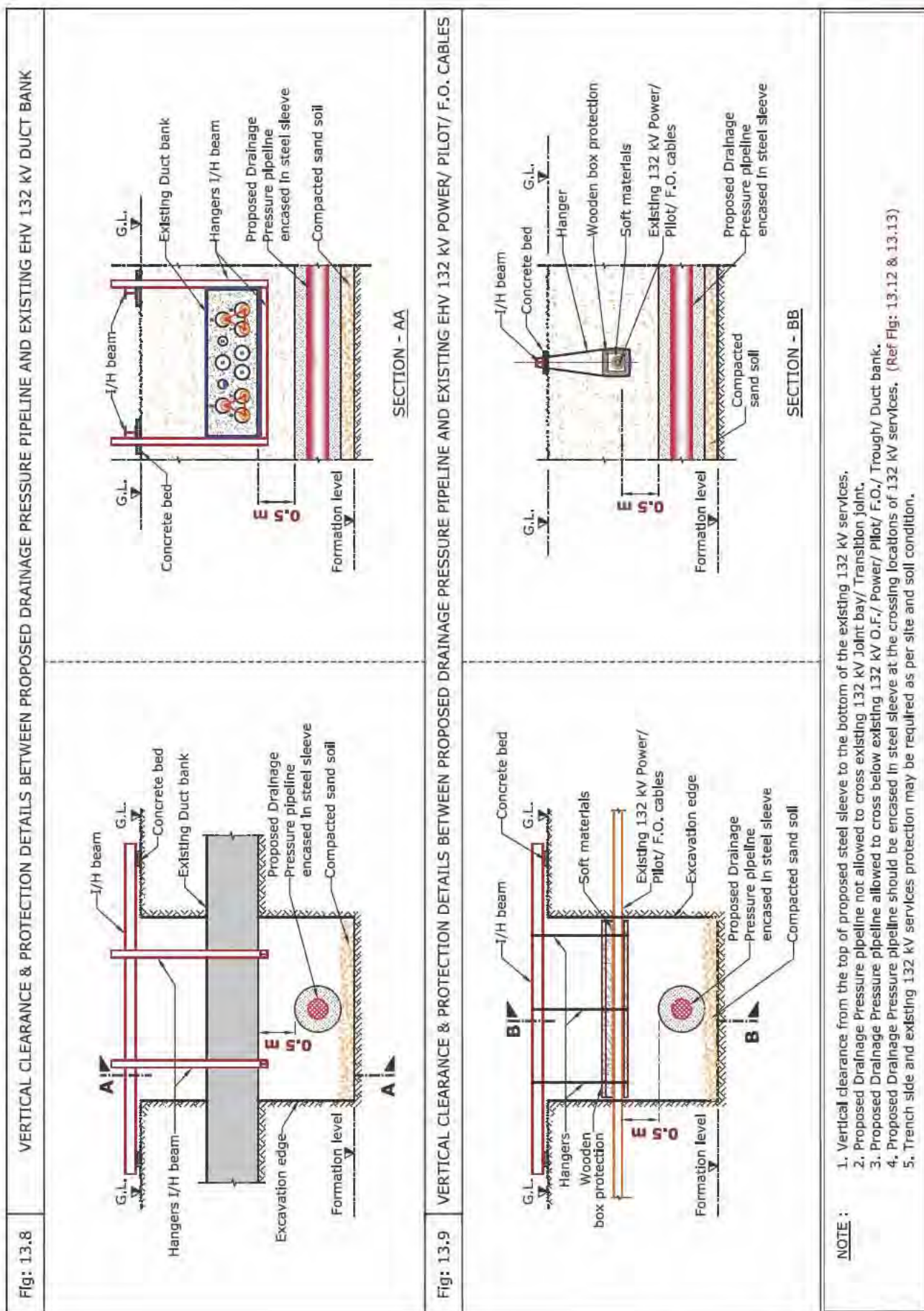
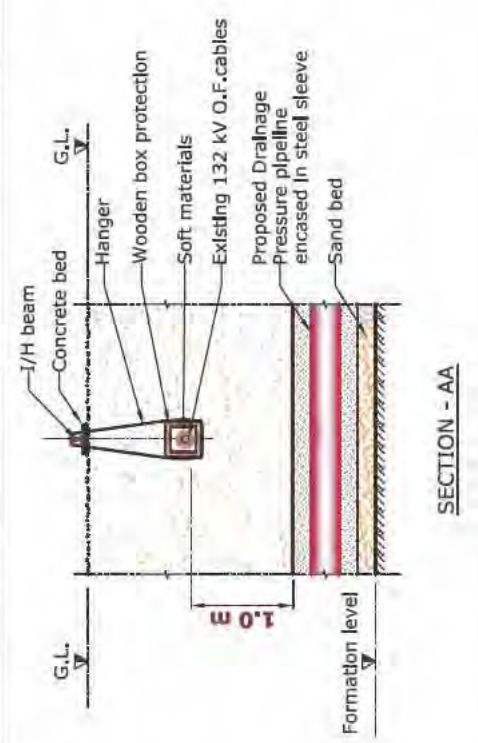
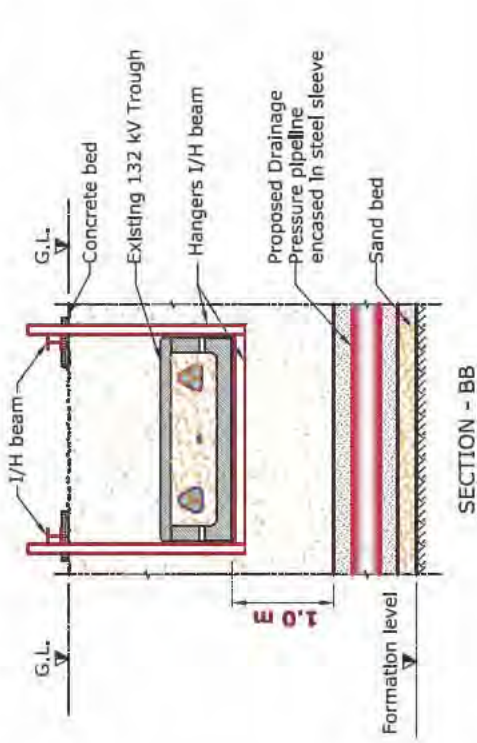
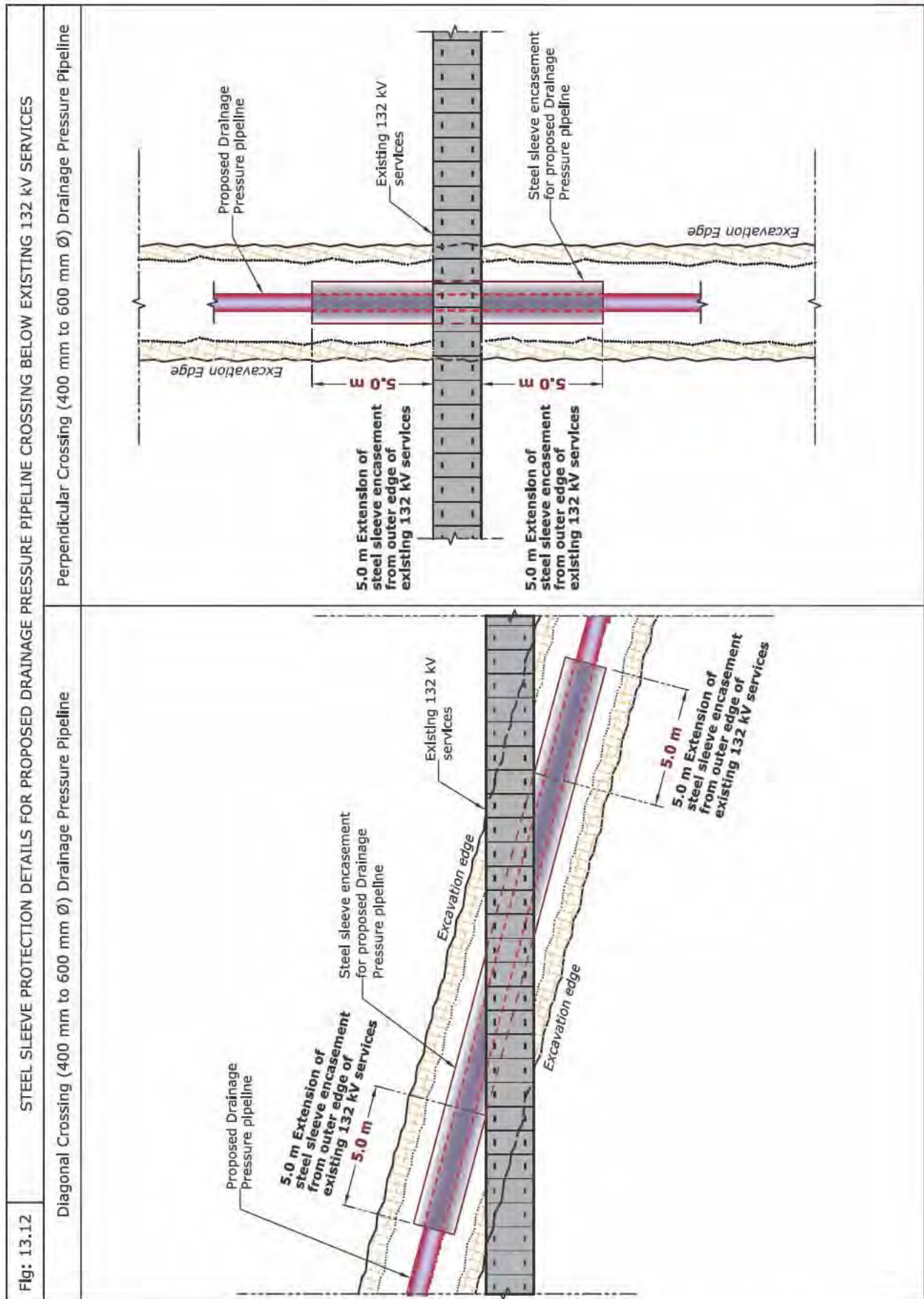
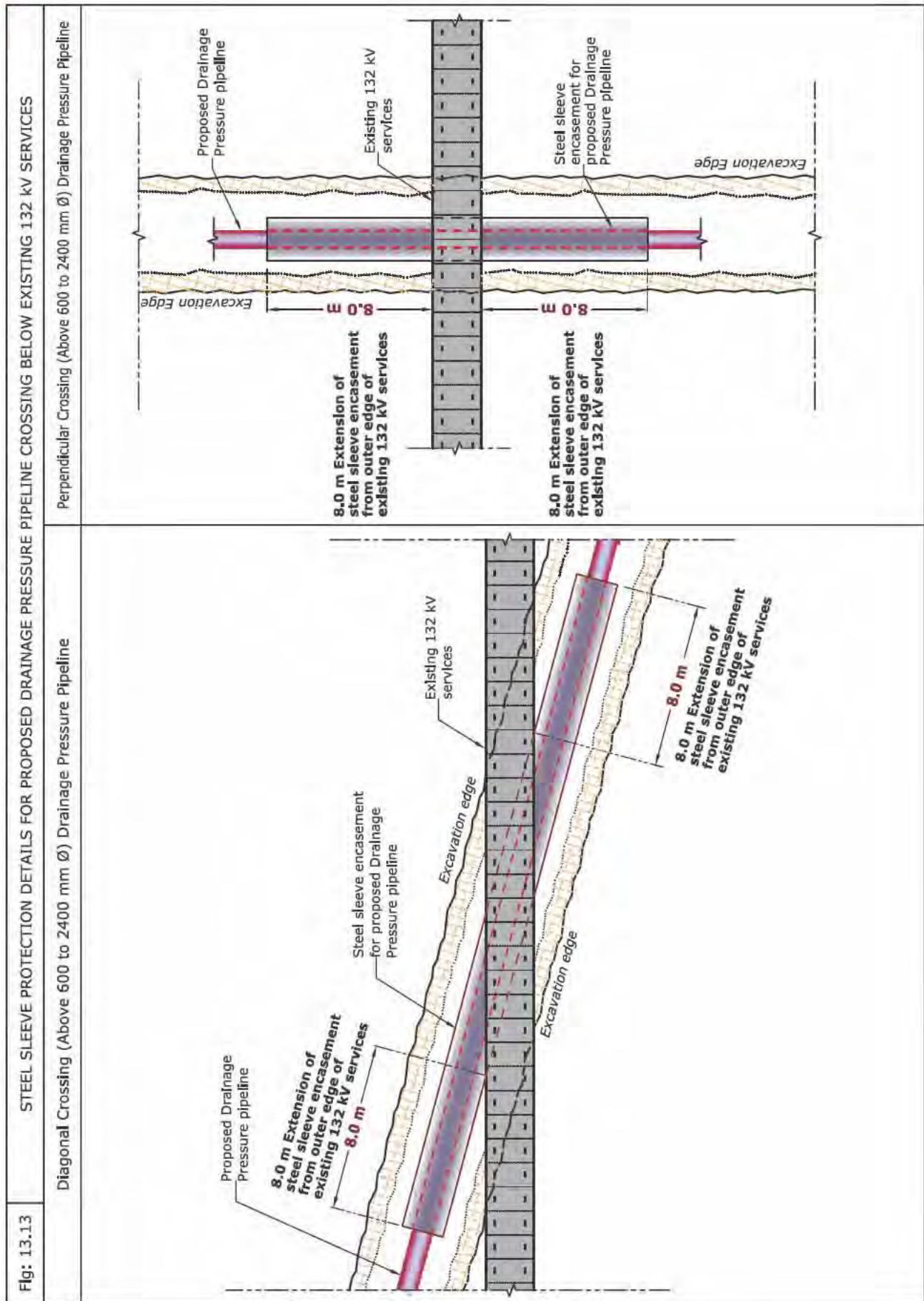


Fig: 13.10	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED DRAINAGE PIPELINE AND EXISTING EHV 132 kV O.F. CABLES</p>  <p style="text-align: center;">SECTION - AA</p>
Fig: 13.11	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED DRAINAGE PIPELINE AND EXISTING EHV 132 kV TROUGH</p>  <p style="text-align: center;">SECTION - BB</p>
NOTE :	<ol style="list-style-type: none"> 1. Vertical clearance from the top of proposed steel sleeve to the bottom of the existing 132 kV services. 2. Proposed Drainage Pressure pipeline not allowed to cross existing 132 kV Joint bay/ Transition joint. 3. Proposed Drainage Pressure pipeline allowed to cross below existing EHV 132 kV services O.F./ Pilot/ F.O./ Trough/ Duct bank services. 4. Proposed Drainage Pressure pipeline should be encased in steel sleeve at the crossing locations. (Ref Fig: 13.12 & 13.13) 5. Trench side and existing EHV 132 kV services protection required as per site and soil condition.





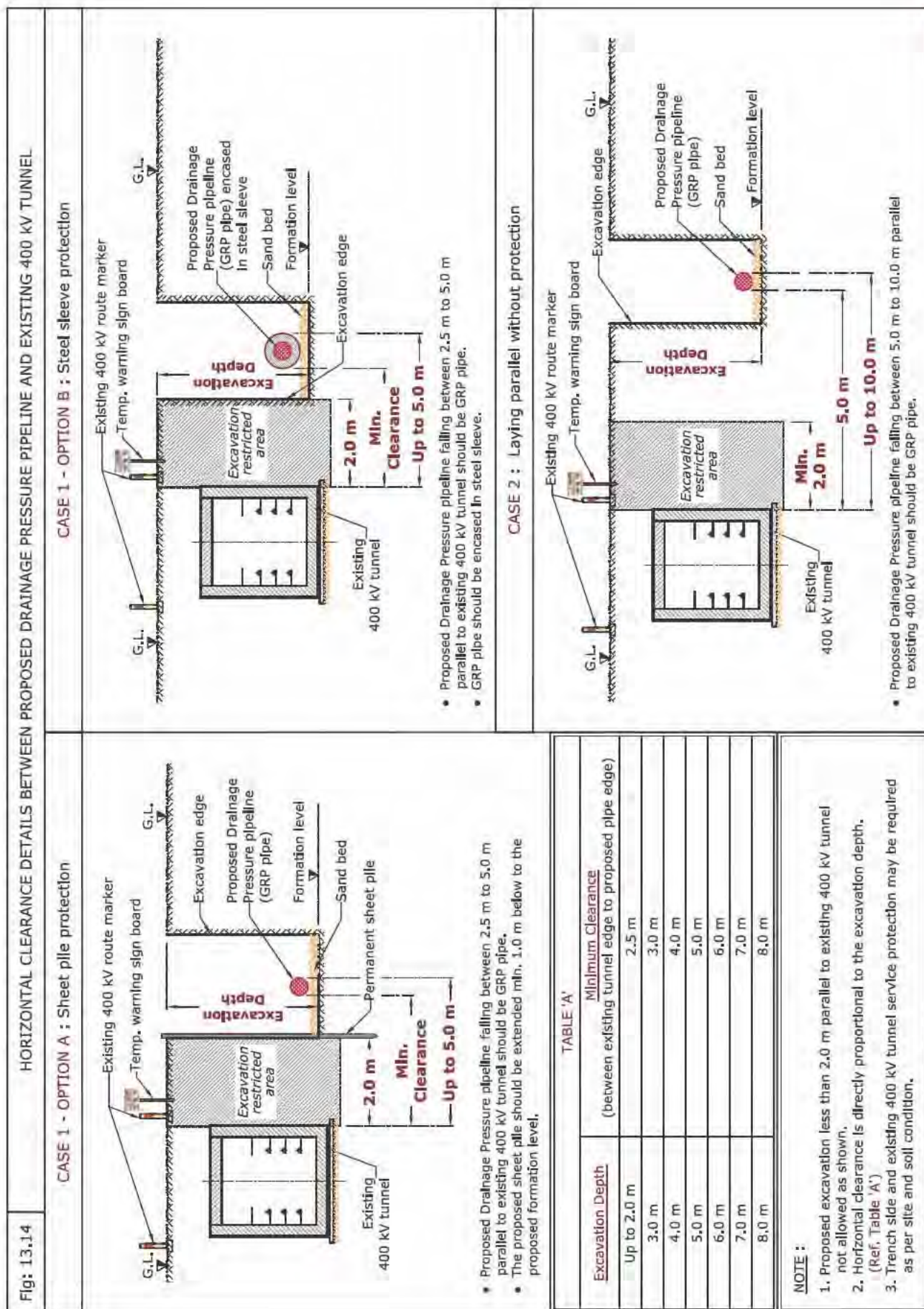
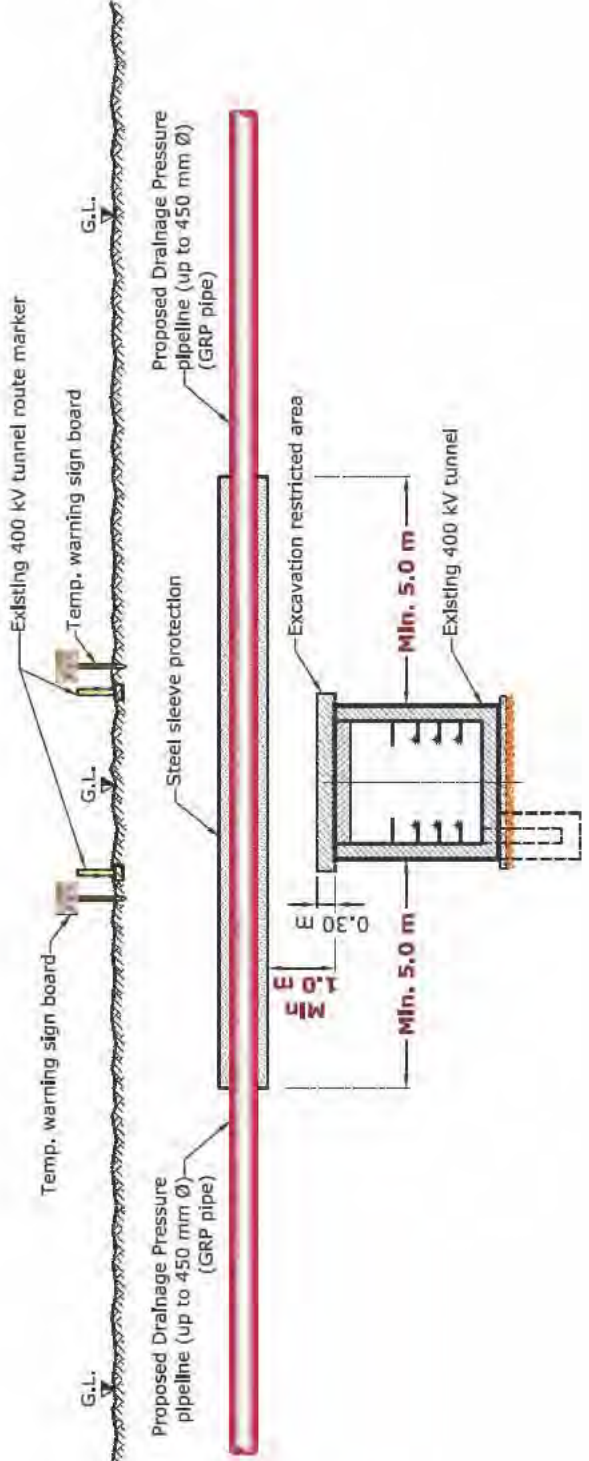


TABLE 'A'

Excavation Depth	Minimum Clearance (between existing tunnel edge to proposed pipe edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

NOTE :

- Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
- Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
- Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Fig: 13.15	VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING 400 KV TUNNEL
	 <p>The diagram illustrates the vertical clearance and protection details between a proposed drainage pressure pipeline and an existing 400 kV tunnel. It includes a side view and a cross-section view.</p> <p>Side View:</p> <ul style="list-style-type: none"> Existing 400 kV tunnel route marker Temp. warning sign board G.L. (Ground Level) Proposed Drainage Pressure pipeline (up to 450 mm ϕ) (GRP pipe) Steel sleeve protection Proposed Drainage Pressure pipeline (up to 450 mm ϕ) (GRP pipe) <p>Cross-section View:</p> <ul style="list-style-type: none"> Excavation restricted area Existing 400 kV tunnel Min. 5.0 m (Minimum clearance from the bottom of the proposed steel sleeve to the top of the existing 400 kV tunnel) Min. 5.0 m (Minimum clearance from the top of the proposed steel sleeve to the bottom of the existing 400 kV tunnel) 0.30 m (Minimum clearance from the tunnel side to the proposed steel sleeve)
NOTE :	<ol style="list-style-type: none"> 1. Proposed Drainage Pressure pipeline up to 450 mm ϕ can be allowed to cross above existing 400 kV tunnel with respect to available vertical clearance. 2. Vertical clearance is from the bottom of proposed steel sleeve to the top of existing 400 kV tunnel. 3. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel. 4. Proposed Drainage Pressure pipeline crossing above existing 400 kV tunnel should be GRP pipe and protected with steel sleeve as shown. 5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING 400 kV TUNNEL

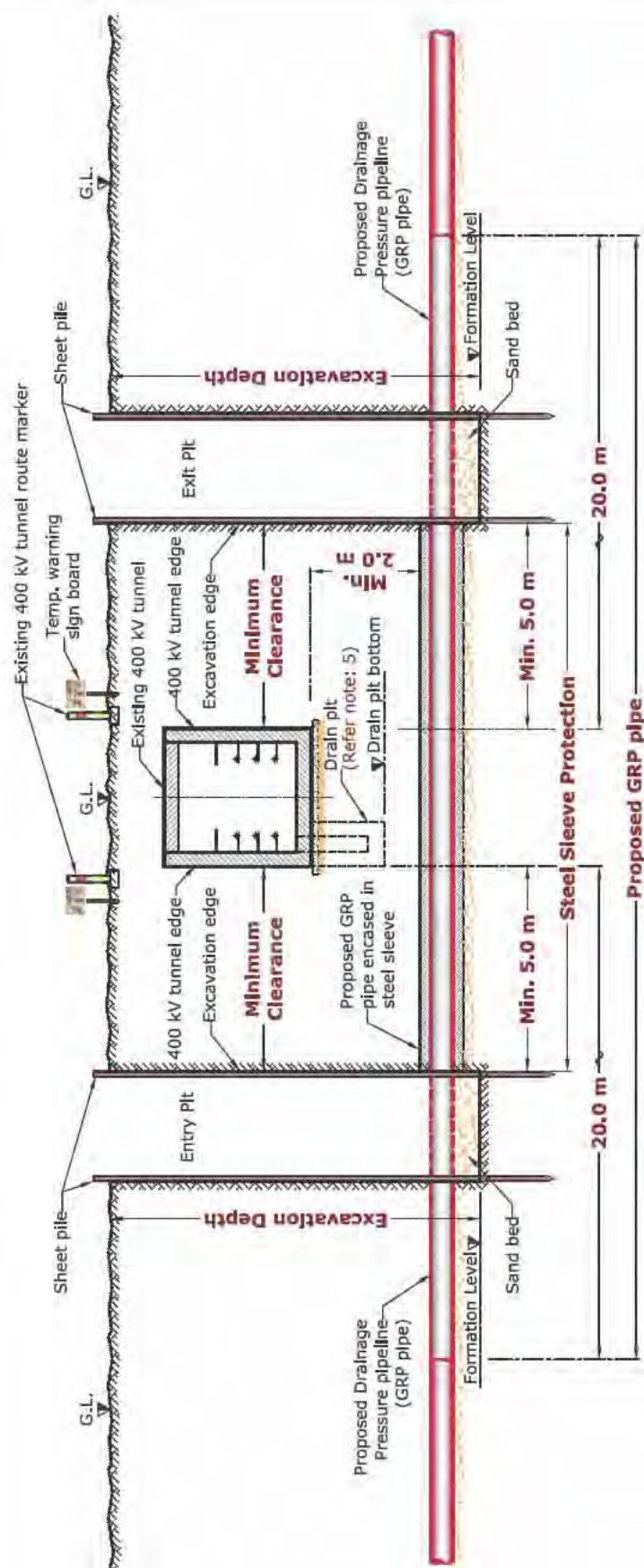


TABLE 'A'	
Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Entry/ Exit excavation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

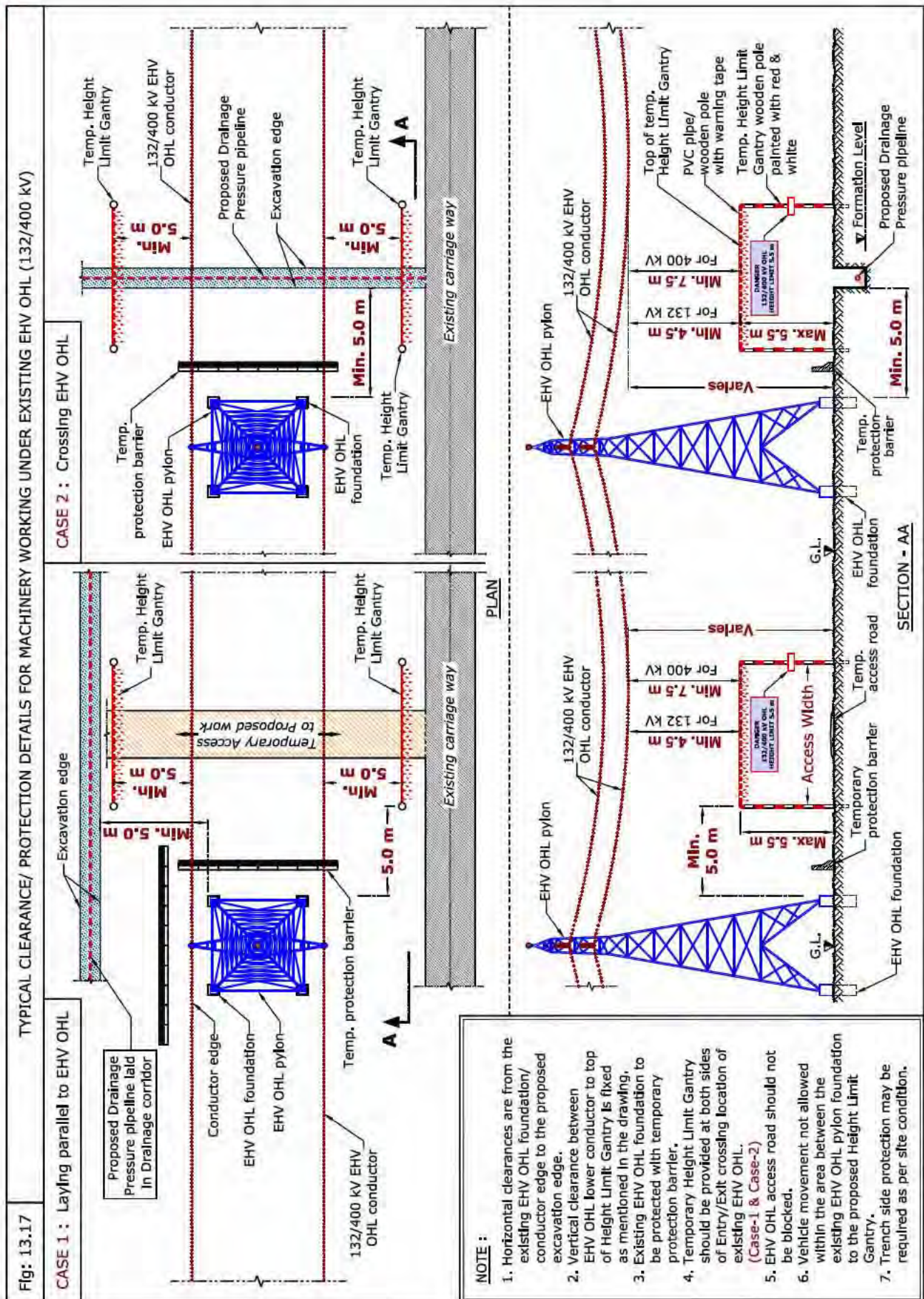


Table 4: Clearance & Protection details for proposed Drainage Pressure pipeline and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 13.18)
Gas/Fuel pipeline (All diameter)	10.0 m	(Refer below Note)	B	NDCM	R	• Horizontal clearance (Ref Fig: 13.18)

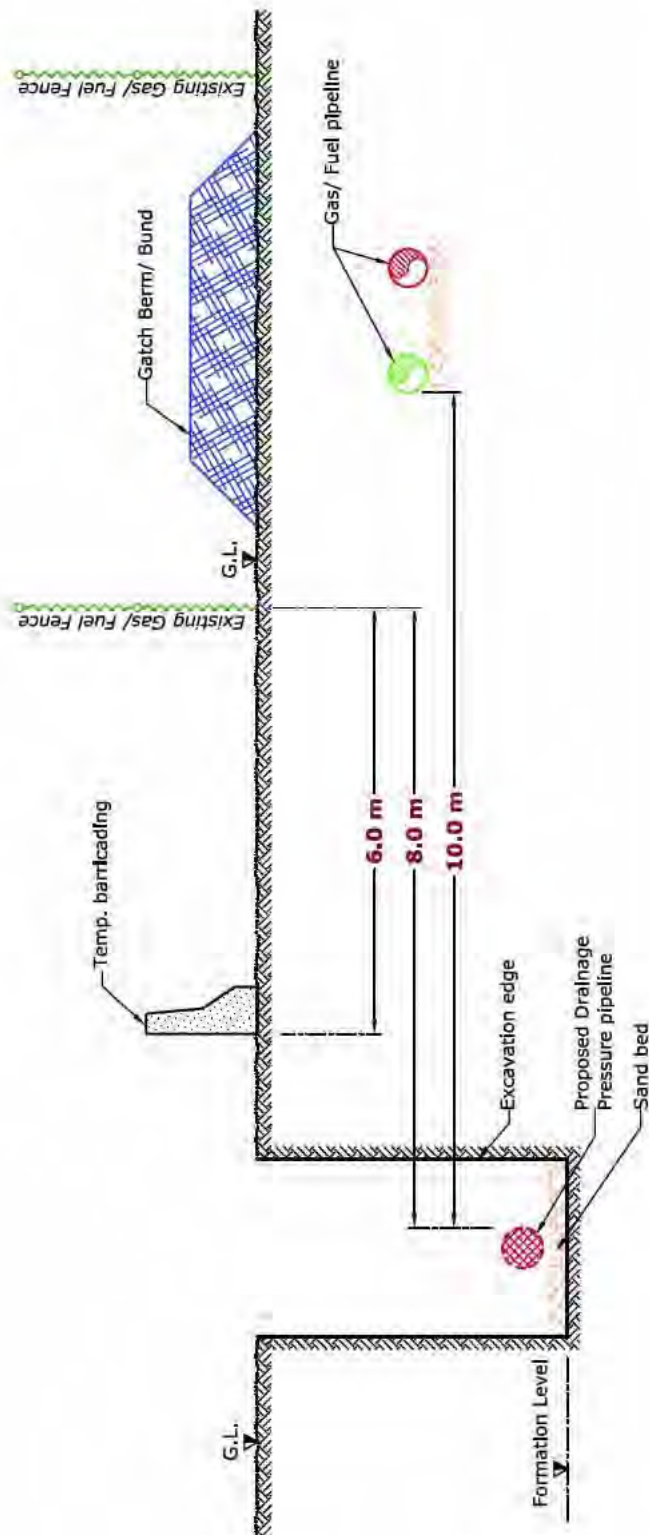
Note: Minimum vertical clearance shall be 2.0 m or 1.5 times of proposed drainage pipeline/sleeve diameter whichever is greater.

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 13.18 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DRAINAGE PRESSURE PIPELINE AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Drainage Pressure pipeline edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Drainage Pressure pipeline edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed Drainage Pressure pipeline allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Minimum vertical clearance for crossing existing Gas/ Fuel pipeline shall be 2.0 m or 1.5 times of proposed Drainage Pressure pipeline/ Sleeve diameter whichever is greater.
6. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
7. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

14. Laying of Proposed Utilities - Irrigation Distribution Pipelines

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14.1 Introduction

The purpose of the irrigation distribution network is to irrigate the green landscaping areas, trees, plantation etc., by treated irrigation water that transmitted from the main networks.

This network consists of distribution pipelines with various diameters of different materials, valves,

and chambers etc., which are constructed within a dedicated corridor in Right Of Way. Therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



Laying Irrigation Distribution Network

14.2 Avoid the following



1. Crossing existing 132 kV Joint Bay/Transition Joint.
2. Proposal for Irrigation pipeline/Manhole/Valve chamber in DEWA corridor.

14.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Irrigation Distribution Pipeline and existing DEWA Electricity LV cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 14.1, Case1) • Vertical clearance (Ref Fig: 14.1, Case2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

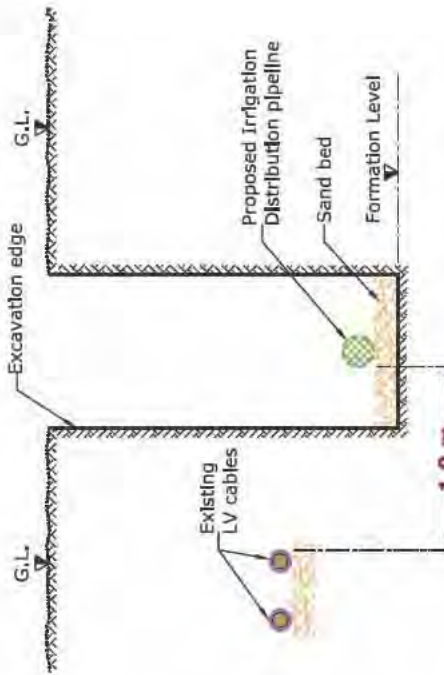
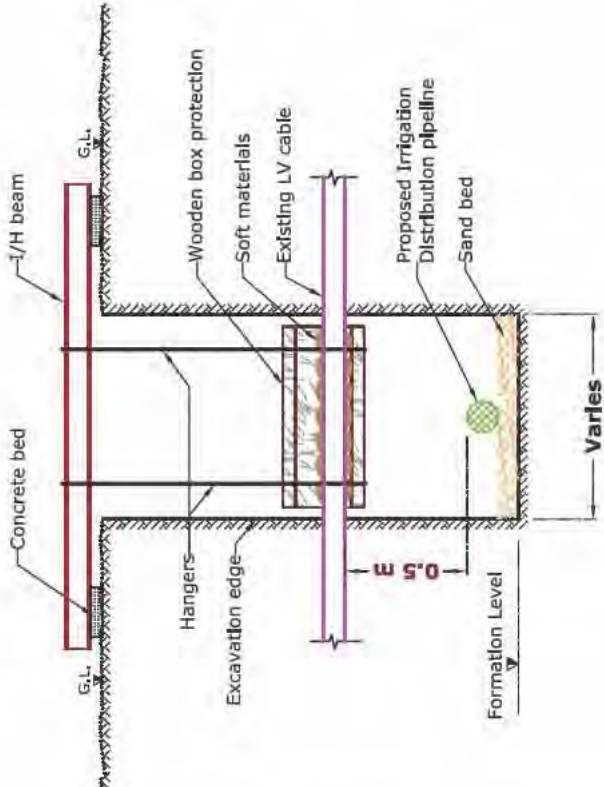
Fig: 14.1	HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED IRRIGATION DISTRIBUTION PIPELINE AND EXISTING LV CABLES
CASE 1 : Laying parallel to existing LV cables	
CASE 2 : Crossing below the existing LV cable	
NOTE :	<ol style="list-style-type: none">1. Horizontal clearance is from the proposed Irrigation Distribution pipeline edge to existing LV cable edge.2. Vertical clearance is from the top of proposed Irrigation Distribution pipeline to bottom of existing LV cable.3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing LV service edge.4. Trench side and existing LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed Irrigation Distribution Pipeline and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 14.2, Case 1) • Vertical clearance (Ref Fig: 14.3, Case 2) • Protection details (Ref Fig: 14.3)
HV (6.6/11/33 kV) Manhole	1.0 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 14.2, Case 2)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 14.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 14.4)
HV (33 kV) O.H.L		3.5 m				<ul style="list-style-type: none"> • Vertical clearance (Ref Fig: 14.4) • Protection details (Ref Fig: 14.4)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

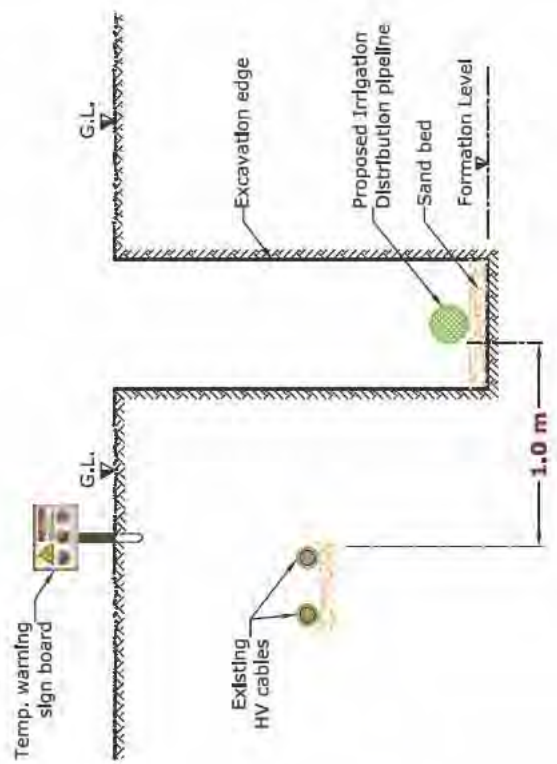
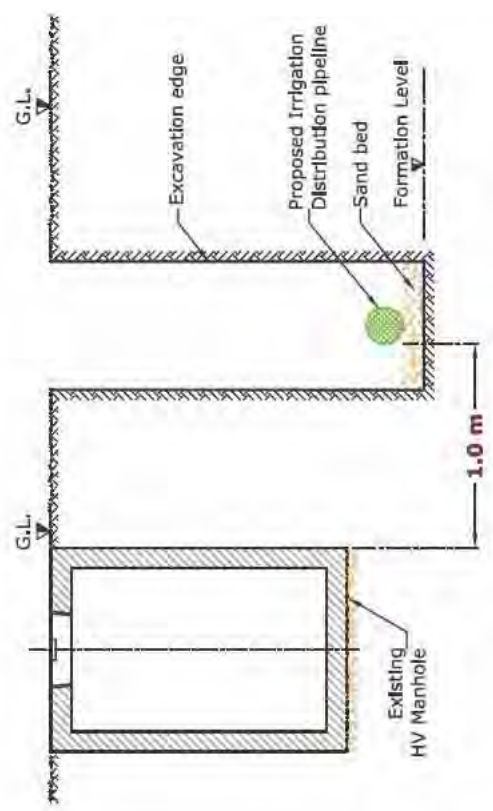

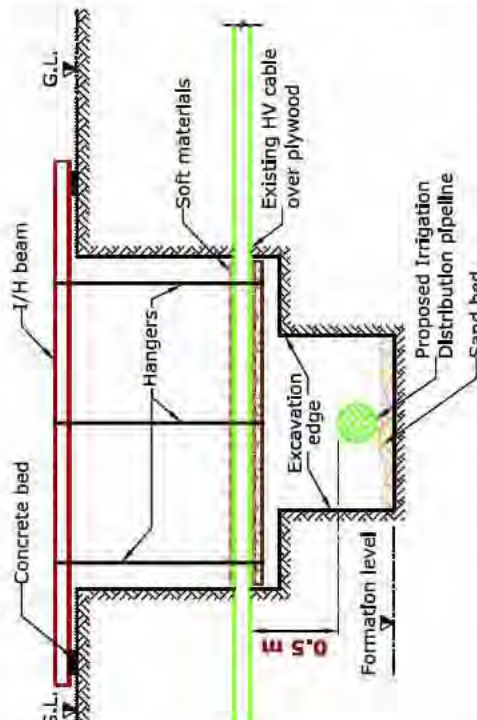
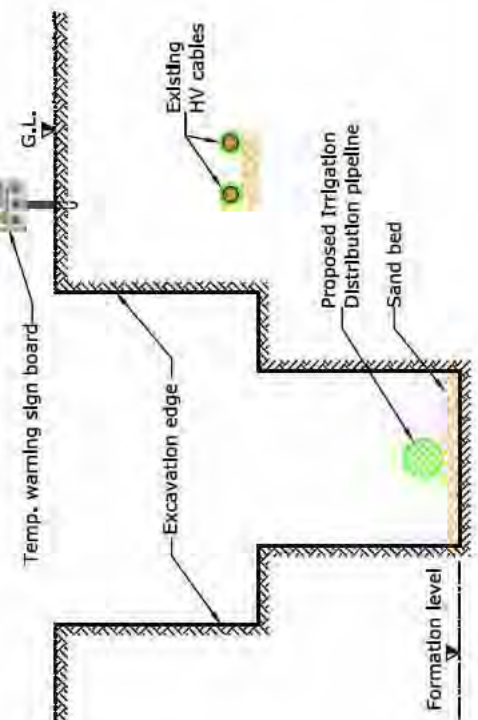
Fig: 14.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED IRRIGATION DISTRIBUTION PIPELINE AND EXISTING HV SERVICES
	<p>CASE 1 : Laying parallel to existing HV cables</p> 
	<p>CASE 2 : Laying parallel to existing HV Manhole</p> 
	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearances are from the proposed Irrigation Distribution pipeline edge to existing HV services edge. 2. Proposed Irrigation Distribution pipeline allowed to cross below existing HV cables. 3. Proposed Irrigation Distribution pipeline not allowed to cross existing HV Manhole. 4. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge. 5. Trench side and existing HV services protection may be required as per site and soil condition.

Fig: 14.3	VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED IRRIGATION DISTRIBUTION PIPELINE AND EXISTING HV CABLES	
CASE 1 : Proposed protection for existing HV cables falling parallel within the deep trench		
CASE 2 : Proposed Irrigation Distribution pipeline crossing existing HV cable		
NOTE :	<p>1. If existing HV cables slewed during the site activity, the same should be placed back to actual position after completion of work.</p> <p>2. Existing HV cables falling parallel within the proposed excavation area should be protected with wooden box. (CASE 1)</p> <p>3. Proposed services allowed to cross existing HV services and the existing HV services should be protected as per site condition. (CASE 2)</p> <p>4. Existing HV cables falling parallel & outside the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. (CASE 3)</p> <p>5. Vertical clearance is from the top of proposed Irrigation Distribution pipeline to the bottom of existing HV cables.</p> <p>6. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge.</p> <p>7. Trench side and existing HV services protection may be required as per site condition.</p>	
CASE 3 : Warning sign board for HV cables falling parallel and outside working area		

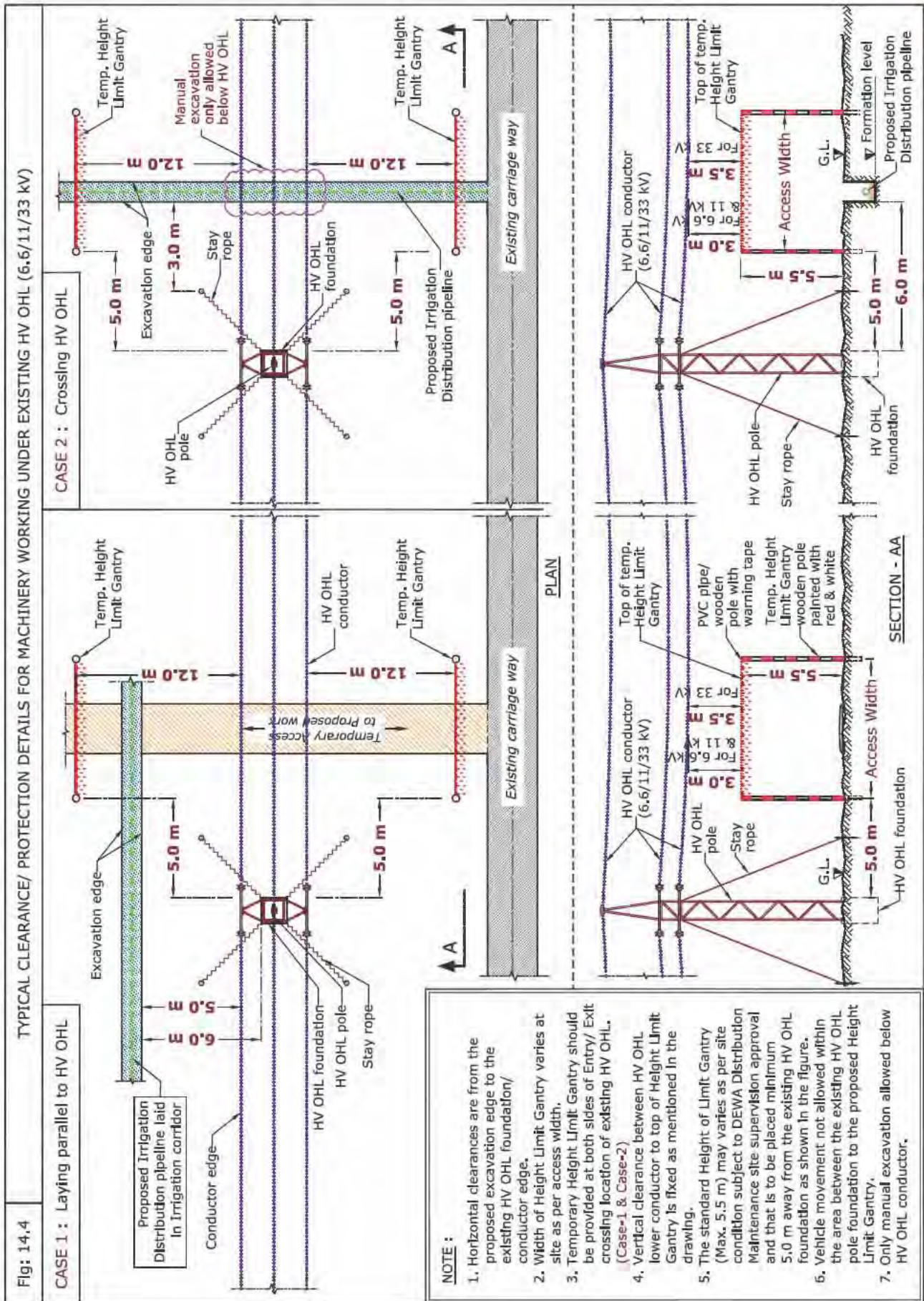
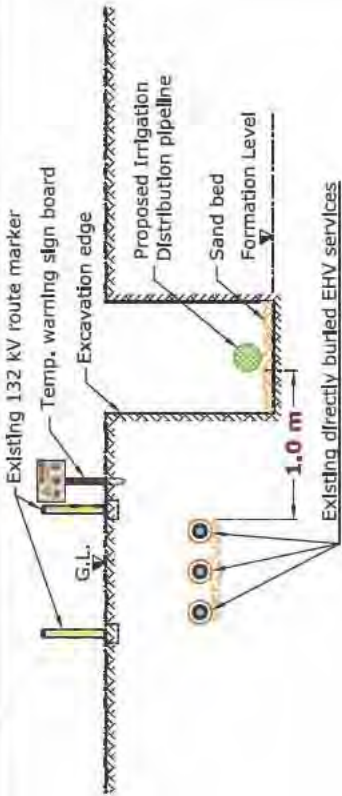
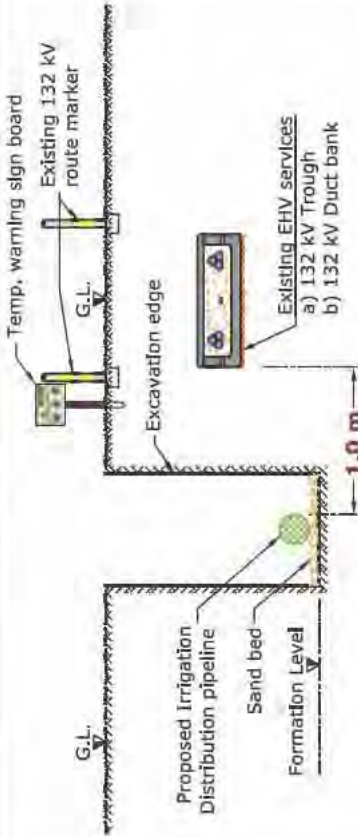
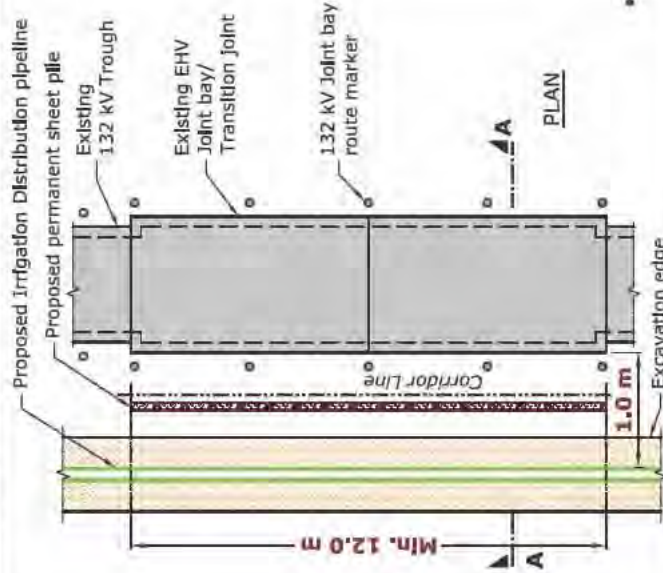
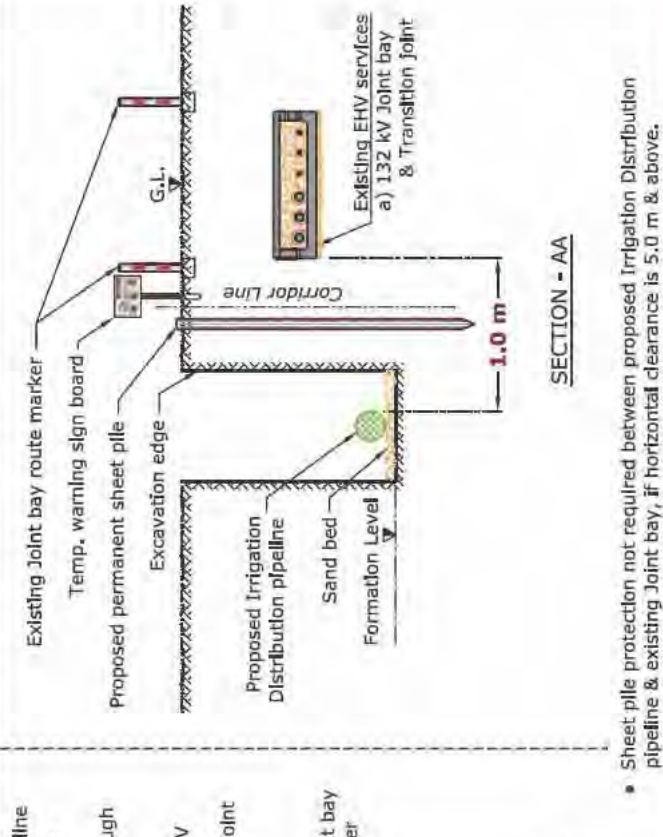


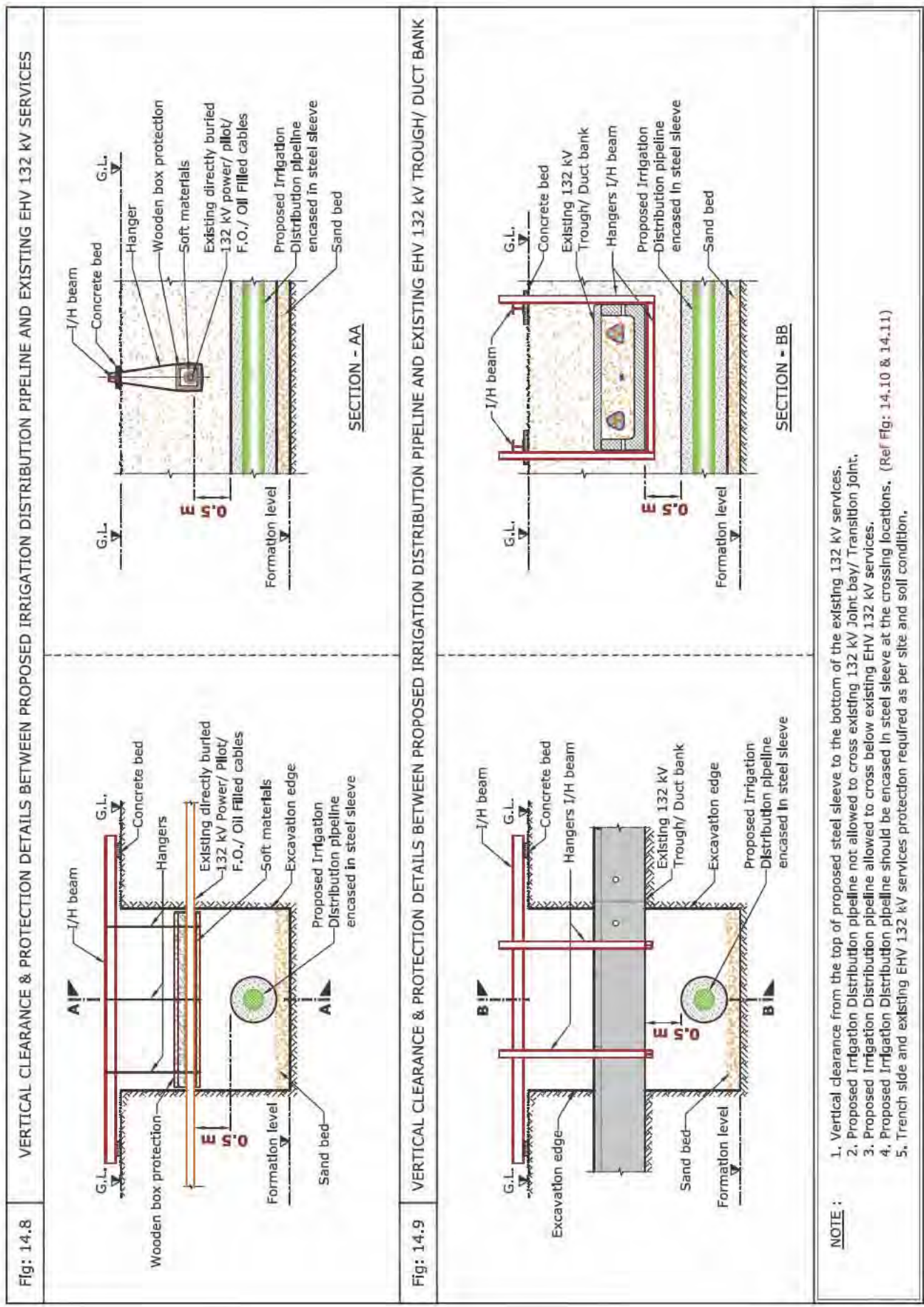
Table 3: Clearance & Protection details for proposed Irrigation Distribution Pipeline and existing DEWA Electricity EHV services

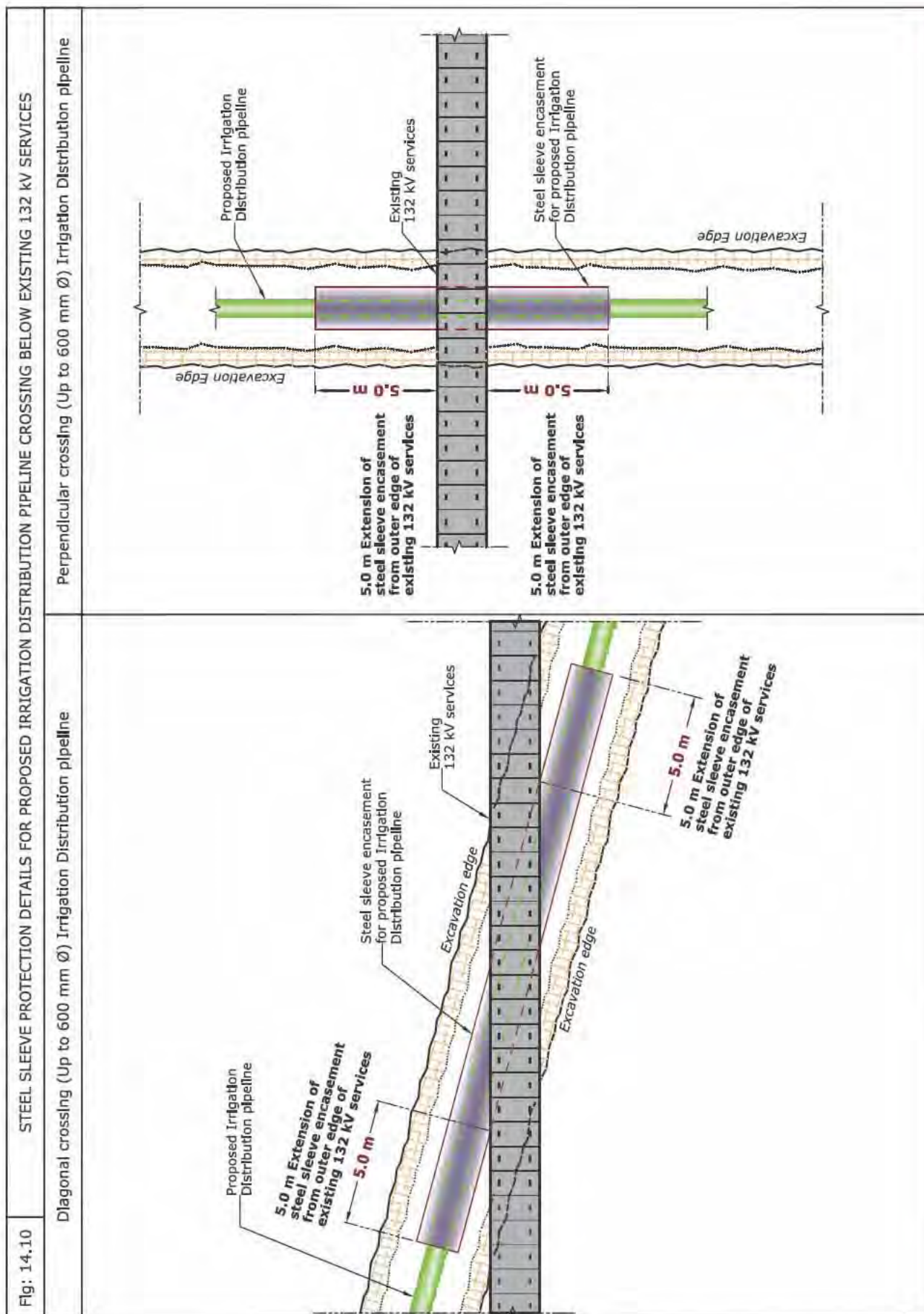
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 14.5)Vertical clearance (Ref Fig: 14.8)Protection details (Ref Fig: 14.8)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 14.5)Vertical clearance (Ref Fig: 14.8)Protection details (Ref Fig: 14.8)
EHV (132 kV) Trough	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 14.6)Vertical clearance (Ref Fig: 14.9)Protection details (Ref Fig: 14.9, 14.10, 14.11)
EHV (132 kV) Duct Bank	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 14.6)Vertical clearance (Ref Fig: 14.9)Protection details (Ref Fig: 14.9)
EHV (132 kV) Joint Bay/ Transition Joint	1.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 14.7)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 14.15)Protection details (Ref Fig: 14.15)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 14.12)Vertical clearance (Ref Fig: 14.13)Protection details (Ref Fig: 14.13)
		2.0 m	B	NDCM		<ul style="list-style-type: none">Vertical clearance (Ref Fig: 14.14)Protection details (Ref Fig: 14.14)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 14.15)Vertical clearance (Ref Fig: 14.15)Protection details (Ref Fig: 14.15)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">Protection details (Ref Fig: 14.15)

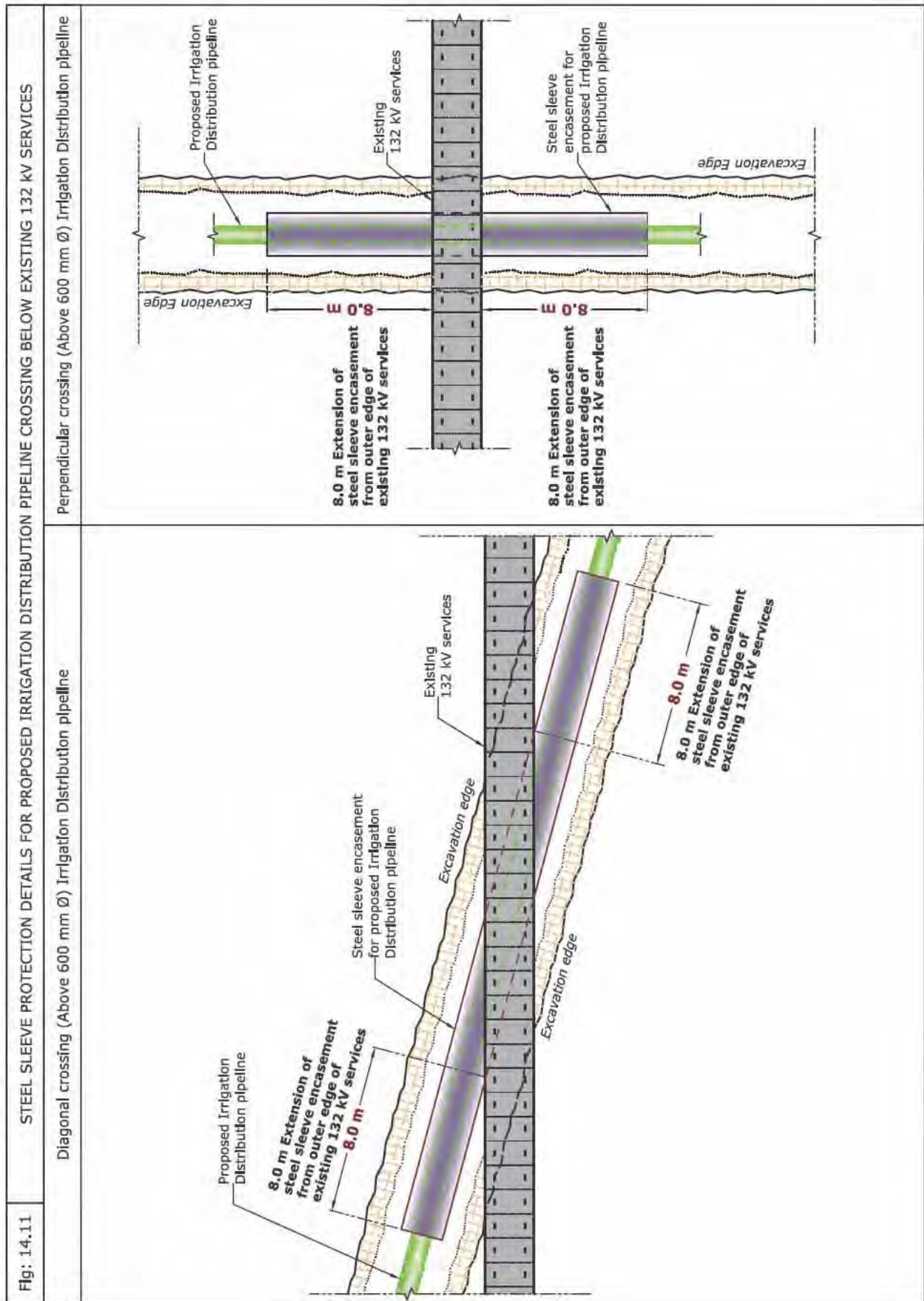
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 14.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION DISTRIBUTION PIPELINE AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>	<p>Fig: 14.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION DISTRIBUTION PIPELINE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>
			
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Irrigation Distribution pipeline outer edge to existing EHV 132 kV services edge. 2. Existing EHV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV service edge. 4. Permanent sheet pile should be provided between existing 132 kV Joint bay/ Transition joint (Minimum 12.0 m length) and proposed excavation as shown. 5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 			
<p>Fig: 14.7</p>		<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION DISTRIBUTION PIPELINE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>	
			
<p>Sheet pile protection not required between proposed Irrigation Distribution pipeline & existing Joint bay, if horizontal clearance is 5.0 m & above.</p>			







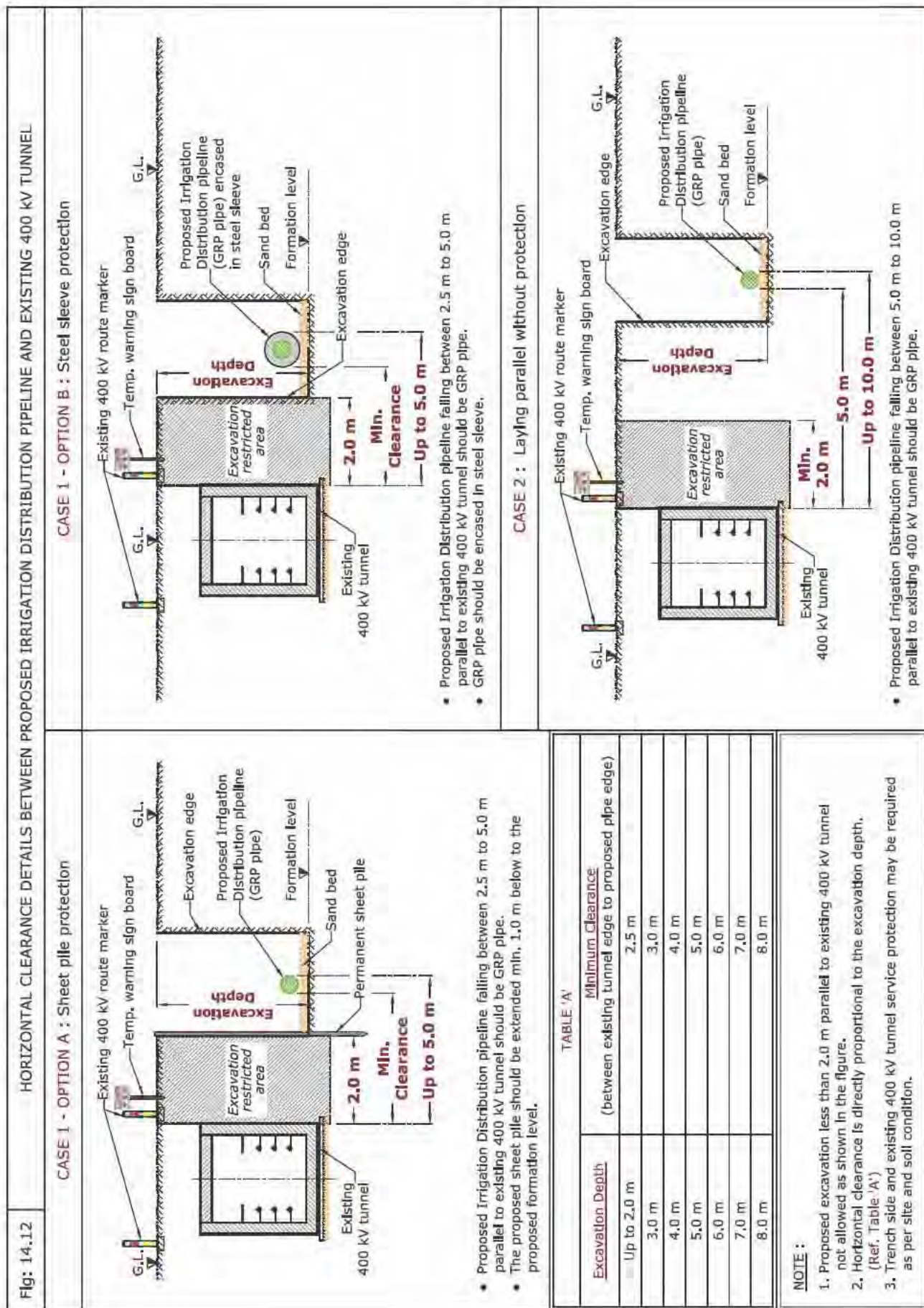
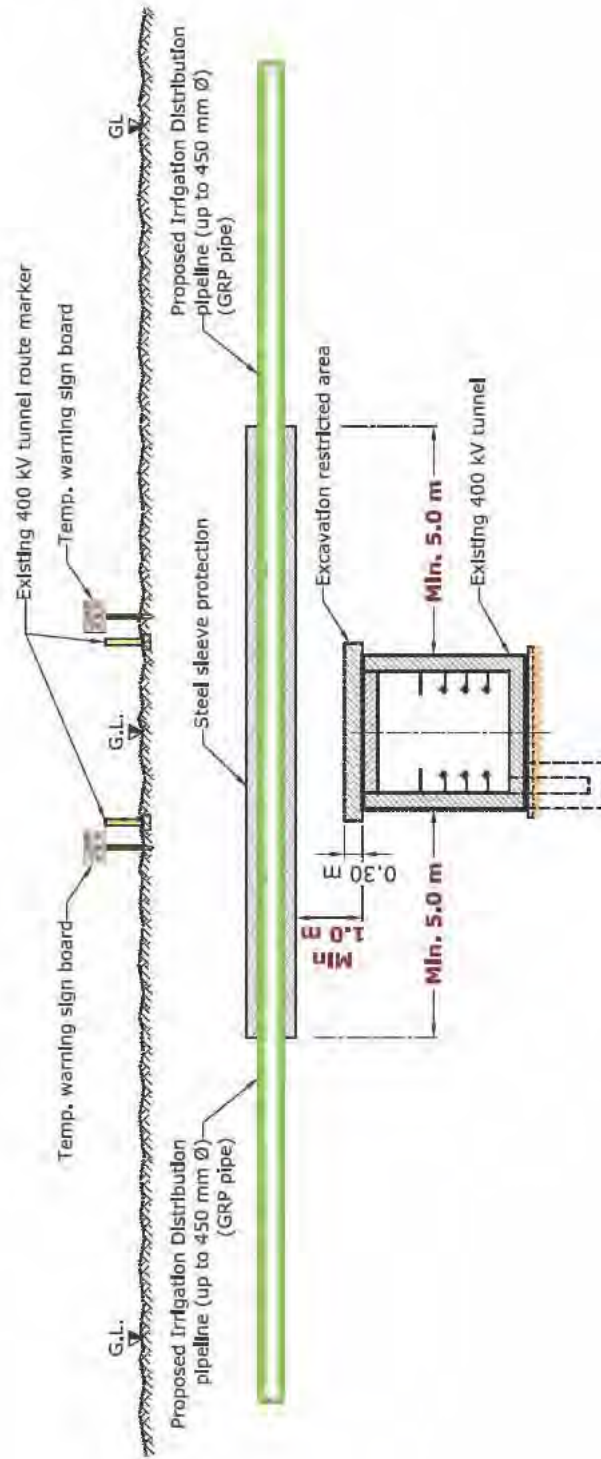


TABLE 'A'

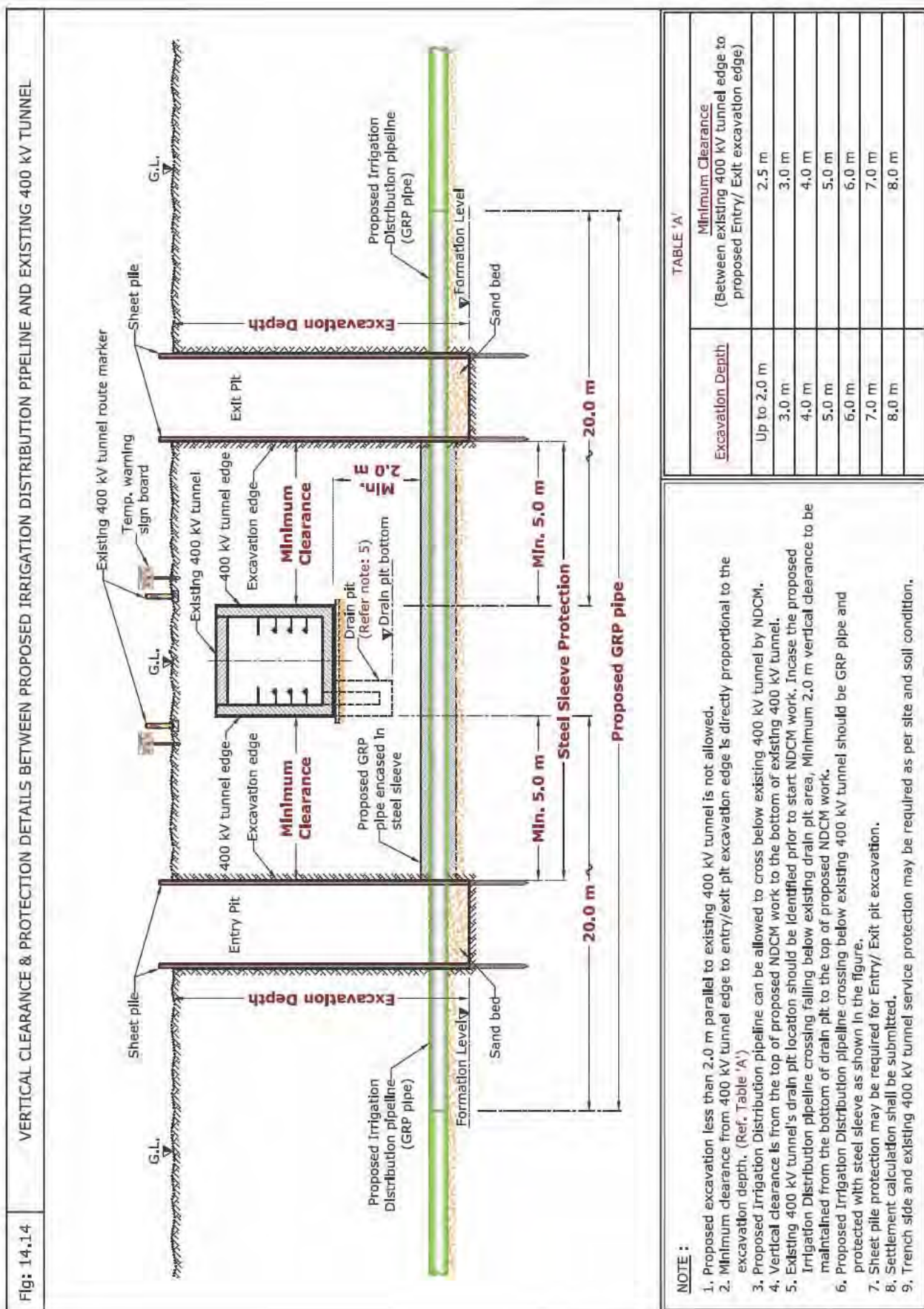
Excavation Depth	Minimum Clearance (between existing tunnel edge to proposed pipe edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

NOTE :

- Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
- Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
- Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.



1. Proposed Irrigation Distribution pipeline up to 450 mm ϕ can be allowed to cross above existing 400 kV tunnel with respect to available vertical clearance.
2. Vertical clearance is from the bottom of proposed steel sleeve to the top of existing 400 kV tunnel.
3. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
4. Proposed Irrigation Distribution pipeline crossing above existing 400 kV tunnel should be GRP pipe and should be protected with steel sleeve as shown.
5. Trench slide and existing 400 kV tunnel service protection may be required as per site and soil condition.



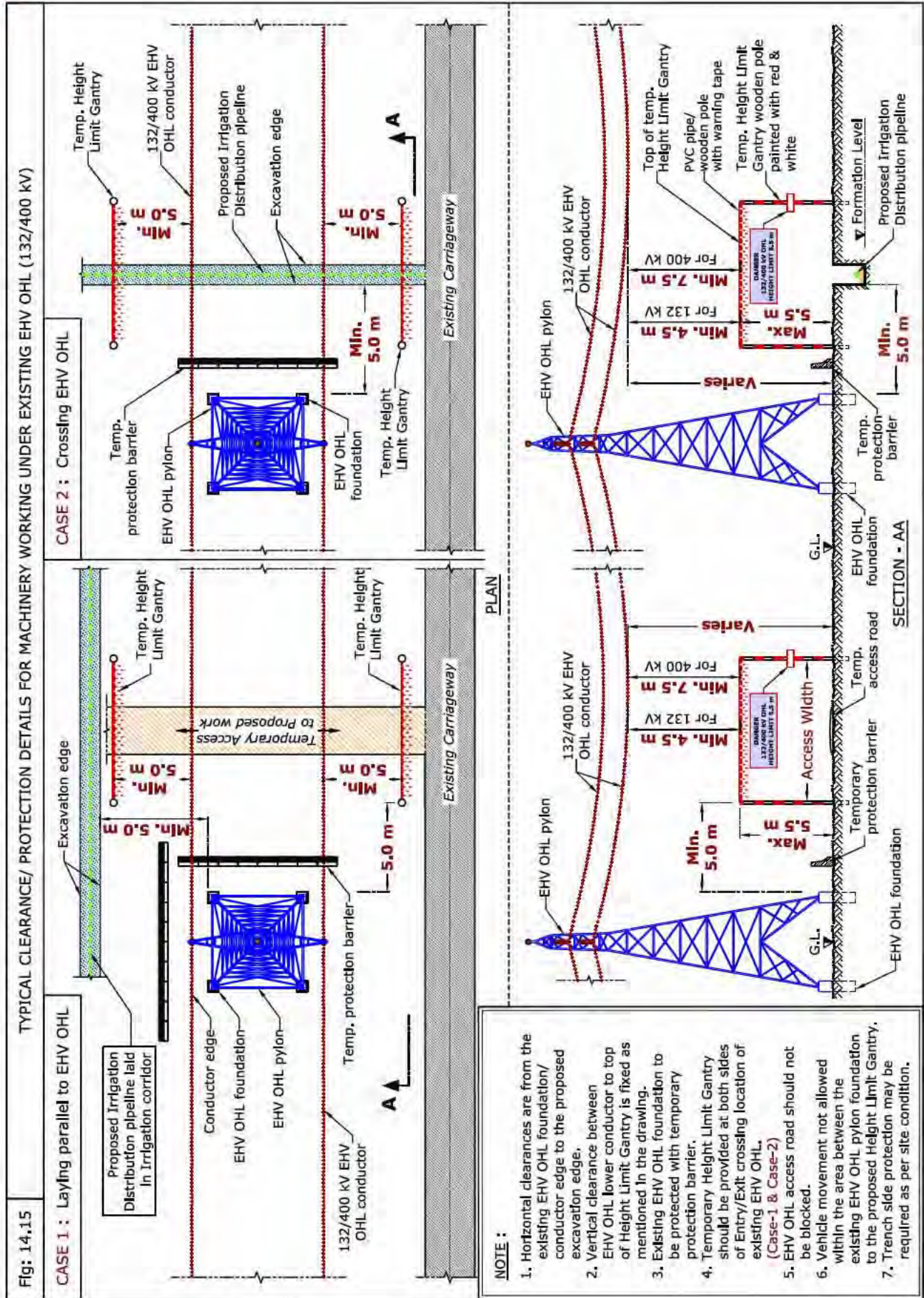


Table 4: Clearance & Protection details for proposed Irrigation distribution Pipeline and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 14.16)
Gas/Fuel pipeline (All diameter)	10.0 m	(Refer below Note)	B	NDCM	R	• Horizontal clearance (Ref Fig: 14.16)

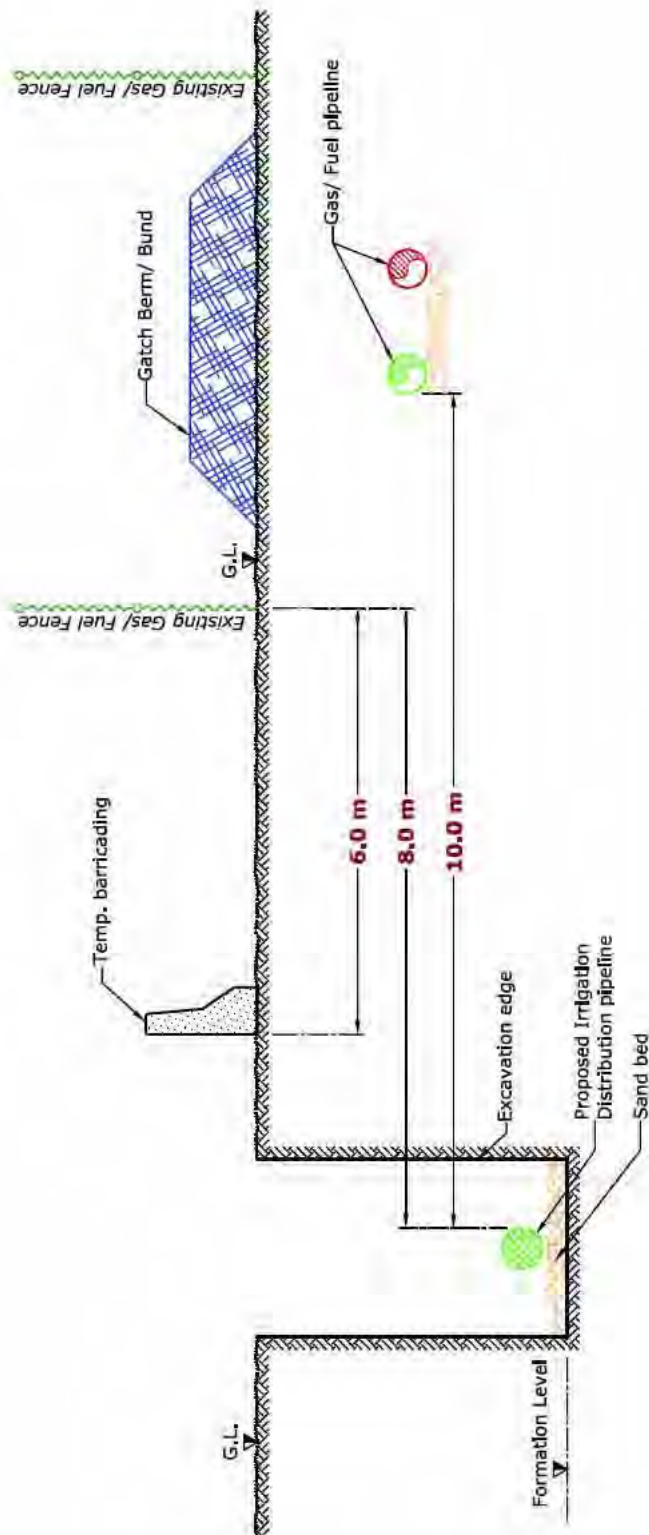
Note: Minimum vertical clearance shall be 2.0 m or 1.5 times of proposed irrigation pipeline/sleeve diameter whichever is greater.

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 14.16 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION DISTRIBUTION PIPELINE AND EXISTING GAS/ FUEL SERVICES

**NOTE :**

1. Horizontal clearance 8.0 m from proposed Irrigation Distribution pipeline edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Irrigation Distribution pipeline edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed Irrigation Distribution pipeline allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Minimum vertical clearance for crossing existing Gas/ Fuel pipeline shall be 2.0 m or 1.5 times of proposed Irrigation Distribution pipeline/ Sleeve diameter whichever is greater.
6. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
7. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

15. Laying of Proposed Utilities - Irrigation Main Pipelines

15.1 Introduction

The purpose of the irrigation main network is to transport the treated water from the treatment plants to the irrigation distribution networks which are the secondary irrigation water supply network.

This network consists of main lines (transmission lines), valves, chambers, pumping station, reservation

tanks etc., and the main lines, valves chambers are constructed in a dedicated corridor within Right Of Way, and therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



Laying of Irrigation Main Network

15.2 Avoid the following



1. Crossing existing EHV 132 kV Joint Bay/Transition Joint.
2. Proposal for Irrigation Pipeline/Manhole/Valve Chambers in DEWA corridor.

15.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Irrigation Main Pipeline and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 15.1, Case 1) • Vertical clearance (Ref Fig: 15.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

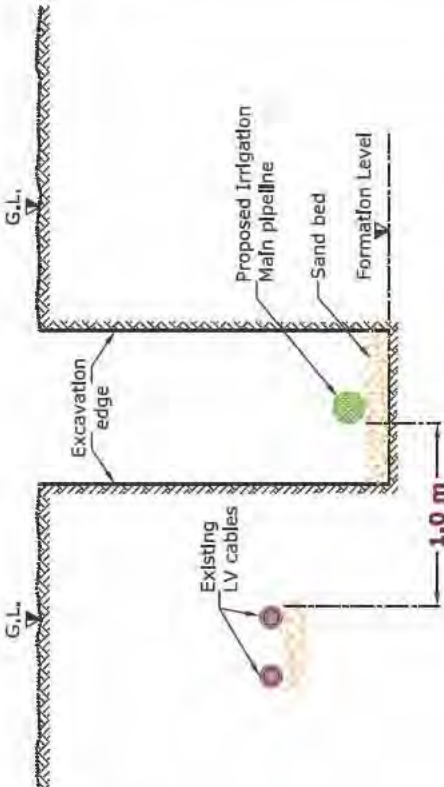
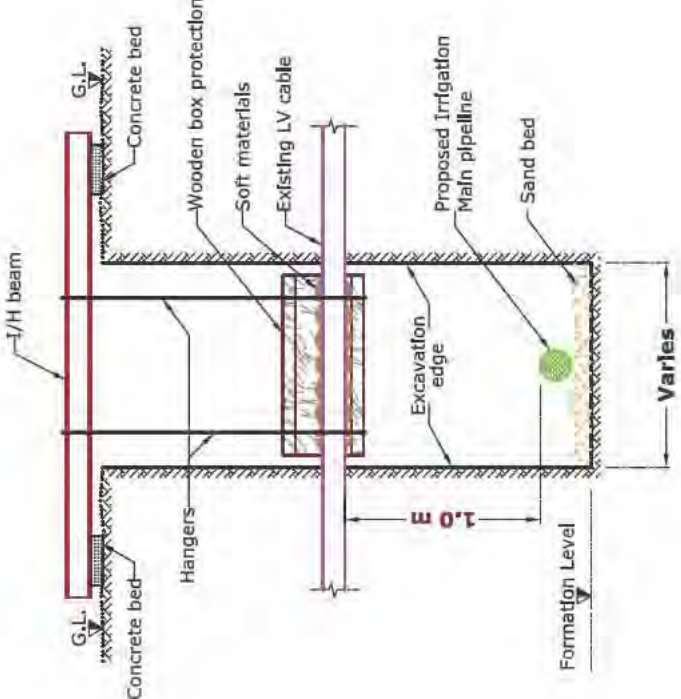
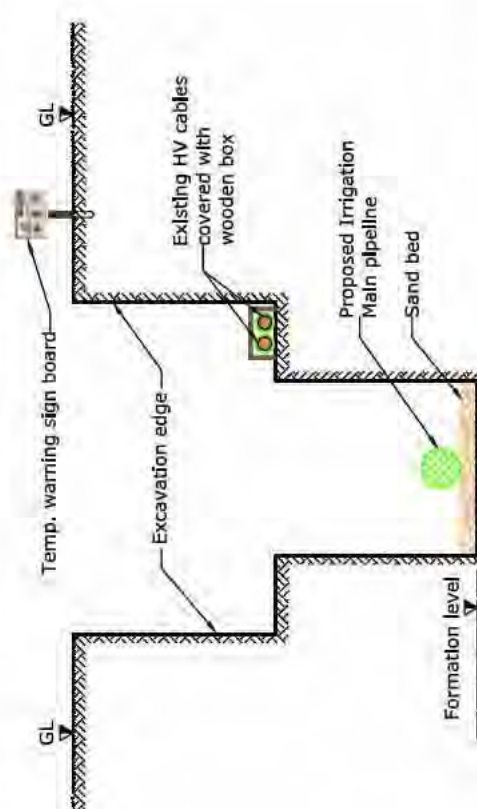
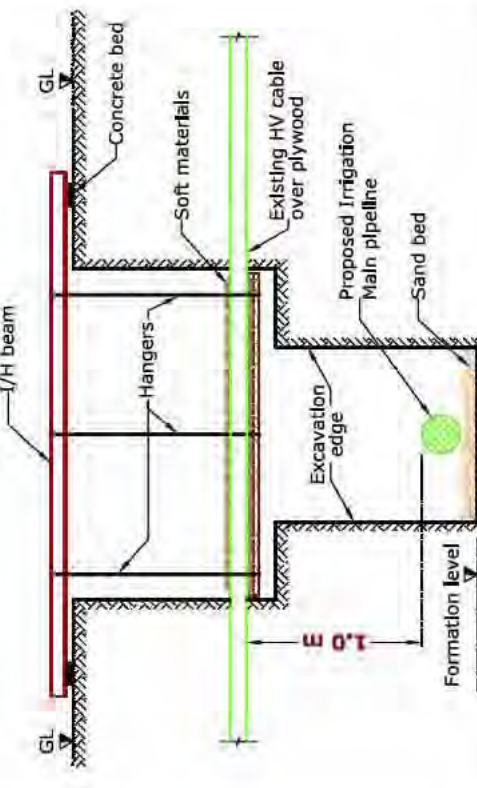
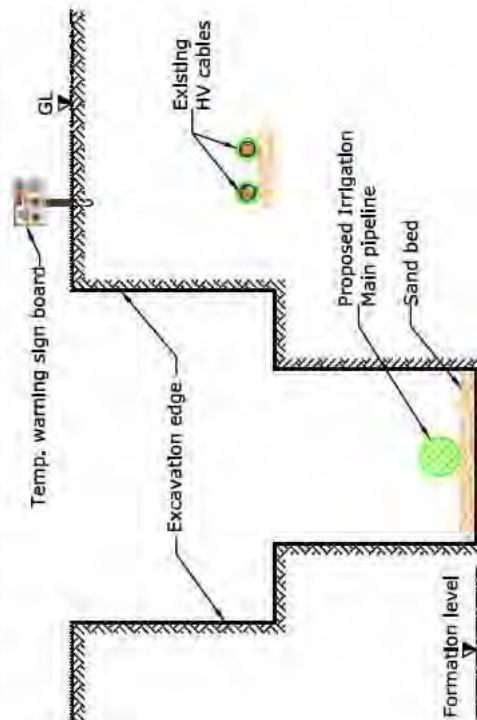
Fig: 15.1	HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING LV CABLES
CASE 1 : Laying parallel to existing LV cables	CASE 2 : Crossing below the existing LV cables
	
NOTE :	<div>1. Horizontal clearance is from the proposed Irrigation Main pipeline edge to existing LV cable edge.</div> <div>2. Vertical clearance is from the top of proposed Irrigation Main pipeline to bottom of existing LV cable.</div> <div>3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing LV service edge.</div> <div>4. Trench side and existing LV cable protection may be required as per site and soil condition.</div>

Table 2: Clearance & Protection details for proposed Irrigation Main Pipeline and existing DEWA Electricity HV services						
Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 15.2, Case 1)• Vertical clearance (Ref Fig: 15.3, Case 2)• Protection details (Ref Fig: 15.3)
HV (6.6/11/33 kV) Manhole	1.0 m	NA	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 15.2, Case 2)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 15.4)• Protection details (Ref Fig: 15.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 15.4)• Vertical clearance (Ref Fig: 15.4)• Protection details (Ref Fig: 15.4)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 15.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING HV SERVICES
CASE 1 : Laying parallel to existing HV cables	
CASE 2 : Laying parallel to existing HV Manhole	
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearances are from the proposed Irrigation Main pipeline edge to existing HV services edge. 2. Proposed Irrigation Main pipeline allowed to cross below existing HV cables. 3. Proposed Irrigation Main pipeline not allowed to cross existing HV Manhole. 4. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge. 5. Trench side and existing HV services protection may be required as per site and soil condition. 	

Fig: 15.3	VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING HV CABLES
CASE 1 : Proposed protection for existing HV cables falling parallel within the deep trench	
CASE 2 : Proposed Irrigation Main pipeline crossing existing HV cable	
<p>NOTE :</p> <ol style="list-style-type: none"> 1. If existing HV cables slewed during the site activity, the same should be placed back to actual position after completion of work. 2. Existing HV cables falling parallel within the proposed excavation area should be protected with wooden box. (Case 1) 3. Proposed services allowed to cross existing HV services and the existing HV services should be protected as per site condition. (Case 2) 4. Existing HV cables falling parallel & outside the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. (Case 3) 5. Vertical clearance is from the top of proposed Irrigation Main pipeline to the bottom of existing HV cable. 6. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing HV service edge. 7. Trench side and existing HV services protection may be required as per site condition. 	<p>CASE 3 : Warning sign board for HV cables falling parallel and outside working area</p> 

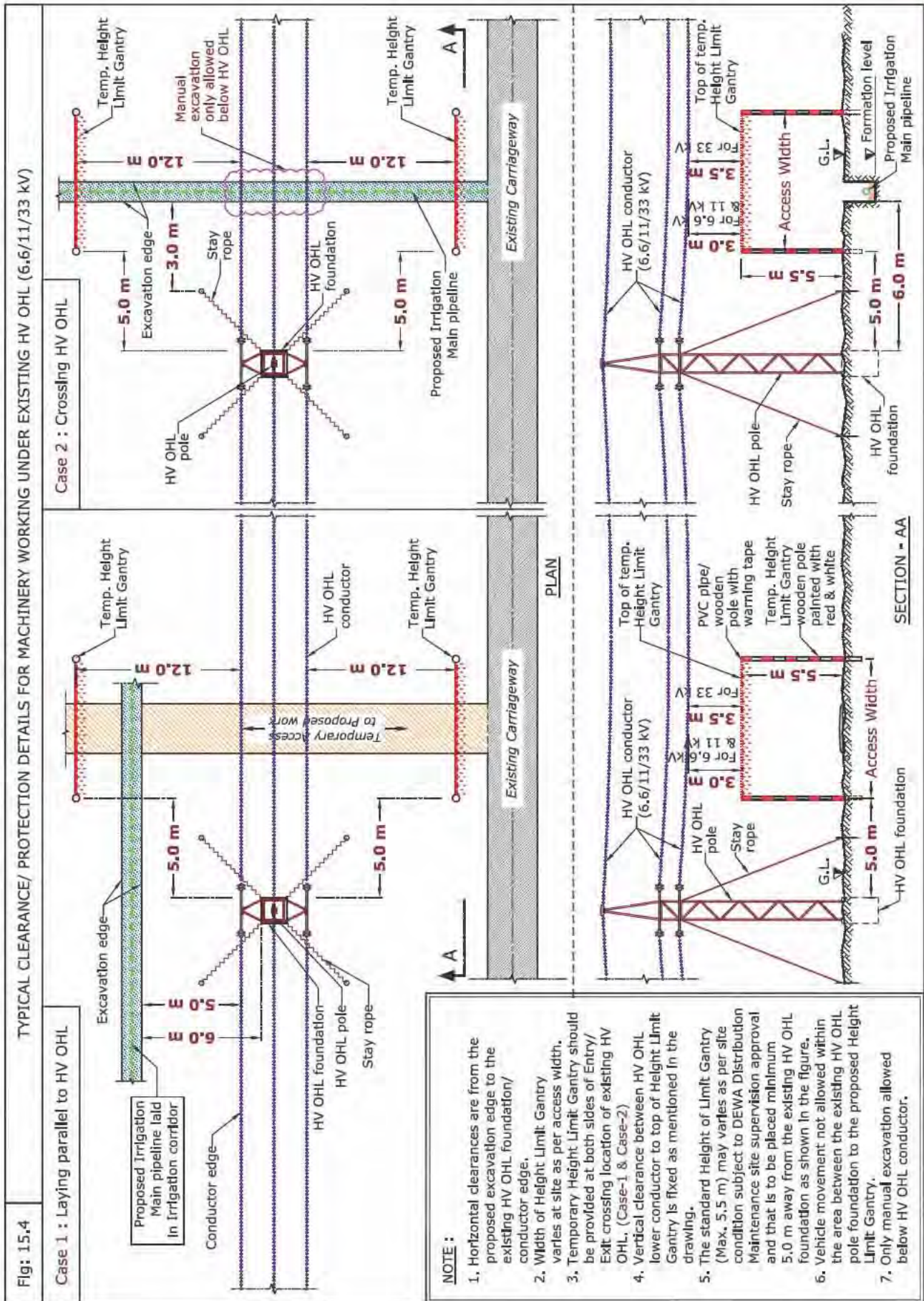
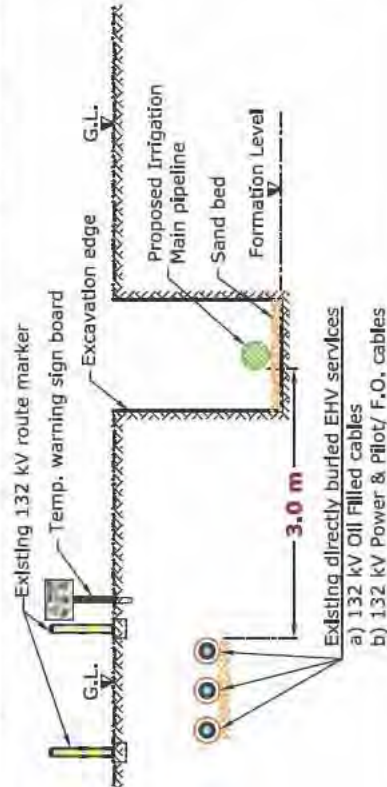
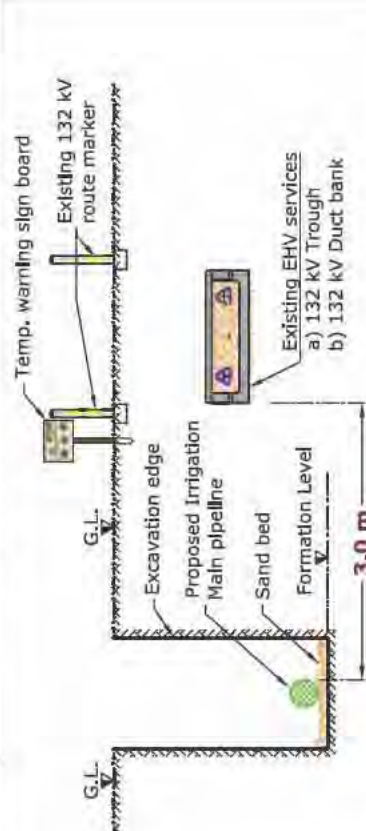
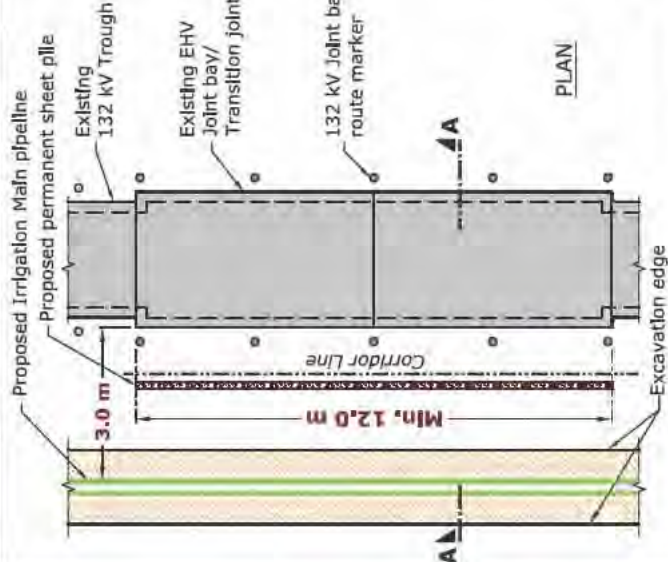
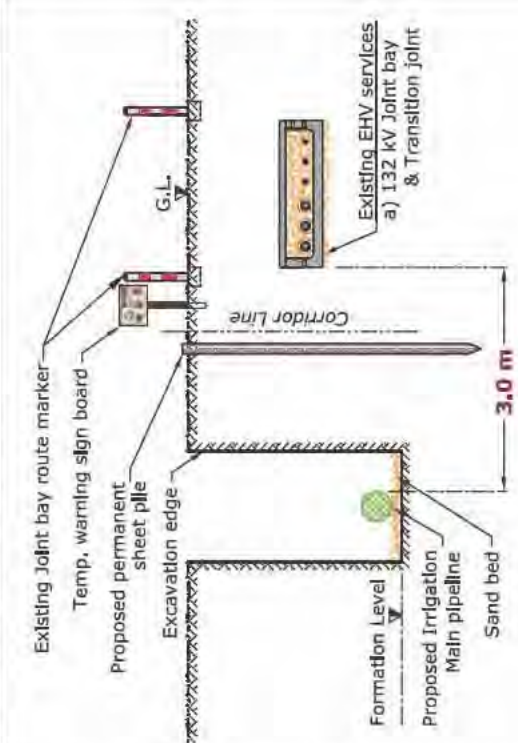


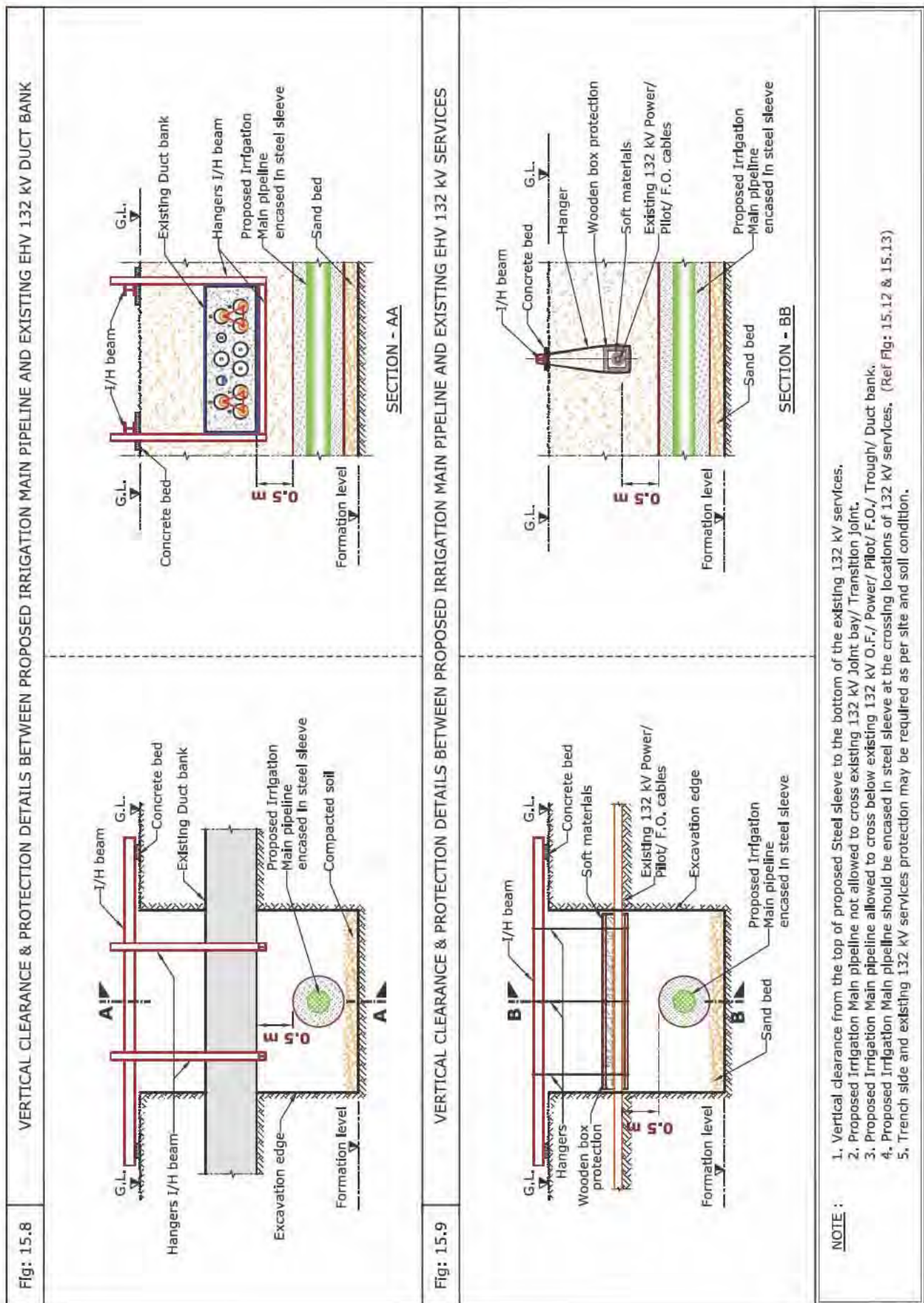
Table 3: Clearance & Protection details for Proposed Irrigation Main Pipeline and existing DEWA Electricity EHV services

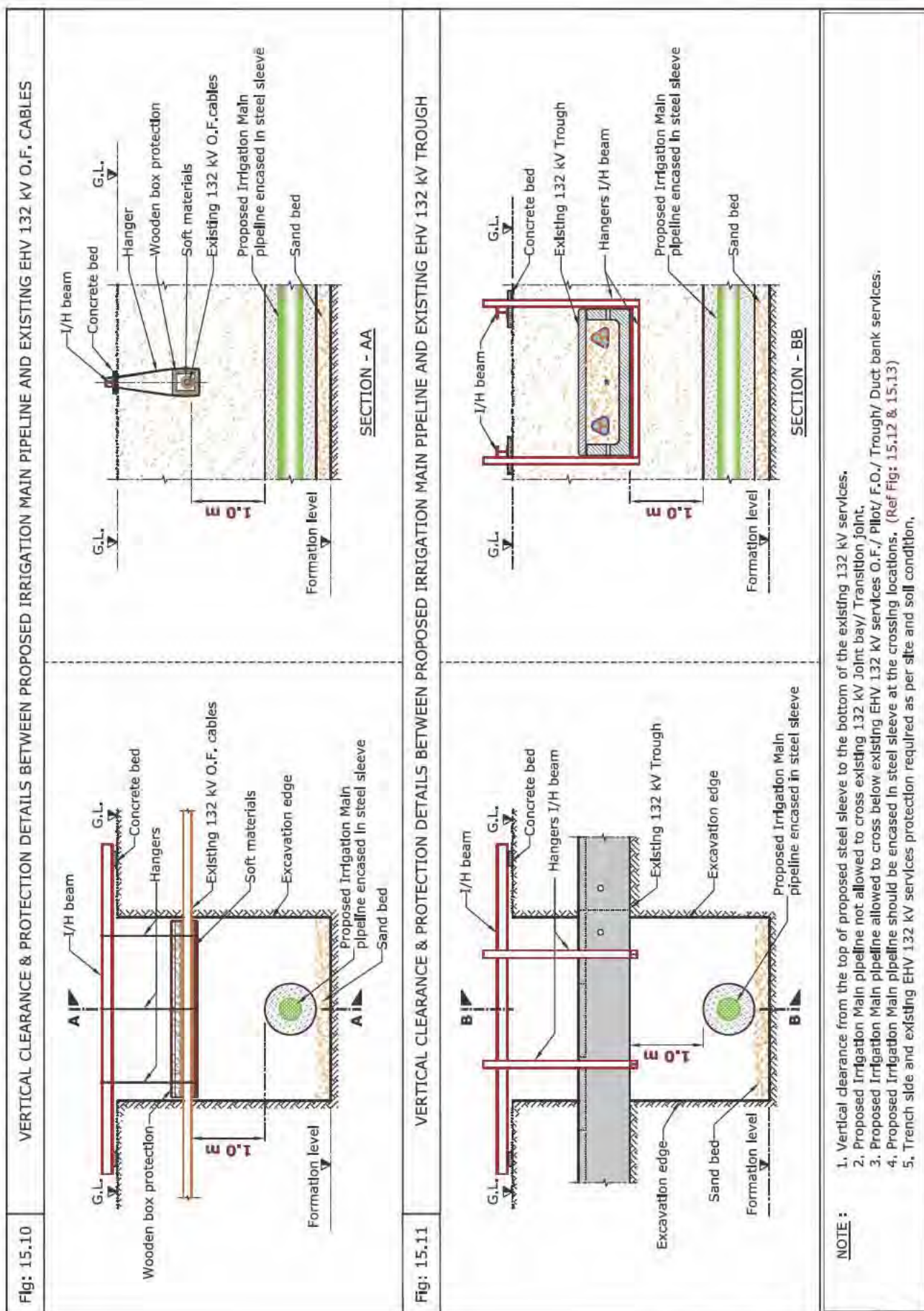
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 15.5)Vertical clearance (Ref Fig: 15.10)Protection details (Ref Fig: 15.10)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 15.5)Vertical clearance (Ref Fig: 15.9)Protection details (Ref Fig: 15.9)
EHV (132 kV) Trough	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 15.6)Vertical clearance (Ref Fig: 15.11)Protection details (Ref Fig: 15.11,15.12 &15.13)
EHV (132 kV) Duct Bank	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 15.6)Vertical clearance (Ref Fig: 15.8)Protection details (Ref Fig: 15.8)
EHV (132 kV) Joint Bay/ Transition Joint	3.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 15.7)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 15.17)Protection details (Ref Fig: 15.17)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 15.14)Vertical clearance (Ref Fig: 15.15)Protection details (Ref Fig: 15.15)
		2.0 m	B	NDCM		<ul style="list-style-type: none">Vertical clearance (Ref Fig: 15.16)Protection details (Ref Fig: 15.16)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 15.17)Vertical clearance (Ref Fig: 15.17)Protection details (Ref Fig: 15.17)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">Protection details (Ref Fig: 15.17)

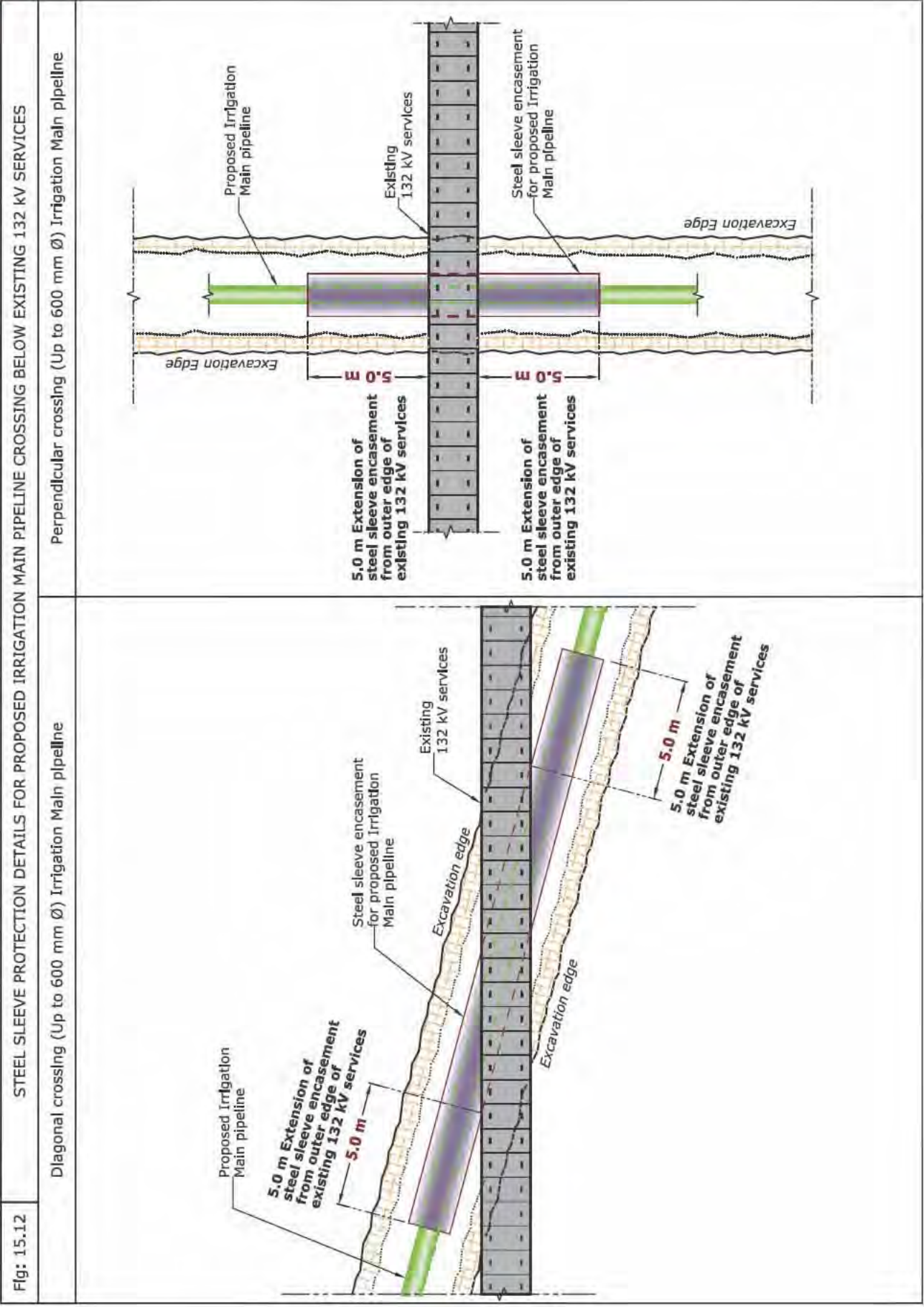
Table Abbreviation

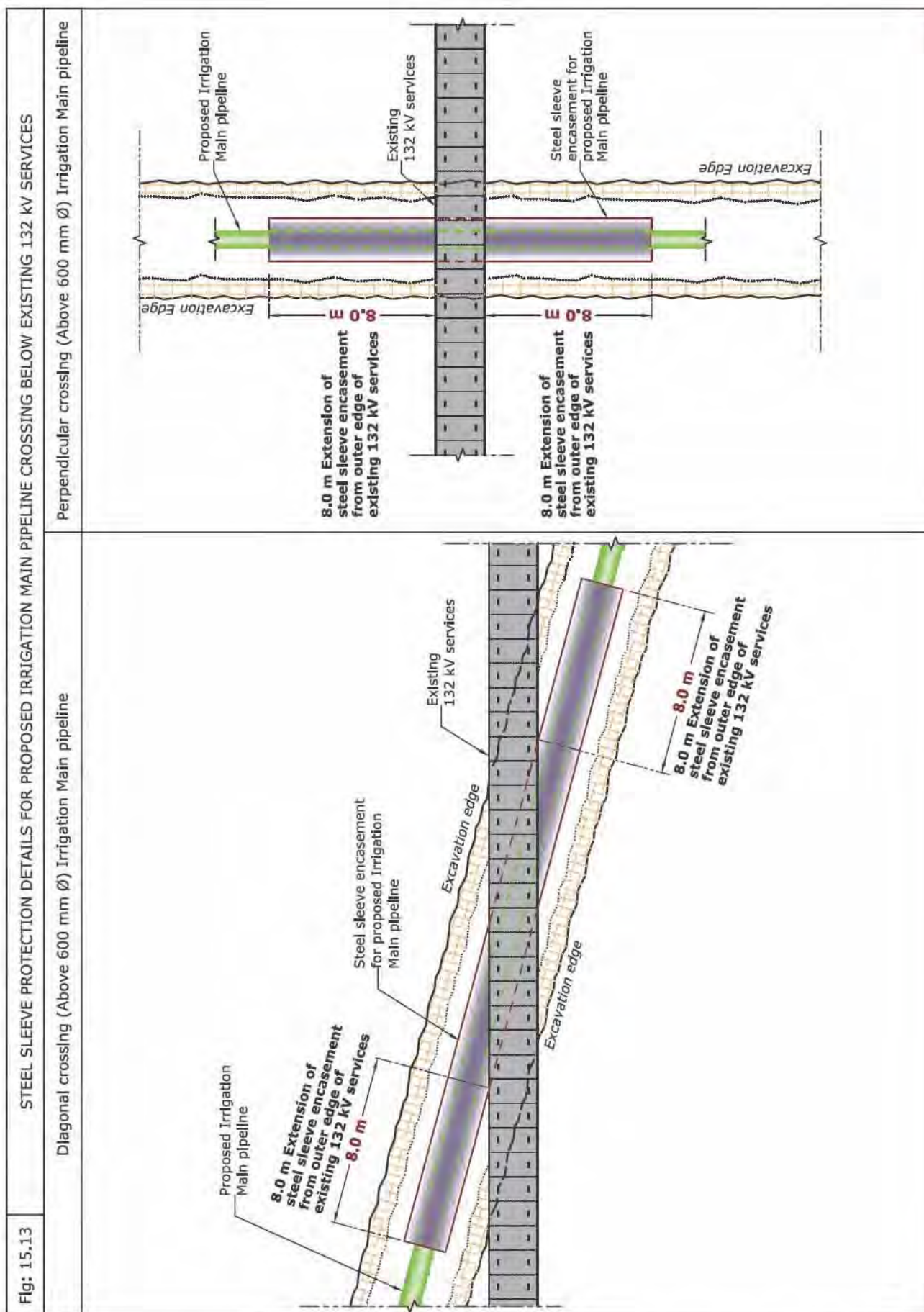
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 15.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>	<p>Fig: 15.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>
			
<p>NOTE :</p> <ol style="list-style-type: none">1. All horizontal clearances are from proposed Irrigation Main pipeline outer edge to existing EHV 132 kV services edge.2. Existing EHV cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV service edge.4. Permanent sheet pile should be provided between existing 132 kV Joint bay/ Transition joint (Minimum 12.0 m length) and proposed excavation as shown.5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.			
<p>Fig: 15.7</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>	
			
		<p>SECTION - AA</p>	
<p>• Sheet pile protection not required between proposed Irrigation Main pipeline & existing Joint bay, if horizontal clearance is 5.0 m & above.</p>			









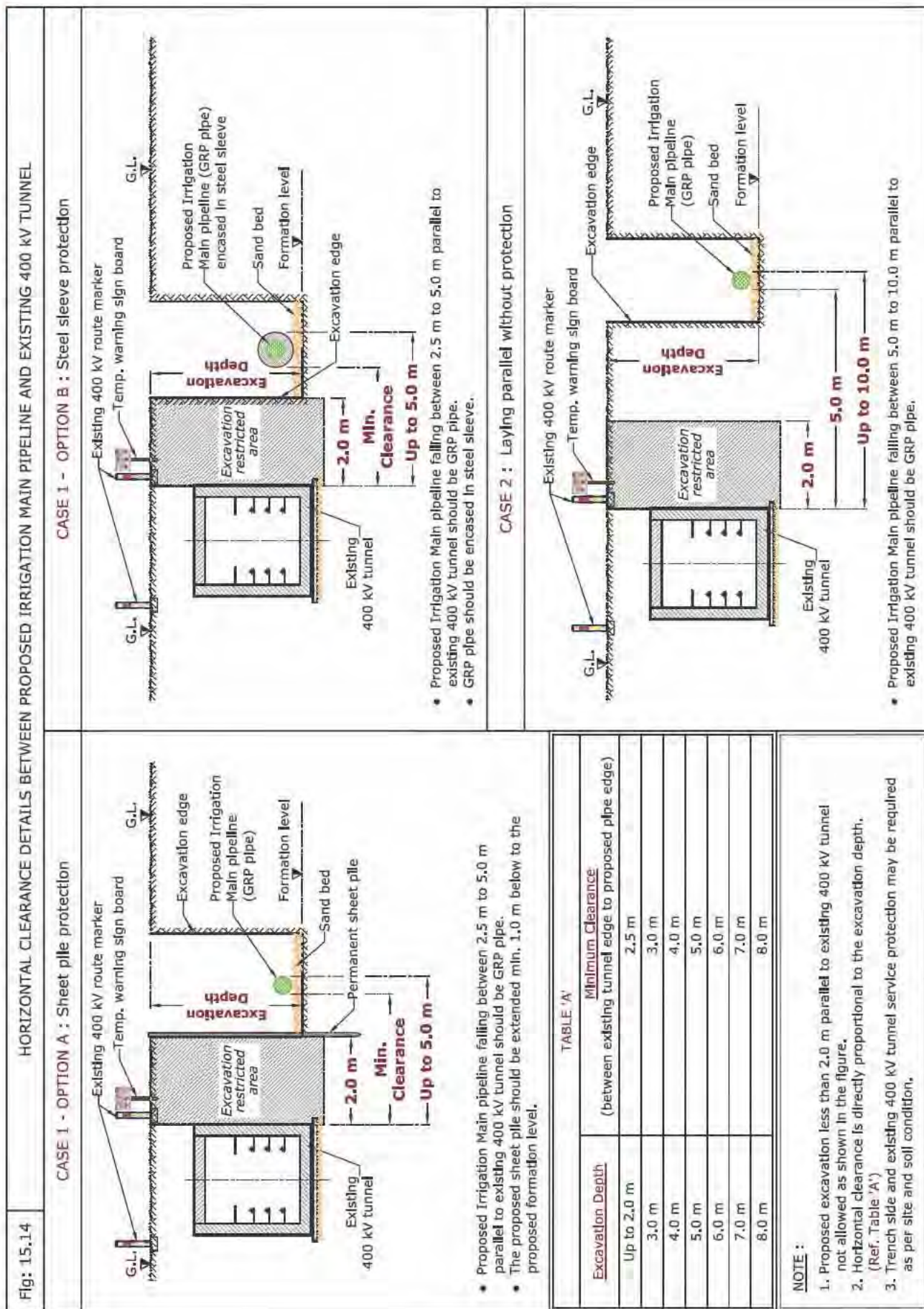


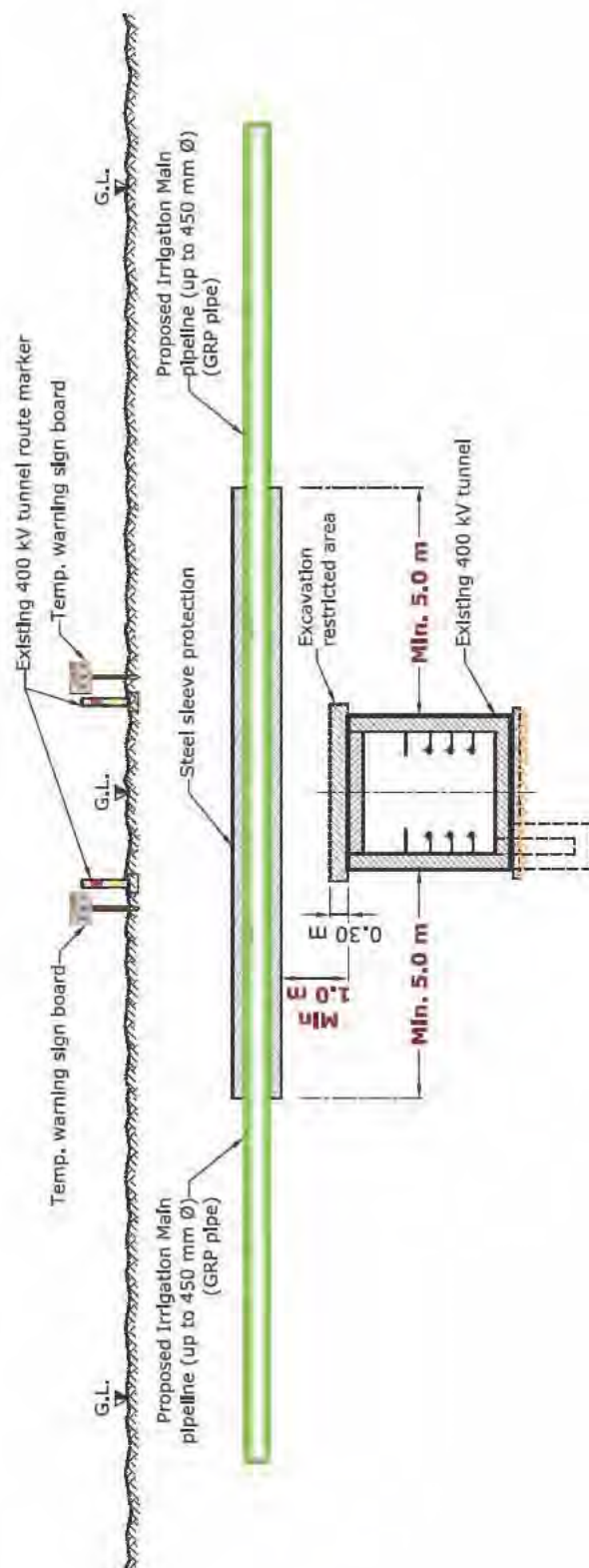
TABLE 'A'

Excavation Depth	Minimum Clearance (between existing tunnel edge to proposed pipe edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

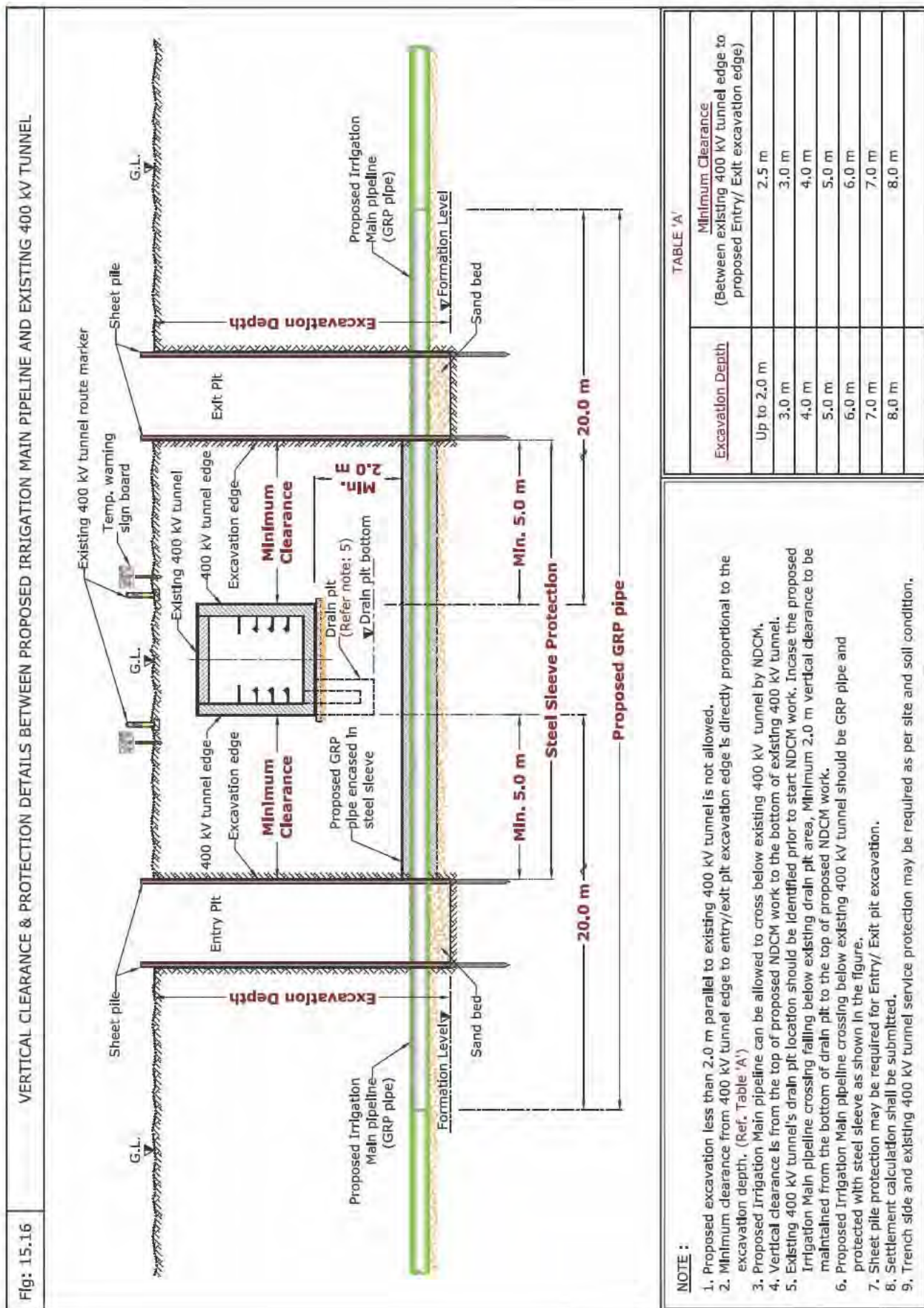
NOTE :

- Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
- Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
- Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Fig: 15.15 VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING 400 KV TUNNEL



- NOTE :**
1. Proposed Irrigation Main pipeline up to 450 mm Ø can be allowed to cross above existing 400 kV tunnel with respect to available vertical clearance.
 2. Vertical clearance is from the bottom of proposed steel sleeve to the top of existing 400 kV tunnel.
 3. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
 4. Proposed Irrigation Main pipeline crossing above existing 400 kV tunnel should be GRP pipe and protected with steel sleeve as shown.
 5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel is not allowed.
2. Minimum clearance from 400 kV tunnel edge to entry/exit pit excavation edge is directly proportional to the excavation depth. (Ref. Table 'A')
3. Proposed Irrigation Main pipeline can be allowed to cross below existing 400 kV tunnel by NDCM.
4. Vertical clearance is from the top of proposed NDCM work to the bottom of existing 400 kV tunnel.
5. Existing 400 kV tunnel's drain pit location should be identified prior to start NDCM work. Increase the proposed Irrigation Main pipeline crossing falling below existing drain pit area, Minimum 2.0 m vertical clearance to be maintained from the bottom of drain pit to the top of proposed NDCM work.
6. Proposed Irrigation Main pipeline crossing below existing 400 kV tunnel should be GRP pipe and protected with steel sleeve as shown in the figure.
7. Sheet pile protection may be required for Entry/ Exit pit excavation.
8. Settlement calculation shall be submitted.
9. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

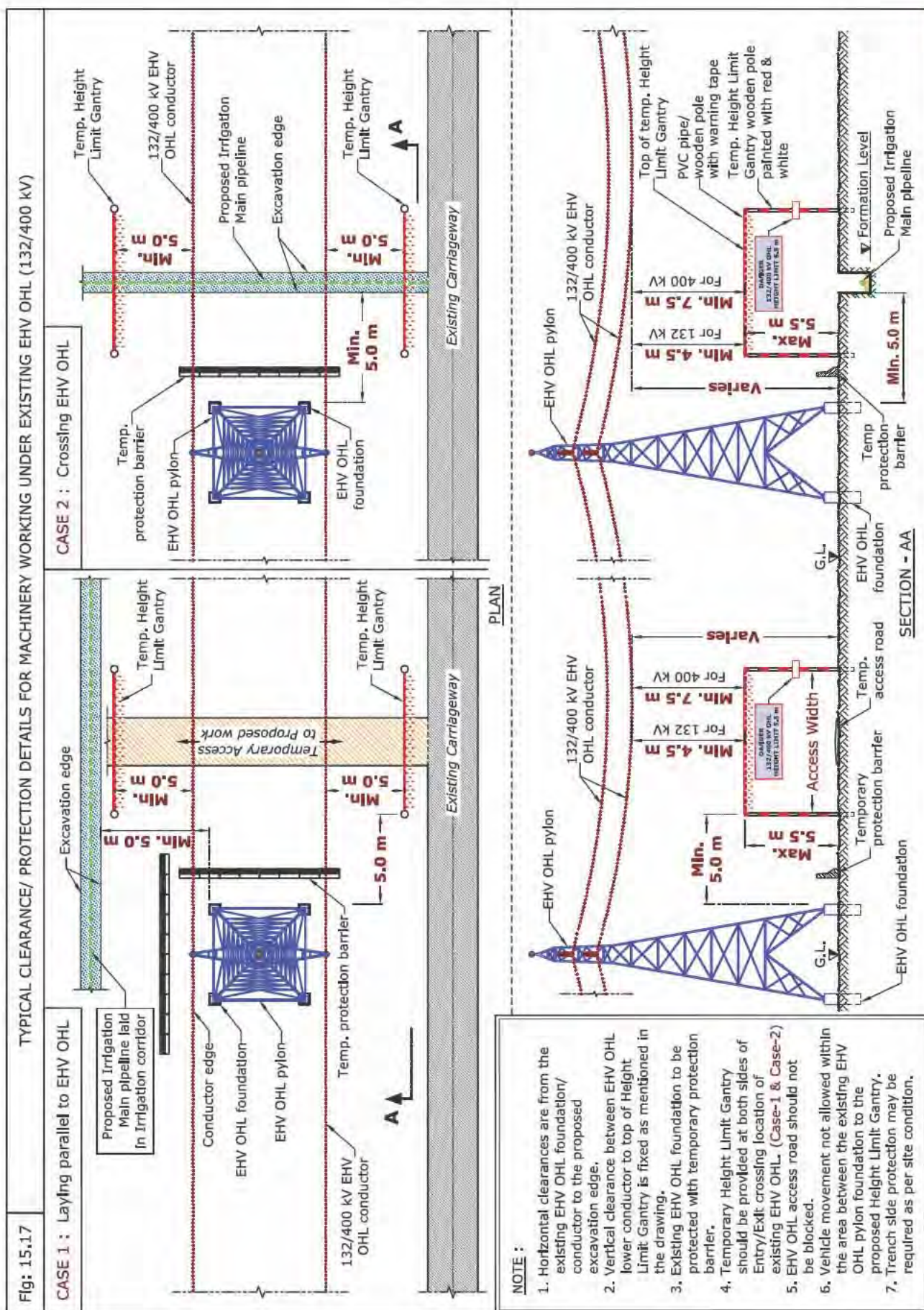


Table 4: Clearance & Protection details for proposed Irrigation Main Pipeline and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 15.18)
Gas/Fuel pipeline (All diameter)	10.0 m	(Refer below Note)	B	NDCM	R	• Horizontal clearance (Ref Fig: 15.18)

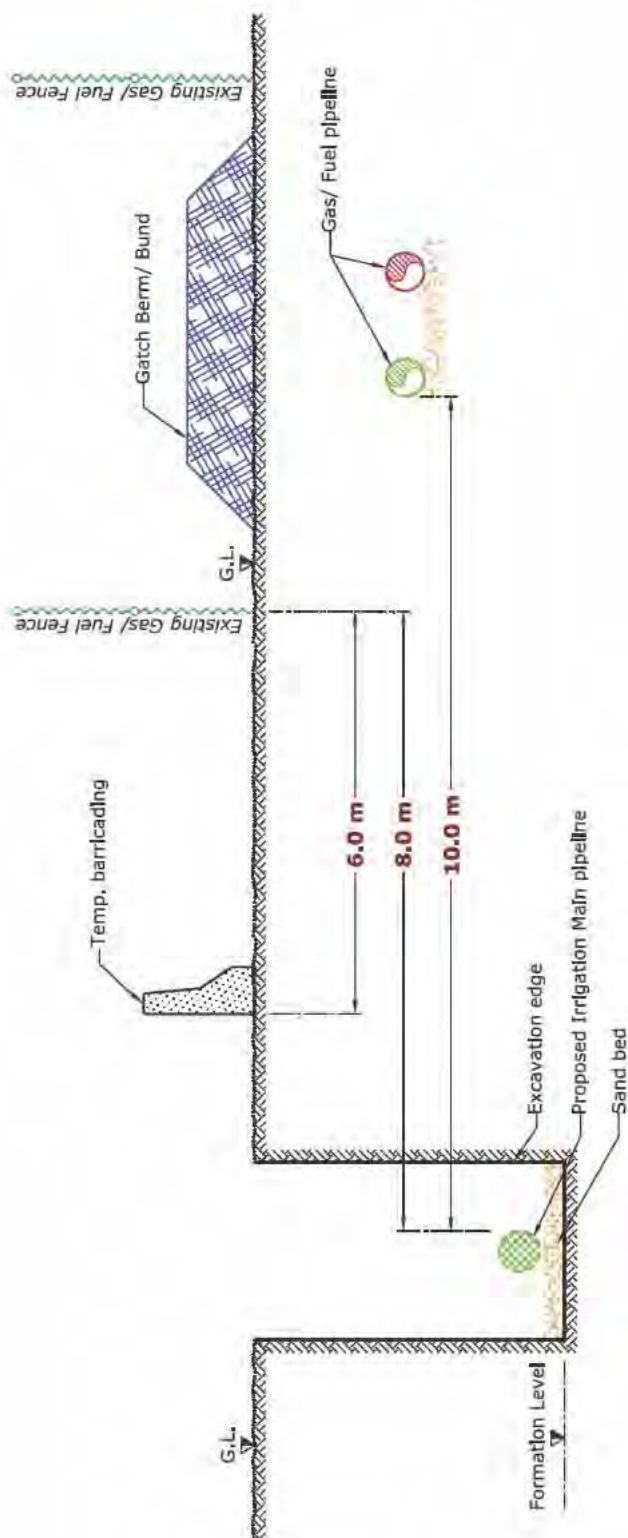
Note: Minimum vertical clearance shall be 2.0 m or 1.5 times of proposed irrigation pipeline/sleeve diameter whichever is greater.

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED IRRIGATION MAIN PIPELINE AND EXISTING GAS/ FUEL SERVICES

**NOTE :**

1. Horizontal clearance 8.0 m from proposed Irrigation Main pipeline edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Irrigation Main pipeline edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed Irrigation Main pipeline allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Minimum vertical clearance for crossing existing Gas/ Fuel pipeline shall be 2.0 m or 1.5 times of proposed Irrigation Main pipeline/ Sleeve diameter whichever is greater.
6. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
7. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

16. Laying of Proposed Utilities - District Cooling Pipelines

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16.1 Introduction

District cooling is a system for producing and distributing chilled water to cool indoor air buildings within districts, offices, industries and residential buildings. The chilled water is circulated from a centrally located plant through underground insulated pipes of various diameters to the end users for air conditioning purposes.

Chilled Water pipelines and all related constructions such as chambers, thrust blocks, etc., are constructed in dedicated corridors within Right Of Way close to DEWA assets, therefore during laying of chilled water pipelines activities existing DEWA assets are required to be protected as per specified standards.



Chilled Water Pipeline.

16.2 Avoid the following



1. Crossing existing 132 kV Joint Bay/Transition joint.
2. Crossing existing 400 kV Tunnel by open cut
3. Crossing existing HV Manholes/Valve chambers/SCADA Unit.

16.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed District Cooling Pipeline and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.1, Case 1) • Vertical clearance (Ref Fig: 16.1, Case 2) • Protection details (Ref Fig: 16.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

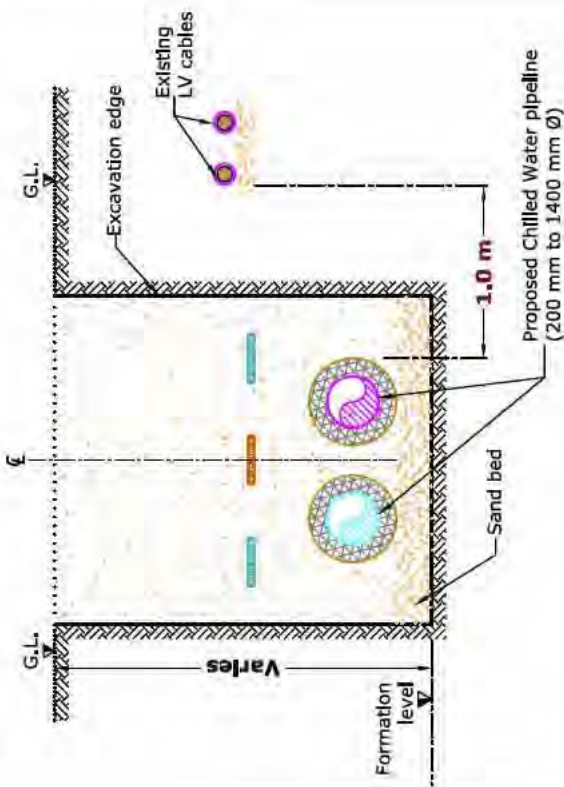
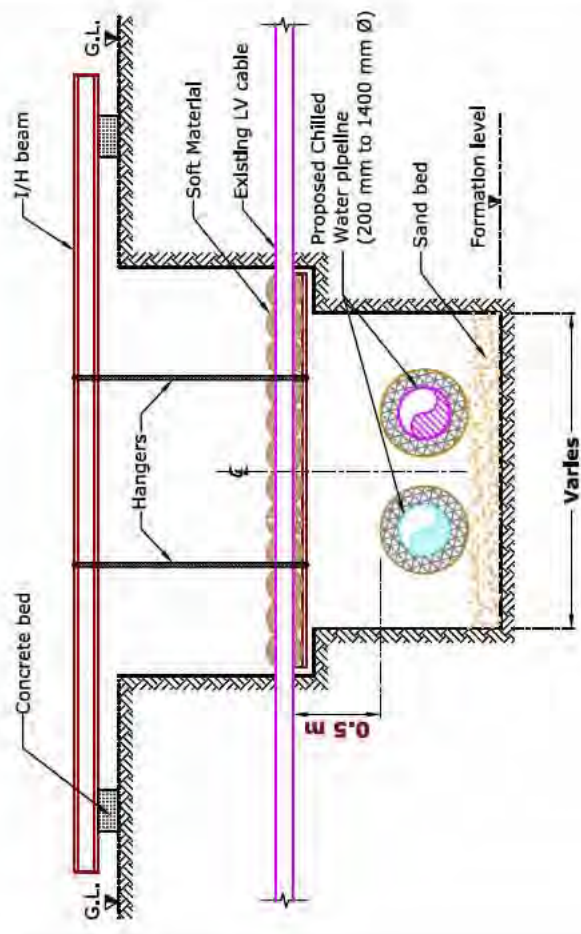
Fig: 16.1	HORIZONTAL/ VERTICAL CLEARANCES & PROTECTION DETAILS BETWEEN PROPOSED CHILLED WATER PIPELINE (200 mm TO 1400 mm Ø) AND EXISTING LV CABLES
<p>CASE 1 : Proposed Chilled Water pipeline laying parallel to existing LV cables</p> 	<p>CASE 2 : Proposed Chilled Water pipeline crossing existing LV cable</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Chilled Water pipeline edge to existing LV cable edge. 2. Vertical clearance from the top of proposed Chilled Water pipeline to the bottom of existing LV cable. 3. Proposed Chilled Water pipeline allowed to cross below existing LV cables. 4. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing LV cable edge. 5. Trench side and LV cable protection may be required as per site and soil condition. 	

Table 2: Clearance & Protection details for proposed District Cooling Pipeline and existing DEWA Electricity HV services						
Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	1.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.2) • Vertical clearance (Ref Fig: 16.3) • Protection details (Ref Fig: 16.4)
HV (6.6/11/33 kV) Manhole	0.5 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.2)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.5)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.5) • Vertical clearance (Ref Fig: 16.5) • Protection details (Ref Fig: 16.5)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

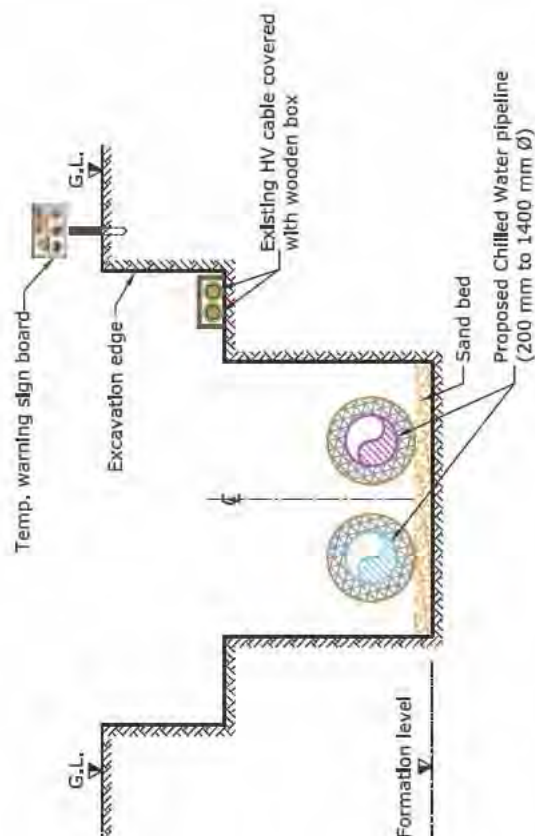
Fig: 16.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED CHILLED WATER PIPELINE (200 mm TO 1400 mm Ø) AND EXISTING HV SERVICES
Fig: 16.3	VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED CHILLED WATER PIPELINE (200 mm TO 1400 mm Ø) AND EXISTING HV SERVICES

NOTE :

1. Horizontal clearance is from the proposed Chilled Water pipeline edge to existing HV cable edge.
2. Vertical clearance from the top of proposed Chilled Water pipeline to the bottom of existing HV cable.
3. Proposed Chilled Water pipeline allowed to cross below existing HV cables.
4. Proposed Chilled Water pipeline not allowed to cross existing HV Manhole.
5. Trench side and HV cable protection may be required as per site and soil condition.

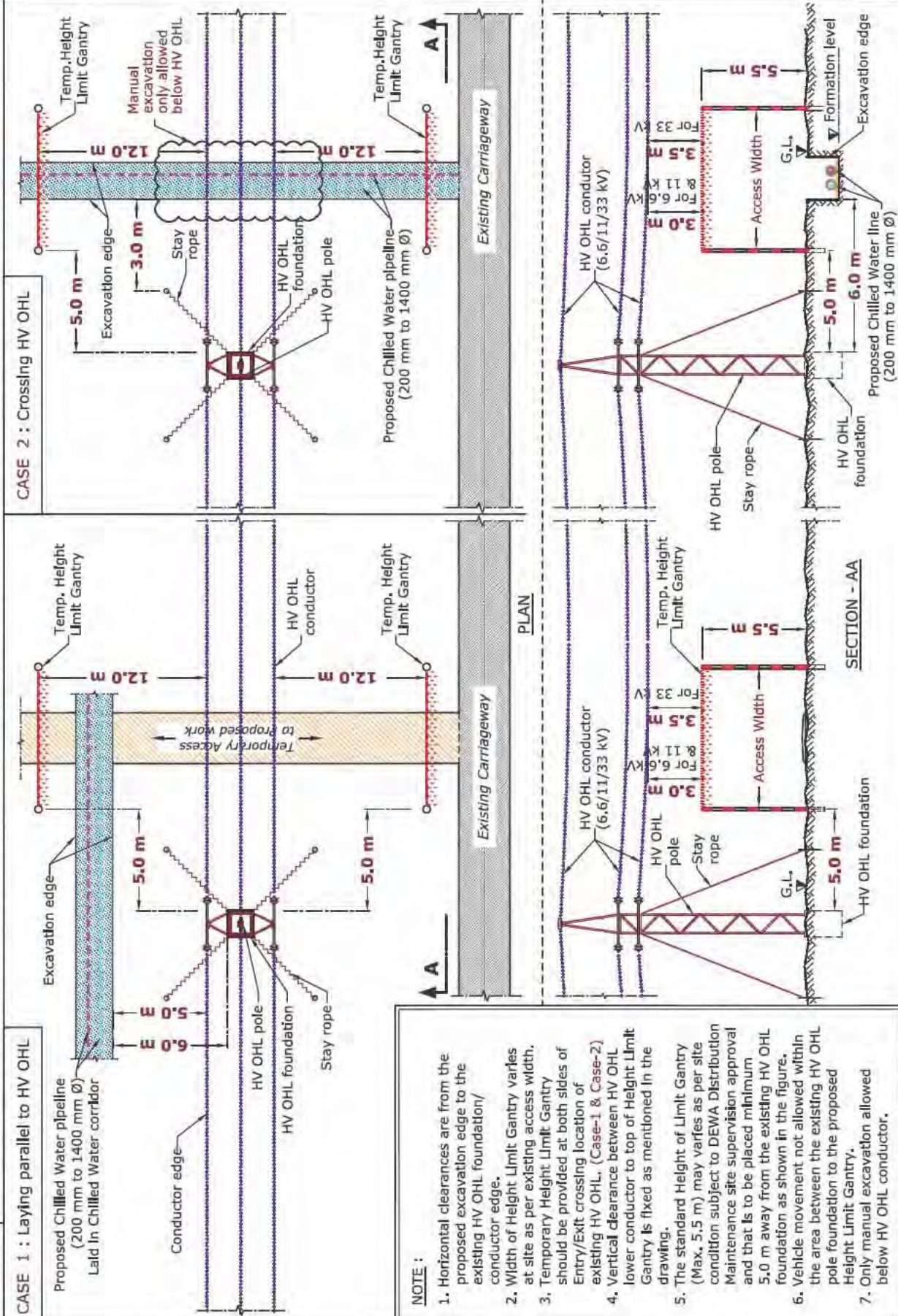
Fig: 16.4

STANDARD PROTECTION DETAILS FOR EXISTING HV CABLES FALLING PARALLEL WITH THE PROPOSED CHILLED WATER PIPELINE

**NOTE :**

1. If existing HV Cables slewed during the site activity, the same should be placed back to actual position after completion of work.
2. Existing HV cables falling parallel within the proposed excavation area should be protected with wooden box as shown in the figure.
3. Proposed services allowed to cross below existing HV services and existing HV services should be protected as per site condition.
4. Existing HV cables falling parallel & outside to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. (Ref Fig:16.2)
5. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing HV cable edge.
6. Trench side and existing HV services protection may be required as per site condition.

TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)



NOTE :

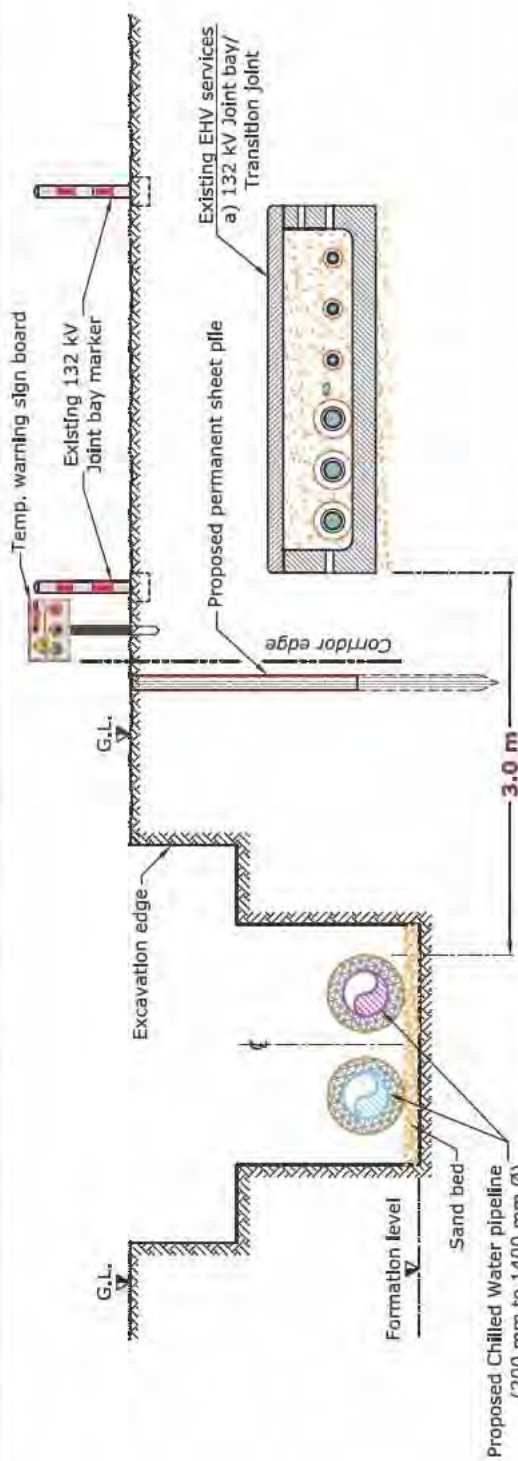
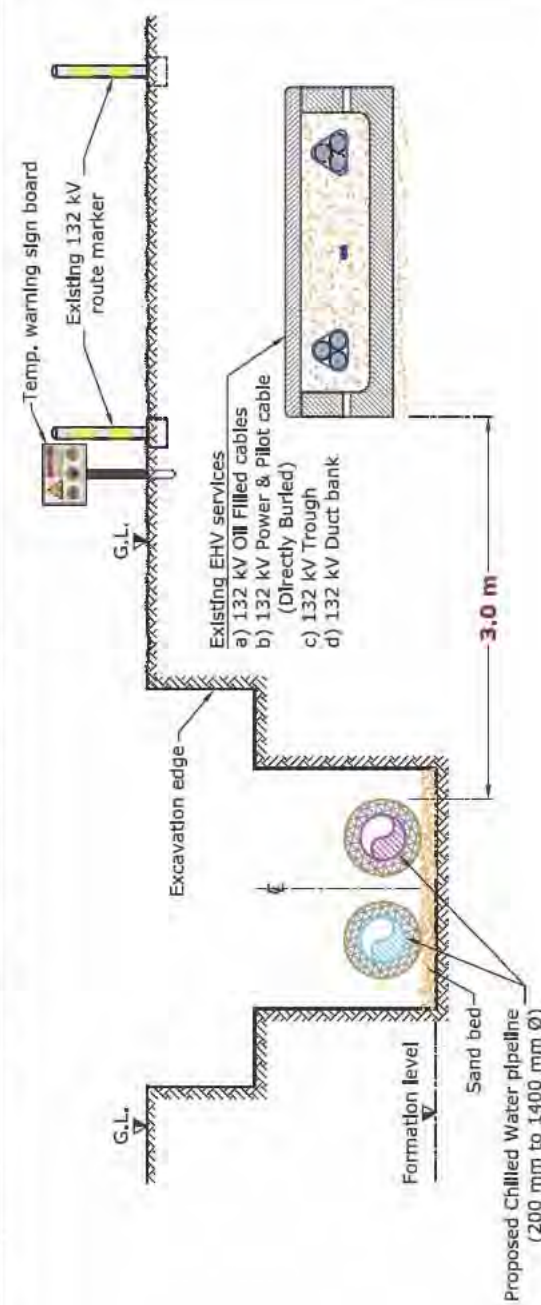
1. Horizontal clearances are from the proposed excavation edge to the existing HV OHL foundation/conductor edge.
2. Width of Height Limit Gantry varies at site as per existing access width.
3. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing HV OHL. (Case-1 & Case-2)
4. Vertical clearance between HV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
5. The standard Height of Limit Gantry (Max. 5.5 m) may varies as per site condition subject to DEWA Distribution Maintenance site supervision approval and that is to be placed minimum 5.0 m away from the existing HV OHL foundation as shown in the figure.
6. Vehicle movement not allowed within the area between the existing HV OHL pole foundation to the proposed Height Limit Gantry.
7. Only manual excavation allowed below HV OHL conductor.

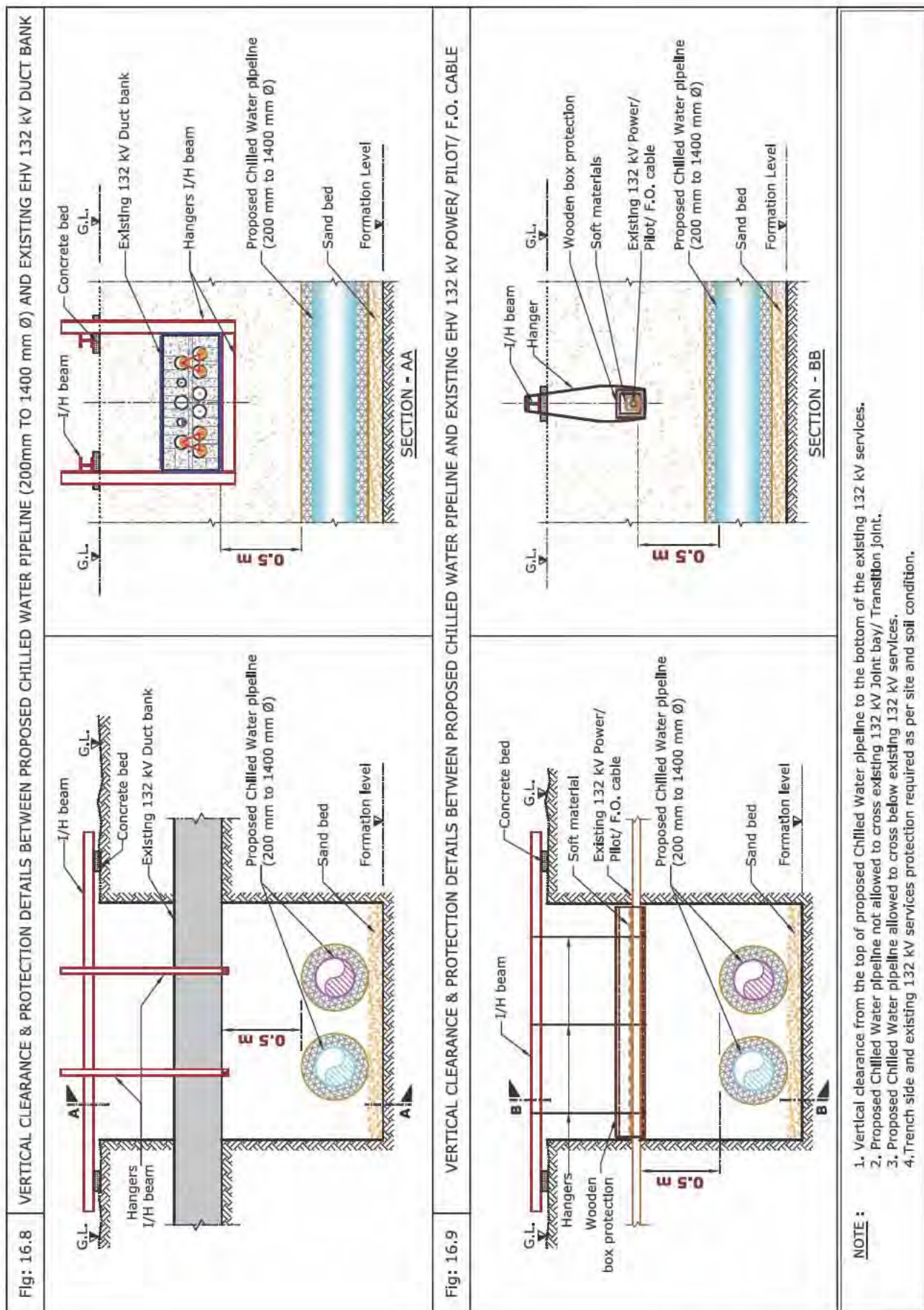
Table 3: Clearance & Protection details for proposed District Cooling Pipeline and existing DEWA Electricity EHV services

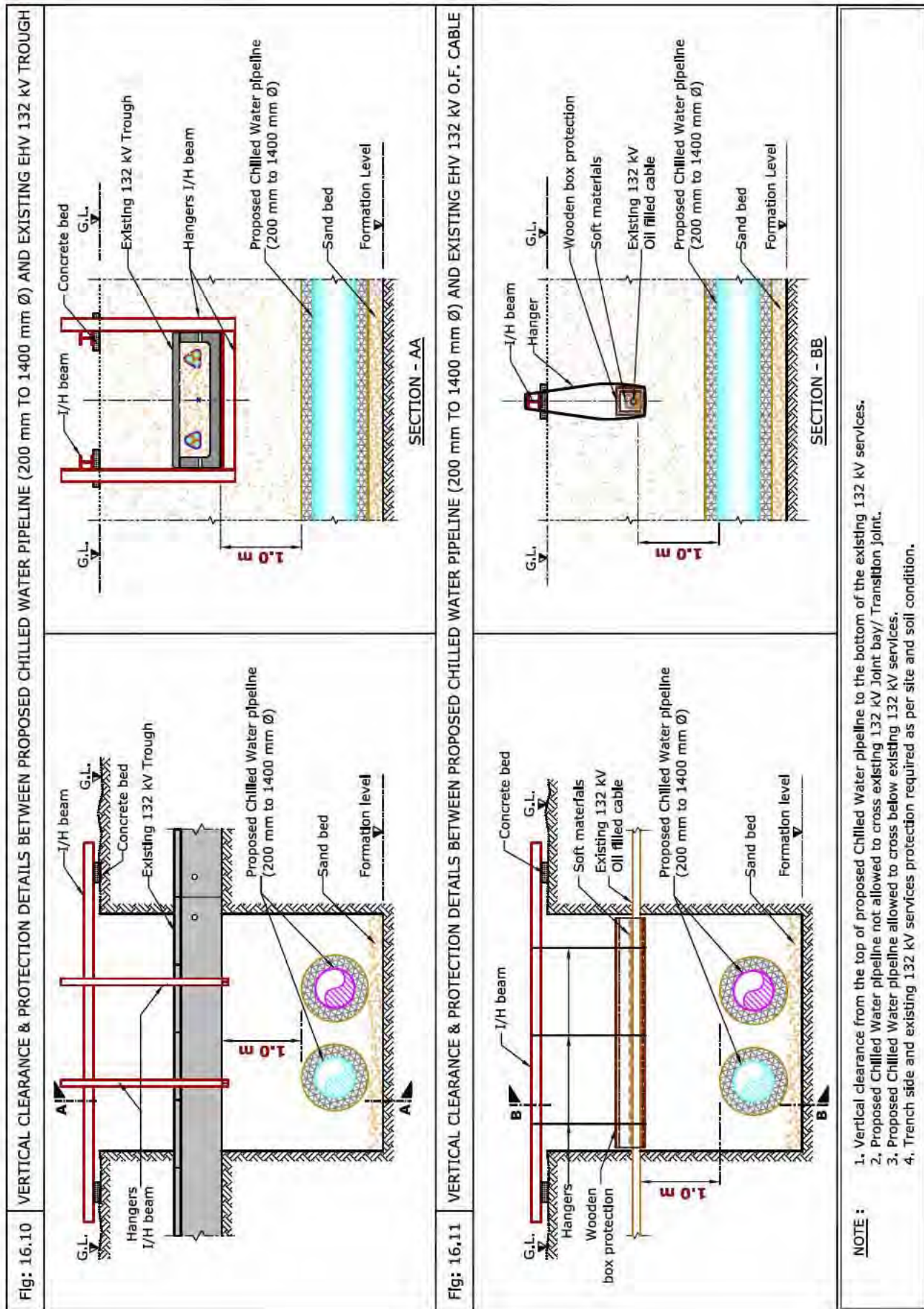
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.7) • Vertical clearance (Ref Fig: 16.11) • Protection details (Ref Fig: 16.11)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.7) • Vertical clearance (Ref Fig: 16.9) • Protection details (Ref Fig: 16.9)
EHV (132 kV) Trough	3.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.7) • Vertical clearance (Ref Fig: 16.10) • Protection details (Ref Fig: 16.10)
EHV (132 kV) Duct Bank	3.0 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.7) • Vertical clearance (Ref Fig: 16.8) • Protection details (Ref Fig: 16.8)
EHV (132 kV) Joint Bay/ Transition Joint	3.0 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.6) • Protection Details (Ref Fig: 16.6)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.14)
EHV (400 kV) Tunnel	2.5 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.12) • Vertical clearance (Ref Fig: 16.13) • Protection details (Ref Fig: 16.13)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 16.14) • Vertical clearance (Ref Fig: 16.14) • Protection details (Ref Fig: 16.14)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 16.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED CHILLED WATER PIPELINE (200 mm TO 1400 mm Ø) AND EXISTING 132 kV JOINT BAY</p> 
<p>Fig: 16.7</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED CHILLED WATER PIPELINE (200 mm TO 1400 mm Ø) AND EXISTING 132 kV SERVICES</p>  <div> <p>NOTE :</p> <ol style="list-style-type: none"> 1. Permanent Sheet pile should be provided between existing 132 kV Joint bay/Transition Joint (Minimum 12.0m length) and proposed Chilled Water pipeline. 2. Existing Link box cable should be protected through split duct and concrete surround. 3. Horizontal clearance from the proposed Chilled Water pipeline edge to existing EHV services edge. 4. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing EHV services edge. 5. Sheet pile protection not required between proposed Chilled Water pipeline & existing Joint bay, if horizontal clearance is 5.0 m & above. 6. Trench side and existing EHV services protection may be required as per site and soil condition. </div>





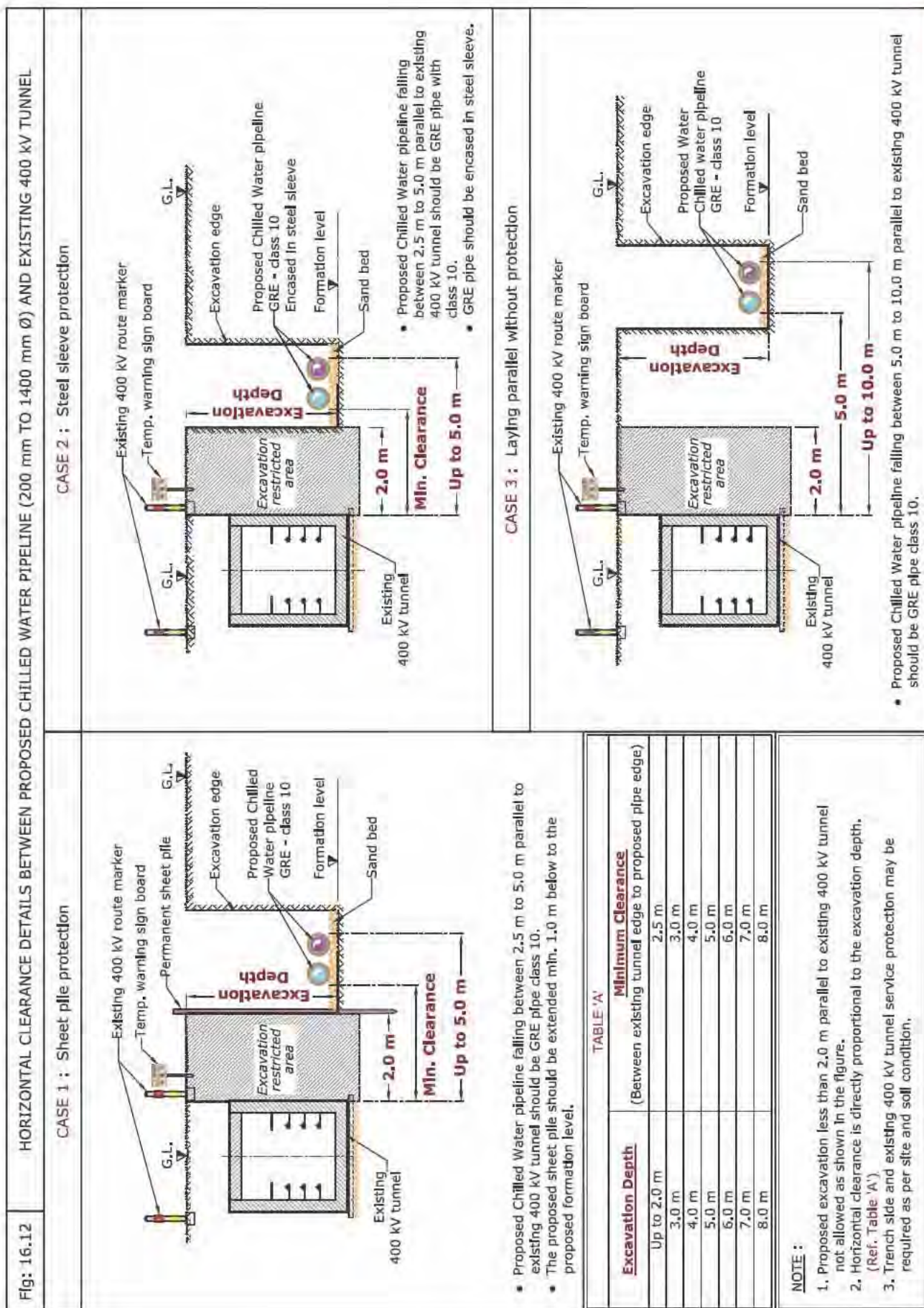
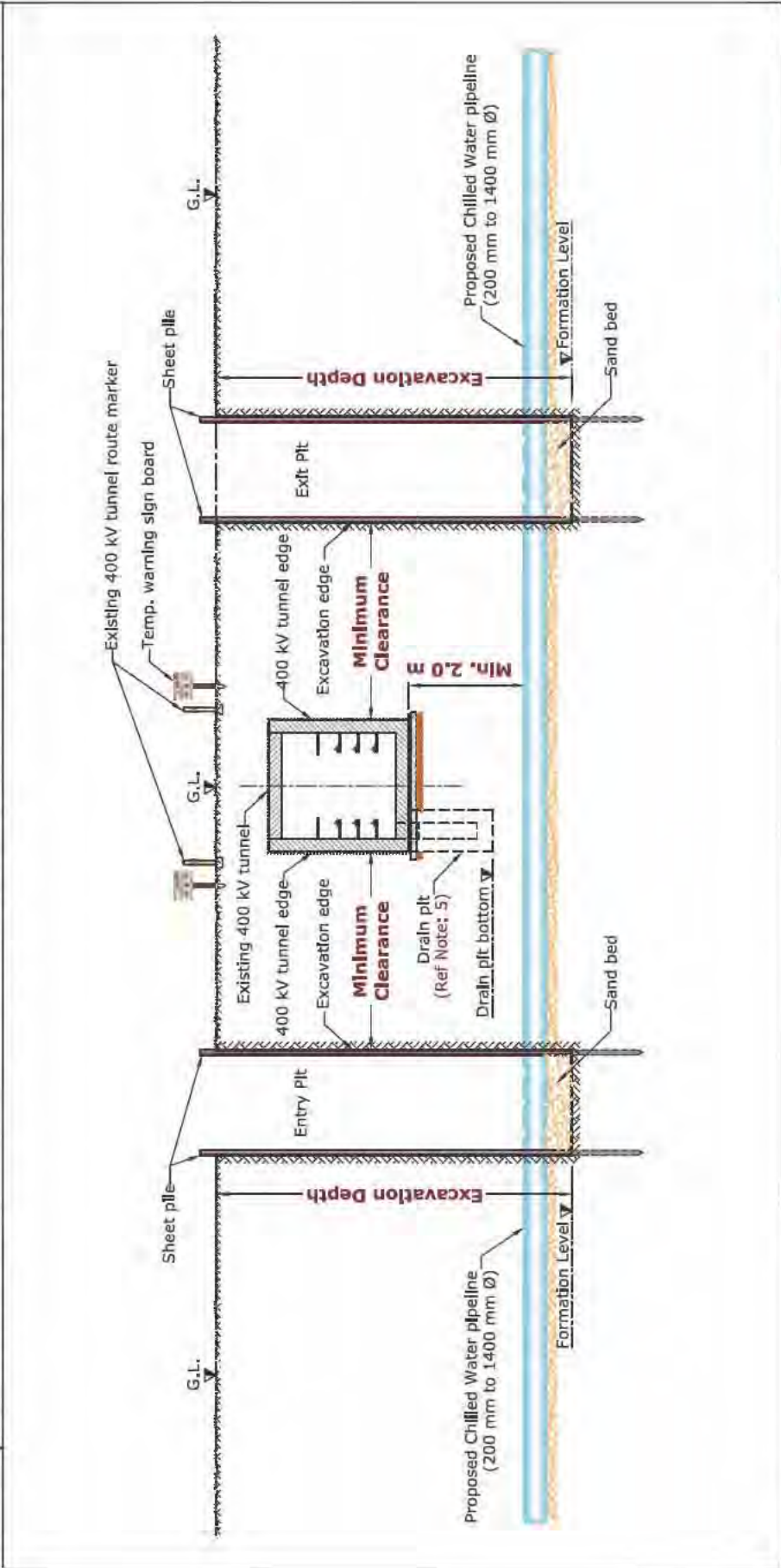


Fig: 16.13 VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED CHILLED WATER PIPELINE (200 mm TO 1400 mm Ø) AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel is not allowed.
2. Minimum clearance from 400 kV tunnel edge to entry/exit pit excavation edge is directly proportional to the excavation depth. (Ref. Table 'A')
3. Proposed Chilled Water pipeline can be allowed to cross below existing 400 kV tunnel by NDCM.
4. Vertical clearance is from the top of proposed NDCM work to the bottom of existing 400 kV tunnel.
5. Existing 400 kV tunnel's drain pit location should be identified prior to start NDCM work. In case the proposed chilled water pipeline crossing falling below existing drain pit area, Minimum 2.0 m vertical clearance to be maintained from the bottom of drain pit to the top of proposed NDCM work.
6. Sheet pile protection may be required for Entry/ Exit pit excavation.
7. Settlement calculation shall be submitted.
8. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Entry/Exit pit excavation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m
9.0 m	9.0 m

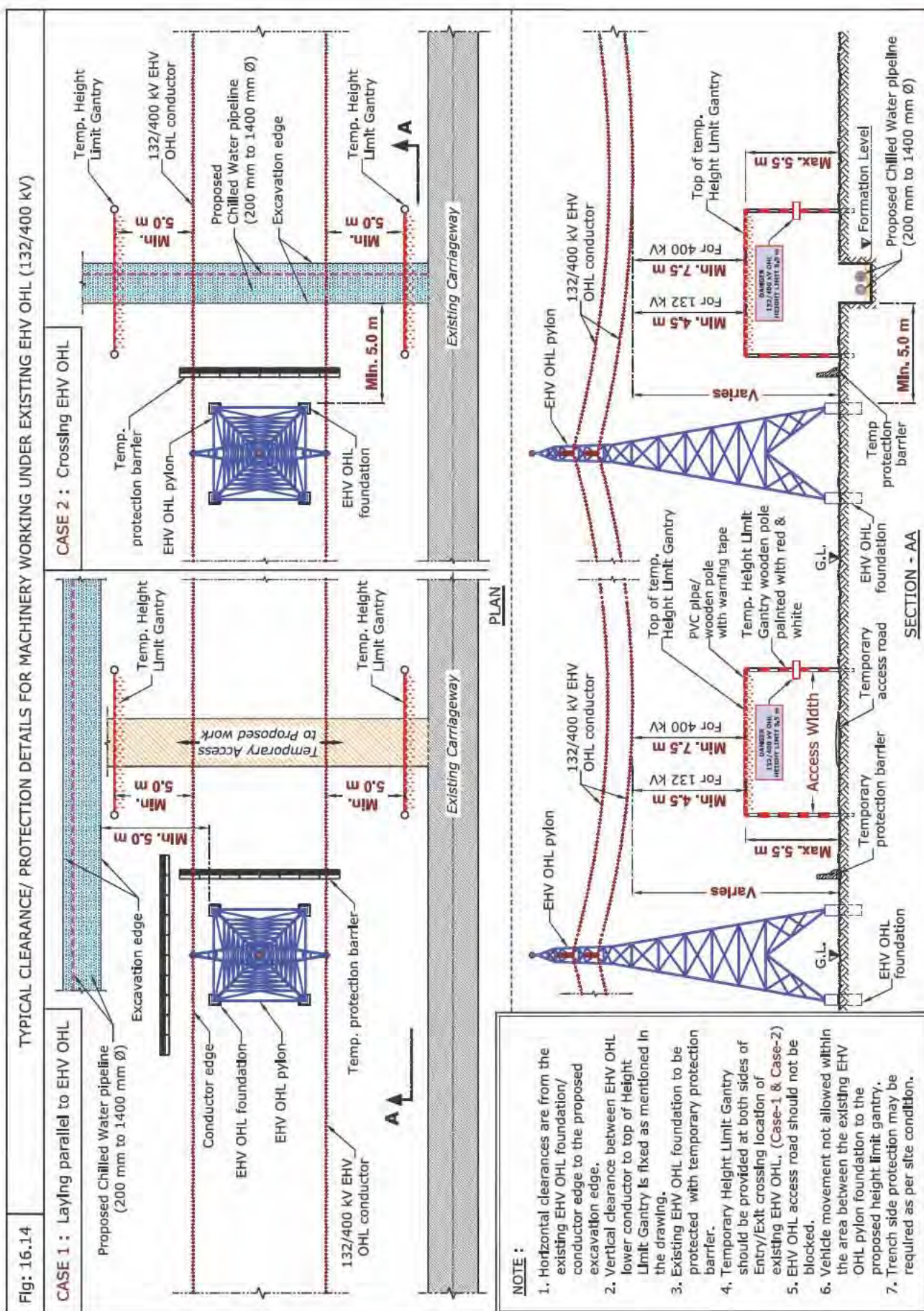


Table 4: Clearance & Protection details for proposed District Cooling Pipeline and existing DEWA Gas/Fuel services

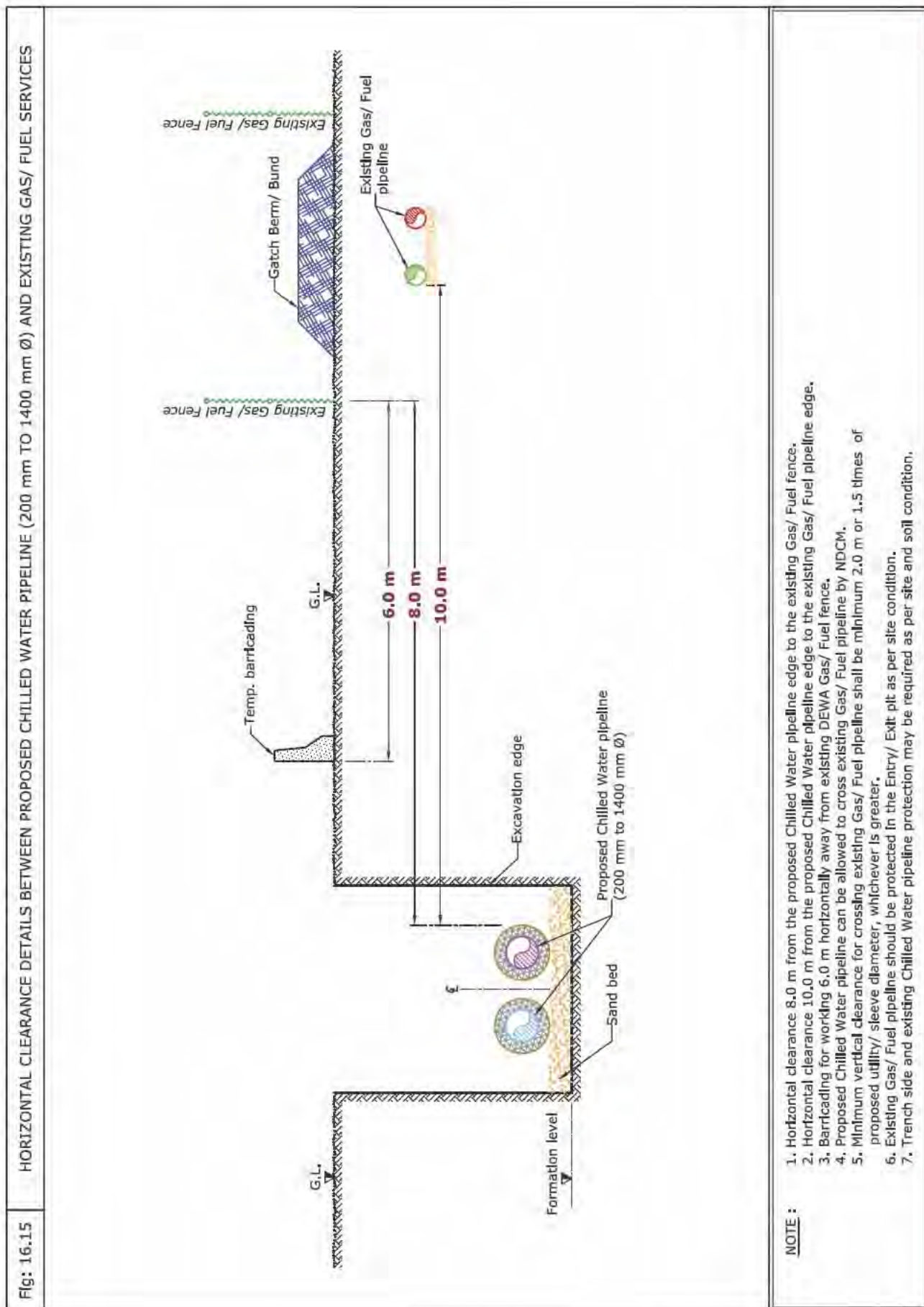
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig:16.15)
Gas/Fuel Pipeline (All diameter)	10.0 m	Ref Note Below	B	NDCM	R	• Horizontal clearance (Ref Fig:16.15)

Note: Minimum vertical clearance shall be 2.0 m or 1.5 times of proposed utility/sleeve diameter, whichever is greater.

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.





17. Laying of Proposed Utilities - Gas/Fuel Pipelines

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17.1 Introduction

It is a network of pipelines used for safe and efficient transporting gaseous fuels for long distances from the point of extraction or production to the points of consumption (End-users).

This network usually consists of carbon steel pipes, valves etc., with various diameters which are laid underground with berm/bund embankment and

protected with steel fence/chain link fence, along the corridor to prevent any movement over these lines.

The Gas/Fuel pipelines in Dubai are laid within Right Of Way or special corridors; therefore it is required to protect DEWA existing assets during laying of Gas/Fuel pipelines activities as per DEWA specified standards.



Gas/Fuel Line



Gas/Fuel Pipe inside fencing with route marker



Gas/Fuel Gatch berm/Bund and route marker



Temporary fencing during Erection of Gas/Fuel Pipeline

17.2 Avoid the following



1. Crossing existing 132 kV Joint Bay/Transition joint.
2. Crossing existing 400 kV Tunnel by open cut
3. Crossing existing HV Manholes/Valve chambers/SCADA Unit.

