

Design and Construction Specification (DCS) for Yorkshire Water

Version: 3 (FINAL)

Date: 31/01/2023



YorkshireWater

Document Revision History

Version	Date	Amendment Details
1	30/10/2020	<ul style="list-style-type: none"> New Design and Construction Specification
2	12/01/2020	<ul style="list-style-type: none"> Added this Version Control Table. Changed the font colour of Yorkshire Water's specific requirements to blue, to make it easier to distinguish them from the standard Water UK template.
3 (for Consultation)	23/09/2022	<ul style="list-style-type: none"> Updates following SLP feedback and an additional internal review. All changes are highlighted in yellow, so they can be easily identified. New YW formatting, changed the font colour of YW's specific requirements to green. Extra clarity in Table 9.3: Yorkshire Water Annual Contestability Summary (ACS), construction of Meters and PRVs is an amber activity, and Design and Construction of Water Pumping Stations is a Red activity A few extra details to section 9.8 Design Proposal, 9.9 Design Standard and 9.10 Drawing Legend. Extended Table 10.1 Permitted Pipe sizes, materials, SDR and pressure ratings to be used within the Water company area, to include extra permitted pipe sizes. Removed section 10.3.1 and Table 10.3.2 Water Mains Sizing Guide and Chart. Added extra detail to sections: 10.7.1 Source Pressure, 10.7.2 Pressure and Flow, 10.7.4 Calculating Headloss through the Network and 10.7.5 Topography. Added extra detail to section 10.8 Selection of Materials for Contaminated Ground. Added extra detail to sections: 11. Water Mains Design and Construction Principles, 11.3 Routing and Positioning Principles. 11.4 Depth of Self-Laid Main, 11.8 Washout and Fire Hydrants, 11.10 District Metered Areas and Boundary Valves and 11.14 Under Pressure Connections. Swapped order of sections 11.13 and 11.14 to align with national template. Added extra detail to section 12.1 Routing, Positioning and Location. Added extra detail to section 12.4 Location of Boundary Boxes including meter location policy and specifications. Added extra detail to section 13. Civil Engineering Considerations, 13.1 General, 13.3 Indicator Posts and Marker Plates, 13.4 Chambers and Covers and 13.7 Ducts. Moved all content from section 14.1.1. Meter Location to section 12.4. Moved section 14.2 Multi Occupancy Buildings to 14.1.6. Added general content and changed structure to section 14 Metering Requirements. Added extra section 14.2 Non Household Meters Added extra section 14.3 NAV Meters Added extra detail to section 15.3 Dedicated Fire Service Pipes Added several extra drawings to section 23 Standard Arrangement Drawings.
3 (Final)	31/01/2023	<ul style="list-style-type: none"> Further detail on Main in Lieu of comm pipe(s)

- Changed all references of AMR meters to AMI meters to reflect our new standard of exclusively using AMI meters on new development sites.
- Embedded the Under Pressure Connection Policy into this document instead of a separate document.

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1 Scope

This document has been prepared to assist practitioners with the planning, design, construction and commissioning of a Self-Laid Main and Service Pipes to supply domestic and industrial / commercial properties.

This document has been prepared by Yorkshire Water to meet the requirements of the Water Codes for Adoption. It shall govern the requirements in the Yorkshire Water area.

This document should be read in conjunction with the Water Sector Guidance which can be found on Water UK's website at: <https://www.water.org.uk/technical-guidance/developers-services/water-asset-adoption/>.

Over time, it is envisaged that work will be undertaken to reduce the scope of variation between each Water Company's version of this document. This will be done through change requests presented to the Water Adoption Codes panel (details of which can be found on the Water UK website).

2 Responsibilities

A Self Lay Provider (SLP) and/or Developer wishing to design and/or construct a Self-Laid Main shall comply with the Design and Construction Specification (DCS).

It is the responsibility of the Water Company to ensure that the relevant sections of the DCS conform to its design standards, completing the sections distinct to the Water Company and highlighting these using this font, to ensure it is clear to readers which elements are company specific. Completing the DCS in this way creates the Water Company's Design and Construction Specification document which is published on the company's website, and which forms a contractually binding part of the Water Adoption Agreement. Further any changes to this document since the last version will be highlighted in yellow to ensure it is clear to readers which areas are new.

Within this document the words "include" and "including" are to be construed without limitation.

All tasks to be undertaken by an SLP shall require all personnel to be trained to the appropriate level of competence to meet the requirements of the WIRS scheme and the WIRS Requirements Document.

<https://www.lrqa.com/en-gb/utilities/wirs-wirsae/wirs-accreditation/>

3 Terminology

In this document the following terms have the stated meanings:

- Shall:** Indicates a mandatory requirement.
- Should:** Indicates a strong preference or best practice.
- May:** Indicates an option which is not mandatory.

References to the SLP shall include a reference to its permitted contractor wherever relevant.

4 Charging

Water Company charges for work relating to the adoption of water assets are based on the Water Company's published charging arrangements.

Funding of any work over and above that which is required to supply a Site (including Network Reinforcement) shall be in accordance with Ofwat's Charging Rules and therefore any work of this type shall be identified during the design stage and funded appropriately by the Water Company.

5 Abbreviations

AC	Asbestos Cement
ACS	Annual Contestability Summary
CDM	Construction, Design and Management Regulations
CESWI	Civil Engineering Specification for the Water Industry
CI	Cast Iron
COSHH	Control of Substances Hazardous to Health
DEFRA	Department for Environment, Food and Rural Affairs
DCS	Design and Construction Specification
DI	Ductile Iron
DMA	District Metered Area / Distribution Management Area
DWI	Drinking Water Inspectorate
EA	Environment Agency
EUSR	Energy and Utility Skills Register
FRS	Fire and Rescue Service
GIS	Geographic Information System
HAUC	Highways Authorities and Utilities Committee
HPPE	(PE 100) High Performance Polyethylene
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act
ICE	Institution of Civil Engineers
ID	Inside diameter of a water main
IGN	Information & Guidance Notes
IWater	Institute of Water
LoS	Levels of Service
LR	Lloyd's Register EMEA
mAOD	Meters Above Ordnance Datum
MDP	Maximum Design Pressure
MDPE	(PE80) Medium Density Polyethylene
NAV	New Appointments and Variations
NCO(W)	Water Network Construction Operations
NRSA	New Roads and Street Works Act
NVQ	National Vocational Qualification
OD	Outside Diameter of a water main
OFWAT	the Water Services Regulation Authority
PE	Polyethylene
PE/AL/PE	Polyethylene Aluminium Composite Barrier Pipe
PE80	Medium Density Polyethylene
PE100	High Density Polyethylene
PoC	Point of Connection
PPE	Personal Protection Equipment
PPM	Parts Per Million

PRV	Pressure Reducing Valve
PVC	Poly Vinyl Chloride
SLP	Self Lay Provider
SuDS	Sustainable (Urban) Drainage System
TA	Technical Advisor
UPC	Under Pressure Connection
WAA	Water Adoption Agreement
WIA	Water Industry Act
WIRS	Water Industry Regulation Scheme
WIS	Water Industry Specification
WRAS	Water Regulation Advisory Service
WSG	Water Sector Guidance
YW	Yorkshire Water

6 Nomenclature

v	Volume, Litres
A	Area, metres squared
V	Velocity, metres per second
Q	Flow, litres per second
t	Time, in seconds
P	Pressure, in Bar
H	Static Head, in metres
h _L	Head loss due to Friction, metres
L	Length in meters
G	Gravitational acceleration, ms ⁻²
D	Diameter, millimetres
C	Friction Coefficient (Hazen Williams)
i	Hydraulic Gradient, metres per metre
θ	Kinematic viscosity of fluid, m ² /s
K _s	Effective roughness value, millimetres (Colebrook White)
Q _t	Design Flow, l/s
LU	Loading Units
E	Equivalent length, metres
Ω	Soil Resistivity, Ohm -cm

7 Reference Documents

See Appendix 1 for a comprehensive list of reference documents.

The documents in this list are relevant to design and construction standards but may not necessarily be referred to expressly in this DCS.

If there is a conflict between any of those standards and the DCS, the DCS shall take precedence unless otherwise agreed by the parties.

A list of accredited SLPs can be found here:

<https://www.lrga.com/en/utilities/water-industry-registration-scheme-wirs-wirsae/search/>

8 Construction (Design & Management) Regulations 2015 (CDM)

8.1 General

The relevant sections of the CDM Regulations (2015) apply to all design works carried out by or on behalf of the Water Company – both the Water Company's representative (Approving Design Engineer) and the SLP's representative (SLP Designer) are Designers under CDM Regulations when the design of Self-Lay Works is being generated and accepted for adoption. When carrying out work specific to a Site, neither the SLP Designer nor the Approving Design Engineer would be expected to be the Principal Designer. The Client (Developer) has a responsibility to formally appoint a competent Principal Designer and Principal Contractor for the Site. The Principal Designer shall provide oversight of all design activity in accordance with the Regulations.

To comply with CDM Regulations (2015) it is expected that, prior to release for construction, the SLP Designer shall:

- Ensure that the design avoids or addresses at source foreseeable risks to health and safety.
- Give priority in the design to measures which will protect all people associated / or affected by the project.
- Ensure that the design includes adequate information about any aspect of the project, structure, and all materials which may affect the health and safety of persons during construction and during any subsequent maintenance operations.
- Make the Water Company aware of any non-standard method of operation applicable to the Self-Lay Works.
- Record non-standard residual risks including chemical or oil pipeline crossing, working at height which cannot be designed out, in the project file, and a copy passed to the Principal Designer and Water Company.
- Co-operate with all parties concerned with planning and design for the project.

The SLP responsible for the proposed construction shall be made aware of the risks identified by the Designer and the control measures required to reduce the risks to an acceptable level.

A design which is prepared or modified outside Great Britain, for use in work to which CDM 2015 applies, must comply with "Regulation 9 – Duties of Designers" and the person who commissions the work is responsible for ensuring "Regulation 9" is complied with.

8.1.1 Pre-Construction Phase Plan

A Pre-construction Phase Plan shall be created at the design stage. This plan shall include the following:

- Description of works.
- Proposed time scales of works within the project.
- Details of risk and required control measures.
- Information required by Principal Contractor to demonstrate competence of resources.
- Information for preparing the health and safety plan for the construction phase.

The pre-construction phase plan shall be passed to the Principal Contractor for inclusion and development of their Construction Phase Plan before work commences on Site.

The need for the plan arises from the requirements of CDM. HSE leaflet INDG411(rev1), published 04/15 states:

“Ensure a construction phase plan is in place

The principal contractor (or contractor if there is only one contractor) has to draw up a plan explaining how health and safety risks will be managed. This should be proportionate to the scale of the work and associated risks and you should not allow work to start on site until there is a plan”.

8.2 Collaborative Design

On occasion Water Companies may produce indicative design drawings relative to the proposed Site layout for costing, routing or tendering purposes.

Where this is the case the design drawing should be clearly marked as “Not for Construction” and/or an accompanying document produced which states precisely what has been considered when producing that layout drawing. The Water Company shall detail any services supplied and the rates chargeable in its published Charging Arrangements.

8.3 Non-Contestable Work – Installation of District Meter or Pressure Reduction Equipment

Sites may require a Source of Water Connection from a high-pressure Water Main and, in such a case, the Water Company may require a pressure reducing valve or district meter installation as part of the Non-contestable Work and Services (typically with branch connection). In this instance, the Water Company shall assume Designer responsibility under CDM Regulations for this element of the work solely where it is off Site (outside of the site boundary) and out of scope of the contestable activity to be undertaken by the SLP. If this installation is required to be installed within the Site boundary due to the proximity of the Source of Water Connection, then design responsibility will be determined between the parties by written agreement.

YW defines that the design of a District Meter or Pressure Reduction Equipment is Non-contestable Work but the installation is contestable, as defined in section 9.3.

9 Design Process

9.1 Minimum Information Required from Developers

Appendix E (Minimum Information) of the WSG contains a complete statement of information requirements at all stages of the adoption process. At the design stage, the SLP may be Accredited to carry out the design activity or may request the Water Company carry out this activity if the Water Company offers this service as a Local Practice under section 4.6 of the WSG. An application form available from the Water Company website shall be completed which is used to identify the minimum inflow of information to begin the design process relevant to the route of delivery of the Design.

9.2 Point of Connection (PoC) Requests

At the determined PoC the connection is typically made by an under-pressure connection (UPC) to ensure disruption to existing customers is minimised. However operational considerations may dictate that the Water Company determines that a UPC is not suitable, and that the connection will require a tee piece to be installed. This involves isolating the Network and cutting a section of the existing Network out to insert same, and additional valves may also be installed in conjunction, on the existing Network. Such a connection will be considered as Non-contestable work.

Where additional valves (including washouts and air valves) on the existing Network, typically installed at the same time as a connection involving cutting into the existing Network, are not specifically required in the design for the new Self-Laid Main (i.e., to supply a Site) but which the Water Company requires to be installed for operational reasons; then these valves shall be considered as Network Reinforcement work.

The Water Company may identify a supply need in respect of future development that means that it requires Network Reinforcement to be incorporated within the SLP's design (e.g., via the planning system, local authority development plans or developer engagement). In these circumstances, the Water Company shall initiate discussions with the SLP when a Point of Connection (PoC) is issued, or at the earliest opportunity if a Point of Connection (PoC) has already been issued.

Similarly, where the Water Company identifies a need for the improvement or upgrade of the Network as part of the Self-Lay Works, the Water Company shall initiate suitable discussions with the SLP when a Point of Connection (PoC) is issued, or at the earliest opportunity if a Point of Connection (PoC) has already been issued. These requirements may be incorporated by agreement into the final SLP Accepted Design.

If an alternative PoC is required and is evident particularly during the early stages of design by the Water Company to a PoC application (that may have been provided also by an SLP/Developer) for technical and/or supply reasons the Water Company shall provide the SLP designer with an explanation and identify related options and requirements.

If Network Reinforcement work is deemed necessary by the Water Company relative to supplying the Site this shall be identified by the Water Company to the SLP and/or Developer during the initial design stage; and considered by the SLP designer in designing the layout of the Self-Lay Works.

The requirement for detailed design drawings and related information relative to design and/or construction activities shall be agreed between the parties to the WAA and included in Schedule 1 of the WAA.

9.3 Annual Contestability Summary

- 9.3.1** This section contains information about how the Water Company assesses contestability of particular work categories.
- 9.3.2** Set out below at **Table 9.3** is the summary that all Water Companies will publish at the date of implementation of this DCS and at least annually thereafter. This will be known as an “Annual Contestability Summary” (“ACS”) and it will be a Water Company specific variant of the standard template appearing at table 3.2 of the WSG.
- 9.3.3** No Water Company’s ACS will allow fewer activities to be Contestable Work and Services than are set out on that template, as amended from time to time.
- 9.3.4** Each Water Company’s ACS will be accompanied by indicative information about the steps that an SLP would be required to take to carry out the higher risk tasks shaded amber on **Table 9.3**.
- 9.3.5** It is expected that over time, the template ACS will be modified in the light of experience and of changing accreditation requirements, to increase the scope of Contestable activities available for SLPs to undertake.
- 9.3.6** The activities appearing in green on **Table 9.3** shall always be Contestable (i.e., marked green).
- 9.3.7** The works and services designated Contestable by a Water Company under its ACS shall not, in any event, be fewer than those permitted to be carried out by SLPs in that Water Company’s area before the date on which the Guidance comes into effect.
- 9.3.8** In advance of publication, the ACS will be discussed with relevant Customers in a Water Company’s area. Each Water Company shall publish its ACS on its website no later than four (4) weeks before it takes effect, to allow sufficient time for SLPs to amend their processes, if required.
- 9.3.9** A Water Company will explain within its ACS where it has used its discretion to include an activity within the red category and ensure this is published on its website.
- 9.3.10** Where providing an adequate Site supply requires Network Reinforcement, elements of this work should be considered as Contestable subject to the scope of works required and impact on existing end-user customers. This concerns additional works to extend from the nearest Point of Connection of suitable size to a more distant Point of Connection specified by the Water Company. Charges shall be by agreement between the SLP and the Water Company and with reference to Water Company Charging Arrangements.

Table 9.3 Yorkshire Water Annual Contestability Summary (ACS)

	Work categories by number of properties potentially affected by work or strategic nature of Existing Main			
	< 50	50 – 199	200 – 499	500 + or Strategic Main
Selection of a proposed PoC to serve a Site/Development from records of Existing Mains				
Construction of new mains and service connections				
Construction of new mains as part of reinforcement of Network extension or associated Site diversion work				
Design of new water network				
Chlorination and pressure testing of Self-lay Works				
Meter installation in conjunction with new service connections				
Undertaking Water Quality samples				
Analysing Water Quality samples (subject to paragraph 17.3)				
Construction of routine mains connections (CRMC) On-site piece up between 'source of supply' connection and approved main or between development phases where approved isolation valves have been installed with back-to-back hydrants.				
Under Pressure Connection for new main or large diameter service pipe: up to 63mm (52mm nominal bore) PE/Barrier pipe to: Parent Network: <300mm (<12") nominal bore* DI / CI / SI / PE / Barrier pipe / Steel / PVCu (Post 1990)				
Under Pressure Connection for new main or large diameter service pipe: 63mm to 300mm PE / Barrier Pipe to: Parent Network: <300mm (<12") nominal bore* CI / SI / DI / PE / Barrier pipe / Steel / PVCu (Post 1990) Operational pressure: up to 50 m				
Under Pressure Connection for new mains or large diameter service pipe: 63mm to 300mm PE/Barrier pipe to: Parent Network: 300mm to 450mm (<12" to 18") nominal bore* DI / CI / SI / PE / Barrier pipe / Steel Operational pressure: 50 m to 75 m				
Under Pressure Connection for new mains: larger than 300mm to: Parent Network: 450mm or greater (18" or greater) nominal bore*, or high-risk parent Network: material (such as Steel and GRP), discolouration and interruptions risk or Operational pressure: above 75 m				

	Work categories by number of properties potentially affected by work or strategic nature of Existing Main			
	< 50	50 – 199	200 – 499	500 + or Strategic Main
Valve operation in relation to commissioning new Self-Lay Works*				
Self-certification of SLP for Site water distribution system designs				
Construction of Meters and PRVs. As per section 8.3 of the DCS				
Any size connection to GRP, AC, and uPVC (Pre 1990) mains network				
Connection to the live Network requiring the installation of a conventional tee and valves by cut out. As detailed in Section 9.2 of the DCS				
Design of Meters and PRVs As per section 8.3 of the DCS				
Design of Network Reinforcement (upsizing of existing assets) and / or design of Network diversions(s).				
Design and Construction of Water Pumping Stations. As per section 10.7.1 of the DCS				
Pipe sizing criteria, and the approval of design by others				
Assessment of network risk, & operating live network				
Commission telemetry links (meters / field equipment)				
Connection, commissioning and/or decommissioning of diverted Network				

***Notes:**

- All references to PE are to all Polyethylene pipe materials.
- PE pipe sizes are identified by outside (OD) diameter and other pipe materials and sizes refer to internal (nominal bore) diameters.
- Strategic mains will be defined by Yorkshire Water with reference to potential impact of any work or intervention on domestic customers and key customers such as a hospitals and public amenity organisations. Generally, a strategic main will defined as:
 - A main which links above ground assets such as reservoirs and pumps.
 - A main which supplies more than 500 properties.
 - A main which supplies more than 200 properties without any alternative supply.
 - A main supplying Key Customers.
- All connections and valve operations will be subject to a risk assessment process undertaken by Yorkshire Water set out in the DCS aligned with Stage 5A and 5B of the Draft Sector Guidance.

5. See further paragraph 11.7.

9.4 Activities Shaded Green in the ACS

- 9.4.1** All activities shaded green in the above table are capable of being performed by SLPs.
- 9.4.2** These green-shaded activities will apply where the SLP has the relevant WIRS or other accreditation (see section 7 of the WSG). Where further activities are accredited by WIRS, such activities shall be marked as green in the above table once approved by the Codes Panel.
- 9.4.3** The Water Company will set out the procedures it has in place relating to connections to the Existing Main and the forms supporting this. These will be published on the Water Company's website.
- 9.4.4** Changes will be brought about by the procedures set out in the Water Sector Guidance Section 11 – Governance.
- 9.4.5** References to the Final Connection of the Self-Laid Main to the Existing Main on the Network are;
- a) of an under-pressure type connection and/or,
 - b) a connection to a previously installed temporary valve-controlled washout installed in conjunction with the connection to the Existing Mains Network at the PoC to supply the Site or Development, and/or,
 - c) a connection to a previously installed valve-controlled washout, which has been installed on a Self-Laid Main for a future connection off such main.

Where references to the Final Connection of the Self-Laid Main to the Existing Main on the Network require a section to be isolated by a shut (to enable it to be cut-out to install a connection point), and/or if a new branch tee is required to be cut into a Self-Laid Main and the relevant assets are subsequently adopted by the Water Company (and therefore forms part of the Network), then such connections are excluded from activities shaded green.

9.5 Activities Shaded Amber in the ACS

- 9.5.1** The activities shaded amber shall be capable of being performed by an SLP in the area of an individual Water Company where the SLP complies with the requirements of the Water Company as set out below. Such publication shall include information about control measures required to allow the work to be performed. The following paragraphs set out how publication of such information is to be approached.
- 9.5.2** The Water Company may require additional evidence of competence to carry out activity and/or require the SLP to follow an operational process equivalent to one that the Water Company's direct labour or term contractor would be required to follow.
- 9.5.3** The Water Company's requirements will relate to the specific Site and will take account of the type of connection involved; the location of the connection; the strategic importance of the main

Network to be connected to; the potential impact on end user customers; risk to water quality and regulatory impact / consideration; and the resources the SLP proposes to use.

9.5.4 The Water Company will set out the information it needs from the SLP regarding its Accreditation and how its general and specific operations, resources, and procedures will protect the company from any risk of interruption of supply to its end-user customers and/or to water quality. These requirements will be equivalent to those that the Water Company's direct labour or term contractor would be required to follow.

9.5.5 The SLP will need to demonstrate its competence or relevant experience to undertake this activity. This may be demonstrated where the Water Company has previously observed relevant Self-lay Works having been carried out by the SLP or by the SLP providing details of similar work that it has carried out to a satisfactory standard for other Water Companies.

9.5.6 Water Company requirements relative to valve operation in relation to commissioning of Self-Lay Works, a contestable activity, shall apply as set out in paragraph 11.7.

9.5.7 The Water Company will set out below the procedures it has in place to allow connections to the Existing Main and the forms supporting this. These will be published on the Water Company's website.

9.5.8 Yorkshire Water will undertake a risk assessment for any proposed UPC to the live water network that will affect supplies to existing customers. This risk assessment will be based on potential customer impact to determine if a connection can be undertaken by the SLP with minimal risk to customers water supply. An application will be required from the SLP which will include a Risk Assessment, Method Statement and Contingency Plan for the planned activity. Yorkshire Water will consider the information provided by the SLP and assess the potential operational impact on customers taking into account:

- Discolouration risk.
- Interruption to supply risk.
- Water mains condition.
- Quality of the RAMS and contingency plans submitted by the SLP or Developer.

If the Risk Assessment identifies the network activity as low risk, the SLP will be approved to do the work.

If the Risk Assessment identifies the network activity as high risk, the quality of the SLP's RAMS will be considered, and dependent upon the degree of difficulty, will either be declined or require amendment.

9.6 Activities Shaded Red in the ACS

9.6.1 The Water Companies have concluded that connections shaded red in **Table 9.3** are of such a high risk that they are unlikely to be contestable in most conceivable circumstances.

- 9.6.2** However, if an SLP wishes to carry out this work, it shall contact the Water Company directly to determine whether conditions can be agreed that enable the SLP to carry out the requested activity.

9.7 Design Submissions to Water Company

Design submissions shall be submitted to the Water Company along with all supporting information as set out in Appendix E – Minimum Information of the WSG.

Any activity classed as Non-Contestable shall be confirmed in writing by the Water Company following discussion between the Water Company and SLP upon the issue of a Design Acceptance.

The design should consider water efficient fittings and fixed appliances. Yorkshire Water incentivise water efficiency by offering a reduction of the Infrastructure Charge. Further information on Infrastructure Charges and Environmental Incentives is provided in the **New Connection Charges**, published on Yorkshire Water's website:

<https://www.yorkshirewater.com/developers/developer-services-charges/>

9.8 Design Proposal

When preparing a water network design proposal, the SLP Designer shall:

1. Select appropriate materials for the Self-Laid Main and Service Pipes.
2. Determine the legal land ownership boundary of the Site, including the CDM working area.
3. Produce a drawing to an appropriate scale to show the layout and route of the Self-Laid Mains and Service Pipes and proposed meter arrangements (relative to Service Pipe entry points) in accordance with this Design and Construction Specification.
4. Provide all related material requirements and details as required by this Design and Construction Specification.
5. Calculate demands and size all Service Pipes in line with this Design and Construction Specification (see also paragraph 10.2).
6. Size the Self-Laid Mains across the Site as may be required to meet the requirements of the Site and any Development relative to the Site, following discussion with the Water Company. Any Water Company requirements will be communicated after such discussion has taken place. See further section 10.2.
7. Identify the agreed Point of Connection and determine by agreement with the Water Company all work that is Contestable and Non-contestable.
8. Design the appropriate number of Self-Laid Main fittings required to control the Network and the Self-Lay Works.
9. Identify any sections of Self-Laid Mains that require easements or wayleaves.
10. Identify any Special Engineering Difficulties and reduce in design risk assessment as appropriate. Avoid Special Engineering Difficulties where possible. If unavoidable then identify on the preliminary design requesting approval from Yorkshire Water.

11. Agree a suitable mains flushing regime with the Water Company, based on appropriate modelling and risk assessment and taking into account the Water Company's published policies and practices regarding flushing regimes.
12. Include information on Trial Holes taken on the existing YW assets with their associated recorded cover levels and confirmed positions of existing clean water mains.

Water Companies shall share with the SLP any pipe size methodology and any further information regarding flushing regimes where this is requested by the SLP. See section 10.3 for details.

9.9 Drawing Standards

The Water Company may supply the SLP with templates to assist in the standardisation of design drawings. If this is not available, then the SLP should provide their own design template.

Design and as-laid (as constructed) drawings shall be submitted to the Water Company electronically in both CAD and PDF format, by agreement with the Water Company, for incorporation into the Water Company's corporate geographical information system (GIS).

Design drawings shall show all asset locations, size and specification in a clear and unambiguous format. Should enlargements, blow ups or schematics be required in order to ensure a clear and unambiguous layout then these shall be incorporated within the design submission.

Design drawings shall include and clearly show, as a minimum:

1. Proposed off-site Self-Laid Mains to Point of Connection to the Network.
2. The ground level (mAOD) at the PoC and highest supply point of the site including contours at minimum 5 m intervals.
3. Proposed Self-Laid Mains, including position of sluice valves, washouts, hydrants, air valves and any other fittings required.
4. Any requirements for the protection and/or diversion of the existing Network.
5. Material and size of each Self-Laid Main.
6. Depth of each Self-Laid Main when installation depth is not in accordance with Street Works UK guidance (subject to agreement by Water Company).
7. The Self-Lay Works and Water Company Works (Contestable / Non-contestable activities).
8. Position of existing buildings or features relative to the design proposal for reference (minimum of 3 points on the drawing to enable triangulation).
9. Individually numbered plots.
10. Location of Service Pipes, showing size if above 25 mm.
11. Service Pipe entry points.
12. Location of boundary boxes, manifold boxes and any meter chambers as applicable.
13. Type of service connection for each plot, i.e., wall box, boundary box or manifold, internal.
14. Hydrants adoptable by the Fire and Rescue Service.
15. Location of any ducts.

16. Any Special Engineering Difficulties including retaining walls, embankments, lakes, ponds and other structures or high risk utility apparatus to be constructed as part of the site development.
17. Areas of contamination where protective pipework is required.
18. Any potential future demand, or Development, or phase adjacent to Site as identified by the Water Company or Developer and its Point of Connection relative to the proposed Self-Laid Main.
19. North point.
20. Site boundary (CDM 2015 Boundary).
21. Roads / highways / service strips / adopted or proposed for adoption / or proposed to be built and maintained to adoptable standards. Clearly identified primary highway access to site. Special surface treatment other than standard tarmac should be identified.
22. Change in ground level.
23. Service strips, wayleaves and easements required for the construction, operation and maintenance of the Self-Laid Main.
24. Significant environmental and health and safety hazards.
25. Contestable / Non-contestable works annotated.
26. A drawing legend / title block.
27. Any pipework greater than 50mm ID is to have a valid chlorination certificate within 2 weeks of the commissioning date.

The above list represents best practice, and in some cases not all such drawings will be required by the Water Company. Water Companies will justify differences in documentation requirements between requisitioned and self-lay schemes.

9.10 Drawing Legend

The drawing legend shall contain:

1. SLP contact details.
2. Developer contact details.
3. Company carrying out the design (if different to above).
4. SLP Designer name.
5. CAD operator name.
6. Site name.
7. Site address.
8. Ordnance Survey coordinates (eastings and northing. NOT SK map refs).
9. Industry recognised scale of the drawing.
10. Drawing / revision reference number.

11. Water Company reference number.
12. Approval status i.e.:
 - a) Proposed design (not for construction).
 - b) Water Company approved design (not for construction).
 - c) Approved for Construction.

9.11 Design & Construction Variations

Changes to the design / construction of the Self-Lay Works (including those due to site conditions, changes to the Site made by the Developer, etc.) which require the re-issue of either the SLP Accepted Design or the Water Company Design shall be considered a Significant Variation. The Parties shall comply with the process in clause 19 of the WAA (Variations). **Variations are also termed re-draw or re-design.**

9.11.1 Minor Variations

Minor variations shall be agreed in writing between the Parties.

Minor variations shall be classed as changes to the proposed Self-Laid Mains and/or Service Pipe design with no significant impact on the maximum scope of work measured by the number of plots on the Site i.e., if there is no change in the number of plots or the financial transaction, the change is classed as minor.

10 Pipe Sizing Methodology

This section covers permitted pipe sizes and methodology of pipe size determination.

10.1 Permitted Pipe Diameters, Pressure Ratings and Permissible Materials

Below is a list of pipe material types required to be installed within the Yorkshire Water footprint:

- PE80 (MDPE) Pipe
- PE100 (HDPE) Pipe
- Multi-Layer Skinned PE100 Pipe
- PE/AL/PE PE80 Type A Barrier Pipe
- PE/AL/PE PE100 Type A Barrier Pipe
- Class 40 or K9 Cement Lined Ductile Iron

The below table specifies the Water Company's accepted size and pressure ratings for water pipes. Requests to use sizes and materials other than those listed below must be approved by the Water Company.

Table 10.1: Permitted pipe sizes, materials, SDR and pressure ratings to be used within the Water Company area

Size (Outside Diameter)	Material	SDR	Pressure Rating
25 mm	MDPE	11	12 bar
32 mm	MDPE	11	12 bar
63 mm	MDPE / PE80	11	12.5 bar
90 mm	HPPE	17 / 11	10 / 16 bar
110 mm	HPPE	17 / 11	10 / 16 bar
125 mm	HPPE	17 / 11	10 / 16 bar
160 mm	HPPE	17 / 11	10 / 16 bar
180 mm	HPPE	17 / 11	10 / 16 bar
225 mm	HPPE	17 / 11	10 / 16 bar
250 mm	HPPE	17 / 11	10 / 16 bar
315 mm	HPPE	17 / 11	10 / 16 bar
355 mm	HPPE	17 / 11	10 / 16 bar

Note: 50 mm MDPE is not approved for use on YW networks. 25mm and 32mm PE pipes shall be used for single property service pipes only.

Note: The appropriate pressure rated fitting shall be used, which will depend on the pressure ratings of the pipe.

10.2 Principles of Sizing of Water Mains

The Self-Laid Main shall be sized to meet peak hydraulic demands and shall not be oversized such that they fail to satisfy all requirements or conditions to maintain water quality.

The Self-Laid Main shall be sized to take in account the entire development that the Developer and SLP are aware of to avoid unnecessary upsizing at a later date, taking into account:

- The results of any Network modelling by the Water Company relative to an area of Development by reference to information in the public domain and/or by reference to related development enquiries it has received.
- Information from the Water Company relevant to the design of mains and services for a Site and/or a Development.

(Water Companies' Charging Arrangements shall be referred to in relation to the provision of more than a single feed into a Site and/or a Development and/or relating to upsizing of proposed Self-Lay Works).

If the Water Company identifies a need for the betterment of Network or associated activity required on the existing network and has agreed with the SLP that they will undertake this work, or part thereof, then this proposal shall be shown as part of the detailed design of the Network and Service Pipe to supply the development.

The sizing of pipes for indicative design purposes (e.g., for cost estimates or tendering) may be done using a simple table method for the number of properties – see section 10.3. No reliance shall be placed on this indicative assessment for the purposes of any final design as pipes shall be designed in accordance with the principles and criteria set out, unless the site meets the criteria stated below.

The sizing of pipes for detailed final design should be based upon a hydraulic calculation using the calculated peak demand and the Hazen Williams Equation. Headloss through fittings and valves should be taken into account using standard allowance tables. See section 10.7.3 Velocity and 10.7.4 Calculating Headloss through the Network.

The hydraulic calculation should detail the headloss through the proposed network at peak flow rate to all the terminus washouts and the highest property elevation. The minimum pressure at the highest elevation and most remote hydraulic location should also be detailed.

10.3 Indicative Pipe Diameter Selection

As an indicative initial assessment of the water network pipe size requirements for a Site, Table 10.3 may be used to determine the size of pipe to supply a given number of residential dwellings. It may also be used as a method of determination of Source of Water requirements on the existing Network.

When a Water Company requires to deviate from these guidelines in determining a suitable PoC (e.g., inadequate capacity in the Network or site-specific constraints including the condition of existing assets) then such additional work would be categorised as Network Reinforcement and funded by the Water Company in accordance with its Charging Arrangements.

Table 10.3: Derived from section A.12 of BS 805:2000

Number of Residential Dwellings	Typical Mains Pipe Outside Diameter (PE Pipes)	Nominal Bore (Other Mains Pipe Materials)
0 – 20	63 mm	50 mm
20 – 40	90 mm	80 mm
40 – 95	110 mm / 125 mm	100 mm
95 – 300	160 mm / 180 mm	150 mm
300 – 700	225 mm / 250 mm	200 mm

For all developments the Designer shall consider and incorporate spine mains as necessary to allow for additional development or phases of development which are to be connected ideally to at least two points on the Network. The Water Company shall make available information during this discussion and an assessment and advice shall be provided to the Designer of any Network Reinforcement to be considered in a Site design.

Note: Notwithstanding that more than one connection point into a Site may be designed (e.g., for mitigation of future supply risk) only one of these shall be designated as the Point of Connection of supply to the Site as required by the Sector Guidance. Any additional work over and above that which is required to provide the Site with a water supply shall be categorised as Network Reinforcement and funded by the Water Company in accordance with its Charging Arrangements. **If a NAV requests additional connection/s, it will not be classed as enhancement and the connection and meter set up will be chargeable to the NAV. Any additional mains connections that are required to be able to feed the site will be classed as enhancement and will not be charged to the NAV.**

The designer should also ensure that as much connectivity between **on-site** mains as the road / highway layout permits should be incorporated into the design, this allows for a more flexible network to reduce the impact on customers in the event of planned maintenance work and reduces the number of dead-ends which is beneficial for water quality.

10.4 Domestic Hydraulic Demand Calculations

In this section the Water Company shall specify the following constants:

140 litres/day (l/day) = Average demand per capita

2.5 = Average household occupancy rate

2.5 = Peak flow factor

Demand per capita per day shall be taken as **140** litres unless evidence to the contrary is provided for the specific development.

Calculation for household occupancy shall be taken as **2.5** persons per household on average unless evidence to the contrary is provided for the Site.

Average daily demand per household is therefore **140 l/day x 2.5 = 350 l/day**.

To account for diversity in the network. Peak Flow Factors for domestic scenarios shall be taken to be **2.5**.

Peak Demand may be calculated then by multiplying the average daily demand per household by the peak flow factor.

For example, a site of 'n' Domestic units has a daily demand in litres of 350 x n litres.

This must be multiplied by the peak flow factor of 2.5. Therefore, peak demand in litres per second can be estimated at $((n \times 350) \times 2.5) / 86400s$ = peak daily demand l/s.

10.5 Calculations for Multi-Occupancy Building and Industrial and Commercial Domestic Use

This section covers the following types of development:

- Non-standard housing (i.e., student accommodation, nursing home, sheltered housing).
- Commercial / industrial use properties.
- A mix of commercial and domestic properties.

Choosing the correct pipe size depends on the designer forecasting the demand. This can be estimated for individual properties based on guidance in **Table 10.5**. Specific commercial equipment or processes will need the design flow rates providing by the manufacturer.

Table 10.5: Design Flow Rates for Internal Fittings and Fixtures

Outlet Fitting	Design Flow Rate (l/s)	Minimum Flow Rate (l/s)	Loading Units
WC flushing cistern single or dual flush – to fill in 2 minutes	0.13	0.05	2
WC trough cistern	0.15 per WC	0.10	2
Wash basin tap size ½ – DN 15	0.15 per tap	0.10	1.5 to 3
Spray tap or spray mixer	0.05 per tap	0.03	–
Bidet	0.20 per tap	0.10	1
Bath tap, nominal size ¾ – DN 20	0.30	0.20	10
Bath tap, nominal size 1 – DN 25	0.60	0.40	22
Shower head (will vary with type of head)	0.20 hot or cold	0.10	3
Sink tap, nominal size ½ – DN 15	0.20	0.10	3
Sink tap, nominal size ¾ – DN 20	0.30	0.20	5
Sink tap, nominal size 1 – DN 25	0.60	0.40	–
Washing machine size – DN 15	0.20 hot or cold	0.15	–
Dishwasher size – DN 15	0.15	0.10	3
Urinal flushing cistern	0.004 per position served	0.002	–
Pressure flushing valve for WC or urinal	1.5	1.2	–

10.6 Process Water

It is expected that the client should provide peak demands given their individual knowledge of the Development. The connection and Self-Laid Mains that are to be installed should then be selected based on their peak demand.

10.7 Pressure and Flow

10.7.1 Source Pressure

For the purposes of designing the network, the SLP shall check with the Water Company to confirm pressure and pressure variation at the source.

Where YW creates the design, we shall provide the SLP Designers with the pressure at the point of connection of the proposed development. The SLP Designers shall ensure each new property will achieve the OFWAT Low Pressure Standard (see Section 10.7.2), by calculating the onsite pressures by compensate for frictional loss of water pressure caused by onsite mains and peak demand.

During the design stage, if any constraints e.g., effect on headloss due to an increased mAOD relative to a Site and/or Development, are identified by the SLP or the Water Company a workable solution is to be agreed between the Parties.

10.7.2 Pressure and Flow

Reference levels of service shall be used to ensure that networks can supply all properties with a minimum pressure and flow at the customer's communication pipe.

The OFWAT Low Pressure Standard is measured at the boundary of each individual property, where the pressure shall not be less than 10 m head when a flow 9 l/min is flowing through the service pipe. Yorkshire Water's agreed surrogate for this standard is to provide a minimum pressure of 15 m head measured in the water main at the connection to each individual property.

Yorkshire Water's design requirement is for a minimum pressure of 20 m head in the water main at the point of service pipe connection to the water main to ensure that standards are secured for variations in network demand. Any proposed pressure between 15 m head and 20 m head shall be highlighted on design proposals and submitted to Yorkshire Water for approval.

Where multi storey properties are proposed, the design will need to specify the means by which all properties will be supplied with sufficient pressure and flow to meet minimum standards at the first tap of each property and provide adequate flow of water to the eaves and to any internal tank fed systems.

Maximum Design Pressure (MDP) which is equal to Design Pressure plus allowance for surge, shall not exceed Pressure Nominal (PN) which is the pressure rating of the lowest rated component in the system.

SLP Designers shall clearly state where a component has been used below the Water Company's standard pressure to allow standard System Test Pressures (STP) to be adjusted on site.

10.7.3 Velocity

Velocity in pipes shall be calculated to ensure that designs are not incorporating pipe configurations which would cause poor turnover of water, leading to water quality issues, and to ensure that large headlosses are not created leading to significant pressure variations.

Where possible, minimum peak time velocities in mains should reach 0.2 ms⁻¹. However, Yorkshire Water does not allow mains diameters to be less than 50 mm (63 mm OD) and therefore acknowledges that it will be difficult to reach minimum peak velocities towards the terminus of a dead-end main and that this will be dependent upon the layout/number of properties and connection points. In these cases, the design shall

state what the likely turnover times are. Where it is not possible to achieve these velocities, this shall be made clear to Yorkshire Water on design drawings along with a rationale for the proposal.

Maximum velocity should be limited to 0.5 ms⁻¹ for onsite mains, however the maximum headloss allowable, see Section 10.7.4, will take precedent as the primary design factor.

Where additional capacity for future development has been incorporated into a design, then velocity calculations should be made taking into account demand from the anticipated development and highlighted in supporting documentation.

Velocities shall be calculated using the standard formula $V = Q/a$ (velocity = flow/area) and based on the theoretical demand and peak flow calculation.

10.7.4 Calculating Headloss through the Network

For newly designed and constructed water mains, headloss per 100 m length of pipe shall not exceed 0.2 mH, target values shall be between 0.01 mH / 100 m and 0.2 mH / 100 m.

However, the maximum headloss shall not exceed 2 mH / 1000 m, with a target range of between 1.0 mH / 1000 m and 1.5 mH / 1000 m.

Headloss should be calculated using the Hazen Williams Equation.

10.7.5 Topography

Metres Above Ordnance Datum (mAOD) shall be the preferred scale when highlighting ground level / elevation changes on the design drawing.

The effect of large variations in ground levels/elevations on a Site shall be taken into consideration by the SLP Designer for all quoted source pressures and particularly when low source pressures have been identified by the Water Company. Hydraulic checks will be required along the route of the main to ensure that YW's minimum design standard of 20 mH in the water main at the point of service pipe connection to the water main are met. If the hydraulic gradient is within 20 m of ground level, then Yorkshire Water should be informed, and a hydraulic gradient long section provided as part of the design submission.

All calculations should take into consideration the requirement of the property dimensions and elevation relative to the water main. A minimum flow rate of 9 litres per minute must be achieved at the first direct mains fed tap in each property and the pressure in the mains should enable water to reach the eaves of the building through the service pipe. Calculations shall be provided as part of a proposed design.

This does not include NAV sites.

10.8 Selection of Materials for Contaminated Ground

Materials for use in contaminated ground shall be selected in accordance with the Water UK Contaminated Land Assessment Guidance. See link in **Appendix 1**.

Where contaminated ground exists or is expected and not negated in the outcome of the completed Contaminated Land Assessment Form (CLAF), barrier pipe shall be installed.

The **Water UK Contaminated Land Assessment Form** needs to be completed and returned. The form can be downloaded from the [Water UK website](https://www.water.org.uk/guidance/contaminated-land-assessment-guidance/):

<https://www.water.org.uk/guidance/contaminated-land-assessment-guidance/>

10.8.1 Ground Contamination During Construction

If contamination is suspected during construction of the Self-Lay Works, the work shall be stopped and shall be isolated from the potential source of contamination and the incident reported to the Water Company and Developer. An investigation and action plan, which may include a change of pipe material (and/or replacement of the apparatus already installed) shall be agreed with the Water Company before work recommences.

The SLP shall ensure that all employees are trained and able to undertake the appropriate actions when working in potentially contaminated land in accordance with health and safety legislation.

