Company Standard -
38kV MV & LV Civil & Ducting Standard

Governance and Control

Issuing Authority:	Head of Asset Management
Content Owner:	Underground Networks Section Asset Management
Document is Effective from:	24/01/2017
Document Number:	DOC-090217-CMY

This document shall be complied with by all end users. Feedback on its content is welcome and should be given to the Content Owner. Should a derogation from any part be required, this shall be referred to the Issuing Authority. Derogations shall be approved by the Issuing Authority only.

Contents

Section 1 – Overview 1
Introduction 1
Scope 1
Mandatory References 1
Section 2 – Provisions 2
1. General 2
2. Materials Requirements 2
3. 38kV Ducting Standards 3
4. MV Ducting Standards 4
5. LV Ducting Standards 4
6. Duct Proving 4
7. Duct Sealing & Duct roping 6
8. Quality Conformance 6
Annex A. (Mandatory or Informative) 7
A.1. 38kV Single Circuit Trench Cross-section 5 duct way 7
A.2. 38kV Single Circuit Trench Cross-section 4 duct way 8
A.3. 38kV Single Circuit no Communication Duct 9
A.4. 38kV Double Circuit Trench Cross-section 8 duct way 10
A.5. 38kV, MV Screen Sectionalising Chamber, Comms Chamber & Lubrication point 11
A.6. 38kV Drain Crossing Under 13
A.7. 38kV Culvert Crossing 14
A.8. 38kV Drain Crossing Over 15
A.9. 38kV Joint Bay Drawing 16
A.10. 38kV Joint Bay Backfill 17
A.11. 38kV Ducting at Mast & Pole Set 18
A.12. MV Trench Cross Section 19
A.13. MV Joint Bay 24
A.14. MV Joint Bay Backfill 25
A.15. MV Ducting at Pole 26
A.16. Ducting within Station Compound 27
A.17. Thermal Backfill Grading Curve 28
A.18. Ducting & Civil Inspection Report 29
A.19. Duct Inspection Report 31
A.20. Duct Proving Report 32
Document Control 34
Definitions and Abbreviations 35

Section 1 – Overview

Introduction

It is ESB Networks Policy to use a fully ducted system for Underground Networks installations. Ducted systems, when installed to a high standard show a reduced fault rate relative to direct buried systems and provide greater protection against external interference. In addition ducted installations allow the flexibility to change cable size and type, install spare ducts, and provide a means of removing defective cable without the high costs of excavation and reinstatement.

Please refer to the "Document(s) Superseded" section to see the list of documents cancelled in whole or part by this Procedure.

LIFETIME PERFORMANCE STANDARD FOR DUCTED SYSTEMS

The expected lifetime standard for ducted trenches is 80-100 years minimum. It is vital for the serviceability and maintainability of the assets that specified minimum clearance and depth standards are maintained and that mechanical strength, thermal surround and quality of ducts and protective materials all meet ESB Specification standards.

Effective quality control measures shall be in place to ensure that minimum ESB Networks standards for design, construction and materials are complied with. A duct installation installed in accordance with ESB Networks standards will provide a safer system.

CAUTION: Substandard ducted installations shall not be accepted.

Scope

This Standard details the design and construction requirements for ESBN 38kV MV & LV Ducting and Civil installations for Underground Networks including Stations.

Mandatory References

The following documents, in whole or in part, are indispensable for the application of this document. For dated references, only the edition stated applies. For undated references, the latest edition of the referenced document (including any alerts which amend the document) applies;

- MV & LV Ducting Summary DTIS-230908-BUV
- MV & LV Cable Installation Standards and Practices Manual DOC-240205-AJC
- Housing Schemes Guidebook for ESB Networks Standards for Electrical Services DTIS-050500-AZF
- ESB Networks Approved Material Suppliers DOC-200815-CAP
- ESBN Specification Number 16113 Plastic Ducts and Fittings for Power and Telecommunications Cables
- ESBN Specification Number 16001 Plastic Warning & Protection Tape Strips Tiles & Concrete Marker Posts for HV, MV & LV Cables & Plastic Covers for LV Earth Guards
- ESBN Specification Number 16002 Plastic Cable Ties

Section 2 – Provisions

1. General

Design considerations at planning stage shall be given to safety, environmental impact and long term Asset Lifetime.

Prior to duct installation the ducting contractor and all associated subcontractors shall attend an ESB Networks ducting workshop and proof of attendance shall be provided to ESB Networks.

Joint Bays shall be installed where joints are required in a circuit or where pulling points are required in a circuit. Joint Bay drawings are detailed for 38kV in Annex 9, for MV in Annex 13.

C2 Communication Chambers shall be installed at each joint bay for 38kV to facilitate communication fibre installation. See Annex 5 for details.

On cable runs in excess of 2 km cable screen sectionalising shall be designed for 38kV and MV. See Annex 5 for details.

Screen sectionalising chambers shall be installed at every alternative joint bay to facilitate this. See Annex 5 for details.

Where non-standard depth is unavoidable in some situations or where non-standard design is unavoidable, Asset Management Underground Networks Section shall be consulted. Consideration should be taken into account for the location of Joint Bays and C2 chambers regarding safe future access.

Compaction of Material in which ducts are laid shall be sufficiently compacted to prevent the occurrence of residual consolidation leading to trench surface depression, trip and falling hazards and ultimately reinstatement failure. Local Authority and NRA requirements shall be adhered to for finish reinstatement.

The minimum clearance of 300mm from other services and 600mm from high pressure gas or water mains shall be strictly observed. Deviations from this over short distances at unavoidable "Pinch Points" may be acceptable in some situations – for these situations where non-standard design is unavoidable Asset Management Underground Networks Section shall be consulted and a Design Risk Assessment produced.

Local ground conditions shall be taken into account for design as this will directly affect approach taken to installations.

2. Materials Requirements

All materials used for duct & joint bay installation shall be approved by ESBN on the Approved suppliers website link below,

https://www.esbnetworks.ie/tns/publications/-in-category/categories/publications/underground-networks-technical-documents/approved-suppliers

ESBN will not accept ducting installations where materials used are not sourced from the Approved suppliers list.

The bedding sand to be used around electric cables ducts & Joint bays shall be natural unwashed sand in accordance with BS EN 12620. The grading, when determined in accordance with BS EN 933-1, Section 103.1, shall comply with grading limit C in Table below and the grading curve shown in Annex 17. It is desirable that the sand shall have a maximum resistivity of 1.0 Km/watt at 0% moisture content. The sand shall be compacted so that no residual consolidation will occur.

Pea gravel is **unacceptable** as it significantly reduces cable current carrying capacity.

BS882 Sieve Size	3/16”	1/8”	7	14	25	52	100
% Passing by Weight	95	89	84	75	54	18	1.6

All installers of ducting should be made aware of this requirement including developers and ducting contractors. The grading curve or that shown in Annex 17 shall be issued with ducting installation contract documentation.

Lean Mix Concrete Specification and Compaction

Cement bound material shall be to Cl.1038 or Cl.1039 for lean mix concrete and shall be compacted in layers not exceeding 150mm and in accordance with Cl.813.10 and Table 8/4 of N.R.A Specification for Roadworks Series 800. Cube testing and Thermal testing shall be carried out on samples and locations where samples were taken be recorded on as builds. Foamed concrete shall not be accepted as it reduces cable ratings.

Red dye for Lean mix surround shall be used where proximity to privately owned cable circuits will be a factor, for these situations Asset Management Underground Networks Section shall be consulted.

Granular Material Specification and Compaction

Granular material for trench reinstatement shall be to Cl.804 (which is Granular Material Type B or Cl.806 wet-mix macadam and exceeding 150mm and in accordance with Cl.813.10 and Table 8/4 of N.R.A Specification for Roadworks Series 800.

Joint Bay backfill is detailed in

Annex 10 for 38kV Joint bays

Annex 14 for MV Joint bays.

3. 38kV Ducting Standards

38kV Ducting

38kV Duct Size	Duct Type	Duct Length
Standard Lay 110mm SDR 17.9	HDPE	6 / 9/ 12 Mtr
Directional Drill 110mm SDR 11 / 14.7	HDPE	Coils
110 mm Coupler	HDPE	250mm

- For Station compound duct type refer to Annex 16

For detailed 38kV trench cross sections refer to

Annex 1 for Single Circuit 5 duct way

Annex 2 for Single Circuit 4 duct way

Annex 3 for Single 3 duct way

Annex 4 Double Circuit 5 duct way

For detailed trench cross section at Pole / Mast refer to

Annex 11 38kV Ducting at Mast & Pole Set

For detailed 38kV non-standard trench cross sections refer to :

Annex 6 for typical crossing under a drain

Annex 7 for typical Culvert crossing

Annex 8 for typical crossing over a drain

4. MV Ducting Standards

MV Ducting

MV Duct Size	Duct Type	Duct Length
125mm uPVC	uPVC	6 Mtr Lengths
160mm uPVC	uPVC	6 Mtr Lengths

- For Station compound duct type refer to Annex 16

For detailed trench cross section refer to Annex 12
For detailed trench cross section at Pole refer to Annex 15

NOTE

125mm uPVC duct size shall be used wherever possible, as required by environmental and sustainability legislation, as magnetic field emissions and cable screen currents and kwh losses are reduced due to the more trefoil cable formation in the 125mm duct.

5. LV Ducting Standards

LV Ducting

LV Duct Size	Duct Type	Duct Length
125mm uPVC	uPVC	6 Mtr Lengths

For detailed trench cross section refer to Annex 12

6. Duct Proving

After duct installation, compaction of the surround materials and pre roping with 12mm rope, the ducts shall be cleaned, proven and pre lubricated the ducts to ensure that no foreign matter including water remains inside the duct circuit. Pre-lubrication is carried out at a rate of 10 litres per 100mtrs of ducting.

The ducts shall be brushed, proven and cleaned using a brush, mandrel and sponge in that order in the duct.

STEP 1 Brush	
STEP 2 Mandrel	
STEP 3 Sponge	

Sizes for each item are detailed in table below.

Duct Size		Duct Type	Mandrel Size	Brush Size	Sponge Size
OD mm	ID mm		OD (mm)	OD(mm)	OD (mm)
110mm	97mm	HDPE	90	120	110
110mm	90mm	Directional Drill HDPE	85	110	95
125mm	117mm	uPVC rigid	105	130	120
125mm	111mm	HDPE	105	130	120
125mm	107mm	Directional Drill HDPE	102	130	110
160mm	152mm	uPVC rigid	135	170	155
160mm	141mm	HDPE	135	160	155
200mm	177mm	HDPE	165	210	187
250mm	221mm	HDPE	210	260	230

Duct proving printouts and signed test certificates are required prior to cable installation. If the duct seals have been disturbed or a delayed period of time between duct installation proving and cable installation re proving will be required for the duct circuit.

The direction of the cleaning and proving shall be the same as that of the planned cable pulling. Cleaning and proving shall be carried out using a winch which has a calibrated dynamometer and printout. The dynamometer shall be calibrated annually and certified by an independent calibration tester. The certification shall be provided to the Employer before any cleaning or proving commences. Pulling tension shall not exceed 1 tonne (10 kN).

Results of cleaning and proving of the ducts shall be recorded on the Ducting Cleaning/Proving Report by the crew that carried out the process, this Report can be found in Annex 20. The report shall be agreed and signed by the ESBN representative who witnessed the entire suite of cleaning and proving operations. Fully completed reports and print outs for each section of ducting shall be submitted to the ESBN for review.

CAUTION: The proving of the ducts shall be deemed failed if the following conditions are not made. Cable shall not be installed if this occurs.

- The pulling tension exceeds 1 tonne (10 kN)
- The mandrel is stuck
- The mandrel is moving with sudden bursts even if the pulling tension is less than the maximum 1 tonne permitted
- The rope shoots suddenly up the duct
- The ducts do not maintain the same formation as at the start of the pull

Note: If this situation occurs Asset Management Underground Networks Section shall be consulted.

7. Duct Sealing & Duct roping

Following successful duct proving process, the following shall be carried out

- Ducts pre roped, the required rope size is 12mm. This shall be in one continuous length where possible if the ropes require splicing they shall be spliced using the ESBN approved method

- Water sealing rubber bungs shall be fitted to prevent water, sand or other debris getting into them. Refer to table below for duct sealing codes and details.

Duct	Sealing Bag	Code
110mm – 125mm	TYCO Bag 125mm (10 per box) Suitable for 110mm &125mm Duct	9317599
150mm – 200mm	TYCO Bag 150mm (10 per box) Suitable for 160mm &200mm Duct	9317596
200mm	TYCO Duct Reducer – Required for 200mm Ducts (4 per box)	9317601
All	Inflation Tool	9317597
All	CO_2 Canisters	9317600

8. Quality Conformance

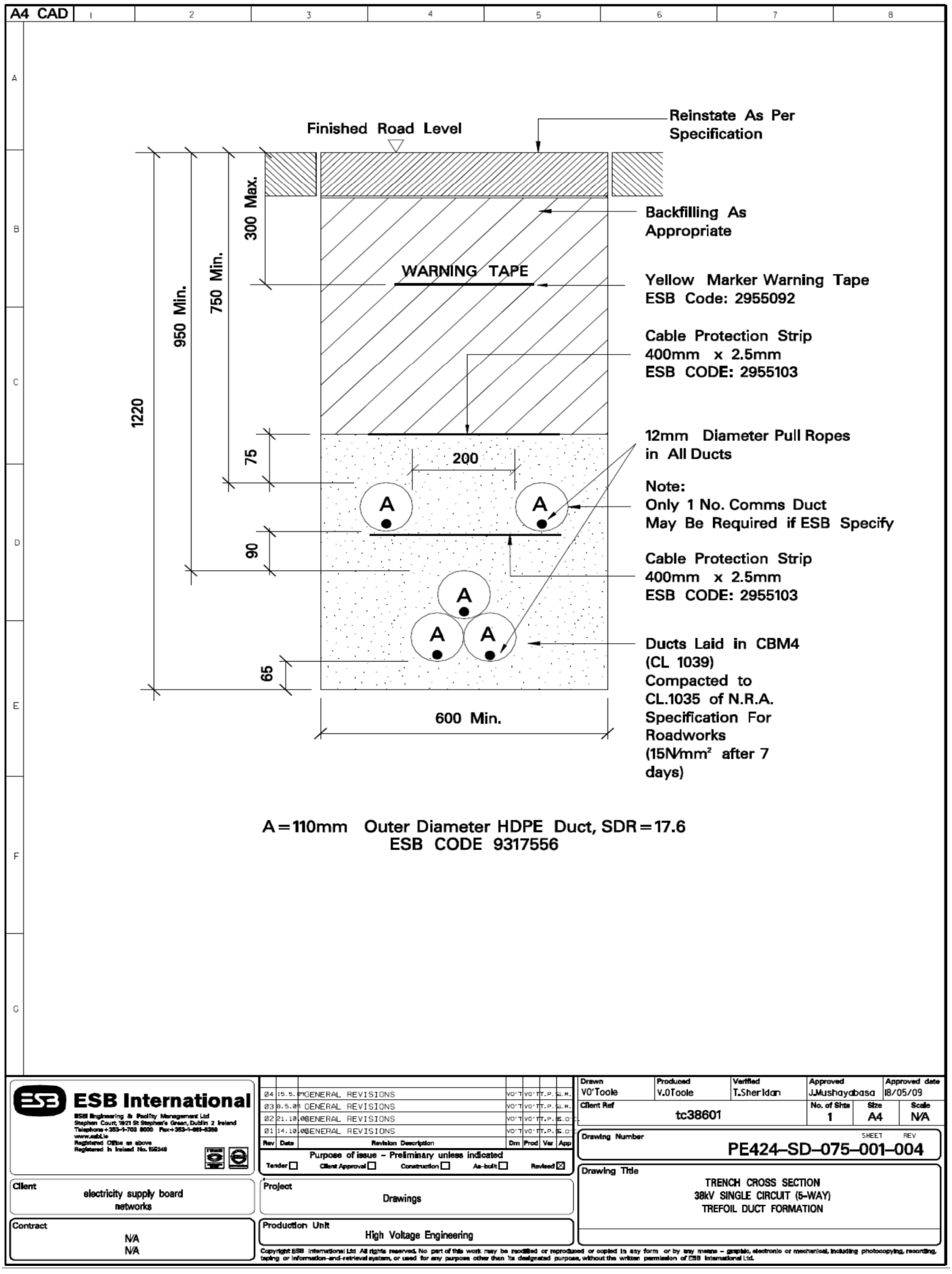
Quality conformance for duct installation shall be implemented at the beginning during the installation and when the installation has been completed.

For Civil Inspection report refer to Annex 18
For Duct Inspection report refer to Annex 19

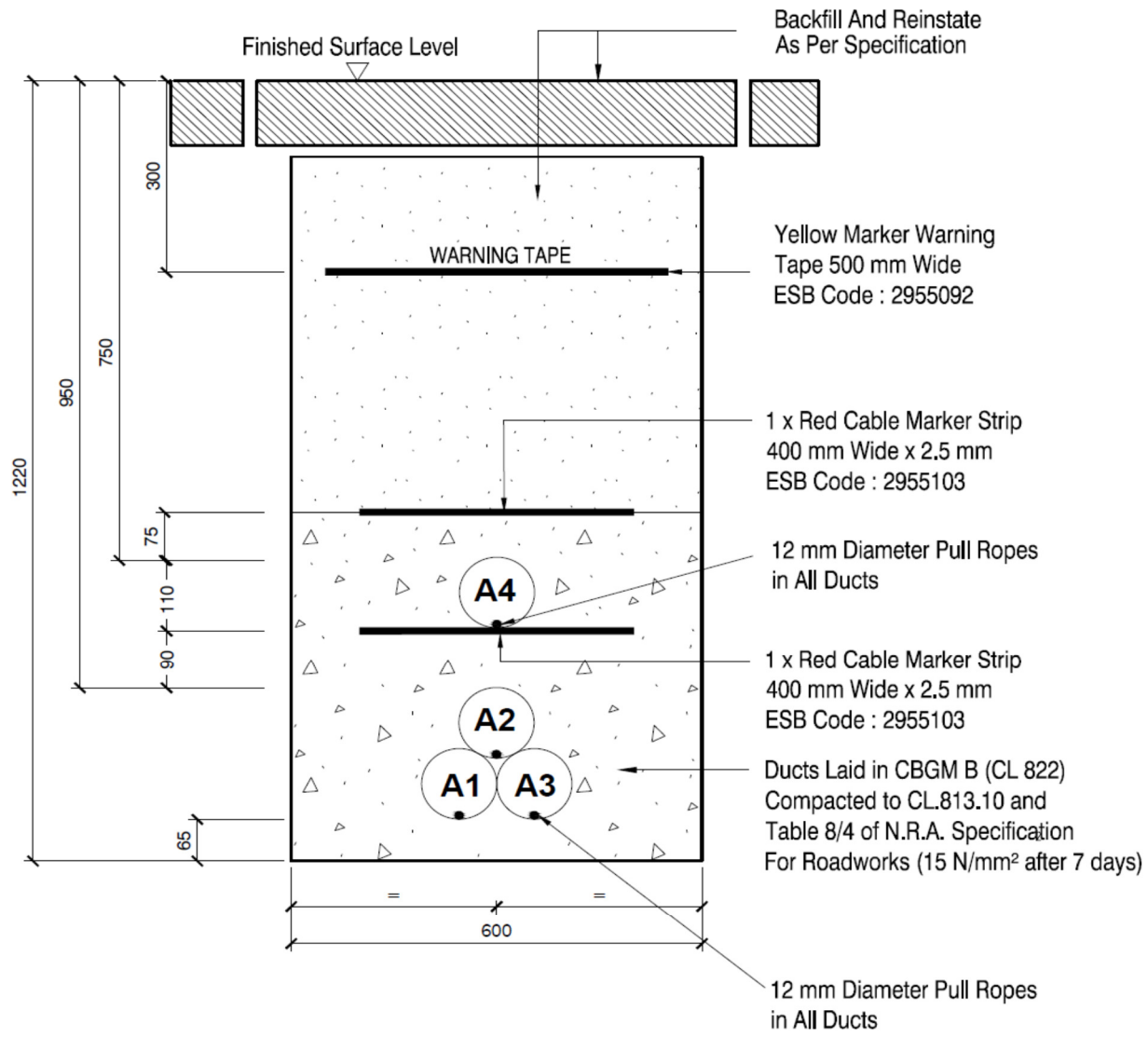
CAUTION: Substandard ducted installations shall not be accepted.

