openreach

Openreach Standards for CAD Site Plans

Version 2.0

April 2019

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1. Introduction

- Currently site plans are provided in an image format to Openreach. Openreach Planners manually scale, rotate, and plan civils in an internal tool called NetDesign. This is currently a manual process that adds unnecessary dwell to the planning process. Import of the CAD drawings allow for information about the site to be automatically identified.

- By updating our systems to consume CAD drawings, this will enable Openreach to provide further service propositions in the future, such as the giving developers the opportunity to plan the Openreach on-site network themselves.

- This document sets out the CAD standards required to allow Openreach to consume CAD drawings from developers, this includes layers, symbol library, duct routes and drawing guidelines.

In order to read the site plan provided by developers, a set of standards with respect to layers and symbols needs to be defined to developers for creating the site plan. This document covers the list of layers and symbols for developers to create site plan in CAD format.

Release – Title

Title	Version	Date	Author	Remarks
Symbology Documentation	Draft Version 0.1	01-Nov-2018	Senthil Kumar Subbiah	Draft Version 0.1
Symbology Documentation	Draft Version 0.2	11-Nov-2018	Pandian RK	Added openreach network layer Updated civil symbols Updated Geo referencing points
Symbology Documentation	Draft Version 0.3	13-Nov-2018	Senthil Kumar Subbiah	Added Netdesign symbologies

CAD Format

CAD Site plans submitted to Openreach will be in the AutoCAD R12 Release ASCII DXF format. This is a text based file format which Openreach systems can read.

Optimising CAD File Size

DXF ASCII files can become very large and so in order to reduce the overall files size the following is recommended.

1. Only those layers required for planning of the external fibre network are to be included in the drawing.
2. Any unused blocks are to be removed from the drawing. (See Appendix)
3. All DXF files to be zipped before sending to Openreach.

The maximum file size which can currently be imported will be determined through the CAD Trial.

Notes

1. At a later date more up to date versions of CAD files including dwg may be included.

2. CAD Layers

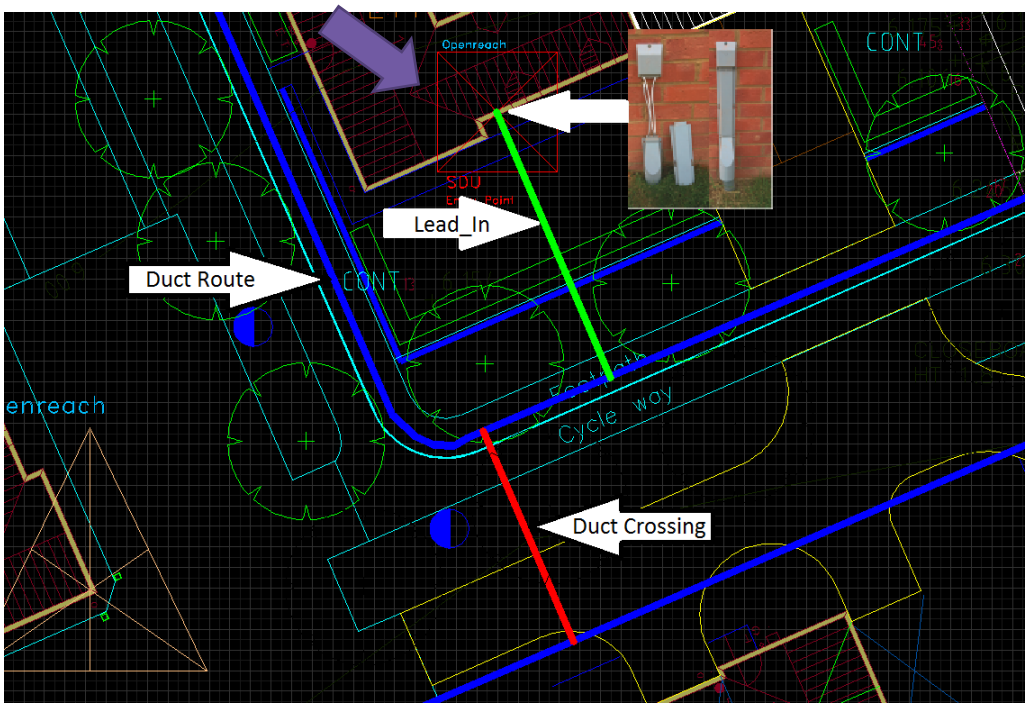
2.1 Site Plan Developer CAD Layers

The CAD site plan will include a number of layers upon which drawing entities are organized. For example a layer might contain entities representing trees. As CAD plans can become very complex and large it is recommended that CAD site plans submitted to Openreach omit those layers that are not relevant for external planning of the fibre network. For example the internals of buildings are not required for fibre planning but can significantly increase the CAD file size.