17.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Gas/Fuel Pipeline and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	10.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.1) Vertical clearance (Ref Fig: 17.2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 17.1 HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED GAS/ FUEL PIPELINE AND EXISTING LV CABLES

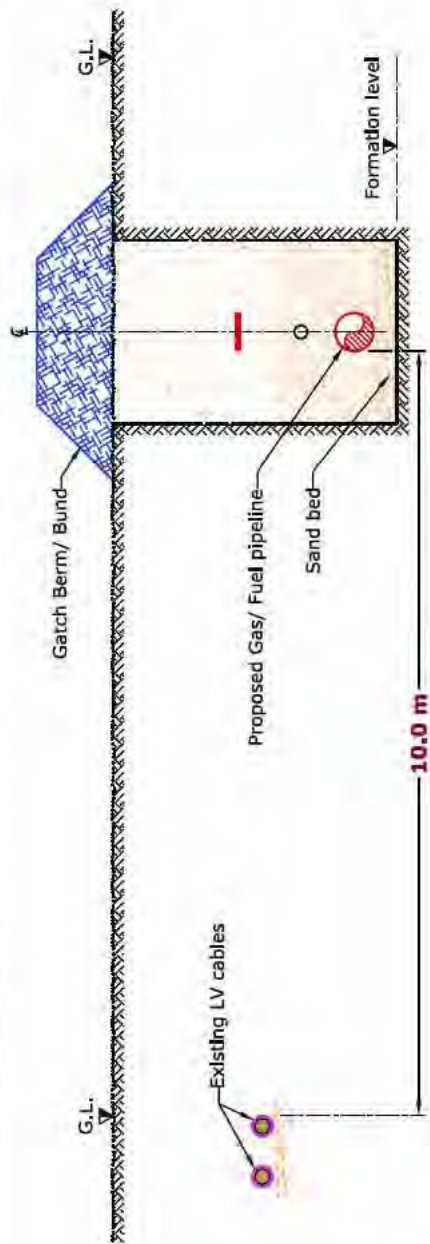
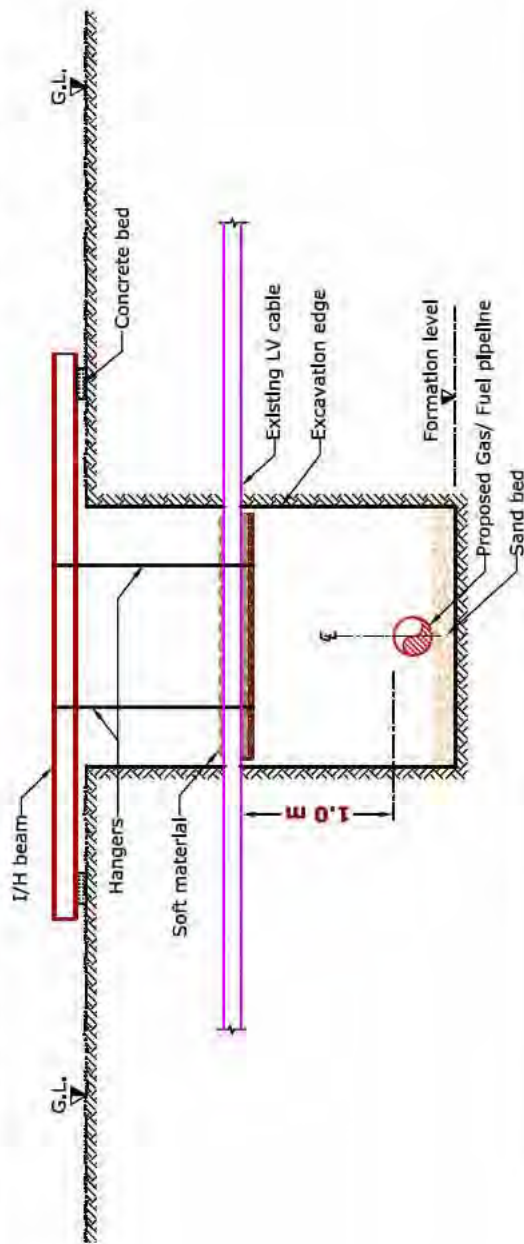


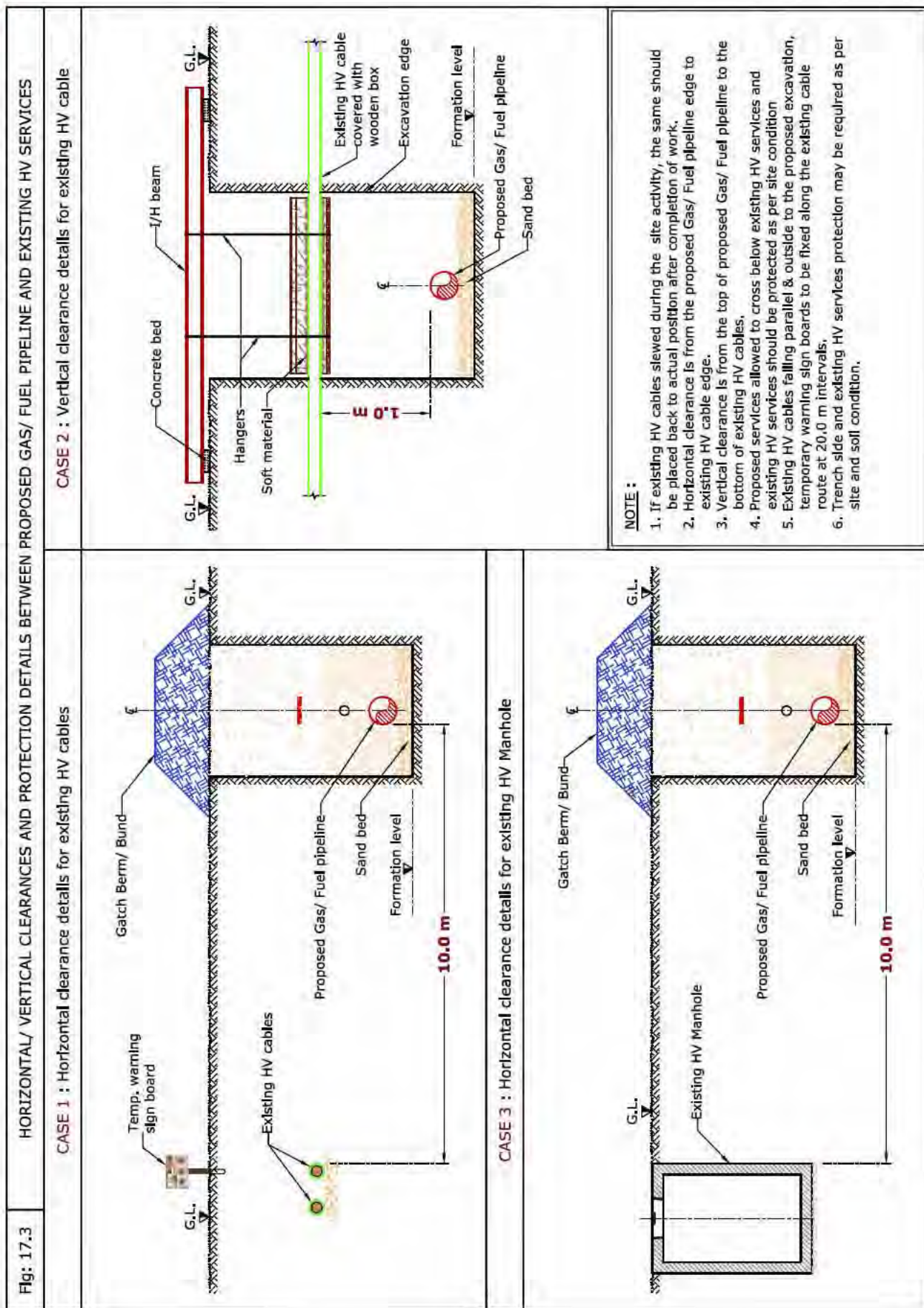
Fig: 17.2 VERTICAL CLEARANCES & PROTECTION DETAILS BETWEEN PROPOSED GAS/ FUEL PIPELINE AND EXISTING LV CABLES



- NOTE :**
1. Horizontal clearance is from the proposed Gas/ Fuel pipeline edge to existing LV cable edge.
 2. Vertical clearance is from the top of proposed Gas/ Fuel pipeline to the bottom of existing LV cable.
 3. Trench side and LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed Gas/Fuel Pipeline and existing DEWA Electricity HV services						
Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	10.0 m	1.0 m	B	OC	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 17.3, Case 1) • Vertical clearance (Ref Fig: 17.3, Case 2) • Protection details (Ref Fig: 17.3, Case 2)
HV (6.6/11/33 kV) Manhole	10.0 m	NA	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 17.3, Case 3)
HV (6.6/11/33 kV) O.H.L	10.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 17.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	10.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 17.4) • Vertical clearance (Ref Fig: 17.4) • Protection details (Ref Fig: 17.4)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



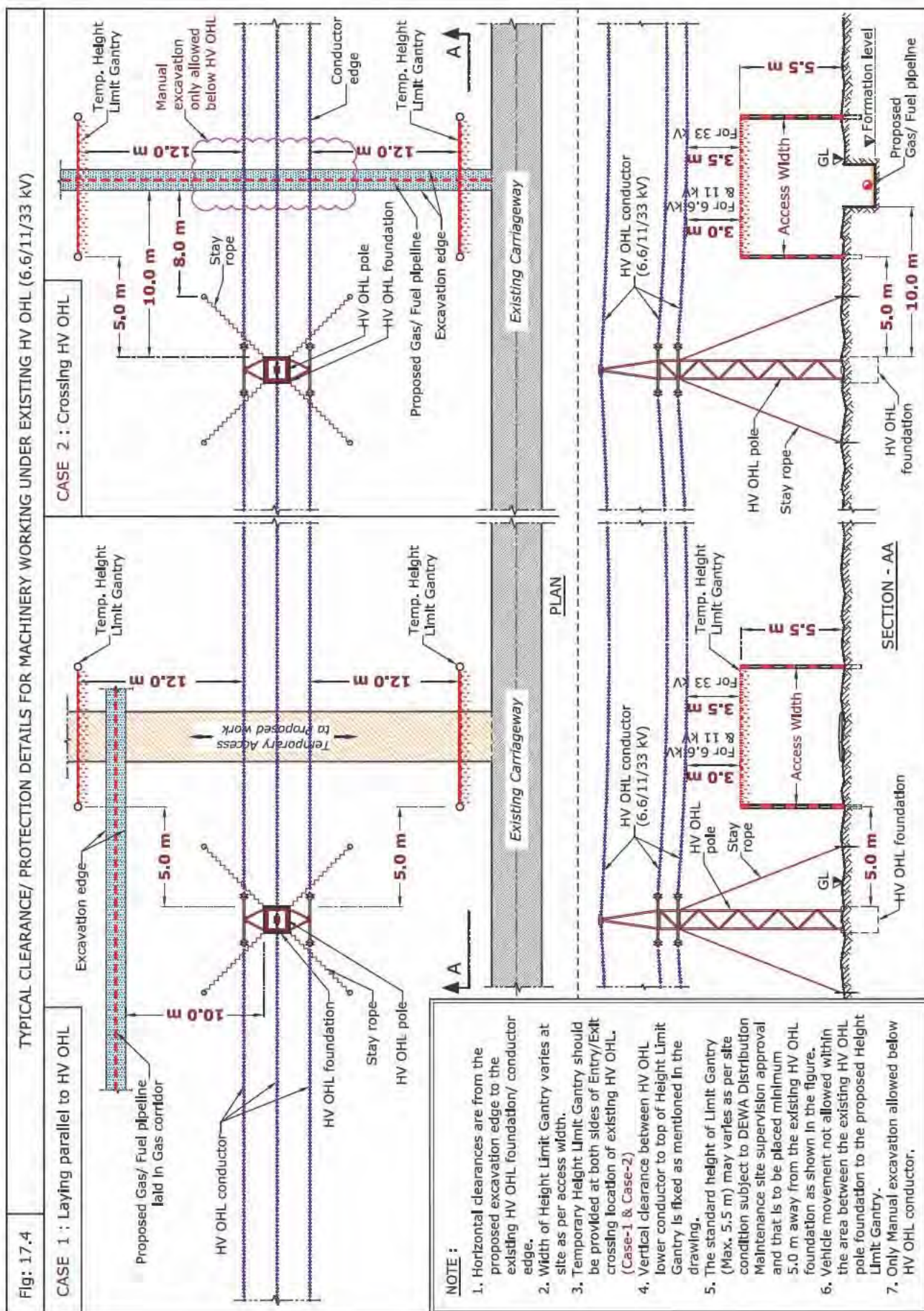


Table 3: Clearance & Protection details for proposed Gas/Fuel Pipeline and existing DEWA Electricity EHV services

Electricity EHV existing Services	Proposed Gas/ Fuel pipe diameter	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	All diameter	10.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.5) Vertical clearance (Ref Fig: 17.8) Protection details (Ref Fig: 17.8)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	All diameter	10.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.5) Vertical clearance (Ref Fig: 17.8) Protection details (Ref Fig: 17.8)
EHV (132 kV) Trough	All diameter	10.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.6) Vertical clearance (Ref Fig: 17.7) Protection details (Ref Fig: 17.7)
EHV (132 kV) Duct Bank	All diameter	10.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.6) Vertical clearance (Ref Fig: 17.7) Protection details (Ref Fig: 17.7)
EHV (132 kV) Joint Bay/ Transition Joint	All diameter	10.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.6)
EHV (132/400 kV) O.H.L	Above 450 mm ø	100.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.9)
	180 to 450 mm ø	50.0 m					
	Upto 150 mm ø	25.0 m					
EHV (400 kV) Tunnel	All diameter	10.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.10) Vertical clearance (Ref Fig: 17.11)

Clearance & Protection details for access and working under Existing EHV-OHL

EHV (132 kV) O.H.L	-	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 17.9) Vertical clearance (Ref Fig: 17.9) Protection details (Ref Fig: 17.9)
EHV (400 kV) O.H.L	-		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 17.5 HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED GAS/FUEL PIPELINE AND EXISTING DIRECTLY BURIED EHV 132 kV O.F./ POWER & PILOT CABLE

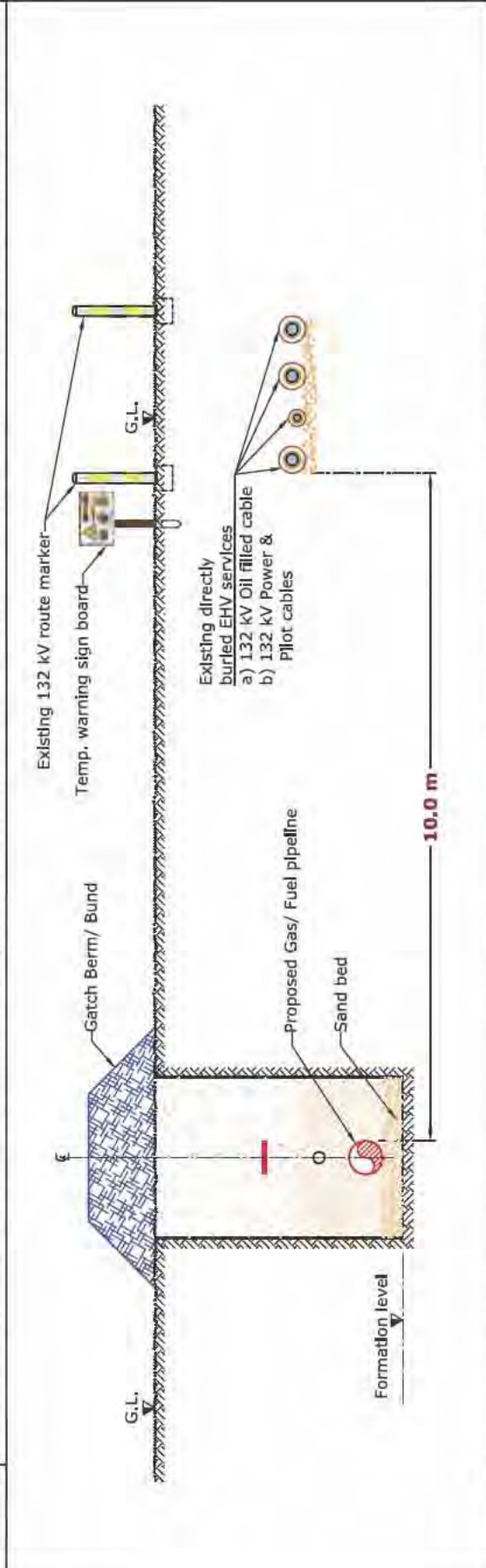
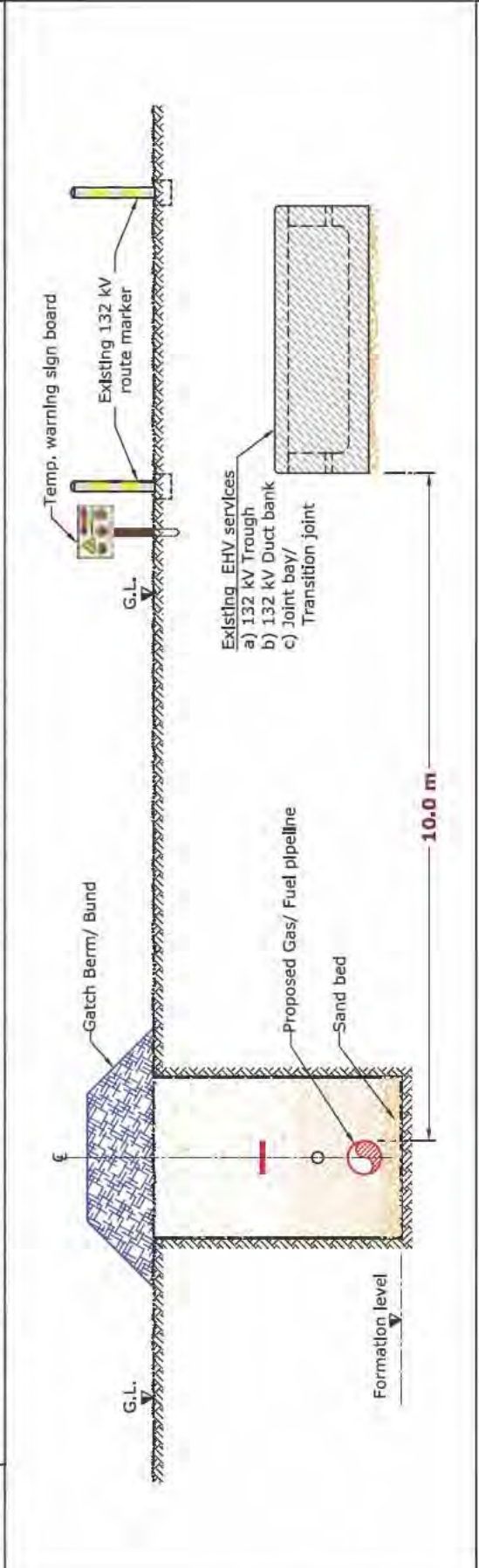


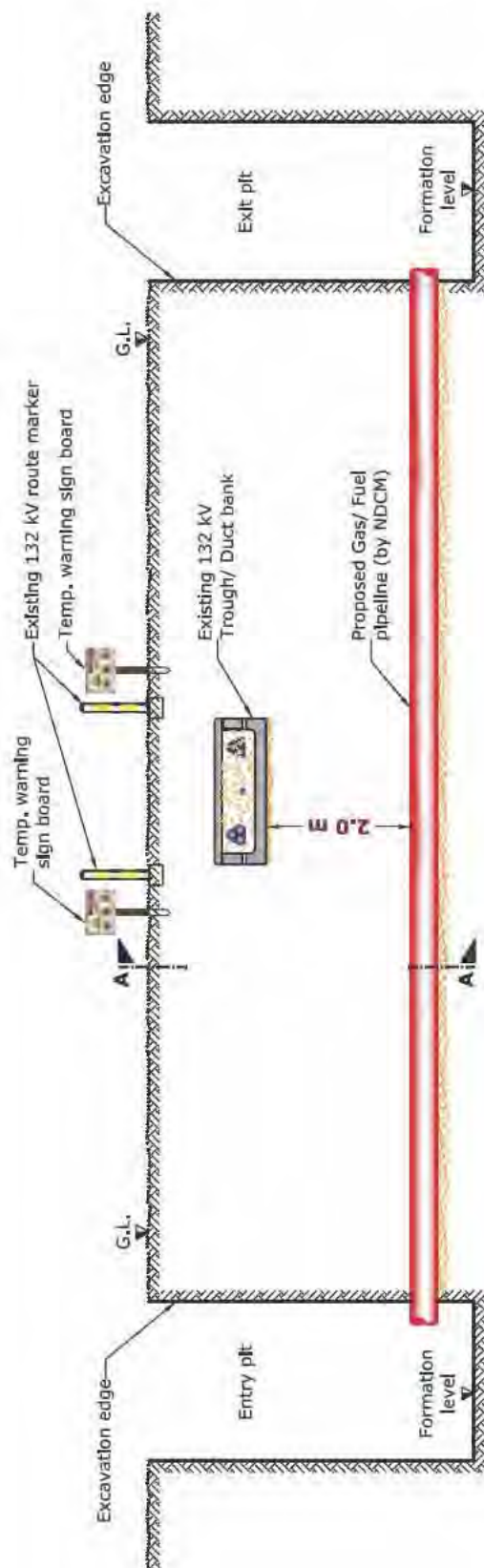
Fig: 17.6 HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED GAS/FUEL PIPELINE AND EXISTING EHV 132 kV TROUGH/DUCT BANK & JOINT BAY/TRANSITION JOINT



NOTE :

1. Horizontal clearance from the proposed Gas/Fuel pipeline edge to existing EHV services edge.
2. Trench side and existing EHV services protection may be required as per site and soil condition

Fig: 17.7 VERTICAL CLEARANCES & PROTECTION DETAILS BETWEEN PROPOSED GAS/FUEL PIPELINE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK



NOTE :

1. Vertical clearance from the top of proposed Gas/ Fuel pipeline to the bottom of the existing 132 kV services.
2. Proposed Gas/Fuel pipeline allowed to cross below existing 132 kV services by NDCM.
3. Proposed Gas/Fuel pipeline not allowed to cross existing 132 kV Joint bay/ Transition joint.
4. Trench side and existing 132 kV services protection at Entry/ Exit pit.

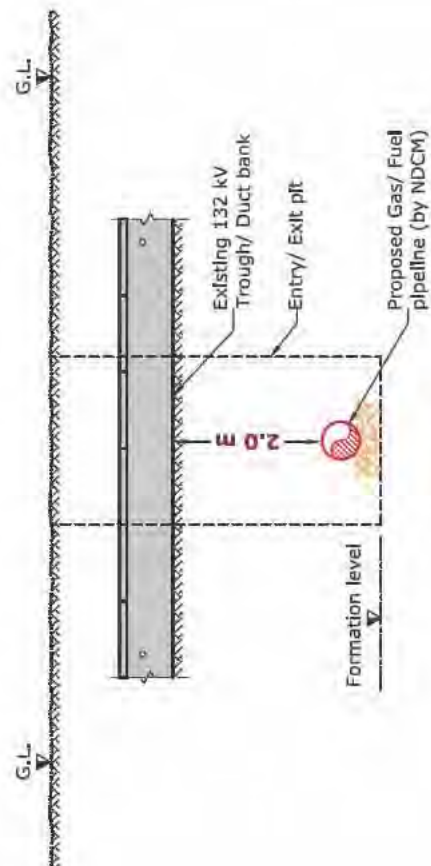
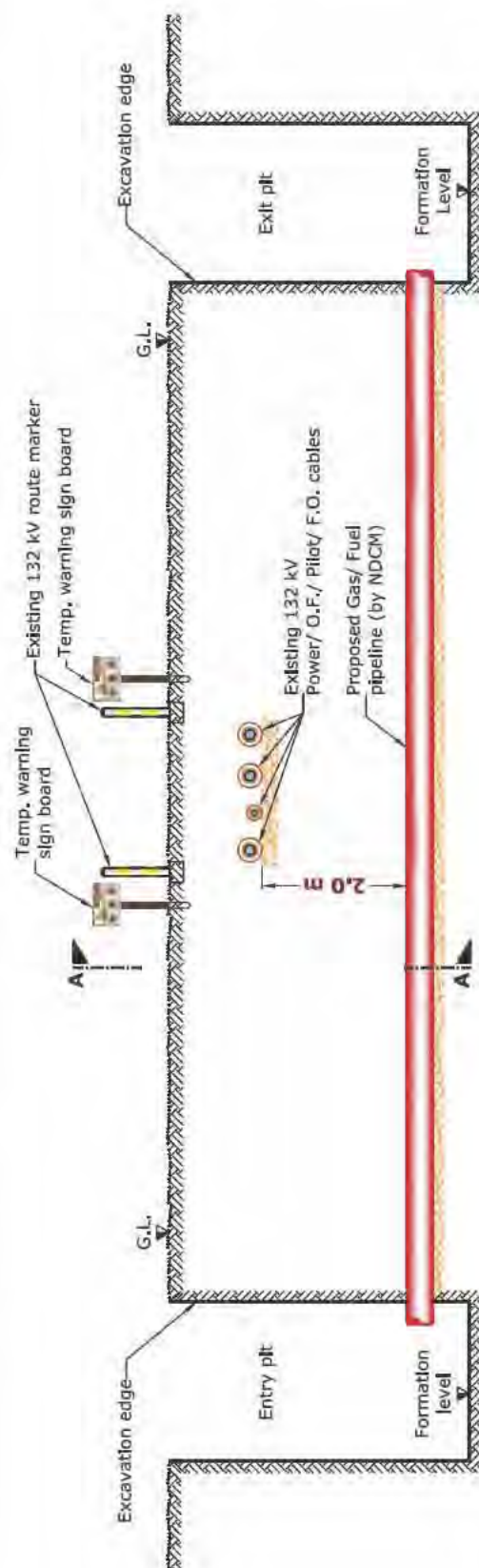
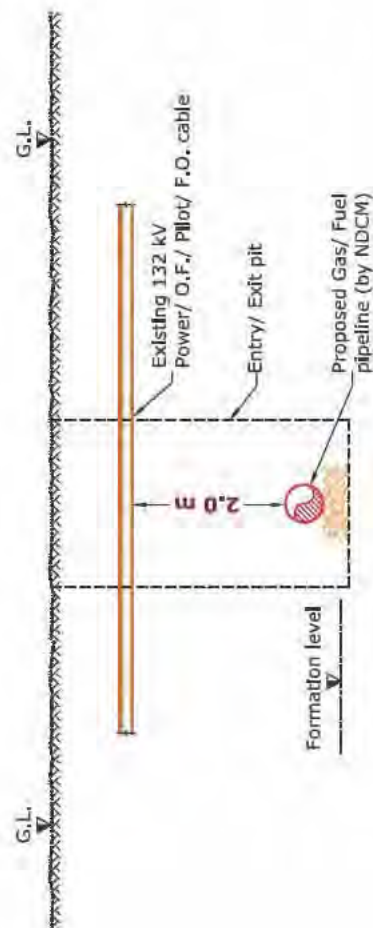


Fig: 17.8 VERTICAL CLEARANCES & PROTECTION DETAILS BETWEEN PROPOSED GAS/ FUEL PIPELINE AND EXISTING EHV 132 kV SERVICES



NOTE :

1. Vertical clearance from the top of proposed Gas/ Fuel pipeline to the bottom of the existing 132 kV services.
2. Proposed Gas/Fuel pipeline allowed to cross below existing 132 kV services by NDCM.
3. Trench side and existing 132 kV services protection at Entry/ Exit pit.



SECTION - AA

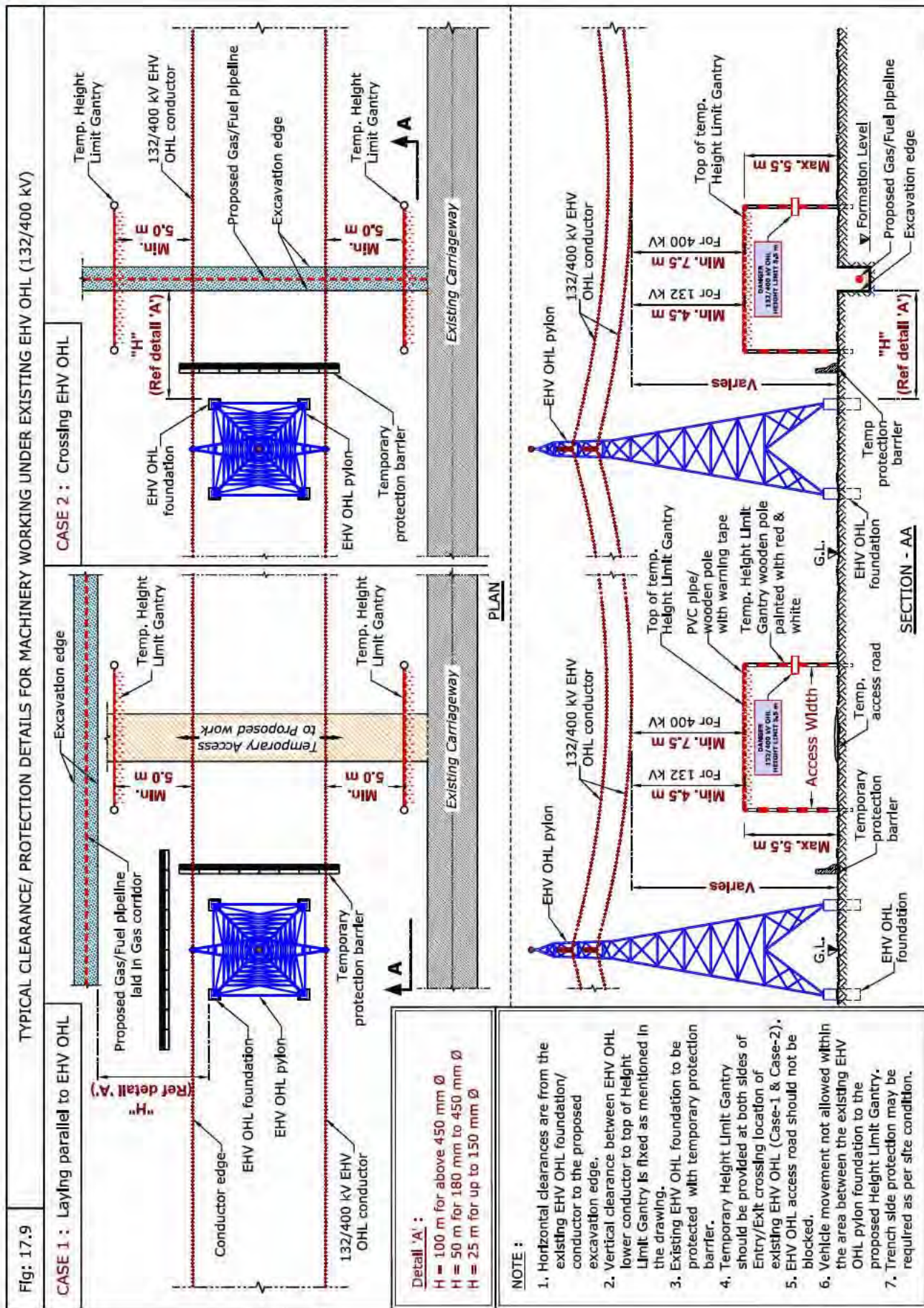
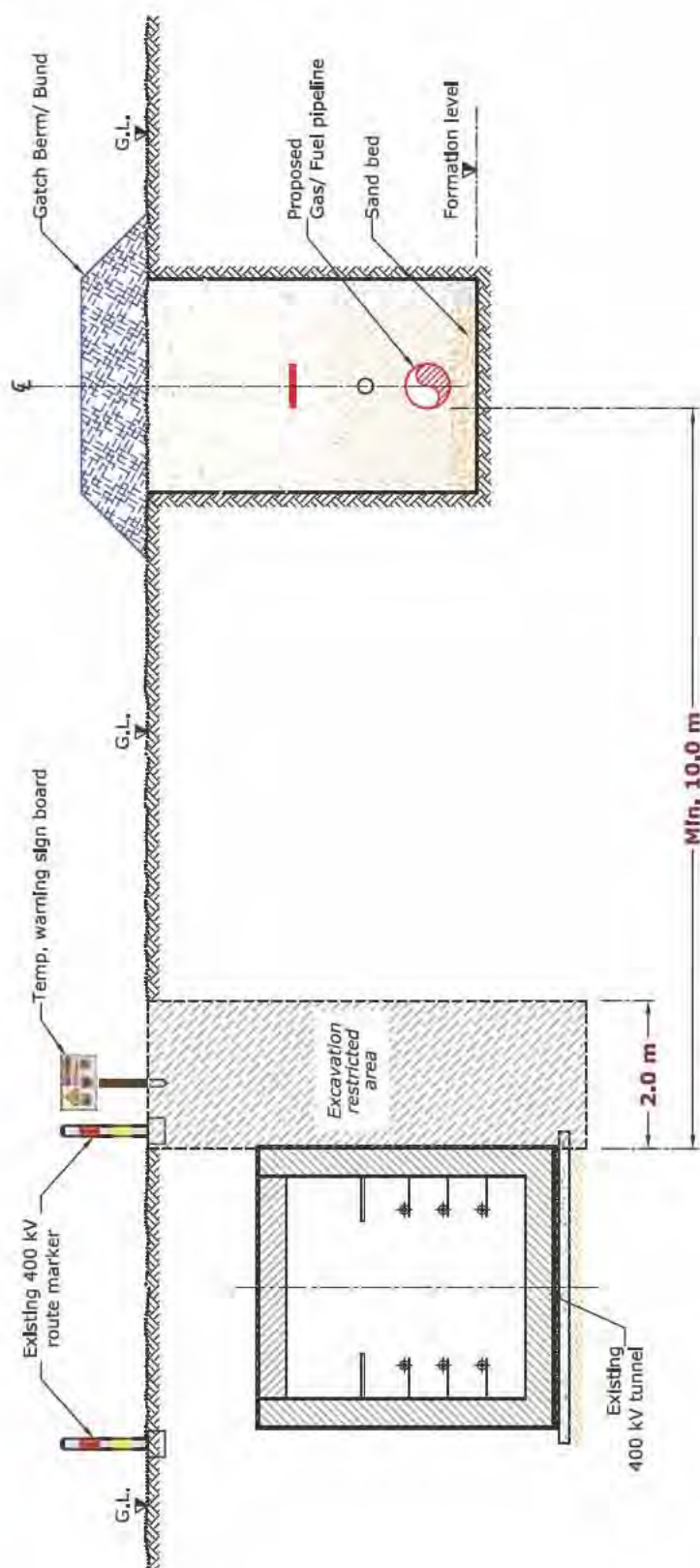
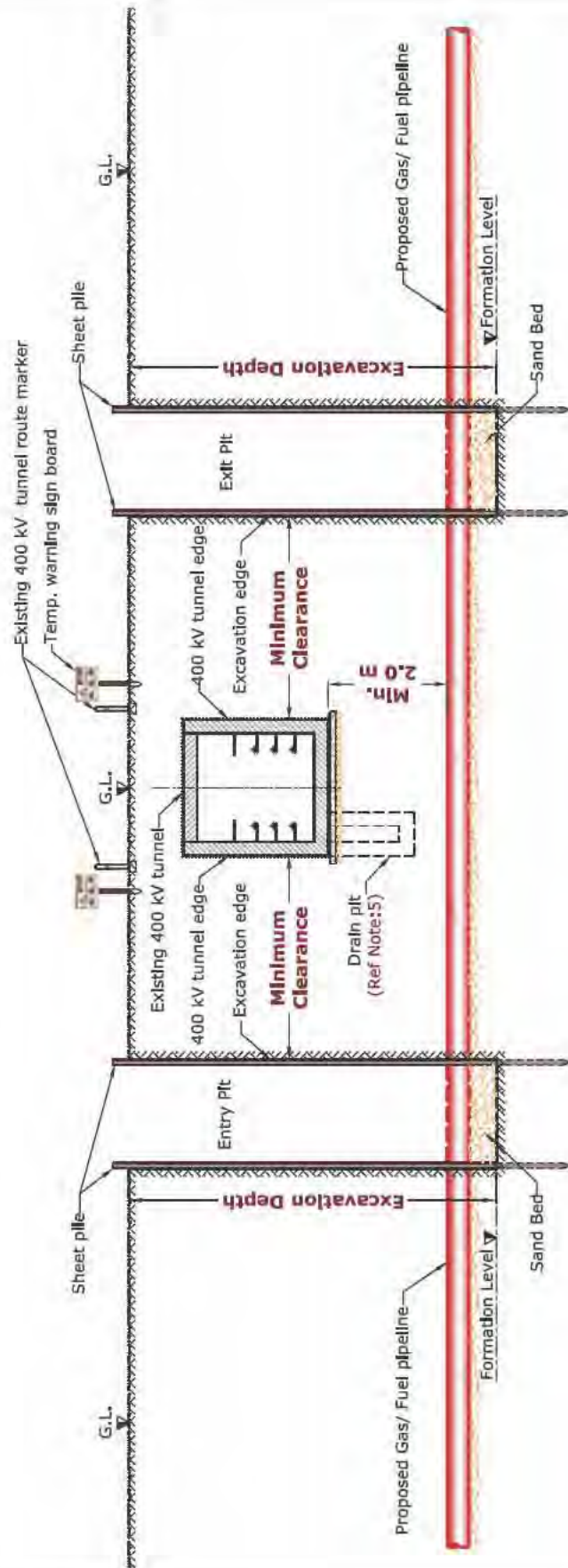


Fig: 17.10 HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED GAS/ FUEL PIPELINE AND EXISTING 400 kV TUNNEL



- NOTE :**
1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown in the figure.
 2. Minimum 10.0 m Horizontal clearance to be maintained from the edge of 400 kV tunnel to the proposed Gas/ Fuel pipeline edge.
 3. Trench side and existing 400 kV tunnel protection may be required as per site and soil condition.

VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED GAS/ FUEL PIPELINE (ALL DIAMETER) AND EXISTING 400 KV TUNNEL

**NOTE :**

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel is not allowed.
2. Minimum clearance from 400 kV tunnel edge to Entry/ Exit pit excavation edge is directly proportional to the excavation depth. (Ref. Table 'A')
3. Proposed Gas/ Fuel pipeline can be allowed to cross below existing 400 kV tunnel by NDCM.
4. Vertical clearance is from the top of proposed NDCM work to the bottom of existing 400 kV tunnel.
5. Existing 400 kV tunnel's drain pit location should be identified prior to start NDCM work. In case the proposed Gas/ Fuel pipeline crossing falling below existing drain pit area, minimum 2.0 m vertical clearance to be maintained from the bottom of drain pit to the top of proposed NDCM work.
6. Sheet pile protection may be required for Entry/ Exit pit excavation.
7. Settlement calculation shall be submitted.
8. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Entry/Exit pit Excavation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m
9.0 m	9.0 m

Table 4: Clearance & Protection details for proposed Gas/Fuel Pipeline and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Gas/Fuel pipeline (All diameter)	5.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 17.12)

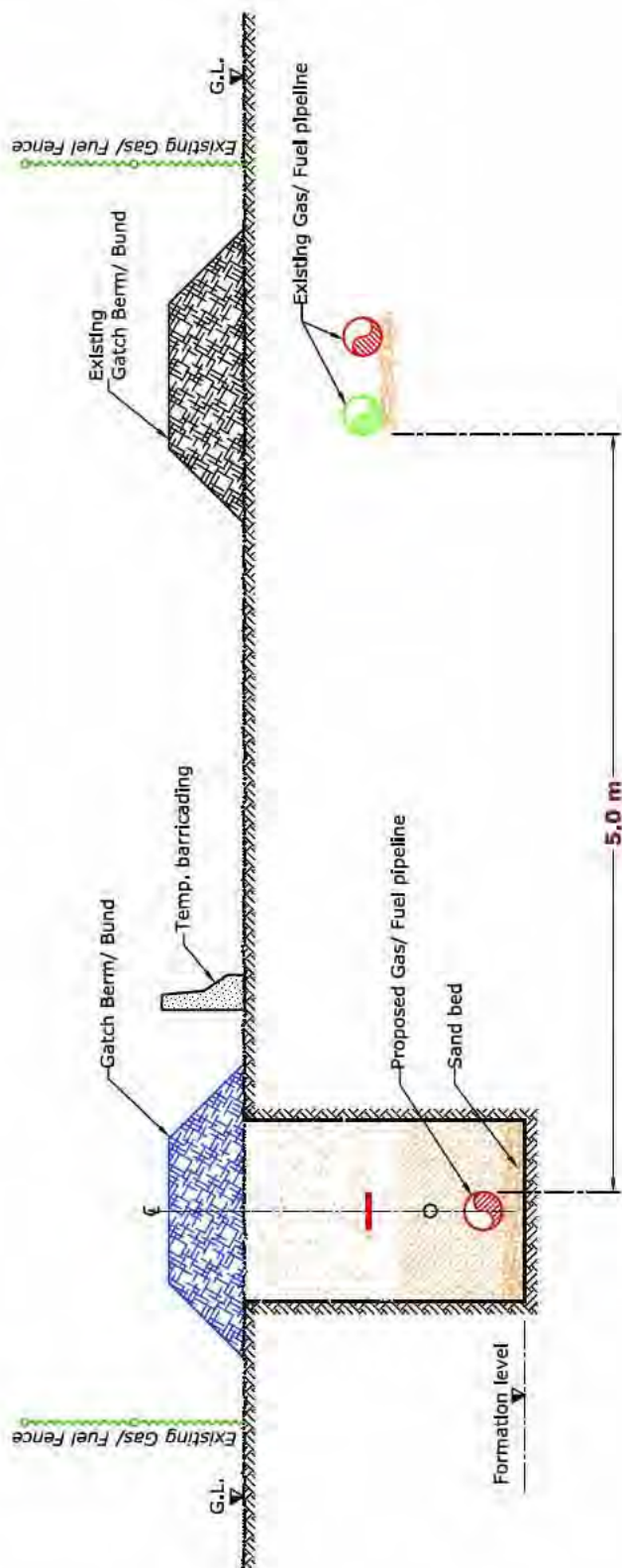
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



VERTICAL CLEARANCES & PROTECTION DETAILS BETWEEN PROPOSED GAS/ FUEL PIPELINE AND EXISTING GAS/ FUEL PIPELINE

Fig: 17.12



- NOTE :**
1. Horizontal clearance is from the proposed Gas/ Fuel pipeline edge to the existing Gas/ Fuel pipeline edge.
 2. Barricading required for existing DEWA Gas/ Fuel pipeline/ fence.
 3. Proposed Gas/ Fuel pipeline can be allowed to cross existing Gas/ Fuel pipeline by NDCM.
 4. Existing Gas/ Fuel pipeline should be protected in the Entry/ Exit pit as per site condition.
 5. Trench side and existing DEWA Gas/ Fuel pipeline protection may be required as per site and soil condition.

18. Laying of Proposed Utilities - Telecommunication

(Etisalat/Du/Military/ITS/CCTV/SCADA).

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18.1 Introduction

Communication is a process to exchange transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature through wire/wireless, radio, optical or other electromagnetic systems.

This network consists of cables, ducts, manholes/ chambers/pull-out boxes, telecommunication towers etc., which are constructed within Right Of Way; therefore it is required to protect DEWA existing assets during construction activities as per specified standards.



Photo: Telecommunication ducts.



18.2 Avoid the following



1. Crossing existing 132 kV Joint Bay/Transition joint.
2. Crossing existing HV Manholes/Valve chambers/ SCADA Unit.

18.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Telecommunication duct and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 18.1, Case 1) Vertical clearance (Ref Fig: 18.1, Case 2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

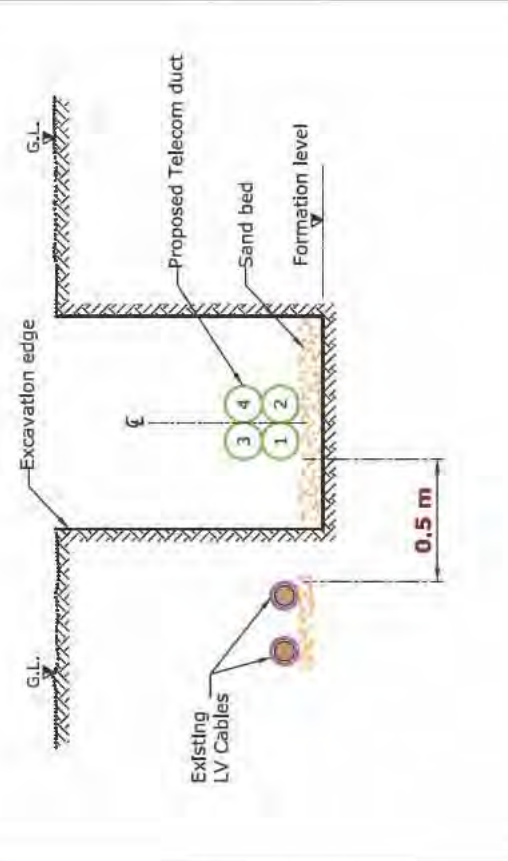
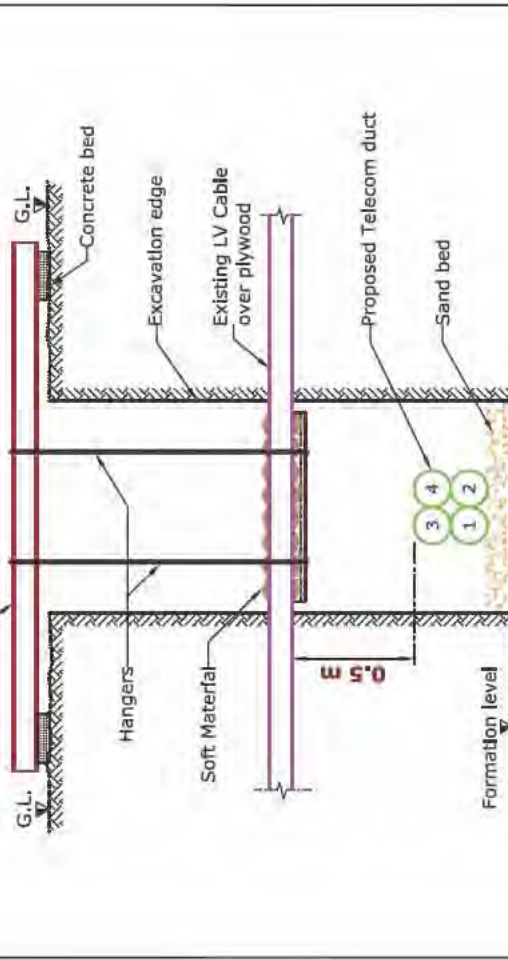
Fig: 18.1	HORIZONTAL/ VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED TELECOMMUNICATION DUCT AND EXISTING LV CABLES
CASE 1 : Proposed Telecommunication duct laying parallel to existing LV cable	
CASE 2 : Proposed Telecommunication duct crossing existing LV cable	
NOTE :	<div>1. Horizontal clearance is from the proposed Telecommunication duct/ concrete surround edge to existing LV cable edge.</div> <div>2. Vertical clearance is from the top of proposed Telecommunication duct/ concrete surround to the bottom of existing LV cable.</div> <div>3. Trench side and existing LV cable protection may be required as per site and soil condition.</div>

Table 2: Clearance & Protection details for proposed Telecommunication duct and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 18.2, Case 1)• Vertical clearance (Ref Fig: 18.2, Case 3)• Protection details (Ref Fig: 18.2, Case 3)
HV (6.6/11/33 kV) Manhole	0.5 m	NA	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 18.2, Case 2)
HV (6.6/11/33 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 18.3)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 18.3)• Vertical clearance (Ref Fig: 18.3)• Protection details (Ref Fig: 18.3)
HV (33 kV) O.H.L		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

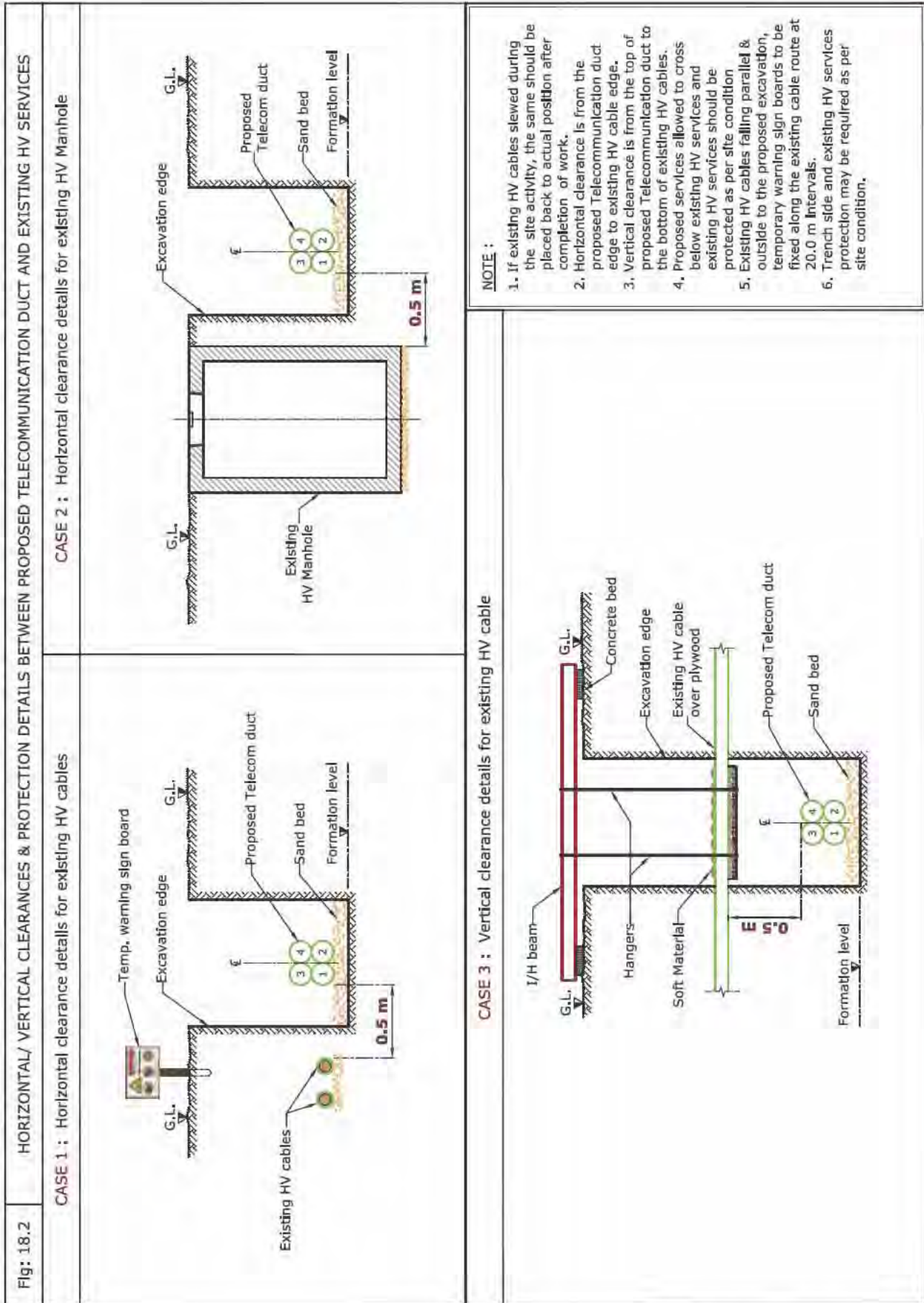
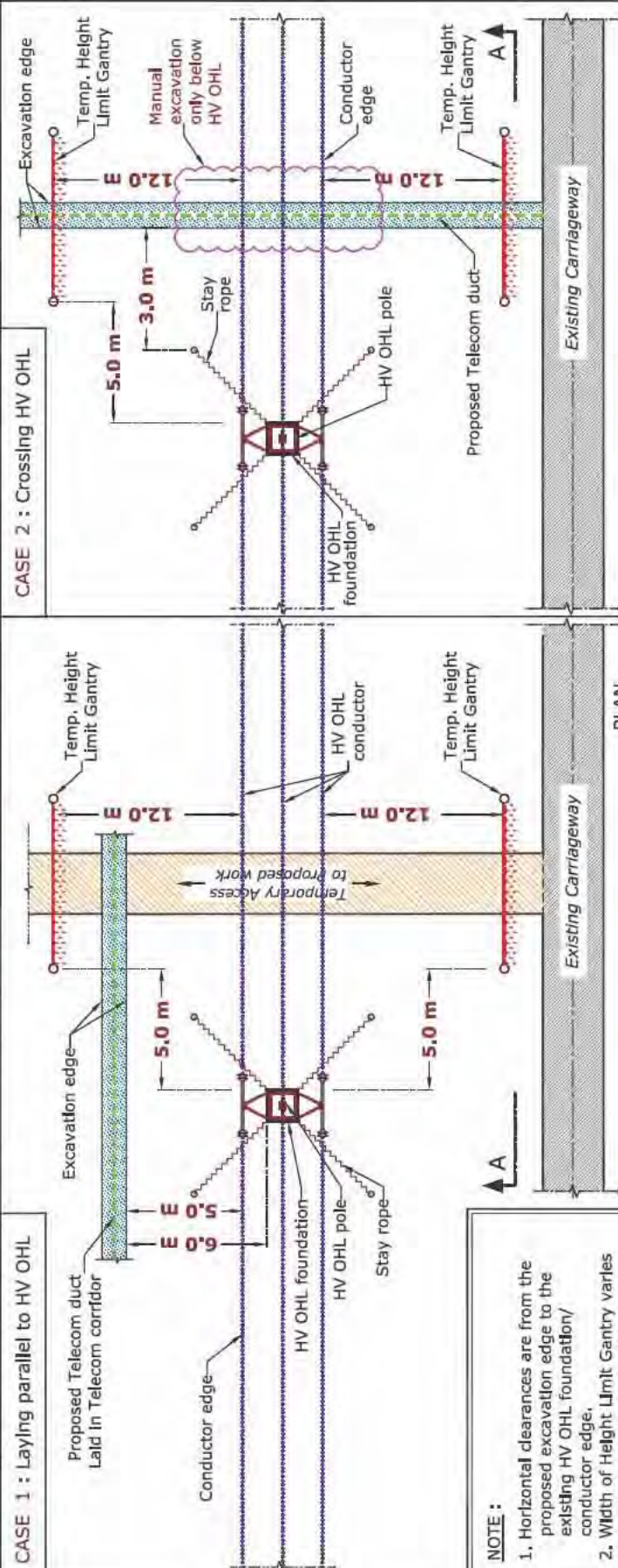


Fig: 18.3



NOTE :

1. Horizontal clearances are from the proposed excavation edge to the existing HV OHL foundation/conductor edge.
2. Width of Height Limit Gantry varies at site as per access width.
3. Temporary Height Limit Gantry should be provided at both slides of Entry/ Exit crossing location of existing HV OHL. (*Case-1 & Case-2*)
4. Vertical clearance between HV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
5. The standard height of Limit Gantry (Max. 5.5 m) may varies as per site condition subject to DEWA Distribution Maintenance site supervision approval and that is to be placed minimum 5.0 m away from the existing HV OHL foundation as shown in the figure.
6. Vehicle movement not allowed within the area between the existing HV OHL pole foundation to the proposed Gantry.
7. Only Manual excavation allowed below HV OHL conductor.

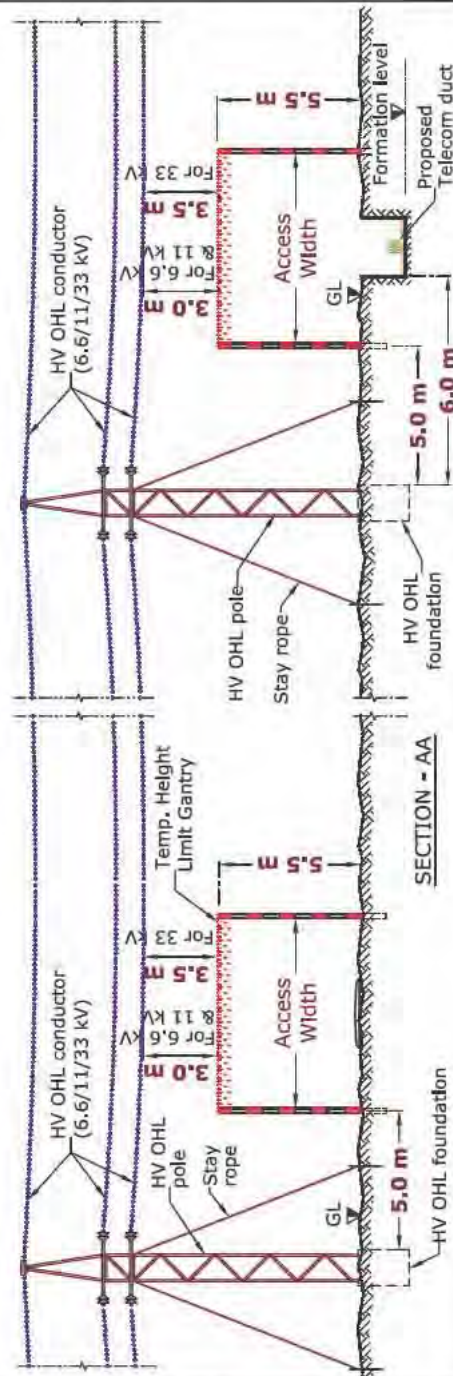
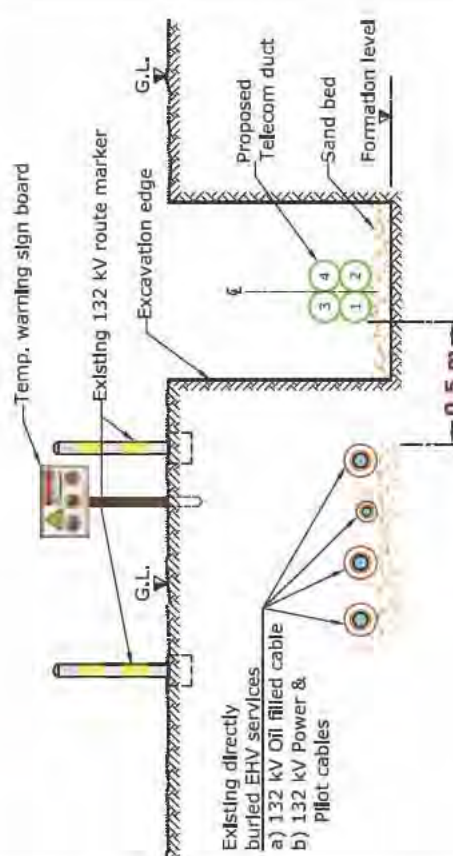
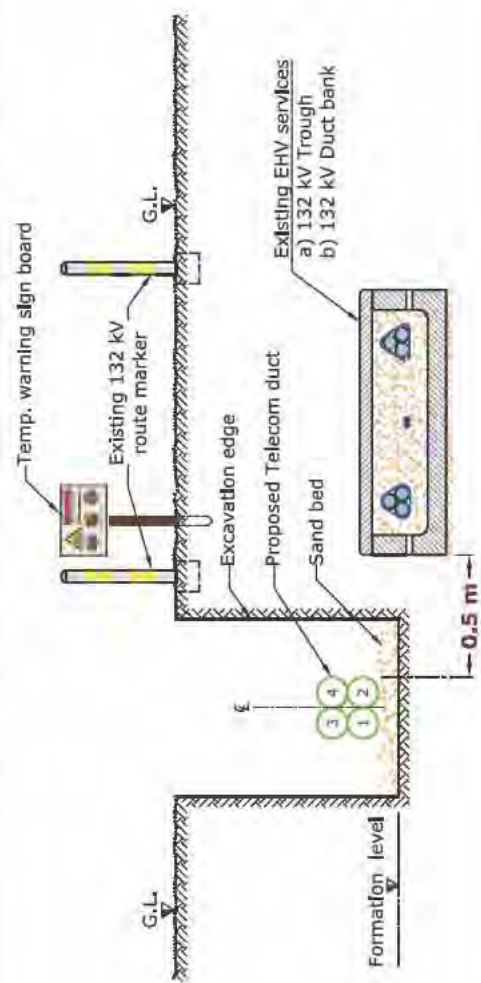


Table 3: Clearance & Protection details for proposed Telecommunication duct and existing DEWA Electricity EHV services

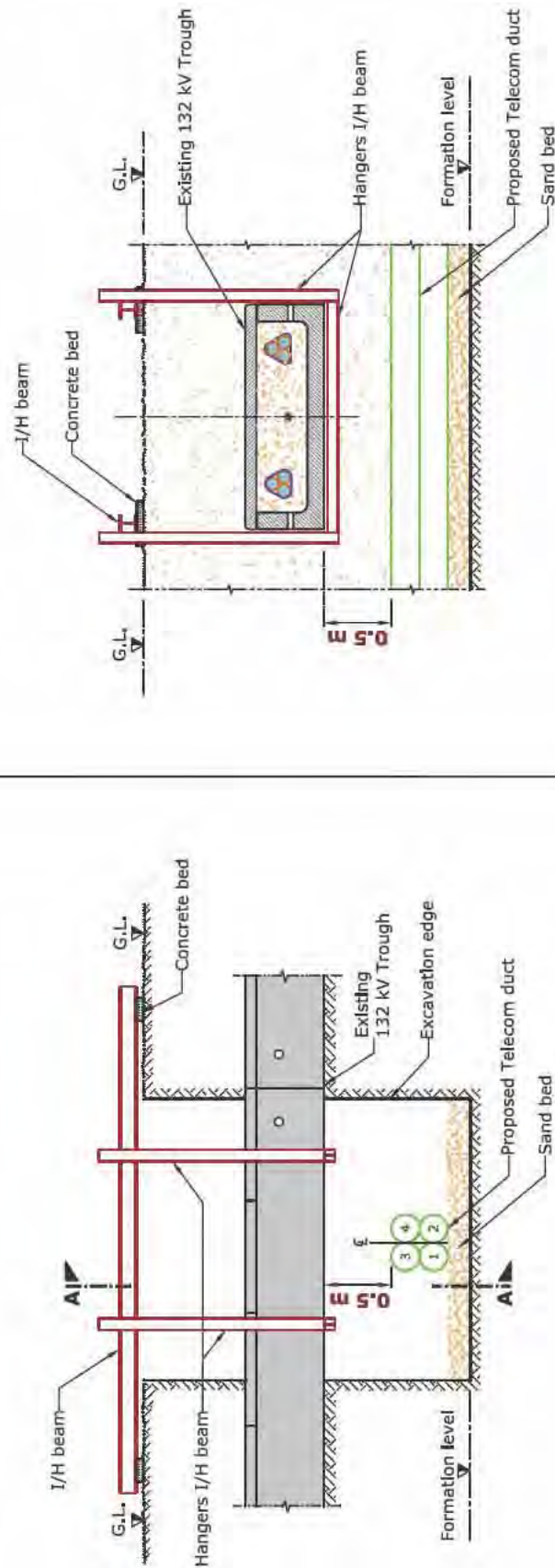
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 18.4, Case 1)Vertical clearance (Ref Fig: 18.8)Protection details (Ref Fig: 18.8)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 18.4, Case 1)Vertical clearance (Ref Fig: 18.8)Protection details (Ref Fig: 18.8)
EHV (132 kV) Trough	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 18.5)Vertical clearance (Ref Fig: 18.6)Protection details (Ref Fig: 18.6)
EHV (132 kV) Duct Bank	0.5 m	0.5 m	B	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 18.5)Vertical clearance (Ref Fig: 18.7)Protection details (Ref Fig: 18.7)
EHV (132 kV) Joint Bay/ Transition Joint	1.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 18.4, Case 2)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 18.9)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	OC	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 18.10, Case 1)Vertical clearance (Ref Fig: 18.10, Case 2)Protection details (Ref Fig: 18.10)
		2.0 m	B	NDCM		<ul style="list-style-type: none">Vertical clearance (Ref Fig: 18.11)Protection details (Ref Fig: 18.11)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 18.9)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">Vertical clearance (Ref Fig: 18.9)Protection details (Ref Fig:18.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

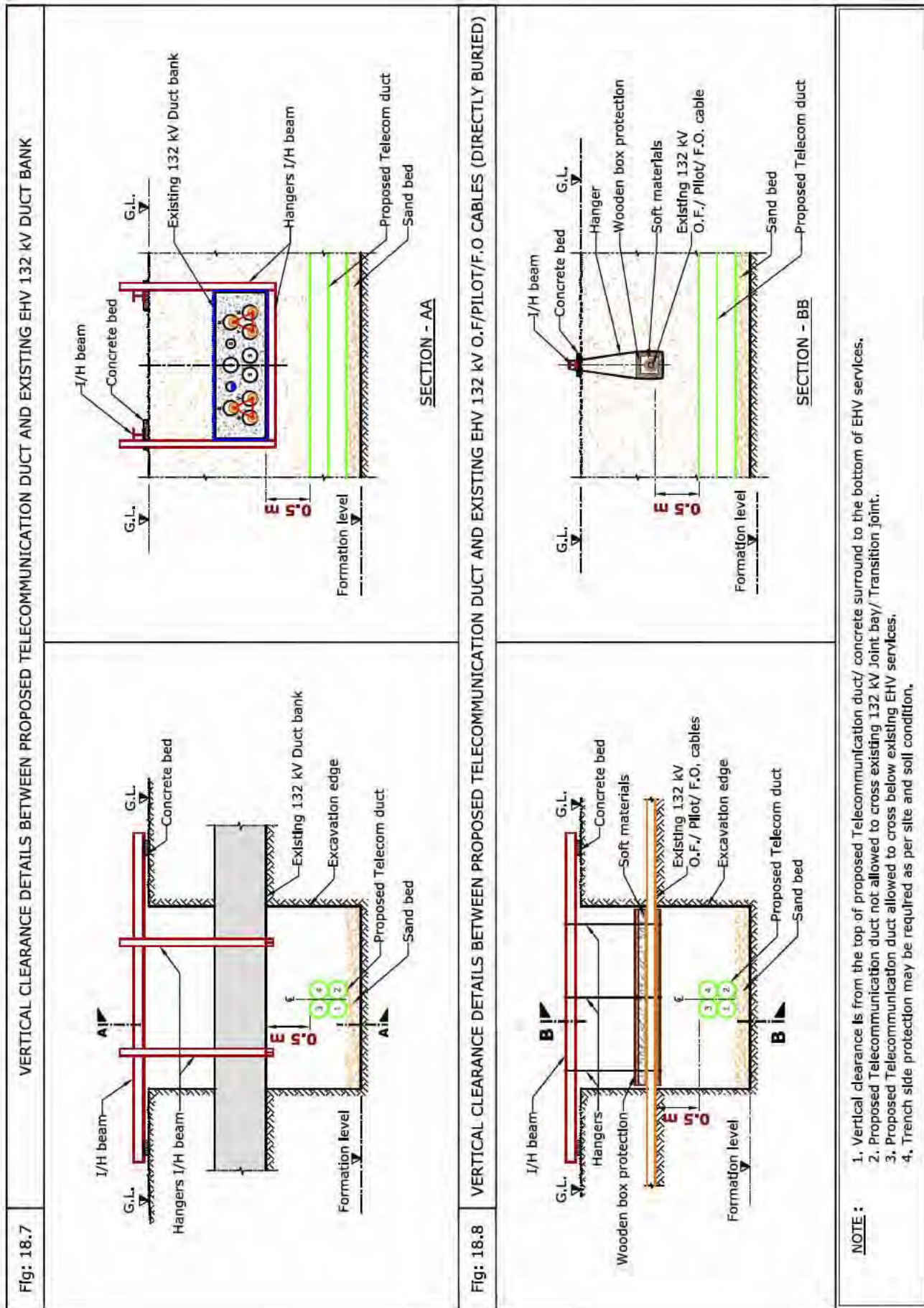
Fig: 18.4	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TELECOMMUNICATION DUCT AND EXISTING EHV SERVICES	
CASE 1 : Laying parallel to existing directly buried EHV services		CASE 2 : Laying parallel to existing Joint bay/ Transition joint
Fig: 18.5	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TELECOMMUNICATION DUCT AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p> 	
<p>NOTE :</p> <ol style="list-style-type: none">1. Existing Link box cable should be protected through split duct and concrete surround.2. Horizontal clearance from the proposed Telecommunication duct/ concrete surround edge to existing EHV services edge.3. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing EHV services edge.4. Trench side and existing EHV services protection may be required as per site and soil condition.		

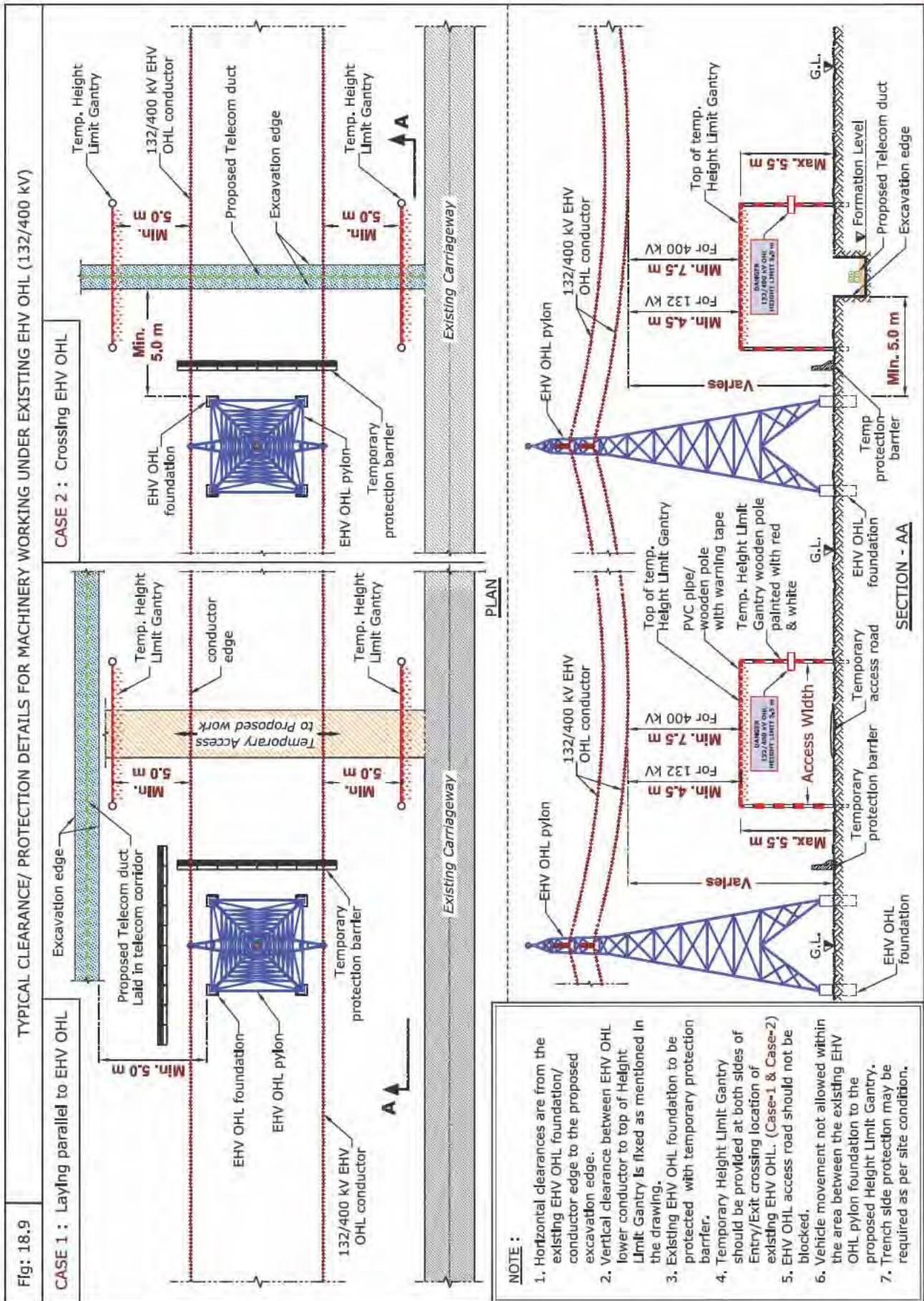
VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED TELECOMMUNICATION DUCTS AND EXISTING EHV 132 kV TROUGH



SECTION - AA

- NOTE :**
1. Vertical clearance from the top of proposed Telecommunication duct/ concrete surround to the bottom of the existing 132 kV Trough.
 2. Proposed Telecommunication duct allowed to cross below existing 132 kV Trough.
 3. Proposed Telecommunication duct not allowed to cross existing 132 kV Joint bay/ Transition joint.
 4. Trench side and existing 132 kV Trough protection required as per site and soil condition.





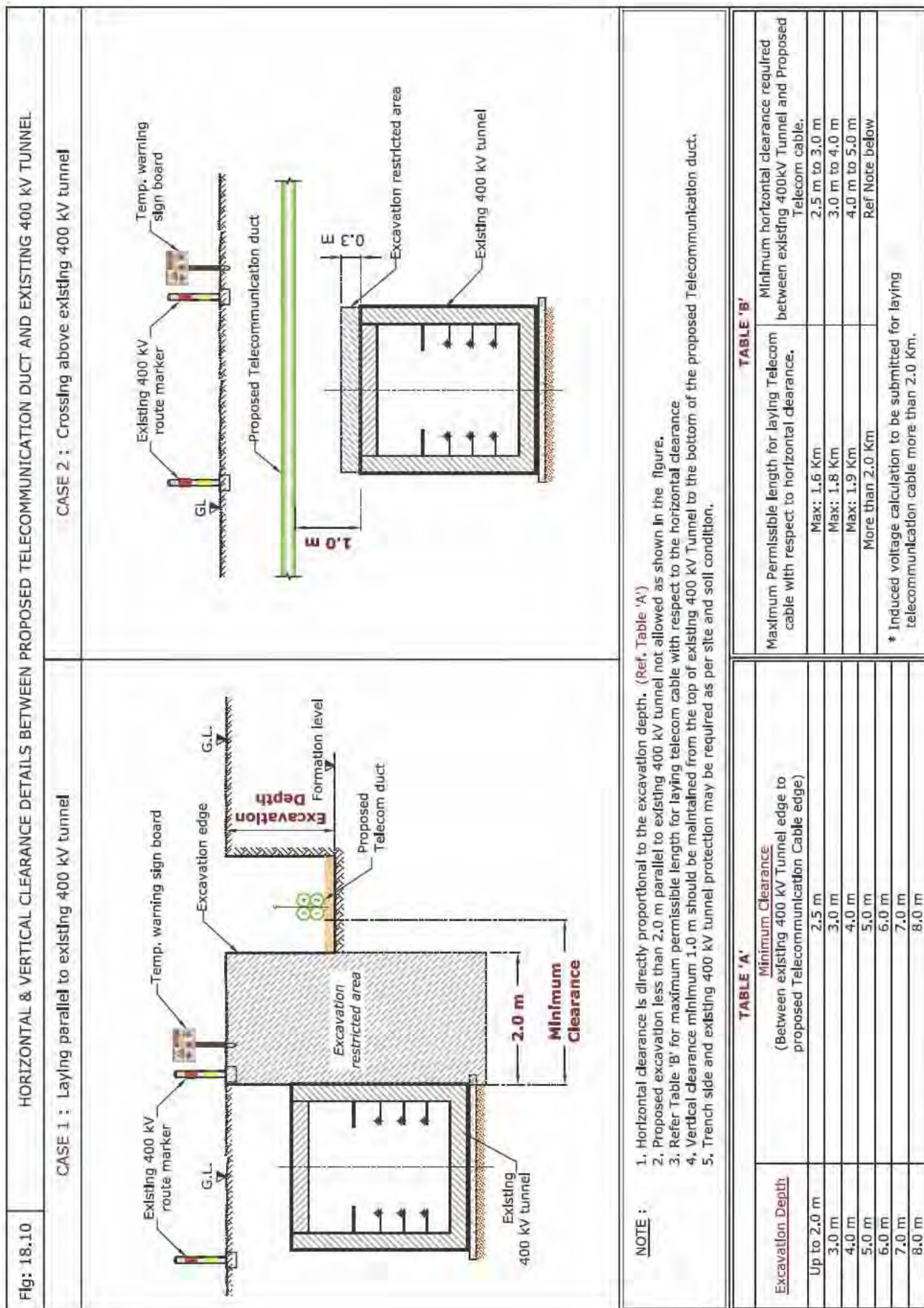
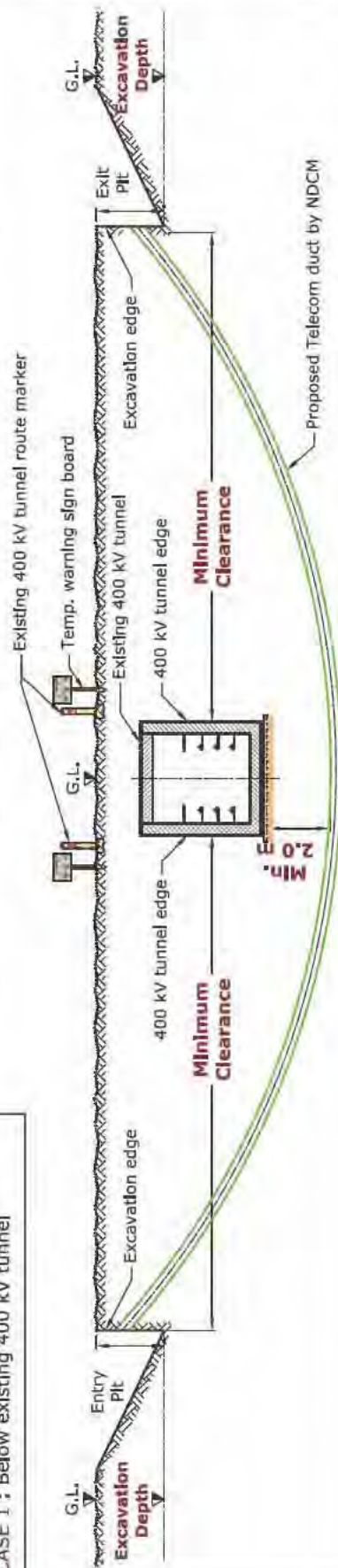
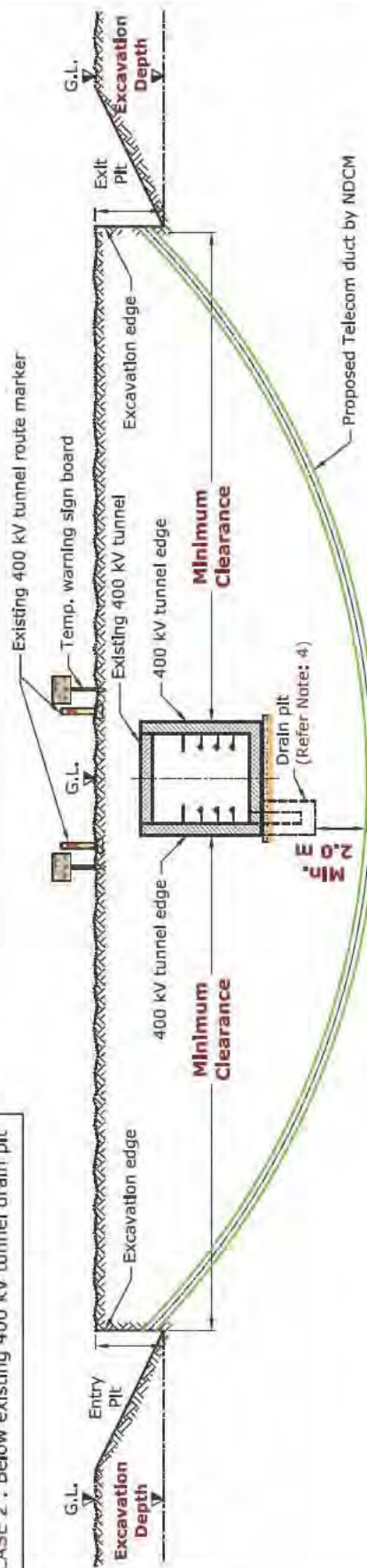


Fig: 18.11 VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED TELECOMMUNICATION DUCT AND EXISTING 400 kV TUNNEL

CASE 1 : Below existing 400 kV tunnel



CASE 2 : Below existing 400 kV tunnel drain pit



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel is not allowed.
2. Minimum clearance from 400 kV tunnel edge to entry/exit pit excavation edge is directly proportional to the excavation depth. (Ref. Table 'A')
3. Vertical clearance is from the top of proposed NDCM work to the bottom of existing 400 kV tunnel.
4. Existing 400 kV tunnel's drain pit location should be identified prior to start NDCM work. In case the proposed Telecommunication cable crossing falling below existing drain pit area, Minimum 2.0 m vertical clearance to be maintained from the bottom of drain pit to the top of proposed NDCM work.
5. Sheet pile protection may be required for Entry/ Exit pit excavation.
6. Settlement calculation shall be submitted.
7. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Entry/ Exit excavation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m
6.0 m	6.0 m
7.0 m	7.0 m
8.0 m	8.0 m

Table 4: Clearance & Protection details for proposed Telecommunication duct and existing DEWA Gas/Fuel services

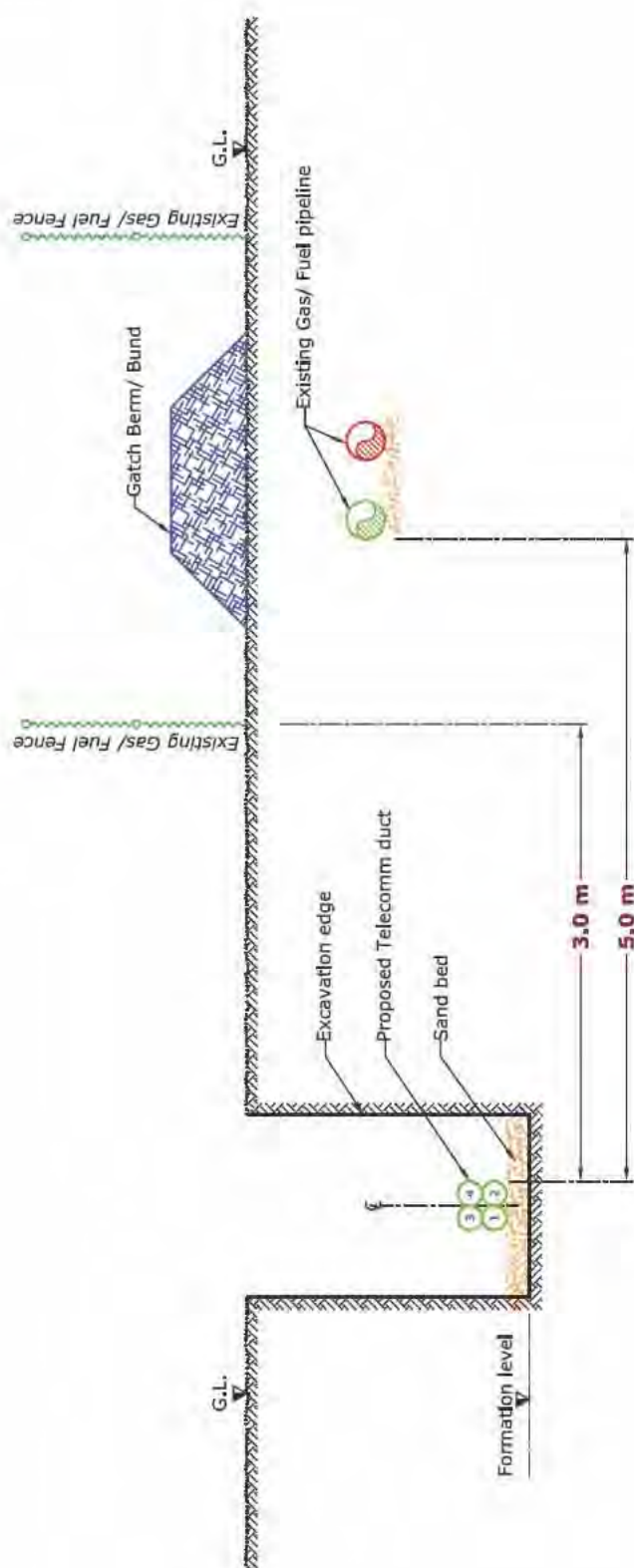
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	3.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 18.12)
Gas/Fuel pipeline (All diameter)	5.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig: 18.12)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 18.12 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TELECOMMUNICATION DUCT AND EXISTING GAS/ FUEL PIPELINES



NOTE :

1. Horizontal clearance 3.0 m from the proposed Telecommunication duct/ concrete surround edge to the existing Gas/ Fuel fence.
2. Horizontal clearance 5.0 m from the proposed Telecommunication duct/ concrete surround edge to the existing Gas/ Fuel pipeline edge.
3. Barricading may be required for existing DEWA Gas/ Fuel pipeline/ fence as per site condition.
4. Proposed Telecommunication duct can be allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Existing Gas/ Fuel pipeline should be protected in the Entry/ Exit pit as per site condition

CHAPTER 2

ROAD WORKS

19. Proposed Road Work - Asphalt Carriageway

315

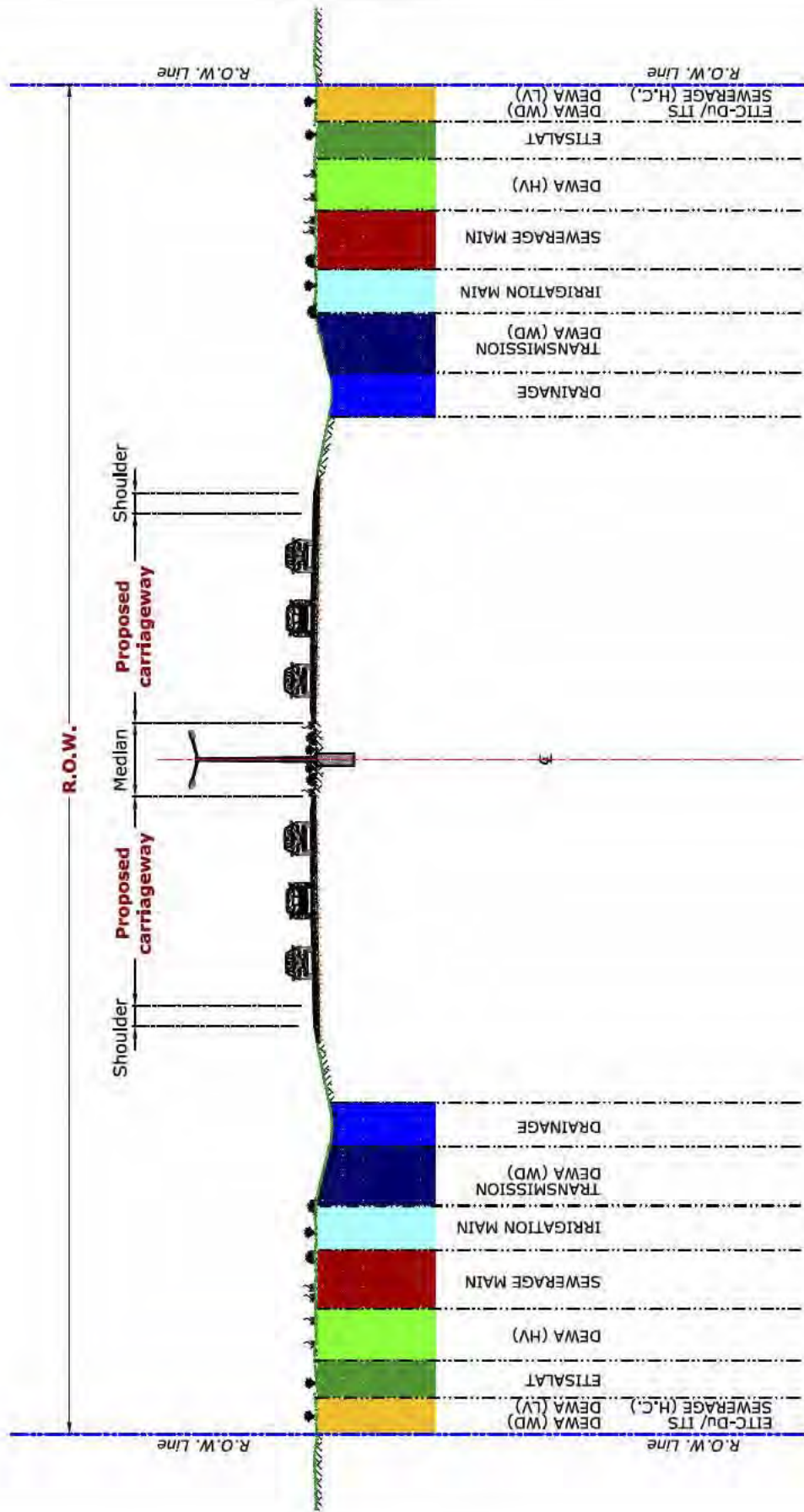
19.1 Introduction

The purpose of the asphalt carriageways are to facilitate the movement of the motorists/travellers/ road users and to accommodate large volumes of traffic with the road design speed in accordance with the geometric design. Roads have different classes (Freeway, expressway, primary arterial, secondary arterial, collector and local roads). Each road has a distinct function, character and level of access control.

Asphalt carriageways are constructed within Right Of Way therefore during construction activities it is required to protect DEWA existing assets and to lay DEWA ducts for future requirements (if required) as per specified standards.



RIGHT OF WAY CROSS SECTION SAMPLE



19.2 Avoid the following



1. Proposal for Asphalt carriageway above Existing DEWA Services/Corridor except crossing locations.

19.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Asphalt Carriageway and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.9 m	A	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 19.1) • Vertical clearance (Ref Fig: 19.2) • Protection details (Ref Fig: 19.2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

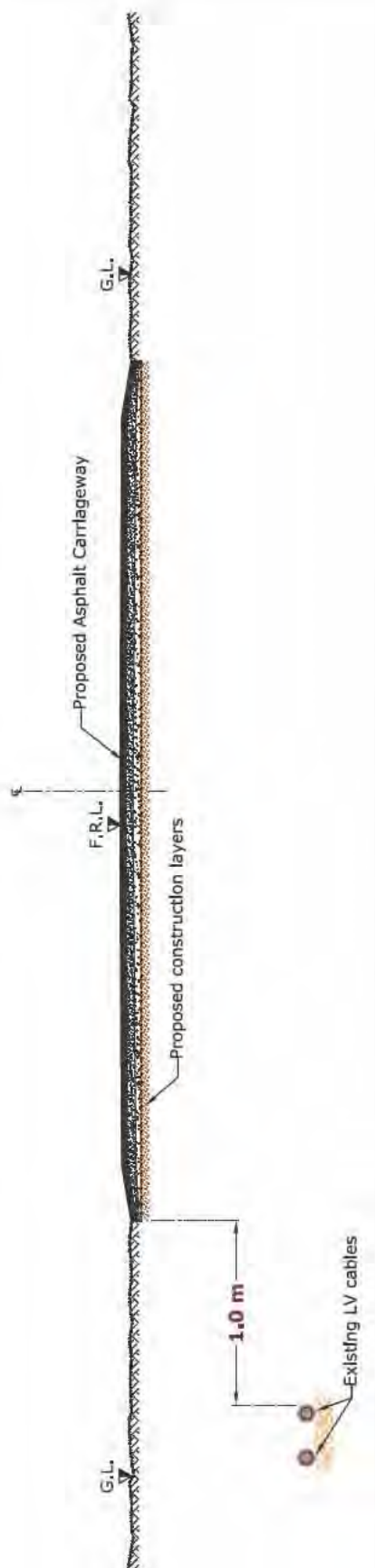
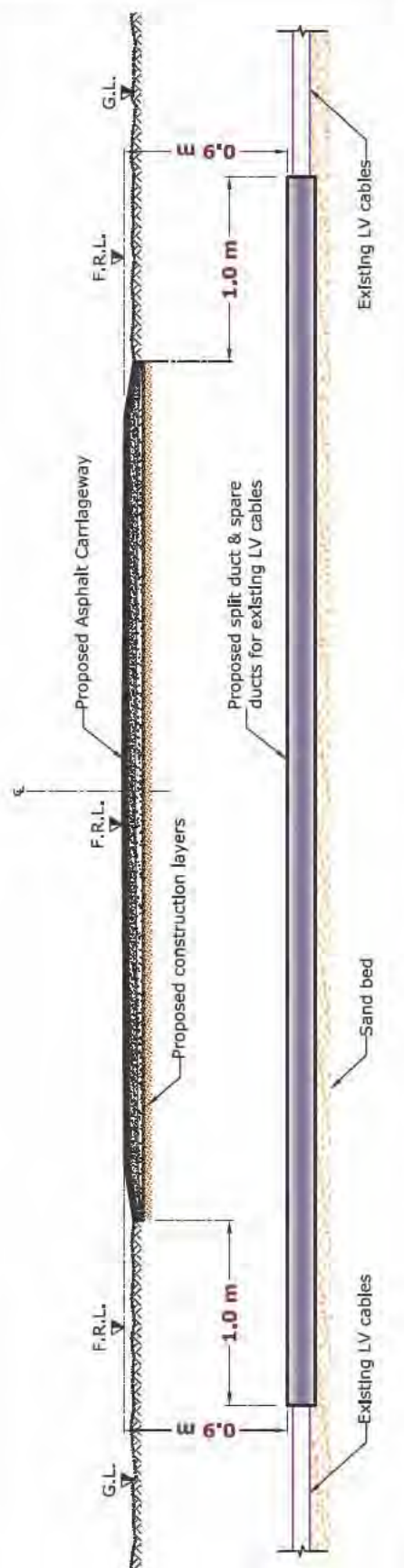
<p>Fig: 19.1</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING LV CABLES</p> 
<p>Fig: 19.2</p>	<p>HORIZONTAL/ VERTICAL CLEARANCES & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING LV CABLES</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Asphalt shoulder edge to existing LV cable edge. 2. Vertical clearance is from the top of existing LV cable (protection) to finished Asphalt level. 3. Proposed Asphalt Carriageway not allowed on top of DEWA reservation. 4. At crossing location existing LV cable should be raised/ lowered to the standard depth and protected with split & spare duct as per specified standard. 5. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Asphalt shoulder edge. 	

Table 2: Clearance & Protection details for Proposed Asphalt Carriageway and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	1.0 m	0.9 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 19.3) Vertical clearance (Ref Fig: 19.5)
HV (6.6/11/33 kV) Manhole.		NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 19.4)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 19.6)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 19.6) Vertical clearance (Ref Fig: 19.6) Protection details (Ref Fig: 19.6)
HV (33 kV) O.H.L.		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

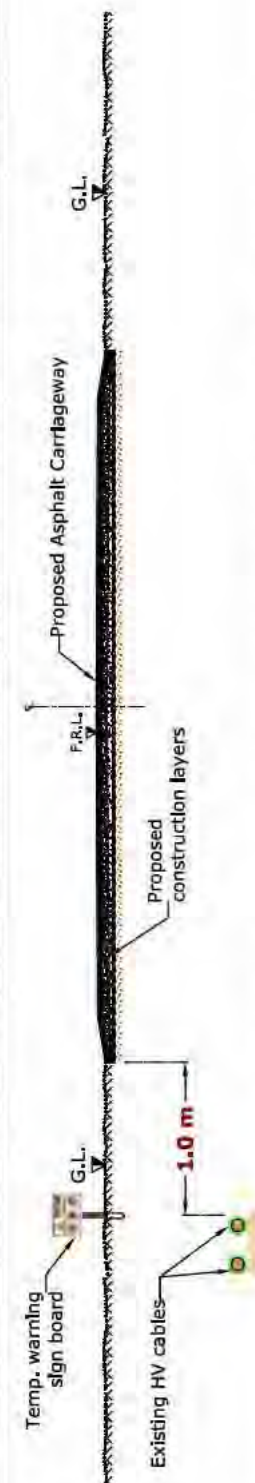
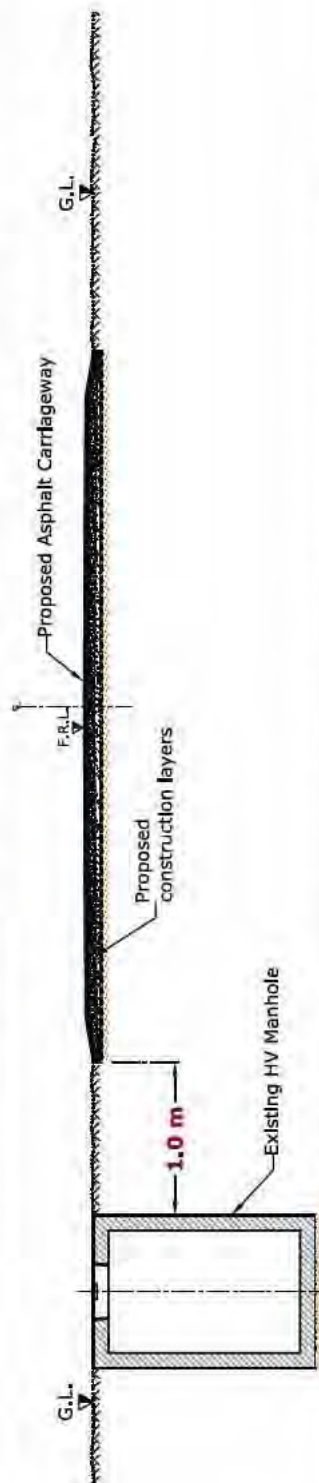
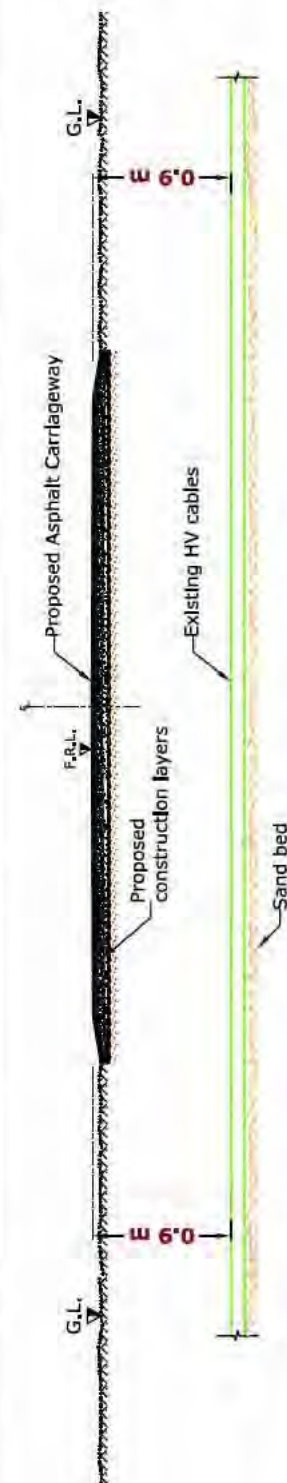
Fig: 19.3	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING HV CABLES</p> 
Fig: 19.4	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING HV MANHOLE</p> 
Fig: 19.5	<p>VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING HV CABLES</p> 
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearance is from the proposed Asphalt shoulder edge to existing HV services edge.2. Vertical clearance is from the top of existing HV cable to finished Asphalt level.3. Proposed Asphalt Carriageway not allowed on top of DEWA reservation.4. At crossing location existing HV cable should be raised/ lowered to the standard depth and spare duct should be provided as per number of existing cables at site.5. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Asphalt shoulder edge.	

Fig: 19.6 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

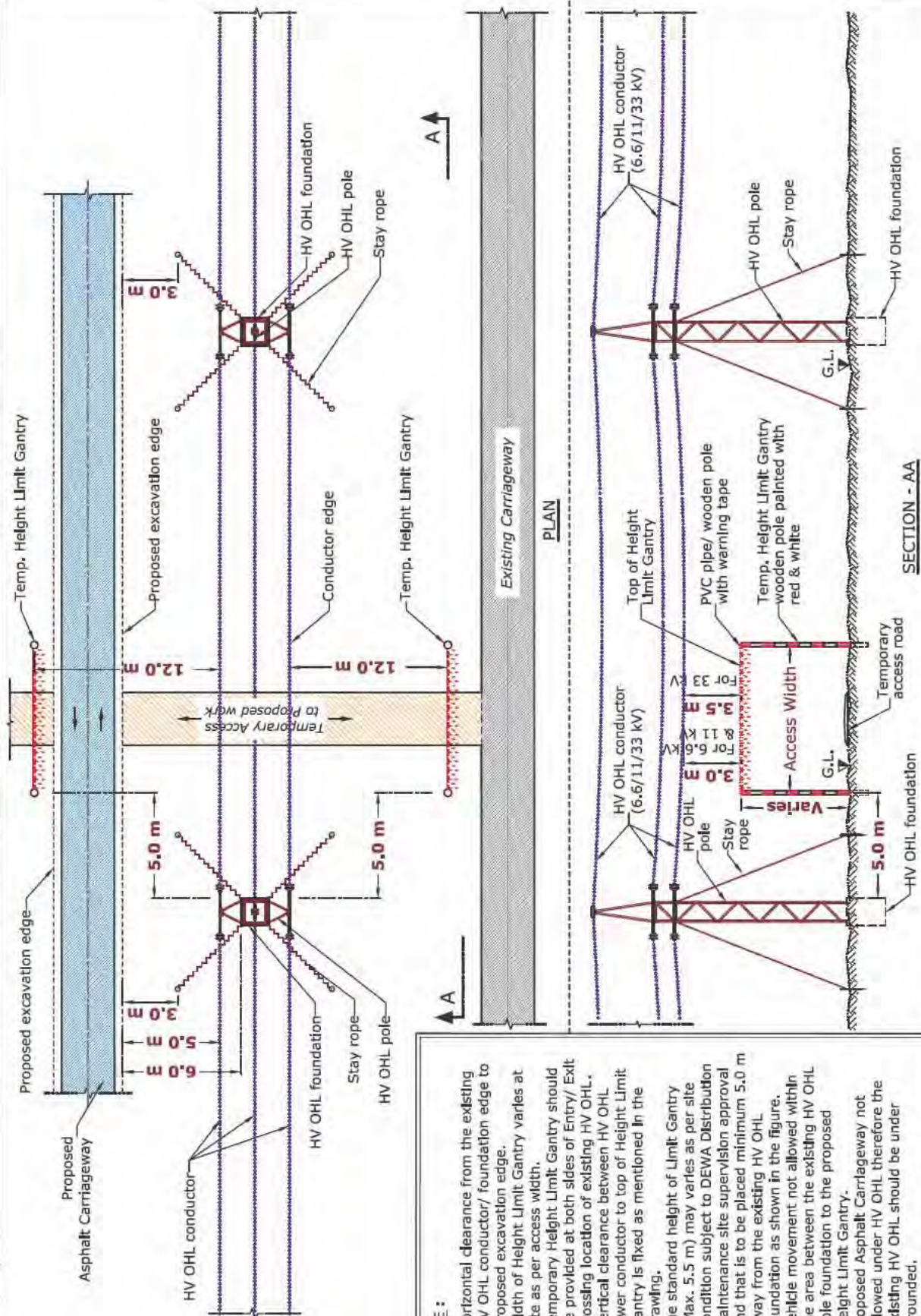
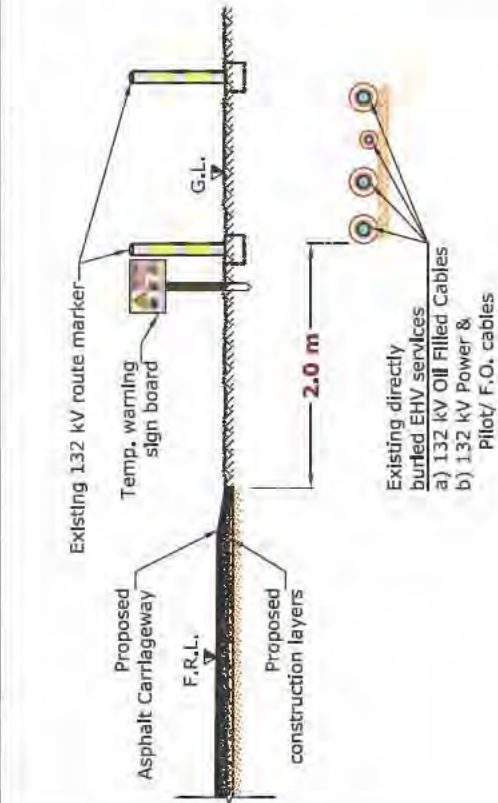
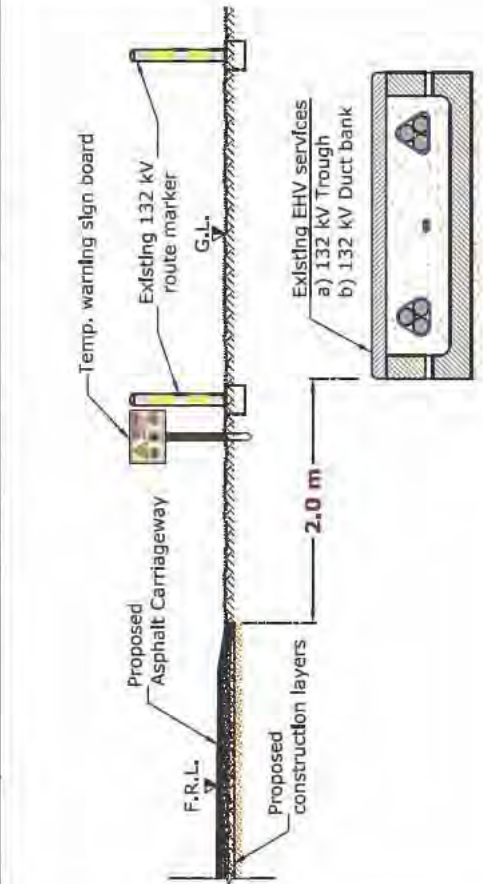
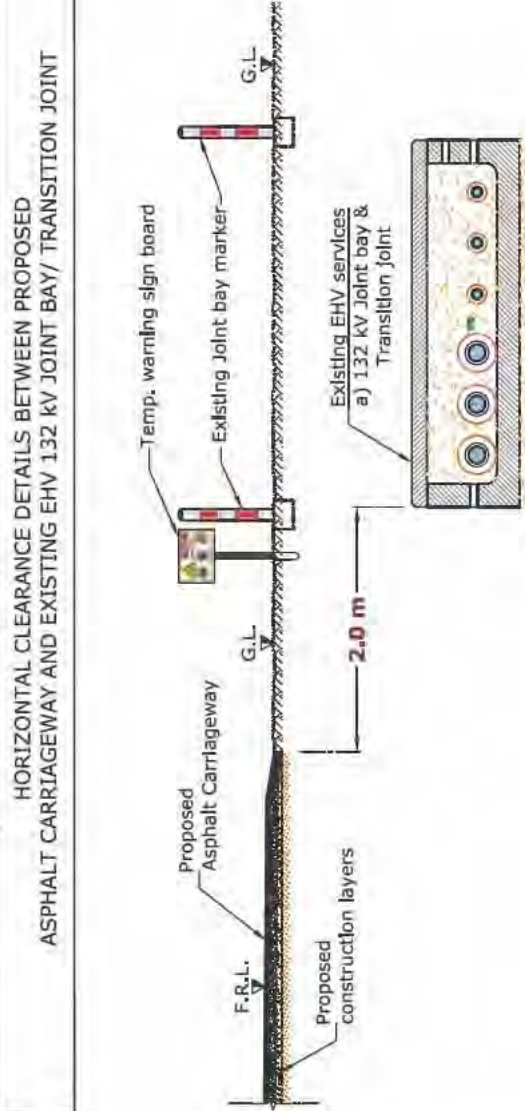


Table 3: Clearance & Protection details for Proposed Asphalt Carriageway and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	2.0 m	1.2 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:19.7) Vertical clearance (Ref Fig: 19.11) Protection Details (Ref Fig: 19.11)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	2.0 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:19.7) Vertical clearance (Ref Fig: 19.10)
EHV (132 kV) Trough	2.0 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:19.8) Vertical clearance (Ref Fig: 19.12) Protection details (Ref Fig: 19.12)
EHV (132 kV) Duct Bank	2.0 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:19.8) Vertical clearance (Ref Fig: 19.13) Protection details (Ref Fig: 19.13)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	-	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:19.9)
EHV (132 kV) O.H.L	25.0 m	15.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance(Ref Fig:19.15) Vertical clearance (Ref Fig:19.15)
EHV (400 kV) O.H.L	40.0 m	16.5 m				<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:19.16) Vertical clearance (Ref Fig: 19.16)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:19.14) Vertical clearance (Ref Fig: 19.14)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:19.15&19.16) Vertical clearance (Ref Fig:19.15&19.16)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none"> Protection details (Ref Fig:19.15&19.16)

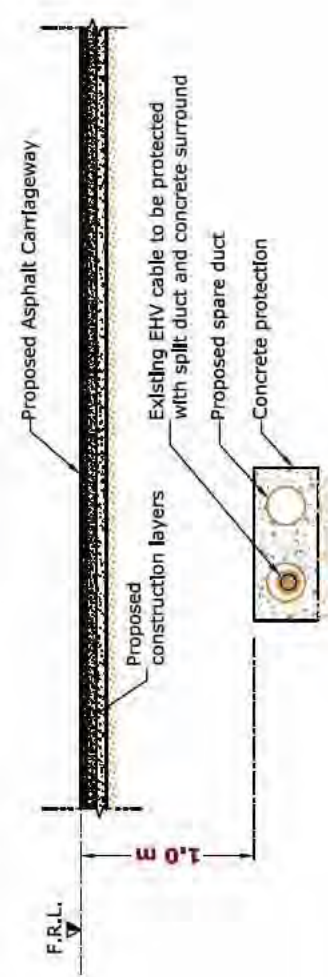
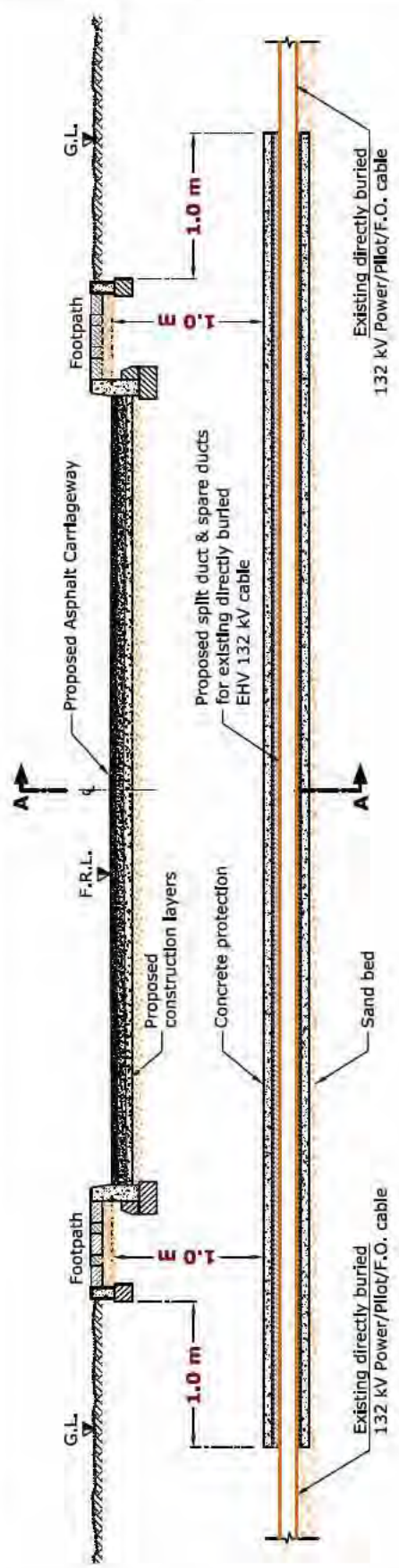
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 19.7	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	Fig: 19.8	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
<p>Existing 132 kV route marker</p>  <p>Temp. warning sign board</p> <p>Proposed Asphalt Carriageway</p> <p>F.R.L.</p> <p>Proposed construction layers</p> <p>2.0 m</p> <p>Existing directly buried EHV services</p> <p>a) 132 kV Oil Filled Cables</p> <p>b) 132 kV Power & Pilot/ F.O. cables</p>		 <p>Temp. warning sign board</p> <p>Proposed Asphalt Carriageway</p> <p>F.R.L.</p> <p>Proposed construction layers</p> <p>2.0 m</p> <p>Existing EHV services</p> <p>a) 132 kV Trough</p> <p>b) 132 kV Duct bank</p>	
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Asphalt shoulder edge to existing EHV 132 kV services edge. 2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Proposed Asphalt Carriageway not allowed running on top of DEWA reservation. 4. Minimum 3.0 m horizontal clearance should be required from the proposed road edge to existing 132 kV link box with RTA standard protection. 5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 	Fig: 19.9	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>  <p>Temp. warning sign board</p> <p>Proposed Asphalt Carriageway</p> <p>F.R.L.</p> <p>Proposed construction layers</p> <p>2.0 m</p> <p>Existing EHV services</p> <p>a) 132 kV Joint bay & Transition joint</p>	

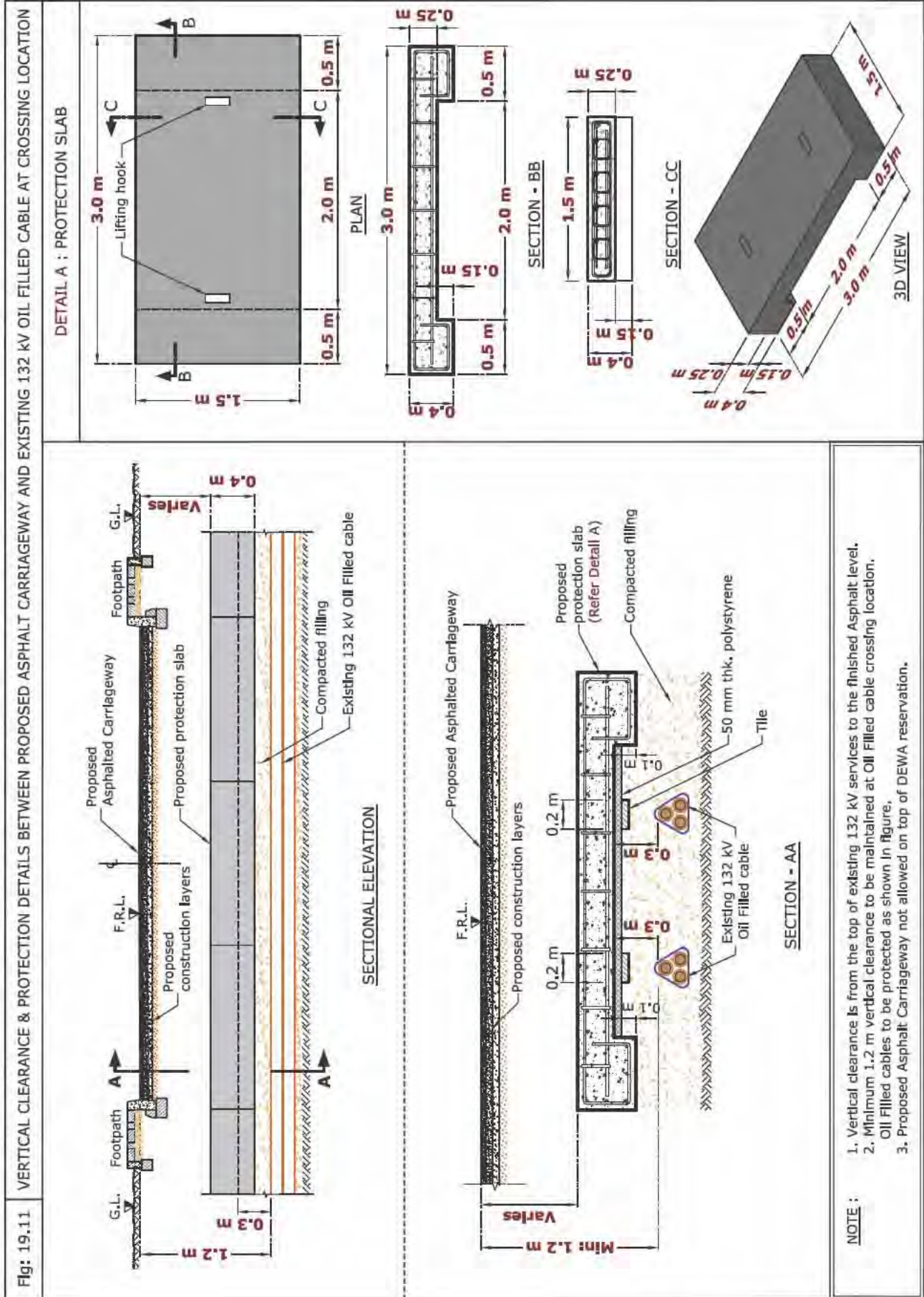
VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING DIRECTLY BURIED 132 kV POWER/ PILOT/ F.O. CABLE AT CROSSING LOCATION

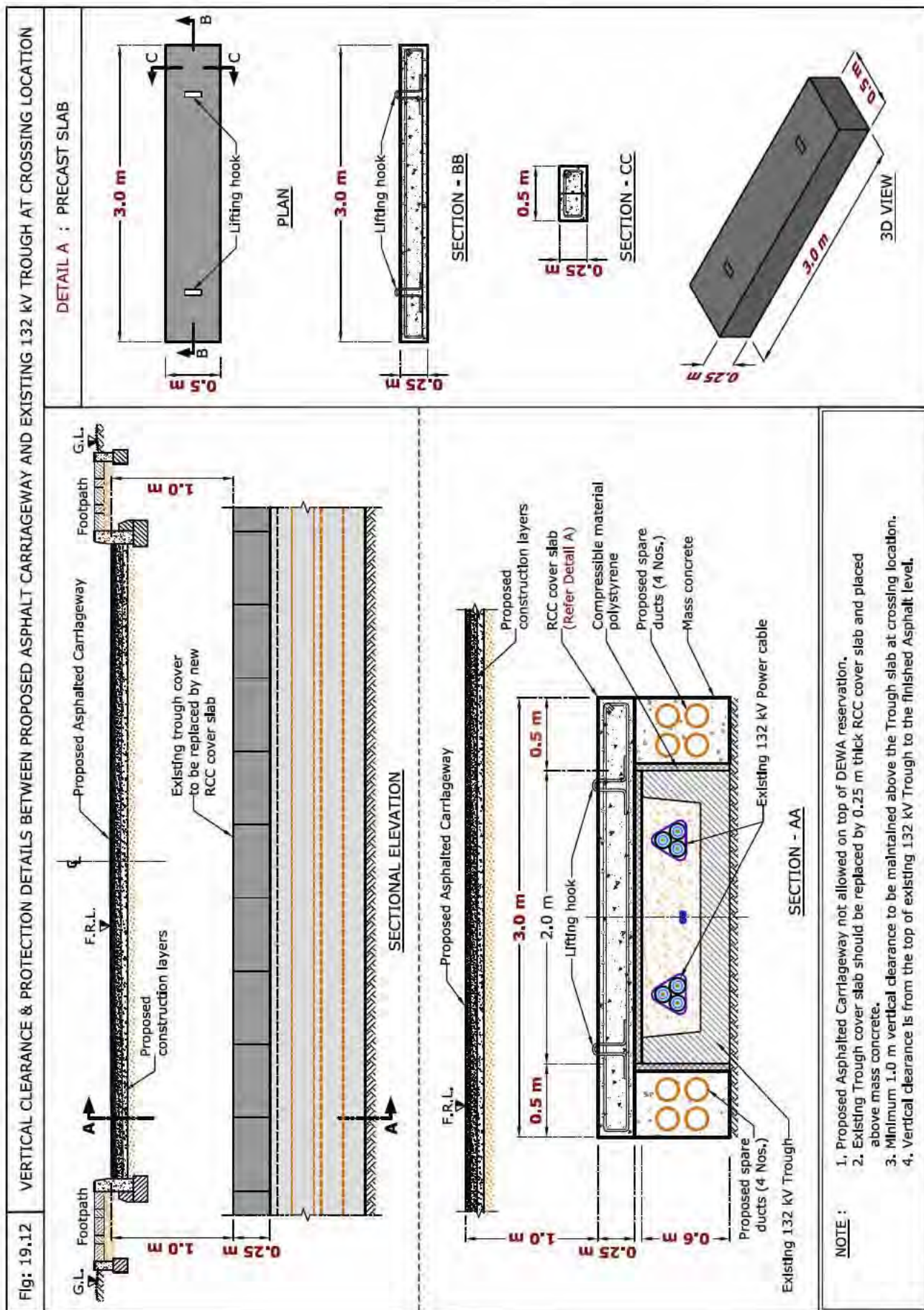
Fig: 19.10



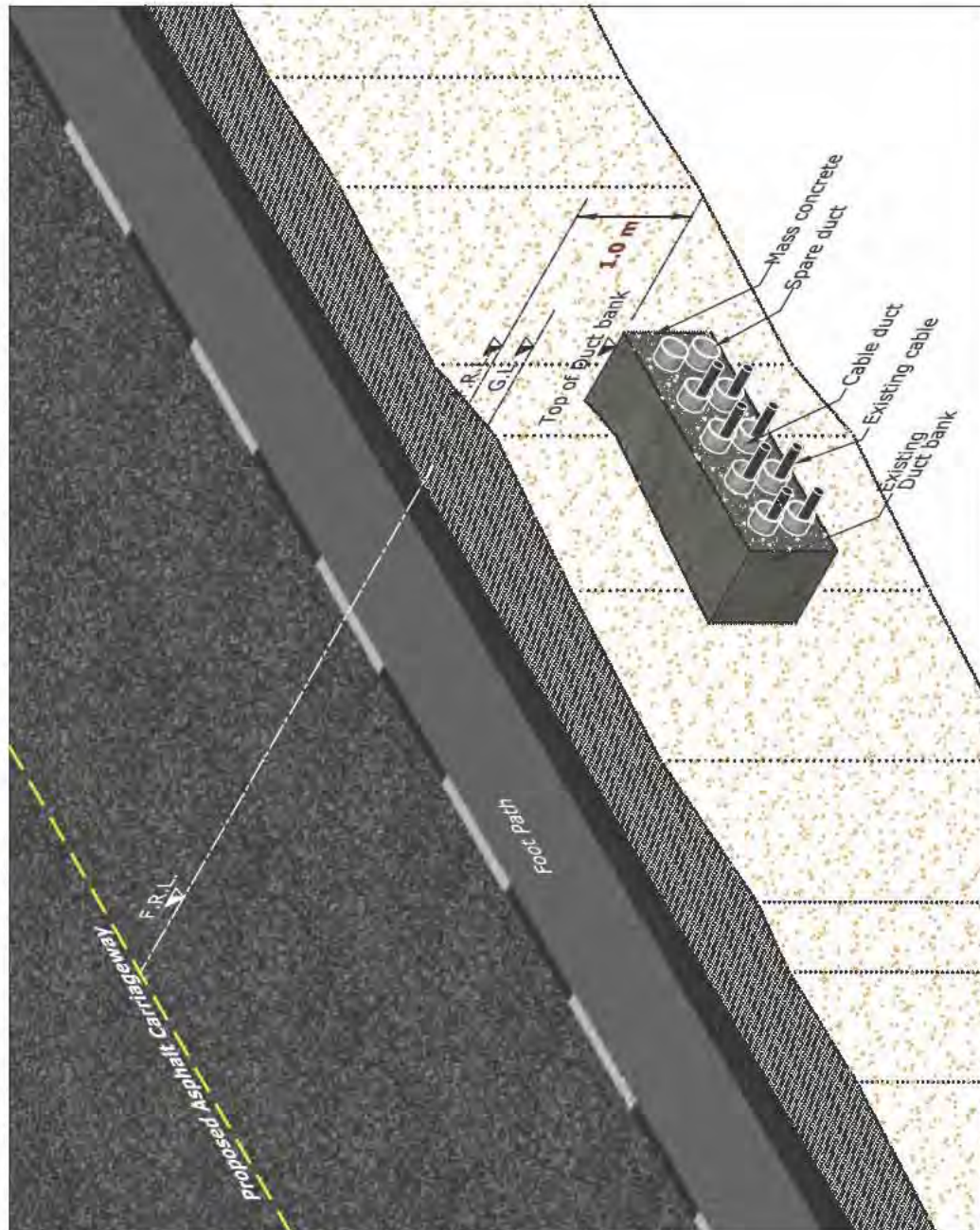
SECTION - AA

- NOTE :
- 1. Vertical clearance is from the top of existing 132 kV services to the finished Asphalt level.
 - 2. Minimum 1.0 m vertical clearance to be maintained at crossing above EHV cables, EHV cables to be protected as shown in figure and additional spare duct to be provided as per DEWA specifications.
 - 3. Proposed Asphalt Carriageway not allowed on top of DEWA reservation.

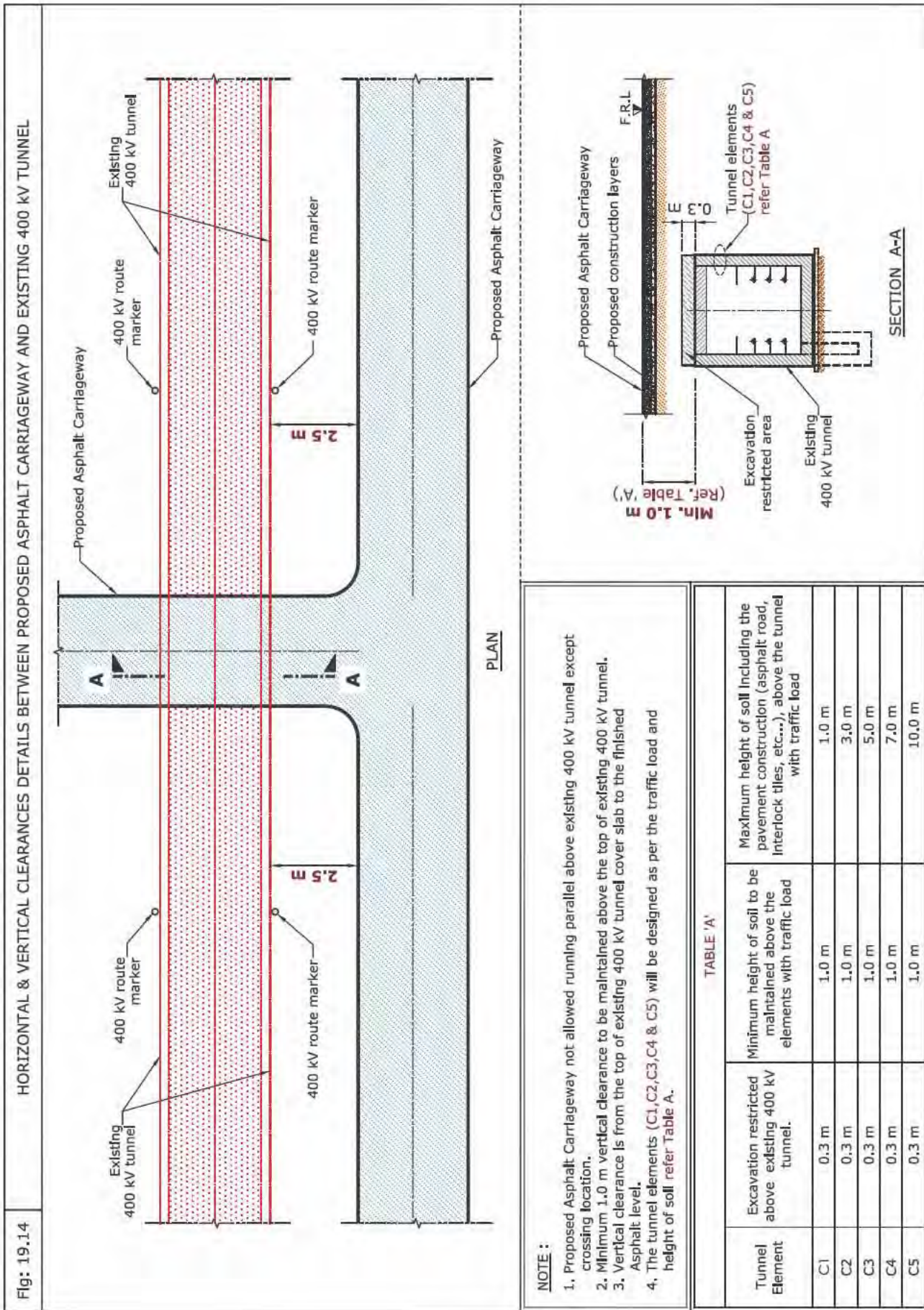


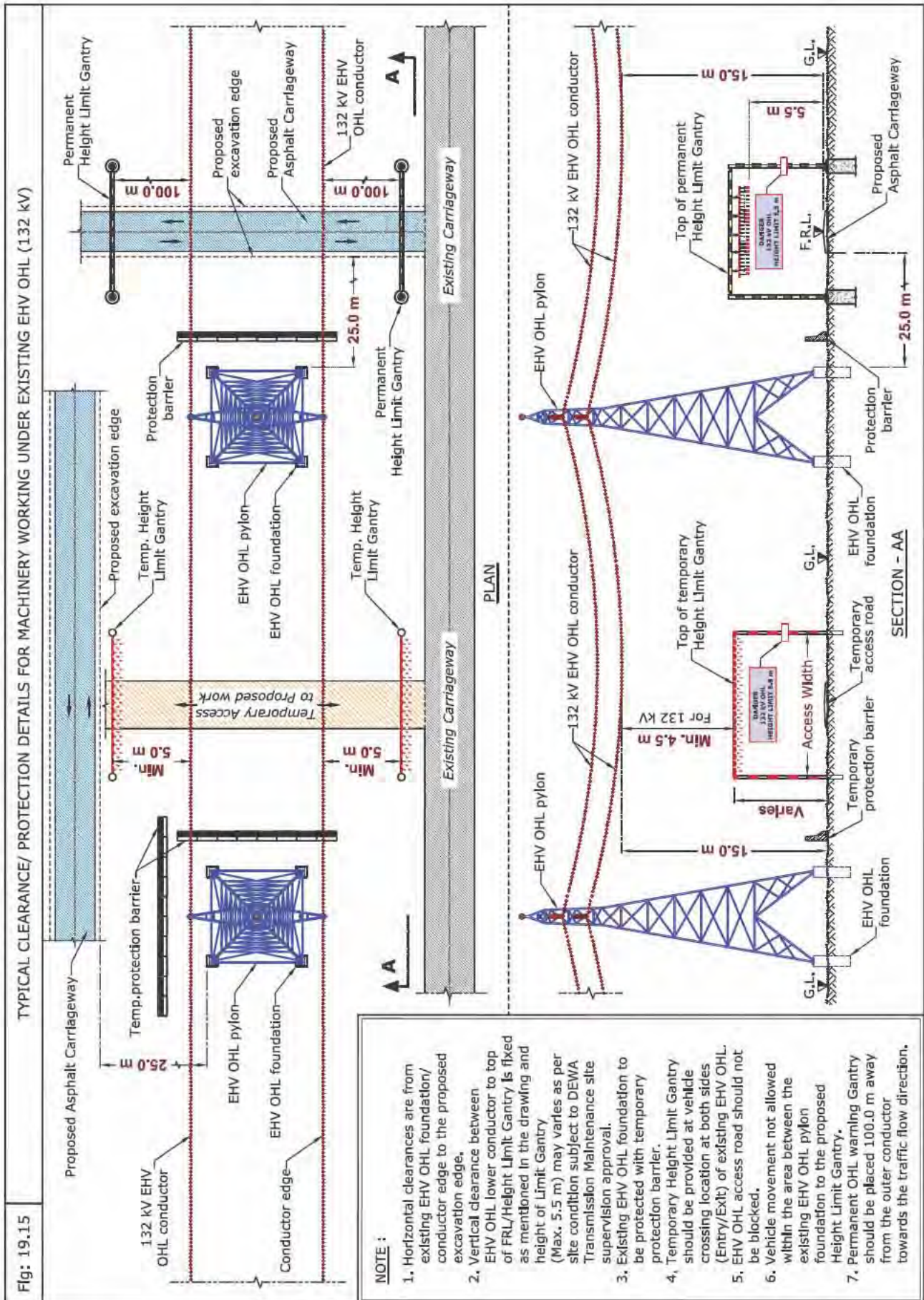


VERTICAL CLEARANCE DETAIL BETWEEN PROPOSED ASPHALT CARRIAGEWAY AND EXISTING 132 kV DUCT BANK



- NOTE :**
1. Proposed Asphalt Carriageway not allowed on top of DEWA reservation.
 2. Vertical clearance is from the top of existing Duct bank to the finished Asphalt level.
 3. Minimum 1.0 m vertical clearance to be maintained at crossing location.





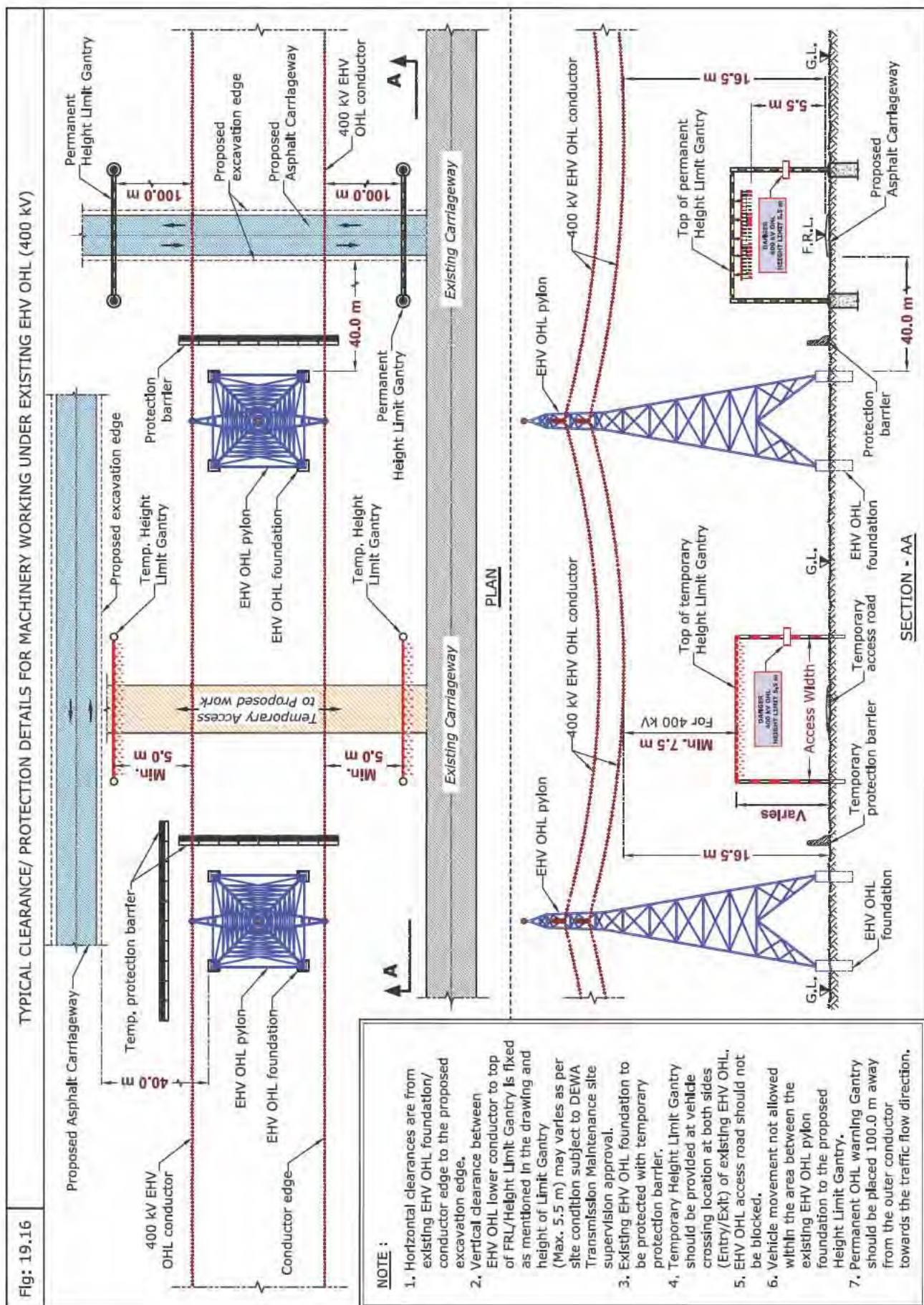


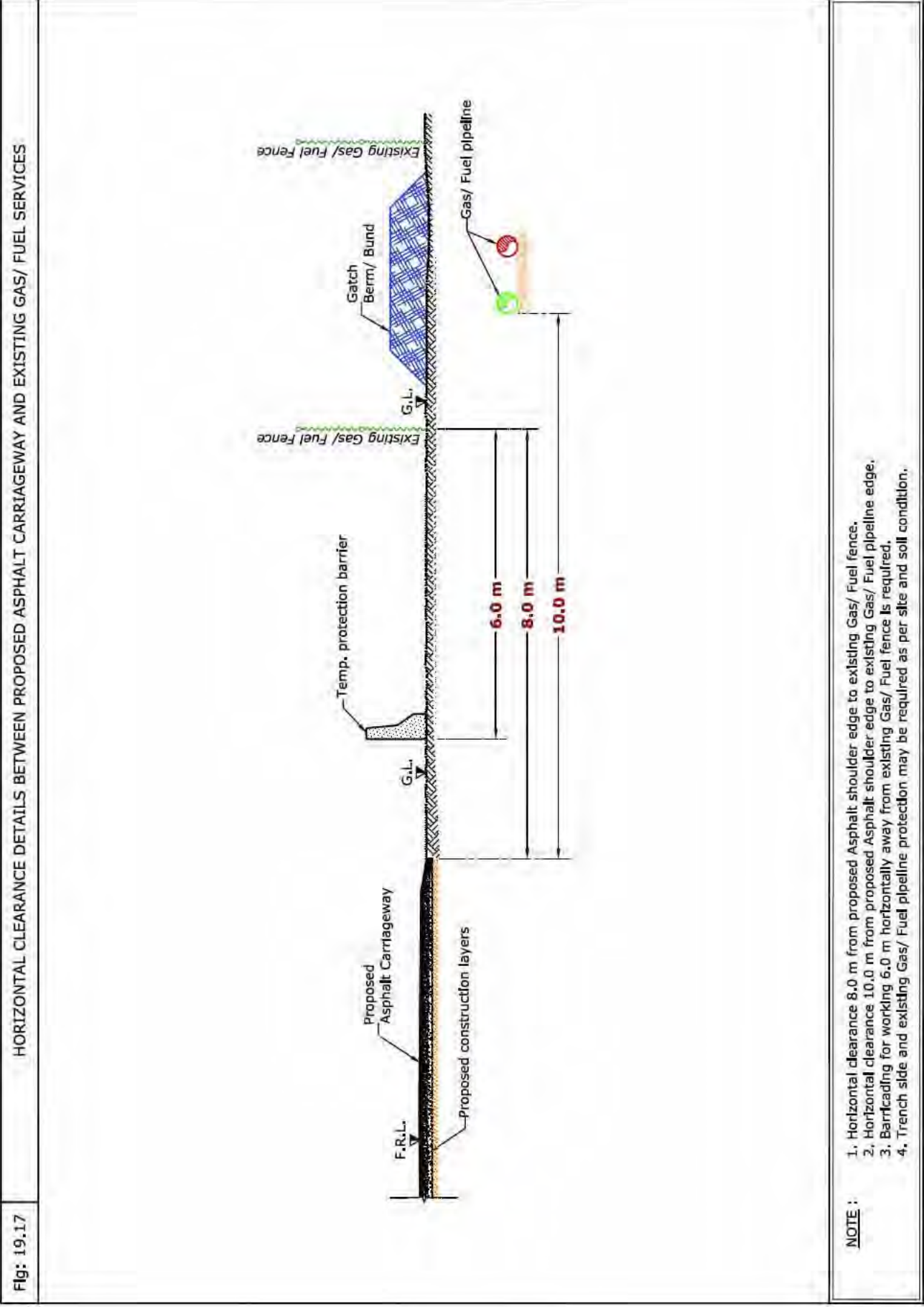
Table 4: Clearance & Protection details for Proposed Asphalt Carriageway and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 19.17)
Gas/Fuel pipeline (All diameter)	10.0 m	3.0 m	A	-	R	• Horizontal clearance (Ref Fig: 19.17) • Vertical clearance (Ref Fig: 19.18) • Protection Details (Ref Fig: 19.18)

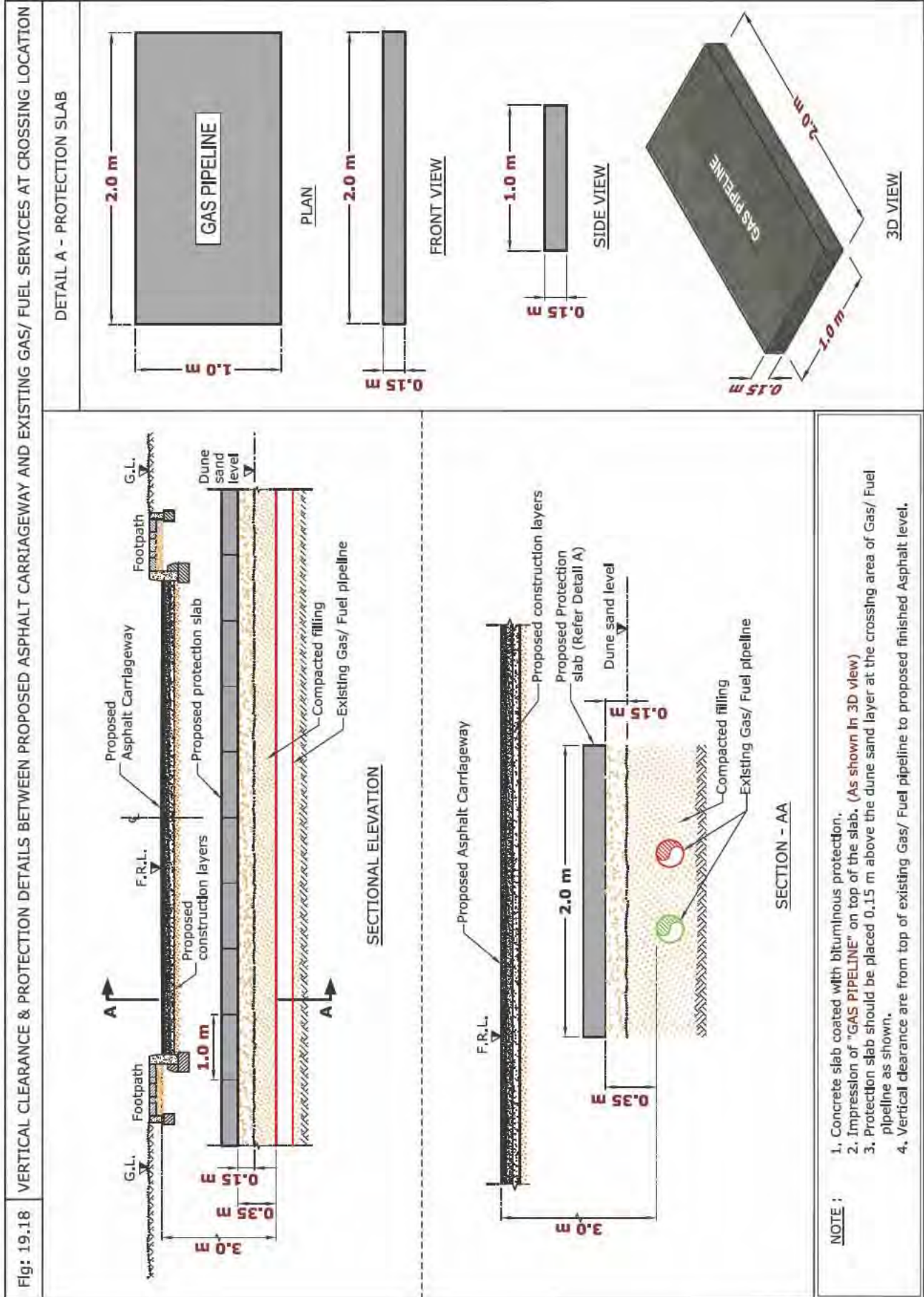
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.





- NOTE :**
1. Horizontal clearance 8.0 m from proposed Asphalt shoulder edge to existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from proposed Asphalt shoulder edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.



20. Proposed Road Work - Asphalt Access/Service Road (To Villa/Plot/Main Road)

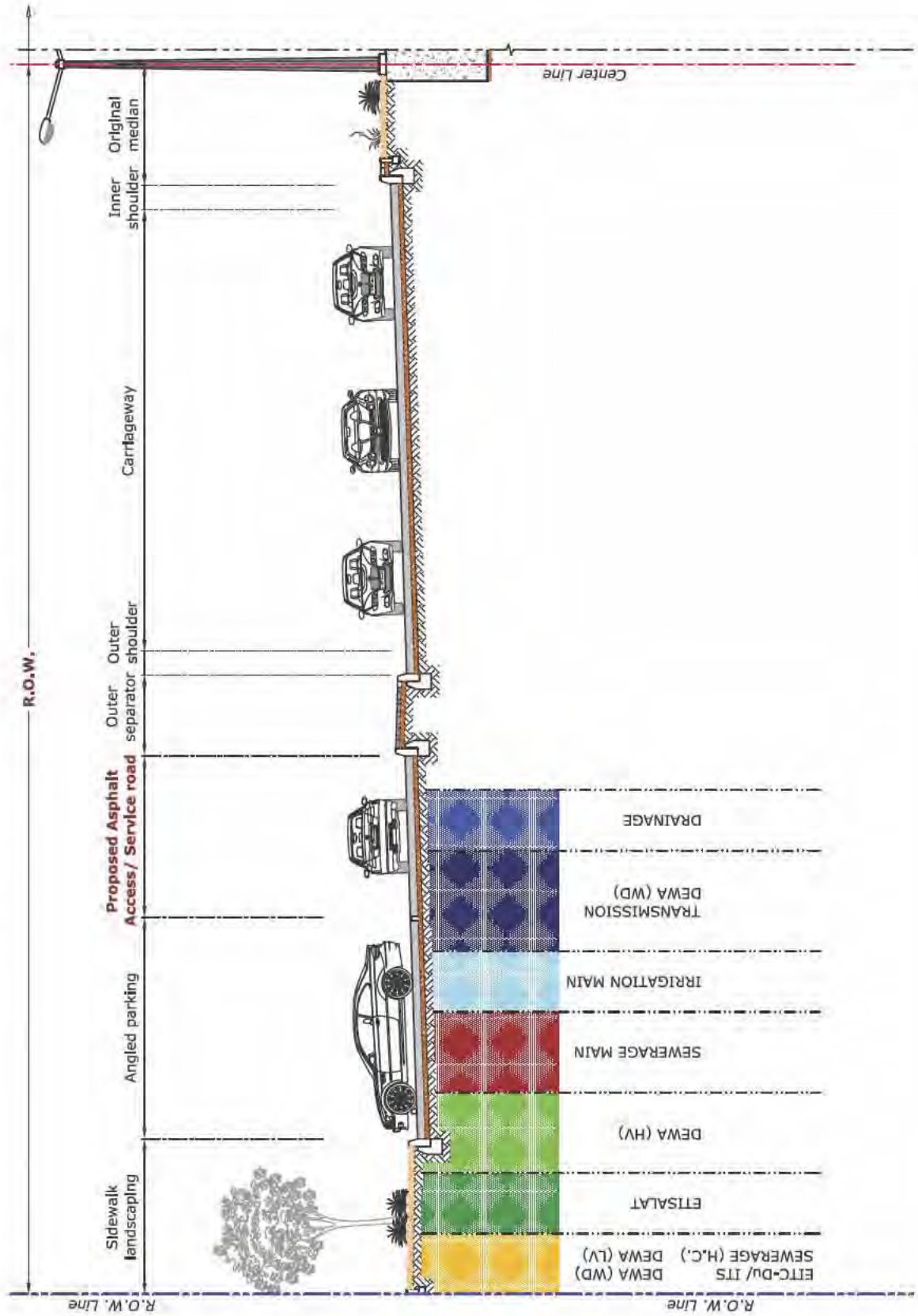
20.1 Introduction

The purpose of the asphalted access road is to tie in/out the service road to the main road which providing the access to plot/villa/farm or individual's properties and to provide a parallel road to an arterial or similar main road, which provides land access, parking and limited movement (generally one way) for through traffic.

Access/Service Road are constructed within Right Of Way therefore during construction activities it is required to protect DEWA existing assets and to lay DEWA ducts (if required) as per specified standards.



RIGHT OF WAY SAMPLE CROSS SECTION AT ASPHALT ACCESS/ SERVICE ROAD



20.2 Avoid the following



1. Proposal Asphalt access/service road above existing DEWA 132 kV Joint bay.

20.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Asphalt Access/Service Road and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.9 m	A	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 20.1) • Vertical clearance (Ref Fig:20.2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

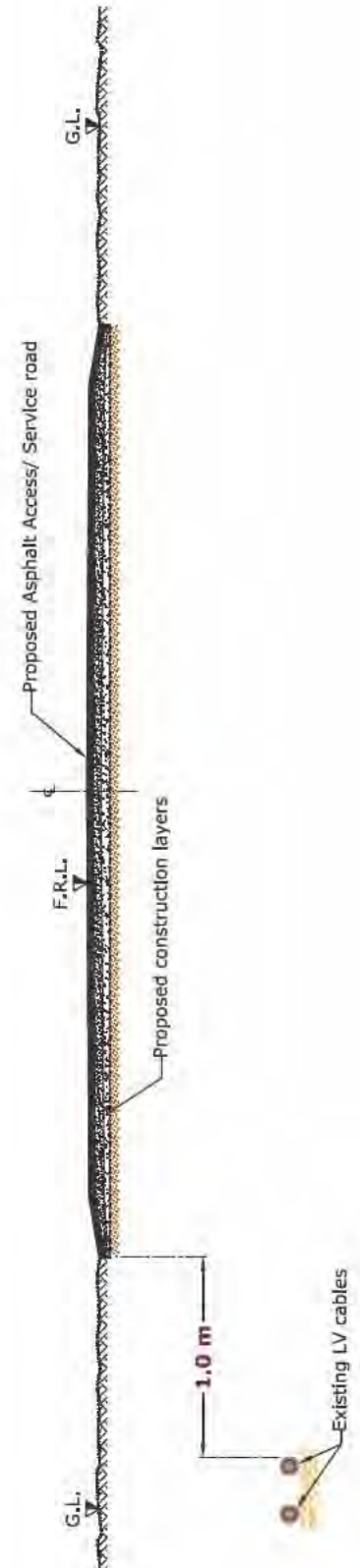
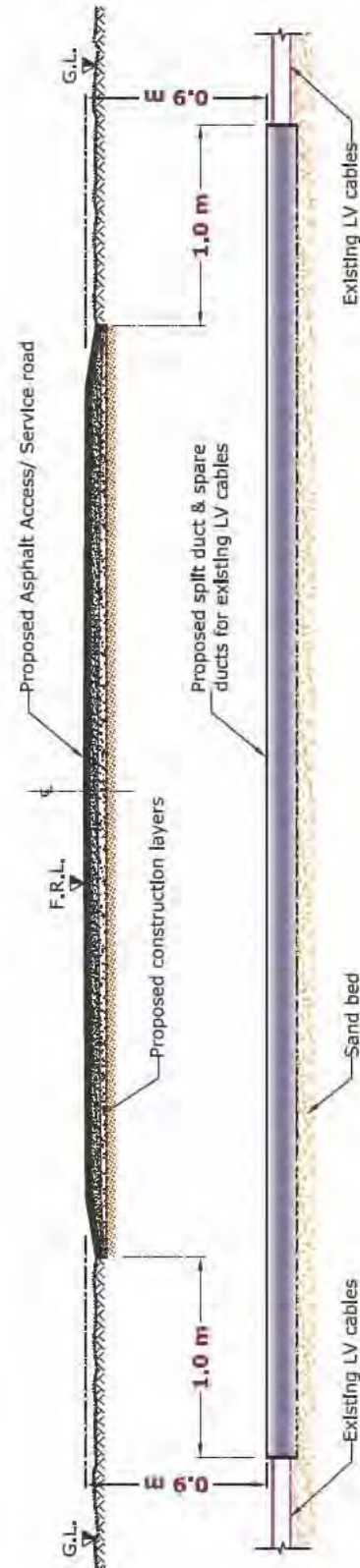
<p>Fig: 20.1</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING LV CABLES</p> 
<p>Fig: 20.2</p>	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING LV CABLES</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Asphalt shoulder edge to existing LV cable edge. 2. Vertical clearance is from the top of existing LV cable (protection) to finished Asphalt level. 3. At crossing location existing LV cable should be raised/ lowered to the standard depth and protected with split & spare duct as per specified standard. 4. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Asphalt shoulder edge. 	

Table 2: Clearance & Protection details for Proposed Asphalt Access/Service Road and existing DEWA Electricity HV Services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints.	NR	0.9 m	A	-	R	• Vertical clearance (Ref Fig: 20.3)
HV (6.6/11/33 kV) Manhole.		-	-	-	R	• (Ref Fig: 20.3, Case 3)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	NA	R	• Horizontal clearance (Ref Fig: 20.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	• Horizontal clearance (Ref Fig: 20.4)
HV (33 kV) O.H.L.		3.5 m				• Vertical clearance (Ref Fig: 20.4) • Protection details (Ref Fig: 20.4)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

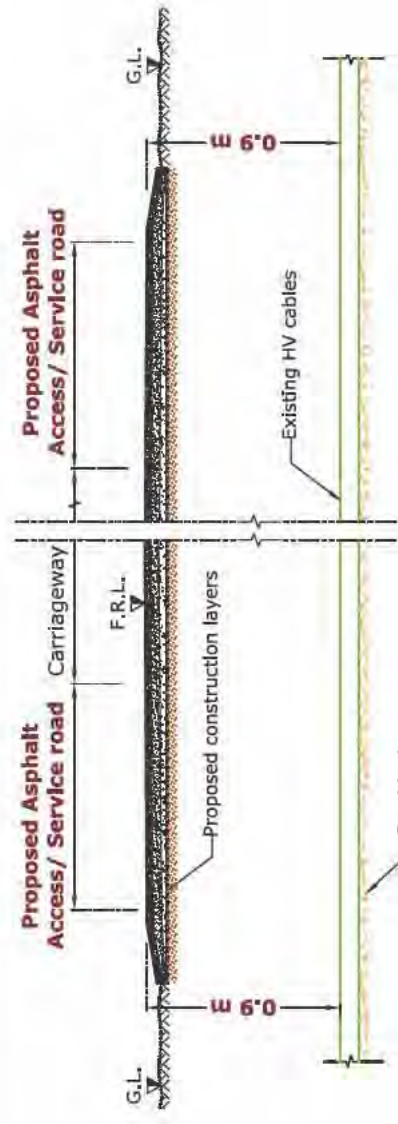
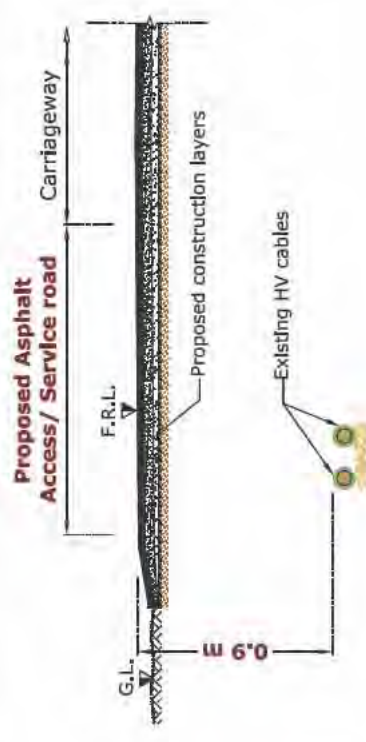
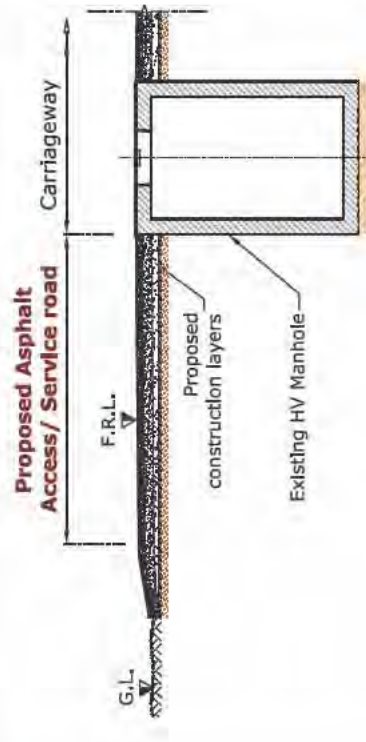
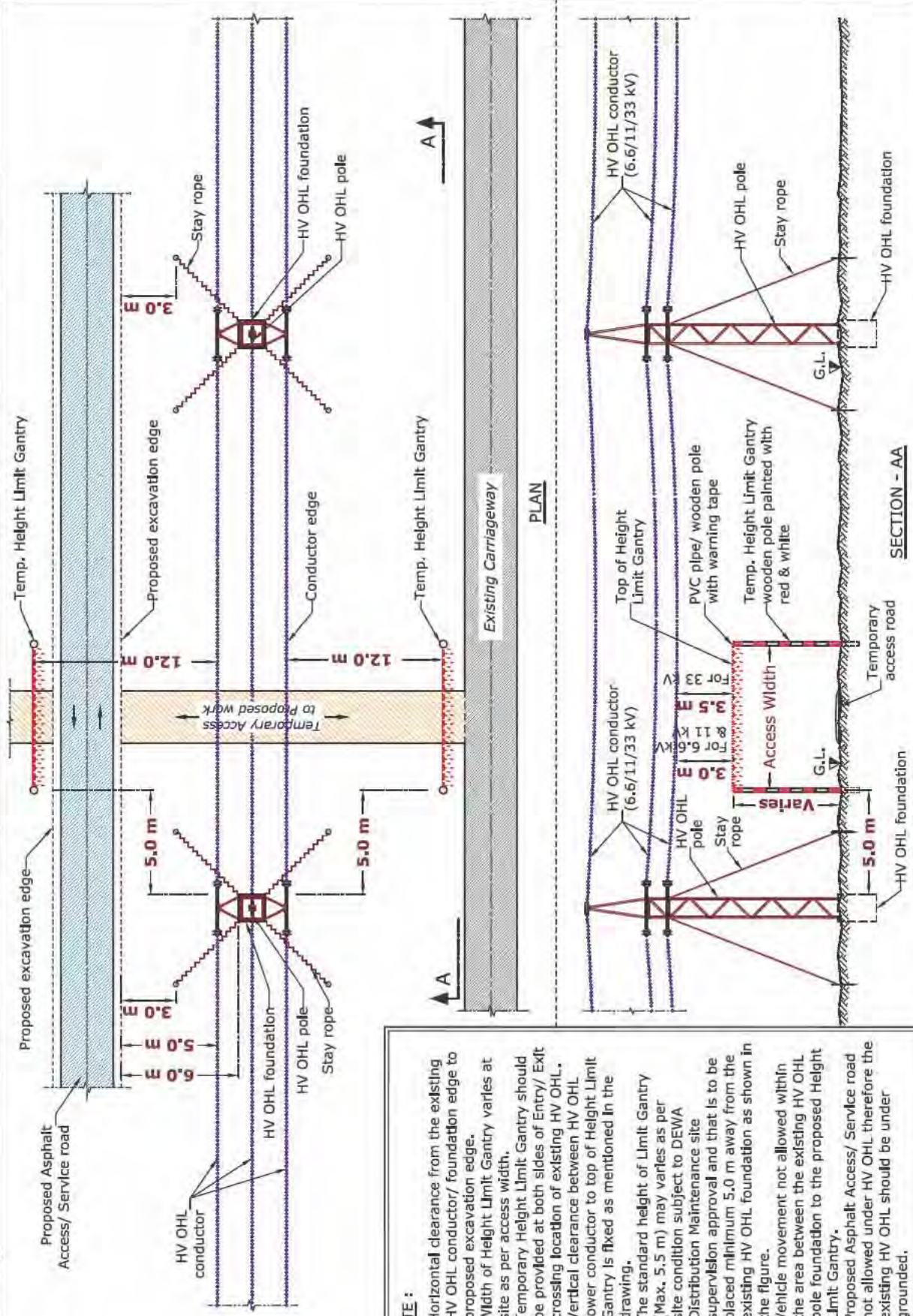
<p>Fig: 20.3</p>	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING HV CABLES AT CROSSING LOCATION</p> <p>CASE 1 : Proposed Asphalt Access/ Service road crossing existing HV cable</p> 
<p>CASE 2 : Proposed Asphalt Access/ Service road above/ parallel to existing HV cables</p>	 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance is from the top of existing HV cable to finished Asphalt level. 2. At crossing/ parallel location existing HV services should be raised/ lowered to the standard depth and spare duct should be provided as per number of existing cables at site. 3. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Asphalt shoulder edge. 4. Trench side and existing DEWA services protection may be required as per site and soil condition. 	

Fig: 20.4 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)



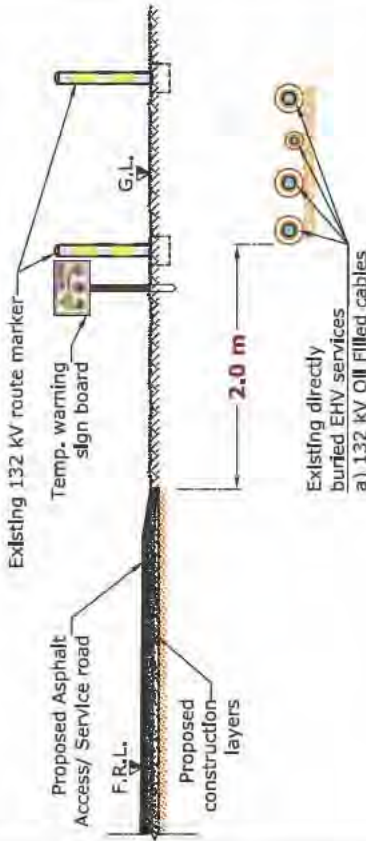
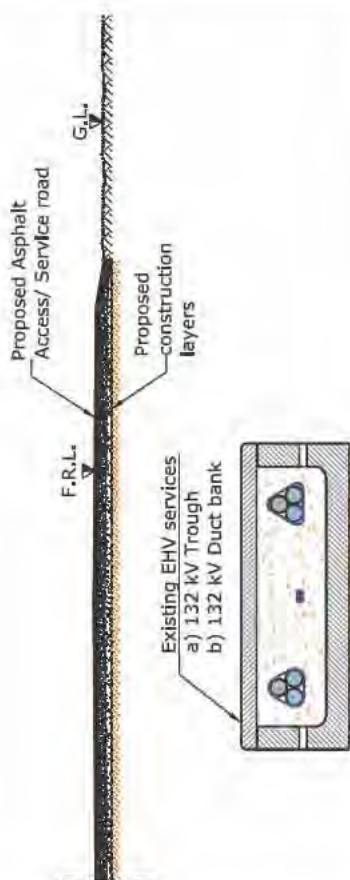
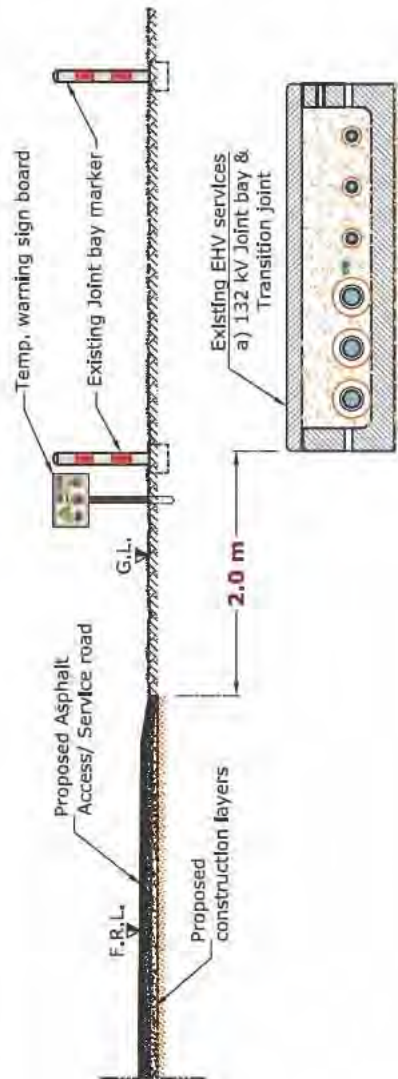
- NOTE :**
1. Horizontal clearance from the existing HV OHL conductor/ foundation edge to proposed excavation edge.
 2. Width of Height Limit Gantry varies at site as per access width.
 3. Temporary Height Limit Gantry should be provided at both sides of Entry/ Exit crossing location of existing HV OHL.
 4. Vertical clearance between HV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
 5. The standard height of Limit Gantry (Max. 5.5 m) may varies as per site condition subject to DEWA Distribution Maintenance site supervision approval and that is to be placed minimum 5.0 m away from the existing HV OHL foundation as shown in the figure.
 6. Vehicle movement not allowed within the area between the existing HV OHL pole foundation to the proposed Height Limit Gantry.
 7. Proposed Asphalt Access/ Service road not allowed under HV OHL therefore the existing HV OHL should be under grounded.

Table 3: Clearance & Protection details for Proposed Asphalt Access /Service Road and existing DEWA Electricity EHV services

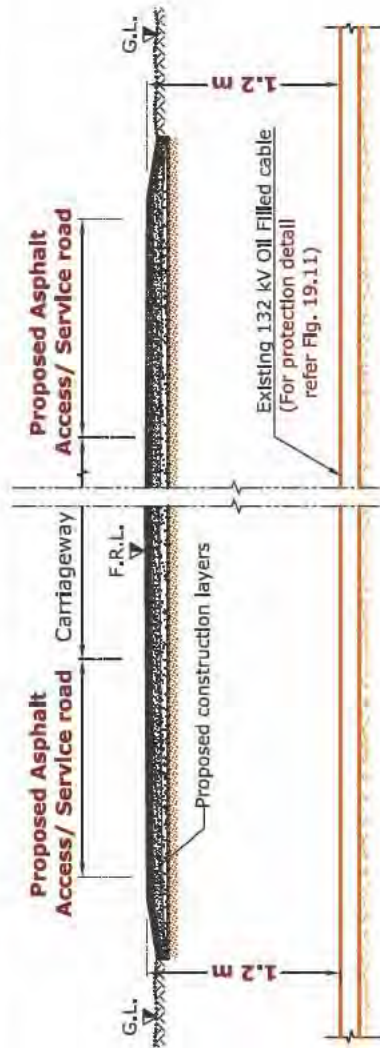
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	1.2 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 20.5) Vertical clearance (Ref Fig: 20.8)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 20.9)
EHV (132 kV) Trough	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> (Ref Fig:20.6) Vertical clearance (Ref Fig: 20.10) Protection details (Ref Fig: 20.10)
EHV (132 kV) Duct Bank	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> (Ref Fig:20.6) Vertical clearance (Ref Fig: 20.11)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 20.7)
EHV (132 kV) O.H.L	25.0 m	15.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 20.13) Vertical clearance (Ref Fig: 20.13)
EHV (400 kV) O.H.L	40.0 m	16.5 m				<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:20.14) Vertical clearance (Ref Fig: 20.14)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 20.12) Vertical clearance (Ref Fig: 20.12)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 20.13, 20.14) Vertical clearance (Ref Fig: 20.13, 20.14) Protection details (Ref Fig: 20.13, 20.14)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

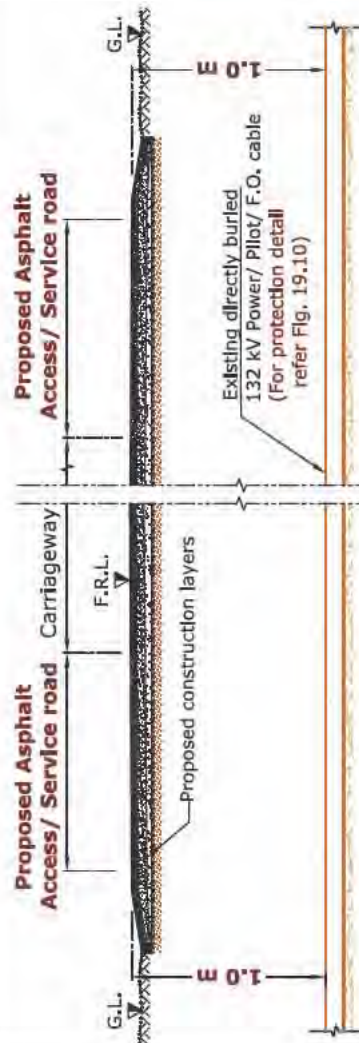
<p>Fig: 20.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>	<p>Fig: 20.6</p>	<p>PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Asphalt edge to existing EHV 132 kV services edge. 2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m Intervals. 3. Minimum 3mtr horizontal clearance should be maintained from the proposed road edge to existing 132kv link box with RTA standard protection. 4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 			<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p> 

VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING 132 kV OIL FILLED CABLE AT CROSSING LOCATION

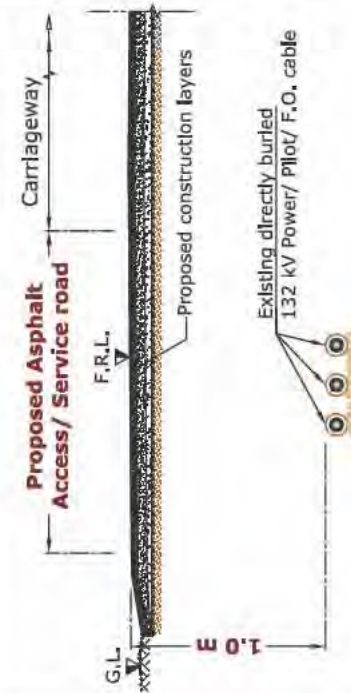


VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING DIRECTLY BURIED 132 kV POWER/ PILOT/ F.O. CABLE

CASE 1 : Crossing

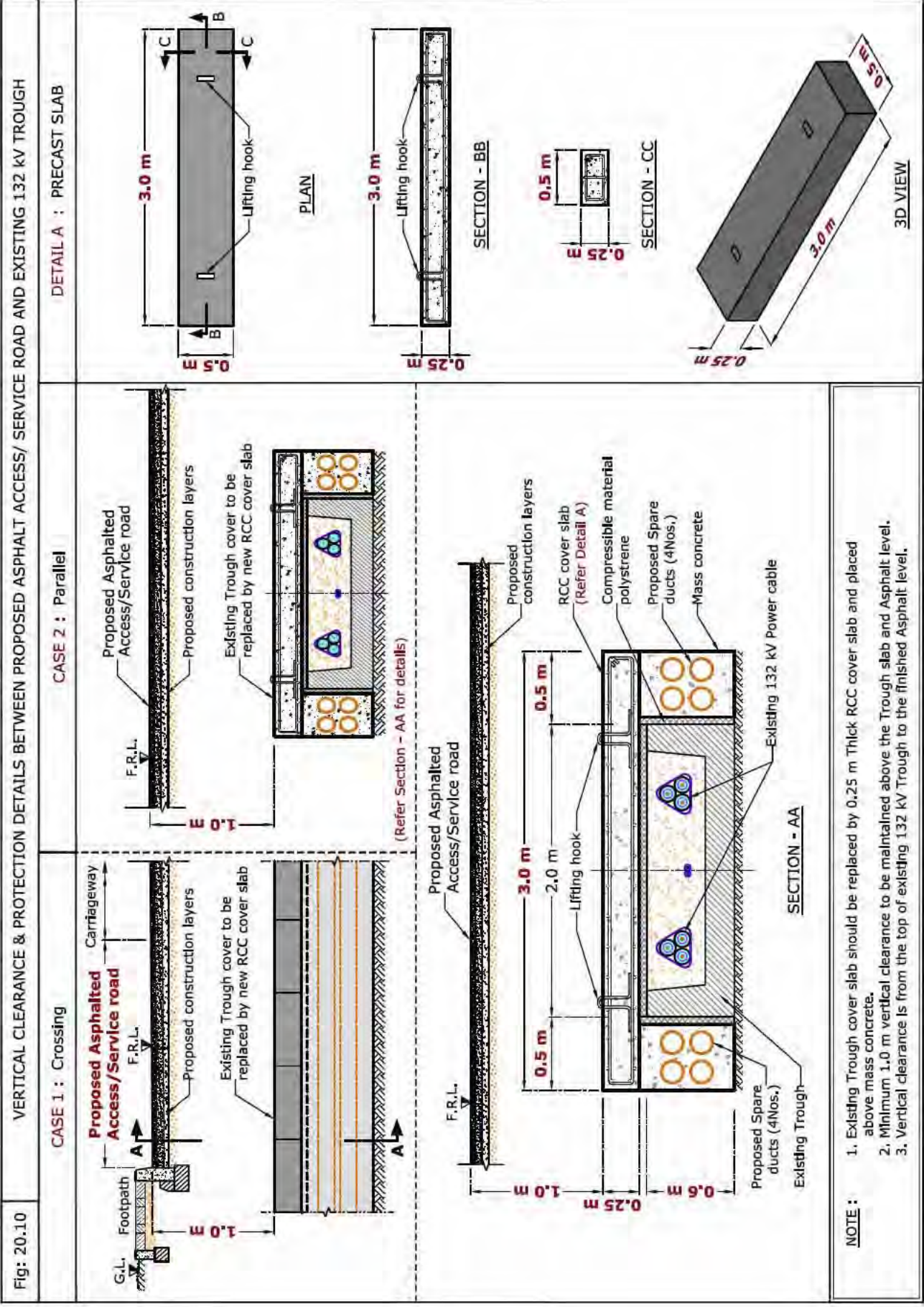


CASE 2 : Parallel



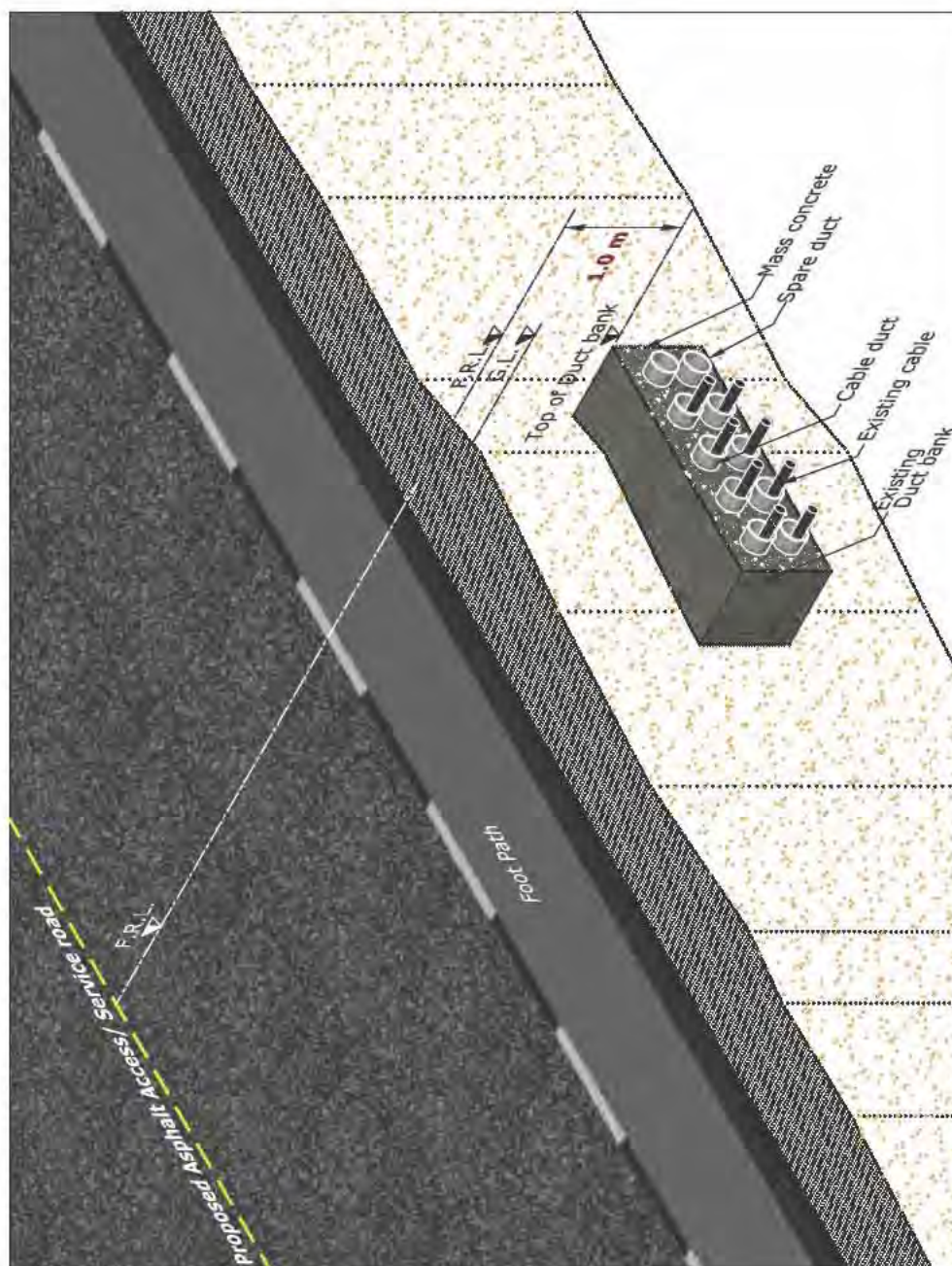
NOTE :

1. Proposed Asphalt Access/ Service road not allowed on top of DEWA reservation.
2. Vertical clearance is from the top of existing 132 kV services to the finished Asphalt level.
3. Existing Oil Filled cables should be diverted outside the proposed Asphalt Access/ Service road as per RTA ROW new corridor.
4. Minimum vertical clearance to be maintained at crossing location as mentioned in the figure. DEWA EHV Services should be protected as per DEWA Standard, (Ref Fig: 19.10 & 19.11)



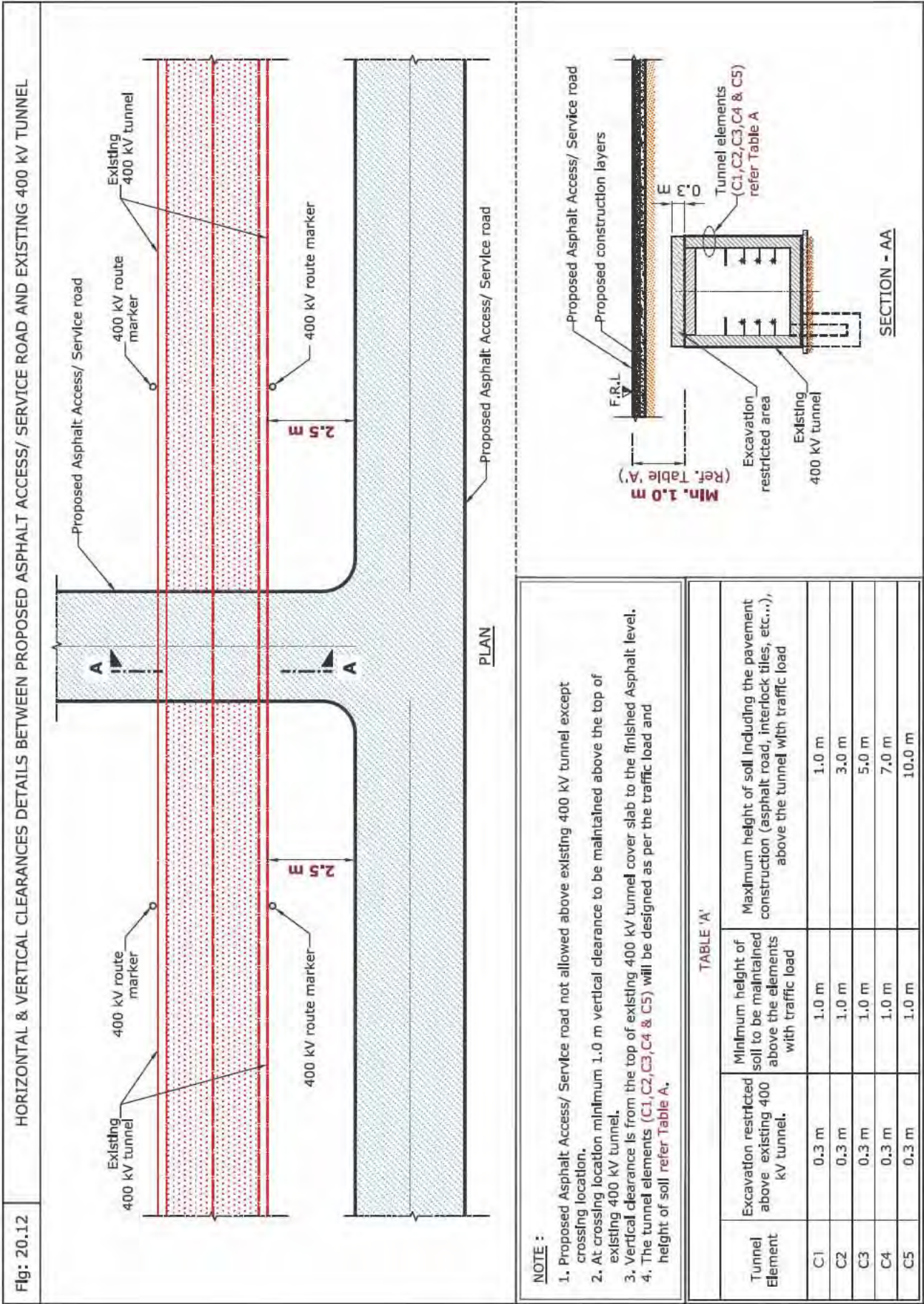
VERTICAL CLEARANCE DETAIL BETWEEN PROPOSED ASPHALT ACCESS/ SERVICE ROAD AND EXISTING 132 KV DUCT BANK

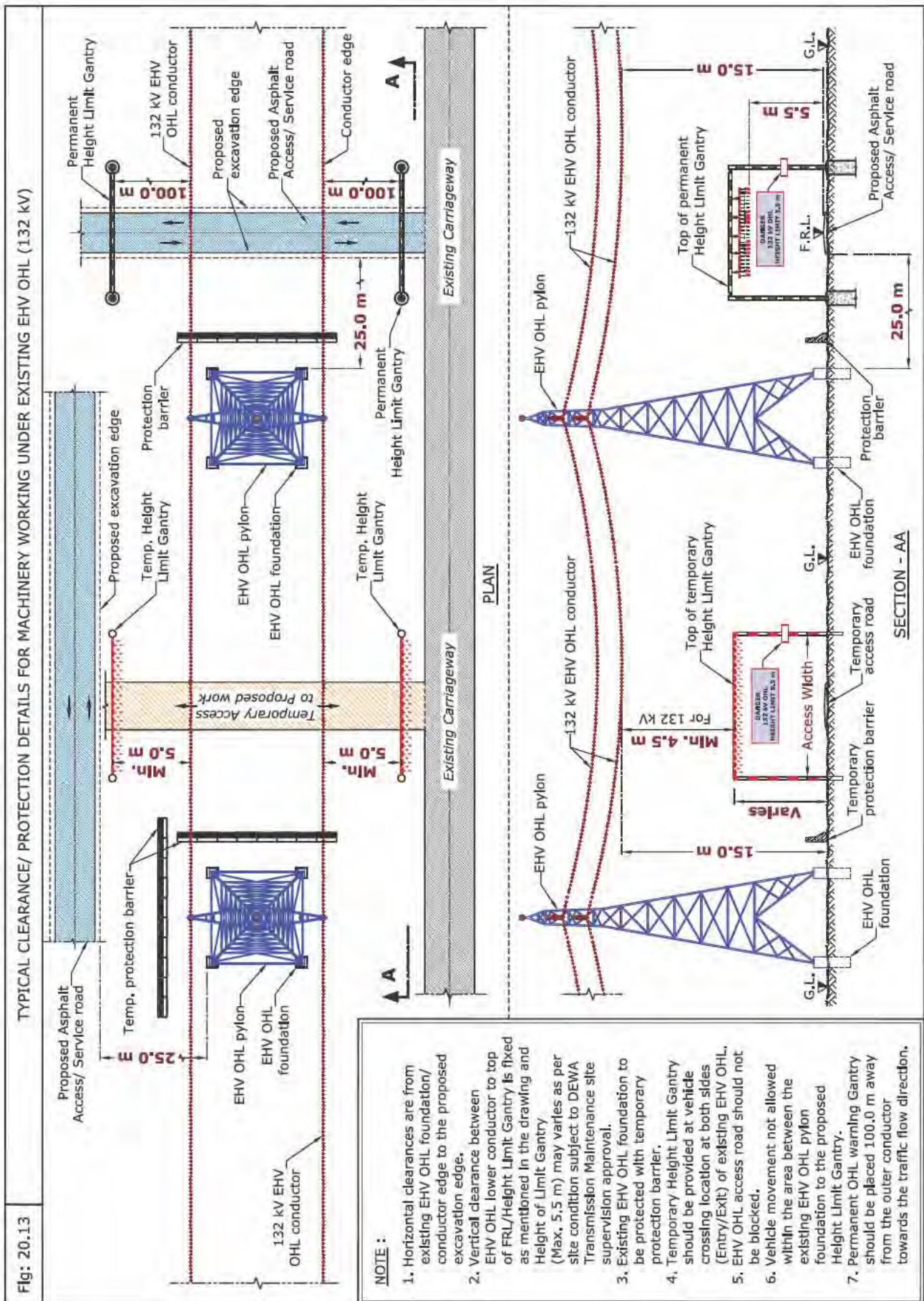
Fig: 20.11



NOTE :

1. Vertical clearance is from the top of existing Duct bank to the finished Asphalt level.
2. Minimum 1.0 m vertical clearance to be maintained at crossing location.





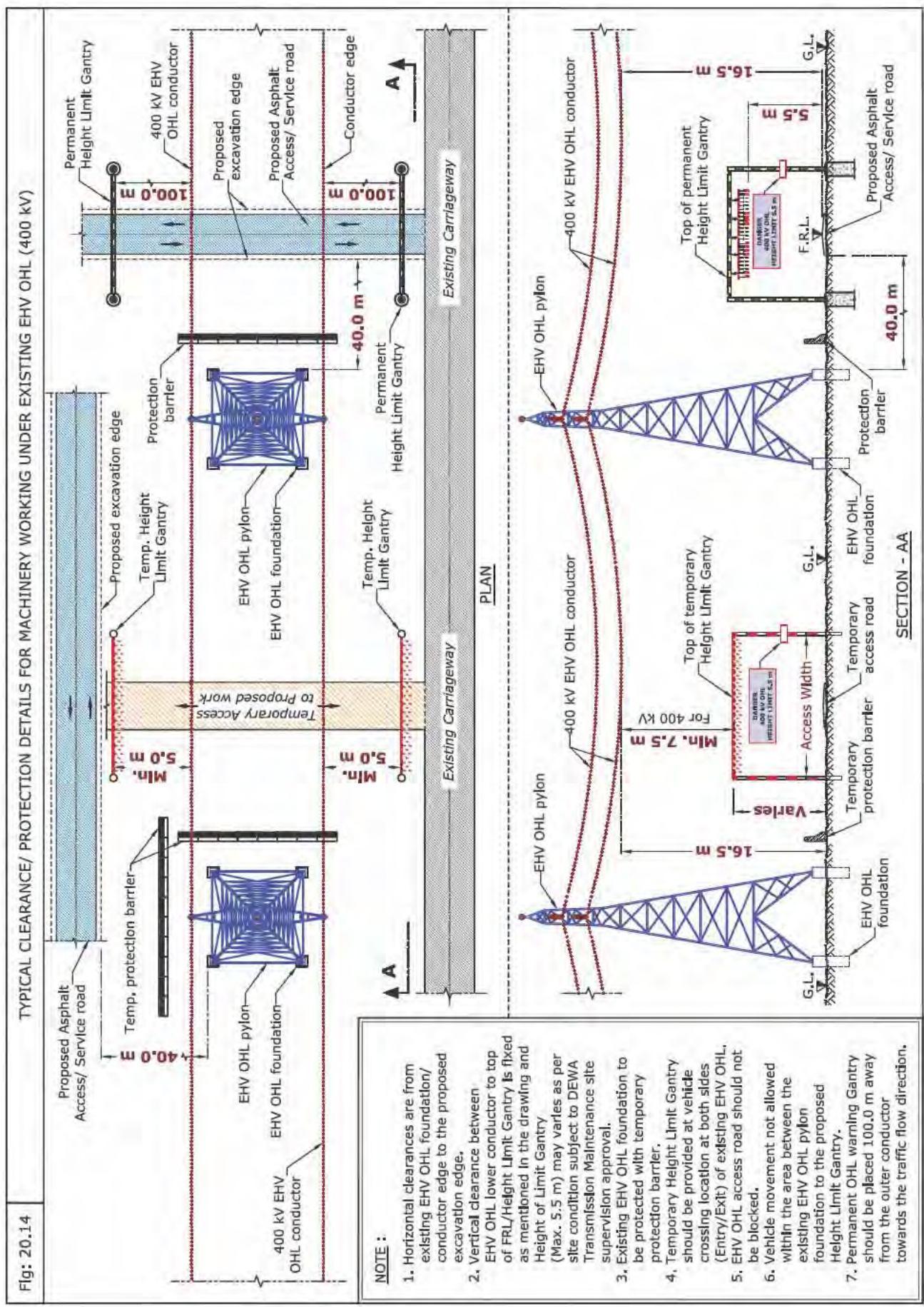


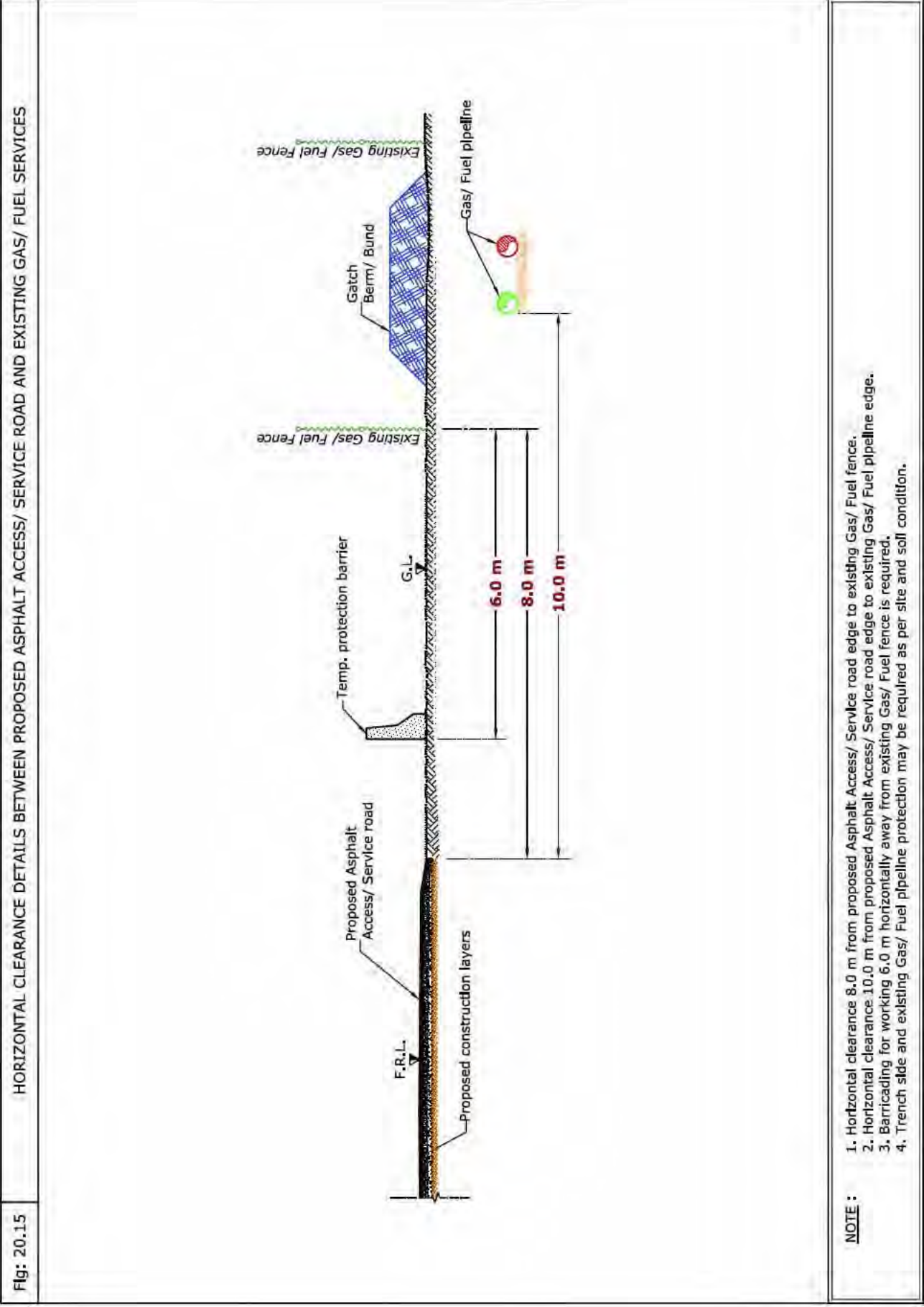
Table 4: Clearance & Protection details for Proposed Asphalt Access/Service Road and existing DEWA Gas/Fuel services

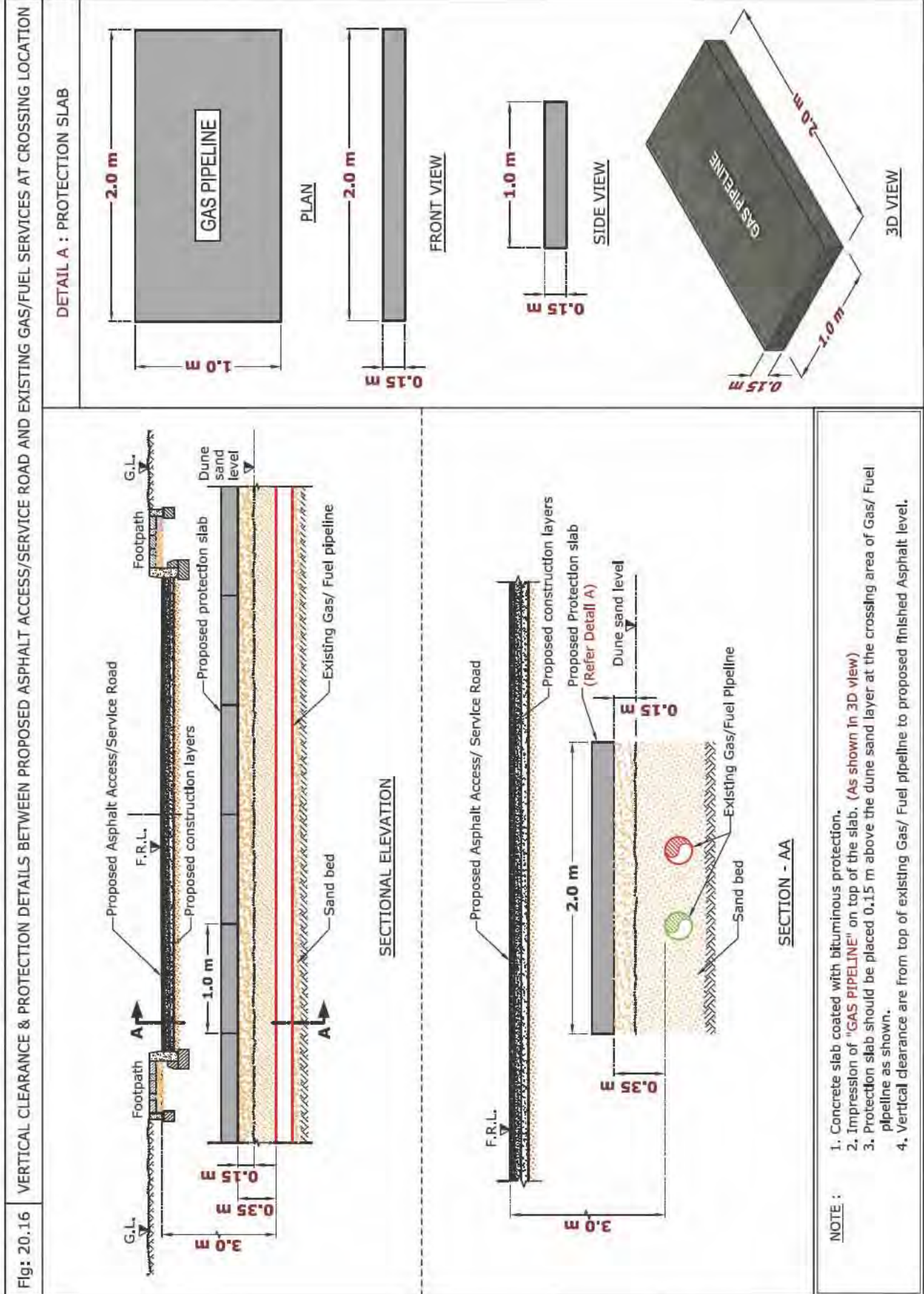
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 20.15)
Gas/Fuel pipeline (All diameter)	10.0 m	3.0 m	A	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 20.15) • Vertical clearance (Ref Fig: 20.16) • Protection Details (Ref Fig: 20.16)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.







