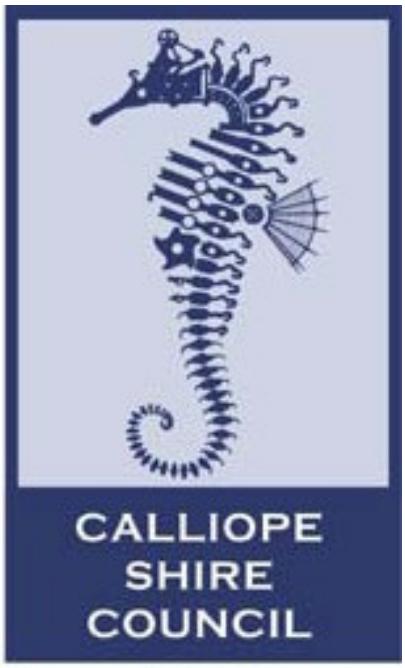
ENGINEERING AND DEVELOPMENT GUIDELINES



WATER SUPPLY STANDARD

June 2006

Incorporates the WSAA "Water Supply Code of Australia" (2002)

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WATER RETICULATION STANDARD

These standards apply to the design and construction of water reticulation works for new development within Calliope Shire and Gladstone City.

The Water Services Association of Australia's "*Water Supply Code of Australia*" - 2002 (WSCOA) forms a part of and is to be read as one with this Standard. This Standard gives the provisions required by Council over and above the "*Water Supply Code of Australia"* and some guidance in the use of the code. This "*Water Supply Code of Australia"* is now being adopted as default IPA code by the Queensland Government. The code can be obtained from the following sources:

Water Services Association of Australia
469 Latrobe Street
Melbourne Victoria 3000

Standards Australia
1 the Crescent
Homebush NSW 2140

This standard outlines Council's current requirements in relation to the provision of water reticulation works and departures from these requirements will only be permitted with the prior agreement of Council.

The distribution of this Standard does not limit Council's authority to impose additional or alternative requirements, if such requirements are warranted having regard to the particular circumstances of a subdivision and good engineering practice.

Where Australian Standards, By-laws, manufacturer's recommendations, or other publications are referred to in these guidelines, the latest revision of such documents shall be used.

Council has produced this standard to simplify the documentation of water reticulation projects. Standards from other authorities will not be accepted where a Council standard is available. Standard drawings have been produced to compliment these standards, a copy of which is available from the respective Council's Offices. Consulting Engineers and Civil contractors should obtain a copy this water supply standard.

Any request for an alternative proposal to the requirements of this Standard must be made in writing to the Manager Water Services. This request must state the reasons and benefits of the alternative arrangement. Capital cost savings alone is not considered a suitable reason. Any approval for alternatives will only be permitted following the written confirmation of acceptance of the alternative.

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DESIGN

1 GENERAL

The design and construction of water supply infrastructure will generally be in accordance with the Water Services Association of Australia's "*Water Supply Code of Australia*" (WSCOA) and the relevant Australian Standards, as amended by this Standard and standard drawings which take precedence over the WSCOA. The Department of Natural Resources and Mines' "Planning Guidelines for Water Supply and Sewerage" (March 2005) may be referenced by Council from time to time.

Construction of "domestic" water infrastructure will require considerable reference to this standard as this is the predominant type of mains laid. The configuration of larger reticulation mains is expected to follow the WSCOA more closely.

In order of preference of compliance, water reticulation systems shall be provided in accordance with the following documents and their priority:

1. Water Supply Standard 2004

2. WSCOA

3. Component manufacturer's specifications.

Only where a specific item is not covered in the previous document, shall the next document be referred to.

Where uncertainty exists due to conflict between these documents, Council advice should be sought. Any deviation from these specifications shall only be permitted with approval of the relevant Water System Manager. Other requirements may be prescribed in the conditions of the Development Permit for the development. These should be included in the check list of any quality system for development works.

Where this document refers to a drawing WAT-XXXX, it is referring to specific a drawing in WSCOA.

1.1 OBJECTIVES OF WATER RETICULATION WORKS

The objectives of water supply construction in both Councils is to provide a ***high quality***, ***low maintenance***, ***minimal water loss*** system produced to a ***high level of workmanship*** which will provide the rate payers with an efficient system which requires a minimum of stores inventory for repair works.

1.2 WATER AGENCY

The Water Agency for water reticulation works within the Calliope Shire is the Calliope Shire Council and within Gladstone City Council is Gladstone City Council.

1.3 RETICULATION SYSTEMS

Council has town pressure reticulation systems in the larger centres with Master Plans guiding the direction of new reticulation systems. Each system will have a service level for which water supply is guaranteed. The minimum and maximum mains pressure for residential zones is 250kPa and 800kPa respectively. The minimum and maximum mains pressure for industrial/commercial properties is 320 kPa and 800 kPa respectively.

In some designated rural areas, Calliope Shire Council may consider constant flow water reticulation systems. The requirements for the constant flow system are somewhat different to the full mains pressure systems and as such Council will generally determine the design of the network. Constant flow systems do not have fire fighting capability.

Gladstone City Council does not permit the use of Trickle Flow Systems.

1.4 PERSONNEL QUALIFICATIONS

Design of Water Reticulation is required to be undertaken by Engineers who hold a current Registration Certificate as a Registered Professional Engineer of Queensland, Area: Civil.

The engineer must be experienced in the design of Water Reticulation.

All submitted plans must be appropriately 'signed off' by the designing and certifying engineer and contain the RPEQ number of the certifying engineer.

2 DESIGN OF LOCALISED NETWORK

Council will have already analysed most of the localised water supply network for the developed areas of Council and has prepared a "Master Plan / Water Supply Planning Report" for water reticulation indicating pipe sizes and connections which will be required at particular locations in order to provide a satisfactory standard of service to the community.

Fire flows of 15l/s for residential areas and 30l/s for commercial/industrial areas will be required to be sustained in the pipe network analysis. Additional requirements may be required within the network to comply with fire flows required in accordance with the building regulations for high density commercial/industrial development.

Developers may be eligible for "over-sizing payments" where larger water mains are required through a development which are significantly larger than determined by the demand of the development. Mains over 150mm diameter may be eligible for oversize payments. From recent modelling results, it is generally expected that the minimum size of mains will be 150mm diameter, in order to achieve fire fighting flows.

Where a development incorporates a staging process, a Consulting Engineer shall submit a Master Plan of the water reticulation showing proposed main sizes, connections to existing mains and valve positions. The Master Plan will be supported by a computer network analysis, undertaken utilising approved software.

Council generally requires a looped network with at least two separate supply mains into each residential, commercial or industrial estate. Designers should aim to achieve this requirement wherever possible when preparing the Master Plan. In the case of a staged development, each stage must facilitate the two feed looping for future stages.

Water reticulation mains shall be a minimum size of 100mm diameter in residential developments and 150mm diameter in commercial, industrial, and high density residential developments. Commercial and industrial developments shall be provided with a main on each side of the road reserve to eliminate the requirement for service crossings.

Trickle feed systems at the end of a line with long lengths of mains between services may use a smaller main size to reduce the time as approved by CSC.

Supply mains of 250mm diameter and larger shall be classed a trunk mains and no service connections shall be permitted on these mains. A smaller diameter reticulation main shall be provided parallel to trunk mains where required to provide house supply services.

The Master Plan is to be submitted prior to, or at the same time as, submission of engineering drawings for the first stage of works. If at any time during the progress of the development, variations to Lot Layout, road alignment or other reasons affect the development to the extent that the original Master Plan ceases to become accurate, a revised Master Plan is to be submitted.

Cul-de-sac water mains are required to be installed as per the requirements of the standard drawing (WDS-05). This follows the requirements of the layout as per section 4.1.4 Cul-de-sacs and cul-de-sac roads.

2.1 PREFERRED MAIN SIZES

Preferred pipe sizes are 100mm, 150mm, 200mm 250mm and 300mm. Mains of 225mm diameter are not acceptable, as these are permissible only for sewerage rising mains. Section 2.3.1.1 of WSCOA with respect to minimum sizes applies.

For the minimum class of pipe and fittings to be used, please refer to “Materials” Sections 1 to 4.

2.2 ENVIRONMENTAL CONTROLS

Where the installation of water facilities involves the disturbance of soil, a stormwater management plan will be required to be submitted as a part of the works showing how erosion and sedimentation from the construction will be controlled from breaking the earth, to stockpile control to restoration of disturbed, susceptible or loose ground.

3 DESIGN OF DISTRIBUTION WORKS

Unless otherwise agreed, Council will provide the concept plan for the distribution network.

Peak flow parameters shall be as supplied by Council based on the characteristics of the water reticulation system being designed for. Where peak flows are not known for a particular use, Table 2.1 of the WSCOA can be used in consultation with Council.

Fire fighting demand shall be included in the analysis simultaneously with the maximum demand and the maximum day flows for urban and commercial areas. Fire fighting flows to be analysed are as follows:

Urban 15 litres/sec, 2 hours

Commercial 30 litres/sec, 4 hours

For high density or integrated urban development, higher fire fighting flows will be required by Council. In this case, the fire fighting requirements will need to be negotiated through an approved fire safety engineering brief in accordance with the "Fire Safety Engineering Guidelines" (ABCB 2001).

For information on pressure zones, storage design, pump stations, and pressure criteria, please consult with Council staff.

4 PIPELINE DESIGN

4.1 LOCATION AND ALIGNMENT

Water mains shall be located within existing or proposed road reserves, preferably on the opposite side to electricity and telecommunication services, and shall run parallel to the front property boundary on an alignment determined by the Std Drawings of the Roads and Transport Standard. The alignment at the time of publication is 1.5 metres from the property boundary.

Trunk mains (250mm diameter and larger) shall be constructed on an alignment 4.8 metres from and parallel to the property boundary. If the verge width forces the main into the road carriageway, the designer should consult with Council with respect to variations of service alignments and road ways within road reserves, consider a wider road reserve, or another variation which must be approved by Council. Trunk mains must be located to minimise damage by flooding should a main break (ie located on the uphill verge of the road).

The network configuration of water mains should be a ring main with interconnecting branches where practical. Council's preferred configurations for water mains in order of preference are as per Figure 4.3 of WSCOA.

4.1.1 Shared Trenches

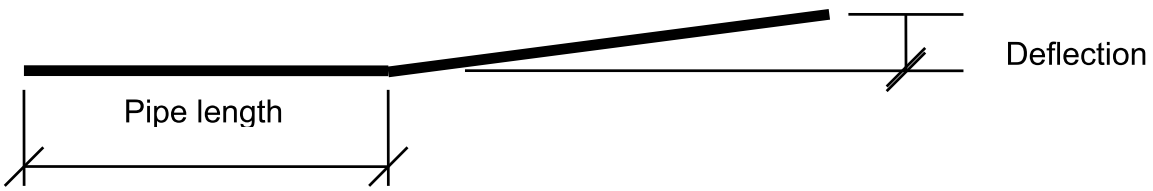
Water assets are not permitted to be installed in shared trenches.

4.1.2 Bends and Curves

If the radius of curvature of the property alignment adjacent to the main is less than 60 metres, *bends* of an appropriate angle shall be used at changes in direction of the property boundary to maintain the required offset for the water main from the property boundary.

If the radius of curvature of the property alignment is greater than 60 metres, a maximum joint deflection of 80% of manufacturer's specification may be used to allow the water main to generally remain on the required alignment. Shorter 4m lengths of pipe may be used to achieve this.

Flexing, curving, or bending of the pipe itself, joint deflections in excess of manufacturer's specifications, or the use of lengths of pipe shorter than 4m shall not be permitted as a substitute for bends.



Bending or curving of the pipe is prohibited as tapping bands cannot achieve a proper seal with the installation on curved pipes. Where the change in angle of the front boundary of the property is more than 5 degrees, bends shall be used at each change of direction of the boundary. This keeps the water main close to the correct alignment.

Pipe lengths of 4 and 6 metre are only to be used.

The angle and specification of all bends must be specified on the project drawings.

4.1.3 Intersections

Tee-junctions shall be used for branching pipes. Water mains crossing road intersections shall run in a straight line between the 1.5 metre alignments on either side of the road at the start of the truncation.

Branches at intersections shall be arranged so that the tee-junction is not located directly under the kerb line.

Class 35 DICL pipe must be utilised under kerbs and road pavements. This must extend a minimum of 0.5 metres behind the kerb into the footpath area.

4.1.4 Cul-de-sacs and cul-de-sac roads.

Bends of an appropriate angle shall be used at each change in direction of the property boundary.

A major problem with keeping proper sterilisation in water mains is the retention times are too great in the mains to keep pace with the degradation of the sterilising agent (generally chlorine). This generally occurs in the dead ends of a water main which are located at the end of culs-de-sac. Therefore, the design of the cul-de-sac must reflect the arrangement of mains as shown in figure 4.3 WSCOA (below), and the standard drawing WDS-05.

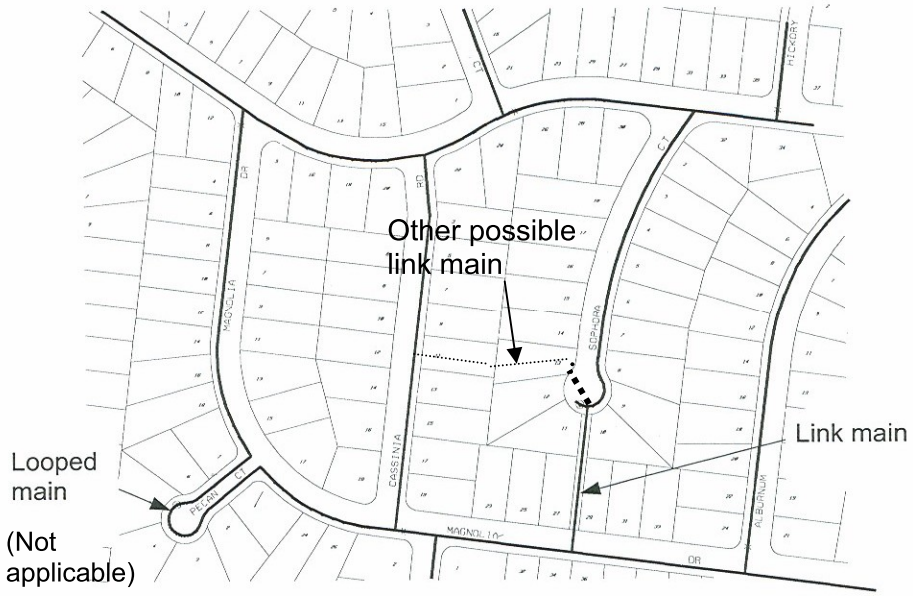


FIGURE 4.3 LOOPED AND LINK MAINS

A link main in accordance with FIGURE 4.3 is preferable where there is a high likelihood of connecting to a future Council main in an approved development layout or it is practical to connect to an existing Council main. The link main is preferably straight on from the end of the cul-de-sac, but may be to an adjoining main to an adjoining parallel cul-de-sac road. These links should be identified in the conceptual design stage of the development, such that loops are provided to as many cul-de-sac mains as possible.

Where a connection to a future main is required, the water main shall finish in the cul-de-sac with a tee and valve installed for future connection and a legal right of way (easement or reserve) 4.0 metres wide provided through the adjoining allotment in the direction of the future main within the subject land.

Where a link main is not practical the water main shall extend around the cul-de-sac head and reconnect onto the water main at the neck of the cul-de-sac forming a loop.

With the number of bends involved, surveyors maybe advised to rationalise the number of changes in direction of the property boundary around the head of the cul-de-sac and use angles to suit commonly available “off the shelf” bends.

4.2 HYDRAULIC DESIGN

As part of the Water Authority's responsibilities for management of the water reticulation network, a network analysis (model) of the water reticulation network is prepared to form the basis for the "Master Plans" or "Water Supply Planning Reports" for the reticulated areas of the Councils.

Where the land use or population density for the development is as assumed in the model and the Water Authority has a network analysis model available, hydraulic design of the water reticulation system will not be required (as per Section 2.2 of the WSCOA) unless specified by Council. The water mains in this case must be as per the diameters and configuration adopted in the model.

The proposed water reticulation system for areas outside of the modelled network area must be modelled to establish that the development provides an appropriate level of service to its residents and maintains an appropriate level of service to the existing network from which it draws from.

To save time and money, consultants may request permission from Council to utilise an existing network model (if available) which may be altered to model the existing and proposed network and establish measures required to provide the appropriate level of service to both networks. This work must be run by Council at cost to the developer.

4.3 STRUCTURAL DESIGN

The designing engineer should consider the parameters as set out in Section 5 of WSCOA with respect to loading and geotechnical in the specification of the pipeline.

For ease of maintenance and reduction of stores and repair crew inventories, Council requires that PVC, Series 2 pipe with a minimum class 16 rating be used, unless:

- according to the appropriate standards, the application of the pipe requires a different type or greater pressure class be used; or
- Ductile Iron Cement lined pipe is being used under the roads; or
- Polyethylene pipe is used in Calliope's constant flow water system.

The PVC pipe used must comply with WSAA's 10 000 stiffness rating.

4.3.1 Embedment & Cover

Water mains of 200mm diameter or less shall have a minimum cover of 750mm under roadways and kerbs, and 600mm elsewhere. During the construction of a road, a minimum of 600mm cover to subgrade is required such that construction loadings do not detrimentally affect the pipe. Acceptable tolerances in the depth of cover over the pipe may be from 0mm to +200mmm from the above depths. Trunk mains require 1200mm cover in all locations. Embedment shall be generally in accordance with WAT-1201 and Council Standard Drawings. Details shall be provided with the design drawings where the depth of water main will be varied to suit other services or impediments.

Embedment material (bedding sand) with a depth greater than 200mm shall be placed above the pipe in all instances.

4.3.2 Pipe Anchorage

Thrust blocks shall be installed at all horizontal and vertical changes in direction of the water flow in the pipe.

Thrust blocks for hydrants and valves and vertical bends shall be designed in accordance with WAT-1207.

Anchor/Thrust blocks for tees, reducers and horizontal bends shall be designed in accordance with WAT-1205. Restrained joint systems shall be designed in accordance with WAT – 1208. The use of this system must be appropriately marked on plans and in ground.

4.3.3 Bulkheads And Trench Stops

Trench stops are usually not required by Council in the construction of water mains, however, pipes on grades steeper than 15% will require the installation of the bulkheads as per WCOA standard drawing WAT-1209.

4.4 OPERATIONAL FACILITIES (RESERVIORS, PUMPS ETC)

Service storages and pumping stations are often included in the developer contributions (ie headworks PIPS etc) depending on the size and location of the development.

For large developments outside of the water service area, these facilities will most likely be provided at full cost to the developer unless some agreement is arranged with the Council. Water quality could also be a consideration for remote developments, with measures required to be provided to ensure correct levels of disinfection in the mains.

4.4.1 Pumping Stations

Pumping stations should be generally avoided and the system designed to operate under gravity where possible. Pump stations are only permitted for pumping to reservoirs through trunk mains. Council does not permit the pressurising of mains by pump stations to directly service allotments in lieu of providing a reservoir.

4.4.2 Service Storage

The size and location of service storages will be determined by Council within the water service area from the network analysis and the Master Plan. For large developments outside of the water service area, the provision of such facilities must be in close consultation with Council.

4.4.3 Provision of Pumping Stations and Service Storage by the Developer

Council has no written standard for the design and construction of service storages or pumping stations as they are rare in communities of this size and mostly constructed by Council.

The design of any such facility will need to be carried out in close consultation with the Council such that the maintenance and operation of such facilities minimises operating costs and easily fit within the Council's maintenance and service regimes.

The Developer may appoint a Consulting Engineer with experience and qualifications acceptable to Council to design the pump station in close consultation with Council, or request Council provide a quotation to design the pumping station at the expense of the Developer in consultation with the Developer's Consulting Engineer.

4.5 OBSTRUCTIONS AND CLEARANCES TO MAINS

All underground obstructions and services and surface obstructions and structures along the proposed water main route must be treated in accordance with Section 4.10 of the WSCOA in the design and construction phase of the project.

Table 4.1 of the WSCOA outlines the clearances between water mains and under ground services. Lesser clearances will be considered based on the mitigation of influence and effects the service has on the water main and vice versa. Where water mains are to deviate around the other structure, the use of bends shall be strictly enforced. Joint deflect is not permitted.

The influence of the main on the zone of influence of the footing of an adjoining building and vice versa must be considered in accordance with Section 4.10.4 of the WSCOA.

4.6 WATER QUALITY

Drinking water supply systems should be designed to maintain water quality in accordance with the "*Australian Drinking Water Guidelines*" by the incorporation of loop mains, measures for easy flushing of mains and minimisation of dead ends.

4.7 VALVES AND HYDRANTS

Valves and hydrants must be provided in accordance with the following sections. Other types of valves may be required for the functioning of the network as specified by the Water Authority.

4.7.1 Service Valves

Two valves shall be provided at every tee-junction to allow either branch to be isolated independently of the other. Valves shall be located within the footpath and if possible, in line with property boundaries. Council in certain situations may require more than two valves at a junction.

Council shall be consulted to identify the mains at the junction on which the valves shall be located. This will be based on the optimum situation for minimising disruptions to customers during maintenance activities.

All valves should be *anticlockwise* closing with a resilient seat, refer "Materials" section of this standard for more details of valves.

Valve covers shall be in accordance with WAT-1304, Type H1

Spacing of valves on straight runs of water mains should be as per Table 6.1 of WSCOA reproduced as follows:

WSCOA - Table 6.1 Stop Valve Spacing Criteria

Water main size DN (mm)	Number of property service connections (Nominal)	Maximum valve spacing (metres)
≤150	40	300*
200-300	100	750

375	150	1000

* in Rural areas, the maximum spacing is 500 metres.

4.7.2 Fire Hydrants

Hydrants must be installed in all full pressure service reticulation systems. Hydrants must **not** be installed on **constant flow** reticulation systems – Refer Air Valves and Scours following.

Council uses 80mm spring hydrants with the standard claw type head suitable for attachment of a hydrant stand pipe. A hydrant shall be provided at the end of every water main (dia>100mm DN), at least 2 metres beyond the last tapping point, to allow for flushing of the water main. The top of the hydrant box shall be painted safety yellow with glass beads embedded in the paint while it is fresh.

Hydrants must be located at the highest (to release air) and the lowest point on the main where scour valves are not installed. Otherwise hydrants must be located in line with side boundaries of a lot and not more than 80 metres apart. A hydrant must be located within 10 metres of an intersection.

Where the end of the water line is permanent, a duck foot bend hydrant shall be used.

Hydrant covers shall be in accordance with WAT-1306, Type H2.

4.7.3 Raised Pavement Markers for Valves and Hydrants

Raised pavement markers must be installed in accordance to indicate the location of hydrants (blue) and the location of valves (orange). For roads with two way traffic, the marker must be located 100mm from the centre of the road on the side of the road where the hydrant is located.

Raised Pavement Markers shall be fixed to the road using a Urethane based adhesive such as RS 2000 or equivalent. Two applications are required for chip seal roads, the first sealing the voids in the road surface and the second to hold the marker. Epoxies such as “Megapoxy 36, Hilti 268, and Degadur 450” are also acceptable.

For details of using raised pavement markers on multiple lane roads or roads with line marking, refer Section 4.4 of the Department of Main Roads’ “Traffic Engineering Manual” book 2 for location of markers.

4.7.4 Marker Posts

Marker posts shall be provided for hydrants and valves only in areas where reflective markers cannot be installed i.e. gravel roads etc. The posts shall be located between 100mm and 200mm from the boundary directly behind the hydrant or valve, preferably located and orientated at 90 degrees to the kerb. (Refer Council’s Standard Drawing WDS-02 for details)

4.7.5 Air Valves And Scour Valves

Air valves and scour valves are required on constant flow mains and on any trunk mains to be installed at high and low points respectively.

For details of air valves and scour valves for rural/constant flow systems refer Calliope Shire Council Standard Drawing WDS-03. Air valves at the end of the line are specifically designed to accommodate maintenance such as scouring.

Air valves must be of 'vent-o-mat' type valve or other approved equivalent.

Scours should discharge to a readily observable and water tolerant location such as a headwall or grated pit, and so as not to cause adverse affects to private properties. ie flooding

4.8 WATER SERVICE CONDUITS

Water service conduits shall be provided by the developer as necessary to ensure supply allotments on the opposite side of the road to the water main, and shall be located at alternate boundaries to electricity and telecommunication service conduit crossings.

Water service conduits in *full pressure service* areas shall be aligned so that they intersect the kerb line at the projection of the property boundary. Water service conduits must not run at an angle less than 60° to the road centre line. Refer relevant Council road standard drawing for details.

All parks, open spaces, etc. shall be provided with a water service conduit in situations where a water main is not adjacent to a park boundary. All grassed medians and traffic islands shall also be provided with a water service conduit.

The location of these conduits shall have regard for the economical installation of future irrigation watering systems, e.g. conduits to be located near to middle of medians, not at either end. Long medians may require the provision of two (2) or more water service conduits.

Water Service conduits shall be capped to prevent blockage by soil, pests and other material via a screw cap whilst there is no service pipe through the conduit, and via expansion foam after the service pipe is installed. The water service is to be located in the middle of the foam.

For developments with a constant flow service (Calliope Shire Council only – Beecher area), water service conduits shall be provided perpendicular to the road in line with the property boundary on the opposite side of the road to the water main. Because of the length of frontage and the practicality of providing a conduit in close proximity to the point of connection, a conduit is required at every boundary. The water service conduit is also taken to within 4.0 metres of the boundary on each side of the road with each end marked with a post. For further details refer to the "Water Service Detail – Rural" in Council's road standard drawings.

4.9 SERVICE CONNECTIONS TO MAINS – GLADSTONE CITY

Gladstone City Council does not permit service connections to existing water mains to be installed by contractor. Water service conduits in development works though shall be provided by the developer.

4.9.1 Tapping Bands

Tapping bands/saddles shall only be installed by Council unless permission is granted in writing from Council.

4.9.2 Commercial Developments Services

Hydraulic consultants are required to provide details of the proposed connection. i.e. proposed location, size, arrangement of fire and potable supply.

4.9.3 Commercial water connections

Service connections to existing water mains shall be carried out only by Council, at the developers cost.

4.10 SERVICE CONNECTIONS TO MAINS – CALLIOPE SHIRE

Calliope Shire Council requires water service lines to be installed to each property boundary in accordance with the following table:

Land Use	Water Service by
Residential, Rural Residential, and the constant flow scheme	Developer
Non-Residential Water Service Areas such as Industrial and commercial	Council

The service connection includes the installation of tapping bands, ferrule's, service pipe and associated fittings to a point of threaded plugs (part 12) within the property boundary. Council will connect the meters at a later point in time.

