

Technical requirements and Work Instructions for Minor Works (sewer)

Version 4 - November 2015



Change history

Version	Key changes	Prepared by	Date	Approved for use
1	Original Issue to replace abbreviated standard specification for the construction of Minor Works (sewer) dated March 1997	FM, WK, BN	Aug 2004	BN
2	Changes to scope, format of work instructions and drawings	WK, MH, BN	July 2005	BN
3	Changes to scope, inclusion of Leak Tight Sewer specification property connection arrangement, and general revision	HP, LS	Sept 2015	KW
4	Change Quick Check references to Sydney Water Tap in TM	BH, HP	Nov 2015	KW

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Definitions

TERM	DEFINITION
Constructor	In the context of this document, a person listed by Sydney Water to carry out Minor Works (sewer) activities.
Customer Sanitary Drain	A pipeline installed by a licensed plumber within the property boundary and operated by a property owner to convey sewage from buildings to the point of connection with Sydney Water's reticulation or property connection sewer; constructed to Plumbing Code standards; also called house drain, house service line, house sewer, sanitary connection, property drain, sanitary drain.
Inspection Shaft	A shaft constructed in the line of the customer sanitary drain for the purpose of inspection and future access for locating and cleaning the drain.
Liner	A plastic composite or pipe inserted or formed inside a sewer.
Property Connection Sewer	A short sewer, owned and operated by Sydney Water, which connects the main sewer and the customer sanitary drain; it includes a junction on the main sewer, sufficient pipework to ensure that a point of connection is provided within each lot to be serviced.
Rodding Point	A structure at the end of a property connection sewer to allow insertion into the property connection sewer of equipment for inspection and maintenance by removing a cover at ground level. The structure can be a rodding shaft or a terminal maintenance shaft.
Sydney Water Tap in™	Sydney Water's on-line service where customers can request connections, disconnections, building plan approvals and related connection and development services.
Vertical	The vertical section of a property connection sewer, at the sewer, used where the customer sanitary drain is at a considerably higher level than the sewer.

Abbreviations

ABBREVIATION	INTERPRETATION
AC	asbestos cement
AS	Australian Standard
CI	cast iron
CCTV	closed-circuit colour television
CSD	customer sanitary drain
DI	ductile iron
DN	nominal size
IS	inspection shaft
kPa	kilopascal
MH	maintenance hole
MS	maintenance shaft
OD	outside diameter
PCS	property connection sewer
PE	polyethylene
PP	polypropylene
PVC	polyvinylchloride
PVC-U	polyvinylchloride-unplasticised
RP	rodding point
RRJ	rubber ring joint
SCJ	solvent cement joint
SS	stainless steel
TMS	terminal maintenance shaft
VC	vitriified clay
WSC	Water Servicing Coordinator

1. Introduction

This document sets out technical requirements and work instructions for construction activities allowed under the Minor Works (sewer) process. It includes both mandatory requirements and informative statements. **The informative text (shown in *italics*) has been provided to allow a better understanding of the mandatory requirements.**

Documents related to this technical specification are listed in [Section 3](#).

If difficulties are encountered at any stage during the conduct of work, contact the WSC or Sydney Water (Phone **13 20 90**) as appropriate.

2. Scope of the Minor Works (sewer) process

NOTE: There may be occasions where works are initiated but are later found to be beyond the scope for the level of Constructor or have other complexities that are beyond the scope of Minor Works. In these instances the WSC or Sydney Water may require the works to be completed by a Constructor with appropriate capability and/or managed under a different process.

The scope of activities allowed under Minor Works (sewer) is outlined below:

Scope for 'MS' listed Constructors

Works relating to gravity sewers of size \leq DN 225 and depth \leq 2.5 metres (measured from the invert of the sewer to the ground surface) and limited to:

- inserting junctions/property connection arrangements into existing VC and PVC sewers
 - constructing PCSs of length not greater than 12 metres *measured along the axis of the PCS from the centreline of the sewer at the PCS connection point to the centreline of the furthest riser for the IS or RP. Configurations may include a PCS off another PCS, extension of an existing PCS on line and grade or a PCS off an existing CSD inlet at a MH (see NOTES 1 and 2)*
 - constructing extensions of existing sewers on line and grade of length not greater than 12 metres *(measured along the axis of the extension from the end of the existing sewer to the centreline of the TMS), where justification for extension has been accepted by Sydney Water (see NOTES 1 and 3)*
 - concrete encasing up to 25 metres of an existing VC or PVC sewer
 - replacing up to 25 metres of existing VC or PVC sewer as a precursor to concrete encasement
 - sealing points of connection to Sydney Water's sewer.
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Scope for 'S1' and 'S2' listed Constructors

Works beyond the scope of MS listed constructors must be performed by S1 and S2 listed constructors (see Note 4). The scope is extended to works relating to gravity sewers of size \leq DN 225 and depth \leq 6.0 metres (measured from the invert of the sewer to the ground surface) and limited to:

- inserting junctions/property connection arrangements into existing VC and PVC sewers
- constructing PCSs of length not greater than 25 metres *measured along the axis of the PCS from the centreline of the sewer at the PCS connection point to the centreline of the furthest riser for the IS or RP. Configurations may include a PCS off another PCS, extension of an existing PCS on line and grade or a PCS off an existing CSD inlet at a MH (see NOTES 1 and 2)*
- constructing extensions of existing sewers on line and grade of length not greater than 25 metres *(measured along the axis of the extension from the end of the existing sewer to the centreline of the TMS), where justification for extension has been accepted by Sydney Water (see NOTES 1 and 3)*
- concrete encasing an existing VC or PVC sewer. Concrete encasing an existing VC or PVC sewer of size $>$ DN 225 and \leq DN 300 where pipe replacement/flow management is not required is also permitted
- replacing up to 25 metres of existing VC, PVC, CI or DI sewer as a precursor to concrete encasement
- sealing points of connection to Sydney Water's sewer
- disusing PCSs and sewers of size \leq DN 300 *(see NOTE 5)*.

NOTE 1: **Sydney Water Tap in™ will only accept** an application where the PCS or a sewer extension is proposed to be not greater than 12 metres. If the length is proposed to be greater than 12 metres, the application **must be lodged through a WSC**.

NOTE 2: Breaking into existing MHs for new connections is not permitted.

NOTE 3: Any proposal to extend a 'dead-end' sewer requires a detailed case to be provided to Sydney Water for consideration and approval before construction.

NOTE 4: Where the scope falls outside that for 'MS' listed constructors, the appropriate additional requirements of 'WSA 02 Sewerage Code of Australia (Sydney Water Edition)' and 'Technical Specification for Leak Tight Sewer Systems (Sydney Water)' will apply. Generally survey, design and compliance testing will not be required except where the WSC or Sydney Water, having considered risks relevant to the case, specifies requirements.

NOTE 5: Any proposal to disuse a sewer will require consultation with Sydney Water and may involve the submission of a detailed case and method prior to approval for construction.

NOTE 6: For purposes of these requirements, VC includes all types of earthenware and clay pipes.

The scope of Minor Works (sewer) does NOT include construction of PCSs, extension of sewers and concrete encasement of sewers in mine subsidence areas, however inserting junctions/property connection arrangements are permitted. For information on the location of mine subsidence areas, visit www.minesub.nsw.gov.au.

3. Complementary documents

The following documents complement these requirements and, with the exception of the Sewerage Code and the 'Technical guidelines: Building over and adjacent to pipe assets', are available on the [Providers](#) page in the Plumbing, building & developing section of the Sydney Water website.

- *Application package for listing as a water and/or wastewater infrastructure Provider for designers, constructors (Major & Minor Works) to the managing new development process*
- *Instructions to Constructors – Minor Works (sewer)*
- *Instructions to Water Servicing Coordinators – Minor Works (sewer)*
- *List of acceptable product specifications*
- *List of approved non-standard products*
- *Deemed to Comply drawings*
- *Technical Specifications for Leak Tight Sewer Systems (Sydney Water)*
- *WSA 02 Sewerage Code of Australia (Sydney Water Edition) (available from the [Water Services Association of Australia](#))*
- *Technical guidelines: Building over and adjacent to pipe assets (available on the [Building over or next to assets](#) page in the Plumbing, building & developing section of the Sydney Water website)*

4. Planning

Plan the work adequately to address safety, minimise impact on the community and the environment and to ensure all materials, plant and equipment are appropriate for the task. Ensure overflow or uncontrolled release of sewage will not occur.

Any work involving cutting into or working directly on a Sydney Water sewer or diverting sewage flows must be completed within one calendar day.

If the work involves cutting into a sewer (including cutting an investigation hole to determine if a sewer is lined), treat the trench environment as a confined space. Ensure compliance with Sydney Water's procedure 'Confined Space Safety' (refer to the [Providers](#) page in the Plumbing, building & developing section of the Sydney Water website).

For each project, determine requirements for controlling sewage flow before starting the work. Consider the potential impact of unpredicted wet weather and/or other surges in flow occurring after work has started. Do not attempt to work during heavy rain or when there is reasonable chance of heavy rain occurring during the course of the job. As necessary, contact Sydney Water to determine the susceptibility of the site to inflow/infiltration. Be prepared for flow variations from diurnal patterns and pumped discharges.

Determine junction/pipe size required to service expected flows from proposed development. *Larger pipes may be required for properties with multiple dwellings or where pumped flow is expected. Refer to your WSC or Sydney Water's Pump to Sewer application process. Information about the Pump to Sewer application process is available in the Getting Connected customer guide, on the [Connections & disconnections](#) page of the Sydney Water website.*

Verify that the size, depth and pipe type of the sewer is within the scope of Minor Works (sewer) and, if the work requires construction of a PCS, that minimum cover requirements can be achieved (refer to Drawing [MWS-200](#)).

Note: Sydney Water's records (e.g. Hydra, Property Sewerage Diagrams) need field verification.

Verify that the soffit requirement can be met for the new connection (refer to [Section 5.1](#)).

Ensure additional fittings, pipe and materials are readily available in case of unforeseen circumstances and/or unexpected damage to the sewer that may interfere with timely completion of the work.

For each job, follow the Work Instruction [Investigate Site](#). If unexpected risks to safety, the environment and/or to compliance with process and/or technical requirements are identified in the site investigation, take timely and appropriate preventive action.

5. Soffit requirement and servicing below ground fixtures (such as in basements)

5.1 Soffit

The soffit requirement is the depth from the controlling surface level on the property (usually the overflow relief gully) to the soffit of the sewer or PCS at the point of connection. The soffit requirement is based on providing assurance that a reticulation sewer, flowing at full capacity, will not surcharge via the CSD.

Ensure that a soffit height of 1200 mm is maintained. If this condition is not achievable, consult the WSC concerning other options for connection. If a WSC is not involved in the works (i.e. Sydney Water Tap inTM process), liaise directly with the Developer.

Permissible options where the 1200 mm soffit requirement cannot be met include:

- *The soffit height can be reduced to 900 mm for connections where there are less than 10 properties upstream of the connection point.*
- *Where the 1200 mm cannot be achieved or cannot be reduced to 900 mm (as per point above) then a reflux valve must be fitted subject to a minimum soffit height of 600mm being achieved.*
- *Where the 600 mm minimum soffit height (as per point above) cannot be achieved, then all connections must connect by use of a pump. Information about the Pump to Sewer application process is available in the Getting Connected customer guide, on the [Connections & disconnections](#) page of the Sydney Water website.*

In cases where the land to be serviced is vacant and the soffit requirement is unlikely to be achievable (assuming the overflow gully is located at the lowest existing ground level within the available building envelope) advise the Developer in writing of possible measures to ensure the soffit requirement will be met and of any impacts of not meeting the soffit requirement. The written correspondence must be kept as part of the quality records and be submitted to Sydney Water along with the Work As Constructed details.

Include on the Work As Constructed drawing or Property Sewerage/Hydra Diagram a note reading 'Overflow gully to be installed to a level which meets Sydney Water soffit requirement' and provide a copy of the drawing to the property owner or Developer.

5.2 Servicing below ground fixtures (such as in basements)

In cases where the land to be serviced will involve below ground fixtures such as in basements, consult a WSC for servicing solutions.

6. Products and materials

Use only products and materials that meet the specifications listed in Table 6.1 or that are listed by Sydney Water as 'Acceptable Products'. *The 'List of acceptable product specifications' and the 'List of approved non-standard products' are available on the [Providers](#) page in the Plumbing, building & developing section of the Sydney Water website.*

Table 6.1* Product Specifications

Product	Specification or product
PVC-U pipes and fittings	AS/NZS 1260, Class SN 8, Class SN 10 pipework/riser for property connection
VC pipe and fittings	EN 295.1
Stainless steel oblique junction	Wang sewer or Rapid sewer OB junction clamps or approved equivalent
Slip coupling (for ribbed PVC)	AS/NZS 1260
Slip coupling (for plain wall PVC)	AS/NZS 1260
Metal banded flexible coupling for VC and PVC (plain wall only)	AS 4327
Sealant (for lined sewers)	Sikadur 31, Nitomortar EL-HB, Epirez 633, or approved equivalent

* Table 6.1 is not a comprehensive listing of product specifications.

7. Excavation

This section specifies general requirements for excavation undertaken for Minor Works activities. Additional requirements for specific activities are specified in the Work Instructions and Drawings.

7.1 Dial Before You Dig

Determine the location and type of services in the area where work is to take place by contacting the 'Dial Before You Dig' service (visit www.1100.com.au or telephone 1100) and by other appropriate means.

Take precautions against the possibility that major and/or dangerous services may be located within private property.

Note: *Dial Before You Dig does not usually provide information about property services.*

Ensure plans and information from utility service owners are available on site to assist in locating, identifying and protecting services both before and throughout excavation and restoration activities.

Immediately report damage to any services, whether public or private, to the owner of the service.

New PCSs must have clearance from other services not less than (*and preferably exceeding*) those shown in Table 7.1.

The clearance must be measured between the two closest parts of the sewer and the other underground service e.g. collar to socket.