Annex A.(Mandatory or Informative)

A.1. 38kV Single Circuit Trench Cross-section 5 duct way



A.2. 38kV Single Circuit Trench Cross-section 4 duct way



A=110 mm Outer Diameter HDPE ESB Approved Duct, SDR=17.6, ESB Code : 9317556

All Dimensions in Millimetres

Note:

The Contractor shall provide test certificates confirming that the thermal resistivity of CBGM B is maximum 1 K.m/W.

ESB International, Stephen Court, 18–21 St. Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 8088 Email: marketing@esbi.ie Web: www.esbi.ie
ESB International is a trading name of ESBI Engineering & Facility Management Limited, Registered Office: as above Registered in Ireland No. 155249

Rev	Date	Revision description	Drn.	Prod.	Ver.	App.
0		ISSUE FOR CONSTRUCTION				

Purpose of issue - Preliminary unless indicated

Tender ☐ Client approval ☐ Construction ☒ As-built ☐ Revised ☐

Drawn	Produced	Verified	Approved	Approved date
G.Ryan	G.Ryan	M.Amet	To.Sheridan	03/10/2016

Client ref.	No. of sheets	Size	Scale
TC216203	1	A4	1:10

Drawing title: TRENCH CROSS SECTION 38 kV SINGLE CIRCUIT TREFOIL 4 WAY DUCT FORMATION

Client: ESB NETWORKS

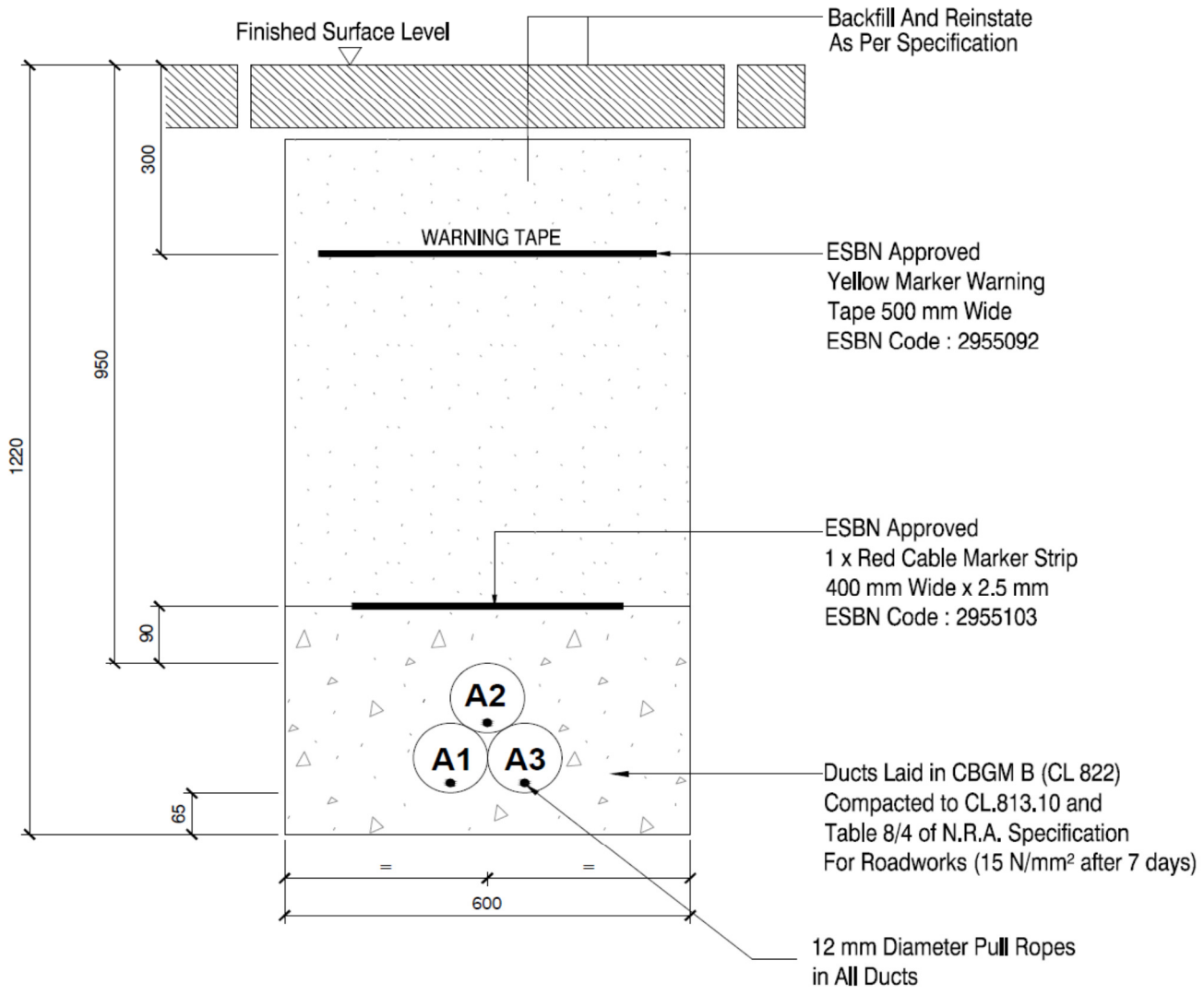
Project: 38 kV Cables Standards

Contract: 38 kV CABLE STANDARDS

Production unit: Civil & Environmental Engineering

Drawing number: PE424-D7003-004-002-000 Sheet Rev

A.3. 38kV Single Circuit no Communication Duct



A=110 mm: Outer Diameter HDPE ESBN Approved Duct, SDR=17.6, ESBN Code : 9317556
All Dimensions in Millimetres

Note:
The Contractor shall provide test certificates confirming that the thermal resistivity of CBGM B is maximum 1 K.m/W

ESB International
ESB International, Stephen Court, 18-21 St. Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 8088
Email: marketing@esbi.ie Web: www.esbi.ie
ESB International is a trading name of ESBI Engineering & Facility Management Limited, Registered Office: as above Registered in Ireland No. 155249

Rev	Date	Revision description	Drn.	Prod.	Ver.	App.
0	SEPT. 15	ISSUED FOR CONSTRUCTION				

Purpose of issue - Preliminary unless indicated
Tender ☐ Client approval ☐ Construction ☒ As-built ☐ Revised ☐

Drawn	Produced	Verified	Approved	Approved date
G.Ryan	S.Rugero	S.ODonovan	R.Donaghy	02/09/2015

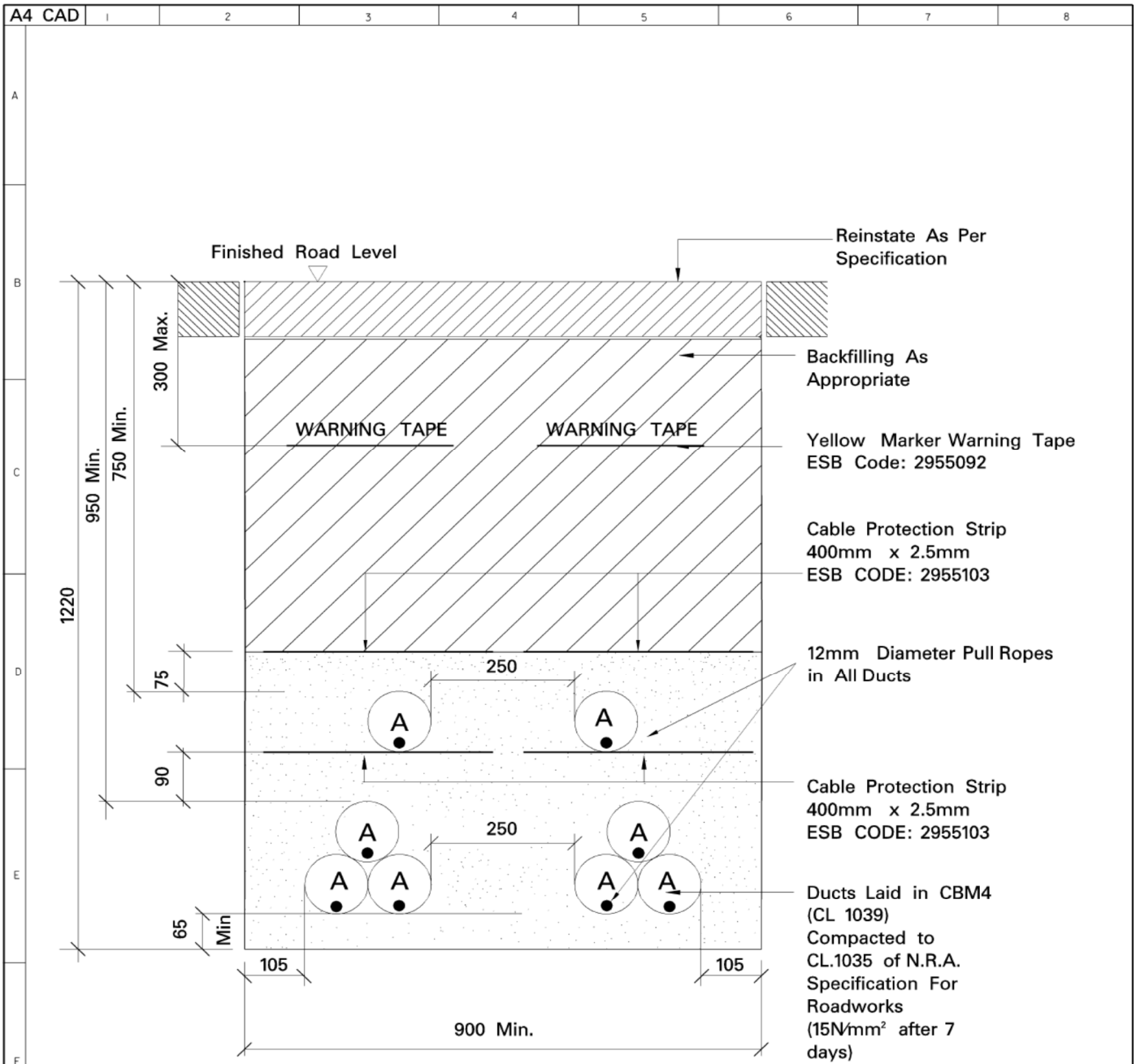
Client ref.	No. of sheets	Size	Scale
TC211209	1	A4	shown

Client: ESB NETWORKS
Project: MV Standard Drawings
Contract: CABLE SERVICES TO ESB
Production unit: Civil & Environmental Engineering

Drawing title:
TRENCH CROSS SECTION
38 kV SINGLE CIRCUIT
TREFOIL 3 WAY DUCT FORMATION

Drawing number: PE424-D7002-011-003-000
Sheet Rev

A.4. 38kV Double Circuit Trench Cross-section 8 duct way



A = 110mm Outer Diameter HDPE Duct, SDR = 17.6

ESB International
ESBI Engineering & Facility Management Ltd
Stephen Court, 18/21 St Stephen's Green, Dublin 2 Ireland
Telephone +353-1-703 8000 Fax +353-1-661-5359
www.esbi.ie
Registered Office as above
Registered in Ireland No. 156249

Rev	Date	Revision Description	Drn	Prod	Ver	App
001	14.11.08	GENERAL REVISIONS	VO'T	VO'T	T.P.S.	

Purpose of issue – Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☐ As-built ☐ Revised ☒

Drawn	Produced	Verified	Approved	Approved date
V0'Toole	V.0Toole	T.P. Sheridan	E.0Connor	14/11/08

Client Ref	No. of Shts	Size	Scale
TC38793	1	A4	N/A

Drawing Number: PE424–SD–076–001–001 (SHEET / REV)

Drawing Title: TRENCH CROSSING SECTION 38kV DOUBLE CIRCUIT (8 WAY) TREFOIL DUCT FORMATION

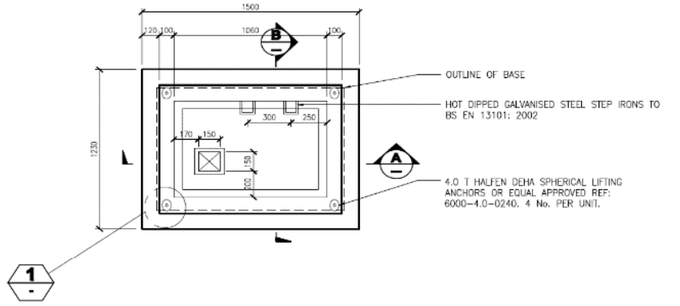
Client: ESB NETWORKS

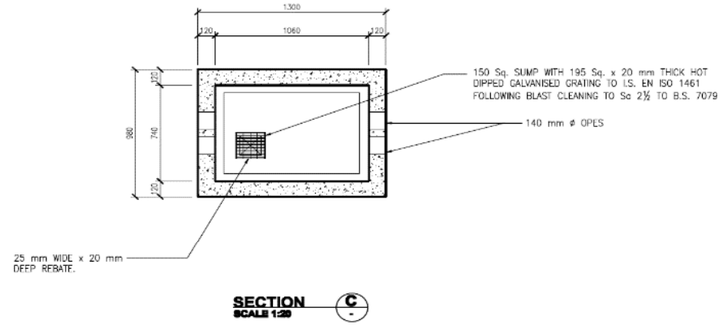
Project: CABLES SERVICES TO ESB

Contract: N/A N/A

Production Unit: High Voltage Engineering

A.5. 38kV, MV Screen Sectionalising Chamber, Comms Chamber & Lubrication point





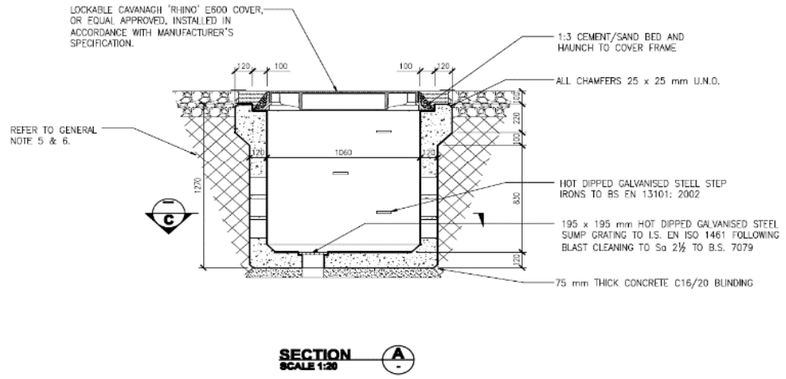
PRECAST CONCRETE NOTES:

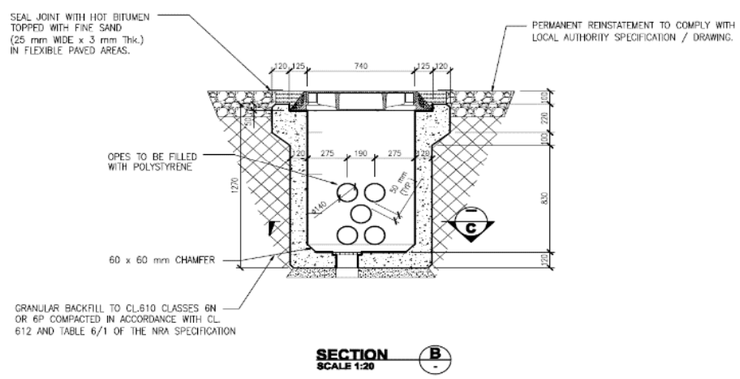
1. ALL PRECAST CONCRETE ELEMENTS TO BE MANUFACTURED TO B.S. EN 13369:2013 "COMMON RULES FOR PRECAST CONCRETE PRODUCTS".
2. LIFTING INSERTS TO BE DESIGNED & INSTALLED TO PD CEN/TR 15728:2008 "DESIGN AND USE OF INSERTS FOR LIFTING AND HANDLING OF PRECAST CONCRETE ELEMENTS".
3. WEIGHT OF PRECAST CONCRETE UNIT = 2.2 T. SPECIFIED LIFTING INSERTS HAVE A S.W.L. OF 4 T. ACCOUNTING FOR DYNAMIC LOADING.
4. LOCATION & SPECIFICATION OF LIFTING INSERTS ARE ASSUMED TO FACILITATE DEMOULDING AND HANDLING IN PRECAST MANUFACTURING FACTORY. IT IS THE RESPONSIBILITY OF THE PRECAST MANUFACTURER TO NOTIFY THE ESBI ENGINEER IF THESE ARE UNSUITABLE FOR HIS MANUFACTURING METHODOLOGY. ESBI ENGINEER TO BE INFORMED OF ANY ALTERNATIVE LIFTING LOCATIONS FOR FACTORY HANDLING & DEMOULDING.
5. CONCRETE TO HAVE A MINIMUM STRENGTH OF 30 N/mm² PRIOR TO HANDLING OR DEMOULDING.
6. MAIN CONTRACTOR TO ENSURE THAT A METHOD STATEMENT AND RISK ASSESSMENT INCLUDING A LIFTING PLAN, ARE PRODUCED FOR INSTALLATION AND ARE AVAILABLE TO ESBI ENGINEER FOR REVIEW IF REQUESTED. LIFTING PLAN TO INCORPORATE REQUIREMENTS OF LIFTING INSERTS AND LIFTING LOOP EYES.
7. A MINIMUM LIFTING SLING ANGLE OF 60° TO THE HORIZONTAL IS REQUIRED.
8. A LIFTING SYSTEM WHICH ENSURES ALL LIFTING POINTS TAKE ON AN EQUAL LOAD IS REQUIRED.
9. TRANSPORT THE CHAMBER BY TRAILER WHEN TRAVELLING OVER ROUGH TERRAIN TO AVOID DAMAGE TO LIFTING ANCHORS.
10. HALFEN DEHA SPHERICAL LIFTING ANCHORS TO BE USED AS SPECIFIED. ANY DEVIATION FROM THIS MUST BE NOTIFIED TO ESBI ENGINEER BY PRECAST MANUFACTURER.
11. FORMWORK FOR PRECASTING TO BE OF A MINIMUM STANDARD OF VARNISHED WOODEN MOULD WITH PLANED BOARDS.
12. CONCRETE TO BE GRADE C32/40, AS SPECIFIED IN TABLE 1.