The ferrule cock shall be installed and left in the open position for pressure testing and on maintenance.

4.10.1 Tapping Bands

Where required to be installed, a single tapping band with a 40mm nominal bore outlet is required to be installed. Each tapping is required to service no more than two properties via the branching of the service pipe.

The tapping band is to be installed with the outlet vertical and located within 0.5m of adjoining property side boundaries.

In constant flow developments, a tapping band is allowable for air valves as shown on Council standard drawing WDS-03. Tapping bands in constant flow areas must be for 20mm diameter service lines.

4.10.2 Pipe

The service pipe must be installed perpendicular to front property boundary.

Service pipe is to extend 300mm into each property, at 0.5m offset. At the termination of the service pipe, the pipe is to be 450mm deep, and completely backfilled with bedding sand to natural surface.

In constant flow systems, all pipe work is to be 25mm poly.

4.10.3 Water Service Fittings

All service fittings are to be as represented in drawing WDS – 06. In constant flow areas fittings are to be sized suitable for 25mm OD poly pipe.

4.10.4 Non-Residential Water Service Connections

For any non residential water service connection, hydraulic consultants are required to provide details to Water Services of the proposed connection. i.e. proposed location, size, arrangement of fire and potable supply, adequacy of supply mains.

Non-residential service connections to existing water mains shall be carried out only by Council, at the developers cost.

4.11 METERING PITS

Metering pits maybe required at key points in the network to enable Council to audit its water losses in the system. This usually will occur in the constant flow networks. Details of these pits are available from Council when requested.

4.12 ZONE METERS

Any zoned meter in a constant flow area shall be a battery operated 'magflow' meter of an approved type. This meter shall be sized 1 increment smaller than the joining pipe size.

Zoned meters in the full reticulation areas shall be run via grid power and connected into Council's telemetry system. The locations and actual arrangement of the connection shall be provided by Council.

4.13 PRESSURE ZONES

Council may require the creation of a pressure zone area. Where these zones are required the specifications of the infrastructure shall be provided by Council.

The creation of the pressure zone, will usually involve a district metering zone, and will be at the cost of the developer.

5 DRAWINGS

Project drawings are required to be prepared for the construction of water mains in accordance with the following sections of the standard.

5.1 GENERAL REQUIREMENTS

Plans should include the following: Title block, locality plan, Layout and stage plan, and layout plan of reticulation network.

5.1.1 Title blocks

Title blocks should include:

Estate name (if any)

Real property description

Locality

Developer's name

Scales & bar scales

Plan number and sheet number

Schedule and date of amendments

Signed design certification by a Registered Professional Engineer, Queensland (Civil)

Street names

5.1.2 Layout Plans

Layout plans for large subdivisions, the layout plan should show the relationship of all new roads to each other, and to existing roads adjoining the subdivision. Where an external catchment would be serviced by gravity mains into this subdivision the boundaries and area of the catchment shall be shown on one of the layout plans. Where development is to be carried out by stages, the boundaries of proposed Stages should be shown on this plan, and the stages identified by numbering. The plan of each water main shall include:-

Road reserve boundaries

Allotment boundaries, both existing and proposed

Location of all existing and proposed services

Location of all existing and proposed water lines, valves and hydrant locations.

Kerb lines or edge of pavement where no kerb exists

Main sizes, pipe type and class, bend location and angles.

These plans shall follow the examples of WAT-1100 and WAT-1101. It should be noted that these are samples of drawing standards and not of reticulation systems, as the mains should be looped in accordance with this standard.

5.1.3 "As Constructed" Information

"As constructed" information shall be supplied as per the requirements of the appropriate section of Council's "Engineering and Development Guidelines".

MATERIALS

Because Calliope and Gladstone Councils are reasonably removed from the major population centres of Brisbane, the types of materials utilised in water reticulation mains shall be limited such that the availability of spares is maximised and the inventory of spares carried by respective repair crews and Council stores is minimised. Therefore the following materials are recommended.

Where material specifications are not covered by the Council standard, the general principles of the WSCOA apply.

6 PIPES

100mm to 250mm diameter (inclusive) –

To be constructed in:

i) uPVC - AS/NZS 1477-1999, Series 2 PN16 rubber ring joint;

ii) PVC-M - AS/NZS 4765 (Int) 2000, Series 2 PN 16 rubber ring joint;

iii) OPVC - AS/NZS 4441 (Int) 1996, Series 2 PN Class 16 rubber ring joint;

iv) DICL – AS/NZS 2280 - 2004, PN35 rubber ring joint pipe, polyethylene wrapped AS 3680 - 1989.

Above 300mm diameter

To be constructed in:

i) DICL – AS/NZS 2280 - 2004, PN35 rubber ring joint pipe, polyethylene wrapped AS 3680 - 1989;

ii) MSCL (AS1594) fusion bonded low density polyethylene coating (AS2518).

Below 100mm diameter

To be constructed in:

i) PE100 (AS/NZS 4130 & WSA 01) PN16, blue lined.

7 VALVES

Valves shall be PN 16 or better, with spigot or socket joints and shall be anti-clockwise closing. Valves must be fully coated internally and externally with thermo-bonded polymeric coatings in accordance with AS4158 (rilsan nylon 11 or similar approved coating) and fully wrapped in appropriate plastic sleeving. Valves shall be fitted with fully encapsulated rubber sealing wedges and o-ring seals, complying to AS 2638.2 - 2002. Stainless steel (316 grade) bolts and fittings will be used where steel fixings are used. For general details of valve installations refer to the joint standard drawing WDS-02.

The shroud ring support shall be pre-manufactured base plate 400mm square, supporting a 225DN pipe riser.

The base plate shall be manufactured from Ductile Iron / ABS.

8 HYDRANTS

Hydrant tees shall have socket joints. Hydrants shall be 80mm diameter spring hydrants fully coated internally and externally with thermo-bonded polymeric coatings in accordance with AS4158 (rilsan nylon 11 or similar approved coating), and fully wrapped where in contact with the soil in appropriate plastic sleeving. All hydrants shall suit a 100DN Tee or riser. Valve and hydrant boxes shall be in accordance with WAT-1304 & WAT-1306 (see Standard drawing table). All hydrants to be supplied with coated metal caps to suppress dirt from the ball seal. For general details of Hydrant installations refer to the joint standard drawing WDS-02.

The riser support shall be pre-manufactured base plate 400mm square, supporting a 225DN pipe riser. The base plate shall be manufactured from Ductile Iron / ABS.

9 FITTINGS

All socketed fittings, shall be the elongated (extended barrel) type ie. griptite/nortite or equivalent, suitable for uPVC applications.

Gibault joints shall also be the elongated (extended barrel) type.

All nuts, bolts and washers shall be Grade 316 Stainless Steel installed with nickel anti-seize grease or equivalent applied to the threads prior to assembly.

All fittings shall be fusion bonded polyethylene (FBE) coated ductile iron, complying with AS/NZS 2280 (2004) and AS/NZS 2518. All ductile iron fittings shall be sleeved in plastic as per the Manufacturers specifications and Australian Standard prior to concrete thrust blocks being poured. Plastic sleeving shall be secured with duct tape or similar such that the plastic is wrapped tightly around the fitting and 'watertight'.

10 ACID SULPHATE SOIL

Where pipes and fitting are installed below RL 5.0 AHD or in actual (or potential) acid sulphate soils, special treatment for protection of metal and concrete surfaces will be required as approved by Council. Embedment material and back fill of limestone material is also required.

11 WATER SERVICES

11.1 CONDUITS

Water service conduits shall be 100mm Class 16 PVC pipe, Series 2. Refer WDS -07 for details.

11.2 TAPPING BANDS

Tapping bands are to be single outlet style, gunmetal bands with stainless steel nuts. The seal is to be nitrile ring format.

The tapping band is to be 32mm nominal bore tapping size.

11.3 PIPE

To be constructed in polyethylene pipe as follows:

PE80B (AS/NZS 4130 & WSA 01) PN16, blue lined.

The pipe is to be 40mm OD for the road crossing, and 32mm OD for each property branch.

11.4 FITTINGS

Tees, bends, joiners and end caps are to be Poly fittings, in accordance with AS/NZS 4129.

Ferrule cock is to be gunmetal, with polyethylene plug cock, gunmetal jumper valve and twin 'O' ring gunmetal bonnet top.

Ferrule cocks must be 32mm in outside diameter.

Ferrule bends are to be made from gunmetal.

11.5 ACCESS CHAMBERS

The Main Cock Box (from Drawing WDS-06) is to be a Top Hat Cover suitable for 225mm ∅ pipe. The lid is to be detectable by metal detector, and must be white in colour.

The riser pipe is to be 225mm DN PVC, class SEH .

The support shall be pre-manufactured base plate 400mm square, supporting a 225DN pipe riser. The base plate shall be manufactured from fibre cement sheet and must be supported directly on bricks either side of the water main. ie provide no load on any of the water fittings.

12 MARKER POSTS

Marker posts are generally not required on sealed road. Marker posts shall be 100 x 50 x 1200 CCA treated hardwood timber (use guidepost blank). Hydrant marker posts shall be painted with 100mm wide red and white bands, and valve marker posts shall be painted with 100mm wide light blue and white bands. At least 3 painted coloured bands shall be provided starting at the top of the post. Three or more coats of final coat shall be applied or as many coats as required to obtain a satisfactory depth of colour. Refer to WDS-02

13 TRENCH BACKFILL

Trench backfill should be as specified on the standard drawings.

13.1 EMBEDMENT MATERIAL

Refer to the construction section 9 of this Standard for embedment grading.

Where pipes are installed below RL5.0 or are likely to be in contact with actual or potential acid sulphate soils, pipes shall be bedded using a limestone crusher dust material in order to neutralise any acid run off from contacting concrete or steel components such as thrust blocks.

13.2 CONCRETE & STABILISED SAND

Only ready-mixed concrete shall be used. Ready-mixed concrete shall comply with AS 1379, and shall have a minimum compressive strength of 25 MPa.

Stabilised sand shall contain 4% cement mix by weight, grading to comply with bedding material in the Construction section of this document.

14 RAISED PAVEMENT MARKERS

Raised Pavement Markers used to mark hydrants and valves on the road shall be provided as approved by the Department of Main Roads Queensland. Markers must have an arrow marked on the top indicating the general direction of the hydrant or valve.

These are to be as follows:

* Hydrants markers are to be blue in colour with reflector both sides and an arrow indicating the location of the hydrant.

* Valves markers are to be orange in colour with reflector both sides and an arrow indicating the location of the valve.

CONSTRUCTION

15 GENERAL

This standard applies up to Water mains up to 375 or equivalent.

16 QUALITY

16.1 PERSONNEL

Personnel carrying out the pipeline work shall be suitably qualified as per Section 10.2 of the WSCOA. It will be the supervising consulting engineer's job to certify the qualification of the construction work force. The generally acceptable minimum is a person working under direct supervision and control of qualified licensed plumber. The plumber is required to be on site at all times when water infrastructure is being installed.

Mains Connections to Existing mains can only be undertaken by Council approved persons. List of approved persons maintained by Water Services.

Water service connections are required to be performed by qualified and licensed plumber only.

16.2 ACCEPTANCE TESTING

Hydraulic pressure testing shall be carried out in accordance with Section 19.4 of the WSCOA. This test shall be supervised by the supervising consulting engineer with a certification and report of test procedures submitted to Council within 5 business days. Council officers shall be notified in advance of the test so as to be able to attend, if desired. Certified Pressure gauges shall be adequately incremented such that 1200kPa is approximately within the middle third of the range of the gauge. Damaged or un-calibrated gauges will not be accepted.

Bacteriological testing is required by Council and is to be performed in accordance with WSCOA. All mains should be sufficiently flushed after testing and chlorination to satisfy the supervising engineer that water in the mains is in accordance with the "*Australian Drinking Water Guidelines*".

17 GENERAL CONSTRUCTION

Works should be generally carried out in accordance with the approved project drawings, however where works contravene the Council's Standards, Council reserves the right to require alterations to comply with the standards.

18 MATERIALS

Materials shall be generally in accordance with the Materials Section preceding this part of the Standard. Section 8 'Products and Materials' of WSCOA should be used where possible.

Embedment sand should comply with the high grade Compaction Sand Grading in Section 16.1 of the WSCOA. Samples shall be approved by the certifying engineer before starting the project based on a grading from an approved Laboratory.

19 EXISTING SERVICES

All existing services shall be located to confirm existing connection points and avoidance of conflict. Contractors should utilise the "Dial before you dig" service to ascertain the location of services other than Council's.

The location of all existing services must be confirmed with the appropriate authority prior to the commencement of any excavation. Council takes no responsibility for the accuracy of the information supplied by Council as it has been received from previous developers and contractors, and not physically located by Council.

Where necessary, test holes shall be excavated to determine the precise locations and grades of such services. The developer shall bear the cost of repairs to any services damaged during the course of the work. Council at the request of the developer/contractor, will locate existing mains at cost at the expense of the developer or the contractor.

20 EXCAVATION

20.1 EXCAVATION

When connecting to an existing main, the existing pipe shall be exposed prior to laying any new pipe so that its position may be confirmed and alignment for later connection. The new mains should be started a safe distance away from the thrust block at the end of the existing mains so as to retain the strength of the soil supporting the thrust block.

20.2 EXCAVATION ACROSS IMPROVED SURFACES

Where excavation occurs thru land with improved surfaces such as roads footpaths gardens and lawns, it is expected by the public and the Council that the land be restored to as good as condition as before the excavation.

20.2.1 Sealed Roads

Where water mains must be installed under existing sealed pavements, this shall be done by means of under-road boring, except where otherwise approved by Council.

Where boring under the road is not practical, Council may approve trenching across the road in accordance with Type 3 construction as shown on Council standard drawing WDS-01. The road surface shall be reinstated to provide smooth running surface with 50mm minimum depth asphalt.

20.2.2 Gravel Roads

Water main crossings of existing gravel roads may be trenched provided the sand surround is thoroughly compacted and the trench is backfilled to subgrade level with stabilised sand. This stabilised sand backfill shall extend through any table drains on both sides of the road.

20.2.3 Driveways and Footpaths

Water main crossings of existing access tracks and driveways may be trenched provided they are backfilled with stabilised sand to a depth of 100mm below finished ground level, and the driveways restored to a similar or better condition than it was prior to construction. Photographs would assist in removing doubt over the condition prior to construction. If photos are not provided, Council will support the written statements of the land owner whose driveway was affected. The reinstatements of the driveways are to be at the expense of the developer or contractor.

Footpaths shall be restored to a similar or better condition than it was prior to construction. Photographs would assist in removing doubt over the condition prior to construction. If photos are not provided, Council will support the written statements of the land owner whose footpath was affected. The reinstatement of the footpaths is to be at the expense of the developer or contractor.

21 FILLING

Placing fill in gullies for the construction of mains without stormwater pipe work shall be avoided because of the high probability of the material being eroded. Embankments should have at least a 1 in 5yr ARI cross flow flood immunity before placing water mains through the gully. Compaction of the embankment shall be verified by test results before acceptance of the main by Council.

Erosion of embankment fill shall be prevented by appropriate rip-rap or gabions.

22 COMPACTION

All backfill of excavations shall be compacted in accordance with Section 19.3 of WSCOA. This section can be summarised by Table 19.1 from the WSCOA as follows.

TABLE 19.1

MINIMUM COMPACTION OF EMBEDMENT AND TRENCH / EMBANKMENT / OTHER FILLS

Material type	Test method	Minimum value (%)			
		Trafficable areas		Non-trafficable areas	
		Embedment	Trench/ embankment fill	Embedment	Trench/ embankment fill
Non-cohesive i.e. granular	Density index (I_D) AS 1289.5.6.1	70 (Note 1)	70 (Notes 2, 3)	60 (Note 3)	60 (Notes 4, 5)
Cohesive	Dry density ratio (R_D) AS 1289.5.4.1 and AS 1289.5.1.1 (Note 6)	95	95	90	90 (Notes 5, 6)

NOTES:

1 Single size coarse aggregates of sizes 7, 10 and 14 mm shall be deemed "self-compacting" and do not require compaction testing when used for pipe embedment (Refer to Clause 16.2).

2 *The road Owner may specify alternative values.*

3 *Degree of compaction of the trench fill in trafficable areas depends on:*

(a) *the backfill zone – higher degrees of compaction is required in the zones closer to the surface; and*

(b) *the road type – freeways and arterial roads carrying greater loads require higher degrees of compaction.*

4 *The value given is a default where excessive initial surface settlement is not permitted. Specification of an alternative degree of compaction of the trench fill in non-trafficable areas depends on the site requirements.*

5 Compaction shall be to the degree specified in the project Specification or the default value in Table 19.1 if not specified.

6 *Graded gravels and sands having fines (silts and clays) greater than 5% have their compaction determined by dry density ratio.*

23 PIPE EMBEDMENT

Pipes shall be laid on a bed of 75mm of compacted sand. A full sand surround shall be provided, with a minimum of 200mm over the pipes in accordance with Council standard drawing WDS-01.

The embedment and the overlay shall be finished flat and compacted to 90% of maximum modified dry density as determined by Part E2.1 of AS 1289, "Methods of Testing Soil for Engineering Purposes".

Other types of embedment may be required for exceptional circumstances in accordance with the WSCOA as specified in the approved drawings or as specified by the consulting engineer with approval of Council.

Bedding material is to be well graded, non-plastic sand material with a no more than 10% aggregate of maximum size of 5mm, unless otherwise approved by the relevant Council manager.

24 LAYING & JOINING

Pipes shall be laid in accordance with the manufacturer's specification & relevant Australian Standard.

24.1 LAYING AND JOINTING METHOD

Pipes shall be laid in accordance with AS 2032 - 1977, "Code of Practice for Installation of U.P.V.C. Pipe Systems" and the manufacturers' specifications, with flexible joints provided at least every six (6) metres.

Care shall be taken to ensure that the rubber rings and ends of the pipe are clean and lubricated as recommended by the pipe manufacturer, and the ring is correctly seated.

The full length of the pipe barrel shall rest on the sand bed suitably excavated at the socket bell, and the sand surround shall be carefully placed and compacted adjacent to and 200mm over the pipe. The purpose of the cover is to provide a warning of the presence of this pipe. Consequently this material must be different to the surrounding natural material in colour and structure. Should the colour of the sand and the natural material be roughly the same, a 100mm wide green plastic trench marker tape (AS 2700 – 1996) appropriately marked shall be provided directly over the water main on top of the bedding sand (ie 200mm above the pipe). Where the main is not installed in the standard footpath alignment, the trench tape shall contain a tracer wire in it with the ends extending a minimum of 500mm into valve/hydrant pits and 'tied' to the fixture such as to enable easy access and visible evidence of its existence. Trench tape shall comply with *AS/NZS 2648.1:1995 – Underground marking tape*.

When pipe laying is not in progress, the end of the laid pipes shall be sealed to prevent the ingress of foreign material including dust sediment etc.

24.2 THRUST BLOCKS

Where bends, junctions, hydrants, valves or end caps are installed, thrust blocks shall be provided in accordance with WSCOA standard drawings WAT-1205 and WAT-1207. Timber Thrust blocks are not acceptable for permanent or temporary works. Where thrust blocks are poured, care shall be taken to ensure that the ***concrete bears onto the fitting, not the pipe.***

24.3 TRENCH STOPS

If stops are required, they shall conform to the requirements of standard drawing WAT-1209.

24.4 BULKHEADS

Bulkheads are required as per the WSCOA standard drawing WAT-1209.

24.5 CORROSION PROTECTION

Corrosion Protection is required on all steel and ductile iron pipes and fittings. In particular, if the pipe or fitting is laid below RL 5.0AHD or in acid sulphate conditions.

Regardless of coating, all fittings shall be plastic sleeved.

24.6 DETECTABLE TAPE

Detectable tape is generally not required for domestic mains, on standard alignment unless specified by Council. Any main installed off alignment (requires specific approval of Councils Water Manager), shall be marked by means of detectable tape marker, joined to the nearest hydrant or valve in each direction as per Clause 15.10 of WSCOA. Refer also section *24.1 Laying and Jointing Method.*

24.7 VALVES AND HYDRANTS

The maximum depth between the top of the surface box and the top of the hydrant 'lug' shall be 200mm as per standard drawing WAT-1301. Hydrants shall be installed with the bolts on the top of the hydrant directly over the centre of the pipe and be fitted with cast-iron dust covers.

The maximum depth from the top of the surface box to the top of the valve spindle shall be 300mm.

Valve and hydrant surrounds shall generally be single piece recycled plastic. Other margins may be approved on written application, a list of approved products may be available from Council. Valve and hydrant surrounds shall be finished at least 30mm above finished ground level on proposed grass verges or flush with paved surfaces. The ground surrounding the margin shall not be mounded or hollowed to achieve this level. The margin set and C.I. box shall be located directly over the valve or hydrant to allow for easy access of hydrant stand pipes or valve spindles. An expansion joint shall be provided around the margins set into concrete slabs to allow access to the main below for maintenance.

All metal fittings in direct contact with soil shall be plastic sleeved.

24.8 BORED PIPES UNDER ROADS ETC

Bored pipes shall be used under existing sealed roads unless otherwise approved by Council.

24.9 AQUEDUCTS

The use of aqueducts is not permitted.

24.10 LOCATION MARKERS

Location markers shall be installed as per Council standard Drawing WDS-02, and the requirements of Department of Main Roads.

24.11 WATER SERVICES – CSC ONLY

Water Service connections are only permitted to be installed following the acceptance of mains from disinfection and pressure testing.

Once installed, water service pipe work is required to remain under pressure at all times.

Each tapping, including connecting pipe work, is to be fully completed once commenced. No tapping shall be left incomplete for any period.

All pipe work shall be left exposed for a minimum of 1 hour following completion of connection.

At this time, a visual and physical check of pipe work is to be made to detect leaks. Once pipe work has been certified leak free, the trench shall be backfilled.

24.11.1 Conduits

Water service conduits shall be laid at a minimum 500mm below the finished pavement level and terminated 300mm behind the back of the kerb. Brass service conduit markers shall be installed in the kerb face in line with the end of the conduit. Refer standard drawing WDS-07 for details.

The conduit may be required to be inspected by Council after the kerb and channel is poured to ensure the ends are aligned with kerb markers. During this inspection some evidence of the completeness of the conduit is required such as mirroring the line or drawing a wire through the conduit. After this inspection the ends of the conduit shall be fitted with uPVC screw caps and the location of the ends recorded prior to back filling.

Following installation of the service pipe, the conduit is to be sealed with 40-50mm thickness of expansion foam.

24.11.2 Pipes

Service pipe is to be installed in accordance with requirements for water mains.

The excavated area within each property is required to be filled with bedding sand to natural surface. The excavation area is to be centrally located around the end of the pipe, with a minimum of 300mm clearance on all sides.

24.11.3 Tapping Band and Ferrule Cock

The tapping band is to be installed with the tapping orifice at the top of the main.

The ferrule cock is to be installed vertical, and 'running with' the main.

The main is to be tapped at 32mm ND. The tapped plug is to be removed from the main.

The tapping is required to be performed under full mains pressure only, ie 'hot' tapped.

Ferrule bend is to be utilised to obtain necessary alignment and angle.

The ferrule cock is to remain in open before enclosing and burial.

24.11.4 Fittings

Compression polyethylene fittings are to be installed and tightened to manufacturers' specifications.

No obvious stress / strain loads to be applied to the pipe, eg no 'pulled' pipe.

Prior to end plug being installed, the service line is to be flushed for 30 seconds.

24.11.5 Access Chambers

Water service access chambers shall be constructed in accordance with Standard Drawing WDS-06.

The base plate shall be located above the ferrule cock body and be 10mm clear of any of the water fittings.

25 ACCESS CHAMBERS

Access chambers (margins and boxes) for valves and hydrants shall be constructed in accordance with standard drawings WAT-1304 & WAT-1306.

26 TOLERANCES ON "AS CONSTRUCTED" WORK

Tolerances on constructed works apply as per Section 21 of the WSCOA.

26.1 HORIZONTAL TOLERANCES

26.1.1 21.2.1 Water mains and in-line structures

Do not exceed the following positional tolerances:

(a) Water mains - ±100 mm lateral displacement from the design water main alignment.

(b) Appurtenances and structures - lateral displacement as for the water main, and ±200 mm displacement (from the design position) along the water main axis.

26.1.2 21.2.2 Property services and meters

Do not exceed the following positional tolerances:

(a) Property services - ±100 mm displacement along water main axis from the position as specified.

(b) Water meters - ±100 mm displacement from the position as specified

26.2 VERTICAL TOLERANCES

26.2.1 Water mains, property connections and structures

Do not deviate the inverts of new water mains, property connections and structures from the specified design level (or interpolated design level) by more than 50 mm higher or lower, providing the depth from final ground surface level to the top of the pipe exceeds the minimum cover stated in Standard Drawings.

Link up to existing water mains or structures at the design levels equal to or greater than the minimum acceptable covers.

26.2.2 Verticality ("plumb")

For hydrant risers, access chambers, shrouds and aqueduct piers, apply a tolerance at any point on the pipe or structure as follows:

(a) 30 mm deviation (from vertical) per metre rise in any direction; and

(b) limited to a maximum 50 mm cumulative deviation (from vertical) in anyone particular direction for structures higher than 5 m.

26.3 TOLERANCES ON FINISHED SURFACE STRUCTURES AND FITTINGS

For structures and fittings designed flush with the ground / pavement surface or proud of the surface, apply a vertical tolerance on the finished surface levels as follows:

(a) ±5 mm in road reserves, including sealed pavements, road verges, driveways, footways, and pedestrian thoroughfares.

(b) ±5 mm in sealed and trafficable areas within private properties (pedestrian and/or vehicular traffic).

(c) +50 mm,-20 mm in private property including garden areas, unsealed areas, non-trafficable areas and areas of occasional traffic (pedestrian and/or vehicular traffic).

27 BACKFILLING

In trafficable areas, the backfill shall be pavement material compacted to 100% Modified Compaction, or cement-stabilised gravel with four percent (4%) cement content.

Minimum cover over mains shall comply with clause 4.3.1 Embedment & Cover of the DESIGN Section of this Standard.

Backfill in footpaths shall be compacted to 95% of maximum modified dry density as determined by Part E2.1 of Australian Standard AS 1289, "Methods of Testing Soil for Engineering Purposes".

Where backfill is actual or potential acid sulphate soil, the disturbed soil shall be neutralised in accordance with any State Planning Policy or Planning Scheme provision for acid sulphate soils. Where practical, impermeable clay trench stops should be constructed at 35m spacing along the trench to prevent the drainage and further oxidation of the acid sulphate soil. These stops should be through to base of the trench substituting for the bedding sand in the immediate area.

28 DISINFECTION

All water mains shall be tested, flushed thoroughly clean and chlorinated before being connected to the existing system.

