

Survey Manual

Third Edition
No.

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About this Manual

This Manual describes the responsibilities and requirements for the survey of water supply and sewerage Works and the supply of related information to the Water Company.

Part 1

Describes the survey responsibilities of the Water Company, the Consultant and the Surveyor.

Part 2

Describes the survey requirements for the supply of as-constructed information and the supply of related subdivisional and survey control information to the Water Company.

Part 3

Describes the as-constructed information to be recorded and supplied to the Water Company.

Part 4

Indicates with diagrams the as-constructed information to be recorded.

Intended audience

This Manual has been written for engineering and survey consultants and the Water Company staff.

Related reference material

The following documents should be referred to in conjunction with this document:

- Water Company Policy and Pricing Manual
- National Sewerage Code
- National Water Supply Code
- Local safety requirements for work in sewers and confined spaces
- Water Company Quality Assurance Requirements

The following documents are also referred to or are relevant to this Manual:

- Occupational Health and Safety Act 1985
- Subdivision Act 1988
- Subdivision (Procedures) Regulations 1989
- Survey Co-ordination Act 1958
- Survey Co-ordination (Surveys) Regulations 1992
- Surveyors Act 1978
- Surveyors (Cadastral Surveys) Regulations 1995
- Survey Practice Handbook, Volume 2

Definitions

The Water Company	The Authority or Agency to whom the water supply, sewerage and associated Works are to be vested or officers appointed to act on behalf of the Water Company.
Consultant	A person or Agency engaged to undertake the design, construction and or survey of water supply and sewerage Works.
Surveyor	Either a Licensed Surveyor or a person whose qualifications and experience are appropriate for the survey requirements of the Works.
Nominated Representative	The Consultants representative whose qualifications and experience are appropriate for them to act as the responsible agent for the Works.
Contractor	The Agency engaged to undertake the Works.
Works	The construction of water supply and or sewerage infrastructure to be vested in the Water Company.
Design Plans	Drawings of the Works prepared in accordance with the Water Supply Design Manual, Sewerage Design Manual and Survey Manual.
Licensed Surveyor	A Surveyor registered and endorsed under the Surveyors Act 1978.
OSG	Office of the Surveyor General.
Verification Form	Applicable to Consultants with accreditation to ISO 9001 or accreditation acceptable to the Water Company.

Part 1

Survey Responsibilities

1 General

This Part of the Survey Manual describes the survey responsibilities of the Water Company, the Consultant and the Surveyor for the provision of water supply and sewerage Works by Agreement.

1.1. Water Company

The Water Company is responsible for:

- I. Determining the standards for survey.
- II. Determining the acceptance requirements.
- III. The quality management of the asset records.
- IV. Undertaking quality audits.
- V. Establishing the tolerances and requirements for the survey and supply of as-constructed information and other related information to the Water Company.

1.2 Consultant

The Consultant shall:

- I. Appoint a Surveyor (or Surveyor's) to provide the survey requirements for the Works.
- II. Ensure that the required subdivisional information is forwarded to the Water Company with the appropriate Verification Form at least five (5) working days prior to the commencement of Works.

III. Continued on next page ...

- IV. Ensure that, if applicable, the Design Plans note the information relating to the Australian Map Grid (AMG) and Australian Height Datum (AHD) permanent marks obtained from the OSG and adopted as datum.
- V. Ensure that, if applicable, the Design Plans note the survey control (marks) established for use during the construction, recording and auditing of Works and a copy of the Plans are forwarded to the Water Company at least five (5) working days prior to the commencement of construction.
- VI. Ensure that the marks established for use during construction, recording and auditing purposes are maintained during construction.
- VII. Ensure that sufficient title pegs are maintained during construction to enable auditing of the Works, i.e. pegs of close proximity to the Works.
- VIII. Ensure that the as-constructed details of the Works are recorded and forwarded to the Water Company with the appropriate Verification Form.

1.3. Surveyor

1.3.1. Prior to the commencement of Works, the Surveyor shall:

- i** Connect the Works and related subdivision to permanent marks obtained from the Office of Surveyor General. A minimum of two (2) marks connected to AMG and two (2) marks connected to AHD are to be adopted as datum.

Exceptions may apply when a subdivision is of nine (9) lots or less **and** the Design Plans do not specify AMG co-ordinates or AHD levels (ref. Part 2 Requirements).

- ii** Provide the Consultant with all information relating to the permanent mark information adopted as datum (if applicable).

Continued on next page ...

- iii** Provide the required subdivision information to the Consultant.
- iv** Ensure that, if applicable, a minimum of three (3) AMG and or three (3) AHD marks are established in the Works area and or per stage of a subdivision and the information is forwarded to the Consultant.

Exceptions may apply when the Design Plans do not specify AMG co-ordinates or AHD levels (ref. Part 2 Requirements).

1.3.2 During construction of the Works, the Surveyor shall:

- i** Provide assistance in survey matters to the Nominated Representative.
- ii** Assume responsibility for the recording of the constructed Works within the tolerances and to the requirements established by the Water Company.
- iii** Liaise with the Contractor to ensure that:
 - The as-constructed detail is recorded as the Works proceed.
 - All recording of the as-constructed detail is completed before the commencement of backfilling.
- iv** Notify the Nominated Representative as soon as unsatisfactory variance is detected between the as-constructed detail and the Design Plans.
- v** Retain copies of all notices (related to the survey of the Works) for audit purposes.

1.3.3 Upon completion of the Works:

The Surveyor shall forward the as-constructed information to the Consultant.

Part 2

Survey Requirements

2 General

The Licensed Surveyor is responsible for connecting the subdivision to the Australian Map Grid (AMG) in accordance with the requirements of the relevant legislation and the appropriate Authorities.

2.1 AMG control of subdivisional information

For subdivisions of ten (10) lots or more the Surveyor shall supply the Consultant with the AMG co-ordinates of four (4) designated points on the title boundaries within the subdivision. Two of the four points are to be at opposite extremes of the subdivision and the other two points shall be evenly distributed.

Exceptions to this requirement include:

- i** Body corporate subdivisions
- ii** Subdivision of buildings
- iii** Subdivisions not requiring new Water Company services
- iv** Subdivisions of nine (9) lots or less that are not part of a staged development and are situated completely within established areas. Contact the Water Company for confirmation of whether the subdivision is within an established area.

2.2 Supply of subdivisional information

2.2.1 Plan of subdivision

A hardcopy Plan of Subdivision is required for all developments and is to be forwarded to the Water Company. The Plan of Subdivision is to be certified by a Licensed Surveyor.

The Plan shall show:

- i** Details of the OSG marks adopted for AMG control of the subdivision.
- ii** AMG co-ordinates of four (4) designated points within the subdivision (ref. AMG control of subdivisional information).

2.2.2 Subdivisional digital data

If the development is of ten (10) lots or more the Plan of Subdivision shall also be submitted in digital format. The digital format shall be in accordance with the Subdivision Digital Input Manual.

The disk containing the digital data shall be:

- i** Labelled with the Suppliers name and the Plan of Subdivision number.
- iii** In either .DXF or MicroStation .DGN format.

3 General

The Surveyor shall establish marks for the horizontal and vertical control of the Works. The marks are for use during the construction, recording and auditing of the Works.

Exceptions to this requirement may apply when:

- i** A development is of nine (9) lots or less, **and**
- ii** The Design Plans do not specify AMG co-ordinates or AHD levels.

3.1 Horizontal control

The Surveyor shall establish three (3) marks connected to the Australian Map Grid (AMG) when the Design Plans specify AMG co-ordinates and or the development is of ten (10) lots or more.

The survey procedures adopted in determining the AMG co-ordinates of the marks shall ensure that the co-ordinates noted on the Design Plans will enable the Works to be constructed within the required tolerances (ref. Construction Specifications).

3.2 Vertical control

The Surveyor shall establish three (3) marks connected to AHD when the Design Plans specify AHD levels and or the development is of ten (10) lots or more.

The surveyor shall establish a minimum of three (3) marks connected to AHD when the Design Plans specify AHD levels and the development is of ten (10) lots or more.

The surveyor shall establish a minimum of two (2) marks connected to AHD when the Design Plans specify AHD levels and the development is of nine lots or less.

The survey procedures adopted in determining the AHD levels of the marks shall ensure that the levels noted on the Design Plans will enable the Works to be constructed within the required tolerances (ref. Construction Specifications).

Exceptions may apply to the supply of vertical control and marks are not required for water supply works where AHD levels are specified or for sewer works when:

- i** A development is of nine (9) lots or less, and
- ii** The functional requirements of the works can be met without reference to vertical control marks, and
- iii** The works consist of two (2) pipe sections or less (ie sewer access point to access point or water main node to node), and
- iv** The total length of the works is less than 80 metres, and
- v** The works are unlikely to have effect upon future extensions.

3.3 AMG and AHD marks

Marks established for AMG control can be the same as those marks established for AHD control.

The marks shall be:

- i** Spaced evenly over each stage of a subdivision or the Works area.
- ii** Of a stable nature, e.g. star picket or galvanised iron pipe driven flush with the ground, nail in concrete, etc,
- iii** Clearly marked in the field with a unique identifier.
- iv** Noted on the Design Plans with the unique identifier, the co-ordinates and or level (quoted to the nearest 0.01 metre) and sufficient information to enable the marks to easily located in the field, i.e. ties, description, etc,

4.2 Supply of as-constructed information

4.2.1 As-constructed details of the water supply and sewerage Works for subdivisions of ten (10) lots or more shall be supplied:

- i** In **either** .DXF or MicroStation .DGN digital format and in accordance with the Water Supply Digital Input Manual and Sewerage Digital Input Manual, **and** shall be
- ii** Accompanied by a hardcopy plan of the graphical information at a scale of 1:1000 for water supply and 1:500 for sewerage Works.

The disk containing the digital data and the accompanying plans shall be labelled with the Supplier's name and the Water Company reference number of the Works.

4.2.2 As-constructed details of the water supply Works for subdivisions of nine (9) lots or less shall be supplied:

- i** In **either** the formats as per (all of) **4.2.1**, **or**
- ii** In the hardcopy formats of an "As-constructed Record - Water Supply" form and accompanying amended Design Plan (ref. pages 4-3 & 4-4).

4.2.3 As-constructed details of the sewerage Works for subdivisions of nine (9) lots or less shall be supplied:

- i** In **either** the formats as per (all of) **4.2.1**, **or**
- ii** In the hardcopy format of an "As-constructed Record - Sewer" field note (ref. page 4-5).

AS-CONSTRUCTED RECORD - WATER SUPPLY

Location: RUSH PLACE/PYGMALION EST. ST 4 M'HAM

Ref. Number: 530/243/0784

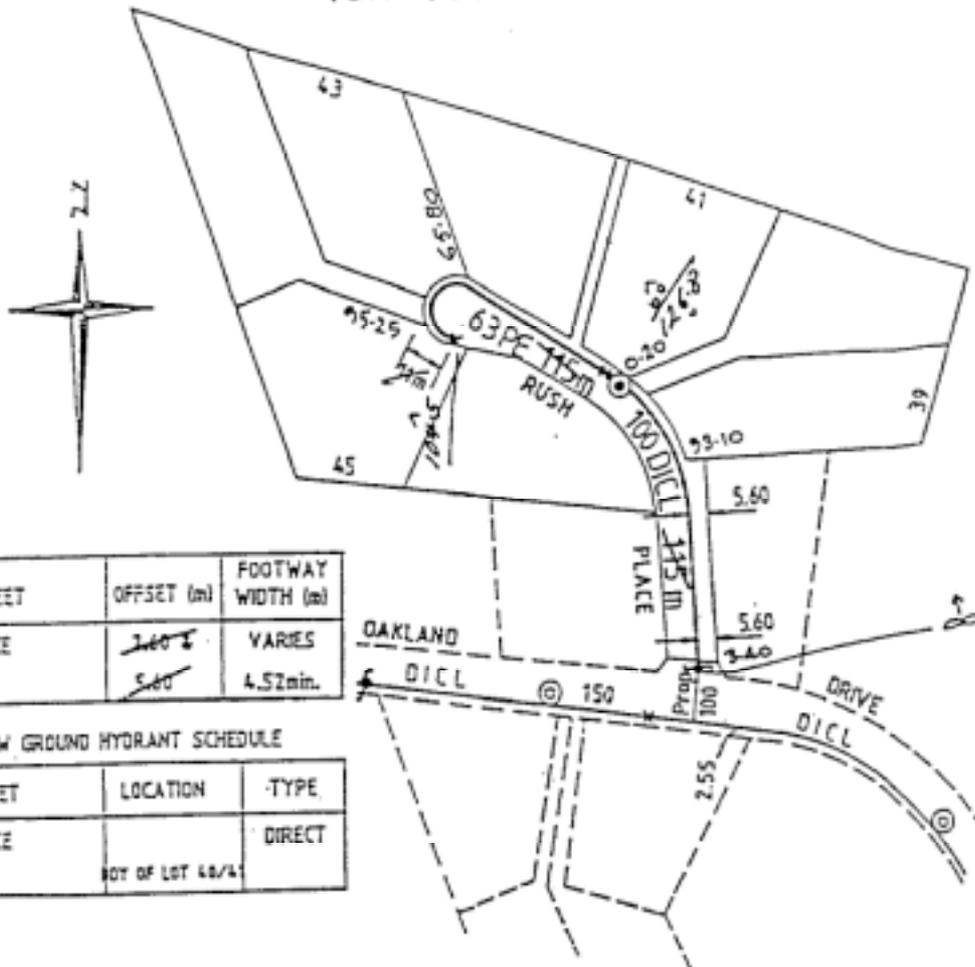
Chainage	Offset to build line	Cover to top of pipe	Connection		Comments
			Left	Right	
0.00		0.90			(A) TOP MAIN (B) BALL VALVE 'A' (C) BALL VALVE 'B'
3.40	5.25				WASHOUT REMOVED (OAKLAND DR INT)
19.0	5.56	0.85			SPLAY PEG
36.0	5.55	0.83			
54.0	5.58	0.82			
72.0	5.70	0.80			
90.0		0.81			
93.10	2.65				T. PEG L 39
100.0	2.64	0.30			
108.10	2.63	0.79		(A)	
108.15				(B)	0.35 INSIDE L39 TIE 9.20 TO 39/40
117.30	2.60	0.75			T. PEG L 39/40
121.40	2.60			(A)	
126.80	2.60	0.65			HYDRANT (DIRECT)
0.00					"
0.20					T. PEG L 40/41
1.00	2.58	0.58			GATE VALVE
11.00			(A)	(A)	
11.05				(B)	0.37 INSIDE L41 TIE 5.15 TO 41/RD
11.20			(B)		0.40 INSIDE L46 TIE 49.30 TO 45/46
16.20	2.59	0.50			T. PEG L41/RD
21.20					" 42/RD
28.00	2.60	0.49		(A)	
28.30				(B)	0.33 INSIDE L43. TIE 4.90 TO 42/43
45.0	2.62	0.51			
63.0	2.60	0.50			
65.80	2.61				T. PEG L 42/43
90.90				(A)	

Surveyed by: Wm BOB PLUMB Date: 5/11/93 Sheet 1 of 2

Example of completed "As-constructed Record - Water Supply" form

DESIGN HEAD 83 m

AS-CONSTRUCTED
REFER TO ATTACHED TABLE
FOR DETAILS.



STREET	OFFSET (m)	FOOTWAY WIDTH (m)
RUSH PLACE	2.60 5.60	VARIES 4.52min.

BELOW GROUND HYDRANT SCHEDULE

STREET	LOCATION	TYPE
RUSH PLACE	NOY OF LOT 43/4	DIRECT

TOTAL WORK

SIZE (mm)	TYPE	LENGTH (m)
100 ✓	DICL ✓	126.80 126.80
63 ✓	PE ✓	104.50 104.50

U/S ACCESS POINT				PROPERTY SERVICE																																											
Identifier	WXY 6-12	SL	105-53	Defaults: Standard, Material/pipe material, Type-common on in. Boundary traverse.																																											
Cross Meth	I	Mat	C	CL	105-53																																										
Shape	T	Size	1.07	IL	103-46																																										
Co-ords	E	Depth	2.07	Type	Change of	Length to	Invert of																																								
	N		Type MEP	Type	Stch	EP	JU	Ob	EP	Sewer	Point	SL	Notes																																		
				<table border="1"> <tr> <td>2</td> <td>48.84</td> <td>50.13</td> <td>108</td> <td>138</td> <td>104-61</td> <td>105-53</td> <td colspan="2"></td> </tr> <tr> <td></td> <td>49.92</td> <td></td> <td>0-70</td> <td>104-61</td> <td>105-57</td> <td colspan="2"></td> </tr> <tr> <td>1</td> <td>10-66</td> <td>11.27</td> <td>0-92</td> <td>102-58</td> <td>104-58</td> <td colspan="2"></td> </tr> <tr> <td>2</td> <td>10-10</td> <td>10-15</td> <td>0-20</td> <td>1-85</td> <td>103-72</td> <td>104-40</td> <td colspan="2"></td> </tr> </table>										2	48.84	50.13	108	138	104-61	105-53				49.92		0-70	104-61	105-57			1	10-66	11.27	0-92	102-58	104-58			2	10-10	10-15	0-20	1-85	103-72	104-40		
2	48.84	50.13	108	138	104-61	105-53																																									
	49.92		0-70	104-61	105-57																																										
1	10-66	11.27	0-92	102-58	104-58																																										
2	10-10	10-15	0-20	1-85	103-72	104-40																																									
D/S ACCESS POINT				PIPE SECTION																																											
Identifier	WXY 6-11	SL	103-95	Length	48.84	Material	PVC / SEH	Cross Meth	BORE																																						
Cross Meth	I	Mat	C	CL	103-95			Size	150	Joining	SCEM																																				
Shape	CON	Size	1.07	IL	102-26			Grade	1:40.7	Shaft Ch																																					
Co-ords	E	Depth	1.69	Bending	GROUT			Backfill	GROUT																																						
	N	Type	JDP	Alt Cross Meth	O/CUT			Ch - Ch	0-0 → 15-0																																						
RESPONSIBLE DEVELOPER/CONSULTANT				Alt Bed Mat.	C/ROCK			Ch - Ch	0-0 → 15-0																																						
SPECIAL PROJECT GROUP				Alt Back Mat.	C/ROCK			Ch - Ch	0-0 → 6-3																																						
AS-CONSTRUCTED RECORD				Job Name	RETIC EXT 123/10				Municipality																																						
SEWER								KNOX																																							
Recorded by:	BOB PLUMB			Ref				Sheet	1 of 1																																						
Date	1/6/94			Drawn	BOE 4			PS	1999 Page 87																																						

Example of completed "As-constructed Record – Sewer" field note

Refer to page 4-6 for default values when using this format

Defaults – sewer field notes

Unless otherwise specified the following defaults shall apply to the sewer field note format of as-constructed sewerage Works.

Item	Default
Access chamber construction method	Cast in-situ
Access chamber shape	Conical truncated
Access chamber construction material	Concrete
Property service connection	Diameter = 100mm Boundary trap = none Material = pipe section material
Pipe shape	Circular
Trench backfill	Excavated material

All values not the default shall be recorded in the appropriate place on the sewer field note.

Type of access point

The pipe configuration through the access point shall be noted on each sewer field note by the below abbreviations.

Junction with a drop	jdp
Junction	j
Straight through	st
Straight through with a drop	sdp
Bend	b
Bend with a drop	bdp
Access chamber at end of pipe	mep
End of pipe (no reducer)	ep
Reducer (line ends with a connection out of a reducer)	red

Part 3

As-constructed Information

5 General

The Surveyor shall be responsible for the recording of the horizontal and vertical position of the water supply pipes and fittings and forwarding the information to the Consultant.

The following as-constructed details are required.

5.3 Vertical position

Depths to top of pipe and or AHD invert levels shall be recorded at:

- Intersection of pipes
- Mid-points of curves
- Vertical bends
- Changes of grade
- Where the depth varies by more than 0.20 metre due to significant changes in surface level, e.g. road crossing, drain crossing, etc,

5.4 Horizontal position

AMG co-ordinates, running chainages and or offsets to title shall be recorded at:

- Horizontal bends
- Changes of grade
- Vertical bends
- Changes in direction
- Fittings
- Changes in pipe characteristics
- Property connections

5.3 Details to be recorded for water supply

Item	For example
Pipes	Diameter Type, e.g. CICL, DICL, MSCL, PVC, etc, Locking Ring pipe jointing Pipes in conduit Tees Crossovers Bypasses Offtakes Crankes Dog Legs Cross connections
Hydrants	Above ground Fire plug or below ground hydrant Washout
Fittings	Vertical or horizontal bends Reducers, tapers, etc, Scours Tapping arms Blank ends Wash out bends Valves
Property connection points	Location of property connection showing tie distance to nearest pegged title boundary
Other	Depth recorders Pressure recorders Flow recorders Electrolysis points Extent of abandoned main to be shown
For submission of digital data	Abandoned mains are to be recorded on a copy of the Design Plan

5.3.1 Other details to be recorded

In addition to recording the horizontal and vertical position of the above information the following details shall also be recorded:

- Job identification, e.g. 37123401 (ref. *Water Supply Digital Input Manual* for the file naming conventions)
- Municipality
- Date of construction
- Road name

5.3.2 Horizontal and vertical position checks

It is recommended that the position and depth (or AHD level if applicable) of the water main pipes be checked at maximum intervals of 30 metres to ensure that construction meets the required tolerances. These checks are not required to be submitted to the Water Company.

6 General

The Surveyor shall be responsible for the recording of the horizontal and vertical position of the sewer pipes and fittings and forwarding the information to the Consultant.

The following as-constructed details are required.

6.1 Access Chambers (manholes)

- The horizontal (plan) position, cover level and invert level of the manhole. The surface level shall be recorded if it differs from the cover level.

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position.	The intersection point (I.P.) of pipes into and out of manhole. Record centre axis of manhole if there is more than one I.P. or the I.P. does not exist or does not fall within the manhole.	The offsets of the pipe centre line to title boundary. Refer to <i>Appendix B "Plan View of Access Chamber"</i> and <i>Appendix C "Junction Access Chamber"</i> .	AMG co-ordinates.	Sufficient measurements to enable plotting including distance along and offset from the pegged title boundary.
Vertical position.	Cover level.	At centre axis as shown in <i>Appendix B "Sectional View of Access Chamber"</i> .	AHD levels.	AHD levels.

Continued on next page ...

Manholes continued ...

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Vertical position (continued).	Invert levels.	The invert level of all pipes (into and out of manhole) projected on grade to centre of manhole. Refer to <i>Appendix B “Sectional View of Access Chamber”, Appendix C “Sectional Elevation”</i> and <i>Appendix D “Sectional Elevation”</i> .	AHD levels.	AHD levels.
	Future extension (stub pipe).	The invert level (and diameter) of the stub pipe.	AHD levels.	AHD levels.

6.1.1 Details to be recorded for manholes

Item	For example
Size	Internal diameter, e.g. 1070 mm, 1200 mm, etc,
Type	Straight through, junction, drop, etc,
Internal shape	Conical, truncated or circular
Material	Construction material, e.g. concrete, polyethylene, etc,
Construction method	Cast-in-situ or precast
Data of construction	Date of installation
Unique identifier	Obtained from the Water Company at the design stage, e.g. SNK26-20

6.2 Inspection Shafts and Maintenance Shafts

- The horizontal and vertical position, cover level and invert level of the shaft. The surface level shall be recorded if it differs from the cover level.

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position.	The centre axis of the shaft.	Centre axis of the shaft.	AMG co-ordinates.	Running chainage from downstream access point and offset from pegged title boundary.
Vertical position.	Invert level.	Invert level projected to centre of shaft. Refer to <i>Appendix G "Inspection Shafts"</i> .	AHD levels.	AHD levels.
	Cover level.	Reduced level of cover at centre axis of shaft.	AHD levels.	AHD levels.

6.3 Pipe Junctions

- The horizontal position and invert level at the pipe junction and surface level above the pipe junction.
- For digital submission the surface level is considered to be a cover level.

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position.	Intersection point of sewer centre lines.	Location of intersection point of centre lines of sewer pipe sections.	AMG co-ordinates.	Running chainage from downstream access point and offset from pegged title boundary.
Vertical position.	Invert level.	Invert level projected on grade to intersection point.	AHD levels.	AHD levels.
	Natural surface level	Natural surface level	AHD levels.	AHD levels.

6.4 Ends of Pipe and Reducers

- The horizontal position and invert level of the end of pipe or reducer and the surface level above that point.
- For digital submission the surface level is considered to be a cover level.

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position.	The centre line of the sewer at the end of pipe or reducer.	End of pipe or reducer.	AMG co-ordinates.	Running chainage from downstream access point to end of pipe or reducer and offset from pegged title boundary.
Vertical position.	Invert level	Invert level at end of pipe or reducer (larger diameter).	AHD levels.	AHD levels.
	Natural surface level	Natural surface level at end of pipe	AHD levels.	AHD levels.

6.5 Pipe Sections

- The horizontal position and vertical position of each pipe section, i.e. the sewer main and or reticulation sewer between consecutive access points.

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal length.	Length of sewer line.	The horizontal length of the pipe section. Refer to <i>Appendix A "Sewer"</i> .	AMG co-ordinates at each end of length indicated.	Length from intersection point to intersection point.
Running chainages.	The corners of pegged title boundaries.	Running chainages along the sewer line locating the corners at right angles to the sewer line. Refer to <i>Appendix A "Sewer"</i> .		Running chainages.

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position.	Downstream and upstream ends of the pipe and at changes in direction.	Horizontal position of the centre of the pipe at access points and tangent points. Refer to <i>Appendix A "Sewer"</i> .	AMG co-ordinates offsets indicated.	Distance along and offset from the pegged title boundary.
Vertical position.	Invert level.	Refer to "Invert levels" at pages 6-2, 6-3, 6-4, 6-6 & 6-7.	AHD levels.	AHD levels.

6.5.1 Grade checks

The invert level of the pipe should be checked at the mid-point of pipe sections to ensure an even grade between access points. For pipe sections of grade 1 in 80 or flatter it is recommended that checks are made at maximum intervals of 30 metres and at changes of construction method, e.g. open cut to bore. These checks are not required to be submitted to the Water Company.

6.5.2 Details to be recorded for pipe sections

Item	For example
Grade	Grade of pipe section, e.g. 1 in 80, etc. Not percentage grade.
Diameter	Nominal diameter of pipe, e.g. 150 mm, 225 mm, etc,
Shape	Shape of the pipe section, e.g. circular, ovoid, etc,
Material	Type of pipe, e.g. vitreous clay (VC), uPVC, etc,
Jointing	Type of jointing, e.g. rubber ring, solvent cement, etc,
Construction method	Method, e.g. open cut, bored, tunnel, etc,
Soil type	Soil type of the excavation, e.g. clay, sand, reef, etc
Bedding material	Main (majority) material, e.g. crushed rock, concrete, etc,
Backfill material	Main (majority) material, e.g. sand, crushed rock, etc,
Flow arrow	Direction of flow through the pipe section
Date constructed	Date of installation, e.g. 28-04-98
Number of property branch sewers	For digital submission the number of property branches is required.

Continued on next page ...

Pipe Sections continued ...

Note: For all sewer Works the following items are to be recorded. For developments of nine (9) lots or less the sewer field note format accommodates the recording of the required information. For developments of ten (10) lots and over an amended copy of the Design Plan shall be submitted with the digital information.

Alternative construction method	Note method of construction and the start and finish chainages.
Alternative bedding	Note type of material, profile (including depth below invert) and the start and finish chainages.
Alternative backfill	Note type of material and the start and finish chainages
Shaft chainage	Note running chainage of intermediate construction shafts.

6.6 Curved Sewers

6.6.1 Vertically curved sewers

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position.	Start and finish of curve (tangent points).	Locate tangent points of curve, i.e. change of grade at start and finish curve.	AMG co-ordinates. Chainage indicated.	Running chainage from downstream access point.
Vertical position.	Invert levels.	Invert levels at the start and end of the curve.	AHD levels.	AHD levels.

- Other details to be recorded for vertically curved sewers

Item	Information required
Grades	The grades of the straight section of pipe before and after the vertical curve. Grade is not specified for the vertically curved section of sewer.

Continued on next page ...

Curved Sewers continued ...

6.6.2 Horizontally curved sewers

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position.	Start and finish of curved sewer (tangent points).	Locate tangent points at the start and finish of curved sewer.	AMG co-ordinates.	Running chainage from the downstream access point and offset from pegged title boundary.
	Mid-point of the curve.	Locate mid-point of curved sewer.	<i>As above</i>	<i>As above</i>
Vertical position.	Invert levels.	Invert levels at the start and finish of the curved sewer.	AHD levels.	AHD levels.

Note: The invert level of the pipe along a horizontally curved sewer should be checked to ensure an even grade between tangent points. These checks are not required to be submitted to the Water Company.

6.7 Property Branch Sewers (connections)

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position.	End of branch.	Location of end of the pipe. Refer to <i>Appendices E & F "Property Branch Sewers"</i> .	AMG co-ordinates.	Running chainage from downstream access point along the line of the sewer to a point square to the end of branch.
	Intersection of line of sewer and line of connection.	Location of intersection point of line of sewer and line of connection. Refer to <i>Appendices E & F "Property Branch Sewers"</i> .	AMG co-ordinates. Chainages indicated.	Running chainages from the downstream access point to the intersection of the line of the sewer and line of connection.

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal distance.	Length of branch.	Distance along the branch from the intersection of sewer line and the property branch to the end of branch. Refer to <i>Appendices E & F "Property Branch Sewers"</i> and page 4-5 (Example sewer field note).	AMG co-ordinates.	Distance along the branch.
	Distance along branch to jump up.	Distance along the branch from the intersection of the sewer line and the property branch to the jump up. Refer to <i>Appendices E & F "Property Branch Sewers"</i> and page 4-5 (Example sewer field note).	AMG co-ordinates. Distance indicated if more than 1.00m.	Distance along the branch to jump up.
Tie distance.	End of branch.	Distance from the nearest title corner of the property serviced to the end of the branch. The distance is parallel to the title boundary.	Tie distance indicated.	Tie distance.
		Alternatively two (2) ties can be used from title corners directly to end of branch (for unusual situations such as curved boundary). Refer to <i>Appendices E & F "Property Branch Sewers"</i> .	Direct ties.	Direct ties.
Horizontal position.	Oblique branch (Ob) constructed for future connection.	Location of oblique branch.	AMG co-ordinates of point of entry. Chainage indicated.	Running chainage from downstream access point along the line of the sewer to the point of entry.

Connections continued ...

Item	Point to be recorded	Requirements	Format	
			Digital	Field Note
Horizontal position <i>(continued)</i> .	Oblique bend “Y” branch.	Distance along the branch from the intersection of sewer line and the property branch to the center of the oblique bend for “Y” branch.	AMG co-ordination of the centre of the oblique branch. Distance indicated.	Distance along the branch.
Vertical position.	Invert level at end of pipe.	Invert level of pipe at the end of the branch. Refer to <i>Appendix E & F “Property Branch Sewers”</i> .	AHD levels.	AHD levels.
	Natural surface level.	The level of the natural surface above the end of the branch. Refer to <i>Appendix E & F “Property Branch Sewers”</i> .	AHD levels.	AHD levels.
	Type 2A and 4A.	Top of Cap. Refer to <i>Appendix F “Types 2A & 4A”</i> .	AHD levels.	AHD levels.

6.7.1 Other details to be recorded for connections

Item	Information Required
Unique identifier	The Property Service number (supplied by the Water Company)
Diameter	The nominal diameter of the Property Branch in millimetre (mm).
Type	The type of Property Branch, ref. <i>Appendix E & F “Property Branch Sewers”</i> .
Material	The material used for the Property Branch, e.g. vitreous clay, uPVC, etc,
Boundary trap note	The note for the Boundary Trap where required, i.e. BT.

6.8 Other sewerage details to be recorded

In addition to the horizontal and vertical position, the following details shall also be recorded:

- Job identification (obtained from the Water Company).
- Municipality.
- Field book and page number (obtained from the Water Company) for information supplied in sewer field note format.

7 General

The Surveyor shall be responsible for the recording of as-constructed information detailing sewerage pumping stations and rising mains and the forwarding of the as-constructed information to the Consultant.

Position shall be recorded relative to the Australian Map Grid and the Australian Height Datum when the Design Plans specify AMG coordinates and AHD levels.

The as-constructed information shall be supplied in either .DXF or MicroStation .DGN digital format and shall be accompanied by an amended copy of the Design Plan showing as-constructed details.

7.1 Pumping stations

Refer to *Sewerage Digital Input Manual* for items to be recorded.

7.2 Rising mains

Refer to *Sewerage Digital Input Manual* for items to be recorded.

Vertical position shall be recorded at:

- Vertical bends
- Changes of grade
- Start and finish of rising main (at Pumping Station and outlet access point)

Vertical position may be recorded as depth from surface to top of pipe when Design Plans do not specify AHD levels.

Continued on next page ...

Rising Mains continued ...

Horizontal (plan) position shall be recorded at:

- Horizontal bends (change in direction)
- Changes of grade
- Fittings
- Changes in pipe characteristics, e.g. material, diameter, etc,
- Changes in construction method

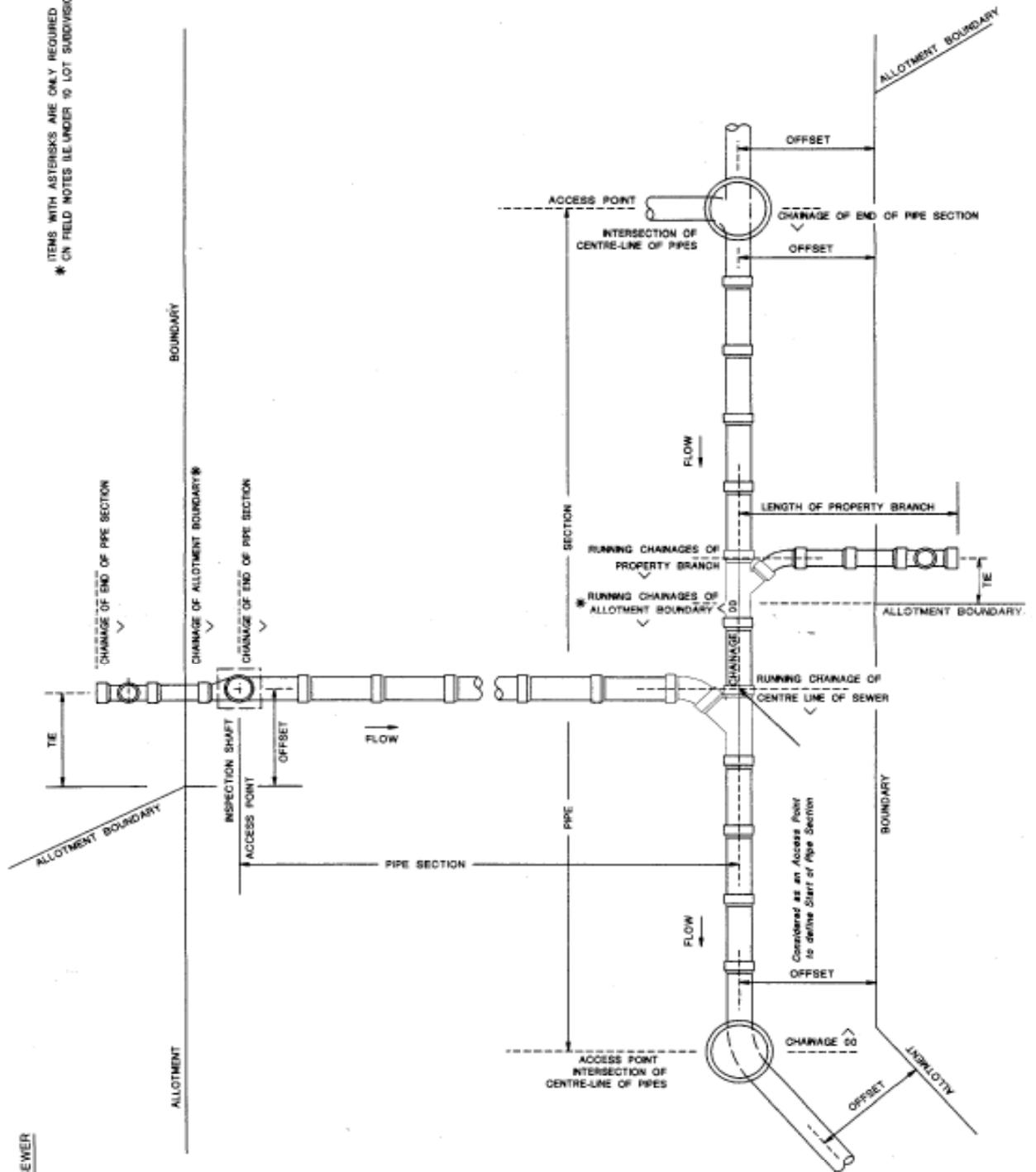
Horizontal (plan) position may be recorded relative to pegged title boundaries and running chainage when Design Plans do not specify AMG co-ordinates.

Part 4

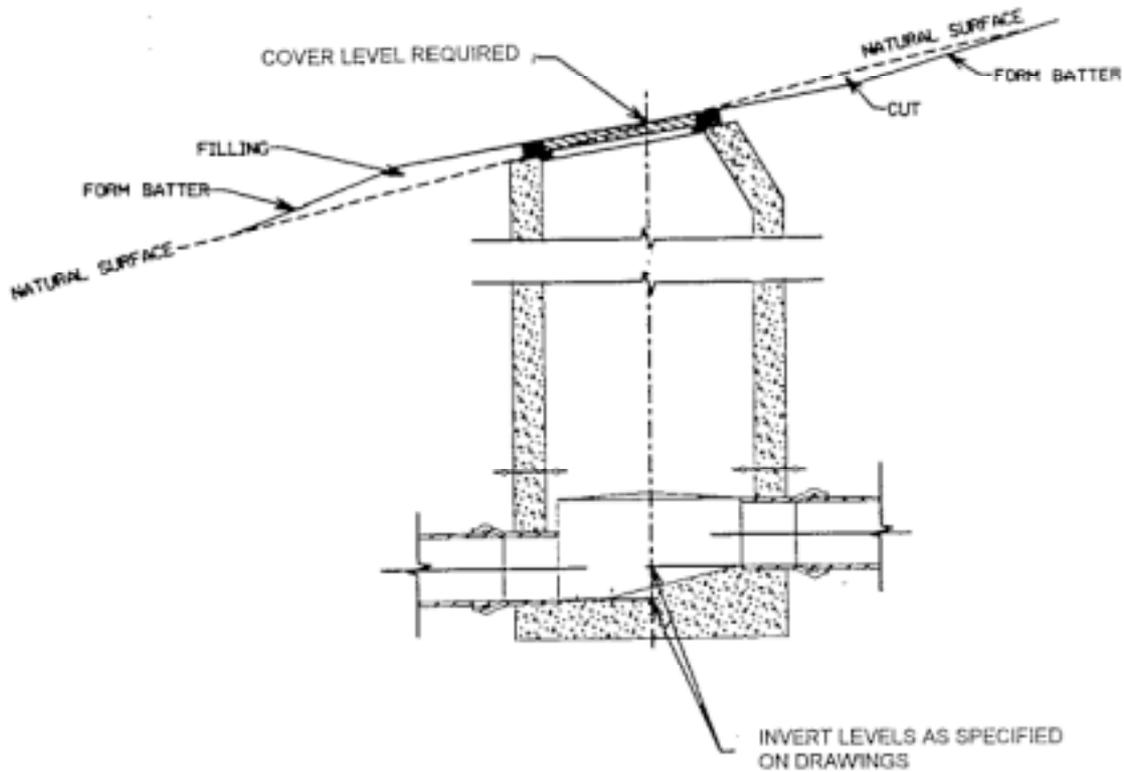
Appendices

APPENDIX A SEWER

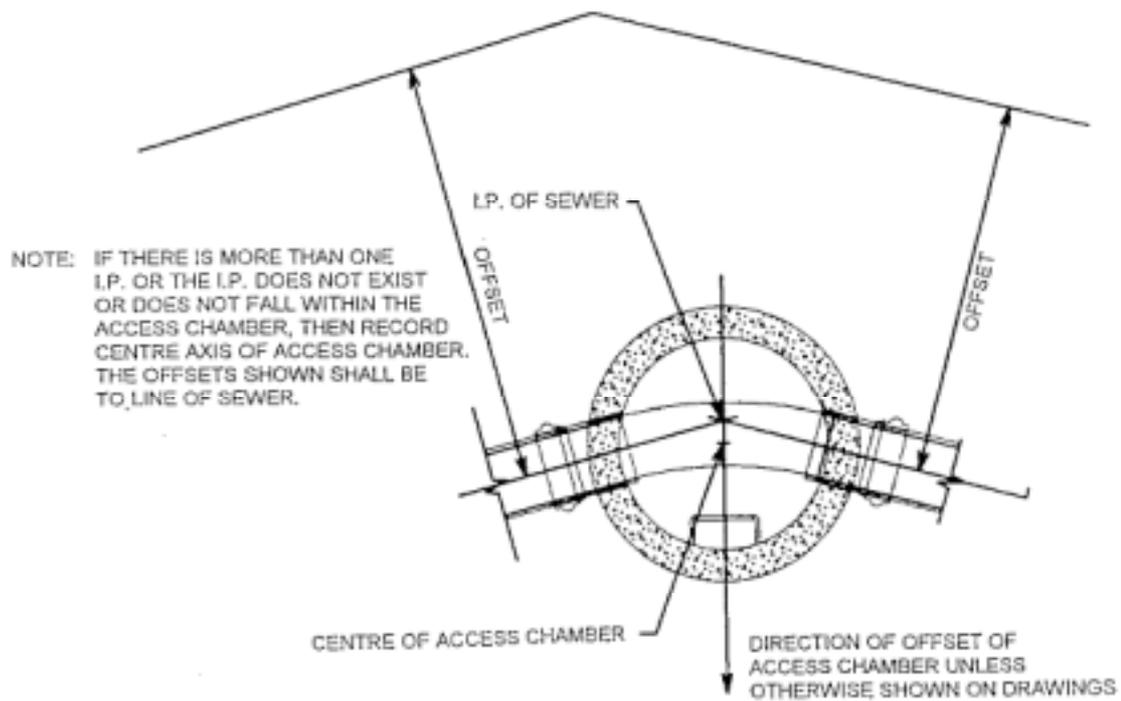
ITEMS WITH ASTERISKS ARE ONLY REQUIRED
* ON FIELD NOTES (E UNDER 10 LOT SUBDIVISIONS)



APPENDIX B - ACCESS CHAMBERS

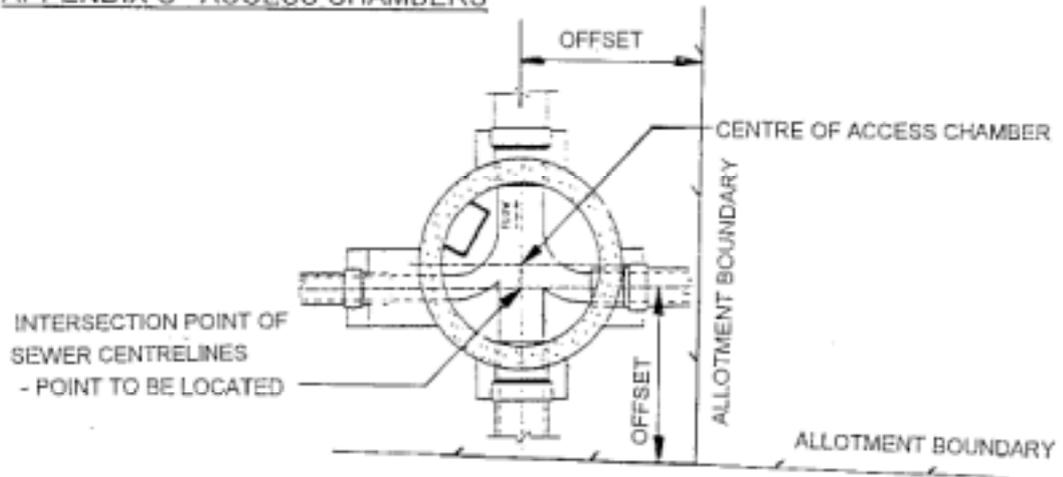


SECTIONAL VIEW OF ACCESS CHAMBER

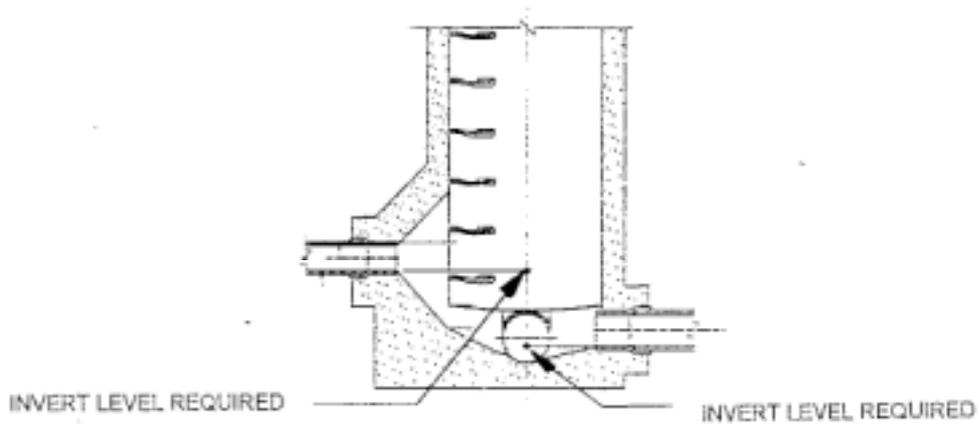


PLAN VIEW OF ACCESS CHAMBER

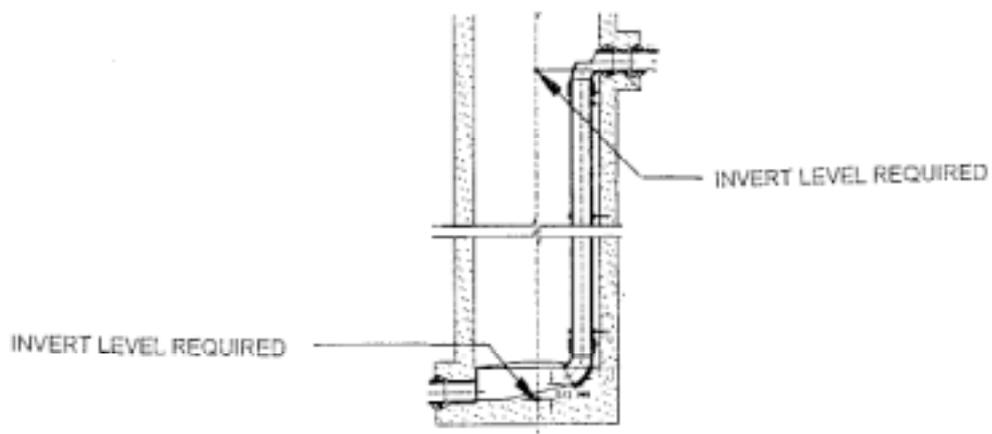
APPENDIX C ACCESS CHAMBERS



JUNCTION ACCESS CHAMBER - PLAN

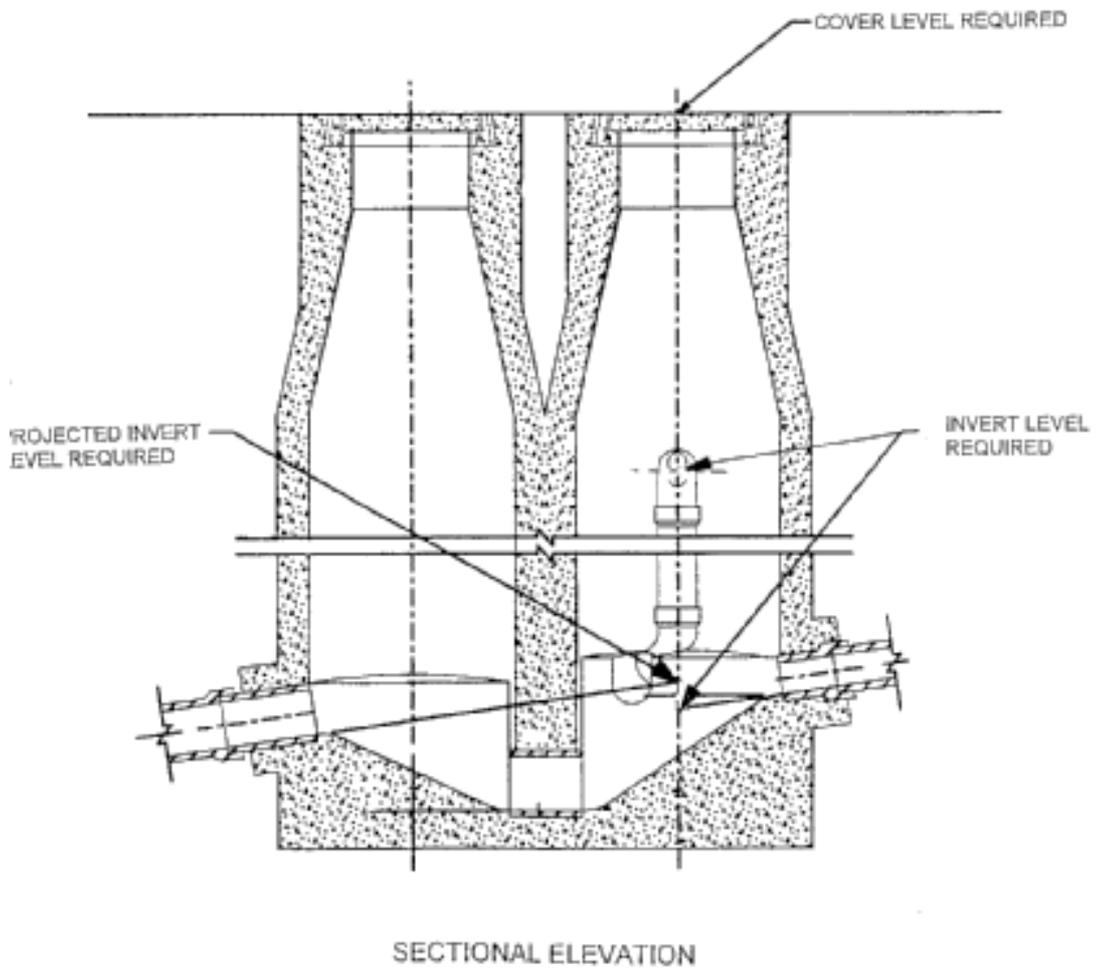
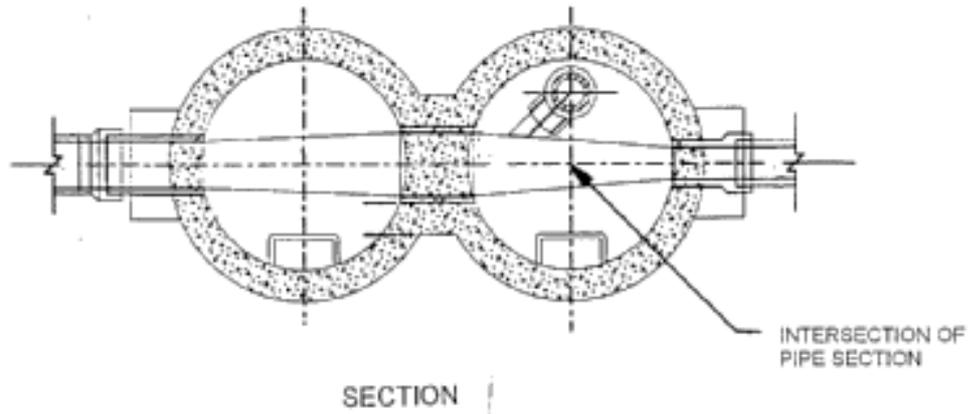


ELEVATION

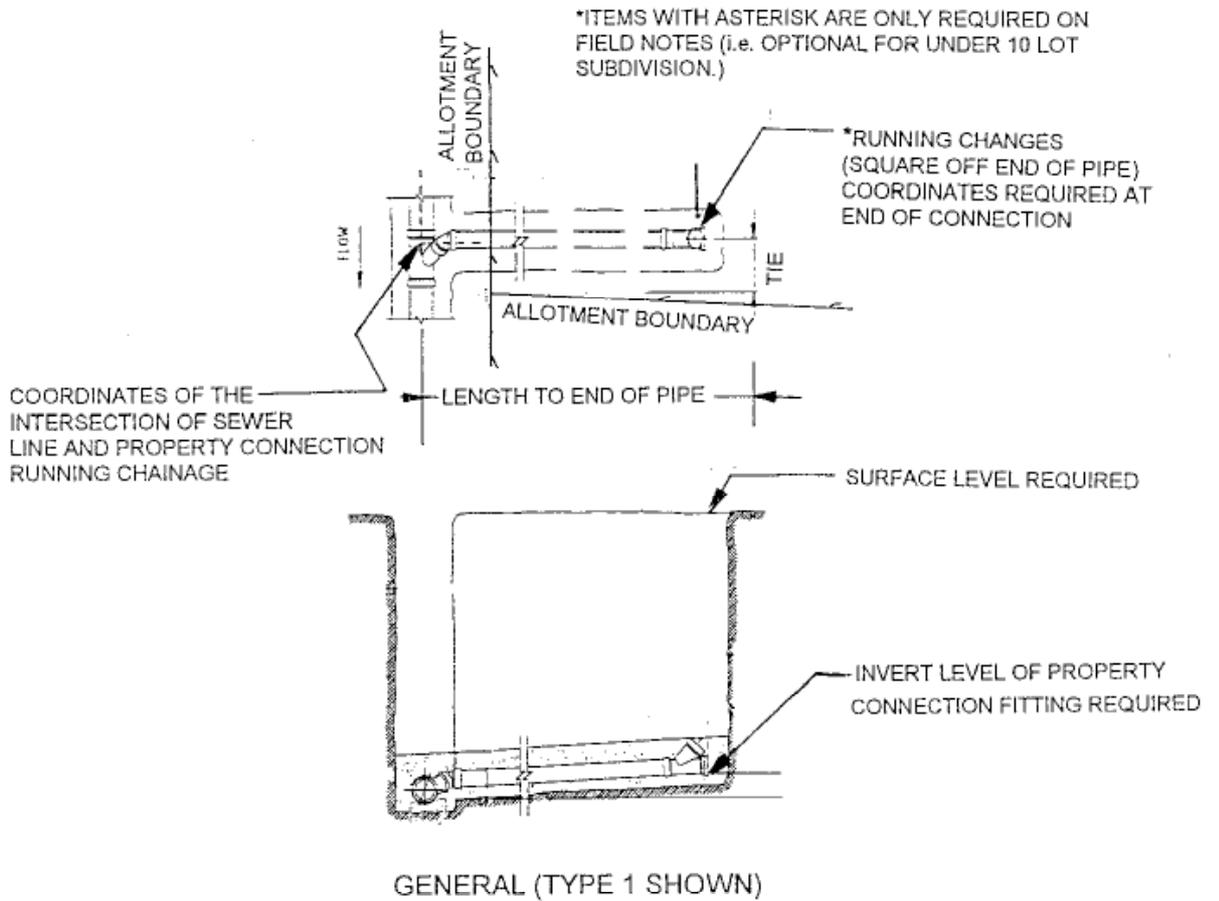


DROP TYPE 3 - ELEVATION

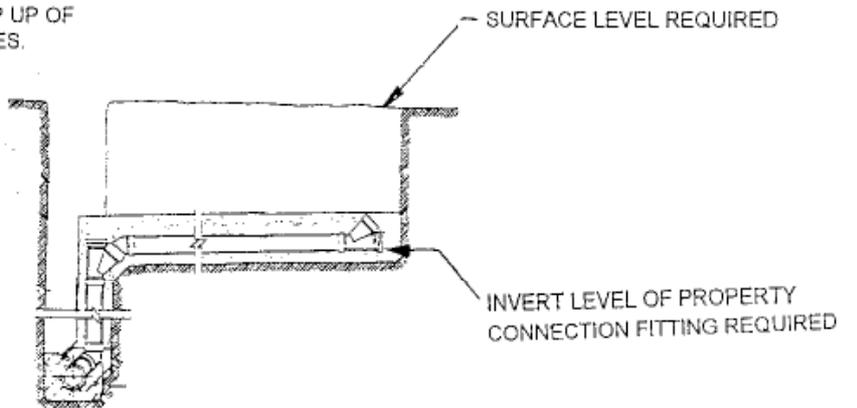
APPENDIX D - GAS CHECK CHAMBER



APPENDIX E PROPERTY BRANCH SEWERS - SHEET 1 OF 2



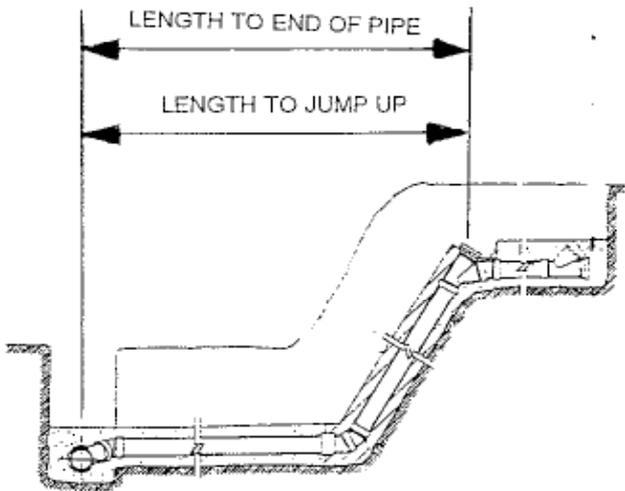
TYPE 2 CONNECTIONS ARE ASSUMED TO HAVE A LENGTH TO JUMP UP OF BETWEEN 0.2 AND 0.5 METRES.



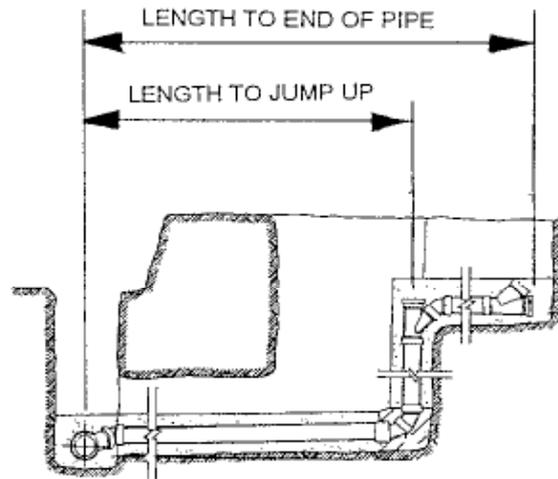
TYPE 2

APPENDIX E PROPERTY BRANCH SEWERS - SHEET 2 OF 2

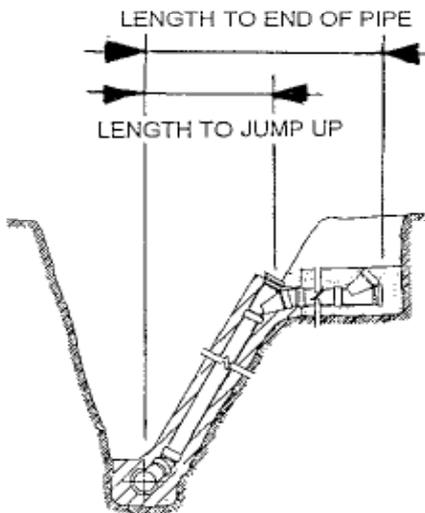
* ITEMS WITH ASTERISK ARE ONLY REQUIRED ON FIELD NOTES i.e. OPTIONAL FOR UNDER 10 LOT SUBDIVISION.



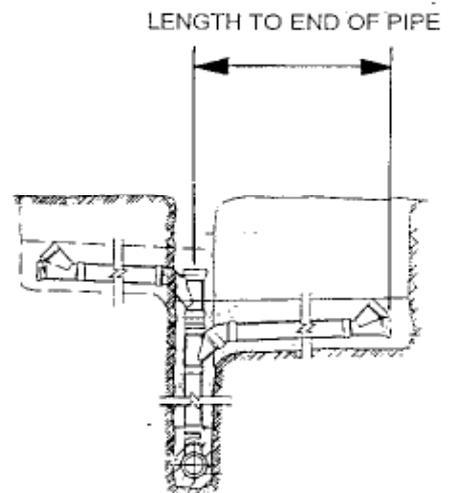
TYPE 3



TYPE 4



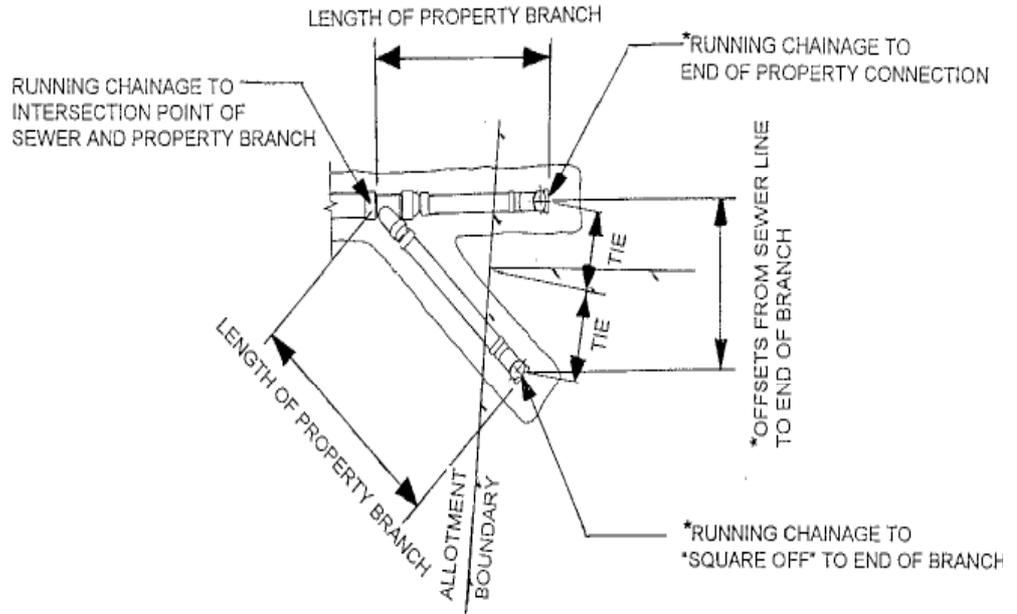
TYPE 5



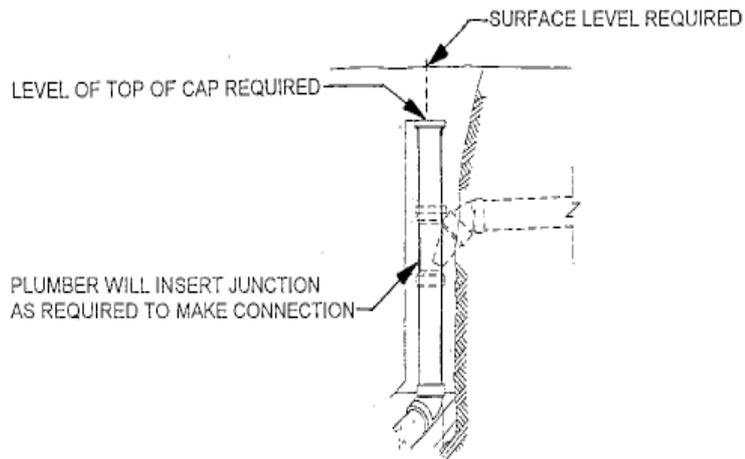
TYPE D or 6

APPENDIX F PROPERTY BRANCH SEWERS - SHEET 1 OF 2

* ITEMS WITH ASTERISK ARE ONLY REQUIRED ON FIELD NOTES I.e. OPTIONAL FOR UNDER 10 LOT SUBDIVISION.



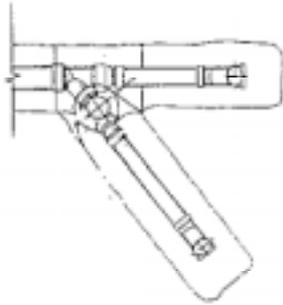
SPUR BRANCH - RUN IN TYPE - PLAN



TYPE 2A OR 4A

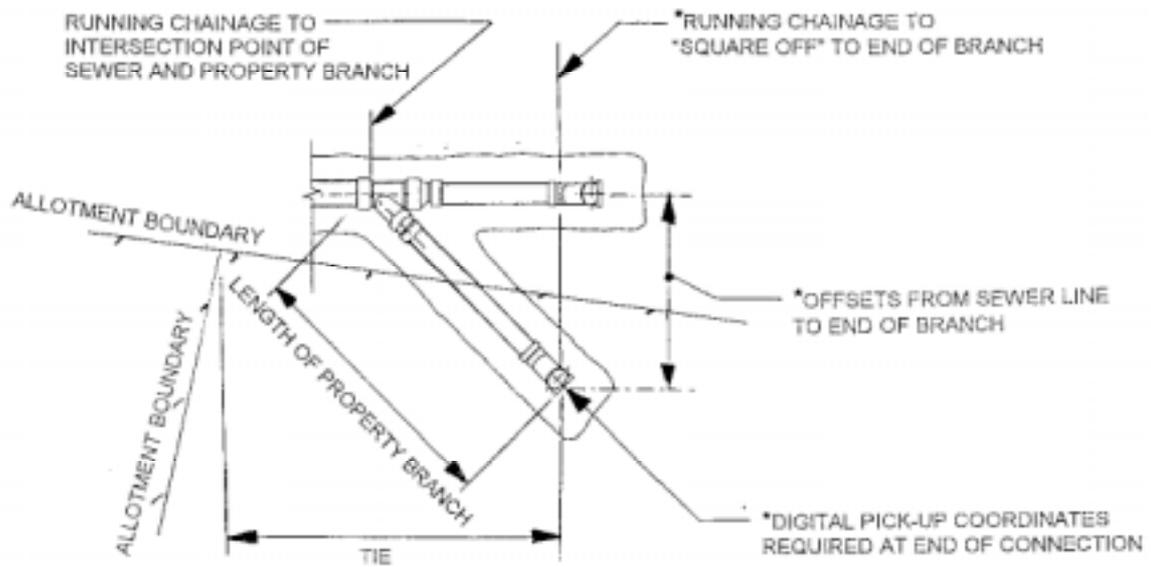
APPENDIX F PROPERTY BRANCH SEWERS - SHEET 2 OF 2

* ITEMS WITH ASTERISK ARE ONLY REQUIRED ON FIELD NOTES I.e. OPTIONAL FOR UNDER 10 LOT SUBDIVISION.



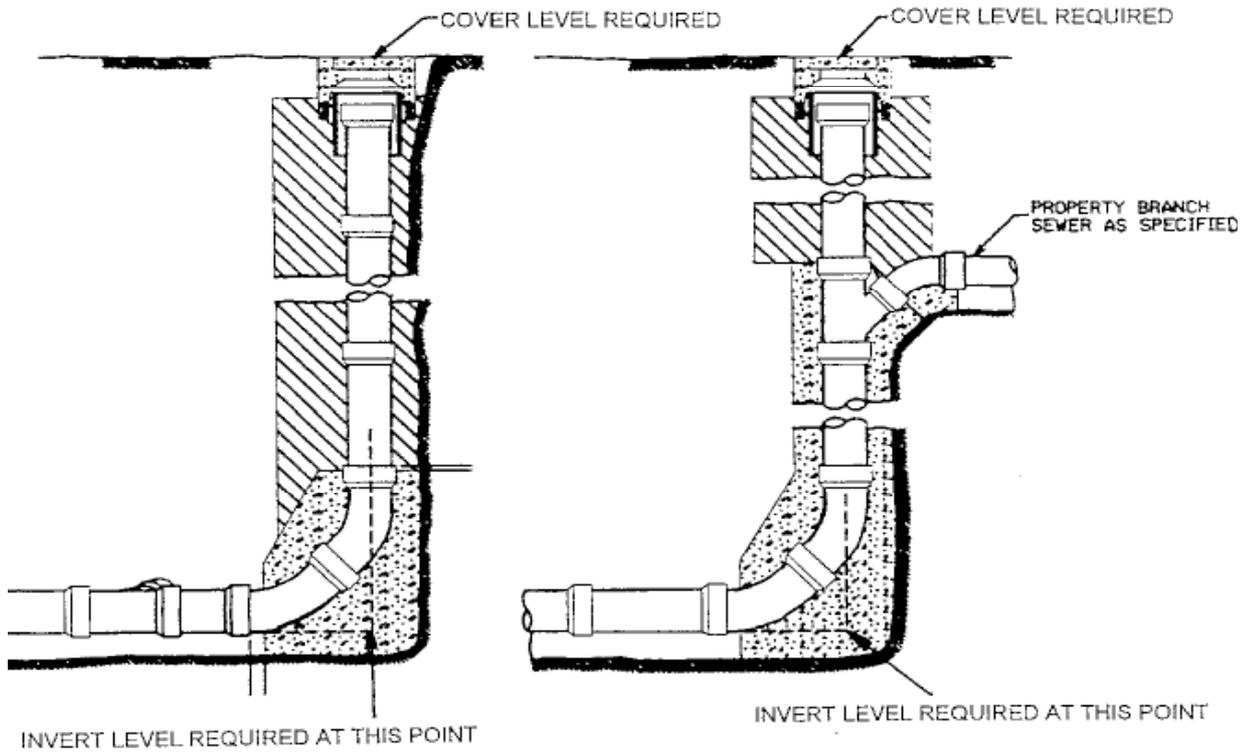
SPUR BRANCH - JUMP UP TYPE
PLAN

VERTICAL SPUR TYPE
ELEVATION



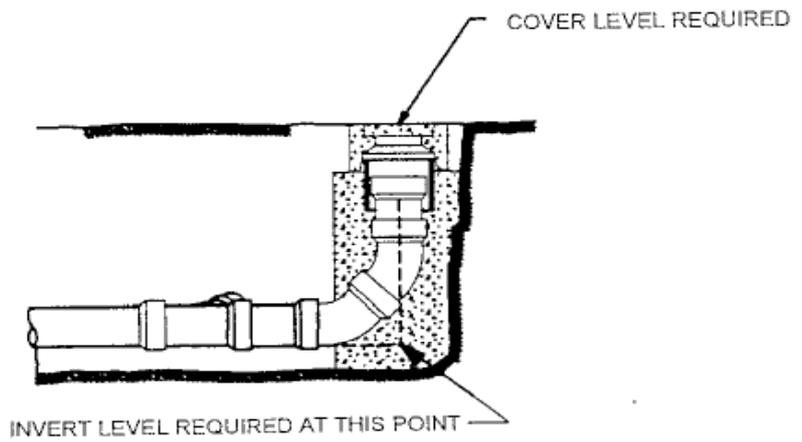
OBLIQUE - RUN IN TYPE

APPENDIX G - INSPECTION SHAFTS SHEET 1 OF 2



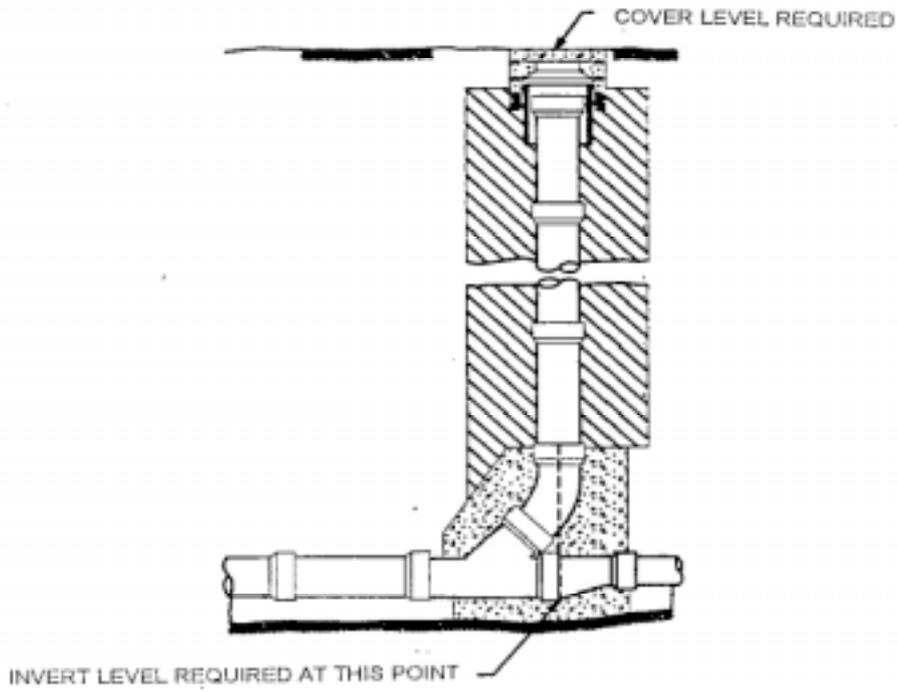
INSPECTION SHAFT
TYPE A

INSPECTION SHAFT
TYPE B

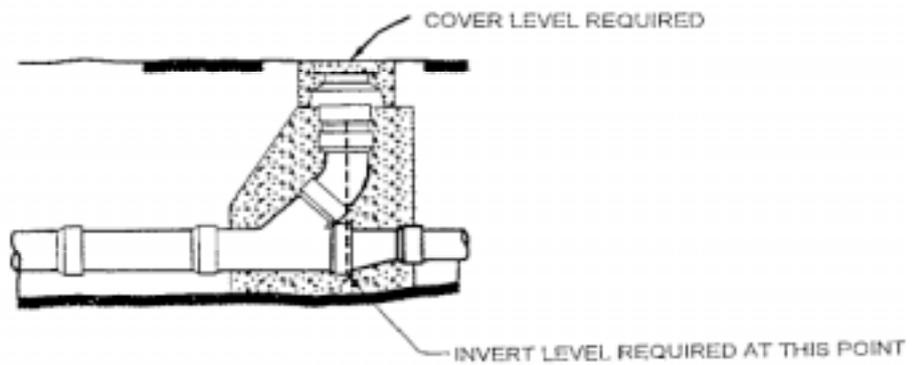


INSPECTION SHAFT
TYPE A
MINIMUM DEPTH

APPENDIX G - INSPECTION SHAFTS SHEET 2 OF 2



INSPECTION SHAFT
TYPE C



INSPECTION SHAFT
TYPE C
MINIMUM DEPTH

APPENDIX H - AS CONSTRUCTED RECORD - SEWERAGE

U/S ACCESS POINT			PROPERTY SERVICE									
Identifier		SL	<i>Defaults: Size=100mm. Material=pipe material. Type=common run in. Boundary trap=none.</i>									
Cons Meth	Mat	CL										
Shape	Size	IL										
Co-ords		Depth	Type	Chainage of	Length to			Invert of		SL	Notes	
E				B'ch	EP	JU	Ob	EP	Sewer	Point		
N		Type										
D/S ACCESS POINT			PIPE SECTION									
Identifier		SL	Length	Material		Cons Meth						
Cons Meth	Mat	CL	Size	Joining		Soil Type						
Shape	Size	IL	Grade	Shaft Ch								
Co-ords		Depth	Bedding				Backfill					
E			Alt Cons Meth				Ch - Ch					
N		Type	Alt Bed Mat.				Ch - Ch					
RESPONSIBLE DEVELOPER/CONSULTANT			Alt Back Mat.				Ch - Ch					
AS-CONSTRUCTED RECORD SEWER			Job Name						Municipality			
Recorded by :		Ref	Melway				Sheet		of			
		Date					FB		Page			

Verification Form

Acceptance of Non-digital As-constructed Information for Water Supply Works

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. The name of the Survey Company used to supply the information.
5. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Non-digital As-constructed Information for Water Supply Works

Job description : _____

Municipality : _____

Consultant : _____

Nominated Rep. : _____

Consultant Ref. No. : _____

Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. The name of the Survey Company used to supply the information.
5. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Digital As-constructed Information for Sewerage Works

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. Specific identification of file is required, i.e. .DGN, .DXF, linked or unlinked in accordance with the *Sewerage Digital Input Manual*.
5. The name of the Survey Company used to supply the information.
6. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the digital information is supplied virus free and in accordance with the Consultants Responsibilities as set out in the *Survey Manual*,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
Name	Company Position
Signature	Date

Verification Form

Acceptance of Digital As-constructed Information for Water Supply Works

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation that is acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. Specific identification of file is required, i.e. .DGN, .DXF, linked or unlinked in accordance with the *Water Supply Digital Input Manual*.
5. The name of the Survey Company used to supply the information.
6. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the digital information is supplied virus free and in accordance with the Consultants Responsibilities as set out in the *Survey Manual*.
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Digital Subdivision Information

Job description : _____

Municipality : _____

Consultant : _____

Nominated Rep. : _____

Consultant Ref. No. : _____

Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the Plan of Subdivision.
3. All information supplied is labelled with the Supplier's name and the Titles Office Plan of Subdivision number.
4. A .DGN level or .DXF layer specifications form.
5. The name of the Survey Company used to supply the information.
6. Verification Form Attachment Sheet, if any of the items on this form are not applicable

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the digital information is supplied virus free and in accordance with the Consultants Responsibilities as set out in the *Survey Manual*,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Non-digital As-constructed Information for Sewerage Works

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. The name of the Survey Company used to supply the information.
5. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Non-digital Subdivision Information

Job description : _____

Municipality : _____

Consultant : _____

Nominated Rep. : _____

Consultant Ref. No. : _____

Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the Plan of Subdivision.
3. All information supplied is labelled with the Supplier's name and the Titles Office Plan of Subdivision number.
4. The name of the Survey Company used to supply the information.
5. Verification Form Attachment Sheet, if any of the items on this form are not applicable

Consultant's Verification

As the Consultant's nominated representative for the Works detailed in Water
Company Reference No. _____/_____/_____.

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the *Water Company Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Survey Verification Forms

Third Edition
No

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Changes may be made periodically to the information herein.

May 1998

About the Verification Forms

This Section describes the Survey Verification Forms to be completed at each of the following stages of a project:

- the acceptance of non-digital subdivision information,
- the acceptance of digital subdivision information,
- the acceptance of non-digital as-constructed information for water supply and sewerage Works,
- the acceptance of digital as-constructed information for water supply and sewerage Works.

Separate Verification Forms are required for water supply and sewerage Works.

The total number of pages for each form is shown at the bottom right of each page. Each form also has a Verification Form Attachment Sheet.

Be careful to photocopy and include all pages when completing a Verification Form.

The forms are included in this Section in the following order. Page counts include the Verification Form Attachment Sheet.

	No of Pages
Acceptance of Non-digital Subdivision Information	2
Acceptance of Digital Subdivision Information	2
Acceptance of Non-digital As-constructed Information for Water Supply Works	2
Acceptance of Digital As-constructed Information for Water Supply Works	2
Acceptance of Non-digital As-constructed Information for Sewerage Works	2
Acceptance of Digital As-constructed Information for Sewerage Works	2
Verification Form Attachment Sheet	1

Verification Form Attachment Sheet

Job description : _____
Municipality : _____
Consultant : _____
Water Company Ref. No. : _____
Verification Form : _____

Note: Please attach a copy of this sheet to the Verification Form, if needed.

Item No.	Comments

Nominated Representative : _____

Signature : _____

Verification Form

Acceptance of Non-digital As-constructed Information for Water Supply Works

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. The name of the Survey Company used to supply the information.
5. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Digital As-constructed Information for Sewerage Works

Job description : _____

Municipality : _____

Consultant : _____

Nominated Rep. : _____

Consultant Ref. No. : _____

Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. Specific identification of file is required, i.e. .DGN, .DXF, linked or unlinked in accordance with the *Sewerage Digital Input Manual*.
5. The name of the Survey Company used to supply the information.
6. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the digital information is supplied virus free and in accordance with the Consultants Responsibilities as set out in the *Survey Manual*,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
Name	Company Position
Signature	Date

Verification Form

Acceptance of Digital As-constructed Information for Water Supply Works

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation that is acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. Specific identification of file is required, i.e. .DGN, .DXF, linked or unlinked in accordance with the *Water Supply Digital Input Manual*.
5. The name of the Survey Company used to supply the information.
6. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the digital information is supplied virus free and in accordance with the Consultants Responsibilities as set out in the *Survey Manual*.
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Digital Subdivision Information

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the Plan of Subdivision.
3. All information supplied is labelled with the Supplier's name and the Titles Office Plan of Subdivision number.
4. A .DGN level or .DXF layer specifications form.
5. The name of the Survey Company used to supply the information.
6. Verification Form Attachment Sheet, if any of the items on this form are not applicable

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the digital information is supplied virus free and in accordance with the Consultants Responsibilities as set out in the *Survey Manual*,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Non-digital As-constructed Information for Sewerage Works

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the asset information.
3. All information supplied is labelled with the Supplier's name and the Water Company reference number for the Works.
4. The name of the Survey Company used to supply the information.
5. Verification Form Attachment Sheet, if any of the items on this form are not applicable.

Consultant's Verification

As the Consultant's nominated representative responsible for the Works detailed in Water Company Reference No. _____/_____/_____,

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Verification Form

Acceptance of Non-digital Subdivision Information

Job description : _____
Municipality : _____
Consultant : _____
Nominated Rep. : _____
Consultant Ref. No. : _____
Water Company Ref. : _____

Documentation to be submitted

1. Evidence of third party verification to ISO 9001 quality system standard or evidence of accreditation acceptable to the Water Company.
2. A hardcopy of the Plan of Subdivision.
3. All information supplied is labelled with the Supplier's name and the Titles Office Plan of Subdivision number.
4. The name of the Survey Company used to supply the information.
5. Verification Form Attachment Sheet, if any of the items on this form are not applicable

Consultant's Verification

As the Consultant's nominated representative for the Works detailed in Water
Company Reference No. _____/_____/_____.

I certify that:

- the survey is in accordance with the Offer,
- the survey has been completed in accordance with our company's quality system,
- the survey is in accordance with the Water Company *Survey Manual*,
- the survey is in accordance with all relevant Water Company specifications and relevant Australian Standards,
- the source documents have been filed in a manner that can be readily accessed for audit purposes.

Nominated Representative	
_____	_____
Name	Company Position
_____	_____
Signature	Date

Sewerage

Digital Input

Manual

Second Edition
No.

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March 1995

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Table of Contents

About This Manual

This manual details the graphics and non-graphics data specifications required by the Water Company for the digital recording of “as constructed” sewerage service information.

Intended audience

This manual defines the requirements and specifications for the supply of digital sewerage data to the Water Company by any person or company, hereafter known as the Consultant.

How to use this manual

This manual is divided into two parts.

Part 1 - Specifications

Part 1 consists of three chapters which describe the requirements of graphics and non-graphic data.

Chapter 1 Supply and Format of Data

This chapter describes the responsibilities of the Water Company and the Consultants with regard to the supply of “as constructed” data and associated documentation. It includes details about the supply and format of all digital data, file naming conventions and database linkage formats.

Chapter 2 Database Specifications

This chapter describes the non-graphics requirements associated with the graphical elements of the sewerage facility. The sewerage database structure is described and a schedule of the entities and attributes detailing default values, uniqueness criteria and attribute format is included. It also contains details of attribute relationships and expected values, which can be used as a basis for database verification checks.

Chapter 3 Graphical Specifications

This chapter describes the graphics data requirements. It includes the level structure, symbology specifications, associated graphics specifications and a graphics library of the cells required in sewerage data capture.

Part 2 - Guidelines

Part 2 consists of eight chapters which detail the presentation standards associated with the graphics input of sewerage assets and associated database entry.

Chapters 4 - 11

Chapters 4-11 contain the requirements for the input of the sewerage assets listed in Chapter 3. These chapters cover:

- ◆ data placement,
- ◆ sewer projects,
- ◆ sewer pipes and flow data,
- ◆ sewer features and notation,
- ◆ property service branches,
- ◆ access chambers.

Glossary of Terms

This chapter contains a glossary of terms used in this manual

Appendices

The Appendices contain:

- ◆ Supply of Digital Information Request Form,
- ◆ sample print outs of non-graphics (database) files,
- ◆ additional symbology specifications,
- ◆ sample sewer plot with subdivisional backdrop.

Index

A cross referenced index is included at the back of the manual.

Conventions used in this manual

Italics are used when reference is made to information in other chapters of this manual. For example,

This is shown in the **Database schedule** in *Chapter 2*.

Italics are also used to *emphasize* words or phrases.

- ◆ Diamond bullets are used for lists of items or topics.

Related reference material

Survey Manual

About This Manual

Part 1

Specifications

This chapter describes the formats in which externally captured sewerage data must be supplied to the Water Company. It describes the responsibilities of the Water Company and associated consultant companies.

The Water Company's responsibilities

Data supplied by the Water Company

On request the Water Company will provide the appropriate digital data files:

- ◆ code lists - filename codelist.dat (ASCII format),
- ◆ font library - filename fontlib.rsc (MicroStation format),
- ◆ cell library - filename fiscell.cel (MicroStation format),
- filename sewblock.dxf (.DXF format of FIS Cells),
- ◆ color table - filename fiscolour.tbl (MicroStation users),
- ◆ seed graphics file - filename basemap.DGN (MicroStation users),
- filename basemap.DXF (.DXF format users),
- ◆ graphics files containing cadastral map base and existing sewerage data that are specifically related to the area of development (supplied per development).

Documentation supplied by the Water Company

The Water Company will provide documentation specific to the development area including:

- ◆ the name of the treatment plant to which each project flows,
- ◆ the sewer project numbers and names, including:
 - sewer name and section number for named sewers,
 - reticulation project numbers for reticulation sewers,
- ◆ sewer project numbers where PS branches are constructed on existing sewers,
- ◆ property service numbers, as applicable,

1 Supply and Format of Data

- ◆ access chamber numbering requirements, including:
 - the existing numbers of access chambers along named sewers,
 - access chamber prefixes,
 - the range of access chamber suffixes,
 - existing access chamber numbers for reticulation sewers, if applicable.

The above information will be supplied when a request is received from consultant on a “Supply of Digital Information Form”. Refer to **Appendix A** for original.

Consultant responsibilities

It is the responsibility of the consultant to supply the Water Company with data in the required format. This can be either in MicroStation .DGN or .DXF formats.

The Water Company uses MicroStation .DGN format graphics files.

.DGN formatted graphics with database linkages are the preferred format that the Water Company would like to receive any graphical information.

The order of preference the Water Company would like digital information supplied is:

1. MicroStation .DGN format with linked database information as per Database Schedule 1 in Chapter 2 and Graphics Schedule 1 in Chapter 3.
2. MicroStation .DGN format without linked database information as per Database Schedule 2 in Chapter 2 and Graphics Schedule 3 in Chapter 3.
3. .DXF format without linked database information as per Database Schedule 2 in Chapter 2 and Graphics Schedule 3 in Chapter 3.

.DXF format graphics files have to be converted to MicroStation .DGN format and linked to an ASCII database file by the Water Company to enable them to be merged into the FIS.

It is the responsibility of the consultant to supply the Water Company with data using either of the required formats.

Submissions that are not in accordance with all relevant Water Company specifications and relevant Australian Standards will be returned to the Consultant for review. The Consultant must ensure that non-conforming submissions (digital and non-digital) are resolved and the Works resubmitted to the Water Company within 10 (ten) working days. ①

Reduced Levels

All reduced levels must be to Australian Height Datum (AHD).

Spatial Correctness

All graphical elements are to be orientated to the correct Australian Map Grid (AMG) Zone 55 location.

Database files

Database files - MicroStation .DGN with linkages

All database files supplied to the Water Company must conform to the following specifications:

- ◆ Data must be supplied as ASCII files,
- ◆ All files must have fixed record lengths,
- ◆ All files must have carriage return, line feed record terminators,
- ◆ Each file must contain all data relating to one specified entity and have that entity number embedded in its filename. This is described in *File naming conventions* later in this chapter,
- ◆ Each record must contain all specified attribute values in the order set out in **Database schedule 1** in *Chapter 2*,
- ◆ All integer, Code list and real values must be right justified, all alphanumeric values must be left justified,
- ◆ Attribute values must be supplied in the correct format as set out in **Database schedule 1** in *Chapter 2*,
- ◆ The first attribute of each record must begin in the first character position on a new line,
- ◆ Attribute fields must be separated by a single blank space,
- ◆ Records failing to satisfy the attribute and ownership uniqueness criteria will be rejected and may result in a non-conformance being issued,
- ◆ If the attribute owner unique identifier is followed by the keyword “required”, the value corresponding to the relevant unique identifier in the owner entity field must be supplied.

Property service list files

Each time a dummy property service number is assigned, both the dummy property service number and the related existing property service number must be supplied to the Water Company in a property service list file. Refer to *Dummy property numbers* in *Chapter 2* for further information on assigning dummy property service numbers.

The information must be supplied in an ASCII file. There must be one dummy number per record and each record must have the format

A8, space, A8

where A8 is a left justified eight character field. The two fields must be separated by a single character space (ASCII value 32) and each record must be terminated with a carriage return, line feed. If there is no existing property service number corresponding to a dummy property service number, the existing field must be blank-filled.

Refer to **Appendix B** for examples of database files.

Database files for graphics files (.DGN & .DXF) with no linkages

All database files supplied to the Water Company must conform to the following specifications:

- ◆ Data files must be supplied in ASCII format (These files can be created by a text editor, word processor or by the use of a spreadsheet),
- ◆ The ASCII files must not contain special characters or tab settings,
- ◆ Database information on **Access chambers, Pipes and Branches** are to be provided in one ASCII file, for each graphical area as defined in the municipal index graphics files and have the file extension of **.asc**,
- ◆ Provision of Treatment Plant information is to be provided in a separate ASCII file and have the file extension of **.301** Refer to table 2.1 in *chapter 2*,
- ◆ The file names must be in accordance with *File naming conventions* as described later in this chapter,
- ◆ Each record must contain all specified attribute values as stated in **Database schedule 2** in *Chapter 2*,
- ◆ The order of each record must be in accordance with **Database schedule 2** in *Chapter 2*,
- ◆ All integer and real values must be right justified and end in the character position as defined in **Database schedule 2** in *Chapter 2*,
- ◆ All alphanumeric and derived codes from code list must be left justified and commence in the character position as defined in **Database schedule 2** in *Chapter 2*.
- ◆ Attribute values must be supplied in the correct format as set out in **Database schedule 2** in *Chapter 2*,
- ◆ AMG co-ordinates must match the graphical occurrences.

Refer to **Appendix C** for examples of database files.

Graphical files

Graphics files containing linked database information - MicroStation .DGN

Graphics data must be supplied to the Water Company in one of the following ISFF formats:

- ◆ MicroStation PC Design Software two dimensional design files (2D), version 3.x or 4.x,
- ◆ Intergraph Interactive Graphic Design Software (IGDS) two dimensional design files (2D), version 8.8 or later.

The Water Company will supply, upon request, a seed graphics file (basemap.dgn) which must be used as the basis to create subsequent graphics files.

Graphics files must be supplied to the Water Company:

- ◆ in accordance with the *MicroStation .DGN Graphical Schedule 1* in *Chapter 3*,
- ◆ with the digital information orientated to the Australian Map Grid (AMG) Zone 55 as defined by the field survey (refer to the Survey Manual),
- ◆ with file names in accordance with *File naming conventions* as described later in this Chapter,
- ◆ with all deleted elements eliminated. A graphic compress must be performed,
- ◆ with no shared cells,
- ◆ with all locks set to “off”, for example, the graphic group, snap, and grid locks,
- ◆ with graphic group = 0 (dropped),
- ◆ with view attributes set to “off” for enter data fields and text nodes,
- ◆ with no reference files attached,
- ◆ with no named views in file,
- ◆ containing no cells other than the ones supplied in the cell library except graphical error flags,
- ◆ with all type 66 elements deleted,
- ◆ with data supplied in 2D design files having the review specifications shown in Table 1-1.

Format Review Specifications	
global origin	2,000,000.00 - 3,000,000.00
master units	metre
sub units	1000mm per metre
positional units	1 positional unit per mm

Table 1-1 Graphic file format review specifications

ISFF Linkage formants - MicroStation .DGN

Graphics data must be linked, where applicable, to relevant non-graphics data by using either ISFF dBASE or ISFF INFORMIX userdata linkages. Each linkage must comprise 8 words (16 bits each) for every userdata linkage.

The acceptable formats are shown in Table 1-2.

Word	Format 1 (dBASE format)	Format 2 (INFORMIX format)
1	4103 (decimal)	4103 (decimal)
2	6513 (decimal)	14664 (decimal)
3	3969 (decimal)	3969 (decimal)
4	Entity number	Entity number
5 and 6*	Unique Id	Unique Id
7	0 (decimal)	0 (decimal)
8	0 (decimal)	0 (decimal)

Table 1-2 Userdata linkage formats

***Note:** The unique identifier long word in Table 1-2 is made up of two words. Word 5 is the low order word and word 6 is the high order word.

Graphics elements that require linkage to the database are identified in Chapter 3. An example of a graphics element with ISFF linkage format is shown in Figure 1-1.

The only entities that do not have a corresponding graphical occurrence in the graphics file are:

- ◆ Entity 301 - Treatment Plants
- ◆ Entity 303 - Sewer Projects

328	(2) CELL "MH"	Level = 0
	Word to follow = 52,	File position = 6038, 216

1 Supply and Format of Data

```
Range: low = 167269025, 682101908, 0
        high = 167270489, 682103372, -1
Graphic group = 0
Index to attributes = 30
Properties : no orphan, snappable, planar, view_independant,
            attributes, not modified, new_element, not locked,
            Class = Primary
Symbology : color = 10, weight = 0, style = 0
            words in description = 114
            Levels = 3
Range Diagonal :
            -999, -1731
            1001, 733
Transformation Matrix :
            -214674 -5626
            5626 -214674
Origin :
            167269757, 682102640
Attributes :
            4103 6513 3696 202
            132 0 0 0
```

Figure 1-1 Sample of an ISFF linkage format

Graphical files containing no database linkage information

1. MICROSTATION FORMAT

Same format as for MicroStation files containing database linkages, except that there must be **no** userdata linkages.

2. .DXF FORMAT

The digital exchange format (.DXF) must:

- ◆ Be in accordance with the **.DXF Graphical Schedule 3** in *Chapter 3*
- ◆ with the digital information orientated to the Australian Map Grid (AMG) Zone 55 as defined by the field survey (refer to the Survey Manual),
- ◆ contain the data in two dimensional (2D) format,
- ◆ with file names in accordance with *File naming conventions* as described later in this Chapter,
- ◆ not contain blocks other than the ones used by the Water Company, except for graphical error flags,
- ◆ with a separate graphics file for each graphical area as defined in the municipal index graphics files.

File naming conventions

Each job has a ten digit file reference number which is the Water Company's File Management System (FMS) number.

For example : 8012371084 (used for subdivisions).

The file naming convention is to drop the first four digits from the file reference number (eg 8012) and add a two digit number (01, 02, etc) to the end to indicate the stage number of the particular subdivision,

For example: 37108401.

Database files

Database files - Linked .DGN

For database files, the filename must have an extension that relates to the relevant entity number.

For example, 37108401.305 (for sewerage pipe sections), 37108401.308 (for sewerage access chamber), etc.

Database files (associated with graphical files not having a database linkage)

The database file for **Access chambers**, **Pipes** and **Branches** must have an extension of **.asc**. The ASCII file for the associated treatment plant must have the extension of **.301**.

For example: 37108401.asc and 37108401.301

Property Service List files

Property Service List files are named in the same manner as other database files except the suffix has a .PSL extension.

For example: 37108401.PSL.

Graphics files

MicroStation graphics files must have a .SW1 extension,

For example: 37108401.SW1

.DXF files must have a .DXF extension,

For example: 37108401.DXF.

FIS Graphic files - (Background Information)

The Water Company's graphics files are named and numbered based on geographic segmentation of municipalities.

Graphics files are named according to the first four letters (in capitals) of the municipality to which they relate, plus a dual numeric delineator (the municipal segment number).

The municipal segment numbers are indicated in the municipal graphics index files. Figure 1-2 shows the municipal segmentation of Kew.

Note: Kew being the only municipality with 3 characters requires an A to be added at the end of the word (i.e. KEWA).

