Severn Trent Design Manual for Self Lay Providers

SEVERN TRENT

SECTION 1 – MANDATORY REQUIREMENTS

1.1 Introduction

Severn Trent Water (STW) has a statutory duty under the Water Industry Act 1991 to provide new water mains and service connections when applied for, and to make easy the provision of self lay schemes by Self Lay Providers (SLPs). Our philosophy is to provide water supplies that are good to drink and always on. This design manual will provide guidance to designers and installers, and will encourage the use of best engineering practice for these installations.

1.2 Health & Safety

The designer of any mains system should take into consideration the health and safety (H&S) risks within the design and construction process.

1.3 Mandatory Requirements

Quality	• All distribution mains should be sized so that the volume of water held within is turned over at least once every 24 hours.
Materials	• All materials and products must comply with Regulation 31 of the Water Supply (Water Quality) Regulations 2000. • Only STW approved materials are to be used.
Flows & Headloss	• For pipes downstream of a Distribution Service Reservoir, design flows shall be calculated on a 25 year potential development / demand horizon. At the design flow: - Head loss in any main shall not exceed 2m/1000m. - Maximum velocity shall not exceed 1m/sec.
Operational Issues	• Systems shall be designed to: - Include all necessary fittings (valves, washouts etc.) to provide operational flexibility, to keep disruption in the event of planned or unplanned supply disruptions to a minimum, and allow restoration of supplies within a three hour period. - Facilitate pressure and leakage monitoring and management. - Provide a minimum pressure of 20m (2bar) head at all times at the defined critical point. - Include the necessary provisions for the Fire Service. - Permit safe operation and maintenance of the system and its ancillaries.
Crossings	• All planned crossings are to be robustly risk assessed to determine the need for the duplication. • Asset owners will be consulted at the earliest opportunity.
General	• The minimum planned cover to any new buried main shall be 750mm. • Hydrants shall not be located where they can be obstructed by parked vehicles.

	• Site investigations shall include a requirement to determine the presence of contaminated land. • Through bore hydrants shall not be installed in contaminated ground.
Service Pipes	• The maximum pressure on any service pipe shall be 100m head (10bar) excluding surge. • The minimum cover shall be 750mm. • The minimum diameter shall be 20mm nominal bore.

SECTION 2 – DESIGN GUIDANCE

2.1 Design Guidance for New Mains

This section is intended to provide designers and constructors with valuable guidance which will cover a majority of situations faced when working on new developments. Designers and constructors are encouraged to continue to use their skills and experience to produce a cost effective and practical proposal.

2.2 Pipe Material Selection

All materials and products intended for use in the preparation or conveying of public water supplies must comply with Regulation 31 of the Water Supply (Water Quality) Regulations 2000. If there's any doubt, please consult STW Public Health & Standards (PHS).

Should specialist pipe or fittings be required to overcome a particular construction problem then consultation must be sought with STW and all materials approved before use. All materials selected must be approved by STW D&B Standards, PHS and Asset Management to ensure future repair and maintenance can be carried out within the performance requirements imposed upon STW. This includes consideration of the fittings and spares readily available from STW suppliers or specialist manufacturers.

If a product/material isn't on STWs approved list of materials then approval from the New Products Group (NPG) must be sought before there use will be considered.

2.2.1 New Distribution Mains

Pipe material should be selected according to the environment in which it is to be laid. It should take into account any specific requirements in connection with water quality, as well as:

- Pressure
- Ground conditions and contaminates
- Soil corrosivity, and
- Durability

Generally, only polyethylene, ductile iron, steel and mopvc should be considered for the construction of safe water mains.

2.2.2 Existing Pipe Records

STW's mains record system is available to designers to determine the existing pipe materials present in any particular area. The absolute accuracy of the records should not be assumed, and the type,

condition and location of the pipe materials and ground conditions may have to be verified by other means.

2.2.3 – Existing Pipe Materials, Sizing and Pressure Rating

The existing pipe materials and fittings used within our distribution network are varied and were produced by a number of manufacturers and have been introduced to our network over many years.

The most common materials are:

- Cast, spun and ductile iron
- Polyethylene – black, MDPE and HDPE
- PVC
- Asbestos cement
- Steel
- GRP, and
- Concrete

Sizing of all new and replacement mains should be confirmed by network analysis, including hydraulic modelling, taking into consideration the following:

- Assessed consumption and demand patterns, including peak demands, calculated on a 25 year design horizon to include the potential for growth.
- Downstream of DSR's - taking into account the first point, above, pipes should be sized to meet the peak day peak week flow (PDPW).
- Flow velocities.
- Pressure requirements.
- Effects on existing system.
- Leakage allowance.
- Fire fighting requirements.
- Known future developments.

Table 2 provides guidance on pipe sizing with rough-cut flow capacities (and approximate values of friction head loss) for the available pipe materials at the recommended maximum flow velocity of approximately 1 m/sec.