Test Results must be submitted to Council by a suitably qualified (NATA registered) company before being connected to the existing system.

28.1 FLUSHING & CHLORINATION

Pipes which have passed the pressure test shall be flushed clean with mains water and then chlorinated using Calcium Hypochlorite powder. The weight in kilograms of powder used shall be;

$$\text{Weight(kg)} = 0.056 \times \text{pipe length(m)} \times [\text{pipe diameter(m)}]^2 ,$$

and the chlorinated water shall be retained in the pipe for between at least 36 hours. Sodium hypochlorite may be used in an equivalent concentration - required dosage dependant on chemical used. The Calcium Hypochlorite powder shall be mixed to the correct concentration in a clean water truck filled with mains water. The mains will then be filled from the truck. This ensures a uniform concentration of chlorine ions through out the mains.

Other chlorination agents can be used provided it is certified that the dosage of the agent specified by the Consulting Engineer contains an equivalent concentration of free chlorine ions with in the main.

The pipe shall then be re-flushed with mains water so that the final free chlorine content is less than 1mg/l.

The supervising Consulting engineering will certify that the mains have been disinfected and flushed before connection to the existing water mains.

All valve, hydrants and other control structures must be suitably operated during the chlorination process (Section 20 of WSCOA)

29 CONNECTION TO EXISTING MAINS

Connections into existing mains will not be permitted until all upstream mains have been completed, tested, cleaned, chlorinated and flushed.

Gladstone City Council undertakes connections to existing Council water mains at the developers expense.

Calliope Shire Council permits approved persons to undertake connections to existing mains, provided prior written permission is obtained from Council before making the connection. The approval of persons is managed by Water Services Section, with the approval of the connection with the Development Services Section.

Ten (10) working days notice to Council is required prior to connecting into existing mains so that Council's water customers have adequate notice of the disruption to the service. Any expenses associated with the notices to the public will be borne by the contractor or developer. The disruption of services to numerous people may require advertisement in a local newspaper and/or local radio station.

Under no circumstances will valves on existing live water mains be turned off or on by anybody other than Council staff.

Where a cut in required to a live main, the developer may request Council to cut into the live mains at the commencement of the construction in order to establish the point of connection early in the project. A flanged Tee and valve will be installed into the line which can be easily connected to without major disruption to the consumers. This work would be at the expense of the developer, however it may minimise delays later on in the project.

30 RESTORATION & CLEAN UP

If water mains must be laid through existing developments, any areas which are affected by the works shall be restored to a condition equivalent to that which existed prior to the work starting. Restoration shall be carried out as soon as the trench has been backfilled and the new main has been tested satisfactorily. All rubbish and spoil shall be removed and the area left in a neat, tidy and near original condition. Refer Section *20.2 Excavation Across Improved Surfaces* for further requirements for restoration.

30.1 STORMWATER QUALITY

The excavated and disturbed area resulting from the construction of water mains shall stabilised to minimise wind and water erosion of the restored area including any measures required by Council to achieve the objectives of Council's Stormwater Quality Objectives. Measures required by Council may include turfing, silt fences, etc.

These measures will be required to be maintained for the duration of the maintenance period.

30.2 EROSION PROTECTION

In all areas of new installation, reinstated trenches shall be adequately protected from erosion immediately upon the reinstatement completion. This protection as a minimum shall be:

Rural areas silt fence or hay bales

Urban Areas pre-grown turf

These measures will be required to be maintained for the duration of the maintenance period.

30.3 HYDRANT & VALVE MAINTENANCE

In all areas of new installation, hydrants and valves shall be adequately protected from the effects of erosion immediately upon the reinstatement completion. This protection as a minimum shall ensure full location and access abilities at all times. That is the hydrant or valve must be clearly visible at the surface and not buried of covered. Any situation which results in a hydrant or valve not being accessible will be required to be rectified within 12 hours of notification, or Council may carry out the work and deduct this from any bonds held.

31 WORKS AS CONSTRUCTED INFORMATION

Works as constructed water reticulation information shall be prepared to comply with Council's standard Specification for As-Constructed information, contained in Council's "*Engineering and Development Guidelines*".

Preliminary as-constructed information showing the location of all water mains and service conduits is required prior to endorsing of the plan of reconfiguration.

Final as-constructed information showing all water reticulation detail is required prior to Council accepting the works on-maintenance.

32 PROCEDURAL REQUIREMENTS

The following sections outline the procedural requirements of the design and construction of water reticulation works.

32.1 DESIGN CHECK LISTS

Appendix A contains a checklist which shall be completed and submitted with the design drawings and specifications. Boxes should be ticked as items are checked.

All checklists must be signed off by Registered Professional Engineer, Queensland (Civil) in order to be accepted by Council.

32.2 INSPECTION AUDITS

At various stages of works during the construction period, a representative of Council shall be invited to carry out audit inspections.

Without limitation, inspections shall be at the “hold points” detailed below, and construction shall not proceed beyond a "hold point" without approval.

Inspections will only be carried with the Supervising Engineer during normal office working hours with a minimum of 24 business hours notice.

32.3 INSPECTIONS

Inspections for water reticulation works are required in accordance with the following requirements. Hold point forms outline the minimum works to be completed before the inspection is to take place.

Hold point forms will generally be issued by each Council after the works are approved by Council. Hold point forms outline the pre-requisites to be completed before a particular inspection takes place. When the Supervising Consulting Engineers have inspected the work and is satisfied that the works are ready for the next stage to commence, they shall sign and fax the completed hold point form to Council and arrange an inspection.

Inspections shall be carried out at the stages as outlined in the following paragraphs.

A pre-start meeting must be carried out before works commence to familiarise contractors, engineers and Council representatives with the procedures for carrying out the works and to sort out any administrative matters necessary such as construction water, site safety, inspection procedures etc.

The supervising consulting engineer shall instruct the persons constructing the works to arrange the inspection of the works by the supervising engineer and a Council inspector at the stages listed below.

At least forty eight hours notice of the inspection is required. Council may decline the inspection however the supervising engineer must attend every inspection and certify the works in accordance with section *32.4 Certification by Supervising Consulting Engineer* of this standard.

The works shall be inspected at the following critical stages of construction:

1. Sand surround and Maintenance holes prior to back filling,
2. Pressure testing,
3. On-maintenance, and
4. Off-maintenance.

At all of the above inspections, the location of the property boundary shall be clearly pegged to ensure correct alignment and locations. The supervising consulting engineer shall inspect the works as per proforma audit sheets, with the relevant Council officer also invited to attend each inspection

32.4 CERTIFICATION BY SUPERVISING CONSULTING ENGINEER

The supervising Consulting Engineer shall certify that the works have been inspected and carried out in accordance with the requirements of this standard. The Supervising Engineer must be a Registered Professional Engineer of Queensland or have current NPER3 registration. When design and works are certified, the following shall be provided as a part of a properly made certification:

a) Company name, address, & contact details

b) Person's name, position in company, qualifications,

c) Professional registration number, body name, & signature.

d) Details of what is Certified, which may include the whole or part of a project (hence further specifics required), and date of installation

e) Relevant standards and documents to which the product or installation complies.

f) Quality assurance system in place, and date of QM manual used.

g) Maintenance procedures required for products certified (optional)

The standard pro-forma supplied in Appendix A shall be used **for each inspection**, as well as any other documentation volunteered by the consultant.

Certification of each inspection must be submitted to Council within two days of carrying out the inspection. The subdivision will not be accepted on to the maintenance period if these certificates are not submitted to Council in accordance with the above requirements.

32.5 MAINTENANCE PERIOD

The work shall be maintained by the contractor/developer for a period of 12 months from the date it is accepted on-maintenance by Council. During the maintenance period, the developer shall make good any defects which appear in the work. Rectification of defects shall be completed within 7 days of being notified by Council. Should the necessary repairs not be carried out within the specified time, Council may carry out the work and deduct the cost from the Maintenance Bond lodged by the developer.

The commencement of the maintenance period may be delayed by the following not occurring **within 4 weeks** of the acceptance of the works for the maintenance period:

- Rectification or completion of outstanding requirements from the works acceptance.
- The plan of survey not endorsed by Council.
- Final "as constructed" plans of the sewerage infrastructure are submitted to Council not being received within 4 weeks of on maintenance inspection.

Council may extend the maintenance period if;

- The works have not been performed satisfactorily.
- Substantial use of the infrastructure or development of the adjacent land has not occurred.

- Certified as-constructed plans of all infrastructure including power and telephone have not been accepted by Council, or

- The Plan of Survey over the subject land has not been registered at the expiration of the specified maintenance period.

The extension period may be for a period of up to 12 months after the resolution of the above issues.

33 WATER FOR CONSTRUCTION

Water is essential for the construction of a subdivision, in particular road and earth works. Where alternate sources of water are available such as reclaimed water ground water etc, the alternate source shall be utilised. Alternate sources of water are available at Calliope, Boyne Island and Tannum Sands.

All water obtained from Council's reticulation system shall only be obtained through registered metered components complying with the section on "BACK FLOW PREVENTION" and Registered Standpipes. The arrangements for obtaining water from water mains must be made with the respective Council.

Contractors may request to supply their own metered standpipes, subject to registration of the standpipe with Council. These stand pipes shall be inspected by Council on installation prior to use by the contractor. The meter on the stand pipe shall be read monthly and calibrated on installation and at 6 monthly intervals. Damaged meters shall be replaced immediately, and an estimate of water consumption will be made by Council. Non-registered standpipes will be removed by Council and the matter fully investigated. Certificates of meter calibration are required before Council accepts the use of private stand pipes. The developer remains liable for all water usage through the devices.

The contractor is liable for payment of all fees associated with the use of the devices and the water consumption.

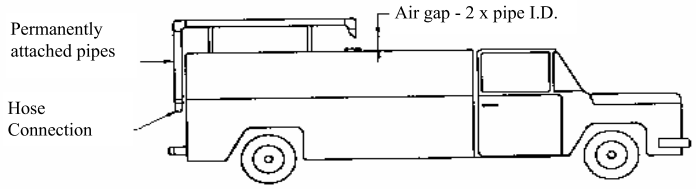
This use of construction water is subject to any water restrictions in place at the time.

The location of accessing Council's mains for obtaining construction water is specified only by Council's Water Services Section, and written approval of locations must be sought prior to commencement of works.

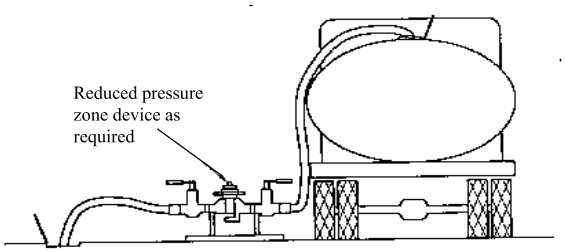
33.1 BACK FLOW PREVENTION

Council enforces the requirements of AS/NZS 3500 Plumbing and Drainage for back flow prevention in relation to town water supplies. Consequently back flow prevention devices shall be provided in all situations.

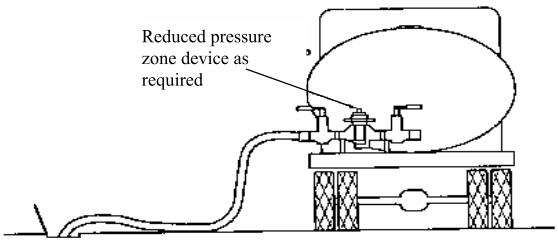
With regards to filling water trucks directly from the mains/hydrants, the simplest acceptable method of back flow prevention is the ***air gap***, where there is a gap of twice the diameter of the filler pipe between the connecting hose and the top of the tank. The second method is a reduced pressure zone (RPZ) device and two valves installed on the line between the truck and the source of water. All RPZ devices must be registered and maintained in accordance with the relevant Australian standards. These two devices are illustrated in the diagrams following.



A) Truck with air gap.



B) With portable assembly



C) Truck with mounted assembly

MINIMUM PROTECTION FOR FILLING TANKER TRUCKS

33.2 REGISTERED STANDPIPES (CSC ONLY)

The registration of Standpipes for use in CSC area is documented in Councils Administrative Direction Number 418.

The devices are only approved by Water Services, and are required to undertake annual registration and checks. Any person using unregistered device in CSC/GCC area shall be fully investigated for a breach of the Water Act.

34 WATER FOR LANDSCAPING PURPOSES

Should the developer require water to establish landscaping on the development, water connections are available by following the same process as a normal house connection application, including payment of fees.

Council will provide the developer with a standard water connection including water meter. The developer will be levied the access fee and water consumption fees by Council which will be as listed in Council's annual rates and charges booklet listed under "Water Connection Fees".

The water service will only be installed on an actual lot in compliance with Councils operating plans for water services.

Following installation the meter will be read and billed as per Council's normal billing regime. The developer remains liable for water usage through such connection, until the sale of the property on which the water meter is located. Once the property is sold, the developer is not entitled access to the water service.

The use of broad range (across more than one property frontage) in-ground irrigation is not permitted.

STANDARD DRAWINGS

The following table indicates the appropriate use of Calliope Shire Council, Gladstone City Council and WSCOA standard drawings.

Status of WSCOA Drawings is per the following key:

Use: Use as Calliope Shire Council/Gladstone City Council standard practice (as amended)

If WSCOA is the primary document (is marked as "use"), any relevant Council drawing is to be considered a secondary document.

Secondary: Used to support Calliope Shire Council/ Gladstone City Council Standard Drawings and Code. The Council Drawing is to be the primary reference document.

Optional: Maybe used if specified (or permission obtained) by Calliope Shire/ Gladstone City Council.

Not to be Used: The WSCOA drawing is not to be used for design or construction purposes.

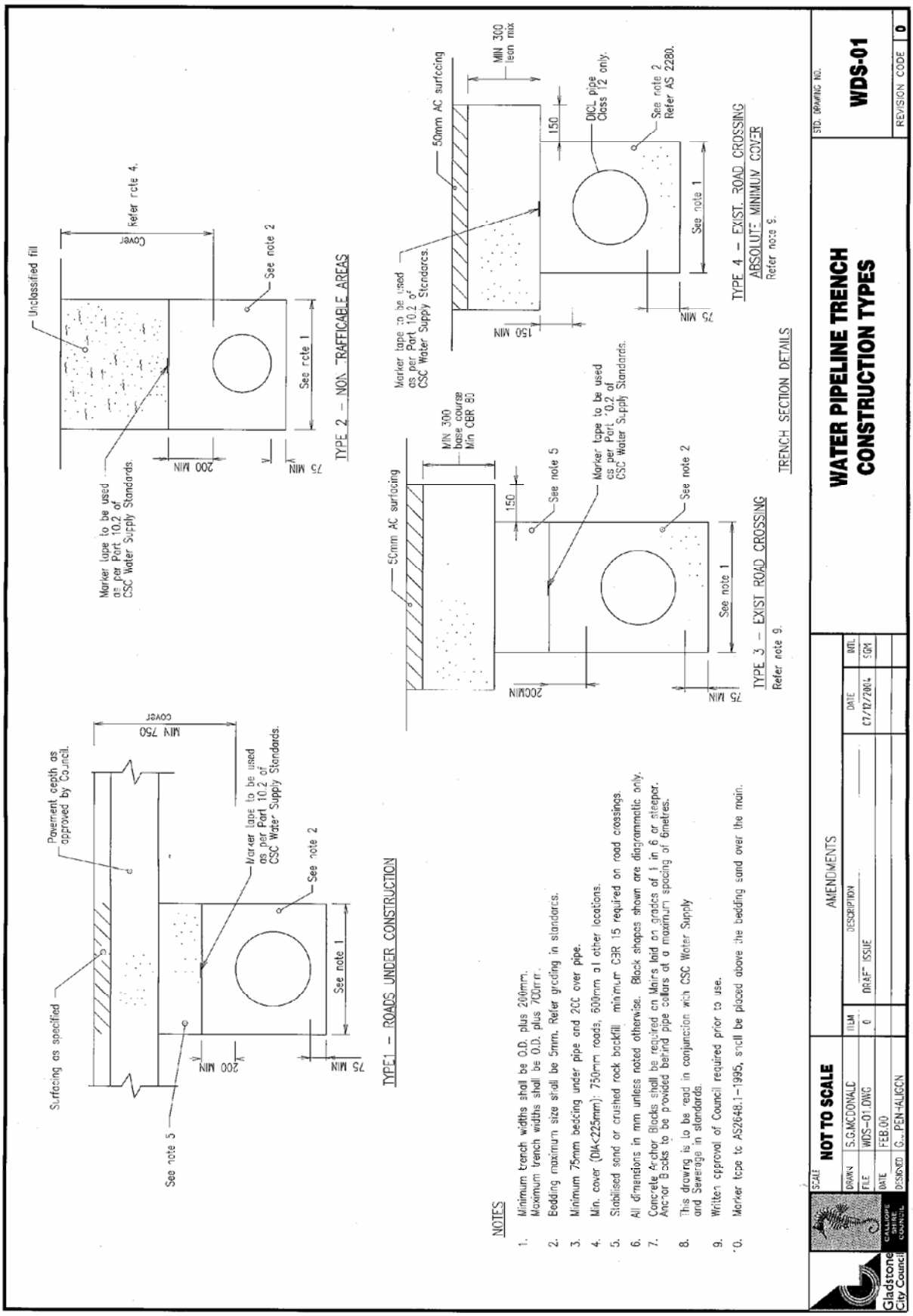
CSC Standard	GCC Standard	Topic	WSCOA Standard	WSCOA Status
		Locality Plan	WAT-1100	Use
		Site Plan	WAT-1101	Use
		Reticulation Arrangements	WAT-1102	Use (Refer "Water Services" in main text)
		Transfer Mains	WAT-1103	Not to be used
		Cul-de-sac layout	WAT-1104	Not to be used
		Connection to Existing Mains	WAT-1105	CSC only Cut in Connection Method Only
		Single Service	WAT-1106	Not to be used
WDS-06		Twin Service	WAT-1107	Secondary
WDS-06		Tapping	WAT-1108	Not to be used
WDS-07	R-0160	Road Conduits	-	

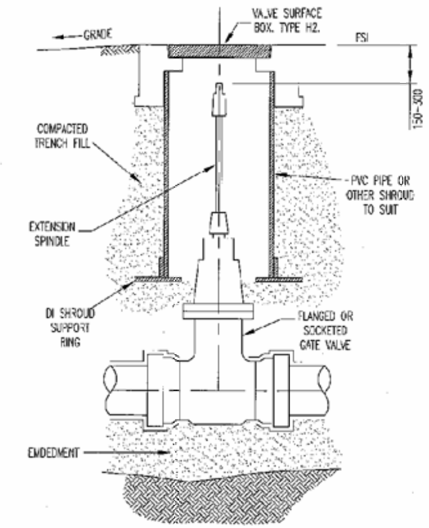
CSC Standard	GCC Standard	Topic	WSCOA Standard	WSCOA Status
		Property Services	WAT-1109	Not to be used
		Soil Classification	WAT-1200	Use
WDS-01	WDS-01	Backfill	WAT-1201	Secondary, minimum cover as per Water Supply Standard 4.3.1
WDS-01	WDS-01	Embedment	WAT-1201	Secondary, minimum cover as per Water Supply Standard 4.3.1
WDS-01	WDS-01	Embedment	WAT-1202	Secondary
		Special Embedments	WAT-1203	Secondary Use Type C, D, & E
		Special Embedments	WAT-1204	Secondary Use Type M
		Concrete thrust blocks	WAT-1205	Use
		Timber thrust	WAT-1206	Not To Be Used
		Anchor Blocks	WAT-1207	Use
		Restrained Joint System	WAT-1208	Optional
		Bulkheads	WAT-1209	Use for Bulkheads only
		Trench drainage	WAT-1210	Secondary
WDS-04	WDS-04	Culvert crossing	WAT-1211	Not Used
		Road Crossing	WAT-1212	Optional, Concrete encased not permitted
		Railway Crossings	WAT-1213	Optional, Concrete encased not permitted
		Bored & Jacked Details	WAT-1214	Use
WDS-02	WDS-02	Valve & Hydrant	WAT-1300	Secondary

CSC Standard	GCC Standard	Topic	WSCOA Standard	WSCOA Status
		Identification		
		Valve +hydrants	WAT-1301	Secondary
WDS-03		Air valve	WAT-1302	Use (on trunk mains)
		Not traffic Valve Boxes	WAT-1303	Not To Be Used
		Trafficable Valve boxes	WAT-1304	Use Type H1 only
		Hydrant Boxes	WAT-1305	Not To Be Used
		Hydrant Boxes	WAT-1306	Use Type H2 only
WDS-03	WDS-03	Scour Valve	WAT-1307	Secondary
		Appurtenance Valves	WAT-1308	Optional
		PRV Arrangements	WAT-1309	Optional
		Aqueduct	WAT-1310	Not To Be Used
		Aerial Grill	WAT-1311	Not To Be Used
		Bridge Crossings	WAT-1312	Use, Option 1 Only
		Flanged Joints	WAT-1313	Use
		Steel Pipe – Butt Welding	WAT-1400	Secondary
		Steel Pipe - RRJ	WAT-1401	Secondary
		Steel Pipe – Welded Collars	WAT-1402	Secondary
		Steel Pipe - Bends	WAT-1403	Secondary
		Steel Pipe – Access Openings	WAT-1404	Secondary
		Steel Pipe – Flexible Joints	WAT-1405	Secondary
		Valve Connection	WAT-1406	Secondary
		Bypass Arrangements	WAT-1407	Secondary
		Joint Corrosion Protection	WAT-1408	Secondary

CSC Standard	GCC Standard	Topic	WSCOA Standard	WSCOA Status
		PE Hydrant Fittings	WAT-1409	Not To Be Used

APPENDIX A – STANDARD DRAWINGS

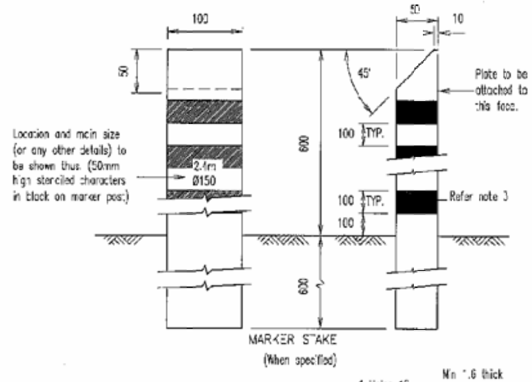

Unclassified fill
Refer note 4.
Cover
See note 2
See note 1
Marker tape to be used as per Part 10.2 of CSC Water Supply Standards.
200 MIN
75 MIN
TYPE 2 – NON TRAFFICABLE AREAS
50mm AC surfacing
MIN 300 base course Min CBR 80
MIN 300 lean mix
150
See note 5
See note 2
See note 1
DICL pipe Class 12 only.
See note 2 Refer AS 2280.
150 MIN
75 MIN
TYPE 3 – EXIST. ROAD CROSSING
Refer note 9.
TYPE 4 – EXIST. ROAD CROSSING
ABSOLUTE MINIMUM COVER
Refer note 9.
TRENCH SECTION DETAILS
Pavement depth as approved by Council.
Surfacing as specified
MIN 750 cover
See note 5
TYPE1 – ROADS UNDER CONSTRUCTION
NOTES
1. Minimum trench widths shall be O.D. plus 200mm. Maximum trench widths shall be O.D. plus 700mm.
2. Bedding maximum size shall be 5mm. Refer grading in standards.
3. Minimum 75mm bedding under pipe and 200 over pipe.
4. Min. cover (DIA<225mm): 750mm roads, 600mm all other locations.
5. Stabilised sand or crushed rock backfill minimum C3R 15 required on road crossings.
6. All dimensions in mm unless noted otherwise. Block shapes shown are diagrammatic only.
7. Concrete Anchor Blocks shall be required on Mains laid on grades of 1 in 6 or steeper. Anchor Backs to be provided behind pipe collars at a maximum spacing of 6metres.
8. This drawing is to be read in conjunction with CSC Water Supply and Sewerage standards.
9. Written approval of Council required prior to use.
10. Marker tape to AS2648.1–1995, shall be placed above the bedding sand over the main.
SCALE NOT TO SCALE
DRAWN S.G.MCDONALD
FILE WDS-01.DWG
DATE FEB.00
DESIGNED G. PEN-ALLCOCK
ITEM 0
AMENDMENTS
DESCRIPTION
DRAFT ISSUE
DATE 07/12/2004
INITIAL SGM
Gladstone City Council
CALLIOPE SHIRE COUNCIL
WATER PIPELINE TRENCH CONSTRUCTION TYPES
STD. DRAWING NO. WDS-01
REVISION CODE 0

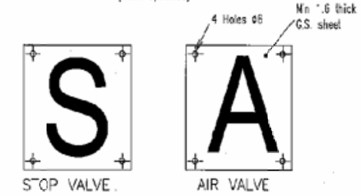


UNDERGROUND VALVE EXTENSION SPINDLE

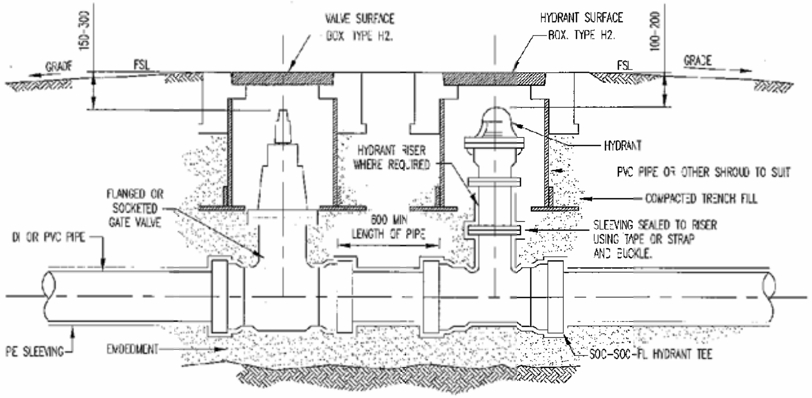
NOTES

1. In areas with sealed roads, hydrants shall also be marked with a blue bi-directional raised reflective pavement marker located 100mm from the centre of the road on the side of the hydrant. Multiple lane roads or roads with centre line marking refer to the "traffic engineering manual" book 2 by main roads (or council) for locations of markers.
2. Hydrants in areas without kerb shall be marked with a guide post with blue delineators on each side. Posts used for hydrant delineation only located directly in line with and on the same side of the road as the fire hydrant.
3. Top of hydrant boxes shall be painted in safety yellow with enamel paint and coated with glass beads while paint is still wet.
4. Marker plate letters and figures painted in black enamel on white enamel background except for fire hydrant markers, where a reflective yellow background, class 1, shall be used.
5. Stake to be cca treated hardwood. Upper section of stake shall be primed, undercoated and finished with enamel gloss. Hydrant marker stakes shall have red and white bands – valves marker stakes blue and white – all other posts shall be white.
6. Hydrants tees and risers to be dicl.
7. Hydrants and valves to be coated with thermosetting epoxy powder to as 3952 and as 2638.2. All bolts shall be 316 grade stainless steel to as 2837.
8. Service authority may require valve pits on mains Ø375 or larger.
9. All dimensions in millimetres.
10. Margin must be left on valve/hydrant in driveways. Use 10mm expansion foam around margin.
11. Marker posts to be located 300mm from the front boundary of the property.
12. Valves dn 200 and greater to be restrained where specified by water agency. See wat-1207.
13. To prevent the transfer of traffic load to the main, ensure shroud and any shroud support ring does not come in contact with the gate valve or the hydrant.
14. Install an extension spindle where depth from surface level top of gate valve exceeds 350.
15. Depth of main may be locally increased to achieve required minimum valve spindle cover.