21. Proposed Road Work - Asphalt Parking

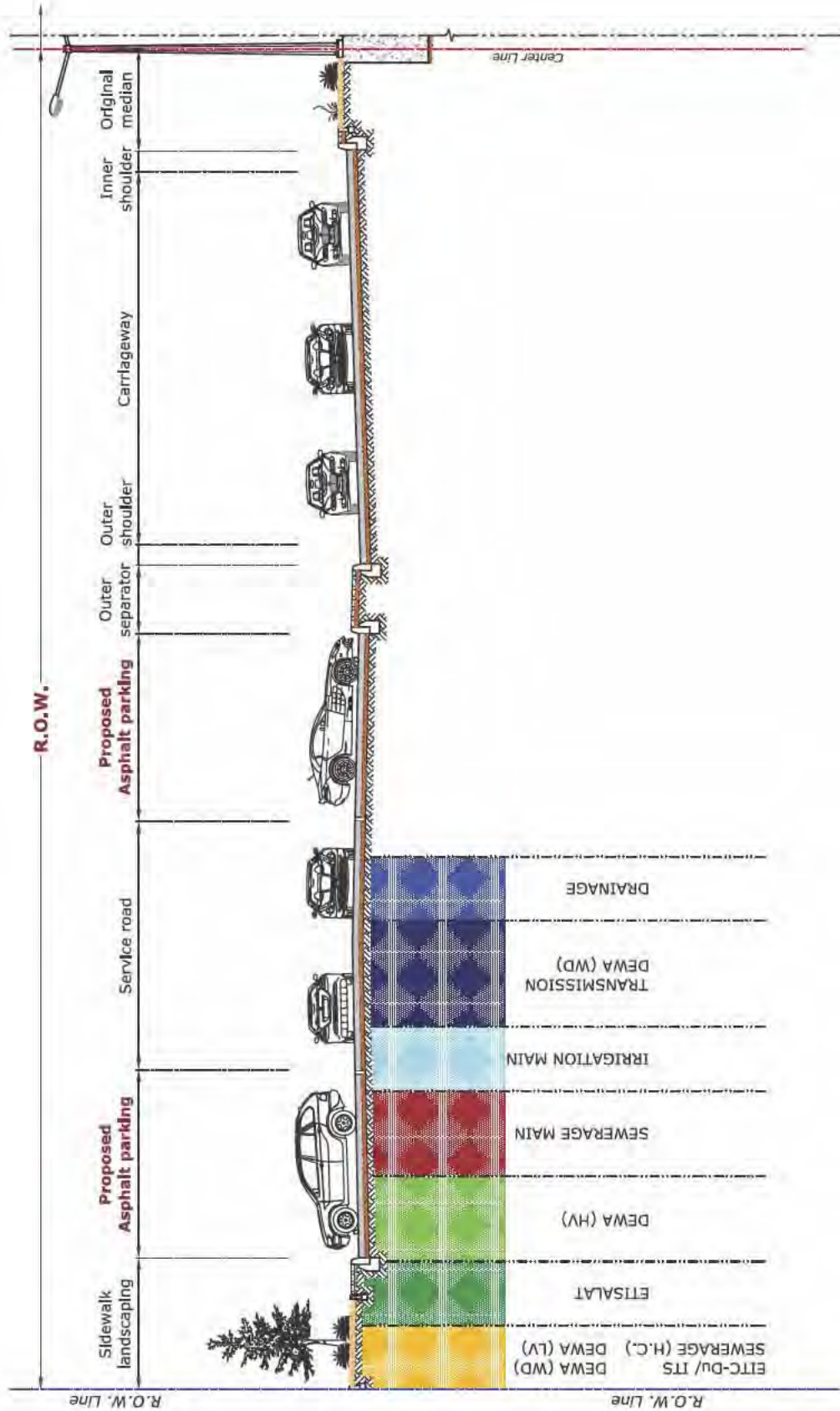
21.1 Introduction

Asphalted parking lot is the area, remote from the road designated for the parking of vehicles. The road may contain Parking lanes which are the areas on the pavement, perpendicular, inclined or parallel to but outside the travelling way. Each parking lane contains several parking bays in which the area are marked out for different sizes of vehicle parking.

Asphalted Parking can be in one or both sides of the road within the Right Of Way, therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



RIGHT OF WAY SAMPLE CROSS SECTION AT PROPOSED ASPHALT PARKING



21.2 Avoid the following



1. Proposal Asphalt parking above existing DEWA 132 kV Joint bay.
2. Proposal Asphalt parking under existing EHV OHL.

21.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Asphalt Parking and existing DEWA Electricity LV Cables						
Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.9 m	A	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 21.1)• Vertical clearance (Ref Fig:21.2)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 21.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING LV CABLES

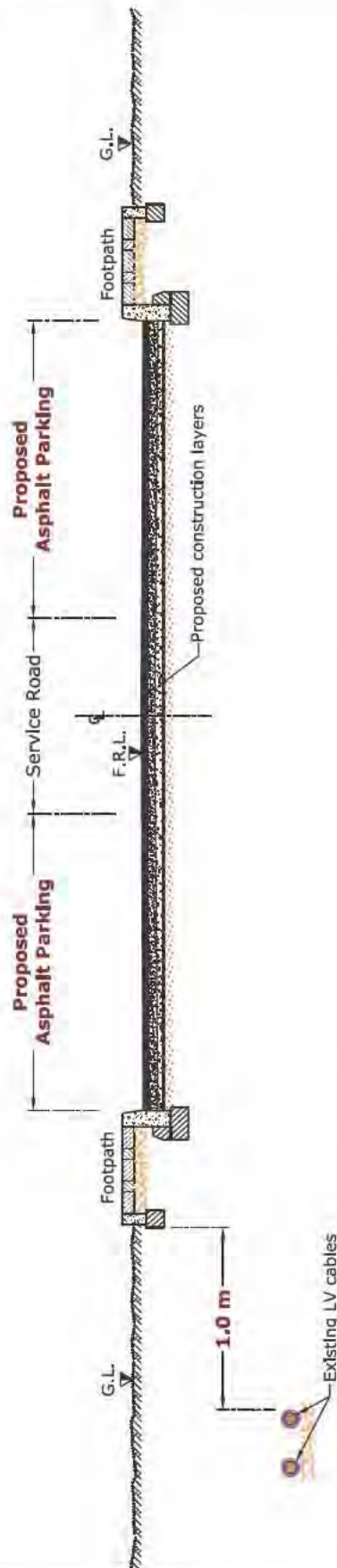
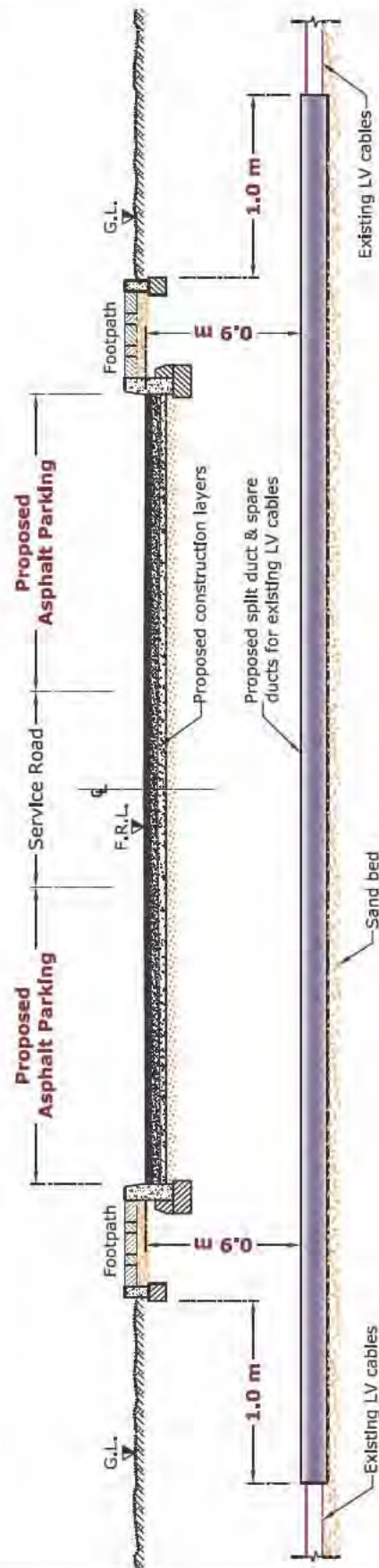


Fig: 21.2 VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING LV CABLES AT CROSSING LOCATION

**NOTE :**

1. Horizontal clearance is from the proposed Asphalt shoulder edge to existing LV cable/ duct edge.
2. Vertical clearance is from the top of existing LV cable/ ducts to finished Asphalt level.
3. At crossing location existing LV cable should be raised/ lowered to the standard depth and protected with split & spare duct as per specified standard.
4. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Asphalt shoulder edge.

Table 2: Clearance & Protection details for Proposed Asphalt Parking and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	NR	0.9 m	A	-	R	• Vertical clearance (Ref Fig: 21.3, Case 1 & 2)
HV (6.6/11/33 kV) Manhole		-	-	-	R	• (Ref Fig: 21.3, Case 3)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	NA	R	• Horizontal clearance (Ref Fig: 21.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 21.4) • Vertical clearance (Ref Fig: 21.4) • Protection details (Ref Fig: 21.4)
HV (33 kV) O.H.L.		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

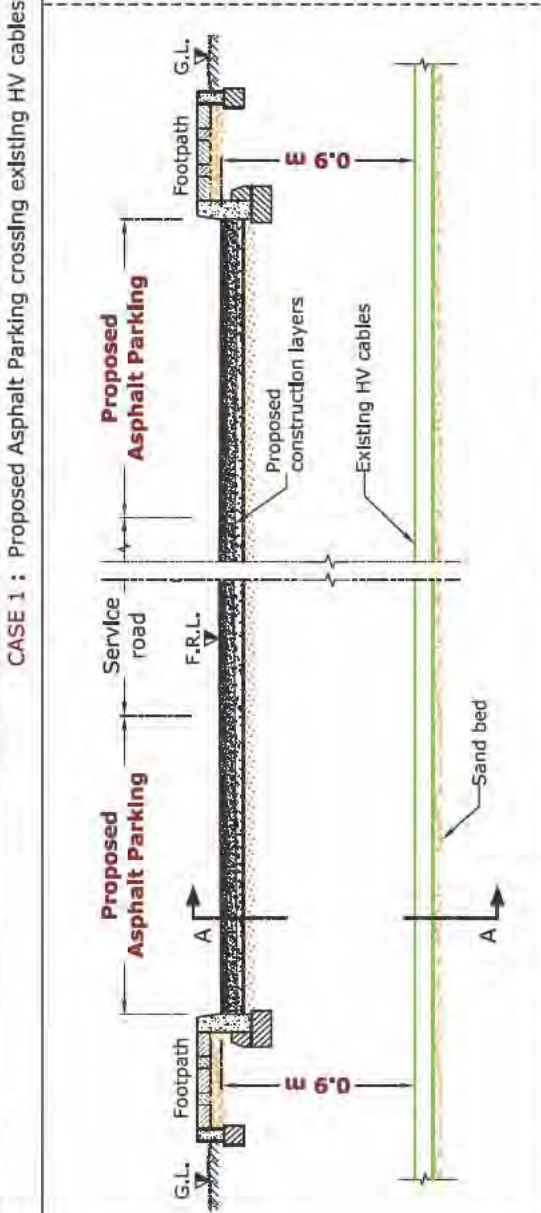
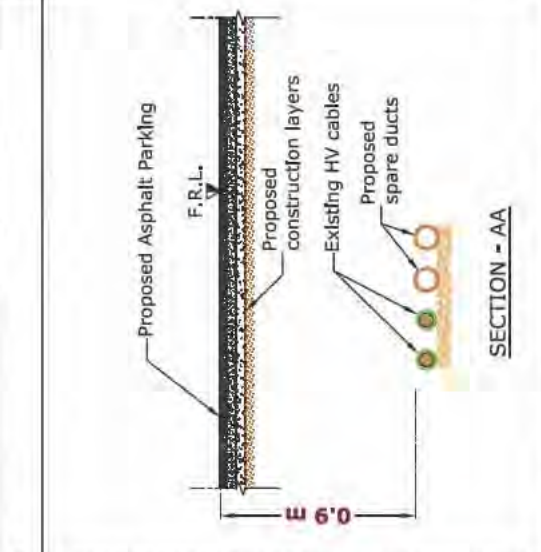
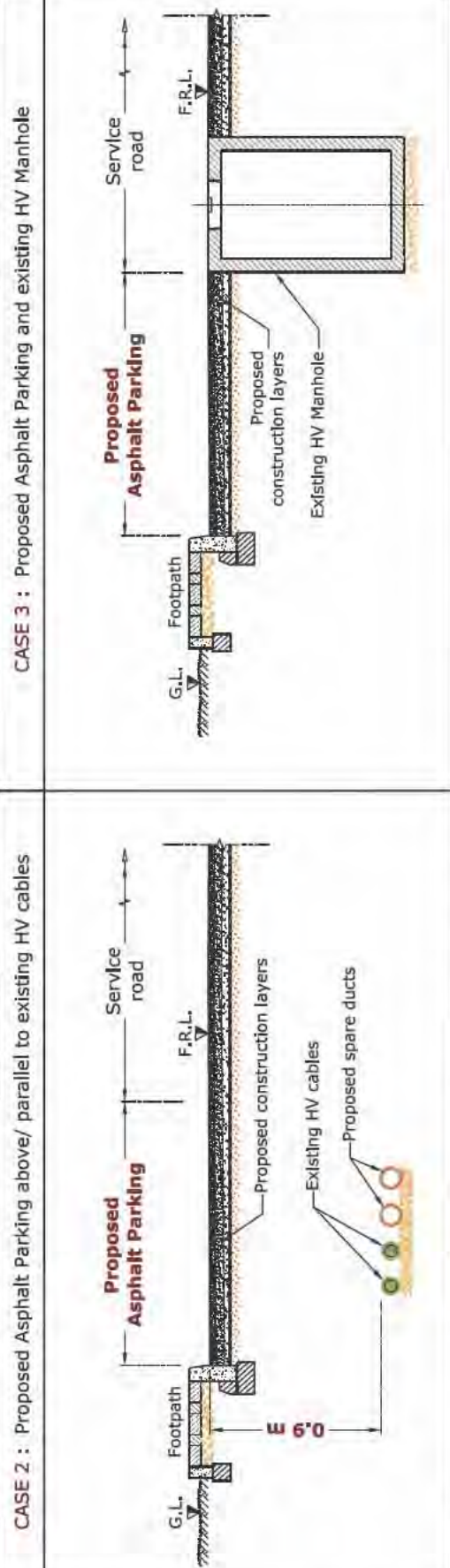
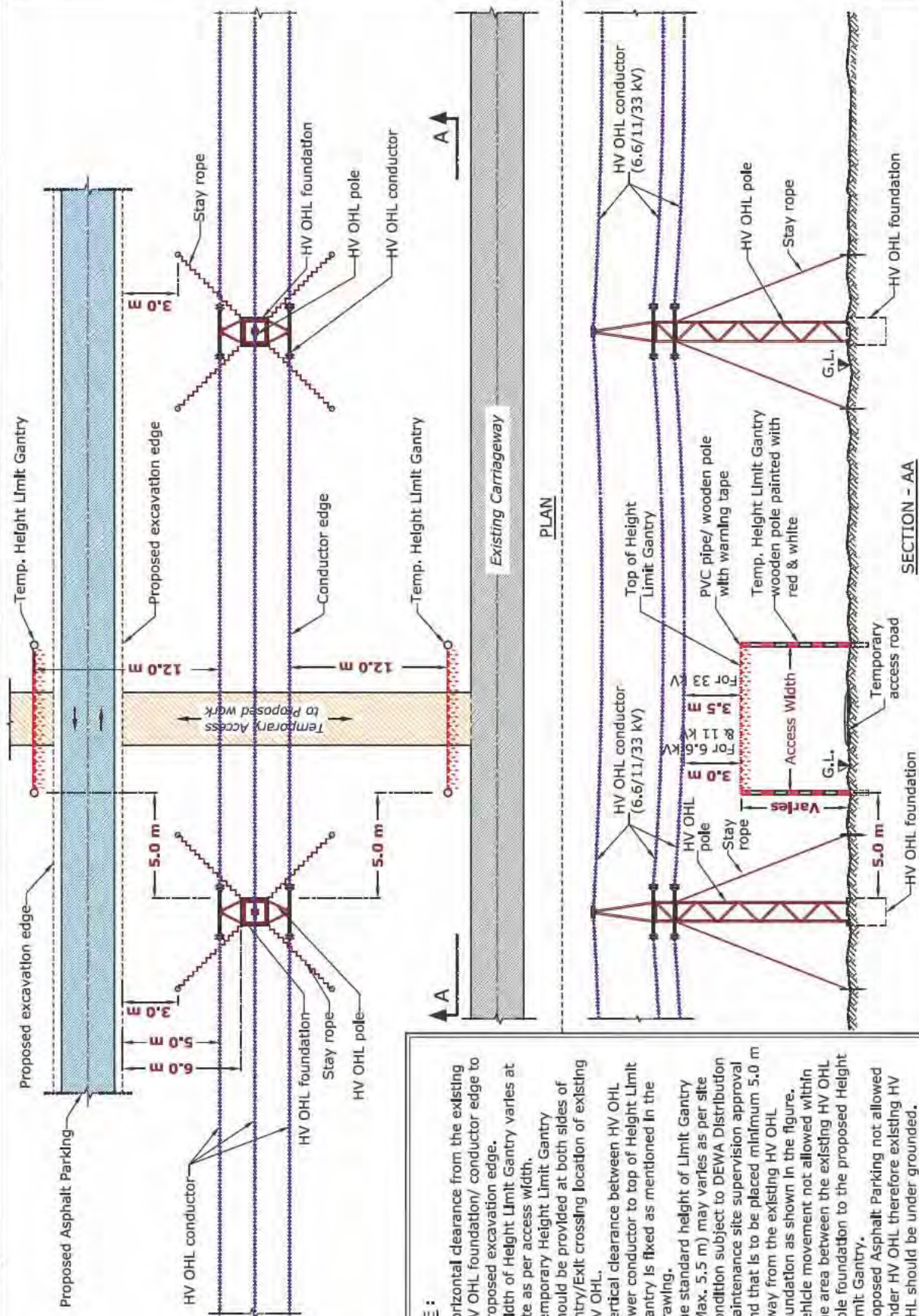
<p>Fig: 21.3</p> <p>VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING HV SERVICES</p>	<p>CASE 1 : Proposed Asphalt Parking crossing existing HV cables</p>  <p>CASE 2 : Proposed Asphalt Parking above/ parallel to existing HV cables</p>  <p>CASE 3 : Proposed Asphalt Parking and existing HV Manhole</p>  <p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance is from the top of existing HV cable to finished Asphalt level. 2. At crossing/ parallel location existing HV services should be raised/ lowered to the standard depth and spare duct should be provided as per number of existing cables at site. 3. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Asphalt shoulder edge. 4. Trench side and existing DEWA services protection may be required as per site and soil condition.
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Fig: 21.4 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

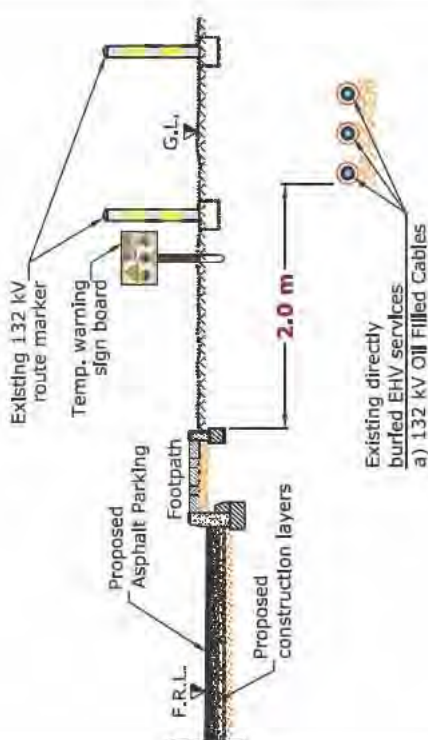
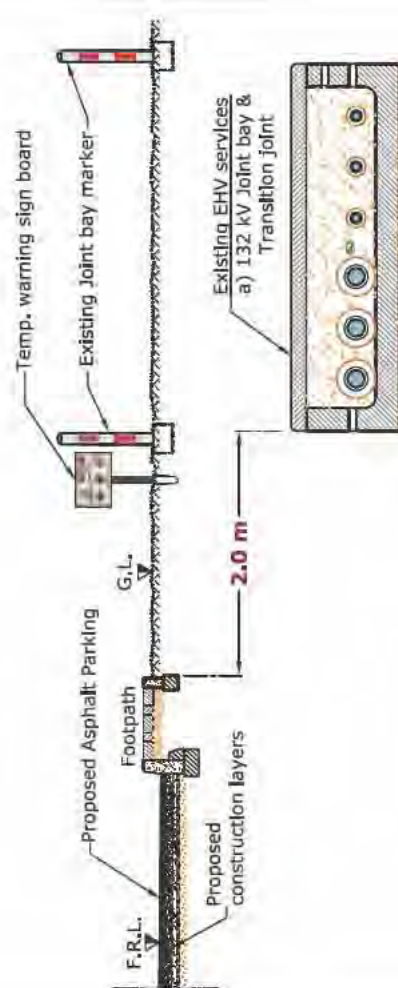


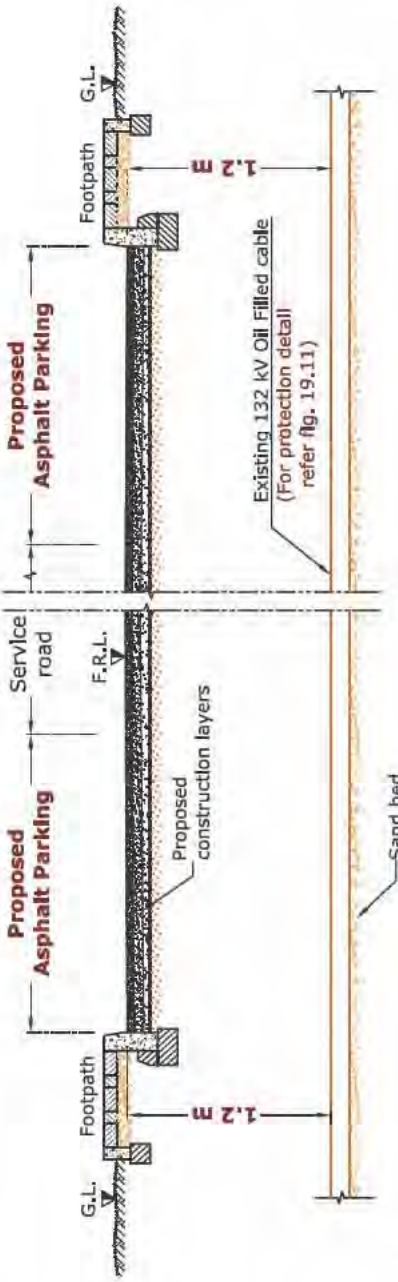
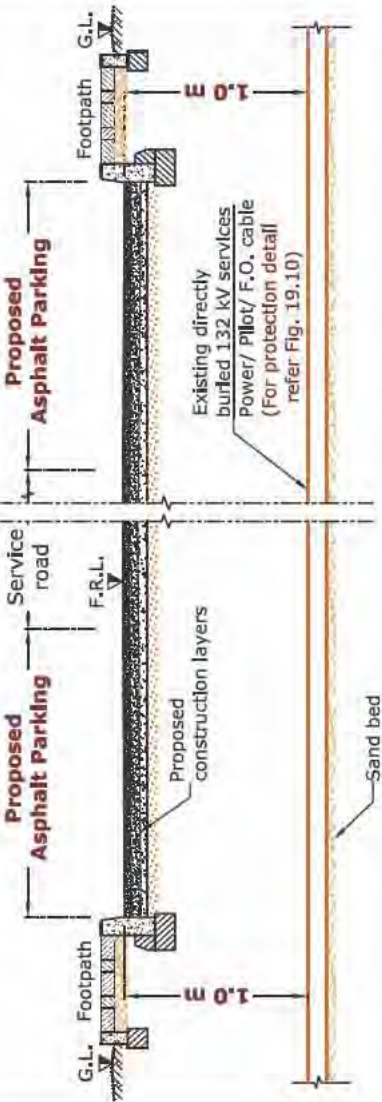
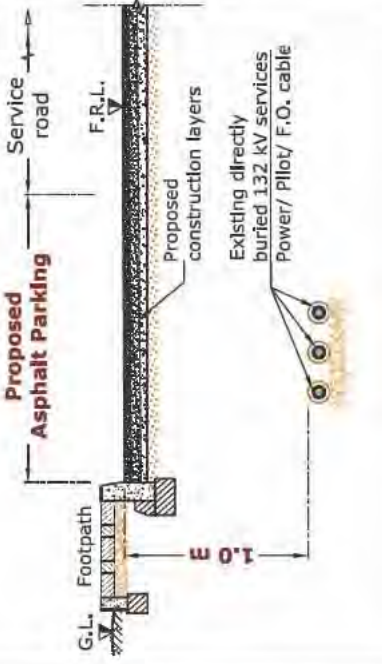
NOTE :

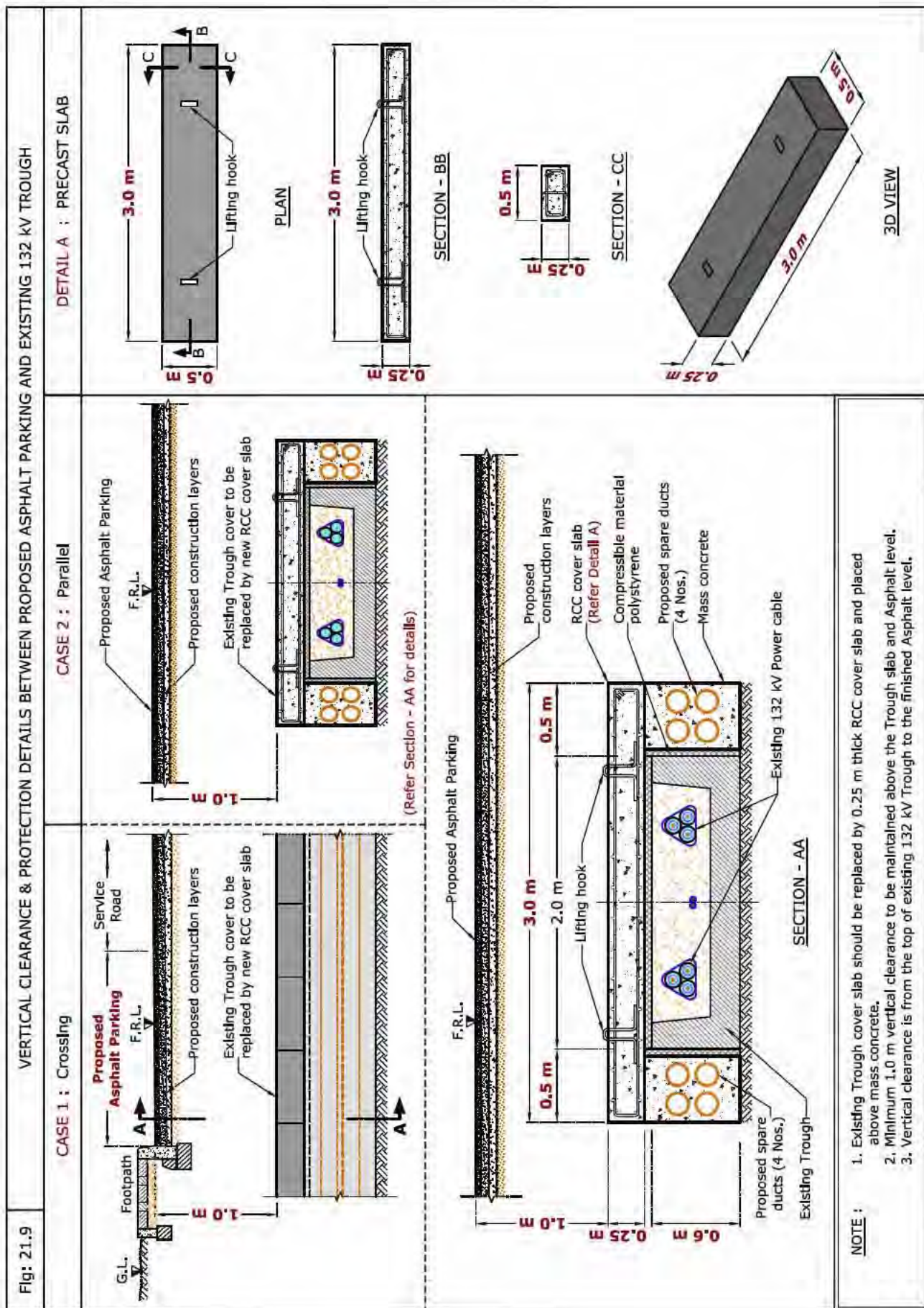
1. Horizontal clearance from the existing HV OHL foundation/ conductor edge to proposed excavation edge.
2. Width of Height Limit Gantry varies at site as per access width.
3. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing HV OHL.
4. Vertical clearance between HV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
5. The standard height of Limit Gantry (Max. 5.5 m) may vary as per site condition subject to DEWA Distribution Maintenance site supervision approval and that is to be placed minimum 5.0 m away from the existing HV OHL foundation as shown in the figure.
6. Vehicle movement not allowed within the area between the existing HV OHL pole foundation to the proposed Height Limit Gantry.
7. Proposed Asphalt Parking not allowed under HV OHL therefore existing HV OHL should be under grounded.

Table 3: Clearance & Protection details for Proposed Asphalt Parking and existing DEWA Electricity EHV services						
Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	1.2 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:21.5) Vertical clearance (Ref Fig: 21.7)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 21.8)
EHV (132 kV) Trough	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 21.9) Protection details (Ref Fig: 21.9)
EHV (132 kV) Duct Bank	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 21.10)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	-	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:21.6)
EHV (132 kV) O.H.L	25.0 m	15.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:21.12) Vertical clearance (Ref Fig: 21.12)
EHV (400 kV) O.H.L	40.0 m	16.5 m				<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:21.13) Vertical clearance (Ref Fig: 21.13)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:21.11) Vertical clearance (Ref Fig: 21.11)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 21.12 & 21.13) Vertical clearance (Ref Fig: 21.12 & 21.13) Protection details (Ref Fig: 21.12 & 21.13)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

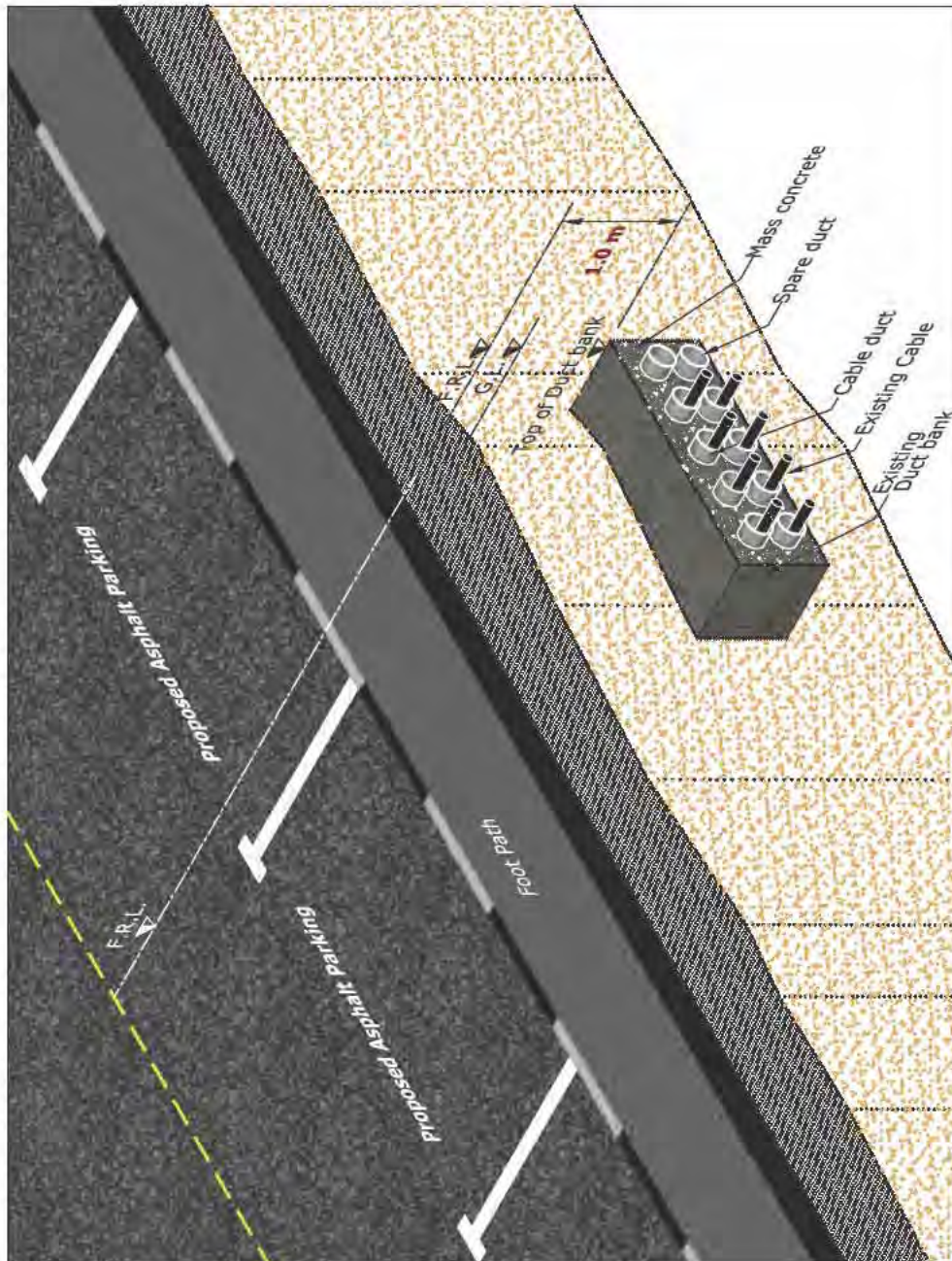
Fig: 21.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED CABLES	Fig: 21.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
			
<p>NOTE :</p> <ol style="list-style-type: none">1. All horizontal clearances are from proposed Asphalt edge to existing EHV 132 kV services edge.2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.3. Minimum 3.0 m horizontal clearance should be maintained from the proposed Parking edge to existing 132kv link box with RTA standard protection.4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.			

<p>Fig: 21.7</p>	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING 132 kV OIL FILLED CABLE AT CROSSING LOCATION</p> 
<p>Fig: 21.8</p>	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING DIRECTLY BURIED 132 kV POWER/ PILOT/ F.O. CABLE</p> <p>CASE 1 : Crossing</p>  <p>CASE 2 : Parallel</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance is from the top of existing 132 kV services to the finished Asphalt level. 2. Existing Oil filled cables should be diverted outside the proposed Asphalt Parking as per RTA ROW new corridor. 3. Minimum vertical clearance to be maintained at crossing location as mentioned in the figure. DEWA EHV Services should be protected as per DEWA Standard. (Ref Fig: 19.10 & 19.11) 	



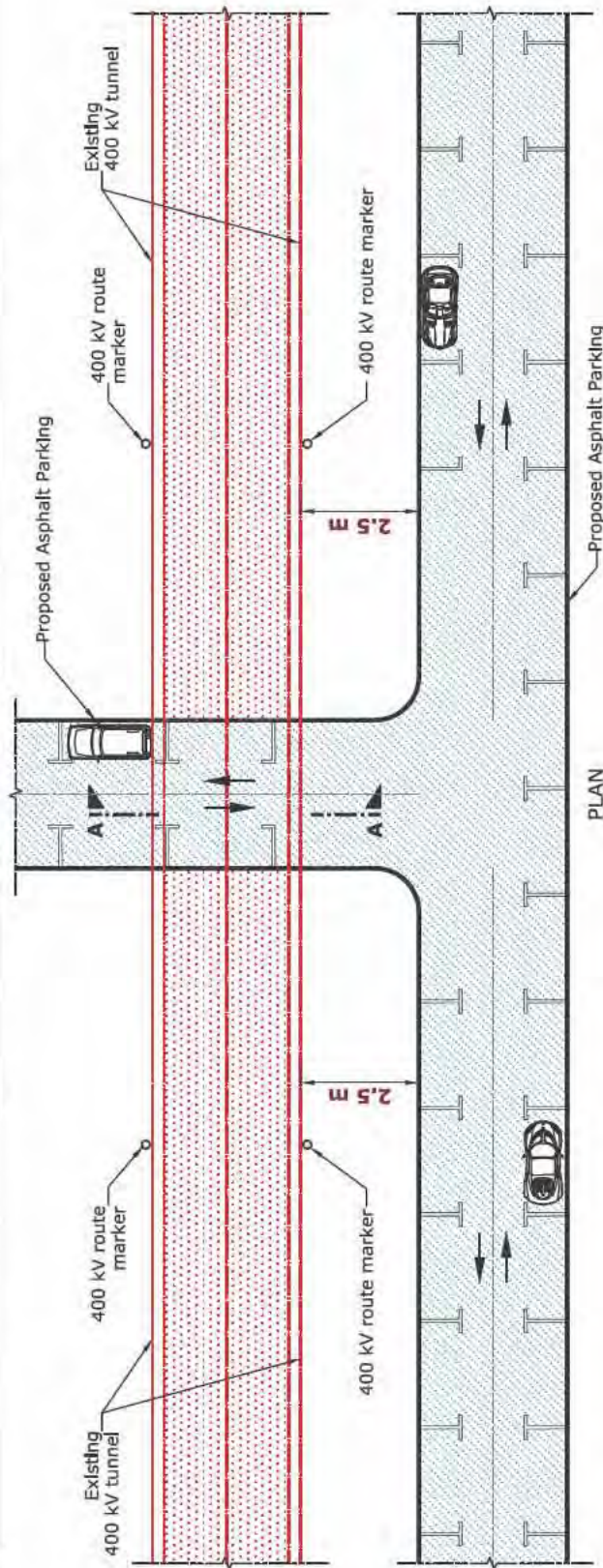
VERTICAL CLEARANCE DETAIL BETWEEN PROPOSED ASPHALT PARKING AND EXISTING 132 kV DUCT BANK

Fig: 21.10



- NOTE :**
1. Vertical clearance is from the top of existing Duct bank to the finished Asphalt level.
 2. Minimum 1.0 m vertical clearance to be maintained at crossing location.

Fig: 21.11 HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING 400 kV TUNNEL



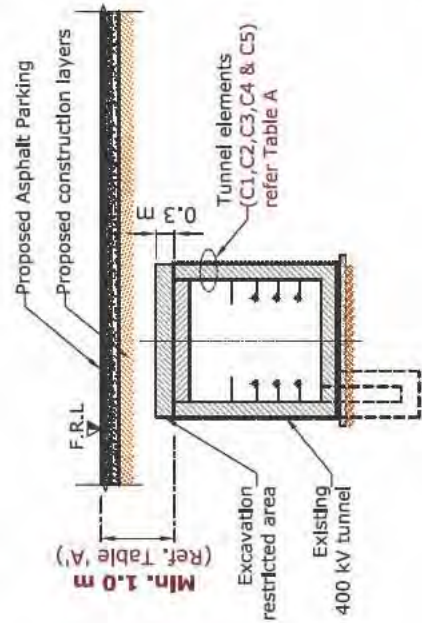
PLAN

NOTE :

1. Proposed Asphalt Parking not allowed above existing 400 kV tunnel except crossing location.
2. At crossing location minimum 1.0 m vertical clearance to be maintained above the top of existing 400 kV tunnel.
3. Vertical clearance is from the top of existing 400 kV tunnel cover slab to the finished Asphalt level.
4. The tunnel elements (C1,C2,C3,C4 & C5) will be designed as per the traffic load and height of soil refer Table A.

TABLE 'A'

Tunnel Element	Excavation restricted above existing 400 kV tunnel.	Minimum height of soil to be maintained above the elements with traffic load	Maximum height of soil including the pavement construction (asphalt road, interlock tiles, etc...), above the tunnel with traffic load
C1	0.3 m	1.0 m	1.0 m
C2	0.3 m	1.0 m	3.0 m
C3	0.3 m	1.0 m	5.0 m
C4	0.3 m	1.0 m	7.0 m
C5	0.3 m	1.0 m	10.0 m



SECTION - AA

TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING EHV OHL (132 kV)

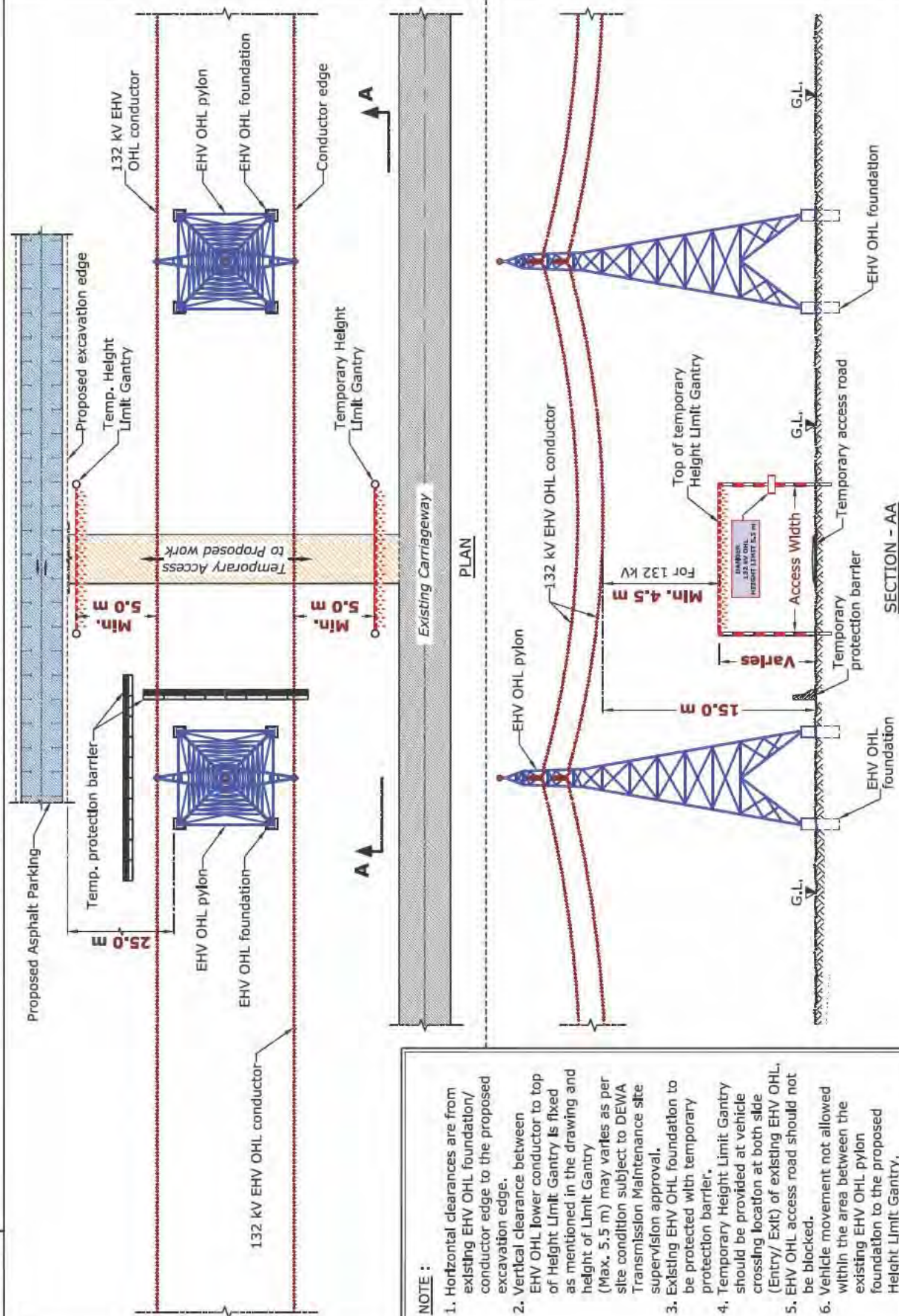


Fig: 21.13

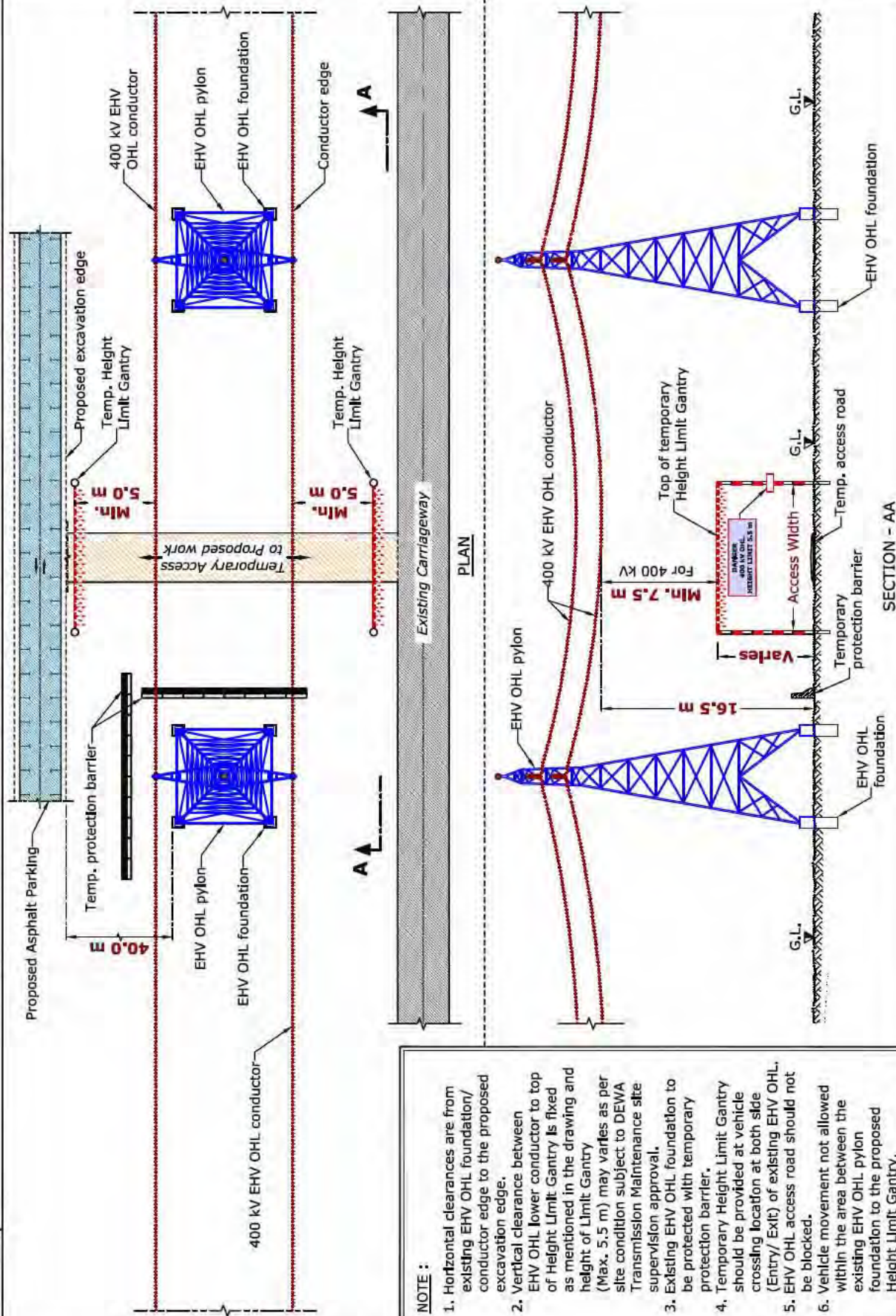


Table 4: Clearance & Protection details for Proposed Asphalt Parking and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 21.14)
Gas/Fuel pipeline (All diameter)	10.0 m	3.0 m	A	-	R	• Horizontal clearance (Ref Fig: 21.14) • Vertical clearance (Ref Fig: 21.15) • Protection details (Ref Fig: 21.15)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

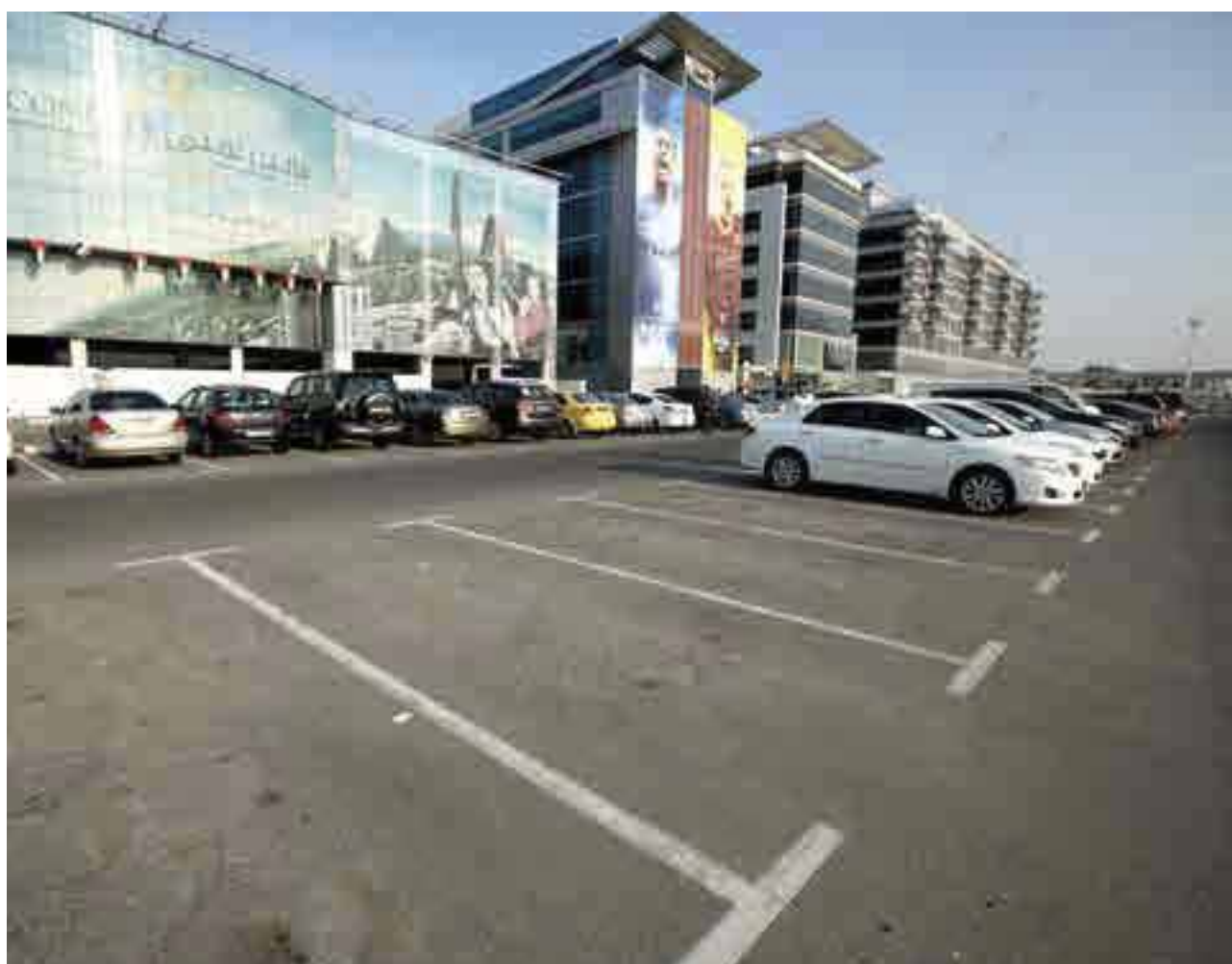
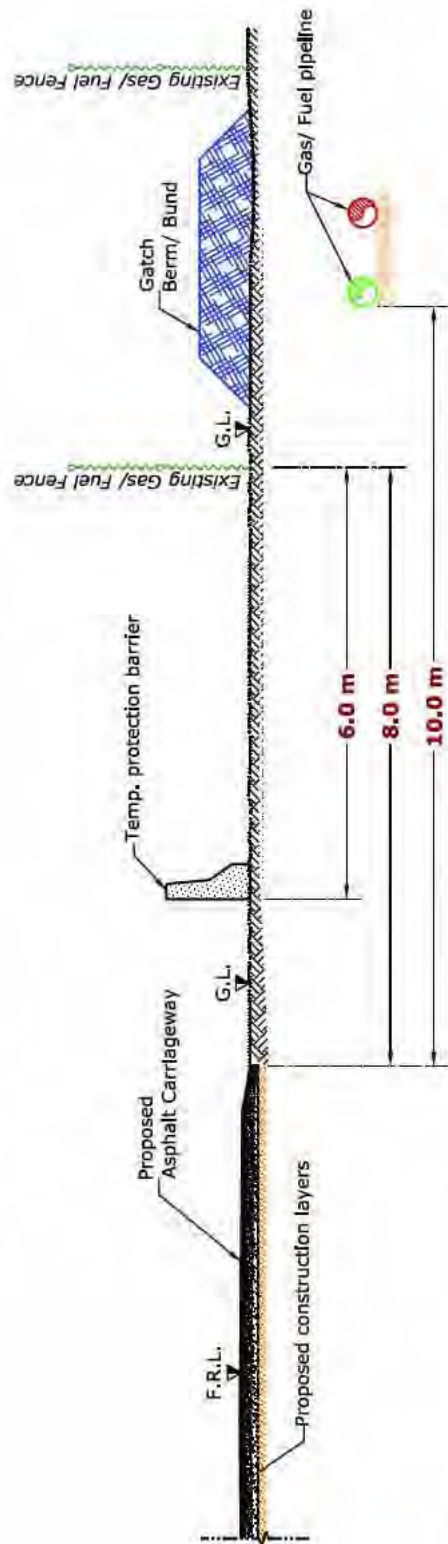
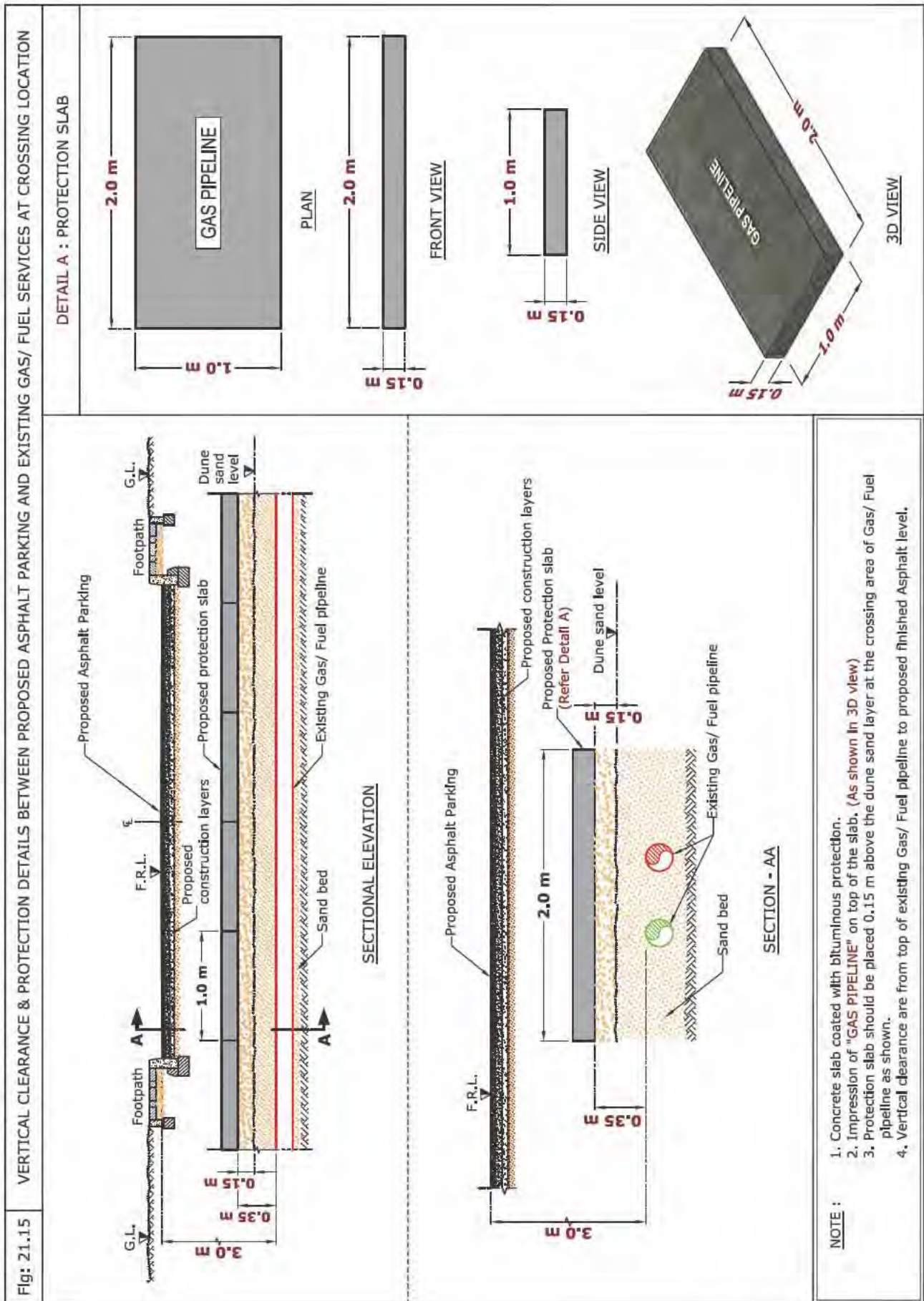


Fig: 21.14 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ASPHALT PARKING AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Asphalt Parking edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Asphalt Parking edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.



22. Proposed Road Work - Interlock Carriageway

370

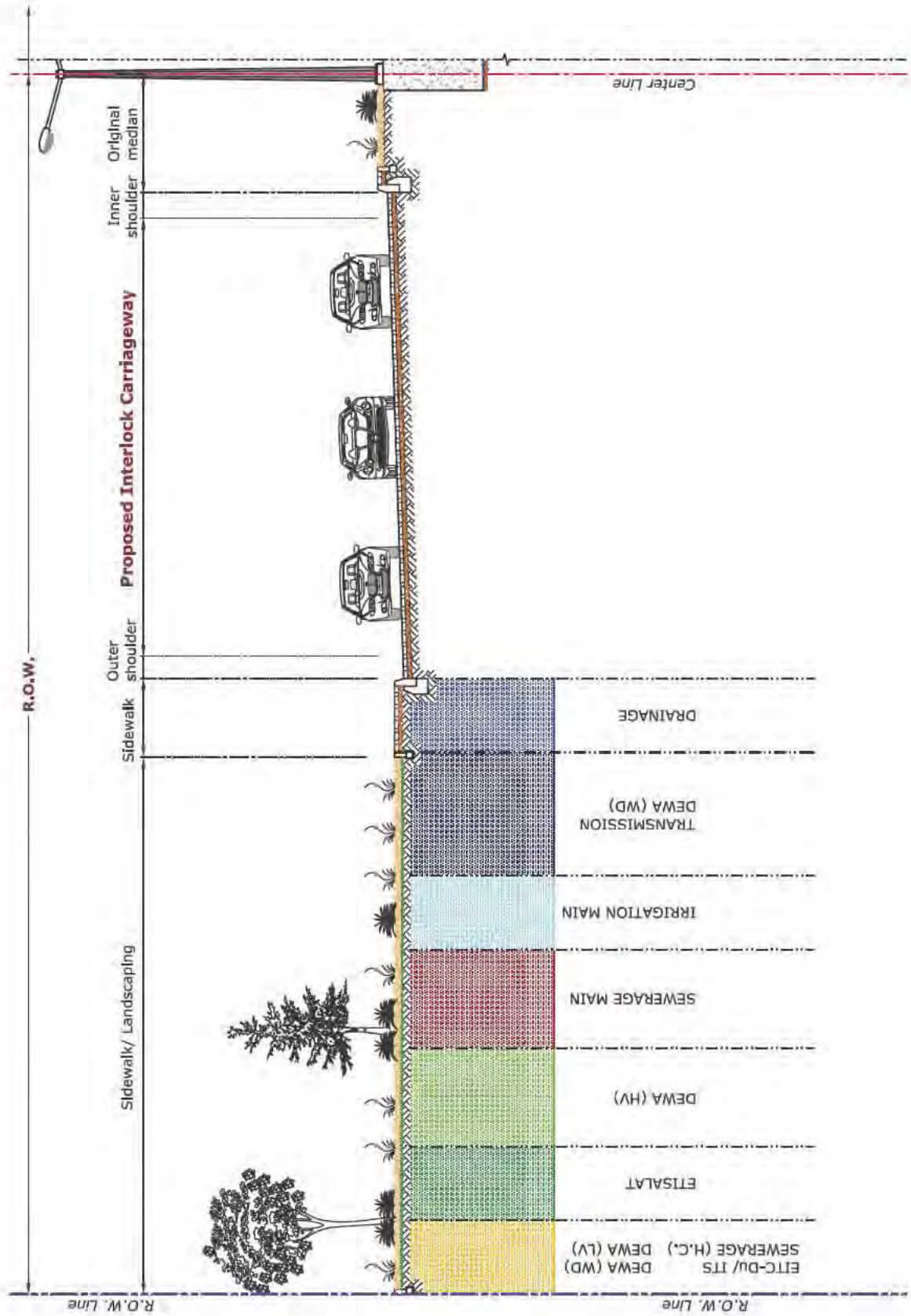
22.1 Introduction

The purposes of the interlock carriageways are the beautification of area and/or to facilitate the future maintenance works for existing services. Generally, interlock carriageway geometric design considers limited speed to ensure safe and smooth traffic flow.

The interlock carriageway can be single or dual carriageway constructed within the Right Of Way therefore, during construction activities it is required to protect DEWA existing assets and to lay DEWA ducts for future requirements (if required) as per specified standards.



RIGHT OF WAY SAMPLE CROSS SECTION AT PROPOSED INTERLOCK CARRIAGEWAY



22.2 Avoid the following



1. Proposal for Interlock carriageway above Existing DEWA Services/Corridor except crossing locations.

22.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Interlock Carriageway and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.9 m	A	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 22.1) • Vertical clearance (Ref Fig: 22.2) • Protection details (Ref Fig: 22.2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

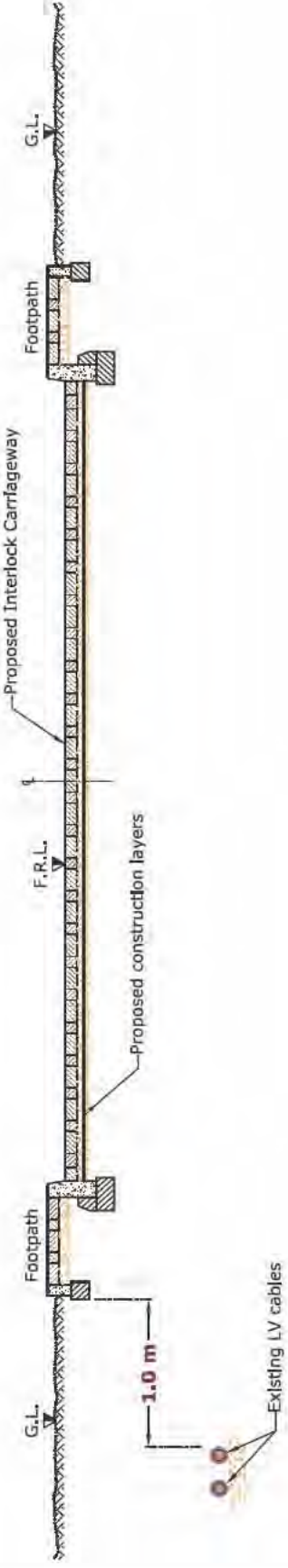
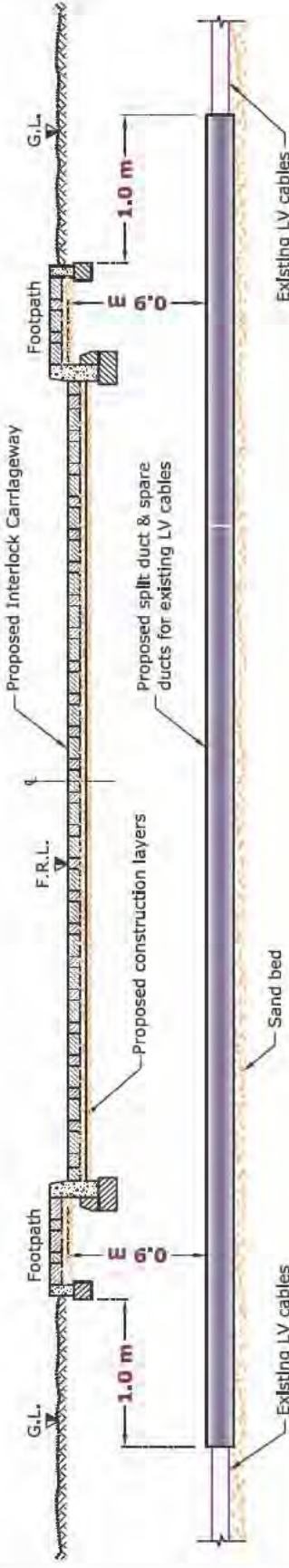
Fig: 22.1	<p style="text-align: center;">HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING LV CABLES</p> 
Fig: 22.2	<p style="text-align: center;">VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING LV CABLES AT CROSSING LOCATION</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Interlock Carriageway footpath/ shoulder edge to existing LV cable/ duct edge. 2. Vertical clearance is from the top of existing LV cable/ ducts to finished Interlock level. 3. At crossing location existing LV cable should be raised/ lowered to the standard depth and protected with split & spare duct as per specified standard. 4. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Interlock Carriageway footpath/ Shoulder edge. 5. Proposed Interlock Carriageway not allowed on top of DEWA reservation. 	

Table 2: Clearance & Protection details for Proposed Interlock Carriageway and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	0.9 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.3) Vertical clearance (Ref Fig: 22.5)
HV (6.6/11/33 kV) Manhole		NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.4)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.6)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.6) Vertical clearance (Ref Fig: 22.6) Protection details (Ref Fig: 22.6)
HV (33 kV) O.H.L.		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

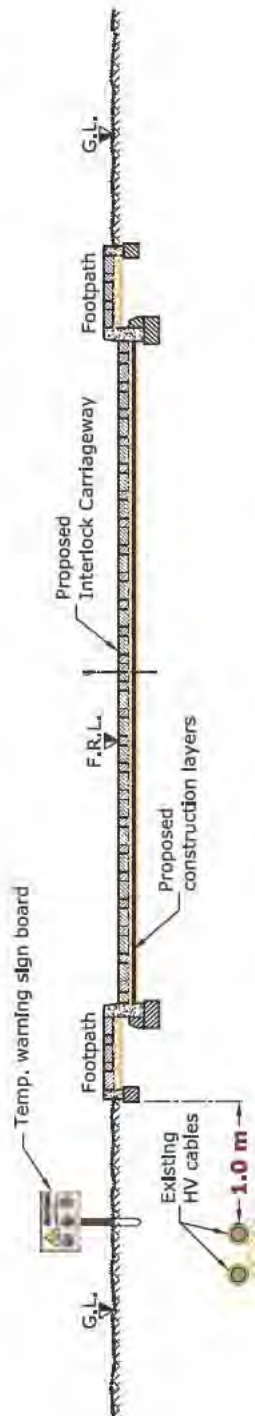
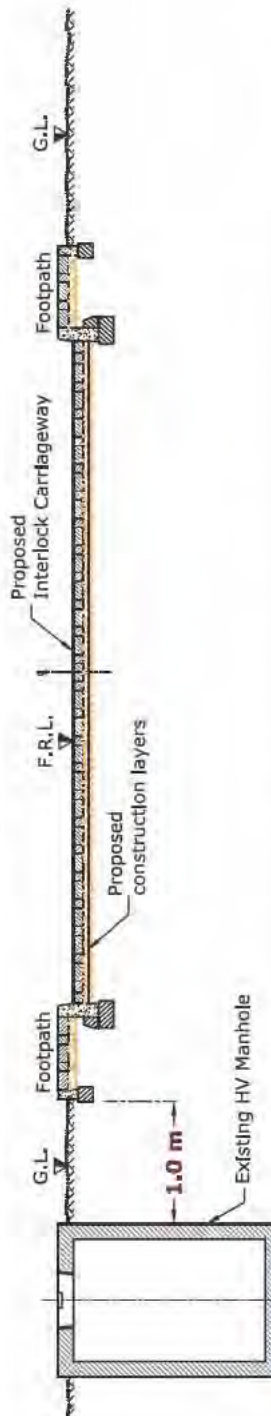
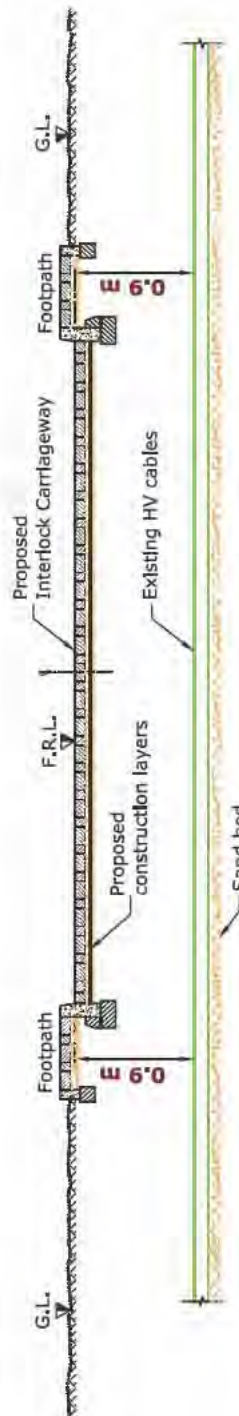
Fig: 22.3	<p style="text-align: center;">HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING HV CABLES</p> 
Fig: 22.4	<p style="text-align: center;">HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING HV MANHOLE</p> 
Fig: 22.5	<p style="text-align: center;">VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING HV CABLES AT CROSSING LOCATION</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Interlock Carriageway footpath/ shoulder edge to existing HV cable edge. 2. Vertical clearance is from the top of existing HV cable (Protection) to finished Interlock level. 3. At crossing location existing HV cable should be raised/ lowered to the standard depth and spare duct should be provided as per number of existing cables at site. 4. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Interlock Carriageway footpath/ shoulder edge. 5. Proposed Interlock Carriageway not allowed on top of DEWA reservation. 	

Fig: 22.6 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

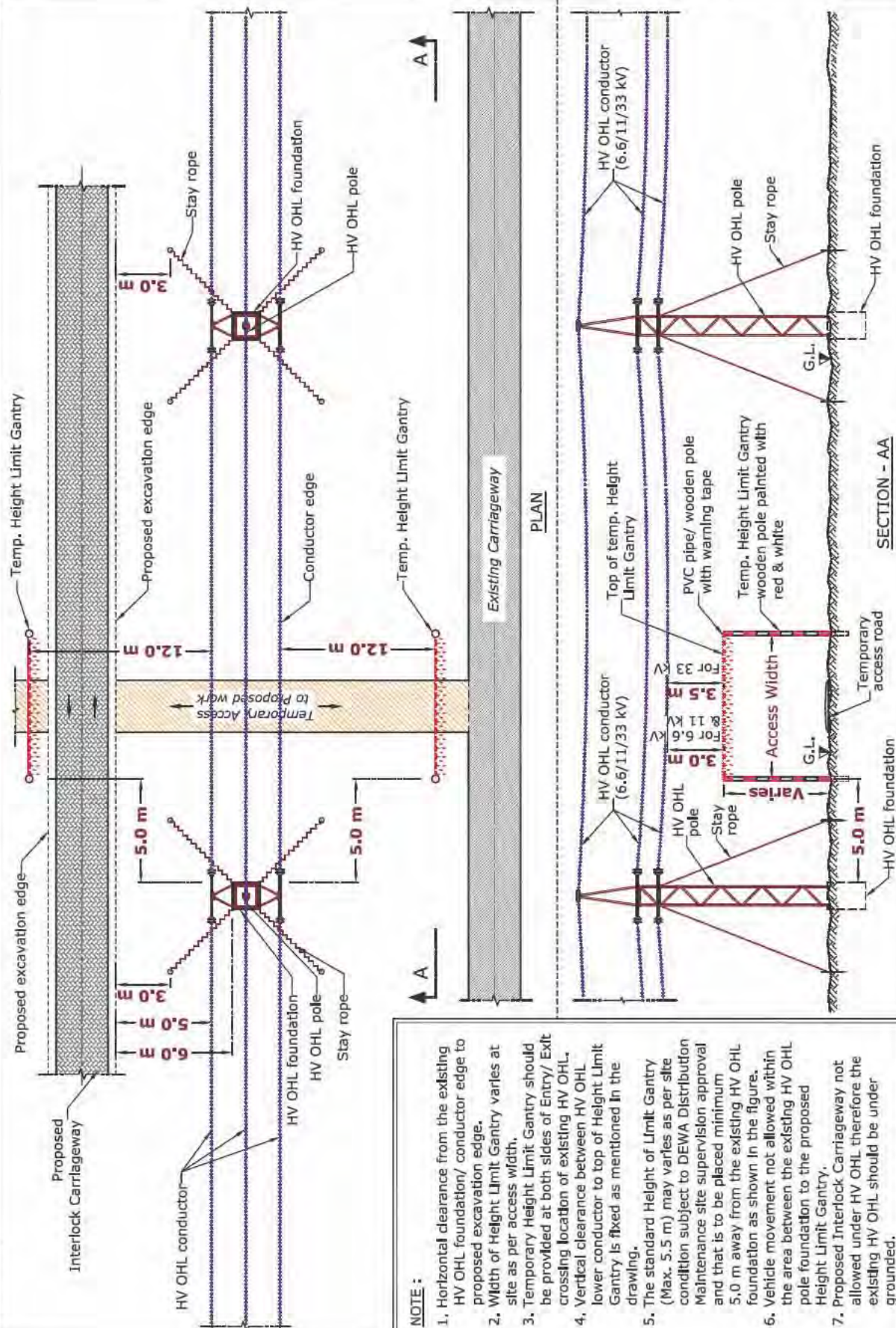
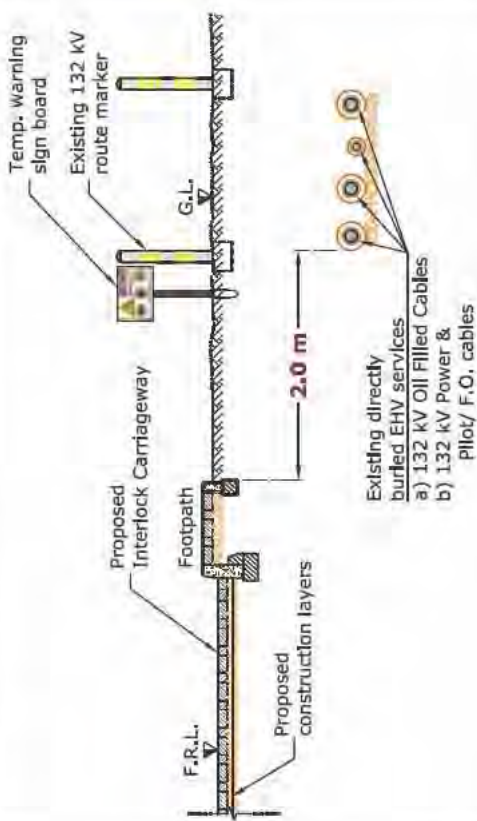
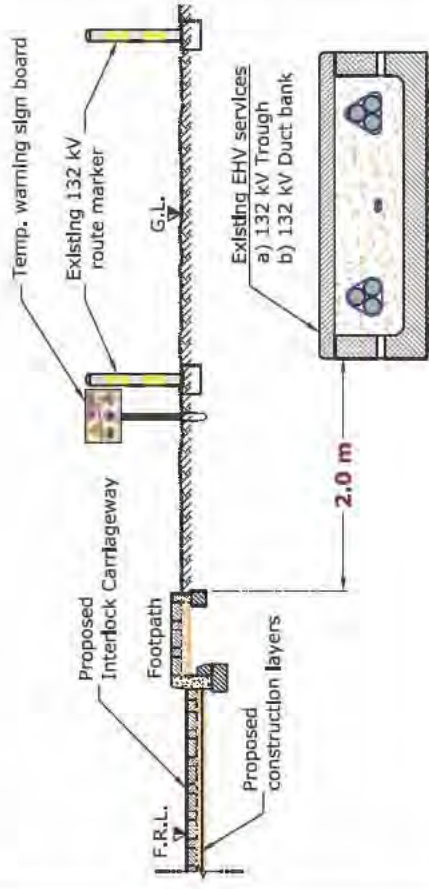
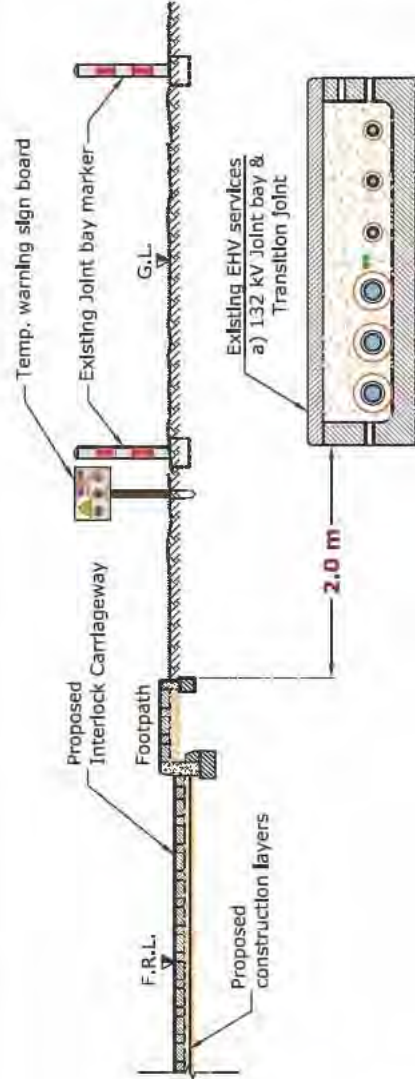


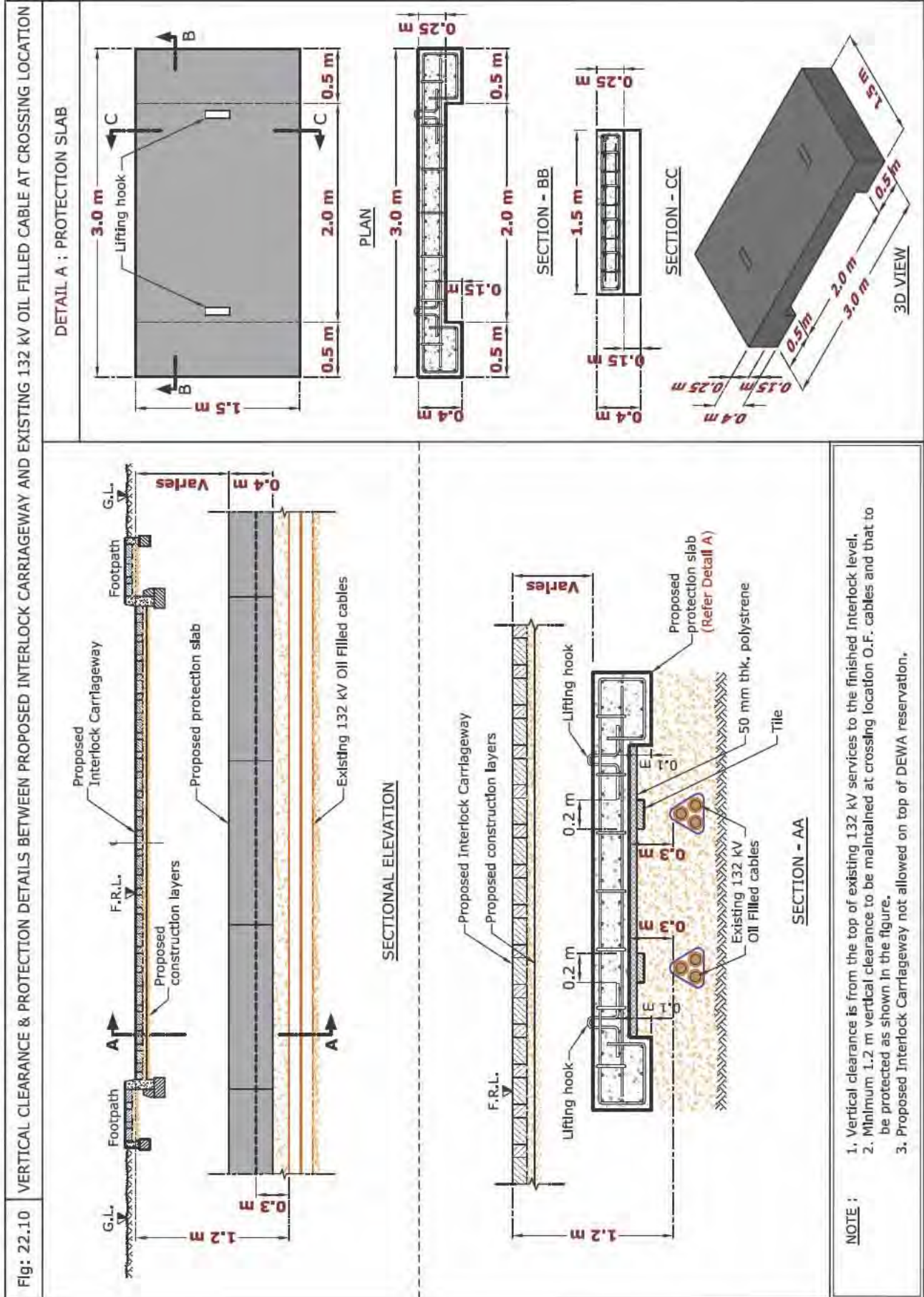
Table 3: Clearance & Protection details for Proposed Interlock Carriageway and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	2.0 m	1.2 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.7) Vertical clearance (Ref Fig: 22.10) Protection details (Ref Fig: 22.10)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	2.0 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.7) Vertical clearance (Ref Fig: 22.11)
EHV (132 kV) Trough	2.0 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.8) Vertical clearance (Ref Fig: 22.12) Protection details (Ref Fig: 22.12)
EHV (132 kV) Duct Bank	2.0 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.8) Vertical clearance (Ref Fig: 22.13) Protection details (Ref Fig: 22.13)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	-	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.9)
EHV (132 kV) O.H.L	25.0 m	15.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.15) Vertical clearance (Ref Fig: 22.15)
EHV (400 kV) O.H.L	40.0 m	16.5 m				<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.16) Vertical clearance (Ref Fig: 22.16)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.14) Vertical clearance (Ref Fig: 22.14)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 22.15 & 16) Vertical clearance (Ref Fig: 22.15 & 16) Protection details (Ref Fig: 22.15 & 16)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

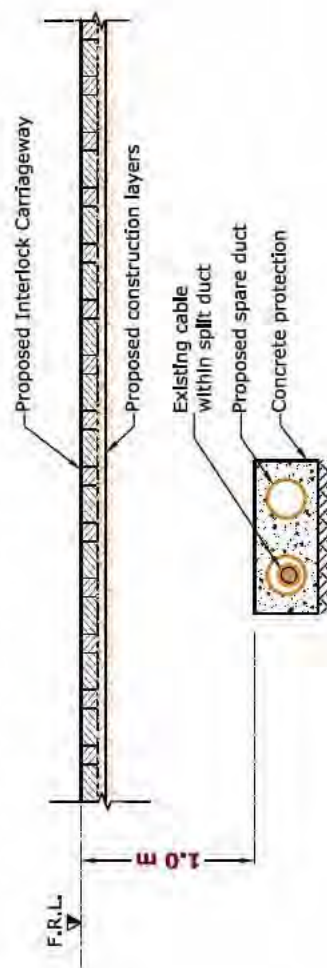
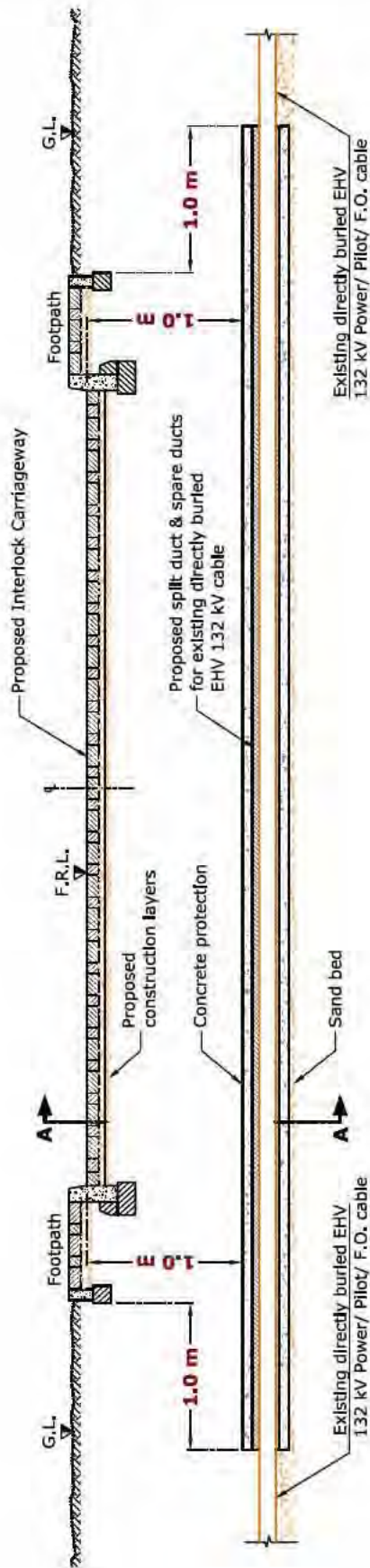
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 22.7	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	Fig: 22.8	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
			
<p>NOTE :</p> <ol style="list-style-type: none">1. All horizontal clearances are from proposed Interlock Carriageway footpath/ Shoulder edge to existing EHV 132 kV services edge.2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m Intervals.3. Proposed Interlock Carriageway not allowed on top of DEWA reservation.4. Minimum 3.0 m horizontal clearance should be maintained from the proposed Interlock Carriageway footpath/ Shoulder edge to existing 132 kV link box with RTA standard protection.5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.		Fig: 22.9	
		HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT	
			



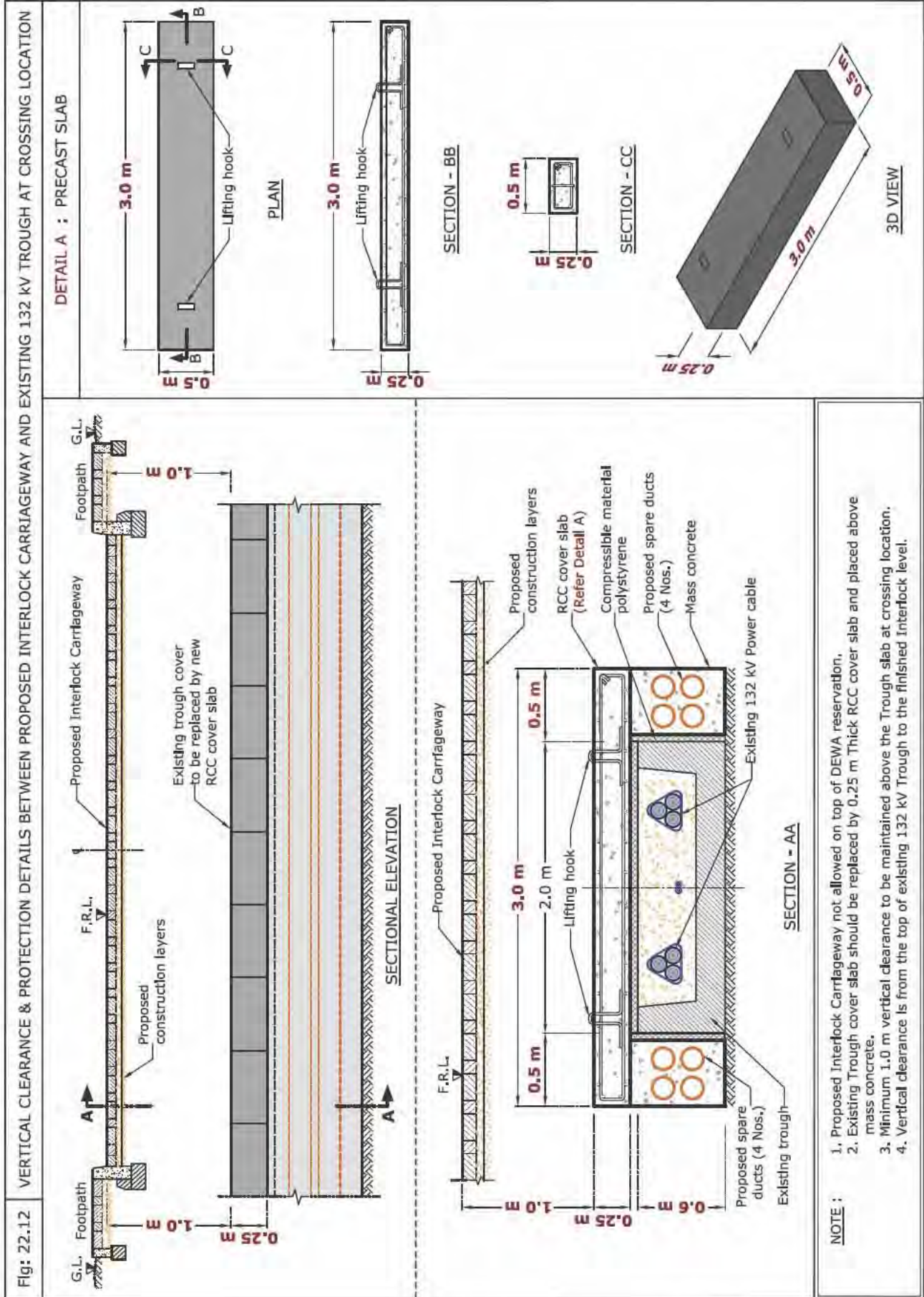
VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY
AND EXISTING DIRECTLY BURIED EHV 132 kV POWER/ PILOT/ F.O. CABLE AT CROSSING LOCATION

Fig: 22.11

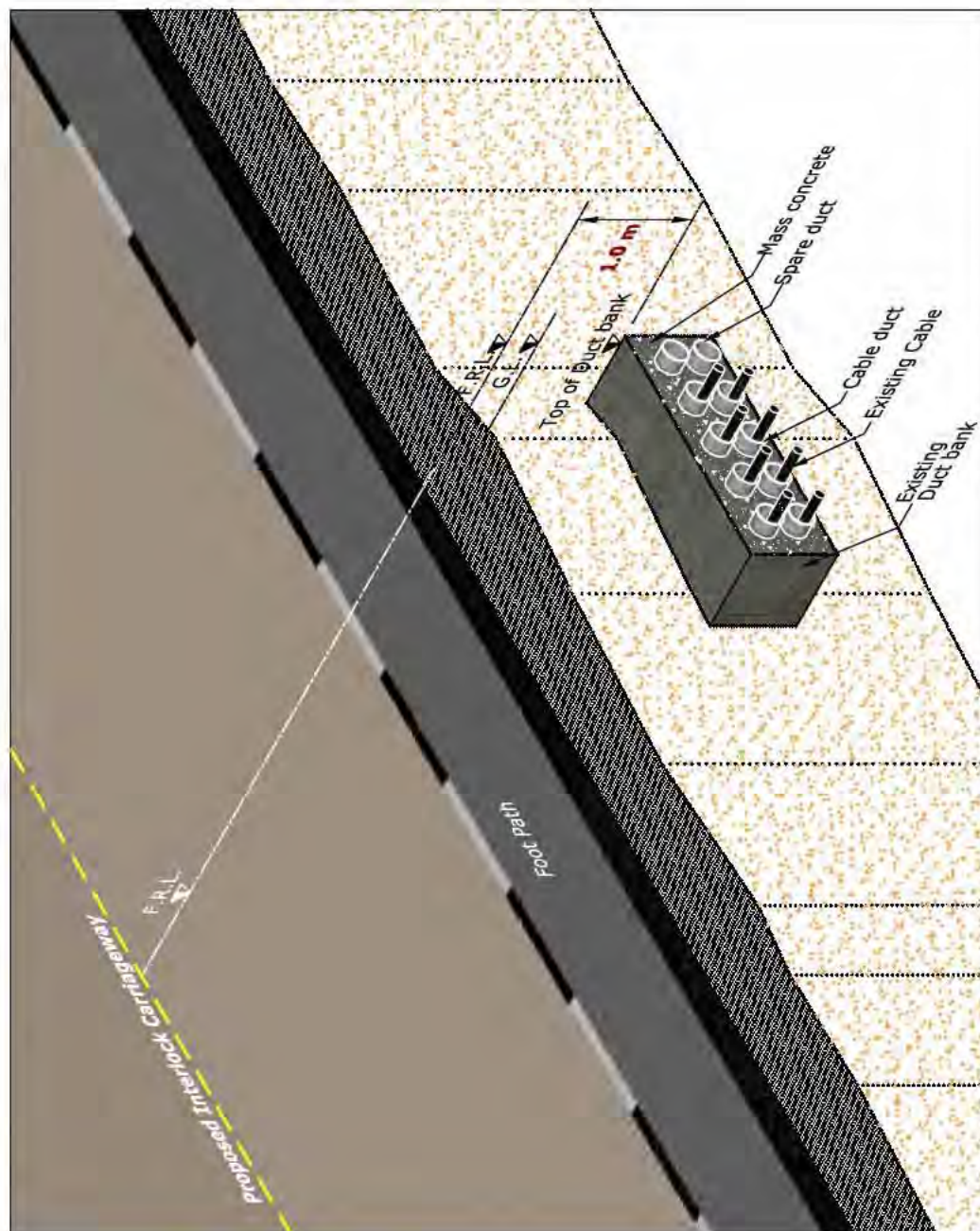


SECTION - AA

- NOTE :**
1. Vertical clearance is from the top of existing 132 kV services to the finished interlock level.
 2. Minimum 1.0 m vertical clearance to be maintained at crossing above EHV cables and that to be protected as shown in the figure and additional spare duct to be provided as per DEWA specifications.
 3. Proposed interlock carriageway not allowed on top of DEWA reservation.



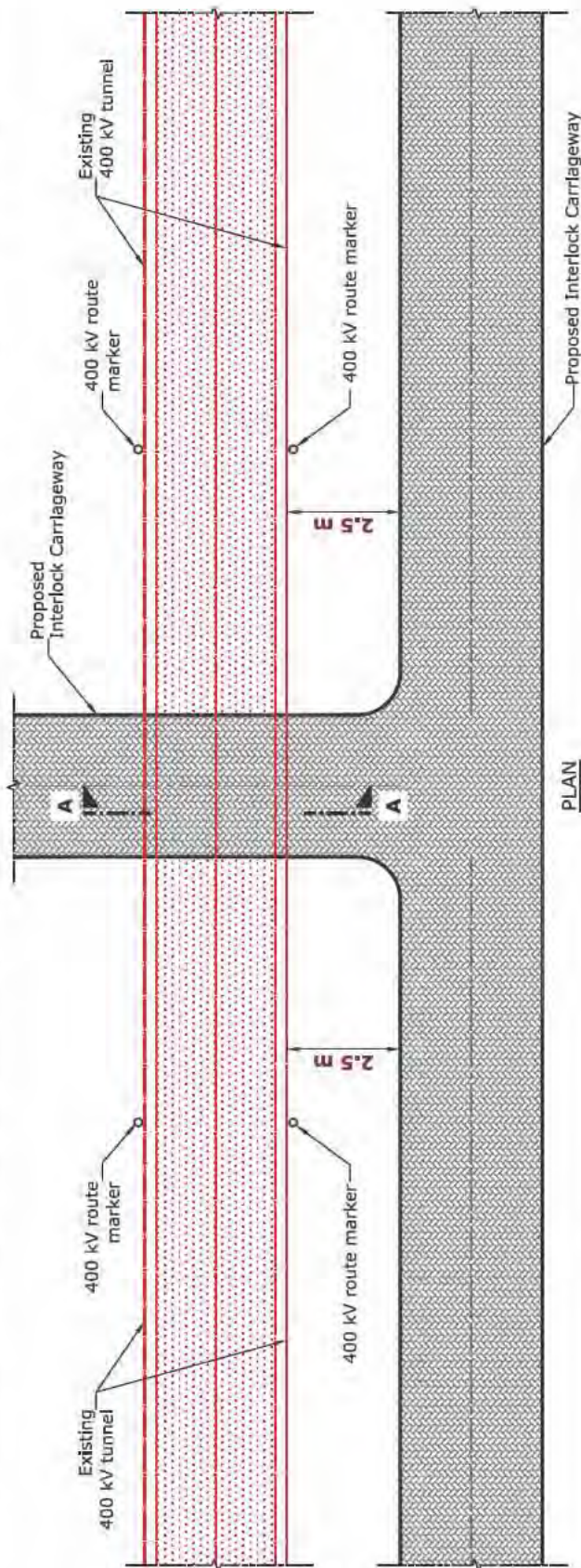
VERTICAL CLEARANCE DETAIL BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING 132 kV DUCT BANK



- NOTE :**
1. Proposed Interlock Carriageway not allowed on top of DEWA reservation.
 2. Vertical clearance **is** from the top of existing Duct bank to the finished Interlock level.
 3. Minimum 1.0 m vertical clearance to be maintained at crossing location.

Fig: 22.13

Fig: 22.14 HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed Interlock Carriageway not allowed on top of DEWA reservation.
2. Minimum 1.0 m vertical clearance to be maintained above the top of existing 400 kV tunnel.
3. Vertical clearance is from the top of existing 400 kV tunnel cover slab to the finished Interlock level.
4. The tunnel elements (C1, C2, C3, C4 & C5) will be designed as per the traffic load and height of soil refer Table A.

TABLE 'A'

Tunnel elements	Excavation restricted area	Minimum height of soil to be maintained above the elements with traffic load	Maximum height of soil including the pavement construction (asphalt road, Interlock tiles, etc...), above the tunnel with traffic load
C1	0.3 m	1.0 m	1.0 m
C2	0.3 m	1.0 m	3.0 m
C3	0.3 m	1.0 m	5.0 m
C4	0.3 m	1.0 m	7.0 m
C5	0.3 m	1.0 m	10.0 m

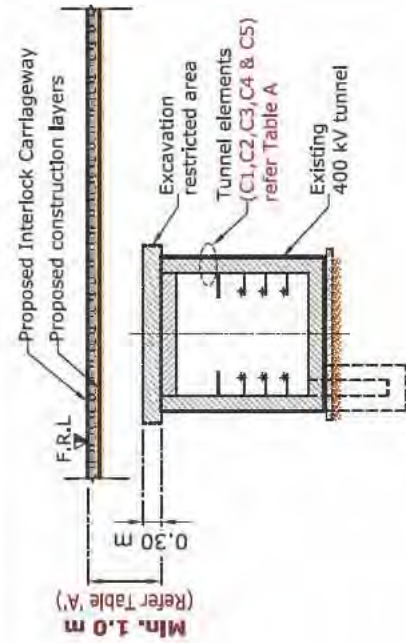
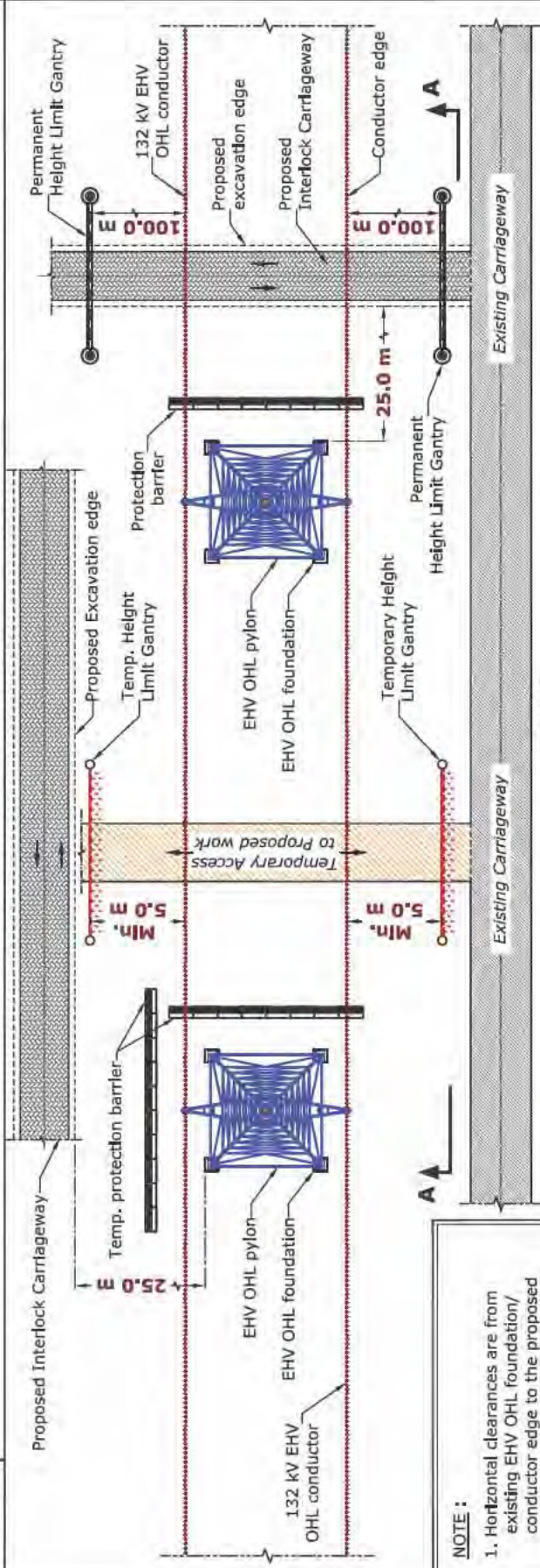
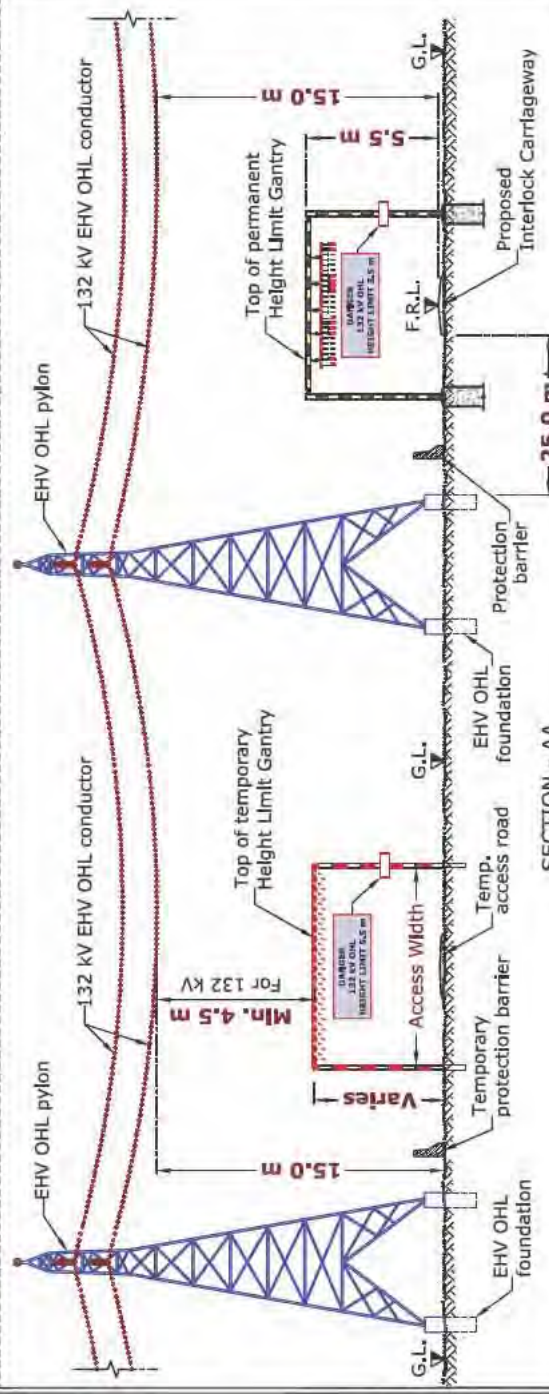


Fig: 22.15 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING EHV OHL (132 kV)



PLAN



SECTION - AA

NOTE :

1. Horizontal clearances are from existing EHV OHL foundation/ conductor edge to the proposed excavation edge.
2. Vertical clearance between EHV OHL lower conductor to top of FRL/Height Limit Gantry is fixed as mentioned in the drawing and Height of Limit Gantry (Max. 5.5 m) may vary as per site condition subject to DEWA Transmission Maintenance site supervision approval.
3. Existing EHV OHL foundation to be protected with temporary protection barrier.
4. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing EHV OHL.
5. EHV OHL access road should not be blocked.
6. Vehicle movement not allowed within the area between the existing EHV OHL pylon foundation to the proposed Height Limit Gantry.
7. Permanent OHL warning Gantry should be placed 100.0 m away from the outer conductor towards the traffic flow direction.

Fig: 22.16 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING EHV OHL (400 KV)

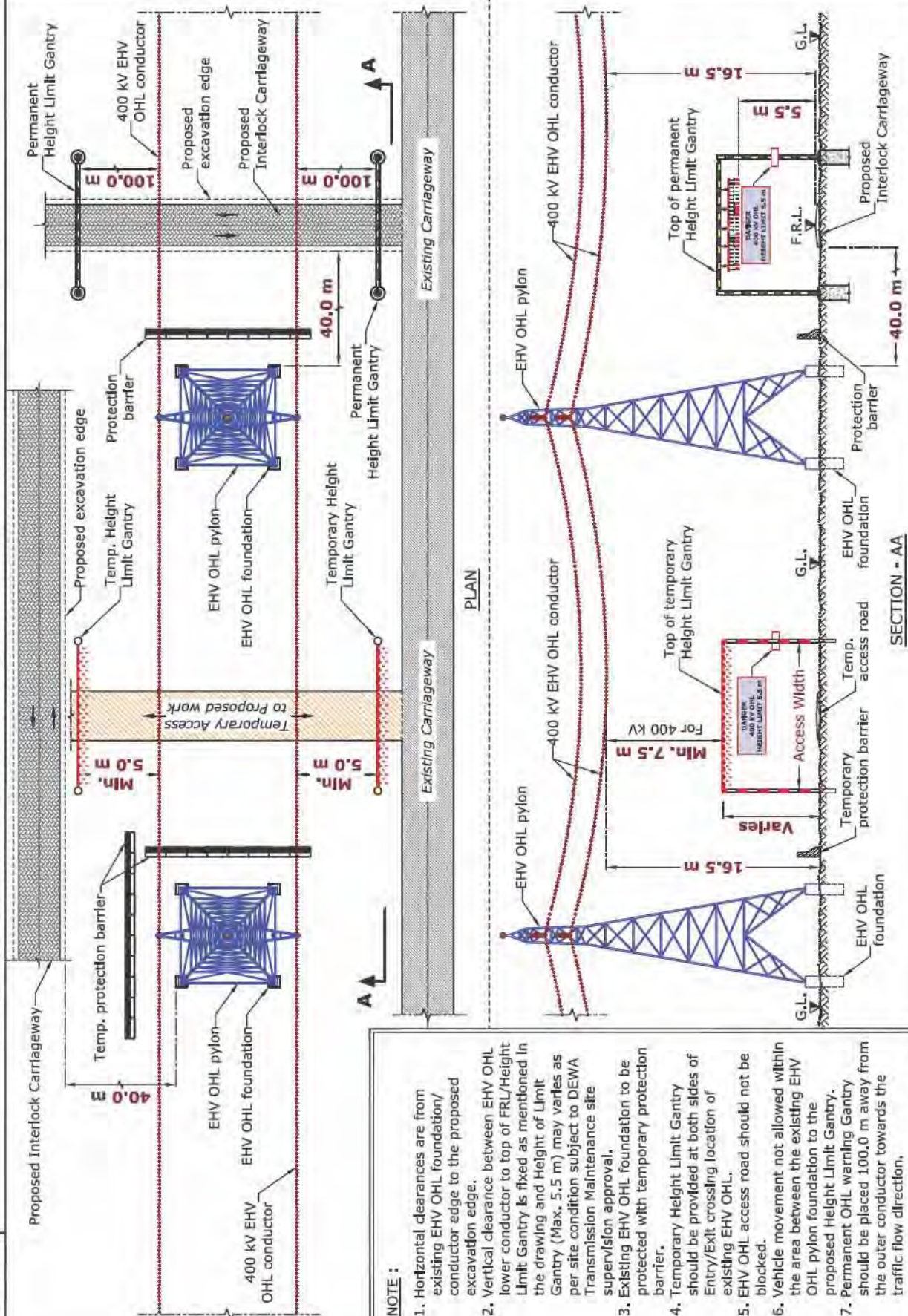


Table 4: Clearance & Protection details for Proposed Interlock Carriageway and existing DEWA Gas/Fuel services

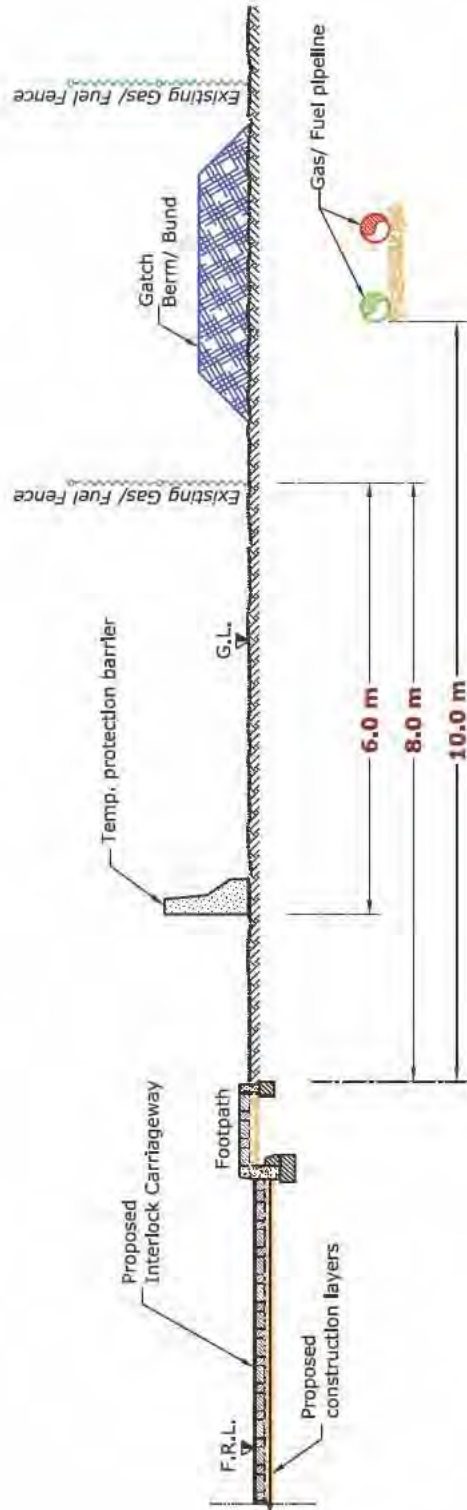
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 22.17)
Gas/Fuel pipeline (All diameter)	10.0 m	3.0 m	A	-	R	• Horizontal clearance (Ref Fig: 22.17) • Vertical clearance (Ref Fig: 22.18) • Protection details (Ref Fig: 22.18)

Table Abbreviation

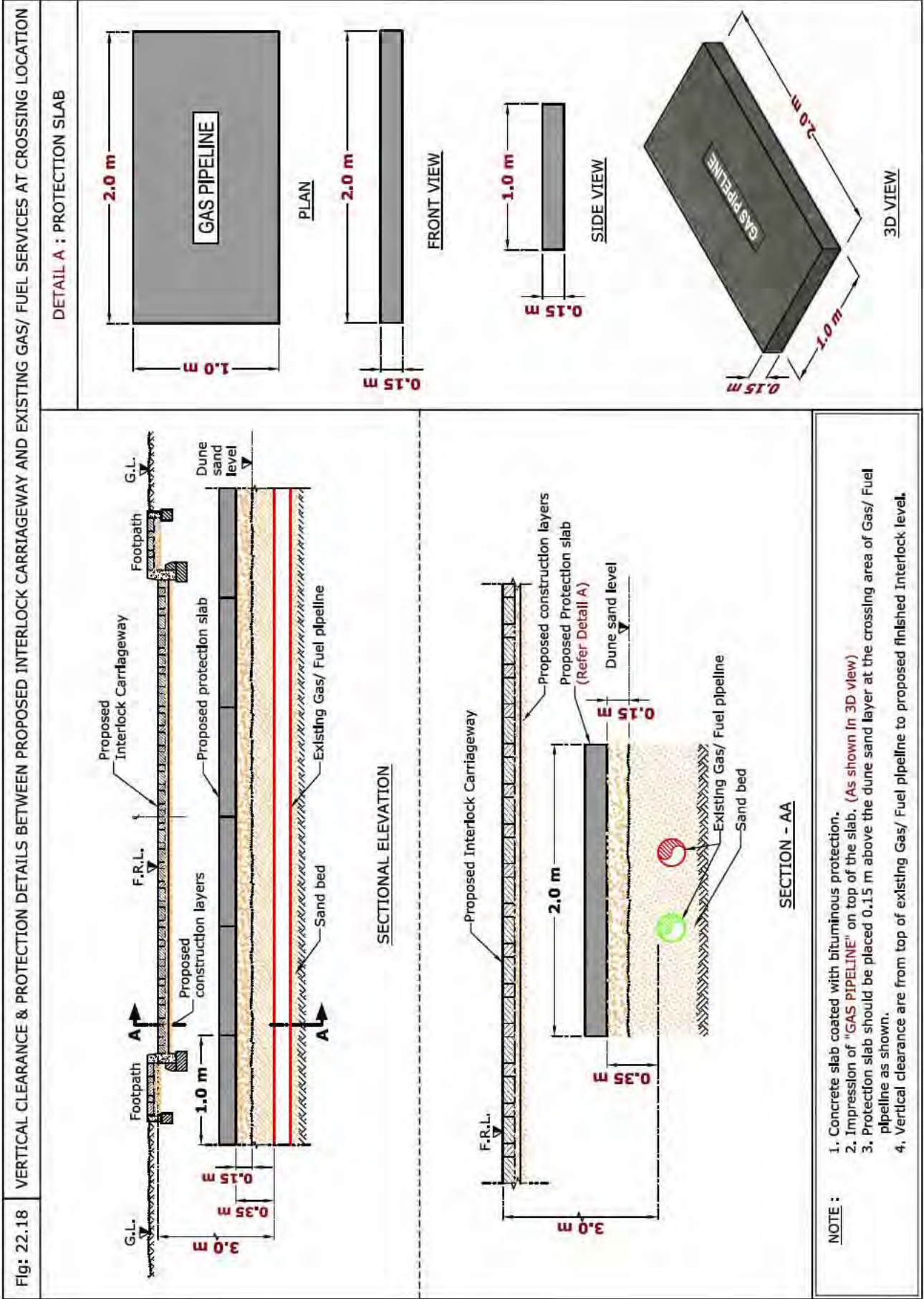
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 22.17 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK CARRIAGEWAY AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed Interlock Carriageway footpath/ shoulder edge to existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from proposed Interlock Carriageway footpath/ shoulder edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.



SECTION - AA

NOTE :

1. Concrete slab coated with bituminous protection.
2. Impression of "GAS PIPELINE" on top of the slab. (As shown in 3D view)
3. Protection slab should be placed 0.15 m above the dune sand layer at the crossing area of Gas/ Fuel pipeline as shown.
4. Vertical clearance are from top of existing Gas/ Fuel pipeline to proposed finished Interlock level.

23. Proposed Road Work - Interlock Access/Service Road (To Villa/Plot/Main Road)

23.1 Introduction

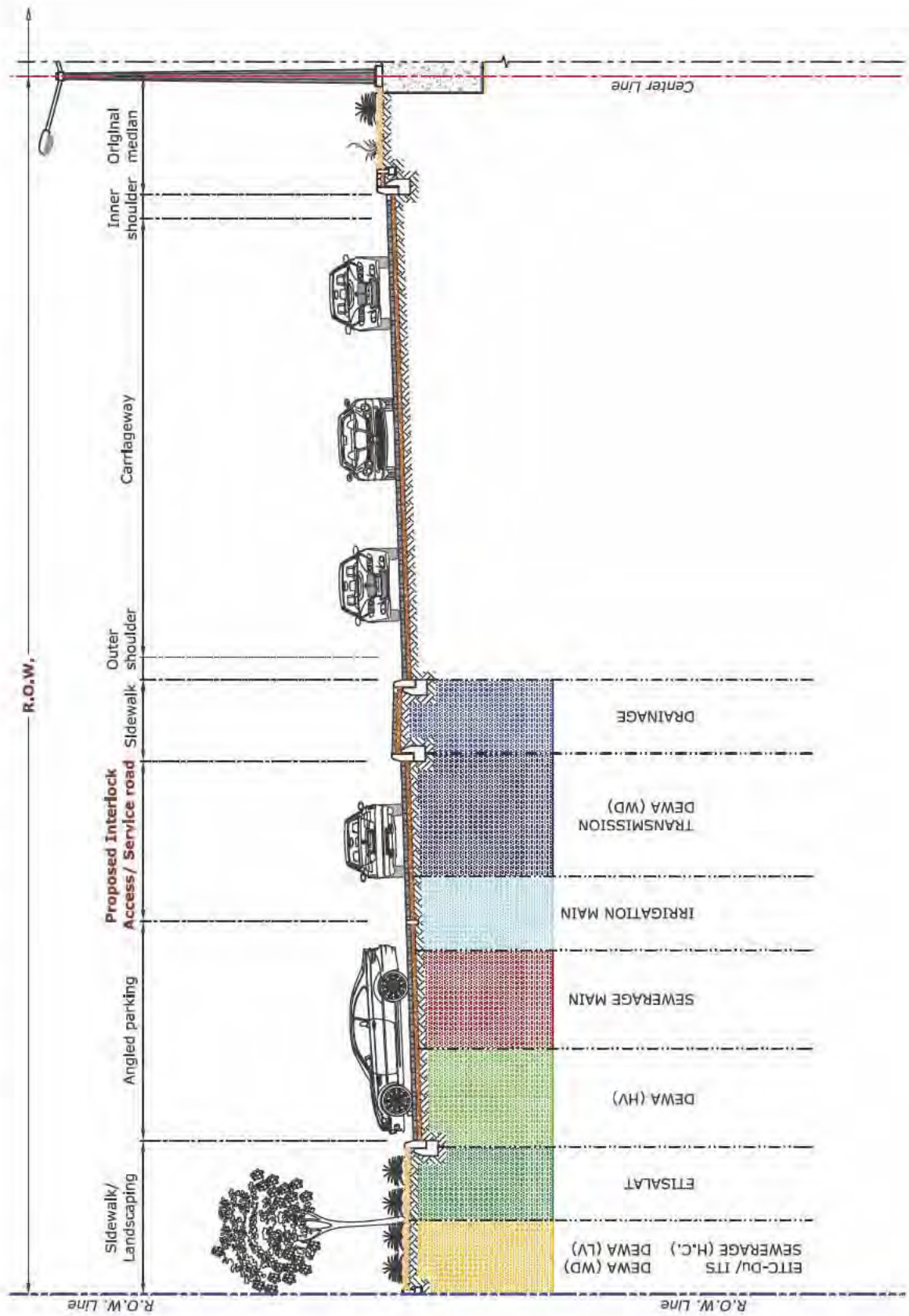
The purposes of the interlocked service road is to provide a parallel road to an arterial or similar main road, which provides land access, parking and limited movement (generally one way) for traffic and it facilitates future maintenance works for existing services.

The interlock access road is within Right Of Way therefore during construction activities it is required to protect DEWA existing assets and to lay DEWA ducts (if required) as per specified standards.



Proposed Road Work - Interlock Access/Service Road

RIGHT OF WAY SAMPLE CROSS SECTION AT PROPOSED INTERLOCK ACCESS/ SERVICE ROAD



23.2 Avoid the following



1. Proposal interlock access/service road above existing DEWA 132 kV Joint bay.

23.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Interlock Access /Service Road and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.9 m	A	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 23.1) • Vertical clearance (Ref Fig: 23.2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



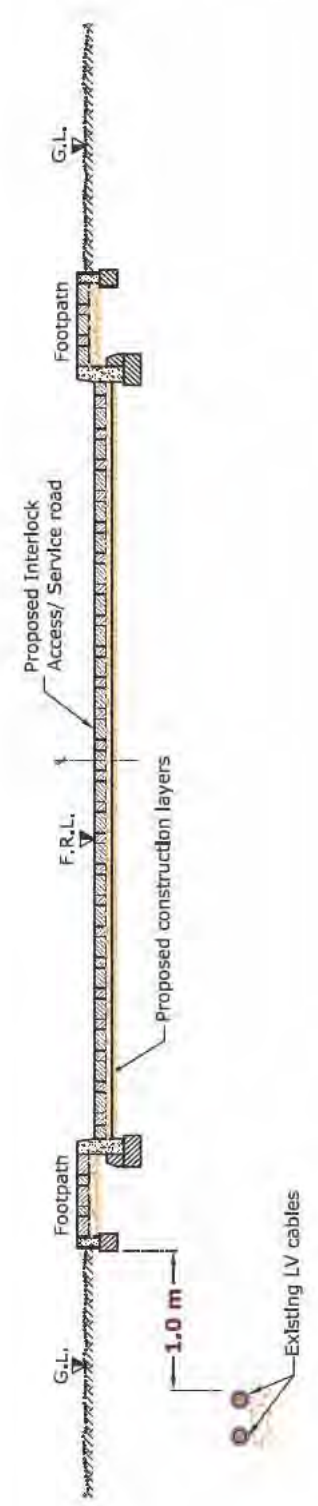
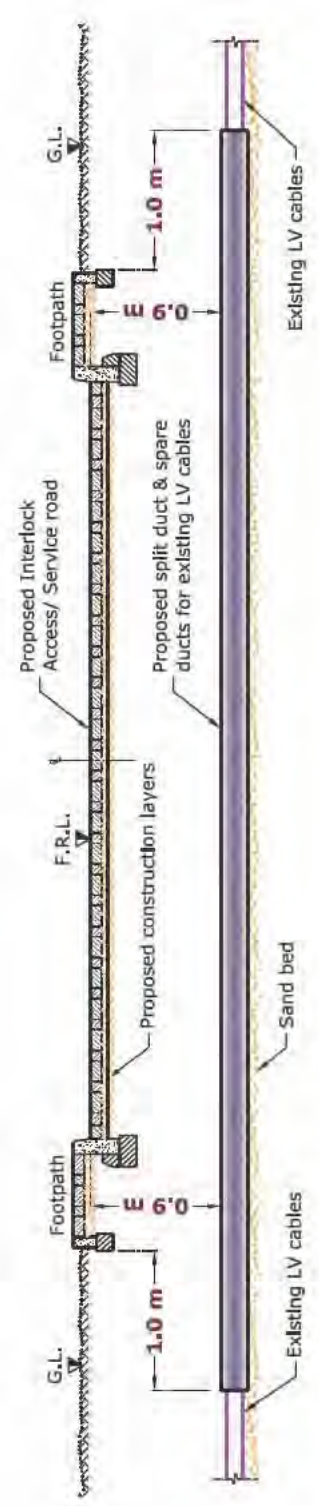
Fig: 23.1	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING LV CABLES</p> 
Fig: 23.2	<p>VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING LV CABLES AT CROSSING LOCATION</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Interlock Service road footpath/ shoulder edge to existing LV cable/ ducts edge. 2. Vertical clearance is from the top of existing LV cable/ ducts to finished Interlock level. 3. At crossing location existing LV cable should be raised/ lowered to the standard depth and protected with split & spare duct as per specified standard. 4. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Interlock Service road footpath/ shoulder edge. 5. Proposed Interlock Access/ Service road not allowed on top of DEWA reservation. 	

Table 2: Clearance & Protection details for Proposed Interlock Access /Service Road and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	NR	0.9 m	A	-	R	• Vertical clearance (Ref Fig: 23.3, Case 1 & 2)
HV (6.6/11/33 kV) Manhole.		-	-	-	R	• (Ref Fig: 23.3, Case 3)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 23.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 23.4) • Vertical clearance (Ref Fig: 23.4) • Protection details (Ref Fig: 23.4)
HV (33 kV) O.H.L.		3.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

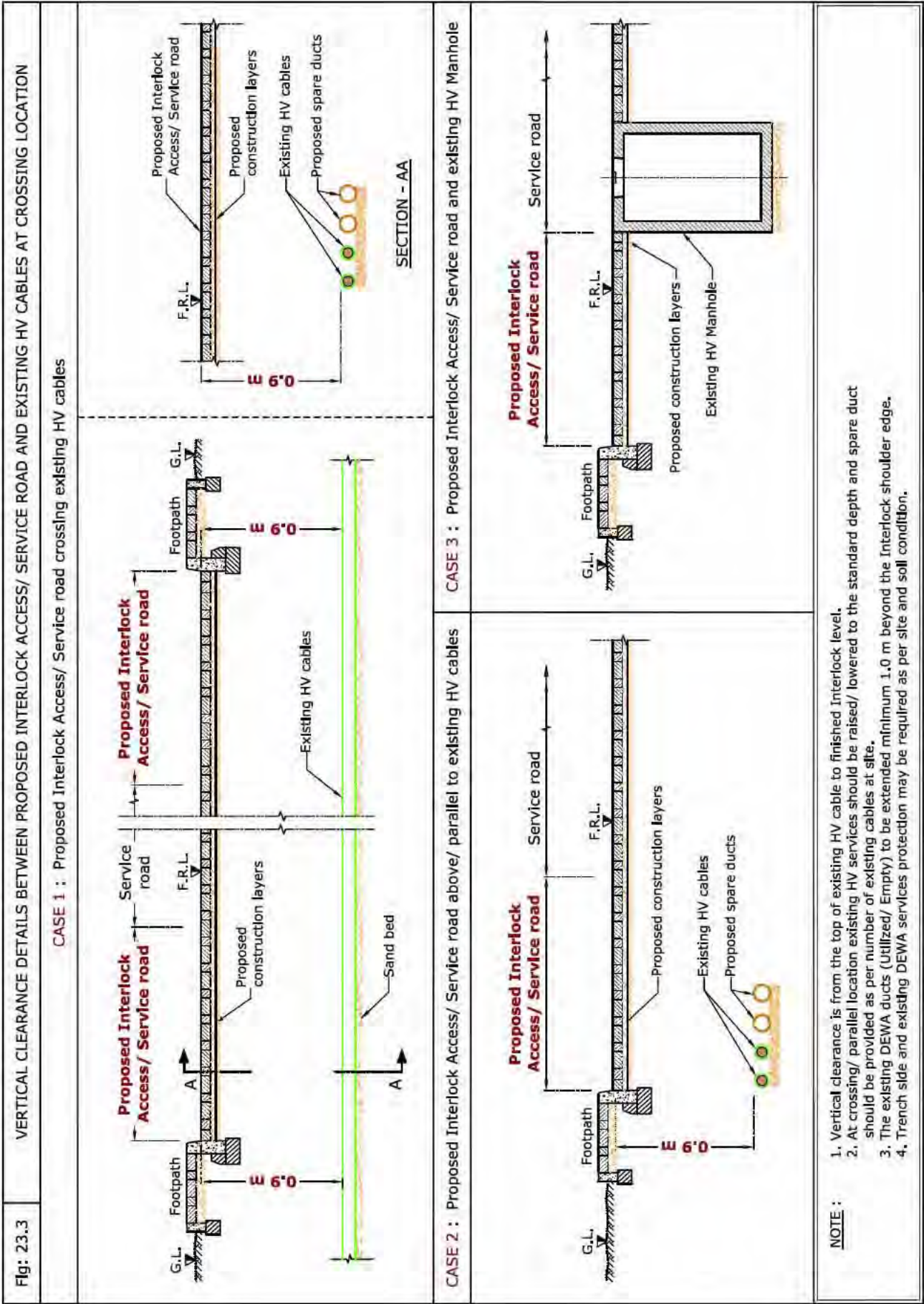


Fig: 23.4 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

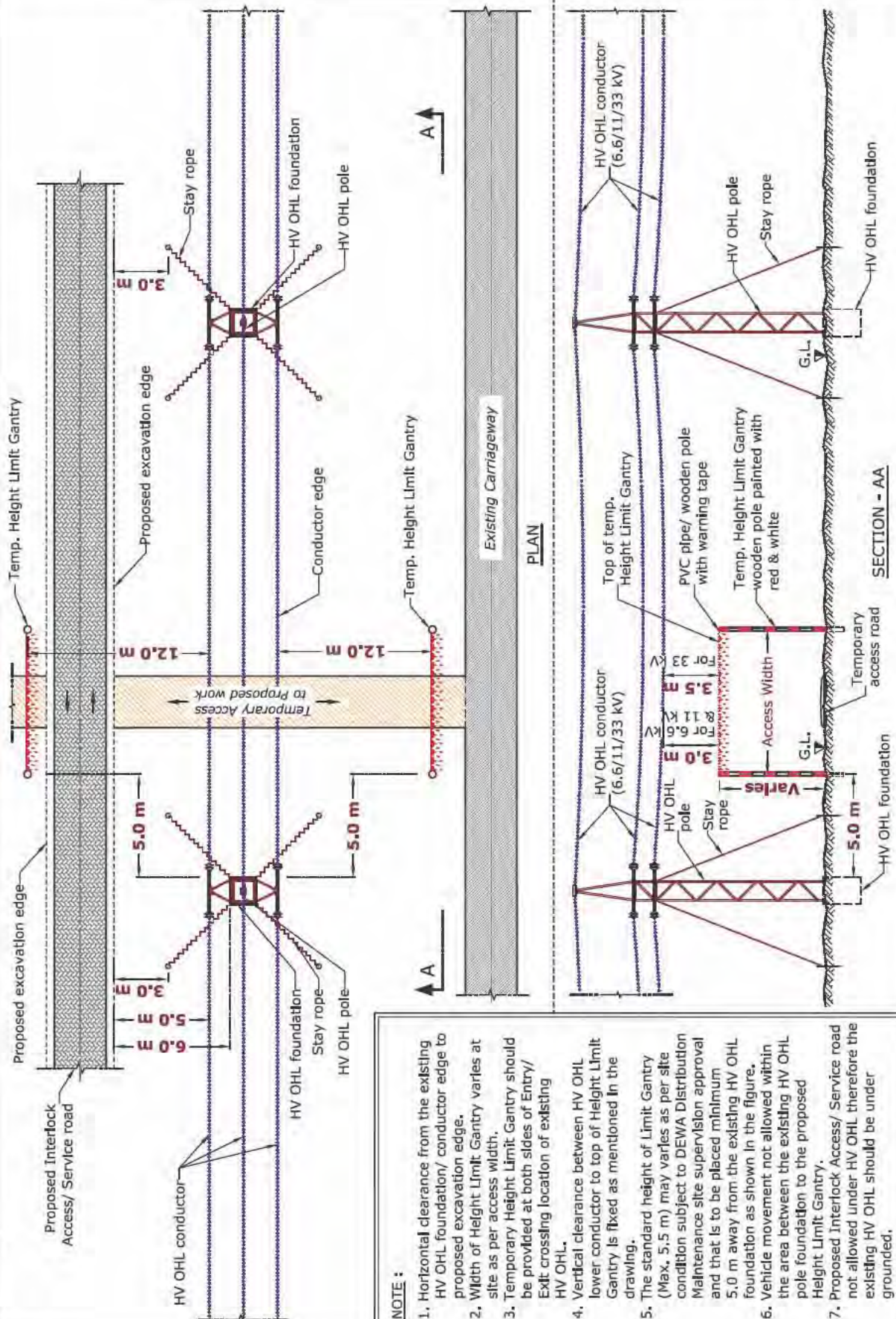


Table 3: Clearance & Protection details for Proposed Interlock Access /Service Road and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	1.2 m	A	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig:23.5) • Vertical clearance (Ref Fig: 23.8) • Protection details (Ref Fig:23.8)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> • Vertical clearance (Ref Fig: 23.9) • Protection details (Ref Fig:23.9)
EHV (132 kV) Trough	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> • (Ref Fig:23.6) • Vertical clearance (Ref Fig: 23.10) • Protection details (Ref Fig: 23.10)
EHV (132 kV) Duct Bank	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> • (Ref Fig:23.6) • Vertical clearance (Ref Fig: 23.11)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	-	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig:23.7)
EHV (132 kV) O.H.L	25.0 m	15.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 23.13) • Vertical clearance (Ref Fig: 23.13)
EHV (400 kV) O.H.L	40.0 m	16.5 m				<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 23.14) • Vertical clearance (Ref Fig: 23.14)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 23.12) • Vertical clearance (Ref Fig: 23.12)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 23.13,14) • Vertical clearance (Ref Fig: 23.13,14) • Protection details (Ref Fig: 23.13,14)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

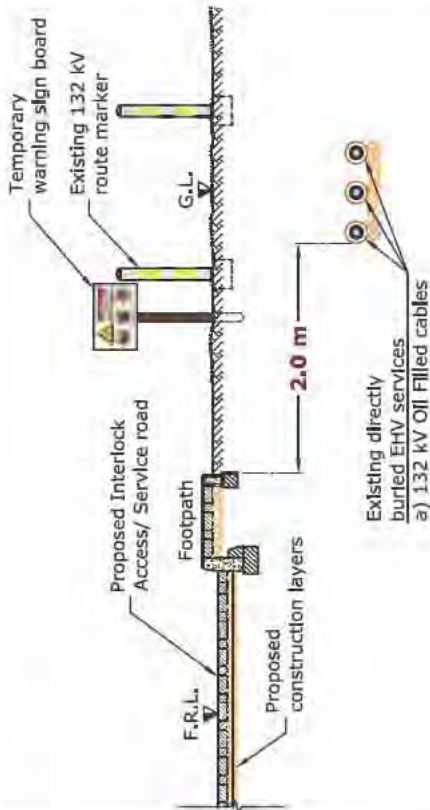
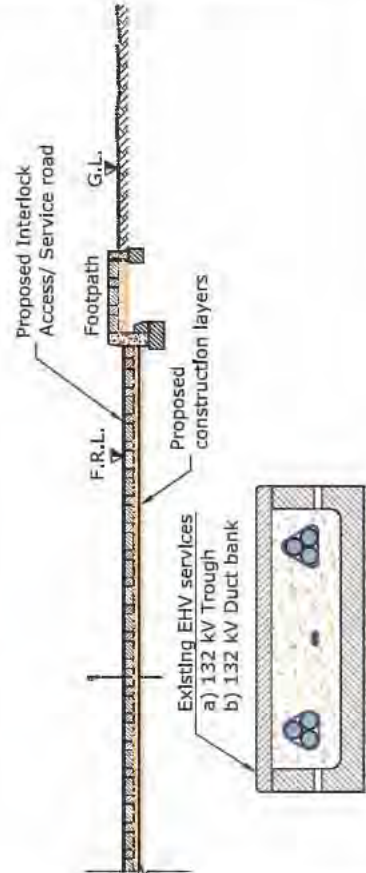
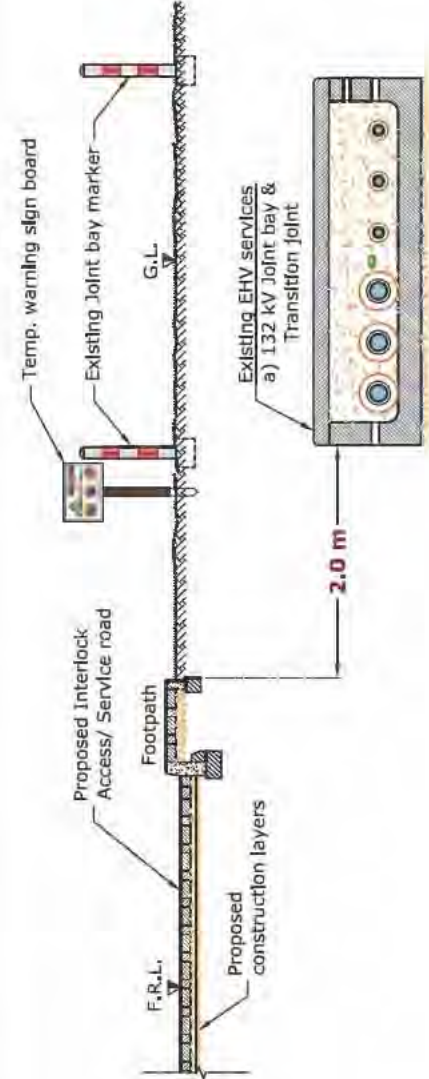
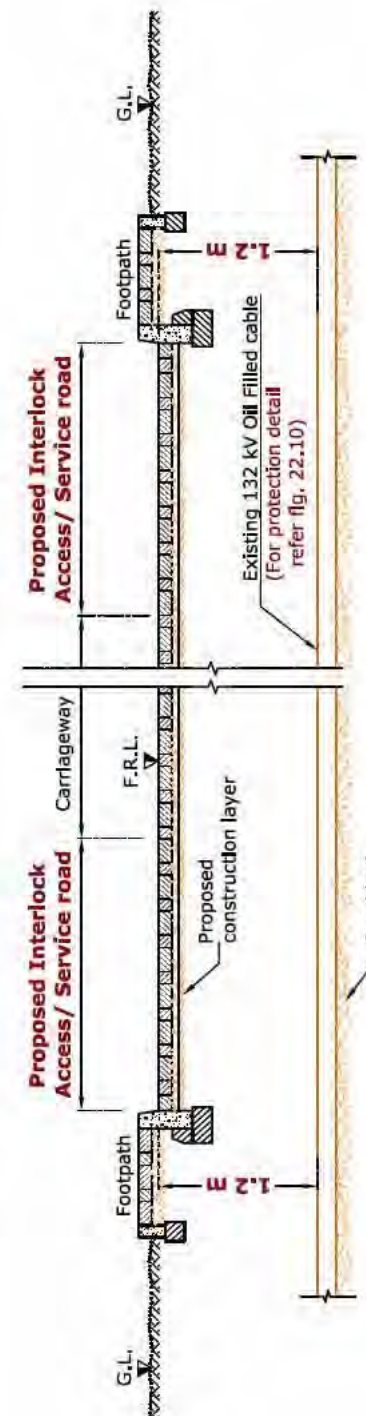
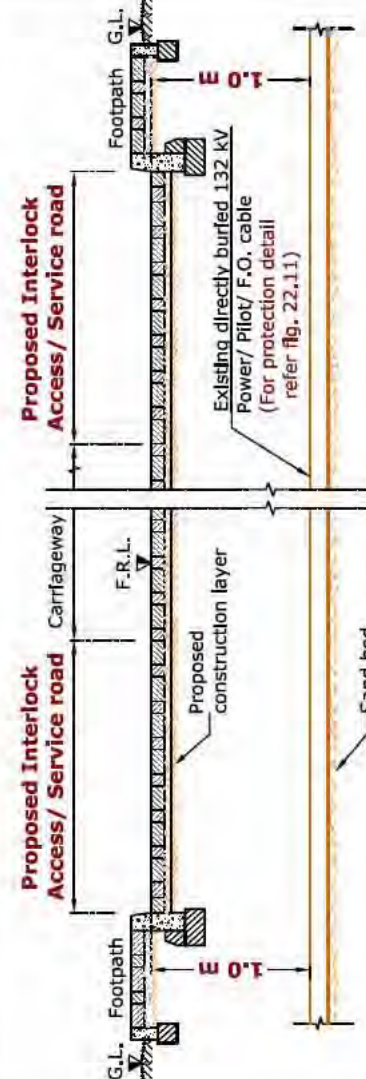
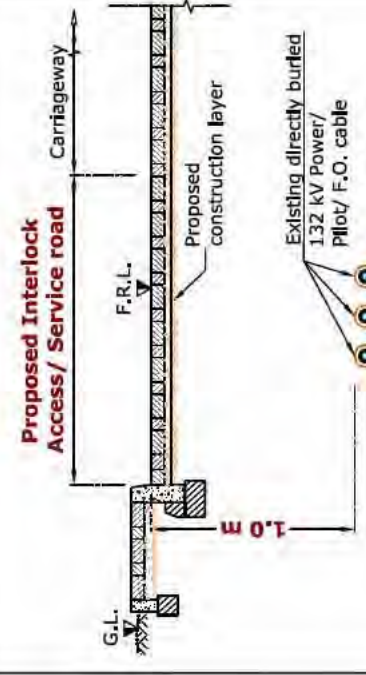
Fig: 23.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	Fig: 23.6	PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
			
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Interlock Service road footpath/ Shoulder edge to existing EHV 132 kV services edge. 2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m Intervals. 3. Proposed Interlock Access/ Service road not allowed on top of DEWA reservation. 4. Minimum 3.0 m horizontal clearance should be maintained from the proposed Interlock Service road footpath/ Shoulder edge to existing 132 kV link box with RTA standard protection. 5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 			
<p>Fig: 23.7</p>		<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>	
			

Fig: 23.8	<p style="text-align: center;">VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING 132 kV OIL FILLED CABLE AT CROSSING LOCATION</p> 
Fig: 23.9	<p style="text-align: center;">VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING DIRECTLY BURIED 132 kV POWER/ PILOT/ F.O. CABLE</p> <p style="text-align: center;">CASE 1 : Crossing</p>  <p style="text-align: center;">CASE 2 : Parallel</p> 
NOTE :	<ol style="list-style-type: none"> 1. Vertical clearance is from the top of existing 132 kV services to the finished interlock level. 2. Minimum vertical clearance to be maintained at crossing location as mentioned in the figure. DEWA EHV services should be protected as per DEWA standard. (Refer fig. 22.10 & 22.11) 3. Existing oil filled cables should be diverted outside the proposed interlock access/ service road as per RTA right of way new corridor.

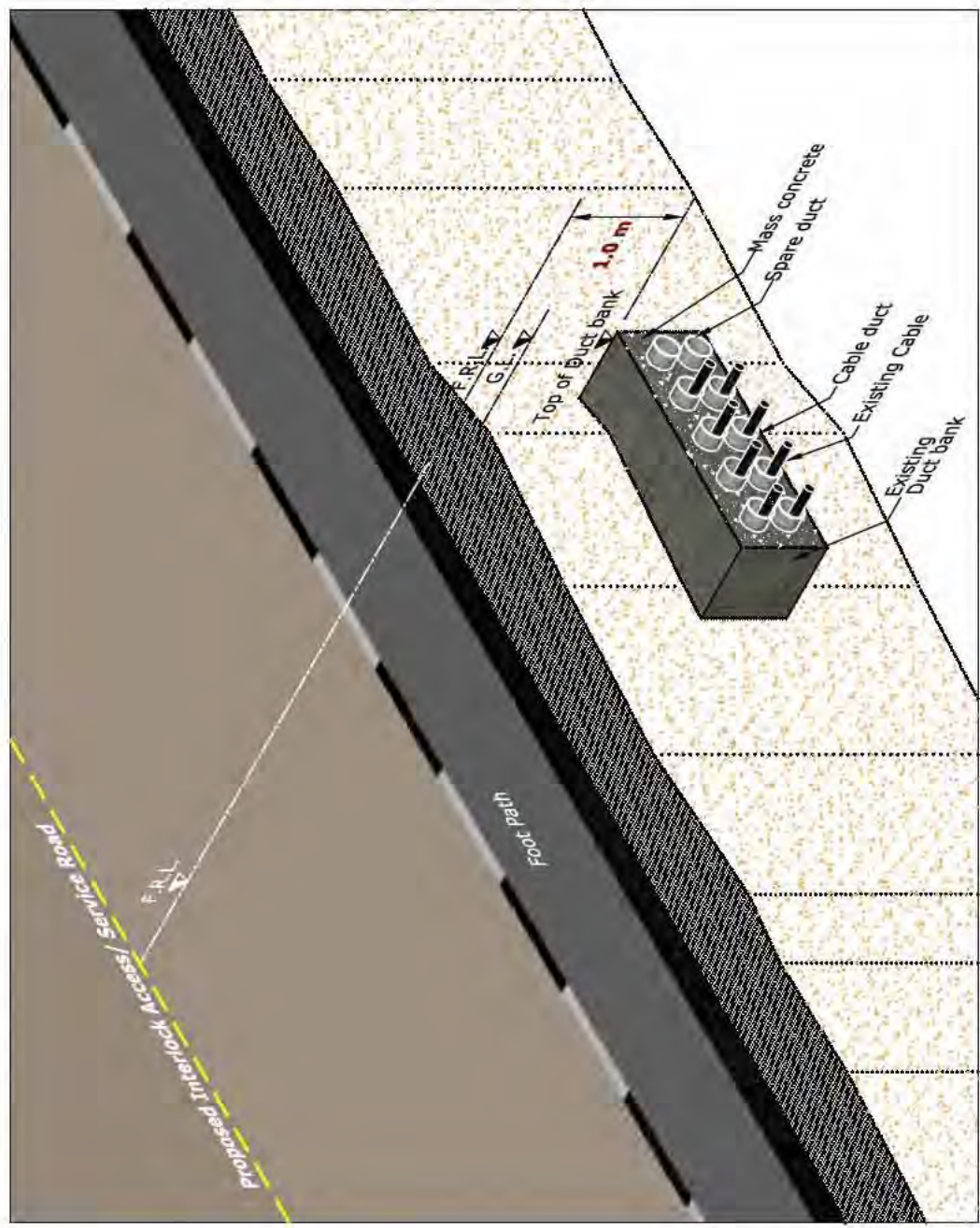
Flg: 23.10



NOTE :

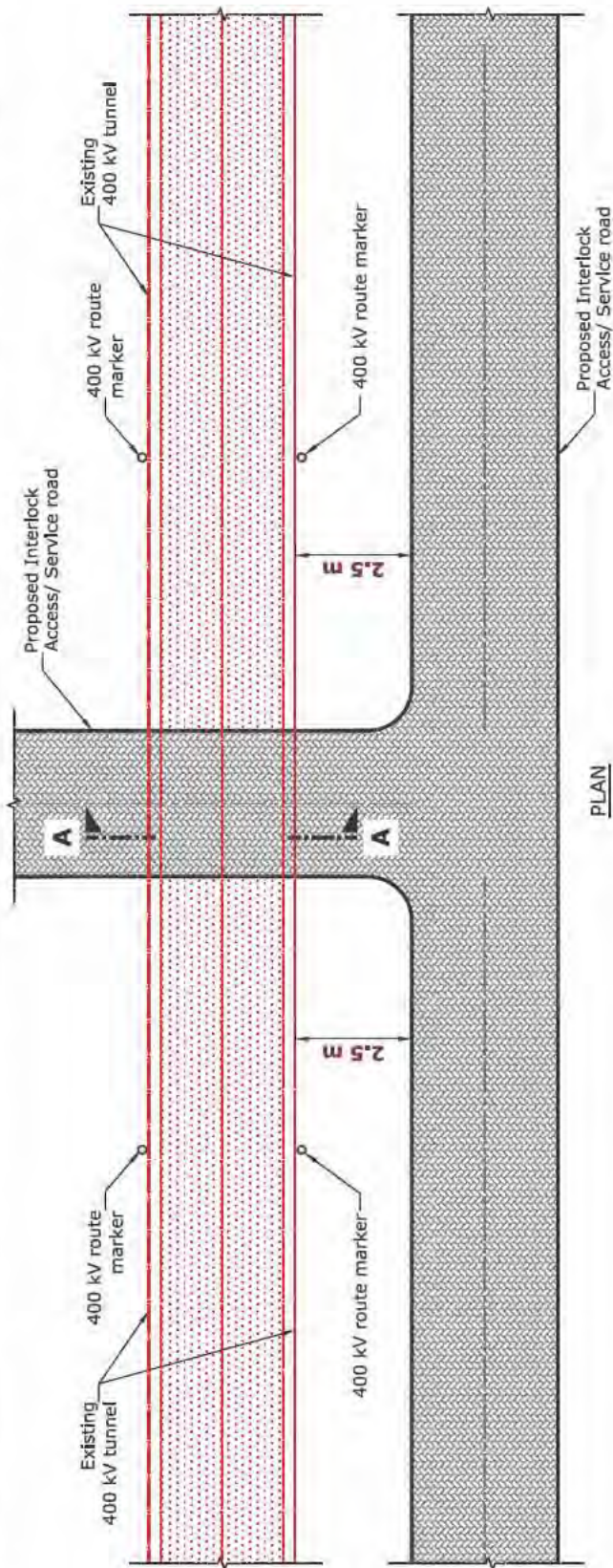
1. Existing Trough cover slab should be replaced by 0.25 m thick RCC cover slab and placed above mass concrete
2. Minimum 1.0 m vertical clearance to be maintained above the Trough slab and Interlock level.
3. Vertical clearance is from the top of existing 132 kV Trough to the finished Interlock level.

VERTICAL CLEARANCE DETAIL BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING 132 kV DUCT BANK



- NOTE :**
- 1. Proposed Interlock Access/ Service road not allowed on top of DEWA reservation.
 - 2. Vertical clearance is from the top of existing Duct bank to the finished Interlock level.
 - 3. Minimum 1.0 m vertical clearance to be maintained at crossing location.

Fig: 23.12 HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING 400 kV TUNNEL

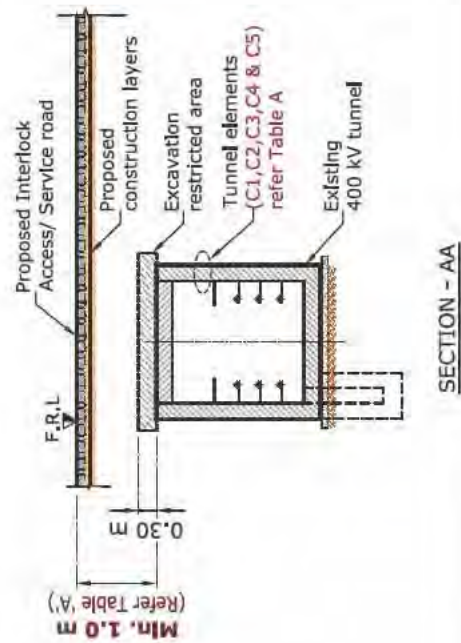


PLAN

NOTE :

1. Proposed Interlock Access/ Service road not allowed on top of DEWA reservation.
2. Minimum 1.0 m vertical clearance to be maintained above the top of existing 400 kV tunnel.
3. Vertical clearance is from the top of existing 400 kV tunnel cover slab to the finished Interlock level.
4. The tunnel elements (C1, C2, C3, C4 & C5) will be designed as per the traffic load and height of soil refer Table A.

TABLE 'A'				
Tunnel elements	Excavation restricted area	Minimum height of soil to be maintained above the elements with traffic load	Maximum height of soil including the pavement construction (asphalt road, Interlock tiles, etc...), above the tunnel with traffic load	
C1	0.3 m	1.0 m	1.0 m	
C2	0.3 m	1.0 m	3.0 m	
C3	0.3 m	1.0 m	5.0 m	
C4	0.3 m	1.0 m	7.0 m	
C5	0.3 m	1.0 m	10.0 m	



SECTION - AA

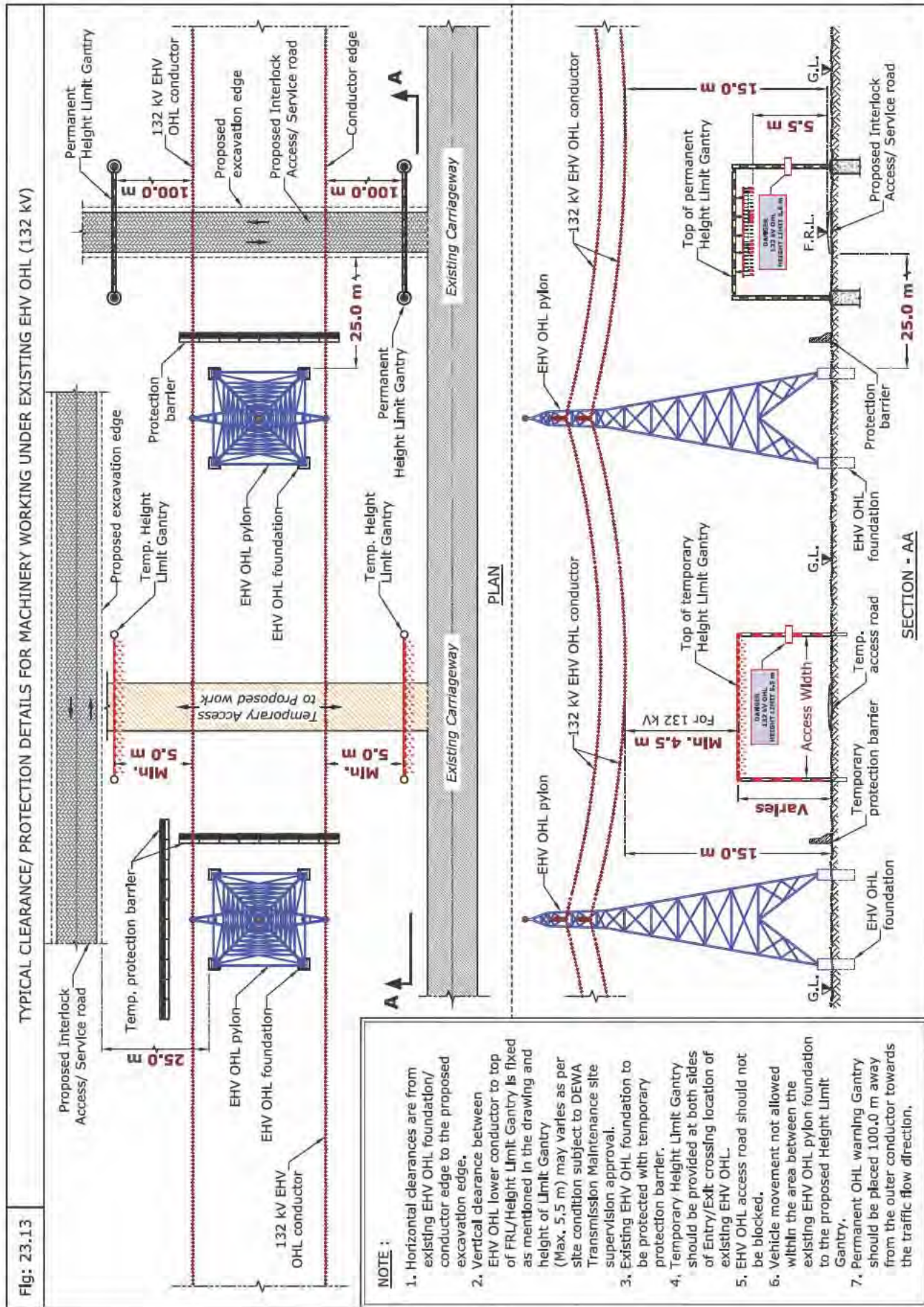
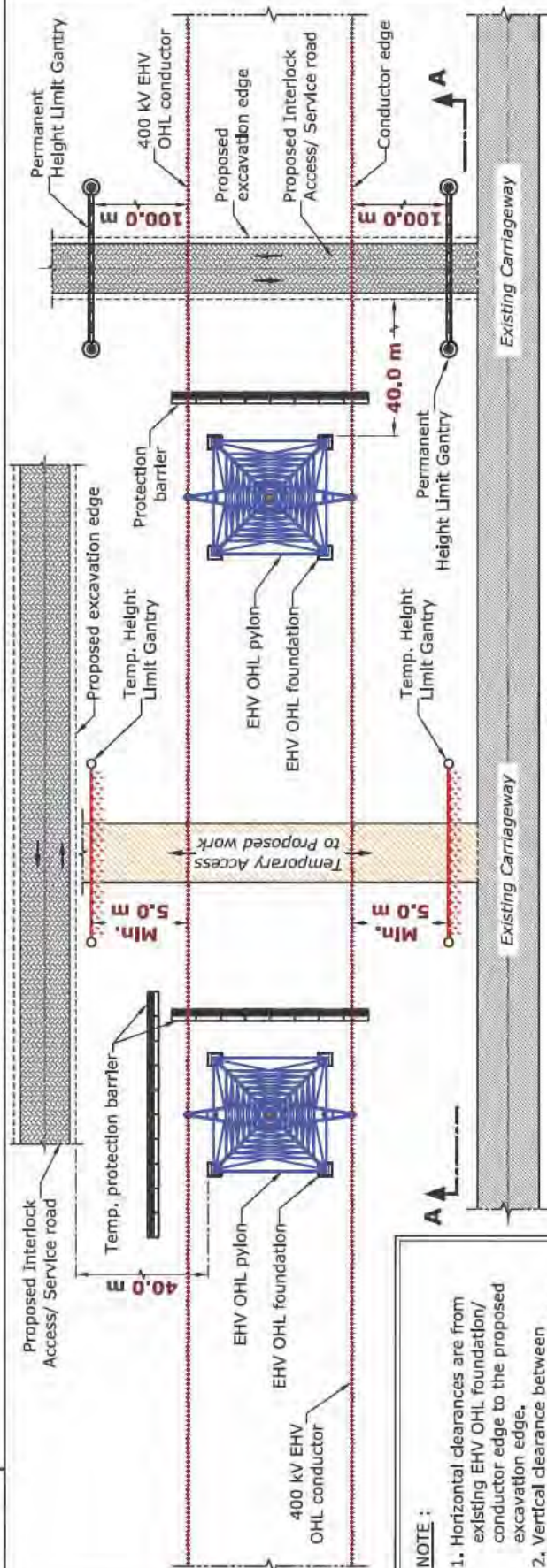
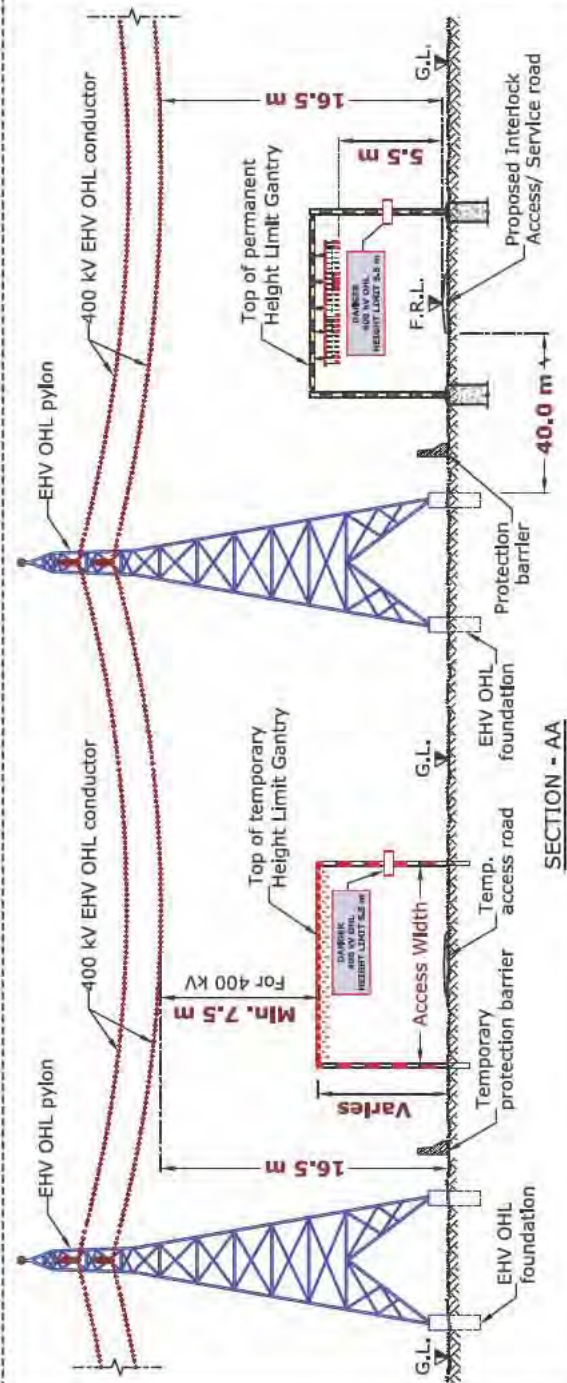


Fig: 23.14 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING EHV OHL (400 kV)



PLAN



SECTION - AA

NOTE :

1. Horizontal clearances are from existing EHV OHL foundation/ conductor edge to the proposed excavation edge.
2. Vertical clearance between EHV OHL lower conductor to top of FRL/Height Limit Gantry is fixed as mentioned in the drawing and height of Limit Gantry (Max. 5.5 m) may vary as per site condition subject to DEWA Transmission Maintenance site supervision approval.
3. Existing EHV OHL foundation to be protected with temporary protection barrier.
4. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing EHV OHL.
5. EHV OHL access road should not be blocked.
6. Vehicle movement not allowed within the area between the existing EHV OHL pylon foundation to the proposed Height Limit Gantry.
7. Permanent OHL warning Gantry should be placed 100.0 m away from the outer conductor towards the traffic flow direction.

Table 4: Clearance & Protection details for Proposed Interlock Access /Service Road and existing DEWA Gas/Fuel services

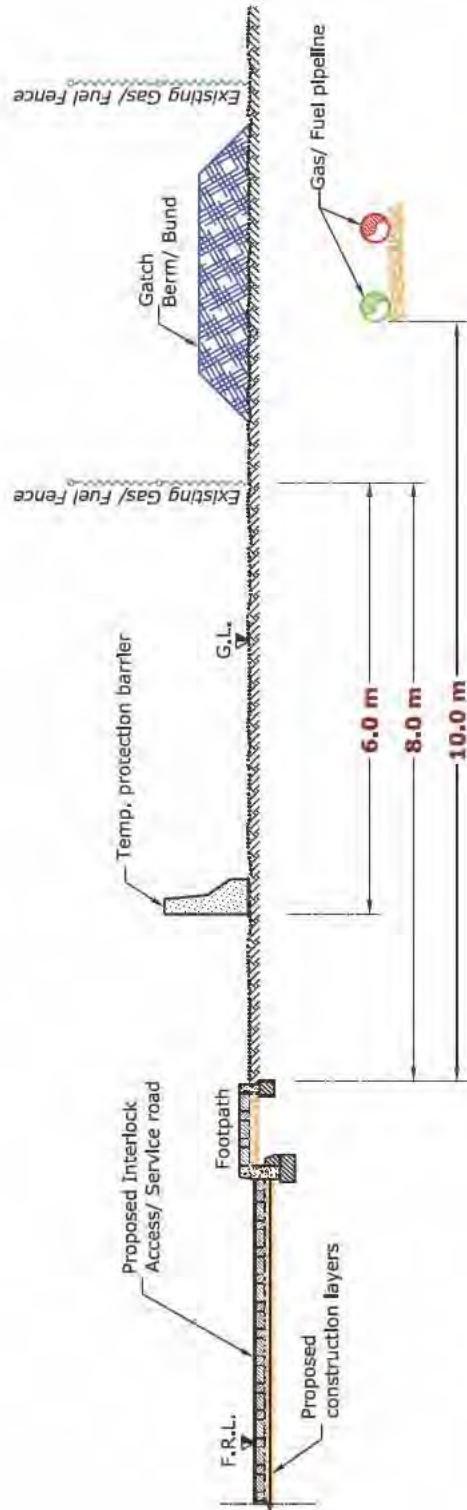
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 23.15)
Gas/Fuel pipeline (All diameter)	10.0 m	3.0 m	A	OC	R	• Horizontal clearance (Ref Fig: 23.15) • Vertical clearance (Ref Fig: 23.16) • Protection details (Ref Fig: 23.16)

Table Abbreviation

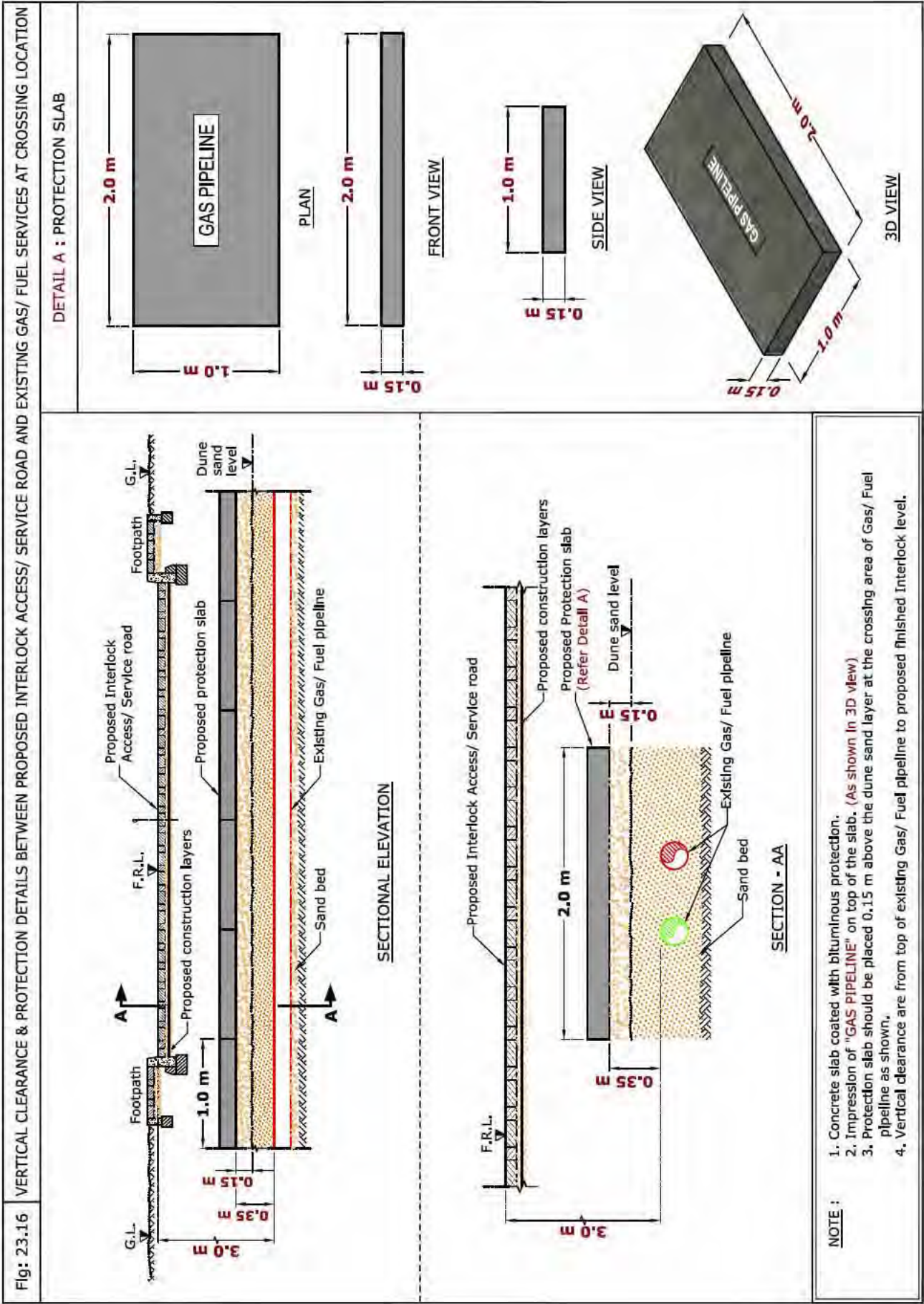
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 23.15 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK ACCESS/ SERVICE ROAD AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed Interlock Service road/ shoulder edge to existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from proposed Interlock Service road/ shoulder edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.



24. Proposed Road Work - Interlock Parking

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24.1 Introduction

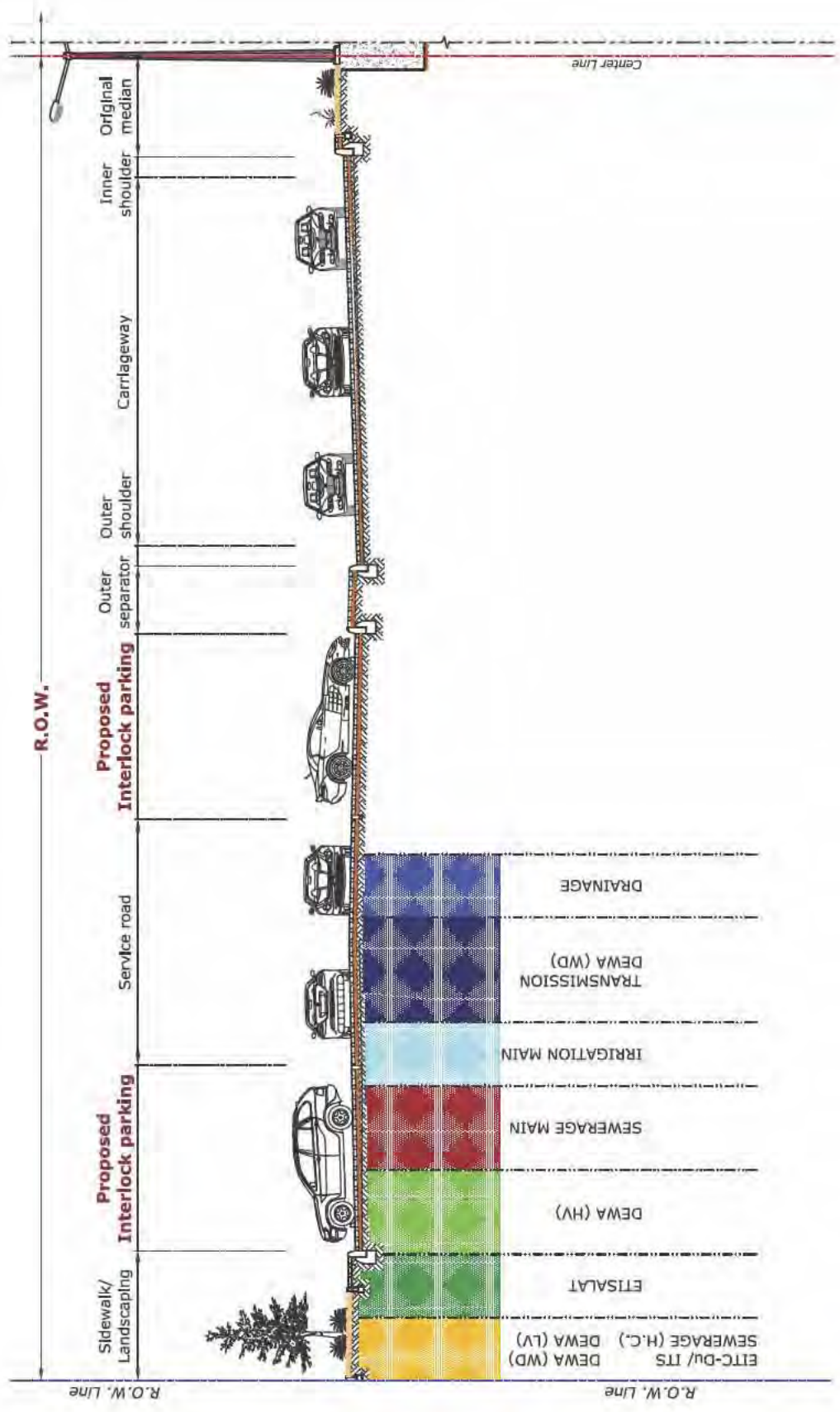
Interlocked parking lot is the area, remote from the road designated for the parking of vehicles. The road may contain Parking lanes which are the areas on the pavement, perpendicular, inclined or parallel to, and outside the travelling way. Each parking lane contains several parking bays which is the area marked out for the parking of a single vehicle. This type of parking

area is constructed by interlock to facilitate the future maintenance work.

Interlocked parking can be in one or both sides of the road within the Right Of Way, therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



RIGHT OF WAY SAMPLE CROSS SECTION AT PROPOSED INTERLOCK PARKING



24.2 Avoid the following



1. Proposal Asphalt parking above existing DEWA 132 kV Joint bay.
2. Proposal Asphalt parking under existing EHV OHL.

24.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Interlock Parking and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	0.9 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 24.1) Vertical clearance (Ref Fig: 24.2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

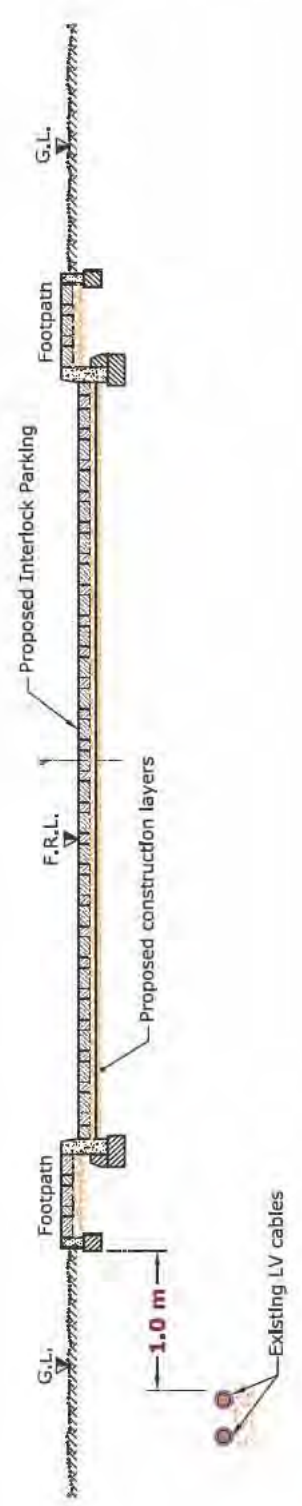
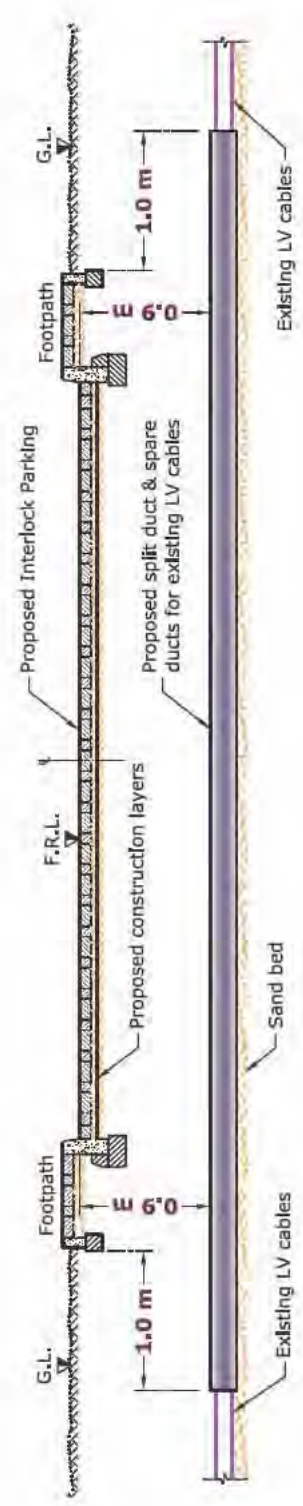
Fig: 24.1	<p style="text-align: center;">HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK PARKING AND EXISTING LV CABLES</p> 
Fig: 24.2	<p style="text-align: center;">VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED INTERLOCK PARKING AND EXISTING LV CABLES AT CROSSING LOCATION</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Interlock Parking footpath/ shoulder edge to existing LV cable/ ducts edge. 2. Vertical clearance is from the top of existing LV cable/ ducts to finished Interlock level. 3. At crossing location existing LV cable should be raised/ lowered to the standard depth and protected with split & spare duct as per specified standard. 4. The existing DEWA ducts (Utilized/ Empty) to be extended minimum 1.0 m beyond the Interlock service road footpath/ shoulder edge. 	

Table 2: Clearance & Protection details for Proposed Interlock Parking and existing DEWA Electricity HV services						
Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	NR	0.9 m	A	-	R	• Vertical clearance (Ref Fig: 24.3, Case 1 & 2)
HV (6.6/11/33 kV) Manhole		-	-	-	R	• (Ref Fig: 24.3, Case 3)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 24.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 24.4) • Vertical clearance (Ref Fig: 24.4) • Protection details (Ref Fig: 24.4)
HV (33 kV) O.H.L.		3.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

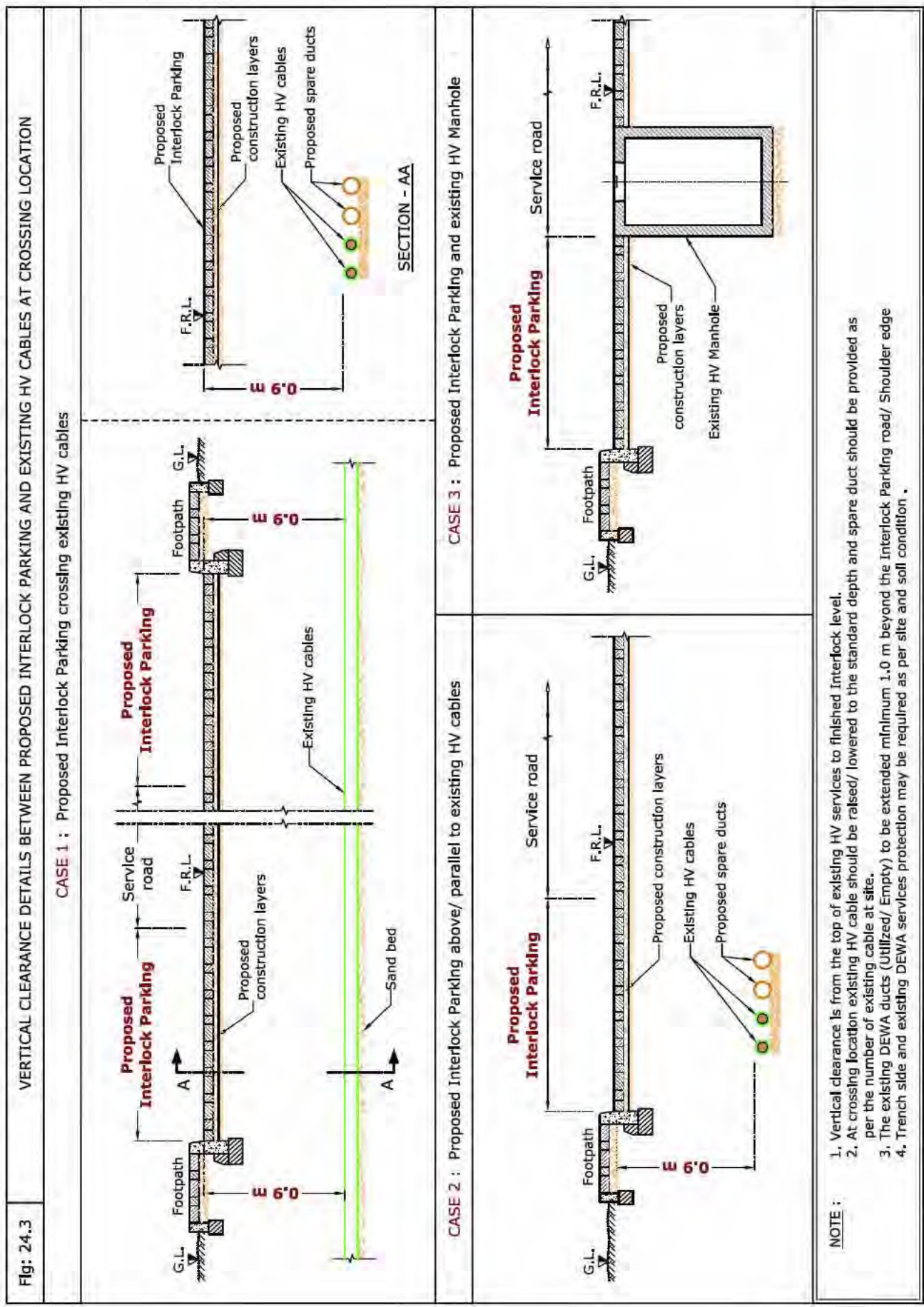


Fig: 24.4 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

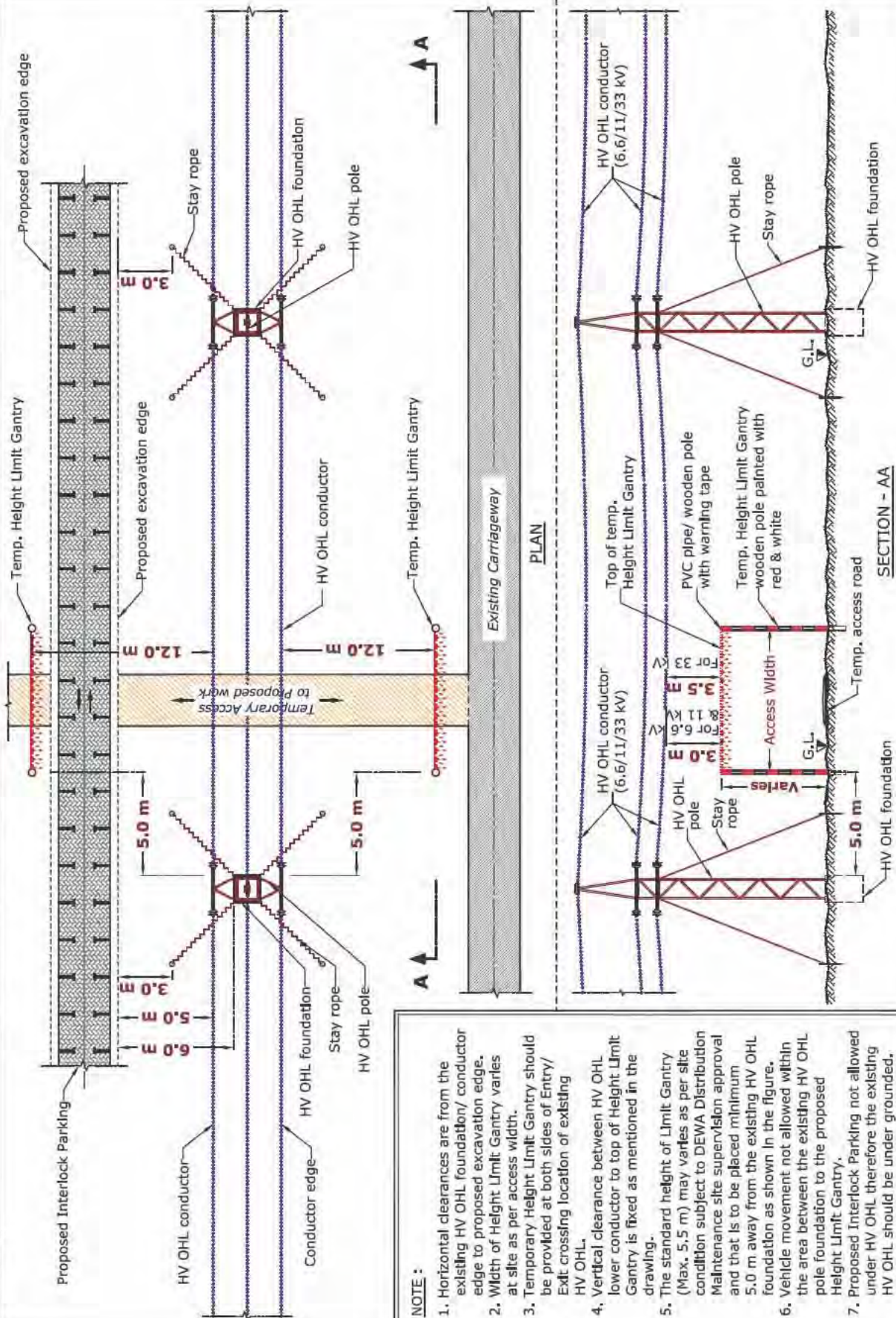


Table 3: Clearance & Protection details for Proposed Interlock Parking and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	1.2 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 24.5) Vertical clearance (Ref Fig: 24.7, Case 3)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 24.7, Case 1 & 2) Protection details (Ref Fig: 24.7, Case 1 & 2)
EHV (132 kV) Trough	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 24.8) Protection details (Ref Fig: 24.8)
EHV (132 kV) Duct Bank	NR	1.0 m	A	-	R	<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 24.9)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	-	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 24.6)
EHV (132 kV) O.H.L	25.0 m	15.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 24.11) Vertical clearance (Ref Fig: 24.11)
EHV (400 kV) O.H.L	40.0 m	16.5 m				<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 24.12) Vertical clearance (Ref Fig: 24.12)
EHV (400 kV) Tunnel	2.5 m	1.0 m	A	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 24.10) Vertical clearance (Ref Fig: 24.10)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 24.11,12) Vertical clearance (Ref Fig: 24.11,12) Protection details (Ref Fig: 24.11,12)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

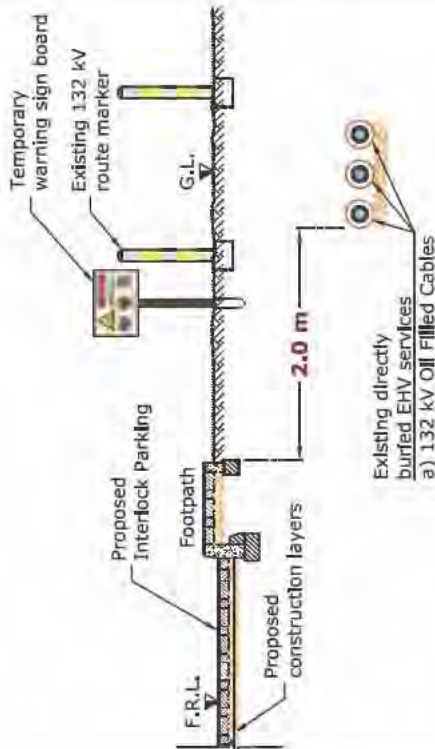
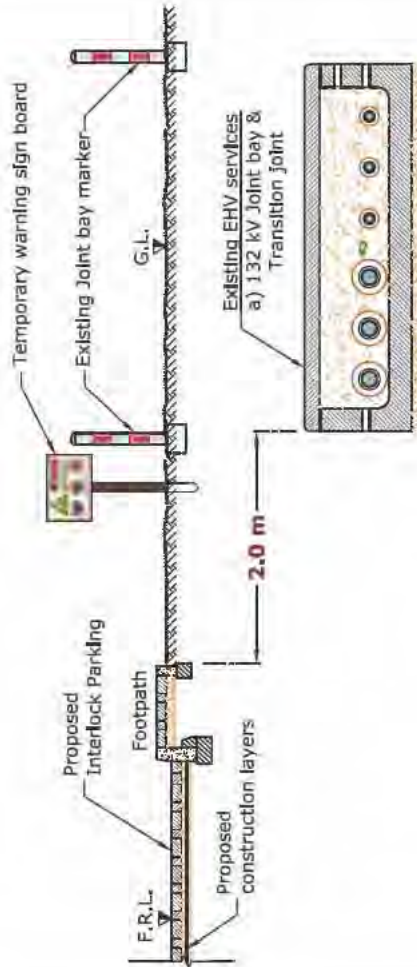
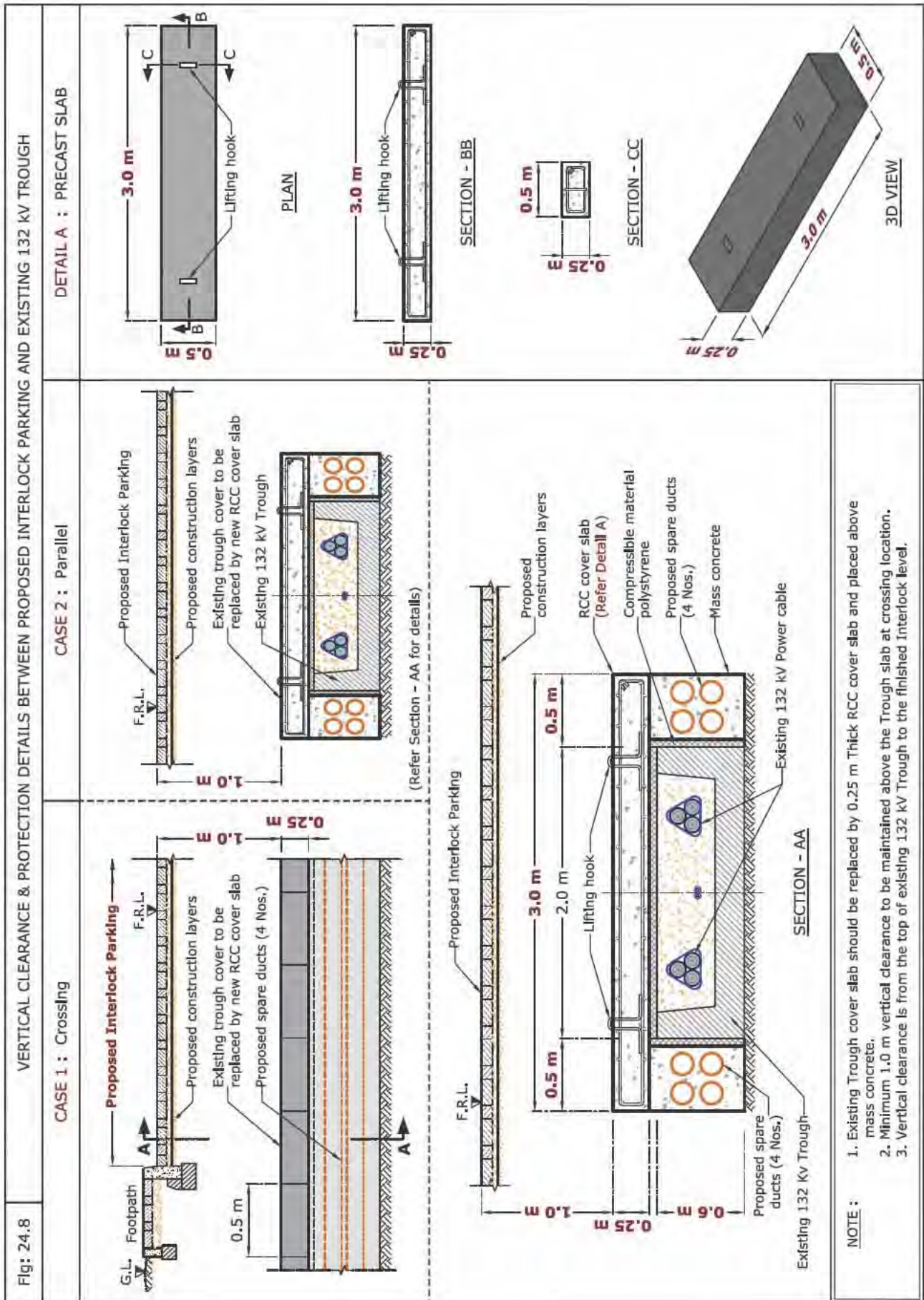
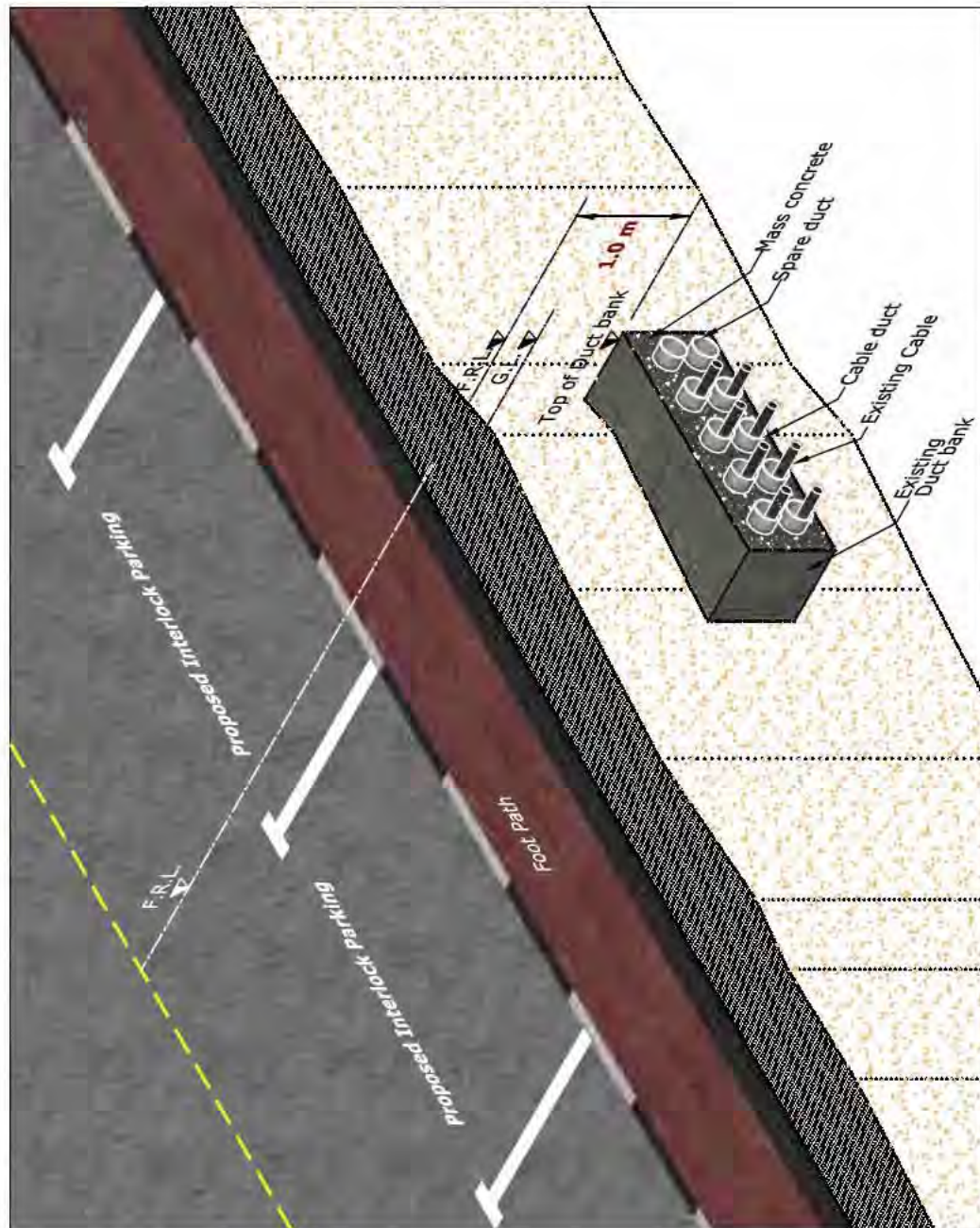
<p>Fig: 24.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK PARKING AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED CABLES</p>	<p>Fig: 24.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK PARKING AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>
			
<p>NOTE :</p> <ol style="list-style-type: none">1. All horizontal clearances are from proposed Interlock Parking footpath/ shoulder edge to existing EHV 132 kV services edge.2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.3. Minimum 3.0 m horizontal clearance should be maintained from the proposed Interlock Parking footpath/ shoulder edge to existing 132 kV link box with RTA standard protection.4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.			