Consideration should be given to the effect of permeable surfaces on future contamination risk and documented in section 5 of the Contaminated Land Risk Assessment.

11 Water Mains Design and Construction Principles

General Principles in designing Self-Laid Mains shall be that they:

- Minimise whole lifecycle costs and impact on the environment.
- Deliver minimum standards of service to customers.
- Ensure security of supply so far as reasonably practicable (see section 4 as regards funding of any such additional works).
- Ensure continuing water quality. Minimise dead ends on the network, but where these are unavoidable, flushing facilities should be available. Any additional water mains provided to loop the network for water quality purposes will be classed as enhancement.
- Allow for safe and flexible operation of control points and surface assets.
- To include provisions in large chambers (915 mm x 610 mm clear openings and greater) to remove control apparatus without the need for removing chamber frames and lids, for the installation of District Meters and PRVs, as per section 8.3.

11.1 Design Accreditation

The SLP shall demonstrate that it has suitable design Accreditation based on WIRS.

11.2 Construction (pre-start)

Prior to the construction of any Self-Lay Work the SLP shall ensure that any Water Company required approvals have been obtained and that a pre-start meeting between the Parties has occurred when one has been requested by reference to **section 24 Construction Pre-Start Meeting Agenda**.

11.3 Routing and Positioning Principles

Where the Self-Laid Main is to be laid within an adopted highway, a street, or a dedicated service strip, it should be laid in accordance with the latest **Street Works** UK good practice guidance (Volumes 1 to 6) unless the Water Company has indicated its preferred routing and positioning of the Self-Laid Main and Service Pipe. In this case, the Water Company's requirements shall be incorporated into the design by the SLP Designer. Any requirement for preferred routing and positioning will typically be associated with technical requirements that includes future access to assets for maintenance and/or repair. Where the Water Company requests a change to the route due to it not meeting their specific requirements, the costs incurred will be payable by the Water Company. Any such variation will need agreement with the SLP and Developer before works proceed.

Where new mains are proposed to cross major obstacles such as rivers, canals, railways, motorways etc then the design shall be discussed with Yorkshire Water prior to a design being submitted. The design shall consider the future repair and maintenance of such crossings to provide minimal impact on customers.

Design Acceptance will consider any installation route relative to private land, land that is defined as a street and/or which is designated as highway and any requirement for an adoptable service strip or footpath. **Easement requirements for private land are detailed in Table 11.**

Where shared drives are proposed that are to be built and maintained to adoptable standards, then Yorkshire Water will require this to be fed via a water main. If the shared drive is not to be built and maintained

to adoptable standards, Yorkshire Water require individual supply pipes to be laid to the boundary of the adopted street in which a water main has been laid. The supply pipes will be connected by individual communication pipes or a single communication pipe with manifold arrangement.

Water mains on new development sites should only be laid in the standard minimum 1.8m service strips identified by developers, not in the 0.6 m service verges, when this is not possible, mains should be laid within the adopted highway.

New mains are to be laid down one side of the highway, in the footpath/verge wherever possible. Mains should be installed on the side which has the most properties, to reduce the number of road crossings and the length of communication pipe in the carriageway. However, where there are exceptional circumstances such as a carriageway which exceeds the average width or where there are significant obstacles, an exception to this rule can be made by agreement with Yorkshire Water.

In cases, where YW require a main to be laid in lieu of a communication pipe(s), the applicant will only pay the same cost as laying a long communication pipe(s). YW will meet the additional cost for upsizing to a water main.

The laying of mains in private gardens or in easements on new developments is to be avoided, except in exceptional circumstances and by agreement of Yorkshire Water.

Where a new main is to be laid near a pumped sewer (rising main), then a minimum horizontal distance is required between the pumped sewer and water main to minimise the risk of any cross contamination, or damage to the water main should the pumped sewer burst. The Designer should use the pumped sewer pipe size and refer to the Table 11.3 to calculate the minimum strip width required. This distance may be increased by YW depending on other critical factors. The Clean Water main should be constructed in barrier pipe when laid within same easements as waste pumped (rising mains) to further reduce risk to YW potable water supply if the rising main fails. Where possible the clean water pipework will have no chambers for control apparatus within the proposed easement.

If it is not possible to follow the [Street Works UK](#) guidance, then the SLP Designer should consult with the Water Company to agree the preferred location.

Any easements required will be obtained by the Water Company (at the expense of the SLP / Developer which will include any consideration payable for the grant of easement and all legal costs and surveyors' fees incurred in relation to the documentation required). The easements must be granted direct to the Water Company and be entered into before adoption of the Self Lay Works can occur.

During construction the SLP / Developer shall use reasonable endeavours to ensure that other utility companies' apparatus installed after the Self-Laid Main and Service Pipe shall not restrict or compromise that Self-Laid Main and future access to it.

Self-Laid Mains are to be laid on the side of the road where the housing density is higher to minimise the number of service pipe crossings.

Although not a preferred configuration, the requirement for new Self-Laid dual Main(s) (typically where road construction prohibits utility apparatus at normal depths e.g., shallow drains, permeable paving systems) may be necessary, and in these instances such a technical consideration is to be agreed between the parties.

Security of supply may be increased by linking in the Self-Laid Main when there is a significant number of properties being serviced through a single pipe, provision for flushing in these cases must be made by designing washouts located at 3-way valve arrangements or between in line valves.

To reduce the likelihood of water quality issues from the lack of turnover in the Self-Laid Main to an end hydrant (dead leg) it shall not extend more than 2 m past the last service connection.

Self-Laid Mains shall maintain minimum proximity to buildings and structures as specified by the Water Company in the table below:

Table 11.3: Minimum strip width required for varying pipe diameters (from centre of pipe either side of the proposed pipeline)

Nominal Pipe Size (mm)	Min Proximity Required (m) From Centre Line of Water Main
< 200	3 (total 6 m)
200 – 600	5 (total 10 m)
> 600	6 (total 12 m)

See also paragraph 13: Designers shall refer to [Street Works](#) UK publication Volume 4: Guidelines for the Planting, Installation & Maintenance of Utility Apparatus in Proximity to Trees when selecting route in proximity to existing trees and if necessary, shall highlight any Tree Protection Orders on the design drawing.

Where planting is to take place after the mains are laid, it is essential that only grass or ground cover plants with limited root systems are permitted. If trees or shrubs are to be planted in adjacent locations, they should be selected and positioned to avoid both root damage to the main and problems when subsequent excavations are undertaken for repair and maintenance.

No Self-Laid Main shall be constructed unless the design of said main has been approved by the Water Company, and no Self-Laid Main or Service Pipe shall be connected to the Network until all conditions precedent within the WAA have been met.

11.4 Depth of Self-Laid Main

Self-Laid Main(s) shall be installed at the appropriate cover depths in accordance with the minimum and maximum depth range specified in the [Street Works](#) UK guidance relative to the surface in which the Self-Laid Main(s) are to be installed.

The Water Company preferred installation depth (cover to crown of pipe) is to be 750 mm for new Self-Laid Main or 900 mm where there is a risk of damage e.g., from agricultural activities. All DI mains should be installed at 900 mm cover (see [Figure 1](#) and [Figure 2](#)).

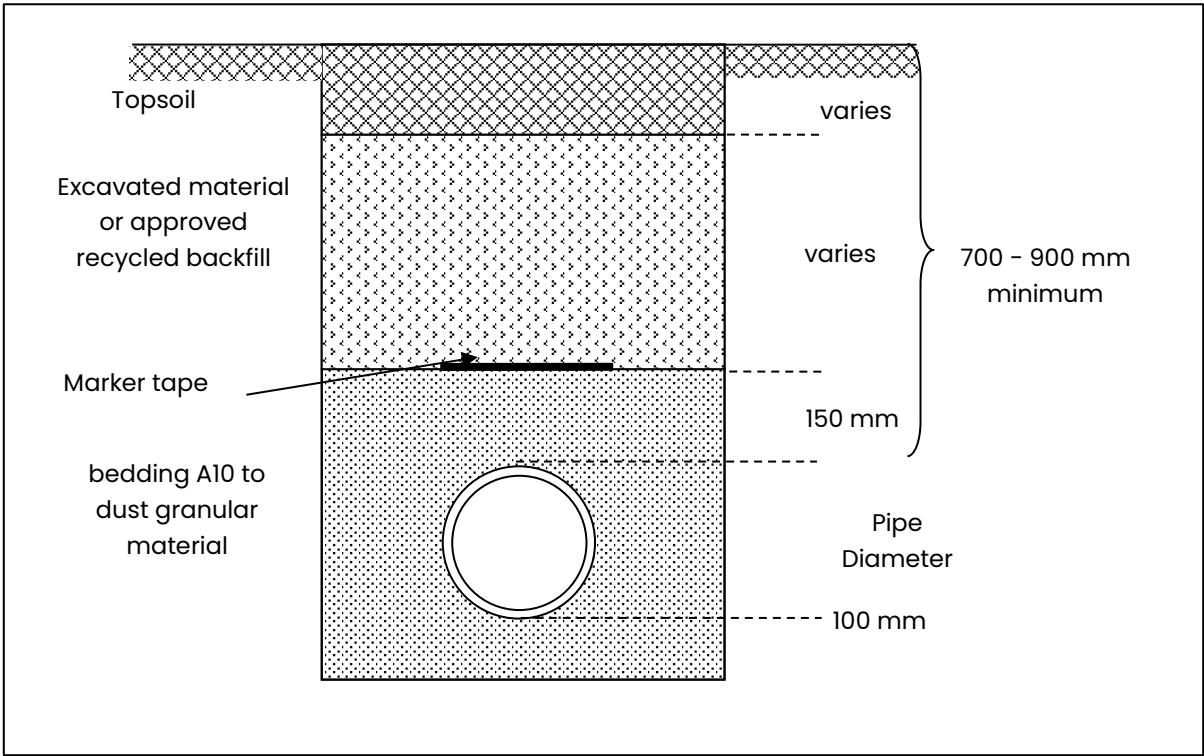


Figure 1: Pipe Laying in Verge

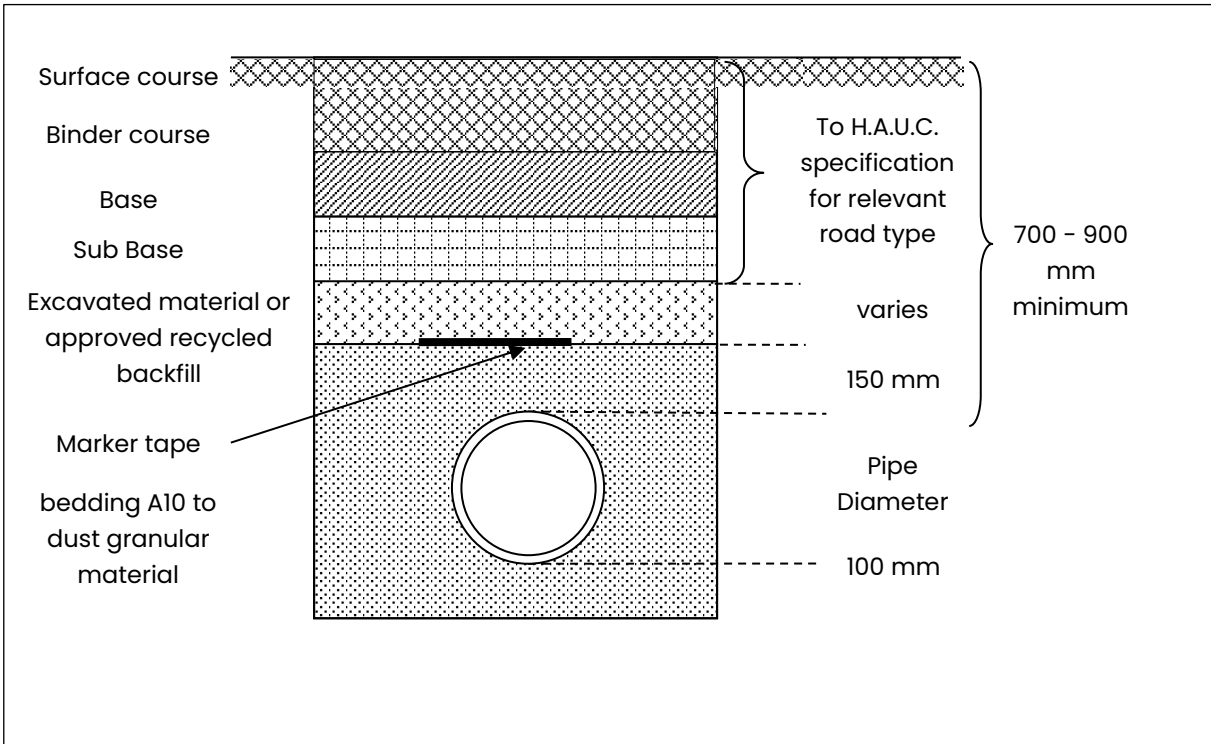


Figure 2: Pipe Laying in Highway

11.5 Water Quality Considerations

In accordance with the Principles of Water Supply Hygiene and related technical guidance notes listed therein (see **Appendix 1** – Other Documents) the SLP shall ensure that the Developer and the SLP ensure demand is sufficient to allow adequate turnover of water following commissioning of any new Self-Laid Main in order to protect water quality.

Where possible, Development spine roads shall be serviced with two-way fed ring mains to maintain water quality across the Site. The Water Company and SLP Designer shall consult on such proposals and the SLP Designer shall incorporate the Water Company requirements relative to this design consideration into the Site design. The costs associated with this shall be dealt with under the principles set out in Section 4 of this document.

Where despite the above, infrastructure is laid in advance of turnover, the Self-Laid Main shall either have artificial load by way of cross connection into the live system or shall have a flushing programme denotated on the design, to be carried out by the SLP.

The Developer or SLP shall be responsible for ensuring that all required permits and agreements are in place for identifying where water can be flushed to and for disposal of said water and whether water is required to be de-chlorinated prior to disposal.

Only standpipes that have been approved by the Water Company shall be used (details of such are published on the [Yorkshire Water website](https://www.yorkshirewater.com/business/standpipes/)):

<https://www.yorkshirewater.com/business/standpipes/>

Operation of valves: The Water Company's **specific** standards in paragraph 11.7 below for operation of valves and hydrants shall be complied with (including satisfactory completion of any related training in line with guidance material offered by the Company).

11.6 Mains Fittings

Valves, washouts, hydrants, etc. should, as far as is practicable be located in the footpath or verge for both access and safety reasons and to mitigate the effect of traffic, surface water and silting in chambers.

Where no other option but to design site fittings in trafficked areas, under no circumstances shall they be placed in parking bays or behind any locked access gates.

11.7 Controlling Valves and Valve Operation

The operation of Valves on Yorkshire Water's off-site live network can only be undertaken by Yorkshire Water. Normally, an isolation of the live network will only be required where Yorkshire Water has advised that a conventional tee with valves should be installed by Yorkshire Water.

Where an isolation is required due to failure of a UPC then Yorkshire Water will undertake a planned isolation to facilitate the failure to be recovered. Dependent upon the risk and warning required this could take more than 7 days to organise.

It may be possible for an SLP to charge a water main, which has been constructed by that SLP and passed all pressure and water quality tests, from the live network. This activity will be subject to the following requirements:

- A completed and approved WAND risk assessment undertaken by a Yorkshire Water Field Technician. This will ascertain any risks that need to be managed by Yorkshire Water.
- Utilisation of Yorkshire Water authorised SLP personnel. Authorisation will be given following completion of the companies Calm Network training and other training as revised from time to time, regular audit and incident free operation and appropriate WIRS accreditation.
- Connection/charge up method which reduces the need to recharge the full length of new mains including provision of double spade valve.

Valve closing direction within the Water Company area is anticlockwise and all new valves to be installed by an SLP shall be anticlockwise closing; except in the old York Waterworks area (**Figure 3**), where valves shall be clockwise closing. Drawings will be stamped at approval stage to indicate the type required.

Isolation valves (sluice valves) and shall be installed at the following locations and frequency:

- Immediately after the connection to the live Yorkshire Water network, ideally on the tee flange, where specified by YW.
- On any installed tee, immediately on the tee branch flange (except for vertical hydrant tees).
- Generally, every 50 properties or at a distance of 100 m, whichever is the least. Preferably, these valves should coincide with tee installations. Where a tee is located within $\pm 30\%$ of 100 m then valves should be installed on all branches of the tee instead of valves at 50 props or 100 m.

Isolation valves should be resilient seat gate type and the equivalent nominal diameter of the main on which they are installed. The top of the valve spindle should be between 200 mm to 300 mm below the cover level. The valve should be placed on a 100mm concrete foundation.

All fittings shall comply with the Water Supply (Water Fittings) Regulations 1999. Products that conform to these requirements currently carrying approval are published in section 1 on the Water Regulations Advisory Scheme (WRAS) 'Directory of Fittings, Materials and Appliances' for use on the UK Water Supply System, published on the WRAS website.

Ductile iron, pipes, fittings and joints shall comply with BS EN 545 for potable water pipelines. Steel pipes and fittings shall conform to BS EN 10224-L275 Option 1:S or SAW. Joints shall conform to BS EN 10311.

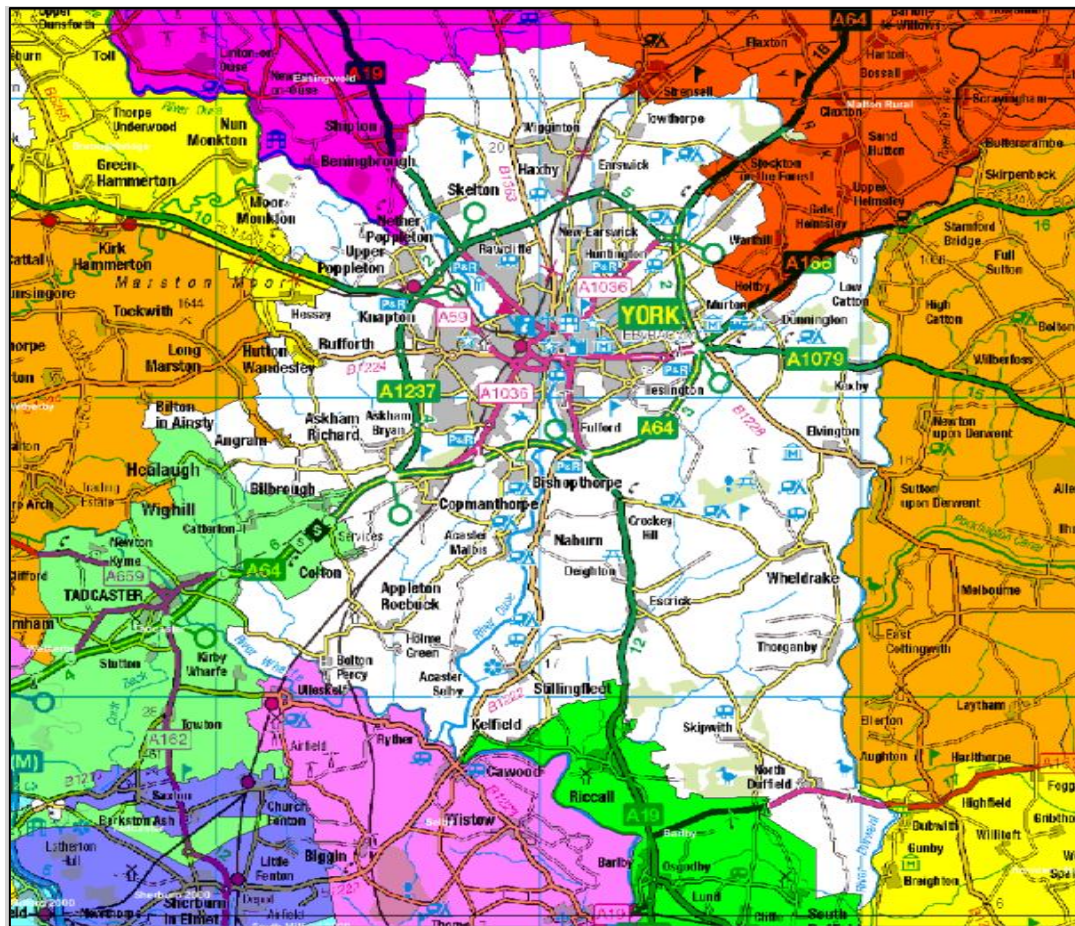


Figure 3: Old York Waterworks Area

11.8 Washout and Fire Hydrants

Washout hydrants shall be installed at each dead end regardless of mains diameter and between any two sluice valves which isolate a section of water main when closed. For mains where line valves have been installed at the maximum distance of 50 properties or 100m then a washout hydrant should be installed at each end of the main between isolation valves.

Yorkshire Water shall determine if additional washout hydrants are required to facilitate future operability and minimisation of disruption to customers due to repair requirements. This will be dependent upon the layout and connectivity of the proposed mains.

A washout hydrant shall be installed together with the isolation valve installed Immediately after the connection to the live Yorkshire Water network, where specified by YW. This will enable removal of any air or sediment built up over time behind the closed isolation valve.

All new hydrant installations on mains greater than 150 mm nominal diameter or mains which will operate at 70 m pressure and above should include a studded sandwich valve attached immediately below the hydrant to facilitate zero interruption future maintenance. Hydrants shall comply with **Figure 37**, **Figure 38** and **Figure 39**.

Fire Hydrants shall only be installed on mains equal to or greater than 90 mm outside diameter.

Hydrants shall comply with **CESWI** clause: **2.61 Hydrants** and Yorkshire Water's additional requirements:

1. Fire Hydrants shall be compatible with the requirements of the local Fire Authority.

2. All hydrants shall be clockwise to close operation.
3. Hydrant box covers shall be provided with recesses for lifting key. The covers shall be of such a design that it is capable of being lifted by the application of a single chisel and ended lever, without risk of falling into the chamber.
4. Hydrants shall have a screwed outlet constructed of gunmetal or stainless steel in accordance with the requirements of BS 705.
5. Hydrants shall be fitted with a frost plug of the blank plug type although automatic drain plug will be accepted. The spindle cap shall be secured by a non-corrodible fastener on to stem.
6. All hydrant installations shall be adjusted by means of riser pipes such that the top of their threaded outlet is no deeper than 300 mm below the upper surface of the cover.
7. All hydrants shall be installed in a chamber on a 100mm concrete foundation slab above the tee off the main or the duckfoot bend. The chamber shall have minimum internal dimensions of 430 mm x 280 mm clear opening. The frame and cover shall be Grade A to BS 750 and have a clear opening of not less the 380 x 230mm. The SLP shall ensure that the hydrant is vertical and central so that a standpipe can be fixed to the outlet and operating key utilised without being impeded by the frame or chamber walls. All caps are to be fitted to the cup of the hydrant outlet following construction.
8. All hydrants installed as washouts and fire hydrants shall be of the "throughbore" type.
9. All hydrants for permanent installation on YW networks shall be "kitemarked" by BSi Product Services (or 3rd party certified by another accredited certification body to BS 750 agreed with YW).
10. Threaded outlets must be constructed of a material in accordance with BS 750 and be attached to the outlet via a four bolt flange. Any other type of mounting for threaded outlets must be type tested in accordance with the procedure in Sections 6.4 and 6.5 of BS 750 to ensure their integrity or attachment and sealing.
11. All nuts and bolts incorporated in the assembly of the hydrant must be manufactured from a corrosion resistant material or coated in accordance with WIS 4-52-03. Galvanizing alone shall not be acceptable as a means of protection for fasteners.
12. The hydrant shall be installed at such a level that the top of its outlet shall be between 250 mm and 300 mm of the finished cover level. The hydrant installation shall be adjusted by means of riser pipes to ensure the outlet is no deeper than 300 mm. The hydrant shall be centralised and aligned as accurately as site conditions allow ensuring easy installation of a standpipe and operation of the hydrant spindle with a key.
13. There shall be a minimum 25 mm clearance from a 2.5" standpipe and / or a hydrant key shaft aligned with the spindle, from the inner edges of the frame to allow for any subsequent settlement or movement that might reduce those clearances.
14. When carrying out backfill and reinstatement a dust cap must be fitted over the outlet in order that no work-related debris enters the cup. The chamber must be cleared of all work-related debris at end of works. The cap must be re-fitted for YW acceptance.
15. Where a washout hydrant is being specifically installed to attach a data logger and the top of the outlet to the finished cover would be less than 250 mm, then an oversized chamber shall be installed. The chamber shall have a clear opening of 600 mm x 450 mm.
16. Frames with a split lid (i.e., a two piece cover rather than a single cover) shall not be fitted to fire hydrant installations. All fire hydrants will be fitted with one-piece lids. The Fire Service's preferred method of lifting is with a single bar. Split lid covers need two lifting keys using a straight upward lift. This tends to be a slower operation and relies on fire fighter's carrying two keys.

11.9 Air Valves

Air valves are required at high elevation points and at points of significant changes of vertical gradient along the network where in either case there is a risk of air locking. The location of air valves is to be agreed at design stage. **Some air valves let air in on depressurising.**

A hydraulic gradient should be used to identify any locations where air is likely to accumulate or will require releasing from the network during charging. It is not expected that air valves will be installed on smaller diameter mains where there are sufficient hydrants and service connections to release air.

Air Valves shall comply with **CESWI** clause **5.28 Installation of Valves** and Yorkshire Water's additional requirements:

1. Air valves shall be carefully sited to avoid areas of poor ground drainage and potential contamination risks. Pipework design / gradients shall be altered, if necessary, to accommodate this. In private land they shall be located within 1 m of the field boundary. Where it is essential to locate an air valve remote from the boundary the chamber structure shall be extended above the level of the surrounding ground.
2. Air valves shall be installed in drained chambers where practicable and where this is impractical, they shall be installed with their air vent(s) at a level higher than that to which water could rise. This may mean the construction of above ground chambers with sufficient clear opening and internal space for access to repair and maintain the air valve and isolating valve.
3. Air valves shall be installed with an isolating valve between the branch / tapping off the main and themselves to facilitate their maintenance without interruption to the mains supply.
4. Covers and frames to manholes containing air valves on water mains should be of a ventilated type.

11.10 District Metered Areas and Boundary Valves

District meter locations shall be agreed with the Water Company. If no information is available, then as a rule where the design exceeds 200 properties **and the properties do not sit within an existing DMA**, then a DMA meter is required, **and a new DMA will be created**. See also paragraph 8.3.

A connection taken off a trunk main which supplies any number of properties, requires a DMA meter. A connection out of a high-pressure trunk main will also require pressure management infrastructure installing alongside the DMA meter. DMA meters and ancillaries of the setup (valves/bypass/strainer etc.) would be classed as enhancement.

Where a new development increases the size of an existing DMA to over YW DMA Design Guidance, then a DMA meter is required. This would also be classed as enhancement.

Shut valves will need to be installed if a Site is fed by two separate DMAs via two Source of Water Connections. In this instance their requirement and location shall be agreed at the design stage with the Water Company.

11.11 Sustainable Drainage Systems (SuDS) Considerations

SLP Designers shall ensure relative to the final installation of the Self-Laid Main and Service Pipe that any Sustainable Drainage System (SuDS) shall not be installed above, underneath, or adjacent to the final position of Self-Laid Mains and Service Pipe. The location of any proposed SuDS and permeable surfaces proposed for a Site are to be clearly marked on the proposed design drawing (see also paragraph 10.8).

11.12 Double Spade Valves

In order to facilitate piece through connections on site, a double spade valve may be used as an alternative to the use of back to back washouts relative to the commissioning of mains.

Non-return double check valves shall be provided on all temporary pipework connections on to existing mains to prevent back siphonage.

Where practical, the SLP shall use a double spade valve and bypass for connecting new and existing mains on development sites. This will enable the new main (further phase) to be connected, pressure tested and sterilised without the need to depressurise the existing main to remove temporary fittings.

Newly laid mains shall not be connected directly to the existing mains system (until cleared bacteriologically) except by way of a standpipe fitted with a double check valve.

Spade valves shall be clearly marked on design proposals and on 'as constructed' record drawings.

11.13 Rights of Access

The Self-Laid Main shall, wherever possible, be routed in publicly adopted highways and maintained highways or streets as defined in NRSWA Section 48 (1) and amended under the Traffic Management Act (TMA) 2004. These shall not normally require rights of access. Examples of situations where Self-Laid Mains are to be laid in a street are:

- An adopted street on land which is owned by a Local Authority.
- A street on land which is owned by the Developer, and which may or may not be adopted in the future but serves more than one property.
- A street on land which is in joint third-party ownership.

The section 38 Drawing shall be used to highlight **proposals for a Self-Laid Main to be installed in third party land**, which is not a street and that may require land rights to be obtained and a legal notice to be issued. In these instances, the Water Company shall establish and confirm with the Developer / SLP **the acceptability of a proposal for laying in private land and the requirements for rights of access such as easements to be provided by the land owner**. Examples of situations where **new mains provided by an SLP may be proposed for installation in private land**:

- Industrial and commercial Site where land is wholly owned by a singular 3rd Party.
- Site access is through a third party's land that does not form part of the development.

In cases requiring the Self Laid Main to be laid in land not defined as a street, all such permissions and rights of access shall be identified before the design is approved.

In the process of designing, it may be necessary to obtain other consents for works; these consents include:

- Local Highways by way of Section 50 Agreements.
- Other Adopting Utilities where the proposed line of a main is within an existing easement.
- Environmental Agencies and Waterways Authorities.
- Rail and Transport Network Operators.
- Historical Societies and National Heritage Agencies.

All such servitudes, easements, wayleaves and planning permission required for the Self-Lay Works and land for the siting of equipment shall be obtained prior to commencement of works and in accordance with the Statutory Consents and Land Rights sections of the WAA.

In accordance with the WAA, the Water Company shall obtain any required easements to protect its Network, or any future extension of such, and any related and/or incurred costs including third party costs shall be recovered by the Water Company in accordance with its published Charging Arrangements.

11.14 Under Pressure Connections

The main advantage for using an Under Pressure Connection (UPC) is that, if carried out correctly, it is a non-intrusive activity having little or no impact to the levels of service customers receive, maintaining the quantity and quality of water supplied throughout the installation process.

However, careful consideration must be given to the risk and impact of failure whilst installing a UPC as well as minimising the probability of failure post installation. It is therefore essential that prior to planning and programming the work a thorough investigation including on-site checks must be carried out.

UPCs include connections for mains extensions, connections for additional washouts and air valves and for line stops. Where line stops are required then a specialist contractor shall be engaged.

All under pressure connections are to be pressure tested to 1.5 x the working pressure of the asset before hot tapping begins. All under pressure tappings are to be horizontal. In rare circumstances YW will allow angled or vertical tappings.

11.14.1 Under Pressure Tees (UPT)

Under Pressure Tees (UPTs) can be purchased for a wide range of pipe materials and diameters, however it is essential that the correct UPT is installed: one that is fit for purpose. All UPTs shall comply with BS 8561:2013, Class A rating with full pipe surface contact sealing.

Some manufacturers will supply similar sized UPTs of differing designs and materials. Certain ones have limitations on what type of main (e.g., ductile iron, cast iron, steel, etc.) they can be attached to. If it is not clear in the specification or technical information provided by the manufacturer that the UPT to be installed is suitable for the main to which it is to be attached, written confirmation from the manufacturer must be provided as part of the approval process.

11.14.2 Pipe Materials

The Yorkshire Water (YW) network has over thirty-three thousand kilometres of water mains of varying diameters and materials, some that have been in the ground for over one hundred years. The majority of mains are made of Cast Iron (CI) and Spun Iron (SI), but over the years other pipe materials have been installed, e.g., Ductile Iron (DI), Steel (ST), Polyvinylchloride (PVC), Asbestos Cement (AC), Polyethylene (PE), Glass Reinforced Plastic (GRP). When considering the use of a UPC, the pipe material, its current condition and known deficiencies of any particular pipe must be taken into account.

Three materials that are known to be less robust than others are Asbestos Cement (AC), pre-1990 Polyvinylchloride (PVC) and Glass Reinforced Plastic (GRP). Making a connection to an AC main needs to be considered very carefully because of its potential fragility. PVC can also be very fragile with failure in a very brittle manner where a running longitudinal failure can extend over a full pipe length. Under no circumstances will a UPC into GRP be allowed. Characteristics of these pipes are detailed below.

11.14.2.1 Asbestos Cement (AC)

1. AC pipes have a low beam strength and therefore have a predisposition to circumferential failure / cracking when there is excessive ground movement and uneven external loading.
2. AC pipes were manufactured with a spigot at each end of the pipe to provide a constant diameter for the installation of flexible couplings. Manufacturers quoted outside diameters for AC pipe only applies to a length of approximately 300 mm at each spigot end. The remainder and majority of the pipe barrel is uneven and therefore needs to be measured to ensure it is within the tolerance levels of any fittings used for repair and maintenance purposes.
3. AC pipes can suffer from internal and external deterioration dependent upon the ground conditions and chemistry of potable water carried. Deterioration results in the pipe becoming 'soft' which would preclude the safe installation of a UPT.
4. UPCs into AC pipes should only be considered where there are circumstances which would have a significant / unacceptable Health and Safety (H&S) risk, Performance Commitment risk or unacceptable risk to customers supplies if a cut out was undertaken. Permission would need to be sought from YW to proceed.
5. The preferred method of connection to an AC main is by the removal of a full section of AC pipe so that couplings can be applied to the spigot ends of the remaining pipes.
6. If approval were to be granted, then a full body UPT should be manufactured to the specific location pipe dimensions. A trial hole would be required on the main at the location of the UPC for the main to be calipered and the external diameter and pipe condition to be checked.
7. Ferrule connections should be made with the use of a gunmetal saddle and non-corrodible fasteners.
8. Under Pressure mains connections into AC pipes should only be considered where there are circumstances which would have a significant H&S risk, Performance Commitment risk or unacceptable risk to customers' supplies if a cut out was to be undertaken. Permission would need to be sought from YW to proceed.

11.14.2.2 Polyvinylchloride (PVC)

1. Generally, pre-1990 PVC (normally labelled as uPVC) pipes normally fail in a brittle manner which will present as a longitudinal crack or split which can run through couplings, especially UPTs and ferrule saddles.
2. PVC pipe is susceptible to failure from cyclic loading, stresses induced by uneven external loading, point loadings from ground conditions and from mechanical forces exerted by, for example, a drilling machine. The quality of backfill during main laying is largely responsible for creating uneven and point loads which lead to pipe failure.
3. Early PVC pipe (uPVC) has a tendency to fail where the pipe has been modified, for example where a socket has been formed.
4. UPTs of any type are unlikely to stop or contain a pipe failure as most failures are longitudinal rather than a circumferential crack.
5. Excess tightening of straps or clamps can instigate bending and/or buckling stresses in the pipe wall and when a drill/cutter breaks through the pipe wall or too much pressure is applied during the drilling process it can induce sudden brittle failure in the pipe.
6. Generally, the older the PVC pipe material, the higher the risk of failure. More recent PVC materials (labelled as PVCu, moPVC or PVC-O) are more resistant to longitudinal failure. Generally, pre-1990 PVC (normally labelled as uPVC) has a high risk of failure. Post 1990 to 1999 is more robust due to the introduction of fracture toughness tests. Since 1999 modified PVC materials (labelled as moPVC)

were purchased for YW use and are considered to be more durable and less likely to fail when installing a UPC.

7. Approval will not be given for UPC to be used on pre 1990 PVC (uPVC).
8. Under Pressure mains connections into post 1990 PVC pipes should only be considered where there are circumstances which would have a significant H&S risk, Performance Commitment risk or unacceptable risk to customers' supplies if a cut out was to be undertaken. Permission would need to be sought from YW to proceed.

11.14.2.3 Glass Reinforced Plastic (GRP)

1. GRP pipes contain glass fibres, and these would be disturbed should the pipe be drilled or cut in any way resulting in contamination of the water supply, therefore UPC to GRP is not permitted under any circumstances.

11.14.3 Strategic Mains

For the purposes of classifying mains with regard to the installation of UPCs, Yorkshire Water (YW) will define the classification of a main at the time of planned works. A definitive list of trunk or strategic mains will not be maintained as the status of mains can change dependent upon operational circumstances and configuration.

Strategic mains will be defined by YW with reference to potential impact of any work or intervention on domestic customers and key customers such as hospitals and public amenity organisations. Generally, a strategic main will be defined as:

- a) A main which links above ground assets such as reservoirs and pumps.
- b) A main which supplies more than 500 properties.
- c) A main which supplies more than 200 properties without any alternative supply.
- d) A main supplying Key Customers identified by YW.

The use of a UPC on a Strategic main shall be considered carefully to fully understand the operational and Health and Safety risks. A full Risk Assessment / Method Statement (RAMS) should be undertaken with sign off at Tier 3 Manager level as a minimum requirement.

Self-Lay Providers (SLPs) will not be allowed to undertake UPCs into any strategic water main. This activity will remain a non-contestable item of work as defined in the Annual Contestability Summary (ACS) for Self-Lay Providers.

11.14.4 Process

11.14.4.1 Planning and Approval

Irrespective of the diameter and material of the host pipe, before proceeding with a UPC a full investigation must be undertaken following which a detailed Risk Assessment / Method Statement (RAMS) must be compiled and sent to YW for approval, and for high risk UPCs or UPCs on parent mains with a diameter over 200mm, the production of a YW risk assessment is required.

Self-Lay Providers should submit their completed UPC application and RAMS to SLP_mailin@yorkshirewater.co.uk. During the Point of Connection (PoC) Assessment YW will indicate the connection type and highlight any known risks such as the condition of the main and potential customer impact.

Items that shall be provided in the Risk Assessment and Method Statements for installation of a UPC are listed below:

1. Detailed location information and purpose of proposed UPC.
2. Proposed date of installation – if available.
3. Contact details of installer.
4. Detailed account of potential H&S issues relating to highway conditions and other utilities and services in the vicinity of the works.
5. Confirmation of adherence to BS 8561 requirements. NB only Class A full body tees shall be installed. For PE pipe, a fully welded tee shall be used.
6. Copies of UPC manufacturer details, specification, and data sheets with evidence of correct material selection.
7. Details of the host pipe diameter, material and pressure rating shall be confirmed.
8. The operating pressure of the host main and proposed test pressure shall be specified. The UPC tee must be pressure tested to ensure it is watertight prior to drilling. The test pressure will be specified by YW, generally equal to the maximum working pressure of the host main +20% for low risk mains. However, +50% shall be required for high risk mains identified in the YW risk assessment process.
9. Details of any trial hole information to determine if sufficient room is available to install the tee, control valve and attach the drilling machine. A detailed plan of the location of other utility apparatus in the vicinity of the UPC should be provided.
10. Details of any mains fittings and joints in the vicinity of the proposed UPC site.
11. Details of mains condition and external diameter checks for ovality shall be provided. A UPC Tee can only be installed if the 'ovality' is within the manufacturer's tolerance levels. The external surface of the host main shall be in a condition that a seal can be formed between the Tee and the pipe surface i.e., only minor external corrosion/pitting is allowable.
12. Other than when installing a hydrant UPC, the completed installation must have the UPC tee in the horizontal position within $\pm 2^\circ$ (see **Figure 4**). The branch valve must be operable from the finished ground level, extension spindles should be provided to ensure the boss / false top is within 300 mm of the finished ground level. Any deviation from this must have the prior agreement of YW.
13. Details of temporary support should be provided. Adequate support must be provided to the drilling machine, UP tee and valve to prevent axial rotation ('spinning') on the host main when the drilling operation is taking place and to ensure there is no undue load on the main which could lead to a failure of the host pipe.
14. Details of permanent installation shall be provided. Provision of adequate support to the Tee and valve to prevent movement during reinstating the excavation and any future traffic loading.
15. Concrete support must be constructed on the opposite side of the tee from the branch to ensure that there is no axial deflection of the main when the connection is charged.
16. There shall be sufficient clear pipe for the UPT to be fitted to the main such that there is at least 500 mm clear pipe from any existing joint.
17. A UPC cannot be made to a 3" or smaller CI mains for a mains branch connection.

18. Prior to fitting the UPC tee, the host main shall be cleaned and disinfected with chlorine solution. All other fittings to be used should be disinfected by Spray Chlorination as specified in Yorkshire Water's standard procedures, detailed in section **17 Self-Laid Main and Services Commissioning**. A bacteriological sample pass will be required prior to using the connection to charge and chlorinate new mains and complete final connections.
19. Contingency plans and equipment shall be detailed in the RAMS, see section **11.14.4.2**.

YW will assess if it is a high risk UPC and requires YW risk assessment. The YW risk assessment will determine the potential customer impact in terms of numbers of properties affected and the severity of the impact in terms of likely timescale for both discolouration and interruption to supply should the main fail during the UPC installation and an immediate shut off be required. The potential impact on customers will determine the contingency requirement and these will need to be agreed with YW.

YW will assess the RAMS, and YW risk assessment if applicable, and either approve the UPC or reject the UPC proposal and provide appropriate feedback. YW approval is required for all UPCs.

If the UPC is approved by YW the UPC installer should schedule the connection. Where the UPC installer is a YW contractor, they shall schedule the connection via SAP. Where the UPC installer is an SLP they shall schedule the connection by contacting the Water Network Controller via emailing at SLP_mailin@yorkshirewater.co.uk.

The UPC installer shall inform the YW Control Room, and the Water Network Controller at SLP_mailin@yorkshirewater.co.uk, before and after the UPC takes place.

If the UPC proposal is not approved by YW, the UPC installer (YW contractor or SLP) should incorporate the feedback and resubmit their proposal. Alternatively, an SLP may request YW complete the connection instead.

11.14.4.2 Contingencies

Generally, provision should be made for the availability, on site, of a suitable repair system in case there is a failure of the host pipe during the installation process. In some circumstances YW may determine that additional contingencies should be made available.

Where approval has been given for a UPC to an AC, uPVC water main, the installer shall have the necessary fittings and pipe on site to undertake an immediate repair, both temporary and permanent. For a permanent repair there should be sufficient fittings and pipe to allow a full pipe length to be replaced. The same contingency requirement is also required for any UPC to be installed on a main => 200mm (8") NB irrespective of pipe material.

For high risk UPCs the YW risk assessment for emergency mains isolation should indicate contingency options. Where the main is deemed to be high risk / high impact, a member of YW Field Operations should be in attendance when the drilling process is undertaken in order to take action for any issues which may arise during the work.

Where high risk / high impact has been determined or if conditions on site are different than expected, then a final decision for go-ahead on the day should be sought from the YW Field Operations Manager or the YW Control Room.

If a problem arises whilst undertaking the UPC, the UPC installer (YW contractor or Self Lay Provider) shall immediately call the YW Control Room. The UPC installer shall follow the YW Control Room's advice to resolve or reduce the impact.

The UPC installer (YW contractor or Self Lay Provider) must be prepared to leave a drilling machine attached to the UPT for an extended period of time should there be a failure of the drilling process and the drilling machine cannot be removed without the main being isolated and depressurised. YW will respond to this situation as if it were a planned intervention and will advise of timescales when a plan has been developed.

YW may choose to attend site to watch the connection.