Pipe Size mm	Profuse (8 Bar)		Profuse (10 Bar)		MDPE (12 Bar)		Profuse (16 Bar)		No.'s which can be supplied (Based on 16 bar pipe)			Length limit
	Nom. Bore	Peak Flow at 2m/1000 m h/loss	Nom. Bore	Peak Flow at 2m/1000m h/loss	Nom. Bore	Peak Flow at 2m/1000 m h/loss	Nom. Bore	Peak Flow at 2m/1000m h/loss	3 Bed Semis	4 bed Detached	1 bed Flat	
25					20				1			10m
32					25				2			10m
50	45				40				10			10m
63	57	0.8 l/s			50	0.55 l/s			16	10	24	-
75	67.3	1.38l /s	65.4	1.2l /s	63.1	1.05 l/s	60.6	0.9 l/s	35	22	55	-
90	81	1.9 l/s	79	1.7 l/s			73	1.5 l/s	65	41	101	-
110	99	3.4 l/s	96	3.1 l/s			90	2.6 l/s	100	65	160	-
125	116	5 l/s	110	4.4 l/s			102	3.6 l/s	160	102	240	-
140	126.2	5.5l/s	122.8	5.3l/s			113.65	5.1l/s	270	193	512	-
160	144	8.75 l/s	141	8.1 l/s			130	6.7 l/s	300	200	-	-
180	162	12.5 l/s	158	11.5 l/s			147	9.5 l/s	500	350	-	-

The mains systems on new developments should be designed to enable the system to meet the STW Standard of Service at all times. The STW requirement is to maintain a minimum pressure of 20m head at the boundary of every property. SLOs should seek advice from STW regarding the incoming pressure at the development connection point in order to determine the correct pipe sizes. The maximum pressure at the stop tap/boundary box on the boundary for any service pipe shall not exceed 100m head. If any property requires in excess of 100m at the boundary (e.g. long service pipe, property at very high elevation) then this should be discussed with STW. Should existing service connections or service pipes to existing properties be affected by development works, consultation with STW should be sought.

STWs aim is to maintain stable pressures within the distribution system. Ideally, there should be less than 10m variance during a typical day.

2.3 Location and Routing of Mains

In urban areas, distribution mains (including mains serving new developments) should, wherever possible, be laid in publicly adopted and maintained highways. Disruption to traffic should be minimised through discussions with the relevant highway authorities – when finalising the precise location.

The preferred route for all mains and services is a:

- Verge
- Footway
- Footpath
- Highway, or
- Cycleway

The route should have a minimum of 2 metres clear width, should preferably be publicly adopted and maintained, and be laid parallel to road kerbs.

Guidance is contained in National Joint Utilities Group guidance "Volume 1 NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus" or "Volume 2 NJUG Guidelines on positioning of underground utilities for new development sites".

Where only a small number of other utilities are involved, a reduction in the route width may be acceptable. It should though, have a clear width of at least 1 metre and prior agreement of all utilities concerned.

Things to consider when selecting a route:

- Adverse ground conditions e.g. rock, groundwater
- Contamination
- Traffic management
- Environmental impact on the works
- Proximity of other utilities
- Ease of access for safe construction and future operation/maintenance of the asset
- Existing and future land use
- Land ownership
- Requirement for air valves, sluice valves etc

2.3.1 Mains Laid in Private Land

This should be avoided, but should it be absolutely necessary please speak to STW beforehand.

Private land (other than fields in rural areas) should be avoided because of the potential for difficulties between occupants and STW if access should be required to excavate.

2.3.2 Mains Laid in Private Drives

Whilst the general laying of mains in private land on residential estates is opposed, it may be unavoidable in types of development which afford shared private drives. In these situations, STW will use its powers under the Water Industry Act for future access and maintenance.

A water main laid on premises within a private driveway is preferable to multiple separate supply pipes being laid in parallel for more than 30 metres of their run, but for clear guidance:

- 2 properties on a private drive – STW supply water to the boundary, developer lays services to the boundary
- 3 properties on a private drive less than 30 metres – STW supply water to the boundary, developer lays services to the boundary
- 4 properties on a private drive less than 30 metres – STW only consider installing a main within the driveway
- 4 properties on a private drive greater than 30 metres – STW lay main on premises within driveway (installation in private footpath prohibited)
- 5 properties or more irrespective of length – STW lay main on premises within driveway (installation in private footpath prohibited).

Things to consider for adoption:

- All apparatus to be accessible
- No access restrictions
- No mains or stop tap boxes to be installed in parking bays
- No mains to be installed in driveways that will have specialist finishes, e.g. coloured tarmac
- Adoption is at the discretion of STW
- Mains laid within adopted highway are preferred
- Mains laid in private are in shared drives and not individual ones.

2.3.3 Mains and New Industrial Development

Developers should be encouraged to provide publicly adopted carriageways and footways/verges throughout the site so that mains and services can be installed in public areas. This will help to ensure that mains are laid as near as practicable to the properties, minimising the length of service pipe and facilitating the provision of future additional contacts should these be required.

Where a suitable adopted surface isn't available, statutory notices will need to be served. The notices will create protected strips for the water mains and will prevent later development over the strips.

Things to consider for industrial development:

- Finished surfaces, e.g. avoiding reinforced concrete and special paved areas where possible
- Siting of fire hydrants (FH)
- Possible future requirements, e.g. sprinkler, additional units, up-sizing etc

- Access for maintenance
- Traffic loading affecting stop tap and meter locations

Standard drawings illustrate the principles to be adopted when providing mains for new industrial developments and adopted carriageway.

When designing a new or replacement mains system the design should minimise the number of road crossings for mains and services. They may require a main to be provided on each side of the highway preferably in the verge or footway. For example using an appropriately sized service rail.

Two-way feeds should always be provided wherever possible to ensure interruptions to the supply are kept a minimum whilst maintenance or repair works are undertaken.

2.4 Pipe Depth

The depth at which a main is laid may be dictated by the method of construction. The key issues are that mains should be laid:

- With an even gradient where possible
- With a minimum depth of 750mm
- At a depth which comfortably allows the installation of chamber covers and frames without interfering with the fitting housed within, and which prevents valves and fittings, including covers and frames, from sitting proud of finished ground level
- At depths which facilitate access for future maintenance and repair.