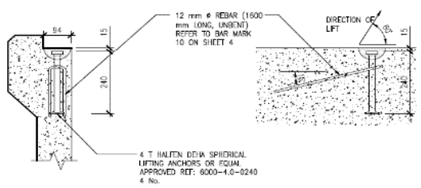
TABLE 1 - CONCRETE SPECIFICATION TO I.S. EN 206-1

ELEMENT	BLINDING & MASS CONCRETE, DRAINAGE PIPE & MANHOLE SURROUNDS.	GROUND BEAMS, FOUNDATIONS & PITS/ CHAMBERS
EXPOSURE CLASS	X0	XC4
MIN. BINDER (CEMENT+GGBS) CONTENT (kg/m³)	220	320
GGBS TO EN 15167-1 (kg/m³)	0	95
CEM II / A-L TO I.S. EN 197-1 (kg/m³)	220	225
MAX. WATER/CEMENT RATIO	–	0.50
CHLORIDE CONTENT CLASS	Cl. 1.0	Cl. 0.40
MAX. AGGREGATE (mm)	10	20
MIN. COVER (CMin) (mm)	–	40
*COMPRESSIVE STRENGTH CLASS @ 28 DAYS.	C16/20	C32/40

NOTES: 1. *C16/20 to be read as follows: Min. Cylinder Strength / Min. Cube Strength (N / mm²) 2. Design working life to be 50 years minimum.







GENERAL NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEER'S, ARCHITECT'S AND ESB NETWORKS DRAWINGS & SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN mm.
3. DO NOT SCALE DIMENSIONS.
4. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS PRIOR TO CONSTRUCTION, ANY DISCREPANCIES TO BE NOTIFIED TO THIS OFFICE IN WRITING IMMEDIATELY.
5. TEMPORARY SUPPORTS TO THE SIDES OF THE EXCAVATION MAY BE REQUIRED DEPENDENT ON SUBSOIL, METHOD OF WORK AND SITE CONSTRAINTS, AND ARE TO BE AGREED WITH THE ESBI ENGINEER PRIOR TO COMMENCEMENT OF EXCAVATION. SIDE SLOPES OF AN UNSUPPORTED EXCAVATION DEPENDENT UPON SUBSOIL AND SHALL BE AGREED WITH ESBI ENGINEER.
6. MAIN CONTRACTOR TO PROVIDE A METHOD STATEMENT AND RISK ASSESSMENT FOR THE EXCAVATION WORKS FOR THE ESBI ENGINEER TO REVIEW.
7. THE CONSTRUCTION, AS SHOWN, IS APPLICABLE ONLY WHERE THE SUBSOIL AT FORMATION LEVEL EXCEEDS 100 kN/m² BEARING CAPACITY.
8. SUITABILITY OF THE COVER AND CHAMBER TO BE ASSESSED BY THE PROJECT ENGINEER IN CIRCUMSTANCES OF HIGH TRAFFIC LOADING IN ACCORDANCE WITH THE RECOMMENDATIONS OF NRA DESIGN MANUAL FOR ROADS AND BRIDGES ADDENDUM TO HA 104/09.
9. COVER AND FRAME TO B.S. EN 124.
10. COVER SHALL HAVE APPROVED BADGED MARKING INCORPORATED TO THE APPROVAL OF THE ESBI ENGINEER.
11. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE NRA SPECIFICATION FOR ROADWORKS.

RSV.	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
1		LIFTING EYE DETAIL ADDED				
0	15/11/13	ISSUED FOR CONSTRUCTION	GR	JH	MA	TS

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED
TENDER ☐ CLIENT APPROVAL ☐ CONSTRUCTION ☒ AS-BUILT ☐ REVISED ☐

Client: ESB NETWORKS

Project: MV Standard Drawings

Contract: MV CABLE STANDARDS

Drawing Title: C2 COMMUNICATIONS / CABLE SHEATH SECTIONALISING PRECAST CHAMBER GENERAL ARRANGEMENT

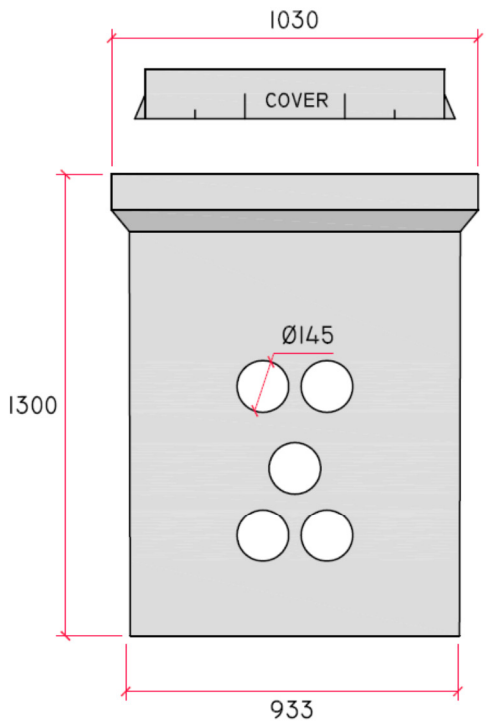
Production Unit: Civil Building and Environmental

ESB International
ESBI International, Stephen Court, 18-21 St. Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 8088
Email: marketing@esbi.ie Web: www.esbi.ie
ESBI International is a trading name of ESBI Engineering & Facility Management Limited.
Registered Office: as above Registered in Ireland No. 185348

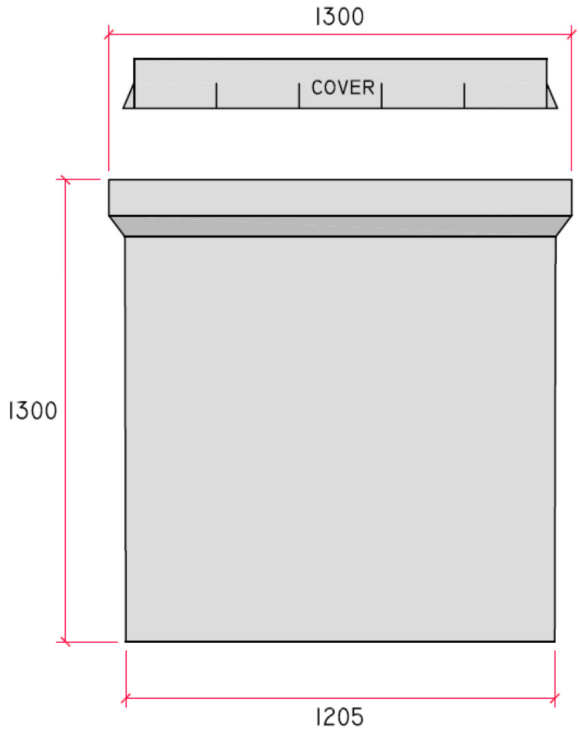
DRAWN	PRODUCED	VERIFIED	APPROVED	APPD DATE
G.Ryan	J.Haverty	M.Arnat	T.Sheridan	12.12.2013

CLIENT REF: TC210983 | No. of Dwg: 4 | SIZE: A1 | SCALE: 1:20

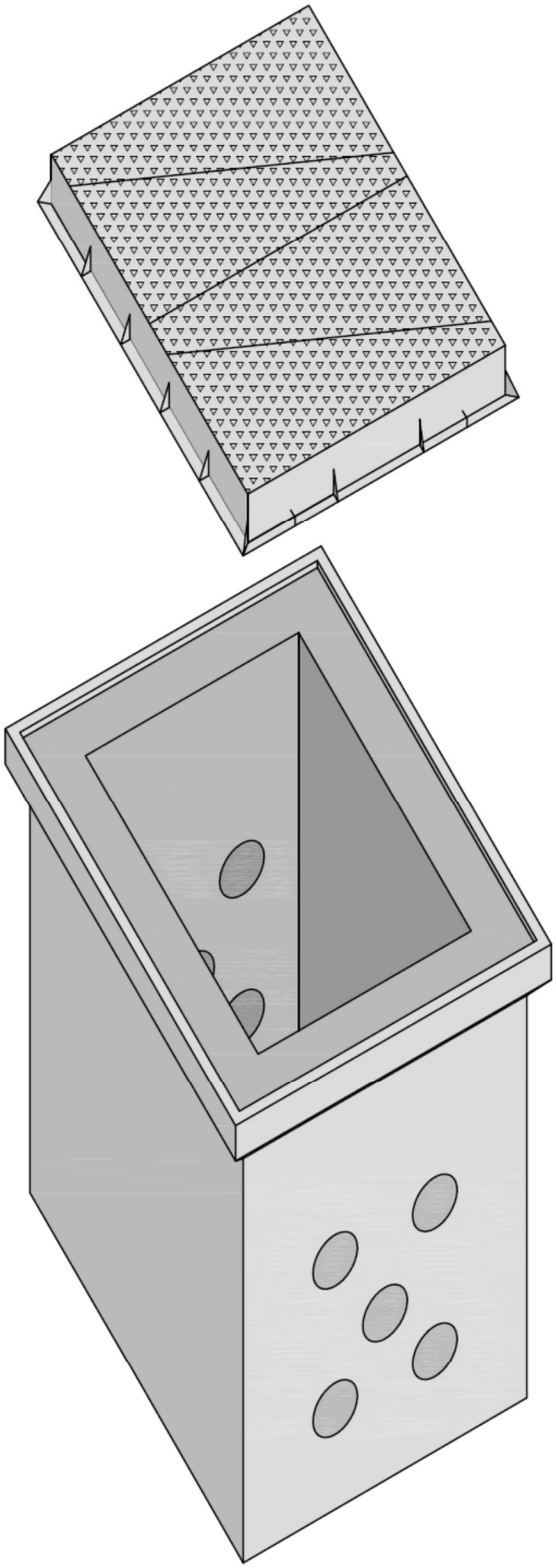
DRAWING NUMBER: PE424-D7002-009-002-001 | SHEET | REV



SIDE

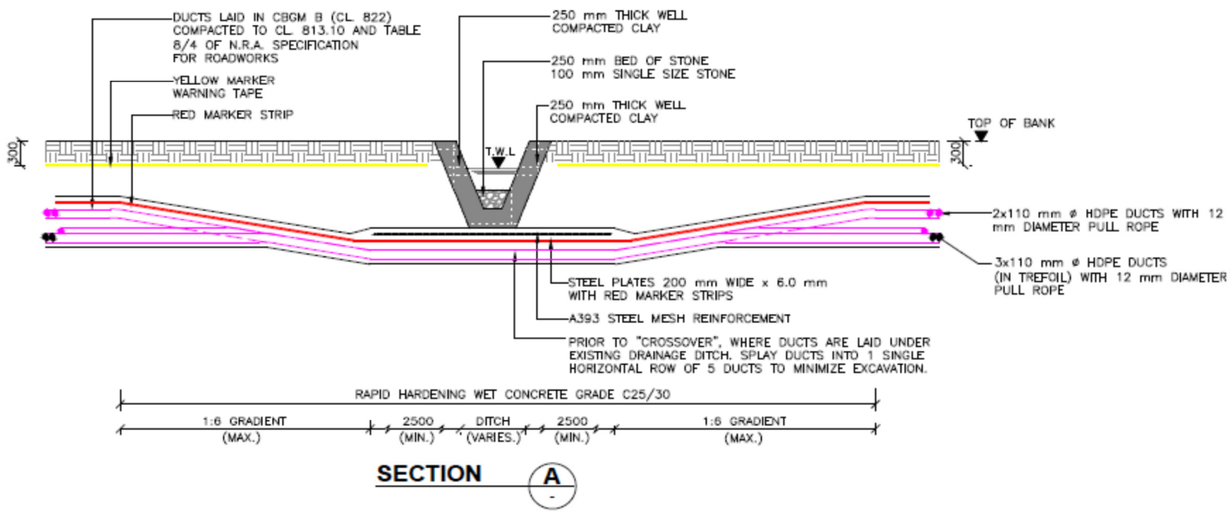


SIDE

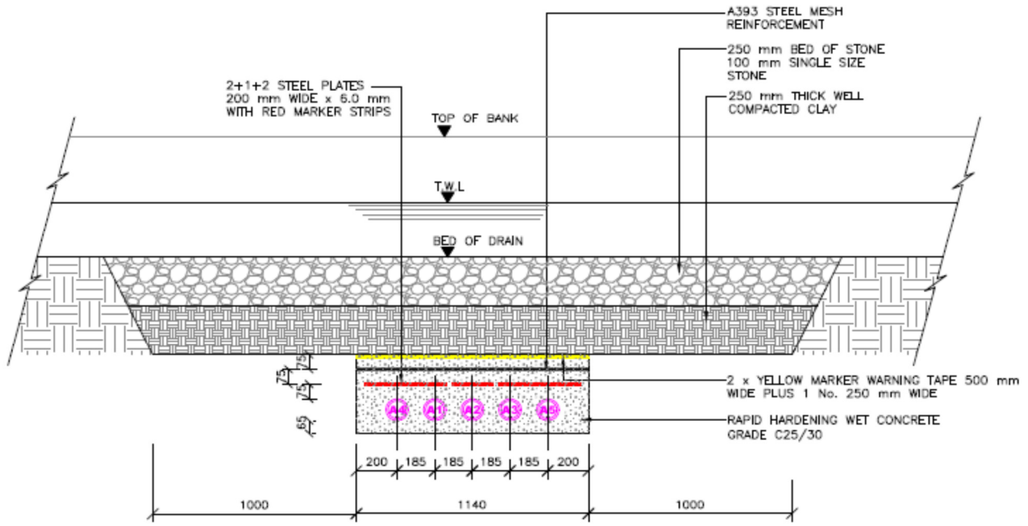


	Chamber Dimensions
Height	1300 mm
Width	933 mm
Length	1205 mm

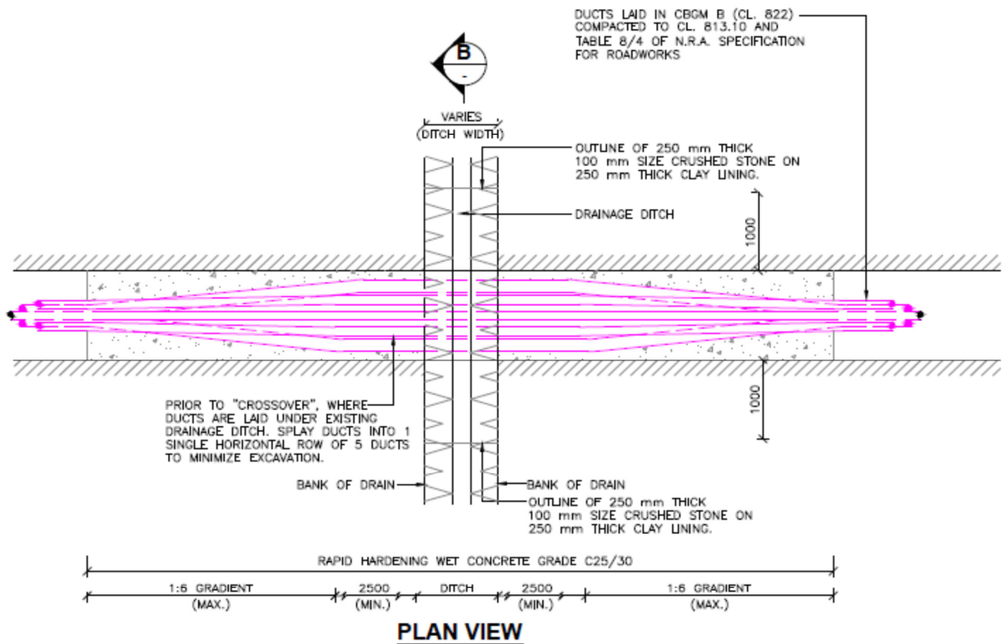
A.6. 38kV Drain Crossing Under



SECTION A



SECTION B



PLAN VIEW

(110 mm OD TYPICAL TREFOIL OR FLAT FORMATION CIRCUIT AT DRAINAGE DITCH CROSSING)

STANDARD TRENCH CROSS SECTION PE424–D7002–011–002

NOTES:

1.) NO EXCAVATION WORK SHALL COMMENCE UNTIL THE CONTRACTOR HAS CONSULTED UP–TO–DATE SERVICES DRAWINGS AND CARRIED OUT AN ELECTROMAGNETIC LOCATOR (EML) SCAN.

2.) HAND DIG ONLY WITHIN 500 mm OF EXISTING SERVICES.

3.) THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF ALL TEMPORARY WORKS, AS DETERMINED BY PSDP. THE CONTRACTOR SHALL APPOINT A COMPETENT TEMPORARY WORKS DESIGNER AND SUBMIT TEMPORARY WORKS DESIGN TO PSDP FOR REVIEW.

LEGEND

	110 mm HDPE DUCT WITH 12 mm DIAMETER PULL ROPE
	RED MARKER STRIP & STEEL PLATES
	YELLOW MARKER WARNING TAPE

Rev	Date	Revision description	Drn.	Prod.	Ver.	App.
0		ISSUED FOR CONSTRUCTION				

Purpose of issue - Preliminary unless indicated

Tender ☐ Client approval ☐ Construction ☒ As-built ☐ Revised ☐

ESB International

ESB International, Stephen Court, 18–21 St. Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 8088
Email: marketing@esbi.ie Web: www.esbi.ie

ESB International is a trading name of ESBI Engineering & Facility Management Limited.
Registered Office: as above Registered in Ireland No. 155249

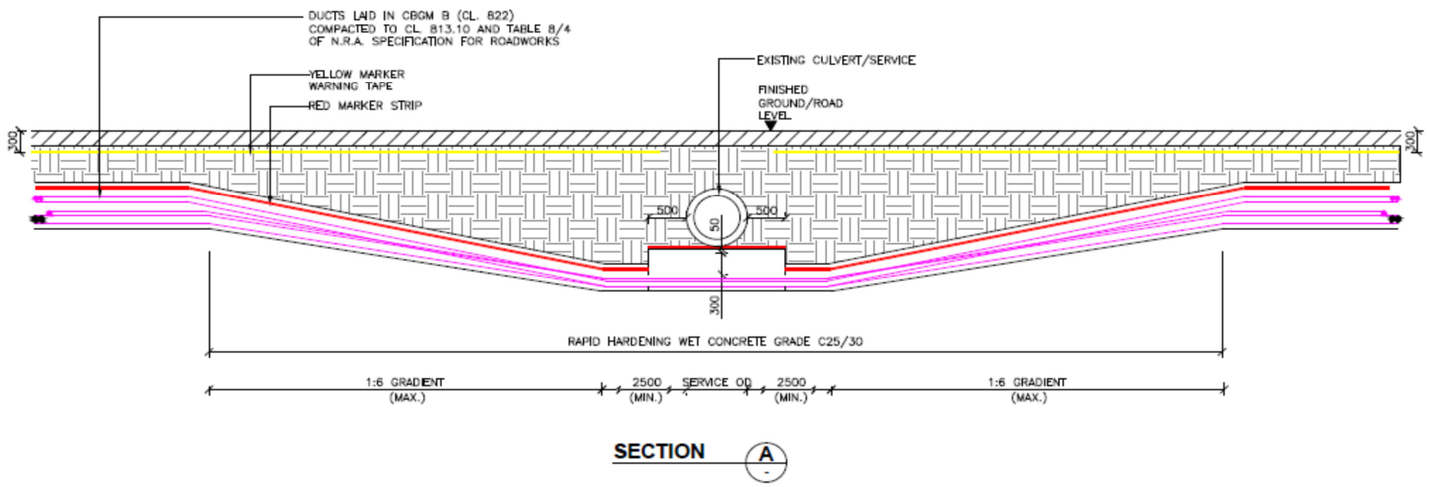
Client	ESB NETWORKS
Project	38 kV Cables Standards
Contract	CABLE SERVICES TO ESB
Drawing title	TREFOIL 5 WAY DUCT FORMATION 38 kV SINGLE CIRCUIT TYPICAL DRAINAGE DITCH CROSSING
Production unit	Civil & Environmental Engineering

Drawn	Produced	Verified	Approved	Approved date
G.Ryan	G.Ryan	M.Amet	To.Sheridan	20/05/2016

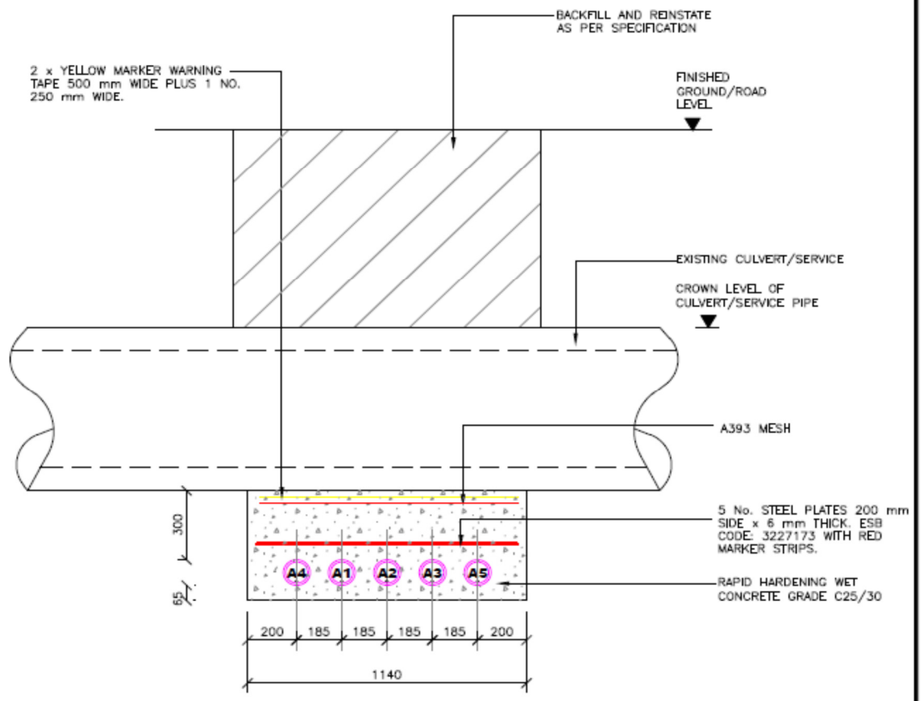
Client ref.	No. of sheets	Size	Scale
TC216202	1	A3	N.T.S.