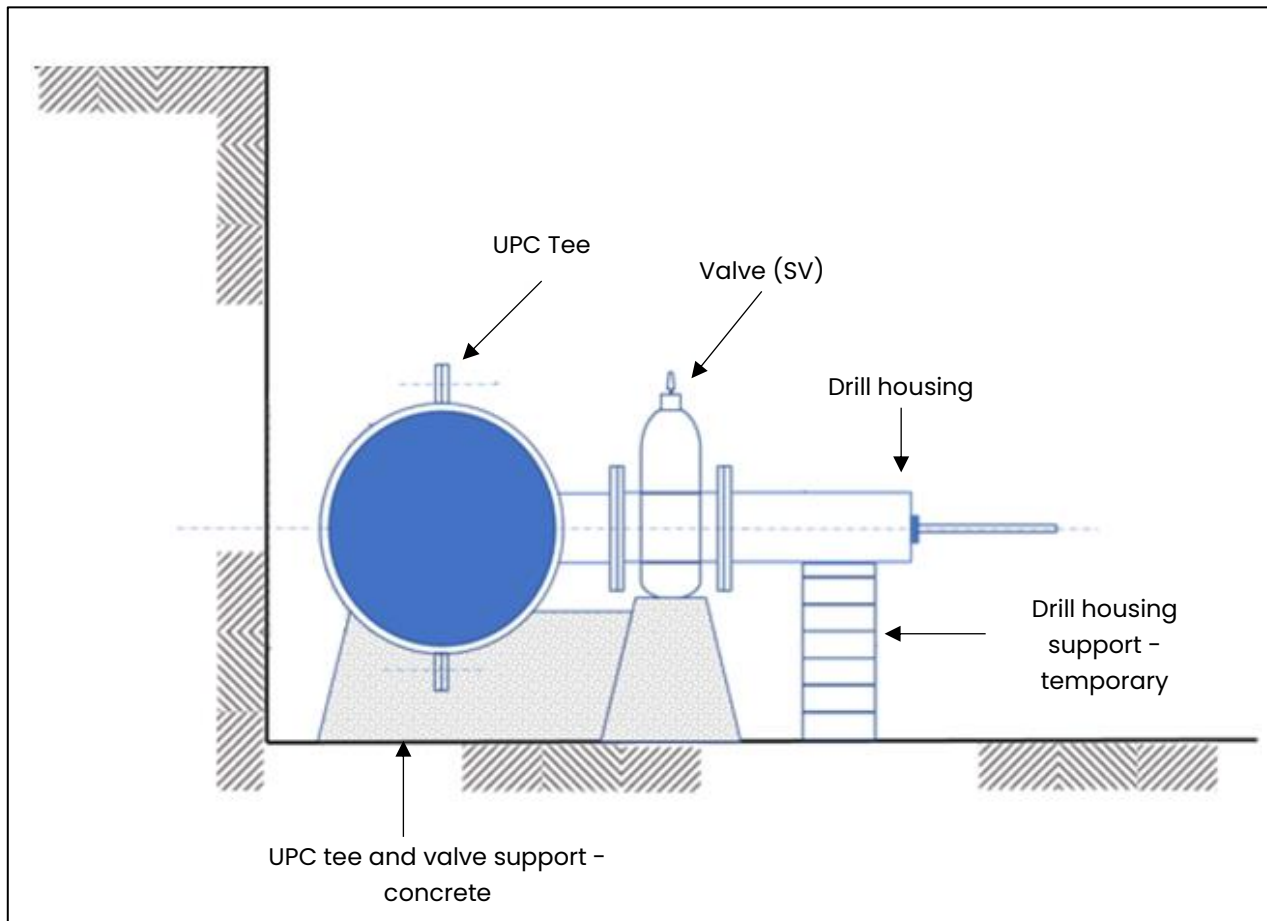


Figure 4: Under Pressure Connection (UPC)

11.14.4.3 Ferrule Connections

Although a ferrule connection is a UPC because of its limited diameter (up to 32 mm) there is no requirement to go through the formal 'Planning and Approval' process described above. However, any ferrule connection made into a uPVC water main installed prior to 1990 or into any water main that has a diameter equal to or greater than 200 mm (8") requires a formal YW risk assessment.

Ferrule straps will be required for all PVC and AC ferrule connections.

11.14.4.4 Redress

Where YW believes that a UPC installer has acted negligently, then redress for damages will be sought. This can extend to; recovery of Performance Commitment penalties; cost of remediation and repair work to water mains and highway construction including provision of alternative supplies.

The UPC installer will be expected to settle any third party damage claims.

12 Service Pipe Design and Installation

Both parts of the Service pipe shall be appropriately designed, and responsibility for design acceptance typically rests with the party responsible for its maintenance.

The following diagram (**Figure 5 and Table 12.1**) provides guidance as to the allocation of such responsibilities.

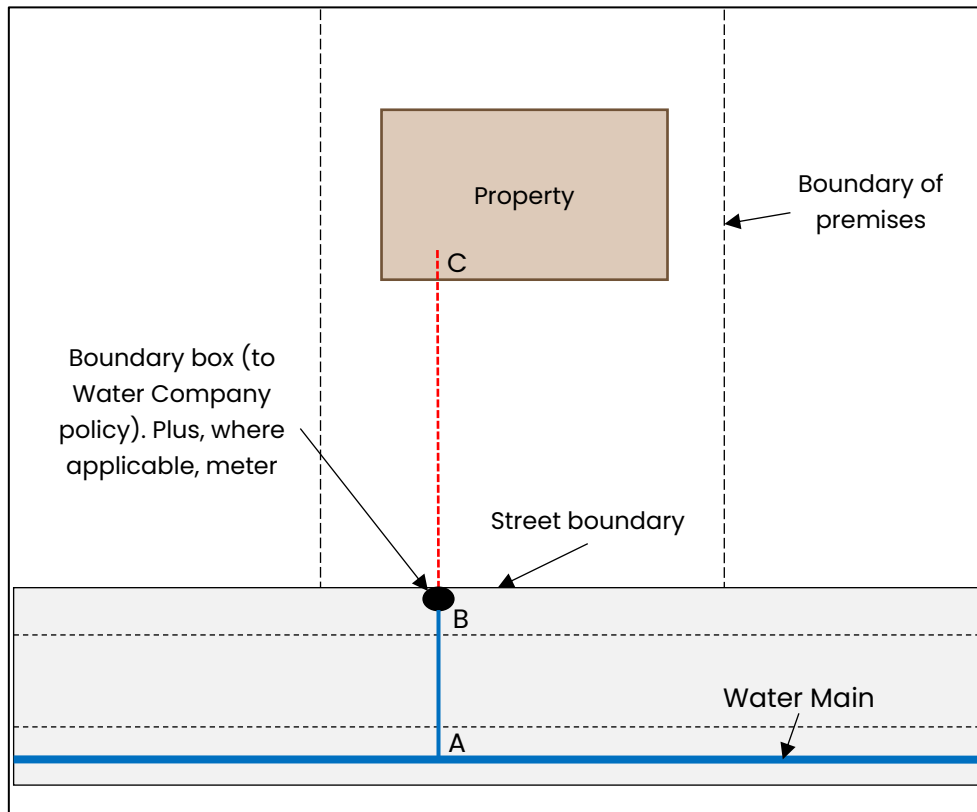


Figure 5: Service Pipe Responsibility

Table 12.1: Service Pipe Responsibility

Service Connection Pipework	Responsibility		Regulations
	Installation	Maintenance	
A – B Communication Pipe	SLP	Water Company	Water Supply (Water Quality) Regulations 2016
Boundary box (plus, where applicable, meter)	SLP	Water Company	
B – C Supply Pipe	Developer	Property owner	Water Supply (Water Fittings) Regulations 1999 and Water Supply (Water Fittings) (Amendment Regulations 1999)
Internal Plumbing	Developer	Property owner	

The supply pipe shall be the property owner's responsibility and shall conform to the Water Regulations and requirements of the Water Company.

Service pipes shall not normally require Easements or Rights of Access unless they cross over land under the ownership of another property.

Shared Service Pipes are those pipes that service multiple customers at point of delivery, usually in multiple occupancy buildings. The design of these service pipes shall likewise be the responsibility of the party responsible for the installation. Future maintenance of the shared supply pipe shall be the responsibility of the customers supplied or a management company appointed on their behalf.

12.1 Routing, Positioning and Location

The Water Company shall specify its policy and installation requirements on the design and installation of Permissible Materials (service pipes, meters, chambers, ducting, etc.) required routing, and location relative also to contaminated ground.

Service Pipes shall only be laid through land which either forms part of a street or to which the property being served has permanent rights of access.

Service Pipe routes in so far as is reasonably practicable shall follow a straight route perpendicular to the Self-Laid Main and the property to which it serves.

Service Pipes shall generally be designed to connect to the nearest Self-Laid Main to the property as is reasonably practicable.

Separate Service Pipes shall be provided to each house or building on the premises, or to those different parts of a building on the premises which are separately occupied by way of multiple supply pipes.

Where four or more service pipes are required to cross the full width of a road, a public water main can be laid in their place. Each property must receive an individual short communication pipe and meter. The dual main should be fitted with an isolation valve immediately on the tee branch flange and be fitted with an end washout hydrant. The layout is to be agreed with YW.

Service Pipes shall be designed such that the requirements of Street Works UK are maintained with respect to separation from other plant and utilities.

Service Pipes should be laid under grassed areas where possible and not laid beneath drives and parking areas. The service will be laid in a trench at right angles to the point of entry to the property. The service pipes shall be covered with approved bedding materials and marker tape laid on top, an example is shown in **Figure 6** and **Figure 7**.

It shall be the duty of the Water Company to ensure a stopcock, belonging to the Water Company, is fitted to the service pipe and, wherever possible the ferrule will be connected to the crown of the water main.

Section 179 (3) of the Water Industry Act 1991 (WIA) states YW does not have to adopt long services pipes in certain circumstances (refer to WIA), where the service pipe is laid in a street other than the street in which the water main with which it connects is situated.

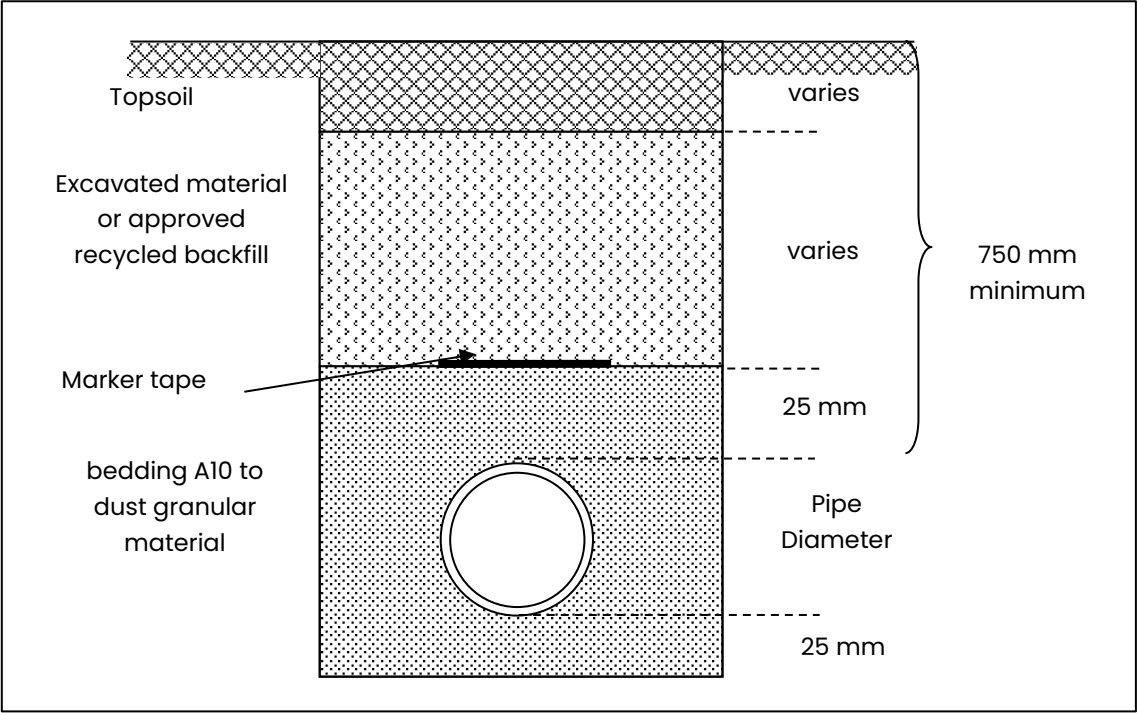


Figure 6: Example of a Service Pipe laid in a garden

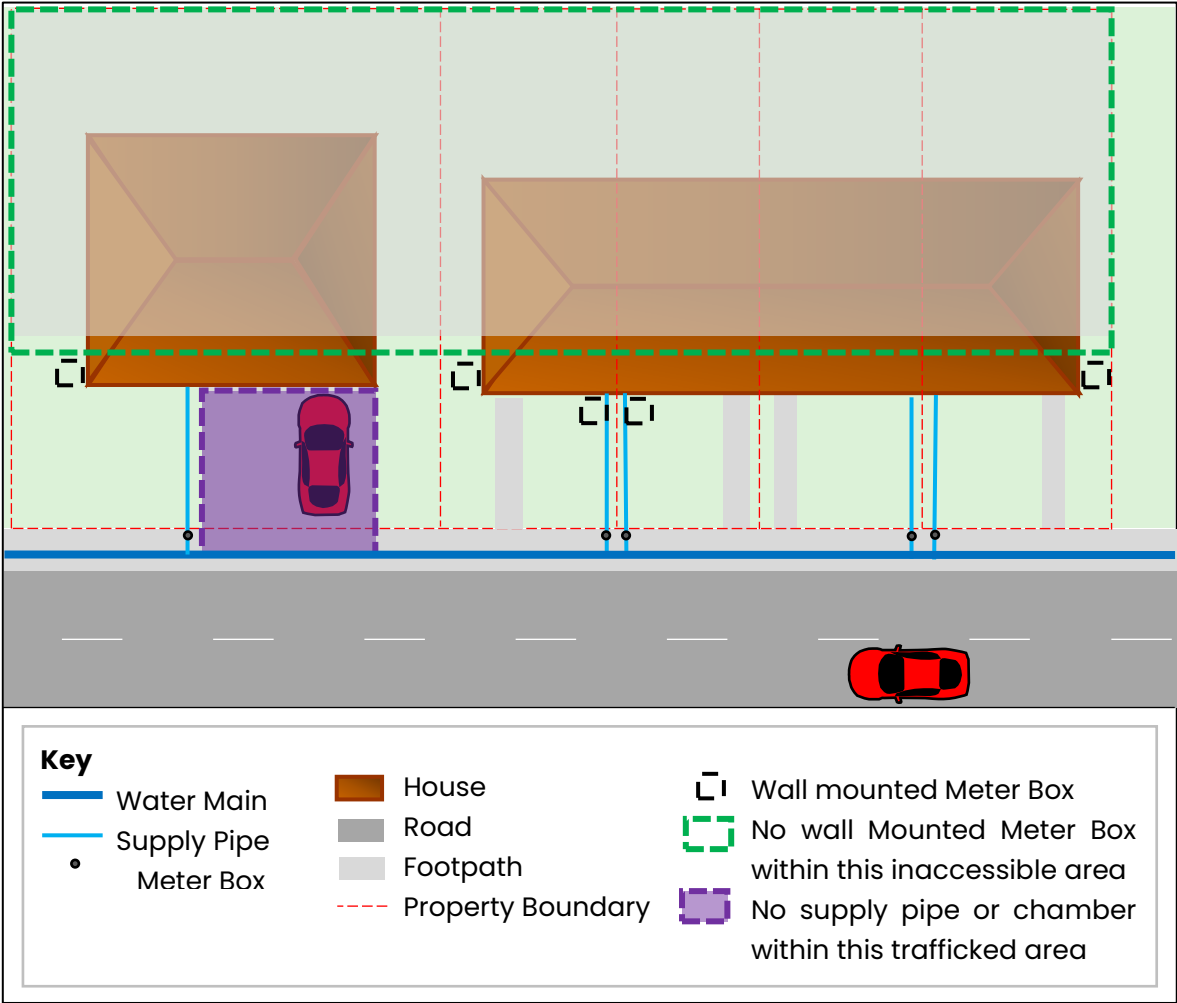


Figure 7: Routing and Positioning of Supply Pipes

12.1.1 Examples of Acceptable Mains and Services Layout for New Development Sites

Examples of Acceptable Mains and Services layout for new development Sites:

- Single Service Pipe

An individual service pipe (communication pipe and supply pipe) shall be laid from the point of entry into the property to water main, for each property (**Figure 8**). Each property will be fitted with a stop tap and a billing meter at the boundary of the property.

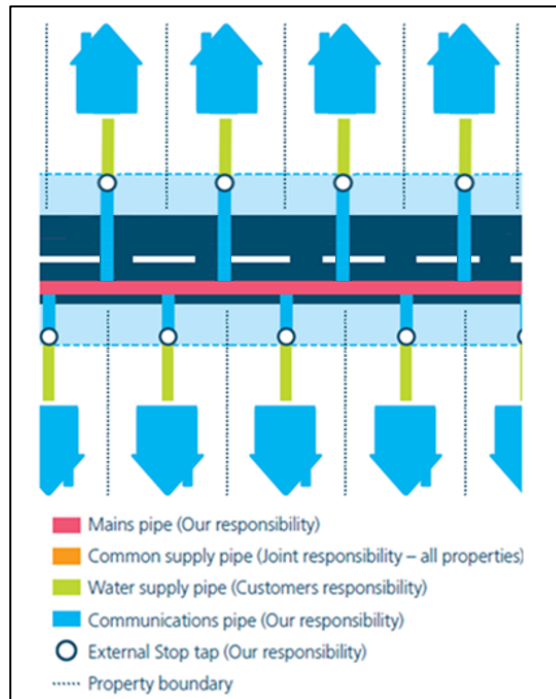


Figure 8: Service Pipe Layout – Single Supply Pipe

- Dual Main

An example of the service pipe layout is shown in **Figure 9** and **Figure 10**.

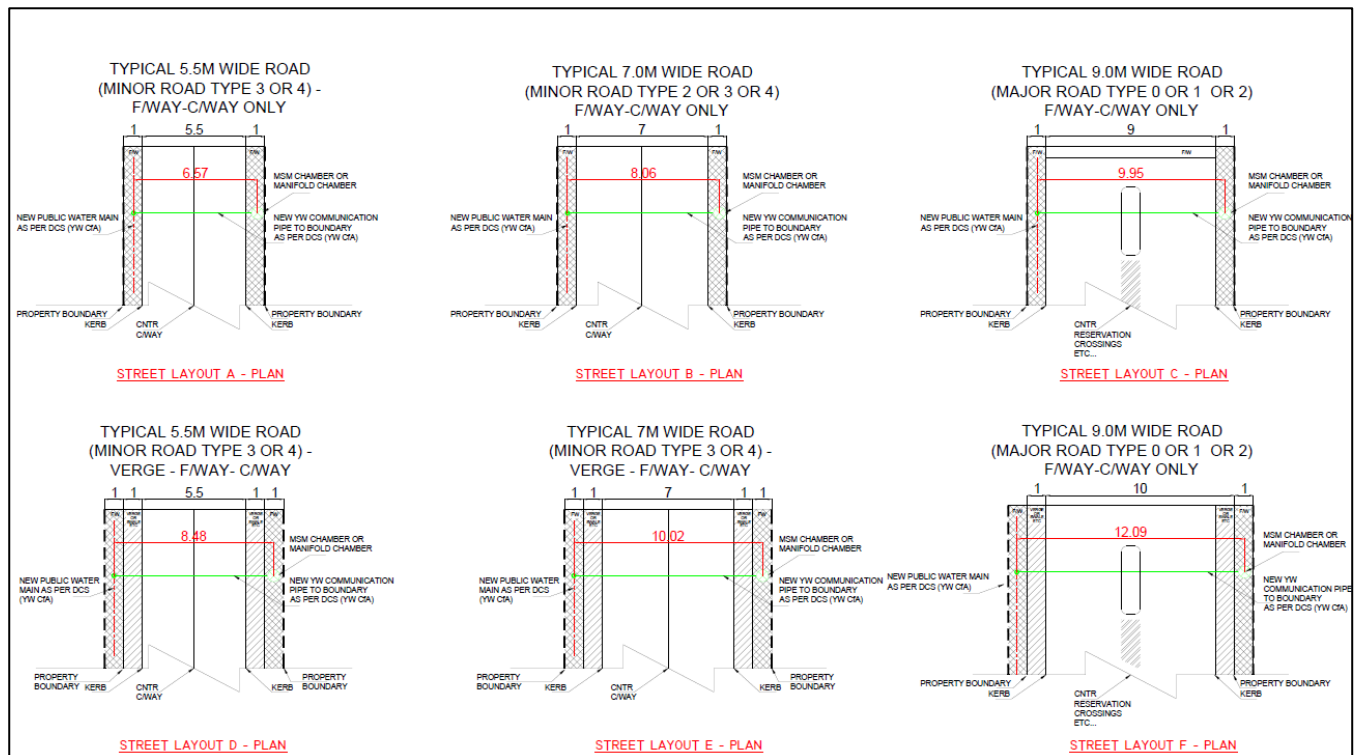


Figure 9: Service Pipe Layout – Road Width Examples

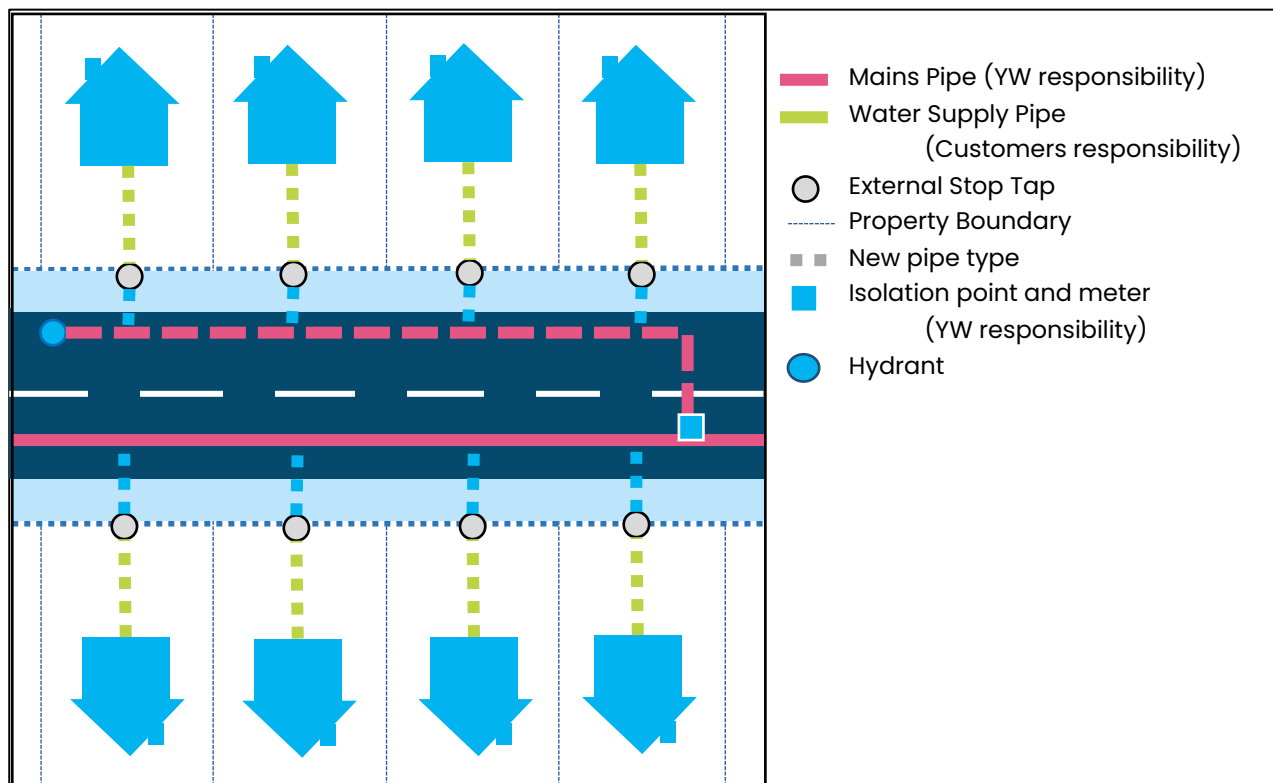


Figure 10: Service Pipe Layout – Dual Main

12.2 Depth of Services

Service Pipes shall be installed in accordance with the Water Regulations and [Street Works](#) UK guidance.

Service pipes shall be laid with an even grade where possible, with cover between a depth of 750 mm to 1350 mm from the finished ground level in accordance with Water Supply (Water Fittings) Regulations 1999.

If a boundary box is to be installed on the Service Pipe, the pipe shall be laid with cover between 750 mm and 850 mm for a minimum of 1.0 metre on each side of the boundary box.

Service Pipes being designed outside this range shall have special protective measures specified [on the design drawings](#) and vetted and agreed by the Approving Design Engineer.

12.3 Sizing of Services

While service connections can only be designed to meet minimum standards at the point of delivery, every effort shall be made to ensure that all parts of the service pipe are sized in accordance with industry standards.

Service Pipes shall be sized to ensure velocity is $\leq 0.5 \text{ ms}^{-1}$ and that total headloss is $\leq 0.2 \text{ mH}/100\text{m}$ linear length of pipe.

Services to standard domestic properties shall be minimum 25 mm internal diameter and capable of supplying required flow and pressure based on [standards of 9 litres/minute whilst maintaining a pressure of 10 mH at the boundary of the property](#).

12.4 Location of Boundary Boxes

Please refer to our meter location policy on our website:

<https://www.yorkshirewater.com/developers/water/water-meter-locations-for-developers/>

Boundary boxes shall have a **Grade B** load rated **composite cover** (to comply with Table 1 of BS 5834) when installed in a non-trafficked area like a footpath, or an occasionally trafficked area like offset to a driveway.

Boundary boxes shall have a **Grade B** load rated **metal cover** (to comply with Table 1 of BS 5834) when installed in a more regularly trafficked areas like a courtyard or car parking area.

12.5 Supplies to Multi Occupancy Buildings

Separate service pipes to all properties is Yorkshire Water's preferred option for all supplies including to multi-occupancy buildings.

12.6 Services to Multi Story Buildings

Water Industry Act 1991 – Section 66 states that where the top-most storey in a building is at a higher elevation than 10.5 m below the draw off point [of the supplying reservoir](#) the statutory undertaker may require the Developer to fit storage equal to twenty-four hours usage and adequate pumping to reach the highest point.

12.7 Additional Requirements for Supplies to Buildings other than Domestic Dwellings

When the Developer's flow rates are in question, the SLP Designer shall check that demand was calculated in accordance with BS EN 806.

The design shall include for back flow prevention, at least single check non-return valves.

Demand for process water shall be treated separately when designing the service.

The SLP Designer shall investigate any seasonal demand patterns when designing the service.

All material shall comply with WRAS, however any quick acting solenoid valves should not be installed under any circumstances. The installation should be designed to ensure that there is no pressure surge or transient pressures generated from daily operation.

The designed / stated maximum flow rate should be specified during the application process and should not be exceeded in operation. YW reserve the right to install a restrictor mechanism if max flows are exceeded.

12.8 Main in lieu of communication pipe(s)

The Water Industry Act 1991, section 46 subsection 8 states:

"Subject to subsection (9) below, a water undertaker may comply with any duty under this section to lay a service pipe by laying a water main instead; but nothing in section 45 above or this section shall impose any duty on a water undertaker to lay a water main where it has no power to lay a service pipe."

Scenario 1 – Multiple road crossing services in the road in which the main is laid (normally deemed 4 or more services)

1. Where services are requested from the long side of a road and these exceed three crossings then it is deemed expedient to lay a single road crossing main in a suitable size (4 – 11 domestic connections = 63mm; 11 – 50 = 90mm, etc.).
2. The developer/applicant will be charged for 4 crossings (or however many services the main in lieu is covering) if the application is for services only. The instruction to the delivery agent (Network Plus, MWS, etc.) is for the main in lieu of comm pipes and the short side connections.
3. If it is part of a mains requisition scheme, then the developer will be charged as designed i.e., for the main and the shorter services.
4. An example is shown in **Figure 11**.

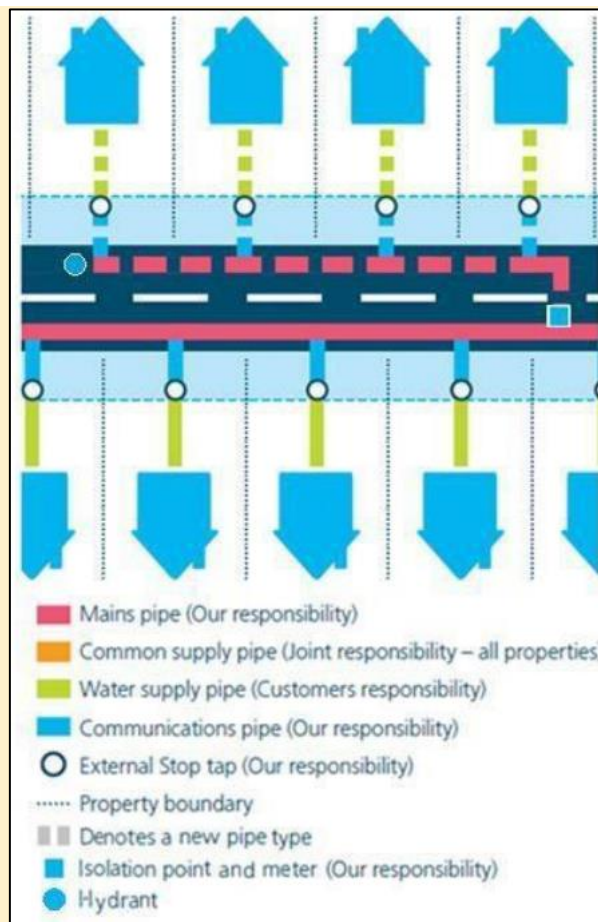


Figure 11: Scenario 1 – Multiple Road Crossing Services in the Road

Scenario 2 – Service/services requested in a road other than that in which the main is laid

1. Where a service is, or services are, requested along a public highway without a main in to the main in a separate road, we may choose to make that service a main to save returning to that same highway for future service connections. Consideration must be given to age of water concerns when doing this unless the extra connections are imminent.
2. In this scenario the developer/applicant would be charged for the service and the cost of upsizing the pipe to a main would be borne by YW as enhancement.
3. Future connections benefit from this as the main is then in the highway; therefore, this must be handled sensitively as the first applicant may feel they have paid for the second applicant's benefit. They haven't because the second applicant's benefit comes from the YW enhancement. Their connection could not be made into the comm pipe of the first applicant.
4. An example is shown in **Figure 12**.

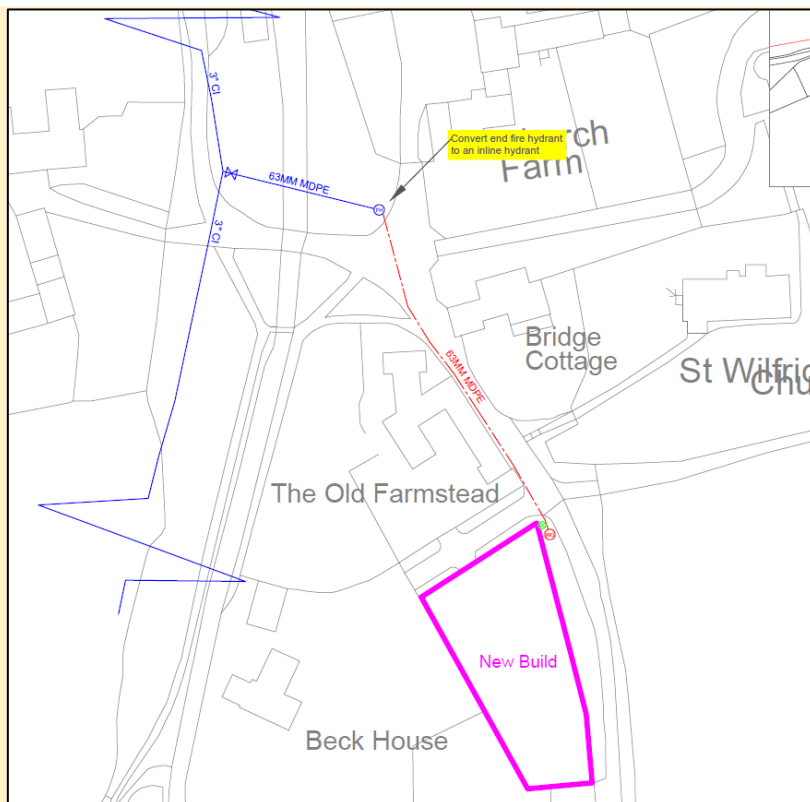


Figure 12: Scenario 2 – Service(s) requested in a road other than that in which the main is laid

Scenario 3 – Where friction losses on long communication pipes (normally 2's and 3's in the same trench) make a single pipe the hydraulically sensible thing to do

1. Long service pipes come with inherent increased friction losses which can be prohibitive and necessitate onwards boosting via pumps with associated carbon footprint. If the length of pipe issue relates to the comm pipes, then we might choose to lay a main in lieu of comm pipes to ensure the OFWAT Low Pressure Standard is complied with at the boundary.
2. Again, the developer/applicant would be charged with the price of the individual comm pipes – the cost of the upsize in pipe will be an enhancement.
3. An example of this is shown in **Figure 13**.

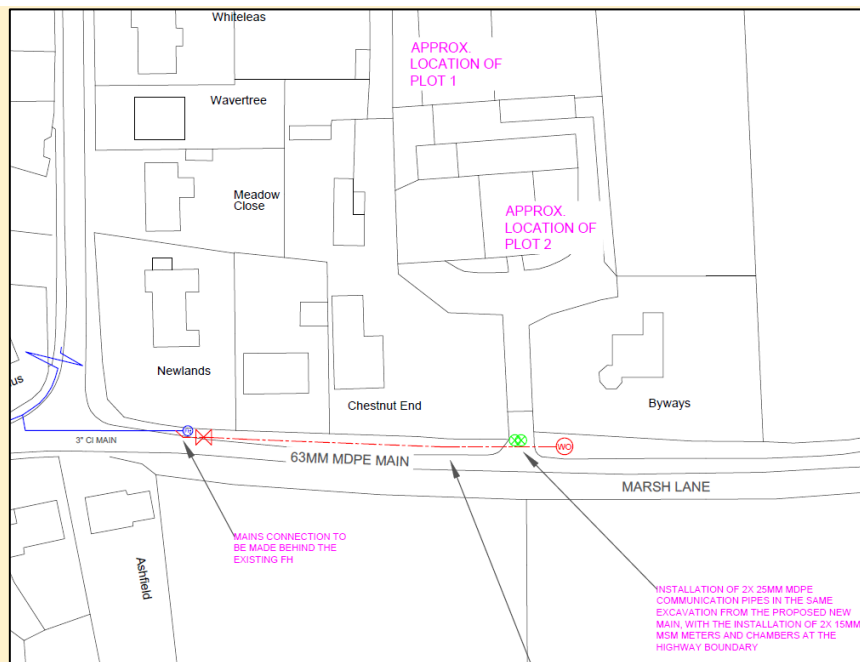


Figure 13: Scenario 3 – Where friction losses on a long communication pipe make a single pipe the hydraulically sensible thing to do

13 Civil Engineering Considerations

13.1 General

The general specification for civil engineering components and materials shall be that of the document “Civil Engineering Specification for The Water Industry” (“CESWI”) 7th Edition which is available from the WRc plc.

The Water Company shall confirm its requirements by reference to CESWI and any additional specific requirements and/or include such in the Schedule of Permissible Materials and Construction in paragraph 21, which as a minimum shall include information and requirements relating to:

- Thrust Restraint and Anchorage
- Puddle Flanges
- Self-Anchoring Joints
- Site Conditions and Ground Bearing Capacities
- Thrust Blocks
- Jointing of Pipes
- Ground Anchorage

All conventional GEN3 concrete thrust blocks to be calculated to F.O.S (factor of safety x2) and WP (working pressure x 1.5). All ground shear strengths to be taken by the designer and used in the thrust block calculation.

13.2 Marker Tape and Tracer Tape

Marker Tape and Tracer Tape shall comply with **The Water Fittings Regulations, CESWI clause 2.76 Marker Tape and Marker Posts** and Yorkshire Water’s additional requirements:

1. Hydrant and valve indicator posts shall be nominally 250 mm x 75 mm x 1350 mm made in concrete. Pipeline field edge marker posts shall be triangular concrete (approximately 100 mm) with the words ‘WATER’ cast in each face.
2. Indicator plates shall be 180 mm x 208 mm x 3 mm with 12 mm radius corners Ref. BS 3251. Fire hydrant plates shall be weatherproof and printed black on yellow on clear unbreakable polycarbonate complete with 4 fixing slots (6 mm x 22 mm). Upper windows 73 mm x 28 mm. Lower windows divided into 3, each 24 mm x 28 mm. Bottom edge of plate shows 9 windows each 14 mm x 14 mm. Adhesive numerals shall be used. All other fittings, sluice valve, air valve, washout and meter, same description but black on.

13.3 Indicator Posts and Marker Plates

Indicator Posts and Marker Plates shall comply with **Figure 14, Figure 15, CESWI clause 5.25 Marker and Indicator Posts** and Yorkshire Water’s additional requirements:

1. If specified by Yorkshire Water, marker and indicator posts shall be erected to show the location of valves and other fittings, changes of direction and at field boundaries.
2. Indicator posts shall be embedded at least 450 mm into the ground, and blend in with surrounding features.

3. Detectable protective mesh tape shall be installed above water pipelines and sewage pumping mains, ducts and cables generally it shall be laid between approximately 300 mm above the pipe after partial backfilling and compaction is complete at a depth of at least 650 mm plus or minus 50 mm below finished ground level. The protective mesh shall be laid in the pipe trench after partial backfilling and compaction is complete. The tracer wire shall be continuous along the length of the main and shall be connected onto a flange bolt on all valves on the mains.
4. Where detectable protective mesh is exposed during the course of any works in and around a pipe then such mesh shall be reinstated to ensure continuity.

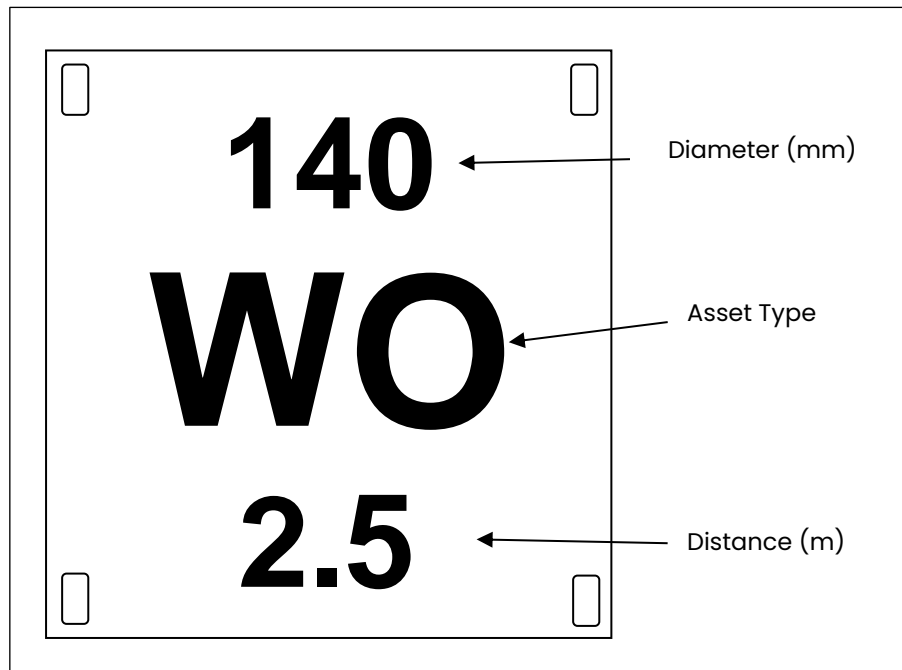


Figure 14: Washout Hydrant / Air Valve / Sluice Valve Indicator Plate

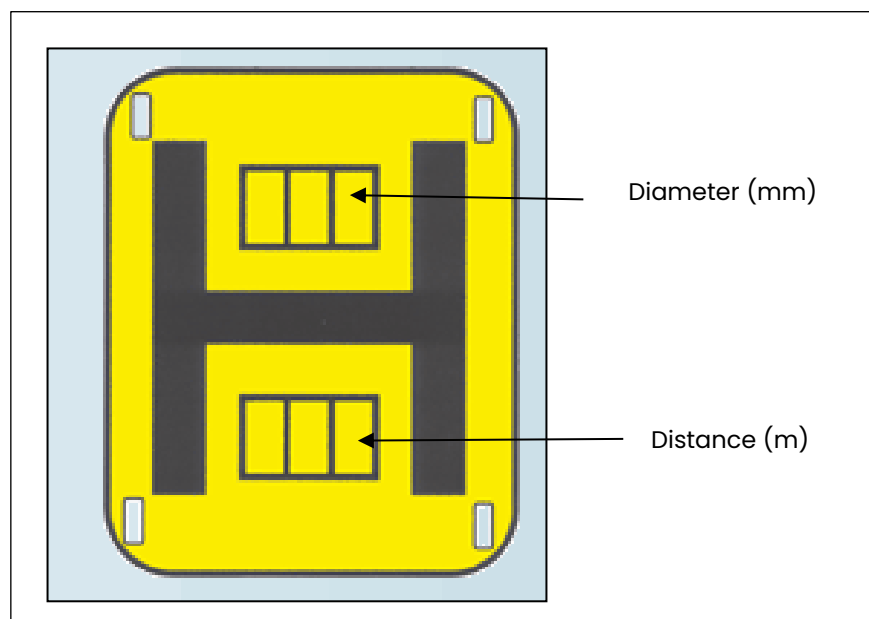


Figure 15: Fire Hydrant Indicator Plate

13.4 Chambers and Covers

Water Company to detail Permissible Materials in paragraph 21. Chambers shall be designed and installed to be of an appropriate size to allow operation of the Self-Laid Mains and service fittings.

Covers shall be designed to be capable of withstanding all potential loads placed upon them and shall comply with BS EN 124.

Chambers and Covers shall comply with **CESWI** clauses **2.124 Surface Boxes and Guards**, **5.16 Precast Concrete Manholes**, **5.17 Brickwork Manholes and Chambers** and Yorkshire Water's additional requirements:

1. Chambers shall be constructed using pre-cast concrete or polymer sections. Chambers should be carefully sited and drained where possible to avoid accumulation of contaminated water.
2. Chambers shall be constructed in accordance with standard diagrams **Figure 40, Figure 41, Figure 42 and Figure 43**.
3. Valve chambers shall have a minimum clear opening of 230 mm x 380 mm. Where there are a number of valves are to be installed within a small area, i.e., a branch connection, then the use of smaller individual chamber can be considered.
4. Air valve fixings of less than or equal to 1" shall be installed in 600 mm x 450 mm chamber, and air valve fixings of greater than 1" shall be installed in 900 mm x 600 mm chamber.
5. Hydrant chambers shall have a minimum clear opening of 230 mm x 380 mm.
6. Frames with a split lid (i.e., a two piece cover rather than a single cover) shall not be fitted to hydrant installations. All hydrants will be fitted with one-piece lids.
7. Covers shall be compliant with the one man lift criteria.
8. The cover and frame shall be level with the proposed finished surface level. The cover / lid should be easily lifted and not obstruct the viewing of the apparatus or operation of the apparatus within the chamber.
9. Covers and Frames shall incorporate a permanent non-rock design feature and have 2 prising slots and 2 lifting keyholes.
10. Covers and frames installed in all areas to which vehicles may have access shall be a minimum grade of B125 according to BS EN 124 or Grade B according to BS 5834.
11. Covers and frames installed in all areas to which vehicles have access shall be a minimum grade of D400 according to BS EN 124 or Grade A according to BS 5834.
12. All chambers for the monitoring fittings should have single man lift lids (not manhole covers). In the footpath or verge B125 lift and slide lids should be used; in the highway D400 split triangle covers which lift and drop/lock in the frame perpendicular to the surface should be used. They should not be locking lids (the cotter pin and locking arm should be removed before installation if the lids are supplied with locks).
13. For Meter installations, the NRV (NRV where required), Strainer and Meter should be housed in three separate chambers whose dimensions are approximately 610 mm x 915 mm with a 600 mm x 900 mm lid to facilitate man entry for maintenance. The chambers should be free draining and should be constructed so that the apparatus and its associated flange work are easily accessible in the chamber.
14. Where the chamber is subject to traffic loading a mass concrete base is required which is GEN 3 class (see CESWI clause 2.20 Concrete - General). The use of packing units is strictly forbidden

however type 1 bedding mortar may be used between the top section (pointed smooth) and the frame up to a depth of 40mm to assist with alignment to the surface level.

