

PART B
CABWATER
DESIGN AND DEVELOPMENT MANUAL
FOR WATER AND SEWERAGE
INFRASTRUCTURE

CABOOLTURE SHIRE COUNCIL

INDEX

1	INTRODUCTION.....	7
1.1	DEFINITIONS.....	7
1.2	PURPOSE & STRUCTURE	8
1.3	SCOPE	8
1.4	GENERAL	8
1.5	DEDICATION OF LAND, EASEMENTS & PERMITS TO ENTER.....	9
1.6	EXTENT OF INFRASTRUCTURE	11
2	ADMINISTRATION	11
2.1	APPLICATIONS	11
2.2	SUMMARY OF THE APPROVAL & REALISATION PROCESS.....	12
2.3	CALCULATIONS TO BE SUBMITTED	13
2.3.1	WATER SUPPLY	13
2.3.2	SEWERAGE	13
2.4	TESTS AND INSPECTIONS	14
2.4.1	AUDIT INSPECTIONS	14
2.4.2	PERFORMANCE TESTS.....	14
2.4.3	"ON MAINTENANCE" INSPECTION	15
2.4.4	MAINTENANCE & OPERATION DURING THE MAINTENANCE PERIOD	15
2.4.5	"OFF MAINTENANCE" INSPECTIONS	15
2.5	CONNECTIONS TO COUNCIL'S INFRASTRUCTURE.....	16
2.5.1	WATER SUPPLY	16
2.5.2	SEWERAGE	16
2.5.3	GENERAL	16
2.6	SUBMISSION OF "AS CONSTRUCTED" & ASSET MANAGEMENT INFORMATION	17
3	REALISATION OF INFRASTRUCTURE - ISSUES COMMON TO WATER & SEWERAGE.....	17
3.1	ESTIMATION OF THE EQUIVALENT POPULATION	17
3.2	WHOLE OF LIFE COSTS TO BE ASSESSED	17
3.3	ENVIRONMENTAL RISK ASSESSMENT.....	18
3.4	COMPATIBILITY WITH ADJACENT EXISTING & PLANNED INFRASTRUCTURE BY OTHERS.....	18
4	PLANNING, DESIGN AND CONSTRUCTION OF WATER SUPPLY INFRASTRUCTURE	18
4.1	GENERAL.....	18
4.2	BOOSTER PUMPS.....	18
4.3	LARGE METERS	18
4.4	RECYCLED WATER MAINS.....	18
5	PLANNING, DESIGN AND CONSTRUCTION OF SEWERAGE INFRASTRUCTURE	19
5.1	GENERAL.....	19
5.2	UNCONVENTIONAL INFRASTRUCTURE	19
5.3	DETERMINATION OF DESIGN FLOW PARAMETERS.....	19



5.4	MAXIMUM DEPTH	19
5.5	CONNECTIONS TO COMMERCIAL & INDUSTRIAL PREMISES	20
5.6	PRODUCTS AND MATERIALS	20
5.7	SEWAGE PUMPING SYSTEMS	20
5.7.1	BASIC DESIGN REQUIREMENTS	21
5.7.2	ELECTRICAL EQUIPMENT, CONTROLS AND TELEMTRY SYSTEM	23
5.7.3	ACCESS TRACKS	23
5.7.4	COVER LEVELS	23
APPENDIX 1	Addendum to WSA 03	24
1.5.2	Water Agency	25
2.1.1	EXTENDING/UPGRADING AN EXISTING WATER SUPPLY SYSTEM	25
2.2	DEMANDS	25
2.4	SYSTEM HYDRAULICS	26
2.4.3.2	Maximum Allowable Service Pressure	26
2.4.3.2	Pressure Variation Analysis	26
2.6	PUMPING STATIONS	26
2.6 (C)	Standby Arrangements:	26
2.7	SERVICE RESERVOIRS	26
3.2.2	MINIMUM PIPE SIZES	26
3.2.4	FIRE FLOWS	27
3.7.2	MINIMUM PIPE CLASS	27
3.8	PIPELINE MATERIALS	27
4.1.1	DESIGN TOLERANCES	27
4.3	LOCATION OF WATER MAINS	27
4.3.1	GENERAL	27
4.3.2	WATER MAINS IN ROAD RESERVES	28
4.3.3	WATER MAINS IN EASEMENTS	28
4.4	SHARED TRENCHING	28
4.7	CONNECTION OF NEW MAINS TO EXISTING MAINS	28
4.8.1	LAYOUT OF WATER MAINS	28
5.4.2	PIPE COVER	28
5.10	BULKHEADS AND TRENCHSTOPS	28
6.2.1.2	GATE VALVES	28
6.7	SWABBING POINTS	29
6.8.3	HYDRANT TYPES	29
6.8.7	HYDRANT SPACING	29
6.8.8.	HYDRANT LOCATION	29
7.3	RECORDING OF WORK-AS CONSTRUCTED INFORMATION	29
8	PRODUCTS AND MATERIALS OVERVIEW	29
8.4.1	PRODUCT STANDARDS	29
8.4.2	PURCHASE SPECIFICATIONS	30
12.1	AUTHORISED PRODUCTS AND MATERIALS	30
12.5.10	REPAIR OF BLEMISHES	30
15.2.3	BENDING PIPE	30
24	WORK AS-CONSTRUCTED DETAILS	30
APPENDIX 2	Addendum to WSA 02	32
2.2.3	CATCHMENT ANALYSIS	33
3.1	DESIGN FLOW ESTIMATION	33
4.2.3	Sewer Layout	33

4.2.5 EASEMENTS	33
4.3 HORIZONTAL ALIGNMENT OF SEWERS.....	33
4.3.1 GENERAL	33
4.3.2 ROADS, RESERVES AND OPEN SPACE	33
4.3.7 HORIZONTAL CURVES IN GRAVITY SEWERS	34
4.5.3 MINIMUM AIR SPACE FOR VENTILATION	34
4.5.7 MINIMUM GRADES FOR SELF-CLEANSING.....	34
4.6.2 LONGITUDINAL SECTIONS.....	34
4.6.3 MINIMUM COVER OVER SEWERS.....	34
4.6.5 MINIMUM DEPTH OF SEWER CONNECTION POINT.....	35
4.6.7 VERTICAL CURVES	35
5 PROPERTY CONNECTIONS	35
5.3 METHODS OF THE PROPERTY CONNECTION	35
5.4 MAXIMUM DEPTH OF PROPERTY CONNECTION.....	35
5.5.2 MULTIPLE OCCUPANCY LOTS.....	35
5.6.1 UNDEVELOPED LOTS	35
5.7 Y-PROPERTY CONNECTIONS.....	36
6.3.1 GENERAL	36
6.3.2 MAINTENANCE STRUCTURE SPACING-RETICULATION SEWERS	36
6.3.3 MAINTENANCE STRUCTURE SPACING-BRANCH AND TRUNK SEWERS	36
6.4 SPECIAL CONSIDERATIONS FOR LOCATION OF MAINTENANCE STRUCTURES.....	36
6.5 SPECIAL CONSIDERATIONS FOR CONNECTION OF NEW SEWERS TO EXISTING INFRASTRUCTURE.....	37
6.6.2 TYPES OF MH CONSTRUCTION	37
6.6.3 DESIGN PARAMETERS FOR MHS	37
6.6.5 DIAMETERS OF MHS.....	37
6.6.8 LADDERS, STEP IRONS AND LANDINGS.....	37
6.6.9 MH COVERS.....	38
6.7 MAINTENANCE SHAFTS (MS)	38
6.7.2 DESIGN PARAMETERS FOR MSs AND TMSs	38
7.5.1 VENTILATION – GENERAL.....	38
7.7 VORTEX INLETS AND WATER CUSHIONS	38
7.8 INVERTED SYPHONS	38
7.10 FLOW MEASURING DEVICES	38
7.11.1 General.....	38
8.2 PRODUCTS AND MATERIALS	38
8.7 ABOVE GROUND CROSSINGS	39
8.8 PIPE COVER	39
8.10 BULKHEADS AND TRENCHSTOPS.....	39
9 APPENDIX A ESTIMATION OF EQUIVALENT POPULATION (EP).....	39
10 APPENDIX B FLOW ESTIMATION FOR UNDEVELOPED AREAS	39
14.1 AUTHORISED PRODUCTS AND MATERIALS.....	39
14.5.10 REPAIR OF BLEMISHES.....	39
17.2.1 GENERAL	39
24 CONNECTION TO EXISTING SEWERS.....	39
26 WORK AS-CONSTRUCTED DETAILS.....	39
STANDARD DRAWINGS.....	40
APPENDIX 3 Addendum to WSA 04	41
1.2.2 PUMPING ALTERNATIVES.....	47
1.5.2 PLANNING RESPONSIBILITIES	47



2.7 STAGING	47
2.13 SECURITY	47
2.15 SUPPORTING SYSTEMS	47
2.17.1 COMMISSIONING PLAN	48
3.1 GENERAL	48
3.2 DESIGN TOLERANCES	48
3.7 EASEMENTS	48
3.11.6 DEVIATION OF PRESSURE MAINS AROUND STRUCTURES	48
4.2.4 MISCELLANEOUS ITEMS	48
5.1 PUMPING STATION DESIGN – INTRODUCTION	48
5.2.6 LANDSCAPING	48
5.4.7 WASHERS	49
5.6.1 OVERFLOW CONTAINMENT – GENERAL	49
6.2 HYDRAULIC DESIGN	49
6.3 PUMP EQUIPMENT	49
9.1.1 PUMP DISCHARGE PIPEWORK – GENERAL	50
9.2.1 ISOLATING VALVES	50
9.3.1 VALVE CHAMBER – GENERAL	50
9.3.3 DISMANTLING JOINTS	50
10.1.1 PRESSURE MAIN – GENERAL	50
10.2.2 ROAD RESERVES	50
10.2.6 EASEMENTS	51
10.11.2 DISCHARGE MHs	51
11.1.1 FOUNDATION DESIGN AND GROUNDWATER CONTROL	51
11.3.2 PRODUCTS AND MATERIALS	51
11.3.7 BULKHEADS AND TRENCH STOPS	51
12.1.1 SUPPORTING SERVICES – GENERAL	51
15.3 DRAFTING STANDARDS	51
36 ACCEPTANCE TESTING	52
 APPENDIX 4 Asset Management Requirements and Pro-forma	 53
 APPENDIX 5 – Large Water Meters	 69
 APPENDIX 6 - ON MAINTENANCE INSPECTION CHECKLIST	 72
 APPENDIX 7 Standard Drawings	 76

Historic Version
Caboolture ShirePlan

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

1 INTRODUCTION

1.1 DEFINITIONS

Note: *These definitions apply to this Manual only*

The Shire means Caboolture Shire.

Water Agency or Council means Caboolture Shire Council and the CabWater business unit of Caboolture Shire Council.

The Manual means this document, the Caboolture Shire Planning Scheme Policy Number 4 – Design & Development Manual Part B – Water & Sewerage Infrastructure including all the associated standard drawings.

Realisation of Infrastructure means any or all aspects of the planning, design, construction, supervision of construction, testing and commissioning of water supply and sewerage infrastructure.

Developer means the person whom has made a planning application requiring the Realisation of Infrastructure or utilisation of existing water supply and sewerage infrastructure.

The Codes means the Water Supply Code of Australia (WSA 03), Sewerage Code of Australia (WSA 02) and Sewage Pumping Station Code of Australia (WSA 04) published by the Water Services Association of Australia (WSAA) as amended from time to time.

Consulting Engineer means an Engineer whom is qualified in Queensland (This qualification is currently met by a person being a Registered Professional Engineer in Queensland [RPEQ]) and is competent to perform Realisation of Infrastructure.

Contractor means a private contractor approved by Council to construct water supply and sewerage infrastructure.

Superintendent has the same meaning given to it as in the Codes.

Developer Contributions Policy means Council's Planning Scheme Policy Number 22 "Water Supply and Sewerage Infrastructure Contributions" as amended from time to time or as superseded by a Planning Scheme Policy introduced to levy Infrastructure Charges Schedule for Water and Sewerage.

IPA means the Integrated Planning Act 1997.

IDAS means the Integrated Development Application system under IPA

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

1.2 PURPOSE & STRUCTURE

The purpose of the Manual is to support the Planning Scheme codes under the Caboolture ShirePlan by specifying acceptable technical standards of planning, design and construction for the provision of water and sewerage infrastructure in Caboolture Shire. In particular, the Manual has the following functions:

- To specify administrative matters that are not the subject of the Codes pertaining to operational works applications made in accordance with the IPA.
- To nominate the Codes as the general requirement to be met for the Realisation of Infrastructure.
- To specify those parameters, requirements and functions contained in the Codes that the Water Agency is to nominate.
- To specify technical requirements not covered by the Codes.
- To identify materials, solutions and methods permitted by the Codes that are not acceptable to the Council.
- To specify preferred options where the Codes provide for several methods to deal with a particular issue.

1.3 SCOPE

The Manual covers the planning, design and construction of all water and sewerage related infrastructure that is to be constructed by a Developer and handed to Council to operate. The Manual also covers certain service connection issues relating to development approvals.

1.4 GENERAL

- It is the Consulting Engineer's responsibility to ensure that the current version of the Manual is used. The Manual may be downloaded from Council's Website. <http://www.caboolture.qld.gov.au/>
- All aspects of the Realisation of Infrastructure shall comply with relevant Federal and State Government Legislation, Codes of Practice and policies and with Council's local laws, policies and guidelines.
- The provisions of the Manual shall take precedence over the provisions in the Codes.
- Only a Consulting Engineer and his, or her, agents and employees shall undertake realisation of Infrastructure.
- The Consulting Engineer shall liaise with Council staff to take note of the long-

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

term and any detailed planning of infrastructure carried out by Council for the area the infrastructure is to serve.

- Council shall approve all Operational Works applications relating to water supply and sewerage infrastructure prior to the commencement of any works.
- The level datum, to be used for all works shall be 'Australian Height Datum' AHD and the coordinate grid shall be GDA
- A Consulting Engineer shall certify all drawings and specifications submitted to Council for approval.
- Council shall not accept any infrastructure 'on-maintenance' until the items detailed in section 2.2 of the manual have been submitted.
- It is the Consulting Engineer's responsibility to ensure that all work is undertaken to Council's requirements. Responsibility for supervision, inspection, commissioning and remedial work rests with the Consulting Engineer.
- The connection to Council's infrastructure of new Infrastructure that has not been supervised to the Council's satisfaction will not be permitted.
- The Superintendent shall provide full-time supervision.
- Council approval of water supply and sewerage infrastructure designs does not relieve the Consulting Engineer of responsibility for the correctness of the design.
- Council shall make audit inspections to check that construction work conforms to Council's requirements. These inspections do not in any way release the Superintendent of his, or her, responsibilities.
- All pumping stations, electrical switchboards, access covers, compounds and associated equipment installed during construction, shall be padlocked when left unattended.
- The Contractor is responsible for the supply of all padlocks as specified by Council. These shall form part of the completed project materials component.

1.5 DEDICATION OF LAND, EASEMENTS & PERMITS TO ENTER

General infrastructure

Council requires all pumping stations, lift stations, storage tanks, reservoirs, water towers and the like to be located on land that is owned by or will be dedicated to Council¹. This land shall be provided to Council at no cost as freehold and zoned for water & sewerage purposes.

The size of land provided to Council shall be large enough to accommodate the infrastructure and its appurtenances, provide for maintenance and for the access and egress of vehicles large enough to maintain the infrastructure, and to satisfy

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

the requirements for development approval. In respect of sewage pumping stations without superstructures or emergency generators, the following minimum clearances shall apply between infrastructure and any lot or road reserve.

Bordering	Pumping Station	Lift Station	Appurtenances
Arterial and Collector Roads	5.0m	3.0m	2.0m
Access & Minor Collector Streets	3.0m	3.0m	2.0m
Property Boundaries	3.0m	2.0m	1.5m

Land dedicated to Council as park, open space or similar cannot be used for this purpose.

Land provided to Council for General Infrastructure that is not directly accessible from a public road that will exist at the time of Council taking over the infrastructure shall include a 5-metre wide access or in unusual circumstances and at Council's discretion a 5-metre wide access easement in favour of Council.

Pipelines

Council requires easements to be registered in its favour as follows when pipelines and appurtenances relating to pipelines are constructed in land other than in what is, or will become, a dedicated road reserve or property owned by Council:

- All water mains.
- All sewerage rising (pressure) mains.
- All sewers in properties of a commercial or industrial nature
- All sewers in residential properties with a lot size of less than 600 square metres.
- All sewers where the depth to invert is greater than 3 metres, except as stipulated below.
- All sewers in residential properties that are not on standard alignment, which is 1.5 metres from the front or rear boundary or 1 metre from a side boundary. Except that, regardless of the sewer depth, no easement is required if the sewer is laid anywhere within 3 metres of the front boundary for lots with a standard 6-metre building setback.

Easements shall be a minimum of 4 metres wide and located centrally over the pipeline, or in the case where a pipeline is laid on standard alignment near a property boundary, the boundary of the lot and one boundary of the easement may be coincident.

In the event that works are to be constructed through properties not under the control of the Developer, the Developer shall submit with the Operational Works Application:

- A 'Permit To Enter' letter, signed by each property owner through whose property the infrastructure is to be constructed, consenting to the construction of the works.

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

- Proof of the registration of easements in favour of Council as specified above.

1.6 EXTENT OF INFRASTRUCTURE

- Water mains shall be constructed along the full frontage of the development site.
- Where a “battle axe” lot is created, in addition to the water main, the Developer shall be responsible for constructing a 25mm internal diameter water service contained within a 50mm diameter conduit, along the full length of the “battle-axe handle”.
- Sewer mains shall be extended through the development site to the boundary of appropriately zoned upstream properties at a depth sufficient to service the upstream properties.
- If a reconfiguration of a lot results in water service or sewerage connection to any existing building being at any point outside the new lot containing the building then the Developer shall realign the services to be situated wholly within the new lot boundary. A separate plumbing works application will be required.

The extent of the infrastructure to be provided by the developer, the extent of infrastructure to be provided by Council from developer contributories and arrangements for offsetting infrastructure built for Council by the Developer against developer contributions are described in the Developer Contributions Policy.

2 ADMINISTRATION

2.1 APPLICATIONS

In accordance with the IPA, an Operational Works application must be made to Council for the construction of any water supply and sewerage infrastructure within the Shire that is to be handed to Council for operation unless Council or Council's agents are constructing the Infrastructure.

The Operational Works application shall include the following:

- Part A (Common Details of all applications) of the IDAS forms
- Part E (Planning Scheme Works) of the IDAS forms.
- Application fees as stated in Council's Fees and Charges schedule.
- Design plans, sections and detail drawings of sufficient detail to describe the works.
- Material and workmanship specifications.
- 'Permit To Enter' letters and easement documents relevant to the application.
- Calculations, performance curves and other information pertaining to the design of pipelines, pumping stations and any other relevant infrastructure.
- Where development is to be staged, a Masterplan layout shall be submitted with the first stage and updated with each subsequent submission.

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

The Operational Works application made in accordance with the IPA shall be assessed against the requirements of the Manual.

2.2 SUMMARY OF THE APPROVAL & REALISATION PROCESS

The steps in this process are:

- Pre-lodgement discussions (Optional)
- Lodgement of an operational works application
- Scrutiny of detailed designs by Council
- Information Request from Council if required
- Approval of the operational works application by Council
- Written notification by the Consulting Engineer a minimum of 7 days prior to the commencement of the construction of the proposed Contractor, the commencement date of construction, the Superintendent and the Superintendent's contact details
- Joint pre-start meeting with the Superintendent, Contractor and Council Inspector arranged in the period after notification and before construction starts
- Construction & Commissioning work
- Submission of the following documentation 7 days prior to the Joint "On Maintenance" inspection:
 - Consulting Engineer's Certificate of Completion (Refer Appendix G of Planning Scheme Policy Number 4 – Design & Development Manual Part A –Roadworks and Stormwater Drainage)
 - Maintenance Inspection Form (Refer Appendix 6)
 - Assets Register Information and Operational and Maintenance Manual; one master copy; one electronic copy in PDF format on CD; one electronic copy of Electrical Drawings on CD (Electrical & Mechanical Equipment only)
 - Testing Certificates in Originals form for Electrical SB, Flow Meters and pump lifting stainless steel chains.
 - Individual coloured CCTV report as prepared by the Consulting Engineer and video/CD (gravity sewers only), which shall include pipe gradient information.
 - "As Constructed" drawings on CD in ADAC format
 - Maintenance bond
- Joint "On Maintenance" inspection with the Superintendent, Contractor and Council Inspector, which shall not take place until the above documentation has been provided.
- Acceptance "On Maintenance" (12-month defects liability period)

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

- Final connection. Note that all connections to Council's water mains shall be carried out by Council at the Developer's cost
- Sealing of Plan of Survey, if applicable
- Submission of the following prior to the Joint "Off Maintenance" inspection: Individual coloured CCTV report as prepared by the Consulting Engineer and video/CD (gravity sewers only), which shall include pipe gradient information.
 - Joint "Off Maintenance" inspection with the Superintendent, Contractor and Council Inspector
 - Remedial work as required
 - Submission to Council of request for release of Maintenance Bond
 - Release of maintenance bond by Council

2.3 CALCULATIONS TO BE SUBMITTED

2.3.1 WATER SUPPLY

The following calculations and plans shall be submitted to the Council with plans for approval:

- Plan showing the area served by proposed network;
- Network Analysis;
- Type and class of pipes for the pressure and cyclical loading regime;
- Thrust block calculation where required;
- Cyclic pressures and reducing mechanisms where required;
- Operating conditions for Pressure reducing valves;
- Structural calculation where necessary for valve pits and associated works.

2.3.2 SEWERAGE

The following calculations and plans shall be submitted to the Council with plans for approval:

- Ultimate sewer design flows including catchment plan for staged development if applicable;
- Gravity sewer pipe capacities and a loading table;

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

- Sewerage system overflow level
- Structural design of pipes exceeding depth to top of pipe of 3m under carriageway, 4m under allotments and 5m under footpaths. These calculations shall demonstrate sufficiency of the strength of the proposed pipe type and trenching condition.
- Thrust block calculation where required;
- Diagram showing controlling allotments and control point;
- Flow velocities under different flow and pipe roughness conditions;
- Rising main long section and the hydraulic grade line;
- System resistance and pump curves showing different static and dynamic heads and duty points;
- Demonstration of pipeline capacity to resist cyclical pressure effects over a 100-year lifespan of the systems;
- Estimation of pump start, stop, alarm, overflow and other control levels;
- Calculations supporting the provision of wet well storage;
- Calculations showing that floatation forces are counteracted for all buried or partially buried structures;
- Estimation of electrical loads - Mains Supply proposed; and RF screening EMC measures
- Structural calculations where necessary for the pump well and associated works.

2.4 TESTS AND INSPECTIONS

2.4.1 AUDIT INSPECTIONS

Audit inspections are carried out by the Council to ensure that Consulting Engineers are correctly discharging their responsibility. These inspections do not release the Consulting Engineer from his responsibility to check the contractor's work.

2.4.2 PERFORMANCE TESTS

The Consulting Engineer shall supervise performance testing of all water supply and sewerage infrastructures in accordance with the Manual. The Consulting Engineer shall both supply the test results and certify that the infrastructure has been designed and built in accordance with the Manual prior to the works being accepted "on maintenance" by Council.

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

2.4.3 "ON MAINTENANCE" INSPECTION

An "on maintenance" inspection shall be carried out to ensure that the water supply and sewerage infrastructure has been completed in accordance with the approved engineering plans, the conditions of subdivision or development approval and that the appropriate standards of construction methods and materials have been used. The maintenance period shall be twelve (12) months from the date of acceptance "on maintenance" of the infrastructure by Council.

Confirmation of the "on maintenance" date will be sent to the Consulting Engineer following receipt of all outstanding items, including the maintenance bond. The maintenance bond shall be 5% of the cost of the infrastructure, or \$2000 (for each component – water and sewerage), whichever is the greater.

The Consulting Engineer shall provide the Council with not less than seven (7) days notice in writing of the inspection date.

The Consulting Engineer, the Contractor and the Council representative shall attend the inspection on site. Those at the meeting will be required to provide their own safety equipment. The Consulting Engineer or the Contractor shall provide any specialised equipment required for the inspection.

Prior to the inspection, the Consulting Engineer shall lodge the following items:

- As constructed drawings
- Performance test results
- Certification of materials used
- Individual coloured CCTV report as prepared by the Consulting Engineer and video/CD (for gravity sewers only), which shall include pipe gradient information.
- Certification that the water supply and sewerage infrastructure has been completed in accordance with the approved drawings and the Manual.

2.4.4 MAINTENANCE & OPERATION DURING THE MAINTENANCE PERIOD

Usually, Council will operate the infrastructure during the Maintenance Period. However, it is the Developer's responsibility to repair any faults that occur or become apparent during the maintenance period unless the faults are a direct result of negligence or incorrect operation by Council staff.

2.4.5 "OFF MAINTENANCE" INSPECTIONS

The Consulting Engineer shall provide the Council with not less than seven (7) days notice in writing of the inspection date.

Prior to the inspection, the Consulting Engineer shall lodge the following items:

- Individual coloured CCTV report as prepared by the Consulting Engineer
- And video/CD (for gravity sewers only), which shall include pipe gradient

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

information.

The infrastructure shall be inspected at the end of the maintenance period. The works shall be thoroughly inspected by the Consulting Engineer and any necessary remedial work completed prior to the off-maintenance inspection. If an off-maintenance inspection is unsuccessful Council will charge an additional fee as set down in its annual fees and charges schedule for the reinspection after the faults have been corrected.

On completion of a satisfactory inspection, the Council shall refund the maintenance bond.

2.5 CONNECTIONS TO COUNCIL'S INFRASTRUCTURE

2.5.1 WATER SUPPLY

The connection of new water reticulation to Council's existing system forms part of the infrastructure realisation to be carried out at the Developer's expense. Normally, Council staff shall undertake all connections to Council's water infrastructure. The Contractor **shall not** carry out the connection unless Council gives special approval in exceptional circumstances.

2.5.2 SEWERAGE

The connection of new sewerage reticulation to Council's existing system forms part of the infrastructure realisation to be carried out at the Developer's expense. Normally, Council staff shall undertake all connections to Council's sewer infrastructure. The Contractor **shall not** carry out the connection unless Council gives approval.

2.5.3 GENERAL

When Council makes the connection, an estimate of cost will be provided to the Developer and the connection will not be made until payment is received.

Where the Contractor is to make the connection, The Consulting Engineer is to co-ordinate the work and the processes for inspection and payment. Council shall be given 5 working days notice of the work to enable Council to provide staff to operate valves and isolate pumping stations as necessary and to supervise the Contractor's work. An estimated cost of the supervision shall be agreed prior to notice being given. The estimated cost and a signed undertaking to pay the actual costs of the work when completed shall accompany the notice.

Contractors are not permitted to operate Council's infrastructure unless written approval has been obtained from the Manager CabWater. The placement and removal of plugs within live sewers must be done under direct supervision of Council's Inspector.

Council reserves the right, on the advice of its Inspector, to stop, or take over a

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

connection being undertaken by a Contractor, if in the Inspector's opinion the Contractor is incapable of completing the connection work in a reasonable time without causing damage to Council's infrastructure or undue inconvenience to the public.

2.6 SUBMISSION OF "AS CONSTRUCTED" & ASSET MANAGEMENT INFORMATION

The Consulting Engineer shall submit "as constructed" information (Refer drawing CAB-G01) for both Passive (pipelines) and Active Assets (Pumping Stations, Lift Stations, Reservoirs and the like). Information on Passive Assets is submitted on A3 size as-constructed drawings. The Consultant is to obtain the Digital Cadastral Data Base (DCDB), "as constructed" drawing grid and the CSC title block from Caboolture Shire Council. Water and sewerage information shall be provided in a legible and logical format suitable to provide all relevant information and/or as directed by CabWater. The drawings shall also be submitted in digital format (DWG files unless otherwise agreed) in GDA co-ordinates and including property information. Asset management information for Active assets shall be submitted by submitting "as constructed" drawings and completing the Asset Management pro-forma detailed in Appendix 4 or as amended from time to time.

Council is a participating Council in the Asset Design & As-constructed Data Routines (www.adac.com.au) regional initiative for the standardisation of the submission of as-constructed drawings in digital format. Council requires submission in digital format utilising the ADAC data model.

Should Council develop the ADAC system to include the submission of data for active assets, submission of the on paper pro-forma will be superseded by digital submissions.

3 REALISATION OF INFRASTRUCTURE - ISSUES COMMON TO WATER & SEWERAGE

3.1 ESTIMATION OF THE EQUIVALENT POPULATION

Equivalent population (EP) for the purposes of calculating water consumption and sewage generation shall not be determined in accordance with the Codes. EP shall be determined in accordance with the methods contained in the Developer Contributions Policy.