Table 7.1 Clearances between sewers and other underground services

Utility (Existing service)	Minimum horizontal clearance (mm) for new sewers ≤ DN300	Minimum vertical clearance ¹ (mm)
Sewers ≤DN 300	300	150
Sewers >DN 300	600	300
Gas mains	300 ³	150 ² /300
Telecommunication conduits and cables	300 ³	150 ² /300
Electricity conduits and cables	500	225 ² /300
Stormwater drains ⁷	300 ³	150 ² and ⁴ /300 ⁴
Water mains	1000 ⁵ /600	500 ⁴
Kerbs	150 ⁶	150 (where practicable)

NOTES:

- Vertical clearances apply when sewers cross one another, except in the case of water mains when a vertical separation must always be maintained, even when the sewer and main are parallel. *The sewer should always be located below water mains to minimise the possibility of backflow contamination in the event of a water main break.*
- A minimum vertical clearance of 300 mm applies if the size of the existing service is >DN 300.
- Clearances can be further reduced to 150 mm for distances up to 2 metres when passing installations such as poles, pits and small structures, providing the structure is not destabilised in the process.*
- Sewers should always cross under water mains and stormwater drains.* If this requirement cannot be met, liaise with the developer/property owner to engage a WSC for the development of a servicing solution and management of the works. Where a sewer crosses a water main at or close to 90 degrees, the vertical clearance may be reduced to not less than 200 mm provided that the sewer is concrete encased and a 50 mm compressible material is placed over the encasement. The encasement must not have any joints within 1000 mm either side of the water main and must conform to Drawing [MWS-300](#).
- When the sewer is at the minimum vertical clearance below the water main (500 mm) maintain a minimum horizontal clearance of 1000 mm. *This minimum horizontal clearance can be progressively reduced to 600 mm as the vertical clearance increases to 750 mm.*
- Clearance from kerbs must be measured from the nearest point of the kerb.
- A sewer to be constructed under an existing or proposed stormwater pipe or channel ≥DN 375 must be concrete encased. The concrete encasement must extend at least one metre each side of the stormwater pipe or channel. Clearances between the sewer and other services must be measured from the outer surface of the concrete encasement.

7.2 Work site assessment

Before starting excavation, re-assess the site, including obstacles such as underground services, overhead power cables and traffic management requirements and verify that proposed environmental and safety precautions are adequate.

Do not commence work until conditions comply with relevant confined space requirements.

Comply with recommendations and guidelines set out in the 'Excavation work code of practice' and 'Construction work code of practice' (*available at www.workcover.nsw.gov.au*).

Do not commence any excavation until all equipment and materials necessary to make the excavation safe are on site and available for use. *Equipment and materials include all necessary fencing and barriers, as well as trench support systems.*

Consider the need for a dilapidation survey.

7.3 Excavation under roadways, driveways and improved surfaces

Where the construction of the works involve the opening of a road or footpath, it is the Constructor's responsibility to obtain the consent of the relevant roads authority and abide by the conditions of consent as referred to in the Roads Act 1993 granted by the approving authority.

Written permission must be obtained from the relevant property owner(s) before commencing any excavation under or across improved surfaces.

If excavation is required across improved surfaces such as pavements, driveways, kerbs and gutters, or where the surfaces cannot be satisfactorily reinstated, assess constraints and, in consultation with a WSC if they are involved with the works, select an appropriate method (*for example, boring*).

For open excavation across improved surfaces, keep the trench width to the minimum allowed. Saw cut neat straight lines through bitumen, asphalt and concrete at least 150 mm beyond the outer limits of the required excavation. Remove pavers, blocks and bricks by hand, clean them and set them aside for later replacement.

7.4 Support of excavations

Comply with all support requirements set out in the 'Excavation work code of practice', (*available at www.workcover.nsw.gov.au*). Particular attention is drawn to the following requirements for trench stability:

- Support, or bench, any trench of depth greater than 1.5 metres
- Where material is stored within the trench's zone of influence, the height of the trench to be used in determining the zone of influence must be the greater of:
 - (a) the distance between the trench floor and the top of the stored material or
 - (b) the height of the highest trench wall
- Support all trenches where trench walls are unstable. Consider all trenches 1.5 metres and deeper to be unstable. In the event of uncertainty about any trench, obtain specialist engineering advice.
- For a trench of depth 1.5 metres or greater, ensure plant, traffic and materials do not encroach within 1 metre of the trench's zone of influence, except where support systems are designed for these surcharge loads.
- Ensure that adjacent structures and services are not subject to disturbance by the trench support system.

7.5 Excavation in root zones

Take every precaution to ensure that no undue damage is caused to tree root systems from excavating. Consider excavating by hand or by boring to protect the root zone.

7.6 Excavation plant and tools

Choose excavation plant and/or tools so that plant operation will minimise safety hazards, will not adversely impact on the environment and community and will not damage existing infrastructure and property.

7.7 Topsoil

Where construction is to occur on grassed areas, remove turf sods and topsoil before excavating and set aside in an appropriate location for later use in restoring the site.

7.8 Disposal of excavated material

Dispose of any excess material in accordance with the property owner's requirements and with regard to environmental legislation.

7.9 Blasting

Do not use blasting.

8. Trench filling and compaction

8.1 Placement and compaction of trench fill

Before placing trench fill, ensure that pipe bedding fully supports the pipe and that pipe embedment material covers the crown of the pipe by at least 150 mm in non-trafficable areas and at least 300 mm in trafficable areas.

Where the filled trench will be subjected to traffic loading, the fill material must comply with the requirements of the road owner. In the absence of a directive, use one of the following:

- Compaction sand; or
- Fine crushed rock; or
- 75 mm crushed rock.

Ensure that trench fill is free of large clumps and debris and complies with requirements specified in the Drawings.

When placing trench fill, avoid impact loading of the sewer and/or junction. Place and compact trench fill in layers of approximately 300 mm. Do not use flooding compaction.

8.2 Removal of trench supports

When removing, raising or withdrawing trench supports, prevent slips and falls and ensure that no damage, disturbance or displacement occurs to the pipe, fittings, geotextile filter fabric, pipe embedment and trench fill already installed. Ensure that all embedment and trench fill material located below such trench support and against native ground is progressively compacted as supports are withdrawn.

If agreed with the property owner, the trench support system may be left in place as permanent support. Where the property owner agrees to trench supports being left in place, cut off the support system at a depth at least 200 mm below the finished surface level required to satisfy structural and development requirements of the site.

Rectify all settlement occurring within 12 months of completion of work.

9. Sealing disused points of connection

Where constructing a new junction/property connection arrangement or a PCS results in an existing connection no longer being required, seal the redundant connection at the point of connection to Sydney Water's system and in accordance with the pipe manufacturers' recommendations.

10. Surface restoration

Unless otherwise authorised in writing by the owner of the disturbed property, replace or repair as near as practicable to the pre-construction condition all surfaces and/or improvements (for example shrubs, gardens, retaining walls, fences, pavements) which are disturbed or damaged during construction.

As soon as possible after completing trench backfill, relay turf sods and topsoil previously removed and set aside.

Immediately after trench backfilling and compaction, make safe and temporarily restore trafficable areas to a condition suitable for withstanding traffic loads. Maintain the temporary restoration until final restoration is completed. Where pavements and driveways require restoration or replacement, complete such work in consultation with the property owner and within one month of trench backfilling.

Restore bushland areas as near as practicable to their pre-construction state. Place previously stockpiled topsoil over the affected area and protect the site against erosion.

11. Final inspection

Arrange inspections as required (refer to '[Instructions for Constructors – Minor Works \(sewer\)](#)'). Rectify non-conformances.

Note: At its discretion, Sydney Water may conduct additional independent inspections of the work, including CCTV inspections.

12. Work As Constructed details

During progress of the work, legibly record all as-constructed details (including ties to enable location of work) in a manner which accurately shows the completed work.

For pipe replacement in lined sewers, record the type of lining found, location, length, material and stiffness of replacement pipes as well as differences in internal diameters.

Where the soffit requirement is unlikely to be achievable, provide the records set out in [Section 5.1](#).

Provide the required Work As Constructed details and documents to Sydney Water or the WSC, as detailed in the relevant Provider Instruction.

Note: Any disused points of connection or disused sewers must be clearly marked on the WAC plan.

13. Work Instructions and Drawings

Any work involving cutting into or working directly on a Sydney Water sewer or diverting sewage flows must be completed within one calendar day.

Care must be taken to ensure that all works are constructed to prohibit the ingress of groundwater and stormwater for the life of the pipework.

The following Work Instructions and Drawings form part of the requirements and must be read in conjunction with the requirements:

Work Instruction title	Drawing no.	Drawing title
Investigate Site	SEW-1150-S	Sewer Symbols
	SEW-1200	Soil Classification Guidelines
Install Junction and pipework/riser for Property Connection	MWS-101	Install SS Junction – Unlined Sewer
	MWS-102	Install SS Junction – Lined VC Sewer
	MWS-103	Install Cut-in Junction – Unlined Sewer
	MWS-104	Install Pipework/Riser for single property connection
Construct Property Connection Sewer	MWS-200	Construct PCS
	MWS-201	Construct Rodding Point
	MWS-202	Existing Vertical for PCS
Concrete Encase Sewer	MWS-300	Concrete Encase Sewer
Replace Pipe	MWS-400	Replace Pipe

13.1 Work Instruction – Investigate site

Scope

This Work Instruction sets out technical requirements for site investigation as a first step in undertaking any and all work. The purpose of the investigation is to:

- identify site safety and environmental issues.
- as necessary, verify:
 - location, depth, size and function of underground services, obstructions and that properties can be served by proposed sewer works
 - that the soffit requirement relating to the lowest fitting on the property is achievable (refer to [Section 5.1](#))
- identify sewer pipe material
- determine whether the sewer is lined
- identify impediments to the work (for example the sewer receives pumped flows or is encased).

Background

To reduce infiltration into Sydney Water's sewers and to increase the life of sewers, many older sewers have been lined.

Special methods may be necessary for undertaking Minor Works activities on sewers constructed from obsolete materials such as cast iron, or materials that do not conform to current design standards.

Sydney Water's database (Hydra) may not accurately record pipe material and/or lining details. Consequently, as a first step in undertaking work, a site investigation is required to determine the sewer pipe material, if the sewer is lined and/or if unexpected features exist.

Constructors should be aware that, as a general rule:

- *Sewers constructed of polyvinylchloride (PVC) are not lined.*
- *Some sewers constructed of vitrified clay (VC) are lined. The lining may also have sealed existing unused junctions.*
- *A relatively small number of sewers are constructed from alternative materials such as asbestos cement (AC), cast iron (CI), ductile iron (DI) or concrete, and they may have been concrete encased at the intended location of a junction.*

Sewer linings that may be encountered include:

- *Folded and formed PVC*
- *Spiral-wound PVC*
- *Cured-in-place resin impregnated felt*
- *Folded and formed PE*
- *Plain PE*
- *Formed fibreglass.*

Procedure

Verify records

Obtain services records (for example through Dial Before You Dig, sewer service diagram, Hydra) and verify the accuracy of records in the field.

Verify that the work site is not located in a mine subsidence area.

Site safety and environmental issues

Assess site safety and environmental issues, develop appropriate documentation and execute requirements in accordance with relevant [Provider Instructions](#).

If work involves cutting into the sewer, or in the event that the sewer is damaged, treat the excavation as a confined space.

Control sewage flow

Ensure that appropriate measures can be implemented to control sewage flow, including any flows from sewage pumping stations and private pumping.

Ensure materials are available

Ensure ready availability of additional fittings, pipe and materials that may be required in the event of unforeseen circumstances and/or unexpected damage to the sewer that may interfere with timely completion of the work.

Excavate to reveal sewer

Taking extreme care to avoid damage to the sewer, excavate and expose a section of sewer at the proposed work location e.g. point of connection. If a Constructor who only has 'MS' listing finds that the depth of the sewer exceeds 2.5 metres, immediately cease work and contact the WSC involved in the case. For applications lodged through Sydney Water Tap in™ phone Sydney Water on 13 20 90. Ensure safety and other issues are addressed should the site need to be made available to others for inspection or further work.

Verify soffit requirement

For a junction installation and/or and construction of a PCS, verify that the overflow level of the lowest actual and/or expected future drainage fitting (for example, overflow gully) on the property being connected is at least 1200 mm above the soffit of Sydney Water's sewer at the point of connection. Where the requirement is not achievable and/or the land to be serviced is vacant, refer to [Section 5.1](#).

Identify sewer material

Clean and inspect the sewer to determine the pipe material. If the sewer pipe material is ductile iron, cast iron, PE, PP, asbestos cement or concrete, or if the sewer is concrete encased at the intended location of work, contact the WSC involved in the case. For applications lodged through Sydney Water Tap in™ phone Sydney Water on 13 20 90.

If the pipe material is PVC, proceed with work as appropriate and in accordance with relevant Work Instructions and Drawings.

If the pipe material is VC, for junction installations and pipe replacement continue as specified below to determine whether the sewer is lined.

Determine if sewer is lined

If an existing junction is to be utilised to connect a PCS, carefully remove the cap and check that the inlet has not been sealed by a lining in the sewer. If it has been sealed, contact the WSC involved in the case. *The condition of the junction and the difficulty of effectively cutting and sealing the liner through the arm of the junction may mean that junction/pipe replacement is required. Alternatively, the installer of the liner might be contracted to cut-out the inlet using job specific tools from within the sewer.*

For new junction installations, mark the location of the proposed junction inlet on the surface of the sewer. Ensure the radial location of the inlet is suitable for either a CSD or a PCS connection.

For pipe replacement, identify and mark one or two appropriate points within the length to be replaced where investigation holes need to be cut in the sewer. Ensure the hole(s) are not more than 4 metres from either end of the section to be replaced, unless there is a nearby MH from where the lining status can be determined.