Notes:

1. Additional consideration should be given if mains will be subject to wheel and point loads.
2. The depth of mains at special crossing should be agreed with STW.
3. Mains may be laid outside the required depths in exceptional circumstances, with the agreement of STW.
4. Trenchless crossings of major utilities require special consideration and agreement of the STW.

2.5 Valves

Valves shall be installed to control the flow within the network and enable all components to be isolated, drained, and recharged for maintenance purposes. Designers should plan the location of valves where they can be safely accessed, operated and maintained. Valves should also be positioned in the verge or footway at all times.

In general, every branch and mains junction should have a valve on each leg to allow complete control of flow and to minimise the number of properties that could potentially be isolated by a valve closure.

2.5.1 Valve Operation

The direction of closing of valves varies across the company and it's essential that the direction of valve closure on every site are agreed with the relevant STW representative. The current requirements are detailed below:

1	West Shropshire and Montgomeryshire	Clockwise
2	East Shropshire	Anticlockwise
3	Wolverhampton	Anticlockwise

4	Birmingham	Anticlockwise
5	Worcestershire	Anticlockwise
6	Gloucestershire	Anticlockwise
7	South Warwickshire	Clockwise
8	Coventry & North Warwickshire	Clockwise
9	Leicestershire	Clockwise
10	Nottinghamshire	Anticlockwise
11	Sherwood	Anticlockwise
12	North Derbyshire	Clockwise
13	Derby	Clockwise
14	Staffordshire	Anticlockwise

2.5.2 Types of Valves

Isolating Valves (for isolation purposes only)

- These should be provided in agreement with STW during the detailed design.
- The maximum distance between valves in urban areas should not exceed 300m.

Sluice Valves also known as Gate Valves (for isolation purposes)

- Intended to be used in either fully open or fully closed positions.
- Must not be used for flow control or for throttled conditions.
- They are not intended for frequent use and may only be good for approx 150 operations.
- Should be resilience seated, not metal seated.
- Valves for services greater than 63mm should be compliant with BS 5163, wedge gate type B, resilient faced, pressure rating PN16, and the caps should be made from ductile iron.

Sandwich (Spade) Valves also known as 'spade valves',

sandwich valves may be used where required and only according to the manufacturer's instructions.

- They are to be installed as standard on hydrant installations (refer to Standard Drawing No. STD5020 Link: Fire Hydrant-Washout). The only exception to this is when the hydrant is supplied via a branch (or 'leg off') the main that is controlled by a sluice valve (refer to Standard Drawing No. 5021. Link: Fire Hydrant/Washout (off-line)).
- They are suitable for mains renewals and new connections construction, and may also be used as isolation valves, where suitable, for air valves. In particular, the Hyram Sandwich valves (Link: Hyram Sandwich Valve) and Double Spade Valve (Link: Hyram Double Spade Valve) are approved for use.

Air Valves (to be used at every high point on larger distribution mains and at sudden changes of pipe gradient)

- It should be ensured that air valves can be isolated and detached without the main being taken out of service.
- If an air valve does not have an integral isolation valve then one must be fitted to enable isolation and maintenance. A spade valve or gate valve may be used but only within the limitations of the manufacturer's instructions. Refer to the section on Spade Valves (Link: Spade Valves)

- It should also be ensured that polluted water cannot gain access through the valve.

If any other valves need to be used please consult STW at the detailed design stage.

2.5.3 Washouts

All washouts/hydrants are to be installed with spade valves to enable isolation and maintenance. Refer to Section 2.5.2 Types of Valves – sub-section on Sandwich (Spade) Valves for more information and a link to the standard drawing (Link: Spade Valves)

Washouts should be provided to allow the main to be flushed and drained at:

- Every low point in the distribution main
- At boundary/kept shut valves (KSV)
- At dead ends, beyond the last service connection
- At air valve locations on larger distribution mains.

Direct discharges into watercourses should be avoided because of the risk of contamination.

Provision should be made for discharges to be conducted in accordance with Section 165/166 of the Water Industry Act 1991. Best practice should also be incorporated into the design, which can be found via Public Health and Standards.

Full bore washouts should be used in all circumstances, except for areas considered to be at risk with regard to water quality. Areas considered to be at risk include: heavy industrial sites, car washes, petrol stations, areas liable to flooding, and low points where water may pool.

Please note, the above is not an exhaustive list and individual risk assessments should be completed as required. Queries should be directed to the Asset Improvement Manager, who may discuss this with the Distribution Water Quality Team.

2.6 Pipe Joints

The layout of PE pipe systems should be designed to minimise the number of joints required. The preferred method is butt fusion welded. However, electrofusion or mechanical joints may also be used if circumstances require.

Contractors are required to follow any and all applicable quality control procedures for all joints on PE pipes, be they butt fusion, electrofusion or mechanical, in accordance with CESWI Engineering Specification - Section 5.8.

When an electrofusion or mechanical joint is to be used the designer will detail the position and ensure there is sufficient room to undertake this process

Post pipe installation, it is the contractor's responsibility to ensure that STW's mains and services records are annotated with the type of joints employed in construction.

For further guidance on butt fusion and electrofusion jointing methods, reference should made to CESWI, the STW Engineering Specification and Water Industry Specifications (WIS), specifically WIS 4-32-08 (Issue 3) and WIS 4-32-16.