Drawing number PE424-D7003-003-001-000 Sheet Rev

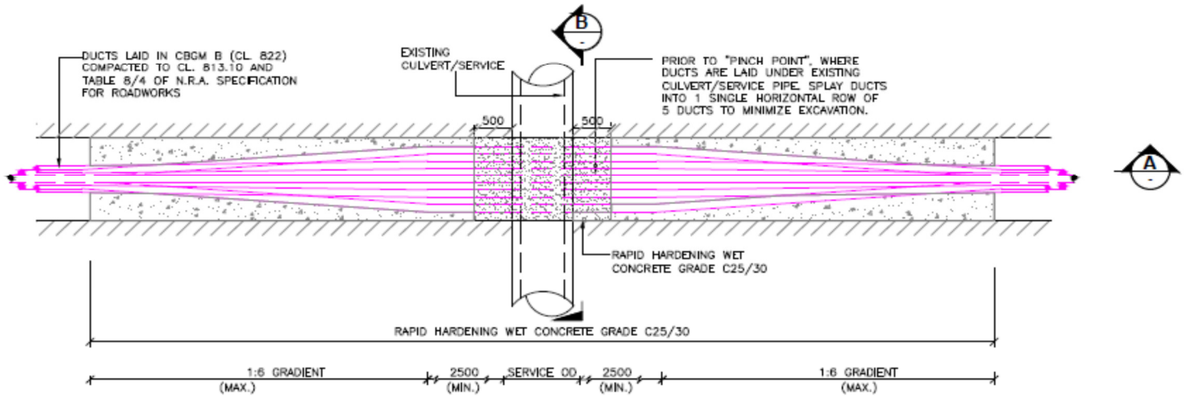
A.7. 38kV Culvert Crossing



SECTION A



SECTION B



PLAN VIEW

(110 mm OD TYPICAL TREFOIL OR FLAT FORMATION CIRCUIT AT CULVERT/SERVICE PIPE CROSSING)
STANDARD TRENCH CROSS SECTION
PE424–D7002–011–002

NOTES:

1.) NO EXCAVATION WORK SHALL COMMENCE UNTIL THE CONTRACTOR HAS CONSULTED UP–TO–DATE SERVICES DRAWINGS AND CARRIED OUT AN ELECTROMAGNETIC LOCATOR (EML) SCAN.

2.) HAND DIG ONLY WITHIN 500 mm OF EXISTING SERVICES.

3.) THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF ALL TEMPORARY WORKS, AS DETERMINED BY PSDP. THE CONTRACTOR SHALL APPOINT A COMPETENT TEMPORARY WORKS DESIGNER AND SUBMIT TEMPORARY WORKS DESIGN TO PSDP FOR REVIEW.

LEGEND	
	110 mm HDPE DUCT WITH 12 mm DIAMETER PULL ROPE
	RED MARKER STRIP OR STEEL PLATES
	YELLOW MARKER WARNING TAPE

Rev	Date	Revision description	Drn.	Prod.	Ver.	App.
0		ISSUED FOR CONSTRUCTION				

Purpose of issue - Preliminary unless indicated
Tender ☐ Client approval ☐ Construction ☒ As-built ☐ Revised ☐

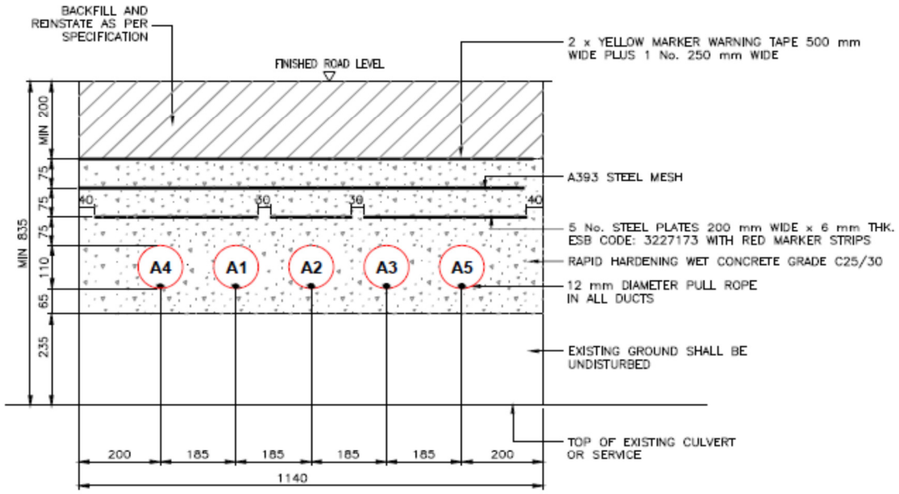
ESB International, Stephen Court, 18–21 St. Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 8088
Email: marketing@esbi.ie Web: www.esbi.ie
ESB International is a trading name of ESBI Engineering & Facility Management Limited.
Registered Office: as above Registered in Ireland No. 155249

Client	ESB NETWORKS
Project	38 kV Cables Standards
Contract	CABLE SERVICES TO ESB
Drawing title	TREFOIL 5 WAY DUCT FORMATION 38 kV SINGLE CIRCUIT TYPICAL TRENCH SECTION FOR CROSSING UNDER CULVERTS OR SECTIONS
Production unit	Civil & Environmental Engineering

Drawn	Produced	Verified	Approved	Approved date
G.Ryan	G.Ryan	M.Amet	To.Sheridan	20/05/2016

Client ref.	No. of sheets	Size	Scale
TC216203	1	A3	N.T.S.

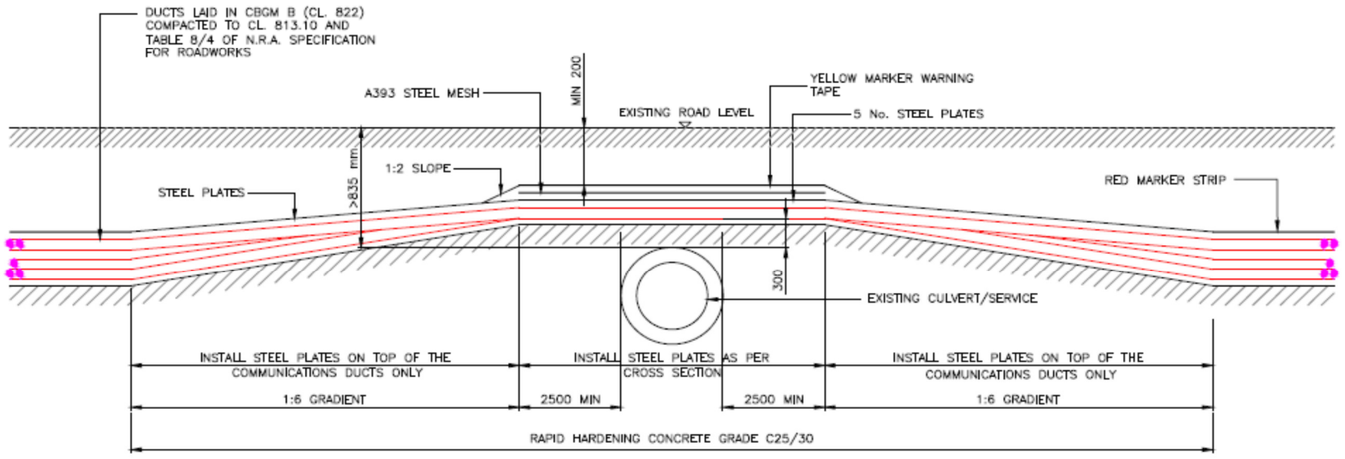
Drawing number: PE424-D7003-004-001-000 Sheet Rev



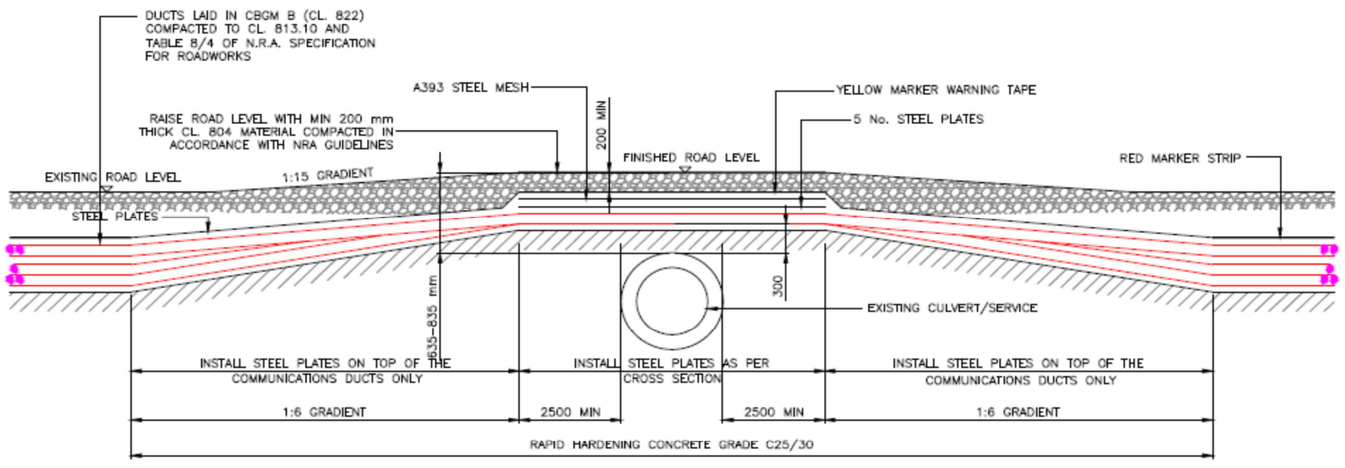
TYPICAL CROSS SECTION AT CULVERT CROSSING / SERVICE

NOTES:

1. REFER TO DRAWING PE424–D7003–001–001 (LATEST REVISION) FOR TYPICAL TRENCH CROSS SECTION DETAIL.
2. HAND DIG ONLY WITHIN 500 mm OF EXISTING CULVERT/SERVICE.
3. WHERE THE DEPTH TO COVER OF THE EXISTING CULVERT/SERVICE IS 635 mm TO 835 mm, THE FINISHED ROAD LEVEL SHALL BE RAISED WITH CL. 804 GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH NRA GUIDELINES. THE FINISHED ROAD LEVEL SHALL PROVIDE A MIN 200 mm COVER TO THE TOP OF CONCRETE (THIS APPLIES TO STONE ROADS ONLY).
4. ALL CULVERTS/SERVICES SHALL BE SUPPORTED, SAFEGUARDED AND PROTECTED.



TYPICAL LONGITUDINAL SECTION AT CULVERT/SERVICE CROSSING



TYPICAL LONGITUDINAL SECTION AT CULVERT/SERVICE CROSSING WITH RAISED ROAD LEVEL (STONE ROADS ONLY)

Rev	Date	Revision description	Drn.	Prod	Ver.	App
0		ISSUED FOR CONSTRUCTION				

Purpose of issue - Preliminary unless indicated

Tender ☐ Client approval ☐ Construction ☒ As-built ☐ Revised ☐

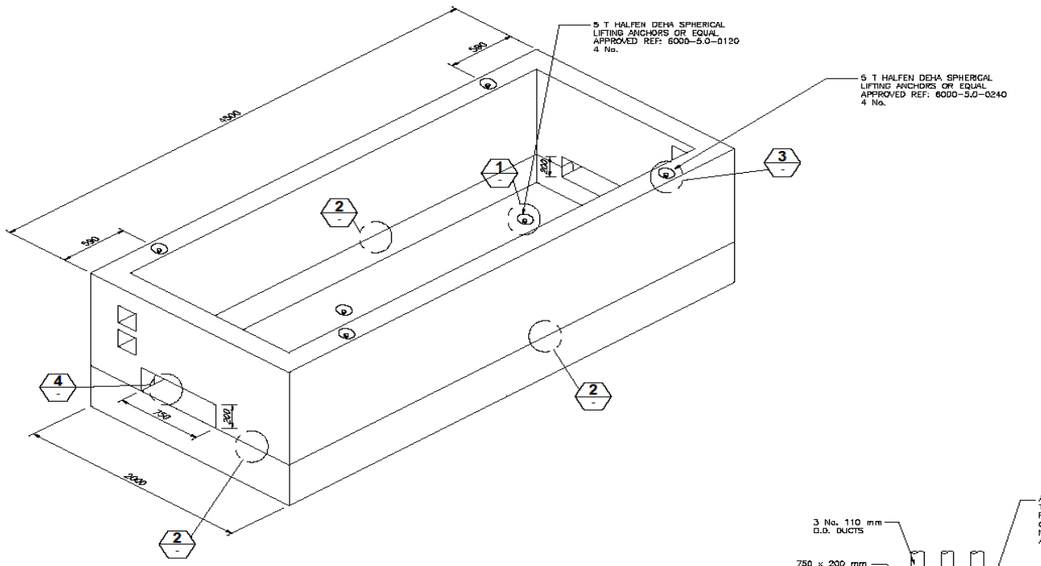
ESB International, Stephen Court, 18–21 St. Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 8088
Email: marketing@esbi.ie Web: www.esbi.ie
ESB International is a trading name of ESBI Engineering & Facility Management Limited.
Registered Office: as above Registered in Ireland No. 155249

Client	ESB NETWORKS
Project	38 kV Cables Standards
Contract	CABLE SERVICES TO ESB
Drawing title	TREFOIL 5 WAY DUCT FORMATION 38 kV SINGLE CIRCUIT TYPICAL TRENCH CROSS SECTION FOR CROSSINGS OVER CULVERTS OR SERVICES
Production unit	Civil & Environmental Engineering

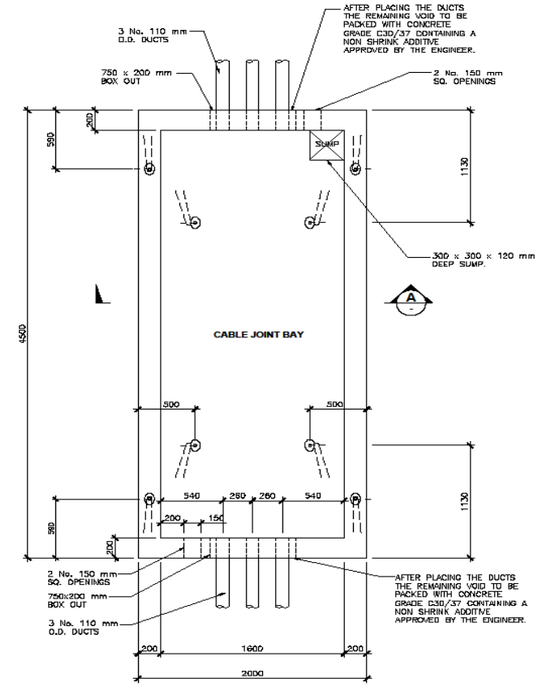
Drawn	Produced	Verified	Approved	Approved date
G.Ryan	G.Ryan	M.Amet	To.Sheridan	20/05/2016

Client ref.	No. of sheets	Size	Scale
TC216201	1	A3	N.T.S.