For new junction installations or pipe replacement, grind or cut a hole (approximately 100 mm x 100 mm) into the sewer at the location(s) previously marked. Prevent pieces cut from the sewer pipe from entering the sewer, or else retrieve them. Use suitable tools to grind or cut the pipe. Do not use hammers and chisels.

Inspect the inside of the sewer (via the cut hole) to determine whether the sewer is lined.

Measure and record the internal diameter of the sewer.

Adopt the appropriate Work Instruction and work method based on whether the sewer is lined or unlined.

13.2 Work Instruction – Install junction

Step 1: Investigate site

Execute Work Instruction [Investigate site](#).

Step 2: Install junction

Select junction size to suit flows from the proposed development. The size for a typical residential property is to be 150 x 100 or 225 x 100. If the junction is to be used for a PCS to serve more than one property or a property with multiple dwellings, then the size is to be 150 x 150 or 225 x 150 or 225 x 225.

Install a junction in accordance with the relevant method/drawing referenced in the table below. *Selection of an allowable method depends on the existing sewer or existing PCS size and material and if the sewer is lined (both determined by site investigation).*

Selection of junction installation methods

	Pipe Material	Drawing
Unlined Sewer	PVC - plain wall	MWS-101
		MWS-103
	PVC – ribbed/profiled wall	MWS-103
		VC
Lined Sewer	VC	MWS-103
		MWS-102

13.3 Work Instruction - Install pipework/riser for property connection

Step 1: Install pipework/riser

Install pipework/riser in accordance with Drawing [MWS-104](#).

13.4 Work Instruction - Construct property connection sewer

Step 1: Investigate site

Execute Work Instruction [Investigate site](#).

Step 2: Construct PCS

Existing sewer or PCS

If the PCS will be constructed off an existing sewer or PCS, or if it will be an extension of an existing sewer or PCS on line and grade, construct a PCS in accordance with Drawing [MWS-200](#). Some possible PCS configurations are shown in Figure 1.

Existing Vertical

If the junction to which the PCS is to be connected is located on an existing PCS Vertical (see Drawing [MWS-202](#)) and is not in a trafficable area, obtain Sydney Water approval to proceed with constructing a PCS. Subject to approval, construct the PCS in accordance with Drawing [MWS-200](#). *This work is not permitted where the PCS Vertical is in a trafficable area.*

Note: In assessing an application to construct a PCS from an existing Vertical, Sydney Water will consider aspects such as:

- *The risk of interfering with an adjacent service (for example, if the sewer is not in the property to be served, or if two connections to the Vertical already exist)*
- *The condition of the Vertical and its connection to the reticulation sewer*
- *Whether the Vertical is connected to the reticulation sewer by means of a square junction (that is, the reticulation sewer may be at risk of damage if rodded via the Vertical)*

New Vertical

A new Vertical is not permitted.

If the existing sewer and existing/new junction are in rock or an obstruction is found, provided the new sewer is not located in a trafficable area and subject to Sydney Water approval, the option exists under the minor works process for ‘S1’ and ‘S2’ listed constructors only to:

- first construct a MS in accordance with WSA 02 Sewerage Code of Australia (Sydney Water edition) and Technical Specification for Leak Tight Sewer Systems (Sydney Water) and then*
- construct a PCS from the MS riser in accordance with Drawing [MWS-200](#).*

Obstruction

If an underground obstruction exists in the proposed route of the PCS:

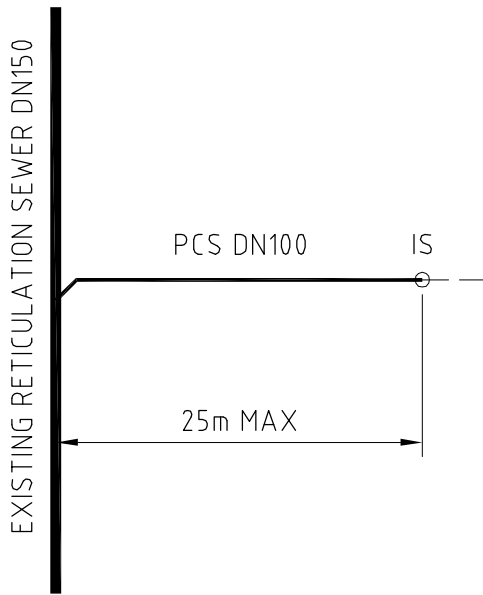
- Document details of function, depth and dimensions of obstruction.
- Undertake a risk assessment and record possible safety risks/hazards including possible damage to obstruction or property.
- Document proposed work method based on the concept of a typical PCS configuration for a single property (see next page) and Drawing [MWS-104](#).
- Before adopting this option, submit obstruction details and proposed work method for WSC or Sydney Water approval.
- Construct PCS in accordance with approved work method and relevant drawings.

Step 3: Construct a Rodding Point

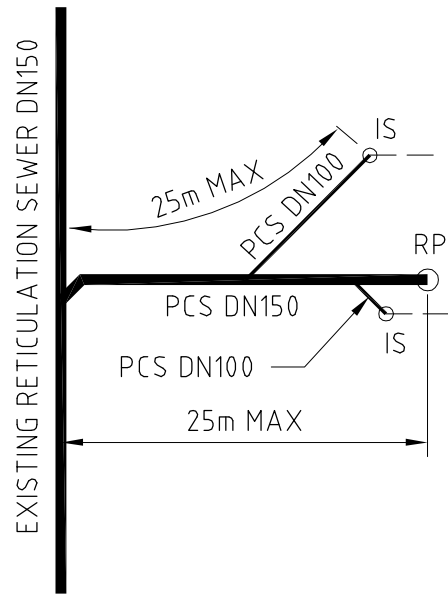
Where a PCS will service more than one property, construct a RP at the upstream end in accordance with Drawing [MWS-201](#).

Figure 1 Typical PCS configurations

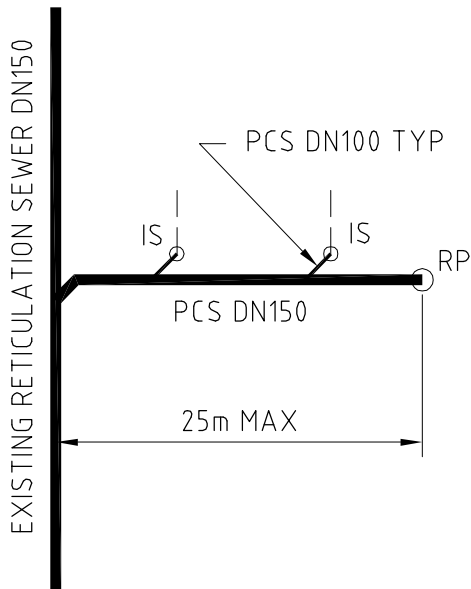
The length of a PCS is measured along the axis of the PCS from the centreline of the existing sewer at the PCS connection point to the centerline of the furthest riser for the IS or RP. Some permitted PCS configurations are listed as follows (length limits shown are for "S1" and "S2" listed Constructors. Length limit for Constructors who only have "MS" listing is 12 m MAX):



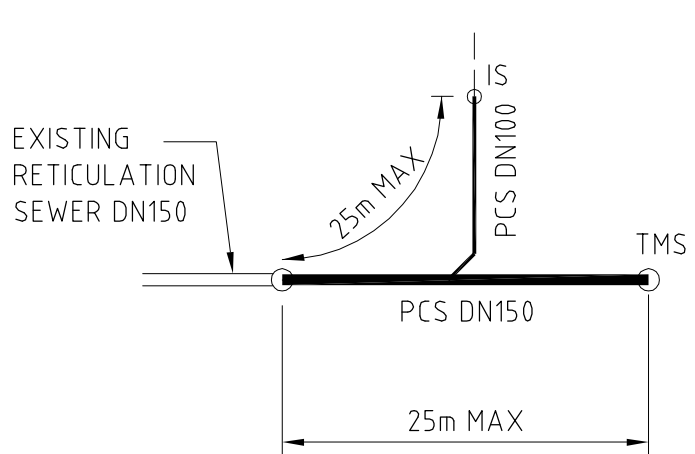
SINGLE PROPERTY



DOUBLE (Y-BRANCH) MULTIPLE PROPERTIES



MULTIPLE PROPERTIES



MULTIPLE PROPERTIES

For all configurations, a PCS shall provide a connection point within each property.

Each PCS shall have maintenance access from the surface at its upstream end. This access will be through the future inspection shaft to be completed by the plumbing licensee on each property. Depending on the configuration, a RP or TMS may also be required to be installed by the Constructor.

The RP for the on line and grade extension of a sewer shall be of TMS type.

RPs must be located within the properties being served by the new works. An exception may be where the TMS of an on-line and grade sewer extension is in public land.

13.5 Work Instruction - Concrete encase sewer

Step 1: Investigate site

Execute Work Instruction [Investigate Site](#).

Step 2: Inspect pipes

Before concrete encasing the sewer, consult with the WSC to arrange for them to inspect the existing pipes. Determine if any live, unused and/or disused junctions are within the length of sewer to be encased. Get direction from the WSC about actions to be taken for junctions.

Step 3: Replace defective pipes/relocate junctions

Replace mortar-jointed VC, CI and DI pipes and, as directed by the WSC or as otherwise determined, replace defective pipes in accordance with Work Instruction [Replace Pipe](#).

Remove, seal or otherwise treat junctions in accordance with Drawing [MWS-300](#).

Step 4: Concrete encase pipes

Concrete encase pipes in accordance with Drawing [MWS-300](#).

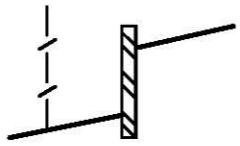
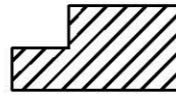
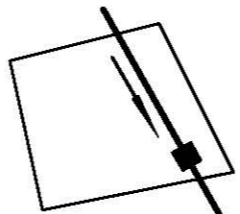
13.6 Work Instruction - Replace pipe


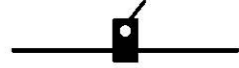


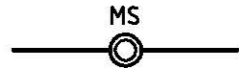
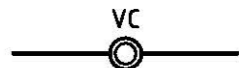
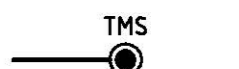

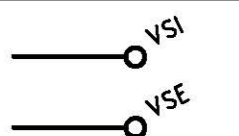

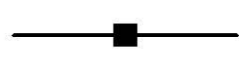
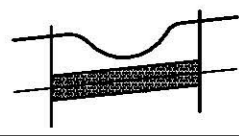
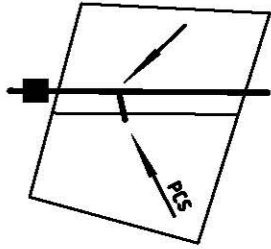
Step 1: Investigate site

As necessary, execute Work Instruction [Investigate Site](#).

Step 2: Replace defective pipes

As directed by the WSC or Sydney Water, or as otherwise determined, replace defective pipes in accordance with Drawing [MWS-400](#).

MISCELLANEOUS	SYMBOL
SURVEY MARKS	
BENCH MARK	▲
LEVEL MARK	△
PERMANENT MARK (PM)	□ PM 12345
STATE SURVEY MARK (SSM)	□ SSM 6789
ROCK MARK OR DRILL HOLE AND WING (DH&W)	! ◀
GALVANISED IRON NAIL IN TREE	☁ GIN
BOUNDARY LINE	—————
FENCE	- - - - -
WALL	▨▨▨▨▨▨▨▨▨▨
RETAINING WALL ON LINE (SECTION)	
BUILDING	
HOUSE ON LOT (IF HOUSE NUMBER IS SHOWN SYMBOL IS OMITTED)	H
VACANT LOT	V
FINISHED SURFACE LEVEL	FSL
DIRECTION OF FLOW	

STRUCTURE	SYMBOL
MAINTENANCE HOLE (ACCESS CHAMBER)	
MAINTENANCE HOLE WITH OVERFLOW AND GAS CHECK	
DUAL MAINTENANCE HOLES FOR OVERFLOW	
MAINTENANCE HOLE WITH VENTSHAFT	
MAINTENANCE SHAFT	MS 
VACUUM CHAMBER	VC 
TERMINAL MAINTENANCE SHAFT	TMS 
RODDING POINT	RP 
VENTSHAFT (INDUCT OR EDUCT)	VSI VSE 
PROPOSED SEWER TO BE CONSTRUCTED ON ASSOCIATED PLANS	
EXISTING SEWER AND MAINTENANCE HOLE	
CONCRETE ENCASEMENT (SECTION)	
POSITION OF JUNCTION AND POSITION OF PROPERTY CONNECTION SEWER (PCS)	

PREPARING THE TEST AREA:

CONDUCT ALL NATIVE SOIL IDENTIFICATION TESTS ON A FRESHLY EXPOSED, DAMP, HAND TRIMMED AREA OF THE TRENCH WALL IN THE PIPE ZONE. TAKE CARE THAT THE SOIL IN THE EXPOSED TEST AREA IS NOT COMPACTED OR LOOSENED DURING TRENCH EXCAVATION. IF THE SOIL IN THE TRENCH FLOOR AND WALL IS VERY DRY AT THE TIME THE TRENCH IS OPENED THEN FLOOD THE TEST AREA AND ALLOW TIME FOR THE WATER TO BE ABSORBED BY THE SOIL BEFORE IT IS TRIMMED AND TESTED.

IDENTIFYING CLAY SOILS:

A LUMP OF CLAY SOIL WILL BE DIFFICULT TO BREAK WHEN DRY. IT WILL BE STICKY AND NEED SOME EFFORT TO MOULD WITH THE FINGERS WHEN WET. CLAY WILL NOT WASH OFF EASILY. INDIVIDUAL CLAY PARTICLES ARE HARD TO SEE.

TESTING CLAY SOILS:

CLAY SOILS ARE BEST TESTED IN THE WALL OF THE TRENCH. THE FIST, THE THUMB OR THE THUMBNAIL ARE USED TO DETERMINE THE CONSISTENCY (STRENGTH) OF THE CLAY (SEE TABLE.)