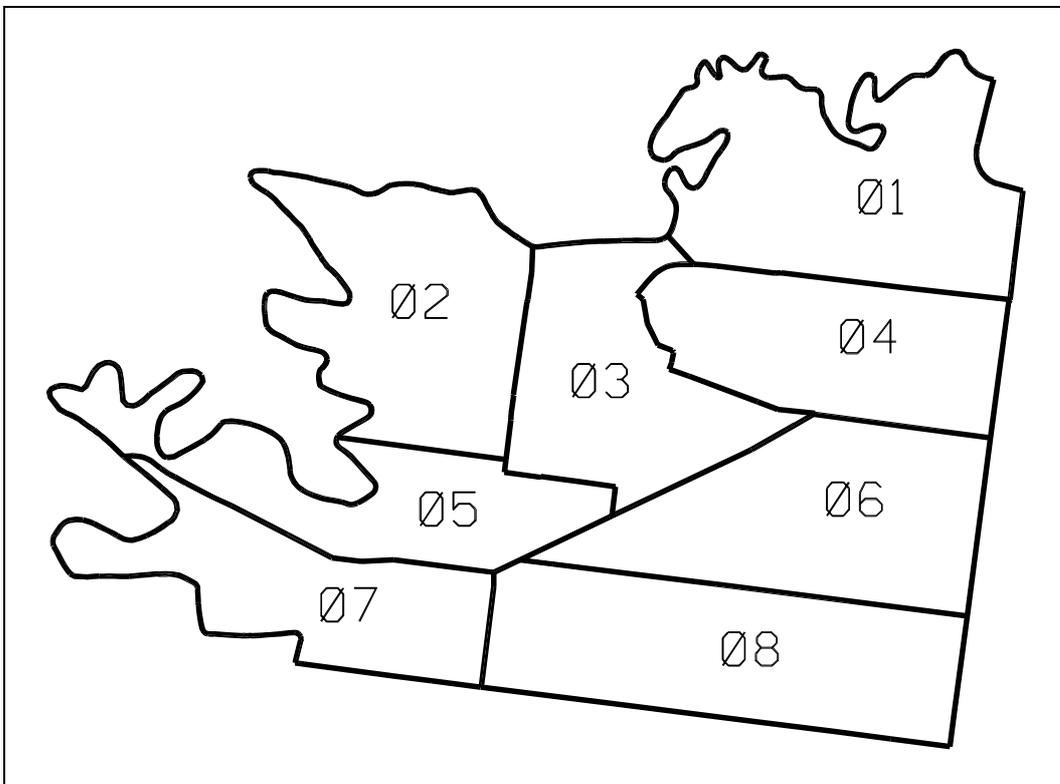


Figure 1-2 Municipal segmentation of KEW

With the amalgamations of municipal councils in Melbourne occurring The Water Company's computer system is not to be changed to suit the new councils. This will be implemented in mid 1995 with the introduction of a new computer system. Until further notice data being supplied to the Water Company will be named using the "pre-amalgamation" council names. An extensive list can be found in the Code List Set numbers 15 and 17.

Data transfer

Formats and media

Data must be delivered in a virus free, non-compressed or non-zipped format, to the Water Company on the following medium.

- ◆ PC DOS dataset, where:
 - the media is a 3.5" double sided high density diskette

The information **must not** be supplied in a compressed or zipped format.

Other formats will not be accepted unless previously arranged with the Water Company.

Batches

All data relating to one job must appear where practicable on a single diskette. However when a job crosses municipal boundaries, the data for each municipality must be supplied on a separate media.

Only one job and one discipline (ie sewer, not water) is to be supplied on one media (eg diskette). Additional jobs and/or disciplines are to be supplied on separate media.

A batch of data must contain at least one graphics file and all applicable database files. Database files containing no records are not required.

Mapbase graphics are **not** to be included.

Documentation which indicates the following, must accompany each batch of data:

- ◆ a listing of files contained on the media,
- ◆ the manner in which data was written to the media,
- ◆ how the data should be retrieved,
- ◆ the municipality and FIS file number(s),
- ◆ a plot at scale 1:500 of the graphical file including mapbase,
- ◆ the total length of sewer pipes in the project,
- ◆ the total number of property service branches in the project.

1 Supply and Format of Data

The Water Company's sewerage database is made up of a number of entities. An entity is a database table consisting of a number of attributes. These attributes describe different aspects of the entity.

For example, a pipe is an entity (number 305) The pipes material type, size, date of construction etc are some of it's attributes.

Each entity in the sewerage database has a unique number and each attribute of that entity is identified by a fiend name.

For example, entity 303 - Sewerage Project has seven attribute field names:

- ◆ a unique identifier,
- ◆ owner entity number,
- ◆ owner unique identifier,
- ◆ sewer name,
- ◆ section number,
- ◆ reticulation area number,
- ◆ reticulation extension number.

A database table can be seen as a set of rows and columns. The attributes are the columns of the table. The rows are the actual occurrences that are stored in the table.

Sewerage database structure

The Water Company's sewerage database is structured hierarchically so that each entity is linked to entities higher up in the database structure using a unique identifier.

For example:

- ◆ The Treatment Plant entity 301 is at the top of the hierarchy and therefore is not owned by any other entity
- ◆ The Sewer Project entity 303 owns the Access chamber entity 308 which in turn owns the Pumping Station entity 315 and the Emergency Relief Structure 318.

The sewerage database structure is shown in Figure 2-1.

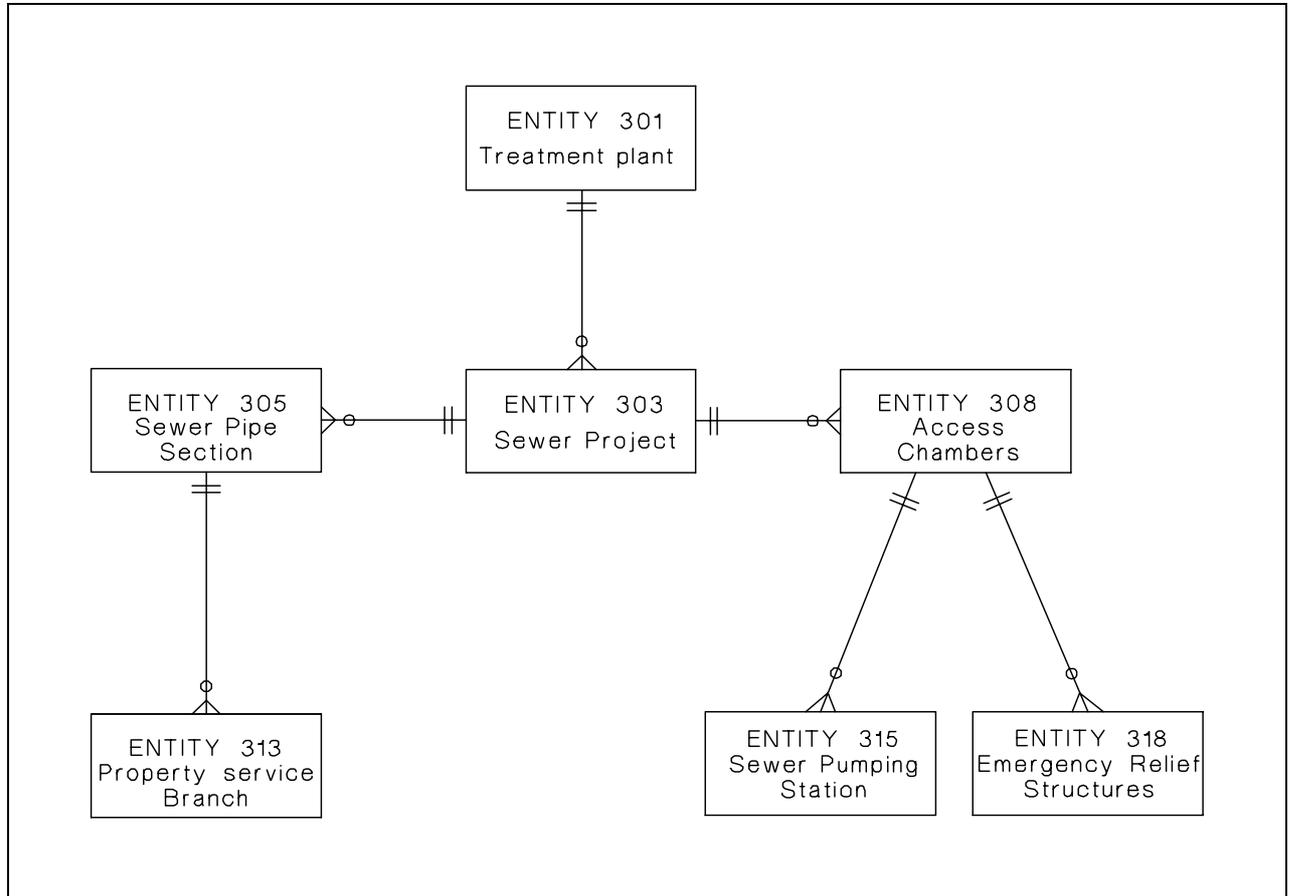


Figure 2-1 Sewerage database hierarchy

When one entity is owned by another entity, the hierarchical relationship is recorded in the owner unique identifier attribute. The owner unique identifier specifies the linkage to a unique occurrence in the owner entity table.

Database schedule 1 - MicroStation DGN with Linkages

The following schedule describes the specifications of the database entities and attributes that are required by the Water Company.

Each of the tables in this schedule are set out to indicate information required, they have seven columns:

- ◆ attribute number,
- ◆ attribute name,
- ◆ attribute format,
- ◆ attribute default value,
- ◆ attribute FIS references,
- ◆ whether the attribute must be unique,
- ◆ usage notes.

Attribute formats

The format of the attributes in the database schedule are as follows:

- ◆ the first character of the format string is the attribute type:
 - I = integer (right justified)
 - C = integer derived from to the FIS code list (right justified)
 - F = floating point (real) number (right justified)
 - A = alphanumeric character (left justified)
- ◆ the remainder of the format string refers to the field width and the number of decimal places for real numbers.

For example:

- I10 indicates that the attribute value must be an integer of up to ten characters. The field must be 10 characters wide.
- F8.3 indicates that the attribute value must be a floating point number with up to four numbers before the decimal point and up to three numbers following the decimal point. The field must be eight characters wide including the decimal point.
- A3 indicates that the attribute value must be alphanumeric and up to three characters wide. The field must be 3 characters wide.

Attribute format values that are not applicable must be filled with blank spaces i.e. the fields must contain the correct number of characters.

Default values

There are two types of default values listed in the database schedule:

Mandatory defaults

Mandatory defaults are attribute values that are required by the database and link entities.

The omission of mandatory defaults can cause the Water Company software procedures to fail and may result in non-conformance's being issued.

Convention dependent defaults

Convention dependent defaults must be used to maintain the consistency of database records.

FIS Reference

The FIS reference column in the database schedule provides four types of reference, which are defined as follows:

- ◆ AN(nn) indicates that the attribute:
 - is an alphanumeric field nn characters wide, where nn equals the number specified in the format field.
 - has an alphanumeric reference designated by the Water Company Facilities Information System (FIS).
- ◆ C(nnn) or C(nnn)/C(mmm) indicates that the attribute is derived from code list (nnn) and/or code list (mmm). Refer to *Code lists* later in this section.
- ◆ I(nnnn) indicates the internal storage space allocated for integer values in the FIS database.
- ◆ F indicates that the attribute value is a floating point number.

FIS Unique criteria

The unique criteria indicates whether a unique value is required by the Water Company in this field.

Attributes requiring a unique value are indicated by an asterisk(*).

Usage notes

The usage notes indicate:

- ◆ whether default values are mandatory,
- ◆ the basis for determination of certain attribute values.

Database Entity Tables - Linked .DGN format

Entity 301 - Sewerage Treatment Plant

Attribute		Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		nil		mandatory
.10	treatment plant name	C3		C(329)/C(330)	*	mandatory select appropriate value from code list

Table 2-1 Treatment Plant

Entity 303 - Sewer Project

Attribute		Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		nil		
.90	owner entity number	I3	301	nil		mandatory
.91	owner unique identifier (required)	I10		nil		mandatory - entity link (the 301.99 attribute)
.10	sewer name	C5	see note below	C(301)/C(302)	*	select appropriate value from code list
.14	section number	A3	see note below	AN(3)	*	default = 1 for valid sewer name 303.10
.15	reticulation area number	A8	see note below	AN(8)	*	refer to <i>Reticulation sewers in Chapter 6</i>
.16	reticulation extension number	A9	see note below	AN(9)	*	refer to <i>Reticulation sewers in Chapter 6</i>

Table 2-2 Sewer Project

Note: if the following criteria are not met, the occurrence will be rejected. The database format only allows a sewer project to be input as one of the following.

- ◆ a sewer name and section number (303.10 and 303.14), or
- ◆ a reticulation area number (303.15), or
- ◆ a reticulation extension number (303.16)

Sewer projects must not be entered as a combination of these projects.

Attribute format values that are not applicable must be filled with blank spaces and the values must contain the correct number of characters.

Entity 305 - Sewer Pipe Section

	Attribute	Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		nil		mandatory
.90	owner entity number	I3	303	nil		mandatory
.91	owner unique identifier (required)	I10		nil		mandatory - entity link (the 303.99 attribute)
.10	downstream structure number	A13		AN(13)	*	refer to <i>Numbering access chambers</i> in Chapter 7
.11	downstream invert level	F8.3		F		refer to <i>Invert levels</i> in Chapter 8
.12	upstream structure number	A13		AN(13)	*	refer to <i>Numbering access chambers</i> in Chapter 7
.13	upstream invert level	F8.3		F		refer to <i>Invert levels</i> in Chapter 8
.14	conduit shape	C3		C(39)/C(40)		select appropriate value from code list
.16	nominal size of conduit	C5		C(41)		select appropriate value from code list
.18	conduit length	F8.3		F		
.20	conduit material	C3		C(43)/C(44)		select appropriate value from code list
.21	conduit lining	C3	6	C(45)/C(46)		select appropriate value from code list
.23	conduit coating	C3	6	C(45)/C(46)		select appropriate value from code list
.28	conduit joint packing	C3		C(51)/C(52)		select appropriate value from code list
.33	excavation method	C3		C(63)/C(64)		select method from code list that relates to majority of pipe section

Table 2-3-1 Sewer pipe sections

Continued on the next page

2 Database Specifications

Entity 305 continued ...

Attribute		Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.35	bedding material	C5		C(65)/C(66)		select material from code list that relates to majority of pipe section
.37	backfill material	C5		C(65)/C(66)		select material from code list that relates to majority of pipe section
.39	ground type	C3		C(59)/C(60)		select type from code list that relates to majority of pipe section
.41	ground type density	C3		C(61)/C(62)		select type from code list that relates to majority of pipe section
.44	number of branches	I3	0	I(127)		must include: - spur branches - branches from upstream access chambers
.45	horizontal curve	C3	6 or 7	C(13)		includes bends in gravity sewers and rising mains
.46	vertical curve	C3	6 or 7	C(13)		includes changes of grades and siphons
.47	date constructed - month	C3		C(9)		select appropriate value from code list
.48	date constructed - year	C5		C(11)		select appropriate value from code list
.49	sewer pipe section status	C3	6	C(31)/C(32)		convention dependant

Table 2-3-2 Sewer pipe sections

Entity 308 - Sewer Access chamber

	Attribute	Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		nil		mandatory
.90	owner entity number	I3	303	nil		mandatory
.91	owner unique identifier (required)	I10		nil		mandatory - entity link (the 303.99 attribute)
.10	access chamber number	A13		AN(13)	*	refer to <i>Numbering access chambers</i> in <i>Chapter 7</i>
.12	access chamber structure type	C3		C(307)/C(308)		select appropriate value from code list
.14	access chamber structure shape	C3		C(309)/C(310)		select appropriate value from code list
.16	access chamber structure size	C5		C(41)		select appropriate value from code list
.18	access chamber cover level	F8.3		F		
.24	access chamber structure material	C3		C(43)/C(44)		select appropriate value from code list
.26	base construction method	C3		C(53)/C(54)		select appropriate value from code list
.28	wall thickness	15		I(32767)		
.29	wall construction method	C3		C(53)/C(54)		select appropriate value from code list
.31	wall joint type	C3		C(49)/C(50)		select appropriate value from code list
.33	wall joint packing	C3		C(51)/C(52)		select appropriate value from code list
.49	date of construction - month	C3		C(9)		select appropriate value from code list
.50	date of construction - year	C5		C(11)		select appropriate value from code list
.51	old access chamber number	A13	Number appearing on Sewer Design Plan	AN(13)		enter all notation previously assigned as the access chamber number if known

Table 2-4 Access chambers

Entity 313 - Sewer Property Service Branch

	Attribute	Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		nil		mandatory
.90	owner entity number	I3	305	nil		mandatory
.91	owner unique identifier (required)	I10		nil		mandatory - entity link (the 305.99 attribute)
.11	property service number	A8		AN(8)	*	<i>property service number</i> to be supplied by the Water Company
.14	branch size	C5		C(41)		select appropriate value from code list
.15	branch material	C3		C(43)/C(44)		select appropriate value from code list
.17	branch length	F8.3		F		
.18	branch type	C3		C(321)/C(322)		select appropriate value from code list
.20	distance from downstream structure to branch	F8.3		F		
.21	surface level at branch	F8.3		F		
.22	invert level at branch	F8.3		F		

Table 2-5 Property Service Branch

Note : If new Property Service Branches are constructed on existing sewers the database information must be supplied using the guidelines referred to in the Property Service Branches chapter in part two of this manual. This is due to the fact that the Water Company's FIS establishes the existing pipe as the owner of a property service branch and the owner of the pipe is the original project it was constructed under. The translator used to import this data requires the FIS Unique Criteria established from the property service branch to the pipe section (305), then the project (303) the pipe was constructed under, (*obtainable from the Water Company*) and finally to the Treatment Plant (301) via their respective Owner Unique Identifier (attribute .91)

By following the guidelines set out in Part two it is a fairly simple procedure. The important criteria is the uniqueness requirements. If the incorrect project is used the data will fail in translation and may result in a non-conformance being issued.

Entity 315 - Sewerage Pumping Station

Attribute		Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		nil		mandatory
.90	owner entity number	I3	308	nil		mandatory
.91	owner unique identifier (required)	I10		nil		mandatory - entity link (the 308.99 attribute)
.10	pumping station name	C5		C(349)/(350)	*	mandatory - must be ≥6

Table 2-6 Pumping Station

Entity 318 - Sewer Emergency Relief Structure

Attribute		Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		nil		mandatory
.90	owner entity number	I3	308	nil		mandatory
.91	owner unique identifier (required)	I10		nil		mandatory - entity link (the 308.99 attribute)
.26	associated equipment type	C3	10 or 26	C(327) /C(328)		based on the type of access chamber to which the ERS is connected. Refer to <i>ERS access chambers in Chapter 7</i>
.28	associated equipment number	A13		AN(13)	*	access chamber number of access chamber or pumping station to which ERS is connected. Refer to <i>ERS access chambers in Chapter 7</i>

Table 2-7 Emergency Relief Structure

Database schedule 2 (associated with graphical files not having a database linkage)

This section describes the specifications of the database entities and attributes that must be supplied by the Consultant to the Water Company, when the graphical files are not linked to the database information.

The following tables define the required attribute information, format of each attribute and format of each record.

The conventions used in the tables are:

- ◆ The letters in the tables (A,B,C etc) describe the columns that are used if the input is performed through a spreadsheet,
- ◆ The **Col.** and **Width** are the start and width of each of each column,
- ◆ The **Used Col.** shows a number in brackets which is the number of digits actually used by the Water Company (not necessarily the same as the column width in the data file). When the type is a floating point decimal, the number before the decimal defines the number of columns to be used including the decimal point and the number after the decimal point defines the position of the decimal point (i.e. 10.3 is a real number of up to 6 digits before the decimal point, followed by the decimal point and three more digits),

- ◆ The valid types are known as:

A alphanumeric	left justified	e.g. ABC123	
I integer	right justified		1234
F floating point decimal	right justified		234.567
C code derived from the FIS code list	left justified	12	

- ◆ **Attr.** relates to the Water Company's FIS database attribute number,
- ◆ **Attribute Name** specifies the attribute information required,
- ◆ **Default** specifies the value that must be used for the data file record type identifier, contained within the first three columns of any record and code values that should be used from the FIS code list, if there is nothing more appropriate,
- ◆ **Code List** identifies the code set that must be used,
- ◆ Spacing has been inserted between each attribute required, to assist readability. This inserted space is one character wide and any character can be used for spacing (commas or semi-colons are recommended).

Access chambers, Pipes and Branch Connections

The ASCII file must be set out with the Sewer Project details in the first row.

The second row contains the first Downstream access chamber details followed by the Upstream access chamber details for the first pipe section in the third row.

The fourth row contains the first Pipe section details which runs between the preceding access chambers. If the pipe section contains a horizontal/vertical curve the details will be recorded on the next row (row five)

If no horizontal/vertical curves are present then the fifth row contains the Property Service branch details for the preceding Pipe section. This is the first branch upstream from the pipes Downstream access chamber.

The sixth, seventh etc contains the rest of the Property Service branches for the preceding Pipe section. Once all PS branches for this respective pipe section have been recorded the next row will contain the next Pipe section's Downstream access chamber details, then the Upstream access chambers, Pipe section, Property Service branches etc until all of the project has been included in the ASCII file.

For an example of an ASCII file refer to **Appendix C**.

If the ASCII file is supplied with all Entities grouped together and not as indicated above the batch of data will be rejected and may result in a non-conformance being placed on the particular job.

Note: If an existing the project connects into an existing access chamber the database record is still required, describing only the AMG position, access chamber name and cover level. The existing access chamber is **not** to be shown in the graphics file.

If new Property Service Branches are constructed on existing sewers the database information must be supplied in field note form and not included in the ASCII files. This is due to the fact that the Water Company's FIS establishes the existing pipe as the owner of a property service branch and the owner of the pipe is the original project it was constructed under. The translator used to transform the unlinked data as set out in this section does not allow for multiple projects. For further information

2 Database Specifications

refer to the Property Service Branches chapter in part two (Guidelines) of this manual.

The order of record types within the ASCII file, as mentioned on the previous page, are set out below:

Record Type	Record Type Description
1	Sewer Project
2	Sewer access chamber - Downstream
2	Sewer access chamber - Upstream
3	Pipe section
4	Pipe section (continued for curved sewers)
5	Property Branch
5	Property Branch
5	Property Branch
"	" "
"	" "
"	" "
2	Sewer access chamber - Downstream
2	Sewer access chamber - Upstream
3	Pipe section
4	Pipe section (continued for curved sewers)
5	Property Branch
5	Property Branch
5	Property Branch
"	" "
"	" "
"	" "

Unique criteria: Access chamber numbers must be unique. (308.10)
Property Service numbers must be unique. (313.11)

Record Type 1 - Entity 303 Sewer Project

	Start Col.	Width	Used Col.	Type	Attr.	Attribute Name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	303	
B	4	1						
C	5	13	(2)	A	n/a	sewer project type	RA,RE,SN	
D	18	1						
E	19	11	(9)	A	n/a	sewer project number		
F	30	1						
G	31	13	(3)	I	n/a	No. of pipe sections in file		
H	44	1						
I	45	8	(4)	A	n/a	municipality identifier		
J	53	1						
K	54	8	(2)	A	n/a	design file number		
L	62	1						
M	63	8	(3)	A	n/a	named sewer section number		
	(70)							

Table 2-8 Sewer Project ASCII data file formats

Record Type 2 - Entity 308 - Sewer Access chamber

	Start Col.	Width	Used Col.	Type	Attr.	Attribute Name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	308	
B	4	1						
C	5	13	(13)	A	.10	access chamber number		
D	18	1						
E	19	11	(3)	C	.12	access chamber structure type		307/308
F	30	1						
G	31	13	(3)	C	.14	access chamber structure shape		309/310
H	44	1						
I	45	8	(5)	C	.16	access chamber structure size		41
J	53	1						
K	54	8	(8.3)	F	.18	access chamber cover level		
L	62	1						
M	63	8	(3)	C	.24	access chamber structure material		43/44
N	71	1						
O	72	8	(3)	C	.26	base construction method		53/54
P	80	1						
Q	81	8	(5)	I	.28	wall thickness		
R	89	1						
S	90	8	(3)	C	.29	wall construction method		53/54
T	98	1						
U	99	10	(3)	C	.31	wall joint type		49/50
V	109	1						
W	110	11	(3)	C	.33	wall joint packing		51/52
X	121	1						
Y	122	10	(3)	C	.49	date of construction month		9
Z	132	1						
AA	133	11	(5)	C	.50	date of construction year		11
AB	144	1						
AC	145	13	(13)	A	.51	old access chamber number		
AD	158	1						
AE	159	10	(10.3)	F	n/a	X co-ordinate (Easting)		
AF	169	1						
AG	170	11	(11.3)	F	n/a	Y co-ordinate (Northing)		
	(180)							

Table 2-9 Sewer access chamber ASCII data file formats

Record Type 3 - Entity 305 - Sewer Pipe Section

	Start Col.	Width	Used Col.	Type	Attr.	Attribute Name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	305	
B	4	1						
C	5	13	(13)	A	.10	downstream structure number		
D	18	1						
E	19	11	(8.3)	F	.11	downstream invert level		
F	30	1						
G	31	13	(13)	A.	.12	upstream structure number		
H	44	1						
I	45	8	(8.3)	F	.13	upstream invert level		
J	53	1						
K	54	8	(3)	C	.14	conduit shape		39/40
L	62	1						
M	63	8	(5)	C	.16	nominal size of conduit		41
N	71	1						
O	72	8	(8.3)	F	.18	conduit length		
P	80	1						
Q	81	8	(3)	C	.20	conduit material		43/44
R	89	1						
S	90	8	(3)	C	.21	conduit lining	6	45/46
T	98	1						
U	99	10	(3)	C	.23	conduit coating	6	45/46
V	109	1						
W	110	11	(3)	C	.28	conduit joint packing		51/52
X	121	1						
Y	122	10	(3)	C	.33	excavation method		63/64
Z	132	1						
AA	133	11	(5)	C	.35	bedding material		65/66
AB	144	1						
AC	145	13	(5)	C	.37	backfill material		65/66

Table 2-10-1 Sewer pipe section ASCII data file formats

Continued on the next page

Record Type 3 - Entity 305 Sewer Pipe Section continued...

	Start Col.	Width	Used Col.	Type	Attr.	Attribute Name	Default	Code List
AD	158	1						
AE	159	10	(3)	C	.39	ground type		59/60
AF	169	1						
AG	170	11	(3)	C	.41	ground density		61/62
AH	181	1						
AI	182	3	(3)	I	.44	number of branches	0	
AJ	185	1						
AK	186	3	(3)	C	.45	horizontal curve	6 or 7	13
AL	189	1						
AM	190	3	(3)	C	.46	vertical curve	6 or 7	13
AN	193	1						
AO	194	3	(3)	C	.47	date constructed month		9
AP	197	1						
AQ	198	5	(5)	C	.48	date constructed year		11
AR	203	1						
AS	204	3	(3)	C	.49	sewer pipe section status	6	31/32
AT	207	1						
AU	208	3	(3)	I	n/a	number of vertices		
	(210)							

Table 2-10-2 Sewer pipe section ASCII data file formats

If horizontal curve or vertical curve is TRUE, **number of vertices** denotes the number of points delineating the pipe section. A corresponding number of lines following should be present specifying the X co-ordinate (Easting) and Y co-ordinate (Northing) of each vertice. (see the table 2-11 describing Record Type 4 below).

Record Type 4 - Entity 305 (cont) - Horizontal & Vertical Curves

	Start Col.	Width	Used Col.	Type	Attr.	Attribute Name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	305	
B	4	1						
C	5	13	(10.3)	F	n/a	vertice X co-ordinate (Easting)		
D	18	1						
E	19	11	(11.3)	F	n/a	vertice Y co-ordinate (Northing)		
	(29)							

Table 2-11 Curved sewer ASCII data file formats

Record Type 5 - Entity 313 - Sewer Property Service Branch

	Start Col.	Width	Used Col.	Type	Attr.	Attribute Name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	313	
B	4	1						
C	5	13	(8)	A	.11	property service number		
D	18	1						
E	19	11	(5)	C	.14	branch size		41
F	30	1						
G	31	13	(3)	C	.15	branch material		43/44
H	44	1						
I	45	8	(8.3)	F	.17	branch length		
J	53	1						
K	54	8	(3)	C	.18	branch type		321/322
L	62	1						
M	63	8	(8.3)	F	.20	distance DS structure to branch		
N	71	1						
O	72	8	(8.3)	F	.21	surface level at branch		
P	80	1						
Q	81	8	(8.3)	F	.22	invert level at branch		
R	89	1						
S	90	8	(8)	A	n/a	RESERVED for the Water Company	Blank	
T	98	1						
U	99	10	(10.3)	F	n/a	branch on pipe X co-ordinate (Easting)		
V	109	1						
W	110	11	(11.3)	F	n/a	branch on pipe Y co-ordinate (Northing)		
X	121	1						
Y	122	10	(10.3)	F	n/a	end of pipe X co-ordinate (Easting)		
Z	132	1						
AA	133	11	(11.3)	F	n/a	end of pipe Y co-ordinate (Northing)		
	(143)							

Table 2-12 Sewer property service branch data file formats

Database verification requirements

Required verification checks

Database attributes must be verified to ensure data accuracy

These checks may be carried out at the point of entry or at the output stage.

The following suggestions are offered as a means of checking a number of attributes.

Uniqueness criteria checks

These checks will ensure that the following numbers are unique:

- ◆ Sewer Project
- ◆ Access chamber number
- ◆ Property Service number
- ◆ Pumping Station name
- ◆ ERS number

Sewer pipe section invert levels, size and length

Table 2-13 lists expected grade values to aid the verification of sewer pipe section invert levels (305.11 & .13), conduit size (305.16) and conduit length (305.18).

This verification check functions as a warning that one or several items may have been incorrectly entered. It is based upon a general relationship between pipe size and grade, the expected ranges for which are specified in Table 2-13. Note that an allowance for grades outside these ranges has been included.

Conduit Size (mm diameter)	Expected Grade	
	Maximum	Minimum
100	1	150
150	5	225
225	10	375
300	20	375
375	50	450
450	50	525
525	50	600
600	100	675
675	100	750
750	100	825
825	150	900
900	150	975
>900	200	1200

Table 2-13 Expected grade ranges for conduits

Number of property service branches

All property service branches along a pipe section must be recorded and the correct branch count must be entered in the database. A suggested method of verifying that all sewer pipe sections have had branches input and counted is:

- Set the initial default branch count to 999, not 0. Any pipes that do not have branches would require the operator to reset the count to zero, while any overlooked counts will be easily identified.

Additional relationships and expected values

Table 2-14 lists each sewerage database attribute, its expected value(s) and its relationship, if any, with other attributes. Where applicable, the expected code list entry number is given.

The table has been supplied as a basis for the development of additional software verification checks.

Unless otherwise stated, the “expected attribute values” may vary depending on the municipality or area. In particular, the ranges may vary for attributes that detail:

- ◆ levels - including invert levels, surface levels and cover levels
- ◆ year of construction

There should not be any values such as Unknown, * or blank

Attribute Number	Attribute Name (and Check Criteria)	Code List	Expected Values and Attribute Relationships
301.10	Treatment Plant Name	329	must be ≥ 6
303.10	Sewer Name	301	≥ 6 if 303.15 and 303.16 are not applicable blank if 303.15 or 303.16 are applicable
303.14	Section Number	-	between 1 & 5 if 303.10 is applicable blank if 303.15 or 303.16 is applicable
303.15	Reticulation Area Number	-	must be prefixed with text “RA” blank if 303.16 or 303.10 is applicable
303.16	Reticulation Extension Number	-	must not be prefixed with any text number must be in two parts, separated by a forward slash (/) blank if 303.15 or 303.10 is applicable
305.10 305.12	Downstream and Upstream Structure Number	-	must be a unique combination of different access chamber numbers (that is the downstream access chamber number must not equal the upstream access chamber number) to define a pipe section.

Table 2-14-1 Verification checks

Continued on the next page

Verification checks continued...

Attribute Number	Attribute Name (and Check Criteria)	Code List	Expected Values and Attribute Relationships
305.11 305.13	Downstream and Upstream Invert Levels	-	downstream IL usually < upstream IL, except for rising mains all IL's are usually between - 10 and 150 metres AHD difference between upstream and downstream IL usually < 10.000 metres outlet IL of sewer pipe conduit at access chamber is usually ≤ IL of any incoming sewer pipes
305.18	Conduit length For pipes of nominal size: < 300 mm diameter 300-600 mm diameter ≥ 600 mm diameter For pipes of all sizes	-	usually between 2 and 150 metres usually between 10 and 250 metres usually between 10 and 350 metres successive sections do not normally have identical conduit lengths
305.20	For Gravity Sewers	43	do not include 54
305.44	Number of Branches For Pipe Size: < 750 mm diameter ≥ 750 mm diameter	-	default = 0 usually ≤ 15 branches per pipe section usually no branches
305.45	Horizontal Curve	13	usually 7 (No) may be 6 (Yes), usually for pipe sizes < 300 mm diameter
305.46	Vertical Curve	13	usually 7 (No) may be 6 (Yes), usually for pipe sizes < 300 mm diameter.
305.47	Date Constructed Month	9	1 to 12
305.48	Date Constructed Year	11	current year
305.49	Sewer Pipe Section Status	31	6

Table 2-14-2 Verification checks

Continued on the next page

2 Database Specifications

Verification checks continued...

Attribute Number	Attribute Name (and Check Criteria)	Code List	Expected Values and Attribute Relationships
308.10	Access chamber Number	-	<p>must be unique</p> <p>has three letter upper case prefix corresponding to entry in code list 302</p> <p>if downstream sewer size \geq 300 mm diameter, Access chamber Number has no suffix</p> <p>if downstream sewer size < 300 mm diam, Access chamber Number usually has a prefix and suffix separated by a dash (-).</p>
308.49	Date of Construction Month	9	1 - 12
308.50	Date of Construction Year	11	current year
313.11	Property Service Number	-	<p>must be unique</p> <p>must have eight characters</p>
313.17	<p>Branch length</p> <p>If Branch Size/Type</p> <p>= 100 mm diameter</p> <p>> 100 mm diameter</p>		<p>0.30 to 10.0 metres</p> <p>0.30 to 25.0 metres</p>
313.18	<p>Branch Type</p> <p>For all PS branches</p>	321	22 to 32 (inclusive)
313.20	Distance from Downstream Structure to Branch (that is, branch chainage)	-	<p>distance \leq Conduit Length</p> <p>usually between 1.00 and 120.00 metres</p> <p>usually no more than two occurrences of the same chainage per sewer pipe section</p>
313.21	Surface Level at Branch	-	<p>usually between -10.000 and 150.000, metres AHD</p> <p>usually the SL at branch minus the IL at branch will be in the range 0.50 to 4.000 metres</p>
313.22	Invert Level at Branch	-	<p>usually between -15.000 and 150.00 metres AHD</p> <p>branch IL \leq upstream IL and \geq downstream IL of conduit to which branch is connected.</p>

Table 2-14-3 Verification checks

Code lists

Code list entries are used to standardise terminology by providing a range of item descriptions relating to a particular attribute.

A number of attributes specified in the database schedule require the input of a code list entry number.

In some cases the same code list entry number can be used for more than one attribute. For example, code list entry number 9 from code list number 43/44 indicates the material concrete (not known if reinforced). This material may be used to define several attributes, as indicated in the database schedule.

Code list entries are constantly reviewed by the Water Company and additions and amendments are made as the need arises. If there is no code list entry that accurately describes a particular attribute and a new one is required please contact the Water Company.

New code list entry numbers must not be assumed and must be validated.

Table 2-15 details the code lists applicable to sewerage data capture.

Code List	Code List Description
9	date of completion - month
11	date of completion - year
13	horizontal and vertical curves
31	operational status
32	operational status (abbreviated)
39	conduit shape
40	conduit shape (abbreviated)
41	conduit and access chamber size
43	conduit material
44	conduit material (abbreviated)
45	conduit lining/coating
46	conduit lining/coating (abbreviated)

Table 2-15-1 Sewer code lists

Continued on the next page

Code Lists continued...

Code List	Code List Description
49	access chamber and conduit joint type
50	access chamber joint type (abbreviated)
51	conduit joint packing
52	conduit joint packing (abbreviated)
53	access chamber wall construction method
54	access chamber wall construction method (abbreviated)
59	soil type
60	soil type (abbreviated)
61	soil density
62	soil density (abbreviated)
63	construction method
64	construction method (abbreviated)
65	bedding and backfill material
66	bedding and backfill material (abbreviated)
301	named sewer names
302	named sewer names (abbreviated)
307	sewerage access chamber types
308	sewerage access chamber types (abbreviated)
309	sewerage access chamber shapes
310	sewerage access chamber shapes (abbreviated)
321	sewerage property service branch type
322	sewerage property service branch type (abbreviated)
327	associated equipment type (ERS etc)
328	associated equipment number
329	sewerage treatment plant name
330	sewerage treatment plant number
349	sewer pumping station names
350	sewer pumping station number

Table 2-15-2 Sewer code lists

This Chapter contains the specifications for the graphical representation of elements in sewer files. It includes:

- ◆ verification requirements for graphics files,
- ◆ a level and layer structure for sewer elements
- ◆ symbology for sewer elements
- ◆ associated software specifications
- ◆ a graphical library of cells used in sewer data capture

The Water Company uses Intergraph .DGN format graphics files. The information is stored in each graphics file in levels, or layers, enabling different types of information to be displayed at any one time.

Certain graphical elements have a link to the FIS database.

Each graphics file has 63 levels.

.DGN formatted graphics as set out in the tables in this chapter are the preferred format that the Water Company would like to receive any graphical information.

The order of preference the Water Company would like digital information supplied is:

1. MicroStation .DGN format with linked database information as per **Database Schedule 1** in *Chapter 2*.
2. MicroStation .DGN format without linked database information as per **Database Schedule 2** in *Chapter 2*.
3. .DXF format without linked database information as per **Database Schedule 2** in *Chapter 2*.

.DXF format graphics files have to be converted to MicroStation .DGN format by the Water Company to enable them to be merged into the FIS.

This chapter contains the specifications for the graphical representation of elements in sewerage files. It is split into three schedules:

- Graphics Schedule 1** - For MicroStation linked .DGN format
- Graphics Schedule 2** - For MicroStation unlinked .DGN format
- Graphics Schedule 3** - For unlinked .DXF format

Graphics Schedule 1 - For MicroStation in Linked .DGN format

This Schedule contains the specifications for the graphical representation of elements with database linked in sewerage file. It includes:

- ◆ Intergraph element type details,
- ◆ verification requirements for graphic files,
- ◆ a listing of level structures,
- ◆ a listing of symbologies,
- ◆ related software specifications,
- ◆ a graphic library of cells used in sewer data capture.

Intergraph element specifications

All sewerage elements must be assigned the Intergraph Element Class “Primary”.

Acceptable Intergraph Element Types are specified in Table 3-1

Version 5.x of MicroStation has new element types which are unknown in earlier versions. The Water Company recommends that the compatibility switch be set to version 3 or version 4 to avoid possible problems.

Element	Intergraph Element Type	Type Number
Line work		
Conduits		
Gravity sewers (including Stub Pipes and ERS Pipes):		
- Straight	LINE	3
- Straight with Horizontal Bend	LINE STRING	4
- Curved * (or straight with curve)	CURVE	11
Rising Mains	LINE STRING	4
Property Service Branch (and OB)	LINE or LINE STRING	3 4
Other:		
Flow Arrow Shaft	LINE	3
Text Arrow Shaft:		
- Straight	LINE	3
- Bent	LINE STRING	4
Branch Tie Arrow Shaft	LINE	3
Symbols		
All Cells	CELL	2**
Text		
All Text	TEXT	17***

Table 3-1 Intergraph element types

* *Element type ARC (number 16) must not be used*

** *In accordance with the cell library provided*

*** *In accordance with the font library provided*

Graphic file verification requirements

Consultants must verify the basic file structure of all graphics design files submitted to the Water Company. Verification checks must be carried out by consultants in the following manner.

The Edit Graphics (EDG) verification command sequence required in the VAX environment is:

```
$      EDG/READ filename
edg>  SET SEARCH/ALL
edg>  SET VERIFY/LENGTH
edg>  EOF
```

If the output from this command sequence is <End of Design>, the basic file structure is acceptable.

Output other than the above indicates file structure problems. File structure problems are displayed in the form of diagnostic messages related to the first element not satisfying the verification procedure. These are major errors and prevent the file from being graphically displayable. Minor errors however may not affect graphical display but can cause subsequent plotting problems.

The equivalent verification in the version 3.x MicroStation PC environment is achieved with the following EDG command sequence:

```
edg>  SET SEARCH/ALL
edg>  SET MODE/VERIFY
edg>  FIND END
```

Output from this command sequence should be <End of Design>.

In the version 4.x MicroStation PC environment, the command sequence must be expanded as follows:

```
edg>  SET SEARCH/ALL
edg>  SET MODE/VERIFY
edg>  SET VERIFY/LENGTH
edg>  FIND END
```

Output from this command sequence should be <End of Design>.

Level structure - DGN

Table 3-2 is the level structure assigned to sewerage file elements related to as constructed information.

All miscellaneous items and notation other than those specified in this table, must be placed on the level of the feature to which they are related.

Level	Graphic Item	Elements to be Represented
1	Sewerage Treatment Plant	<ul style="list-style-type: none"> Name Number Type Symbol
2	<p>≥ 600 - 1500 mm diam. Conduits</p> <p>≥ 600 - 1500 mm diam. Access chambers</p>	<ul style="list-style-type: none"> Gravity Sewers, Rising Mains, Stub Pipes, ERS Conduits Access chambers, Access chamber Numbers and Capsules
3	Sewer Project Notation	<ul style="list-style-type: none"> On all Named Sewers (except Trunk Sewers); Name, Type and Section Number
4	Table Construction Alignment	<ul style="list-style-type: none"> All diameters
5	<p>≥ 600-1500mm diam. Conduit: Flow Arrow</p> <p>≥ 600 - 1500 mm diam. Conduit: Text Arrow</p>	<ul style="list-style-type: none"> Shaft and Head Size and Grade (or RM/SIPHON Notation) Shaft and Head
6	Conduit Material and Joint Packing Abbreviations	<ul style="list-style-type: none"> Conduit Material Abbreviation Joint Packing Abbreviation
7	Conduit Invert Levels (at all Access chambers) other than for Stub Pipes	<ul style="list-style-type: none"> Conduit Invert Level at Access chamber
9	<p>300 - < 600 mm diam. Conduit</p> <p>Access chambers on Conduits 300 - < 600 mm diam.</p>	<ul style="list-style-type: none"> Gravity Sewers, Rising Mains, Stub Pipes, ERS Conduits Access chambers, Access chamber Numbers and Capsules

Table 3-2-1 Sewerage level structures

Continued on the next page

Sewer Level structures continued...

Level	Graphic Item	Elements to be Represented
10	300 - < 600 mm diam. Conduit: Flow Arrow 300 - < 600mm diam. Conduit: Text Arrow	<ul style="list-style-type: none"> • Shaft and Head • Size and Grade (or RM/SIPHON Notation) • Shaft and Head
12	< 300mm diam. Conduit Access chambers on Conduit < 300 mm diam	<ul style="list-style-type: none"> • Gravity Sewers, Rising Mains, Stub Pipes, ERS Conduits • Access chambers, Access chamber Numbers and Capsules
13	< 300 mm diam. Conduit: Flow Arrow <300mm diam. Conduit: Text Arrow	<ul style="list-style-type: none"> • Shaft and Head • Size and Grade (or RM/SIPHON Notation) • Shaft and Head
14	Sewer Conduit Offset Combined Drain Notation	<ul style="list-style-type: none"> • Sewer Offset Dimensions and Pointers • CD Text
15	Rising Main Notation (all sizes)	<ul style="list-style-type: none"> • Rising Main Notation
16	Property Service Number Boundary Trap Notation	<ul style="list-style-type: none"> • The PS number supplied by the Water Company • BT Text
17	Access chamber Chainage & Miscellaneous Notation	<ul style="list-style-type: none"> • Pipe Section or Access chamber Features
18	Combined CD & BT Text	<ul style="list-style-type: none"> • BTCD Text
21	Features on Conduit: Change of Grade Horizontal Curve or bend Miscellaneous Invert Level Miscellaneous Chainage	<ul style="list-style-type: none"> • Text, Chainage and Symbol • Tangent Point (Text, Chainage & Symbol) • Invert Levels other than those on Level 7 (Stub Pipe, Table Construction, etc.) • Along Conduits (for example, running chainage or Rising Mains and Independent Sewers)

Table 3-2-2 Sewerage level structures

Continued on the next page

Sewer Level structures continued...

Level	Graphic Item	Elements to be Represented
22	Vertical Curve (and Rising Main)	<ul style="list-style-type: none"> • Tangent Point (Text, Chainage and Symbol) • Invert Levels
23	Vertical Curve text	<ul style="list-style-type: none"> • Notation
24	Sewer Shed	<ul style="list-style-type: none"> • Chainage and Symbol
29	Conduct Replacement/Lining	<ul style="list-style-type: none"> • Notation and details
32	Trunk Sewer Notation	<ul style="list-style-type: none"> • Access shaft name • Sewer name and section number
34	> 1500 mm diam. Conduit: Flow Arrow > 1500 mm diam. Conduit: Text Arrow	<ul style="list-style-type: none"> • Shaft and Head • Size and Grade (or RM/SIPHON notation) • Shaft and Head
35	Minor Sewerage Pumping Station	<ul style="list-style-type: none"> • Access chamber • Access chamber Number and Capsule
43	Major Sewerage Pumping Station	<ul style="list-style-type: none"> • Access chamber • Access chamber Number and Capsule
44	Major Sewerage Pumping Station	<ul style="list-style-type: none"> • Name
45	Minor Sewerage Pumping Station Associated Features Valve Pit Electrical Control Cabinet	<ul style="list-style-type: none"> • Symbol • Symbol
46	Sewerage Pumping Station Details (Major and Minor)	<ul style="list-style-type: none"> • Pipe Work • Buildings • Equipment • Structures • Notation • Pipeline Details

Table 3-2-3 Sewerage level structures

Continued on the next page

Sewer Level structures continued...

Level	Graphic Item	Elements to be Represented
47	Sewerage Treatment Plant Details	<ul style="list-style-type: none"> • Pipe Work • Buildings • Equipment • Structure • Labels and Notation
48	Sewer Detention Tank	<ul style="list-style-type: none"> • Structure, Pipe Work, Name
49	Property Service Branches, Oblique Branches (OB's), Associated Features and Notation	<ul style="list-style-type: none"> • Branch/OB Pipe • Inspection Opening at End of Branch • Branch Tie (Dimension and Notation) • Branch Projection Line • Branch Tie Arrow (Shaft and Head) • Chainage of Branch or OB from downstream Access chamber • Branch Details <ul style="list-style-type: none"> - NSL, - IL, - EP Length
50	Features on Branch: Jump-Up (JU) Oblique Branch (OB) Bend	<ul style="list-style-type: none"> • Text, and Symbol • Text and Chainage • Text and Chainage
57	Other Authority Sewers	<ul style="list-style-type: none"> • All details (Line work, Symbols, Text) <p>Excluding: - "Abandoned Sewer" Notation and Symbols - File Reference Numbers</p>
58	Private Sewers	<ul style="list-style-type: none"> • All details (Line work, Symbols, Text) <p>Excluding: - "Abandoned Sewer" Notation and Symbols - File Reference Numbers</p>
59	Private Rising Mains	<ul style="list-style-type: none"> • All details (Line work, Symbols, Text) <p>Excluding: - "Abandoned Sewer" Notation and Symbols - File Reference Numbers</p>
63	Graphical Flags	<ul style="list-style-type: none"> • "Problem", and "Edge Matching" Symbols

Table 3-2-4 Sewerage level structures

Element symbology

This section contains the symbology specifications for the graphical representation of sewerage elements. Symbology is specified in terms of level, color, line weight, line style, font, height, width and justification of text, and whether or not there is a cell to represent the item.

Elements are grouped by entities.

A cross-hatch (#) indicates that the item requires a database linkage.

These tables must be read in conjunction with the specifications detailed in *Associated graphical specifications* later in this section. A list of text justification abbreviations used in these tables is also included.

Sewerage treatment plants

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Name, Number, Type	1	26	1	0	37	2.75	2.50	CC	-
Symbol	1	26	1	0	-	-	-	-	PP
Building/Structures/E quipment	47	13	1	0	-	-	-	-	-
Pipe Work (including Access chambers)	47	3	0	0	-	-	-	-	-
Labels and Pipeline details notation	47	3	0	0	37	1.25	1.00	As req'd	-

Table 3-3 Sewerage treatment plants symbology

Sewer project notation

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Name, Type & Section Number									
Named Sewers (except Trunk Sewers)	3	-	-	0	37	1.50	1.50	CC	-
Trunk Sewers	32	26	0	0	37	5.00	5.00	CC	-

Table 3-4 Sewerage project notation symbology

Sewer pipes and associated flow data

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Conduits Gravity Sewers #, Rising Mains #, ERS Conduits # and Stub Pipes in the size range:									
< 300 mm diam.	12	10	1	0	-	-	-	-	-
300 -< 600 mm dia.	9	10	2	0	-	-	-	-	-
≥ 600-1500 mm dia	2	10	3	0	-	-	-	-	-
> 1500 mm dia.	33	10	4	0	-	-	-	-	-
Flow Arrow Arrow Shaft and Arrow Head: Size and Grade Text: For Pipes in the size range:									FLOW
< 300 mm dia.	13	10	0	0	37	1.25	1.25	<i>Refer</i>	
300 -< 600 mm dia.	10	10	0	0	37	1.25	1.25		-
≥ 600-1500 mm dia	5	10	0	0	37	1.25	1.25	<i>to</i>	
> 1500 mm dia.	34	10	0	0	37	1.25	1.25		-
Conduit Material and Joint Packing Abbreviations	6	10	0	0	37	1.25	1.25	<i>Table 3-20</i>	-
Conduit Invert Levels (at all Access chambers) Gravity Sewers and ERS Conduits	7	2	0	0	37	1.25	1.00	CC	-
Rising Mains	7	3	0	0	37	1.25	1.00	CC	-

Table 3-5 Sewer pipes and associated flow data symbology

Sewer pipe features and notation

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Table Construction Alignment (all diam's)	4	10	0	4	-	-	-	-	-
Sewer Offset Dimension	14	26	0	0	37	1.00	1.00	CC	-
Pointers	14	26	0	0	-	-	-	-	SEWOFF
Change of Grade Text (COG) & Chainage	21	10	0	0	37	1.00	1.00	LC,RC	-
Symbol	21	10	0	0	-	-	-	-	COG
Horizontal Curve or Bend									
Text (TP) & Chainage or Bend	21	10	0	0	37	1.00	1.00	LC,RC	-
Symbol (for TP's)	21	10	0	0	-	-	-	-	TP
Vertical Curve Notation	23	26	0	0	37	1.00	1.00	CC	-
Invert Level	22	2	0	0	37	1.25	1.00	CC	-
Text (TP) & Chainage	22	10	0	0	37	1.00	1.00	LC,RC	-
Symbol	22	10	0	0	-	-	-	-	TP
Sewer Shed									
Chainage	24	10	0	0	37	1.00	1.00	LC,RC	-
Symbol	24	10	0	0	-	-	-	-	SSHED
Cut & Sealing									
Notation	28	10	0	0	37	1.00	1.00	CB,CT	-
Symbol (Marker)	28	10	0	0	-	-	-	-	ARCS
Symbol (Arrow)	28	10	0	0	-	-	-	-	CANDS
Conduit Replacement or Lining									
Notation & Details	29	26	0	0	37	1.00	1.00	CC	-

Table 3-6-1 Sewerage pipe features & notation symbology

Continued on the next page

Sewer pipe features & notation continued...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Detention Tank									
Name	48	26	0	0	37	2.00	2.00	As Req'd	-
Structure/Pipe Work	48	3	0	0	-	-	-	-	-
Text Arrow									
Arrow Shaft for pipe in size range:									
< 300 mm dia.	13	10	1	1	-	-	-	-	-
300 -< 600 mm dia.	10	10	1	1	-	-	-	-	-
≥ 600-1500 mm dia	5	10	1	1	-	-	-	-	-
> 1500 mm dia.	34	10	1	1	-	-	-	-	-
Arrow Head for pipe in size range:									
< 300 mm dia.	13	10	0	0	-	-	-	-	FLOW
300 -< 600 mm dia.	10	10	0	0	-	-	-	-	FLOW
≥ 600-1500 mm dia	5	10	0	0	-	-	-	-	FLOW
> 1500 mm dia.	34	10	0	0	-	-	-	-	FLOW
Miscellaneous Notation									
Sewer &/or Access chamber Feature	17	10	0	0	37	1.20	1.20	As Req'd	-
Misc. Invert Level	21	2	0	0	37	1.00	1.00	CC	-
Miscellaneous Chainage	21	10	0	0	37	1.00	1.00	LC,RC	-
Other Miscellaneous Notation	(Symbology as specified for individual item notation)								
Graphical Flags									
Edgematching, Problem, Data Symbols	63	23	Unspecified, but must contain the letter E, or P in a circle of Rad. 4m			4.00	4.00	CC	-

Table 3-6-2 Sewerage pipe features & notation symbology

Access chambers (other than pumping stations)

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Access chambers For Defining Sewer Pipe Sections on Conduits #:									
< 300 mm dia.	12	10	0	0	-	-	-	-	As
300-<600 mm dia.	9	10	0	0	-	-	-	-	per
≥ 600-1500 mm dia.	2	10	0	0	-	-	-	-	Cell
> 1500 mm dia.	33	10	0	0	-	-	-	-	Library
Access chamber Capsules & Numbers For Access chamber on Conduits:									
< 300 mm dia.	12	26	0	0	37	1.25	1.25	LC,RC	CAP
300-<600 mm dia.	9	26	0	0	37	1.25	1.25	LC,RC	CAP
> 600-1500 mm dia.	2	26	0	0	37	1.25	1.25	LC,RC	CAP
> 1500 mm dia.	33	26	0	0	37	1.25	1.25	LC,RC	CAP
Access chamber Chainage (Conduit Length)									
All Access chambers	17	10	0	0	37	1.20	1.20	LC,RC	-
Trunk Sewer Access Shaft									
Name	32	26	0	0	37	1.20	1.20	As Req'd	-

Table 3-7 Access chambers (other than pumping stations) symbology

Property service branches and associated features

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Property Service and Oblique Branches (OB's)									
Associated Features and Notation:									
Branch (or OB) chainage	49	3	0	0	37	1.20	1.20	LC,RC	-
End of Branch Data and Notation:									
SL, IL, & EP Length	49	4	0	0	37	1.20	1.20	CC	-
Branch/OB. Pipe #	49	4	1	0	-	-	-	-	-
Inspection Opening at End of Branch	49	4	1	0	-	-	-	-	SWEPT
Branch Tie									
Notation & Dimension	49	4	0	0	37	1.00	1.00	CC	-
Branch Projection Line	49	13	0	5	-	-	-	-	-
Branch Tie Arrow									
Arrow Shaft	49	13	0	0	-	-	-	-	-
Arrow Head	49	13	0	0	-	-	-	-	FLOW
Features On Branch									
Text & Chainage:									
Jump-Up (JU)	50	3	0	0	37	1.00	1.00	LC,RC	-
Oblique Branch (OB)	50	3	0	0	37	1.00	1.00	LC,RC	-
Bend	50	3	0	0	37	1.00	1.00	LC,RC	-
Symbols:									
Jump-Up	50	3	0	0	-	-	-	-	JORED
Property Service Number									
Property with Branch	16	4	0	0	64	1.30	1.30	CC	-
Miscellaneous Property Service Text									
Combined Drain (CD)	14	15	0	0	31	1.30	1.30	CC	-
Boundary Trap (BT)	16	13	0	0	64	1.30	1.30	CC	-
BT CD Text	18	16	0	0	64	1.30	1.30	CC	-

Table 3-8 Property service branches symbology

Sewerage pumping station access chambers

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Minor Sewerage Pumping Station									
Access chamber #	35	10	0	-	-	-	-	-	MINPS
Access chamber Capsule and Number	35	26	0	0	37	1.25	1.25	LC,RC	CAP
Valve Pit	45	10	0	0	-	-	-	-	VALPIT
Electrical Control Cabinet	45	10	0	0	-	-	-	-	ECC
Major Sewerage Pumping Station									
Access chamber #	43	10	0	0	-	-	-	-	MAJPS
Access chamber Capsule and Number	43	26	0	0	37	1.25	1.25	LC,RC	CAP
Name	44	26	1	0	37	2.75	2.50	-	-
Sewerage Pumping Station Details (Major and Minor)									
Pipe Work, Buildings, Equipment & Structures	46	10	0	0	-	-	-	-	-
Notation, Labels	46	10	0	0	37	1.25	1.00	As Req'd	-

Table 3-9 Sewerage pumping station access chambers symbology

Note: For element symbology and associated requirements in relation to:

- ◆ Other authority sewerage assets,
- ◆ Private gravity sewers,
- ◆ Private rising mains,
- ◆ Sanitary disposal plant etc.

Consultants should contact the Water Company for advice and direction.

Graphics Schedule 2 - For MicroStation in Unlinked .DGN format

This Schedule is the same as **Schedule 1** with the exception the graphical elements **must not** have any elements with database links in sewerage file.

Graphics Schedule 3 - For .DXF format

The graphical information to be supplied to the Authority in .DXF format is to fit the criteria set out in this schedule.

The graphical elements must have the exact AMG position as the related database information set out in Tables 2-8 to 2-12 of Database Schedule 2. If these graphical elements are modified or moved due to any form of editing (eg for edgematching) then the AMG co-ordinates must be altered in the database tables to reflect their new position. If this procedure is not performed the data may fail the linking process and may result in a non-conformance being issued by the Water Company.

The Water Company's Sewerage Assets

Tables 3-13 to 3-17 show the symbology for the Water Company's sewerage assets in DXF format.

Mapping DXF colors to the Water Company's FIS color table:

DXF Colors	MicroStation Colors
241	26
1	10
102	2
10	3
110	23
4	1
30	13
41	4
5	15
3	16

Table 3-10 DXF colors used for sewerage assets

Mapping DXF Font Styles to the Water Company's Font Numbers:

DXF Text Styles	FIS Font Numbers
ITALIC	37
ROM100	31
STANDARD	64
ITAL80	37

Table 3-11 DXF text styles used for sewerage assets

Element	DXF Element Types
Line work for Sewerage Assets <u>Sewer Mains and Property Connections:</u> Gravity Sewers (including Stub Pipes and ERS pipes): - Straight - Straight with Horizontal Bend - Curved Rising Mains Property Service Branch (and OB) <u>OTHER</u> Flow Arrow Shaft Text Arrow Shaft: - Straight - Bent Branch Tie Arrow Shaft	LINE POLYLINE WITHOUT ARCS (line string) POLYLINE WITHOUT ARCS (line string) POLYLINE WITHOUT ARCS (line string) LINE or POLYLINE WITHOUT ARCS (line string)
Symbols All Blocks	As per the Water Company's FIS Library
Text All Text	TEXT

Table 3-12 DXF element types for sewerage assets.

Sewer Project Notation

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Name, Type and Section Number:								
Named Sewers (except Trunk sewers)	6	3_26A	241	Italic	1.50	1.50	CC	-
Trunk Sewers	36	32_26A	241	Italic	5.00	5.00	CC	-

Table 3-13 Sewer project notation symbology

Access chambers (other than pumping stations)

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Access chambers								Refer to cell table for names and add # where
For Defining Sewer Pipe Sections on Conduit								
< 300 mm dia	21	12_10B	1	-	-	-	-	# is 1
300 -< 600 mm dia	14	9_10B	1	-	-	-	-	# is 2
600-1500 mm dia	3	2_10B	1	-	-	-	-	# is 3
> 1500 mm dia	39	33_10B	1	-	-	-	-	# is 4
Acc. chamber Capsules								
< 300 mm dia	23	12_26A	241	-	-	-		CAP1
300 -< 600 mm dia	16	9_26A	241	-	-	-		CAP2
600-1500 mm dia	5	2_26A	241	-	-	-		CAP3
> 1500 mm dia	40	33_26A	241	-	-	-		CAP4
Acc. chamber Numbers								
< 300 mm dia	23	12_26A	241	Italic	1.25	1.25	LC,RC	-
300 -< 600 mm dia	16	9_26A	241	Italic	1.25	1.25	LC,RC	-
600-1500 mm dia	5	2_26A	241	Italic	1.25	1.25	LC,RC	-
> 1500 mm dia	40	33_26A	241	Italic	1.25	1.25	LC,RC	-
Acc. chamber Chainage (Conduit Length)								
All Access chambers	29	17_10A	1	Italic	1.20	1.20	LC,RC	-
Trunk Sewer Access Shaft								
Name	36	32_26A	241	Italic	1.20	1.20	As req'd	-

Table 3-14 Sewer access chambers symbology

Sewer Pipes and Associated Flow Data

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Conduits								
Gravity Sewers								
Rising Mains, ERS Conduits and Stub Pipes in the size ranges:								
< 300 mm dia	20	12_10A	1	-	-	-	-	-
300 -< 600mm dia	13	9_10A	1	-	-	-	-	-
600-1500 mm dia	2	2_10A	1	-	-	-	-	-
>1500 mm dia	38	33_10A	1	-	-	-	-	-
Curved Conduits								
< 300 mm dia	22	12_10C	1	-	-	-	-	-
300 -< 600 mm dia	15	9_10C	1	-	-	-	-	-
600-1500 mm dia	4	2_10C	1	-	-	-	-	-
Flow Arrow								
Arrow Shaft and Arrow Head in the size range:								
< 300 mm dia	24	13_10A	1	-	-	-	-	Use for Arrow Head: FLOW1
300 -< 600mm dia	17	10_10A	1	-	-	-	-	FLOW2
600-1500 mm dia	7	5_10A	1	-	-	-	-	FLOW3
>1500 mm dia	41	34_10A	1	-	-	-	-	FLOW4
Size and Grade Text For Pipes in the size range:								
< 300 mm dia	24	13_10A	1	Italic	1.25	1.25	Refer	-
300 -< 600mm dia	17	10_10A	1	Italic	1.25	1.25	to	-
600-1500 mm dia	7	5_10A	1	Italic	1.25	1.25	Table	-
>1500 mm dia	41	34_10A	1	Italic	1.25	1.25	3-20	-
Conduit Material and Joint Packing Abbrev's.	9	6_10A	1	Italic	1.25	1.25	Justification of text	-
Conduit Invert Levels (at all Access chambers)								
Gravity Sewers and ERS Conduits	10	7_2A	102	ITAL80	1.25	1.00	CC	-
Rising Mains	11	7_3A	10	ITAL80	1.25	1.00	CC	-

Table 3-15 Sewer pipes and associated flow data symbology

Note: For curved conduits as specified in Table 3-15. Place as a polyline without arcs ensuring vertices are placed at

branch connection points and additional points to define the straight and curved portions. A vertex must be placed along the straight portion at the TP tangent points, since the line string is converted to a curved line string by the Water Company. Refer to Figure 8-6 in Chapter 8.

Sewer Pipe Features and Notation

Note:

The “SEWOF1” block as specified in Table 3-16 is an example of a MicroStation cell that would contain an enter data field. This block must be “exploded” prior to submission to the Water Company, so as to provide “polyline” pointers at either end of the offset dimension. The distance between the pointers is dependant on the number of digits required to be shown. Refer to Figure 3-4 for details.

Sewer Pipe Features and Notation

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Sewer Offset								
Dimension	27	14_26A	241	Italic	1.00	1.00	CC	-
Pointers	27	14_26A	241	-	-	-	-	SEWOF1
Change of Grade								
Text (COG) and Chainage	32	21_10A	1	Italic	1.00	1.00	LC,RC	-
Symbol	32	21_10A	1	-	-	-	-	COG1
Horizontal Curve								
Text (TP) & Chainage	32	21_10A	1	Italic	1.00	1.00	LC,RC	-
Symbol	32	21_10A	1	-	-	-	-	TP1
Vertical Curve								
Notation	35	23_26A	241	Italic	1.00	1.00	CC	-
Invert Level	33	22_2A	102	ITAL80	1.25	1.00	CC	-
Text (TP) & Chainage	34	22_10A	1	Italic	1.00	1.00	LC,RC	-
Symbol	34	22_10A	1	-	-	-	-	TP2
Arrow for Text								
Arrow Shaft for pipe in size range:								
< 300 mm dia	25	13_10B	1					
300 -< 600 mm dia	18	10_10B	1				-	
600-1500 mm dia	8	5_10B	1	-	-	-	-	
> 1500 mm dia	42	34_10B	1	-	-	-	-	
Arrow Head for pipe in size range:								
< 300 mm dia	24	13_10A	1	-	-	-	-	FLOW1
300 -< 600 mm dia	17	10_10A	1	-	-	-	-	FLOW2
600-1500 mm dia	7	5_10A	1	-	-	-	-	FLOW3
> 1500 mm dia	41	34_10A	1	-	-	-	-	FLOW4
Miscellaneous Notation								
Sewer &/or Access chamber Feature	29	17_10A	1	Italic	1.20	1.20	As Req'd	-
Misc. Invert Level	31	21_2A	102	Italic	1.00	1.00	CC	-
Misc. Chainage	32	21_10A	1	Italic	1.00	1.00	LC,RC	-

Table 3-16 Sewer pipe features and notation symbology

Property Service Branches and Associated Features

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Property Service and Oblique Branches (OB's)								
Branch/OB. Pipe	43	49_4A	41	-	-	-	-	-
Inspection Opening at End of Branch	43	49_4A	41	-	-	-	-	SEWPT1
Branch Tie								
Notation & Dimension	43	49_4A	41	Italic	1.00	1.00	CC	-
Branch Projection Line								
44	49_13A	30	-	-	-	-	-	-
Branch Tie Arrow								
Arrow Shaft	45	49_13B	30	-	-	-	-	-
Arrow Head	45	49_13B	30	-	-	-	-	FLOW5
Features On Branch								
Text & Chainage:								
Jump-Up (JU)	46	50_3A	10	Italic	1.00	1.00	LC,RC	-
Reducer (RED)	46	50_3A	10	Italic	1.00	1.00	LC,RC	-
Oblique Branch (OB)	46	50_3A	10	Italic	1.00	1.00	LC,RC	-
Bend	46	50_3A	10	Italic	1.00	1.00	LC,RC	-
Symbols:								
Jump-Up	46	50_3A	10	-	-	-	-	JORED1
Reducer (RED)	46	50_3A	10	-	-	-	-	JORED1
Branch (or OB) Chainage	49	49_3A	10	Italic	1.20	1.20	LC,RC	-
End of Branch data								
NSL, IL and EP length	43	49_4A	41	Italic	1.20	1.20	CC	-
Miscellaneous Property Service Text								
Property Service number	48	16_4A	41	STANDARD	1.30	1.30	CC	-
Combined Drain (CD)	26	14_15A	5	ROM100	1.30	1.30	CC	-
Boundary Trap (BT)	28	16_13A	30	STANDARD	1.30	1.30	CC	-
BT CD Text	30	18_16A	3	STANDARD	1.00	1.00	CC	-

Table 3-17 Property Service branches symbology

Graphical Error Flags

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Edge matching flags	47	63_23A	110	STANDARD	4.00	4.00	CC	Circle of radius 4m containing the letter E or P.
Problem flags	47	63_23A	110	STANDARD	4.00	4.00	CC	

Table 3-18 Graphical error flag symbology

Graphical error flags are placed in the graphics file to alert the Water Company of problems that the Consultant may have when edgematching the new digital data to the Water Company's existing digital data. Sufficient documentation must accompany any digital information supplied containing these flags.

Associated graphical specifications

The following specifications must be read in conjunction with *Element symbology* earlier in this section. This section must be read in conjunction with *Part 2 - Guidelines*.

Text

Justification of text

In general, if text is placed parallel to an element in a sewerage file, it must be justified centre-centre. If text is placed at right angles to an element, it must be justified either left-centre or right -centre at the point closest to its corresponding element.

The following text justifications and abbreviations are used in this manual.

Abbreviation	Justification
CT	centre-top
CB	centre-bottom
CC	centre-centre
RT	right-top
RB	right-bottom
RC	right-centre
LT	left-top
LB	left-bottom
LC	left-centre
As Req'd*	As Required

Table 3-19 Text justifications

* Text specified with the justification "As required" indicates that the text must be justified at the point closest to its corresponding element.

Scaling of text

Scaling of text, flow arrow and associated data is not normally permitted, but these items may be scaled by a factor of 0.80 if necessitated by a lack of available space to display graphical information at its normal size.

Displayable number of decimal places

The following information applies only to numeric data displayed in graphics.

Conduit grade

Grades must be displayed on the flow in the following manner:

- ◆ Grade of less than 1 in 50 or greater display no decimal places. (eg 1 in 200)
- ◆ Grades of 1 in 50 are displayed to one decimal place. (eg 1 in 20.1)

The standard practice of rounding to one or no decimal places applies. For example:

- A grade of 10.05 rounds up to 10.1
- A grade of 50.04 rounds down to 50

Other items

All ties, offsets, invert levels and chainages must be graphically displayed to two decimal places. If necessary, zeros must be added to satisfy this requirement. For example:

- TIE 8.2 is displayed as TIE 8.20.
- Invert Level 120.650 is displayed as 120.65.

Symbology of access chambers

The symbology of access chambers is derived from the size range of sewer pipe section immediately downstream. Figure 3-1 illustrates the level assigned to access chambers placed on sewers of various size ranges.

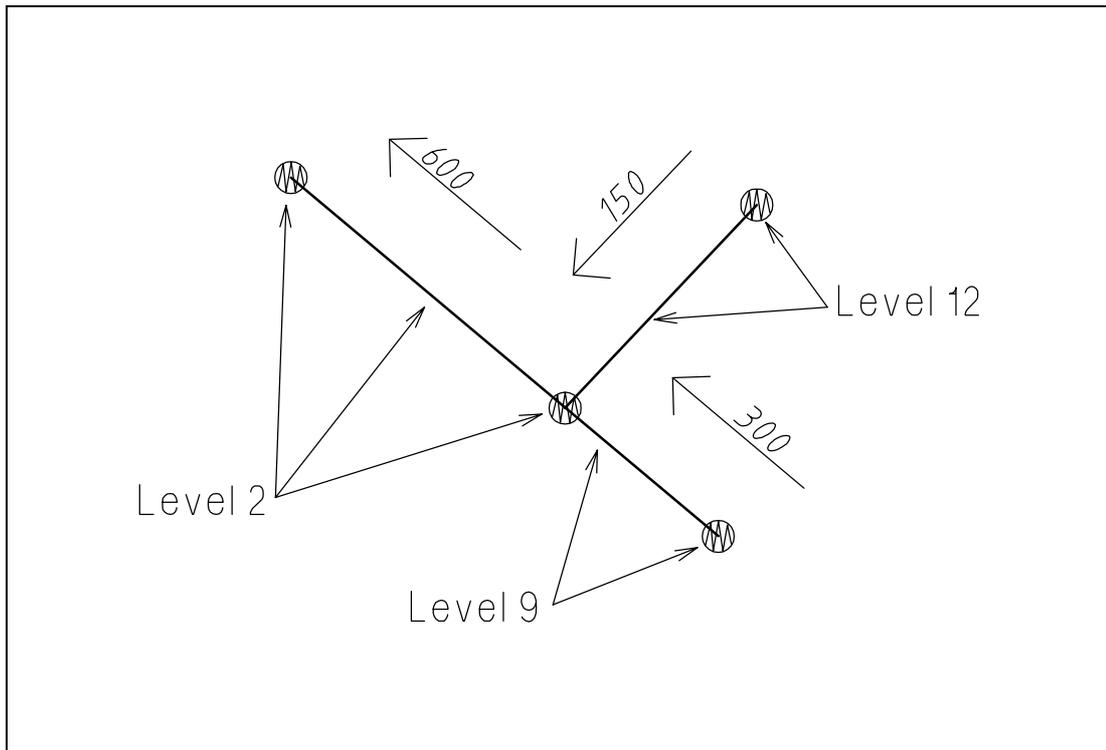


Figure 3-1 Assignment of symbology to access chambers

Symbology of non-circular conduits

The symbology used for non-circular conduits and associated access chambers depends on the size range into which the largest dimension falls.

For example, a 350 x 200 mm conduit would acquire the symbology of a pipe in the size range 300-<600 mm diam..

Flow arrows

Arrow shaft

All flow arrow shafts should be 13.0 metres long at ground scale. The length of flow arrows should not vary, except where limited space necessitates scaling. In this case, the arrow head and all data on the flow arrow must be scaled.

Text justification

Size and grade notation should be entered as one unit for double-line text, justified right centre with line spacing of 0.50. The point of justification must be 4.50 metres (ground scale) from the left end of the arrow shaft.

Material and jointing abbreviations should be placed as one unit, if possible, of double-lined text, justified left centre with line spacing of 0.50. It must be positioned 2 metres (ground scale) from the size/grade point of justification, and 6.50 metres (ground scale) from the right end of the arrow shaft, as shown in Figure 3-2.

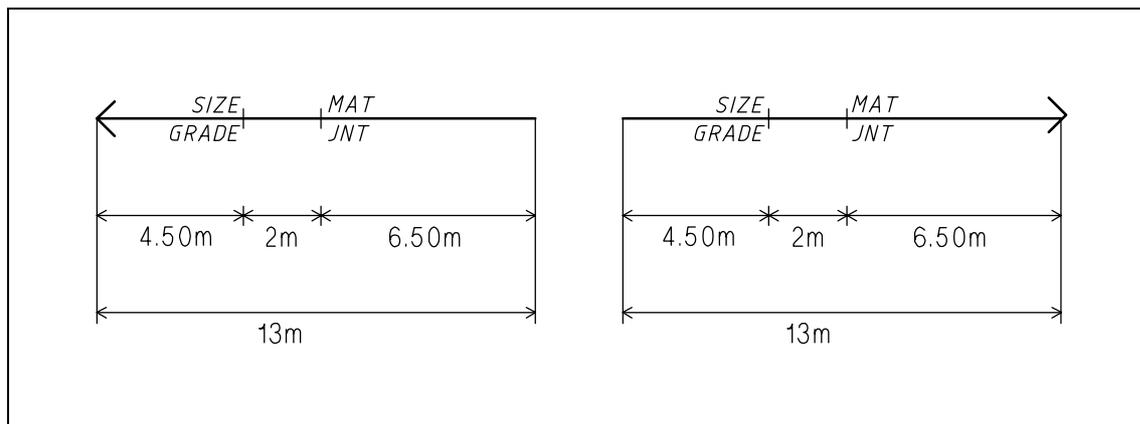


Figure 3-2 Position of text on flow arrow

If not placed as double line text the individual justifications in Table 3-20 are also permitted for size/grade and material /jointing notation. The appropriate points of justification should follow the dimensions in Figure 3-2.

	Size	Grade	Material	Jointing
Justification	RB	RT	LB	LT

Table 3-20 Justifications for flow arrow data

Direction of arrow head cell

The flow arrow head (cell = flow) arrow must be placed on the arrow shaft for each sewer conduit to indicate the direction of flow. For gravity sewers, this is from the highest invert level to the lowest invert level. For rising mains and gravity sewers laid with reverse grade, this is usually from the lowest invert level to the highest invert level.

The only exception to this rule is for the pipe section of emergency relief conduits. The arrow shaft should be placed with flow data in the usual location but an arrow head is not required.

Limit of displayable characters

Table 3-21 shows the maximum number of characters to be displayed in each category.

Flow Arrow Notation	Maximum Number of Displayed Characters
Size	4
Grade	4
Material	6
Jointing	6

Table 3-21 Limit of displayable characters

Display of notation derived form code lists

Flow arrow notation must be displayed in graphics on the flow arrow in exactly the manner shown in the respective abbreviated code lists. Variations in abbreviation of flow arrow notation are not acceptable.

For example, the conduit material abbreviation UPVC must displayed on the flow arrow in lieu of the sometimes used abbreviation of PVC.

Calculation of conduit grade

Conduit gradients are usually referred to as grades. They must be calculated using the difference between upstream and downstream invert levels and the conduit length. The following formula is used to calculate grades:

$$\frac{\text{Conduit length}}{(\text{Upstream IL} - \text{Downstream IL})}$$

The grade must be displayed as an integer. Grades must not be displayed as percentages or fractions.

Standard offsets of selected sewerage notation

Table 3-22 lists the offsets that should be used as guide to the desired manual placement of data. All offsets are measured, at ground scale, to the point of justification. Refer to the relevant sections of *Part 2 - Guidelines* for further details on the placement of these items.

Item	Offset From Sewer	Offset From Access chamber Centre
Flow Arrow	10 metres	-
Invert Levels	1.0 metres	5 metres
Access chamber Capsule	-	4.5 metres
Access chamber Chainage	-	2.5 metres
Sewer Offset	5.0 metres	-

Table 3-22 Standard offsets of key sewerage notation

Access chambers

Table 3-23 lists the different types of access chambers and their cell names.

Note that cells MINPS and MAJPS are not included in this table because they have different symbology requirements to those listed here. The Purification Plant symbol PP must not be entered as an access chamber.

Access chamber Type	Cell Name
Circular Access chamber	MH
Square Access chamber	SQMH
Rectangular Access chamber	RECMH
Gas Check Access chamber	GCMH
Chambered Access chamber	CHMH
Inspection Shaft	IS
Trunk Sewer Access Shaft	ASHAFT
Emergency Relief Structure	ERS
Blower House Vent	BLOV
Vent	VENT
End of Pipe	EP
Pipe Junction	JUNC

Table 3-23 Access chambers

Scaling of access chambers and treatment plant symbol

The following access chambers must be scaled to their actual measured diameters:

- ◆ Major Pumping Station (MAJPS)
- ◆ Trunk Sewer Access Shaft (ASHAFT)

The cell PP should be scaled by a factor of 10 or less if space is limited.

Scaling and placement of access chamber capsules

Access chamber capsules must be placed along the radial axis of the access chambers to which they relate.

The cell CAP must be scaled in the X (horizontal) direction relative to the number of characters in the access chamber number. The characters must be placed so that the total remaining free space within the cell, does not exceed two character spaces. This is shown in Figure 3-3.

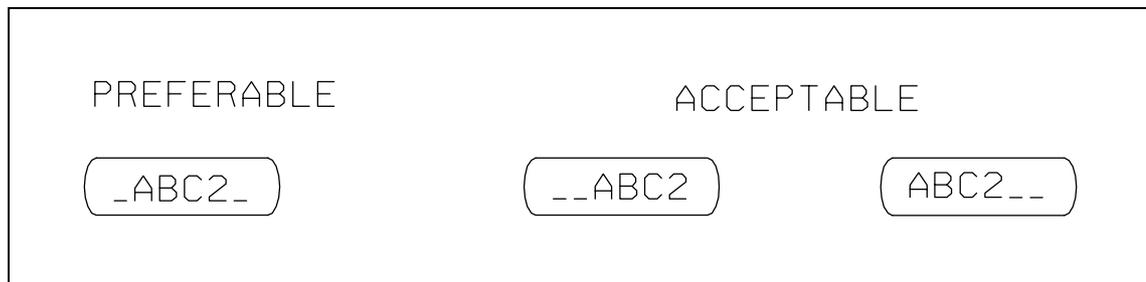


Figure 3-3 Placement of characters in CAP cell

Variation of text string requirements for TIE text

The TIE text/dimension string must be placed in the following manner:

- ◆ If the measured tie is less than 10.00 metres, a double-line text string is required with line spacing 0.50.

For example: TIE
 9.99

- ◆ If the tie is greater than or equal to 10.00 metres, a single lined text string is required.

For example: TIE 10.00

Sewer offset cells

There is a cell in the cell library that may be used to place the sewer offset, dimension and pointers:

◆ SWOFF

This cell contains an enter data field. The status of the cell must be dropped upon placement so that it is returned to its basic constituent elements. This will result in a separate line sting at either end of the associated offset text (ie three separate graphical elements)

If a cell cannot be used (in there is a problem not being able to drop the status) then a line string/polyline can be placed at either end of the offset text. If this method is used they must be single line strings/polylines and not individual line elements. The dimensions for setting out these lines are shown in Figure 3-4 and they are in metres, to ground scale

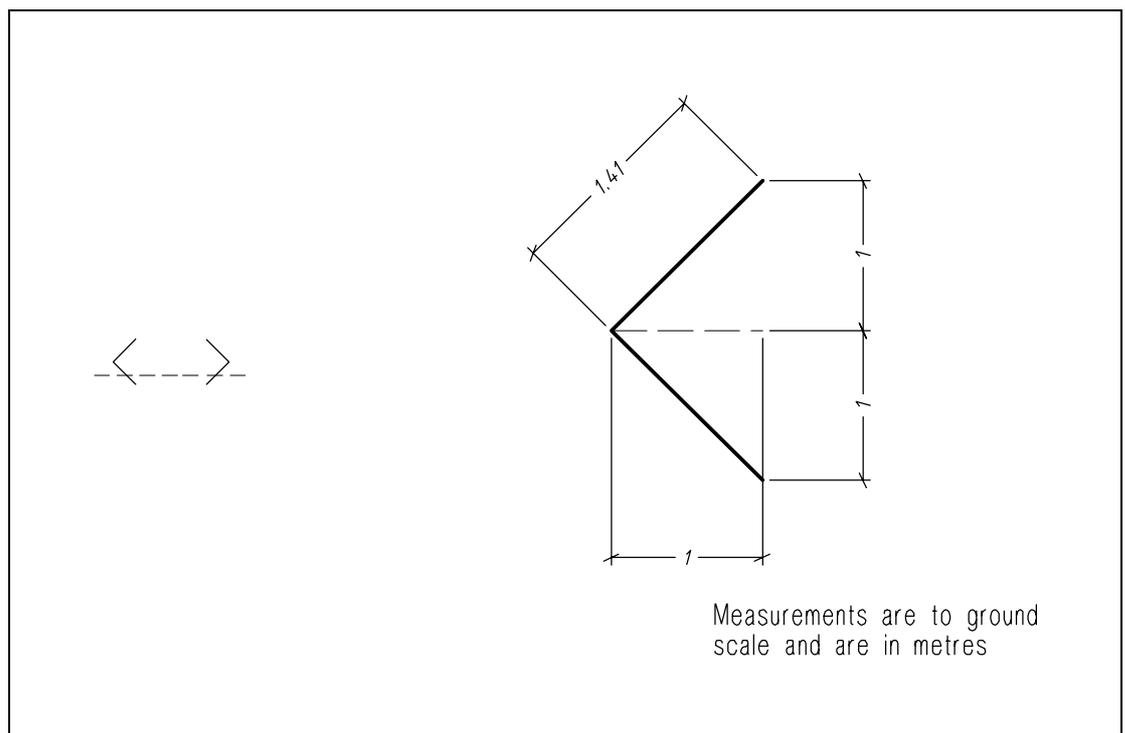


Figure 3-4 SEWOFF dimensions

Difference between property service branches and oblique branches

The cell SEWPT must be placed on the free end of all property service branch pipes. Oblique branches (dummy branches) must not have this cell. Property service branches have their attributes recorded in the database whereas OB's do not.

Property Service Branch end of pipe data information

The surface level, invert level and length of pipe from the sewer to the end of the property service branch is to be placed in the middle of each property. This is placed at right angles to the sewer as a triple line of text, in order, as set out in Figure 3-4 below.

34.44	Surface (NSL) Level
32.95	Invert Level
1.34	Length to end of pipe

Figure 3-4 Placement of PS branch end of pipe data

Property service information is covered more extensively in **Chapter 10**.

Sewerage cells

Cells are standard symbols used to represent particular elements.

Table 3-24 is a graphical listing of all cells relating to sewerage access chambers.

Table 3-25 is a graphical listing of cells other than those relating to access chambers.

CELL	CELL NAME	DESCRIPTION
	MH	CIRCULAR ACCESS CHAMBER
	SQMH	SQUARE ACCESS CHAMBER
	RECMH	RECTANGULAR ACCESS CHAMBER
	GCMH	GAS CHECK CHAMBER
	CHMH	CHAMBERED ACCESS CHAMBER
	IS	INSPECTION SHAFT
	ASHAFT	TRUNK SEWER ACCESS SHAFT
	ERS	EMERGENCY RELIEF STRUCTURE
	BLOV	BLOWER HOUSE VENT
	VENT	VENT
	EP	END OF PIPE
	JUNK	PIPE JUNCTION
	MAJPS#	MAJOR PUMPING STATION
	MINPS	MINOR PUMPING STATION
	CAP#	ACCESS CHAMBER NUMBER CAPSULE

Table 3-24 Cells used in sewerage data capture - access chambers and capsule

Note: Cells marked with a # must be scaled to actual or required size

CELL	CELL NAME	DESCRIPTION
>	FLOW	FLOW ARROW
×	ABAN	ABANDONED SEWER
	CANDS	CUT AND SEALED (MARKER)
←	ARCS	CUT AND SEALED (ARROW)
	ECC	ELECTRICAL CONTROL CABINET
	VALPIT	VALVE PIT
	PP #	PURIFICATION PLANT
	TP	CURVED SEWER TANGENT POINT
	COG	CHANGE OF GRADE
°	SEWPT	INSPECTION OPENING AT END OF BRANCH
-	JORED	JUMP UP & REDUCED SYMBOL
	SSHED	SEWER SHED
< >	SEWOFF	SEWER OFFSET DIMENSION POINTERS

Table 3-25 Cells used in sewerage data capture - not related to access chambers

Note: Cells marked with a # must be scaled to actual or required size

Cells marked with a * contain an enter data field and must be dropped after placing.

3 Graphical Specifications

Chapter 4 Placement of Data in Graphics Files

This chapter provides guidelines for the placement of pipework, access chambers and associated features and notation in sewerage graphics files.

Placement of data with regard to file boundaries

The geographical file boundaries of the Water Company are defined in the municipal index files. Sewer pipes, access chambers and associated data and notation must be placed with regard to the file boundaries, as shown in Figure 4-1.

Sewers which cross file boundaries:

- must not be broken at the file boundary. They must be placed as continuous lines, from access chamber to access chamber across the boundary.
- must be stored in the graphics file in which the majority of the sewer pipe section resides.

Access chambers on sewers which cross file boundaries must be stored in the graphics file in which they are geographically located, except when they terminate the upstream end of a sewer line. These access chambers must be stored in the same graphics file as the sewer pipe section.

Property service branches, invert levels, notation, chainages, flow arrows, etc. must be stored in the same graphics file as the sewer pipe section to which they refer.

Ote: No elements or text must be duplicated when placing data across file boundaries.

Edgematching to existing data

Edgematching is the process of joining new sewer pipe sections to existing graphics data. Edgematching is required when digitising across file boundaries, or when joining to existing data within a file supplied by the Water Company. When edgematching, ensure that:

- + no elements or text are duplicated,
- sewer lines intersect exactly at the centre of access chambers,

- t the placement of data other than sewer lines does not clash with existing data. Text, flow arrows and other data must not overwrite existing data.

Inaccuracies in edge matching

Where new sewer information does not exactly edge match with existing graphics data, that the Water Company has supplied, the following is to be observed:

1. If the mismatch is less than 0.5 metre (ground scale) the new graphics are to be modified to the existing graphics supplied by the Water Company.

or

2. If the mismatch is greater than or equal to 0.5 metre (ground scale) the new graphics are to be left in their correct position and an edgematching symbol is to be placed. (to the correct specifications) This is to be drawn to the Water Company's attention by the Consultant in the documentation sunnlid with the rob.

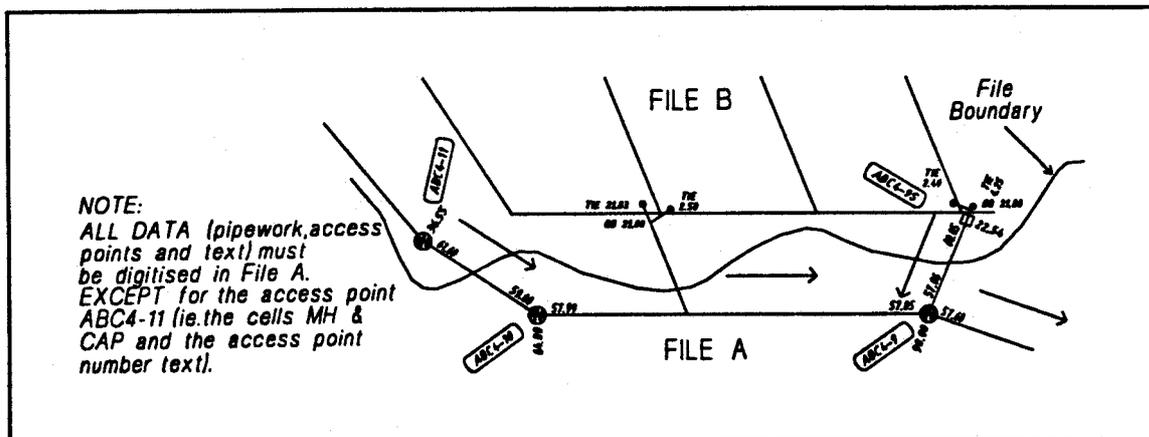


Figure 4-1 Placement of data with regard to file boundaries

Placement of additional branches on existing sewers

Additions of further property service branches made by consultants to existing sewers may be supplied to the Water Company in field note form or, if the data is being supplied in "Linked DGN" format, in digital form with the relative database information. Refer to the procedure set out in Chapter 9 for full details.

Placement of text and flow data

Text must always be placed so that it does not clash with cadastral information, including:

- title/property boundaries
- t easements and associated text
- t road boundaries
- road names
- property lot numbers
- street numbers

Text placement priorities

These guidelines must be observed when placing text for sewerage conduits and structures.

The following list indicates the order of importance for the placement of each item of text. The priorities must be applied whenever space is limited.

1. Sewer inverts - as close as practical to sewer (above or below) and as near M.H./I.S. as possible, remaining clear of easements and title lines.
2. Branch & M.H./I.S. chainages - on the opposite side of the sewer to the branch and either side for M.H./I. S. remaining clear of easements and title lines.
3. **Flow** arrow - above sewer (where possible) at specified offset from sewer, remaining clear of easements, title lines, chainages, etc.
4. Branch information - to be located in approximately the centre of the property. For large allotments, reserves, etc. locate close to branch.
5. T_ - between branch and relevant title line (where possible), clear of easements, title lines, chainages, etc.
6. P.S. Numbers - parallel to front boundary, between boundary and lot number.

4 Placement of Data in Graphics Files

7. Sewer offsets - within the property that the sewer is located in (where possible), clear of easements, title lines, chainages, etc.
8. Access chamber capsules
9. Notation associated with: - treatment plants - named sewers - abandoned sewers, cut and sealing's - purchased sewers - curved sewers - changes of grade - oblique branches, jump ups, bends - boundary traps, combined drains

Placement of text in areas of limited space

Text must not clash with associated sewerage data. Where space is limited, and after referring to the priorities listed in the previous section, one or more of the following alternatives may be used:

- The invert levels of a sewer pipe section can be grouped with the associated flow arrow. The grouped data should then be placed above the sewer pipe section or in close proximity to pipe section if space is limited.
Data can be placed outside the information boundary. The information boundaries of a sewer pipe section are defined by an imaginary line perpendicular to the sewer pipe section and projected from each access chamber.
- * Use text arrows to associate data with the appropriate pipe section.
- Text and flow arrows may be scaled (as a last resort) down by a factor of 0.8.

Placement of text arrows

Text arrows are used to associate text and/or flow arrows with sewer pipe sections. They may only be used when space is extremely limited or where the association between a sewer pipe section and related data is unclear, as shown in Figure 4-2

Place the text arrow so that the arrow head touches the related sewer pipe section.

Text arrows:

- + must not cross a sewer pipe,
- i must not be used when there is sufficient space to place the text and flow arrows in the usual manner,
- f must not be placed at right angles to sewer pipe sections, must not be used for access chamber names or chainages,
- t may cross titles, may be straight or bent.

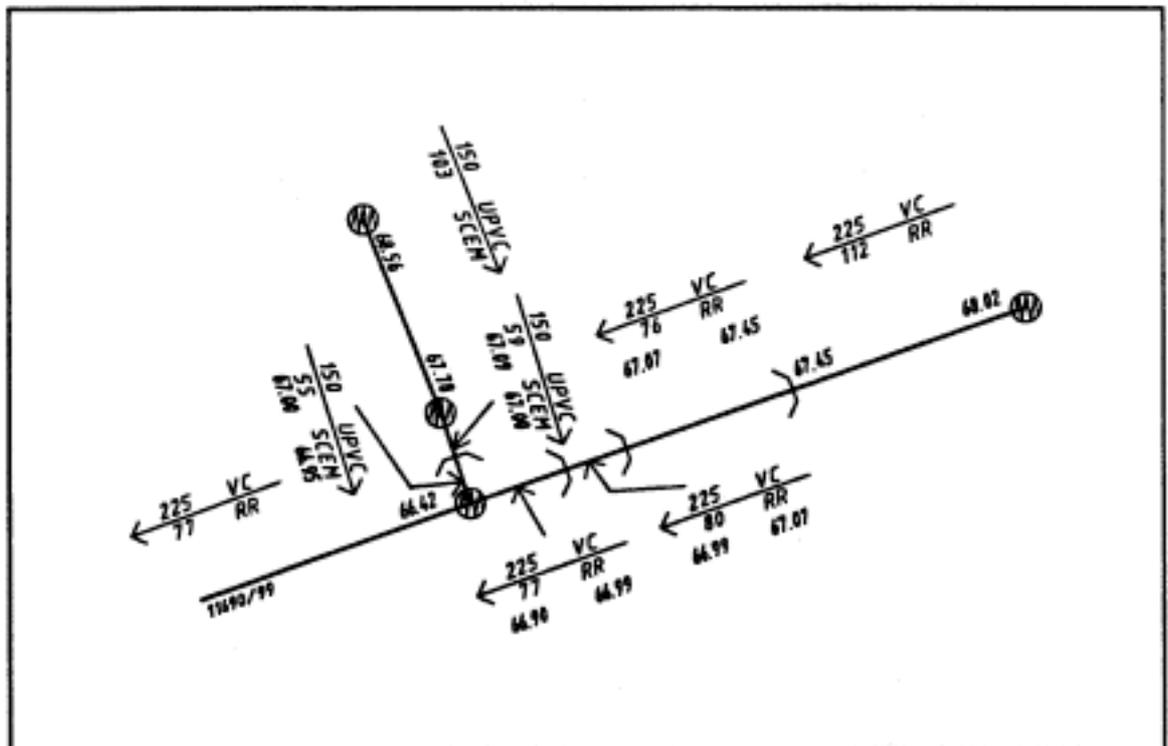


Figure 4-2 Placement of grouped flow data and use of text arrow

Chapter 5

Sewerage Treatment Plants

This chapter covers the database and graphical requirements for the input of sewerage treatment plants. In this document the terms "sewerage treatment plant" and "sewerage purification plant" refer to the same entity.

Database

Sewerage Treatment Plants (entity 301) are located at the top of the database hierarchy. Entity 301 owns all other entities in the database either directly or indirectly.

Sewerage treatment plants have no graphical elements that are linked to the database. All elements within the treatment plant complex downstream of the entry access chambers) are graphical representations only.

Graphics

Name, number and type

The name of the treatment plant is determined from the Regional Asset areas and will be provided to consultants upon request and should be displayed in graphics as listed in Code List 329.

The name should be placed in upper case at an active angle of zero degrees (horizontally).

The number of the treatment plant is determined from Code List 330.

The type of plant is determined from the letter prefix of the number, that is:

M Major Purification Plant

R Regional Purification Plant

N Neighbourhood Purification Plant

Note: Designate the plant as a purification plant unless specified as a treatment plant in the code lists.

Symbol

The cell PP must be placed without database linkage at a scale of 10, or less if necessary, to fit within the complex boundaries. It must not be placed as an access chamber at the point of entry to the treatment plant.

Text and symbol placement

The name, number and type must appear once within the boundaries of the plant. For example, the text associated with the Barry Road purification plant would be placed as shown in Figure 5-1.

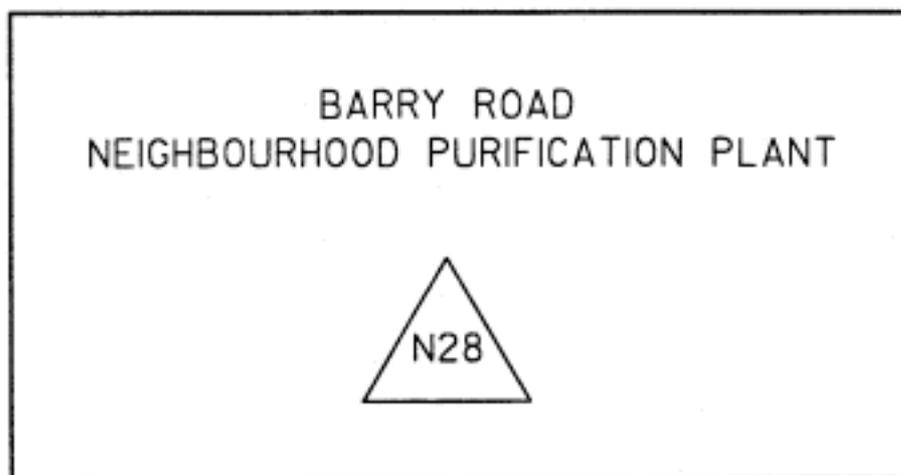


Figure S-1 Treatment Plant Text and symbol placement

Structures

Structures may include

buildings

- equipment, for example, tanks and clarifiers
- in-ground structures, for example, sedimentation ponds

it may be necessary to contact the Water Company for additional details of structures and pipework.