3.2 WHOLE OF LIFE COSTS TO BE ASSESSED

Designs of Infrastructure shall be planned to satisfy the requirements of the Manual and to meet CabWater's Customer Service Standards, which are published pursuant to the requirements of the Water Act 2000, at a minimum whole-of-life cost (capital cost, and operational and maintenance cost) for an environmentally acceptable solution, and not simply to minimise the Developer's capital cost.

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

3.3 ENVIRONMENTAL RISK ASSESSMENT

Designs of Infrastructure shall be planned to reduce risk to the environment. Where a choice of alternative solutions is possible, a risk assessment shall be carried out to give due weight to reducing the risks to the environment resulting from the construction and operation of the infrastructure.

3.4 COMPATIBILITY WITH ADJACENT EXISTING & PLANNED INFRASTRUCTURE BY OTHERS

Design of Infrastructure shall be planned to be compatible with existing Council infrastructure and planned infrastructure to be built by Council and other developers to optimise the overall provision of infrastructure to an area in accordance with the principles set out in section 3.2 above and the Developer Contributions Policy.

4 PLANNING, DESIGN AND CONSTRUCTION OF WATER SUPPLY INFRASTRUCTURE

4.1 GENERAL

The planning, design and construction of water supply infrastructure shall be in accordance with the Manual. Those aspects of modification or clarification of the Codes detailed in section 1.2 above in respect of water supply are detailed in Section 3 and Section 4 of the Manual and in Appendix 1 of the Manual, which relates to the Water Supply Code of Australia (WSA 03).

4.2 BOOSTER PUMPS

Council's water supply system is designed to deliver Maximum Hour Demand for the design Equivalent Population at the pressures described in Appendix 2 coincident with meeting statutory fire-fighting requirements. Booster pumps to provide increased fire-fighting capability as required for individual developments by the Building Regulations or to supply water to the upper floors of tall buildings will not be permitted to be connected directly to Council's mains or to the water service without special approval. The purpose of this requirement is to ensure that pumps do not reduce availability and pressures to adjacent customers.

4.3 LARGE METERS

Design issues and guidelines pertaining to the fitting of large water meters are given in Appendix 5. Meters with a nominal diameter (DN) of greater than 50mm are considered to be large meters.

4.4 RECYCLED WATER MAINS

Mains to convey recycled water shall conform to the standard colour code markings to differentiate them from potable water mains. No cross-connections shall be permitted with potable water mains. Recycled water mains shall comply with the requirements of "A Supplement to Water Supply Code WSA 03-2002 Version 2.3".

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

The minimum diameter of recycled water mains shall be DN100.

5 PLANNING, DESIGN AND CONSTRUCTION OF SEWERAGE INFRASTRUCTURE

5.1 GENERAL

The planning, design and construction of sewerage infrastructure shall be in accordance with the Manual. Those aspects of modification or clarification of the Codes detailed in section 1.2 above in respect of sewerage reticulation are detailed in Section 3 and Section 5 of the Manual and in Appendix 2 of the Manual, which relates to the Sewerage Code of Australia (WSA 02). Those aspects of modification or clarification of the Codes detailed in section 1.2 above in respect of sewage pumping stations and lift stations are detailed in Section 3 and Section 5 of the Manual and in Appendix 3 of the Manual, which relates to the Sewage Pumping Station Code of Australia (WSA 04).

5.2 UNCONVENTIONAL INFRASTRUCTURE

Conventional infrastructure includes gravity sewers; lift stations, area pumping stations and rising mains. The use of unconventional infrastructure shall require special approval and may require extended maintenance periods and a higher value for performance bonds. Unconventional infrastructure includes small bore systems of any kind, including vacuum systems, common effluent drainage systems, grinder pumps serving small clusters of properties and the like, proprietary manhole systems that do not permit entry by personnel, and any other unconventional or unusual systems.

5.3 DETERMINATION OF DESIGN FLOW PARAMETERS

In the Manual, the determination of the design flow shall be in accordance with Section 3 & Appendix B of WSA 02 but **always** using the following parameters:

- ADWF = 240 L/d/EP
- Portion wet² = 0
- C (Leakage Severity Coefficient) = 0.4
- I_{1,2} (1 hour duration rainfall intensity
With a recurrence interval of 2 years = 47 mm
- ARI of overflows³ = 2 years

5.4 MAXIMUM DEPTH

The Consulting Engineer shall obtain approval from Council and submit calculations for sewers exceeding depth to top of pipe of 3m under carriageway, 4m under allotments and 5m under footpaths. These calculations shall demonstrate sufficiency of the strength of the proposed pipe type and trenching condition.

² The effect of 0 as the Portion Wet is to reduce GWI to 0.

³ A return period of greater than 1 in 2 years may be required for large pumping stations and trunk sewers in environmentally sensitive areas such as those overflowing directly to water courses or marine environments.

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

5.5 CONNECTIONS TO COMMERCIAL & INDUSTRIAL PREMISES

Except where the connection is made into a manhole, an inspection chamber shall be constructed at the point of connection.

5.6 PRODUCTS AND MATERIALS

All the products and materials used for sewerage infrastructure shall comply with the Products and Materials specifications prepared by the Water Services Association of Australia (ref: <http://www.wsaa.asn.au/>).

Permitted materials for use in for gravity and pressure sewer mains are given in the table below:

Type of Pipe	Joining Method	Class of Pipe	
		Gravity Sewer	Pressure Sewer
OPVC	Rubber ring seal or solvent cement weld	Minimum Class – SN10 for 100DN and SN8 for larger pipes, Series 2	Minimum 16 ^a
PE	Electro fusion or Butt fusion		Minimum PN16
ABS (AS3518) ^a	Rubber Ring Seal or Solvent Cement Welded	Series 2	
DI (Cement Lined or Calcium Aluminate Special Lining) ^b	Rubber ring sealed, flanged	Tytonxtreme or equal approved	PN20 and PN35. Tytonxcel or equal approved
Mild Steel Cement Lined (MSCL)	Rubber Ring jointed, unless otherwise approved	Sintakote or equal approved	Sintakote or equal approved

- Using PVC or ABS pipes for sewer rising mains shall be subject to special approval
- All DI pipes and fittings shall be sleeved in polyethylene in compliance with manufacture's recommendations. DI pipes with normal cement lining shall not be used for gravity sewers, which should be Calcium Aluminate lined. For sections of pressure sewers that are permanently wet, DI pipes with normal cement lining may be used subject to Council Approval. Sections of rising main subject to alternate wetting and drying shall have Calcium Aluminate lining.

Sluice valves shall be resilient seated and clockwise opening.

5.7 SEWAGE PUMPING SYSTEMS

The following requirements take precedence over the requirements of WSA 04.

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.1 BASIC DESIGN REQUIREMENTS

Submersible sewage pumping stations including lift stations shall be designed in accordance with Council's standard drawings included in the Manual.

Lift stations⁴ shall be permitted only where the incoming total design flow to the station is 7 L/s, or less, and in the event of pump failure the incoming flow can overflow by gravity to the next catchment without causing any spillage⁵. The sewerage system downstream of the overflow must be capable of taking the overflow in addition to the flows generated in its own catchment. By reason of the restrictions on the use of lift stations, the requirements for storage, standby and telemetry is less than those for a standard duplex pumping station.

Pumping stations shall have 2 pumps, or pump sets, each providing 100% standby capacity.

Pumping Stations serving populations of 5,000EP, or more, shall be provided with stand-by power generation.

Pump stations and lift stations shall be designed in accordance with the flows ADWF, PDWF & DF calculated in accordance with Section 5.3 and used as described below to determine the pumping and storage requirements.

Pumping Requirements

Pumps shall be designed to pump the Total Design Flow (TDF)

TDF = DF + PF

DF = the full local design flow (PDWF + GWI + IIF) arising from the local catchment served by the station and arriving as gravity flow.

PF is the pumped flow arriving under pressure from upstream pumping stations and lift stations. For each upstream station, PF shall be taken as the lesser⁶ of the actual instantaneous flow rate of the pumping by the upstream pump or 120% of the upstream station's TDF.

Storage Requirements

Pumping Stations and Lift Stations shall be provided with storage in the wet well to cater for equipment or power failures and maintenance requirements.

Wet Well Storage **WWS**

⁴ Lift Stations are small pumping stations with no standby pump that usually deliver into a short rising main discharging into the head of a gravity sewerage system.

⁵ For an incoming sewer correctly designed for the design flow, this condition will be satisfied if at the lift station the height of the overflow above the invert of the incoming sewer is less than the freeboard available at each upstream manhole and ORG when the lift station pump is operating normally.

⁶ The rationale behind the calculation of PF is as follows. The pumping rate from the upstream station is an upper limit. However, in the case of oversized pumps, using the pump rate is conservative, as the pumps would tend to pump only intermittently. The TDF for the upstream station is the lower limit, but inflow can exceed the TDF in severe rainfall events if the pumps are oversized so that a flow greater than the TDF will be delivered to the downstream station; the factor of 120% has been adopted to cater for this effect.

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

For Lift Stations

WWS = 2 hours at Σ ADWF

Where **Σ ADWF** is the sum of the ADWFs for all the catchments discharging to the station either by gravity or under pressure.

For Pumping Stations

The Consulting Engineer may chose to calculate the storage with either of the following two methods

Method 1

WWS = 6 hours at Σ ADWF

Where **Σ ADWF** is the sum of the ADWFs for all the catchments discharging to the station either by gravity or under pressure.

OR

Method 2⁷

Calculated as follows:

Storage requirements are based on dry weather flows and the response time needed to reach an inactive pumping station and either reactivate it or to arrange for tankers, and if necessary, to turn off upstream pumping stations that discharge into the failed station. In the calculation of flows for all aspects of the storage calculations, the Design Flow as calculated in accordance with Section 5.3 can ignore the contribution of the IIF (inflow infiltration component).

The **Total Storage Required (TSR)** shall be calculated as follows:

$$\text{TSR} = \text{LCS} + \text{PFS}$$

LCS (Local Catchment Storage)

is the storage required for the **DWDF**

Where DWDF = the dry weather design flow (PDWF + GWI) arising from the local catchment served by the station and arriving as gravity flow.

$$\text{LCS} = 3 \text{ hours at DWDF}$$

PFS (Pumped Flow Storage) is the storage required for the **DWPF**.

Where DWPF is the dry weather pumped flow arriving under pressure from upstream pumping stations and lift stations. DWPF shall be taken as the DWDF of the upstream catchment being pumped into the station.

⁷ Method 2 takes the storage in the gravity reticulation into account and will generally result in less storage being provided at the pumping station.

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

PFS:

- For flows from an upstream Pumping Station⁸,
PFS = 90 minutes at the DWPF
- For flows from an upstream Lift Station⁹,
PFS = 3 hours at DWPF.

The amount of storage provided as wet well storage (**WWS**) is the difference between the total storage required (**TSR**) and the storage available in the gravity reticulation (**GRS**) discharging into the station filled to a level such that there is no overflow of sewage from the reticulation.

Wet Well Storage $WWS = TSR - GRS$.

But

the **WWS** so calculated shall never be less than 3hours at **$\Sigma ADWF$**
Where **$\Sigma ADWF$** is the sum of the ADWFs for all the catchments discharging to the station either by gravity or under pressure.

5.7.2 ELECTRICAL EQUIPMENT, CONTROLS AND TELEMETRY SYSTEM

Requirements to be met in addition to the provisions made in WSA 04 are contained in Appendix 3

5.7.3 ACCESS TRACKS

Pumping Stations and lift stations shall be provided with a 4-metre wide all-weather access track to provide access without traversing the covers, and constructed from concrete or asphaltic concrete or other materials approved in special circumstances by Council. Except in special circumstances approved by Council, the top surface of access tracks should be wholly above a level 250 millimetres below the flood level with an average return period of 1 in 50 years. Plans detailing the route of any access track shall be submitted to Council for approval.

The structural design of the access track shall be in accordance with Planning Scheme Policy Number 4 – Design & Development Manual Part A –Roadworks and Stormwater Drainage.

5.7.4 COVER LEVELS

Except where otherwise approved, cover levels of pumping stations and lift stations shall be a minimum of 100 millimetres above the flood level with an average return period of 1 in 100 years.

⁸ It is assumed that a pumping station upstream of a failed station can be turned off within 90 minutes of the failure.

⁹ Since flow from lift stations will overflow when the station is turned off and then gravitate to the downstream pumping station, there is no benefit in turning off the lift station.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

APPENDIX 1 Addendum to WSA 03**CABWATER****Addendum to the****Water Supply Code of Australia
WSA 03 – 2002**

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

NOTE:

The clause numbers and table numbers given in this addendum correspond with the clause numbers and table numbers given in the Water Supply Code of Australia WSA 03 – 2002

1.5.2 Water Agency

The Designer shall be responsible for the Concept Plan.

2.1.1 EXTENDING/UPGRADING AN EXISTING WATER SUPPLY SYSTEM

Council shall assess the impacts of the proposed development on the existing water supply system by using a water supply network simulation model. The assessment shall be based on the details of the system extension provided by the Consultants.

2.2 DEMANDS

2.2.2.1 GENERAL

The Developer Contributions policy shall be used in conjunction with the methods outlined in 2.2.2.2 and 2.2.2.3 to assess demand.

Average Day (AD)Water Consumption shall be taken as 350 l/EP/day

Maximum hour flow must be used as the base demand for fire flows.

Latest version of Department of Natural Resources & Mines' guidelines¹⁰ for water supply & sewerage shall be used to compute fire flows in the design.

Where part of the demand is to be supplied by recycled water, the demand can be pro-rated subject to Council approval of the pro-rating. However, the potable water network shall be sized to fully supply the fire flow requirements

2.2.3.1 GENERAL

In addition to the other demand definitions, Mean Day Max Month (MDMM)is defined as 1.5 x Average Day demand

2.2.3.2 PEAK DAY DEMAND¹¹

PDF = 2.50 for reticulation systems serving populations below 2000

PDF = 2.25 for populations of 2000 or above

¹⁰ Peak Hour demand simultaneous with 15 l/s residential areas and 30 l/s commercial and industrial areas at pressures not less than 12metres water head

¹¹ Peak Day is also known as Max Day or Maximum Day demand

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

2.2.3.3 PEAK HOUR DEMAND¹²

PHF = 5 for reticulation systems serving populations below 2000

PHF = 4.5 for of 2000 or above

2.4 SYSTEM HYDRAULICS

Table 2.2 – Minimum pressure for domestic and industrial applications shall be 22 m (water head). Council may approve a reduction of up to 2m under special circumstances.

2.4.3.2 Maximum Allowable Service Pressure

The maximum allowable SP shall be 600 kPa. Higher values of up to 800 kPa may be considered by Council, but shall be subject to prior approval. The location of pressure measurement shall be on Council assets, i.e. not within private property boundaries.

2.4.3.2 Pressure Variation Analysis

Pressure variation analysis shall take into account pressure deratings as recommended in WSA 03, Tables 3.2 and 3.5.3.

2.6 PUMPING STATIONS

2.6 (C) Standby Arrangements:

Council requires standby pump units to be provided. The standby capacity shall match the largest single pump duty.

The power supply to pumping stations shall have 50% spare capacity for future upgrading and be electrically configured such that the pumping station can operate from an emergency generator supply at times of power failure (thus, a provision of space in the switchboard for a manual or ATS change over panel is required).

Where pumps are installed above ground, they are to be housed in a brick building with internal acoustic lining to reduce noise emissions. In residential areas, care should be taken to ensure pump stations have an aesthetic appearance and do not cause any noise nuisance. The pipe work inside pumping stations shall include sufficient valves and fittings to ensure the pumps can be removed for future repairs and maintenance.

2.7 SERVICE RESERVOIRS

The consultants shall liaise with Council to establish the requirements of the service reservoirs and the capacity.

3.2.2 MINIMUM PIPE SIZES

The minimum pipe diameter under sub-clause (a) for residential zones shall be DN 150.

¹² Peak Hour is also known as Max Hour or Maximum Hour demand

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

The minimum pipe diameter under sub-clause (b) for industrial and commercial zones shall be DN 200.

For short runs in cul-de-sacs the standard clause and the standard drawing WAT-1104 shall apply except where the water main branch off the main line would be less than 40 metres into the cul-de-sac. For such short cul-de-sacs, the water main in the road, from which the cul-de-sac branches off, will be looped into and back out of the cul-de-sac.

3.2.4 FIRE FLOWS

System should be capable of meeting with firefighting flows. Refer 2.2.2.1 above.

3.7.2 MINIMUM PIPE CLASS

The minimum class for pipes and fittings shall be class 16.

3.8 PIPELINE MATERIALS

Council's requirements for pipeline materials are given in the following table.

Type of Pipe	Joining Method	Class of Pipe
MPVC, uPVC or OPVC	Rubber ring seal	Minimum 16 Series 2
PE	Electrofusion or Butt fusion	Minimum PN16
ABS (AS3518) ¹	Rubber Ring Seal or Solvent Cement Welded	Series 2
DI (Cement Mortar Lined) ^{2,3}	Rubber ring sealed, flanged	PN20 and PN35. Tytonxcel or equal approved
Mild Steel Cement Lined (MSCL) ³	Rubber Ring jointed, unless otherwise approved	Sintakote or equal approved

Notes -

- 1 - ABS pressure mains shall be subject to Council's approval
- 2 - All pipes and fittings shall be sleeved in polyethylene in compliance with Manufacturers recommendations. Seal coats shall be provided where specified by Cabwater.
3. Where necessary, the cement lining shall be seal coated as directed by Council

4.1.1 DESIGN TOLERANCES

Horizontal alignment shall be referenced to GDA.

4.3 LOCATION OF WATER MAINS

4.3.1 GENERAL

The location and alignment of water mains shall be generally in accordance with Council's Standard Drawing No. CAB-G01-2.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

Reticulation mains shall be located on an approved footpath alignment, 1.2 metres from the property boundary. The mains shall normally be located on the low side of the roadway or on the opposite side to that used for sewerage reticulation.

4.3.2 WATER MAINS IN ROAD RESERVES

Water mains that are to be constructed in roads shall be in accordance with Planning Scheme Policy Number 4 – Design & Development Manual Part A –Roadworks and Stormwater Drainage Standard Drawing Numbers 01-64 and 01-74 for public utility locations in road reserves.

4.3.3 WATER MAINS IN EASEMENTS

Easements shall be in accordance with Section 1.5 of the Manual.

4.4 SHARED TRENCHING

Shared trenching shall not be permitted unless approved by Council.

4.7 CONNECTION OF NEW MAINS TO EXISTING MAINS

Connections shall be in accordance with Section 2.5 of the Manual.

4.8.1 LAYOUT OF WATER MAINS

Permanent dead ends to water mains shall be subject to Council's approval.

5.4.2 PIPE COVER

Minimum pipe cover shall be as follows:

DN63 – DN150: 600mm minimum cover

DN200 – DN1000: 1000mm minimum cover

Where a smaller category joins/converts to the larger category, the greater depth shall be achieved by using joint deflections as recommended by the pipe manufacturers, however a minimum of two standard pipe lengths shall be used to achieve the required offset.

5.10 BULKHEADS AND TRENCHSTOPS

Trench stops are required for gradients steeper than 10%. Spacing shall be at every 1m increase or decrease in invert level.

6.2.1.2 GATE VALVES

Anchorage shall be designed and installed for valves of DN200 and greater.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

6.2.5.2 ARRANGEMENT 1

Unless directed by Council, valves shall be connected on the branch line directly to the straight water main tee using flanged connection

6.2.5.4 ARRANGEMENT 3

Pressure zone dividing valves and hydrants shall be installed as per the clause 6.2.5.4 (a)

6.7 SWABBING POINTS

Swabbing points shall be provided where specified by Council.

6.8.3 HYDRANT TYPES

Hydrants shall be 100DN flanged spring type (SWASH) hydrants without isolating valves. Pillar Hydrants shall be installed where directed by Cabwater.

6.8.7 HYDRANT SPACING

The Maximum spacing between hydrants shall be 80m.

6.8.8. HYDRANT LOCATION

Hydrants shall be located at the boundary between adjacent real properties. Hydrants shall be located such that existing or future development lots are or will be within 40m of the nearest hydrant. Bi-directional blue fire hydrant raised reflective pavement markers (otherwise known as blue "cats eyes") complying with the guidelines provided by the Queensland Department of Main Roads shall be provided to indicate the fire hydrants.

7.3 RECORDING OF WORK-AS CONSTRUCTED INFORMATION

As constructed information shall conform to the requirements of section 2.6 of the Manual.

8 PRODUCTS AND MATERIALS OVERVIEW

All the products and materials used for sewerage infrastructure shall comply with the Products and Materials specifications prepared by the Water Services Association of Australia (ref: <http://www.wsaa.asn.au/>) unless otherwise specified by Council.

The sluice valves shall be resilient seated and clockwise opening.

8.4.1 PRODUCT STANDARDS

The use of products that are not certified to comply with AS/NZ Standards shall be subject to prior approval by Council.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

8.4.2 PURCHASE SPECIFICATIONS

Where more than one product specification for a specific product is listed on the WSAA website, the purchaser shall submit to CabWater its preferred specification for approval.

The Designer shall be responsible for appropriate material and product selection to meet design life and operational requirements.

11.5.4.2 Traffic management

Traffic Management shall be in accordance with the authority responsible for the roads in the area where construction activities are carried out.

12.1 AUTHORISED PRODUCTS AND MATERIALS

Except where specifically specified elsewhere, for example large diameter meters, Council does not have preferred suppliers

12.5.10 REPAIR OF BLEMISHES

Council requires the use of non-shrink mortar for repair works.

15.2.3 BENDING PIPE

Bending of pipes shall be subject to Council's Approval.

24 WORK AS-CONSTRUCTED DETAILS

As constructed information shall conform to the requirements of section 2.6 of the Manual.

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

STANDARD DRAWINGS

WSA 03 Drawing Number	Comment												
WAT-1100	CAB-G01-2 supersedes WAT-1100												
WAT-1106	CAB-W01 supersedes WAT-1106												
WAT-1107	Split services are not allowed												
WAT-1108	CAB-W01 supersedes WAT-1108												
WAT-1109	Not applicable												
WAT-1201	Detectable marker tapes shall be installed for all non-metallic pipelines and non-detectable marker tapes shall be provided for metallic pipes.												
WAT-1207	The puddle flange shall be thrust type												
WAT-1300	<p>The guideposts for water shall be powder coated, galvanised steel and 1350mm long (1500mm for the areas with soft/sandy soil) as supplied by <i>Dura-Post</i>. They shall be fitted with plastic safety end caps and reflective markers. The colours shall be:</p> <table><tr><td></td><td>Post</td><td>Reflective marker</td></tr><tr><td>Valve</td><td>Blue</td><td>Blue</td></tr><tr><td>Hydrant</td><td>Yellow</td><td>Orange</td></tr><tr><td>Air and Scour</td><td>White</td><td>White</td></tr></table> <p>Hydrant marker posts are only required in rural residential areas.</p>		Post	Reflective marker	Valve	Blue	Blue	Hydrant	Yellow	Orange	Air and Scour	White	White
	Post	Reflective marker											
Valve	Blue	Blue											
Hydrant	Yellow	Orange											
Air and Scour	White	White											
WAT-1301	For hydrant or valve boxes refer Council's standard drawing CAB-W03												
WAT-1302	Hydrants with isolation valves are not allowed. Alternative hydrant arrangement is not allowed												
WAT-1303	The surface fitting installation shall be of Type A1. For the surface box and lid details refer CAB-W03												
WAT-1304	The surface fitting installation shall be of Type H1. For the surface box and lid details refer CAB-W03												
WAT-1305	This drawing is only applicable for non-trafficable areas. The surface fitting installation shall be of Type A2. For the surface box and lid details refer CAB-W03.												
WAT1306	The surface fitting installation shall be of Type H2. For the surface box and lid details refer CAB-W03												
WAT-1309	Above ground installations shall be subject to Councils approval. Low flow by-pass shall be provided where specified by Council												

Refer Council's standard Drawings CAB-G01 to CAB-G04 for other general requirements.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

APPENDIX 2 Addendum to WSA 02

**Addendum to the
Sewerage Code of Australia
WSA 02 – 2002**



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

NOTE:

The clause numbers and table numbers given in this addendum correspond with the clause numbers and table numbers given in the Sewerage Code of Australia WSA 02 – 2002.

2.2.3 CATCHMENT ANALYSIS

Standards listed in the Manual shall also apply to future development planning. Financial costing shall be on the basis of NPV, and design options shall take into account whole of life cost.

3.1 DESIGN FLOW ESTIMATION

Design Flow Estimation shall be in accordance with the section 5.3 of the Manual.

4.2.3 Sewer Layout

Clauses 4.3.1 and 4.3.2 of Appendix 2 of the Manual state and clarify requirements for sewer locations.

4.2.5 EASEMENTS

In accordance with section 1.5 of the Manual

4.3 HORIZONTAL ALIGNMENT OF SEWERS**4.3.1 GENERAL**

Sewers shall be located:

- At the rear of private property 1.5m from and parallel to the boundary.
- At the low side of the private property side boundary, 1m from and parallel to the boundary.
- In the front of private property 1.5m from and parallel to the RP alignment.
- In the footpath when the presence of water-supply pipelines and other services permit.
- In the street carriageway.

For a typical layout of sewers and boundary alignments refer to Standard Drawing No. CAB-G01-1

4.3.2 ROADS, RESERVES AND OPEN SPACE

Sewers that are to be constructed in roads shall be provided within the public utility allocation for sewers in accordance with Planning Scheme Policy Number 4 – Design & Development

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

Manual Part A –Roadworks and Stormwater Drainage Standard Drawing numbers 01-64 and 01-74.

4.3.7 HORIZONTAL CURVES IN GRAVITY SEWERS

Horizontal curves in gravity sewers are not permitted.

4.5.3 MINIMUM AIR SPACE FOR VENTILATION

At design flow, the depth of flow shall be not more than 70% of pipe diameter.

4.5.7 MINIMUM GRADES FOR SELF-CLEANSING

4.5.7.1 GENERAL

Except as provided in clauses 4.5.7.2 and 4.5.7.3, self-cleansing of grit and debris shall be based on achieving a wetted cross section average velocity of 0.7m/s at PDWF

The minimum grades required to achieve self-cleansing shall be calculated using either the Colebrook-White equation for $k = 1.5\text{mm}$ or the Manning equation for n_M equivalent to $k = 1.5\text{mm}$ (refer to Table 4.5).

Irrespective of outcomes using the above methodology, grades shall not be less than those specified in Tables 4.6 and 4.7.

The maximum allowable velocity for rising mains shall be 1.5 m/s. Higher velocities may be accepted, but shall be subject to Council approval.

4.6.2 LONGITUDINAL SECTIONS

Longitudinal Sections are required. Longitudinal sections shall, as a minimum, show the following information

- ▶ Manhole cover level, invert level, depth and surface level adjacent to each manhole
- ▶ Pipe material, nominal diameter, class and gradient
- ▶ Existing and final surface levels, including roads
- ▶ Existing services including Invert Levels
- ▶ Property Connections and details – including Control Invert Levels, Surface level, Depth and property connection type.

For a typical layout of Longitudinal sections refer to Standard Drawing No. CAB-Go1-3.

4.6.3 MINIMUM COVER OVER SEWERS

Minimum cover over sewers shall be as indicated in Table 4.8. Any reduction of these stated cover requirements shall be subject to written approval by Council. It is expressly stated that pipeline material selection appropriate for the relevant traffic loading shall be the responsibility of the Consulting Engineer.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

4.6.5 MINIMUM DEPTH OF SEWER CONNECTION POINT

The sewer connection shall be deep enough to drain the total area of the property, with house drains being laid at required grades and position, in accordance with AS3500 and shall not exceed 1.5m maximum depth.

4.6.7 VERTICAL CURVES

Vertical curves are not permitted.

5 PROPERTY CONNECTIONS

Council requires a property connection marker to be installed on all property connections to sewer. The marker shall consist of a 50mm x 40mm x 200mm yellow painted peg located above the property connection end cap with the top of the marker peg 50mm above the finished surface. An approved brown plastic tape 50mm wide shall be attached to the end cap and brought vertically to the surface and stapled to the marker peg. Installation of the marker shall generally be in accordance with Standard Drawing No. CAB-S01 and CAB-S01-1.

5.3 METHODS OF THE PROPERTY CONNECTION

The property connections shall be as per the Council's Standard Drawing number CAB-S01 and CAB-S01-1.

5.4 MAXIMUM DEPTH OF PROPERTY CONNECTION

The property connections shall be as per the Council's Standard Drawing number CAB-S01 and CAB-S01-1.

5.5.2 MULTIPLE OCCUPANCY LOTS

An application shall be made at the design stage for determination of servicing method.

5.6.1 UNDEVELOPED LOTS

A property connection shall be provided to each property at the lowest point of the sewer serving the property. It shall be capable of draining the total area of the property that can be developed, with house drains being laid at required grades and position, in accordance with AS3500.

These connection branches shall be constructed using GRP fittings and supported on concrete to the dimensions and types shown on Standard Drawing No. CAB-S01. Connection branches are generally located 1.2 metres upstream of the allotment boundary.