IDENTIFYING CLEAN SAND SOILS:

THE INDIVIDUAL GRAINS OF SAND WILL BE VISIBLE TO THE EYE. A LUMP OF CLEAN SAND, IF IT CAN BE PICKED UP AT ALL, WILL CRUMBLE WITH VERY LITTLE EFFORT. CLEAN SAND WASHES OFF EASILY.

TESTING CLEAN SAND SOILS:

CLEAN SAND SOILS ARE BEST TESTED IN THE FLOOR OF THE TRENCH BY PUSHING WITH THE WHOLE BODY WEIGHT ON ONE FOOT. THE DEPTH OF THE DEPRESSION LEFT BY THE BOOT IS RELATED TO THE DENSITY OF THE SAND (SEE TABLE). TAKE CARE TO ENSURE THAT THE SAND IN THE TRENCH FLOOR WAS NOT COMPACTED OR LOOSENED DURING THE EXCAVATION OF THE TRENCH OR THE TRIMMING OF THE TEST AREA.

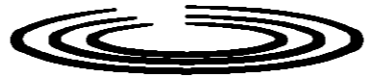
TESTING ROCK:

THE RECOMMENDED FIELD IDENTIFICATION TESTS FOR ROCK RELY ON OBSERVING THE EASE WITH WHICH THE ROCK CAN BE DUG WITH A PICK, AND ESTIMATING THE SPACING OF THE JOINTS IN THE ROCK. (JOINTS ARE COMMONLY CALLED CRACKS OR BREAKS). THE SPACING BETWEEN JOINTS IS IMPORTANT BECAUSE THE ALLOWABLE BEARING PRESSURE ON ROCK IS USUALLY CONTROLLED BY THE JOINTS IN IT, RATHER THAN THE INHERENT STRENGTH OF THE BLOCK OF ROCK. JOINTS MAY BE TIGHTLY CLOSED (LIKE HAIRLINE CRACKS), BUT CAN ALSO BE OPEN (FILLED WITH AIR) OR FILLED WITH SOFT CLAY OR OTHER SOIL.

SOIL CLASSIFICATION		FIELD IDENTIFICATION TEST	▲ AHBP kPa
CLAY SOILS	VERY SOFT	EASILY PENETRATED 40 mm WITH FIST.	< 50 *
	SOFT	EASILY PENETRATED 40 mm WITH THUMB.	< 50 *
	FIRM	MODERATE EFFORT NEEDED TO PENETRATE 30 mm WITH THUMB.	< 50 *
	STIFF	READILY INDENTED WITH THUMB BUT PENETRATED ONLY WITH GREAT EFFORT.	50
	VERY STIFF	READILY INDENTED WITH THUMBNAIL.	100
	HARD	INDENTED WITH DIFFICULTY BY THUMBNAIL.	200
SAND & GRAVEL	LOOSE CLEAN SAND	TAKES FOOTPRINT MORE THAN 10 mm DEEP.	< 50 *
	MEDIUM-DENSE CLEAN SAND	TAKES FOOTPRINT 3 mm TO 10 mm DEEP.	50
	DENSE CLEAN SAND OR GRAVEL	TAKES FOOTPRINT LESS THAN 3 mm DEEP.	100
ROCK	BROKEN OR DECOMPOSED ROCK	DIGGABLE. HAMMER BLOW "THUDS". JOINTS (BREAKS IN ROCK) SPACED AT LESS THAN 300 mm APART.	100
	SOUND ROCK	DIGGABLE. HAMMER BLOW "THUDS". JOINTS (BREAK IN ROCK) SPACED AT MORE THAN 300 mm APART.	200
UNCOMPACTED FILL DOMESTIC REFUSE		OBSERVATION AND KNOWLEDGE OF THE SITE HISTORY.	< 50 *

LEGEND

- ▲ AHBP ALLOWABLE HORIZONTAL BEARING PRESSURE FOR:
 - 10 mm MOVEMENT.
 - CENTRE OF THRUST 800 mm BELOW THE NATURAL SURFACE LEVEL.
 - HIGH WATER TABLE.
- * SPECIAL GEOTECHNICAL ASSESSMENT REQUIRED

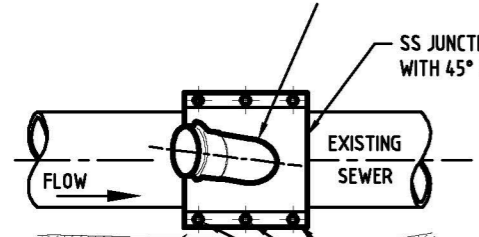
 WATER SERVICES ASSOCIATION <i>of Australia</i>	SEWERAGE CODE OF AUSTRALIA	NOT TO SCALE
	SOIL CLASSIFICATION GUIDELINES AND ALLOWABLE BEARING PRESSURES FOR BULKHEADS	SEW-1200
		© WSAA, 2002 V2.1

THIS METHOD PERMITTED FOR:
 - PLAIN WALL PVC SEWERS
 - UNLINED VC SEWERS

ELLIPTICAL HOLE CUT TO MATCH SS JUNCTION INLET SIZE. LOCATE TO ACHIEVE SPECIFIED FALL TO INVERT FOR EITHER PROPERTY CONNECTION ARRANGEMENT OR PCS CONNECTION.

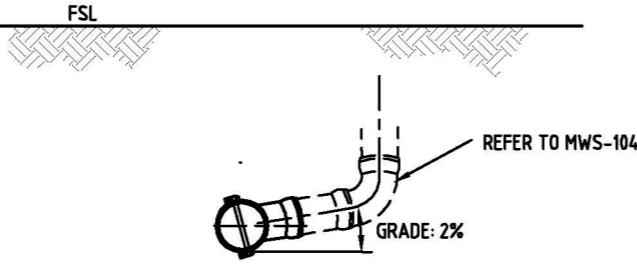


INLET BRANCH PLACED OVER ELLIPTICAL HOLE CUT INTO EXISTING SEWER.

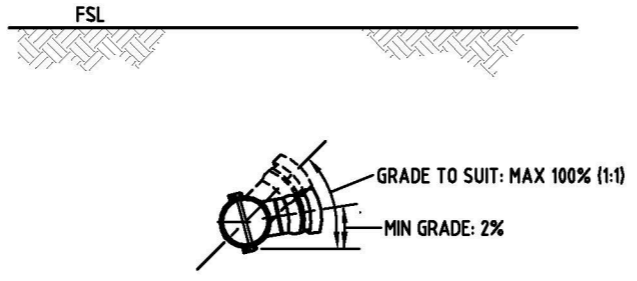


REINSTATED BEDDING

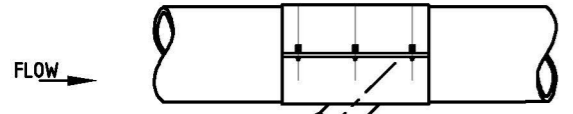
BOLTS RE-TIGHTENED BOLTS TEN MINUTES AFTER INITIAL TIGHTENING.



JUNCTION FOR PIPEWORK / RISER TO IS



JUNCTION FOR PCS



45° JUNCTION LOCATED TO SUIT EXPECTED PROPERTY CONNECTION ARRANGEMENT OR PCS

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

MWS-101

Investigate Site

1. Execute Work Instruction "Investigate Site".

Excavation

2. Excavate under and along sewer to enable placing two halves of junction in position. When in rock strata, ensure excavation is sufficient to enable later connection of property connection arrangement or PCS without having to excavate rock within 500 of junction.
3. If sewer is damaged, replace damaged pipes in accordance with Work Instruction "Replace Pipe", at same time installing cut-in junction in accordance with Drawing MWS-103.

Install Junction

4. At proposed location of connection to PVC sewer or at investigation hole previously cut into VC sewer (refer Work Instruction "Investigate Site"), mark an outline of the elliptical inlet hole to be cut into sewer that matches branch of stainless steel junction. Use a template of branch – do not use the SS junction itself as template.

Do not use permanent markers (e.g. non-water-based markers and paints or spray paints etc) on SS junctions as it may cause corrosion.
5. For PVC sewer, cut elliptical hole in sewer to match elliptical trace of junction branch. Prevent pieces cut from pipe from entering sewer or else retrieve. Use suitable tools to cut the pipe. Do not use hammers and chisels.

For a VC sewer, reshape initial investigation hole to match elliptical trace by cutting, grinding or nibbling edges of hole. Prevent pieces cut from pipe from entering sewer or else retrieve. Ensure edges of hole are smooth and clean. Use suitable tools to cut and grind the pipe. Do not use hammers and chisels.

6. Thoroughly clean full circumferential surface of sewer over length greater than SS junction.
7. Clean and then apply lubricant to corrugated elastomer underlay of junction to ensure it will effectively seal when clamped onto surface of sewer.
8. Place two parts of junction around sewer so branch is aligned with direction of flow and is directly over elliptical opening previously cut in sewer. Look through branch and ensure inlet aligns with and matches size of elliptical hole cut into sewer. As necessary, re-work the cut hole and/or re-align junction before tightening bolts to secure junction in place. Ensure grade of junction branch is 2% for pipework to riser for IS or min 2% for PCS. **Re-tighten bolts** 10 minutes after initial tightening.
9. As required for specific job, install pipework/riser for property connection as per Drawing MWS-104 or install PCS as per Drawing MWS-200 from junction.
10. Carefully remove temporary pipe supports while placing single size 7 or 10 granular bedding or placing and compacting stabilised sand (25:1 sand/cement) under and around junction to ensure sound support of sewer.
11. Place trench fill material in 300 layers and compact progressively.
12. Restore surface.



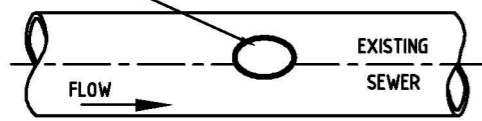
RECOMMENDED
R.RIZZI
 for MANAGER
 WASTEWATER SYSTEMS
 APPROVED 07.07.05
B. NELSON
 for MANAGER
 STRATEGIC ASSET MANAGEMENT

2	GENERAL REVISION	H.P.	12.08.15
1	ORIGINAL ISSUE	B.N.	07.07.05
LETTER	DETAILS OF VERSION / AMENDMENT	APP'D	DATE

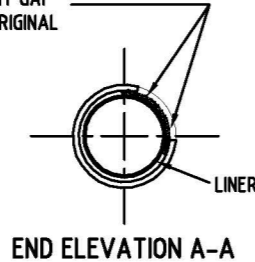
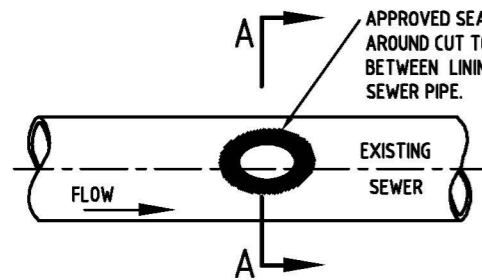
MINOR WORKS (SEWER)
INSTALL JUNCTION
INSTALL STAINLESS STEEL JUNCTION
UNLINED SEWER

NOT TO SCALE
MWS - 101
 ISSUED: 2015 | VERSION: 2

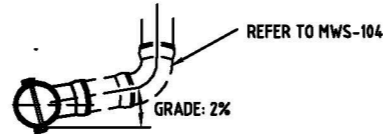
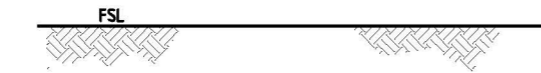
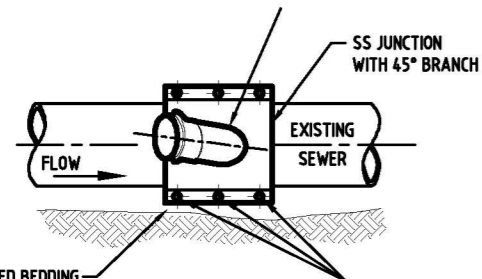
ELLIPTICAL HOLE CUT TO MATCH SS JUNCTION INLET SIZE. LOCATE TO ACHIEVE FALL TO INVERT SPECIFIED FOR EITHER PROPERTY CONNECTION ARRANGEMENT OR PCS CONNECTION



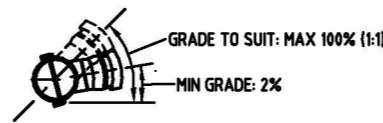
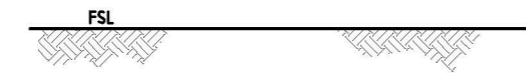
THIS METHOD MUST BE USED FOR LINED VC SEWERS



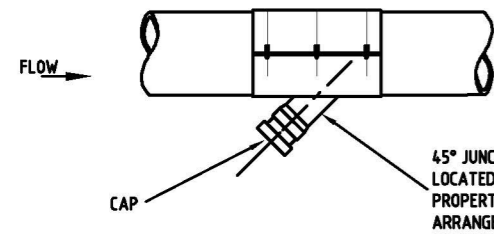
INLET BRANCH PLACED OVER ELLIPTICAL HOLE CUT INTO EXISTING SEWER.



JUNCTION FOR PIPEWORK / RISER TO IS



JUNCTION FOR PCS



ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

MWS-102

Investigate Site

1. Execute Work Instruction "Investigate Site".

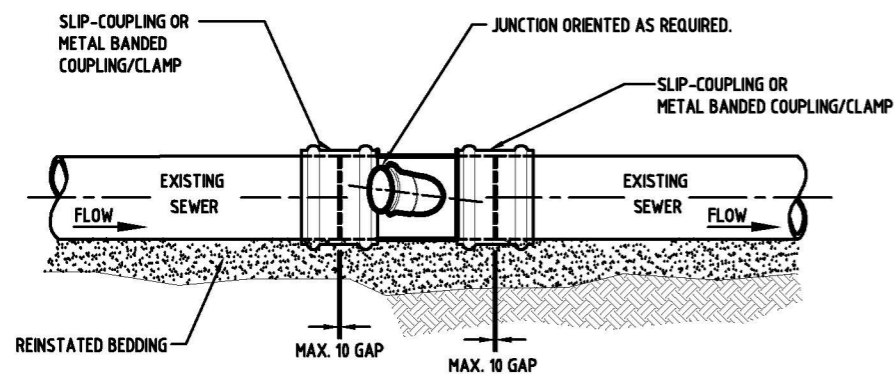
Excavation

2. Excavate under and along sewer to enable placing two halves of junction in position. When in rock strata, ensure excavation is sufficient to enable later connection of property connection arrangement or PCS without having to excavate rock within 500 of junction.
3. If sewer is damaged, replace damaged pipes in accordance with Work Instruction "Replace Pipe", at same time installing cut-in junction in accordance with Drawing MWS-103. If lining is spiral-wound type, first consult Sydney Water.