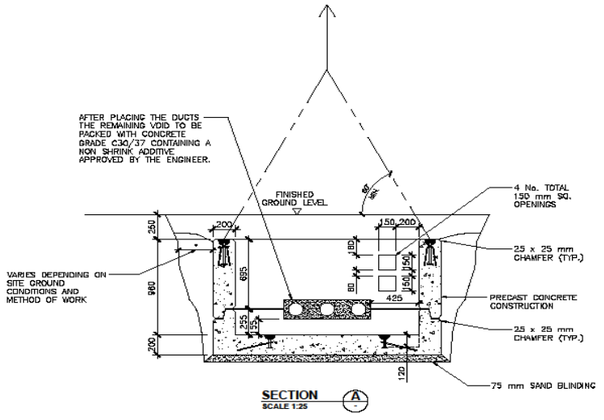
Drawing number PE424-D7003-002-001-000 Sheet Rev



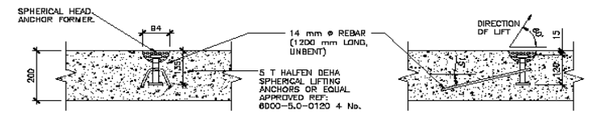
ISOMETRIC: JOINT BAY ARRANGEMENT
SCALE 1:25



TYPICAL PLAN OF JOINT BAY
SCALE 1:25

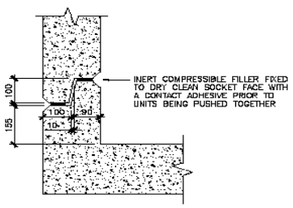


SECTION A
SCALE 1:25



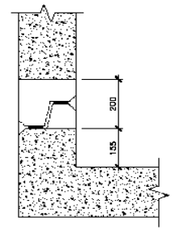
DETAIL 1
SCALE 1:10

[LIFTING EYE DETAIL - IN BASE SLAB]

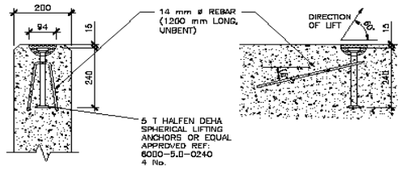


DETAIL 2
SCALE 1:10

[TYPICAL SOCKET & SPIGOT DETAIL AT WALL & BASE JOINT]



DETAIL 4
SCALE 1:10



DETAIL 3
SCALE 1:10

[LIFTING EYE DETAIL - IN WALL]

PRECAST CONCRETE NOTES:

1. ALL PRECAST CONCRETE ELEMENTS TO BE MANUFACTURED TO B.S. EN 13369:2013 "COMMON RULES FOR PRECAST CONCRETE PRODUCTS".
2. LIFTING INSERTS TO BE DESIGNED & INSTALLED TO PD CEN/TR 15728:2008 "DESIGN AND USE OF INSERTS FOR LIFTING AND HANDLING OF PRECAST CONCRETE ELEMENTS".
3. WEIGHT OF BASE PRECAST CONCRETE UNIT = 5.5 T. WEIGHT OF WALL PRECAST CONCRETE UNIT = 5.5 T. SPECIFIED LIFTING INSERTS HAVE A S.W.L. OF 5 T. ACCOUNTING FOR DYNAMIC LOADING.
4. LOCATION & SPECIFICATION OF LIFTING INSERTS ARE ASSUMED TO FACILITATE DEMOULDING AND HANDLING IN PRECAST MANUFACTURING FACTORY. IT IS THE RESPONSIBILITY OF THE PRECAST MANUFACTURER TO NOTIFY THE ESBI ENGINEER IF THESE ARE UNSUITABLE FOR HIS MANUFACTURING METHODOLOGY. ESBI ENGINEER TO BE INFORMED OF ANY ALTERNATIVE LIFTING LOCATIONS FOR FACTORY HANDLING & DEMOULDING.
5. CONCRETE TO HAVE A MINIMUM STRENGTH OF 30 N/mm² PRIOR TO HANDLING OR DEMOULDING.
6. MAIN CONTRACTOR TO ENSURE THAT A METHOD STATEMENT AND RISK ASSESSMENT INCLUDING A LIFTING PLAN, ARE PRODUCED FOR INSTALLATION AND ARE AVAILABLE TO ESBI ENGINEER FOR REVIEW IF REQUESTED. LIFTING PLAN TO INCORPORATE REQUIREMENTS OF LIFTING INSERTS AND LIFTING LOOP EYES.
7. A MINIMUM LIFTING SLING ANGLE OF 60° TO THE HORIZONTAL IS REQUIRED.
8. A LIFTING SYSTEM WHICH ENSURES ALL LIFTING POINTS TAKE ON AN EQUAL LOAD IS REQUIRED.
9. TRANSPORT THE UNITS BY TRAILER WHEN TRAVELLING OVER ROUGH TERRAIN TO AVOID DAMAGE TO LIFTING ANCHORS.
10. HALFEN DEHA SPHERICAL LIFTING ANCHORS TO BE USED AS SPECIFIED. ANY DEVIATION FROM THIS MUST BE NOTIFIED TO ESBI ENGINEER BY PRECAST MANUFACTURER.
11. FORMWORK FOR PRECASTING TO BE OF A MINIMUM STANDARD OF VARNISHED WOODEN MOULD WITH PLANED BOARDS.
12. UNITS TO BE FITTED TOGETHER BY PRECAST CONCRETE MANUFACTURER PRIOR TO DELIVERY ON SITE TO ENSURE FIT.
13. CONCRETE TO BE GRADE C32/40, AS SPECIFIED IN TABLE 1.
14. 25 x 25 mm CHAMFER TO ALL EXPOSED CONCRETE EDGES.

GENERAL NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEER'S, ARCHITECT'S AND ESB NETWORKS DRAWINGS & SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN mm.
3. DO NOT SCALE DIMENSIONS.
4. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE NOTIFIED TO THIS OFFICE IN WRITING IMMEDIATELY.
5. TEMPORARY SUPPORTS TO THE SIDES OF THE EXCAVATION MAY BE REQUIRED DEPENDENT ON SUBSOIL, METHOD OF WORK AND SITE CONSTRAINTS, AND ARE TO BE AGREED WITH THE ESBI ENGINEER PRIOR TO COMMENCEMENT OF EXCAVATION. SIDE SLOPES OF AN UNSUPPORTED EXCAVATION DEPENDENT UPON SUBSOIL AND SHALL BE AGREED WITH ESBI ENGINEER.
6. MAIN CONTRACTOR TO PROVIDE A METHOD STATEMENT AND RISK ASSESSMENT FOR THE EXCAVATION WORKS FOR THE ESBI ENGINEER TO REVIEW.
7. THE CONSTRUCTION, AS SHOWN, IS APPLICABLE ONLY WHERE THE SUBSOIL AT FORMATION LEVEL EXCEEDS 100 kN/m² BEARING CAPACITY.

TABLE 1 - CONCRETE SPECIFICATION TO I.S. EN 206-1

ELEMENT	BLINDING & MASS CONCRETE, DRAINAGE PIPE & MANHOLE SURROUNDS.	GROUND BEAMS, FOUNDATIONS & PITS/ CHAMBERS
EXPOSURE CLASS	X0	XC4
MIN. BINDER (CEMENT+GGBS) CONTENT (kg/m³)	220	320
GGBS TO EN 15167-1 (kg/m³)	0	95
CEM II / A-L TO I.S. EN 197-1 (kg/m³)	220	225
MAX. WATER/CEMENT RATIO	–	0.50
CHLORIDE CONTENT CLASS	Cl. 1.0	Cl. 0.40
MAX. AGGREGATE (mm)	10	20
MIN. COVER (CMin) (mm)	–	40
*COMPRESSIVE STRENGTH CLASS @ 28 DAYS.	C16/20	C32/40

NOTES: 1. *C16/20 to be read as follows: Min. Cylinder Strength / Min. Cube Strength (N/mm²) 2. Design working life to be 50 years minimum.

REV.	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
1		ISSUED FOR CONSTRUCTION				
0	27.11.12	ISSUED FOR APPROVAL	T.T.	J.H.	M.A.	T.S.

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED
TENDER ☐ CLIENT APPROVAL ☐ CONSTRUCTION ☒ AS-BUILT ☐ REVISED ☐

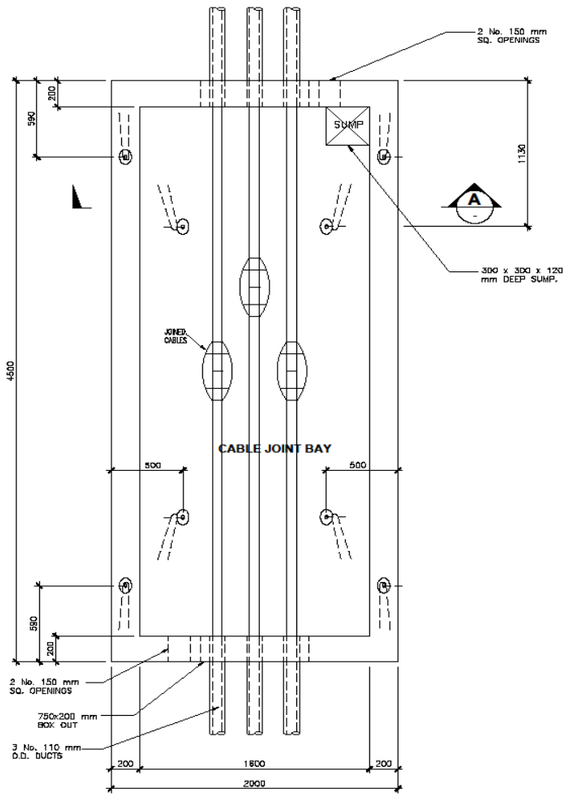
Client: ESB Networks
Project: MV Standard Drawings
Contract: MV CABLES STANDARDS
Drawing Title: 38 kV SINGLE CIRCUIT PRECAST JOINT BAY GENERAL ARRANGEMENT
Production Unit: Civil Building and Environmental

ESBI Engineering Solutions, Stephen Court, 18-21 St Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 7185 Email: marketing@esbi.ie Web: www.esbi.ie

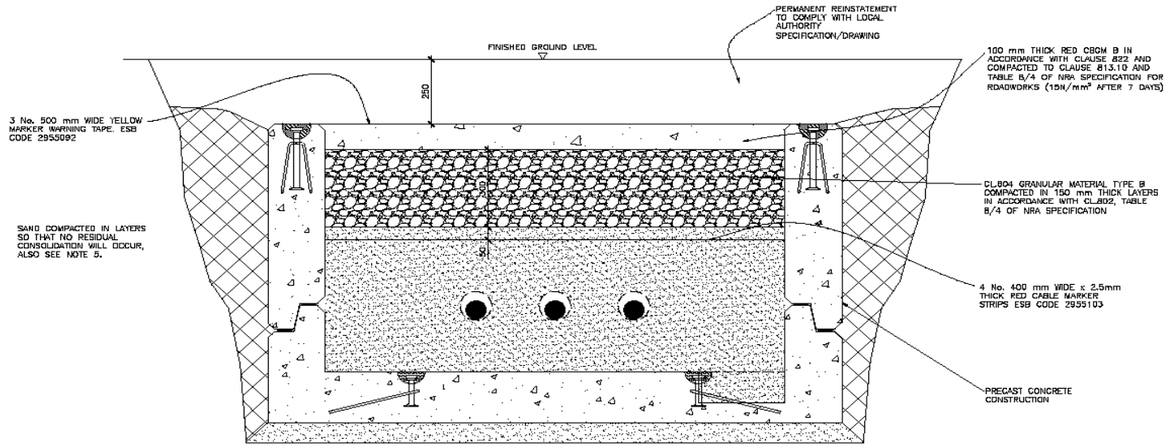
DRAWN	PRODUCED	VERIFIED	APPROVED	APPD DATE
J.Haverty	J.Haverty	M.Arnet		

CLIENT REF: TC208532 | No. of Shts: 7 | SIZE: A1 | SCALE: AS SHOWN
DRAWING NUMBER: PE424-D7002-002-002-001 | SHEET | REV

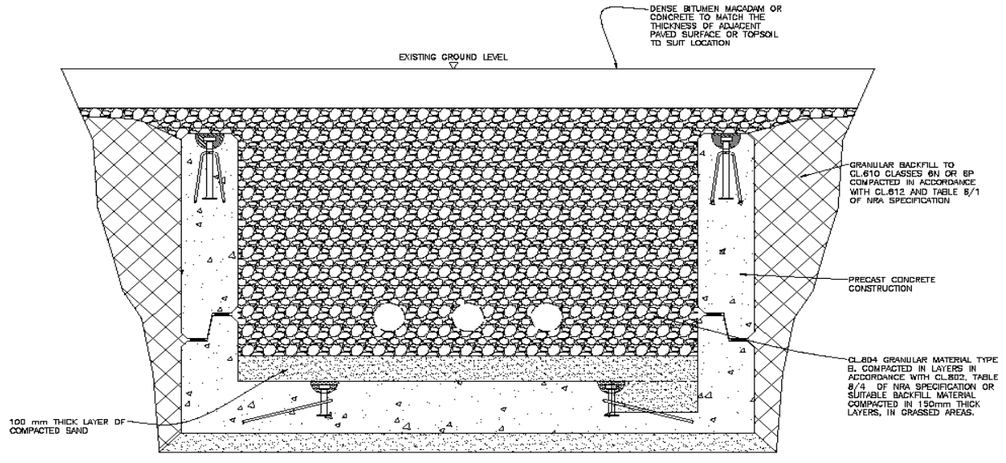
A.10. 38kV Joint Bay Backfill



TYPICAL PLAN OF JOINT BAY
SCALE 1:20



SECTION A-A PERMANENT REINSTATEMENT
SCALE 1:10



SECTION A-A TEMPORARY REINSTATEMENT
SCALE 1:10

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEER'S, ARCHITECT'S AND ESB NETWORKS DRAWINGS & SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN mm.
3. DO NOT SCALE DIMENSIONS.
4. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS PRIOR TO CONSTRUCTION, ANY DISCREPANCIES TO BE NOTIFIED TO THIS OFFICE IN WRITING IMMEDIATELY.
5. SAND SHALL BE NATURAL UNWASHED SAND IN ACCORDANCE WITH BS 882–1992 (BS EN 12620) COMPLYING WITH GRADING LIMIT C IN TABLE 4 WITH A MAXIMUM THERMAL RESISTIVITY OF 1.0 K.m/WATT AT 0% MOISTURE CONTENT.
6. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE NRA SPECIFICATION FOR ROADWORKS.

REV.	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
1		ISSUED FOR CONSTRUCTION				
0	27.11.12	ISSUED FOR APPROVAL	T.T.	J.H.	M.A.	T.S.

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED
TENDER ☐ CLIENT APPROVAL ☐ CONSTRUCTION ☒ AS-BUILT ☐ REVISED ☐

Client: ESB Networks

Project: MV Standard Drawings

Contract: MV CABLES STANDARDS

Drawing Title: 38 kV SINGLE CIRCUIT PRECAST JOINT BAY REINSTATEMENT DETAILS

Production Unit: Civil Building and Environmental

ESBI International
ESBI Energy Innovation
ESBI Engineering Solutions, Shepherd Court, 15–21 St. Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 7199
Email: marketing@esbi.ie Web: www.esbi.ie
ESBI Engineering Solutions is a trading name of ESBI Engineering & Facility Management Limited. Registered Offices as above. Registered in Ireland No. 156240

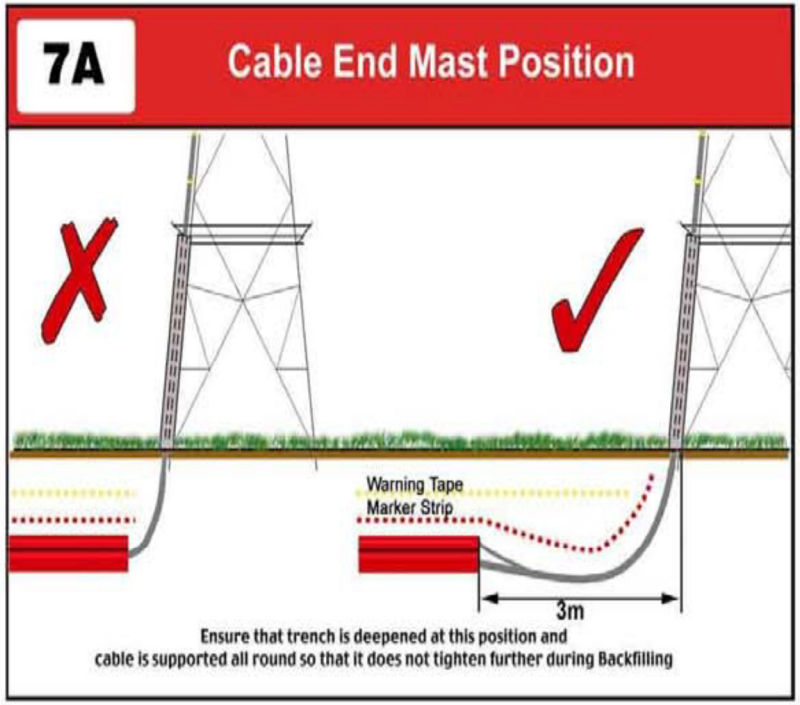
DRAWN	PRODUCED	VERIFIED	APPROVED	APPD DATE
J.Haverty	J.Haverty	M.Arnet		

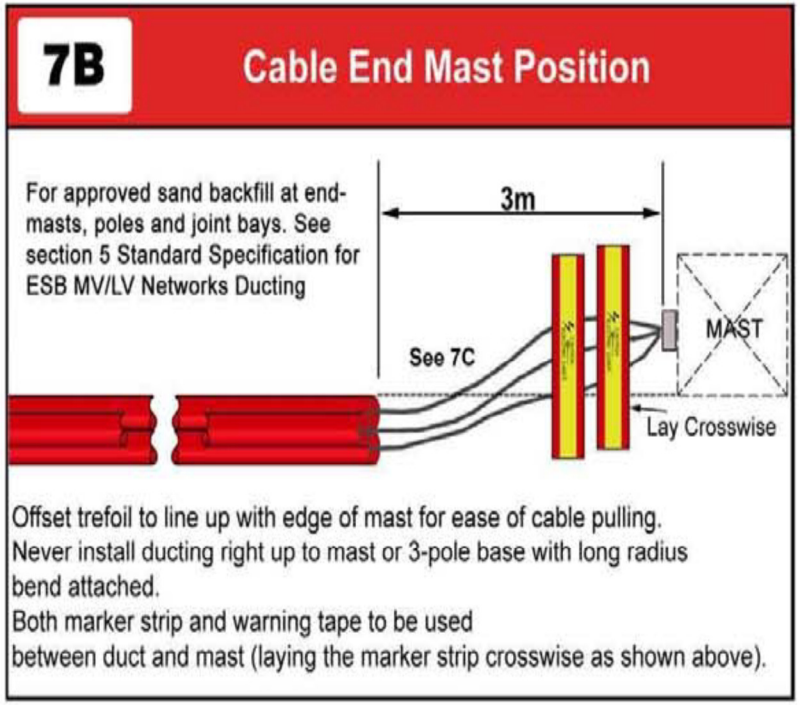
CLIENT REF	No. of ITEMS	SIZE	SCALE
TC208532	7	A1	AS SHOWN