Property connections shall not be constructed across streets or reserves to enter sewer lines.

Where practicable, property connection branches adjacent to maintenance structures (manholes) should be constructed as inlet entries to the maintenance structures with internal drops, if necessary, and shall have inspection openings as per the standard drawings.

Council parks or reserves shall be provided with a connection to the sewer at maintenance holes



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

as directed by Council.

Where an unsewered dwelling is located on land, which is being reconfigured, the Developer shall connect the dwelling to the sewerage reticulation at his cost as part of the subdivision work. The Developer shall be responsible for the removal of any septic tanks and backfilling of the excavation to the satisfaction of Council, which will require a plumbing works application.

Sewerage connection points are to be located a minimum of 3m from roof water connection points.

5.7 Y-PROPERTY CONNECTIONS

Y-property connections shall not be permitted.

6.3.1 GENERAL

The finished surface level of all maintenance structures shall be at least 300mm above the overflow level of the sewerage catchment that they serve.

CabWater allows the use of Maintenance Shafts as a case-by-case assessment for each development proposal and only on DN150 sewers as an alternative to Maintenance Holes generally in accordance with the Code subject to the following conditions:

- Installation shall be in accordance with the manufacturer's specifications;
- The maximum depth shall not exceed 3.0m;
- Shall be restricted to the intersection of \leq two sewers at the same level;
- Shall be restricted to the deflection through the Maintenance Shaft of $\leq 25^\circ$;
- Where the deflection through the intermediate maintenance shafts is $\leq 5^\circ$; a maximum of 3 consecutive Maintenance Shafts may be placed along the same sewer before locating a Maintenance Hole, however, the maximum spacing between any two (2) consecutive Maintenance Holes shall not exceed 300m; and
- Maintenance Shafts shall not be permitted at the permanent end of a sewer or in place of the last Maintenance Hole before an end line sewer.

Any development proposal requiring the use of these products should submit preliminary plans conforming to the above conditions to Caboolture Shire Council, CabWater for individual assessment and approval of Maintenance Shaft System use.

6.3.2 MAINTENANCE STRUCTURE SPACING-RETICULATION SEWERS

The maximum spacing between any two consecutive maintenance structures shall be 120m.

6.3.3 MAINTENANCE STRUCTURE SPACING-BRANCH AND TRUNK SEWERS

The maximum spacing between any two consecutive maintenance structures shall be 120m.

6.4 SPECIAL CONSIDERATIONS FOR LOCATION OF MAINTENANCE STRUCTURES

Maintenance structures shall be constructed at:



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

- 1 metre upstream of allotment side boundaries and 1.5 metres from front and rear boundaries
- At truncated sections, wholly on the footpath or wholly in the allotment, not across the alignment
- At the end of any line that services more than one allotment or is greater than 30 metres in length.
- Consideration shall be given to future sewerage reticulation requirements and maintenance structures shall be located to facilitate the direct connection of future extensions directly to existing maintenance structures.
- Any additional locations as required by Council

Where maintenance structures are to be located in the footpath, approval from Council will be required.

Sewer maintenance structures and roof water pits shall always be located a least 3 metres apart (centre to centre).

6.5 SPECIAL CONSIDERATIONS FOR CONNECTION OF NEW SEWERS TO EXISTING INFRASTRUCTURE

Refer to Section 2.5 of the Manual.

6.6.2 TYPES OF MH CONSTRUCTION

No tapered sections are permitted for maintenance holes. Joints of pre-cast maintenance holes shall be sealed as recommended by the manufacturer. External bitumastic seal tapes of 150mm wide over a coat of prime seal recommended by manufactures shall be applied for all joints of pre-cast manholes.

Special manhole construction shall be subject to prior approval by Council.

6.6.3 DESIGN PARAMETERS FOR MHS

Pre-cast maintenance holes can be used for any area unless otherwise specified by Council. All concrete in maintenance holes shall be Grade S25 with a minimum fly-ash/type A cement ratio of 0.25.

6.6.5 DIAMETERS OF MHS

The minimum internal diameter of a manhole to be 1050mm

6.6.8 LADDERS, STEP IRONS AND LANDINGS

Not permitted.

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

6.6.9 MH COVERS

All maintenance hole covers shall be watertight and gas tight.

6.6.9.(e) Bolt down maintenance hole covers shall be used in areas subject to localized flooding or below 1 in 100 year flood (Q100), in parks and reserves and for all sewers greater than 375mm diameter.

6.7 MAINTENANCE SHAFTS (MS)

Refer to Section 6.3.1 of the Manual.

6.7.2 DESIGN PARAMETERS FOR MSs AND TMSs

The maximum permissible depth of MS's and TMS's shall be 3m, measured from FSL to the top of the pipe.

7.5.1 VENTILATION – GENERAL

Forced ventilation is not required unless design circumstances warrant the need for fan stations. This statement is made without prejudice and Council reserves the right to require forced ventilation, if in its sole opinion, the design requires forced ventilation.

7.7 VORTEX INLETS AND WATER CUSHIONS

Prior approval must be obtained from Council for the use of vortex inlets & water cushions

7.8 INVERTED SYPHONS

Prior approval must be obtained from Council for inverted siphons.

7.10 FLOW MEASURING DEVICES

Flow measuring devices shall not be installed unless directed by Council.

7.11.1 General

Prior approval must be obtained from Council for using wet weather storage as a means of reducing downstream infrastructure.

8.2 PRODUCTS AND MATERIALS

Acceptable pipeline materials are listed in Section 5.6 of the Manual.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

8.7 ABOVE GROUND CROSSINGS

Buried crossings are preferred. Any above ground crossing shall be subject to approval from the relevant asset owner, statutory approvals as applicable and Council.

8.8 PIPE COVER

In addition to the requirements given in WSA02, Council requires the Design Engineer to submit calculations for sewers exceeding depth to top of pipe of 3m under carriageway, 4m under allotments and 5m under footpaths. These calculations shall demonstrate sufficiency of the strength of the proposed pipe type and trenching condition.

8.10 BULKHEADS AND TRENCHSTOPS

Trench stops are required for gradients steeper than 10%. Spacing shall be at every 1m increase or decrease in invert level.

9 APPENDIX A ESTIMATION OF EQUIVALENT POPULATION (EP)

Not applicable. Refer to Section 3.1 of the Manual.

10 APPENDIX B FLOW ESTIMATION FOR UNDEVELOPED AREAS

Refer to Section 5.3 of the Manual.

13.5.4.2 TRAFFIC MANAGEMENT

Traffic Management shall be in accordance with the authority responsible for the roads in the area where construction activities are carried out.

14.1 AUTHORISED PRODUCTS AND MATERIALS

Council does not have preferred suppliers.

14.5.10 REPAIR OF BLEMISHES

Non-shrinking mortar shall be used.

17.2.1 GENERAL

Horizontal & vertical pipe deflections are not permitted.

24 CONNECTION TO EXISTING SEWERS

In accordance with Section 2.5 of the Manual.

26 WORK AS-CONSTRUCTED DETAILS

As constructed information shall conform to Section 2.6 of the Manual.



Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

STANDARD DRAWINGS

WSA 02 Drawing Number	Comment
SEW-1100	CAB-G01-1 supersedes SEW-1100
SEW-1101	CAB-G01-3 supersedes SEW-1101
SEW-1103	Bends are not allowed without maintenance holes
SEW-1104 to SEW1109	CAB-S01 and CAB-S01-1 supersedes SEW-1104 to SEW1109
SEW-1201	Road reinstatements shall be in accordance with the road authority's requirements
SEW-1300	Tapers shall not be allowed
SEW-1301	Tapers shall be not allowed
SEW-1307	Ladders and step irons shall not be allowed
SEW-1308	Tapers shall be not allowed
SEW-1315	Not applicable
SEW-1408	CAB-S07 supersedes SEW-1408

Other Requirements:

The guide posts for sewer valves shall be powder coated, galvanised steel and 1350mm long as supplied by *Dura-Post*. They shall be fitted with plastic safety end caps and reflective markers. The colours shall be:

Valve	Post	Reflective marker
	Red	Red



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

APPENDIX 3 Addendum to WSA 04

Addendum to the
Sewage Pumping Station Code of Australia
WSA 04 – 2005

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

Electricity Supply and Control System Requirements for Pumping Stations and Lift Stations

The following requirements shall be met in addition to the provisions made in WSA 04:

- Installation of variable speed pumps shall be subject to Council's approval. The pipe - configuration and electrical control system for the pump stations with variable speed drives may be different from that for the constant speed pumps.
- all pump stations and lift stations shall be equipped with telemetry;
- equipment and components used for telemetry shall correspond with current equipment used by Council;
- designers shall consult with Council to get a current approved components list for telemetry equipment;
- the control panel shall be of 'standardised cubicle design' for installation outdoors. (IP rating shall be IP 65D and no lesser rating will be accepted - See drawings);
- the cubicle shall be constructed from 3mm 'Marine Grade Aluminium' sheet, welded at joints and stiffened where necessary to form a weather/vermin proof enclosure. Welds are to be ground smooth and flush with panel surfaces;
- cubicles to have a powder coat colour to mist green finished surface,
- the cubicle basically should form four separate compartments' to accommodate the following equipment:
 - General controls, motor starting equipment and control terminals
 - Metering for the power supply company and main switch/circuit breakers;
 - Outgoing motor plug connectors where fitted ; and
 - Telemetry Equipment.
- ventilation holes shall be provided in the cubicles covered with stainless steel wire gauze with 1.5mm squared openings and retained by framing secured by metal thread screws. Four openings shall be provided, two at each side of the switchboard with one each at the top and bottom and on both sides of the plug compartment. All openings shall be fitted with external metal shrouds of the same material as the switchboard. (These shrouds shall be designed to prevent the entry of windblown rain.) In addition, the inside of the ventilation openings shall be fitted with a removable dust filter which can be readily cleaned or replaced, which will allow to continually maintain the IP65D rating;
- suitably positioned sun shade panels must be attached to the top, Western and Eastern faces of the Control cabinet to prevent over heating of electronic control equipment;

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

- where an air conditioning unit is fitted it shall be of a three phase type as specified by Council and controlled by a thermostat to operate whilst the pump drive is running.
- all doors are to have 'three point locking' where required and hinged with chrome plated pintal hinges. Locks to be of the vandal-type swing handle recessed for padlocking. A door stay shall be fitted to the inside of the door
- all doors to have a reed type switch fitted for intrusion alarm inputs to the telemetry system.
- gear mounting plate to be 3mm, aluminium sheeting folded, stiffened where required. Powder coated in white colour. Aluminium sheet thickness to be increased where mechanical loading of equipment requires same;
- flange plates fitted with gaskets shall be provided on the bottom of the cubicle;
- the 'hinged escutcheon panel' shall be mounted with pintal type hinges and fitted with Emka lock;
- electrical equipment offered shall be based on, but not limited to, the following requirements:
 - Main Switch/Circuit Breaker - The switchboard shall be fitted with a three phase main isolating switch of suitable rating in the form of a circuit breaker;
 - A Phase fail / phase asymmetry relay of DPDT configuration for each pump motor.
 - Primary surge protection shall be provided by:
 - Surge Diverters to earth and neutral installed on the 'load side' of the main switch/circuit breaker connected to three phases included neutral conductor, then bonded to an effective earth conductor with ground resistance not exceeding one (1) ohm. The surge diverters shall be rated at 280V, 15 KA to 20 KA (maximum 40KA) for a period of between 8 milliseconds to 20 milliseconds. And
 - 'Fault current', limiting fuses with neon indicators. Fault current fuses and surge diverters shall be mounted flush through meter/Eschuteon panel to allow for observation of the failed indication.
 - Secondary surge protection shall be provided by:
 - fitting a surge diversion unit to the load side of any control circuit breaker supplying the level control or other sensitive electronic equipment.
 - The rating of the secondary protection shall be so as to protect the equipment from any lightening strike or severe surge that is not intercepted by the primary surge protection diverter. Typically, this rating would be a minimum of 6KA.

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

- each of the following circuits shall be fitted to the switchboard:
 - ❑ Twin 10 amp general purpose outlet complete with 30 milliamp earth leakage sensitivity protected by a circuit breaker, 20 amp;
 - ❑ 18 watt fluorescent light fittings shall be mounted inside the switchboard and controlled by a door switch; these lights shall be mounted in the common control and motor control areas.
 - ❑ Where requested, a 'wet well fan' motor circuit breaker (2.2kW, 4.2 amps, 3 Phase), providing short circuit and overload protection plus control switch and run indicator light shall be provided. This facility shall generally be provided on all switchboards controlling motors 11kW and greater. Terminals shall be provided in the 'termination area' for motor connection;
 - ❑ Where requested, a manual changeover switch shall be provided allowing a generator supply to power the switchboard. A 63A lockable power inlet shall be provided on the side of the panel allowing the generator to be plugged in when required. This facility shall generally be provided on switchboards controlling motors 11kW and greater;
 - ❑ A flashing **Amber** 12 Volt DC Strobe Light IP65 rated for 'high level alarm' detection shall be fitted to the top rain hood section of the switchboard protected by a stainless steel wire cage (mesh size 3mm x 25mm square opening - stiffened where required) and adequately spaced from the roof to ensure no electrolytic action occurs. The flashing light alarm shall operate via a local output from the Telemetry Module (RTU) and shall be configured to activate for either or both of well high level and power supply fault (phase asymmetry, phase under volts, power failure and pumps critical faults). A separate DC powered audible alarm IP65 rated shall be fitted to operate when the auxiliary high-level electrode is reached. When operated, audible alarm shall cycle continuously 10 minutes on and 10 minutes off while the high-high level condition exist. A 12V DC number plate type light with a protective cover shall also be fitted to the front left hand side door of the switchboard. This shall be wired in parallel with the external amber alarm light
 - ❑ BOC/Liquid Air power: Where specified for Liquid Oxygen Installations. A three-phase 32amp 5pin switched socket is to be provided.
- Motor Protection and Starting Equipment - Unless otherwise approved, the following methods of motor starting shall be employed:
 - ❑ Motors rated up to and including 5kW - D.O.L;
 - ❑ Motors rated greater than 5kW - Soft Starter or Variable Frequency Drives where requested; and

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

- ☐ Equipment should be selected on the basis of Class 0.3 duty. (ie. frequent duty and 30 starts per hour). For motors rated at 22kW and over, each starter shall contain the following equipment at a minimum
- ☐ 'Motor protection circuit breaker' with plug in trip block c/w overload and short circuit protection;
- ☐ Trip indicating contacts differentiating between overload and short circuit trip;
- ☐ Circuit breaker standard auxiliary contacts;
- ☐ Remote operation facility for circuit breaker. If not protruding through Eschuteon panel;
- ☐ Contactors suitable for 'frequent duty starting' (Class 0.3);
- ☐ Thermistor relay. A resistor (260 ohm) shall be connected in series with one thermistor input. A control socket shall be provided for each thermistor input connections, or incorporated in the pump cable plug for smaller units; and
- ☐ Mechanical seal monitor relay 'Water in oil sensing', which is normally incorporated as an integral part in pump control.
- ☐ For motors rated to 30kW and over each starter shall contain equipment as detailed above as a minimum with the following exceptions:
 - ☐ Motor protective circuit breakers shall be moulded case circuit breakers c/w overload and short circuit protection;
 - ☐ Trip indicating contacts only;
 - ☐ 'Control Circuits' for each pump motor shall be separately protected by an individual MCB;
 - ☐ Provide adequate 'spare space' in the switchboard (minimum 10% overall) for future power and control installation, within cable ducting and equipment panel mounting panels.
- Mains Supply - The mains supply to be provided is 3 x 80 amps per phase for 1.8m diameter pump stations and 3 x 100 amps per phase for 3.6m diameter pump stations unless directed otherwise by the Superintendent. 2.4m pump stations shall have 3 x 80 amps per phase or as directed;
- Copper busbar – All bare copper busbars to be silver plated.
- Cables and Wiring - All wiring shall be carried out in a neat tradesperson like manner with adequate cable ducts, clips, etc. provided. Cable ducts shall be screwed to the mounting plate. Adhesive backed duct will not be accepted;

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

- The cable insulation for all control and power cabling is to be V-90 HT 0.6/1KV;
- All power wiring within the switchboard shall be carried out in flexible V-90 HT grade PVC insulated multi stranded tinned copper conductors of minimum size 2.5mm² (50/0.25mm²).- Suitable ferrules shall be crimped onto the conductor before connection.
- All control wiring shall be carried out in flexible V-90 HT grade PVC insulated multi stranded tinned copper conductors, of minimum size 1.5mm² (30/0.25mm²) - Suitable ferrules shall be crimped onto the conductor before connection. All wiring shall be coloured as follows:-

PHASES (Up to 16 mm²)

Red
White
Blue

PHASES (Above 16 mm²)

Red with Phase Identification at Both Cable Ends (Heat shrink or equivalent)

PHASE (NEUTRAL)

Black

EARTH

Green/Yellow

CONTROL – (250V AC).

- Pump 1 Orange
- Pump 2 Brown
- Pump Common Grey
- General Control Red
- Metering White

CONTROL (NEUTRAL)

Blue

CONTROL (12V DC)

Pos.VDC

Purple

Neg.VDC

Pink

CONTROL (24V DC)

Pos.VDC

Blue / Red Stripe

Neg.VDC

Blue / White Stripe

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

CONTROL (24V AC)

Pos.VDC

Neg.VDC

White / Red Stripe

Black / White Stripe

SCREENED ANALOGUE Positive

SCREENED ANALOGUE - Negative

White

Black

- Control Wiring Identification – All cable cores shall be identified by ferrules - Graphoplast Trasp System or equivalent.
- Labelling -Traffolyte labels shall be provided for “all equipment” fitted to the panel. Labels shall be fixed by means of fine threaded chrome plated round headed screws; adhesive backing will not be accepted! Push buttons and indicator lights shall be supplied with standard labels. The switchboard shall be supplied and fitted with an identification label of minimum size 105mm x 52mm x 2.0mm fixed to the front of the panel i.e. Pump Station Name/Designation, as provided by Caboolture Shire Council.

NOTE:

The clause numbers and table numbers given from this point in this addendum correspond with the clause numbers and table numbers given in the Sewerage Code of Australia WSA 04 - 2005

1.2.2 PUMPING ALTERNATIVES

Council require documentary evidence that life-cycle cost of all options have been analysed before approving a pumping station.

1.5.2 PLANNING RESPONSIBILITIES

Council will provide the Developer/Designer with Masterplan information associated with each catchment as available. Information that require further planning shall be dealt with pursuant Clause 1.5.3

2.7 STAGING

Staging shall be done in accordance with Council's requirements.

2.13 SECURITY

Security fence design shall be submitted to Council for approval.

2.15 SUPPORTING SYSTEMS

Electrical and control requirements in addition to those listed in WSA 04 are listed at the beginning of Appendix 3.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

2.17.1 COMMISSIONING PLAN

Pumps Stations shall be commissioned by the Contractor under Council's instruction in accordance with Council's pump station commissioning procedure

3.1 GENERAL

The capacity shall be equal to the ultimate DF from the system.

3.2 DESIGN TOLERANCES

Levels shall be to AHD and coordinates to GDA.

3.7 EASEMENTS

Refer to Section 1.5 of the Manual for Council's requirements on easements. Any deviation from these requirements shall be subject to prior agreement and approval of Council.

3.11.6 DEVIATION OF PRESSURE MAINS AROUND STRUCTURES

Bending of PVC pipes shall not be permitted.

4.2.2 CONCRETE SURFACES

The concrete protective coatings approved by Council shall be provided for all the internal surfaces of the pumping stations, receiving maintenance holes and discharge maintenance holes.

4.2.4 MISCELLANEOUS ITEMS

Dissimilar metals shall be effectively insulated to prevent corrosion.

5.1 PUMPING STATION DESIGN – INTRODUCTION

Section 5 references various Standard Drawings. Council Standard Drawings that form part of the Manual shall have precedence over any WSA Drawings referenced in the text of Section 5.

5.2.6 LANDSCAPING

Landscaping and fencing to the pumping station site and access shall be provided to improve visual amenity, provide noise attenuation and to comply with development approval requirements. A landscaping plan shall be submitted to Council for approval and to comply with



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

development approval. The minimum requirements shall be a 50mm layer of decorative gravel over weed matting to cover the unused portions of the pumping station compound up to the perimeter fencing

5.4.2 SIZING

Wet-well sizing shall be in accordance with section 5.7.1 of the Manual

5.4.7 WASHERS

Council requires an approved wet-well washing system to be supplied and installed in all pumping stations controlled by a Man-Off-Auto switch. Copper connection at the RPZ shall be bonded by 4mm² wire back to main earth link.

Where an OFF LINE storage containment well is required a well washer system is to be installed and shall be controlled by a Man-Off-Auto switch to a separate solenoid, accessed from control panel. The type of well washer system required shall be determined by the size of the containment well.

The Auto sequence is to run after the water level has dropped below the HI-HI probe setting in the main pump wet well.

Approval shall be at Council's sole discretion.

5.6.1 OVERFLOW CONTAINMENT – GENERAL

Storage shall be provided in accordance with Section 5.7 of the Manual. As a general rule, it is preferred that storage be provided in the well, taking into account system storage. Alternative solutions shall be subject to Council approval.

5.8 WET WELL ACCESS COVERS

An approved aluminium safety grate shall be fitted into the wet well opening to be incorporated into the access cover structure and designed to open after the main access covers are opened.

6.2 HYDRAULIC DESIGN

Hydraulic design shall be in accordance with Section 5.7 of the Manual.

6.3 PUMP EQUIPMENT

The Designer shall obtain the list of preferred pumping equipment from Council.

Pump motors however shall be of four poles in configuration.

7.3.4 LIGHTING

Where the pump station is to be situated in a position away from adequate street lighting, or in areas with a high-risk classification, additional area lighting may be required.

This lighting is to be installed atop the vent pole with a control switch inside the switchboard.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

9.1.1 PUMP DISCHARGE PIPEWORK – GENERAL

Section 9 references various Standard Drawings. Council Standard Drawings that form part of the Manual shall have precedence over any WSA Drawings referenced in the text of Section 9.

A Council approved electromagnetic flow meter shall be installed as per the manufacture's instructions and as shown on the Drawing Number CAB-S03.

The earth bonding shall be of 4mm² in sizing and connected back to the main earth link.

The earth links across corresponding flanges shall to be made as per manufacturers specifications.

9.2.1 ISOLATING VALVES

Isolating valves shall be clockwise opening.

9.3.1 VALVE CHAMBER – GENERAL

Direct burial of pipework, valves, meters and specials is not permitted unless otherwise approved by Council.

9.3.3 DISMANTLING JOINTS

Council requires dismantling joints to be provided in the valve chamber to allow easy removal of valves.

10.1.1 PRESSURE MAIN – GENERAL

Section 10 references various Standard Drawings. Council Standard Drawings that form part of the Manual shall have precedence over any WSA Drawings referenced in the text of Section 10.

In addition to the provisions made in WSA 04, Council requires rising mains to be designed to have a minimum continuous rise of 1:1000 where feasible. If it is not feasible they shall have minimum rises and falls of 1:500 and 1:250 respectively. Where feasible, the rises and falls of the rising mains shall be such that it would minimise the requirement of using air valves. Scour valves shall be provided at low points. Intermediate high points on the rising main shall be vented where possible. If the hydraulic grade line and/or odour control requirements does not permit to provide a vent pole, approved air valves shall be provided at high points unless otherwise approved by Council. The scour and air valves shall be housed and marked as directed, and should preferably discharge to a gravity sewer or a pump out manhole. Section sluice valves shall be provided every 1000 metres unless otherwise approved.

10.2.2 ROAD RESERVES

Rising mains that are to be constructed in roads shall be in accordance with Planning Scheme Policy Number 4 – Design & Development Manual Part A –Roadworks and Stormwater Drainage Standard Drawing Numbers 01-64 and 01-74 for public utility locations in road reserves.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

10.2.6 EASEMENTS

In addition to requirements listed in WSA 04, easements are required in accordance with Section 1.5 of the Manual.

10.11.2 DISCHARGE MHs

Rising mains must discharge to a standard discharge manhole as detailed on Council's Standard Drawing No. CAB-S09. Council may require venting at the discharge manhole.

11.1.1 FOUNDATION DESIGN AND GROUNDWATER CONTROL

Flotation prevention using emergency pop-up valves is not permitted

11.3.2 PRODUCTS AND MATERIALS

Acceptable pipeline materials are listed in Section 5.6 of the Manual.

11.3.7 BULKHEADS AND TRENCH STOPS

Trench stops are required for gradients steeper than 10%. Spacing shall be at every 1m increase or decrease in invert level.

12.1.1 SUPPORTING SERVICES – GENERAL

Section 12 references various Standard Drawings. Council Standard Drawings that form part of the Manual shall have precedence over any WSA Drawings referenced in the text of Section 12.

15.3 DRAFTING STANDARDS

Drafting standards and as constructed drawings shall comply with Sections 2.4.3 and 2.6 of the Manual.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

36 ACCEPTANCE TESTING

Vacuum testing of pumping station wet wells is not permitted these must be tested hydrostatically in accordance with AS 3735. Such testing shall be carried out prior to the application of any protective coatings. The Consulting Engineer shall certify compliance with AS 3735 Standard.

STANDARD DRAWINGS

Standard Drawings that form part of the Manual shall have precedence over any WSA Drawings. Specific reference is made to Council's Standard Drawings CAB-S01 to CAB-S09, CAB-G01 to CAB-G04 and CAB-S20 to CAB-S24.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

APPENDIX 4 Asset Management Requirements and Pro-forma

CABOOLTURE SHIRE COUNCIL

ASSET MANAGEMENT SPECIFICATION FOR WATER AND SEWERAGE WORKS

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.4.1.1.1 Hansen Asset Management System

The Hansen Asset Management System (AMS)) has been adopted by Caboolture Shire Council for the management of preventative and corrective maintenance of its assets.

Basic information about equipment and facility items shall include descriptions, manufacturer, model number, serial number, technical name plate data, replacement costs, start up date, recommended spare parts and other details as required and specified on the asset management return.

Name plate data varies for different kinds of equipment and facility items, and separate asset management returns shall therefore be completed for each of the following items:

- (1) Pumps;
- (2) Motors;
- (3) Special line valves and pumping station valves;
- (4) Meters;
- (5) Chambers;
- (6) Pump wells;
- (7) Pump houses;
- (8) Switchgear;
- (9) Ventilation fans;
- (10) Pump gantry; and
- (11) All other mechanical and electrical equipment not listed above.

Items excluded from asset management returns include:

- (1) Pipelines, Gravity Vacuum and Pressure;
- (2) Pipeline valves, hydrants and fittings;
- (3) Sewer manholes;
- (4) Sewer House Connections
- (4) Valve and hydrant boxes;
- (5) Thrust blocks;
- (6) Marker posts;
- (7) Air/Gas valves;
- (8) Scour Valves and Pump out Points; and
- (9) Water Meters.

Asset returns shall be satisfactorily completed by the principal contractor and shall be supplied to Council prior to the acceptance of the contract works on-maintenance.

If the asset returns are found to be incomplete or inaccurate then the acceptance of the contract works may be deferred until such time as the relevant information is supplied to Council.

A separate asset return shall be submitted for each facility item, and only those returns, which form part of this specification, shall be accepted by Council.