Internal pipework and access chambers

Internal pipework refers to all pipes downstream of the access chamber at the point of entry to the complex. This includes the outfall pipe to the outlet drain. Standard cells may be placed without database attributes to represent pipeline structures within the plant. The cells should be scaled as necessary. Lines, line strings, arcs, ellipses and other element types may also be used.

Labels, notation and pipeline text

Treatment plant labels include notation which identifies buildings, equipment and other in-ground structures. Treatment plant pipeline notation includes: pipe size

grade

material and jointing

- pipe purpose, for example, "Effluent Line"

Flow arrows and associated data should only be included when there is sufficient information to determine the direction of flow. When placing flow arrows particular attention should be given to pipes designated as rising mains.

Any available data (for example, pipe size or material) should be placed along the pipe, either above or below.

Invert levels of internal pipework must be input as miscellaneous invert levels.

Numbering of access chambers at point of entry to treatment plants

Refer to *Numbering access chamber at point of entry to treatment plants in Chapter 7 (Access chambers)*

Chapter 6

Sewer Projects

This chapter describes the database and graphical requirements for the input of sewer projects.

Database

Sewer projects have no graphical element that is linked to the database.

Ownership of sewer projects

Sewer Projects (entity 303) are owned by the Sewerage Treatment Plant entity (entity 301). Together these entities own all other entities in the sewerage database, either directly or indirectly.

The database entry of sewer projects must conform to the following guidelines:

- + The sewer name (303.10) for a named sewer must be a legitimate entry from Code List 301.
- + The section number (303.14) for a named sewer must be entered as supplied by the Authority or as the default value of "I".
- + The reticulation area number (303.15) must be prefixed with "RA". For example, RA1234 would apply to reticulation area number 1234.
- + Sewer renewal numbers for sewer replacements, must also be entered as attribute 303.15, but must be prefixed with the text "SR".
- + The reticulation extension number (303.16) must not be prefixed by any text. Enter the two numbers separated by a slash. For example, 122/90 would apply

Ownership of sewer projects divided by treatment plant catchment boundaries

Due to the structure of the database, sewer projects can only be owned by a single treatment plant. In rare cases, however, a reticulation area or reticulation extension may straddle a treatment plant catchment boundary. In these cases, the reticulation area or extension project must be divided into the appropriate number of sections, as follows:

Determine which is the smaller portion of the project and assign it the suffix "*" in the database.

For example, if 123/90 flows to two treatment plants, the smaller portion of the project is assigned the reticulation extension number 123/90*, while the larger portion remains as 123/90.

In the rare case of a named sewer that outlets to multiple treatment plants (eg. via a diversion), the project can be entered in the database by adding a suffix "*" to one of section numbers, for example, 1*.

Named sewers

Named sewers, as detailed in Code List 301, are titled as trunk, main, branch, relieving or intercepting sewers. Consequently, they generally have pipe sizes 300 mm or greater.

Note: Named sewers with a pipe size of less than 300 mm diem. should be entered in the usual manner. The graphic symbology of these sewers is assigned on the basis of pipe size.

A section number is usually assigned to named sewers as either a number or a number and a letter. This number is obtained from the Water Company.

If more than one section of a named sewer is constructed as part of a single project, include both section numbers in the database. For example, Section 3 and 4 would be entered as "3&4".

Reticulation sewers

Reticulation sewers are pipes of less than 300 mm diem., usually 150 mm or 225 mm. Smaller diem. pipes that are functioning as part of sewerage system (usually with an access chamber at the upstream end) are also considered to be reticulation sewers.

Reticulation extension sewer projects must only contain reticulation sewers.

Mixed sewer projects

It is common for a project to consist of both a named sewer and either a reticulation area or extension. In these cases individual sewers must be assigned to the appropriate project. Assignment is generally based on pipe size:

- + All pipes 300 mm diem. and above are assigned to the named sewer project.
- + All pipes less than 300 mm diem. are assigned to either the reticulation area or reticulation extension project.

For example, if BANKSIA STREET BRANCH SEWER SECTION 5 is constructed as part of RE123/90 then all sewers 300mm diameter and greater must be assigned ownership of the sewer project " Banksia Street Branch Sewer Section 5" . All sewers less than 300mm diameter will be owned by reticulation extension 123/90.

For " linked" .DGN jobs all can be included in one batch of data.

For " unlinked" .DGN and .DXF jobs the different projects must be supplied in separate batches, one per project.

Named sewers and section number

- + **All** sewers of 300 mm diem. and greater must be named. If a name cannot be determined from plans or field notes, contact the Water Company for assistance.
- + Name sewers must not be assigned the reticulation area or extension number of reticulation sewers constructed as part of the same works.
- + If a named sewer has not been allocated a section number, the section number (303.14) must be entered as 1. Do not enter as 0 or a blank. In these cases do not include the section number in graphics.
- + Any confusion about the above can be clarified by the Water Company.

Reticulation sewers

All sewers less than 300 mm diem. must be assigned a reticulation area or extension number. If a number cannot be determined, contact the Water Company for assistance.

Graphics

The following standards apply when inputting sewer project notation.

Placement of named sewer notation

Sewer names and section numbers must be placed in the following manner:

Notation should, where possible:

- be placed above and parallel to the sewer line with individual text strings for each word,
- be evenly spaced over a maximum distance of 500 metres, as shown in Figure 6-1.
- graphically define the extent of each portion of sewer assigned to each section number.
- be placed at least once on each portion of sewer that has been assigned a different section number. That is, the entire name must be repeated with each new section number,
- be placed at least once per graphics file, where space permits,
- be placed in accordance with standard drafting practice (ie -orientation of text to be read from the bottom of a plan).

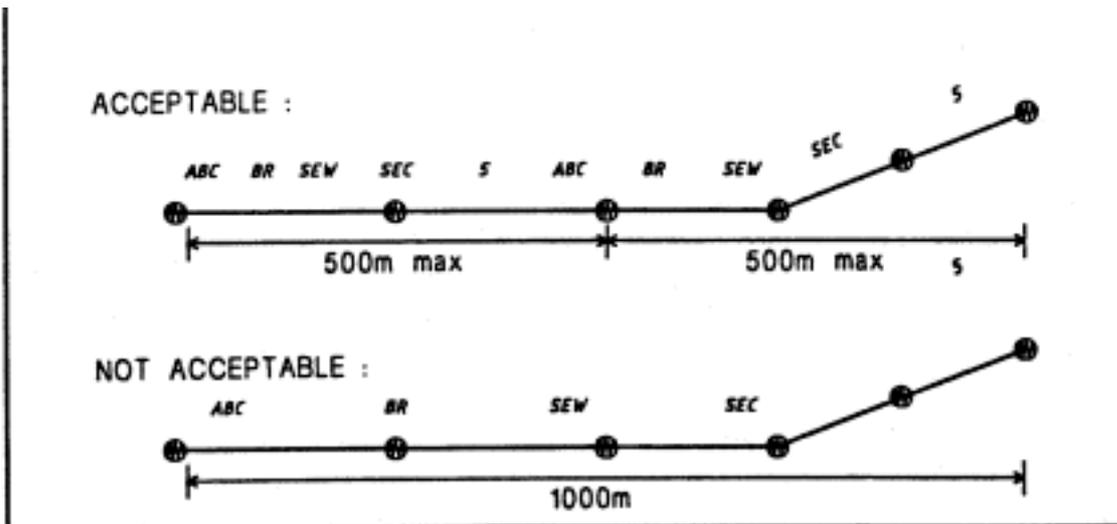


Figure 6-1 Placement of named sewer notation

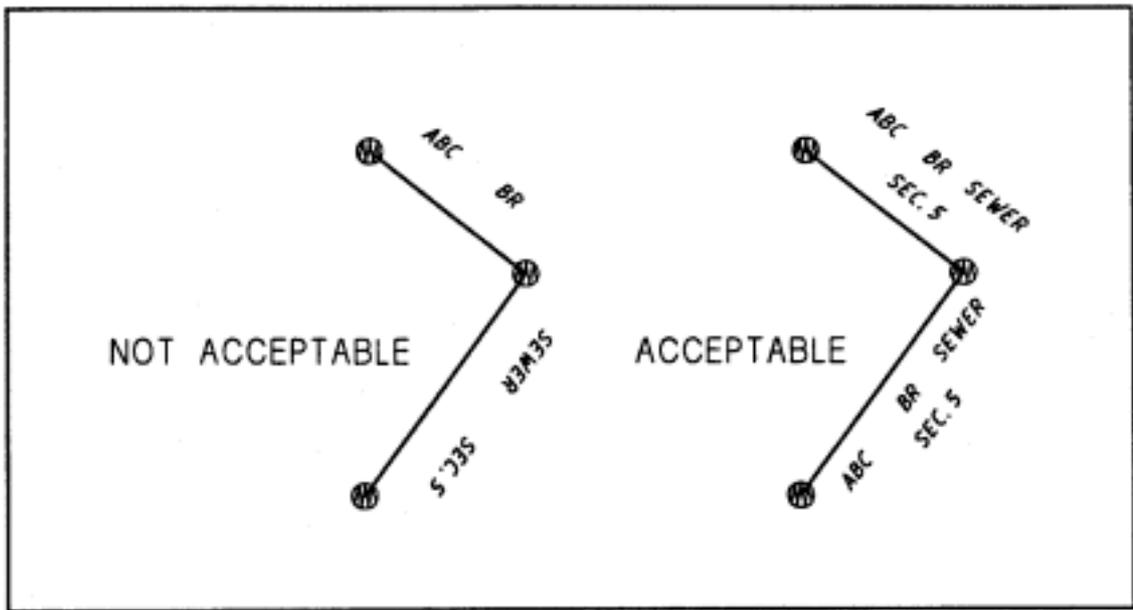


Figure 6-2 Placement of named sewer notation

Do not place the entire sewer name as a single text string, unless space is limited.

Notation must not be placed as multiple lines of text, unless space is extremely limited. See Figure 6-3

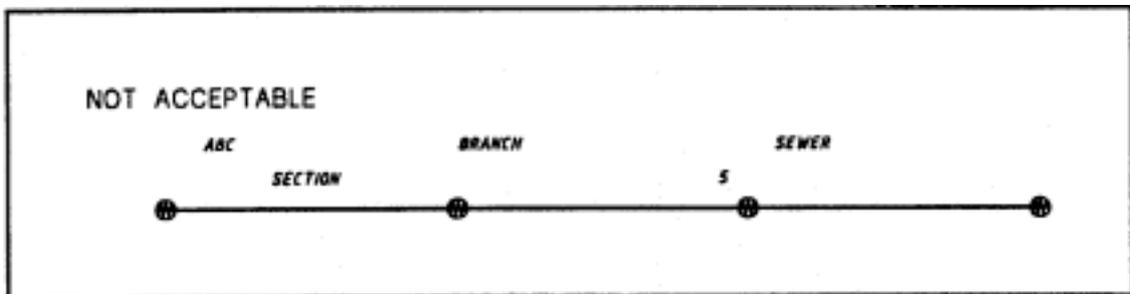


Figure 6-3 Unacceptable placement of named sewer notation

It is preferable for notation to appear above the sewer line. It should not be placed both above and below the sewer.

It is preferable for notation to be placed between the alignment of the flow arrows and other information, for example, branch ties, invert levels, and access chamber chainages. It should not be placed above, below or alongside flow arrows, or directly opposite access chambers. See Figure 6-4.

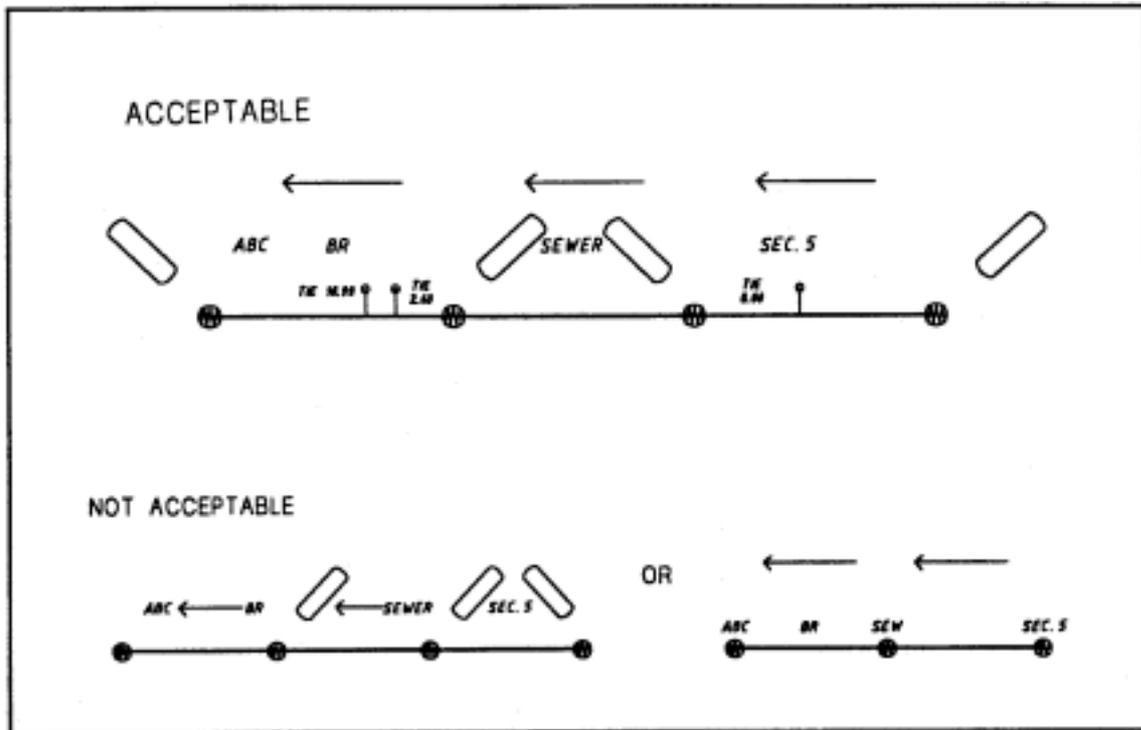


Figure 6-4 Placement of named sewer notation with respect to other data

Abbreviation of named sewer notation

The name component of a sewer name and section number must not be abbreviated. Where space is limited, associated notation may be abbreviated as shown in Table 6-1.

--

Table 6-1 Abbreviation of sewer project notation

All named sewer notation must appear in upper case.

- t If the named sewer does not have an assigned section number, do not include the section notation.
- v Road types associated with named sewers may be abbreviated using standard abbreviations as set out in the Code List 104. For example, the abbreviation for ROAD is RD

This chapter describes the requirements for the graphical and database input of access chambers. Refer to Table 3-23 for a full list of sewer access chambers.

The symbology of all access chambers, except pumping station access chambers, is based on the size of the downstream sewer pipe section.

Access chambers are used to define sewer pipe sections. They must be placed at the end of each sewer pipe section and have database attributes.

End of pipe and pipe junctions are referred to as access chambers for the purpose of digital input.

Orientation of access chambers

All non-circular access chambers must be placed either along the alignment of the downstream sewer pipe section or as indicated on the plan or field notes.

Figure 7-1 shows the placement of non-circular access chambers.

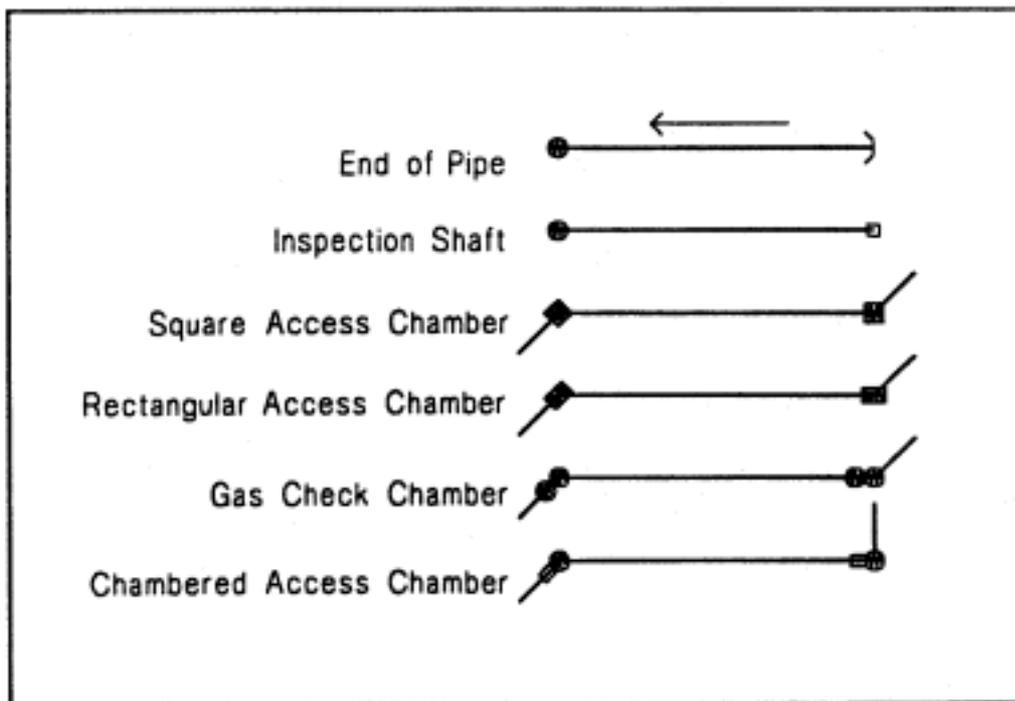


Figure 7-1 Orientation of non-circular access chambers

Database

The Access chamber entity (308) is owned by the Sewer Project entity (303). The Access chamber entity owns the Sewerage Pumping Station entity and the Emergency Relief Structure entity.

Access chambers are identified in the database by a unique access chamber number.

Refer to the *Database schedules* in *Chapter 2* for a complete list of access chamber attributes.

Default values for non-precast access chambers

Default values for non-precast access chambers vary depending on the access chamber type.

Pipe functions and end of pipes

Attribute Name	Attribute Number	Default Value	From Code List	Description
structure type	308.12	42	307	- pipe junction
		34		- end of pipe (no access chamber)
		45		- end of pipe (reducer)
structure shape	308.14	4	309	not applicable
structure size	308.16	4	41	not applicable
structure cover level	308.18		-	natural surface level
structure material	308.24	4	43	not applicable
base construction method	308.26	4	53	not applicable
wall thickness	308.28		-	thickness of pipe
wall construction method	308.29	4	53	not applicable
wall joint type	308.31	4	49	not applicable
wall joint packing	308.33	4	51	not applicable

Table 7-1 Default values for pipe junctions and end of

Inspection shafts				
Attribute Name	Attribute Number	Default Value	From ,Code :List	Description
structure type	308.12	33 29	307	- at end of pipe - over straight through pipe
structure shape	308.14	6	309	circular
structure size	308.16		41	same as pipe diameter
structure cover level	308.18		-	as measured in field
structure material	308.24		43	as per downstream pipe
base construction method	308.26	4	53	not applicable
wall thickness	308.28		-	thickness of pipe
wall construction method	308.29	4	53	not applicable
wall joint type	308.31	4	59	not applicable
wall joint packing	308.33	4	51	not applicable

Table 7-2 Default values for inspection shafts

Vents as Access chambers

A vent may either terminate a normal sewer pipe section or be located at a sewer pipe junction or bend.

Such vents must be placed using the same method as other access chambers, with access chamber numbers and database attributes. For a vent access chamber the suffix number must be followed with a vent. Figure 7-2 shows the graphical representation of these vents.

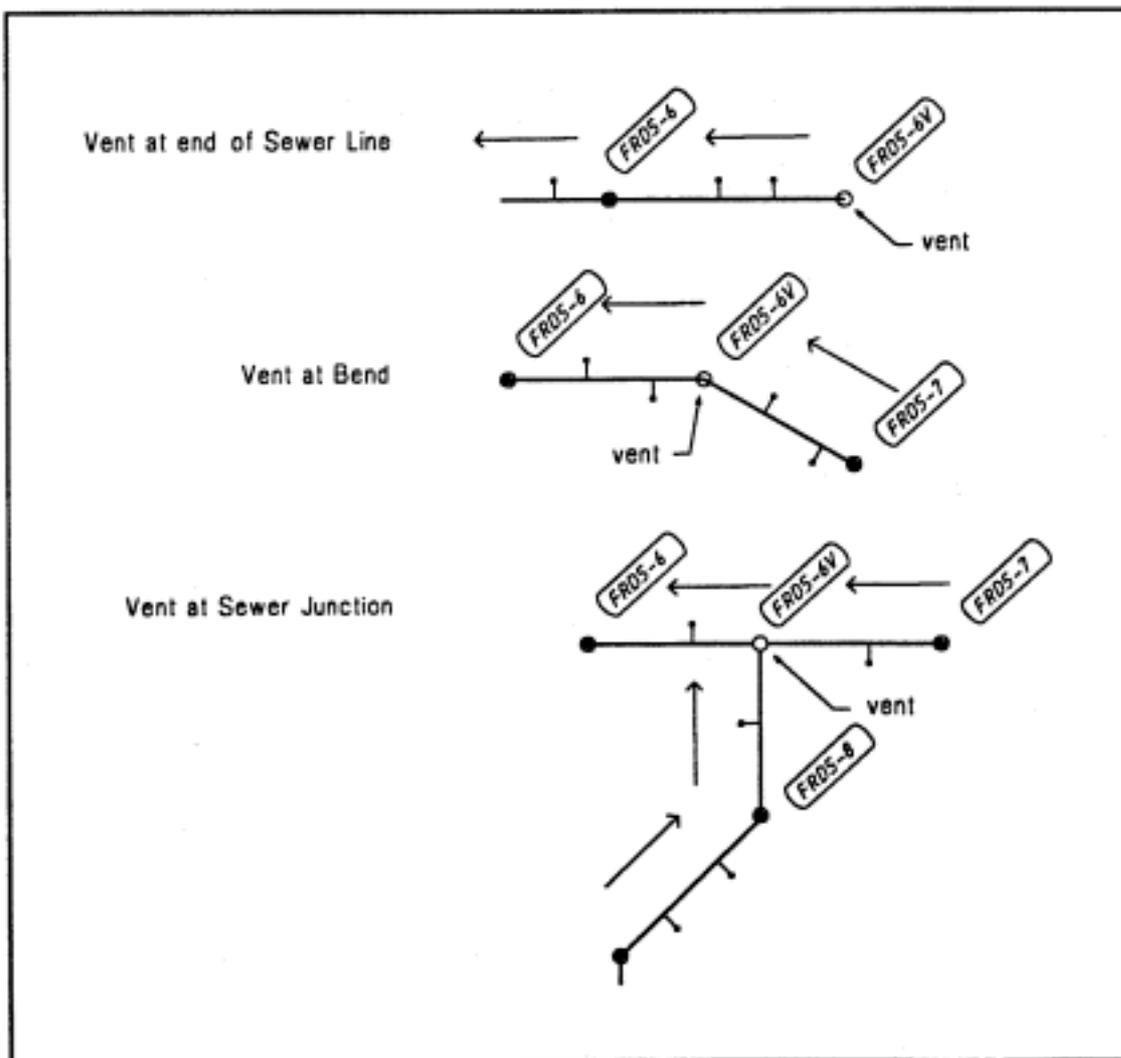


Figure 7-2 Vents as Access chambers

Gas check chambers

Gas check chambers exist in several different configurations.

Note: The conduit length (305.18) of the sewer pipe section immediately downstream of double chambered gas check chambers must be entered as the distance to the centre of the upstream chamber. The grade of the downstream sewer may be calculated using this length and not the distance to the centre of the downstream chamber.

Double chambered - circular

The double chambered cell (GCMH) must be placed and orientated with the cell origin at the centre of the upstream chamber, as shown in Figure 7-3.

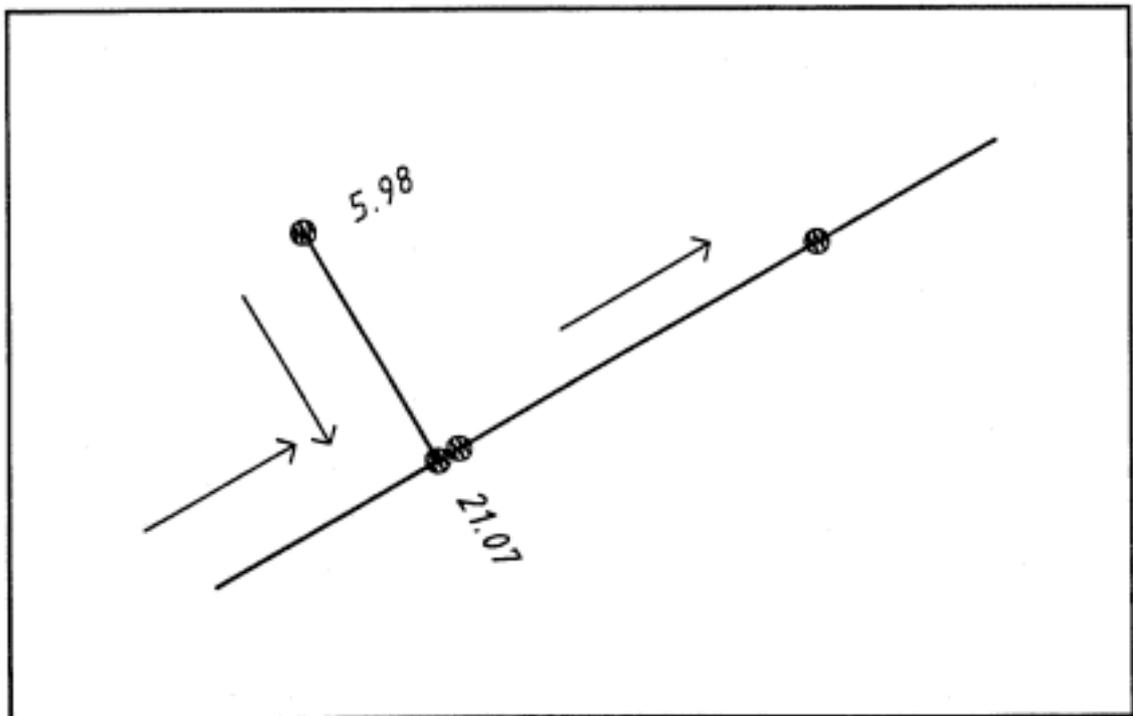


Figure 7-3 Double chambered circular gas check chamber

The database entries for a double circular gas check chamber are:

- access chamber structure type = gas check access
- chamber structure shape = double circular
-

Double chambered - rectangular or square

The placement procedure is as follows:

- Place the upstream access chamber with a rectangular or square access chamber cell (RECMH or SQMH), at the junction of the sewer pipe sections. The upstream access chamber must be input with the database attributes.
- Place the text "Gas Check" in graphics using miscellaneous sewer and/or access chamber symbology. Align the text with the access chamber capsule.
- t Place an additional non database access chamber cell (RECMH or SQMH) with symbology as required, immediately downstream of the first chamber. The chambers must not overlap. No access chamber number is required for the second chamber.

Figure 7-4 shows a double chambered rectangular gas check chamber.

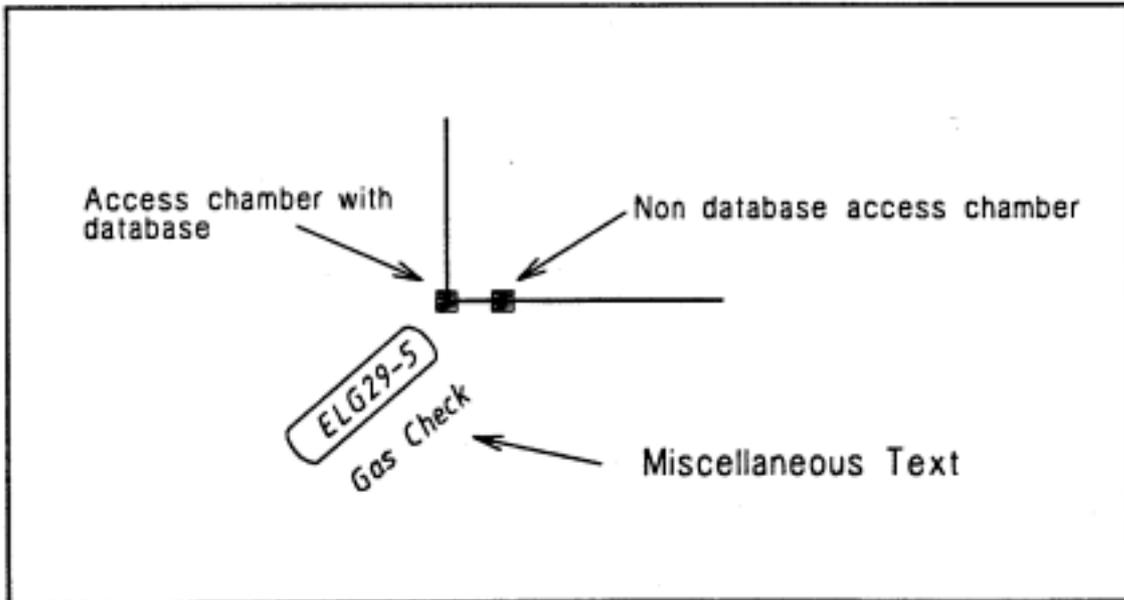


Figure 7-4 Double chambered rectangular or square gas check chamber

The database entries for a double chambered rectangular or square gas check chamber are:

- access chamber structure type = gas check
- access chamber structure shape = double rectangular or double square
- access chamber structure size = size of the largest chamber

i

Single chambered - circular, rectangular or square

The placement procedure is as follows:

- t Place the appropriate access chamber cell.
- Place the text "Gas Check" in graphics using miscellaneous sewer and/or access chamber symbology. Align the text with the access chamber capsule as shown in Figure 7.5

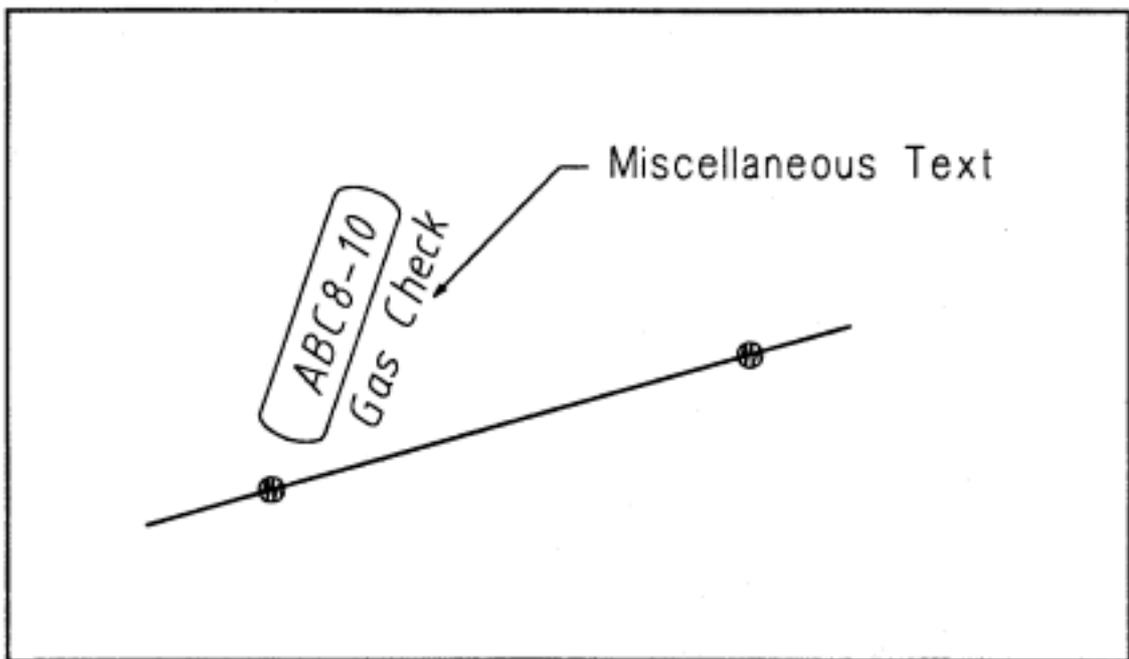


Figure 7-5 Single chambered gas check chamber

The database entries for a single chambered gas check chamber are:

- access chamber structure type = gas check
- access chamber structure shape = circular, square or rectangular
- access chamber structure size = size of the chamber

End of pipe access chambers

There are three common ways in which end of pipe access chambers may be entered.

An end of pipe access chamber placed as a blank end or a cap. Refer to Figure 7-6. In the database, access chamber structure type = end of pipe (no access chamber).

Walk-in access chambers

Walk-in access chambers may be located adjacent to access chambers on sewer pipes. They are used when direct access through a normal access chamber is not possible.

The placement procedure for the walk-in access chamber and the conduit which connects it to the access chamber on the sewer line is as follows:

Place the appropriate access chamber cell. No database attributes are necessary.

f Place the conduit between the numbered access chamber and the walk-in access chamber using Table Construction Alignment symbology. No database attributes are necessary.

- Place the notation " Walk-in Access chamber" using miscellaneous sewer and/or access chamber symbology.

Place the chainage of the walk-in access chamber using miscellaneous chainage symbology.

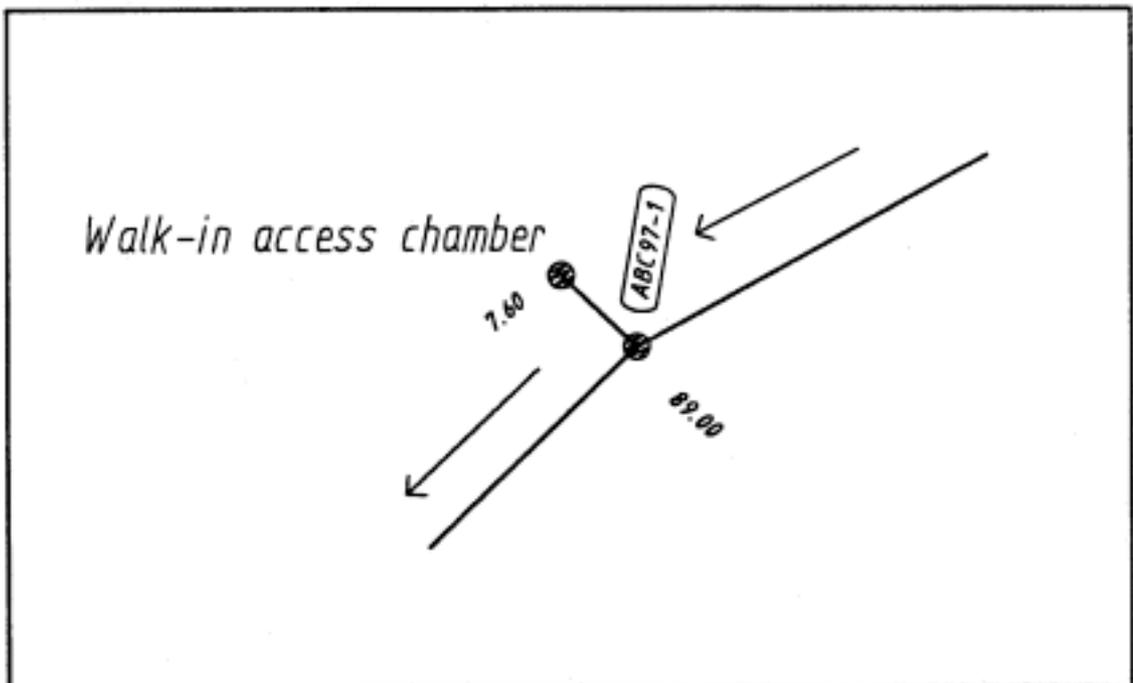


Figure 7-7 Walk-in access chamber

Access chamber chainages

The access chamber chainage is the distance between one numbered access chamber and the next numbered access chamber immediately downstream. The access chamber chainage is also referred to as the conduit length because it defines the length of a sewer pipe section.

Chainages for numbered access chambers are calculated by subtracting the downstream chainage from the upstream chainage, as shown in Figure 7-8.

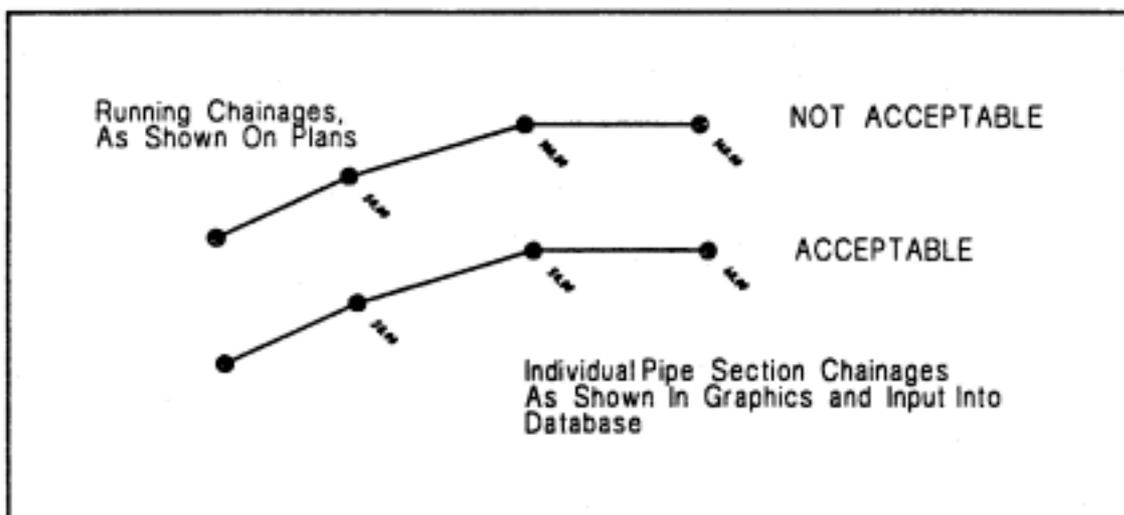


Figure 7-8 Converting running chainages to individual pipe section chainages

Note that

Chainages of sewer pipe sections must be entered in graphics and the database.

- The chainage is used to calculate the grade of pipe section (except in the case of rising mains and siphons).
- It is not necessary to graphically display datum chainages of 0.00

Chainages are measured as from the centre of an access chamber to the centre of another.

Graphical input of running chainages

Running chainages based on the numbered access chamber immediately downstream must only be displayed in graphics for the following features, as shown in Figure 7-9.

- tangent points of horizontal and vertical curves
- intermediate invert levels along rising mains
- intermediate vents and inspection shafts
- end of pipe access chambers along independent sewers

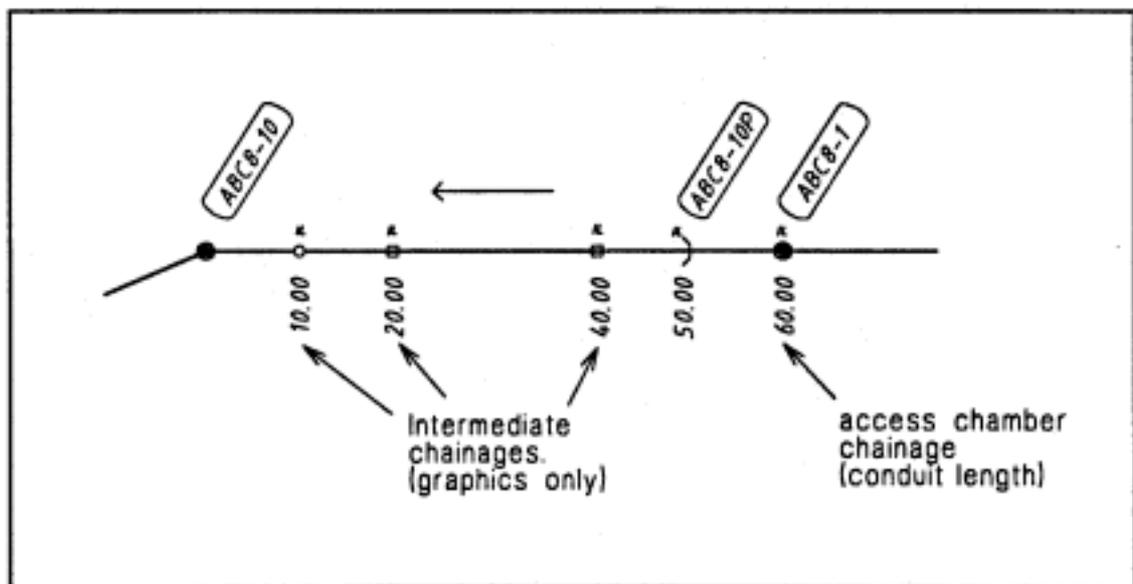


Figure 7-9 Running chainages

Placement of access chamber chainages

The chainage must be placed in graphics opposite the access chamber at right angles to downstream sewer pipe section, as shown in Figure 7-10. Where possible, chainages on a series of sewer pipe sections should be placed on the same side of the sewer.

The chainage of an access chamber located at the intersection of several sewer lines should be placed at an angle that indicates the downstream pipe section to which it refers, as shown in Figure 7-10.

In the case of sewer sheds and emergency relief structures place two chainages adjacent to the same access chamber. These chainages must be positioned that they clearly indicate the downstream pipe section to which they are referring

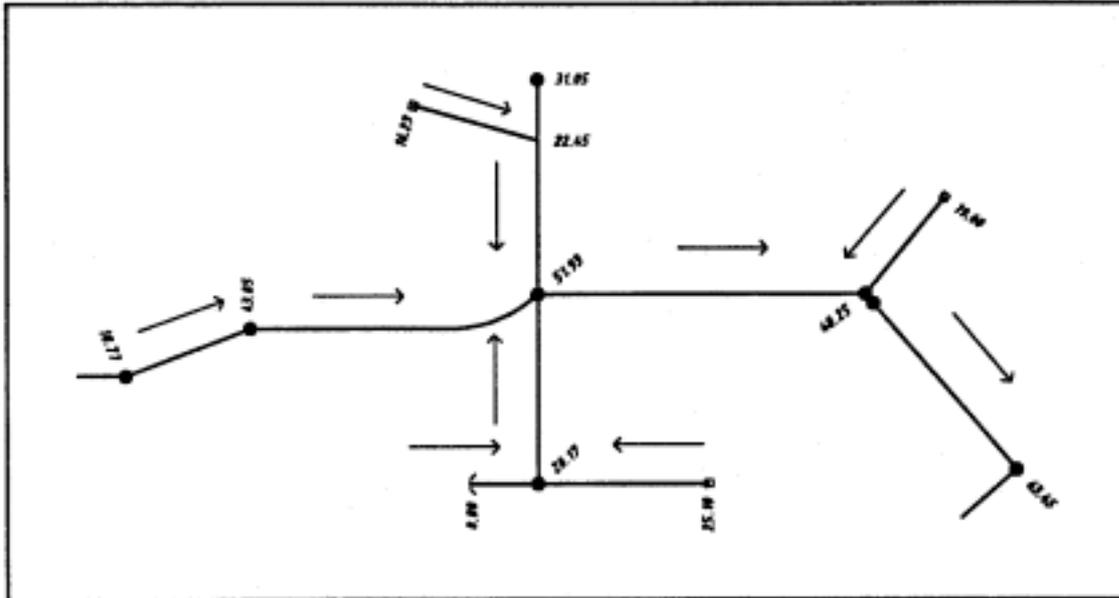


Figure 7-10 Placement of Access chamber Chainages

Access chamber numbering

Note: For a range of access chamber numbers for each job, consultants must contact the job's design engineers for the numbers and verify these with the Water Company.

All access chambers other than intermediate vents, intermediate inspection shafts and minor vents must be numbered according to the conventions outlined below:

Access chamber numbers must be unique.

- All access chamber numbers must be entered in the database, except for those on private sewers.
- Access chambers should always be numbered so that the numbers increase from downstream to upstream.
- Access chambers numbers are usually made up of
 - a prefix of three letters and up to three numerals.
 - a suffix of up to eight characters (numerals and letters).

The access chamber number must not exceed 13 characters.

Access chamber numbers are not to include the letter D after suffix. This D is generally placed on a design plan to signify a "drop structure" in an access chamber.

When numbering access chambers along a sewer:

The three letter prefix of the upstream access chamber number should usually equal the three letter prefix of the downstream access chamber number. For example:

ABC65 will be downstream from ABC66.

- The suffix of an upstream access chamber number will usually be either:
 - a number greater than the suffix of the downstream access chamber number, for example:

ABC65-9 will be downstream from ABC65-10.

- equal to the suffix of the downstream access chamber number plus a designated suffix description, for example:
 - ABC65A will be downstream from ABC65B
 - ABC65-90 will be downstream from ABC65-90P

For a listing of access chamber types refer to Code List 307/308.

Access chamber descriptions

Several types of access chambers require a single letter description to be added to the end of the access chamber number.

The descriptive characters must be assigned in the alphabetic order listed below.

An access chamber number may contain a series of descriptive characters.

- Inspection shafts must be labelled with the characters, S, T, or U.
- + Vents must be labelled with the characters, V, W, X, Y, or Z.
- End of pipes must be labelled with the characters, P, Q, or R
- Pipe junctions must be labelled with the characters, J, K, L, M, or N.
- Additional access chambers, that do not have an allocated number, must be labelled with the characters, A, B, C, D, E, F, G, or H.
- Access chambers that are constructed by "cutting into" an existing sewer will take the sewers downstream access chamber number and have an A, B, C or D etc added to it's suffix. For example

A new access chamber constructed on an existing sewer between ABC65-90 and ABC65-91 would have a number ABC65-90A

Numbering of access chambers along named sewers

This chapter does not apply to sewerage pumping station access chambers, ERS access chambers on named sewers or ERS conduits.

Access chambers on named sewers are assigned a prefix of three letters, a number and where necessary, a description. The letters are derived from Code List 302 and based on the sewer name.

For example, if the access chambers to be numbered are located along the Croydon Main Sewer:

* 209 is the code list entry number in Code List 301 for the Croydon Main Sewer.

"CRY" is the entry in Code List 302 corresponding to code list entry number 209.

Therefore all access chambers on the Croydon Main Sewer are prefixed with the letters CRY.

The remainder of the access chamber numbers will consist of either a number, a description, or a combination of both. For example:

CRY1 would be the first access chamber on the Croydon Main Sewer, upstream of its outlet.

CRYIP would be the first end of pipe upstream of access chamber number CRY 1.

* CRY IQ would be the second end of pipe upstream of CRY I.

CRY5V would be the first vent upstream of CRY5.

Numbering of access chambers along reticulation sewers

This chapter applies to unnamed access chambers along sewers less than 300mm in diameter. It does not apply to access chambers in sewerage pumping station catchments or along ERS conduits.

The number of an access chamber on a reticulation sewer consists of two parts separated by a dash (-):

- The first part takes the number of the access chamber on the named sewer to which it flows.
- The second part is assigned as an incrementing number, a descriptive character, or both.

For example, if a particular reticulation sewer flows to access chamber number CRY5 on the Croydon Main Sewer, then the first three access chambers along the reticulation sewer would be numbered CRY5-1, CRY5-2, CRY5-3.

7 Access Points

For example:

CRY5-1 is the first access chamber on a reticulation sewer upstream from CRY5 on the named sewer line,

CRY5-2 is the second access chamber on a reticulation sewer . upstream from

CRY5 on the named sewer line, CRY5-2S is the first inspection shaft upstream of

CRY5-2, * CRY5-2T is the second inspection shaft upstream of CRY5-2,

f CRY5A-V is a vent at the end of reticulation sewer immediately upstream of CRY5A on the named sewer line,

CRY5-A is an additional access chamber on a reticulated sewer immediately upstream of CRY5 on the named sewer line and downstream from CRY5-1,

t CRY3-3J is the first pipe junction upstream of CRY3-3 on the reticulated sewer,

f CRY3-3JS is the first inspection shaft upstream of CRY3-3J on the reticulated sewer,

s CRY3-3K is the first pipe junction upstream of CRY3-3J on the reticulated sewer,

CRY3-3KS is the first inspection shaft upstream CRY3-3K on the reticulated sewer.

Numbering of access chambers at the point of entry to treatment plans

Access chambers on sewer pipe sections at the point of entry to treatment plants must be input with database linkages and numbered as follows:

- Access chambers on a named sewer must be numbered using the access chamber numbering convention.
- Access chambers on a reticulation sewer must have the treatment plant number as the first part of the number. For example, M02 for treatment plant number M02.

Pumping station access chambers must have the prefix TPS and the treatment plant number as the first part of the number. For example, TPASM02 for treatment plant number M02.

Refer to Figure 7-14.

Numbering of access chambers upstream of treatment plants

The numbering of access chambers on named sewers upstream of treatment plants is unaffected by the treatment plant number.

Access chambers on reticulation sewers upstream of treatment plants must be assigned the appropriate prefix. The first part of this number is based on the number of the access chamber at the point of entry to the treatment plant. The suffixes of subsequent access chambers are numbered in the usual manner for reticulation sewers. For example:

TPASM02-1 is the first access chamber upstream of TPASM02 on a reticulation sewer which enters treatment plant number M02 at a pumping station.

M02-1 is the first access chamber upstream of M02 on a reticulation sewer which enters treatment plant number M02 at a normal access chamber.

Refer to Figure 7-14.

Numbering of pumping station access chambers

Pumping station access chambers on reticulated or named sewers must have a prefix consisting of SPS and the pumping station number.

Sewerage pumping station numbers will be supplied by the Water Company.

Pumping stations at the point of entry to treatment plants, must have a number consisting of the letters TPS and the treatment plant number.

Refer to Pumping station associated details later in this chapter, for the numbering of multiple pumps at a single pumping station.

Numbering of access chambers upstream of pumping stations

The numbering of access chambers on named sewers upstream of pumping stations is unaffected by the pumping station number as shown in Figure 7-11 and 7-14.

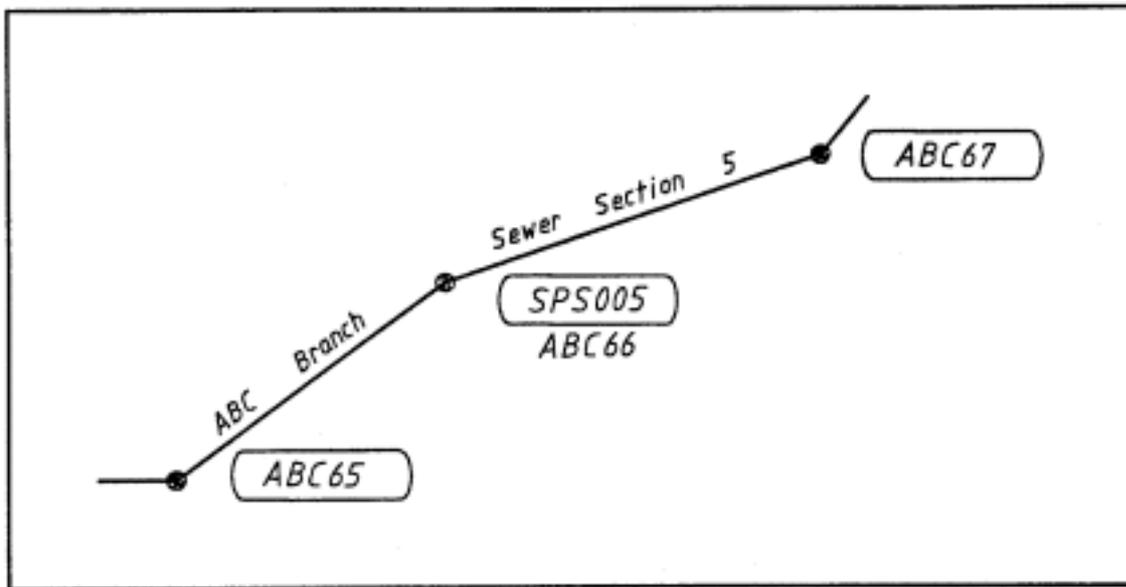


Figure 7-11 Access chamber upstream of pumping station on a named sewer

Access chambers on reticulation sewers upstream of pumping stations must be assigned the prefix SPS and the pumping station number as the first part of the number. Subsequent access chambers are numbered in the usual manner for reticulation sewers, as shown in Figure 7-14.

Where a pumping station access chamber is located on a named sewer, treat as follows:

- + determine the number that the access chamber would be assigned by access chamber numbering convention, were it not a pumping station. Place this number in graphics below and parallel to the SPS access chamber number, as shown in Figure 7-14, using access chamber number symbology, but without a capsule.
- enter this secondary access chamber number in the database as the old access chamber number (308.51).

Numbering of emergency relief structure (ERS) access chambers

The first access chamber along an emergency relief structure (ERS) conduit is usually the ERS access chamber. It must be numbered with a prefix of ERS followed by the appropriate ERS number. For example, the ERS access chamber on ERS number 157 would be numbered ERS 157.

Subsequent access chambers are numbered in the usual manner for reticulation sewers, regardless of the pipe diameter.

The last access chamber of an ERS conduit is usually an end of pipe. It would be numbered as follows

- ERS157-P if there were no preceding access chambers between it and ERS 157.
- ERS 157-2P if there were, for example, two preceding access chambers (ERS 157-1 and ERS 157-2) between it and ERS 157.

If an ERS access chamber is located on a reticulated or named sewer, the ERS access chamber must be numbered with its ERS number. The numbering of other access chambers along the reticulated or named sewer is unaffected. Refer to the example in Figure 7-12 and 7-14.

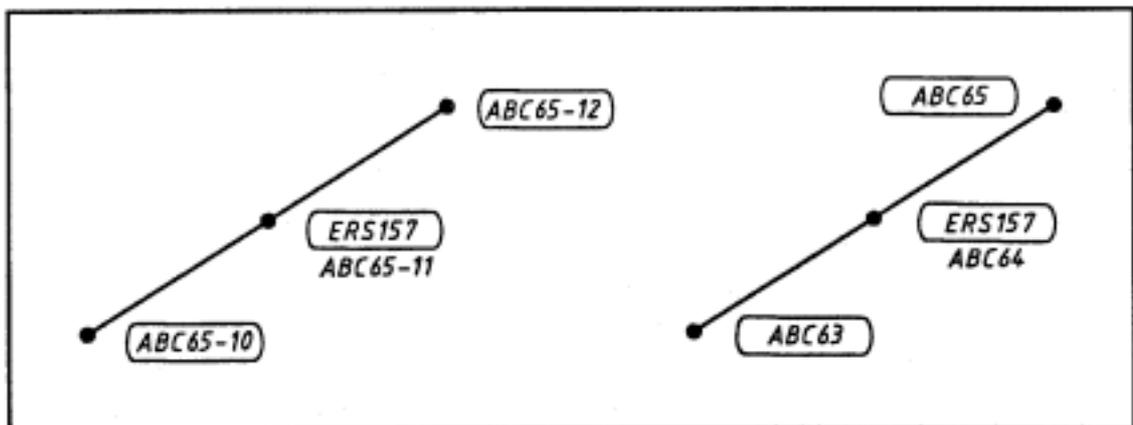


Figure 7-12 Numbering of ERS access chambers

Where the ERS access chamber is located on a sewer line, that is, there are no ERS conduits:

determine the number that the access chamber would be assigned by access chamber numbering convention, were it not an ERS access chamber. Place this number in graphics only below and parallel to the ERS access chamber number, as shown in Figure 7-13 and 7-14, using access chamber number symbology, but without a capsule.

enter this secondary access chamber number in the database as the associated equipment number (318.28) and the old access chamber number (308.51).

Access chamber capsules

Access chamber numbers must be placed inside an access chamber capsule.

Access chamber capsules must be orientated radially about the centre of their respective access chamber and positioned at the preferred offset as detailed in *Chapter 3, Table 3-21*.

Wherever possible, place the capsules along the same side of successive sewer pipe sections, at the same offset and angle. They should be placed inside the boundary of the property in which the access chamber is located. The capsule should not be placed parallel to the property boundary or road. Figure 7-13 shows the placement of access chamber capsules.

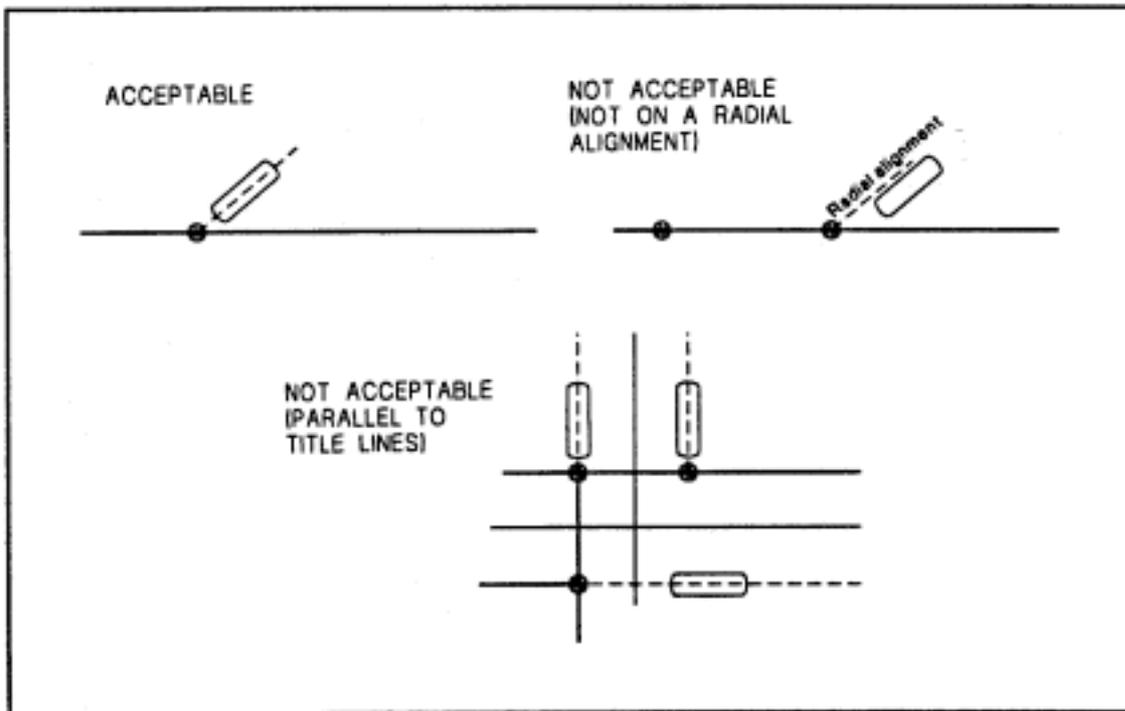


Figure 7-13 Placement of access chamber capsules

Trunk sewer access shaft name

The trunk sewer access shaft name should be placed in graphics in upper case at an active angle of zero degrees (horizontal), opposite the centre of the shaft.

Note: The name should be shown on the plan. The name can be verified, if necessary in Code List 305. If there is a discrepancy, place the name indicated in the code list.

Trunk sewer access shafts must be designated a unique access chamber number in the same manner as standard access chambers and a name.

Sewerage pumping station access chambers

Pumping station access chambers also define sewer pipe and rising main sections. The symbology of pumping station access chambers varies according to the size of the pumping station, not the size range of the downstream pipe station.

Pumping station access chambers are considered to be major if they have been designated as such in Code List 349. Major pumping station access chambers must be scaled in graphics according to their size. Minor pumping station access chambers must not be scaled.

Database

Pumping Station Access chambers (entity 315) are identified by a unique access chamber number designated by the Water Company. Since they are owned by the Access chamber entity (308) and the Pumping Station entity (315) they have a dual set of attributes. Refer to the *Database Schedules in Chapter 2* for details of pumping station attributes.

The access chamber structure type (308.12) is Pump Station.

Pump station name

The pumping station name (315.10) is derived from Code List 349 and corresponds to the pumping station access chamber number (as found in Code List 350); the two code lists are linked by common entry numbers. For example, if the pumping station access chamber number is SPS 123

* " 128" is the code list entry number in Code List 350 for Sewerage Pumping Station " 123" .

i " Margaret St" is the entry in Code List 349 corresponding to code list entry number 128.

The sewerage pumping station name is only required to be placed in graphics for major pumping stations. The name should be input in upper case at an active angle of zero degrees (horizontal) opposite the access chamber.

Pumping station associated details

A number of features are commonly associated with pumping stations.

Electrical control cabinet

The cell name for an electrical control cabinet is ECC. It should be placed in the appropriate position and orientated according to the plan.

Valve pit

The cell name for a valve pit is VALPIT. This cell represents a Reflux valve and should be placed on the rising main outlet pipes in the appropriate position and orientation. It is not necessary to input the external shape of the valve pit structure.

Pipework and buildings

Pipework and buildings should be shown for major sewerage pumping stations. The pipework should be shown as graphics. Major buildings should be shown as outlines.

Additional pumps

Some sewerage pumping stations contain more than one pumping station access chamber.

In cases where there is no separate name for each pumping station, input each pump into graphics and the database.

Assign access chamber numbers to each pump, using pump station number as normal, and a descriptive letter (A to H) as required, for each additional pump. For example, at the Brooklyn Pumping Station, multiple pumps would be numbered SPS005A, SPS005B, SPS005C and so on. In the database assign multiple pumps at a single pump station, the same pumping station name. In the above example, all pumps would be owned by the Brooklyn Pumping Station, entry number 10 in the Code List 349.

Multiple outlet rising main pipework

Pumping stations usually have one or more short lengths of outlet pipe that connect to the primary rising main. These outlet pipes should only be placed in graphics.

Emergency relief structure access chambers

Each emergency relief structure (ERS) has a specially designed access chamber associated with it. The cell ERS must be placed to represent this structure. Other access chambers located along the ERS conduit must be placed as standard access chambers.

The ERS access chamber is usually located at the end of the first section of ERS conduit. This is the pipe section which connects directly to the access chamber or pumping station on the sewer line. In some cases the ERS access chamber may be located on the sewer line itself as a normal access chamber.

Database

The ERS Access chamber entity (318) is owned by the Sewer Access chamber entity (308). It therefore has a dual set of attributes. Refer to the *Database Schedule* in *Chapter 2* for a complete list of attributes.

The database entries for access chambers placed as the ERS cell are as follows:

- access chamber number = ERSnnn, where nnn is the number of the ERS.
- access chamber structure type = Emergency Relief Structure.
- associated equipment type = Pumping Station or Access chamber, as appropriate.
- associated equipment type number = the access chamber number of the pumping station or access chamber.

Note: The associated equipment type and number attributes refer to the structure on the sewer line which **the ERS has been** constructed to **relieve**.

Graphical placement

The circular ERS cell must be placed as the ERS access chamber in all cases.

Where the shape of the access chamber is not circular:

- place an appropriate shape in graphics around the ERS cell with the same symbology.
- * enter the appropriate shape in the database for access chamber structure shape.

Chapter 8

Sewer Pipes and Flow Data

This chapter covers the database and graphical requirements for the input of sewer pipe conduits and flow data including:

- sewer pipe sections
- curved sewers
- * independent sewer pipe sections
- multiple pipes between access chambers
- f rising mains
- emergency relief structures
- * siphons
- future sewer connections
- t flow arrows
- conduit data
- invert levels

Sewer pipe sections

A sewer pipe section is defined as the length of sewer conduit between two numbered access chambers, as shown in Figure 8-1.

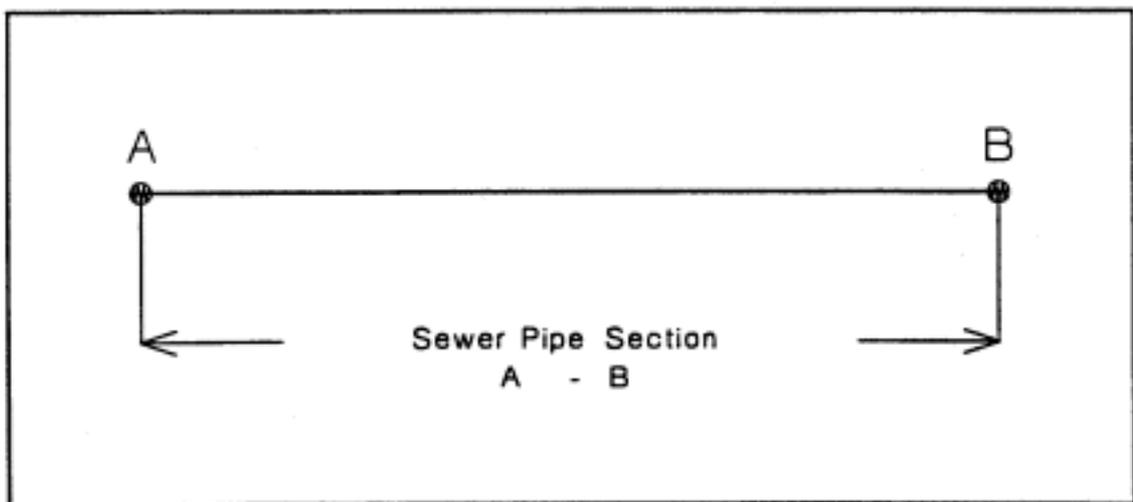


Figure 8-1 Sewer pipe section

Sewer pipe sections are used to define all types of sewers:

Gravity sewers, including named sewers, reticulation sewers, emergency relief conduits and siphons.

Rising mains.

Sewer pipe sections may be straight or curved. All sewer pipe sections must be input as a continuous line, curve string or line string from one access chamber to the next as shown in Figure 8-2. They must not be shown as complex chain type lines. There must be one graphical element between access chambers.

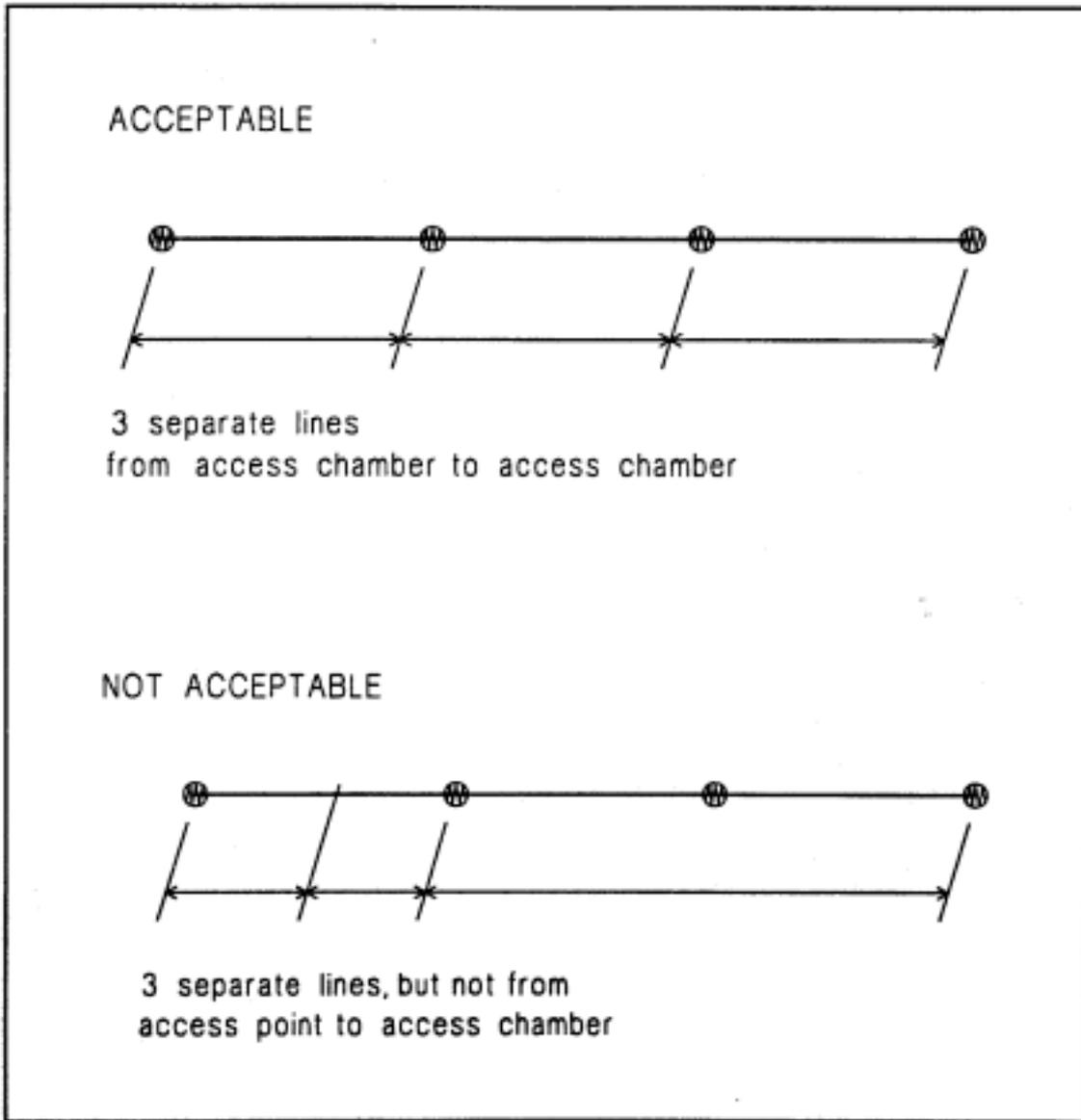


Figure 8-2 Line placement between access chambers

Intersection of sewer pipes

Sewer pipes must always intersect with each other at the centre of the access chamber cell except at the entry and exit sewer configurations of some rectangular, gas check and chambered access chambers.

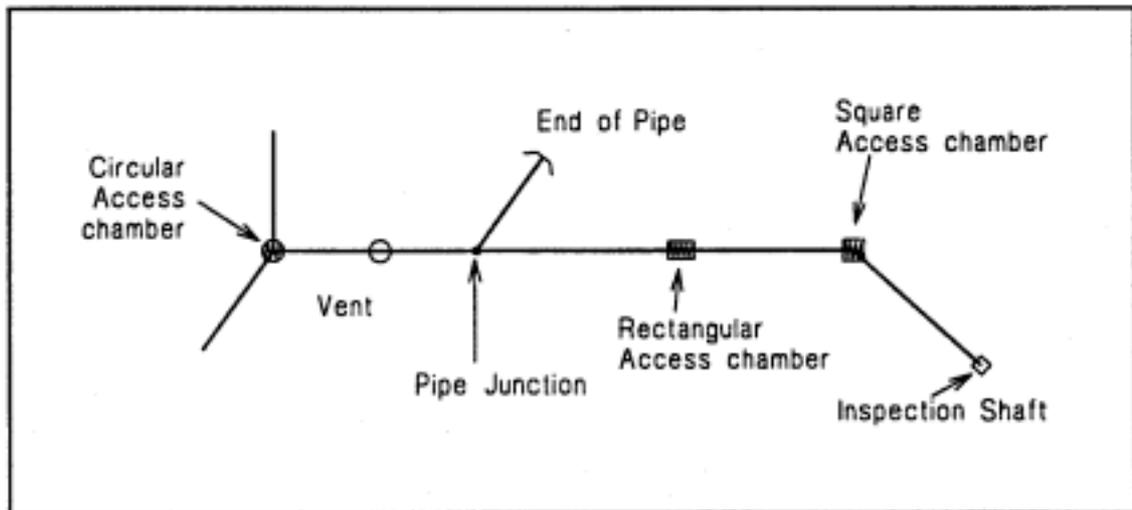


Figure 8-3 Intersection of sewer pipes at some typical access chambers

In the case of a double chambered gas check chamber, entry and exit sewers should normally intersect at the cell origin (the centre of the upstream chamber). Refer to Figure 8-4.

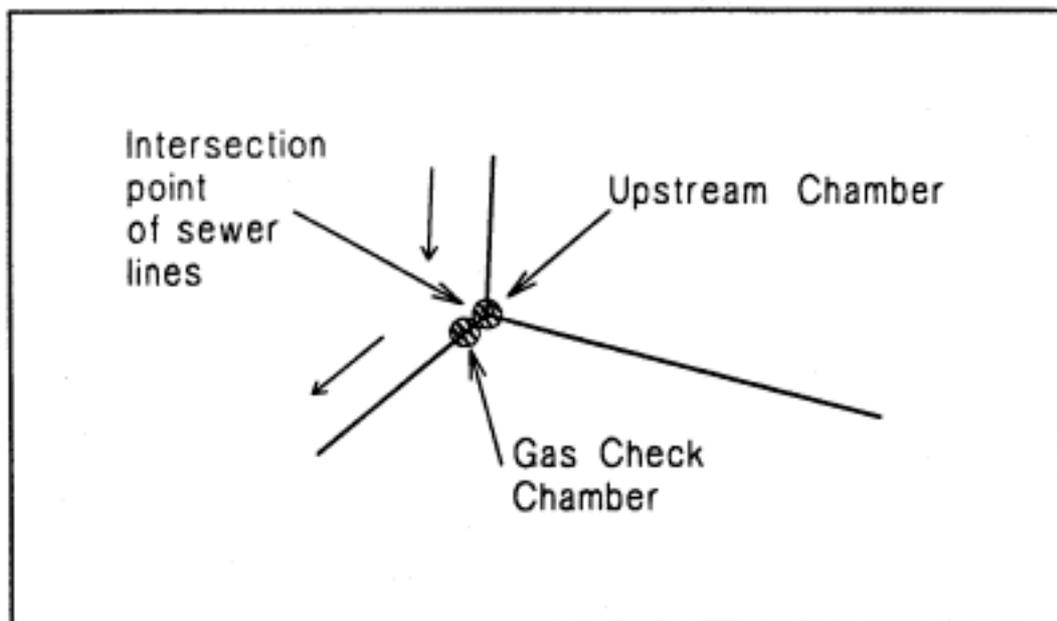


Figure 8-4 Intersection of sewer pipes at a double chambered gas check chamber

8 Sewer Pipes and Flow Ddata

In some cases entry and exit sewers at rectangular, chambered or gas check chambers do not always intersect at the centre of the access chamber. This is acceptable. Do not modify sewer lines or move the access chambers. Refer to Figure 8-5.

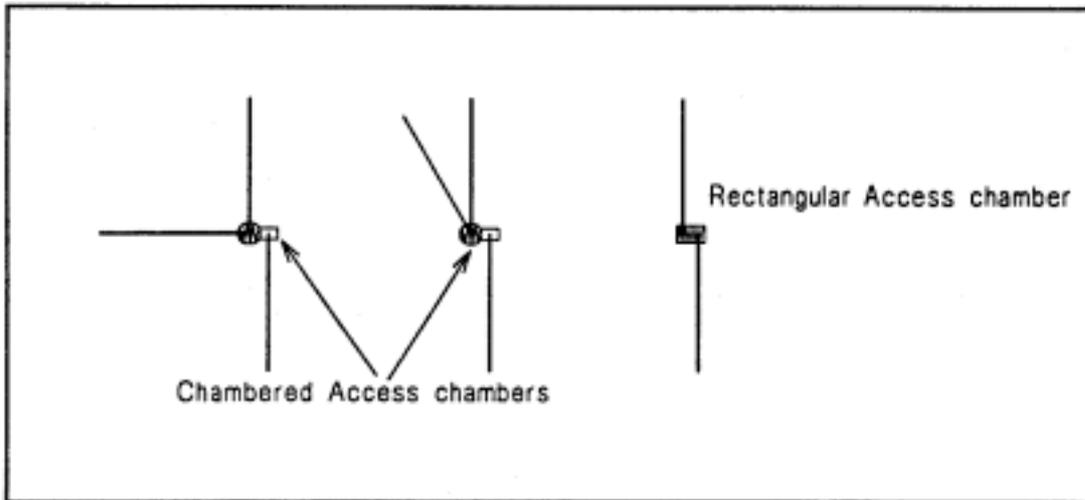


Figure 8-5 Intersection of sewer pipes at rectangular and chambered access chambers

Note that in the above example, the access chamber is input so that it covers the area of the junction of the sewers. If necessary, the access chamber size may be scaled up in order to cover the -area of pipe intersection.

Curved sewers

Curved sewers are sewers that do not run in a direct horizontal plane between access chambers (horizontal curves), or sewers that do not run at a constant grade between access pints (vertical curves).

The database entry must indicate whether or not a sewer pipe section is curved and if so, the correct type of curved sewer. That is:

.305.45 (HORIZONTAL CURVE), entry No 6 (Yes - Code List 13)

* 305.46 (VERTICAL CURVE), entry No. 6 (Yes - Code List 13)

Horizontal curves and bends

There are two types of horizontally curved sewers:

- + horizontal curves (smooth curves)
- horizontal bends (sharp changes of direction)

Horizontal curves

To ensure that property service branches intersect with the curve, and that the curve is smooth, data points must be placed at intersections with branches, at

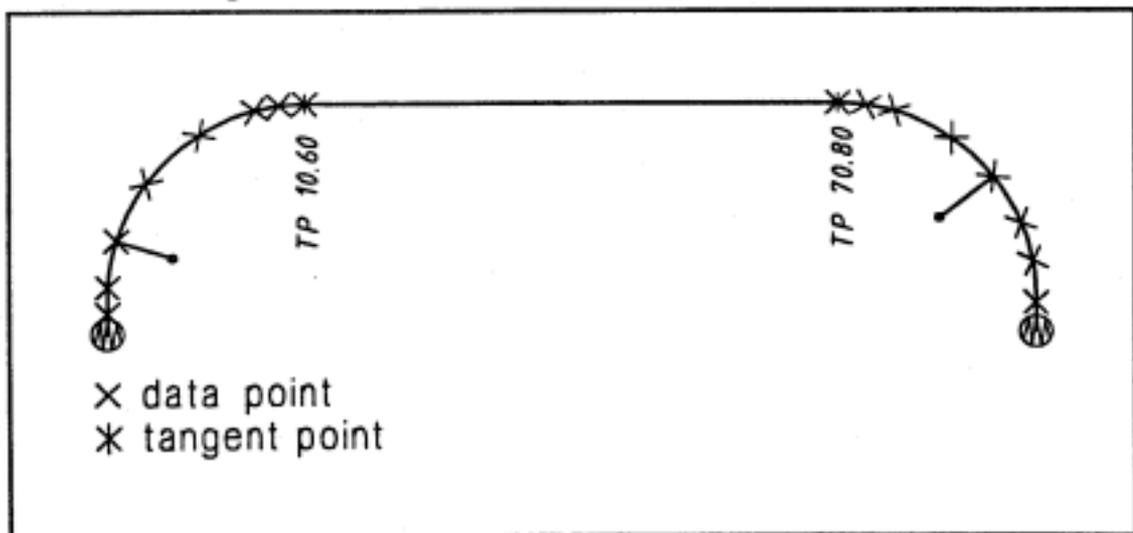


Figure 8-6 Horizontal curve, showing typical data point locations.

8 Sewer Pipes and Flow Data

A horizontal TP cell must be placed at the point where curvature commences, on and perpendicular to the sewer line at the tangent point. The chainage of the tangent point must also be included prefixed with the letters " TP" . The invert levels of the tangent point are placed using miscellaneous invert level symbology. Refer to Figure 8-7.

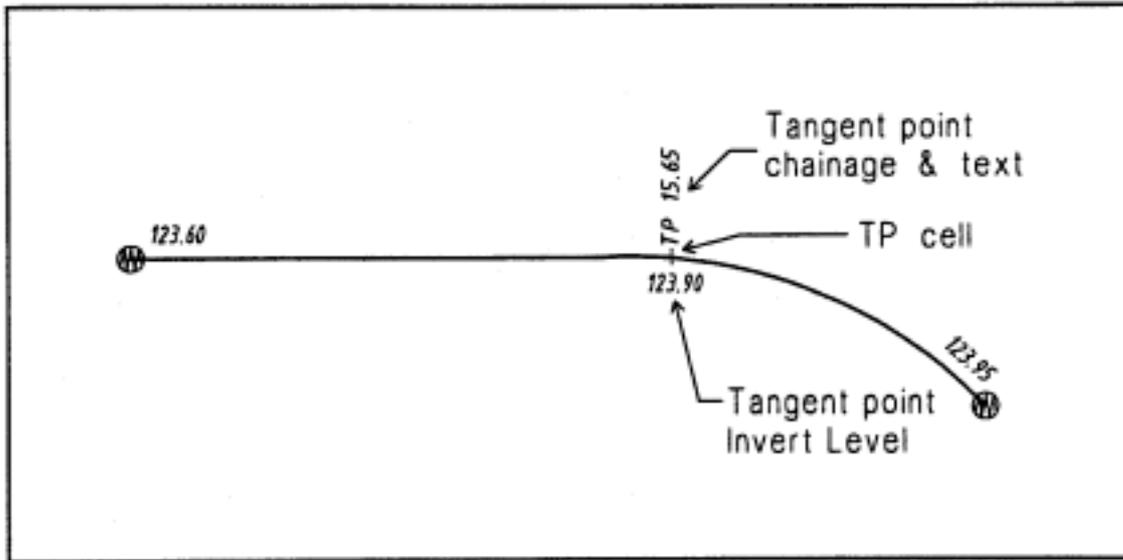


Figure 8-7 Tangent point : cell, text and invert level placement

Horizontal bends

Sewer pipe sections with sharp bends must be recorded in the database as horizontal curves.

The notation " BEND" must be placed opposite and perpendicular to the change in alignment. Include the chainage of the tangent point prefixed with the letters " TP" . The invert level of the bend, must be placed using miscellaneous invert level symbology. It is not necessary to place a tangent point cell for a horizontal bend. Refer to Figure 8-8.

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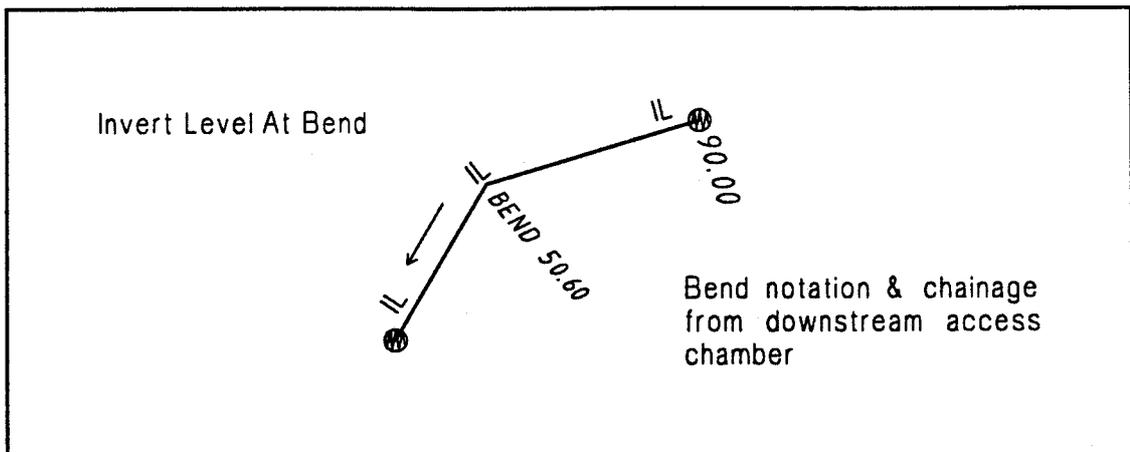


Figure 8-8 Horizontal bend

Vertical curves and changes of grade

There are two types of vertically curved sewers, those with:
smooth curves (vertical curves)

- sharp changes of direction (changes of grade)

Flow arrows must be placed with the appropriate grade notation along a vertical curve pipe section to indicate differences in grade.

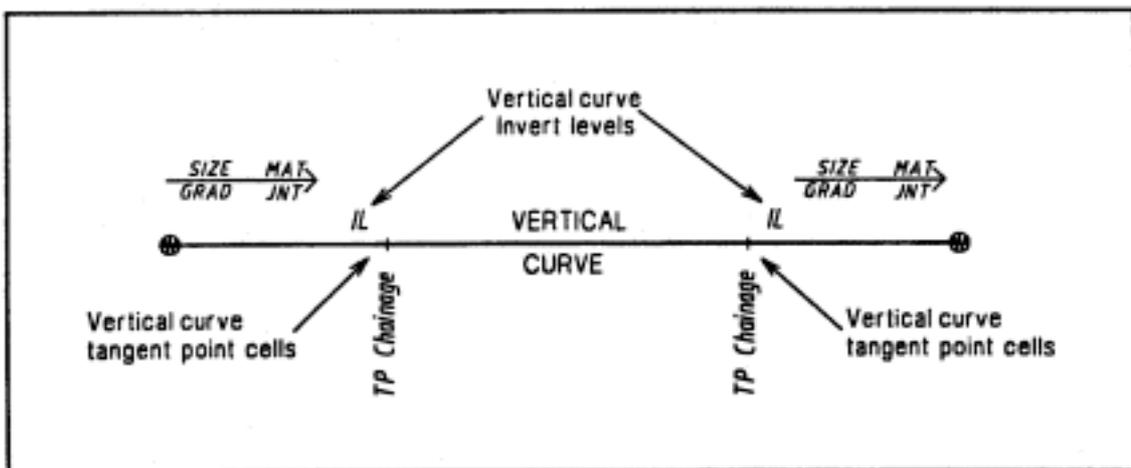


Figure 8-9 Vertical curve notation and features

Vertical curves

Vertical curves must be labelled " VERTICAL CURVE" as shown in Figure 8-9. The tangent points must be placed at the extreme limits of the curve. The chainage of the tangent point must be included, prefixed with the letters " TP" . The invert level of the tangent point must be placed using vertical curve invert level symbology.

Changes of grade

Sewer pipe sections with a change of grade must be entered in the database as vertical curves.

The change of grade cell must be placed on and at a right angle to the sewer at the point indicated. The notation "COG" and its chainage from the downstream access chamber must be placed at a right angle to the symbol. Place the invert level at the change of grade using vertical curve invert level symbology. Refer to Figure 8-10.

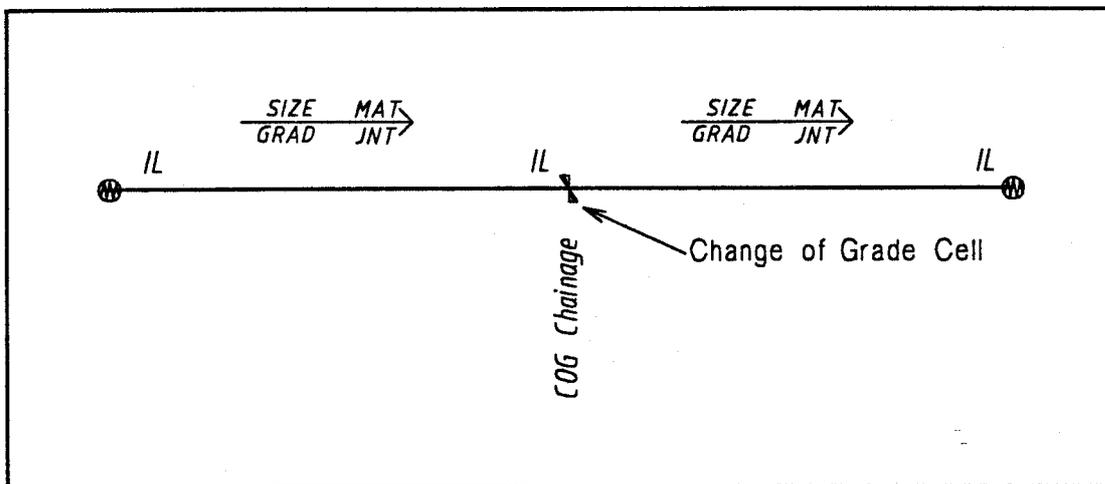


Figure 8-10 Change of grade Notation and features

Independent sewer pipe sections

Independent sewers use access chambers (such as end of pipes and pipe junctions) as entry to the downstream sewerage system. The pipes may be part of the same, or different projects.

This is a common occurrence in new areas where a blank ended pipe is left for a future extension.

Independent sewers must be placed in the following manner:

- Input each pipe section separately using end of pipe access chambers.
- Input individual chainages into the database for each pipe section.
- Do not duplicate end of pipe invert levels.
- † Individual upstream access chamber chainages are placed in graphics as running chainages measured from the downstream access chamber.

I

- + The natural surface level on any new end of pipe must be recorded in the database, as a normal access chamber would have its cover level recorded (database attribute 308.18)

Independent sewers of constant characteristics

If separate sewer lines have combined to make a sewer line of constant grade, diam., conduit material and conduit jointing, then place in the manner described above.

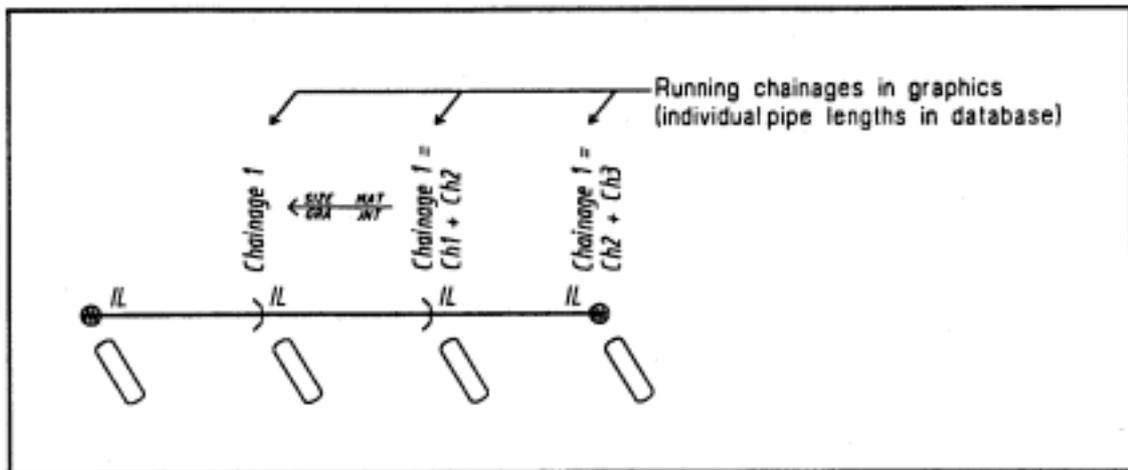


Figure 8-11 Independent sewers of constant characteristics

Independent sewers of varying characteristics

If sewer lines of different grade, diam., conduit material and/or conduit jointing have combined to make a sewer line, then: place in the manner described above. input a flow arrow for each pipe section.

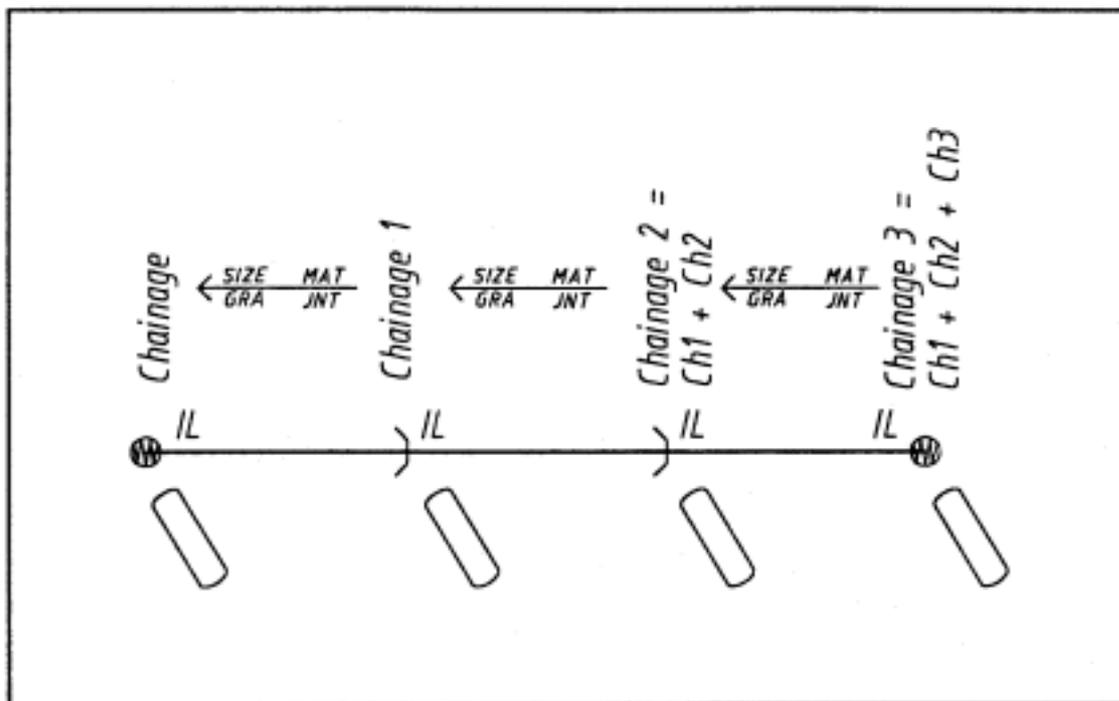


Figure 8-12 Independent sewers of varying characteristics

Multiple pipes between access chambers

Where multiple pipes exist between the same downstream and upstream access chambers, as is typical of siphons and some rising mains, each pipe must be entered with full database attributes, and individual flow arrows placed.

To enable the database uniqueness criteria of each pipe section to be met, the following procedure is required:

- ` First" pipe section between access chambers is numbered as per normal.
- Suffix with " *" , the upstream access chamber number reference for the second pipe.
- Suffix with " **" , the upstream access chamber number reference for the third pipe, and so on.

e.g.	downstream structure number	upstream structure number
1st pipe:	ABC65-10	ABC65-11
2nd pipe:	ABC65-10	ABC65-11
3rd pipe :	ABC65-10	ABC65-11 **

Note: Do not place multiple access chambers/access chamber numbers.

Rising mains

Rising mains are sewer conduits of various sizes through which sewage is pumped under pressure.

When digitally representing a rising main:

- + Input the rising main as a continuous line, from pumping station to outlet access chamber, except when there is a change in size, material or status.
- Use horizontal curve tangent point cells to indicate intermediate invert levels and chainage locations.
- All invert levels along the rising main, other than those at the pumping station and outlet access chamber, must be shown in graphics using miscellaneous invert level symbology.
- t Chainages of all features along the rising main, other than those at the pumping station and outlet access chamber, must be shown as running chainages, using miscellaneous chainage symbology. This includes intermediate invert level locations.

Any access chamber structures along the rising main between the pumping station and outlet access chamber are usually shown in graphics only.

Flow arrows on rising mains of constant characteristics, should be placed at least once every 500 metres (ground scale).

* The text RM replaces grade on the flow arrow.

* Flow arrows point in the overall direction of flow.

Change of rising main size, material, status or number of conduits

Changes may occur in the rising main conduit dia., material, status, or the number of conduits comprising the rising main. Such changes normally occur at roads, railway lines or rivers. Changes may occur over a significant length (more than 10% of the total length of the rising main) or an insignificant length (less than 10% of the total length of the rising main) and should be treated in the following manner

Change in size and/or material:

Over an insignificant length:

levels, chainages etc and place pipe junction access chambers where the pipes meet the old.

- b) Supply to the Water Company a hard copy field note of the rising main section that has been abandoned

Siphons

A siphon may consist of one or more pipes, and must be graphically represented as such.

Graphical representation

Refer to "*Multiple pipes between access chambers*" earlier in this Chapter.

Note that the text "SIPHON" replaces grade on the flow arrow in Figure 8-15. The siphon conduits are not required to intersect with gravity sewer conduits at the centre of the access chambers.

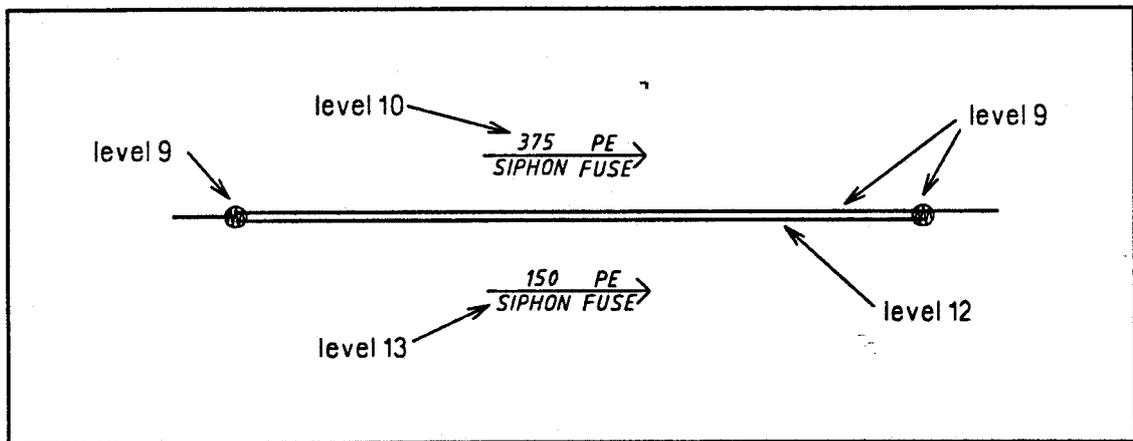


Figure 8-15 Siphon with different sized pipes

Database requirements

For the access chambers at either end of the siphon the database entry for access chamber structure type is upstream access chamber = siphon entry
downstream access chamber = siphon exit

Future sewer connections

To allow for the connection of future sewer mains, stub pipes may be incorporated at the time of access chamber construction. This feature must be graphically represented.