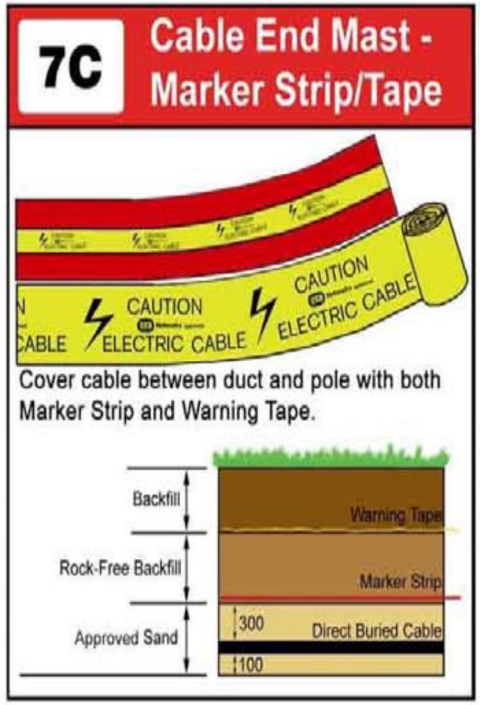
DRAWING NUMBER: PE424-D7002-002-003-001 (SHEET, REV)

d:\program files\microsite publisher framework\jems\web_outputs\dwg

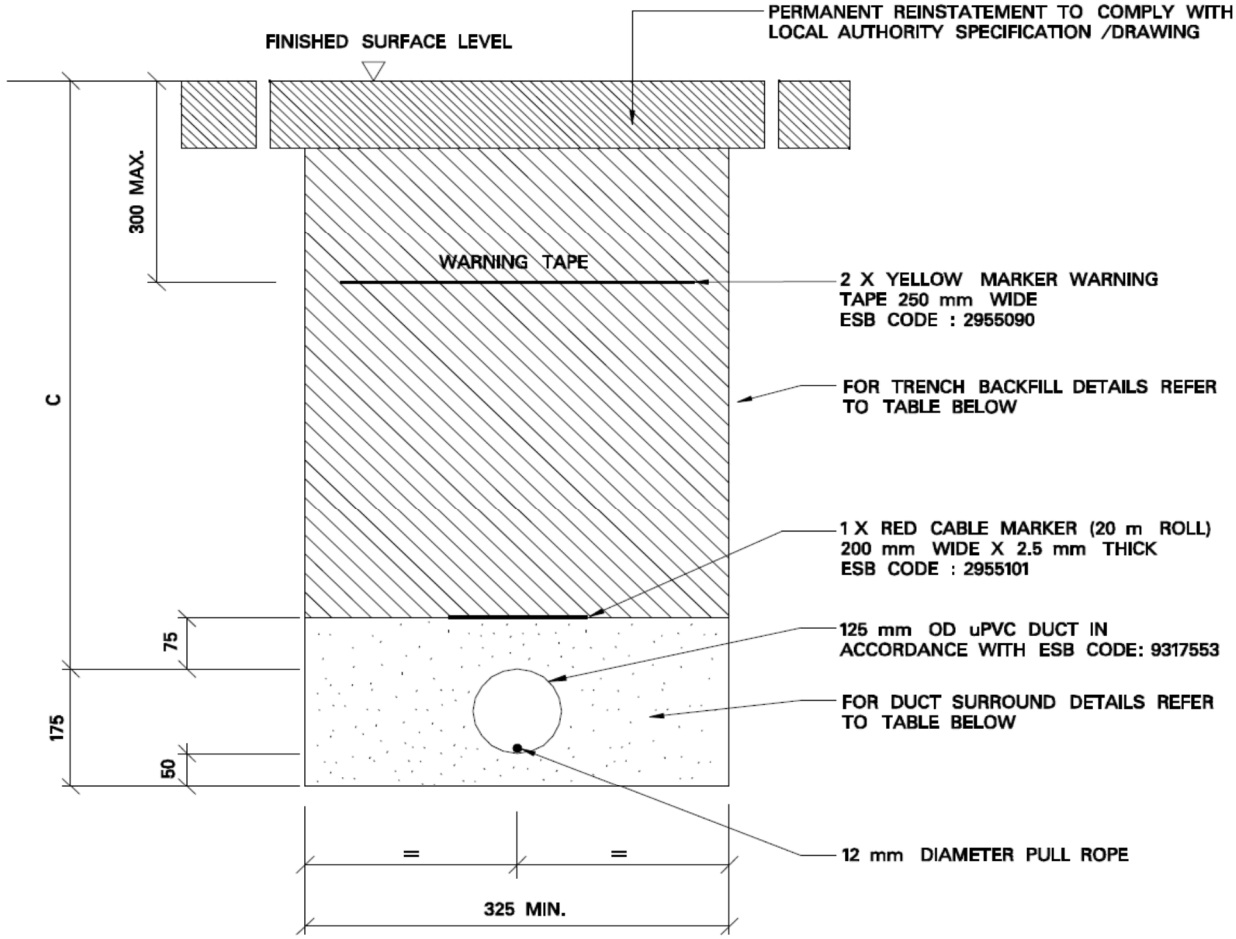
A.11. 38kV Ducting at Mast & Pole Set







A.12. MV Trench Cross Section



TRENCH LOCATION	MIN. DEPTH OF COVER TO TOP OF DUCTS (C)	TRENCH BACKFILL DETAILS	DUCT SURROUND MATERIAL
EXISTING FOOTPATH (NON HOUSING ESTATE)	450 mm	CL 804	ESB N APPROVED SAND
NEW ESTATE & NON ESTATE FOOTPATH	600 mm	CL 804	ESB N APPROVED SAND
NEW & EXISTING ESTATE ROADS, ESTATE GRASS VERGES & ADJOINING ROADS	600 mm	CL 804	ESB N APPROVED SAND
ESTATE OPEN GRASSED AREAS	600 mm	SUITABLE BACKFILL MATERIAL	CBGM B
NEW & EXISTING NON ESTATE ROADS	750 mm	CL 804	ESB N APPROVED SAND
FARM LAND, FOREST TRACK, BOG LAND, PUBLIC OPEN GRASSED AREAS & PRIVATE PROPERTY	750 mm	CL 804	CBGM B

NOTES:

1. RED CBGM B BACKFILL IN ACCORDANCE WITH CLAUSE 822 AND COMPACTED TO CLAUSE 813.10 AND TABLE 8/4 OF N.R.A. SPECIFICATION FOR ROADWORKS (15 N/mm^2 AFTER 7 DAYS)
2. ESB N APPROVED WELL COMPACTED NATURAL UNWASHED SAND TO BS 882 OR EQUIVALENT MATERIAL APPROVED BY ESB NETWORKS. MAXIMUM THERMAL RESISTIVITY OF THE SURROUND MATERIAL SHALL BE 1.0 K.m/W AT 0% MOISTURE CONTENT

ESB International

ESB International, Stephen Court, 18-21 St. Stephen's Green Dublin 2, Ireland. Tel: (01) 703 8000 Fax: +353 (0)1 703 8085 Email: marketing@esbie Web: www.esbi.ie

Rev	Date	Revision Description	Dm	Prod	Ver	App
1	29/11/13	BACKFILL AND SURROUND MATERIALS REVISED				
0	05/05/13	ISSUED FOR CONSTRUCTION	GR	GR	TS	MA

Purpose of issue - Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☒ As-built ☐ Revised ☐

Drawn	Produced	Verified	Approved	Approved date
C.Ryan	C.Ryan	M.Amet	T.Sheridan	02/12/13

Client Ref: TC210096 | No. of Shts: - | Size: A4 | Scale: N.T.S.

Drawing Number: PE424-D7002-008-001-001 (SHEET / REV)

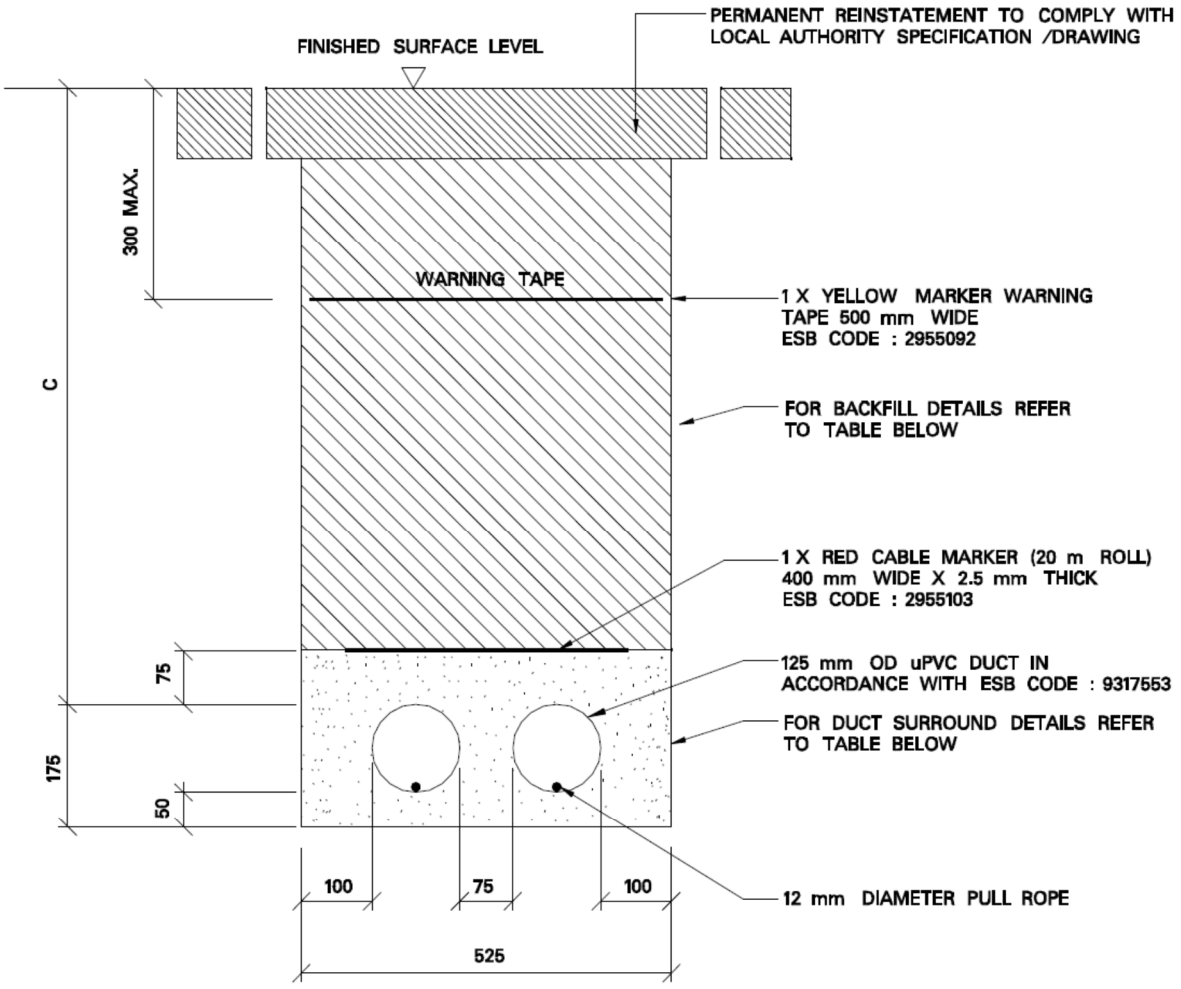
Drawing Title: MV SINGLE CIRCUIT TRENCH CROSS SECTION 1 WAY DUCT FORMATION

Client: ESB NETWORKS

Project: MV Standard Drawings

Contract: MV CABLES STANDARDS

Production Unit: Civil Building and Environmental



TRENCH LOCATION	MIN. DEPTH OF COVER TO TOP OF DUCTS (C)	TRENCH BACKFILL DETAILS	DUCT SURROUND MATERIAL
EXISTING FOOTPATH (NON HOUSING ESTATE)	450 mm	CL 804	ESB N APPROVED SAND
NEW ESTATE & NON ESTATE FOOTPATH	600 mm	CL 804	ESB N APPROVED SAND
NEW & EXISTING ESTATE ROADS, ESTATE GRASS VERGES & ADJOINING ROADS	600 mm	CL 804	ESB N APPROVED SAND
ESTATE OPEN GRASSED AREAS	600 mm	SUITABLE BACKFILL MATERIAL	CBGM B
NEW & EXISTING NON ESTATE ROADS	750 mm	CL 804	ESB N APPROVED SAND
FARM LAND, FOREST TRACK, BOG LAND, PUBLIC OPEN GRASSED AREAS & PRIVATE PROPERTY	750 mm	CL 804	CBGM B

NOTES:

1. RED CBGM B BACKFILL IN ACCORDANCE WITH CLAUSE 822 AND COMPACTED TO CLAUSE 813.10 AND TABLE 8/4 OF N.R.A. SPECIFICATION FOR ROADWORKS (15 N/mm^2 AFTER 7 DAYS)
2. ESB N APPROVED WELL COMPACTED NATURAL UNWASHED SAND TO BS 882 OR EQUIVALENT MATERIAL APPROVED BY ESB NETWORKS. MAXIMUM THERMAL RESISTIVITY OF THE SURROUND MATERIAL SHALL BE 1.0 K.m/W AT 0% MOISTURE CONTENT

ESB International

ESB International, Stephen Court, 18-21 St. Stephen's Green Dublin 2, Ireland. Tel: (01) 703 8000 Fax: +353 (0)1 703 8085 Email: marketing@esbi.ie Web: www.esbi.ie
ESB International is a trading name of ESB Engineering & Facility Management Limited. Registered Offices as above Registered in Ireland No. 185240

Rev	Date	Revision Description	Drn	Prod	Ver	App
1	29/11/13	BACKFILL AND SURROUND MATERIALS REVISED				
0	05/05/13	ISSUED FOR CONSTRUCTION	GR	GR	TS	MA

Purpose of issue - Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☒ As-built ☐ Revised ☐

Drawn	Produced	Verified	Approved	Approved date
C.Ryan	C.Ryan	M.Amet	T.Sheridan	02/12/13

Client Ref	No. of Shts	Size	Scale
TC210096	-	A4	N.T.S.

Drawing Number: PE424-D7002-008-002-001 (SHEET / REV)

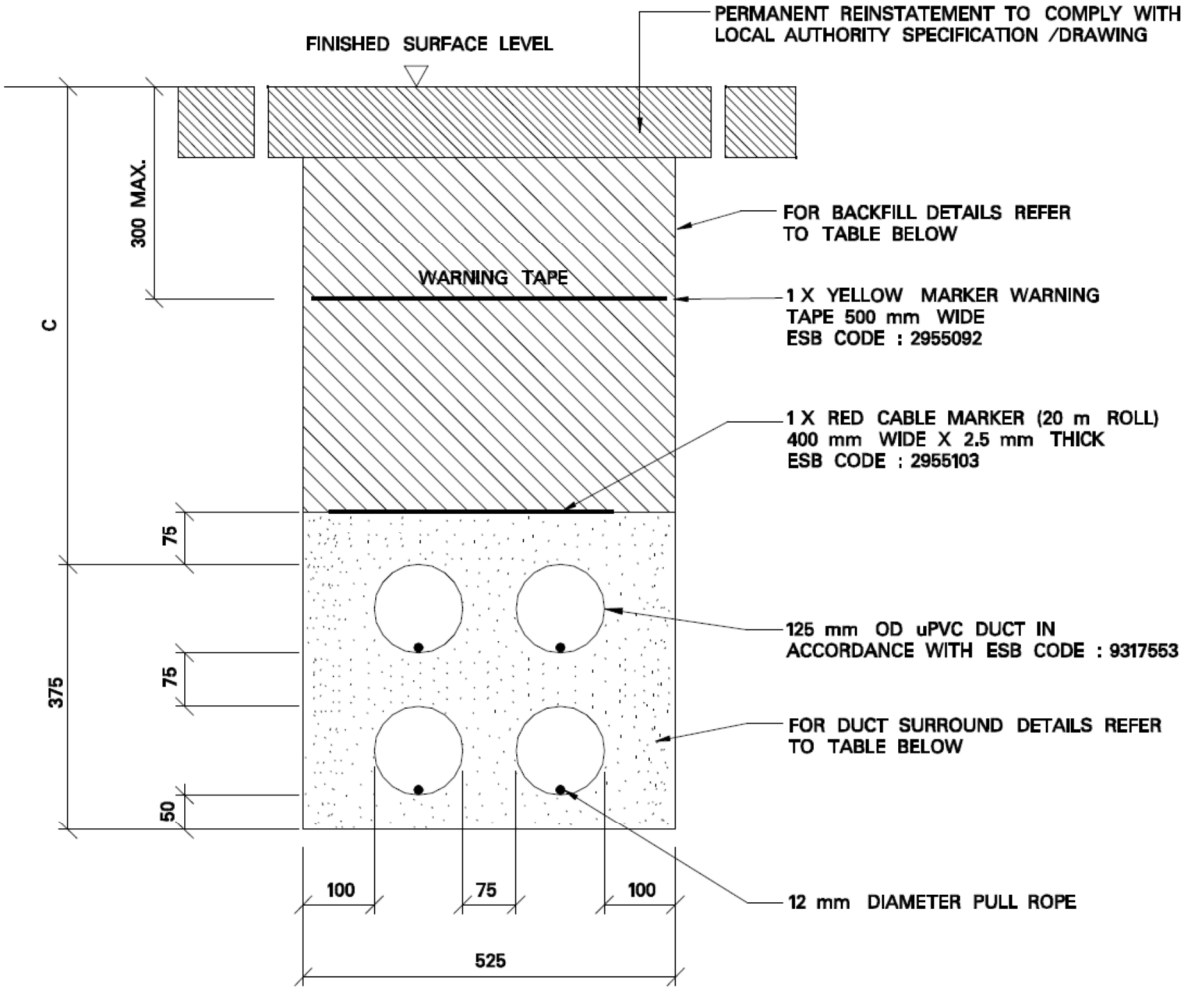
Drawing Title: MV DOUBLE CIRCUIT TRENCH CROSS SECTION 2 WAY DUCT FORMATION

Client: ESB NETWORKS

Project: MV Standard Drawings

Contract: MV CABLES STANDARDS

Production Unit: Civil Building and Environmental



TRENCH LOCATION	MIN. DEPTH OF COVER TO TOP OF DUCTS (C)	TRENCH BACKFILL DETAILS	DUCT SURROUND MATERIAL
EXISTING FOOTPATH (NON HOUSING ESTATE)	450 mm	CL 804	ESB N APPROVED SAND
NEW ESTATE & NON ESTATE FOOTPATH	600 mm	CL 804	ESB N APPROVED SAND
NEW & EXISTING ESTATE ROADS, ESTATE GRASS VERGES & ADJOINING ROADS	600 mm	CL 804	ESB N APPROVED SAND
ESTATE OPEN GRASSED AREAS	600 mm	SUITABLE BACKFILL MATERIAL	CBGM B
NEW & EXISTING NON ESTATE ROADS	750 mm	CL 804	ESB N APPROVED SAND
FARM LAND, FOREST TRACK, BOG LAND, PUBLIC OPEN GRASSED AREAS & PRIVATE PROPERTY	750 mm	CL 804	CBGM B

NOTES:

1. RED CBGM B BACKFILL IN ACCORDANCE WITH CLAUSE 822 AND COMPACTED TO CLAUSE 813.10 AND TABLE 8/4 OF N.R.A. SPECIFICATION FOR ROADWORKS (15 N/mm^2 AFTER 7 DAYS)

2. ESB N APPROVED WELL COMPACTED NATURAL UNWASHED SAND TO BS 882 OR EQUIVALENT MATERIAL APPROVED BY ESB NETWORKS. MAXIMUM THERMAL RESISTIVITY OF THE SURROUND MATERIAL SHALL BE 1.0 K.m/W AT 0% MOISTURE CONTENT

ESB International

ESB International, Stephen Court, 18-21 St. Stephen's Green Dublin 2, Ireland. Tel: (01) 703 8000 Fax: +353 (0)1 703 8085 Email: marketing@esbi.ie Web: www.esbi.ie
ESB International is a trading name of ESB Engineering & Facility Management Limited. Registered Office as above Registered in Ireland No. 185249

Rev	Date	Revision Description	Dm	Prod	Ver	App
1	29/11/13	BACKFILL AND SURROUND MATERIALS REVISED				
0	05/05/13	ISSUED FOR CONSTRUCTION	GR	GR	TS	MA

Purpose of Issue - Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☒ As-built ☐ Revised ☐

Drawn	Produced	Verified	Approved	Approved date
C.Ryan	C.Ryan	M.Amet	T.Sheridan	02/12/13

Client Ref: TC210096 | No. of Shts: - | Size: A4 | Scale: N.T.S.