MARKER PLATES OTHER THAN VALVES AND HYDRANTS



VALVES & HYDRANTS AT STANDARD DEPTHS

COLOUR IDENTIFICATION TABLE FOR SURFACE FITTINGS

COVER \ COLOUR	RED	WHITE	BLUE	YELLOW
PLASTIC IDENTIFICATION COVER	Closed valve	Open valve	Dialysis patient	N/A
SURFACE BOX FOR STOP VALVE	Normally closed valve	Trunk & reticulation main fittings	N/A	N/A
SURFACE BOX FOR HYDRANT	N/A	N/A	N/A	Fire brigade use

AMENDED MEAQ DWG W-0060

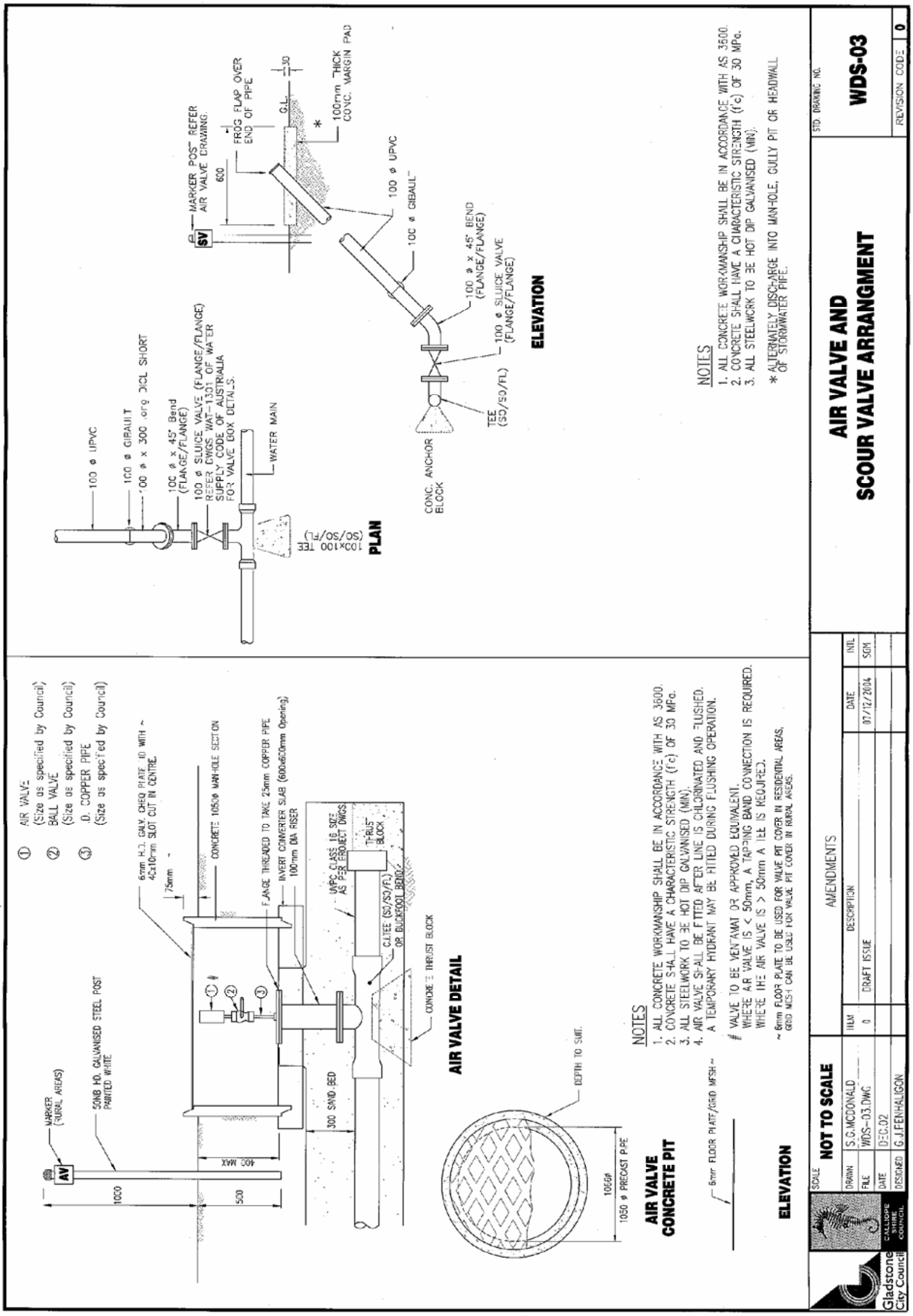
SCALE	NOT TO SCALE	AMENDMENTS			
DRAWN	S.G.MCDONALD	ITEM	DESCRIPTION	DATE	INTL
FILE	WDS-02.DWG	A	MAX DEPTH OF HYDRANT AMENDED.	08/04/05	DJC
DATE	FEB.00	B	HYDRANT & VALVE DETAILS AMENDED	18/10/05	DJC
DESIGNED	G. PENHALIGON				

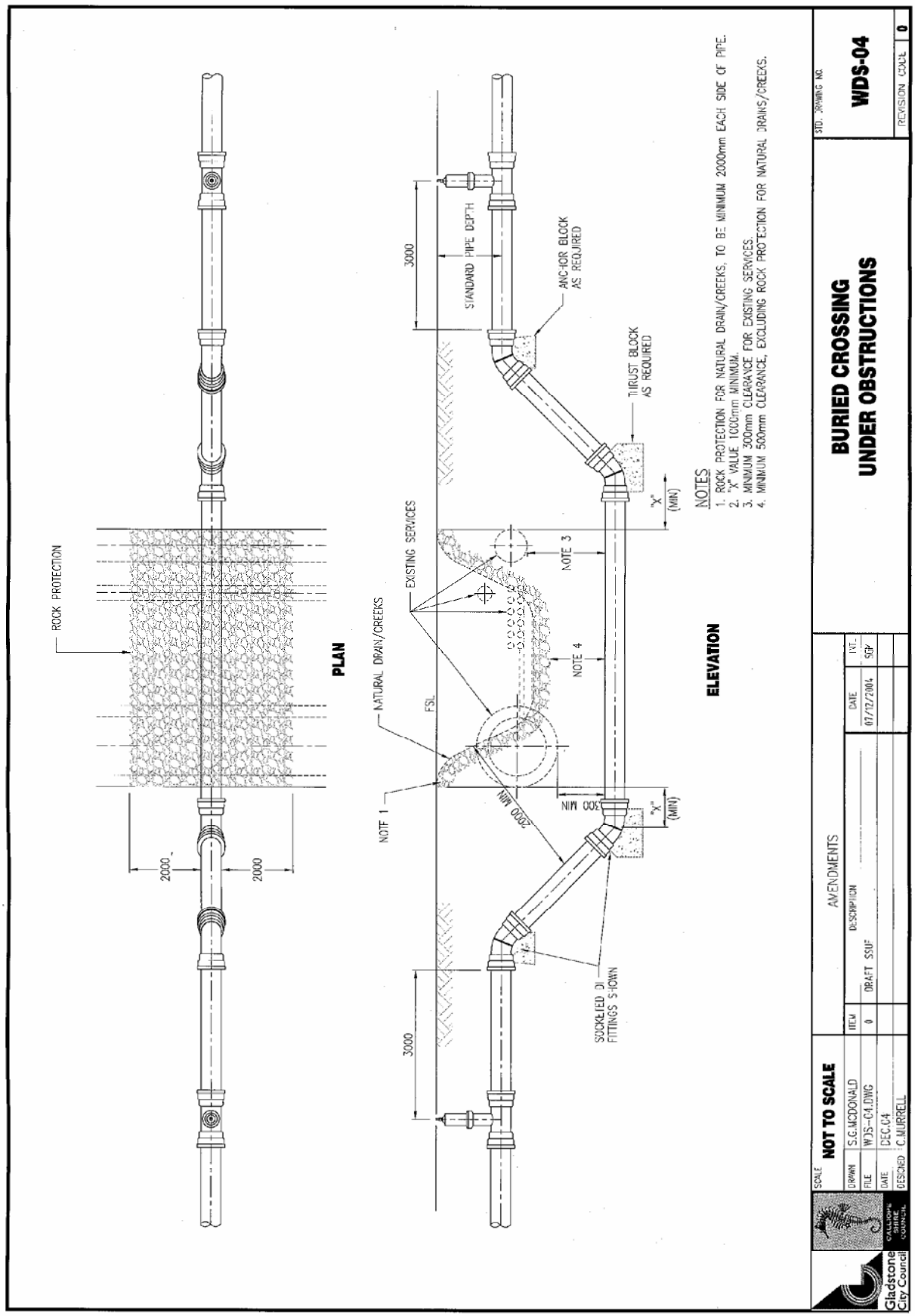
Gladstone City Council — Calliope Shire Council

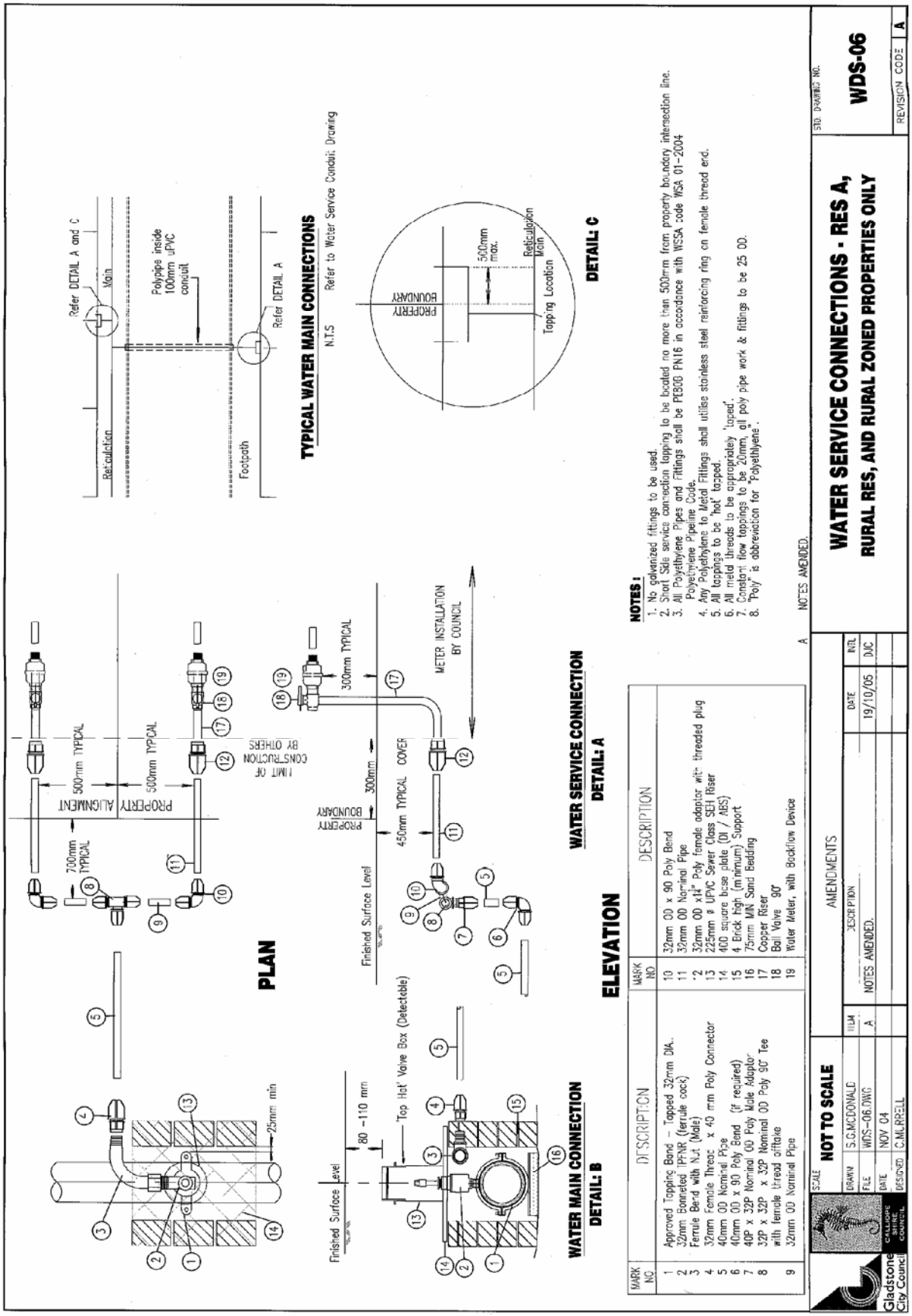
HYDRANT AND VALVE INSTALLATION

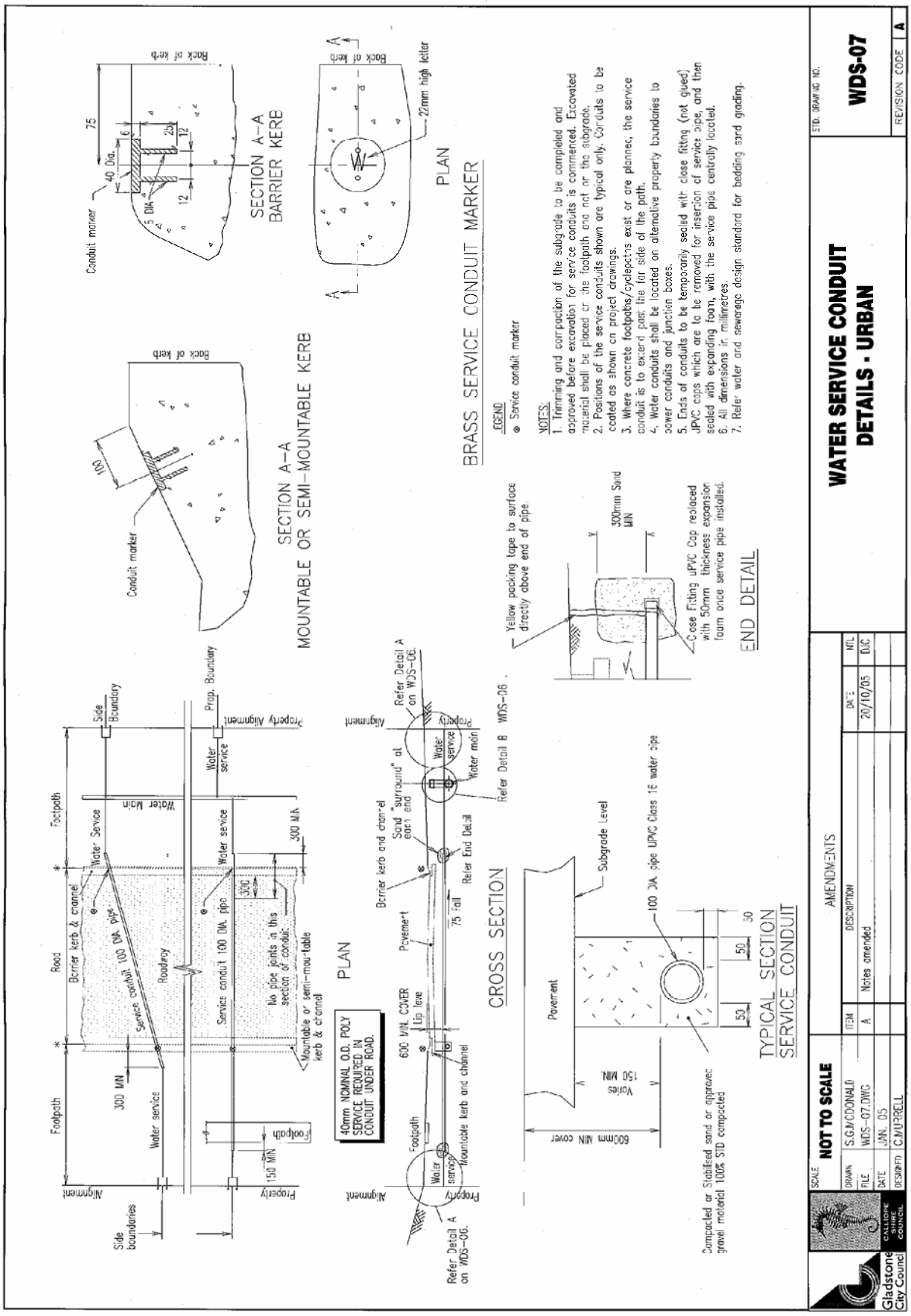
STD. DRAWING NO. **WDS-02**

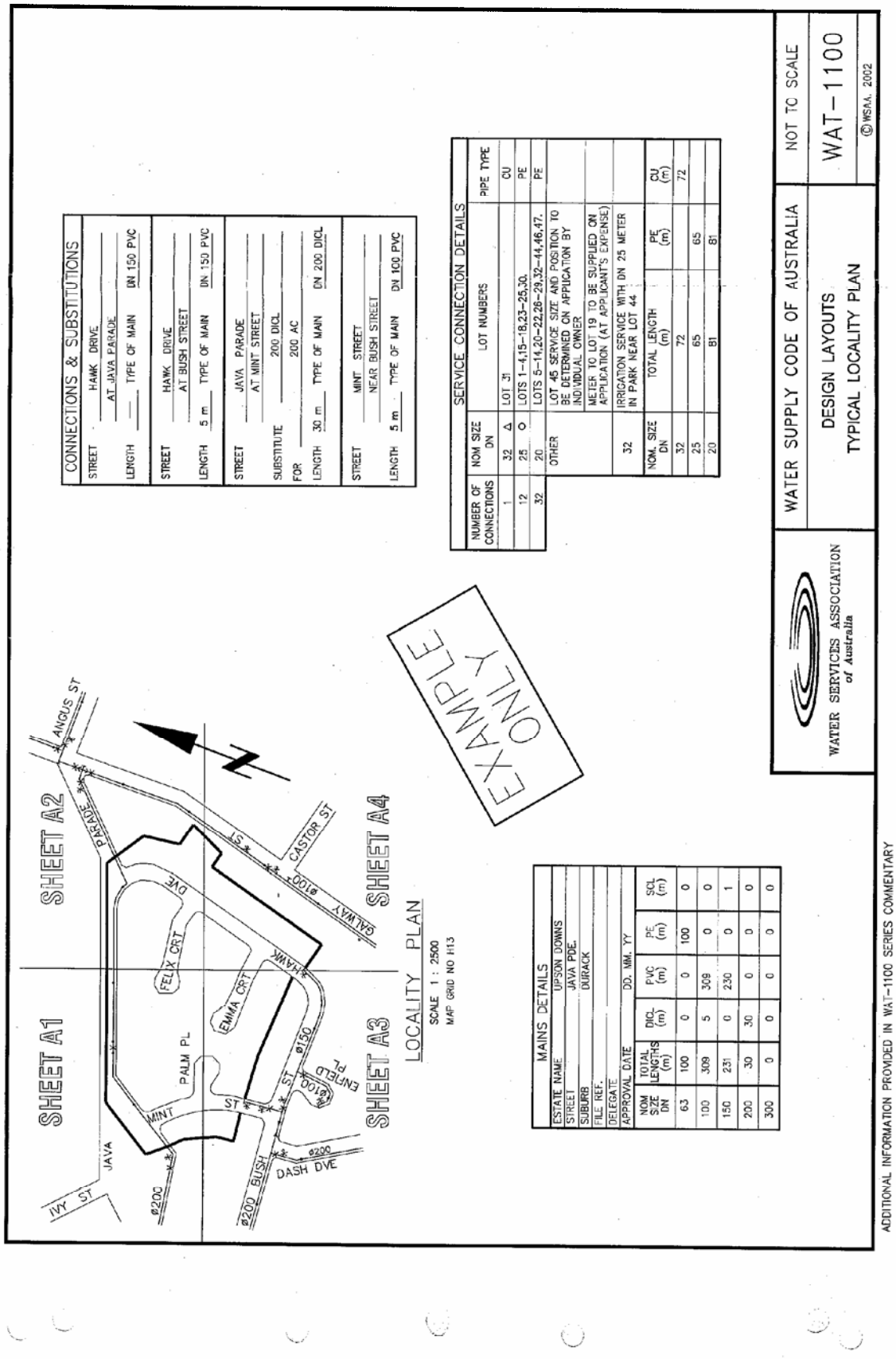
REVISION CODE B


① AIR VALVE (Size as specified by Council)
② BALL VALVE (Size as specified by Council)
③ .D. COPPER PIPE (Size as specified by Council)
MARKER (RURAL AREAS)
AV
50NB HD. GALVANISED STEEL POST PAINTED WHITE
1000
500
400 MAX
6mm H.D. GALV. CHEQ PLATE LID WITH ~ 40x10mm SLOT CUT IN CENTRE.
75mm
CONCRETE 1050ø MANHOLE SECTION
FLANGE THREADED TO TAKE 25mm COPPER PIPE
INVERT CONVERTER SLAB (600x600mm Opening)
100mm DIA RISER
300 SAND BED
UPVC CLASS 16 SIZE AS PER PROJECT DWGS.
THRUST BLOCK
C.I.TEE (SO/SO/FL) OR BUCKFOOT BEND
CONCRETE THRUST BLOCK
AIR VALVE DETAIL
DEPTH TO SUIT.
1056ø
1050 ø PRECAST PIPE
AIR VALVE CONCRETE PIT
6mm FLOOR PLATE/GRID MESH ~
ELEVATION
NOTES
1. ALL CONCRETE WORKMANSHIP SHALL BE IN ACCORDANCE WITH AS 3600.
2. CONCRETE SHALL HAVE A CHARACTERISTIC STRENGTH (f'c) OF 30 MPa.
3. ALL STEELWORK TO BE HOT DIP GALVANISED (MIN).
4. AIR VALVE SHALL BE FITTED AFTER LINE IS CHLORINATED AND FLUSHED. A TEMPORARY HYDRANT MAY BE FITTED DURING FLUSHING OPERATION.
VALVE TO BE VENTAMAT OR APPROVED EQUIVALENT. WHERE AIR VALVE IS < 50mm, A TAPPING BAND CONNECTION IS REQUIRED. WHERE THE AIR VALVE IS > 50mm A TEE IS REQUIRED.
~ 6mm FLOOR PLATE TO BE USED FOR VALVE PIT COVER IN RESIDENTIAL AREAS, GRID MESH CAN BE USED FOR VALVE PIT COVER IN RURAL AREAS.
100 ø UPVC
100 ø GIBAULT
100 ø x 300 long DICL SHORT
100 ø x 45° Bend (FLANGE/FLANGE)
100 ø SLUICE VALVE (FLANGE/FLANGE) REFER DWGS WAT-1301 OF WATER SUPPLY CODE OF AUSTRALIA FOR VALVE BOX DETAILS.
WATER MAIN
100x100 TEE (SO/SO/FL)
PLAN
MARKER POST REFER AIR VALVE DRAWING.
SV
600
FROG FLAP OVER END OF PIPE
G.L.
30
100mm THICK CONC. MARGIN PAD
100 ø UPVC
100 ø GIBAULT
CONC. ANCHOR BLOCK
100 ø x 45° BEND (FLANGE/FLANGE)
TEE (SO/SO/FL)
100 ø SLUICE VALVE (FLANGE/FLANGE)
ELEVATION
NOTES
1. ALL CONCRETE WORKMANSHIP SHALL BE IN ACCORDANCE WITH AS 3600.
2. CONCRETE SHALL HAVE A CHARACTERISTIC STRENGTH (f'c) OF 30 MPa.
3. ALL STEELWORK TO BE HOT DIP GALVANISED (MIN).
* ALTERNATELY DISCHARGE INTO MANHOLE, GULLY PIT OR HEADWALL OF STORMWATER PIPE.
Gladstone City Council
CALLIOPE SHIRE COUNCIL
SCALE NOT TO SCALE
DRAWN S.G.MCDONALD
FILE WDS-03.DWG
DATE DEC.02
DESIGNED G.J.FENHALIGON
AMENDMENTS
ITEM DESCRIPTION DATE INTL
0 DRAFT ISSUE 07/12/2004 SGM
AIR VALVE AND SCOUR VALVE ARRANGMENT
STD. DRAWING NO.
WDS-03
REVISION CODE 0


PLAN
ROCK PROTECTION
2000
2000
ELEVATION
NATURAL DRAIN/CREEKS
EXISTING SERVICES
FSL
NOTE 1
NOTE 3
NOTE 4
3000
STANDARD PIPE DEPTH
ANCHOR BLOCK AS REQUIRED
THRUST BLOCK AS REQUIRED
"X" (MIN)
300 MIN
SOCKETED DI FITTINGS SHOWN
NOTES
1. ROCK PROTECTION FOR NATURAL DRAIN/CREEKS, TO BE MINIMUM 2000mm EACH SIDE OF PIPE.
2. 'X' VALUE 1000mm MINIMUM.
3. MINIMUM 300mm CLEARANCE FOR EXISTING SERVICES.
4. MINIMUM 500mm CLEARANCE, EXCLUDING ROCK PROTECTION FOR NATURAL DRAINS/CREEKS.
BURIED CROSSING UNDER OBSTRUCTIONS
STD. DRAWING NO.
WDS-04
REVISION CODE 0
AMENDMENTS
ITEM
DESCRIPTION
DATE
INT.
0
DRAFT ISSUE
07/12/2004
SGM
SCALE
NOT TO SCALE
DRAWN S.G.MCDONALD
FILE WDS-04.DWG
DATE DEC.04
DESIGNED C.MURRELL
Gladstone City Council
CALLIOPE SHIRE COUNCIL