This specification, which is inclusive of the asset management returns, shall form part of the tender documents.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.4.1.1.2 SEWER PUMP STATION ACQUISITION FORM



Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

NEW ☐ REPLACEMENT ☐ DISPOSAL ☐ RELOCATION ☐ OTHER ☐

RETURN COMPLETED TO ASSET MANAGEMENT

METHOD OF DISPOSAL: _____

LOCATION

Pump Station ID:	_____
Address:	_____
Position:	_____
Area:	Sub Area: _____
District:	Location: _____

STATION DATA

Station Type:	Wet Well Volume: _____
Lid/Slab Elevation:	O'flow Elevation: _____
No of Pumps:	Station Capacity: _____
Pump Discharge Size:	_____

ASSOCIATED

Date Built:	Service Status:
Ownership:	Usage Area:

CONTACT

Contact Name: _____	Unit: _____
---------------------	-------------

COMMENTS:

For Use By Asset Office Only

Equipment ID:	Area:
Sub-area:	Expected Life:
Asset Category:	Date entered in Register:
Contact Person:	Signature:
Asset No:	



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.4.1.1.3 SEWER / WATER PUMPS ACQUISITION FORM



Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

NEW ☐ REPLACEMENT ☐ DISPOSAL ☐ RELOCATION ☐ OTHER ☐
RETURN COMPLETED TO ASSET MANAGEMENT

METHOD OF DISPOSAL:

LOCATION

Address:	
Position:	District:
Area:	Sub Area:

STRUCTURAL

Pump Type:	Manufacturer:
Model No	Serial No:

ASSOCIATED

Date Installed:	Service Status:
Ownership:	Supplier:

NAME PLATE DETAILS

AMPS:	DE BEARING:	DELIVER DIA:	FRAME NO:
Hz:	IMPELLOR DIA:	MOTOR KW:	CAPACITY:
NDE BEARING:	PHASE:	REVS PER MIN:	SEAL TYPE:
SUCTION DIA:	TOTAL DYNAMIC	VOLTAGE:	

CONTACTS

Contact Name:	Unit:
---------------	-------

COMMENTS:

For Use By Asset Office Only

Sub-area:	Expected Life:
Asset Category:	Date entered in Register:
Contact Person:	Signature:
Asset No:	



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.4.1.1.4 SEWER / WATER VALVES ACQUISITION FORM



Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

NEW ☐ REPLACEMENT ☐ DISPOSAL ☐ RELOCATION ☐ OTHER ☐
RETURN COMPLETED TO ASSET MANAGEMENT

METHOD OF DISPOSAL:

LOCATION

Address: _____	
Position: _____	
Area: _____	Sub Area: _____
District: _____	Location: _____

STRUCTURAL

Valve Type: _____	Valve Status: _____
Valve Size: _____	Manufacturer: _____
Model No: _____	Serial No: _____

ASSOCIATED

Date Installed: _____	Service Status: _____
Ownership: _____	Usage Area: _____

CSC

CSC ID: _____	Supplier: _____
Job No: _____	Valve Function: _____

CONTACT

Contact Name: _____	Unit: _____
---------------------	-------------

COMMENTS:

For Use By Asset Office Only

Sub-area: _____	Expected Life: _____
Asset Category: _____	Date entered in Register: _____
Contact Person: _____	Signature: _____
Asset No: _____	



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.4.1.1.5 SEWER / WATER METER ACQUISITION FORM



Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

NEW ☐ REPLACEMENT ☐ DISPOSAL ☐ RELOCATION ☐ OTHER ☐
RETURN COMPLETED TO ASSET MANAGEMENT

METHOD OF DISPOSAL:

LOCATION

Address: _____	
Position: _____	District: _____
Area: _____	Sub Area: _____

STRUCTURAL

Meter Type: _____	Manufacturer: _____
Model No: _____	Meter Size: _____
Serial No: _____	No of Dials: _____

ASSOCIATED

Date Installed: _____	Usage Area: _____
Service Status: _____	Supplier: _____
Ownership: _____	

CSC

Job No: _____	Supplier: _____
---------------	-----------------

CONTACT

Contact Name: _____	Unit: _____
---------------------	-------------

COMMENTS:

For Use By Asset Office Only

Sub-area: _____		Expected Life: _____	
Asset Category: _____		Date entered in Register: _____	
Contact Person: _____		Signature: _____	
Asset No: _____			



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.4.1.1.6 SEWER / WATER MISCELLANEOUS ACQUISITION FORM



Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

NEW ☐ REPLACEMENT ☐ DISPOSAL ☐ RELOCATION ☐ OTHER ☐
RETURN COMPLETED TO ASSET MANAGEMENT ☐

METHOD OF DISPOSAL:

LOCATION

Position: _____	Description: _____
Address: _____	
Area: _____	Sub Area: _____
District: _____	

STRUCTURAL

Misc Type: _____	Length / Width: _____
Model No: _____	Height / _____
Manufacturer: _____	Weight / Depth: _____
Serial No: _____	Average Monthly _____

ASSOCIATED

Date Installed: _____	Ownership _____
Service Status: _____	

CSC

CSC ID: _____	Supplier: _____
---------------	-----------------

CONTACT

Contact Name: _____	Unit: _____
---------------------	-------------

COMMENTS:

For Use By Asset Office Only

Equipment ID: _____	Area: _____
Sub-area: _____	Expected Life: _____
Asset Category: _____	Date entered in Register: _____
Contact Person: _____	Signature: _____
Asset No: _____	



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.4.1.1.7 WATER BACKFLOW PREVENTER ACQUISITION FORM



Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

NEW ☐ REPLACEMENT ☐ DISPOSAL ☐ RELOCATION ☐ OTHER ☐
RETURN COMPLETED TO ASSET MANAGEMENT

METHOD OF DISPOSAL:

LOCATION

Address:	
Position:	
Area:	Sub Area:
District:	Location:

STRUCTURAL

Backflow Type:	Manufacturer:
Model No:	Serial No:
Backflow Size:	

ASSOCIATED

Date Installed:	Service Status:
Ownership:	Usage Area:

CSC

Supplier:	Testable:	YES / NO
-----------	-----------	----------

CONTACT

Contact Name:	Unit:
---------------	-------

COMMENTS:

For Use By Asset Office Only

Sub-area:		Expected Life:	
Asset Category:		Date entered in Register:	
Contact Person:		Signature:	
Asset No:			



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

5.7.4.1.1.8 EQUIPMENT ACQUISITION FORM



Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

NEW ☐ REPLACEMENT ☐ DISPOSAL ☐ RELOCATION ☐ OTHER ☐
RETURN COMPLETED TO ASSET MANAGEMENT

METHOD OF DISPOSAL:

LOCATION

Description:	Site:
Address:	
District:	Ownership:
Location:	
Subunit Of:	

STRUCTURAL

Equipment Type:	Service Status:
Model No:	Serial No:
Manufacturer:	Warranty Expires:
Purchase Date:	Purchase Cost:

CSC

CSCID:	Supplier:
Job No:	PO No:
Testable Item: YES / NO	

Contact Name:	Unit:
---------------	-------

COMMENTS:

For Use By Asset Office Only

Sub-area:	Expected Life:
Asset Category:	Date entered in Register:
Contact Person:	Signature:
Asset No:	

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

APPENDIX 5 – Large Water Meters

GUIDELINES FOR INSTALLING LARGE WATER SERVICE METERS

1. Objectives:

Caboolture Shire Council intends to install mechanical type water meters for large water services instead of electromagnetic magnetic flow meters. The main objectives of providing these guidelines are to ensure the correct selection of mechanical type water meters and to minimise their life cycle impacts.

2. Scope:

These guidelines are applicable for water meters greater than 50mm. The guidelines cover the general matters that need to be considered in selecting the type and size of meters and installing them. The guidelines do not cover each and every specific circumstance encountered in the field. It is the hydraulic designer's responsibility to ensure that all the water service installations are in accordance with Australian Standards, the Federal, State and Local Government rules and regulations and other Council's acceptable practices.

3. Selection of mechanical Type Water Meters

The hydraulic designer shall provide the Council with the estimated peak water flow rate and this shall be based on the loading units, probable simultaneous demands or other method acceptable to Council. The hydraulic designer, where appropriate, shall provide the following details.

- Details of fixtures/appliances
- Loading units
- Number of units
- Constant demands (e.g. pumps within the system)
- Probable simultaneous demand flow rates
- Any other demands (please specify)

This is to enable Council to estimate the available residual pressure in Council's water mains and to give an indication of the type and size of the meter to be used. The hydraulic designer's calculations shall be based on the residual pressure estimated by the Council. The type and size of the meter shall only be based on the flow requirements and the type of use and they shall not be based on the pressure loss through the pipe.

Factors influencing the selection of the type and size of meters include diurnal demand pattern,

Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
Document Number: CW-DC-0007	Revision No: 000	Revision Date: 21 Jan 04
Document Number: CW-DC-0007	Revision No: 001	Revision Date: August 06

pressures in Council's water main, diameters of the internal lines, life cycle cost of the meter, service life and the water tariff. The diurnal flow pattern should be compared with the accuracy envelope (provided by the meter manufacturer) of the meter. The meter characteristics that need to be considered in sizing the meters, as defined in ISO 4064 (1993), are as follows:

- q_{min} - The lowest flow rate at which the meter is required to give indications within the permissible tolerance and is specified as a ratio of the permanent flow rate q_n for various classes of meters.
- q_n - The flow rate for which the meter is designed and at which the meter is required to give indications within the permissible tolerance under normal condition of use
- q_{max} - The rate equal to 2 q_n which represents the highest flow rate at which the meter is required to operate in a satisfactory manner for a short period of time without deterioration
- q_t - The transitional flow which is between q_{min} and q_n

The overall weighted accuracy of the flow meter based on the estimated diurnal demand pattern and Council water tariffs need to be taken into account in selecting the meters. Where the diurnal flow pattern can not be determined with a sufficient accuracy (e.g. for a new development) by comparison with similar developments or by another acceptable method, the general guidelines provided in the *Manual Of Water Supply Practices – M6, Fourth Edition, 1999, Water Meters – Selection, Installation, Testing and Maintenance*, AWWA should be used in selecting the meter.

The general guidelines for selecting meters are:

80mm diameter and above – Where the flow ranges predominantly around q_n for the meter size, a turbine meter is likely to be the most economical meter. For sites with widely ranging flow profiles where a significant amount of the total usage occurs at a low flow rate, a compound meter may be the choice. Suggested applications for Compound meters are medium hotels and motels, schools, public buildings, laundries, and large apartments. Suggested applications for turbine meters are large hotels and motels, some manufacturing, refineries, petrochemical, public irrigation (no leakage), pump discharge and large government installations.

A typical example is given below (applicable for apartments, hotels and motels, minimum system pressure 350kPa, no fire protection, no booster systems)

80dn compound	<ul style="list-style-type: none"> - 50-99 units and a pool - 50-99 units with a pool and Laundromat or/and irrigation system - 100-199 units with a pool or Laundromat or irrigation system or with a pool or Laundromat or irrigation system or with a pool and Laundromat and irrigation system - 200-299 units or 200-299 units with a pool and/or Laundromat and/or irrigation system - 300-399 units or 300-399 units with a pool and/or Laundromat and/or irrigation system
80dn Turbine	-400-499 units or 400-499 units with a pool or/and Laundromat or irrigation system
100dn Turbine	400-499 units with a pool and Laundromat and irrigation system

The final selection of the type and size of the meter shall be approved by the Council based on the details provided by the hydraulic designer.

<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

Where existing meters are to be replaced, Council will make arrangements to install data loggers where possible. The replacement meter shall be selected to provide the most economical meter installation when considering the weighted accuracy of the meter. Weighted accuracy is calculated using the accuracy envelopes published by the meter manufacturer.

4. Metered Service Connection Formats:

The suggested formats in installing large water meters (greater than 50mm diameter) are:

- Format 1 – Metered water service for domestic use only, or combination of domestic and fire hose reels;
- Format 2 – Detector check with metered bypass water service for fire services supplying internal hydrants and fire sprinkler systems, including fire hose reels.
- Format 3 – Combination of Format 1 (for domestic only supply) and Format 2 (for all fire services on site).

Detailed descriptions of the above formats are given below (refer the Attachment 1 for more details). **Note that it is the responsibility of the owner/occupier to select, install and maintain appropriately rated backflow prevention containment protection on their water service connection to protect the authority's water supply network from contamination.**

4.1 Format 1 - Metered Water Service For Domestic or Combination Domestic and Fire Hose Reels

This format enables measurement of all water delivered to the property. This is the most preferable format where the relevant Australian Standards regarding hydraulic design can be met. The meter must be sized on the expected flow characteristics, and may be single or compound, helix type.

4.2 Format 2 – Detector Check Water Service For Major Fire Systems

This format enables unrestricted high flows to major fire fighting systems (hydrants and sprinklers), whilst still metering lower flows through the bypass to hose reels and any internal leakage. No domestic services will be allowed off this type of service.

4.3 Format 3 – Combination Domestic and Major Fire System

This format simply comprises a Format 1 metered water service for only domestic supply in parallel with a Format 2 detector check with metered bypass water service for all fire sprinkler, hydrant and hose reel supply. Segregation of the domestic and fire systems must be maintained internally at all times for this type of water service connection.

It should be noted that flows through the detector check metered bypass should be minimal as it is an offence to use fire fighting equipment for anything other than fighting fires. If abnormally high flows are recorded by the bypass meter, Council will investigate water use on the property, and may instigate replacement of the existing service with a more appropriate metering system at the Owner's expense.



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

**APPENDIX 6 - ON MAINTENANCE INSPECTION CHECKLIST
(Water and Sewerage)**



<i>Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE</i>		
<i>Document Number: CW-DC-0007</i>	<i>Revision No: 000</i>	<i>Revision Date: 21 Jan 04</i>
<i>Document Number: CW-DC-0007</i>	<i>Revision No: 001</i>	<i>Revision Date: August 06</i>

Caboolture Shire Council**CHECKLIST PRIOR TO ON MAINTENANCE INSPECTION (Water and Sewerage)**

Development Address:

Date of Consultant's Inspection ____/____/____

Council Reference No.....STAGE

Consultant's Signature.....

ITEM		WORK PASSED			REMARKS
		Yes	No	N/A	
1.0	Sewerage Reticulation. The works have been finally inspected by the Consulting Engineer and:				
	(a) Construction has been completed as per the approved design and "As Constructed" plans with respect to pipe, diameter, levels, minimum grading, location and pipe specification.				
	(b) All house connections are constructed as per design and Council's standards and are minimum 3m from stormwater connections.				
	(c) Existing unsewered dwellings have been connected to the sewerage reticulation system and septic tank/trenches removed and area backfilled/compacted.				
	(d) House connections associated with existing dwellings are fully contained within the new lot boundary.				



<i>Document Title: DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE</i>		
<i>Document Number: CW-DC-0007</i>	<i>Revision No: 000</i>	<i>Revision Date: 21 Jan 04</i>
<i>Document Number: CW-DC-0007</i>	<i>Revision No: 001</i>	<i>Revision Date: August 06</i>

	(e) All pipes have been cleaned and are free of debris.				
	(f) All manholes have been benched/mortared/sealed.				
	(g) Lines and manholes have passed vacuum tests after backfilling (results attached).				
	(h) Manhole lids are 75mm above surrounding surface (30mm above F.S.).				
	(i) Trenches: i) No visible subsidence has occurred; ii) All density tests are satisfactory (results attached). iii) All restoration works have been satisfactorily completed and area has been top-soiled and grassed.				
	(j) Coloured CCTV inspection has been carried out. Report and Video/DVD has been assessed by the Consulting Engineer and an individual report provided (Video/DVD and individual report attached).				
	(k) Sewer house connections have been marked (markers brought to surface).				



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

2.0	Water Supply. The works have been finally inspected by the Consulting Engineer and:				
	(a) Water mains constructed as per approved design and "As Constructed" plan with respect to pipe diameter, depth, location, pipe specification and bedding.				
	(b) All valves, hydrants, bends, fittings and associated thrust blocks have been installed in accordance with Council's Standards.				
	(c) All valves and hydrants are clean, marked and concrete surrounds are flush with surrounding surface.				
	(d) All lines have passed pressure tests (results attached).				
	(e) All lines have been chlorinated and passed bacteriological testing (results attached).				
	(f) All service conduits are installed and marked (including kerb markers).				
3.0	Pump Stations. The works have been completed including structural, mechanical and electrical work.				
	(a) Operation and Maintenance Manuals including Asset Management details have been completed and are attached.				



<i>Document Title:</i> DESIGN AND DEVELOPMENT MANUAL FOR WATER & SEWERAGE		
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 000	<i>Revision Date:</i> 21 Jan 04
<i>Document Number:</i> CW-DC-0007	<i>Revision No:</i> 001	<i>Revision Date:</i> August 06

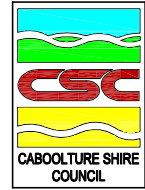
APPENDIX 7 Standard Drawings

CABOOLTURE SHIRE COUNCIL

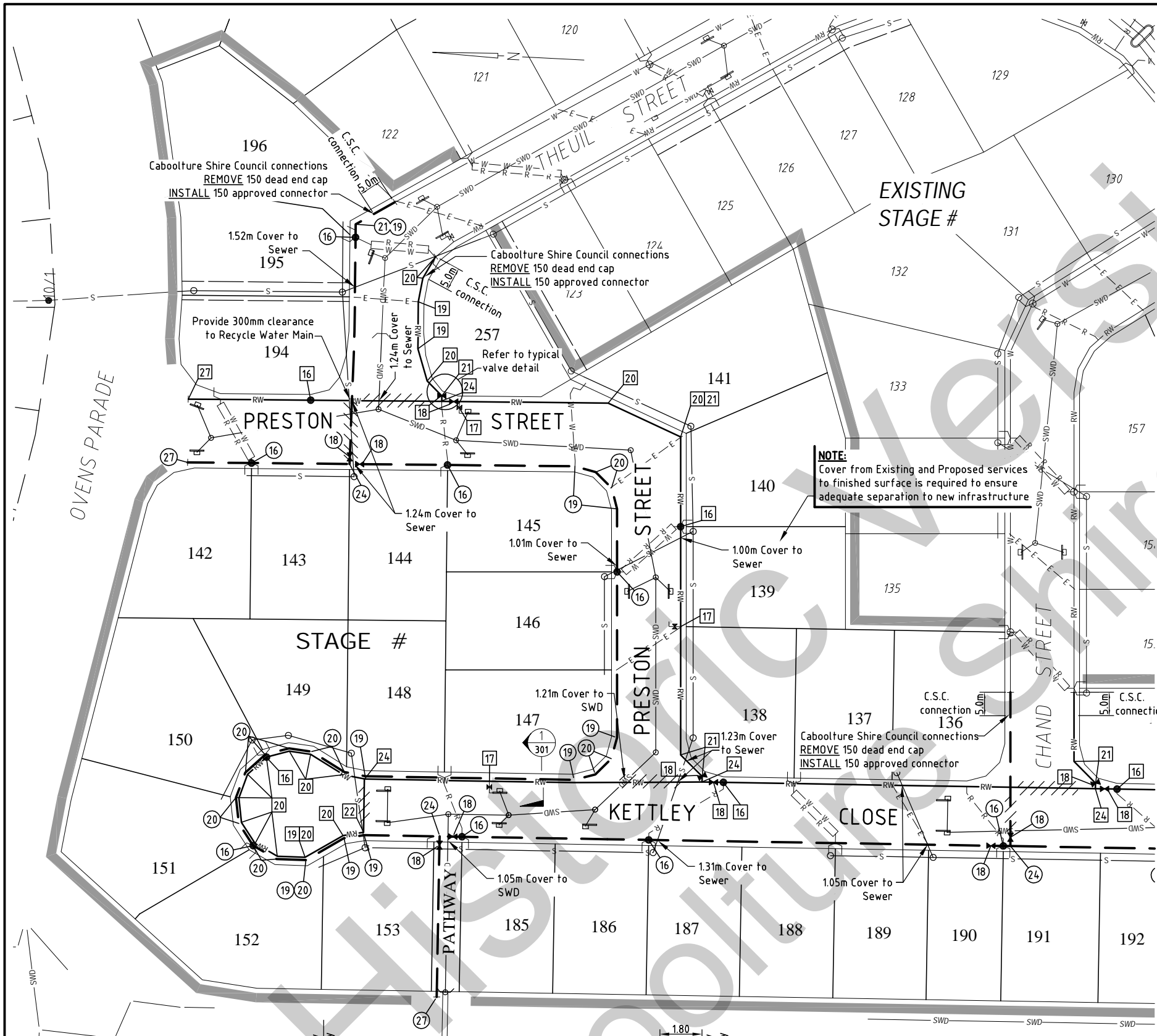
STANDARD DRAWINGS FOR WATER AND SEWERAGE WORKS

CABWATER

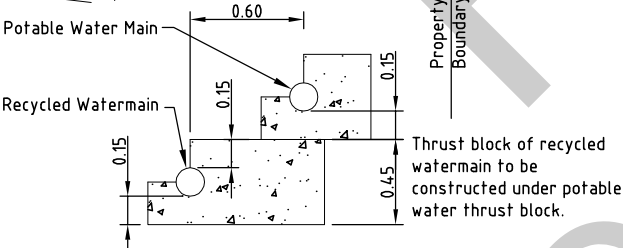
STANDARD DRAWINGS



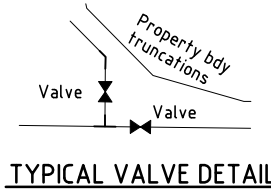
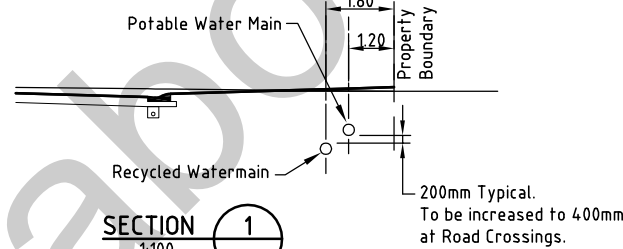
<u>GENERAL</u> Drawing No.	Rev.	Date	Description
CAB-G01	B	08/06	Water and Sewerage Reticulation - As Constructed Details.
CAB-G01-1	X-orig.	08/07	Sewerage Reticulation - Typical Design Plan Details
CAB-G01-2	X-orig.	08/07	Water / Recycle Reticulation - Typical Design Plan Details
CAB-G01-3	X-orig.	08/07	Sewerage Reticulation - Typical Longitudinal Section Details
CAB-G02	A	08/07	Aluminium Access Lids - General Arrangement.
CAB-G03	X-orig.	10/03	Aluminium Access Lids - Details.
CAB-G04	X-orig.	10/03	Aluminium Ladders - Details.
<u>WATER</u>			
CAB-W01	B	08/06	Typical Water Service & Conduit Details incl. Conduit Marker Detail.
CAB-W02	C	10/07	Water Meter Detail Greater than 50mm.
CAB-W03	X-orig.	10/03	Fire Hydrant Box and Valve Box - Detail Plan.
<u>SEWERAGE</u>			
CAB-S01	B	08/06	Sewerage House Drain Connection - Detail Plan.
CAB-S01-1	X-orig.	08/07	Sewerage House Drain - Manhole Connection - Detail Plan
CAB-S02	E	10/07	Submersible Pump Station - Typical Site Plan Details & Notes.
CAB-S03	D	10/07	2440 dia. Duplex Submersible Pump Station - Roof Slab Layout & Pipe Arrangement Plan.
CAB-S04	C	07/07	2440 dia. Duplex Submersible Pump Station - Sectional Details.
CAB-S05	E	10/07	1800dia. "Simplex" Submersible Lift Station - General Arrangement & Notes.
CAB-S06	D	07/07	1800dia. "Simplex" Submersible Lift Station - Pipe Arrangement Plan & Sectional Details.
CAB-S07	B	02/07	Submersible Pump Station - General Details.
CAB-S08	A	08/07	Sewer Pressure mains Ø100 to Ø225 - Scour and Gas Release Valve Details.
CAB-S09	A	08/06	Sewer Rising Main Discharge to Gravity Sewer - Detail Plan
<u>ELECTRICAL</u>			
CAB-S20	A	01/08	Simplex P.S. =<5.5Kw Schematic Single Line Wiring Diagram Sheet 1
CAB-S21	B	01/08	Simplex P.S. =<5.5Kw Schematic Single Line Wiring Diagram Sheet 2
CAB-S22	B	01/08	Simplex P.S. =<5.5Kw Schematic Single Line Wiring Diagram Sheet 3
CAB-S23	B	01/08	Simplex P.S. =<5.5Kw Equipment Schedule
CAB-S24	B	01/08	Simplex P.S. =<5.5Kw Panel Arrangement and Const. Notes
CAB-S25	X-orig.	01/08	Duplex P.S. =<5.5Kw Schematic Single Line Wiring Diagram Sheet 1
CAB-S26	X-orig.	01/08	Duplex P.S. =<5.5Kw Schematic Single Line Wiring Diagram Sheet 2
CAB-S27	X-orig.	01/08	Duplex P.S. =<5.5Kw Schematic Single Line Wiring Diagram Sheet 3
CAB-S28	X-orig.	01/08	Duplex P.S. =<5.5Kw Equipment Schedule
CAB-S29	X-orig.	01/08	Duplex P.S. =<5.5Kw Panel Arrangement and Const. Notes
Amendment 01/08			



NOTE:
Cover from Existing and Proposed services to finished surface is required to ensure adequate separation to new infrastructure



**THRUST BLOCK CLASH ARRANGEMENT
POTABLE WATER ON PROPERTY BOUNDARY SIDE**
CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.



GENERAL NOTES:

- The location of existing services as shown on the plan is indicative only and the contractor must ascertain the position of all services (i.e. Water, Electricity, Telstra, Gas, etc.) before commencing construction.
- Concrete thrust blocks (Class 'N20') shall be placed at all bends, tees, wyes and dead ends. (Refer to WSA Std Drg WAT-1205 for thrust block details).
- Swash hydrants shall be positioned so that the hydrant ball is between 75mm and 250mm below finished surface level.
- All ductile iron fittings and specials to be polyethylene wrapped.
- Water main road crossings of new roads are to be backfilled with sand to subgrade level.
- All connections and alterations to the existing watermains are to be carried out by Caboolture Shire Council at Developers expense.

GENERAL SERVICE & CONDUIT NOTES:

- Water service pipe, conduits and end fittings to be coloured coded:
- Blue for Potable water
- Lilac for Recycled water
Colour to be achieved by either the materials manufactured colour (striped or full colour), coloured polyethylene sleeved, coated or painted.
- Conduits to be a single 100mm Dia. Class 20 conduit with up to 2 x 25mm Dia. HDPE PN16 services. Ends of conduits are to be perpendicular from back of kerb to common RP boundary.
- Conduits are to finish a minimum of 300mm beyond the back of the kerb.
- 20mm (Class 16 min.) Dia. Polyethylene water services are to be laid from alignment to alignment through the service conduits as shown on the drawings. Water services are to line up with alignment extended to back of kerb.
- All conduits are to have each end exposed for inspection by council's water & sewerage technical officer at pre-seal stage.
- Before commencing installation of conduits, the contractor shall give CSC inspector 24 hours notice to allow inspection during installation
- Conduit road crossings of new roads are to be backfilled with sand to subgrade level.
- All conduit and water service works are to be carried out in accordance with the requirements shown on CSC Std. Dwg No's CAB-W01 and WSA Std Drgs. 1803 to 1806.

POTABLE WATER RETICULATION NOTES:

- New potable water mains shall be uPVC Class 16, except road crossings which shall be uPVC Class 20 or DICI PN35. All fittings shall be DICI. Non-metallic water mains to be installed with detectable marker tape in accordance with Council requirements.
- New water mains shall be located in footpath & offset 1.2m from property alignment.
- Blue RRP's shall be placed on the road centerlines opposite all potable water main hydrants as per WSA 03 Std Drg WAT-1300.