Fig: 24.7	VERTICAL CLEARANCE & PROTECTION DETAILS BETWEEN PROPOSED INTERLOCK PARKING AND EXISTING DIRECTLY BURIED 132 kV POWER/ PILOT/ F.O. CABLES	
	CASE 1 : Crossing to existing Directly buried 132 kV cables	<div> <p>Proposed Interlock Parking</p> <p>1.0 m</p> <p>Existing Directly buried 132 kV Power/ Pilot/ F.O. cable (For protection detail refer fig. 22.11)</p> <p>Proposed construction layers</p> <p>G.L. Footpath</p> <p>F.R.L.</p> <p>Proposed Interlock Parking</p> </div> <div> <p>Proposed Interlock Parking</p> <p>1.0 m</p> <p>Existing Directly buried 132 kV Power/ Pilot/ F.O. cable (For protection detail refer fig. 22.11)</p> <p>Proposed construction layers</p> <p>G.L. Footpath</p> <p>F.R.L.</p> <p>Proposed Interlock Parking</p> <p>Sand bed</p> </div>
	CASE 2 : Parallel	<div> <p>Proposed Interlock Parking</p> <p>1.0 m</p> <p>Existing directly buried services 132 kV Power/ Pilot/ F.O. cable</p> <p>Proposed construction layers</p> <p>G.L. Footpath</p> <p>F.R.L.</p> <p>Proposed Interlock Parking</p> </div>
	CASE 3 : Crossing to existing 132 kV Oil Filled cable	<div> <p>Proposed Interlock Parking</p> <p>1.2 m</p> <p>Existing 132 kV Oil Filled cable (For protection detail refer Fig. 22.10)</p> <p>Proposed construction layers</p> <p>G.L. Footpath</p> <p>F.R.L.</p> <p>Proposed Interlock Parking</p> </div> <div> <p>Proposed Interlock Parking</p> <p>1.2 m</p> <p>Existing 132 kV Oil Filled cable (For protection detail refer Fig. 22.10)</p> <p>Proposed construction layers</p> <p>G.L. Footpath</p> <p>F.R.L.</p> <p>Proposed Interlock Parking</p> <p>Sand bed</p> </div>
	CASE 3 : Crossing to existing 132 kV Oil Filled cable	
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Vertical clearance is from the top of existing 132 kV services to the finished Interlock level. 2. Minimum vertical clearance to be maintained at crossing location as mentioned in the figure. DEWA EHV services should be protected as per DEWA standard. (Refer fig. 22.10 & 22.11) 3. Existing Oil Filled cables should be diverted outside the proposed Interlock Parking as per RTA right of way new corridor.



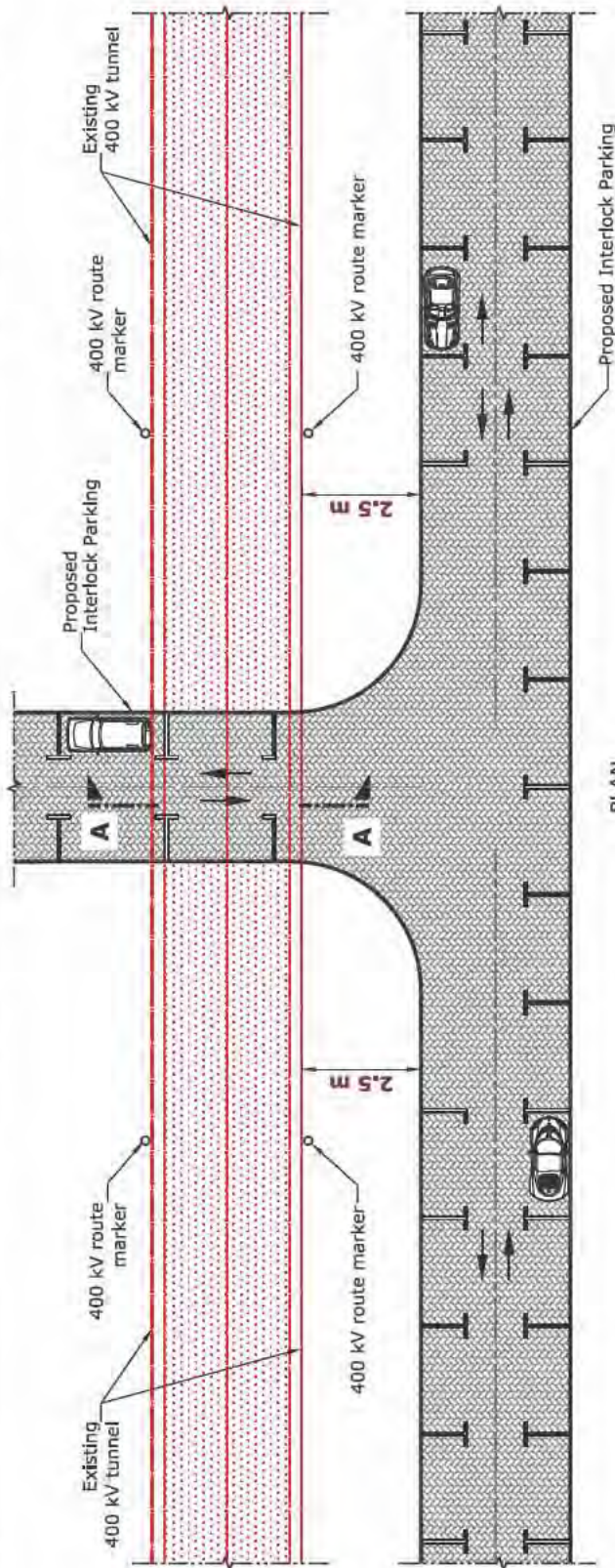
VERTICAL CLEARANCE DETAIL BETWEEN PROPOSED INTERLOCK PARKING AND EXISTING 132 kV DUCT BANK

Fig: 24.9



- NOTE :**
1. Vertical clearance is from the top of existing Duct bank to the finished Interlock level.
 2. Minimum 1.0 m vertical clearance to be maintained at crossing location.

Fig: 24.10 HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED INTERLOCK PARKING ROAD AND EXISTING 400 KV TUNNEL



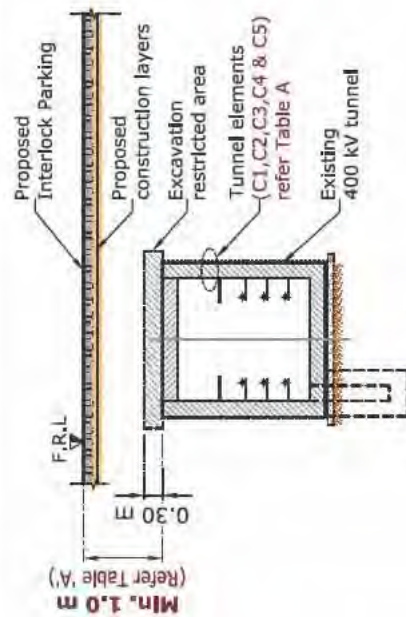
PLAN

NOTE :

1. Proposed Interlock Parking road not allowed on top of DEWA reservation.
2. Minimum 1.0 m vertical clearance to be maintained above the top of existing 400 kV tunnel.
3. Vertical clearance is from the top of existing 400 kV tunnel cover slab to the finished Interlock level.
4. The tunnel elements (C1, C2, C3, C4 & C5) will be designed as per the traffic load and height of soil refer Table A.

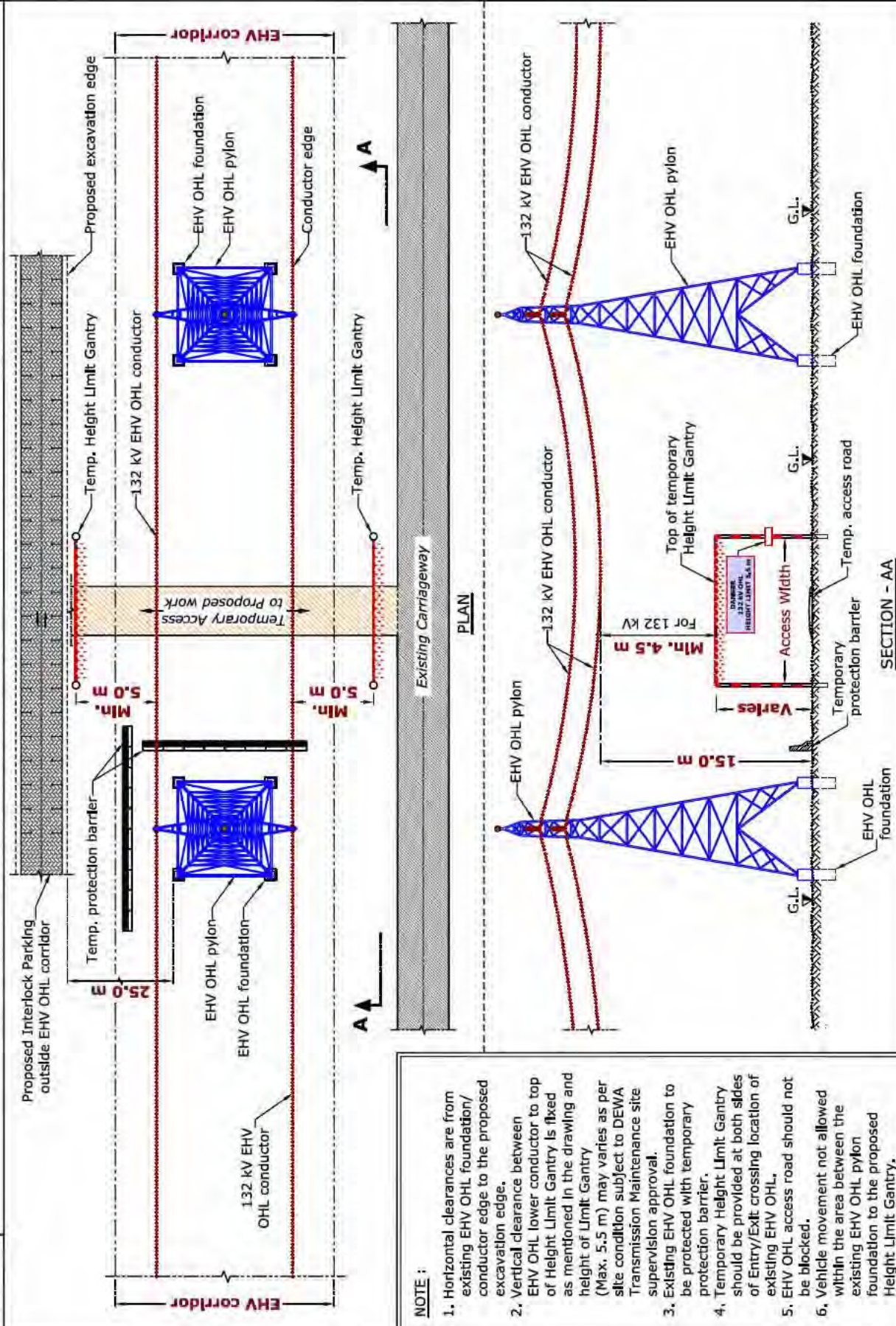
TABLE 'A'

Tunnel elements	Excavation restricted area	Minimum height of soil to be maintained above the elements with traffic load	Maximum height of soil including the pavement construction (asphalt road, Interlock tiles, etc...), above the tunnel with traffic load
C1	0.3 m	1.0 m	1.0 m
C2	0.3 m	1.0 m	3.0 m
C3	0.3 m	1.0 m	5.0 m
C4	0.3 m	1.0 m	7.0 m
C5	0.3 m	1.0 m	10.0 m



SECTION - AA

Fig: 24.11



NOTE :

1. Horizontal clearances are from existing EHV OHL foundation/conductor edge to the proposed excavation edge.
2. Vertical clearance between EHV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing and height of Limit Gantry (Max. 5.5 m) may vary as per site condition subject to DEWA Transmission Maintenance site supervision approval.
3. Existing EHV OHL foundation to be protected with temporary protection barrier.
4. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing EHV OHL.
5. EHV OHL access road should not be blocked.
6. Vehicle movement not allowed within the area between the existing EHV OHL pylon foundation to the proposed Height Limit Gantry.

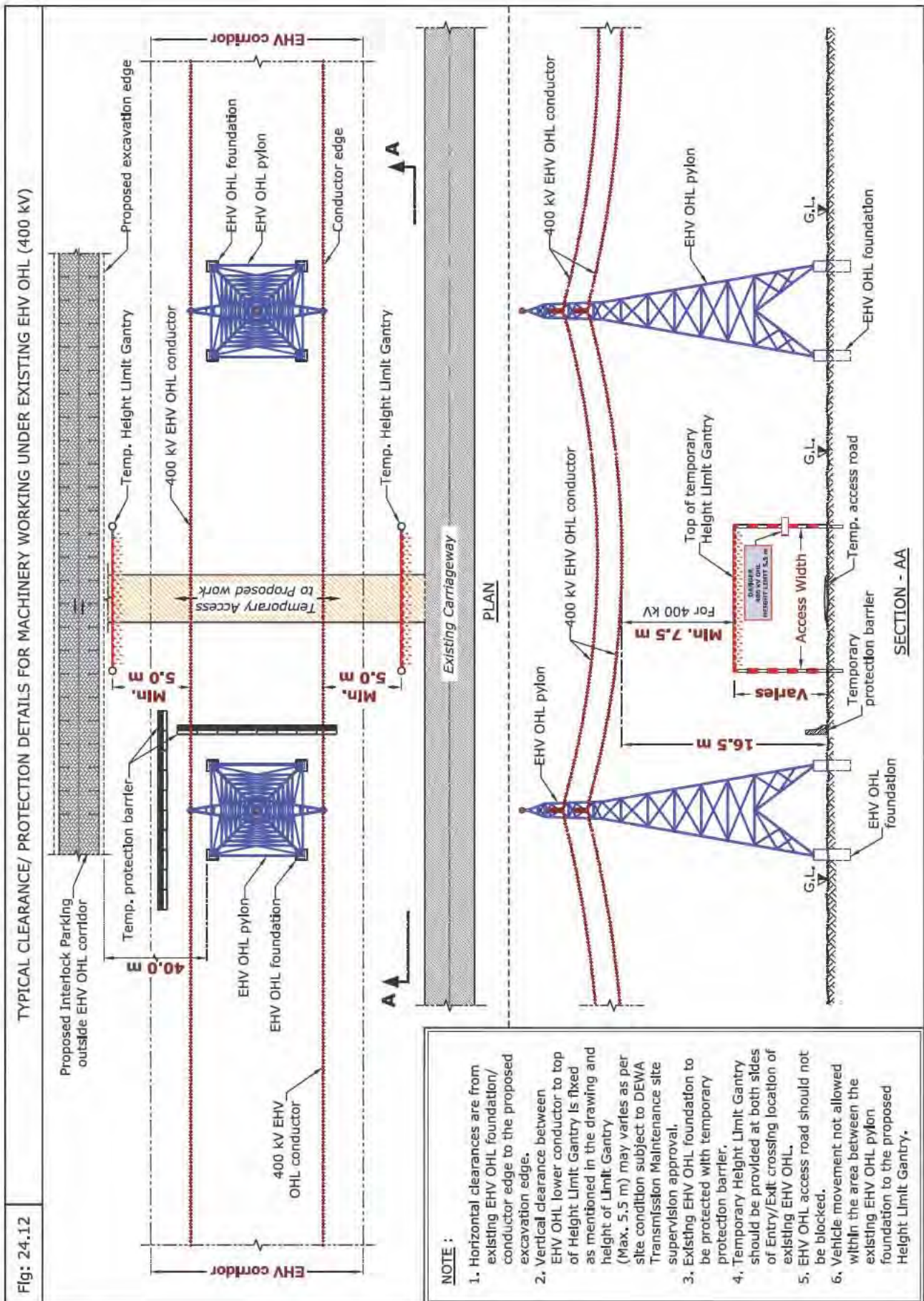


Table 4: Clearance & Protection details for Proposed Interlock Parking and existing DEWA Gas/Fuel services

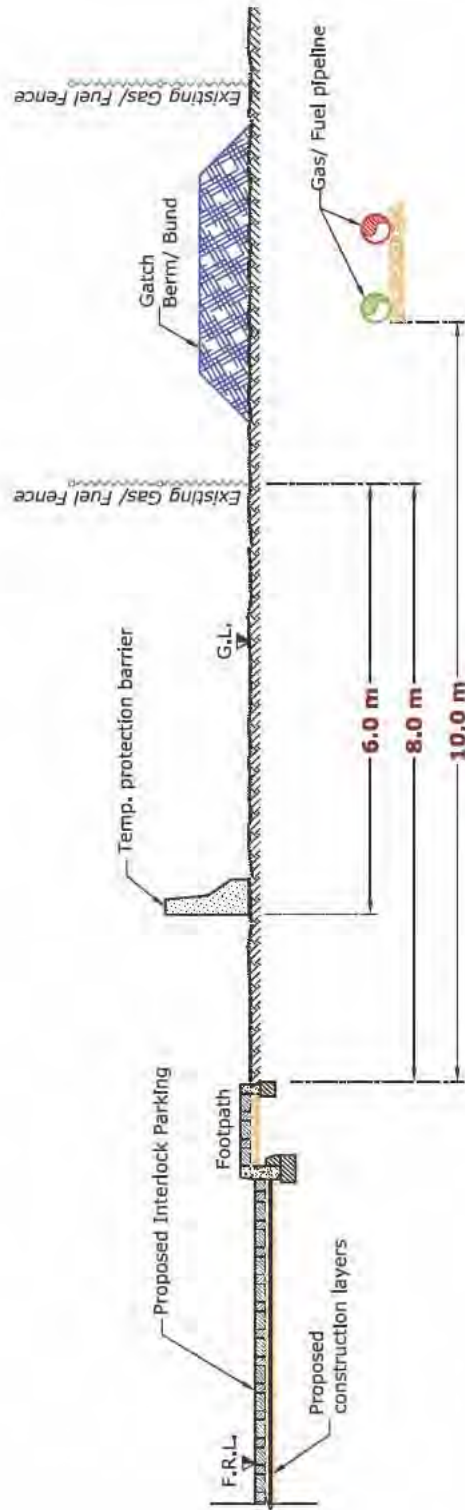
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 24.13)
Gas/Fuel pipeline (All diameter)	10.0 m	3.0 m	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 24.13) • Vertical clearance (Ref Fig: 24.14) • Protection details (Ref Fig: 24.14)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

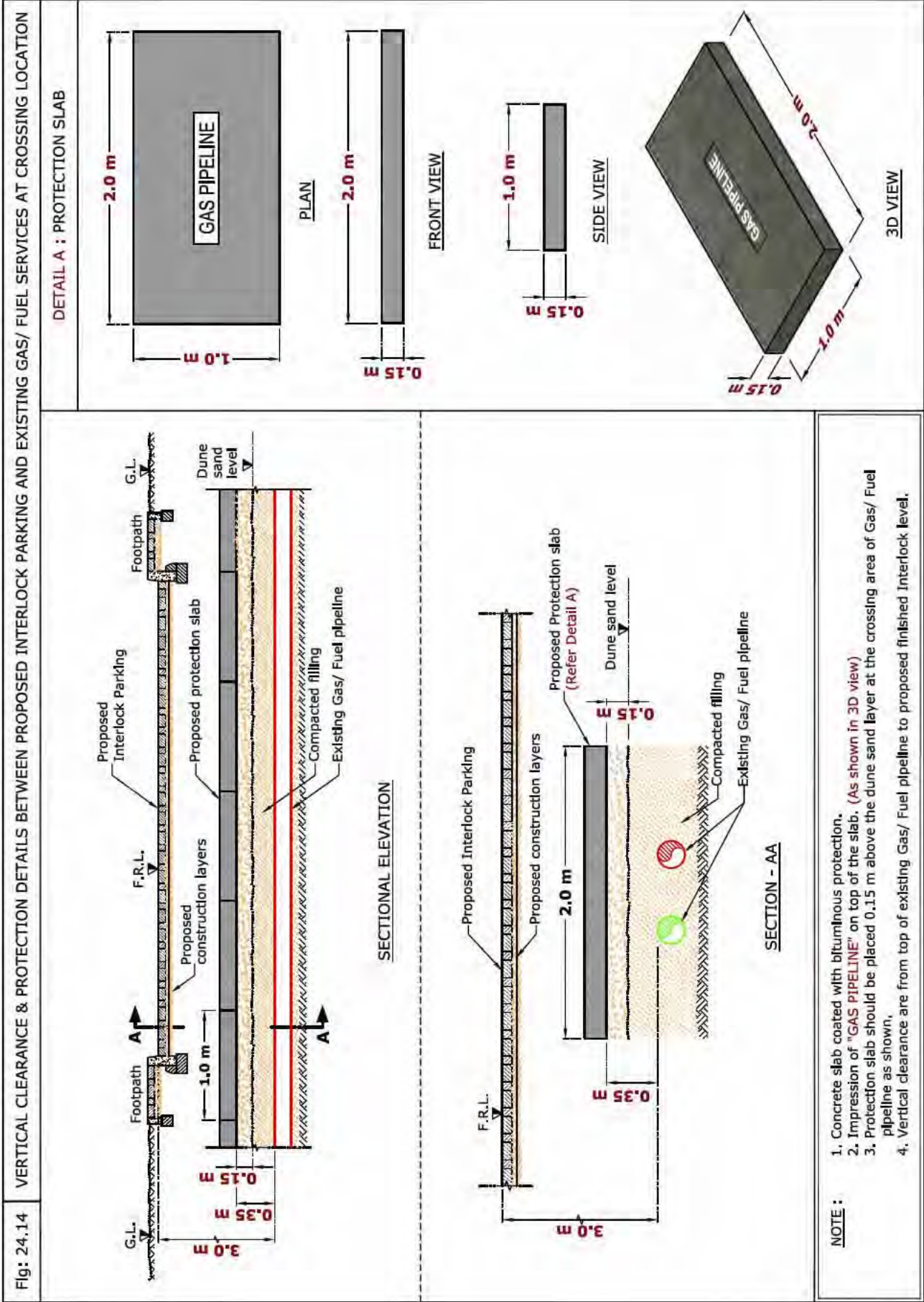


Fig: 24.13 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED INTERLOCK PARKING AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Interlock Parking footpath/ shoulder edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Interlock Parking footpath/ shoulder edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.



25. Proposed Road Work - (Bridges/Interchanges/Railway/Ramps/Flyover/ Roundabout)

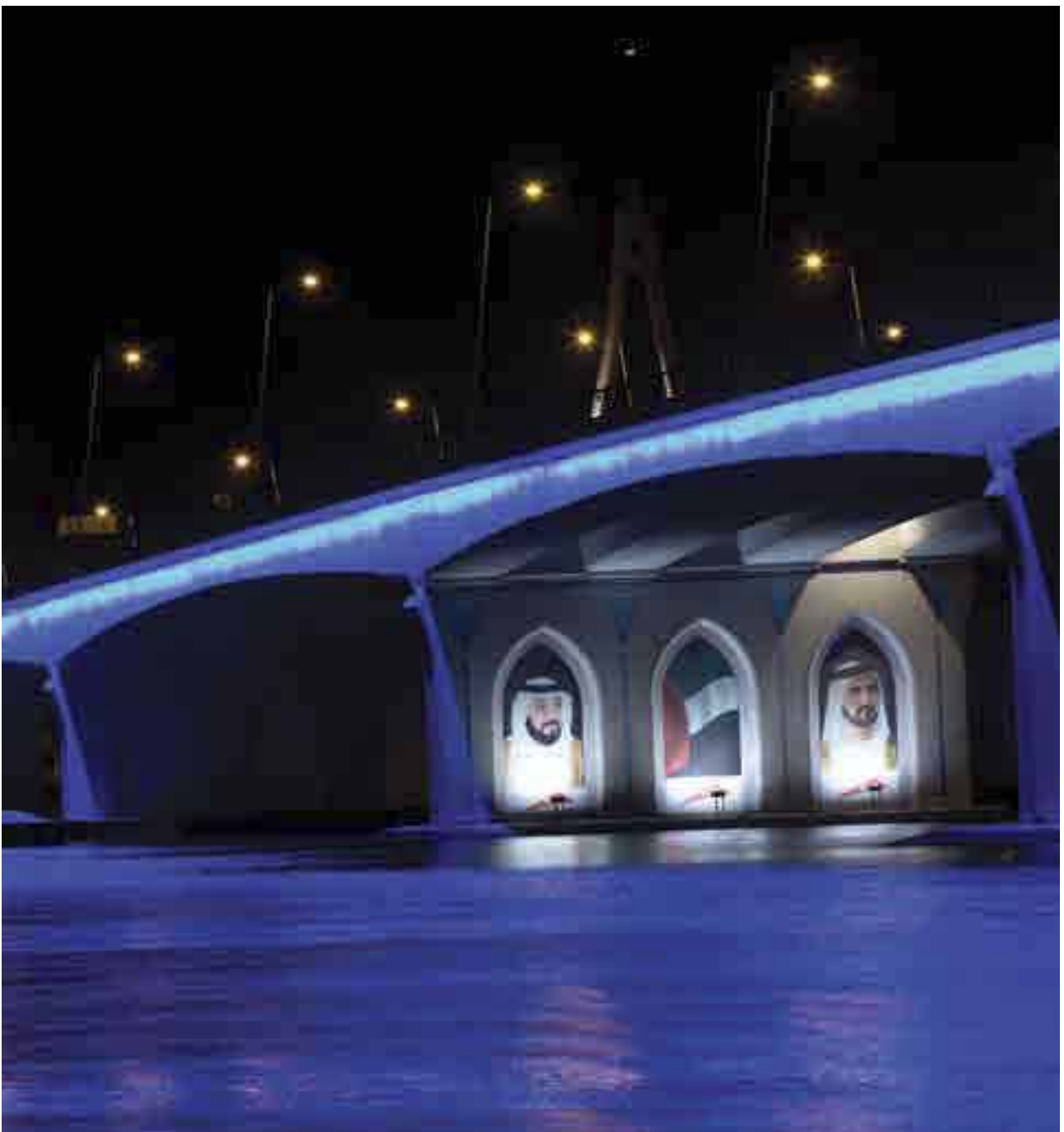
425

25.1 Introduction

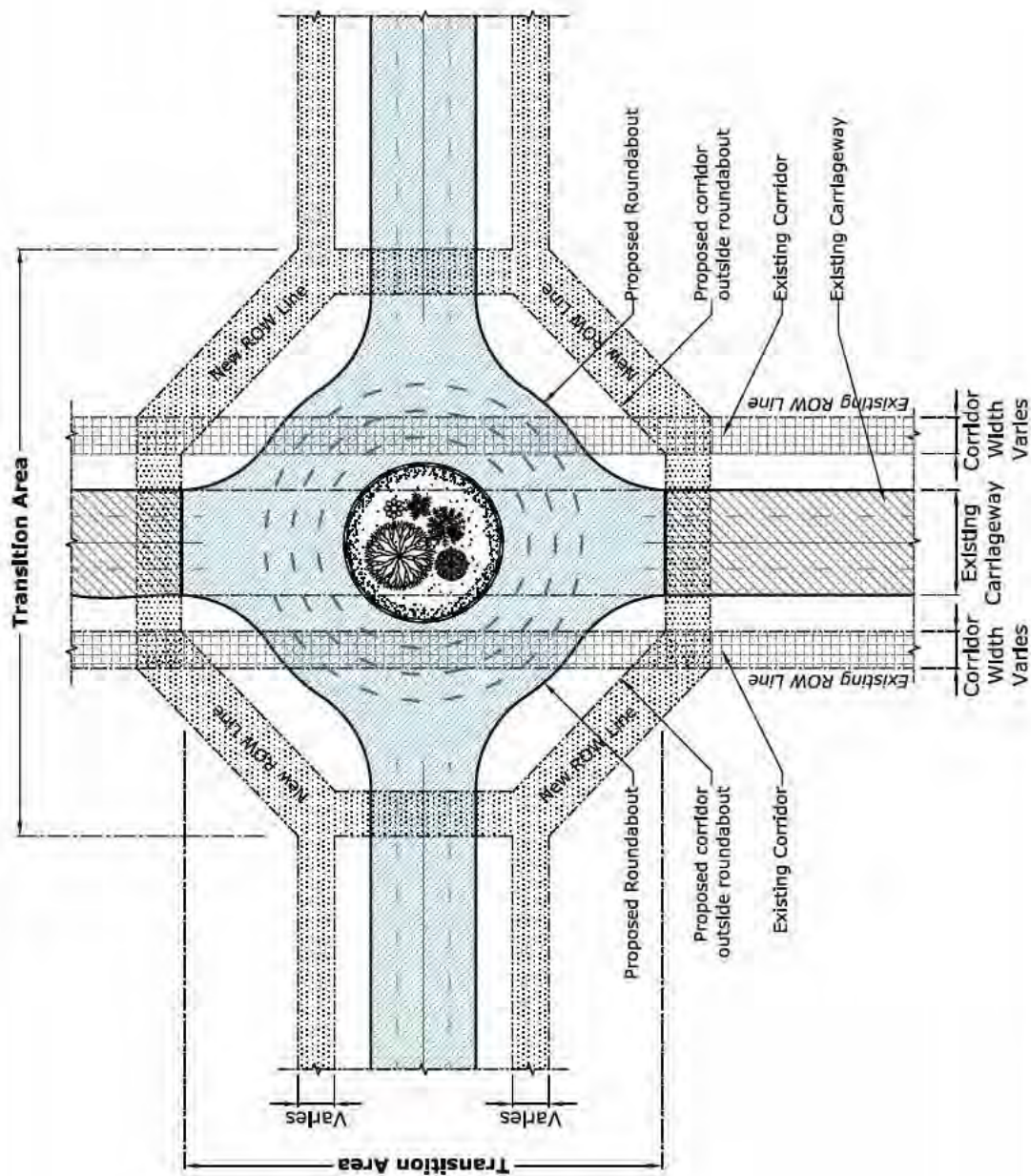
The purpose of bridge/interchange/flyover/railway overpass is to cross over existing water ways, roads, railway tracks etc., to enable free traffic to flow through the junctions without direct crossing or congestion.

These structures consist of infrastructure and superstructure elements such as concrete foundation,

piles, piers and ramps etc., the infrastructure/ superstructure are constructed within Right Of Way therefore; it is required to protect DEWA existing assets as per specified standards.



TYPICAL ROUNDABOUT



NOTE :

1. Existing DEWA Services falling within the Roundabout area should be relocated to new corridor.
2. Existing DEWA services falling near/ close to the proposed working area should be protected as per site condition under DEWA supervision.

25.2 Avoid the following



1. Construction above DEWA corridor and services.

25.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed work and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 25.1)

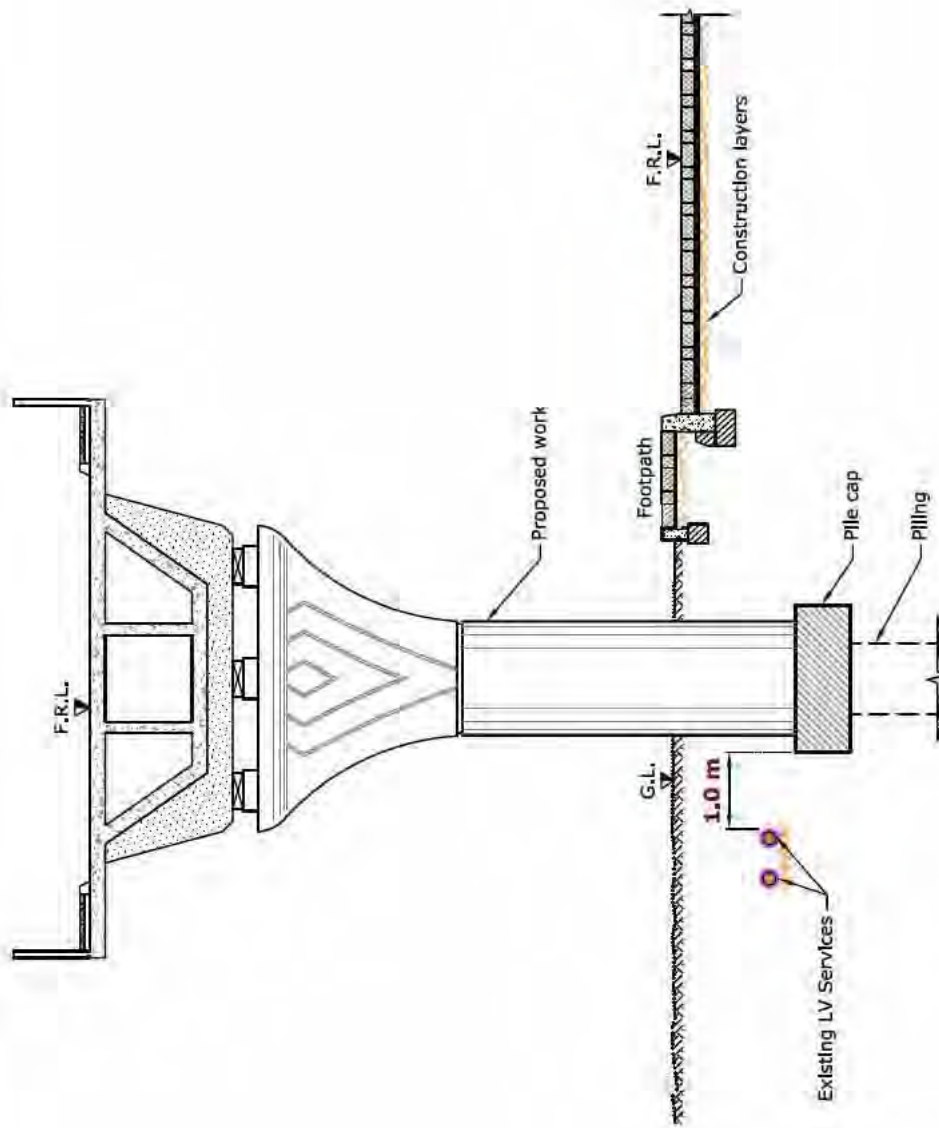
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 25.1

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WORK AND EXISTING LV CABLES



NOTE :

1. Horizontal clearance is from the proposed pile / pile cap / abutment edge to existing LV cable edge.
2. Existing LV cable should be relocated to proper LV corridor.
3. Existing LV cable should be protected as per site and soil condition.
4. Proposed pile / pile cap / abutment work not allowed in DEWA reservation.

Table 2: Clearance & Protection details for proposed work and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 25.2)
HV (6.6/11/33 kV) O.H.L.	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 25.3 & 25.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 25.5) • Vertical clearance (Ref Fig: 25.5) • Protection details (Ref Fig: 25.5)
HV (33 kV) O.H.L.		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

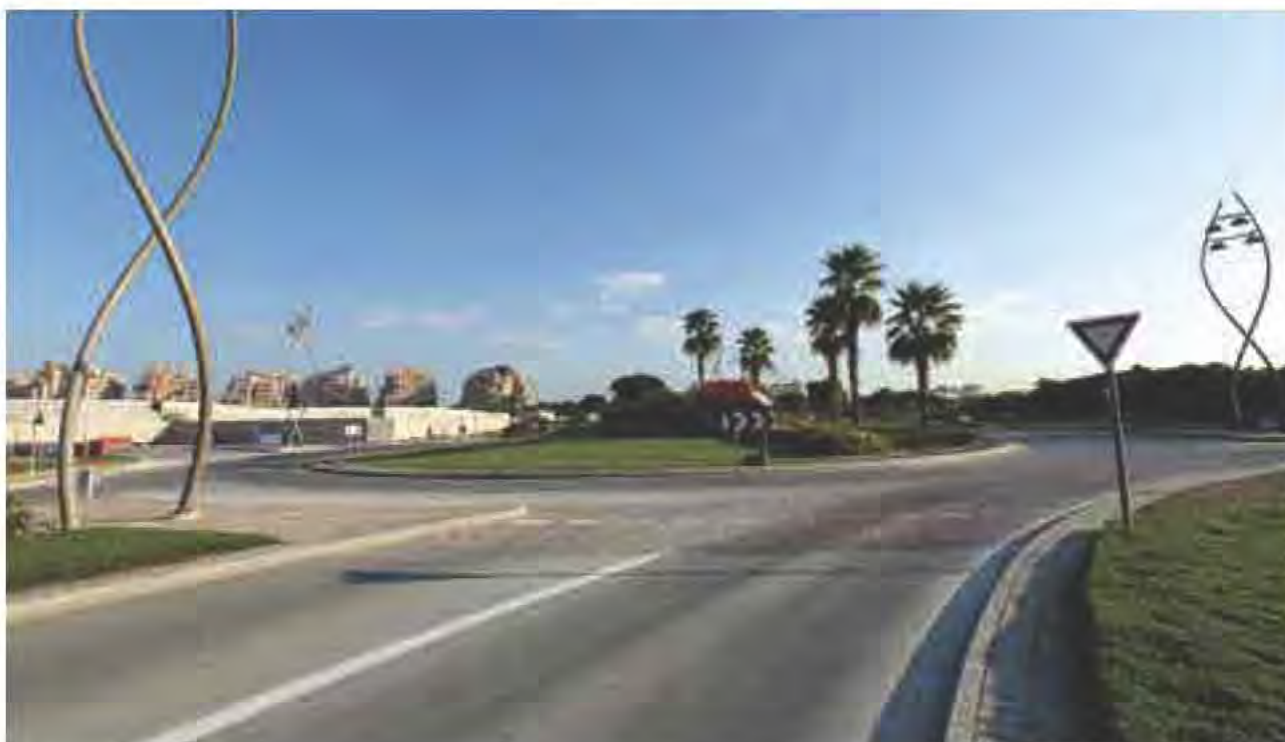
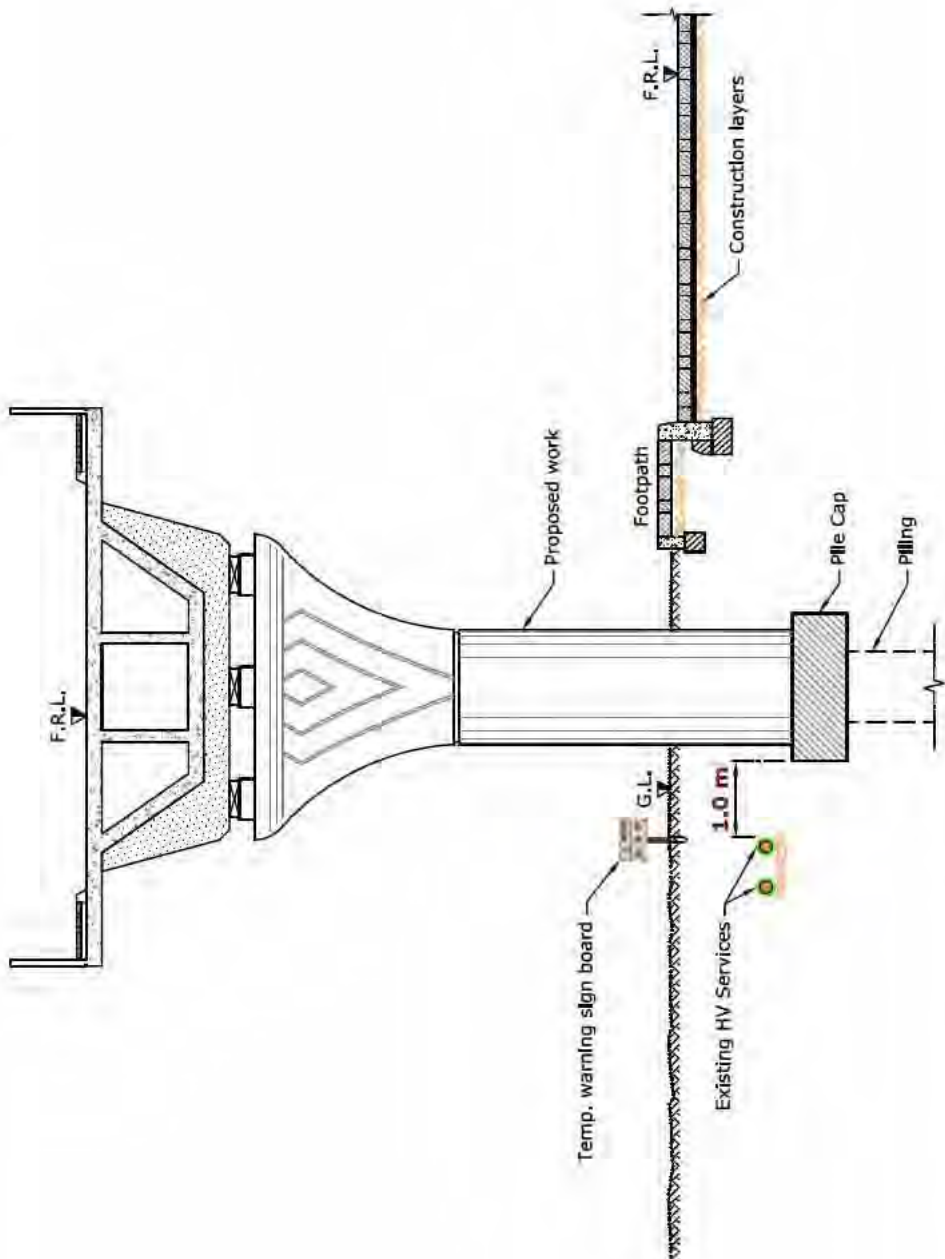


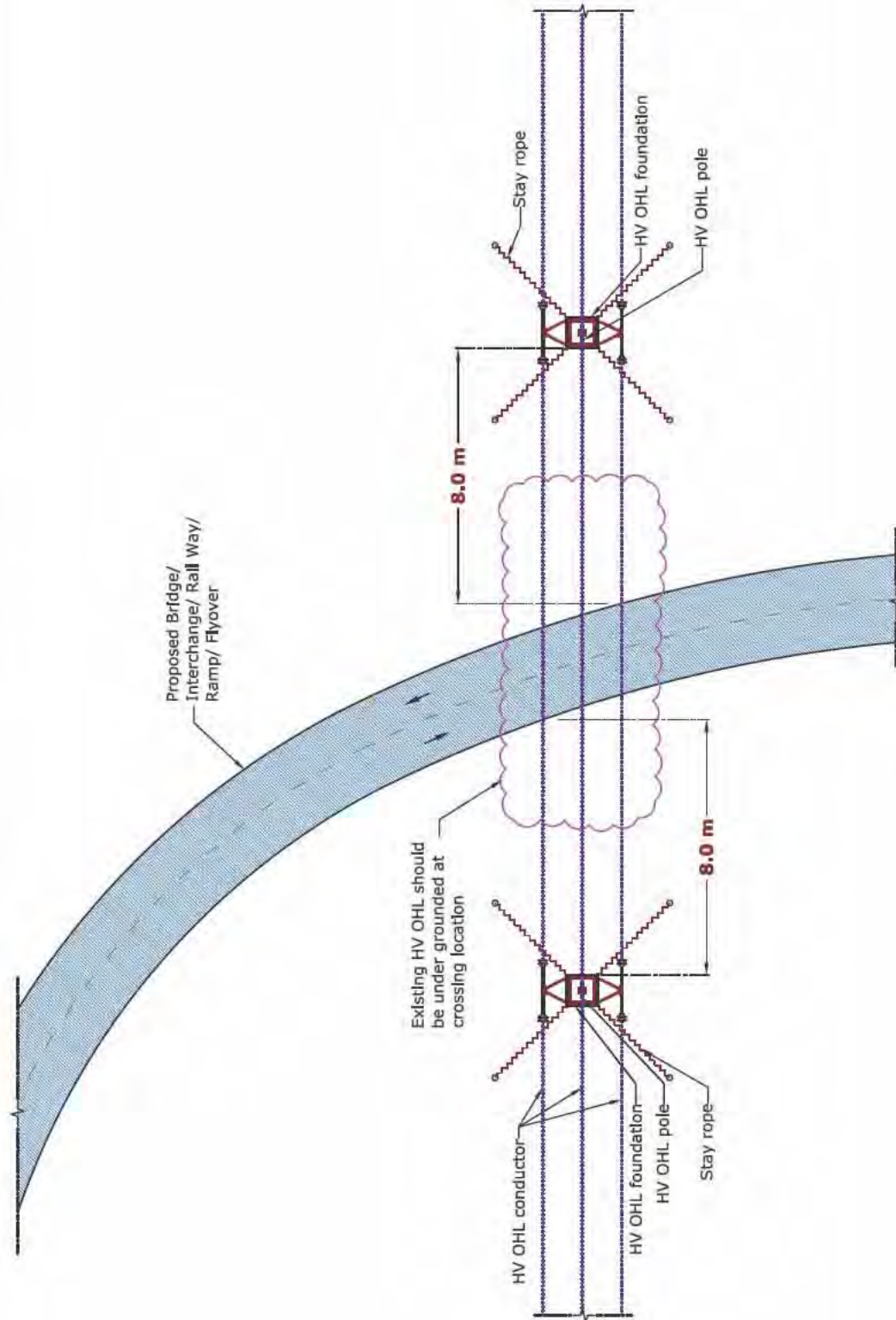
Fig: 25.2

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WORK AND EXISTING HV SERVICES



- NOTE :**
- 1. Horizontal clearance is from the proposed pile/ pile cap/ abutment edge to existing HV services edge.
 - 2. Existing HV services should be relocated to proper HV corridor.
 - 3. Existing HV services should be protected as per site and soil condition.
 - 4. Proposed pile/ pile cap/ abutment work not allowed in DEWA reservation.

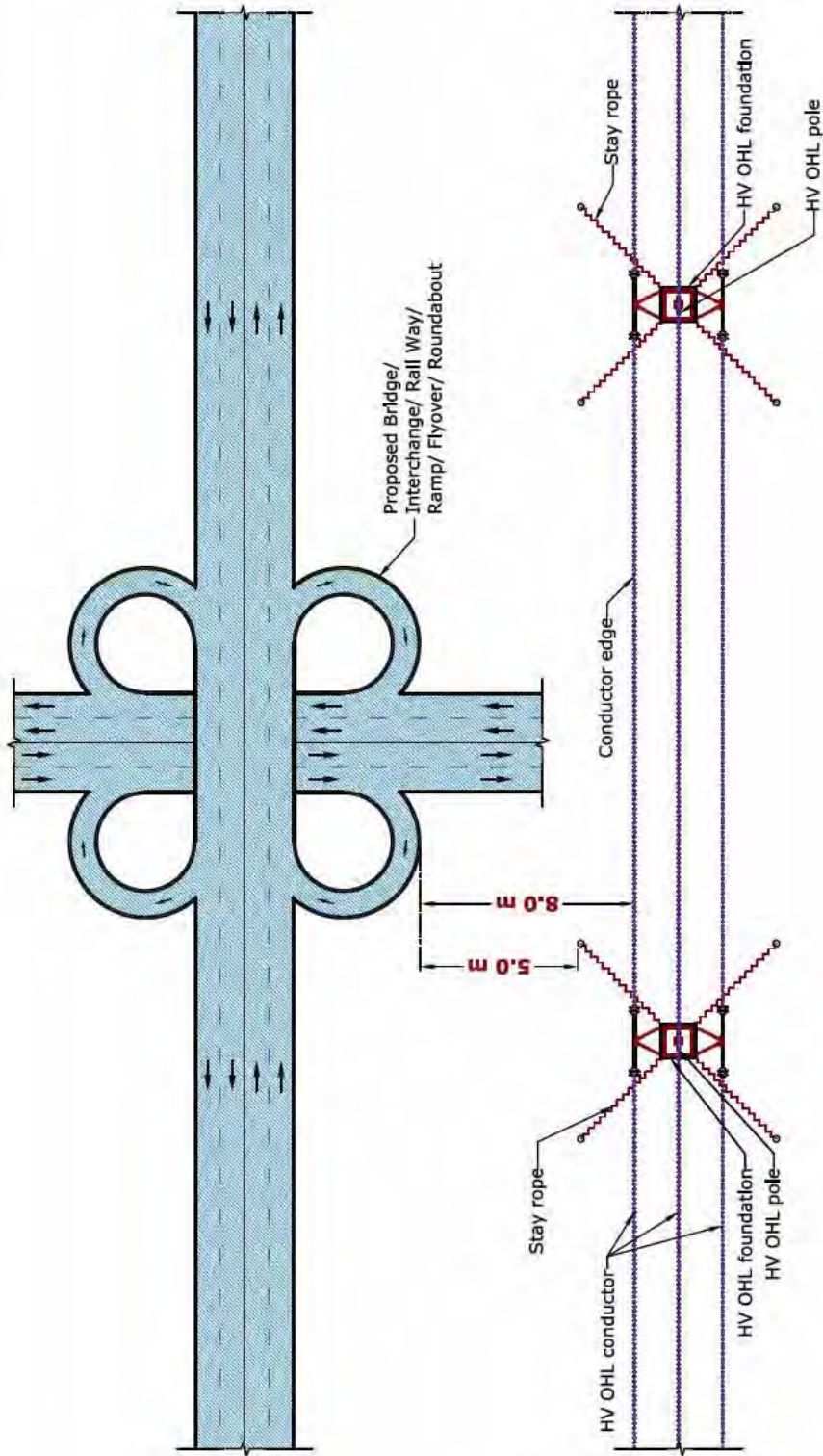
Fig: 25.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WORK AND EXISTING HV SERVICES



NOTE : 1. Existing HV OHL should be under grounded in the respective corridor at the proposed crossing location.
2. Existing HV OHL should be protected as per site condition.

HORIZONTAL CLEARANCE (PARALLEL) DETAILS BETWEEN PROPOSED WORK AND EXISTING HV OHL (6.6/11/33 kV)

Fig: 25.4



- NOTE :**
1. Horizontal clearance is from the proposed work to existing HV OHL conductor edge.
 2. Existing HV OHL should be under grounded in the respective corridor at the proposed crossing location.
 3. Existing HV OHL pole/foundation should be protected as per site condition.

Fig: 25.5 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

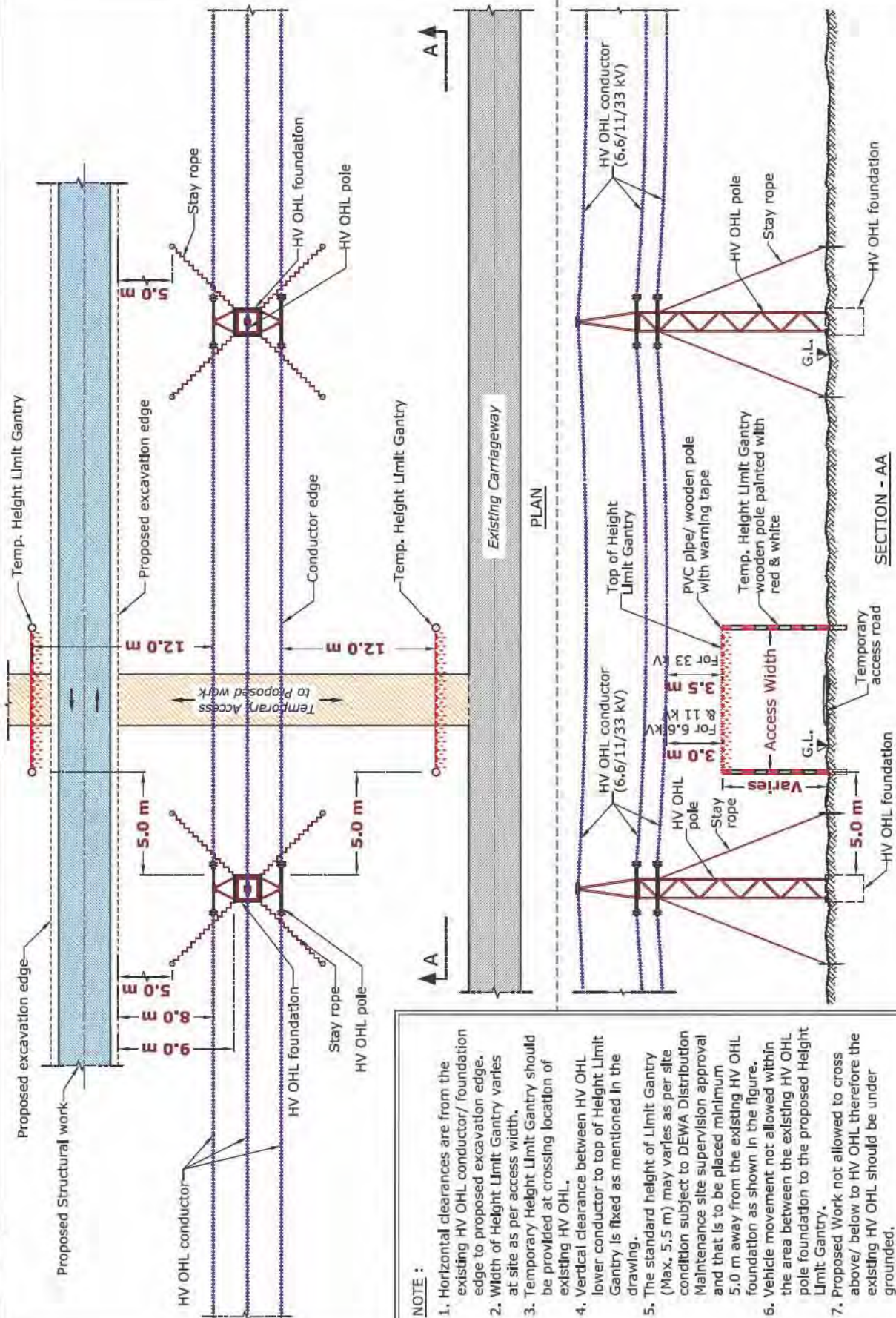


Table 3: Clearance & Protection details for proposed work and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance		Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	2.0 m		5.5 m	A	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 25.6)Vertical clearance (Ref Fig: 25.8)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	2.0 m		5.5 m	A	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 25.6)Vertical clearance (Ref Fig: 25.8)
EHV (132 kV) Trough	2.0 m		5.5 m	A	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 25.7)Vertical clearance (Ref Fig: 25.8)
EHV (132 kV) Duct Bank	2.0 m		NR	A	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 25.7)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m		5.5 m	A	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 25.8)Vertical clearance (Ref Fig: 25.8)
EHV (400 kV) Tunnel	To be studied on case by case basis.						<ul style="list-style-type: none">Ref Note below
EHV (132 kV) O.H.L	25.0 m	10.0 m	15.0 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 25.10 & 25.11)Vertical clearance (Ref Fig: 25.12)
EHV (400 kV) O.H.L	40.0 m	16.0 m	16.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 25.10 & 25.11)Vertical clearance (Ref Fig: 25.12)
Clearance & Protection details for access and working under Existing EHV-OHL							
EHV (132 kV) O.H.L	5.0 m		4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 25.9)Vertical clearance (Ref Fig: 25.9)Protection details (Ref Fig: 25.9)
EHV (400 kV) O.H.L			7.5 m				
*Note: The maximum vibration level for civil works not to exceed 15 mm/s PPV							

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 25.6 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WORK AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES

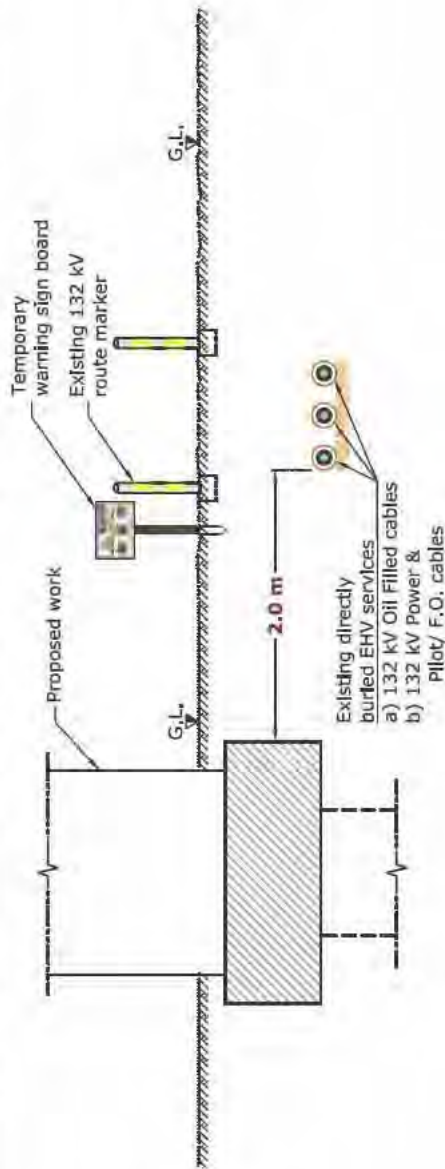
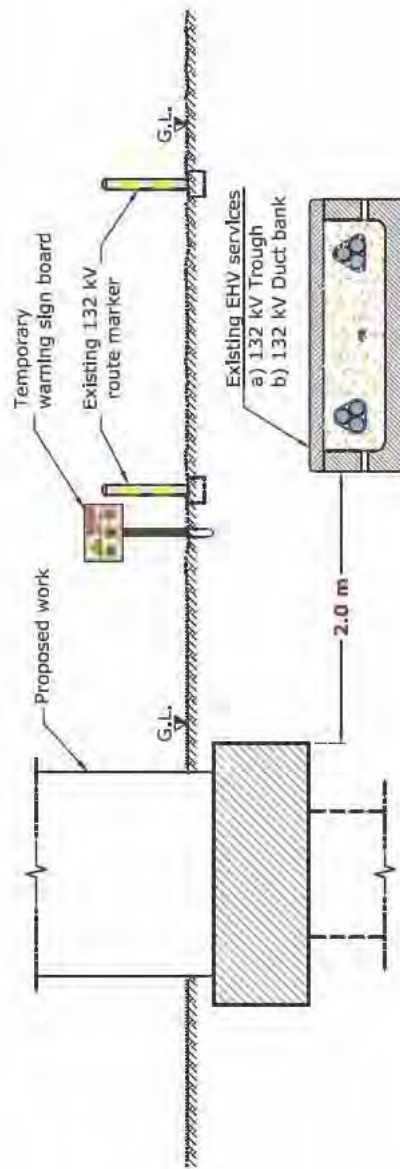
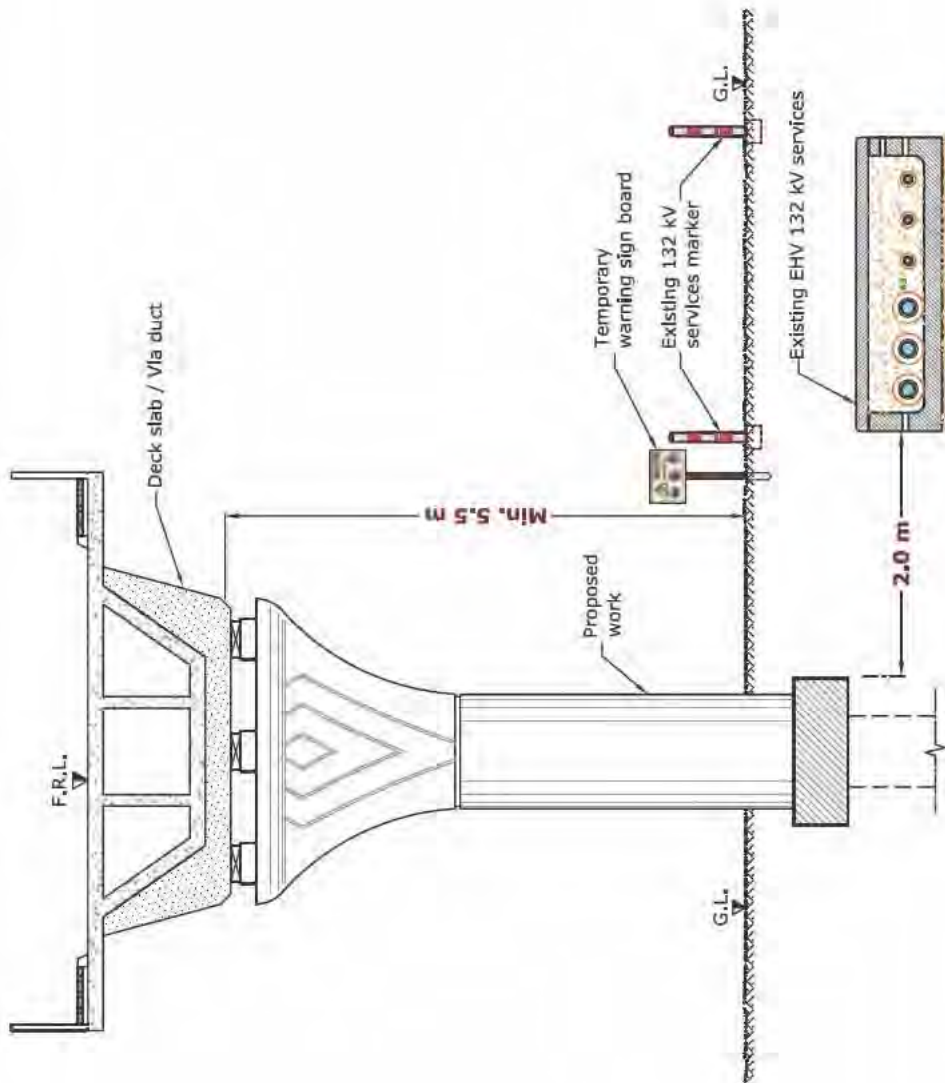


Fig: 25.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WORK AND EXISTING EHV 132 kV TROUGH/ DUCT BANK



- NOTE :**
1. Minimum 5.5 m vertical clearance to be maintained from ground level to the bottom of proposed bridge, at crossing locations for maintenance purpose.
 2. All horizontal clearances are from proposed Work edge to existing EHV 132 kV services edge.
 3. Temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.
 4. Proposed work not allowed on top of DEWA reservation.
 5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

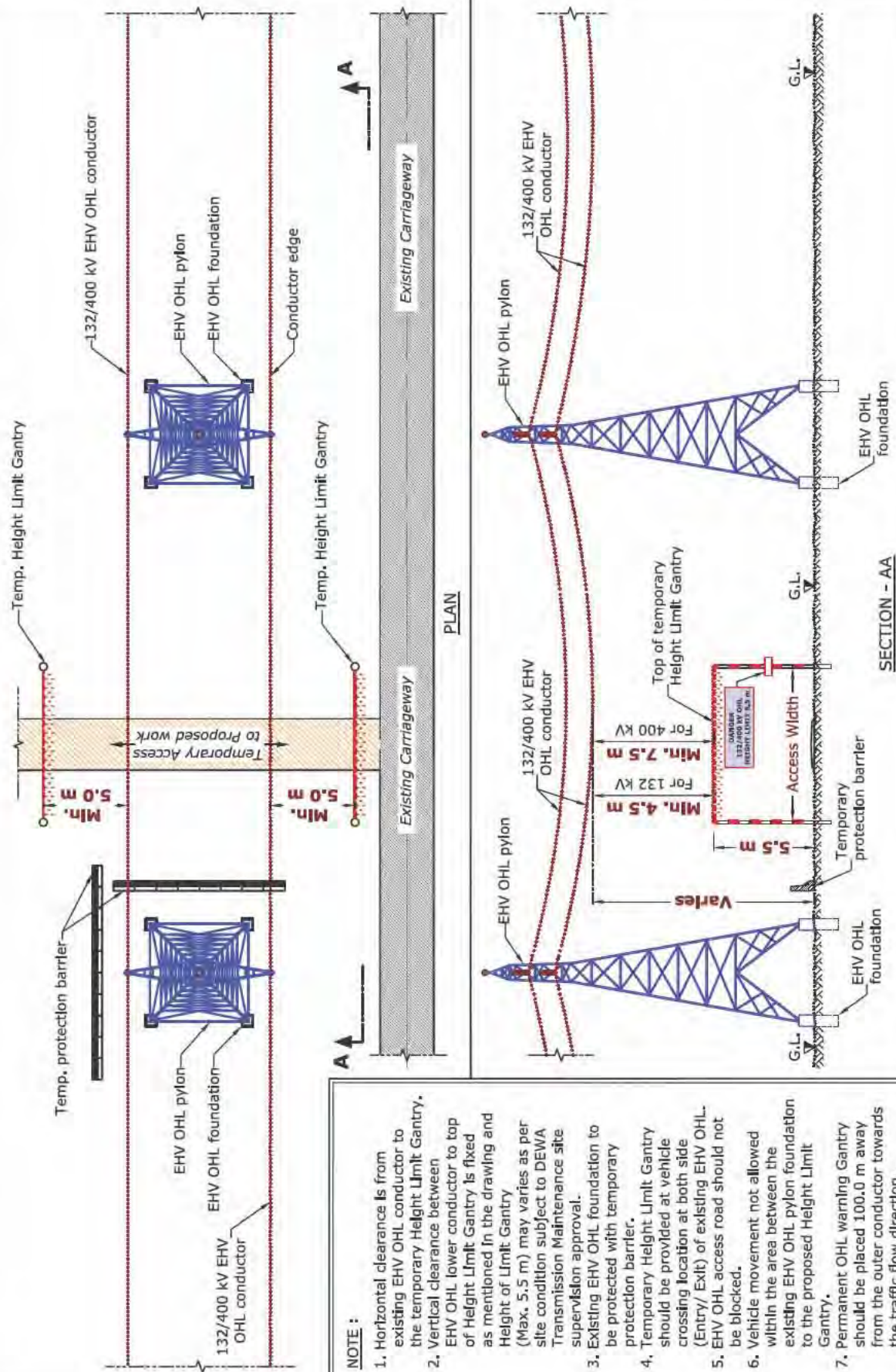
Fig: 25.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WORK AND EXISTING EHV 132 kV SERVICES



NOTE :

1. Horizontal clearance is from proposed pile/ piling cap/ abutment edge to existing EHV 132 kV services.
2. Vertical clearance from the Ground level to the bottom of the Deck slab/ Via duct.
3. Minimum vertical clearance for maintenance purpose to be maintained at site as mentioned in the drawing.
4. Temporary warning sign boards to be fixed around the existing EHV 132 kV services location.
5. Proposed work not allowed on top of DEWA reservation.
6. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

Fig: 25.9 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING EHV OHL (132/400 kV)



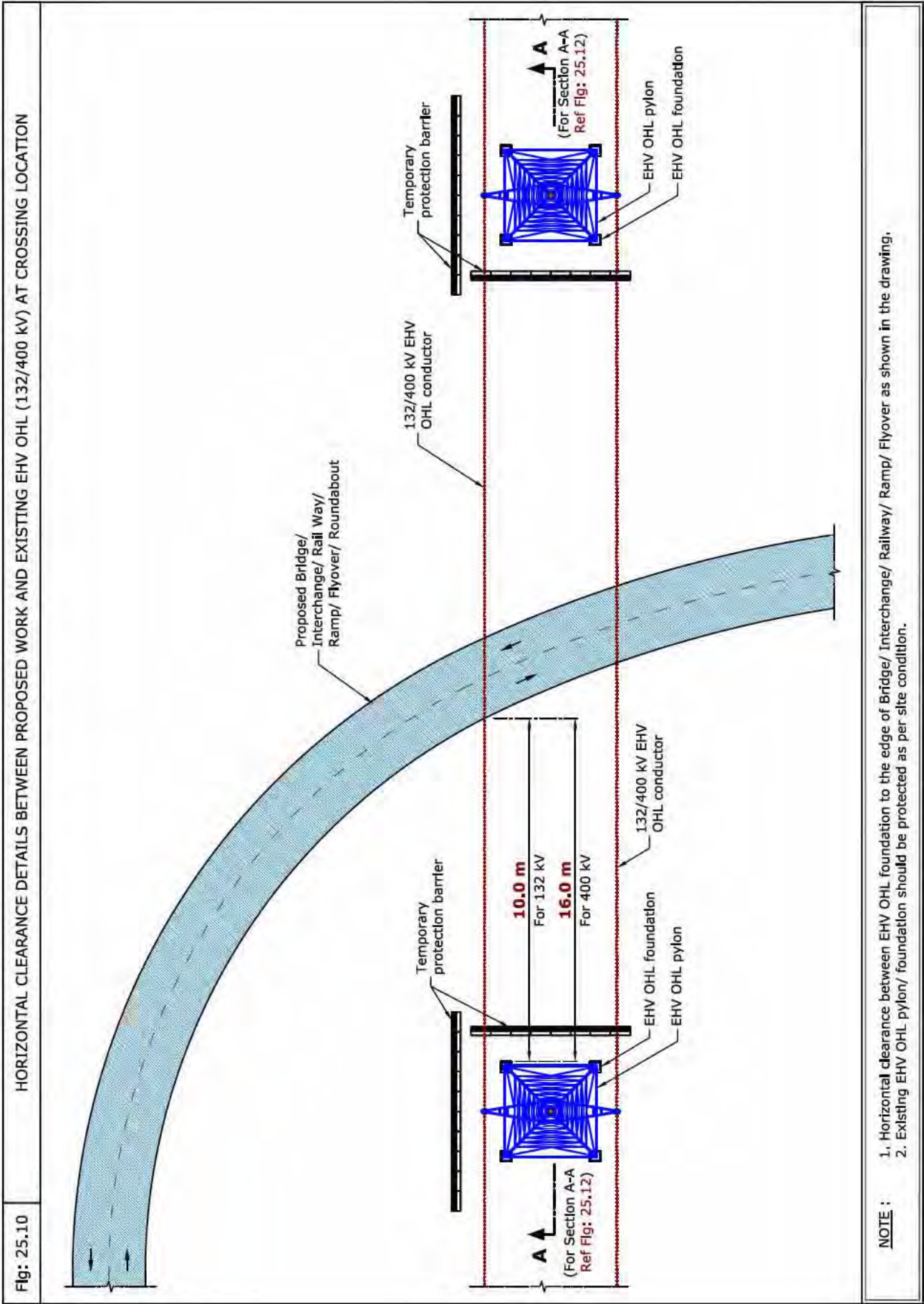
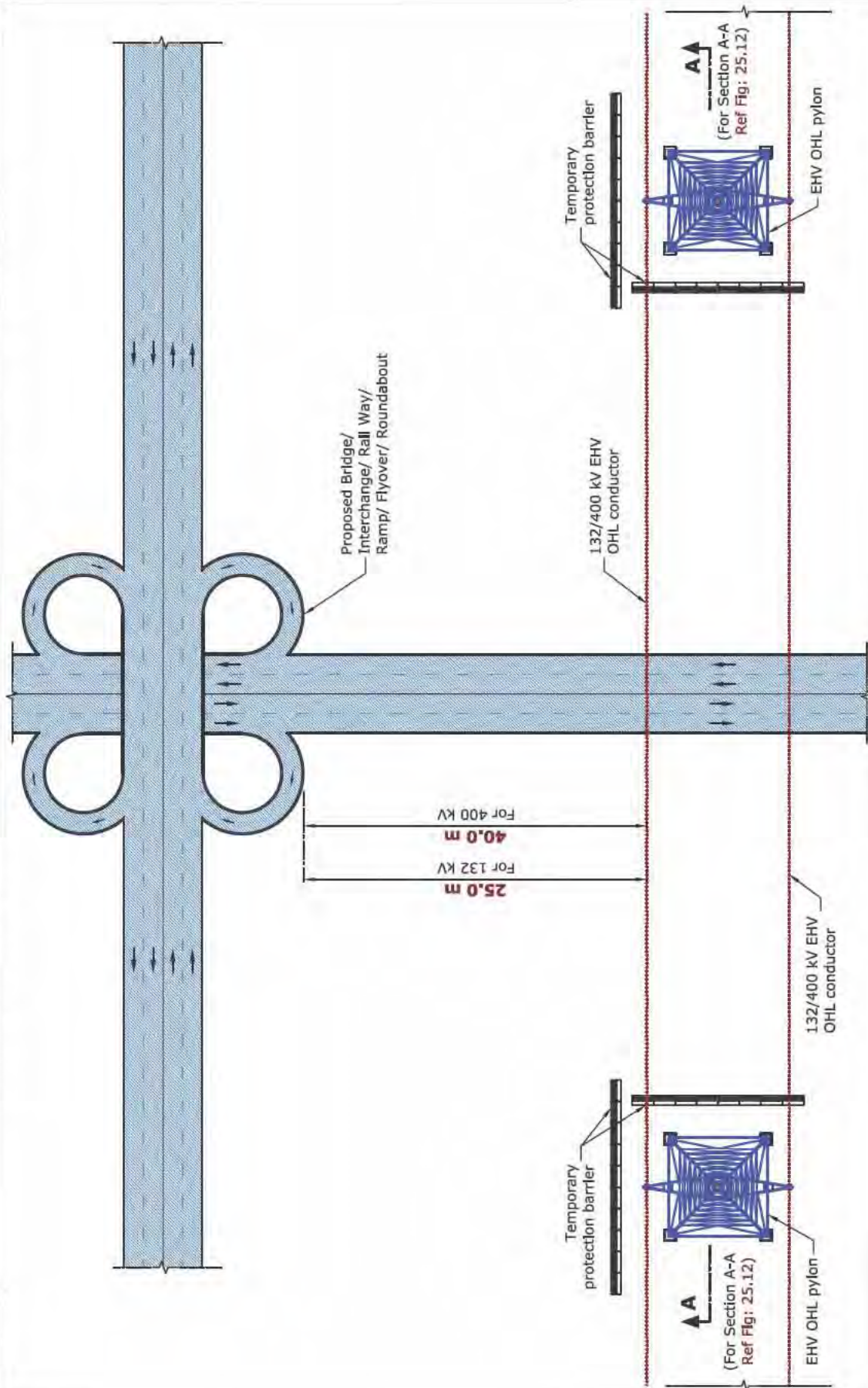
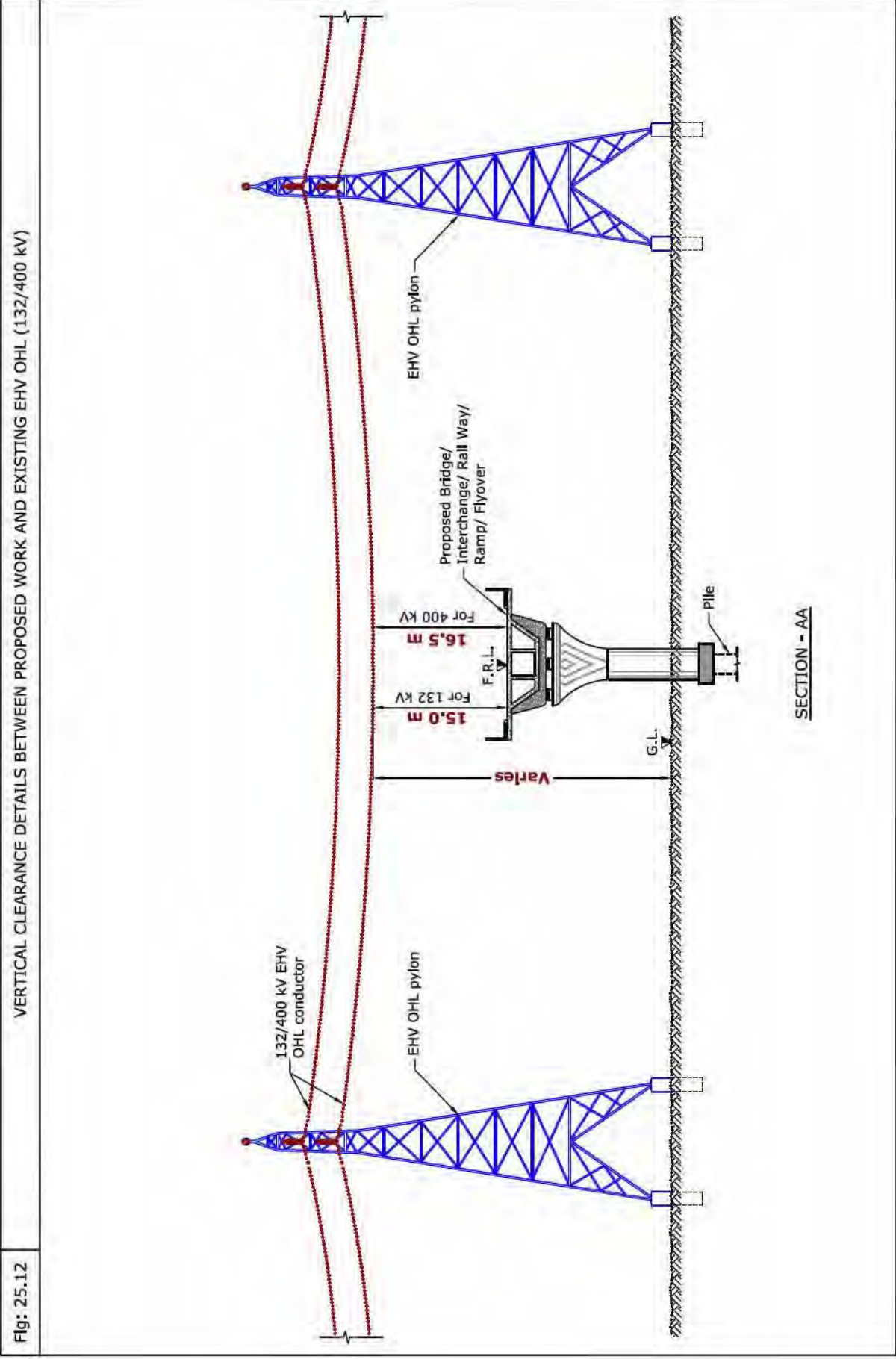


Fig: 25.11 HORIZONTAL CLEARANCE (PARALLEL) DETAILS BETWEEN PROPOSED WORK AND EXISTING EHV OHL (132/400 kV)



- NOTE :**
1. Horizontal clearance between EHV OHL conductor edge to the edge of Bridge/ Interchange/ Railway/ Ramp/ Flyover as shown in the drawing.
 2. Existing EHV OHL pylon/ foundation should be protected as per site condition.



NOTE :

1. Vertical clearance between EHV OHL lower conductor to top of Bridge/ Interchange/ Railway/ Ramp/ Flyover as shown in the drawing.
2. Existing EHV OHL pylon/ foundation should be protected as per site condition.

Table 4: Clearance & Protection details for proposed work and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	13.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 25.13)
Gas/Fuel pipeline (All diameter)	15.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 25.13)

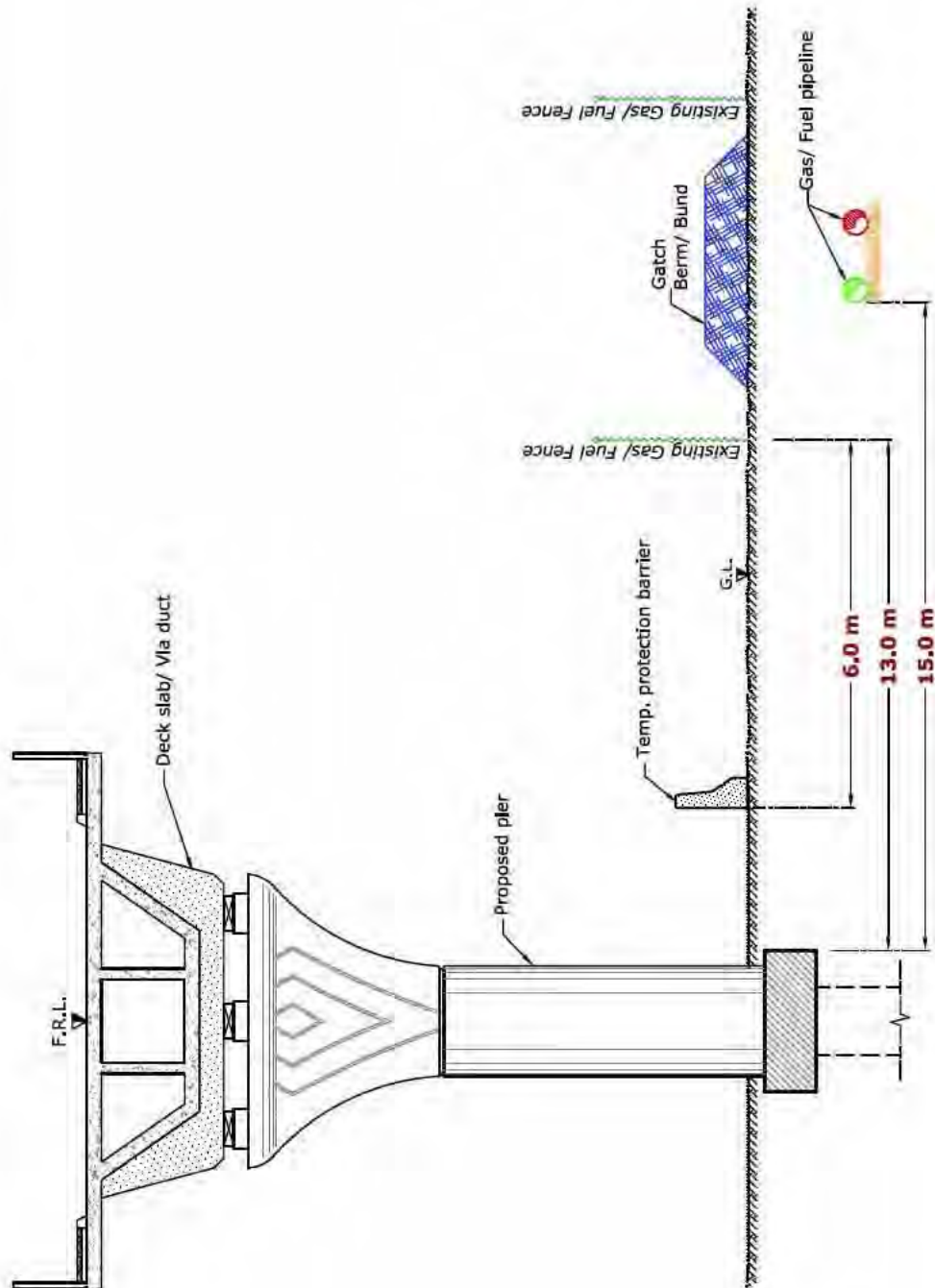
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 25.13

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED WORK AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 13.0 m from proposed pier/ pier cap/ abutment edge to existing Gas/ Fuel fence.
2. Horizontal clearance 15.0 m from proposed pier/ pier cap/ abutment edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

26. Proposed Grading

26.1 Introduction

The purpose of grading work is to prepare the existing ground to be suitable to receive construction activities, such as building foundations, roads works, landscape works etc., by shaping/reshaping either by cutting and/or filling which allows a maximum depth of 300 mm. In general the grading works include

changing the existing surface horizontally with a minimum slope for surface drain.

Earthwork activities usually implemented within Right Of Way therefore, it is required to protect DEWA existing assets as per specified standards.



Grading work

26.2 Avoid the following



1. Proposing Grading under HV OHL (33/11 kV)
2. Proposing Grading above the existing Gas/Fuel pipeline.
3. Proposed grading above 132 kV joint bay

26.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Grading Works and existing DEWA Electricity LV Cables						
Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	NR	0.9 m	-	-	R	• Vertical clearance (Ref Fig: 26.1)

Table 2: Clearance & Protection details for Proposed Grading Works and existing DEWA Electricity HV services						
Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	NR	0.9 m	-	-	R	• Vertical clearance (Ref Fig: 26.2)
HV (6.6/11/33 kV) Manhole	NA	-	-	-	R	-
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 26.3)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	• Horizontal clearance (Ref Fig: 26.3)
HV (33 kV) O.H.L.		3.5 m				• Vertical clearance (Ref Fig: 26.3) • Protection details (Ref Fig: 26.3)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

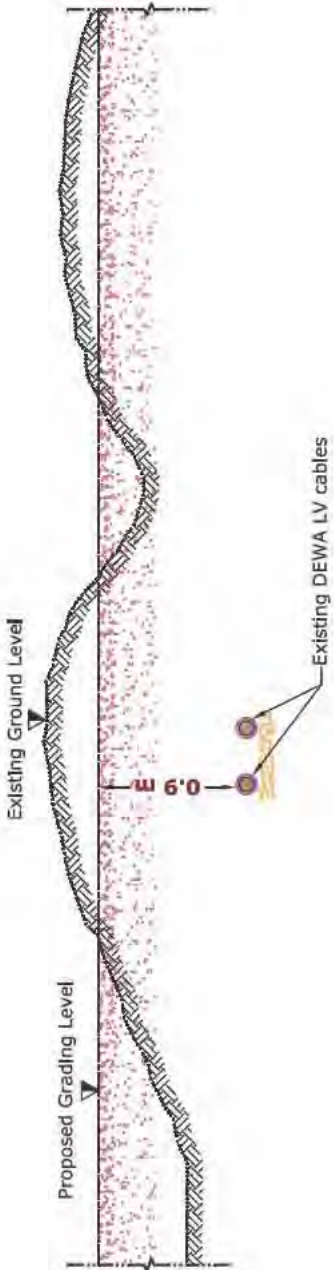
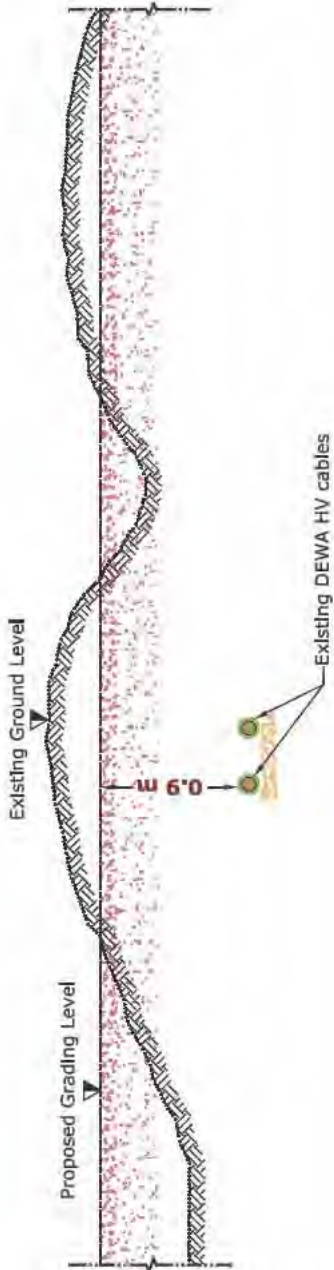
Fig: 26.1	<p>TYPICAL SECTION FOR THE PROPOSED GRADING WORKS AND EXISTING DEWA LV CABLES</p>  <p>The diagram shows a cross-section of the ground. A wavy line represents the 'Existing Ground Level'. A dashed line represents the 'Proposed Grading Level'. Below the grading level, two purple circles represent 'Existing DEWA LV cables'. A vertical dimension line indicates a clearance of '0.6 m' from the top of the cables to the proposed grading level.</p>
Fig: 26.2	<p>TYPICAL SECTION FOR THE PROPOSED GRADING WORKS AND EXISTING DEWA HV CABLES</p>  <p>The diagram shows a cross-section of the ground. A wavy line represents the 'Existing Ground Level'. A dashed line represents the 'Proposed Grading Level'. Below the grading level, two green circles represent 'Existing DEWA HV cables'. A vertical dimension line indicates a clearance of '0.6 m' from the top of the cables to the proposed grading level.</p>
NOTE :	<ol style="list-style-type: none"> 1. Vertical clearance are from proposed Grading level to the top of existing LV/ HV services. 2. Cutting/ Filling soil on top of existing DEWA Electrical services allowed LV/HV up to 0.3 m. 3. Existing cable route marker should not be displaced/ destroyed.

Fig: 26.3 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

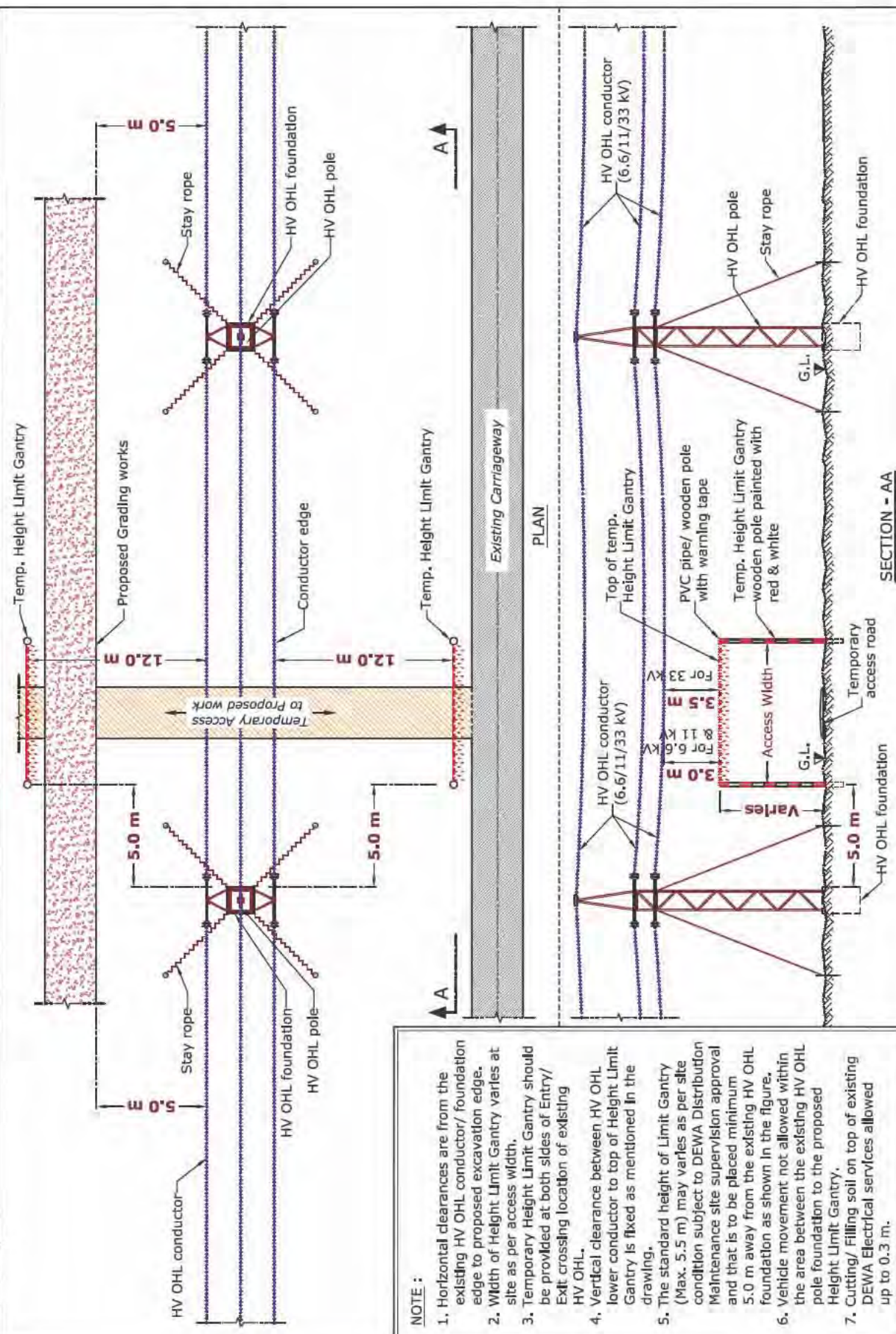


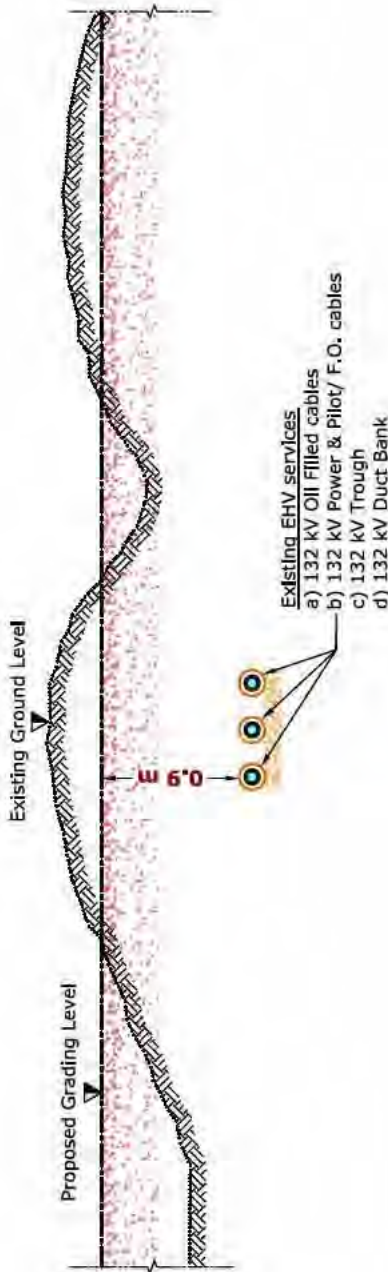
Table 3: Clearance & Protection details for Proposed Grading works and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	NR	0.9 m	-	-	R	• Vertical clearance (Ref Fig: 26.4)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	NR	0.9 m	-	-	R	• Vertical clearance (Ref Fig: 26.4)
EHV (132 kV) Trough	NR	0.9 m	-	-	R	• Vertical clearance (Ref Fig: 26.4)
EHV (132 kV) Duct Bank	NR	0.9 m	-	-	R	• Vertical clearance (Ref Fig: 26.4)
EHV (132 kV) Joint Bay/Transition Joint	NA	-	-	-	-	-
EHV (132 kV) O.H.L	NR	15.0 m	-	-	R	• Vertical clearance (Ref Fig: 26.5)
EHV (400 kV) O.H.L		16.5 m				
EHV (400 kV) Tunnel	NR	1.0 m	-	-	R	• Vertical clearance (Ref Fig: 26.6)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	-	-	R	• Horizontal clearance (Ref Fig: 26.5)
EHV (400 kV) O.H.L		7.5 m				• Vertical clearance (Ref Fig: 26.5) • Protection details (Ref Fig: 26.5)

Table Abbreviation

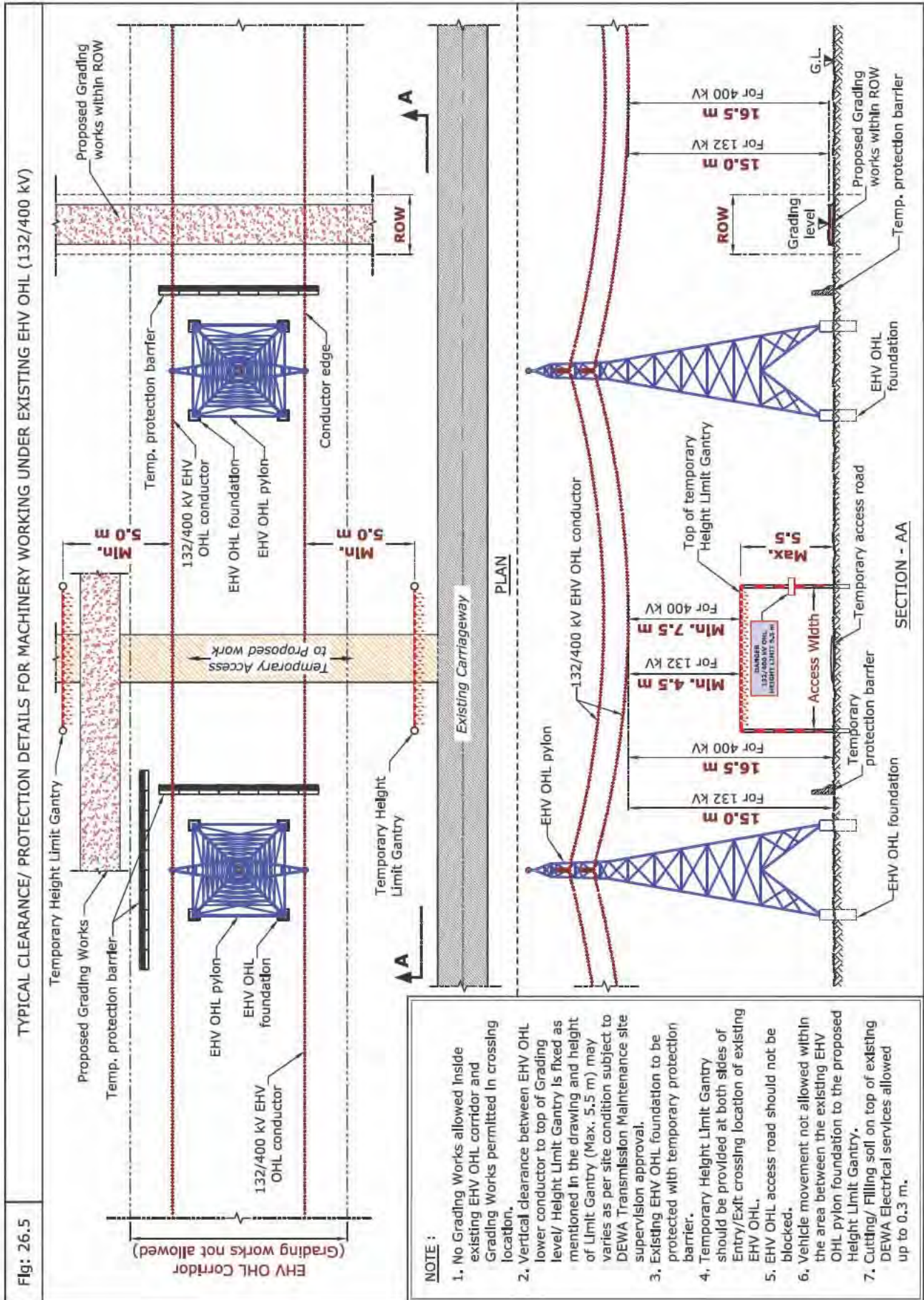
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 26.4 TYPICAL SECTION FOR THE PROPOSED GRADING WORKS AND EXISTING DEWA EHV SERVICES

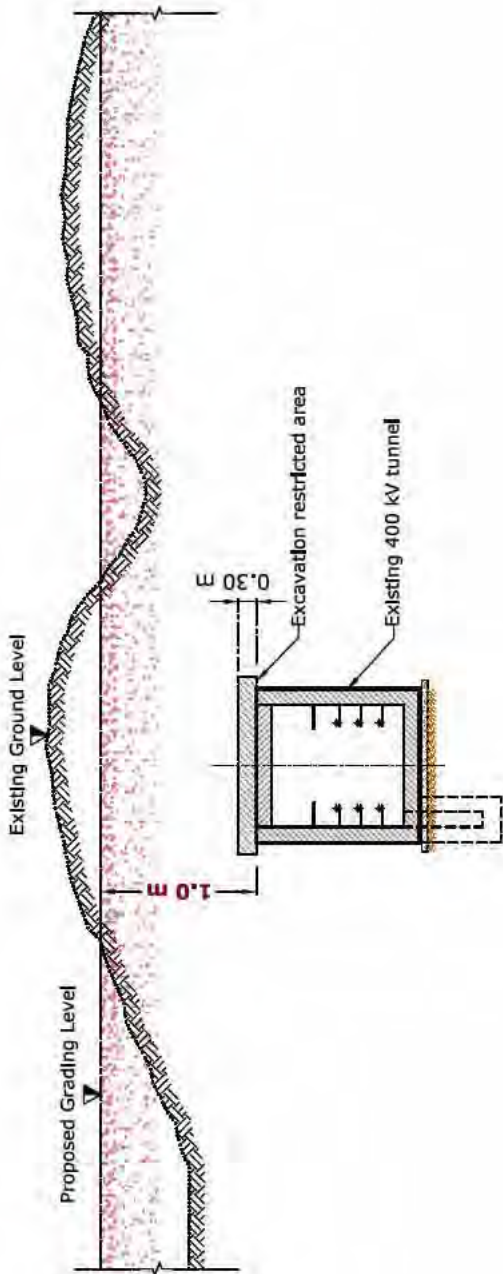


NOTE :

1. Vertical clearance is from proposed Grading level to the top of existing EHV services.
2. Cutting/ Filling soil on top of existing DEWA Electrical services allowed up to 0.3 m.
3. Existing cable route marker should not be displaced/ destroyed.
4. If the proposed Grading level affect the existing link box, the link box should be raised/ relocated as per DEWA requirement.
5. Proposed Grading works not allowed above existing 132 kV Joint bay/ Transition joint.
6. Link box area protection to be provided as per the site condition to avoid water accumulation/ any other obstruction within the link box surrounding area.



VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED GRADING WORKS AND EXISTING 400 KV TUNNEL



- NOTE :**
- 1. Vertical clearance is from proposed Grading level to the top of existing services.
 - 2. Cutting/ Filling soil on top of existing DEWA Electrical services allowed up to 0.3 m.
 - 3. Existing cable route marker should not be displaced/ destroyed.

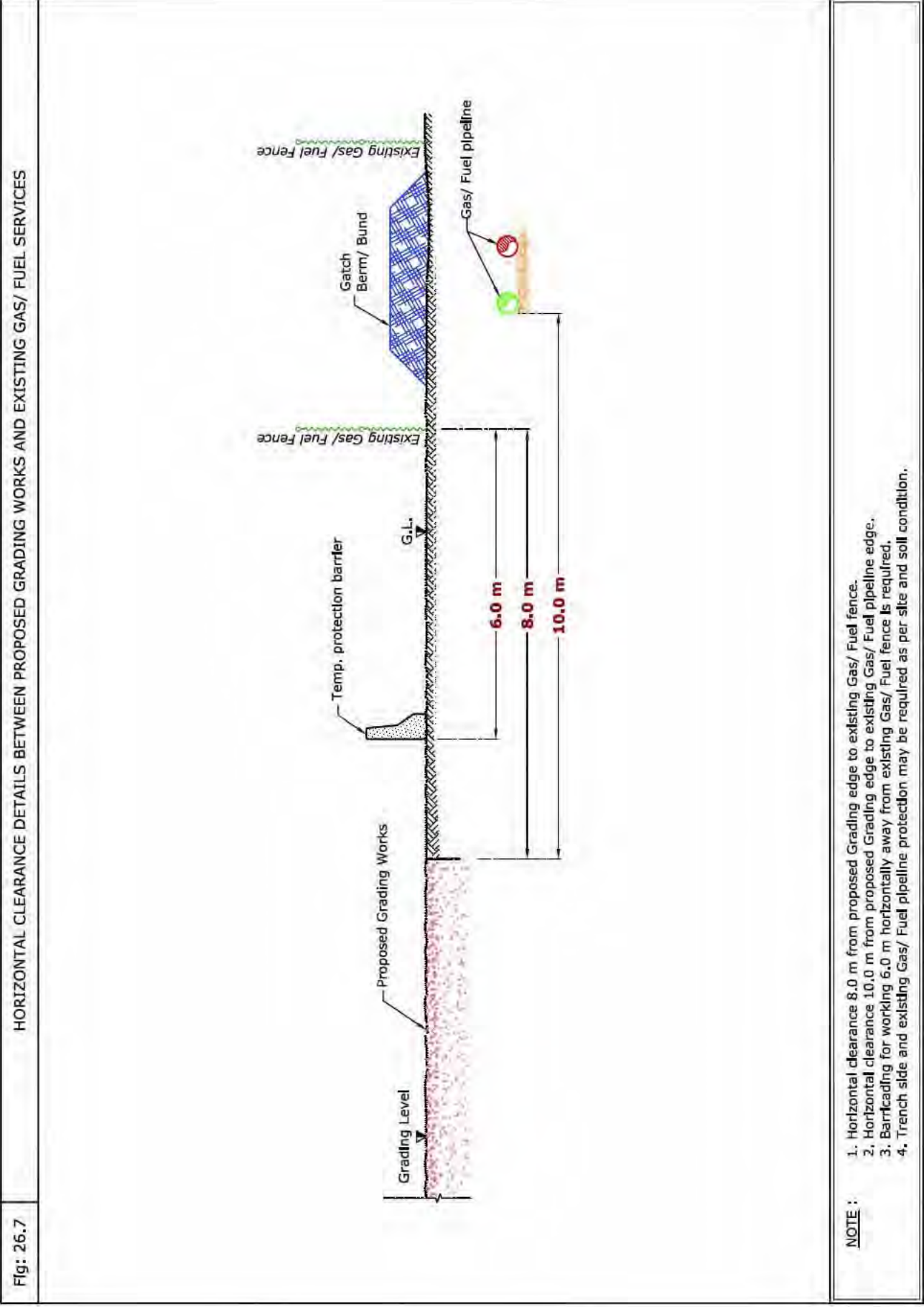
Table 4: Clearance & Protection details for Proposed Grading works and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 26.7)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 26.7)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.





27. Proposed Road Maintenance Works

27.1 Introduction

The purpose of road maintenance work is to maintain the road elements such as wearing course, base course, curbstone, guardrail, road marking, etc., to keep it as its original condition as constructed or as subsequently improved to provide satisfactory and safe condition to motorists/road users. The road maintenance is a

frequent activity to repair any defects that may occur to the existing road.

Road maintenance activities always implemented within Right Of Way therefore; it is required to protect DEWA existing assets as per DEWA specified standards.



27.2 Avoid the following



1. Disturbing /damages to DEWA existing services
2. Excavation exceeding 100 mm from F.R.L
3. Changing the road profile/geometry

27.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for Proposed Road Maintenance -Resurfacing and existing DEWA Electricity LV Cables						
Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	NR	As Existing	A	-	R	• Vertical clearance (Ref Fig: 27.1)

Table 2: Clearance & Protection details for Proposed Road Maintenance -Resurfacing and existing DEWA Electricity HV services						
Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	NR	As Existing	A	-	R	• Vertical clearance (Ref Fig: 27.2)
HV (6.6/11/33 kV) Manhole		NA	-	-	R	-
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 27.3)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	• Horizontal clearance (Ref Fig:27.3)
HV (33 kV) O.H.L.		3.5 m				• Vertical clearance (Ref Fig: 27.3) • Protection details (Ref Fig: 27.3)

Table Abbreviation	
A - Above existing DEWA services.	DC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

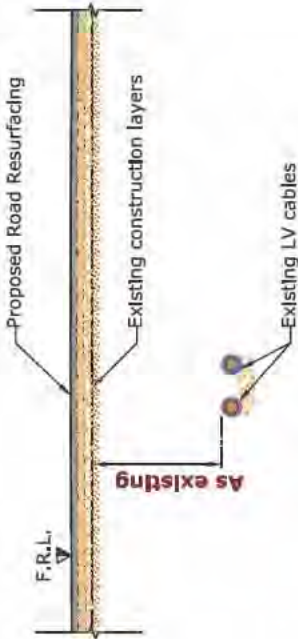
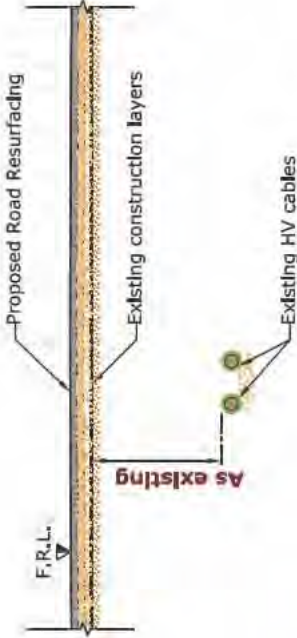
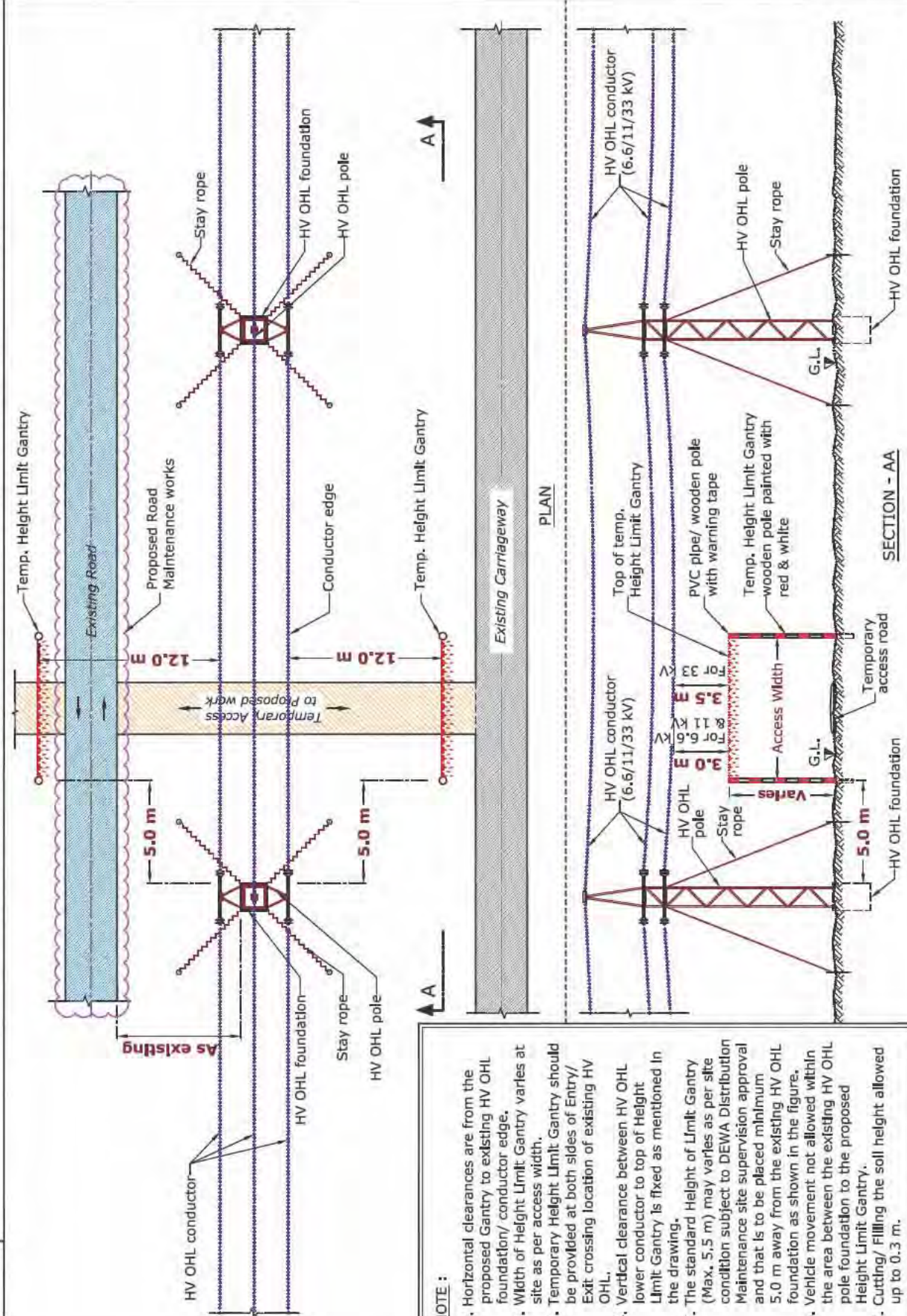
Fig: 27.1	VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED ROAD MAINTENANCE WORKS AND EXISTING LV CABLES	Fig: 27.2	VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED ROAD MAINTENANCE WORKS AND EXISTING HV SERVICES
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Resurfacing/ Kerb stone repair/ Patch works are considered as Road Maintenance works, rest of works considered as Road project. 2. Road elements such as Carriageway, Service road and Parking lots should be Identified prior to start the Road Maintenance activities. 3. Existing DEWA services cover/ depth to be maintained as existing during the maintenance works. 	

Fig: 27.3 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)



- NOTE :**
1. Horizontal clearances are from the proposed Gantry to existing HV OHL foundation/ conductor edge.
 2. Width of Height Limit Gantry varies at site as per access width.
 3. Temporary Height Limit Gantry should be provided at both sides of Entry/ Exit crossing location of existing HV OHL.
 4. Vertical clearance between HV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
 5. The standard Height of Limit Gantry (Max. 5.5 m) may vary as per site condition subject to DEWA Distribution Maintenance site supervision approval and that is to be placed minimum 5.0 m away from the existing HV OHL foundation as shown in the figure.
 6. Vehicle movement not allowed within the area between the existing HV OHL pole foundation to the proposed Height Limit Gantry.
 7. Cutting/ Filling the soil height allowed up to 0.3 m.

Table 3: Clearance & Protection details for Proposed Road Maintenance -Resurfacing and existing DEWA Electricity EHV services

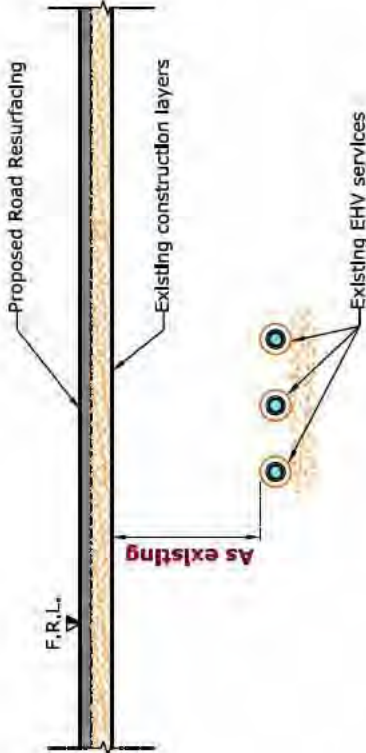
Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	NR	As Existing	-	-	R	• Vertical clearance (Ref Fig: 27.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	NR	As Existing	-	-	R	• Vertical clearance (Ref Fig: 27.4)
EHV (132 kV) Trough	NR	As Existing	-	-	R	• Vertical clearance (Ref Fig: 27.4)
EHV (132 kV) Duct Bank	NR	As Existing	-	-	R	• Vertical clearance (Ref Fig: 27.4)
EHV (132 kV) Joint Bay/ Transition Joint	NA	-	-	-	R	-
EHV (132/400 kV) O.H.L	NA	-	-	-	R	-
EHV (400 kV) Tunnel	NR	As Existing	-	-	R	• Vertical clearance (Ref Fig: 27.6)

Clearance & Protection details for access and working under Existing EHV-OHL

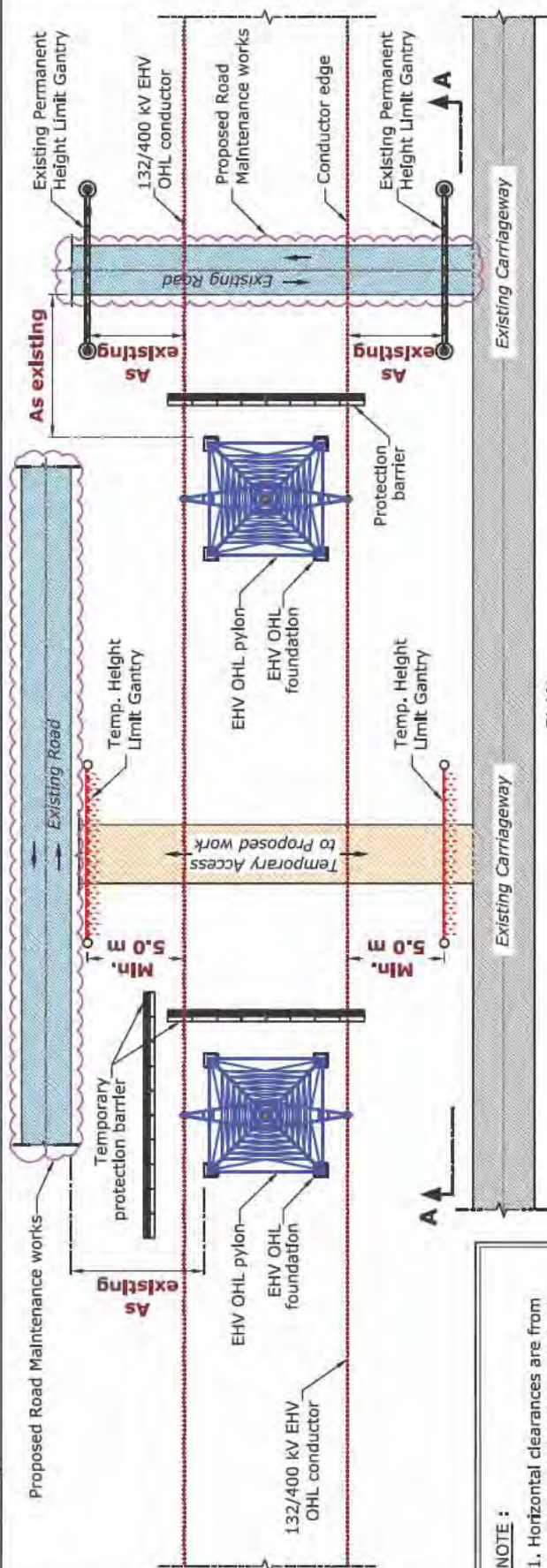
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	• Horizontal clearance (Ref Fig: 27.5)
EHV (400 kV) O.H.L		7.5 m				• Vertical clearance (Ref Fig: 27.5) • Protection details (Ref Fig: 27.5)

Table Abbreviation

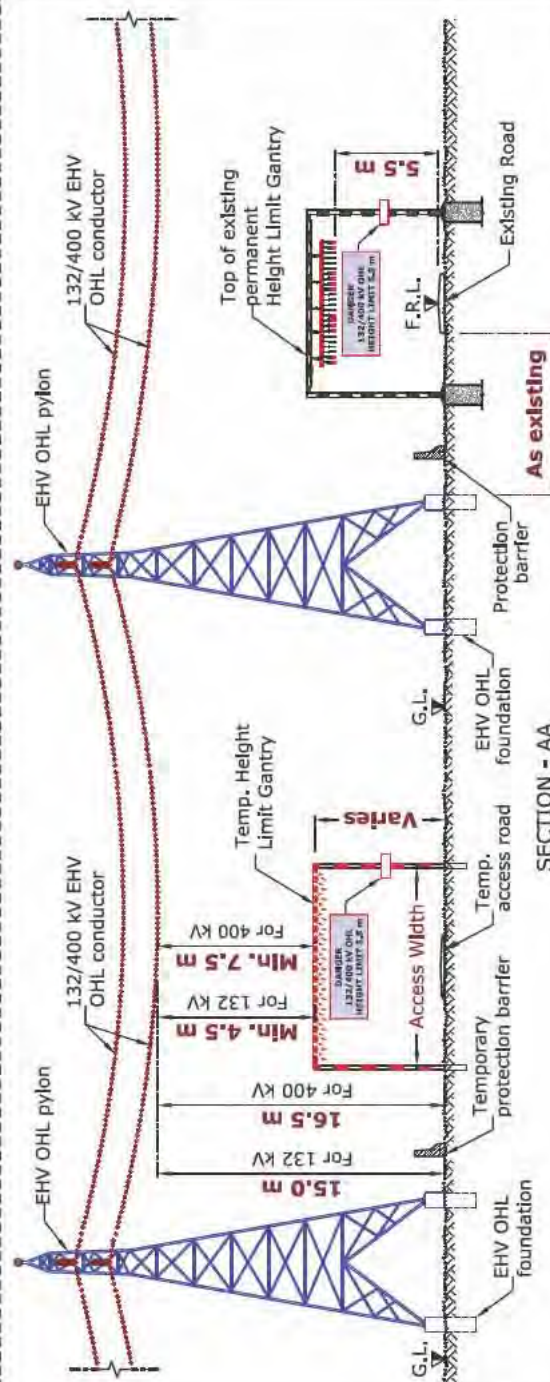
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 27.4	VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED ROAD MAINTENANCE WORKS AND EXISTING EHV SERVICES
 <p>The diagram illustrates the vertical clearance requirements for proposed road maintenance works relative to existing EHV (Extra High Voltage) services. It shows a cross-section of a road with a proposed road resurfacing layer and existing construction layers. A vertical line indicates the F.R.L. (Finished Road Level). To the right, existing EHV services are shown with a vertical clearance dimension labeled 'As existing'.</p>	
<p>NOTE :</p> <ol style="list-style-type: none">1. Resurfacing/ Kerb stone repair/ Patch works are considered as Road Maintenance works, rest of works considered as Road project.2. Road elements such as Carriageway, Service road and Parking lots should be identified prior to start the Road Maintenance activities.3. Existing DEWA services cover/ depth to be maintained as existing during the maintenance works.	

TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING EHV OHL (132/400 kV)



PLAN



SECTION - AA

NOTE :

1. Horizontal clearances are from existing EHV OHL foundation/ conductor to the proposed working area.
2. Vertical clearance between EHV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing and height of Limit Gantry (Max. 5.5 m) may varies as per site condition subject to DEWA Transmission Maintenance site supervision approval.
3. Existing EHV OHL foundation to be protected with temporary protection barrier.
4. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing EHV OHL.
5. EHV OHL access road should not be blocked.
6. Vehicle movement not allowed within the area between the existing EHV OHL pylon foundation to the proposed Temp.Height Limit Gantry.

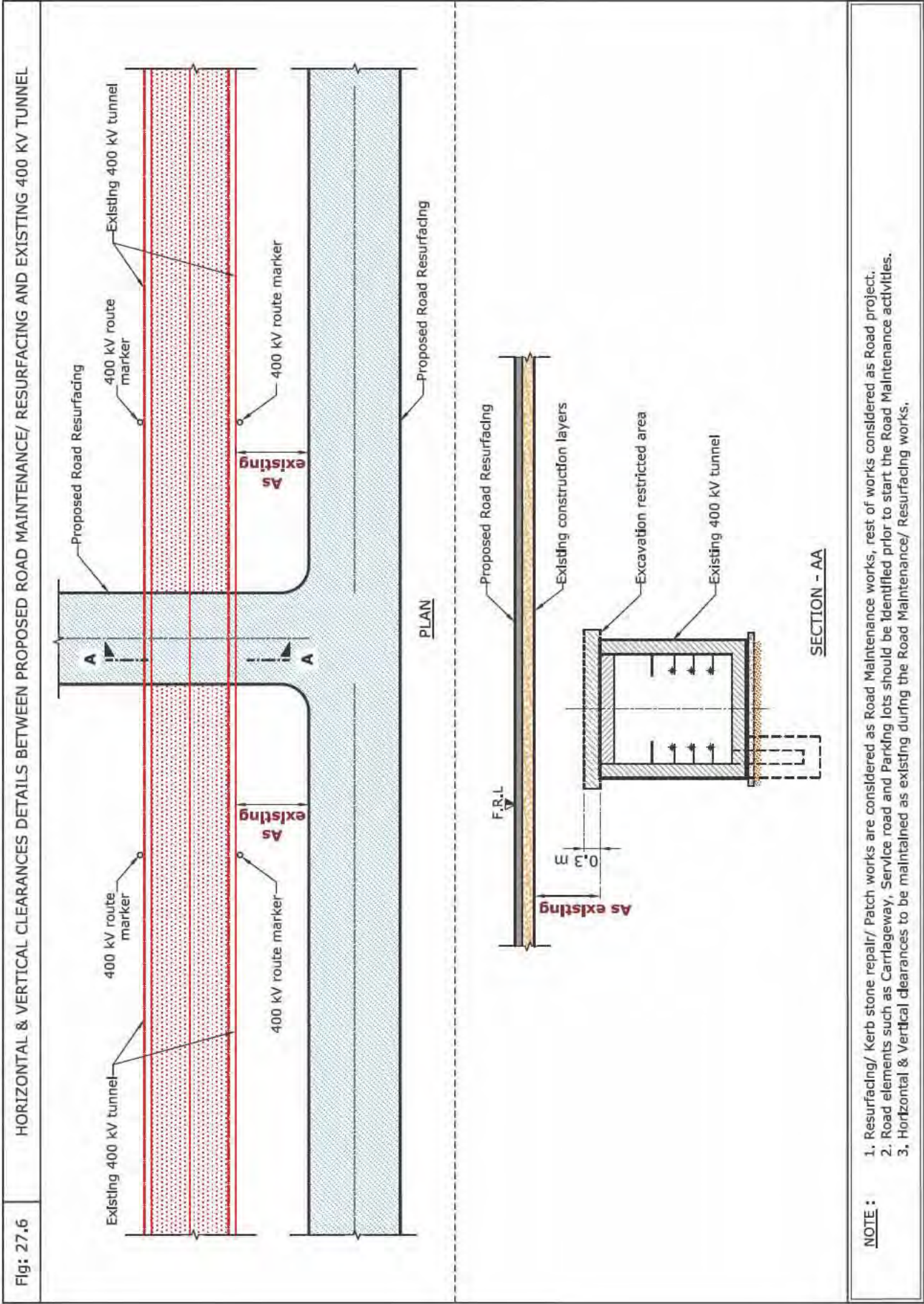


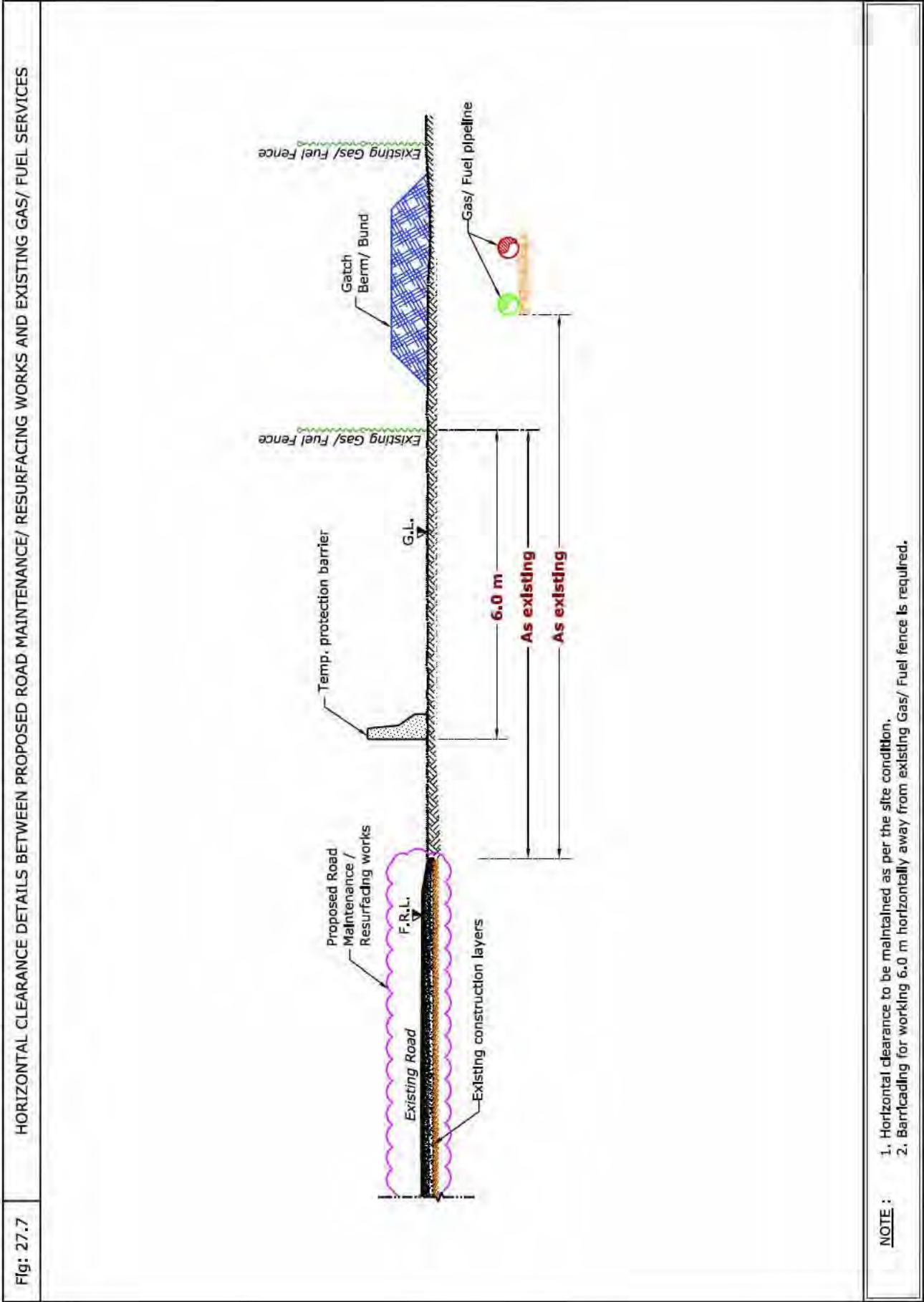
Table 4: Clearance & Protection details for Proposed Road Maintenance -Resurfacing and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	As Existing	NA	-	-	R	• Horizontal clearance (Ref Fig: 27.7)
Gas/Fuel pipeline (All diameter)	As Existing	NA	-	-	R	• Horizontal clearance (Ref Fig: 27.7)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.





28. Proposed DEWA Electrical Ducts, Extension and protection of existing Ducts

28.1 Introduction

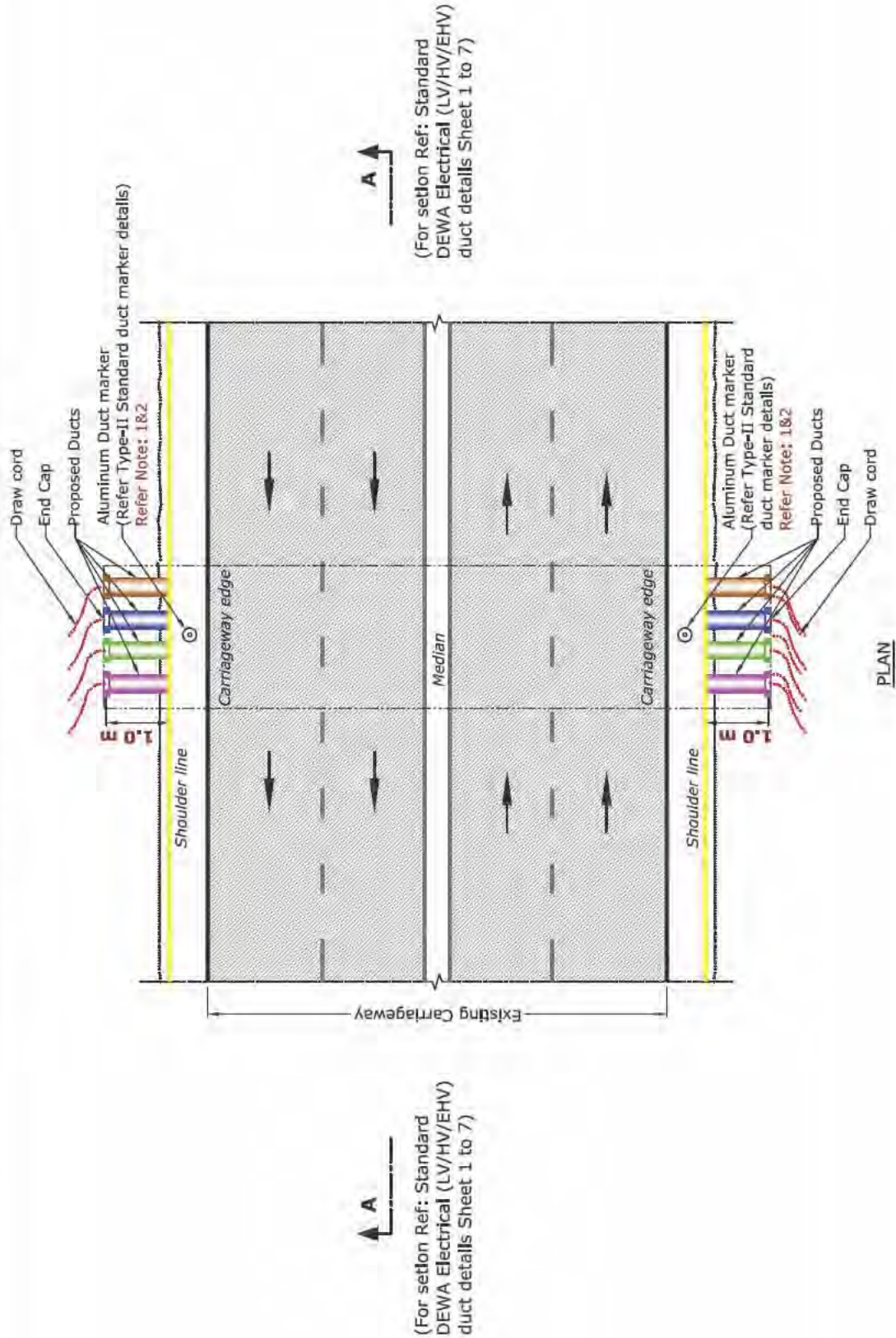
Proposed ducts are used to provide a clear pathway for laying future DEWA ED cables without disturbing the existing Services/Roads.

During the construction activities of proposed duct(s), extension and/or protection, DEWA existing services must be protected as per DEWA specified standards.



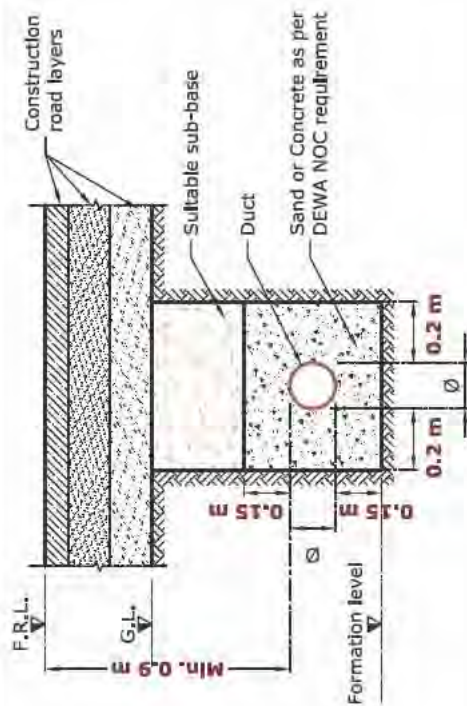
Proposed DEWA Electrical Ducts, Extension and protection of existing Ducts

STANDARD DEWA ELECTRICAL (LV/HV/EHV) DUCT DETAILS

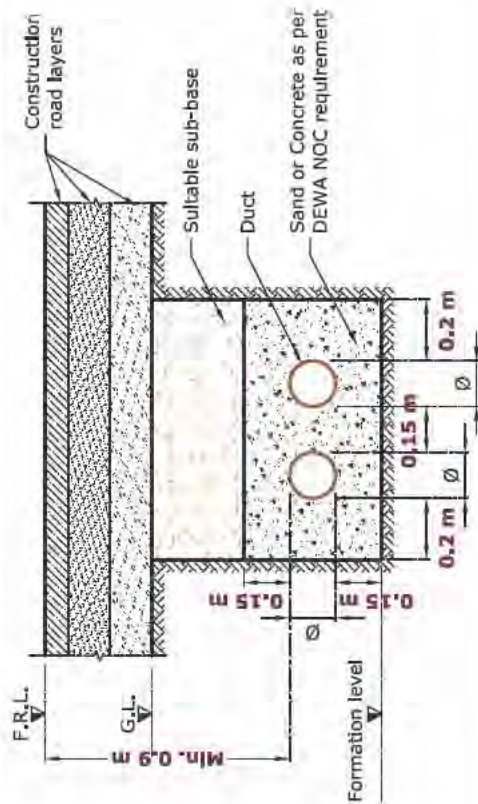


- NOTE :**
1. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
 2. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.

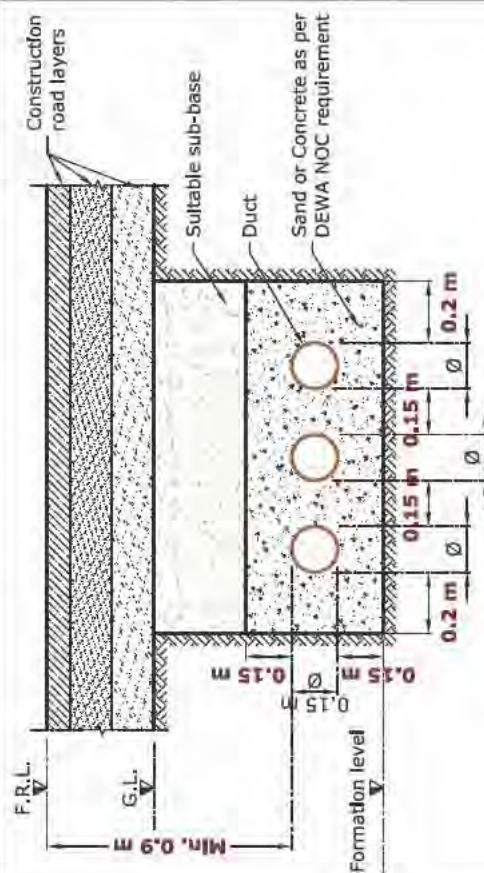
STANDARD DEWA ELECTRICAL (LV/HV) DUCT DETAILS (SHEET-1)



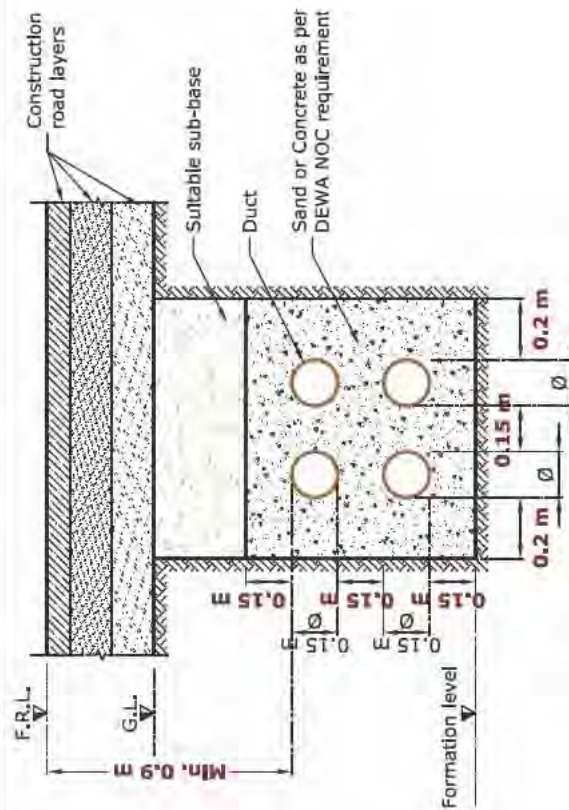
TYPICAL 1-WAY DUCT



TYPICAL 2-WAY DUCT

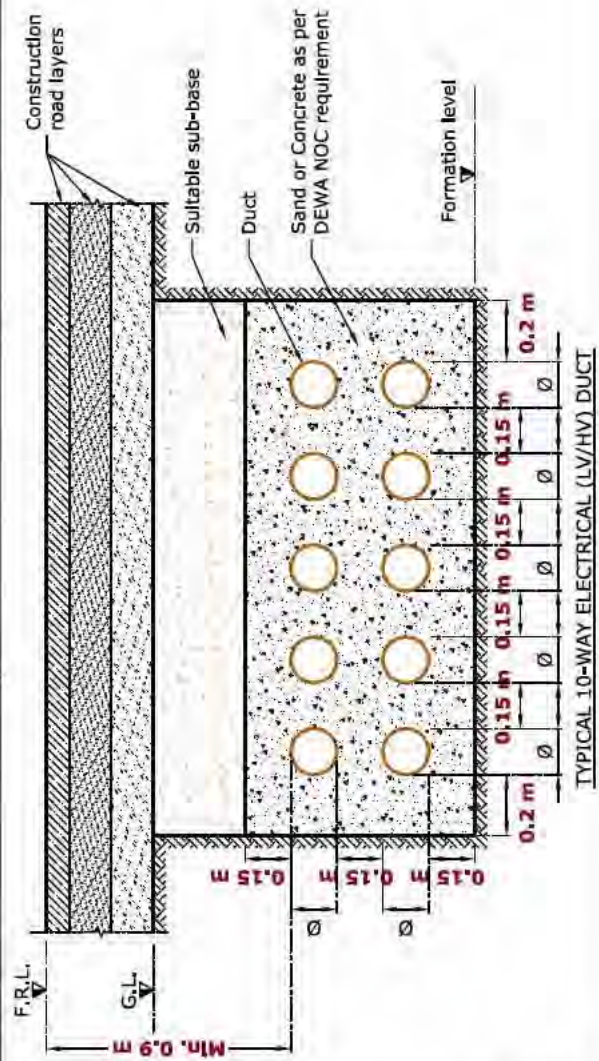
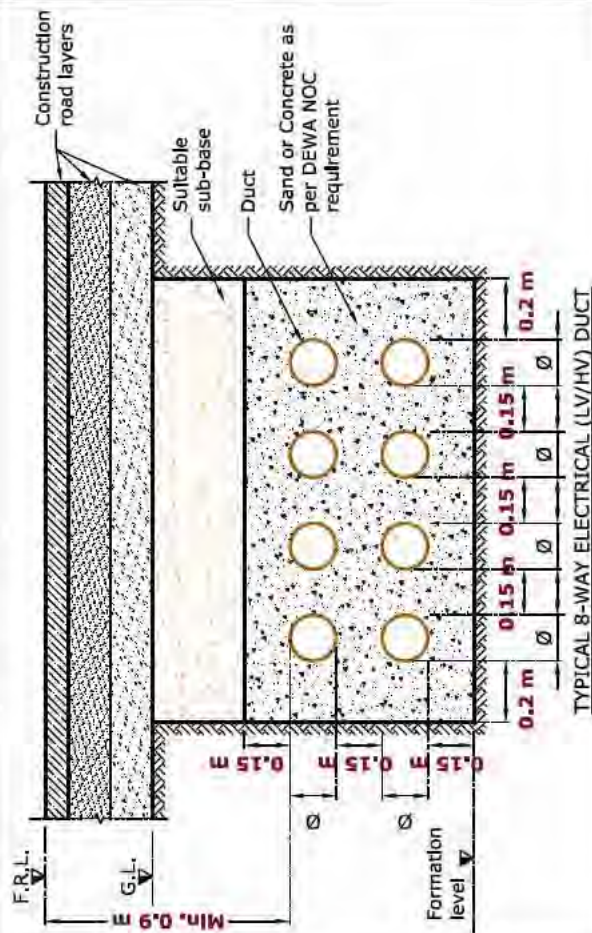
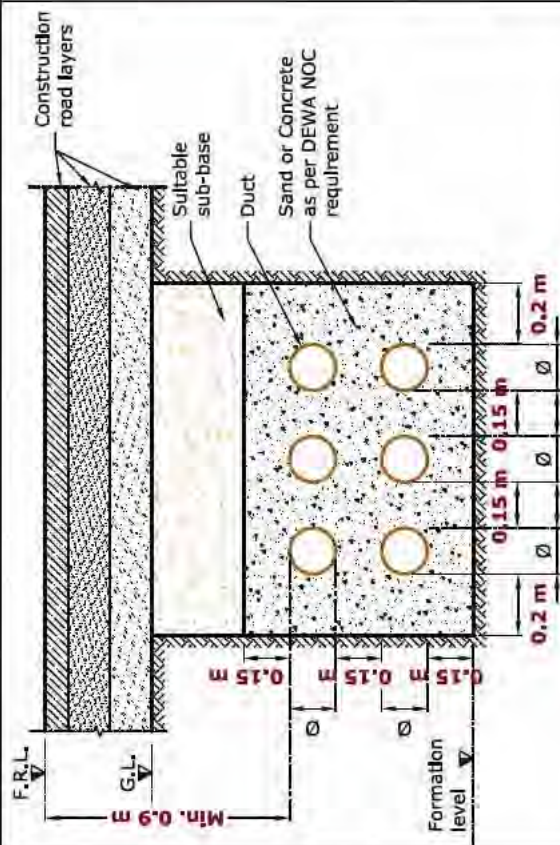


TYPICAL 3-WAY ELECTRICAL (LV/HV) DUCT



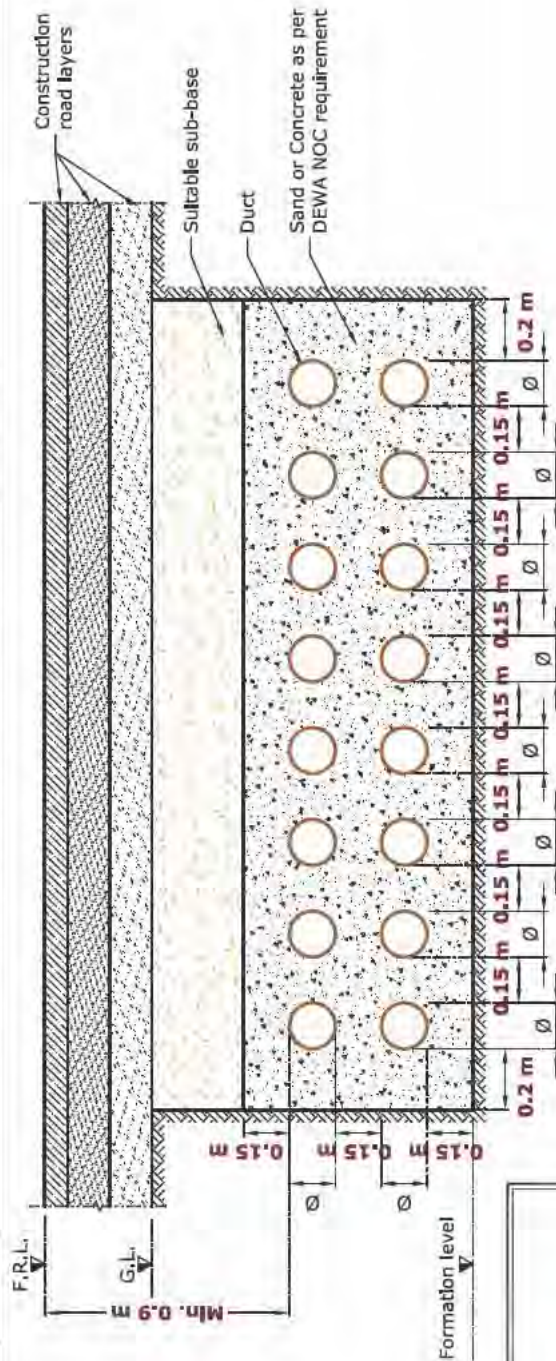
TYPICAL 4-WAY ELECTRICAL (LV/HV) DUCT

NOTE : Refer general duct note in "STANDARD DUCT DETAILS (SHEET-4)"

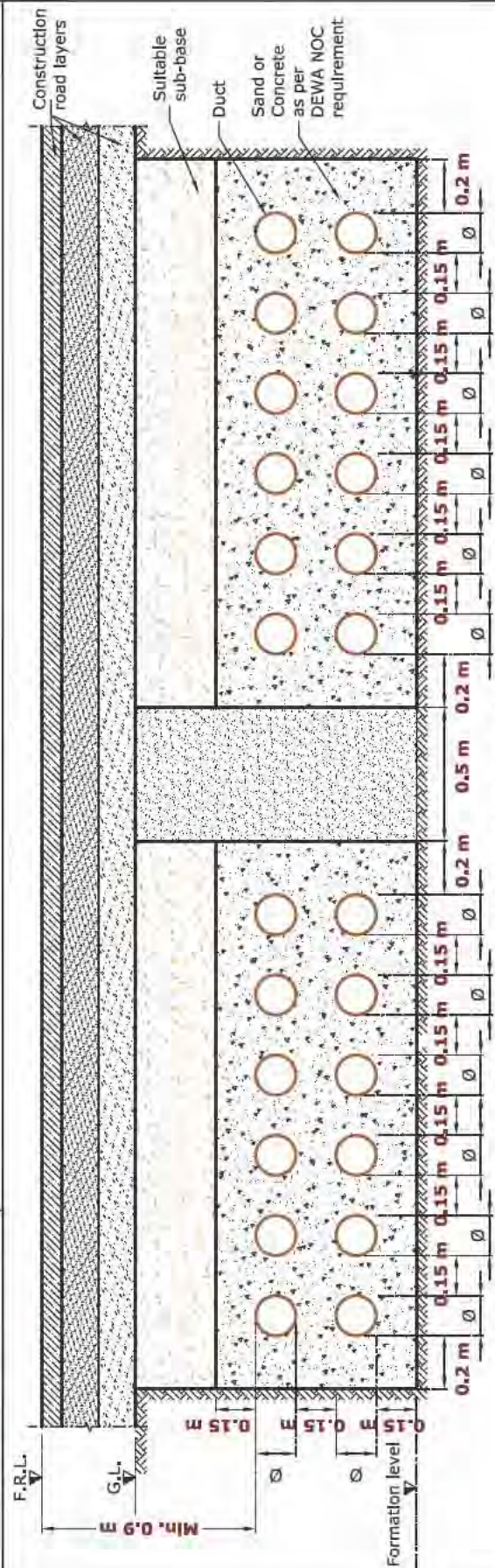


NOTE :
Refer general duct note in
"STANDARD DUCT DETAILS (SHEET-4)"

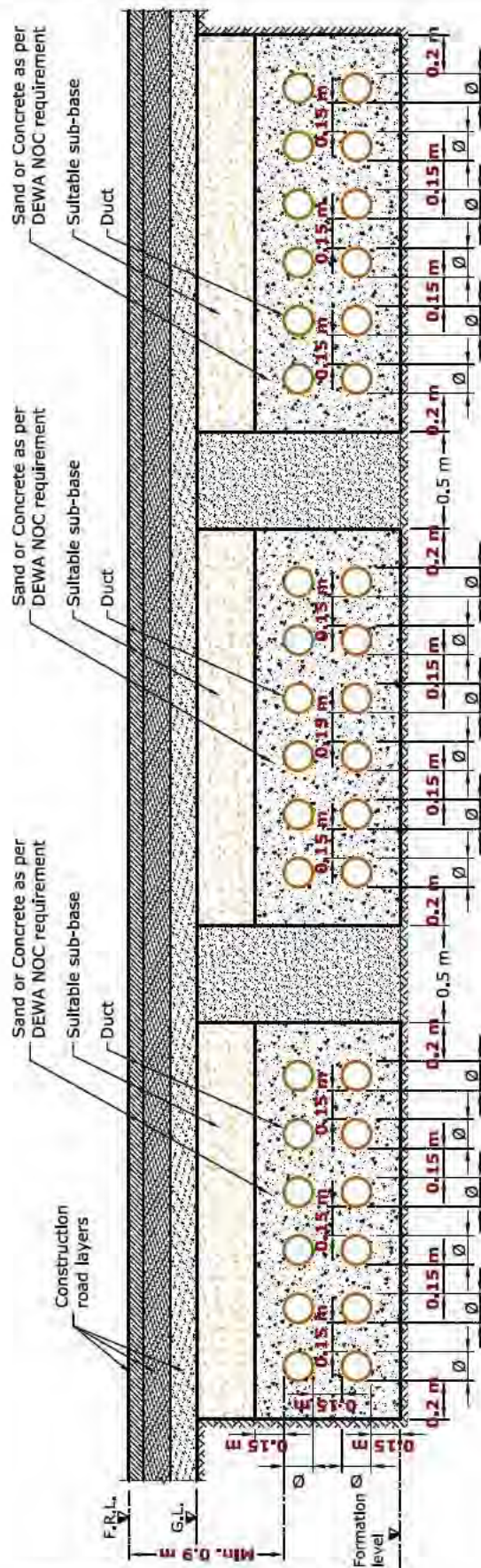
STANDARD DEWA ELECTRICAL (LV/HV) DUCT DETAILS (SHEET-3)



TYPICAL 16-WAY ELECTRICAL (LV/HV) DUCT



TYPICAL 24-WAY ELECTRICAL (LV/HV) DUCT

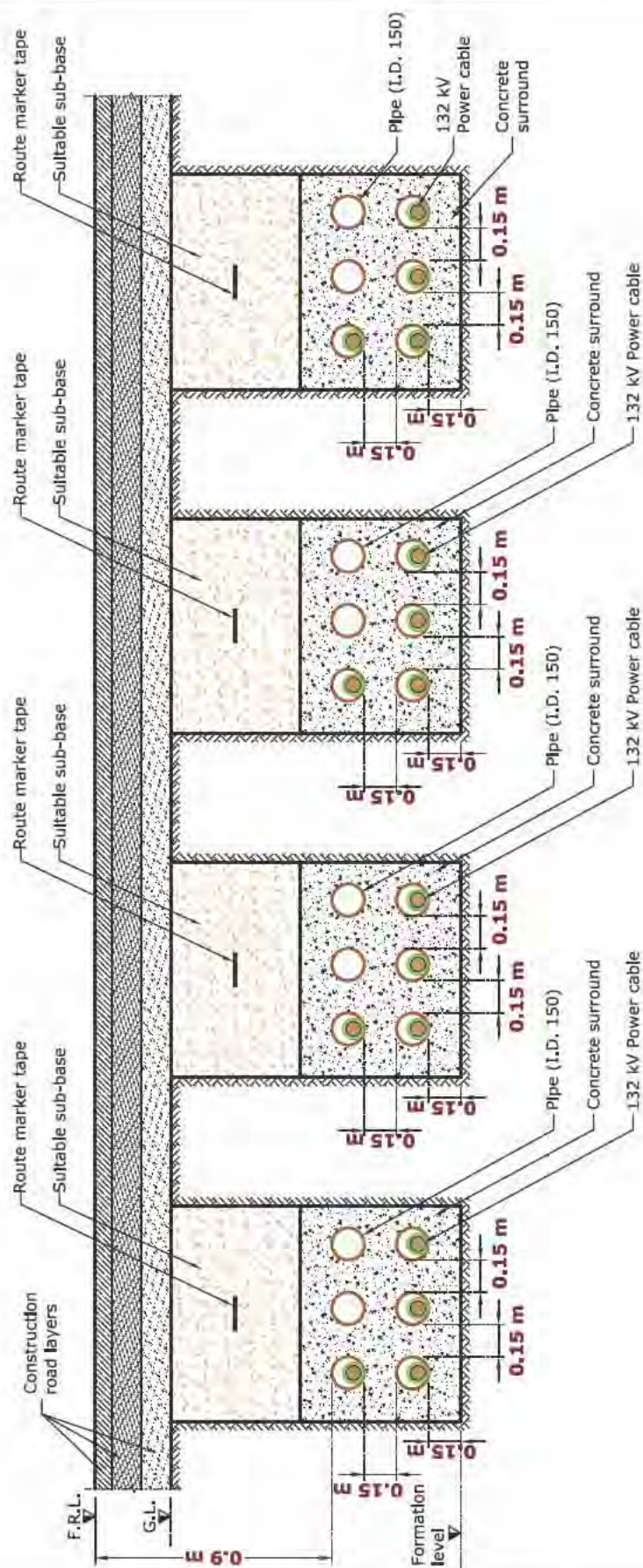


TYPICAL 36-WAY ELECTRICAL (LV/HV) DUCT

NOTE :

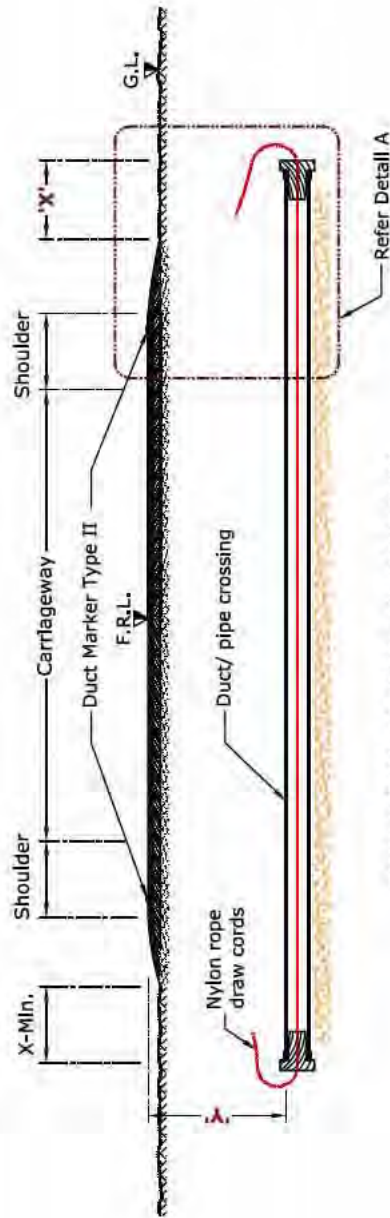
1. \varnothing = Outer Diameter of the ducts as per DEWA Specification.
2. Ducts will be laid in the Respective corridors at depth of 0.9 m from finish road level as shown in relevant drawings and as per specifications.
3. All ducts to be end-capped and fitted with draw cord.
4. The exact length of each duct to be measured at site.
5. All dimensions are in meters unless otherwise noted.
6. Concrete surround shall be provided as alternative to sand where depth is less than 0.90m.
7. Warning tape to be provided as per specification.
8. Proposed duct should be extended 1.0 m outside the road edge.
9. Sample of duct marker (Type I & Type II) to be submitted for approval.
10. Existing ducts should be left in usable condition after completion of construction work.
11. Any damages/blockages to existing ducts, it should be replaced with new sets of ducts.
12. Existing ducts with cable should be extended 1.0m outside the road edge with split duct and concrete surround.
13. Existing empty ducts should be extended 1.0m outside the road edge.

STANDARD DEWA ELECTRICAL (EHV) DUCT DETAILS (SHEET-5)



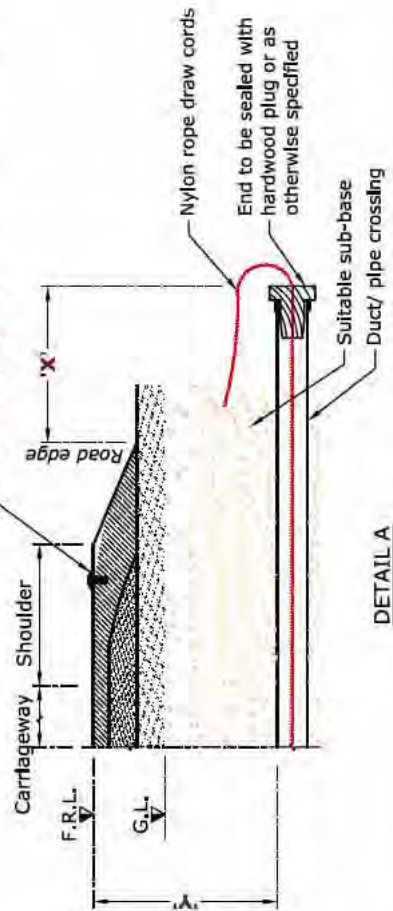
NOTE: 1. Refer general duct note in "STANDARD DUCT DETAILS (SHEET-4)"

STANDARD DEWA ELECTRICAL (LV/HV/EHV) DUCT DETAILS (SHEET-6)



SINGLE CARRIAGEWAY - WITHOUT CURB
(REFER BELOW SCHEDULE FOR DETAILS)

Type II Marker
(Refer Type-II Standard Duct marker Details)
Refer Note : 2 & 3



DETAIL A

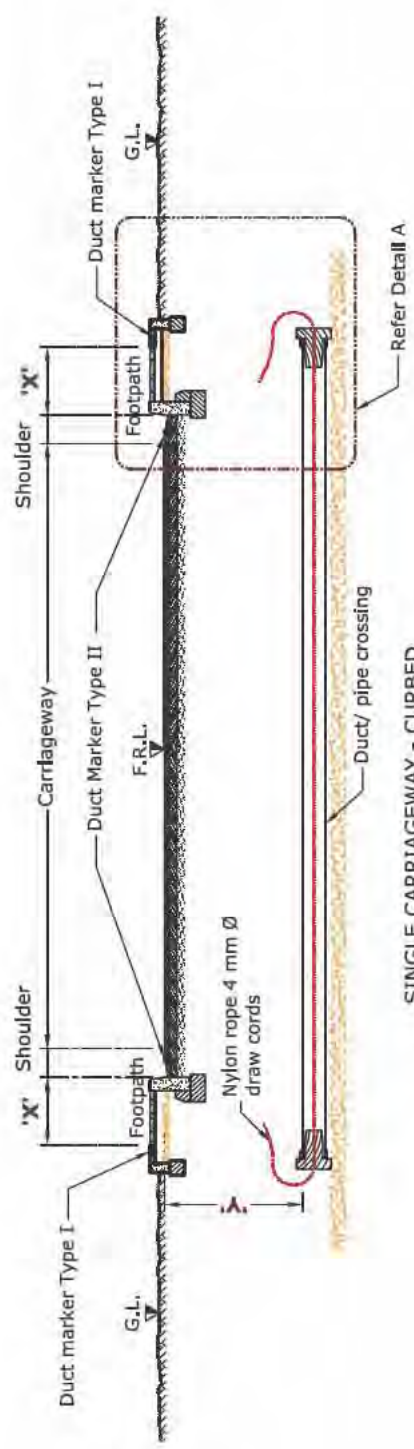
NOTE :

1. Refer general duct note in "STANDARD DUCT DETAILS (SHEET-4)"
2. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
3. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.

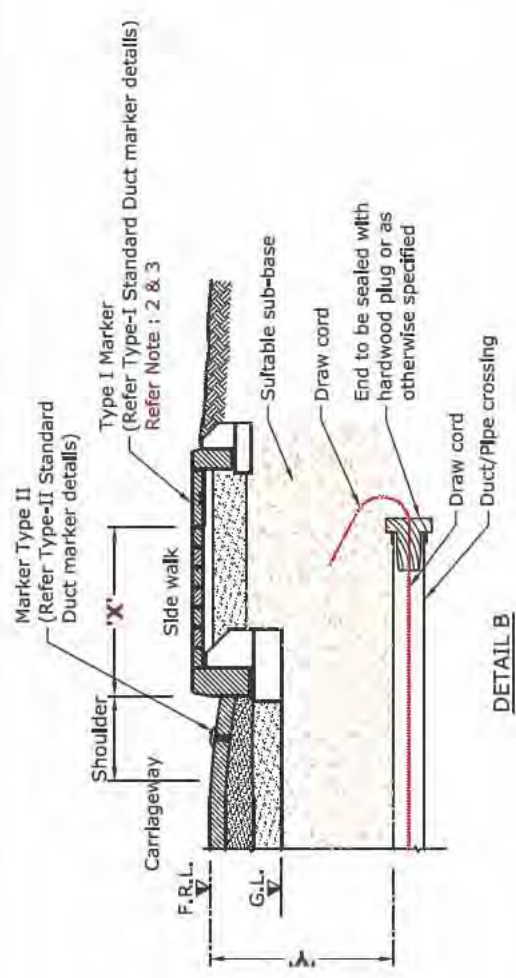
Pipeline and Duct Crossing Schedule

Utility Service	Dia (mm)	Material	X (m)	Y (m)	Marker Abbreviation	Draw Cords
DEWA Electrical	150	uPVC	1.0 m	0.9 m	Refer Type-II Marker	Red

STANDARD DEWA ELECTRICAL (LV/HV/EHV) DUCT DETAILS (SHEET-7)



SINGLE CARRIAGEWAY - CURBED
(REFER BELOW SCHEDULE FOR DETAILS)



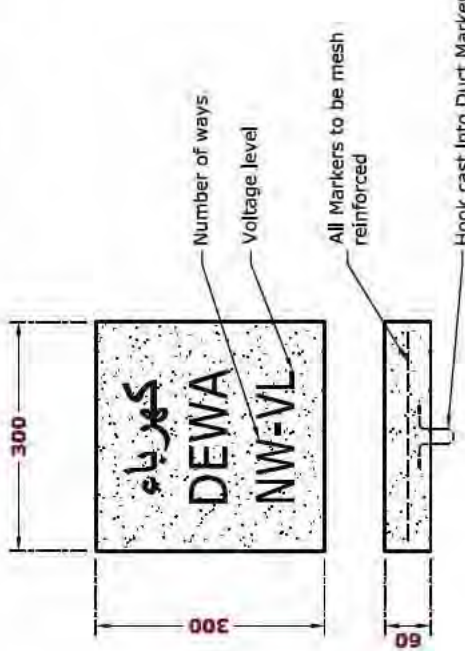




DETAIL B

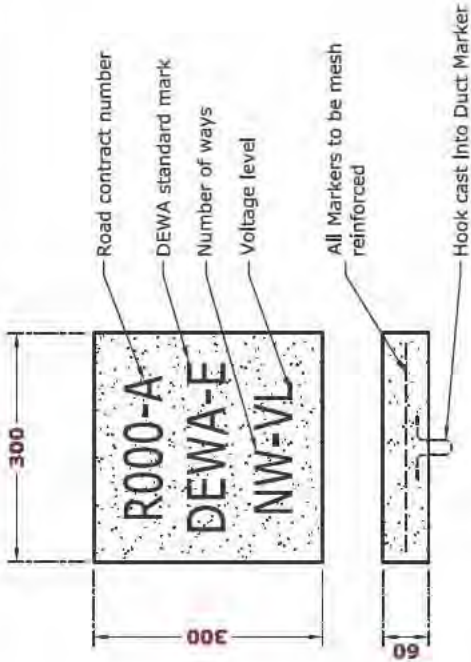

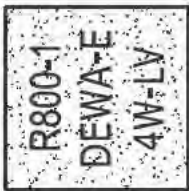
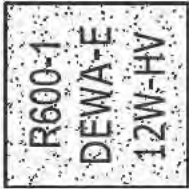

NOTE :

- 1. Refer general duct note in "STANDARD DUCT DETAILS (SHEET-4)"
- 2. For RTA projects - Refer Type-I standard Duct marker details for RTA projects.
- 3. For Non-RTA projects - Refer Type-I standard Duct marker details for Non-RTA projects.

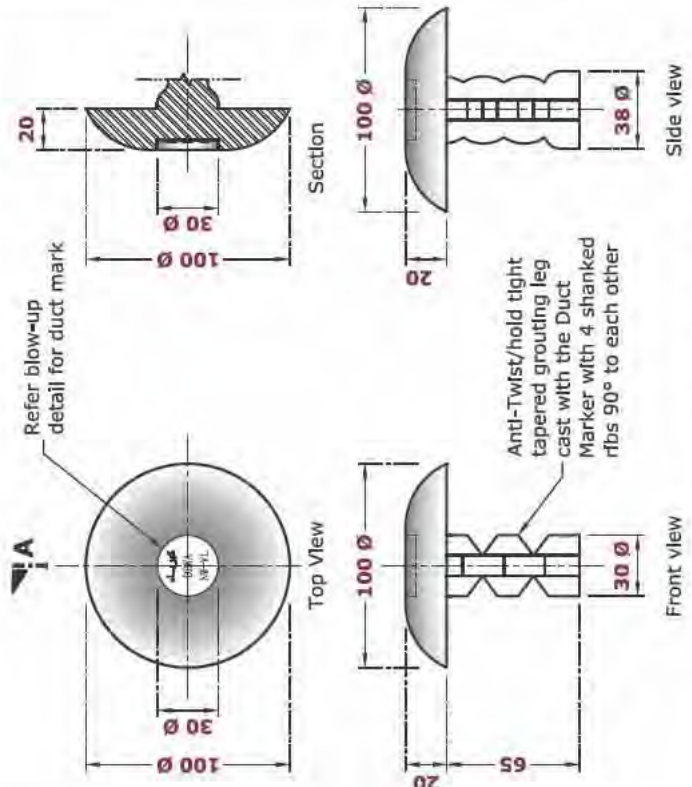



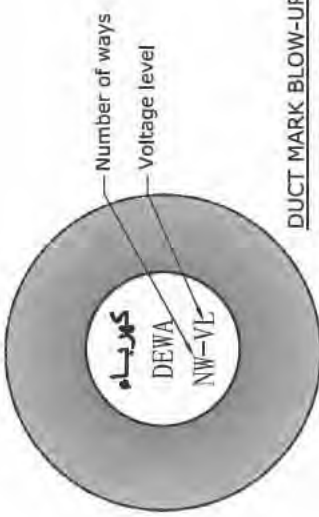
Pipeline and Duct Crossing Schedule

Utility Service	Dia (mm)	Material	X (m)	Y (m)	Marker Abbrevlation	Draw Cords
DEWA Electrical	150	uPVC	1.0 m	0.9 m	Refer Type-I Marker	Red

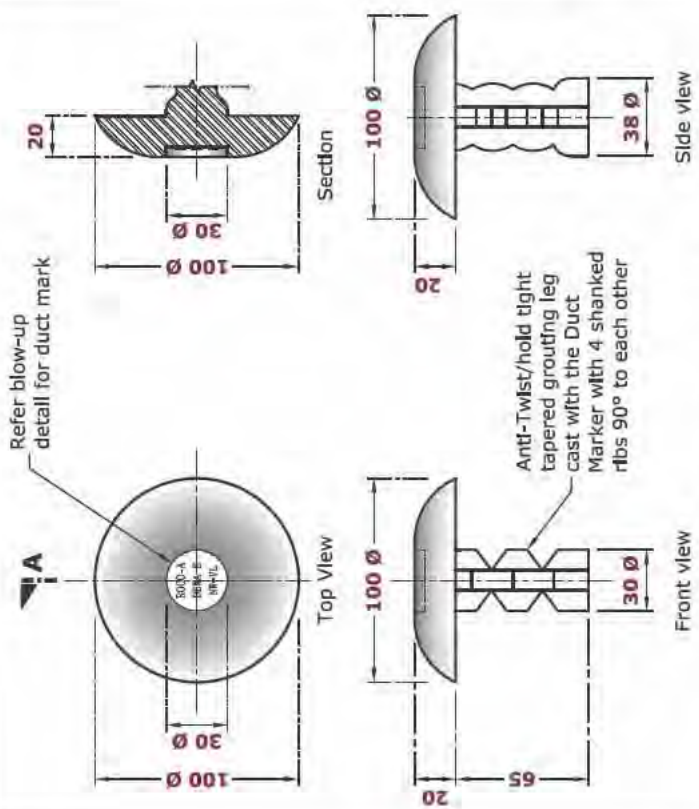




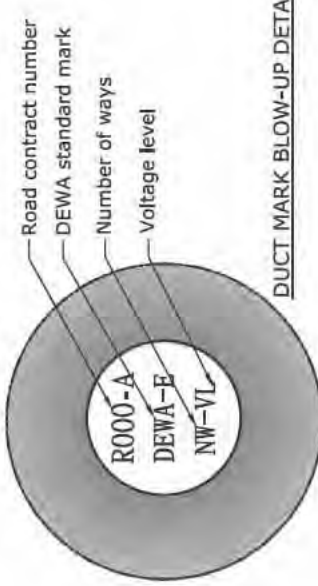
TYPE-1 STANDARD DUCT MARKER DETAILS FOR NON-RTA PROJECTS (CONCRETE)			
 <p>CONCRETE DUCT MARKER TYPE I</p>		 <p>3D VIEW</p>	
SAMPLES			
 <p>Sample - 1</p>		 <p>Sample - 2</p>	
		 <p>Sample - 3</p>	
SAMPLES FOR INDICATIVE PURPOSE ONLY			
NOTE : 1. All dimensions are in mm.			

TYPE-I STANDARD DUCT MARKER DETAILS FOR RTA PROJECTS (CONCRETE)		
 <p>300</p> <p>300</p> <p>60</p> <p>R000-A DEWA-E NW-VL</p> <p>Road contract number DEWA standard mark Number of ways Voltage level</p> <p>All Markers to be mesh reinforced</p> <p>Hook cast Into Duct Marker</p> <p>CONCRETE DUCT MARKER TYPE I</p>	 <p>3D VIEW</p>	
SAMPLES		
 <p>Sample - 1</p>	 <p>Sample - 2</p>	 <p>Sample - 3</p>
SAMPLES FOR INDICATIVE PURPOSE ONLY		
<p>NOTE : 1. All dimensions are in mm.</p>		

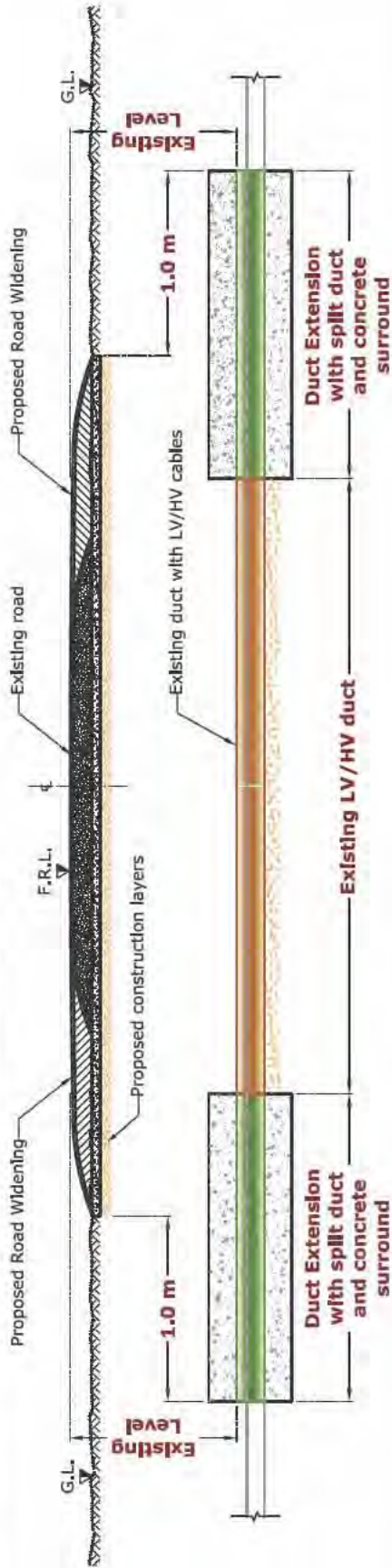
TYPE-II STANDARD DUCT MARKER DETAILS FOR NON- RTA PROJECTS (ALUMINIUM)

SAMPLES	SAMPLES FOR INDICATIVE PURPOSE ONLY
 <p>Refer blow-up detail for duct mark</p> <p>Top View</p> <p>Section</p> <p>Front view</p> <p>Side view</p> <p>Anti-Twist/hold tight tapered grouting leg cast with the Duct Marker with 4 shanked ribs 90° to each other</p> <p>ALUMINIUM DUCT MARKER TYPE II</p>	 <p>SAMPLE - 1</p>  <p>SAMPLE - 2</p>  <p>SAMPLE - 3</p>
 <p>DUCT MARK BLOW-UP DETAIL</p>	

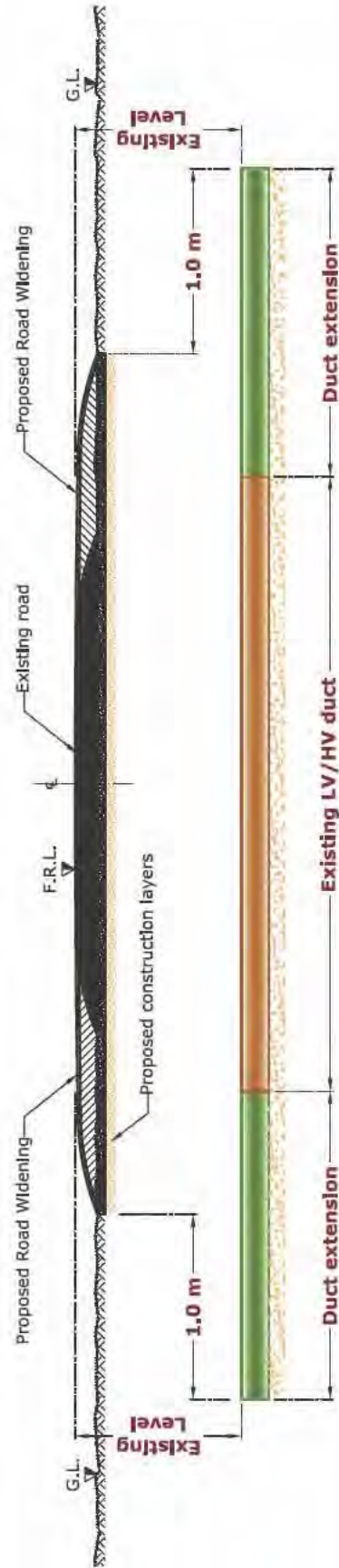
NOTE : 1. All dimensions are in mm.

TYPE-II STANDARD DUCT MARKER DETAILS FOR RTA PROJECTS (ALUMINIUM)		
 <p>Top View</p> <p>Section</p> <p>Front view</p> <p>Side view</p> <p>Anti-Twist/hold tight tapered grouting leg Marker with 4 shanked ribs 90° to each other</p>		<p>SAMPLES</p> <div>  <p>SAMPLE - 1</p> </div> <div>  <p>SAMPLE - 2</p> </div> <div>  <p>SAMPLE - 3</p> </div> <p>SAMPLES FOR INDICATIVE PURPOSE ONLY</p>
 <p>3D VIEW</p>		
<p>ALUMINIUM DUCT MARKER TYPE II</p>  <p>DUCT MARK BLOW-UP DETAIL</p>		
<p>NOTE : 1. All dimensions are in mm.</p>		

Existing ducts with cables extension details for proposed Road Widening



Existing empty ducts extension details for proposed Road Widening

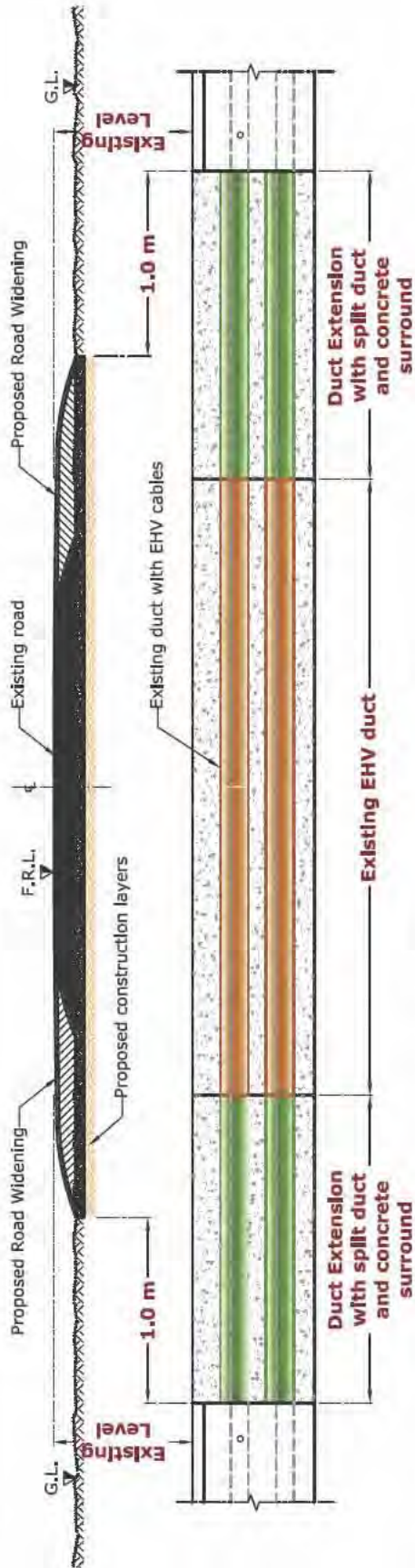


NOTE :

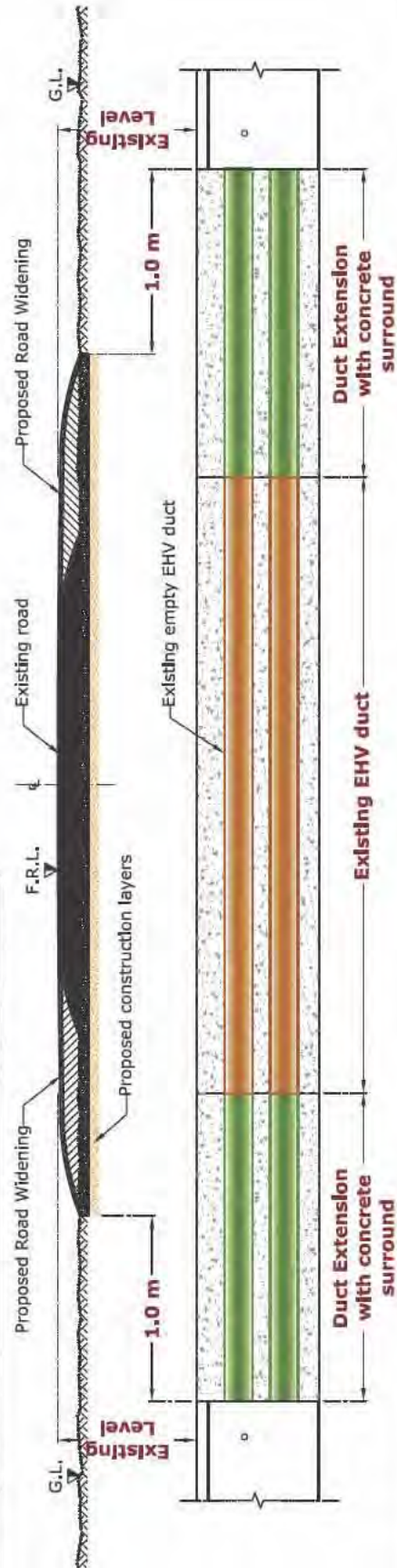
1. At proposed road crossing location existing DEWA LV/HV ducts/ split ducts and its protection (Utilized/ Empty) to be extended minimum 1.0 m beyond the road/ shoulder edge,
2. Existing LV/HV duct should not be damaged/blocked due to site activities,
3. Protection to existing LV/HV ducts required as per site and soil condition.

STANDARD DUCT EXTENSION DETAILS FOR EXISTING EHV DUCTS

Existing ducts with cables extension details for proposed Road Widening



Existing empty ducts extension details for proposed Road Widening



NOTE :

1. At proposed road crossing location existing DEWA EHV ducts/ split ducts and its protection (Utilized/ Empty) to be extended minimum 1.0 m beyond the road/ shoulder edge.
2. Existing EHV duct should not be damaged/ blocked due to site activities.
3. Protection to existing EHV ducts required as per site and soil condition.

28.2 Avoid the following



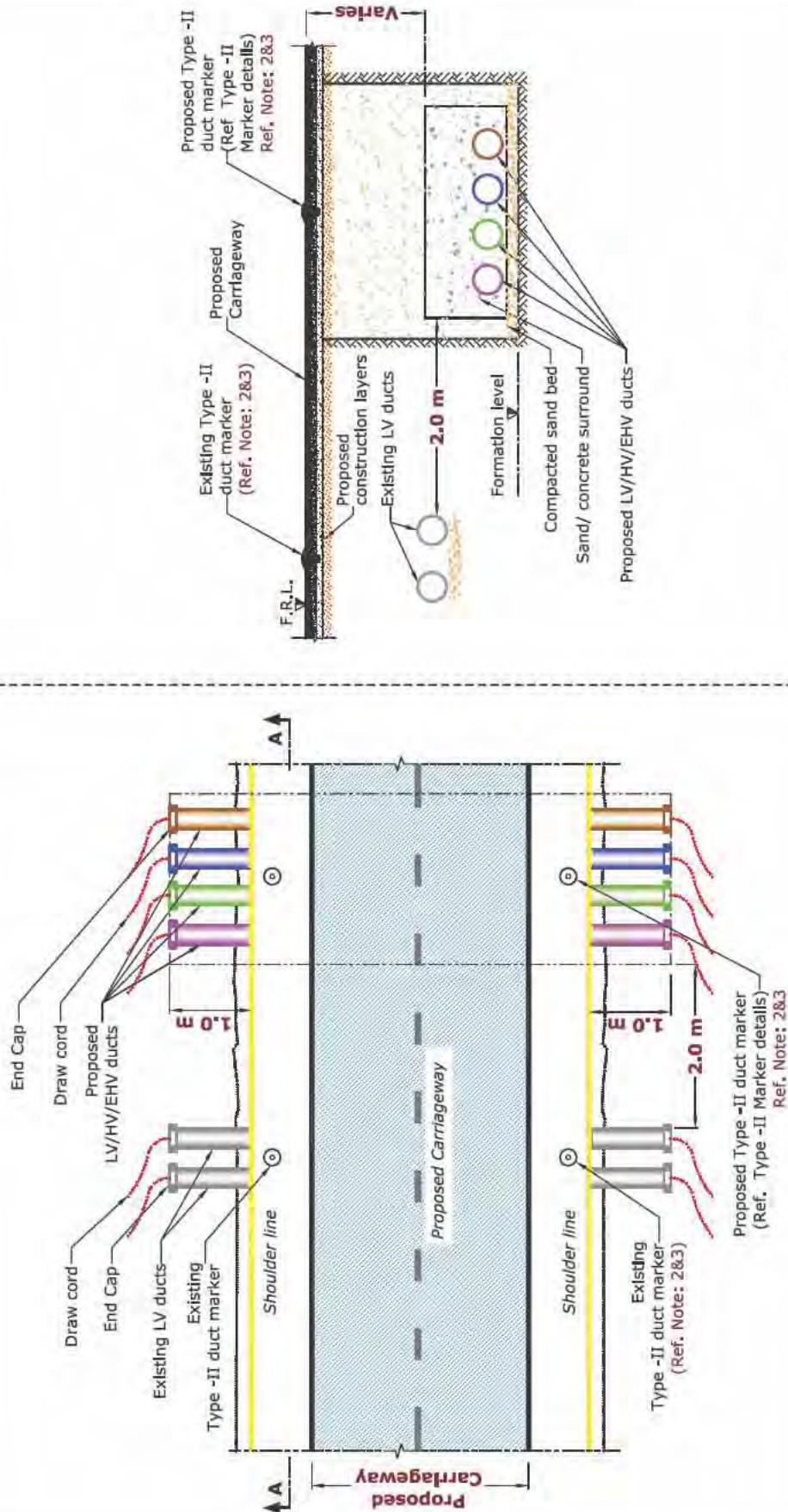
1. Road construction above DEWA directly buried cables without protection/extension.
2. Blocking of existing and proposed ducts.

28.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed duct work and existing DEWA Electricity LV Cables						
Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	2.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 28.1)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 28.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LV/HV/EHV DUCTS AND EXISTING LV DUCTS



- NOTE :**
1. Horizontal clearance is from the proposed LV/HV/EHV ducts edge to existing LV cable/ duct edge.
 2. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
 3. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.
 4. Trench side and existing DEWA services protection may be required as per site and soil condition.