TYPICAL WATER MAIN CONNECTIONS
N.T.S
Refer to Water Service Conduit Drawing
Refer DETAIL A and C
Main
Reticulation
Polypipe inside 100mm uPVC conduit
Refer DETAIL A
Footpath
DETAIL: C
PROPERTY BOUNDARY
500mm max.
Reticulation Main
Tapping Location
PLAN
700mm TYPICAL
500mm TYPICAL
500mm TYPICAL
PROPERTY ALIGNMENT
LIMIT OF CONSTRUCTION BY OTHERS
25mm min
WATER MAIN CONNECTION
DETAIL: B
ELEVATION
Finished Surface Level
80 -110 mm
Top Hot Valve Box (Detectable)
300mm
PROPERTY BOUNDARY
450mm TYPICAL COVER
300mm TYPICAL
METER INSTALLATION BY COUNCIL
WATER SERVICE CONNECTION
DETAIL: A
NOTES :
1. No galvanized fittings to be used.
2. Short Side service connection tapping to be located no more than 500mm from property boundary intersection line.
3. All Polyethylene Pipes and fittings shall be PE80B PN16 in accordance with WSA code WSA 01-2004 Polyethylene Pipeline Code.
4. Any Polyethylene to Metal Fittings shall utilise stainless steel reinforcing ring on ferrule thread end.
5. All toppings to be 'hot' tapped.
6. All mield threads to be appropriately 'taped'.
7. Constant flow toppings to be 20mm, all poly pipe work & fittings to be 25 OD.
8. 'Poly' is abbreviation for 'Polyethylene'.
A. NOTES AMENDED.
WATER SERVICE CONNECTIONS - RES A, RURAL RES, AND RURAL ZONED PROPERTIES ONLY
STD. DRAWING NO.
WDS-06
REVISION CODE A
MARK NO | DESCRIPTION
1 Approved Topping Band – Tapped 32mm DIA..
2 32mm Bonneted TPFNR (ferrule cock)
3 Ferrule Bend with Nut (Male)
4 32mm Ferrule Thread x 40 mm Poly Connector
5 40mm OD Nominal Pipe
6 40mm OD x 90 Poly Bend (if required)
7 40P x 32P Nominal OD Poly Male Adaptor
8 32P x 32P x 32P Nominal OD Poly 90° Tee with ferrule thread offtake
9 32mm OD Nominal Pipe
10 32mm OD x 90 Poly Bend
11 32mm OD Nominal Pipe
12 32mm OD x¼" Poly female adaptor with threaded plug
13 225mm ø UPVC Sewer Class SEH Riser
14 400 square base plate (DI / ABS)
15 4 Brick high (minimum) Support
16 75mm MIN Sand Bedding
17 Copper Riser
18 Ball Valve 90°
19 Water Meter, with Backflow Device
SCALE NOT TO SCALE
DRAWN S.G.MCDONALD
FILE WDS-06.DWG
DATE NOV 04
DESIGNED C.M.RRELL
AMENDMENTS
ITEM A
DESCRIPTION NOTES AMENDED.
DATE 19/10/05
INITIAL DJC
Gladstone City Council
CALLIOPE SHIRE COUNCIL


WATER SERVICE CONDUIT
DETAILS - URBAN
WDS-07
NOT TO SCALE
S.G.M.CDONALD
WDS-07.DWG
JAN. 05
C.MURRELL
AMENDMENTS
ITEM
DESCRIPTION
DATE
A
Notes amended
20/10/05
SECTION A-A
BARRIER KERB
SECTION A-A
MOUNTABLE OR SEMI-MOUNTABLE KERB
BRASS SERVICE CONDUIT MARKER
PLAN
LEGEND
Service conduit marker
NOTES:
1. Trimming and compaction of the subgrade to be completed and approved before excavation for service conduits is commenced. Excavated material shall be placed on the footpath and not on the subgrade.
2. Positions of the service conduits shown are typical only. Conduits to be coated as shown on project drawings.
3. Where concrete footpaths/cycleways exist or are planned, the service conduit is to extend past the far side of the path.
4. Water conduits shall be located on alternative property boundaries to power conduits and junction boxes.
5. Ends of conduits to be temporarily sealed with close fitting (not glued) UPVC caps which are to be removed for insertion of service pipe, and then sealed with expanding foam, with the service pipe centrally located.
6. All dimensions in millimetres.
7. Refer water and sewerage design standard for bedding sand grading.
END DETAIL
PLAN
CROSS SECTION
TYPICAL SECTION
SERVICE CONDUIT
Conduit marker
Back of kerb
Footpath
Road
Barrier kerb & channel
Water Service
Water Main
Roadway
Service conduit 100 DIA. pipe
Side Boundary
Prop. Boundary
Property Alignment
Water service
300 MIN
No pipe joints in this section of conduit.
Mountable or semi-mountable kerb & channel
40mm NOMINAL O.D. POLY SERVICE REQUIRED IN CONDUIT UNDER ROAD.
Refer Detail A on WDS-06.
Refer Detail B WDS-06.
Refer End Detail
75 Rad
600 MIN. COVER
Lip level
Pavement
Subgrade Level
100 DIA. pipe UPVC Class 16 water pipe
Compacted or Stabilised sand or approved gravel material 100% STD compacted
Yellow packing tape to surface directly above end of pipe.
Close Fitting uPVC Cap replaced with 50mm thickness expansion foam once service pipe installed.
300mm Sand MIN
22mm high letter
40 Dia.
5 DIA
20
12
75
6
100
150 MIN
Varies
600mm MIN cover
50
30
Gladstone City Council
CALLIOPE SHIRE COUNCIL


CONNECTIONS & SUBSTITUTIONS
STREET HAWK DRIVE
AT JAVA PARADE
LENGTH — TYPE OF MAIN DN 150 PVC
STREET HAWK DRIVE
AT BUSH STREET
LENGTH 5 m TYPE OF MAIN DN 150 PVC
STREET JAVA PARADE
AT MINT STREET
SUBSTITUTE 200 DICL
FOR 200 AC
LENGTH 30 m TYPE OF MAIN DN 200 DICL
STREET MINT STREET
NEAR BUSH STREET
LENGTH 5 m TYPE OF MAIN DN 100 PVC
SERVICE CONNECTION DETAILS
NUMBER OF CONNECTIONS
NOM SIZE DN
LOT NUMBERS
PIPE TYPE
1 32 LOT 31 CU
12 25 LOTS 1–4,15–18,23–25,30. PE
32 20 LOTS 5–14,20–22,26–29,32–44,46,47. PE
OTHER LOT 45 SERVICE SIZE AND POSITION TO BE DETERMINED ON APPLICATION BY INDIVIDUAL OWNER
METER TO LOT 19 TO BE SUPPLIED ON APPLICATION (AT APPLICANT'S EXPENSE)
32 IRRIGATION SERVICE WITH DN 25 METER IN PARK NEAR LOT 44
NOM. SIZE DN
TOTAL LENGTH (m)
PE (m)
CU (m)
32 72 72
25 65 65
20 81 81
SHEET A1
SHEET A2
SHEET A3
SHEET A4
ANGUS ST
PARADE
CASTOR ST
GALWAY
DVE
FELIX CRT
EMMA CRT
HAWK
PALM PL
MINT ST
ENFIELD PL
JAVA
IVY ST
BUSH ST
DASH DVE
ø200
ø150
ø100
LOCALITY PLAN
SCALE 1 : 2500
MAP GRID NO H13
EXAMPLE ONLY
MAINS DETAILS
ESTATE NAME UPSON DOWNS
STREET JAVA PDE.
SUBURB DURACK
FILE REF.
DELEGATE
APPROVAL DATE DD. MM. YY
NOM SIZE DN | TOTAL LENGTHS (m) | DICL (m) | PVC (m) | PE (m) | SCL (m)
63 100 0 0 100 0
100 309 5 309 0 0
150 231 0 230 0 1
200 30 30 0 0 0
300 0 0 0 0 0
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
DESIGN LAYOUTS
TYPICAL LOCALITY PLAN
NOT TO SCALE
WAT–1100
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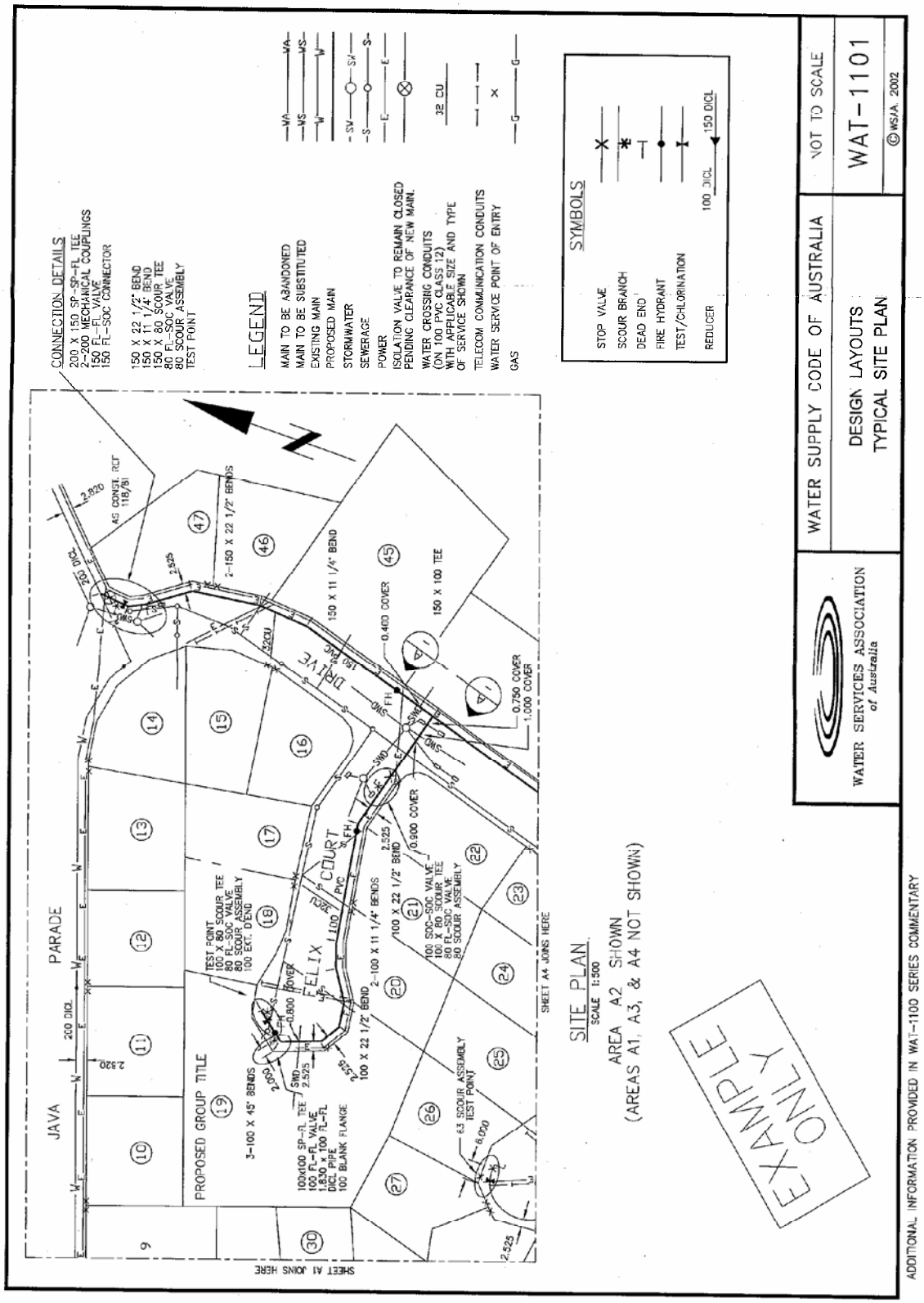
CONNECTION DETAILS
200 X 150 SP-SP-FL TEE
2-200 MECHANICAL COUPLINGS
150 FL-FL VALVE
150 FL-SOC CONNECTOR
150 X 22 1/2° BEND
150 X 11 1/4° BEND
150 X 80 SCOUR TEE
80 FL-SOC VALVE
80 SCOUR ASSEMBLY
TEST POINT
LEGEND
MAIN TO BE ABANDONED
MAIN TO BE SUBSTITUTED
EXISTING MAIN
PROPOSED MAIN
STORMWATER
SEWERAGE
POWER
ISOLATION VALVE TO REMAIN CLOSED PENDING CLEARANCE OF NEW MAIN.
WATER CROSSING CONDUITS (ON 100 PVC CLASS 12) WITH APPLICABLE SIZE AND TYPE OF SERVICE SHOWN
TELECOM COMMUNICATION CONDUITS
WATER SERVICE POINT OF ENTRY
GAS
SYMBOLS
STOP VALVE
SCOUR BRANCH
DEAD END
FIRE HYDRANT
TEST/CHLORINATION
REDUCER
JAVA PARADE
PROPOSED GROUP TITLE
FELIX COURT
DRIVE
SHEET A4 JOINS HERE
SHEET A1 JOINS HERE
SITE PLAN
SCALE 1:500
AREA A2 SHOWN
(AREAS A1, A3, & A4 NOT SHOWN)
EXAMPLE ONLY
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
DESIGN LAYOUTS
TYPICAL SITE PLAN
NOT TO SCALE
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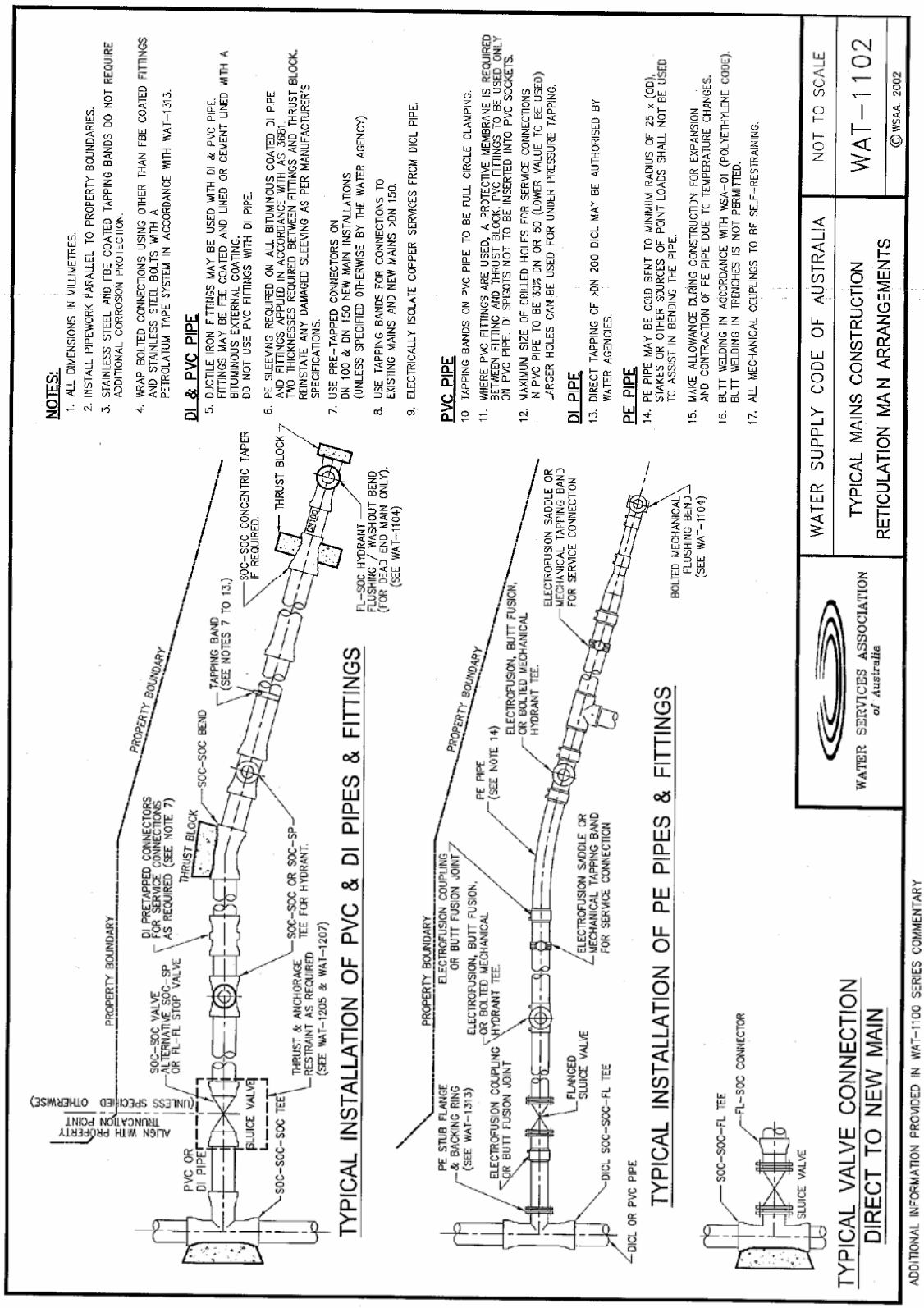
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. INSTALL PIPEWORK PARALLEL TO PROPERTY BOUNDARIES.
3. STAINLESS STEEL AND FBE COATED TAPPING BANDS DO NOT REQUIRE ADDITIONAL CORROSION PROTECTION.
4. WRAP BOLTED CONNECTIONS USING OTHER THAN FBE COATED FITTINGS AND STAINLESS STEEL BOLTS WITH A PETROLATUM TAPE SYSTEM IN ACCORDANCE WITH WAT-1313.
DI & PVC PIPE
5. DUCTILE IRON FITTINGS MAY BE USED WITH DI & PVC PIPE. FITTINGS MAY BE FBE COATED AND LINED OR CEMENT LINED WITH A BITUMINOUS EXTERNAL COATING. DO NOT USE PVC FITTINGS WITH DI PIPE.
6. PE SLEEVING REQUIRED ON ALL BITUMINOUS COATED DI PIPE AND FITTINGS APPLIED IN ACCORDANCE WITH AS 3681. TWO THICKNESSES REQUIRED BETWEEN FITTINGS AND THRUST BLOCK. REINSTATE ANY DAMAGED SLEEVING AS PER MANUFACTURER'S SPECIFICATIONS.
7. USE PRE-TAPPED CONNECTORS ON DN 100 & DN 150 NEW MAIN INSTALLATIONS (UNLESS SPECIFIED OTHERWISE BY THE WATER AGENCY).
8. USE TAPPING BANDS FOR CONNECTIONS TO EXISTING MAINS AND NEW MAINS >DN 150.
9. ELECTRICALLY ISOLATE COPPER SERVICES FROM DICL PIPE.
PVC PIPE
10. TAPPING BANDS ON PVC PIPE TO BE FULL CIRCLE CLAMPING.
11. WHERE PVC FITTINGS ARE USED, A PROTECTIVE MEMBRANE IS REQUIRED BETWEEN FITTING AND THRUST BLOCK. PVC FITTINGS TO BE USED ONLY ON PVC PIPE. DI SPIGOTS NOT TO BE INSERTED INTO PVC SOCKETS.
12. MAXIMUM SIZE OF DRILLED HOLES FOR SERVICE CONNECTIONS IN PVC PIPE TO BE 30% OF DN OR 50 (LOWER VALUE TO BE USED) LARGER HOLES CAN BE USED FOR UNDER PRESSURE TAPPING.
DI PIPE
13. DIRECT TAPPING OF >DN 200 DICL MAY BE AUTHORISED BY WATER AGENCIES.
PE PIPE
14. PE PIPE MAY BE COLD BENT TO MINIMUM RADIUS OF 25 x (OD). STAKES OR OTHER SOURCES OF POINT LOADS SHALL NOT BE USED TO ASSIST IN BENDING THE PIPE.
15. MAKE ALLOWANCE DURING CONSTRUCTION FOR EXPANSION AND CONTRACTION OF PE PIPE DUE TO TEMPERATURE CHANGES.
16. BUTT WELDING IN ACCORDANCE WITH WSA-01 (POLYETHYLENE CODE). BUTT WELDING IN TRENCHES IS NOT PERMITTED.
17. ALL MECHANICAL COUPLINGS TO BE SELF-RESTRAINING.
TYPICAL INSTALLATION OF PVC & DI PIPES & FITTINGS
PROPERTY BOUNDARY
ALIGN WITH PROPERTY TRUNCATION POINT
(UNLESS SPECIFIED OTHERWISE)
PVC OR DI PIPE
SOC-SOC-SOC TEE
SLUICE VALVE
SOC-SOC VALVE ALTERNATIVE SOC-SP OR FL-FL STOP VALVE
DI PRETAPPED CONNECTORS FOR SERVICE CONNECTIONS AS REQUIRED (SEE NOTE 7)
THRUST & ANCHORAGE RESTRAINT AS REQUIRED (SEE WAT-1205 & WAT-1207)
THRUST BLOCK
SOC-SOC BEND
SOC-SOC OR SOC-SP TEE FOR HYDRANT.
TAPPING BAND (SEE NOTES 7 TO 13.)
SOC-SOC CONCENTRIC TAPER IF REQUIRED.
THRUST BLOCK
FL-SOC HYDRANT FLUSHING / WASHOUT BEND (FOR DEAD END MAIN ONLY). (SEE WAT-1104)
TYPICAL INSTALLATION OF PE PIPES & FITTINGS
PROPERTY BOUNDARY
PE STUB FLANGE & BACKING RING (SEE WAT-1313)
ELECTROFUSION COUPLING OR BUTT FUSION JOINT
DICL SOC-SOC-FL TEE
FLANGED SLUICE VALVE
DICL OR PVC PIPE
ELECTROFUSION, BUTT FUSION, OR BOLTED MECHANICAL HYDRANT TEE.
PE PIPE (SEE NOTE 14)
ELECTROFUSION SADDLE OR MECHANICAL TAPPING BAND FOR SERVICE CONNECTION
ELECTROFUSION, BUTT FUSION, OR BOLTED MECHANICAL HYDRANT TEE.
ELECTROFUSION SADDLE OR MECHANICAL TAPPING BAND FOR SERVICE CONNECTION
BOLTED MECHANICAL FLUSHING BEND (SEE WAT-1104)
TYPICAL VALVE CONNECTION DIRECT TO NEW MAIN
SOC-SOC-FL TEE
FL-SOC CONNECTOR
SLUICE VALVE
ADDITIONAL INFORMATION PROVIDED IN WAT-1100 SERIES COMMENTARY
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
TYPICAL MAINS CONSTRUCTION
RETICULATION MAIN ARRANGEMENTS
NOT TO SCALE
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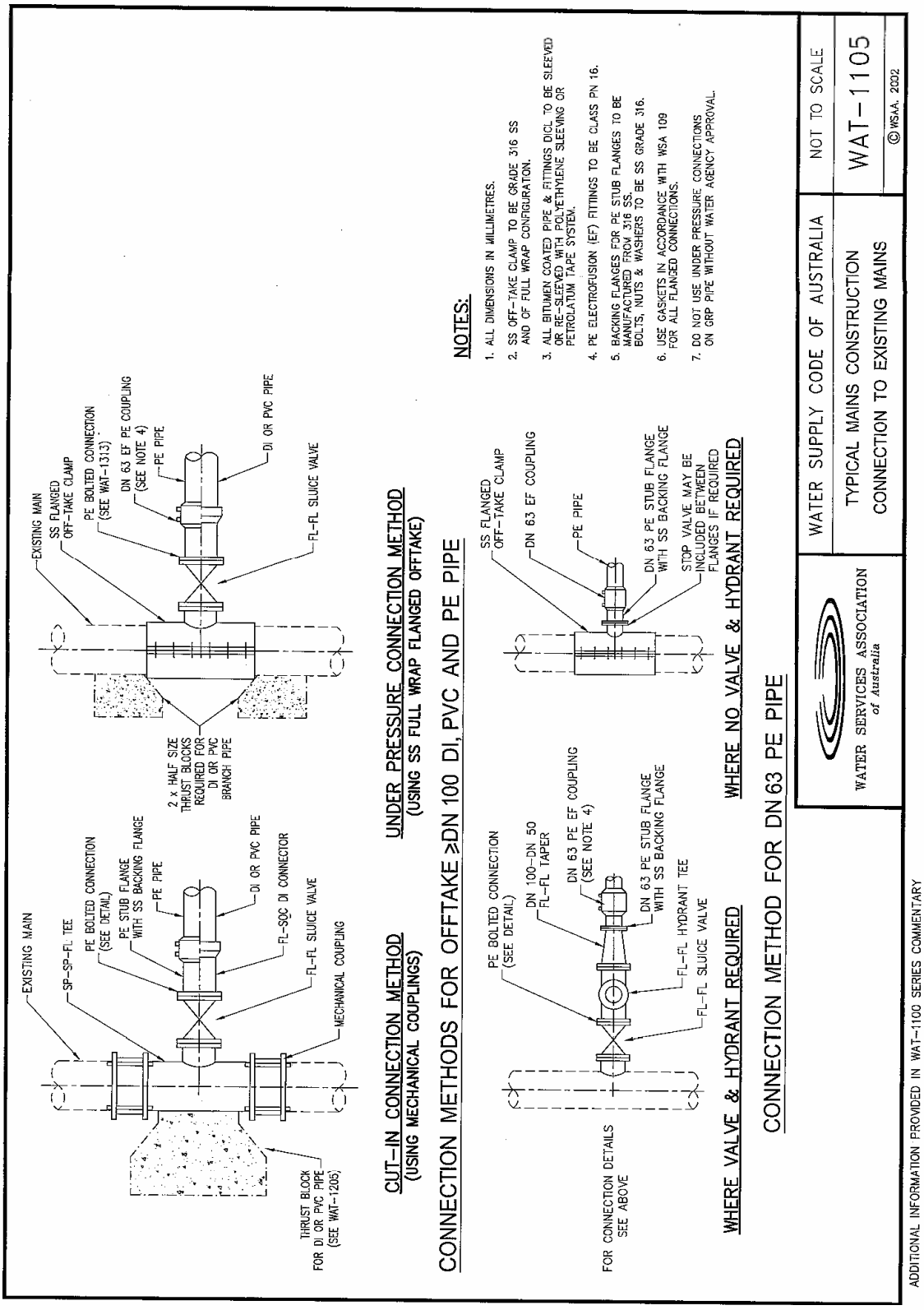
CUT-IN CONNECTION METHOD
(USING MECHANICAL COUPLINGS)
EXISTING MAIN
SP-SP-FL TEE
PE BOLTED CONNECTION (SEE DETAIL)
PE STUB FLANGE WITH SS BACKING FLANGE
PE PIPE
DI OR PVC PIPE
FL-SOC DI CONNECTOR
FL-FL SLUICE VALVE
MECHANICAL COUPLING
THRUST BLOCK FOR DI OR PVC PIPE (SEE WAT-1205)
UNDER PRESSURE CONNECTION METHOD
(USING SS FULL WRAP FLANGED OFFTAKE)
EXISTING MAIN
SS FLANGED OFF-TAKE CLAMP
PE BOLTED CONNECTION (SEE WAT-1313)
DN 63 EF PE COUPLING (SEE NOTE 4)
PE PIPE
DI OR PVC PIPE
FL-FL SLUICE VALVE
2 x HALF SIZE THRUST BLOCKS REQUIRED FOR DI OR PVC BRANCH PIPE
CONNECTION METHODS FOR OFFTAKE ≥DN 100 DI, PVC AND PE PIPE
WHERE VALVE & HYDRANT REQUIRED
PE BOLTED CONNECTION (SEE DETAIL)
DN 100-DN 50 FL-FL TAPER
DN 63 PE EF COUPLING (SEE NOTE 4)
DN 63 PE STUB FLANGE WITH SS BACKING FLANGE
FL-FL HYDRANT TEE
FL-FL SLUICE VALVE
FOR CONNECTION DETAILS SEE ABOVE
WHERE NO VALVE & HYDRANT REQUIRED
SS FLANGED OFF-TAKE CLAMP
DN 63 EF COUPLING
PE PIPE
DN 63 PE STUB FLANGE WITH SS BACKING FLANGE
STOP VALVE MAY BE INCLUDED BETWEEN FLANGES IF REQUIRED
CONNECTION METHOD FOR DN 63 PE PIPE
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. SS OFF-TAKE CLAMP TO BE GRADE 316 SS AND OF FULL WRAP CONFIGURATION.
3. ALL BITUMEN COATED PIPE & FITTINGS DICL TO BE SLEEVED OR RE-SLEEVED WITH POLYETHYLENE SLEEVING OR PETROLATUM TAPE SYSTEM.
4. PE ELECTROFUSION (EF) FITTINGS TO BE CLASS PN 16.
5. BACKING FLANGES FOR PE STUB FLANGES TO BE MANUFACTURED FROM 316 SS. BOLTS, NUTS & WASHERS TO BE SS GRADE 316.
6. USE GASKETS IN ACCORDANCE WITH WSA 109 FOR ALL FLANGED CONNECTIONS.
7. DO NOT USE UNDER PRESSURE CONNECTIONS ON GRP PIPE WITHOUT WATER AGENCY APPROVAL.
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
TYPICAL MAINS CONSTRUCTION
CONNECTION TO EXISTING MAINS
NOT TO SCALE
WAT-1105
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ADDITIONAL INFORMATION PROVIDED IN WAT-1100 SERIES COMMENTARY