15. Installations in soft verges / unmade ground may require a concrete surround plinth (minimum width 150mm) to secure the cover and frame in position.
16. Standard Covers shall be annotated with the appropriate label:

SV = Sluice Valves

WO = Washout Hydrants

FH = Fire Hydrant

M = Chamber in footpath containing ducted out-reader equipment (where required)

13.5 Bedding and Backfill

Materials used for bedding shall conform to WIS 4-08-02 "Specification for bedding and side fill materials for buried pipelines" and material for backfill material shall be in accordance with the NRSWA 1991 the Specification for the Reinstatement of Opening in Highways (3rd Edition).

Bedding shall comply with **CESWI** clause **5.2 Pipe Bedding** and Yorkshire Waters additional requirements:

1. Where the bottom of the excavation is not sufficiently firm and stable to provide a suitable bed for the pipe or fitting, the Contractor shall excavate below the final surface until a firm foundation is reached and the excavation shall be filled up to the final surface with imported material.
2. Pipe bed and surround for GRP pipes should be designed to match pipe properties in accordance with the manufacturer's specification.
3. Structural design of buried polyethylene pipelines and the trench conditions including bed surround and backfill compaction should be validated in accordance with IGN 4-32-18.
4. Material for pipe bedding shall be approved by Yorkshire Water.

Backfill shall comply with **CESWI** clause **3.6 Backfilling** and Yorkshire Water's additional requirements:

1. The use of recycled or reuse of existing materials shall be the preferred method of backfilling excavations. The Contractor shall comply with the manufacturer's recommendations and the Reinstatement Specification when using recycled materials. In Highways, only recycled materials that are approved by the Street Authority shall be used and the Contractor shall comply with any provisions requested by the Street Authority when using recycled materials.
2. Where recycled materials cannot be used, excavations in carriageways or within 1 metre of the edge of the carriageway shall be backfilled with foamed concrete or granular sub-base type 1 and compacted in accordance with the Reinstatement Specification.

13.6 Reinstatement of Highways

Materials and work shall be in accordance with the NRSWA 1991 the Specification for the Reinstatement of Opening in Highways (3rd Edition).

The SLP is responsible for the classification and disposal of waste from excavations in highway accordance with Applicable Law.

13.7 Ducts

Ducts shall not be used to enclose new water mains.

In certain scenarios, YW will permit the use of ducts for off-site main laying to facilitate railway, major roads i.e., Type 0,1 or river crossings, but we will approve these on a case-by-case basis.

SLP Designers shall consult with the Water Company at Design Acceptance stage if ducts are required to be installed by a SLP / Developer.

Where ducts are designed to be laid under major roads or obstructions, they shall be shown to extend beyond the road to ease installation and future inspection.

Service pipe ducting where extending into building to form part of the service entry must facilitate the installation of insulation to Water Fitting Regulations.

The service pipe shall be ducted where it enters the property (i.e., it should not rest on brickwork).

Where communication / service pipes cross a road, they shall be laid in separate ducts coloured blue.

The ducts shall be a minimum of 50mm diameter and rigid, having proprietary, self-aligning, watertight joints and a smooth internal bore.

Ducts should be installed at 90 degrees to the point of connection and extended beyond the kerb line by a minimum of 750 mm.

Ducts shall comply with **CESWI** clause **2.91 Pipes for Ducts**.

14 Metering Requirements

14.1 Standard Domestic Metering for Individual Dwellings and Multi Occupancy buildings

14.1.1 Meter Specification

Specification for the installation of wall mounted meter boxes or meter chambers:

1. Developers can install either wall mounted boxes or conventional meter chambers as long as they are WRAS and WRc approved. Yorkshire Water has assessed the risk of joint leakage and does not accept the use of in-wall meter chambers. The box or chamber should be fitted with a 15mm manifold meter with compatible AMI unit (sourced from YW Preferred Meter Supplier). An additional clearance of at least 50 mm above the top of the meter must be available to accommodate the unit.
2. Excavate the trench from the property to the water main, or edge of property boundary at a depth which gives the pipework 750 mm of cover.
3. Fit the pipework from inside the property to either the wall mounted box or meter chamber. Meter and chamber boxes should only be fitted on the front face of a property or outbuilding, or the side of a property within 1.5m of the front face.
4. Fit the box or chamber, ensuring all joints are water tight.
5. Lay an un-jointed length of pipe from the box or chamber, leaving enough pipe for Yorkshire Water / SLP to connect to the water main. Pipework should be capped with a mechanical fitting (this will be returned to the developer once the connection is made).
6. Yorkshire Water will not be held responsible for blockages in the pipework once the connection is made. Please ensure all pipework is free of debris prior to fitting a cap end.
7. All pipework should be marked up to identify the plot it will be feeding.
8. Excavate around the water main for the service connection to be made by Yorkshire Water / SLP (new sites, ferrule only option). If Yorkshire Water / SLP is connecting to a main in the highway, sufficient unjointed pipe from the stop tap should be left to allow the connection at the boundary to be made to avoid the installation of additional fittings and pipework.
9. Backfill all excavations with appropriate backfill material but leave open the joints at the meter chamber until connection is made.
10. All service pipe connections and meter installations must comply with the manufacturer's instructions and the Water Supply (Water Fittings) Regulations 1999. Failure to comply will mean delays to your connection and possible abortive visit charges.
11. Once the connection is made, Yorkshire Water's installer / SLP will fit the meter and collect the property details.
12. All pipework installed by the Developer / SLP should be clean and free from debris. The end of each pipe should be fitted with a mechanical fitting to protect the pipe from ingress, this will be returned to the Developer / SLP once the connection has been made.
13. All meters shall be fitted with an AMI unit to enable them to be read from outside the property. This ensures customers are not inconvenienced by needing to provide access to meter reader every 6 months.

14. It is the Developers / SLPs responsibility to install the manifold into the plumbing system which will hold the water meter. YW will provide this manifold at a cost, if requested.
15. YW must be able to safely and comfortably access the meter to maintain and exchange it if it becomes damaged. The meters should be installed at a height no higher than 1.5 m and a meter reader must be able to comfortably maintain and exchange it in the future.
16. The meter should not be enclosed or built over.
17. If the ground has been identified as being contaminated, then ensure a boundary box is used that is suitable for contaminated ground.
18. Boundary boxes shall be laid on a 100mm foundation of concrete.
19. Telescopic boundary boxes should have a mechanism fitted to prevent the tube dropping over its lifetime.
20. The boundary box must have a rectangular/square cover frame.

14.1.2 Manifolds

Where a communication pipe crosses a street to several properties, a manifold can be used. The SLP shall choose a single or a 4-8 way manifold (or a mixture of them) that fit the space into which the meters will be placed (examples are shown in **Figure 16**). The SLP shall decide if they will provide these themselves or request them from YW.

Multi manifold boxes can be used as an alternative in non-trafficked areas where space is an issue due to existing underground utilities.

A large stop tap shall be installed on the inlet to a manifold to enable the manifold to be exchanged.

1. The meter installer can safely and comfortably access the manifold and install the meter.
2. Immediately upstream of each meter a check valve and a drain cock shall be installed.
3. Each pipe shall be tagged to indicate the apartment/unit it supplies.
4. A stop tap (closed) is fitted within each apartment/unit.
5. The manifold must be secured to a wall. If being placed in a meter cupboard, the meter will protrude 250 mm (10") from the wall.
6. If using a single manifold, there needs to be at least 160 mm between the centres of each manifold to provide enough space to enable the meters to be screwed in. This installation shall comply with **Figure 49**.
7. If using a multiple manifold, there needs to be at least 90 mm space at either side of the manifold to accommodate the meter and space to fix it.

Fitting a manifold shall meet the following requirements and those described above. If a YW meter installer turns up and the pipework is not correct, the YW meter installer will not fit the meters and the developer will be charged for any abortive visits.



Figure 16: Manifold

14.1.3 Fitting Meters Process

After fitting the meters, the SLP shall complete the **Meter Installation Form** providing the postal addresses of the properties being connected.

Please Note: YW will not install meters if the pipework does not comply.

All new premises should be fitted with a water meter within 5 working days of being connected to the water network. All meters fitted must include an AMI unit sourced from YW Preferred Meter Supplier. This is to ensure that all meters meet YW specifications. All meters must be fitted with the compatible radio read capability.

YW may help with the provision of a small number of meters from our nominated supplier, details of whom will be provided on request.

SLP's wanting to make use of Yorkshire Water's metering facility should request this through the relevant form to raise a rechargeable order for the number of meters requested.

SLP's are expected to procure and fit all meters on standard connections. Notification by Weekly Whereabouts is required.

Once the service connection is made and the meter fitted, notification and details are required within published LoS requirements.

14.1.4 Meter Pits

WRAS approved meter tubes. Large pits Sectional chamber systems, dimensionally compliant with BS 5834. Large covers and frames for meter chambers (all grade B125) must be lift and slide. Manifold meter pits are to be laid as close as practical to the property boundary and no further away than 0.50 m away.

14.1.5 Metering Non-Standard Service Connections

Metering of non-standard connections will be dealt with on an individual basis, please contact YW to discuss.

14.1.6 Multi Occupancy Buildings

Multi Occupancy Buildings includes all new or converted multi-occupancy domestic premises and includes flats, sheltered accommodation or other circumstances where domestic units are or may be under separate ownership or occupation. YW prefer each domestic premises to have a separate stop tap and a billing meter,

wherever practicable, to minimise disputes and to provide a simple method for charging individual occupiers instead of a Common Billing Agreement.

On the wall meter boxes are only capable of housing 15 mm meters, if your meter will be larger than this, then YW will install an appropriately sized meter chamber at the site boundary.

14.1.6.1 Single and Two Storey Buildings

There should be no problems in providing separate services and standard meter installations to single or two storey developments. The installation method for 4 or more supplies in a single trench is a single, under-pressure mains connection (63mm) with a 4-8 way multiple outlet manifold with 15mm manifold meters.

If communal facilities are to be installed in the premises (e.g., laundries, garden taps, visitor toilets) these need to be separately supplied and metered charges levied to the building Management Co., Tenant Association, or landlord.

14.1.6.2 Three or More Storey Buildings

The installation of separate service pipes becomes problematic when dwellings consist of three or more storeys as a lack of pressure can prevent mains water from reaching the upper storeys by gravity feed. Therefore, on site boosting and or pumps may be required, and consideration will therefore be given to providing a single large diameter service.

In such circumstances a single metered large diameter supply and rising main within the property will be allowed if provision is made for separate charging of individual dwellings at the time of installation and at the developers cost by the installation of a meter at the end of each communication pipe which meters the whole of the supply to the individual dwelling.

The options for charging are then as follows:

1. The owner of the block, landlord, Management Co. or Tenant Assoc. take legal responsibility for all charges based on the communal meter installed on the large diameter service by completing a Common Billing Agreement. They in turn recharge individual unit owners / occupiers based on a private agreement by apportionment of the metered charges or based on actual consumption recorded by individual meters fitted to each unit. They must ensure pipework is configured for meters to be installed if sold off at a later date.
2. The individual meters fitted to each unit are billed direct to each owner / occupier and the communal external meter is set up as a check meter for leakage detection purposes.

There will be a substantial length of common pipe-work within the property that is at risk of leakage. Individual meters fitted to each unit will not record this leakage. The common check meter fitted externally will record this leakage, but it would be difficult to isolate a leakage charge to the landlord, Management Co. or Tenant Assoc. unless all meters were read at the same time and set up as a Main-Sub set up. It is, however, unlikely that internal leaks will remain undiscovered for any length of time, and therefore potential revenue loss will be negligible.

The External meter would also show usage of any external illegal connections and would help the owner / management company monitor the usage.

14.2 Non Household Meters

Please refer to our NHH Meter Installation, Replacement & Repair Policy on our website:

<https://www.yorkshirewater.com/media/emjdf5ga/yw-meter-policy-v2-0-external.pdf>

Acceptable NHH meter location and layout arrangements can be found in:

- **Figure 45: Manifold Assembly Installation including Meter**
- **Figure 50: Standard Drawing for an Internal In-Line 20 mm – 39 mm Meter Installation**
- **Figure 51: Standard Drawing for an Internal In-Line 20 mm – 39 mm Meter Installation in a Kiosk / Meter Box**
- **Figure 52: Standard Drawing for an Internal 20 mm – 39 mm Meter Installation Requiring Diversion**
- **Figure 53: Standard Drawing for an Internal In-Line 20 mm – 39 mm Meter Installation**
- **Figure 54: Standard Drawing for an External Meter Installed in a Precast Concrete Chambers for meters 15 mm, 20 mm, 25 mm, 30 mm, and 40 mm in-line PSM Meters**
- **Figure 55: Standard Drawing for an Installation of a 20 mm – 39 mm Meter in Place of a Flanged Meter in an External Precast Concrete Chamber**
- **Figure 56: Standard Drawing for an External In-Line 20 – 39 mm Meter Installation in a Precast Concrete Chamber**
- **Figure 57: Standard Drawing for an External 20 mm – 39 mm Meter Installation**
- **Figure 58: Typical Meter Set Up – In Line – Standard Design**
- **Figure 59: Typical Meter Set Up – On A Bypass – Standard Design**

14.3 NAV Meters

All water supply connections require bulk metering arrangements to be in place. In accordance with the industry standard bulk supply agreement a water meter is required to be capable of accurately measuring both the volume and the rate of flow of the supply.

All NAV sites shall have a billing meter. NAVs have the requirement to maintain supplies to their customers. Therefore, the NAV meter installation shall include a Non Return Valve (NRV) to protect YW's network from ingress or cross contamination.

The defined meter size dictates the size of the pipework between the tapers and by default the size of the strainer and NRV (and flow plate if deemed necessary).

If a NAV site is being built in several phases or over several years, the initial meter size may be smaller than will be required at the final site completion. This is to make sure that low flows are captured through the early phases of the build.

The meter has a dual purpose. The primary purpose is billing and revenue generation. The secondary purpose is to deduct the flow from the DMA (or TM zone) of the host main. The meter type is specified by the term contract for billing meters (contact YW for more information). To provide information for the purposes outlined above a splitter should be installed on the data management connection to the meter to allow AMI and concurrent logging.

The pressure port on the meter body should have a quick release pressure tapping installed to allow connection to the pressure port.

Where work is contestable, YW can provide the metering equipment free of charge to an Accredited Entity to install, if this is requested in advance of installation. However, the NAV can choose to procure the equipment itself so long as the equipment meets the required design specifications as dictated by YW.

14.3.1 NAV Meter Installation Specification

1. Up to 500 properties or 5 l/s requested peak flow: the design will include an in-line meter, strainer and non-return valve (NRV), as shown in **Figure 62**. It does not have a bypass. If the NAV requires a bypass, this can be accommodated however, the NAV will pay the costs associated with the installation of the bypass.
2. 500 properties and above or > 5 l/s requested peak flow: the design will include either an in-line meter with a bypass or meter on the bypass, whichever is applicable to situate the meter in the footpath / verge, as shown in **Figure 63**. It will also include a strainer and NRV.
3. The size of the meter, strainer and NRV size are dependent on the number of properties and the requested peak flow, as shown in **Table 14.1**. If a NAV wishes to upsize the meter, this can be accommodated, however the NAV will pay the difference in cost for the larger meter and upsizing of the associated fittings.
4. All meter installations should have a logger installed to measure the flow and pressure. Monitoring fittings should be installed between 750 mm and 1200 mm deep (to pipe centre) and should be installed within chambers which are large enough to allow access for maintenance and repair. If for any reason the monitoring fittings must be located in the carriageway, then a duct and chamber in the footpath should be installed to carry the monitoring equipment out of the road to minimise the access required in the carriageway.
5. A Cyble 5 AMI unit should be fitted to the meter and a splitter should be installed to carry the signal to a billing device and the logger.
6. A pressure tapping should be installed on the meter body and a flexible hose used to connect the tapping to the logger.
7. Where appropriate a three way tee connection should be made into the host main.
8. Hydraulic Modelling should be utilised to identify network impact and reinforcement.
9. A Non Return Valve (NRV) is required on all NAV connections, to protect the YW network from back flow from any NAV that chooses to feed their properties by emergency means which may be supplied at a greater pressure than the host main. The NRV can be of any hinged gate type WRAS approved flanged manufacture.
10. A flow restrictor plate may be installed where YW consider it necessary to protect YW's network from excessive flow. Only if modelling shows the host network as being vulnerable at flows marginally, but not significantly greater than the requested maximum peak instantaneous flow as calculated from the build schedule final total, then a flow restriction plate should be purchased. This should be sized to fit in between flanges on the outlet of the NRV (or after the meter). Fitting the flow plate here will not interrupt the laminar flow into the meter which would cause the meter readings to be inaccurate. The flow restriction plate (if required) will be free issues by YW.
11. Unless specifically requested by the NAV (e.g., in the very rare situation where a connection out of a high-pressure trunk main has been approved by YW) no pressure management infrastructure should be designed as part of the NAV connection, regardless of the static head at the point of connection. The NAV is responsible for controlling pressure to its customers and for utilising pressure management to assist with internal leakage should it wish so.
12. A Strainer is required to protect the meter. The strainer shall comply with section: **14.3.2 Strainer**.

13. All fittings installed as part of the NAV connection should be standard WRAS approved fittings and comply with section **11.7 Controlling Valves and Valve Operation** and **11.8 Washout and Fire Hydrants**.
14. The Chambers / Covers and Frames shall comply with section **13.4 Chambers and Covers**.

Table 14.1: NAV Meter Size

Number of Properties	Peak Flow l/s	Meter Size
1 – 399 properties	Peak flow less than 4 l/s	50 mm
	Peak flow between 4 – 5 l/s	50 mm
400 – 500 properties	Peak flow less than 5 l/s	50 mm
501 – 1,200 properties	Peak flow between 5 – 12 l/s	80mm
1,201 – 2,500 properties	Peak flow between 12 – 25 l/s	100mm
More than 2,500 properties	Peak flow more than 25 l/s	By exception, bespoke design

14.3.2 Strainer

1. Where strainers are required, they shall be sized equivalent to the meter.
2. The strainer can be of any approved manufacture and should be top opening and of a mesh thickness which will capture particles which would damage the meter but not so thick as to cause significant hydraulic restriction.
3. Strainers shall be installed upstream of the meter and under no circumstances should the strainer be bolted directly to the meter.

15 Water for Firefighting

15.1 Fire and Rescue Service (FRS) Consultation

Pursuit to Section 43 (1) of the Fire and Rescue Act 2004 a plan showing adoptable washouts shall be sent to the FRS for consultation purposes, along with this plan shall be a location plan and a covering letter **from the designer of the water mains**.

Water Companies to provide FRS contact upon request from an SLP.

The FRS have the statutory period, 42 calendar days, to respond with their requirements in respect of adopting hydrants for firefighting.

Hydrants to be adopted shall be then marked on the drawing.

15.2 Location and Flow from Hydrants

Ordinarily, water companies do not design distribution networks for firefighting purposes. It should be expected that flow from fire hydrants would be in line with minimum standards on the water distribution network.

See also Water UK Guidance: <https://www.water.org.uk/guidance/national-guidance-document-on-the-provision-of-water-for-firefighting-3rd-edition-jan-2007/> (in particular, those details referenced in Appendix 5 regards flow from fire hydrants).

YW complies with statutory requirements to provide water for firefighting purposes. YW will, if requested, confirm if the existing water network is able to meet the flows and pressures for any proposed firefighting purpose. If the required flow and pressure can be achieved, it must be noted that YW cannot guarantee that they can be sustained in the future.

The SLP designer is responsible for contacting and providing the relevant Fire and Rescue Service with all information needed to assess firefighting requirements. All financial transactions relating to the provision of firefighting equipment shall be between the relevant Fire and Rescue service and Developer / SLP.

Fire Hydrants shall only be installed on mains equal to or greater than 90 mm outside diameter. The coverage of Fire Hydrants and Washout Hydrants together shall ensure one hydrant is available for every 50 properties, or every 80 m whichever is the least distance. The end of each leg of a main which doesn't terminate within a building shall be fitted with an end hydrant. Further information in section **11.8 Washout and Fire Hydrants**.

Note: YW may refuse to connect any new mains where the agreed firefighting equipment has not been installed, or where a Fire and Rescue Service hasn't been provided with adequate opportunity to provide their requirements.

The Through Bore Hydrant is the only approved choice of hydrant within the Yorkshire region. The installation of standard hydrants will be prohibited in Yorkshire and the Through Bore hydrant will only be the only accepted fitting. However, YW will consider the use of other hydrants on a case-by-case basis. After assessment and approval, these hydrants will be added to the approved materials list.

15.3 Dedicated Fire Service Pipes

Dedicated fire **service pipes** shall be designed and constructed in accordance with Water Supply (Water Fittings) Regulations 2016 and fitted with backflow prevention, spiral wrapping and appropriate marker tape.

In line with the Water Act, YW do not guarantee to maintain any particular flow or pressure to dedicated Fire Service Pipes or firefighting equipment. YW do not accept liability in the event of the water supply to firefighting equipment failing. YW will advise the flow and pressure under normal circumstances, however if there is a leak or other issue on the network, then YW may not be able to guarantee the water.

YW do not have a separate application for fire service pipes. The application and design process will be treated the same as a standard service pipe.

If immediately outside the proposed building there isn't a suitable main, the Fire Service Pipe may need to be laid and connected to the current network at a further away point.

15.4 Fire Sprinkler Systems

In the absence of any information from the Water Company, SLP Designers shall refer developers to the policies within the building regulation when requests for sprinklers are being made, these documents, "Document B (Fire Safety) – Volume 1: Dwellings and Volume 2: Buildings other than Dwelling houses", can be obtained on the UK Government Planning Portal at: <https://www.gov.uk/building-regulations-approval>

It is recommended that the SLP Designer consults with the Developer who is responsible for seeking advice from a specialist provider of sprinkler systems (where one is required) relative to the Site and/or Development.

Further guidance on installing domestic fire sprinkler systems is presented within YW's 'Policy and Guidance on Installing a Domestic Fire Sprinkler System'; available on YW's website:

<https://www.yorkshirewater.com/developers/water/mains/>

YW cannot guarantee pressure or flow above the minimum guaranteed standards set by the OFWAT of 10 meters head pressure with a simultaneous flow of 9 litres per minute measured at the boundary of the property (for a single property). These Levels of Service exist to protect the drinking water supply and are not applied to the supply of water for fire sprinklers.

16 As Laid (As Constructed) Drawings

The Water Company's asset data is typically recorded on a geographic information (digital mapping) or CAD systems. Therefore, it is important that accurate and compliant location information is supplied to the Water Company in a format agreed with the Water Company and which shall be specified by each Water Company in the Schedule of Permissible Materials and construction.

The approved design drawing shall be updated and amended in accordance with all changes to as constructed installation whenever there is a deviation from the approved design (note: all changes to an approved design shall only be made with the acceptance of the Water Company as per Level of Service measure S2/1b). **Approved site layout / plan – black and white allows accurate location / placement of assets in relation to background map on Odyssey / GIS). Draw in colour any New Mains, New Fittings, and any network / assets which have been abandoned / diverted as part of the scheme.**

The “as-laid / as-constructed / **as-built**” installation shall be in accordance with the approved design and with any changes to same approved by the Water Company as any deviation not agreed by the Water Company from the approved design shall be a Defect and the Water Company may require such to be corrected prior to adoption of the installation.

The position of all installed apparatus shall be recorded to ensure locational accuracy (the position of apparatus shall be recorded relative to a minimum of two fixed (geographical or otherwise) features adjacent to the installed apparatus and the measurements shall intersect the centre of the new asset and if available is to be referenced by British National grid reference).

Positional accuracy is to be measured and recorded, wherever practicable, to a minimum GPS accuracy of ± 100 mm to the centre of the apparatus.

Surveys for Self-Lay Works shall be carried out using triangulation, i.e., two measurements taken from fixed features. They should intersect at the centre of the asset in the following order of priority:

- corners of buildings, and
- corners of boundary walls.

Surveys done using offsets, i.e., using a single measurement (usually along the length of the Self-Laid Main) in accordance with the following order of priority:

- building lines, and
- kerb lines.

Temporary and natural features should only be used when no other permanent features are available, with the agreement of the Water Company. **Measurements must not be taken from curved kerb lines or walls etc.**

Scaled survey drawings should be provided. The scale shall be to 1:500 (unless otherwise agreed with the Water Company) to ensure clarity of applicable measurement and features. **A minimum scale in urban areas must be 1:500 and in rural areas must be 1:1250 to ensure clarity of measurements, features etc. On large schemes, drawings showing the overall route of the scheme must accompany the survey drawings and be provided at a scale no smaller than 1:2500.**

Material, pipe size, external and internal corrosion protection of pipe, and the depth of cover to Self-Laid Main (where depth differs from standard) shall be identified. **The type of lining in a pipe must be identified and the date the pipe was re-lined if applicable.**

All valves, hydrants, washouts, meters, ducts, swab access points, tappings, tees, Service Pipe(s) and boundary boxes shall be clearly identified, together with the relevant fitting on the plan and/or in an accompanying legend. The legend should be consistent with the Water Company' Schedule of Permissible Materials and construction.

Where a number of assets are installed adjacent to each other, suitable asset information (increased scale extracts) are to be incorporated and clearly referenced as a subset of information from the Self-Laid Main "as-laid / as-constructed" drawing.

The full dimensional references for all pipes and fittings shall be indicated (e.g., material, diameter, SDR) at any change in details, and measurements shall be in millimetres.

The position of the apparatus must be recorded to ensure locational accuracy where changes in the characteristics of the assets have occurred.

- a. Every significant change in direction e.g., Road crossing.
- b. Every change in attribute e.g., changes in diameter, material type, lining type etc.
- c. Every junction of mains or connections.
- d. Those fittings located within chambers must be accurately shown e.g., all valve types, hydrants, meters, strainers.
- e. When a main is continuous, and there are no bends, fittings, changes of attributes etc, then measurements along the main must be taken at 50 metre intervals.
- f. Depth measurements, to the top of the pipe, must be recorded at 50 metre intervals or more frequently if depths do not fall within the 0.9 to 1.0 m standard.

Clear differentiation should be made between live and decommissioned Water Mains and associated fittings. Decommissioned Network assets may be shown on a separate drawing, if required.

As-laid / as-constructed drawings shall be submitted with any request to commission any completed work. Such shall be clearly labelled with the Developer's name, scheme number, scheme name, scheme type, stage, number, and date of submission.

Satisfactory as-built drawings should be submitted to Yorkshire Water prior to connection of the new main to the company's network. As built drawings should comply with the Section 16 As Laid (As Constructed) Drawings. Drawings should be submitted electronically to: SLP_Mailin@yorkshirewater.co.uk

All 'as built' drawings received into SLP_Mailin@yorkshirewater.co.uk, inbox will be subjected to a desktop survey by the Developer Services Inspector, followed by a sample site check by the asset data mapping team, to ensure they meet the required standards.

The following data requirements should be provided when submitting 'As-Laid' Drawings:

1. **Scheme Title Block:** Ensure the following data is shown in the 'as built' Title block (**Figure 17**).
 - a. Scheme Title / Address
 - b. Scheme Cost Code
 - c. Easting & Northing – grid ref must be provided. Taken from an Arbitrary point centre of scheme.
 - d. Description of works – actual length, diameter and material of mains laid.


 <p>YorkshireWater New Supplies, Service Centre - Water, P.O. Box 52, Bradford, BD3 7YD Tel: 01274 608008</p>			
SCHEME TITLE: CHERRY TREE DRIVE FARSLEY LEEDS LS28 5SP			
SCHEME DETAILS: 56MTRS OF 63MM MDPE 18.06.2015			
DEVELOPER: CHARTFORD HOMES			
DESIGNER:	LOUISE WHITAKER	X1DEV No:	17737305
DATE:	26/03/2015	ORDER No:	ML12 - 17933393
SCALE:	1:250	ORDER No:	ML10 - 18090254
GRID REF:	421889 / 435471	FIRE REF:	NO REQUIREMENTS
ICE REF:	P662242	DRAWING No:	B.5.046.1023

Figure 17: As Built Drawing Scheme Title Block Example

2. **Legend:** If it is on the plan, it must be shown in the legend (Figure 18).

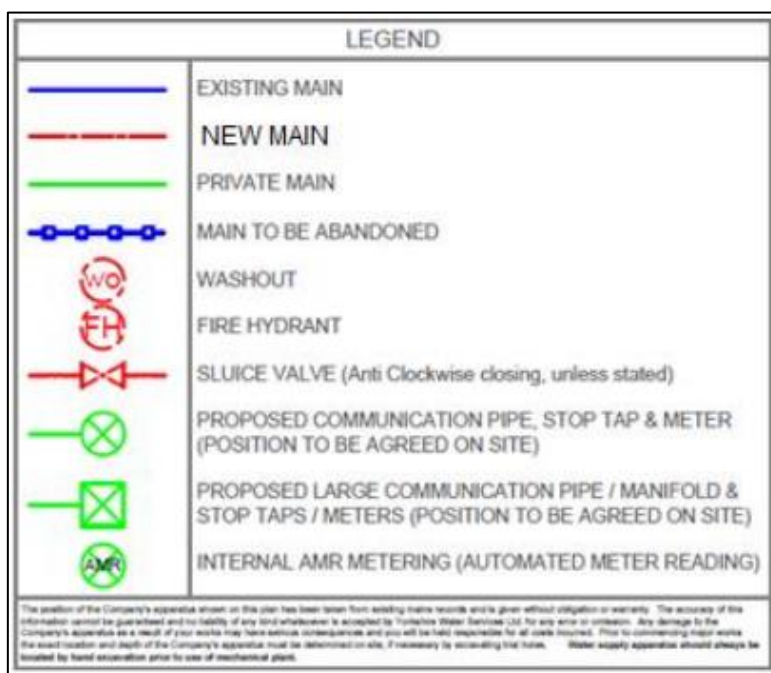


Figure 18: 'As Built' Drawing Scheme Legend Example

3. **Plan Drawing:**
 - a. Plan clearly showing the extents (start & end) covered by the scheme, providing ALL the following data requirements defined above.
 - b. Examples of 'As Built' Drawings are provided below (Figure 19, Figure 20, Figure 21, Figure 22 and Figure 23).

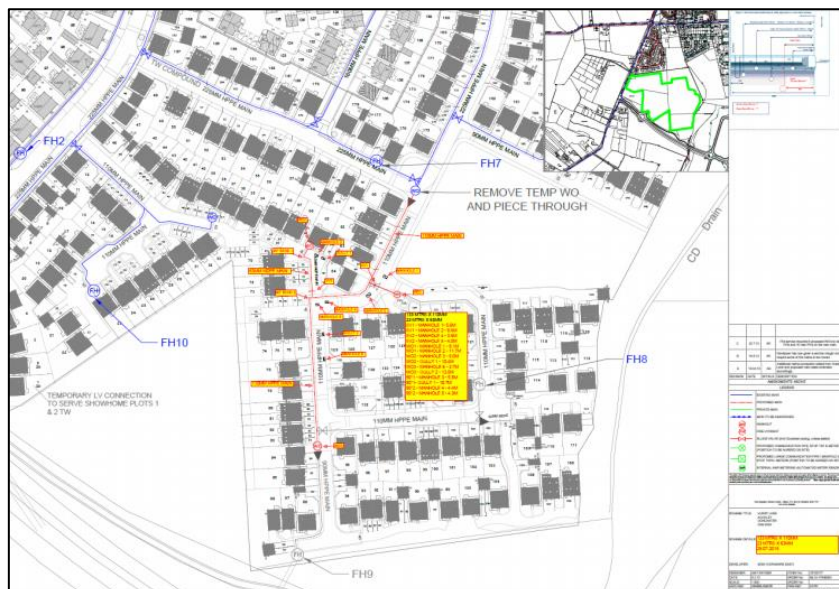


Figure 19: Example 'As Built' Drawing

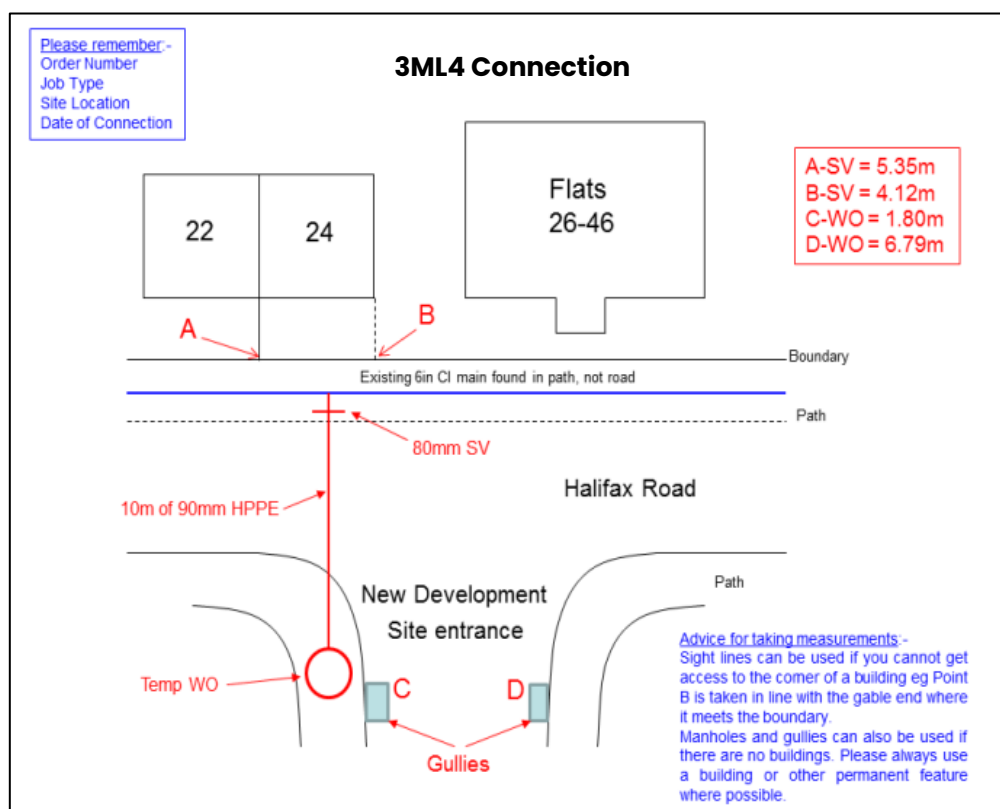


Figure 20: Example 'As Built' Drawing - 3ML4 Connection

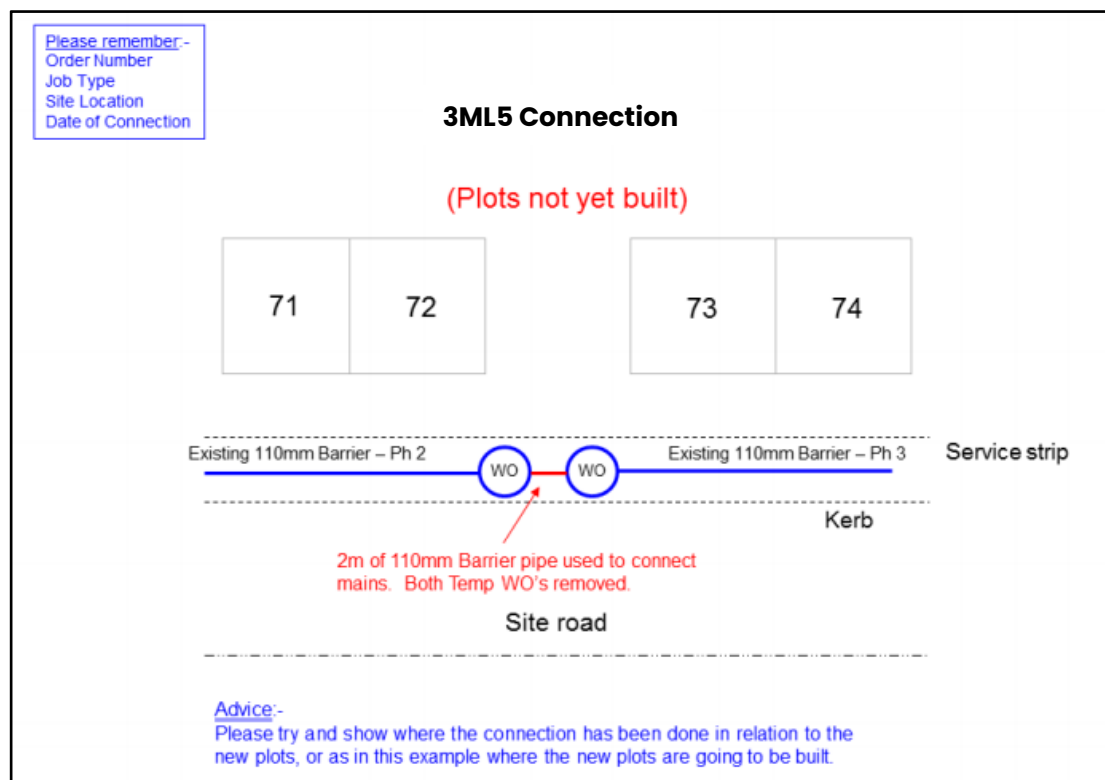


Figure 21: Example 'As Built' Drawing – 3ML5 Connection

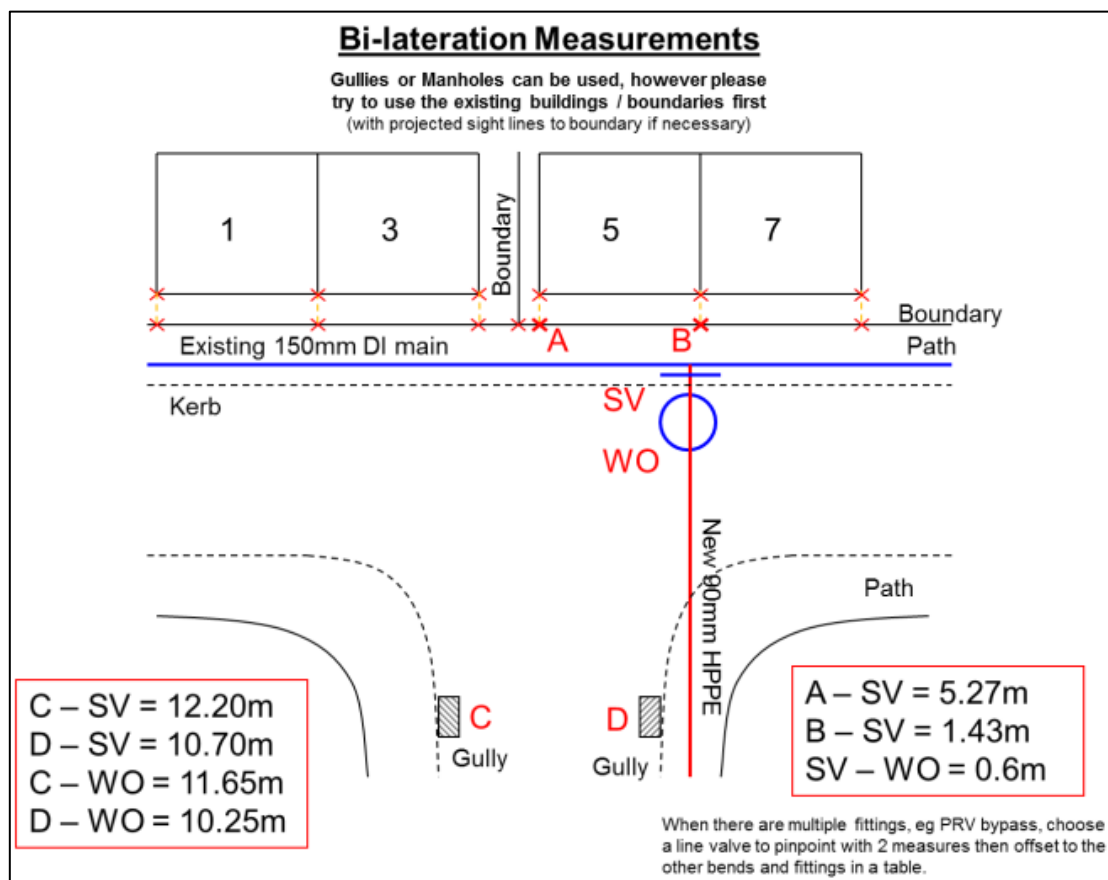


Figure 22: Example 'As Laid' Drawing – Bi-Lateralation Measurements

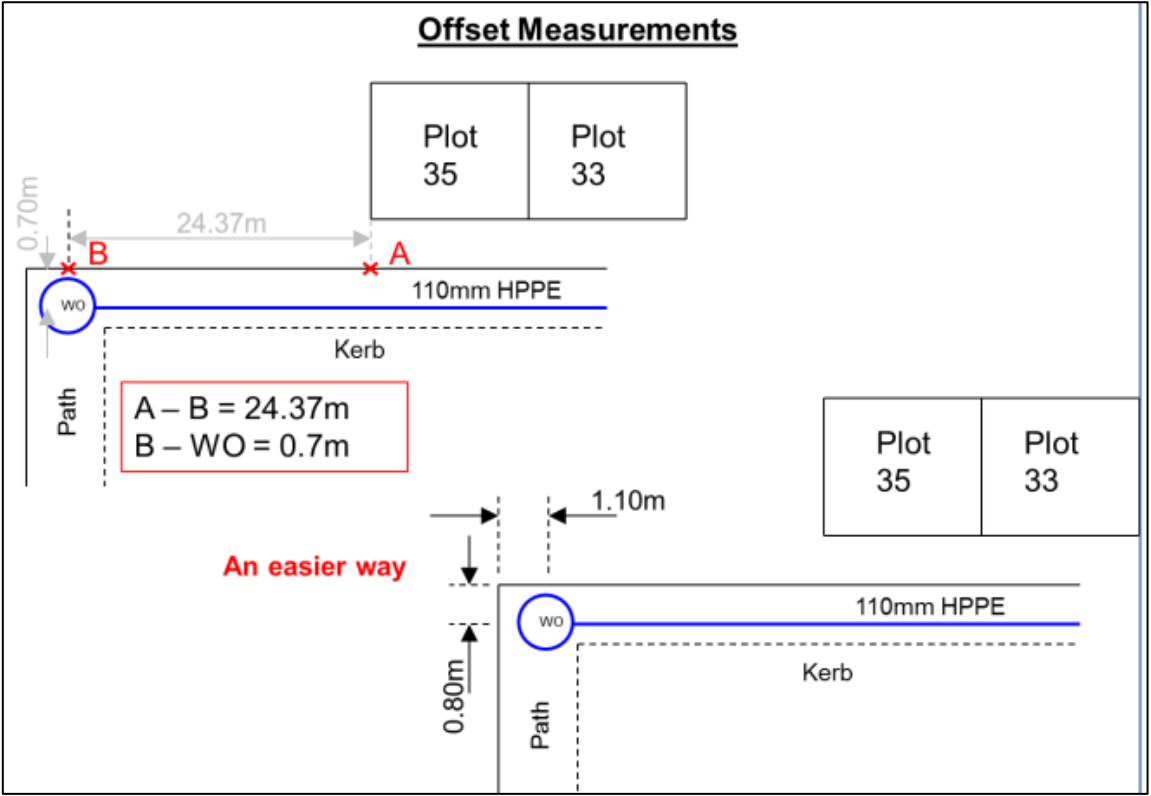


Figure 23: Example 'As Laid' Drawing – Offset Measurements

17 Self-Laid Main and Services Commissioning

To enable the commissioning of new assets to take place the Water Company shall provide its flushing, super chlorination and sampling requirements including minimum training requirements for samplers e.g., as per the Water Regulations under ISO / IEC 17025 may be deemed appropriate.