2.1.1 Openreach Mandatory CAD Layers.

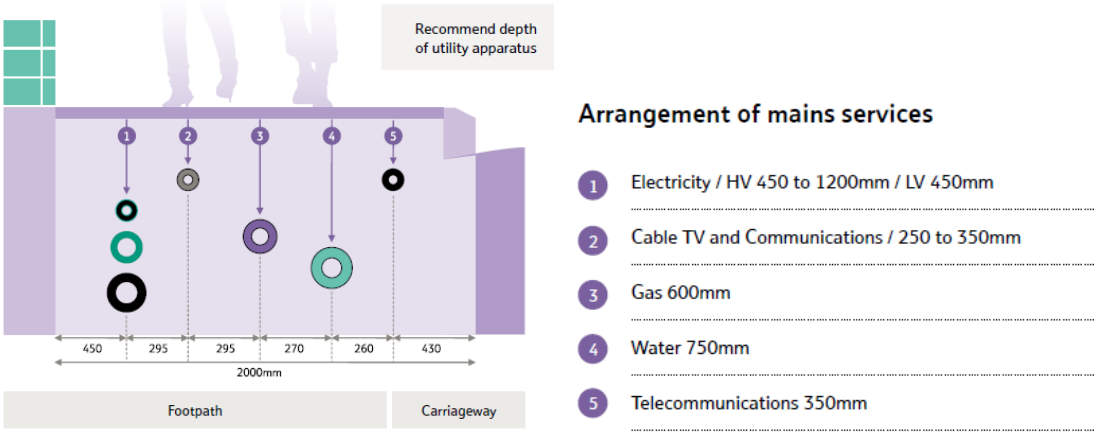
In additional to the layers that represent the site layout Openreach require a number of additional mandatory CAD layers are added to the plan. These layers will be used by Openreach to help in the planning of the fibre network. For example the additional layers will indicate to Openreach where potentially duct can be laid and where cable entry points are located on buildings.

The Site Plan extract below shows some of the key concepts that will be captured in the Openreach CAD layers. The image shows an insert locating the cable entry point for a premise. Connected to this insert is a lead-in route (green line) which connects the premise entry point to the main duct running under the footway. Where duct (red line) crosses a road duct will be captured on a separate layer.



Detailed in the following sections are the naming conventions that will be used for the Openreach mandatory layers and descriptions of the Openreach block library. These standards ensure that planning systems used within Openreach can extract the relevant information from the CAD drawings.

CAD Layer *OPENREACH_PROPOSED_DUCT_ROUTE*



The *Openreach_Proposed_Duct_Route* layer will be used to capture all the possible duct routes which typically are be located under footpaths. Duct routes should ideally follow the recommended placement indicated in the diagram above at approximately 430mm from the kerb edge and at a depth of 350mm.

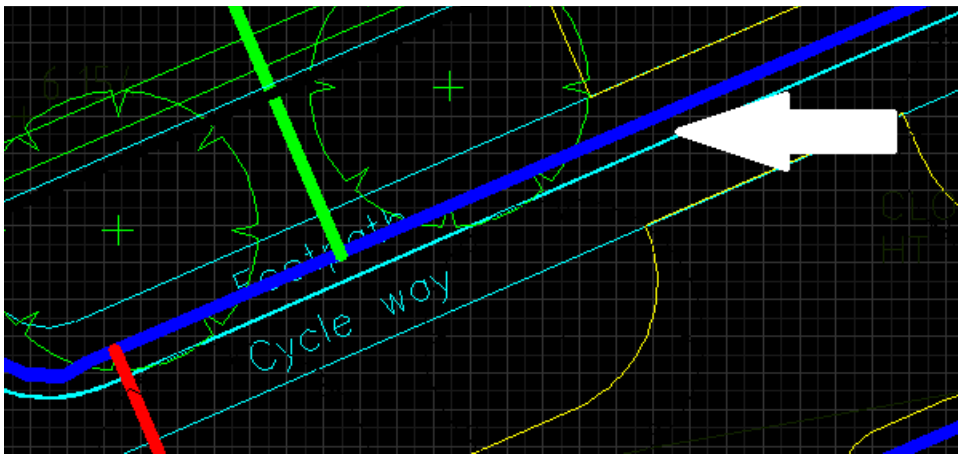
Drawing Guidelines

On the *Openreach_Proposed_Duct_Route* _layer Polyline and Line entities will be used to capture the duct routes. Ideally placed at 430mm from the road edge all duct runs should be a straight as possible. When capturing the duct routes using the Polyline or Line drawing entities care must be taken to ensure that lines that are connected are drawn to a certain level of precision(Ideally snapped) that can be interpreted by Openreach planning systems. Details of drawing precision will be covered in a later section. Typically all possible duct routes should be added routing duct routes on both sides of a road. This will allow the Openreach Planning tools create network compliant designs.

Please note

The latest information on the positioning of utilities, mains and plant can be obtained from the National Joint Utilities Group: www.njug.org.uk