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 A FRAGMENT 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
SANDS	*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	NOT DIGGABLE WITH PICK. HAMMER BLOW "RINGS" JOINTS (BREAK IN ROCK) SPACED 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 of Australia

WATER SUPPLY CODE OF AUSTRALIA

SOIL CLASSIFICATION GUIDELINES AND ALLOWABLE BEARING PRESSURES FOR ANCHORS AND THRUST BLOCKS

NOT TO SCALE

WAT-1200

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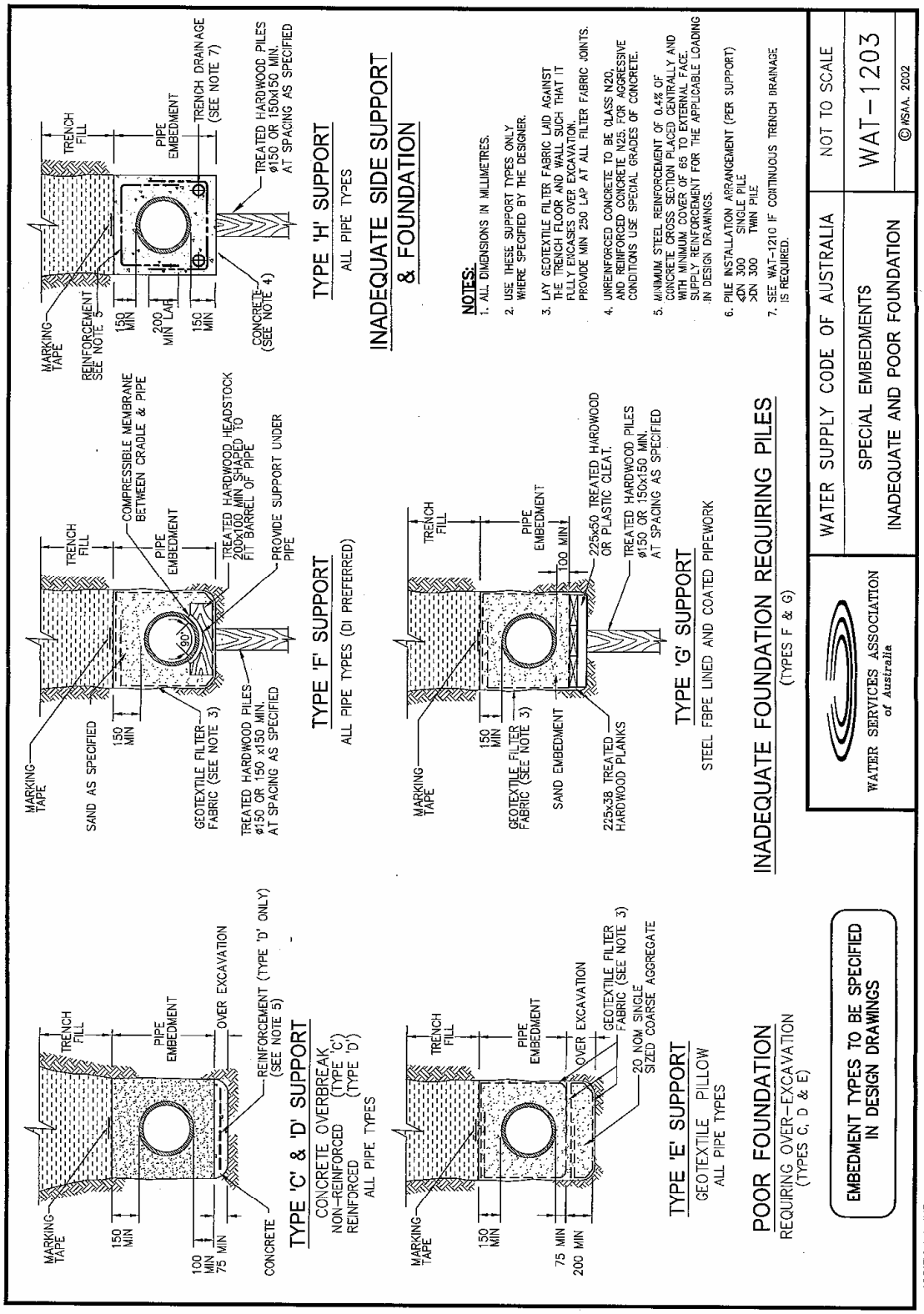
TYPE 'C' & 'D' SUPPORT
CONCRETE OVERBREAK (TYPE 'C')
NON-REINFORCED (TYPE 'D')
REINFORCED
ALL PIPE TYPES
MARKING TAPE
TRENCH FILL
PIPE EMBEDMENT
OVER EXCAVATION
REINFORCEMENT (TYPE 'D' ONLY) (SEE NOTE 5)
CONCRETE
150 MIN
100 MIN
75 MIN
TYPE 'E' SUPPORT
GEOTEXTILE PILLOW
ALL PIPE TYPES
GEOTEXTILE FILTER FABRIC (SEE NOTE 3)
20 NOM SINGLE SIZED COARSE AGGREGATE
75 MIN
200 MIN
POOR FOUNDATION
REQUIRING OVER-EXCAVATION
(TYPES C, D & E)
EMBEDMENT TYPES TO BE SPECIFIED IN DESIGN DRAWINGS
TYPE 'F' SUPPORT
ALL PIPE TYPES (DI PREFERRED)
SAND AS SPECIFIED
COMPRESSIBLE MEMBRANE BETWEEN CRADLE & PIPE
TREATED HARDWOOD HEADSTOCK 200x100 MIN SHAPED TO FIT BARREL OF PIPE
PROVIDE SUPPORT UNDER PIPE
GEOTEXTILE FILTER FABRIC (SEE NOTE 3)
TREATED HARDWOOD PILES ø150 OR 150 x150 MIN. AT SPACING AS SPECIFIED
90°
TYPE 'G' SUPPORT
STEEL FBPE LINED AND COATED PIPEWORK
SAND EMBEDMENT
100 MIN
225x50 TREATED HARDWOOD OR PLASTIC CLEAT.
225x38 TREATED HARDWOOD PLANKS
TREATED HARDWOOD PILES ø150 OR 150x150 MIN. AT SPACING AS SPECIFIED
INADEQUATE FOUNDATION REQUIRING PILES
(TYPES F & G)
TYPE 'H' SUPPORT
ALL PIPE TYPES
INADEQUATE SIDE SUPPORT & FOUNDATION
REINFORCEMENT SEE NOTE 5
200 MIN LAP
TRENCH DRAINAGE (SEE NOTE 7)
CONCRETE (SEE NOTE 4)
TREATED HARDWOOD PILES ø150 OR 150x150 MIN. AT SPACING AS SPECIFIED
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. USE THESE SUPPORT TYPES ONLY WHERE SPECIFIED BY THE DESIGNER.
3. LAY GEOTEXTILE FILTER FABRIC LAID AGAINST THE TRENCH FLOOR AND WALL SUCH THAT IT FULLY ENCASES OVER EXCAVATION. PROVIDE MIN 250 LAP AT ALL FILTER FABRIC JOINTS.
4. UNREINFORCED CONCRETE TO BE CLASS N20, AND REINFORCED CONCRETE N25, FOR AGGRESSIVE CONDITIONS USE SPECIAL GRADES OF CONCRETE.
5. MINIMUM STEEL REINFORCEMENT OF 0.4% OF CONCRETE CROSS SECTION PLACED CENTRALLY AND WITH MINIMUM COVER OF 65 TO EXTERNAL FACE. SUPPLY REINFORCEMENT FOR THE APPLICABLE LOADING IN DESIGN DRAWINGS.
6. PILE INSTALLATION ARRANGEMENT (PER SUPPORT)
≤DN 300 SINGLE PILE
>DN 300 TWIN PILE
7. SEE WAT-1210 IF CONTINUOUS TRENCH DRAINAGE IS REQUIRED.
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
SPECIAL EMBEDMENTS
INADEQUATE AND POOR FOUNDATION
NOT TO SCALE
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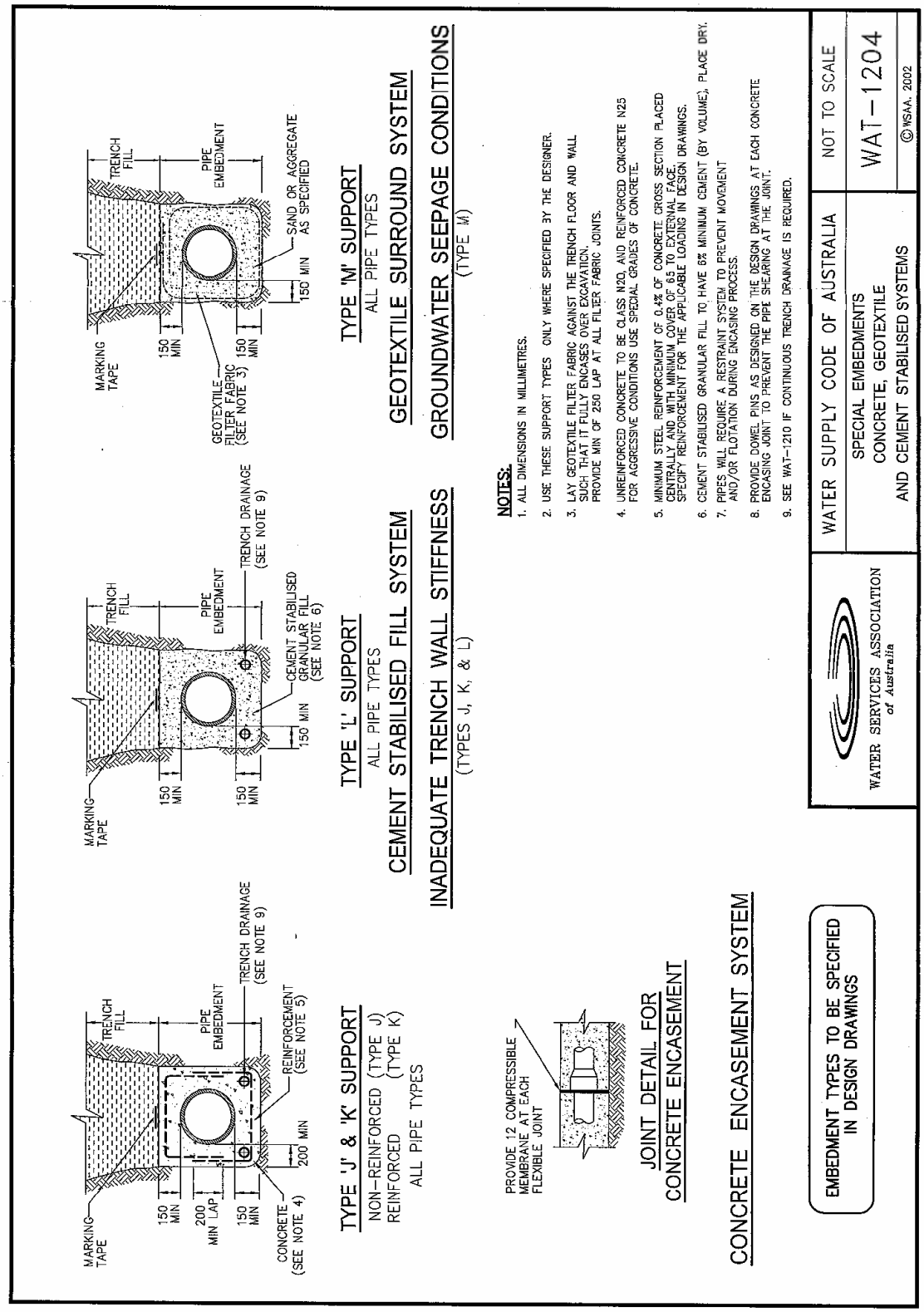
MARKING TAPE
TRENCH FILL
PIPE EMBEDMENT
150 MIN
200 MIN LAP
CONCRETE (SEE NOTE 4)
REINFORCEMENT (SEE NOTE 5)
200 MIN
TRENCH DRAINAGE (SEE NOTE 9)
TYPE 'J' & 'K' SUPPORT
NON-REINFORCED (TYPE J)
REINFORCED (TYPE K)
ALL PIPE TYPES
CONCRETE ENCASEMENT SYSTEM
PROVIDE 12 COMPRESSIBLE MEMBRANE AT EACH FLEXIBLE JOINT
JOINT DETAIL FOR CONCRETE ENCASEMENT
CEMENT STABILISED GRANULAR FILL (SEE NOTE 6)
TYPE 'L' SUPPORT
ALL PIPE TYPES
CEMENT STABILISED FILL SYSTEM
INADEQUATE TRENCH WALL STIFFNESS
(TYPES J, K, & L)
GEOTEXTILE FILTER FABRIC (SEE NOTE 3)
SAND OR AGGREGATE AS SPECIFIED
TYPE 'M' SUPPORT
ALL PIPE TYPES
GEOTEXTILE SURROUND SYSTEM
GROUNDWATER SEEPAGE CONDITIONS
(TYPE M)
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. USE THESE SUPPORT TYPES ONLY WHERE SPECIFIED BY THE DESIGNER.
3. LAY GEOTEXTILE FILTER FABRIC AGAINST THE TRENCH FLOOR AND WALL SUCH THAT IT FULLY ENCASES OVER EXCAVATION. PROVIDE MIN OF 250 LAP AT ALL FILTER FABRIC JOINTS.
4. UNREINFORCED CONCRETE TO BE CLASS N20, AND REINFORCED CONCRETE N25 FOR AGGRESSIVE CONDITIONS USE SPECIAL GRADES OF CONCRETE.
5. MINIMUM STEEL REINFORCEMENT OF 0.4% OF CONCRETE CROSS SECTION PLACED CENTRALLY AND WITH MINIMUM COVER OF 65 TO EXTERNAL FACE. SPECIFY REINFORCEMENT FOR THE APPLICABLE LOADING IN DESIGN DRAWINGS.
6. CEMENT STABILISED GRANULAR FILL TO HAVE 6% MINIMUM CEMENT (BY VOLUME), PLACE DRY.
7. PIPES WILL REQUIRE A RESTRAINT SYSTEM TO PREVENT MOVEMENT AND/OR FLOTATION DURING ENCASING PROCESS.
8. PROVIDE DOWEL PINS AS DESIGNED ON THE DESIGN DRAWINGS AT EACH CONCRETE ENCASING JOINT TO PREVENT THE PIPE SHEARING AT THE JOINT.
9. SEE WAT-1210 IF CONTINUOUS TRENCH DRAINAGE IS REQUIRED.
EMBEDMENT TYPES TO BE SPECIFIED IN DESIGN DRAWINGS
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
SPECIAL EMBEDMENTS
CONCRETE, GEOTEXTILE
AND CEMENT STABILISED SYSTEMS
NOT TO SCALE
WAT-1204
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ADDITIONAL INFORMATION PROVIDED IN WAT-1200 SERIES COMMENTARY

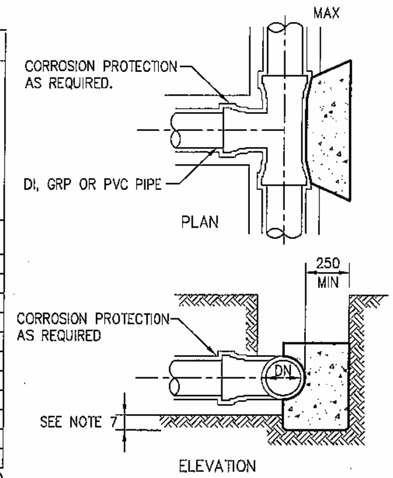
MINIMUM THRUST AREA FOR BLOCKS IN SQUARE METRES (m^2)
DESIGN PRESSURE 1000 kPa (NOM. 100 m HEAD)

SOIL CLASSIFICATION AND ALLOWABLE HORIZONTAL BEARING PRESSURE OF GROUND. (SEE NOTE 3)

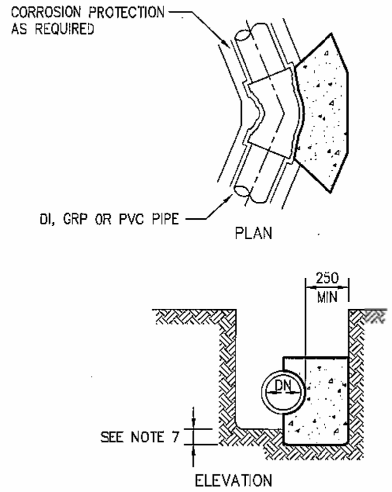
FOR HORIZONTAL THRUST ON TRENCH WALLS WHERE THE COVER OVER PIPES IS 450 OR GREATER	90° & 60° HORIZONTAL BENDS			45° & 30° HORIZONTAL BENDS			22.5° HORIZONTAL BENDS			11.25° HORIZONTAL BENDS			TEES AND DEAD ENDS		
	STIFF CLAY MEDIUM DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY SOUND ROCK	STIFF CLAY MEDIUM-DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY SOUND ROCK	STIFF CLAY MEDIUM-DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY SOUND ROCK	STIFF CLAY MEDIUM-DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY SOUND ROCK	STIFF CLAY MEDIUM-DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY SOUND ROCK
PBH kPa	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200
100	0.34	0.17	N	0.18	N	N	N	N	N	N	N	N	0.24	0.12	N
150	0.70	0.35	0.18	0.38	0.19	N	0.20	N	N	N	N	N	0.50	0.25	0.12
200	1.20	0.60	0.30	0.64	0.32	0.16	0.34	0.17	N	0.16	N	N	0.84	0.42	0.21
225	1.52	0.75	0.38	0.81	0.41	0.21	0.42	0.22	0.11	0.22	N	N	1.06	0.53	0.27
250	1.80	0.91	0.45	0.98	0.49	0.25	0.50	0.25	0.12	0.26	0.13	N	1.28	0.64	0.32
300	2.66	1.33	0.66	1.44	0.72	0.36	0.74	0.37	0.18	0.36	0.18	N	1.88	0.94	0.47
375	4.04	2.02	1.01	2.18	1.09	0.55	1.12	0.56	0.28	0.56	0.28	0.14	2.86	1.43	0.72
225	5.71	2.86	0.73	3.09	1.55	0.40	1.58	0.79	0.20	1.58	0.79	0.20	4.04	2.02	0.52
250	6.98	3.49	0.89	3.78	1.89	0.49	1.93	0.98	0.25	1.93	0.98	0.25	4.93	2.37	0.63
300	9.89	4.95	1.27	5.36	2.68	0.68	2.73	1.36	0.35	2.73	1.36	0.35	6.90	3.50	0.89
375	15.16	7.58	1.94	8.21	4.10	1.05	4.19	2.10	0.53	4.19	2.10	0.53	10.72	5.36	1.37

NOMINAL DIAMETER OF FITTING (DN)

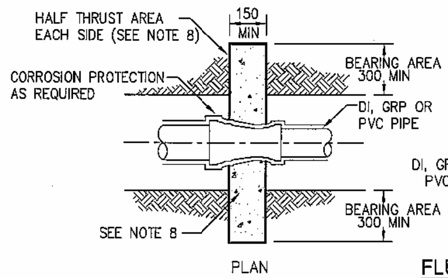
'N' DENOTES NOMINAL THRUST AREA – (SEE NOTES 4&5)
PBH – ALLOWABLE HORIZONTAL BEARING PRESSURE



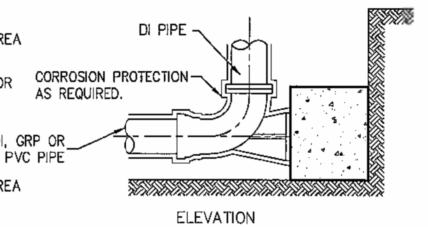
THRUST BLOCK FOR TEES
(FOR HORIZONTAL THRUST)



THRUST BLOCK FOR BENDS
(FOR HORIZONTAL THRUST)



TAPER THRUST BLOCK
(FOR HORIZONTAL THRUST)



FLUSHING/WASHOUT BEND THRUST BLOCK
(FOR HORIZONTAL THRUST)
(MINIMUM REQUIRED THRUST AREA AS PER DEAD END)

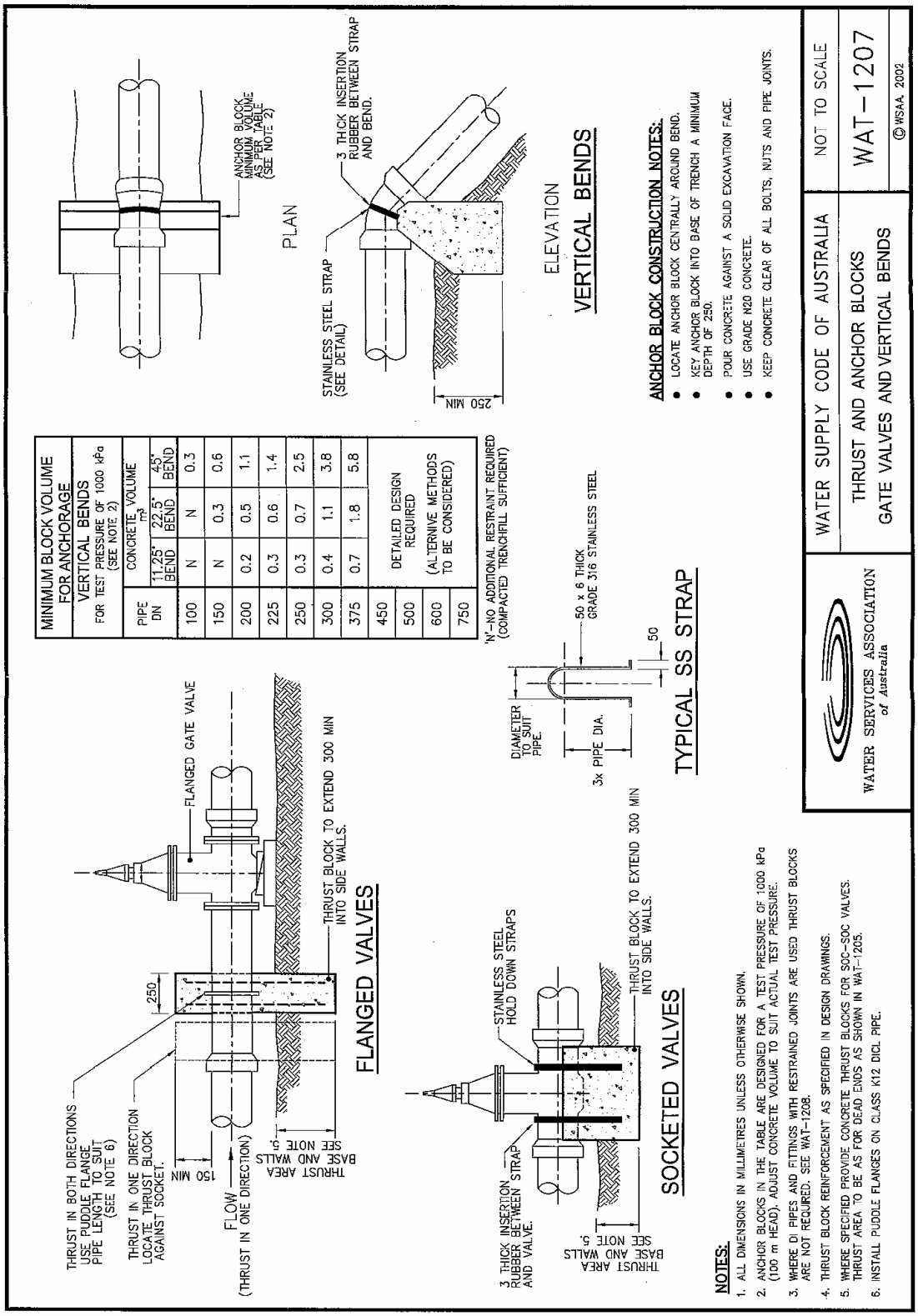
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS NOT TO INTERFERE WITH OTHER SERVICES.
3. SOIL CLASSIFICATIONS USED ON THIS DRAWING ARE EXPLAINED IN WAT–1200.
4. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN:
   - VERY SOFT, SOFT OR FIRM CLAY.
   - LOOSE CLEAN SAND.
   - UNCOMPACTED FILL OR REFUSE.