Drawing Number: PE424-D7002-008-003-001 (SHEET / REV)

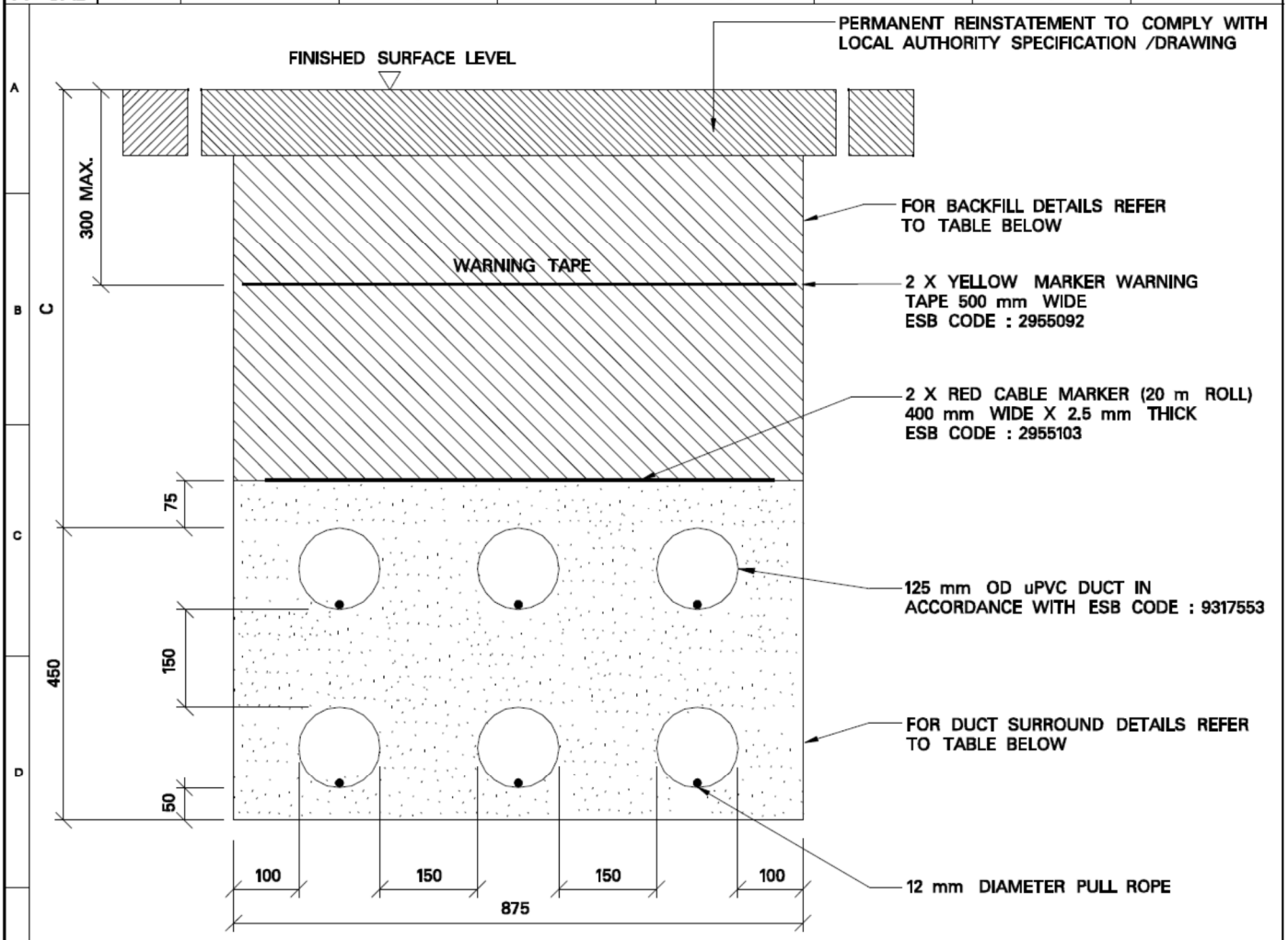
Drawing Title: MV CIRCUIT TRENCH CROSS SECTION 4 WAY DUCT FORMATION

Client: ESB NETWORKS

Project: MV Standard Drawings

Contract: MV CABLES STANDARDS

Production Unit: Civil Building and Environmental



TRENCH LOCATION	MIN. DEPTH OF COVER TO TOP OF DUCTS (C)	TRENCH BACKFILL DETAILS	DUCT SURROUND MATERIAL
EXISTING FOOTPATH (NON HOUSING ESTATE)	450 mm	CL 804	ESB N APPROVED SAND
NEW ESTATE & NON ESTATE FOOTPATH	600 mm	CL 804	ESB N APPROVED SAND
NEW & EXISTING ESTATE ROADS, ESTATE GRASS VERGES & ADJOINING ROADS	600 mm	CL 804	ESB N APPROVED SAND
ESTATE OPEN GRASSED AREAS	600 mm	SUITABLE BACKFILL MATERIAL	CBGM B
NEW & EXISTING NON ESTATE ROADS	750 mm	CL 804	ESB N APPROVED SAND
FARM LAND, FOREST TRACK, BOG LAND, PUBLIC OPEN GRASSED AREAS & PRIVATE PROPERTY	750 mm	CL 804	CBGM B

NOTES:

1. RED CBGM B BACKFILL IN ACCORDANCE WITH CLAUSE 822 AND COMPACTED TO CLAUSE 813.10 AND TABLE 8/4 OF N.R.A. SPECIFICATION FOR ROADWORKS (15 N/mm^2 AFTER 7 DAYS)
2. ESB N APPROVED WELL COMPACTED NATURAL UNWASHED SAND TO BS 882 OR EQUIVALENT MATERIAL APPROVED BY ESB NETWORKS. MAXIMUM THERMAL RESISTIVITY OF THE SURROUND MATERIAL SHALL BE 1.0 K.m/W AT 0% MOISTURE CONTENT

ESB International

ESB International, Stephen Court, 18-21 St. Stephen's Green Dublin 2, Ireland. Tel: (01) 703 8000 Fax: +353 (01) 703 8099 Email: marketing@esbi.ie Web: www.esbi.ie

Rev	Date	Revision Description	Drn	Prod	Ver	App
1	29/11/13	BACKFILL AND SURROUND MATERIALS REVISED	GR	GR	TS	MA
0	05/05/13	ISSUED FOR CONSTRUCTION				

Purpose of issue - Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☒ As-built ☐ Revised ☐

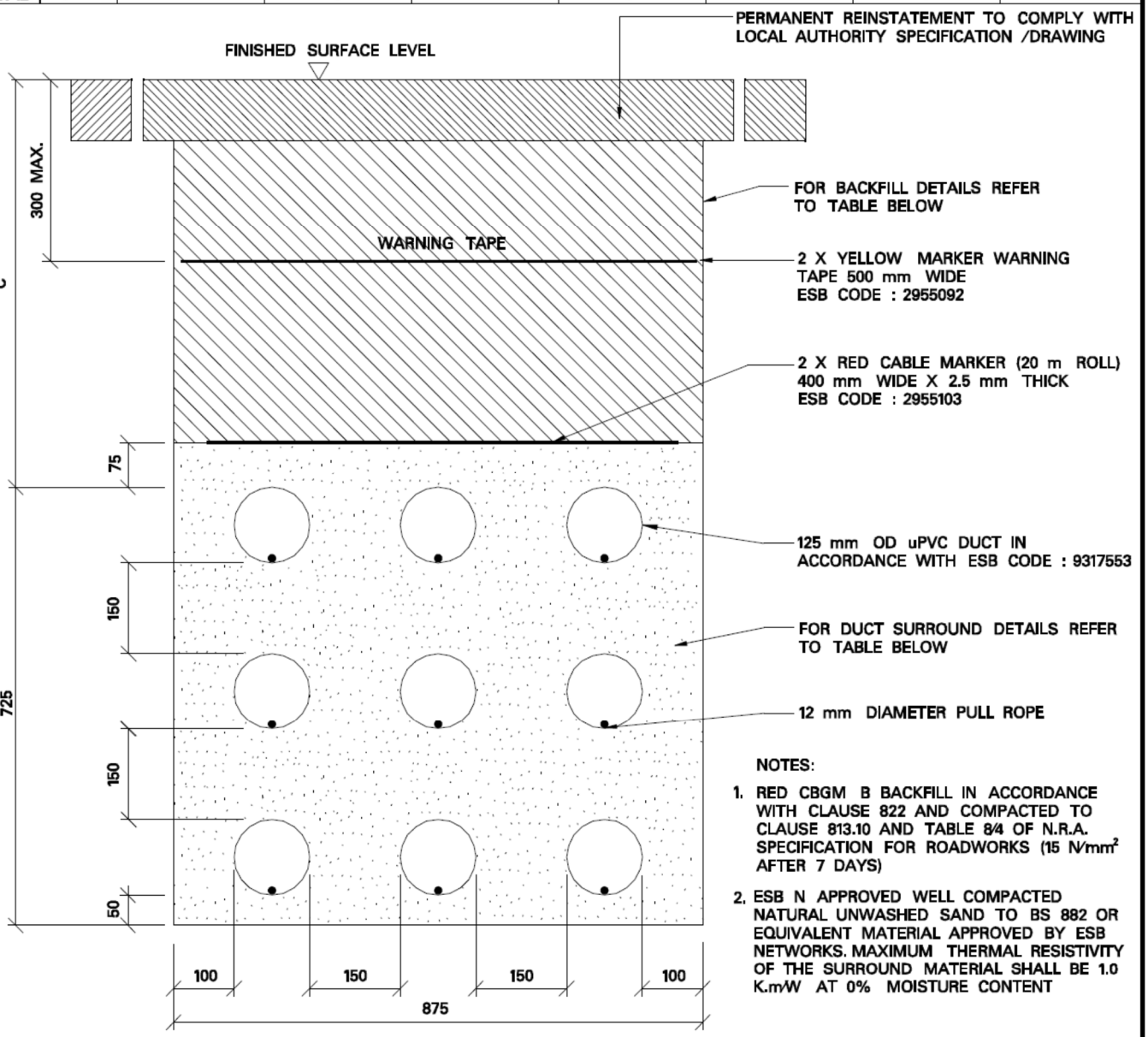
Drawn	Produced	Verified	Approved	Approved date
G.Ryan	G.Ryan	M.Amet	T.Sheridan	02/12/13

Client Ref	No. of Shts	Size	Scale
TC210096	-	A4	N.T.S.

Drawing Number: PE424-D7002-008-004-001 (SHEET / REV)

Drawing Title: MV CIRCUIT TRENCH CROSS SECTION 6 WAY DUCT FORMATION

Client: ESB NETWORKS
Project: MV Standard Drawings
Contract: MV CABLES STANDARDS
Production Unit: Civil Building and Environmental



NOTES:

1. RED CBGM B BACKFILL IN ACCORDANCE WITH CLAUSE 822 AND COMPACTED TO CLAUSE 813.10 AND TABLE 8/4 OF N.R.A. SPECIFICATION FOR ROADWORKS (15 N/mm^2 AFTER 7 DAYS)
2. ESB N APPROVED WELL COMPACTED NATURAL UNWASHED SAND TO BS 882 OR EQUIVALENT MATERIAL APPROVED BY ESB NETWORKS. MAXIMUM THERMAL RESISTIVITY OF THE SURROUND MATERIAL SHALL BE 1.0 K.m/W AT 0% MOISTURE CONTENT

TRENCH LOCATION	MIN. DEPTH OF COVER TO TOP OF DUCTS (C)	TRENCH BACKFILL DETAILS	DUCT SURROUND MATERIAL
EXISTING FOOTPATH (NON HOUSING ESTATE)	450 mm	CL 804	ESB N APPROVED SAND
NEW ESTATE & NON ESTATE FOOTPATH	600 mm	CL 804	ESB N APPROVED SAND
NEW & EXISTING ESTATE ROADS, ESTATE GRASS VERGES & ADJOINING ROADS	600 mm	CL 804	ESB N APPROVED SAND
ESTATE OPEN GRASSED AREAS	600 mm	SUITABLE BACKFILL MATERIAL	CBGM B
NEW & EXISTING NON ESTATE ROADS	750 mm	CL 804	ESB N APPROVED SAND
FARM LAND, FOREST TRACK, BOG LAND, PUBLIC OPEN GRASSED AREAS & PRIVATE PROPERTY	750 mm	CL 804	CBGM B

ESB International

ESB International, Stephen Court, 18-21 St. Stephen's Green
Dublin 2, Ireland. Tel: (01) 703 8000 Fax: +353 (0)1 703 8088
Email: marketing@esbi.ie Web: www.esbi.ie

Rev	Date	Revision Description	Drn	Prod	Ver	App
1	29/11/13	BACKFILL AND SURROUND MATERIALS REVISED				
0	05/05/13	ISSUED FOR CONSTRUCTION	GR	GR	TS	MA

Purpose of issue - Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☒ As-built ☐ Revised ☐

Drawn	Produced	Verified	Approved	Approved date
C.Ryan	C.Ryan	M.Amet	T.Sheridan	02/12/13

Client Ref	No. of Shts	Size	Scale
TC210096	-	A4	N.T.S.

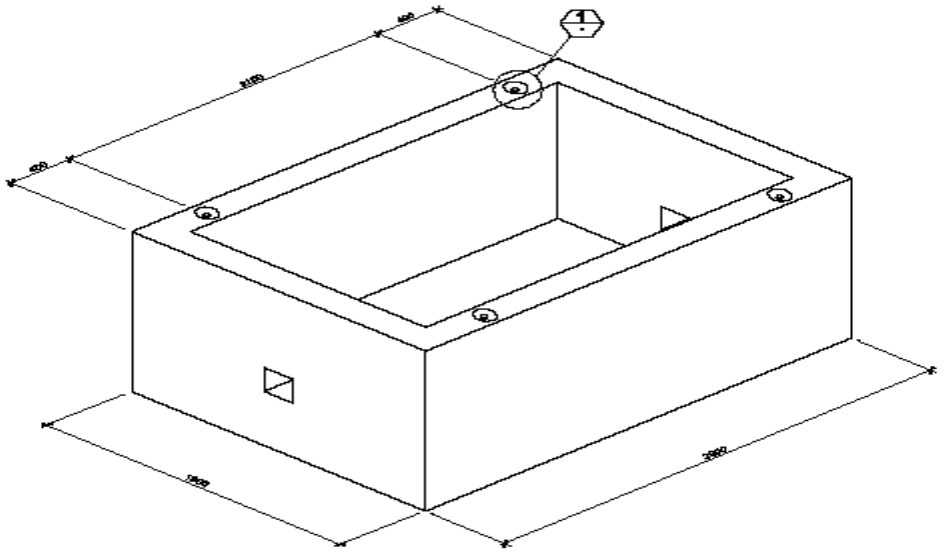
Drawing Number: PE424-D7002-008-005-001 (SHEET / REV)

Drawing Title: MV CIRCUIT TRENCH CROSS SECTION 9 WAY DUCT FORMATION

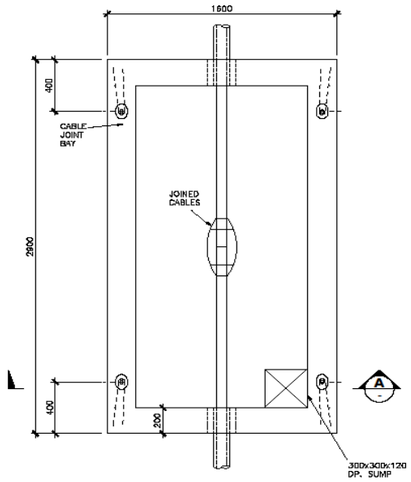
Client: ESB NETWORKS
Project: MV Standard Drawings
Contract: MV CABLES STANDARDS
Production Unit: Civil Building and Environmental

A.13. MV Joint Bay

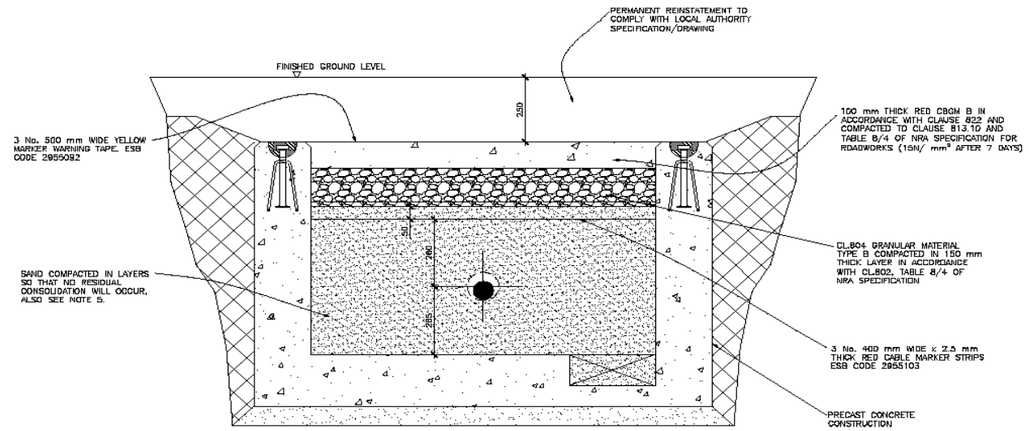
	MV Joint Bay Dimensions
Height	1000 mm
Length	2900 mm
Width	1600 mm



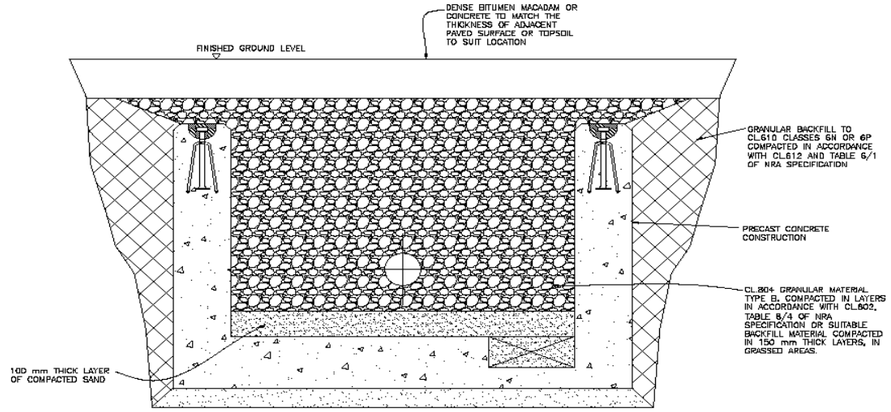
A.14. MV Joint Bay Backfill



PLAN
SCALE 1:20



SECTION A-A PERMANENT REINSTATEMENT
SCALE 1:10



SECTION A-A TEMPORARY REINSTATEMENT
SCALE 1:10

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEER'S, ARCHITECT'S AND ESB NETWORK'S DRAWINGS & SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN mm.
3. DO NOT SCALE DIMENSIONS.
4. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS PRIOR TO CONSTRUCTION, ANY DISCREPANCIES TO BE NOTIFIED TO THIS OFFICE IN WRITING IMMEDIATELY.
5. SAND SHALL BE NATURAL UNWASHED SAND IN ACCORDANCE WITH BS 882-1992 (BS EN 12620) COMPLYING WITH GRADING LIMIT C IN TABLE 4 WITH A MAXIMUM THERMAL RESISTIVITY OF 1.0 K.m/WATT AT OR MOISTURE CONTENT.
6. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE NRA SPECIFICATION FOR ROADWORKS.

REV.	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
1		ISSUED FOR CONSTRUCTION				
0	13.12.12	ISSUED FOR APPROVAL	T.T.	J.H.	A.M.	T.S.