Stub pipes

Stub pipes are not sewer pipe sections and have no linkage to the database, they are only graphics.

Stub pipes do not require end of pipe access chambers.

The symbology of a stub pipe is determined by its diameter. Text to indicate the stub pipe diameter must be placed parallel to the stub pipe (using the symbology for conduit size notation). The invert level of the stub pipe should also be placed as a miscellaneous invert level.

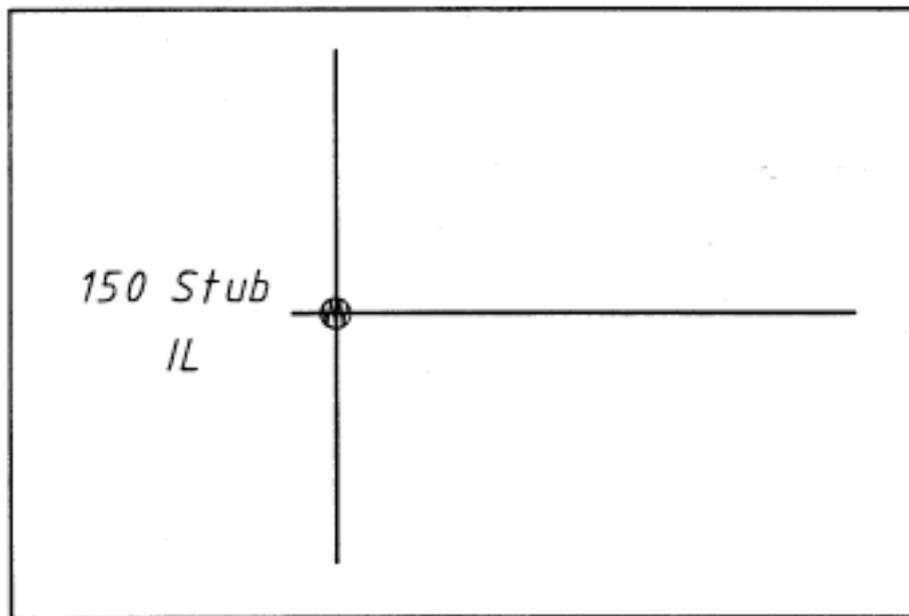


Figure 8-16 Stub pipe

Note that 100mm diameter stub pipes out of access chambers should be input in the same manner as oblique branches off sewer lines.

Table constructions

Table constructions are not sewer pipes, but formations in the base of access chambers to allow for the construction of a stub pipe and connecting sewer in the future.

Table construction information is not shown in graphics or stored in the database.

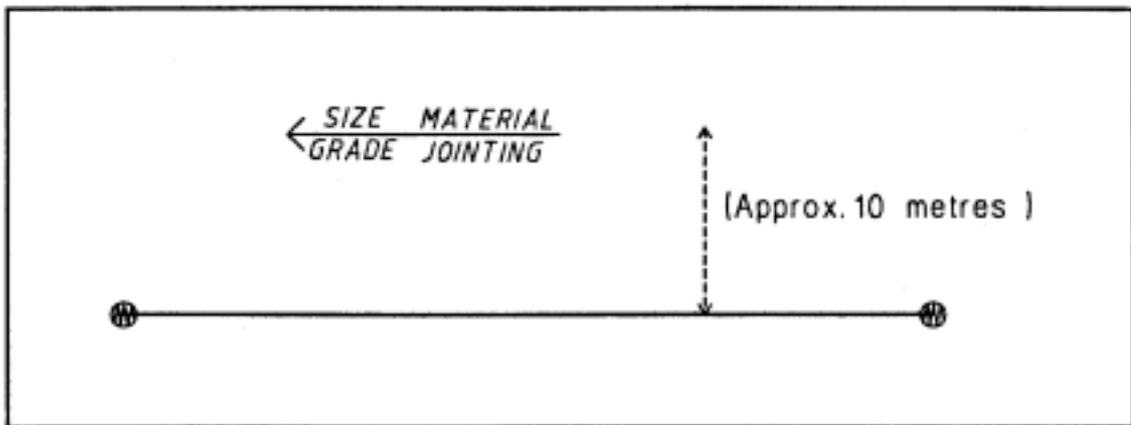


Figure 8-18 Offset of flow arrow from sewer line

- + Flow arrows should be offset from the sewer so that they are clear of any other sewer notation, for example, ties, offsets, chainages or named sewer notation. For clarity and consistency, all flow arrows along a series of sewer pipe sections should be placed at the same offset from the sewer line. Refer to Figure 8-19.

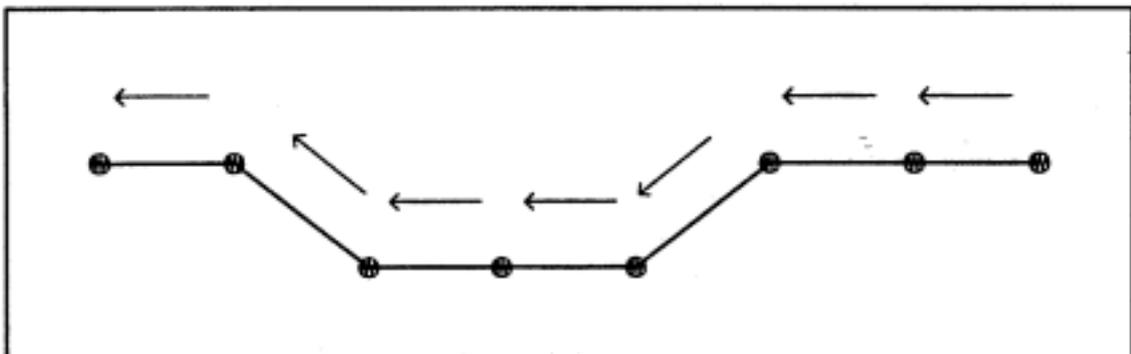


Figure 8-19 Placement of flow arrows along a series of pipe sections

- + Flow arrows along curved sewers should be placed:
 - **parallel to the tangent of the curved sewer that is directly below the flow arrow, as shown in Figure 8-20**

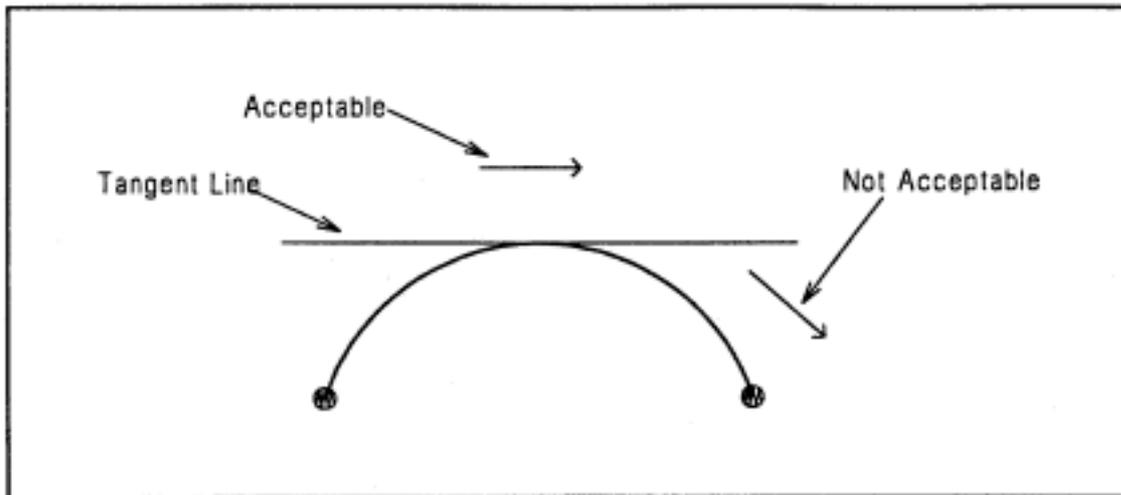


Figure 8-20 Flow arrow on a curved sewer

- or, parallel to the straight section of the curved sewer, as shown in Figure 8-21.

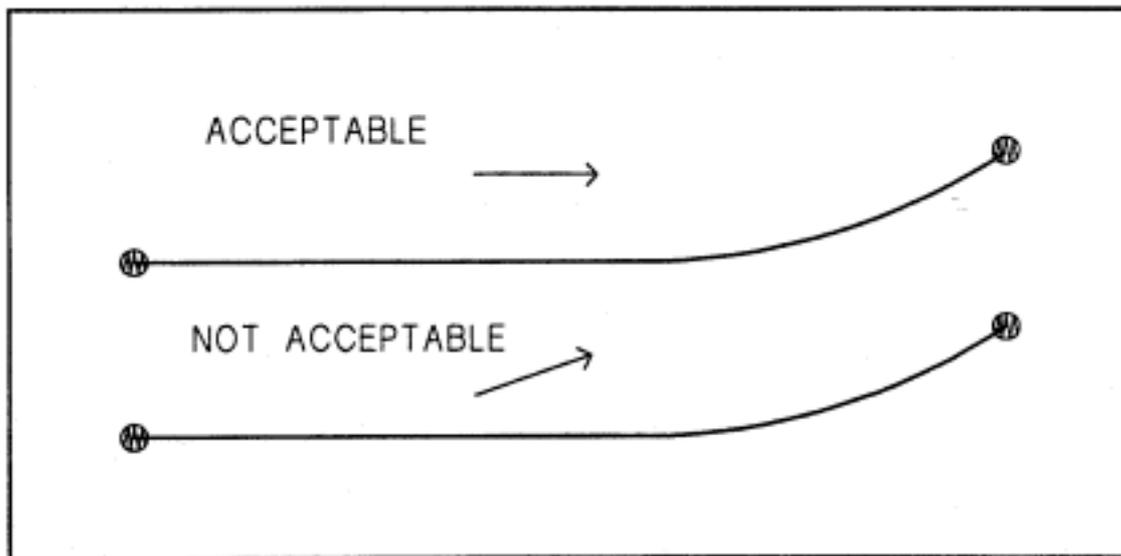


Figure 8-21 Flow arrow on a curved sewer

If necessary, a flow arrow may be placed across a title boundary. It is preferable that the title boundary does not pass through the text on the arrow, although this may be unavoidable in some cases. Refer to Figure 8-22A and 8-22B.

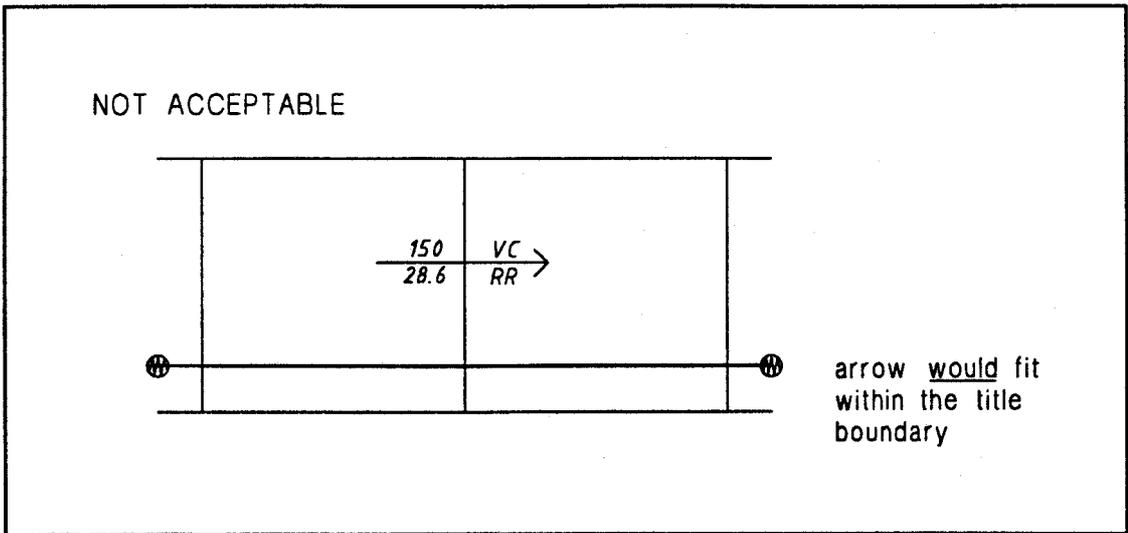


Figure 8-22A Placement of flow arrows across title boundaries

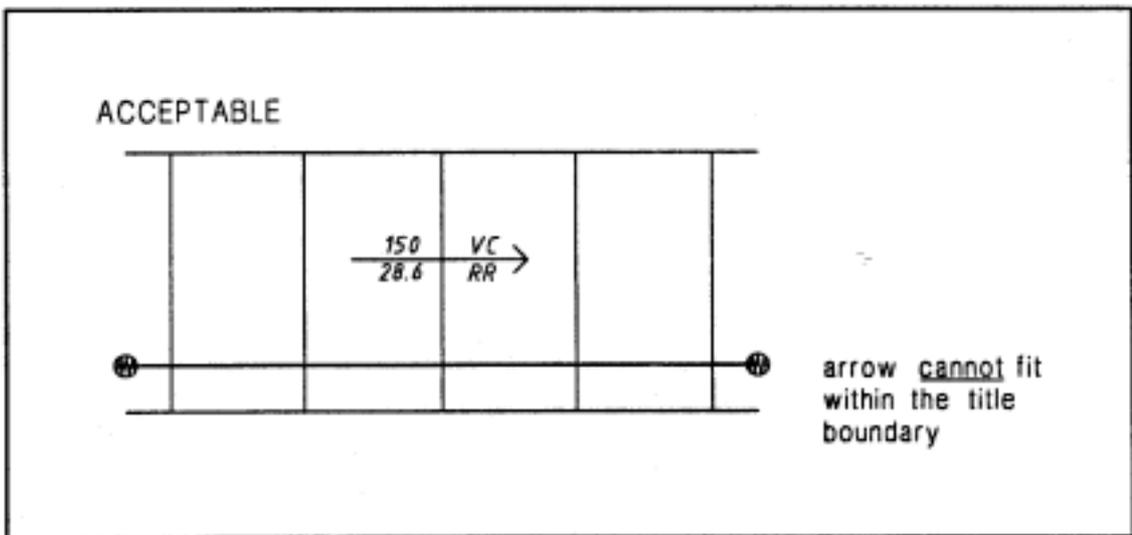


Figure 8-22B Placement of flow arrows across title boundaries

Conduit data

Conduit data to be displayed on flow arrows consists of

- + conduit size
- conduit grade
- + conduit material; and
- joint packing material

Conduit size

The conduit size displayed on the flow arrow must be the same as the size input into the database from Code List number 41.

Circular conduits

The size of a circular conduit is defined as the nominal diameter. Code List 41 includes all standard normal diameters. If the exact nominal diameter for a conduit is not listed, contact the Water Company for advice. Do not use the nearest conduit size.

Non circular conduits

Square, ovoid and irregular shaped pipes are measured by height and width. Select the closest size from Code List 41 for which both dimensions are within 25mm of those required.

Conduit grade

Variations in grade

The representation of variations in grade along sewer pipes were discussed earlier in this chapter.

Reverse grade

For gravity sewers with an uphill grade (that is, the downstream invert level of the pipe section is higher than the upstream invert level), the *flow* arrow must point " uphill" in the direction of *overall flow* (as for rising mains). The grade is then calculated as normal.

The database entries for the invert levels are entered so that the downstream invert level is greater than the upstream invert level.

Do not prefix a reverse grade with a negative sign.

Text placement in lieu of grade

The following text must be placed in lieu of the numeric grade on the flow arrow as required.

RM For a sewer pipe conduit which is a Rising Main.

SIPHON For a sewer pipe conduit which is a Siphon.

Conduit material and joint packing material

The following details are provided to assist when determining and inputting sewer pipe conduit materials.

If a required pipe jointing material does not appear in Code List 43, contact the Water Company for advice.

Pipeline trade names

Although made from standard materials, the following pipes are included as separate entries in Code List 43, due to significant variations in their wall construction.

Code List Entry Number	Trade Name	Conduit Material
41	HOBAS	Glass Reinforced Plastic
44	HARDYFLEX	Asbestos Cement
54	BLUE BRUTE	Thick Walled (Pressure Pipe) Unplasticised Polyvinyl Chloride
61	BLACK BRUTE	Profile Wall High Density Polyethylene
62	ULTRA-RIB	Profile Wall Unplasticised Polyvinyl Chloride
63	VITRAM	Vitreous Clay Jacking Pipe

Table 8-1 Pipeline trade names and conduit material

Conduit material abbreviations

Table 8-2 lists the abbreviations that have been most common for conduit materials.

Common Abbreviations	Conduit Material to be input from Code List 43		Common Conduit Purpose
VC, VCP, VP, SW, SWP, EW, EWP, GEW, SPD	VC	Vitreous Clay (Spigot/Socket)	Gravity Sewers
"Rocco Rings"	VCTWSB	Vitreous Clay - Thin Walled, Straight Barrel	Gravity Sewers
Jacking Pipe, "Vitram"	VCJP	Vitreous Clay Jacking Pipe (including Vitram)	Gravity Sewers
CON, CONC, CP, CEM	CONC	Concrete - not known if reinforced	Gravity Sewers
RC, RCP	RC	Reinforced Concrete	Gravity Sewers
UPVC, PVC	UPVC	Unplasticised Polyvinyl Chloride - Thin Walled, Non-Pressure	Gravity Sewers
"Ultra-Rib", "Corflo"	UPVC-P	Unplasticised Polyvinyl Chloride - Profile Wall (including Ultra-Rib)	Gravity Sewers
UPVC, PVC, "Metro Pipe", "Vinyl Iron", "Blue Brute"	UPVC-T	Unplasticised Polyvinyl Chloride - Thick Walled Pressure Pipe (including Blue Brute)	Rising Mains
PE, Poly, HDPE	PE	Polyethylene - Solid Wall, High Density	Gravity Sewers, Rising Mains, Siphons
"Black Brute", PWPE, HDPEPW	PE-P	Polyethylene - Profile Wall, High Density	Gravity Sewers
"Hobas"	GRP	Glass Reinforced Plastic (including Hobas)	Gravity Sewers

Table 8-2 Conduit material abbreviations

Conduit joint packing

Conduit joint packing must be recorded as it was used in the sewer construction. Table 8-3 lists the common jointing materials used for sewer pipes and their code list abbreviations. These are to be used as a guide only. The actual joint packing must be verified in the field.

Conduit Material		Conduit Jointing Material	
Description (Code List 43)	Abbrev. (CL 44)	Description (Code List 51)	Abbrev. (CL 52)
Cannot be Determined	UNKN	Unknown	UNKN
Vitreous Clay			
- Spigot/Socket	VC	a) pre 1966 (all diam's): mortar b) 1966-1973 (all diam's): rubber ring c) 1974-Present : < 300 mm diam. : rubber ring ≥ 300 mm diam. : chloro ring d) construction period uncertain: not stated	MOR RR RR CRP NOT
- Jacking Pipe	VCJP	chloro ring and stainless steel sleeve	CRPSSS
- Thin Wall, Straight Barrel	VCTWSB	rubber ring and "rocco ring" sleeve	RROCO
Concrete			
- Concrete (not known if reinforced) - Un-reinforced Concrete - Reinforced Concrete	CONC UCON RC	as for vitreous clay spigot/socket pipes for all types of concrete pipes	As for VC Pipes
Unplasticised Polyvinyl Chloride			
- Thin Walled (non-pressure)	UPVC	gravity sewers: a) if no jointing indicated: solvent cement b) if rubber rings are indicated: rubber ring	SCEM RR
- Thick Walled Pressure Pipe, (including Blue Brute)	UPVC-T	rising mains a) ≥ 100 mm diam. : rubber ring b) < 100 mm diam. : not stated	RR NOT
- Profile Wall (including Ultra-Rib)	UPVC-P	gravity sewers: a) < 300 mm diam. : rubber ring b) ≥ 300 mm diam. : chloro ring	RR CRP

Table 8-3-1 Conduit joint packing

Continued on the next page

Conduit joint packing continued.....

Conduit Material		Conduit Jointing Material	
Description (Code List 43)	Abbrev. (CL 44)	Description (Code List 51)	Abbrev. (CL 52)
Polyethylene - High Density Solid Wall - High Density Profile Wall (including Black Brute)	PE	fused joint	FUSE
	PE-P	ethylene propylene diene monomer rubber	EPDMR
Glass Reinforced Plastic (including Hobas)	GRP	ethylene propylene diene monomer rubber	EPDMR
Ductile Iron (Cement Lined)	DI(CL)	rubber ring	RR
Cast Iron (Cement Lined)	CI(CL)	not stated	NOT
Asbestos Cement (including Hardy Flex)	AC	a) pre 1974 (all diam's): not stated	NOT
		b) 1974 - Present: < 300 mm diam. : rubber ring ≥ 300 mm diam. : chloro ring	RR CRP
Other Materials	Refer CL 44	Refer Code List	NOT

Table 8-3-2 Conduit joint packing

Invert levels

Each sewer pipe section has an upstream and downstream invert level that must be recorded in the database and displayed in graphics. Intermediate invert levels between access chambers must be placed in graphics only.

Placement of invert levels

The following guidelines must be taken into account when placing invert levels:

- + Text " IL" is not required to precede any numerical invert level.
- + Upstream and downstream invert levels should be placed above and parallel to the sewer line (within 2-3 metres) and adjacent to the access chamber to which they are referring. Refer to Figure 8-23
- + Where space is limited, they must be grouped together with the flow arrows.

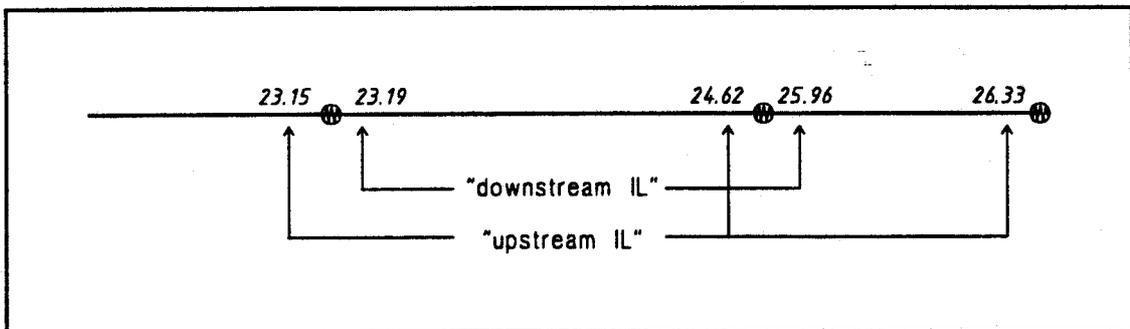


Figure 8-23 Placement of upstream and downstream invert levels adjacent to access chambers.

- + If the invert levels of the pipes entering and leaving the access chamber are the same, it must be displayed digitally as shown in Figure 8-24.

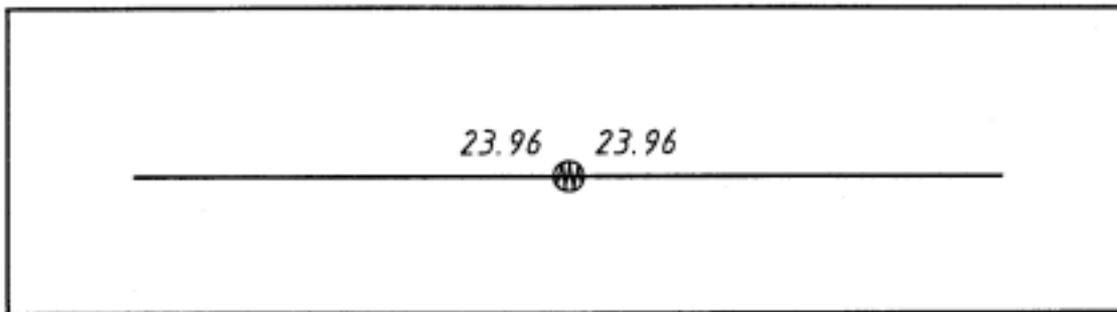


Figure 8-24 Identical invert levels as shown in graphics.

Only one invert level is required in graphics at the end of a pipe and at a junction.

- Where a curved sewer intersects with an access chamber, the invert level must be rotated so that it is parallel to the tangent of the curve at the point of placement. Refer to Figure 8-25.

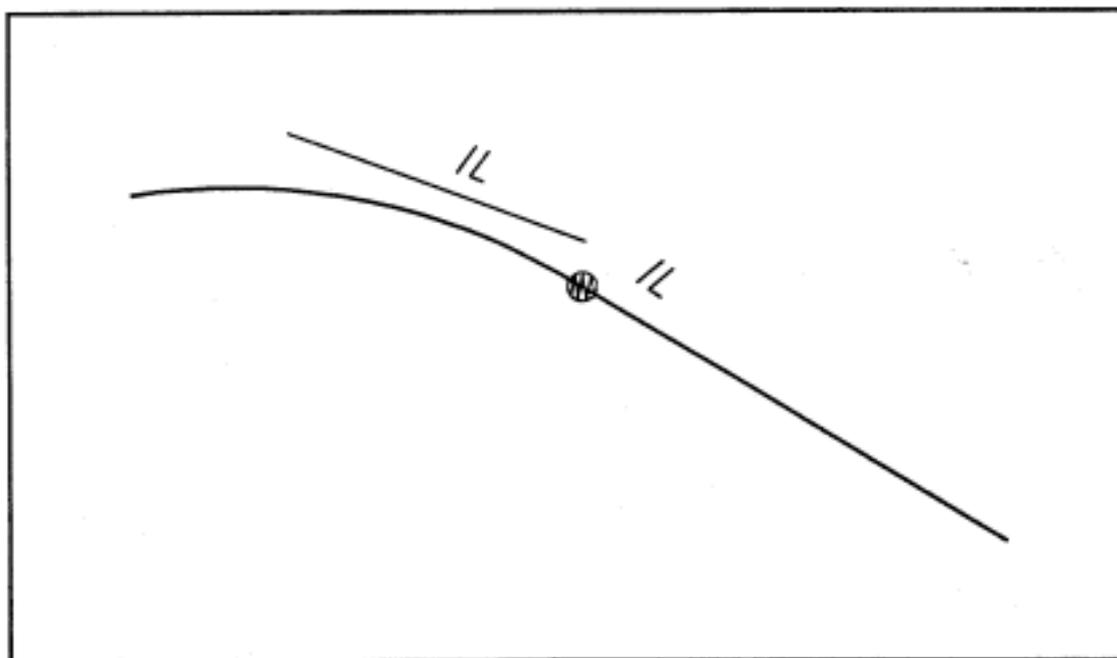


Figure 8-25 Invert level on a curved sewer

Database and graphical entry of invert levels

Graphics and database invert levels

All invert levels at the upstream and downstream end of conduits must be recorded in the database and displayed in graphics.

Graphics only invert levels

Graphics only invert levels must be placed using appropriate symbology, for the following:

* miscellaneous invert levels. For example:

- at intermediate points along rising mains
- at tangent points on horizontal curves
- stub pipes

at vertical curve tangent points and at changes of grade.

Chapter 9

Sewer Pipe Features and Notation

This chapter covers the requirements for the database and graphical input of features and notation associated with sewer pipe conduits including:

- sewer offsets
- sewer sheds
- abandoned sewers
- demolished sewers
- *sewer renewals
- sanitary disposal plants
- detention tanks
- graphical flags

Sewer offsets

The sewer offset is the distance at which the sewer pipe is located from a title boundary.

Placement

Sewer pipe offsets must be placed:

- for each sewer pipe section, where practical
- on the same side of the title line as the sewer, but not between the title line and the sewer
- at right angles to the sewer line
- at a standard distance from the sewer line. Refer to Table 3-21 in Graphics Specifications for the preferred distance at which offsets should be placed from the sewer line.
- Refer to Chapter 3 for guidelines relating to placement

Constant offsets

If the offset is the same along the full length of the sewer pipe section, the offset must be placed once, approximately midway between the access chambers, as shown in Figure 9-1.

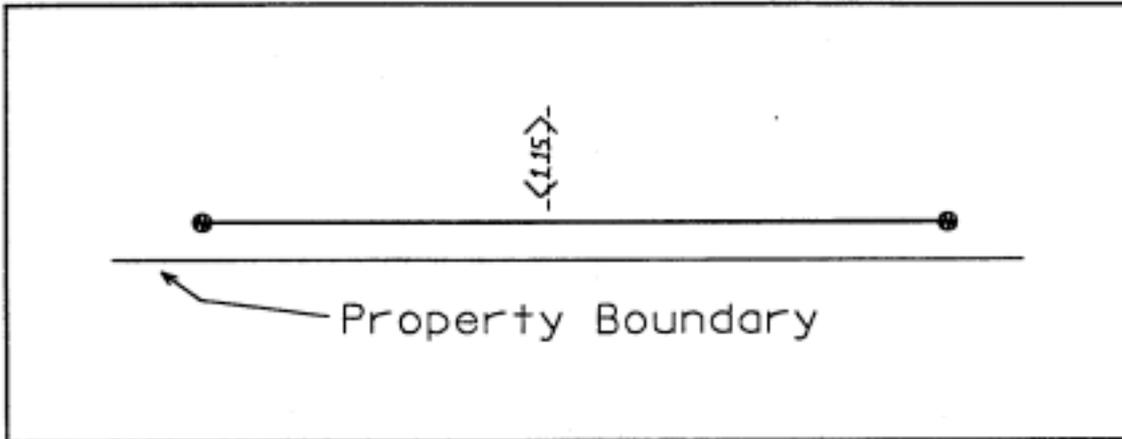


Figure 9-1 Placement of a constant offset

The offset notation may be moved slightly to avoid clashes with other notations.

Variable offsets

If the offset of the sewer is different at each end of the pipe section, the appropriate offsets must be placed as close as practical to the access chambers, as shown in Figure 9-2.

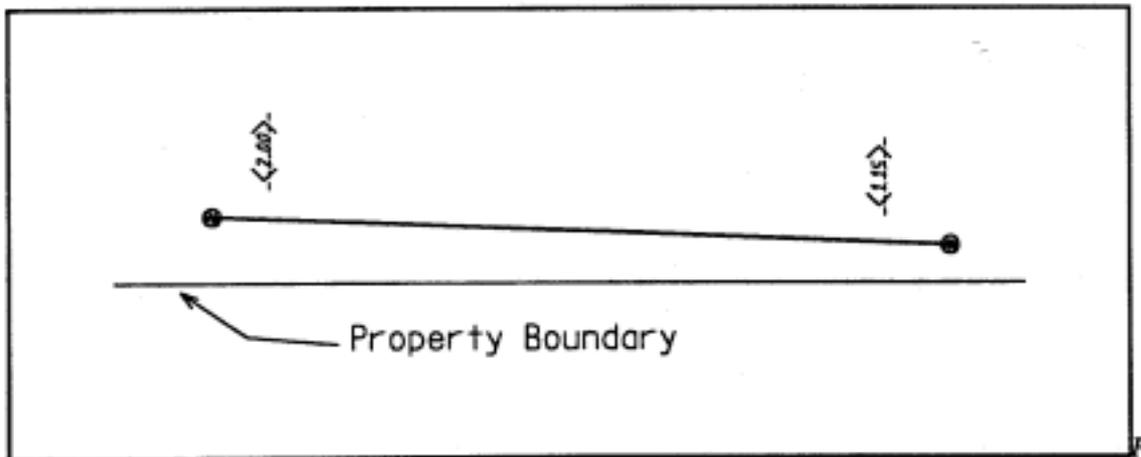


Figure 9-2 Placement of variable offsets

The offset must not be repeated on both sides of an access chamber when it is the same on the both sides. Refer to Figure 9-3.

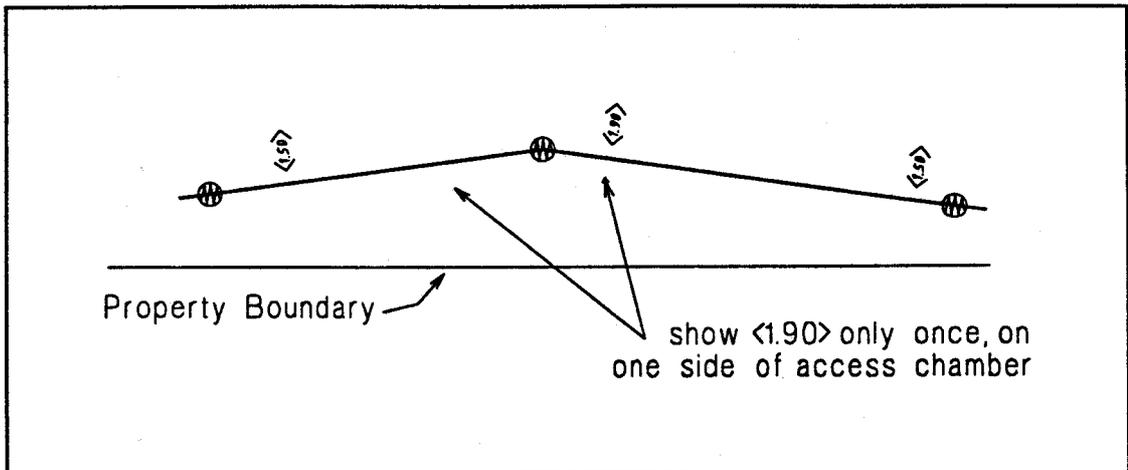


Figure 9-3 Placement of offsets where offset is identical on both sides of access chamber B.

Offsets from features other than property boundary

In some cases offsets will be taken from features other than a property boundary, such as the back of the kerb or a retaining wall. Appropriate text must be added to the offset to indicate the feature to which the sewer is measured. This additional notation must be input using offset symbology. Refer to Figure 9-4

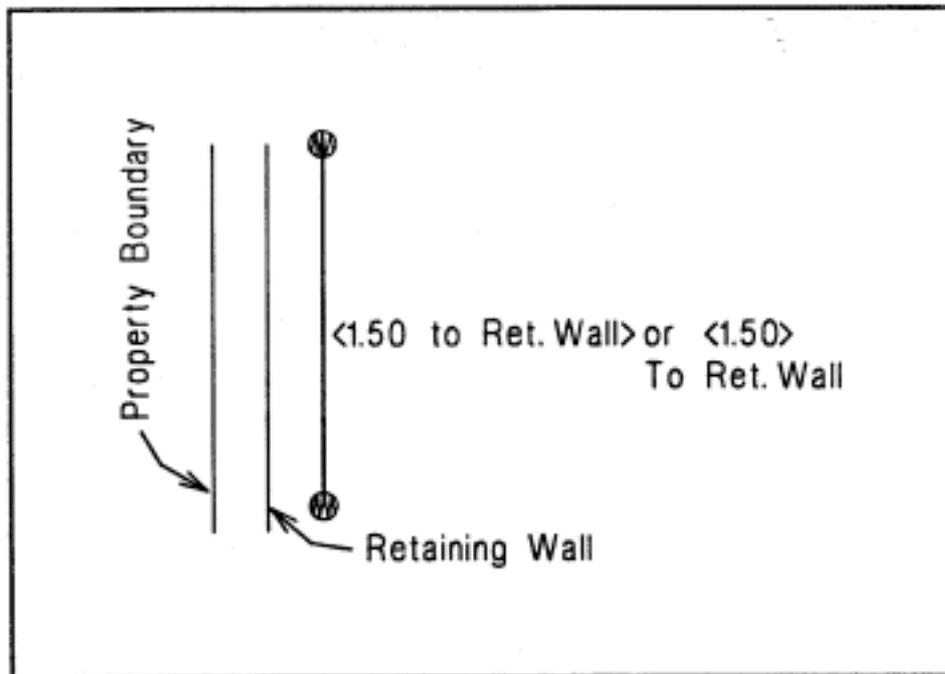


Figure 9-4 Offset from a feature other than title property

Sewer sheds

Sewer shed symbols are used to represent the direction of flow at "high" points in the sewerage system. They usually occur in inner municipalities, either along conduits or at access chambers.

Sewer sheds on pipe sections

Sewer pipe sections which have a sewer shed point on them are classified as vertical curves. The database attribute 305.46 (Vertical Curve) must be recorded as No. 6 (YES) in Code List 13. A sewer shed on a pipe section is graphically represented as in Figure 9-5.

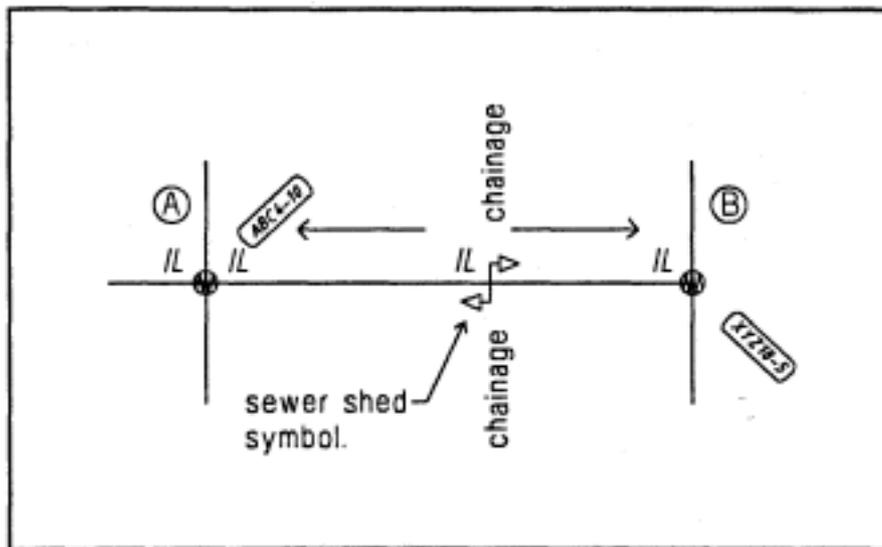


Figure 9-5 Sewer shed: features and notation

Note that in Figure 9-5

- the sewer pipe section from access chamber A-B is input as a continuous line.
- * two flow arrows must be shown. The grade on each must be calculated and displayed for each component of the conduit.
- two chainages must be placed on either side of the sewer shed symbol, indicating the distance downstream to each access chamber in direction indicated by sewer shed arrow.
- * the chainage of the sewer pipe section A-B (conduit length) is not placed in graphics. It must however be recorded in the database as normal.
- the downstream access chamber is considered to be the access chamber furthest from the sewer shed point.

Sewer sheds at access chambers

If a sewer shed occurs at an access chamber, place the symbol slightly to one side of the access chamber, making it clearly visible, as shown in Figure 9-6. In this case, no sewer shed chainage is required and access chamber chainages are displayed in graphics as normal.

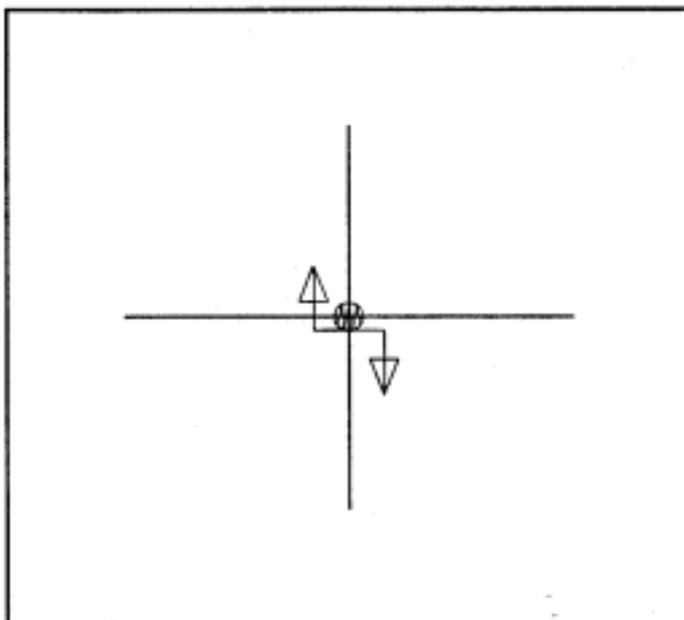


Figure 9-6 Placement of Sewer shed symbol at access chamber

Abandoned sewers

Where it has been determined that a sewerage pipe has been abandoned, the consultant must supply to the Water Company a hard copy plan detailing the extent of abandonment.

Demolished sewers

Where an abandoned sewer has been demolished or removed from the ground, the consultant must supply to the Water Company a hard copy plan detailing the extent of demolition.

Sewer renewals

Sewer pipe sections can be renewed by two methods:

relining replacement

Relining is when another pipe or lining material is inserted into an existing pipe. Replacement is when an existing pipe is removed from the ground and a new pipe is laid in its place.

Relining

For relining the practice should be as per abandoned and demolished sewers. Provide hard copy plans showing the extent of relining with size, materials etc included.

Replacement

In graphics:

Input the new sewer pipe section as normal.

Place text "REPLACED" parallel to and above each sewer pipe section, using conduit replacement/relining symbology, as illustrated in Figure 9-7.

* Supply a hard copy plan of all pipes that have been replaced.

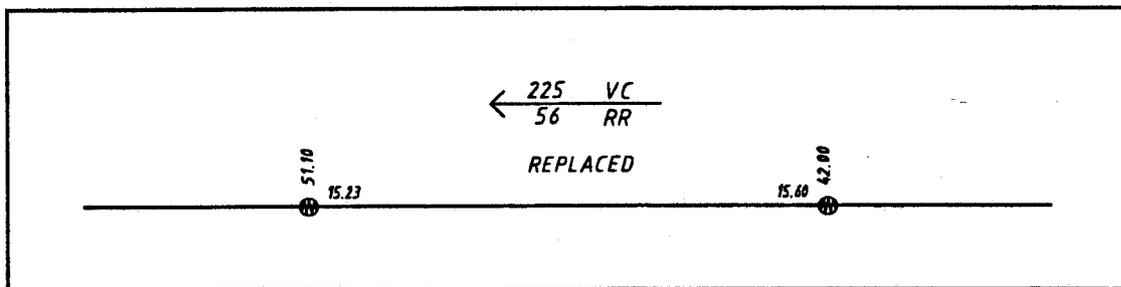


Figure 9-7 Replaced sewer

In the database, all attributes must be input to record the details of the *new* sewer pipe section.

No details of the original pipe are recorded in the database.

Conduit status (305.49) = No. 6 (Active) from Code List 31.

Where reticulation sewers have been replaced, the sewer renewal number may be entered in the database as the reticulation area attribute (305.15). In this case, text SR will replace text RA

Sanitary disposal plants

Input the details in graphics, using sanitary disposal plants symbology.
Contact the Water Company for further details if required.

Detention tanks

Input the details in graphics, using detention tank symbology.
Contact the Water Company for further details if required.

Graphical flags

Graphical flags must be used by consultants to graphically indicate unresolved and edgematching problems.

Graphical flags should be supplied as MicroStation cells; or .DXF blocks;
They do not appear in the cell library. Figure 9-7 illustrates how a " edge match" and " problem" graphical flag should appear.

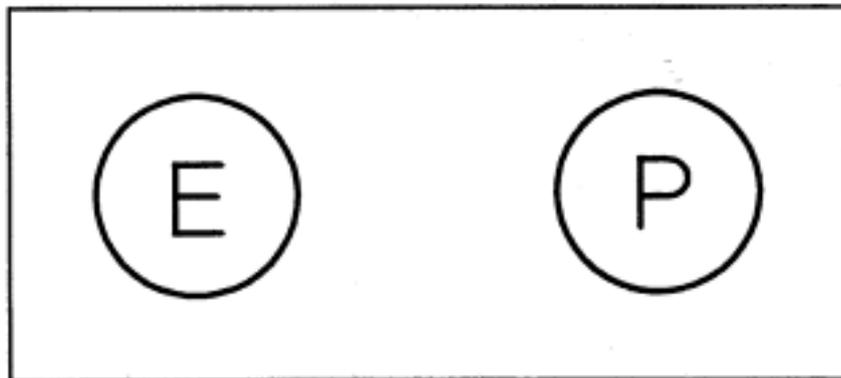


Figure 9-7 Edge match and Problem graphical flags

Edge matching graphical flags

A graphical flag containing the letter " E" must be placed once at each location where additional work is required by the Water Company. Such cases include:

- where edge matching to existing data requires the moving or modifying of data already digitised by the Water Company.
- if the new information mismatches the Water Company data by more than 0.5m.
- + where property service branches cannot be digitised because they connect to an existing sewer line already digitised by the Water Company. Refer to Figure 9-8.

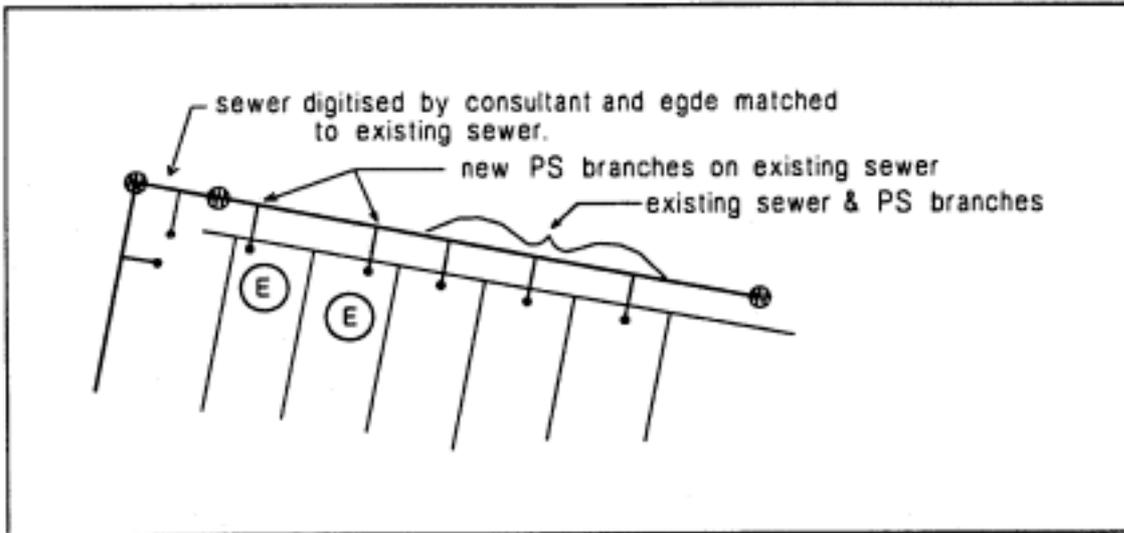


Figure 9-8 Placement of edgematching graphical flag for branches on existing sewer

Problem graphical flags

If a problem cannot be resolved after liaising with the Water Company, a " P" graphical flag must be placed in the graphics file in the vicinity of problem. Problem graphical flags should be placed once for each problem identified.

Documentation to be supplied

Consultants must supply information to the Water Company about each flag placed detailing: Municipality name The Water Company file number The graphical file number

- Approximate AMG co-ordinates
- A clear, accurate and precise description of the problem
- Numbered attachments (for example, copies of field notes and/or plans to clarify the nature of the problem).

This chapter describes the database and graphical requirements for the input of property service branches and associated features.

General

Property service branches are pipes which connect the property service drains within a privately owned property to the Water Company's sewer pipes.

Oblique branches (OBs) are short stub pipes located on sewer pipes to allow for the construction of property service branches at a later date. They should not be confused with oblique branches on property service spur branches.

The graphical difference between property service branches and oblique branches on sewer pipe sections is explained in *Chapter 3*. The Intergraph line type to be used for branches and OB's (for MicroStation DGN) is specified in Table 3-1.

Property service branch conduits and oblique branch conduits must be input to:

- ◆ intersect exactly with the sewer pipe that owns them. Branches constructed out of access chambers are owned by the sewer immediately downstream, and must be included in the branch count for that sewer pipe section.
- ◆ show all bends (shown as a line string and not individual line segments).

Database

Property Service and Oblique Branches (entity 313) are owned by Sewer Pipe Sections (entity 305).

Branch count

The branch count (305.44) for a pipe section must include:

- ◆ all individual property branches,
- ◆ all spur branches including the branch which does not actually connect to the sewer,
- ◆ all property service branches and oblique branches out of the upstream access chamber.

Property service numbers

All property service branches and oblique branches constructed on a sewer line must have a unique property service number.

Property service numbers can be obtained from the Water Company.

Dummy property service numbers

In cases where more than one property service branch on a sewer have the same property service number, the existing number must be assigned to only one branch. Unique dummy property service numbers must be assigned to all other branches or OB's servicing that property.

Dummy numbers must also be assigned to branches and OB's on the sewer for which the Water Company property service number is not available.

The correlation between dummy and existing property service numbers must be recorded in a .PSL file. Refer to *Chapter 1* for details.

Dummy property service numbers must be eight characters in length and assigned with a three letter prefix according to the name of the consultant (ie three letter prefix followed by five numbers. For example, the company "ACME Digitising Corporation" could assign all dummy property service numbers with the three letter prefix "ADC". These numbers can only ever be used once.

The assignment of dummy property service numbers is shown in Figure 10-1.

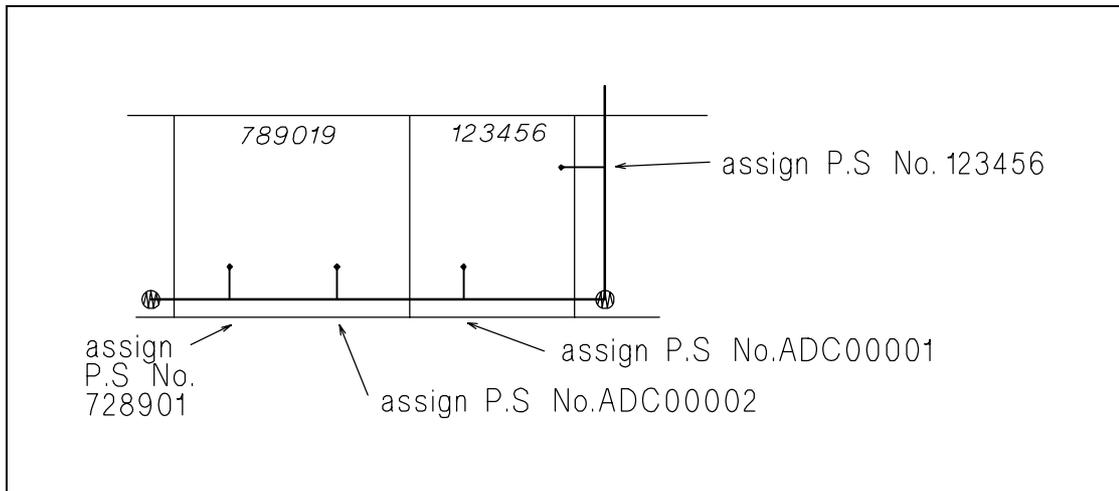


Figure 10-1 Assignment of dummy property service numbers where existing property service numbers exist

Note: For each municipality the dummy number must be unique. It is the consultants responsibility to ensure that for every job presented in a municipality that it has not been duplicated.

Property service branch size

The property service branches size is determined in the field at time of construction and are based on their internal diameter. The sizes is obtainable from the Code List 41.

Property service branch material

The property service branches material is determined in the field at time of construction. A full listing of materials is available in Code Lists 43 & 44.

Property service branch length

The property service branches length is determined in the field at time of construction. It is the distance measured from the intersection of the OB and the sewer to the end of the branch where the house connection will be later placed.

Property service branch type

The property service branch type descriptions in Code List 321 and 322 describe the configuration of the branch structure. The entries 22 to 32 inclusive relate to the current branch types. These are determined in the field at the time of construction.

Property service branch chainage

The distance from the downstream access chamber to the branch (attribute 313.20) is commonly referred to as the branch chainage.

The chainage of property service branches must be entered in the database as running chainages, measured from the downstream access chamber. For all branches constructed out of an upstream access chamber, the branch chainage must equal the conduit length (305.18).

Property Service branch surface level

The surface level is determined in the field at the time of construction. It is the natural surface level directly above the end of the property service branch.

Property Service branch invert level

The invert level of a property service is determined in the field at the time of construction. It is the AHD level of the end of the property service branch.

For type 2A branches it is the top of the pipe end. This will be cut at a later date when the plumber installs the house connection and the length of pipe cut off will have to be measured and supplied back to the Water Company to enable the invert level to be adjusted in the database and graphics.

Graphics

Property service branch ties

Property service branch tie notation and dimensions must be placed for all property service branches.

They are not recorded in the database.

Placement of property service branch ties

The following guidelines should be followed when placing property service branch ties in graphics. Refer to *Chapter 3* for details regarding text strings for tie text and dimensions.

Tie text/dimension should be placed parallel to the dimension being defined. This means that the notation will be at a right angle to the title boundary or projection line to which the dimension is being measured.

Where this is not practical, the tie text/dimension may be placed parallel to the sewer on which the branch is located.

Variations in the placement of tie text dimensions are shown in Figure 10-2(a).

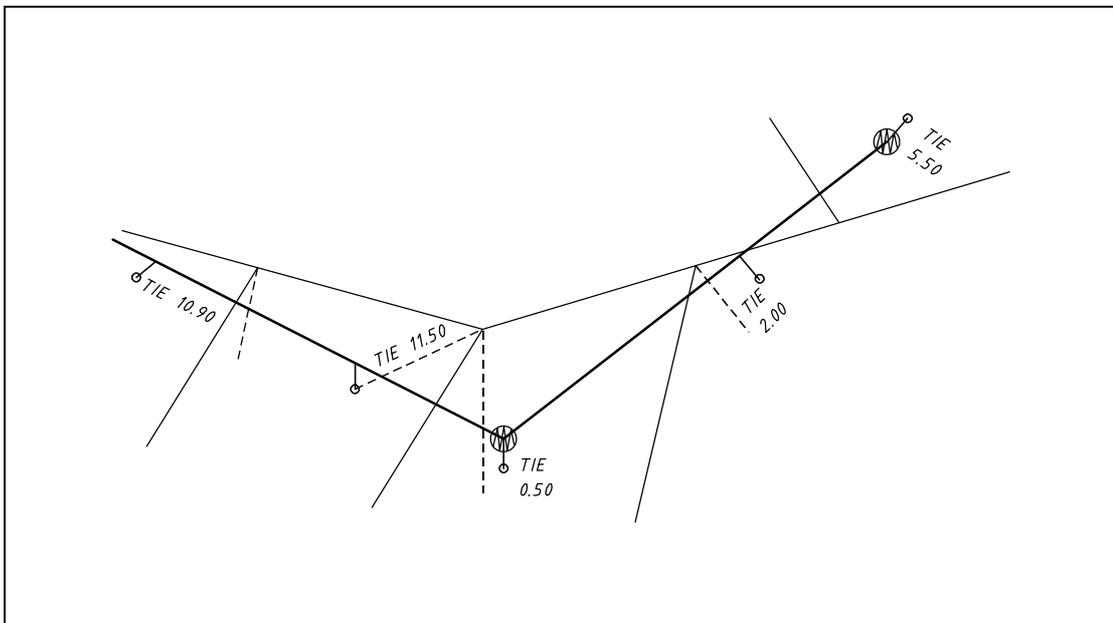


Figure 10-2(a) Variations in the placement of property service branch ties

Note: Tie 11.50 in Figure 10-2(a) is a direct tie, placed parallel to the distance being defined by the projection line.

Where possible, property service branch ties should be placed at a constant offset from the title boundary, easement or sewer line for the length of successive sewer pipe sections, as shown in Figure 10-2(b).

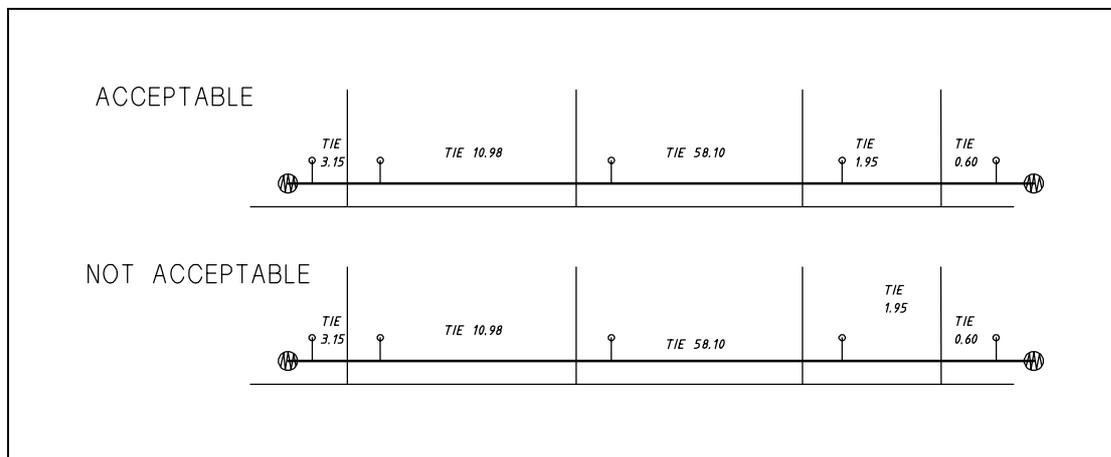


Figure 10-2(b) Placement of property service branch ties

Ties must be placed between the branch and the appropriate property boundary or projection line where space permits, as shown in Figure 10-2(c).

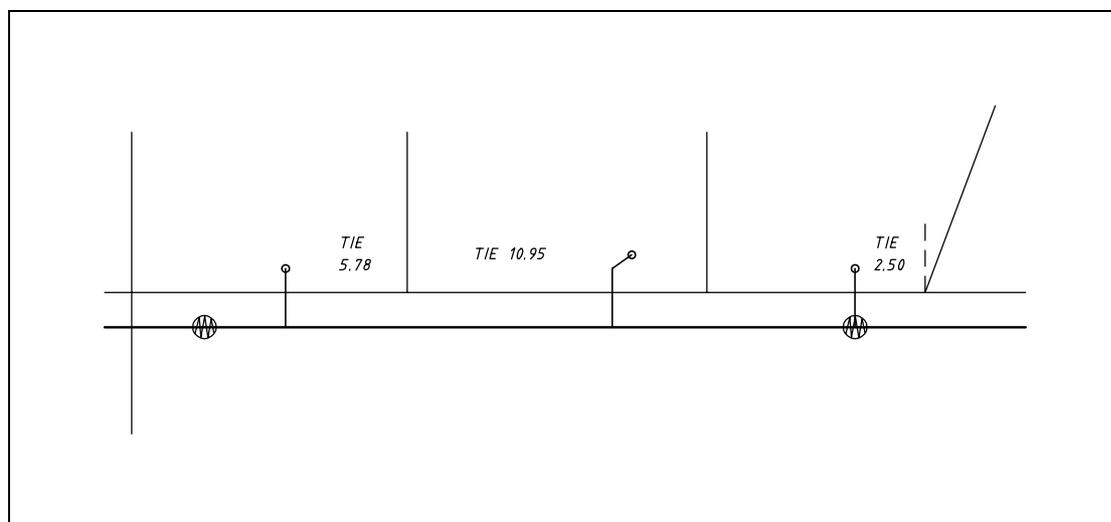


Figure 10-2(c) Placement of property service branch ties

If space does not permit a tie to be placed between the branch and the appropriate title boundary or projection line, it should be placed adjacent to, but clear of the end of the branch, as shown in Figure 10-2(d)

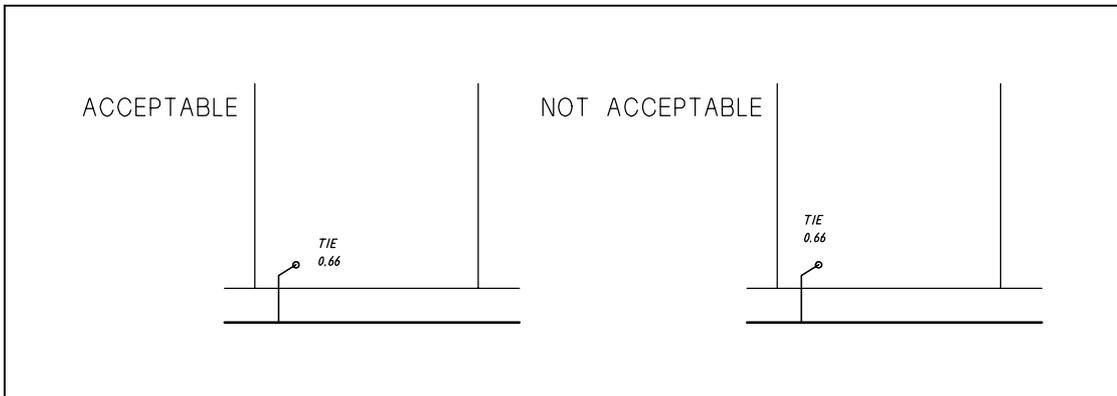


Figure 10-2(d) Placement of property service branch ties

Ties must always be placed within the property of the branch to which they refer, as shown in Figure 10-2(e).

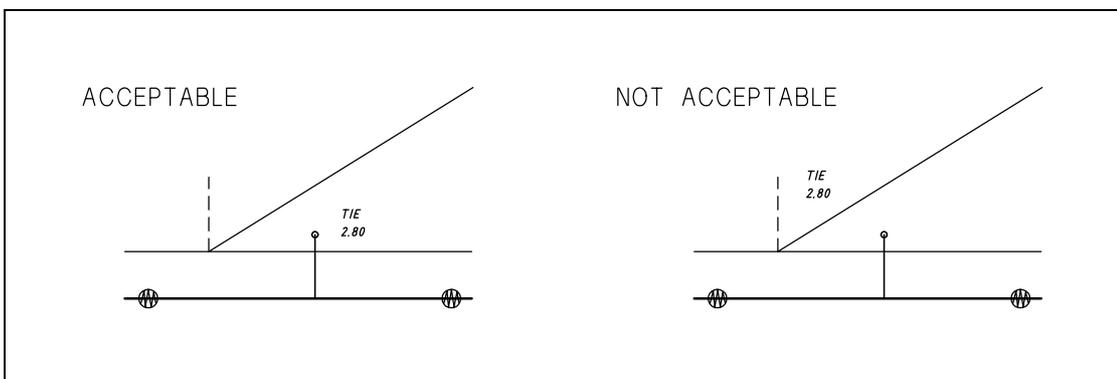


Figure 10-2(e) Placement of property service branch ties

If a branch has several ties associated with it, place all ties.

For extremely long distances, or to clarify obscure dimensions, a tie arrow may be used to indicate the title or feature from which the tie is measured. The tie notation may also be edited to clarify the distance being defined. Refer to Figure 10-2(f).

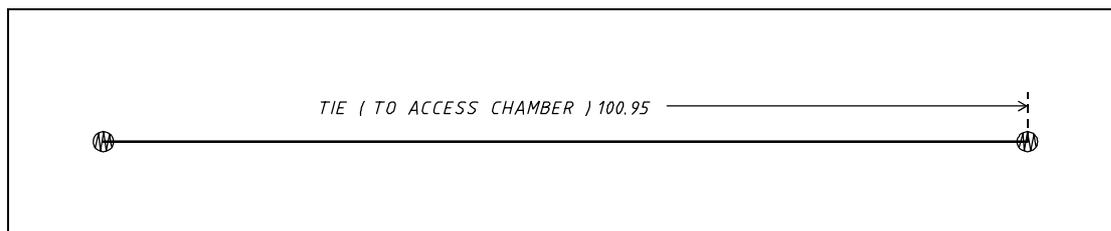


Figure 10-2(f) Placement of property service branch tie to access chamber

If an easement is parallel to the title and sewer line, it is acceptable to place a tie as shown in Figure 10-2(g).

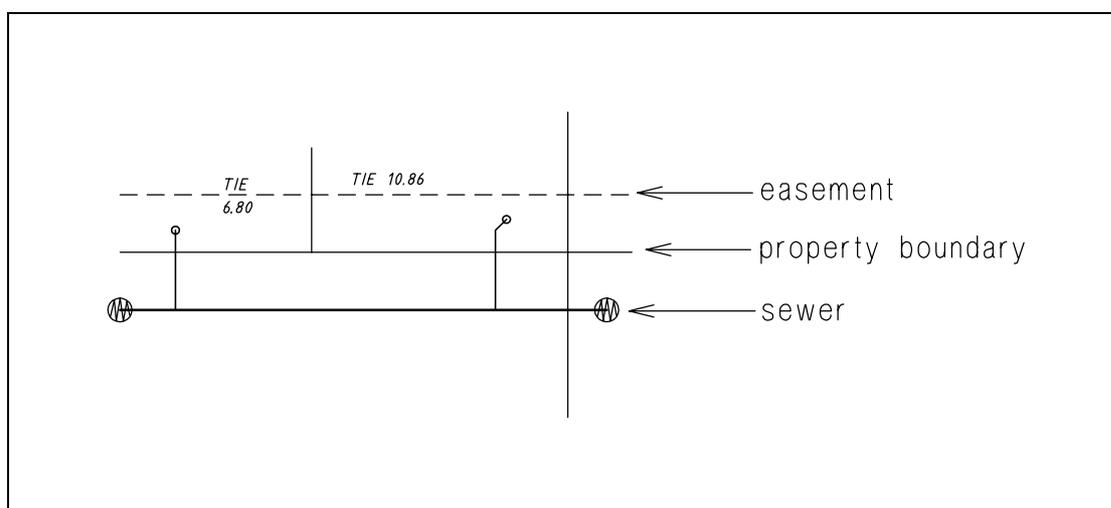


Figure 10-2(g) Placement of property service branches with respect to easements

In extreme cases, a tie can be placed wholly within an easement, if the easement is wider than 3.00 metres.

Projection lines

A project line is used to indicate the point to which a tie is measured, where the point is other than a nearby title line at right angles to the dimension.

For standard ties

If there is any doubt where the tie has been taken from, a standard tie (projection) line must be used. In graphics, they should extend to the same offset as the tie text, as shown in Figure 10-3.

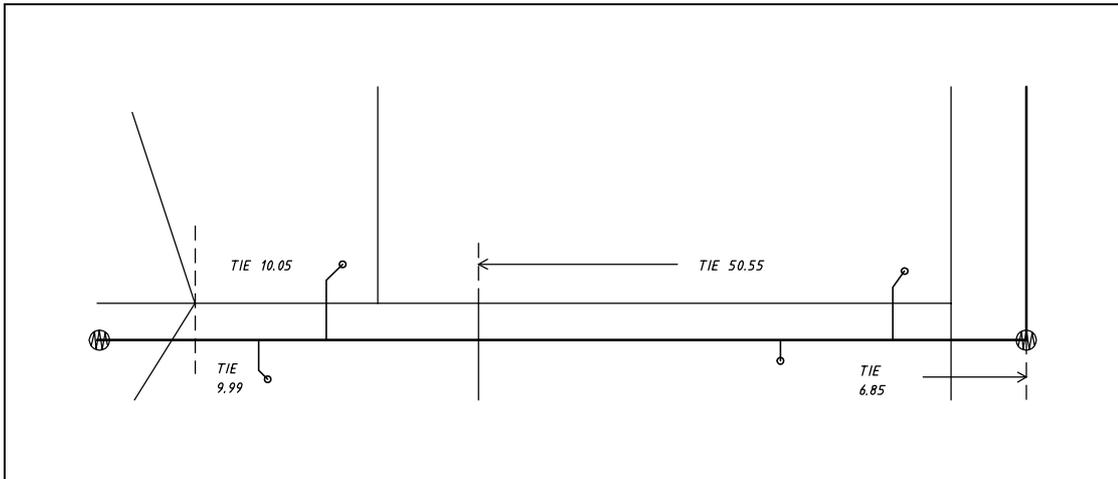


Figure 10-3 Projection lines for standard ties

For direct ties

Projection lines may be placed to indicate direct ties. That is, the distance between the end of a property service branch and a feature (for example, a access chamber or the corner of the title). In these cases, the tie should be placed on the same angle as the projection line as shown in Figure 10-4.

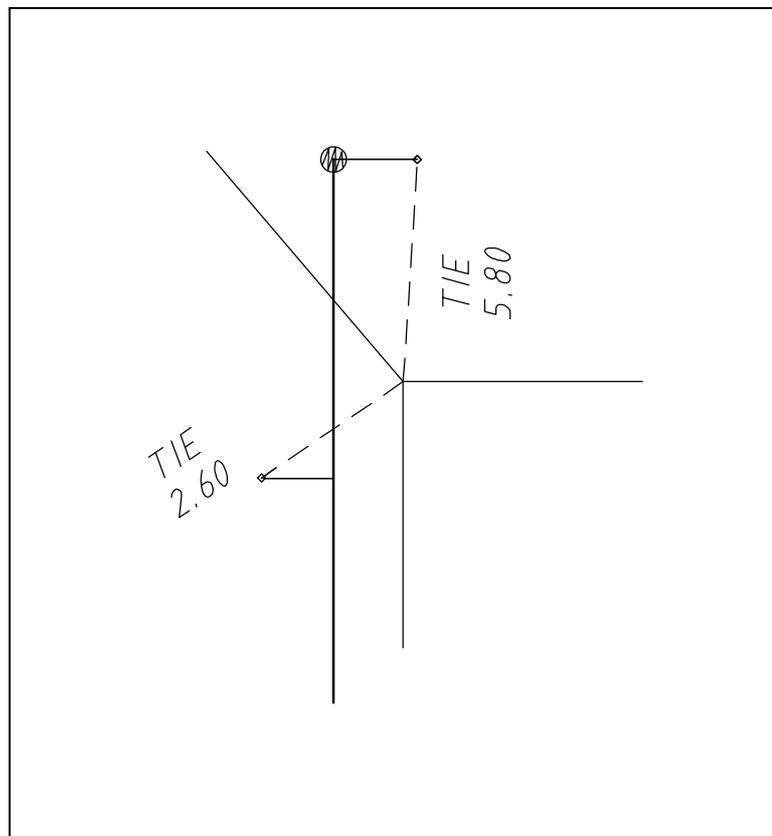


Figure 10-4 Projection line placement to define direct tie alignment

Property service branch features and notation

Property service branch chainage

The distance from the downstream access chamber to the branch is commonly referred to as the branch chainage.

The chainage of property service branches and OB's must be entered in graphics as running chainages, measured from the downstream access chamber. For all branches and OB's constructed out of an upstream access chamber, the branch chainage must equal the conduit length.

The chainage is to be placed in graphics as per Figure 10-5.

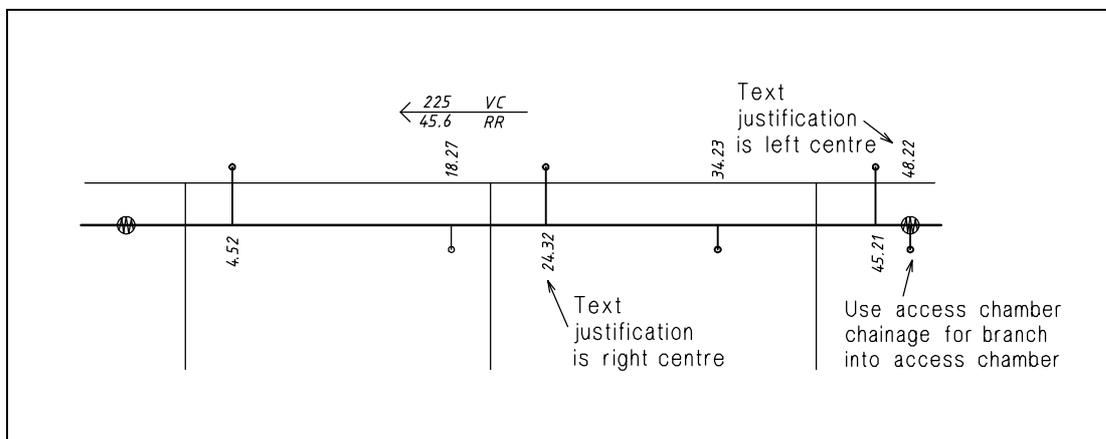


Figure 10-5 Placement of P.S. branch chainages

Spur branches and OB on branch chainage

Spur branches are property service branches that fork to provide more than one connection point. When placing spur branches:

- ◆ Input the first branch (A-C in Figure 10-6) as normal, connecting to the sewer. This is generally the longest and/or straightest of the branches.
- ◆ Input the second, usually the shorter branch (B-D in Figure 10-6), connecting it to the first branch.
- ◆ Place the text OB and the chainage at the spur, either parallel to the sewer line, or at a right angle to the first branch. This chainage represents the distance along branch A-C from point A to point where the second branch is connected.

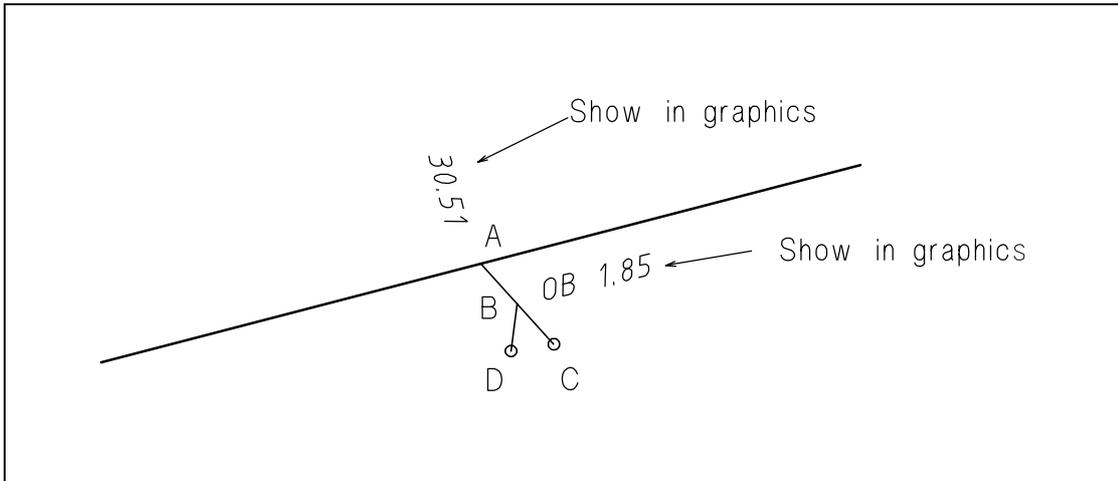


Figure 10-6 Spur branch

Note: In the database, distance downstream access chamber to branch (313.20) is identical for both branches. Also both branches must be recorded in the branch count (305.44).

Surface level and invert level of branch

The text is to be placed as a three line block of text at right angles to the sewer in approximately the centre of the property. For large allotments, reserves etc. place the text closer to the branch. Refer to Figure 10-7.

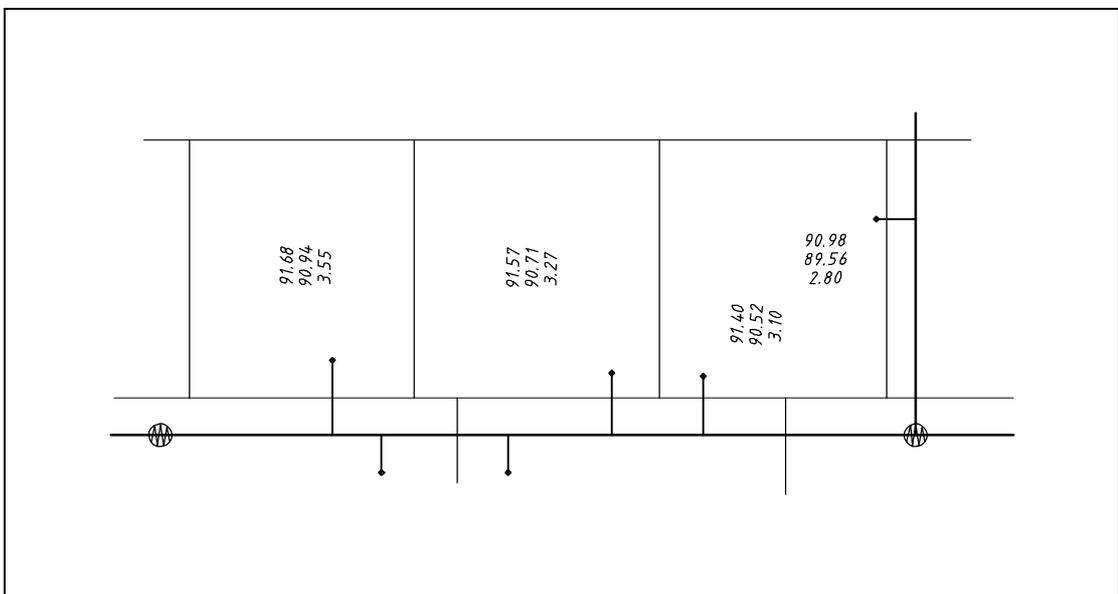


Figure 10-7 Placement of end of pipe text

Jump-up symbol

A jump-up (JU) indicates the location on the branch of a vertical rise or stack. For all jump-ups with a chainage of 1.00 meter or greater, the cell JORED must be centrally placed on the branch at the location of the jump-up at a right angle to the branch.

The jump-up chainage measures the distance along a property service branch from the sewer line to the point on the branch at the location of the jump-up stack.

If a JU and OB chainage is identical, text may be placed to read “JU & OB”, as shown in Figure 10-8. Placement of a JU cell is not required in this case.

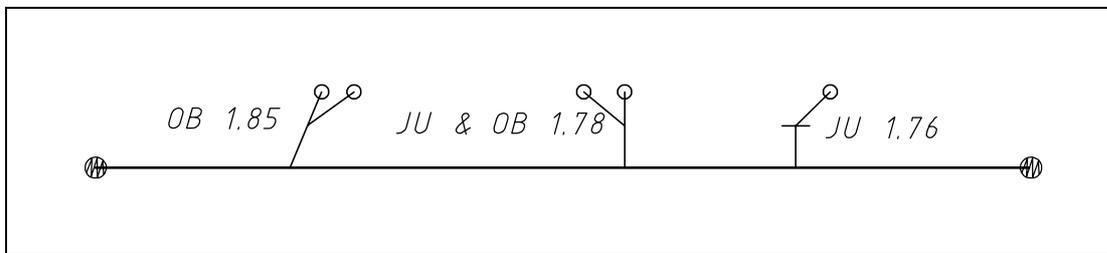


Figure 10-8 Variations in the placement of identical JU and OB chainages

Long property service branches

Long property service branches are those which extend across roads or service two or more properties by means of a spur branch.

Long property service branches of constant size

These are true long property service branches and must be input in the same manner as normal property service branches. Refer to Figure 10-9. The following guidelines must also be observed:

- ◆ Any available invert levels must be placed on the long property service branch as miscellaneous invert levels.
- ◆ The branch length (313.17) must be entered in the database as the entire length of the branch.

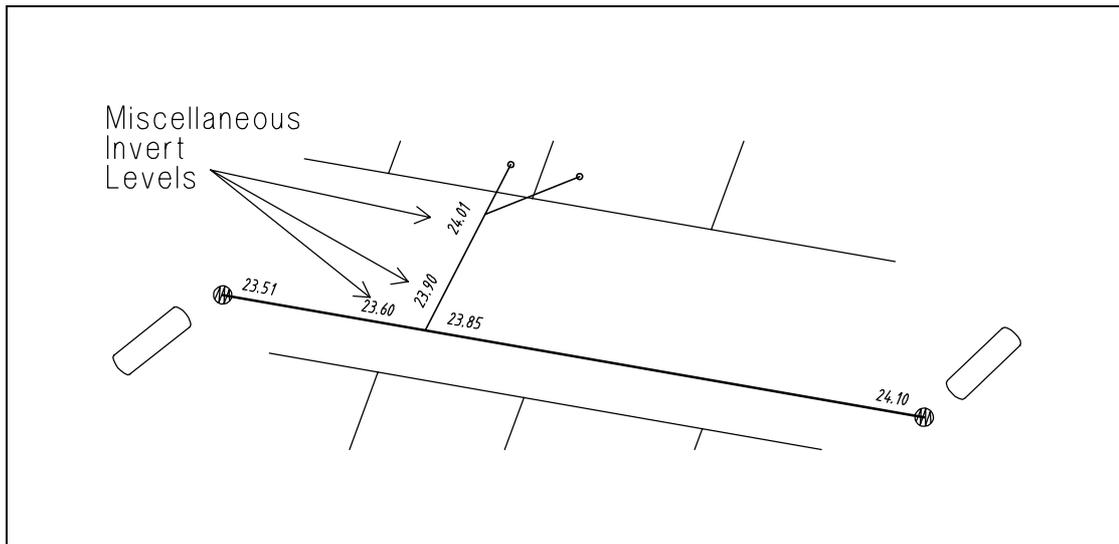


Figure 10-9 Long property service branch of constant size

Long property service branches of varying size

Long property service branches which reduce in size at the upstream end must be digitised as two separate components:

- ◆ a sewer pipe section up to the reducer
- ◆ a property service branch beyond the reducer

An end of pipe access chamber must be placed at the location of the reducer. The cell JORED must not be used as a reducer to define a sewer pipe section. If the sewer pipe section component of the long property service branch connects to a sewer line between access chambers then the pipe must be broken at the junction and all pipes treated as separate sewer pipes. At the intersection place a junction access chamber (cell name JUNC). Refer to Figure 10-10.

The following guidelines must also be observed:

- ◆ The branch length (313.17) must be entered into the database as the length of the actual property service branch only. This is from the end of the property service branch downstream to the end of pipe access chamber which was placed as a reducer.
- ◆ The branch chainage (313.17) must be entered as the reducer chainage at the end of the sewer pipe section, not as the chainage of the pipe junction access chamber on the downstream sewer line. This chainage is also the access chamber chainage and the conduit length (305.18).

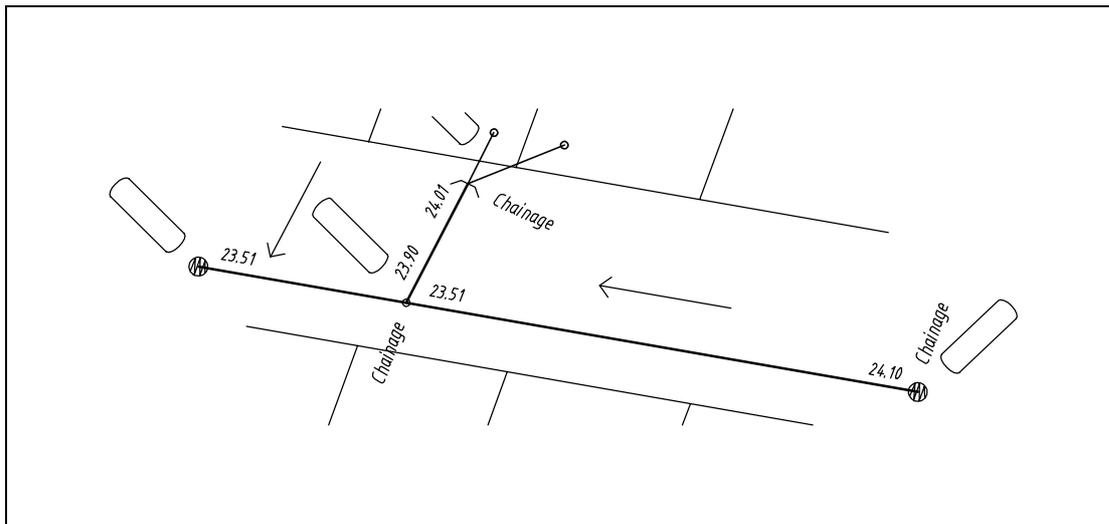


Figure 10-10 Long property service branch of varying size

Reducers on branches

In cases other than for long branches, the reducer symbol JORED must be placed centrally on the branch and at a right angle to the branch. Place the chainage opposite the cell also at a right angle to the branch and prefix with text “RED”.

The reducer chainage must represent the distance along the branch to the access chamber immediately downstream of the reducer. Refer to Figure 10-11.

Bends in branches

If a chainage is available for a bend in a branch, text “BEND” and chainage must be placed at a right angle and adjacent to the bend. the chainage of the bend must represent the distance along the branch, to the access chamber immediately downstream of the bend. Refer to Figure 10-11.

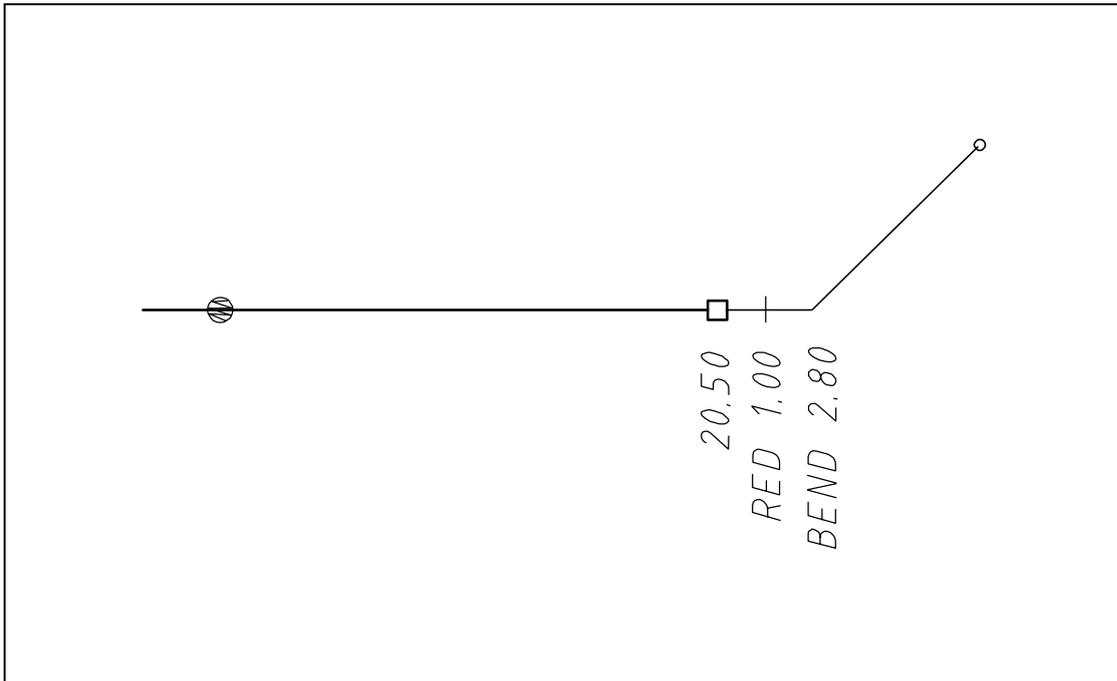


Figure 10-11 Bend and reducer on a property service branch

Property service number placement

The property service branch number must be placed in the front of the property as per example in Figure 10-12.

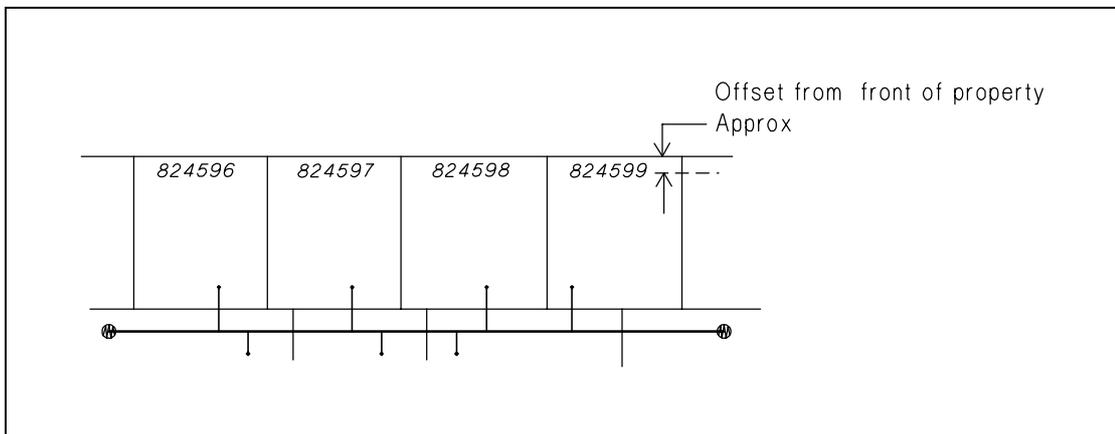


Figure 10-12 Example of property service number placement

Boundary trap and combined drain notation

If a property service branch is fitted with a boundary trap, indicate this by placing the appropriate text, **BT** adjacent to the property service number, as shown in Figure 10-13.

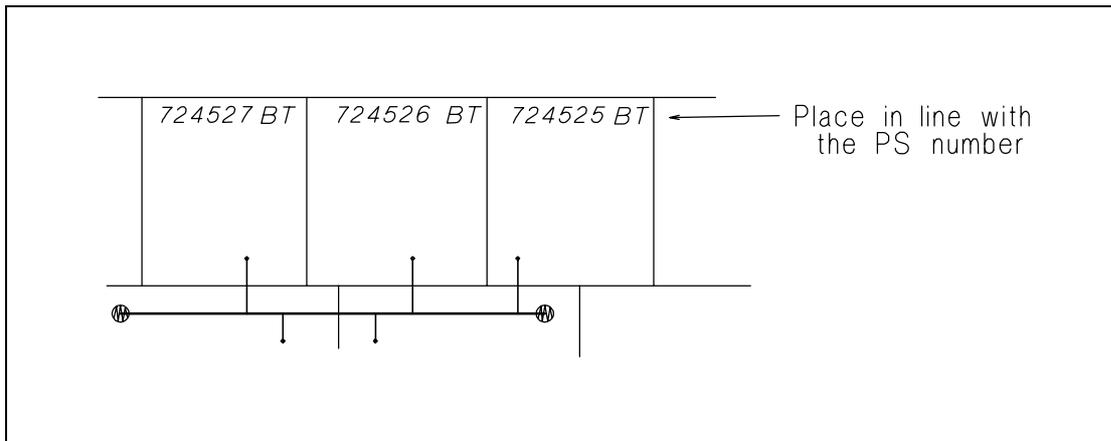


Figure 10-13-1 Example of boundary trap (BT) text placement

If properties are serviced by a combined drain, indicate this by placing the appropriate property service number that services the property and place the text, **CD** adjacent to the property service number. If the property service connection has a boundary trap place the text **BTCD** in the property with the boundary trap. This is illustrated in Figure 10-13-2.

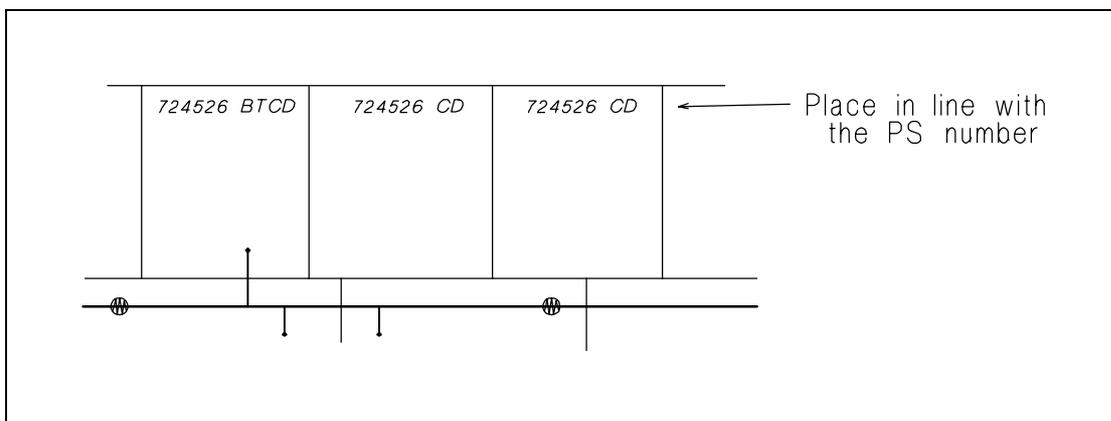


Figure 10-13-2 Placement of combined drain and boundary trap notation

Properties without a property service branch

For properties which have been assigned a property service number by the Water Company, but do not have a property service branch, the property service number must be shown in graphics (using the appropriate symbology). The property service number should be placed midway along and parallel to the front boundary of the property, between the title line and lot number. Refer to Figure 10-14.

This occurrence should rarely happen.

Dummy property service numbers must not be placed in graphics.

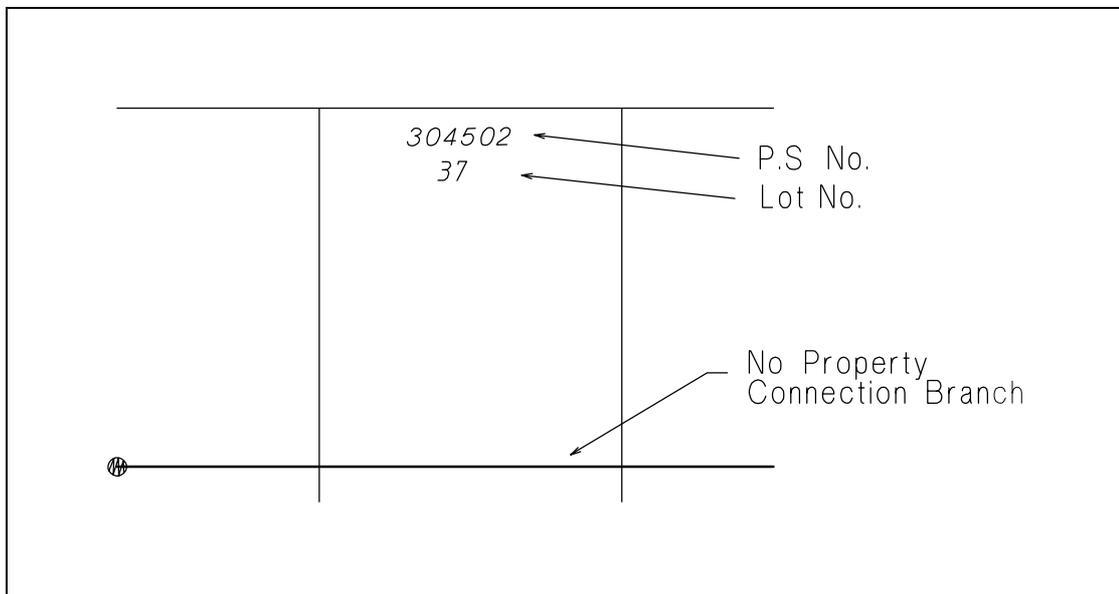


Figure 10-14 Placement of a property service number in graphics, for a property without a property service branch

New PS branches on existing sewers

For property service branches on existing sewers the following is to be used for supply of digital information.

For Linked .DGN format

For property service branches on existing sewers the following is to be used as a guide

1. Obtain a digital copy of the Water Company's FIS data for the area concerned together with the original sewer project name/number that it was constructed under. (eg 456/10)

2. Digitise a new sewer line exactly over the top of the existing sewer pipe and in the 305 entity table recreate the existing FIS database occurrence (obtained from the Water Company) for the pipe section as set out below:

- a) 305.99 Unique identifier
- b) 305.90 owner entity number (303)
- c) 305.91 owner unique identifier
(the original project name/number - ie. the 303.99 attribute)
- d) 305.10 downstream structure number
- e) 305.12 upstream structure number

All other attributes in the 305 entity table can be omitted

Refer to Table 2-3 for database details.

3. In the 303 entity table record the original sewer project name/number that it was constructed under. (eg 456/10) That is:

- a) 303.99 Unique identifier
- b) 303.90 owner entity number (301)
- c) 303.91 owner unique identifier (the treatment plant)
- d) either the 303.10, 303.14, 303.15 or 303.16 attribute as per **Schedule 1** in the *database specifications* in Chapter 2

Refer to Table 2-2 for database details.

4. The 301 entity table record will be the same as the current one being used for the new project being constructed
5. Once all of the property service branches have been input into graphics and had their database attributes input into the 313 entity table. Delete the graphical elements for the existing sewer pipes and access chambers ensuring that the database attributes **are not deleted** too. This is achieved by turning the delete entity switch to “off” in MicroStation.

It is imperative that these procedures are followed and that all graphics are deleted for the existing sewer pipes and access chambers leaving the database records still in the ASCII file.

The Water Company's translator will successfully input these branches into the FIS if these procedures are used. If they are not the translator will fail resulting in a rejection of the data and a possible non conformance being issued.

For Unlinked MicroStation .DGN and .DXF formats

The additional branches cannot be provided to the Water Company via the means set out above.

The consultant must provide the information relating to these branches in hard copy format in the form of field notes.

If the information relating to these branches is included in the ASCII files it will result in a failure to process through the Consulcad translator resulting in a rejection of the data and a possible non conformance being issued.