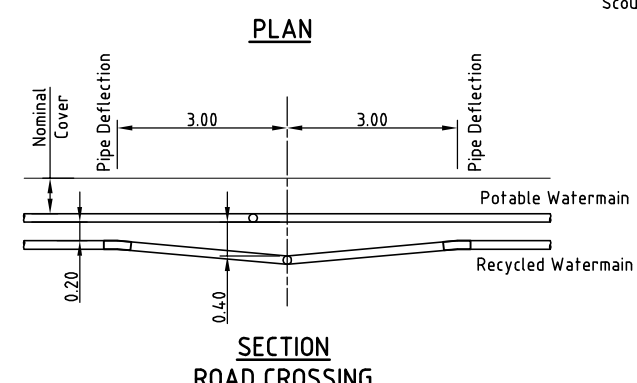
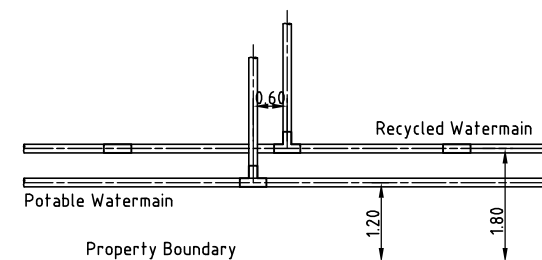
RECYCLED WATER RETICULATION NOTES:

- New recycled water main to be Lilac coloured, uPVC Class 16 RRJ, except for road crossings which shall be uPVC Class 20 or DICI PN35 RRJ. Non-metallic mains to be installed with detectable marker tape in accordance with Council requirements.
- New recycled water mains shall be located in footpath & offset 1.8m from property alignment:
- Recycle mains to have minimum 800mm cover.
- Hydrant riser to be powder coated lilac.
- Hydrant and scour valve markers, posts and boxes refer to WSA Std Drgs WSA-1820, 1821, 1825 for details.
- Vertical clearance of 400mm is required at crossings between Potable and Recycle mains

ITEM	DESCRIPTION
16	150 x 100 DIA. SWASH HYDRANT, TEE, RISER & MARKER
17	150 x 80 SCOUR TEE AND 80 DIA. VALVE
18	150 DIA. GATE VALVE & MARKER
19	150 DIA. x 11 1/4 D.I. BEND & THRUST BLOCK
20	150 DIA. x 22 1/2 D.I. BEND & THRUST BLOCK
21	150 DIA. x 45 D.I. BEND & THRUST BLOCK
22	150 DIA. x 90 D.I. BEND & THRUST BLOCK
24	150 x 150 DIA. D.I. TEE & THRUST BLOCK
27	150 DIA. END CAP & THRUST BLOCK

LEGEND

Proposed Water Service Conduit	— W — W —
Proposed Recycle Water Service Conduit	— R — R —
Proposed Electrical Conduit	— E — E —
Proposed uPVC Water Main	— — — — —
Proposed uPVC Class20/DICI PN35 Water/Recycle Main	— / / / / /
Proposed Recycled Water Main	— RW —
Dead End Cap	— — — — —
Stop Vales	— — — — —
Fire Hydrant	●
Reducer	>
Water Service Point of Entry	— C —
Scour Valve	— S —



5 0 5 10 15 20 25m
SCALE BEFORE REDUCTION (Do Not Scale)

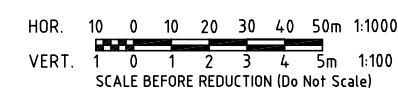
REVISIONS	INIT	DATE	NOT TO SCALE
ORIGINAL ISSUE	B.M.	8/07	



**CABWATER
STANDARD DRAWING
WATER / RECYCLE RETICULATION
TYPICAL DESIGN PLAN DETAILS**

DRAWING No.
CAB-G01-2
ORIGINAL SHEET SIZE
A3

PROP. DESCRIPTION
DIAMETER & TYPE
GRADE (1 in X)
GRADE (%)
JUNCTION INVERT LEVEL
DEPTH BELOW F.S.L. SURFACE LEVEL
INVERT LEVEL OF SEWER
FINISHED SURFACE LEVEL
EXISTING SURFACE LEVEL
PEGGED CHAINAGE

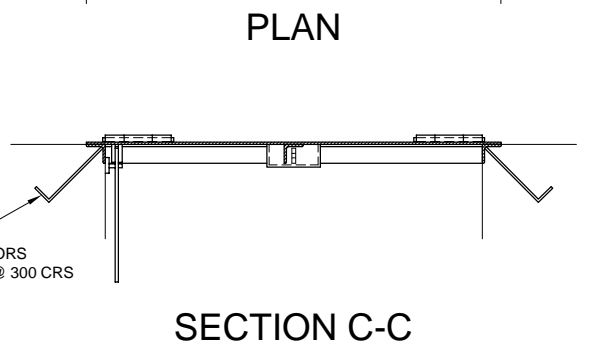
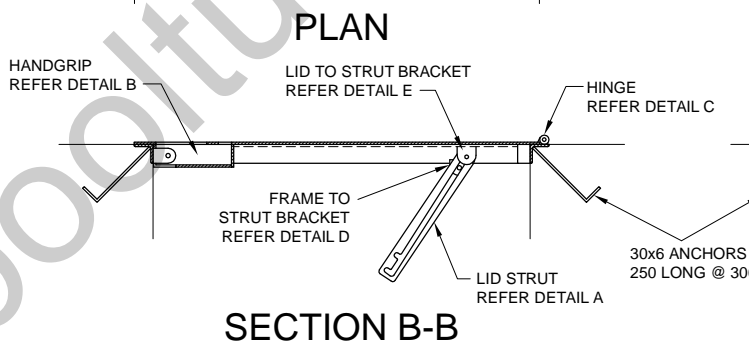
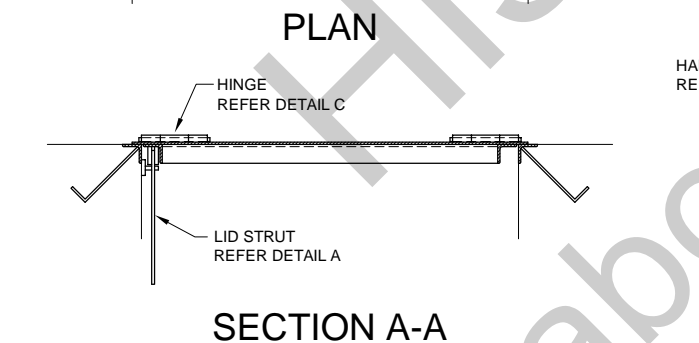
DATUM RL -4.0



NOT TO SCALE	Cabwater Manager	 Planning & Design Manager	Design Engineer	
--------------	------------------	--	-----------------	---

CABWATER
STANDARD DRAWING
SEWERAGE RETICULATION
TYPICAL LONGITUDINAL SECTION DETAILS

DRAWING No.	REV.
CAB-G01-3	
ORIGINAL SHEET SIZE	A3



REVISIONS		INIT	DATE
A	'SAFE HATCH' DETAILS ADDED	B.M.	8/07
X	ORIGINAL ISSUE	D.W.	10/03

NOT
TO
SCALE

[illegible]

Business & Planning

Design

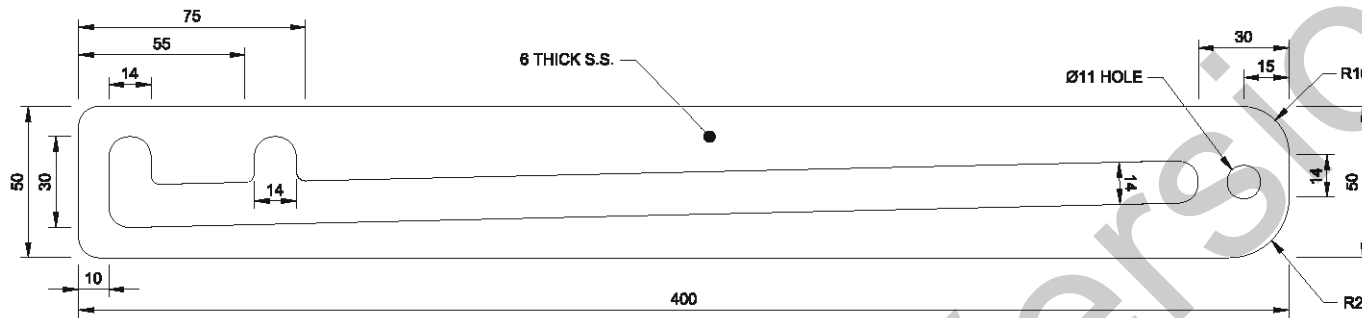


CABWATER STANDARD DRAWING ALUMINIUM ACCESS LIDS GENERAL ARRANGEMENT

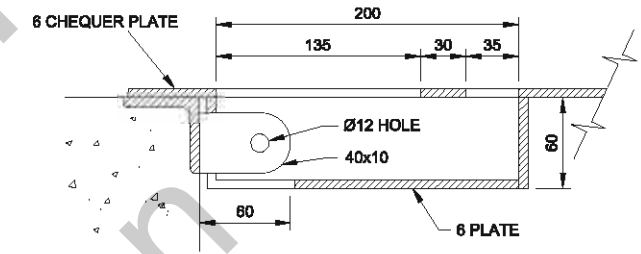
DRAWING No.
CAB-G02

ORIG SIZE A4	
--------------------	--

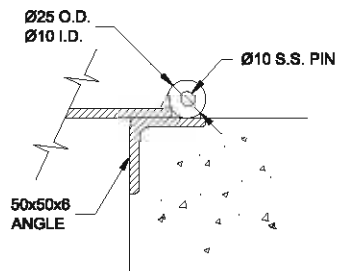
A					
---	--	--	--	--	--



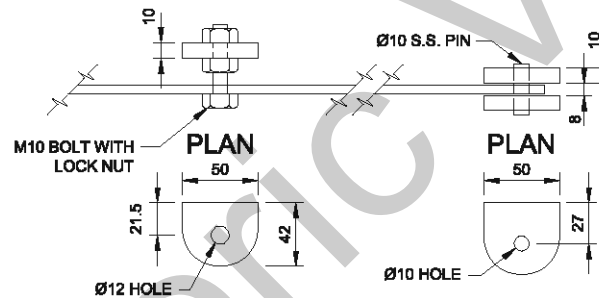
DETAIL A



DETAIL B

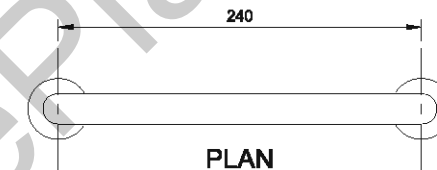


DETAIL C

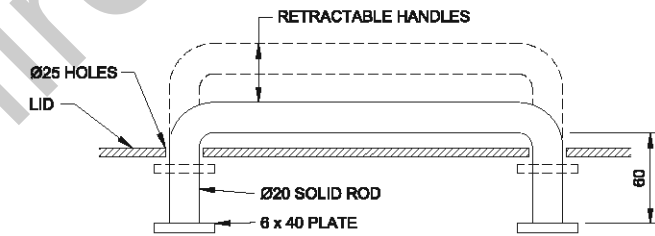


ELEVATION
DETAIL D

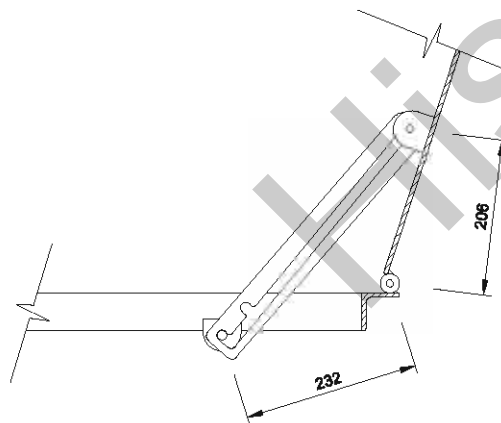
ELEVATION
DETAIL E



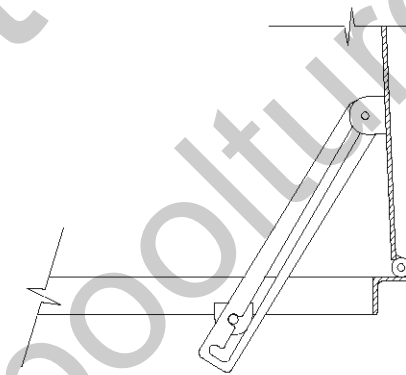
PLAN



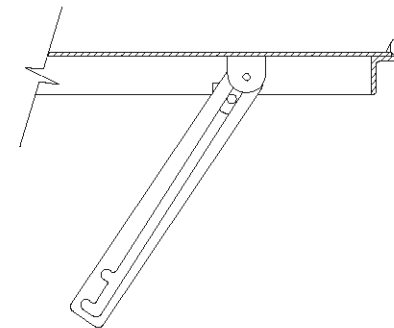
ELEVATION
RETRACTABLE HANDLE DETAIL



LID POSITION 1



LID POSITION 2



CLOSED POSITION

REVISIONS	INIT	DATE
ORIGINAL ISSUE	DW	1003

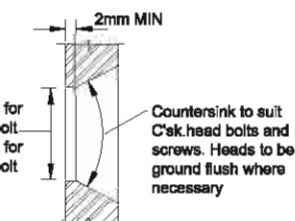
NOT
TO
SCALE

Manager	Business & Planning Manager	Design Engineer	CABOOLTURE SHIRE COUNCIL
---------	-----------------------------	-----------------	--------------------------

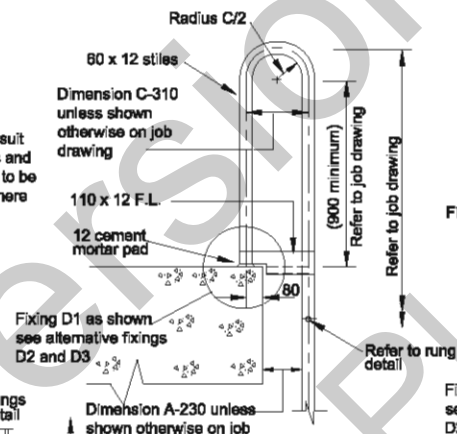
CABWATER
STANDARD DRAWING
ALUMINIUM ACCESS LIDS
DETAILS

DRAWING No.	ORIG. SIZE
CAB-G03	A4

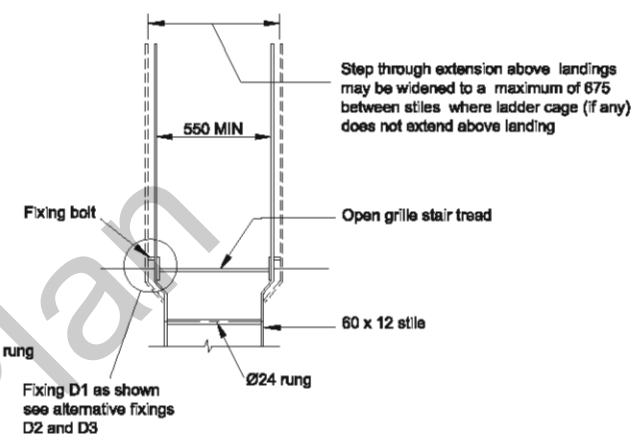
SIDE ELEVATION M-M



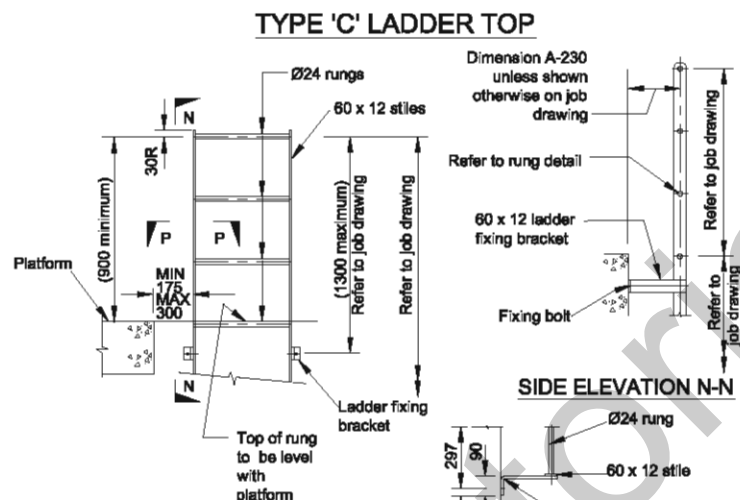
DETAIL OF COUNTERSUNK HOLE



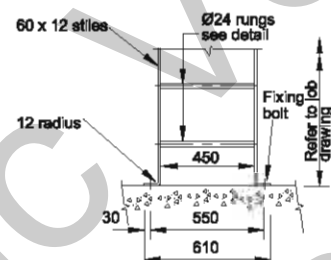
9 SIDE ELEVATION TYPE D1



FRONT ELEVATION TYPE D1



SIDE ELEVATION N-N



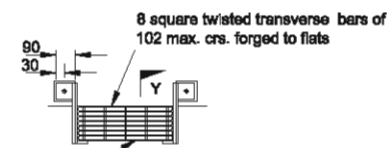
FRONT ELEVATION



ALTERNATIVE TYPE D3



ALTERNATIVE TYPE D2

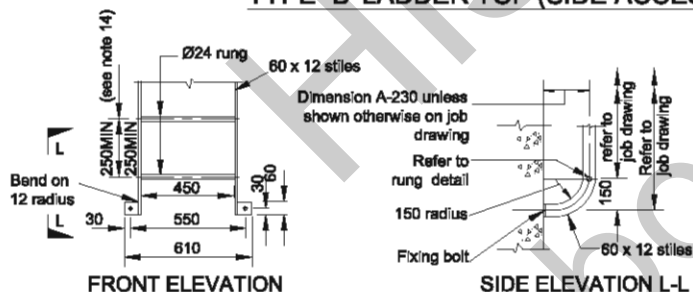


32x5 (6061-T6) load bearing
bars at 30crs. see note 12

PLAN VIEW TYPE D1

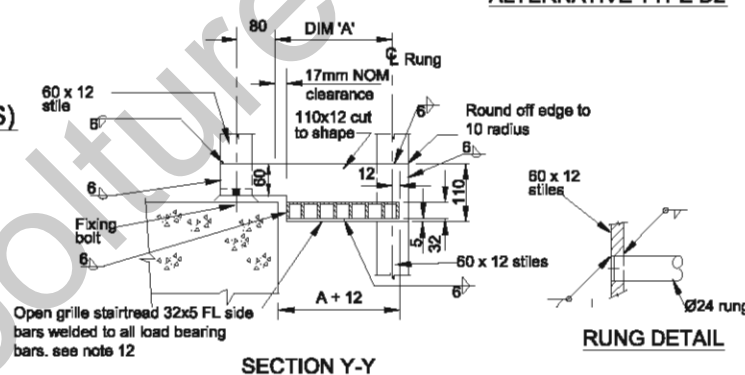
FRONT ELEVATION

TYPE 'B' LADDER TOP (SIDE ACCESS)



FRONT ELEVATION

SIDE ELEVATION L-L



RUNG DETAIL

DETAILS OF TYPE D1,D2 AND D3 LADDER TOPS

REVISIONS		INIT	DATE
X	ORIGINAL ISSUE	DW	10/03

NOT
TO
SCALE


Business & Planning Manager

**Design
Engineer**



CANADIAN SCHOOLS COUNCIL

CABWATER

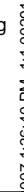
STANDARD DRAWING

ALUMINIUM LADDERS

DETAILS

DRAWING No.	ORIG SIZE
CAB-G04	A4

1. Water service conduits and 20mm dia services shall be provided and installed in locations shown on the project drawings.
2. The location of the conduits shall be indicated by brass service conduit marker discs positioned in kerb & channel directly above the conduit.
3. Temporary polystyrene or approved equivalent plugs or stops shall be inserted in the end of the conduits to prevent the entry of dirt or foreign matter.
4. Provide sand or rock bedding thoroughly compacted up to the underside of the pavement box. Trench width shall be 300mm as per specification.
5. A plastic tape (lilac for recycle) is to be provided between the surface marker and the end of the conduit.
6. Where conduits cross roads on the diagonal they are to be aligned on the extension of the property boundary to the kerb.
7. Where possible Telstra and waters service conduits are to be placed in a common trench, if such a situation is unavoidable, a minimum horizontal separation of 300mm is required, under no circumstances are conduits to be placed on top of each other.
8. All conduits are to have each end exposed for inspection by Council's Inspector.
9. Electrical conduits are not to be placed in the same trench as water conduits a minimum separation of 1m is required.
10. A 20mm service is to be provided using a pre-tapped Readytap Connector (or approved equivalent). Up to four services 20mm dia can be provided off each connector (two for each side of the road).
11. Two 20mm poly services are to be laid within conduit, the service is to be PN16 black (lilac for recycle) poly pipe.
12. The ball valve is the service connection termination, which is to be left in the closed position after construction and with the handle in the vertical position. The ball valve shall have a sealing plug inserted and a marker is to be placed to enable location from the surface level.
13. A small WHITE painted marker peg is to be placed at the end of all water services. A small LILAC painted marker peg is to be placed at the end of all recycled services.
14. Service conduit to be 100Ø PVC CL20 or SEH for residential A & rural residential and 200dia for residential B & C Commercial & Industrial zones. Multiple services to be laid in conduits in residential areas.
15. A minimum of 1m clear is required between a water service connection point and and electrical pillar box.



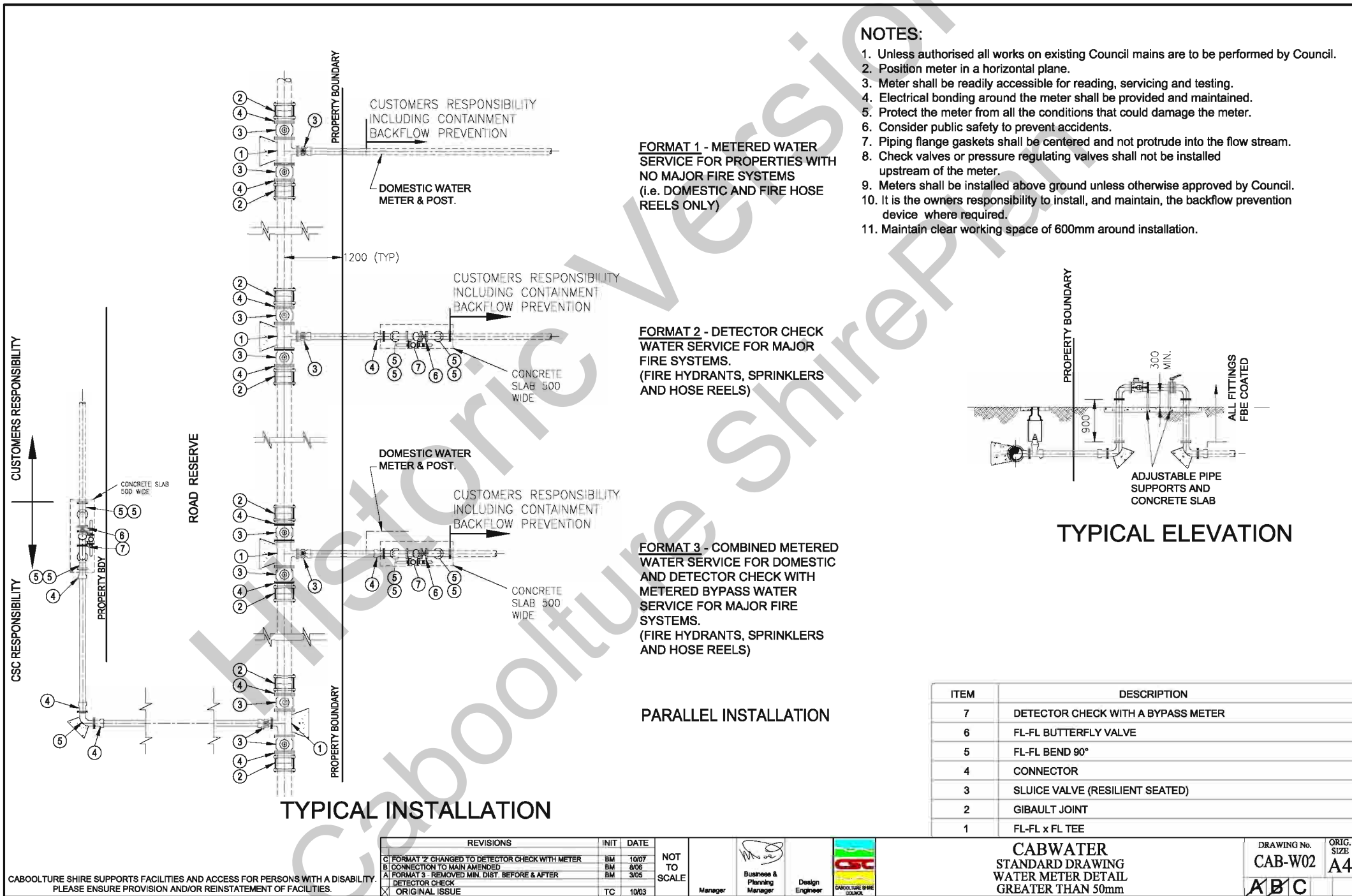
		REVISIONS	INIT	DATE
B	RECYCLE SERVICE AND CONDUIT DETAILS ADDED	B.M.	8/06	
A	SINGLE CONDUIT CROSSING	B.M.	3/04	
	ORIGINAL ISSUE	T.C.	10/03	

**CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY.
PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.**

NOT TO SCALE	Manager	 Business & Planning Manager	 Design Engineer	 COUNCIL OF SCIENCE
--------------	---------	--	--	---

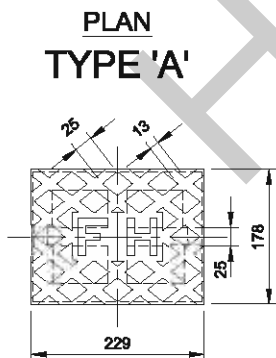
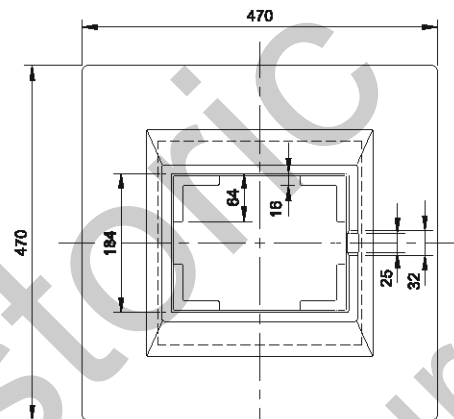
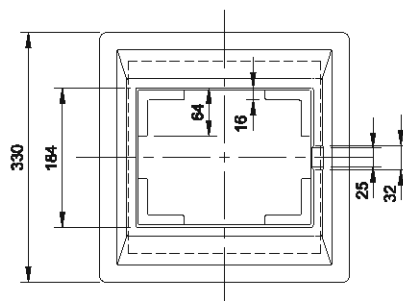
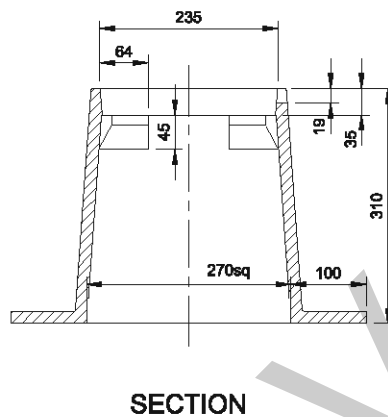
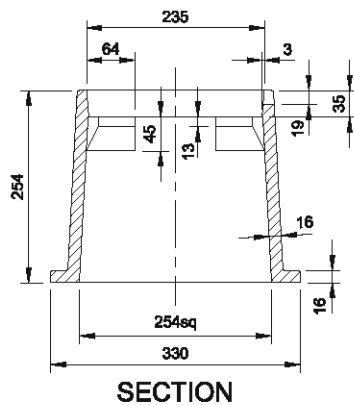
CABWATER
STANDARD DRAWING
TYPICAL WATER SERVICE & CONDUIT DETAILS
INCLUDING CONDUIT MARKER DETAIL

DRAWING No. CAB-W01		ORIG SIZE A4
A	B	



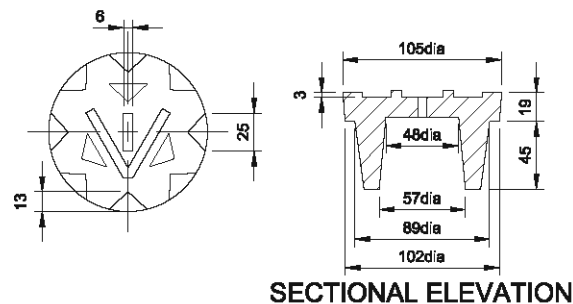
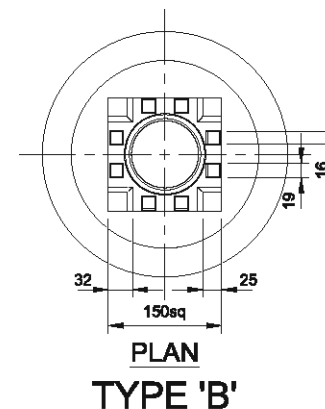
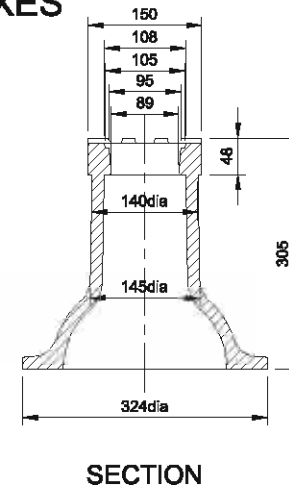
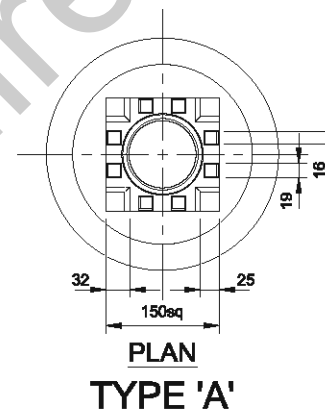
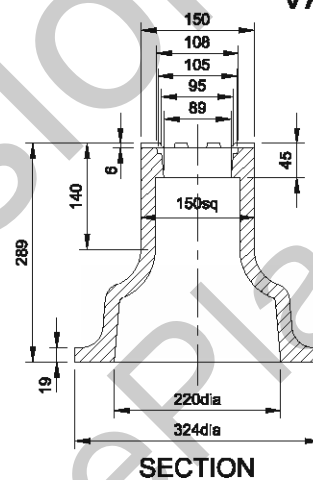
HYDRANT BOXES

VALVE BOXES



NOTES:

1. A bitumastic based material shall be applied to all boxes and covers when they are in a clean dry & rust free condition
2. Paint top of covers to the following code:
RED VALVE - RED
STOP VALVE - WHITE
HYDRANT - YELLOW



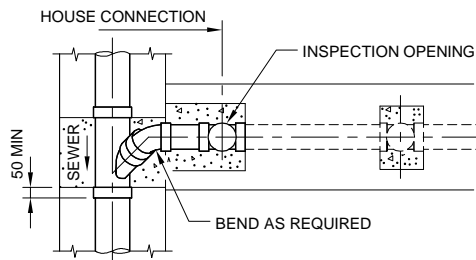
COVERS

NOTES :