Install Junction

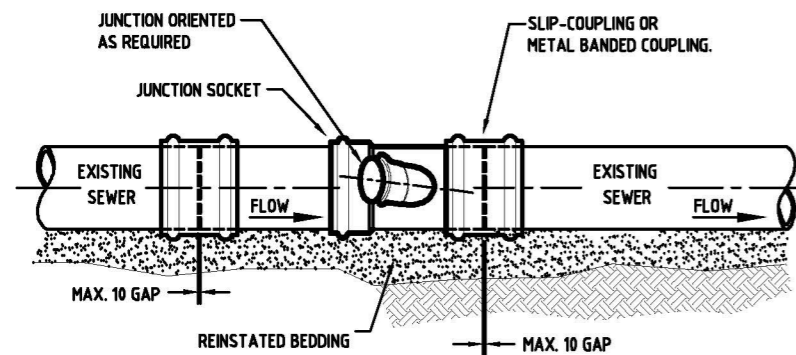
4. At location of investigation hole previously cut into sewer (refer Work Instruction "Investigate Site"), mark an outline of elliptical inlet hole to be cut into sewer that matches branch of stainless steel junction. Use a template of branch – do not use SS junction itself as template.
Do not use permanent markers (e.g. non-water-based markers and paints or spray paints etc) on SS junctions as it may cause corrosion.
5. Reshape initial investigation hole to match elliptical trace by cutting, grinding or nibbling edges of hole. Prevent pieces cut from pipe from entering sewer or else retrieve. Ensure edges of hole are smooth and clean. Use suitable tools to cut and grind pipe and liner. Do not use hammers and chisels.
6. Thoroughly clean full circumferential surface of sewer over length greater than SS junction.
7. Clean cut face of elliptical hole and apply an approved sealant to completely seal any gap between liner and internal surface of sewer.
8. Clean and then apply lubricant to corrugated elastomer underlay of junction to ensure it will effectively seal when clamped onto surface of sewer.
9. Place two parts of junction around sewer so branch is aligned with direction of flow and is directly over elliptical opening previously cut in sewer. Look through branch and ensure inlet aligns with and matches size of elliptical hole cut into sewer. As necessary, re-work cut hole and/or re-align junction before tightening bolts to secure junction in place. Ensure grade of junction branch is 2% for pipework to riser for IS or min 2% for PCS. **Re-tighten bolts** 10 minutes after initial tightening.
10. As required for specific job, install pipework/riser for property connection as per Drawing MWS-104 or install PCS as per Drawing MWS-200 from junction.
11. Carefully remove temporary pipe supports while placing single size 7 or 10 granular bedding or placing and compacting stabilised sand (25:1 sand/cement) under and around junction to ensure sound support of sewer.
12. Place trench fill material in 300 layers and compact progressively.
13. Restore surface.

2	GENERAL REVISION	H.P.	12.08.15
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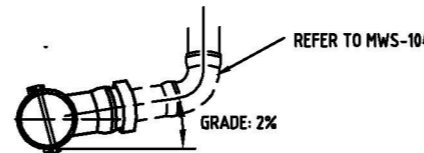
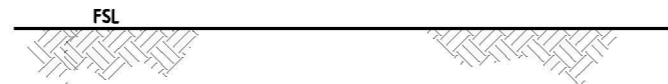


SPIGOT/SPIGOT JUNCTION

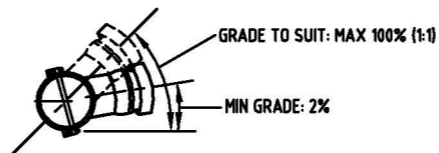
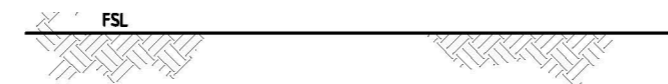
THIS METHOD PERMITTED FOR:
 - PLAIN WALL PVC SEWERS
 - RIBBED PVC SEWERS
 - UNLINED VC SEWERS



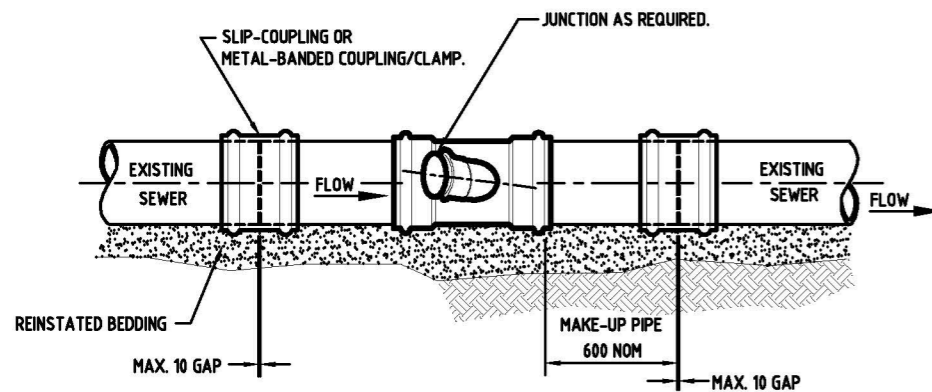
SOCKET/SPIGOT JUNCTION



JUNCTION FOR PIPEWORK / RISER TO IS



JUNCTION FOR PCS



SOCKET/SOCKET JUNCTION

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

Investigate Site

1. Execute Work Instruction "Investigate Site".

Excavation

2. Excavate under and along sewer to enable insertion of junction, short pipe section (if required) and slip couplings. When in rock strata, ensure excavation is sufficient to enable later connection of property connection arrangement or PCS without having to excavate rock within 500 of junction.
3. If sewer is damaged, replace damaged pipes in accordance with Work Instruction "Replace Pipe".

Check Dimension Tolerances

4. Ensure junction is same material and strength/stiffness class as existing sewer. To avoid creating a step in invert of sewer, ensure internal diameter of main bore of both junction and short pipe match internal diameter of sewer into which they are to be inserted within following tolerances:
 - ± 8 for DN 150
 - ± 10 for DN 225.
5. Where a pipe coupling is to be used, ensure difference in ODs of junction/short pipe and sewer are within coupling manufacturer's limits.

Cut Pipe and Install Junction

6. Provide temporary supports under sewer at either side of proposed junction location.
7. Determine length of sewer to be removed to achieve neat fit of junction (and short-pipe inserts if spigot/socket or socket/socket junctions to be used). Mark where cuts are to be made; cut and remove section of sewer. Ensure cut ends are square and smooth. Clean external surfaces of any short-pipe inserts and external surfaces (ends) of sewer.
8. Ensure internal and external dimensions of sewer, short-pipe inserts and junction satisfy dimensional tolerances specified above.
Position junction (and short-pipes as required) in sewer and ensure gaps are ≤ 10. Align inverts to match as closely as practicable.
9. Ensure grade of junction branch is 2% for pipework to riser for IS or min 2% for PCS.
10. Provide witness marks on inserted pipe to indicate final positions of couplings. Thoroughly clean full circumferential surface of sewer at joint vicinity. Slide each coupling so it is centred over its joint and secure couplings.
11. As required for specific job, install pipework/riser for property connection as per Drawing MWS-104 or install PCS as per Drawing MWS-200 from junction.
12. Carefully remove temporary pipe supports while placing single size 7 or 10 granular bedding or placing and compacting stabilised sand (25:1 sand/cement) under and around junction to ensure sound support of sewer.
13. Place trench fill material in 300 layers and compact progressively.
14. Restore surface.

MINOR WORKS (SEWER)

NOT TO SCALE

**INSTALL JUNCTION
 INSTALL CUT-IN JUNCTION
 UNLINED SEWER**

MWS - 103

ISSUED: 2015

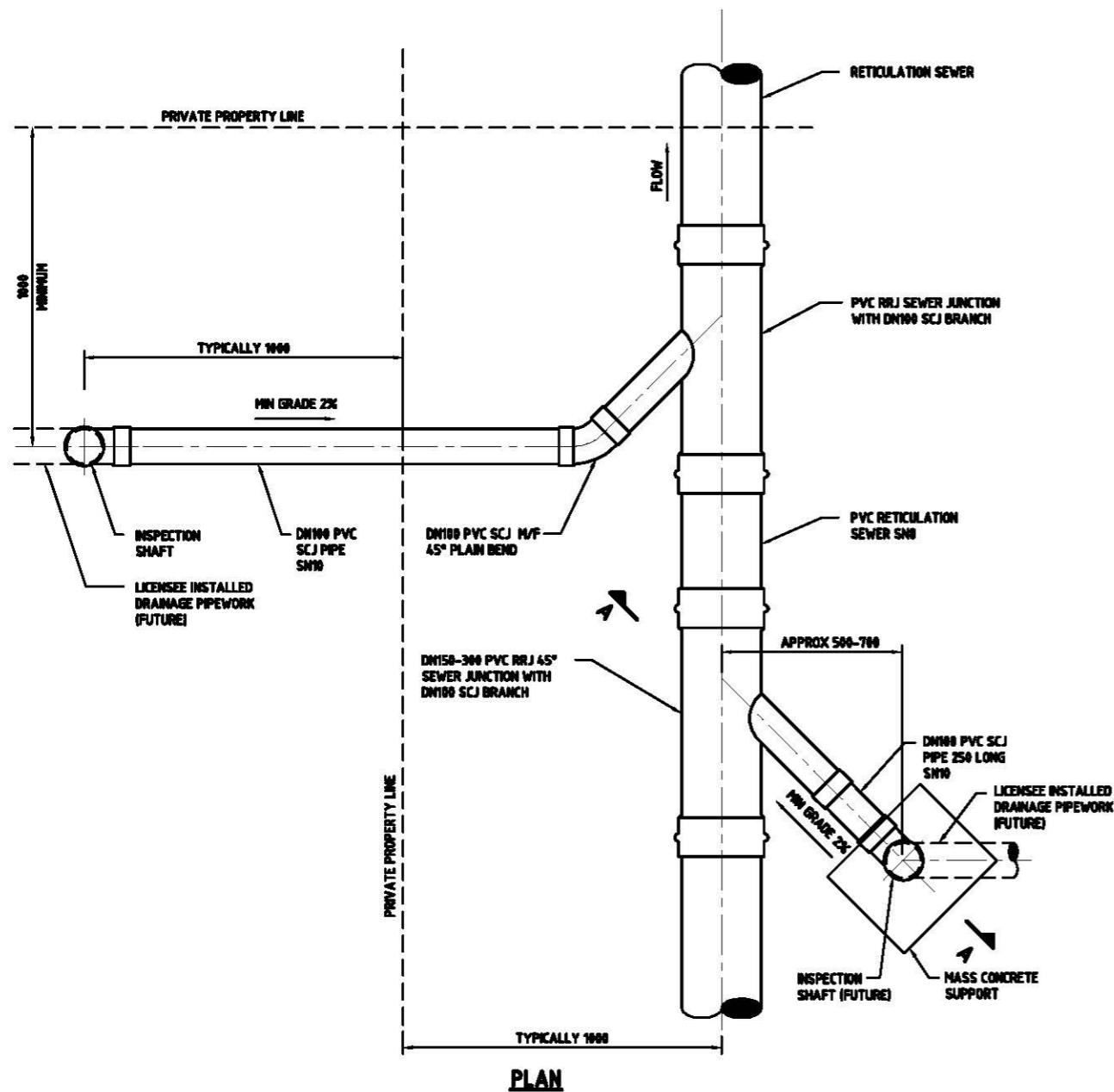
VERSION: 2



RECOMMENDED
R. RIZZI
 for MANAGER
 WASTEWATER SYSTEMS
 APPROVED 07.07.05
B. NELSON
 for MANAGER
 STRATEGIC ASSET MANAGEMENT