2.7 Joint Integrity System Specification

Contractors (including Self Lay Providers) are required to ensure that all Electrofusion and Butt Welded joints completed on PE pipe systems are subject to a STW approved Joint Integrity System.

The system should meet the following requirements

- Record a GPS location of the fusion accurate to five metres (pre welding).
- Record a digital photograph showing the prepared joint prior to fusion welding (pre welding).
- Provide a unique reference for each joint.
- Upload fusion data, photograph and GPS location to an online joint repository in real time (post welding).

Contractors should be able to demonstrate that they're confident that the fused joints meet the client's specification prior to burial and commission. The system will allow the real time inspection of each individual joint and for the joint to be measured against agreed non-conformances in the installation process. The joint repository should be reviewed by an external third party for added quality assurance. Access to the repository will be restricted by individual login and password.

To read the full Joint Integrity System Specification (Appendix E) please follow the link.

The location of electrofusion joints, including grid reference should be recorded and the information provided to STW at handover.

The specification for the grid reference is: National Grid Reference, OSGB36, to one place of decimal.

2.8 Chambers

Chambers are to be designed according to Standard Drawings and Engineering Specifications. Chamber covers and frames will comply with the relevant British Standard applicable to the environment in which they are installed.

Generally, chambers in the STW company area, in particular hydrant chambers, are constructed from composite plastic units as standard. Other forms of construction should be agreed with STW and approval gained before construction begins. Chambers installed in contaminated ground shall be constructed from reinforced concrete.

2.9 Marker Posts

Marker posts should be provided to aid future inspection and maintenance:

- at each fence, wall and hedgerow crossing on all cross-country mains and in rural verges to readily identify the route of the main
- at each washout, Fire Hydrant, line and branch valve
- the local Fire Service should be asked if they require posts for Fire Hydrants

In built-up areas the number of marker posts should be kept to the minimum. These may be limited to fire hydrants and cases of complex installations (with numerous valves and hydrants) where one marker may be used with a printed schematic of the installation.

The posts should be located in positions which will avoid any possible injury to third parties and unnecessary accidental damage.

2.10 Trees and other surface planting

Mains should not be laid in the proximity of any trees that could damage or restrict the access for the future maintenance. See National Joint Utilities Group guidance document "Volume 4: NJUG

Guidelines for the Planning, Installation & Maintenance of Utility Apparatus in Proximity to Trees (Issue 1)". The document and an 'Operatives Hand-out' can be downloaded from the NJUG website (Link) and should be made available during design and construction.

Where planting is to take place after 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.

Recommendations for tree and surface planting:

- poplar and willow trees have extensive root systems and should not be planted within 10m of the water main.
- the following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 m of the pipeline e.g. ash, beech, birch, most conifers, elm, horse chestnut, lime, oak, sycamore, apple and pear.
- bearing in mind that personnel should have a clear path to conduct surveys, no shrubs or bushes should be planted within one metre of the centre line of the pipeline.
- in cases where both the Company and landowners wish to plant shrubs / bushes in close proximity to the water main for screening purposes the following which are shallow rooting are suitable for this purpose blackthorn, broom, cotoneaster, elder, hazel, laurel, privet, quick thorn, snowberry and most ornamental flowering shrubs.

It is essential that agreement is reached with STW before or during the design stage on the detailed operational requirements of the main to facilitate its operation, maintenance and repair.

SECTION 3 – FIRE SERVICE REQUIREMENTS

3.1 Fire Hydrants

The location of washouts on STW new mains and on new developments should be designed according to the requirements of STW as per the guidance given within the washouts section. The local Fire and Rescue Service should be invited to adopt whichever washouts they see fit as fire hydrants during the consultation process. Hydrants are adopted by the Fire Service free of charge.

The request for extra washouts specifically to be designated as fire hydrants is subject to negotiation between the designer and the Fire and Rescue Service and, in this instance, the installation is chargeable to the Fire and Rescue Service.

The designer should follow the requirements for fire fighting as required under Section 43 (1) of the Fire and Rescue Services Act 2004.

Throughbore hydrants are the company standard. However, loose jumper hydrants should be installed in areas considered to be at risk of back siphonage resulting in water quality issues or where installed in contaminated ground. Only STW approved hydrants are to be installed.

All washouts/hydrants are to be installed with spade valves to enable isolation and maintenance. The only exception to this is where the hydrant is supplied by a branch off the main that is controlled by a sluice valve. Refer to Appendices A and B for Standard Drawings.

3.2 Location of Fire Hydrants

Early consultation and site meetings with Fire Officers/Water Officers/Hydrant Technicians should take place to agree the precise locations.

Hydrants should always:

- Be located where they can be safely operated and maintained, and where they won't be obstructed by parked vehicles.
- Wherever possible, be out of main carriageways.
- Have a branch that is less that five metres long, unless there is a service connection between the fire hydrant and the main to maintain a regular flow.

3.3 Fire Fighting – Flow Requirements

The availability of flow and the flow requirements for fire fighting should be subject to close consultation with the Fire Service but it should be noted that there are specific obligations and responsibilities placed upon the various parties to the discussions.

During the consultation process with the fire service the designer should provide details of the available flow at the point where any new main meets any existing main. The flow rates provided should be an honest indication of flow capability for single and two story dwellings.

3.4 Covers & Frames

Chambers are to be designed according to Standard Drawings and Engineering Specifications. Chamber covers and frames will comply with the relevant British Standard applicable to the environment in which they are installed.