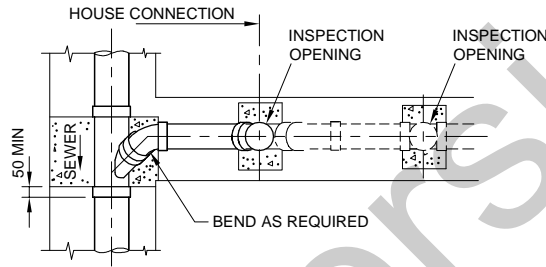
1. Mass of body; Type A = 26kg approx.
2. Mass of body; Type B = 23kg approx.
3. Mass of cover = 2kg approx.
4. Grey cast Iron, grade T180 to AS 1830.
5. Alternative valve boxes may be adopted where approved by Council Officers.
6. All dimensions in millimetres.
7. Cast Iron shall comply with AS1830 and shall be grade 220 Unless otherwise directed
8. TYPE 'A' Boxes shall be provided at all installations of fire hydrants & valves

REVISIONS	INIT	DATE	NOT TO SCALE
ORIGINAL ISSUE	TC	1003	

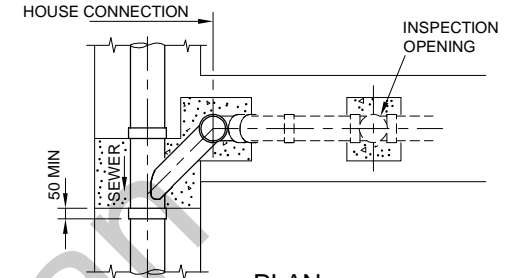
Manager	Business & Planning Manager	Design Engineer	CABOULTURE SHIRE COUNCIL
---------	-----------------------------	-----------------	--------------------------



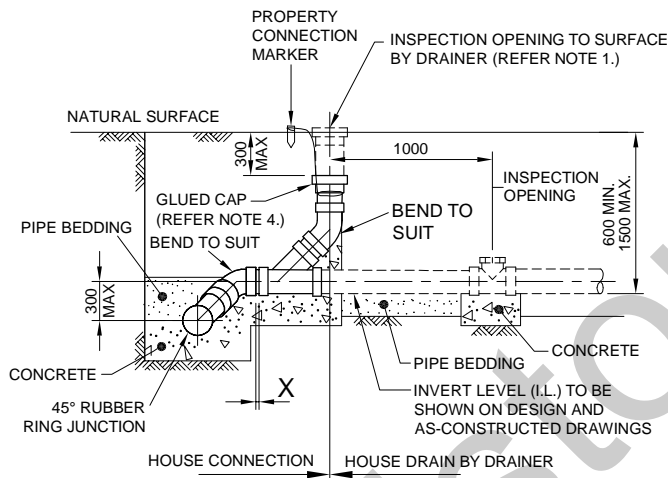
PLAN



PLAN

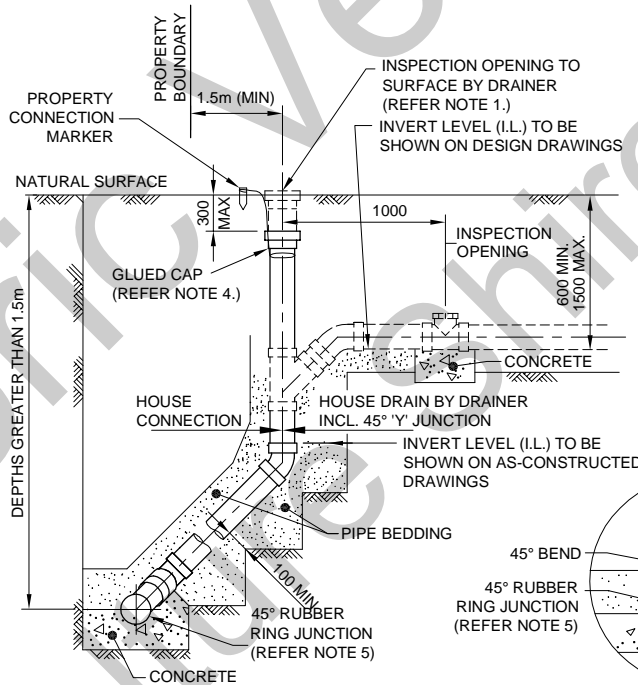


PLAN



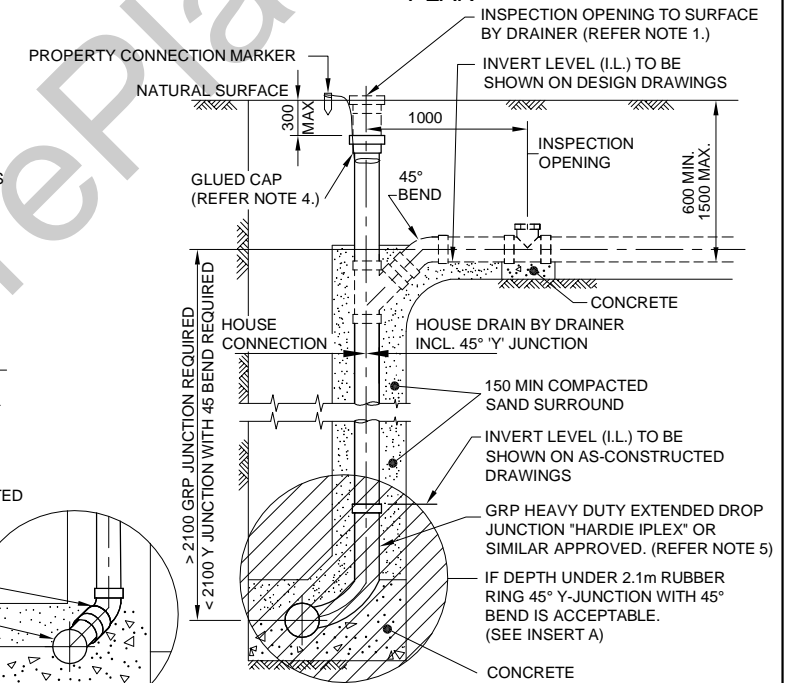
ELEVATION
TYPE D

(HOUSE CONNECTION WHEN SEWER LESS THAN 1.5m DEEP)
(EXTEND DIST X WHEN HOUSE CONNECTION LOCATED IN
ADJACENT BOUNDARY)



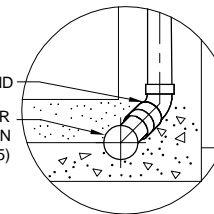
ELEVATION
TYPE E

(HOUSE CONNECTION WHEN SEWER IS OVER
1.5m DEEP AND LOCATED IN ADJACENT
BOUNDARY TO LOT BEING SERVICED)



ELEVATION
TYPE F

(VERTICAL DROP WHEN SEWER GREATER THAN
1.5m DEEP AND LOCATED IN LOT BEING SERVICED)

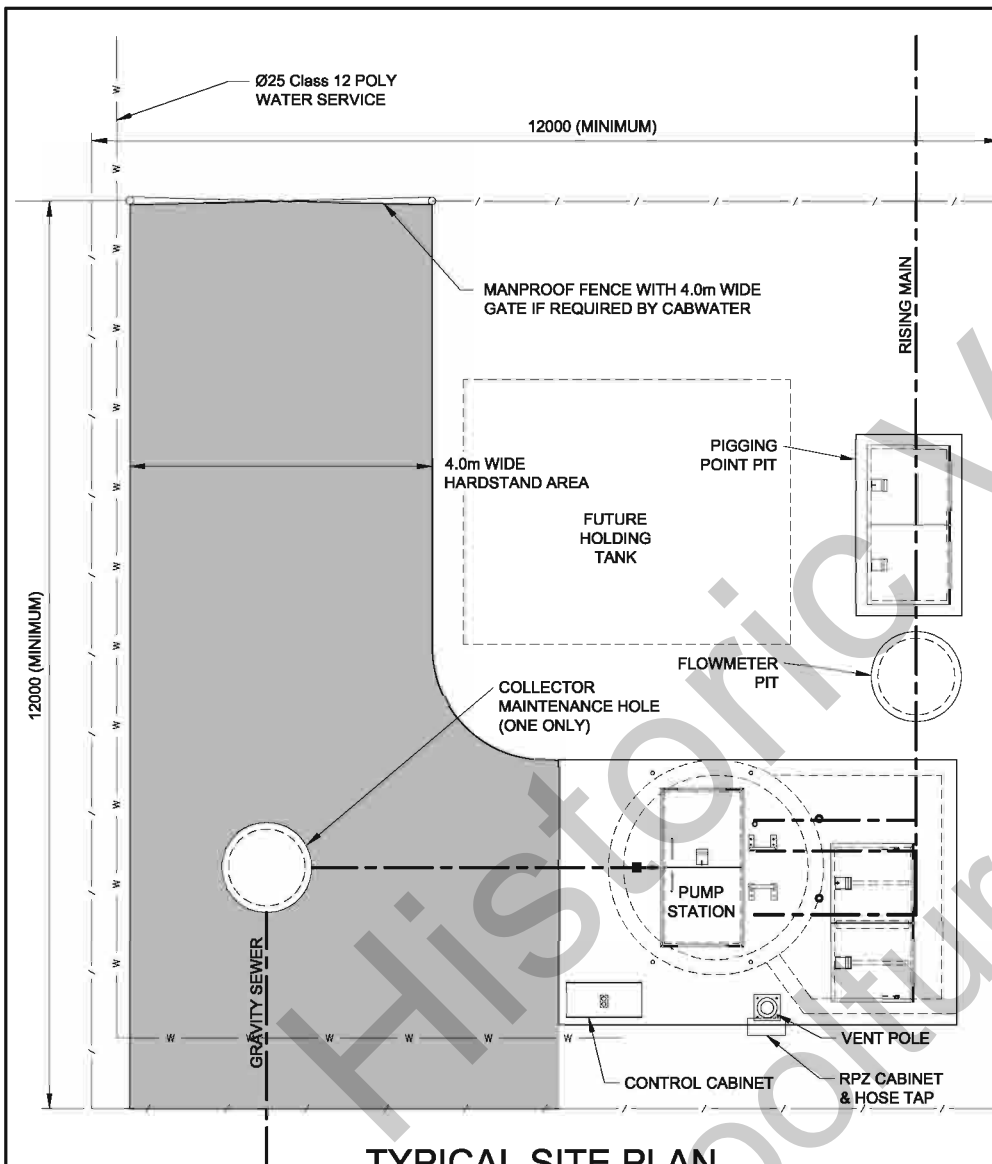


INSERT A

CONSTRUCTION NOTES

- Where internal drainage exists or is to be constructed as part of the property connection works, inspection openings shall be finished off with concrete surround, min. 50mm above finished surface level.
- Contractor to bring location markers to surface.
- Where noted Grade N20 concrete is required.
- House Drainer to bring bolted trap screw to surface.
- Connections < 2.1m deep do not require GRP heavy duty extended drop junction.

REVISIONS	INIT	DATE	NOT TO SCALE
B DESIGN & AS-CONST. LEVEL NOTE ADDED	B.M.	8/06	
A REVISED REFERENCE NOTE 4	B.M.	3/04	
X ORIGINAL ISSUE	D.W.	10/03	



TYPICAL SITE PLAN

GENERAL

1. This drawing and all other drawings that relate to sewage pumping stations shall be read in conjunction with the Sewage Pumping Station Code of Australia WSA 04 and the Design and Development Manual.
2. All structures shall be designed to be suitable for site specific Geotechnical and Water Table conditions.
3. Ground Water Table shall be assumed to be at ground level for the purposes of design unless otherwise approved by Council.
4. Vent pole and free-standing control cabinet (if required) are to be located adjacent to each other and on the opposite side of the pump station to the access, so as to minimise obstruction to vehicular movement.
5. Landscaping as directed by Cabwater.

MATERIALS

1. All nuts & bolts to be stainless steel grade 316 in accordance with AS1444. (treated with grease to prevent galling)
2. All pump lifting chains to be long link proof coil 8mm stainless steel chain, pitch 41.2mm, width 31.9mm and minimum working load of 500kg.
3. All aluminium to be coated with approved bituminous seal where set into or contacting concrete.
4. Mild steel hand grips to be hot dip galvanised.

CONTROL CABINET

1. For motor sizes of 22kw or less, the control cabinet may be mounted to the vent pole as detailed. For motor sizes greater than 22kw the control cabinet is required to be a free-standing cabinet, on a stand. (no plinth)
2. PVC conduit to be provided between bottom of switchboard plug compartment and entry into wet-well as per table (min. Ø150 for duplex pump stations). Suitable support and sealing are to be provided for pvc conduit both at entry to plug compartment and roof of wet-well at floor level.
3. Control cabinet & its hinges to be located to ensure technicians have a clear view of wet-well opening with cabinet door open/latched, while standing in front of instrument panel.
4. Where possible access door to control panel to open away from prevailing S.E. winds.
5. Heavy duty stainless steel mesh guard is to be installed as protection around flashing alarm light and audible alarm.
6. Mains conduit, when supplied by aerial service line to be strapped to the vent pole with stainless steel 'bandit strapping'.

LEVEL PROBE

1. Level probe to be provided in accordance with requirements of Cabwater.
2. Level probe to have manufacturer's support/cleaning bracket installed in a suitable location for access by maintenance staff.

SAFETY FITTINGS

1. Recessed "Davit" base to suit Sala jumbo portable davit to be installed at approved location as per SALA documentation.
2. Recessed Stainless Steel ring for fall arrester to be installed at approved location.
3. Provide holes in Pump Station Roof for Portable Safety Barrier

PIPEWORK

1. All pipework and fittings within concrete structures shall be designed to withstand thrust as applicable and shall be configured for easy dismantling.
2. All pipework and unprotected fittings in the pumpwell and pits shall be given three (3) external coats of an approved epoxy paint. Two coats before fitting and the third coat after installation.
3. Drop-pipe from inlet pipe to be constructed from high density polyethylene pipe.

VALVES & FITTINGS

1. All valves to be resilient seated with fusion bonded epoxy (fbe) coating
2. All fittings to be fusion bonded epoxy (fbe) coated

LADDER

1. Internal aluminium ladders shall conform to AS1657 in conjunction with C.S.C. standard drawing.
2. Intermediate supports are to be provided to all ladders.
3. Ladder to be bracketed to concrete pumpstation base in an approved manner.
4. Valve pit and holding tank entry requires fixed aluminium ladder access.

COVERS & OPENINGS

1. Pump Station, holding tank and valve pit openings shall generally be 1000 x 2000 fitted with dual aluminium access covers as per C.S.C. standard drawing. However the volute diameter of the pump used may dictate an increase in the opening requirements.
2. Hinged safety grating 'SAFE HATCH' to be fitted below all Pump Station covers.
3. 'Compribond' or an equiv. approved foam gasket sealer is to be provided between the access lids and frames to insect proof the chamber.
4. Access lids to have a bituminous coating exposed surface and have hinge pins (stainless steel) securely attached (preferably welded).

1. COLLECTOR MAINTENANCE HOLE

Collector Maintenance Holes must be provided downstream of all connections to the gravity sewer, so that there is single line entry to the pump station.

1. INTERNAL COATING

Internal surfaces to pump station, holding tank, collector maintenance manhole and outflow maintenance manhole shall have concrete protection with approved epoxy coating or liner.

1. WELL WASHER

Pump station well washer to Council specification.
Well washer to be installed by Contractor in a clear space where rotating arms will not come into contact with other obstructions. Mount one (1) metre above HIGH LEVEL ALARM POINT or as per supplier's instructions.

CONDUIT TABLE

MOTOR CAPACITY	CONDUIT SIZE
22 kW MAX.	Ø150
>22 kW	INDIVIDUALLY SIZED TO SUIT PLUG SIZE

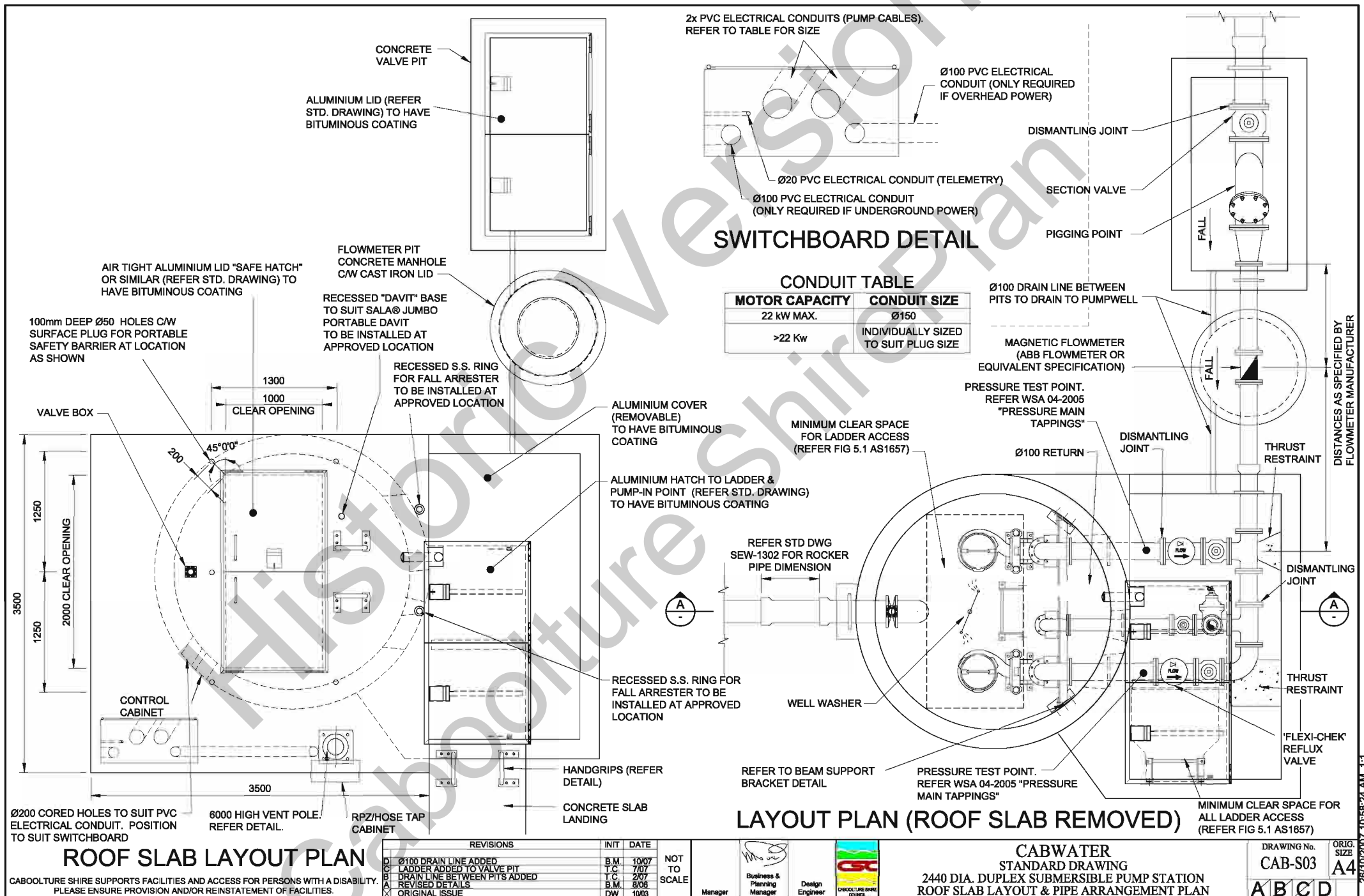
REVISIONS	INIT	DATE
E MINOR AMENDMENT	B.M.	10/07
D NOTES 'SAFE HATCH' ADDED	B.M.	8/07
C NOTES AMENDED	T.C.	7/07
B NOTES AMENDED, ALARM ADDED TO CABINET	T.C.	2/07
A NOTES AMENDED, FUTURE HOLDING TANK ADDED	B.M.	8/06
ORIGINAL ISSUE	DW	10/03

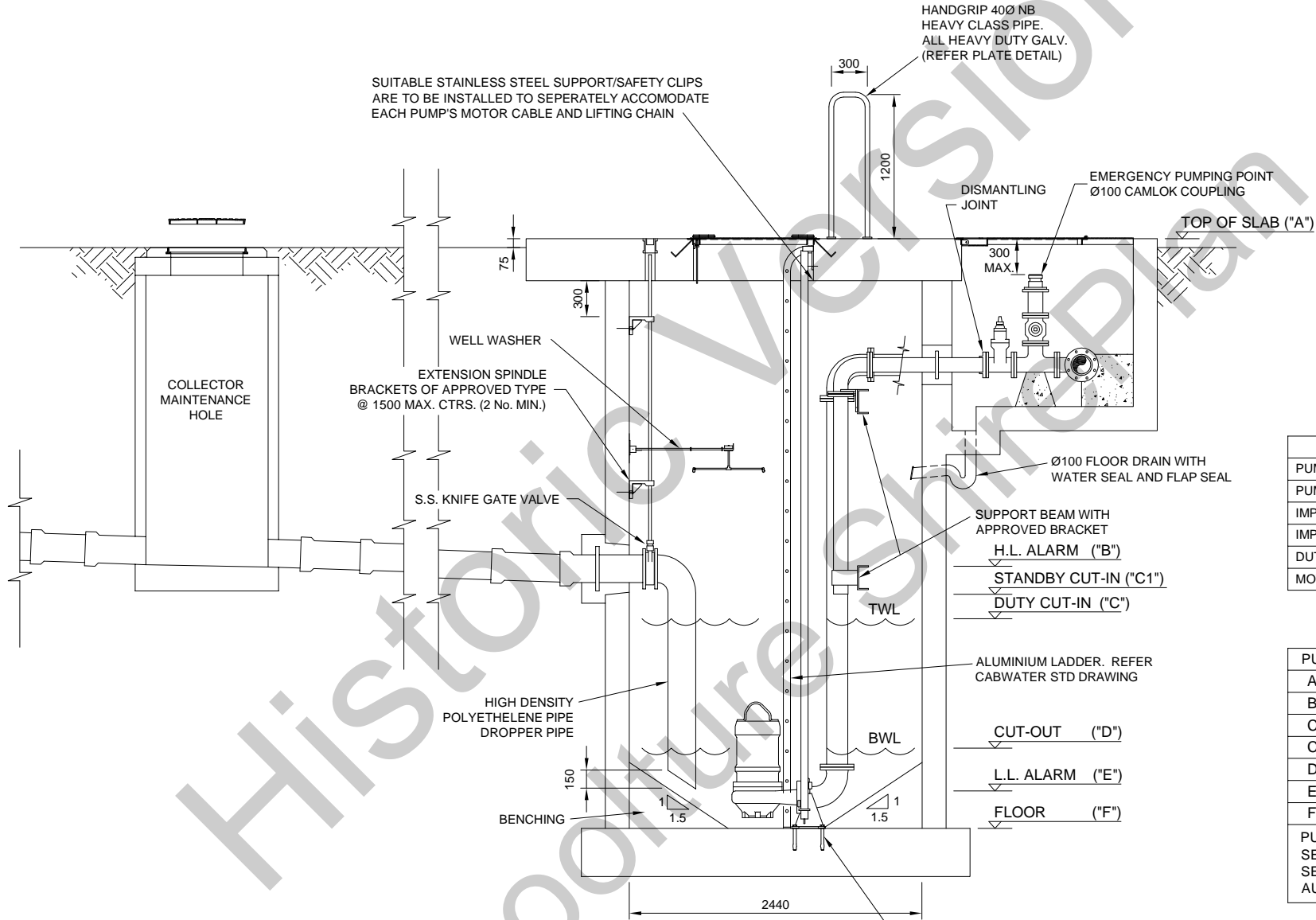
NOT TO SCALE

Manager	Business & Planning Manager	Design Engineer	CABOOLTURE SHIRE COUNCIL
---------	-----------------------------	-----------------	--------------------------

CABWATER
STANDARD DRAWING
TYPICAL SUBMERSIBLE PUMPING STATION
SITE PLAN DETAILS & NOTES

DRAWING No.	ORIG. SIZE
CAB-S02	A4
A	B
C	D
E	





SECTION A-A

PUMP INFORMATION	
PUMP MANUFACTURER	
PUMP MODEL No.	
IMPELLOR TYPE (eg GRINDER)	
IMPELLOR Ø	mm
DUTY POINT (FLOW @ HEAD)	l/s @ m
MOTOR SIZE	kW

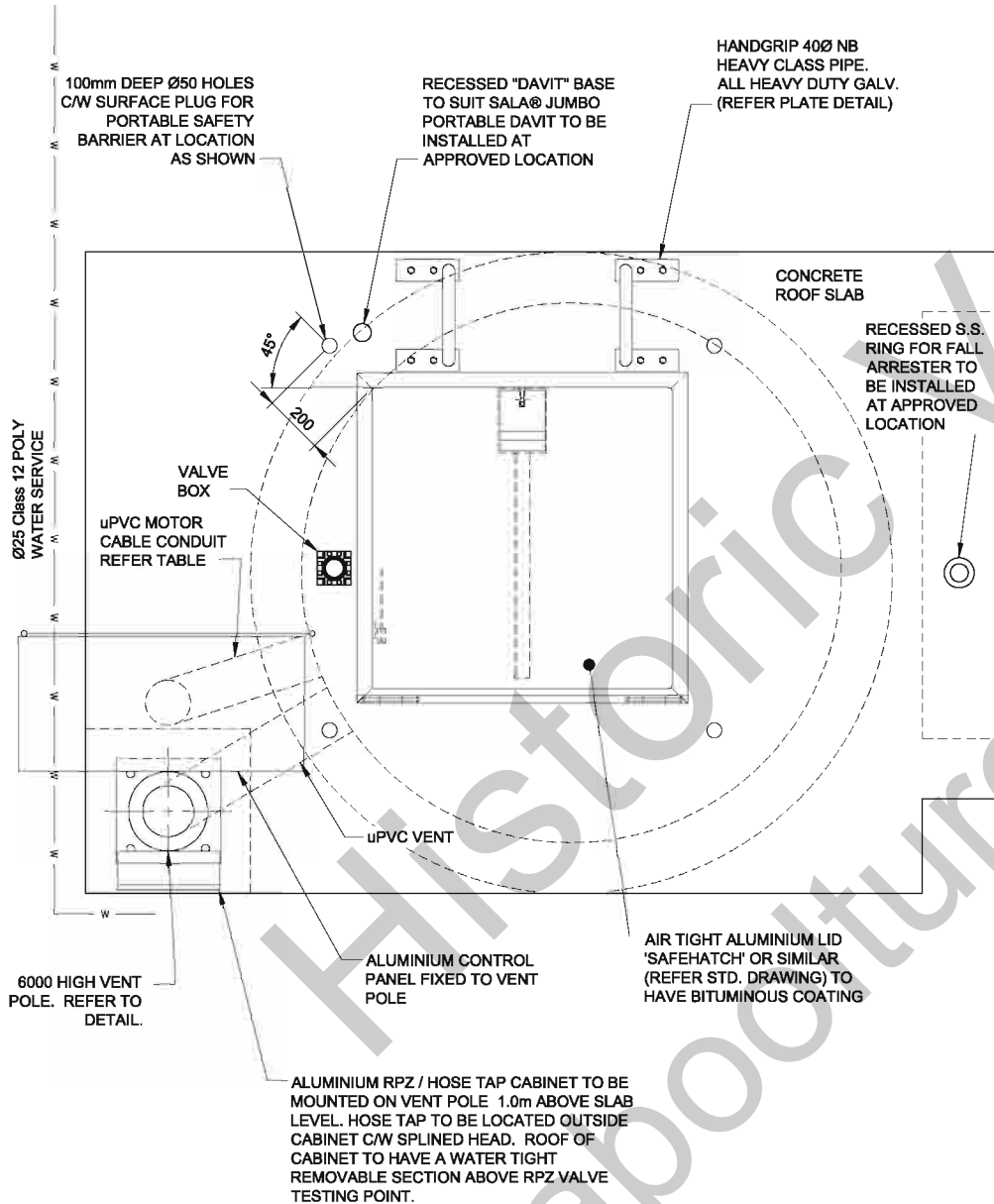
PUMPSTATION CONTROL LEVELS (A.H.D.)		
A	TOP OF SLAB	m
B	HIGH LEVEL ALARM	m
C	DUTY CUT-IN LEVEL	m
C1	STANDBY CUT-IN LEVEL	m
D	CUT-OUT LEVEL	m
E	LOW LEVEL ALARM	m
F	FLOOR LEVEL	m

PUMP OPERATING LEVELS AND DEFAULT SETTINGS SHALL BE AS PER THE SEWAGE PUMPING STATION CODE OF AUSTRALIA (WSA 04)

PUMPS TO BE ANCHORED TO BASE WITH S.S. BOLTS SET INTO BASE. SIZE & MIN. EMBEDMENT OF BOLTS TO PUMP MANUFACTURER'S SPECIFICATION.

REVISIONS	INIT	DATE	NOT TO SCALE
C ROOFSLAB SAFETY CHAIN & POSTS REMOVED	T.C.	7/07	
B WELL WASHER ADDED	T.C.	2/07	
A REVISED DETAILS	B.M.	8/06	
ORIGINAL ISSUE	DW	10/03	

Manager	Business & Planning Manager	Design Engineer



GENERAL

1. This drawing and all other drawings that relate to sewage pumping stations shall be read in conjunction with the Sewage Pumping Station Code of Australia WSA 04 and the Design and Development Manual.
2. All structures shall be designed to be suitable for site specific Geotechnical and Water Table conditions.
3. Ground Water Table shall be assumed to be at ground level for the purposes of design unless otherwise approved by Council.
4. Vent pole and free-standing control cabinet (if required) are to be located adjacent to each other and on the opposite side of the pump station to the access, so as to minimise obstruction to vehicular movement.
5. Landscaping as directed by Cabwater.