The graphics elements may be supplied in the graphics file as long as there is no database information relating to them in the ASCII file.

Documentation **must** be supplied drawing the Water Company to the attention of these particular type of branches being constructed on existing sewers.

Chapter 11 Private and Other Authority Sewers

This chapter covers the requirements for the graphical input of private and other authority sewerage assets.

All features associated with sewerage works not owned by the Water Company must be input in the same manner as normal sewerage assets, but in graphics only. Elements relating to private or other authority sewers **must have no link to the database**.

Numbering of access chambers

Although only graphical representations, access chambers must be assigned unique numbers in the manner described in *Chapter 7*. The numbering of access chambers for private and other authority pumping stations is as follows:

- ◆ Private sewerage pumping stations must be designated a two part unique access chamber number based on the municipality in which they are located.

The number must take the form:

PPSmn-No.

Where:

- PPS = Private Pumping Station abbreviation
- mn = Municipal Number (from Code List 15 and 17)
- No. = Number of pumping station, to be assigned on an incremental basis.

Therefore, the private sewerage pumping stations in Werribee would be numbered PPS42-01, PPS42-02 and so on.

- ◆ Other authority sewerage pumping stations must be designated a two part unique access chamber number based on the municipality in which they are located.

The number must take the form:

OPSmn-No.

Where:

- OPS = Other Authority Pumping Station abbreviation
- mn = Municipal Number (from Code List 15 and 17)
- No. = Number of pumping station, to be assigned on an incremental basis.

Therefore, the other authority sewerage pumping stations in Werribee would be numbered OPS42-01, OPS42-02 and so on.

Graphics

The following guidelines must be taken into account when placing private and other authority sewers:

- ◆ Because these sewers have no connection to the database, property service branch details must be shown in graphics. The property service branch chainage must be placed adjacent to the branch, on the opposite side of the sewer, at a right angle. Branch surface level, invert level and end of pipe length are placed in a group, as illustrated in Figure 11-1.

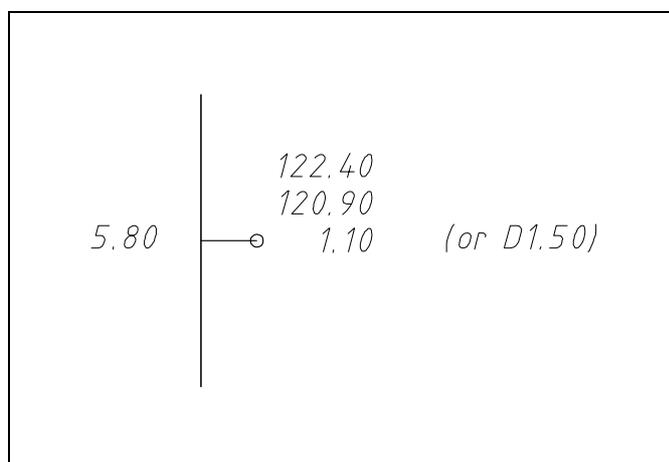


Figure 11-1 Placement of property service branches on private and other authority sewers

- ◆ Private sewers and private rising mains must be labelled with the name of the company they are owned by as illustrated in Figure 11-2.

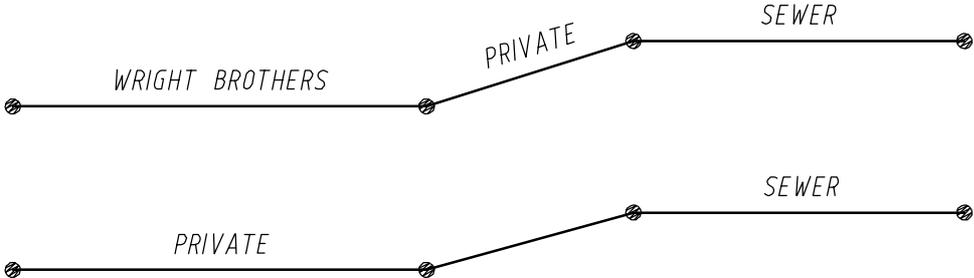


Figure 11-2 Placement of private sewer notation

access chamber

A feature on the sewerage system which allows inspection of and/or access to the sewerage system. Access chambers are used to define sewer pipe sections via their upstream and downstream numbers. See entries under *standard access chamber*, *intermediate access chamber*, *sewerage pumping station access chamber* and *emergency relief structure*.

access chamber chainage

The distance between one numbered access chamber and the next numbered access chamber immediately downstream. Also referred to as the conduit length of the sewer pipe section.

access point

refer *access chamber*

attribute

A database field (column) under which details are stored about a particular entity.

branch tie

A measurement which specifies the location of the end of a property service branch, usually measured from the corner of a property or a fixed feature.

cell

A combination of elements which form a standard graphical symbol for the representation of a feature. Cells are able to be manipulated as a single element. The cell origin is the point at which a cell is placed, usually at the centre if the cell is symmetrical.

code list

A list of numbered item descriptions which describe particular attribute values in standard terminology. Code list entry numbers are entered in the database as attribute values for particular items.

curved sewer

A sewer pipe section which contains horizontal and/or vertical changes of alignment such as curves, bends or changes of grade.

database file

An ASCII format file with an extension containing the database records of the attributes for a particular entity. One file is required for each entity in each municipality.

database schedule

A listing of all entities and associated attributes for which the Water Company requires valid database records. The schedule includes details of formats, default values and user notes for each attribute. In this document, the database schedule is referred to as “the database”.

default value

A database entry input when a value cannot be determined from source documents.

downstream

The end of a pipeline to which sewage flows by gravity or is pumped. For gravity sewers, the downstream end is usually lower than the upstream end. For rising mains, the downstream end is usually higher than the upstream end. Also see *upstream*.

dummy property service number

A unique number which must be assigned by consultants to property service branches on sewer lines when a the Water Company assigned number is not available, or a single the Water Company number relates to multiple branches. Also see *property service number*.

edgematching

The process of connecting new pipe sections to previously digitised data.

element

A basic graphical item. For example, a line, circle or arc.

emergency relief structure (ERS)

A system of sewer pipe sections and/or access chambers designed to control sewage overflow during peak wet weather flow or the failure of pumping stations. Each emergency relief structure includes a specially designed access chamber - the ERS access chamber.

entity

A database table consisting of attributes (columns) and occurrences (rows).

flow arrow

The graphical pointer which indicates the overall direction of flow of sewage along a sewer pipe section, as determined by gravity or pumping. Data displayed on the flow arrow indicates the size, grade, material and joint packing of the sewer pipe section to which it relates.

grade

The slope (or gradient) of a pipe. Grade is calculated from the conduit length and the difference between the upstream and downstream invert levels.

graphical flags

Symbols placed in graphics files by consultants to indicate locations where further action is required by the Water Company.

gravity sewer

A sewer pipe section through which the sewage flows under the influence of gravity.

horizontal curve

Any change of direction in the horizontal alignment of a sewer pipe section. Horizontal curves include bends and smooth curves of constant or varied radius.

independent sewer

A sewer which connects to the immediate downstream sewer by way of an end of pipe or pipe junction access chamber. They typically occur where a sewer line has been extended on the same alignment, or where a change of size, material or status has occurred.

intermediate access chamber

An access chamber is intermediate when it is located between standard access chambers, and there is no change of conduit size, grade, material, level or project at that point. Intermediate access chambers are not numbered and do not require database attributes.

invert level

The level (to Australian Height Datum) of a point on the inside bottom of a pipe.

level structure

A listing of the levels to which all items must be assigned in graphics files.

manhole

Refer to *access chamber*

municipal index file

Graphics file showing the geographic division of and numbering of municipalities. The boundary lines define the placement of graphics data in each digital file.

named sewer

Named sewers from the basis of gravity sewerage systems. All sewer pipes of 300 mm diam. and greater are classified as named sewers. Some pipes of less than 300 mm diam. are also classified as named sewers, as defined by the Water Company. Most named sewers are branch sewers or main sewers.

occurrence

A database field (row) which records an entities attribute.

offset

A measurement that specifies the location of a pipe line, usually measured at a right angle from a property boundary.

other authority sewer

A sewer and its associated features which is owned and operated by an authority other than the Water Company which may or may not outlet to the Water Company sewerage system.

outfall access chamber

The access chamber, usually at the downstream end of a rising main.

precast access chamber

A manufactured access chamber, usually circular.

private sewer

A sewer and its associated features which is owned and operated by a private company which may or may not outlet to the Water Company sewerage system. Also see *other authority sewer*.

property service branch

Pipes which connect the property service drains within a privately owned property to the Water Company's sewer pipes.

property service list file

An ASCII format file with the extension .PSL containing a list of dummy property service numbers and the corresponding Water Company property service numbers. One file is required for each municipality. Also see *dummy property service number*.

property service number

A unique number assigned by the Water Company to each property served by the sewerage system. They serve as reference numbers for records about the property service branch, property service drains and fittings within the property. Also see *dummy property service number*.

property service oblique branch

Short "stub" pipes on sewer pipes which allow for the future construction of property service branches. Also referred to as OB's. These are graphics only elements with no database information.

pumping station access chamber

An access chamber structure containing sewerage pumping equipment. Sewerage pumping stations vertically lift sewage and either convey it under pressure to another point in the sewerage system, or discharge it at a higher level into the gravity sewer immediately downstream.

reticulation area / reticulation extension projects

Particular types of sewer projects consisting of sewers of less than 300mm diameter. Reticulation area numbers are prefixed by text “RA” and reticulation extension numbers are prefixed with text “RE”.

reticulation sewer

A gravity sewer pipe of less than 300 mm diameter. Reticulation area and reticulation extension projects may only consist of reticulation sewers.

rising main

A sewer pipe section through which sewage is pumped, usually in an uphill direction.

running chainage

A chainage which increments along the length of a sewer pipe section between two numbered access chambers. The downstream access chamber is assigned a datum chainage of zero. The zero is not shown in graphics.

sewage

The effluent (waste water) conveyed by sewer pipes.

sewerage

The system of sewer pipes, access chambers and structures that collect and convey sewage from individual properties to treatment plants for purification.

sewerage project

The scheme under which the sewers of a particular area are planned, designed and constructed. Types of sewer projects include named sewers, reticulation areas and reticulation extensions. All sewerage projects are individually numbered.

sewerage treatment (purification) plant

In this manual, the terms sewerage treatment plant and purification plants are considered to be the same. They refer to a complex to which sewage is conveyed by the sewerage system and treated. In the database, sewerage treatment plants “own” all other entities.

sewer pipe section

A length of sewer pipe (conduit) between two numbered access chambers. Sewer pipe sections are graphically input as continuous elements - lines, strings or curves.

siphon

A vertically curved sewer, the invert levels of which are designed so that sewage is able to be conveyed under features such as natural watercourses and man made drains.

This is achieved by the hydraulic design of the system, which causes sewage to be siphoned between inlet and outlet access chambers.

standard access chamber

Access chambers which derive their symbology from the size range of the sewer pipe section immediately downstream. Standard access chambers must be uniquely numbered and entered with full database attributes. Also see *intermediate access chamber*.

symbol

See *cell*.

symbology

The specifications describing the way in which elements must appear in graphics files. Symbology defines the element class, element type, level, colour, weight, line style, text criteria (font, height, width, justification) and cell requirements for each graphics item.

tie

See *branch tie*.

upstream

The end of a pipeline from which sewage flows by gravity, or is pumped. For gravity sewers, the upstream end is usually higher than the downstream end. For rising mains, the upstream end is usually lower than the downstream end. Also see *downstream*.

vertical curve

Any change of direction in the vertical alignment of a sewer pipe section. Vertical curves include changes of grade and smooth curves of constant or varied radius.

Appendices

Supply of. Digital Information

Supplied to :
 Company Name :
 Name of Project:
 Melways description:XY co-ord's
 Date requested:
 Date required:

Information requested:	Yes	No	(Please Tick required Box <input checked="" type="checkbox"/>)
FIS file number	<input type="checkbox"/>	<input type="checkbox"/>	
Digital Mapbase	<input type="checkbox"/>	<input type="checkbox"/>	
Digital Sewer	<input type="checkbox"/>	<input type="checkbox"/>	
Access chamber numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Property Service numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Field Book & Page numbers	<input type="checkbox"/>	<input type="checkbox"/>	** Only required if non-digital type of job
Treatment Plant	<input type="checkbox"/>	<input type="checkbox"/>	
Digital Water	<input type="checkbox"/>	<input type="checkbox"/>	
Valve numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Node numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Street Name Code Numbers	<input type="checkbox"/>	<input type="checkbox"/>	

NOTE: Please supply a copy of the design plan to assist in issuing the appropriate number of Access chamber numbers and Node and Valve numbers.

Format requested for digital information:

DGN or DXF (strike out one not applicable)

Information Supplied:	Yes	No	(for use by the Water Company)
FIS file number	<input type="checkbox"/>	<input type="checkbox"/>
Digital Mapbase	<input type="checkbox"/>	<input type="checkbox"/>
Digital Sewer	<input type="checkbox"/>	<input type="checkbox"/>
Access chamber numbers	<input type="checkbox"/>	<input type="checkbox"/>
Property Service numbers	<input type="checkbox"/>	<input type="checkbox"/>
Field Book & Page numbers	<input type="checkbox"/>	<input type="checkbox"/>
Treatment Plant	<input type="checkbox"/>	<input type="checkbox"/>
Digital Water	<input type="checkbox"/>	<input type="checkbox"/>
Valve numbers	<input type="checkbox"/>	<input type="checkbox"/>
Node numbers	<input type="checkbox"/>	<input type="checkbox"/>
Street Name Code Numbers	<input type="checkbox"/>	<input type="checkbox"/>

Information Supplied by:

Date supplied :

NOTE: The digital information supplied remains the property of the Water Company. It is to be used for edge matching purposes relating to the supply of data back to the Water Company.

Appendix A: Access chamber numbering

Note: For a range of access chamber numbers for each job, consultants must contact the job's design engineers for the numbers and verify these with the Water Company.

All access chambers other than intermediate vents, intermediate inspection shafts and minor vents must be numbered according to the conventions outlined below:

- Access chamber numbers must be unique.
- All access chamber numbers must be entered in the database, except for those on private sewers.
- Access chambers should always be numbered so that the numbers increase from downstream to upstream.
- Access chambers numbers are usually made up of
 - a prefix of three letters and up to three numerals.
 - a suffix of up to eight characters (numerals and letters).

The access chamber number must not exceed 13 characters.

- Access chamber numbers are not to include the letter D after suffix. This D is generally placed on a design plan to signify a "drop structure" in an access chamber.

When numbering access chambers along a sewer:

- The three letter prefix of the upstream access chamber number should usually equal the three letter prefix of the downstream access chamber number. For example:

ABC65 will be downstream from ABC66.

- The suffix of an upstream access chamber number will usually be either:
 - a number greater than the suffix of the downstream access chamber number, for example:

ABC65-9 will be downstream from ABC65-10.

- equal to the suffix of the downstream access chamber number plus a designated suffix description, for example:

ABC65A will be downstream from ABC65B

ABC65-90 will be downstream from
ABC65-90P

For a listing of access chamber types refer to Code List 307/308.

Access chamber descriptions

Several types of access chambers require a single letter description to be added to the end of the access chamber number.

The descriptive characters must be assigned in the alphabetic order listed below. An access chamber number may contain a series of descriptive characters.

- Inspection shafts must be labelled with the characters, S, T, or U.
- Vents must be labelled with the characters, V, W, X, Y, or Z.
- End of pipes must be labelled with the characters, P, Q, or R
- Pipe junctions must be labelled with the characters, J, K, L, M, or N.
- Additional access chambers, that do not have an allocated number, must be labelled with the characters, A, B, C, D, E, F, G, or H.
- Access chambers that are constructed by "cutting into" an existing sewer will take the sewers downstream access chamber number and have an A, B, C or D etc added to it's suffix. For example

A new access chamber constructed on an existing sewer between ABC65-90 and ABC65-91 would have a number ABC65-90A

Numbering of access chambers along named sewers

This chapter does not apply to sewerage pumping station access chambers, ERS access chambers on named sewers or ERS conduits.

Access chambers on named sewers are assigned a prefix of three letters, a number and where necessary, a description. The letters are derived from Code List 302 and based on the sewer name.

For example, if the access chambers to be numbered are located along the Croydon Main Sewer:

- 209 is the code list entry number in Code List 301 for the Croydon Main Sewer.
- "CRY" is the entry in Code List 302 corresponding to code list entry number 209.

Therefore all access chambers on the Croydon Main Sewer are prefixed with the letters CRY.

The remainder of the access chamber numbers will consist of either a number, a description, or a combination of both. For example:

- CRY1 would be the first access chamber on the Croydon Main Sewer, upstream of its outlet.
- CRYIP would be the first end of pipe upstream of access chamber number CRY I.
- CRY 1 Q would be the second end of pipe upstream of CRY 1.
- CRY5V would be the first vent upstream of CRY5.

Numbering of access chambers along reticulation sewers

This chapter applies to unnamed access chambers along sewers less than 300mm in diameter. It does not apply to access chambers in sewerage pumping station catchments or along ERS conduits.

The number of an access chamber on a reticulation sewer consists of two parts separated by a dash (-):

- The first part takes the number of the access chamber on the named sewer to which it flows.
- The second part is assigned as an incrementing number, a descriptive character, or both.

For example, if a particular reticulation sewer flows to access chamber number CRY5 on the Croydon Main Sewer, then the first three access chambers along the reticulation sewer would be numbered CRY5-1, CRY5-2, CRY5-3.

for example:

- CRY5-1 is the first access chamber on a reticulation sewer upstream from CRY5 on the named sewer line,
- CRY5-2 is the second access chamber on a reticulation sewer . upstream from CRY5 on the named sewer line, CRY5-2S is the first inspection shaft upstream of CRY5-2, t CRY5-2T is the second inspection shaft upstream of CRY5-2,
- CRY5A-V is a vent at the end of reticulation sewer immediately upstream of CRY5A on the named sewer line,
- CRY5-A is an additional access chamber on a reticulated sewer immediately upstream of CRY5 on the named sewer line and downstream from CRY5-1,
- CRY3-3J is the first pipe junction upstream of CRY3-3 on the reticulated sewer,
- CRY3-3JS is the first inspection shaft upstream of CRY3-3J on the reticulated sewer,
- CRY3-3K is the first pipe junction upstream of CRY3-3J on the reticulated sewer,
- CRY3-3KS is the first inspection shaft upstream CRY3-3K on the reticulated sewer.

Numbering of access chambers at the point of entry to treatment plans

Access chambers on sewer pipe sections at the point of entry to treatment plants must be input with database linkages and numbered as follows:

- Access chambers on a named sewer must be numbered using the access chamber numbering convention.
- Access chambers on a reticulation sewer must have the treatment plant number as the first part of the number. For example, M02 for treatment plant number M02.

- Pumping station access chambers must have the prefix TPS and the treatment plant number as the first part of the number. For example, TPSM02 for treatment plant number M02. Refer to Figure 7-14.

Numbering of access chambers upstream of treatment plants

The numbering of access chambers on named sewers upstream of treatment plants is unaffected by the treatment plant number.

Access chambers on reticulation sewers upstream of treatment plants must be assigned the appropriate prefix. The first part of this number is based on the number of the access chamber at the point of entry to the treatment plant. The suffixes of subsequent access chambers are numbered in the usual manner for reticulation sewers. Fore example:

- TPSM02-1 is the first access chamber upstream of TPSM02 on a reticulation sewer which enters treatment plant number M02 at a pumping station.
- M02-1 is the first access chamber upstream of M02 on a reticulation sewer which enters treatment plant number M02 at a normal access chamber.

Refer to Figure 7-14.

Numbering of pumping station access chambers

Pumping station access chambers on reticulated or named sewers must have a prefix consisting of SPS and the pumping station number.

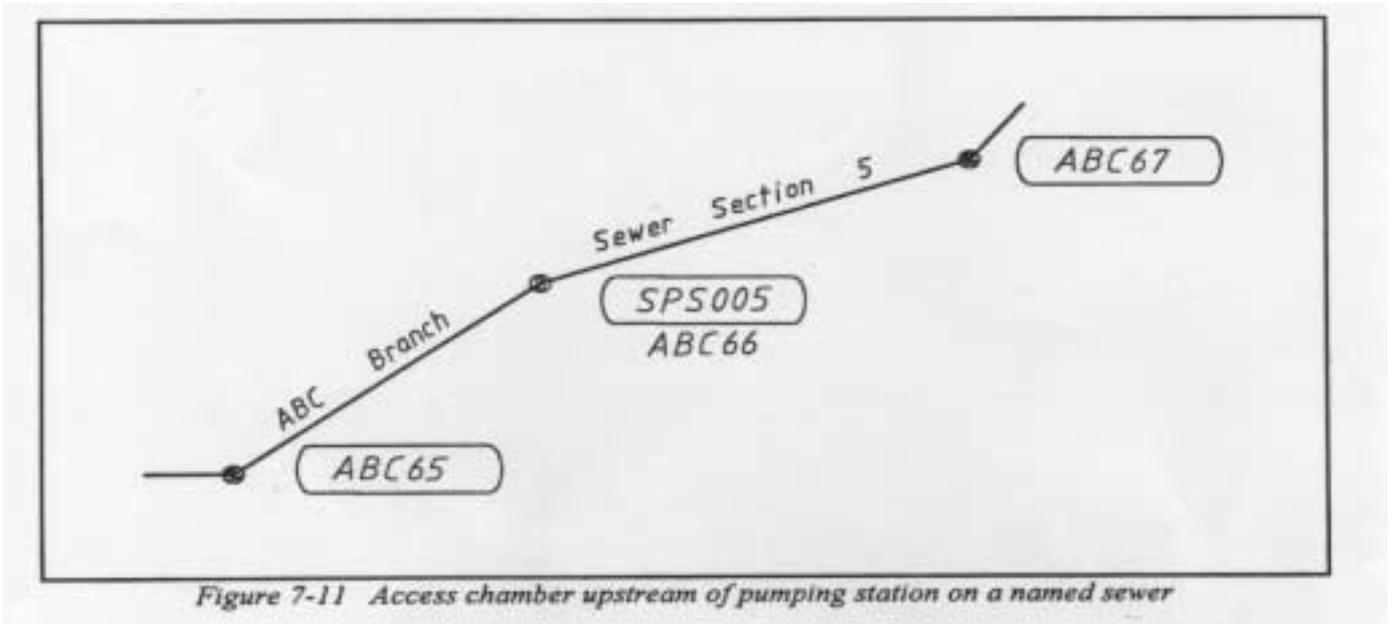
Sewerage pumping station numbers will be supplied by the Water Company.

Pumping stations at the point of entry to treatment plants, must have a number consisting of the letters TPS and the treatment plant number.

Refer to Pumping station associated details later in this chapter, for the numbering of multiple pumps at a single pumping station.

Numbering of access chambers upstream of pumping stations

The numbering of access chambers on named sewers upstream of pumping stations is unaffected by the pumping station number as shown



in Figure 7-11 and 7-14.

Access chambers on reticulation sewers upstream of pumping stations must be assigned the prefix SPS and the pumping station number as the first part of the number. Subsequent access chambers are numbered in the usual manner for reticulation sewers, as shown in Figure 7-14.

Where a pumping station access chamber is located on a named sewer, treat as follows:

- determine the number that the access chamber would be assigned by access chamber numbering convention, were it not a pumping station. Place this number in graphics below and parallel to the SPS access chamber number, as shown in Figure 7-14, using access chamber number symbology, but without a capsule.
- enter this secondary access chamber number in the database as the old access chamber number (308.51).

Numbering of emergency relief structure (ERS) access chambers

The first access chamber along an emergency relief structure (ERS) conduit is usually the ERS access chamber. It must be numbered with a prefix of ERS followed by the appropriate ERS number. For example, the ERS access chamber on ERS number 157 would be numbered ERS 157.

Subsequent access chambers are numbered in the usual manner for reticulation sewers, regardless of the pipe diameter.

The last access chamber of an ERS conduit is usually an end of pipe. It would be numbered as follows:

- ERS157-P if there were no preceding access chambers between it and ERS 157.
- ERS 157-2P if there were, for example, two preceding access chambers (ERS 157-1 and ERS 157-2) between it and ERS 157.

If an ERS access chamber is located on a reticulated or named sewer, the ERS access chamber must be numbered with its ERS number. The numbering of other access chambers along the reticulated or named sewer is unaffected. Refer to the example in Figure 7-12 and 7-14.

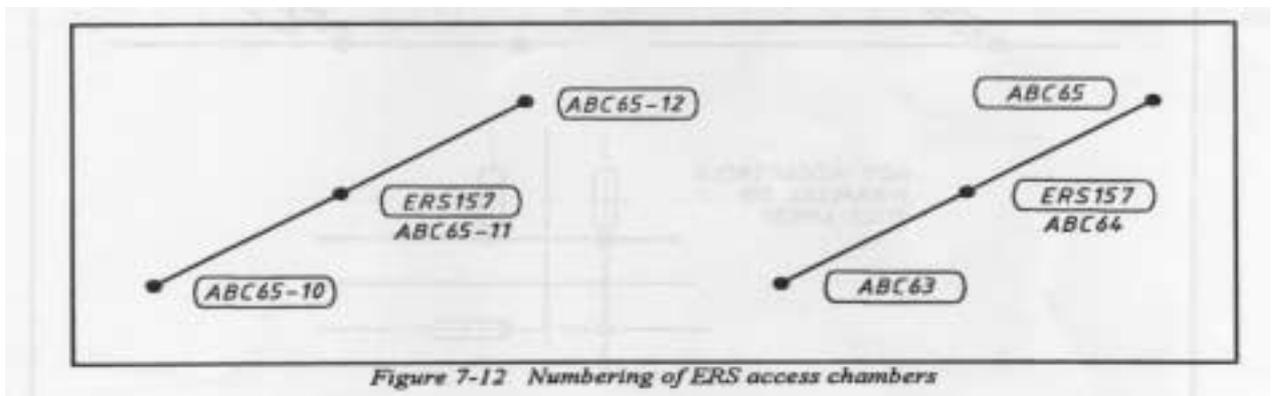


Figure 7-12 Numbering of ERS access chambers

Where the ERS access chamber is located on a sewer line, that is, there are no ERS conduits:

- determine the number that the access chamber would be assigned by access chamber numbering convention, were it not an ERS access chamber. Place this number in graphics only below and parallel to the ERS access chamber number, as shown in Figure 7-13 and 7-14, using access chamber number symbology, but without a capsule.

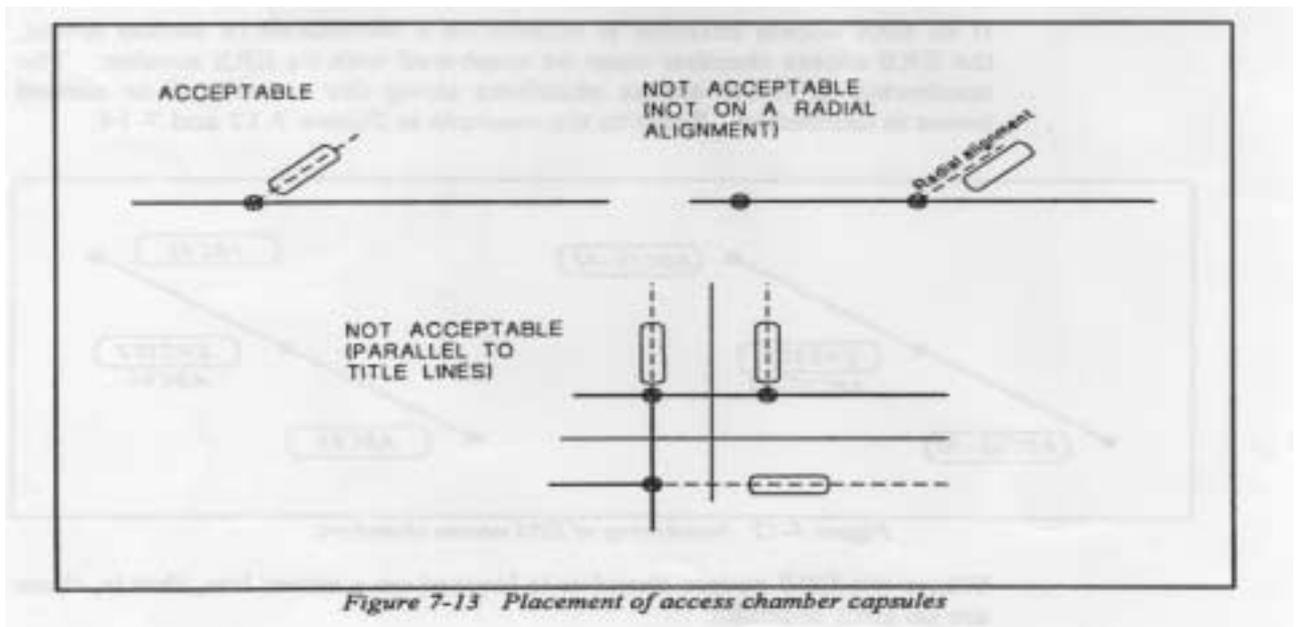
- enter this secondary access chamber number in the database as the associated equipment number (318.28) and the old access chamber number (308.51).

Access chamber capsules

Access chamber numbers must be placed inside an access chamber capsule.

Access chamber capsules must be orientated radially about the centre of their respective access chamber and positioned at the preferred offset as detailed in *Chapter 3, Table 3-21*.

Wherever possible, place the capsules along the same side of successive sewer pipe sections, at the same offset and angle. They should be placed inside the boundary of the property in which the access chamber is located. The capsule should not be placed parallel to the property boundary or road. Figure 7-13 shows the placement of access chamber capsules.



Trunk sewer access shaft name

The trunk sewer access shaft name should be placed in graphics in upper case at an active angle of zero degrees (horizontal), opposite the centre of the shaft.

Note: The name should be shown on the plan. The name can be verified, if necessary in Code List 305. If there is a discrepancy, place the name indicated in the code list.

Trunk sewer access shafts must be designated a unique access chamber number in the same manner as standard access chambers and a name.

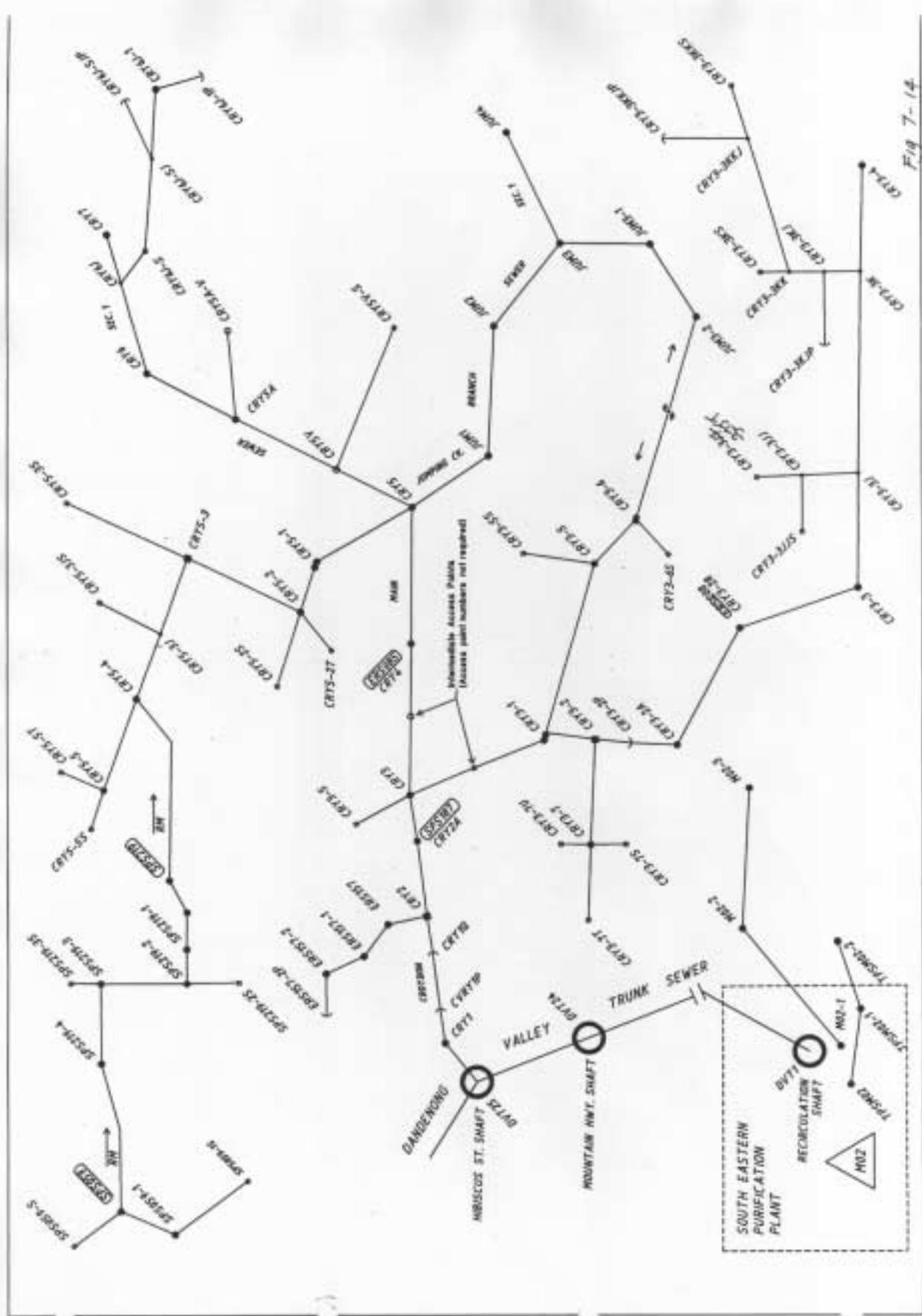
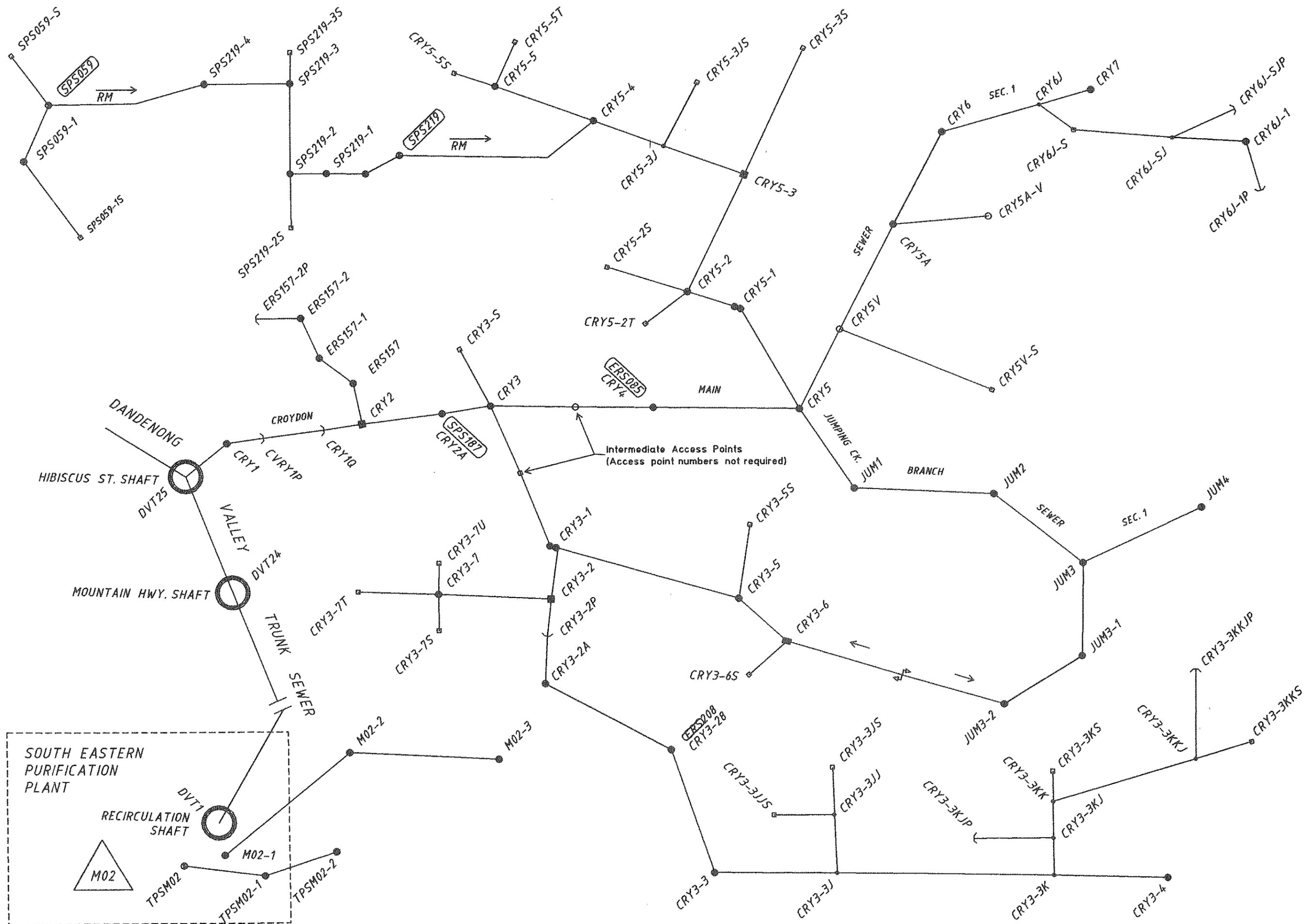


Fig 7-14



(A)

Appendix B (part 1)

Sample "Linked" Sewer .dbf ASCII database files

NOTE: These tables are sample .dbf files to be used as a guide when developing ASCII files

For the correct field sizes and justifications please refer to Database Schedule 1 in Chapter two.

The grey boxes are there for information only and would not normally appear in a .dbf ASCII file supplied to the Water Company.

Sample 301.dbf file (Sewer Treatment plant):

.99	.10
1	6

Sample 303.dbf file (Sewer Project) for a Main Sewer :

.99	.90	.91	.10	.14	.15	.16
1	301	1	1242	1		

or

Sample 303.dbf file (Sewer Project) for a Reticulation Area :

.99	.90	.91	.10	.14	.15	.16
1	301	1			RA1539	

or

Sample 303.dbf file (Sewer Project) for a Reticulation Extension :

.99	.90	.91	.10	.14	.15	.16
1	301	1				434/10

Sample 315.dbf file (Sewer Pumping Station):

.99	.90	.91	.10
1	308	40	12
2	308	111	170
3	308	7896	101
4	308	9973	341

Sample 313.dbf file (Sewer Property Service Connections):

.99	.90	.91	.11	.14	.15	.17	.18	.20	.21	.22
1	305	1	875776	21	37	1.880	22	44.700	97.300	95.780
2	305	1	875777	21	37	1.620	22	32.920	96.770	95.150
3	305	1	875778	21	37	1.680	22	17.810	96.360	94.630
4	305	1	875779	21	37	0.410	22	3.130	95.540	93.510
5	305	2	875763	21	37	2.190	22	13.490	96.110	93.990
6	305	3	875764	21	37	1.500	22	11.830	96.040	94.180
7	305	3	875765	21	37	1.490	22	19.970	96.180	94.310
8	305	3	875766	21	37	1.490	22	26.350	96.390	94.350
9	305	3	875767	21	37	1.450	22	38.920	96.480	94.410
10	305	3	875768	21	37	5.760	22	55.360	96.470	94.550
11	305	3	875769	21	37	2.090	23	55.360	96.520	95.160
12	305	4	875770	21	37	1.750	23	13.200	97.070	95.340
13	305	4	875771	21	37	1.750	23	24.990	97.360	95.600
14	305	4	875772	21	37	1.800	23	37.540	97.410	95.890
15	305	4	875773	21	37	1.720	23	50.000	97.760	96.020
16	305	4	875774	21	37	1.750	23	62.020	98.070	95.960
17	305	4	875775	21	37	1.870	23	72.330	97.850	96.130
18	305	6	875761	21	37	0.570	23	10.900	96.360	95.420
19	305	6	875762	21	37	0.470	23	22.680	96.150	95.130
20	305	7	875757	21	37	1.360	22	23.920	96.360	95.360
21	305	7	875759	21	37	0.400	22	18.960	96.490	95.290
22	305	7	875760	21	37	0.500	23	8.000	96.460	95.350
23	305	8	875758	21	37	0.270	22	10.400	96.670	95.490

Sample .psf file (Dummy Sewer Property Service Numbers) :

Dummy	Existing
ADC1	167543
ADC2	
ADC3	748295
ADC4	748295
ADC5	
ADC6	
ADC7	652001
ADC8	652001
ADC9	652001
ADC10	

Sample 318.dbf file (Emergency Relief Structure):

.99	.90	.91	.26	.27
1	308	194	26	FON8-65
2	308	57	26	LAS35
3	308	2006	10	SPS105
4	308	796	26	LAS18-2

Appendix B (part 2)

Sample "Linked" Sewer .dbf ASCII database files

NOTE: These tables are sample .dbf files to be used as a guide when developing ASCII files

For the correct field sizes and justifications please refer to Database Schedule 1 in Chapter two.

The grey boxes are there for information only and would not normally appear in a .dbf ASCII file supplied to the Water Company.

Sample 305.dbf file (Sewer Pipe Section):

.99	.90	.91	.10	.11	.12	.13	.14	.16	.18	.20	.21	.23	.28	.33	.35	.37	.39	.41	.44	.45	.46	.47	.48	.49
1	303	1	STS7-164	93.230	STS7-164S	95.680	6	24	44.700	37	6	6	34	7	14	6	12	8	4	7	7	6	180	6
2	303	1	STS7-170	93.810	STS7-171	93.960	6	24	13.490	37	6	6	34	7	14	6	12	8	1	7	7	6	180	6
3	303	1	STS7-171	93.980	STS7-172	94.520	6	24	55.360	37	6	6	34	7	14	6	12	8	6	7	7	6	180	6
4	303	1	STS7-172	94.560	STS7-173	95.300	6	24	72.330	37	6	6	34	7	14	6	12	8	6	7	7	6	180	6
5	303	1	STS7-173	95.340	STS7-174	95.550	6	24	17.420	37	6	6	34	7	14	14	12	8	0	7	7	6	180	6
6	303	1	STS7-157	93.530	STS7-170	93.790	6	24	26.080	37	6	6	34	7	14	6	12	8	2	7	7	6	180	6
7	303	1	STS7-157	94.900	STS7-175	95.210	6	24	23.920	37	6	6	34	7	14	6	12	8	3	7	7	6	180	6
8	303	1	STS7-175	95.210	STS7-175P	95.480	6	24	10.400	37	6	6	34	7	14	6	12	8	1	7	7	6	180	6

Sample 308.dbf file (Sewer Access Point):

.99	.90	.91	.10	.12	.14	.16	.18	.24	.26	.28	.29	.31	.33	.49	.50	.51
1	303	1	STS7-164S	33	6	24	97.250	37	4	9	4	4	6	6	180	STS7-164IS
2	303	1	STS7-170	8	6	55	96.270	11	6	90	7	4	6	6	180	
3	303	1	STS7-171	10	6	55	96.110	11	6	90	7	4	6	6	180	
4	303	1	STS7-172	7	6	55	96.520	11	6	90	7	4	6	6	180	STS7-172D
5	303	1	STS7-173	10	6	55	97.770	11	6	90	7	4	6	6	180	
6	303	1	STS7-174	10	6	55	97.910	11	6	90	7	4	6	6	180	
7	303	1	STS7-175	10	6	55	96.360	11	6	90	7	4	6	6	180	
8	303	1	STS7-175P	45	6	24	96.610	37	4	9	4	4	6	6	180	STS7-176EP

APPENDIX E Sample Plot

This is a plot from the digital file
SAMPCAD.DGN



Subdivision
Digital Input Manual

Second Edition
No.

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About This Manual

This manual details the graphics data specifications required by the Water Company for the supply of digital subdivision data.

Intended Audience

This manual defines the requirements and specifications for the supply of digital subdivision data to the Water Company by any person or company, hereafter known as the Consultant.

How to use this manual

This manual is divided into two parts.

Part 1 - Specifications

Part 1 consists of two chapters, which describe the requirements of graphics data.

Chapter 1 Supply and Format of Data

This part describes the responsibilities of the Water Company and consultants with regard to the supply of digital data and documentation. It includes details about the supply and format of all digital data and file naming conventions.

Chapter 2 Graphical Specifications

This chapter describes the graphics data requirements. It includes the level structure, symbology specifications and associated graphics specifications.

Database Specifications

It is to be noted that there are no database requirements for the supply of digital subdivision information.

Part 2 - Guidelines

Part 2 consists of one chapter which details the presentation standards associated with the graphics input of digital subdivisions.

Glossary of Terms

- ◆ This chapter contains a glossary of terms used in this manual.

Appendices

The Appendices contain:

- ◆ A plot of part of the Water Company's map base. (derived from SAMPCAD.DGN),
- ◆ DGN Layer Specification List,
- ◆ DXF Layer Specification -ist.

Conventions used in this manual

Italics are used when reference is made to information in other chapters of this manual. For example, refer to the *Graphics Schedule 1* in *Chapter. 2*. Italics are also used to *emphasise* words or phrases.

- ◆ Diamond bullets are used for lists of items or topics.

Related reference material

Survey Manual.

Part 1
Specifications

This chapter describes the formats in which digital subdivision information must be supplied to the Water Company. It describes the responsibilities of the Water Company and consultants engaged in the process of supplying this information.

The Water Company's Responsibilities

Digital Data supplied by the Water Company

On request the Water Company will provide the appropriate digital data files:

- ◆ font library - file name fontlib (MicroStation format),
- ◆ colour table - file name fiscolor.tbl (MicroStation users),
- ◆ seed graphics file - file name basemap.DGN (NficroStation users),
- file name basemap.D@ (.DXF format users).

Documentation supplied by the Water Company

For the purpose of digital subdivision information there is no documentation required to be supplied by the Water Company.

Consultant's responsibilities

It is the responsibility of the consultant to supply the Water Company with digital data in the required format. This can be either in MicroStation DGN or AutoCad DXF formats.

The Water Company uses DGN format graphics files.

The order of preference the Water Company would like digital information supplied is:

1. MicroStation DGN format graphics information as per *Graphics Schedule 1 in Chapter 2*.
2. AutoCad DXF format graphics information as per *Graphics Schedule 2 in Chapter 2*.

AutoCad DXF format graphics files have to be converted to MicroStation.DGN format by the Water Company to enable them to be merged into the FIS.

It is the responsibility of the consultant to supply the Water Company with data using either of the required formats.

Submissions that are not in accordance with all relevant Water Company specifications and relevant Australian Standards will be returned to the Consultant for review. The consultant must ensure that non conforming submissions (digital and non digital) are resolved and the works resubmitted to the Water Company within 10 (ten) working days.

Digital Data supplied by the consultant

1. MicroStation.DGN Format

MicroStation graphics data must be supplied to the Water Company in one of the following formats:

1. MicroStation 32/MicroStation PC Design Software two dimensional design files (2D), version 3.x
2. Intergraph Interactive Graphic Design Software (IGDS) two dimensional design files (2D), version 8.8 or later.

The Water Company will supply, upon request, a seed graphics file (basemap.DGN) which must be used as the basis to create subsequent graphics files.

Graphics files must be supplied to the Water Company:

- ◆ in accordance with the *MicroStation.DGN Graphical Schedule 1* in Chapter 2,
- ◆ with the digital subdivision orientated to the Australian Map Grid (AMG) Zone 55 as defined by the field survey (refer to the Survey Manual),
- ◆ contain the data in two dimensional (2D) format,
- ◆ with file names in accordance with *File naming conventions* as described later in this Chapter,
- ◆ with all deleted elements eliminated. A graphic compress must be performed,
- ◆ with no shared cells,
- ◆ with all locks set to "off", for example, the graphic group, snap, and grid lock
- ◆ with graphic group = 0 (dropped),
- ◆ with view attributes set to " off" for enter data fields.
- ◆ with no named views in file,
- ◆ containing no cells other than the ones supplied in the cell library except graphical error flags,
- ◆ with all type 66 elements deleted,

- ◆ with data supplied in 2D files having the review specifications shown in Table 1 - 1.

Format Review Specifications	
global origin	2,000,000.00 - 3,000,000.00
master units	metre
sub units	1000 mm per metre
positional units	1 positional unit per mm

Table1-1 Graphic file format review specifications

2. AutoCad DXF Format

The Water Company will supply, upon request, a seed graphics file (basemap.DXF) which must be used as the basis to create subsequent graphics files.

The digital exchange format (.DXF) must:

- ◆ be in accordance with the *AutoCad.DXF Graphical Schedule 2* in *Chapter 2*,
- ◆ contain the data in two dimensional (2D) format,
- ◆ contain the data orientated according to the Australian Map Grid (AMG) Zone 55 and all co-ordinate data expressed in eastings and northings to three decimal places,
- ◆ the file names must be in accordance with *File naming conventions* as described later in this Chapter,
- ◆ have the review specifications data supplied in 2D files shown in Table 1-1.

Documentation supplied by the consultant

Licensed Surveyor's specification

The Licensed Surveyor must:

- ◆ Include supporting written information when sending digital information to the Water Company. This is necessary to ensure the successful input of digital subdivision information into the Water Company's FIS. The supporting information must include, either:

1. a completed MicroStation Level Specification form if the digital information is in MicroStation.DGN format.

or

2. a completed AutoCad Layer Specification form if the digital information is in AutoCad DXF format.

Note: The layer specification forms are available in the Certification Lists chapter of the Survey Manual and in Appendices B and C respectively of this manual.

- ◆ for the first (initial) supply of digital subdivision information to the Water Company, the consultant will make an application to the Water Company to obtain a surveyor's code (a unique code number identifying the Licensed Surveyor). This must be done before submitting the digital information. Once obtained this code is to be used for all future submissions.

Application details

As part of the application for conditions the Owner must provide the following details to the Water Company:

- ◆ Licensed Surveyor's name,
- ◆ Licensed Surveyor's code,
- ◆ the format of the digital information (.DGN or.DXF),
- ◆ appropriate disk,
- ◆ the Titles Office reference number eg. PS 324556,
- ◆ a paper copy (hard copy) of the proposed subdivision (Titles Office plan),
- ◆ Acceptance of Subdivision Digital Information on Disk Certification List.

File naming conventions

When naming the files on disk, use the titles Office Plan of Subdivision (PS) number with an extension of either .DGN or 324556 .DXF (*leaving off the letters PS*)

Data transfer

Formats and media

Data must be delivered, in a virus free, non-compressed or non-zipped PC DOS format, to the Water Company in either MicroStation or AutoCad format. (*MicroStation being the preferred format*)

The information must not be supplied in a compressed or zipped format.

Other formats will not be accepted unless previously arranged with the Water Company.

Note: If requested by the consultant the disks will be returned upon completion of a successful transfer to the Water Company's Facilities Information System.

Batches

All data relating to one job must appear where practicable on a single diskette. However, when a job crosses municipal boundaries, the data for each municipality must be supplied on a separate media.

Only one job is to be supplied on one media (eg diskette). Additional jobs are to be supplied on separate media.

Documentation which indicates the following must accompany each batch of data:

- ◆ a listing of files contained on the media,
- ◆ the manner in which data was written to the media, (eg DOS)

This chapter contains the symbology specifications for the graphical representation of subdivisional elements. Symbology is specified in terms of level, color, line weight, line style, font, height, width and justification of text, and whether or not there is a cell to represent the item.

Content, structure and separation of the data

The digital plan of subdivision must be supplied using the following criteria:

- ◆ the digital information must represent the computed plan that is lodged with the responsible authority for certification,
- ◆ the proposed development must be connected to at least two co-ordinated pennant marks of known Australian Map Grid (AMG) position and shown on the face sheet of the Plan of Subdivision,
- ◆ the geographical position of the digital subdivision information must reflect the AMG position of the subdivision. (ie. the digital subdivision must be orientated to its correct AMG position).

Information required in digital format

The digital information must be on different MicroStation .DGN levels or AutoCad .DXF layers to reflect the separation of digital data into the following categories:

- ◆ road alignments,
- ◆ centrelines of roads,
- ◆ road names,
- ◆ property/title boundaries,
- ◆ easements and their related text,
- ◆ lot numbers,
- ◆ reserves text.

Tables 2-1 and 2-2 contain detailed requirements for DGN level symbologies and DXF layer names respectively.

Information NOT required in digital format

The Water Company **does not** require the following information included in the supply of digital subdivision information:

- ◆ contours,
- ◆ spot heights,
- ◆ subdivisional boundary,
- ◆ subdivision face sheet,
- ◆ North points,
- ◆ Surveyor's Logo etc,
- ◆ allotment areas,
- ◆ dimensions,
- ◆ abuttals,
- ◆ tangent points and splay corner intersection points,
- ◆ plan borders.

All of the non required information would be deleted by the Water Company when the digital subdivision is input into the digital map base.

Amended plans of subdivision

For a subdivision which has been previously submitted, has had amendments made and is being resubmitted, the following criteria is to be followed:

- ◆ Re-submission in digital format together with a hard copy plan:
 - where allotments have been added or removed from the previous submission,
 - where the dimensions of properties have varied.
- ◆ Re-submission on a hard copy plan only:
 - where the subdivision has a change of road names,
 - alteration to any textual information in general,
 - addition or removal of easements.

If there is any doubt regarding whether to resubmit the subdivision in digital or hard copy format contact the Water Company for advice.

Documentation is to accompany these amendments to bring the nature of the amendments to the attention of the Water Company.

Graphics Schedule 1 - MicroStation .DGN

Table 2-1 sets out the symbologies required by the Water Company for proposed subdivisions.

The headings for each column represent the following:

- Level = the level on which the graphical elements are placed
- Color = the color to be used (using the color table fiscolor.tbl)
- Weight = the weight (line thickness) to be used
- Style = the line style number to be used
- Font = the font number to be used (using the fontlib)
- Height = the height of the text (in metres)
- Width = the width of the text (in metres)
- Just'n = the justification to be used for text placement

Where:

CT = Centre Top CB = Centre Bottom

CL = Centre Left CR = Centre Right

CC = Centre Centre

Cell = the cell name to be used (using the cell library fiscell.cel)

By using the fiscolor.tbl and fontlib files available from the Water Company it will ensure that the correct colors and font styles are supplied by the consultant.

Refer to Part 2 - Guidelines for information relating to the placement and positioning of graphical elements as required by the Water Company.

MicroStation .DGN Requirements

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Road Alignment:									
Freeway	5	23	1	3	-	-	-	-	-
Primary arterial	6	9	1	3	-	-	-	-	-
Secondary arterial	7	16	1	3	-	-	-	-	-
Other	55	2	1	3	-	-	-	-	-
Road Centre Lines:									
Freeway	19	23	1	3	-	-	-	-	-
Primary arterial	20	9	1	3	-	-	-	-	-
Secondary arterial	21	16	1	3	-	-	-	-	-
Other	56	2	1	3	-	-	-	-	-
Road Names:									
Freeway	12	23	1	0	61	3.20	3.40	CL	-
Primary arterial	13	9	1	0	61	3.20	3.40	CL	-
Secondary arterial	14	16	1	0	61	3.20	3.40	CL	-
Other	57	2	1	0	61	3.20	3.40	CL	-
Road Types:									
Freeway	12	23	1	0	61	3.20	3.40	CR	-
Primary arterial	13	9	1	0	61	3.20	3.40	CR	-
Secondary arterial	14	16	1	0	61	3.20	3.40	CR	-
Other	57	2	1	0	61	3.20	3.40	CR	-
Title boundaries	50	4	0	4	-	-	-	-	-
Lot numbers	53	7	0	0	37	1.25	1.25	CC	-
Easement lines									
Normal < 10m	51	7	0	1	-	-	-	-	-
Normal > or = 10m	52	7	0	1	-	-	-	-	-
Irregular <10m	58	7	0	1	-	-	-	-	-
Irregular > or =10m	54	7	0	1	-	-	-	-	-
Easement Text - above line									
Normal < 10m	51	7	0	0	37	1.25	1.25	CB	-
Normal > or = 10m	52	7	0	0	37	1.25	1.25	CB	-
Irregular <10m	58	7	0	0	37	1.25	1.25	CB	-
Irregular > or =10m	54	7	0	0	37	1.25	1.25	CB	-
Easement Text - below line									
Normal < 10m	51	7	0	0	37	1.25	1.25	CT	-
Normal > or = 10m	52	7	0	0	37	1.25	1.25	CT	-
Irregular <10m	58	7	0	0	37	1.25	1.25	CT	-
Irregular > or =10m	54	7	0	0	37	1.25	1.25	CT	-
Vinculum	45	20	0	0	-	-	-	-	VINC
Reserve Name Text	60	13	0	0	37	2.00	2.00	CC	

Table 2-1 Proposed subdivision Microstation .DGN symbology

Graphics Schedule 2 -AutoCad .DXF

Table 2-2 sets out the symbologies required by the Water Company for proposed subdivisions.

The headings for each column represent the following:

- DXF Layer Number = the layer on which the graphical elements are placed
- DXF Layer Name = the layer on which the graphical elements are placed
- DXF Color = the color to be used (using the color table
fiscolor.tbl)
- DXF Font style = the name of a created font style that should appear similar
to the MicroStation font (refer to Water & Sewer manuals)
- DXF Text Height = the height of the text (in mm)
- DXF Text Width = the width of the text (in mm)
- Just'n = the justification to be used for text placement.

Where:

- CT = Centre Top CB = Centre Bottom
- CL = Centre Left CR = Centre Right
- CC = Centre Centre

DXF Block = Blocks to be developed by consultant where required

Note: The specifications set out in Table 2-2 are provided as a guide only. The DXF layer name and number are the ones suggested to be used on the layer specification form. The rest of the columns are provided to represent the closest symbology match to the Water Company's FIS symbologies. The Water Company's translator will convert the DXF data to the correct DGN levels and symbology using the layer specification table.

AutoCad .DXF Requirements

Item Name	DXF Layer Number	DXF Layer Name	DXF Color	DXF Font Style	DXF Text Height	DXF Text Width	Just'n	DXF Block
Road Alignment:								
Freeway	5	PFRERD	110	-	-	-	-	-
Primary arterial	6	PPRIRD	112	-	-	-	-	-
Secondary arterial	7	PSECRD	3	-	-	-	-	-
Other	55	POTHRD	102	-	-	-	-	-
Road Centre Lines:								
Freeway	19	PFRECL	110	-	-	-	-	-
Primary arterial	20	PPRICL	112	-	-	-	-	-
Secondary arterial	21	PSECCL	3	-	-	-	-	-
Other	56	POTHCL	102	-	-	-	-	-
Road Names:								
Freeway	12	PFRENM	110	Stand106	3.20	3.40	CL	-
Primary arterial	13	PPRINM	112	Stand106	3.20	3.40	CL	-
Secondary arterial	14	PSECNM	3	Stand106	3.20	3.40	CL	-
Other	57	POTHNM	102	Stand106	3.20	3.40	CL	-
Road Types:								
Freeway	12	PFRENM	110	Stand106	3.20	3.40	CR	-
Primary arterial	13	PPRINM	112	Stand106	3.20	3.40	CR	-
Secondary arterial	14	PSECNM	3	Stand106	3.20	3.40	CR	-
Other	57	POTHNM	102	Stand106	3.20	3.40	CR	-
Title boundaries	50	PTITLE	41	-	-	-	-	-
Lot numbers	53	PLOTNO	254	Italic	1.25	1.25	CC	-
Easement lines								
Normal < 10m	51	PNEL10	254	-	-	-	-	-
Normal > or = 10m	52	PNEG10	254	-	-	-	-	-
Irregular <10m	58	PNEIRS	254	-	-	-	-	-
Irregular > or =10m	54	PNEIRL	254	-	-	-	-	-
Easement Text - above line								
Normal < 10m	51	PNEL10	254	Italic	1.25	1.25	CB	-
Normal > or = 10m	52	PNEG10	254	Italic	1.25	1.25	CB	-
Irregular <10m	58	PNEIRS	254	Italic	1.25	1.25	CB	-
Irregular > or =10m	54	PNEIRL	254	Italic	1.25	1.25	CB	-
Easement Text - below line								
Normal < 10m	51	PNEL10	254	Italic	1.25	1.25	CT	-
Normal > or = 10m	52	PNEG10	254	Italic	1.25	1.25	CT	-
Irregular <10m	58	PNEIRS	254	Italic	1.25	1.25	CT	-
Irregular > or =10m	54	PNEIRL	254	Italic	1.25	1.25	CT	-
Vinculum	45	PVINCM	250	-	-	-	-	VINC
Reserve Name text	60	PRESNM	40	Italic	2.00	2.00	CC	-

Table 2-2 Proposed subdivision AutoCad .DXF symbology

Part 2

Guidelines

The following guidelines are supplied to assist in the placement of line work and text in the graphics files. Each chapter covers the requirements for the supply of digital subdivision information.

An example plot for each chapter, *Figures 3-1 to 3-9* inclusive, is included to provide a pictorial example of what is required in line work and text placement. The section being discussed has its symbology depicted in black where all other symbologies = depicted in grey.

Proposed Road alignments

Proposed Road alignments are placed in the graphics file as either lines or arcs. The symbology to be used is set out in *Tables 2-1* and *2-2*.

A guide for distinguishing the type of road to be input into a graphics file (ie. Freeway, Primary, Secondary, or Other) is the Melway Street directory.

Green = Freeways

Black = Primary Roads

Red = Secondary Roads

Other colours = Other Roads

There would not be many subdivisions containing Freeway, Primary or Secondary road alignments except where they would have a frontage onto one.

The splayed corners are always placed as to the lesser hierarchy of road. The intersection point of the road alignments is not to be input if the corner has a splay.

Lines may be placed as one between changes of bearing or as one between each property boundary. They are not to be placed as continuous line strings or complex line strings. A new line must begin at the point of change of direction or at a tangent point with an arc.

Curves are to be placed as arcs and fit the criteria as per lines. B-spline curves, ellipses, and spirals must not be used.

All lines and arcs must intersect and must not have overshoots or fall short of each other. They are to be "snapped together" .

Figure 3-1 provides an example of proposed road alignment line work placement.

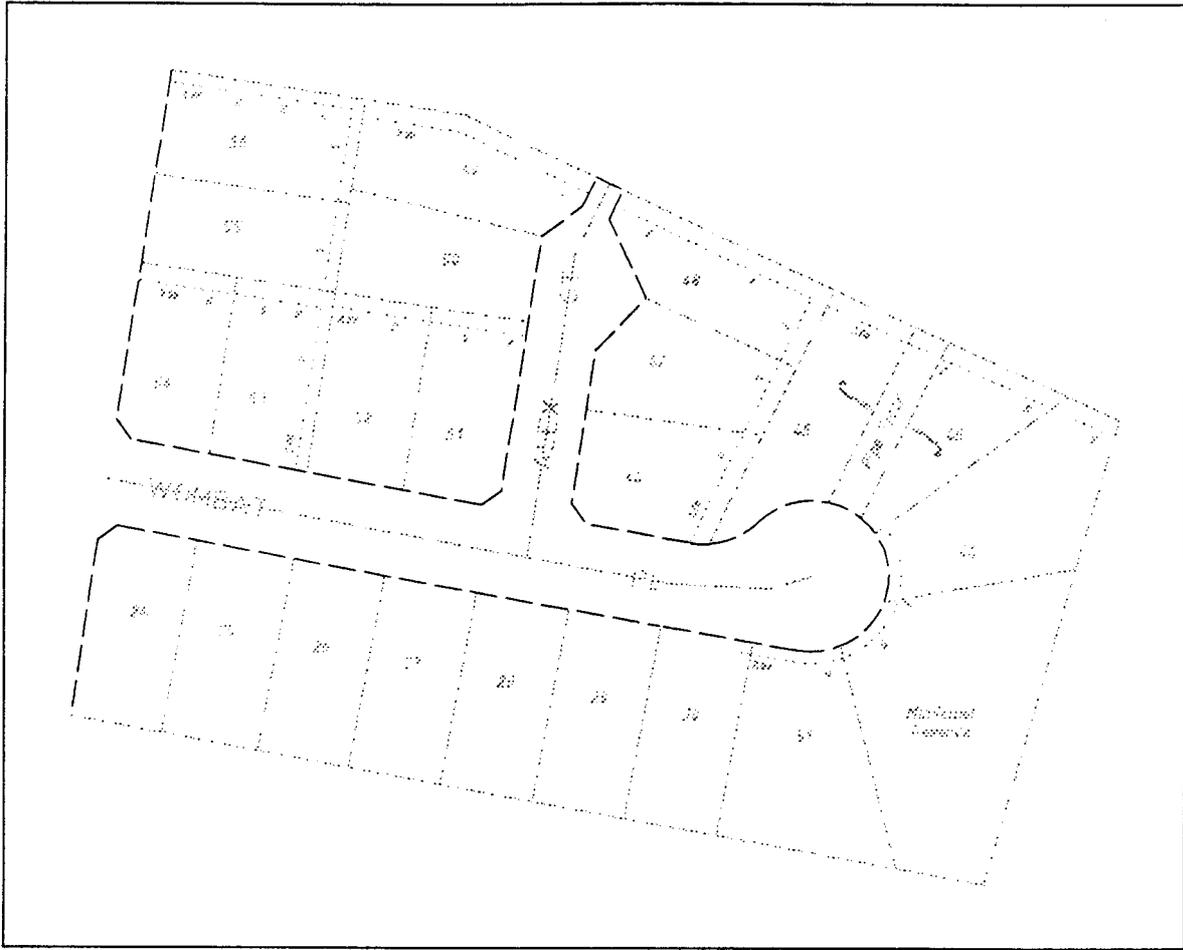


Figure3-1 Example of Proposed Road alignment placement

Proposed Road centrelines

Proposed road centrelines are to be input as the name suggests; in the centre of the proposed road alignment. They are placed in the graphics files as either lines or arcs. The symbology to be used is set out in *Tables 2-1 and 2-2*.

Lines must be placed as one between changes of bearing. They are not to be placed as continuous line strings or complex line strings. A new line must begin at the point of change of direction or at a tangent point with an arc.

Curves are to be placed as arcs and fit the criteria as per lines. B-spline curves, ellipses, and spirals **must not** be used.

All lines and arcs must intersect and must not have overshoots or fall short of each other. They are to be "snapped together".

Where a centreline ends in a court bowl it finishes at what would be the centre of the arc that depicts the bowl.

If a subdivision fronts onto an existing road the centreline does not have to be input since the centreline for this road would already exist in the mapbase.

Figure 3-2 provides an example of road centreline line work placement.

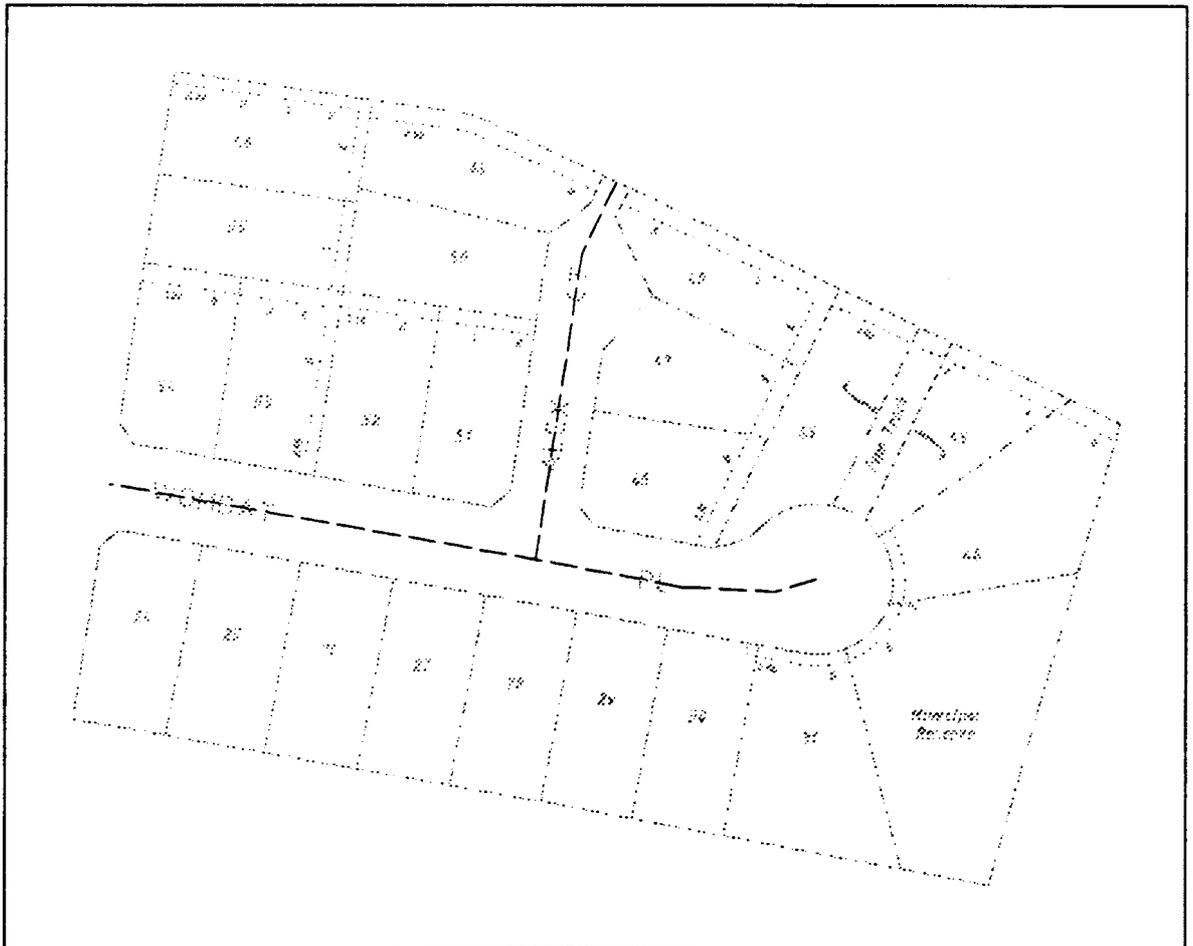


Figure 3-2 Example of Proposed Road centrelines placement

Proposed Road Names and Road Types

Road Names and Road Types are placed as a single string of text. The name and type are always placed as separate text strings and are never combined. The symbology to be used is set out in *Tables 2-1* and *2-2*.

Road Names are placed at the start of a road reservation on the road centreline and are text justified as Centre Left (CL)

Road Types are placed at the end of a road reservation on the road centreline and are text justified as Centre Right (CR)

It is desirable not to have them passing through an intersection with another road reservation, but sometimes this cannot be avoided.

Where a Road Name or Type are to be placed on a curved centreline the text is to be placed along the curve at an even spacing. The spacing is generally approximately half a character width, but may vary depending on the radius of the arc.

Figure 3-3 provides an example of proposed road name and type text placement.

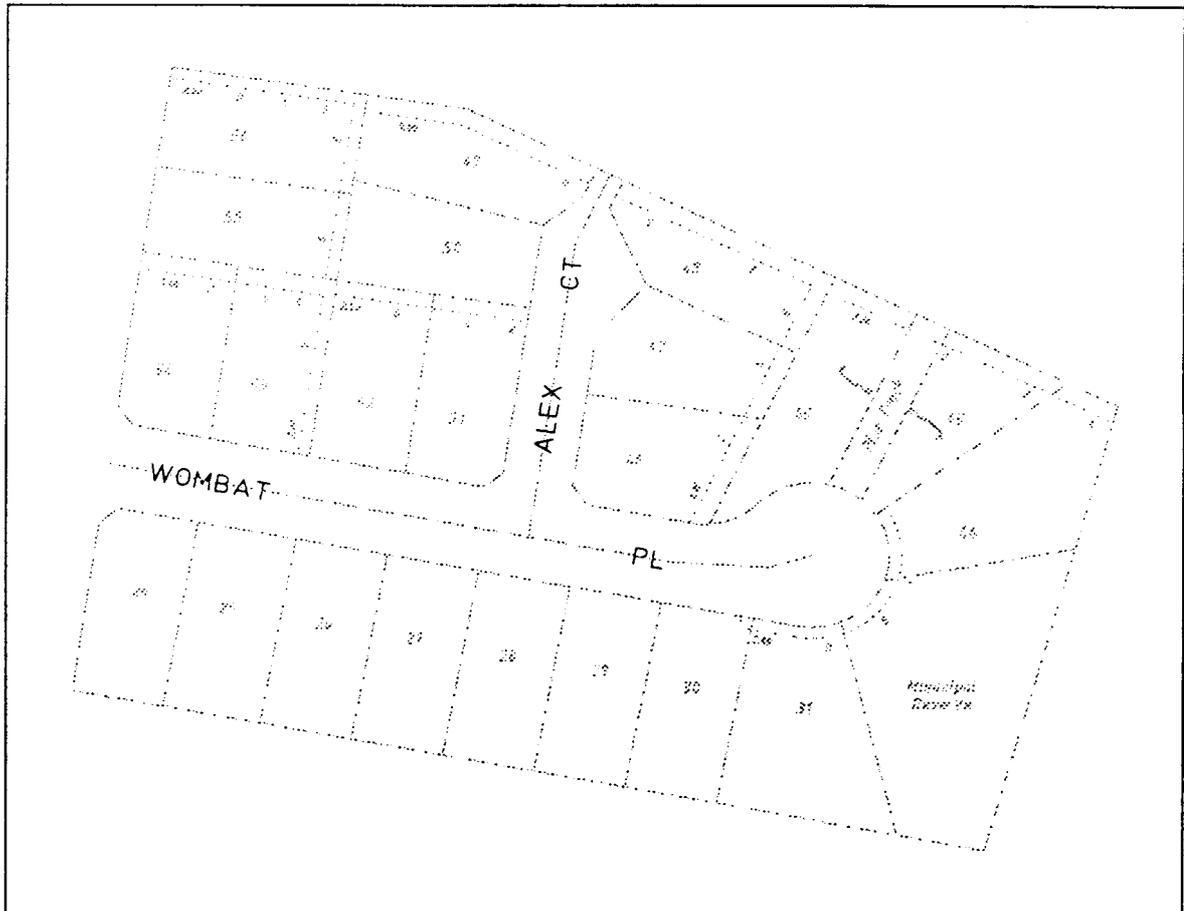


Fig 3-3 Example of Proposed Road Names and Proposed Road Types placement

Proposed Title Boundaries

Proposed title boundaries are placed in the graphics file as either lines or arcs. The symbology to be used is set out in *Tables 2-1* and *2-2*.

Lines may be placed as one between changes of bearing or as one between each property boundary. They are not to be placed as continuous line strings or complex line strings. A new line must begin at the point of change of direction or at a tangent point with an arc.

Curves are to be placed as arcs and fit the criteria as per lines. B-spline curves, ellipses, and spirals must not be used.

All lines and arcs must intersect and must not have overshoots or fall short of each other. They are to be "snapped together".

Where a proposed road alignment and proposed title boundary are coincidental (on top of each other) the proposed road alignment is to be input and not the proposed title boundary ie. there is to be one line and not two. The same applies for abutting properties there is only to be one line input and not multiple lines on top of each other.

Figure 3-4 provides an example of proposed title boundary line work placement.

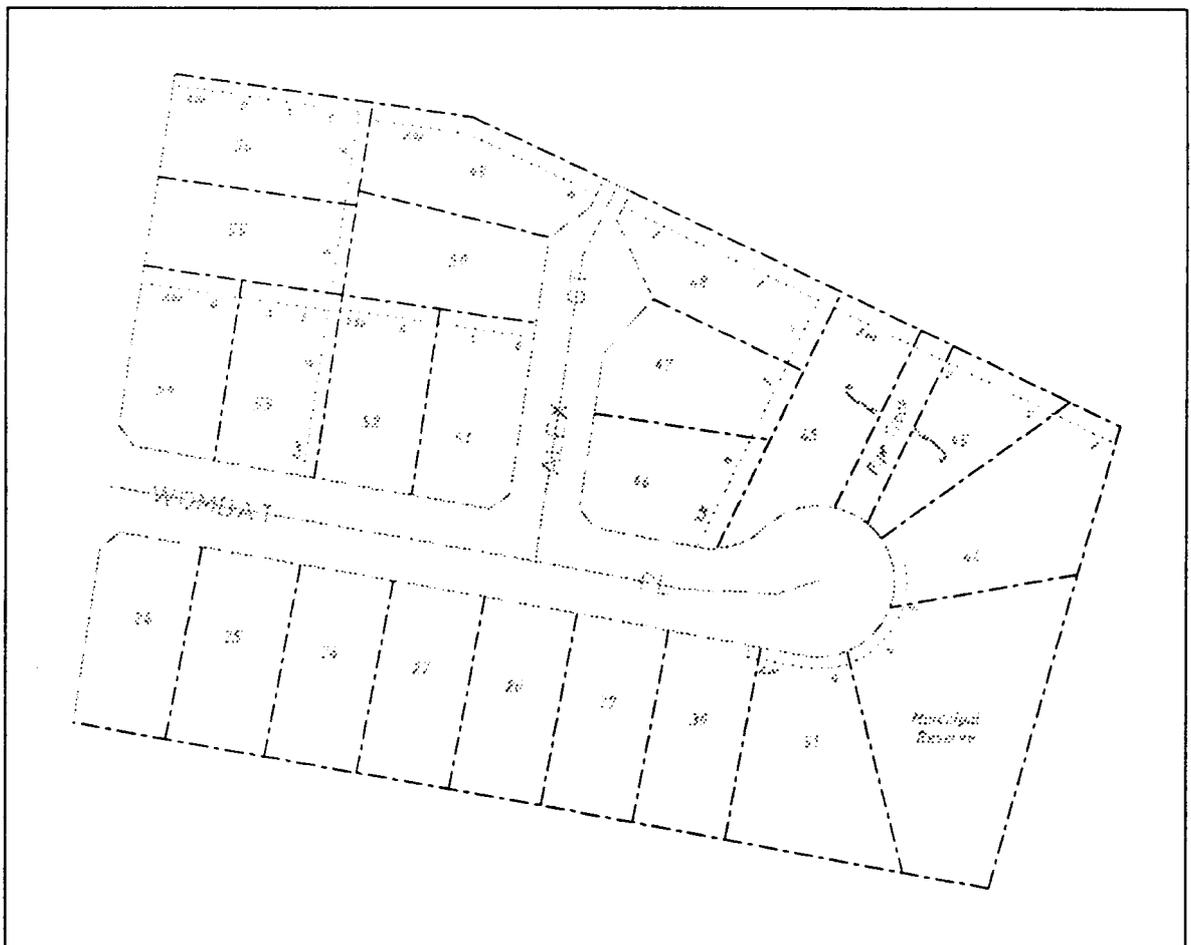


Figure3-4 Example of Proposed Title Boundary placement

Proposed Lot Numbers

Proposed lot numbers are placed in the graphics file in the approximate centre of each allotment. The lot numbers will be input again by the Water Company. The Water Company needs to create the lot number on the Facilities Information System (FIS) and then @ it to the Property Information and Rating system (POLARIS). The lot numbers are only required to provide an indication to the FIS operator for this input.

Figure 3-5 provides an example of proposed lot number text placement.

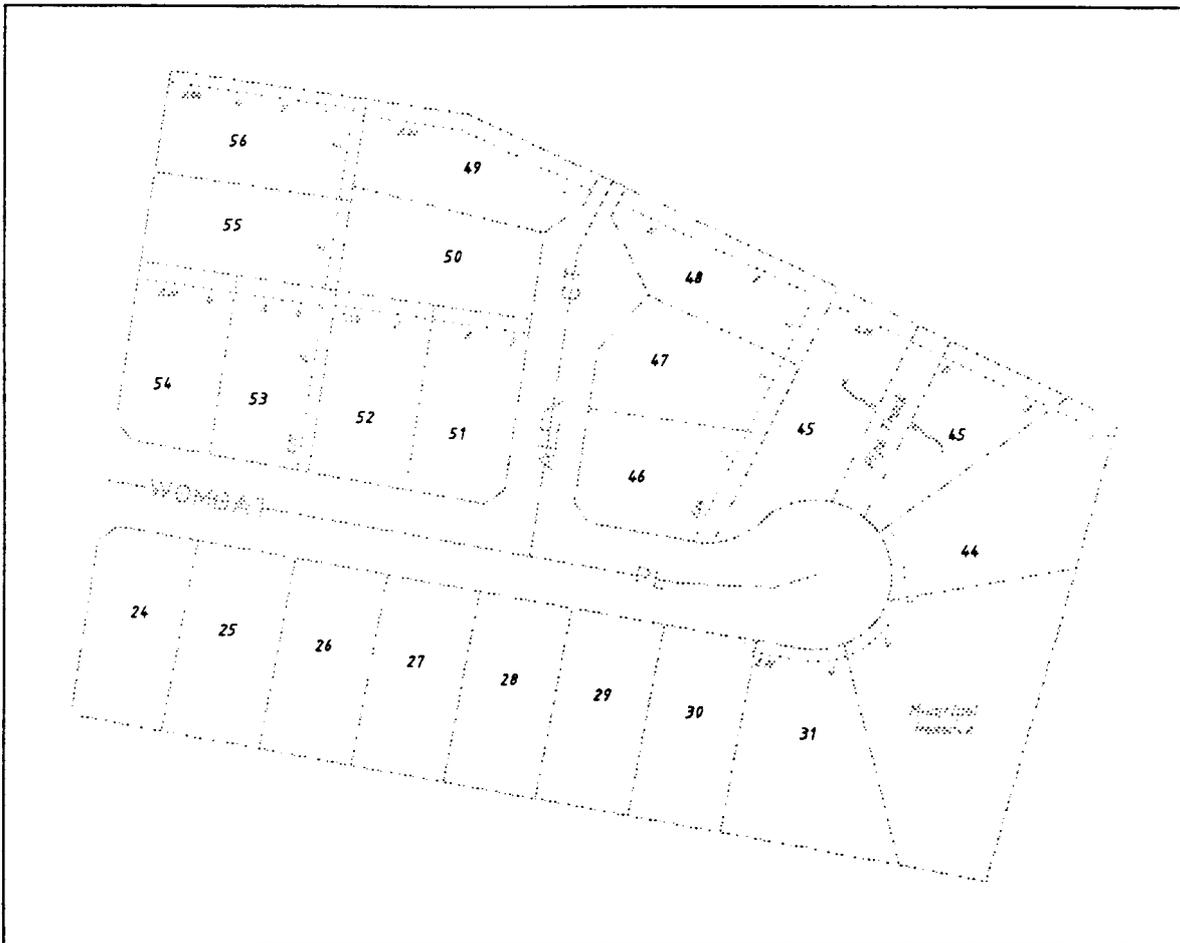


Figure 3-5 Example of proposed Lot Number placement

Proposed Easement Lines

Proposed easement lines are placed in the graphics file as either lines or arcs. The symbology is to be used as set out in *Tables 2-1* and *2-2*.

Lines must be placed as one between changes of bearing or as one between each property boundary. They are not to be placed as continuous line strings or complex line strings. A new line must begin at the point of change of direction or at a tangent point with an arc.

Curves are to be placed as arcs and fit the criteria as per lines. B-spline curves, ellipses, and spirals must not be used.

All lines and arcs must intersect and must not have overshoots or fall short of each other. They are to be "snapped together".

Proposed easement lines are placed at the correct offset distance, ground scale, away from title boundaries. Easement lines must not be placed under road alignment or title boundary line work.

Where an easement exists in a newly created Road, from an earlier stage of the development, the information relating to such easement is not required.

Figure 3-6 provides an example of proposed easement line work placement.

Proposed Easement Text

Proposed easement text is placed in the graphics file evenly spaced along the easement line at an offset of 1.15 metres (ground scale) to the text justification point. If the text is placed above the line it has a justification of Centre Bottom (CB) and if placed below the line it has a justification of Centre Top (CT) The symbology is to be used as set out in *Tables 2-1* and *2-2*.

The easement text traditionally placed on plans of subdivision (ie E-1 E-2 etc) are not required to be placed in graphics. In viewing the graphics file when merged into the map base this text is of no relevance and the convention used throughout the development of the map base is therefore to be used.

For example:

If a 2.50 metre Drainage and Sewerage Easement is placed in graphics the text 2.50 D S E is to be placed. These would be placed as four individual text elements and not as a continuous text string.

Figure 3-6 provides an example of proposed easement text placement.

3 Placement of Data in Graphics Files

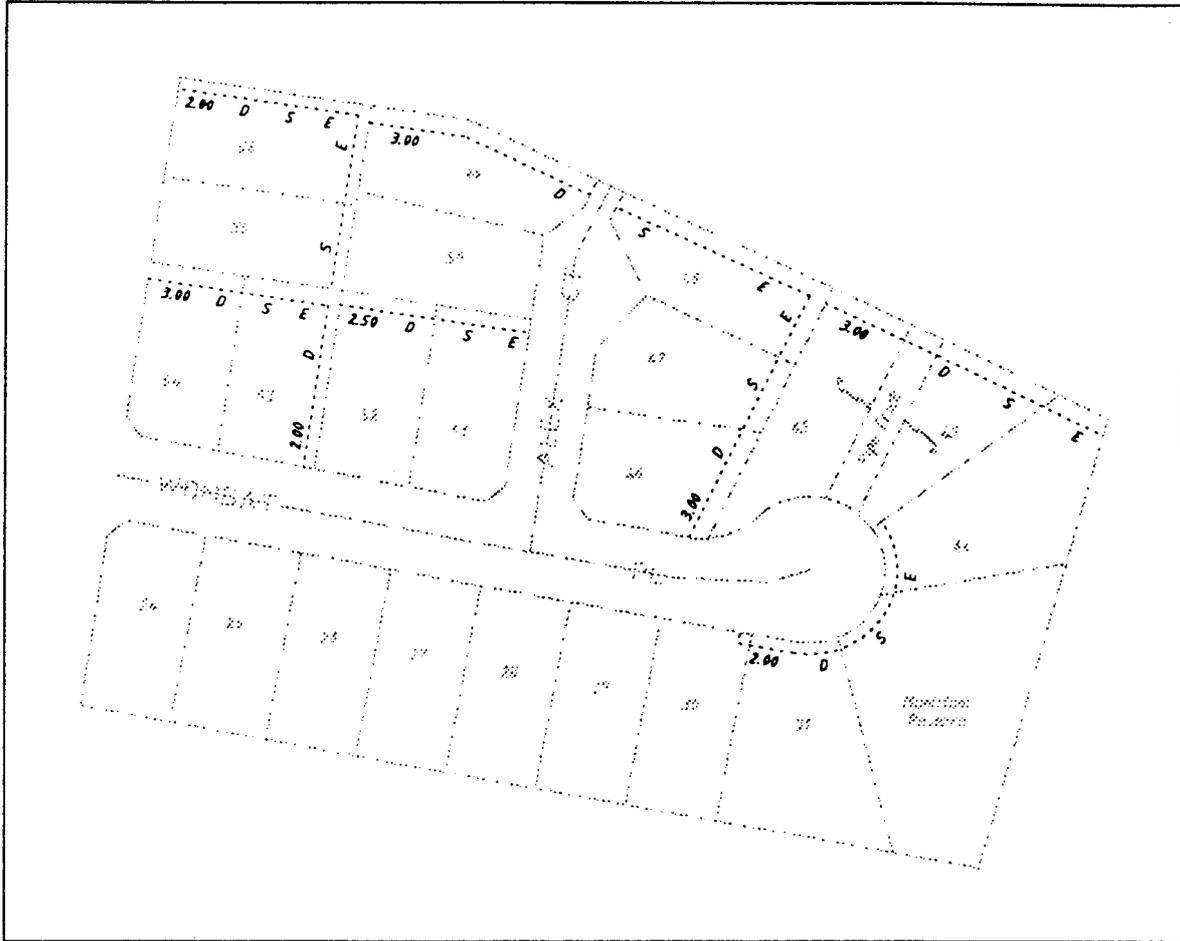


Figure 3-6 Example of Proposed Easement Line work and Proposed Easement Text placement

Proposed Reserves Text

Proposed reserve text is placed in the graphics file in approximately the centre of each reserve. It traditionally has an orientation of zero degrees but, if space does not allow this, the orientation can be as best fit. The symbology to be used is set out in *Tables 2-1* and *2~ 2*.

The reserve text traditionally placed on plans of subdivision (ie R-1 R-2 etc) are not required to be placed in graphics. In viewing the graphics file when merged into the map base this text is of no relevance and the convention used throughout the development of the map base is therefore to be used. That is, the reserve description is placed in graphics. This is placed as a continuous text string.

Figure 3-7 provides an example of proposed reserve text placement.

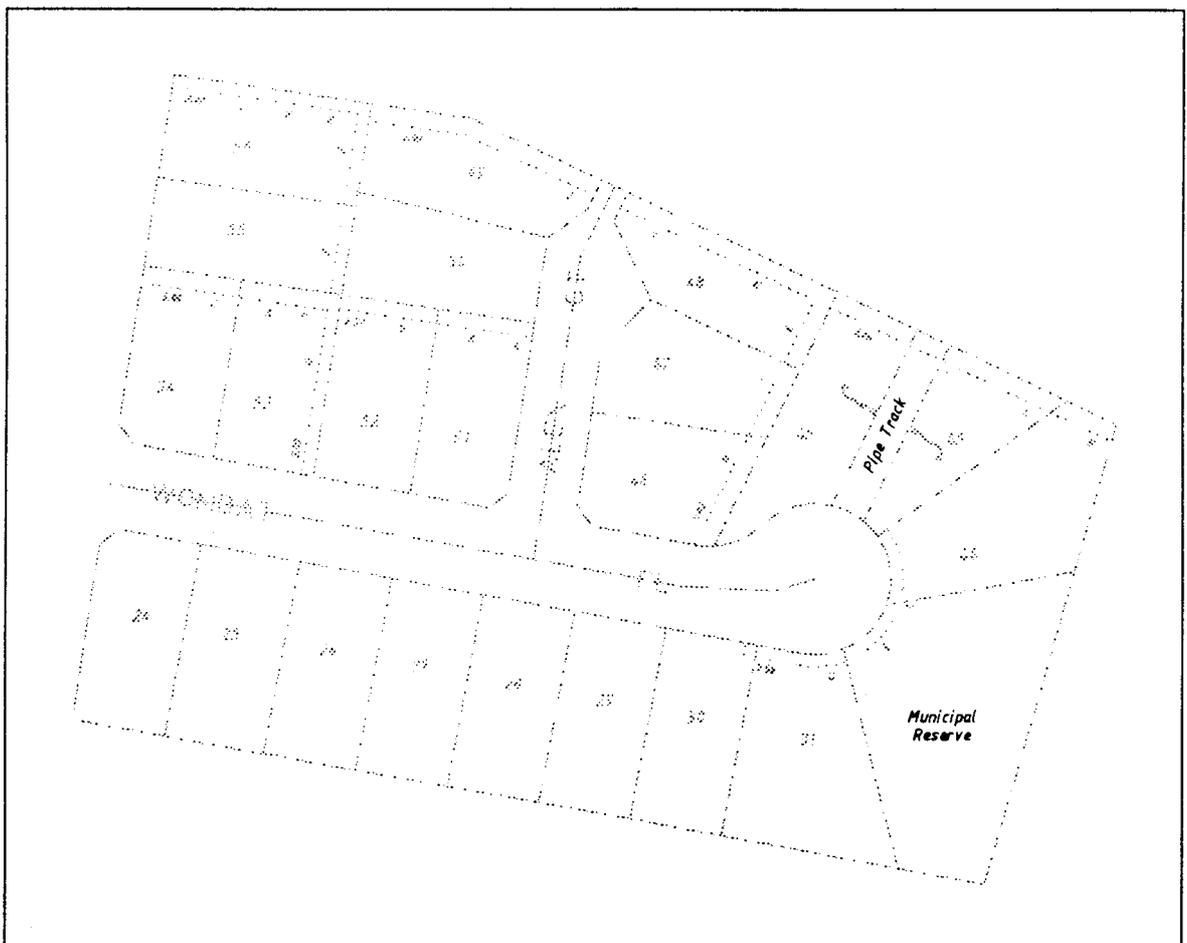


Figure3-7 Example of Proposed Reserve Text placement

Vinculums

Vinculums are placed in the graphics file. The symbology to be used is set out in *Tables 2-1* and *2-2*.

Vinculums indicate where a property is divided by another property or road. A cell is available in the FIS Cell Library (FISCELL.CEL) called "VINC".

They may require scaling down in size to look cartographically correct. They are not to be scaled up. The vinculum placed in the example below was placed at a scale of 0.7.

They rarely occur but when they do they are to be placed in graphics as per the example in *Figure 3-8*

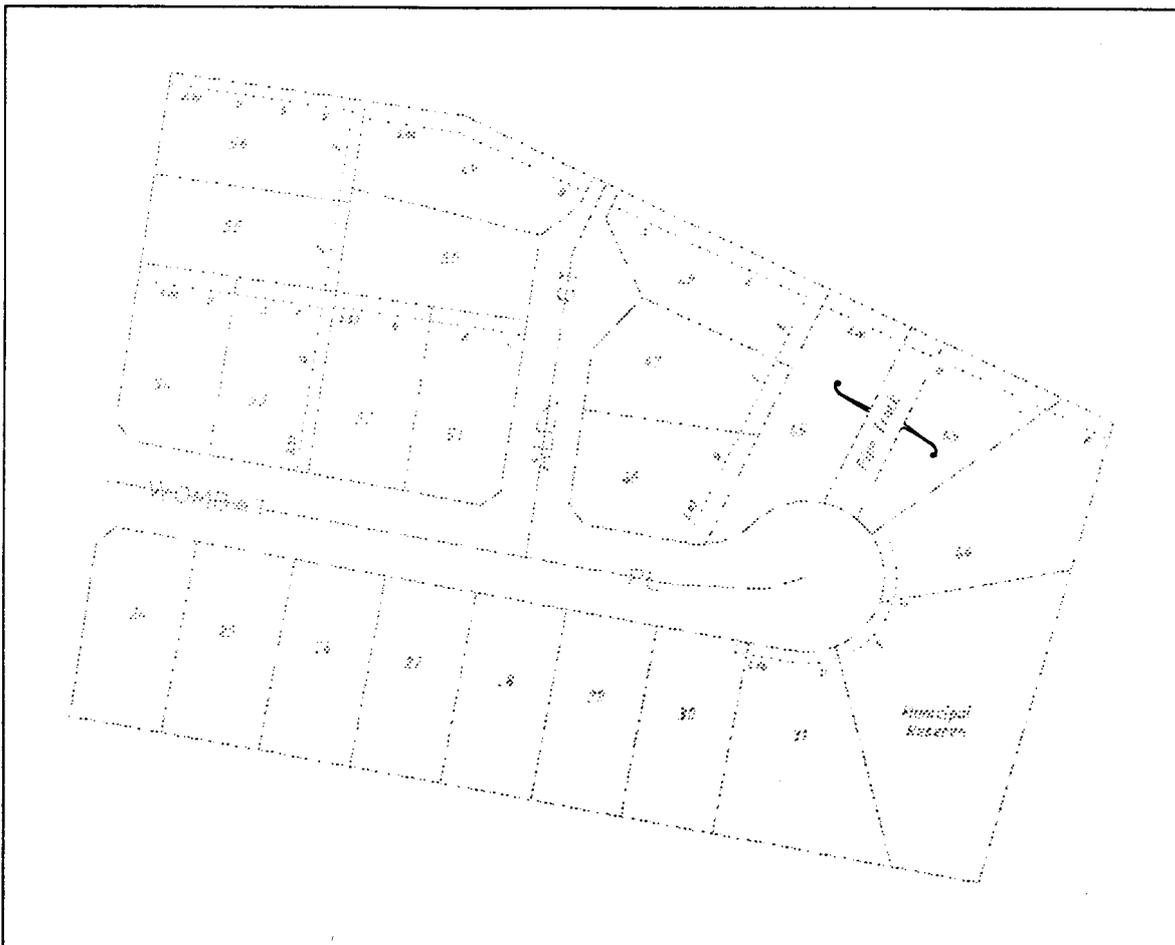


Figure 3-8 Example of a Vinculum placement

Glossary

Consultant

Any person or company involved in the provision and supply of digital subdivisional information

DGN

The abbreviation and file name extension given to MicroStation graphics files.

DXF

The abbreviation and file name extension given to graphics files that can be created in various graphics packages. It was created by Autodesk, Inc. for exchanging graphics files - the word DXF stands for Drawing Interchange Format.

FIS

The Water Company's Facilities Information System. The computer system used by the Water Company to store and retrieve their digital information relating to subdivisions, water supply, sewer and drainage.

Fiscolor.tbi

The Water Company's color table file used in MicroStation DGN files. By using this file the correct colors used by the Water Company will be obtained.

Fontlib

The Water Company's font file used in MicroStation DGN files. By using this file the correct font styles used by the Water Company will be obtained.

