

VITAL ENERGI UTILITIES LIMITED

Manchester Civic Quarter Heat Network Connection to Manchester Town Hall

Design and Access Statement

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1 Introduction

This Design and Access statement serves to provide information in sufficient detail for the intended connections of district heating and power to Manchester Town Hall. It is part of the overall planning application for the Manchester City Council (MCC) Civic Quarter Heat Network (CQHN) project. The information provided in this report is specific to the Manchester Town Hall connection in order to clearly explain the work content and any affects the Grade I listed areas of the building.

This document has been prepared in accordance with the requirements of Circular 01/06 and the CABE Guidance "Design and Access Statements – How to Read, Write and Use Them."

It should be noted that the proposed works which are located within the grade I listed building include the basement plate heat exchanger room and basement RMU rooms.

The report covers: -

- Scope of work.
- Method statement and schedule of works.
- Structural considerations.
- Drawings of the work entailed.
- Outline specifications.

2 Background to the report

The CQHN project is part of the Greater Manchester (GM) heat network programme, which has identified a pipeline of heat network opportunities across the ten Greater Manchester authorities.

Manchester – A Certain Future (MACF) is the city's climate change action plan, setting out the vision and commitment for Manchester to become a leading low carbon city by 2020. MACF recognises that low-carbon decentralised energy networks will play a key role in the city meeting its 41% carbon reduction target by 2020 (from a 2005 baseline), and they will help to ensure the city's energy supply is more resilient.

MCC's contribution to MACF includes the commitment for MCC to deliver heat networks. The Civic Quarter contains a number of key MCC-owned buildings, and the Authority is committed to supplying them with low-carbon energy as well as demonstrating leadership to others in the city to do the same.

The CQHN is a network that is located in the Civic Quarter area of the city centre. The heat network in this phase of work is intended to serve the following core buildings in the Civic Quarter: Our Town Hall, Town Hall Extension and Central Library, Manchester Central (the proposed location for the energy centre), Bridgewater Hall and Manchester Art Gallery. The initial phase of works also includes the supply of electricity to Our Town Hall, Manchester Central, Town Hall Extension and Central Library and Bridgewater Hall.

Vital Energi are responsible for the maintenance and operation of the Energy Centre plant, Energy Network, heat substations and the electrical ring main unit. This includes the plant associated with the energy network to be installed within the Town Hall.

3 Our Town Hall – Existing Listed Building Consents and Planning Applications

3.1 Our Town Hall Project

The Town Hall is currently being refurbished by the Our Town Hall Project in association with the recently approved listed building consent (ref: 125553/LO/2019).

Vital Energi have liaised with the Our Town Hall (OTH) team in the production of the OTH application in order to facilitate the works described within this report.

The works concerned with this application sit separate to the OTH listed building application works, but the OTH works will continue post the installations described within this report. The areas within the OTH affected by these works i.e. The Plate Heat Exchanger Room and the RMU room will have been refurbished to the standards as stated within application 125553/LO/2019 prior to the works starting as described within this report.

The OTH scheme includes alterations to the areas including and surrounding the proposed Plate Heat Exchanger room and RMU room as per the 125553/LO/2019 application drawings; OTH-PUR-TH-LG-DWG-A-0363 and OTH-PUR-TH-LG-DWG-A-0366 respectively.

The proposed by the OTH team are detailed upon 125553/LO/2019 application drawing; OTH-PUR-TH-LG-DWG-A-0570.

Within this report and for clarity, when an area is described as ‘existing’, this refers to the status of the area after the works within 125553/LO/2019 have been completed and that they accord with the principles set out within the approved listed building consent.

3.2 Our Town Hall External Works

As a precursor to the works described in this report, planning permission (ref: 124260/VO/2019) was granted by MCC for the installation of the Energy network around the Town Hall. These works have now been completed. The works described in this report are an extension of the energy network into the Town Hall.

4 Our Town Hall Connections – Outline Description

4.1 Heating Connection – Albert Square

New Heating pipework and a communications duct will be extended from the existing buried heating mains within Albert Square, through the OTH moat wall, through an existing window, to the existing plate heat exchanger plantroom.

Within the OTH installation consists of the installation of heat substations within existing plate heat exchanger plant room (the room as identified in the recently approved OTH application) to allow the connection of OTH heating systems to the new district heating network.

The heat substation will be a decoupling point between the primary network and the building's existing heating systems. The heat substations will also be the point of metering of heat offtake and control of heat supply to the OTH.

The new heat substations will be connected to the heat network by two pipes and a communications duct, which will be routed through an existing window opening, through the moat wall (on the Albert Square façade) to the existing buried mains located within Albert Square.

The integration of the existing heating systems will require the installation of a fibre optic cable ring circuit which will be routed through Town Hall above ground on a dedicated cable tray adjacent the heating pipework / HV cabling. This fibre ring circuit will connect into the new heat substation control panels in North, South, Charter and Exchange plant rooms. The fibre optic will then continue across the city below ground in 100mm ducts adjacent the heating pipework. This fibre optic cable will be installed in a ring formation to connect all the heat substations within the new heating network back to the energy centre's ECS control panel. The fibre optic cable will facilitate remote monitoring of all the heat substations located within the network.

4.2 High Voltage Power Connection – Princess Street

High voltage will be installed to serve new Ring Main Units (RMU). The existing high voltage and follows a similar route to the heating pipework but continues across Albert Square and terminates along the Princess Street elevation.

From the existing ducting, the principal works include the installation of a ring circuit from, through an existing (non-original) basement blockwork wall, currently blocking the original window opening, into the existing RMU room (the room being as per the recently approved OTH application).

The penetration will be adjacent to the existing cable duct installation, providing the current power to the existing ENW substation. The works to remove this form part of the OTH application.

The ring will be formed by 300mm² 3C CTS/SWA/XLPE cables (approximately 85mm diameter each) installed within 2No. 150mm ducts. Once through the blockwork wall, the ducting will terminate at a Roxtec flange.

When through the wall, the cables will continue on 2No. medium-duty ladder racks to the new RMU's installed as part of the existing OTH installations.