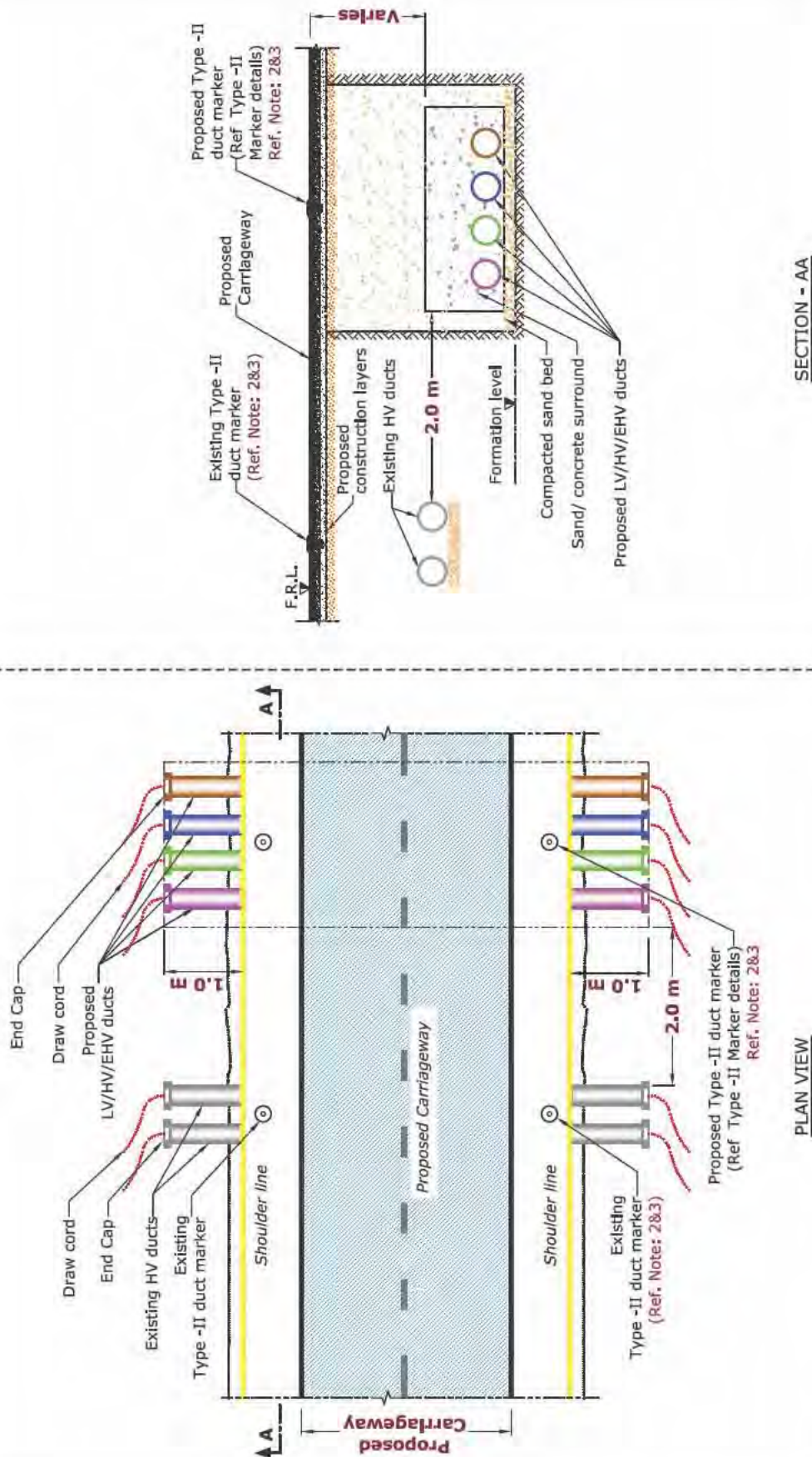
Table 2: Clearance & Protection details for proposed duct work and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	2.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 28.2)
HV (6.6/11/33 kV) Manhole	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 28.3)
HV (6.6/11/33 kV) O.H.L.	NR	NR	-	-	R	-

Table Abbreviation

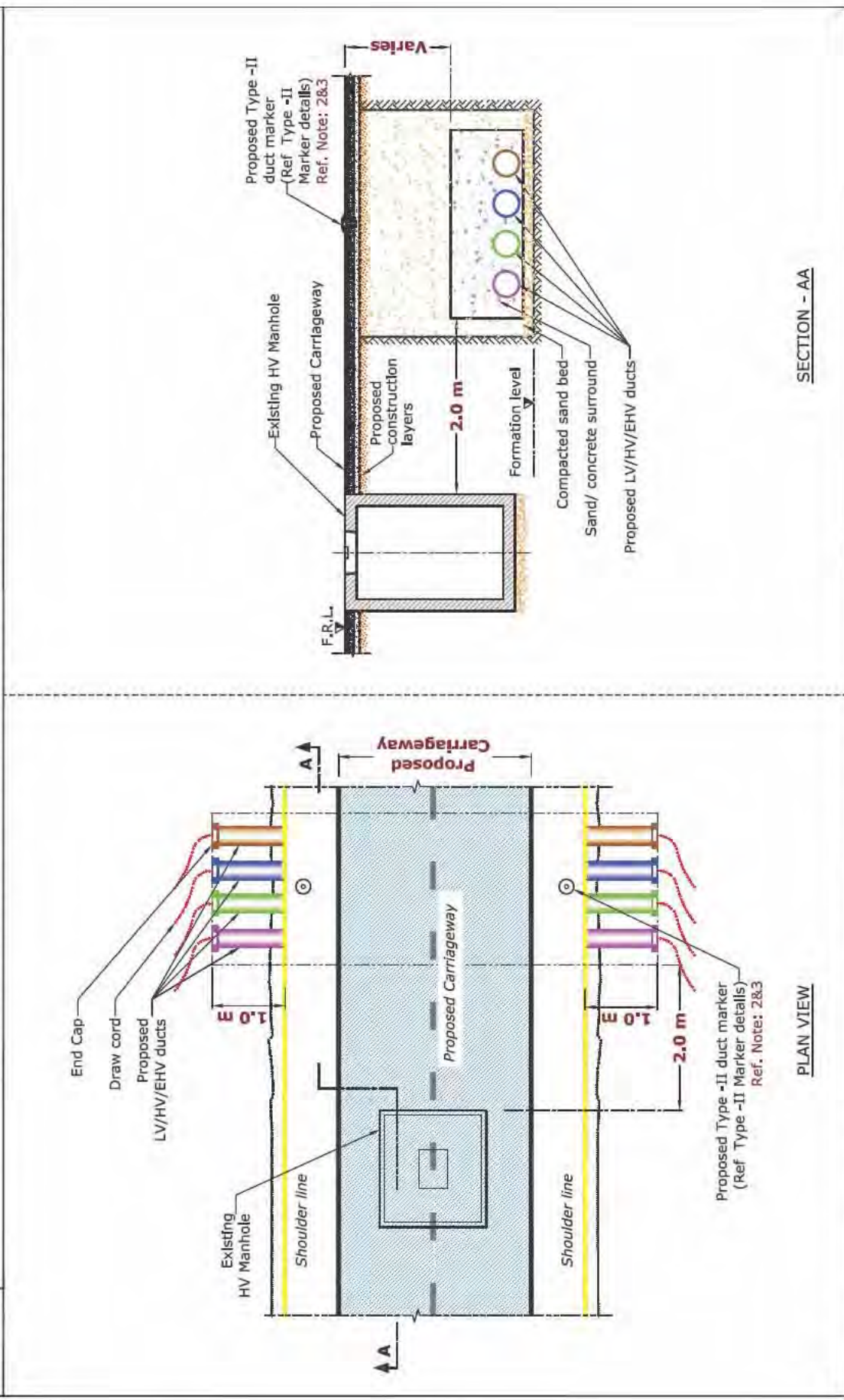
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 28.2 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LV/HV/EHV DUCTS AND EXISTING HV DUCTS



- NOTE :**
1. Horizontal clearance is from the proposed LV/HV/EHV Ducts edge to existing HV cable/ duct edge.
 2. For RTA projects - Refer Type-II standard Duct marker details for RTA projects,
 3. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.
 4. Trench side and existing DEWA services protection may be required as per site and soil condition.

Fig: 28.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LV/HV/EHV DUCTS AND EXISTING HV MANHOLE



- NOTE :**
1. Horizontal clearance is from the proposed LV/HV/EHV Ducts edge to existing HV services edge.
 2. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
 3. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.
 4. Trench side and existing DEWA services protection may be required as per site and soil condition.

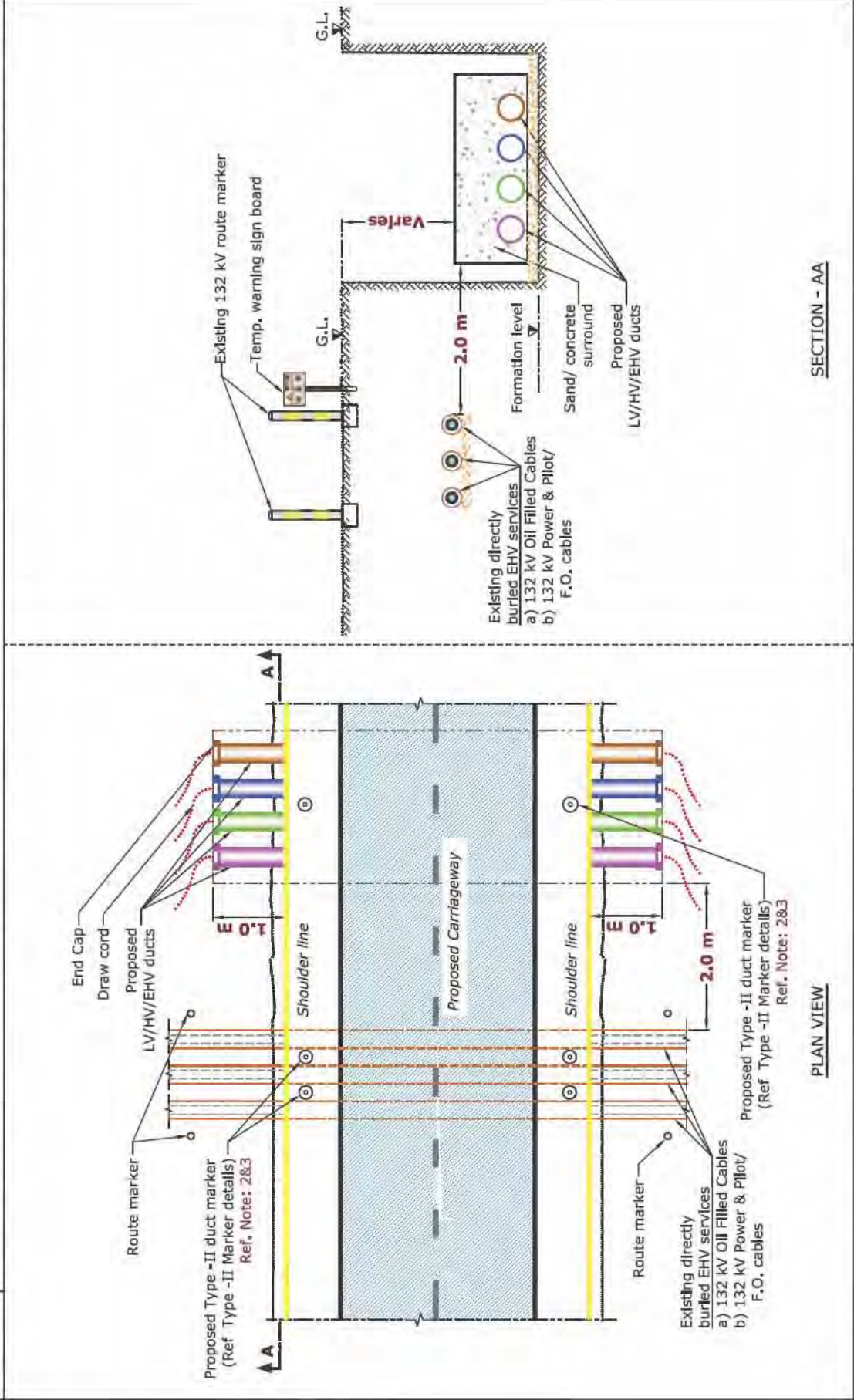
Table 3: Clearance & Protection details for proposed duct work and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 28.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 28.4)
EHV (132 kV) Trough	2.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 28.5)
EHV (132 kV) Duct Bank	2.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 28.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 28.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 28.7)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 28.8)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	• Horizontal clearance (Ref Fig: 28.8)
EHV (400 kV) O.H.L		7.5 m				• Vertical clearance (Ref Fig: 28.8) • Protection details (Ref Fig: 28.8)

Table Abbreviation

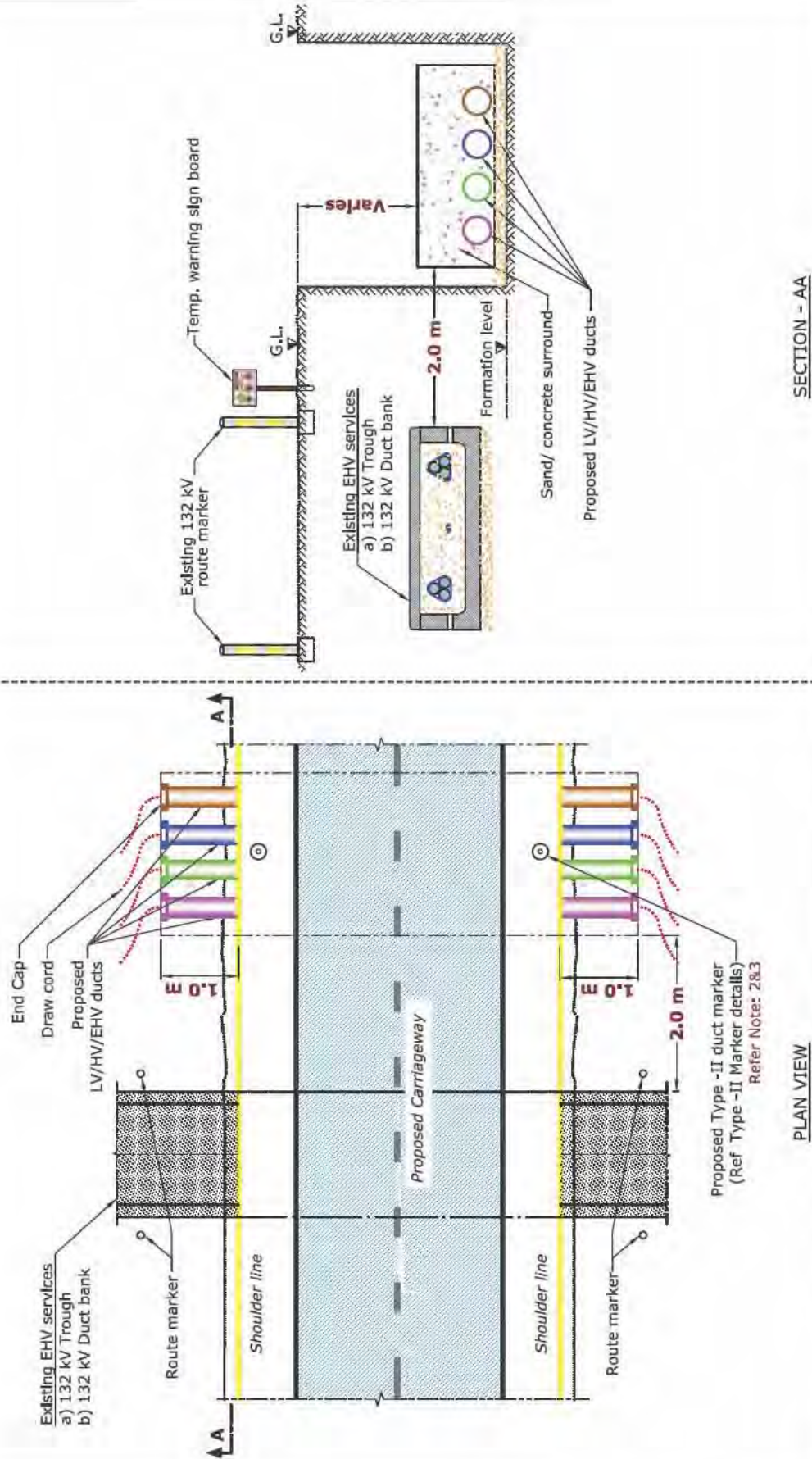
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 28.4 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LV/HV/EHV DUCTS AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES



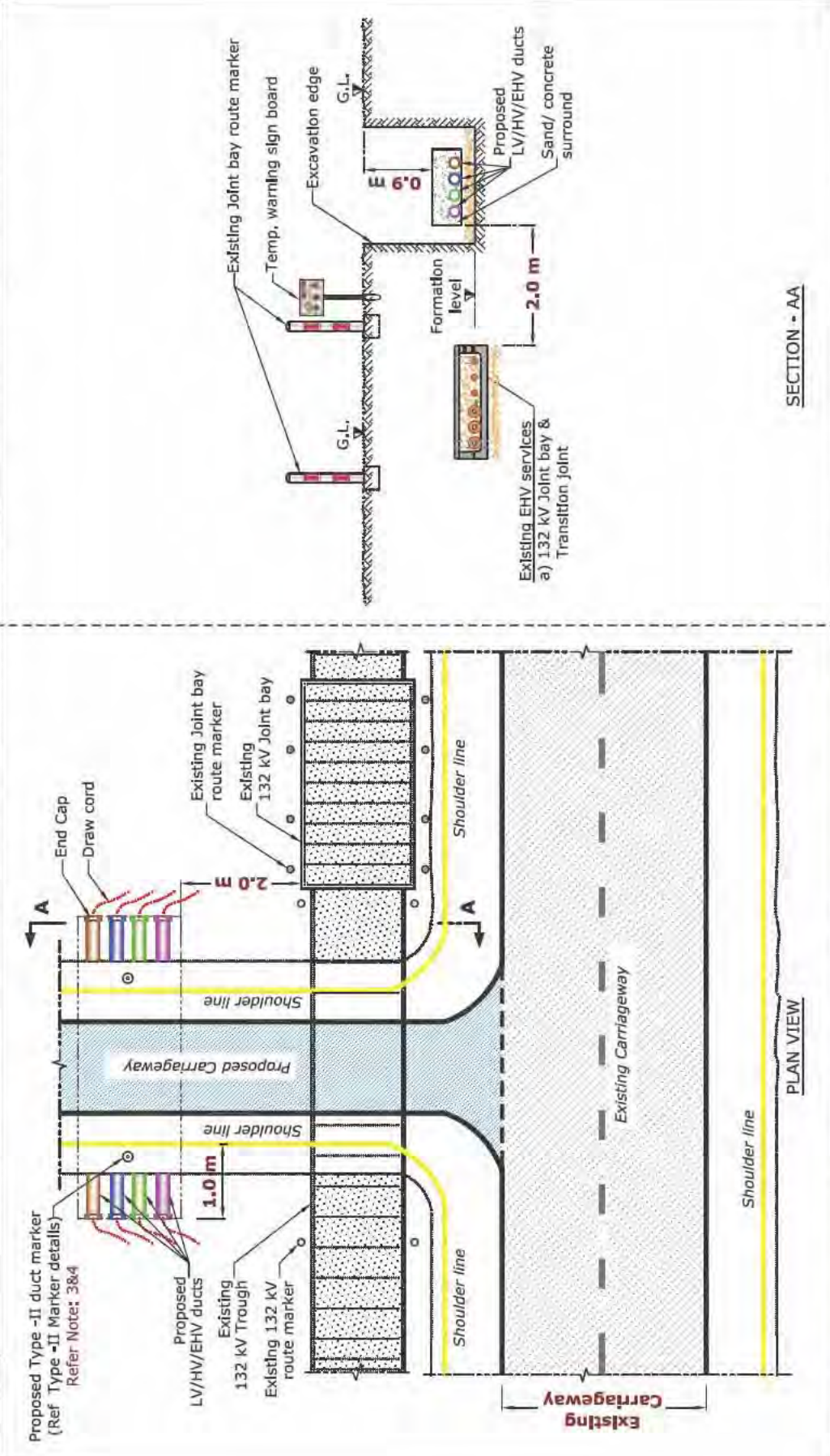
- NOTE :**
1. Horizontal clearance is from the proposed LV/HV/EHV ducts edge to existing EHV services edge.
 2. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
 3. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.
 4. Trench side and existing DEWA services protection may be required as per site and soil condition.

Fig: 28.5 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LV/HV/EHV DUCTS AND EXISTING EHV 132 kV TROUGH/ DUCT BANK



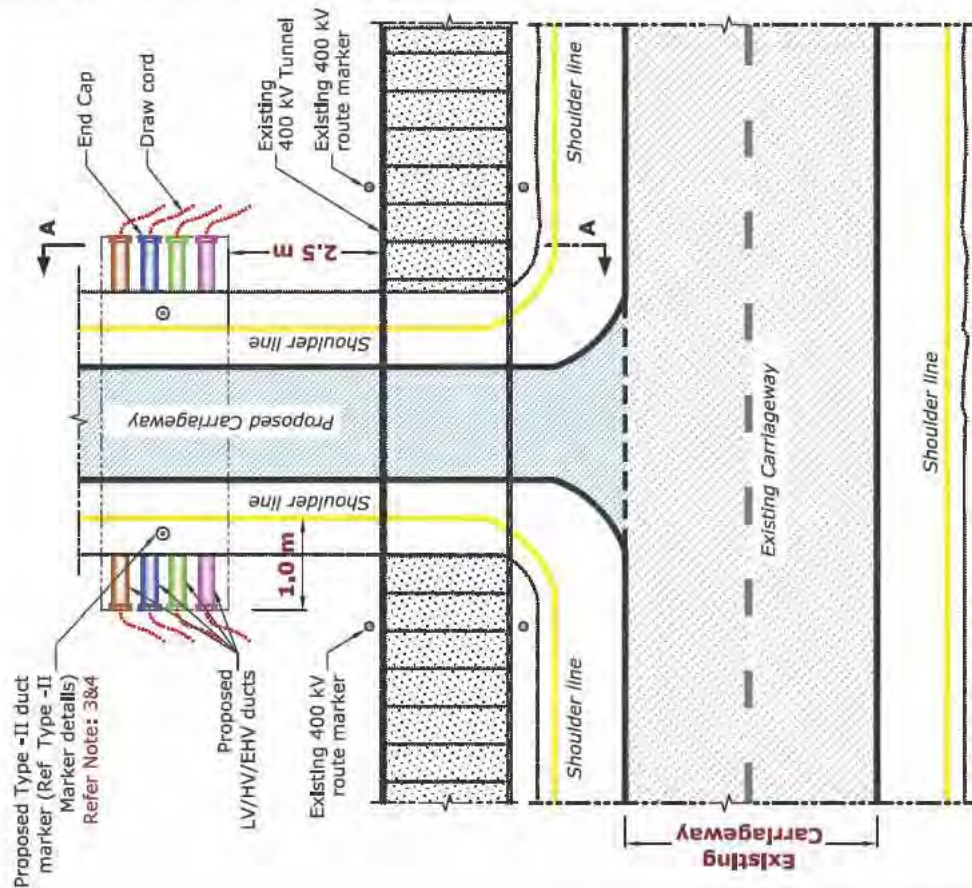
- NOTE :**
1. Horizontal clearance is from the proposed LV/HV/EHV ducts edge to existing EHV services edge.
 2. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
 3. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.
 4. Trench side and existing DEWA services protection may be required as per site and soil condition.

Fig: 28.6 HORIZONTAL CLEARANCE DETAILS FOR PROPOSED LV/HV/EHV DUCTS AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT

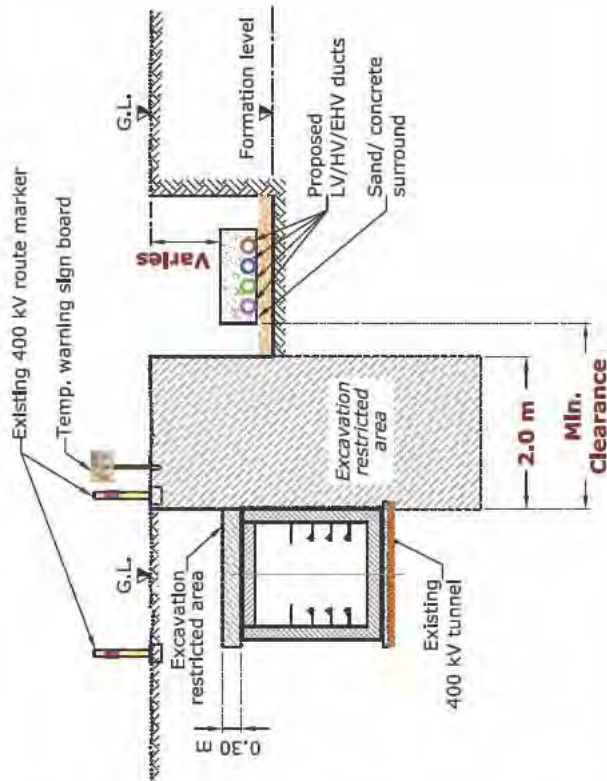


- NOTE :**
1. All horizontal clearances are from proposed LV/HV/EHV ducts edge to existing EHV 132 kV Joint bay/ Transition joint edge as shown in the drawing.
 2. Existing DEWA services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.
 3. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
 4. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.
 5. Trench side and existing DEWA services protection may be required as per site and soil condition.

Fig: 28.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LV/HV/EHV DUCT AND EXISTING 400 kV TUNNEL



PLAN VIEW



SECTION - AA

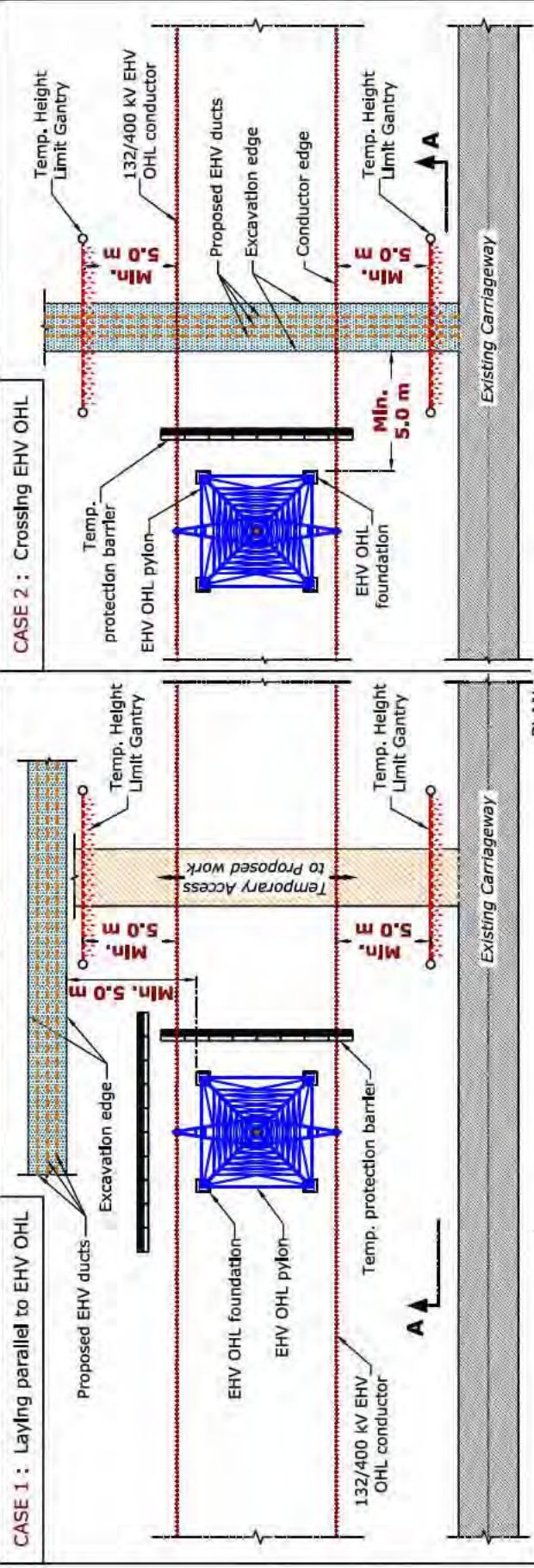
TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed service edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m

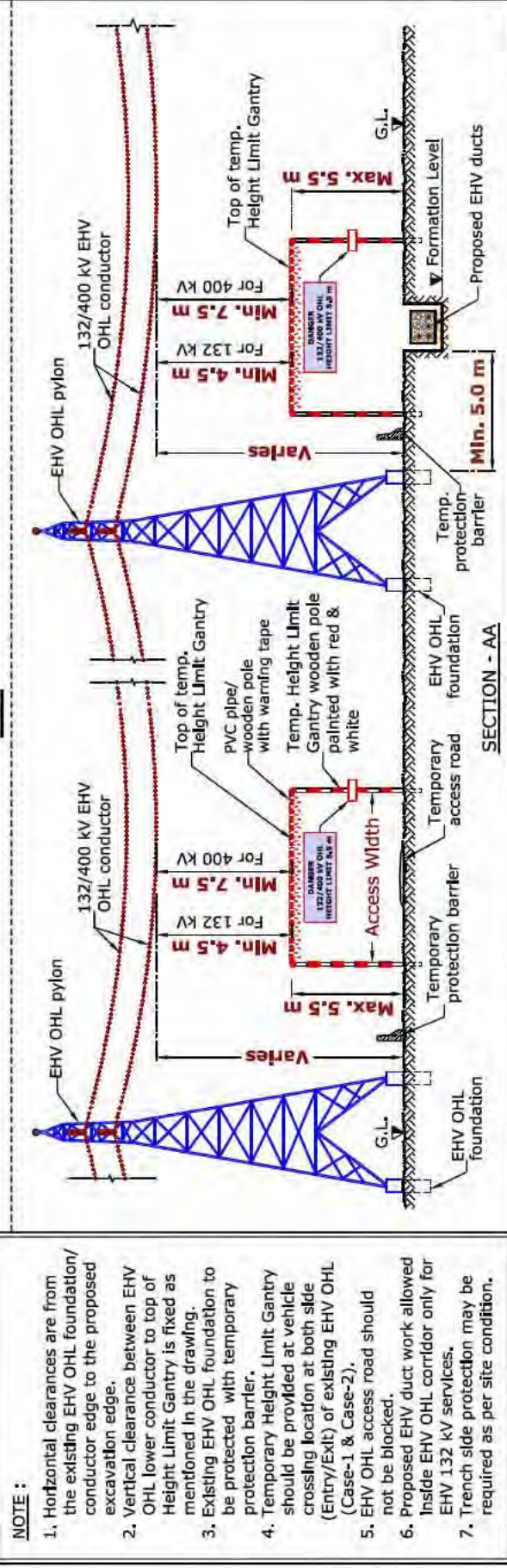
NOTE :

1. Proposed excavation less than 2.0 m parallel and 0.3 m above from the existing 400 kV tunnel is not allowed as shown in the figure.
2. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
3. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
4. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.
5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Fig: 28.8 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING EHV OHL (132/400 kV)



PLAN



NOTE :

1. Horizontal clearances are from the existing EHV OHL foundation/conductor edge to the proposed excavation edge.
2. Vertical clearance between EHV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
3. Existing EHV OHL foundation to be protected with temporary protection barrier.
4. Temporary Height Limit Gantry should be provided at vehicle crossing location at both side (Entry/Exit) of existing EHV OHL (Case-1 & Case-2).
5. EHV OHL access road should not be blocked.
6. Proposed EHV duct work allowed inside EHV OHL corridor only for EHV 132 kV services.
7. Trench side protection may be required as per site condition.

Table 4: Clearance & Protection details for proposed duct work and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 28.9)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 28.9)

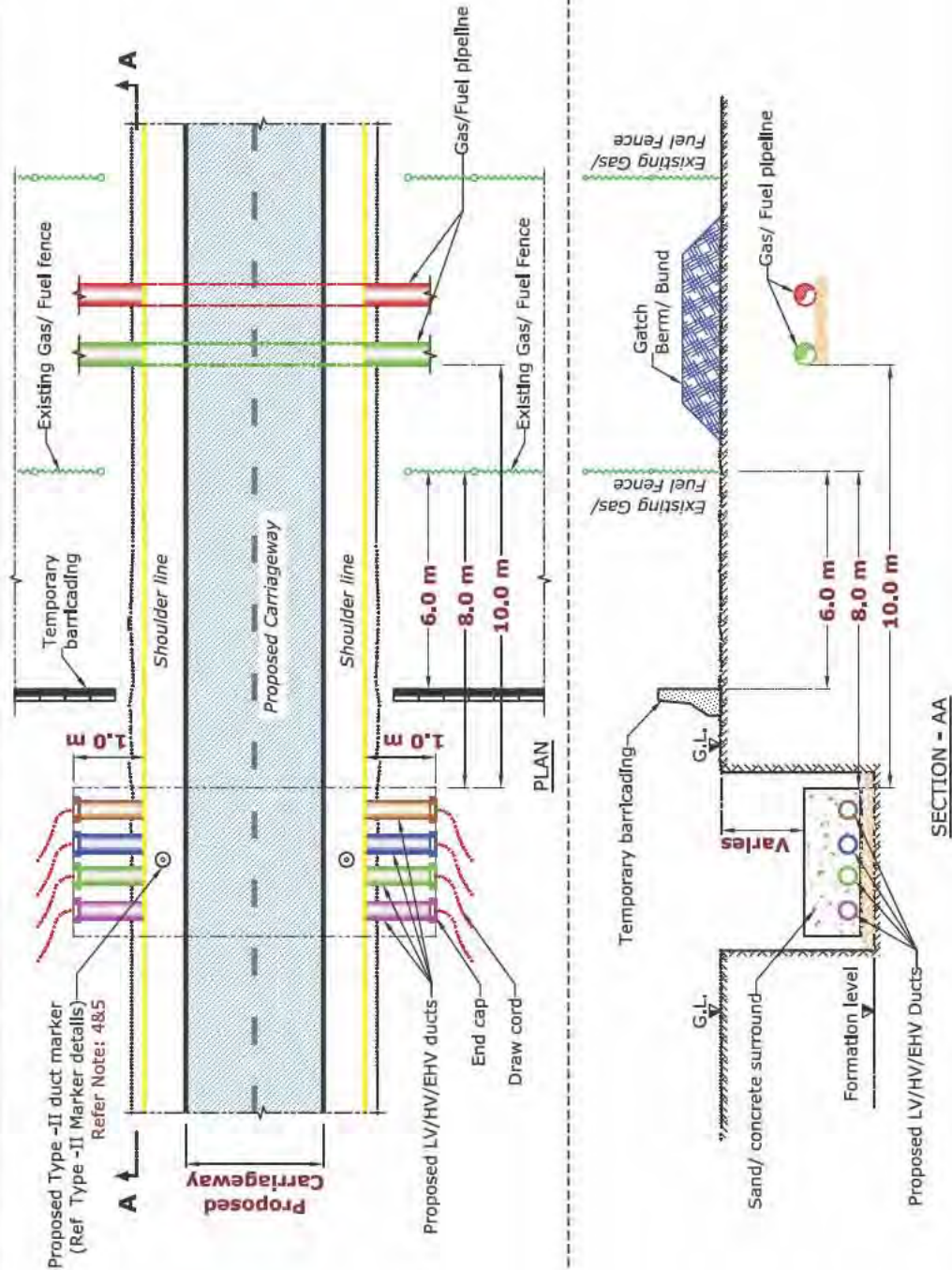
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Proposed DEWA Electrical Ducts, Extension and protection of existing Ducts

Fig: 28.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LV/HV/EHV DUCTS AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 10.0 m from proposed LV/HV/EHV duct edge to existing Gas/ Fuel pipeline edge.
 2. Horizontal clearance 8.0 m from proposed LV/HV/EHV duct edge to existing Gas/ Fuel fence.
 3. Temporary barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. For RTA projects - Refer Type-II standard Duct marker details for RTA projects.
 5. For Non-RTA projects - Refer Type-II standard Duct marker details for Non-RTA projects.
 6. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

29. Proposed Pedestrian Bridge

29.1 Introduction

The purpose of pedestrian/foot bridges is to provide a safe crossing for the pedestrians to cross areas where walking could be perilous/impossible such as carriageways, water ways, etc., from one side to the other.

This structure consists of foundations, columns, slab, drainage system, elevators, etc. The pedestrian/

foot bridges structures are constructed within Right Of Way therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



Photo – Pedestrian Bridge

29.2 Avoid the following



1. Installation of Pedestrian Bridge in DEWA corridor and above DEWA services.

29.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Pedestrian Bridge and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.1)

Table 2: Clearance & Protection details for proposed Pedestrian Bridge and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.3)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

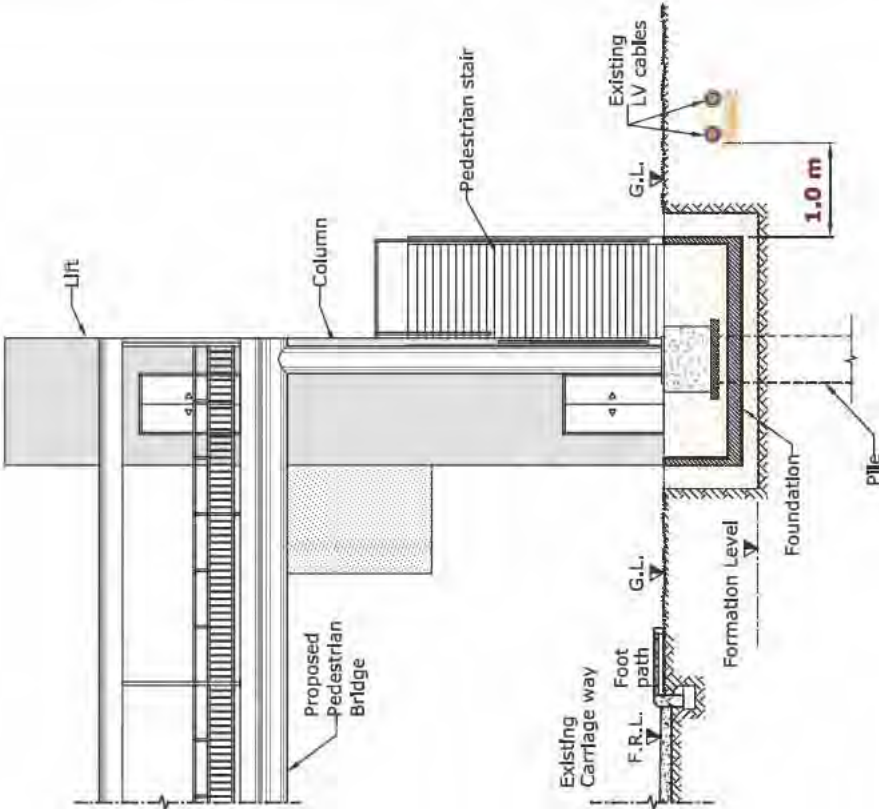
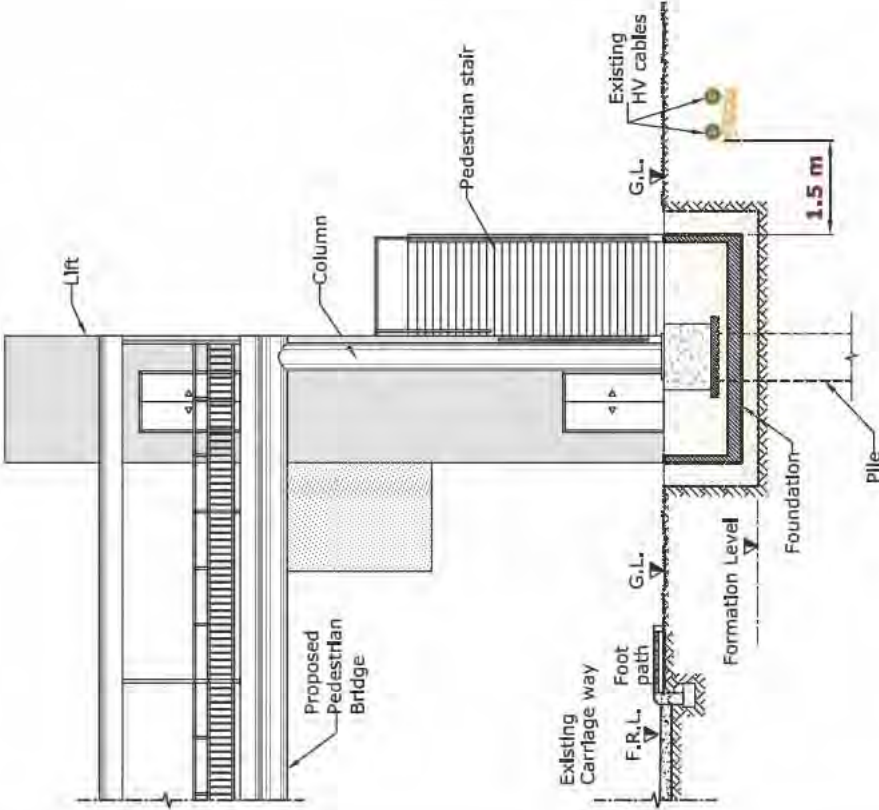
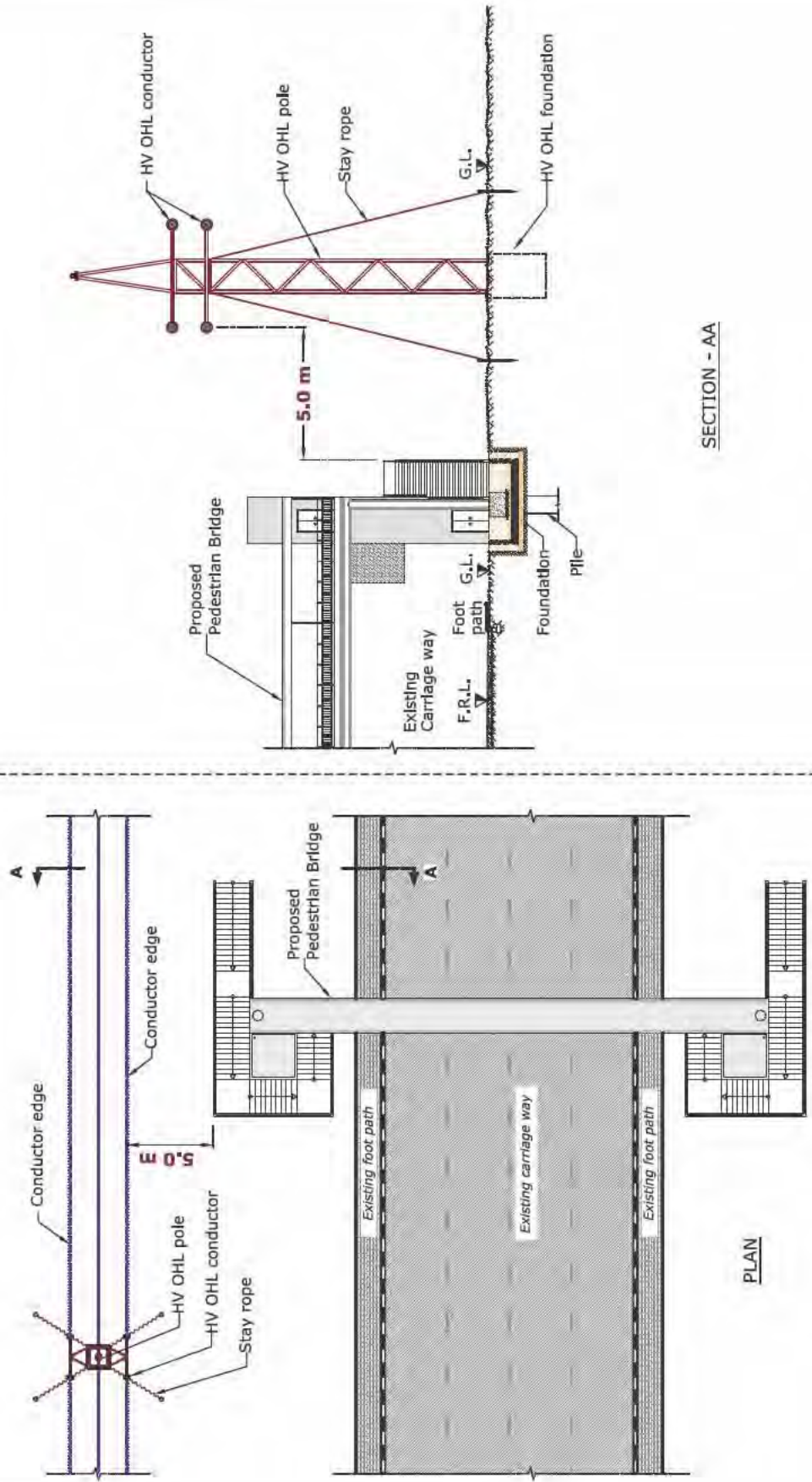
<p>Fig: 29.1</p>	<p>HORIZONTAL CLEARANCE DETAIL BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING LV CABLES</p>	<p>Fig: 29.2</p>	<p>HORIZONTAL CLEARANCE DETAIL BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING HV CABLES</p>
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Pedestrian Bridge foundation edge to existing LV/ HV cable edge. 2. Trench side and existing LV/ HV cable protection may be required as per site and soil condition. 	

Fig: 29.3

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING HV OHL (6.6/11/33 kV)



NOTE : 1. Horizontal clearances are from the proposed Pedestrian Bridge edge to existing HV OHL conductor.

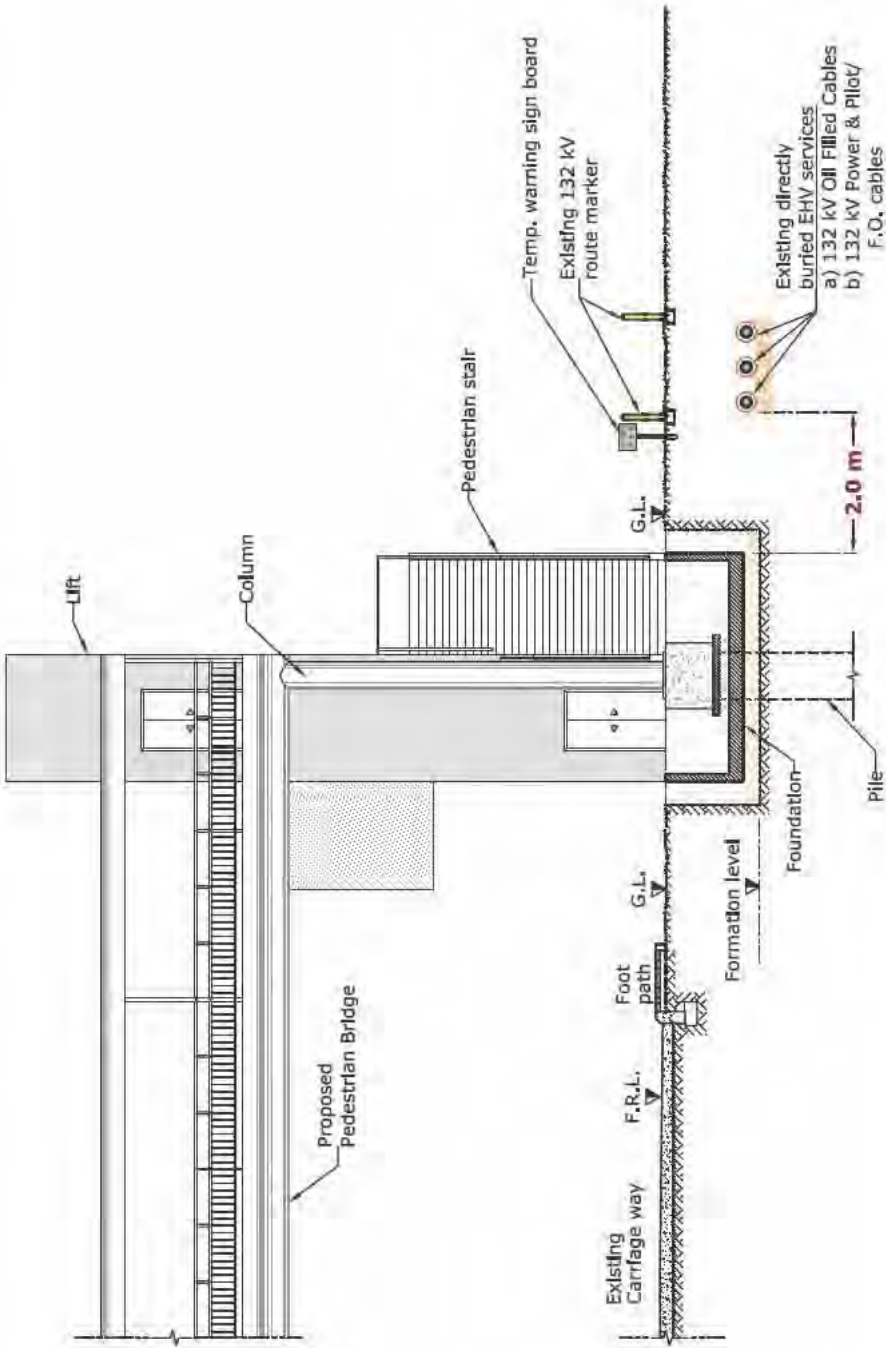
Table 3: Clearance & Protection details for proposed Pedestrian Bridge and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.5)
EHV (132 kV) Joint Bay/Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.9)
EHV (132 kV) O.H.L	15.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.7)
EHV (400 kV) O.H.L	20.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.8)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

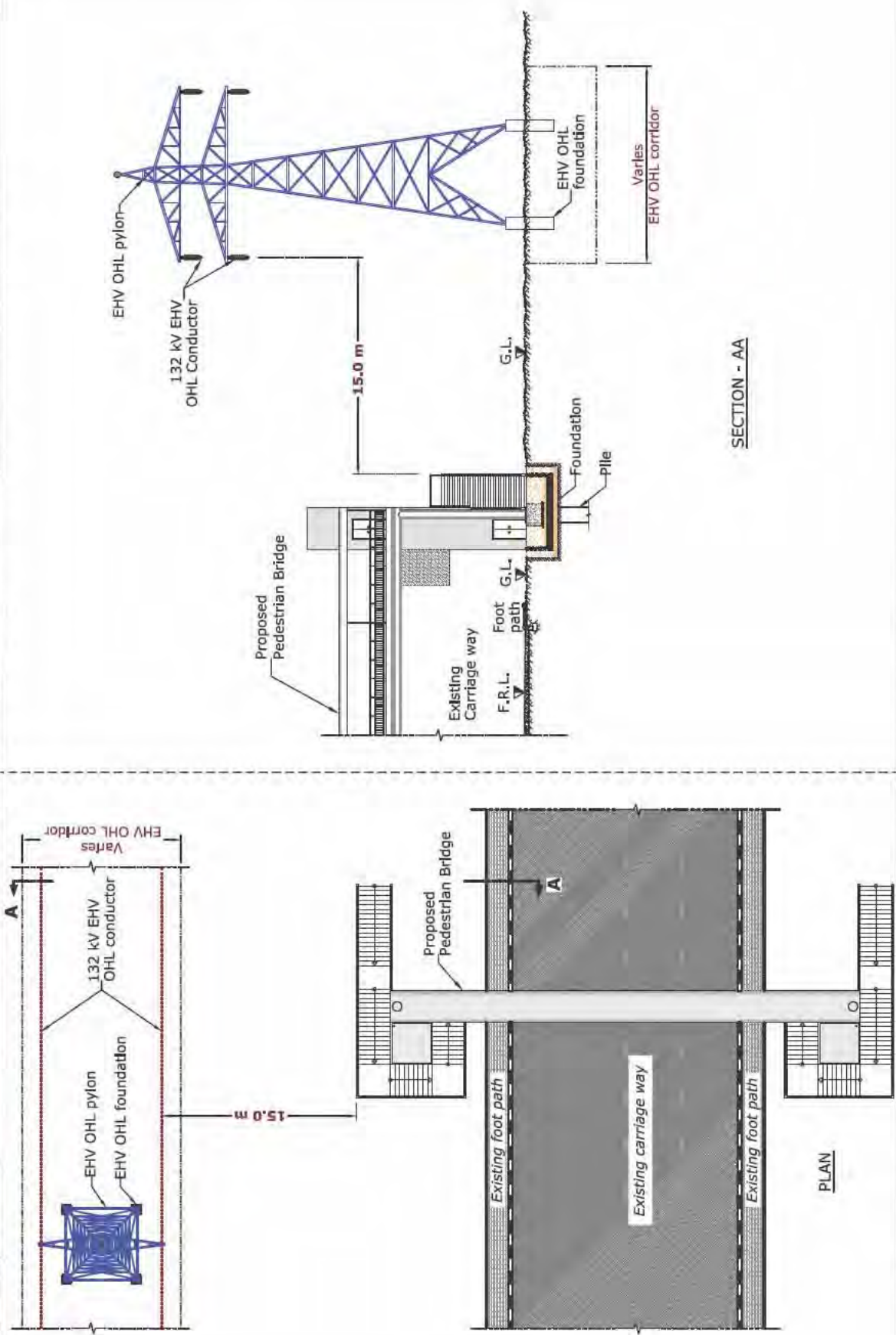
Fig: 29.4 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES



NOTE :
1. Horizontal clearances Is from the proposed Pedestrian Bridge foundation edge to existing EHV 132 kV service edge.
2. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge.
3. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

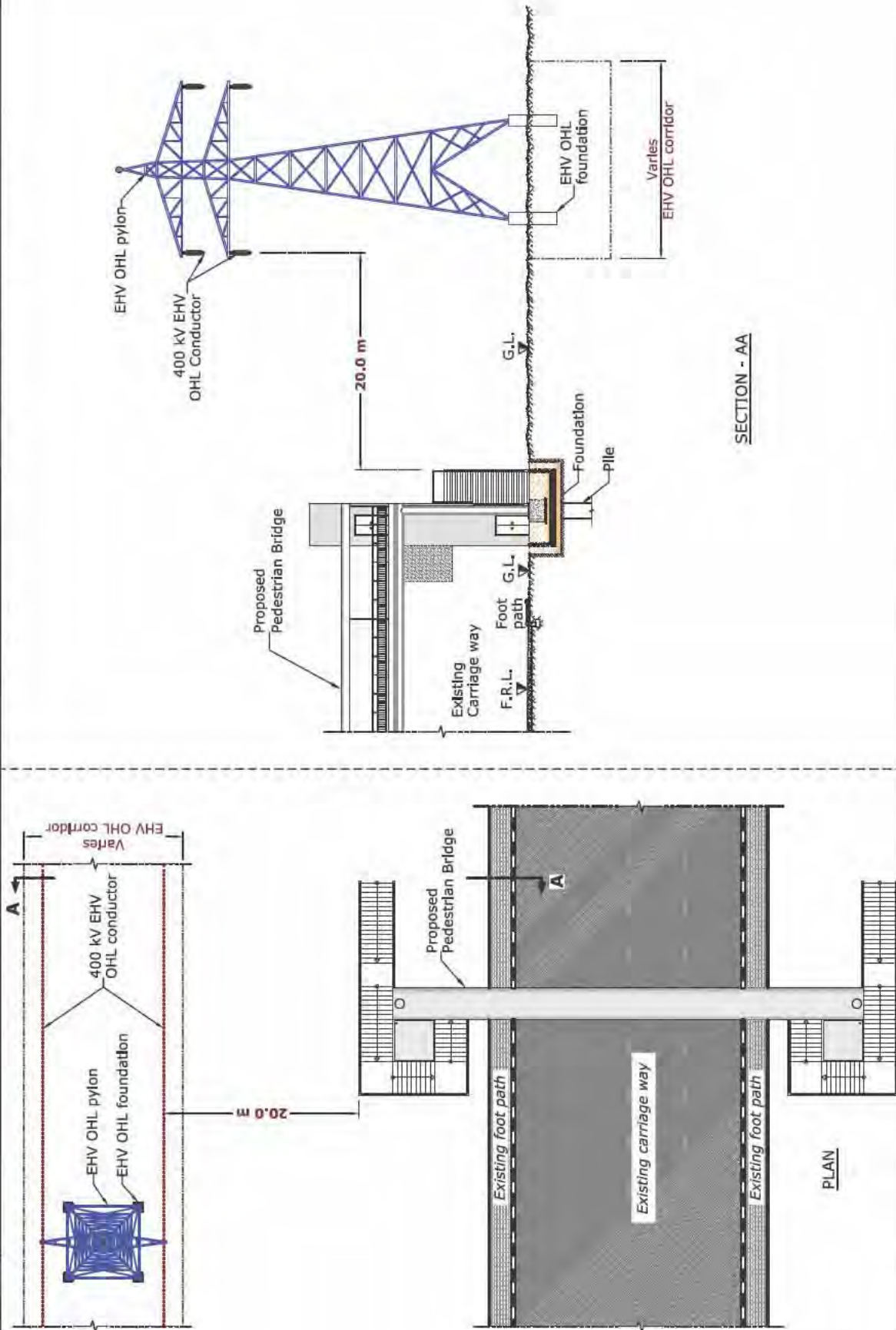
<p>Fig: 29.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>
<p>Fig: 29.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p> <p>Existing EHV services a) 132 kV Joint bay & Transition joint</p> <p>Existing EHV services a) 132 kV Trough b) 132 kV Duct bank</p>
	<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearances are from the proposed Pedestrian Bridge foundation edge to existing EHV 132 kV service edge. 2. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge. 3. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

Fig: 29.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING EHV OHL (132 kV)



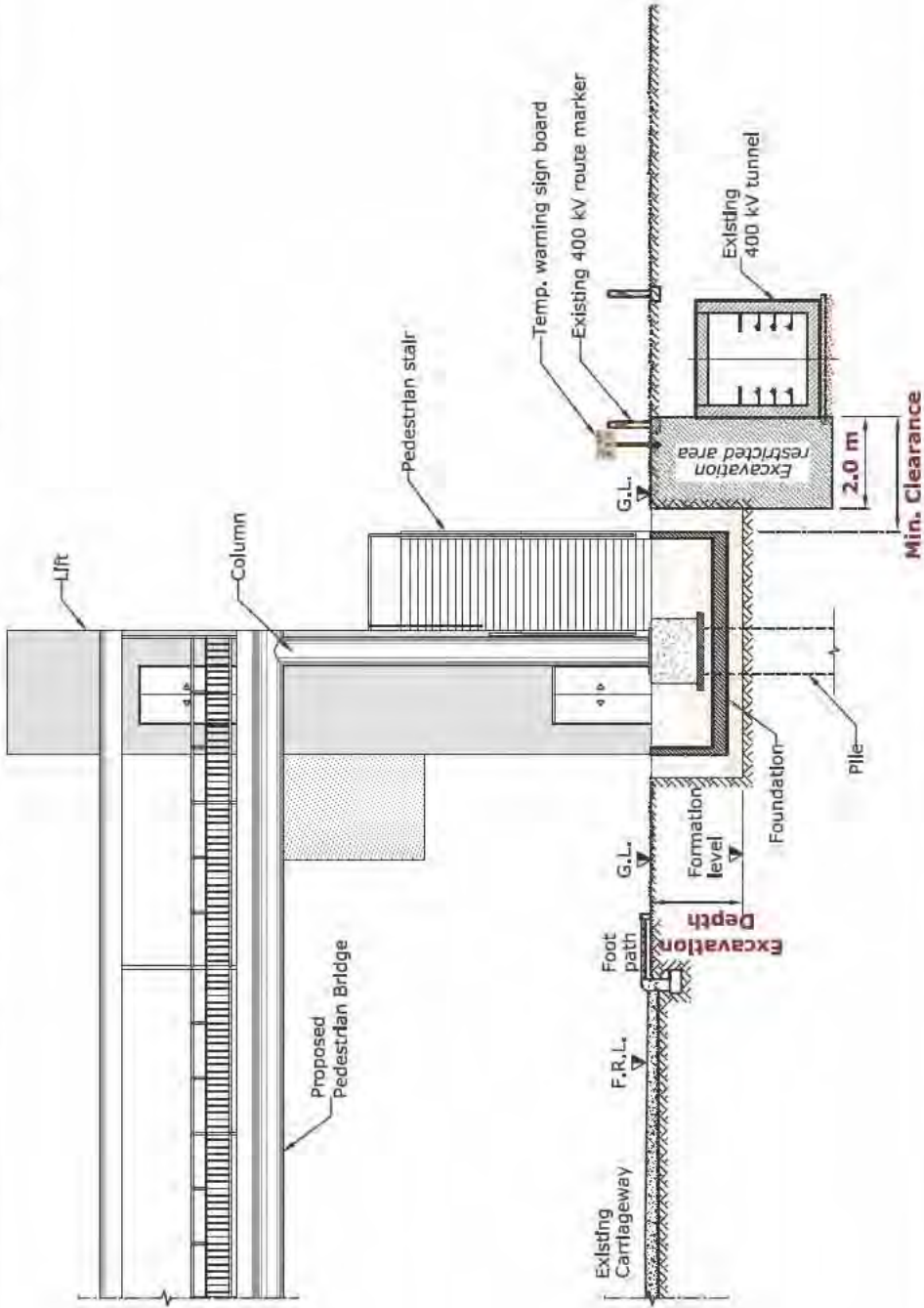
NOTE : 1. Horizontal clearances are from the proposed Pedestrian Bridge edge to existing EHV OHL conductor.

Fig: 29.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING EHV OHL (400 kV)



NOTE : 1. Horizontal clearances are from the proposed Pedestrian Bridge edge to existing EHV OHL conductor.

Fig: 29.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING 400 KV TUNNEL



NOTE :

1. The maximum vibration level for nearest edge of 400 kV Tunnel from any civil works should not exceed 15 mm/s PPV.
2. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
3. Protection method for existing 400 kV tunnel varies as per proposed services and it's formation level.
4. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed excavation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m

Table 4: Clearance & Protection details for proposed Pedestrian Bridge and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.10)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 29.10)

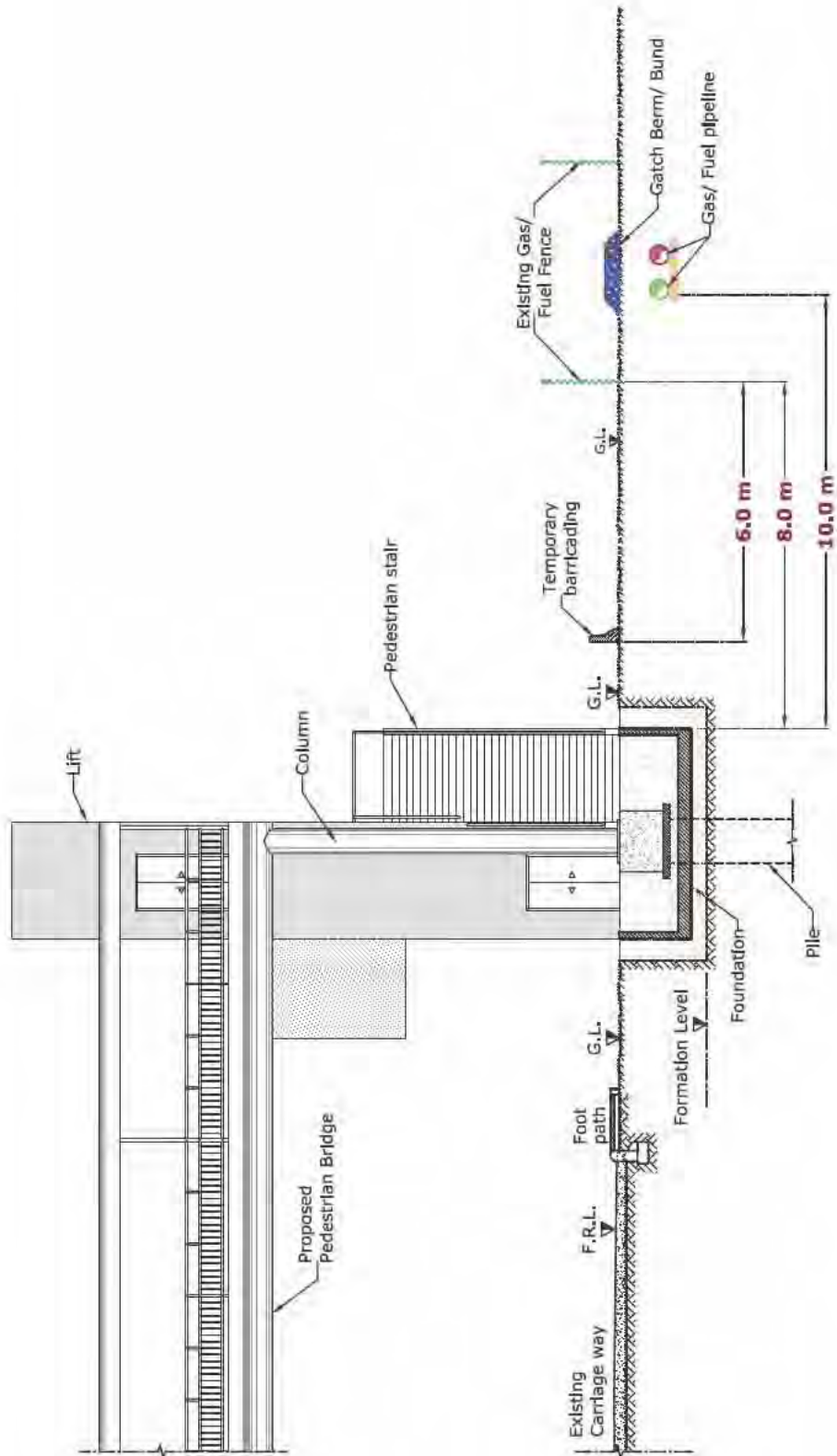
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Proposed Pedestrian Bridge

Fig: 29.10 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PEDESTRIAN BRIDGE AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed Pedestrian Bridge foundation/ pile edge to existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from proposed Pedestrian Bridge foundation/ pile edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

CHAPTER 3

STRUCTURES

30. Installation of Proposed Bus Shelter/ Kiosks

503

30.1 Introduction

Bus shelters are resting/ waiting areas for passengers. They serve to protect people from adverse weather conditions. A bus shelter is essentially a kiosk constructed on a concrete foundation with resting seats, lighting, an air conditioning system, signage, bus services time table board, etc.

A bus shelter is constructed within the Right Of Way. Therefore it is important to protect DEWA existing assets during construction activities as per specified standards.



30.2 Avoid the following



1. Installation of Bus Shelter/Kiosk foundation in DEWA corridor and above DEWA services.

30.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Bus shelter/Kiosks and existing DEWA Electricity LV Cables						
Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 30.1)

Table 2: Clearance & Protection details for proposed Bus shelter/Kiosks and existing DEWA Electricity HV services						
Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.3)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.


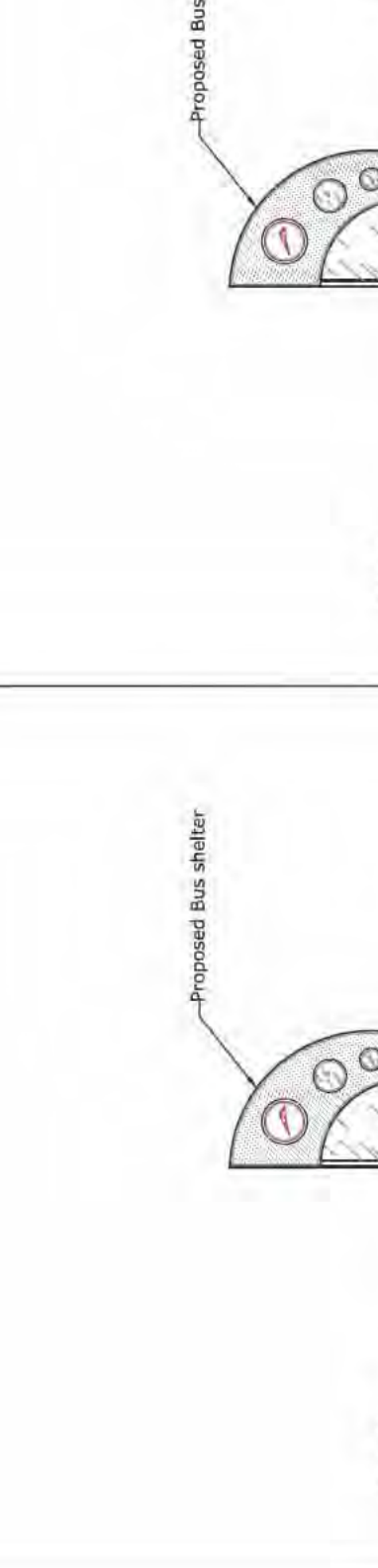
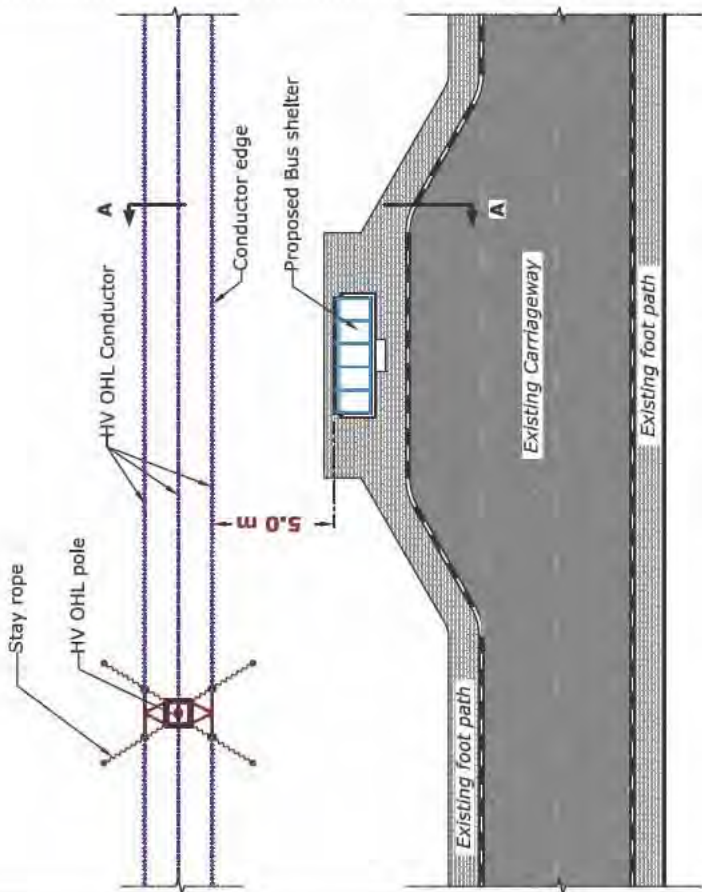
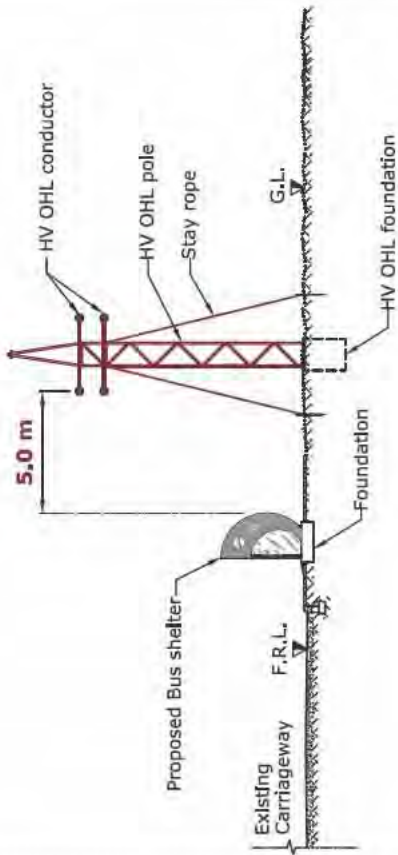
Fig: 30.1	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED BUS SHELTER AND EXISTING LV CABLES	Fig: 30.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED BUS SHELTER AND EXISTING HV SERVICES
			
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Bus shelter foundation edge to existing LV/ HV cable edge. 2. Trench side and existing LV/ HV cable protection may be required as per site and soil condition. 			

Fig: 30.3

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED BUS SHELTER AND EXISTING HV OHL (6.6/11/33 kV)



PLAN



SECTION - AA

NOTE : 1. Horizontal clearances are from the proposed Bus shelter edge to existing HV OHL conductor.

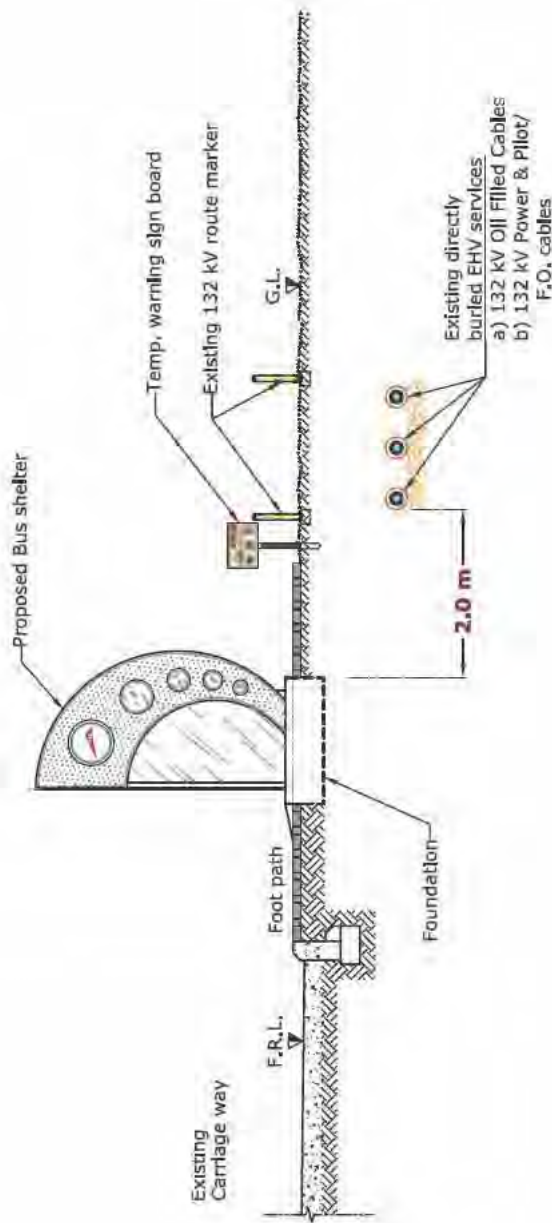
Table 3: Clearance & Protection details for proposed Bus shelter/Kiosks and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.9)
EHV (132 kV) O.H.L	15.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 30.7)
EHV (400 kV) O.H.L	20.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 30.8)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 30.4 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED BUS SHELTER AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES



NOTE : 1. Horizontal clearance is from the proposed Bus shelter foundation edge to existing EHV 132 kV service edge.
2. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

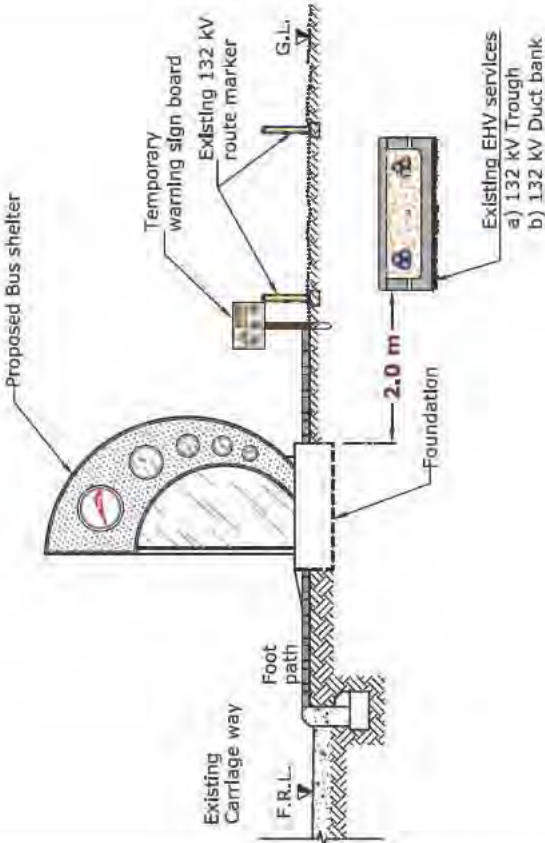
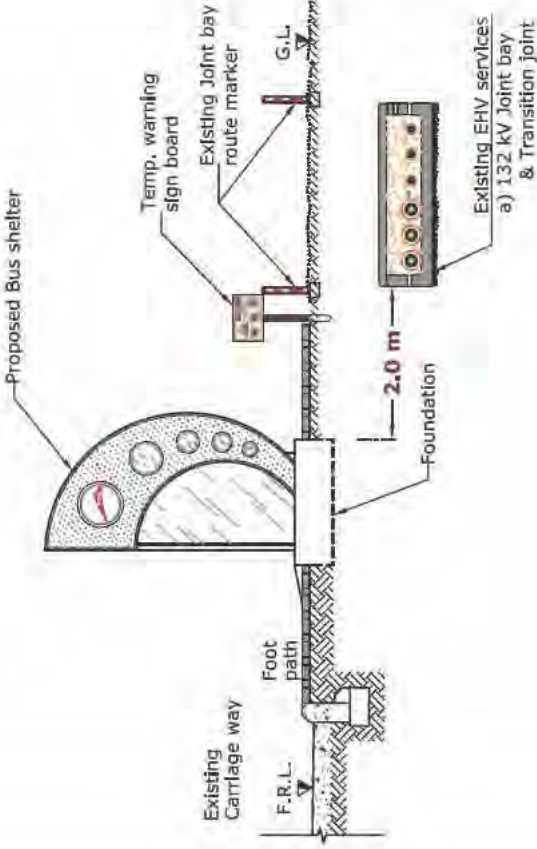
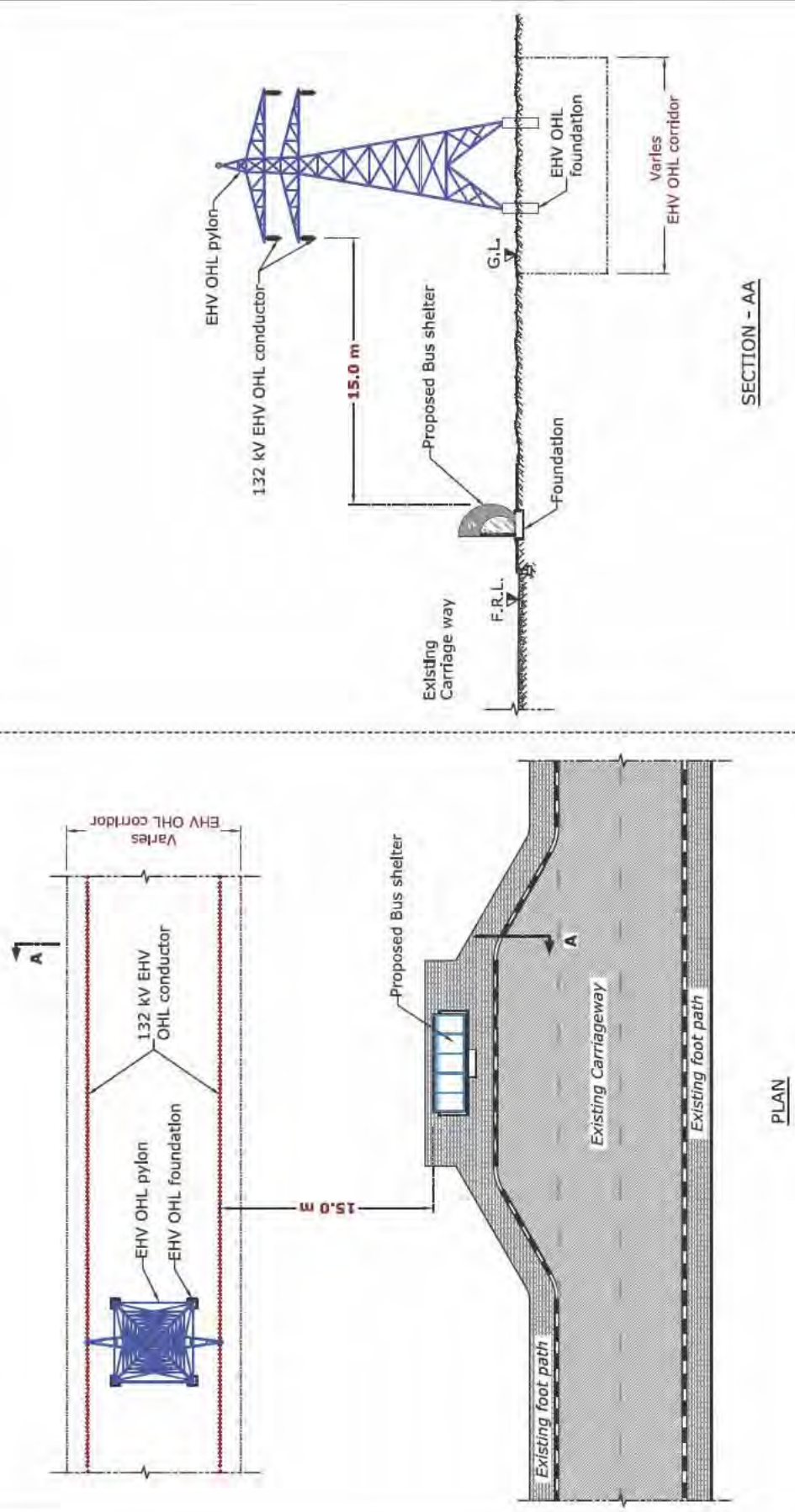
<p>Fig: 30.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED BUS SHELTER AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>	<p>Fig: 30.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED BUS SHELTER AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>
			
<p>NOTE :</p>	<ol style="list-style-type: none"> 1. Horizontal clearances are from the proposed Bus shelter foundation edge to existing EHV 132 kV service edge. 2. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 		

Fig: 30.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED BUS SHELTER AND EXISTING EHV OHL (132 kV)



NOTE :

1. Horizontal clearances are from the proposed Bus shelter edge to existing EHV OHL conductor.
2. Bus shelter not allowed in EHV OHL corridor.

Fig: 30.8

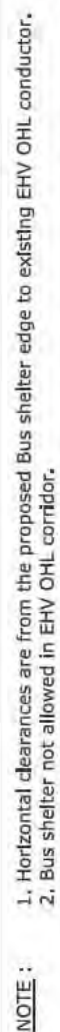
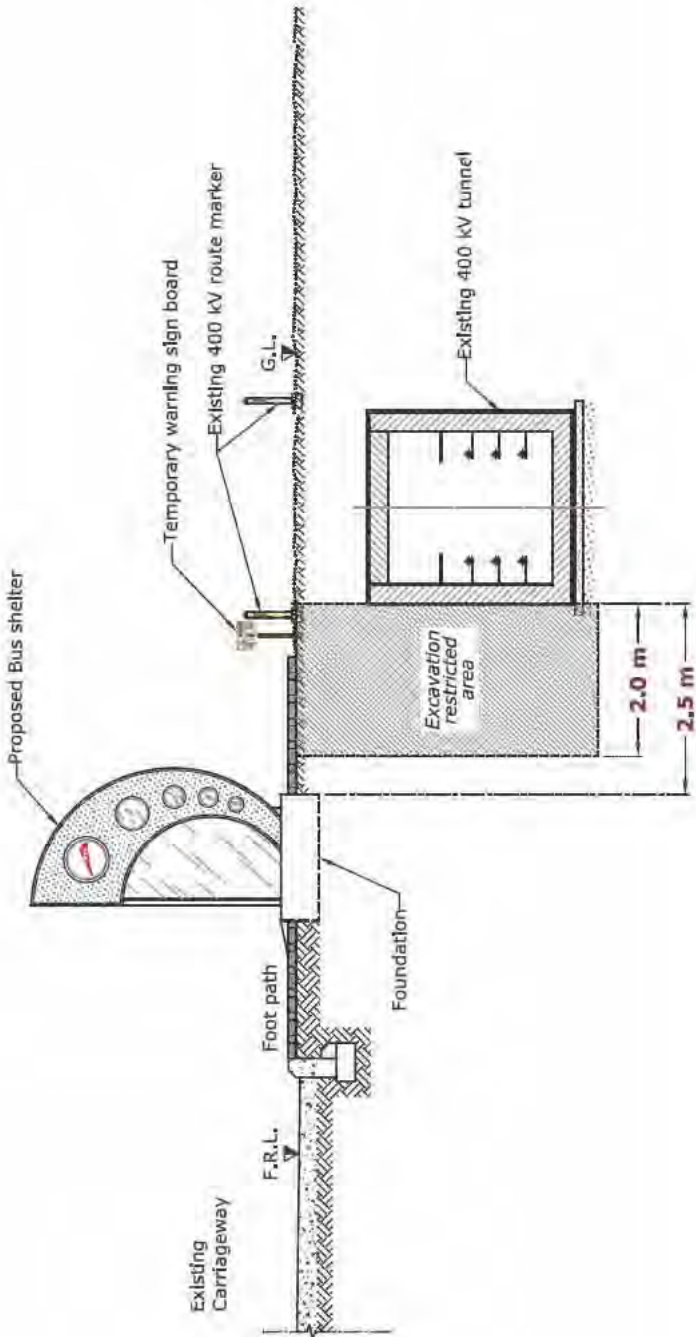


Fig: 30.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED BUS SHELTER AND EXISTING 400 KV TUNNEL



- NOTE :**
1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
 2. Horizontal clearance is from the proposed foundation edge to the existing 400 kV Tunnel outer wall.
 3. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

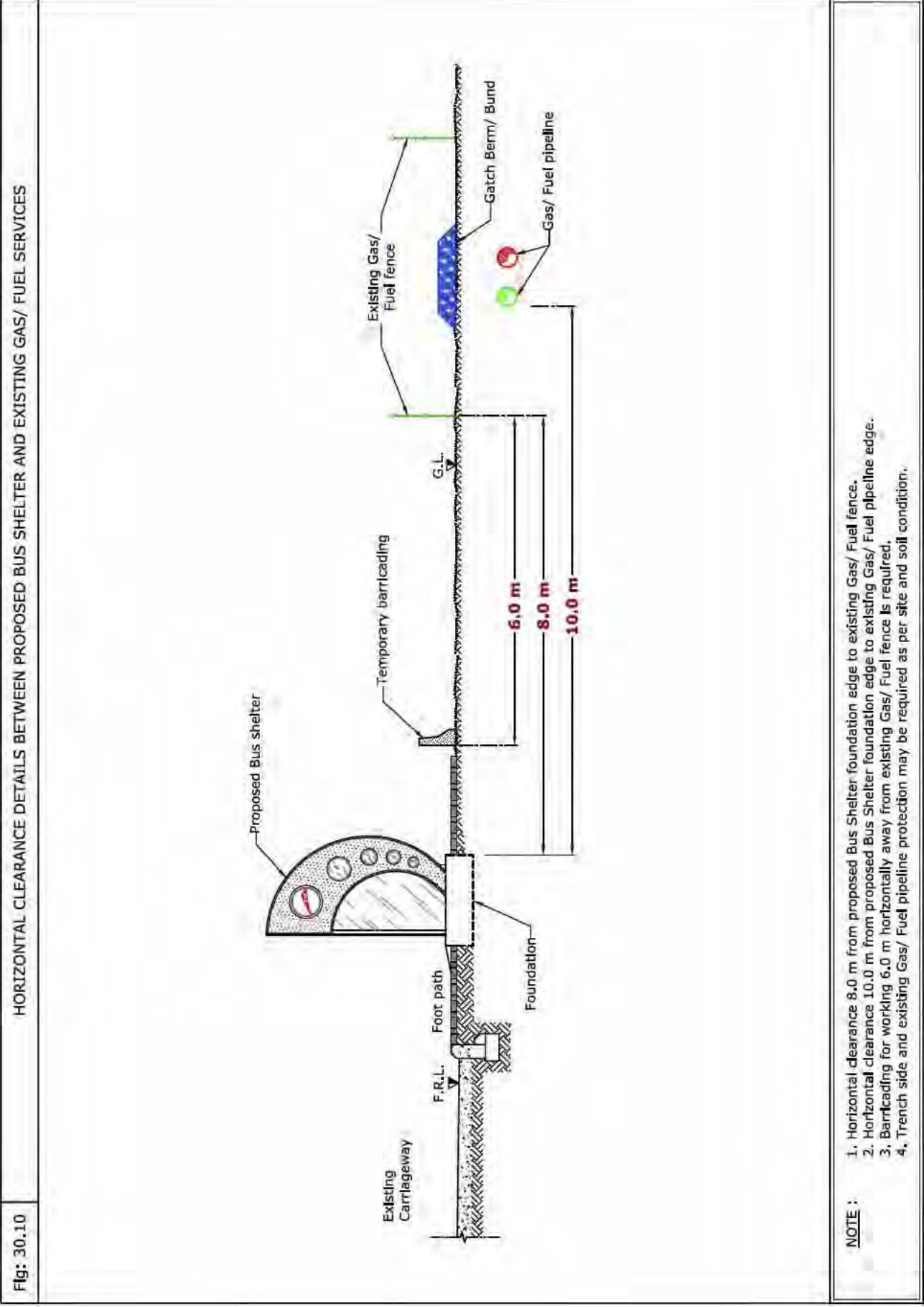
Table 4: Clearance & Protection details for proposed Bus shelter/Kiosks and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.10)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 30.10)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.





31. Proposed Street Lighting

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31.1 Introduction

Street lighting system is necessary to illuminate the streets/roads to serve communities, prevent accidents and enhance traffic and pedestrian safety.

This system consists of LV cables, pull box, control cabinets/feeder pillar etc., and luminary poles fixed on precast concrete foundations of various sizes at

certain intervals along road edges, intersections, and medians etc. The street lighting system components are installed in a dedicated corridor within the Right Of Way. Therefore, during installation it is important to protect DEWA existing assets as per specified standards.



31.2 Avoid the following



1. Installation of street light foundation in DEWA corridor and above DEWA services.
2. Proposed Street Light Cable, crossing 132 kV Joint bay/Transition joint.
3. Installation of street light pole below existing DEWA OHL conductor.

31.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Installation of Street light and existing DEWA Electricity LV Cables							
Electricity LV Existing Services	Proposed Street light	Horizontal Clearance	Crossing details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	Foundation	0.3 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.1, Case-1)
	Cable	0.3 m	0.2 m	B	OC		• Horizontal clearance (Ref Fig: 31.1, Case-2) • Vertical clearance (Ref Fig: 31.1, Case-3)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Street Light Foundation



Foundation Installation



Street Light Pole

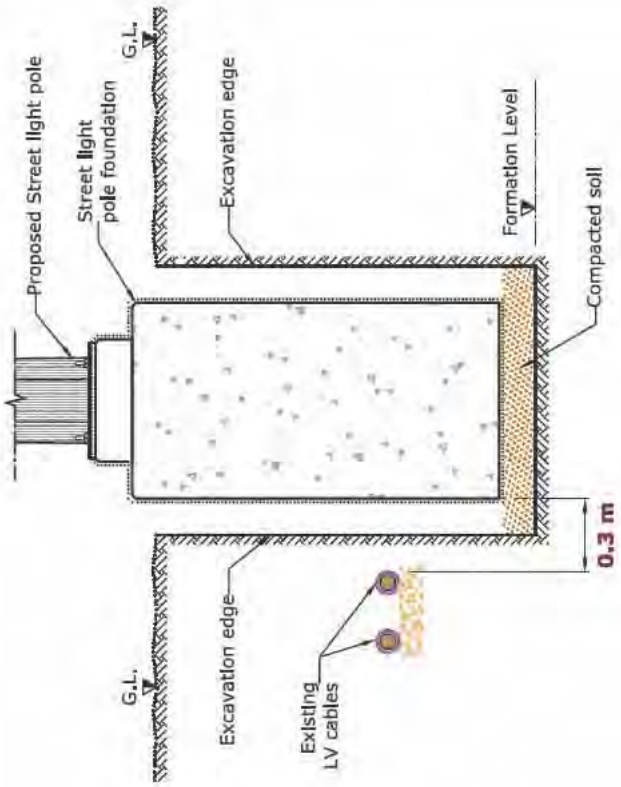
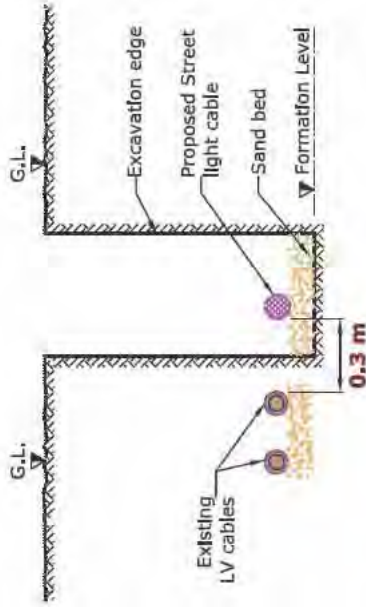
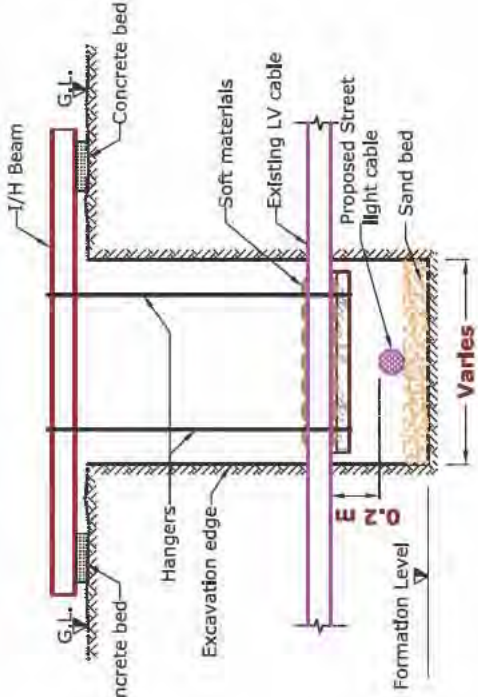
Fig: 31.1	HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED STREET LIGHT AND EXISTING LV CABLES	
CASE 1 : Installation of Street Light Pole Foundation And Existing LV Cables		
CASE 3 : Street Light Cable Crossing Below the Existing LV Cables		
NOTE :	1. Horizontal clearance is from the proposed Street light cable/ foundation edge to existing LV cable edge. 2. Vertical clearance is from the top of proposed Street light cable to bottom of existing LV cable. 3. Trench side and existing LV cable protection may be required as per site and soil condition.	

Table 2: Clearance & Protection details for proposed Installation of Street light and existing DEWA Electricity HV services

Electricity HV Existing Services	Proposed Street light	Crossing Details					Remarks
		Horizontal Clearance	Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	Foundation	0.3 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.2, Case-1)
	Cable	0.3 m	0.2 m	B	OC		• Horizontal clearance (Ref Fig: 31.2, Case-2) • Vertical clearance (Ref Fig: 31.2, Case-3)
HV (6.6/11/33 kV) Manhole.	Cable	0.3 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.3)
HV (6.6/11/33 kV) O.H.L.	Street Light Pole	3.0 m	NA	-	-	R	• Falling clearance from conductor (Ref Fig: 31.4, Ref Photo: 31.1)
		2.0 m	NA	-	-		• Falling clearance from stay rope (Ref Fig: 31.4)
	Cable	5.0 m	NR	-	-		• Horizontal clearance from stay rope (Ref Fig:31.5, Case-2)
Clearance & Protection details for access and working under Existing HV-OHL							
HV (6.6/11 kV) O.H.L.	-	5.0 m	3.0 m	B	-	R	• Horizontal clearance (Ref Fig: 31.5) • Vertical clearance (Ref Fig: 31.5)
HV (33 kV) O.H.L.	-		3.5 m				• Horizontal clearance (Ref Fig: 31.5) • Vertical clearance (Ref Fig: 31.5)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

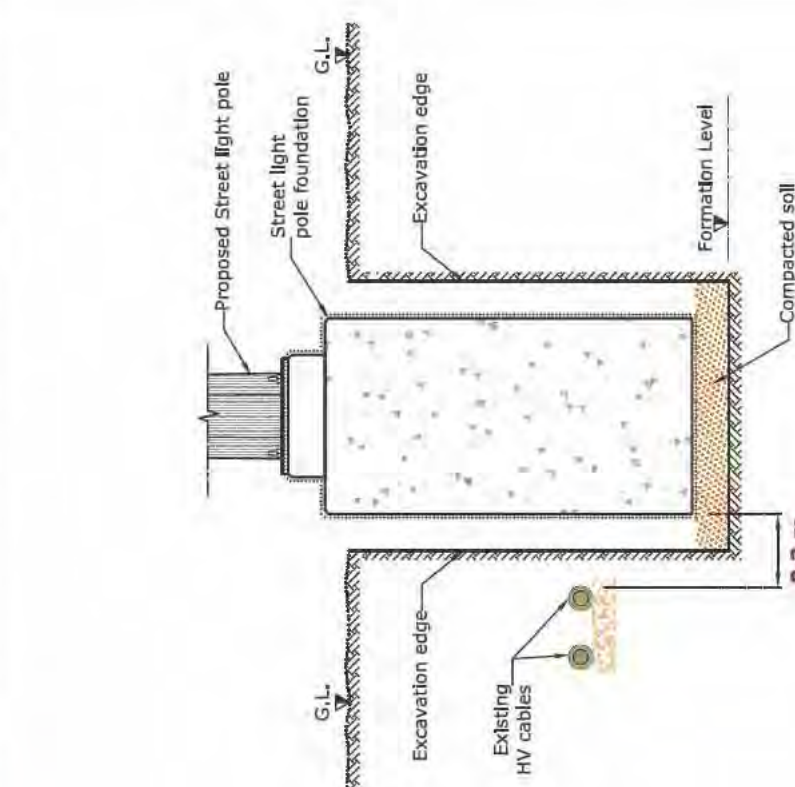
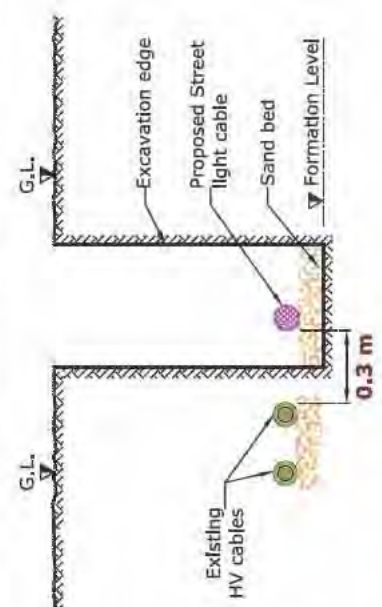
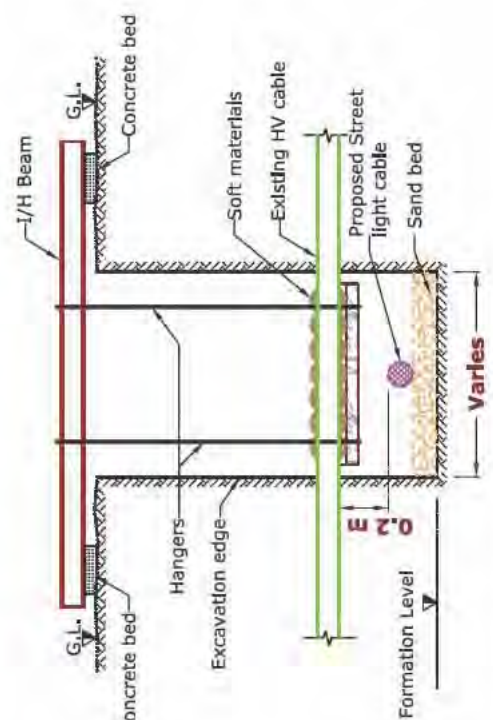
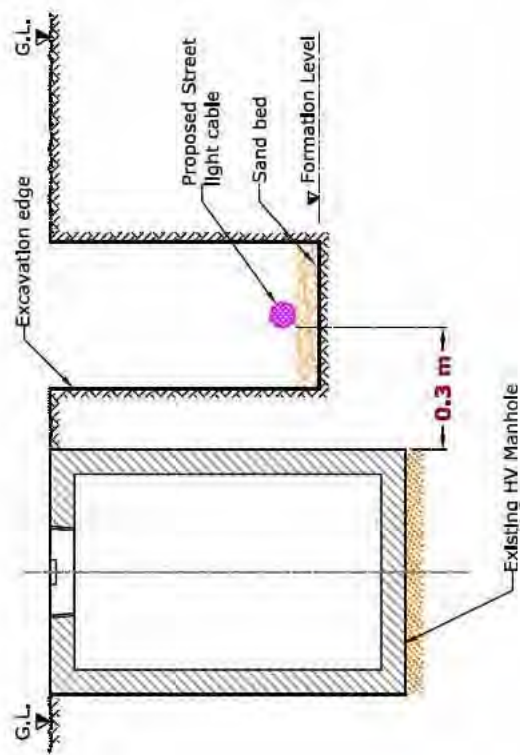
Fig: 31.2	HORIZONTAL & VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED STREET LIGHT AND EXISTING HV SERVICES
CASE 1 : Installation of Street Light Pole Foundation And Existing HV Cables	
CASE 2 : Street Light Cable Laying Parallel To Existing HV Cables	
CASE 3 : Street Light Cable Crossing Below the Existing HV Cables	
NOTE :	<ol style="list-style-type: none"> 1. Horizontal clearance Is from the proposed Street light cable/ foundation edge to existing HV cable edge. 2. Vertical clearance Is from the top of proposed Street light cable to bottom of existing HV cable. 3. Trench side and existing HV cable protection may be required as per site and soil condition.

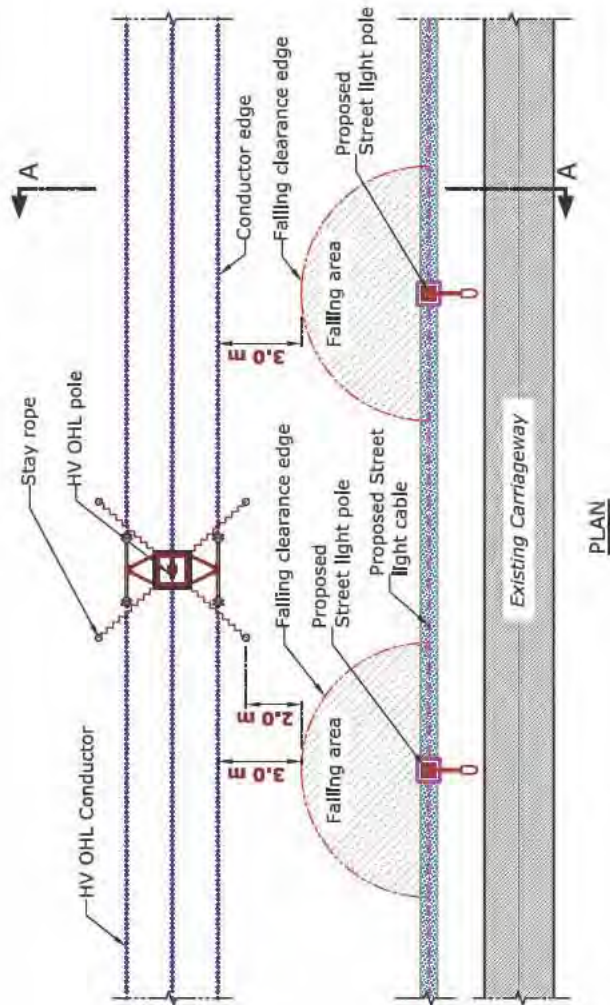
Fig: 31.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED STREET LIGHT CABLE AND EXISTING HV MANHOLE



NOTE :

1. Horizontal clearance is from the proposed Street light cable edge to existing HV Manhole edge.
2. Trench side and existing HV Manhole protection may be required as per site and soil condition.

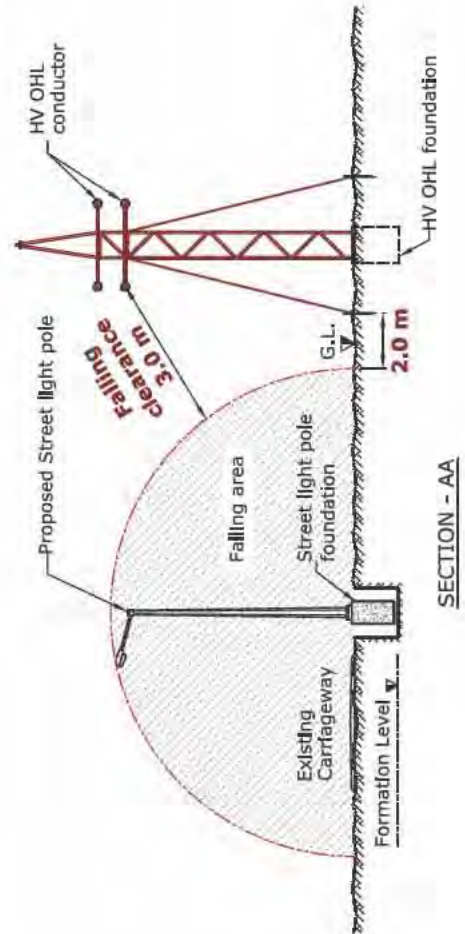
Fig: 31.4 FALLING CLEARANCE DETAILS BETWEEN PROPOSED STREET LIGHT AND EXISTING HV OHL (6.6/11/33 kV)



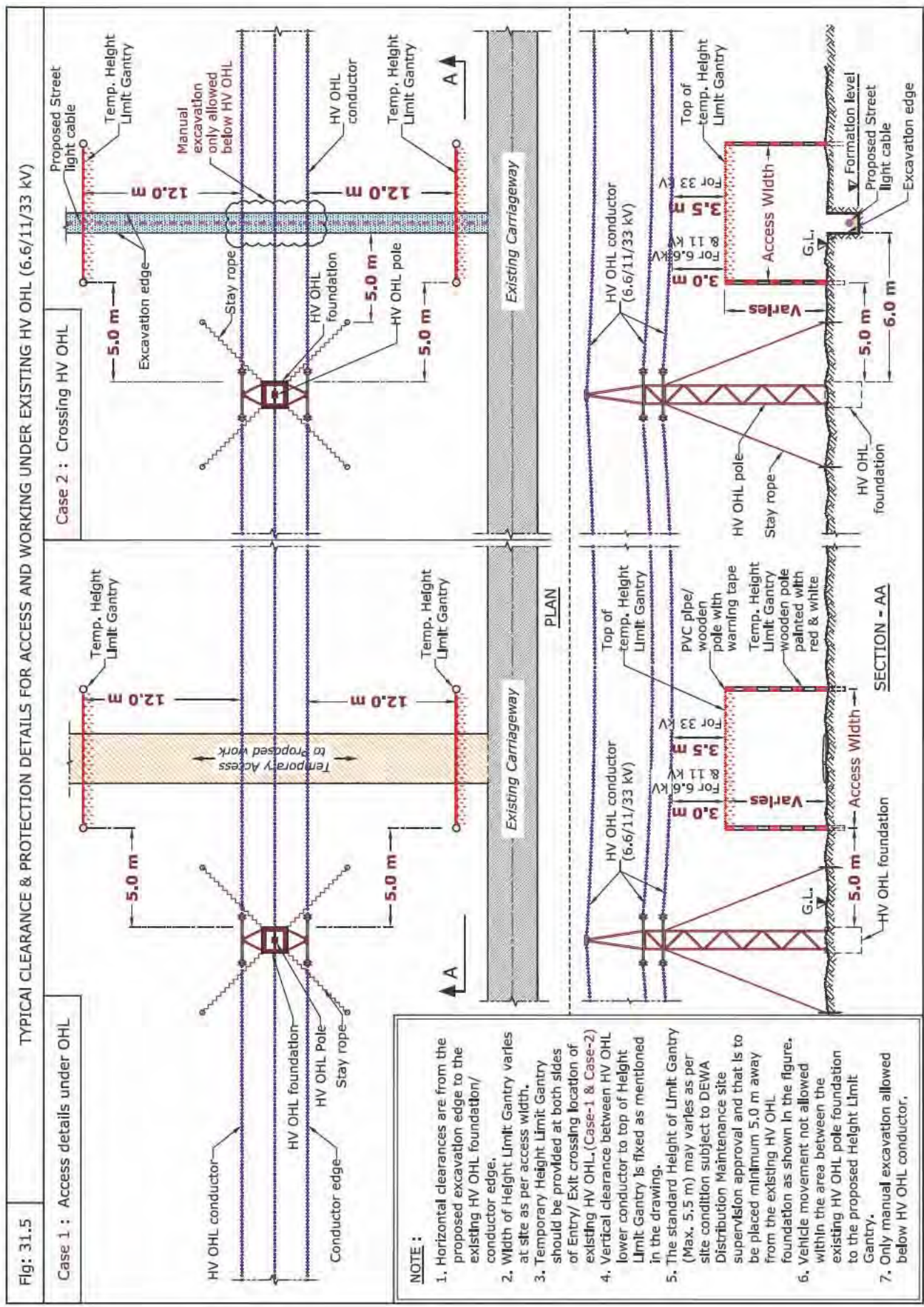
PLAN

NOTE :

1. Street light pole falling area varies according to the pole height.
2. Falling clearance measured from the edge of falling area to the existing HV OHL nearest conductor edge.
3. Temporary Height Limit Gantry should be provided at both sides of Entry/ Exit crossing location of existing HV OHL.
4. Only manual excavation allowed below existing HV OHL conductor.
5. Street light pole not allowed below existing HV OHL conductor.



SECTION - AA



FALLING CLEARANCE SITE VIEW - HV OHL AND STREET LIGHT POLE

Photo: 31.1



Table 3: Clearance & Protection details for proposed Installation of Street light and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Proposed Street light	Horizontal Clearance	Crossing details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	Foundation	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.6, Case-1)
	Cable	1.0 m	0.5 m	B	OC		• Horizontal clearance (Ref Fig: 31.6, Case-2) • Vertical clearance (Ref Fig: 31.9) • Protection details (Ref Fig: 31.9)
EHV (132 kV) Power/ Pilot/ F.O Cable (Directly Buried)	Foundation	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.6, Case-1)
	Cable	1.0 m	0.5 m	B	OC		• Horizontal clearance (Ref Fig: 31.6, Case-2) • Vertical clearance (Ref Fig: 31.9) • Protection details (Ref Fig: 31.9)
EHV (132 kV) Trough	Foundation	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.7, Case-1)
	Cable	0.5 m	0.5 m	B	OC		• Horizontal clearance (Ref Fig: 31.7, Case-2) • Vertical clearance (Ref Fig: 31.10) • Protection details (Ref Fig: 31.10)
EHV (132 kV) Duct Bank	Foundation	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.7, Case-1)
	Cable	0.5 m	0.5 m	B	OC		• Horizontal clearance (Ref Fig: 31.7, Case-2) • Vertical clearance (Ref Fig: 31.10) • Protection details (Ref Fig: 31.10)
EHV (132 kV) Joint Bay/ Transition Joint	Foundation	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.8, Case-1)
	Cable	0.5 m	NA	-	-		• Horizontal clearance (Ref Fig: 31.8, Case-2)
EHV (132 kV) O.H.L	Street light Pole	5.0 m	NA	-	-	R	• Falling clearance (Ref Fig: 31.11, Case-1 and Ref Photo: 31.2)
	Cable	5.0 m	NR	B	OC		• Horizontal clearance (Ref Fig: 31.11, Case-2)
EHV (400 kV) O.H.L	Street light Pole	6.0 m	NA	-	-	R	• Falling clearance (Ref Fig: 31.12, Case-1 and Ref Photo: 31.2)
	Cable	5.0 m	NR	B	OC		• Horizontal clearance (Ref Fig: 31.12, Case-2)

Table 3: Clearance & Protection details for proposed Installation of Street light and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Proposed Street light	Horizontal Clearance	Crossing details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (400 kV) Tunnel	Foundation	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.13)
	Cable	2.5 m	1.0 m	A	OC	R	• Vertical clearance (Ref Fig: 31.13)
Clearance & Protection details for access and working under Existing EHV-OHL							
EHV (132 kV) O.H.L	-	5.0 m	4.5 m	B	-	R	• Horizontal clearance (Ref Fig: 31.14, Case-1)
EHV (400 kV) O.H.L	-		7.5 m				• Vertical clearance (Ref Fig: 31.14, Case-1)
							• Horizontal clearance (Ref Fig: 31.14, Case-2)
							• Vertical clearance (Ref Fig: 31.14, Case-2)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



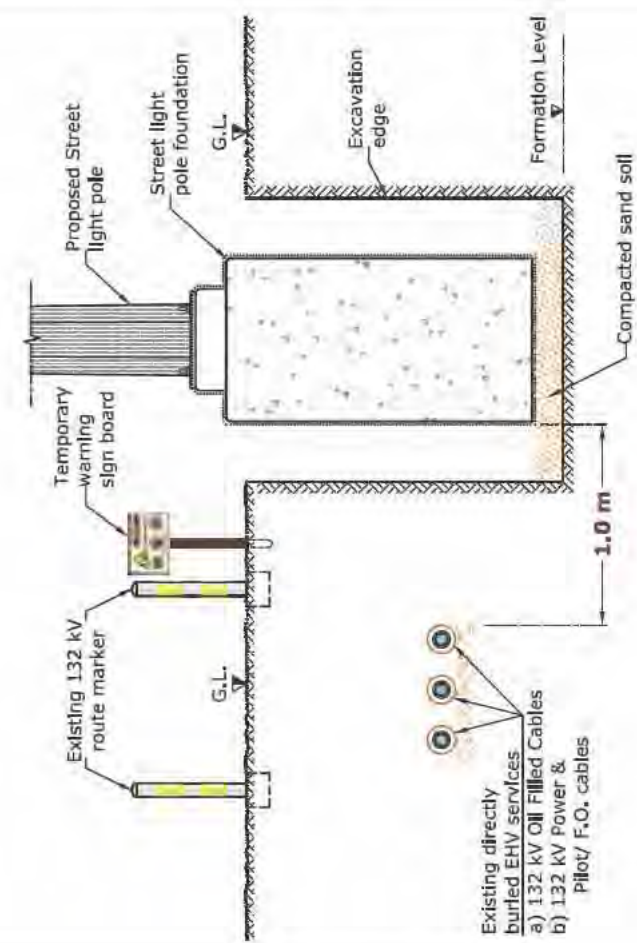
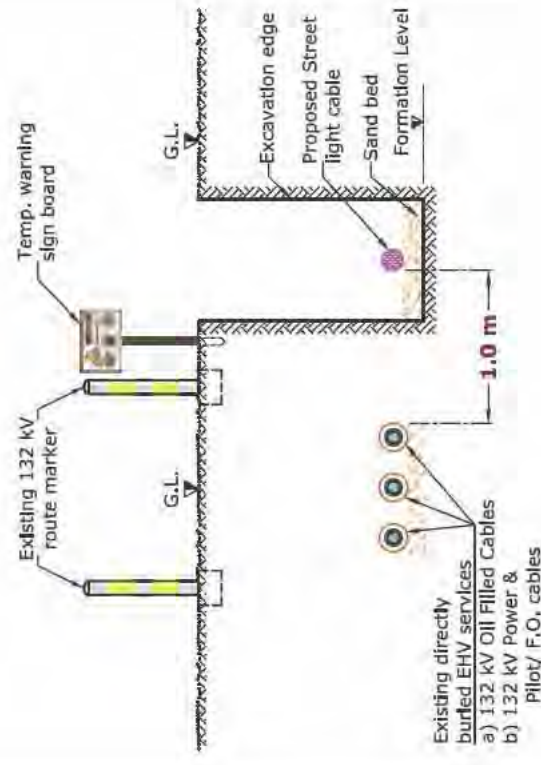
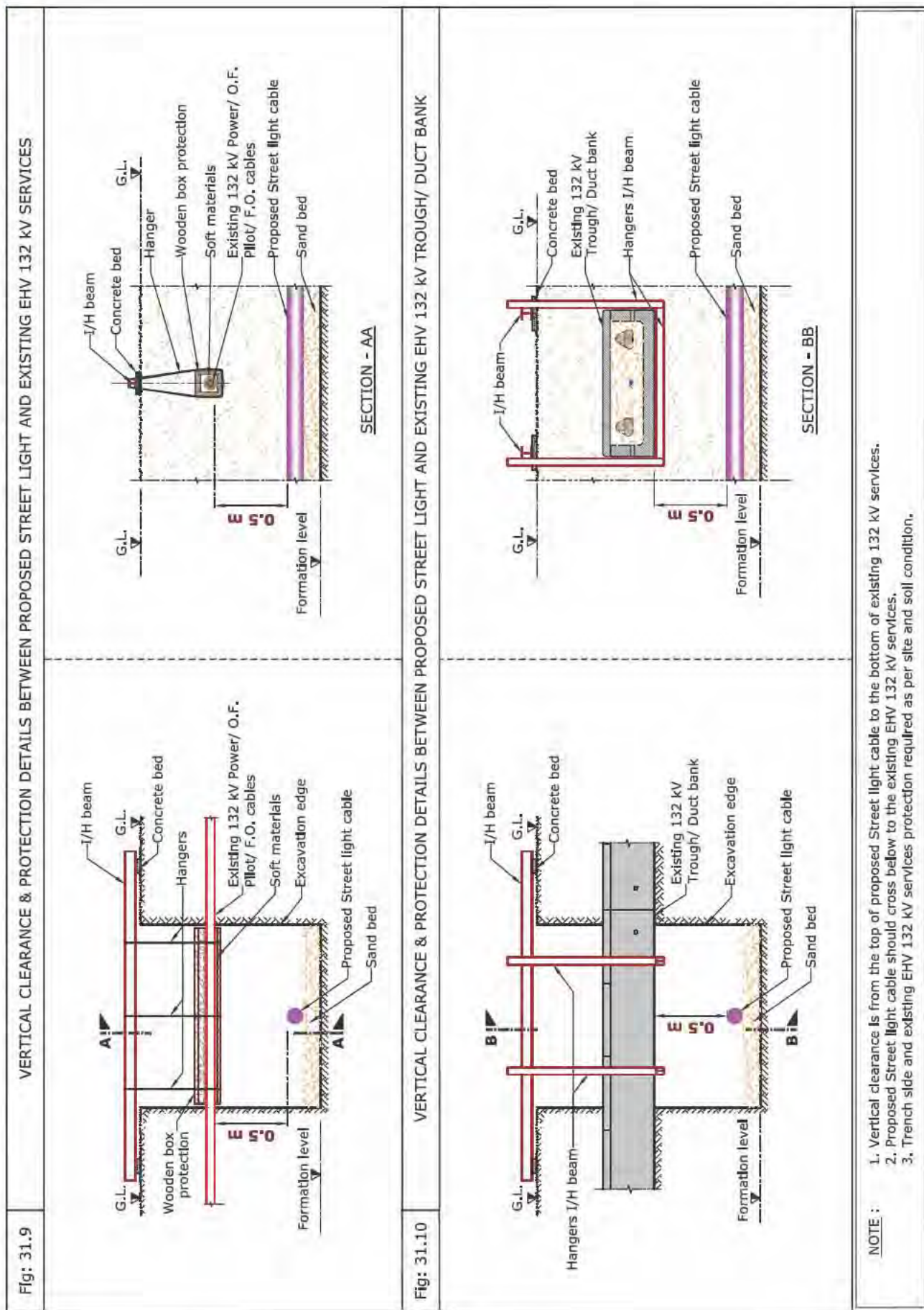
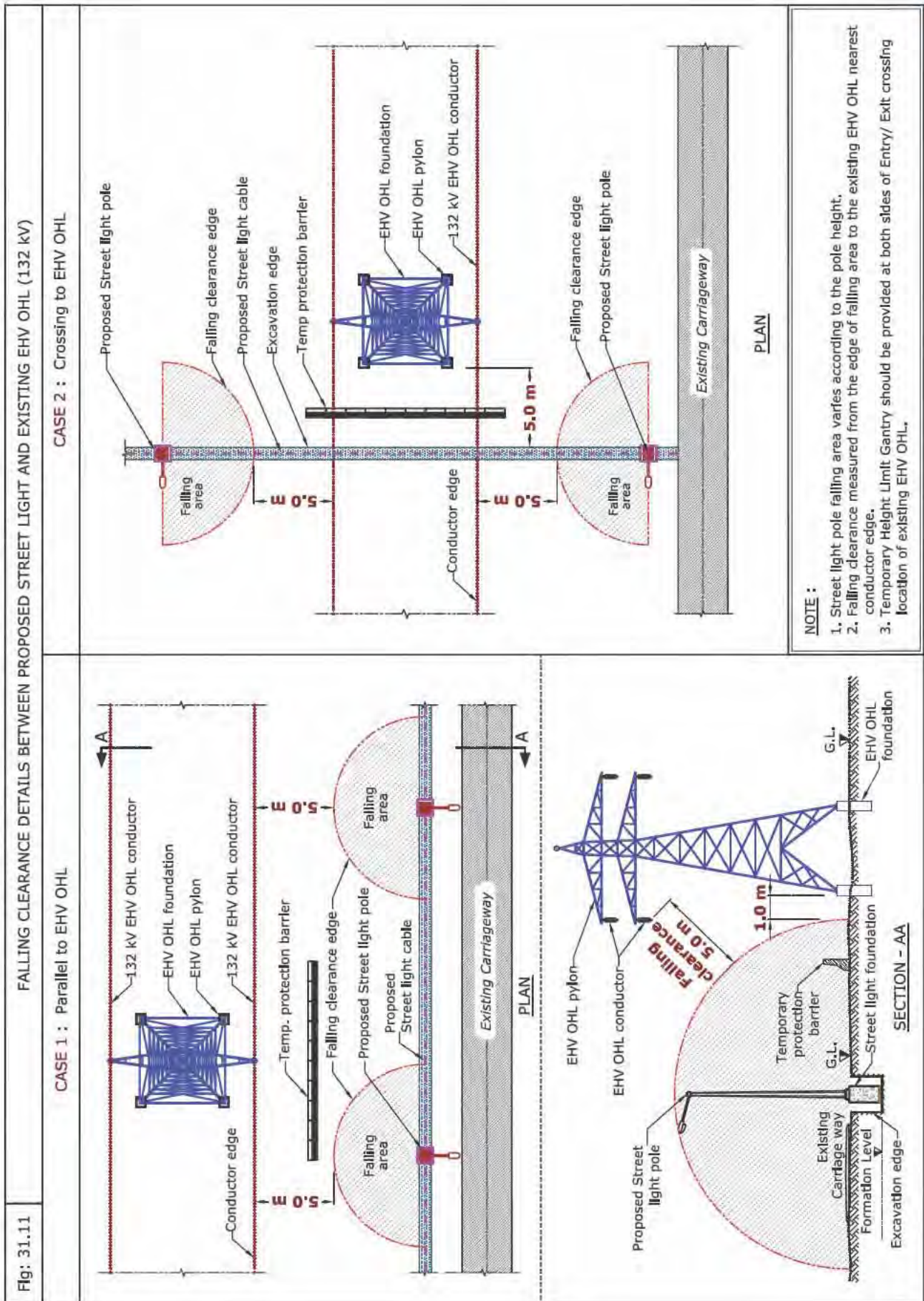
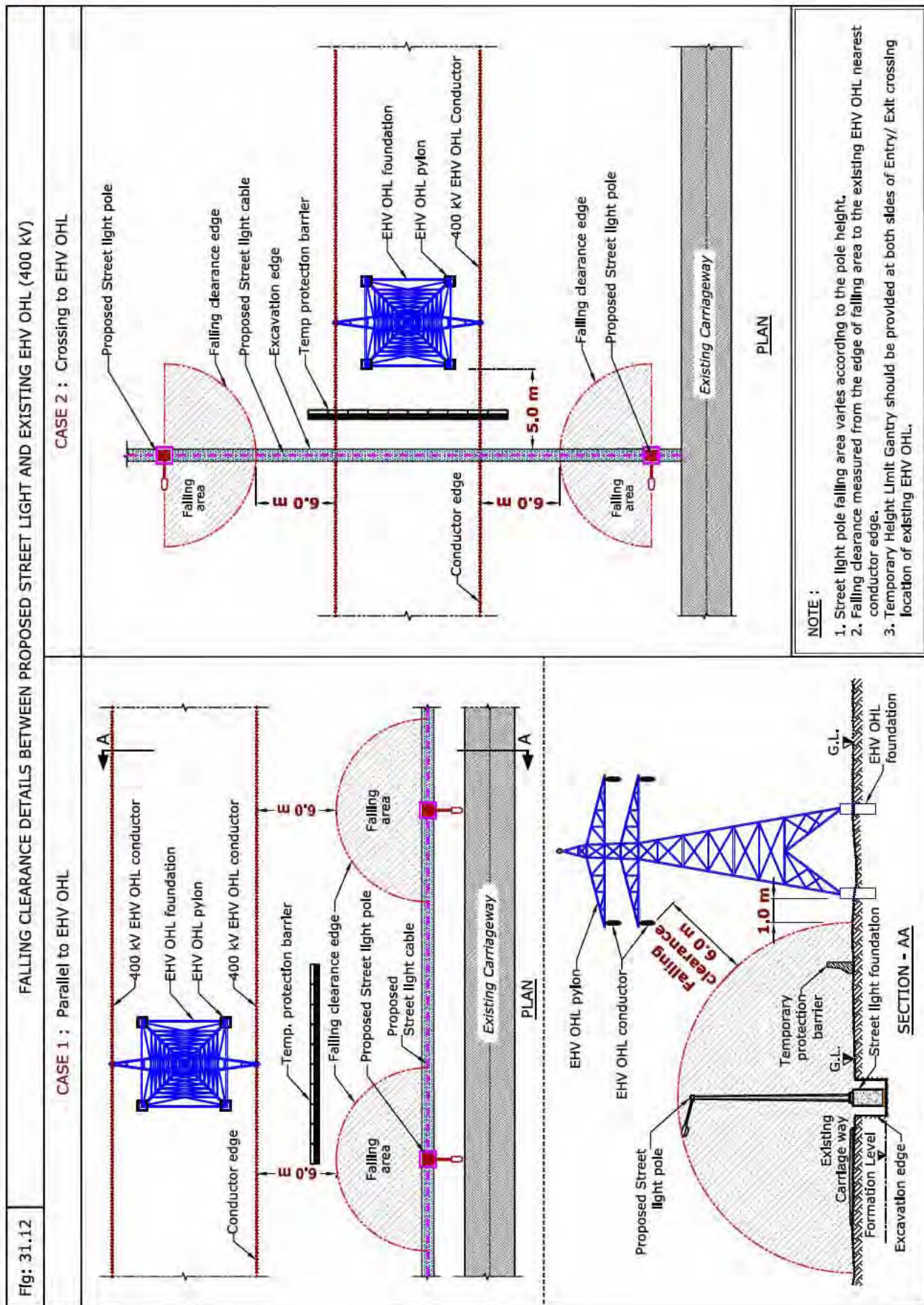
Fig: 31.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED STREET LIGHT AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES
CASE 1 : Installation of Street light pole foundation and existing 132 kV services	
CASE 2 : Street light cable laying parallel to existing 132 kV services	
NOTE :	<ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Street light foundation/ cable edge to existing 132 kV service edge. 2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m Intervals. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge. 4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

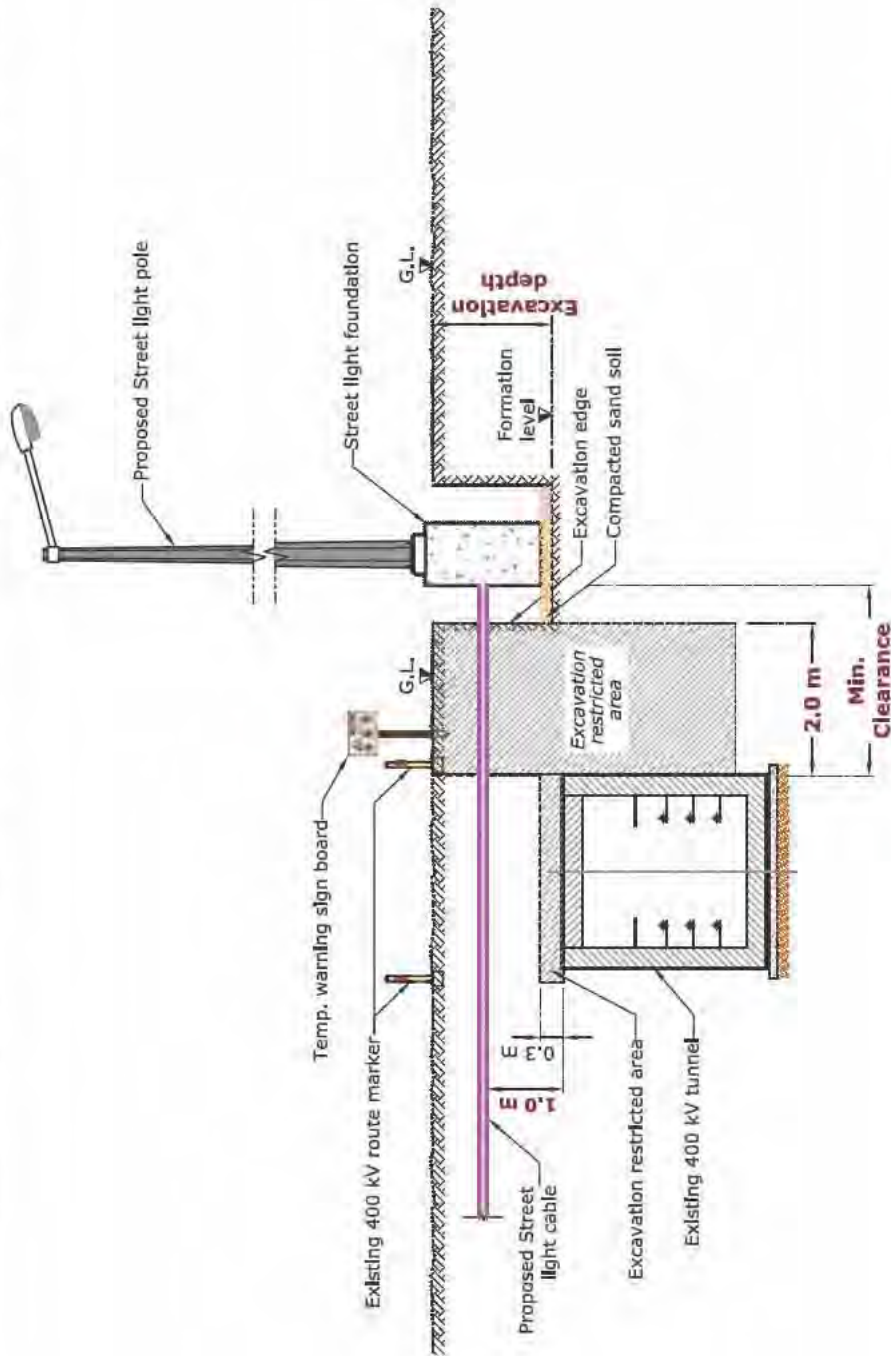
Fig: 31.7	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED STREET LIGHT AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
CASE 1 : Installation of Street light pole and existing 132 kV services	
CASE 2 : Street light cable laying parallel to existing 132 kV services	
Fig: 31.8	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED STREET LIGHT AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
CASE 1 : Installation of Street light pole and existing 132 kV services	
CASE 2 : Street light cable laying parallel to existing 132 kV services	
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Street light cable/ foundation edge to existing EHV 132 kV services edge. 2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge. 4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 	







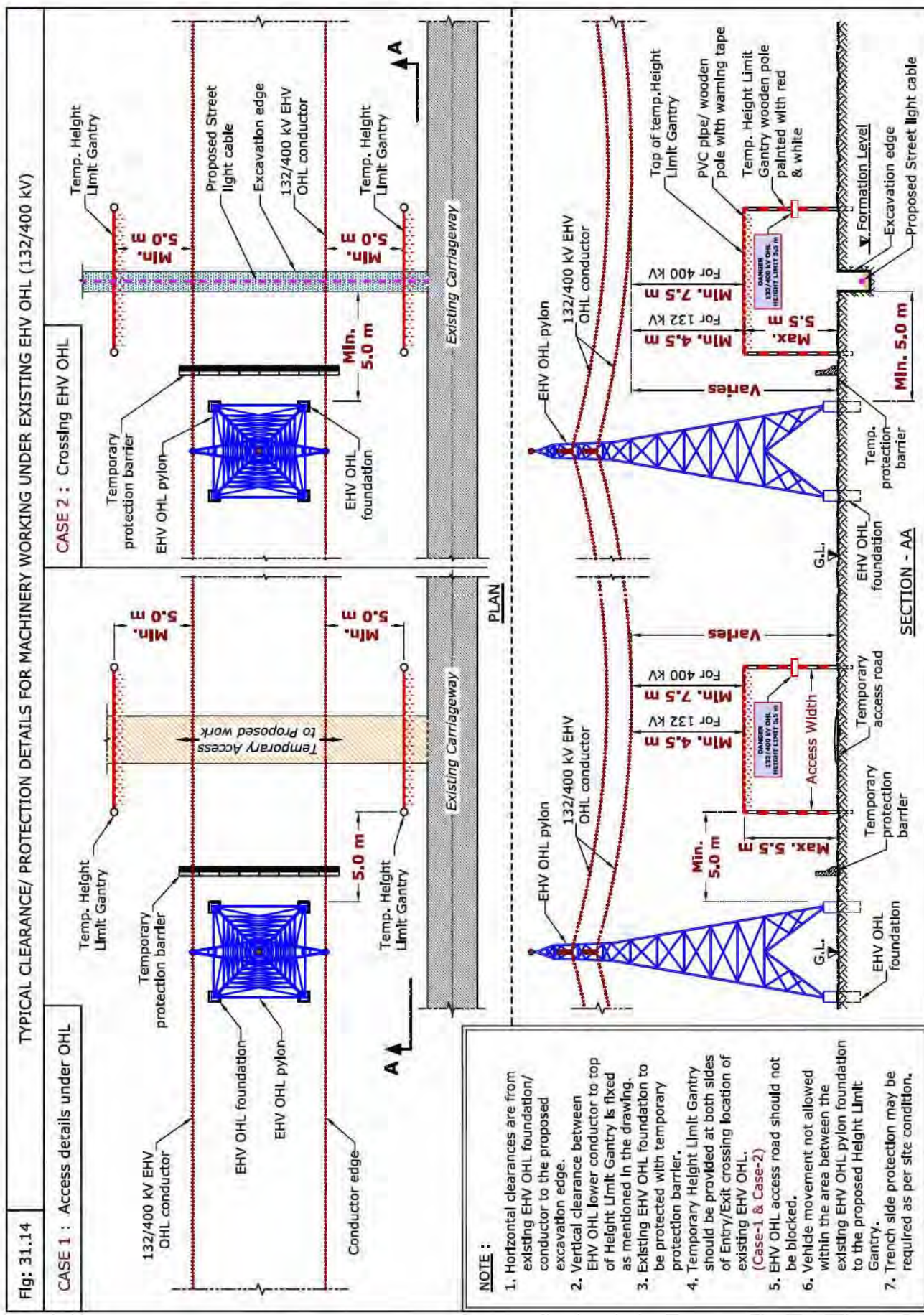
HORIZONTAL & VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED STREET LIGHT AND EXISTING 400 kV TUNNEL

**NOTE :**

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
2. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
3. Horizontal clearance is from the proposed excavation edge to the existing 400 kV tunnel outer wall.
4. Protection method for existing 400 kV tunnel varies as per proposed services and its formation level.
5. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
6. Vertical clearance minimum 1.0 m should be maintained from the top of the 400 kV tunnel to the bottom of the proposed Street light cable.
7. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Street light foundation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m



FALLING CLEARANCE SITE VIEW - EHV OHL AND STREET LIGHT POLE

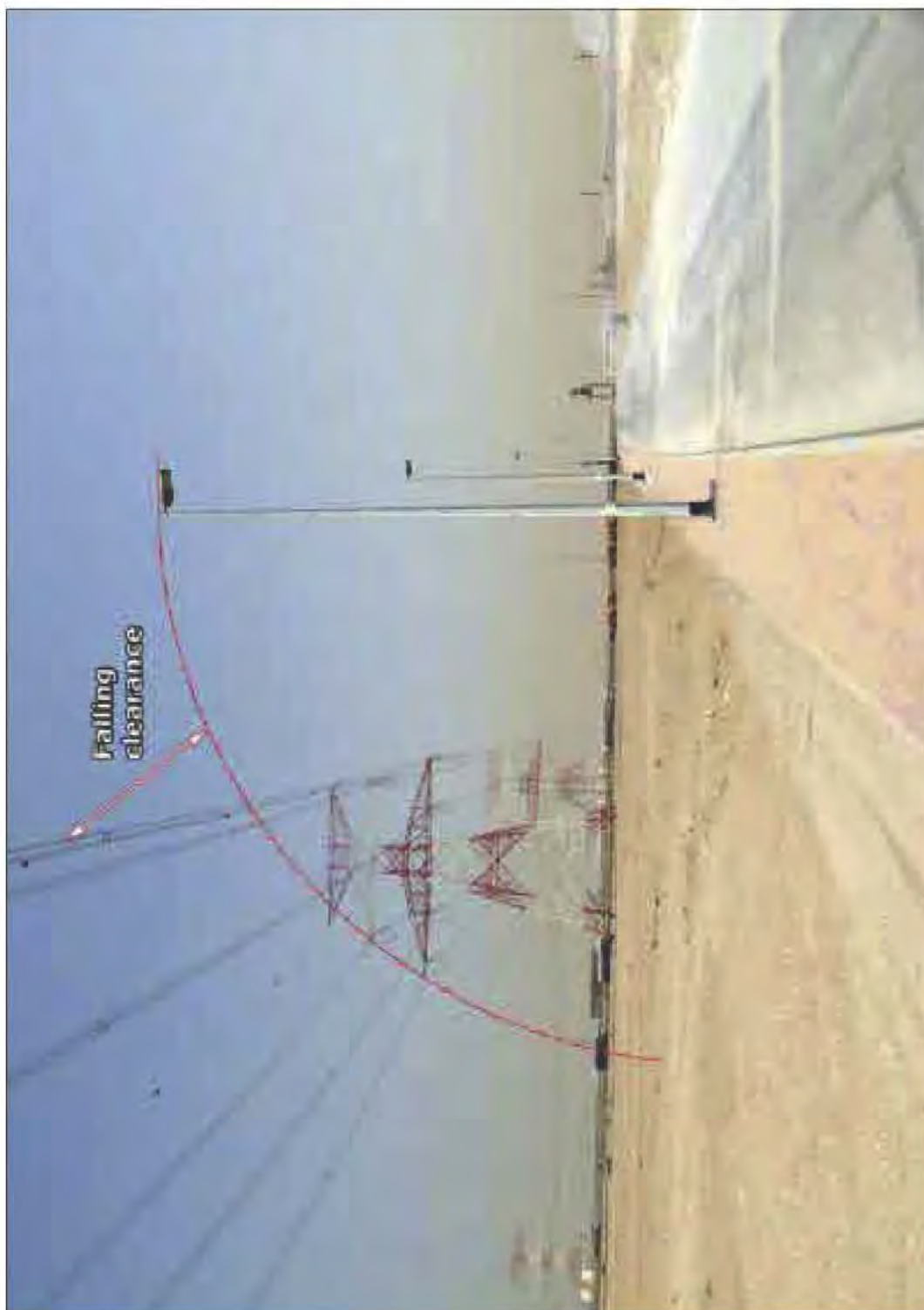


Photo: 31.2

Table 4: Clearance & Protection details for proposed Installation of Street light and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Proposed Street light	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	Foundation	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.15)
	Cable	8.0 m	2.0 m	B	NDCM		
Gas/Fuel pipeline (All diameter)	Foundation	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 31.15)
	Cable	10.0 m	2.0 m	B	NDCM		

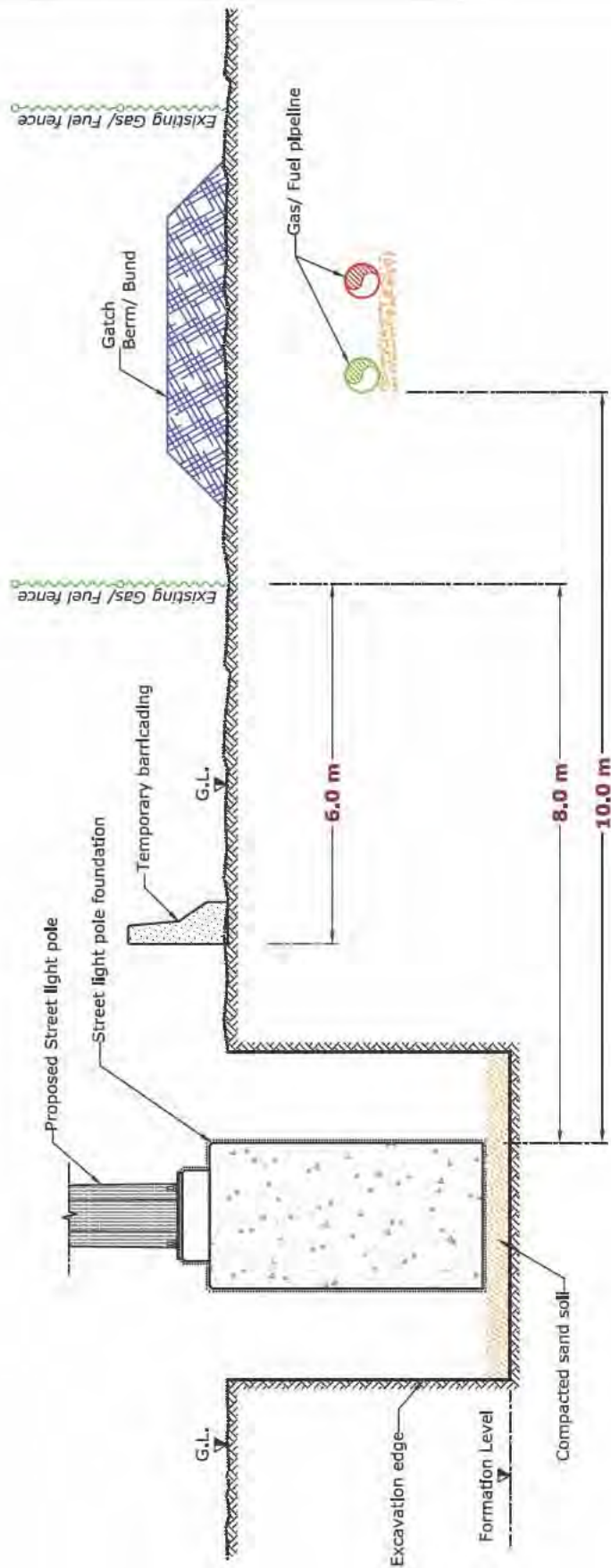
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED STREET LIGHT AND EXISTING GAS/ FUEL SERVICES

Fig: 31.15

**NOTE :**

1. Horizontal clearance 8.0 m from proposed Street light cable/ foundation edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Street light cable/ foundation edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Proposed Street light cable allowed to cross existing Gas/ Fuel pipeline by NDCM.
5. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
6. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

32. Installation of Proposed Advertisement Signage

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32.1 Introduction

The purpose of advertisement signage is to attract people's attention and create awareness for products, services or ideas offered by an organisation/company.

A typical outdoor signage is a structure supported by a vertical post to display the advertisements in

public places, highways or on the face of buildings. The vertical post of the signboard is placed over a concrete foundation and constructed within Right Of Way. Therefore, during construction it is important to protect DEWA existing assets as per specified standards.



32.2 Avoid the following



1. Installation of the foundation for advertisement signage in DEWA corridor/reservation and above DEWA services.

32.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Installation of Advertisement Signages and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.1)

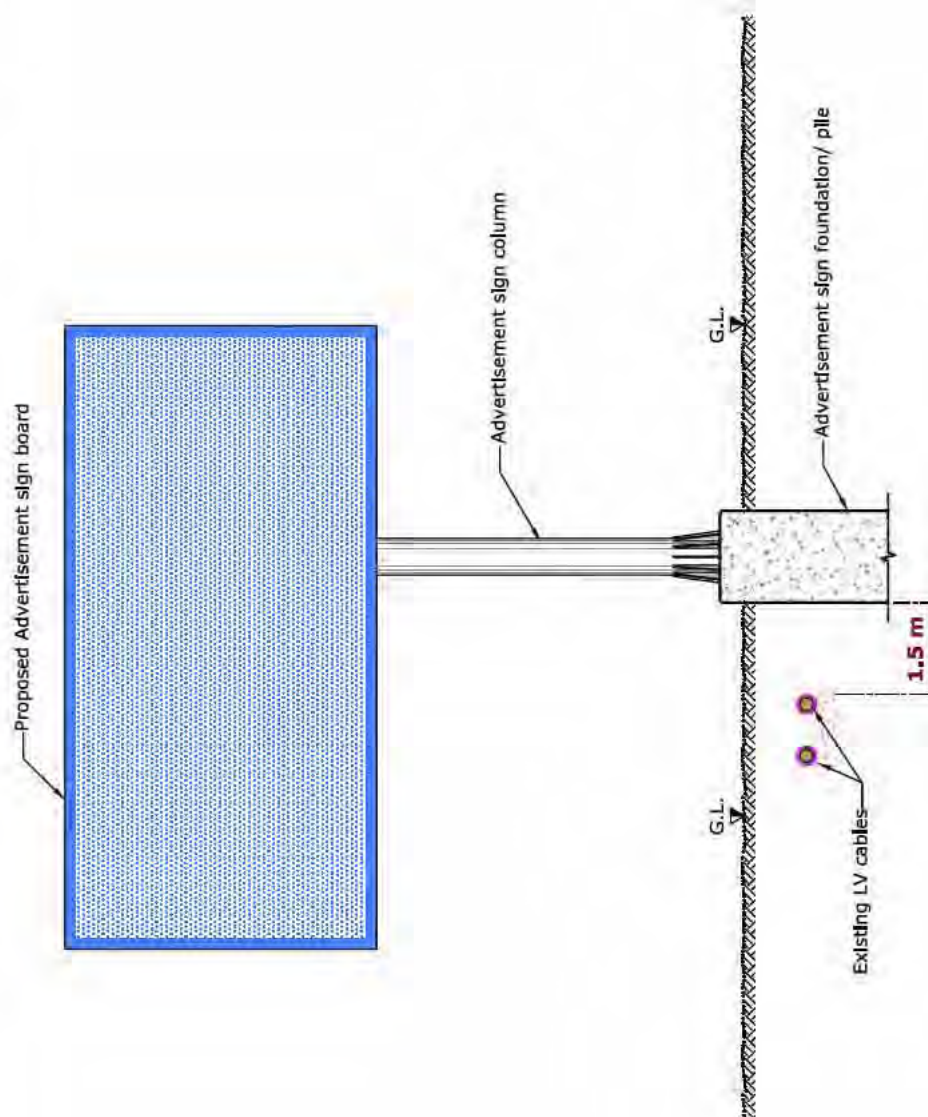
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Advertisement Signs Boards at service corridor

Fig: 32.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING LV CABLES



NOTE : 1. Horizontal clearance is from the proposed Advertisement sign foundation/ pile edge to existing LV cable edge.
2. Trench side and existing LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed Installation of Advertisement Signages and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.2)
HV (6.6/11/33 kV) Manhole	1.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.3)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Falling clearance from conductor (Ref Fig: 32.4)
	2.0 m	NA	-	-	R	• Falling clearance from stay rope (Ref Fig: 32.4)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Installation of Proposed Advertisement Signage

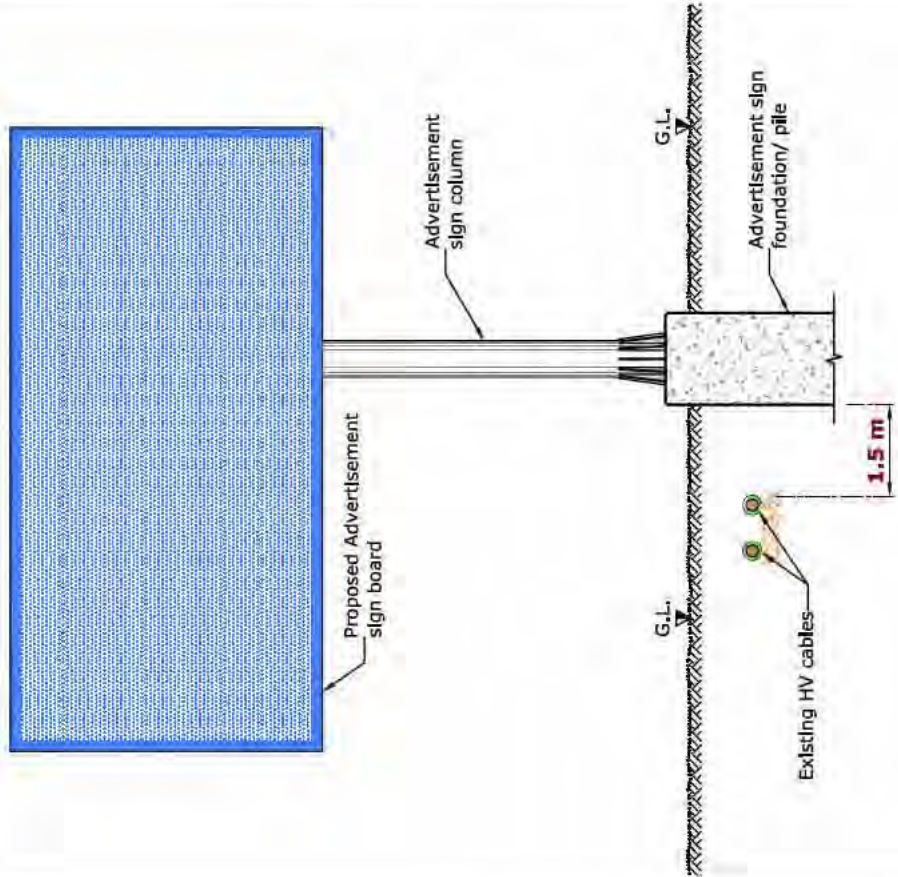
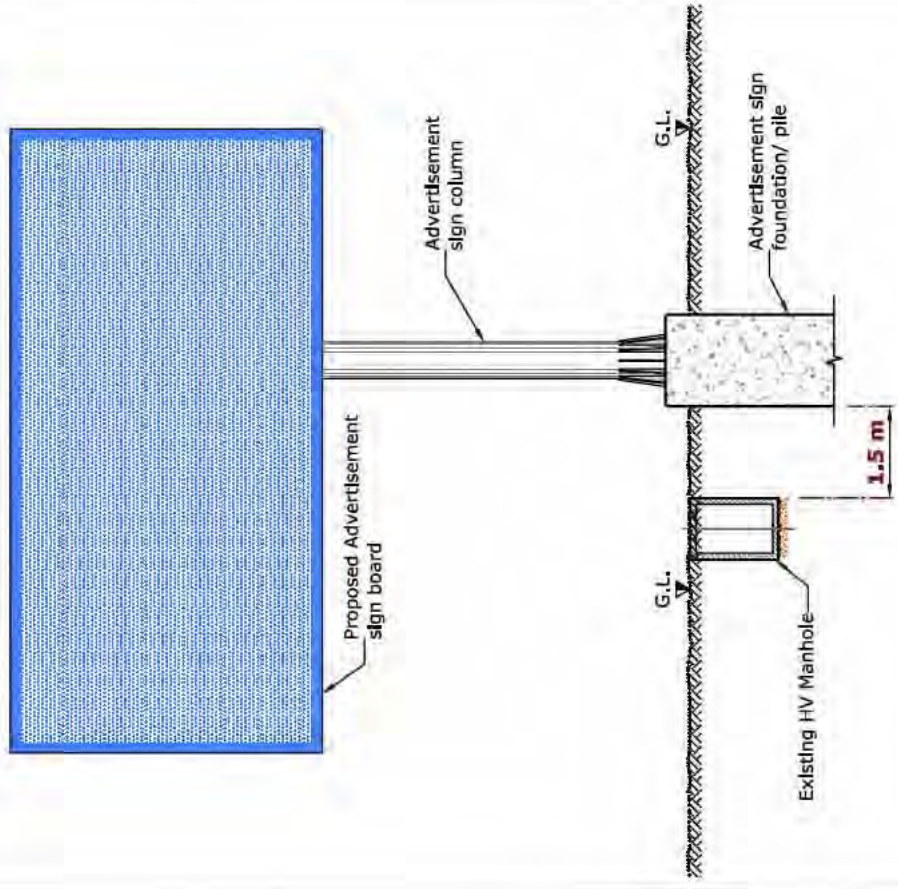
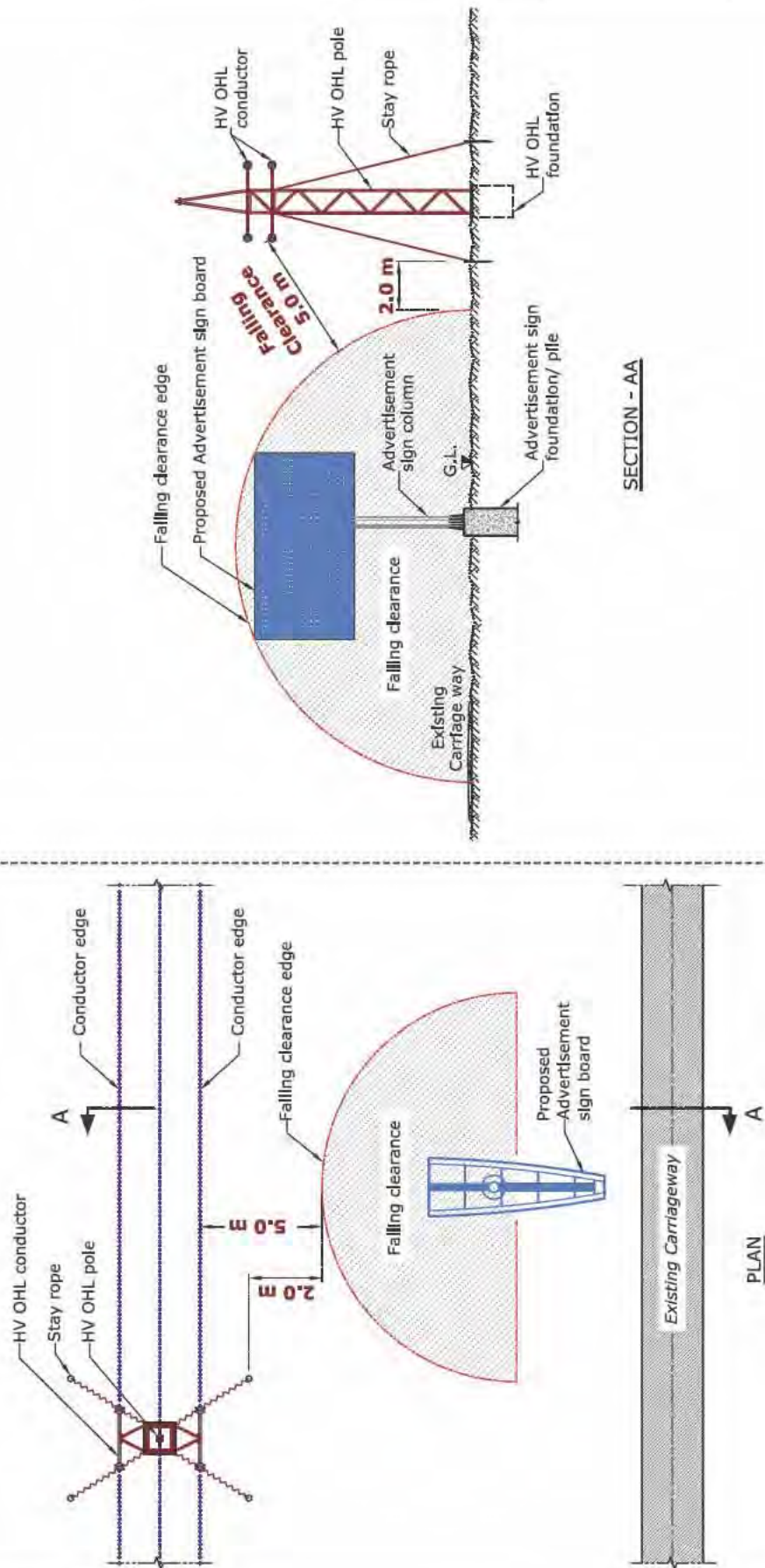
Fig: 32.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING HV SERVICES	Fig: 32.3	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING HV MANHOLE
			<p>NOTE :</p> <ul style="list-style-type: none">1. Horizontal clearance is from the proposed Advertisement sign foundation/ pile edge to existing HV cable/ Manhole edge.2. Trench side and existing HV cable protection may be required as per site and soil condition.

Fig: 32.4 FALLING CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING HV OHL (6.6/11/33 kV)



NOTE :

1. Falling clearances are from the proposed Advertisement sign edge to existing HV OHL conductor/ stay rope.
2. Trench side and existing HV service protection may be required as per site and soil condition.

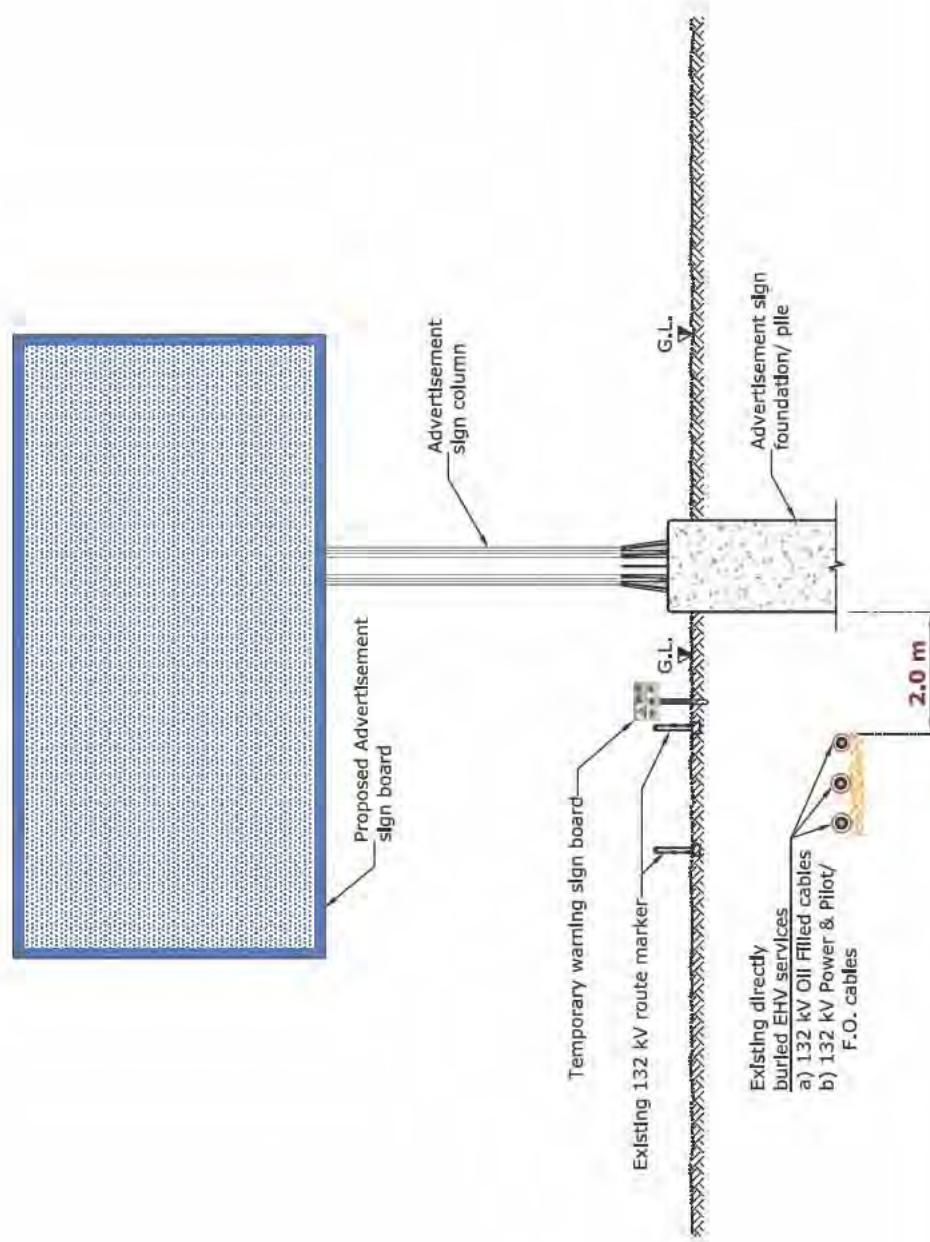
Table 3: Clearance & Protection details for proposed Installation of Advertisement Signages and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.5)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.5)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.6)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.6)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.7)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.10)
EHV (132 kV) O.H.L	15.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.8)
EHV (400 kV) O.H.L	20.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.9)

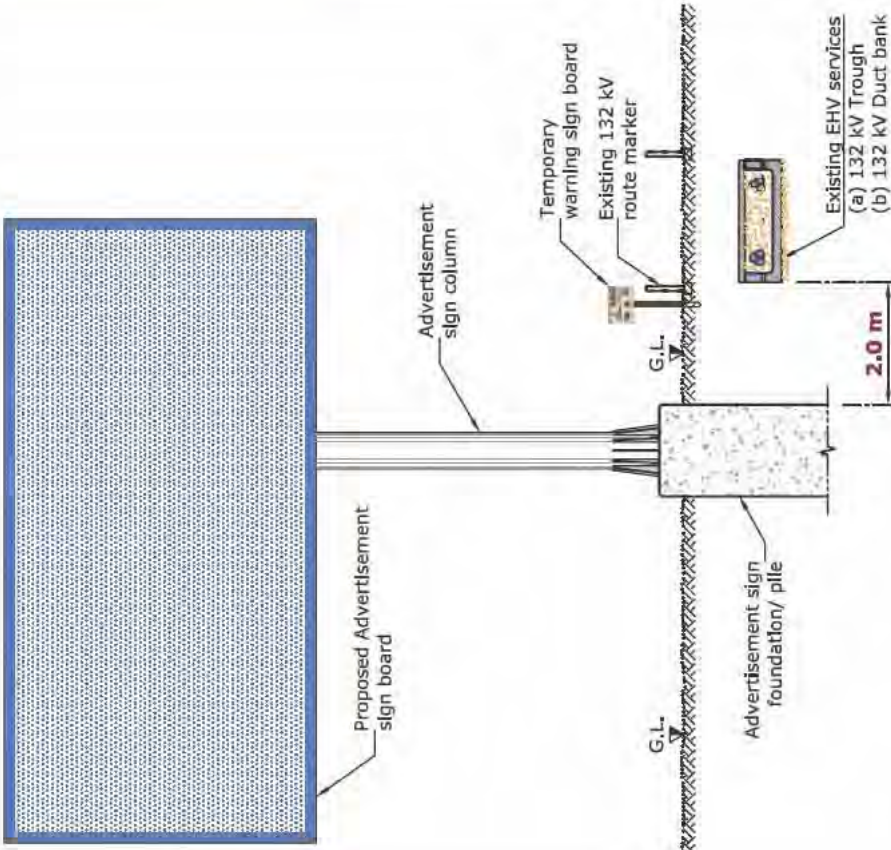
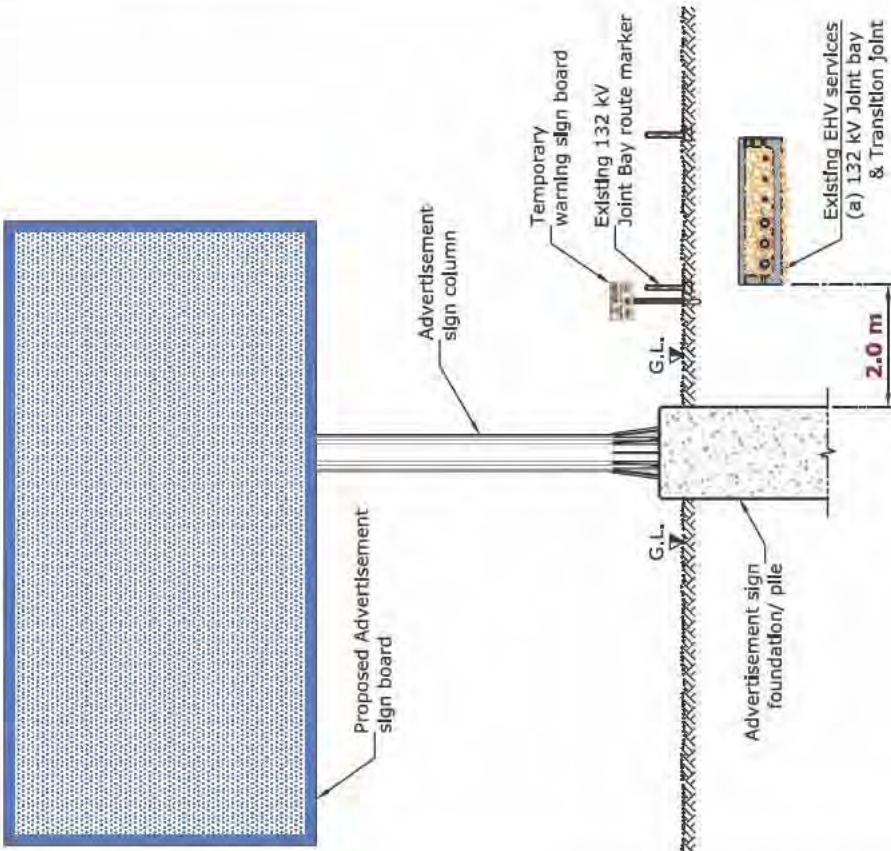
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 32.5 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES



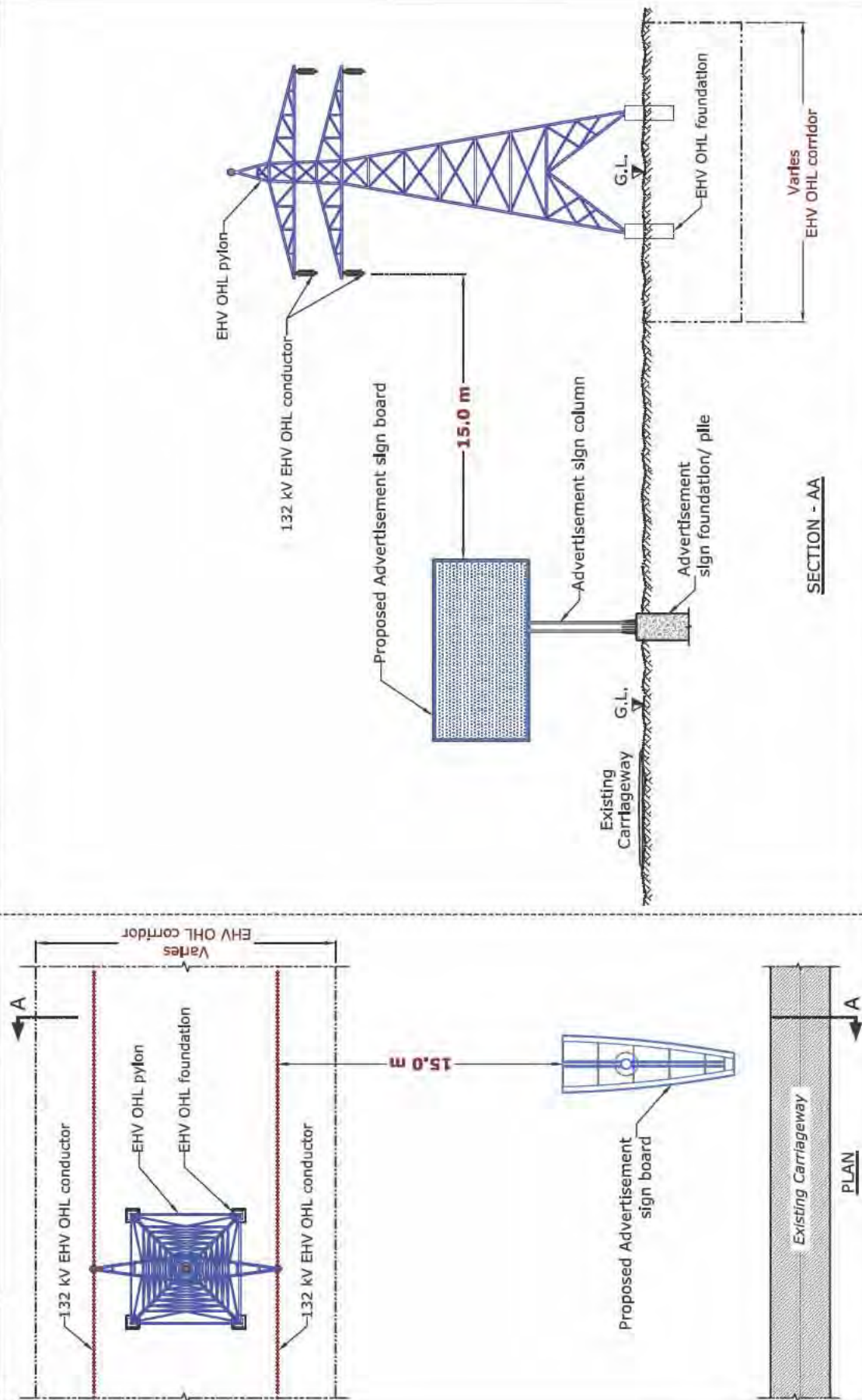
NOTE : 1. Horizontal clearances are from the proposed Advertisement sign foundation/ piling edge to existing EHV 132 kV service edge.
2. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

<p>Fig: 32.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>	
<p>Fig: 32.7</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>	

NOTE :

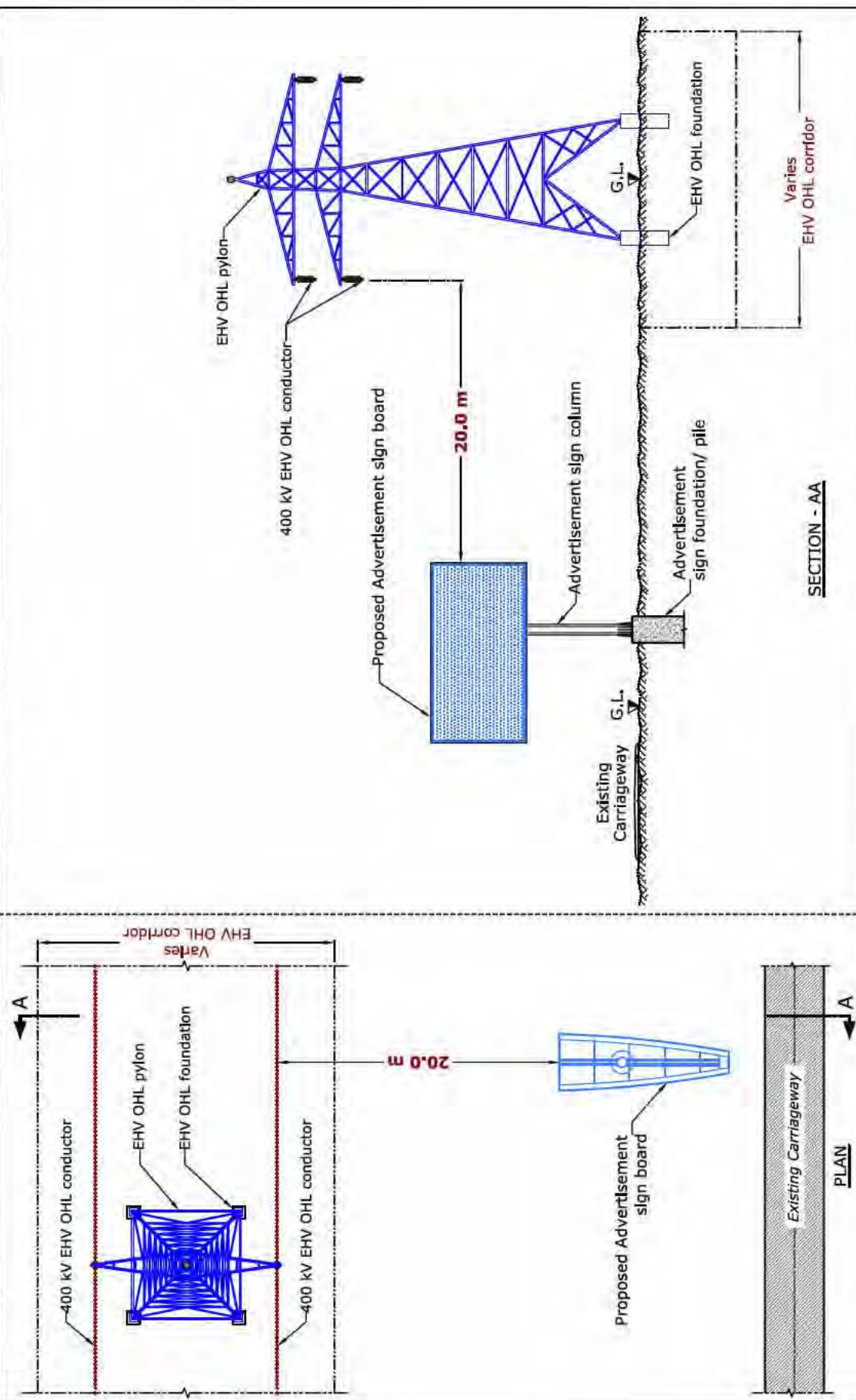
- 1. Horizontal clearances are from the proposed Advertisement sign foundation/ piling edge to existing EHV 132 kV service edge.
- 2. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

Fig: 32.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING EHV OHL (132 kV)



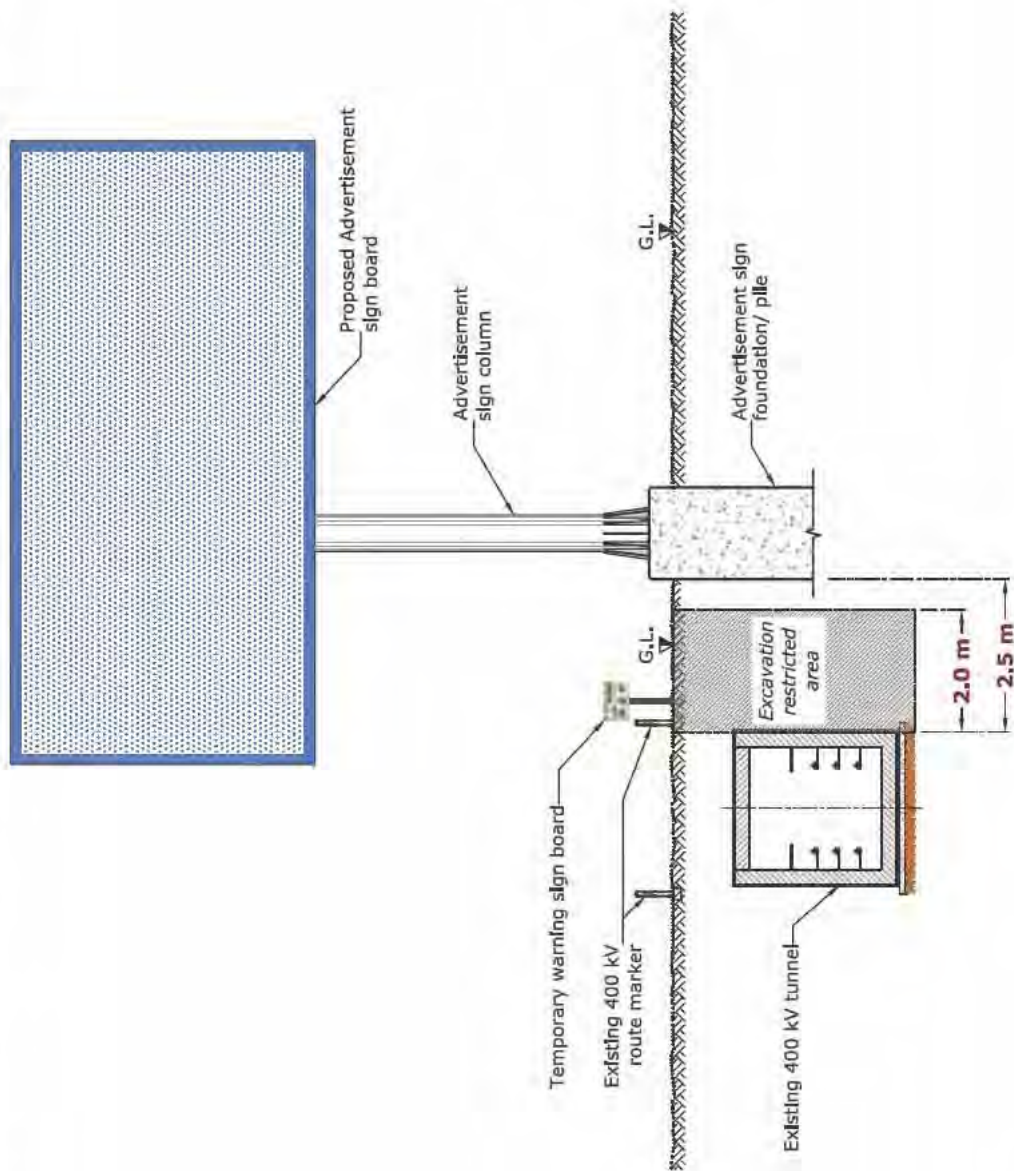
- NOTE :**
1. Horizontal clearances are from the proposed Advertisement sign board edge to existing EHV OHL conductor.
 2. Advertisement sign board is not allowed inside EHV OHL corridor.
 3. Trench side and existing EHV service protection may be required as per site and soil condition.

Fig: 32.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING EHV OHL (400 kV)



- NOTE :**
- 1. Horizontal clearances are from the proposed Advertisement sign board edge to existing EHV OHL conductor.
 - 2. Advertisement sign board is not allowed inside EHV OHL corridor.
 - 3. Trench side and existing EHV service protection may be required as per site and soil condition.

Fig: 32.10 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING 400 KV TUNNEL



NOTE :

1. The maximum vibration for civil work not to exceed 15 mm/s PPV near to existing 400 kV tunnel.
2. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
3. Horizontal clearance is from the proposed foundation/ piling edge to the existing 400 kV tunnel outer wall.
4. Protection method for existing 400 kV tunnel varies as per proposed services and its formation level.
5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Table 4: Clearance & Protection details for proposed Installation of Advertisement Signages and existing DEWA Gas/Fuel services

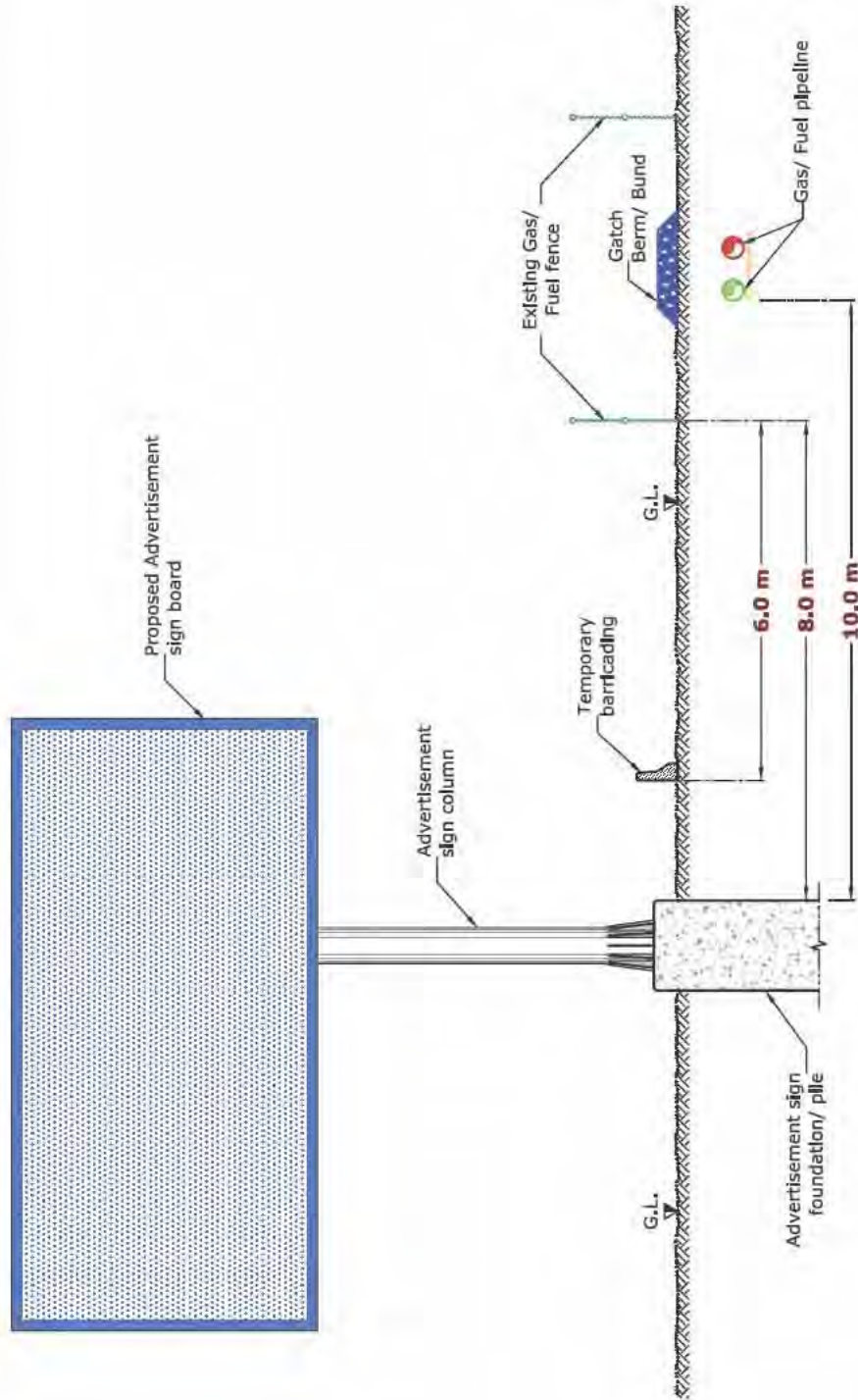
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 32.11)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-		R	• Horizontal clearance (Ref Fig: 32.11)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 32.11 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADVERTISEMENT SIGN AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Advertisement sign board foundation/ pile edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Advertisement sign board foundation/ pile edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

33. Installation of Proposed Traffic Signal

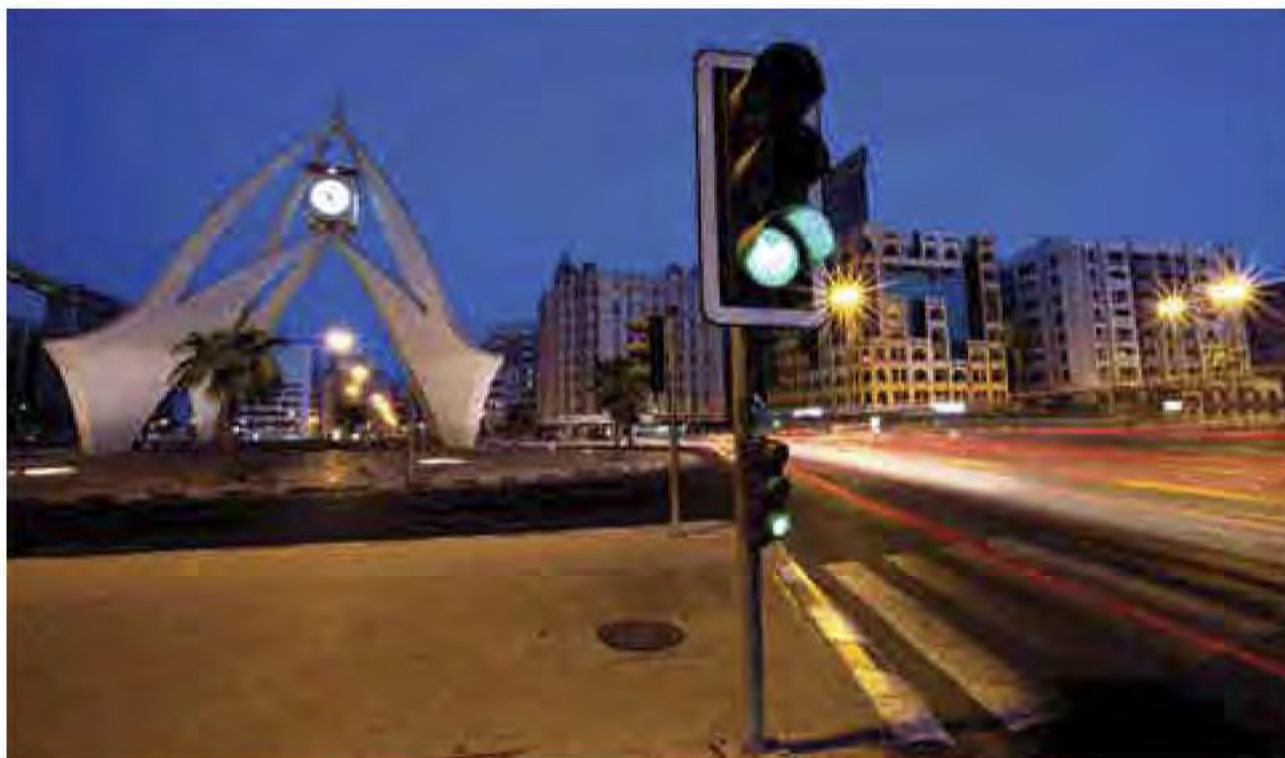
33.1 Introduction

Traffic signals are installed at intersections, junctions and pedestrian crossing areas to manage pedestrian and motorist traffic flow.

This system consists of single posts, cantilever posts or a combination of both, fixed on concrete foundation, signal cables, cables, manholes, pullout box, loop

detectors, traffic controller cabinets etc. Traffic signals are computerised.

Traffic signal components are usually laid within the intersection areas. Therefore during construction it is important to protect DEWA existing assets as per specified standards.



33.2 Avoid the following



1. Installation of traffic signal foundation/ manholes in DEWA corridor and above DEWA services.

2. Proposed traffic signal cable, crossing 132 kV joint bay/transition joint.

33.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Installation of Traffic Signal and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Proposed Traffic Signal	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	Foundation	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.1, Case-1)
	Cable	0.5 m	0.2 m	B	OC		• Horizontal clearance (Ref Fig: 33.1, Case-2) • Vertical clearance (Ref Fig: 33.1, Case-3)

Table Abbreviation

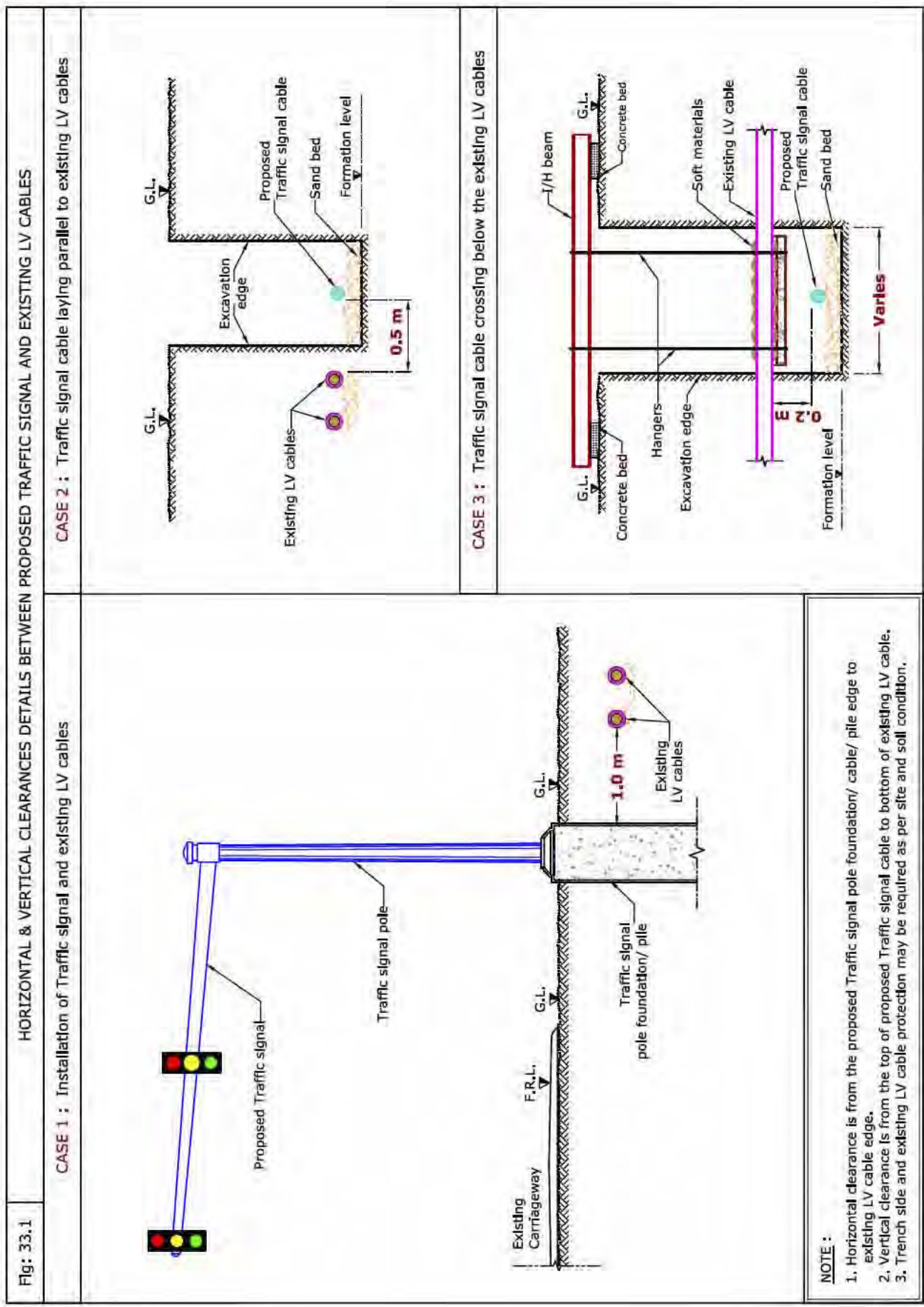
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Example of traffic signal at service corridor



Installation of Proposed Traffic Signal



NOTE :

1. Horizontal clearance is from the proposed Traffic signal pole foundation/ cable/ pile edge to existing LV cable edge.
2. Vertical clearance is from the top of proposed Traffic signal cable to bottom of existing LV cable.
3. Trench side and existing LV cable protection may be required as per site and soil condition.