Generally, chambers in the STW company area, in particular hydrant chambers, are constructed from composite plastic units as standard. Other forms of construction should be agreed with STW and approval gained before construction begins. Chambers installed in contaminated ground shall be constructed from reinforced concrete.

Covers installed on fire hydrants are to bear the initials 'FH' on their surface.

SECTION 4 – TESTING AND COMMISIONING

4.1 Filling and Testing

The designer shall make provision for all the permanent and temporary works required for the filling, testing, disinfection and draining of a new main prior to commissioning, particularly if it is to be laid and commissioned in sections. Such arrangements should be fully agreed with STW.

4.2 Flushing and Disinfection

All water which the company supplies should comply with the standards stipulated by the Water Supply (Water Quality) Regulations 2000. This applies to the water passing through newly commissioned mains systems as well as any other system.

Provision should be made for sterilising the main in accordance with the requirements of STW Public Health and Standards.

Permission will be required for disposal of waste water into water courses and sewers. The discharge of large quantities of water from the main should be planned so as to avoid causing serious flooding or dangerous road conditions, and to avoid flooding outlets from the main. Discharge into watercourses or onto agricultural land, including pasture, should be agreed with a representative of the Environment Agency (EA) and care should be taken to ensure that water discharged to highway/surface drainage systems will not cause a problem when it discharges to a watercourse.

Consent for discharge to a foul or combined sewer is to be sought from the commercial waste team (via the commercial.waste@severntrent.co.uk inbox) and appropriately authorised via a Short Term Discharge Agreement.

Consent for flushing and disposal of de-chlorinated water to a watercourse (either directly or indirectly via storm sewer) is to be sought from the Regulatory Performance – Environmental Team (environmental.permits@severntrent.co.uk).

Discharge pipes with a bore of 225mm/9 inches or above require a temporary consent from the EA.

4.3 Pressure Test

Designers should properly consider the requirements to test the main and the requirements of the specification.

Testing should always be carried out against blank flanges or caps with properly designed thrust restraints.

4.4 Commissioning Plans

The scheme drivers should be clearly understood by all parties to ensure that the criterion for design is followed. Certain lengths of the main or other mains may be required to be commissioned before others in order to meet Regulatory or Statutory commitments.

The design of commissioning plans should properly consider the effects of testing and disinfection on the existing supply system, environment of water mains, and the necessary connections required in order to commission the new mains.

This will require information to be documented within Project Environmental Risk Assessments (PERA) and Waste Management plans.

4.5 Connections

All connections should be designed in such a manner to enable them to be

- Constructed safely
- Operated safely
- Decommissioned safely
- Prevent or minimise disruption to the network and environment

Additional valves and hydrants may be required to be installed into the network to facilitate easier commissioning and provision or disposal of water for testing/swabbing purposes.

Design Risk Assessments should be carried out for all necessary connections and be included within the Commissioning Plan.

Connections should be designed so that once installed there is no need to disrupt the live system again in order to make the final piece through.

Piece up lengths should be kept to less than 5m in length because over this the full disinfection process needs to be followed. A special process applies to short lengths less than 2m.

SECTION 5 – Communication and Service Pipes

5.1 Communication (service) Pipes – Company

The section of the supply pipe connecting the main to the meter/controlling stop tap or property boundary is called the 'communication pipe'. The communication pipe is the responsibility of STW.

New Company communication pipes should:

- be laid at right angles to the main and ferrules
- be a minimum of 20mm nominal bore
- be a minimum of 300mm apart
- connect to customer service pipes through a Company Boundary box/Stop tap

Long Side communication pipes crossing major roads (Type 0, 1 and 2) and junctions should be installed in a duct to allow ease of replacement and up sizing in the future.

Where two Company pipes are to share a common trench, their respective customer service pipes should be laid no more than 1 m apart where they cross the boundary of the street.

Boundary boxes / stop taps should be installed in the adopted service strip, easement or footway, situated no more than 300mm from the footway boundary and a minimum of 150mm apart. Where multiple connections to the same point are required a multi manifold control and metering system should be installed where possible.. This ensures reinstatement can be carried out to the correct standard.
Developers should be encouraged to install a customer service pipe of at least the same size nominal bore as the company communication pipe and will be required to submit proposals in line with the new supplies procedure.

Separate Company communication pipes should be provided to non-domestic properties.

Domestic Properties (other than Flats)

New company communication pipes for domestic properties should serve one house or dwelling. For large Domestic Properties reference should be made to BS 6700 for guidance on the determination of pipe size.

For short side services where the main is on the same side of the proposed highway as the properties to be served separate Company service pipes should be provided.

For long side services where the main is on the opposite side of the highway to the properties to be serviced, it is preferable that separate Company communication pipes be laid. However, where it would be unreasonable for economic or site reasons to lay long single Company communication pipes, a joint Company communication pipe may be laid as in the following instances:

- for new development sites where the highway has not been made up and there will be long road crossings (in the order of 12m or longer), it is recommended that no more than two separate customer service pipes are serviced off one joint Company communication pipe.
- a communication pipe crossing of an existing highway, where it is economic, i.e. the actual cost of laying a joint pipe are less than if the properties were served with separate Company communication pipes. The maximum number of properties to be served off one Company communication pipe should be no greater than four.
- should a crossing of a heavily trafficked road be involved then the design and laying arrangement of the communication pipes should be determined in agreement with STW.

When two properties are to share a Company communication pipe, their respective customer service pipes should be no more than 1 m apart at the point where they cross the boundary of the highway. If two to four properties are to be served off one Company communication pipe, the alternative of a service rail (see Glossary of Terms) should be investigated in consultation with STW Service Delivery staff.