5 Method Statement and Schedule of Works

5.1 Work Content

As a guideline for the scale of the project being considered for Manchester Town Hall, the scope of work and the parameters, as presented by the Our Town Hall team, are detailed below.

- Peak heating demand = 4350 kW
- 3no 2175kW plate heat exchangers
- Access via single door and down stairs
- Secondary flow/return temperature: 80°C/60°C
- Primary flow/return temperatures: 95°C/65°C
- Flow/return pipes from building entry point = 15 meters (DN 200)
- Pressure rating Secondary side = 6 bar
- Cable length to power supply = 15 meters

The pipe size, at the point of entry is to be DN200. All pipe sizes downstream will be smaller than this.

The district heating energy centre is situated away from Manchester Town Hall premises at the Energy Centre on Lower Mosely Street.

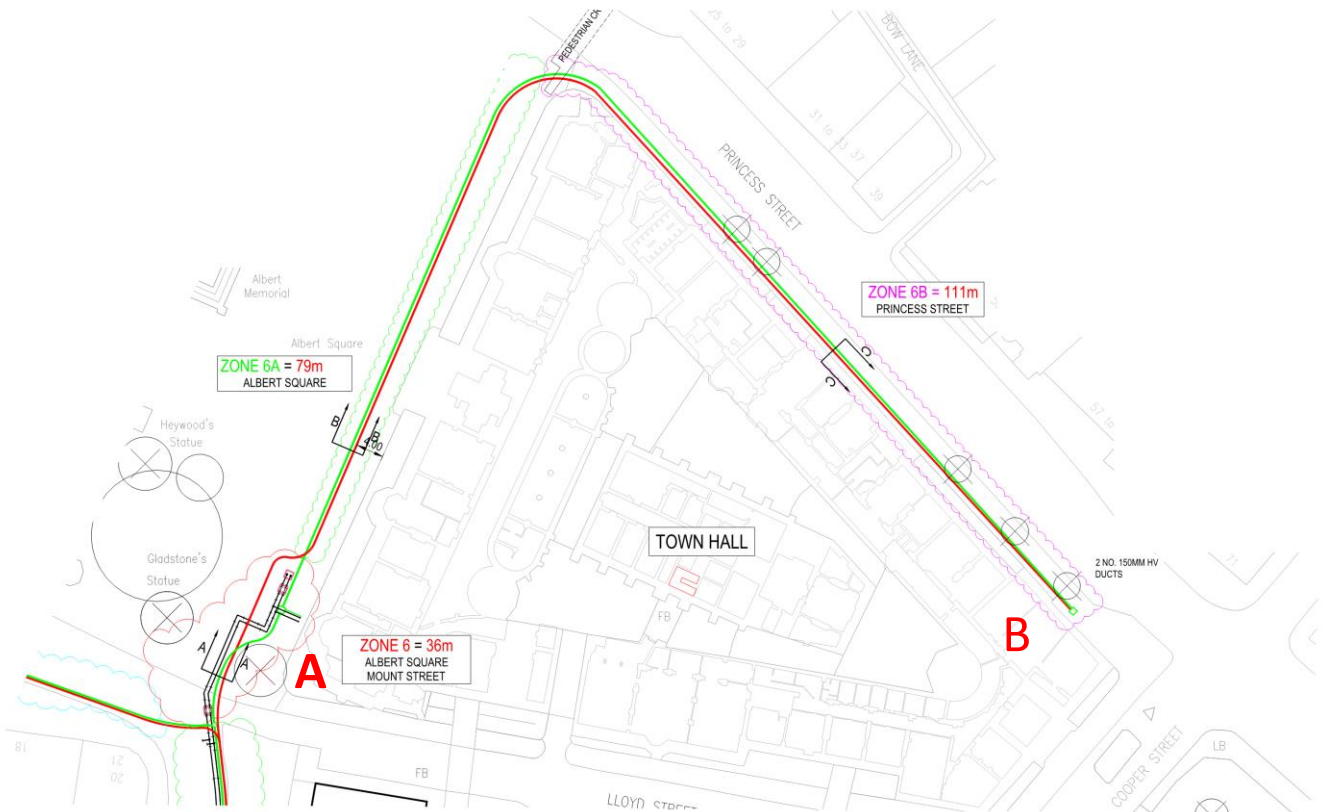


*Figure 1: Manchester Town Hall
and neighbouring buildings in relation to the installed Energy Network.*

5.2 Methodology

5.2.1 Existing Energy Network

The Energy network has been installed as an enabling works package around the town hall. The installation is summarised in the below sketch.



There are two proposed connections points into the town hall from the existing energy network;

- Heating connections and communication ducts at the corner of Mount Street and Albert Square (Point 'A')
- High voltage connections along the Princess Street Elevation. (Point 'B')

The existing connection points have been left at a close distance from the existing façade to limit the works required in the public realm.

5.2.2 Above Ground District Heating Connection

From the existing buried pipework. The existing pipework will be extended through the moat wall to feed the Town Hall. Pipe work will then proceed to cross the light well at the same level, through the opening of the existing bay window and into the proposed heat exchanger plantroom.

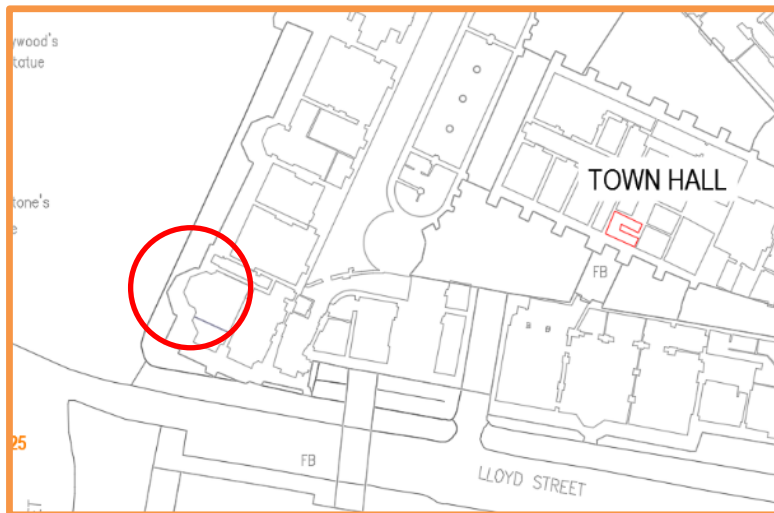


Figure 2: Lightwell Location

The position of the branches within Albert Square have been co-ordinated with the OTH project team to limit the visual impact of the proposed pipework.