CASE 3 : Traffic signal cable crossing below the existing LV cables

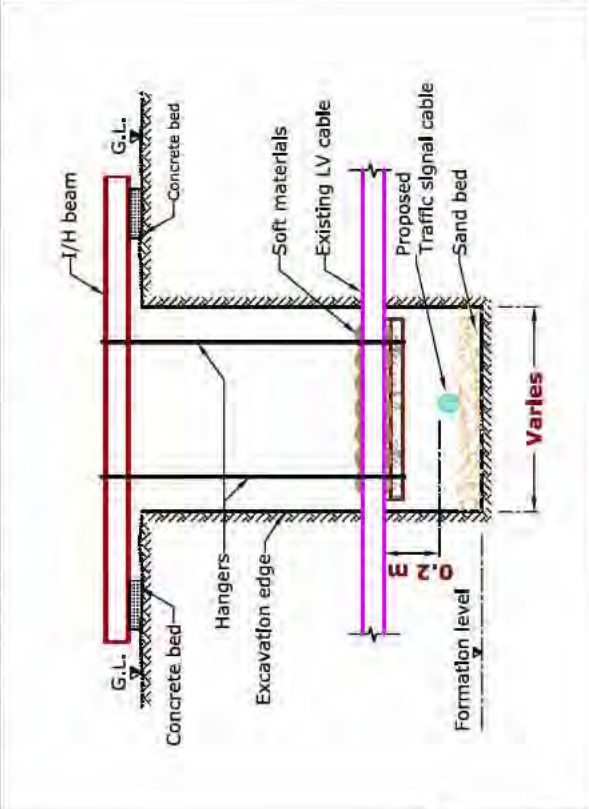


Table 2: Clearance & Protection details for proposed Installation of Traffic Signal and existing DEWA Electricity HV services

Electricity HV Existing Services	Proposed Traffic Signal	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	Foundation	1.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig:33.2, Case-1)
	Cable	0.5 m	0.2 m	B	OC		• Horizontal clearance (Ref Fig:33.2, Case-2) • Vertical clearance (Ref Fig:33.2, Case-3)
HV (6.6/11/33 kV) Manhole	Cable	0.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.3)
HV (6.6/11/33 kV) O.H.L.	Traffic Signal	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.4)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Installation of Proposed Traffic Signal

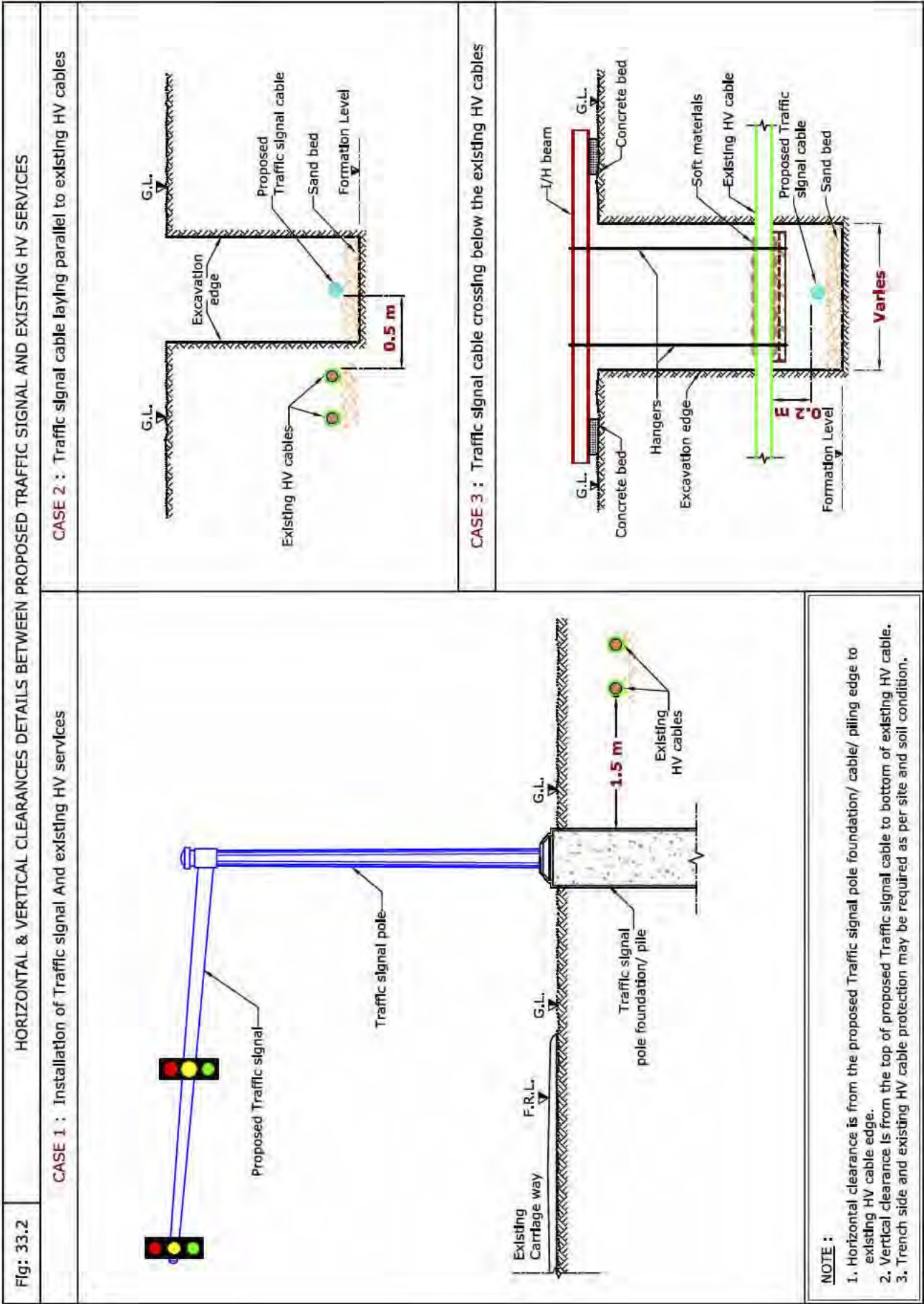
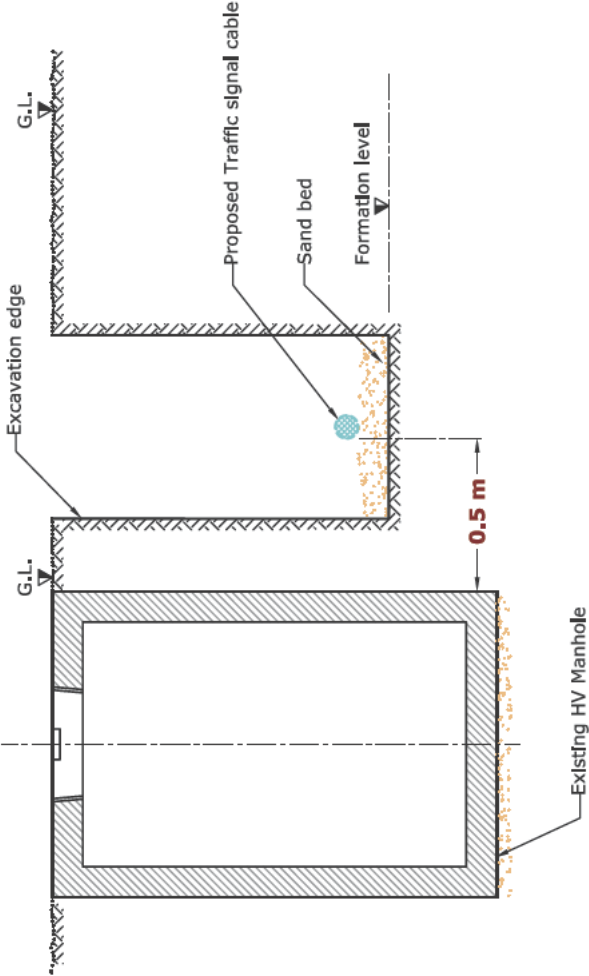


Fig: 33.3 HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED TRAFFIC SIGNAL CABLE AND EXISTING HV SERVICES



NOTE :
1. Horizontal clearance is from the proposed Traffic signal cable edge to existing HV Manhole edge.
2. Trench side and existing HV Manhole protection may be required as per site and soil condition.

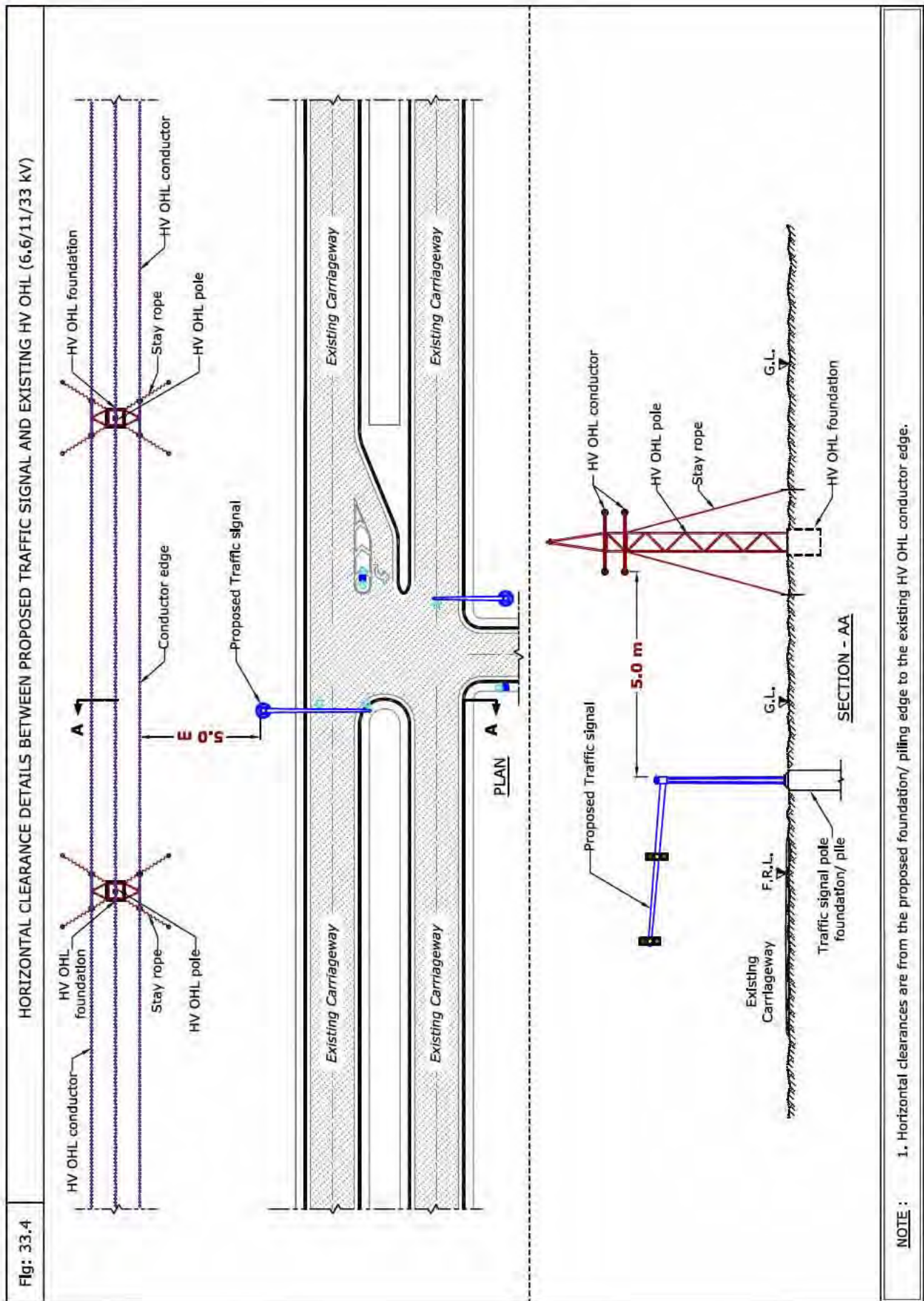


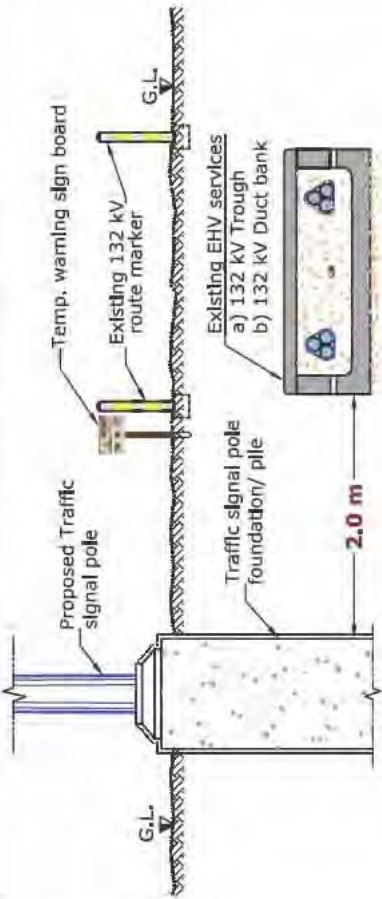
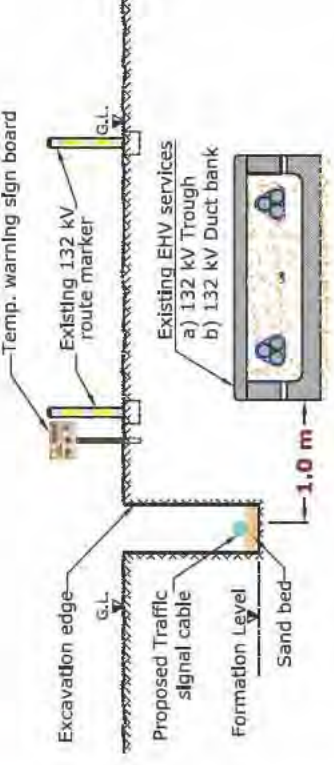
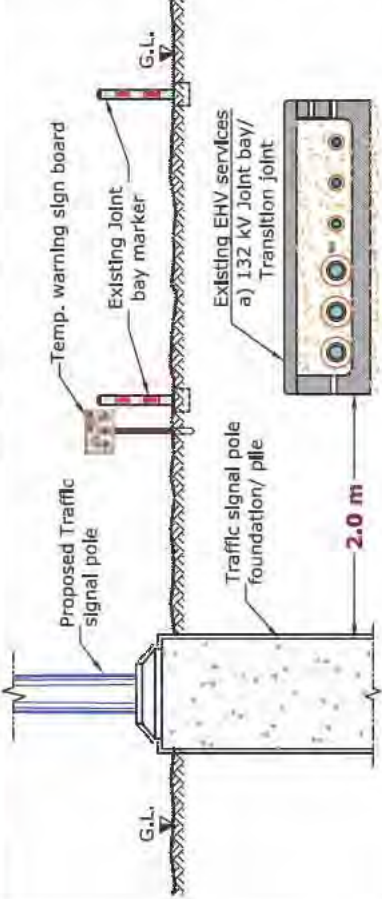
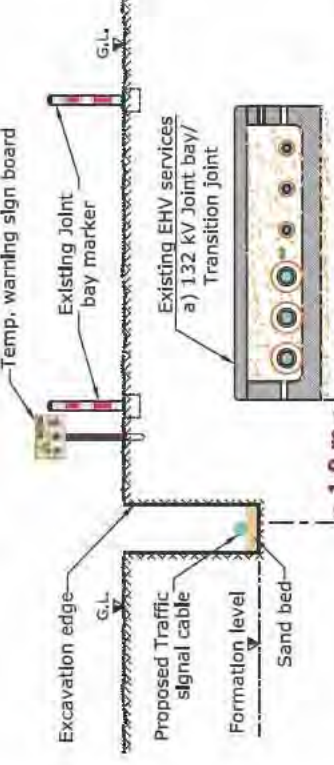
Table 3: Clearance & Protection details for proposed Installation of Traffic Signal and existing DEWA Electricity EHV services

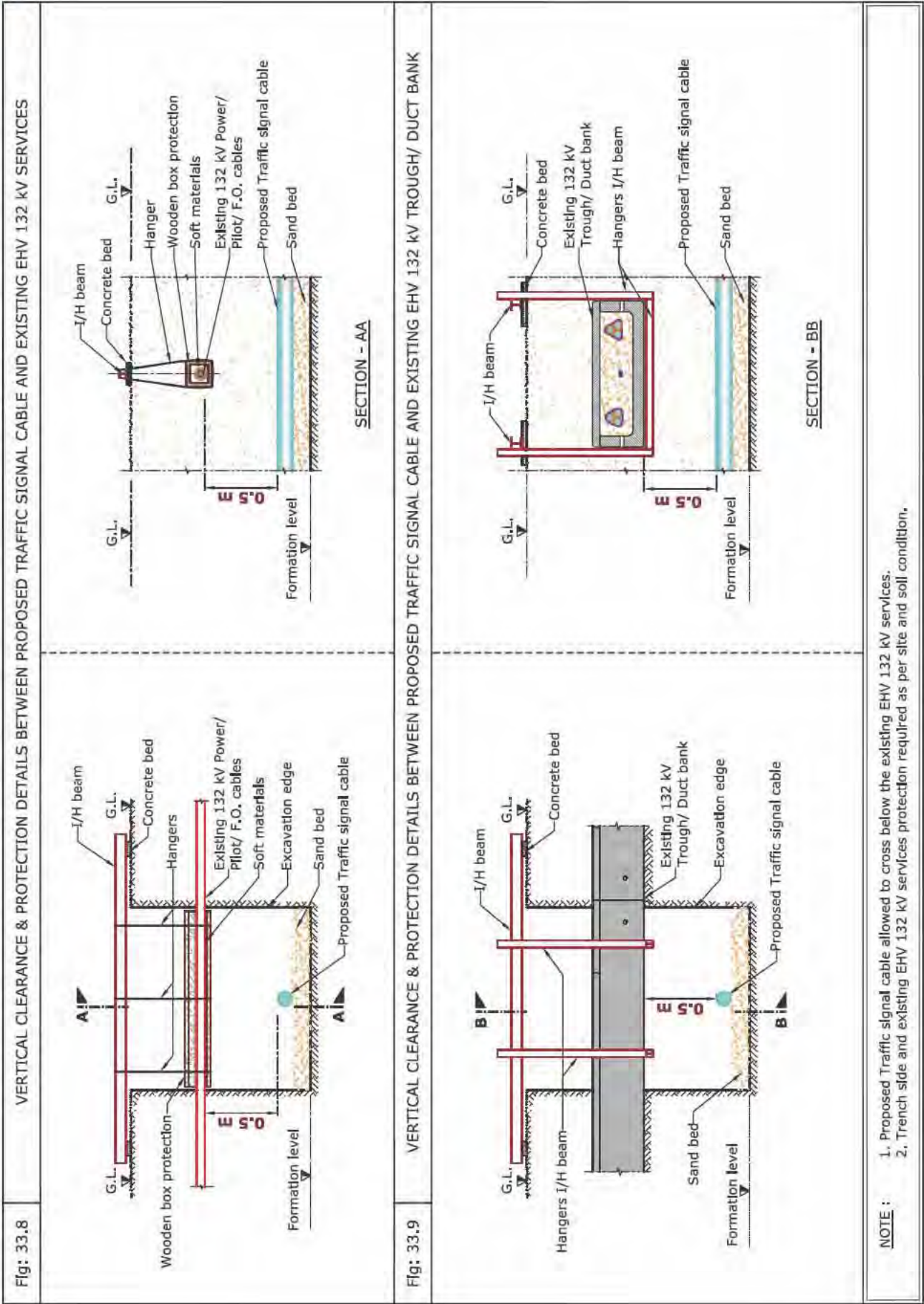
Electricity EHV Existing Services	Proposed Traffic Signal	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	Foundation	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.5, Case-1)
	Cable	1.0 m	0.5 m	B	OC		• Horizontal clearance (Ref Fig: 33.5, Case-2) • Vertical clearance (Ref Fig: 33.8) • Protection details (Ref Fig: 33.8)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	Foundation	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.5, Case-1)
	Cable	1.0 m	0.5 m	B	OC		• Horizontal clearance (Ref Fig: 33.5, Case-2) • Vertical clearance (Ref Fig: 33.8) • Protection details (Ref Fig: 33.8)
EHV (132 kV) Trough	Foundation	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.6, Case-1)
	Cable	1.0 m	0.5 m	B	OC		• Horizontal clearance (Ref Fig: 33.6, Case-2) • Vertical clearance (Ref Fig: 33.9) • Protection details (Ref Fig: 33.9)
EHV (132 kV) Duct Bank	Foundation	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.6, Case-1)
	Cable	1.0 m	0.5 m	B	OC		• Horizontal clearance (Ref Fig: 33.6, Case-2) • Vertical clearance (Ref Fig: 33.9) • Protection details (Ref Fig: 33.9)
EHV (132 kV) Joint Bay/ Transition Joint	Foundation	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.7, Case-1)
	Cable	1.0 m	NA	-	-		• Horizontal clearance (Ref Fig: 33.7, Case-2)
EHV (400 kV) Tunnel	Foundation	2.5 m	NA	-	OC	R	• Horizontal clearance (Ref Fig: 33.10)
	Cable	2.5 m	1.0 m	A	OC	R	• Vertical clearance (Ref Fig: 33.10)
EHV (132 kV) O.H.L	Traffic Signal Pole	15.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 33.11)
EHV (400 kV) O.H.L	Traffic Signal Pole	20.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 33.12)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

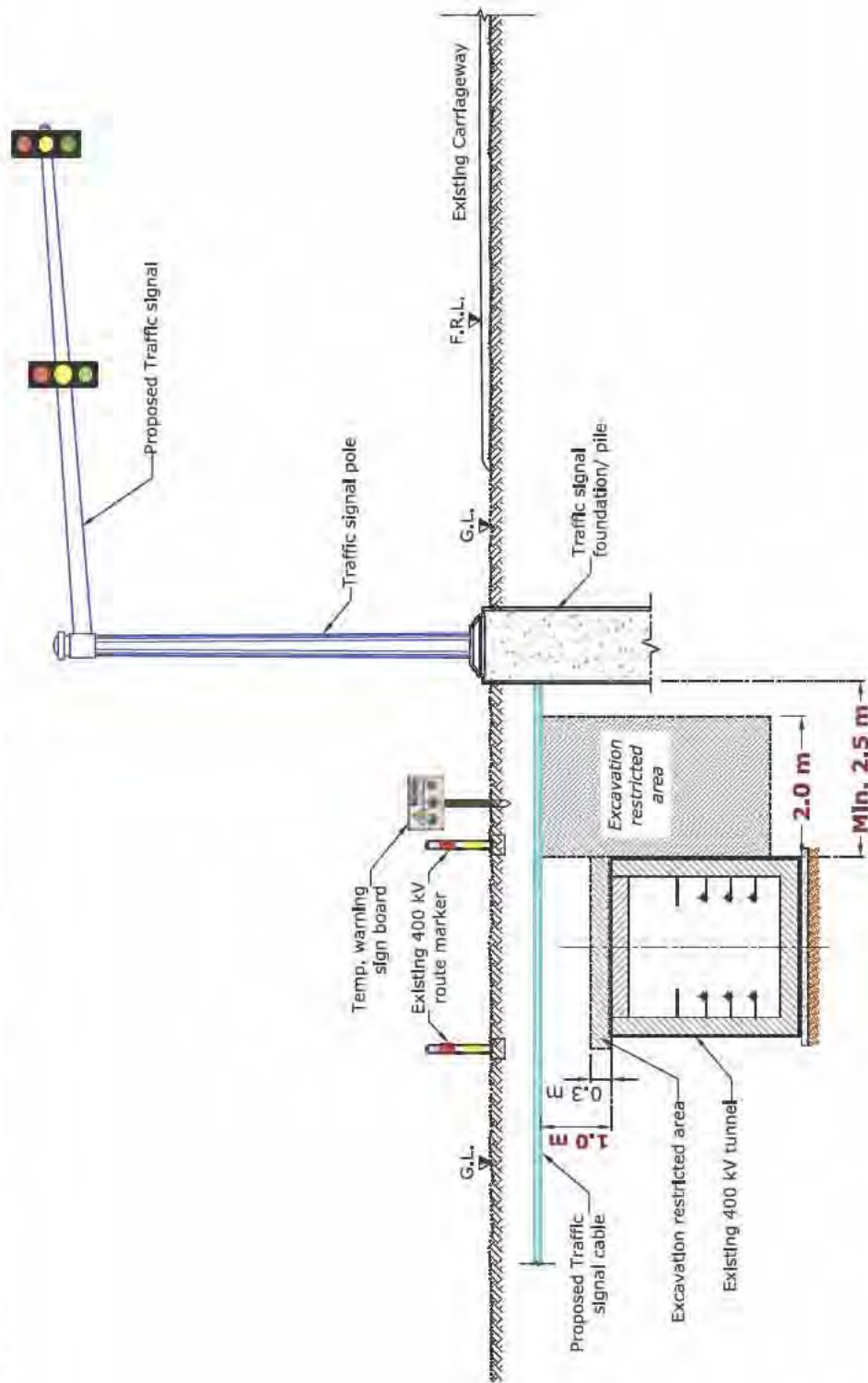
<p>Fig: 33.5 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC SIGNAL AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>	<div> <p>CASE 1 : Installation of Traffic signal pole foundation/ pile and existing 132 kV services</p> </div> <div> </div> <div> <p>CASE 2 : Traffic signal cable laying parallel to existing 132 kV services</p> </div> <div> </div>	<p>NOTE :</p> <ol style="list-style-type: none"> Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.
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<p>Fig: 33.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC SIGNAL AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p> <p>CASE 1 : Installation of Traffic signal pole and existing 132 kV services</p> 	<p>CASE 2 : Traffic signal cable laying parallel to existing 132 kV services</p> 
<p>Fig: 33.7</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC SIGNAL AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p> <p>CASE 1 : Installation of Traffic signal pole and existing 132 kV services</p> 	<p>CASE 2 : Traffic signal cable laying parallel to existing 132 kV services</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. All horizontal clearances are from proposed Traffic signal pole foundation/ cable edge to existing EHV 132 kV services edge. 2. Existing EHV 132 kV services falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals. 3. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge. 4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition. 		



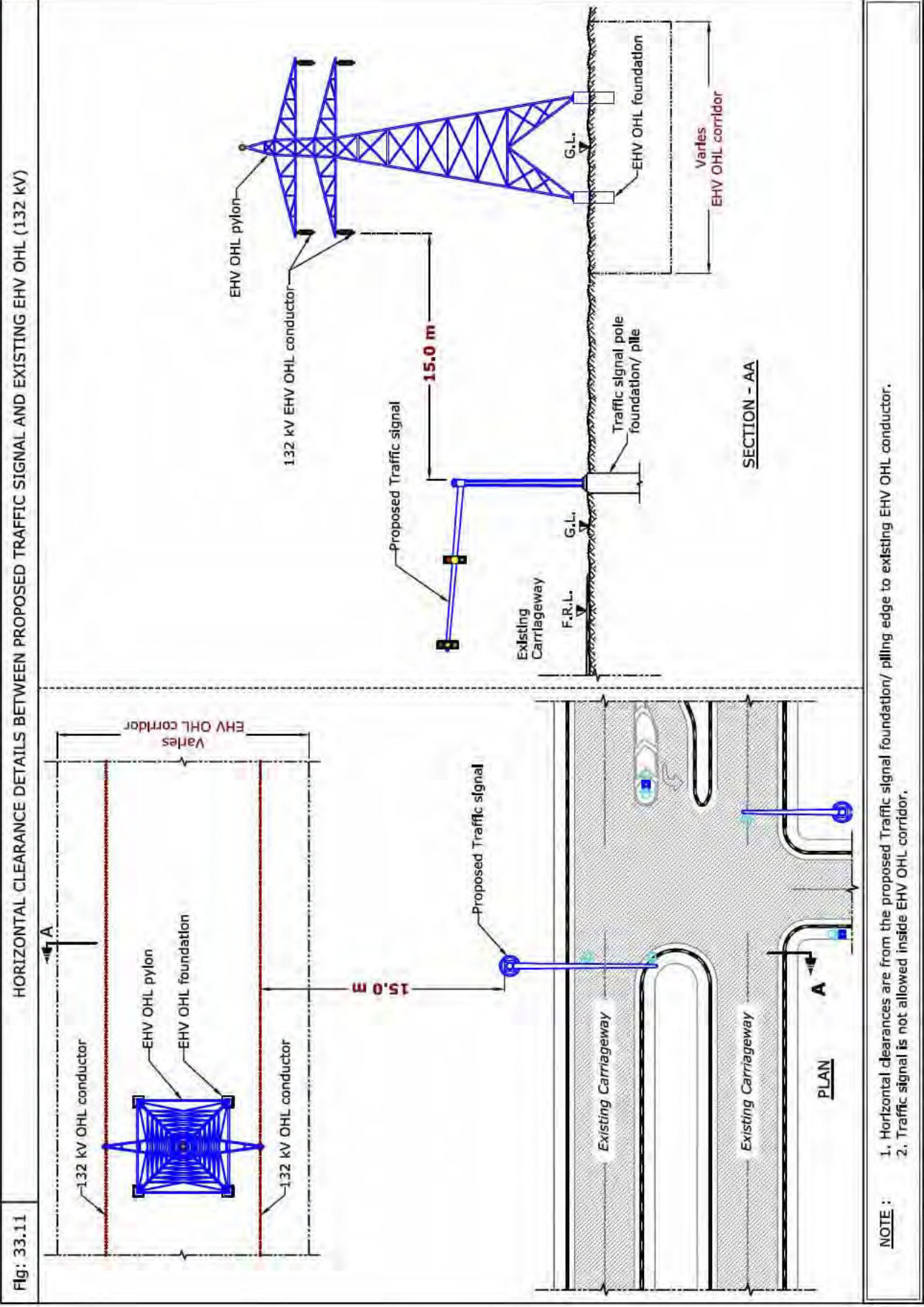
NOTE : 1. Proposed Traffic signal cable allowed to cross below the existing EHV 132 kV services.
2. Trench side and existing EHV 132 kV services protection required as per site and soil condition.

Fig: 33.10 HORIZONTAL & VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC SIGNAL AND EXISTING 400 KV TUNNEL



NOTE :

1. The maximum vibration for civil work not to exceed 15 mm/s PPV near to existing 400 kV tunnel.
2. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
3. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
4. Horizontal clearance is from the proposed foundation/ piling edge to the existing 400 kV tunnel outer wall.
5. Protection method for existing 400 kV tunnel varies as per proposed services and its formation level.
6. Vertical clearance minimum 1.0 m should be maintained from the top of the 400 kV tunnel to the bottom of the proposed Traffic signal cable.
7. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.



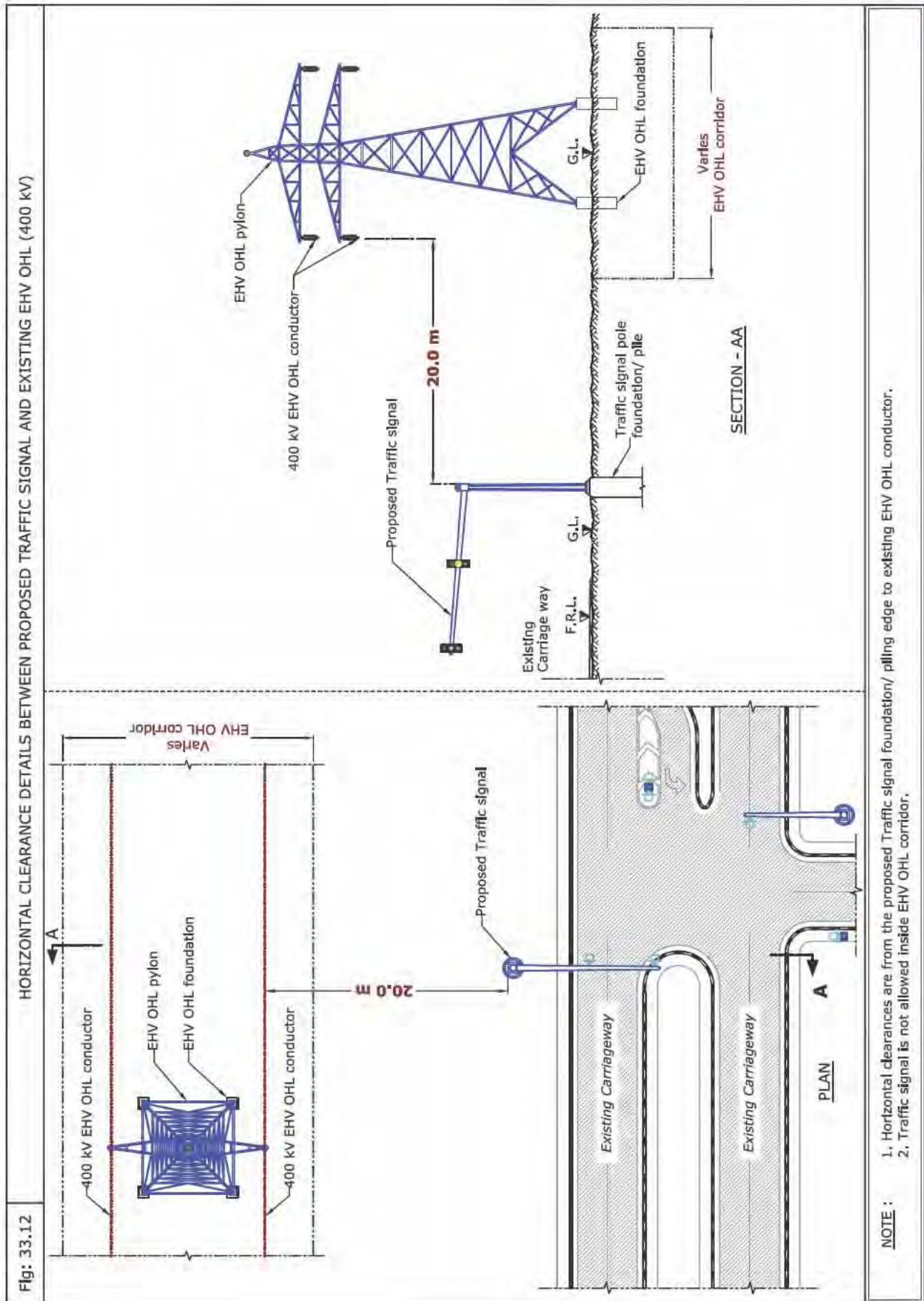


Table 4: Clearance & Protection details for proposed Installation of Traffic Signal and existing DEWA Gas/Fuel services

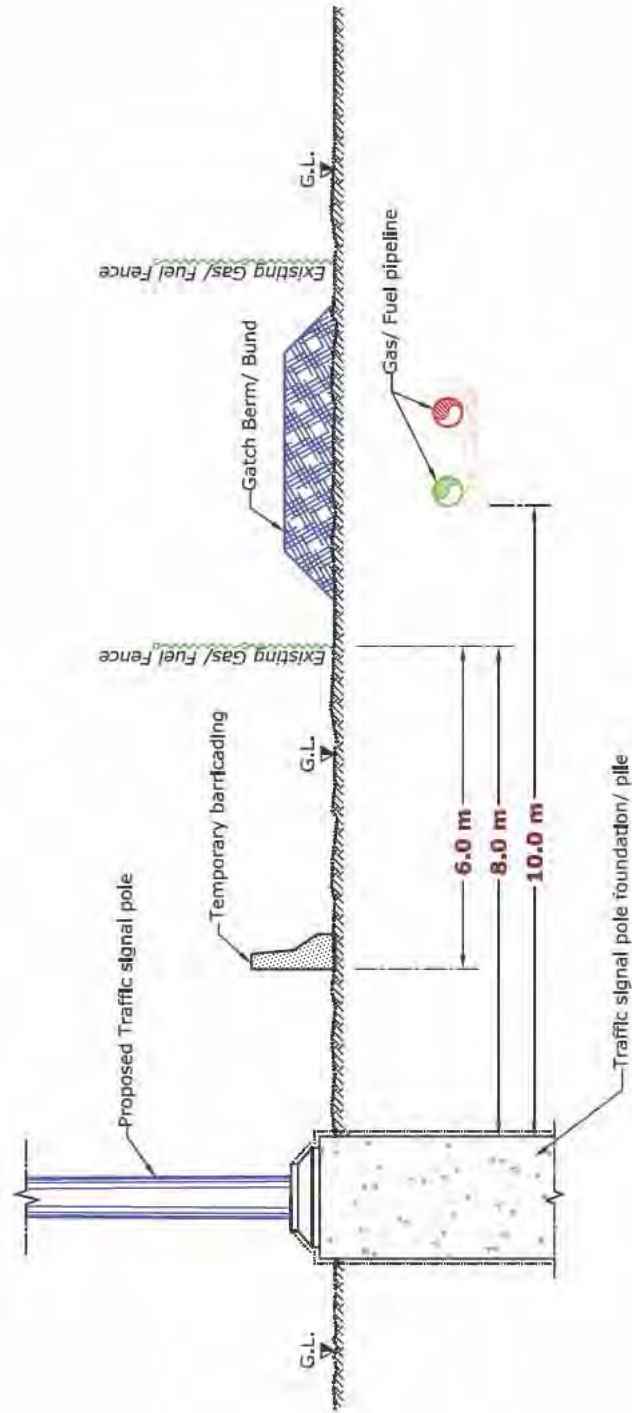
Gas/Fuel Existing Services	Proposed Traffic Signal	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	Foundation	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.13)
	Cable	8.0 m	2.0 m	B	NDCM		
Gas/Fuel pipeline (All diameter)	Foundation	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 33.13)
	Cable	10.0 m	2.0 m	B	NDCM		

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 33.13 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC SIGNAL AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed Traffic signal foundation/ pile edge to existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from proposed Traffic signal foundation/ pile edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Proposed Traffic signal cable allowed to cross existing Gas/ Fuel pipeline by NDCM.
 5. Existing Gas/ Fuel pipeline should be protected in the proposed Entry/ Exit pit area.
 6. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

34. Installation of Proposed Addressing/ Traffic Signs

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34.1 Introduction

The purpose of address/traffic signs is to advise motorists about traffic regulations that apply at specific locations and/or at specific times to warn of hazards that may not be apparent. Traffic signs also provide motorists with information concerning routes, destinations and locations of interest.

The address/traffic sign boards are fixed on a steel structure with concrete foundation along roads within Right Of Way. Therefore during construction it is important to protect DEWA existing assets as per specified standards.



34.2 Avoid the following



1. Installation of Addressing/Traffic sign foundation in DEWA corridor and above DEWA services.

34.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Installation of Address/Traffic Sign and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.1)

Table 2: Clearance & Protection details for proposed Installation of Addressing/Traffic Sign and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.3)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

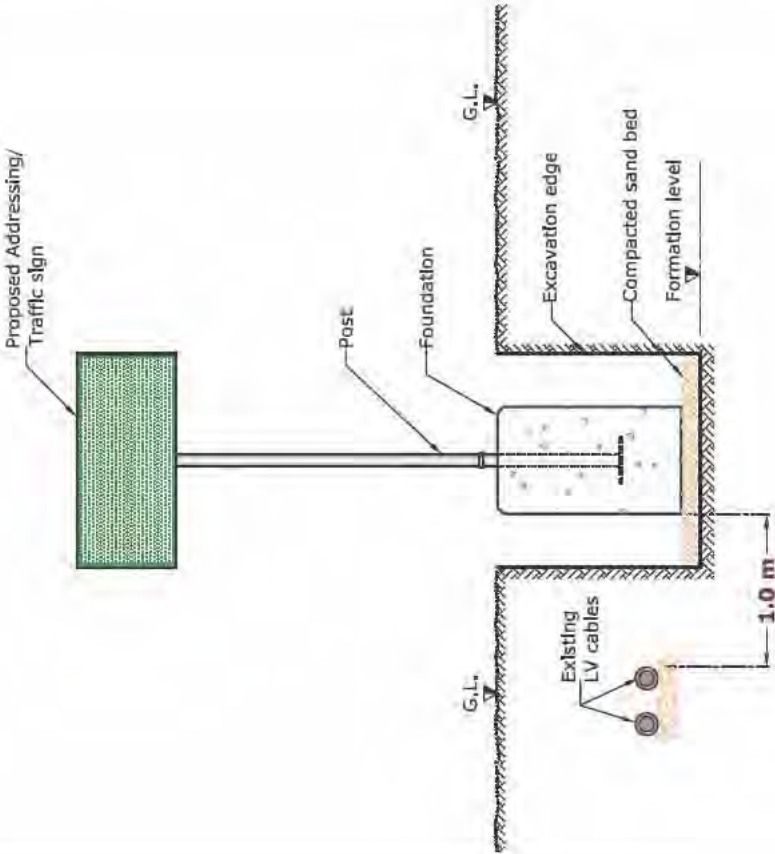
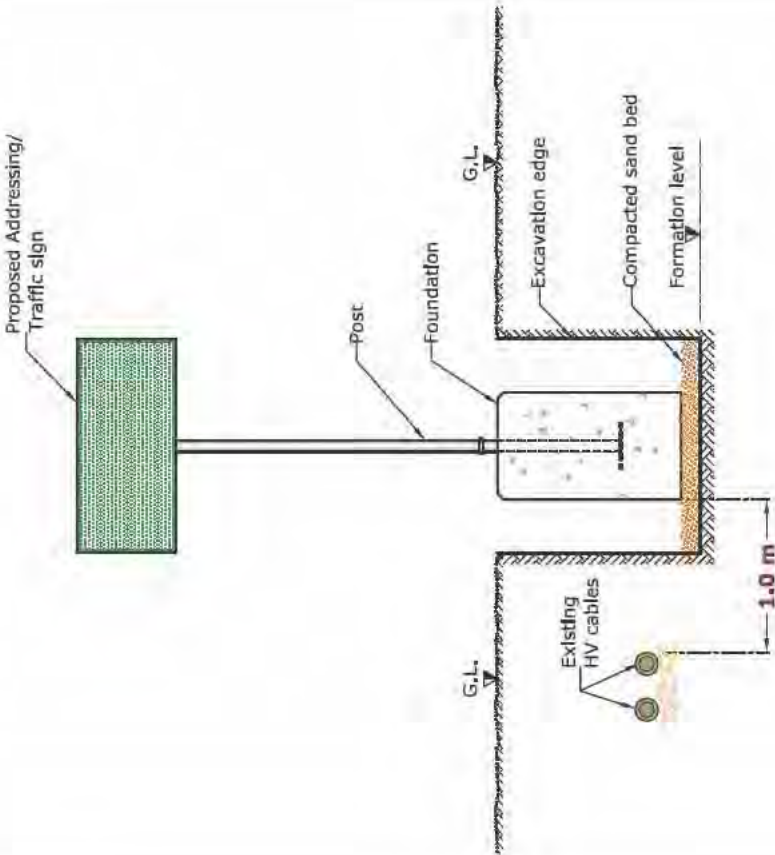
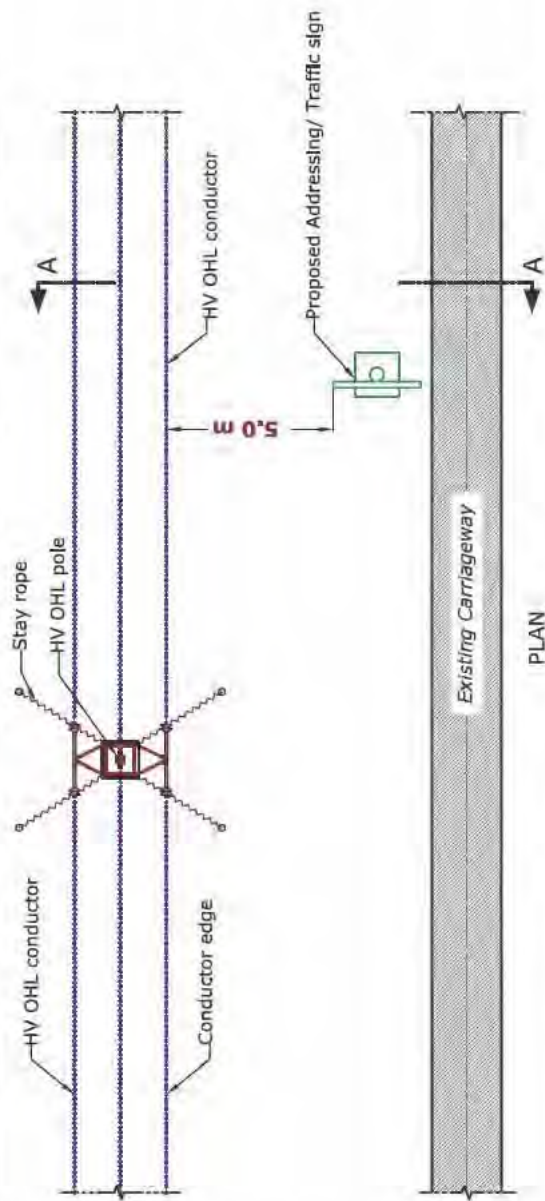
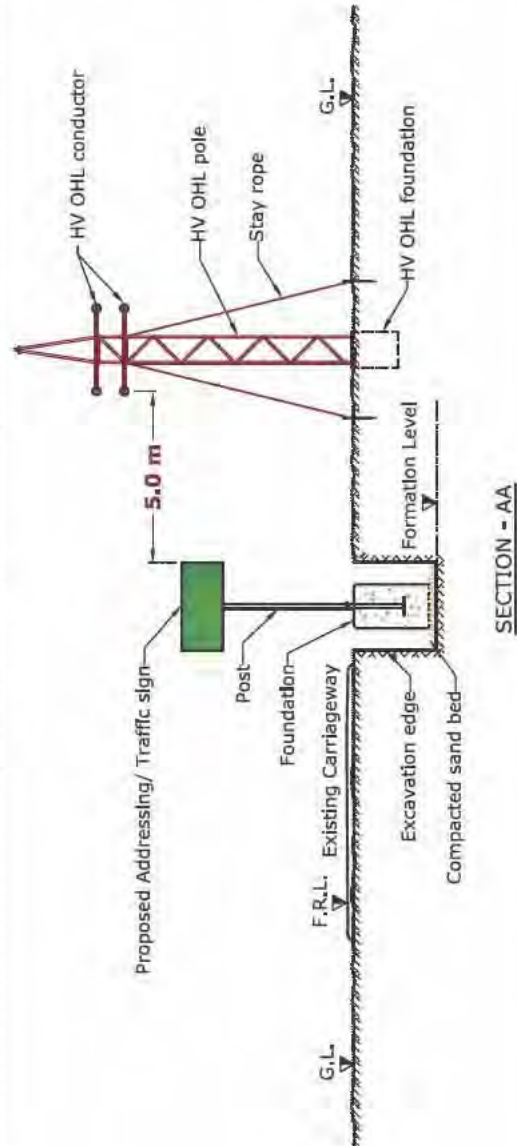
Fig: 34.1	HORIZONTAL CLEARANCE DETAIL BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING LV CABLES	Fig: 34.2	HORIZONTAL CLEARANCE DETAIL BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING HV SERVICES
			
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearance is from the proposed Addressing/ Traffic sign foundation edge to existing LV/ HV cable edge.2. Trench side and existing LV/ HV cable protection may be required as per site and soil condition.			

Fig: 34.3

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING HV OHL (6.6/11/33 kV)



PLAN



SECTION - AA

- NOTE :**
1. Horizontal clearances are from the proposed Addressing/ Traffic sign edge to existing HV OHL conductor.
 2. Trench side and existing HV service protection may be required as per site and soil condition.

Table 3: Clearance & Protection details for proposed Installation of Address/Traffic Sign and existing DEWA Electricity EHV services

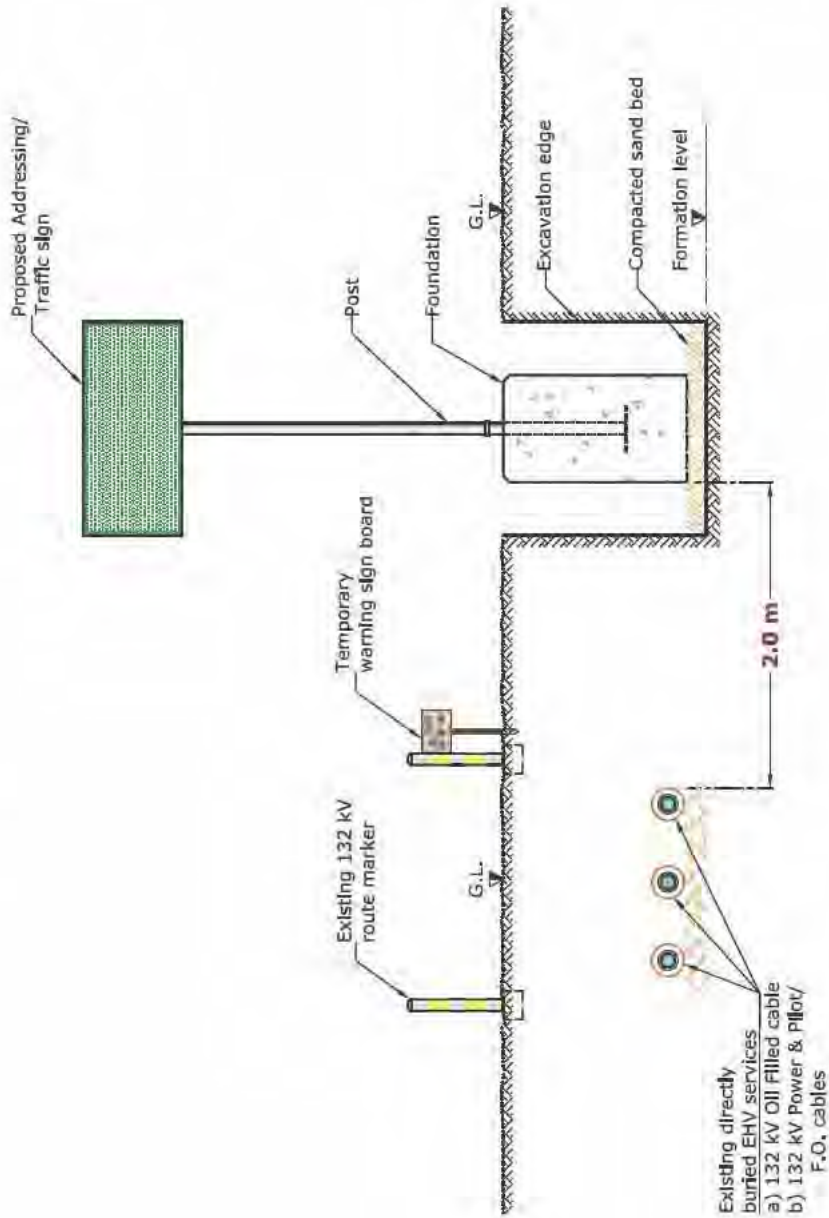
Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.9)
EHV (132 kV) O.H.L	15.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.7)
EHV (400 kV) O.H.L	20.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.8)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 34.4

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES



- NOTE :**
1. Horizontal clearance is from the proposed Addressing/ Traffic sign foundation edge to existing EHV 132 kV service edge.
 2. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge
 3. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

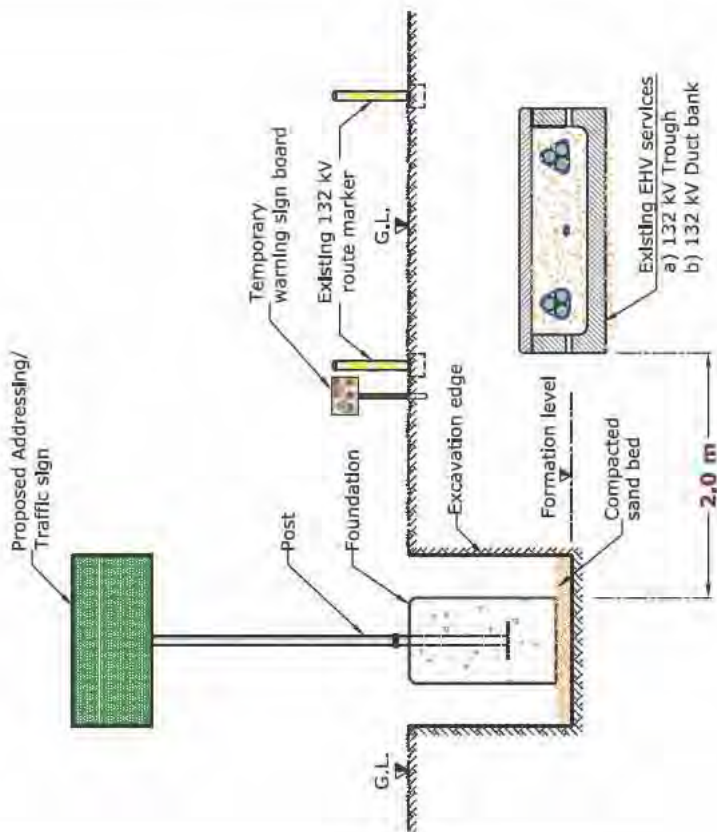
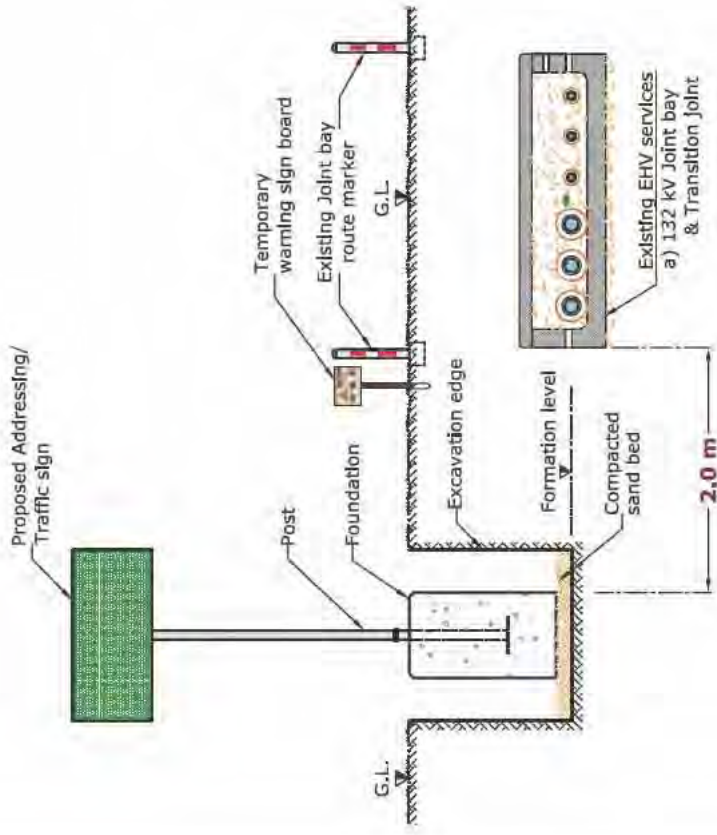
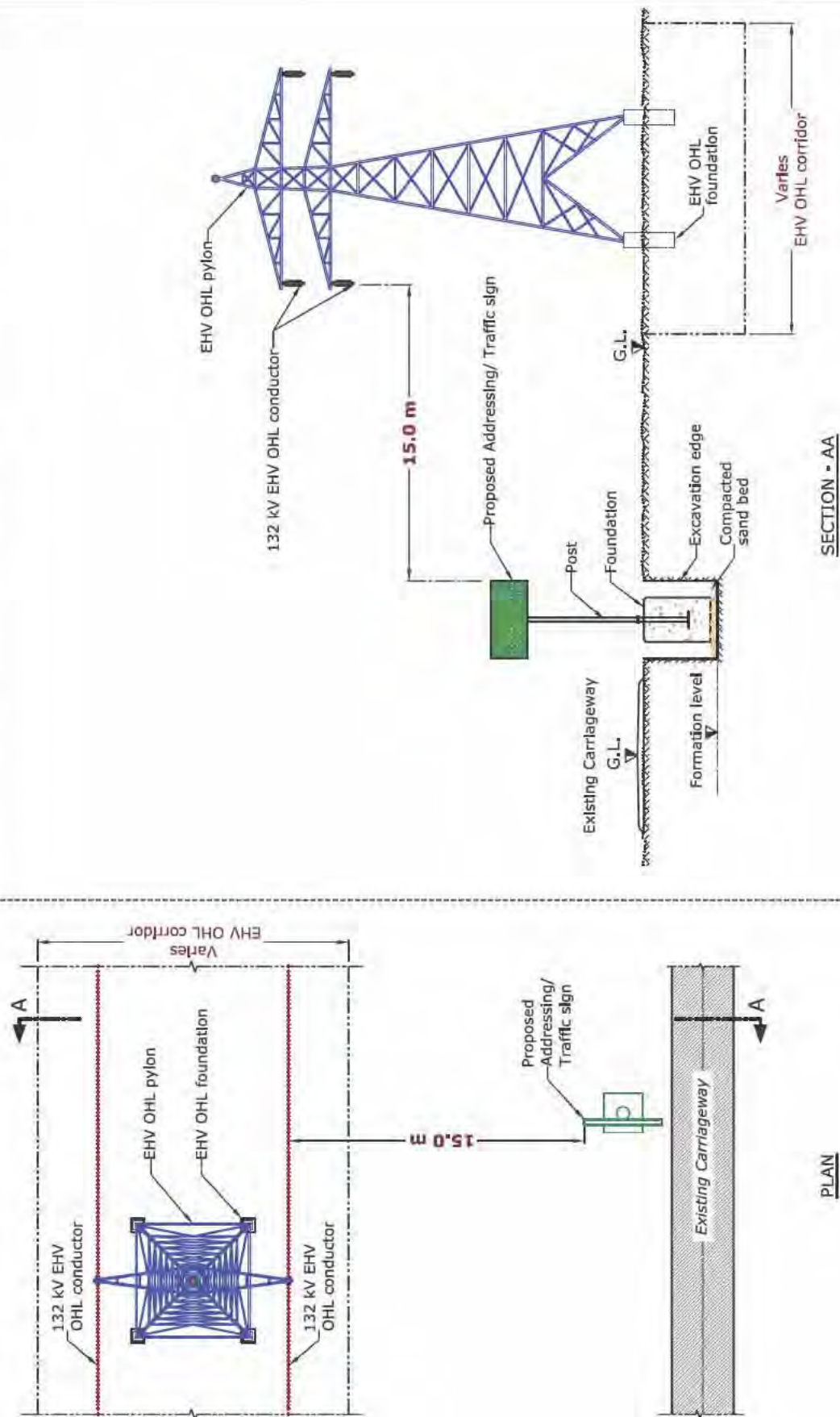
<p>Fig: 34.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p>	<p>Fig: 34.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p>
			
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearances are from the proposed Addressing/ Traffic foundation edge to existing EHV 132 kV service edge.2. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge.3. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.			

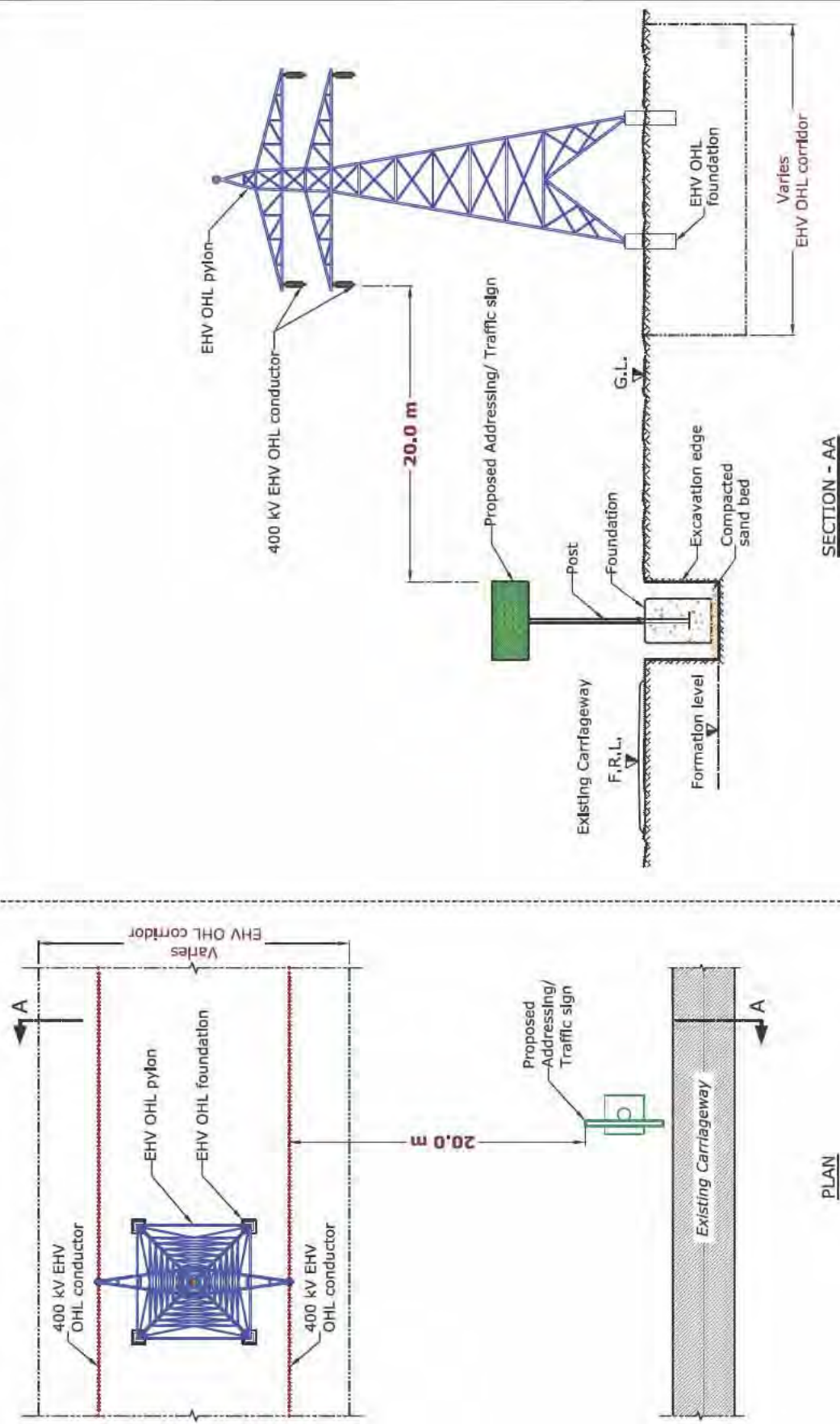
Fig: 34.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING EHV OHL (132 kV)



NOTE :

1. Horizontal clearances are from the proposed Addressing/ Traffic sign edge to existing EHV OHL conductor.
2. Trench side and existing EHV service protection may be required as per site and soil condition.

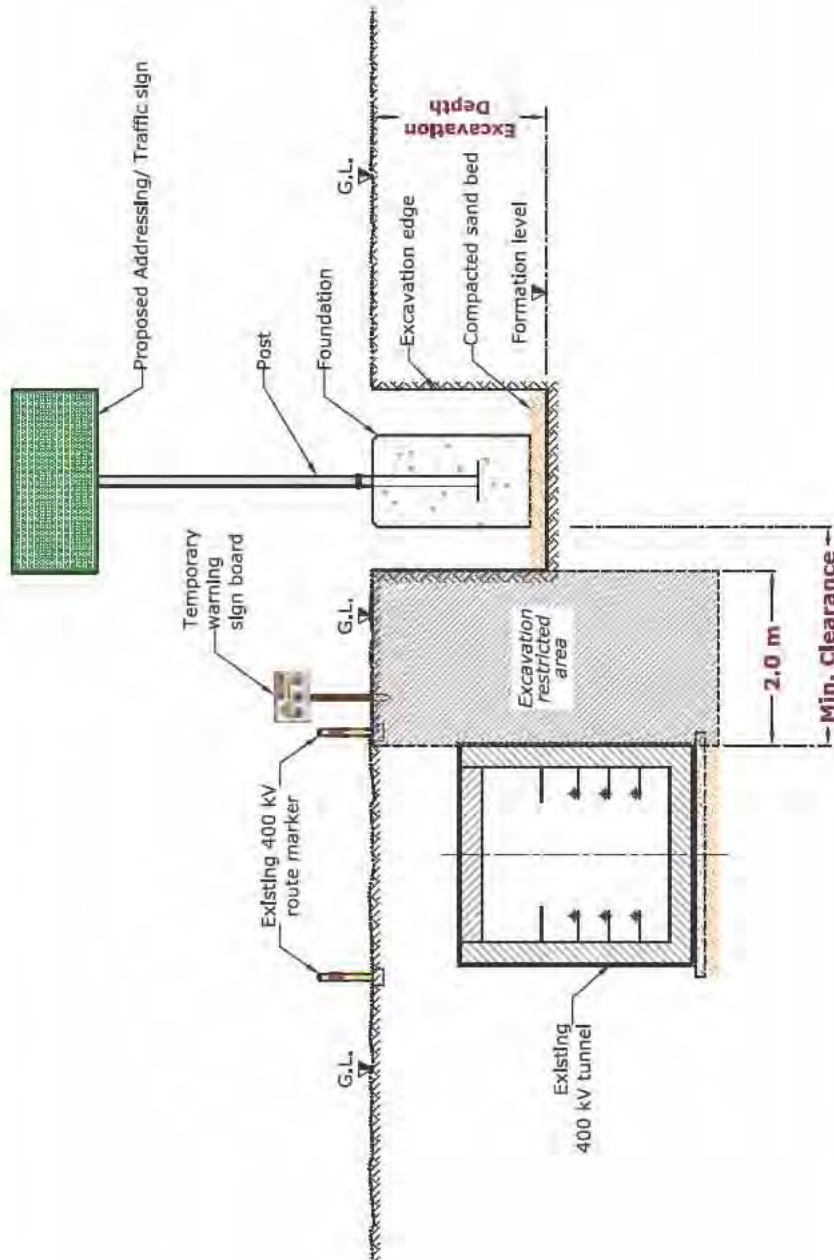
Fig: 34.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING EHV OHL (400 kV)



NOTE :

1. Horizontal clearances are from the proposed Addressing/ Traffic sign edge to existing EHV OHL conductor.
2. Trench side and existing EHV service protection may be required as per site and soil condition.

Fig: 34.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED ADDRESSING/ TRAFFIC SIGN AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
2. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
3. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
4. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Street Light foundation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m

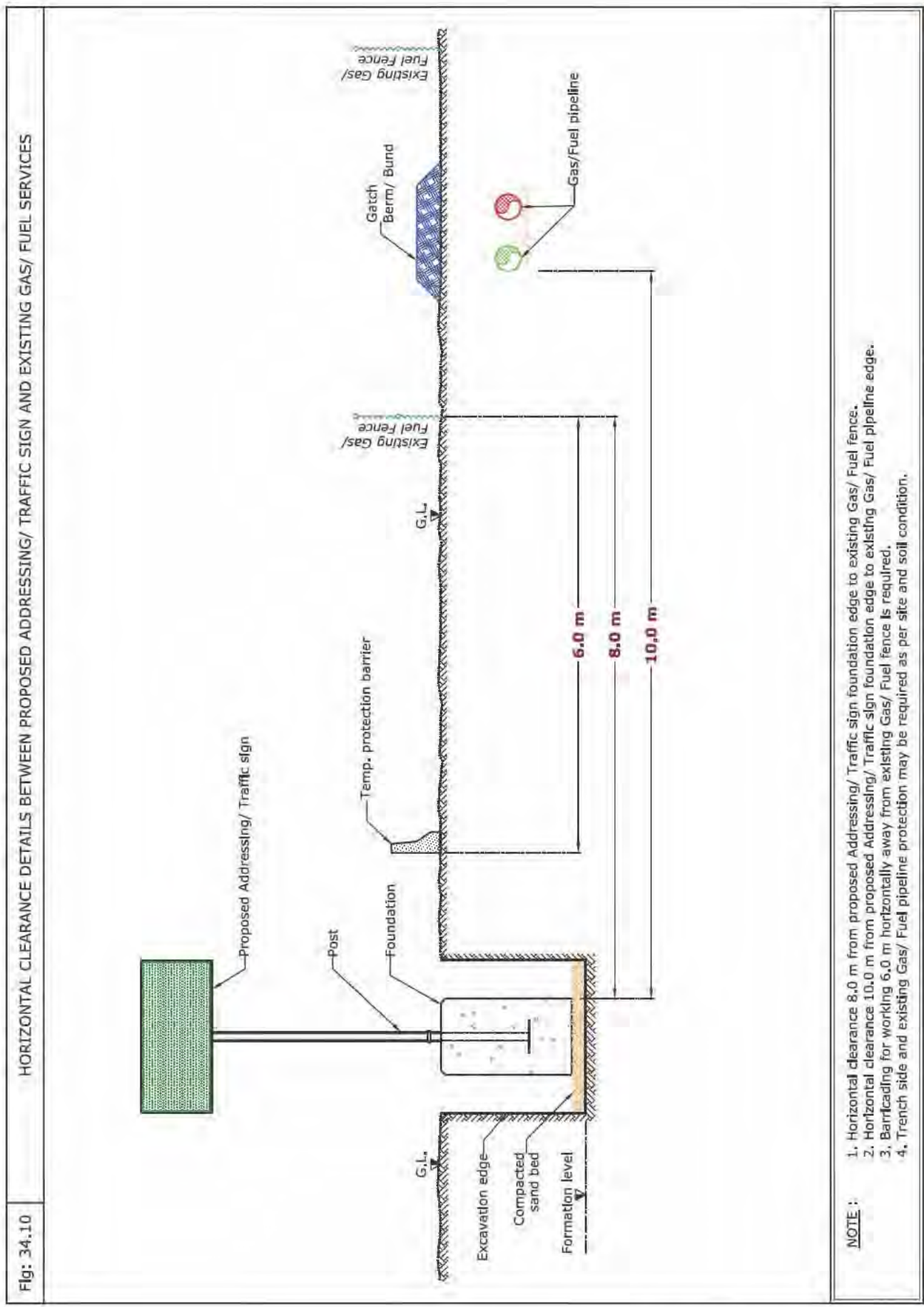
Table 4: Clearance & Protection details for proposed Installation of Address/Traffic Sign and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.10)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 34.10)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.





35. Installation of Proposed Gantry/ Cantilever (Traffic/Toll Gate/I.T.S)

578

35.1 Introduction

The purpose of traffic gantry/cantilever is to provide directional information to guide the motorists to take the appropriate lane/direction and to guide motorist to their destinations.

The traffic gantry/cantilever consists of a steel structure fixed on concrete pile foundation. For gantries, the

foundations are located on the road edges, and or median. However, cantilever foundation is located on the road edge. During construction it is important to protect DEWA existing assets as per specified standards.



35.2 Avoid the following



1. Installation of Traffic Cantilever (Traffic/Toll Gate/ I.T.S) in DEWA corridor and above DEWA services.

35.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Installation of Traffic Gantry/Cantilever and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.1)

Table 2: Clearance & Protection details for proposed Installation of Traffic Gantry/Cantilever and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	1.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.3)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

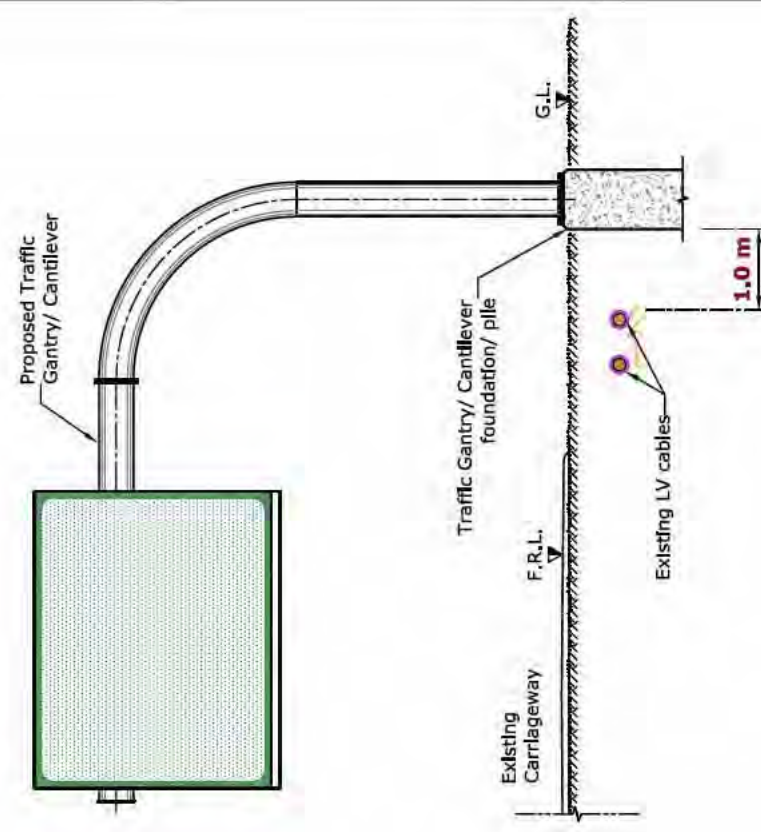
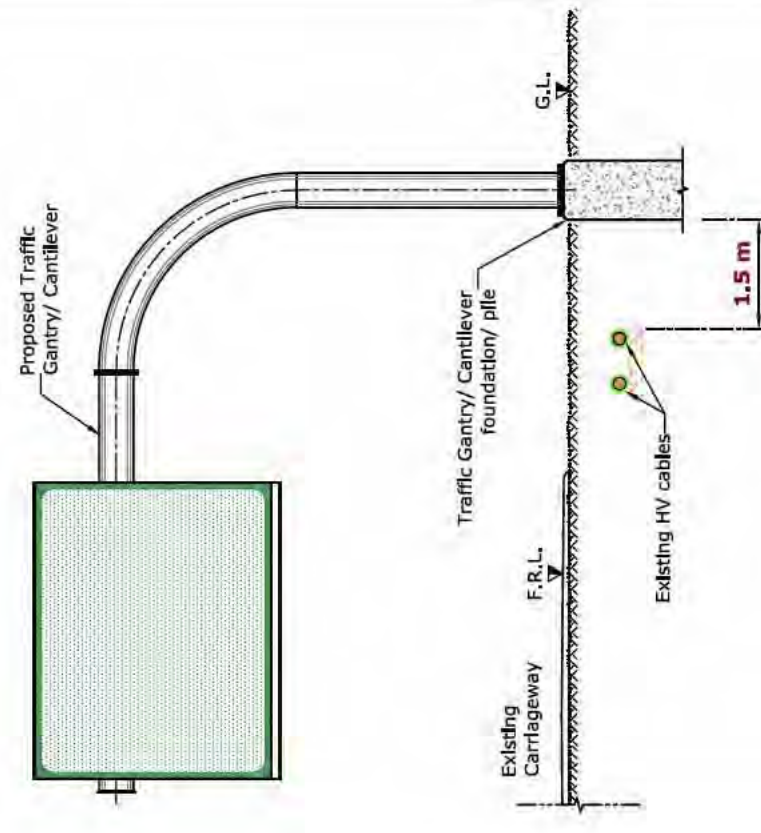
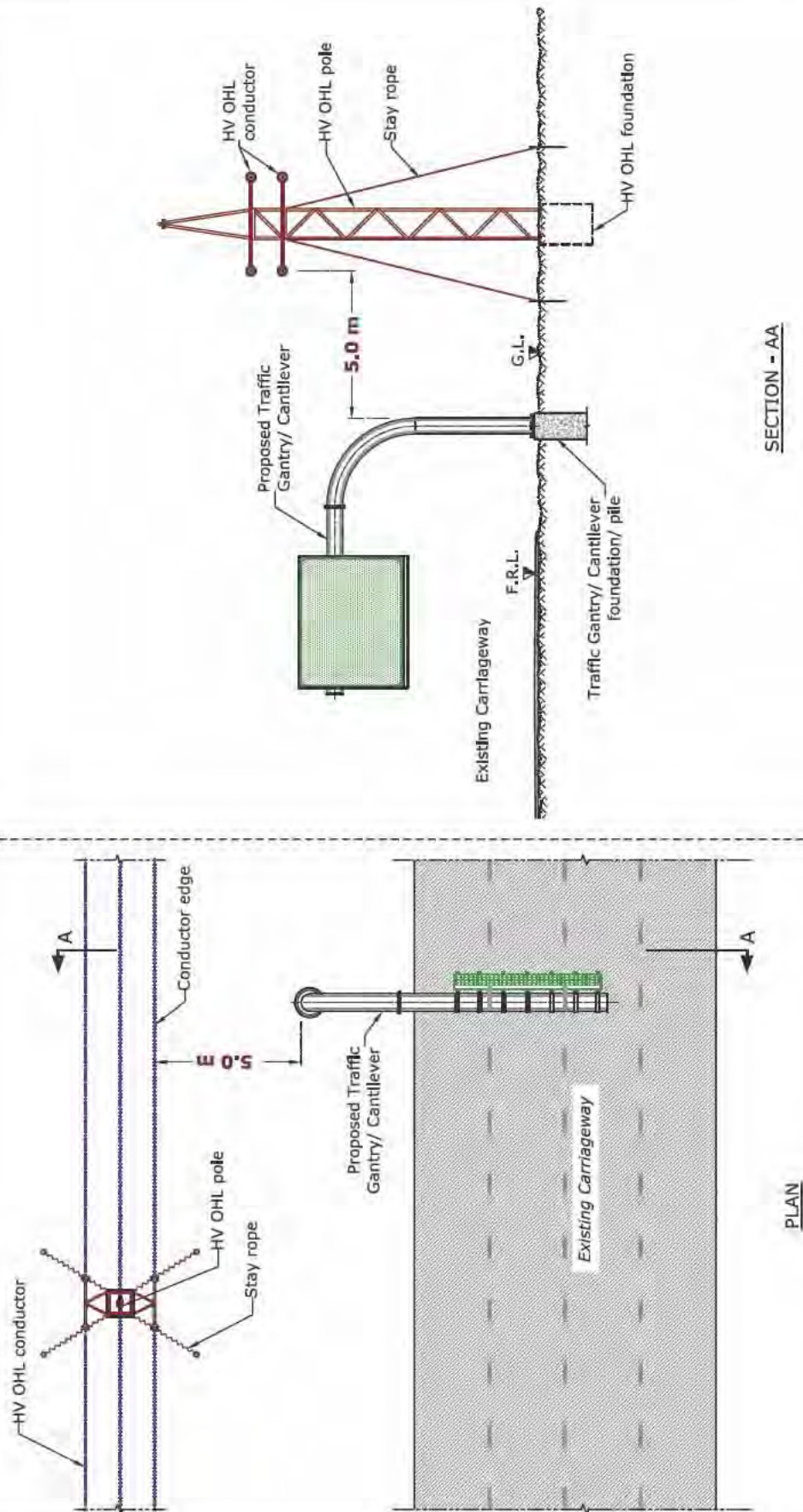
Fig: 35.1	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING LV CABLES	Fig: 35.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING HV SERVICES
 <p>Proposed Traffic Gantry/ Cantilever</p> <p>Traffic Gantry/ Cantilever foundation/ pile</p> <p>Existing Carriageway</p> <p>F.R.L.</p> <p>G.L.</p> <p>Existing LV cables</p> <p>1.0 m</p>		 <p>Proposed Traffic Gantry/ Cantilever</p> <p>Traffic Gantry/ Cantilever foundation/ pile</p> <p>Existing Carriageway</p> <p>F.R.L.</p> <p>G.L.</p> <p>Existing HV cables</p> <p>1.5 m</p>	
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearance is from the proposed Traffic Gantry/ Cantilever foundation/ pile edge to existing LV/ HV cable edge.2. Trench side and existing LV/ HV cable protection may be required as per site and soil condition.			

Fig: 35.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING HV OHL (6.6/11/33 KV)



NOTE :

1. Horizontal clearances are from the proposed Traffic Gantry/ Cantilever edge to existing HV OHL conductor.
2. Trench side and existing HV service protection may be required as per site and soil condition.

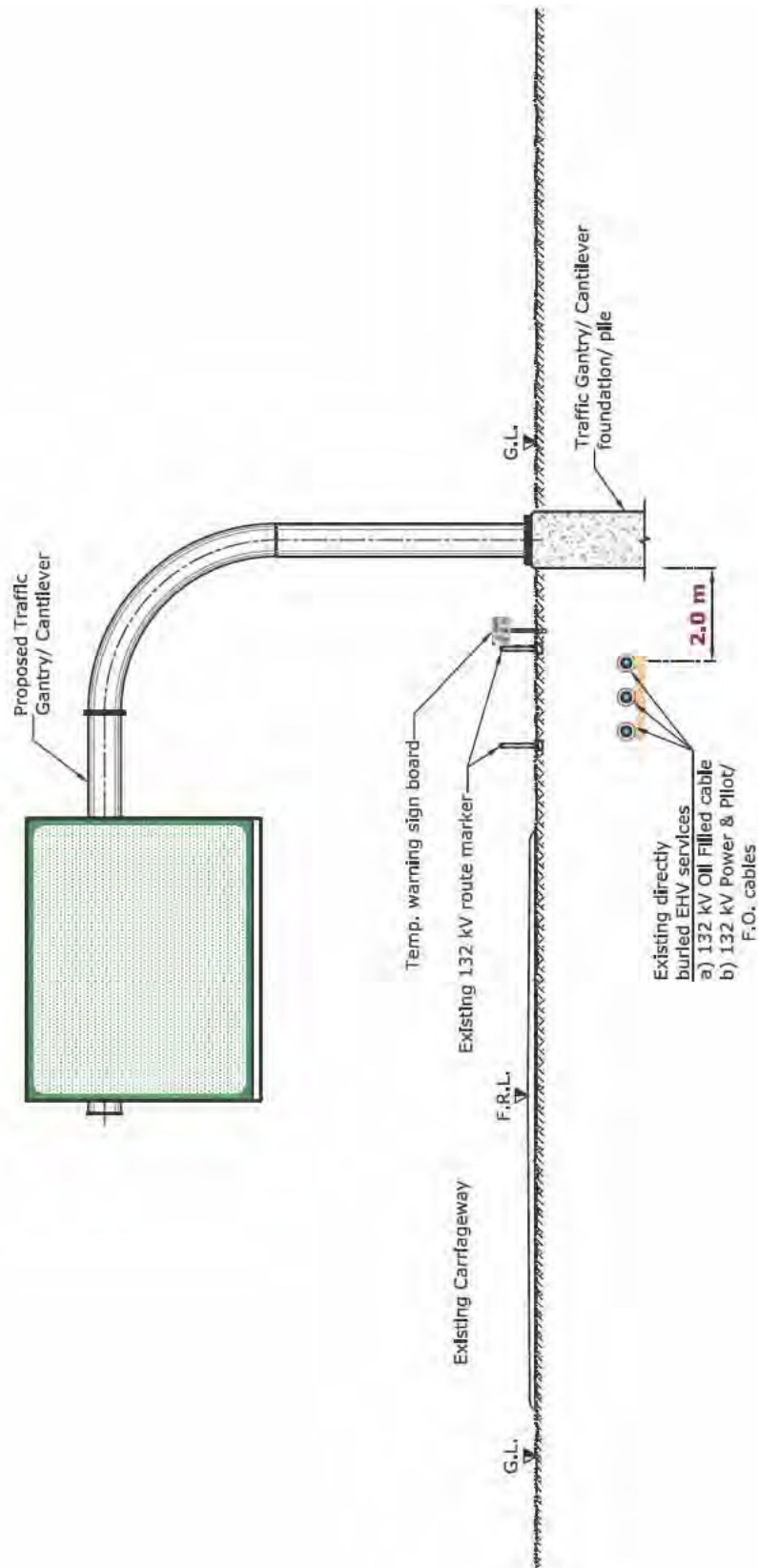
Table 3: Clearance & Protection details for proposed Installation of Traffic Gantry/Cantilever and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.9)
EHV (132 kV) O.H.L	15.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.7)
EHV (400 kV) O.H.L	20.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.8)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 35.4 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES



NOTE : 1. Horizontal clearances are from the proposed Traffic Gantry/ Cantilever foundation/ piling edge to existing EHV 132 kV service edge.
2. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

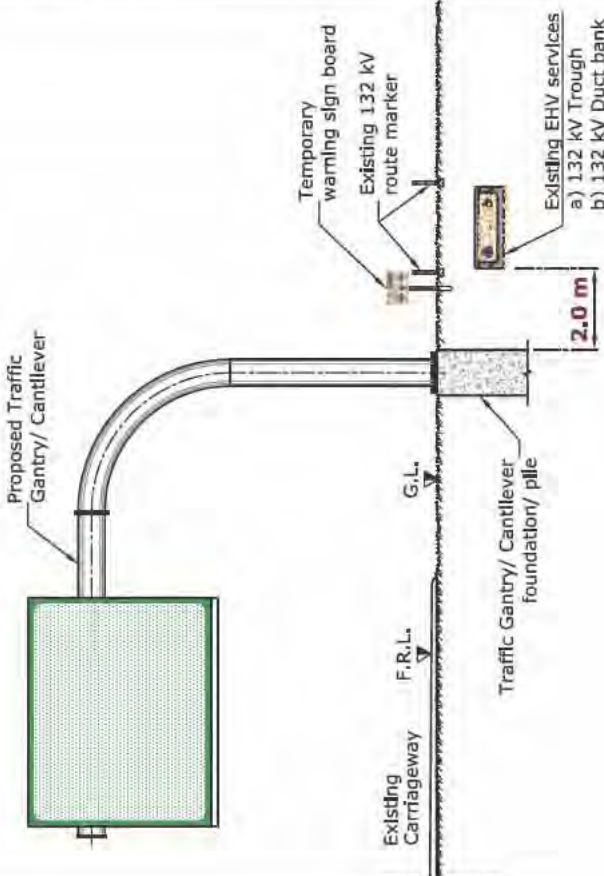
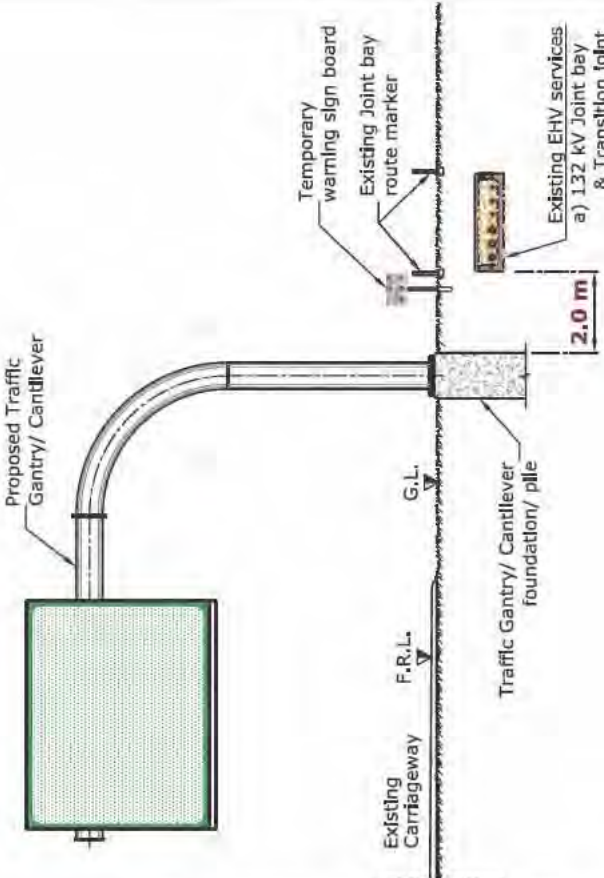
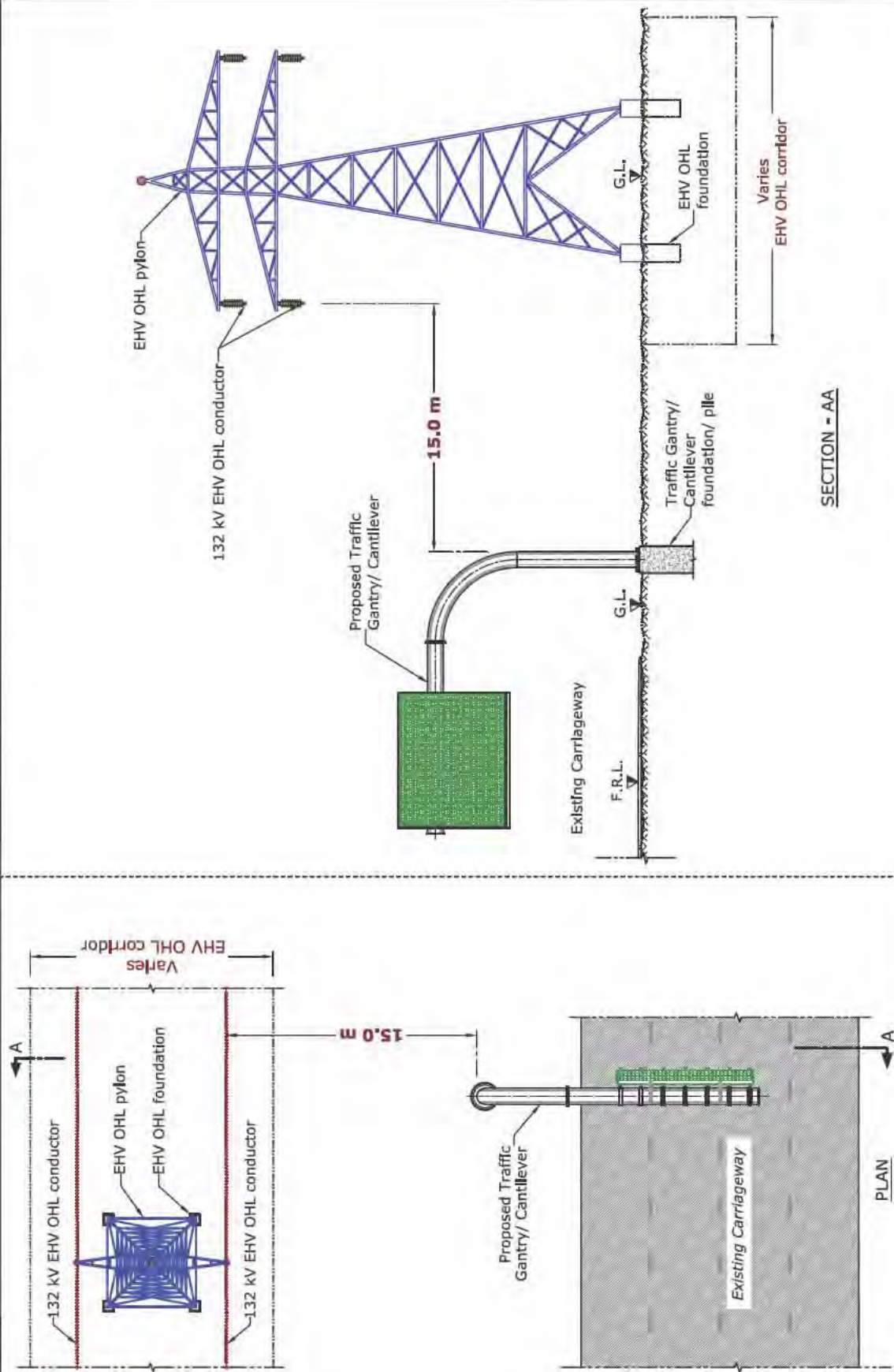
Fig: 35.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING EHV 132 kV TROUGH/ DUCT BANK	Fig: 35.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
			
<p>NOTE :</p> <ul style="list-style-type: none">1. Horizontal clearances are from the proposed Traffic gantry/ Cantilever foundation/ piling edge to existing EHV 132 kV service edge.2. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.			

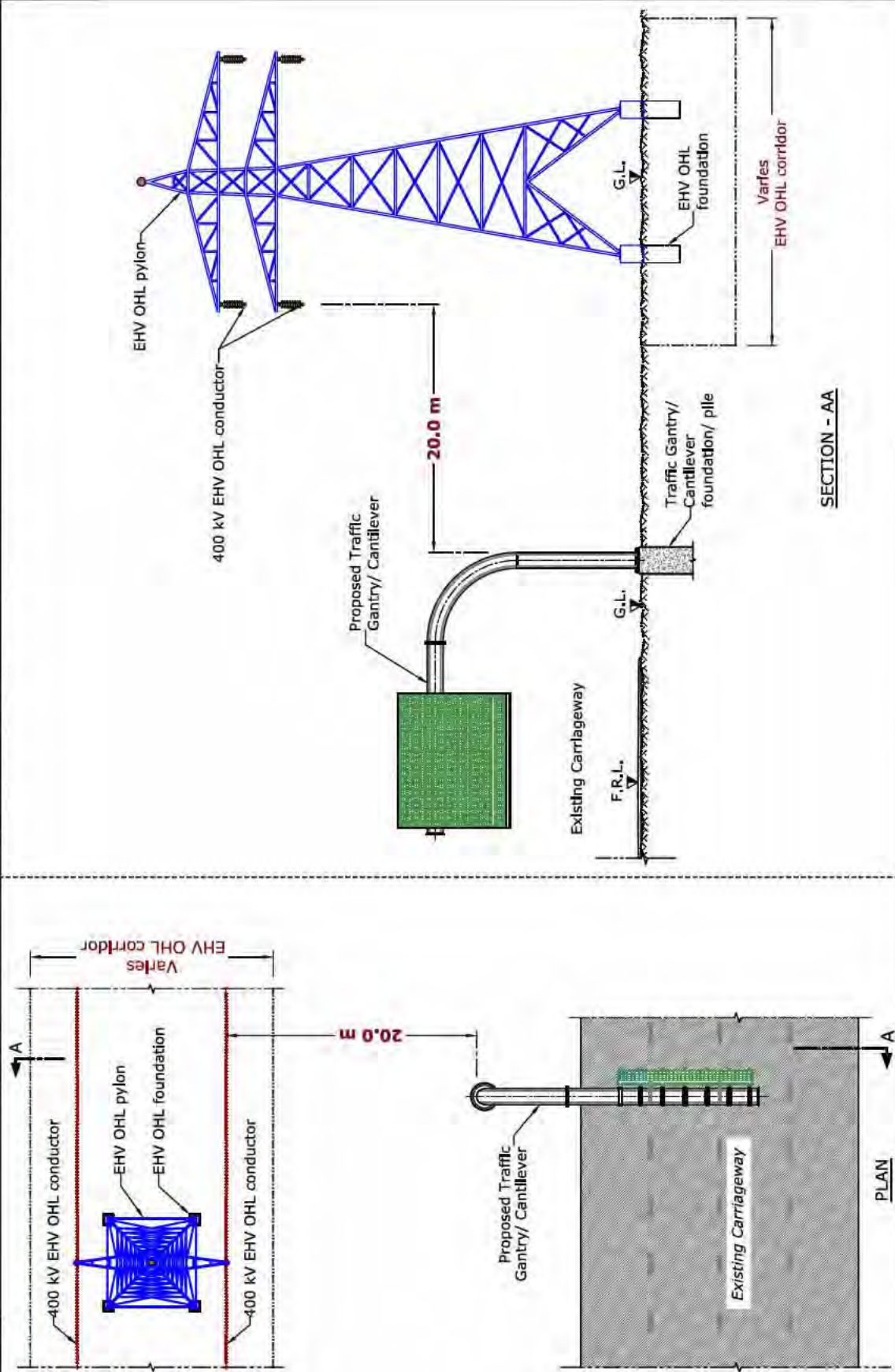
Fig: 35.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING EHV OHL (132 kV)



NOTE :

1. Horizontal clearances are from the proposed Traffic Gantry/ Cantilever edge to existing EHV OHL conductor.
2. Traffic Gantry Is not allowed Inside EHV OHL corridor.

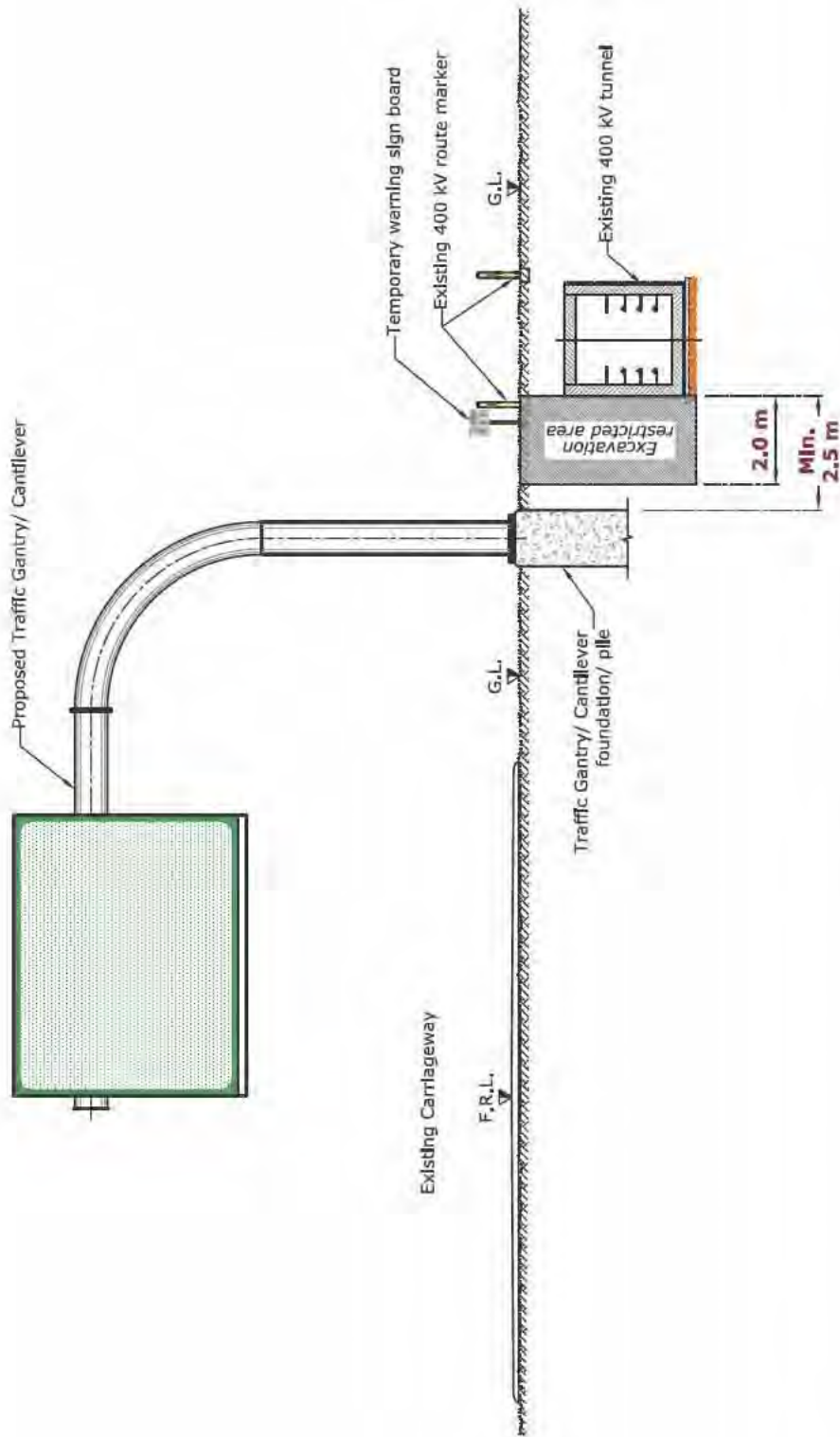
Fig: 35.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING EHV OHL (400 kV)



NOTE :

1. Horizontal clearances are from the proposed Traffic Gantry/ Cantilever edge to existing EHV OHL conductor.
2. Traffic Gantry Is not allowed Inside EHV OHL corridor.

Fig: 35.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING 400 kV TUNNEL



NOTE :

1. The maximum vibration for civil work not to exceed 15 mm/s PPV near to existing 400 kV tunnel.
2. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
3. Horizontal clearance is from the proposed excavation edge to the existing 400 kV tunnel outer wall.
4. Protection method for existing 400 kV tunnel varies as per proposed services and its formation level.
5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Table 4: Clearance & Protection details for proposed Installation of Traffic Gantry/Cantilever and existing DEWA Gas/Fuel services

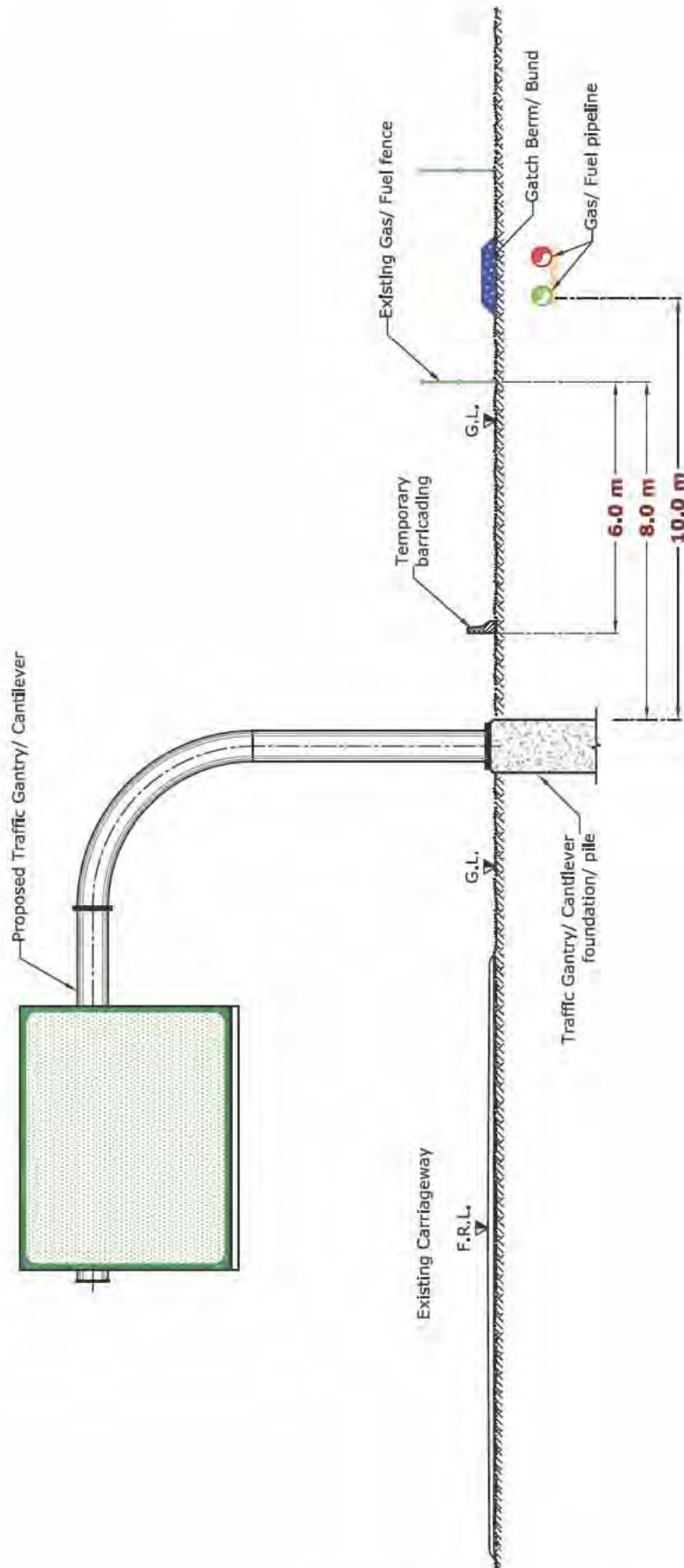
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.10)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 35.10)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 35.10 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TRAFFIC GANTRY/ CANTILEVER AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Traffic Gantry/ Cantilever foundation/ pile edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Traffic Gantry/ Cantilever foundation/ pile edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

36. Installation of Proposed Permanent OHL Warning/Head Room Gantry

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36.1 Introduction

The purpose of overhead line (OHL) warning gantry/head room gantry is to restrict the height of vehicles or equipment that intends to cross under the OHL/existing structure, and to ensure that the minimum safe vertical clearance is maintained. OHL warning/head room gantries are installed on roads well in advance in the direction of traffic flow.

The gantry structures are fixed on concrete foundation within Right Of Way. Therefore it is important during construction activities to protect DEWA existing assets as per specified standards.



36.2 Avoid the following



1. Installation of OHL Warning/Head Room Gantry above DEWA services.

36.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed OHL Warning/Head Room Gantry and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.1)

Table 2: Clearance & Protection details for proposed OHL Warning/Head Room Gantry and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	1.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.2)
HV (6.6/11 kV) O.H.L.	12.0 m	3.0 m	B	-	R	• Horizontal clearance (Ref Fig: 36.3)
HV (33 kV) O.H.L.		3.5 m				• Vertical clearance (Ref Fig: 36.3)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

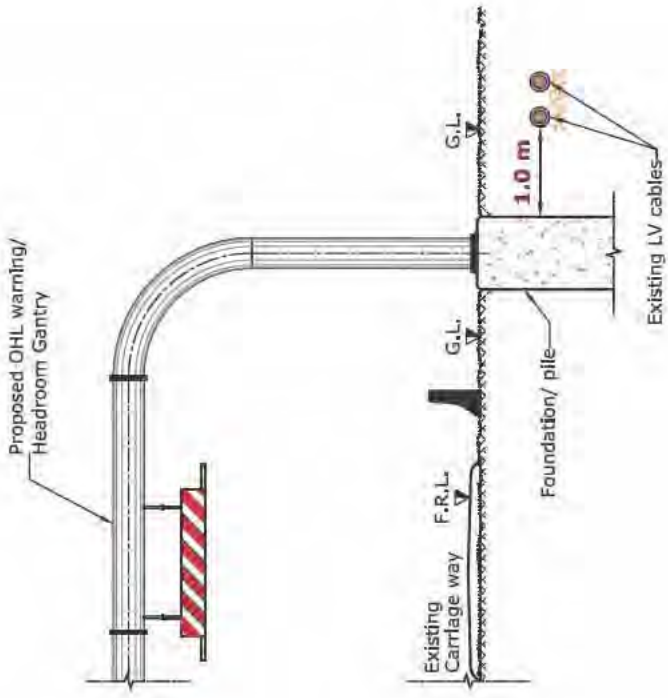
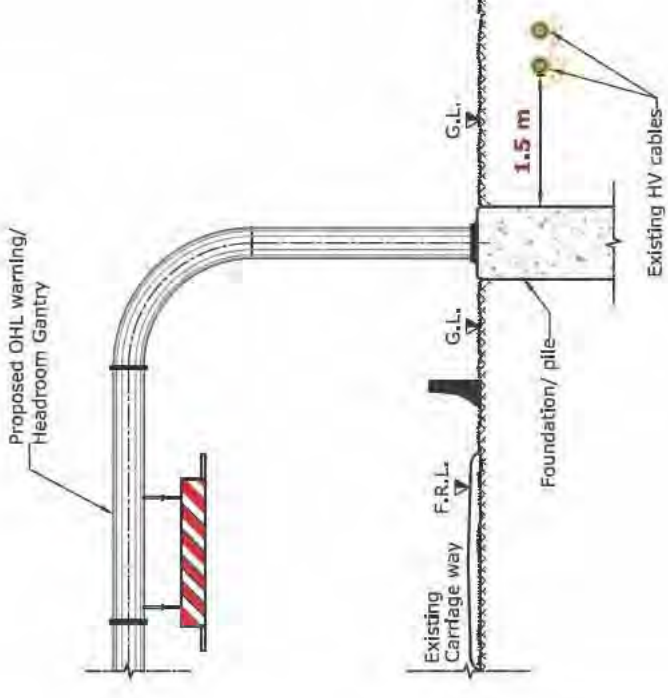
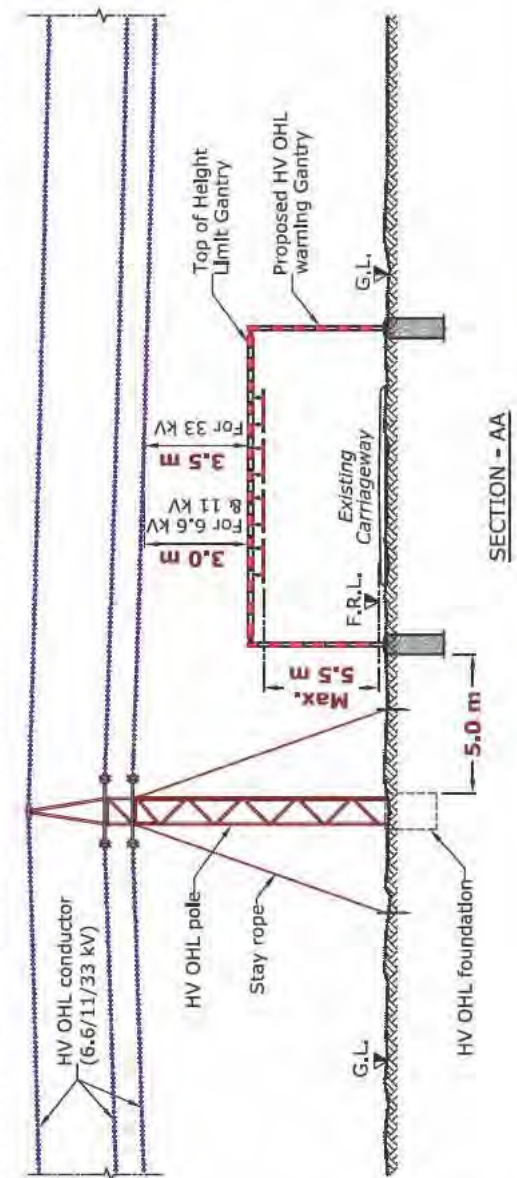
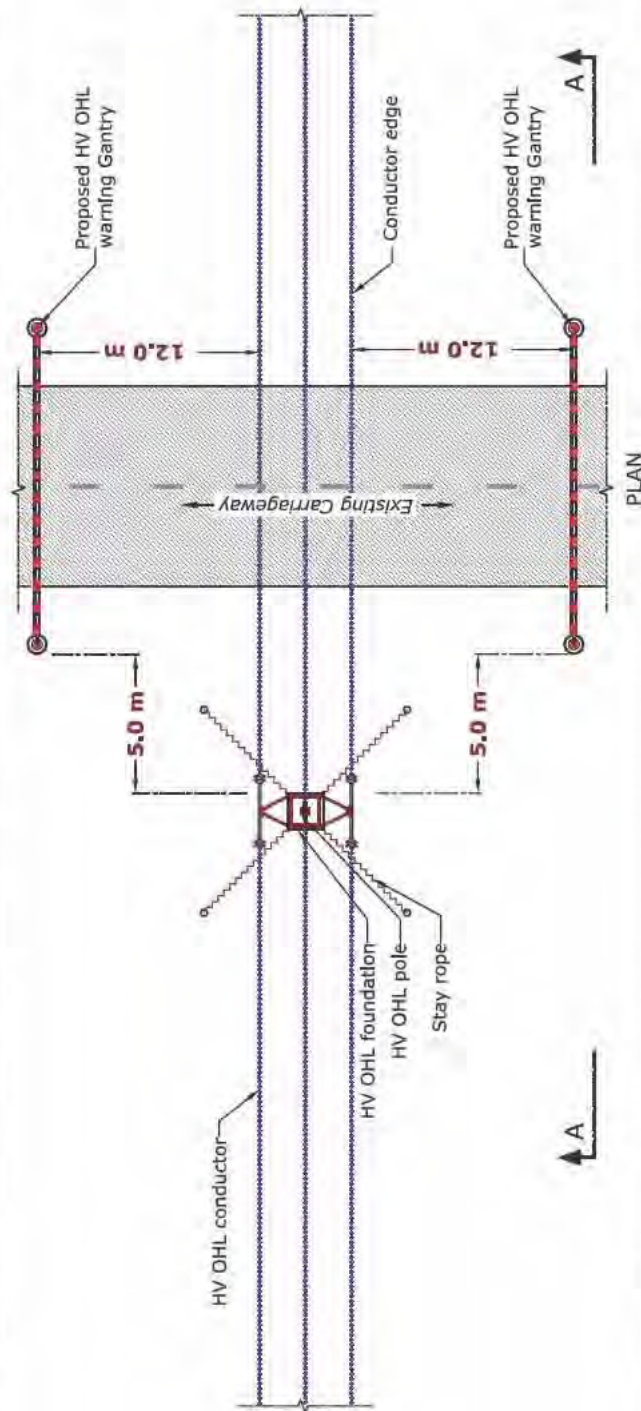
Fig: 36.1	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED OHL WARNING/ HEADROOM GANTRY AND EXISTING LV CABLES	Fig: 36.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED OHL WARNING/ HEADROOM GANTRY AND EXISTING HV CABLES
			
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearance is from the proposed OHL warning/ Headroom Gantry foundation/ pile edge to existing LV/ HV cable edge.2. Trench side and existing LV/ HV cable protection may be required as per site and soil condition.			

Fig: 36.3 HORIZONTAL & VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED OHL WARNING/ HEADROOM GANTRY AND EXISTING HV OHL (6.6/11/33 kV)



NOTE :

1. Horizontal clearance is from existing HV OHL conductor to the proposed Height Limit Gantry.
2. Vertical clearance between HV OHL lower conductor to the top of Height Limit Gantry is fixed as mentioned in the drawing.
3. Height Limit Gantry should be provided at vehicle crossing location of existing HV OHL.

Table 3: Clearance & Protection details for proposed OHL Warning/Head Room gantry and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.8)
EHV (132 kV) O.H.L	100.0 m	4.5 m	B	-	R	• Horizontal clearance (Ref Fig: 36.7)
EHV (400 kV) O.H.L		7.5 m				• Vertical clearance (Ref Fig: 36.7)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED OHL WARNING/ HEADROOM GANTRY AND EXISTING DIRECTLY BURIED EHV 132 KV. OIL FILLED/ F.O./ POWER & PILOT CABLES.



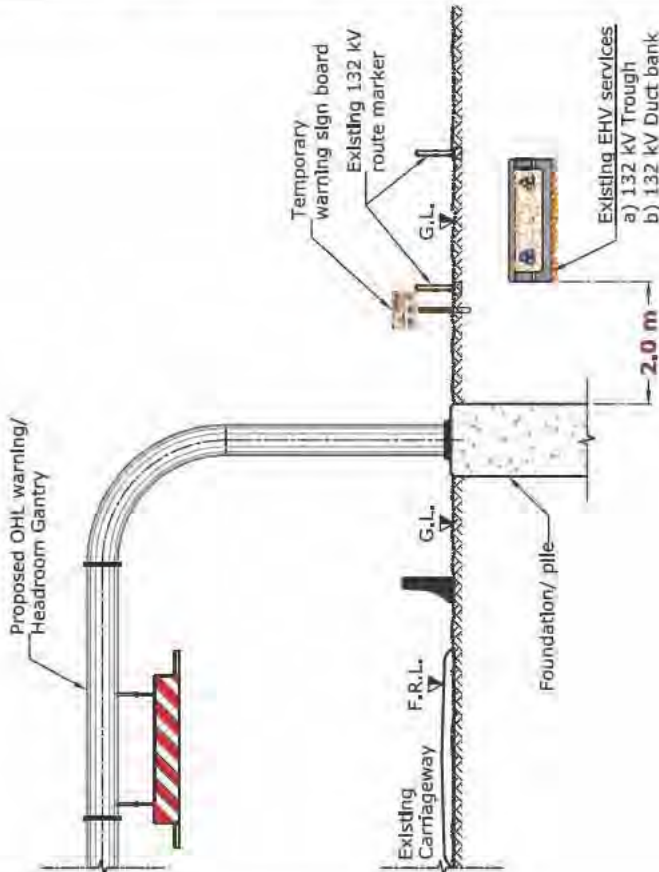
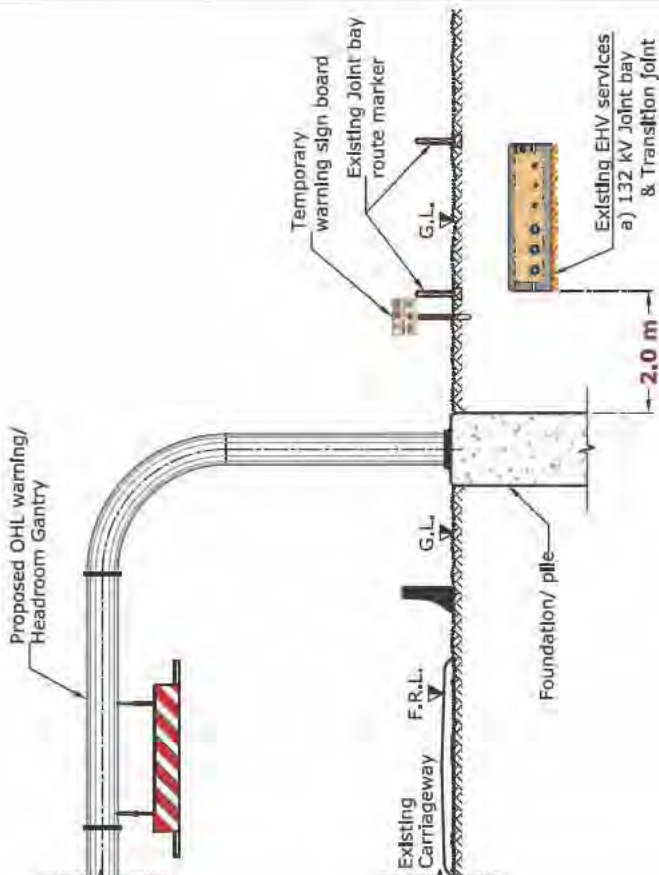
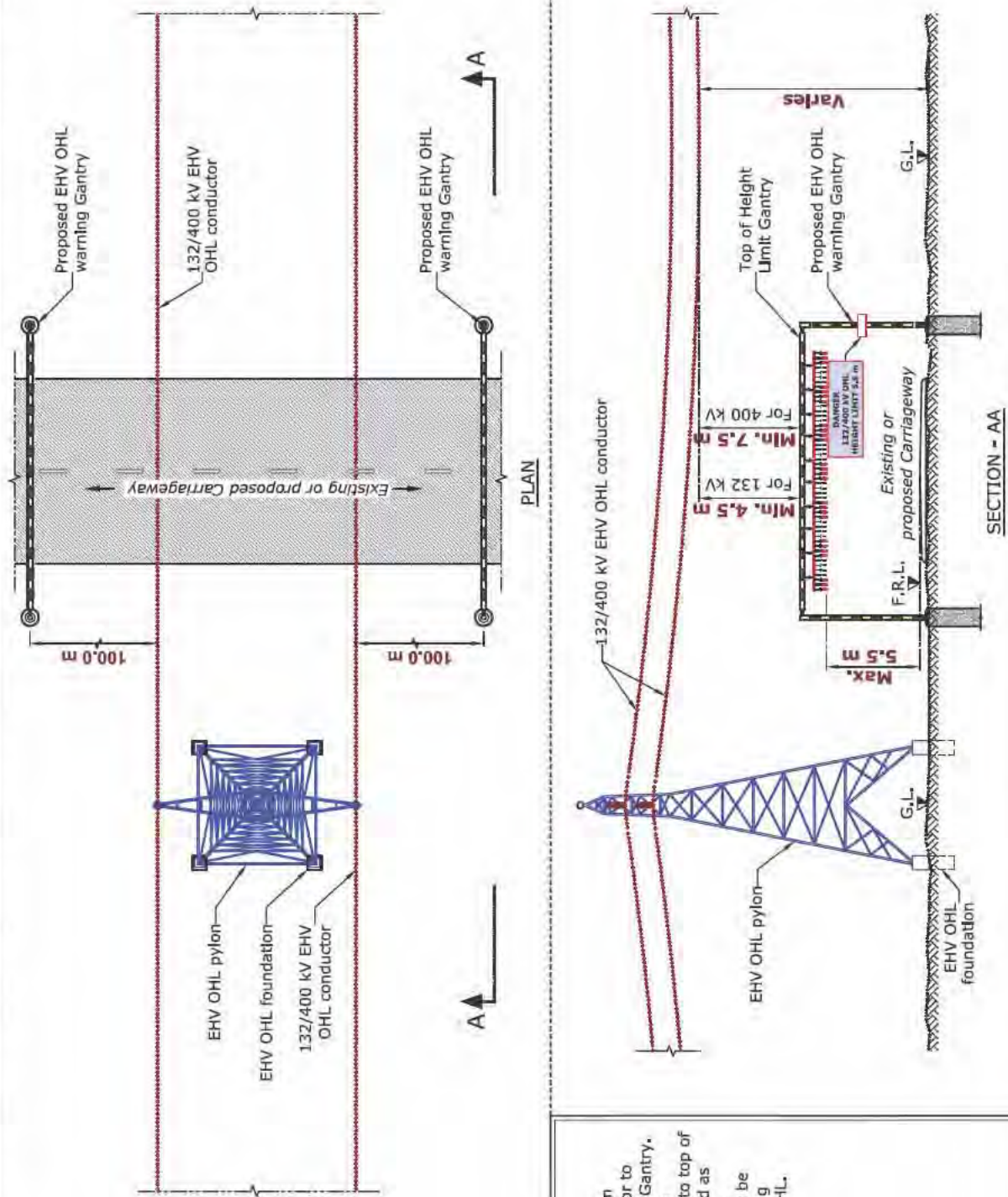
Fig: 36.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED OHL WARNING/ HEADROOM GANTRY AND EXISTING EHV 132 kV TROUGH/ DUCT BANK	Fig: 36.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED OHL WARNING/ HEADROOM GANTRY AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
			
<p>NOTE :</p> <ul style="list-style-type: none">1. Horizontal clearances are from the proposed OHL warning/ Headroom Gantry foundation/ piling edge to existing EHV 132 kV service edge.2. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.			

Fig: 36.7

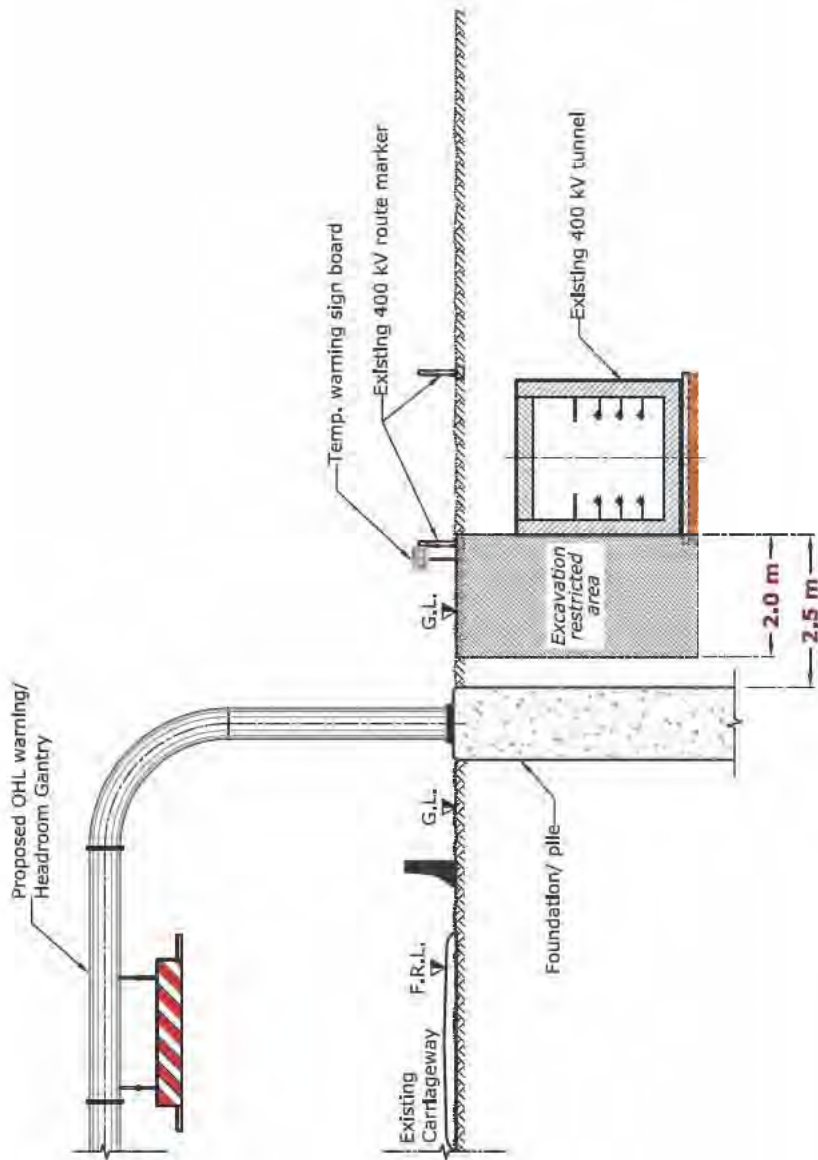
HORIZONTAL & VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED OHL WARNING GANTRY AND EXISTING EHV OHL (132/400 kV)

**NOTE :**

1. Horizontal clearance is from existing EHV OHL conductor to the proposed Height Limit Gantry.
2. Vertical clearance between EHV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
3. Height Limit Gantry should be provided at vehicle crossing location of existing EHV OHL.

Fig: 36.8

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED OHL WARNING/ HEADROOM GANTRY AND EXISTING 400 KV TUNNEL



NOTE :

1. The maximum vibration for civil work not to exceed 15 mm/s PPV near to existing 400 kV tunnel.
2. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
3. Horizontal clearance is from the proposed excavation edge to the existing 400 kV tunnel outer wall.
4. Protection method for existing 400 kV tunnel varies as per proposed services and its formation level.
5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

Table 4: Clearance & Protection details for proposed OHL Warning/Head Room Gantry and existing DEWA Gas/Fuel services

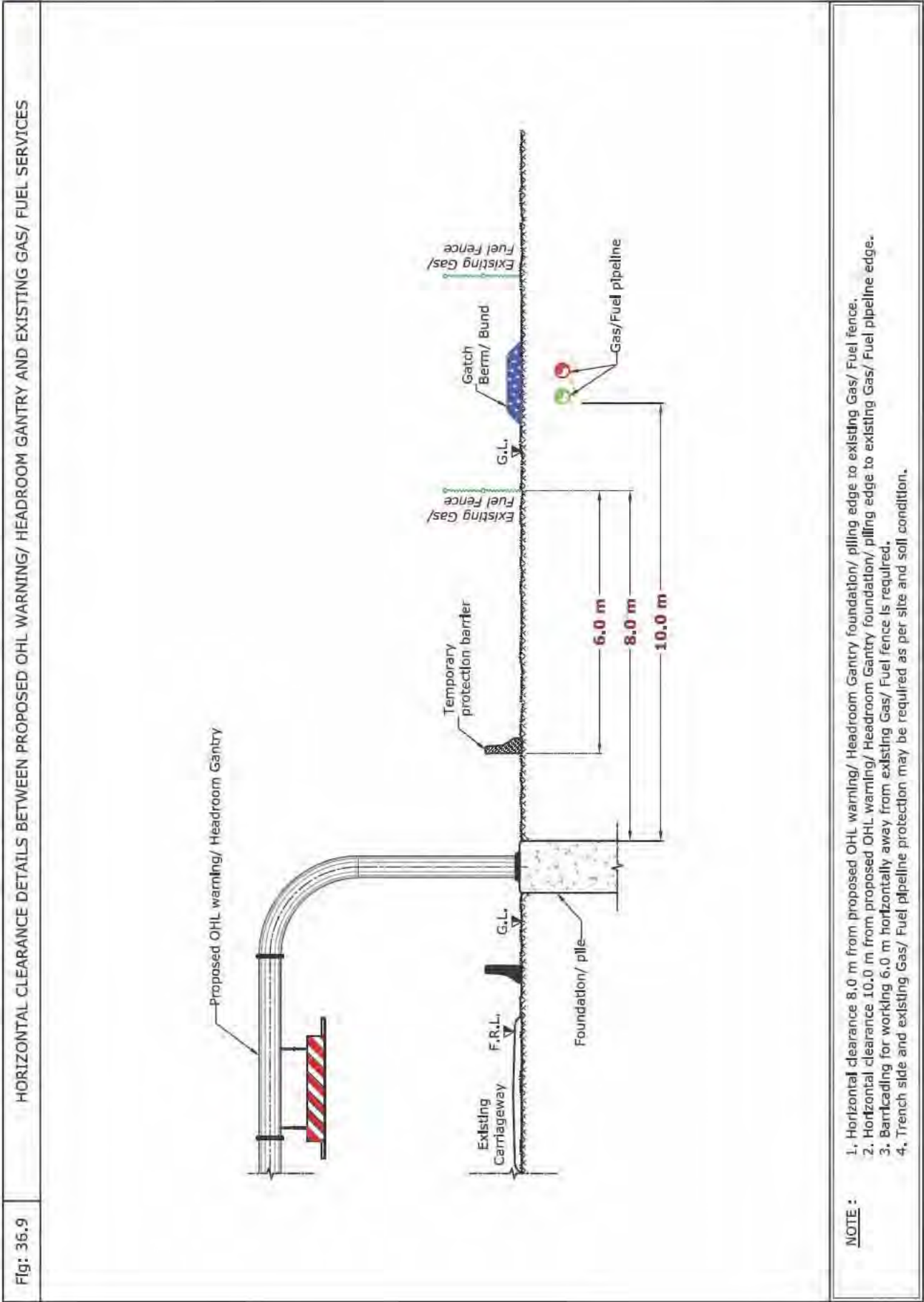
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.9)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 36.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Installation of Proposed Permanent OHL Warning/Head Room Gantry



- NOTE :**
1. Horizontal clearance 8.0 m from proposed OHL warning/ Headroom Gantry foundation/ piling edge to existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from proposed OHL warning/ Headroom Gantry foundation/ piling edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

37. Installation of Proposed RTU

37.1 Introduction

Remote Terminal Unit (RTU) is a microprocessor controlled electronic device that interfaces objects in the physical world to a Supervisory Control and Data Acquisition system (SCADA) by transmitting telemetry data to the system and by using messages from the supervisory system to control connected objects.

It contains a setup software which connects data input streams to data output streams, define communication protocols, and troubleshoot installation problems.

The remote terminal unit is placed over precast foundation within the Right Of Way. Therefore, during construction it is important to protect DEWA existing assets as per specified standard.



Installation of Proposed RTU

37.2 Avoid the following



1. Installation of RTU (Remote Terminal Unit) above DEWA existing services.

37.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed RTU (Remote Terminal Unit) and existing DEWA Electricity LV Cables

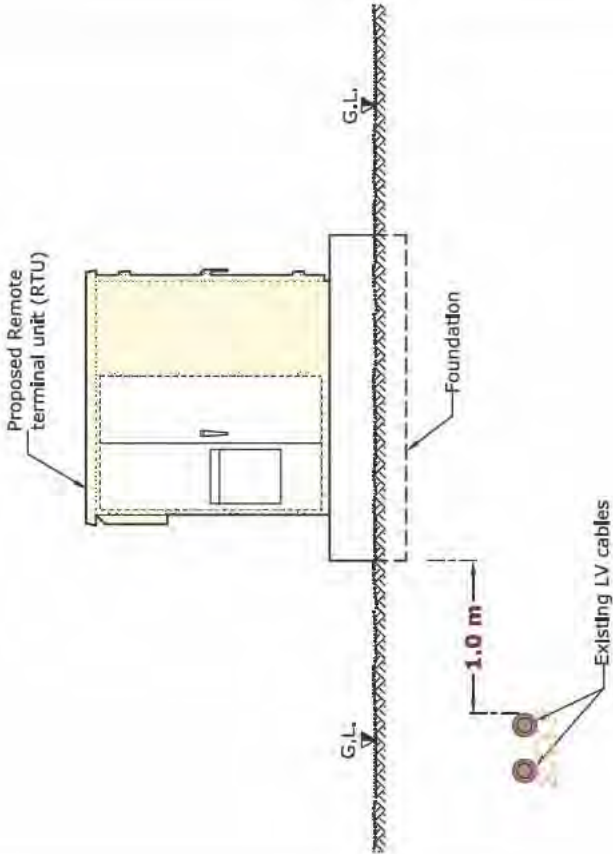
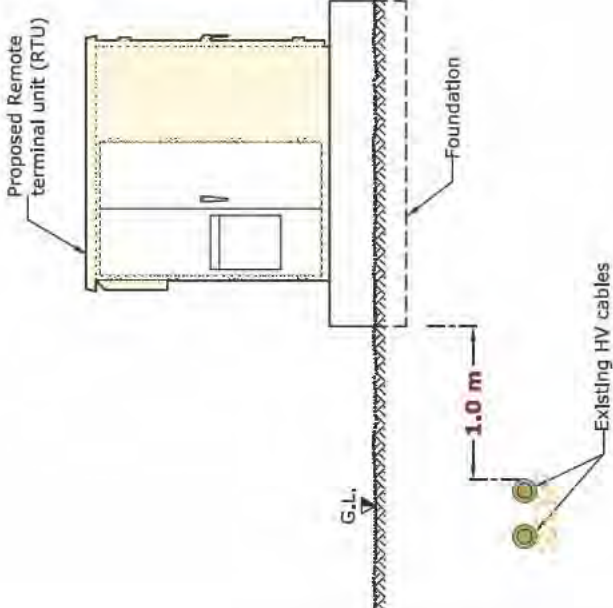
Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.1)

Table 2: Clearance & Protection details for proposed RTU (Remote Terminal Unit) and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.3)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 37.1</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED RTU (REMOTE TERMINAL UNIT) AND EXISTING LV CABLES</p>	<p>Fig: 37.2</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED RTU (REMOTE TERMINAL UNIT) AND EXISTING HV CABLES</p>
<p>Fig: 37.1</p>			<p>NOTE : 1. Horizontal clearance is from the proposed RTU (Remote terminal unit) foundation edge to existing LV/ HV cable edge.</p>

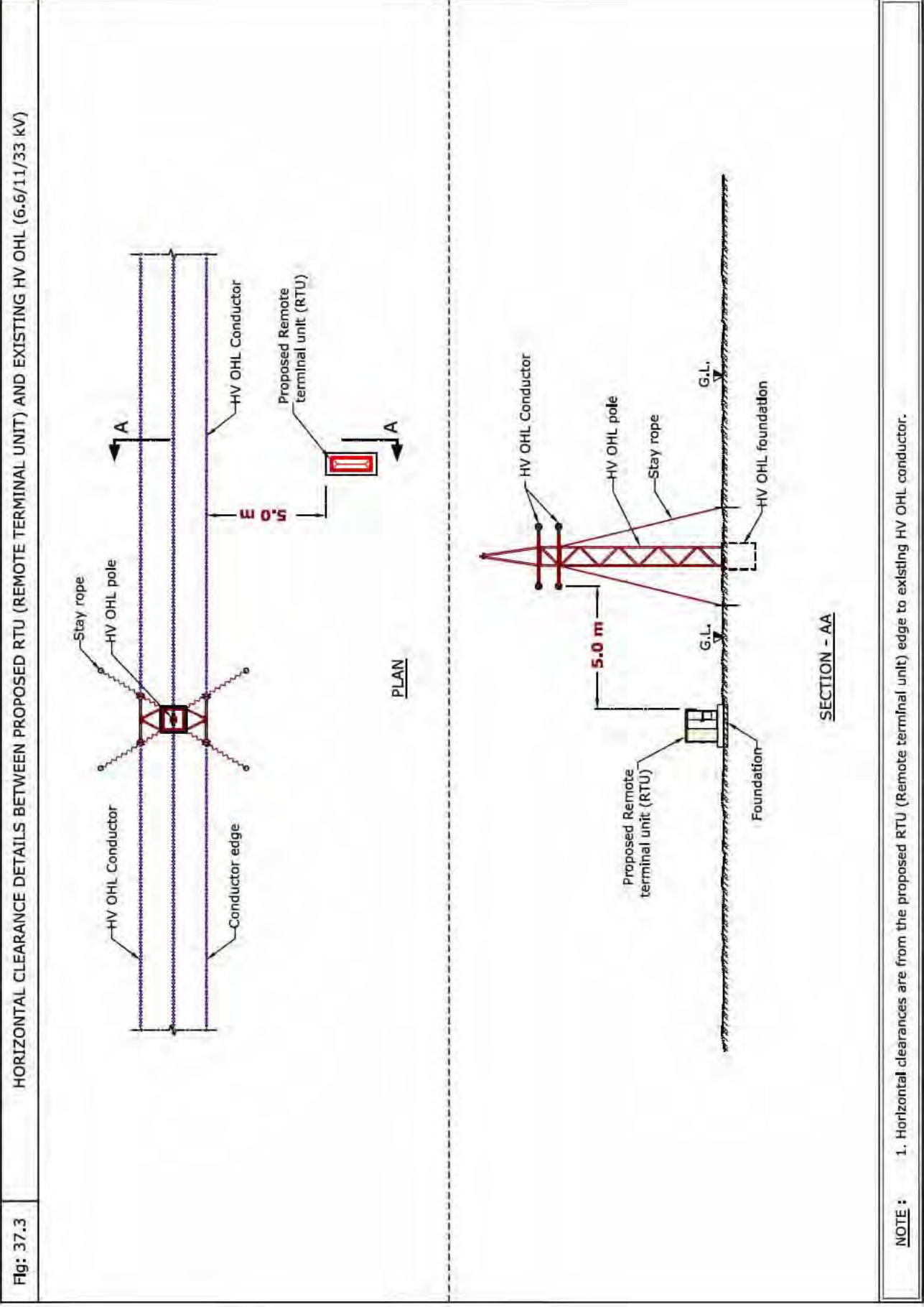


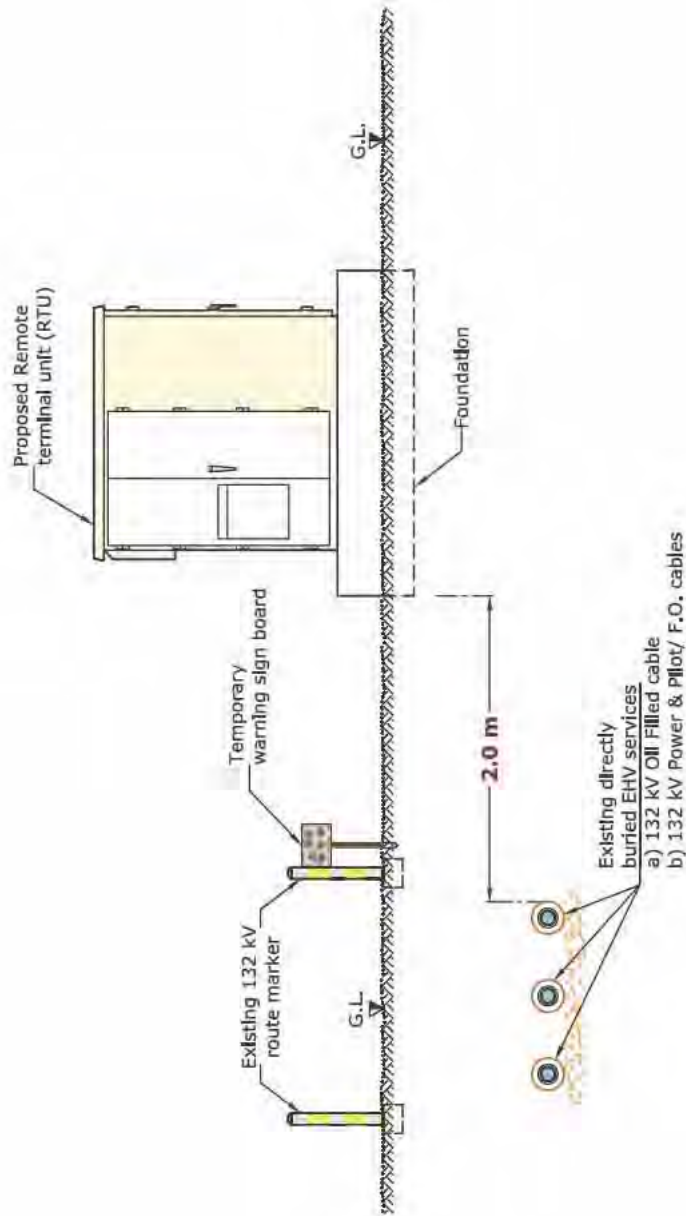
Table 3: Clearance & Protection details for proposed RTU (Remote Terminal Unit) and existing DEWA Electricity EHV services

Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable(O.F)	2.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.8)
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	-	• Horizontal clearance (Ref Fig: 37.7)
EHV (400 kV) O.H.L		7.5 m				• Vertical clearance (Ref Fig: 37.7)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 37.4 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED RTU (REMOTE TERMINAL UNIT) AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES



NOTE : 1. Horizontal clearance is from the proposed RTU (Remote terminal unit) foundation edge to existing EHV 132 kV service edge.

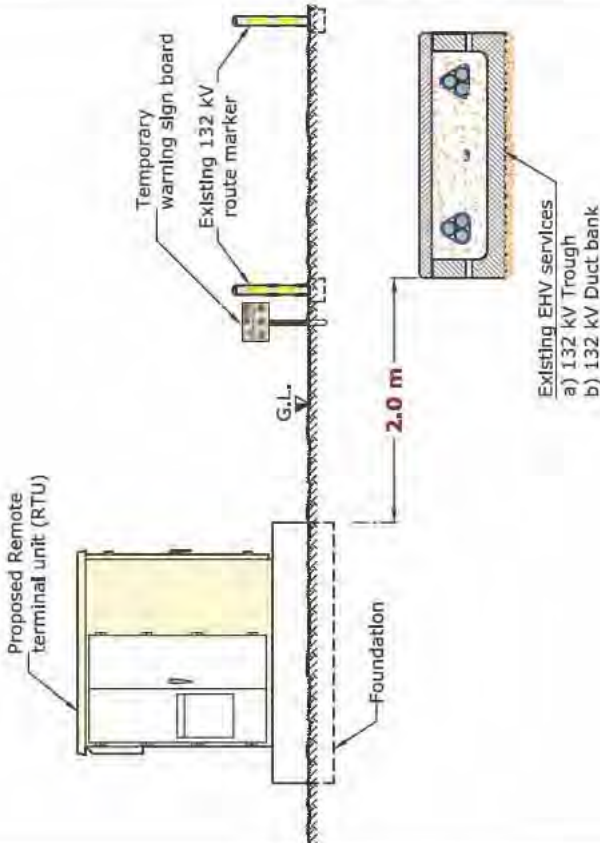
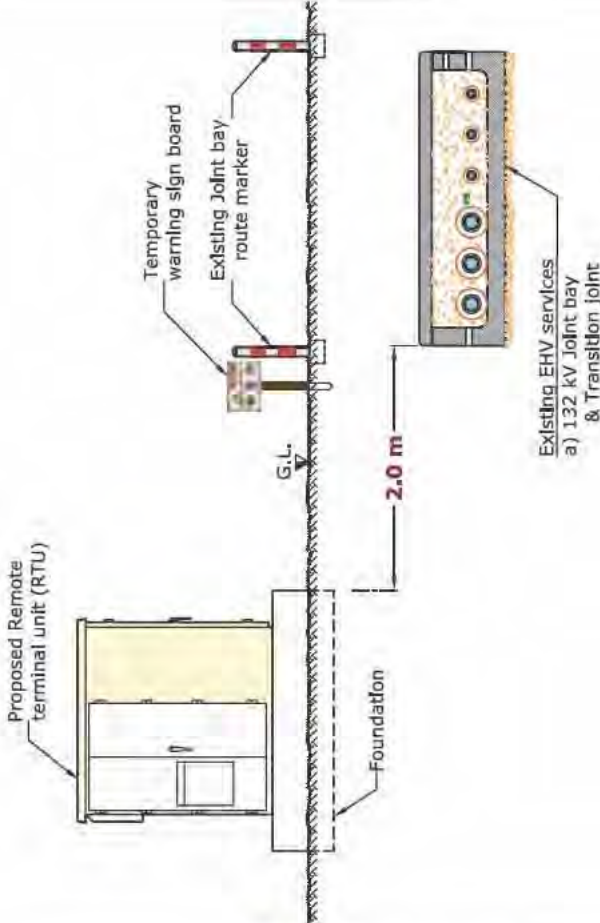
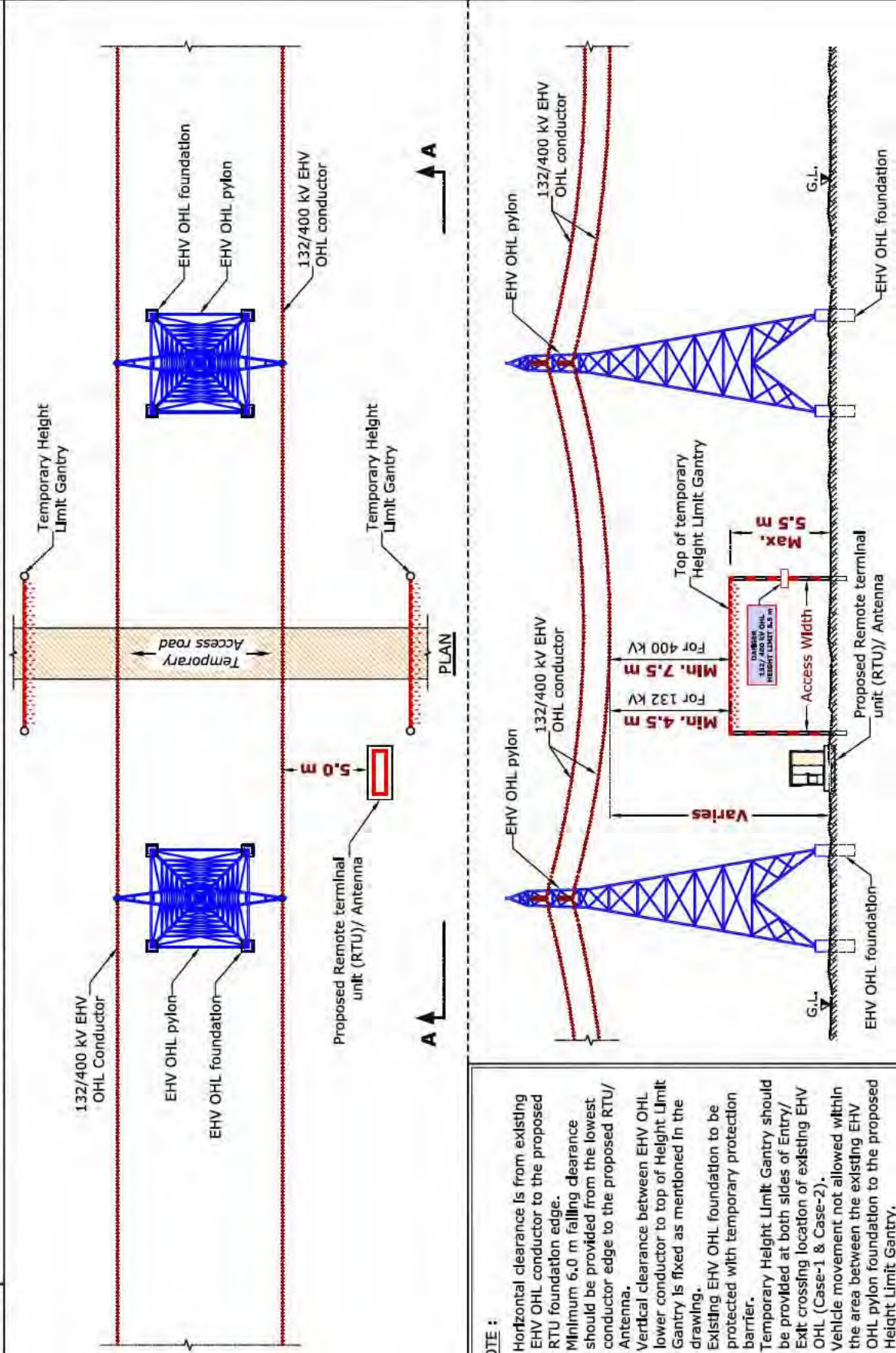
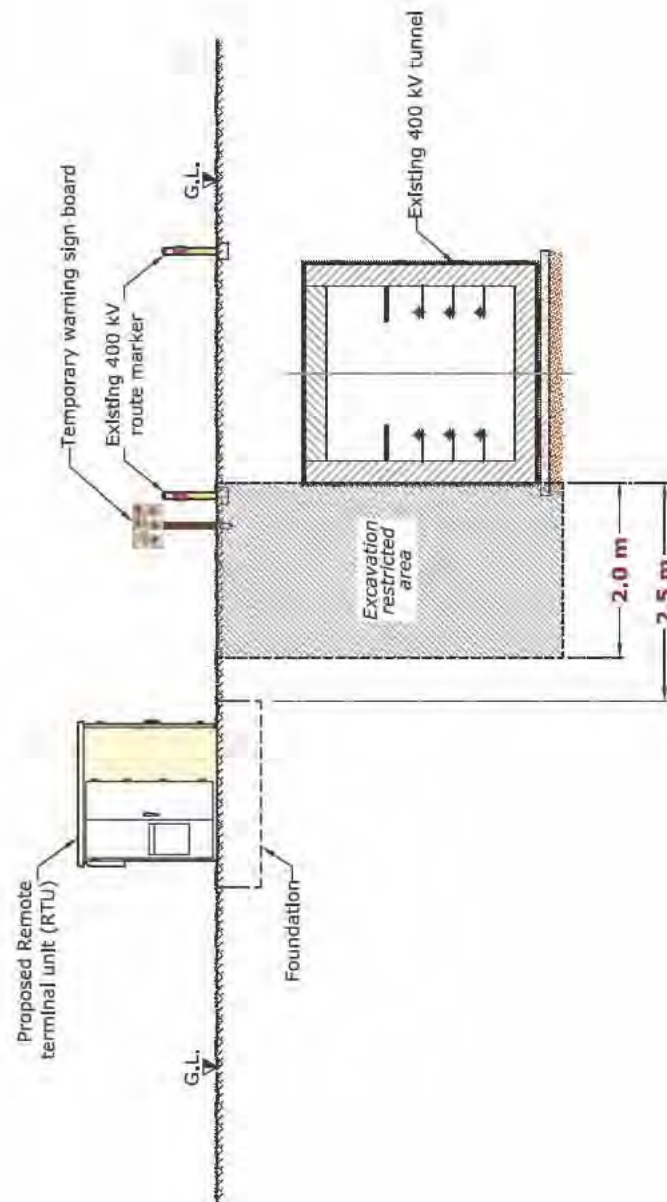
Fig: 37.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED RTU (REMOTE TERMINAL UNIT) AND EXISTING EHV 132 kV TROUGH/ DUCT BANK	Fig: 37.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED RTU (REMOTE TERMINAL UNIT) AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
			
<p>NOTE : 1. Horizontal clearances are from the proposed RTU (Remote terminal unit) foundation edge to existing EHV 132 kV service edge.</p>			

Fig: 37.7 TYPICAL CLEARANCE DETAILS FOR PROPOSED RTU (REMOTE TERMINAL UNIT) AND EXISTING EHV OHL (132/400 kV)



- NOTE :**
1. Horizontal clearance is from existing EHV OHL conductor to the proposed RTU foundation edge.
 2. Minimum 6.0 m falling clearance should be provided from the lowest conductor edge to the proposed RTU/Antenna.
 3. Vertical clearance between EHV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
 4. Existing EHV OHL foundation to be protected with temporary protection barrier.
 5. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing EHV OHL (Case-1 & Case-2).
 6. Vehicle movement not allowed within the area between the existing EHV OHL pylon foundation to the proposed Height Limit Gantry.
 7. EHV OHL access road should not be blocked.

Fig: 37.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED RTU (REMOTE TERMINAL UNIT) AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
2. Horizontal clearance is from the proposed excavation edge to the existing 400 kV Tunnel outer wall.

Table 4: Clearance & Protection details for proposed RTU (Remote Terminal Unit) and existing DEWA Gas/Fuel services

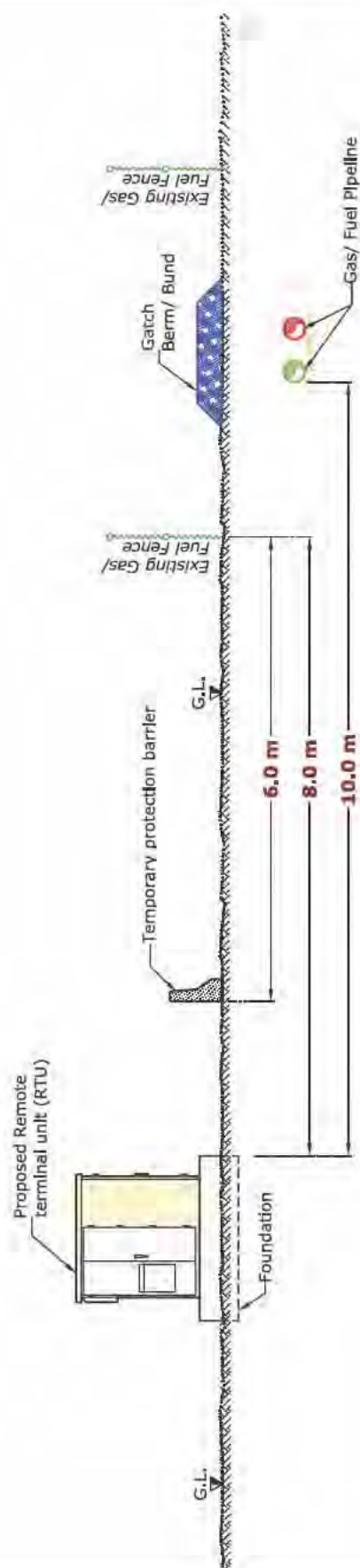
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.9)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 37.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 37.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED RTU (REMOTE TERMINAL UNIT) AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed RTU (Remote terminal unit) foundation edge to existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from proposed RTU (Remote terminal unit) foundation edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.

38. Installation of Proposed Safety Fencing within R.O.W

38.1 Introduction

The purpose of installing Safety Fences is to set the R.O.W limits and to provide a barrier for the anti-intruders such as stray animals preventing them access to the highway.

Fences are supported on a concrete foundation and posts which use different types of accessories, which

may encroach DEWA existing services therefore, during construction activities it is required to protect DEWA existing assets as per specified standards



38.2 Avoid the following



1. Installation of Safety Fence in DEWA corridor and above DEWA services.
2. Blocking the OHL access road and OHL/cable corridor enclosed by fencing.

38.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Fencing and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	0.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.1)

Table 2: Clearance & Protection details for proposed Fencing and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.2)
HV (6.6/11/33 kV) O.H.L. (Stay rope)	3.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.3)
HV (6.6/11/33 kV) O.H.L. (Conductor)	5.0 m					

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

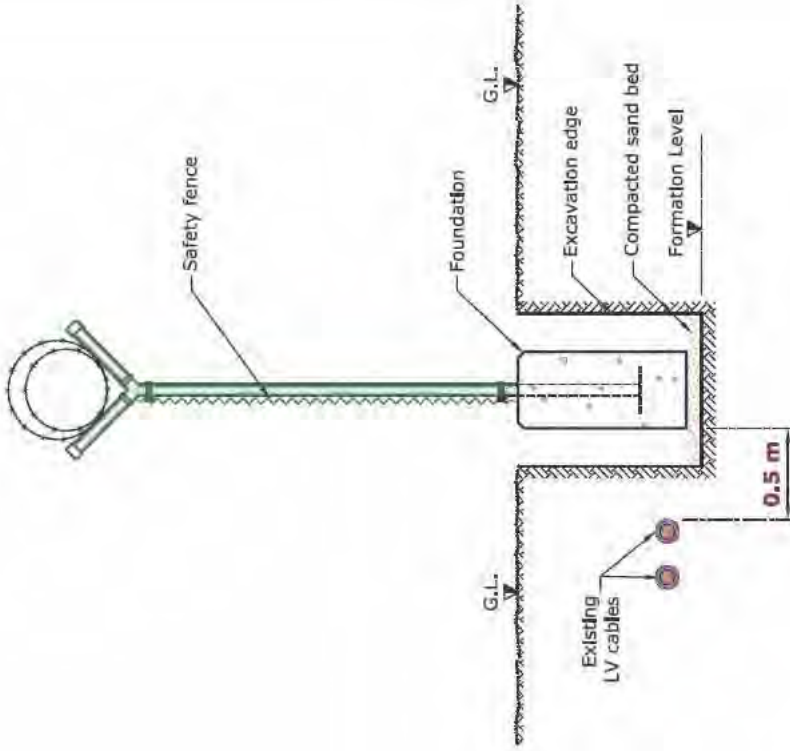
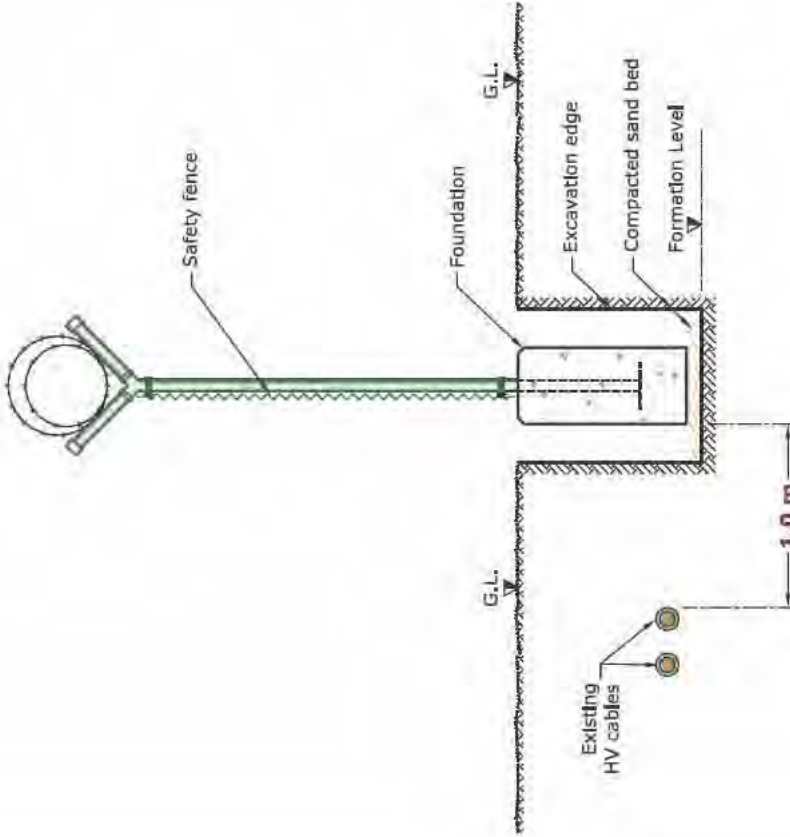
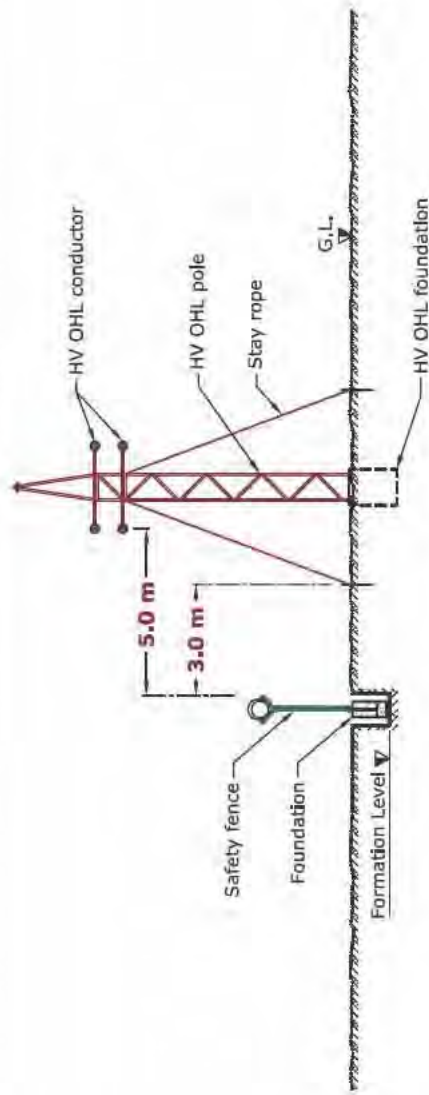
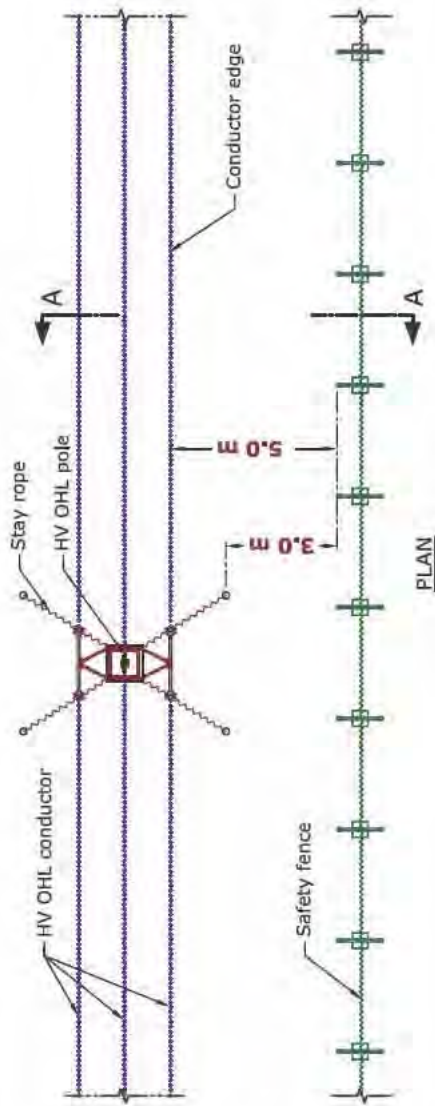
Fig: 38.1	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING LV CABLES	Fig: 38.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING HV SERVICES
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Safety Fence foundation edge to existing LV/ HV cable edge. 2. Fencing not allowed to cross within ROW. 3. Access to DEWA existing utilities should not be blocked. 4. Trench side and existing LV/ HV cable protection may be required as per site and soil condition. 	

Fig: 38.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING HV OHL (6.6/11/33 kV)



- NOTE :**
1. Horizontal clearances are from the proposed Safety Fence edge to existing HV OHL conductor.
 2. Fencing not allowed to cross within ROW.
 3. Access to DEWA existing utilities should not be blocked.
 4. Trench side and existing HV service protection may be required as per site and soil condition.

Table 3: Clearance & Protection details for proposed Fencing and existing DEWA Electricity EHV services

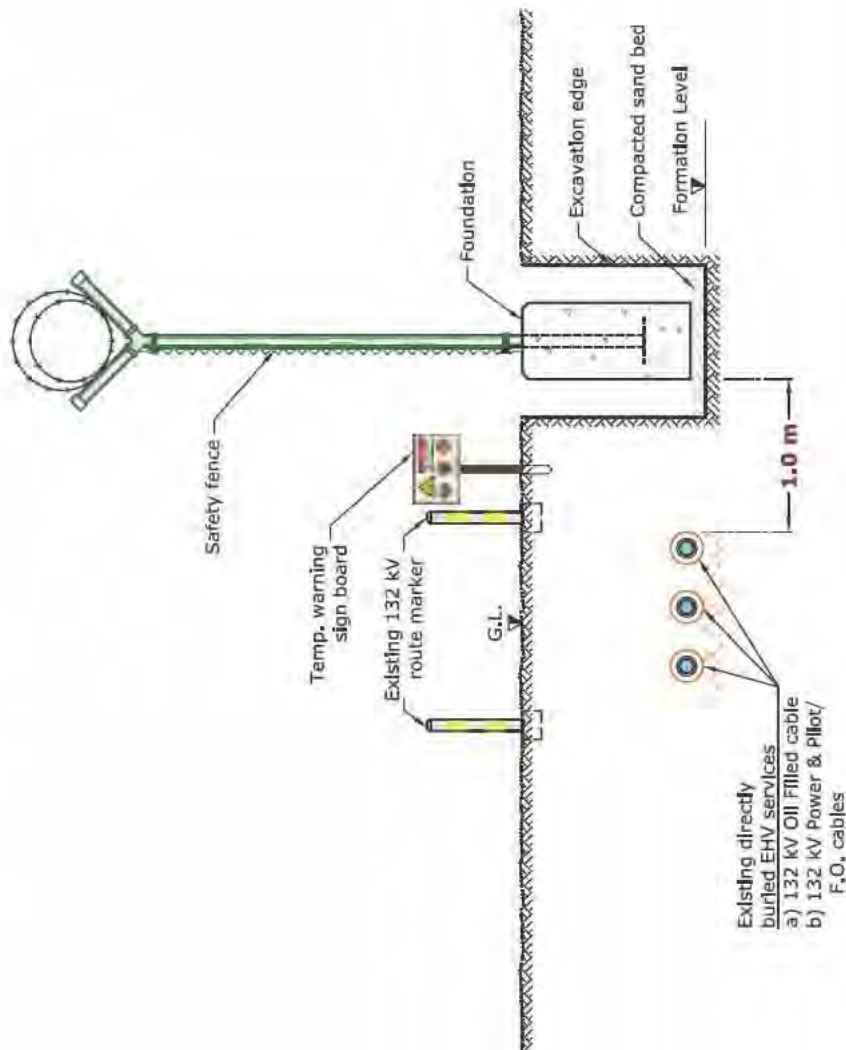
Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.4)
EHV (132 kV) Trough	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.5)
EHV (132 kV) Duct Bank	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.5)
EHV (132 kV) Joint Bay/ Transition Joint	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.9)
EHV (132 kV) O.H.L	15.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 38.7)
EHV (400 kV) O.H.L	20.0 m	NA	-		R	• Horizontal clearance (Ref Fig: 38.8)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 38.4

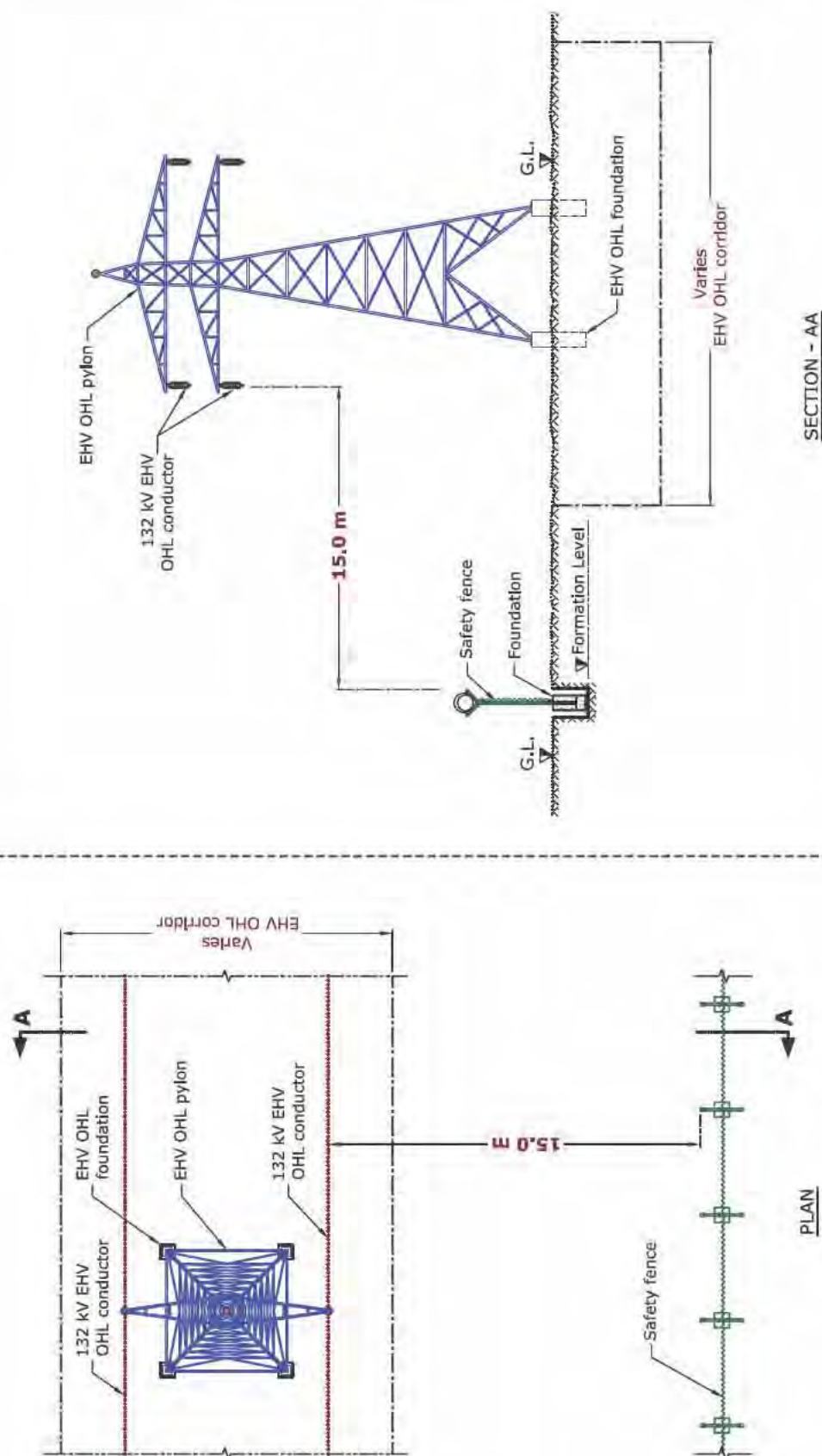
HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND
EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES

**NOTE :**

1. Horizontal clearance is from the proposed Safety Fence foundation edge to existing EHV 132 kV service edge.
2. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing EHV 132 kV service edge.
3. Fencing not allowed to cross within ROW.
4. Access to DEWA existing utilities should not be blocked.
5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

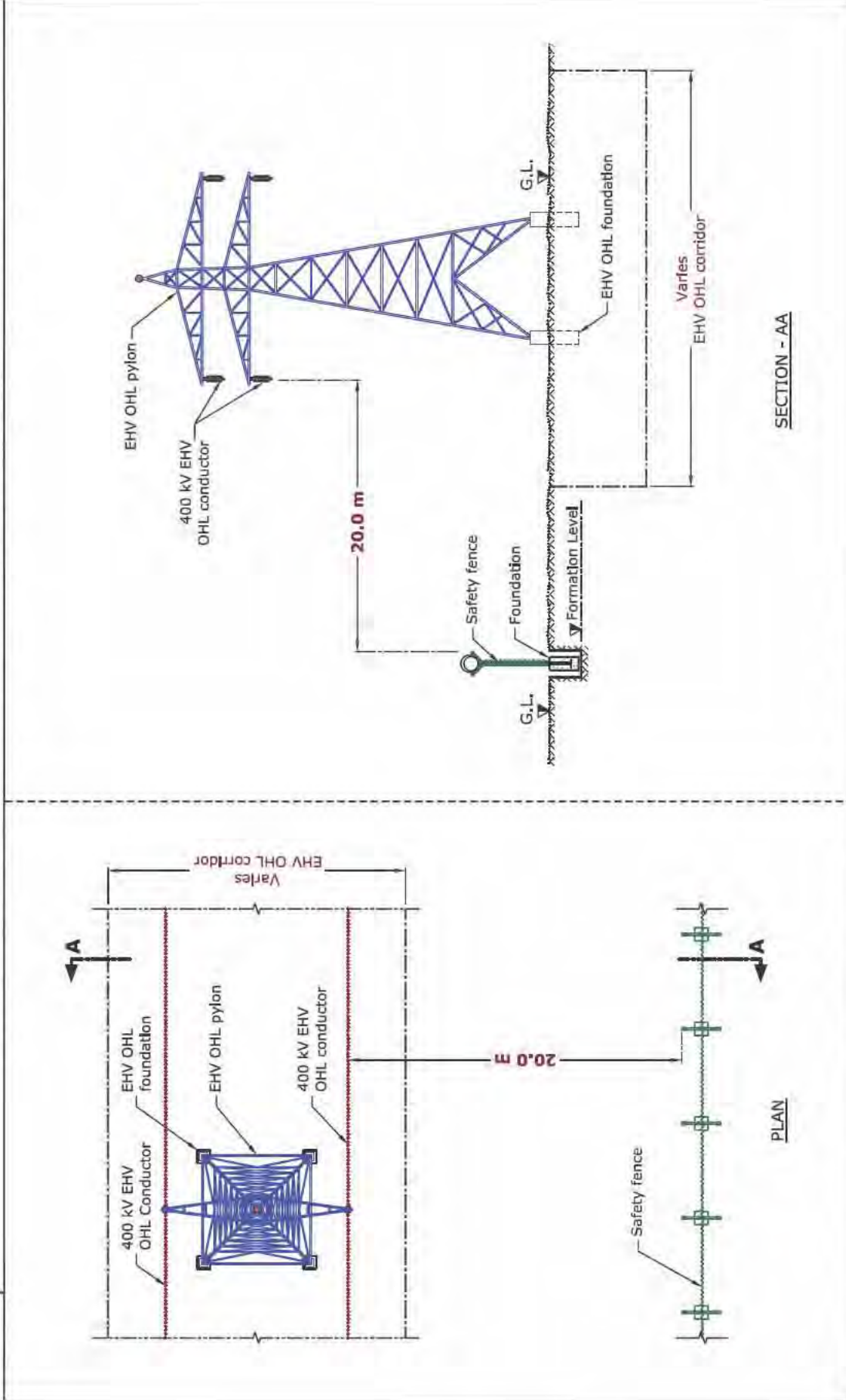
Fig: 38.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK	Fig: 38.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
<p>Safety fence</p> <p>Foundation</p> <p>Excavation edge</p> <p>Compacted sand bed</p> <p>Formation Level</p> <p>G.L.</p> <p>Temporary warning sign board</p> <p>Existing 132 kV route marker</p> <p>G.L.</p> <p>Existing EHV services</p> <p>a) 132 kV Trough</p> <p>b) 132 kV Duct bank</p> <p>1.0 m</p>		<p>Safety fence</p> <p>Foundation</p> <p>Excavation edge</p> <p>Compacted sand bed</p> <p>Formation Level</p> <p>G.L.</p> <p>Temporary warning sign board</p> <p>Existing Joint bay route marker</p> <p>G.L.</p> <p>Existing EHV services</p> <p>a) 132 kV Joint bay & Transition joint</p> <p>1.0 m</p>	
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearances are from the proposed Safety Fence foundation edge to existing EHV 132 kV service edge.2. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing EHV 132 kV service edge.3. Fencing not allowed to cross within ROW.4. Access to DEWA existing utilities should not be blocked.5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.			

Fig: 38.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING EHV OHL (132 kV)



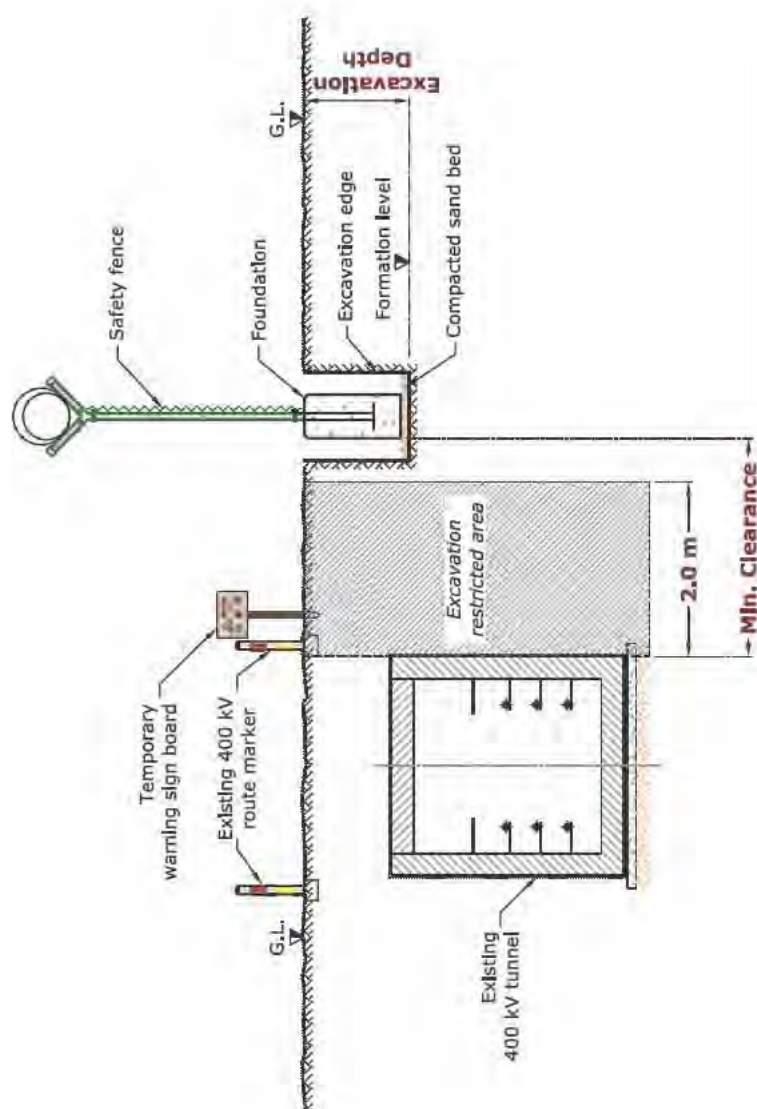
- NOTE :**
1. Horizontal clearances are from the proposed Safety Fence edge to existing EHV OHL conductor.
 2. Fencing not allowed to cross within ROW.
 3. Access to DEWA existing utilities should not be blocked.
 4. Trench side and existing EHV service protection may be required as per site and soil condition.

Fig: 38.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING EHV OHL (400 kV)



- NOTE :**
1. Horizontal clearances are from the proposed Safety Fence edge to existing EHV OHL conductor.
 2. Fencing not allowed to cross within ROW.
 3. Access to DEWA existing utilities should not be blocked.
 4. Trench side and existing EHV service protection may be required as per site and soil condition.

Fig: 38.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
2. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
3. Fencing not allowed to cross within ROW.
4. Access to DEWA existing utilities should not be blocked.
5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Safety Fence foundation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m

Table 4: Clearance & Protection details for proposed Fencing and existing DEWA Gas/Fuel services

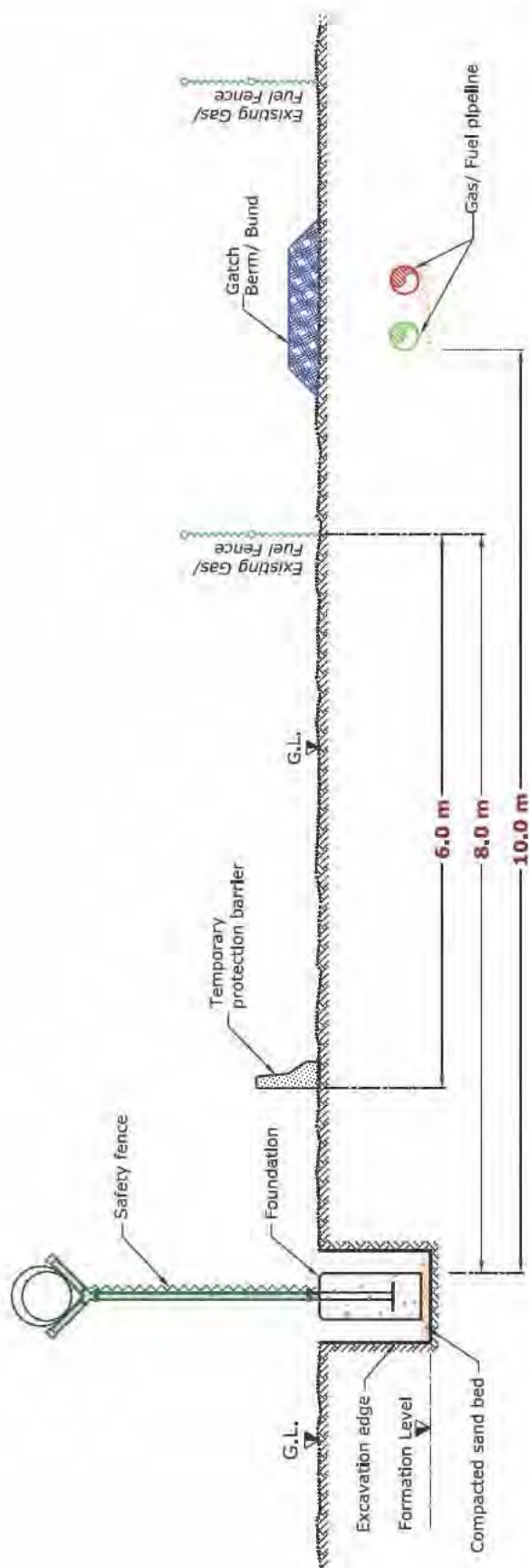
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 38.10)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 38.10)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 38.10 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SAFETY FENCE AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Safety Fence foundation edge to existing Gas/ Fuel Fence.
2. Horizontal clearance 10.0 m from proposed Safety Fence foundation edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

39. Installation of Proposed Site Office

39.1 Introduction

The purpose of establishing the site offices is to provide a facility to the site superintendence to run the site activities close to the construction site, the site office is always a temporary facility, which requires water supply, sewerage, electrical power

supply, telephone, fax and internet connections and access roads. Site offices may be static or mobile (movable), therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



39.2 Avoid the following



1. Installation of Site office in DEWA corridor or above DEWA services.

39.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Site office and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.1)

Table 2: Clearance & Protection details for proposed Site office and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.2)
HV (6.6/11/33 kV) O.H.L.	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.3)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

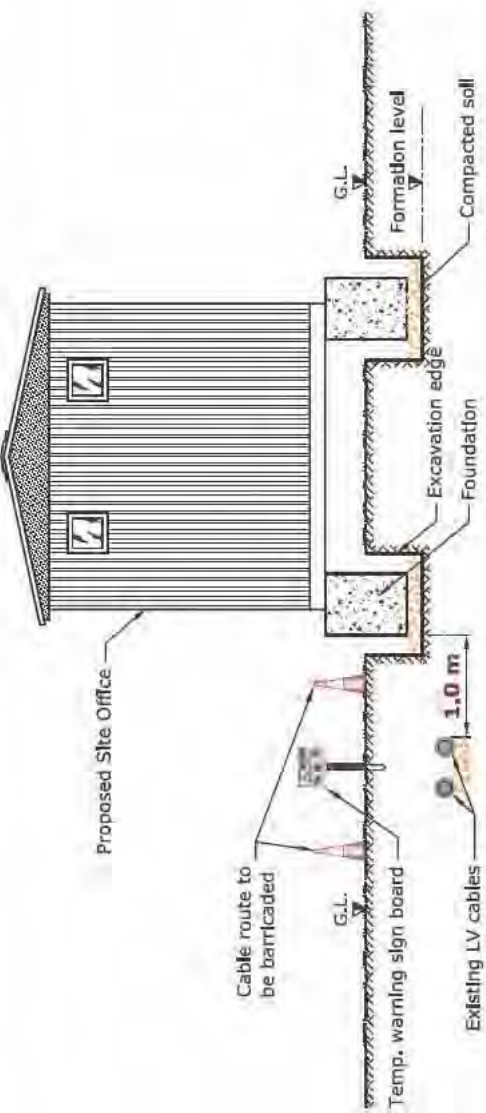
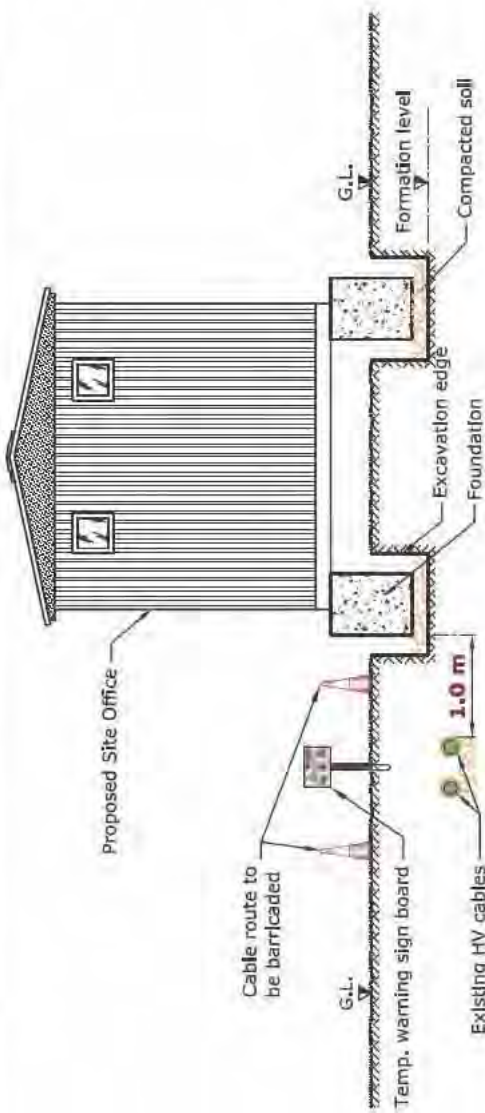
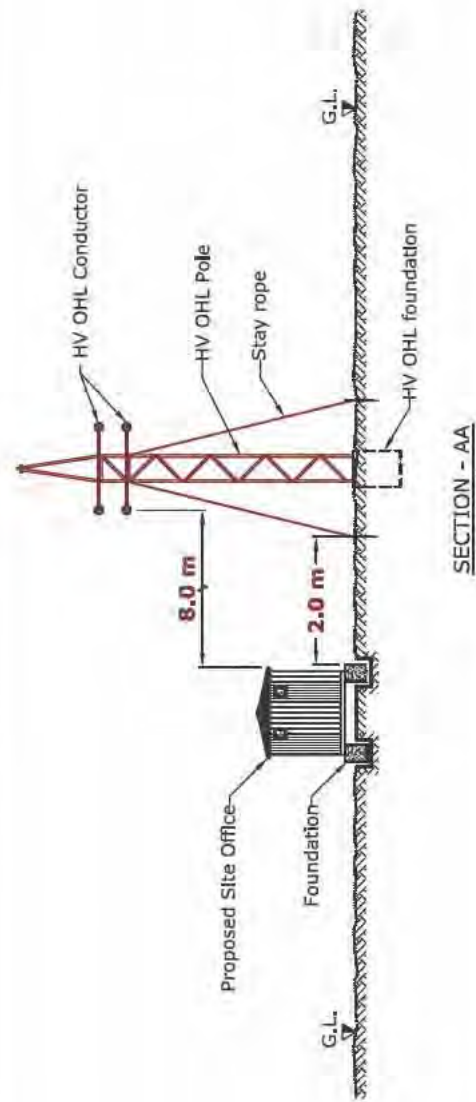
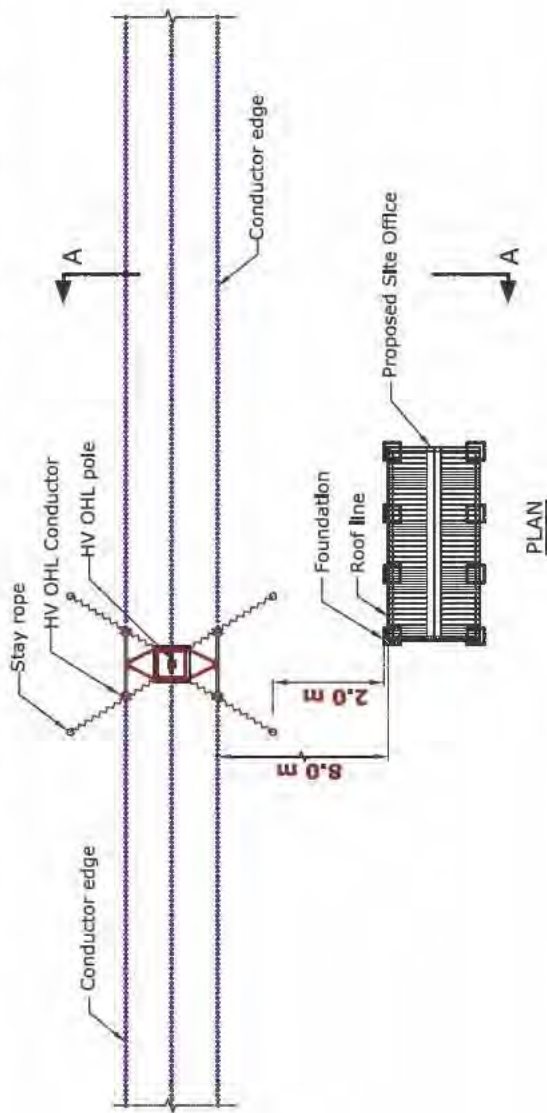
Fig: 39.1	<p style="text-align: center;">HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING LV CABLES</p>  <p>Proposed Site Office</p> <p>Cable route to be barricaded</p> <p>G.L.</p> <p>Temp. warning sign board</p> <p>Existing LV cables</p> <p>1.0 m</p> <p>Excavation edge</p> <p>Foundation</p> <p>G.L.</p> <p>Formation level</p> <p>Compacted soil</p>
Fig: 39.2	<p style="text-align: center;">HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING HV SERVICES</p>  <p>Proposed Site Office</p> <p>Cable route to be barricaded</p> <p>G.L.</p> <p>Temp. warning sign board</p> <p>Existing HV cables</p> <p>1.0 m</p> <p>Excavation edge</p> <p>Foundation</p> <p>G.L.</p> <p>Formation level</p> <p>Compacted soil</p>
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Site Office foundation edge to existing LV/ HV cable edge. 2. Existing DEWA services to be protected at Site Office access area. 3. Trench side and existing LV/HV cable protection may be required as per site and soil condition. 	

Fig: 39.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING HV OHL (6.6/ 11/ 33 kV)



- NOTE :**
1. Horizontal clearances are from the proposed Site Office/ foundation edge to existing HV OHL nearest conductor/ Stay rope.
 2. Trench side and existing HV service protection may be required as per site and soil condition.