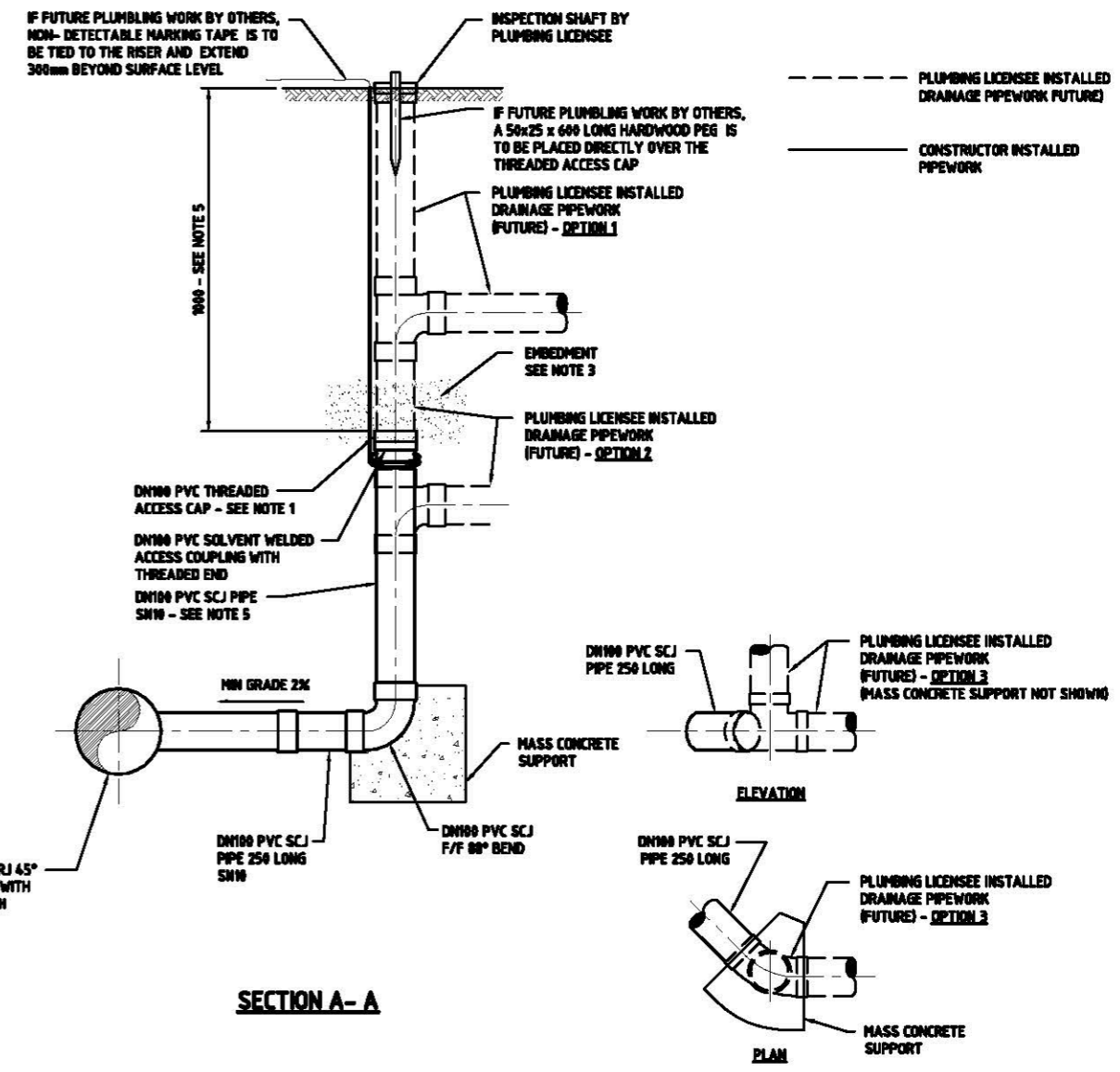
2	GENERAL REVISION	H.P.	12.08.15
1	ORIGINAL ISSUE	B.N.	07.07.05
LETTER	DETAILS OF VERSION / AMENDMENT	APP'D	DATE

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PLAN

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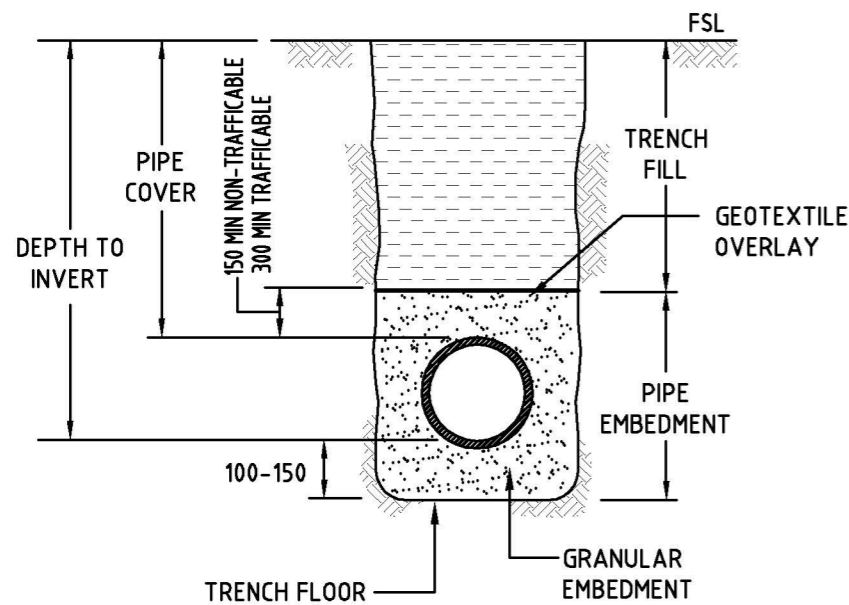
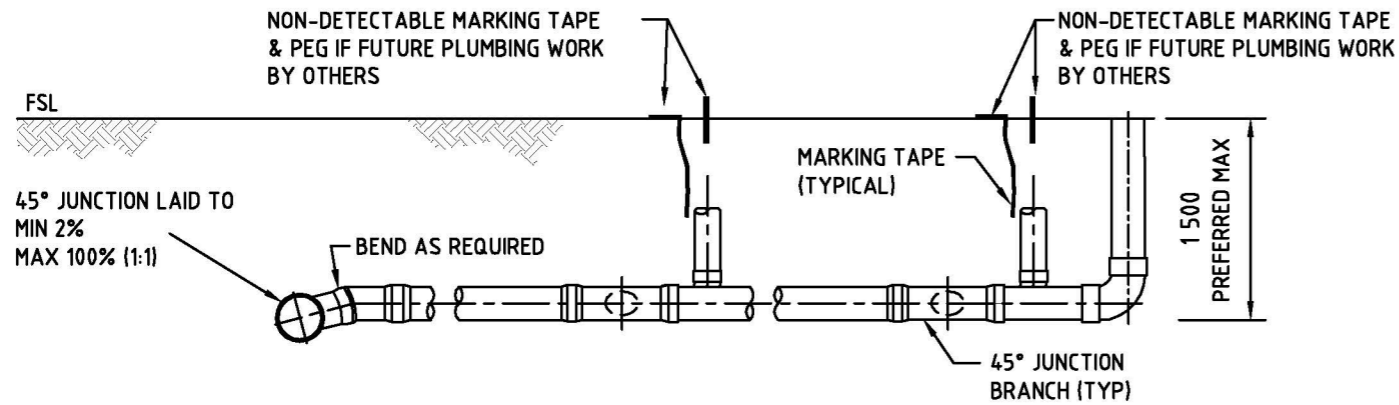
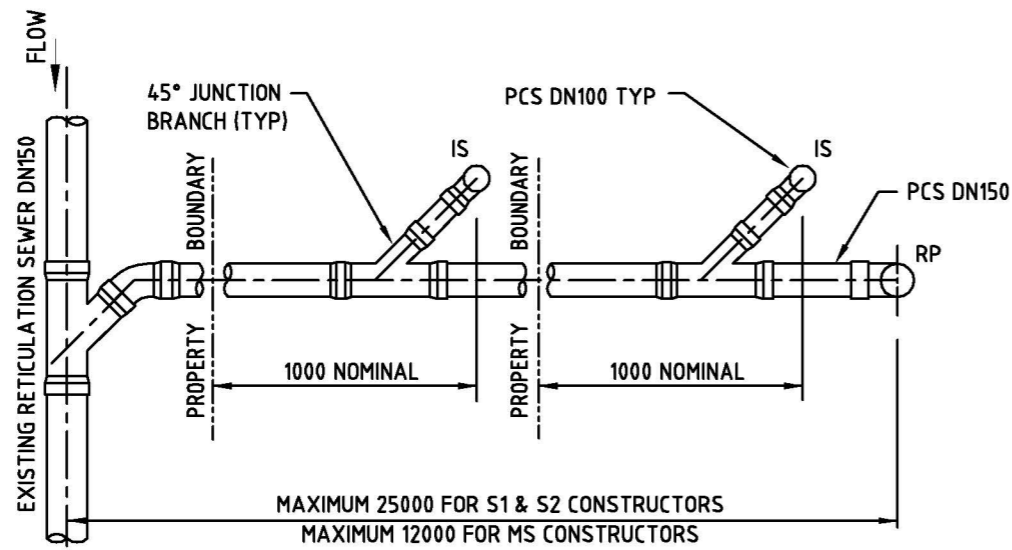


SECTION A-A

NOTES:-

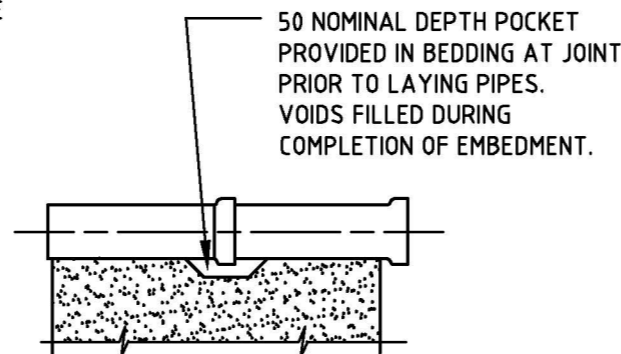
1. THE CONSTRUCTOR SHALL INSTALL UP TO AND INCLUDING THE THREADED ACCESS CAP IN ALL CASES.
2. ALTERNATIVE FITTINGS MAY BE UTILISED IN THE PCS IN PLACE OF THOSE SHOWN IF APPROVED BY SYDNEY WATER.
3. PROPERTY CONNECTION SEWERS AND INSPECTION SHAFTS SHALL BE SURROUNDED BY PIPE EMBEDMENT MATERIAL WITH MINIMUM COVER OF 150mm TO ALL COMPONENTS. EMBEDMENT MATERIAL SHALL BE SINGLE SIZE 7 OR 10 GRANULAR AND SHALL EXTEND 150mm ABOVE THREADED ACCESS CAP.
4. DN100 PROPERTY CONNECTION SIZE SHOWN. PIPEWORK AND FITTING ARRANGEMENT MAY BE ADOPTED FOR LARGER CONNECTIONS TO SUIT DEVELOPMENT.
5. THE MINIMUM LENGTH OF RISER PIPE SHALL BE 250mm. DEPTH TO THREADED ACCESS CAP MAY BE LESS THAN 1000mm FOR SHALLOW INSTALLATIONS TO PROVIDE THE MINIMUM LENGTH OF RISER PIPE.
6. CONNECTION OPTIONS SHOWN ARE FOR FUTURE PLUMBING WORK BY OTHERS.

1	ORIGINAL ISSUE - REDRAW OF FIGURE LT-2 FROM THE TECHNICAL SPECIFICATION FOR LEAK TIGHT SEWER SYSTEMS (SYDNEY WATER) VERSION 8	H.P.	12.08.15
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TRENCH DETAILS

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN



PIPE JOINT BEDDING POCKETS

Investigate Site

1. As necessary, execute Work Instruction "Investigate Site".
2. Obtain Sydney Water approval before extending a sewer on line and grade (*detailed case required, not permitted if chance of future extension*).

Construct PCS – Standard Method

3. Excavate at proposed connection point for new PCS to existing sewer or PCS.
 - Check bearing capacity of trench floor in accordance with Drawing SEW-1200. If allowable bearing is deemed to be < 50 kPa, consult WSC or Sydney Water for instruction regarding special requirements.
 - If PCS connection point is part way along the sewer or PCS and there is no existing junction, install new junction in accordance with Drawing MWS-101, MWS-102 or MWS 103, as required.
 - If PCS connection point is for the extension of a sewer or PCS on line and grade, remove existing RP, TMS or end cap as required.
4. Excavate PCS trench to achieve trench width and cover requirements of Tables A and B.
5. The PCS shall be laid at a grade that is:
 - not less than 2% where PCS connection point is part way along the sewer or PCS.
 - same grade as existing sewer or PCS where PCS connection point is for the extension of a sewer or PCS on line and grade.
6. Place single size 7 or 10 granular bedding to 100 min depth.
7. Starting from the PCS connection point, install PCS configuration so that a riser for an IS can be installed approximately 1000 inside the boundary of each property to be served unless approved otherwise by Sydney Water. Ensure pipe invert is laid at the appropriate level and grade.
8. Install pipework/riser to IS as per Drawing MWS-104. Ensure riser is suitable for future connection of solid-walled PVC pipe or PVC property connection fitting utilising a solvent welded joint.
9. Where required, construct RP at upstream end of PCS as per Drawing MWS-201. The RP for on line and grade sewer extensions shall be of TMS type.
10. Complete pipe embedment.
11. Place trench fill material in 300 layers and compact progressively.
12. Restore surface.

TABLE A - MINIMUM TRENCH WIDTH

Nominal Size (DN)	Minimum Trench Width [#]
150	450
200	550
225	600

[#] Unsupported trench width measured at spring line.
Supported trench width measured inside faces of shields.