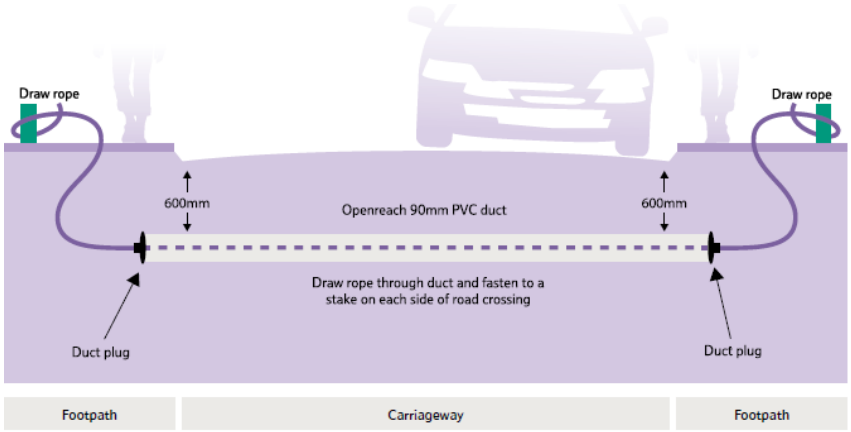
Appearance



Line Style – CONTINUOUS

Color - Blue

CAD Layer *OPENREACH_PROPOSED_DUCT_CROSSING*

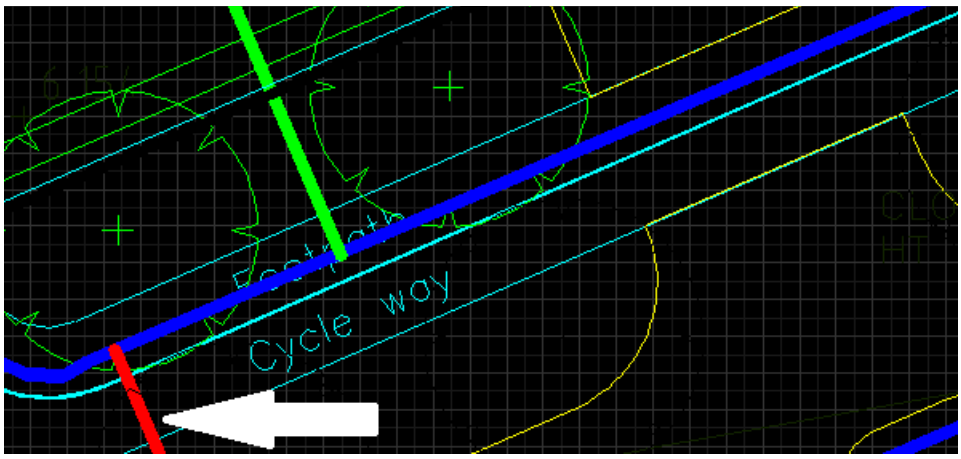


The *Openreach_Proposed_Duct_Crossing* layer will be used to capture the possible duct routes which typically will be located under carriageways. Road crossing ducts are installed by the site developer at a depth of 600mm and typically have joint boxes installed at either end to facilitate the transition from footway duct running at 350mm deep to the deeper duct crossing the road.

Drawing Guidelines

On the *Openreach_Proposed_Duct_Crossing* _layer Polylines and Lines entities will be used to capture the duct routes. Typically a number of routes should be identified where duct will be routed across roads to allow the Openreach planning tools options to make network compliant designs.

Appearance



Line Style – CONTINUOUS

Color - Red

CAD Layer *OPENREACH_PREMISE_LEADIN*

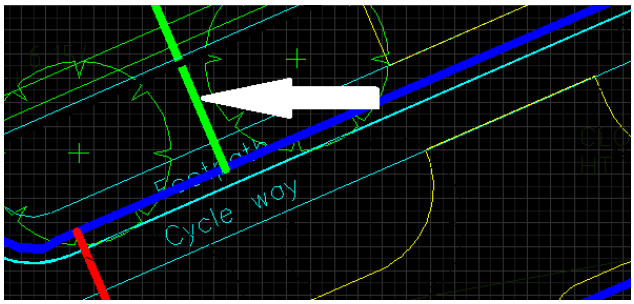
Overview

The *Openreach_Premise_Lead_In* layer will be used to capture the premise duct lead-in routes.

Drawing Guidelines

On the *Openreach_Premise_Lead_In* layer Polylines and Lines entities will be used to capture the duct routes. The duct lead-in routes must be as straight as possible and be located at a location allowing unrestricted future access. The lead-in duct routes will connect at one end (Snapped) to the insert points of premise entry points detailed in later sections.

Appearance



Line Style – CONTINUOUS

Color - Green

CAD Layer OPENREACH_SYMBOLS

Overview

The CAD site plan will include a number of layers upon which drawing entities are organized. Symbols can be added to any layer in the drawing. Below are the names of the layers in the drawing.

Layer Name	Layer Name implemented in the code
Site Entrance Point	OPENREACH_SITE_ENTRY_POINT
Site Phases	OPENREACH_PHASE
SDU's	OPENREACH_SDU_ENTRY_POINT
MDU's	OPENREACH_MDU_ENTRY_POINT
Maisonettes	OPENREACH_MAISONETTE_ENTRY_POINT
Site Duct Route	OPENREACH_PROPOSED_DUCT_ROUTES
Site Duct Crossing	OPENREACH_PROPOSED_DUCT_CROSSING

3. Openreach Block Library

Openreach block library will have the symbols of each layer grouped.

The block library will have the below symbols.

- SDU
- MDU
- Maisonettes
- Site Entry Point
- Phases
- Ref A
- Ref B

Format of the Symbol Library file with the attributes

3.1. Block Library Overview

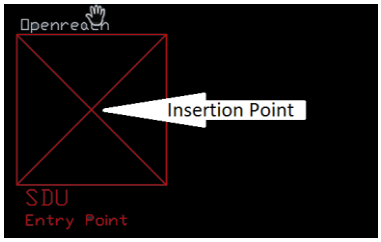
In addition to capturing the potential duct routes additional information needs to be captured within the CAD Site Plan. The Openreach New Sites Block library provides a number of Openreach specific blocks and associated attributes definitions for creating inserts within the CAD drawing. For example the library includes a block symbol for the cable entry point for a single dwelling premise. This block when inserted into the drawing as an insert includes an attribute to capture the plot id for the premise. The Openreach blocks will be imported into the Site Plan where they can be inserted into the drawing in the usual way and attribute data captured as prompted.

Openreach Inserts can be added to any of the previously described Openreach mandatory layers.