MATERIALS

1. All nuts & bolts to be stainless steel grade 316 in accordance with AS1444. (treated with grease to prevent galling)
2. All pump lifting chains to be long link proof coil 8mm stainless steel chain, pitch 41.2mm, width 31.9mm and minimum working load of 500kg.
3. All aluminium to be coated with approved bituminous seal where set into or contacting concrete.
4. Mild steel handgrips to be hot dip galvanised.

CONTROL CABINET

1. For motor sizes of 22kw or less, the control cabinet may be mounted to the vent pole as detailed. For motor sizes greater than 22kw the control cabinet is required to be a free-standing cabinet, on a stand. (no plinth)
2. PVC conduit to be provided between bottom of switchboard plug compartment and entry into wet-well as per table (min. Ø150 for duplex pump stations). Suitable support and sealing are to be provided for pvc conduit both at entry to plug compartment and roof of wet-well at floor level.
3. Control cabinet & its hinges to be located to ensure technicians have a clear view of wet-well opening with cabinet door open/latched, while standing in front of instrument panel.
4. Where possible access door to control panel to open away from prevailing S.E. winds.
5. Heavy duty stainless steel mesh guard is to be installed as protection around flashing alarm light and audible alarm.
6. Mains conduit, when supplied by aerial service line to be strapped to the vent pole with stainless steel 'bandit' strapping.

LEVEL PROBE

1. Level probe to be provided in accordance with requirements of Cabwater.
2. Level probe to have manufacturer's support/cleaning bracket installed in a suitable location for access by maintenance staff.

SAFETY FITTINGS

1. Recessed "Davit" base to suit SALA jumbo portable davit to be installed at approved location, as per SALA documentation.
2. Recessed Stainless Steel ring for fall arrester to be installed at approved location.
3. Provide recessed holes in Pump Station Roof for Portable Safety Barrier

PIPEWORK

1. All pipework and fittings within concrete structures shall be designed to withstand thrust as applicable and shall be configured for easy dismantling.
2. All pipework and unprotected fittings in the pumpwell and pits shall be given three (3) external coats of an approved epoxy paint. Two coats before fitting and the third coat after installation.
3. Drop-pipe from inlet pipe to be constructed from high density polyethylene pipe.

VALVES & FITTINGS

1. All valves to be resilient seated with fusion bonded epoxy (fbe) coating
2. All fittings to be fusion bonded epoxy (fbe) coated

LADDER

1. Internal aluminium ladders shall conform to AS1657 in conjunction with Cabwater standard drawing.
2. Intermediate supports are to be provided to all ladders.
3. Ladder to be bracketed to concrete pumpstation base in an approved manner.
4. Valve pit and holding tank entry requires fixed aluminium ladder access.

COVERS & OPENINGS

1. Pump Station, holding tank and valve pit openings shall generally be 1000 x 2000 fitted with dual aluminium access covers as per C.S.C. standard drawing. However the volute diameter of the pump used may dictate an increase in the opening requirements.
2. Hinged safety grating 'SAFE HATCH' to be fitted below all Pump Station covers.
3. 'Compribond' or an equiv. approved foam gasket sealer is to be provided between the access lids and frames to insect proof the chamber.
4. Access lids to have a bituminous coating exposed surface and have hinge pins (stainless steel) securely attached (preferably welded).

COLLECTOR MAINTENANCE HOLE

Collector Maintenance Holes must be provided downstream of all connections to the gravity sewer, so that there is single line entry to the pump station.

INTERNAL COATING

Internal surfaces to pump station, holding tank, collector maintenance manhole and outflow maintenance manhole shall have concrete protection with approved epoxy coating or liner.

WELL WASHER

1. Pump station well washer to Council specification.
2. Well washer to be installed by Contractor in a clear space where rotating arms will not come into contact with other obstruction's. Mount one (1) metre above HIGH LEVEL ALARM POINT or as per suppliers instructions.

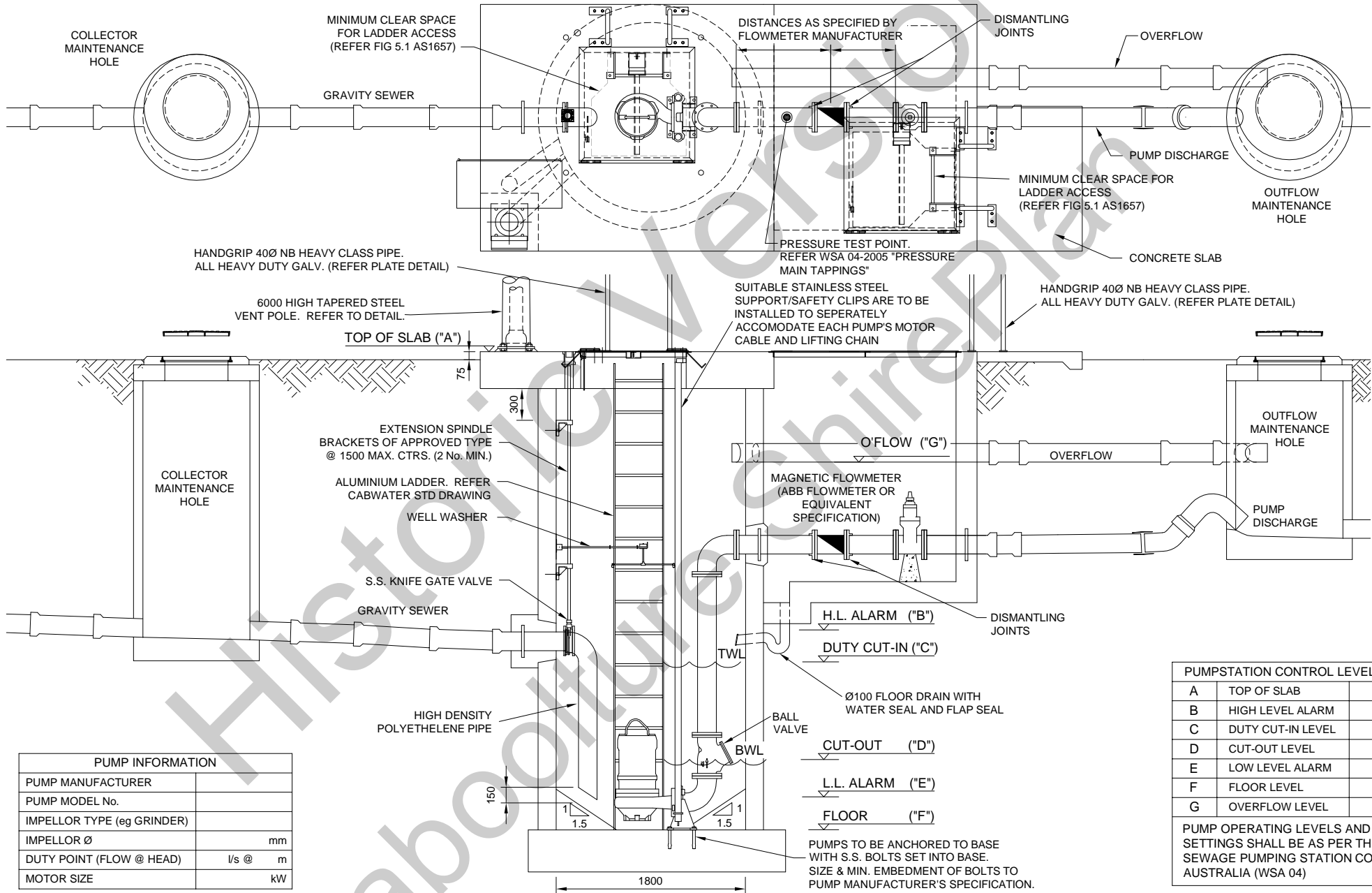
CONDUIT TABLE

MOTOR CAPACITY	CONDUIT SIZE
22 KW MAX.	Ø150
>22 Kw	INDIVIDUALLY SIZED TO SUIT PLUG SIZE

REVISIONS		INIT	DATE
E	MINOR AMENDMENT	B.M.	10/07
D	NOTES 'SAFE HATCH' ADDED	B.M.	8/07
C	CORED HOLES FOR SAFETY BARRIER ADDED	T.C.	7/07
B	NOTES AMENDED	T.C.	2/07
A	NOTES AMENDED	B.M.	8/06
X	ORIGINAL ISSUE	DW	1903

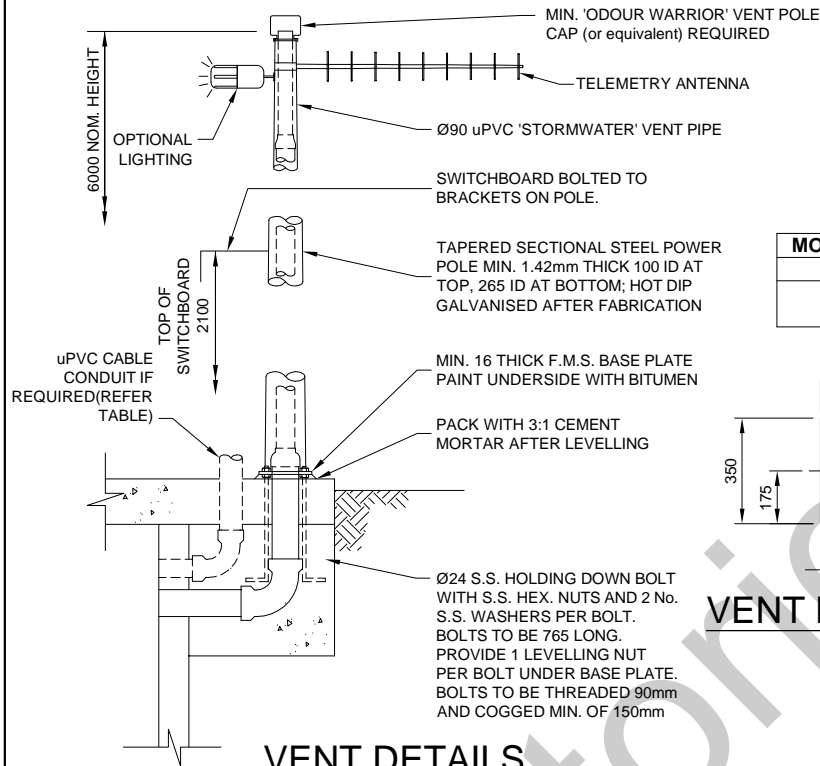
NOT TO SCALE

Manager	Business & Planning Manager	Design Engineer	CABOOLTURE SHIRE COUNCIL
---------	-----------------------------	-----------------	--------------------------



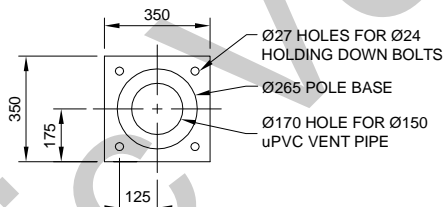
REVISIONS	INIT	DATE	NOT TO SCALE
D. LADDER ADDED TO VALVE PIT	T.C.	7/07	
C. WELL WASHER ADDED TO ELEVATION	T.C.	2/06	
B. THRUST DETAILS ADDED, NOTES ADDED	B.M.	8/06	
A. REMOVAL EMERGENCY PUMPOUT PIT, RELOCATE FLOWMETER & REFLEX	B.M.	12/07/04	
ORIGINAL ISSUE	D.W.	10/03	

Manager	Business & Planning Manager	Design Engineer

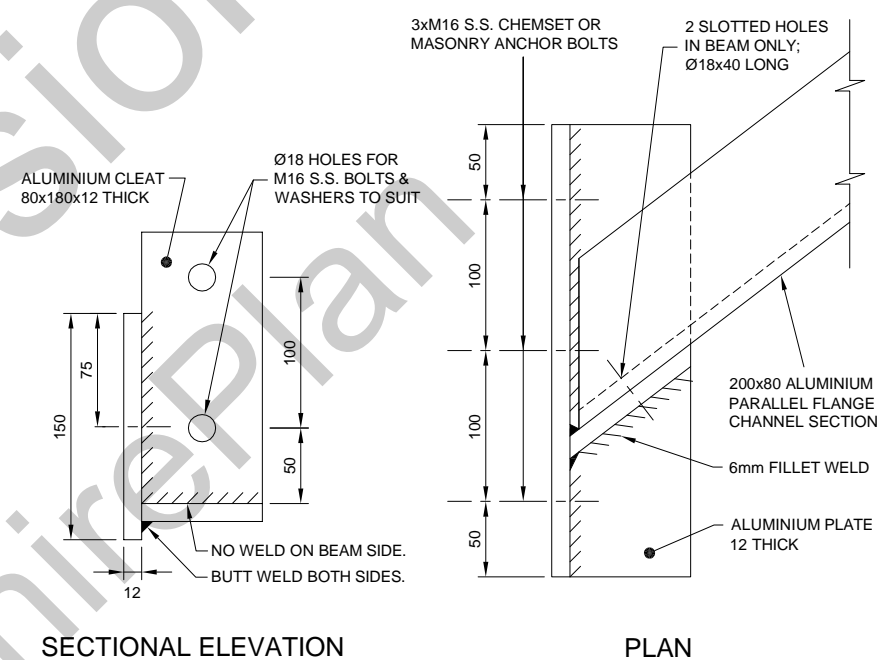


VENT DETAILS

MOTOR CAPACITY	CONDUIT SIZE
22 kW MAX.	Ø150
>22 Kw	INDIVIDUALLY SIZED TO SUIT PLUG SIZE



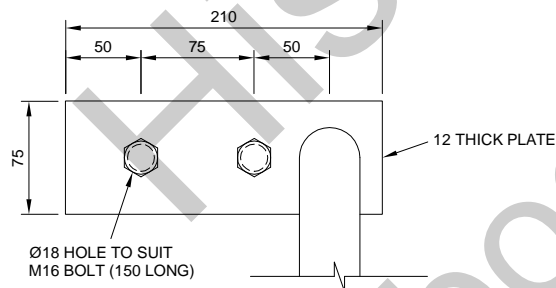
VENT BASE PLATE DETAIL



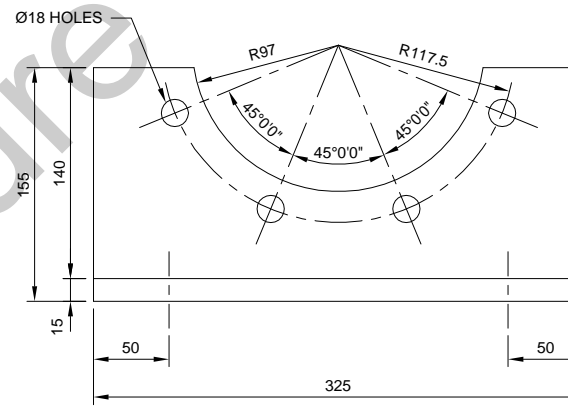
SECTIONAL ELEVATION

PLAN

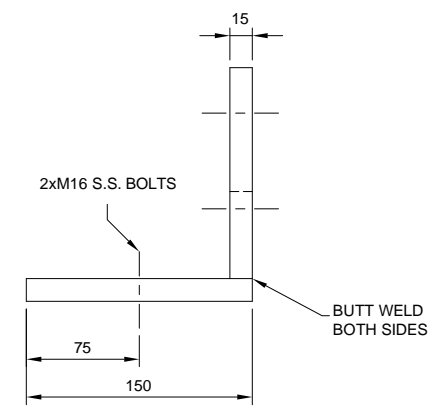
BEAM SUPPORT BRACKET DETAIL



HANDGRIP ANCHOR PLATE DETAIL



PLAN

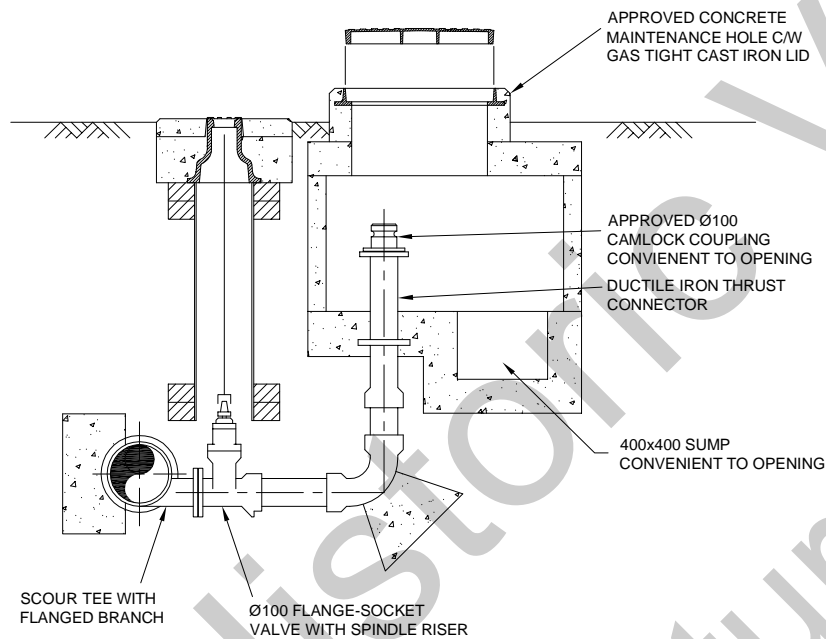


END

PIPE SUPPORT BRACKET (TYP. Ø150)

REVISIONS		INIT	DATE	NOT TO SCALE
B	TELEMETRY AND LIGHT ADDED TO VENT POLE	T.C.	2/07	
A	'ODOUR WARRIOR' VENT POLE CAP ADDED	B.M.	8/06	
X	ORIGINAL ISSUE	DW	10/03	

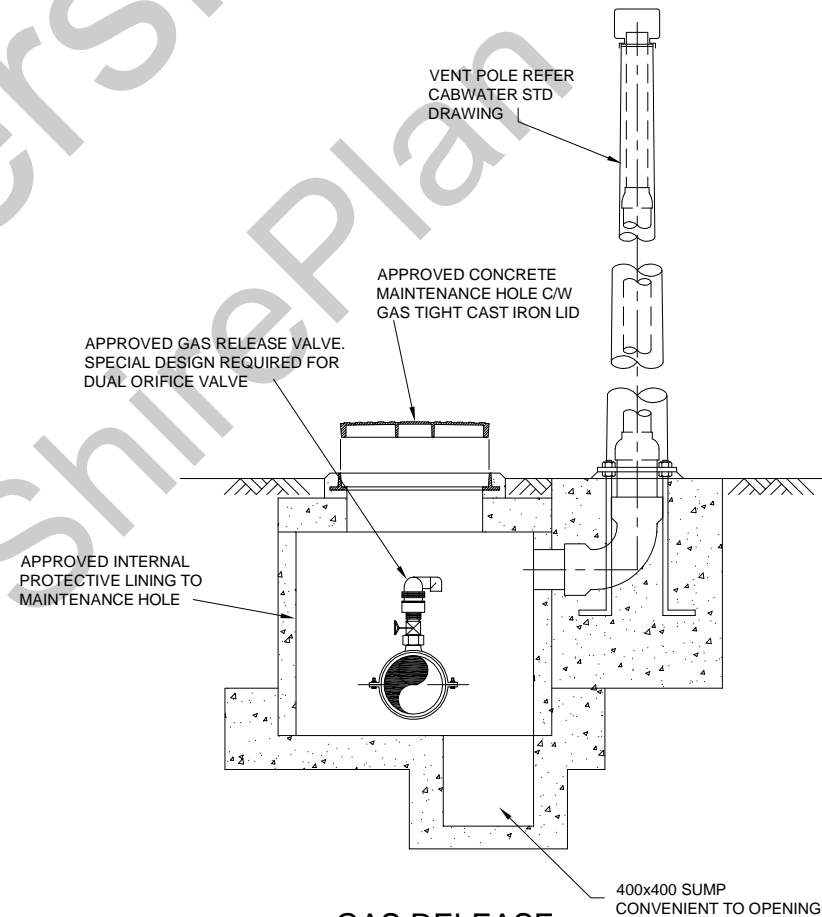
Manager	Business & Planning Manager	Design Engineer
---------	-----------------------------	-----------------



SCOUR DETAIL

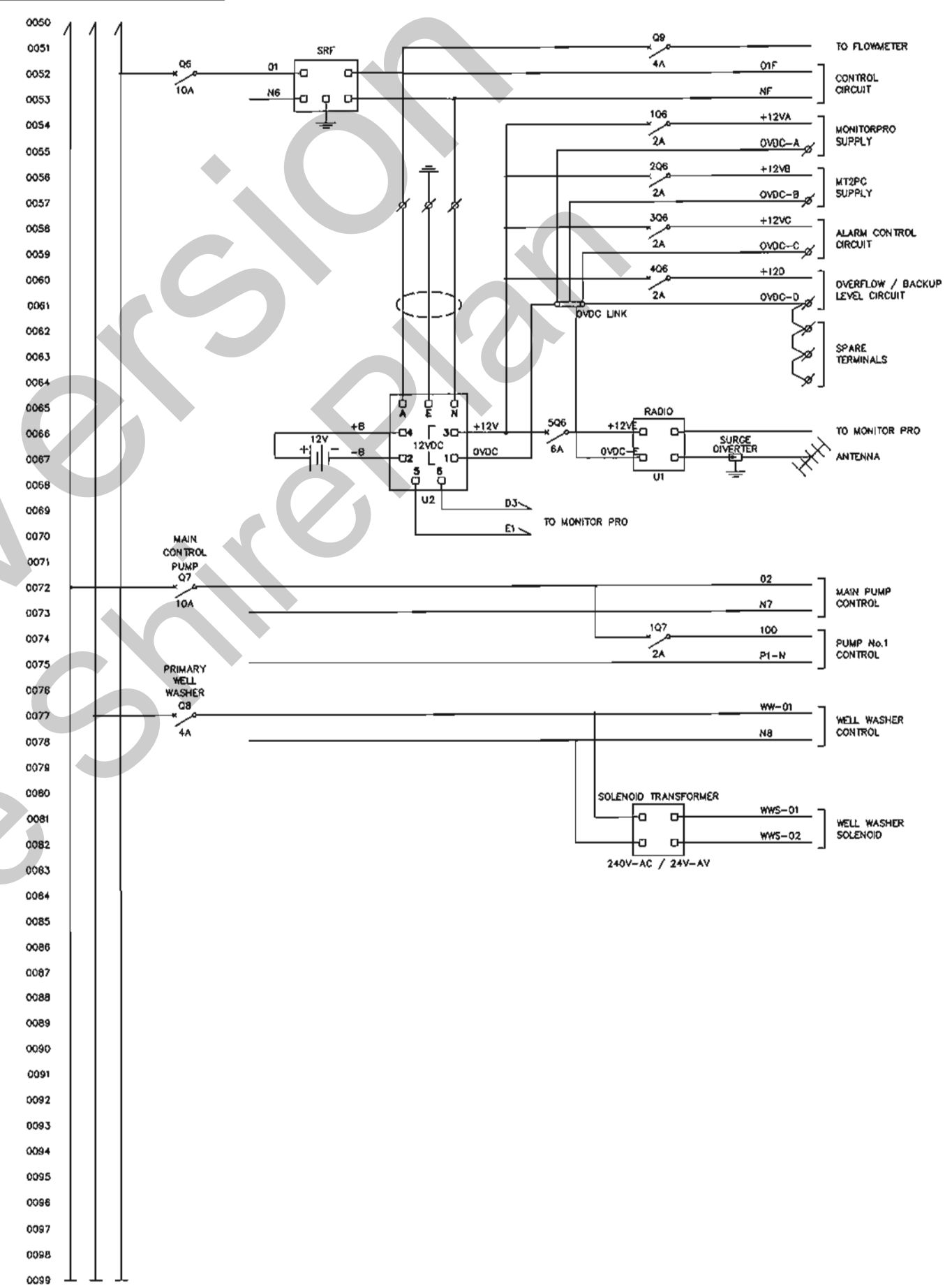
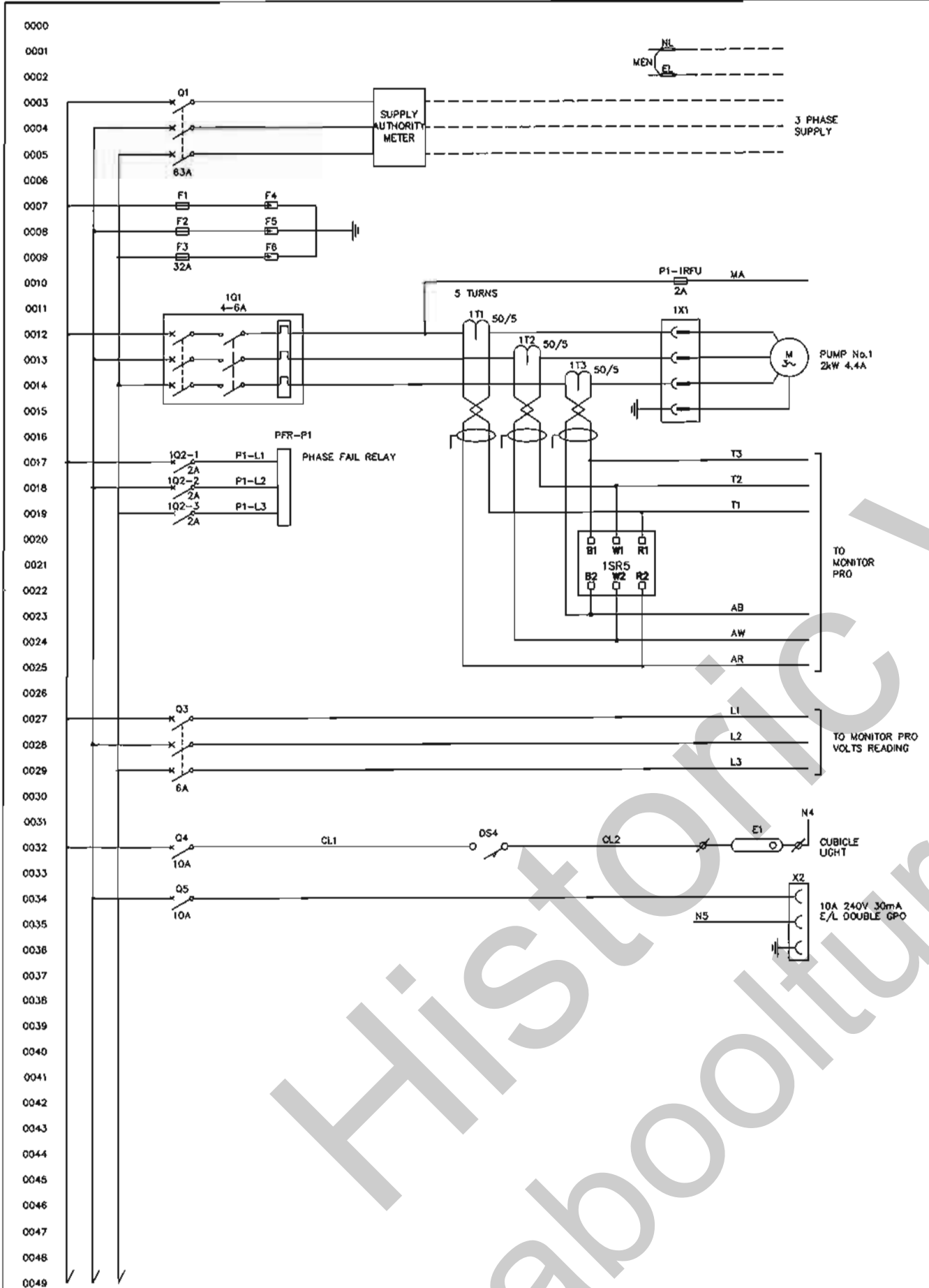
NOTES:

1. Short pipes as shown shall be 300mm minimum and 600mm maximum length. Care shall be taken to ensure any concrete is kept clear of flexible joints.
2. All fittings to be DICL PN35 or otherwise approved.