Global origin

The Easting and Northing origin of a file. This being the bottom left hand corner of the file. *Refer to Table 1-1.*

POLARIS

The Water Company's Property On Line And Retrieval Information System used to store the Water Company's rating and metering information.

Property boundary

Refer Title boundary

Reserve

A property set aside for a specific purpose (eg municipal uses, pipe tracks, tree reserves, drainage etc)

Road alignment

A line depicting the road, reservation boundary

Road centreline

A line depicting the centre of a road reservation.

SAMPCAD

A digital file available from the Water Company (in DGN or DXF format) providing an example of what the Water Company's map base looks like.

Seed file

An empty digital file with the correct global origin and working units, thus enabling the user to create files with the correct attributes.

Surveyors Code

A unique code number identifying the Licensed Surveyor to enable the transfer of digital subdivision information to the digital map base. This code is available upon request from the Water Company

Title boundary

The line depicting the boundary between properties on a plan of subdivision.

Working Units

The units of measure that the graphics **file** uses. *Refer to Table 1-1.*

Water Supply

Digital Input

Manual

Second Edition

No.

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March 1995

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About This Manual

This manual details the graphics and non-graphics data specifications required by the Water Company for the digital recording of a constructed water supply service information.

Intended audience

This manual defines the requirements and specifications for the supply of digital water supply data to the Water Company by any person or company, hereafter known as the Consultant.

How to use this manual

This manual is divided into two parts.

Part 1 - Specifications

Part 1 consists of three chapters which describe the requirements of graphics and non-graphics data.

Chapter 1 Supply and Format of Data

This chapter describes the responsibility of the Water Company and the Consultants with regard to the supply of “as constructed” data and associated documentation. It includes details about the supply and format of all digital data, file naming conventions and database linkage formats.

Chapter 2 Database Specifications

This Chapter describes the non-graphics requirements associated with the graphical elements of the water supply facility. The water supply database structure is described and a schedule of the entities and attributes, default values, uniqueness criteria and attribute format is included. It also contains details of attribute relationships and expected values, which can be used as a basis for database verification checks.

Chapter 3 Graphical Specifications

This chapter describes the graphics data requirements. It includes the level structure, symbology specifications, associated graphics specifications and a graphical library of cells required in water supply data capture.

Part 2 - Guidelines

Part 2 consists of seven chapters which detail the presentation standards association with the graphics input of water supply assets and associated database entry.

Chapters 4 - 8

Chapters 4-10 contain the requirements for the input of the water supply assets listed in Chapter 3. These chapters cover:

- ◆ nodes,
- ◆ pipes,
- ◆ valves,
- ◆ hydrants,
- ◆ other water fittings,
- ◆ recorders,
- ◆ electrolysis installations.

Glossary of Terms

This chapter contains a glossary of terms used in this manual.

Appendices

The Appendices contain:

- ◆ Supply of Digital Information Request Form,
- ◆ sample print-outs of non-graphics (database) files,
- ◆ a symbology quick reference guide,
- ◆ sample water supply plot with subdivisional backdrop.

Index

A cross referenced index is included at the back of the manual.

Conventions used in this manual

Italics are used when reference is made to information in other chapters of this manual.

For example:

This is shown in the **Database schedule** in *Chapter 2*.

Italics are also used to *emphasize* words or phrases.

◆ Diamond bullets are used for lists of items of topics.

Related reference material

Survey Manual

About This Manual

Part 1 Specifications

This chapter describes the formats in which externally captured Water Supply data must be supplied to the Water Company. It describes the responsibilities of the Water Company and associated consultant companies.

The Water Company's Responsibilities

Data supplied by the Water Company

On request the Water Company will provide appropriate digital data files:

- | | |
|--------------------|---|
| code lists | - filename codelist.dat (ASCII format), |
| font library | - filename fontlib.rsc (MicroStation format), |
| cell library | - filename fiscell.cel (MicroStation format),
- filename watblock.dxf (DXF format of FIS cells), |
| color Table | - filename fiscolour.tbl (MicroStation Users), |
| seed graphics file | - filename basemap.dgn (MicroStation Users),
- filename basemap.dxf (DXF format), |

graphics files containing cadastral map base and existing water supply data that are specifically related to the area of development (supplied per development).

Documentation supplied by the Water Company

The Water Company will provide documentation specific to the development area including:

- ◆ node numbers required to perform the task,
- ◆ valve numbers required to perform the task,
- ◆ street name code list numbers,
- ◆ job number,
- ◆ record set number for large mains where required.

The above information will be supplied when a request is received from consultant on a "Supply of Digital Information" form. Refer to **Appendix A** for original.

Consultant responsibilities

It is the responsibility of the consultant to supply The Water Company with data in the required format. This can be either in MicroStation .DGN or .DXF formats.

The Water Company uses MicroStation .DGN format graphics files.

.DGN formatted graphics with database linkages are the preferred format that The Water Company would like to receive any digital information.

The order of preference The Water Company would like digital information supplied is:

1. MicroStation .DGN format with linked database information as per **Database Schedule 1** in *Chapter 2* and **Graphics Schedule 1** in *Chapter 3*.
2. MicroStation .DGN format without linked database information as per **Database Schedule 2** in *Chapter 2* and **Graphics Schedule 2** in *Chapter 3*.
3. .DXF format without linked database information as per **Database Schedule 2** in *Chapter 2* and **Graphics Schedule 3** in *Chapter 3*.

.DXF format graphics files have to be converted to MicroStation .DGN format and linked to an ASCII database file by The Water Company to enable them to be merged into the FIS.

It is the responsibility of the consultant to supply The Water Company with data using either of the required formats.

Submissions that are not in accordance with all relevant Water Company specifications and relevant Australian Standards will be returned to the Consultant for review. The Consultant must ensure that non-conforming submissions (digital and non-digital) are resolved and the Works resubmitted to the Water Company within 10 (ten) working days. ①

Reduced Levels

All reduced levels must be to Australian Height Datum (AHD).

Spatial Correctness

All graphical elements are to be orientated to the correct Australian Map Grid (AMG) Zone 55 location.

Database files

Database files - MicroStation .DGN with linkages

All database files supplied to The Water Company must conform to the following specifications:

- ◆ Data must be supplied as ASCII files,
- ◆ All files must have fixed record lengths,
- ◆ All files must have carriage return, line feed record terminators,
- ◆ Each file must contain all data relating to one specified entity. The entity number must be embedded in the file name. Refer to *File naming conventions* later in this chapter,
- ◆ Each record must contain all specified attribute values in the order set out in **Database Schedule 1** in *Chapter 2*,
- ◆ All integer, Code list and real values must be right justified, all character attribute values are to be left justified,
- ◆ Attribute values must be supplied in the correct format, as set out in **Database Schedule 1** in *Chapter 2*,
- ◆ The first attribute of each record must begin in the first character position on a new line,
- ◆ Attribute fields must be separated by a single blank space,
- ◆ Records failing to satisfy the attribute and ownership uniqueness criteria will be rejected and may result in a non-conformance being issued,
- ◆ If the attribute owner unique identifier is followed by the keyword “required”, the value corresponding to the relevant unique identifier in the owner entity field must be supplied.

Refer to **Appendix B** for examples of database files.

Database files for graphics files (.DGN & .DXF) with no linkages

All database files supplied to The Water Company must conform to the following specifications:

- ◆ Data files must be supplied in ASCII format (These files can be created by a text editor, word processor or by the use of a spreadsheet),
- ◆ The ASCII files must not contain special characters or tab settings,
- ◆ Database information on **Nodes**, **Pipes** and **Fittings** are to be provided in three separate ASCII files, for each graphical area and have the file extensions of .nod .pip and .fit respectively,

1 Supply and Format of Data

- ◆ The file names must be in accordance with *File naming conventions* as described later in this chapter,
- ◆ Each record must contain all specified attribute values as stated in **Database schedule 2** in *Chapter 2*,
- ◆ The order of each record must be in accordance with **Database schedule 2** in *Chapter 2*,
- ◆ All integer and real values must be right justified and end in the character position as defined in **Database schedule 2** in *Chapter 2*,
- ◆ All alphanumeric and derived codes from code list must be left justified and commence in the character position as defined in **Database schedule 2** in *Chapter 2*,
- ◆ Attribute values must be supplied in the correct format as set out in **Database schedule 2** in *Chapter 2*,
- ◆ AMG co-ordinates must match the graphical occurrences.

Refer to **Appendix C** for examples of database files.

Graphical files

Graphics files containing linked database information - MicroStation .DGN

Graphics data must be supplied to The Water Company in one of the following ISFF formats:

- ◆ MicroStation PC Design Software two dimensional design files (2D), version 3.x or 4.x,
- ◆ Intergraph Interactive Graphics Design Software (IGDS) two dimensional design files, version 8.8 or later.

The Water Company will supply, upon request, a seed graphics file (basemap.dgn) which must be used as the basis to create subsequent graphics files.

Graphics files must be supplied to The Water Company:

- ◆ in accordance with the **MicroStation .DGN Graphical Schedule 1** in *Chapter 3*,
- ◆ with the digital information orientated to the Australian Map Grid (AMG) Zone 55 as defined by the field survey (refer to the Survey Manual),
- ◆ with file names in accordance with *File naming conventions* as described later in this Chapter,
- ◆ with all deleted elements eliminated. A graphics compress must be performed,

- ◆ with no shared cells,
- ◆ with all locks set to “off”, for example, the graphic group, snap, and grid locks,
- ◆ with graphic group = 0 (dropped),
- ◆ with view attributes set to “off” for enter data fields and text nodes,
- ◆ with no reference files attached,
- ◆ with no named views in file,
- ◆ containing no cells other than the one supplied in the cell library, except graphical error flags,
- ◆ with all type 66 elements deleted,
- ◆ with data supplied in 2D design files having the review specifications shown in Table 1-1.

Format Review Specifications	
global origin	2,000,000.00 - 3,000,000.00
master units	metre
sub units	1000mm per metre
positional units	1 positional unit per mm

Table 1-1 Graphic file format review specifications

ISFF Linkage formants - MicroStation .DGN

Graphics data must be linked, where applicable, to relevant non-graphics data by using either ISFF dBASE or ISFF INFORMIX userdata linkages. Each linkage must comprise 8 words (16 bits each) for every userdata linkage.

The acceptable formats are shown in Table 1-2.

Word	Format 1 (dBASE format)	Format 2 (INFORMIX format)
1	4103 (decimal)	4103 (decimal)
2	6513 (decimal)	14664 (decimal)
3	3969 (decimal)	3969 (decimal)
4	Entity number	Entity number
5 and 6*	Unique Id	Unique Id
7	0 (decimal)	0 (decimal)
8	0 (decimal)	0 (decimal)

Table 1-2 Userdata linkage formats

***Note:** The unique identifier long word in Table 1-2 is made up of two words. Word 5 is the low order word and word 6 is the high order word.

Graphics elements that require linkage to the database are identified in Chapter 3. An example of a graphics element with ISFF linkage format is shown in Figure 1-1.

```

427(2) CELL "VALVE"           Level = 0
  Word to follow = 52,         File position = 74, 231
  Range:  low  = 187111029,    699161129,    0
         high  = 187114547,    699164647,   -1
  Graphic group = 0
  Index to attributes = 30
  Properties: no orphan, snappable, planar, view_independant,
             attributes, not modified, new_element, not locked,
             Class = Primary
  Symbology : color = 232, weight = 0, style = 0
             words in description = 113
             Levels = 3
  Range Diagonal :
             -999,  -1731
             1001,  1733
  Transformation Matrix :
             -214674  -5626
             5626   -214674
  Origin:
             187112788,  69916288
  Attributes:
             4103  6513  3696  202
             132   0    0    0
    
```

Figure 1-1 ISFF linkage format

Graphical files containing no database linkage information

1. MICROSTATION FORMAT

Same format as for MicroStation files containing database linkages, except that there must be **no** userdata linkages.

2. .DXF FORMAT

The digital exchange format (.DXF) must:

- ◆ Be in accordance with the **.DXF Graphical Schedule 3** in *Chapter 3*
- ◆ with the digital information orientated to the Australian Map Grid (AMG) Zone 55 as defined by the field survey (refer to the Survey Manual),
- ◆ contain the data in two dimensional (2D) format,
- ◆ with file names in accordance with *File naming conventions* as described later in this Chapter,
- ◆ not contain blocks other than the ones used by The Water Company, except for graphical error flags,
- ◆ with a separate graphics file for each graphical area as defined in the municipal index graphics files.

File naming conventions

Each job has a ten digit file reference number which is The Water Company's File Management System (FMS) number.

For example 8012371084. (used for subdivisions)

The file naming convention is to drop the first four digits from the file reference number (eg 8012) and add a two digit number (01, 02, etc) to the end to indicate the stage number of the particular subdivision,

For example: 37108401.

Database files

Database files - Linked MicroStation .DGN

For database files, the filename must have an extension that relates to the relevant entity number.

For example, 37108401.201 (for water supply pipe sections), 37108401.225 (for water supply node numbers), etc.

Database files (associated with graphical files not having a database linkage)

Database files for **Nodes**, **Pipes** and **Fittings** must have extensions of **.nod**, **.pip** and **.fit** respectively.

For example 37108401.nod, 37108401.pip and 37108401.fit

Graphics files

MicroStation graphics files must have a .WAT extension,

For example, 37108401.WAT

.DXF files must have a .DXF extension,

For example, 37108401.DXF

FIS Graphical files - (Background Information)

The Water Company's graphics files are named and numbered based on geographic segmentation of municipalities.

Graphic files are named according to the first four letters (in capitals) of the municipality to which they relate, plus a dual numeric delineator (the municipal segment number).

The municipal segment numbers are indicated in the municipal graphics index files. Figure 1-2 shows the municipal segmentation of Kew.

Note: Kew being the only municipality with 3 characters requires an A to be added at the end of the word (KEWA)

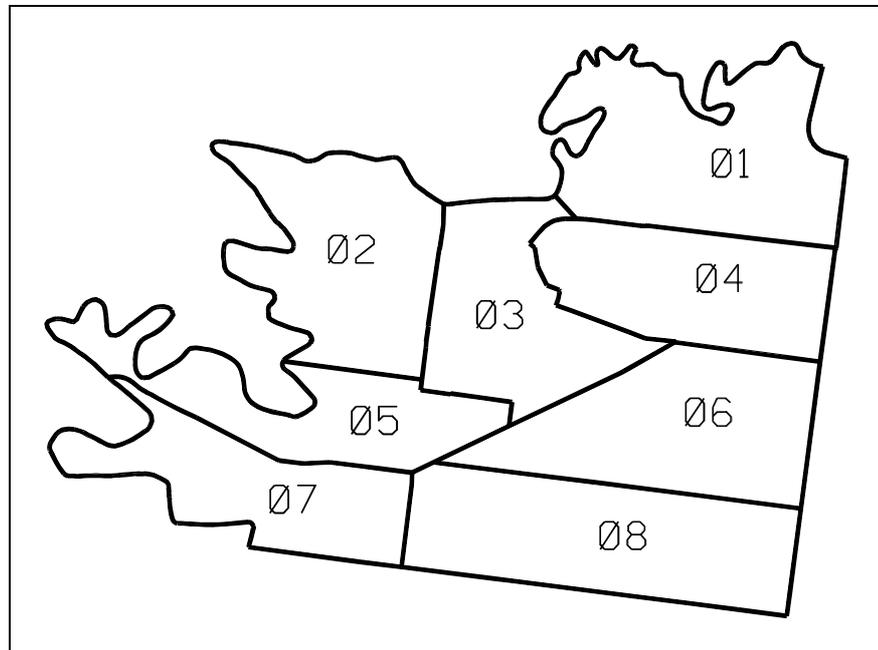


Figure 1-1 Municipal segmentation of KEW

With the amalgamations of municipal councils in Melbourne occurring The Water Company's computer system is not to be changed to suit the new councils. This will be implemented in mid 1995 with the introduction of a new computer system. Until further notice data being supplied to The Water Company will be named using the "pre-amalgamation" council names. An extensive list can be found in the Code List Set numbers 15 and 17.

Data transfer

Formats and media

Data must be delivered in a virus free, non-compressed or non-zipped format, to the Water Company on the following medium.

- ◆ PC DOS dataset, where:
 - the media is a 3.5" double sided high density diskette

The information **must not** be supplied in a compressed or zipped format.

Other formats will not be accepted unless previously arranged with the Water Company.

Batches

All data relating to one job must appear where practicable on a single diskette. However when a job crosses municipal boundaries, the data for each municipality must be supplied on a separate media.

Only one job and one discipline (ie water, not sewer) is to be supplied on one media (eg diskette). Additional jobs and/or disciplines are to be supplied on separate media.

A batch of data must contain at least one graphics file and all applicable database files. Database files containing no records are not required.

Mapbase graphics are **not** to be included.

Documentation which indicates the following, must accompany each batch of data:

- ◆ a listing of files contained on the media.
- ◆ the manner in which data was written to the media.
- ◆ how the data should be retrieved.
- ◆ the municipality and FIS file number(s).
- ◆ a plot at scale 1:1000 of the graphical file including mapbase.
- ◆ the total length of water mains in the project,

The Water Company's water supply database is made up of a number of entities. An entity is a database Table consisting of a number of attributes. These attributes describe different aspects of the entity.

For example, a pipe is an entity (number 201). The pipes material type, size, date of construction etc are some of it's attributes.

Each entity in the water supply database has a unique number and each attribute of that entity is identified by a field name.

For example, entity 225 - Nodes have five attributes:

- ◆ a unique identifier,
- ◆ a municipality,
- ◆ a node number,
- ◆ an X co-ordinate (Easting),
- ◆ a Y co-ordinate (Northing).

A database Table can be seen as a set of rows and columns. The attributes are the columns of the table. The rows are the actual occurrences that are stored in the table.

Water supply database structure

The Water Company's water supply database is structured so that most entities are linked to other entities in the database structure using a unique identifier.

For example:

- ◆ The Nodes entity (225) is the owner of the Pipe Section entity (201) which in turn is the owner of the Valves entity (202).

The water supply database structure is shown in Figure 2-1.

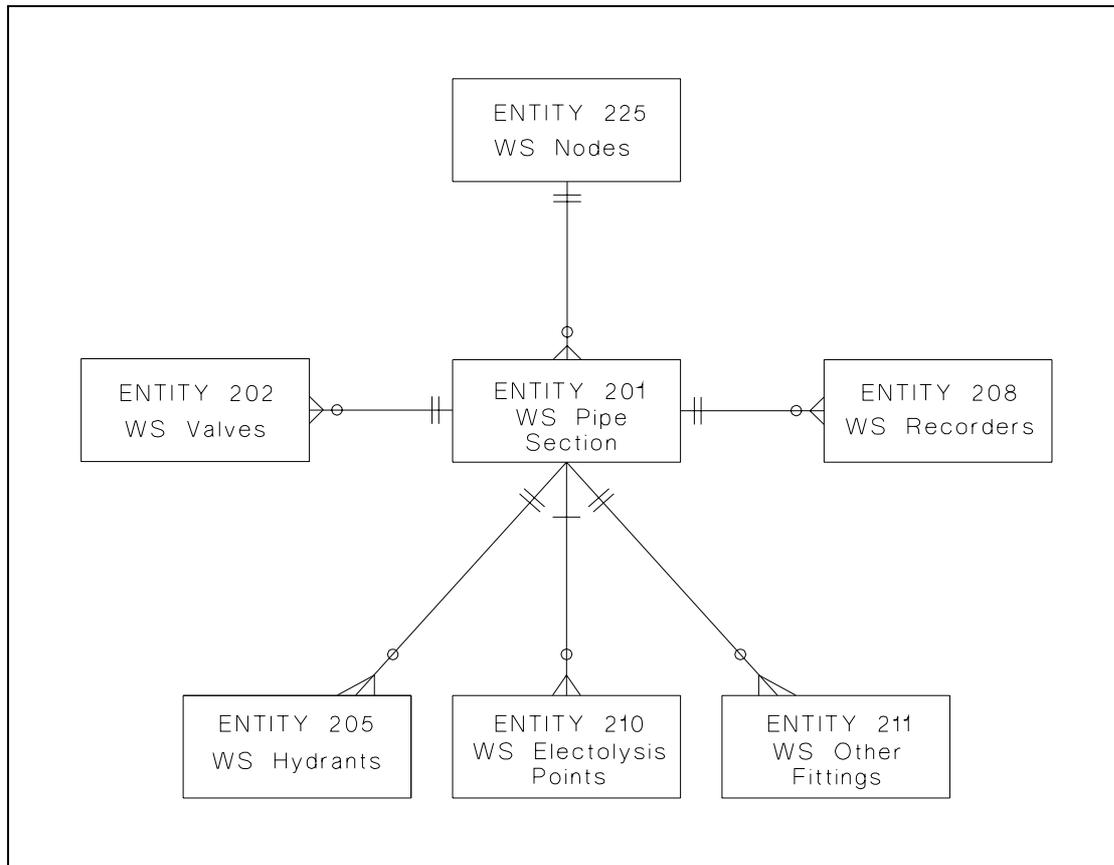


Figure 2-1 Water supply database relationship

When one entity is owned by another entity, the relationship is recorded in the owner unique identifier attribute. The owner unique identifier specifies the linkage to a unique occurrence in the owner entity table.

Database Schedule 1 - For MicroStation DGN file with linkages

The following schedule describes the specifications of the database entities and attributes that are required by the Water Company.

Each of the tables in this schedule are set out to indicate information required, they have seven columns:

- ◆ attribute number,
- ◆ attribute name,
- ◆ attribute format,
- ◆ attribute default value - mandatory,
- ◆ attribute FIS references,
- ◆ whether the attribute must be unique,
- ◆ usage notes.

Attribute formats

The format of the attributes in the database schedule are as follows:

- ◆ the first character of the format string is the attribute type:
 - I = integer
 - C = integer derived from to the FIS code list
 - F = floating point (real) number
 - A = alphanumeric character
- ◆ the remainder of the format string refers to the field width and the number of decimal places for real numbers.

For example:

- I10 indicates that the attribute value must be an integer of up to ten characters. The field must be 10 characters wide and right justified.
- F8.3 indicates that the attribute value must be a floating point number with up to four numbers before the decimal point and up to three numbers following the decimal point. The field must be eight characters wide including the decimal point and right justified.
- A3 indicates that the attribute value must be alphanumeric and up to three characters wide. The field must be 3 characters wide and left justified.

- C5 indicates that the attribute value must be a code list entry and up to five characters wide. The field must be five characters wide and right justified.

Attribute format values that are not applicable must be filled with blank spaces i.e. the fields must contain the correct number of characters.

Default values

There are two types of default values listed in the database schedule:

Mandatory defaults

Mandatory defaults are attribute values that are required by the database and link entities.

For example: the water supply valve owner entity number must = 201

The omission of mandatory defaults can cause the Water Company's software procedures to fail and may result in non-conformances being issued.

Convention dependent defaults

Convention dependent defaults must be used to maintain the consistency of database records.

For example: if the water supply valve status is not otherwise known, then a value of 6 (active) should be supplied.

FIS Reference

The FIS reference column in the database schedule provides four types of reference, which are defined as follows:

- ◆ AN(nn) indicates that the attribute:
 - is an alphanumeric field nn characters wide, where nn equals the number specified in the format field.
 - has an alphanumeric reference designated by the Water Company's Facilities Information System (FIS).
- ◆ C(nnn) or C(nnn)/C(mmm) indicates that the attribute is derived from code list (nnn) and/or code list (mmm). Refer to *Code lists* later in this chapter.
- ◆ I(nnnnn) indicates the maximum value allowed for integer values in the FIS database.
- ◆ F indicates that the attribute value is a floating point number

FIS Unique criteria

The unique criteria indicates whether the attribute value is used by the Water Company's FIS as (part of) the Primary Key.

Primary Key defines the attribute value/values which are used to select a unique row from the associated database table.

Attributes which comprise the Primary Key are indicated by an asterisk (*)

Usage notes

The usage notes indicate:

- ◆ whether default values are mandatory,
- ◆ the basis for determination of certain attribute values.

Water Supply Entity Tables - Linked DGN format

Entity 225 - Water Supply Nodes

	Attribute	Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		NIL		mandatory
.10	municipality	C3		C(15)/C(17)		mandatory select appropriate vale from code list
.12	node number	I7		I(8388607)	*	mandatory
.14	X co-ordinate (Easting)	F10.3		F		mandatory
.25	Y co-ordinate (Northing)	F11.3		F		mandatory

Table 2-1 Water supply nodes database table

Entity 201 - Water Supply Pipe Section

Attribute		Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		NIL		mandatory
.90	owner entity number	I3	225	NIL		mandatory
.91	owner unique identifier (required)	I10		NIL	*	mandatory - the 225 .99 attribute
.11	pipe size	C5		C(41)		select appropriate value from code list
.13	abbrev. pipe material	C3		C(43)/C(44)		select appropriate value from code list
.20	day of completion	C3		C(7)		select appropriate value from code list
.21	month of completion	C3		C(9)		select appropriate value from code list
.22	year of completion	C5		C(11)		select appropriate value from code list
.24	record set number	I5		I(32767)		
.25	road name	C5		C(101)		select appropriate value from code list
.27	abbrev. road type	C3		C(103)/C(104)		select appropriate value from code list
.29	abbrev. location in road	C3		C(121)/C(122)		select appropriate value from code list
.37	pipe length	I5		I(32767)		round to nearest metre
.38	pipe id	I3		I(127)	*	
.39	pipe status	C3	6 = active	C(31)		convention dependent
.41	connect node number	I7		I(8388607)	*	convention dependent

Table 2-2 Water supply pipe sections database table

Entity 202 - Water Supply Valves

Attribute		Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		NIL		mandatory
.90	owner entity number	I3	201	NIL		mandatory
.91	owner unique identifier (required)	I10		NIL		mandatory - the 201.99 attribute
.11	abbrev. valve type	C3		C(203)/C(204)		select appropriate value from code list
.12	valve size	C5		C(41)		select appropriate value from code list
.13	valve open	C3	19 = Open	C(229)		select appropriate value from code list
.15	valve number	I5		I(32767)	*	
.19	valve insulated	C3		C(13)		select appropriate value from code list
.23	valve status	C3	6 = active	C(31)		convention dependent

*Table 2-3 Water supply valves database table***Entity 205 - Water Supply Hydrants**

Attribute		Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		NIL		mandatory
.90	owner entity number	I3	201	NIL		mandatory
.91	owner unique identifier (required)	I10		NIL		mandatory - the 201.99 attribute
.10	hydrant type	C3		C(206)		select appropriate value from code list
.11	authority own hydrant	C3		C(207)		select appropriate value from code list
.12	hydrant status	C3	36= exists	C(31)		convention dependent

Table 2-4 Water supply hydrants database table

Entity 211 - Water Supply Other Fittings

	Attribute	Format	Default	FIS Reference	FIS Unique Criteria	Usage Notes
.99	unique identifier	I10		NIL		mandatory
.90	owner entity number	I3	201	NIL		mandatory
.91	owner unique id (required)	I10		NIL		mandatory the 201.99 attribute
.10	type of fitting	C3		C(258)		select appropriate valve from code list
.15	fitting status	C3	6=active	C(31)		convention dependent

Table 2-5 Water supply other fittings database table

Database Schedule 2 - For graphical files not having database linkages

This section describes the specifications of the database entities and attributes that must be supplied by the Consultant to the Water Company, when the graphical files are not linked to the database.

The following tables define the required attribute information, format of each attribute and format of each record.

The conventions used in the tables are:

- ◆ The letters in the tables (A, B, C, etc) describe the columns that are used if the input is performed through a spreadsheet,
- ◆ The start **Col.** and **Width** are the start and width of each column,
- ◆ The **Used Col.** shows a number in brackets which is the number of digits actually used by the Water Company (not necessarily the same as the column width in the data file). When the type is a floating point decimal, the number before the decimal defines the number of columns to be used including the decimal point and the number after the decimal point defines the position of the decimal point (ie 10.3 is a real number of up to 6 digits before the decimal point, followed by the decimal point and three more digits),
- ◆ The valid types are known as:

A	alphanumeric	left justified	e.g. ABC123	
I	integer	right justified		1234
F	floating point decimal	right justified		234.567
C	code derived from the FIS code list	left justified	12	

- ◆ **Attr.** relates to the Water Company's FIS database attribute number,
- ◆ **Attribute Name** specifies the attribute information required,
- ◆ **Default** specifies the value that must be used for the data file record type identifier, contained within the first three columns of any record and code values that should be used from the FIS code list, if there is nothing more appropriate,
- ◆ **Code List** identifies the code set that must be used,
- ◆ Spacing has been inserted between each attribute required, to assist readability. This inserted space is one character wide and any character can be used for spacing (commas or semi-colons are recommended).

The water supply ASCII data must be supplied in three separate files:

1. **Nodes** - containing all node information (*filename.nod*),
2. **pipes** - containing all pipe information (*filename.pip*),
3. **fittings** - containing all fittings information (*filename.fit*).

Nodes

The nodes ASCII file (*filename.nod*) contains two record types.

1. The first row contains the Node header,
2. The second and following rows contain the node descriptions.

For example:

The order of record types within the node ASCII file is as follows:

Record Type	Record Type Description:
--------------------	---------------------------------

1	Node Header
2	Node Description
2	Node Description
2	Node Description

Unique criteria: Node numbers must be unique within each municipality.

Note: All fields must be filled, excepting those reserved by the Water Company.

The owner node must appear in graphics and in the ASCII file for the linkage process to work.

Tables 2-6 to 2-7 set out the required formats

Record type 1 - Node Header

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	291	
B	4	1						
C	5	20	(20)	A	n/a	job number		
D	25	1						
E	26	4	(4)	A	n/a	municipality identifier/name		
F	30	1						
G	31	10	(2)	A	n/a	design file number		
H	41	1						
I	42	11	(4)	I	n/a	number of nodes in job		
J	53	1						
K	54	20	(20)	A	n/a	RESERVED for the Water Co.	Blank	
	(73)							

*Table 2-6 Water supply node header***Record Type 2 - Entity 225 - Node Description**

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	225	
B	4	1						
C	5	20	(7)	I	.12	node number		
D	25	1						
E	26	4	(3)	C	.10	abbreviated municipality		15/17
F	30	1						
G	31	10	(10.3)	F	.14	node X co-ordinate (Easting)		
H	41	1						
I	42	11	(11.3)	F	.25	node Y co-ordinate (Northing)		
	(52)							

Table 2-7 Water supply node description

Pipes

The pipes ASCII file (*filename.pip*) contains two record types.

1. The first row contains the Pipe header,
2. The second and following rows contain the pipe descriptions.

For example:

The order of record types within the pipe ASCII file is as follows:

Record Type	Record Type Description:
--------------------	---------------------------------

1	Pipe Header
2	Pipe Description
2	Pipe Description
2	Pipe Description

Unique criteria: The concatenation (grouping) of owner node, connect node and pipe section number (pipe ID) must be unique.

Note: All fields must be filled, excepting those reserved by the Water Company.

Tables 2-8 to 2-9 set out the required formats

Record Type 1 - Pipe Header

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	292	
B	4	1						
C	5	20	(20)	A	n/a	job number		
D	25	1						
E	26	7	(4)	A	n/a	municipality identifier/name		
F	33	1						
G	34	3	(2)	A	n/a	design file number		
H	37	1						
I	38	7	(4)	I	n/a	number of pipe sections in job		
J	45	1						
K	46	20	(20)	A	n/a	RESERVED for the Water Co.	blank	
	(65)							

*Table 2-8 Water supply pipe header***Record Type 2 - Entity 201 - Pipe Description**

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	201	
B	4	1						
C	5	20	(7)	I	n/a	owner node number		
D	25	1						
E	26	7	(7)	I	.41	connect node number		
F	33	1						
G	34	3	(3)	I	.38	pipe section number (pipe ID)		
H	37	1						
I	38	7	(5)	C	.11	pipe size		41
J	45	1						
K	46	20	(3)	C	.13	pipe material		43/44
L	66	1						

*Table 2-9-1 Water supply pipe description**Continued on the next page*

Record Type 4 - Entity 201 Water supply pipe description continued...

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
M	67	3	(3)	C	.20	day of completion		7
N	70	1						
O	71	3	(3)	C	.21	month of completion		9
P	74	1						
Q	75	5	(5)	C	.22	year of completion		11
R	80	1						
S	81	5	(5)	I	.24	record set number	blank	
T	86	1						
U	87	5	(5)	C	.25	road name		101
V	92	1						
W	93	3	(3)	C	.27	road type		103/104
X	96	1						
Y	97	3	(3)	C	.29	abbreviated location in road	4	121/122
Z	100	1						
AA	101	5	(5)	I	.37	pipe length		
AB	106	1						
AC	107	3	(3)	C	.39	pipe status	6	31
AD	110	1						
AE	111	10	(10.3)	F	n/a	start X co-ordinate (Easting)		
AF	121	1						
AG	122	11	(11.3)	F	n/a	start Y co-ordinate (Northing)		
AH	133	1						
AI	134	10	(10.3)	F	n/a	end X co-ordinate (Easting)		
AJ	144	1						
AK	145	11	(11.3)	F	n/a	end Y co-ordinate (Northing)		
	(155)							

Table 2-9-2 Water supply pipe description

Fittings

The fittings ASCII file (*filename.fit*) contains four record types.

1. The first row contains the Fittings header,
2. The second and following rows contain the Valves, Hydrants and Other Fittings descriptions.

For example:

The order of record types within the fittings ASCII file is as follows:

Record Type	Record Type Description:
1	Fittings Header
2	Valves Description
2	Valves Description
"	" "
"	" "
3	Hydrants Description
3	Hydrants Description
"	" "
"	" "
4	Other Fittings Description
4	Other Fittings Description
"	" " "
"	" " "

Unique criteria: Valve numbers must be unique within each municipality.

Note: All fields must be filled, excepting those reserved by the Water Company.

Tables 2-10 to 2-13 set out the required formats

Record Type 1 - Fittings Header

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	293	
B	4	1						
C	5	20	(20)	A	n/a	job number		
D	25	1						
E	26	10	(4)	A	n/a	municipality identifier/name		
F	36	1						
G	37	3	(2)	A	n/a	design file number		
H	40	1						
I	41	4	(4)	I	n/a	number of valves in job		
J	45	1						
K	46	5	(4)	I	n/a	number of hydrants in job		
L	51	1						
M	52	10	(4)	I	n/a	number of other fittings in job		
	(61)							

Table 2-10 Water supply fittings header

Record Type 2 - Entity 202 - Valves Description

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	202	
B	4	1						
C	5	20	(7)	I	n/a	owner node number		
D	25	1						
E	26	10	(7)	I	n/a	connect node number		
F	36	1						
G	37	3	(3)	I	n/a	pipe section number (pipe ID)		
H	40	1						
I	41	4	(3)	C	.11	valve type		203/204
J	45	1						
K	46	5	(5)	C	.12	valve size		41
L	51	1						
M	52	10	(3)	C	.13	valve open		229
N	62	1						
O	63	11	(5)	I	.15	valve no.		
P	74	1						
Q	75	11	(3)	C	.19	valve insulated		13
R	86	1						
S	87	3	(3)	C	.23	valve status	6	31
T	90	1						
U	91	10	(10.3)	F	n/a	valve X co-ordinate (Easting)		
V	101	1						
W	102	11	(11.3)	F	n/a	valve Y co-ordinate (Northing)		
	(112)							

Table 2-11 Water supply valves description

Record Type 3 - Entity 205 - Hydrants Description

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	205	
B	4	1						
C	5	20	(7)	I	n/a	owner node number		
D	25	1						
E	26	10	(7)	I	n/a	connect node number		
F	36	1						
G	37	3	(3)	I	n/a	pipe section number (pipe ID)		
H	40	1						
I	41	4	(3)	C	.10	hydrant type		206
J	45	1						
K	46	5	(3)	C	.11	authority own hydrant		207
L	51	1						
M	52	10	(3)	C	.12	hydrant status	6	31
N	62	1						
O	63	11	(10.3)	F	n/a	hydrant X co-ordinate (Easting)		
P	74	1						
Q	75	11	(11.3)	F	n/a	hydrant Y co-ordinate (Northing)		
	(85)							

Table 2-12 Water supply hydrants description

Record Type 4 - Entity 211 - Other Fittings Description

	Start Col.	Width	Used Col.	Type	Attr.	Attribute name	Default	Code List
A	1	3	(3)	I	n/a	data file record type identifier	211	
B	4	1						
C	5	20	(7)	I	n/a	owner node number		
D	25	1						
E	26	10	(7)	I	n/a	connect node number		
F	36	1						
G	37	3	(3)	I	n/a	pipe section number (pipe ID)		
H	40	1						
I	41	4	(3)	C	.10	fitting type		258
J	45	1						
K	46	5	(3)	C	.15	fitting status	6	31
L	51	1						
M	52	10	(10.3)	F	n/a	fitting X co-ordinate (Easting)		
N	62	1						
O	63	11	(11.3)	F	n/a	fitting Y co-ordinate (Northing)		
	(73)							

Table 2-13 Water supply other fittings description

Database verification requirements

Required verification checks

Database attributes must be verified to ensure data accuracy.

These checks may be carried out at the point of data entry, or at output stage.

The following suggestions are offered as a means of checking a number of attributes.

Uniqueness criteria checks

These checks will ensure that the following numbers are unique:

- ◆ node numbers within a municipality,
- ◆ valve numbers within a municipality,
- ◆ pipe identification numbers within a municipality.

Attribute tests

Table 2-14 provides a set of guidelines which may be taken into consideration when verifying database entries.

The Table has been supplied as a basis for the development of additional software certification checks.

Unless otherwise stated, the “expected attribute values” may be varied depending on the municipality or area.

There should not be any values such as Unknown, * or blank.

Attribute Number	Attribute Name (and Check Criteria)	Code List	Expected Values and Attribute Relationships
225.10	municipality	15/17	default to the prefix of the municipality
201.11	pipe size	41	10, 12, 14, 15, 16, 17, 19, 21, 23, 24, 27, 36, 37, 39, 47 For P.E. pipes the size is the outside diameter (OD) <i>Refer to Chapter 5 - Pipes</i>
201.13	pipe material	43/44	20-25, 27-29, 39, 44, 53-58
201.20	day of completion	7	7, 9, 11, 13, 15, 17, 19, 21, 23, 24-45
201.21	month of completion	9	1-12
201.22	year of completion	11	current year
201.24	record set number		usually only applicable to pipes ≥ 225 mm
201.25	road name	101	all values in code list 101 are applicable check Melways for spelling if an entry fails validation
201.27	road type	103/104	all values are applicable except 1, 2, 3, 5, and 121-127
201.29	location in road	121/122	all values are applicable except 1, 2, 3, and 5
201.39	pipe status	31	usually 6 = active
202.11	valve type	203/204	10, 13, 21, 22, 23, 25, 26, 48
202.12	valve size	41	10, 12, 14, 15, 16, 17, 19, 21, 23, 24, 27, 36, 37, 39, 47 For pipes 80 mm and above valve size usually will equal the pipe size
202.13	valve open	229	usually 19 = Open or 6 = 100% shut
202.15	valve number		must be unique
202.23	valve status	31	usually 6 = active
205.10	hydrant type	206	6, 8, 10, 12, 14, 16
205.11	hydrant authority owner	207	6, 8, 10
205.12	hydrant status	31	usually 36 = existing
211.10	other fitting type	258	6, 19-25
211.15	fitting status	31	usually 6 = active

Table 2-14 Database attribute tests

Code lists

Code list entries are used to standardise terminology by providing a range of item descriptions relating to a particular attribute.

A number of attributes specified in the database schedules require the input of a code list entry number.

In some cases the same code list entry number can be specified for more than one attribute. For example, code list entry number 9 from code list number 43/44 indicates the material concrete (not known if reinforced). This material may be used to define several attributes, as indicated in the database schedule.

Code list entries are constantly reviewed by the Water Company and additions and amendments are made as the need arises. If there is no code list entry that accurately describes a particular attribute and a new one is required please contact the Water Company.

New code list entry numbers must not be assumed and must be validated.

Table 2-15 details the code lists applicable to water supply data capture.

Code List	Code List Description
7	date of completion - day
9	date of completion - month
11	date of completion - year
13	valves insulated
15	municipal names
17	municipal numbers
31	operational status
41	conduit and access point size
43	conduit material
44	conduit material (abbreviated)
71	gauging devices
101	street names
103	street types
104	street types (abbreviated)
121	location in road
122	location in road (abbreviated)
203	valve types
204	valve types (abbreviated)
206	hydrant type
207	hydrant authority owner
229	valve - open
241	recorder number (pressure, flow)
242	recorder numbers (pressure, flow) abbreviated
243	types of gauging devices
258	other fitting type

Table 2-15 Relevant Water Supply Code Lists

This Chapter contains the specifications for the graphical representation of elements in water files. It includes:

- ◆ verification requirements for graphics files,
- ◆ a level and layer structure for water elements
- ◆ symbology for water elements
- ◆ associated software specifications
- ◆ a graphical library of cells used in water data capture

The Water Company uses Intergraph .DGN format graphics files. The information is stored in each graphics file in levels, or layers, enabling different types of information to be displayed at any one time.

Certain graphical elements have a link to the FIS database.

Each graphics file has 63 levels.

.DGN formatted graphics as set out in the tables in this chapter are the preferred format that The Water Company would like to receive any graphical information.

The order of preference The Water Company would like digital information supplied is:

1. MicroStation .DGN format with linked database information as per **Database Schedule 1** in *Chapter 2*.
2. MicroStation .DGN format without linked database information as per **Database Schedule 2** in *Chapter 2*.
3. .DXF format without linked database information as per **Database Schedule 2** in *Chapter 2*.

.DXF format graphics files have to be converted to MicroStation .DGN format by The Water Company to enable them to be merged into the FIS.

This chapter is split into three schedules:

- Graphics Schedule 1** - For MicroStation linked .DGN format
- Graphics Schedule 2** - For MicroStation unlinked .DGN format
- Graphics Schedule 3** - For unlinked .DXF format.

Graphics Schedule 1 - For MicroStation in Linked .DGN format

This Schedule contains the specifications for the graphical representation of elements with database linked in water supply file. It includes:

- ◆ Intergraph element type details,
- ◆ verification requirements for graphic files,
- ◆ a listing of level structures,
- ◆ a listing of symbologies,
- ◆ related software specifications,
- ◆ a graphic library of cells used in water supply data capture.

Intergraph element specifications

All water supply elements must be assigned the Intergraph Element Class “Primary”.

Acceptable Intergraph Element Types are specified in Table 3-1

Version 5.x of MicroStation has new element types which are unknown in earlier versions. The Water Company recommends that the compatibility switch be set to version 3 or version 4 to avoid possible problems.

Element	Intergraph Element Type	Type Number
<p>Line work</p> <p>Water mains, Property connections, Projection lines and Conduits</p> <ul style="list-style-type: none"> - Straight - Straight with Horizontal Bend - Curved * (or straight with curve) <p>Other:</p> <p>Text Arrow Shaft:</p> <ul style="list-style-type: none"> - Straight - Bent 	<p>LINE</p> <p>LINE STRING</p> <p>CURVE</p> <p>LINE STRING</p> <p>LINE</p> <p>LINE STRING</p>	<p>3</p> <p>4</p> <p>11</p> <p>4</p> <p>3</p> <p>4</p>
<p>Symbols</p> <p>All Cells</p>	<p>CELL</p>	<p>2**</p>
<p>Text</p> <p>All Text</p>	<p>TEXT</p>	<p>17***</p>

Table 3-1 Intergraph element types

* Element type ARC (number 16) must not be used

** In accordance with the cell library provided

*** In accordance with the font library provided

Graphic file verification requirements

Consultants must verify the basic file structure of all graphics design files submitted to The Water Company. Verification checks must be carried out by consultants in the following manner.

The Edit Graphics (EDG) verification command sequence required in the VAX environment is:

```
$      EDG/READ filename
edg>  SET SEARCH/ALL
edg>  SET VERIFY/LENGTH
edg>  EOF
```

If the output from this command sequence is <End of Design>, the basic file structure is acceptable.

Output other than the above indicates file structure problems. File structure problems are displayed in the form of diagnostic messages related to the first element not satisfying the verification procedure. These are major errors and prevent the file from being graphically displayable. Minor errors however may not affect graphical display but can cause subsequent plotting problems.

The equivalent verification in the version 3.x MicroStation PC environment is achieved with the following EDG command sequence:

```
edg>  SET SEARCH/ALL
edg>  SET MODE/VERIFY
edg>  FIND END
```

Output from this command sequence should be <End of Design>.

In the version 4.x MicroStation PC environment, the command sequence must be expanded as follows:

```
edg>  SET SEARCH/ALL
edg>  SET MODE/VERIFY
edg>  SET VERIFY/LENGTH
edg>  FIND END
```

Output from this command sequence should be <End of Design>.

Level structure

Table 3-2 is the level structure assigned to water supply file elements related to as constructed information.

All miscellaneous items and notation other than those specified in this table, must be placed on the level of the feature to which they are related.

Level	Graphic Item
1	Water main <100 mm diameter and fittings
2	Water main 100 - <150 mm diameter and fittings
3	Water main 150 - <225 mm diameter and fittings
4	Water main 225 - <300 mm diameter and fittings
5	Water main 300 - <375 mm diameter and fittings
6	Water main 375 - 600 mm diameter and fittings
7	Water main >600 - 825 mm diameter and fittings
8	Water main >825 mm diameter and fittings
9	Water main text <100 mm diameter
10	Water main text 100 - <150 mm diameter
11	Water main text 150 - <225 mm diameter
12	Water main text 225 - <300 mm diameter
13	Water main text 300 - <375 mm diameter
14	Water main test 375 - 600 mm diameter
15	Water main text >600 - 825 mm diameter
16	Water main text >825 mm diameter
17	Trunk services and text
21	Depth (level of cover) text
22	Depth recorder, flow recorders, pressure recorders and associated text
23	Gauging stations
39	Pipe section nodes and text
46	Aqueducts - The Water Company and other authorities, graphics and text
48	Other authority mains
49	Water supply pipe scours
50	Abandoned mains and Text
52	Dry Tapping Text (DT)
54	Property Connection - pipe, tie and projection line
63	Graphical flag - Problems in edge matching

Table 3-2 Water Supply Level Structure

Element symbology

This section contains the symbology specifications for the graphical representation of water supply elements. Symbology is specified in terms of level, color, line weight, line style, font, height, width and justification of text, and whether or not there is a cell to represent the item.

Elements are grouped by entities.

A cross-hatch (#) indicates that the item requires a database linkage.

These tables must be read in conjunction with the specifications detailed in *Associated graphical specifications* later in this chapter. A list of text justification abbreviations used in these tables is also included.

Nodes

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Node #	39	222	0	0	–	–	–	–	WSNODE
Node Number Text	39	222	0	0	31	3.00	3.00	LB	–

Table 3-3 Nodes symbology

Water pipe section

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Water Main #									
For Water Main Size:									
<100 mm	1	232	0	0	–	–	–	–	–
100 - <150 mm	2	232	0	0	–	–	–	–	–
150 - <225 mm	3	232	0	0	–	–	–	–	–
225 - <300 mm	4	232	1	0	–	–	–	–	–
300 - <375 mm	5	232	1	0	–	–	–	–	–
375 - 600 mm	6	232	2	0	–	–	–	–	–
>600 - 825 mm	7	232	2	0	–	–	–	–	–
>825 mm	8	232	2	0	–	–	–	–	–
Water Main Text									
For Water Main Size:									
<100 mm	9	232	0	0	37	4.50	4.00	L,R,T,CB	–
100 - <150 mm	10	232	0	0	37	4.50	4.00	L,R,T,CB	–
150 - <225 mm	11	232	0	0	37	4.50	4.00	L,R,T,CB	–
225 - <300 mm	12	232	0	0	37	4.50	4.00	L,R,T,CB	–
300 - <375 mm	13	232	0	0	37	4.50	4.00	L,R,T,CB	–
375 - 600 mm	14	232	0	0	37	4.50	4.00	L,R,T,CB	–
>600 - 825 mm	15	232	0	0	37	4.50	4.00	L,R,T,CB	–
>825 mm	16	232	0	0	37	4.50	4.00	L,R,T,CB	–
Change of Date/ Pipe Material									
For Water Main Size:									
<100 mm	1	232	0	0	–	–	–	–	CHANGE
100 - <150 mm	2	232	0	0	–	–	–	–	CHANGE
150 - <225 mm	3	232	0	0	–	–	–	–	CHANGE
225 - <300 mm	4	232	0	0	–	–	–	–	CHANGE
300 - <375 mm	5	232	0	0	–	–	–	–	CHANGE
375 - 600 mm	6	232	0	0	–	–	–	–	CHANGE
>600 - 825 mm	7	232	0	0	–	–	–	–	CHANGE
>825 mm	8	232	0	0	–	–	–	–	CHANGE

*Table 3-4-1 Water supply pipe symbology**Continued on the next page*

3 Graphical Specifications

Water pipe section continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Offset Symbol									
For Water Main Size:									
<100 mm	9	232	0	0	-	-	-	-	WSOFF
100 - <150 mm	10	232	0	0	-	-	-	-	WSOFF
150 - <225 mm	11	232	0	0	-	-	-	-	WSOFF
225 - <300 mm	12	232	0	0	-	-	-	-	WSOFF
300 - <375 mm	13	232	0	0	-	-	-	-	WSOFF
375 - 600 mm	14	232	0	0	-	-	-	-	WSOFF
>600 - 825 mm	15	232	0	0	-	-	-	-	WSOFF
>825 mm	16	232	0	0	-	-	-	-	WSOFF
Offset Symbol Text									
For Water Main Size:									
<100 mm	9	232	0	0	37	4.00	3.00	L, RC	-
100 - <150 mm	10	232	0	0	37	4.00	3.00	L, RC	-
150 - <225 mm	11	232	0	0	37	4.00	3.00	L, RC	-
225 - <300 mm	12	232	0	0	37	4.00	3.00	L, RC	-
300 - <375 mm	13	232	0	0	37	4.00	3.00	L, RC	-
375 - 600 mm	14	232	0	0	37	4.00	3.00	L, RC	-
>600 - 825 mm	15	232	0	0	37	4.00	3.00	L, RC	-
>825 mm	16	232	0	0	37	4.00	3.00	L, RC	-
Record Set Number Identifier - 1 Digit									
For Water Main Size:									
150 - <225 mm	11	232	0	0	31	2.50	2.00	CC	RS1
225 - <300 mm	12	232	0	0	31	2.50	2.00	CC	RS1
300 - <375 mm	13	232	0	0	31	2.50	2.00	CC	RS1
375 - 600 mm	14	232	0	0	31	2.50	2.00	CC	RS1
>600 - 825 mm	15	232	0	0	31	2.50	2.00	CC	RS1
>825 mm	16	232	0	0	31	2.50	2.00	CC	RS1

Table 3-4-2 Water supply pipe symbology

Continued on the next page

Water pipe section continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Record Set Number Identifier -2 Digit									Cell radius = 3.25cm
For Water Main Size:									
150 - <225 mm	11	232	0	0	31	2.50	2.00	CC	RS1
225 - <300 mm	12	232	0	0	31	2.50	2.00	CC	RS1
300 - <375 mm	13	232	0	0	3	2.50	2.00	CC	RS1
375 - 600 mm	14	232	0	0	31	2.50	2.00	CC	RS1
>600 - 825 mm	15	232	0	0	31	2.50	2.00	CC	RS1
>825 mm	16	232	0	0	31	2.50	2.00	CC	RS1
Record Set Number Identifier -3 Digit									Cell radius =3.25 cm
For Water Main Size:									
150 - <225 mm	11	232	0	0	31	2.50	2.00	CC	RS2
225 - <300 mm	12	232	0	0	31	2.50	2.00	CC	RS2
300 - <375 mm	13	232	0	0	31	2.50	2.00	CC	RS2
375 - 600 mm	14	232	0	0	31	2.50	2.00	CC	RS2
>600 - 825 mm	15	232	0	0	31	2.50	2.00	CC	RS2
>825 mm	16	232	0	0	31	2.50	2.00	CC	RS2
Conduits									
For Water Main Size:									
<100 mm	1	211	0	2	-	-	-	-	-
100 - <150 mm	2	211	0	2	-	-	-	-	-
150 - <225 mm	3	211	0	2	-	-	-	-	-
225 - <300 mm	4	211	0	2	-	-	-	-	-
300 - <375 mm	5	211	0	2	-	-	-	-	-
375 - 600 mm	6	211	0	2	-	-	-	-	-
>600 - 825 mm	7	211	0	2	-	-	-	-	-
>825 mm	8	211	0	2	-	-	-	-	-
Water Main Scour Pipe									
Pipe	49	212	1	3	-	-	-	-	-
Text	49	212	1	3	31	3.00	3.00	L,R,T,CB	-
Abandoned Water Main									
Pipe #	50	223	0	1	-	-	-	-	-
Text	50	223	0	0	37	2.5	2.5	CC	-

Table 3-4-3 Water supply pipe symbology

Continued on the next page

3 Graphical Specifications

Water pipe section continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Arrows for Offset of Water Main									
For Water Main Size:									
<100 mm	9	232	0	0	-	-	-	-	WSARR
100 - <150 mm	10	232	0	0	-	-	-	-	WSARR
150 - <225 mm	11	232	0	0	-	-	-	-	WSARR
225 - <300 mm	12	232	0	0	-	-	-	-	WSARR
300 - <375 mm	13	232	0	0	-	-	-	-	WSARR
375 - 600 mm	14	232	0	0	-	-	-	-	WSARR
>600 - 825 mm	15	232	0	0	-	-	-	-	WSARR
>825 mm	16	232	0	0	-	-	-	-	WSARR
Arrows for Text of Water Main									
For Water Main Size:									
<100 mm	9	232	0	0	-	-	-	-	WSARR
100 - <150 mm	10	232	0	0	-	-	-	-	WSARR
150 - <225 mm	11	232	0	0	-	-	-	-	WSARR
225 - <300 mm	12	232	0	0	-	-	-	-	WSARR
300 - <375 mm	13	232	0	0	-	-	-	-	WSARR
375 - 600 mm	14	232	0	0	-	-	-	-	WSARR
>600 - 825 mm	15	232	0	0	-	-	-	-	WSARR
>825 mm	16	232	0	0	-	-	-	-	WSARR
The Water Co. and Other Authorities Aqueducts									
Banks	46	225	1	0	-	-	-	-	-
Text	46	225	1	0	0	6.00	6.00	T,CB	-
Water Supply Service (Trunk Service)									
Service	17	211	0	2	-	-	-	-	-
Text	17	211	0	2	31	3.00	2.00	L,R,T,CB	-
Pipe Section Number	39	216	0	0	31	3.00	2.50	CC	-

Table 3-4-4 Water supply pipe symbology

Valves

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Valve #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	VALVE
100 - <150 mm	2	232	0	0	-	-	-	-	VALVE
150 - <225 mm	3	232	0	0	-	-	-	-	VALVE
225 - <300 mm	4	232	0	0	-	-	-	-	VALVE
300 - <375 mm	5	232	0	0	-	-	-	-	VALVE
375 - 600 mm	6	232	0	0	-	-	-	-	VALVE
>600 - 825 mm	7	232	0	0	-	-	-	-	VALVE
>825 mm	8	232	0	0	-	-	-	-	VALVE
Non Return Valve (Reflux) #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	NRVALV
100 - <150 mm	2	232	0	0	-	-	-	-	NRVALV
150 - <225 mm	3	232	0	0	-	-	-	-	NRVALV
225 - <300 mm	4	232	0	0	-	-	-	-	NRVALV
300 - <375 mm	5	232	0	0	-	-	-	-	NRVALV
375 - 600 mm	6	232	0	0	-	-	-	-	NRVALV
>600 - 825 mm	7	232	0	0	-	-	-	-	NRVALV
>825 mm	8	232	0	0	-	-	-	-	NRVALV

Table 3-5-1 Water supply valve symbology

Continued on the next page

3 Graphical Specifications

Valves continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Pressure Reducing Valve - Right to Left #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	PVL
100 - <150 mm	2	232	0	0	-	-	-	-	PVL
150 - <225 mm	3	232	0	0	-	-	-	-	PVL
225 - <300 mm	4	232	0	0	-	-	-	-	PVL
300 - <375 mm	5	232	0	0	-	-	-	-	PVL
375 - 600 mm	6	232	0	0	-	-	-	-	PVL
>600 - 825 mm	7	232	0	0	-	-	-	-	PVL
>825 mm	8	232	0	0	-	-	-	-	PVL
Pressure Reducing Valve - Left to Right #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	PVR
100 - <150 mm	2	232	0	0	-	-	-	-	PVR
150 - <225 mm	3	232	0	0	-	-	-	-	PVR
225 - <300 mm	4	232	0	0	-	-	-	-	PVR
300 - <375 mm	5	232	0	0	-	-	-	-	PVR
375 - 600 mm	6	232	0	0	-	-	-	-	PVR
>600 - 825 mm	7	232	0	0	-	-	-	-	PVR
>825 mm	8	232	0	0	-	-	-	-	PVR

Table 3-5-2 Water supply valve symbology

Continued on the next page

Valves continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Pressure Sustaining Valve - Right to Left #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	PVL
100 - <150 mm	2	232	0	0	-	-	-	-	PVL
150 - <225 mm	3	232	0	0	-	-	-	-	PVL
225 - <300 mm	4	232	0	0	-	-	-	-	PVL
300 - <375 mm	5	232	0	0	-	-	-	-	PVL
375 - 600 mm	6	232	0	0	-	-	-	-	PVL
>600 - 825 mm	7	232	0	0	-	-	-	-	PVL
>825 mm	8	232	0	0	-	-	-	-	PVL
Pressure Sustaining Valve - Left to Right #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	PVR
100 - <150 mm	2	232	0	0	-	-	-	-	PVR
150 - <225 mm	3	232	0	0	-	-	-	-	PVR
225 - <300 mm	4	232	0	0	-	-	-	-	PVR
300 - <375 mm	5	232	0	0	-	-	-	-	PVR
375 - 600 mm	6	232	0	0	-	-	-	-	PVR
>600 - 825 mm	7	232	0	0	-	-	-	-	PVR
>825 mm	8	232	0	0	-	-	-	-	PVR
Altitude Pressure Sustaining Valve - Right to Left #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	APVL
100 - <150 mm	2	232	0	0	-	-	-	-	APVL
150 - <225 mm	3	232	0	0	-	-	-	-	APVL
225 - <300 mm	4	232	0	0	-	-	-	-	APVL
300 - <375 mm	5	232	0	0	-	-	-	-	APVL
375 - 600 mm	6	232	0	0	-	-	-	-	APVL
>600 - 825 mm	7	232	0	0	-	-	-	-	APVL
>825 mm	8	232	0	0	-	-	-	-	APVL

Table 3-5-3 Water supply valve symbology

Continued on the next page

3 Graphical Specifications

Valves continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Altitude Pressure Sustaining Valve - Right to Left #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	APVR
100 - <150 mm	2	232	0	0	-	-	-	-	APVR
150 - <225 mm	3	232	0	0	-	-	-	-	APVR
225 - <300 mm	4	232	0	0	-	-	-	-	APVR
300 - <375 mm	5	232	0	0	-	-	-	-	APVR
375 - 600 mm	6	232	0	0	-	-	-	-	APVR
>600 - 825 mm	7	232	0	0	-	-	-	-	APVR
>825 mm	8	232	0	0	-	-	-	-	APVR
Altitude Valve - Right to Left #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	ALVALL
100 - <150 mm	2	232	0	0	-	-	-	-	ALVALL
150 - <225 mm	3	232	0	0	-	-	-	-	ALVALL
225 - <300 mm	4	232	0	0	-	-	-	-	ALVALL
300 - <375 mm	5	232	0	0	-	-	-	-	ALVALL
375 - 600 mm	6	232	0	0	-	-	-	-	ALVALL
>600 - 825 mm	7	232	0	0	-	-	-	-	ALVALL
>825 mm	8	232	0	0	-	-	-	-	ALVALL
Altitude Valve - Left to Right #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	ALVALR
100 - <150 mm	2	232	0	0	-	-	-	-	ALVALR
150 - <225 mm	3	232	0	0	-	-	-	-	ALVALR
225 - <300 mm	4	232	0	0	-	-	-	-	ALVALR
300 - <375 mm	5	232	0	0	-	-	-	-	ALVALR
375 - 600 mm	6	232	0	0	-	-	-	-	ALVALR
>600 - 825 mm	7	232	0	0	-	-	-	-	ALVALR
>825 mm	8	232	0	0	-	-	-	-	ALVALR

Table 3-5-4 Water supply valve symbology

Continued on the next page

Valves continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Altitude Pressure Reducing Valve - Right to Left #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	APVL
100 - <150 mm	2	232	0	0	-	-	-	-	APVL
150 - <225 mm	3	232	0	0	-	-	-	-	APVL
225 - <300 mm	4	232	0	0	-	-	-	-	APVL
300 - <375 mm	5	232	0	0	-	-	-	-	APVL
375 - 600 mm	6	232	0	0	-	-	-	-	APVL
>600 - 825 mm	7	232	0	0	-	-	-	-	APVL
>825 mm	8	232	0	0	-	-	-	-	APVL
Altitude Pressure Reducing Valve - Left to Right #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	APVR
100 - <150 mm	2	232	0	0	-	-	-	-	APVR
150 - <225 mm	3	232	0	0	-	-	-	-	APVR
225 - <300 mm	4	232	0	0	-	-	-	-	APVR
300 - <375 mm	5	232	0	0	-	-	-	-	APVR
375 - 600 mm	6	232	0	0	-	-	-	-	APVR
>600 - 825 mm	7	232	0	0	-	-	-	-	APVR
>825 mm	8	232	0	0	-	-	-	-	APVR
Pressure Relief Valve #									
For Water Main Size:									
<100 mm	1	232	0	0	-	-	-	-	PRELEF
100 - <150 mm	2	232	0	0	-	-	-	-	PRELEF
150 - <225 mm	3	232	0	0	-	-	-	-	PRELEF
225 - <300 mm	4	232	0	0	-	-	-	-	PRELEF
300 - <375 mm	5	232	0	0	-	-	-	-	PRELEF
375 - 600 mm	6	232	0	0	-	-	-	-	PRELEF
>600 - 825 mm	7	232	0	0	-	-	-	-	PRELEF
>825 mm	8	232	0	0	-	-	-	-	PRELEF

Table 3-5-5 Water supply valve symbology

Continued on the next page

3 Graphical Specifications

Valves continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Flow Regulator/ Needle Valve #									
For Water Main Size:									
<100 mm	1	232	0	0	–	–	–	–	FLWREG
100 - <150 mm	2	232	0	0	–	–	–	–	FLWREG
150 - <225 mm	3	232	0	0	–	–	–	–	FLWREG
225 - <300 mm	4	232	0	0	–	–	–	–	FLWREG
300 - <375 mm	5	232	0	0	–	–	–	–	FLWREG
375 - 600 mm	6	232	0	0	–	–	–	–	FLWREG
>600 - 825 mm	7	232	0	0	–	–	–	–	FLWREG
>825 mm	8	232	0	0	–	–	–	–	FLWREG
Valve Number for ALL Valves except Air Valves and Ferrules									
On Water Main Size:									
<100 mm	9	232	0	0	31	3.50	3.50	L, RC	–
100 - <150 mm	10	232	0	0	31	3.50	3.50	L, RC	–
150 - <225 mm	11	232	0	0	31	3.50	3.50	L, RC	–
225 - <300 mm	12	232	0	0	31	3.50	3.50	L, RC	–
300 - <375 mm	13	232	0	0	31	3.50	3.50	L, RC	–
375 - 600 mm	14	232	0	0	31	3.50	3.50	L, RC	–
>600 - 825 mm	15	232	0	0	31	3.50	3.50	L, RC	–
>825 mm	16	232	0	0	31	3.50	3.50	L, RC	–
Valve Text for ALL Valves except Air Valves and Ferrules									
On Water Main Size:									
<100 mm	9	232	0	0	31	3.50	3.00	L, RC	–
100 - <150 mm	10	232	0	0	31	3.50	3.00	L, RC	–
150 - <225 mm	11	232	0	0	31	3.50	3.00	L, RC	–
225 - <300 mm	12	232	0	0	31	3.50	3.00	L, RC	–
300 - <375 mm	13	232	0	0	31	3.50	3.00	L, RC	–
375 - 600 mm	14	232	0	0	31	3.50	3.00	L, RC	–
>600 - 825 mm	15	232	0	0	31	3.50	3.00	L, RC	–
>825 mm	16	232	0	0	31	3.50	3.00	L, RC	–

Table 3-5-6 Water supply valve symbology

Continued on the next page

Valves continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Air Valve #									
For Water Main Size:									
<100 mm	1	210	0	0	–	–	–	–	AVTYPB
100 - <150 mm	2	210	0	0	–	–	–	–	AVTYPB
150 - <225 mm	3	210	0	0	–	–	–	–	AVTYPB
225 - <300 mm	4	210	0	0	–	–	–	–	AVTYPB
300 - <375 mm	5	210	0	0	–	–	–	–	AVTYPB
375 - 600 mm	6	210	0	0	–	–	–	–	AVTYPB
>600 - 825 mm	7	210	0	0	–	–	–	–	AVTYPB
>825 mm	8	210	0	0	–	–	–	–	AVTYPB
Air Valves Numbers									
On Water Main Size:									
<100 mm	9	210	0	0	31	3.50	3.50	L, RC	–
100 - <150 mm	10	210	0	0	31	3.50	3.50	L, RC	–
150 - <225 mm	11	210	0	0	31	3.50	3.50	L, RC	–
225 - <300 mm	12	210	0	0	31	3.50	3.50	L, RC	–
300 - <375 mm	13	210	0	0	31	3.50	3.50	L, RC	–
375 - 600 mm	14	210	0	0	31	3.50	3.50	L, RC	–
>600 - 825 mm	15	210	0	0	31	3.50	3.50	L, RC	–
>825 mm	16	210	0	0	31	3.50	3.50	L, RC	–
Text for Air Valves									
On Water Main Size:									
<100 mm	9	210	0	0	31	3.50	3.00	L, RC	–
100 - <150 mm	10	210	0	0	31	3.50	3.00	L, RC	–
150 - <225 mm	11	210	0	0	31	3.50	3.00	L, RC	–
225 - <300 mm	12	210	0	0	31	3.50	3.00	L, RC	–
300 - <375 mm	13	210	0	0	31	3.50	3.00	L, RC	–
375 - 600 mm	14	210	0	0	31	3.50	3.00	L, RC	–
>600 - 825 mm	15	210	0	0	31	3.50	3.00	L, RC	–
>825 mm	16	210	0	0	31	3.50	3.00	L, RC	–
Ferrule									
Ferrule #	1	212	0	0	–	–	–	–	FERRUL
Number	9	212	0	0	31	3.50	3.50	L, RC	–
Text	9	212	0	0	31	3.50	3.00	L, RC	–

Table 3-5-7 Water supply valve symbology

Hydrants

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
The Water Co. Hydrant (Direct) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	BHYDDR
100 - <150 mm	2	219	0	0	-	-	-	-	BHYDDR
150 - <225 mm	3	219	0	0	-	-	-	-	BHYDDR
225 - <300 mm	4	219	0	0	-	-	-	-	BHYDDR
300 - <375 mm	5	219	0	0	-	-	-	-	BHYDDR
375 - 600 mm	6	219	0	0	-	-	-	-	BHYDDR
Council Hydrant (Direct) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	CHYDDR
100 - <150 mm	2	219	0	0	-	-	-	-	CHYDDR
150 - <225 mm	3	219	0	0	-	-	-	-	CHYDDR
225 - <300 mm	4	219	0	0	-	-	-	-	CHYDDR
300 - <375 mm	5	219	0	0	-	-	-	-	CHYDDR
375 - 600 mm	6	219	0	0	-	-	-	-	CHYDDR
The Water Co. Washout (Direct) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	BFPDIR
100 - <150 mm	2	219	0	0	-	-	-	-	BFPDIR
150 - <225 mm	3	219	0	0	-	-	-	-	BFPDIR
225 - <300 mm	4	219	0	0	-	-	-	-	BFPDIR
300 - <375 mm	5	219	0	0	-	-	-	-	BFPDIR
375 - 600 mm	6	219	0	0	-	-	-	-	BFPDIR
Council Fire Plug (Direct) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	CFPDIR
100 - <150 mm	2	219	0	0	-	-	-	-	CFPDIR
150 - <225 mm	3	219	0	0	-	-	-	-	CFPDIR
225 - <300 mm	4	219	0	0	-	-	-	-	CFPDIR
300 - <375 mm	5	219	0	0	-	-	-	-	CFPDIR
375 - 600 mm	6	219	0	0	-	-	-	-	CFPDIR

Table 3-6-1 Water supply hydrant symbology

Continued on the next page

Hydrants continued . . .

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
The Water Co. Hydrant (Offset) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	BHYDOF
100 - <150 mm	2	219	0	0	-	-	-	-	BHYDOF
150 - <225 mm	3	219	0	0	-	-	-	-	BHYDOF
225 - <300 mm	4	219	0	0	-	-	-	-	BHYDOF
300 - <375 mm	5	219	0	0	-	-	-	-	BHYDOF
375 - 600 mm	6	219	0	0	-	-	-	-	BHYDOF
Council Hydrant (Offset) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	CHYDOF
100 - <150 mm	2	219	0	0	-	-	-	-	CHYDOF
150 - <225 mm	3	219	0	0	-	-	-	-	CHYDOF
225 - <300 mm	4	219	0	0	-	-	-	-	CHYDOF
300 - <375 mm	5	219	0	0	-	-	-	-	CHYDOF
375 - 600 mm	6	219	0	0	-	-	-	-	CHYDOF
The Water Co. Washout (Offset) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	BFPOFF
100 - <150 mm	2	219	0	0	-	-	-	-	BFPOFF
150 - <225 mm	3	219	0	0	-	-	-	-	BFPOFF
225 - <300 mm	4	219	0	0	-	-	-	-	BFPOFF
300 - <375 mm	5	219	0	0	-	-	-	-	BFPOFF
375 - 600 mm	6	219	0	0	-	-	-	-	BFPOFF
Council Fire Plug (Offset) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	CFPOFF
100 - <150 mm	2	219	0	0	-	-	-	-	CFPOFF
150 - <225 mm	3	219	0	0	-	-	-	-	CFPOFF
225 - <300 mm	4	219	0	0	-	-	-	-	CFPOFF
300 - <375 mm	5	219	0	0	-	-	-	-	CFPOFF
375 - 600 mm	6	219	0	0	-	-	-	-	CFPOFF

Table 3-6-2 Water supply hydrant symbology

Continued on the next page

3 Graphical Specifications

Hydrants continued . . .

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Hydrant - Half Cost (Direct) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	HCCHD
100 - <150 mm	2	219	0	0	-	-	-	-	HCCHD
150 - <225 mm	3	219	0	0	-	-	-	-	HCCHD
225 - <300 mm	4	219	0	0	-	-	-	-	HCCHD
300 - <375 mm	5	219	0	0	-	-	-	-	HCCHD
375 - 600 mm	6	219	0	0	-	-	-	-	HCCHD
Hydrant - Half Cost (Offset) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	HCCHOF
100 - <150 mm	2	219	0	0	-	-	-	-	HCCHOF
150 - <225 mm	3	219	0	0	-	-	-	-	HCCHOF
225 - <300 mm	4	219	0	0	-	-	-	-	HCCHOF
300 - <375 mm	5	219	0	0	-	-	-	-	HCCHOF
375 - 600 mm	6	219	0	0	-	-	-	-	HCCHOF
Fire Plug - Half Cost (Direct) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	HCFPD
100 - <150 mm	2	219	0	0	-	-	-	-	HCFPD
150 - <225 mm	3	219	0	0	-	-	-	-	HCFPD
225 - <300 mm	4	219	0	0	-	-	-	-	HCFPD
300 - <375 mm	5	219	0	0	-	-	-	-	HCFPD
375 - 600 mm	6	219	0	0	-	-	-	-	HCFPD
Fire Plug - Half Cost (Offset) #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	HCFPOF
100 - <150 mm	2	219	0	0	-	-	-	-	HCFPOF
150 - <225 mm	3	219	0	0	-	-	-	-	HCFPOF
225 - <300 mm	4	219	0	0	-	-	-	-	HCFPOF
300 - <375 mm	5	219	0	0	-	-	-	-	HCFPOF
375 - 600 mm	6	219	0	0	-	-	-	-	HCFPOF

Table 3-6-3 Water supply hydrant symbology

Continued on the next page

Hydrants continued . . .

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
The Water Co. Hydrant - Valve Controlled #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	
100 - <150 mm	2	219	0	0	-	-	-	-	VCUHB
150 - <225 mm	3	219	0	0	-	-	-	-	VCHB
225 - <300 mm	4	219	0	0	-	-	-	-	and
300 - <375 mm	5	219	0	0	-	-	-	-	VCHBM
375 - 600 mm	6	219	0	0	-	-	-	-	
Hydrant - Valve Controlled - Council #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	
100 - <150 mm	2	219	0	0	-	-	-	-	VCHC
150 - <225 mm	3	219	0	0	-	-	-	-	VCHCM
225 - <300 mm	4	219	0	0	-	-	-	-	and
300 - <375 mm	5	219	0	0	-	-	-	-	VCUHC
375 - 600 mm	6	219	0	0	-	-	-	-	
Hydrant - Valve Controlled - Half Cost #									
For Water Main Size:									
<100 mm	1	219	0	0	-	-	-	-	
100 - <150 mm	2	219	0	0	-	-	-	-	VCHHC
150 - <225 mm	3	219	0	0	-	-	-	-	VCHHCM
225 - <300 mm	4	219	0	0	-	-	-	-	and
300 - <375 mm	5	219	0	0	-	-	-	-	VCUHHC
375 - 600 mm	6	219	0	0	-	-	-	-	
Text for ALL Hydrants, Washouts and Fire Plugs									
For Water Main Size:									
<100 mm	9	219	0	0	31	3.50	3.50	L, RC	-
100 - <150 mm	10	219	0	0	31	3.50	3.50	L, RC	-
150 - <225 mm	11	219	0	0	31	3.50	3.50	L, RC	-
225 - <300 mm	12	219	0	0	31	3.50	3.50	L, RC	-
300 - <375 mm	13	219	0	0	31	3.50	3.50	L, RC	-
375 - 600 mm	14	219	0	0	31	3.50	3.50	L, RC	-

Table 3-6-4 Water supply hydrant symbology

Other water supply fittings

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Pumping Point #									
For Water Main Size:									
<100 mm	1	212	0	0	-	-	-	-	PUMPPT
100 - <150 mm	2	212	0	0	-	-	-	-	PUMPPT
150 - <225 mm	3	212	0	0	-	-	-	-	PUMPPT
225 - <300 mm	4	212	0	0	-	-	-	-	PUMPPT
300 - <375 mm	5	212	0	0	-	-	-	-	PUMPPT
375 - 600 mm	6	212	0	0	-	-	-	-	PUMPPT
>600 - 825 mm	7	212	0	0	-	-	-	-	PUMPPT
>825 mm	8	212	0	0	-	-	-	-	PUMPPT
Manhole #									
For Water Main Size:									
225 - <300 mm	4	212	0	0	-	-	-	-	MANHOL
300 - <375 mm	5	212	0	0	-	-	-	-	MANHOL
375 - 600 mm	6	212	0	0	-	-	-	-	MANHOL
>600 - 825 mm	7	212	0	0	-	-	-	-	MANHOL
>825 mm	8	212	0	0	-	-	-	-	MANHOL
Swab Point #									
For Water Main Size:									
375 - 600 mm	6	212	0	0	-	-	-	-	SWABPT
>600 - 825 mm	7	212	0	0	-	-	-	-	SWABPT
>825 mm	8	212	0	0	-	-	-	-	SWABPT

Table 3-7-1 Water supply other fittings symbology

Continued on the next page

Other water supply fittings continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Reducer/Taper #									
For Water Main Size:									
<100 mm	1	212	0	0	–	–	–	–	REDUCE
100 - <150 mm	2	212	0	0	–	–	–	–	REDUCE
150 - <225 mm	3	212	0	0	–	–	–	–	REDUCE
225 - <300 mm	4	212	0	0	–	–	–	–	REDUCE
300 - <375 mm	5	212	0	0	–	–	–	–	REDUCE
375 - 600 mm	6	212	0	0	–	–	–	–	REDUCE
>600 - 825 mm	7	212	0	0	–	–	–	–	REDUCE
>825 mm	8	212	0	0	–	–	–	–	REDUCE
Reducer/Taper Text									
On Water Main Size:									
<100 mm	9	212	0	0	31	3.50	3.50	L, RC	–
100 - <150 mm	10	212	0	0	31	3.50	3.50	L, RC	–
150 - <225 mm	11	212	0	0	31	3.50	3.50	L, RC	–
225 - <300 mm	12	212	0	0	31	3.50	3.50	L, RC	–
300 - <375 mm	13	212	0	0	31	3.50	3.50	L, RC	–
375 - 600 mm	14	212	0	0	31	3.50	3.50	L, RC	–
>600 - 825 mm	15	212	0	0	31	3.50	3.50	L, RC	–
>825 mm	16	212	0	0	31	3.50	3.50	L, RC	–
Blank End/Cap #									
On Water Main Size:									
<100 mm	1	212	0	0	–	–	–	–	BLNKED
100 - <150 mm	2	212	0	0	–	–	–	–	BLNKED
150 - <225 mm	3	212	0	0	–	–	–	–	BLNKED
225 - <300 mm	4	212	0	0	–	–	–	–	BLNKED
300 - <375 mm	5	212	0	0	–	–	–	–	BLNKED
375 - 600 mm	6	212	0	0	–	–	–	–	BLNKED
>600 - 825 mm	7	212	0	0	–	–	–	–	BLNKED
>825 mm	8	212	0	0	–	–	–	–	BLNKED

Table 3-7-2 Water supply other fittings symbology

Continued on the next page

3 Graphical Specifications

Other water supply fittings continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Blank End/Cap Text									
For Water Main Size:									
<100 mm	9	212	0	0	31	3.50	3.00	L, RC	–
100 - <150 mm	10	212	0	0	31	3.50	3.00	L, RC	–
150 - <225 mm	11	212	0	0	31	3.50	3.00	L, RC	–
225 - <300 mm	12	212	0	0	31	3.50	3.00	L, RC	–
300 - <375 mm	13	212	0	0	31	3.50	3.00	L, RC	–
375 - 600 mm	14	212	0	0	31	3.50	3.00	L, RC	–
>600 - 825 mm	15	212	0	0	31	3.50	3.00	L, RC	–
>825 mm	16	212	0	0	31	3.50	3.00	L, RC	–
Chlorination Installation #									
On Water Main Size:									
<100 mm	1	212	0	0	–	–	–	–	CHILNS
100 - <150 mm	2	212	0	0	–	–	–	–	CHILNS
150 - <225 mm	3	212	0	0	–	–	–	–	CHILNS
225 - <300 mm	4	212	0	0	–	–	–	–	CHILNS
300 - <375 mm	5	212	0	0	–	–	–	–	CHILNS
375 - 600 mm	6	212	0	0	–	–	–	–	CHILNS
>600 - 825 mm	7	212	0	0	–	–	–	–	CHILNS
>825 mm	8	212	0	0	–	–	–	–	CHILNS
Scour Symbol on Water Pipe #									
On Water Main Size:									
<100 mm	1	212	0	0	–	–	–	–	SCOUR
100 - <150 mm	2	212	0	0	–	–	–	–	SCOUR
150 - <225 mm	3	212	0	0	–	–	–	–	SCOUR
225 - <300 mm	4	212	0	0	–	–	–	–	SCOUR
300 - <375 mm	5	212	0	0	–	–	–	–	SCOUR
375 - 600 mm	6	212	0	0	–	–	–	–	SCOUR
>600 - 825 mm	7	212	0	0	–	–	–	–	SCOUR
>825 mm	8	212	0	0	–	–	–	–	SCOUR

Table 3-7-3 Water supply other fittings symbology

Continued on the next page

Other water supply fittings continued ...

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Scour Symbol on Water Pipe (Text)									
For Water Main Size:									
<100 mm	9	212	0	0	31	3.50	3.00	L, RC	–
100 - <150 mm	10	212	0	0	31	3.50	3.00	L, RC	–
150 - <225 mm	11	212	0	0	31	3.50	3.00	L, RC	–
225 - <300 mm	12	212	0	0	31	3.50	3.00	L, RC	–
300 - <375 mm	13	212	0	0	31	3.50	3.00	L, RC	–
375 - 600 mm	14	212	0	0	31	3.50	3.00	L, RC	–
>600 - 825 mm	15	212	0	0	31	3.50	3.00	L, RC	–
>825 mm	16	212	0	0	31	3.50	3.00	L, RC	–
Water Main Scour Pipe (All sizes)	49	212	1	3	–	–	–	–	–
Scour Symbol on Scour Pipe									
Symbol	49	212	0	0	–	–	–	–	SCOUR
Text	49	212	1	3	31	3.50	3.00	L, RC	–
Standpipe #									
On Water Main Size:									
<100 mm	1	212	0	0	–	–	–	–	STANDP
100 - <150 mm	2	212	0	0	–	–	–	–	STANDP
150 - <225 mm	3	212	0	0	–	–	–	–	STANDP
225 - <300 mm	4	212	0	0	–	–	–	–	STANDP
300 - <375 mm	5	212	0	0	–	–	–	–	STANDP
375 - 600 mm	6	212	0	0	–	–	–	–	STANDP
>600 - 825 mm	7	212	0	0	–	–	–	–	STANDP
>825 mm	8	212	0	0	–	–	–	–	STANDP
Strainer #									
On Water Main Size:									
<100 mm	1	212	0	0	–	–	–	–	STRAIN
100 - <150 mm	2	212	0	0	–	–	–	–	STRAIN
150 - <225 mm	3	212	0	0	–	–	–	–	STRAIN
225 - <300 mm	4	212	0	0	–	–	–	–	STRAIN
300 - <375 mm	5	212	0	0	–	–	–	–	STRAIN
375 - 600 mm	6	212	0	0	–	–	–	–	STRAIN
>600 - 825 mm	7	212	0	0	–	–	–	–	STRAIN
>825 mm	8	212	0	0	–	–	–	–	STRAIN

Table 3-7-4 Water supply other fittings symbology

Miscellaneous water supply items

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Depth Text	21	232	0	0	31	2.00	2.00	L, RC	–
Other Authority Water Pipes in Vicinity - Text	48	225	0	0	31	5.00	5.00	CC	–
Dialysis Symbol	48	225	0	0	–	–	–	–	DIALYS
Dry Tapping Text (DT)	52	232	0	0	37	2.00	2.00	CC	–
Property Connection (pipe)	54	216	0	0	–	–	–	–	–
Property Connection (TIE)	54	216	0	0	37	1.50	1.50	CC	–
Property Connection Projection Line	54	214	0	5	–	–	–	–	–
Graphical Error flags	63	219	0	0	–	–	–	–	–
Edgematching flags	63	219	0	0	61	4.00	4.00	CC	Circle of radius 4m
Problem flags	63	219	0	0	61	4.00	4.00	CC	containing the letter E or P

Table 3-8 Water supply miscellaneous items symbology

Graphical error flags are placed in the graphics file to alert The Water Company of problems that the Consultant may have when edgematching the new digital data to The Water Company's existing digital data. Sufficient documentation must accompany any digital information supplied containing these flags.

Water supply recorders

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Flow Recorder #									
Right to Left	22	214	0	0	–	–	–	–	RECLEF
Left to Right	22	214	0	0	–	–	–	–	RECRIT
Both Directions	22	214	0	0	–	–	–	–	RECBTH
Pressure Recorder #	22	214	0	0	31	1.67	1.83	L,RC	ICECRM
Depth Recorder #	22	214	0	0	31	1.67	1.83	L,RC	ICECRM

Table 3-9 Water supply recorders symbology

Water supply electrolysis points

Item Name	Level	Color	Weight	Style	Font	Height	Width	Just'n	Cell
Electrolysis Installation #	37	223	0	0	31	3.50	3.00	L,RC	EI1
Integral of Flanged Insulating	38	223	0	0	–	–	–	–	INSLJT
Ground Ring	38	223	0	0	–	–	–	–	GRRING
Earthing Bed	37	223	2	3	–	–	–	–	–
Ground Bed	37	223	1	4	–	–	–	–	–

Table 3-10 Water supply electrolysis points symbology

Graphics Schedule 2 - For MicroStation in Unlinked .DGN format

This Schedule is the same as **Schedule 1** with the exception the graphical elements **must not** have any elements with database links in sewerage file.

Graphics Schedule 3 - For .DXF format

The graphical information to be supplied to the Water Company, in .DXF format is to fit the criteria set out in this schedule.

The graphical elements must have the exact AMG position as the related database information set out in Tables 2-8 to 2-15 of *Database Schedule 2*. If these graphical elements are modified or moved due to any form of editing (eg for edgematching) then the AMG co-ordinates must be altered in the database tables to reflect their new position. If this procedure is not performed the data may fail the linking process and may result in a non-conformance being issued by The Water Company.

The Water Company's Water Supply Asset

Tables 3-14 to 3-22 show the symbology for The Water Company's water supply assets in DXF format.

Mapping the Water Company's FIS color table to DXF colors

MicroStation Colors	DXF Colors
232	4
211	141
212	3
225	5
223	21
216	31
210	252
219	110
214	41
222	241
13	30

Table 3-11 DXF colors used for water supply assets

Mapping the Water Company's Font Numbers To DXf Font Styles

FIS Font Numbers	DXF Text Styles
37	ITALIC
37	ITAL75
37	ITAL89
31	ROM67
31	ROM80
31	ROM83
31	ROM86
31	ROM100
31	ROM101

Table 3-12 DXF text styles used for water supply assets.