Basic Drawing Principle's

1. Insertion Point – The insertion points for all block will be at the centre of the block.

For example for the OPENREACH_SDU_ENTRY_POINT the insertion point will be located as follows.



2. All duct routes connected to the insert will be snapped to the insertion point of the insert.
3. Inserts can be scaled as desired
4. All Openreach Symbols MUST be added to the Openreach _Symbols layer, as defined in above section.
5. The Plot ID across the site i.e. SDU's, MDU's and Maisonettes need to be unique.

Symbol of SDU in the Drawing

Symbol of MDU in the Drawing

Symbol of Maisonitte in the drawing

Symbol of Phases in the drawing

3.2. OPENREACH_SDU_ENTRY_POINT

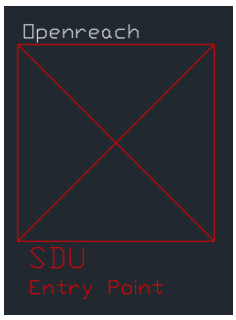
Overview

The Openreach_SDU_Entry_Point block is used to identify the location on a premise external wall at which Openreach's optical fibre will enter a single dwelling unit (premise).

Drawing Guidelines

This will be used as insert (block) to capture SDU entry point. Insertion point should be at the location of entry of lead-in into the building and should be connected with the duct lead-in (snapped with the insertion point).

Block Symbol



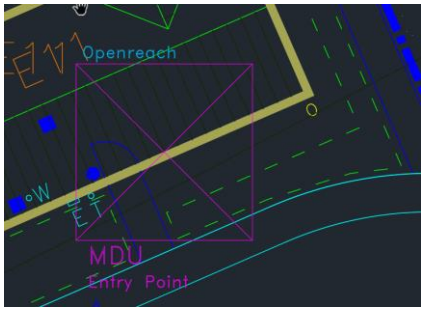
Attribute Definitions

Attribute Value	Attribute Description	Format	Is Mandatory?
Plot Id	Plot Number of the Proposed Plot	Integer	Yes
Address 1	Street address	String (max 256 characters)	No
Address 2	Area Name	String (max 256 characters)	No
Address 3	Post code	String (max 256 characters)	Yes

Attribute Example

PLOT_ID = 1
ADRRESS1 = 124
ADDRESS2 = Christchurch St
ADDRESS3 = IP4 2DH

3.3. OPENREACH_MDU_ENTRY_POINT



Overview

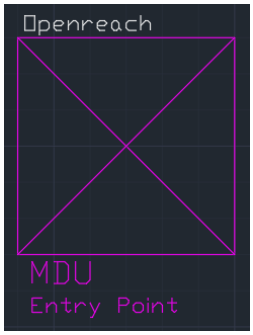
The Openreach_MDU_Entry_Point block is used to identify the location on a premise external wall at which Openreach's optical fibre will enter a multi dwelling unit (block of flats/apartments).

Drawing Guidelines

This will be used as insert (block) to capture MDU (building with more than 2 premises) entry point. Insertion point should be at the location of duct entry into MDU building and should be connected with the duct lead-in (snapped with the insertion point).

For each individual block of flats having separate entrance, separate MDU insert should be used.

Block Symbol



Attribute Data

Attribute Value	Attribute Description	Format	Is Mandatory?
Block Name	Block Name of the MDU	Integer	Yes
Address 1	Street address	String	No
Address 2	Area Name	String	No
Address 3	Post code	String	Yes

Stress on the point that the Block Name is exactly the same in the XLS sheet.

Method for capturing MDU demand

Sending attributes at site and plot level is done via the Excel file below. This will allow you to send us details about the site on the first tab, along with details on each MDU block located within the site.

Please see the attached example

TAPLEY_PREMS_DUCT_REF.xls

Site Info:

1) This attached sheet has details of various attributes of symbols used in cad file like Total number of Plots(Demands) in the current site [Count of No. of SDU plots + No. of MDU plots + No. of maisonette plots]
2) Total number of SDU plots
3) Total number of MDU plots
4) Total number Of Maisonette Plots
5) Total number of phases planned and demands planned in each phase
6) Total site demand including phases (Total number of Plots(Demands) in the current site + demands in each phase)

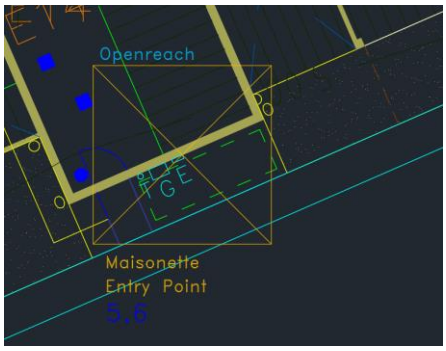
These details needs to be entered by developers in xls file while importing CAD file to ensure that count of respective symbols in dxf matches the actual expected count given in excel sheet.

MDU:

MDU symbol has some properties whose values are either obtained from dxf or excel sheet (where the property of MDU is defined). Block Id in dxf should match with a block name in excel so that its other property values like demands, floor details and plotids are taken by the tool as its property values. If the excel sheet does not have a matching MDU block id/name, then the default value defined in dxf will be taken.