As can be seen from figure 3, this principle has been followed in the past.



Figure 3: DH pipework will enter light well at a similar height as existing services

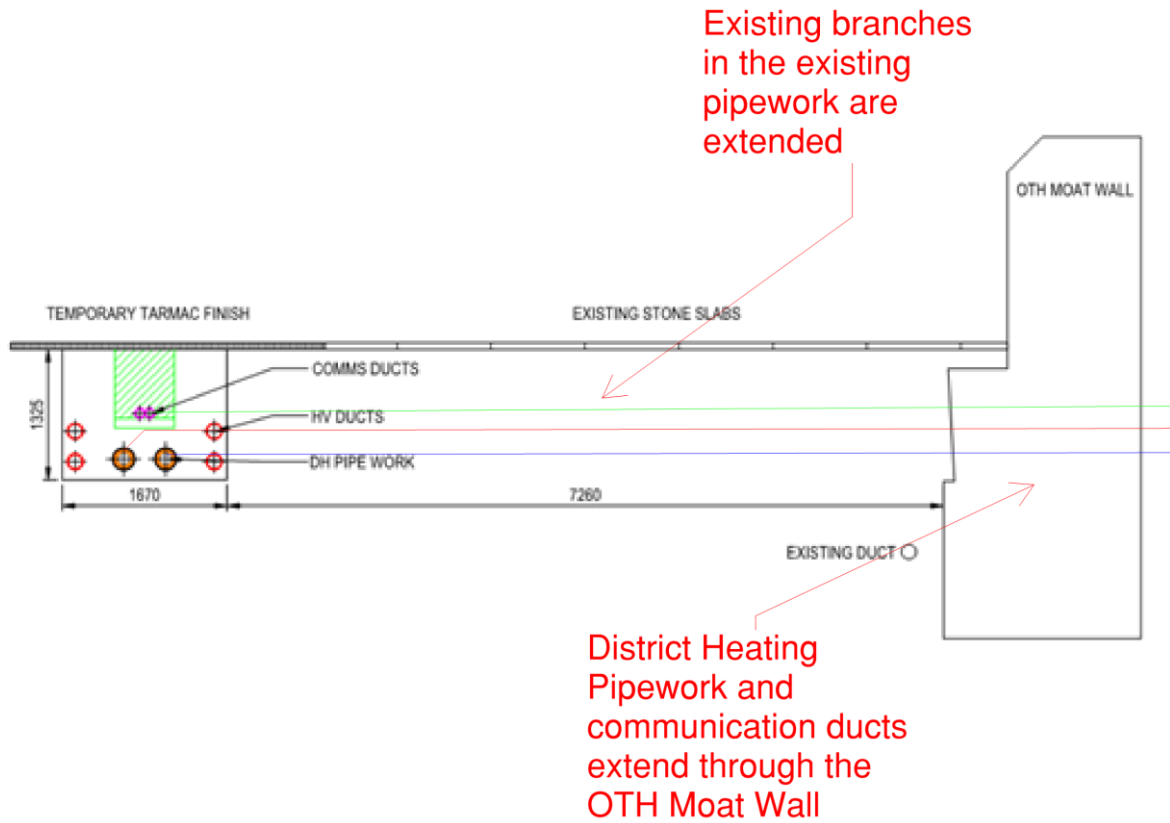


Figure 4: principle of the below ground pipe work trench layout, approaching Manchester Town Hall

5.3 Retaining the Integrity of the Town Hall Appearance

To approach the entry point of the Town Hall, we propose crossing the pipe and comms within the light well along the Albert Square Elevation. The walls either side of the moat are curtilage listed and their appearance should be maintained where possible. Therefore we propose to span the entirety of the moat at its shortest point. This will enable the supports to be from the below ground pipework within Albert Square and from supports within the heat exchanger plantroom. This ensures that the supports will not connect to any original features i.e. the external walls or the moat wall.

Vital Energi will limit the visual impact to the public by finishing the pipes crossing the moat in Black.

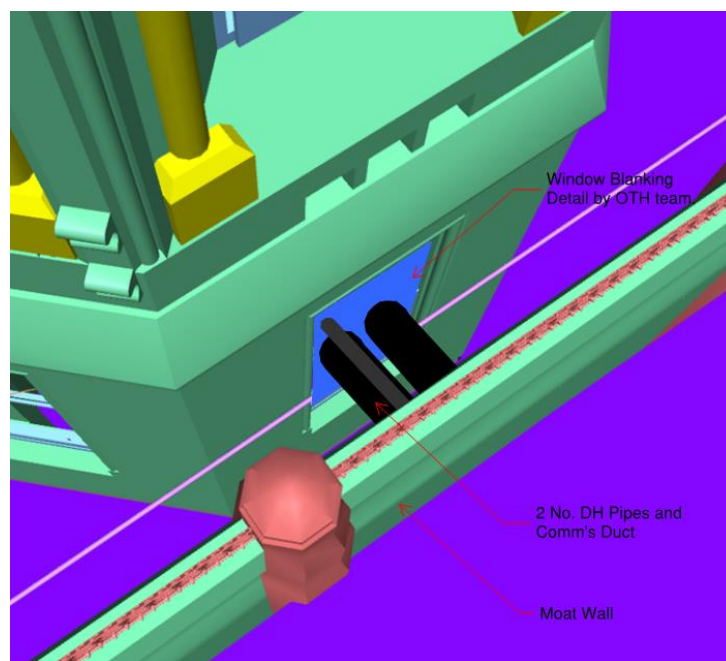


Figure 5 - View looking down into the OTH Moat from high level

To enable the pipes and comms ducts to pass from Albert Square through the moat, core holes will be drilled within the moat wall. This will consist of 2No. 450mmDia holes for the 2 No. 355mmDia heating pipes and 1 No. 200mmDia hole for the 100mmDia Comms duct.