Element	DXF Element Types
<p>Line work for Water Supply Assets</p> <p><u>Water Mains, Property Connections, Projection Lines and Conduits</u></p> <ul style="list-style-type: none"> - Straight - Straight with Horizontal Bend - Curve (only) - Combination of Straight and Curve <p><u>Other</u></p> <p>Text Arrow Shaft</p> <ul style="list-style-type: none"> - Straight - Bent 	<p>LINE</p> <p>POLYLINE WITHOUT ARCS (line string)</p> <p>ARC</p> <p>POLYLINE WITH ARCS (complex element)</p> <p>LINE</p> <p>POLYLINE WITHOUT ARCS (line string)</p>
<p>Symbols</p> <p>All Blocks</p>	<p>As per The Water Company's FIS Library</p>
<p>Text</p> <p>All Text</p>	<p>TEXT</p>

Table 3-13 DXF element types for Water Supply

Nodes

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Node	98	39_222A	241	–	–	–	–	WSNOD1
Node Number Text	98	39_222A	241	ROM100	3.00	3.00	LB	–

Table 3-14 Water Supply Nodes symbology

Water Supply Pipe Section

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Water Main								
<100 mm	5	1_232A	4	–	–	–	–	–
100-<150mm	10	2_232A	4	–	–	–	–	–
150-<225mm	15	3_232A	4	–	–	–	–	–
225-<300mm	22	4_232B	4	–	–	–	–	–
300-<375mm	29	5_232B	4	–	–	–	–	–
375-600mm	36	6_232B	4	–	–	–	–	–
>600-825mm	42	7_232B	4	–	–	–	–	–
>825mm	48	8_232B	4	–	–	–	–	–
Water Main Text								
For Water Main Size:								
<100 mm	52	9_232A	4	ITAL89	4.50	4.00	L,R,T,CB	–
100-<150mm	56	10_232A	4	ITAL89	4.50	4.00	L,R,T,CB	–
150-<225mm	60	11_232A	4	ITAL89	4.50	4.00	L,R,T,CB	–
225-<300mm	64	12_232A	4	ITAL89	4.50	4.00	L,R,T,CB	–
300-<375mm	68	13_232A	4	ITAL89	4.50	4.00	L,R,T,CB	–
375-600mm	72	14_232A	4	ITAL89	4.50	4.00	L,R,T,CB	–
>600-825mm	75	15_232A	4	ITAL89	4.50	4.00	L,R,T,CB	–
>825mm	78	16_232A	4	ITAL89	4.50	4.00	L,R,T,CB	–
Change of Date/Pipe Material								
For Water Main Size								
<100mm	5	1_232A	4	–	–	–	–	CHANG1
100-<150mm	10	2_232A	4	–	–	–	–	CHANG2
150-<225mm	15	3_232A	4	–	–	–	–	CHANG3
225-<300mm	21	4_232A	4	–	–	–	–	CHANG4
300-<375mm	28	5_232A	4	–	–	–	–	CHANG5
375-600mm	35	6_232A	4	–	–	–	–	CHANG6
>600-825mm	41	7_232A	4	–	–	–	–	CHANG7
>825mm	47	8_232A	4	–	–	–	–	CHANG8

Table 3-15-1 Water supply pipes symbology

Continued on the next page

Water Supply Pipe Section continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Offset Symbol								
For Water Main Size:								
<100 mm	52	9_232A	4	–	–	–	–	WSOFF1
100-<150mm	56	10_232A	4	–	–	–	–	WSOFF2
150-<225mm	60	11_232A	4	–	–	–	–	WSOFF3
225-<300mm	64	12_232A	4	–	–	–	–	WSOFF4
300-<375mm	68	13_232A	4	–	–	–	–	WSOFF5
375-600mm	72	14_232A	4	–	–	–	–	WSOFF6
>600-825mm	75	15_232A	4	–	–	–	–	WSOFF7
>825mm	78	16_232A	4	–	–	–	–	WSOFF8
Offset Symbol Text								
For Water Main Size:								
<100 mm	52	9_232A	4	ITAL75	4.00	3.00	L,R,C	–
100-<150mm	56	10_232A	4	ITAL75	4.00	3.00	L,R,C	–
150-<225mm	60	11_232A	4	ITAL75	4.00	3.00	L,R,C	–
225-<300mm	64	12_232A	4	ITAL75	4.00	3.00	L,R,C	–
300-<375mm	68	13_232A	4	ITAL75	4.00	3.00	L,R,C	–
375-600mm	72	14_232A	4	ITAL75	4.00	3.00	L,R,C	–
>600-825mm	75	15_232A	4	ITAL75	4.00	3.00	L,R,C	–
>825mm	78	16_232A	4	ITAL75	4.00	3.00	L,R,C	–
Record of Set Number Identifier - 1 Digit								Cell radius = 3.25 cm
For Water Main Size								
150-<225mm	60	11_232A	4	ROM80	2.50	2.00	CC	RS11
225-<300mm	64	12_232A	4	ROM80	2.50	2.00	CC	RS12
300-<375mm	68	13_232A	4	ROM80	2.50	2.00	CC	RS13
375-600mm	72	14_232A	4	ROM80	2.50	2.00	CC	RS14
>600-825mm	75	15_232A	4	ROM80	2.50	2.00	CC	RS15
>825mm	78	16_232A	4	ROM80	2.50	2.00	CC	RS16

Table 3-15-2 Water supply pipes symbology

Continued on the next page

3 Graphical Specifications

Water Supply Pipe Section continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Record Set Number Identifier - 2 Digit								Cell radius = 3.25 cm
For Water Main Size:								
150-<225mm	60	11_232A	4	ROM80	2.50	2.00	CC	RS11
225-<300mm	64	12_232A	4	ROM80	2.50	2.00	CC	RS12
300-<375mm	68	13_232A	4	ROM80	2.50	2.00	CC	RS13
375-600mm	72	14_232A	4	ROM80	2.50	2.00	CC	RS14
>600-825mm	75	15_232A	4	ROM80	2.50	2.00	CC	RS15
>825mm	78	16_232A	4	ROM80	2.50	2.00	CC	RS16
Record Set Number Identifier - 3 Digit								Cell radius = 3.25 cm
For Water Main Size:								
150-<225mm	60	11_232A	4	ROM80	2.50	2.00	CC	RS21
225-<300mm	64	12_232A	4	ROM80	2.50	2.00	CC	RS22
300-<375mm	68	13_232A	4	ROM80	2.50	2.00	CC	RS23
375-600mm	72	14_232A	4	ROM80	2.50	2.00	CC	RS24
>600-825mm	75	15_232A	4	ROM80	2.50	2.00	CC	RS25
>825mm	78	16_232A	4	ROM80	2.50	2.00	CC	RS26
Conduit								
For Water Main Size								
<100mm	2	1_211A	141	-	-	-	-	-
100-<150mm	7	2_211A	141	-	-	-	-	-
150-<225mm	12	3_211A	141	-	-	-	-	-
225-<300mm	17	4_211A	141	-	-	-	-	-
300-<375mm	24	5_211A	141	-	-	-	-	-
375-600mm	31	6_211A	141	-	-	-	-	-
>600-825mm	38	7_211A	141	-	-	-	-	-
>825mm	44	8_211A	141	-	-	-	-	-
Water Main Scour Pipe								
Pipe	102	49_212B	3	-	-	-	-	-
Text	102	49_212B	3	ROM100	3.00	3.00	L,R,T,CB	-

Table 3-15-3 Water supply pipes symbology

Continued on the next page

Water Supply Pipe Section continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Arrows for Offset of Water Main								
For Water Main Size:								
<100mm	52	9_232A	4	–	–	–	–	WSARR1
100-<150mm	56	10_232A	4	–	–	–	–	WSARR2
150-<225mm	60	11_232A	4	–	–	–	–	WSARR3
225-<300mm	64	12_232A	4	–	–	–	–	WSARR4
300-<375mm	68	13_232A	4	–	–	–	–	WSARR5
375-600mm	72	14_232A	4	–	–	–	–	WSARR6
>600-825mm	75	15_232A	4	–	–	–	–	WSARR7
>825mm	78	16_232A	4	–	–	–	–	WSARR8
Arrows for Text of Water Main								
For Water Main Size:								
<100mm	52	9_232A	4	–	–	–	–	WSARR1
100-<150mm	56	10_232A	4	–	–	–	–	WSARR2
150-<225mm	60	11_232A	4	–	–	–	–	WSARR3
225-<300mm	64	12_232A	4	–	–	–	–	WSARR4
300-<375mm	68	13_232A	4	–	–	–	–	WSARR5
375-600mm	72	14_232A	4	–	–	–	–	WSARR6
>600-825mm	75	15_232A	4	–	–	–	–	WSARR7
>825mm	78	16_232A	4	–	–	–	–	WSARR8
The Water Co. and Other Authorities Aqueducts								
Aqueducts								
Banks	100	46_225A	5					–
Text	100	46_225A	5	ROM100	6.00	6.00	T,CB	–
Water Supply Services (Trunk Service)								
Service	79	17_211A	141	–	–	–	–	–
Text	79	17_211A	141	ROM67	3.00	2.00	L,R,T,CB	–
Pipe Section Number	97	39_216A	31	ROM83	3.00	2.50	CC	–

Table 3-15-4 Water supply pipes symbology

Valves

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Valve								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	VALVE1
100-<150mm	10	2_232A	4	–	–	–	–	VALVE2
150-<225mm	15	3_232A	4	–	–	–	–	VALVE3
225-<300mm	21	4_232A	4	–	–	–	–	VALVE4
300-<375mm	28	5_232A	4	–	–	–	–	VALVE5
375-600mm	35	6_232A	4	–	–	–	–	VALVE6
>600 - 825mm	41	7_232A	4	–	–	–	–	VALVE7
>825mm	47	8_232A	4	–	–	–	–	VALVE8
Non Return Valve (Reflux)								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	NRVAL1
100-<150mm	10	2_232A	4	–	–	–	–	NRVAL2
150-<225mm	15	3_232A	4	–	–	–	–	NRVAL3
225-<300mm	21	4_232A	4	–	–	–	–	NRVAL4
300-<375mm	28	5_232A	4	–	–	–	–	NRVAL5
375-600mm	35	6_232A	4	–	–	–	–	NRVAL6
>600 - 825mm	41	7_232A	4	–	–	–	–	NRVAL7
>825mm	47	8_232A	4	–	–	–	–	NRVAL8

Table 3-16-1 Water supply valves symbology

Continued on the next page

Valves continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Pressure Reducing Valve - Right to Left								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	PVL1
100-<150mm	10	2_232A	4	–	–	–	–	PVL2
150-<225mm	15	3_232A	4	–	–	–	–	PVL3
225-<300mm	21	4_232A	4	–	–	–	–	PVL4
300-<375mm	28	5_232A	4	–	–	–	–	PVL5
375-600mm	35	6_232A	4	–	–	–	–	PVL6
>600 - 825mm	41	7_232A	4	–	–	–	–	PVL7
>825mm	47	8_232A	4	–	–	–	–	PVL8
Pressure Reducing Valve - Left to Right								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	PVR1
100-<150mm	10	2_232A	4	–	–	–	–	PVR2
150-<225mm	15	3_232A	4	–	–	–	–	PVR3
225-<300mm	21	4_232A	4	–	–	–	–	PVR4
300-<375mm	28	5_232A	4	–	–	–	–	PVR5
375-600mm	35	6_232A	4	–	–	–	–	PVR6
>600 - 825mm	41	7_232A	4	–	–	–	–	PVR7
>825mm	47	8_232A	4	–	–	–	–	PVR8

Table 3-16-2 Water supply valves symbology

Continued on the next page

3 Graphical Specifications

Valves continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Pressure Sustaining Valve - Right to Left								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	PVL1
100-<150mm	10	2_232A	4	–	–	–	–	PVL2
150-<225mm	15	3_232A	4	–	–	–	–	PVL3
225-<300mm	21	4_232A	4	–	–	–	–	PVL4
300-<375mm	28	5_232A	4	–	–	–	–	PVL5
375-600mm	35	6_232A	4	–	–	–	–	PVL6
>600 - 825mm	41	7_232A	4	–	–	–	–	PVL7
>825mm	47	8_232A	4	–	–	–	–	PVL8
Pressure Sustaining Valve - Left to Right								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	PVR1
100-<150mm	10	2_232A	4	–	–	–	–	PVR2
150-<225mm	15	3_232A	4	–	–	–	–	PVR3
225-<300mm	21	4_232A	4	–	–	–	–	PVR4
300-<375mm	28	5_232A	4	–	–	–	–	PVR5
375-600mm	35	6_232A	4	–	–	–	–	PVR6
>600 - 825mm	41	7_232A	4	–	–	–	–	PVR7
>825mm	47	8_232A	4	–	–	–	–	PVR8

Table 3-16-3 Water supply valves symbology

Continued on the next page

Valves continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Altitude Pressure Sustaining Valve - Right to Left								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	APVL1
100-<150mm	10	2_232A	4	–	–	–	–	APVL2
150-<225mm	15	3_232A	4	–	–	–	–	APVL3
225-<300mm	21	4_232A	4	–	–	–	–	APVL4
300-<375mm	28	5_232A	4	–	–	–	–	APVL5
375-600mm	35	6_232A	4	–	–	–	–	APVL6
>600 - 825mm	41	7_232A	4	–	–	–	–	APVL7
>825mm	47	8_232A	4	–	–	–	–	APVL8
Altitude Pressure Sustaining Valve - Left to Right								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	APVR1
100-<150mm	10	2_232A	4	–	–	–	–	APVR2
150-<225mm	15	3_232A	4	–	–	–	–	APVR3
225-<300mm	21	4_232A	4	–	–	–	–	APVR4
300-<375mm	28	5_232A	4	–	–	–	–	APVR5
375-600mm	35	6_232A	4	–	–	–	–	APVR6
>600 - 825mm	41	7_232A	4	–	–	–	–	APVR7
>825mm	47	8_232A	4	–	–	–	–	APVR8

Table 3-16-4 Water supply valves symbology

Continued on the next page

3 Graphical Specifications

Valves continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Altitude Valve - Right to Left								
For Water Main Size:								
<100mm	5	1_232A	4	-	-	-	-	ALVAL1
100-<150mm	10	2_232A	4	-	-	-	-	ALVAL2
150-<225mm	15	3_232A	4	-	-	-	-	ALVAL3
225-<300mm	21	4_232A	4	-	-	-	-	ALVAL4
300-<375mm	28	5_232A	4	-	-	-	-	ALVAL5
375-600mm	35	6_232A	4	-	-	-	-	ALVAL6
>600 - 825mm	41	7_232A	4	-	-	-	-	ALVAL7
>825mm	47	8_232A	4	-	-	-	-	ALVAL8
Altitude Valve - Left to Right								
For Water Main Size:								
<100mm	5	1_232A	4	-	-	-	-	ALVAR1
100-<150mm	10	2_232A	4	-	-	-	-	ALVAR2
150-<225mm	15	3_232A	4	-	-	-	-	ALVAR3
225-<300mm	21	4_232A	4	-	-	-	-	ALVAR4
300-<375mm	28	5_232A	4	-	-	-	-	ALVAR5
375-600mm	35	6_232A	4	-	-	-	-	ALVAR6
>600 - 825mm	41	7_232A	4	-	-	-	-	ALVAR7
>825mm	47	8_232A	4	-	-	-	-	ALVAR8

Table 3-16-5 Water supply valves symbology

Continued on the next page

Valves continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Altitude Pressure Sustaining Valve - Right to Left								
For Water Main Size:								
<100mm	5	1_232A	4	-	-	-	-	APVL1
100 - <150mm	10	2_232A	4	-	-	-	-	APVL2
150 - <225mm	15	3_232A	4	-	-	-	-	APVL3
225 - <300mm	21	4_232A	4	-	-	-	-	APVL4
300 - <375mm	28	5_232A	4	-	-	-	-	APVL5
375 - 600mm	35	6_232A	4	-	-	-	-	APVL6
>600 - 825mm	41	7_232A	4	-	-	-	-	APVL7
>825mm	47	8_232A	4	-	-	-	-	APVL8
Altitude Pressure Reducing Valve - Left to Right								
For Water Main Size:								
<100mm	5	1_232A	4	-	-	-	-	APVR1
100 - <150mm	10	2_232A	4	-	-	-	-	APVR2
150 - <225mm	15	3_232A	4	-	-	-	-	APVR3
225 - <300mm	21	4_232A	4	-	-	-	-	APVR4
300 - <375mm	28	5_232A	4	-	-	-	-	APVR5
375 - 600mm	35	6_232A	4	-	-	-	-	APVR6
>600 - 825mm	41	7_232A	4	-	-	-	-	APVR7
>825mm	47	8_232A	4	-	-	-	-	APVR8
Pressure Relief Valve								
For Water Main Size:								
<100mm	5	1_232A	4	-	-	-	-	PRELE1
100 - <150mm	10	2_232A	4	-	-	-	-	PRELE2
150 - <225mm	15	3_232A	4	-	-	-	-	PRELE3
225 - <300mm	21	4_232A	4	-	-	-	-	PRELE4
300 - <375mm	28	5_232A	4	-	-	-	-	PRELE5
375 - 600mm	35	6_232A	4	-	-	-	-	PRELE6
>600 - 825mm	41	7_232A	4	-	-	-	-	PRELE7
>825mm	47	8_232A	4	-	-	-	-	PRELE8

Table 3-16-6 Water supply valves symbology

Continued on the next page

3 Graphical Specifications

Valves continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Flow Regulator/ Needle Valve								
For Water Main Size:								
<100mm	5	1_232A	4	–	–	–	–	FLWRE1
100 - <150mm	10	2_232A	4	–	–	–	–	FLWRE2
150 - <225mm	15	3_232A	4	–	–	–	–	FLWRE3
225 - <300mm	21	4_232A	4	–	–	–	–	FLWRE4
300 - <375mm	28	5_232A	4	–	–	–	–	FLWRE5
375 - 600mm	35	6_232A	4	–	–	–	–	FLWRE6
>600 - 825mm	41	7_232A	4	–	–	–	–	FLWRE7
>825mm	47	8_232A	4	–	–	–	–	FLWRE8
Valve Number for ALL Valves except Air Valves and Ferrules								
For Water Main Size:								
<100mm	52	9_232A	4	ROM100	3.50	3.50	L, RC	–
100 - <150mm	56	10_232A	4	ROM100	3.50	3.50	L, RC	–
150 - <225mm	60	11_232A	4	ROM100	3.50	3.50	L, RC	–
225 - <300mm	64	12_232A	4	ROM100	3.50	3.50	L, RC	–
300 - <375mm	68	13_232A	4	ROM100	3.50	3.50	L, RC	–
375 - 600mm	72	14_232A	4	ROM100	3.50	3.50	L, RC	–
>600 - 825mm	75	15_232A	4	ROM100	3.50	3.50	L, RC	–
>825mm	78	16_232A	4	ROM100	3.50	3.50	L, RC	–
Valve Text for ALL Valves except Air Valves and Ferrules								
For Water Main Size:								
<100mm	52	9_232A	4	ROM86	3.50	3.00	L, RC	–
100 - <150mm	56	10_232A	4	ROM86	3.50	3.00	L, RC	–
150 - <225mm	60	11_232A	4	ROM86	3.50	3.00	L, RC	–
225 - <300mm	64	12_232A	4	ROM86	3.50	3.00	L, RC	–
300 - <375mm	68	13_232A	4	ROM86	3.50	3.00	L, RC	–
375 - 600mm	72	14_232A	4	ROM86	3.50	3.00	L, RC	–
>600 - 825mm	75	15_232A	4	ROM86	3.50	3.00	L, RC	–
>825mm	78	16_232A	4	ROM86	3.50	3.00	L, RC	–

Table 3-16-7 Water supply valves symbology

Continued on the next page

Valves continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Air Valve								
For Water Main Size:								
<100mm	1	1_210A	252	–	–	–	–	AVTYP1
100 - <150mm	6	2_210A	252	–	–	–	–	AVTYP2
150 - <225mm	11	3_210A	252	–	–	–	–	AVTYP3
225 - <300mm	16	4_210A	252	–	–	–	–	AVTYP4
300 - <375mm	23	5_210A	252	–	–	–	–	AVTYP5
375 - 600mm	30	6_210A	252	–	–	–	–	AVTYP6
>600 - 825mm	37	7_210A	252	–	–	–	–	AVTYP7
>825mm	43	8_210A	252	–	–	–	–	AVTYP8
Numbers for Air Valves								
For Water Main Size:								
<100mm	49	9_210A	252	ROM100	3.50	3.50	L, RC	–
100 - <150mm	53	10_210A	252	ROM100	3.50	3.50	L, RC	–
150 - <225mm	57	11_210A	252	ROM100	3.50	3.50	L, RC	–
225 - <300mm	61	12_210A	252	ROM100	3.50	3.50	L, RC	–
300 - <375mm	65	13_210A	252	ROM100	3.50	3.50	L, RC	–
375 - 600mm	69	14_210A	252	ROM100	3.50	3.50	L, RC	–
>600 - 825mm	73	15_210A	252	ROM100	3.50	3.50	L, RC	–
>825mm	76	16_210A	252	ROM100	3.50	3.50	L, RC	–
Text for Air Valves								
For Water Main Size:								
<100mm	49	9_210A	252	ROM86	3.50	3.00	L, RC	–
100 - <150mm	53	10_210A	252	ROM86	3.50	3.00	L, RC	–
150 - <225mm	57	11_210A	252	ROM86	3.50	3.00	L, RC	–
225 - <300mm	61	12_210A	252	ROM86	3.50	3.00	L, RC	–
300 - <375mm	65	13_210A	252	ROM86	3.50	3.00	L, RC	–
375 - 600mm	69	14_210A	252	ROM86	3.50	3.00	L, RC	–
>600 - 825mm	73	15_210A	252	ROM86	3.50	3.00	L, RC	–
>825mm	76	16_210A	252	ROM86	3.50	3.00	L, RC	–
Ferrule								
Ferrule	3	1_212A	3	–	–	–	–	FERRUL
Number	50	9_212A	3	ROM100	3.50	3.50	L, RC	-
Text	50	9_212A	3	ROM86	3.50	3.00	L, RC	-

Table 3-16-8 Water supply valves symbology

Hydrants

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
The Water Co. Hydrant (Direct)								
For Water Main Size:								
<100mm	4	1_219A	110	-	-	-	-	BHYDD1
100 - <150mm	9	2_219A	110	-	-	-	-	BHYDD2
150 - <225mm	14	3_219A	110	-	-	-	-	BHYDD3
225 - <300mm	20	4_219A	110	-	-	-	-	BHYDD4
300 - <375mm	27	5_219A	110	-	-	-	-	BHYDD5
375 - 600mm	34	6_219A	110	-	-	-	-	BHYDD6
Council Hydrant (Direct)								
For Water Main Size:								
<100mm	4	1_219A	110	-	-	-	-	CHYDD1
100 - <150mm	9	2_219A	110	-	-	-	-	CHYDD2
150 - <225mm	14	3_219A	110	-	-	-	-	CHYDD3
225 - <300mm	20	4_219A	110	-	-	-	-	CHYDD4
300 - <375mm	27	5_219A	110	-	-	-	-	CHYDD5
375 - 600mm	34	6_219A	110	-	-	-	-	CHYDD6
The Water Co. Washout (Direct)								
For Water Main Size:								
<100mm	4	1_219A	110	-	-	-	-	BFPDI1
100 - <150mm	9	2_219A	110	-	-	-	-	BFPDI2
150 - <225mm	14	3_219A	110	-	-	-	-	BFPDI3
225 - <300mm	20	4_219A	110	-	-	-	-	BFPDI4
300 - <375mm	27	5_219A	110	-	-	-	-	BFPDI5
375 - 600mm	34	6_219A	110	-	-	-	-	BFPDI6

Table 3-17-1 Water supply hydrants symbology

Continued on the next page

Hydrants continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Council Fire Plug (Direct)								
For Water Main Size:								
<100mm	4	1_219A	110	-	-	-	-	CFPDI1
100 - <150mm	9	2_219A	110	-	-	-	-	CFPDI2
150 - <225mm	14	3_219A	110	-	-	-	-	CFPDI3
225 - <300mm	20	4_219A	110	-	-	-	-	CFPDI4
300 - <375mm	27	5_219A	110	-	-	-	-	CFPDI5
375 - 600mm	34	6_219A	110	-	-	-	-	CFPDI6
The Water Co. Hydrant (Offset)								
For Water Main Size:								
<100mm	4	1_219A	110	-	-	-	-	BHYDO1
100 - <150mm	9	2_219A	110	-	-	-	-	BHYDO2
150 - <225mm	14	3_219A	110	-	-	-	-	BHYDO3
225 - <300mm	20	4_219A	110	-	-	-	-	BHYDO4
300 - <375mm	27	5_219A	110	-	-	-	-	BHYDO5
375 - 600mm	34	6_219A	110	-	-	-	-	BHYDO6
Council Hydrant (Offset)								
For Water Main Size:								
<100mm	4	1_219A	110	-	-	-	-	CHYDO1
100 - <150mm	9	2_219A	110	-	-	-	-	CHYDO2
150 - <225mm	14	3_219A	110	-	-	-	-	CHYDO3
225 - <300mm	20	4_219A	110	-	-	-	-	CHYDO4
300 - <375mm	27	5_219A	110	-	-	-	-	CHYDO5
375 - 600mm	34	6_219A	110	-	-	-	-	CHYDO6
The Water Co. Washout (Offset)								
For Water Main Size:								
<100mm	4	1_219A	110	-	-	-	-	BFPOF1
100 - <150mm	9	2_219A	110	-	-	-	-	BFPOF2
150 - <225mm	14	3_219A	110	-	-	-	-	BFPOF3
225 - <300mm	20	4_219A	110	-	-	-	-	BFPOF4
300 - <375mm	27	5_219A	110	-	-	-	-	BFPOF5
375 - 600mm	34	6_219A	110	-	-	-	-	BFPOF6

Table 3-17-2 Water supply hydrants symbology

Continued on the next page

3 Graphical Specifications

Hydrants continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Council Fire Plug (Offset)								
For Water Main Size:								
<100mm	4	1_219A	110	–	–	–	–	CFPOF1
100 - <150mm	9	2_219A	110	–	–	–	–	CFPOF2
150 - <225mm	14	3_219A	110	–	–	–	–	CFPOF3
225 - <300mm	20	4_219A	110	–	–	–	–	CFPOF4
300 - <375mm	27	5_219A	110	–	–	–	–	CFPOF5
375 - 600mm	34	6_219A	110	–	–	–	–	CFPOF6
Hydrant - Half Cost (Direct)								
For Water Main Size:								
<100mm	4	1_219A	110	–	–	–	–	HCCHD1
100 - <150mm	9	2_219A	110	–	–	–	–	HCCHD2
150 - <225mm	14	3_219A	110	–	–	–	–	HCCHD3
225 - <300mm	20	4_219A	110	–	–	–	–	HCCHD4
300 - <375mm	27	5_219A	110	–	–	–	–	HCCHD5
375 - 600mm	34	6_219A	110	–	–	–	–	HCCHD6
Hydrant - Half Cost (Offset)								
For Water Main Size:								
<100mm	4	1_219A	110	–	–	–	–	HCCHO1
100 - <150mm	9	2_219A	110	–	–	–	–	HCCHO2
150 - <225mm	14	3_219A	110	–	–	–	–	HCCHO3
225 - <300mm	20	4_219A	110	–	–	–	–	HCCHO4
300 - <375mm	27	5_219A	110	–	–	–	–	HCCHO5
375 - 600mm	34	6_219A	110	–	–	–	–	HCCHO6
Fire Plug - Half Cost (Direct)								
For Water Main Size:								
<100mm	4	1_219A	110	–	–	–	–	HCFPD1
100 - <150mm	9	2_219A	110	–	–	–	–	HCFPD2
150 - <225mm	14	3_219A	110	–	–	–	–	HCFPD3
225 - <300mm	20	4_219A	110	–	–	–	–	HCFPD4
300 - <375mm	27	5_219A	110	–	–	–	–	HCFPD5
375 - 600mm	34	6_219A	110	–	–	–	–	HCFPD6

Table 3-17-3 Water supply hydrants symbology

Continued on the next page

Hydrants continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Fire Plug - Half Cost (Offset)								
For Water Main Size:								
<100mm	4	1_219A	110	-	-	-	-	HCFPO1
100 - <150mm	9	2_219A	110	-	-	-	-	HCFPO2
150 - <225mm	14	3_219A	110	-	-	-	-	HCFPO3
225 - <300mm	20	4_219A	110	-	-	-	-	HCFPO4
300 - <375mm	27	5_219A	110	-	-	-	-	HCFPO5
375 - 600mm	34	6_219A	110	-	-	-	-	HCFPO6
Hydrant - Valve Controlled - The Water Co.								VCUHB# VCHB# VCHBM#
For Water Main Size:								Where:
<100mm	4	1_219A	110	-	-	-	-	# is 1
100 - <150mm	9	2_219A	110	-	-	-	-	# is 2
150 - <225mm	14	3_219A	110	-	-	-	-	# is 3
225 - <300mm	20	4_219A	110	-	-	-	-	# is 4
300 - <375mm	27	5_219A	110	-	-	-	-	# is 5
375 - 600mm	34	6_219A	110	-	-	-	-	# is 6
Hydrant - Valve Controlled - Council								VCHC# VCHCM# VCUHC#
For Water Main Size:								Where:
<100mm	4	1_219A	110	-	-	-	-	# is 1
100 - <150mm	9	2_219A	110	-	-	-	-	# is 2
150 - <225mm	14	3_219A	110	-	-	-	-	# is 3
225 - <300mm	20	4_219A	110	-	-	-	-	# is 4
300 - <375mm	27	5_219A	110	-	-	-	-	# is 5
375 - 600mm	34	6_219A	110	-	-	-	-	# is 6

Table 3-17-4 Water supply hydrants symbology

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3 Graphical Specifications

Hydrants continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Hydrant - Valve Controlled - Half Cost								VCHHC# VCHHM# VCUHH#
For Water Main Size:								where:
<100mm	4	1_219A	110	-	-	-	-	# is 1
100 - <150mm	9	2_219A	110	-	-	-	-	# is 2
150 - <225mm	14	3_219A	110	-	-	-	-	# is 3
225 - <300mm	20	4_219A	110	-	-	-	-	# is 4
300 - <375mm	27	5_219A	110	-	-	-	-	# is 5
375 - 600mm	34	6_219A	110	-	-	-	-	# is 6
Text for ALL Hydrants, Washouts and Fire Plugs								
For Water Main Size:								
<100mm	51	9_219A	110	ROM100	3.50	3.50	L,RC	-
100 - <150mm	55	10_219A	110	ROM100	3.50	3.50	L,RC	-
150 - <225mm	59	11_219A	110	ROM100	3.50	3.50	L,RC	-
225 - <300mm	63	12_219A	110	ROM100	3.50	3.50	L,RC	-
300 - <375mm	67	13_219A	110	ROM100	3.50	3.50	L,RC	-
375 - 600mm	71	14_219A	110	ROM100	3.50	3.50	L,RC	-

Table 3-17-5 Water supply hydrants symbology

Other water supply fittings

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Pumping Point								
For Water Main Size:								
<100mm	3	1_212A	3	–	–	–	–	PUMPP1
100 - <150mm	8	2_212A	3	–	–	–	–	PUMPP2
150 - <225mm	13	3_212A	3	–	–	–	–	PUMPP3
225 - <300mm	18	4_212A	3	–	–	–	–	PUMPP4
300 - <375mm	25	5_212A	3	–	–	–	–	PUMPP5
375 - 600mm	32	6_212A	3	–	–	–	–	PUMPP6
>600 - 825mm	39	7_212A	3	–	–	–	–	PUMPP7
> 825mm	45	8_212A	3	–	–	–	–	PUMPP8
Access Point (Manhole)								
For Water Main Size:								
225 - <300mm	19	4_216A	31	–	–	–	–	MANHO1
300 - <375mm	26	5_216A	31	–	–	–	–	MANHO2
375 - 600mm	33	6_216A	31	–	–	–	–	MANHO3
>600 - 825mm	40	7_216A	31	–	–	–	–	MANHO4
> 825mm	46	8_216A	31	–	–	–	–	MANHO5
Swab Point								
For Water Main Size:								
375 - 600mm	33	6_216A	31	–	–	–	–	SWABP1
>600 - 825mm	40	7_216A	31	–	–	–	–	SWABP2
> 825mm	46	8_216A	31	–	–	–	–	SWABP3

Table 3-18-1 Water supply other fittings symbology

Continued on the next page

3 Graphical Specifications

Other water supply fittings continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Reducer/Taper								
For Water Main Size:								
<100mm	3	1_212A	3	–	–	–	–	REDUC1
100 - <150mm	8	2_212A	3	–	–	–	–	REDUC2
150 - <225mm	13	3_212A	3	–	–	–	–	REDUC3
225 - <300mm	18	4_212A	3	–	–	–	–	REDUC4
300 - <375mm	25	5_212A	3	–	–	–	–	REDUC5
375 - 600mm	32	6_212A	3	–	–	–	–	REDUC6
>600 - 825mm	39	7_212A	3	–	–	–	–	REDUC7
> 825mm	45	8_212A	3	–	–	–	–	REDUC8
Reducer/Taper Text								
For Water Main Size:								
<100mm	50	9_212A	3	ROM100	3.50	3.50	L, RC	–
100 - <150mm	54	10_212A	3	ROM100	3.50	3.50	L, RC	–
150 - <225mm	58	11_212A	3	ROM100	3.50	3.50	L, RC	–
225 - <300mm	62	12_212A	3	ROM100	3.50	3.50	L, RC	–
300 - <375mm	66	13_212A	3	ROM100	3.50	3.50	L, RC	–
375 - 600mm	70	14_212A	3	ROM100	3.50	3.50	L, RC	–
>600 - 825mm	74	15_212A	3	ROM100	3.50	3.50	L, RC	–
> 825mm	77	16_212A	3	ROM100	3.50	3.50	L, RC	–
Blank End/Cap								
For Water Main Size:								
<100mm	3	1_212A	3	–	–	–	–	BLNKE1
100 - <150mm	8	2_212A	3	–	–	–	–	BLNKE2
150 - <225mm	13	3_212A	3	–	–	–	–	BLNKE3
225 - <300mm	18	4_212A	3	–	–	–	–	BLNKE4
300 - <375mm	25	5_212A	3	–	–	–	–	BLNKE5
375 - 600mm	32	6_212A	3	–	–	–	–	BLNKE6
>600 - 825mm	39	7_212A	3	–	–	–	–	BLNKE7
> 825mm	45	8_212A	3	–	–	–	–	BLNKE8

Table 3-18-2 Water supply other fittings symbology

Continued on the next page

Other water supply fittings continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Blank End/Cap Text For Water Main Size:								
<100mm	50	9_212A	3	ROM86	3.50	3.00	L,RC	–
100 - <150mm	54	10_212A	3	ROM86	3.50	3.00	L,RC	–
150 - <225mm	58	11_212A	3	ROM86	3.50	3.00	L,RC	–
225 - <300mm	62	12_212A	3	ROM86	3.50	3.00	L,RC	–
300 - <375mm	66	13_212A	3	ROM86	3.50	3.00	L,RC	–
375 - 600mm	70	14_212A	3	ROM86	3.50	3.00	L,RC	–
>600 - 800mm	74	15_212A	3	ROM86	3.50	3.00	L,RC	–
> 825mm	77	16_212A	3	ROM86	3.50	3.00	L,RC	–
Chlorination Installation For Water Main Size:								
<100mm	3	1_212A	3	–	–	–	–	CHLIN1
100 - <150mm	8	2_212A	3	–	–	–	–	CHLIN2
150 - <225mm	13	3_212A	3	–	–	–	–	CHLIN3
225 - <300mm	18	4_212A	3	–	–	–	–	CHLIN4
300 - <375mm	25	5_212A	3	–	–	–	–	CHLIN5
375 - 600mm	32	6_212A	3	–	–	–	–	CHLIN6
>600 - 825mm	39	7_212A	3	–	–	–	–	CHLIN7
> 825mm	45	8_212A	3	–	–	–	–	CHLIN8
Scour Symbol on Water Pipe For Water Main Size:								
<100mm	3	1_212A	3	–	–	–	–	SCOUR1
100 - <150mm	8	2_212A	3	–	–	–	–	SCOUR2
150 - <225mm	13	3_212A	3	–	–	–	–	SCOUR3
225 - <300mm	18	4_212A	3	–	–	–	–	SCOUR4
300 - <375mm	25	5_212A	3	–	–	–	–	SCOUR5
375 - 600mm	32	6_212A	3	–	–	–	–	SCOUR6
>600 - 800mm	39	7_212A	3	–	–	–	–	SCOUR7
> 825mm	45	8_212A	3	–	–	–	–	SCOUR8

Table 3-18-3 Water supply other fittings symbology

Continued on the next page

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Other water supply fittings continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Scour Symbol on Water Pipe (Text)								
For Water Main Size:								
<100mm	50	9_212A	3	ROM86	3.50	3.00	L,RC	-
100 - <150mm	54	10_212A	3	ROM86	3.50	3.00	L,RC	-
150 - <225mm	58	11_212A	3	ROM86	3.50	3.00	L,RC	-
225 - <300mm	62	12_212A	3	ROM86	3.50	3.00	L,RC	-
300 - <375mm	66	13_212A	3	ROM86	3.50	3.00	L,RC	-
375 - 600mm	70	14_212A	3	ROM86	3.50	3.00	L,RC	-
>600 - 825mm	74	15_212A	3	ROM86	3.50	3.00	L,RC	-
> 825mm	77	16_212A	3	ROM86	3.50	3.00	L,RC	-
Water Main Scour Pipe	102	49_212B	3	-	-	-	-	-
Scour Symbol on Scour Pipe								
Symbol	101	49_212A	3	-	-	-	-	SCOURP
Text	102	49_212B	3	ROM86	3.50	3.00	L,RC	-
Standpipe								
For Water Main Size:								
<100mm	3	1_212A	3	-	-	-	-	STAND1
100 - <150mm	8	2_212A	3	-	-	-	-	STAND2
150 - <225mm	13	3_212A	3	-	-	-	-	STAND3
225 - <300mm	18	4_212A	3	-	-	-	-	STAND4
300 - <375mm	25	5_212A	3	-	-	-	-	STAND5
375 - 600mm	32	6_212A	3	-	-	-	-	STAND6
>600 - 825mm	39	7_212A	3	-	-	-	-	STAND7
> 825mm	45	8_212A	3	-	-	-	-	STAND8

Table 3-18-4 Water supply other fittings symbology

Continued on the next page

Other water supply fittings continued ...

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Strainer								
For Water Main Size:								
<100mm	3	1_212A	3	–	–	–	–	STRAI1
100 - <150mm	8	2_212A	3	–	–	–	–	STRAI2
150 - <225mm	13	3_212A	3	–	–	–	–	STRAI3
225 - <300mm	18	4_212A	3	–	–	–	–	STRAI4
300 - <375mm	25	5_212A	3	–	–	–	–	STRAI5
375 - 600mm	32	6_212A	3	–	–	–	–	STRAI6
>600 - 825mm	39	7_212A	3	–	–	–	–	STRAI7
> 825mm	45	8_212A	3	–	–	–	–	STRAI8

Table 3-18-5 Water supply other fittings symbology

Miscellaneous water supply items

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Depth Text	91	21_232A	4	ROM100	2.00	2.00	T,BC	–
Dry Tapping Text (DT)	104	52_232A	4	ITALIC	2.00	2.00	CC	–
Property Connection (Pipe)	105	54_216A	31	–	–	–	–	–
Property Connection (TIE)	105	54_216A	31	ITALIC	1.50	1.50	CC	–
Property Connection Projection Line	103	54_13A	30	–	–	–	–	–

Table 3-19 Miscellaneous water supply items symbology

Graphical Error Flags

Item Name	Layer Number	Layer Name	Color	Font Style	Text Height	Text Width	Just'n	DXF Block
Edge matching flags	47	63_23A	110	STANDARD	4.00	4.00	CC	Circle of radius 4m containing the letter E or P
Problem flags	47	63_23A	110	STANDARD	4.00	4.00	CC	

Table 3-20 Graphical error flag symbology

Graphical error flags are placed in the graphics file to alert The Water Company of problems that the Consultant may have when edgematching the new digital data to The Water Company's existing digital data. Sufficient documentation must accompany any digital information supplied containing these flags.

Associated graphical specifications

The following specification must be read in conjunction with Element Symbology earlier in this chapter. This section must be read in conjunction with **Part 2 - Guidelines**.

Text

Justification of text

In general, if text is placed parallel to an element in a water file, it must be justified centre-centre. If text is placed at right angles to an element, it must be justified either left-centre or right-centre, at the point closest to its corresponding element.

Table 3-23 shows text justification and abbreviations used in this manual.

Abbreviation	Justification
CT	centre-top
CB	centre-bottom
CC	centre-centre
RT	right-top
RB	right-bottom
RC	right-centre
LT	left-top
LB	left-bottom
LC	left-centre

Table 3-21 Text Justification

Scaling of text

Scaling of text is not normally permitted, however, node numbers, pipe section numbers, valve numbers and pipe detail text may be scaled by a factor of 0.80 in either of the following cases:

- ◆ The area is an “inner municipality” as defined by The Water Company,
- ◆ Scaling is necessary due to limited space,
- ◆ Five figure node and or value numbers.

Displayable number of decimal places

All water main offset ties are to be displayed to one decimal place.

All property connection ties are to be displayed to two decimal places.

All depths are to be displayed to two decimal places.

All nominal pipe sizes are to be displayed in millimetres.

Water cells

Cells are standard symbols used to represent particular elements. Figure 3-1 is a graphical listing of all cells relating to water data capture. These are all in the MicroStation Cell Library called FISCELL.CEL, which is available from the Water Company.

The DXF blocks used in the dxf graphical files are available from the Water Company as well. Their names are similar to those used in the cell library and are easily identifiable. Sample plots showing the typical use and placement of water cells are included in Appendix D and E.

	PIPE NODE ORIGIN OF CELL - CIRCLE CENTRE CELL NAME - WSNODE		AIR VALVE TYPE A ORIGIN OF CELL - BOTTOM VERTEX OF TRIANGLE CELL NAME - AVTYP A
	OFFSET ORIGIN OF CELL - AT CENTRE CELL NAME - WSOFF		AIR VALVE TYPE B ORIGIN OF CELL - BOTTOM VERTEX OF TRIANGLE CELL NAME - AVTYP B
	ARROWHEAD ORIGIN OF CELL - POINT OF TRIANGLE CELL NAME - WSARR		AIR VALVE TYPE AB ORIGIN OF CELL - BOTTOM VERTEX OF TRIANGLE CELL NAME - AVTYP AB
	CHANGE OF COMPLETION DATE/PIPE MATERIAL ORIGIN OF CELL - INTERSECTION OF DIAGONALS CELL NAME - CHANGE		SHUT VALVE ORIGIN OF CELL - CENTRE OF CIRCLE CELL NAME - AVTYAB
	RECORD SET NUMBER ORIGIN OF CELL - CIRCLE CENTRE CELL NAME - RS1		ALTITUDE PRESSURE VALVE LEFT TO RIGHT ORIGIN OF CELL - BISECTORS OF RECTANGLE CELL NAME - APVR
	RECORD SET NUMBER ORIGIN OF CELL - CIRCLE CENTRE CELL NAME - RS2		ALTITUDE PRESSURE VALVE RIGHT TO LEFT ORIGIN OF CELL - BISECTORS OF RECTANGLE CELL NAME - APVL
	RECORD SET NUMBER ORIGIN OF CELL - CIRCLE CENTRE CELL NAME - RS3		PRESSURE VALVE LEFT TO RIGHT ORIGIN OF CELL - BISECTORS OF RECTANGLE CELL NAME - PVR
	NON RETURN (REFLUX) VALVE ORIGIN OF CELL - MID POINT OF DIAGONAL CELL NAME - NRVALV		PRESSURE VALVE RIGHT TO LEFT ORIGIN OF CELL - BISECTORS OF RECTANGLE CELL NAME - PVL
	VALVE ORIGIN OF CELL - INTERSECTION OF DIAGONALS CELL NAME - VALVE		ALTITUDE VALVE LEFT TO RIGHT ORIGIN OF CELL - BISECTORS OF RECTANGLE CELL NAME - ALVALR
	FERRULE ORIGIN OF CELL - MID POINT OF LINE CELL NAME - FERRULE		ALTITUDE VALVE RIGHT TO LEFT ORIGIN OF CELL - BISECTORS OF RECTANGLE CELL NAME - ALVALL
	PRESSURE RELIEF VALVE ORIGIN OF CELL - INTERSECTION OF DIAGONALS CELL NAME - PRELEF		
	FLOW REGULATOR/NEEDLE VALVE ORIGIN OF CELL - RIGHT VERTEX OF TRIANGLE CELL NAME - FLWREG		
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Figure 3-1

3 Graphical Specifications

	ORIGIN OF CELL - CENTRE OF CIRCLE AUTHORITY HYDRANT DIRECT CELL NAME - BHYDDR		ORIGIN OF CELL - BASE OF CIRCLE HALF COST FIREPLUG OFFSET CELL NAME - HCFPOF
	ORIGIN OF CELL - BASE OF CIRCLE AUTHORITY HYDRANT OFFSET CELL NAME - BHYDOF		ORIGIN OF CELL - AT THE END OF PIPE VALVE CONTROLLED HYDRANT - AUTHORITY CELL NAME - VCHB
	ORIGIN OF CELL - CENTRE OF CIRCLE AUTHORITY FIRE PLUG DIRECT CELL NAME - BFPDIR		ORIGIN OF CELL - AT THE END OF PIPE VALVE CONTROLLED HYDRANT - AUTHORITY CELL NAME - VCHBM
	ORIGIN OF CELL - BASE OF CIRCLE AUTHORITY FIRE PLUG OFFSET CELL NAME - BFPOFF		ORIGIN OF CELL - AT THE END OF PIPE VALVE CONTROLLED HYDRANT - COUNCIL CELL NAME - VCHC
	ORIGIN OF CELL - CENTRE OF CIRCLE COUNCIL HYDRANT DIRECT CELL NAME - CHYDDR		ORIGIN OF CELL - AT THE END OF PIPE VALVE CONTROLLED HYDRANT - COUNCIL CELL NAME - VCHCM
	ORIGIN OF CELL - BASE OF CIRCLE COUNCIL HYDRANT OFFSET CELL NAME - CHYDOF		ORIGIN OF CELL - AT THE END OF PIPE VALVE CONTROLLED HYDRANT - HALF COST CELL NAME - VCHHC
	ORIGIN OF CELL - CENTRE OF CIRCLE COUNCIL FIRE PLUG DIRECT CELL NAME - CFPDIR		ORIGIN OF CELL - AT THE END OF PIPE VALVE CONTROLLED HYDRANT - HALF COST CELL NAME - VCHHCM
	ORIGIN OF CELL - BASE OF CIRCLE COUNCIL FIRE PLUG OFFSET CELL NAME - CFPOFF		ORIGIN OF CELL - AT THE END OF PIPE UPRIGHT VALVE CONTROLLED HYDRANT - AUTHORITY CELL NAME - VCUHB
	ORIGIN OF CELL - CENTRE OF CIRCLE HALF COST HYDRANT DIRECT CELL NAME - HCCHD		ORIGIN OF CELL - AT THE END OF PIPE UPRIGHT VALVE CONTROLLED HYDRANT - COUNCIL CELL NAME - VCUHC
	ORIGIN OF CELL - BASE OF CIRCLE HALF COST HYDRANT OFFSET CELL NAME - HCCHOF		ORIGIN OF CELL - AT THE END OF PIPE UPRIGHT VALVE CONTROLLED HYDRANT - HALF COST CELL NAME - VCUHHC
	ORIGIN OF CELL - CENTRE OF CIRCLE HALF COST FIRE PLUG DIRECT CELL NAME - HCFPD		

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Figure 3-1

	<p>STRAINER ORIGIN OF CELL - CENTRE OF CIRCLE CELL NAME - STRAIN</p>		<p>RECORDER BOTH ORIGIN OF CELL - INTERSECTION OF TANGENTS CELL NAME - RECOTH</p>
	<p>BLANKEND/CAP ORIGIN OF CELL - MID POINT OF VERTICAL LINE CELL NAME - BLNKED</p>		<p>ELECTROLYSIS INSTALLATION ORIGIN OF CELL AT POINT OF TRIANGLE CELL NAME - EL1</p>
	<p>REDUCER/TAPER ORIGIN OF CELL - CENTRE OF TRIANGLE CELL NAME - REDUCE</p>		<p>GROUND RING ORIGIN OF CELL - CENTRE OF CIRCLE CELL NAME - GRRING</p>
	<p>MANHOLE ORIGIN OF CELL - CENTRE OF CIRCLE CELL NAME - MANHOL</p>		<p>INTEGRAL OR FLANGED INSULATING JOINT ORIGIN OF CELL - MIDPOINT OF LONGEST LINE CELL NAME - INSLJT</p>
	<p>CHLORINATION INSTALLATION ORIGIN OF CELL - CENTRE OF STAR CELL NAME - CHLINS</p>		<p>INSET DETAIL SHAPE ORIGIN OF CELL - CENTRE OF SHAPE CELL NAME - INSET</p>
	<p>SCOUR ORIGIN OF CELL - INTERSECTION OF DIAGONALS CELL NAME - SCOUR</p>		<p>CHLORINATION/COMPREHENSIVE UNIT ORIGIN OF CELL - CENTRE OF OCTAGON CELL NAME - CHCOUN</p>
	<p>PUMPING POINT ORIGIN OF CELL - CENTRE OF SQUARE CELL NAME - PUMPPT</p>		<p>FLUORIDATION/DISINFECTION UNIT ORIGIN OF CELL - CENTRE OF OCTAGON CELL NAME - FLDIUN</p>
	<p>SWAB POINT ORIGIN OF CELL - CENTRE OF RECTANGLE CELL NAME - SWABPT</p>		<p>COMPLAINT SYMBOL ORIGIN OF CELL - CENTRE OF CIRCLE CELL NAME - COMSYM</p>
	<p>WATER PUMP ORIGIN OF CELL - CENTRE OF CIRCLE CELL NAME - WSPUMP</p>		<p>STAND PIPE ORIGIN OF CELL - BOTTOM VORTEX OF SQUARE CELL NAME - STANDP</p>
	<p>RECORDER ORIGIN OF CELL - INTERSECTION OF TANGENTS CELL NAME - ICECRM</p>		<p>DIALYSIS MACHINE ORIGIN OF CELL - LEFT CENTRE OF SYMBOL CELL NAME - DIALYS</p>
	<p>RECORDER RIGHT ORIGIN OF CELL - INTERSECTION OF TANGENTS CELL NAME - RECRIT</p>		
	<p>RECORDER LEFT ORIGIN OF CELL - INTERSECTION OF TANGENTS CELL NAME - RECLEF</p>		
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Figure 3-1

Part 2

Guidelines

This Chapter describes the requirements for the graphical and database entry of nodes.

Nodes are placed in graphics and are always linked to the database. They divide the pipe network into smaller units and their position is recorded in the database with AMG co-ordinates.

Nodes are usually located at pipe intersections and at file or municipal boundaries. It is important to note that pipe sections between nodes may not necessarily have the same characteristics throughout.

Node definitions

Every water main must have an owner and connect node

Owner nodes

An owner node is placed on the first section of pipe placed. This becomes the owner of the particular pipe. An owner node may own more than one pipe section, if this is the case then pipe sections will have different pipe numbers. The number of this node is used to produce the pipe section owner id.

Connect nodes

A connect node is placed at the other end of the pipe section mentioned in the above paragraph. There are exceptions to this rule (eg Courts - where the connect node number is the same as the owner node number) which are covered in this chapter.

Note: Nodes are placed in graphics using the FIS Cell called WSNODE. The matter of owner and connect node is only related to the database records and not graphics.

Node numbers

Node numbers will be issued upon request by the Water Company. Nodes should be numbered sequentially, where possible.

Do not change the specified level, rotate, or scale node numbers, except for a five figure node, pipe section and valve numbers which should be scaled down to 80% of the original size.

The node numbers must be placed within the road, where possible, with an orientation of 0 degrees (horizontal). The number must be preceded by a “+ ” symbol.

If there is no node placed on the end of a water main, the connect node number (for database attribute values) must be the same as the owner node number.

This would generally occur in a court bowl, dead-end street or very short section of pipe.

In general:

- ◆ A node must be placed where two pipes intersect,
- ◆ Place node numbers in the road reserve wherever possible,
- ◆ One node may act as both the owner and connect node in courts, bypasses and blank ended pipes.

Node placement

Connection onto the Water Company's existing mains

With new water main projects being built and connecting to existing mains there must be a node present on the end of the existing main. There are two methods which may be followed for node placement to this existing main.

1. Where a node is present at the end of an existing main

Follow the conventions set out in this chapter and make the existing node the connect node in the database file. This will assist in pipe numbering and make QA practices for both the Consultant and The Water Company easier to carry out. Refer to Figure 4-1 for an example.

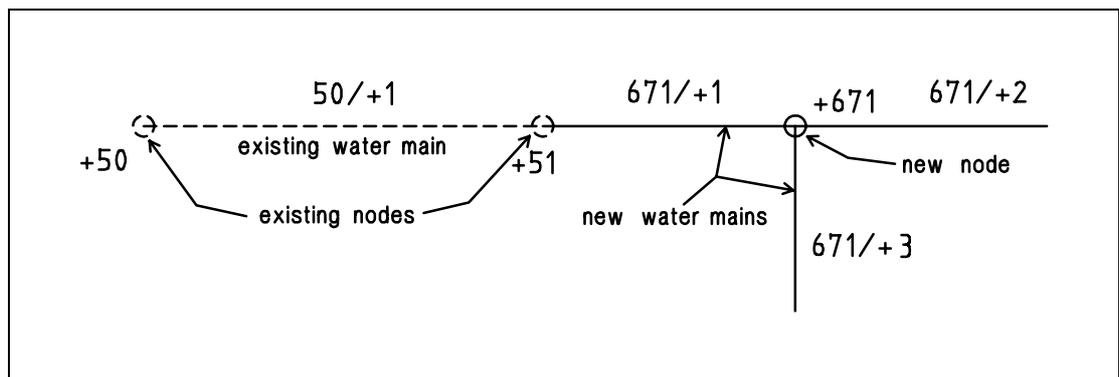


Figure 4-1 Existing node on existing main

2. Where a node is not present at the end of an existing main

Place a new node where the end of the existing main is and then follow the conventions set out in this chapter. Refer to Figure 4-2 for an example. There is no criteria for this node becoming the owner or connect node, it really doesn't matter

It is imperative that the Consultant places an edge matching symbol when this situation occurs so that The Water Company may update their database and graphics files. If this is not done it may result in a non-conformance being issued.

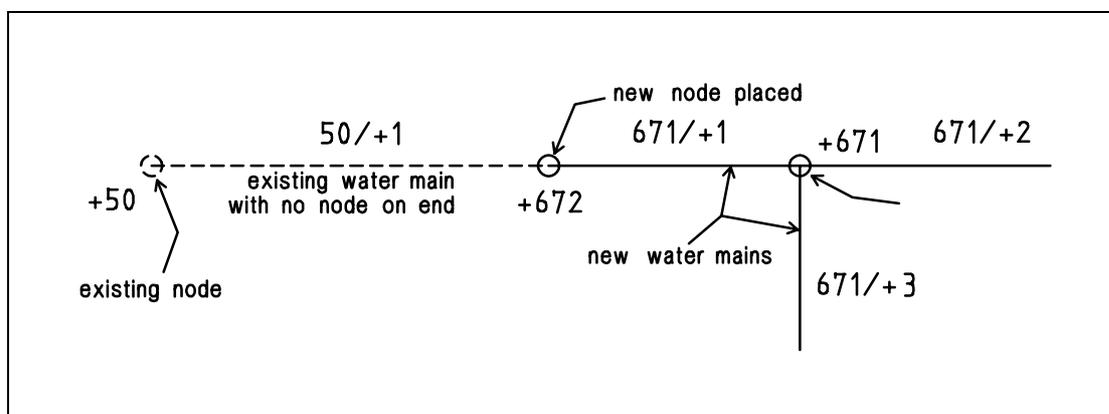


Figure 4-2 No node on existing main

Water mains crossing a municipal boundary

Nodes must be placed where water mains cross municipal boundaries.

The placement procedure for a node at a municipal boundary is as follows:

- ◆ If the water mains in the adjoining municipality do not exist, a node must be placed on the end of the pipe at the municipal boundary. Refer to Figure 4-3.

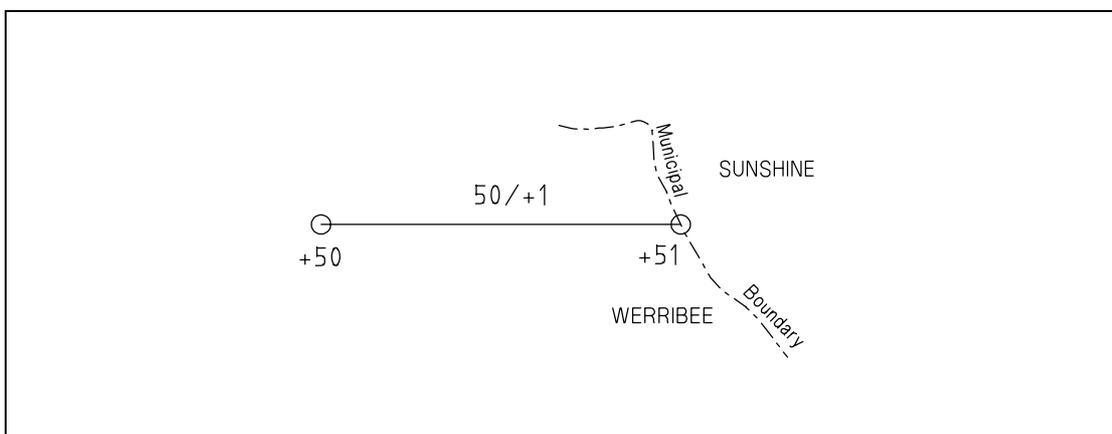


Figure 4-3 Node on municipal boundary

- ◆ If the adjoining water main already exists, the pipe must be joined graphically to the node on the boundary. However, in the database, the connect node must be the same as the owner node. A second node must not be placed on the boundary. Refer to Figure 4-4.

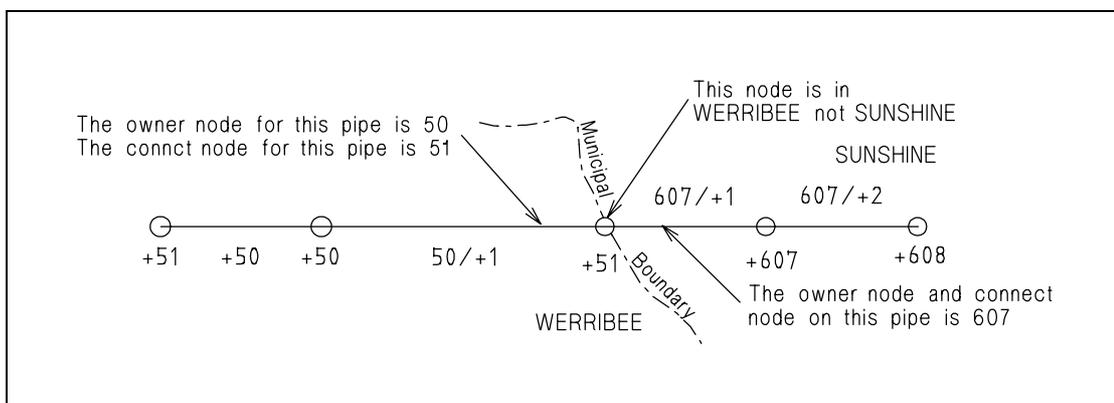


Figure 4-4 Node on municipal boundary

Nodes in courts

Only one node is required in a court. The connect node number is the same as the owner node number. Figure 4-5 shows the placement of nodes in a court.

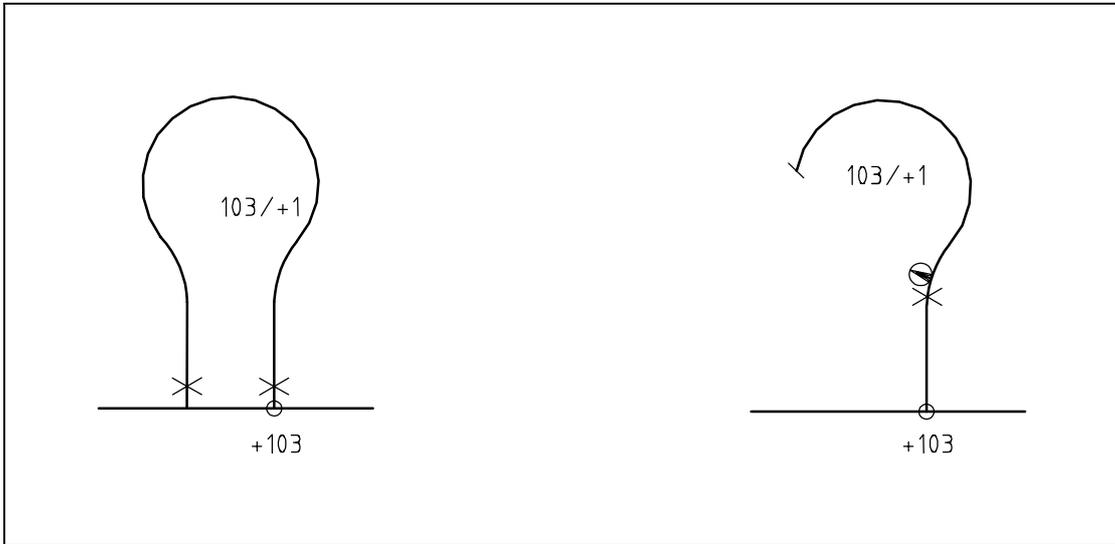


Figure 4-5 Nodes in a court

Nodes at intersections

Nodes must be placed at each pipe intersection as shown in Figures 4-6 and 4-7, except when the intersections are less than 3 metres apart. Intersections of pipes less than 3 metres apart require only one node, as shown in Figure 4-8.

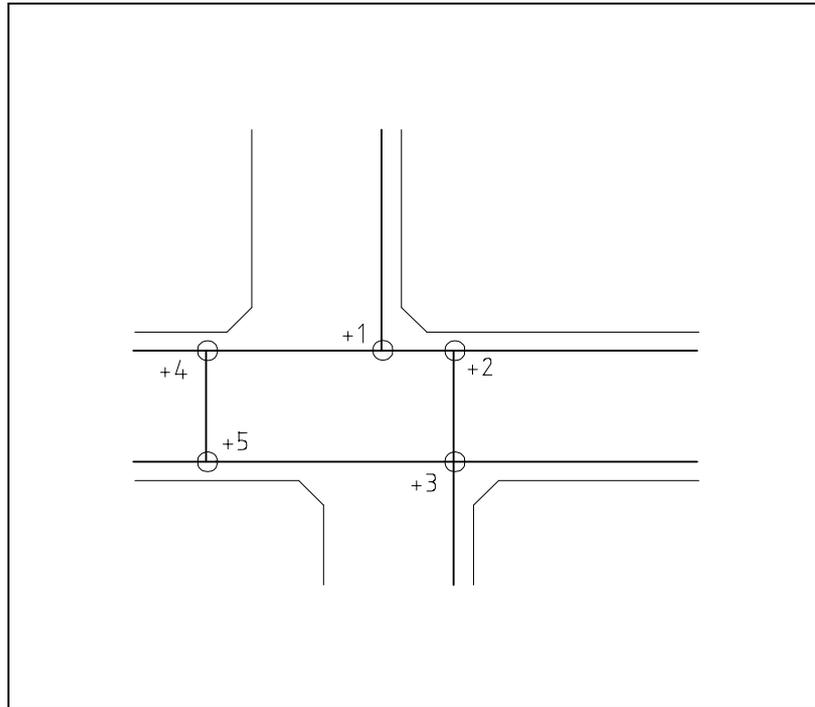


Figure 4-6 Node placement at intersections

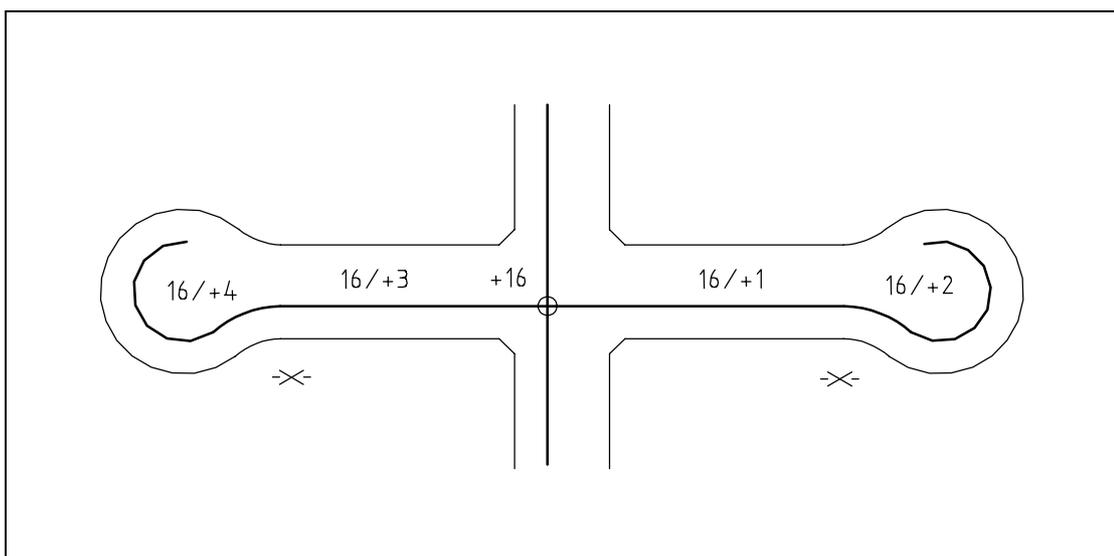


Figure 4-7 Node placement at intersections

4 Nodes

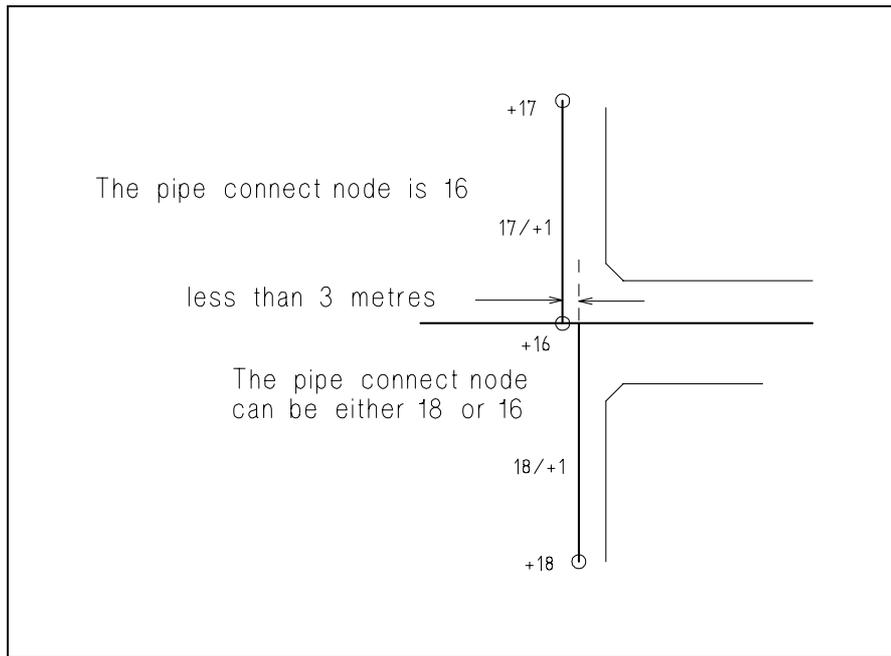


Figure 4-8 Node placement at intersection less than 3 metres apart

Nodes at file boundaries

If a pipe crosses a file boundary, for a short distance, it is not necessary to place a node on the file boundary. This is shown in Figure 4-9.

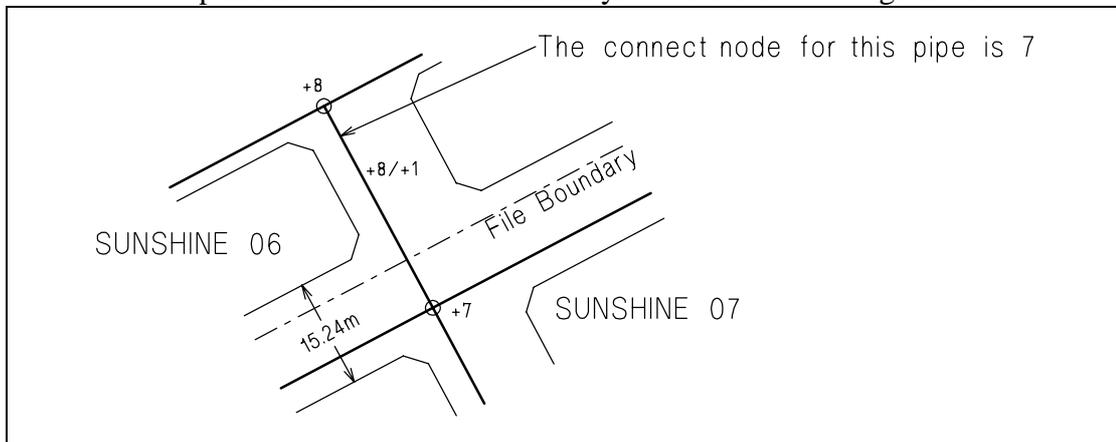


Figure 4-9 Pipes crossing file boundary

The pipe in Figure 4-9 is in Sunshine area 06 and the node in Sunshine area 07.

If a pipe extends more than the standard road width (16m) into the adjoining municipal area then:

- ◆ a node must be placed on the boundary in the original file.
- ◆ a node must be placed in the adjoining file, alongside the file boundary, to establish ownership of the pipe. This is shown in Figure 4-10.

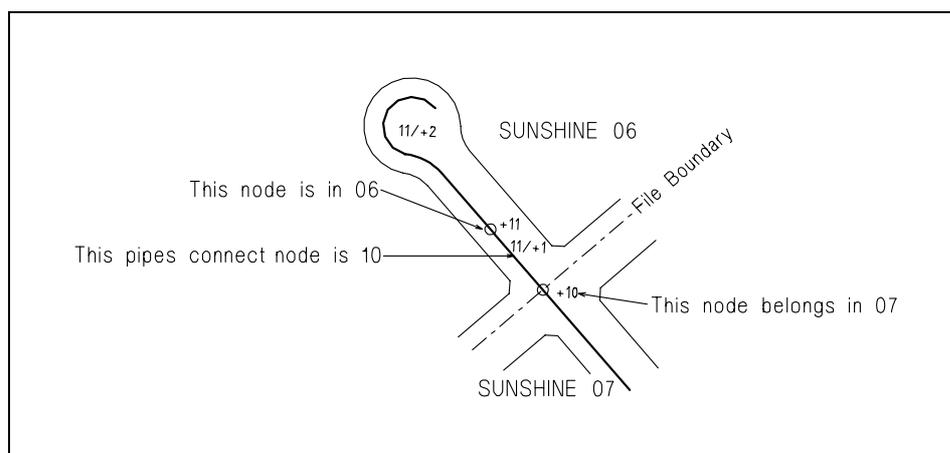


Figure 4-10 Pipe extending across file boundary

Nodes on short pipes

Only one node is required for short pipes. The owner and connect node in Figure 4-11 is node number 6.

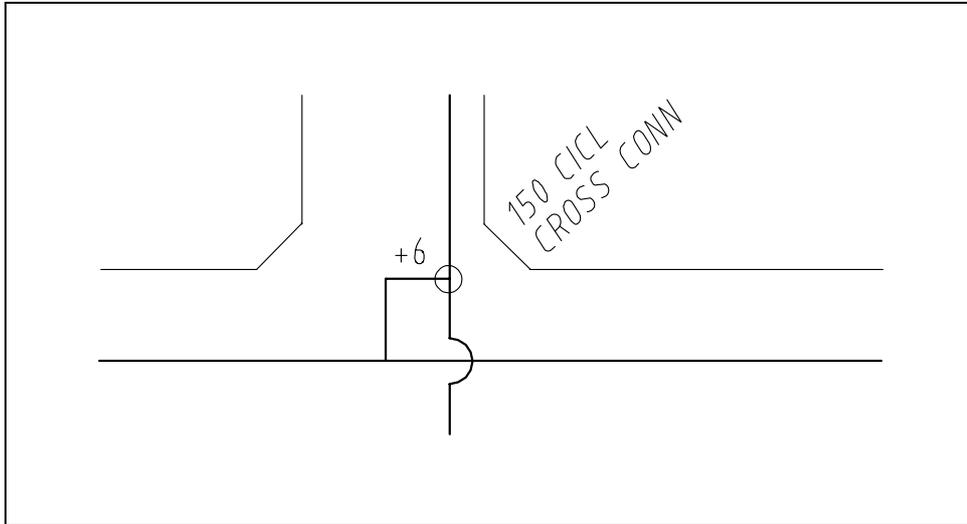


Figure 4-11 Nodes on short pipes

Nodes on by-passes

By-passes must be digitised in the same manner as pipe sections. They are owned by the by-pass node and have the same connect node. In Figure 4-12, nodes are not required at the intersection of the by-pass with the pipe section.

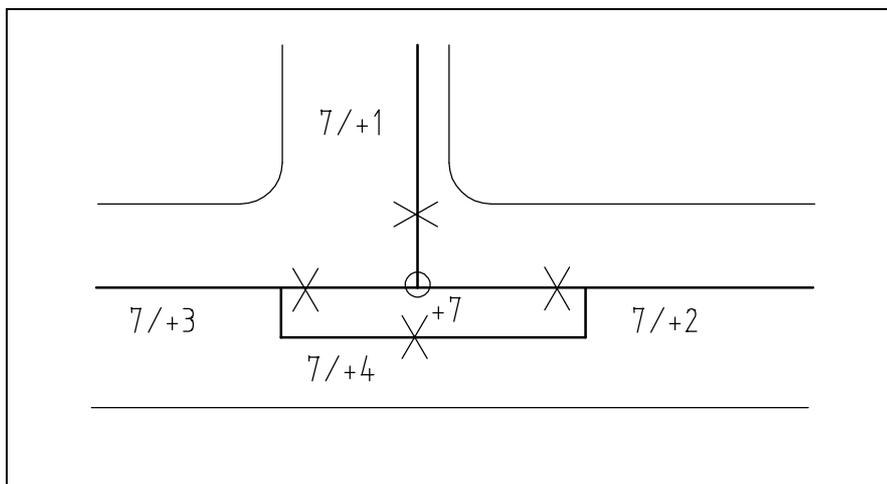


Figure 4-12 Nodes on by-passes

For by-passes that are further than the standard road width (16m) away from the nearest node, a node must be placed on one of the intersections of the by-pass and the pipe section. This is shown in Figure 4-13.

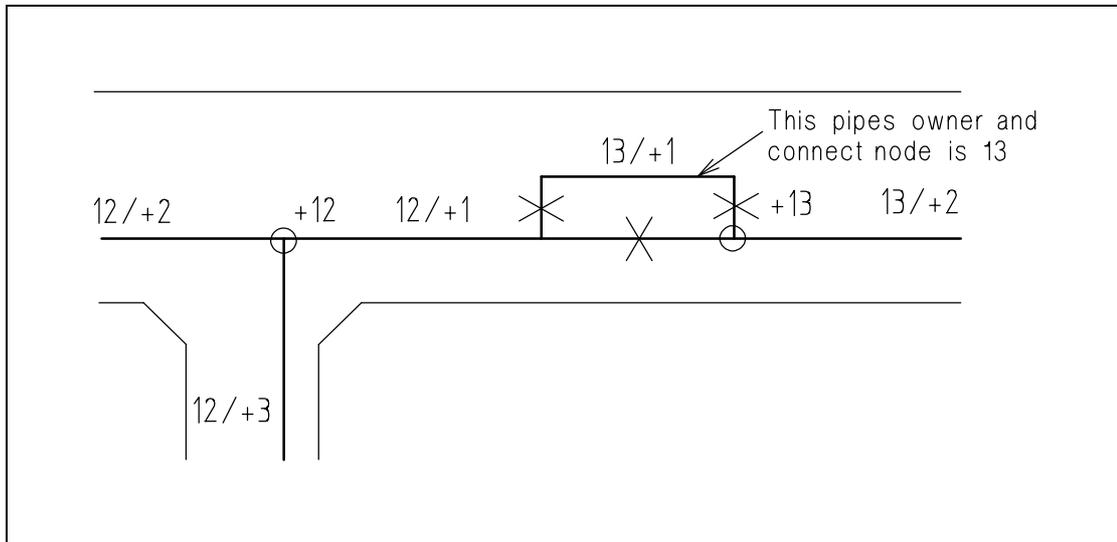


Figure 4-13 Nodes on by-passes

Nodes on offtakes

Offtakes are short pipes which allow for future extensions to the Water Supply Reticulation system.

A node must be placed for the offtake at the pipe intersection. This is shown in Figure 4-14.

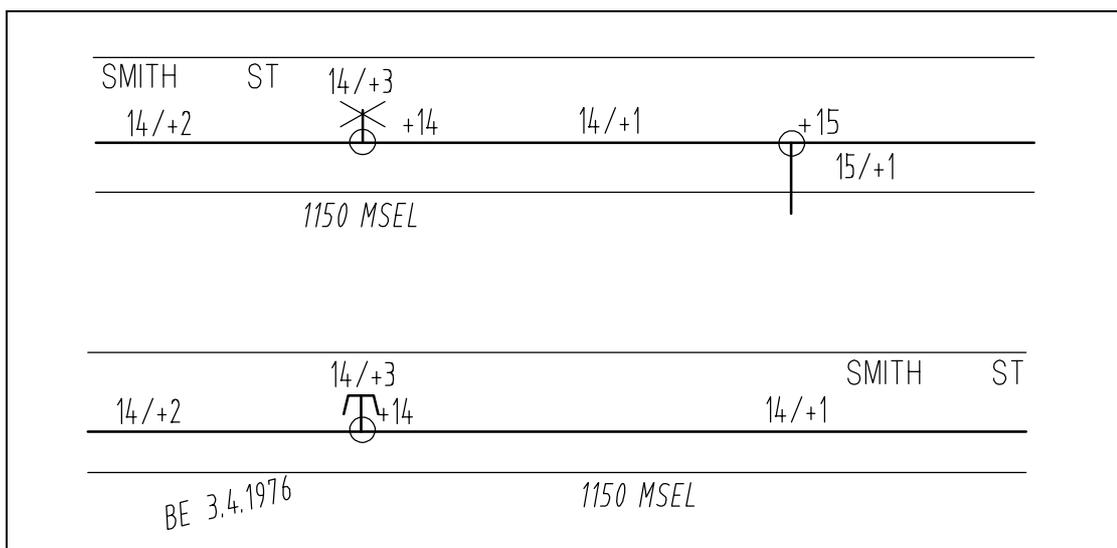


Figure 4-14 Nodes on offtakes

This chapter describes the requirements for the graphical and database entry of pipes.

Pipe placement

Pipes must be graphically represented by single line or arc elements. These may be chained together to form a pipe section.

Each pipe within a pipe section must have the same:

- ◆ diameter
- ◆ type
- ◆ construction date

If any of the above characteristics change, a new pipe section is required.

More than one pipe section may link two nodes. This is shown in Figure 5-1.

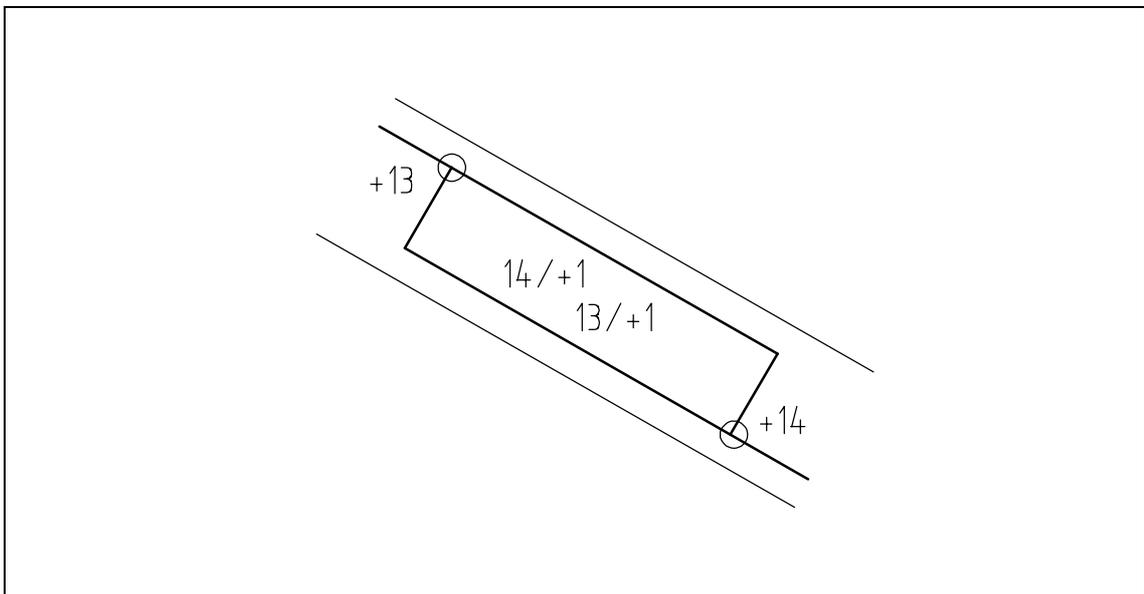


Figure 5-1 Two pipe sections linking nodes

Crossovers

A crossover symbolises graphically where two pipes cross but do not interconnect.

All crossovers must be included in the chaining process. Figure 5-2 shows the separate elements which must be chained together.

Note that the crossover must be defined as an arc. A crossover is not a cell. The size of a crossover may vary but it must be readily discernible at 1:2500 scale.

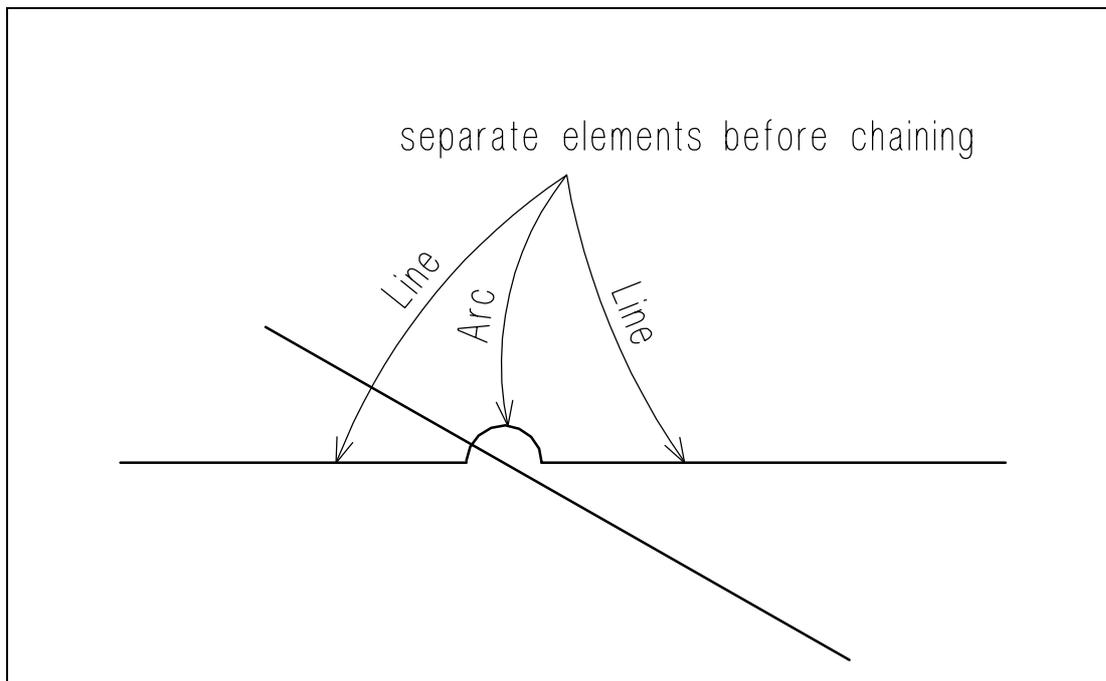


Figure 5-2 Chaining crossovers elements

Chaining

Chaining involves selecting individual pipe elements in turn and linking them together to create a single pipe having the same characteristics. After the pipe elements have been chained together, they are no longer displayed individually and are reviewed as one element.

The elements are always chained in sequential order.

Examples of pipe sections

If the characteristics of a pipe change and the pipe is more than a standard road width (16m) from another change symbol or intersection, a new section must be created. There must always be a separate pipe section between two nodes. Figure 5-3 illustrates some standard pipe sections.

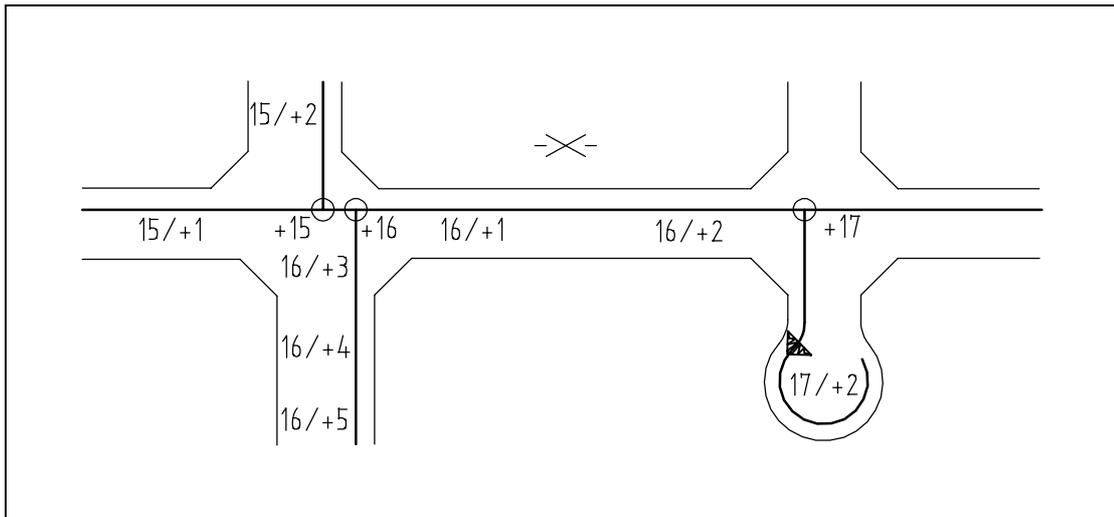


Figure 5-3 Pipe sections

If a pipe extends past another intersecting pipe by no more than three metres and has the same characteristics, then a separate pipe section is not required. This is shown in Figure 5-4.

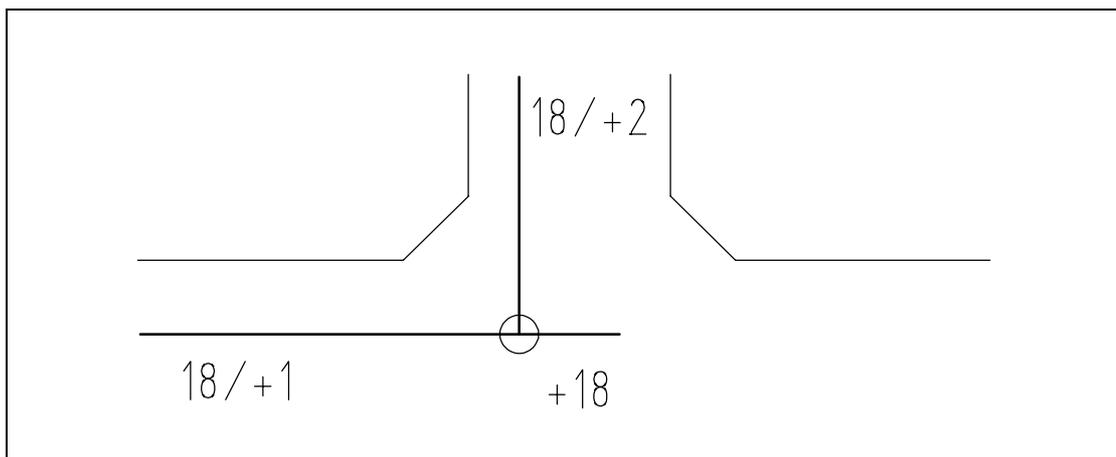


Figure 5-4 Extended pipe section

If there is a fitting on a pipe extension, the extension must be entered as a separate pipe section. This is shown in Figure 5-5.

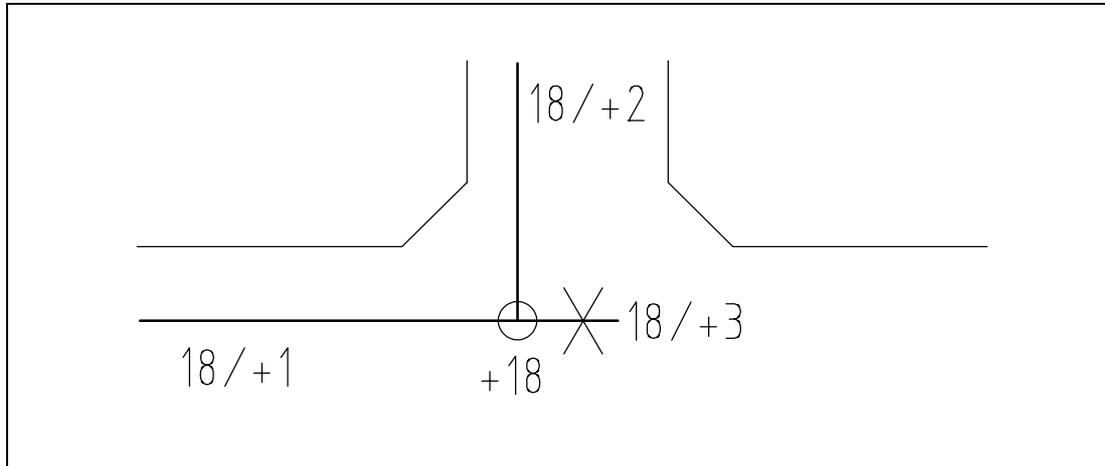


Figure 5-5 Extended pipe section with a fitting

If a pipe has a reducer immediately next to a node, a separate pipe section is not required. This is shown in Figure 5-6.

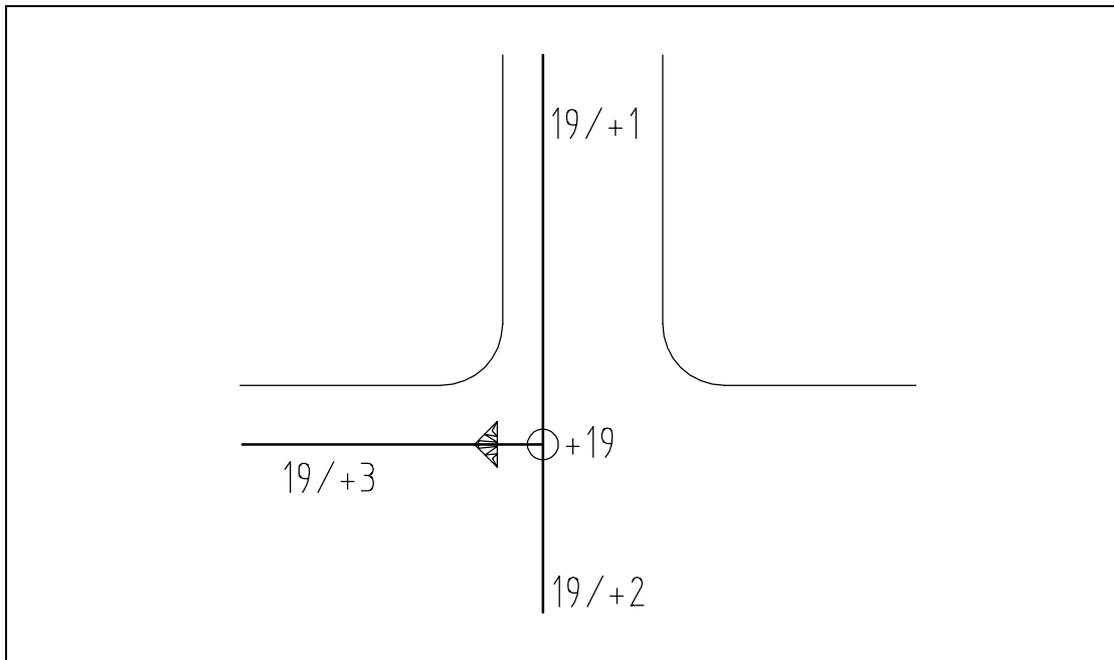


Figure 5-6 Pipe with reducer immediately next to a node

If there is a fitting between a node and a reducer, a separate pipe section must be created. This is shown in Figure 5-7.

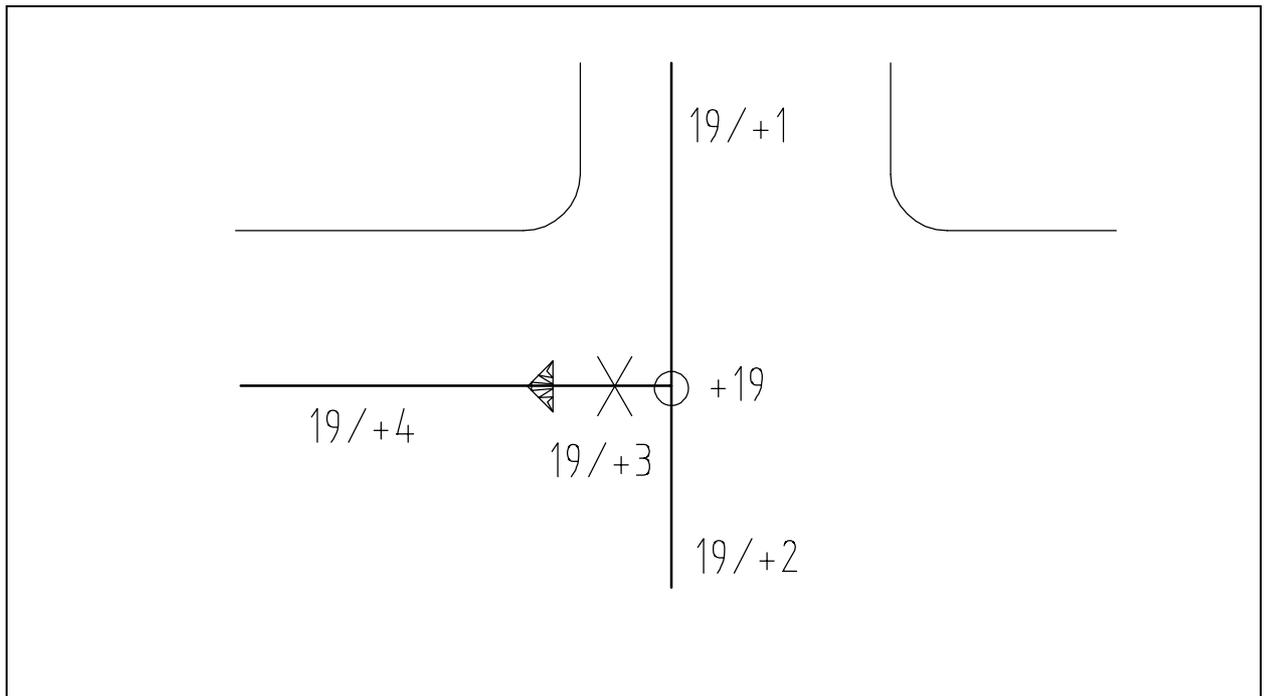


Figure 5-7 A fitting placed between a node and a reducer

If the pipe characteristics change for a length of pipe less than a standard road width (16m), a separate pipe section is not required. This is shown in Figure 5-8.

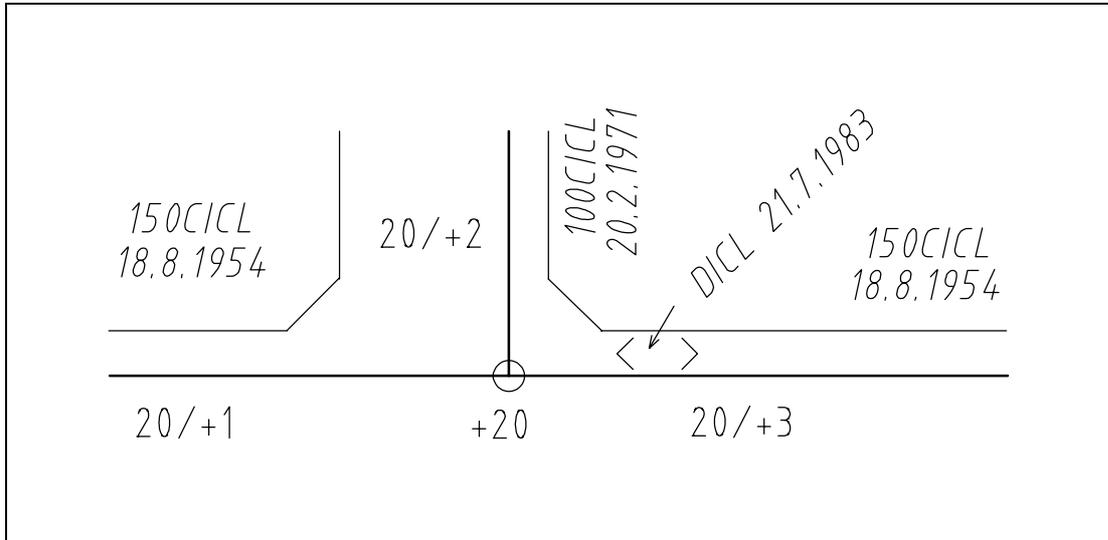


Figure 5-8 A change of pipe characteristics

If the pipe characteristics change for a length of pipe less than a standard road width (16m) and the short length of pipe has a fitting, then a separate pipe section must be created.

This is shown in Figure 5-9.

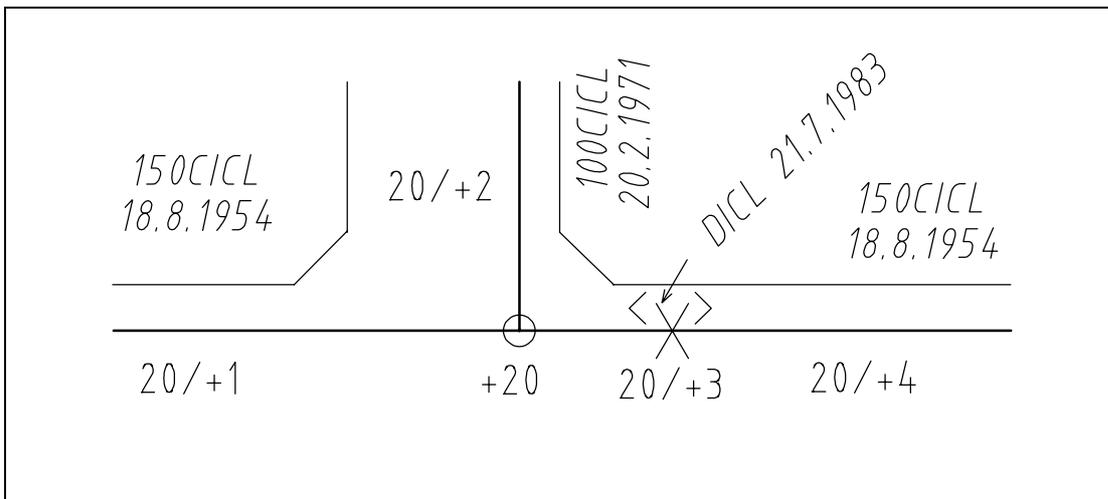


Figure 5-9 A change of pipe characteristics

If the pipe symbol changes for a length of pipe less than a standard road width (16m), a separate pipe section is not required. This is shown in Figure 5-10.

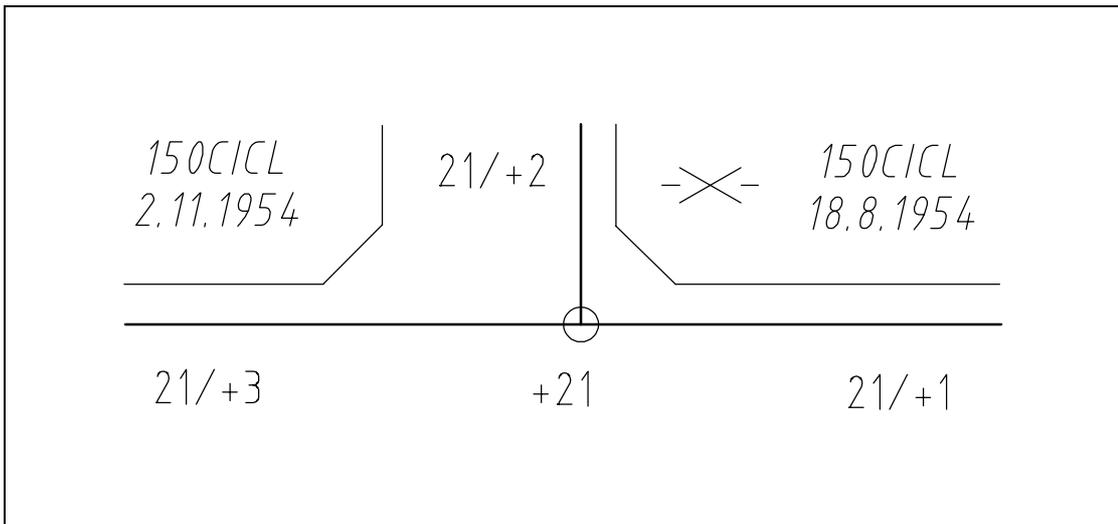


Figure 5-10 A change of pipe characteristics

A separate pipe section must be created where the pipe symbol changes and a fitting is on the pipe. This is shown in Figure 5-11.

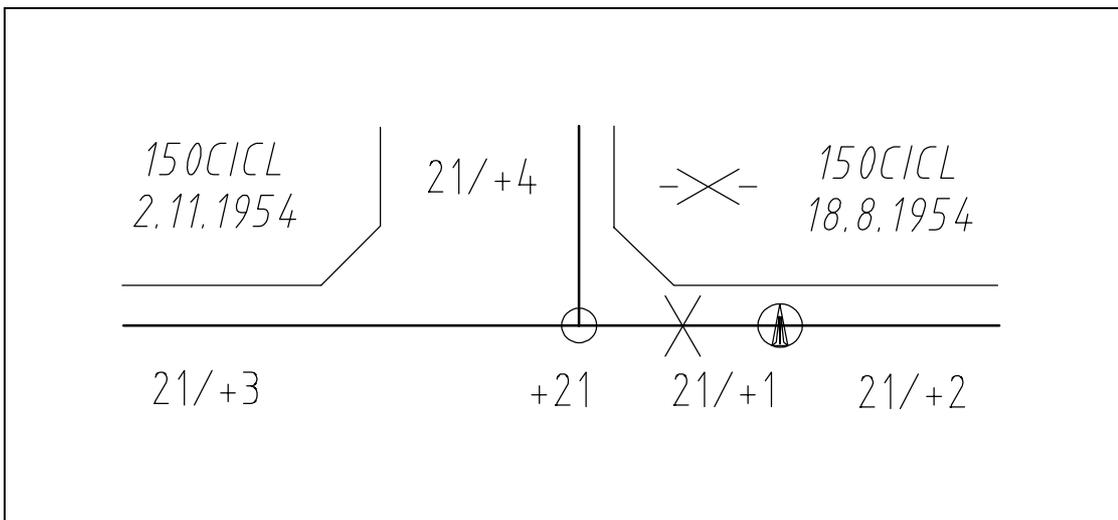


Figure 5-11 A change of pipe characteristics

Offset symbol and text

The offset symbol should be centred on the cadastre road alignment. Text should be placed inside the cadastre, not in the road. as shown in Figure 5-12

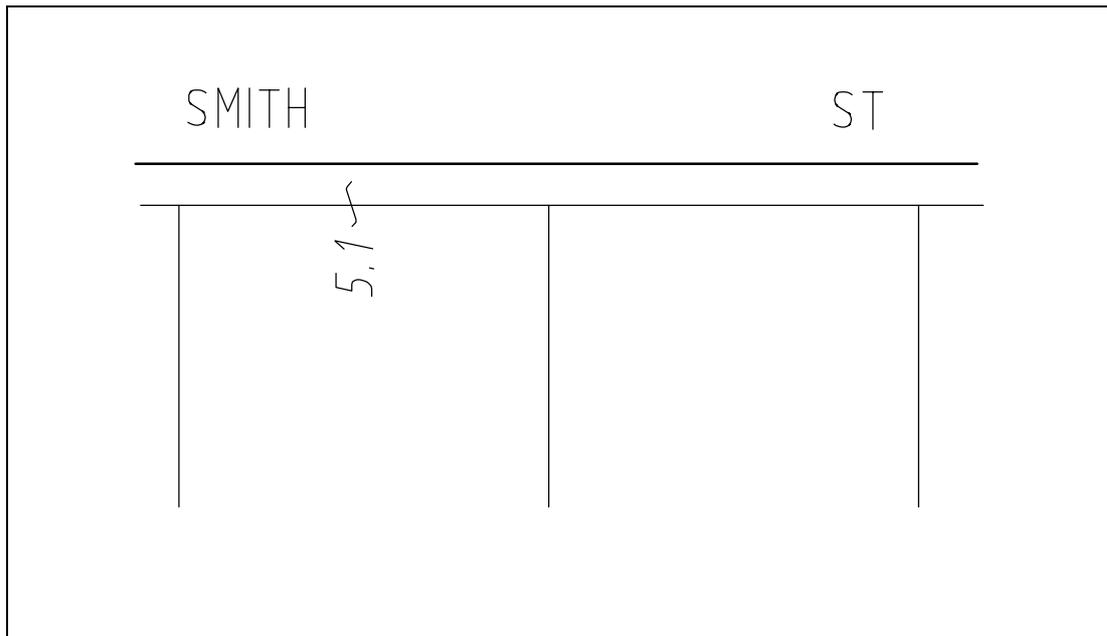


Figure 5-12 Offset symbol and text for a water main inside a road

The offset symbol and text must be placed graphically at or close to nodes, midpoints of curves or at significant bends where there is variation by more than 0.2 metre with the text displayed to one decimal place.

If a pipe is aligned inside the cadastre do not place offset symbol and text in the road alignment. Place the symbol and text inside arrowheads as shown in Figure 5-13.