7) The various attributes/properties defined in excel sheet are:
8) * Block_Name (ie. Block Id in dxf)
9) * Total demand (sum of floor demand)
10) * Floor names (eg. 1,2,3,4)
11) * Floor demand (Demands in each floor is listed. If this is not defined in excel, the value defined in dxf will be considered. Eg. 10,10,10,10)
12) * Plots id (eg. 1-10;11-20;21-30;31-40)

3.4. OPENREACH_MAISONETTE_ENTRY_POINT



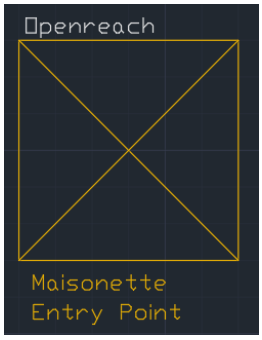
Overview

A maisonette consists of two premises within a single building.

Drawing Guidelines

This will be used as insert (block) to capture maisonette entry point. Insertion point should be at the location of lead-in entry into the building and should be connected with the duct lead-in (snapped with the insertion point).

Block Symbol



Attribute Definitions

Attribute Value	Attribute Description	Format	Is Mandatory?
Plot IDs	Floor details	Comma separated Integers 000,000	Yes
Address 1	Street address	String	No

Address 2	Area Name	String	No
Address 3	Post code	String	Yes

Attribute Example

PLOT_IDS = 2, 3
ADRRESS1 = 124
ADDRESS2 = Christchurch St
ADDRESS3 = IP4 2DH

OPENREACH_PHASE

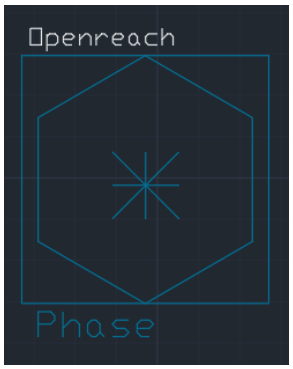
Overview

For a site plan having several phases or part of larger development, developers needs to identify the different phases and associate expected number of premises. This will allow Openreach to correctly dimension the duct infrastructure in the current phase of the development allowing for installation of additional cables at a later date.

Drawing Guidelines

This will be used as insert (block) to capture additional phase details if your site is part of a bigger site being developed in multiple phase. It's recommended to place at the future site entry point if possible and connected via openreach_proposed_duct_crossing. However if that is not possible then this can be left unconnected.

Block Symbol



Attribute Definitions

Attribute Value	Attribute Description	Format
Phase Number	Phase ID e.g. "A"	String
No. of plots/flats in this phase	Total number of proposed plots in the new phase	Integer

Attribute Example

PHASE_ID = A
DEMAND = 200

OPENREACH_SITE_ENTRY

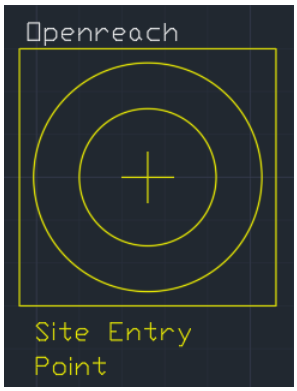
Overview

The OPENREACH_SITE_ENTRY block identifies the demarcation between on site and off site duct. The developer is responsible for the installation of on-site duct whilst Openreach will install any off site duct required. Typically a joint box will be installed at this location.

Drawing Guidelines

This will be used as insert (block) to capture the duct entrance to the site. It's recommended that insertion point is connected with openreach_proposed_duct_crossing. It's recommended that one drawing only has one insert.

Block Symbol

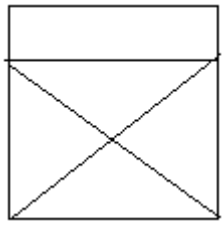


3.5. openreach Pre determine Boxes.Is this still required?

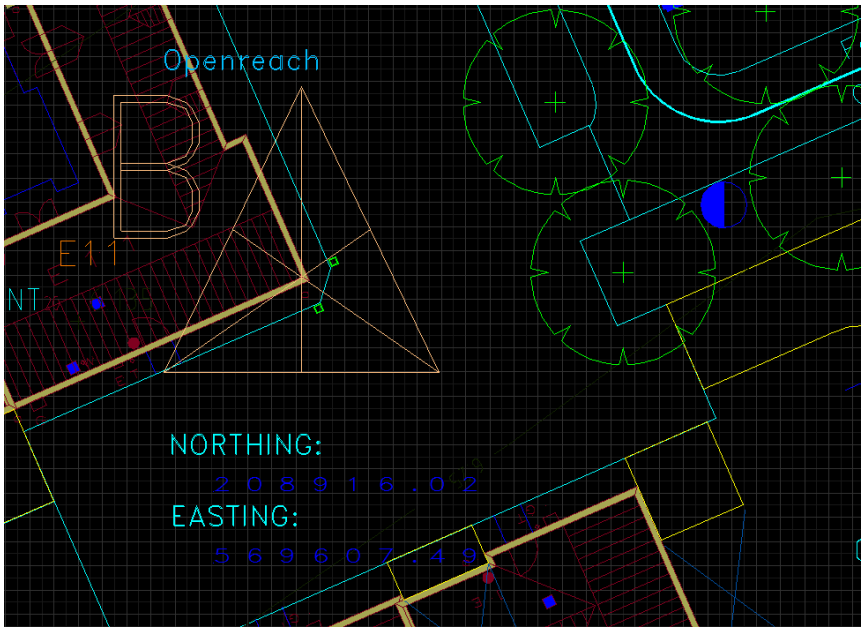
Predetermine box functionality in netdesign are used to place the joint box to obtain the optimal cost by forcing the civil route to route though the place determine box.

The planned predetermine box should be placed or planned on the openreach proposed duct route only.