Once the holes have been created, the wall will be protected by placing a rubber sleeve around the pipe to prevent water ingress.

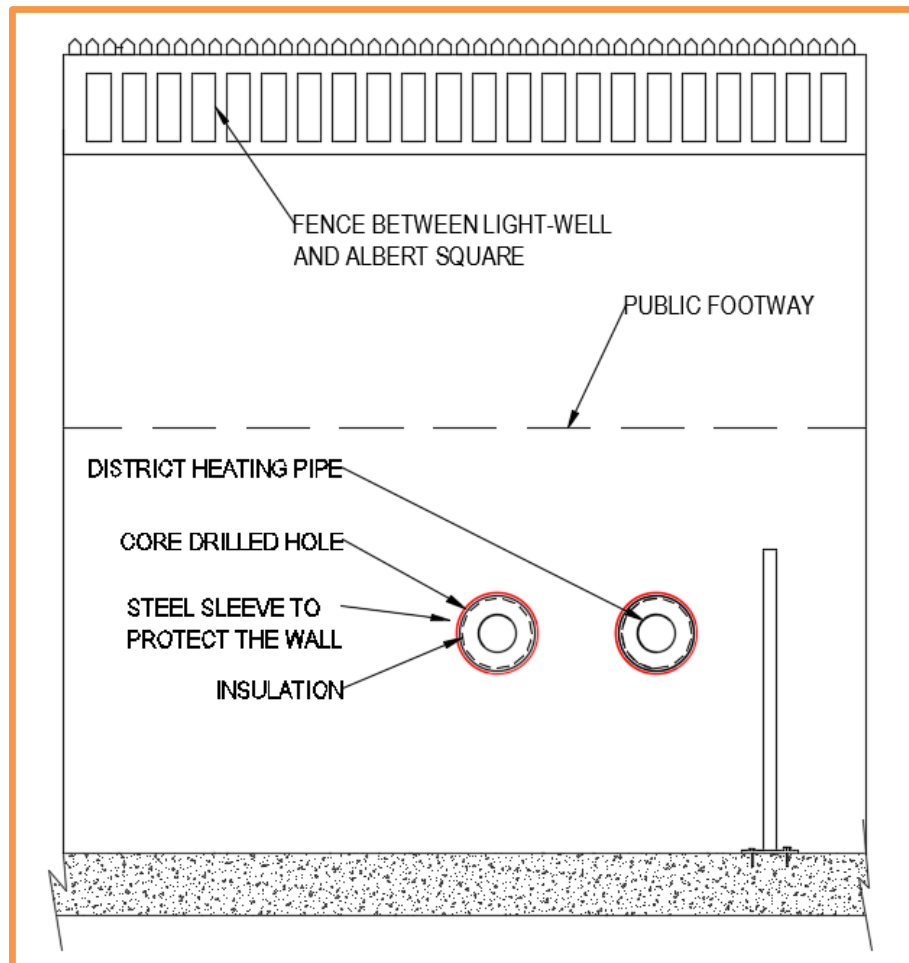


Figure 6: Pipe sections, viewed as flush with the light-well wall

To further secure the building against damage, the pipes will include a leak detection system. This system is monitored 24 hours a day throughout the year.