   A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
5. THE NOMINAL THRUST AREA 'N' TO BE ACHIEVED BY POURING CONCRETE THE FULL LENGTH OF THE FITTING AND EXTENDING FROM THE FLOOR OF THE TRENCH TO ABOVE THE FITTING (SEE ALSO NOTE 7).
6. DESIGN PRESSURES OTHER THAN 1000 kPa REDUCE OR INCREASE THE MINIMUM THRUST AREA BY THE RATIO OF THE DESIGN PRESSURES EXCEPT WHERE:
   - MIN THRUST AREA IS <0.1 m^2, AND
   - 'N' APPEARS IN THE TABLE AND DESIGN PRESSURE IS ABOVE 1000 kPa CALCULATE THE AREA.
7. FINISH THRUST BLOCKS APPROXIMATELY 100 ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
8. THE MINIMUM THRUST AREA FOR TAPER THRUST BLOCKS TO BE EQUAL TO THE DIFFERENCE BETWEEN THE THRUST AREAS FOR DEAD ENDS OF EQUIVALENT DIAMETER TO THOSE EACH SIDE OF TAPER.
9. FOR DOWNWARD VERTICAL THRUST, THE ALLOWABLE BEARING PRESSURES FOR VARIOUS SOILS MAY BE TAKEN AS TWICE THAT FOR HORIZONTAL THRUST SHOWN.
10. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE, PVC OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING. JOINTS TO BE CLEAR OF CONCRETE.
11. CONCRETE THRUST BLOCKS AND ANCHORS FOR VALVES TO BE AS DETAILED IN WAT–1207.

WATER SERVICES ASSOCIATION of Australia	WATER SUPPLY CODE OF AUSTRALIA	NOT TO SCALE
	THRUST BLOCK DETAILS CONCRETE BLOCKS	WAT–1205

ADDITIONAL INFORMATION PROVIDED IN WAT–1200 SERIES COMMENTARY


MINIMUM BLOCK VOLUME FOR ANCHORAGE
VERTICAL BENDS
FOR TEST PRESSURE OF 1000 kPa (SEE NOTE 2)
PIPE DN
CONCRETE VOLUME m³
11.25° BEND
22.5° BEND
45° BEND
100 N N 0.3
150 N 0.3 0.6
200 0.2 0.5 1.1
225 0.3 0.6 1.4
250 0.3 0.7 2.5
300 0.4 1.1 3.8
375 0.7 1.8 5.8
450 DETAILED DESIGN REQUIRED (ALTERNIVE METHODS TO BE CONSIDERED)
500
600
750
'N'-NO ADDITIONAL RESTRAINT REQUIRED (COMPACTED TRENCHFILL SUFFICIENT)
ANCHOR BLOCK MINIMUM VOLUME AS PER TABLE (SEE NOTE 2)
PLAN
3 THICK INSERTION RUBBER BETWEEN STRAP AND BEND.
STAINLESS STEEL STRAP (SEE DETAIL)
250 MIN
ELEVATION
VERTICAL BENDS
ANCHOR BLOCK CONSTRUCTION NOTES:
LOCATE ANCHOR BLOCK CENTRALLY AROUND BEND.
KEY ANCHOR BLOCK INTO BASE OF TRENCH A MINIMUM DEPTH OF 250.
POUR CONCRETE AGAINST A SOLID EXCAVATION FACE.
USE GRADE N20 CONCRETE.
KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS.
THRUST IN BOTH DIRECTIONS USE PUDDLE FLANGE PIPE LENGTH TO SUIT (SEE NOTE 6)
THRUST IN ONE DIRECTION LOCATE THRUST BLOCK AGAINST SOCKET.
FLOW (THRUST IN ONE DIRECTION)
150 MIN
250
FLANGED GATE VALVE
THRUST BLOCK TO EXTEND 300 MIN INTO SIDE WALLS.
THRUST AREA BASE AND WALLS SEE NOTE 5.
FLANGED VALVES
STAINLESS STEEL HOLD DOWN STRAPS
3 THICK INSERTION RUBBER BETWEEN STRAP AND VALVE.
THRUST BLOCK TO EXTEND 300 MIN INTO SIDE WALLS.
THRUST AREA BASE AND WALLS SEE NOTE 5.
SOCKETED VALVES
DIAMETER TO SUIT PIPE.
50 x 6 THICK GRADE 316 STAINLESS STEEL
3x PIPE DIA.
50
TYPICAL SS STRAP
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ANCHOR BLOCKS IN THE TABLE ARE DESIGNED FOR A TEST PRESSURE OF 1000 kPa (100 m HEAD). ADJUST CONCRETE VOLUME TO SUIT ACTUAL TEST PRESSURE.
3. WHERE DI PIPES AND FITTINGS WITH RESTRAINED JOINTS ARE USED THRUST BLOCKS ARE NOT REQUIRED. SEE WAT-1208.
4. THRUST BLOCK REINFORCEMENT AS SPECIFIED IN DESIGN DRAWINGS.
5. WHERE SPECIFIED PROVIDE CONCRETE THRUST BLOCKS FOR SOC-SOC VALVES. THRUST AREA TO BE AS FOR DEAD ENDS AS SHOWN IN WAT-1205.
6. INSTALL PUDDLE FLANGES ON CLASS K12 DICL PIPE.
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
THRUST AND ANCHOR BLOCKS
GATE VALVES AND VERTICAL BENDS
NOT TO SCALE
WAT-1207
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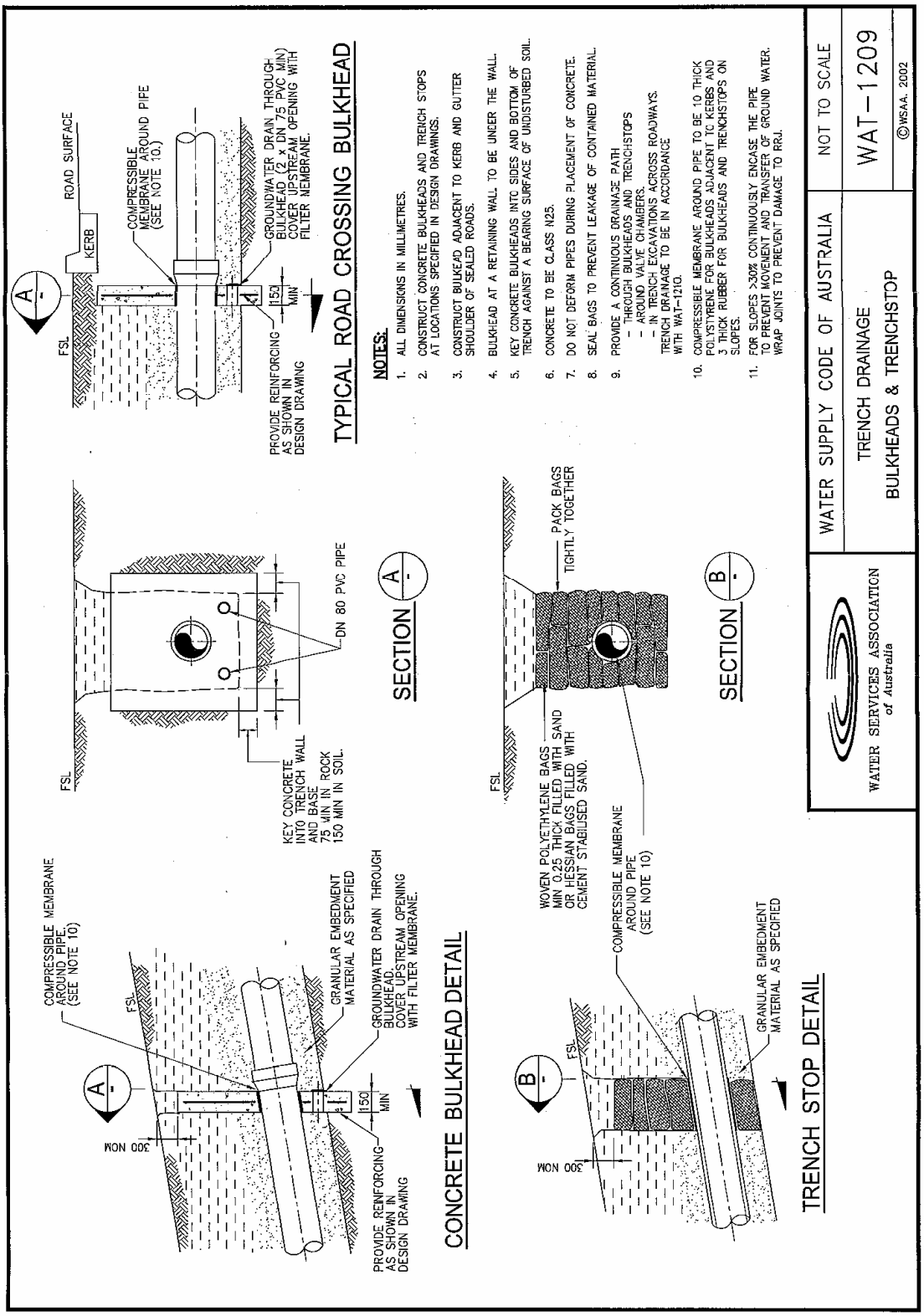
ADDITIONAL INFORMATION PROVIDED IN WAT-1200 SERIES COMMENTARY


TYPICAL ROAD CROSSING BULKHEAD
ROAD SURFACE
KERB
FSL
COMPRESSIBLE MEMBRANE AROUND PIPE (SEE NOTE 10.)
GROUNDWATER DRAIN THROUGH BULKHEAD (2 x DN 75 PVC MIN) COVER UPSTREAM OPENING WITH FILTER MEMBRANE.
PROVIDE REINFORCING AS SHOWN IN DESIGN DRAWING
150 MIN
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. CONSTRUCT CONCRETE BULKHEADS AND TRENCH STOPS AT LOCATIONS SPECIFIED IN DESIGN DRAWINGS.
3. CONSTRUCT BULKEAD ADJACENT TO KERB AND GUTTER SHOULDER OF SEALED ROADS.
4. BULKHEAD AT A RETAINING WALL TO BE UNDER THE WALL.
5. KEY CONCRETE BULKHEADS INTO SIDES AND BOTTOM OF TRENCH AGAINST A BEARING SURFACE OF UNDISTURBED SOIL.
6. CONCRETE TO BE CLASS N25.
7. DO NOT DEFORM PIPES DURING PLACEMENT OF CONCRETE.
8. SEAL BAGS TO PREVENT LEAKAGE OF CONTAINED MATERIAL.
9. PROVIDE A CONTINUOUS DRAINAGE PATH
– THROUGH BULKHEADS AND TRENCHSTOPS
– AROUND VALVE CHAMBERS.
– IN TRENCH EXCAVATIONS ACROSS ROADWAYS.
TRENCH DRAINAGE TO BE IN ACCORDANCE WITH WAT-1210.
10. COMPRESSIBLE MEMBRANE AROUND PIPE TO BE 10 THICK POLYSTYRENE FOR BULKHEADS ADJACENT TO KERBS AND 3 THICK RUBBER FOR BULKHEADS AND TRENCHSTOPS ON SLOPES.
11. FOR SLOPES >30% CONTINUOUSLY ENCASE THE PIPE TO PREVENT MOVEMENT AND TRANSFER OF GROUND WATER. WRAP JOINTS TO PREVENT DAMAGE TO RRJ.
SECTION A-A
SECTION B-B
DN 80 PVC PIPE
KEY CONCRETE INTO TRENCH WALL AND BASE 75 MIN IN ROCK 150 MIN IN SOIL.
PACK BAGS TIGHTLY TOGETHER
WOVEN POLYETHYLENE BAGS MIN 0.25 THICK FILLED WITH SAND OR HESSIAN BAGS FILLED WITH CEMENT STABILISED SAND.
COMPRESSIBLE MEMBRANE AROUND PIPE (SEE NOTE 10)
GRANULAR EMBEDMENT MATERIAL AS SPECIFIED
CONCRETE BULKHEAD DETAIL
TRENCH STOP DETAIL
300 NOM
WATER SUPPLY CODE OF AUSTRALIA
TRENCH DRAINAGE
BULKHEADS & TRENCHSTOP
NOT TO SCALE
WAT-1209
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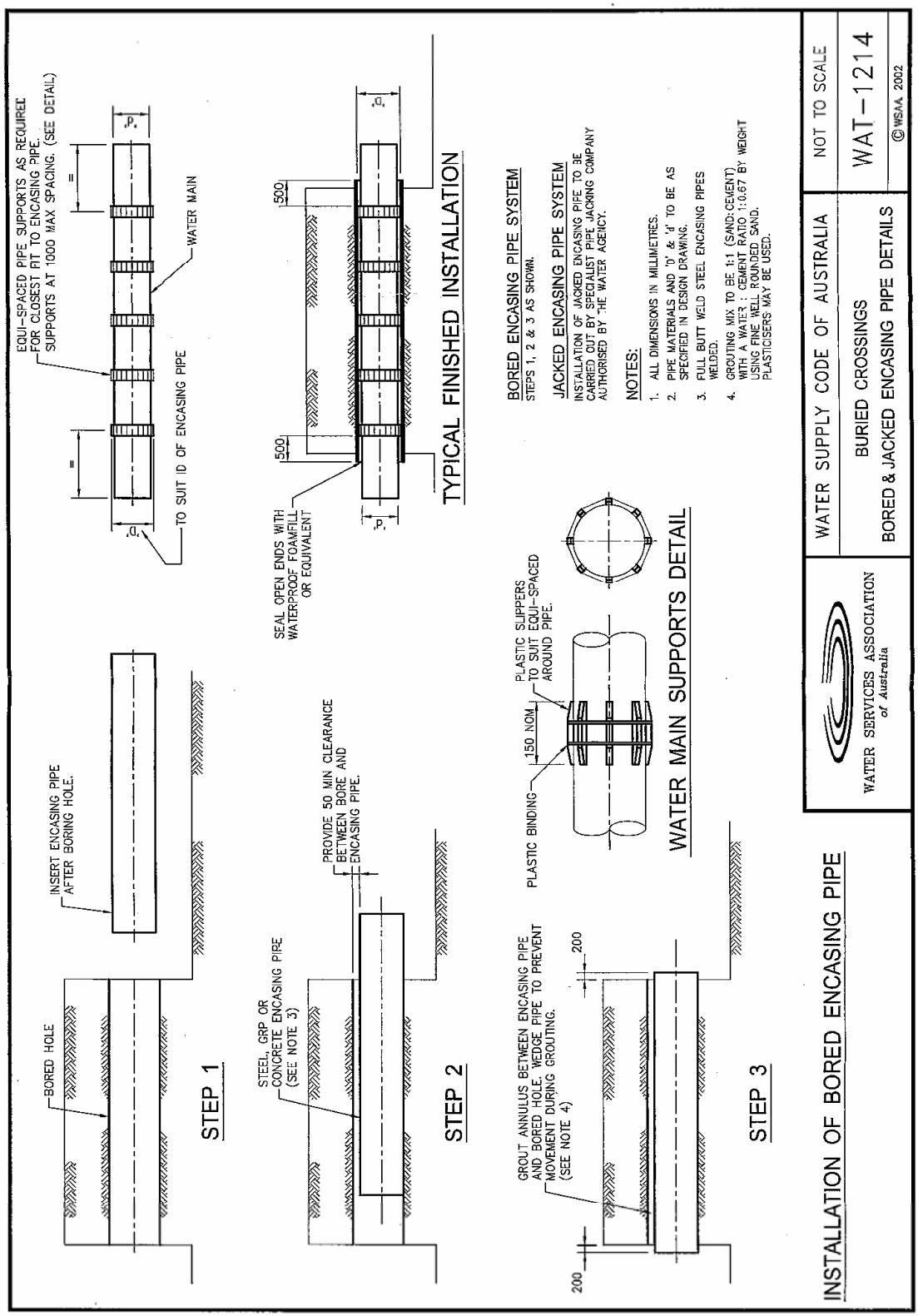
ADDITIONAL INFORMATION PROVIDED IN WAT-1200 SERIES COMMENTARY


INSTALLATION OF BORED ENCASING PIPE
STEP 1
BORED HOLE
INSERT ENCASING PIPE AFTER BORING HOLE.
STEP 2
STEEL, GRP OR CONCRETE ENCASING PIPE (SEE NOTE 3)
PROVIDE 50 MIN CLEARANCE BETWEEN BORE AND ENCASING PIPE.
STEP 3
GROUT ANNULUS BETWEEN ENCASING PIPE AND BORED HOLE. WEDGE PIPE TO PREVENT MOVEMENT DURING GROUTING. (SEE NOTE 4)
200
200
WATER MAIN SUPPORTS DETAIL
PLASTIC BINDING
150 NOM
PLASTIC SLIPPERS TO SUIT EQUI-SPACED AROUND PIPE.
TYPICAL FINISHED INSTALLATION
SEAL OPEN ENDS WITH WATERPROOF FOAMFILL OR EQUIVALENT
500
500
d
d
d
EQUI-SPACED PIPE SUPPORTS AS REQUIRED FOR CLOSEST FIT TO ENCASING PIPE. SUPPORTS AT 1000 MAX SPACING. (SEE DETAIL)
=
=
TO SUIT ID OF ENCASING PIPE
WATER MAIN
BORED ENCASING PIPE SYSTEM
STEPS 1, 2 & 3 AS SHOWN.
JACKED ENCASING PIPE SYSTEM
INSTALLATION OF JACKED ENCASING PIPE TO BE CARRIED OUT BY SPECIALIST PIPE JACKING COMPANY AUTHORISED BY THE WATER AGENCY.
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. PIPE MATERIALS AND 'D' & 'd' TO BE AS SPECIFIED IN DESIGN DRAWING.
3. FULL BUTT WELD STEEL ENCASING PIPES WELDED.
4. GROUTING MIX TO BE 1:1 (SAND:CEMENT) WITH A WATER : CEMENT RATIO 1:0.67 BY WEIGHT USING FINE WELL ROUNDED SAND. PLASTICISERS MAY BE USED.
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
BURIED CROSSINGS
BORED & JACKED ENCASING PIPE DETAILS
NOT TO SCALE
WAT-1214
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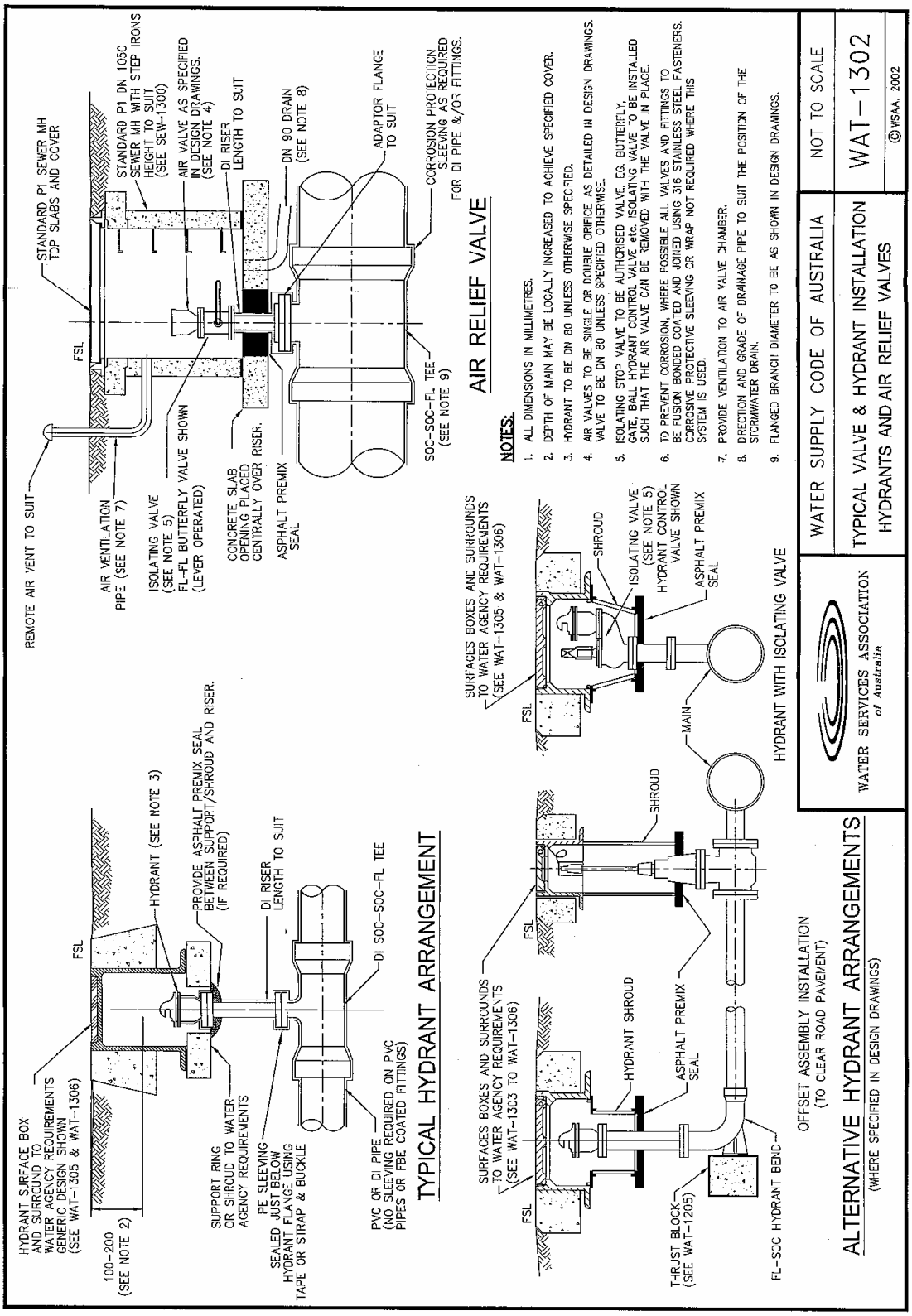
REMOTE AIR VENT TO SUIT
STANDARD P1 SEWER MH TOP SLABS AND COVER
STANDARD P1 DN 1050 SEWER MH WITH STEP IRONS HEIGHT TO SUIT (SEE SEW-1300)
AIR VALVE AS SPECIFIED IN DESIGN DRAWINGS. (SEE NOTE 4)
DI RISER LENGTH TO SUIT
DN 90 DRAIN (SEE NOTE 8)
ADAPTOR FLANGE TO SUIT
CORROSION PROTECTION SLEEVING AS REQUIRED FOR DI PIPE &/OR FITTINGS.
FSL
AIR VENTILATION PIPE (SEE NOTE 7)
ISOLATING VALVE (SEE NOTE 5) FL-FL BUTTERFLY VALVE SHOWN (LEVER OPERATED)
CONCRETE SLAB OPENING PLACED CENTRALLY OVER RISER.
ASPHALT PREMIX SEAL
SOC-SOC-FL TEE (SEE NOTE 9)
AIR RELIEF VALVE
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. DEPTH OF MAIN MAY BE LOCALLY INCREASED TO ACHIEVE SPECIFIED COVER.
3. HYDRANT TO BE DN 80 UNLESS OTHERWISE SPECIFIED.
4. AIR VALVES TO BE SINGLE OR DOUBLE ORIFICE AS DETAILED IN DESIGN DRAWINGS. VALVE TO BE DN 80 UNLESS SPECIFIED OTHERWISE.
5. ISOLATING STOP VALVE TO BE AUTHORISED VALVE, EG. BUTTERFLY, GATE, BALL HYDRANT CONTROL VALVE etc. ISOLATING VALVE TO BE INSTALLED SUCH THAT THE AIR VALVE CAN BE REMOVED WITH THE VALVE IN PLACE.
6. TO PREVENT CORROSION, WHERE POSSIBLE ALL VALVES AND FITTINGS TO BE FUSION BONDED COATED AND JOINED USING 316 STAINLESS STEEL FASTENERS. CORROSIVE PROTECTIVE SLEEVING OR WRAP NOT REQUIRED WHERE THIS SYSTEM IS USED.
7. PROVIDE VENTILATION TO AIR VALVE CHAMBER.
8. DIRECTION AND GRADE OF DRAINAGE PIPE TO SUIT THE POSITION OF THE STORMWATER DRAIN.
9. FLANGED BRANCH DIAMETER TO BE AS SHOWN IN DESIGN DRAWINGS.
HYDRANT SURFACE BOX AND SURROUND TO WATER AGENCY REQUIREMENTS GENERIC DESIGN SHOWN (SEE WAT-1305 & WAT-1306)
HYDRANT (SEE NOTE 3)
PROVIDE ASPHALT PREMIX SEAL BETWEEN SUPPORT/SHROUD AND RISER. (IF REQUIRED)
DI RISER LENGTH TO SUIT
DI SOC-SOC-FL TEE
100-200 (SEE NOTE 2)
SUPPORT RING OR SHROUD TO WATER AGENCY REQUIREMENTS
PE SLEEVING SEALED JUST BELOW HYDRANT FLANGE USING TAPE OR STRAP & BUCKLE
PVC OR DI PIPE (NO SLEEVING REQUIRED ON PVC PIPES OR FBE COATED FITTINGS)
TYPICAL HYDRANT ARRANGEMENT
SURFACES BOXES AND SURROUNDS TO WATER AGENCY REQUIREMENTS (SEE WAT-1305 & WAT-1306)
SHROUD
ISOLATING VALVE (SEE NOTE 5)
HYDRANT CONTROL VALVE SHOWN
ASPHALT PREMIX SEAL
MAIN
HYDRANT WITH ISOLATING VALVE
SURFACES BOXES AND SURROUNDS TO WATER AGENCY REQUIREMENTS (SEE WAT-1303 TO WAT-1306)
HYDRANT SHROUD
ASPHALT PREMIX SEAL
THRUST BLOCK (SEE WAT-1205)
FL-SOC HYDRANT BEND
OFFSET ASSEMBLY INSTALLATION (TO CLEAR ROAD PAVEMENT)
ALTERNATIVE HYDRANT ARRANGEMENTS
(WHERE SPECIFIED IN DESIGN DRAWINGS)
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
TYPICAL VALVE & HYDRANT INSTALLATION HYDRANTS AND AIR RELIEF VALVES
NOT TO SCALE
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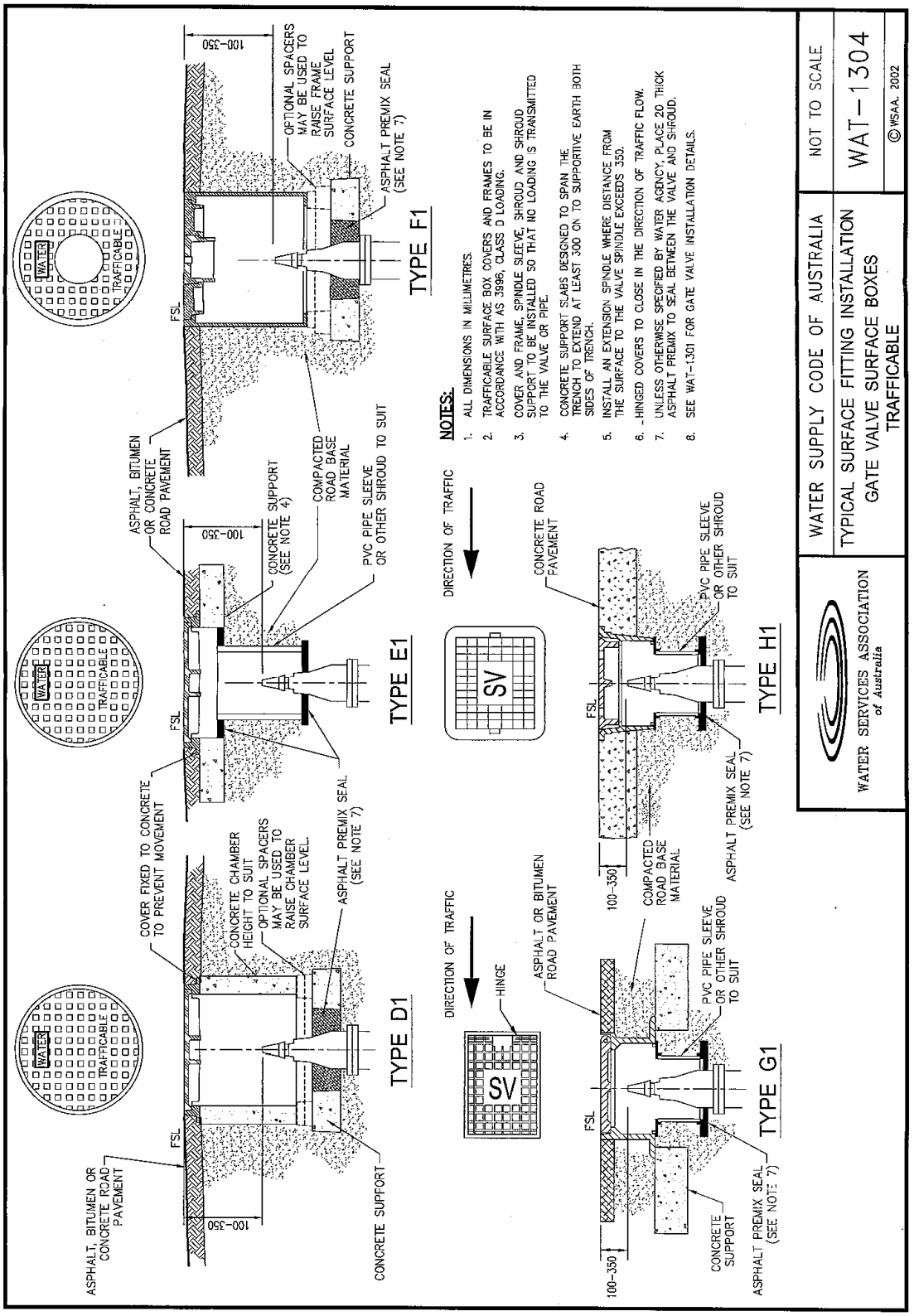
WATER SUPPLY CODE OF AUSTRALIA
TYPICAL SURFACE FITTING INSTALLATION
GATE VALVE SURFACE BOXES
TRAFFICABLE
NOT TO SCALE
WAT-1304
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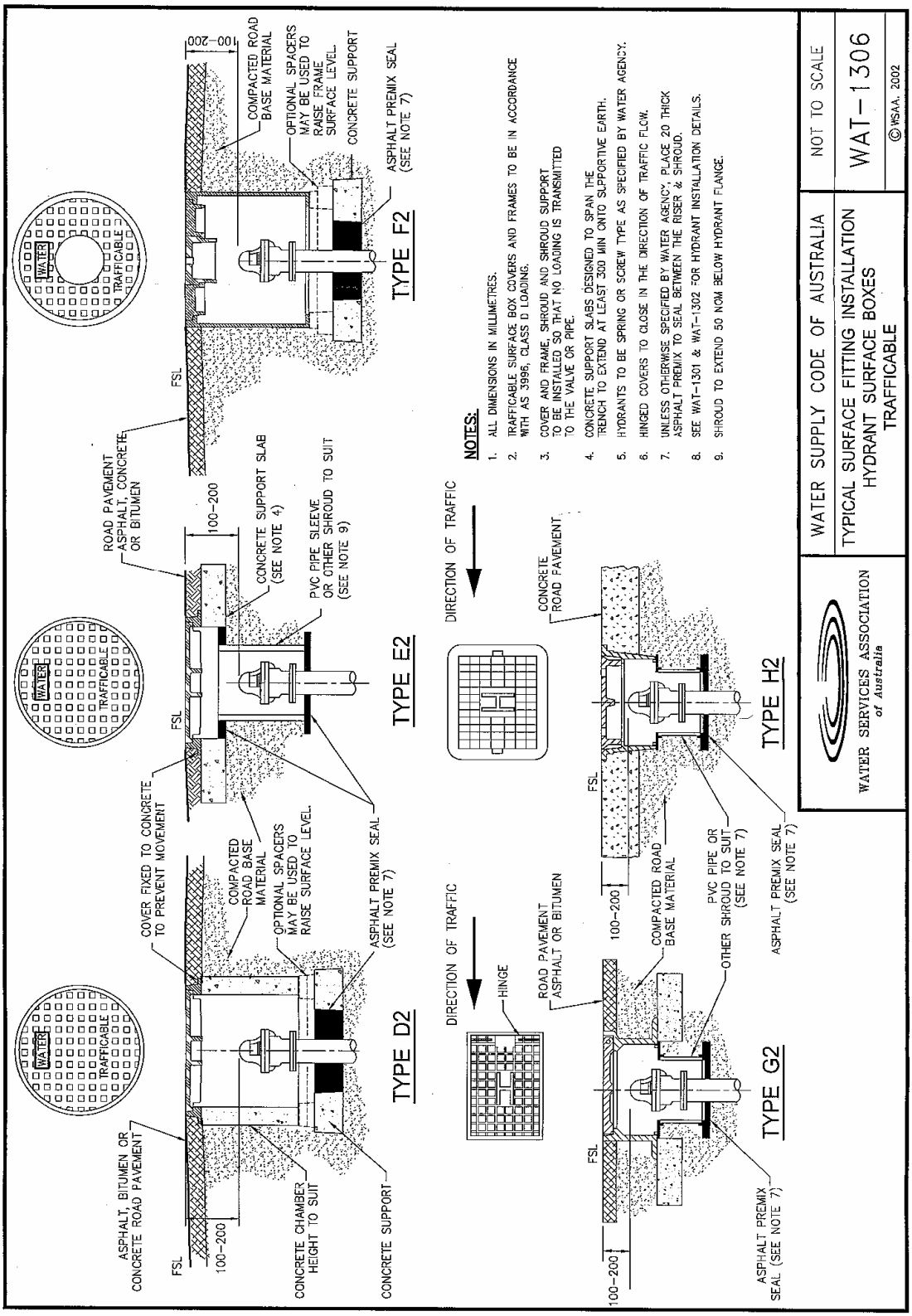
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. TRAFFICABLE SURFACE BOX COVERS AND FRAMES TO BE IN ACCORDANCE WITH AS 3996, CLASS D LOADING.
3. COVER AND FRAME, SPINDLE SLEEVE, SHROUD AND SHROUD SUPPORT TO BE INSTALLED SO THAT NO LOADING IS TRANSMITTED TO THE VALVE OR PIPE.
4. CONCRETE SUPPORT SLABS DESIGNED TO SPAN THE TRENCH TO EXTEND AT LEAST 300 ON TO SUPPORTIVE EARTH BOTH SIDES OF TRENCH.
5. INSTALL AN EXTENSION SPINDLE WHERE DISTANCE FROM THE SURFACE TO THE VALVE SPINDLE EXCEEDS 350.
6. HINGED COVERS TO CLOSE IN THE DIRECTION OF TRAFFIC FLOW.
7. UNLESS OTHERWISE SPECIFIED BY WATER AGENCY, PLACE 20 THICK ASPHALT PREMIX TO SEAL BETWEEN THE VALVE AND SHROUD.
8. SEE WAT-1301 FOR GATE VALVE INSTALLATION DETAILS.
DIRECTION OF TRAFFIC
HINGE
SV
WATER
TRAFFICABLE
FSL
100-350
ASPHALT, BITUMEN OR CONCRETE ROAD PAVEMENT
COVER FIXED TO CONCRETE TO PREVENT MOVEMENT
CONCRETE CHAMBER HEIGHT TO SUIT
OPTIONAL SPACERS MAY BE USED TO RAISE CHAMBER SURFACE LEVEL
ASPHALT PREMIX SEAL (SEE NOTE 7)
CONCRETE SUPPORT
ASPHALT OR BITUMEN ROAD PAVEMENT
PVC PIPE SLEEVE OR OTHER SHROUD TO SUIT
COMPACTED ROAD BASE MATERIAL
CONCRETE SUPPORT (SEE NOTE 4)
CONCRETE ROAD PAVEMENT
OPTIONAL SPACERS MAY BE USED TO RAISE FRAME SURFACE LEVEL
TYPE D1
TYPE E1
TYPE G1
TYPE H1
TYPE F1
ADDITIONAL INFORMATION PROVIDED IN WAT-1300 SERIES COMMENTARY