Table 3: Clearance & Protection details for proposed Site office and existing DEWA Electricity EHV services

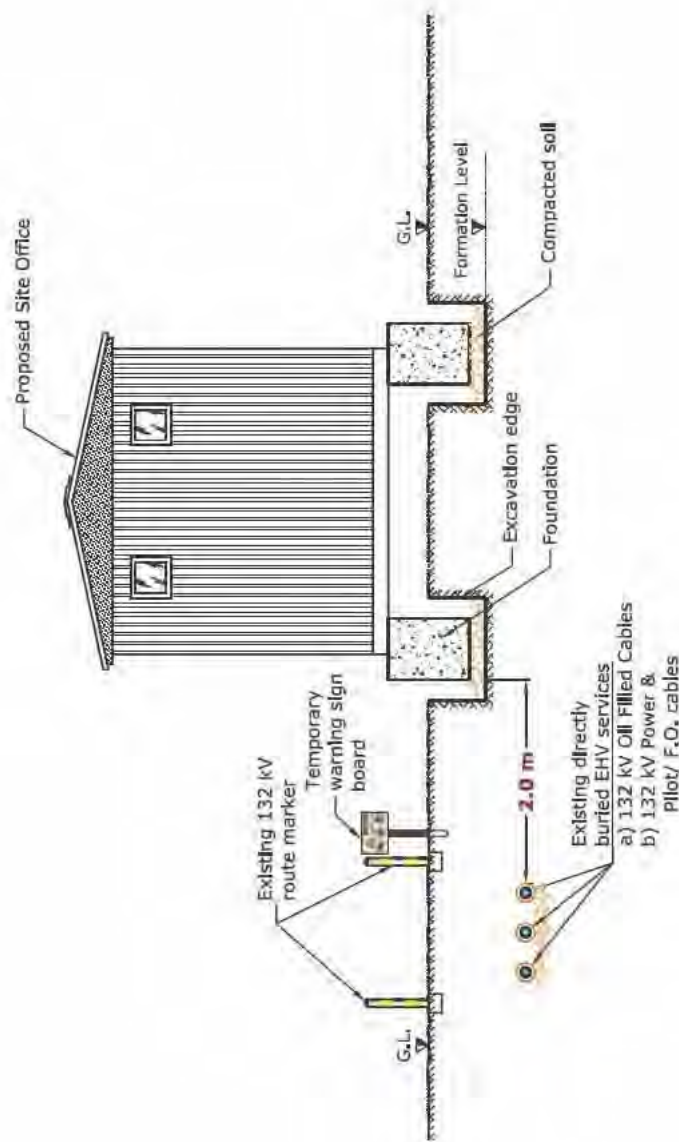
Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.9)
EHV (132 kV) O.H.L	2.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 39.7)
EHV (400 kV) O.H.L	2.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 39.8)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 39.4

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND
EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES

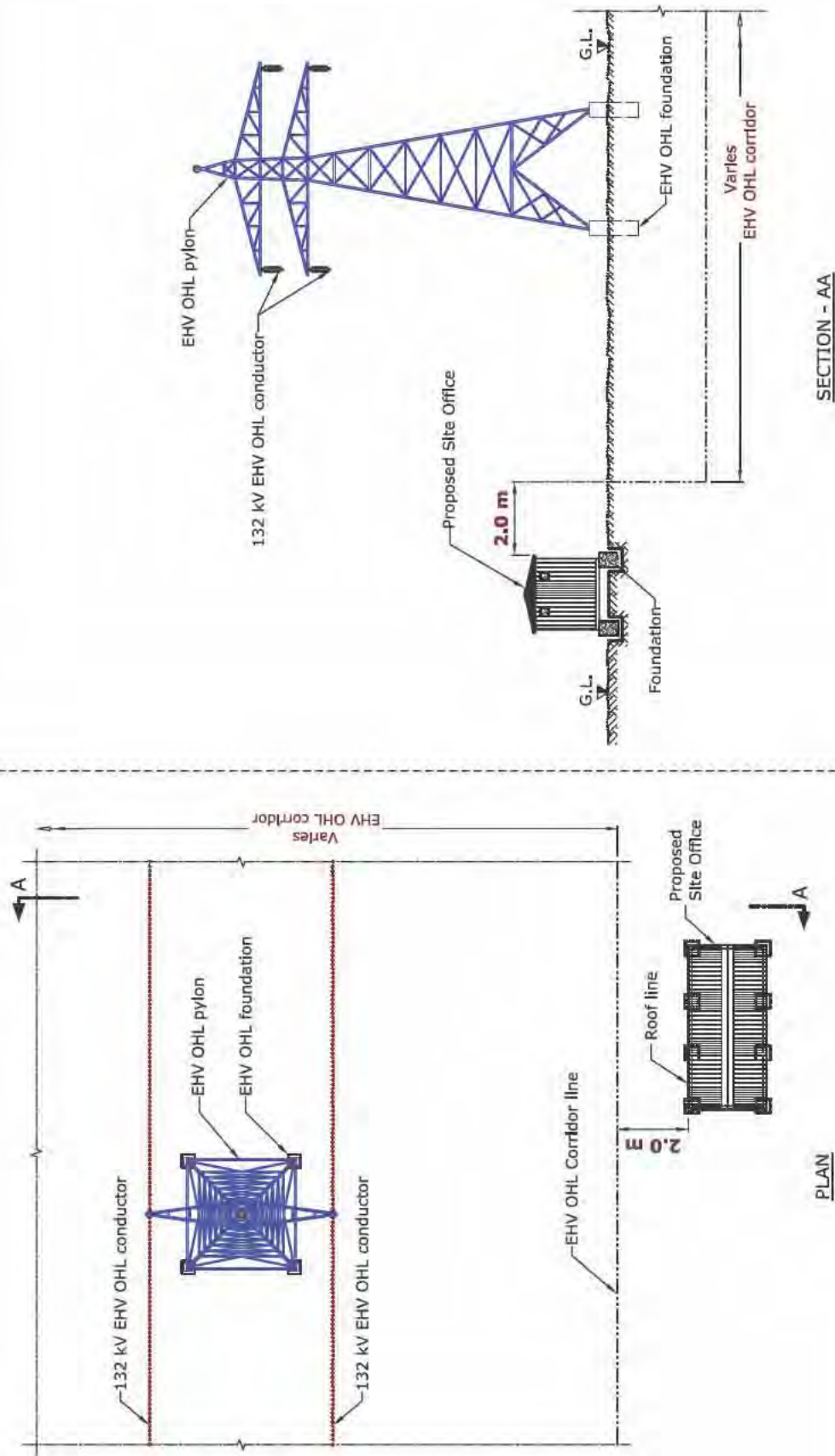


NOTE :

1. Horizontal clearance is from the proposed Site Office foundation edge to existing EHV 132 kV service edge.
2. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge.
3. Existing DEWA services to be protected at Site Office access area.
4. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

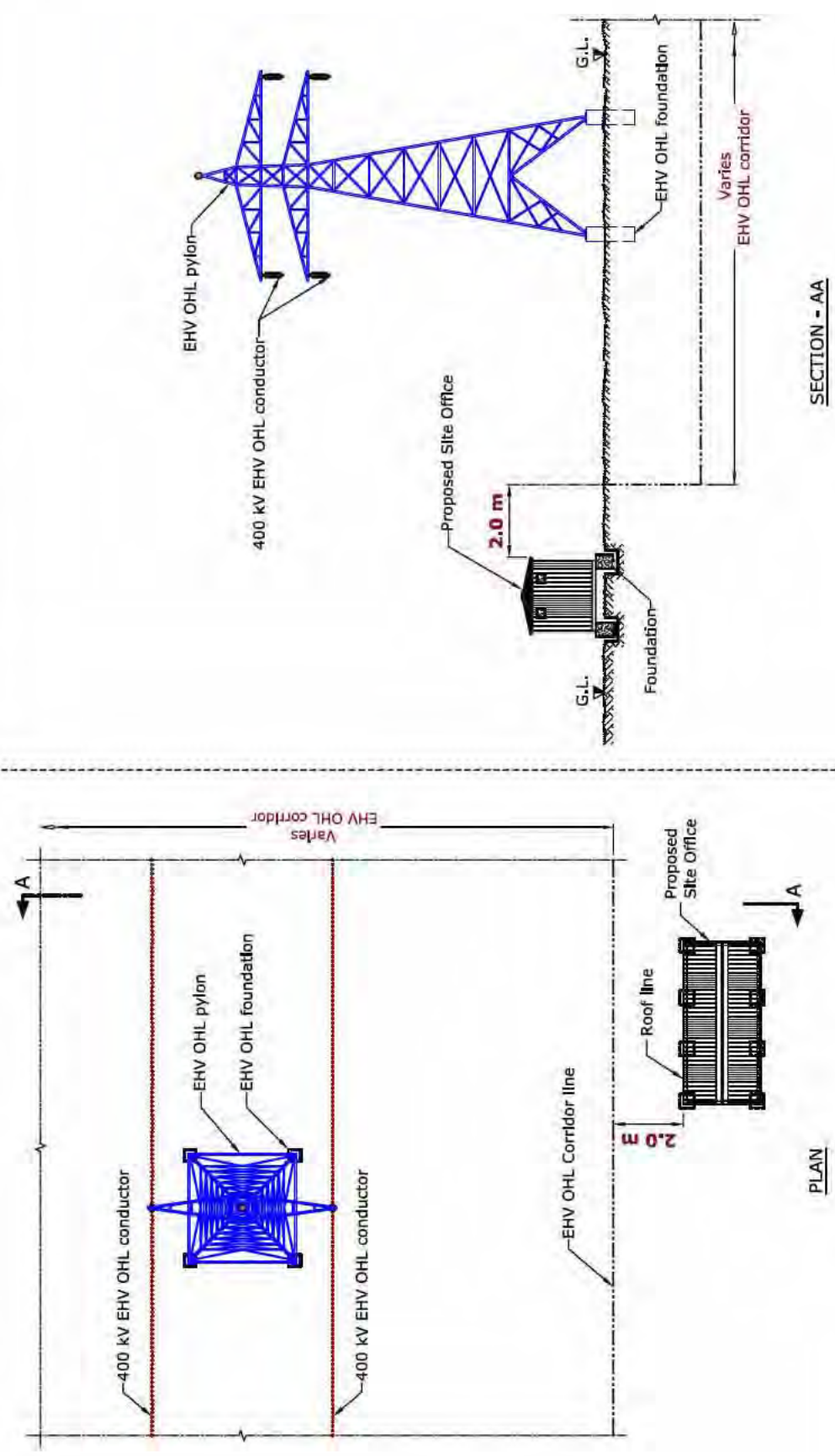
Fig: 39.5	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p> <p>Proposed Site Office</p> <p>G.L. Formation level</p> <p>Excavation edge</p> <p>Foundation</p> <p>Compacted soil</p> <p>Temp. warning sign board</p> <p>Existing 132 kV route marker</p> <p>Existing EHV services a) 132 kV Trough b) 132 kV Duct bank</p> <p>2.0 m</p>
Fig: 39.6	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p> <p>Proposed Site Office</p> <p>G.L. Formation level</p> <p>Excavation edge</p> <p>Foundation</p> <p>Compacted soil</p> <p>Temp. warning sign board</p> <p>Existing 132 kV route marker</p> <p>Existing EHV services a) 132 kV Joint Bay/ Transition joint</p> <p>2.0 m</p>
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearances are from the proposed Site Office foundation edge to existing EHV 132 kV service edge.2. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge3. Existing DEWA services to be protected at Site Office access area.4. Site Office access not allowed above existing 132 kV Joint Bay area.5. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.	

Fig: 39.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING EHV OHL (132 kV)



- NOTE :**
1. Horizontal clearances are from the proposed Site Office edge to existing EHV OHL corridor edge.
 2. Proposed Site Office is not allowed inside EHV OHL corridor.

Fig: 39.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING EHV OHL (400 kV)

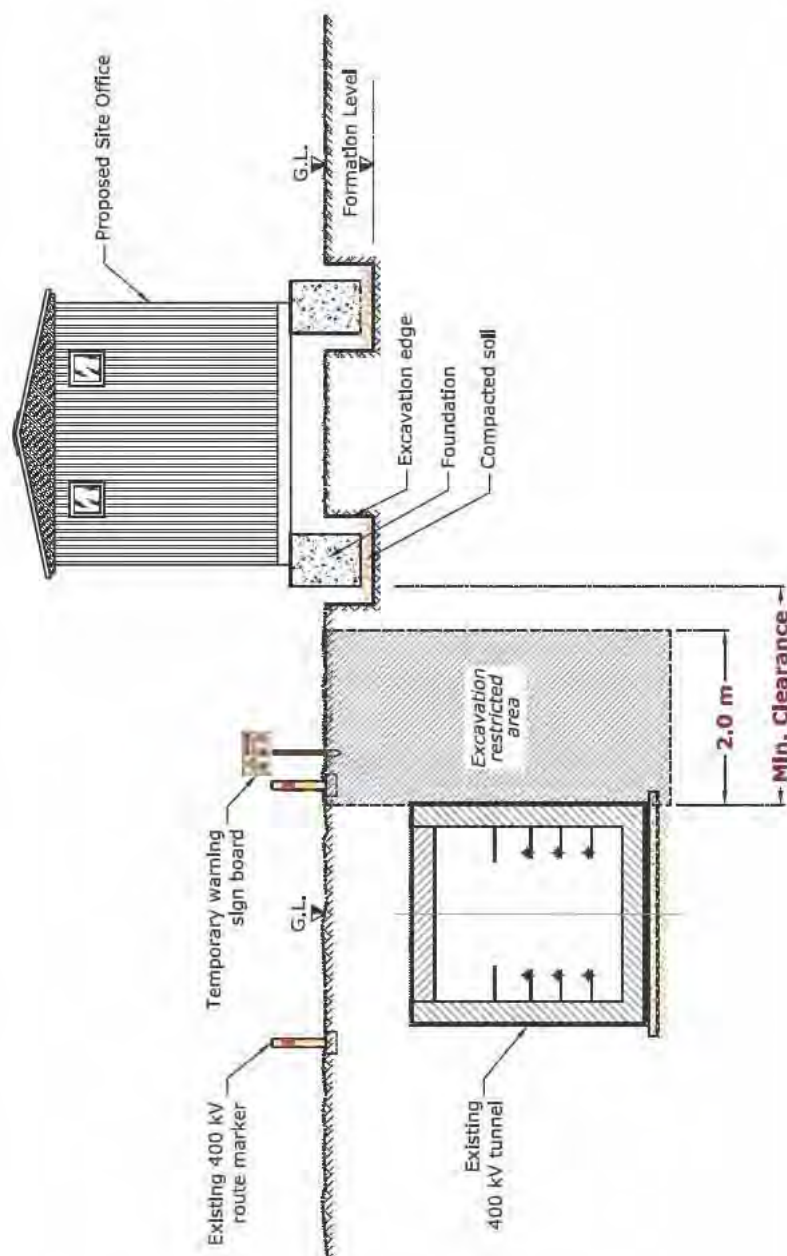


NOTE :

1. Horizontal clearances are from the proposed Site Office edge to existing EHV OHL corridor edge.
2. Proposed Site Office is not allowed inside EHV OHL corridor.

Fig: 39.9

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
2. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
3. Existing DEWA services to be protected at Site Office access area.
4. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (between existing tunnel edge to proposed foundation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m

Table 4: Clearance & Protection details for proposed Site office and existing DEWA Gas/Fuel services

Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.10)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 39.10)

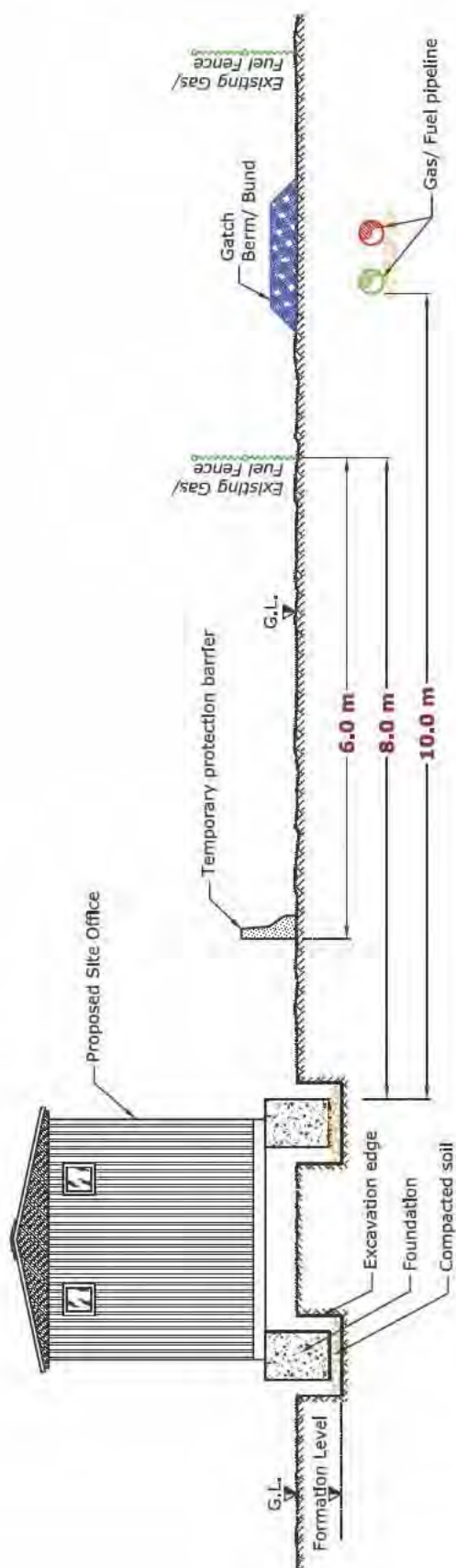
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 39.10

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SITE OFFICE AND EXISTING GAS/ FUEL SERVICES

**NOTE :**

1. Horizontal clearance 8.0 m from proposed Site Office foundation edge to existing Gas/ Fuel Fence.
2. Horizontal clearance 10.0 m from proposed Site Office foundation edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

40. Installation of Proposed Sound barrier

40.1 Introduction

Barriers are often used and designed to meet the safety requirements during/before the construction activities. Barrier allocation should meet the safety design scheme.

Sound barriers are designed to minimise noise, by building an obstruction between noise sources such as the vehicle movements, industrial and/or

commercial community operations... etc. They are made of a number of different materials such as concrete, steel, etc.

During construction of Sound barriers it may encroach DEWA existing services and/or corridors, therefore it is required to protect DEWA existing assets as per specified standard.



40.2 Avoid the following



1. Installation of Sound barrier in DEWA corridor or above DEWA services.

40.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Sound barrier and existing DEWA Electricity LV Cables

Electricity LV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.1)

Table 2: Clearance & Protection details for proposed Sound barrier and existing DEWA Electricity HV services

Electricity HV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.3)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

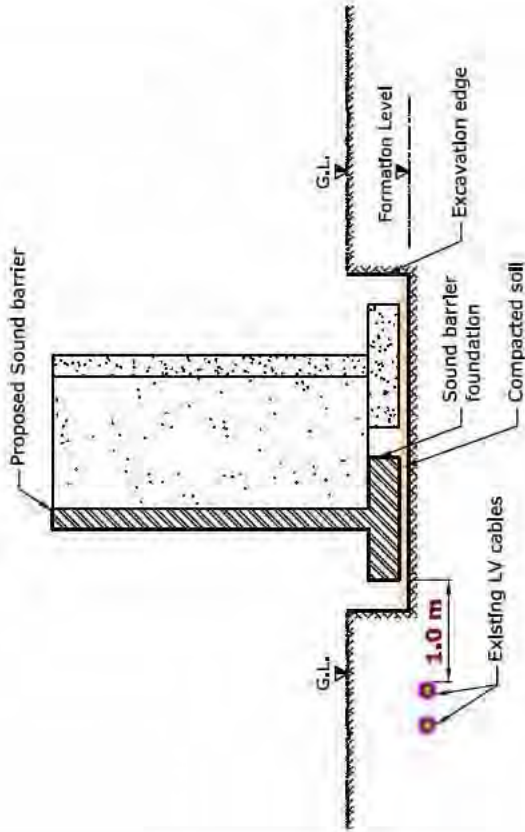
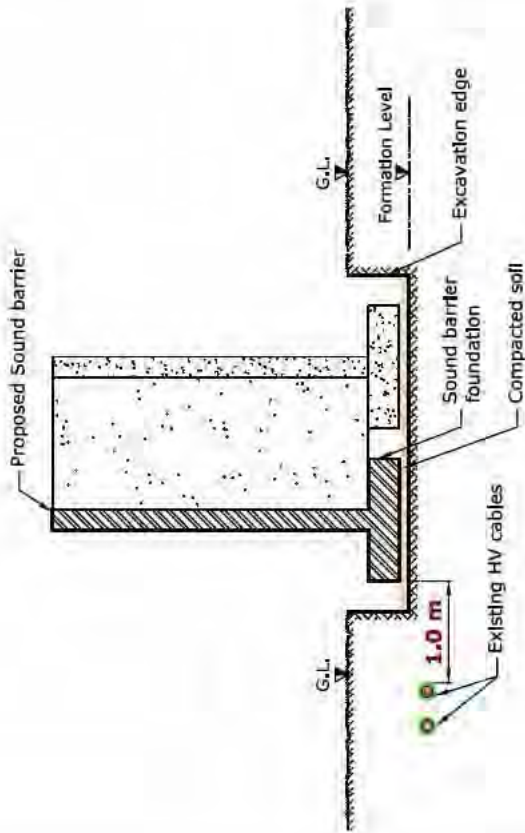
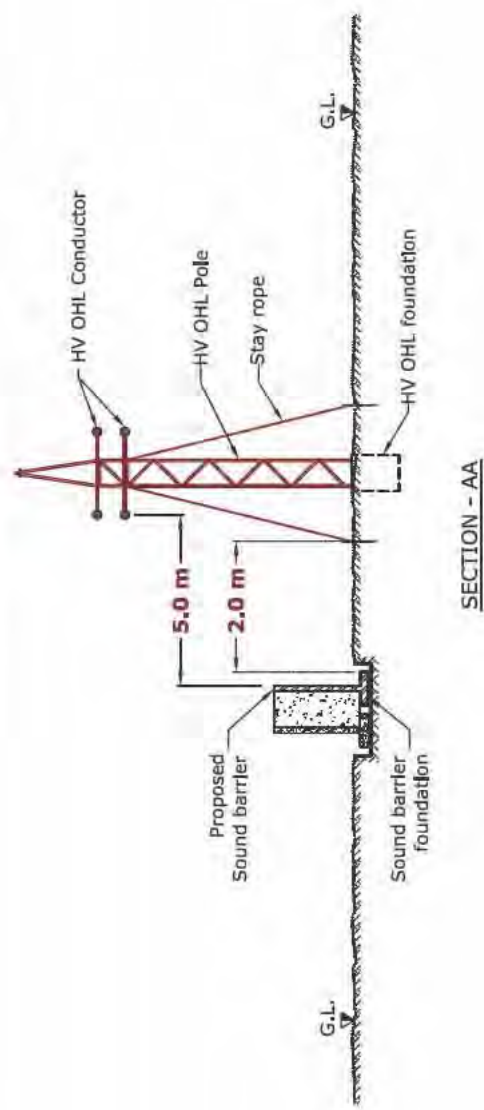
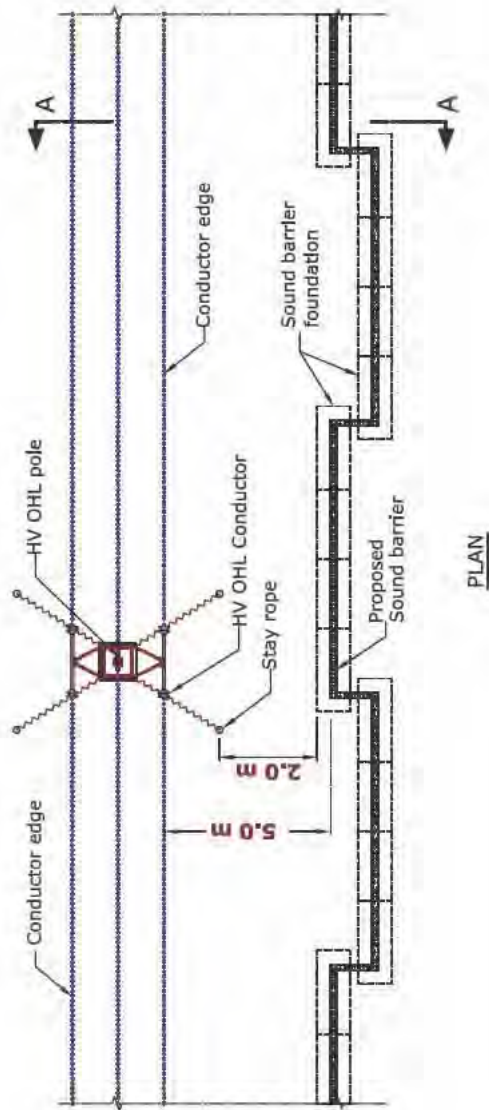
Fig: 40.1	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING LV CABLES	Fig: 40.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING HV CABLES
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Sound barrier foundation edge to existing LV/HV cable edge. 2. Trench side and existing LV/ HV cable protection may be required as per site and soil condition. 	

Fig: 40.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING HV OHL (6.6/ 11/ 33 kV)



- NOTE :**
1. Horizontal clearances are from the proposed Sound Barrier/ foundation edge to existing HV OHL conductor/ Stay rope.
 2. Trench side and existing HV service protection may be required as per site and soil condition.

Table 3: Clearance & Protection details for proposed Sound barrier and existing DEWA Electricity EHV services

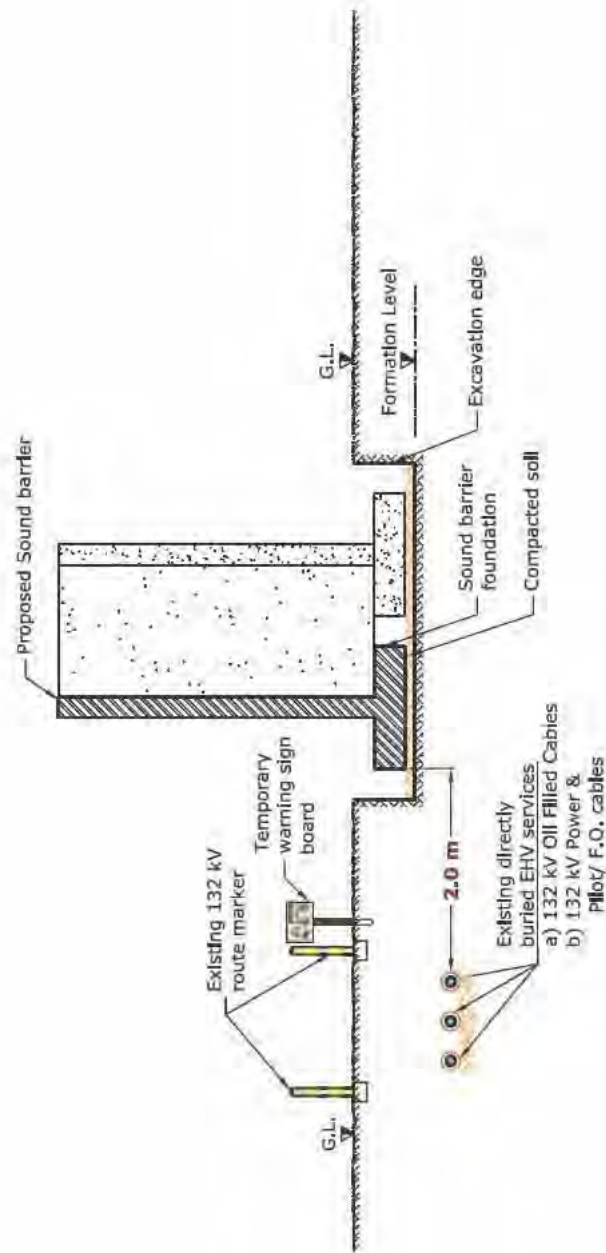
Electricity EHV Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.6)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.9)
EHV (132 kV) O.H.L	15.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.7)
EHV (400 kV) O.H.L	20.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.8)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES

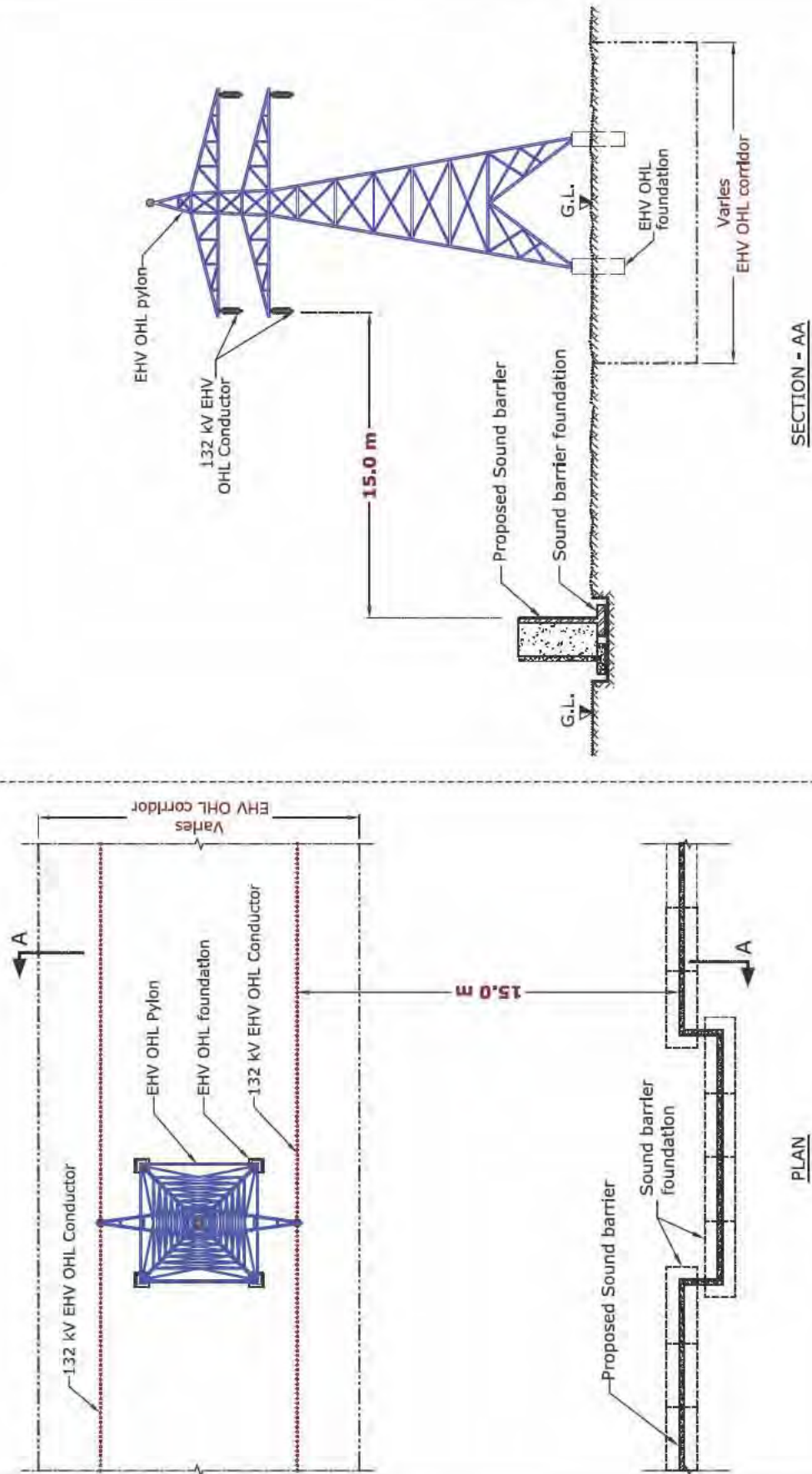
Fig: 40.4



- NOTE :**
1. Horizontal clearance is from the proposed Sound barrier foundation edge to existing EHV 132 kV service edge.
 2. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge.
 3. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

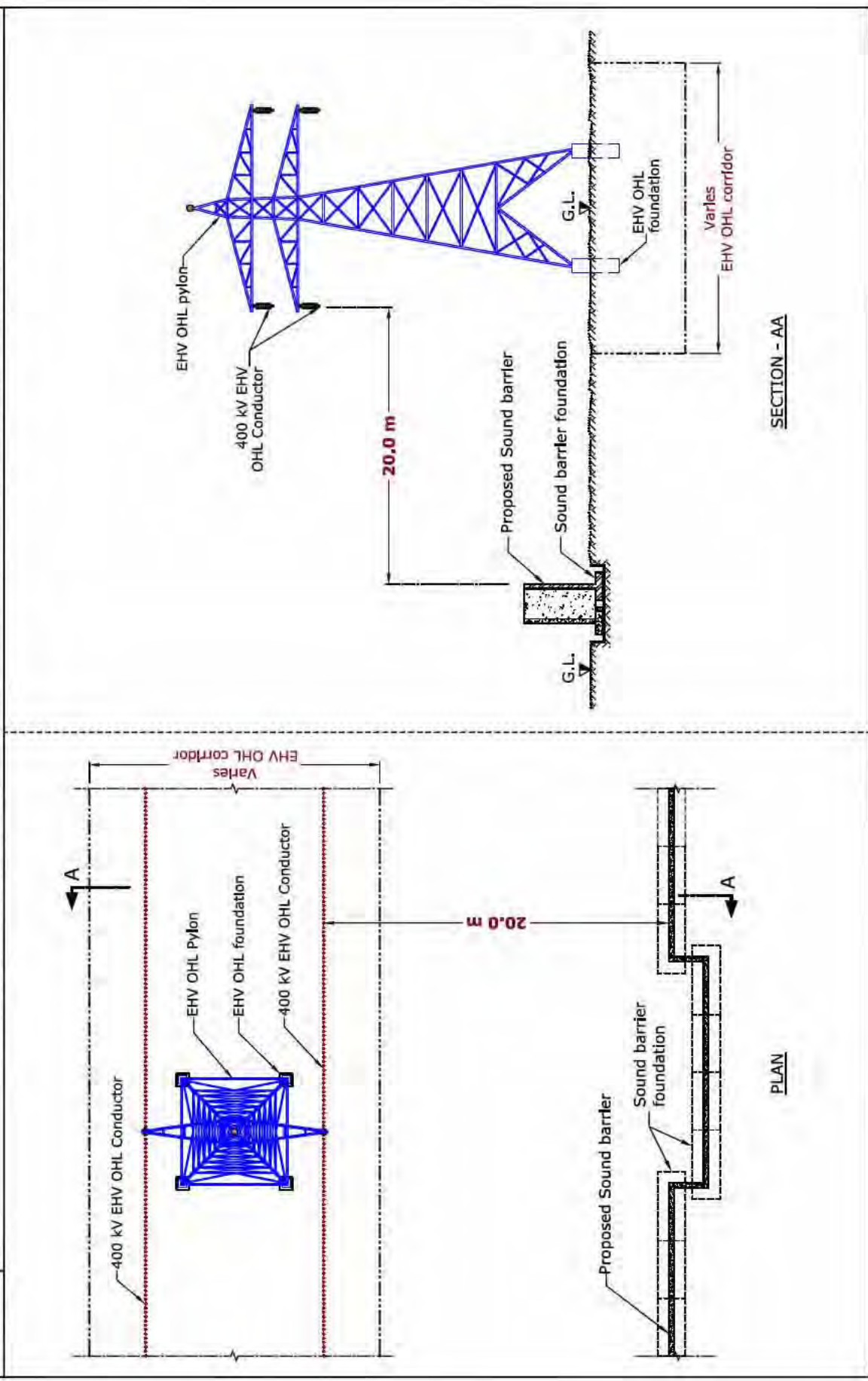
Fig: 40.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING EHV 132 kV TROUGH/ DUCT BANK	<p>Diagram Fig: 40.5 illustrates the horizontal clearance details between a proposed sound barrier and existing EHV 132 kV trough/duct bank. The diagram shows a cross-section of the ground with a proposed sound barrier on the left. A temporary warning sign board is placed on the sound barrier foundation. To the right of the foundation, there is an excavation edge and compacted soil. The existing EHV services (a) 132 kV Trough and (b) 132 kV Duct bank are shown further to the right. A dimension of 2.0 m is indicated between the sound barrier foundation and the existing services. The ground level (G.L.) and formation level are also marked.</p>
Fig: 40.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT	<p>Diagram Fig: 40.6 illustrates the horizontal clearance details between a proposed sound barrier and existing EHV 132 kV joint bay/transition joint. The diagram shows a cross-section of the ground with a proposed sound barrier on the left. A temporary warning sign board is placed on the sound barrier foundation. To the right of the foundation, there is an excavation edge and compacted soil. The existing EHV services (a) 132 kV Joint bay & Transition joint are shown further to the right. A dimension of 2.0 m is indicated between the sound barrier foundation and the existing services. The ground level (G.L.) and formation level are also marked.</p>
		<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearances are from the proposed Sound Barrier foundation edge to existing EHV 132 kV service edge.2. Minimum 0.5 m horizontal clearance to be maintained from the proposed excavation edge to the existing EHV 132 kV service edge.3. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.

Fig: 40.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING EHV OHL (132 kV)



- NOTE :**
1. Horizontal clearances are from the proposed Sound Barrier edge to existing EHV OHL conductor.
 2. Proposed Sound Barrier should be outside the OHL corridor.

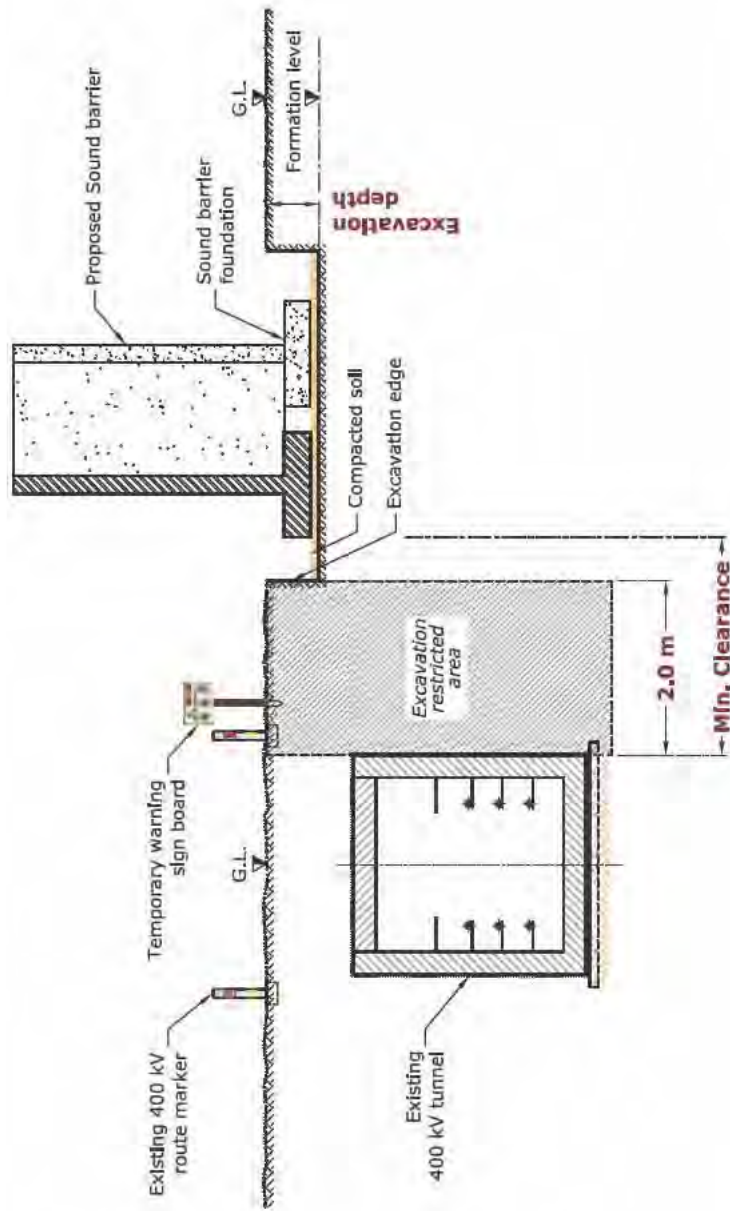
Fig: 40.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING EHV OHL (400 kV)



NOTE :

1. Horizontal clearances are from the proposed Sound Barrier edge to existing EHV OHL conductor.
2. Proposed Sound Barrier should be outside the OHL corridor.

Fig: 40.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING 400 KV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
2. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
3. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (between existing tunnel edge to proposed foundation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m

Table 4: Clearance & Protection details for proposed Sound barrier and existing DEWA Gas/Fuel services

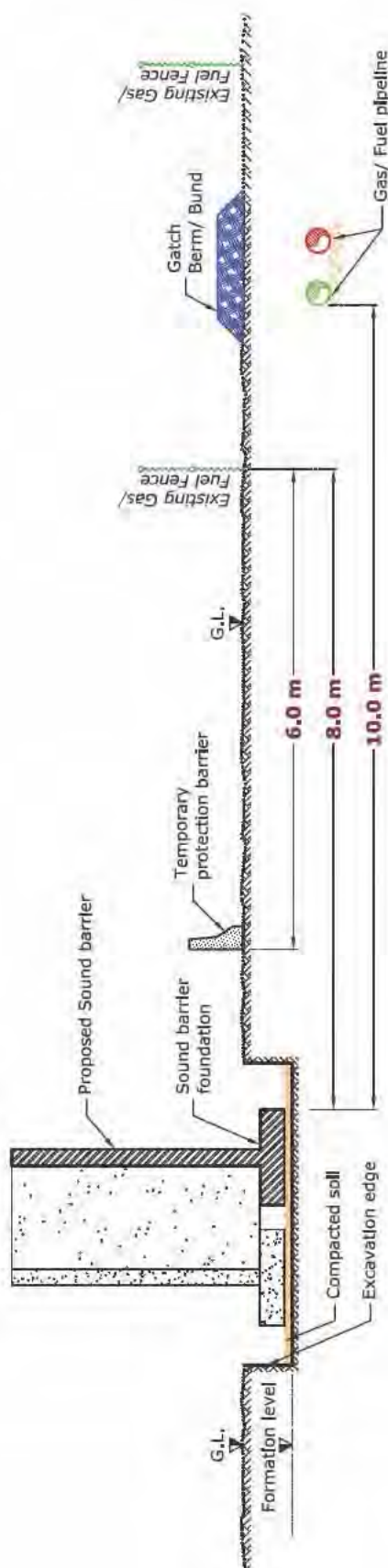
Gas/Fuel Existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.10)
Gas/Fuel pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 40.10)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 40.10 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOUND BARRIER AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Sound barrier foundation edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Sound barrier foundation edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.



CHAPTER 4

GENERAL PROJECTS

41. Proposed Dewatering

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41.1 Introduction

It is a process to lower ground water table or to drain out accumulated surface water in order to maintain the working area in a dry condition allowing contractors to carry out excavation and other activities.

In most cases this process involves drilling of Dewatering wells, pumps, sedimentation tank and

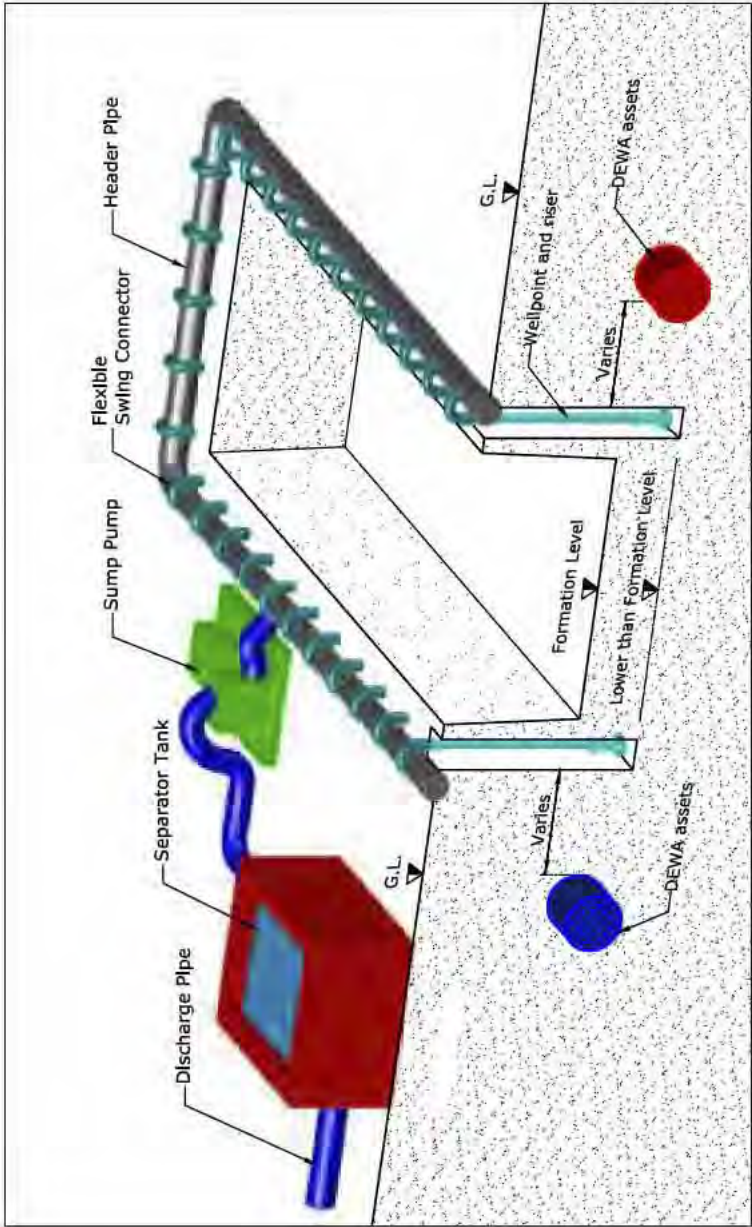
temporary Pipelines, therefore the contractor should carry out the dewatering system away from DEWA assets as per specified standards.

The contractor, during dewatering process, should take all precautions to ensure that DEWA assets will not be affected due to any settlement.



Proposed Dewatering

TYPICAL ARRANGEMENTS OF DEWATERING/ WELL POINT SYSTEM



41.2 Avoid the following



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Proposal of Dewatering systems above DEWA network. 2. Proposal of Dewatering under HV OHL (6.6/11/33 kV). 3. Proposal of Dewatering systems in DEWA corridor (Exceptional for DEWA Projects) 4. Proposal of Temporary lagoons less than 10.0 m from DEWA network/ Corridor. | <ol style="list-style-type: none"> 5. Proposal of Temporary lagoons less than 40 m from HV/EHV OHL foundation. 6. Proposal of Drain pipes using DEWA ducts while road crossing. 7. Proposal of Well point in Gas/Fuel Corridor. (Exceptional for gas/fuel Projects) |
|---|--|

41.3 Standard Clearance & Protection details

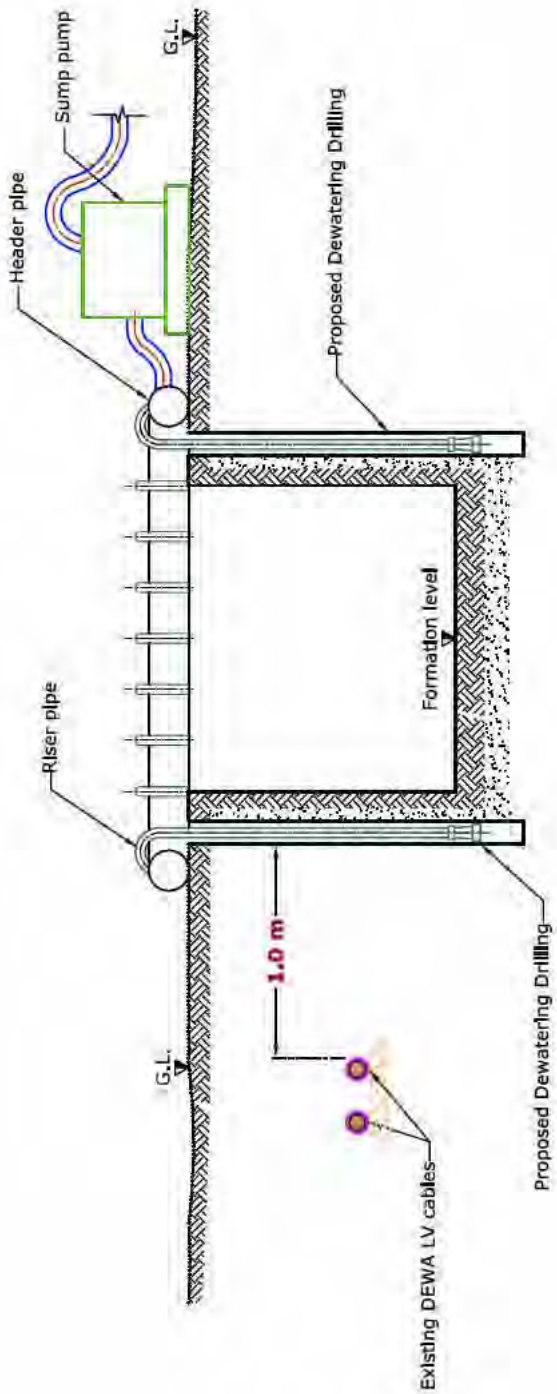
Table 1: Clearance & Protection details for proposed Dewatering and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	Horizontal clearance (Ref Fig: 41.1)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 41.1.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DEWATERING DRILLING AND EXISTING LV CABLES



- NOTE :**
1. Horizontal clearance from the proposed Dewatering Drilling edge to existing LV cables edge.
 2. Existing LV cables protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed Dewatering and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/ Pilot Cable and Joints	1.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 41.2, Case 1) Protection details (Ref Fig: 41.2, Case 1)
HV (6.6/11/33 kV) Manhole	1.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 41.2, Case 2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 41.3)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 41.4)
HV (33 kV) O.H.L.		3.5 m		-		<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 41.4) Protection details (Ref Fig: 41.4)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



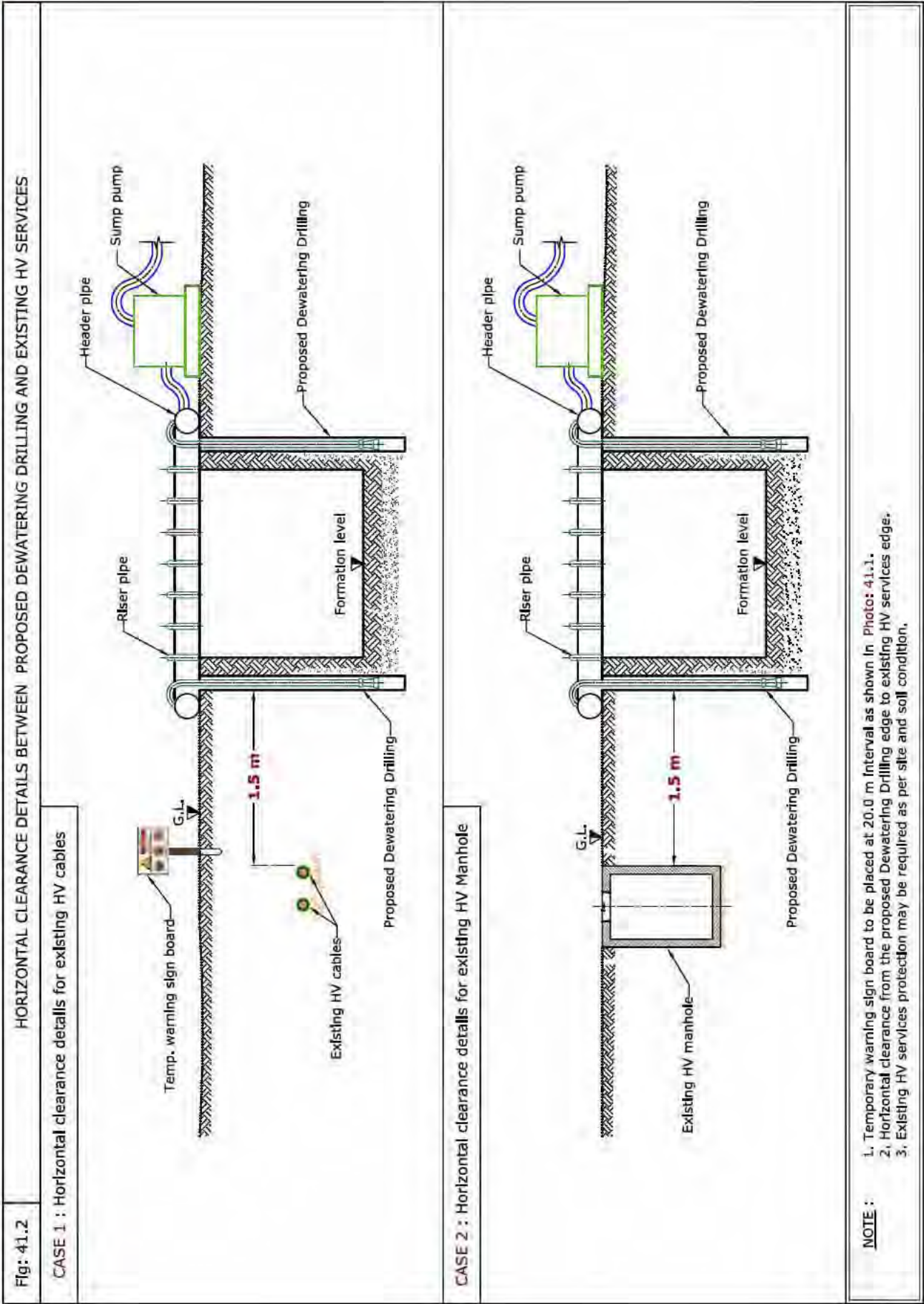
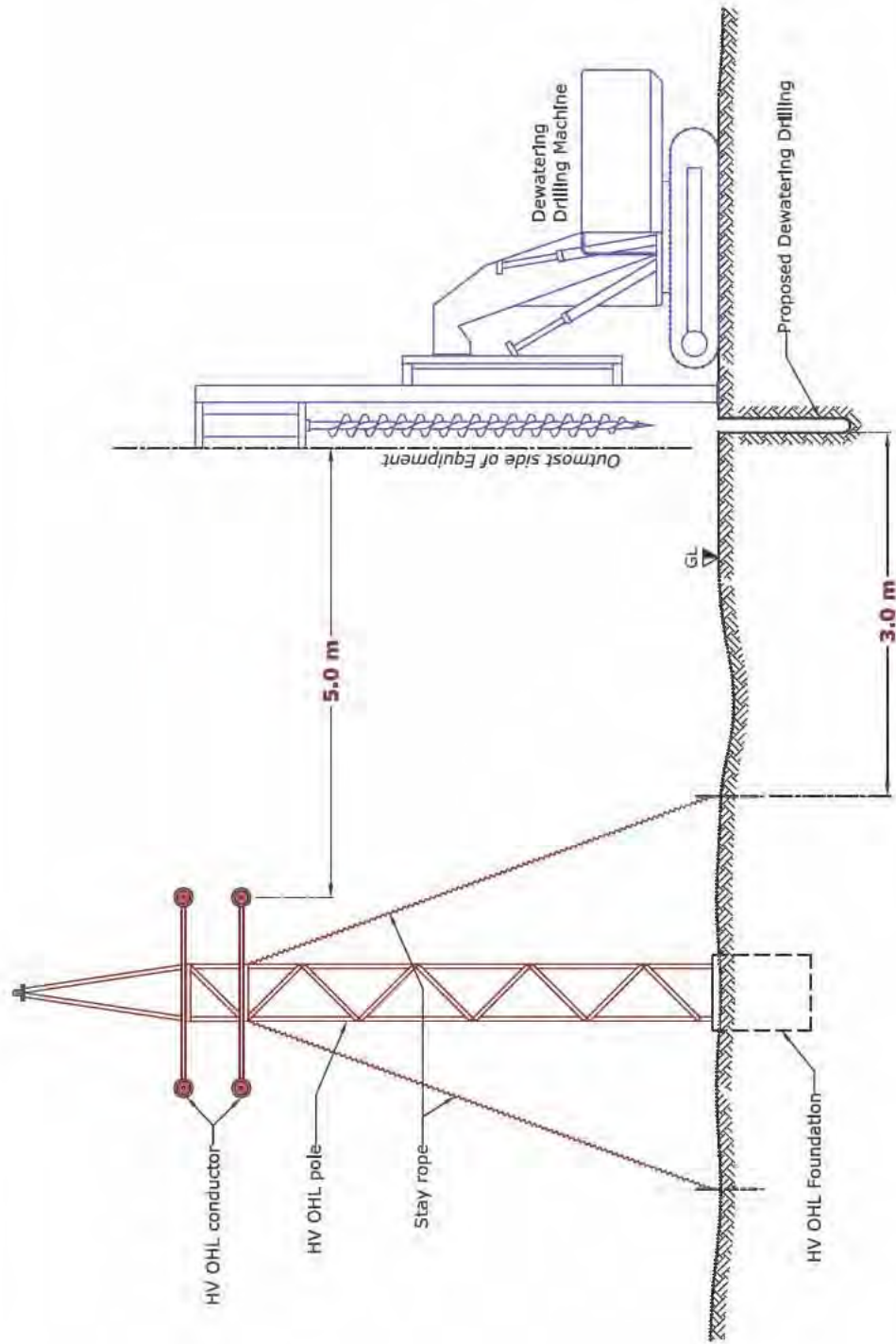


Fig: 41.3

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DEWATERING DRILLING MACHINERIES AND EXISTING HV OHL (6.6/11/33 kV)



NOTE :

1. Horizontal clearance from the proposed Dewatering Drilling edge to existing HV OHL conductor edge.
2. Machineries should be placed opposite side to HV OHL as shown in the Photo: 41.2.

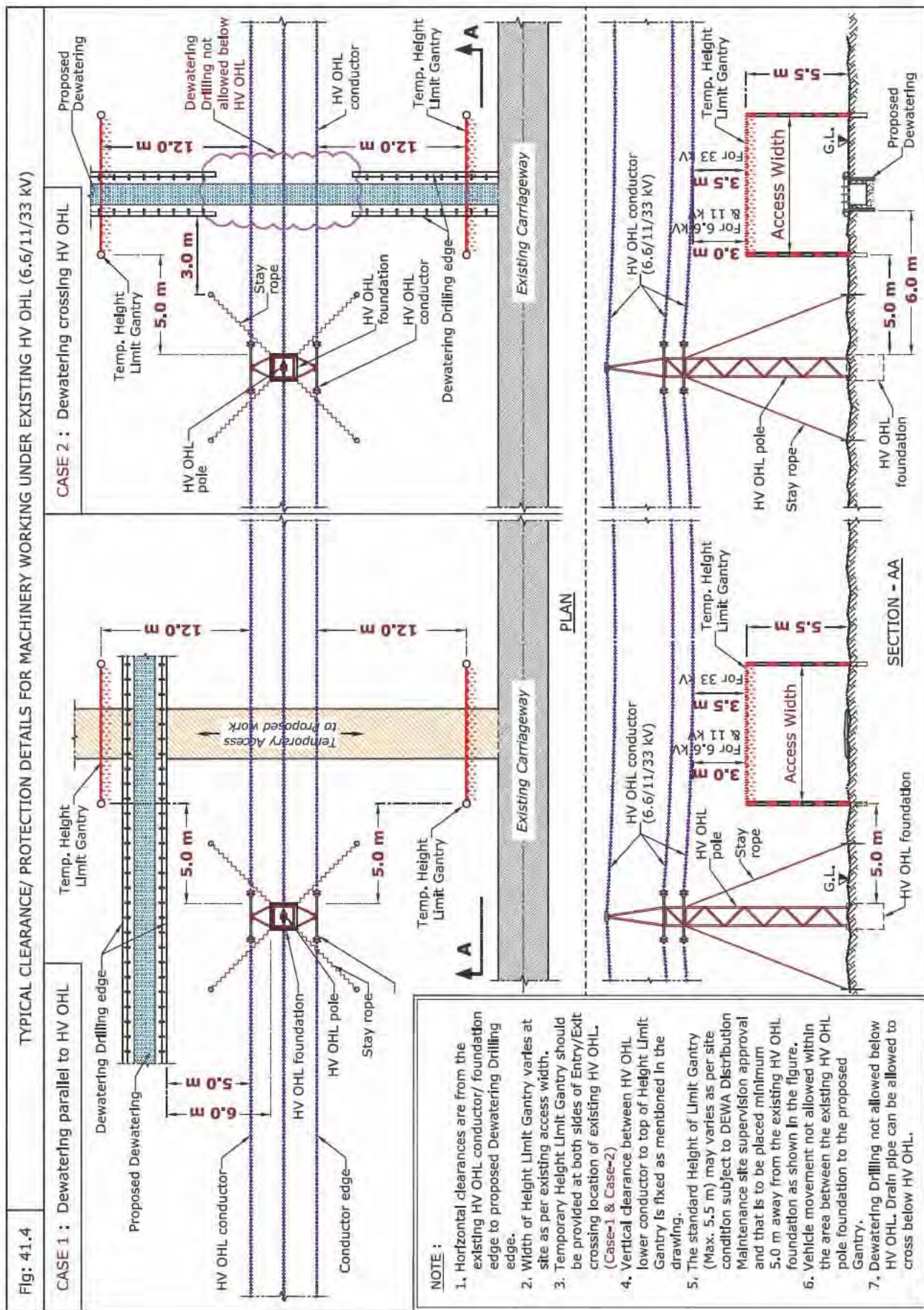


Photo: 41.1

TEMPORARY WARNING SIGN BOARDS INDICATING DEWATERING LOCATION CLOSE TO EXISTING HV CABLES



GENERAL ARRANGEMENTS OF DEWATERING MACHINERIES CLOSE TO EXISTING HV OHL (6.6/11/33 kV)

Photo: 41.2



Table 3: Clearance & Protection details for proposed Dewatering and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 41.7)Protection details (Ref Fig: 41.5)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 41.7)
EHV (132 kV) Trough	1.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 41.9)
EHV (132 kV) Duct Bank	1.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 41.10)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 41.8)
EHV (400 kV) Tunnel	To be studied on case by case basis					<ul style="list-style-type: none">Refer note below
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 41.11)Protection details (Ref Fig: 41.6 & 41.11)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none">Horizontal clearance (Ref Fig: 41.11)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none">Vertical clearance (Ref Fig: 41.11)Protection details (Ref Fig: 41.11)
Note: 1. Dewatering drilling will be studied case by case basis 2. Discharge pipe/ hose allowed to cross above the 400 kV tunnel						

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 41.5</p>	<p>DISCHARGE PIPE CROSSING (ABOVE GROUND) 132kV OIL FILLED CABLES</p>	<p>Fig: 41.6</p>	<p>HUMP DETAILS FOR DRAIN/ DISCHARGE PIPE CROSSING ABOVE EHV OHL ACCESS ROAD</p>
<p>NOTE :</p> <ol style="list-style-type: none"> 1, Drain pipe allowed to cross within sleeve at crossing location of 132 kV Oil Filled cables. 2, Hump to be provided if drain pipe crossing above OHL access road. 			

Fig: 41.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DEWATERING AND EXISTING 132 kV POWER/ PILOT/ F.O/ O.F SERVICES

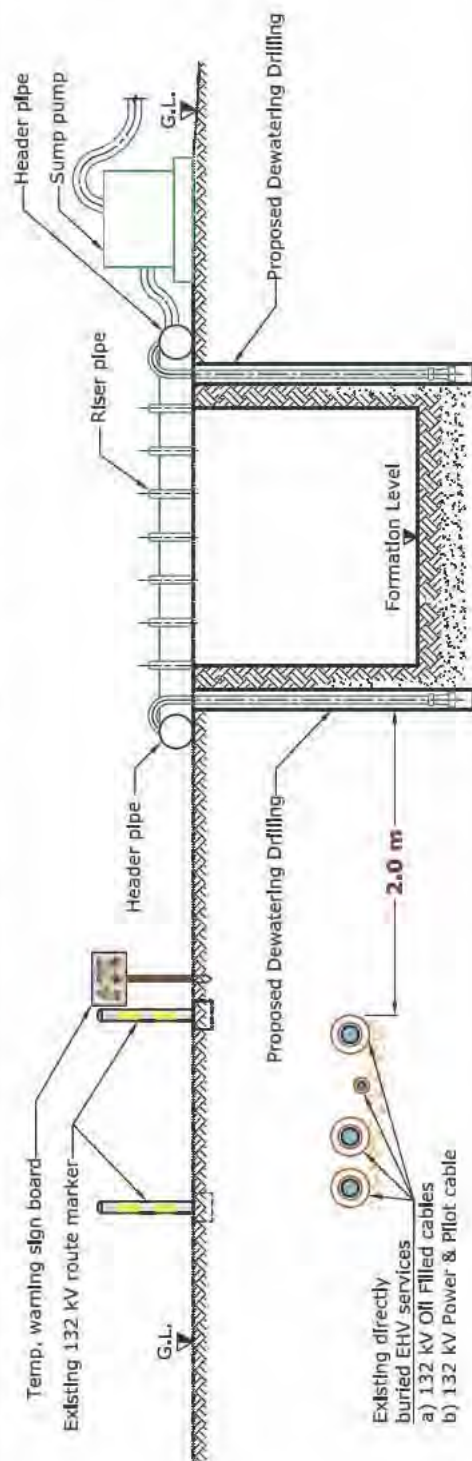
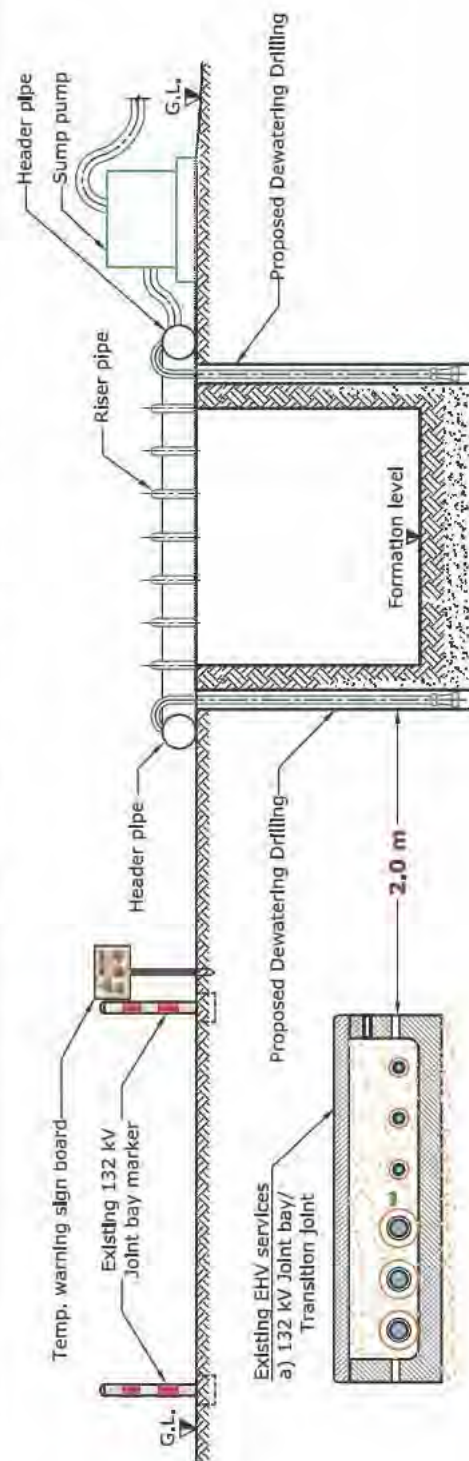


Fig: 41.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DEWATERING AND EXISTING 132 kV JOINT BAY/ TRANSITION JOINT



NOTE :
1. Horizontal clearance from the proposed Dewatering Drilling edge to existing EHV services edge.
2. Trench side and existing EHV services protection may be required as per site and soil condition.

Fig: 41.9

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DEWATERING AND EXISTING 132 kV TROUGH

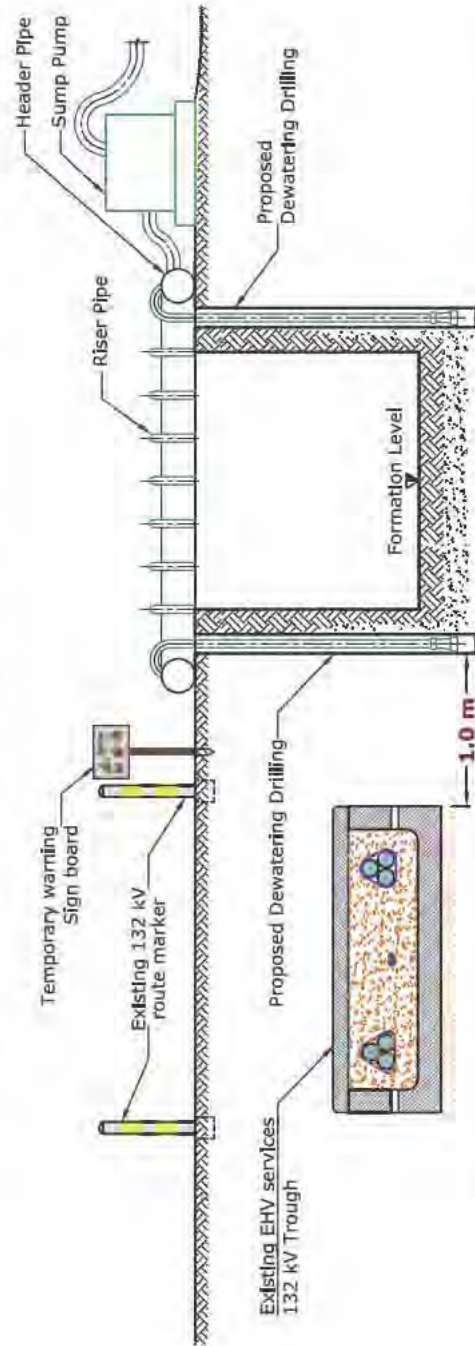
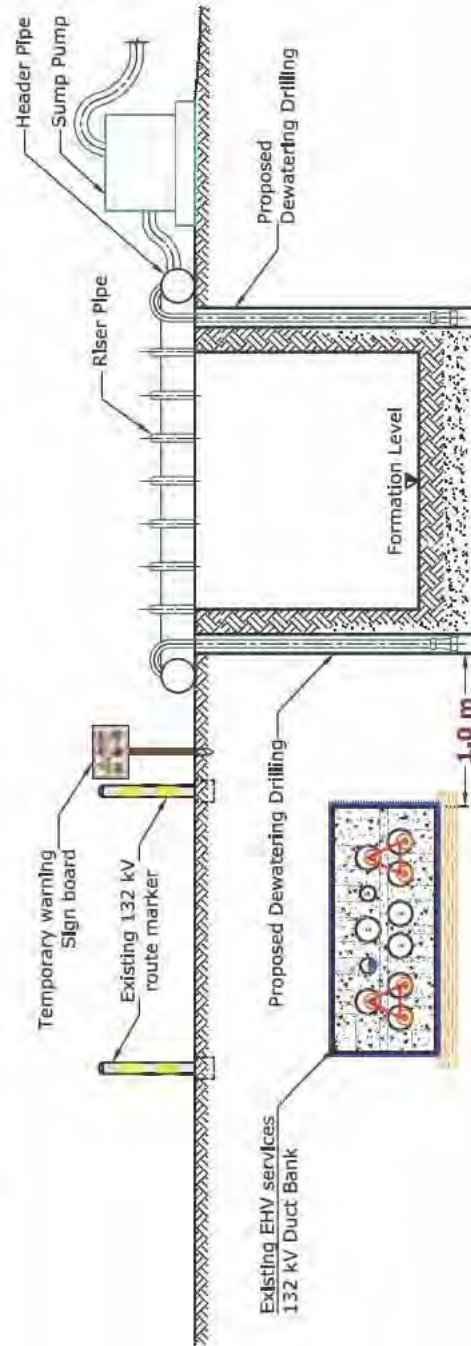


Fig: 41.10

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DEWATERING AND EXISTING 132 kV DUCT BANK



- NOTE :**
1. Horizontal clearance from the proposed Dewatering Drilling edge to existing EHV services edge.
 2. Trench side and existing EHV services protection may be required as per site and soil condition .

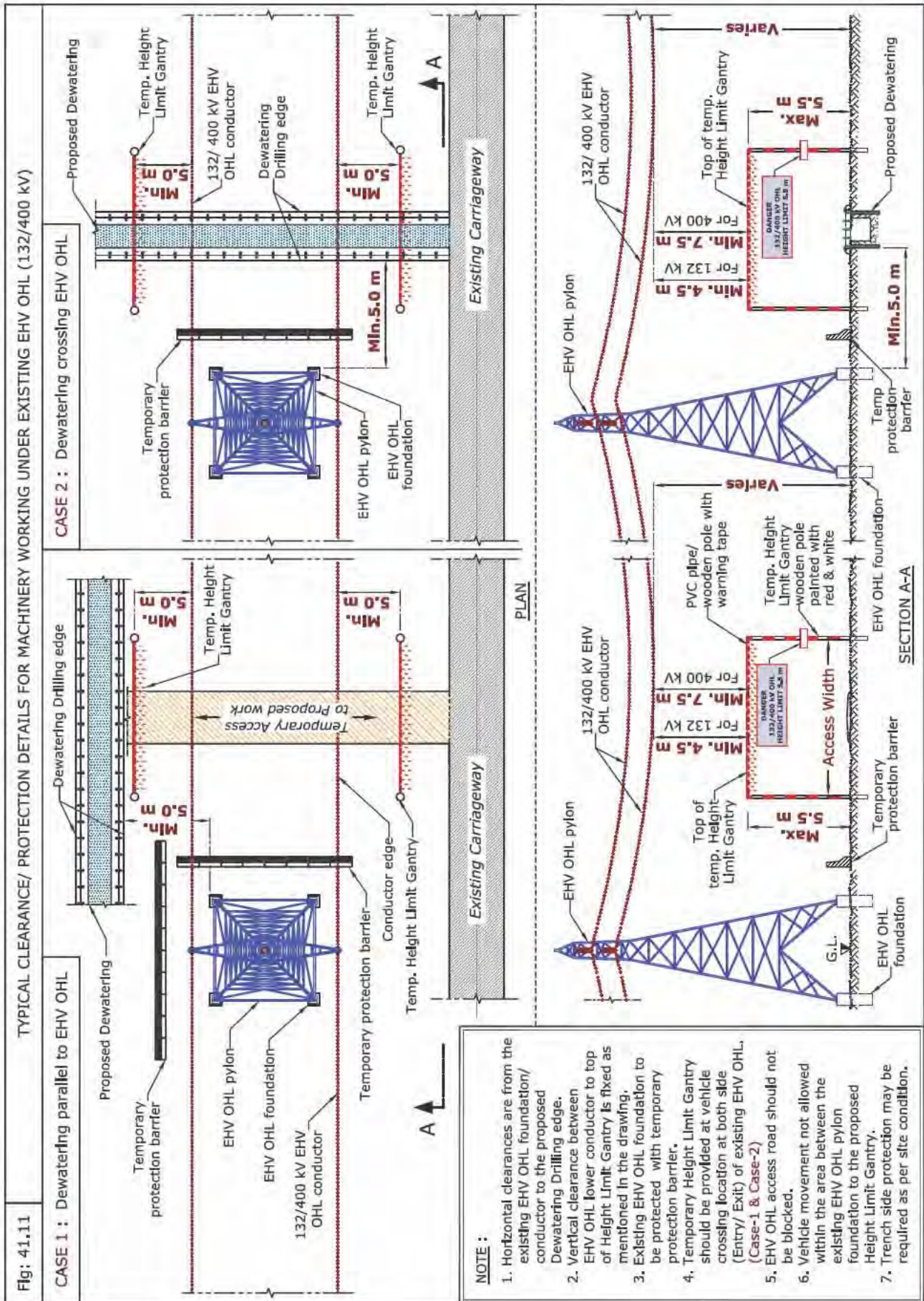
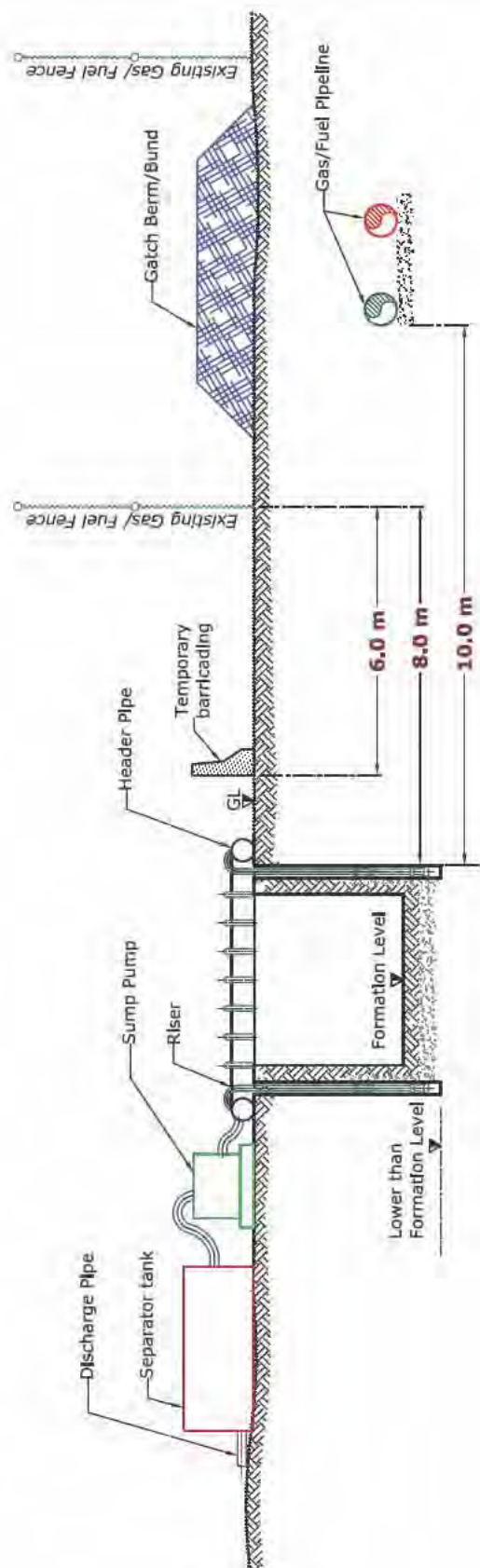


Table 4: Clearance & Protection details for proposed Dewatering and existing DEWA Gas/Fuel services						
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 41.12)
Gas/Fuel Pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 41.12)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 41.12 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED DEWATERING AND EXISTING GAS/FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from the proposed Dewatering Drilling edge to the existing Gas/Fuel fence.
 2. Horizontal clearance 10.0 m from the proposed Dewatering Drilling edge to the existing Gas/Fuel services edge.
 3. Barricading for working 6.0 m horizontally away from existing DEWA Gas/Fuel fence.

42. Proposed Soil Investigation/ Borehole

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42.1 Introduction

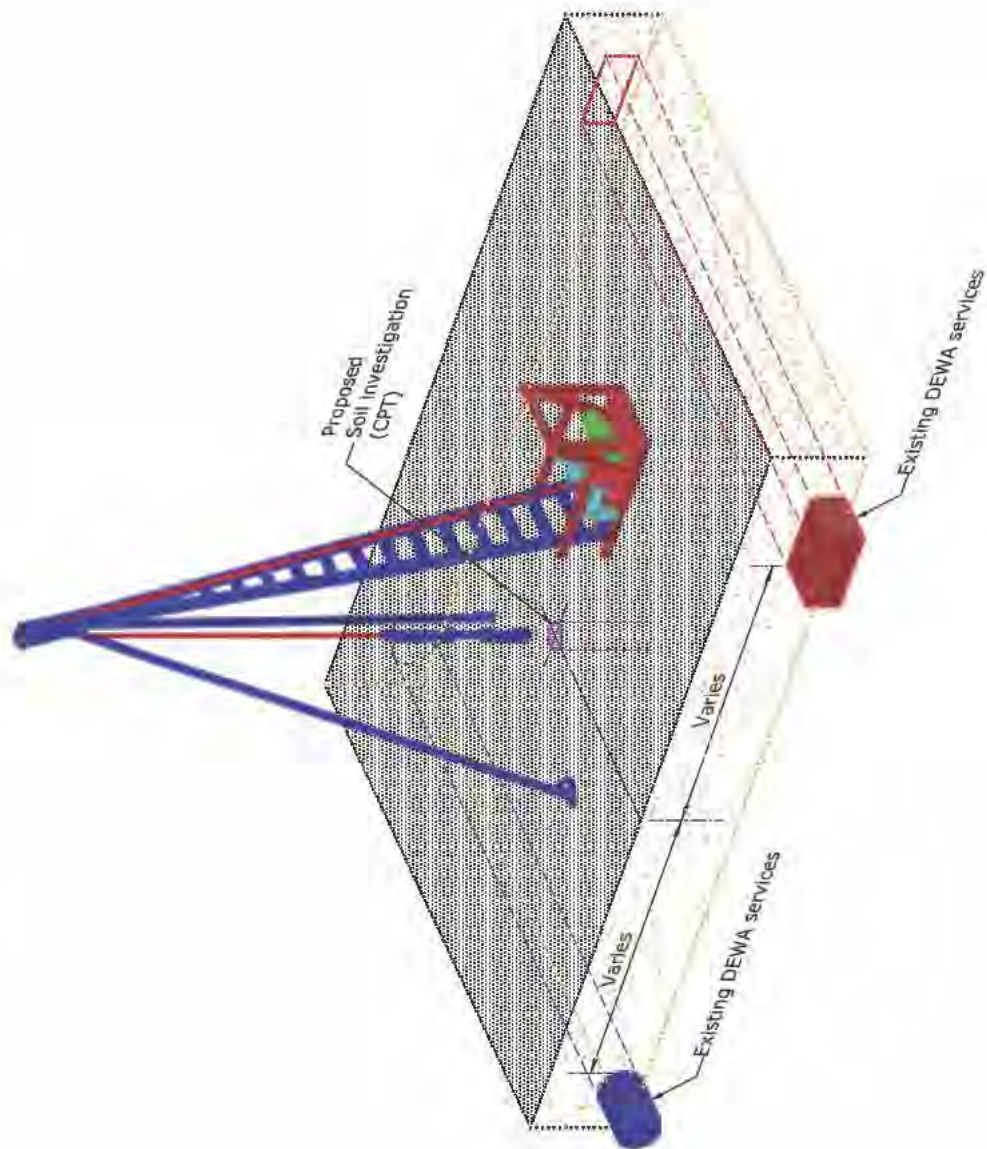
To evaluate the suitability of construction site and disclose/predict the difficulties during construction and also to enable adequate economic and structural design as per soil condition. The suitability of construction location will be concluded after testing various properties of soil collected from the construction site.

Construction activity involves boring/drilling and other machinery, borehole location to be away from DEWA assets as per specified standards.



Typical Soil Investigation

SOIL INVESTIGATION (CONE PENETRATION TEST)



42.2 Avoid the following



1. Drilling proposal above DEWA Services.

2. Drilling proposal under HV OHL (6.6/11/33 kV).

3. Drilling proposal in EHV OHL Corridor.
(Exceptional for DEWA Projects)
4. Drilling proposal in Gas/Fuel Corridor.
(Exceptional for gas/fuel Projects)

42.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Soil investigation/Bore hole and existing DEWA Electricity LV Cables						
Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 42.1)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



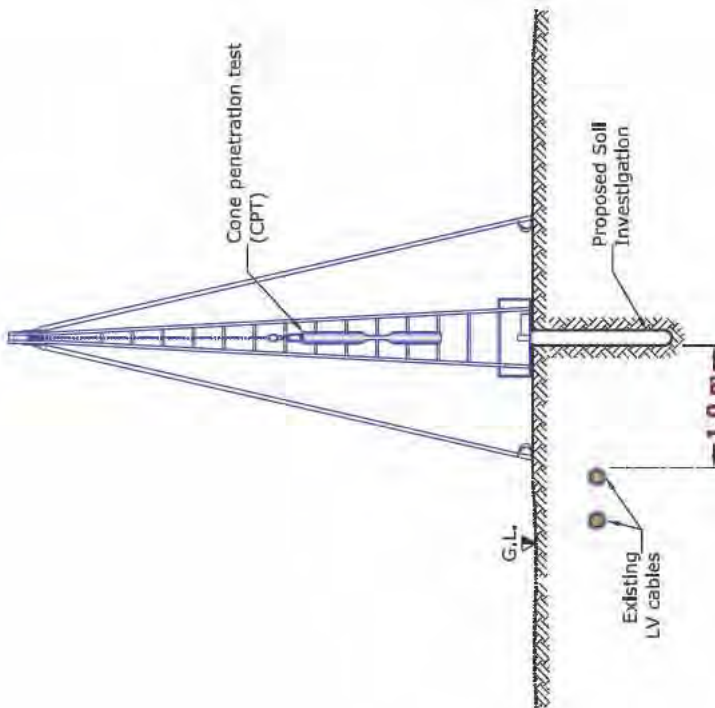
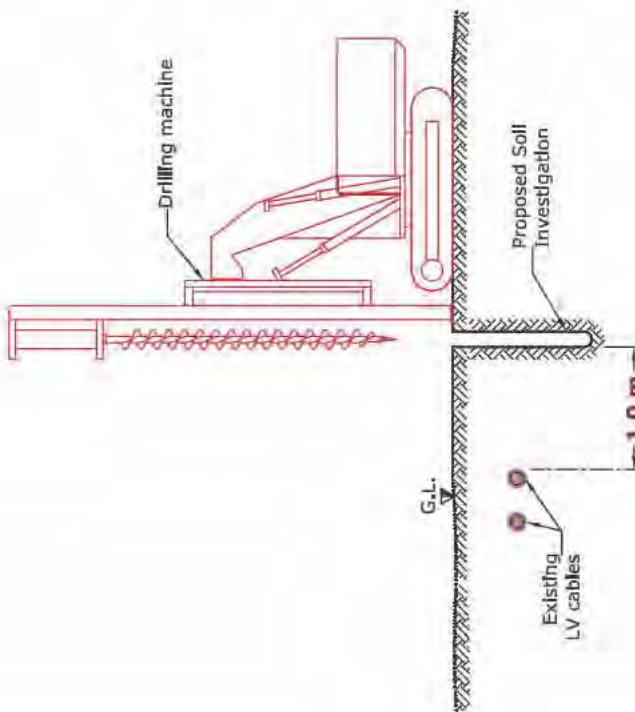
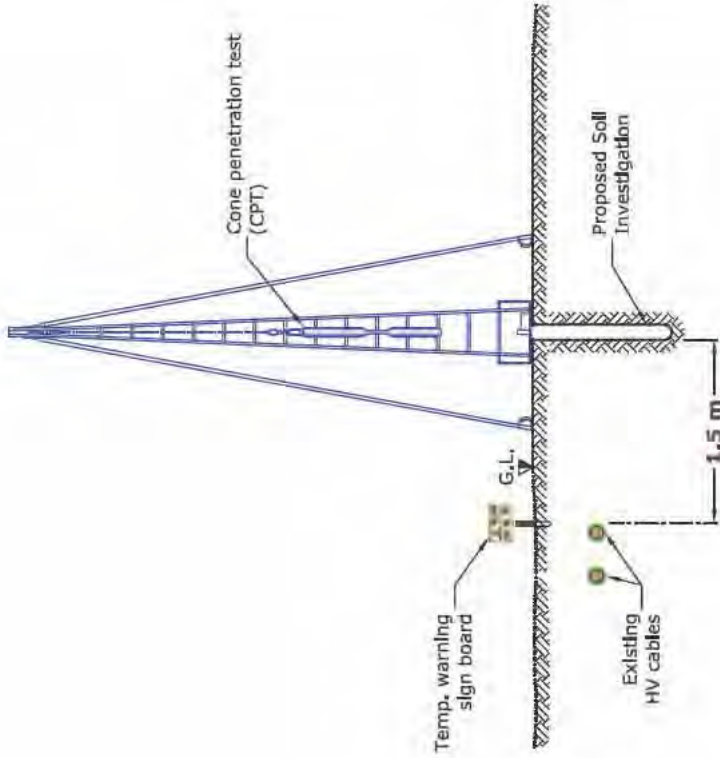
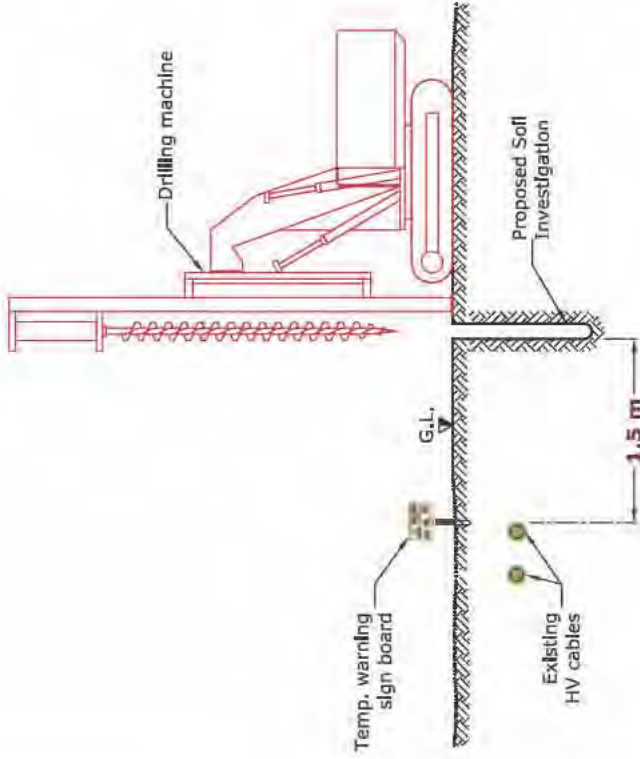
Fig: 42.1	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOIL INVESTIGATION AND EXISTING LV CABLES
	<div> <div> <p>CASE 1 : Cone penetration test</p>  </div> <div> <p>CASE 2 : Drilling machine</p>  </div> </div>
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance from the proposed Soil Investigation drilling edge to existing LV cable edge. 2. Existing LV cable protection may be required as per site and soil condition. 	

Table 2: Clearance & Protection details for Proposed Soil investigation/Bore hole and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	1.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.2) Protection details (Ref Fig: 42.2)
HV (6.6/11/33 kV) Manhole.	1.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.3)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.4)
Clearance & Protection details for access and crossing under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.5) Vertical clearance (Ref Fig: 42.5) Protection details (Ref Fig: 42.5)
HV (33 kV) O.H.L.		3.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 42.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOIL INVESTIGATION AND EXISTING HV CABLES
<div>CASE 1 : Cone penetration test</div> 	<div>CASE 2 : Drilling machine</div> 
<div>NOTE :</div> <div> <ol style="list-style-type: none"> 1. Horizontal clearance from the proposed Soil Investigation drilling edge to existing HV cable edge. 2. HV cable warning sign board to be placed at 20.0 m Interval. (Ref. Photo 42.1) 3. Existing HV cable protection may be required as per site and soil condition. </div>	

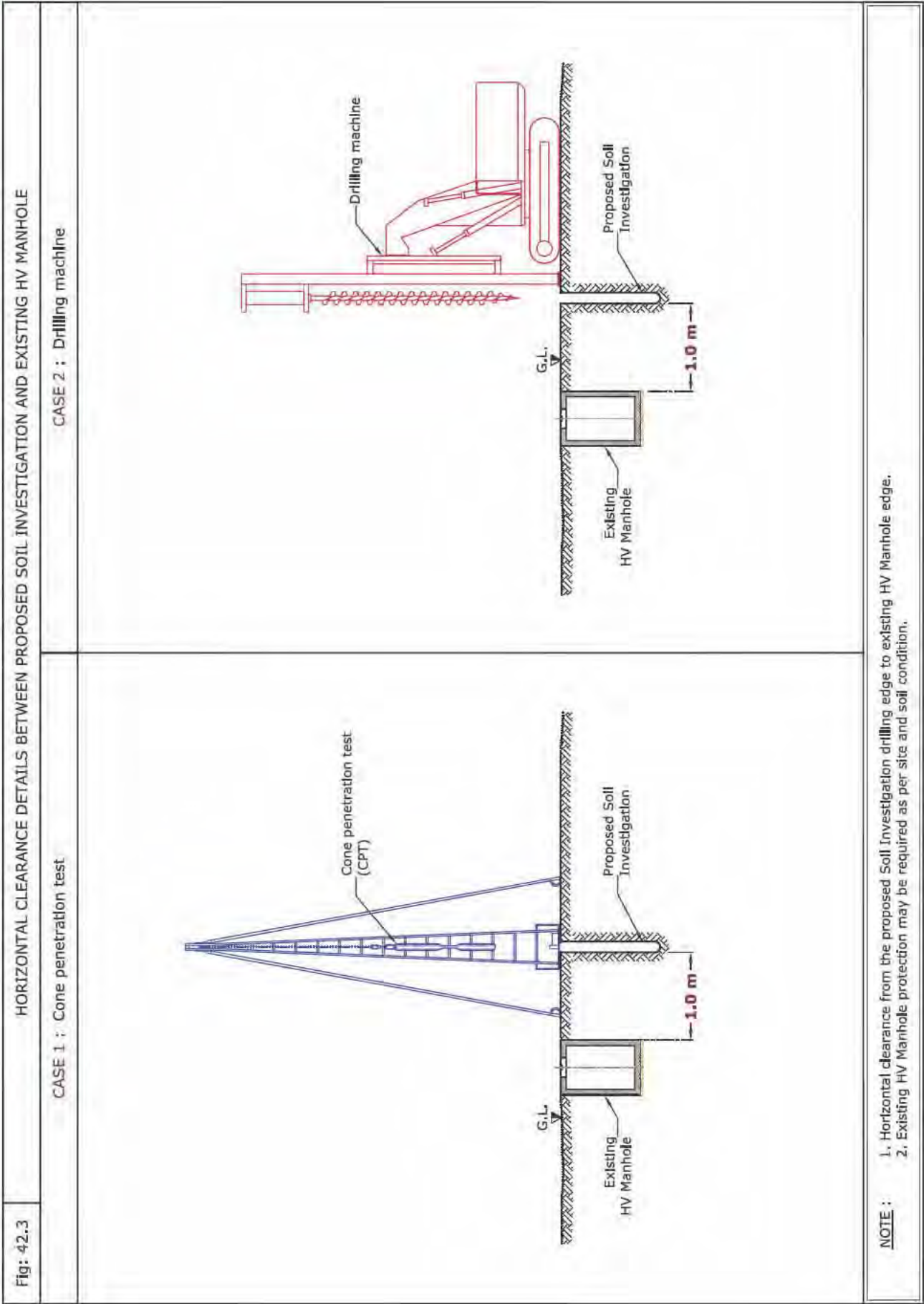
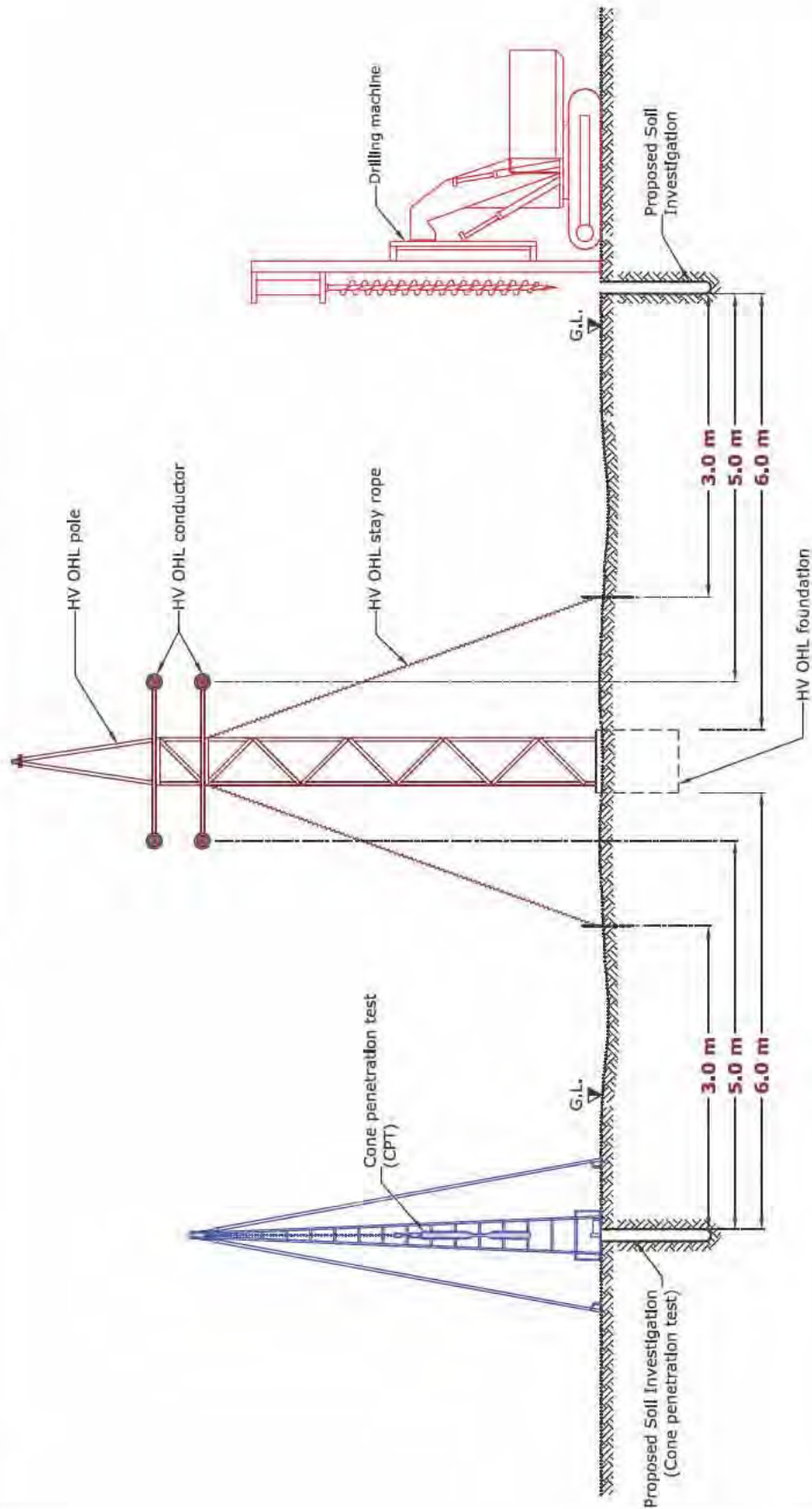


Fig: 42.4
HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOIL INVESTIGATION DRILLING MACHINE
(CPT & DRILLING MACHINE) AND EXISTING HV OHL (6.6/11/33 kV)



- NOTE :**
1. Horizontal clearance 3.0 m from the proposed Soil Investigation drilling edge to existing HV OHL stay rope edge.
 2. Horizontal clearance 5.0 m from the proposed Soil Investigation drilling edge to existing HV OHL conductor edge.
 3. Horizontal clearance 6.0 m from the proposed Soil Investigation drilling edge to existing HV OHL foundation edge.
 4. Machines should be placed opposite side to HV OHL as shown in the Photo; 42.2.
 5. Soil Investigation not allowed under HV OHL.

Fig: 42.5 TYPICAL HEIGHT LIMIT GANTRY CLEARANCE DETAILS FOR EXISTING HV OHL (6.6/11/33 kV)

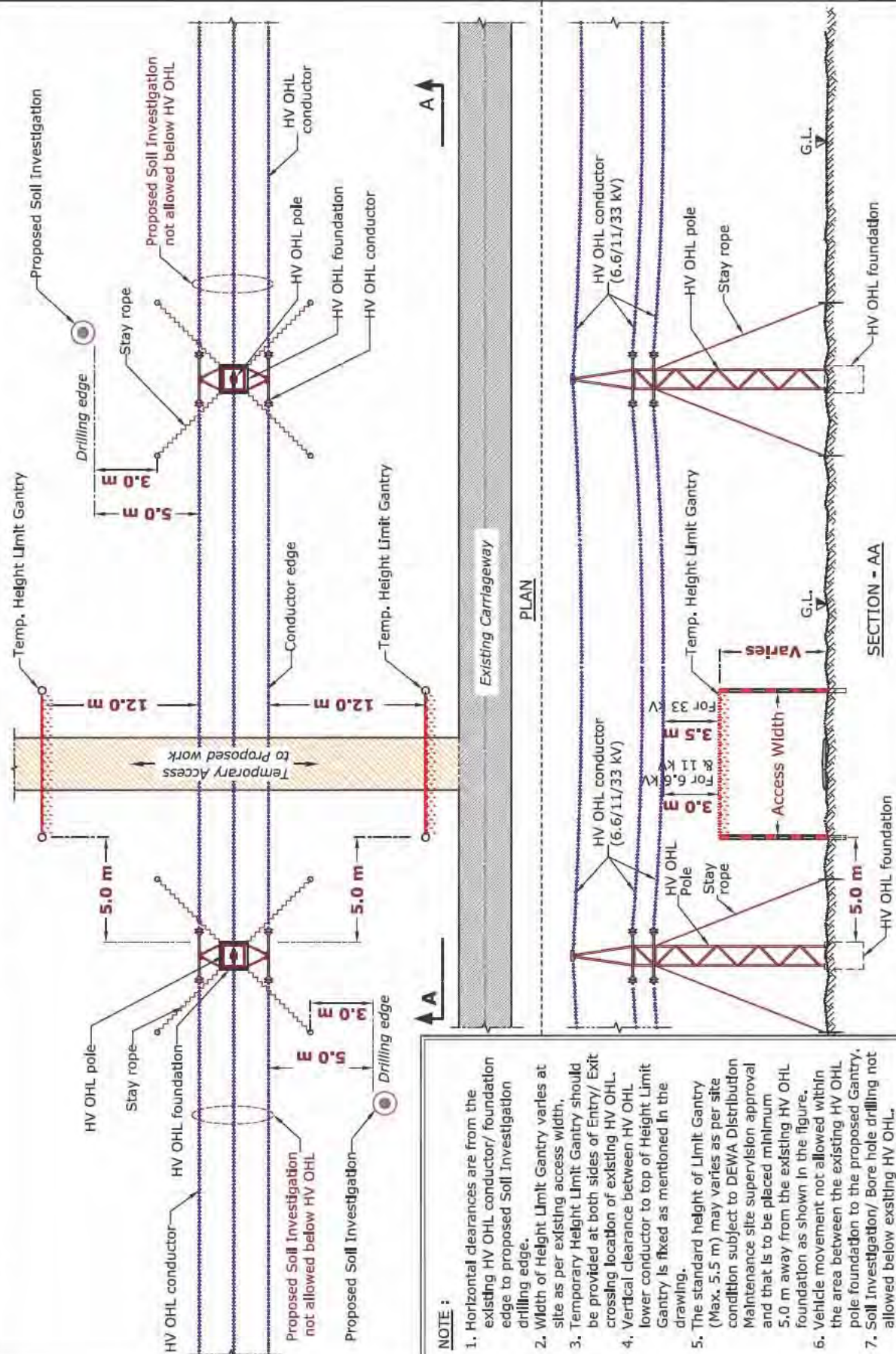


Photo: 42.1 TEMPORARY WARNING SIGN BOARD INDICATING EXISTING HV SERVICES CLOSE TO PROPOSED SOIL INVESTIGATION LOCATION



HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOIL INVESTIGATION DRILLING MACHINE
(CPT & DRILLING MACHINE) AND EXISTING HV OHL (6.6/11/33 kV)

Photo: 42.2



Table 3: Clearance & Protection details for proposed Soil investigation/Bore hole and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.6) Protection details (Ref Photo: 42.3)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.6) Protection details (Ref Photo: 42.3)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.7) Protection details (Ref Photo: 42.3)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.8) Protection details (Ref Photo: 42.3)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.9) Protection details (Ref Photo: 42.3)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.10) Protection details (Ref Fig: 42.10)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.11) Protection details (Ref Photo: 42.3)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 42.10) Vertical clearance (Ref Fig: 42.10) Protection details (Ref Fig: 42.10)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

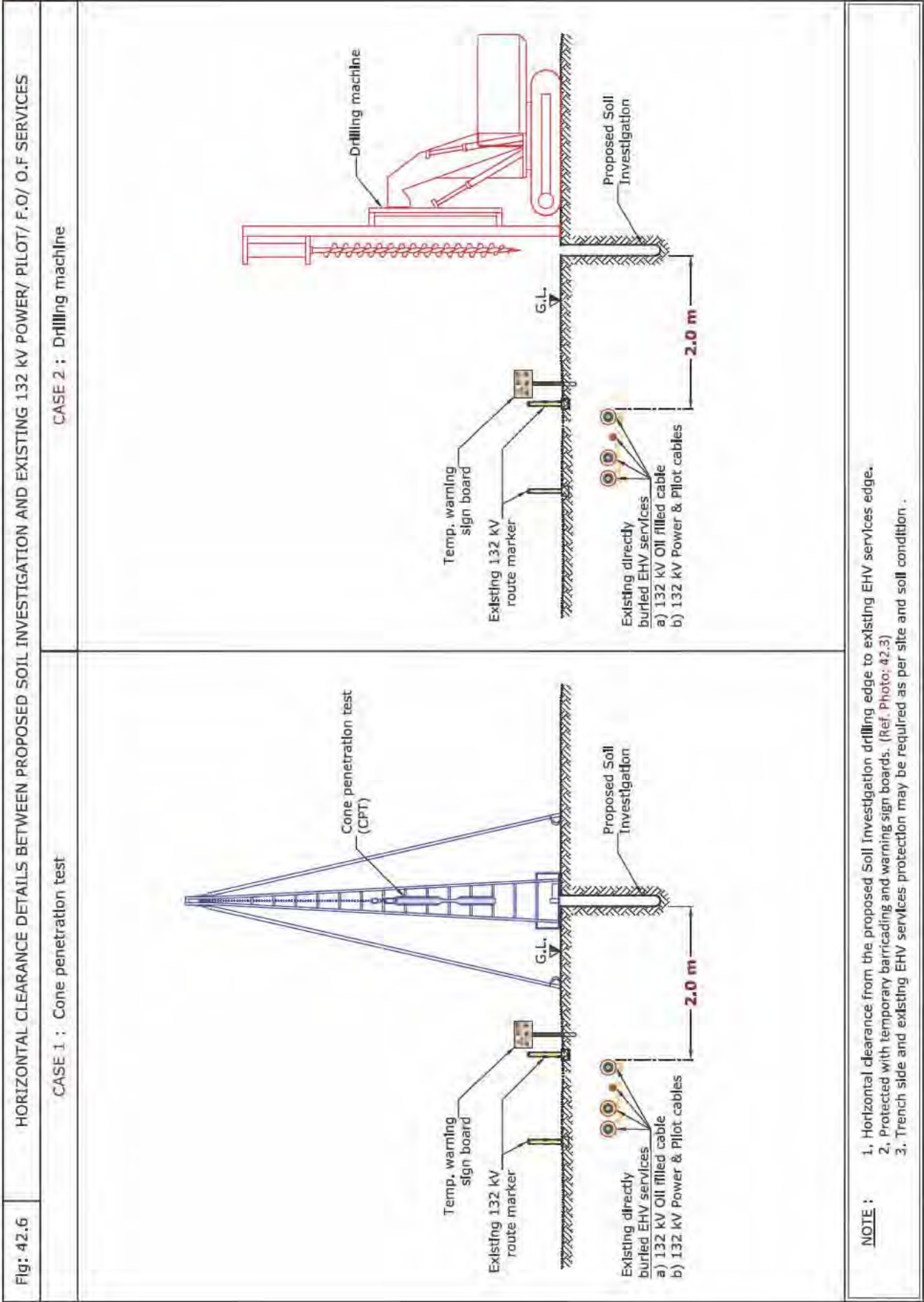
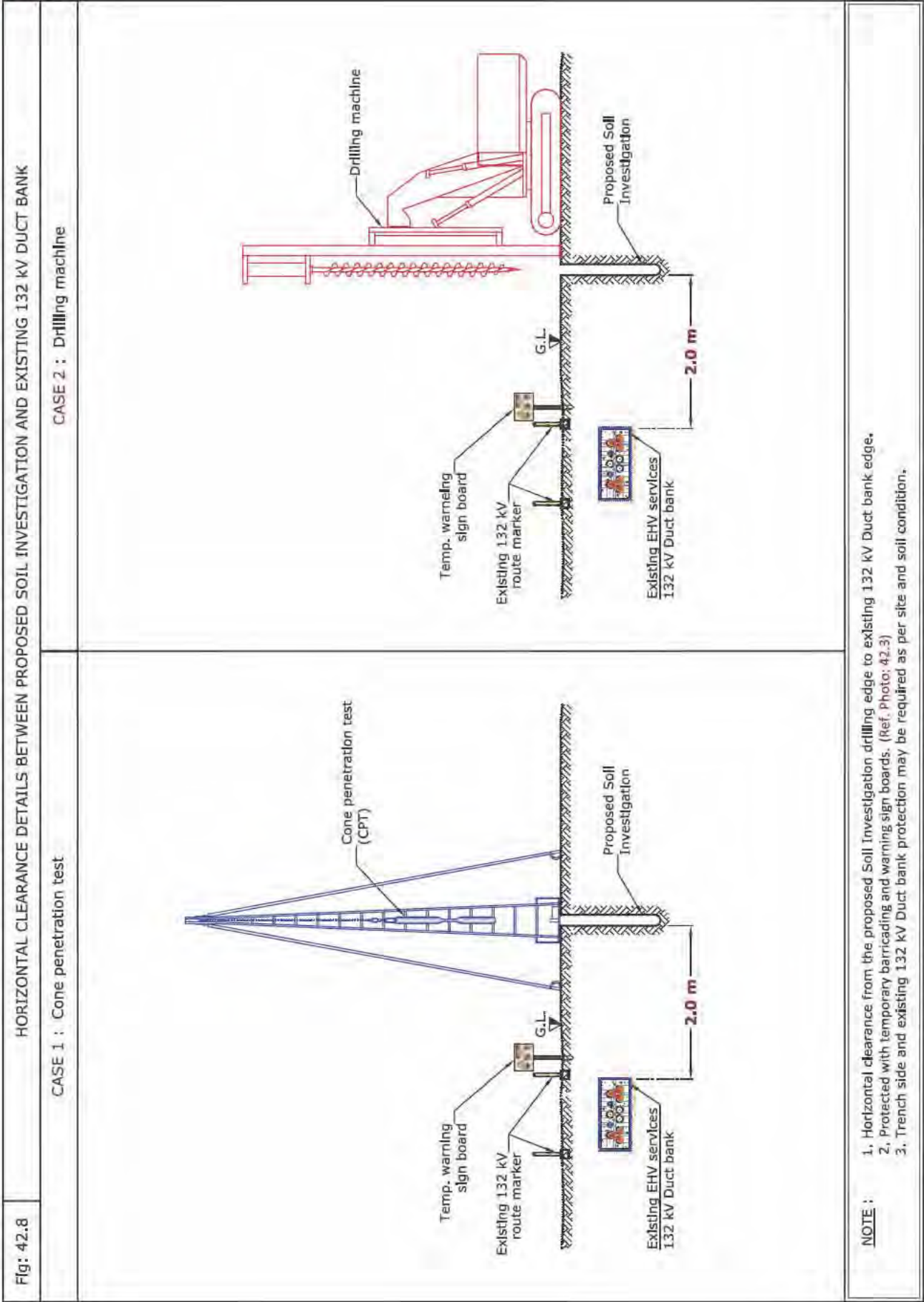
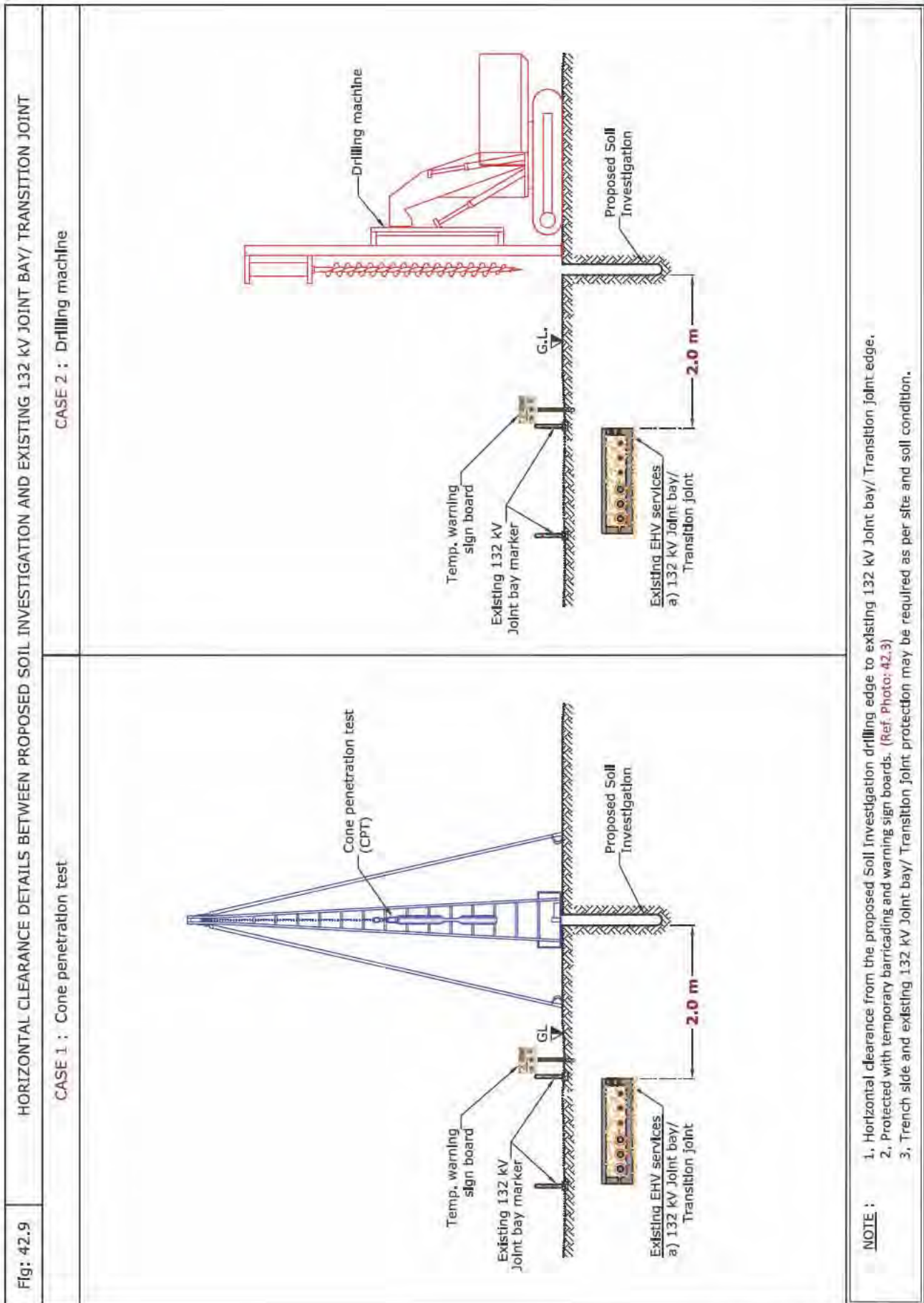
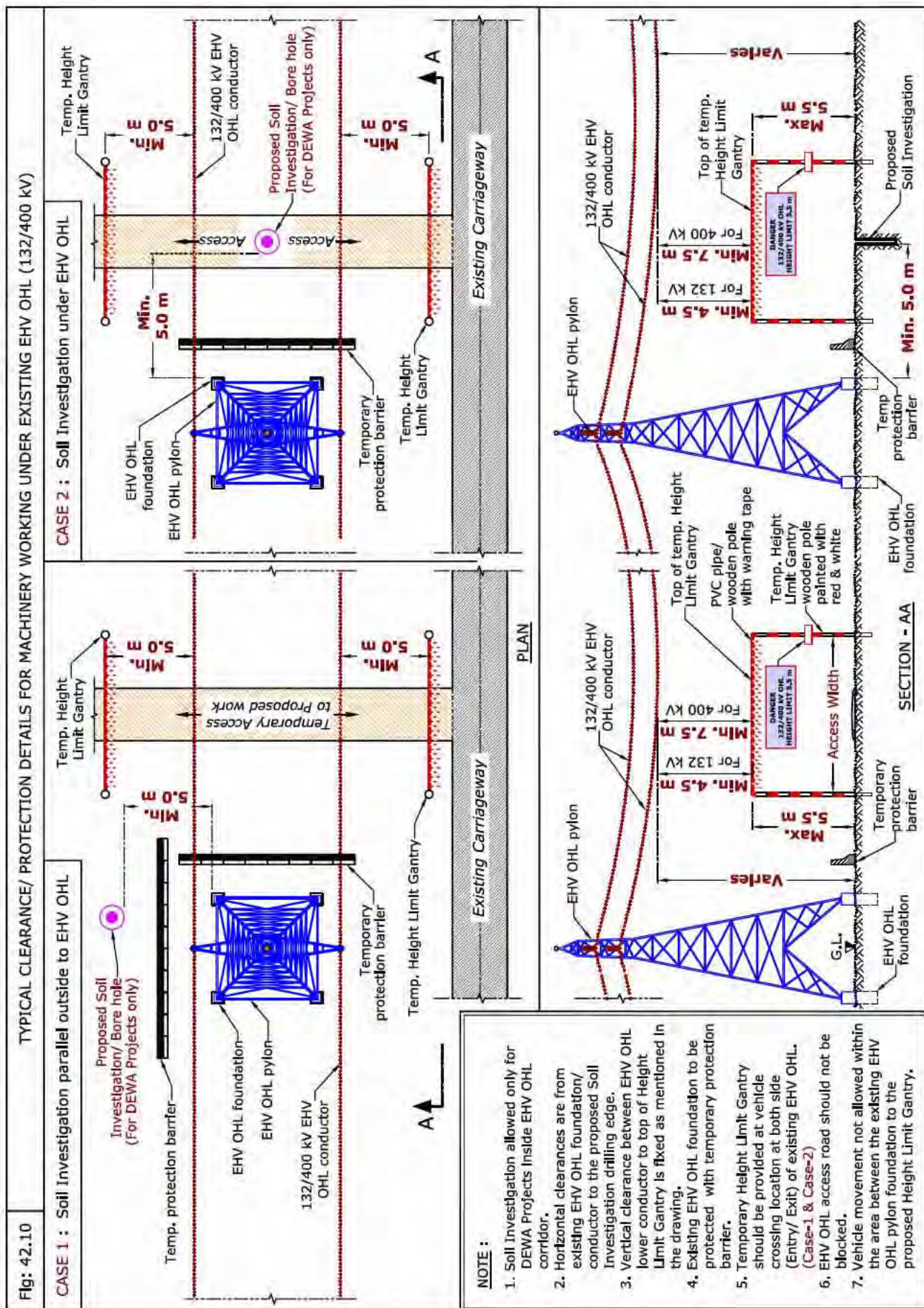


Fig: 42.7	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOIL INVESTIGATION AND EXISTING 132 kV TROUGH
	<div> <div>CASE 1 : Cone penetration test</div> <div>CASE 2 : Drilling machine</div> </div>
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	<div> <div> <p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance from the proposed Soil Investigation drilling edge to existing 132 kV Trough edge. 2. Protected with temporary barricading and warning sign boards. (Ref. Photo: 42.3) 3. Trench side and existing 132 kV Trough protection may be required as per site and soil condition . </div> </div>







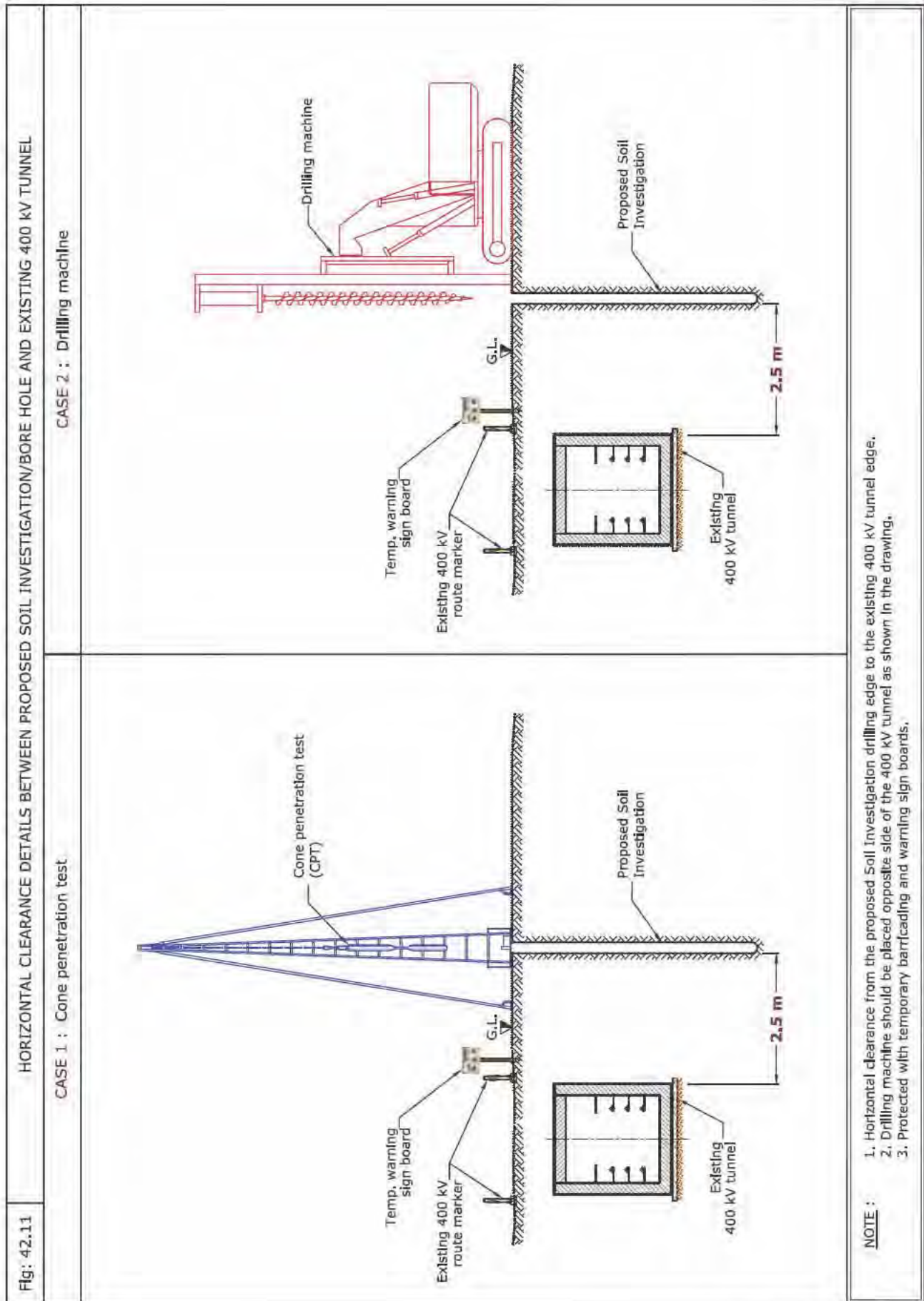


Photo: 42.3	TEMPORARY WARNING SIGN BOARD AND PROTECTION BARRIER FOR EHV SERVICES CLOSE TO PROPOSED SOIL INVESTIGATION LOCATION
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Min. 2.0 m

Proposed Borehole (CPT)

Table 4: Clearance & Protection details for proposed Soil investigation/Bore hole and existing DEWA Gas/Fuel services

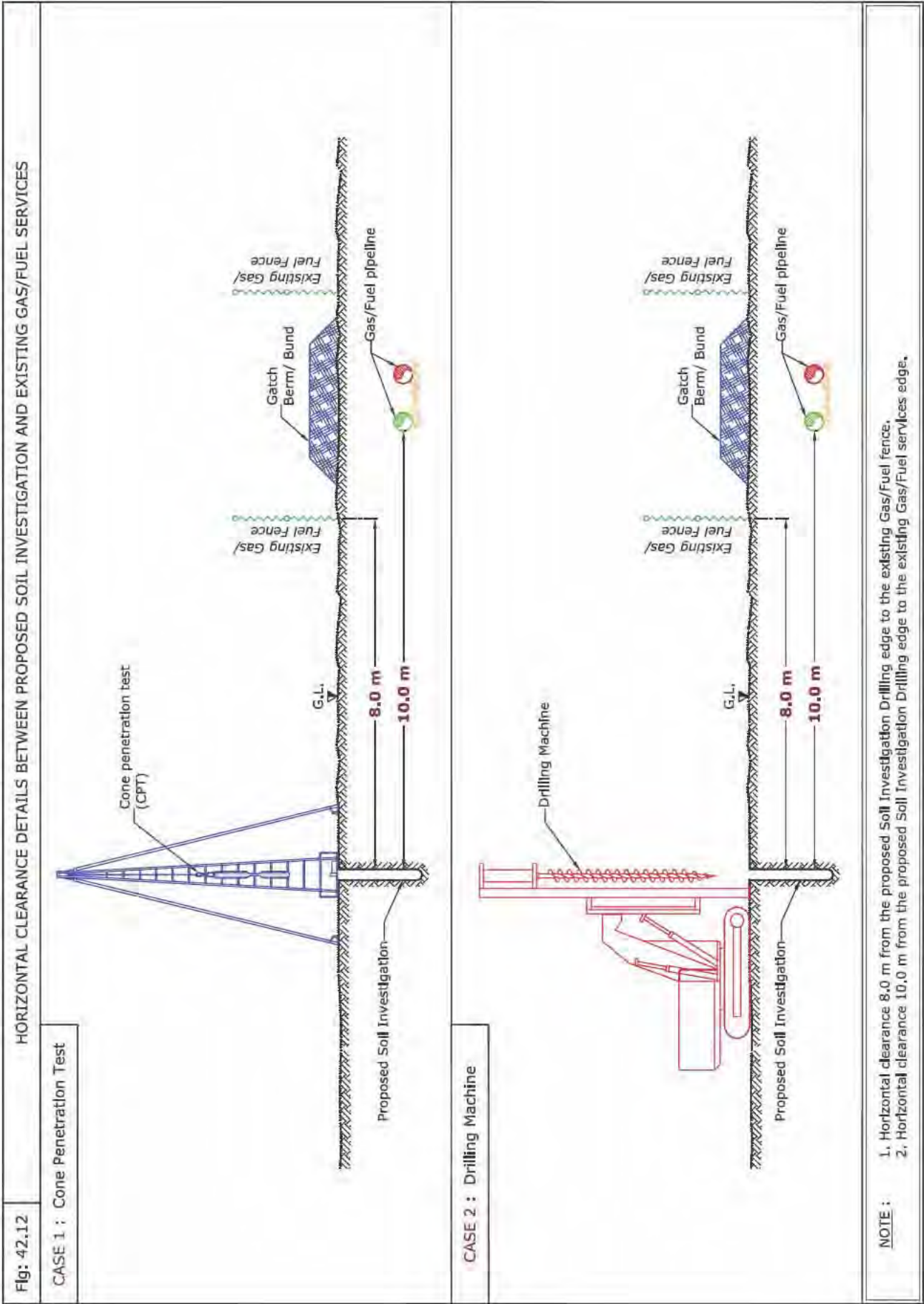
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 42.12)
Gas/Fuel Pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 42.12)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Proposed Soil Investigation/Borehole



43. Proposed Non-Disruptive Crossing Method (NDCM) (Road and Service Crossing)

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43.1 Introduction

Non-disruptive crossing method (NDCM) is trenchless technology used to connect the utilities from one point to another to cross existing road, waterway and/or services, this method involves the boring technique to install either a sleeve or pipe directly.

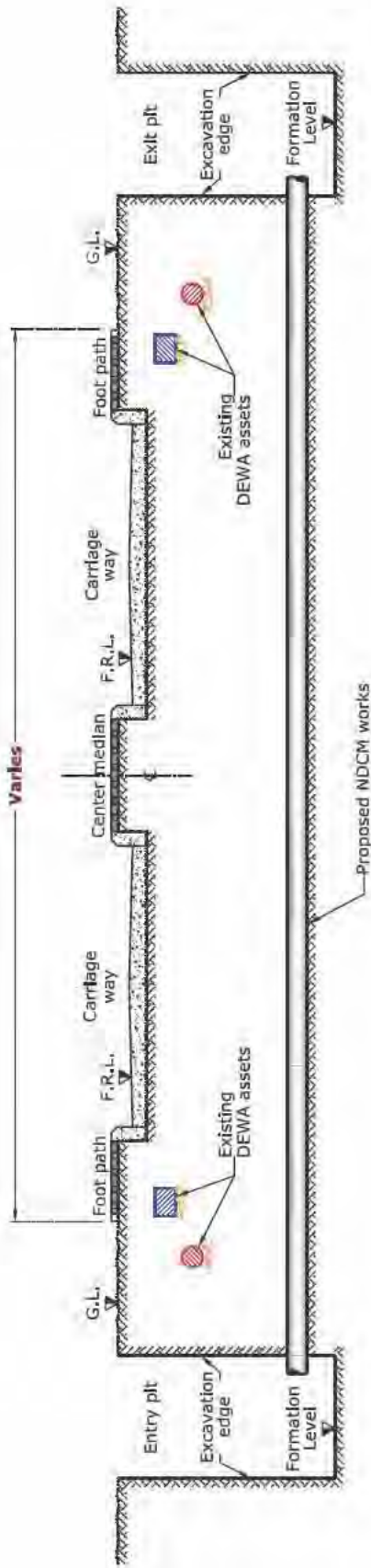
Prior to commence NDCM the contractor has to carry out an extensive geotechnical investigation study,

monitor and control the settlement during and after completion of the NDCM work. Horizontal Directional drilling (HDD), Micro tunneling, Thrust boring and Pipe jacking are the commonly used (NDCM) techniques.



Proposed Non-Disruptive Crossing Method (NDCM)

TYPICAL CROSS SECTIONAL ARRANGEMENT FOR NON-DISRUPTIVE CROSSING METHOD



- NOTE :
- 1. Existing DEWA assets should be protected around Entry/ Exit pit location.
 - 2. Trench side and existing DEWA assets protection may be required as per site and soil condition.

43.2 Avoid the following



1. Crossing below existing DEWA 132 kV Joint Bay.
2. Entry & Exit pit excavation on the existing DEWA services (Joints/Valves).

43.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed NDCM and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 43.1) • Vertical clearance (Ref Fig: 43.1)

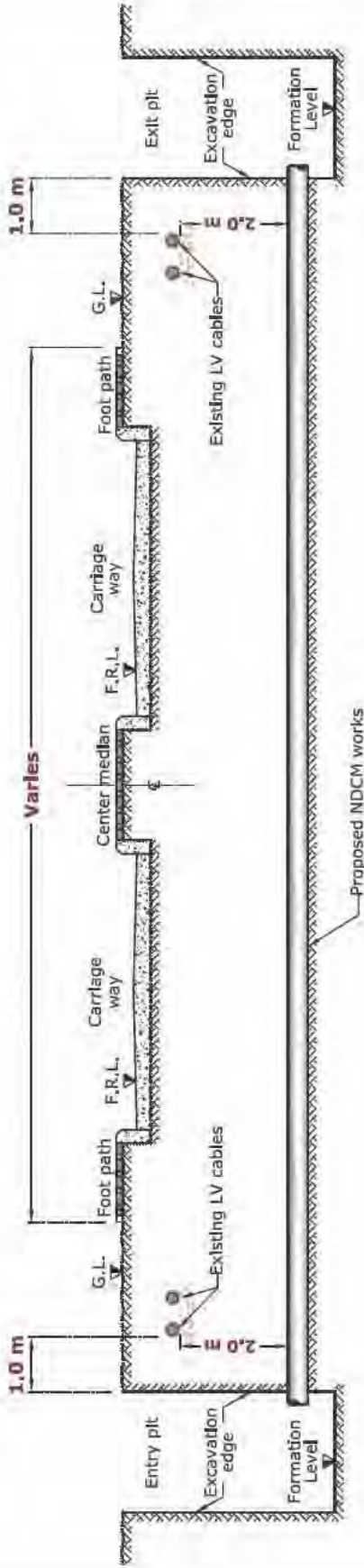
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Proposed Non-Disruptive Crossing Method (NDCM)

Fig: 43.1 HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED NDCM WORKS AND EXISTING LV CABLES



- NOTE :**
- 1. Horizontal clearance is from the proposed Entry/ Exit pit outer edge to existing LV cable edge.
 - 2. Vertical clearance is from the top of proposed NDCM to bottom of existing LV cable.
 - 3. Trench side and existing DEWA assets protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed NDCM and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	2.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 43.2) • Vertical clearance (Ref Fig: 43.2) • Protection details (Ref Photo 43.1)
HV (6.6/11/33 kV) Manhole	1.5 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 43.2) • Vertical clearance (Ref Fig: 43.2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NR	-	NDCM	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 43.3)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	NDCM	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 43.3) • Vertical clearance (Ref Fig: 43.3) • Protection details (Ref Fig: 43.3)
HV (33 kV) O.H.L.		3.5 m				

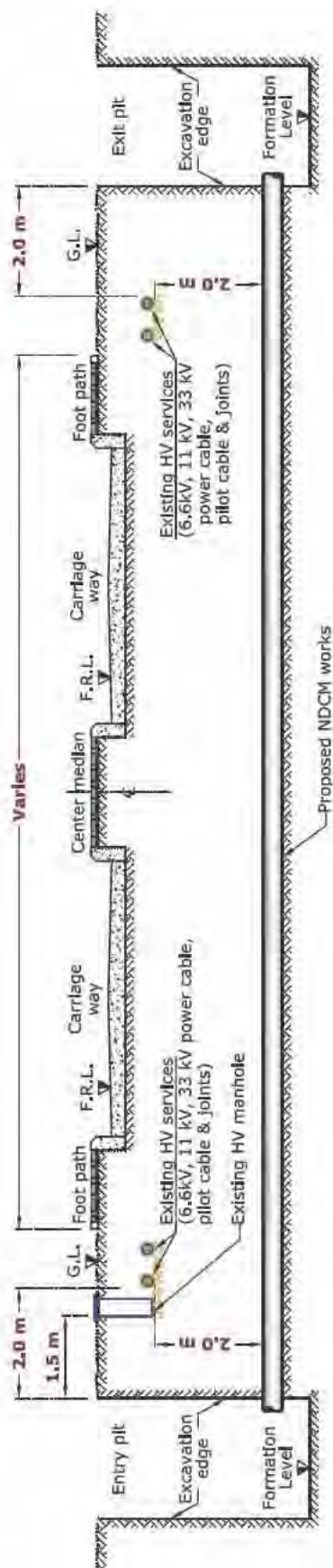
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

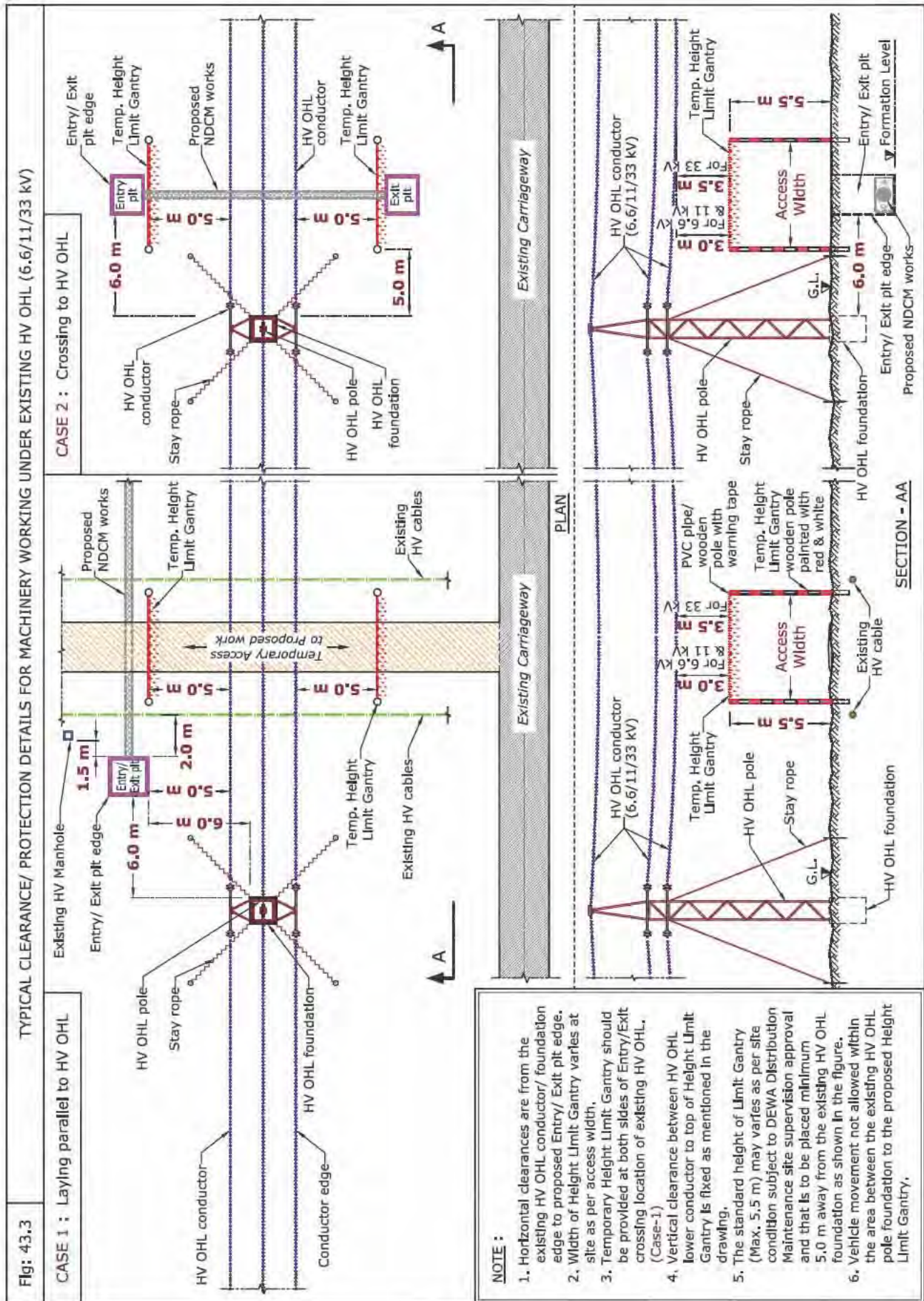


Proposed Non-Disruptive Crossing Method (NDCM)

Fig: 43.2 HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED NDCM WORKS AND EXISTING HV SERVICES



- NOTE :**
1. Horizontal clearance is from the proposed Entry/ Exit pit outer edge to existing HV services edge.
 2. Vertical clearance is from the top of proposed NDCM to bottom of existing HV services.
 3. Trench side and existing DEWA assets protection may be required as per site and soil condition..



PROTECTION FOR EXISTING EXPOSED CABLE AT NDCM WORKING AREA (ENTRY PIT)

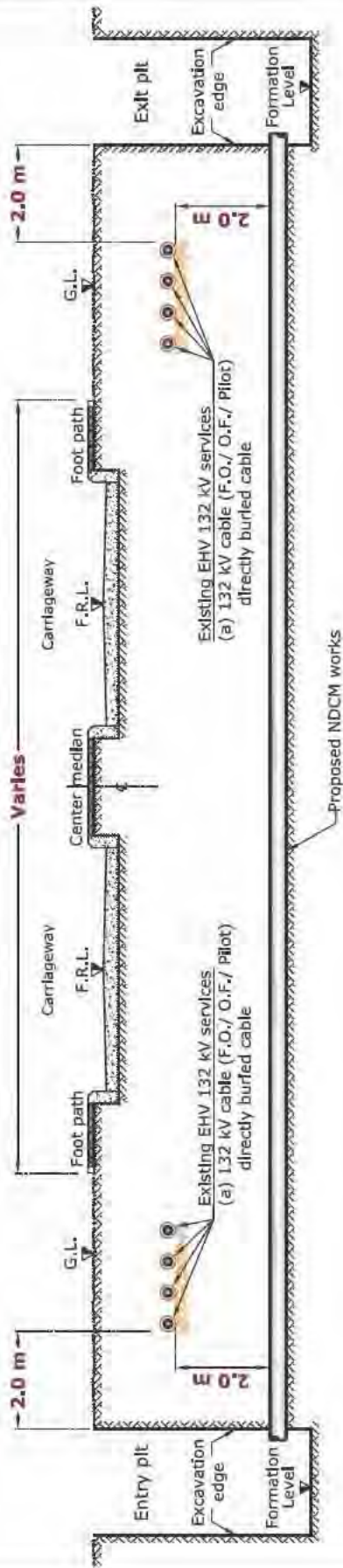
Photo: 43.1



Table 3: Clearance & Protection details for proposed NDCM and existing DEWA Electricity EHV services						
Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:43.4) Vertical clearance (Ref Fig:43.4) Protection details (Ref Fig:43.4)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	2.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:43.4) Vertical clearance (Ref Fig:43.4) Protection details (Ref Fig:43.4)
EHV (132 kV) Trough	2.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:43.5) Vertical clearance (Ref Fig:43.5) Protection details (Ref Fig:43.5)
EHV (132 kV) Duct Bank	2.0 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:43.5) Vertical clearance (Ref Fig:43.5) Protection details (Ref Fig:43.5)
EHV (132 kV) Joint Bay/ Transition Joint	5.0 m	NA	-	-	-	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:43.6)
EHV (132/400 kV) O.H.L	5.0 m	NR	-	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:43.9) Protection details (Ref Fig:43.9)
EHV (400 kV) Tunnel	2.5 m	2.0 m	B	NDCM	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:43.7) Vertical clearance (Ref Fig:43.8) Protection details (Ref Fig:43.7 & 43.8)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:43.9) Vertical clearance (Ref Fig:43.9) Protection details (Ref Fig:43.9)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 43.4 HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED NDCM WORKS AND EXISTING EHV 132 kV SERVICES



- NOTE :**
1. Horizontal clearance is from the proposed Entry/ Exit pit outer edge to existing EHV services edge.
 2. Vertical clearance is from the top of proposed NDCM to bottom of existing EHV services.
 3. Proposed NDCM not allowed to cross existing EHV 132 kV Joint bay/ Transition Joint.
 4. Trench side and existing EHV services protection may be required as per site and soil condition.

Fig: 43.5 HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED NDCM WORKS AND EXISTING EHV 132 kV TROUGH/ DUCT BANK

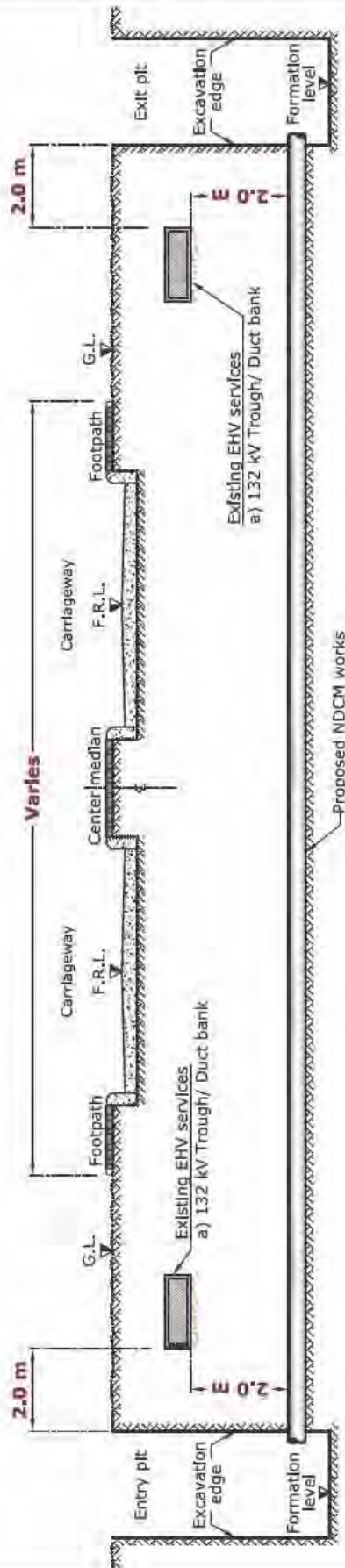
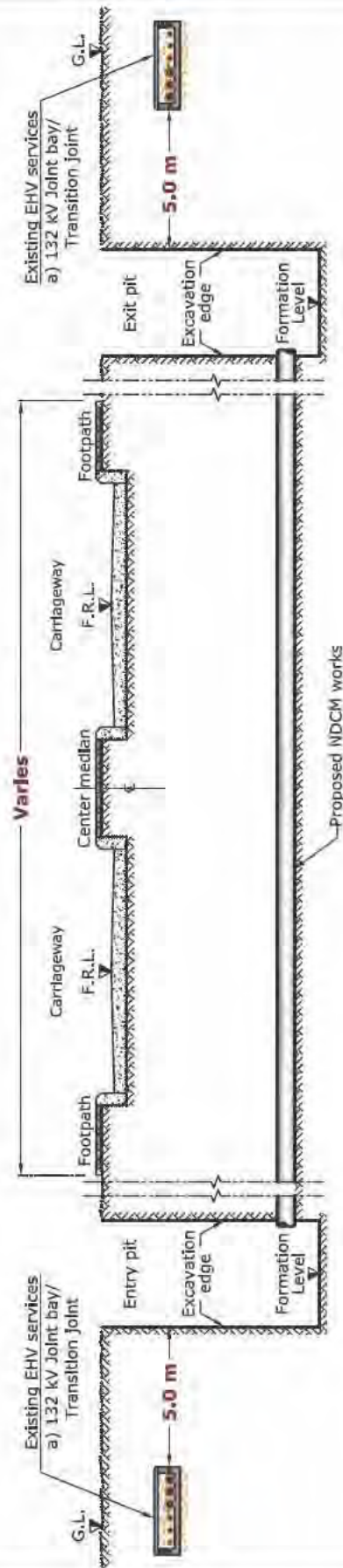
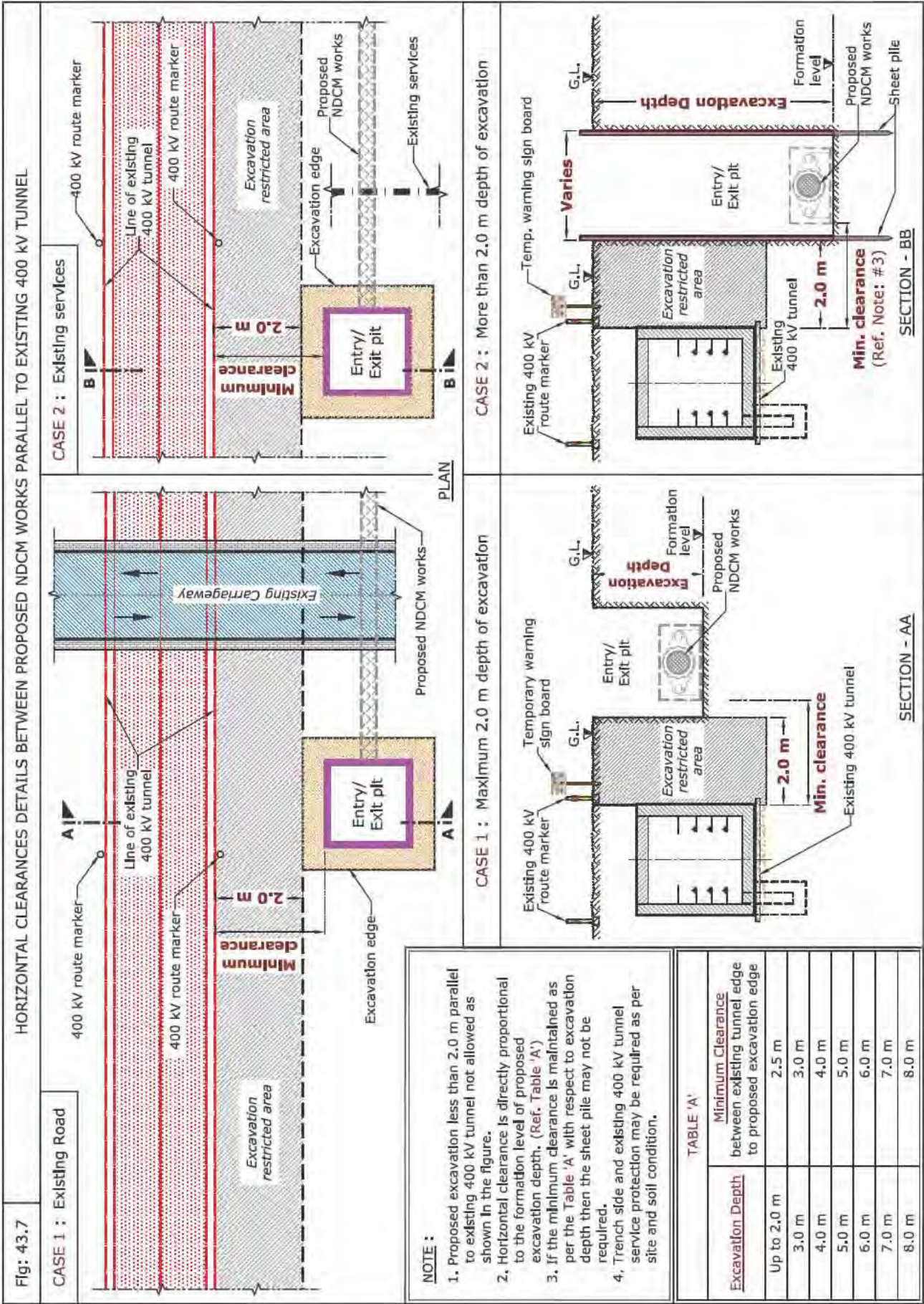
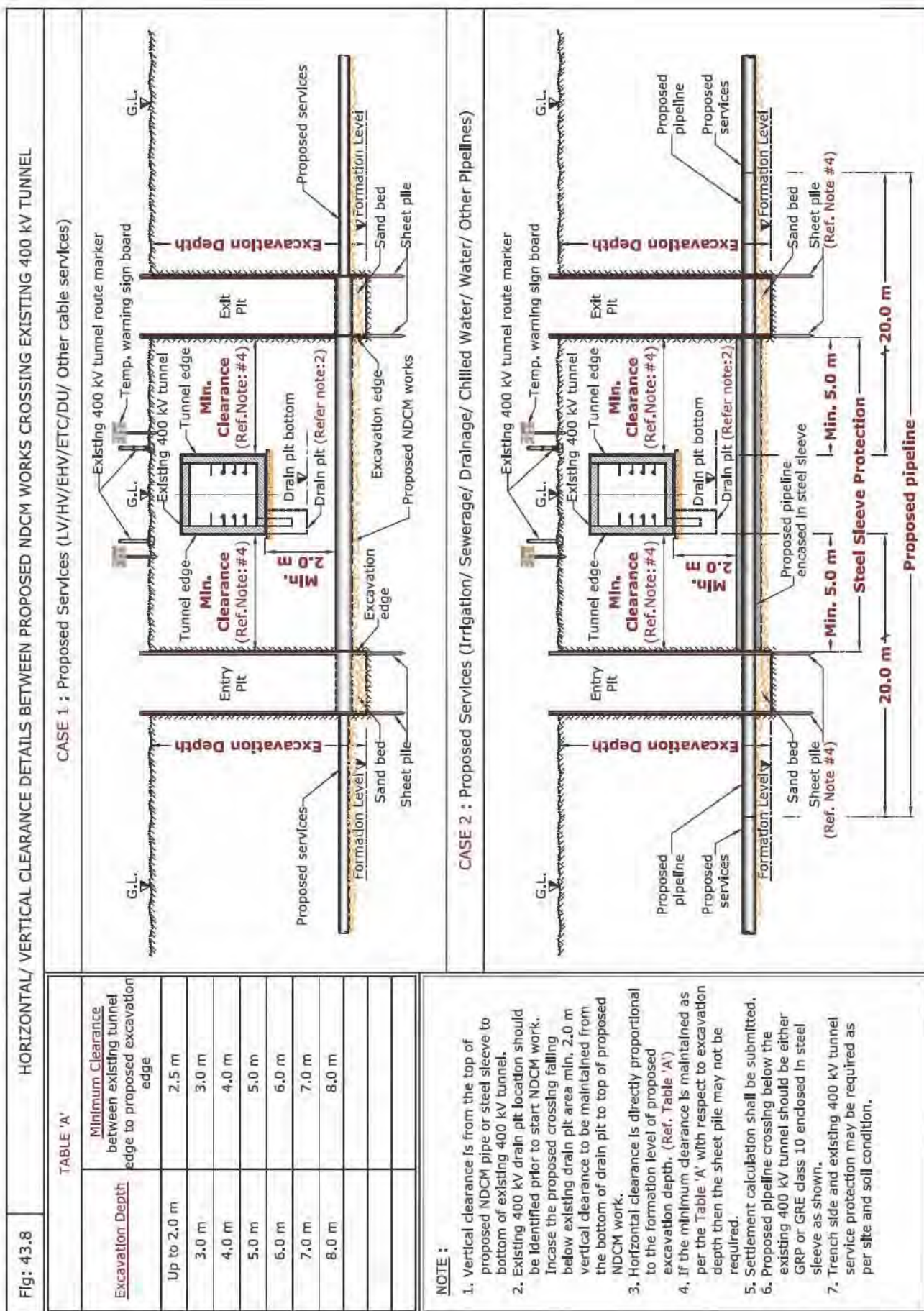


Fig: 43.6 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED NDCM WORKS AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT



- NOTE :**
1. Horizontal clearance is from the proposed Entry/ Exit pit outer edge to existing EHV services edge.
 2. Vertical clearance is from the top of proposed NDCM to bottom of existing EHV services.
 3. Proposed NDCM not allowed to cross existing EHV 132 kV Joint bay/ Transition joint.
 4. Trench side and existing EHV services protection may be required as per site and soil condition.





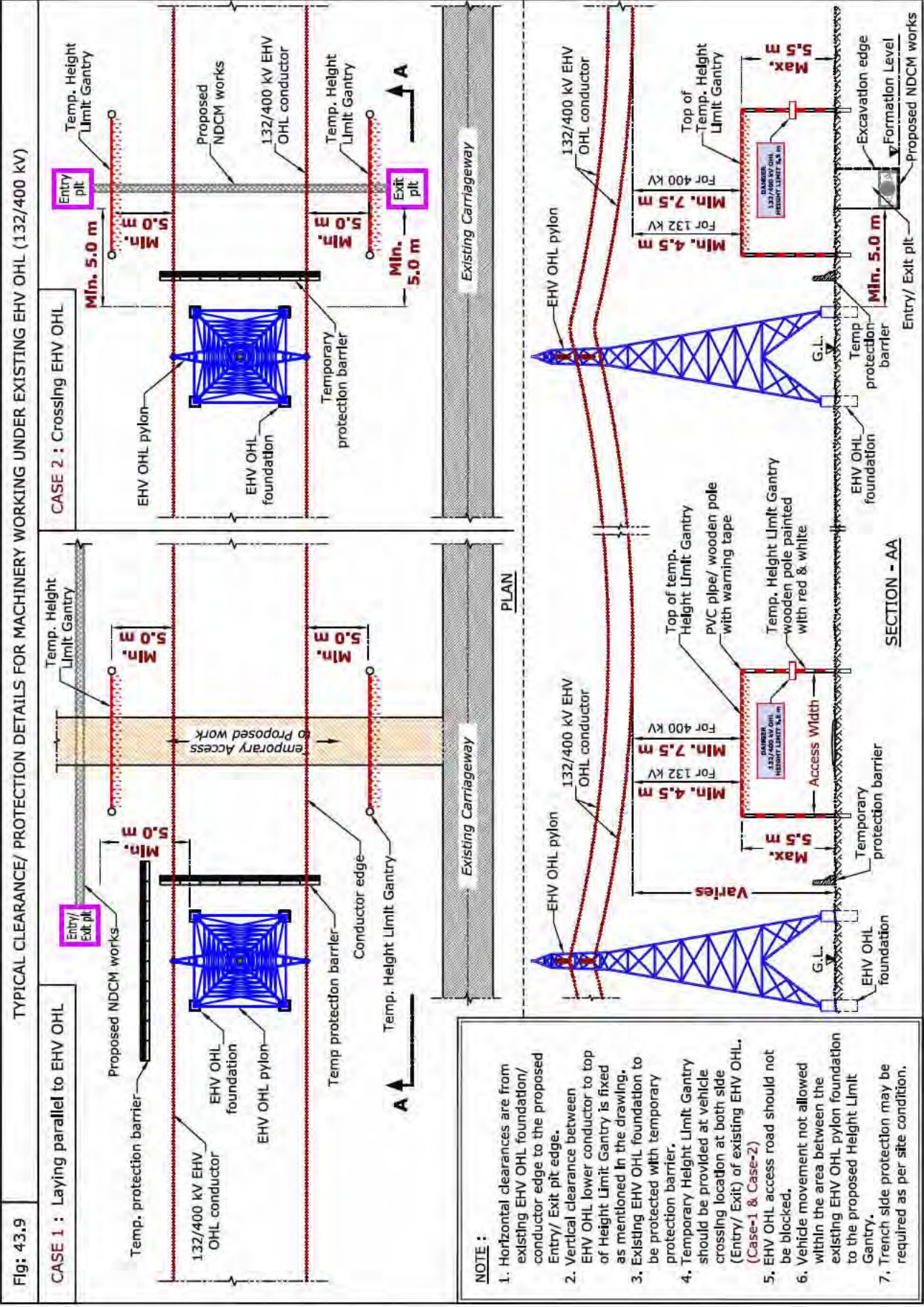


Fig: 43.9

Table 4: Clearance & Protection details for proposed NDCM and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig:43.10)
Gas/Fuel Pipeline (All diameter)	10.0 m	2.0 m	B	NDCM	R	• Horizontal clearance (Ref Fig:43.10)

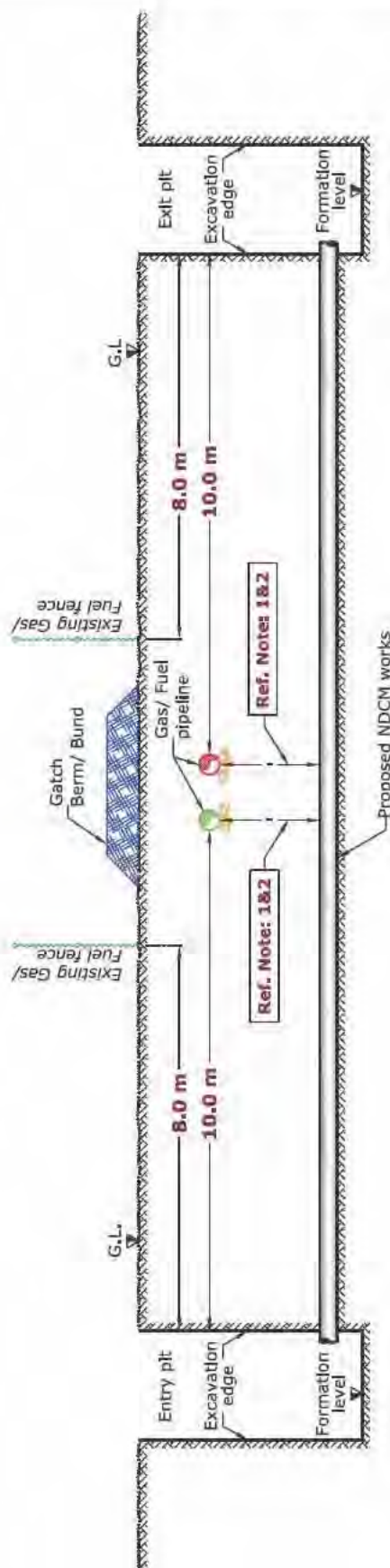
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Proposed Non-Disruptive Crossing Method (NDCM)

Fig: 43.10 HORIZONTAL/ VERTICAL CLEARANCES DETAILS BETWEEN PROPOSED NDCM WORKS AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Minimum vertical clearance for Cables/ Ducts shall be 2.0 m.
2. Minimum vertical clearance for Pipes/ Sleeves shall be 2.0 m or 1.5 times of proposed Pipes/ Sleeves diameter whichever is greater.
3. Horizontal clearance is from the proposed Entry/ Exit pit outer edge to existing Gas/ Fuel pipeline/ fence edge.
4. Vertical clearance is from the top of proposed NDCM to bottom of existing Gas/ Fuel pipeline.
5. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

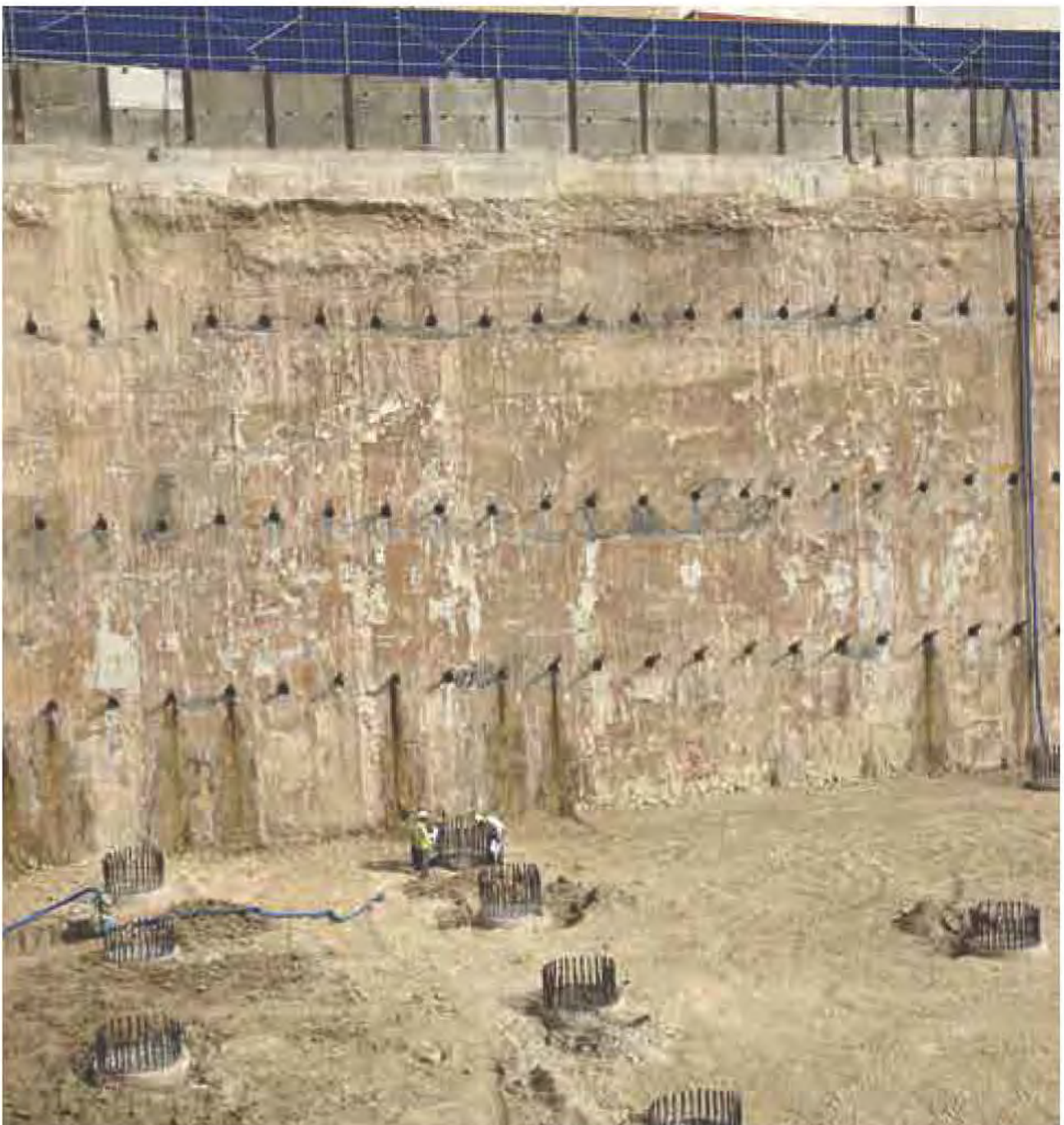
44. Proposed Building Shoring

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44.1 Introduction

The shoring system is a temporary support that provides a safe and efficient working environment during construction, reconstruction, demolition etc. For any structure, these temporary supports always use lateral support which encroaches DEWA existing services or corridors.

Therefore during the construction activities it is required to protect DEWA existing assets as per specified standards.



Proposed Building Shoring

44.2 Avoid the following



1. Shoring in DEWA corridor and above DEWA services.
2. Anchoring with in DEWA substation plot.
3. Anchoring towards DEWA OHL corridor.

44.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Shoring and existing DEWA Electricity LV Cables							
Electricity LV existing Services	Proposed Shoring	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	Shoring	0.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.1) • Vertical clearance (Ref Fig:44.1)
	Anchoring	NR	1.0 m	B	-		

Table 2: Clearance & Protection details for proposed Shoring and existing DEWA Electricity HV services							
Electricity HV existing Services	Proposed Shoring	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	Shoring	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 44.2) • Vertical clearance (Ref Fig: 44.2)
	Anchoring	NR	1.0 m	B	-		
HV (6.6/11/33 kV) O.H.L. (Stay rope)	Shoring	3.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.3)
HV (6.6/11/33 kV) O.H.L. (Conductor)	Shoring	5.0 m	NA	-	-	R	

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

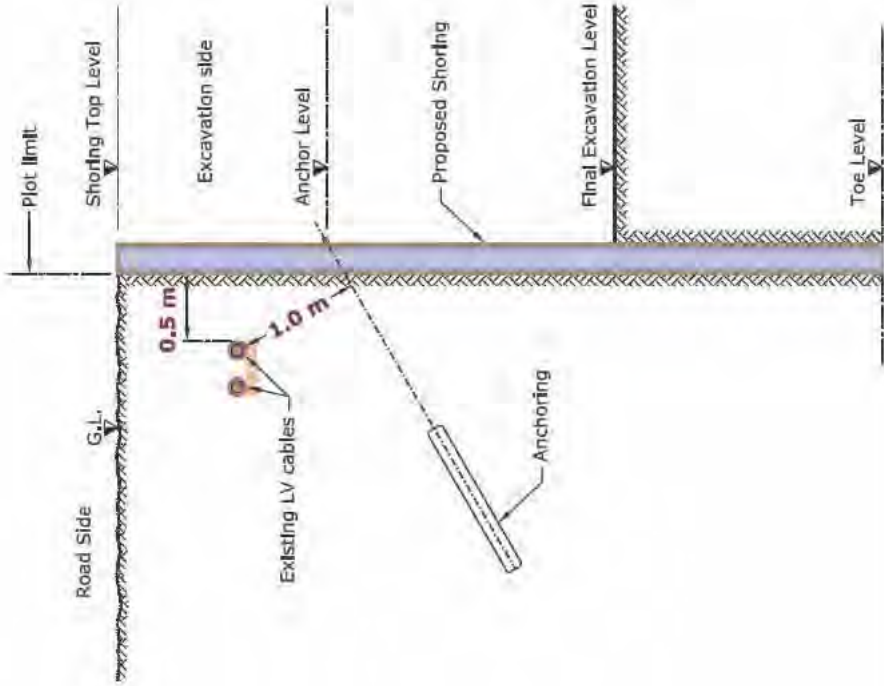
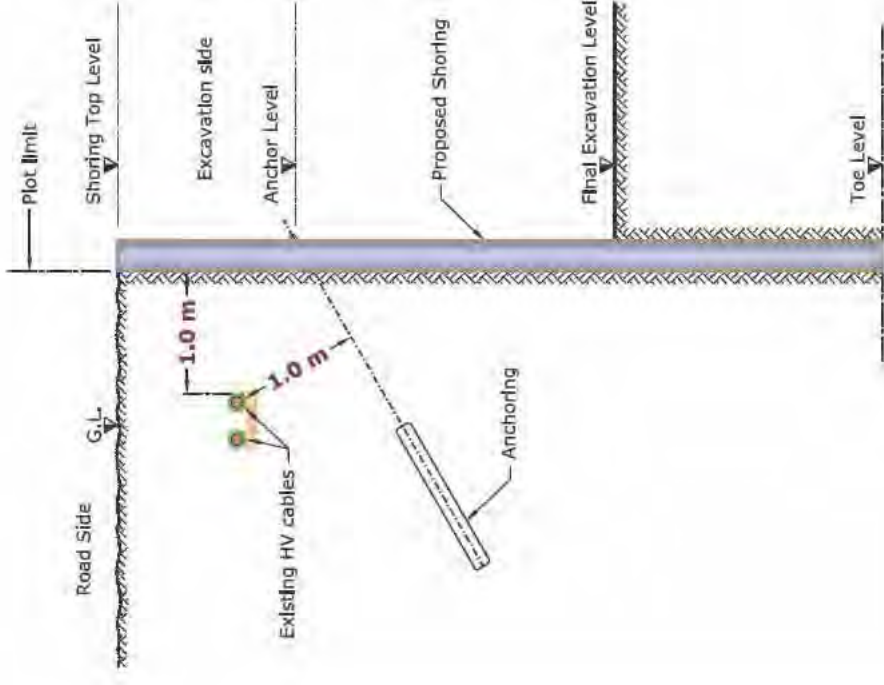
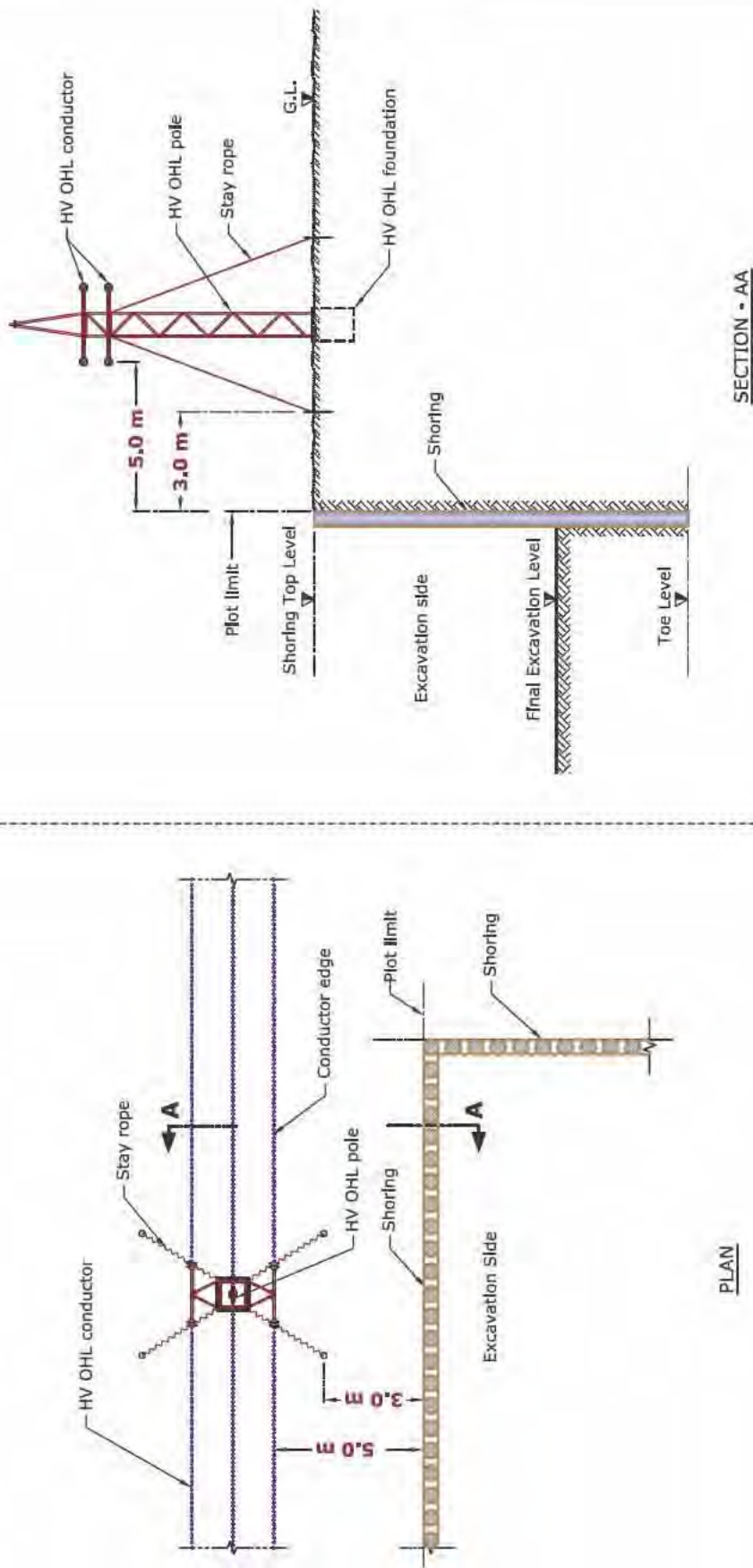
Fig: 44.1	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING LV CABLES	Fig: 44.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING HV SERVICES
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal/Vertical clearances are from the proposed Shoring/Anchor edge to existing LV/HV cable edge. 2. Trench side and existing LV/HV cable protection may be required as per site and soil condition. 	

Fig: 44.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING HV OHL (6.6/11/33 kV)



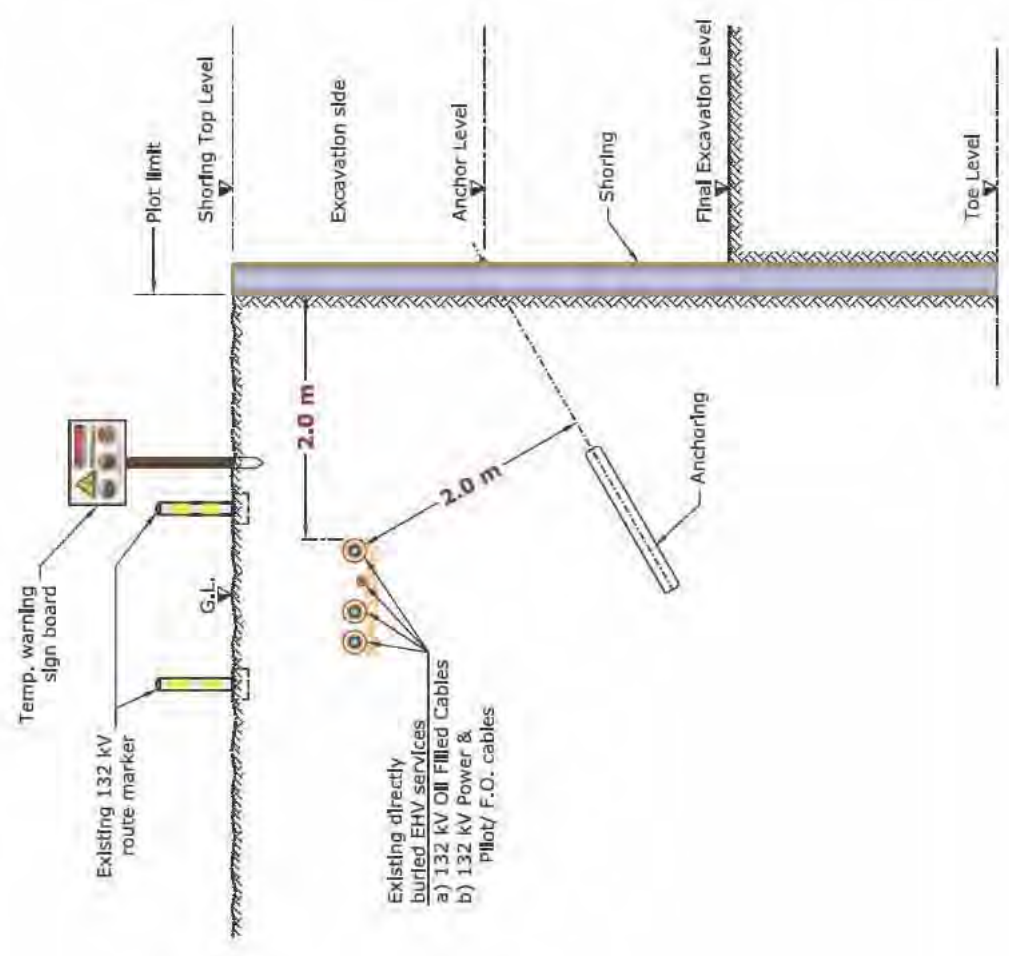
- NOTE :**
1. Horizontal clearance is from the proposed Shoring edge to existing HV OHL conductor.
 2. Trench side and existing HV OHL service protection may be required as per site and soil condition.
 3. Anchoring is not allowed towards HV OHL corridor.

Table 3: Clearance & Protection details for proposed Shoring and existing DEWA Electricity EHV services							
Electricity EHV existing Services	Proposed Shoring	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	Shoring	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.4)
	Anchoring	NR	2.0 m	B	-		
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	Shoring	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.4)
	Anchoring	NR	2.0 m	B	-		
EHV (132 kV) Trough	Shoring	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.5)
	Anchoring	NR	2.0 m	B	-		
EHV (132 kV) Duct Bank	Shoring	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.5)
	Anchoring	NR	2.0 m	B	-		
EHV (132 kV) Joint Bay/ Transition Joint	Shoring	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.6)
	Anchoring	NR	2.0 m	B	-		
EHV (132 kV) O.H.L	Shoring	15.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.7)
EHV (400 kV) O.H.L	Shoring	20.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig:44.8)
EHV (400 kV) Tunnel	To be studied on case by case basis						• Refer Note below
Note: The maximum vibration level for civil works not to exceed 15 mm/s PPV							

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES

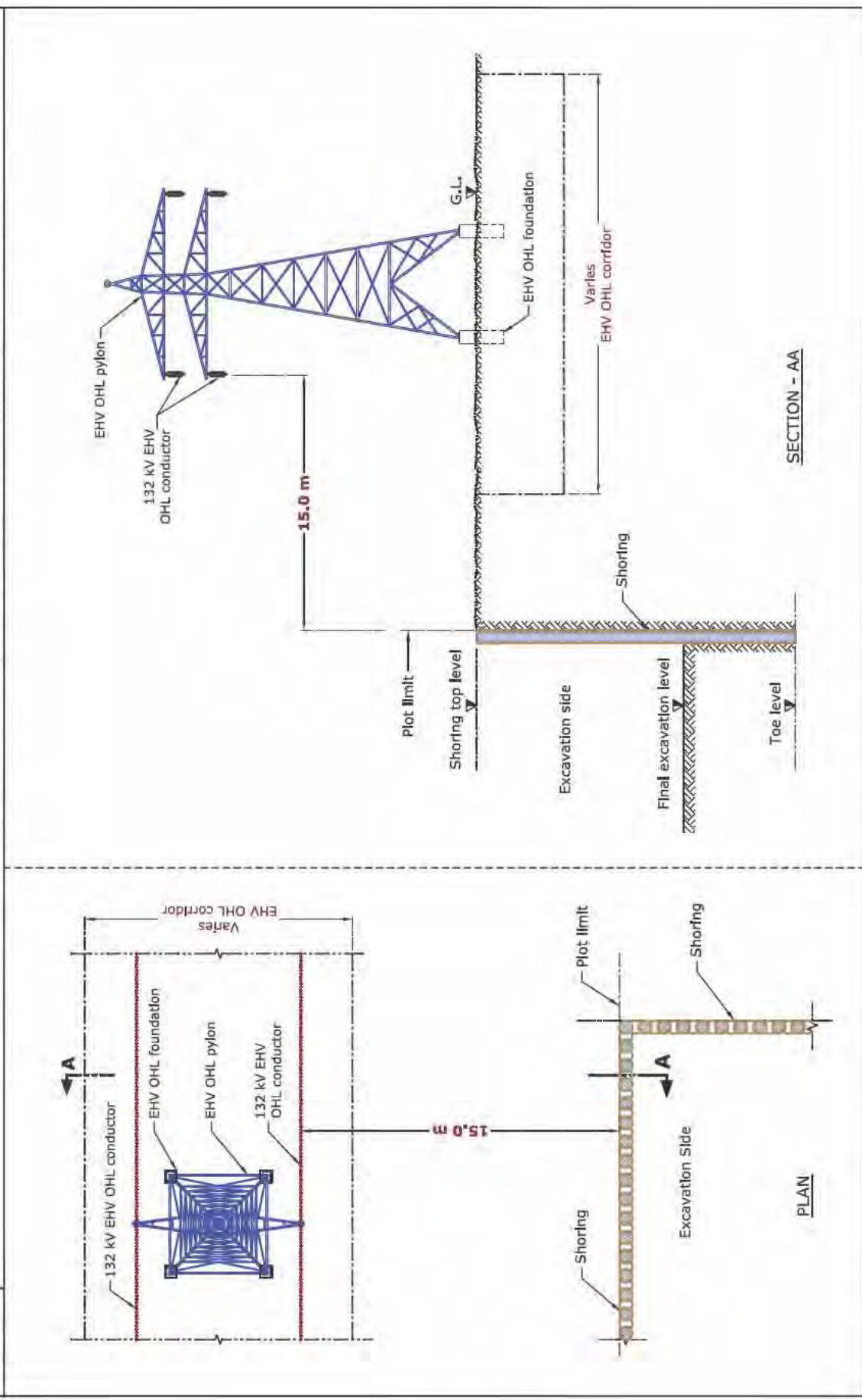
Fig: 44.4



NOTE : 1. Horizontal clearance is from the proposed Shoring/ Anchor edge to existing EHV 132 kV service edge.
2. Trench side and existing EHV 132 kV cable protection may be required as per site and soil condition.

Fig: 44.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING EHV 132 kV TROUGH/ DUCT BANK	Fig: 44.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
<p>Temp. warning sign board</p> <p>Existing Joint bay route marker</p> <p>G.L.</p> <p>Plot limit</p> <p>Shoring Top Level</p> <p>Excavation side</p> <p>Anchor Level</p> <p>Shoring</p> <p>Final Excavation Level</p> <p>Toe Level</p> <p>Existing EHV services</p> <p>a) 132 kV Trough</p> <p>b) 132 kV Duct bank</p> <p>2.0 m</p> <p>Anchoring</p>		<p>Temp. warning sign board</p> <p>Existing Joint bay route marker</p> <p>G.L.</p> <p>Plot limit</p> <p>Shoring Top Level</p> <p>Excavation side</p> <p>Anchor Level</p> <p>Shoring</p> <p>Final Excavation Level</p> <p>Toe Level</p> <p>Existing EHV services</p> <p>a) 132 kV Joint bay & Transition joint</p> <p>2.0 m</p> <p>Anchoring</p>	
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal/ vertical clearances are from the proposed Shoring/ Anchor edge to existing EHV 132 kV service edge.2. Trench side and existing EHV 132 kV services protection may be required as per site and soil condition.			

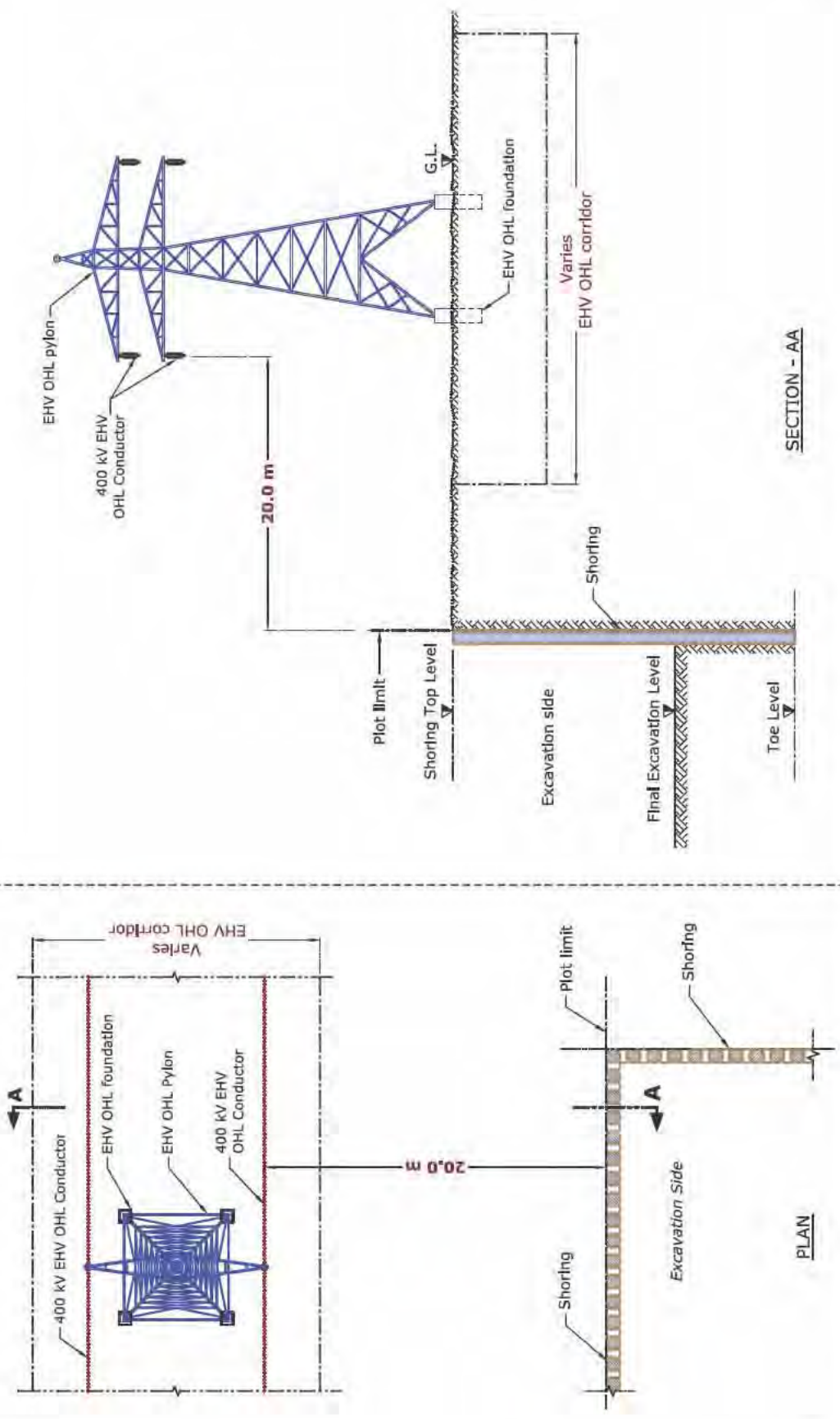
Fig: 44.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING EHV OHL (132 kV)



- NOTE :**
1. Horizontal clearance is from the proposed Shoring edge to existing EHV OHL conductor.
 2. Anchoring is not allowed towards EHV OHL corridor.
 3. Trench side and existing EHV OHL service protection may be required as per site and soil condition.

Fig: 44.8

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING EHV OHL (400 kV)



- NOTE :**
1. Horizontal clearance is from the proposed Shoring edge to existing EHV OHL conductor.
 2. Anchoring is not allowed towards EHV OHL corridor.
 3. Trench side and existing EHV OHL service protection may be required as per site and soil condition.

Table 4: Clearance & Protection details for proposed Shoring and existing DEWA Gas/Fuel services

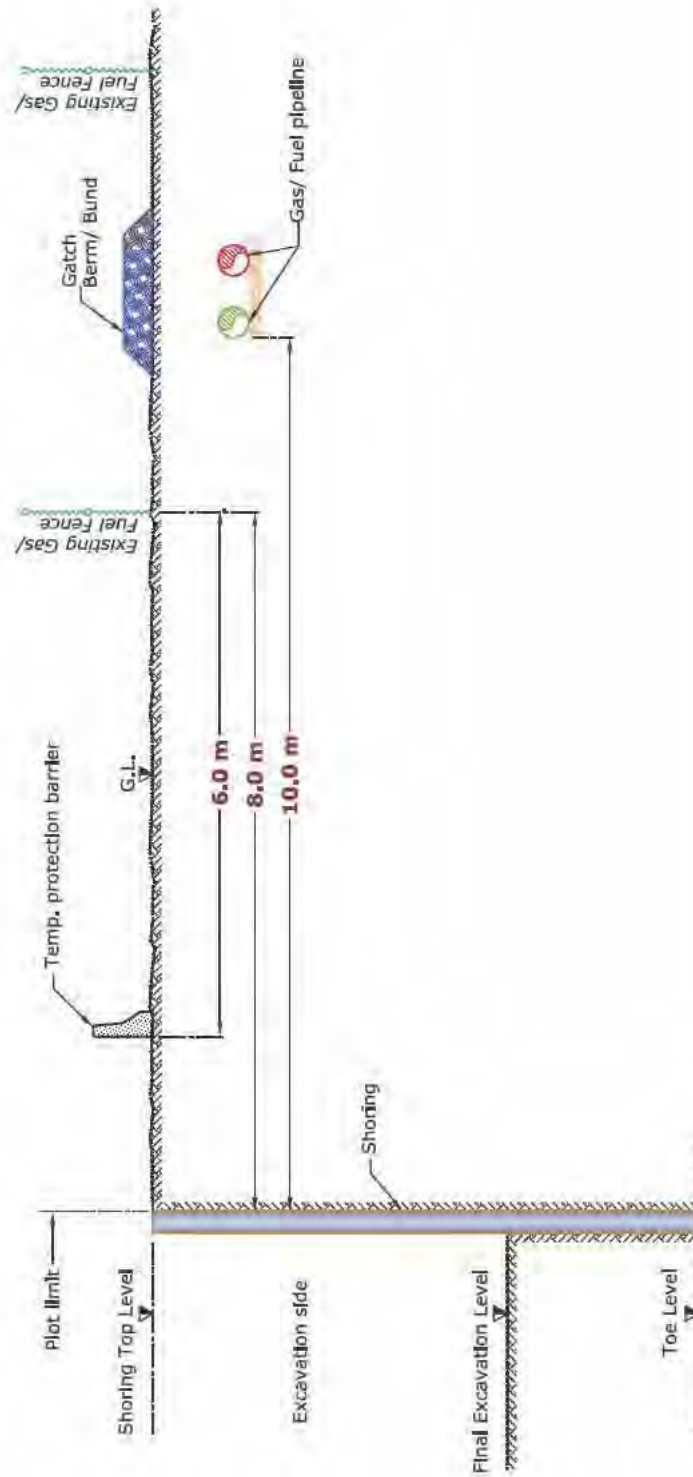
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:44.9)
Gas/Fuel Pipeline (All diameter)	10.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:44.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SHORING AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed Shoring edge to existing Gas/ Fuel Fence.
 2. Horizontal clearance 10.0 m from proposed Shoring edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.
 5. Anchoring is not allowed towards Gas/ Fuel corridor.

45. Proposed Scaffolding

45.1 Introduction

Scaffolding is a temporary platform arrangement erected to reach the heights for the purpose of construction, maintenance, repair, decoration etc. It is always made of wood and steel elements and accessories. Scaffolding always supports on

the ground by wooden/steel or concrete plates which may encroach DEWA existing assets or corridors, therefore during construction activities it is required to protect DEWA existing assets as per specified standards.



45.2 Avoid the following



1. Excavation above existing DEWA Services.
2. Placing vehicles/machineries above existing DEWA Services/corridor.
3. Scaffolding in EHV OHL Corridor.