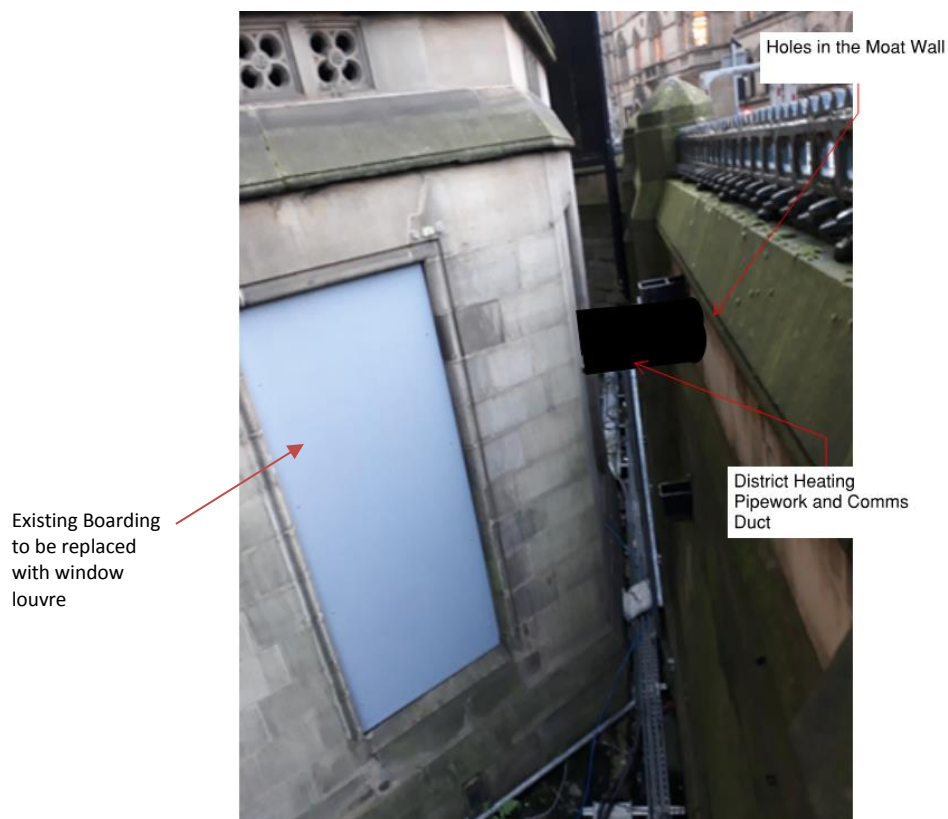


Figure 7 - View South within the Moat

5.3.1 HV Connection through external wall

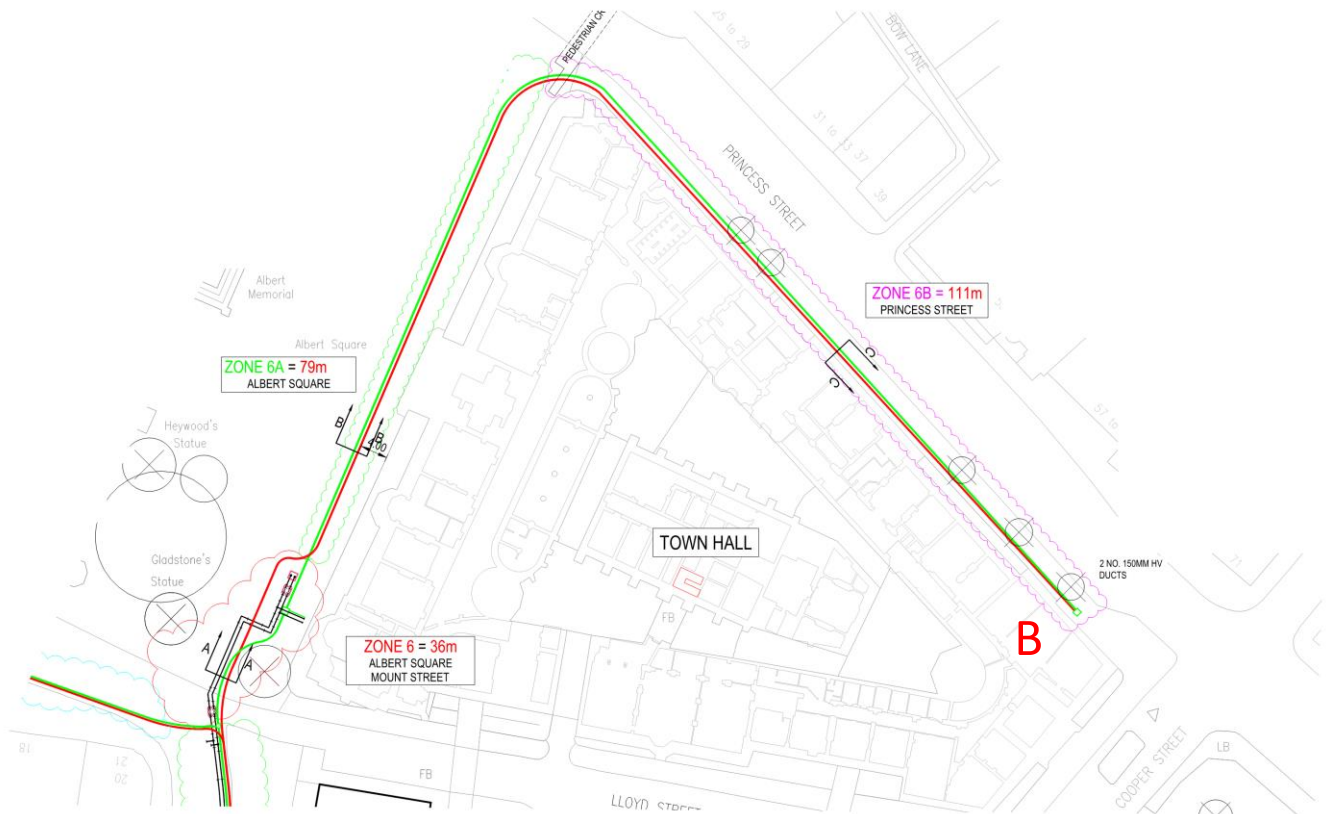


Figure 8 - Princess Street HV Entry Point

The principal works for the HV cabling will be undertaken from the existing ducting within Princess Street. The cable duct will be extended from the footpath, through an existing basement blockwork wall, currently blocking the original window opening, into the existing RMU room.

The penetration will be adjacent to the existing cable duct installation, providing the current power to the existing ENW substation.



Figure 9 - Existing HV Duct Penetration

The existing penetrations are an ENW Asset and are to be retained by ENW (Therefore cannot be re-purposed for this scheme).

6 Internal Works

6.1.1 HV Connection

The OTH internal works consist of the installation of cables installed on top of cable ladders emanating from the outer wall penetration. The ladders will be supported by drop rods fixed to the soffit with resin anchors.

The cables will terminate at two new ring main units located within the centre of each room. One ring main unit within each existing ring main unit room respectively.

The works do not involve the removal of any features of interest.