YW require SLP personnel laying new mains and services to hold registration under the National Water Hygiene Scheme. Ideally, relevant personnel should have current certification to at least NVQ level 2 in Network Construction Operations.

A compliant pressure test should be carried out which demonstrates the Self-Laid Main to be free of air and leaks. Certificates shall be provided by the SLP to the Water Company confirming a compliant pressure test.

Before flushing into a public combined or surface water sewer the developer shall contact and obtain approval from the local wastewater company, Environment Agency, Highway Authority or other, as appropriate.

In addition, the Water Company may include further guidance in its Schedule of Permissible Materials and construction in paragraph 21 setting out its requirements for the provision of Testing and commissioning.

17.1 Mains Flushing

In accordance with the Principles of Water Supply Hygiene and associated technical guidance notes (see in particular TGN02 and TGN03 <https://www.water.org.uk/guidance/principles-of-water-supply-hygiene/>) it is a requirement that there is always a sufficient turnover of water on all potential dead-legs of main or sectional lengths and a regular flushing of these mains shall be undertaken to satisfy water quality requirements.

Accordingly, a suitable flushing regime is to be agreed in respect of the construction programme of the Self-Laid Main. The responsibility for work and related costs is set out in the WAA. The Water Company must publish details of its policies and practices regarding flushing regimes on its website and provide a copy of these policies to the SLP upon request.

Note: Operation of existing valves shall only be in accordance with the Water Company's published guidelines in this DCS.

The Water Company may seek to recover the cost of flushing work where a delay to the proposed Delivery Date occurs as a consequence of a failed pressure test and/or mains sample. This will likely delay the mains connection date and subsequent installation date of new service connections and hence an appropriate flushing regime to protect water quality will be required to be agreed with the Water Company who reserves the right to revert to a flushing regime operated and managed by the Water Company with costs recovered.

Prior to any end washout on any phase / section of main the SLP may install a temporary or permanent sluice valve and if the washout is to be used for flushing or building water with a standpipe then it shall be an approved metered standpipe in accordance with the Water Company requirements.

The SLP is responsible for ensuring that the Developer secures all required permits and agreements for flushing, identifies where water can be flushed to and disposed of and, where the Water Company is to undertake flushing, is able to indicate whether water is required to be de-chlorinated first.

As a general rule, it is unnecessary to consider cleansing velocities, except the need to discharge a volume (twice the pipe's volume will ensure complete turnover) from a washout at the end of the main.

The Water Company has a responsibility to ensure that its customers are not affected by discoloured water which may be caused by flushing out mains so when discharging water, it is important to keep velocities in the pipe under control to avoid discolouration upstream.

Suggested guideline is to limit flow velocity to no greater than 0.2 m/sec with the need to turn over mains water at least once per week, and examples are detailed in the table below.

Table 17.1: Example Guidelines

Pipe Size (mm)	Internal Diameter (mm for PE)	Imperial equivalent	Area m ² and Volume in m ³ per metre	Volume in litres per metre (rounded off)
63	50	2 inches	0.00196	2
90	80	3 inches	0.00502	5
125	110	4 inches	0.00950	9.5
180	158	6 inches	0.01960	19.6
225	198	8 inches	0.03079	31
250	220	8 to 9 inches	0.03801	38
315	278	11 inches	0.06069	61
355	312	12 inches	0.07645	76.5

17.2 Not Used

17.3 Mains Bacteriological Sampling

All sampling and data relating shall be undertaken by an approved UKAS accredited analytical laboratory that will confirm and provide all results and required reports relative to:

- Incoming main sample(s).
- New mains sample(s) - result(s) for each length of new main to be commissioned and connected to existing water supply distribution network.

Table 17.3: Criteria for passing new mains samples

Parameter	Unit	Standard
pH	pH Units	6.5 – 9.5
Colour	Hazen	< 10
Turbidity	NTU	< 2.0
Coliforms	No. per 100 ml	0
E.coli	No. per 100 ml	0
NLF Bacteria	No. per 100 ml	< 20
Taste	Dilution No.	0
Odour	Dilution No.	0

All taking of samples shall be carried out by accredited persons. Sample point location(s) where samples were taken from must be detailed and cross-referenced with the results and shown on the construction drawing and provided to the Water Company.

All activities are to be carried out in accordance with Principles of Water Supply Hygiene & Technical Guidance Notes: (<https://www.water.org.uk/guidance/principles-of-water-supply-hygiene/>).

Prior to accepting a request for any Final Connection to the Network, the Water Company must be reasonably satisfied that the samples have been taken where indicated and have passed water quality requirements such that the Self-Laid Main can be adopted.

As such, the Water Company may (at its own cost) undertake a check sample on the Main post Final Connection, prior to permitting any further connections (mains or services).

In accordance with the Principles of Water Supply Hygiene (TGN02) if the Self-Laid Main is not brought into service within 14 calendar days of a satisfactory sample having been taken, the Main should be flushed with mains water and re-sampled. If contamination is suspected, the Main should be re-chlorinated, and sampling carried out as in paragraphs numbered 10 & 12 of the TGN02.

The SLP is advised to contact the Water Company to confirm arrangements for taking samples, sample testing, testing parameters and reporting, and laboratories they intend to use and/or to confirm any requirement for the Water Company to provide (at reasonable cost) any such support services.

17.3.1 YW Procedure for Mains Chlorination

Designers, constructors, and operators of water networks should be alert to all the possible opportunities for contamination to enter supplies and take all reasonable precautions to minimise the risk. They should equally avoid circumstances where water in the mains can deteriorate through stagnation or long contact with particular materials e.g., cement mortar pipe lining. The design and specification of the network can itself significantly reduce most of these risks.

As part of the installation process for any new main or service connection, the SLP or Developer should adopt the following good practice:

1. Pipes and fittings must be transported and carefully stored on site, off the ground, to avoid entry of dirt or vermin. All pipes must be supplied with close-fitting end caps where feasible, and these must remain in place until the pipe is laid. All pipes and fittings (and in particular, plastic types) must be kept clear of fuel oils, and any materials so contaminated should be discarded.
2. All fittings and pipe ends must be sprayed with a solution of 1000 mg/l free available chlorine as they are laid.
3. Care must be taken to prevent water, subsoil or other material entering a pipeline under construction. It must not be assumed that such material will be flushed out on commissioning. Additional cleaning measures (e.g.: swabbing) and inspection techniques (e.g.: CCTV) must be considered prior to commissioning on larger diameter mains.
4. Swabs may be useful for clearing a new main of any dirt or debris that has entered, and the use of a chlorinated swab may be appropriate if any form of contamination is suspected. However, a chlorinated swab is only an intermediate measure and is not a substitute for disinfection.

Following installation and prior to any connection into the Yorkshire Water distribution network the SLP or Developer should ensure that all New Mains, Service Connections and Service Pipes are disinfected in accordance with the code of good practice detailed in the Principles of Water Supply Hygiene Technical Guidance Note 2, as follows:

New Mains, Service Connections and Service Pipes > 63 mm OD:

- After installation and before use, water mains must be flushed until visibly clear. They must be disinfected by charging with water containing sufficient free chlorine to ensure that a concentration of at least 20 mg/l has been maintained throughout the entire pipe length over a period of standing for at least 16 hours. The time is important to ensure adequate dispersion and contact of the chlorine with the water and the entire internal surface of the main and fittings. The main must then be flushed and left charged for a minimum of 16 hours, and sampled at appropriate points, including the downstream end. The number and location of samples required must be sufficient to ensure the suitability for supply of the entire length of main.
- Alternative disinfection methods can be considered that are equivalent to 20 mg/l for 16 hours (for example, spraying the full internal length with solution containing 1000 mg/l chlorine).
- No New Main, Service Connection or Service Pipe shall be brought into service until the contents of the main have been tested successfully for bacteriological, chemical, taste, odour and appearance. The SLP or Developer should ensure that the appropriate samples are taken and analysed in a suitable UKAS accredited analytical laboratory.
- Chlorination certificates and certificates of analysis from the UKAS accredited laboratory should be emailed to: SLP_Mailin@yorkshirewater.co.uk.
- The chlorination certificates and certificates of analysis must be assessed by Yorkshire Water's Information and Regulation Team. No new main, shall be connected to the Yorkshire Water Network until approval has been granted by the Information and Regulation Team.
- The criteria for passing new mains samples are stated in **Table 17.3**.
- If the New Main is not brought into service within 14 days of a satisfactory sample having been taken, the main should be flushed with mains water and re-sampled. If contamination is suspected, then the main should be chlorinated and re-sampled.

Service Connections and Service Pipes 15 mm – 50 mm OD:

- All new service connections must, as a minimum, be pressure tested and flushed with mains water before use.

Service Connections and Service Pipes > 50 mm OD or 6m length or over:

- In addition, service pipes above 50mm in external diameter or 6m in length require disinfection, although water quality samples will not normally be required. Proof of disinfection must be provided and approved by Yorkshire Water's Information and Regulation team prior to connection to the YW distribution network.
- Chlorination certificates should be emailed to: SLP_Mailin@yorkshirewater.co.uk
- No connection to the Yorkshire Water Network will be made until approval has been granted by the Information and Regulation Team.
- If the disinfected Service Connection or Service Pipe is not commissioned and brought into supply within 30 days of completing disinfection, the disinfection process should be repeated prior to commissioning as it is considered that deterioration of water quality may have occurred within this period.

Service Connections and Service Pipes ≥ 63 mm OD:

- Further to above, service pipes 63 mm and above in external diameter should be treated as a New Main and as such will require disinfection, and water quality samples, under the arrangements for New Mains stated above.

The party that will undertake the connection of the New Main or Service must not do so until the SLP or Developer has provided proof that the correct disinfection procedure has been followed and satisfactory samples, where required, have been taken.

Documentation that details the results of samples taken and a formal approval from the Information and Regulation team that confirms that the results or samples meet the acceptance criteria is also required.

Yorkshire Water reserves the right, should the need arise, to contact directly any analytical service provider or chlorination company used by a developer or SLP in order to verify any documentation provided to the Information and Regulation team prior to any approval being granted for connection to the YW distribution network.

17.4 Pressure Testing of Self-Laid Main

17.4.1 Pressure testing of pressure pipes and fittings for use by public water suppliers must be carried out as set out in the Water Industry 'Information and Guidance note' (IGN 4-01-03 October 2015: issue 2), available to view online at: <https://www.water.org.uk/technical-guidance/water-standards/wiss-and-igns/> with reference to the following guidance notes: 'Pressure Testing and Disinfection (supplemental) of PE Water Pipelines, Services and Installations'. Pressure data, analysis report / pass certificate and pressurisation / decay graphs are to be provided by the SLP to the Water Company within a handover commissioning suite of information.

All results must be provided in both graphical (test output graph) and tabular formats.

17.4.2 Pressure Testing and Disinfection (supplemental) of PE Water Pipelines, Services and Installations

All testing shall be carried out in accordance with IGN 4-01-03, reference should also be made to the Civil Engineering Specification for the Water Industry (CESWI) (with Additional Clauses) and any specific Water Company requirements specified additionally in paragraph 21 Schedule of Permissible Materials and construction.

The following also applies:

1. On-site testing operations will be clearly identified using appropriate warning notice boards.
2. Service test: All new Service Pipe connections must undergo a service test. The procedure is also defined in Water Industry Information & Guidance Note (IGN 4-01-03) 'Pressure Testing of Pressure Pipes and Fittings for use by Public Water Suppliers'.
 - The system test pressure shall be 18 bar.
 - The service shall not have been tapped prior to this test being conducted.

18 Water Company Key Contacts

Key contacts are available on YW's website:

<https://www.yorkshirewater.com/developers/water/self-lay/>

19 Local Practices

By reference to the Water Sector Guidance, the Water Company may insert here a permitted local practice using the terminology in the WSG.

19.1 Meter Pairing and Commissioning

Not applicable.

19.2 Timing of the Generation of Plot Reference Numbers

Not applicable.

19.3 Water Company Design Service Offerings

Yorkshire Water offer a service of designing new water infrastructure to feed new development sites. This can be requested at application stage. The details for the charges for this service can be found in YW's charges document, available on YW's website:

<https://www.yorkshirewater.com/developers/developer-services-charges/>

19.4 Design Self-Certifications Scheme

Not applicable.

20 Design and Construction Specification Appendices

Water Companies may insert appendices into this document within the following [sections](#) 21 to 24.

21 Schedule of Permissible Materials and Construction

21.1 Puddle Flanges

Puddle Flanges shall comply with Yorkshire Water's requirements:

1. Pipes with puddle flanges shall be supplied in all cases where the pipework passes through sub-structures or structures designed to retain water. Where puddle flanges are required to carry thrust, they shall be cast integrally with the pipe or welded to the pipe and designed to withstand the maximum force taking into account of maximum test pressures and all other loadings on the pipe. Clamp type puddle flanges are not permissible where required to carry thrust.

21.2 Site Conditions and Ground Bearing Capacities

Site Conditions and Ground Bearing Capacities shall comply with Yorkshire Water's requirements:

1. Adequate supporting arrangements for all pipes and valves shall be provided. Where pipework is installed either vertically or at significant slopes the vertical supports shall be designed to carry the total weight of the pipe and contents.
2. The SLP shall supply brackets, saddles, hangers, clamps, supports, anchors, clips, fastenings, straps and fixings to fix the pipe runs to the civil structure. All supports shall be protected against corrosion or fabricated from a corrosion resistant material. All fixings to the pipework shall be fitted with neoprene strips to ensure that paintwork is not damaged. Support material of construction shall either be metal or concrete.

21.3 Thrust Blocks, Thrust Restraint and Anchorage, Self-Anchoring Joints, and Ground Anchorage

Thrust Blocks, Thrust Restraint and Anchorage, Self-Anchoring Joints, and Ground Anchorage shall comply with **CESWI** clause **5.6 Thrust Blocks** and Yorkshire Water's additional requirements:

1. A ground check is to be carried out to confirm that design ground conditions are similar to those found on Site and if different then the design is to be revised accordingly.
2. For pressure mains where the gradient is steeper than 1 in 6, a self-restraining joining system or anchor blocks should be used. Where anchor blocks are proposed these should be designed to suit the loading from the main and the local ground conditions.
3. The Contractor shall not remove or interfere with any thrust block, restraint or support on a live main, valve or fitting unless adequate temporary restraints or supports have been provided.
4. Where pipes, bends, tees, blank ends and other fittings have been installed, repaired, renewed, altered or disturbed the Contractor shall design and install an appropriate thrust block taking into account the proximity of other services, the operating pressure of the affected apparatus, the bearing capacity of the surrounding ground and the period in which the Employer requires the pipeline to be re-pressurised.
5. In repair scenarios or where fittings have to be removed and replaced and the water supply restored as quickly as practicable, adequate thrust restraint shall be provided that will be effective within the timescale of the re-pressurisation. This may take the form of:

- a. Mechanical couplings/flange adaptors with integrated restraint systems (Type 2 in accordance with WIS 4-24-01 for PE or WIS 4-21-02 for Iron Pipes).
 - b. Thrust blocks or other adequate supports bearing against undisturbed ground. All materials used shall be non-biodegradable. In the circumstances of (a) it must be taken into account that this relies upon transferring the thrust from the new fitting into axial tension (Type 1 in accordance with WIS 4-24-01 offers axial restrains) within the existing pipework and this force is only restrained by the friction between that pipe and the surrounding ground and the presence of an unrestrained pipe joint near the connection may mean that the length of existing pipe may be insufficient to absorb the transferred thrust. Therefore, additional measures such as (b) above should also be considered dependent upon mains pressure and the level of thrust generated by the fitting type.
6. All pipes, valves and fittings installed by the Contractor shall be adequately supported and restrained to resist a working pressure compatible with 1.5 times the pressure rating of that pipe, valve or fitting allowing for surge, before the pipe, valve or fitting is re-pressurised and backfilled.
 7. Concrete support blocks shall be cast to hydrant tees, duckfoot bends and sluice valves installed in plastic/MDPE/HDPE pipelines in order to resist the operational torque imposed on the fittings during operation. Support blocks shall be cast in such a manner so as not to interfere with the operation or maintenance of the apparatus.
 8. Anchorage is not necessarily required at junctions or bends where a fully integrated fusion weld PE pipe system is in place (refer to the "Manual for PE Pipe Systems for Water Supply" published by WRc). Anchorage is required for end Fire Hydrant or Washout Hydrants even if temporary.

21.4 Mains Jointing

All welded joints should be made above ground and only mechanical joints should be made underground. PCV pressure pipes, joints and fittings shall comply with the relevant provisions set out in **Table 21.4**.

PE pipe should be designed to be laid using one continuous coil length to minimise the number of joints required. PE pipe of 160 mm diameter and greater must be laid in 6 m lengths and welded together.

Table 21.4: Mains Jointing

Material	Pipe	Joints and Fittings
PVC-U (metric blue)	BS EN ISO 1452-2	BS EN ISO 1452-3
PVC-A	PAS 27	PAS 27
PVC-O	WIS 4-31-08 (12.5 bar and 16 bar only)	BS EN ISO 1452-3

Pipe Jointing shall comply with **CESWI** clause **5.7 Pipe Jointing Generally** and Yorkshire Water's additional requirements:

1. Unless authorised by Yorkshire Water, all joints to PE pipe shall be made using automated butt fusion or mechanical fittings intended for PE of minimum Type 2 (In accordance with WIS 4-24-01) end load restraint rating. (See also **CESWI** clause **5.8 Welded Joints in Polyethylene Pipes**). Mechanically jointed flange adaptors of metallic construction should be utilised to make flanged connection to PE pipe in preference to using PE stub flanges. If PE stub flanges are used, then for any flanged joints operating above 10bar or larger than DN 300, reinforced flange gaskets shall be utilised.
2. Mechanically sealing under pressure tees (DN 80 mm branch size or larger) shall not be used to make connections to PE mains. Such joints shall only be made using Electrofusion branch saddles

installed by authorised teams meeting the requirements of **CESWI** clause **5.8 Welded Pipes in Polyethylene Pipes** additional requirement **1**.

3. Connections to PE mains pipes that have been previously in service (e.g., for repairs or branch connections) shall only be made using mechanical couplings or flange adaptors. Electrofusion shall NOT be utilised in these circumstances.

Welded Joints in Polyethylene Pipes shall comply with **CESWI** clause **5.8 Welded Pipes in Polyethylene Pipes** and Yorkshire Water's additional requirements:

1. Jointing PE pipe with electrofusion couplers will only be authorised by the Employer subject to:
 - a. Evidence of appropriately trained, equipped, and accredited welders undertaking that work.
 - b. On PE pipe larger than DN 400mm the welding personnel and the equipment being satisfactorily audited by an external expert organisation approved by the Employer and approved before any joints are made which would form part of the finished asset.
 - c. All jointing procedures being fully in accordance with the fittings manufacturer's instructions. Electrofusion couplers larger than DN 630mm shall not be utilised to joint PE pipe without specific written authorisation from the Employer.
2. Sample joints shall be made and witnessed then subsequently tested in accordance with WIS 4-32-08 to ensure adequate standards of toughness and ductility. Where these joint samples are determined to have failed then corrections to equipment and process shall be made to ensure satisfactory joints and no such joints shall be included in the Works until satisfactory test results have been obtained. Where a change of welding equipment or personnel is made within the duration of a scheme then further independent testing shall be required to validate the performance.
3. For Schemes laying pipe in excess of DN 315 mm using Electrofusion further site audits shall be undertaken on the basis of one per 0.5km of pipe laid.
4. For schemes laying pipe in excess of DN 450 mm diameter using butt fusion jointing, the welding personnel and equipment shall be initially audited as per paragraph **1** above.
5. YW don't require fitting wrapping for additional corrosion protection.

21.5 Material and Compliant Standard

Materials shall comply with CESWI, **Table 21.1** and **Table 21.2**.

Table 21.1: Material Compliance

Service	Size Range	Pipe Material
Buried Pipelines for Conveying Water for Public Supply	Up to & including DN 300	Ductile Iron PVC-A High Performance Polyethylene Medium Density Polyethylene PVC-O Steel (including stainless)
	DN 300 to DN 600	Ductile Iron High Performance Polyethylene PVC-O PVC-A Steel (including stainless)

Service	Size Range	Pipe Material
	Greater than DN 600	Ductile Iron Steel (including stainless) High Performance Polyethylene PVC-O
Above Ground Pipework and within Structures	Up to & including DN 300	Ductile Iron PVC-A Steel (including stainless) ABS

Table 21.2: Material and Compliant Standard

Material	Compliant Standard
Mains on new development sites	<ul style="list-style-type: none"> HPPE PE80- PE100. BS EN 805:2000 Water supply. Requirements for systems and components outside buildings.
Mains on new development sites (contaminated land)	<ul style="list-style-type: none"> BS EN 12201:2011 Plastics piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE).
Service pipework on new development sites 25-63mm OD	<ul style="list-style-type: none"> MDPE PE80 BS EN 12201:2011 Plastics piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE) (all parts). Polyethylene piping systems for water supply shall comply with BS EN 12201-1 and BS EN 12201-2. Polyethylene fittings for use with cold potable water shall comply with the relevant provisions of BS EN 12201-3. Electrofusion fittings shall comply with the relevant provisions of BS EN 12201-3.
Service pipework on new development sites 25-63mm OD (contaminated land)	<ul style="list-style-type: none"> BS EN 12201:2011 Plastics piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE). WIS 4-32-19 2007: Polyethylene Pressure Pipe systems with an Aluminium Barrier layer for potable water supply in contaminated land.
Ductile Iron Pipe above 300mm only	<ul style="list-style-type: none"> Ductile iron pipes, fittings and joints shall comply with BS EN 545:2010 Ductile iron pipes, fittings, accessories and their joints for water pipelines. Requirements and test methods IGN 4-21-01 Ductile iron pipes
Ductile Iron Pipe Fittings	<ul style="list-style-type: none"> Ductile iron pipes, fittings and joints shall comply with BS EN 545:2010 Ductile iron pipes, fittings, accessories and their joints for water pipelines. Requirements and test methods.
Fire Hydrants and Washout Hydrants Note: Through Bore Only Please check with YW for hydrants approved by the Fire Service	<ul style="list-style-type: none"> BS 750: 2012 Specification for underground fire hydrants and surface box frames and covers. 2.5 stainless steel London Round thread design, clockwise closing. BS EN 3251 Indicator Plates for Fire Hydrants and Emergency Water Supplies.
Under Pressure Tees	<ul style="list-style-type: none"> BS 8561: NB only Class A- full body tees shall be used for connection to live networks.

Material	Compliant Standard		
Sectional Chamber Systems, polymer or concrete	<ul style="list-style-type: none"> BS 750: 2012 Specification for underground fire hydrants and surface box frames and covers. Dimensionally compliant with BS 5834:2011 Surface boxes, guards and underground chambers for the purposes of utilities. BS EN 750 Underground Fire Hydrants and Surface Box Frames and Covers 		
Mechanical Couplings and Flange Adaptors for rigid pipe materials (not PE)	<ul style="list-style-type: none"> Mechanical couplings and repair clamps for iron pipes shall comply with WIS 4-21-02 (Mechanical couplings and repair clamps for iron pipes for the conveyance of cold potable water (underground use) for the size range 40 to 1600mm) 		
Resilient Seat Gate Valves	<ul style="list-style-type: none"> Ductile Iron BS EN1563 blue fusion bonded epoxy powder coating in accordance with WIS 4-52-01. Internal to class A and external to Class B. Anti-clockwise closing unless specified for the York Area. Wedge or gate valves for water supply purposes should be selected with the operational and design features described in BS 5163: 2004 Valves for waterworks purposes. Stem caps for use on isolating valves and associated water control apparatus. Isolating valves for water supply (includes wedge gate and butterfly). Check/non-return valves for water supply. Air valves for water supply. Control valves for water supply. All covered under BS EN 1074: Valves for water supply. Fitness for purpose requirements and appropriate verification tests. 		
Mechanical Couplings and Flange Adaptors for PE pipe (min Type 1 or 2 End Load Resistance required)	<ul style="list-style-type: none"> Mechanical joints and fittings for polyethylene pipes in nominal size 90 mm or above for use with cold potable water shall comply with WIS 4-24-01 (Mechanical fittings and joints for polyethylene pipes for nominal sizes 90 to 1000). Mechanical joints and fittings for polyethylene pipes less than or equal to nominal size below 63 mm for use with cold potable water shall comply with WIS 4-32-11 (Thermoplastic end load resistant mechanical fittings for polyethylene pipes of nominal size) or BS EN 1254:2012 Copper and copper alloys. Plumbing fittings. 		
Water Meters	<ul style="list-style-type: none"> YW Preferred Supplier, including AMI output unit 		
	Product	Specification / Information	Part No.
	For DN15 manifold		
	15 mm Manifold RF (Composite)	2.5 R 315 factory fitted Cyble 5	AQPI5MCVMQB315EB
	15mm Manifold RF (brass)	Qn 1 -1.5 Class D factory fitted Cyble 5	AQUAPI5M53UKSVNEB
	For DN15 in-line		
	15 mm In-line RF (composite)	Q3 2.5 R 315 factory fitted Cyble 5	AQI5110CB315VMUKEB
	15 mm In-line RF (brass)	Qn 1 - 1.5 Class D factory fitted Cyble 5	QUAPI5I34VMUKSNEB

Material	Compliant Standard
Stop Tap / Meter Boundary Boxes	<ul style="list-style-type: none"> The boundary box shall be able to incorporate a manifold meter with 1½inch thread, stop tap and non-return valve. All boundary boxes shall have height adjustment capabilities. Small and large surface boxes shall comply with the relevant provisions of BS 5834:2011 Surface boxes, guards and underground chambers for the purposes of utilities, respectively, or WIS 4-37-01 (Boundary boxes for the metering and control of domestic and small industrial water services). Chambers of materials other than precast concrete shall meet the loading requirements in BS 5834. BS 6700:2006 Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages, applies to meter boxes and their installation All repair and connection fittings including those for use on with PE pipe shall comply with the requirements BS 8561. Mechanical joints and fittings for polyethylene pipes less than or equal to nominal size below 63mm for use with cold potable water shall comply with WIS 4-32-11 (Thermoplastic end load resistant mechanical fittings for polyethylene pipes of nominal size) or BS EN 1254:2012 Copper and copper alloys. Plumbing fittings.
Meter manifolds Gunmetal only external	<ul style="list-style-type: none"> Manifold body and components: Gunmetal to BS EN 1982:2008 Copper and copper alloys. Ingots and castings.
Stoptap/Meter Boundary Boxes Contaminated land	<ul style="list-style-type: none"> To WIS-4-37-01, be watertight and shall have gunmetal connection fittings. The unit shall incorporate a 1½" BSP meter connection, stop tap and non-return valve.
Surface Boxes	<ul style="list-style-type: none"> Covers and frames to be installed in carriageway or other areas with frequent passage of vehicles shall be to the minimum grade stated in BS EN 124:2015 Gully tops and manhole tops for vehicular and pedestrian areas or to BS 5834:2011 Surface boxes, guards and underground chambers for the purposes of utilities. Covers and frames to be installed in all other areas shall comply to BS EN 124:2015, or Grade B to BS 5834:2011.
Gunmetal Fittings (including manifolds)	<ul style="list-style-type: none"> Hydrants shall have a screwed outlet constructed of gunmetal or stainless steel in accordance with the requirements of BS 750.
Large Covers and Frames for meter chambers, single man lift. For use in footways or areas exposed to light, infrequent traffic use	<ul style="list-style-type: none"> Grade B125 must be "lift and slide" type. D400 Heavy duty 2 man lift must be Split triangle held in hinges. These are designed for use in the highway and occasionally traffic bearing footways/driveways. Covers and frames to be installed in carriageway or other areas with frequent passage of vehicles shall be to the minimum grade stated in BS EN 124:2015 to BS 5834:2011. Covers and frames to be installed in all other areas shall comply to BS EN 124:2015, or BS 5834:2011.
Flange Jointing Sets, i.e. fasteners and gasket. Fasteners shall be sheraplex coated	<ul style="list-style-type: none"> Gaskets shall be manufactured from material complying with the provisions of BS EN 681:2000 Elastomeric seals. Material requirements for pipe joint seals used in water and drainage applications. All fasteners shall be protected from corrosion by the application of zinc and a polymeric barrier coating in accordance with WIS 4-52-03 (Anti-corrosion coatings on threaded fasteners).

Note: Self-Lay Providers wanting to use other materials should submit a request to Yorkshire Water prior to any work starting on site.

22 Meter and Service Pipes Policy and Installation

Yorkshire Water's Metering Policy is stated in section: **14 Metering Requirements** and Service Pipes Policy in section: **12 Service Pipe Design and Installation**.

23 Standard Arrangement Drawings

Water Mains and Service Pipes:

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- **Figure 25: Branch and Multiple Valve Assembly**
- **Figure 26: Typical Self Lay Mains Connection**
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- **Figure 28: Standard Installation Drawing for Manifolds**
- **Figure 29: Metered Communication Pipe Short Side**
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- **Figure 31: Downstream Tee and Branch Connection Outline Drawing**

Valves and Hydrants:

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- **Figure 33: Typical Sluice Valve with Bypass**
- **Figure 34: Typical Valve and Washout Arrangement**
- **Figure 35: Typical OXO (Hydrant - Valve - Hydrant) Arrangement**
- **Figure 36: Typical Valve Layout**
- **Figure 37: Hydrant (Without Sandwich Valve)**
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- **Figure 51: Standard Drawing for an Internal In-Line 20 mm – 39 mm Meter Installation in a Kiosk / Meter Box**
- **Figure 52: Standard Drawing for an Internal 20 mm – 39 mm Meter Installation Requiring Diversion**
- **Figure 53: Standard Drawing for an Internal In-Line 20 mm – 39 mm Meter Installation**
- **Figure 54: Standard Drawing for an External Meter Installed in a Precast Concrete Chambers for meters 15 mm, 20 mm, 25 mm, 30 mm, and 40 mm in-line PSM Meters**

- **Figure 55: Standard Drawing for an Installation of a 20 mm – 39 mm Meter in Place of a Flanged Meter in an External Precast Concrete Chamber**
- **Figure 56: Standard Drawing for an External In-Line 20 – 39 mm Meter Installation in a Precast Concrete Chamber**
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- **Figure 58: Typical Meter Set Up – In Line – Standard Design**
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- **Figure 61: Typical Meter and PRV Set Up – On A Bypass – Plus Extra Control Valve – Standard Design**
- **Figure 62: Typical NAV Set Up – Standard In Line – Flow Restricted – Less than and up to 500 Properties**
- **Figure 63: Typical NAV Set Up – Standard In Line with Bypass – Flow Restricted – More than 500 properties and up to 2,500 Properties**

23.1 Water Mains and Service Pipes

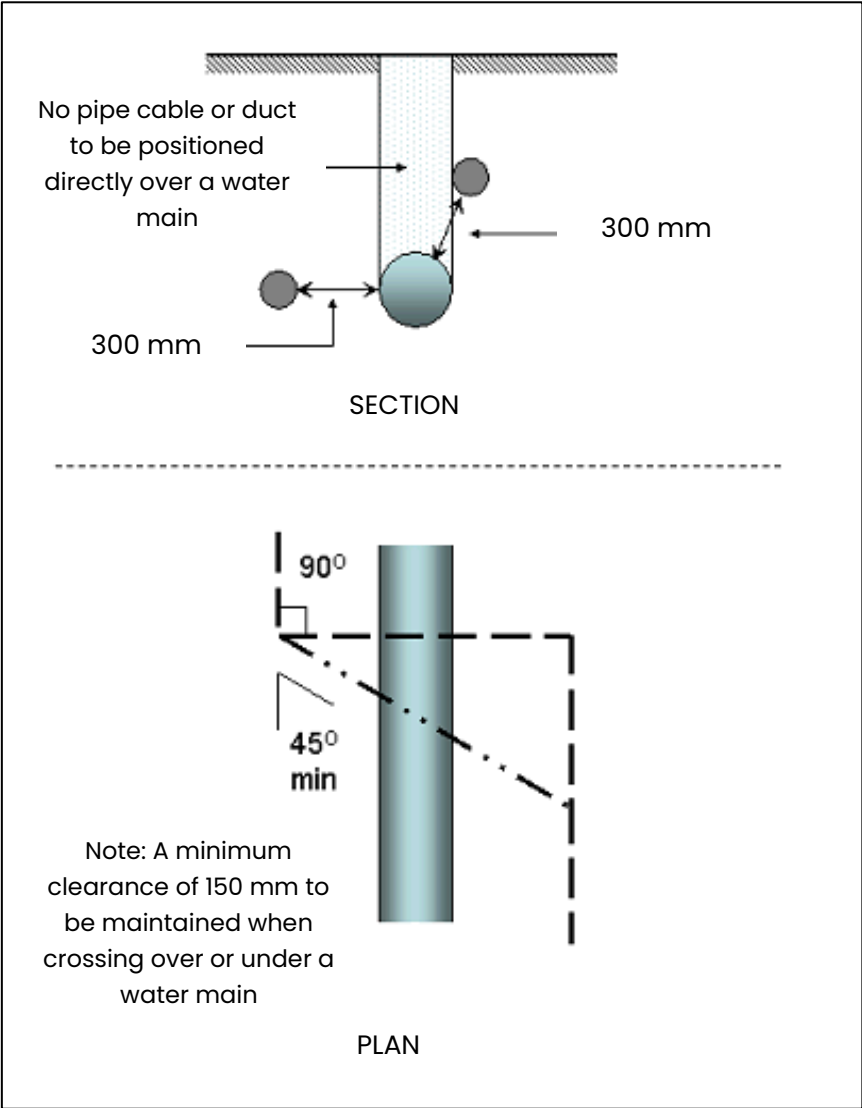


Figure 24: Protection of Mains and Services

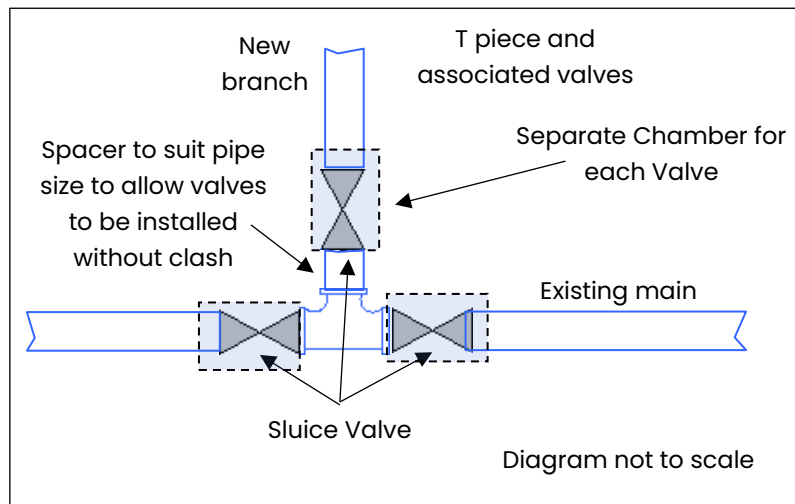


Figure 25: Branch and Multiple Valve Assembly

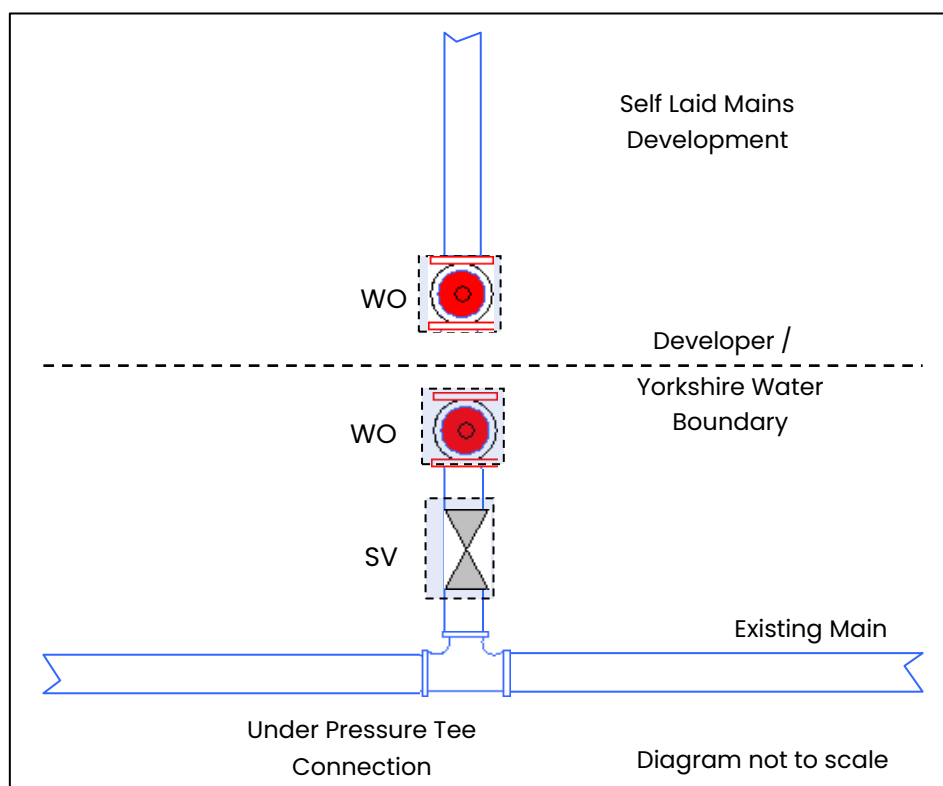


Figure 26: Typical Self Lay Mains Connection

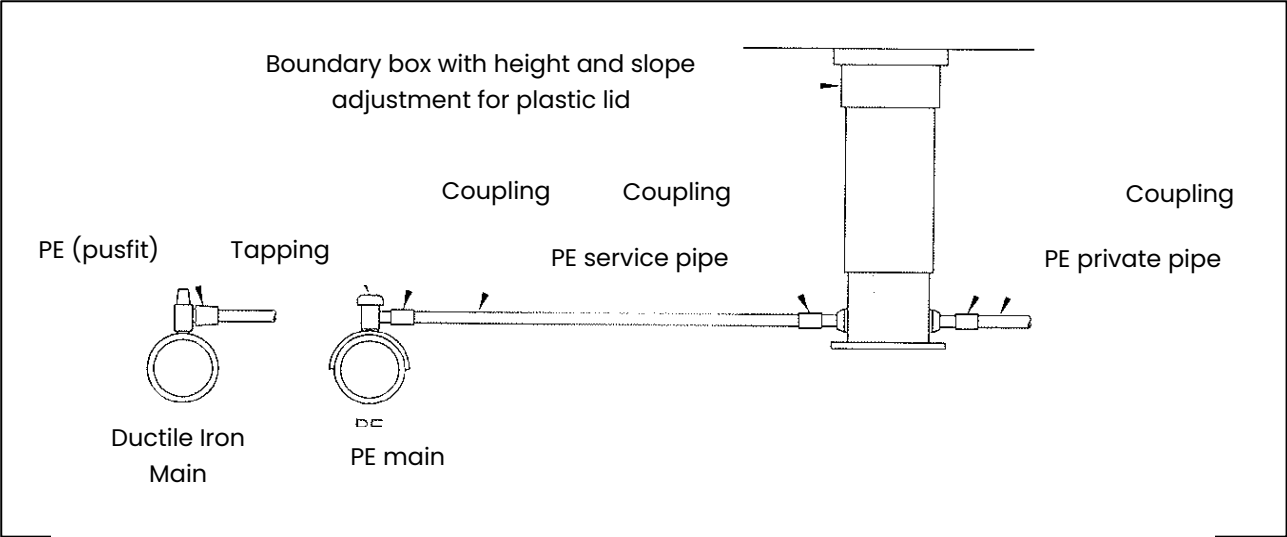


Figure 27: Communication Pipe Connection

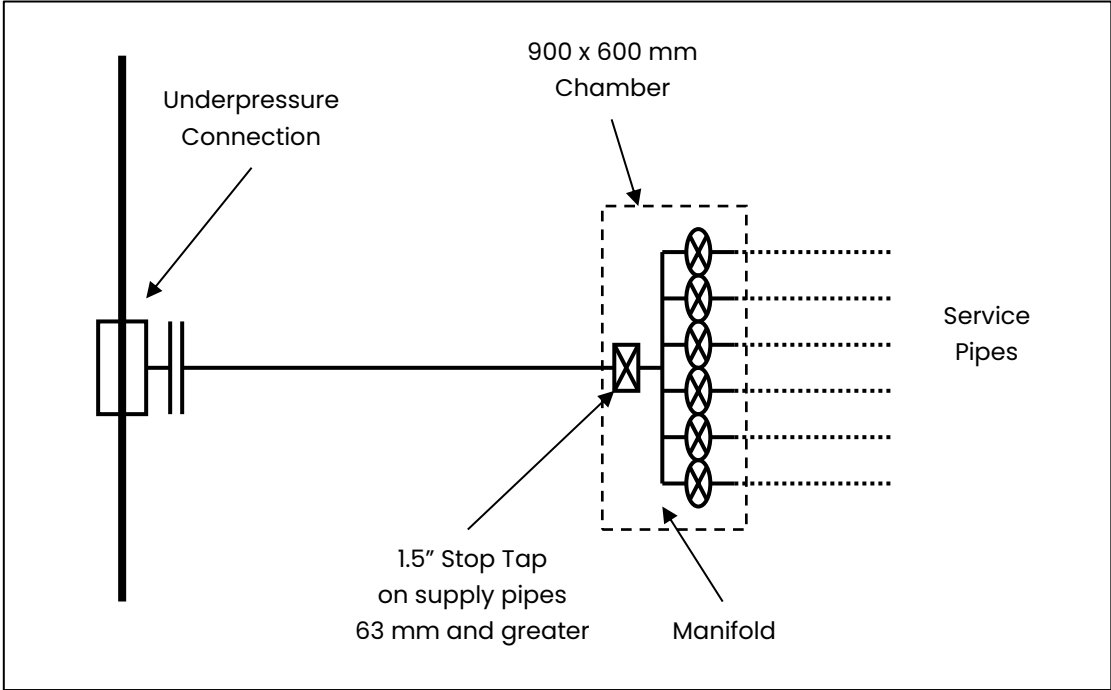


Figure 28: Standard Installation Drawing for Manifolds

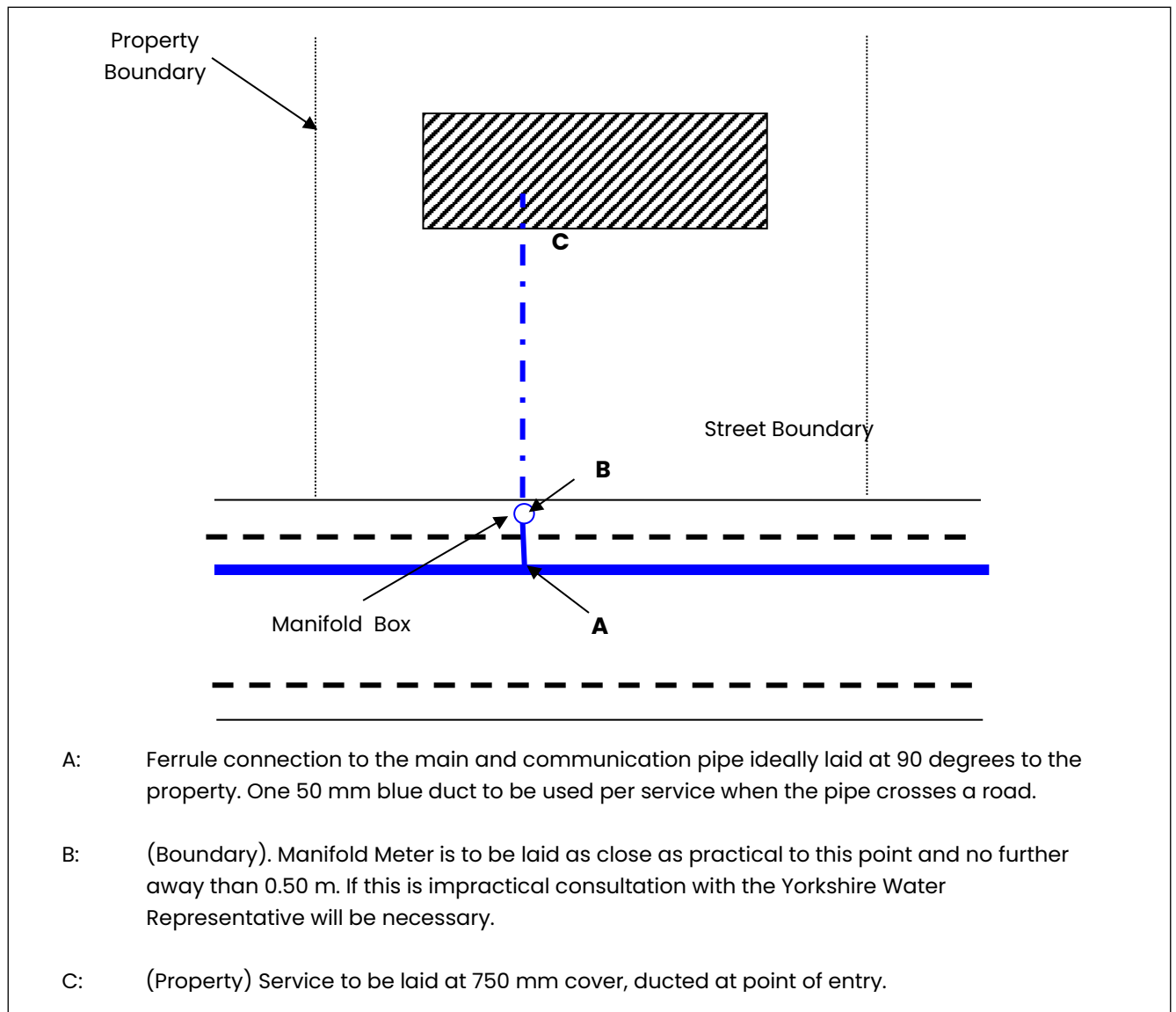
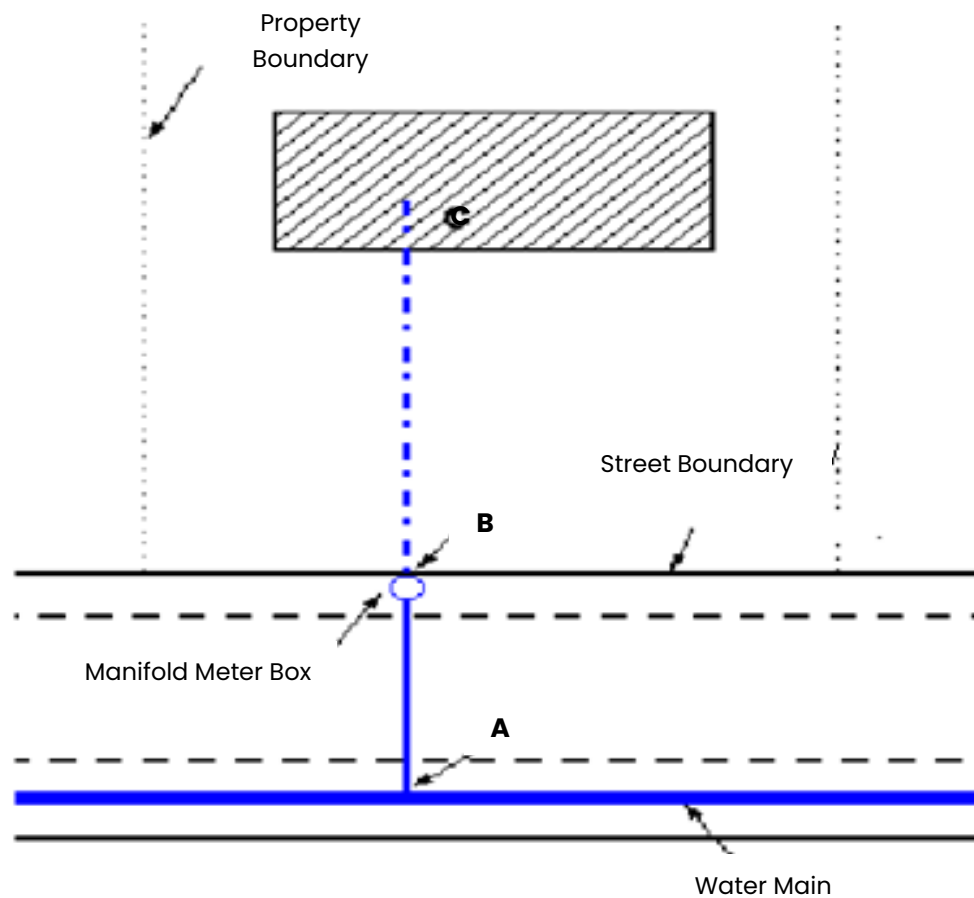