TABLE B - MINIMUM PIPE COVER

Location	Minimum Cover to Top of Sewer
Private and public property / Non-vehicular loading	600 ^{##}
Private residential property / Vehicular loading	750
Footway, industrial property & local roads	900
Arterial roads, State roads, unsealed roads	1200

^{##} 450 permitted in existing developments

MINOR WORKS (SEWER)

PROPERTY CONNECTION SEWER CONSTRUCT PCS

NOT TO SCALE

MWS - 200

ISSUED: 2015

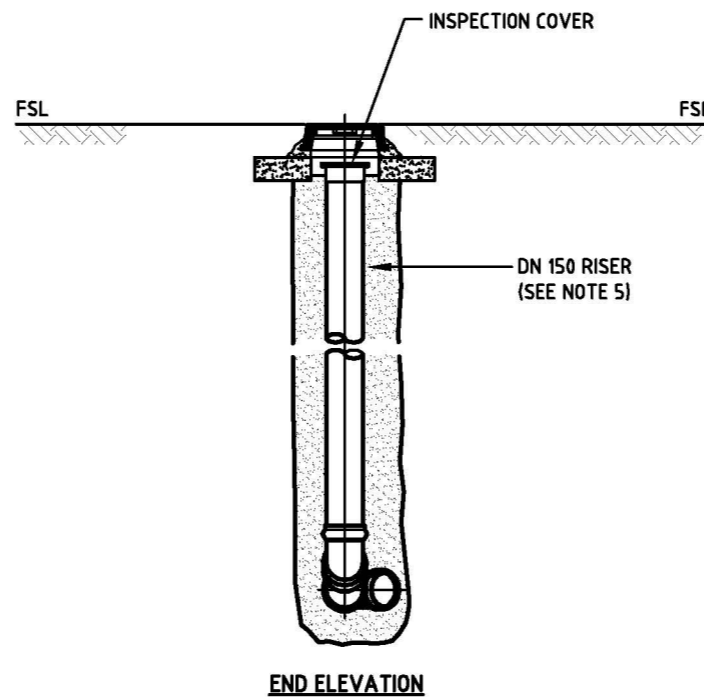
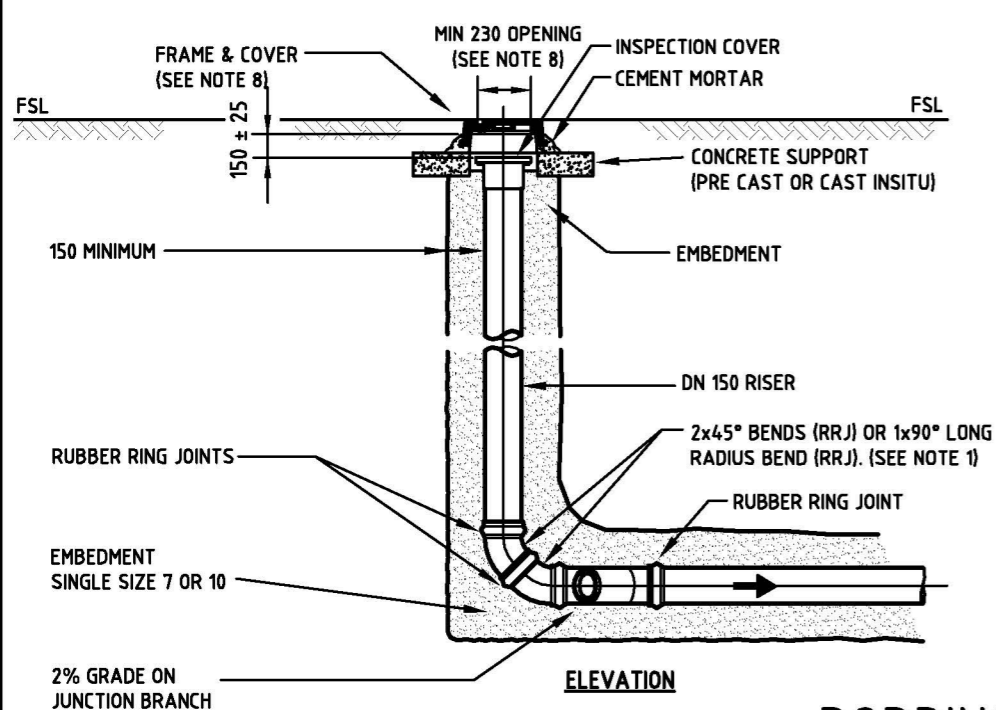
VERSION: 2



RECOMMENDED
R. RIZZI
for MANAGER
WASTEWATER SYSTEMS
APPROVED 07.07.05
B. NELSON
for MANAGER
STRATEGIC ASSET MANAGEMENT

LETTER	DETAILS OF VERSION / AMENDMENT	APP'D	DATE
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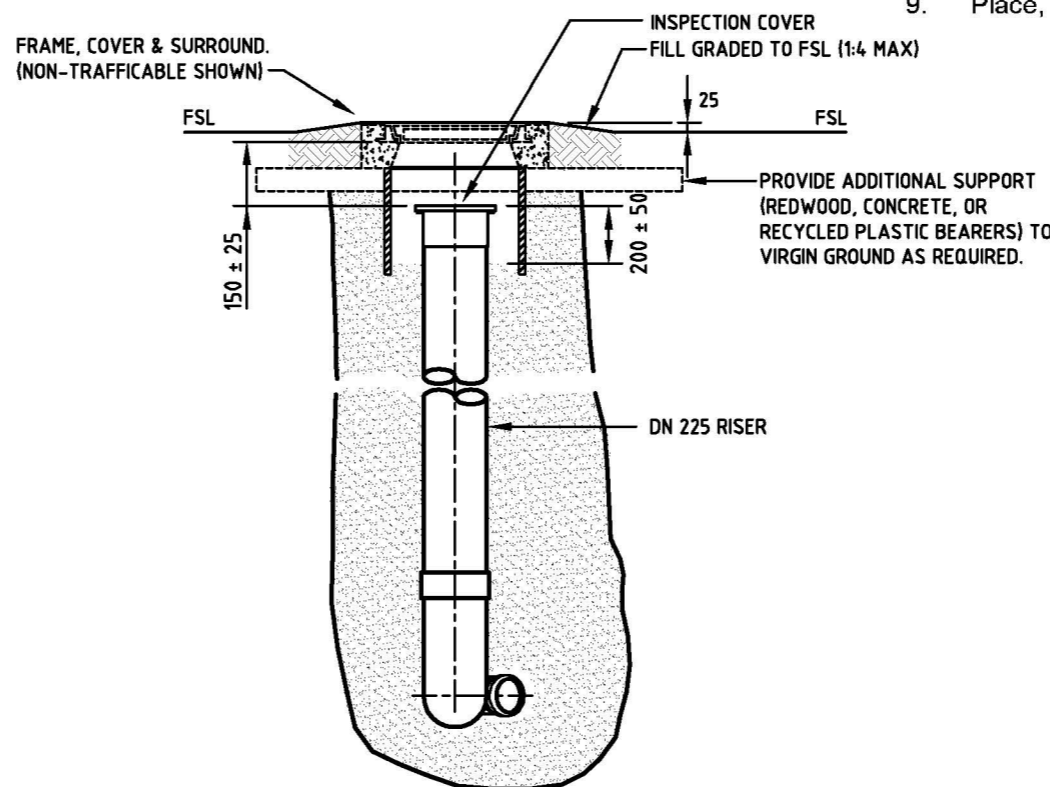
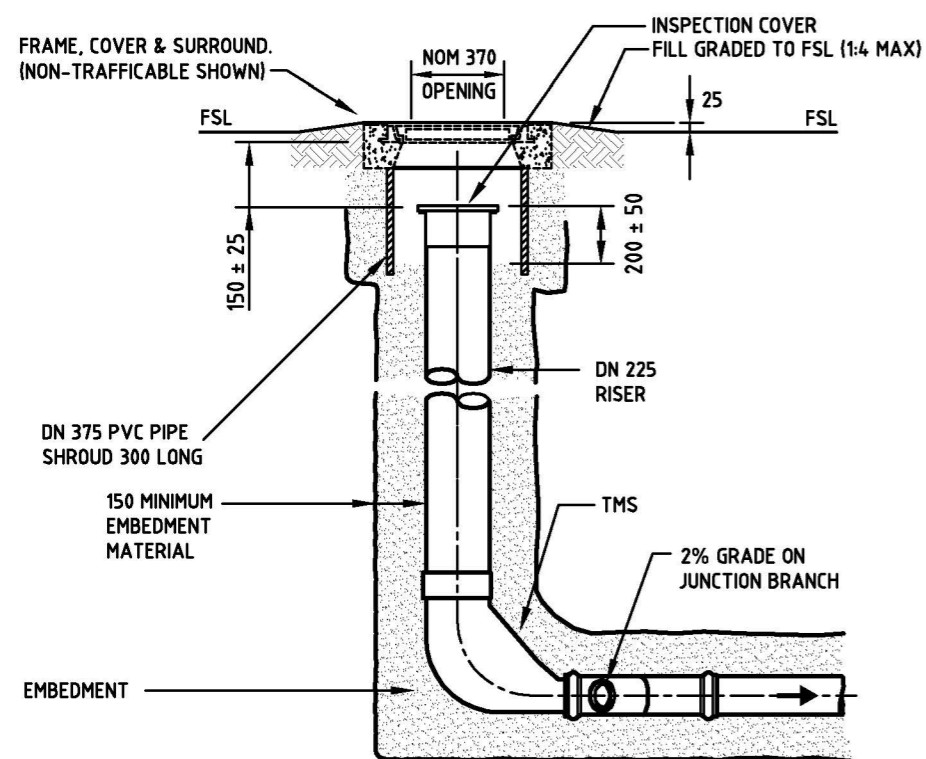
RODDING SHAFT

General

Use either a site-assembled rodding shaft or prefabricated terminal maintenance shaft (TMS) to provide maintenance access to a PCS. If an existing sewer is being extended, a prefabricated TMS shall be installed.

Procedure

1. For rodding shaft option, connect 2 x 45 degree bends (or 1 x 90 degree) to terminal junction. Bends and riser to be same size as PCS.
OR
For TMS option, connect base piece of TMS to terminal junction.
2. Place single size 7 or 10 granular bedding under bend or base piece.
3. Orient rising bend or base piece to ensure riser will be vertical.
4. Place bedding over and around bend or base piece.
5. Connect riser pipe ensuring it is vertical.
6. Place bedding around riser. Ensure bedding material will support cover and surround without settlement.
7. Trim riser as required to achieve specified clearances from inspection cover.
8. Fit inspection cover to riser; fit frame, cover and surround. If DN 225 riser, use arrangement shown for TMS.
9. Place, grade and compact fill material around the cover and surround.



**ALL DIMENSIONS IN MILLIMETRES
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TERMINAL MAINTENANCE SHAFT

MINOR WORKS (SEWER)

NOT TO SCALE

PROPERTY CONNECTION SEWER CONSTRUCT RODDING POINT

MWS - 201

ISSUED: 2015

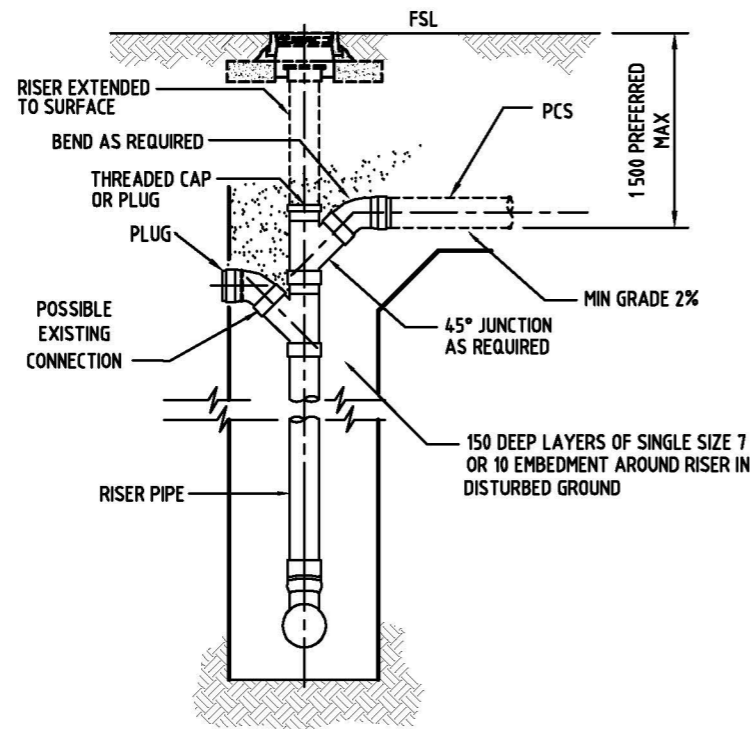
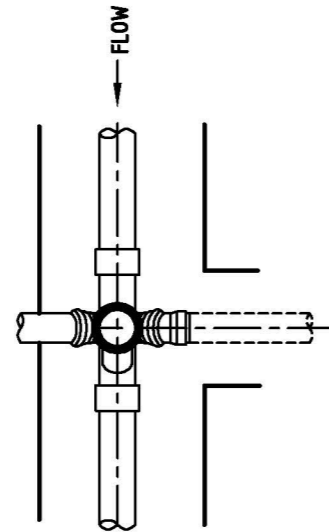
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TYPICAL EXISTING VERTICAL


Investigate Site

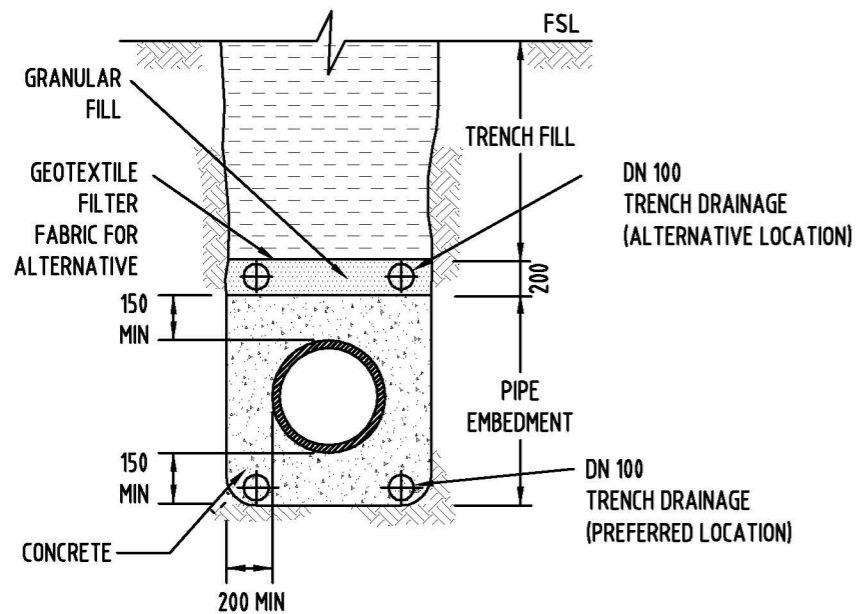
1. Execute Work Instruction "Investigate Site".
2. Obtain Sydney Water approval before connecting a PCS to an existing Vertical on a Sydney Waster sewer (*not permitted if in trafficable area*).