Symbol for Predetermined box in the CAD Drawing



3.6. Geographical Reference Points



The CAD Site Plan will need to have geographical references added allowing the site to be placed within Openreach's infrastructure database. By providing two known points with Northing's and Easting's the drawing coordinate system can be translated to the British National grid coordinate system used within Openreach's planning systems.

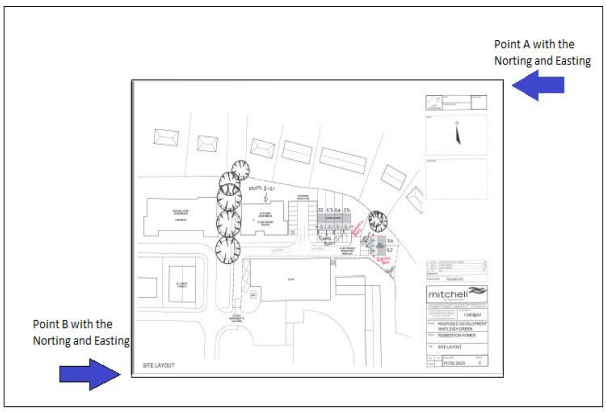
The Openreach Block Library provides two blocks called OPENREACH_REF_A and OPENREACH_REF_B both of which have attribute definitions for Easting's and Northing's. Both Easting and Northing are captured as 6 digit numbers which gives accuracy down to 1cm (chk?).

For example the British National grid reference for BT Tower in London is given as

Northing = 181921, Easting = 529200

Geo Reference Point Drawing Guidelines

To provide a greater degree of accuracy when determining the transformation from drawing coordinates to British National Grid coordinates it is advised that the reference points are located at some distance from each other. For example placing the OPENREACH_REF_A insert at the top/left of the site plan and the OPENREACH_REF_B insert at the bottom/left as shown in the diagram below.



3.8.1 OPENREACH_REF_A

Block Symbol

Attribute Definitions

Attribute Value	Attribute Description	Format
Easting	British National Grid Easting Reference	6 digit integer
Northing	British National Grid Easting Reference	6 digit integer

3.8.2 OPENREACH_REF_B

Block Symbol

Attribute Definitions

Attribute Value	Attribute Description	Format
Easting	British National Grid Easting Reference	6 digit integer
Northing	British National Grid Easting Reference	6 digit integer

4. Drawing precision
Polyline/Line connection to Insert precision

The CAD Site Plans will be imported into Openreach Planning systems. The planning systems build a fully connected model of the civils network i.e. premise entry points and duct routes allowing planning to take place. As such it is vital that the entities on the Openreach mandatory layer are drawn with a level of precision that allow connectivity to be inferred. For example a duct lead-in will terminate at an OPENREACH_SDU_ENTRY_POINT. The lead-in (Polyline/Line) end point needs to be snapped to the insertion point of the entry point insert with a degree of precision that indicates it is actually connected to the entry point. Therefore Polylines/Lines will connect to inserts if an end point is snapped to the insertion point of an insert within a certain tolerance.

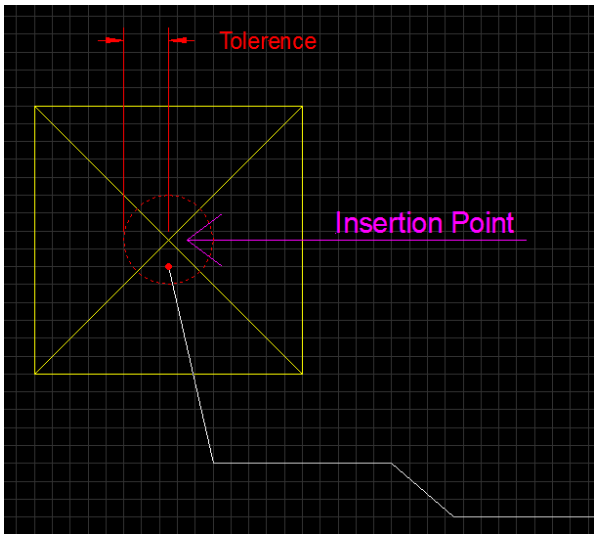


Figure 1 Polyline snapped to insertion point of insert

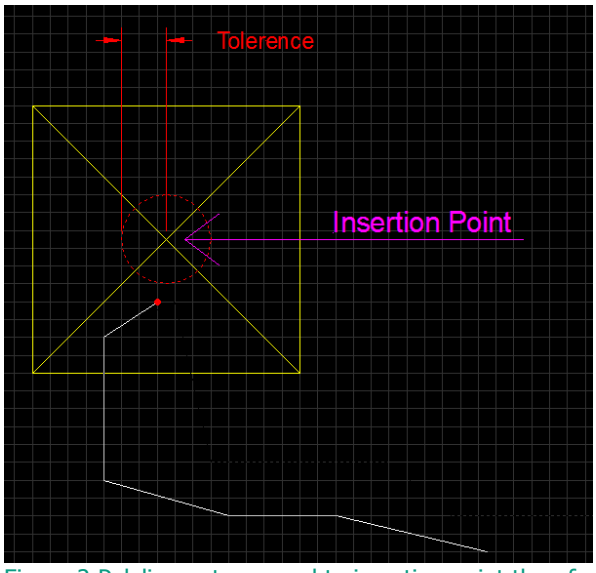


Figure 2 Polyline not snapped to insertion point therefore not connected

Polyline/Line to Polyline/Line connections

Polyline and Line entities can also connect to each other. Again the lines will be assumed to be connected if the distance between them is below a specified tolerance distance.