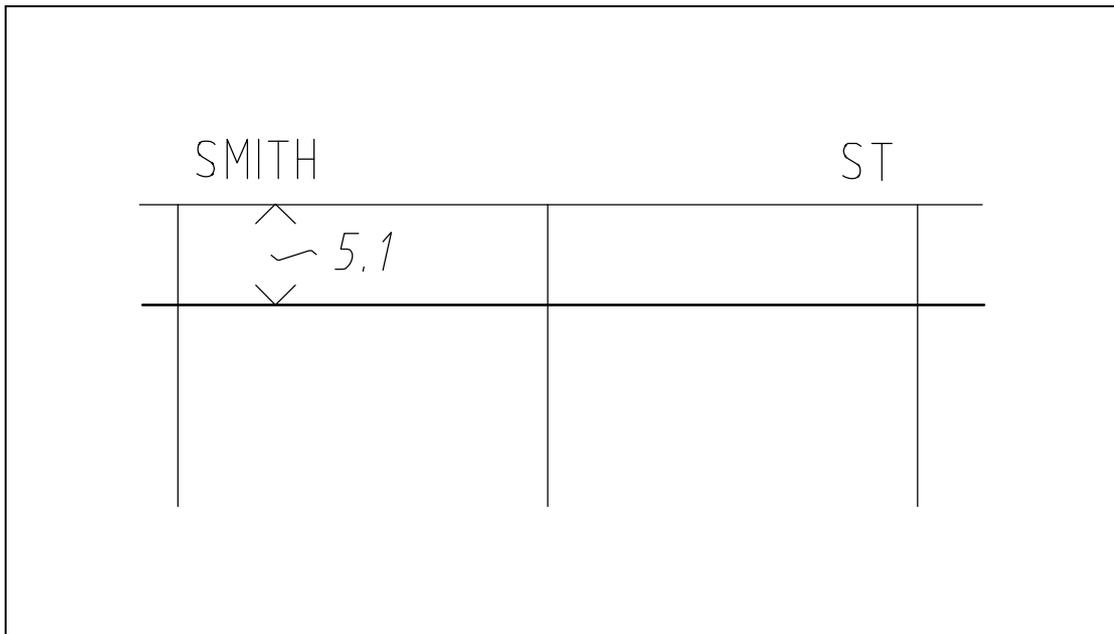


Figure 5-13 Offset symbol and text for a water main inside a property

If more than one water main runs along a road, arrowheads must be used to assist in identifying the offsets for each pipe. The arrowheads must touch both the pipe and the road alignment as shown in Figure 5-14.

Note: The pipe closest to the cadastre boundary inside the road alignment does not require arrowheads.

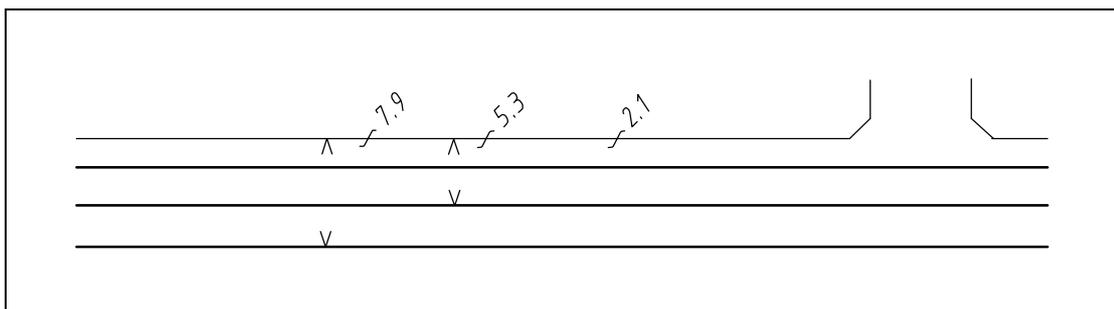


Figure 5-14 Arrowheads identifying offsets

Pipe details and placement

All nominal pipe sizes are to be displayed in millimetres. Pipe details include:

- ◆ size,
- ◆ type (use code set 44 for abbreviated types),
- ◆ construction date (d-m-yyyy).

It is to be noted that all pipes excepting polyethylene (PE) have the sizes taken from the internal diameter (ID). Polyethylene pipes sizes are taken from the outer diameter (OD). All pipe fittings, including polyethylene, are taken from the internal diameter of all pipes.

Double line display

Double line display should be used in most cases. For example:

150 UPVC-T
1.8.1975

This is shown in Figure 5-15

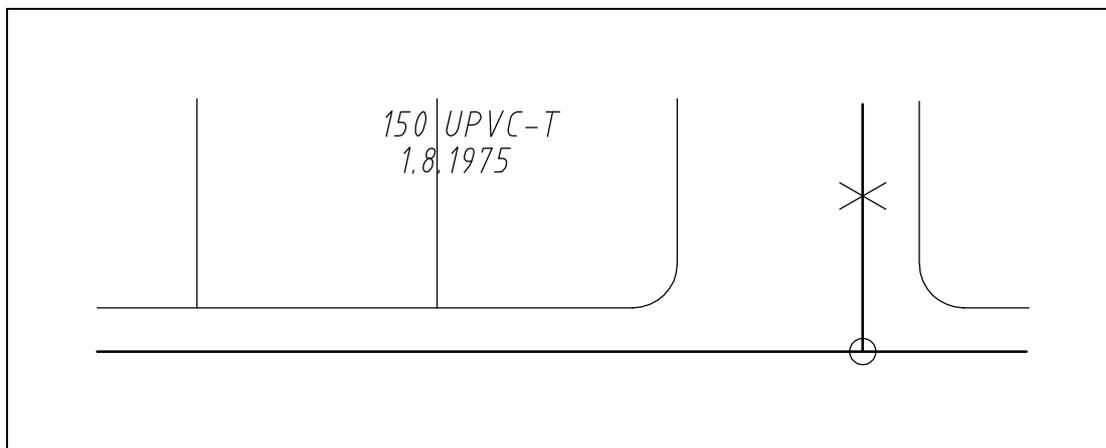


Figure 5-15 Double line text

Single line display

Single line display should be used when cadastre constraints exist, or when only one line of text is required.

This is shown in Figure 5-16

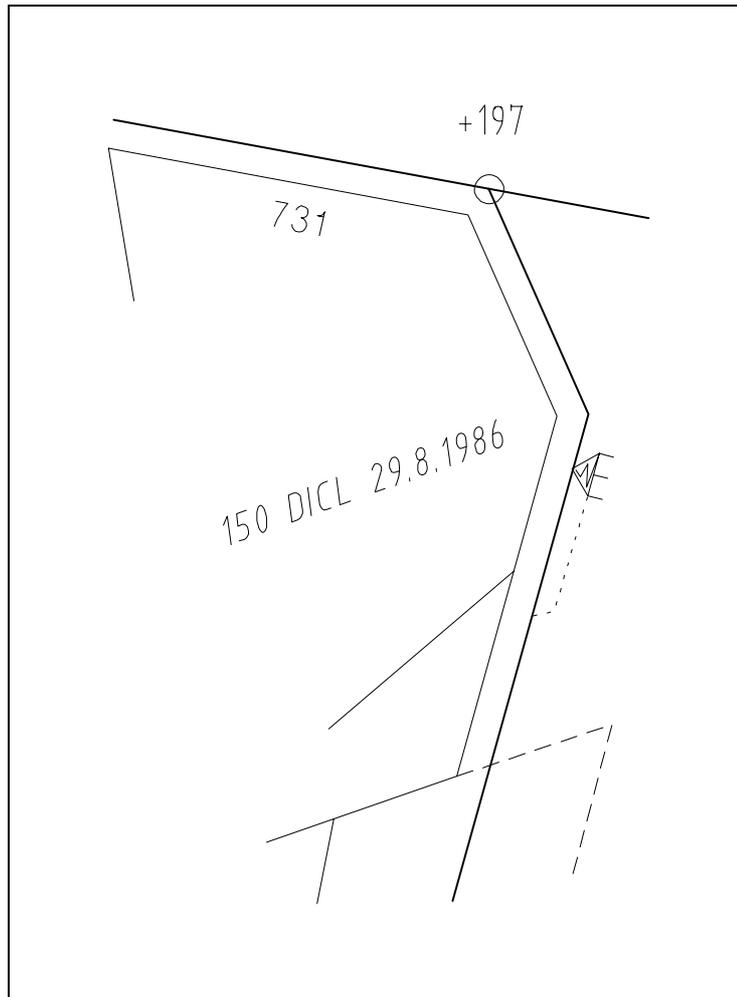


Figure 5-16 Single line text

Pipe details and cadastre constraints

Pipe details must be placed inside the cadastre and not in the road. Pipe details must be placed so that they do not bisect cadastre lines except when cadastre constraints exist. This is shown in Figure 5-17 and Figure 5-18.

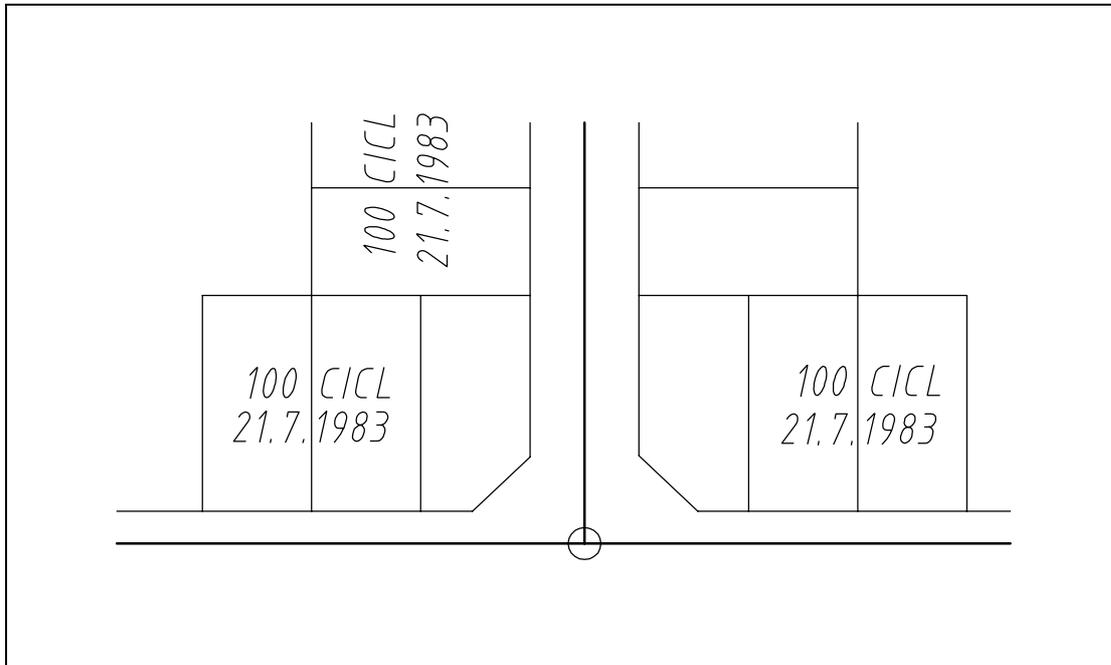


Figure 5-17 Pipe details and cadastre lines

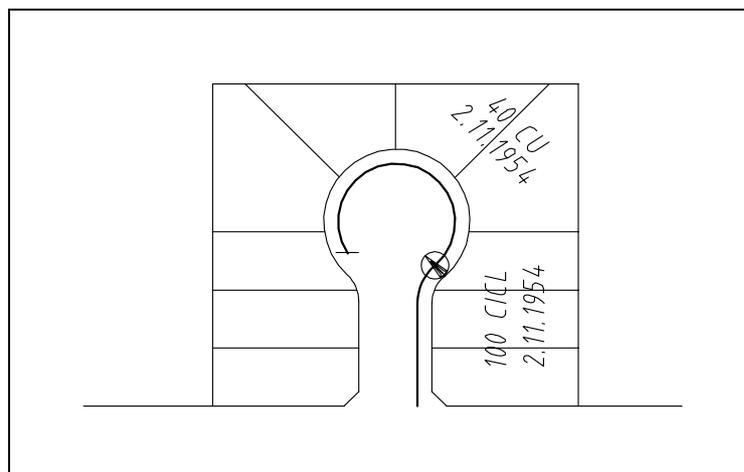


Figure 5-18 Pipe details and cadastre lines

The pipe details should not be scaled except when cadastre constraints exist. If necessary, the pipe details may be scaled down to 80% of the original size and placed in graphics.

Pipe details alignment

The change of pipe symbol must be placed 18 metres from the road alignment wherever possible.

The pipe details on either side of the change symbol should be placed so that the centre of the details align with the change of pipe symbol. This is shown in Figure 5-19.

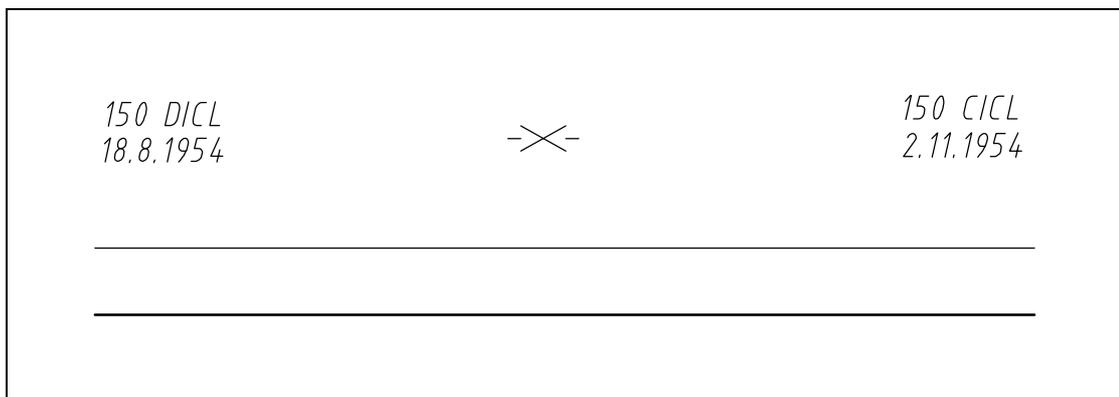


Figure 5-19 Pipe details alignment with change symbol

Placement regularity

The pipe detail text must be shown:

- ◆ whenever the pipe changes characteristics,
- ◆ between nodes,
- ◆ approximately every 20 properties (in the case of very long pipes).

Pipe identifier

Each pipe section must be assigned an identifier which is unique within a municipality. The pipe section number prefix consists of the number of the owner node from which the pipe originates.

The suffix consists of a plus sign (+) and a number identifying the order in which it has been digitised. The prefix and suffix must be separated by a slash(/). This is shown in Figure 5-20.

Where a pipe section number prefix consists of five or more figures, then the whole pipe section number may be scaled down to 80% of the original size.

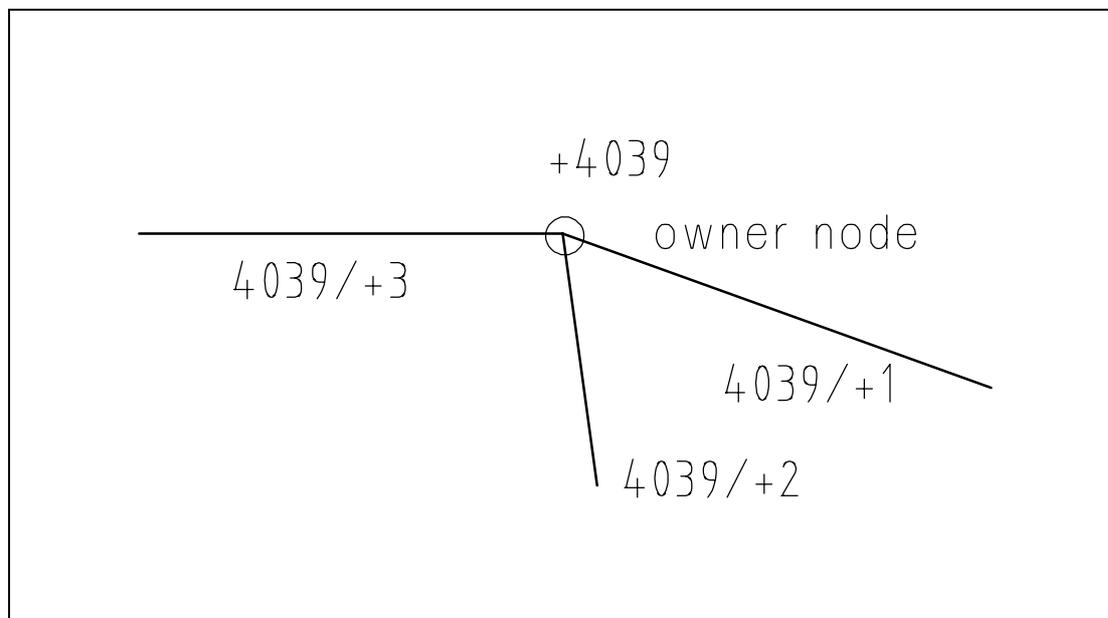


Figure 5-20 Pipe section numbering

Pipe sections between nodes can be numbered from either node. The node to be the owner of these pipe sections must be determined before placement. Figure 5-21 shows a correct pipe section numbering sequence.

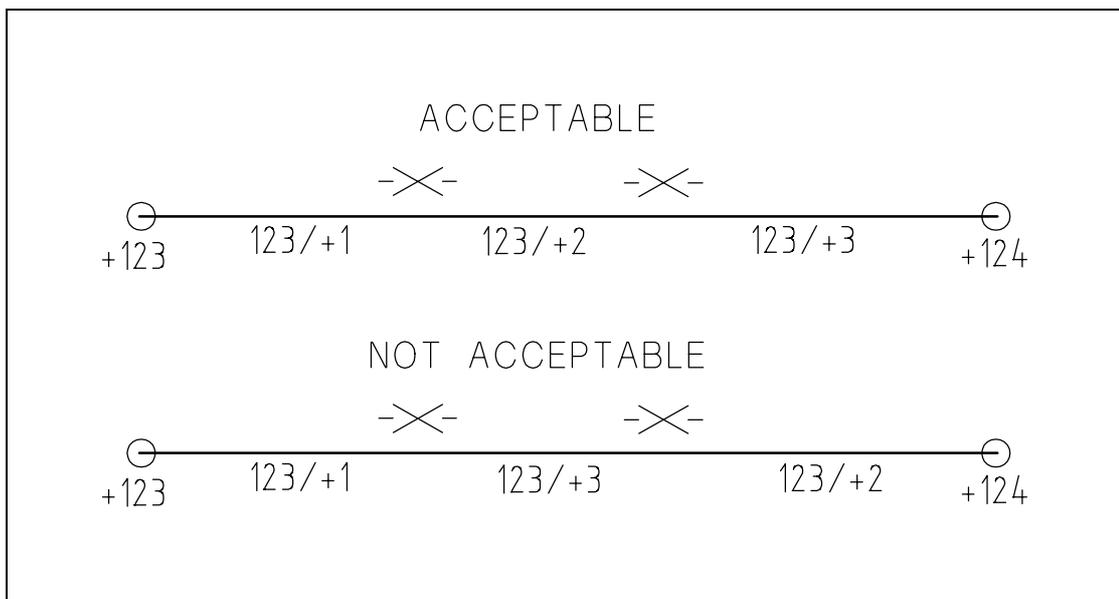


Figure 5-21 Pipe section numbering

Pipe section numbers must be consecutive.

Pipe section numbers must not be duplicated. If a node owns many pipe sections, the pipes must be numbered consecutively beginning at the owner node and going away from the owner node as shown in Figure 5-22.

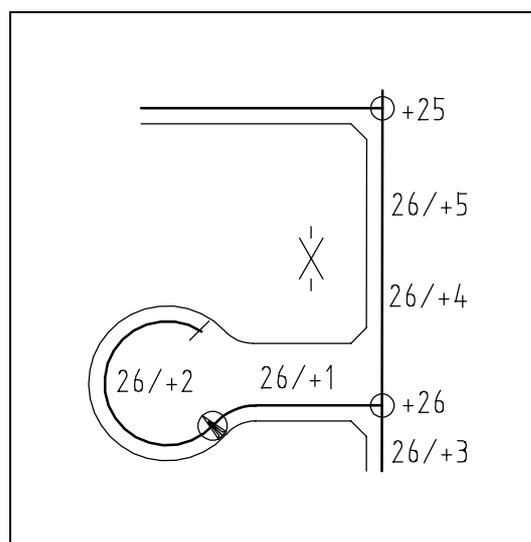


Figure 5-22 Pipe section numbering

The first pipe in court bowls must be entered from the owner node. Figure 5-23 shows pipe section number sequences in a court bowl.

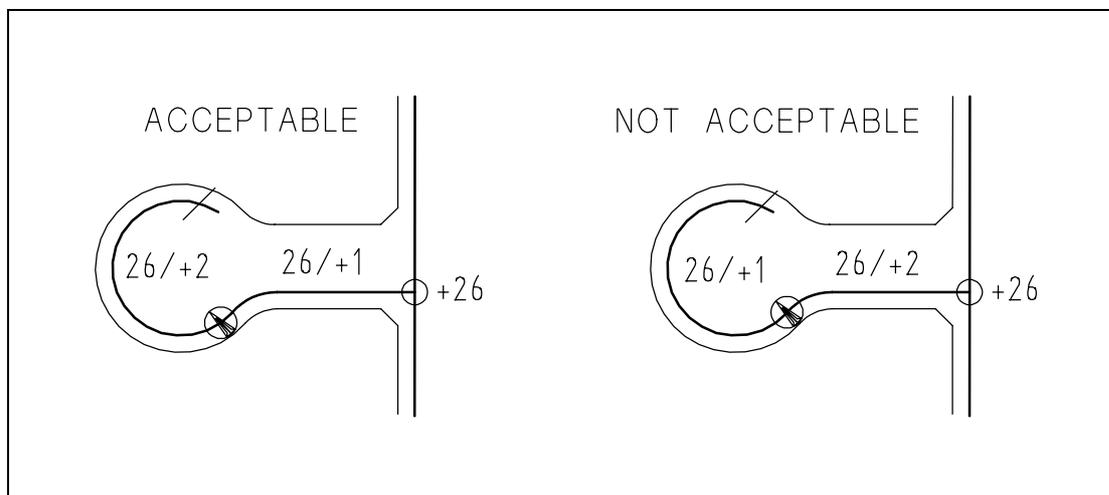


Figure 5-23 Pipe section numbers in a court bowl

Placement of pipe section numbers

Pipe section numbers should be placed at zero degrees, opposite the pipe details and within the road alignment, if possible. The numbers may be rotated to fit the road alignment if necessary. This is shown in Figure 5-24.

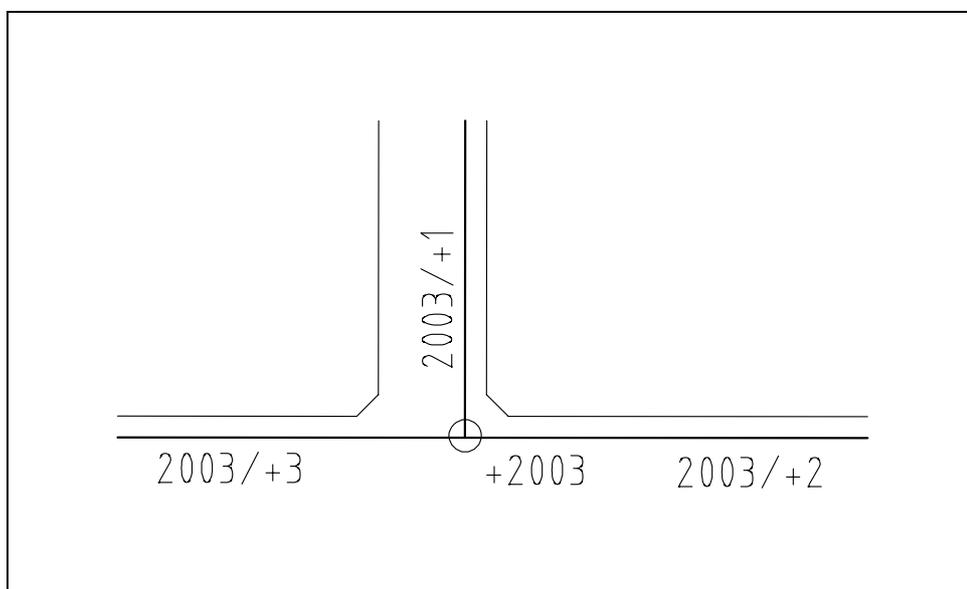


Figure 5-24 Pipe section number placement

Pipe section numbers should not be scaled, unless the prefix is five or more figures. Then it may be scaled down to 80%.

Change of pipe characteristics

A change of pipe symbol must be placed whenever the characteristics of a pipe between nodes are changed, that is:

- ◆ size,
- ◆ type,
- ◆ construction date.

This is shown in Figure 5-25

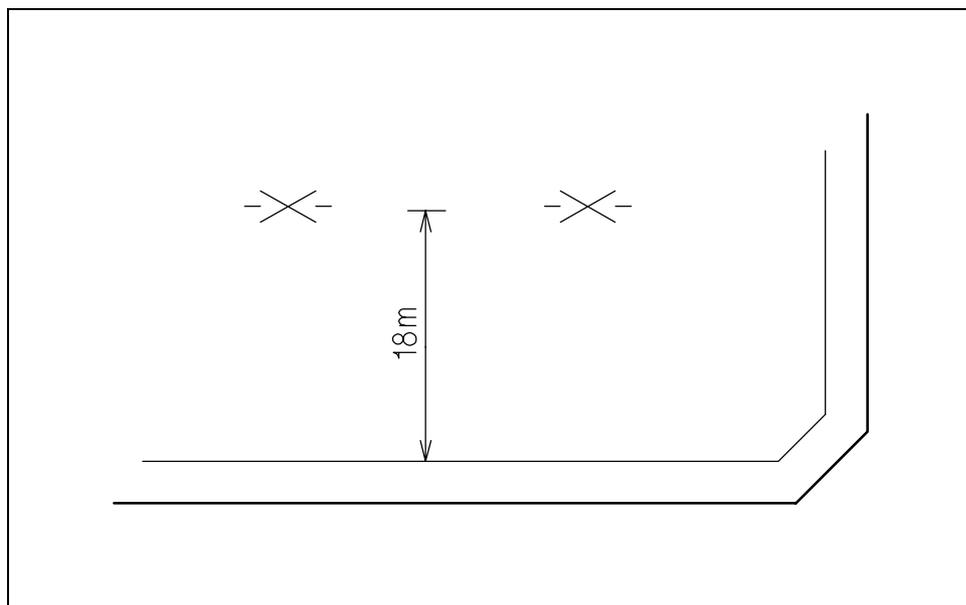


Figure 5-25 Change of pipe symbol placement

The change of pipe symbol must be placed 18 metres from the road alignment at the meeting of the two pipe sections. The symbol must not be moved except during graphical representation enhancement. This is shown in Figure 5-26.

5 Pipes

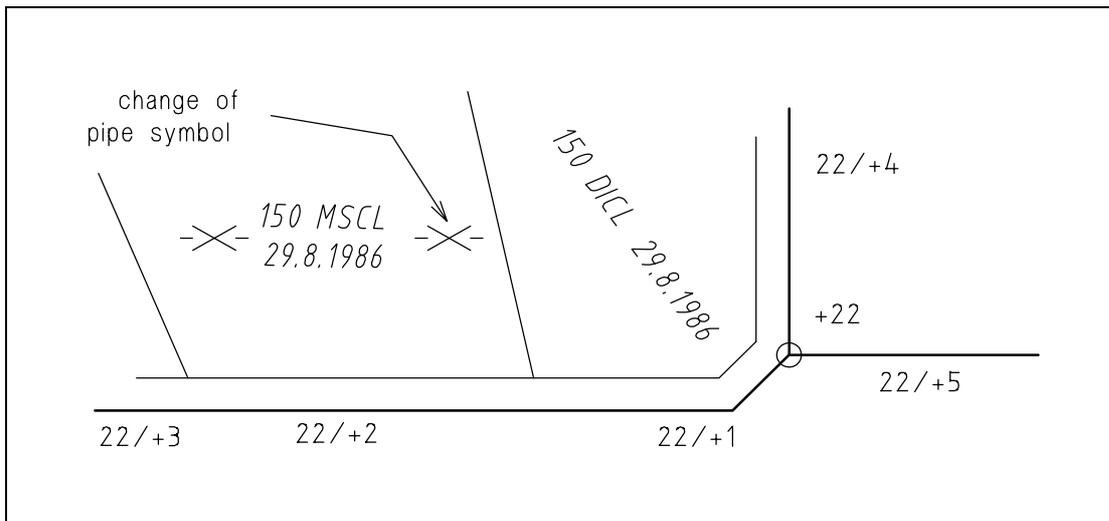


Figure 5-26 Change of pipe symbol

The change of pipe symbol must be placed inside the cadastre and not appear in the road alignment except where necessary. It should be placed exactly opposite the meeting of the two pipe sections.

Miscellaneous text

Miscellaneous text refers to all text in graphics that provides additional information about features.

There are several types of miscellaneous pipe detail text, for example:

- ◆ Duplication Main
- ◆ Tapping Main
- ◆ (CL 1983)
- ◆ (INS 1983)
- ◆ ALT'D 1983

Miscellaneous text has the same symbology as normal pipe detail text. Figure 5-27 shows examples of miscellaneous text.

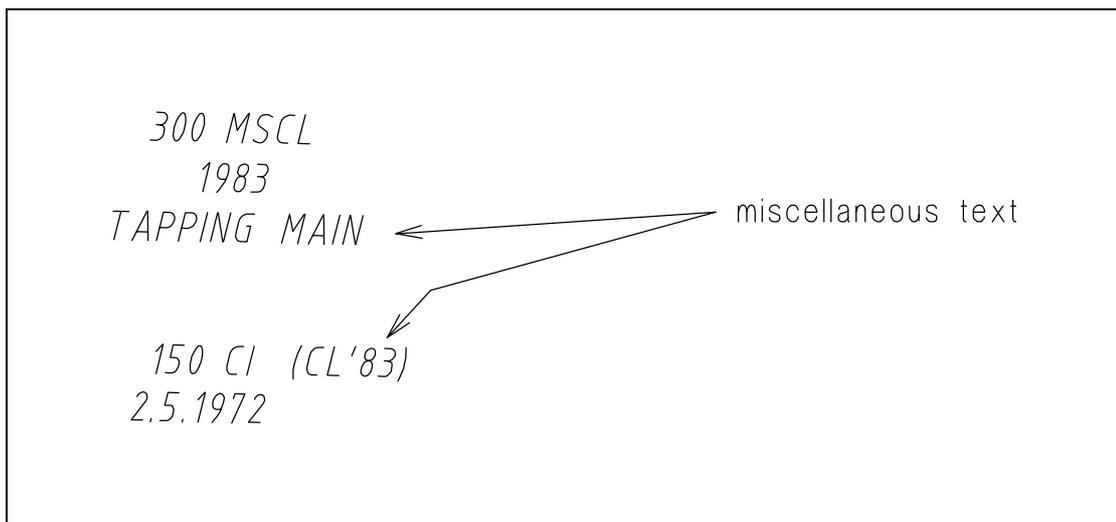


Figure 5-27 Miscellaneous text

Miscellaneous text can also be used to describe a short pipe that has not been made into a separate pipe section as shown in Figure 5-28.

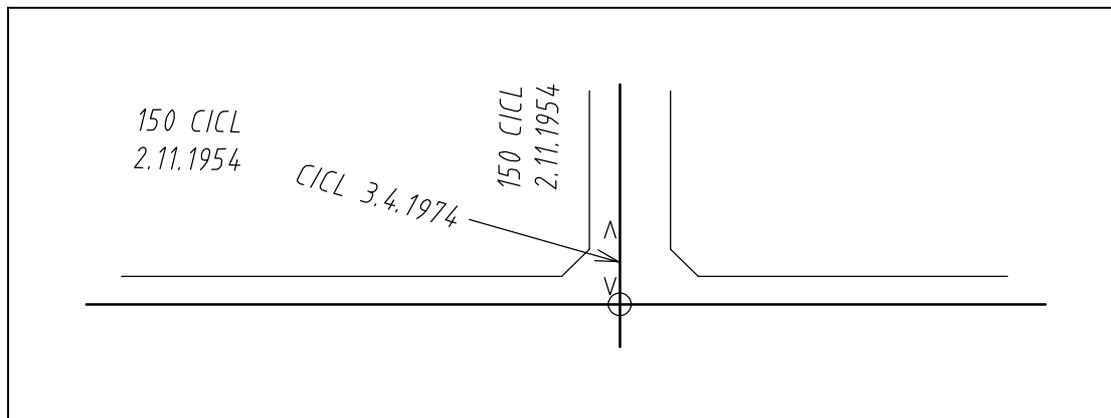


Figure 5-28 Miscellaneous text

Miscellaneous text can be used when changes to an existing pipe occur. Refer to Figure 5-29.

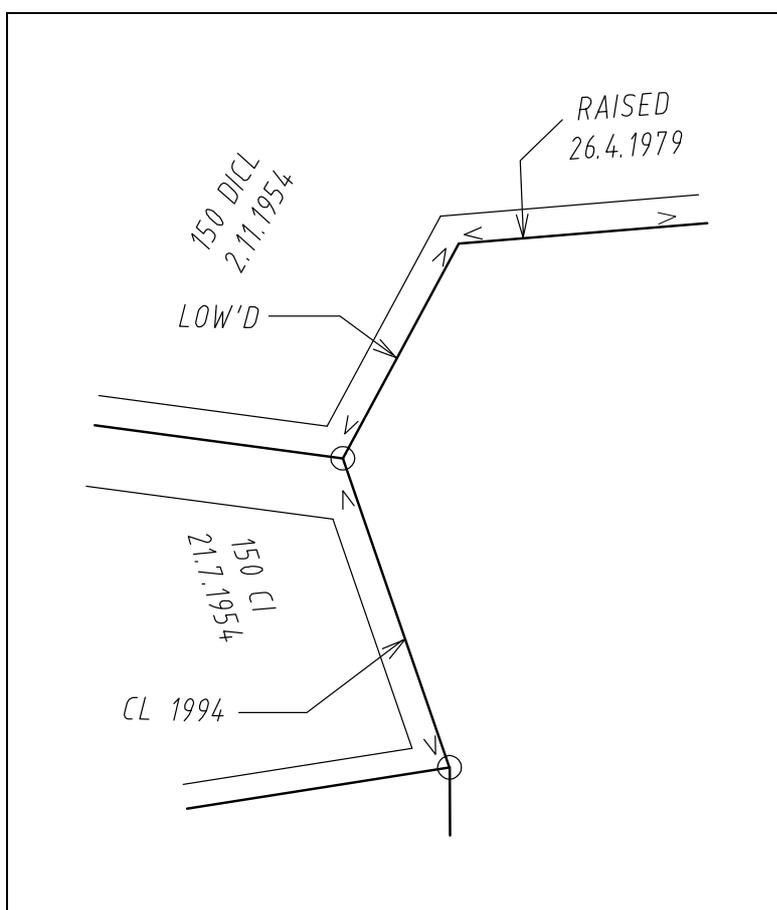


Figure 5-29 Miscellaneous text

Pipe text arrows

Pipe text arrows may be used when placing text to assist in clarifying and identifying pipe details, especially where cadastre constraints are present. This is shown in Figure 5-30.

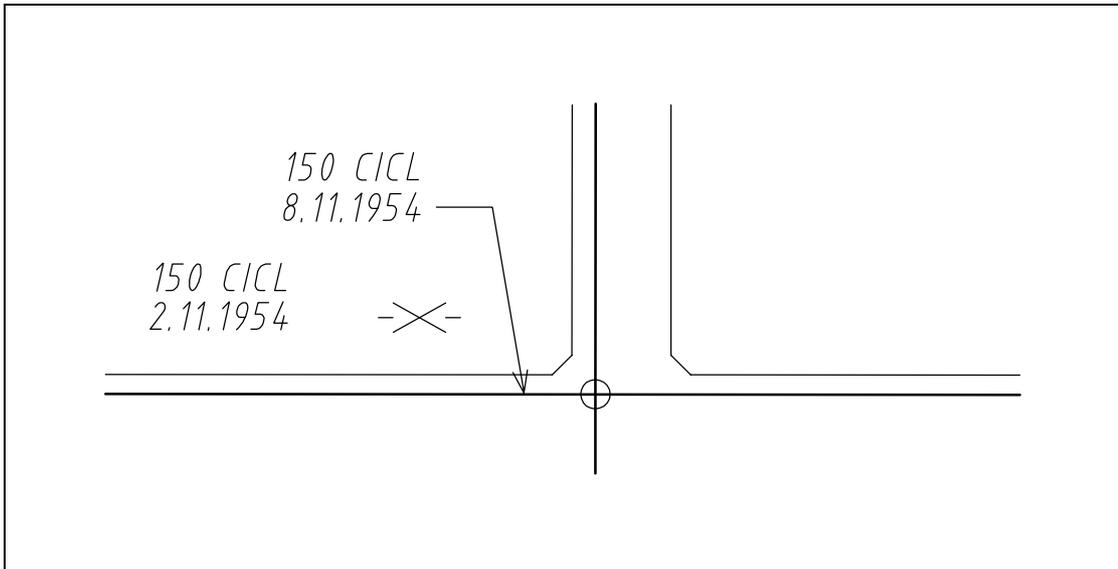


Figure 5-30 Pipe text arrows

Pipe text arrows can be used to identify miscellaneous text to pipe sections as shown in Figure 5-31

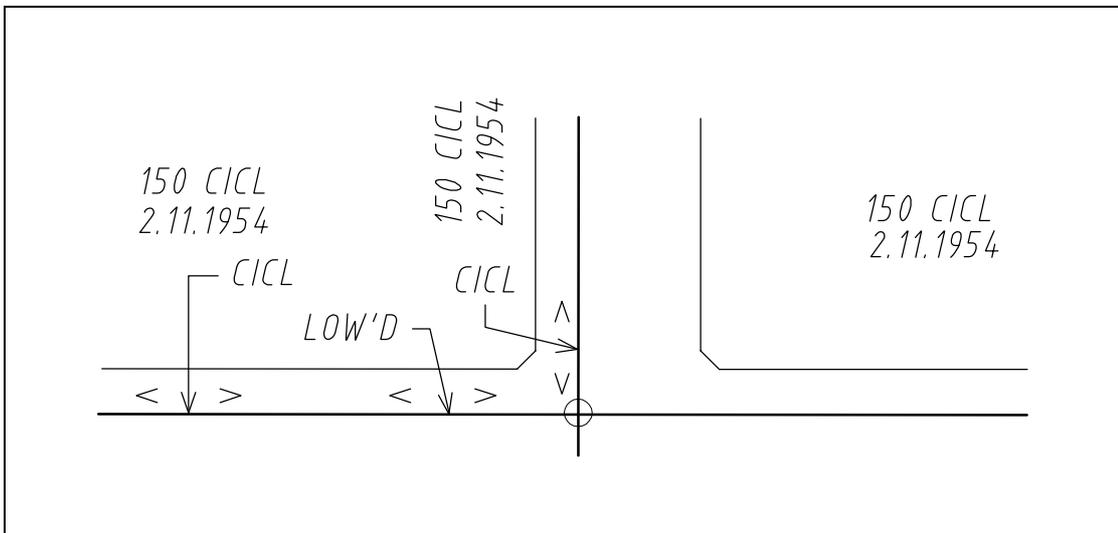


Figure 5-31 Pipe text arrows with and pipe sections

The arrow head must be placed so that it touches the pipe. The arrow shaft must be bent when placed with text. Where possible, the arrows must be placed so that they do not cross water pipes. This is shown in Figure 5-32.

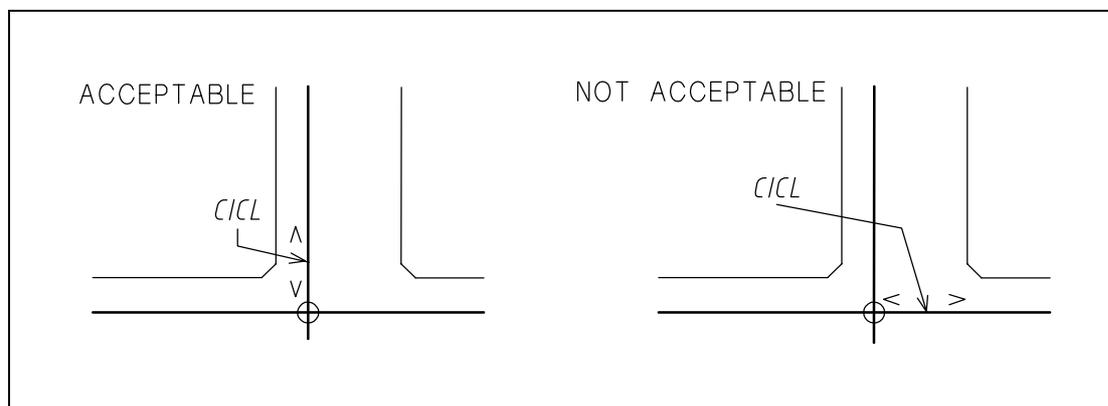


Figure 5-32 Pipe text arrows and pipes

Main offset arrow

Mains offset arrows must be used:

- ◆ To help identify the offset of pipes to boundaries. The arrowhead symbol should touch the pipe and title line. This is shown in Figure 5-33.
- ◆ To identify lengths of pipe that have changed and will not or can not be tagged separately in the database. This is shown in Figure 5-34.

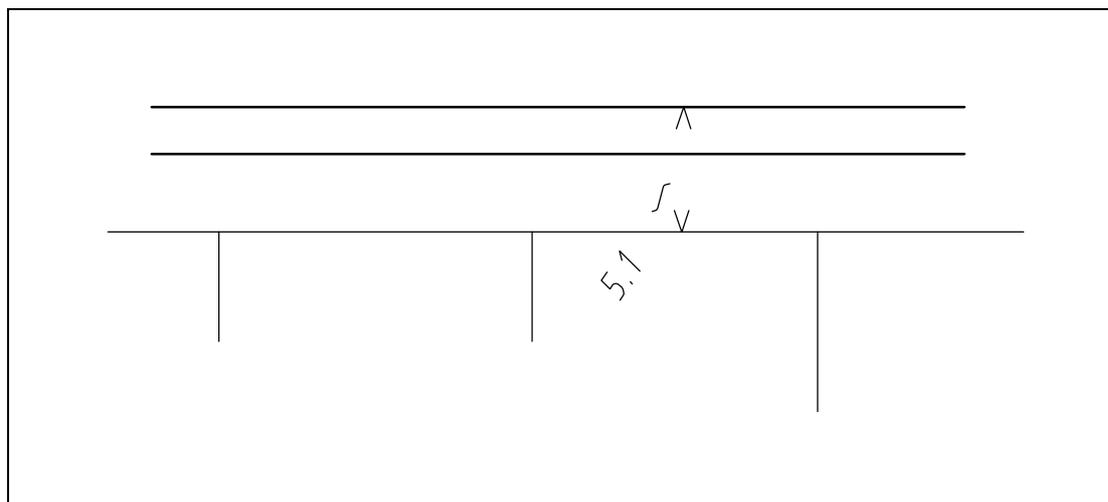


Figure 5-33 Mains offset arrows

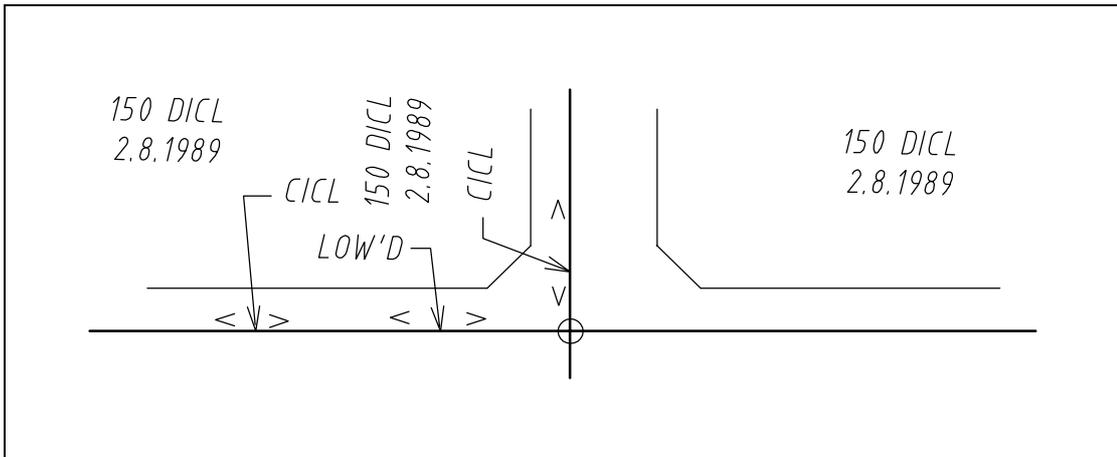


Figure 5-34 Mains offset arrows

The arrowheads must appear between the cadastre and the pipe, wherever possible. They must be placed closer to the pipe than the cadastre as shown in Figure 5-35.

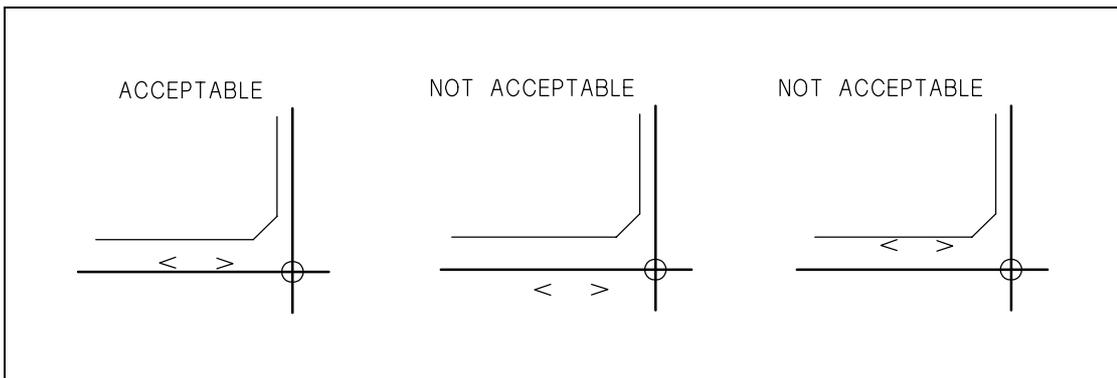


Figure 5-35 Mains offset arrow placement

By-Passes

Bypasses are usually 100mm or 150mm in diameter. For graphical representation of Bypasses refer to “Nodes on bypasses” in Chapter 4.

Offtakes

For graphical representation of Offtakes refer to “Nodes on offtakes” in Chapter 4.

Pipes in conduits

Pipes in conduits are represented in graphics, but the conduits have no database linkage.

If a pipe is encased in a conduit, place lines parallel to both sides of the pipe section, at a suitable offset, so that there is a visible gap between conduit lines and pipe when plotted at a 1:2500 scale.

Figure 5-36 shows a graphical representation of a pipe in a conduit.

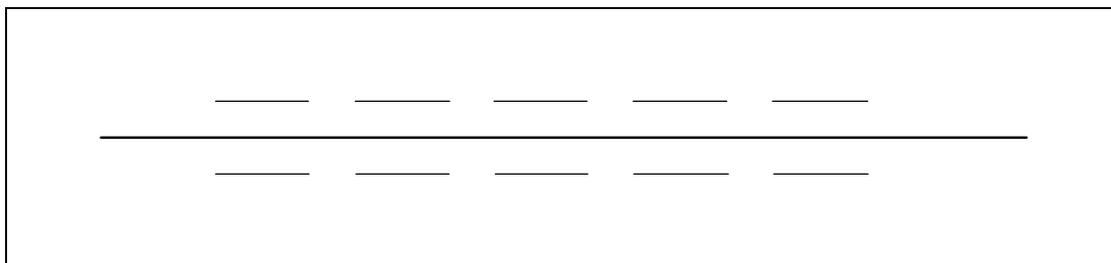


Figure 5-36 Pipe in a conduit

Property Connections

Property connections are pipes which connect the water meter within a privately owned property to the Water Company's water main.

They are commonly called "Tapping Arms".

The property connections do not have database linkages.

Property connections must be graphically represented so that:

- ◆ they intersect exactly with the water main that owns them,
- ◆ each connection line must be one graphical element,
- ◆ all bends are shown.

Property Connection Ties

Property connection tie notation and dimension must be placed. All ties must be graphically displayed to two decimal places. If necessary, zeros must be added to satisfy this requirement. For example:

- ◆ TIE 8.2 is displayed as TIE 8.20

The text/dimension should be placed parallel to the dimension being defined. This means that the notation will be at a right angle to the title boundary or projection line to which the dimension is being measured.

Such placement may not always be practical, therefore the tie text/dimension may be placed parallel to the water main on which the connection is located. Variations in the placement of the text/dimensions are shown in Figure 5-37.

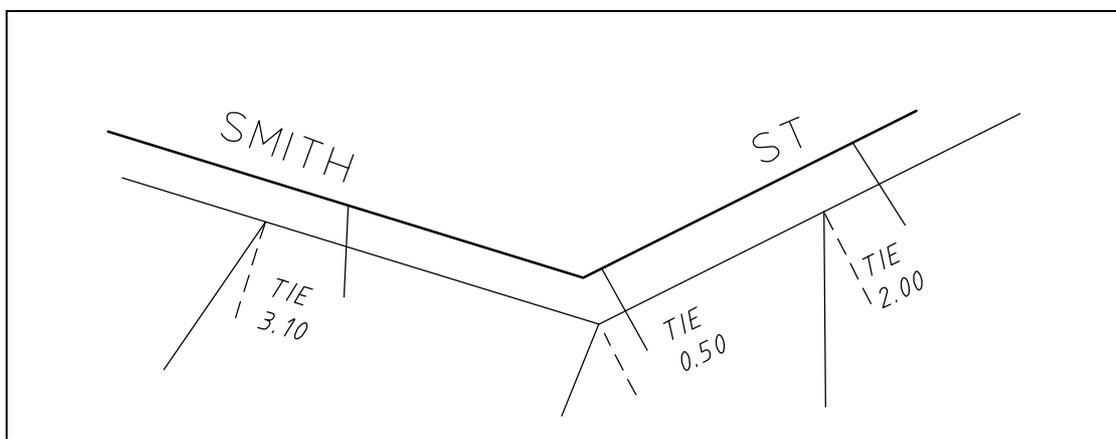


Figure 5-37 Variations in placement of property connection ties

Where possible, property connection tie should be placed at a constant offset from the title boundary, for the length of successive water pipe sections.

Ties must be placed between the connection and the appropriate title boundary (or projection line) where space permits, as shown in Figure 5-38.

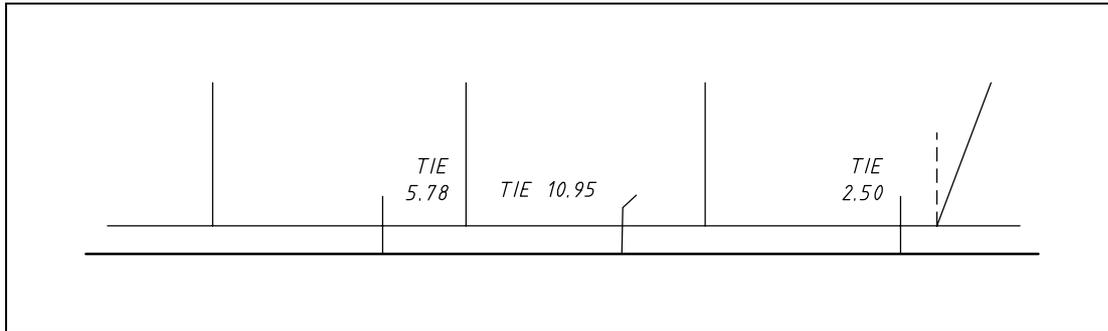


Figure 5-38 Placement of property connection

If space does not permit a tie to be placed between the connection appropriate title boundary or projection line, it should be placed adjacent to, but clear of the end of the connection as shown in Figure 5-39.

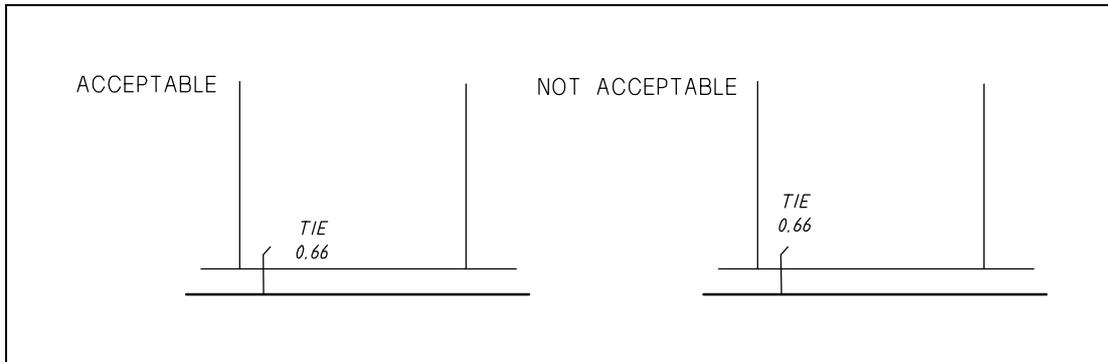


Figure 5-39 Placement of property connection ties

Ties must always be placed within the property of the branch to which they refer, as shown in Figure 5-40.

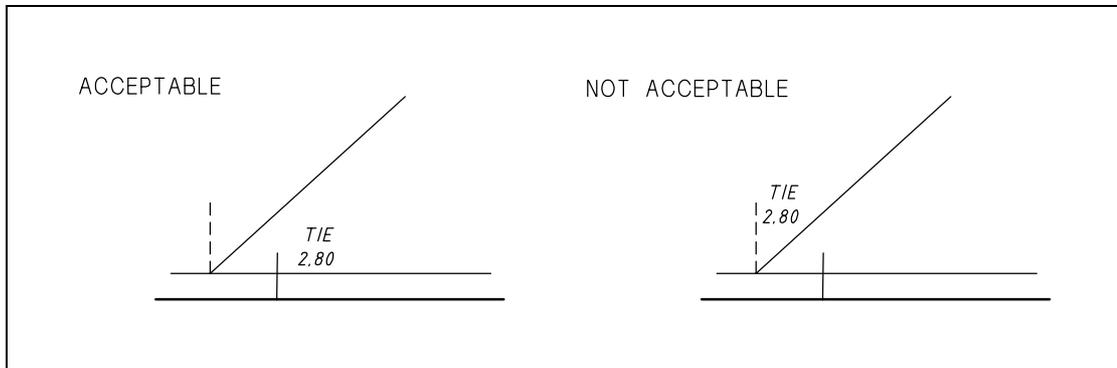


Figure 5-40 Placement of property connection ties

If a connection has several ties associated with it, place all ties.

Dry Tapping Text

Where it has been determined that the method of connecting water supply services to mains is by dry tapping then the letters for dry tapping text, DT, must be placed 2.5 metres from the front of the property and located centrally. Refer Figure 5-41.

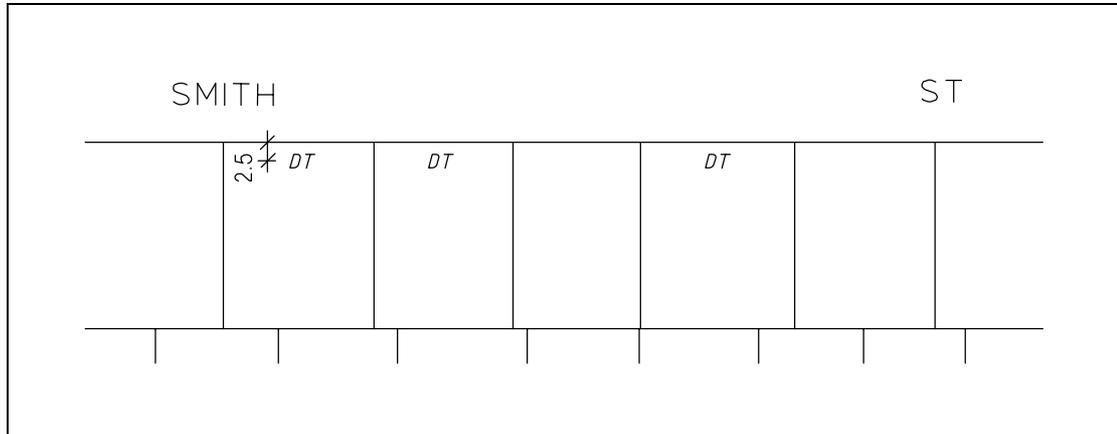


Figure 5-41 Dry Tapping Text

Scour pipes

Scour pipes and their fittings are represented in graphics, but have no database linkage. Text associated with these scours should be placed alongside and parallel to the pipe scour as shown in Figure 5-42.

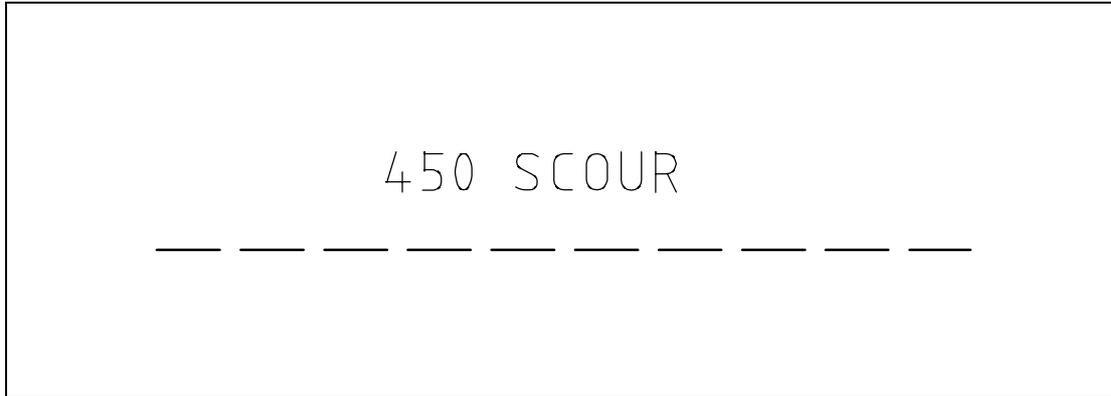


Figure 5-42 Scour pipe

Scour pipes should be placed in graphics in a similar manner to water pipes.

Valves placed on scour pipes at construction must be replaced graphically with a scour symbol.

Graphical flags

Graphical flags must be used by consultants to graphically indicate unresolved and edgematching problems.

Problem graphical flag

If a problem cannot be resolved after liaising with the Water Company officer, a “P” graphical flag must be placed in the graphics file in the vicinity of the problem. Problem graphical flags should be placed once for each problem identified.

Edgematching graphical flags

A graphical flag containing the letter “E” must be placed once at each location where additional work is required by the Water Company. Such cases include:

- ◆ where edgematching to existing data requires the moving or modifying of data already digitised by the Water Company.
- ◆ If the new information does not match the Water Company data by more than 0.5 m.

Note: In the above case and new information does not match the Water Company data by less than 0.5 m, then the new data is to be modified to the Water Company data.

Graphical flags should be supplied as cells; they do not appear in the cell library. Figure 5-43 illustrates how a “problem” graphical flag could appear.

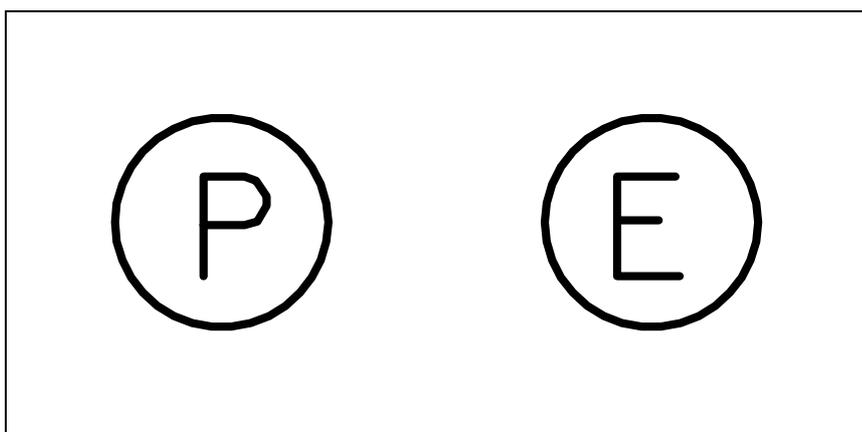


Figure 5-43 Problem and edge matching graphical flags

Documentation to be supplied

Consultants must supply information to the Water Company about each flag placed detailing:

- ◆ Municipality name,
- ◆ The graphical file number,
- ◆ Approximate AMG co-ordinates,
- ◆ *A clear, accurate and precise description* of the problem,
- ◆ Numbered attachments (for example, copies of field notes and/or plans to clarify the nature of the problem)

Other authority's water mains

For each pipe section that does not belong to the Water Company:

- ◆ Do not input pipes, fittings or associated text
- ◆ Documentation is to be forwarded to the Water Company relating to the details of these mains and their location.
- ◆ Place the following label -

OTHER AUTHORITY WATER MAIN

either along the alignment of the main pipe or across the general area covered by the mains.

If the other authority mains connect to one of the Water Company's pipe sections, place a node at the intersection.

Abandoned Water Mains

Where it has been determined that water pipes, etc. have been abandoned, the consultant must supply to the Water Company a hard copy plan detailing the extent of abandonment.

Aqueducts

The size, shape and material of aqueducts must be determined by taking a cross-section of the aqueduct.

Graphically place a water pipe between the nodes in the usual manner. The pipe size should be given as the larger of the two diameters obtained from the cross-section. For example, if the cross-section of the aqueduct is 450 mm by 375 mm, the pipe size would be 450 mm.

The pipe is then established as the centre of the aqueduct and the banks of the aqueducts should be placed.

Note that:

- ◆ aqueduct shape - derived from Code List 39,
- ◆ aqueduct size - derived from Code List 41,
- ◆ Aqueduct names are not database linked and must be input in graphics as capitals.

Trunk services (private mains)

Trunk services must be input in graphics and are not linked to the database. They are placed in the usual manner for pipes using lines and arcs. They have their own particular symbologies as set out in the graphics specifications.

Crossovers, offset and pipe details are to be addressed in the usual manner for pipes as described earlier in this section

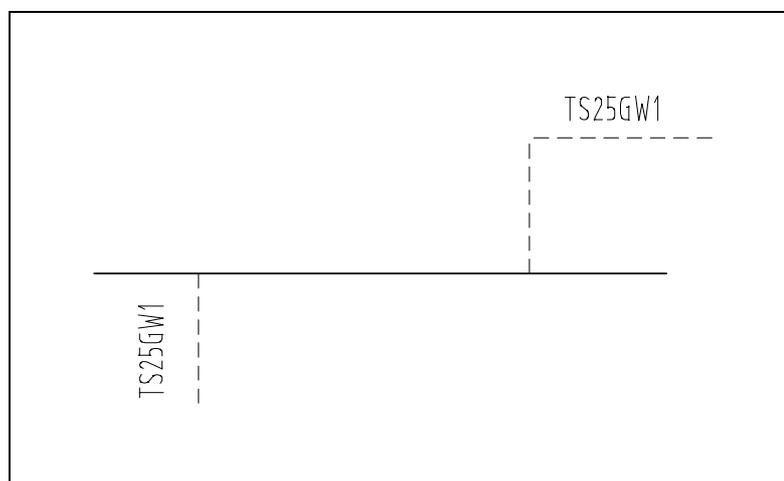


Figure 5-44 Trunk services

Abandoned Water Mains

For each existing water pipe section that has been abandoned the consultant must supply a field note in hard copy format (when delivering the completed digital data), indicating the extent that the existing water main has been abandoned.

Depth

For those purposes depth is defined as the top of pipe subtracted from the surface level. (refer to Survey Manual)

The depth text should be placed inside the cadastre, not in the road.

Text is to be displayed graphically to two decimal places with the letter capital D appearing immediately after the integers.

The depth text must be placed graphically at or close to intersection of pipes, mid points of curves, significant bends or changes of vertical bends and at least once per pipe section where there is variation by more than 0.2 metre. Refer to Figure 5-45

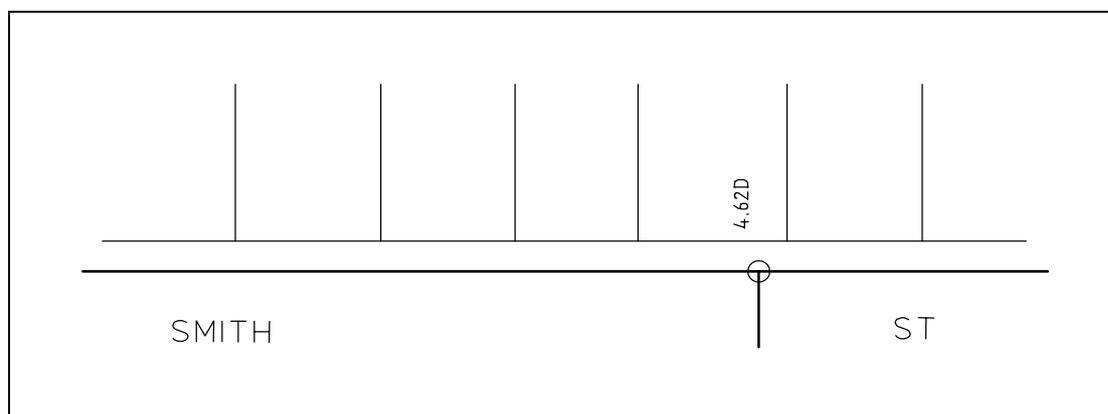


Figure 5-45 Depth of water main

This chapter describes the requirement for the graphical entry of valves.

The valve symbols do have a database linkage whereas the numbers do not.

Valves sizes are the same as the internal pipe size.

Valves fall into the following categories unless otherwise determined:

- ◆ Valves that are sized between 80 mm and 450 mm inclusive are sluice valves,
- ◆ Valves that are greater than 450 mm are butterfly valves,
- ◆ Valves on pipes less than 80 mm are gate valves.

Air Valves

There are three types of air valves:

- ◆ Type A rises above the ground from the side of the main,
- ◆ Type B is used in roads and is flush with the road surface,
- ◆ Type AB rises above the ground from the top of the main.

Ferrules

Ferrules must be placed as ferrules and numbered as valves. Ferrules are assumed to be less than 80 mm diameter.

Shut valves

Shut valves are determined by the Water Company and relate to valves that isolate water supply distribution zones.

The shut valve symbol is only to be placed by the Water Company.

Valves and ferrules at the end of mains and in courts should be considered shut for database entry, however, they do not have the circle placed over the valves symbol. The corresponding entry in the database for that particular valve should show that valve as 100% shut (code list entry = 6).

Other valves

Other types of valves including reflux, needle, altitude and pressure valves are less common but must be addressed in the same manner using the relevant cell and entry from the code lists.

Valve number

These numbers are to be supplied, upon request, by the Water Company. Valve numbers must be unique within each municipality, but do not have to be sequential. All text associated with valves must have the same symbology and be placed on the same level as the valve number.

Five figure valve numbers should be scaled down to 80% of the original size.

Valve numbers should be placed at an angle of 45 degrees, as shown in Figure 6-1. Numbers should be placed in the road alignment wherever possible.

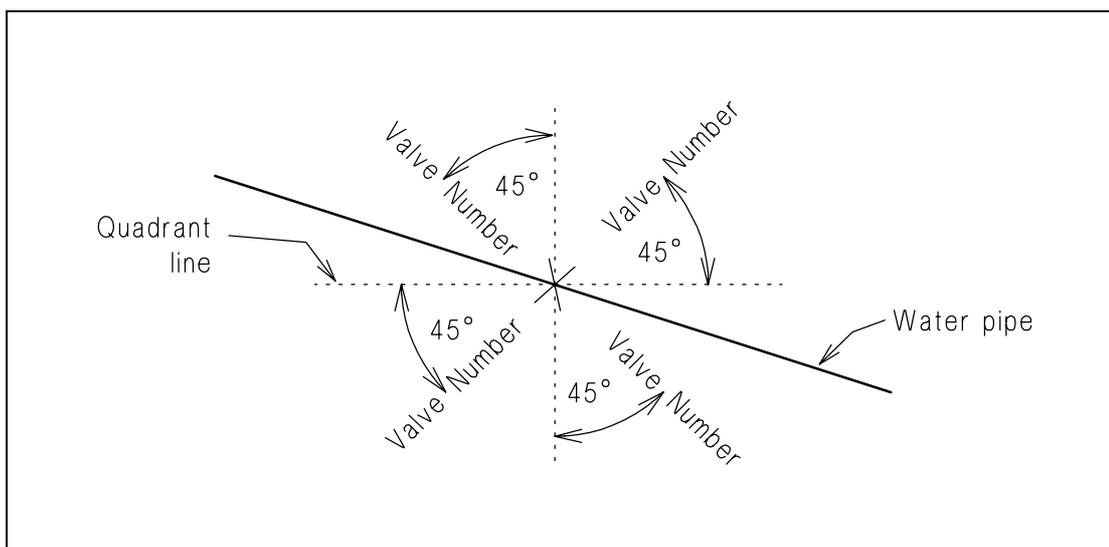


Figure 6-1 Placement of valve number

Valve controlled hydrants are not valves and must not be numbered.

Valve placement

The following rules apply when placing valves:

- ◆ Valves must be placed in graphics in the position as determined by field survey,
- ◆ If a valve is between two reducers and the distance is less than a standard road width then:-
 - the valve must be entered on the same level as the pipe on which it is placed,
- ◆ If a valve is between a reducer and a node and the distance between the node and the reducer is less than three metres then:-
 - the valve must be entered on the same level as the pipe on which it is placed,
- ◆ If a water main is insulated, the valve is assumed not to be insulated, unless otherwise determined.

Valves in courts

Valves on water pipes in courts are shown in a variety of ways.

Figure 6-3 illustrates the requirements for placing valves and ferrules in courts. The right hand column shows typical as constructed court layouts. The left hand column shows the standard for graphical representation.

The valve at the end of court in CASE 1 is to be shown as a ferrule. The same applies if a washout is placed at the end of the court and the pipe size is less than 80 mm.

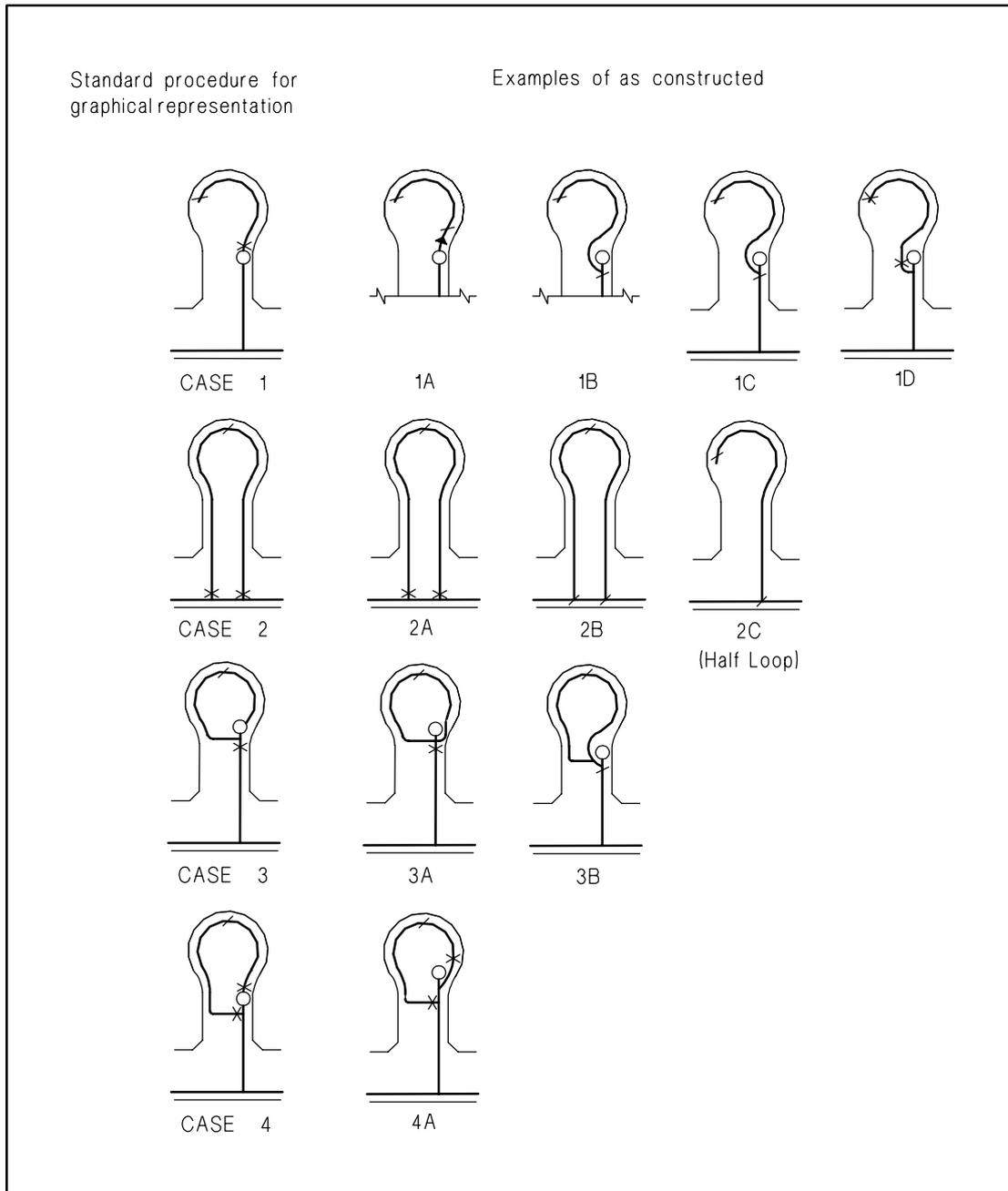


Figure 6-3 Representation of valves in courts

Note: Case 2C (half loop) is to be graphically shown as it is in the above diagram and not as case 2 - this is an exception.

This chapter covers the requirements for the graphical entry of hydrants, fireplugs and washouts. It is to be noted that below ground hydrants have a graphical symbol the same as a fire plug but a definite database description of being a below ground hydrant.

Ownership of hydrants

Hydrants are either owned by the Water Company, by the municipal council or shared between both.

Ownership should be established at the design stage and therefore should be available from the design engineers.

Hydrants must be placed in the graphics file with the correct symbols as set out in the symbology tables in **Chapter 3** and their database attributes recorded in the ASCII files as set out in the database tables in **Chapter 2**.

Placement of hydrants

Hydrants must be positioned as determined by field survey.

Hydrants must be placed on the water main as shown in Figure 7-1. Fire plug symbols have the arrow shape at 90 degrees to the pipe and the hydrant symbols have the filled x running parallel to the pipe.

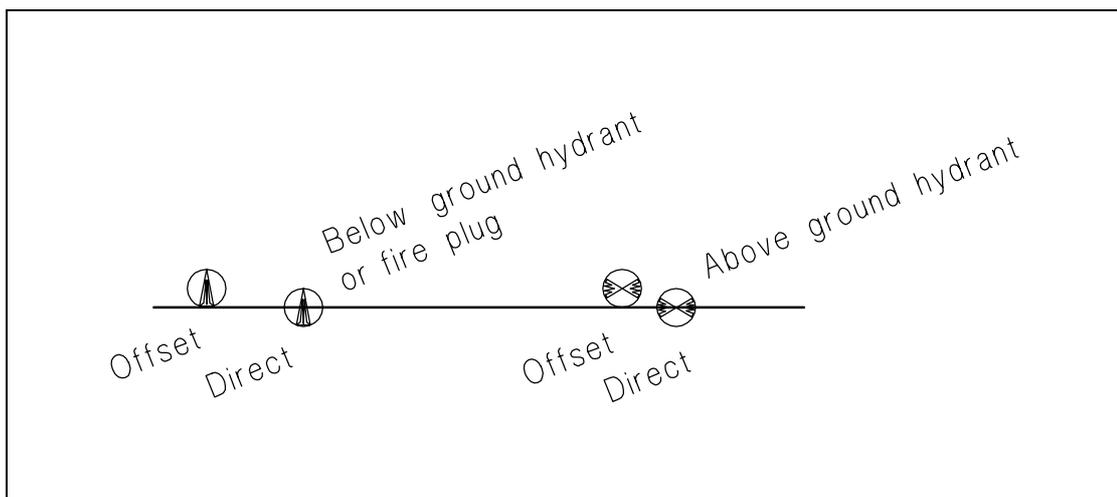


Figure 7-1 Hydrant orientation

Valved offset hydrants do not require a node at their intersection with the main. The valve is not numbered.

Hydrants with fittings

Hydrants, fireplugs or washouts on mains which also have valves and or other fittings must be entered as a single pipe section, not as a pipe section with a valve controlled hydrant cell attached. The valves must be numbered as described in **Chapter 6 - Valves**.

This is shown in Figure 7-2.

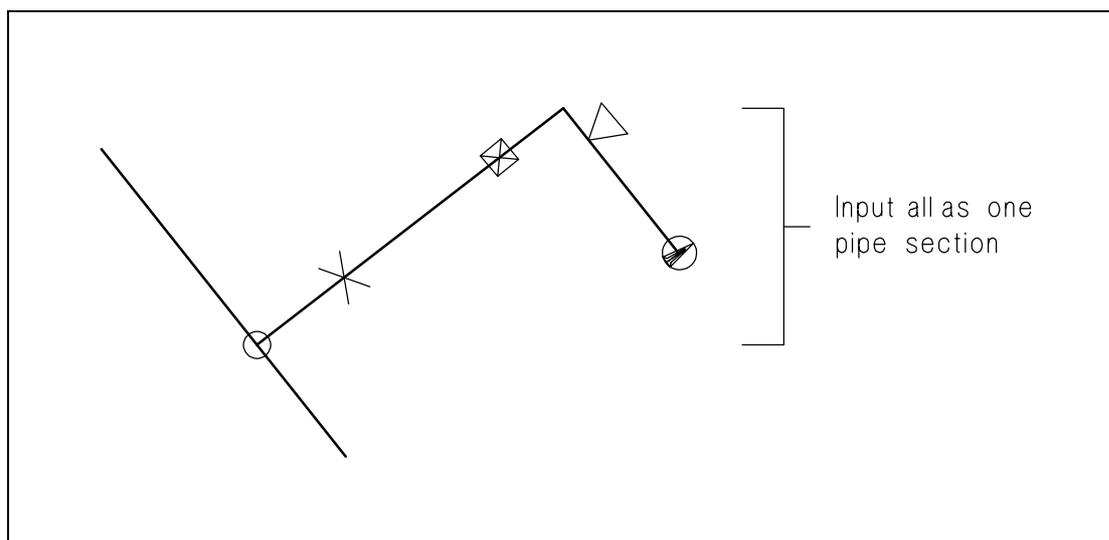


Figure 7-2 Hydrant with fittings

Offset hydrants

If the field survey determines that the hydrant is offset, it must be shown as offset and not as online. This is shown in Figure 7-3.

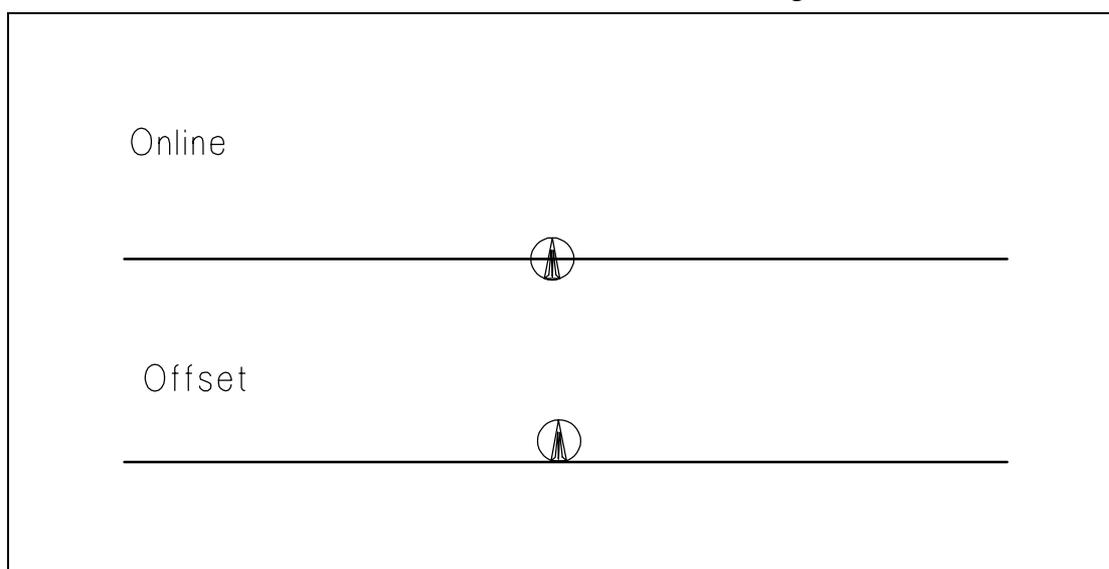


Figure 7-3 Offset hydrant

Valve controlled hydrants across mains

Figure 7-4 shows the correct representation of valve controlled hydrants on and across mains.

When a valve controlled hydrant is to be placed in graphics, then you must use the appropriate cell. The valve included with the cell does not have a separate database link and is not numbered.

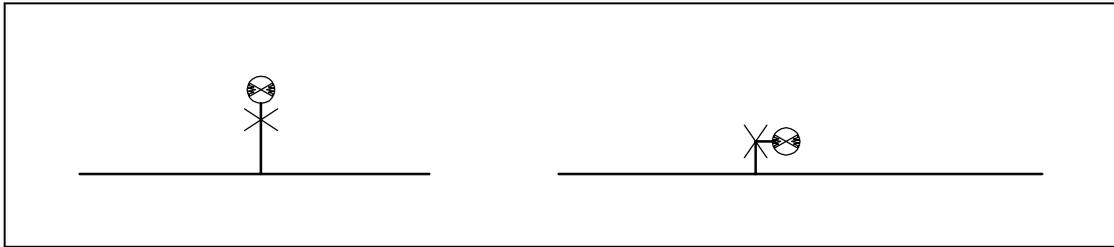


Figure 7-4 Valve controlled hydrants

Valve and hydrant text

Text is normally placed when clarification for the fittings is required or alterations have occurred.

A single or double line of text can be used for a hydrant. For example:

V RELOC 29.5.1985

or

V RELOC
29.5.1985

If text refers to both a valve and a hydrant, the same symbology must be used, with the exception of color. In these cases, use the color of the first fitting.

For example, for the text V & HYD ALT D 1983, use valve color (232)

Fireplug and washout symbol

A fire plug usually occurs between the ends of a pipe, while a washout occurs at the end of a pipe.

A washout is placed at the end of a main to enable the Water Company to flush the main.

The cell library does not include a cell for a washout. If a washout located on a pipe of less than 80 mm a ferrule is to be placed (closed status). If a washout is located on a pipe 80 mm or greater a fireplug is to be placed. The database must indicate a washout.

If the fire plug is owned by a council it must be placed as a fireplug in the database and not as a washout.

Below Ground hydrants

As from 1st January 1992, the Water Company implemented the change from above to below ground hydrants.

For graphical representation purposes, this hydrant is shown as a fireplug symbol.

There is a database value to differentiate between above or below ground hydrants and this must be recorded in the ASCII database file. Refer to Code Set 206.

This chapter describes the requirements for the graphical entry of water items not partitioned in the database. This includes:

- ◆ reducers
- ◆ blank ends
- ◆ strainers
- ◆ swab points
- ◆ chlorination points
- ◆ scours
- ◆ pump points
- ◆ manholes

These fittings must be positioned as determined by field survey. However, some variation of positioning can occur to ensure that all symbols are placed with regard to cartographic excellence.

Reducers

The reducer symbol must be placed from the centre of the triangle, as shown in Figure 8-1.

Reducers are always owned graphically and database by the larger diameter pipe.

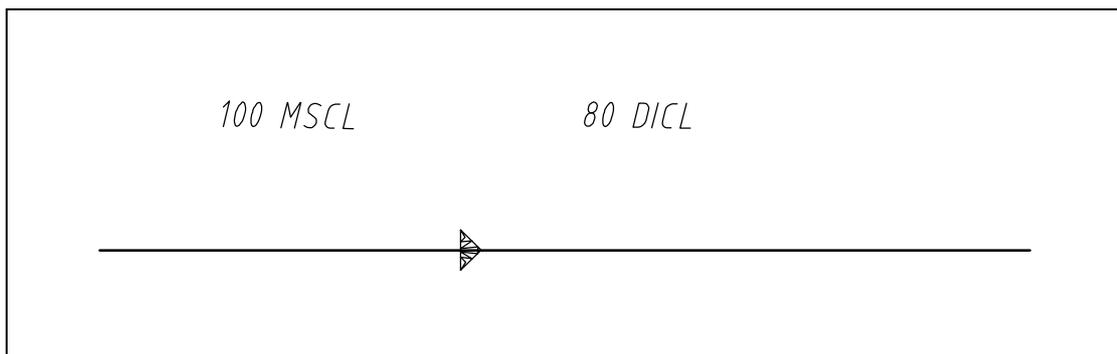


Figure 8-1 Orientation of reducers

Blank ends

Blank ends are usually placed for stub pipes or when a pipe extends beyond a pipe intersection. Any associated text should be placed, within the cadastre, where possible. This is shown in Figure 8-2.

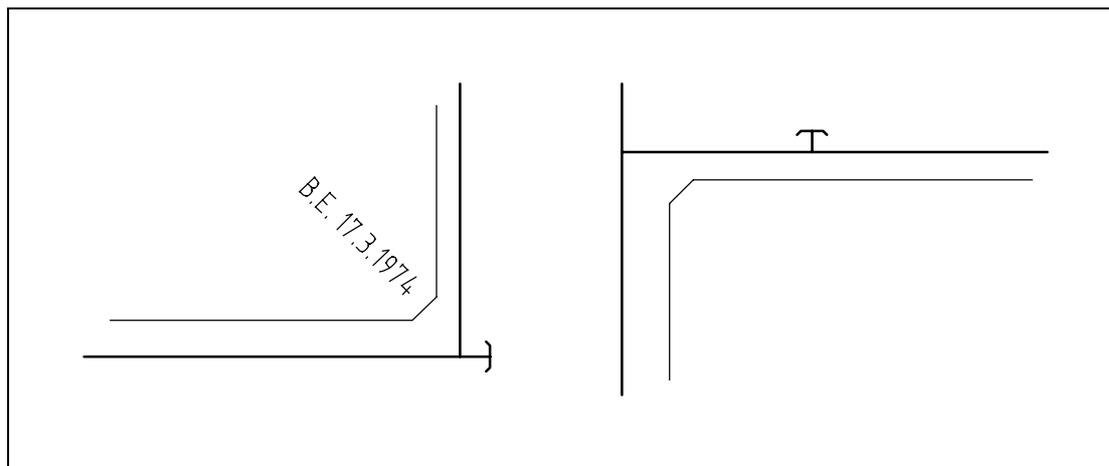


Figure 8-2 Blank ends

Strainers, swabbing points, chlorination points, scours, pump points and manholes

Strainers, swabbing points, chlorination points, scours, pump points and manholes must be positioned as identified from field survey.

Chlorination points are usually located at the end of reticulation mains. Manholes are usually located on large mains.

attribute

A database field (column) under which details are stored about a particular entity. An attribute could be seen as information about an entity (e.g. Material, size, etc.)

blank end

A short pipe with a welded blank plate attached to a water main which allows for future extensions.

block

A combination of elements which form a standard DXF graphical symbol for the representation of a feature. Blocks are able to be manipulated as a single element. These are the same as cells.

cell

A combination of elements which form a standard MicroStation graphical symbol for the representation of a feature. Cells are able to be manipulated as a single element.

code list

A list of numbered item descriptions which describe particular attribute values in standard terminology. Code list entry numbers record water supply item attributes in a relational database.

database file

An ASCII format file containing the database records of the attributes.

database schedule

A listing of all entities and associated attributes for which the Water Company requires valid database records. The schedule includes details of formats, default values and user notes for each attribute.

default value

A database entry to be input when a value cannot be determined.

edgematching

The process of joining new graphical information with that of the Water Company's existing graphical data.

electrolysis point

Features on the water supply system which prevent corrosion by stray electric currents generated by the movement of water through the main.

element

An individual graphical item. For example, a line, circle or arc.

entity

A database table consisting of attributes (columns) and occurrences (rows). An entity is an object (eg. pipe, valve, node, etc.)

ferrule

A fitting placed where a service connection draws water from a reticulation water main.

fire plug

A fitting on the water supply system to allow the fire department access to the system or for flushing the water main.

FIS

"Facilities Information System". This is the name given to the Water Company's computer system which stores their assets in graphical and database form.

graphic file

Microstation .DGN or .DXF format file containing the digital water supply data.

hydrant

A fitting on the water supply system to allow the fire department access to the system or for flushing the water main.

level structure

A listing of the 63 MicroStation levels to which all items must be assigned in graphics files.

manhole

A fitting on large water mains that allows access to or inspection of the water main.

municipal index file

Graphics file showing the geographic division of and numbering of municipalities. The boundary lines define the placement of graphics data in each digital file.

node

Conveniently placed points used to break up the water pipe system into pipe sections. Nodes are not a physical feature of the water supply system - they exist in the graphics and database only.

occurrence

A database field (row) which records an entities attribute.

pipe id

The section number of a water pipe.

reducer

A fitting used to connect pipes of varying diameters with the minimum loss of pressure.

water pipe section

A length of water pipe between two nodes.

symbol

See *cell or block*.

symbology

The specification describing the way in which elements must appear in the graphic design files. Symbology defines the element class, element type, level, color, weight, line style, text criteria (font, height, width, justification) and cell requirements for each graphics item.

valve

A fitting on a water main that controls the rate and direction of water flow. Also used to isolate water mains for repair.

Appendices

Appendix A

Supply of Digital Information form (blank)

See next page

Appendix A

Supply of Digital Information

Supplied to :

Company Name :

Name of Project:

Melways description:XY co-ords

Date requested:

Date required:

Information requested:	Yes	No	<i>(Please Tick required Box <input checked="" type="checkbox"/>)</i>
FIS file number	<input type="checkbox"/>	<input type="checkbox"/>	
Digital Mapbase	<input type="checkbox"/>	<input type="checkbox"/>	
Digital Sewer	<input type="checkbox"/>	<input type="checkbox"/>	
Access Point numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Property Service numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Field Book & Page numbers	<input type="checkbox"/>	<input type="checkbox"/>	<i>** Only required if non-digital type of job</i>
Treatment Plant	<input type="checkbox"/>	<input type="checkbox"/>	
Digital Water	<input type="checkbox"/>	<input type="checkbox"/>	
Valve numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Node numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Street Name Code Numbers	<input type="checkbox"/>	<input type="checkbox"/>	

NOTE: *Please supply a copy of the design plan to assist in issuing the appropriate number of Access Point numbers and Node and Valve numbers.*

Format requested for digital information:

DGN or **DXF** *(strike out one not applicable)*

Information Supplied:	Yes	No	<i>(for use by the Water Company)</i>
FIS file number	<input type="checkbox"/>	<input type="checkbox"/>
Digital Mapbase	<input type="checkbox"/>	<input type="checkbox"/>
Digital Sewer	<input type="checkbox"/>	<input type="checkbox"/>
Access Point numbers	<input type="checkbox"/>	<input type="checkbox"/>
Property Service numbers	<input type="checkbox"/>	<input type="checkbox"/>
Field Book & Page numbers	<input type="checkbox"/>	<input type="checkbox"/>
Treatment Plant	<input type="checkbox"/>	<input type="checkbox"/>
Digital Water	<input type="checkbox"/>	<input type="checkbox"/>
Valve numbers	<input type="checkbox"/>	<input type="checkbox"/>
Node numbers	<input type="checkbox"/>	<input type="checkbox"/>
Street Name Code Numbers	<input type="checkbox"/>	<input type="checkbox"/>

Information Supplied by:

Date supplied :

NOTE: The digital information supplied remains the property of the Water Company. It is to be used for edge matching purposes relating to the supply of data back to the Water Company.

Linked MicroStation Database Print outs

Entity 202 Valves

.99	.90	.91	.11	.12	.13	.15	.19	.23
132	201	274	25	24	1	132	1	6
133	201	259	25	24	1	133	1	6
134	201	265	25	24	1	134	1	6
135	201	248	25	21	1	135	1	6
136	201	249	25	36	1	136	1	6
137	201	248	25	21	1	137	1	6
138	201	290	25	24	1	138	1	6
139	201	281	25	19	1	139	1	6
140	201	283	25	19	1	140	1	6
141	201	309	25	21	1	141	1	6

Table 1 Linked DGN format ASCII database file - Entity 202

Appendix B

Sample "Linked" Water .dbf ASCII database files

NOTE: These tables are sample .dbf files to be used as a guide when developing ASCII files

For the correct field sizes and justifications please refer to Database Schedule 1 in Chapter two.

The grey boxes are there for information only and would not normally appear in a .dbf ASCII file supplied to the Water Company.

Sample 225.dbf file (Water Supply Nodes) :

.99	.10	.12	.14	.25
1	9	417	335637.943	5809339.455
2	9	418	335606.852	5809343.206
3	9	419	335612.054	5809428.875
4	9	420	335577.574	5809433.159
5	9	421	335567.713	5809352.234
6	9	424	335493.499	5809358.584

Sample 202.dbf file (Water Supply Valves) :

.99	.90	.91	.11	.12	.13	.15	.19	.23
1	201							
2	201	4	13	16	1	515	2	6
3	201	4	13	16	1	516	2	6
4	201	6	13	16	1	517	2	6
5	201	6	13	16	1	518	2	6
6	201	8	25	21	1	519	2	6

Sample 201.dbf file (Water Supply Pipes) :

.99	.90	.91	.11	.13	.20	.21	.22	.24	.25	.27	.29	.37	.38	.39	.41
1	225	1	21	37	39	7	180	0	2767	59	10	31	1	6	418
2	225	2	21	37	39	7	180	0	2767	59	8	91	1	6	419
3	225	2	21	37	39	7	180	0	2767	59	10	44	2	6	421
4	225	3	17	39	39	7	180	0	2767	59	8	9	1	6	419
5	225	3	21	37	35	7	180	0	2767	59	6	35	2	6	420
6	225	4	17	39	39	7	180	0	2767	59	6	16	1	6	420
7	225	4	21	37	35	7	180	0	2767	59	12	82	2	6	421
8	225	5	21	37	35	7	180	0	2767	59	12	75	1	6	424

Sample 205.dbf file (Water Supply Hydrants) :

.99	.90	.91	.10	.11	.12
1	201	7	18	8	36
2	201	8	18	6	36

Sample 211.dbf file (Water Supply Other Fittings) :

.99	.90	.91	.10	.15
1	201	3	6	6
2	201	5	20	6
3	201	8	25	6

Sample water.nod file (water supply nodes):

	A	B	C	D	E	F	G	H	I	J	K
1	291		530/230/0051	BOXH			08			6	
2	225		417	9			335637.943			5809339.455	
3	225		418	9			335606.852			5809343.206	
4	225		419	9			335612.054			5809428.875	
5	225		420	9			335577.574			5809433.159	
6	225		421	9			335567.713			5809352.234	
7	225		423	9			335493.499			5809358.584	

Sample water.pip file (water supply pipes):

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	
1	292		530/230/0051	BOXH			08			8																												
2	201		417	418			1		21	37	39	7			180					2767	59		10			31	6			335637.943	5809339.455		335606.852	5809343.206	335612.054	5809428.875		
3	201		418	419			1		21	37	39	7			180					2767	59		8			91	6			335606.852	5809343.206	335612.054	5809428.875					
4	201		418	421			2		21	37	39	7			180					2767	59		10			44	6			335606.852	5809343.206	335612.054	5809428.875	335567.713	5809352.234			
5	201		419	419			1		17	39	39	7			180					2767	59		8			9	6			335612.054	5809428.875	335613.730	5809437.900					
6	201		419	420			2		21	37	35	7			180					2767	59		6			35	6			335612.054	5809438.875	335577.574	5809435.309					
7	201		420	420			1		17	39	39	7			180					2767	59		6			16	6			335577.574	5809433.159	335561.835	5809435.309					
8	201		420	421			2		21	37	35	7			180					2767	59		12			62	6			335577.574	5809433.159	335567.713	5809352.234					
9	201		421	423			1		21	37	35	7			180					2767	59		12			75	6			335567.713	5809352.234	335493.499	5809358.584					

Sample water.fit file (water supply fittings):

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	
1	293		530/230/0051	BOXH			08			6	1			0										
2	202		417	418			1	25		21	1				514	2		6			335633.884	5809339.945		
3	202		419	419			1	13		16	1				515	2		6			335612.163	5809429.753		
4	202		419	419			1	13		16	1				516	2		6			335613.730	5809437.900		
5	202		420	420			1	13		16	1				517	2		6			335575.910	5809433.193		
6	202		420	420			1	13		16	1				518	2		6			335561.835	5809435.309		
7	202		421	423			1	25		21	1				519	2		6			335566.890	5809352.365		
8	205		420	421			2	18		8	36				335571.654		5809384.253							

Note: The above tables are a sample copy of the Water Supply ASCII files referred to in Schedule 2 of Chapter 2.

The grey areas across the top (A,B,C etc) and down the left hand side (1,2,3 etc) have been provided as a guide for spread sheet input and are not to be included in any ASCII files provided by the Consultant.

For the correct formats refer to Database Schedule 2 of Chapter 2.

If the ASCII file is created in a "Spreadsheet" it must be supplied to the Water Company as a "straight ASCII text" file.