Excavation

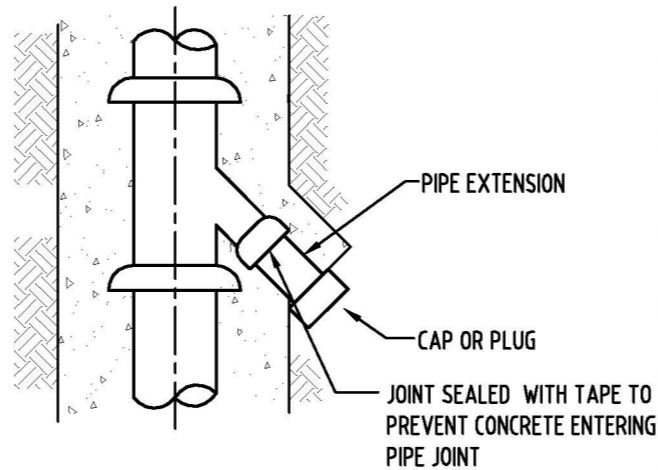
3. If necessary, excavate to locate cap of vertical, junction(s) and any existing CSD.
4. Where riser terminates below ground, extend riser to surface and install surface fittings as for Rodding Point in accordance with Drawing MWS-201.
5. As appropriate, remove junction cap/plug or existing CSD connection.
6. Construct PCS in accordance with Drawings MWS-200 and MWS-201.

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	APPROVED 07.07.05 B. NELSON for MANAGER STRATEGIC ASSET MANAGEMENT	2 GENERAL REVISION H.P. 12.08.15	1 ORIGINAL ISSUE B.N. 07.07.05	LETTER DETAILS OF VERSION / AMENDMENT APP'D DATE				MWS - 202 ISSUED: 2015 VERSION: 2



UN-REINFORCED CONCRETE ENCASEMENT



JUNCTION IN ENCASED SECTION

Investigate Site

1. Execute Work Instruction "Investigate Site".

Excavation

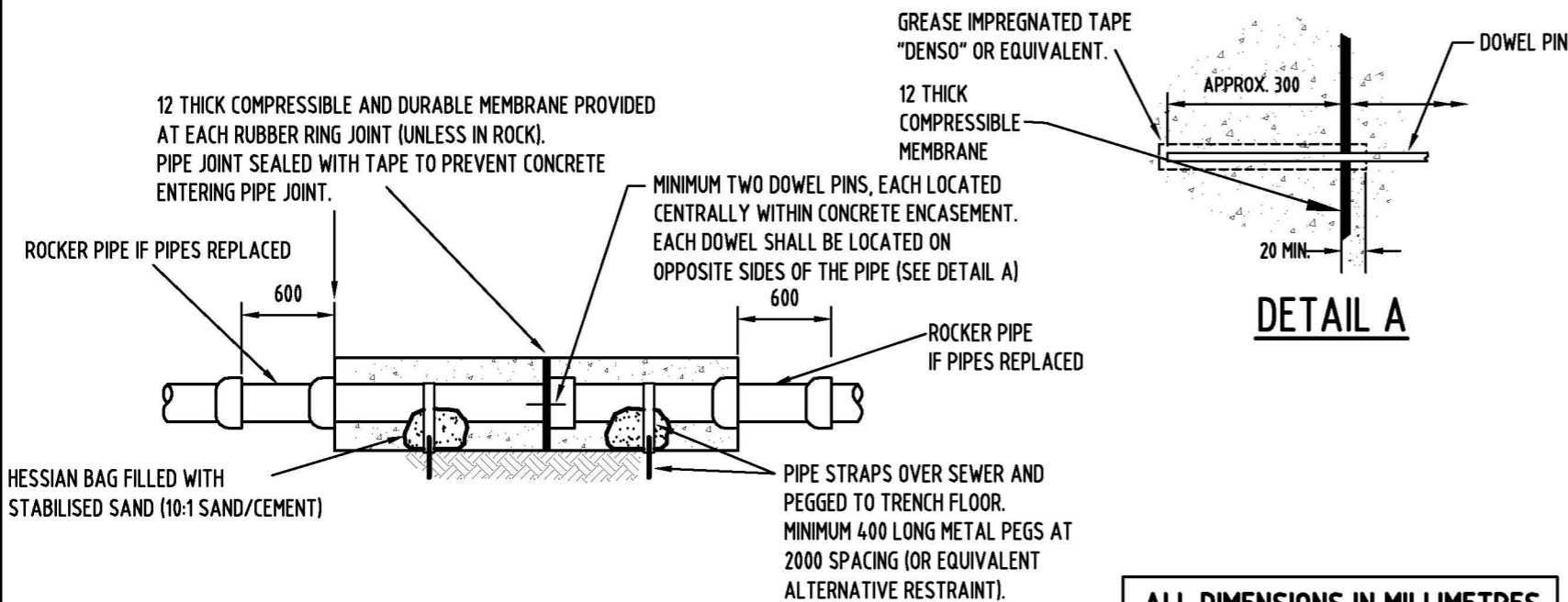
2. Excavate and expose full length of sewer to be encased.
3. Determine if any live and/or disused junctions are within length to be encased.
Do not encase existing junctions without prior Sydney Water approval.
4. Check bearing capacity of trench floor in accordance with Drawing SEW-1200. If allowable bearing is deemed to be <math>< 50 \text{ kPa}</math>, consult WSC or Sydney Water for instruction.
5. If sewer is damaged, either as a result of excavation or other causes, consult WSC or Sydney Water for instruction.
6. Complete excavation under sewer, supporting each excavated pipe on precast concrete support blocks or hessian bags filled with stabilised sand (25:1 sand/cement) placed at 3 m spacing or one under each pipe, whichever is lesser distance.
7. Replace mortar-jointed VC, CI & DI pipes, defective pipes and other pipes as directed by WSC or Sydney Water and in accordance with Work Instruction "Replace Pipe".
8. Unless otherwise authorised, remove junctions and reinstate sewer in accordance with Work Instruction "Replace Pipe".
9. Arrange for WSC or Sydney Water inspection of sewer before concrete encasement.

Pipework Preparation

10. Ensure sewer and trench are free of debris and loose spoil.
11. Where Sydney Water has authorised a junction to remain or to be located in encased sewer, connect a length of pipe to junction. Extend pipe so that its socket (or, alternatively, a coupling at spigot end of a pipe) is located at proposed edge of encasement. Cap extended socket/coupling and wrap in polyethylene prior to placing concrete.
12. Install rocker pipes (if pipes replaced).
13. Place compressible membrane and steel dowels at all encased flexible joints (not required for SCJs).
14. Install support/restraint system to prevent pipe movement/floatation during concrete placement.
15. Install drainage pipe, ensuring both upstream and downstream ends of pipe protrude past concrete encasement into granular embedment. Wrap ends of drainage pipe in geotextile fabric. Where encasement ends within 1000 of a MH, extend encasement to MH. Extend drainage pipe beyond MH to adjoining pipework embedment.

Encasement

16. Use normal class concrete to AS 1379, and min strength Grade 20. Whilst progressively withdrawing pipe supports, place concrete along one side of sewer and vibrate concrete so it flows under sewer to height of haunch on other side.
17. Do not let free fall of concrete exceed 1.6 m and do not permit concrete to impact directly on exposed sewer.
18. Continue to place concrete around sewer from both sides to achieve specified cover. Stop concrete 10 short of face of pipe socket each end. Vibrate concrete.
19. Make work site safe during initial curing period and allow min 24 hours curing before placing and compacting trench fill.
20. Remove any temporary forms without disturbing concrete.
21. Place trench fill material in 300 layers and compact progressively.
22. Restore surface.



SPIGOT/SOCKET JOINT OR SLEEVED COUPLING

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

MINOR WORKS (SEWER)

NOT TO SCALE

CONCRETE ENCASE SEWER

MWS - 300

ISSUED: 2015

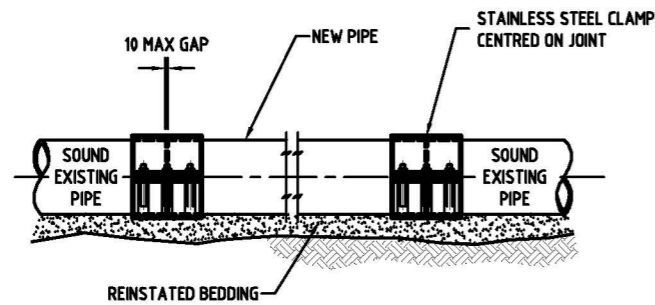
VERSION: 2

Sydney WATER

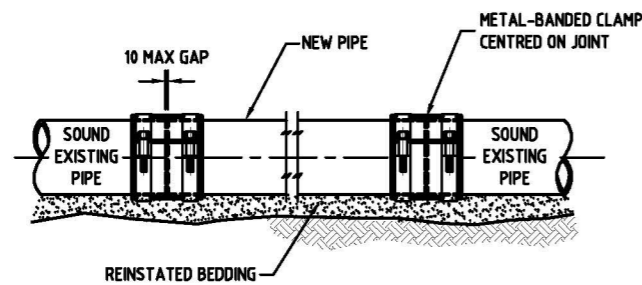
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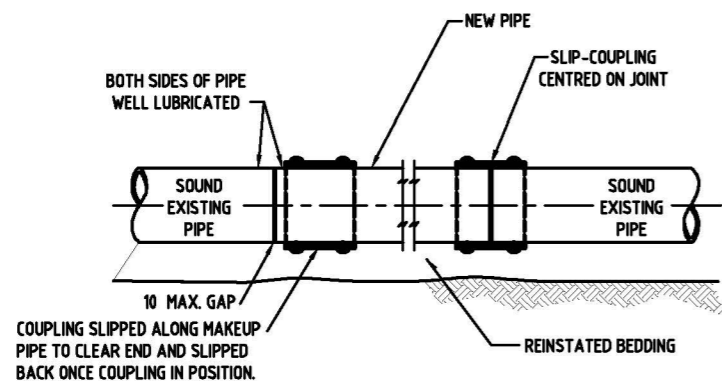
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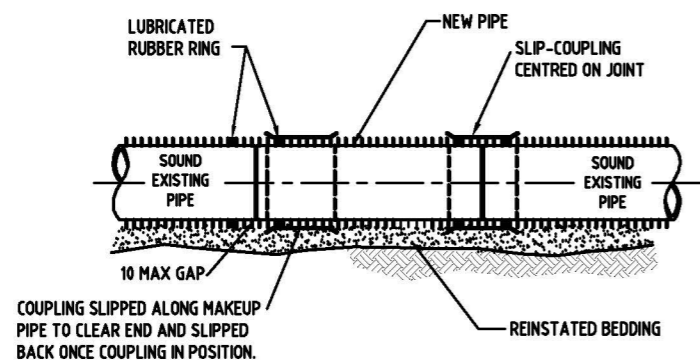
STAINLESS STEEL REPAIR CLAMP METHOD



METAL-BANDED FLEXIBLE COUPLING METHOD



**SLIP-COUPLING METHOD
PLAIN WALL PIPE**



**SLIP-COUPLING METHOD
PROFILED WALL**

**ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SHOWN**

Investigate Site

1. As necessary, execute Work Instruction "Investigate Site".

Excavate and Support Existing Sewer

2. Excavate and expose full length of sewer to be replaced. Achieve min 100 clearance between underside of sewer and trench floor. Support each excavated pipe. At each end of section to be removed, place supports under exposed section of existing sewer not being removed i.e. immediately adjacent to intended cut locations.
3. Ensure proposed cuts are at least 400 from a remaining socket. Cut and remove pipes to be replaced. Clean remaining pipe ends and ensure cut faces are square.
4. Prepare trench floor e.g. remove or trim rock outcrops and treat soft or loose areas. Check bearing capacity of trench floor in accordance with Drawing SEW-1200. If allowable bearing is deemed to be <50 kPa, consult WSC or Sydney Water for instruction regarding special requirements.
5. Compact fill and disturbed areas. Remove debris and water before placing bedding.

For Unlined Sewers

6. Ensure replacement pipes are same material and strength/stiffness class as existing sewer. Exceptions are where VC, CI & DI pipe can be replaced by PVC pipe as part of concrete encasement work. Ensure that internal diameters of existing sewer and replacement pipes match within the following tolerances:
 - ± 8 for DN 150
 - ± 10 for DN 225.
7. Where a coupling is to be used, ensure difference in ODs of replacement pipe and sewer are within coupling manufacturer's limits.

For Lined Sewers

6. Completely fill any gap between the sewer and its liner using an approved epoxy mastic. Measure and record any difference in internal diameters of lined pipe and replacement pipe
7. Where a difference exists in internal diameters, file or grind end of appropriate pipes (at least 3 o'clock to 9 o'clock) to approximately 30 degrees to achieve smooth transition. Use suitable tools to cut and/or grind the pipe/liner. Do not use hammers and chisels.

Note: Consult Sydney Water for instruction if replacement pipes do not meet material, stiffness, strength and/or dimensional requirements e.g. lip of sewer may need to be ground (tapered) or a maintenance structure be constructed at upstream face of encasement, or pipes may need to be replaced from MH to MH.

8. Set replacement pipes to line and grade, ensuring gaps between existing sewer and replacement pipes are ≤ 10.
9. Thoroughly clean surfaces of pipes before installing clamps or couplings. Connect pipes by means of flexible couplings centred over each joint.
10. Unless pipes to be concrete encased (refer Drawing MWS-300), complete pipe embedment.
11. Place trench fill material in 300 layers and compact progressively.
12. Restore surface.
13. For lined sewers, advise Sydney Water in writing of:
 - type of lining found
 - location, length, material and stiffness of replacement pipes inserted into sewer
 - difference in internal diameters of lined sewer and replacement pipes.

RECOMMENDED R. RIZZI for MANAGER WASTEWATER SYSTEMS					
APPROVED 07.07.05 B. NELSON for MANAGER STRATEGIC ASSET MANAGEMENT	2	GENERAL REVISION	H.P.	12.08.15	
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MINOR WORKS (SEWER)

NOT TO SCALE

REPLACE PIPE

MWS - 400

ISSUED: 2015

VERSION: 2