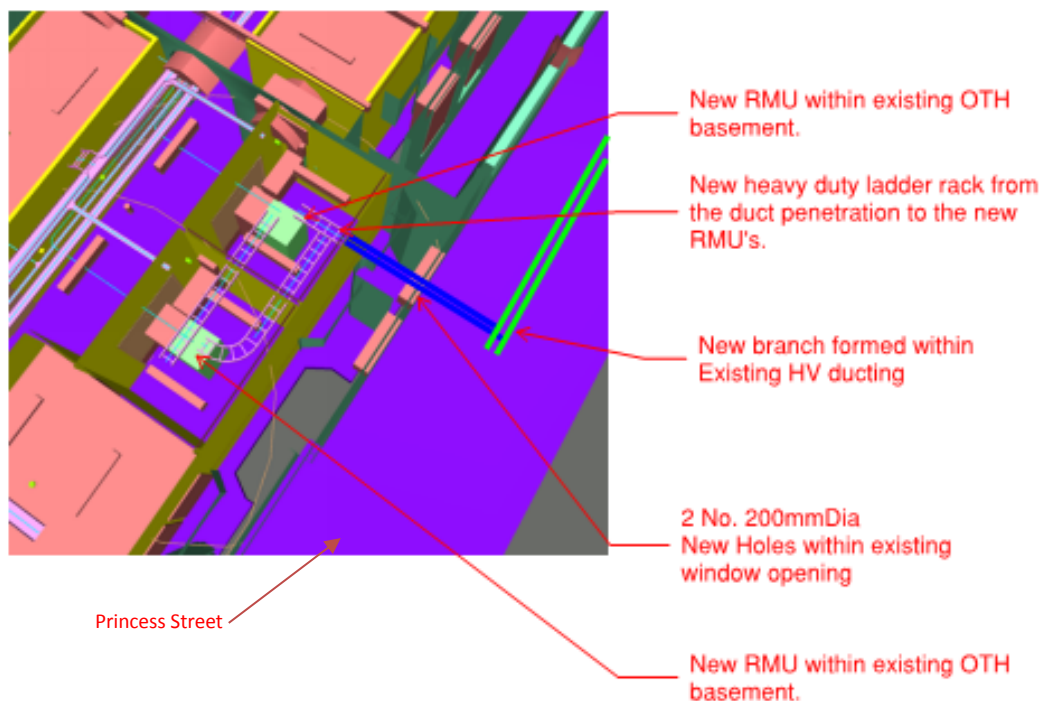


Figure 10 - Princess Street New HV Connection

6.1.2 Plate Heat Exchanger Plantroom

The district heating pipework will emanate from the window aperture into the plate heat exchanger room.

Pipework and cable tray will follow the perimeter of the room and be supported by a series of mild steel frames, fixed with anchors from the existing floor. The pipework will terminate at plate heat exchangers located side by side from the centre of the room.

The works do not involve the removal of any features of interest.

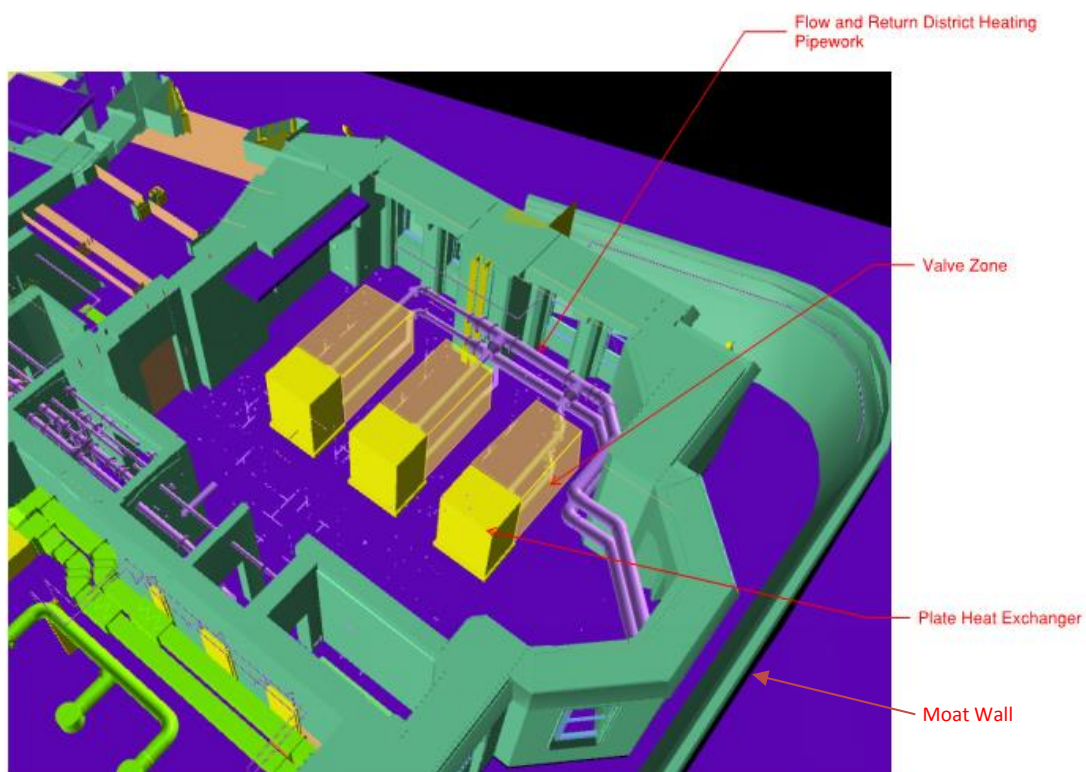


Figure 11 - Plate Heat Exchanger Plantroom (View South)