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED
TENDER ☐ CLIENT APPROVAL ☐ CONSTRUCTION ☒ AS-BUILT ☐ REVISED ☐

Client: ESB Networks
Project: MV Standard Drawings
Contract: MV CABLE STANDARDS
Drawing Title: 20 kV SINGLE CIRCUIT PRECAST JOINT BAY REINSTATEMENT DETAILS
Production Unit: Civil Building and Environmental

ESB International
ESBI Energy Integration

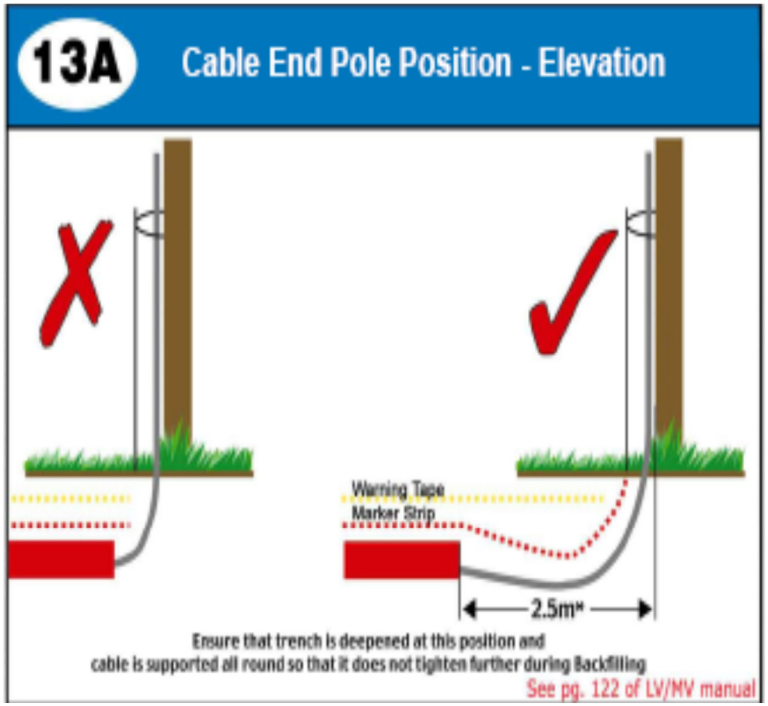
ESBI Engineering Solutions, Stephen Court, 18-21 St. Stephen's Green, Dublin 2, Ireland. Tel: +353 (0)1 703 8000 Fax: +353 (0)1 703 7198
Email: mailadmin@esbi.ie Web: www.esbi.ie
ESBI Engineering Solutions is a trading name of ESBI Engineering & Facility Management Limited. Registered Office in above. Registered in Ireland No. 116240

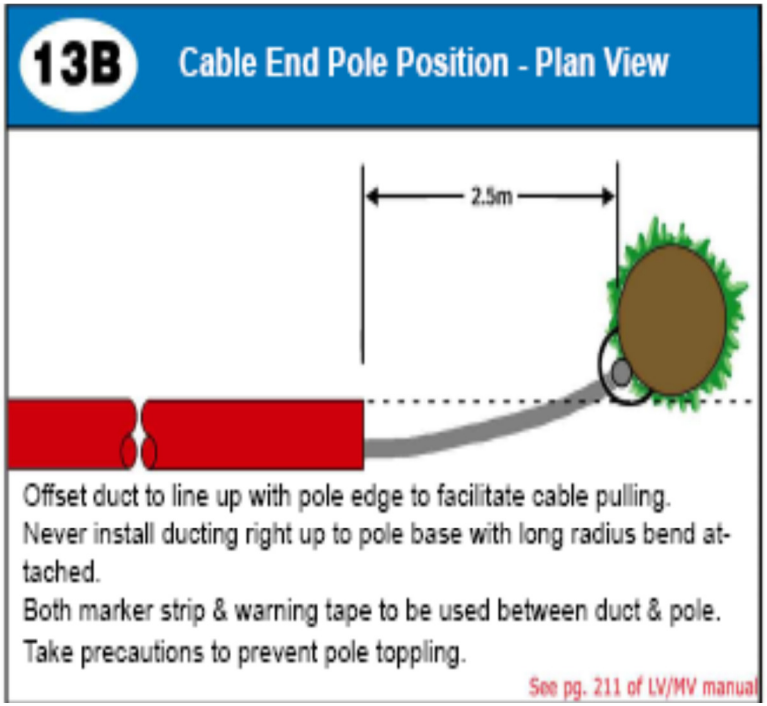
DRAWN	PRODUCED	VERIFIED	APPROVED	APP. DATE
J.Haverty	J.Haverty	M.Amet		

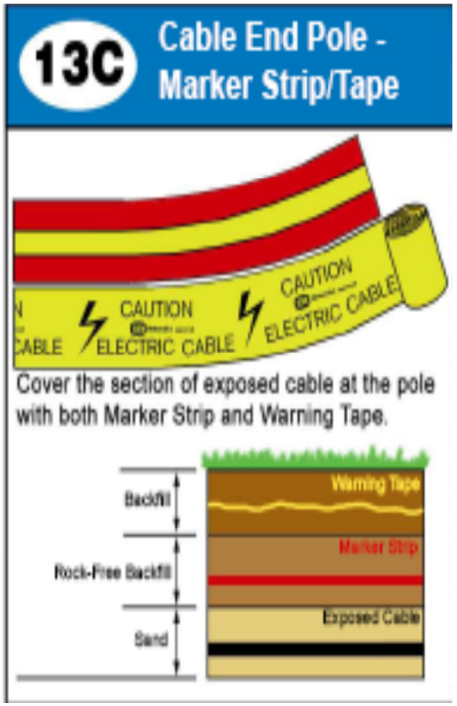
CLIENT REF	No. of Sms	SIZE	SCALE
TC208568	5	A1	AS SHOWN

DRAWING NUMBER: PE424-D7002-003-003-001
SHEET
REV

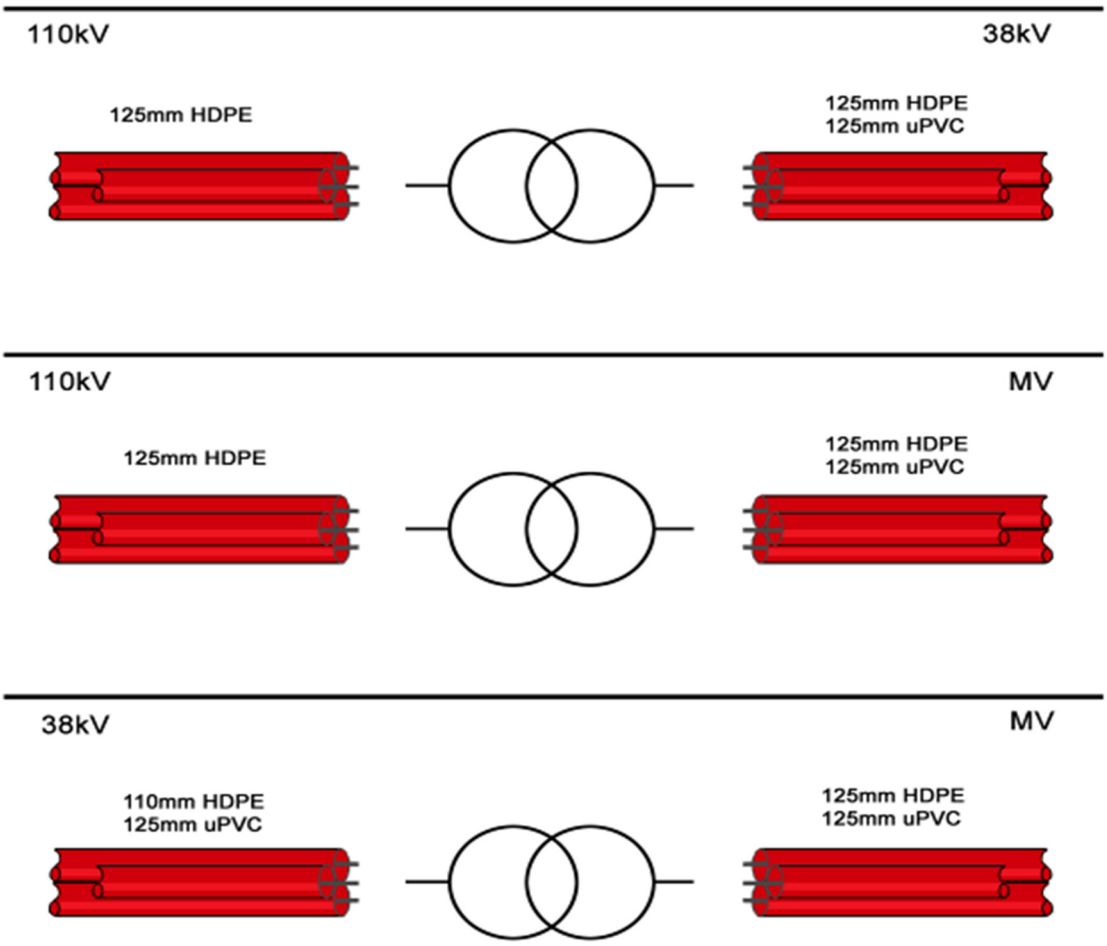
A.15. MV Ducting at Pole







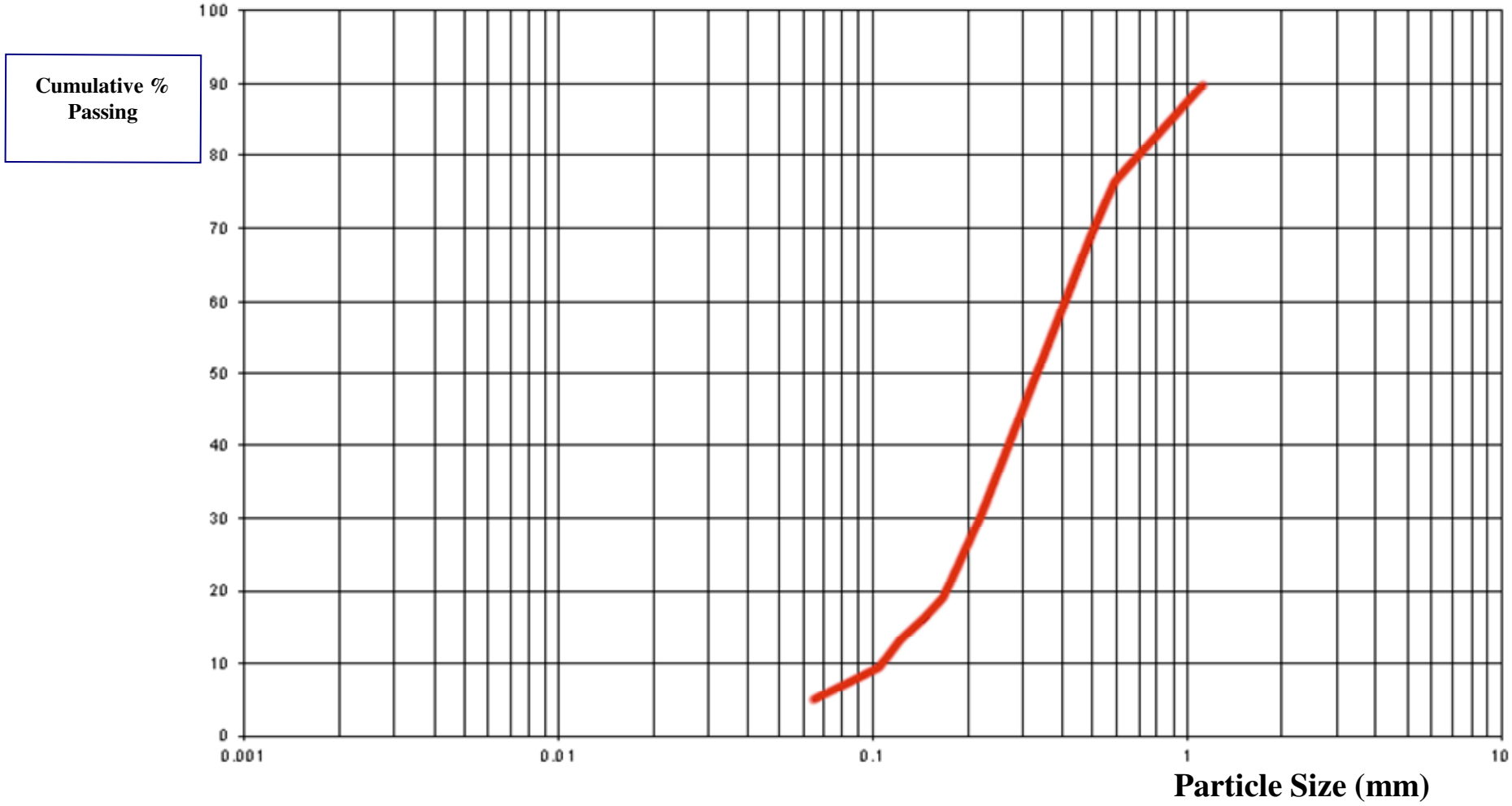
A.16. Ducting within Station Compound



Duct Size	Material	Voltage	Usage
125mm	HDPE	110kV	All 110kV works
125mm*	uPVC	MV	All MV works. *Can be used in station compound s for MV side of Transformers once short runs are used. *Can be used for 38kV side of Transformer once short runs are used and within a station compound.
110mm	HDPE	38kV	All 38kV works
110mm	uPVC		Bends Only for 38kV arm chair

NB: 1 cable per duct (3 Ducts per circuit) all above construction is within station compound ONLY

A.17. Thermal Backfill Grading Curve



NETWORKS

Ducting & Civil Inspection Report

Site Details: _____

Date: _____

Detail of ducting being installed: _____

Duct Installation

		Comment	Y/N
1.	Are all ducts, couplers and preformed bends stored correctly on site		
2.	Have the ducts the ESBN specified marking		
3.	Are transport caps fitted to all ducts		
4.	Have the duct installation crew a specification drawing		
5.	Have the duct installation crew completed the ESBN ducting workshop		
6.	Are duct position & levels being recorded as laid		
7.	Are the correct tools on site for correct duct installation		
	Ducting Template		
	Wacker plate (Mechanical Compactor)		
	Cable Ties		
	Lubrication for coupler installation		
8.	Are all the materials used ESBN approved		
9.	Is the trench the standard width and depth as per specification drawing		
10.	Is the CBGM B / ESBN approved sand base layer compacted		
11.	Are the power ducts laid in to ESBN specification with correct formation and spacing		
	Transport caps fitted until duct engagement with coupler		
	Trefoil ducting are ducts cable tied every 3 Mtrs		
	Are couplers staggered		

	Is lubrication being used on couplers		
	Is a rubber mallet being used to tap couplers in to position on the duct / uPVC to tap spigot into socket		
	Is the template being used		
12.	**For uPVC bends is the bend supported according to ESBN minimum standard**		
13.	**Is the CBGM B / ESBN approved sand layer compacted over the power ducts**		
14.	**Is the red warning strip laid in at the standard depth and position over the ducting**		
15.	**Are the fibre ducts laid in to ESBN specification with correct formation and spacing**		
	Transport caps fitted until duct engagement with coupler		
	Is lubrication being used on couplers		
	Is a rubber mallet being used to tap couplers in to position on the duct		
	Is the template being used		
16.	**Is the CBGM B / ESBN approved sand layer compacted over & around the fibre ducts**		
17.	**Is the red warning strip laid in at the standard depth and position over the ducting**		
18.	**Is the specified backfill used for filling the remainder of the trench**		
19.	**Is the yellow warning tape installed to standard depth and position in the trench max 300mm from finished ground level**		
20.	**Are ESBN approved duct seals used when ducting is installed**		
21.	**When the ducting circuit is completed is the correct backfill around the ducting and duct route accurately recorded**		
22.	**Has photographic evidence of installation been recorded**		

Comments from Duct Installation:

_____

_____

_____

A.19. Duct Inspection Report

Duct Inspection Report

		Comment
1.	Project Name and Worksite	
2.	Date of Delivery to site	
3.	Date and Location of Inspection	
4.	Name of Duct / Coupler Supplier	
5.	Duct Size (110, 125, 160, 200, 250mm)	
6.	Duct Type (uPVC / HDPE)	
7.	Wall thickness	
8.	Duct Length	
9.	Quantity of Ducts	
10.	Quantity of Couplers	
11.	Are Ducts & Couplers Packaged and Secured (Timber struts 3 & Nylon or Plastic Straps)	
12.	Are ducts marked with ESBN Approved Specification No. 16113 marking?	
13.	Are Ducts discoloured?	
14.	Are all ducts fitted with Transportation Caps?	
15.	Are there any visible signs of Damage along lengths of Ducts?	
16.	Are there any visible signs of Damage to ends of Ducts?	
17.	Are duct end chamfered inside and outside?	
18.	Are there any visible signs of damage to couplers?	
19.	Are rubber seals correctly fitted to all Couplers?	
20.	Any others items of Note?	

Signed & Dated	

A.20. Duct Proving Report

ESB NETWORKS

ESB Networks

Ducts Cleaning/Proving Report

Project: _____

Duct ID	Duct Diameter(s) (mm)	Sponge Diameter (mm)	Brush Diameter (mm)	Mandrel Diameter (mm)

Winch Serial No._____ **Calibration date** _____

Direction of proving from _____to _____

Typical circuit cross section & Ducts ID	**Ducts formation & ID at the start of the pull**	**Ducts formation & ID at the end of pull**

Pre-Taking Over

Duct ID	Duct Designation	Max Pulling Tension (tonnes)	Comments
1			
2			
3			
4			
5			

Have the ducts maintained the correct formation?	**Yes** ☐	**No** ☐
Rubber bungs fitted after ducts proving?	**Yes** ☐	**No** ☐
Have the ducts been cleaned and proved successfully?	**Yes** ☐	**No** ☐

Signed for Contractor: _____ signature _____ date

Name of Contractor: _____

ESB Supervisor who witnessed the tests: _____ signature _____ date

CAUTION: The proving of the ducts shall be deemed as failed if the following conditions are not made:

- The pulling tension exceeds 1 tonne (10 kN)
- Mandrel is stuck
- Mandrel is moving with sudden bursts even if the pulling tension is less than maximum specified
- Rope shoots suddenly up the duct
- Ducts do not maintain the same formation as at the start of the pull

Document Control

Policy Base

Policy No.	Policy Title

Document Control

Version	Date	Details	Originator	Revision Class	Section Update
0.1	24/01/2017	Original	Asset Management		

Document Review

Role	Name	Date

Document Approval

Role	Name	Date

Document(s) Superseded

Document No.	Title	Full (F) / Partial (P)
DOC-240205-AJC	Summary of the MV LV Cable Installation Standards and Practices Manual	P
DOC-230908-ATU	Summary of MV&LV cable Installation Standards & Practices Manual	F

Distribution List

This document is for circulation to personnel who undertake the following activities;

x☐ All ESB Networks Staff ☐ Commissioning ☐ Contractor Management ☐ Design Services ☐ Fibre optic on the Network ☐ Finance ☐ Fleet Management ☐ Legal ☐ Material Services ☐ Operations ☐ Overhead Networks (HV) ☐ Overhead Networks (MV/LV) ☐ Procurement ☐ Substations (HV) ☐ Substations (MV/LV) ☐ Technical Training ☐ Telecom Services ☐ Underground Networks (HV) ☐ Underground Networks (MV/LV) ☐ Work at the Meter	☐ All Contractors x☐ Civil ☐ Haulage ☐ Overhead Lines ☐ Substations ☐ Timber x☐ Underground Networks ☐ Others (specify)

Definitions and Abbreviations

Definitions

CBGM B : Cement Bound Granular Material Category B
CL : Clause
$C0^2$: Carbon Dioxide
HDPE : High Density Polyethylene
kN : kilo Newton
K.m/W : Kelvin Meter per Watt
LV : Low Voltage
mm : millimetres
MV : Medium Voltage
N : Newton

N.R.A : National Roads Authority
uPVC : Unplasticized Polyvinyl Chloride
38kV : 38,000 Volts

Terminology

For the purposes of this document, the following terminology applies;

Shall	Designates a company requirement where conformance is mandatory.
Should	Designates a company recommendation where conformance is recognised as best practice.
May	Designates a Permissive Statement - an option that is neither mandatory nor specifically recommended.

CAUTION: Used to give the end user information on what can happen, why and the consequences of ignoring the caution.

Used to give the end user specific, important information to help complete the task or procedure correctly.

This is a stop or critical point in the procedure.
It contains a rule that shall be followed by the end user.