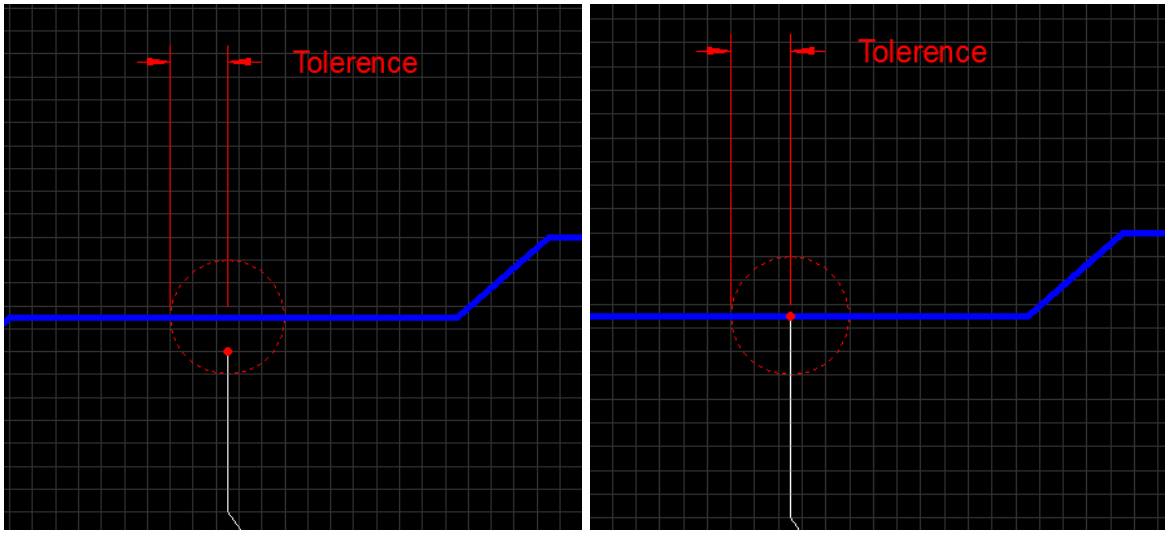


Figure 3 Polyline snapped to another polyline

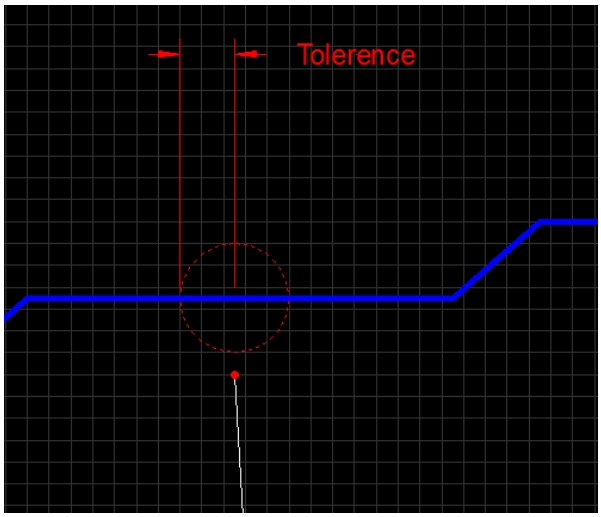


Figure 4 Polyline not snapped to another polyline therefore not connected

Connection Tolerance

Insert and lines will be assumed to be connected if the distance between them is less than 0.1m.

Appendices

CAD Unsupported Entities

TBC

5. Invalid Plans

Submitted CAD plans will be validated by Openreach Planning tools. If for any reason the plan doesn't adhere to the CAD standards the New Site CAD process cannot be followed and will therefore revert to the current BAU process.

A validation report will be produced that indicates where the CAD failed the CAD standards validation process. The reason a CAD Site plan might fail the validation stage might include some or all of the following:-

1. Connectivity cannot be established.
2. Geo Reference Inserts not added to plan including attribute information.

6. Validation Report while loading the DXF in the NetDesign Too

When loading the dxf file in the NetDesign tool, below are the validation checks will take place in th NetDesign tool.

Geo-Reference A

Feature Name	Type	Validation Check	Validation Status
Geo-Reference A	Symbol	The Symbol is not available	Error
Geo-Reference A	Symbol	The Easting and/or Northing attributes are not populated	Error
Geo-Reference A	Symbol	The Easting and/or Northing attributes are as per the agreed format	Error

User/Planner Action:-

Geo Reference A point is Mandatory. Planner cannot proceed with the planning if the Geo Reference A is not available

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Geo-Reference B

Feature Name	Type	Validation Check	Validation Status
Geo-Reference B	Symbol	The Symbol is not available	Error
Geo-Reference B	Symbol	The Easting and/or Northing attributes are populated	Error
Geo-Reference B	Symbol	The Easting and/or Northing attributes are as per the agreed format	Error

User/Planner Action:-

Geo-Reference co-ordinates are not shared by the Developer
Manually can align the Site Plan by referencing it with the OS map.