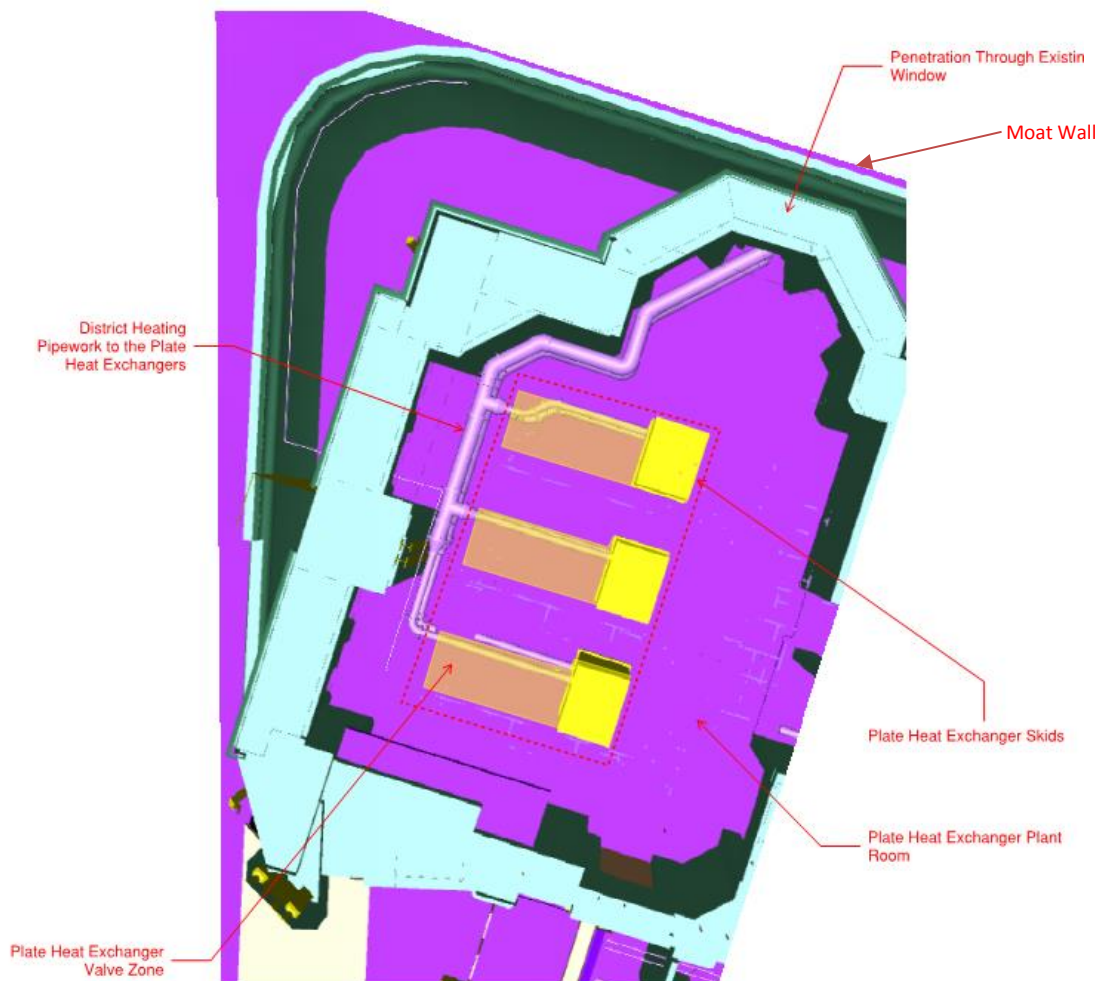


Figure 12 - Plate Heat Exchanger Room Layout

Window louvres will be installed to replace the existing frames to provide ventilation to the plantroom.

7 Structural Information

8.1 Pipe work supports

In order to ensure that there is no risk or damage to the existing building facades: all fixings are to be applied to the existing floor. Due to constraints on existing floor space, VE will look to double stack pipework where possible.

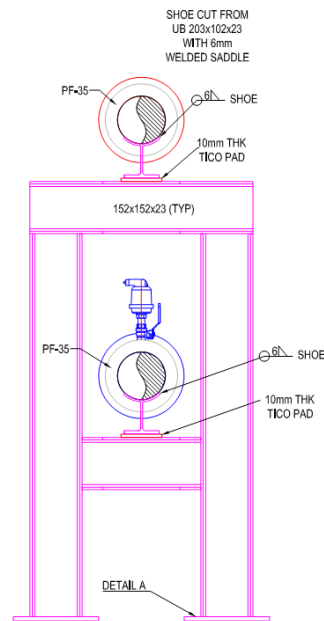


Figure 13 - Example Anchor Support

Due to the nature of heating pipework expanding, anchor supports at the window entry and the end of the pipe run maybe required. If this is required, a anchor support bracket will be required. This can only be determined following detailed design. VE will look to eliminate this requirement where possible.

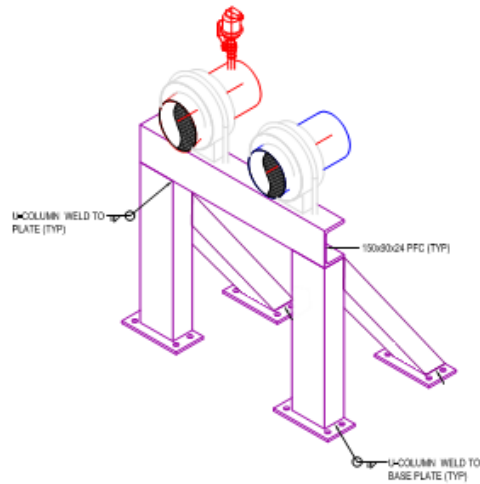


Figure 14 - Example Guide Support

8.2 Holes through walls

Holes will be core drilled for the 2 No. Pipework and 1 No. Comms duct required to penetrate the Moat Wall.



Figure 15 - Example Core Drill

This work will be undertaken from the Albert Square side of the moat wall – having the moat wall been exposed by excavation.



Figure 16 - Example Cable Seal

8 Specifications

This section provides details of the proposed pipework and equipment installation proposed for these works.

8.3 Below ground district heating pipework

All below ground district heating will be manufactured by Logstor. Pipework is pre-insulated with proprietary seals at each joint. All pipework will be single pipe with series 2 insulation.



Figure 17 - Logstor Series 2 insulated district heating pipework

8.4 Above ground district heating pipework

All above ground pipework will be flanged steel to BS EN 10217-2:2002 +A1: 2005.



Figure 18 - Flanged steel pipework.

8.5 Pipework Supports

Typical pipework supports are highlighted within Figure 13 - Example Anchor Support and Figure 14 - Example Guide Support. The supports consist of a proprietary fixing to the pipework which is support off drop rods/clamps to a prefabricated steel frame. The frame is painted oxide red.

8.6 Thermal Insulation to above ground district heating pipework

All above ground district heating pipework will be thermally insulated in accordance with British Standards.



Figure 19 - Flanged steel pipework.

8.7 Insulation cladding within plant rooms

All above ground district heating pipework insulation in plant rooms will be finished in hammer finish aluminium to protect it from mechanical damage.

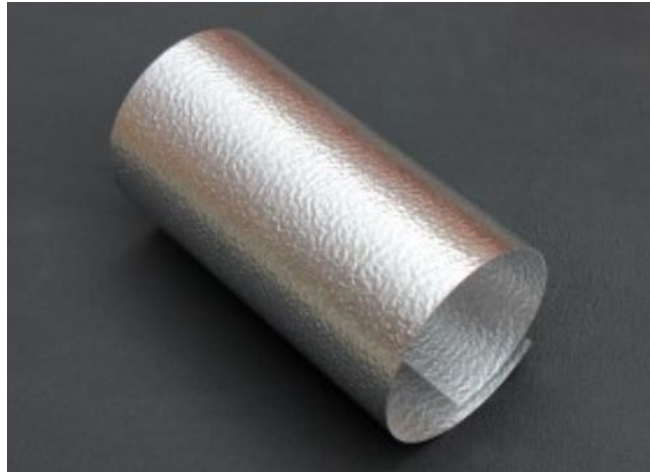


Figure 20 - Hammer finish aluminium.