Figure 29: Metered Communication Pipe Short Side



- A: Ferrule connection to the main and communication pipe ideally laid at 90 degrees to the property. One 50 mm blue duct to be used per service when the pipe crosses a road.
- B: (Boundary). Manifold Meter is to be laid as close as practical to this point and no further away than 0.50 m. If this is impractical consultation with the Yorkshire Water Representative will be necessary.
- C: (Property) Service to be laid at 0.75 m cover, ducted at point of entry.

Figure 30: Metered Communication Pipe Long Side

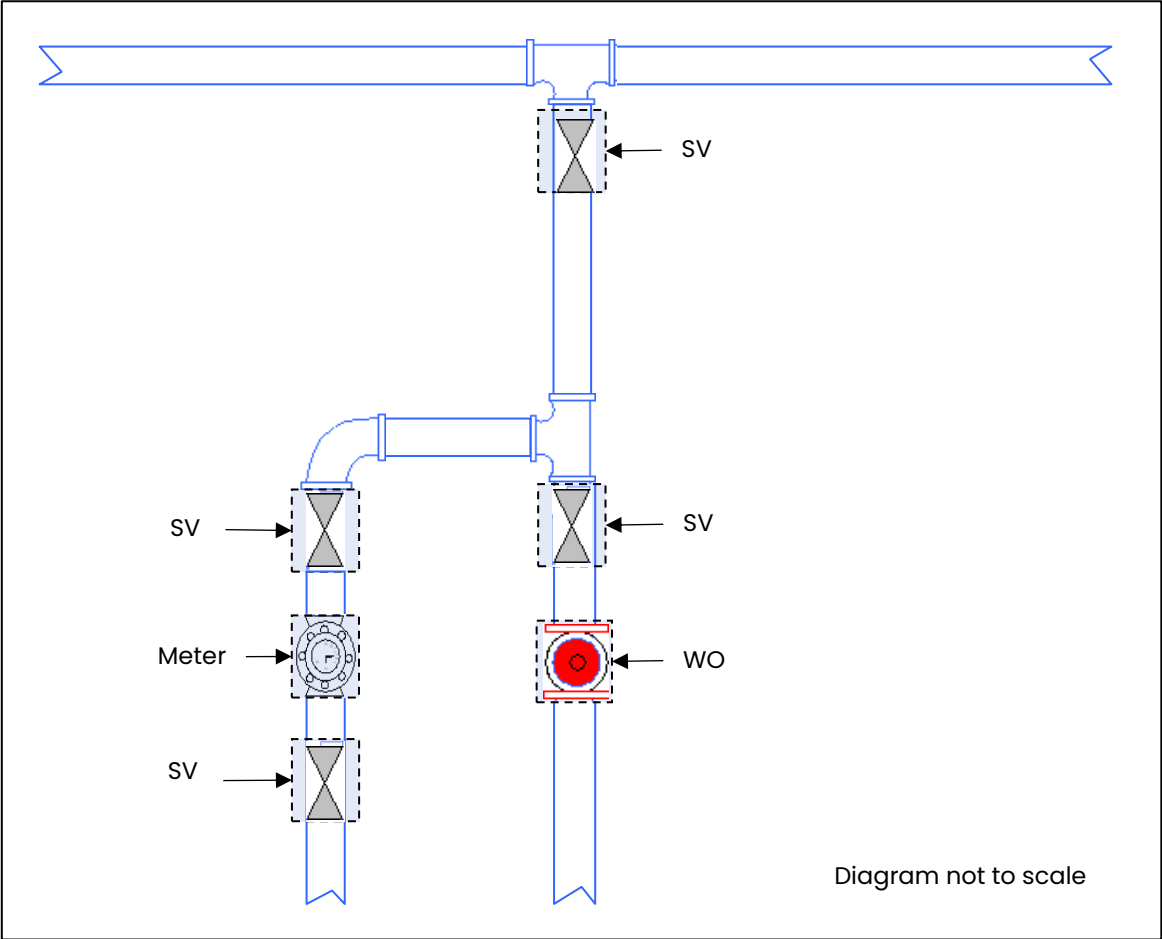


Figure 31: Downstream Tee and Branch Connection Outline Drawing

23.2 Valve and Hydrant

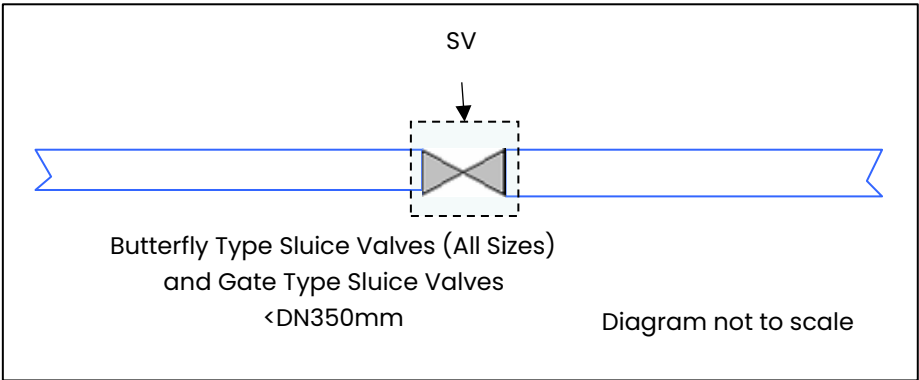


Figure 32: Typical Inline Sluice Valve

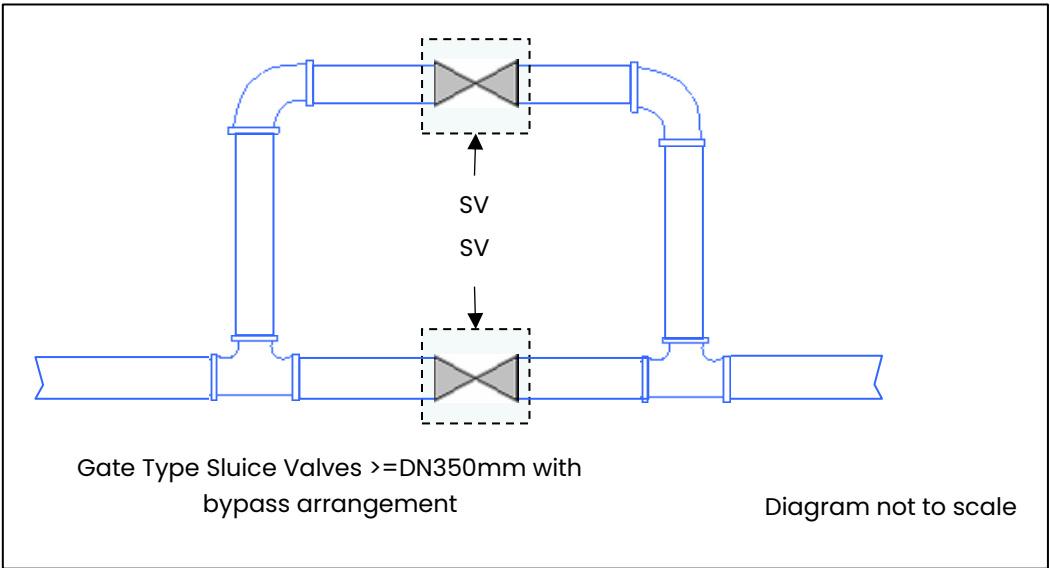


Figure 33: Typical Sluice Valve with Bypass

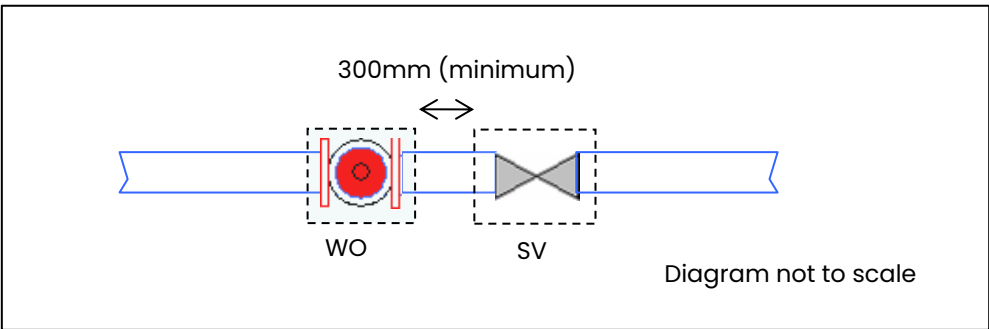


Figure 34: Typical Valve and Washout Arrangement

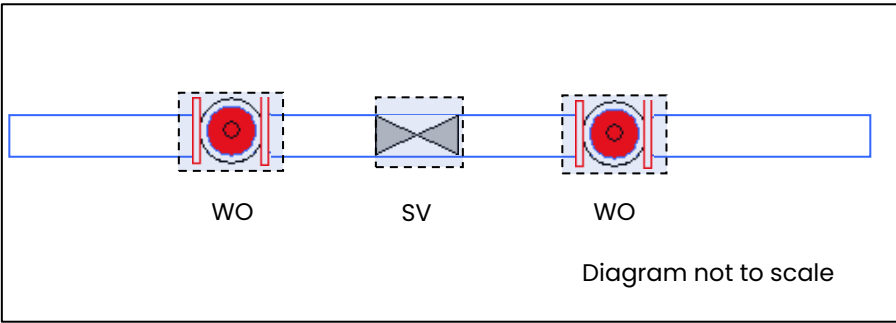


Figure 35: Typical OXO (Hydrant - Valve - Hydrant) Arrangement

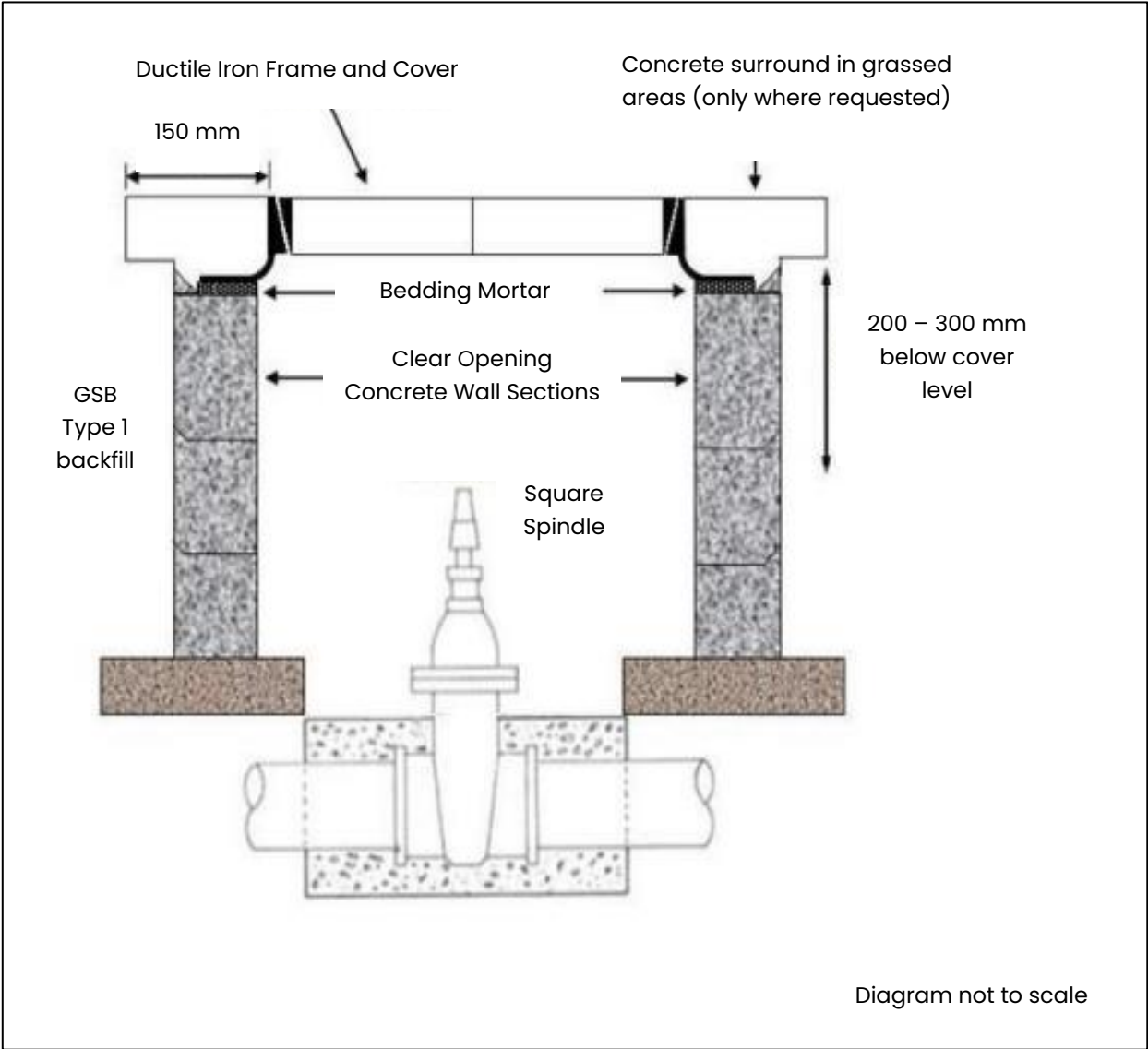


Figure 36: Typical Valve Layout

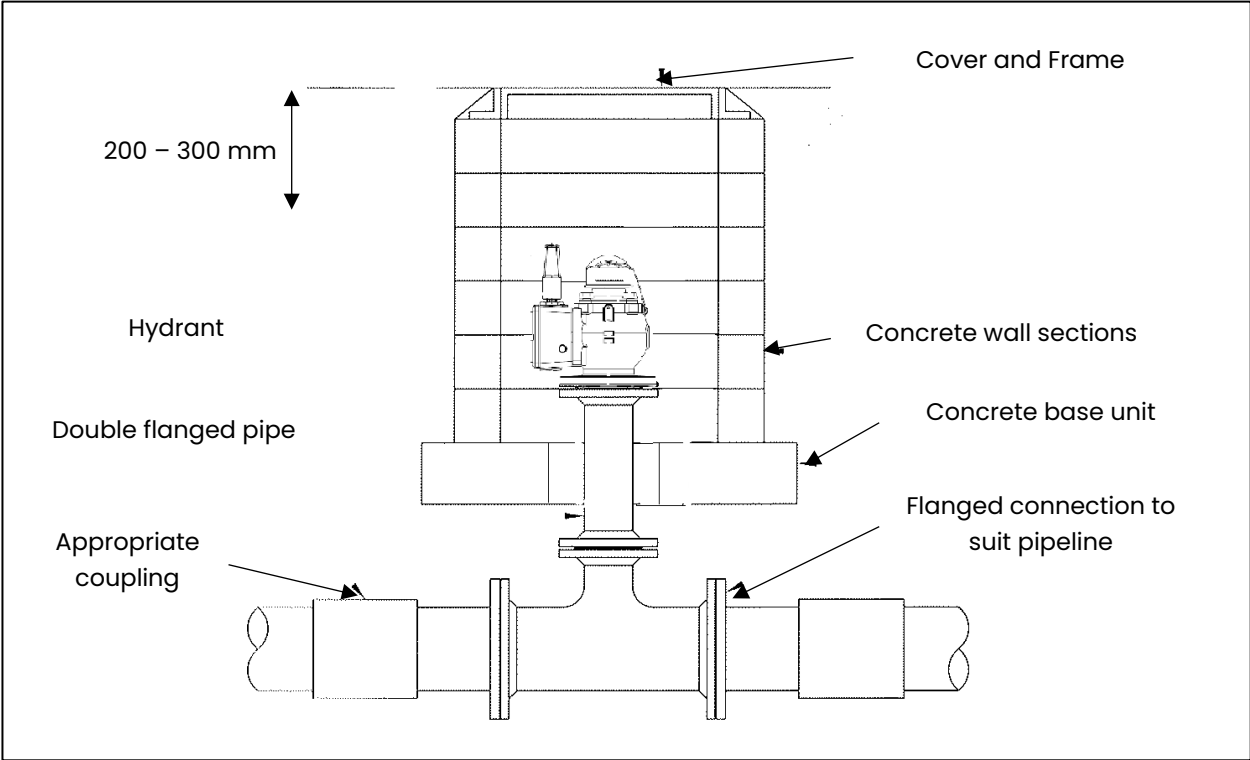


Figure 37: Hydrant (Without Sandwich Valve)