Flats and Communal Buildings

Living units in flats and communal developments should be taken as the equivalent of one house each for the purpose of sizing the Company communication pipes or designed based on BS 6700.

Low rise blocks or maisonettes (3 stories or less)

Separate Company communication pipes are preferred. Joint Company communication pipes may be provided by agreement with STW where the Company considers it unreasonable to install separate pipes. A manifold with stop taps contained in one chamber, or a proprietary multi-meter boundary box, can be used. Unused outlets should be blanked off.

Manifolds should be used only with a maximum of six outlets of 20 mm nominal bore each off any one inlet of 57mm nominal bore. See Standard drawing database.

All meters should be external to the property.

High rise block and / or bed-sitter type buildings

Separate Company communication pipes should be installed where separate customer service pipes are laid to the boundary of the property. Where the Company considers this to be unreasonable and by agreement with STW a joint Company service pipe may be laid.

5.2 Service Pipes – Customer

Separate customer service pipes should be provided in all cases unless specifically approved by STW.

Flats and Communal Buildings

Low rise blocks or maisonettes (3 stories or less)
Separate Customer service pipes should be provided.

High rise block and/or bed-sitter type buildings

A separate customer service pipe to each flat is desirable, but joint service pipes may be acceptable by agreement with STW. Where separate services are not possible stop valves are to be provided on the single branch service pipes and should be in a position accessible to the Company at all times.

In instances when it is not practicable to terminate the separate service pipes external to the building, the following conditions will apply:

- where practicable the separate service pipes will be taken off a 'common riser' pipe located in a communal area.
- meters will be fitted on each service pipe and be located within the communal area and immediately adjacent to the 'common riser' pipe.

When it is impracticable to locate the 'common riser' in the communal area, i.e. the common riser is within the habitable area (e.g. kitchen or bathroom), meters will be permitted to be fitted within the habitable area. However each meter should have the facility to accommodate an outreader and the meters will not be permitted to be fitted more than three metres from the outreader.

5.3 Service Pipes – Non Domestic Properties

All new supplies to non-domestic properties should consist of separate Company and Customer service pipes to each property to be served. A meter should be installed on every service, outside each property.

Boundary boxes/stop taps should be installed in land adopted by the Highway Authority unless (and only in exceptional circumstances) when a Protected Strip has been created. The designer should also make reference to Sections 2.3.2 and 2.3.3 (follow the links): Mains Laid in Private Drives and Mains and New Industrial Development

Except where a service strip abuts land adopted by the Highway Authority, where a main has been laid in a Protected Strip, Company communication pipes should terminate with a boundary stop tap within the Protected Strip and as close as practicable to the main.

Where a service strip abuts adopted land, Company communication pipes on that side may be terminated at the distant edge of the adopted land.

Likely consumption and the required size of the service pipe should be calculated by the developer in accordance with the requirements of BS 6700 and notified to STW New Connections. Service pipes should be sized such that the velocity does not exceed 1 m/sec and the head loss due to friction should not exceed 1 m per 10 m at average flow.

The feasibility of meeting the developer's calculated demand and maximum flow rate, and the size of the company communication pipe, should be determined by the designer.

A general guideline that can be used in discussions with developers of new green field sites where the future consumption pattern is unknown is:

- Development up to 1000m^2 - 15 litres/day/m^2 floor area.

- Development greater than 1000m^2 - 30 litres/day/m^2 floor area.

The required bore size can be determined from the Table 5 or from using the above design criteria, incorporating any necessary adjustment according to local factors, e.g. long service pipes or low mains pressure.

Recommended Minimum Service Pipe Bore Sizes for Given Maximum Flows

	Service Pipe Size			
Nominal Bore (mm) (Note 1)	20	25	40	50
MDPE	25	32	50	63
Cu (copper)	22	28	42	n/a
Maximum Flow (litres/minute)	24	36	100	150

Notes:

1. Pipes of 20mm to 40mm nominal bore should be used only for domestic service connections.
2. On site storage may be required for industrial or fire fighting purposes; and to provide security of supply. Advice should be sought from Commercial Services water – New Connections.

5.4 Service Pipes - Materials

Under normal conditions blue medium density polyethylene (MDPE) to British Standard BS 6572 should be used. (Note: this pipe may only be laid above ground provided it is not exposed to direct sunlight and is adequately protected to prevent freezing.)

Alternative pipes should be used where the ground is contaminated with organic compounds the following pipe materials should be used:

- metal sheathed MDPE. This is standard MDPE pipe factory-sheathed with an aluminium barrier coating protected with an outer layer of blue MDPE incorporating 4 brown identification stripes. Sizes are available between 25 – 110mm nom bore.
- copper tube (to BS 2871 Table Y for underground use) factory coated with blue PE for protection and identification. The pipe must bear a BS Certification Mark which states that it has been effectively cleaned internally.

5.5 Joints, valves and fittings

Jointing

Electrofusion couplers should be used for all new PE service joints. They should be capable of interfacing with auto recognition control boxes. Mechanical fittings conforming to BSEN 1254-2 should be used for jointing copper service pipe. Where PE service pipe is jointed to copper, galvanised iron, lead or LDPE service pipes, mechanical fittings conforming to relevant parts of WIS 4-32-11, BSEN 1254-2, BSEN 1254-3 and BS 5114 should be used.