WATER SUPPLY CODE OF AUSTRALIA
TYPICAL SURFACE FITTING INSTALLATION
HYDRANT SURFACE BOXES
TRAFFICABLE
NOT TO SCALE
WAT-1306
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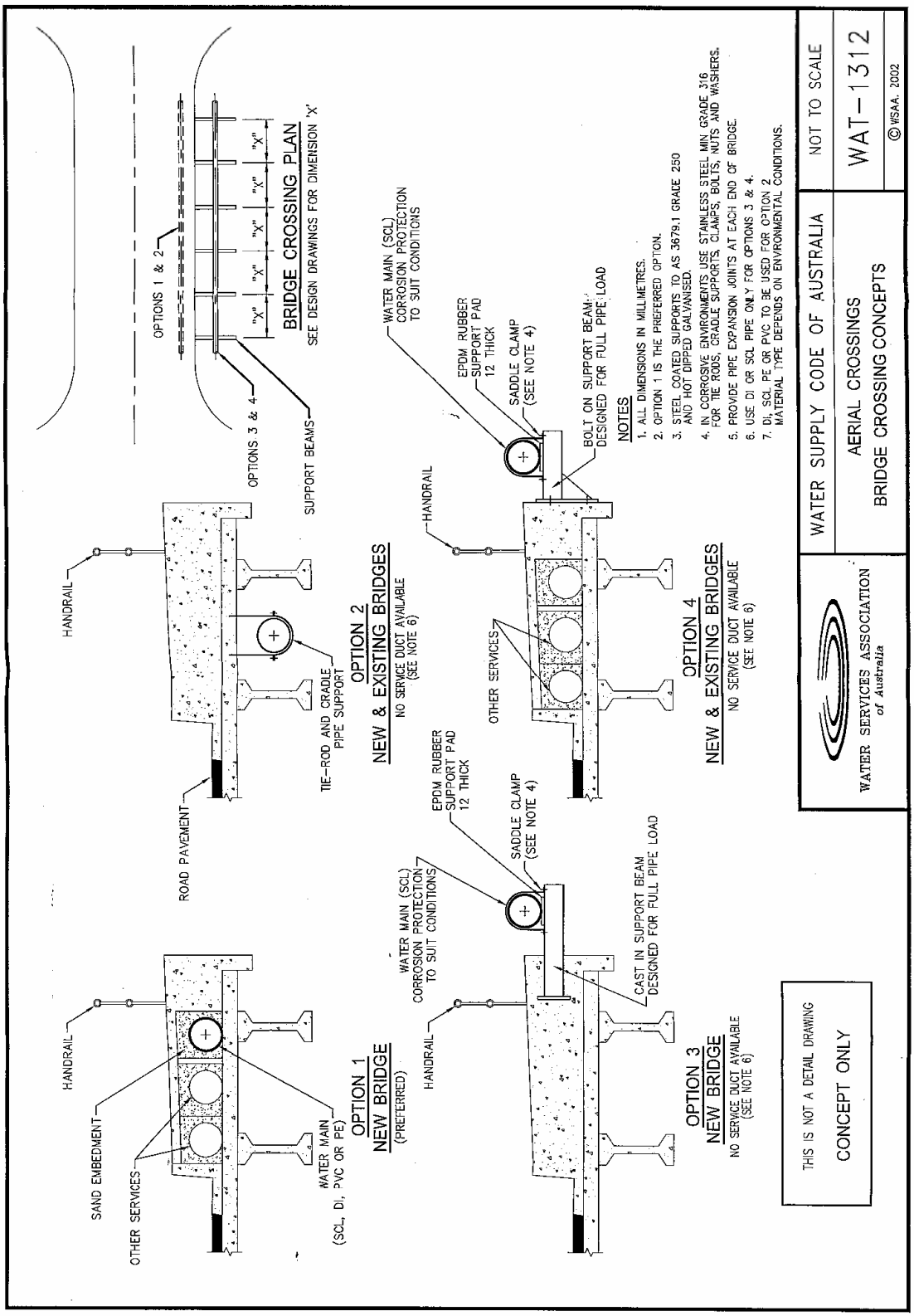
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. TRAFFICABLE SURFACE BOX COVERS AND FRAMES TO BE IN ACCORDANCE WITH AS 3996, CLASS D LOADING.
3. COVER AND FRAME, SHROUD AND SHROUD SUPPORT TO BE INSTALLED SO THAT NO LOADING IS TRANSMITTED TO THE VALVE OR PIPE.
4. CONCRETE SUPPORT SLABS DESIGNED TO SPAN THE TRENCH TO EXTEND AT LEAST 300 MM ONTO SUPPORTIVE EARTH.
5. HYDRANTS TO BE SPRING OR SCREW TYPE AS SPECIFIED BY WATER AGENCY.
6. HINGED COVERS TO CLOSE IN THE DIRECTION OF TRAFFIC FLOW.
7. UNLESS OTHERWISE SPECIFIED BY WATER AGENCY, PLACE 20 THICK ASPHALT PREMIX TO SEAL BETWEEN THE RISER & SHROUD.
8. SEE WAT-1301 & WAT-1302 FOR HYDRANT INSTALLATION DETAILS.
9. SHROUD TO EXTEND 50 NOM BELOW HYDRANT FLANGE.
TYPE D2
TYPE E2
TYPE F2
TYPE G2
TYPE H2
WATER
TRAFFICABLE
ASPHALT, BITUMEN OR CONCRETE ROAD PAVEMENT
COVER FIXED TO CONCRETE TO PREVENT MOVEMENT
COMPACTED ROAD BASE MATERIAL
OPTIONAL SPACERS MAY BE USED TO RAISE SURFACE LEVEL
ASPHALT PREMIX SEAL (SEE NOTE 7)
CONCRETE CHAMBER HEIGHT TO SUIT
CONCRETE SUPPORT
ASPHALT PREMIX SEAL (SEE NOTE 7)
ROAD PAVEMENT ASPHALT, CONCRETE OR BITUMEN
CONCRETE SUPPORT SLAB (SEE NOTE 4)
PVC PIPE SLEEVE OR OTHER SHROUD TO SUIT (SEE NOTE 9)
DIRECTION OF TRAFFIC
HINGE
ROAD PAVEMENT ASPHALT OR BITUMEN
CONCRETE ROAD PAVEMENT
COMPACTED ROAD BASE MATERIAL
PVC PIPE OR OTHER SHROUD TO SUIT (SEE NOTE 7)
ASPHALT PREMIX SEAL (SEE NOTE 7)
ASPHALT PREMIX SEAL (SEE NOTE 7)
FSL
100-200
ADDITIONAL INFORMATION PROVIDED IN WAT-1300 SERIES COMMENTARY


BRIDGE CROSSING PLAN
SEE DESIGN DRAWINGS FOR DIMENSION 'X'
OPTIONS 1 & 2
OPTIONS 3 & 4
SUPPORT BEAMS
"X"
OPTION 1
NEW BRIDGE
(PREFERRED)
HANDRAIL
SAND EMBEDMENT
OTHER SERVICES
WATER MAIN
(SCL, DI, PVC OR PE)
OPTION 2
NEW & EXISTING BRIDGES
NO SERVICE DUCT AVAILABLE
(SEE NOTE 6)
ROAD PAVEMENT
TIE-ROD AND CRADLE
PIPE SUPPORT
OPTION 3
NEW BRIDGE
NO SERVICE DUCT AVAILABLE
(SEE NOTE 6)
WATER MAIN (SCL)
CORROSION PROTECTION
TO SUIT CONDITIONS
EPDM RUBBER
SUPPORT PAD
12 THICK
SADDLE CLAMP
(SEE NOTE 4)
CAST IN SUPPORT BEAM
DESIGNED FOR FULL PIPE LOAD
OPTION 4
NEW & EXISTING BRIDGES
NO SERVICE DUCT AVAILABLE
(SEE NOTE 6)
BOLT ON SUPPORT BEAM
DESIGNED FOR FULL PIPE LOAD
NOTES
1. ALL DIMENSIONS IN MILLIMETRES.
2. OPTION 1 IS THE PREFERRED OPTION.
3. STEEL COATED SUPPORTS TO AS 3679.1 GRADE 250 AND HOT DIPPED GALVANISED.
4. IN CORROSIVE ENVIRONMENTS USE STAINLESS STEEL MIN GRADE 316 FOR TIE RODS, CRADLE SUPPORTS, CLAMPS, BOLTS, NUTS AND WASHERS.
5. PROVIDE PIPE EXPANSION JOINTS AT EACH END OF BRIDGE.
6. USE DI OR SCL PIPE ONLY FOR OPTIONS 3 & 4.
7. DI, SCL PE OR PVC TO BE USED FOR OPTION 2. MATERIAL TYPE DEPENDS ON ENVIRONMENTAL CONDITIONS.
THIS IS NOT A DETAIL DRAWING
CONCEPT ONLY
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
AERIAL CROSSINGS
BRIDGE CROSSING CONCEPTS
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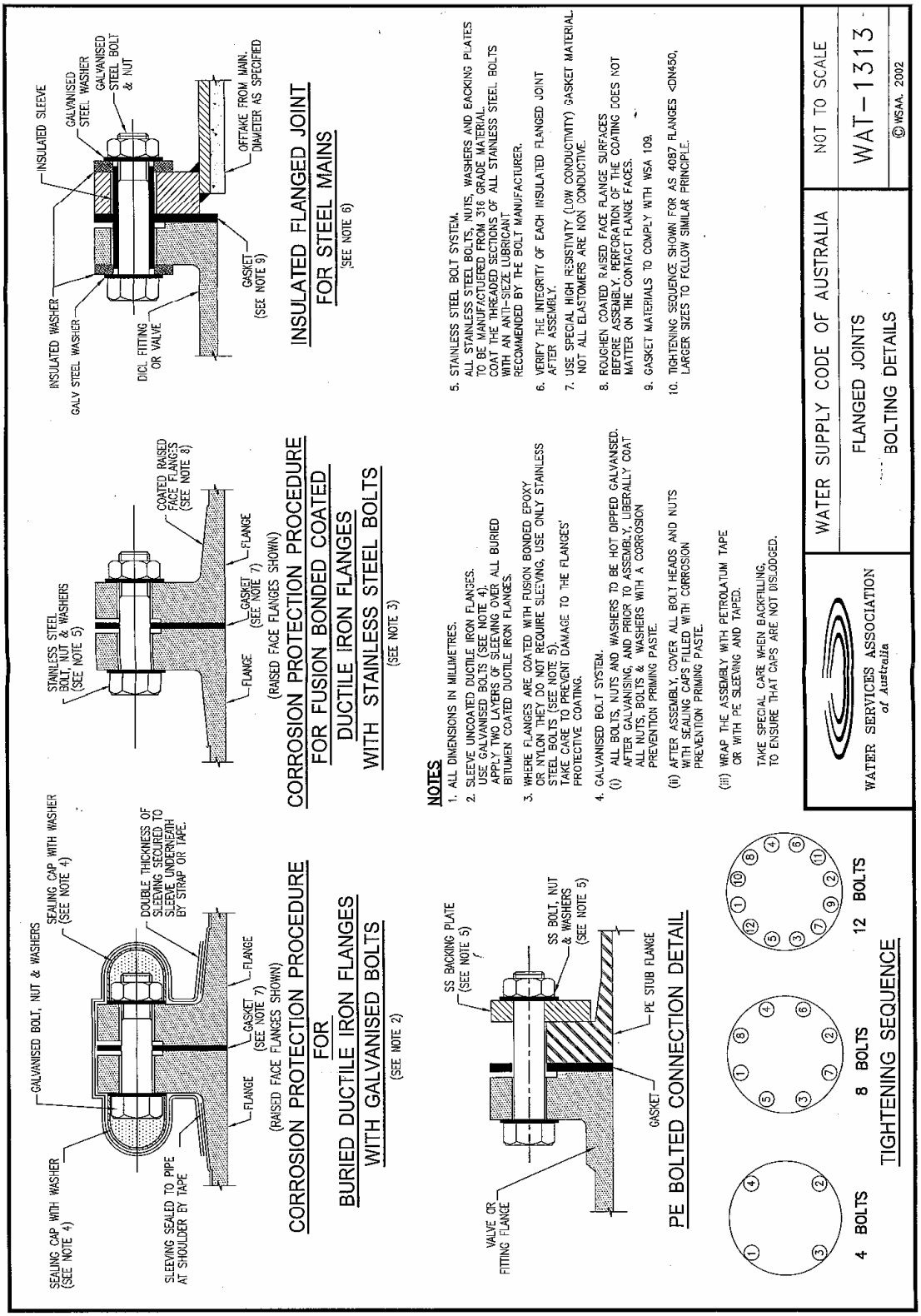
INSULATED SLEEVE
GALVANISED STEEL WASHER
GALVANISED STEEL BOLT & NUT
OFFTAKE FROM MAIN, DIAMETER AS SPECIFIED
INSULATED WASHER
GALV STEEL WASHER
DICL FITTING OR VALVE
GASKET (SEE NOTE 9)
INSULATED FLANGED JOINT
FOR STEEL MAINS
(SEE NOTE 6)
STAINLESS STEEL BOLT, NUT & WASHERS (SEE NOTE 5)
COATED RAISED FACE FLANGES (SEE NOTE 8)
FLANGE
GASKET (SEE NOTE 7)
FLANGE
(RAISED FACE FLANGES SHOWN)
CORROSION PROTECTION PROCEDURE
FOR FUSION BONDED COATED
DUCTILE IRON FLANGES
WITH STAINLESS STEEL BOLTS
(SEE NOTE 3)
GALVANISED BOLT, NUT & WASHERS
SEALING CAP WITH WASHER (SEE NOTE 4)
DOUBLE THICKNESS OF SLEEVING SECURED TO SLEEVE UNDERNEATH BY STRAP OR TAPE.
SEALING CAP WITH WASHER (SEE NOTE 4)
SLEEVING SEALED TO PIPE AT SHOULDER BY TAPE
FLANGE
GASKET (SEE NOTE 7)
FLANGE
(RAISED FACE FLANGES SHOWN)
CORROSION PROTECTION PROCEDURE
FOR
BURIED DUCTILE IRON FLANGES
WITH GALVANISED BOLTS
(SEE NOTE 2)
NOTES
1. ALL DIMENSIONS IN MILLIMETRES.
2. SLEEVE UNCOATED DUCTILE IRON FLANGES. USE GALVANISED BOLTS (SEE NOTE 4). APPLY TWO LAYERS OF SLEEVING OVER ALL BURIED BITUMEN COATED DUCTILE IRON FLANGES.
3. WHERE FLANGES ARE COATED WITH FUSION BONDED EPOXY OR NYLON THEY DO NOT REQUIRE SLEEVING, USE ONLY STAINLESS STEEL BOLTS (SEE NOTE 5). TAKE CARE TO PREVENT DAMAGE TO THE FLANGES' PROTECTIVE COATING.
4. GALVANISED BOLT SYSTEM.
(i) ALL BOLTS, NUTS AND WASHERS TO BE HOT DIPPED GALVANISED AFTER GALVANISING, AND PRIOR TO ASSEMBLY, LIBERALLY COAT ALL NUTS, BOLTS & WASHERS WITH A CORROSION PREVENTION PRIMING PASTE.
(ii) AFTER ASSEMBLY, COVER ALL BOLT HEADS AND NUTS WITH SEALING CAPS FILLED WITH CORROSION PREVENTION PRIMING PASTE.
(iii) WRAP THE ASSEMBLY WITH PETROLATUM TAPE OR WITH PE SLEEVING AND TAPED.
TAKE SPECIAL CARE WHEN BACKFILLING, TO ENSURE THAT CAPS ARE NOT DISLODGED.
5. STAINLESS STEEL BOLT SYSTEM. ALL STAINLESS STEEL BOLTS, NUTS, WASHERS AND BACKING PLATES TO BE MANUFACTURED FROM 316 GRADE MATERIAL. COAT THE THREADED SECTIONS OF ALL STAINLESS STEEL BOLTS WITH AN ANTI-SIEZE LUBRICANT RECOMMENDED BY THE BOLT MANUFACTURER.
6. VERIFY THE INTEGRITY OF EACH INSULATED FLANGED JOINT AFTER ASSEMBLY.
7. USE SPECIAL HIGH RESISTIVITY (LOW CONDUCTIVITY) GASKET MATERIAL NOT ALL ELASTOMERS ARE NON CONDUCTIVE.
8. ROUGHEN COATED RAISED FACE FLANGE SURFACES BEFORE ASSEMBLY. PERFORATION OF THE COATING DOES NOT MATTER ON THE CONTACT FLANGE FACES.
9. GASKET MATERIALS TO COMPLY WITH WSA 109.
10. TIGHTENING SEQUENCE SHOWN FOR AS 4087 FLANGES <DN450, LARGER SIZES TO FOLLOW SIMILAR PRINCIPLE.
SS BACKING PLATE (SEE NOTE 5)
SS BOLT, NUT & WASHERS (SEE NOTE 5)
VALVE OR FITTING FLANGE
PE STUB FLANGE
GASKET
PE BOLTED CONNECTION DETAIL
4 BOLTS
8 BOLTS
12 BOLTS
TIGHTENING SEQUENCE
WATER SERVICES ASSOCIATION of Australia
WATER SUPPLY CODE OF AUSTRALIA
FLANGED JOINTS
BOLTING DETAILS
NOT TO SCALE
WAT-1313
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DOCUMENT INFORMATION

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Public Release Information :

Status	Release	Document Name	Date
Draft	Water Supply & Sewerage Guidelines	Wat& Sew3.doc	16/1/96
Draft	Water Design Standard 2001	WATER DESIGN STD 2001.doc	
Approved	Water Design Standard 2001	WATER DESIGN STD 2001.doc	January 2003
Draft	Water Supply Standard 2005		JULY 2005
Scheme Notification	Water Supply Standard 2005	WATER DESIGN STD 2005 5.doc	October 2005

Related files:
Check list for design purposes: Nil

Blank pages required for double sided printing.

Watch for loss of subscripts and superscripts with reformating.