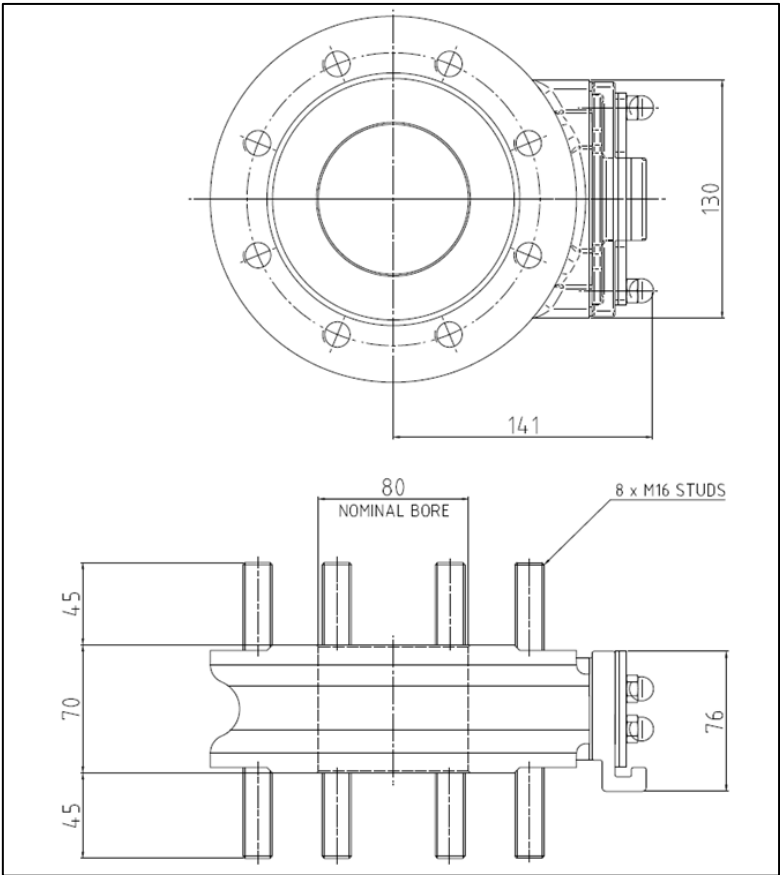


Figure 38: MK3 Sandwich Valve

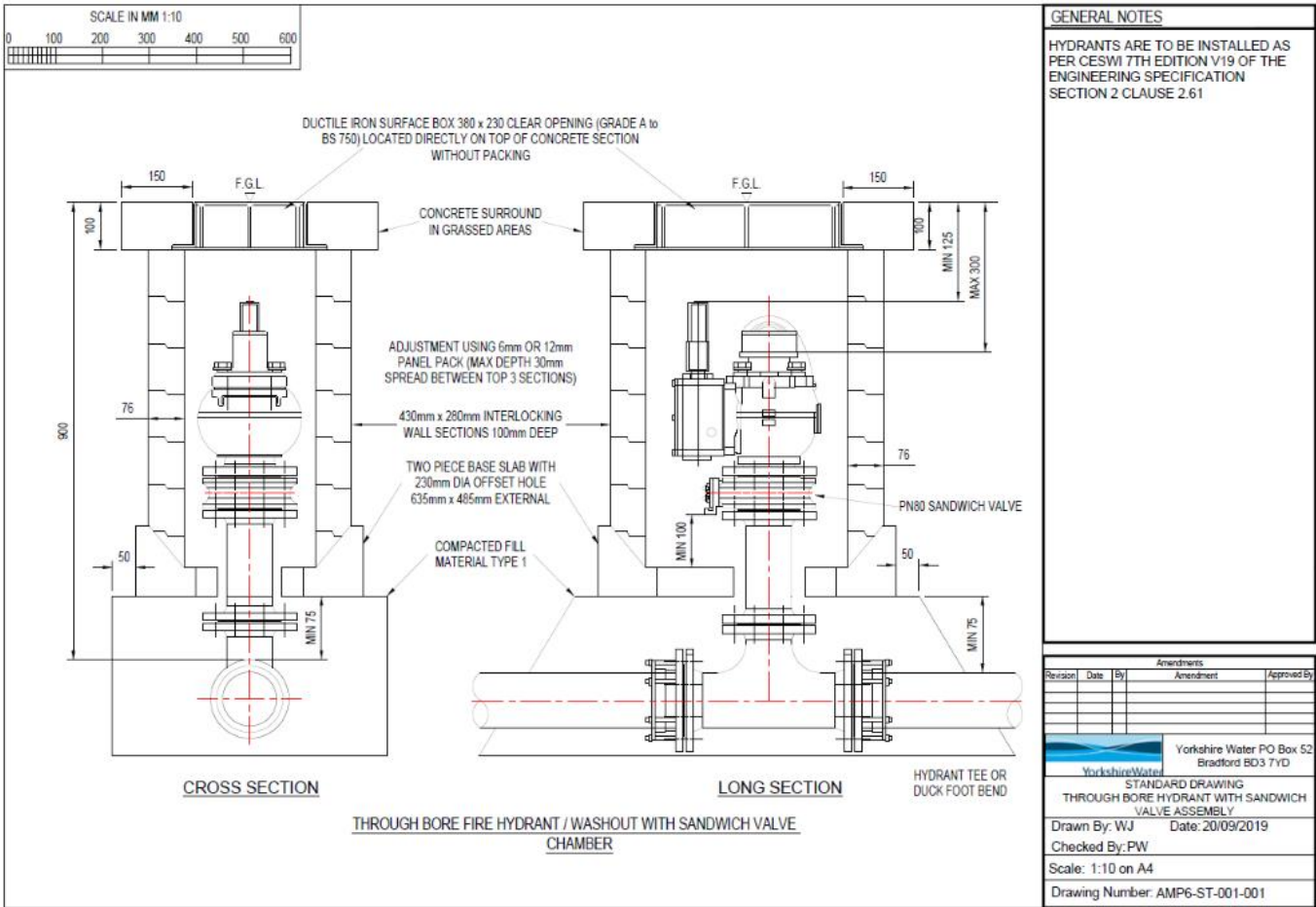


Figure 39: Hydrant and Sandwich Valve Assembly

23.3 Chamber

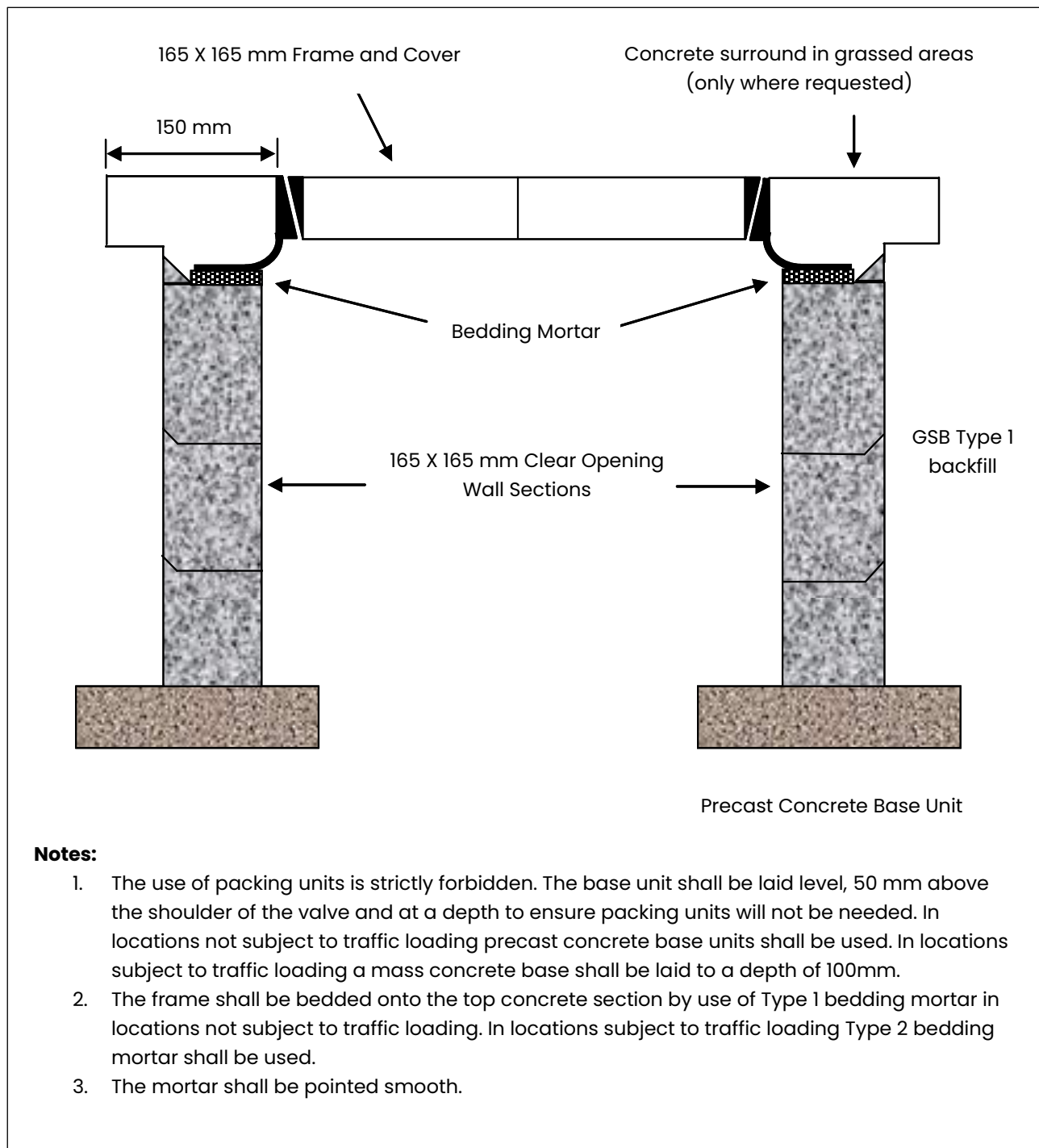


Figure 40: Precast Concrete Chamber with a 165 x 165 mm Frame and Cover

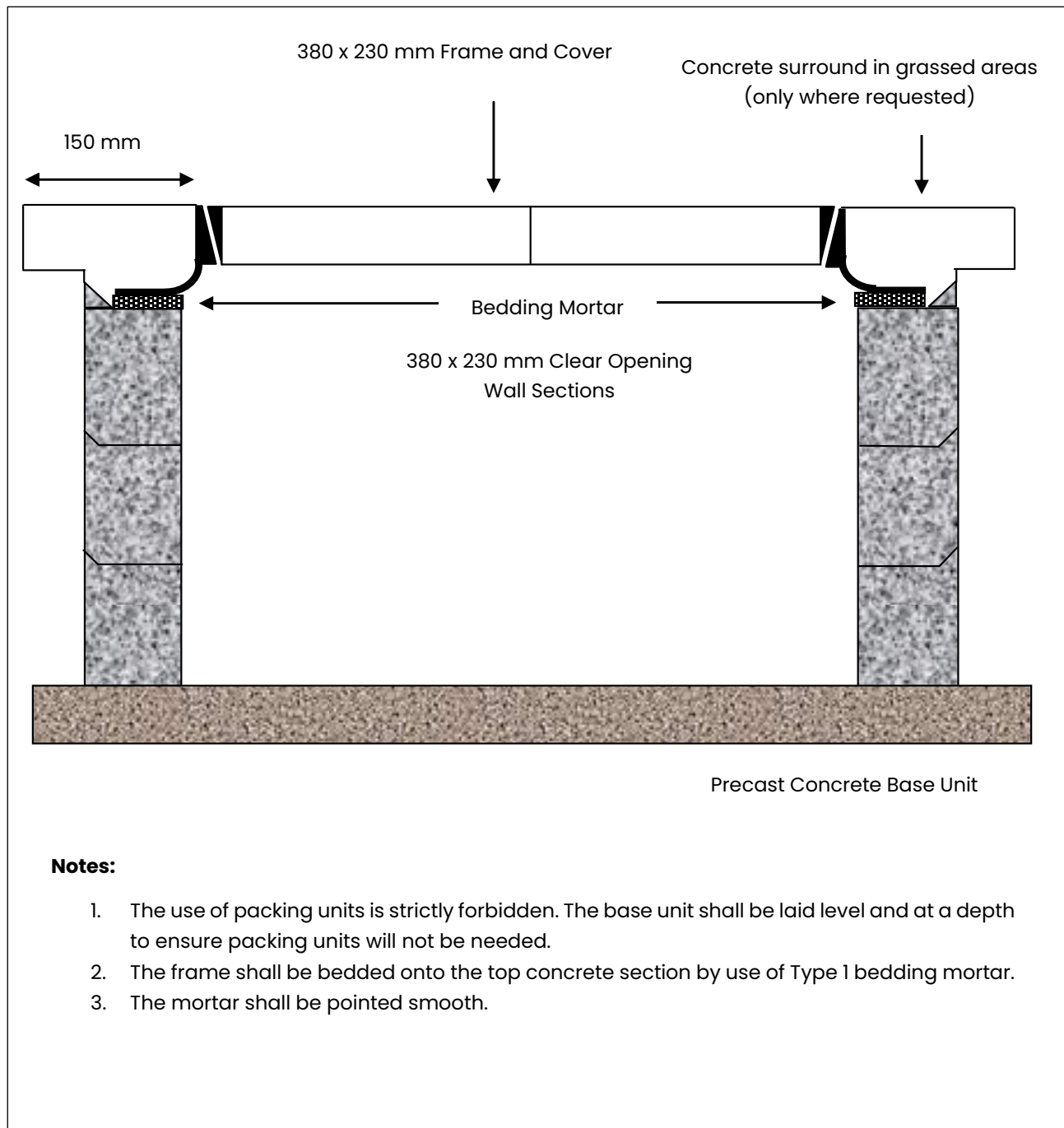


Figure 41: Precast Concrete Chamber with a 380 x 230 mm Frame and Cover

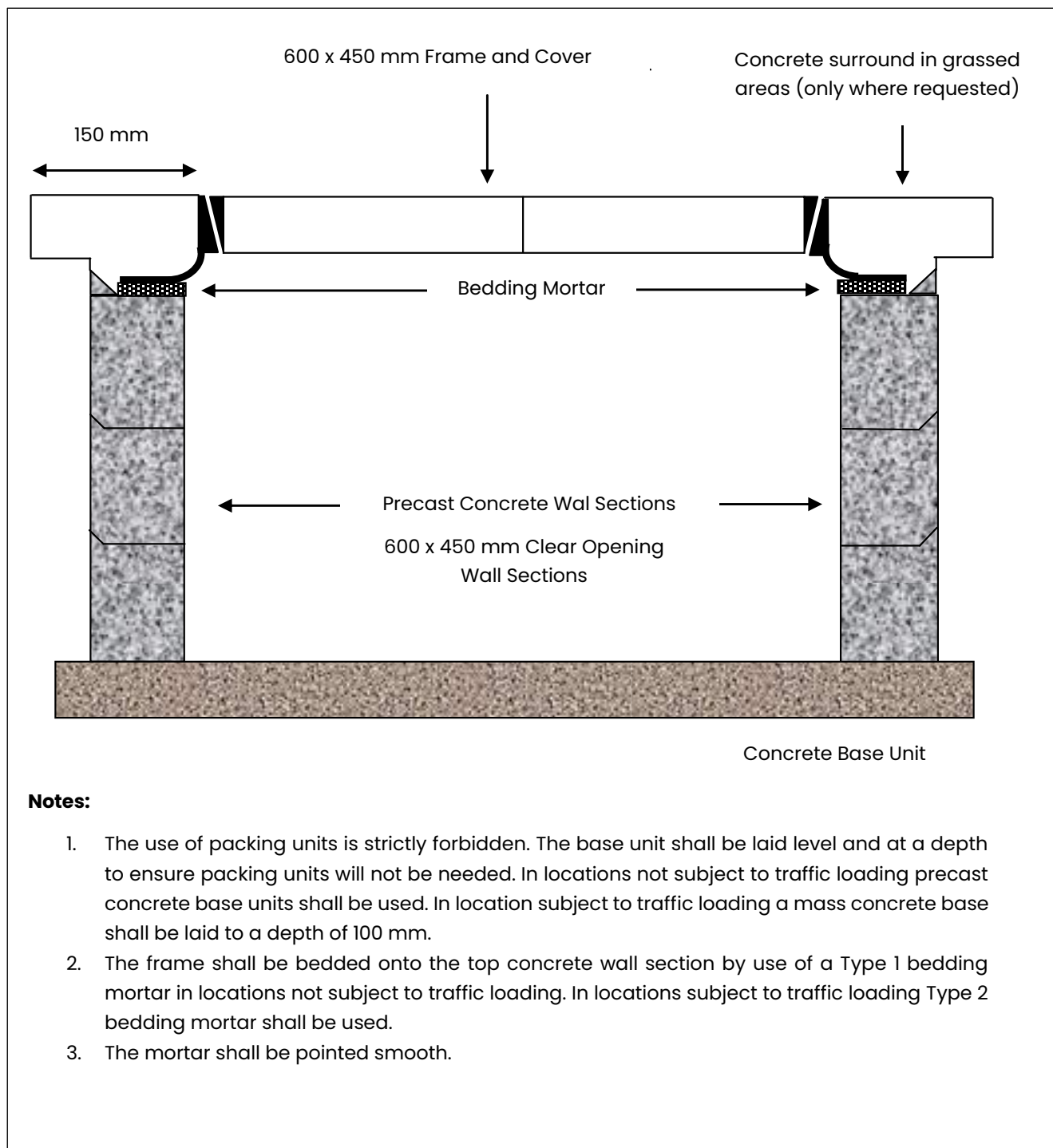


Figure 42: Precast Concrete Chamber with a 600 x 450 mm Frame and Cover

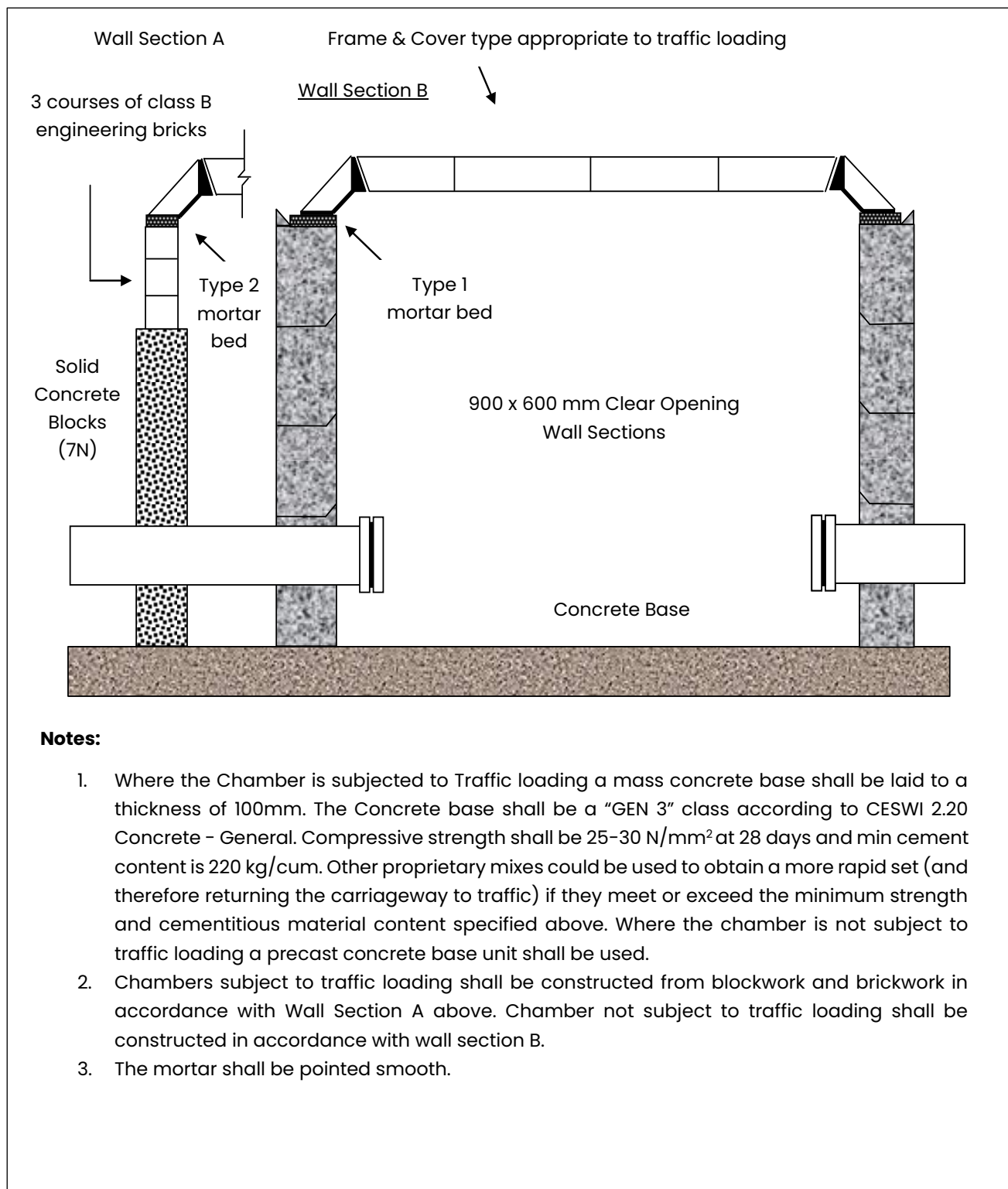


Figure 43: Precast Concrete Chamber with a 900 x 600 mm Frame and Cover

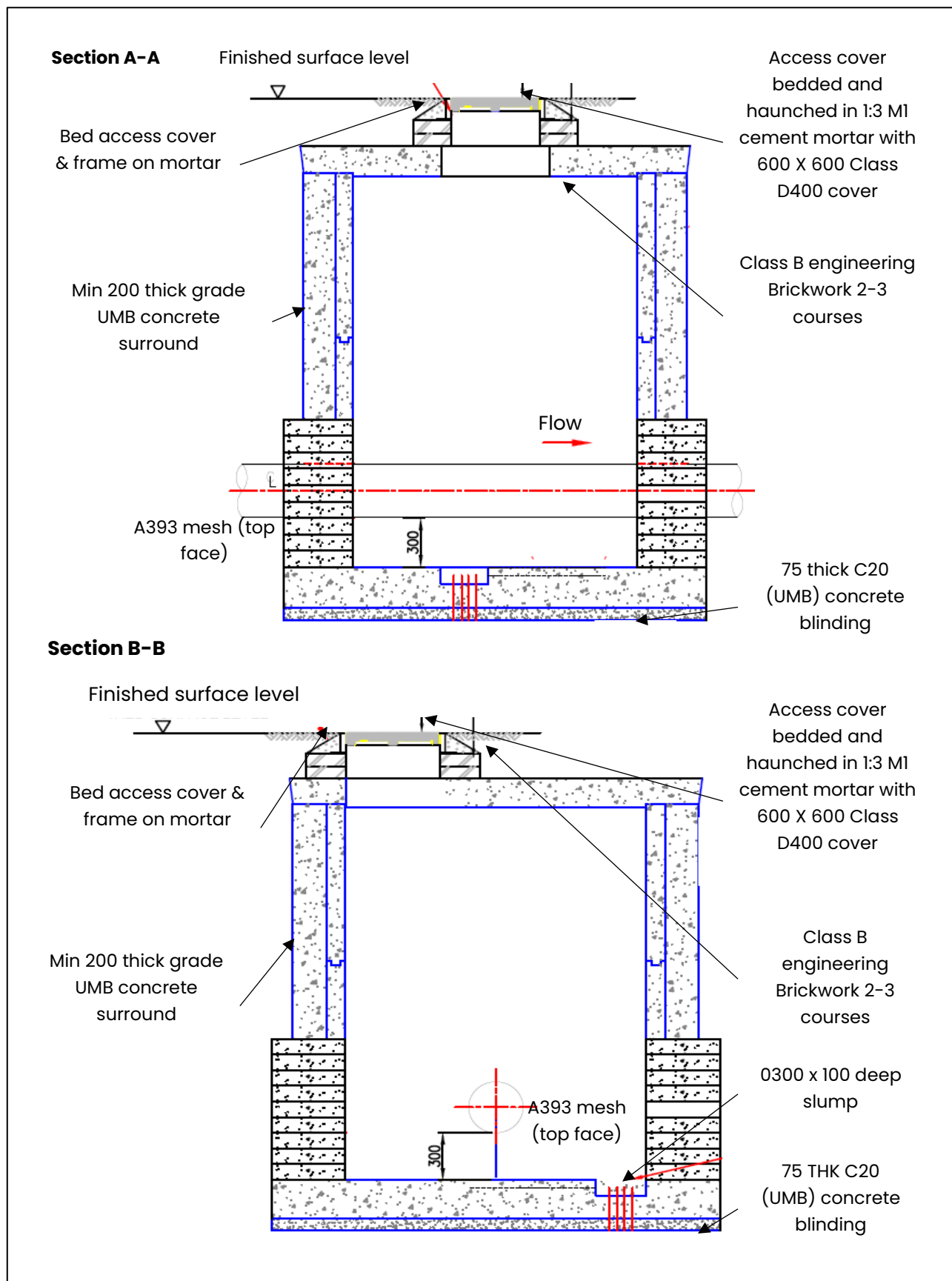


Figure 44: Install Chamber around Main

23.4 Meter

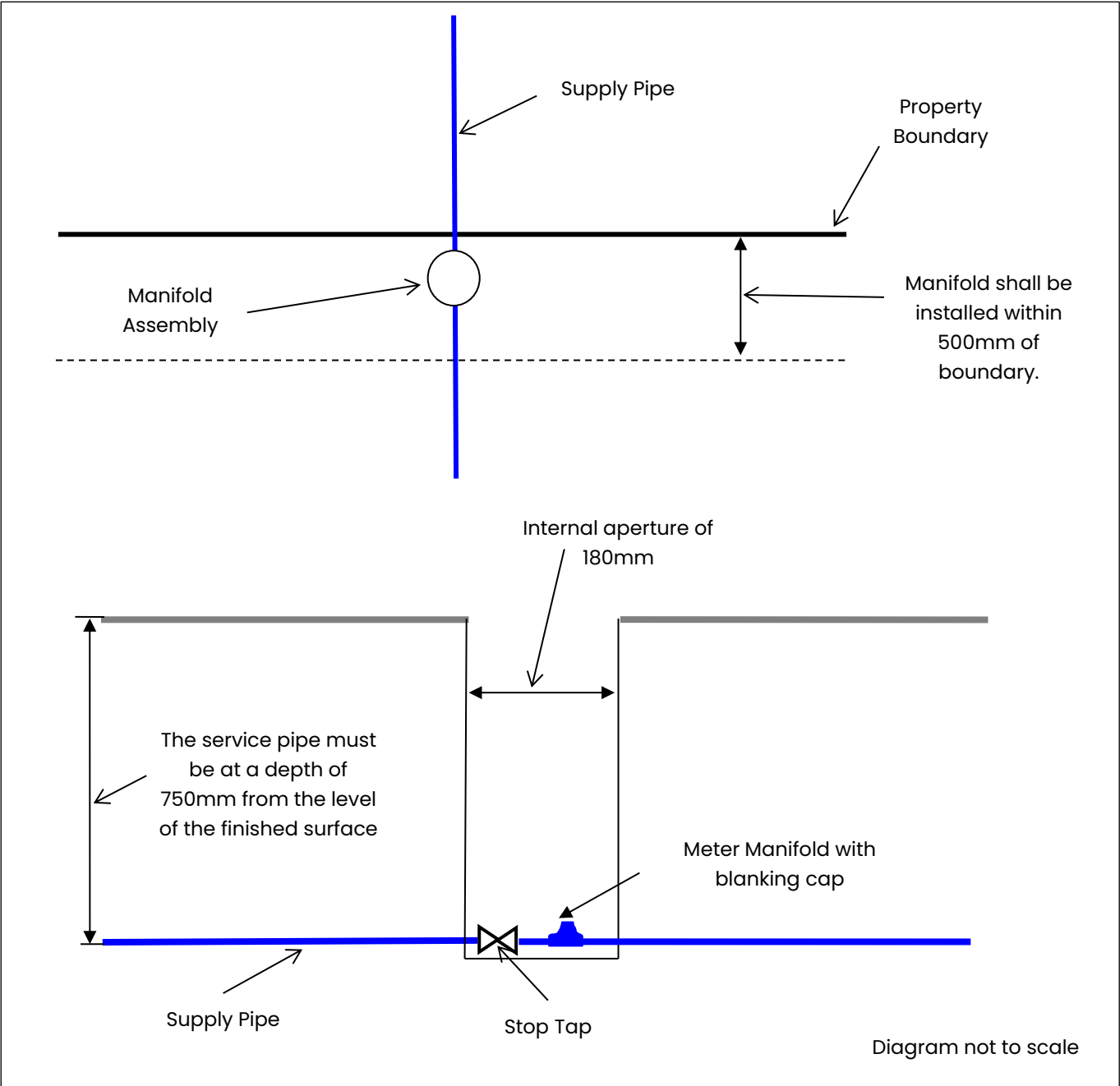


Figure 45: Manifold Assembly Installation including Meter



Figure 46: AMI Unit

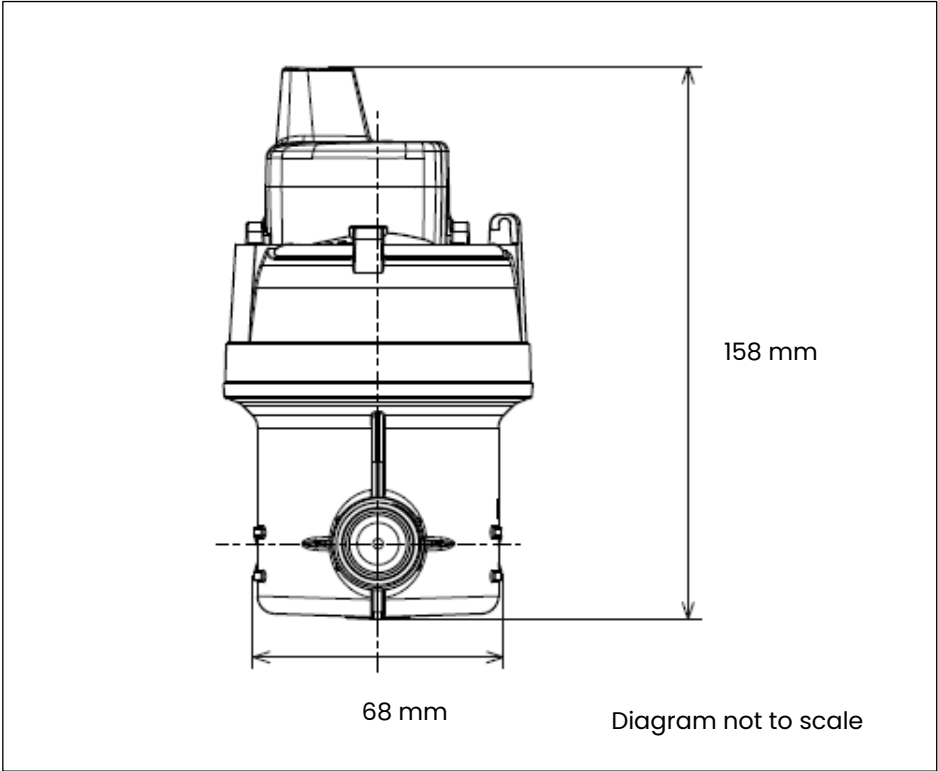


Figure 47: AMI installed on a 15mm Inline Brass Meter

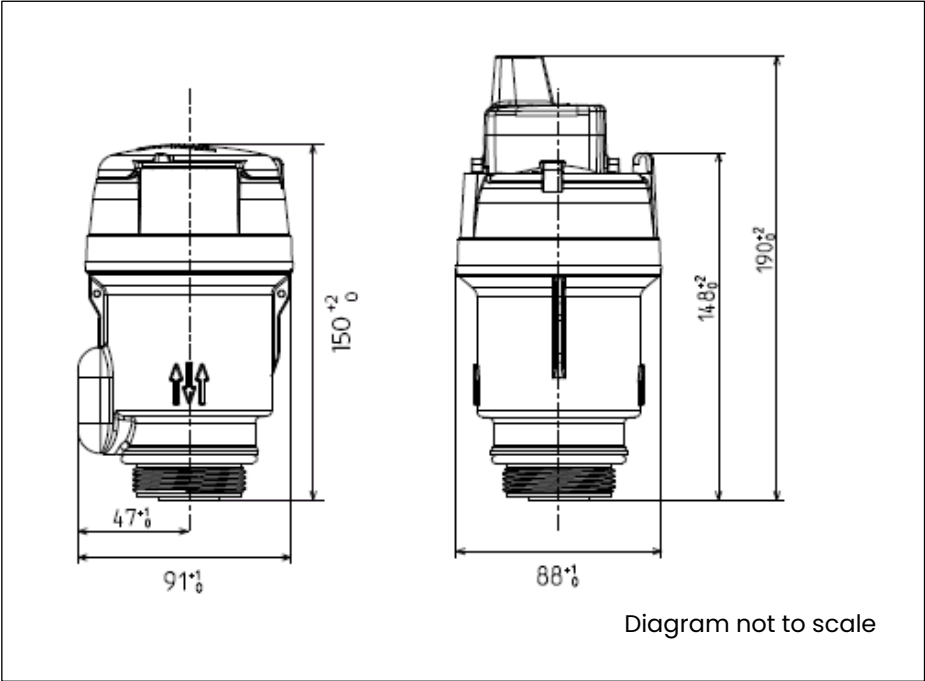


Figure 48: AMI Unit Installed on 15 mm Manifold Brass Meter

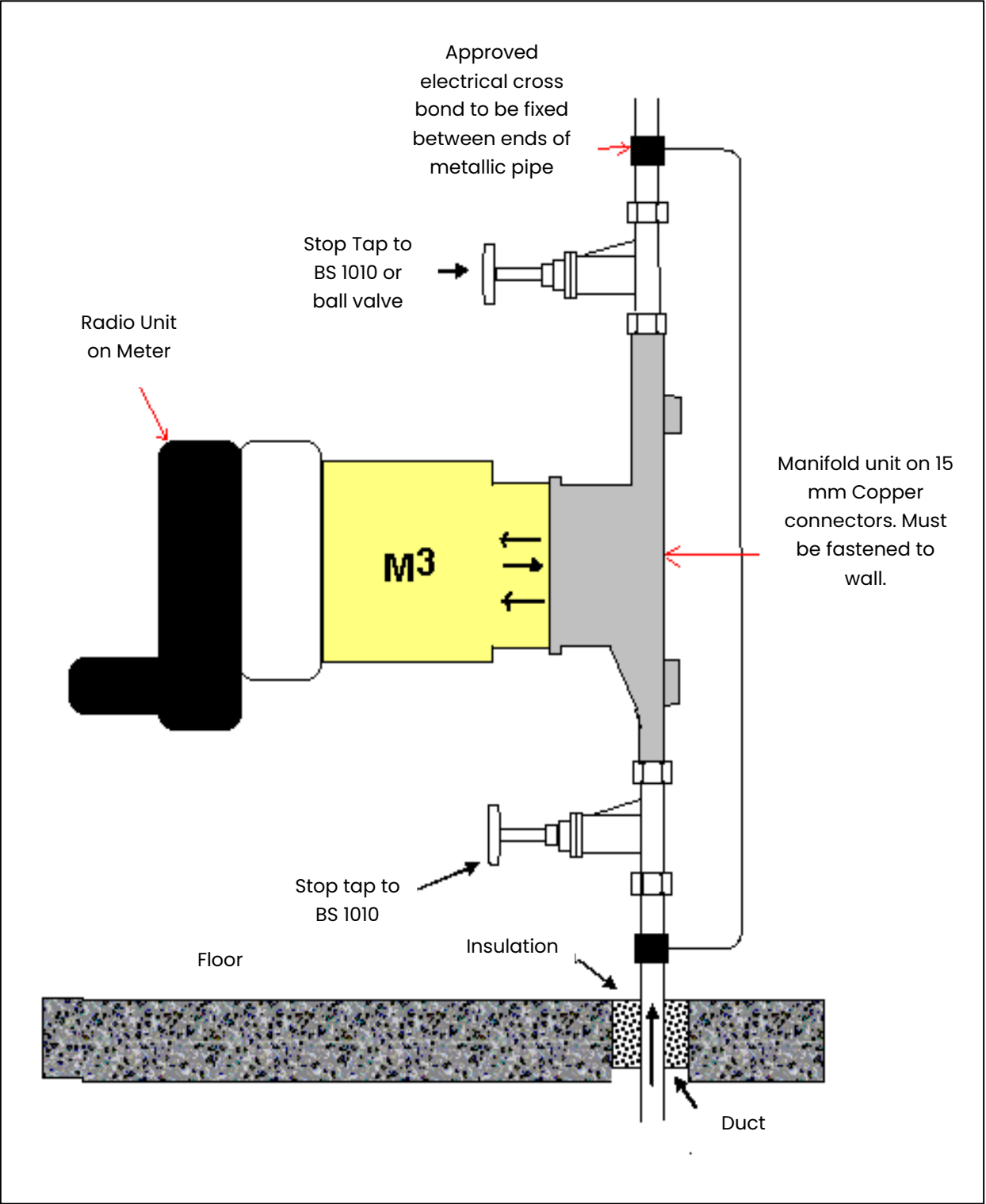


Figure 49: Fitting Single Manifold

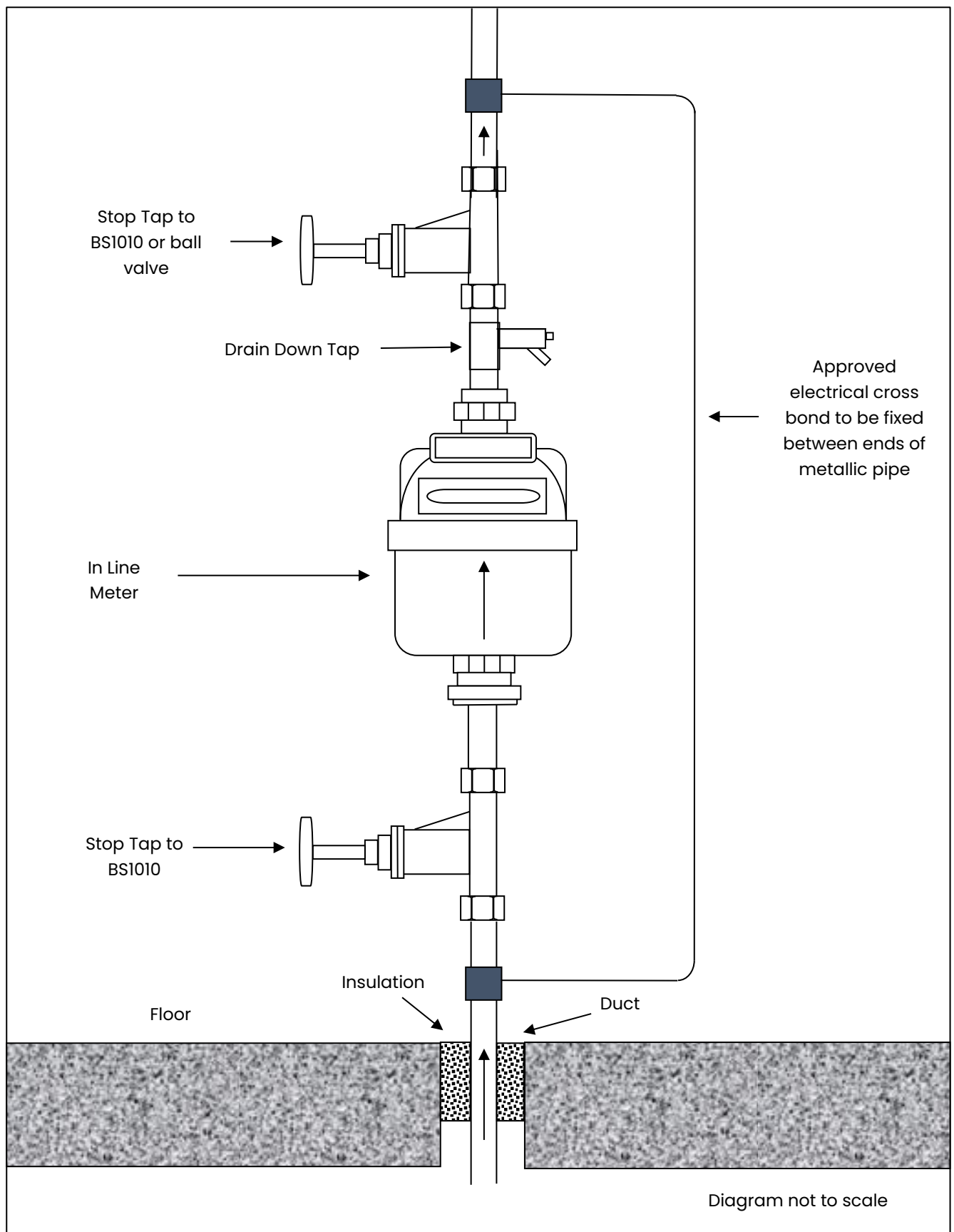


Figure 50: Standard Drawing for an Internal In-Line 20 mm – 39 mm Meter Installation

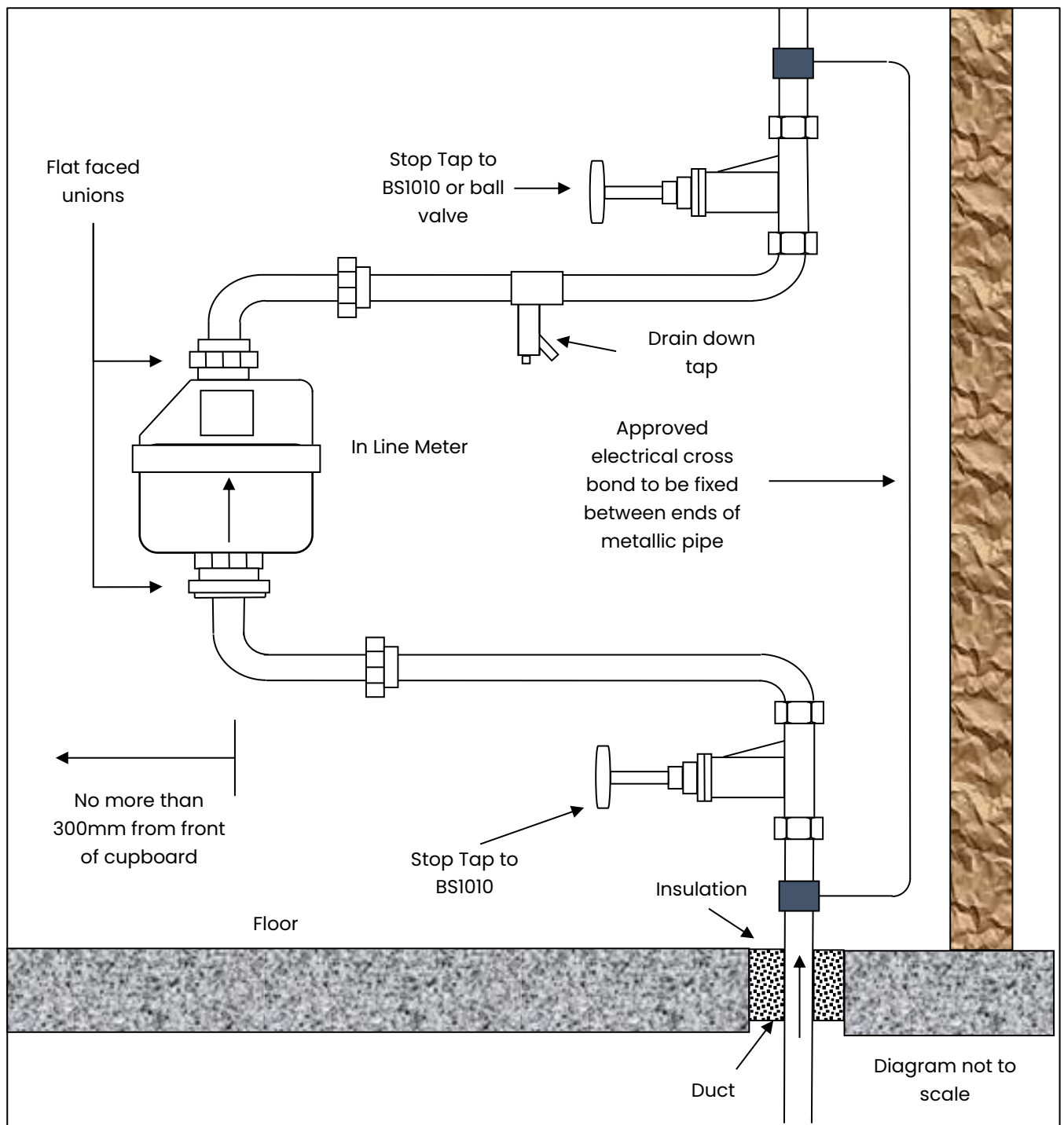


Figure 51: Standard Drawing for an Internal In-Line 20 mm – 39 mm Meter Installation in a Kiosk / Meter Box

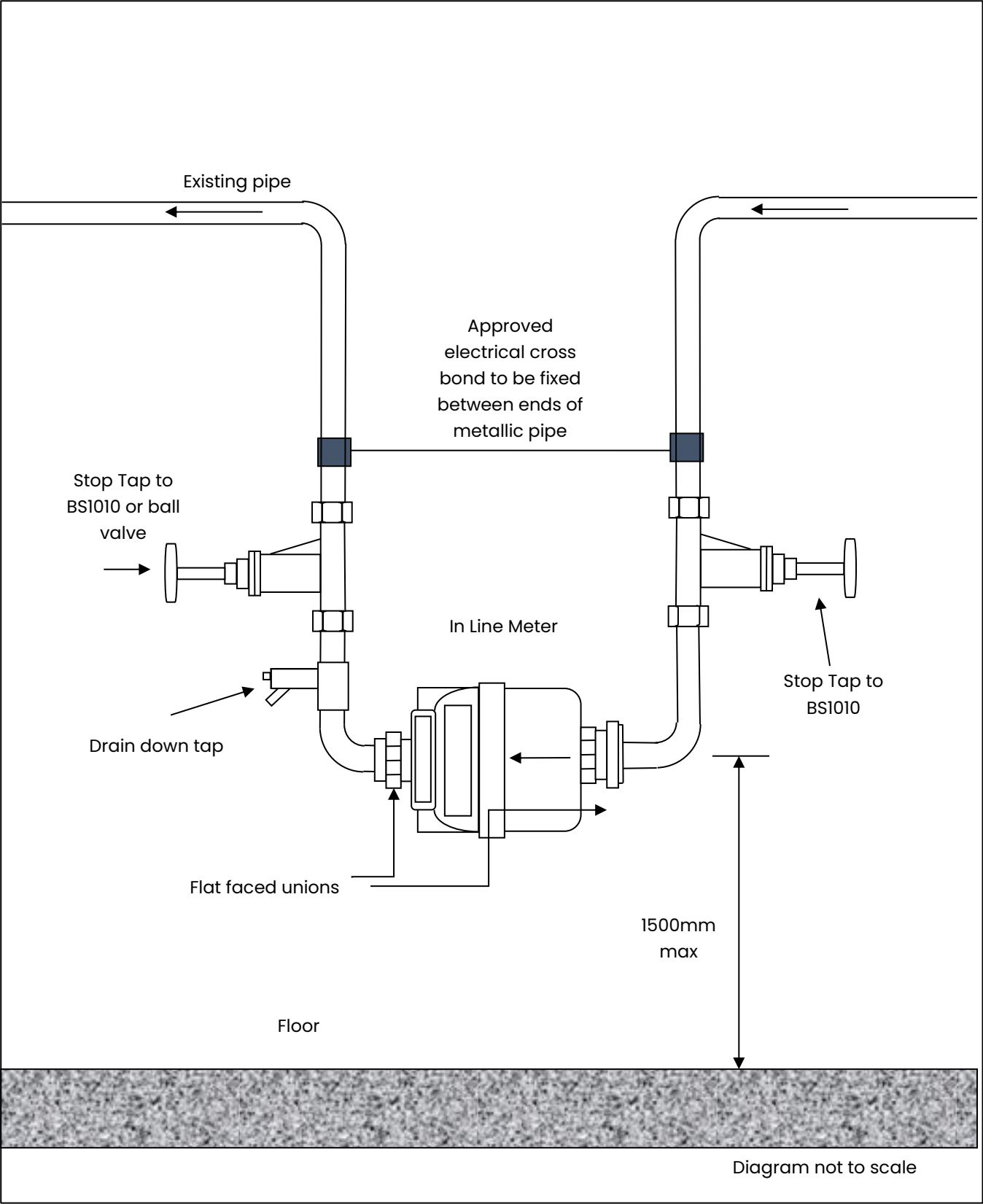


Figure 52: Standard Drawing for an Internal 20 mm – 39 mm Meter Installation Requiring Diversion

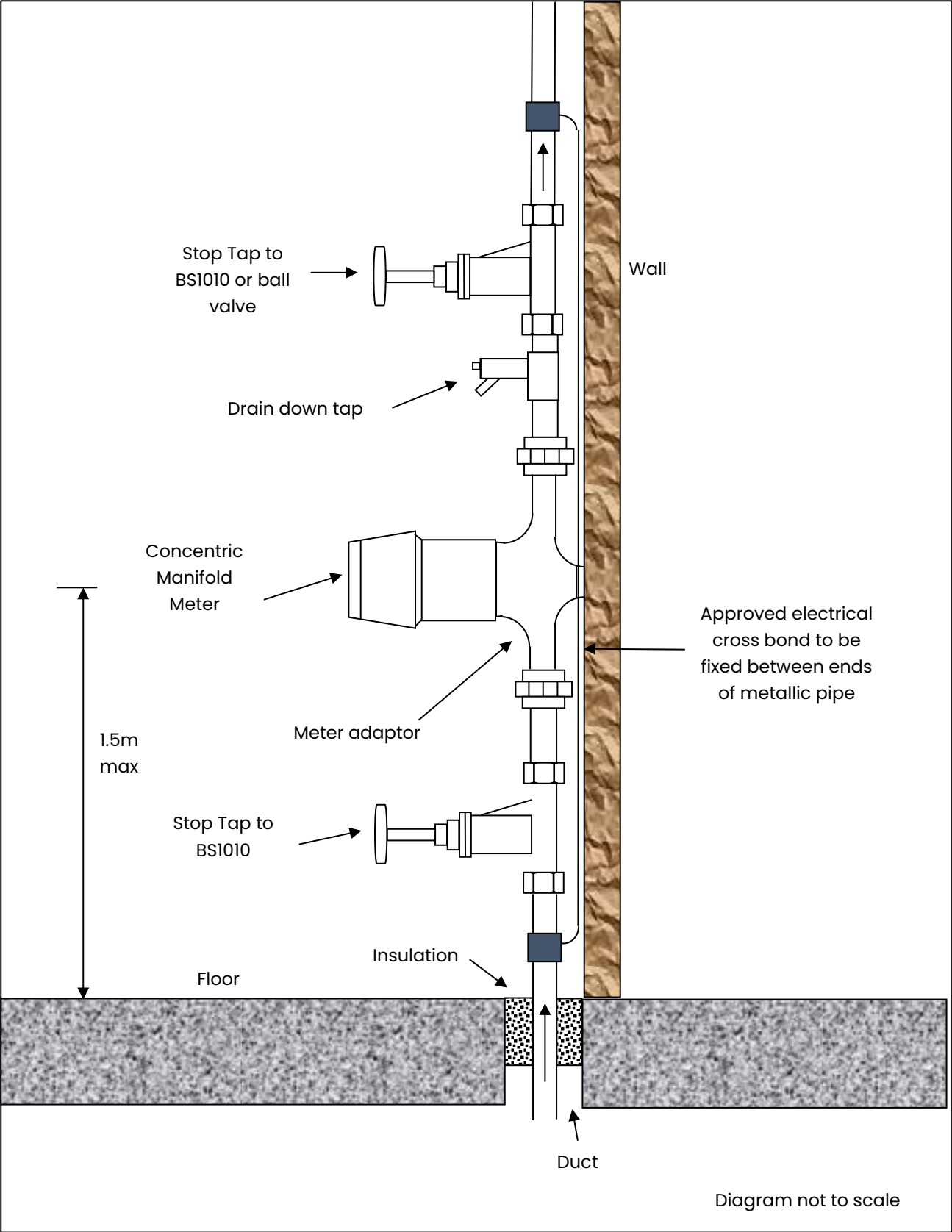
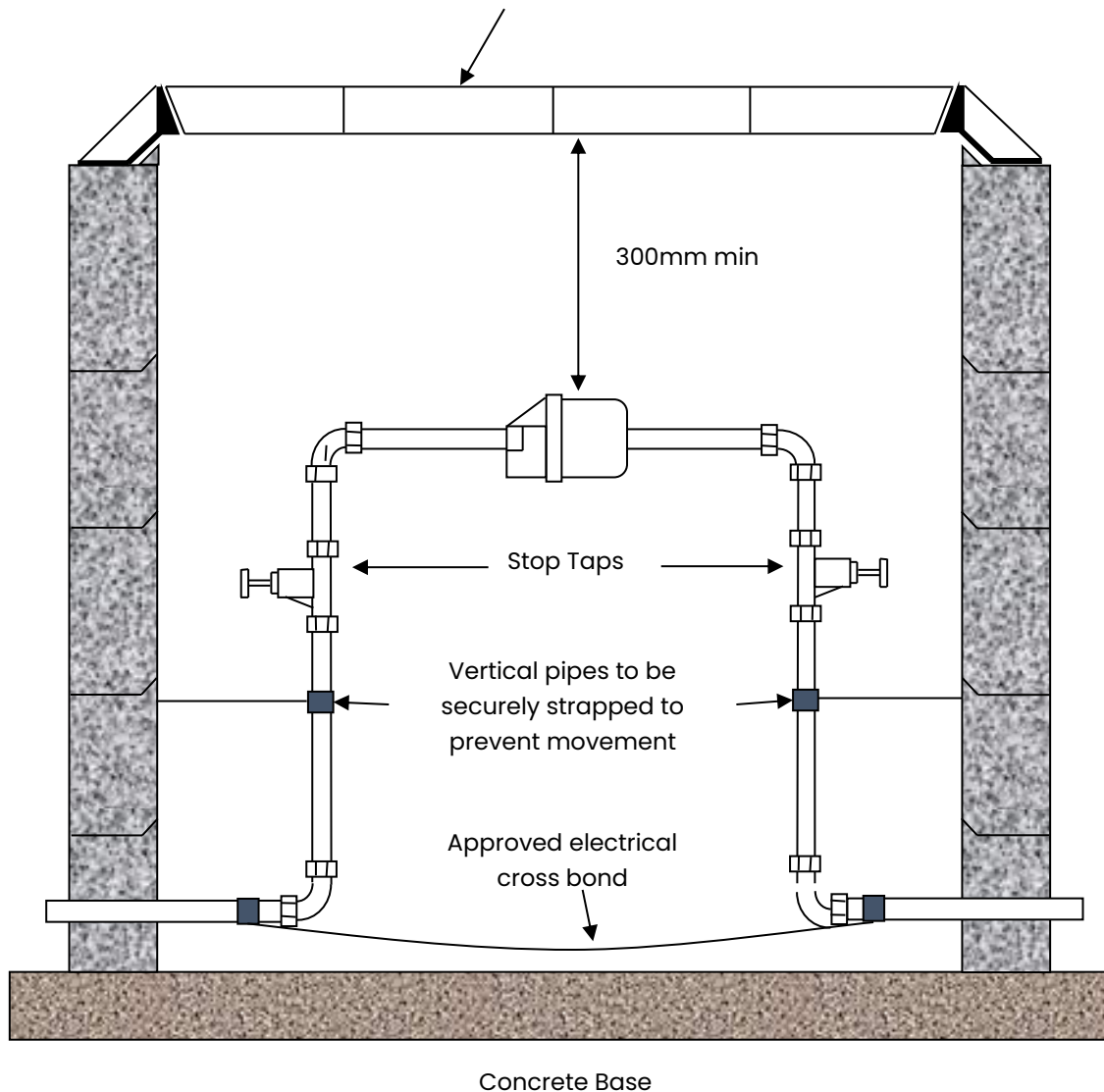


Figure 53: Standard Drawing for an Internal In-Line 20 mm – 39 mm Meter Installation

Frame & Cover type appropriate to traffic loading. Grade B125 for pavement & verges.
Grade D400 for all trafficked surfaces.



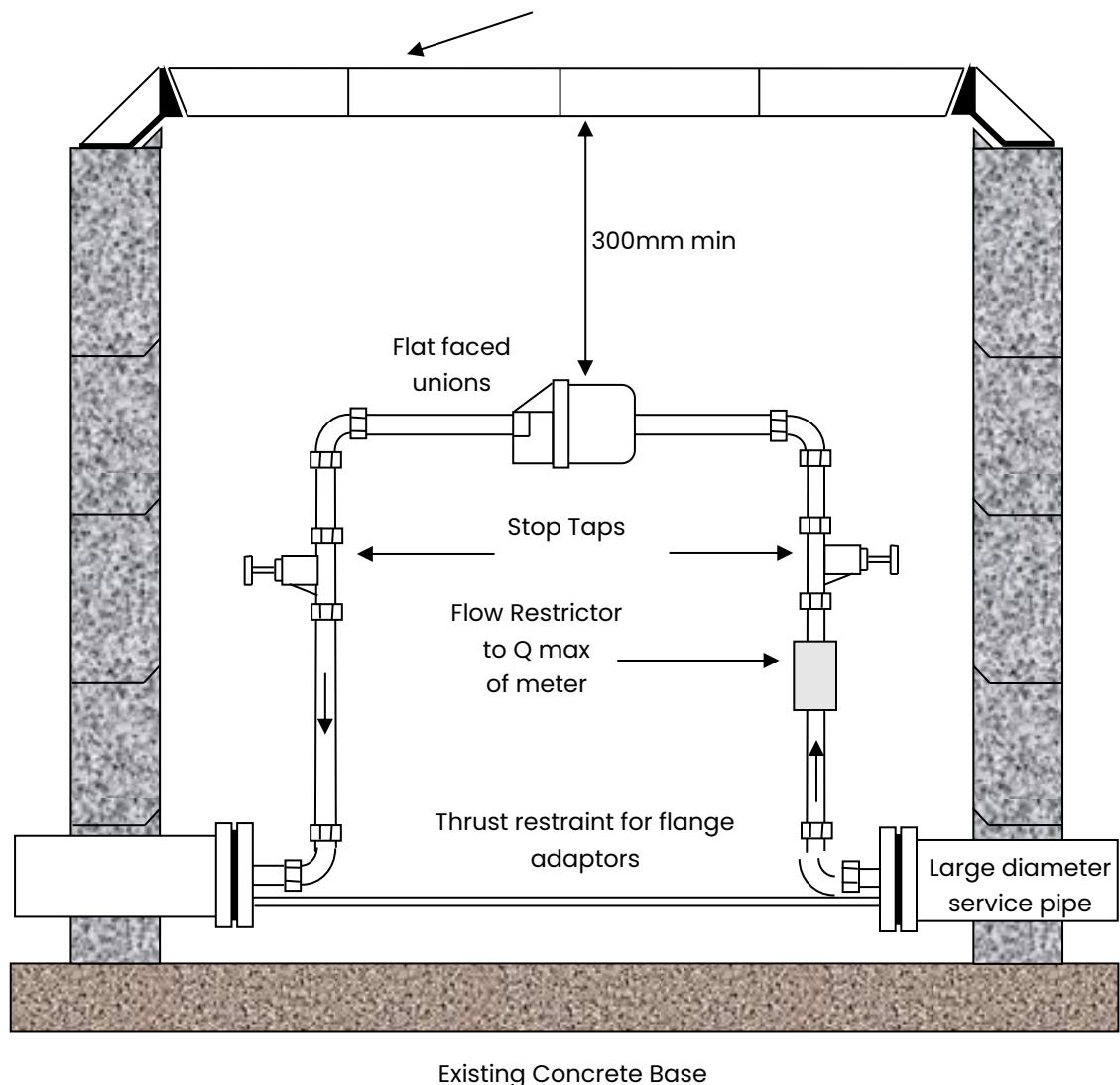
Notes:

- For chamber size 610 x 455 mm where the chamber is subject to traffic loading a mass concrete base laid to a thickness of 100 mm. Where chamber is not subject to traffic loading a precast concrete base unit shall be used.
- For chamber size 430 x 280 mm a precast concrete base unit shall be used in all loading conditions.
- Chamber size of 610 x 455 mm shall be used for 30 and 40 mm PSM's. Chamber size 430 x 280 mm for 25 mm PSM meters.

Diagram not to scale

Figure 54: Standard Drawing for an External Meter Installed in a Precast Concrete Chambers for meters 15 mm, 20 mm, 25 mm, 30 mm, and 40 mm in-line Meters

Frame & Cover type appropriate to traffic loading Grade B125 for pavement & verges.
Grade D400 for all trafficked surfaces.



Notes:

1. For chamber size 610 x 455 mm where the chamber is subject to traffic loading a mass concrete base is laid to a thickness of 100 mm. Where chamber is not subject to traffic loading a precast concrete base unit shall be used.
2. For chamber size 430 x 280 mm a precast concrete base shall be used in all loading conditions.
3. Chamber size of 610 x 455 mm shall be used for 30 and 40 mm in line meter. Chamber size 430 x 280 mm for 25 mm in line meters.