Connections

Ferrules should be used for connecting the service pipe to the main and are designed for fitting 'under pressure' i.e. the water main continues in service and is not isolated or drained down whilst

the connection is made. Various types of ferrule are available depending upon the material of the water main.

Connections to Iron Mains

Ferrules for connections to iron mains should be of the 'swivel' type and be capable of being installed under pressure with either a Talbot or Pass-Peart Drill and Tapping machine. The minimum size of the connection should be a 1/2" BSP thread into the main and the minimum outlet to suit 20 mm nominal bore service pipe. The diameter of the tapping should not exceed D/4 for cast iron or D/6 for ductile iron, where D = the nominal diameter of the main. Should these limits be exceeded then it is recommended that a repair collar be used appropriately drilled to suit the size of the ferrule.

Connections to PVC Mains (PVC-U, PVC-A and MOPVC)

Connections to mains should be made by the use of self-tapping ferrule straps.

Connections to PE Mains (MDPE, HPPE and Coated PE)

Connections to polythene mains should be made by the use of self-tapping electrofusion saddles (tapping tees), minimum 32 mm outlet. Ferrule straps, or saddle straps are not to be not be used. Any coating / sheath should first be removed. Tapping saddles may either be of the 'bottom-loading' or 'top-loading' type and capable of interfacing with an auto-recognition control box. Saddle straps and hot-plate fusion ferrules are not to be not be used.

Sluice Valves

Valves for services greater than 63mm, including for large industrial supplies, should be:

- compliant with BS 5163
- wedge gate Type B
- resilient faced
- pressure rating PN16

Valve caps should be manufactured from Ductile Iron.

Also refer to Section 2.5.2 Types of Valves – sub-section on sluice valves (Link: Sluice Valves (SV))

Boundary Boxes

Boundary boxes will be fitted to all single Company communication pipes, up to and including 32mm, and should comply with WIS 4-37-01A. They should be rigid Type R. Where a single communication pipe supplies more than two properties a multi-manifold control should be used (refer to the section: Multi Manifold Controls).

The box should provide continuously variable height adjustment up to 150mm. Boundary boxes intended for installation where the final ground level is indeterminate should provide continuously variable height adjustment. Boxes for installation in normal conditions should be Class 2 with 25mm MDPE tails, and in contaminated ground should be Class 1 sealed units with metal union connectors.

Stop Cocks (Taps)

Underground Stop cocks should conform to BS 5433 or WIS 4-23-04. They should only be used for nominal supply pipe diameters of 50mm and above. They are to be contained within a plastic tube of 160 mm minimum diameter and mounted on a suitable base.

Multi Manifold controls

A multi manifold control and metering system should be used where up to 6 service pipes are laid to a single point. This ensures reinstatement can be carried out to the correct standard.

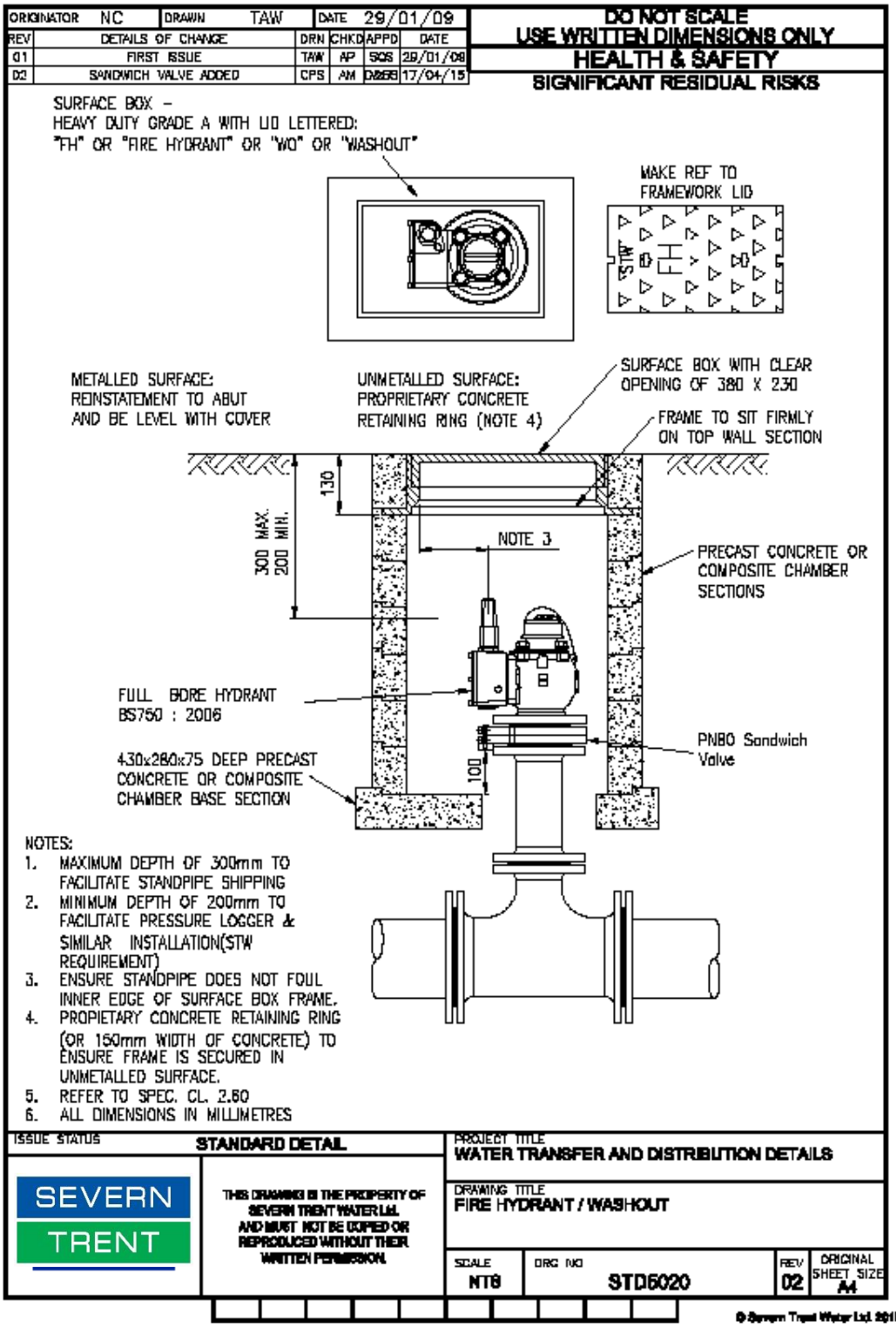
It should be noted that these controls cannot be used in areas where contaminated ground is present.