45.3 Standard Clearance & Protection details

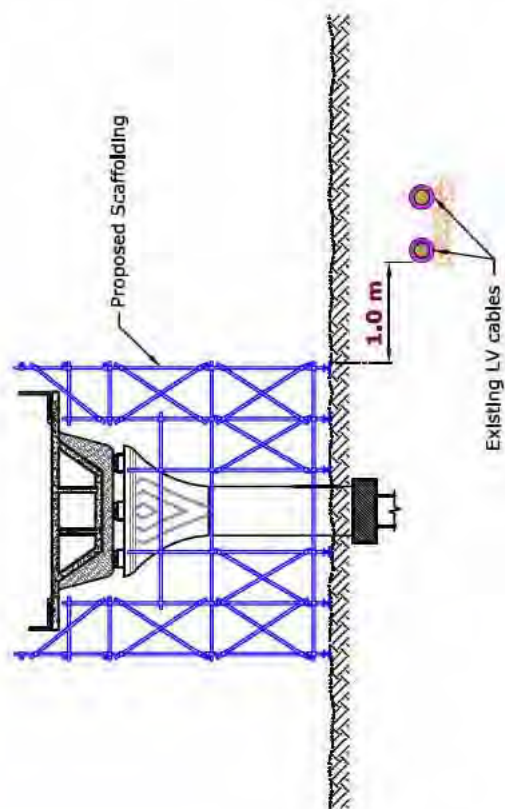
Table 1: Clearance & Protection details for proposed Scaffolding and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 45.1)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 45.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SCAFFOLDING AND EXISTING LV CABLES



NOTE :

1. Scaffolding structures/Machinerles/Equipments should be Minimum 1.0 m away from the existing LV cables as shown in the figure.
2. Existing LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed Scaffolding and existing DEWA Electricity HV services						
Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.2) Protection details (Ref Fig: 45.2)
HV (6.6/11/33 kV) Manhole	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.3)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.4)
HV (33 kV) O.H.L.		3.5 m				<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 45.4) Protection details (Ref Fig: 45.4)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

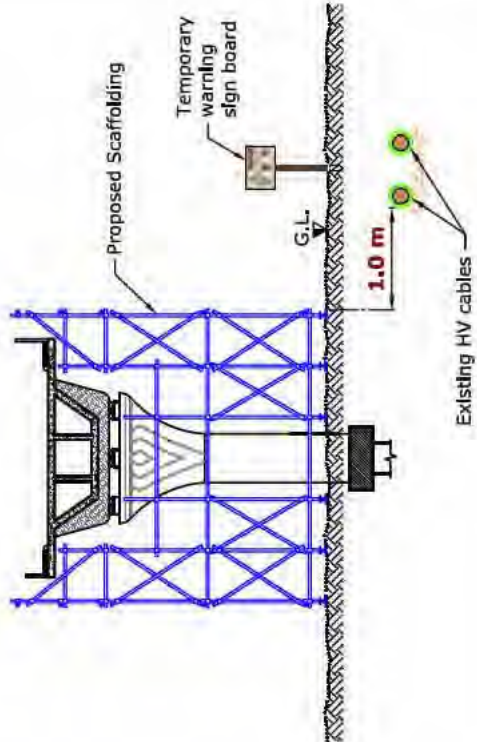
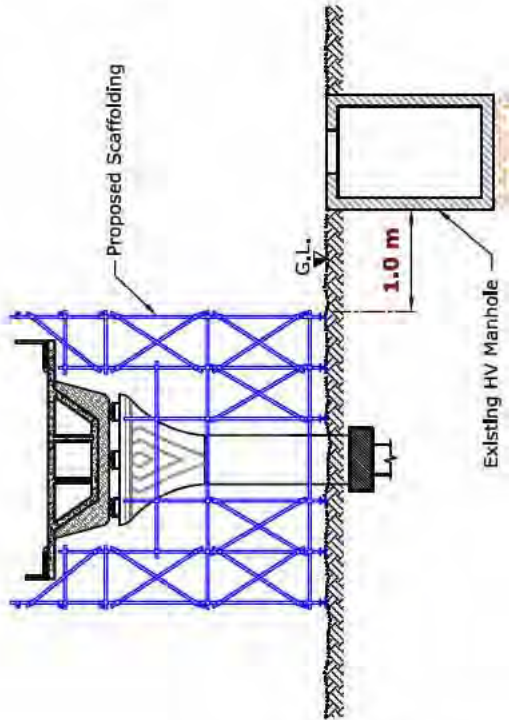
Fig: 45.2	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SCAFFOLDING AND EXISTING HV CABLES	Fig: 45.3	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SCAFFOLDING AND EXISTING MANHOLE
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Scaffolding structures/ Machinerles/ Equipments should be minimum 1.0 m away from the existing HV services as shown in the figure. 2. Temporary warning sign boards to be placed as shown in the figure. 3. Existing HV service protection may be required as per site and soil condition. 	

Fig: 45.4 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

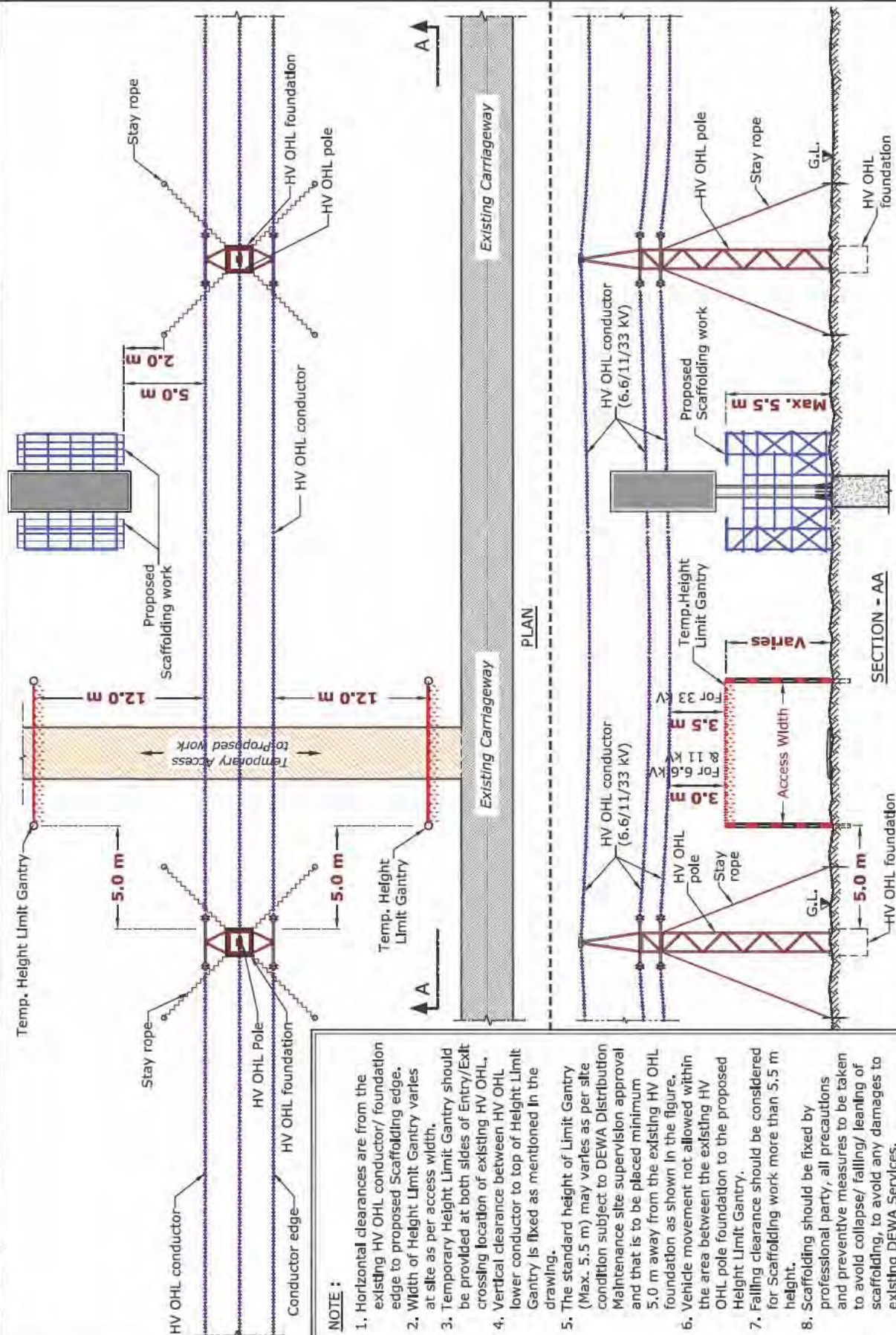


Table 3: Clearance & Protection details for proposed Scaffolding and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.5) Protection details (Ref Fig: 45.5)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.5) Protection details (Ref Fig: 45.5)
EHV (132 kV) Trough	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.6) Protection details (Ref Fig: 45.6)
EHV (132 kV) Duct Bank	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.6) Protection details (Ref Fig: 45.6)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.7)
EHV (132 kV) O.H.L	NR	15.0 m	B	-	R	<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 45.9) Protection details (Ref Fig: 45.9)
EHV (400 kV) O.H.L	NR	16.5 m	B	-	R	
EHV (400 kV) Tunnel	2.5 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.8) Protection details (Ref Fig: 45.8)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 45.9) Vertical clearance (Ref Fig: 45.9) Protection details (Ref Fig: 45.9)
EHV (400 kV) O.H.L		7.5 m				

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

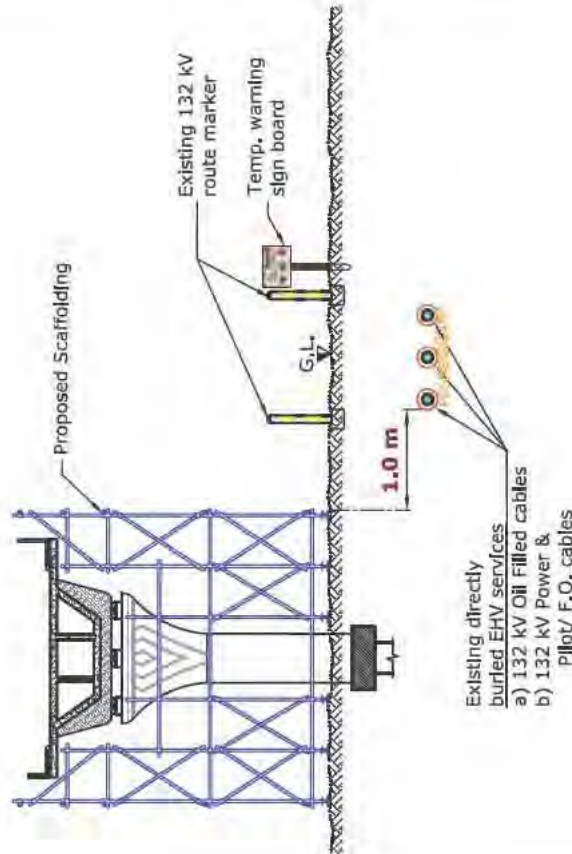
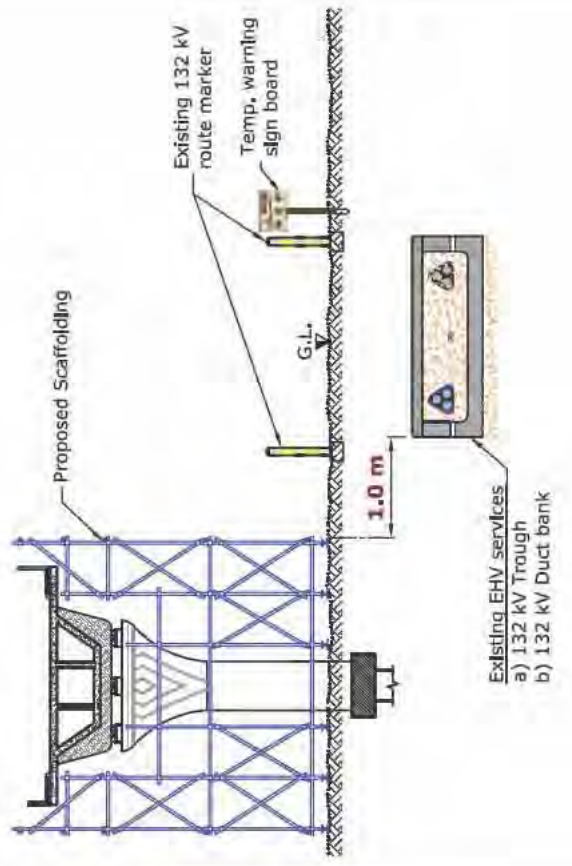
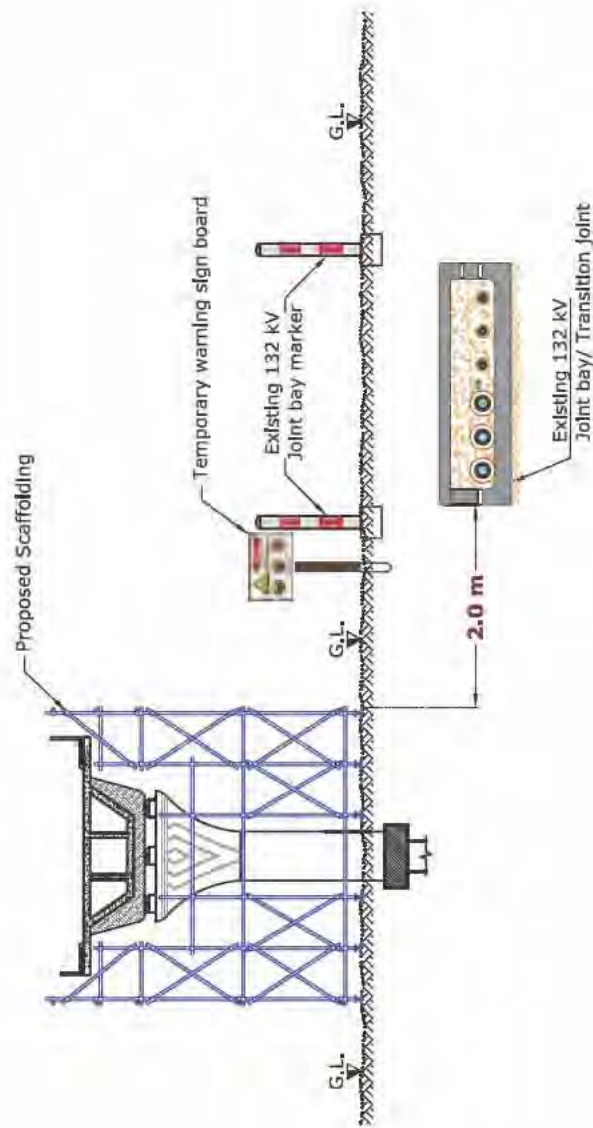
Fig: 45.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SCAFFOLDING AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	Fig: 45.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SCAFFOLDING AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
			
NOTE :		NOTE :	
1. Scaffolding structures/ Machines/ Equipments should be minimum 1.0 m away from the existing EHV services as shown in the figure.		1. Scaffolding structures/ Machines/ Equipments should be minimum 1.0 m away from the existing EHV services as shown in the figure.	
2. Existing EHV service protection may be required as per site and soil condition.		2. Existing EHV service protection may be required as per site and soil condition.	

Fig: 45.7

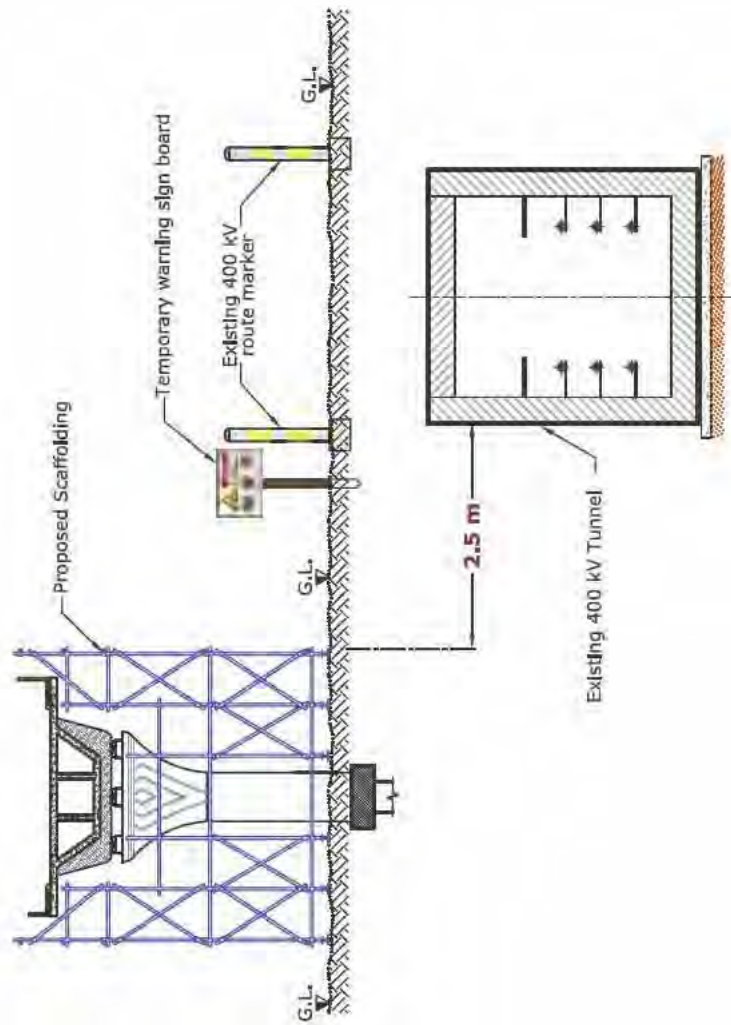
HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SCAFFOLDING AND EXISTING EHV JOINT BAY/ TRANSITION JOINT



NOTE :

1. Scaffolding structures/ Machinerles/ Equipments should be Minimum 2.0 m away from the existing 132 kV Joint bay/ Transition Joint as shown in the figure.
2. Existing 132 kV service protection may be required as per site and soil condition.

Fig: 45.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SCAFFOLDING AND EXISTING EHV 400 kV TUNNEL



NOTE :

1. Scaffolding structures/ Machines/ Equipments should be minimum 2.5 m away from the existing 400 kV Tunnel as shown in the figure.
2. Existing 400 kV Tunnel protection may be required as per site and soil condition.

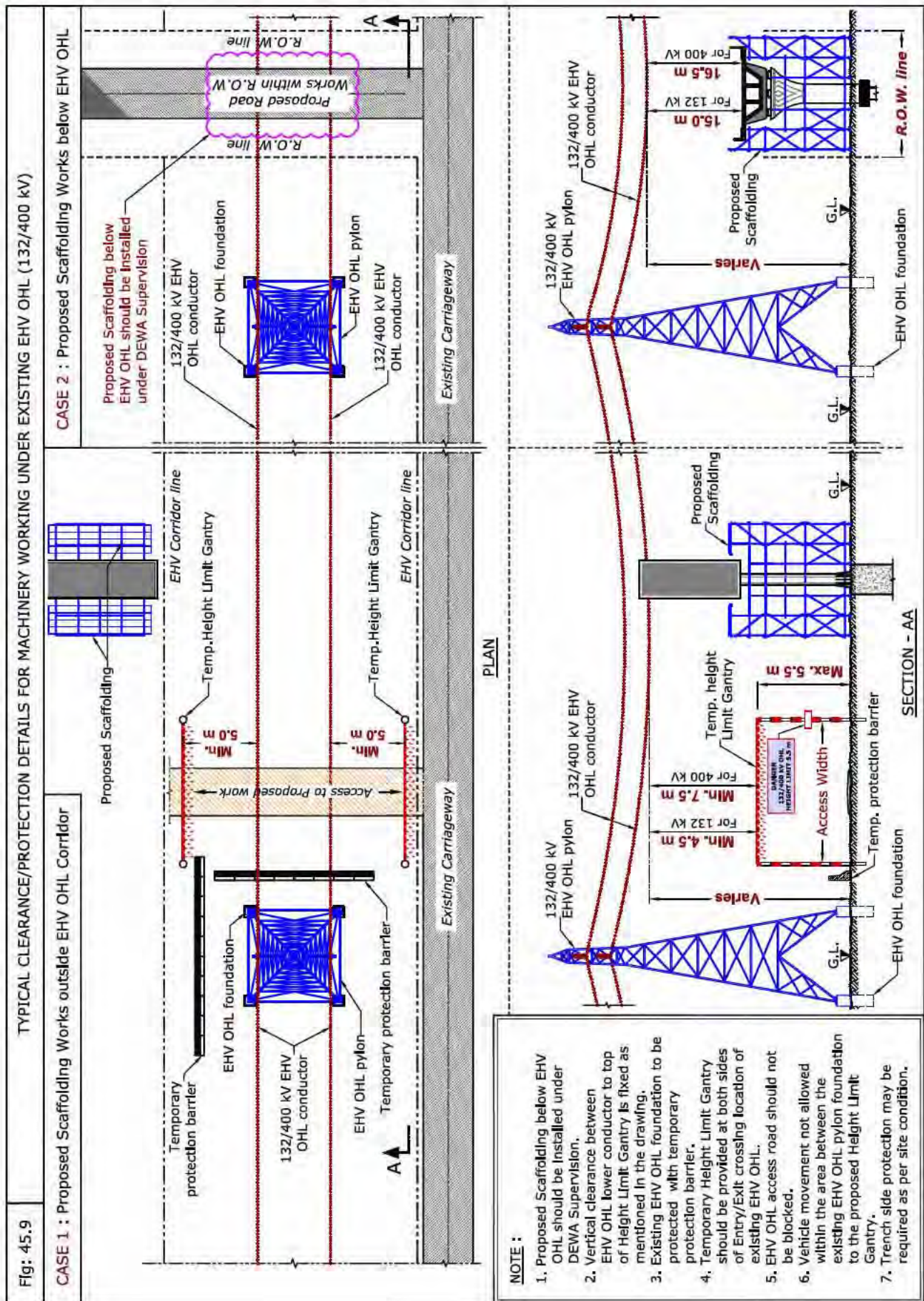


Table 4: Clearance & Protection details for proposed Scaffolding and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 45.10) • Protection details (Ref Fig: 45.10)
Gas/Fuel Pipeline (All diameter)	10.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 45.10) • Protection details (Ref Fig: 45.10)

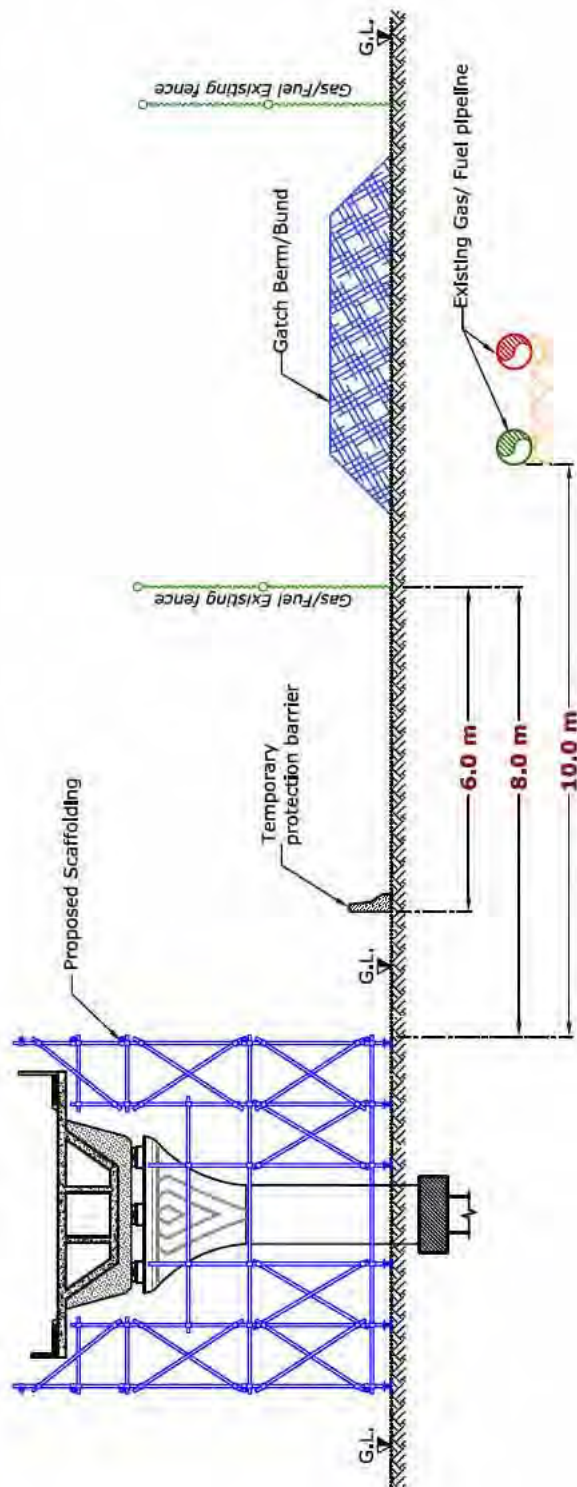
Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Proposed Scaffolding

Fig: 45.10 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SCAFFOLDING AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Scaffolding structures/ Machines/ Equipments should be minimum 8.0 m away from the existing fence as shown in the figure.
 2. Horizontal clearance 10.0 m from proposed Scaffolding edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.

46. Proposed Utility Manhole/ Chamber/Gully

727

46.1 Introduction

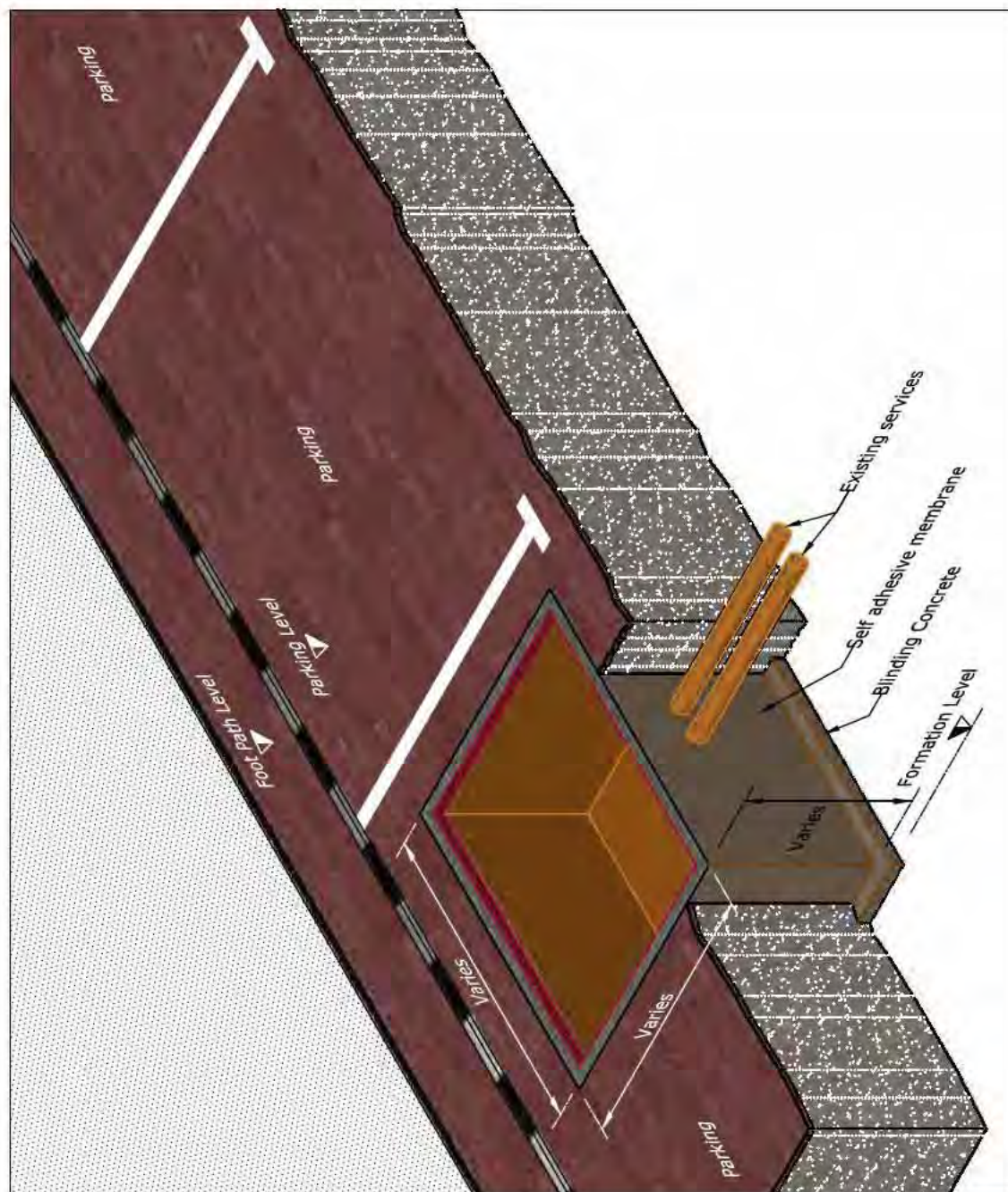
After completion of a particular network it may be required to connect and/or upgrade the existing system by lowering/raising or adding extra chambers/manholes or gullies in accordance with the revised design.

During construction activities, the required utility manhole/utility chamber/gully may encroach DEWA existing services and/or corridors therefore it is required to protect DEWA existing assets as per specified standard.



Proposed Utility Manhole/Chamber/Gully

TYPICAL UTILITY CHAMBER DETAIL



46.2 Avoid the following



1. Proposal for Utility Manhole /Utility Chamber & Gully in DEWA corridor.

46.3 Standard Clearance & Protection details

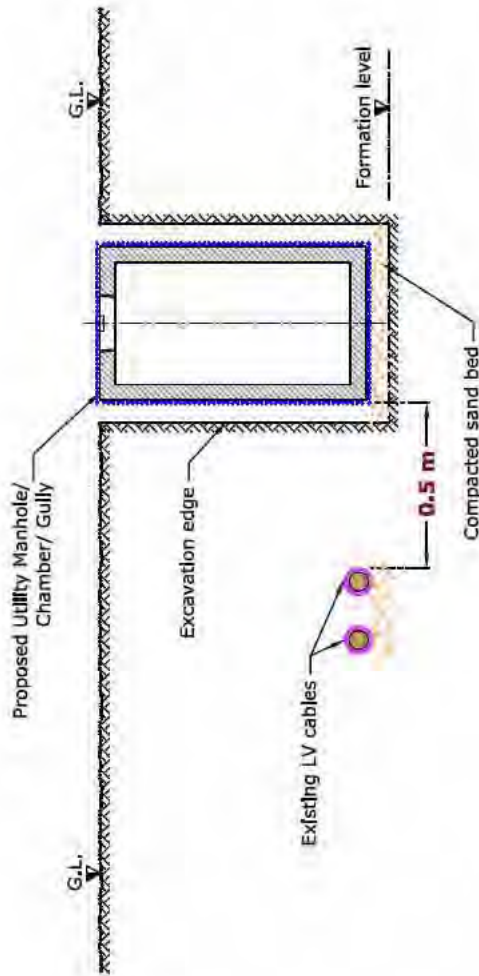
Table 1: Clearance & Protection details for proposed construction of Utility Manhole/Chamber/ Gully and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	0.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.1)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 46.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED UTILITY MANHOLE/ CHAMBER/ GULLY AND EXISTING LV CABLES



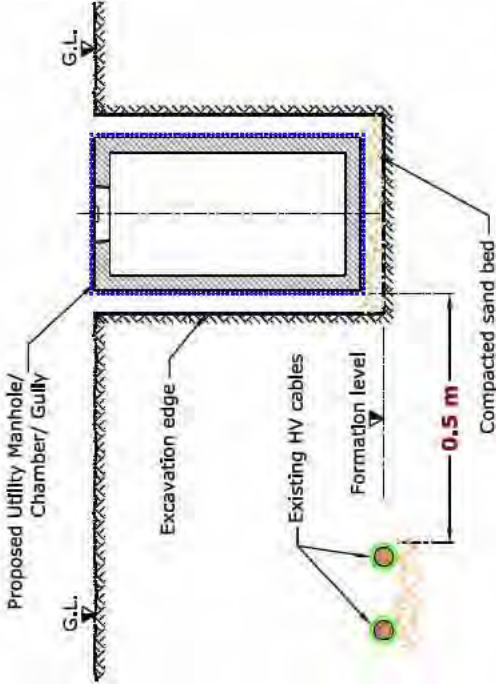
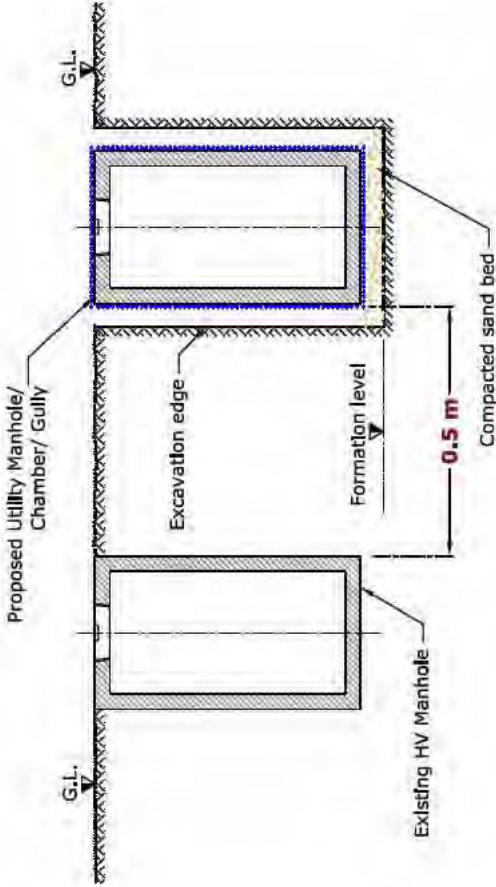
- NOTE :**
1. Horizontal clearance is from the proposed Utility Manhole/ Chamber/ Gully edge to existing LV cable edge.
 2. Utility Manhole/ Chamber/ Gully should be constructed within designated/ allowed corridor only.
 3. Trench side and existing LV cable protection may be required as per site and soil condition.

Table 2: Clearance & Protection details for proposed construction of Utility Manhole/Chamber/ Gully and existing DEWA Electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	0.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.2 - Case1)
HV (6.6/11/33 kV) Manhole			-	-	R	• Horizontal clearance (Ref Fig: 46.2 - Case 2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig: 46.3)
Clearance & Protection details for access under Existing HV OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	• Horizontal clearance (Ref Fig: 46.3)
HV (33 kV) O.H.L.		3.5 m				• Vertical clearance (Ref Fig: 46.3) • Protection details (Ref Fig: 46.3)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 46.2	HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED UTILITY MANHOLE/ CHAMBER/ GULLY AND EXISTING HV SERVICES
	CASE 2 : Parallel to existing HV Manhole
<p>CASE 1 : Parallel to existing HV cables</p> 	
NOTE :	<ol style="list-style-type: none"> 1. Horizontal clearances are from the proposed Utility Manhole/ Chamber/ Gully edge to existing HV services edge. 2. Utility Manhole/ Chamber/ Gully should constructed within designated/ allowed corridor only, 3. Trench side and existing HV service protection may be required as per site and soil condition.

TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

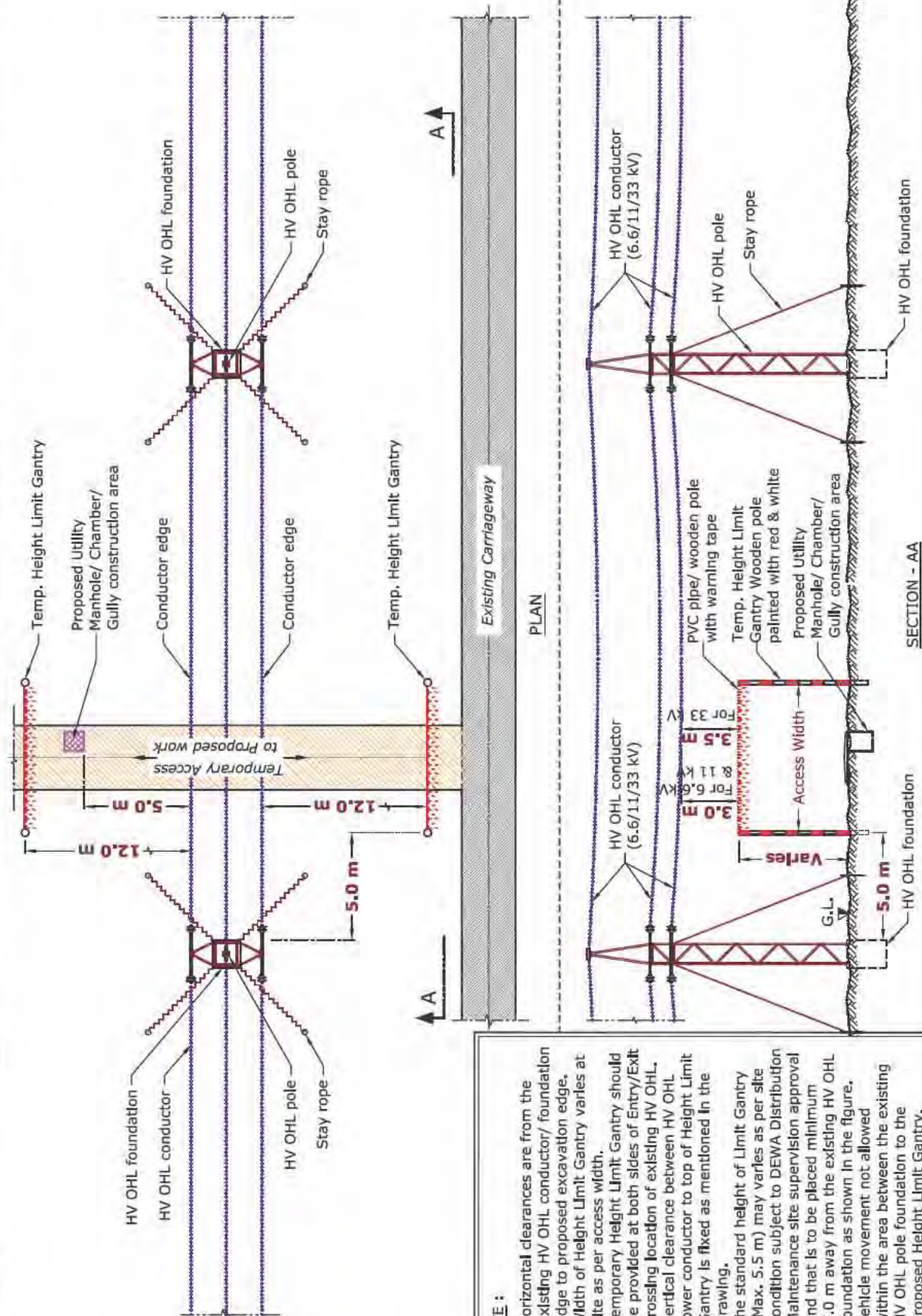
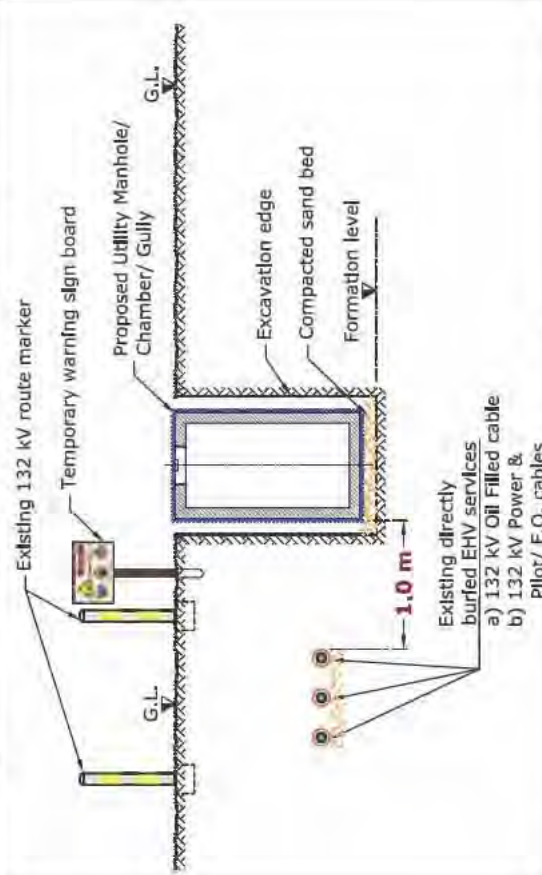
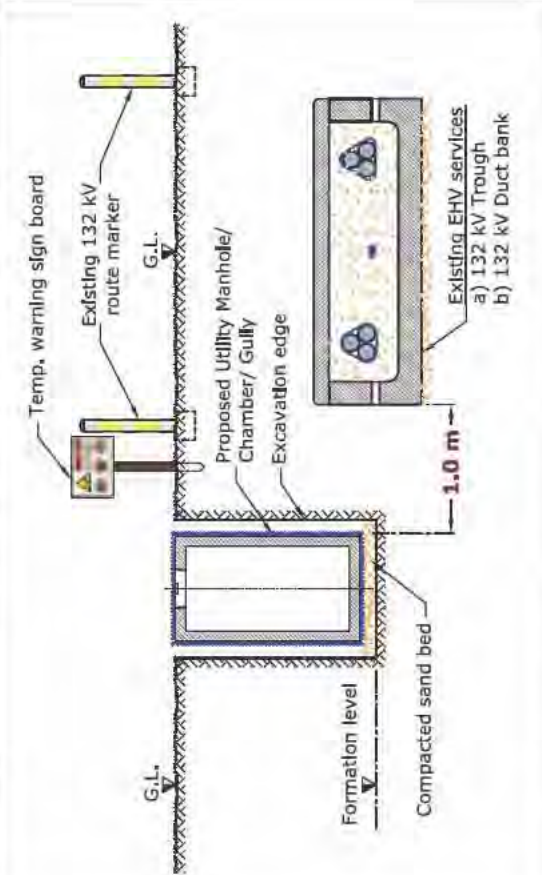
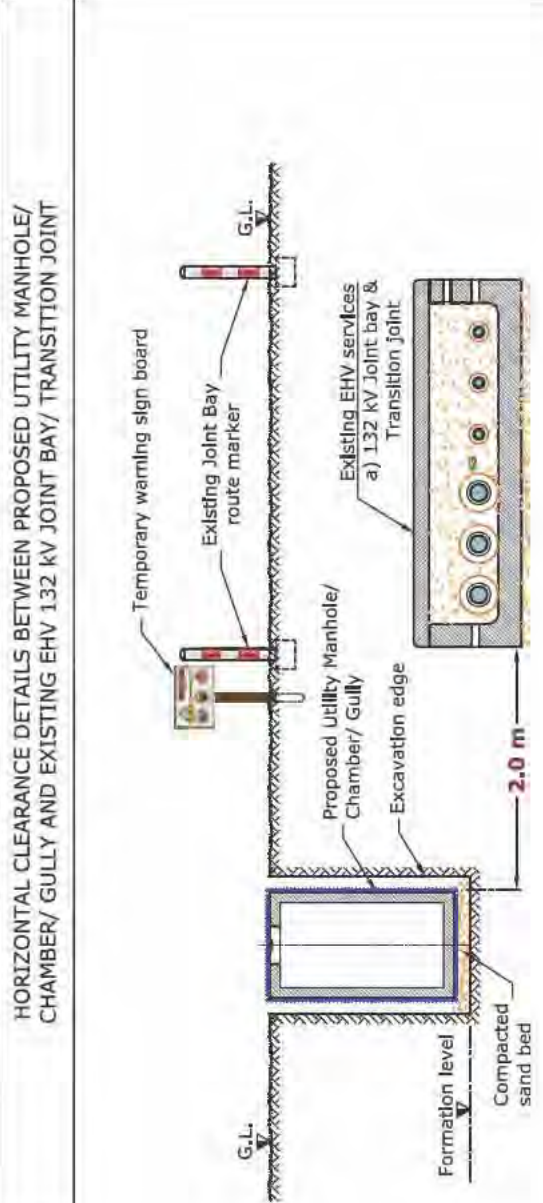


Table 3: Clearance & Protection details for proposed construction of Utility Manhole/Chamber/ Gully and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.4)
EHV (132 kV) Trough	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.5)
EHV (132 kV) Duct Bank	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.5)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.6)
EHV (132/400 kV) O.H.L	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.7)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.8)
Clearance & Protection details for access and working under Existing EHV OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	• Horizontal clearance (Ref Fig: 46.7)
EHV (400 kV) O.H.L		7.5 m				• Vertical clearance (Ref Fig: 46.7) • Protection details (Ref Fig: 46.7)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

<p>Fig: 46.4</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED UTILITY MANHOLE/ CHAMBER/ GULLY AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES</p>  <p>Existing directly buried EHV services a) 132 kV Oil Filled cable b) 132 kV Power & Pilot/ F.O. cables</p>	<p>Fig: 46.5</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN UTILITY MANHOLE/ CHAMBER/ GULLY AND EXISTING EHV 132 kV TROUGH/ DUCT BANK</p> 
<p>NOTE :</p> <ol style="list-style-type: none">1. All horizontal clearances are from proposed Utility Manhole/ Chamber/ Gully outer edge to existing EHV services edge.2. Minimum 0.5 m horizontal clearance is required from the proposed excavation edge to the existing EHV service edge.3. Existing EHV Cables falling parallel to the proposed excavation, temporary warning sign boards to be fixed along the existing cable route at 20.0 m intervals.4. Horizontal clearance minimum 3.0 m should be maintained from the proposed Utility Manhole/ Chamber/ Gully outer edge to existing 132 kV link box with RTA standard protection.5. Utility Manhole/ Chamber/ Gully should be constructed within designated/ allowed corridor only.6. Trench side and existing EHV services protection may be required as per site and soil condition.	<p>Fig: 46.6</p>	<p>HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED UTILITY MANHOLE/ CHAMBER/ GULLY AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT</p> 	

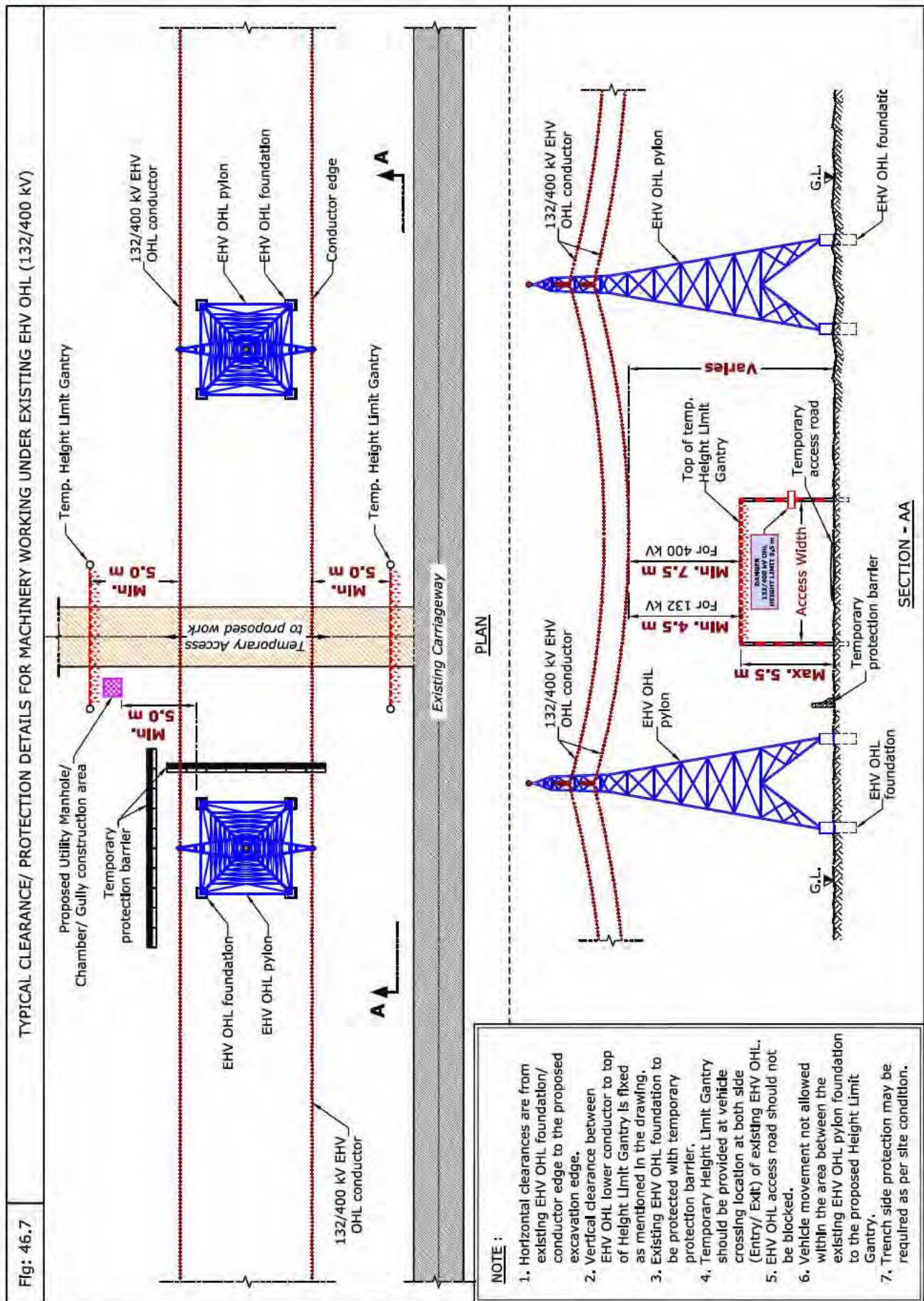
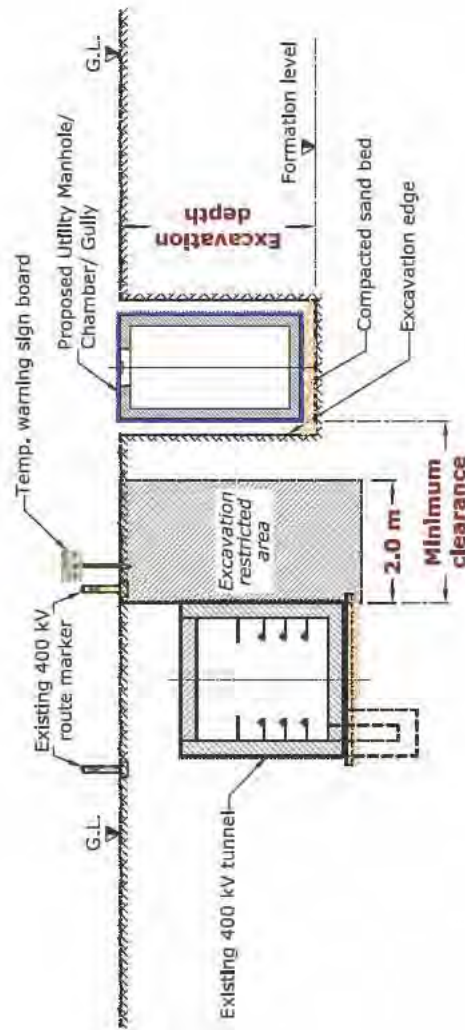


Fig: 46.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED UTILITY MANHOLE/ CHAMBER/ GULLY AND EXISTING 400 kV TUNNEL



NOTE :

1. Proposed excavation less than 2.0 m parallel to existing 400 kV tunnel not allowed as shown.
2. Horizontal clearance is directly proportional to the excavation depth. (Ref. Table 'A')
3. Utility Manhole/ Chamber/ Gully should be constructed within designated/ allowed corridor only.
4. Access to DEWA existing utilities should not be blocked.
5. Trench side and existing 400 kV tunnel service protection may be required as per site and soil condition.

TABLE 'A'

Excavation Depth	Minimum Clearance (Between existing 400 kV tunnel edge to proposed Safety Fence foundation edge)
Up to 2.0 m	2.5 m
3.0 m	3.0 m
4.0 m	4.0 m
5.0 m	5.0 m

Table 4: Clearance & Protection details for proposed construction of Utility Manhole/Chamber/ Gully and existing DEWA Gas/Fuel services

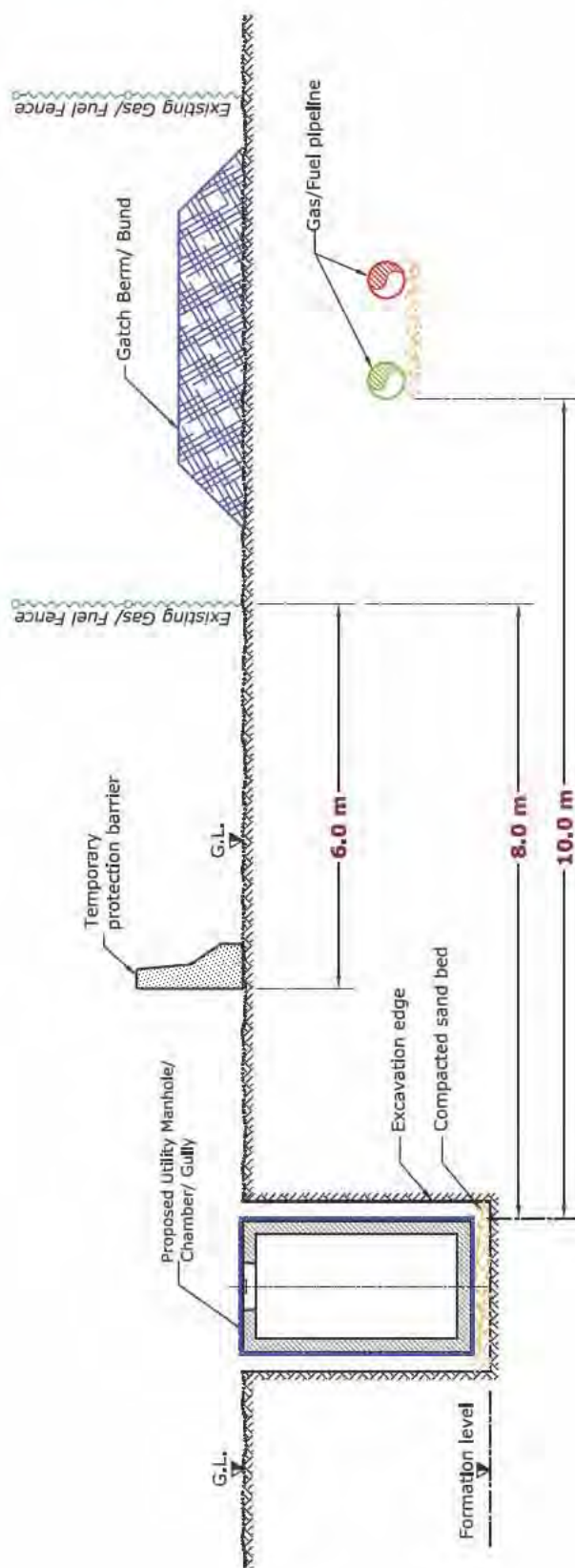
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.9)
Gas/Fuel Pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 46.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 46.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED UTILITY MANHOLE/ CHAMBER/ GULLY AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed Utility Manhole/ Chamber/ Gully edge to existing Gas/ Fuel Fence.
 2. Horizontal clearance 10.0 m from proposed Utility Manhole/ Chamber/ Gully edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Trench side and existing Gas/ Fuel pipeline protection may be required as per site and soil condition.

47. Proposed Loading/Unloading materials and Machineries

47.1 Introduction

It is a normal daily practice for the trading and construction industry to procure the materials and machines from/to the construction site, therefore all wiring/slides/ropes and handling shall be handled by skilled labourers/operators only, which should conform to the international and the project specifications and supplier/machine manufacturer

recommendations. Hence it is required during this process to consider environmental rules and regulations. Loading/unloading of materials and machines could affect DEWA existing services and/or encroaching corridors therefore during this process it is required to protect DEWA existing assets as per specified standards.



47.2 Avoid the following



1. Machineries and Materials parking and stocking in DEWA corridors /Reservations

47.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Loading, Unloading Material Machinery and existing DEWA Electricity LV Cables

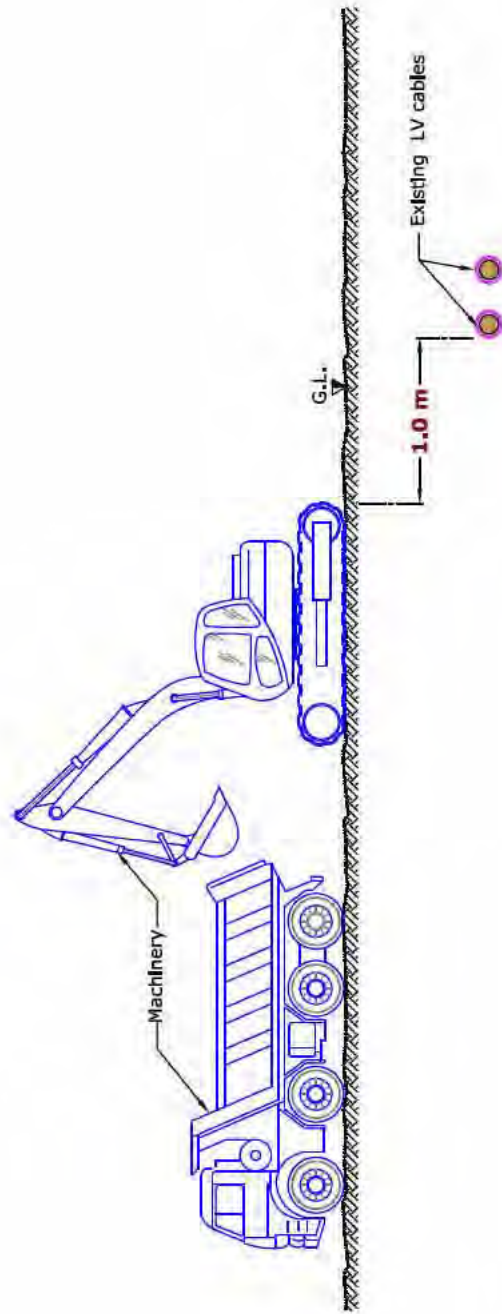
Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 471)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 47.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LOADING/ UNLOADING MATERIAL MACHINERY AND EXISTING LV CABLES

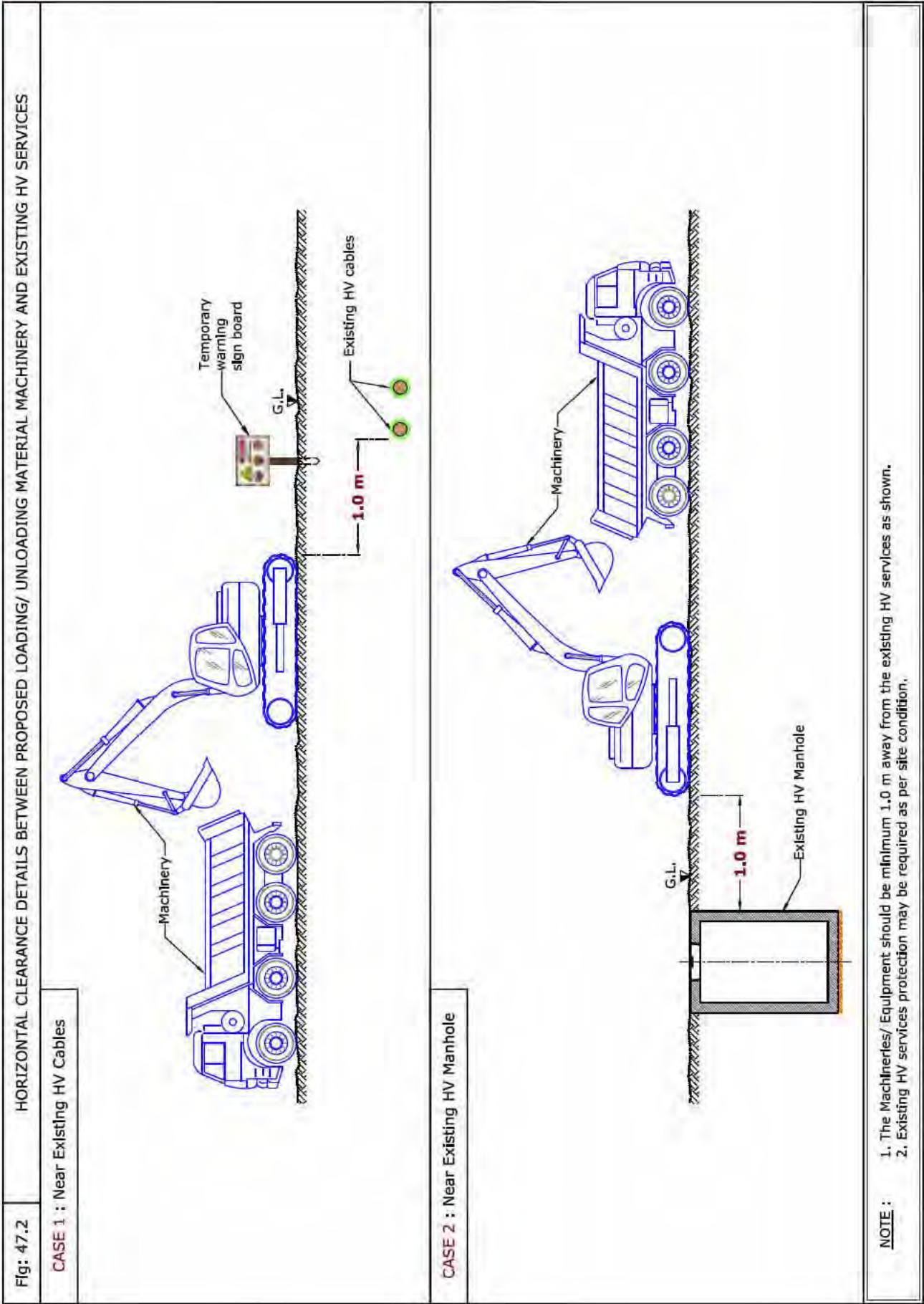


NOTE :

1. The Machines/ Equipment should be minimum 1.0 m away from the existing LV cables as shown.
2. Existing LV cable protection may be required as per site condition.

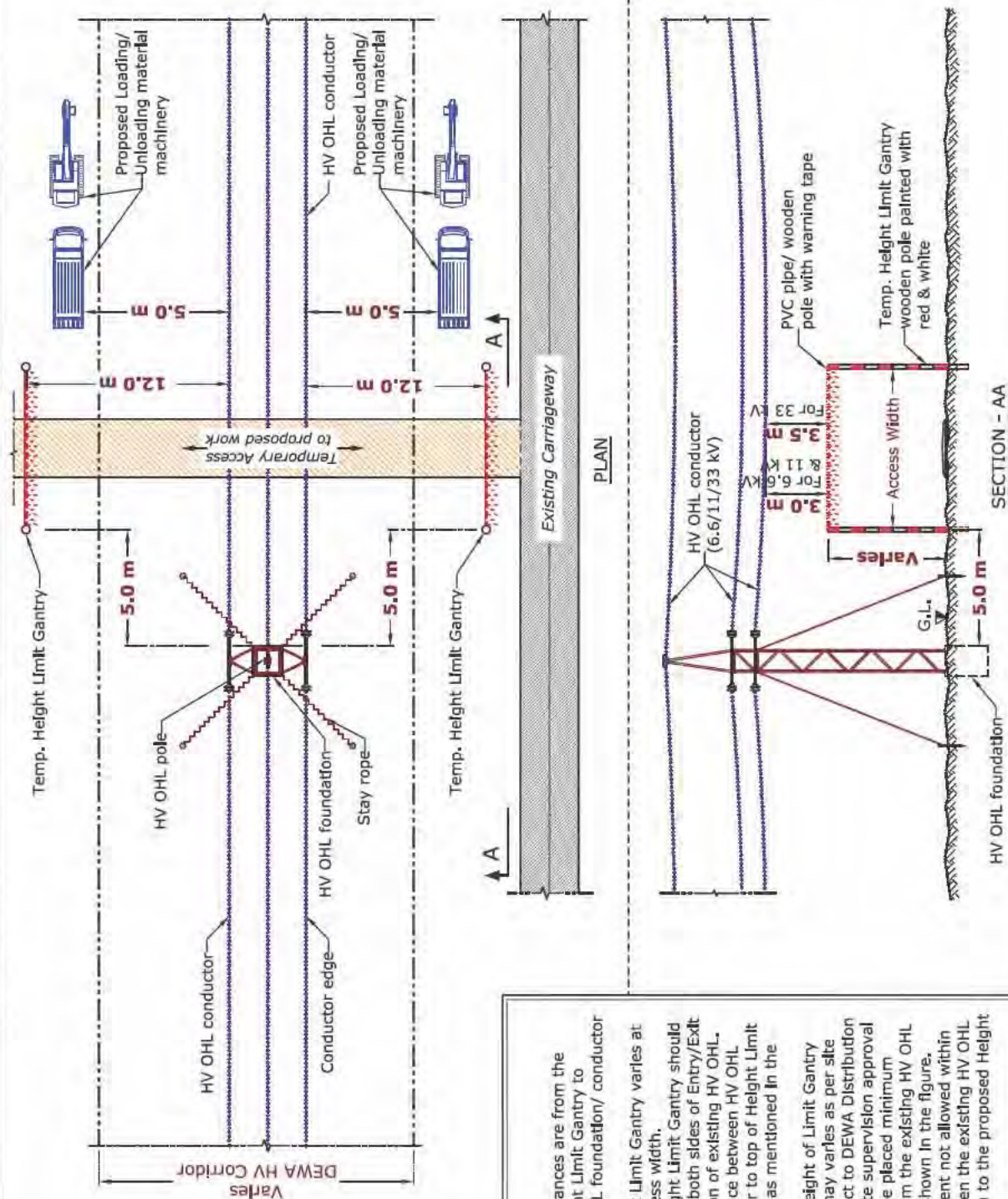
Table 2: Clearance & Protection details for proposed Loading, Unloading Material Machinery and existing DEWA Electricity HV services						
Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.2, Case 1)
HV (6.6/11/33 kV) Manhole			-	-	-	• Horizontal clearance (Ref Fig: 47.2, Case 2)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.3)
Clearance & Protection details for access under Existing HV OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	• Horizontal clearance (Ref Fig: 47.3)
HV (33 kV) O.H.L.		3.5 m				• Vertical clearance (Ref Fig: 47.3) • Protection details (Ref Fig: 47.3)

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

Fig: 47.3

**NOTE :**

1. Horizontal clearances are from the proposed Height Limit Gantry to existing HV OHL foundation/ conductor edge.
2. Width of Height Limit Gantry varies at site as per access width.
3. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing HV OHL.
4. Vertical clearance between HV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
5. The standard height of Limit Gantry (Max. 5.5 m) may vary as per site condition subject to DEWA Distribution Maintenance site supervision approval and that is to be placed minimum 5.0 m away from the existing HV OHL foundation as shown in the figure.
6. Vehicle movement not allowed within the area between the existing HV OHL pole foundation to the proposed Height Limit Gantry.

Table 3: Clearance & Protection details for proposed Loading, Unloading Material Machinery and existing DEWA Electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.4)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.4)
EHV (132 kV) Trough	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.5)
EHV (132 kV) Duct Bank	2.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.5)
EHV (132 kV) Joint Bay/ Transition Joint	3.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig: 47.6)
EHV (132/400 kV) O.H.L	5.0 m	-	B	-	R	• Horizontal clearance (Ref Fig: 47.8)
EHV (400 kV) Tunnel	2.5 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.7)
Clearance & Protection details for access under Existing EHV OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	• Horizontal clearance (Ref Fig: 47.8)
EHV (400 kV) O.H.L		7.5 m				• Vertical clearance (Ref Fig: 47.8) • Protection details (Ref Fig: 47.8)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

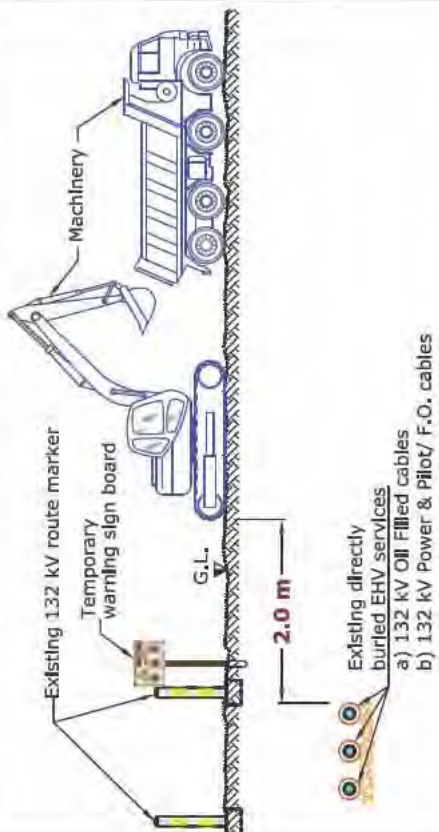
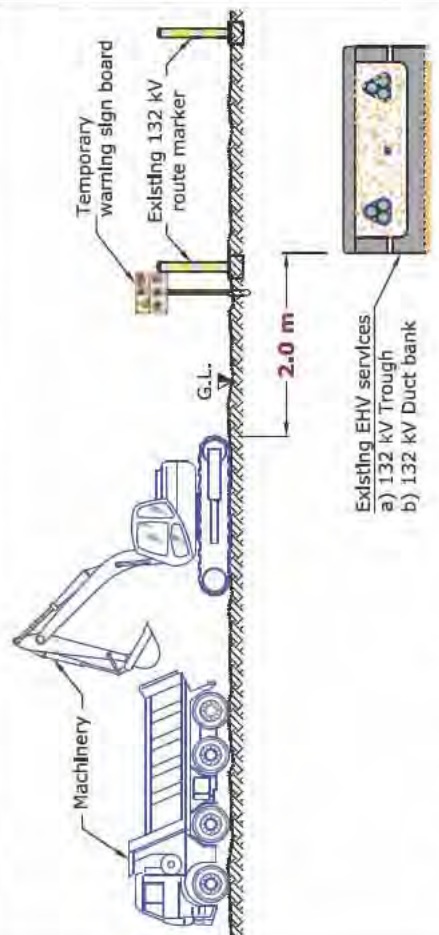
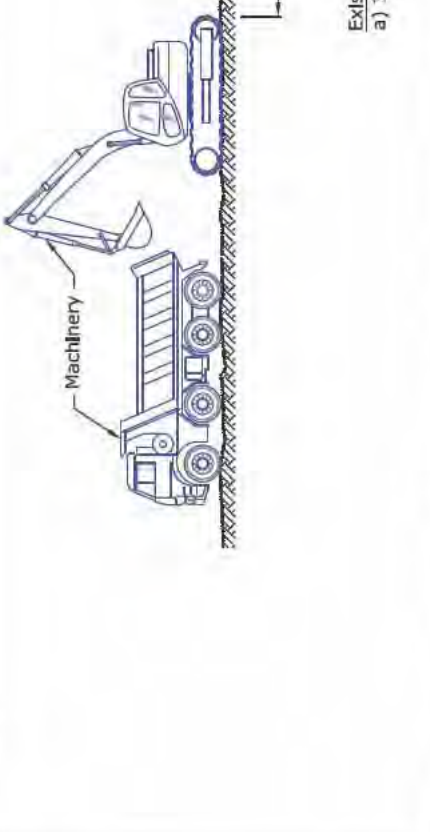
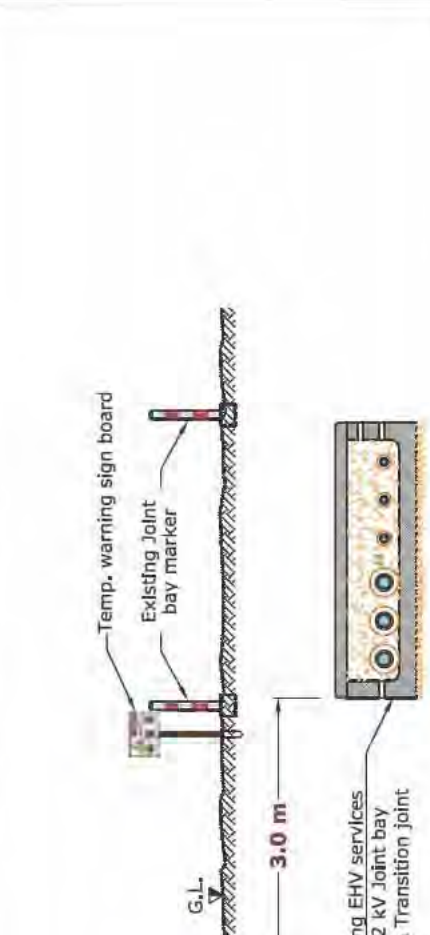
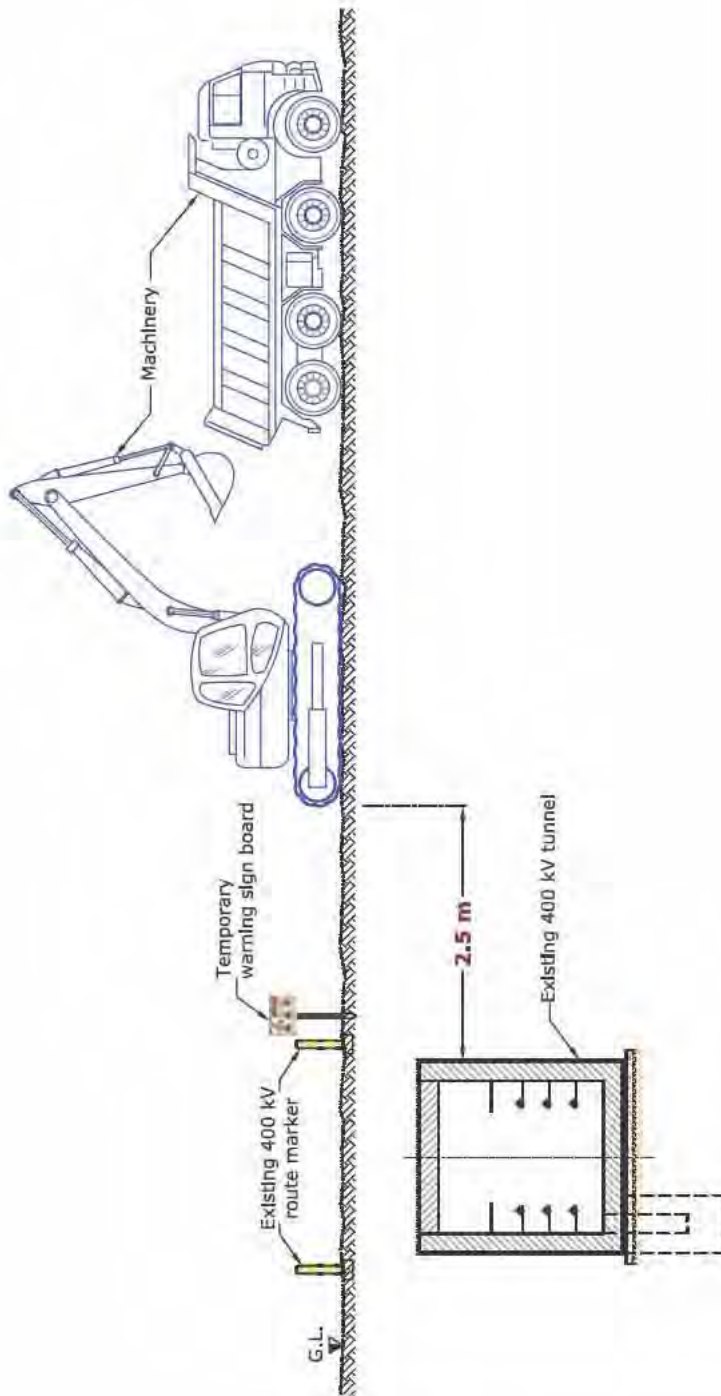
Fig: 47.4	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LOADING/ UNLOADING MATERIAL MACHINERY AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES	Fig: 47.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LOADING/ UNLOADING MATERIAL MACHINERY AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
		Fig: 47.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED LOADING/ UNLOADING MATERIAL MACHINERY AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearances are from the proposed Machinery location to existing 132 kV service edge as shown. 2. If any vehicle/ equipment are required to cross temporary over the existing EHV 132 kV cable corridor at unmade areas, existing EHV services at crossing area to be protected with protection slab/ steel sheet (over the ground - with extra sand filling) under DEWA supervision. 3. Proposed temporary access crossing should not come over the existing 132 kV cable joint and near to the link box areas. 	

Fig: 47.7

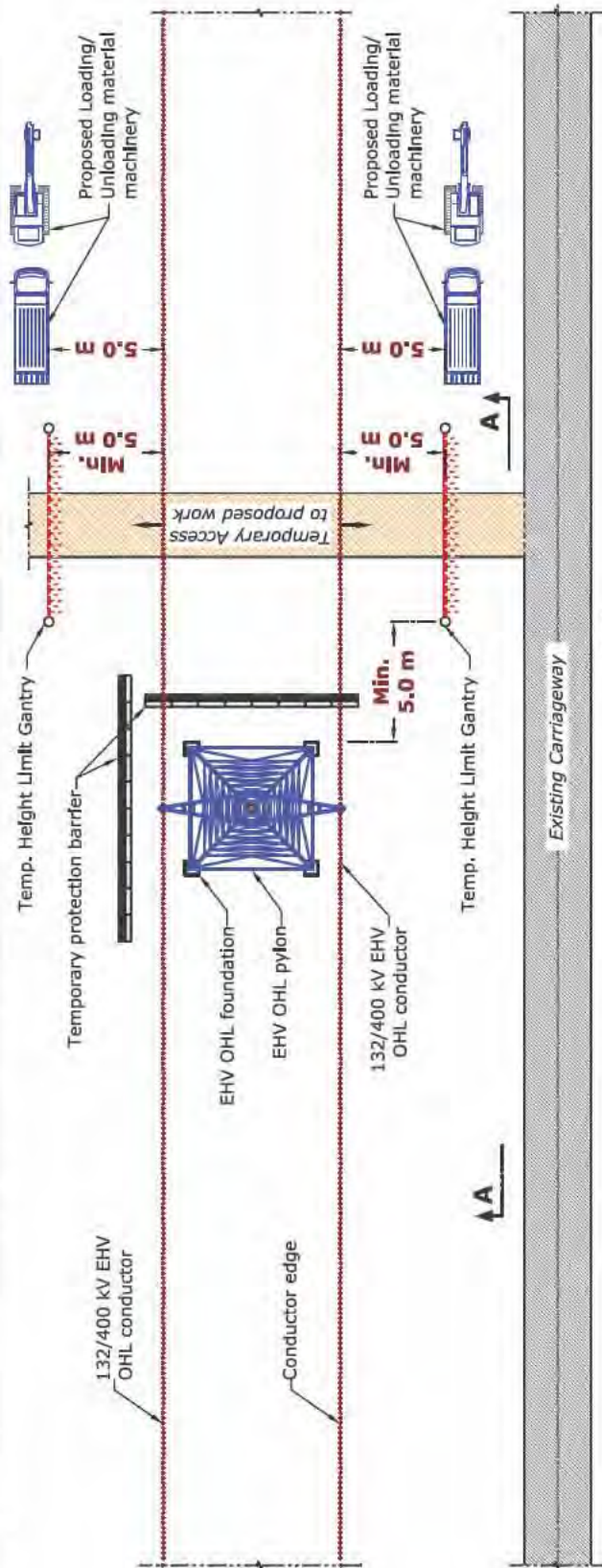
HORIZONTAL CLEARANCES DETAILS BETWEEN PROPOSED LOADING/ UNLOADING MATERIAL MACHINERY AND EXISTING 400 kV TUNNEL



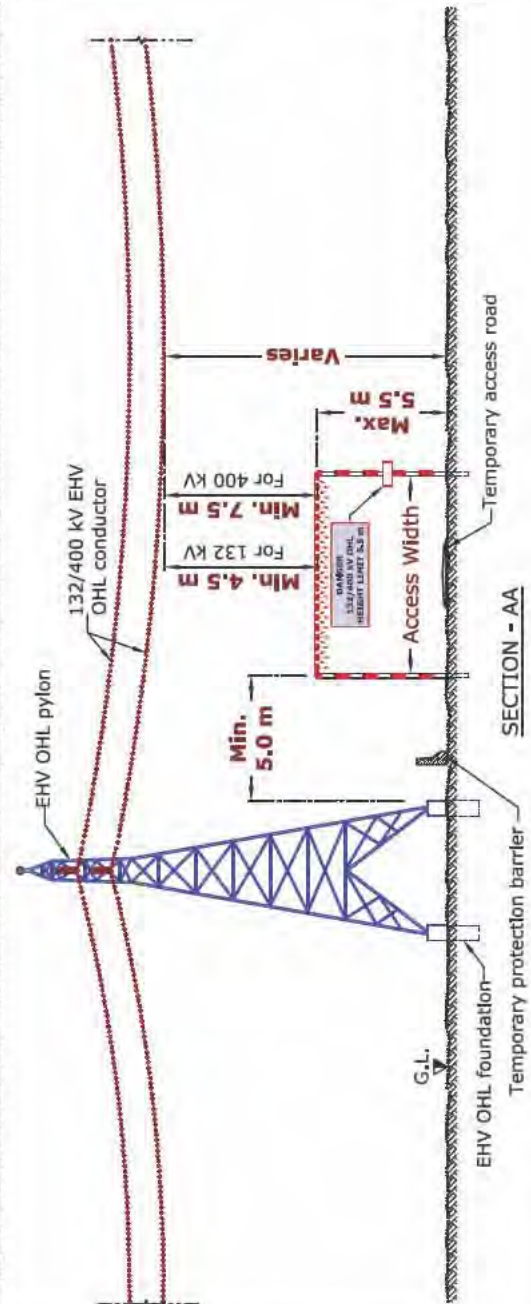
NOTE :

1. The Machineries/ Equipment should be minimum 2.5 m away from the existing 400 kV tunnel as shown.
2. If any vehicle/ equipment are required to cross temporary over the existing EHV 400 kV cable/ tunnel corridor at unmade areas, the existing 400 kV cable/ tunnel at crossing area to be protected with protection slab/ steel sheet (over the ground - with extra sand filling) under DEWA supervision

Fig: 47.8 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING EHV OHL (132/400 kV)



PLAN



NOTE :

1. Horizontal clearances are from the existing EHV OHL foundation/conductor to the proposed Temporary Height Limit Gantry.
2. Vertical clearance between EHV OHL lower conductor to top of Height Limit Gantry is fixed as mentioned in the drawing.
3. Existing EHV OHL foundation to be protected with temporary protection barrier.
4. Temporary Height Limit Gantry should be provided at both sides of Entry/Exit crossing location of existing EHV OHL.
5. EHV OHL access road should not be blocked.
6. Vehicle movement not allowed within the area between the existing EHV OHL pylon foundation to the proposed Height Limit Gantry.

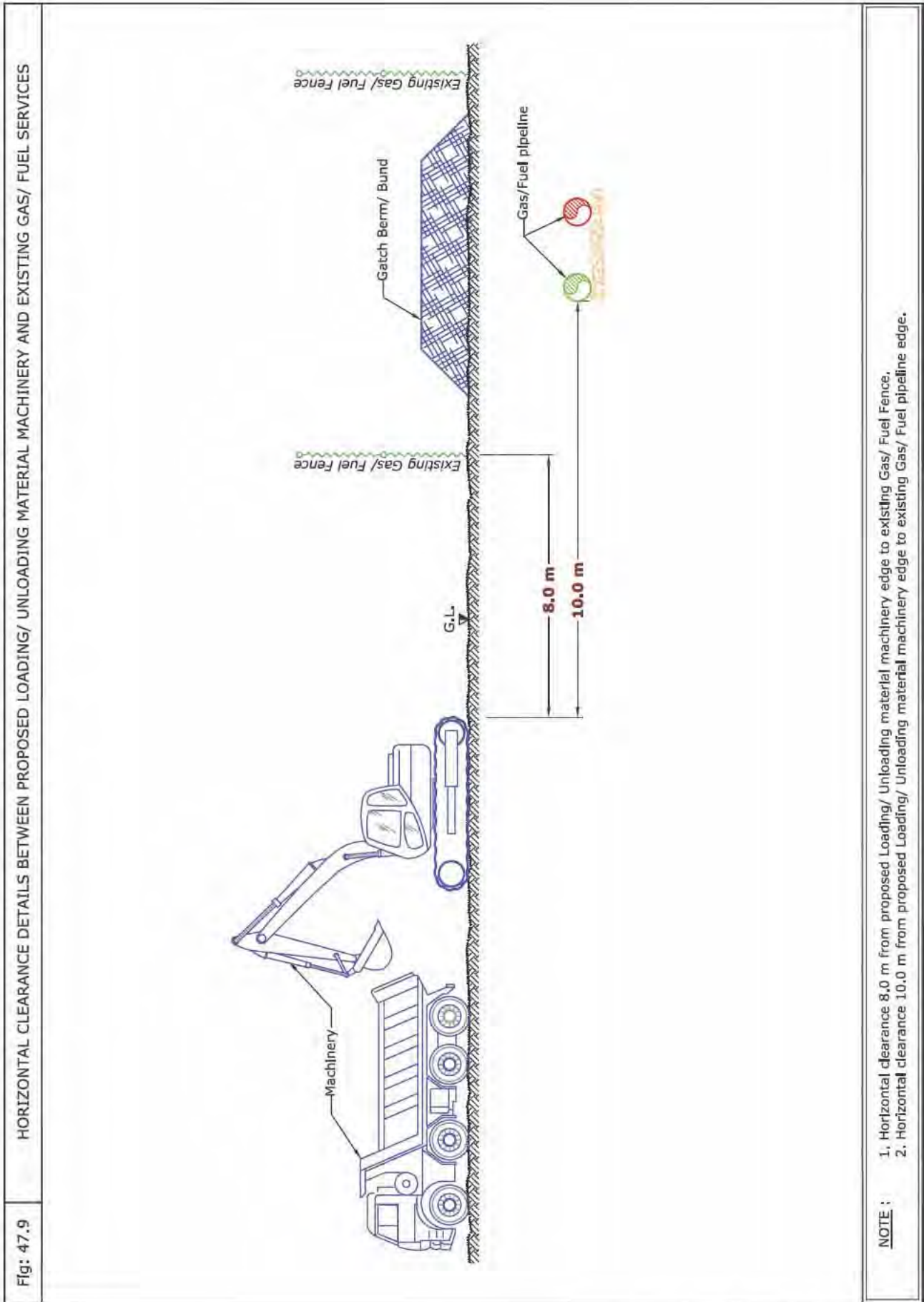
Table 4: Clearance & Protection details for proposed Loading, Unloading Material Machinery and existing DEWA Gas/Fuel services

Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.9)
Gas/Fuel Pipeline (All diameter)	10.0 m	NA	-	-	R	• Horizontal clearance (Ref Fig: 47.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.





48. Removal of Existing Plants & Trees

48.1 Introduction

Removal of trees/plants could not be avoided in some circumstances, such as, when they obstruct construction site, or when severely injured by storms, or when they outgrow their sites, or hinder maintenance work of utilities/services, or when they may have to be replanted in another location. Trees/plants removals must be carried out by specialised

agricultures using special equipment, tools and machines under supervision of a specialist from the concerned authority. During the removal process Machines could encroaching DEWA existing services and/or corridors therefore during this process it is required to protect DEWA existing assets as per specified standards.



48.2 Avoid the following



1. Mechanical excavation.
2. Placing vehicles/machineries above existing DEWA Services.

48.3 Standard Clearance & Protection details

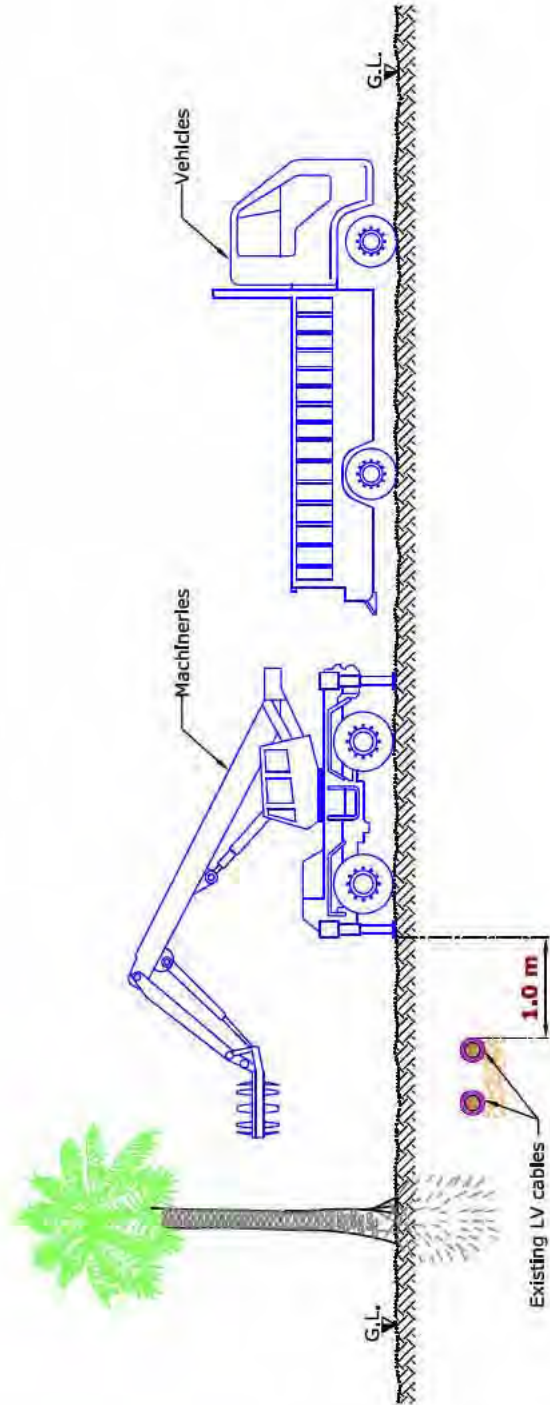
Table 1: Clearance & Protection details for proposed removal of Plants/Trees and existing DEWA Electricity LV Cables

Electricity LV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	1.0 m	NR	-	-	R	• Horizontal clearance (Ref Fig:48.1)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 48.1 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PLANTS / TREE REMOVAL AND EXISTING LV CABLES



NOTE :

- 1. Roots of existing plants and trees near to existing LV cables should be removed manually.
- 2. Machineries and equipments should be minimum 1.0 m away from the existing LV cables as shown in the figure.

Table 2: Clearance & Protection details for proposed removal of Plants/Trees and existing DEWA electricity HV services

Electricity HV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 48.2) • Protection details (Ref Fig: 48.2)
HV (6.6/11/33 kV) Manhole	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 48.3)
HV (6.6/11/33 kV) O.H.L.	5.0 m	NR	-	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 48.4) • Protection details (Ref Fig: 48.4)
Clearance & Protection details for access and working under Existing HV-OHL						
HV (6.6/11 kV) O.H.L.	5.0 m	3.0 m	B	-	R	<ul style="list-style-type: none"> • Horizontal clearance (Ref Fig: 48.4) • Vertical clearance (Ref Fig: 48.4) • Protection details (Ref Fig: 48.4)
HV (33 kV) O.H.L.		3.5 m				

Table Abbreviation	
A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

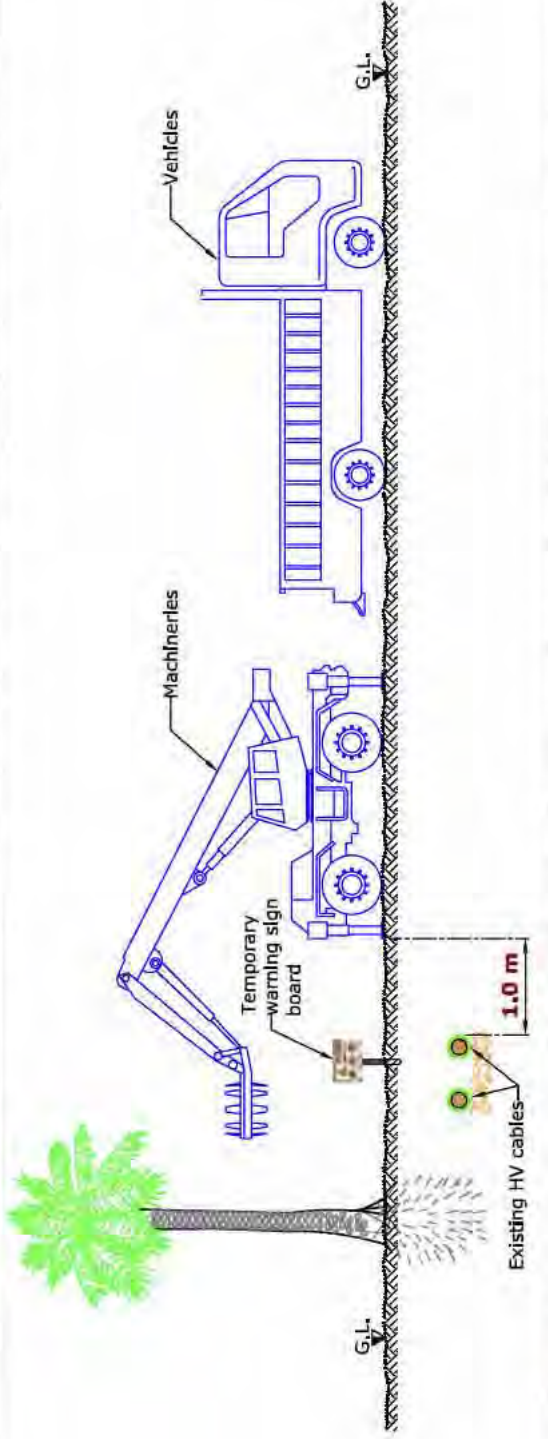
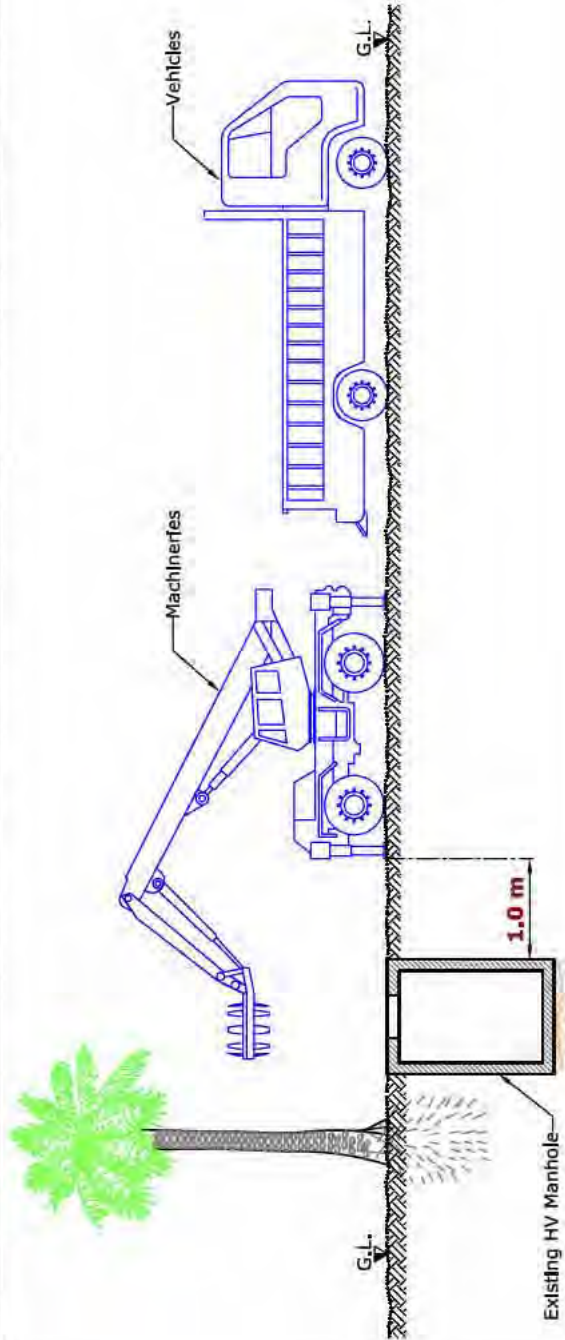
Fig: 48.2	<p style="text-align: center;">HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PLANTS/ TREE REMOVAL AND EXISTING HV CABLES</p> 
Fig: 48.3	<p style="text-align: center;">HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PLANTS/ TREE REMOVAL AND EXISTING MANHOLE</p>  <div>NOTE :</div> <ol style="list-style-type: none"> 1. Roots of existing plants and trees near to existing HV services should be removed manually. 2. Machinerfes and equipments should be Minimum 1.0 m away from the existing HV cables as shown in the figure. 3. Temporary warning sign boards to be placed as shown in the figure. 4. Existing HV Services should be protected as per site and soil condition.

Fig: 48.4 TYPICAL CLEARANCE/ PROTECTION DETAILS FOR MACHINERY WORKING UNDER EXISTING HV OHL (6.6/11/33 kV)

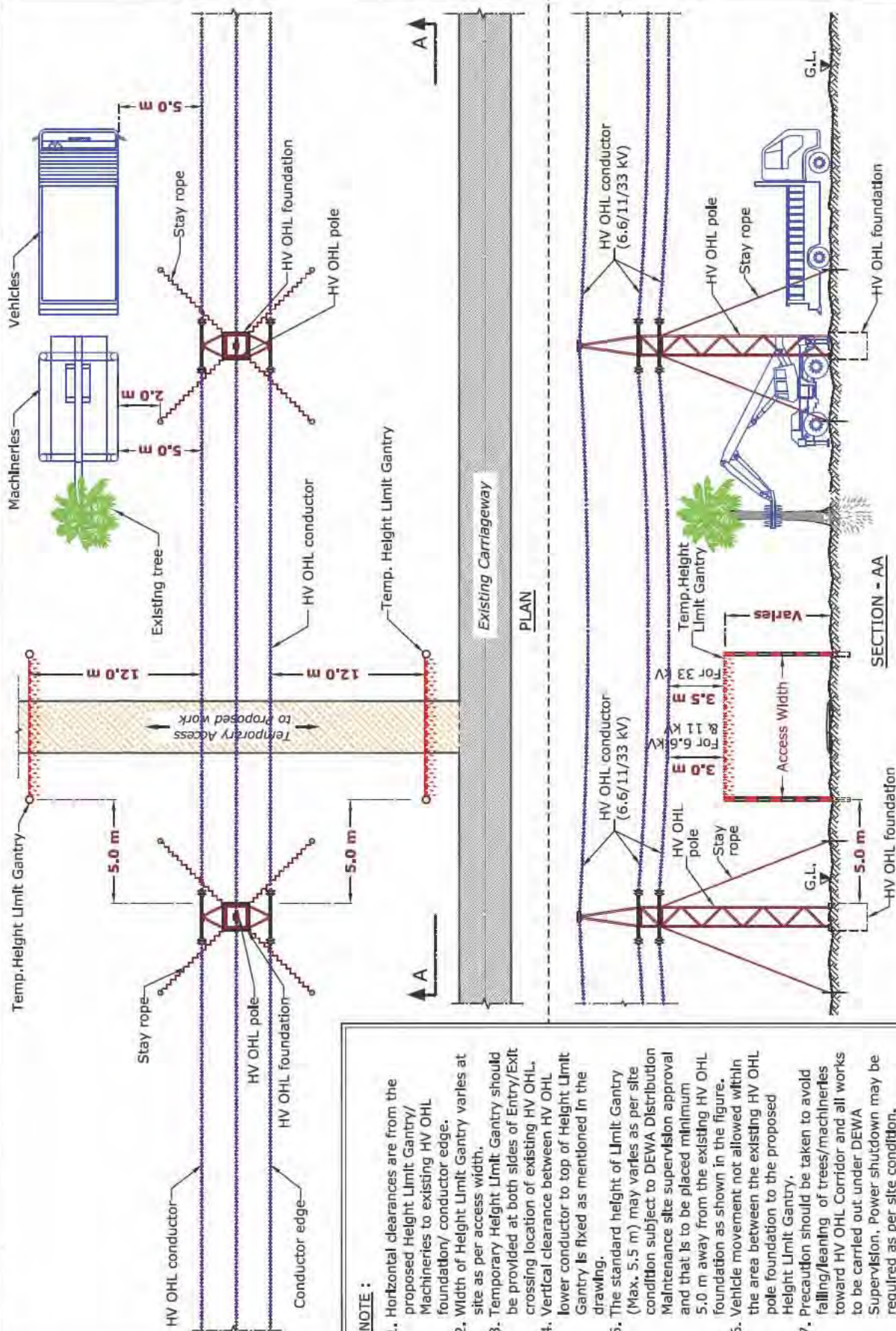


Table 3: Clearance & Protection details for proposed removal of Plants/Trees and existing DEWA electricity EHV services

Electricity EHV existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig:48.5) Protection details (Ref Fig: 48.5)
EHV (132 kV) Power/Pilot/F.O Cable (Directly Buried)	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 48.5) Protection details (Ref Fig: 48.5)
EHV (132 kV) Trough	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 48.6) Protection details (Ref Fig: 48.6)
EHV (132 kV) Duct Bank	1.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 48.6) Protection details (Ref Fig: 48.6)
EHV (132 kV) Joint Bay/ Transition Joint	2.0 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 48.7)
EHV (132/400 kV) O.H.L	NR	-	-	-	-	-
EHV (400 kV) Tunnel	2.5 m	NR	-	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 48.8) Protection details (Ref Fig: 48.8)
Clearance & Protection details for access and working under Existing EHV-OHL						
EHV (132 kV) O.H.L	5.0 m	4.5 m	B	-	R	<ul style="list-style-type: none"> Horizontal clearance (Ref Fig: 48.9)
EHV (400 kV) O.H.L		7.5 m				<ul style="list-style-type: none"> Vertical clearance (Ref Fig: 48.9) Protection details (Ref Fig: 48.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 48.5 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PLANTS / TREE REMOVAL AND EXISTING EHV DIRECTLY BURIED 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES

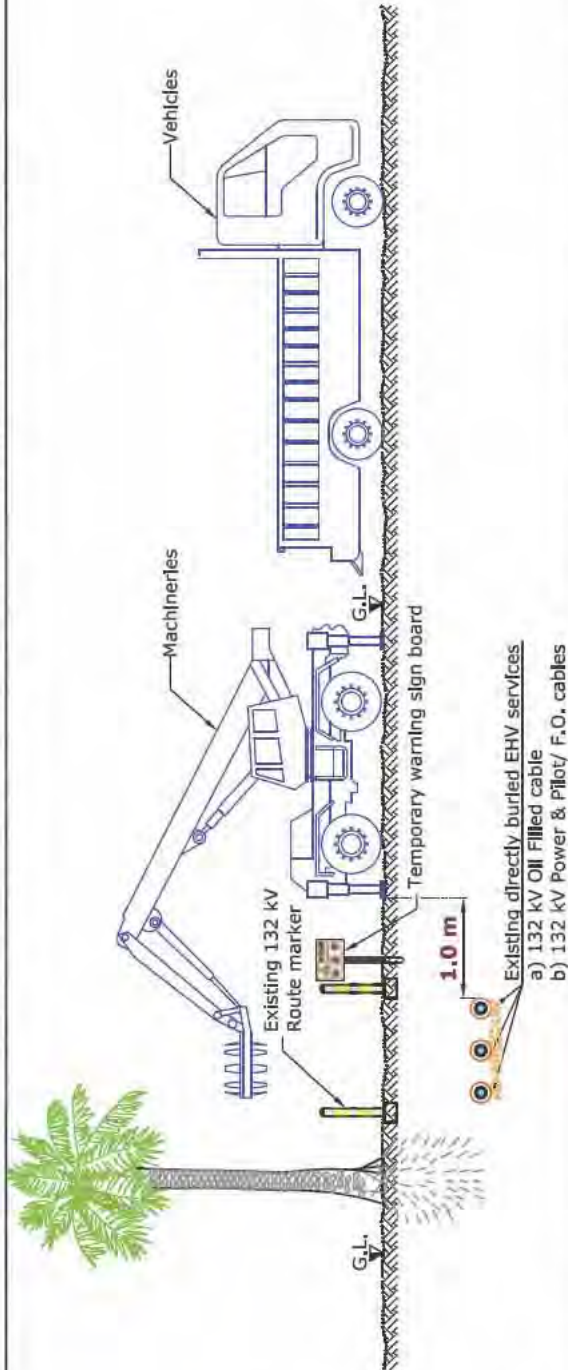
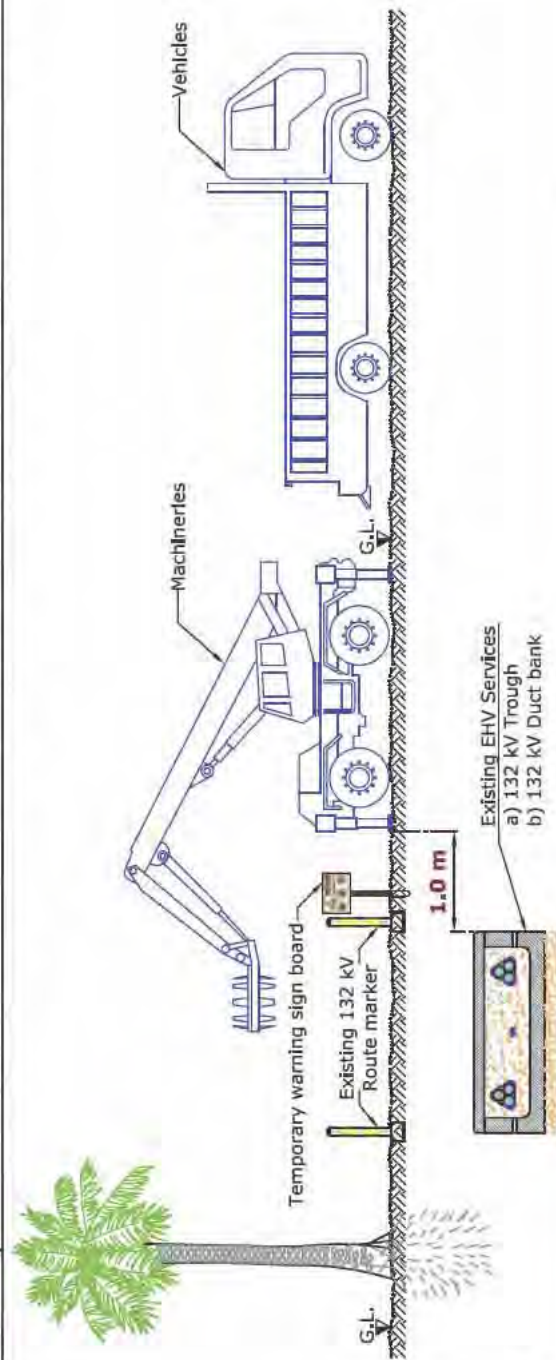
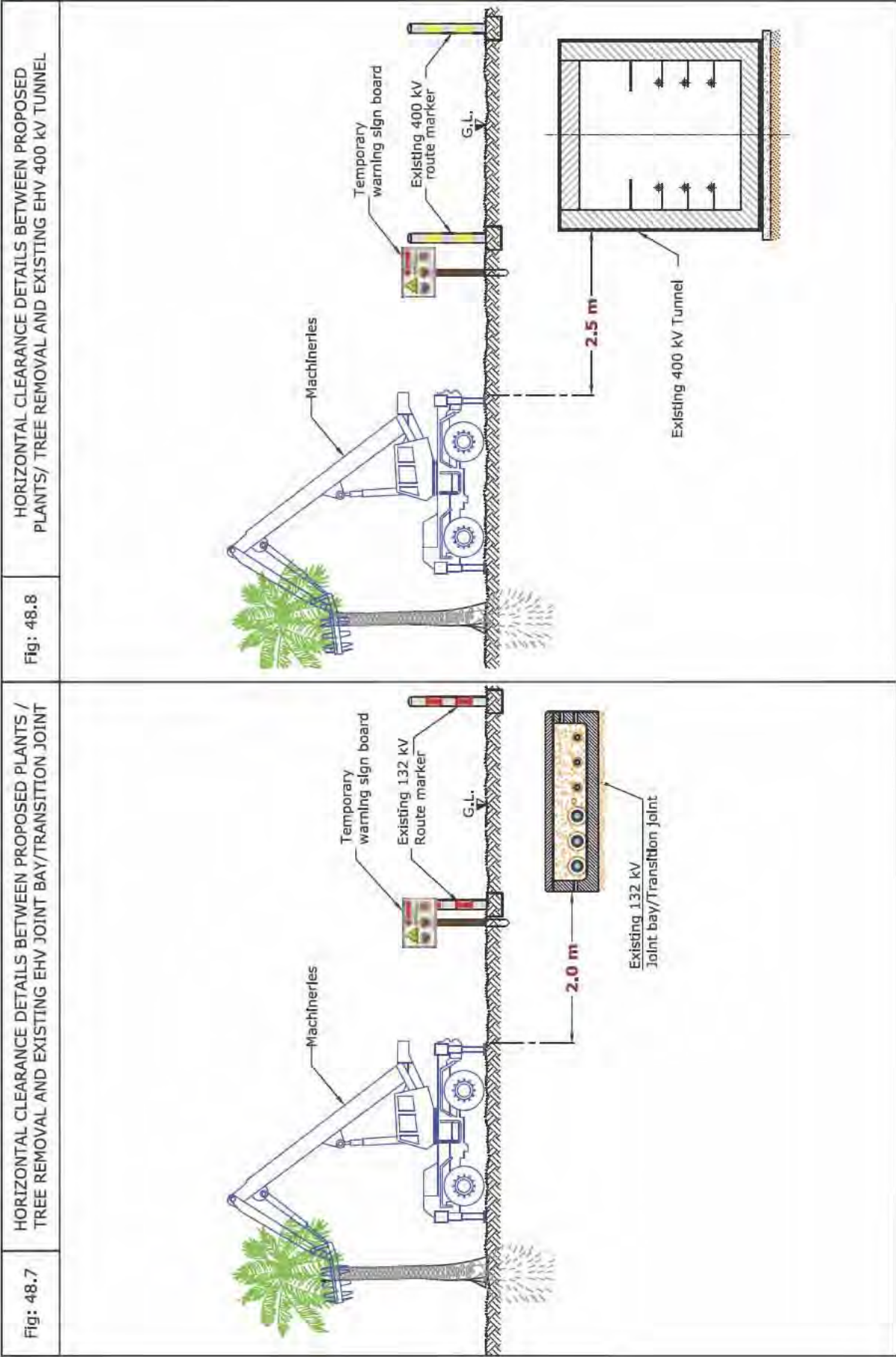


Fig: 48.6 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PLANTS / TREE REMOVAL AND EXISTING EHV 132 kV TROUGH/DUCT BANK



NOTE :

1. Roots of existing plants and trees near to existing EHV services should be removed manually.
2. Machineries and equipments should be away from the existing EHV services as shown in the figure.



NOTE : 1.Roots of existing plants and trees near to existing EHV services should be removed manually.
2.MachInerfes and equipments should be away from the existing EHV services as shown in the figure.

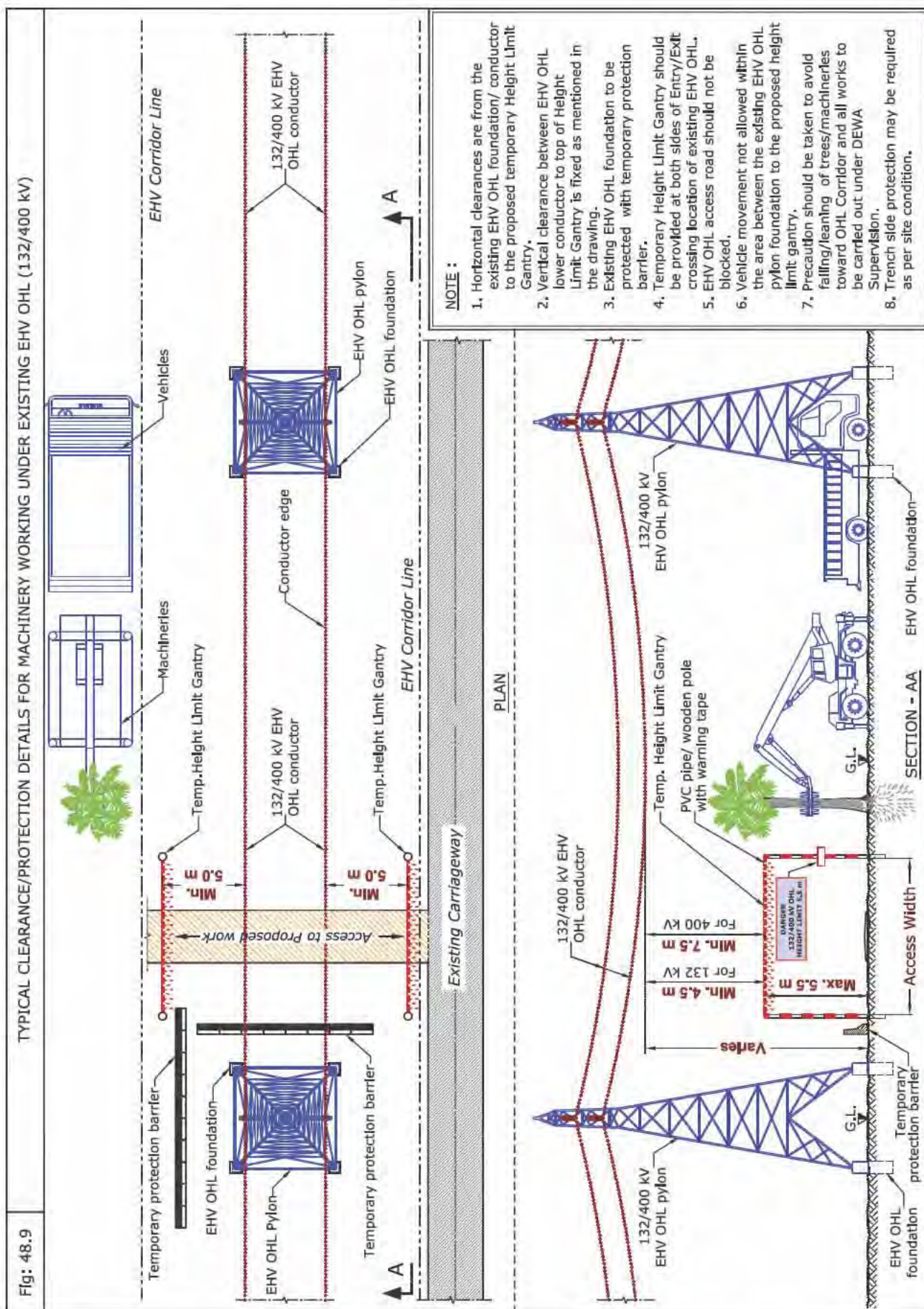


Table 4: Clearance & Protection details for proposed removal of Plants/Trees and existing DEWA Gas/Fuel services

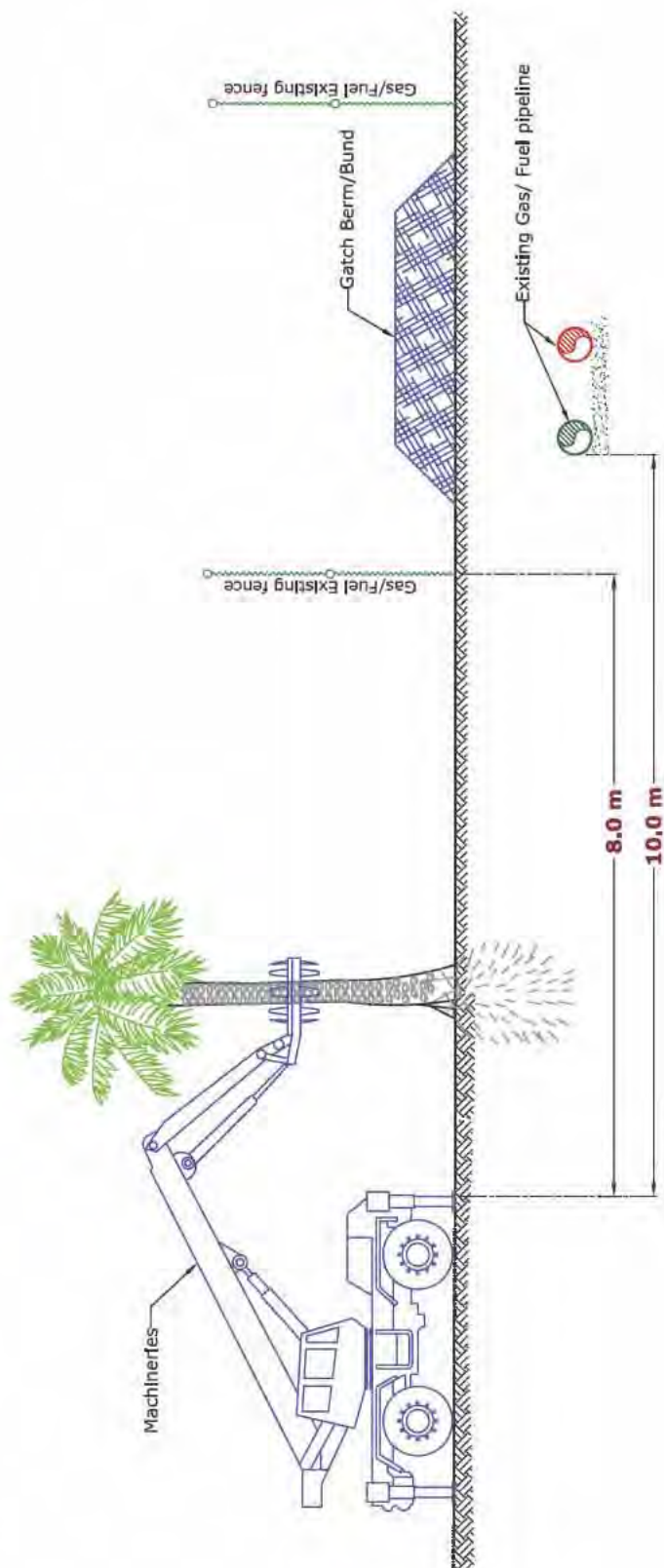
Gas/Fuel existing Services	Horizontal Clearance	Crossing Details				Remarks
		Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Existing Fence	8.0 m	NR	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 48.10)• Protection details (Ref Fig: 48.10)
Gas/Fuel Pipeline (All diameter)	10.0 m	NR	-	-	R	<ul style="list-style-type: none">• Horizontal clearance (Ref Fig: 48.10)• Protection details (Ref Fig: 48.10)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED PLANTS/ TREE REMOVAL AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Roots of existing plants and trees near to existing Gas fuel pipeline should be removed manually.
 2. Horizontal clearance 8.0 m from the machiner/ies edge to the existing Gas/Fuel fence.
 3. Horizontal clearance 10.0 m from the machiner/ies edge to the existing Gas/Fuel pipeline edge.

49. Proposed Soft Landscaping/Tree

49.1 Introduction

It is the use of vegetative material such as palms, trees, flowers, shrubs and lawns, to enhance and show the beauty of the landscape to enlarge the green sight. Soft landscape works involve a watering

system which could encroach DEWA existing services and/or corridors therefore it is required to protect DEWA existing assets as per specified standards.



49.2 Avoid the following



1. Raising/Lowering existing ground more than 0.3 m.
2. Proposed Soft Landscaping/Trees are in DEWA OHL corridor.

49.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Soft Landscaping/Tree and existing DEWA Electricity LV Cables

Electricity LV existing Services	Proposed Soft Landscaping/ Tree	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	Soft Landscaping	NR	1.0 m	-	-	R	• Vertical clearance (Ref Fig: 49.1)
	Tree	4.0 m	NA	-	-		• Horizontal clearance (Ref Fig:49.1)

Table 2: Clearance & Protection details for proposed Soft Landscaping/Tree and existing DEWA Electricity HV services

Electricity HV existing Services	Proposed Shoring	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints	Soft Landscaping	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:49.2)
	Tree	4.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.2)
HV (6.6/11/33 kV) O.H.L.	Soft Landscaping	NA	-	-	-	-	• Refer note below
	Tree	9.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.3)

Note: Soft Landscaping is not allowed under the HV OHL conductor

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

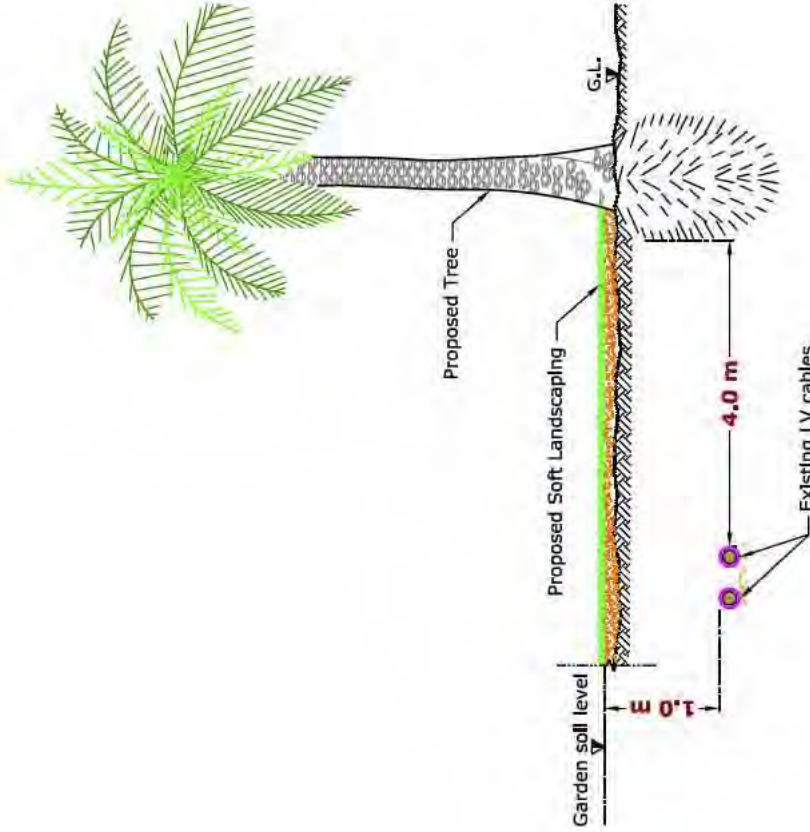
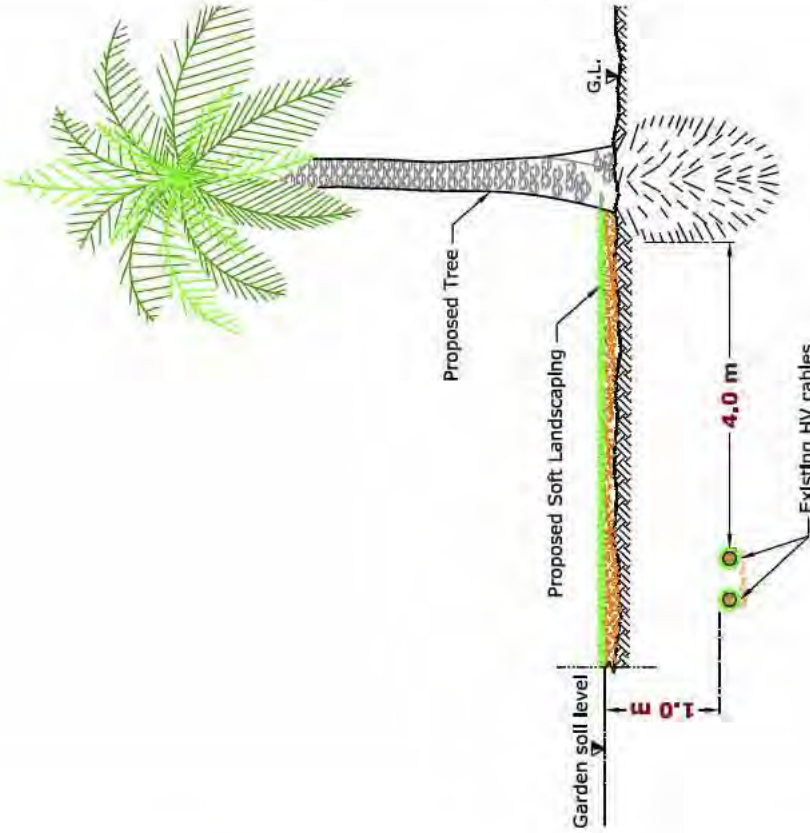
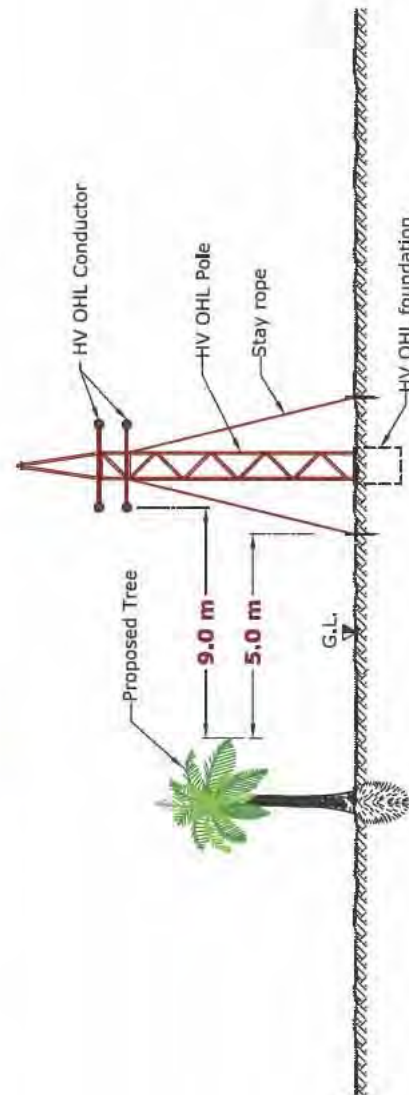
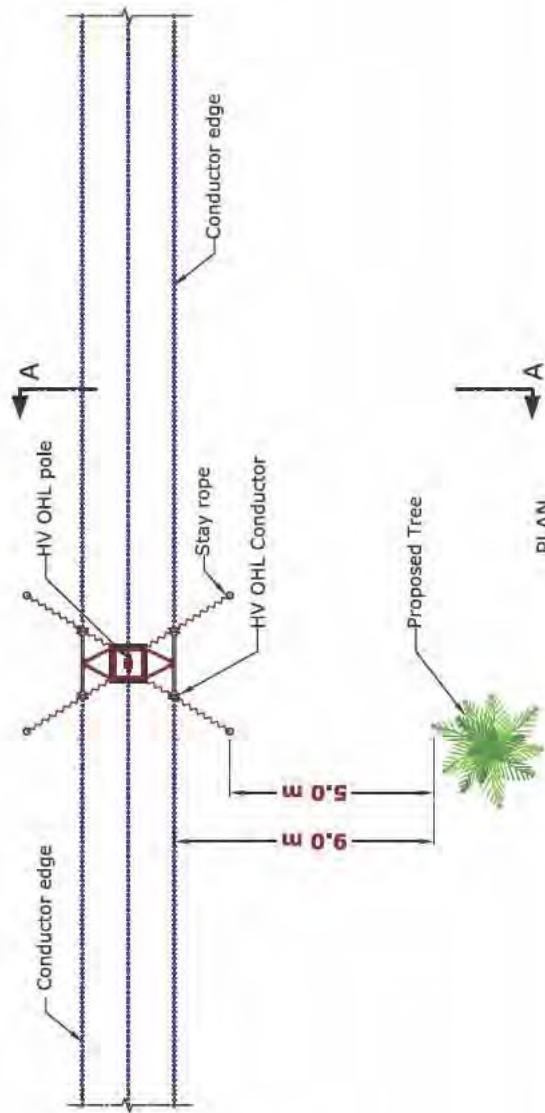
Fig: 49.1	HORIZONTAL/ VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED TREE/ SOFT LANDSCAPING AND EXISTING LV CABLES	Fig: 49.2	HORIZONTAL/ VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED TREE/ SOFT LANDSCAPING AND EXISTING HV CABLES
			
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearance is from the proposed Tree edge to existing LV/HV cable edge.2. Vertical clearance is from the proposed Soft Landscaping (Garden soil level) to top of existing LV/HV cables.3. Existing ground level raised or lowered not more than 0.3 m.			

Fig: 49.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TREE AND EXISTING HV OHL (6.6/ 11/ 33 kV)



SECTION - AA

- NOTE :**
1. Horizontal clearances are from the proposed Tree edge to existing HV OHL nearest conductor/ Stay rope,
 2. Soft Landscaping **is** not allowed under the HV OHL conductor.

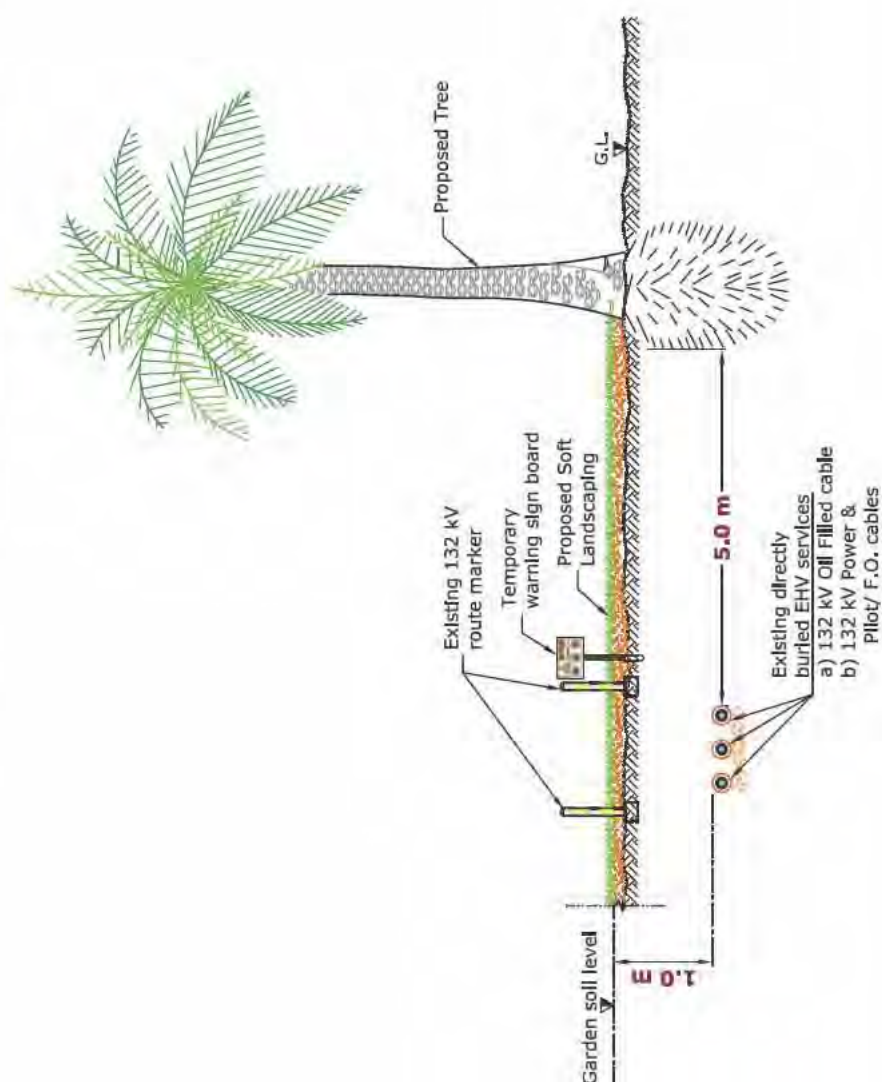
Table 3: Clearance & Protection details for proposed Soft Landscaping/Tree and existing DEWA Electricity EHV services

Electricity EHV existing Services	Proposed Soft Landscaping/ Tree	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	Soft Landscaping	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:49.4)
	Tree	5.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.4)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	Soft Landscaping	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:49.4)
	Tree	5.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.4)
EHV (132 kV) Trough	Soft Landscaping	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:49.5)
	Tree	5.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.5)
EHV (132 kV) Duct Bank	Soft Landscaping	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:49.5)
	Tree	5.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.5)
EHV (132 kV) Joint Bay/ Transition Joint	Soft Landscaping	NA	-	-	-	-	-
	Tree	5.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.6)
EHV (132 kV) O.H.L	Soft Landscaping	NA	-	-	-	-	-
	Tree	15.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.7)
EHV (400 kV) O.H.L	Soft Landscaping	NA	-	-	-	-	-
	Tree	20.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.8)
EHV (400 kV) Tunnel	Soft Landscaping	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:49.9)
	Tree	5.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

Fig: 49.4 HORIZONTAL/ VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED TREE/ SOFT LANDSCAPING AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES



- NOTE :**
1. Horizontal clearance is from the proposed Tree edge to existing EHV 132 kV service edge.
 2. Vertical clearance is from the proposed Soft Landscaping (Garden soil level) to top of existing EHV 132 kV service.
 3. Existing ground level raised or lowered not more than 0.3 m.

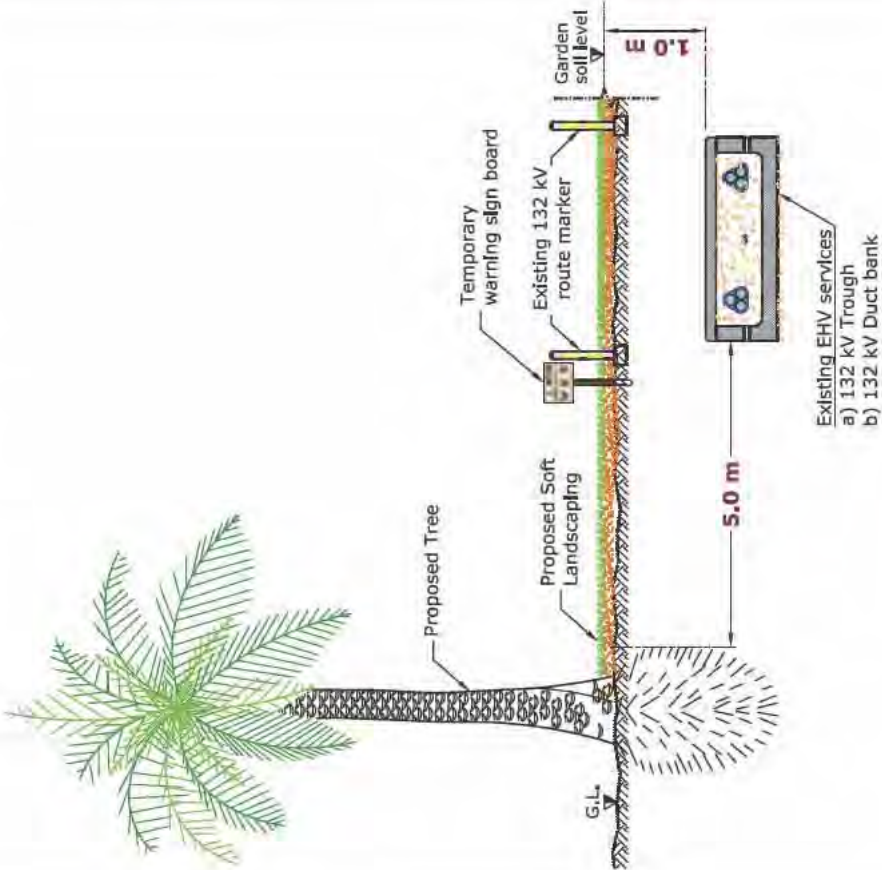
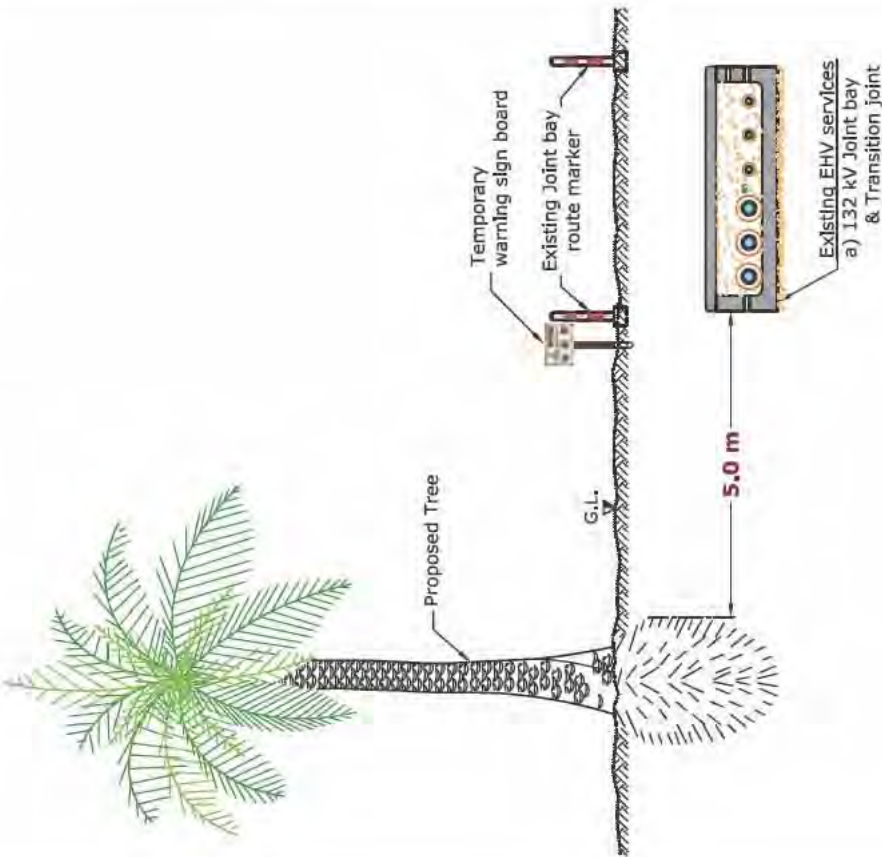
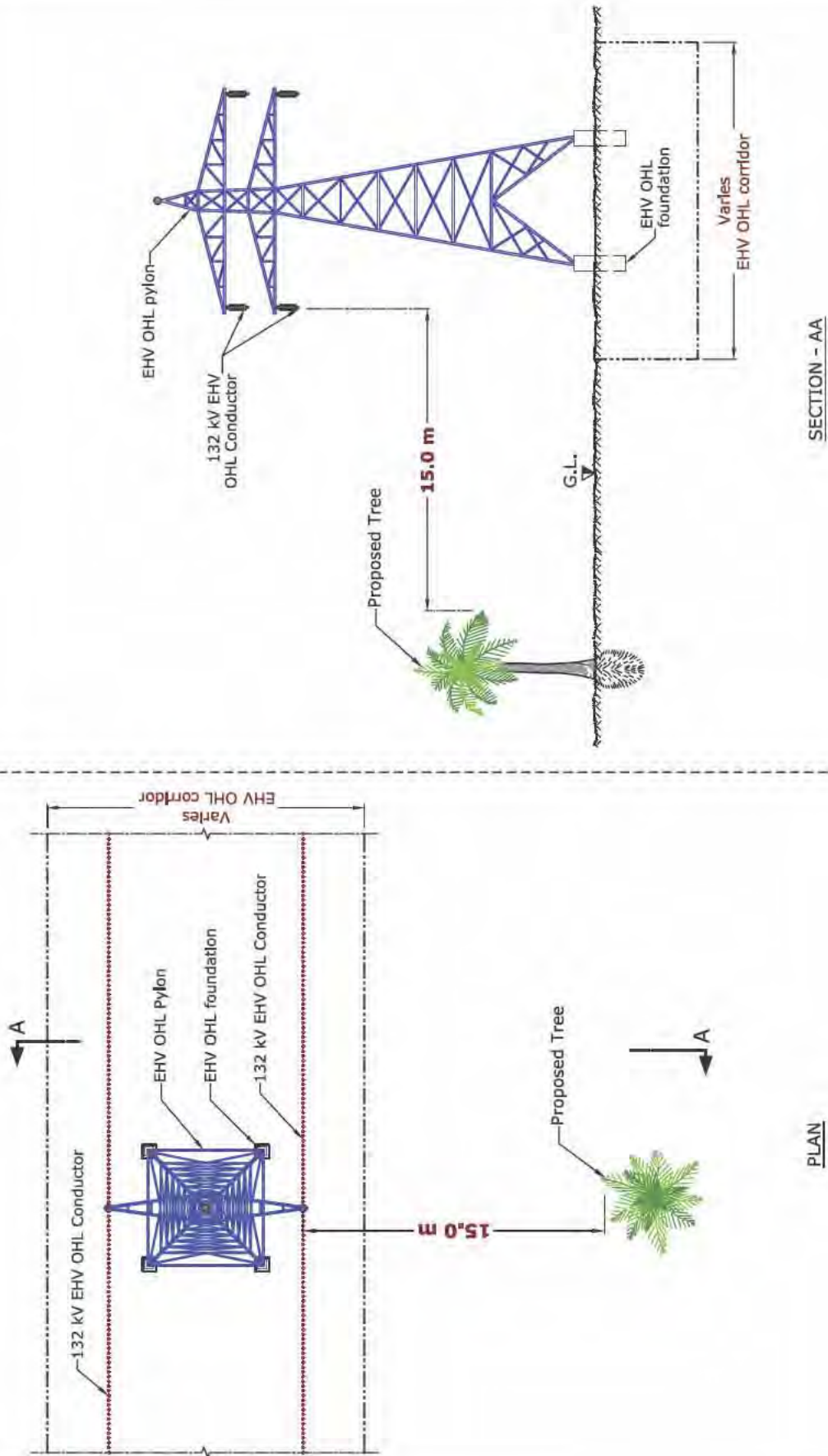
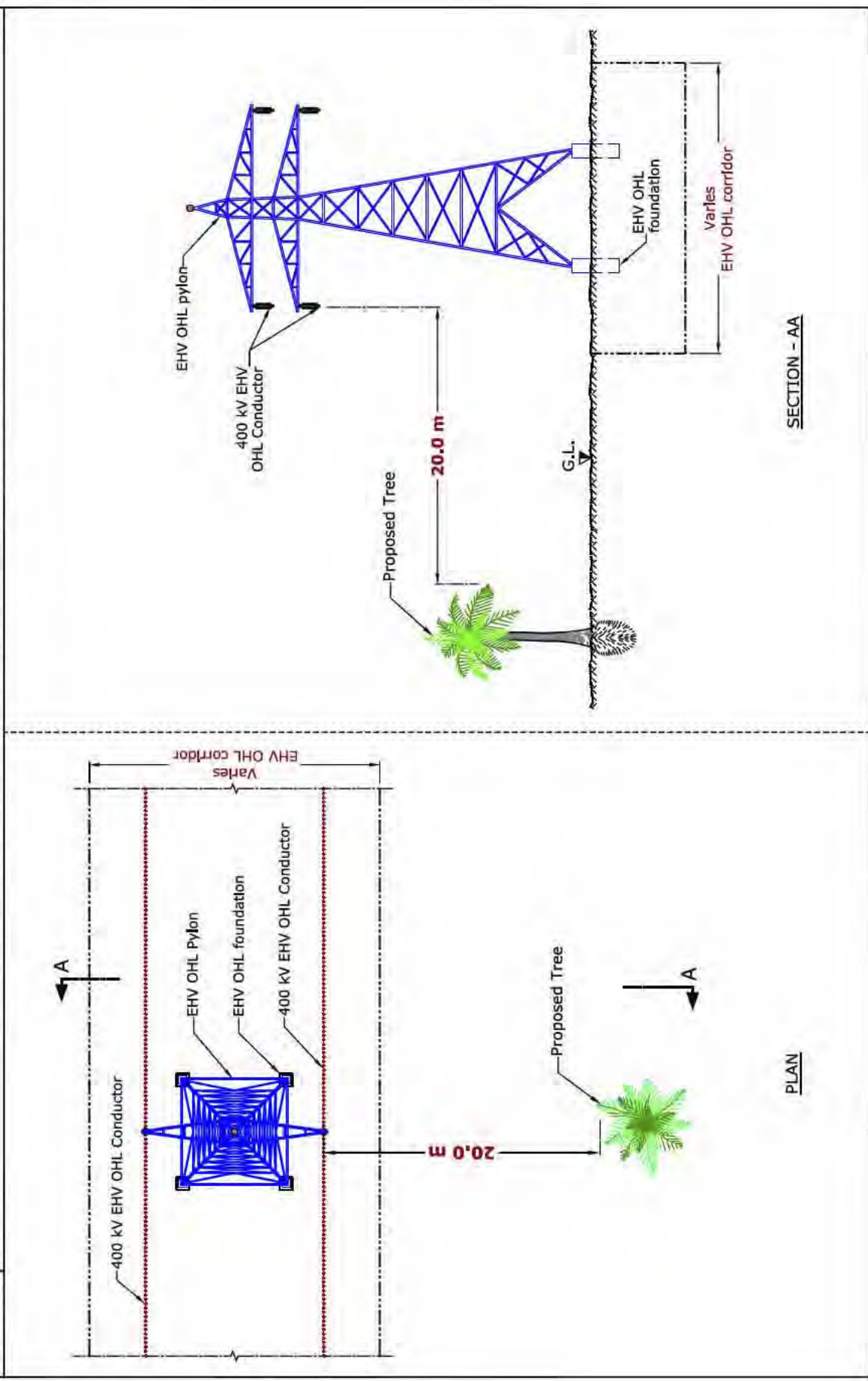
Fig: 49.5	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TREE/ SOFT LANDSCAPING AND EXISTING EHV 132 kV TROUGH/ DUCT BANK	Fig: 49.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED SOFT LANDSCAPING AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
		<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Tree edge to existing EHV 132 kV service edge. 2. Vertical clearance is from the proposed Soft Landscaping (Garden soil level) to top of existing EHV 132 kV service 3. Landscaping not allowed at the Joint Bay / Transition Joint location. 4. Existing ground level raised or lowered not more than 0.3 m. 	

Fig: 49.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TREE AND EXISTING EHV OHL (132 kV)



- NOTE :**
1. Horizontal clearance is from the proposed Tree edge to existing EHV OHL nearest conductor edge.
 2. Landscaping not allowed within EHV OHL corridor.

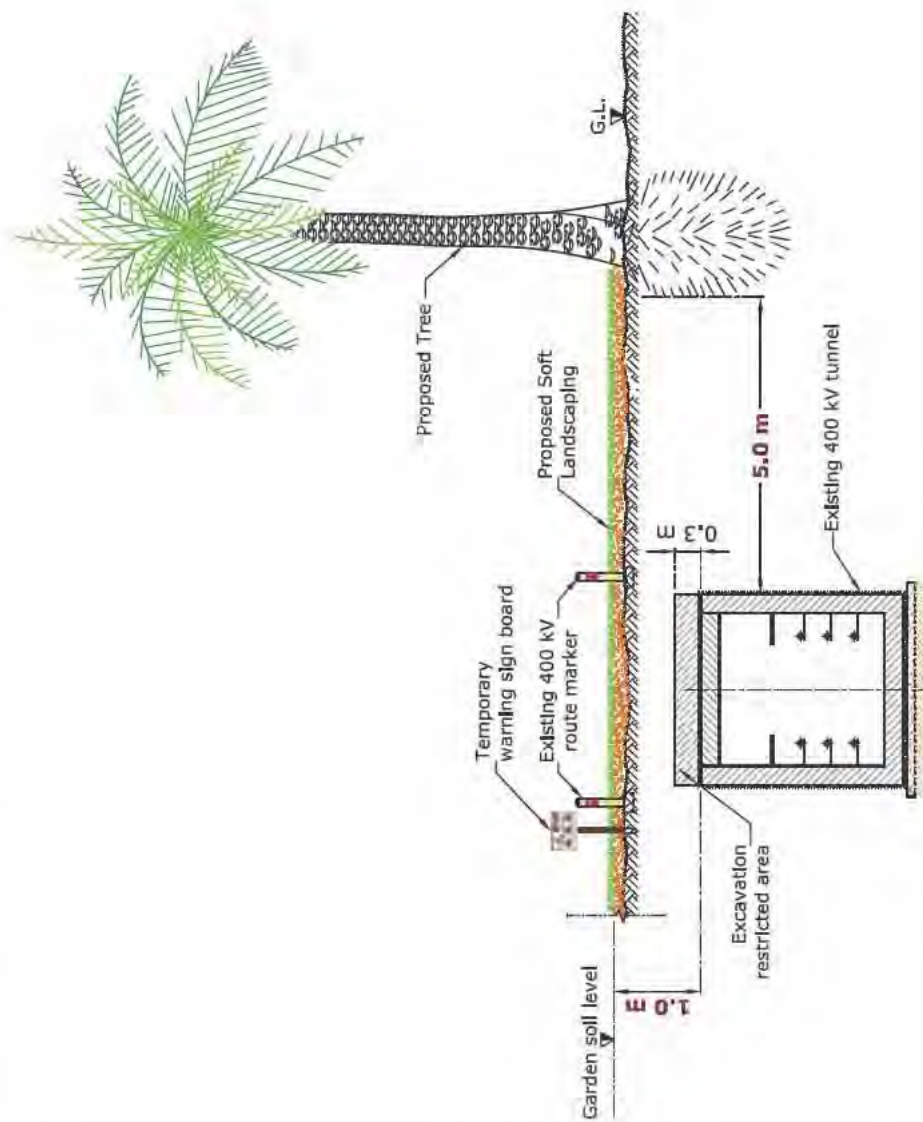
Fig: 49.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TREE AND EXISTING EHV OHL (400 kV)



NOTE :

1. Horizontal clearance is from the proposed Tree edge to existing EHV OHL nearest conductor edge.
2. Landscaping not allowed within EHV OHL corridor.

Fig: 49.9 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TREE/ SOFT LANDSCAPING AND EXISTING 400 kV TUNNEL



- NOTE :**
1. Horizontal clearance is from the proposed Tree edge to existing 400 kV tunnel edge.
 2. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
 3. Vertical clearance minimum 1.0 m should be maintained from the top of the 400 kV tunnel to the garden soil finished level.
 4. Existing ground level raised or lowered not more than 0.3 m.

Table 4: Clearance & Protection details for proposed Soft Landscaping/Tree and existing DEWA Gas/Fuel services

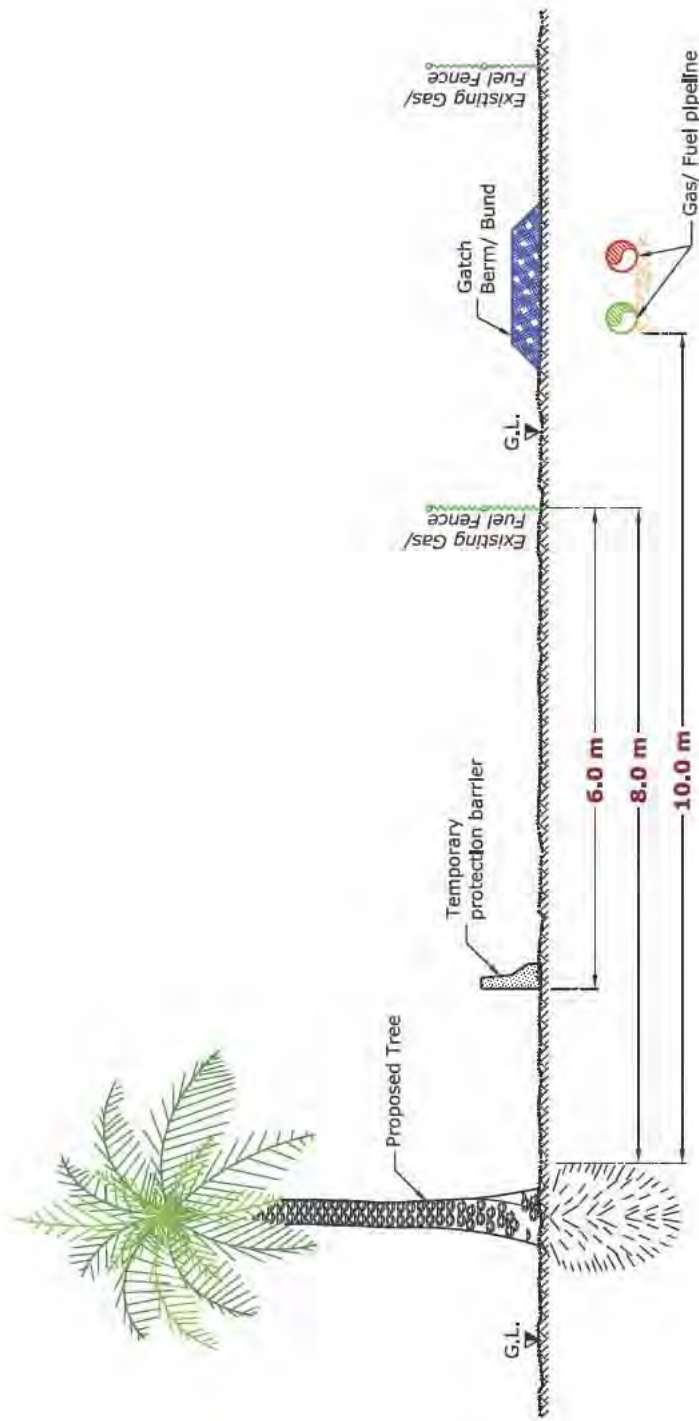
Gas/Fuel existing Services	Proposed Soft Landscaping/ Tree	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Gas/Fuel Pipeline (All diameter)	Soft Landscaping	NA	-	-	-	-	-
	Tree	10.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:49.10)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED TREE AND EXISTING GAS/ FUEL SERVICES



- NOTE :**
1. Horizontal clearance 8.0 m from proposed Tree edge to existing Gas/ Fuel fence.
 2. Horizontal clearance 10.0 m from proposed Tree edge to existing Gas/ Fuel pipeline edge.
 3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
 4. Landscaping not allowed within Gas/ Fuel pipeline corridor.

50. Proposed Hard Landscaping

50.1 Introduction

Hard landscaping is the part of landscape architecture works, for the beautification of areas using a wide range of hard landscape materials such as Stones, Rocks, Tiles, Concrete, Timber, etc. Hard landscape works

involve several types of activities which could affect DEWA existing services and/or encroach corridors, therefore it is required to protect DEWA existing assets as per specified standards.



50.2 Avoid the following



1. Applying Lean Mix concrete/Normal concrete within DEWA corridor.
2. Proposed Hard Landscaping is in DEWA OHL corridor.

50.3 Standard Clearance & Protection details

Table 1: Clearance & Protection details for proposed Hard Landscaping and existing DEWA Electricity LV Cables

Electricity LV existing Services	Proposed Hard Landscaping	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
LV Cable	Interlock Tiles	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:50.1)
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.1)

Table 2: Clearance & Protection details for proposed Hard Landscaping and existing DEWA Electricity HV services

Electricity HV existing Services	Proposed Hard Landscaping	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
HV (6.6/11/33 kV) Power/Pilot Cable and Joints.	Interlock Tiles	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:50.2)
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.2)
HV (6.6/11/33 kV) O.H.L.	Interlock Tiles	NA	-	-	-	-	• Refer note below
	Stones, Granite, Concrete, etc	6.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.3)

Note: Hard Landscaping is not allowed under the HV OHL conductor

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

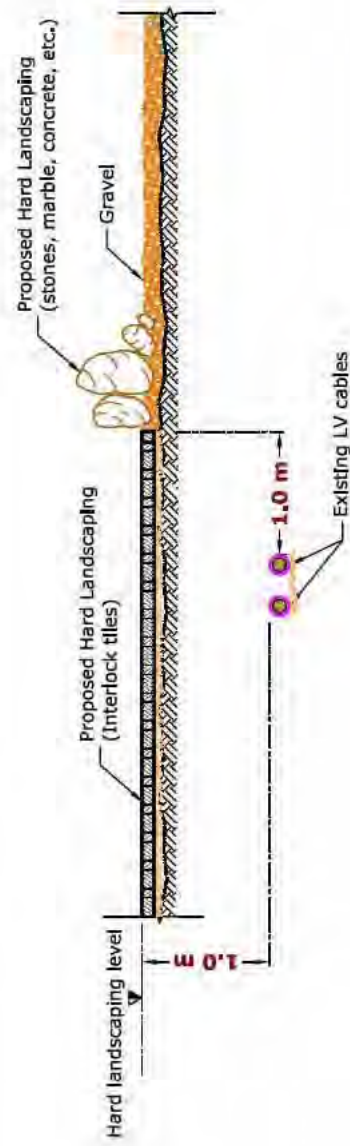
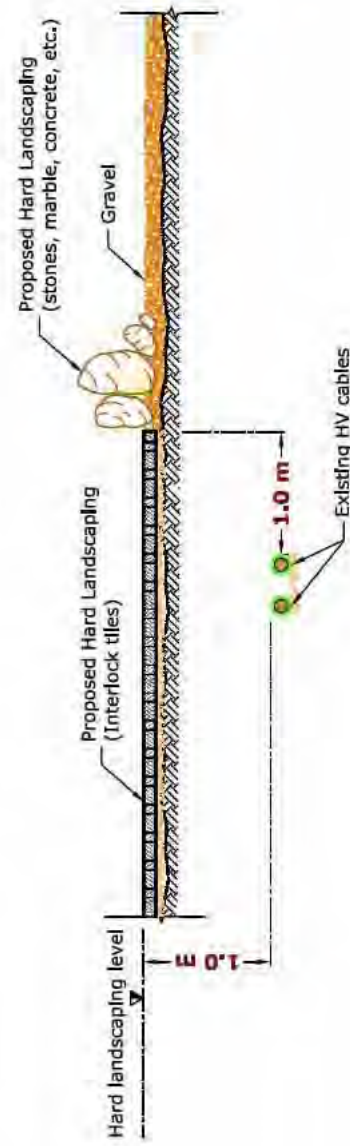
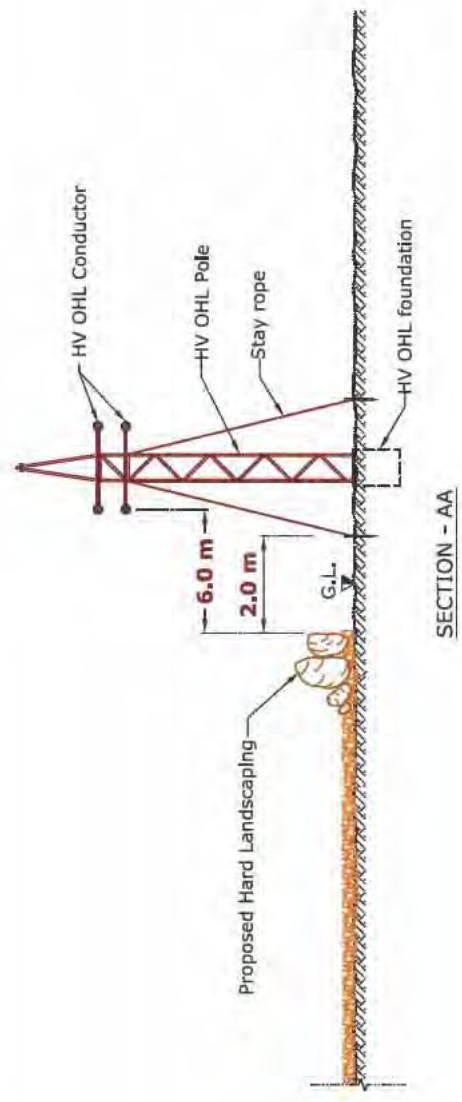
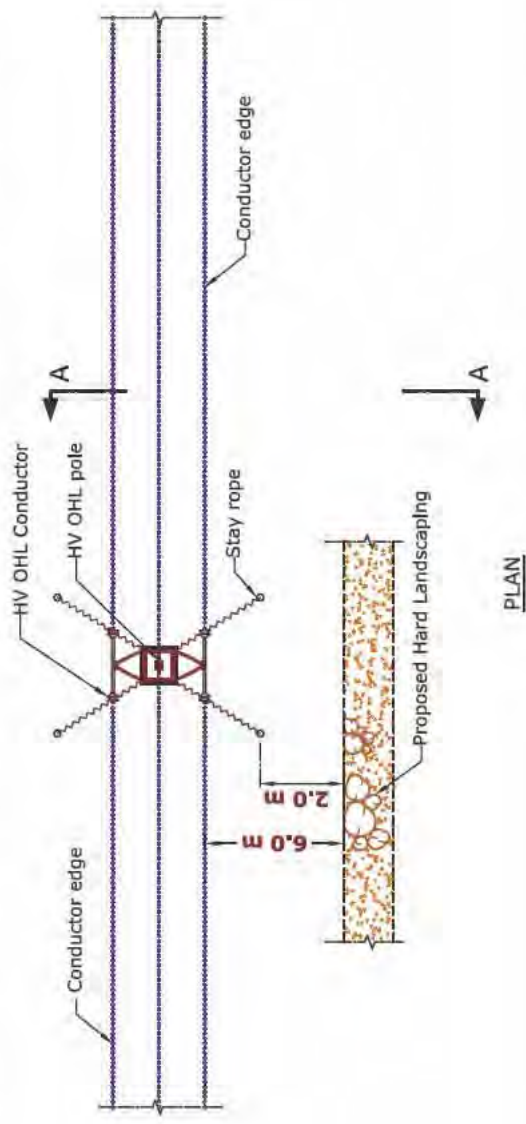
Fig: 50.1	<p>HORIZONTAL/ VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING LV CABLES</p> 
Fig: 50.2	<p>HORIZONTAL/ VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING HV CABLES</p> 
<p>NOTE :</p> <ol style="list-style-type: none"> 1. Horizontal clearance is from the proposed Hard Landscaping edge to existing LV/HV cable edge. 2. Vertical clearance is from the proposed Interlock tile to top of existing LV/HV cables. 3. Lean mix concrete/ normal concrete/ Hard Landscaping not allowed within DEWA corridor. 4. DEWA will not be responsible for the reinstatement of special Interlock tiles, stones, marbles, etc. 	

Fig: 50.3 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING HV OHL (6.6/ 11/ 33 kV)



NOTE :
 1. Horizontal clearances are from the proposed Hard Landscaping edge to existing HV OHL nearest conductor/ Stay rope.
 2. Hard Landscaping is not allowed under the HV OHL conductor.

Table 3: Clearance & Protection details for proposed Hard Landscaping and existing DEWA Electricity EHV services

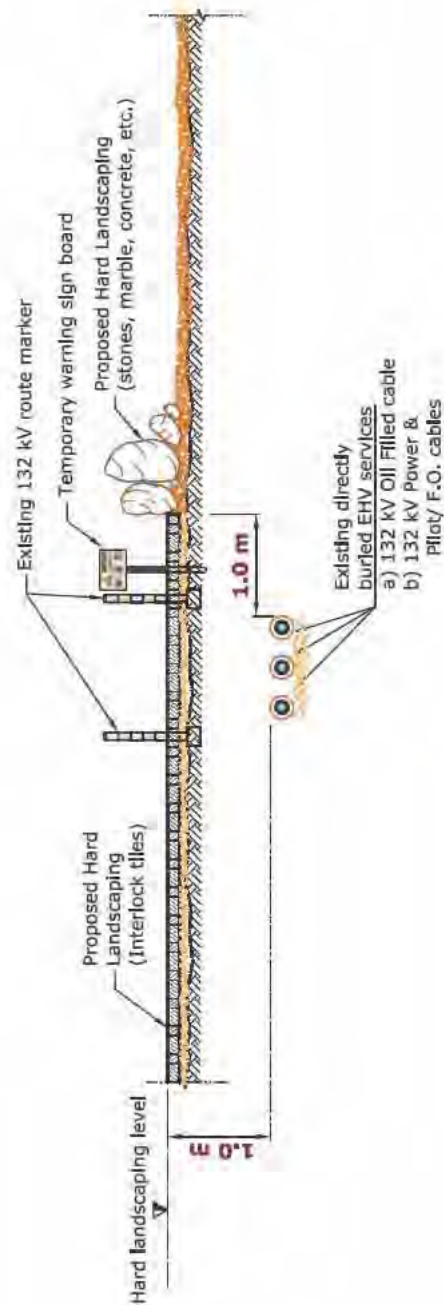
Electricity EHV existing Services	Proposed Hard Landscaping	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
EHV (132 kV) Oil Filled Cable (O.F)	Interlock Tiles	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:50.4)
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.4)
EHV (132 kV) Power/Pilot/ F.O Cable (Directly Buried)	Interlock Tiles	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:50.4)
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.4)
EHV (132 kV) Trough	Interlock Tiles	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:50.5)
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.5)
EHV (132 kV) Duct Bank	Interlock Tiles	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:50.5)
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.5)
EHV (132 kV) Joint Bay/ Transition Joint	Interlock Tiles	NA	-	-	-	-	-
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.6)
EHV (132 kV) O.H.L	Interlock Tiles	NA	-	-	-	-	-
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.7)
EHV (400 kV) O.H.L	Interlock Tiles	NA	-	-	-	-	-
	Stones, Granite, Concrete, etc	1.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.8)
EHV (400 kV) Tunnel	Interlock Tiles	NR	1.0 m	-	-	-	• Vertical clearance (Ref Fig:50.9)
	Stones, Granite, Concrete, etc	2.5 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.9)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.

HORIZONTAL & VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING DIRECTLY BURIED EHV 132 kV OIL FILLED/ F.O./ POWER & PILOT CABLES

Fig: 50.4



NOTE :

1. Horizontal clearance is from the proposed Hard Landscaping edge to existing EHV 132 kV service edge.
2. Vertical clearance is from the proposed Interlock tiles to top of existing EHV 132 kV service.
3. Lean mix concrete/ normal concrete/ Hard Landscaping not allowed within DEWA corridor.
4. DEWA will not be responsible for the reinstatement of special Interlock tiles, stones, marbles, etc.
5. Under taking letter is required for the Hard Landscaping (Interlock tiles) works over the EHV cable route.

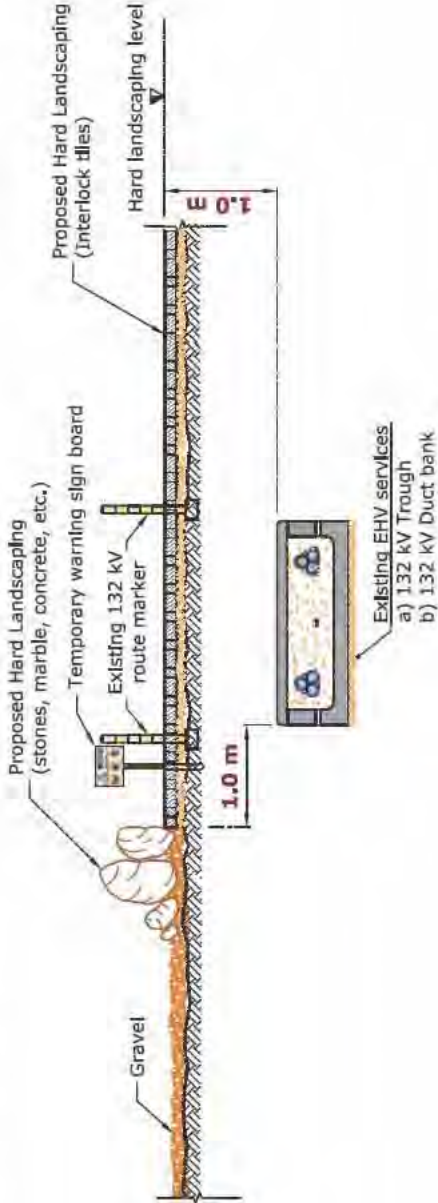
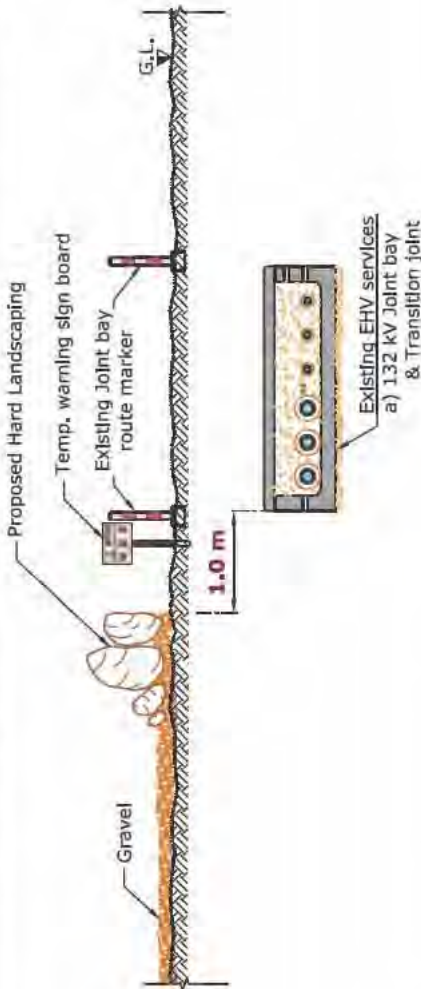
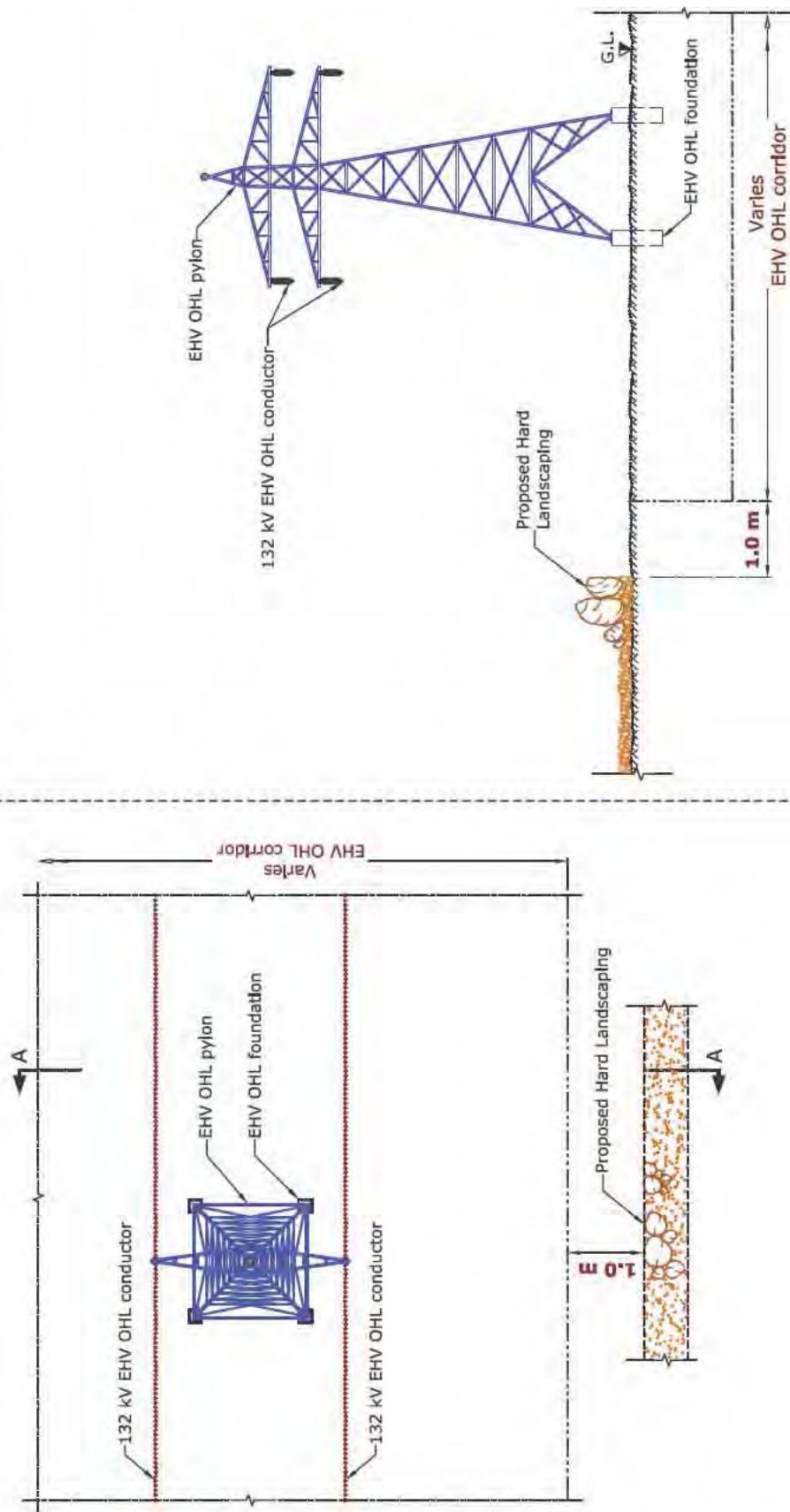
Fig: 50.5	HORIZONTAL/ VERTICAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING EHV 132 kV TROUGH/ DUCT BANK
	
Fig: 50.6	HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING EHV 132 kV JOINT BAY/ TRANSITION JOINT
	
<p>NOTE :</p> <ol style="list-style-type: none">1. Horizontal clearance is from the proposed Hard Landscaping edge to existing EHV 132 kV service edge.2. Vertical clearance is from the proposed Interlock tiles to top of existing EHV 132 kV service.3. Hard Landscaping not allowed at the Joint bay/ Transition joint location.4. Lean mix concrete/ normal concrete/ Hard Landscaping not allowed within DEWA corridor.5. DEWA will not be responsible for the reinstatement of special Interlock tiles, stones, marbles etc.6. Under taking letter to be submitted for the Hard Landscaping (Interlock tiles) works over the EHV cable route.	

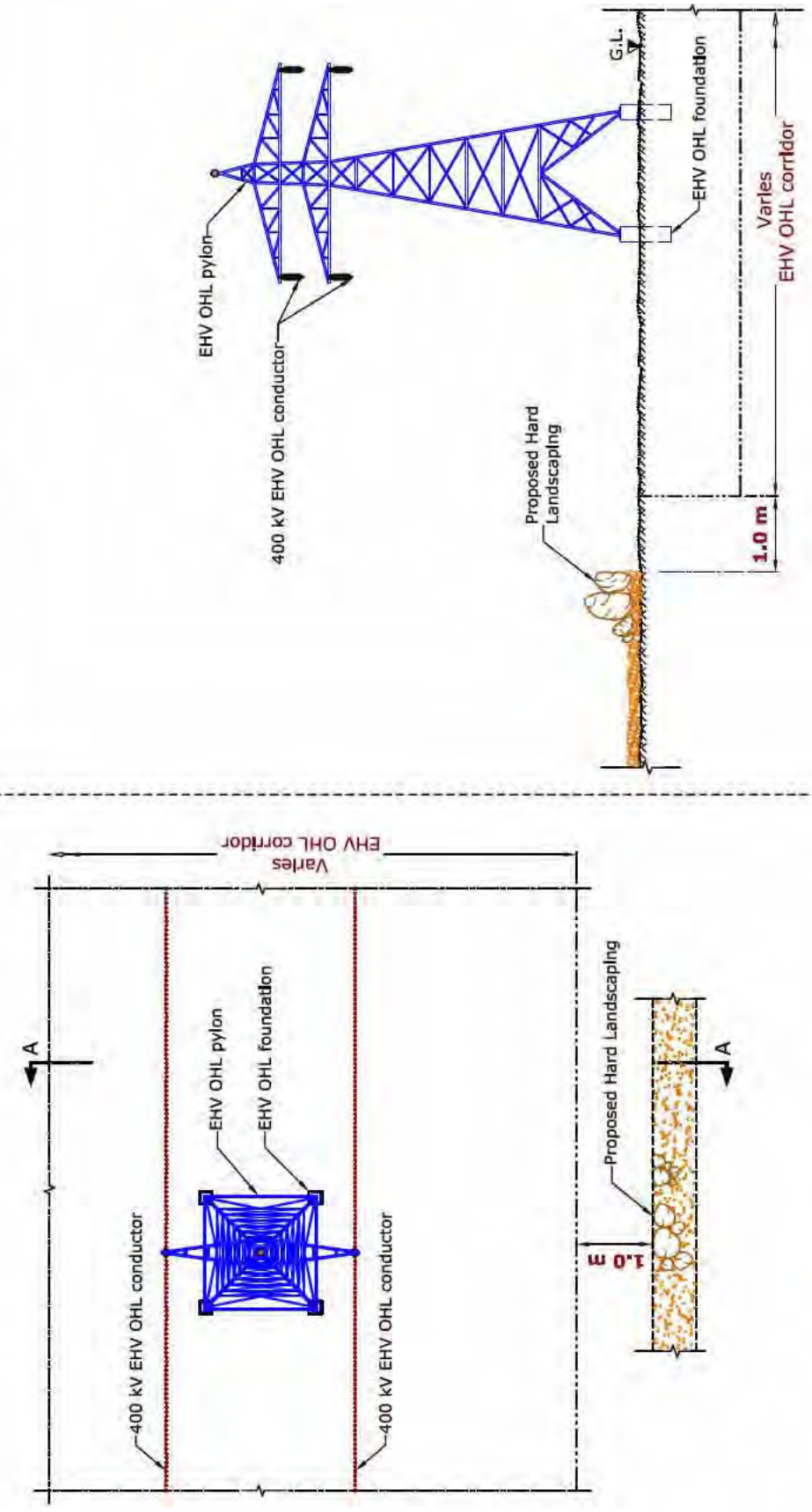
Fig: 50.7 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING EHV OHL (132 kV)



NOTE :

1. Horizontal clearance is from the proposed Hard Landscaping edge to existing EHV OHL corridor edge.
2. Hard Landscaping not allowed within EHV OHL corridor.

Fig: 50.8 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING EHV OHL (400 kV)



PLAN

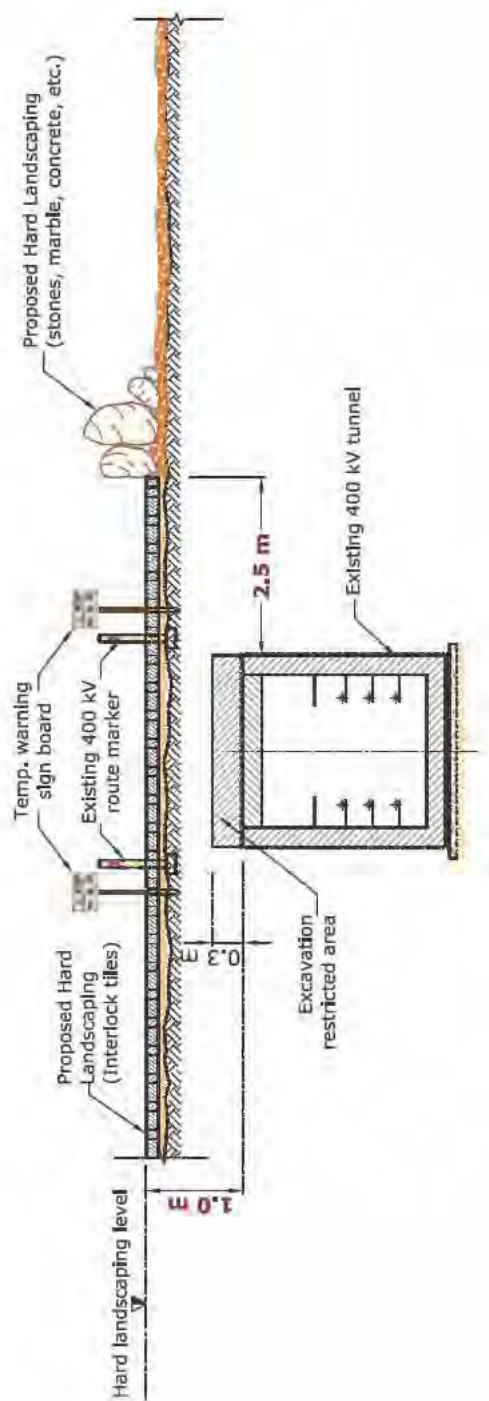
SECTION - AA

NOTE :

- 1. Horizontal clearance is from the proposed Hard Landscaping edge to existing EHV OHL corridor edge.
- 2. Hard Landscaping not allowed within EHV OHL corridor.

Fig: 50.9

HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING 400 kV TUNNEL

**NOTE :**

1. Horizontal clearance is from the proposed Hard Landscaping edge to existing 400 kV tunnel edge.
2. Minimum 0.3 m soil (without disturbance) to be maintained above the tunnel.
3. Vertical clearance minimum 1.0 m should be maintained from the top of the 400 kV tunnel to the Hard Landscaping finished level.
4. Existing ground level raised or lowered not more than 0.3 m.

Table 4: Clearance & Protection details for proposed Hard Landscaping and existing DEWA Gas/Fuel services

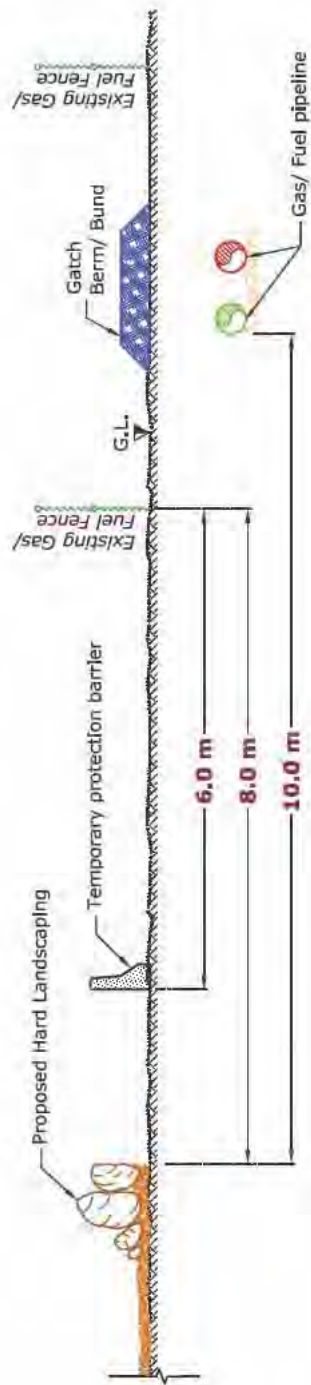
Gas/Fuel existing Services	Proposed Hard Landscaping	Horizontal Clearance	Crossing Details				Remarks
			Vertical Clearance	Crossing Position	Crossing Method	Standard Protection	
Gas/Fuel Pipeline (All diameter)	Interlock Tiles	NA	-	-	-	-	-
	Stones, Granite, Concrete, etc	10.0 m	NA	-	-	-	• Horizontal clearance (Ref Fig:50.10)

Table Abbreviation

A - Above existing DEWA services.	OC - Open Cut Method.
B - Below existing DEWA services.	R - Required Protection.
A/B - Above or Below existing DEWA services.	NR - Not required.
NDCM - Non Disruptive Crossing Method.	NA - Not allowed.



Fig: 50.10 HORIZONTAL CLEARANCE DETAILS BETWEEN PROPOSED HARD LANDSCAPING AND EXISTING GAS/ FUEL SERVICES



NOTE :

1. Horizontal clearance 8.0 m from proposed Hard Landscaping edge to existing Gas/ Fuel fence.
2. Horizontal clearance 10.0 m from proposed Hard Landscaping edge to existing Gas/ Fuel pipeline edge.
3. Barricading for working 6.0 m horizontally away from existing Gas/ Fuel fence is required.
4. Hard Landscaping not allowed within Gas/ Fuel pipeline corridor.



ACRONYMS

S No	Abbreviations	Expansion
1	AC Pipe	Asbestos Cement Pipe
2	CPT	Cone Penetration Test
3	DEWA	Dubai Electricity & Water Authority
4	Dia	Diameter
5	EHV	Extra High Voltage
6	FGL	Finish Ground Level
7	Fig	Figure
8	F.O	Fiber optic
9	FRL	Finish Road Level
10	GI	Galvanized Iron
11	GL	Ground level
12	GRE	Glass Reinforced Epoxy
13	GRP	Glass Reinforced Pipes
14	HDD	Horizontal Directional Drilling
15	HDPE	High-Density Poly Ethylene
16	HV	High Voltage
17	HL	Horizontal
18	I/H Beam	I or H shape beam
19	I D	Internal Diameter
20	kV	Kilovolt
21	LV	Low Voltage
22	m	Meter
23	Max	Maximum
24	Min	Minimum
25	mm	Millimeter
26	NDCM	Non-Disruptive Crossing Method
27	NDRC	Non-Disruptive Road Crossing
28	NOC	No Objection Certificate
29	Ø	Diameter
30	OHL	Over Head Line
31	O.F	Oil Filled
32	OPGW	Optical Ground Wire
33	PPV	Peak Particle Velocity
34	Ref	Refer to
35	RCC	Reinforced Cement Concrete
36	ROW	Right Of Way
37	RTA	Road & Transportation Authority
38	SCADA	Supervisory Control and Data Acquisition
39	Temp.	Temporary
40	uPVC	Unplasticized polyvinyl chloride
41	VL	Vertical

DEFINITIONS

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1. **400kV Cable Tunnel:** Is a precast concrete hollow structure for housing and protecting the 400kV power cables laid inside.
2. **Bund/Gatch Berm:** Rising backfilling Earth works
3. **Carriageway:** The part of the road used as a motorway in the same traffic flow direction which can be one lane or more.
4. **Compacted soil:** Soil compacted by mechanical/manual means to remove the air trapped in the soil particles to improve the soil density and stability.
5. **Concrete bed:** Precast concrete unit used as a supporting element.
6. **Conductor:** Conductors are made of materials, usually Copper or Aluminum in Cables, so that electricity can flow through easily.
7. **Corridor:** The dedicated Area reserved for utilities within right of way
8. **Crossing Method:** The Proposed services crossing the existing services either by using NDCM or Open cut methodology.
9. **Crossing Position:** The Proposed services crossing the existing services either above or below.
10. **Directly buried:** Cables or pipes laid/installed underground with soil backfilling surround.
11. **Discharge pipe:** Is the pipe that carries the discharged water from the dewatering point to the discharge point or Manhole.
12. **Duct Bank:** Group of buried pipes, which are protected by concrete encasement for cable laying through it, without disturbing the nearby structures/ installations.
13. **Duct:** Pipe laid across a road/service to accommodate future pipes/cables without disturbance to existing road and/or other services.
14. **Entry/Exit pit:** Excavated drive and receive pits for NDCM/NDRC works.
15. **Excavation edge:** The virtual line parallel to the centerline of the excavation trench, whereas the excavation ends forms an edge.
16. **Falling clearance:** The minimum / shortest distance between the nearest OHL Phase conductors, measured from the top of the object (street light poles, posts, etc.) which may fall on side of conductor.
17. **Formation level:** It is the required excavation or backfilling level to lay/install services in accordance with the designed profile.
18. **Hangers:** Any robust materials capable to carry suspended weight.
19. **Head room gantry:** The maximum safe vertical clearance measured from the finished road level, where the road passes under overhead structure.
20. **Height Limit Gantry:** It is a structure to Control and warn the vehicles or machineries for a certain height limit in OHL (overhead line) areas.
21. **Horizontal Clearance:** The Lateral distance measured from the edge of service to the nearest edge of other service or one point to other point.

22. **Hump:** Small mounted projection rising above the existing ground/road level.
23. **HV Manhole:** Access chamber for making connections and maintenance for buried HV cables under the road.
24. **I/H Beam:** I-Beam shape or H-beam shaped is a steel element, used as a supporting element.
25. **Joint Bay for Transmission Cable Joints:** A concrete structure with cover to accommodate and protect 132 kV cable joints
26. **Link Box:** It is a box like enclosure equipped with disconnecting/ isolating links, used in the transmission cable system, for bonding and grounding the metallic screen/ sheath of power transmission cables.
27. **Manual excavation:** It is the excavation activity carried out by hand tools only and without the use of any mechanical machines/equipment.
28. **Oil Field cable:** It is a cable insulated with Oil and paper.
29. **OPGW:** Optical Ground Wire is a combination of Fiber optic cables (inside) for communication purpose, and ground wire (outside) – for lightening protection, used in HV and EHV overhead power transmission lines.
30. **Overhead Line:** One or more power transmission lines (conductors) stringed/ suspended above the ground by insulators on towers/ Pylons or utility poles.
31. **Pile Cap:** It is a structure element consists of mass concrete mat connecting group of piles/single pile top portion
32. **Pilot cable:** It is a copper cable laid for cable route identification, which helps to indicate the presence of Transmission cable(s) underneath the subject area.
33. **Pipeline joint:** It is the assembly of two pipes or fittings or pipe and fitting by electrical or mechanical means to form a flexible or rigid joint
34. **Pole:** It is a Steel or wooden post used to support an Overhead HV power line
35. **Power Cable:** An assembly of one or more electrical conductors covered with sheath used for transmission of electrical power.
36. **Protection Slab:** A flat reinforced concrete structure element, used to protect the existing services.
37. **Pylon:** It is a Steel lattice structure /tower used to support an Overhead power transmission lines.
38. **Route marker:** Standard visible markers installed on the services route to indicate the existing services.
39. **Settlement Calculation:** An accurate estimate of soil settlement.
40. **Sheet Pile:** It is always steel sheet structure to support the soil during the excavation
41. **Shoulder line:** It is the yellow line that defines the portion of pavement continuous with the travelled way for accommodation of stopped vehicles for emergency use.
42. **Soft material:** Any compressive material that can separate two different elements without showing impact on the contacted materials
43. **Spare Duct:** An additional pipe/duct placed for future use.
44. **Split Duct:** A longitudinally split/cut pipe used to protect existing cable/pipe always surrounded with concrete.

- 45. **Stay rope:** It is a tensioned wire used to stabilize the erected pole, that carries HV power cables
- 46. **Steel Sleeve Protection:** Heavy duty hollow steel cylinder covered to protect pipes from damage.
- 47. **Temporary access:** It is an access designated for vehicles/machineries prepared to meet specific requirements for temporary duration.
- 48. **Temporary warning sign board:** Warning signs fixed in visible places to warn the users/operators from specific hazard.
- 49. **Trough:** A concrete channel shaped precast structure with cover which is used for protection of 132kV power cables along the route.
- 50. **Valve Chamber:** Precast or cast in situ reinforced concrete, which is a protected assembly space that contains valve arrangements to control the fluid flow.
- 51. **Wooden box protection:** Used to cover the existing power cable(s) from any falling objects, to safeguard existing exposed cables from damages during a construction activity.

REFERENCES

Infrastructure NOC Technical Manual references

- British Standards (BS)
- American Association of State Highway and Transportation Officials (AASHTO)
- DEWA specifications
- Hand book on EHV overhead line& underground cable protective regulation 2013
- American Water Works Association (AWWA)
- ISO-14692
- Geometric design manual for Dubai roads (2001)

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