Site Entrance Point

Feature Name	Type	Validation Check	Validation Status
Site Entrance Point	Symbol	The Symbol is not available	Error

User/Planner Action:-

The Site Entrance Point is not provided by the Developer. Please request the Reception team to liaise with Developer and verify the Site Entrance Details

Site Phases

Feature Name	Type	Validation Check	Validation Status
Site Phases	Symbol	The Symbol is not available	Error
Site Phases	Attribute Value	The Demand attribute is not populated or the value is non-zero	Error
Site Phases	Attribute Value	The value of Demand attribute MUST also be validated with meta-data submitted in the XLS file (Info Sheet), if available	Error
Site Phases	Attribute Value	The count of Phase Symbol MUST be validated against the meta-data submitted in the XLS file (Info Sheet), if available	Error

User/Planner Action:-

Additional Phase details are required to ensure that the Site is designed to meet future phase(s) demands. Please request the Reception team to liaise with Developer to get the missing details of the phase(s)

SDU's

Feature Name	Type	Validation Check	Validation Status
SDU	Attribute Value	The count of SDU Symbol is not as per the meta-data submitted in the XLS file (Info Sheet), if available	Error
SDU	Attribute Value	The Plot ID attribute is not populated or the value is non-zero for all SDU Symbols	Error
SDU	Attribute Value	The Plot ID's are unique	Error

User/Planner Action:-

There are either missing SDU's not submitted by the Developer and / or SDU details are missing. Please request the Reception team to liaise with Developer to get the missing details of the SDU's.

MDU's

Feature Name	Type	Validation Check	Validation Status
MDU	Attribute Value	The count of MDU Symbol is not as per the meta-data submitted in the XLS file (Info Sheet), if available	Error
MDU	Attribute Value	The Plot ID attribute is not populated or the value is non-zero for all MDU Symbols	Error
MDU	Attribute Value	The meta-data submitted in the XLS file (in the MDU sheet) is missing mandatory attributes	Error
MDU	Attribute Value	The Plot ID's are unique	Error

User/Planner Action:-

There are either missing MDU's not submitted by the Developer and / or MDU details are missing. Please request the Reception team to liaise with Developer to get the missing details of the MDU's

Maisonettes

Feature Name	Type	Validation Check	Validation Status
Maisonettes	Attribute Value	The count of Maisonettes Symbol is not as per the meta-data submitted in the XLS file (Info Sheet), if available	Error
Maisonettes	Attribute Value	The Plot ID attribute is not populated or the value is non-zero for all Maisonettes Symbols	Error
Maisonettes	Attribute Value	The Plot ID's are unique	Error

User/Planner Action:-

There are either missing Maisonettes not submitted by the Developer and / or Maisonettes details are missing. Please request the Reception team to liaise with Developer to get the missing details of the Maisonettes

Site Duct Route

Feature Name	Type	Validation Check	Validation Status
Site Duct Route	Layer	The Layer is not submitted in the CAD file.	Error
Site Phases	Attribute Value	The count of Phase Symbol MUST be validated against the meta-data submitted in the XLS file (Info Sheet), if available	Error

User/Planner Action:-

The Duct Route is NOT shared by the Developer. Hence please manually plot the Duct Route.

Site Duct Crossing

Feature Name	Type	Validation Check	Validation Status
Site Duct Crossing	Layer	The Layer is not submitted in the CAD file.	Error/Not Applicable

User/Planner Action:-

The Duct Crossings are NOT shared by the Developer. Hence please manually place the Duct Crossings

Site Meta-Data (XLS File)

Feature Name	Type	Validation Check	Validation Status
Site Meta-Data (XLS File)	Attribute Value	Mandatory details in the XLS sheet are missing	Error

User/Planner Action:-

The meta-data submitted by the Developer is missing / not valid. Please request the Reception team to liaise with Developer to get the missing details.

6. Reducing DXF File Size

Removing unused blocks

https://knowledge.autodesk.com/support/autocad-lt/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/AutoCAD-LT/files/GUID-D68BA47B-A79D-4F58-9715-0569CC24BCEF-htm.html

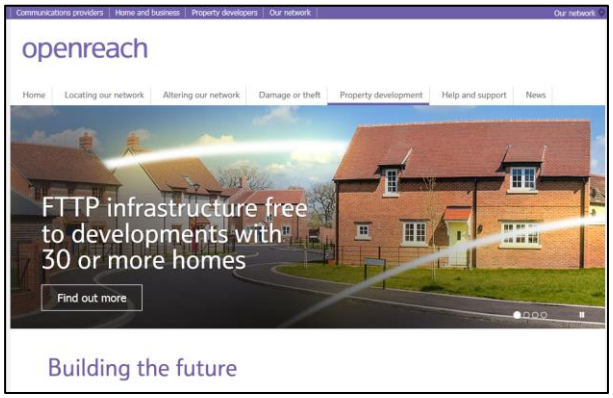
7. List of Abbreviation and acronyms

SDU	Single Dwelling Unit
Maisonette	Two units within a single premise.
MDU	Multi Dwelling Unit (3 or above units)
CSP	Customer Splice point
CBT	Connector Block Terminal
JBC	Joint box carriageway
JBF	Joint box footway
FDP	Fibre distribution point
ISPN	Internal splitter
CSPN	Splitter Node
NetDesign	Internal Planning Tool

8. Further Information

Further information on New Site Fibre Planning can be found at the following URL

https://www.ournetwork.openreach.co.uk/property-development.aspx?utm_source=furl-newsites&utm_medium=site&utm_campaign=Openreach-furl-newsites



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https://www.ournetwork.openreach.co.uk/resources/site1/General/Downloads/Fibre_Handbook_V8.pdf

Ultrafast speeds with fibre infrastructure

https://www.ournetwork.openreach.co.uk/resources/site1/General/OR_10403_Ultrafast-speeds-fibre-infrastructure-Guide_3.pdf