Diagram not to scale

Figure 55: Standard Drawing for an Installation of a 20 mm – 39 mm Meter in Place of a Flanged Meter in an External Precast Concrete Chamber

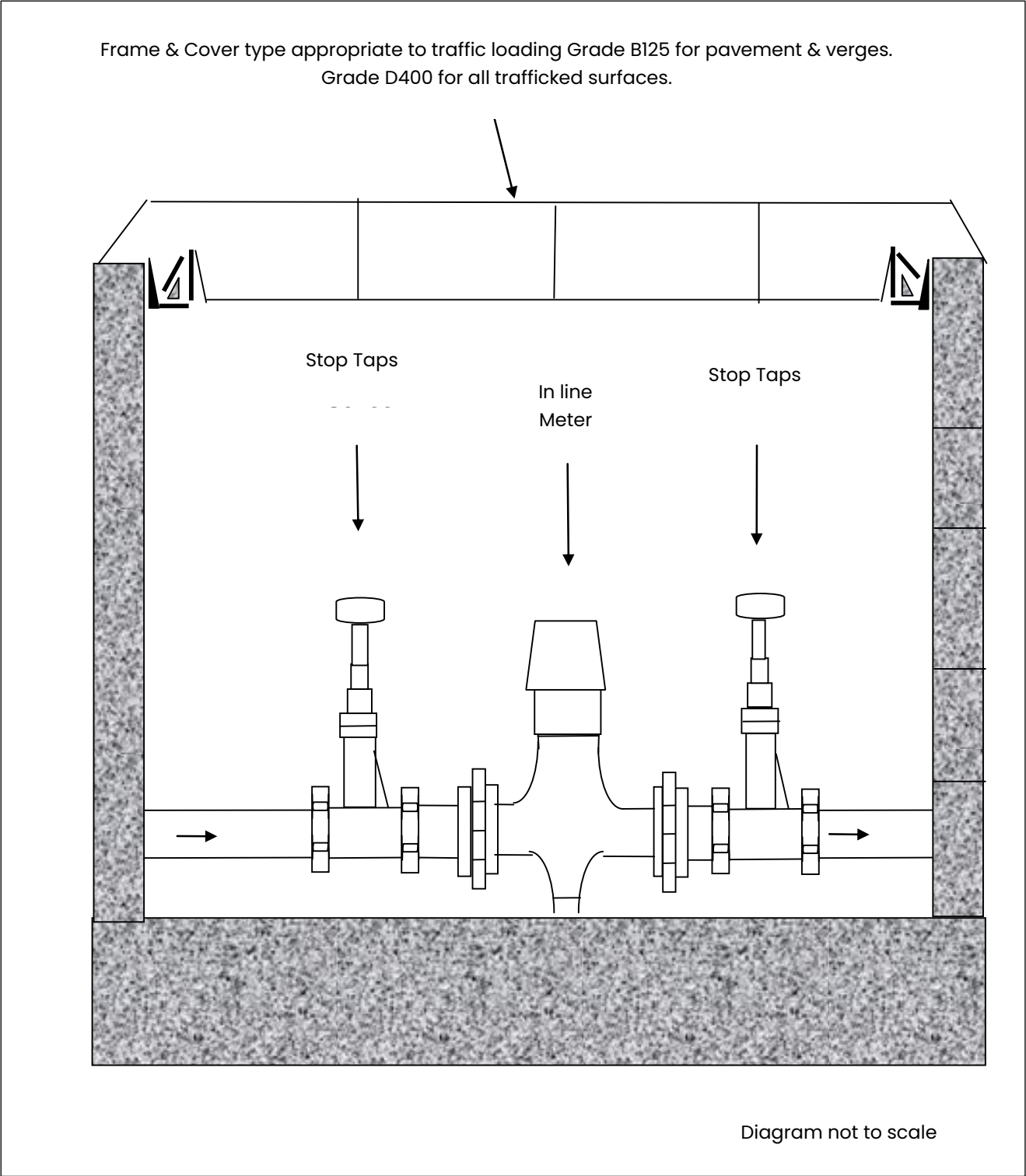


Figure 56: Standard Drawing for an External In-Line 20 – 39 mm Meter Installation in a Precast Concrete Chamber

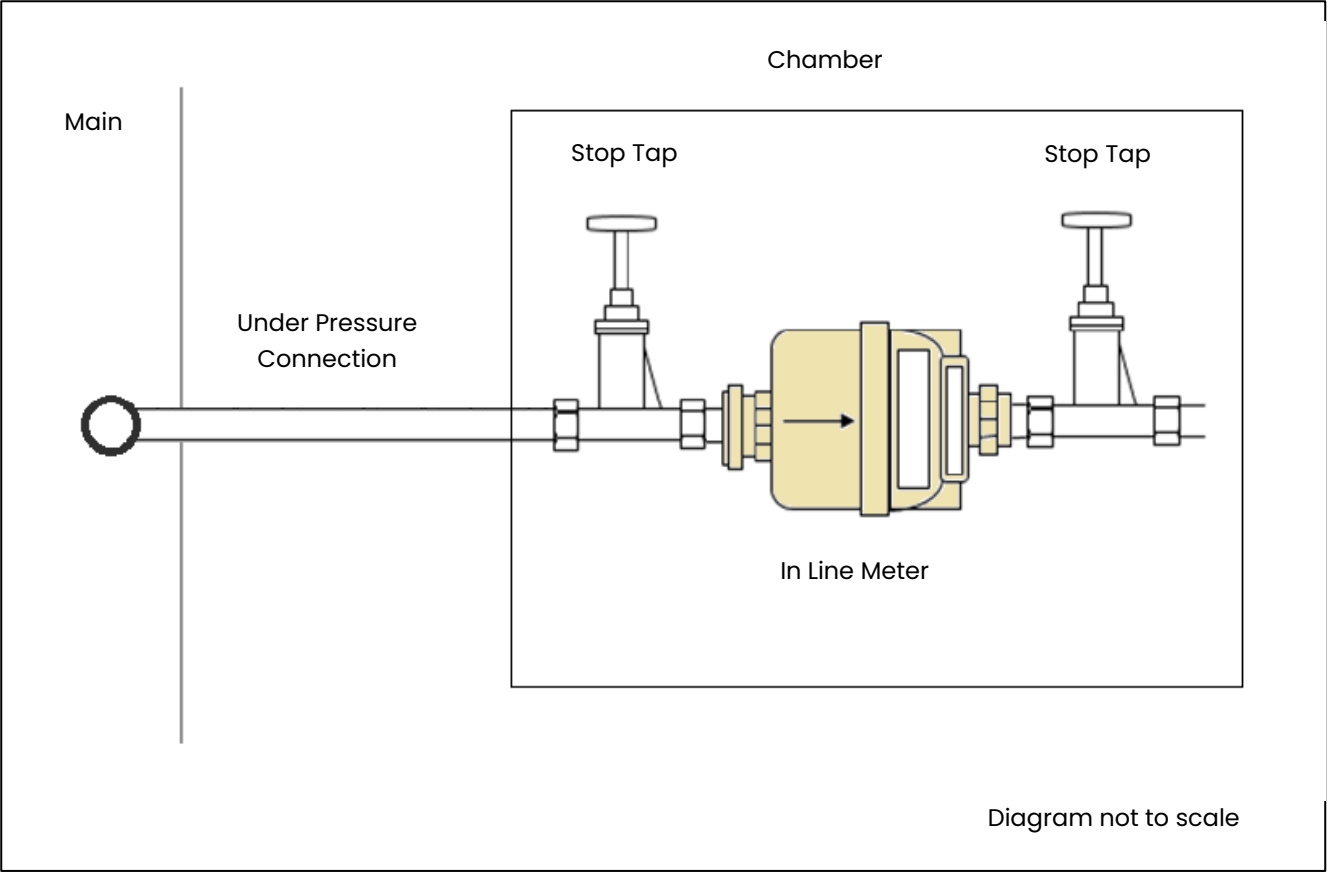
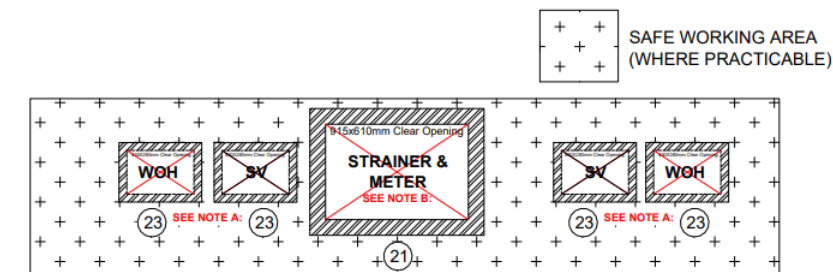
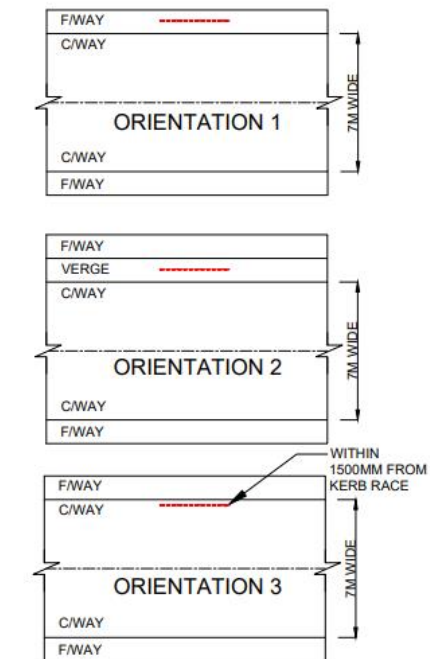
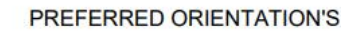
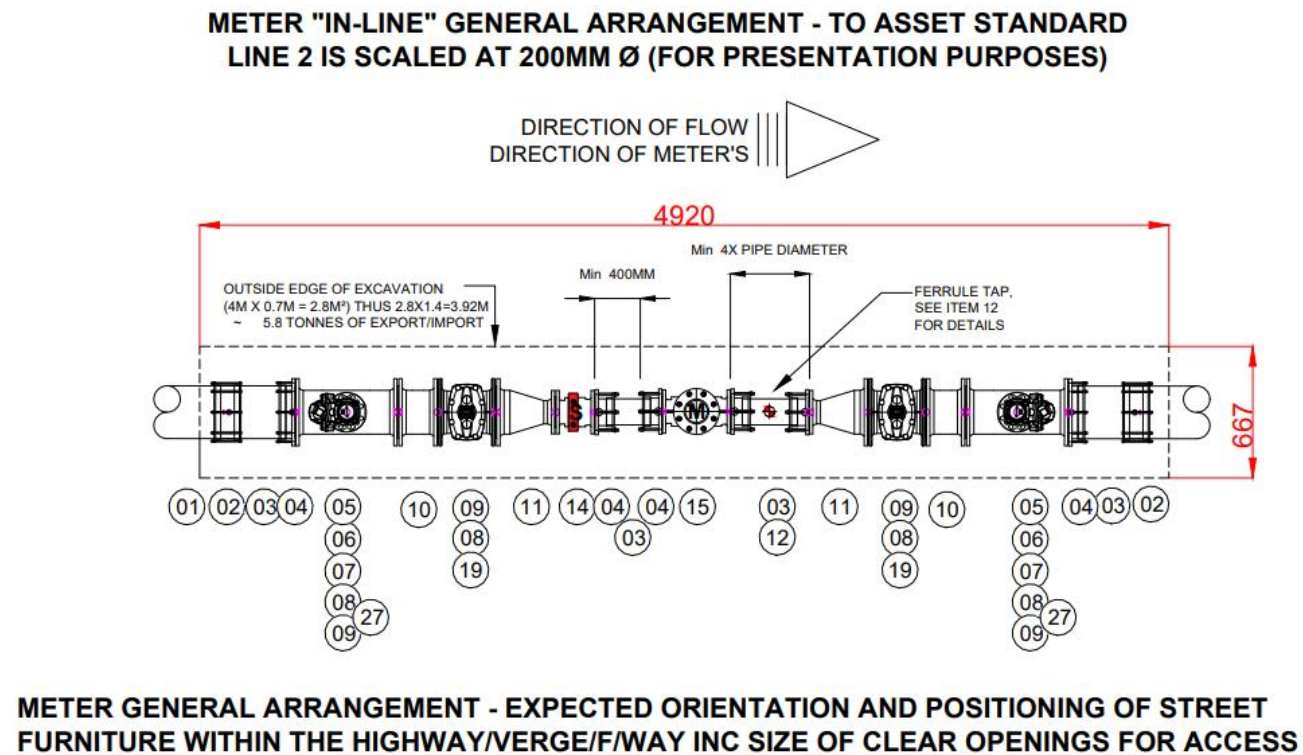


Figure 57: Standard Drawing for an External 20 mm – 39 mm Meter Installation



NOTE A:
IN SOME CIRCUMSTANCES YW WILL APPROVE THE USE OF 150X150 SECTIONS AND 100X100 SQ SURFACE FURNITURE TO ALLOW THE WOH TO BE POSITIONED TIGHT UP TO THE GATE VALVE REMOVING THE NEED FOR A SPACER (ITEM 10). SEEK ADVICE FROM YW SPONSOR/REPRESENTATIVE IF THIS IS A REQUIREMENT ON A SCHEME BY SCHEME BASIS.

NOTE B:
IN SOME CIRCUMSTANCES YW WILL APPROVE THE USE OF SEPARATE CHAMBERS TO HOUSE THE STRAINER AND METER SEEK ADVICE FROM YW SPONSOR/REPRESENTATIVE IF THIS IS A REQUIREMENT ON A SCHEME BY SCHEME BASIS.

- 01 = EXISTING WATER MAIN
- 02 = COUPLER FOR "MAKE UP PIECE"
- 03 = "MAKE UP PIECE"
- 04 = FLANGED ADAPTOR SIZED FOR PARENT MAIN
(CALIPER IF $\geq 300\text{MM}/12"$)
- 05 = A/F DI TEE PN16
- 06 = RISERS TO SUIT TEE OUTLET
- 07 = 80MM T.B.H (THROUGH BORE HYDRANT)
- 08 = POLYMER SECTIONS AND BASE PLATE
- 09 = D400 SURFACE BOX
- 10 = SPACER TO SUIT PIPELINE SIZE TO ALLOW FOR
SECTIONS TO BE PLACED WITHOUT CLASH
- 11 = AF CONCENTRIC TAPER TO SUIT REDUCTION SIZE
APPROACHING METER
- 12 = 1X32MM TAPPING WITH 32 PIPE AND BRASS TAP
FOR FUTURE VENTING ON COMMISSIONING
- 13 = FLANGED ADAPTOR (END LOADING TYPE) TO
NEGATE RISK OF SURGE SHIFT
- 14 = STRAINER (TO SUIT METER SIZE TYPE -
DEPENDENT ON YW AREA STRAINER MAY NOT BE
REQUIRED)
- 15 = METER (TO SUIT SIZE & TYPE REQUESTED BY YW
TSE)
- 16 = 90° AF DI BEND
- 17 = TRAPEZOIDAL CONVENTIONAL THRUST BLOCK
(CALC TO BE 1.5X NIGHT LINE PRESSURE)
- 18 = RECTANGULAR CONVENTIONAL THRUST BLOCK
(CALC TO BE 1.5X NIGHT LINE PRESSURE)
- 19 = GATE VALVE (SIZED TO SUIT PIPELINE)
- 20 =
- 21 = 915MMX610MM CLEAR OPENING SECTIONS
- 22 =
- 23 = 430MMX280MM CLEAR OPENING SECTIONS
- 24 =
- 25 = FLANGED SPIGOT DI
- 26 = COUPLING (NON END LOADING TYPE)
- 27 = SANDWICH VALVE FOR WOH (IN CASE OF REFIT)
- 28 = PRV (SIZED AND TYPE BY TECHNICAL
OPERATIONS)

CHECKED BY: P S WARD	DATE: NOV 2021
APPROVED BY: C NEEDHAM	DATE: NOV 2021

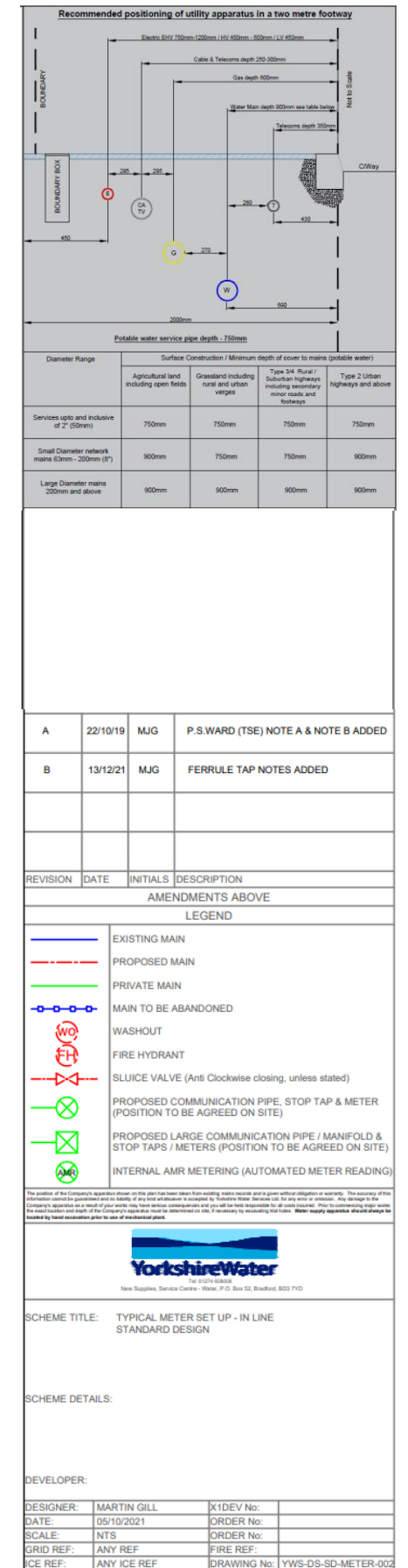
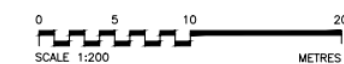


Figure 58: Typical Meter Set Up – In Line – Standard Design

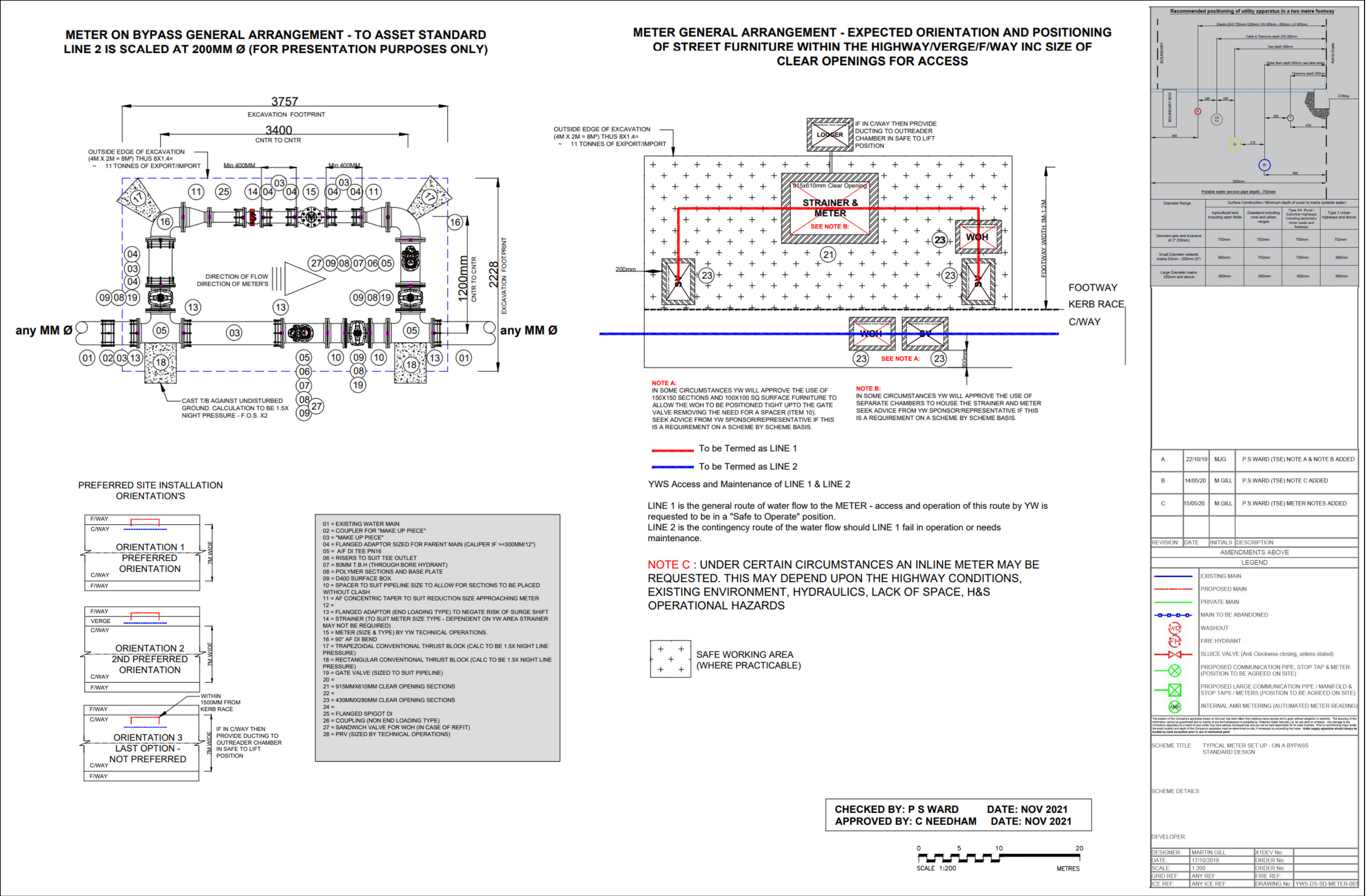


Figure 59: Typical Meter Set Up – On A Bypass – Standard Design

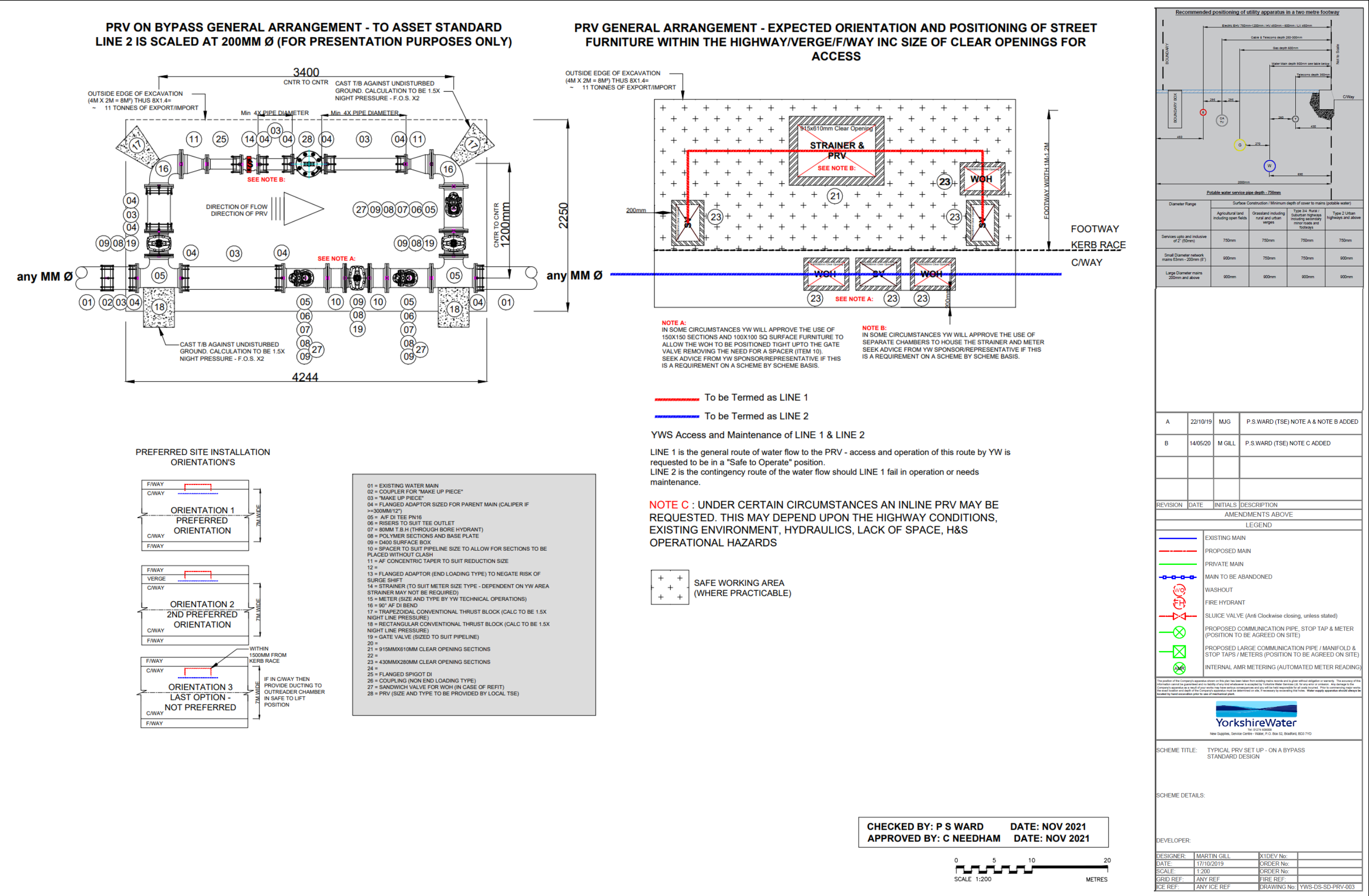
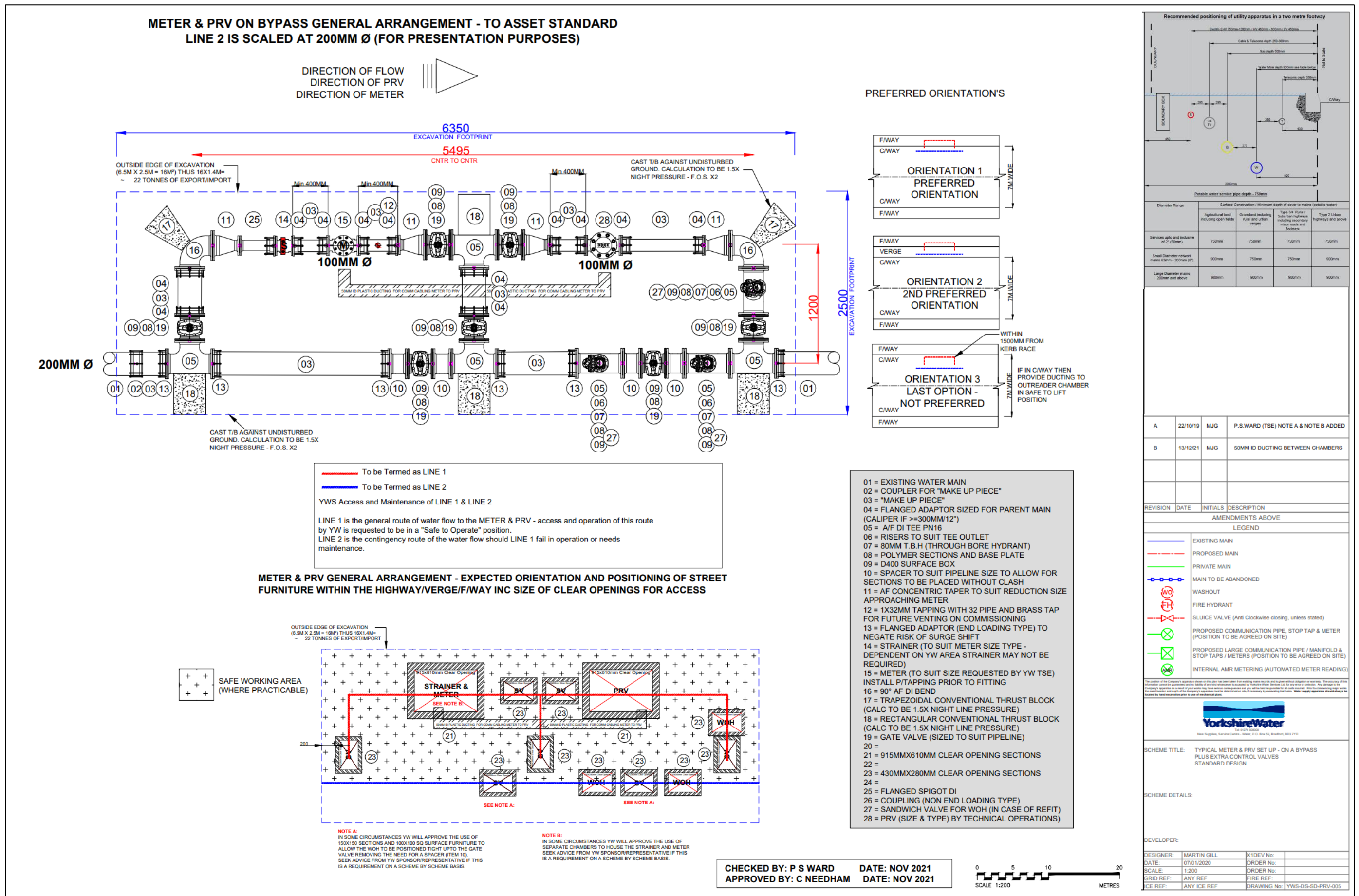


Figure 60: Typical PRV Set Up - On A Bypass - Standard Design



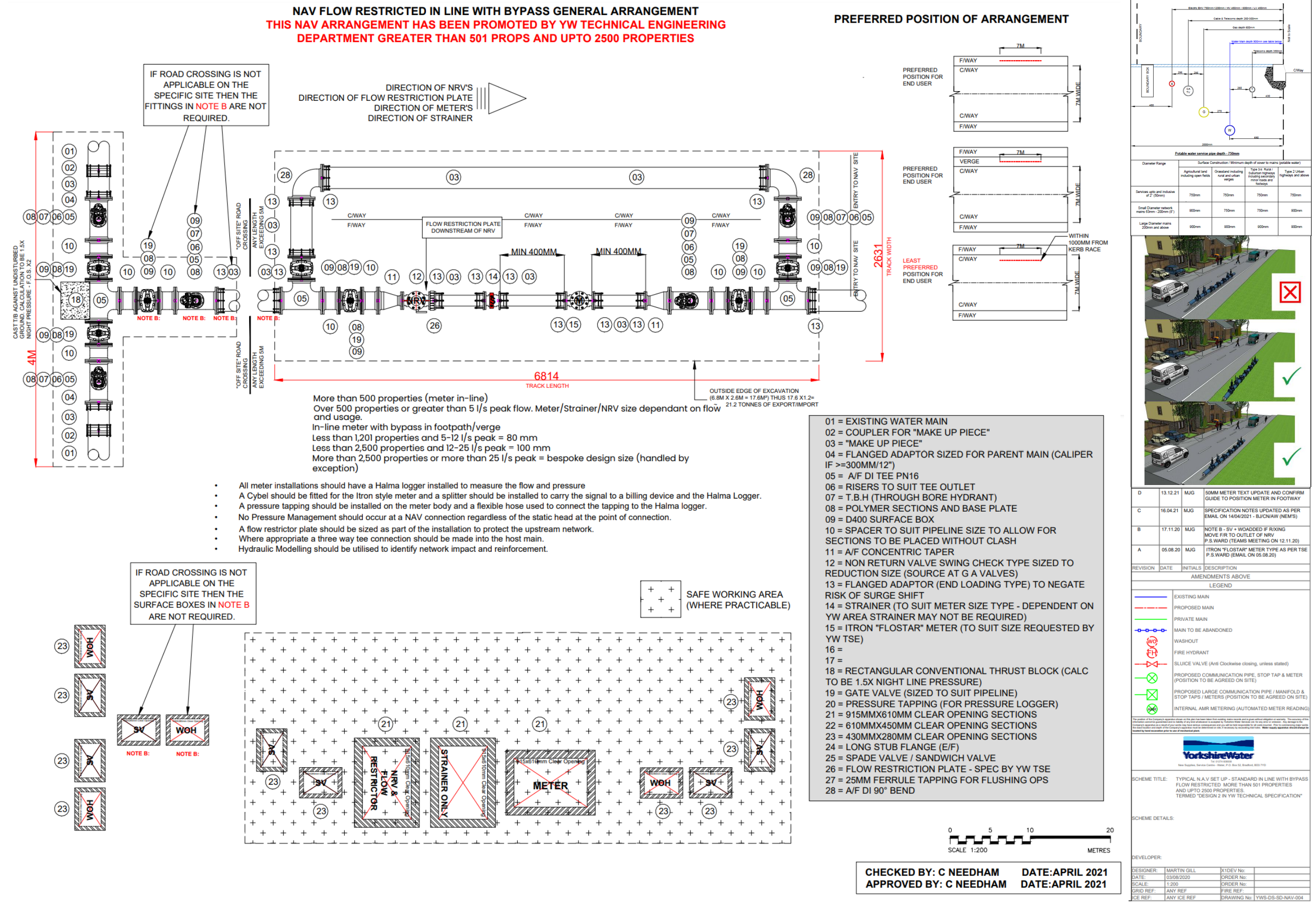


Figure 62: Typical NAV Set Up – Standard In Line – Flow Restricted – Less than and up to 500 Properties

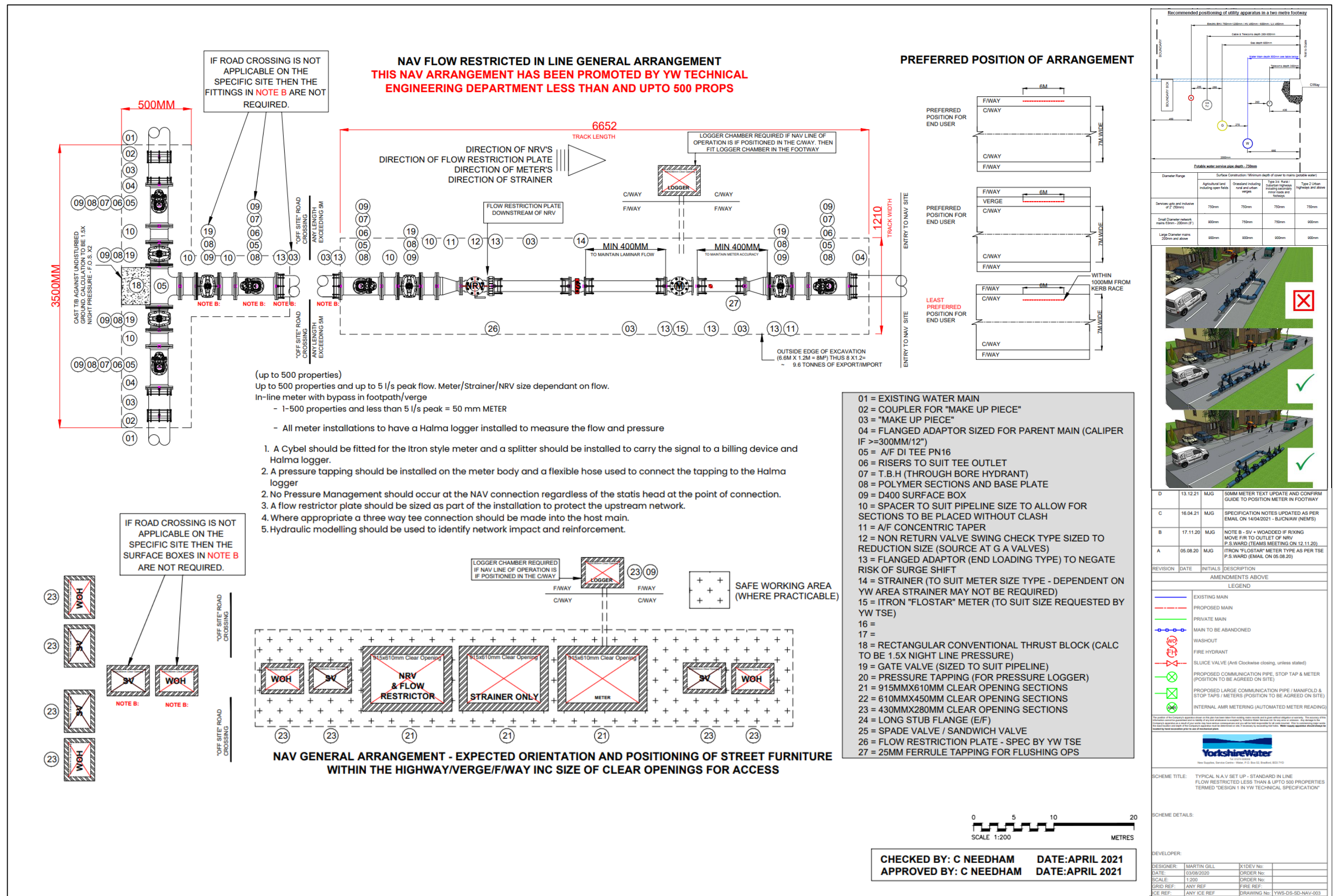


Figure 63: Typical NAV Set Up – Standard In Line with Bypass – Flow Restricted – More than 500 properties and up to 2,500 Properties

24 Construction Pre-Start Meeting Agenda

A pre-start meeting shall only be required if one party to the WAA submits a written request to the remaining Parties notifying them that it requires a pre-start meeting.

However, such meetings are viewed by Water Companies as a key means of helping to achieve good Health and Safety outcomes, of securing timely, cost-effective delivery and ensuring smooth adoption and handover. For this reason, they will generally be requested by Water Companies.

In more detail, such meetings will allow the following aspects of the project to be addressed:

- Site-specific Health & Safety and site management issues.
- Confirmation of the identity of the Principal Contractor under CDM Regulations.
- Introduce site personnel and establish their individual roles and responsibilities.
- Establish local lines of communication between site and Water Company staff.
- Assess any associated construction activity that may need accommodating in the SLP construction programme.
- Discuss issues relating to the distribution that have the potential to affect the project.

The Parties shall agree the date of the pre-start meeting and shall record the minutes of the meeting and circulate such within 5 calendar days. The pre-start meeting shall include the 'pre-start information' listed below.

Where no pre-start meeting is required by a party, the SLP and/or Developer shall, if requested by the Water Company, prior to the commencement of the Self-Lay Works, provide the following pre-start information in any event.

'Pre-start information' includes as a minimum:

1. Confirmed arrangements for CDM 2015 Regulations and other H&S requirements.
2. Future contact arrangements and authorised parties for giving instructions, agreeing "right day" for SLAs, making variations, and exchanging information regarding progress with all parties' works.
3. Confirmation of line and level of Self-lay Works.
4. Confirmation of national (Street Works) and local (Water Company) design requirements.
5. Overview of process for dealing with variations / and changes to the Site layout and associated approved design drawing (revisions and impact on design, co-ordination and charges etc.).
6. Confirm and detail the Source of Water for testing and mains connection Delivery Date.
7. Confirm latest design approved drawing, and any revision, and drawing for construction.
8. Process for submitting as-laid drawings.
9. Identify any potential site hazards or constraints (such as existing Network considerations, including protection, diversion or renewal).
10. Confirm that access is approved relative to any land rights, statute, and third-party consents.
11. Contact details.

12. An indication of when any new service connections are required by and if any new property is to be fed from the Network.
13. Confirmation that the Agreement has been signed by all Parties.
14. Completion and issue by the SLP and/or Developer and/or the Water Company of all risk and method statements relative to design and/or construction activities.
15. Arrangements for co-ordination of activities.
16. Arrangements for supply of proof of WIRS Accreditation, personnel qualifications and/or certification documents (i.e., Hygiene Code of Practice).
17. Arrangements for water sampling and requirements for certification and accreditation of results, pressure testing, and disposal of water.
18. Arrangements for Water Company approved standpipe supply if required.
19. Confirmation of all required Regulatory requirements, arrangements, permits and consents relative to the construction, flushing (and any future arrangements to maintain water quality), and commissioning of the Self-lay Works.
20. Confirmation of any requirement for a Water Company post commissioning check sample by the Water Company in accordance with the Code Procedures.
21. Arrangements and contact details for future management of Defects and/or damage following adoption.
22. Confirmation of how the SLP proposes to demonstrate to the Water Company that the materials and products intending to be used (and on completion of work all actual materials used in case of divergence from the intended list) in the installation of Self-lay Works complies with Regulation 31 of The Water Supply (Water Quality) Regulations 2016 before commencement of any work. This confirmation may consist of the SLP providing the Regulation 31 appropriate identifier relative to the materials proposed.

Appendix 1

WIS & IGNs

Number		Title
IGN	4-01-03	Guide to Pressure Testing of Pressure Pipes and Fittings for use by Public Water Suppliers
IGN	4-37-02	Design against surge and fatigue conditions for thermoplastic pipes
IGN	4-50-03	Operating guidelines for the use of site-applied, factory applied, and reinforced factory applied polyethylene sleeving on ductile iron pipeline systems
IGN	4-51-01	External zinc coating of ductile iron pipe.
IGN	4-52-02	The use of polymeric anti-corrosion (barrier) coatings
IGN	9-04-05	Report of the expert group on the risks of contamination of the public water supply by backflow at: https://www.waterregsuk.co.uk/
WIS	4-08-01	Bedding and sidefill materials for buried pipelines
WIS	4-08-02	Specification for bedding and sidefill materials
WIS	4-21-02	Mechanical couplings and repair clams for iron pipes for the conveyance of cold potable water (underground use) for the size range 40 to 1600mm
WIS	4-22-02	Specification for ferrules (tapping tees) and ferrule straps for underground use
WIS	4-23-04	Specification for underground stop valves, including spherical valves, for potable water services for nominal sizes up to and including 63 and nominal pressures of 10 bar minimum and made principally of metal or thermoplastics
WIS	4-23-16	Specification for butt fusion joining machines.
WIS	4-32-08	Specification for the fusion jointing of polyethylene pressure pipeline systems using PE80 and PE100 materials.
WIS	4-32-11	Specification for thermoplastic end load resistant mechanical fittings for polyethylene pipes of nominal size < 63 mm. Note with outside diameters to BS 5556 (metric)
WIS	4-37-01	Specification for boundary boxes for the metering and control of domestic and small industrial water services (see also British Standards).
WIS	4-52-01	Specification for polymeric anti-corrosion (barrier) coatings.
WIS	4-52-03 & 4-52-03A	Specification for Anti-Corrosion Coatings on Threaded Fasteners. See also amendment 4-52-03A

British Standards (BS) & BS EN Standards

Number		Title
BS EN	124	Gully tops and manhole tops for vehicular and pedestrian areas

Number		Title
BS EN	545	Ductile iron pipes, fittings, accessories and their joints for water pipelines. Requirements and test methods.
BS	750	Specification for underground fire hydrants and surface box frames and covers.
BS EN	805	Water Supply. Requirements for systems and components outside buildings.
BS EN	806	Specification for installations inside buildings conveying water for human consumption. Operation and maintenance.
BS	1042-2.2 1983 & ISO 7145 1982	Measurement of fluid flow in closed conduits and Determination of flowrate of fluids in closed conduits of circular cross section – Method of velocity measurement at one point of cross-section.
BS EN	1295	Structural design of buried pipelines under various conditions of loading. General requirements.
BS	3251	Indicator plates for fire hydrants and emergency water supplies.
		Part 1: Hose Reels and Foam Inlets.
BS	5834-2	“Meter chamber” – Boundary box – (and when for use in areas subject to occasional vehicular access relevant aspects of this BS apply) with anti-slip lid design to BS 7976 Part 2
		Internal fitted NRV in accordance with WIS 5-11-01 (BS EN 13959 and shut off device rising-spindle with WIS 4-23-04
BS	8561	Specification for mechanical fittings for use in the repair, connection and renovation of pressurised water supply pipelines. Requirements and test methods.
BS	8588	Polyethylene pressure pipe with an aluminium barrier layer and associated fittings for potable water supply in contaminated land. Size 20 mm to 630 mm
BS	9295	Guide to the structural design of buried pipelines.
BS EN	12201	Plastics piping system for water supply, and for drainage and sewerage under pressure. Polyethylene (PE). General.
		Part 2: Pipes
		Part 3: Fittings
BS	PD 855468	Guide to the flushing and disinfection of services supplying water for domestic use within buildings and their curtilages.

Other Documents

Number / Date	Title
10/WM/03/21	Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites
CESWI	Civil Engineering Specification for the Water Industry 7 th Edition (or later version thereof) (“CESWI”) together with any Water Company amendments (to be published on Water Company website with DCS).

2009/03	Guidance Note on Notification of Methods of Reinstatement using EToN available at: http://hauc-uk.org.uk/	
Published January 2014	Contaminated Land Assessment Guidance: Protocols Published by Agreement Between Water UK and the Home Builders Federation https://www.water.org.uk/guidance/contaminated-land-assessment-guidance/	
Water UK / HBF National Joint Committee 2014	Water UK / HBF National Joint Committee 2014 Available free of charge at: http://www.water.org.uk/publications/water-industry-guidance	
Volumes 1 - 6	Street Works UK (formerly National Joint Utilities Group) Guidance Publications available at: http://streetworks.org.uk/resources/publications/	
	Principals of Water Supply Hygiene & Technical Guidance Notes Available from Water UK online at: http://www.water.org.uk/publications/reports/principles-water-supply-hygiene	
Drinking Water Safety – Guidance to Health and Water Professionals	DWI Available free of charge at: http://www.dwi.gov.uk/stakeholders/information-letters/index.htm	
	Specifications for polyethylene pipe and fittings	https://bpfpipesgroup.com/support-downloads/technical-guidance/
	Specifications for PVC pipe and fittings	
Report R97	Teaching Practice (2 nd edition)	CIRIA, 1983 Available at https://www.ciria.org/ItemDetail?iProductCode=R97&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91
Report 128	Guide to the Design of Thrust Blocks for Buried Pressure Pipelines	CIRIA, 1994 Available at: https://www.ciria.org/ItemDetail?iProductCode=R128&Category=PHOTOCOPY
HSG 47	Avoiding Danger from Underground Services	HSE Books, 2015 Available free of charge at: https://www.hse.gov.uk/pUbns/priced/hsg47.pdf
	Specification for the Reinstatement of Openings in Highways (3 rd Edition)	Department of Transport 2010 Available at: https://www.gov.uk/government/publications/specification-for-the-reinstatement-of-openings-in-highways

	Water Supply to domestic fire sprinkler system	Water UK June 2015 (and earlier documents) Available free of charge at: https://www.water.org.uk/publication/water-supply-to-domestic-fire-sprinkler-systems/
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