Covers and Frames

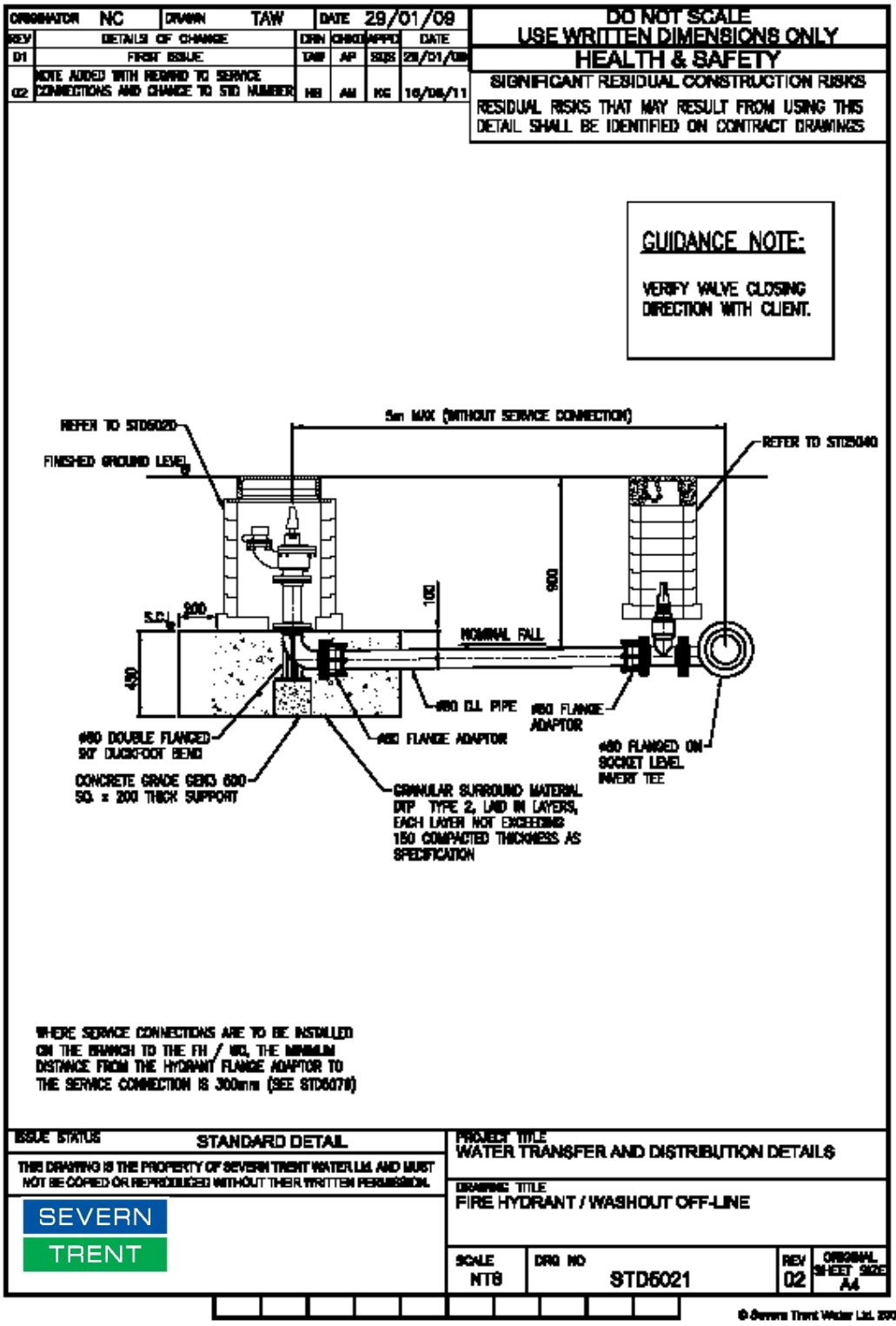
Covers and frames for boundary boxes should be Type 135B2H in accordance with BS5834: Part 2. Ductile iron covers and frames should be used for in areas subject to vehicle loading including driveways, car parking the carriageway and the footpath adjacent to the carriageway. In grass verges or footpaths not adjacent to the carriageway plastic covers and frames may be used.

Covers and frames for stop tap tubes should be ductile or grey iron Type 135B1H or B2H in accordance with BS5834: Part 2.

Appendix A - Standard Fire Hydrant/Washout installation



Appendix B - Fire Hydrant/Washout offline installation



Version control

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