8.8 Pipe support bracket

All above ground district heating pipework will be supported by a ring support bracket to allow single drop rod supports to be used. Support brackets are manufactured from stainless steel.



Figure 21 - Typical pipework support bracket.

8.9 Heat substations

Heat sub-stations will be provided to interface the new district heating network with the existing building heating systems. The heat substation is a hydraulic break between the district heating network and the building's heating systems. The substation also acts as a point for energy metering, system monitoring and control.



Figure 22 - Typical heat-substation. (Uninsulated).

8.10 Containment

All cables running through the RMU area will be installed upon medium duty SW6 ladder rack containment as shown in the image below, all elbows and Tee pieces will be pre-manufactured. The ladder will be supported by unistrut suspended via 10mm drop rods, fixed into the ceiling via Hilti HIT HY-270 resin anchors. The ladder rack will be installed prior to the installation of the HV cable, as part of the Our Town Hall works.



Figure 23 - Example Cable Ladder

8.11 HV Cable

The cables forming the 6.6KV private ring network will be 300mm² CU CTS XLPE SWA LSZH, manufactured to BS7385 as per the data sheet below.



3 CORE MAINS CABLES LSZH 11000V

Stranded plain annealed compacted circular copper conductors, thermosetting XLPE insulated, semi-conducting tape insulated, each core copper tape screened, low smoke and zero halogen (LSZH) bedding, galvanised steel wire armour, low smoke and zero halogen (LSZH) outer sheath - Red. 6350/11000 volts grade to BS7835. Acid gas emission to BS EN 50267 (IEC60754), smoke emission to BS EN 50268 (IEC 61034) and flame propagation to BS EN 50265, BS EN 50266 (IEC 60332). Due to poor U.V resistant qualities red outer sheath cables are not recommended for outdoor installation.

CCC Code	Conductor Size (mm ²)	Stranding (mm)	No. Of Cores	Weight (Kg/Km)	Overall Diameter (mm)	Nylon Cleat Size
10302RD	35	19/1.53	3	4501	50.5	TC9
10304RD	50	19/1.78	3	5117	53.3	TC9
10306RD	70	19/2.14	3	6032	56.9	TC9
10308RD	95	19/2.52	3	7163	61.0	TC10
10310RD	120	37/2.03	3	8216	64.6	TC11
10312RD	150	37/2.25	3	9292	67.8	TC11
10314RD	185	37/2.52	3	10726	71.9	TC12
10316RD	240	61/2.25	3	13763	78.8	TC14
10318RD	300	61/2.52	3	16077	84.1	TC14
10320RD	400	70/3.15	3	19124	90.3	TC15

Temperature limits:
- 15 to + 90°C

*Bending radius:
12 x overall diameter.

Core identification: Brown, Black, Grey tapes.

Should not be installed at temperatures below 0°C or above +40°C.

Figure 24 - Example Cable

8.12 Ventilation Louvre

To provide ventilation to the plate heat exchanger plantroom, louvres are to be installed, recessed within the existing window openings, replacing the frame of the window. The louvres will be signal black colour (RAL 9004). Subject to agreement with planning and conservation officer.



Figure 25 - Example Window Louvre

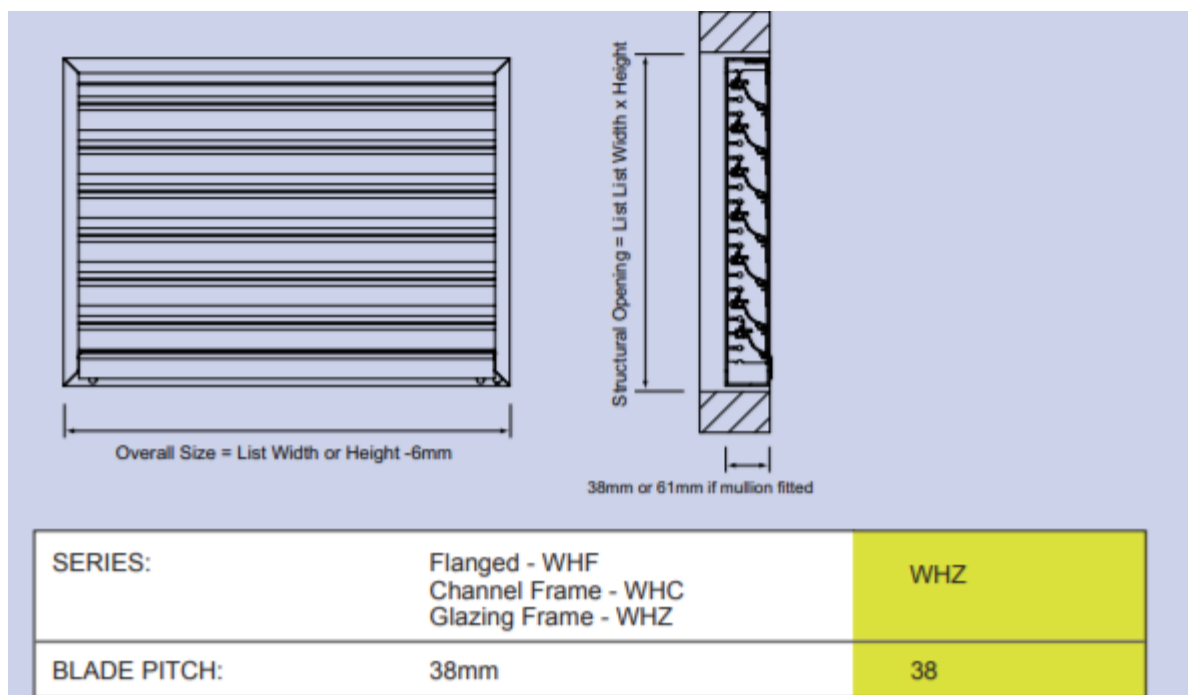


Figure 26 - Window Louvre Recessed Detail