GAS RELEASE DETAIL

REVISIONS		INIT	DATE	NOT TO SCALE
A	DICL CLASS AMENDED IN NOTES	B.M.	08/07	
X	ORIGINAL ISSUE	DW	1003	



CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

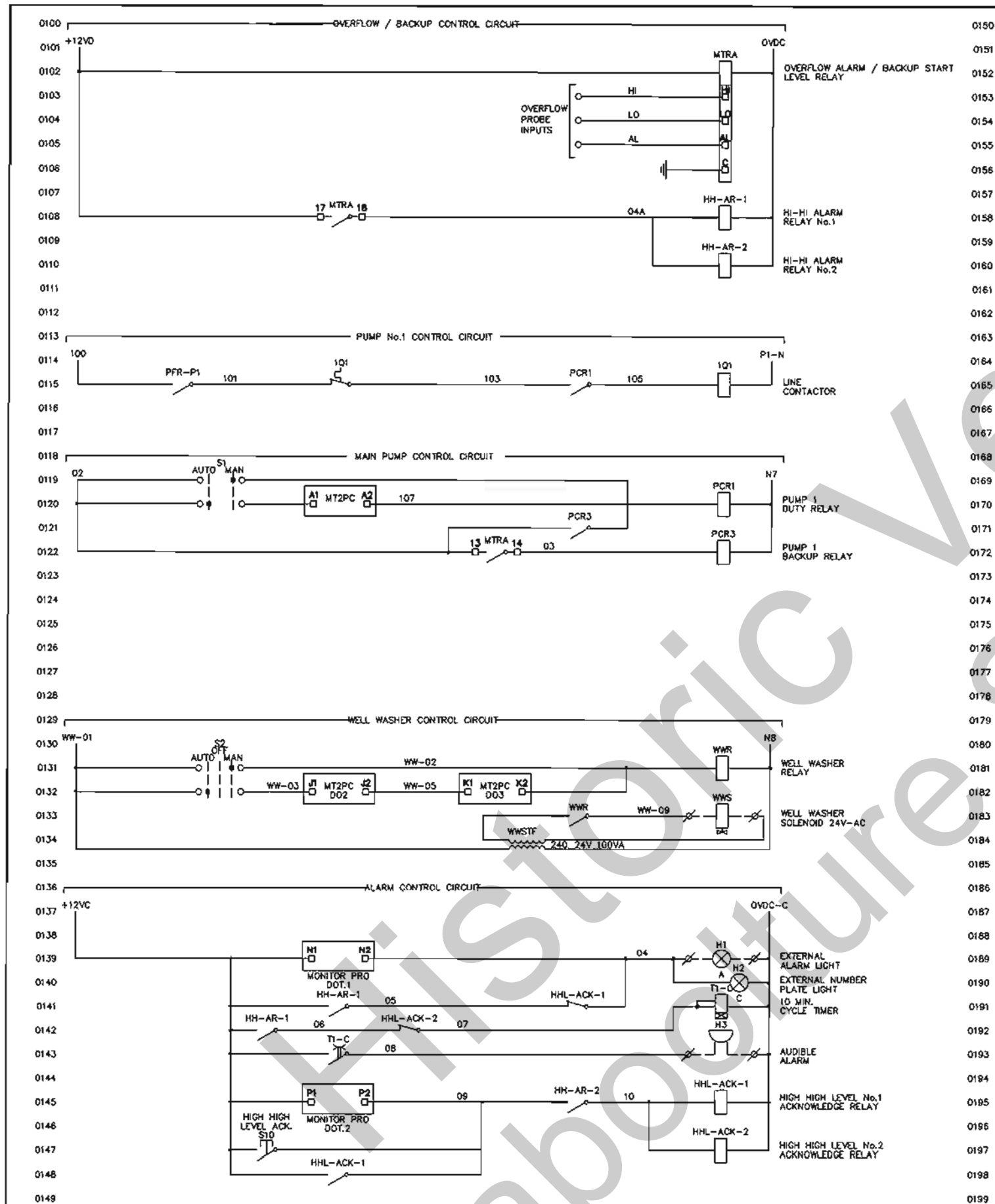
REVISIONS	INIT	DATE
A PHASE FAIL RELAY & FLOWMETER CIRCUIT BREAKER ADDED	B.M.	6/1/08
X ORIGINAL ISSUE	M.T.	8/01

NOT TO SCALE

Cabwater Manager
Planning & Design Manager
Design Engineer
CABOOLTURE SHIRE COUNCIL

CABWATER
STANDARD DRAWING
PUMP STATION - ELECTRICAL
SIMPLEX P.S. <5.5Kw SCHEMATIC SINGLE LINE DIAGRAM SHEET 1

DRAWING No.	REV.
CAB-S20	A
ORIGINAL SHEET SIZE	A3



0100	0150
0101	0151
0102	0152
0103	0153
0104	0154
0105	0155
0106	0156
0107	0157
0108	0158
0109	0159
0110	0160
0111	0161
0112	0162
0113	0163
0114	0164
0115	0165
0116	0166
0117	0167
0118	0168
0119	0169
0120	0170
0121	0171
0122	0172
0123	0173
0124	0174
0125	0175
0126	0176
0127	0177
0128	0178
0129	0179
0130	0180
0131	0181
0132	0182
0133	0183
0134	0184
0135	0185
0136	0186
0137	0187
0138	0188
0139	0189
0140	0190
0141	0191
0142	0192
0143	0193
0144	0194
0145	0195
0146	0196
0147	0197
0148	0198
0149	0199

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

REVISIONS	INIT	DATE
B1 REMOVED PUMP 1, ADDED PFR-P1 & S1	B.M	01/08
A1 WELL WASHER TRANSFORMER ADDED	M.T	10/07
ORIGINAL ISSUE	M.T	8/07

NOT TO SCALE

Cabwater Manager

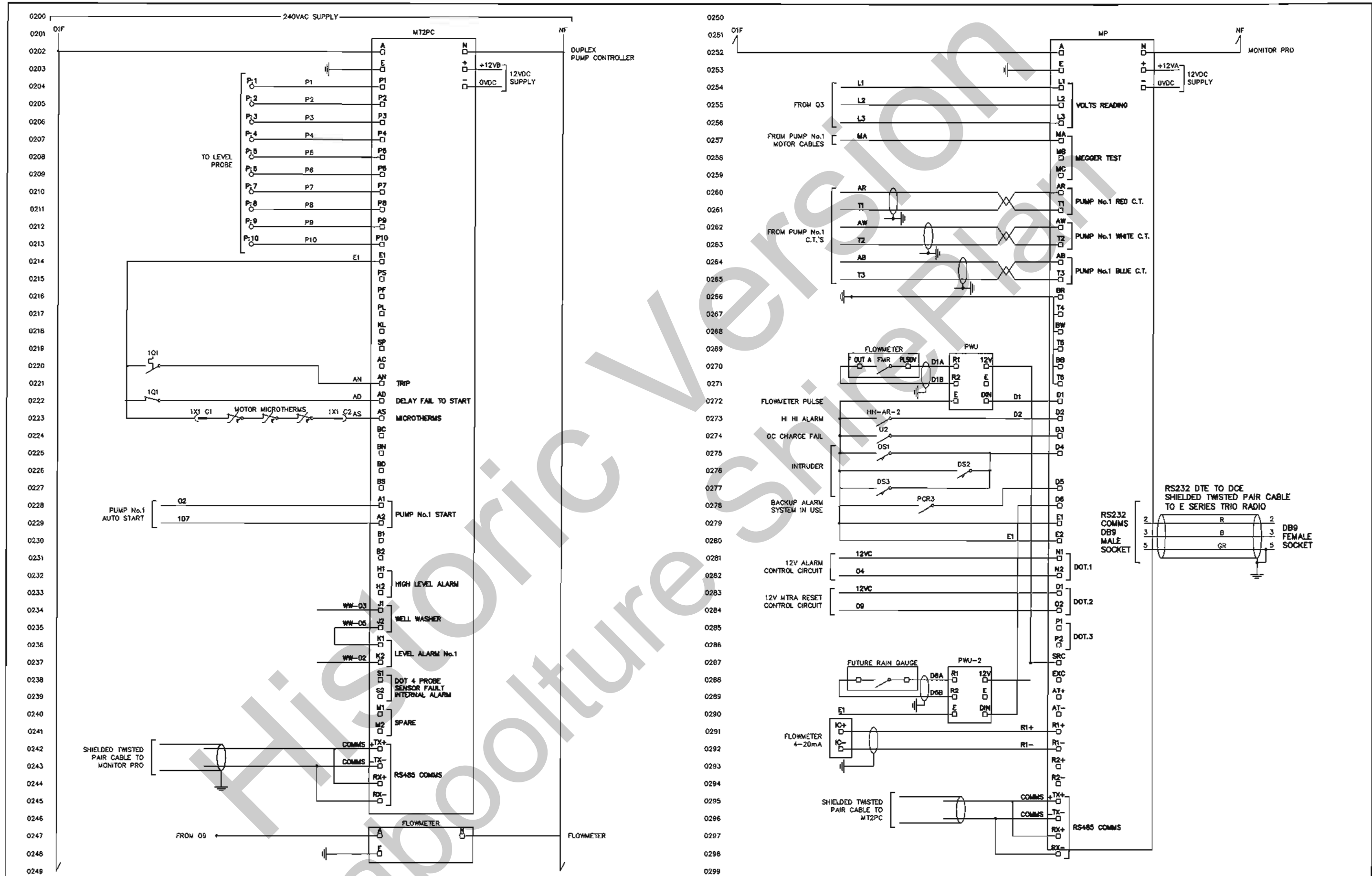
Planning & Design Manager

Design Engineer

CABOOLTURE SHIRE COUNCIL

CABWATER
STANDARD DRAWING
PUMP STATION - ELECTRICAL
SIMPLEX P.S. SCHEMATIC SINGLE LINE DIAGRAM SHEET 2

DRAWING No.	REV.
CAB-S21	B
ORIGINAL SHEET SIZE	A3



CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

REVISIONS	INIT	DATE
B SHORT & EARTH SPARE TERMINALS, PC CHARGE FAIL ETC	B.M.	01/08
A TRIP RELOCATED	M.T.	10/07
X1 ORIGINAL ISSUE	M.T.	8/07

NOT TO SCALE

Cabwater Manager

Planning & Design Manager

Design Engineer



CABWATER
STANDARD DRAWING
PUMP STATION - ELECTRICAL
SIMPLEX P.S. SCHEMATIC SINGLE LINE DIAGRAM SHEET 3

DRAWING No.	REV.
CAB-S22	B
ORIGINAL SHEET SIZE	A3

ITEM	QTY	MAKE & NUMBER	DESCRIPTION	LABEL
HH-AR-1,2	2	TELEMECANIQUE CA3SK20 JD 12VDC	HI HI ALARM RELAY	HH-AR-1,2
HHL-ACK-1,2	2	TELEMECANIQUE CA3SK11 JD 12VDC	HIGH HIGH LEVEL ACKNOWLEDGE RELAY	HHL-ACK-1,2
EL	1	CLIPSAL BP165D12	EARTH LINK	EARTH
E1	1	LANSON LBB113	CUBICLE LIGHT	
F1-3	3	GEC RS32H C/W TIA32L FUSE LINKS	FUSE HOLDER	F1, F2, F3
F4-F6	3	HPM-H6SD	SURGE DIVERTERS	F4, F5, F6
5Q6	1	CLIPSAL 4CB106/10	CONTROL CIRCUIT BREAKER	5Q6
P1-1RFU	1	GEC SC20H C/W NS2 FUSE LINKS	FUSE HOLDER	P1-1RFU
H1	1	SIFCO SYF100 12VDC	AMBER STROBE LIGHT	
H2	1	NUMBER PLATE LIGHT (IP54)	NUMBER PLATE LIGHT LIGHT	
H3	1	ROSHNI ROLP/R/S/3	12VDC SIREN	
1Q1	1	TELEMECANIQUE LD1-LB030U c/w LA1-LB015 & LB1-LB03P10	CIRCUIT BREAKER/240VAC CONTACTOR/ THERMAL OVERLOAD	1Q1
T1-C	1	CARLO GAVAZZI DMB-51-C-W24	FLASHING TIMER	T1-C
PCR1, PCR3	2	TELEMECANIQUE CA2SK20 240VAC	PUMP 1 CONTROL RELAYS	PCR1, PCR3
MP	1	MULTITRODE MONITOR PRO-2	PUMP MONITOR	
MT2PC	1	MULTITRODE MT2PC 2 c/w 3m/10 POINT PROBE 10MTR	LEVEL CONTROLLER	
MTRA	1	MULTITRODE MTRA 6 12VDC c/w 0.5m/3 POINT PROBE 10MTR	LEVEL RELAY	MTRA
NL	1	CLIPSAL BP165D12 C/W BP165F MOUNTING FEET	NEUTRAL LINK	NEUTRAL
Q1	1	CLIPSAL 4CB363/10 c/w 4CC3 SURFACE MOUNTING MOULDED ENCLOSURE	MAIN SWITCH	MAIN SWITCH
Q3	1	CLIPSAL 4CB306/10	VOLTS CIRCUIT BREAKER	Q3
Q4	1	CLIPSAL 4CB110/10	CUBICLE LIGHT CIRCUIT BREAKER	Q4
Q5	1	CLIPSAL 4CB110/10	240V OUTLET CIRCUIT BREAKER	Q5
Q6	1	CLIPSAL 4CB110/10	CONTROL CIRCUIT BREAKER	Q6
1Q6 - 4Q6	4	CLIPSAL 4CB102/10	CONTROL CIRCUIT BREAKER	1Q6 - 4Q6
Q7	1	CLIPSAL 4CB110/10	CONTROL CIRCUIT BREAKER	Q7
1Q7	1	CLIPSAL 4CB102/10	CONTROL CIRCUIT BREAKER	1Q7
Q8	1	CLIPSAL 4CB104/10	CONTROL CIRCUIT BREAKER	Q8
S1	1	TELEMECANIQUE ZB4-BZ105 C/W ZB4-BD2	PUMP SELECTOR SWITCH	MANUAL - AUTO
S2	1	TELEMECANIQUE ZB4-BZ103 C/W ZB4-BD3	WELL WASHER SELECTOR	WELL WASHER 'AUTO-OFF-MAN'
S10	1	TELEMECANIQUE ZB4-BA5 C/W ZB4-BZ101	PUSHBUTTON	HIGH HIGH LEVEL ACKNOWLEDGE
1SR5	1	MULTITRODE SR5	CURRENT SHUNT ADAPTORS	1SR5
SRF	1	CRITEC DSF-6A-275V	SURGE REDUCTION FILTER	SRF
1T1,2,3	3	NHP CT50(50/5AMP)	CURRENT TRANSFORMER	1T1, 1T2, 1T3
U1	1	TRIO DATA COMM ER450-51-A01-DO	TELEMETRY RADIO 400Mhz	U1
U2	1	RF INDUSTRIES SME-240-12-10	12VDC POWER SUPPLY	U2
	1	RF INDUSTRIES LC-R1233P	12V BATTERY	
	1	RF INDUSTRIES YBSS9-61	9 ELEMENT YAGI ANTENNA (STAINLESS STEEL)	
	1	RF INDUSTRIES UNV2	ANTENNA BRACKET	
	1	RF INDUSTRIES IS-B50-LN-C2	CO-AX SURGE DIVERTER	
	1	RF INDUSTRIES 9006	RADIO CABLE	
1X1	1	CLIPSAL 56SO720 C/W 56PA720	MOTOR OUTLET AND PLUG	
X2	1	CLIPSAL 2025RC	240V EARTH LEAKAGE OUTLET	
	26	TELEMECANIQUE AB1-VV435U	TERMINALS	
	4	TELEMECANIQUE AB1-AS24	END PLATE	
	8	DORE ELECTRICS	END CLAMP	
	3	SELECTRIX 1107SCC05	PADLOCKABLE SWING HANDLE	
	2	DIRAK 2107-9526	3 POINT CAM	
	4	DIRAK RODADAPT	ROD ADAPTORS	
	1	ABB MAGMASTER	FLOWMETER	
WWR	1	TELEMECANIQUE CA2SK20 U7 240VAC	WELL WASHER RELAY	WWR
WWS	1	BURKERT 25mm BSP FEMALE SOLENOID VALVE 24VAC N/S BRASS BODY 20mm ORIFICE 6213 SERIES	WELL WASHER SOLENOID VALVE	WWS
DS1,2,3	3		REED SWITCH, INTRUDER ALARM	
DS4	1	DORE SM202	DOOR SWITCH, CUBICLE LIGHT	
	1	RF INDUSTRIES CNT 400	ANTENNA CABLE	
	1	ATCO TRIDONIC OMT75-240/24V, 100VA	SOLENOID TRANSFORMER	WWSTF
PFR	1	CARLO GAVA221 DPB02CM48	PHASE FAIL RELAY	
1Q2-1 1Q2-3	3	CLIPSAL 4CB102/10	PHASE FAIL CIRCUIT BREAKER	
Q9	1	CLIPSAL 4CB104/10	FLOW METER CIRCUIT BREAKER	
PWU-1, PWU-2	2	MULTITRODE MTPWU	PULSE WIDTH EXTENDER	PWU-1, PWU-2

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

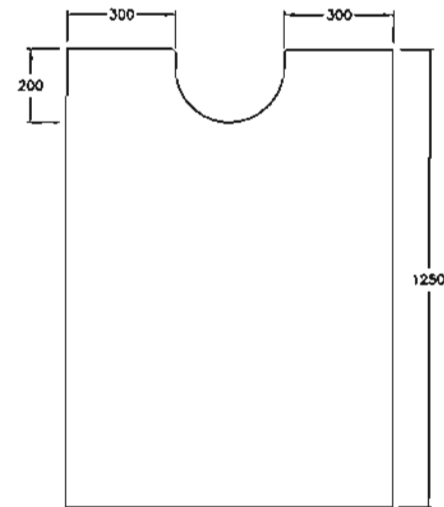
REVISIONS	INIT	DATE
1) PHASE FAIL RELAY & 1Q2 ADDED	B.M.	01/08
2) WELL WASHER SOLENOID MAKE & MODEL CHANGED	M.T.	10/07
3) ORIGINAL ISSUE	M.T.	8/07

NOT TO SCALE

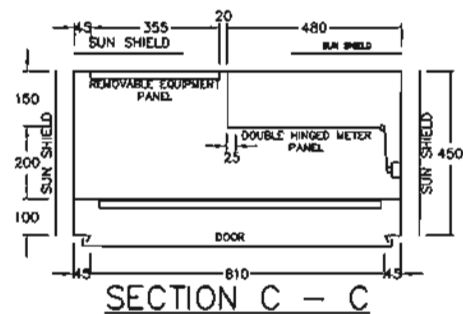
Cabwater Manager	Planning & Design Manager	Design Engineer	CABOOLTURE SHIRE COUNCIL
------------------	---------------------------	-----------------	--------------------------

CABWATER
STANDARD DRAWING
PUMP STATION - ELECTRICAL
SIMPLEX P.S. EQUIPMENT SCHEDULE

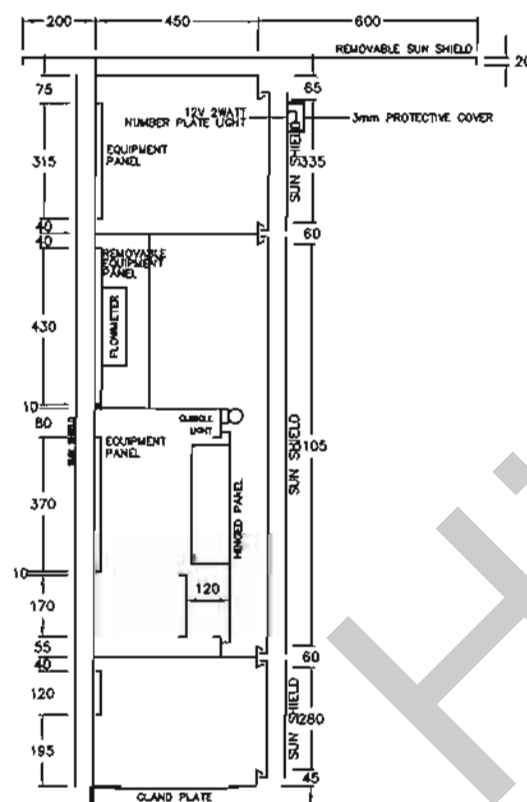
DRAWING No.	REV.
CAB-S23	B
ORIGINAL SHEET SIZE	A3



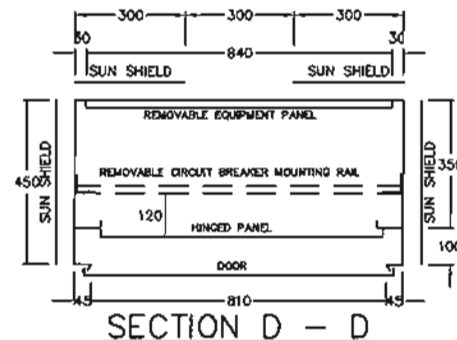
TOP VIEW OF SUN SHIELD



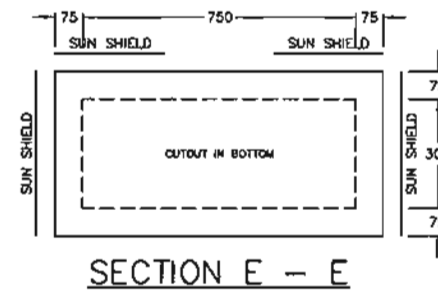
SECTION C - C



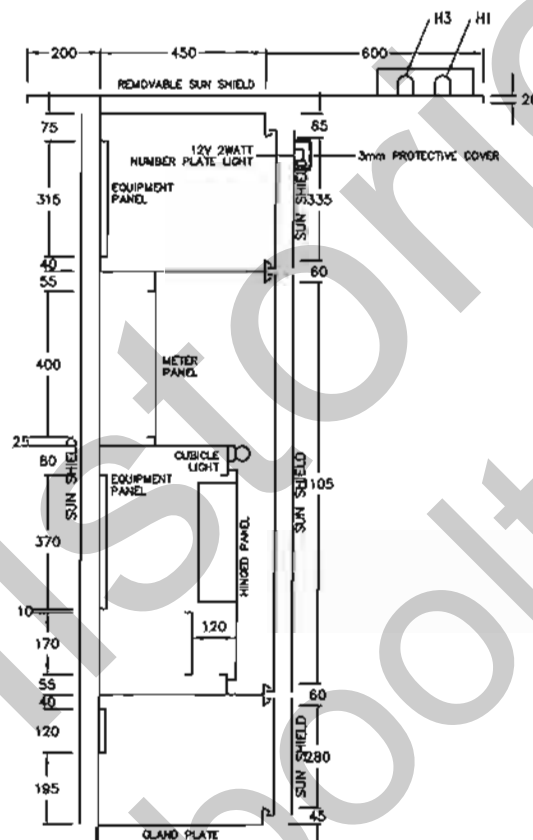
SECTION A - A



SECTION D - D



SECTION E - E



SECTION B - B

CONSTRUCTION

- Cubicle to be of 3.00mm thick Aluminium sheet folded, fully welded at joints, stiffened where necessary to form a rigid Weather and Vermin Proof Pole mounting enclosure.
- Construction to Form 1 to AS 3439.1.
- Door seals to be 25mm x 6mm Adhesive Backed Neoprene retained by use of Metal Framing.
- Fit three (3) sets of Louvres to each side, (1) towards the top, (1) behind the circuit breaker panel, and (1) being in the Termination Zone.
- Louvres to be backed by Stainless Steel Gauze.
- Louvre filter material to be retained.
- Equipment panels to be 3.0mm Aluminium sheet.
- Fit 3mm thick Aluminium gland plate for cutout in Base of cubicle.
- Meter Panel is 6mm thick laminated phenolic resin & Double Hinged.
- Fit Catch Stays to doors to allow minimum opening of 120°.
- Fit Clear Perspex Barrier behind door mounted equipment.
- Fit one A4 size Drawing Holder to the Rear of Door 2.
- Fit one Legend Card Holder to the Rear of Door 2.

PAINTWORK - CUBICLE

- Grind smooth all welds, descale and degrease. MIST GREEN FINISH

PAINTWORK - EQUIPMENT CHASSIS

- Grind smooth all welds, descale and degrease.

HINGES - DOORS

- Lowe & Fletcher CP lift off Type KIS.

HINGES - HINGED PANEL

- Lowe & Fletcher CP lift off Type KIS.

LOCKS DOOR 1

- Emko 1000-u45 housing with 1000-u142 slotted insert & 1000-25 Tongue & seal.

LOCKS DOORS 2 & 3

- Emko CP type 1107 SCC05 three point locking.

LOCKS - HINGED PANEL

- Emko 1000-u45 housing with 1000-u142 slotted insert & 1000-25 Tongue & seal.

LABELS

- All labels to be W-B (except MAIN SWITCH and WARNING labels which are to be R-W) trafficite inscribed as shown in label schedule. Main switch labels letter size to be 8mm, compartment labels letter size to be 6mm and remainder labels letter size to be 4mm. All labels to be secured with M3 Stainless Steel metal threads.
- Pump station label to be supplied & fitted by Caboolture Shire Council.

WIRING

- All wiring to be PVC V75 600V Grade. Control and instrumentation wiring to be a minimum 1.5mm sq lined flexible copper conductors colour coded as shown below, numbered at each end using Clear Plastic Sleeves with Insertable Tabs and terminated by use of metal ferrules or crimp lugs.
- Power wiring to be a minimum 2.5mm sq multistrand copper conductors phase colour coded as shown below.

COLOUR CODE

Phase wiring - red, white, & blue

(A, B, C)

Neutral - black

Control wiring - Pump 1 - orange - 12VDC - Grey

- Pump 2 - brown

- Pump Common - grey

- General Control - red

- Metering - white

- Solenoid 24V AC - WHT/Red

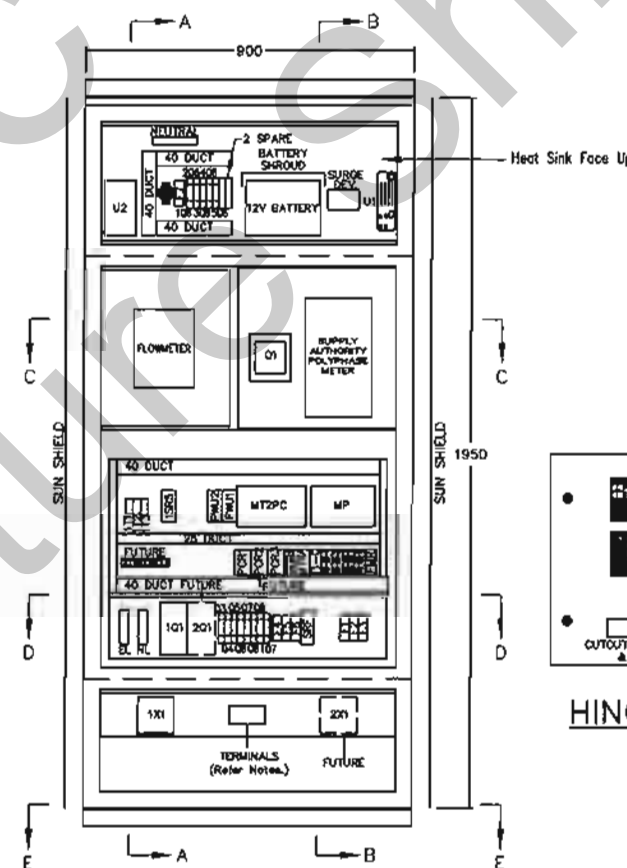
24V AC - BLACK/Wht

Neutral - blue - 12VDC+ - Violet

Earth - green-yellow

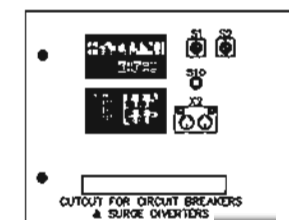
NOTES

- Fit flashing alarm light (H1) to top of cubicle towards front protected by 3mm gauge wire stainless steel light guard with 2mm PVC gasket between light guard & cubicle.
- No 240V terminals in lower terminal area. (Door 1)
- All DC circuit breakers in Door 3 Area ONLY

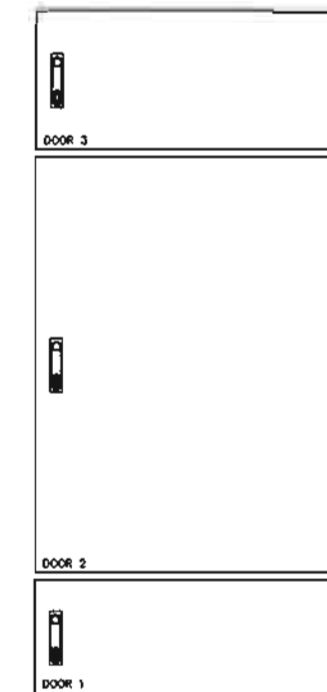


FRONT VIEW

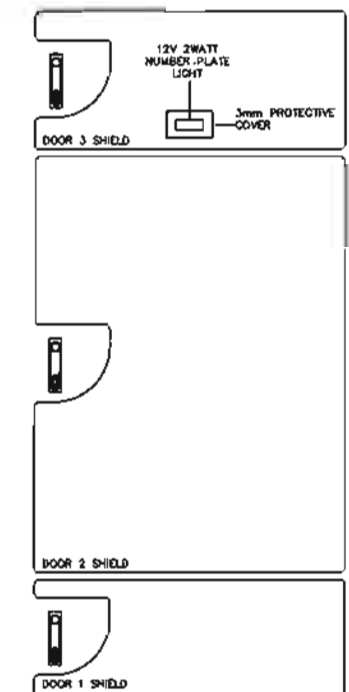
DOORS & HINGED PANEL NOT SHOWN



HINGED PANEL



DOORS



DOOR SHIELDS

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

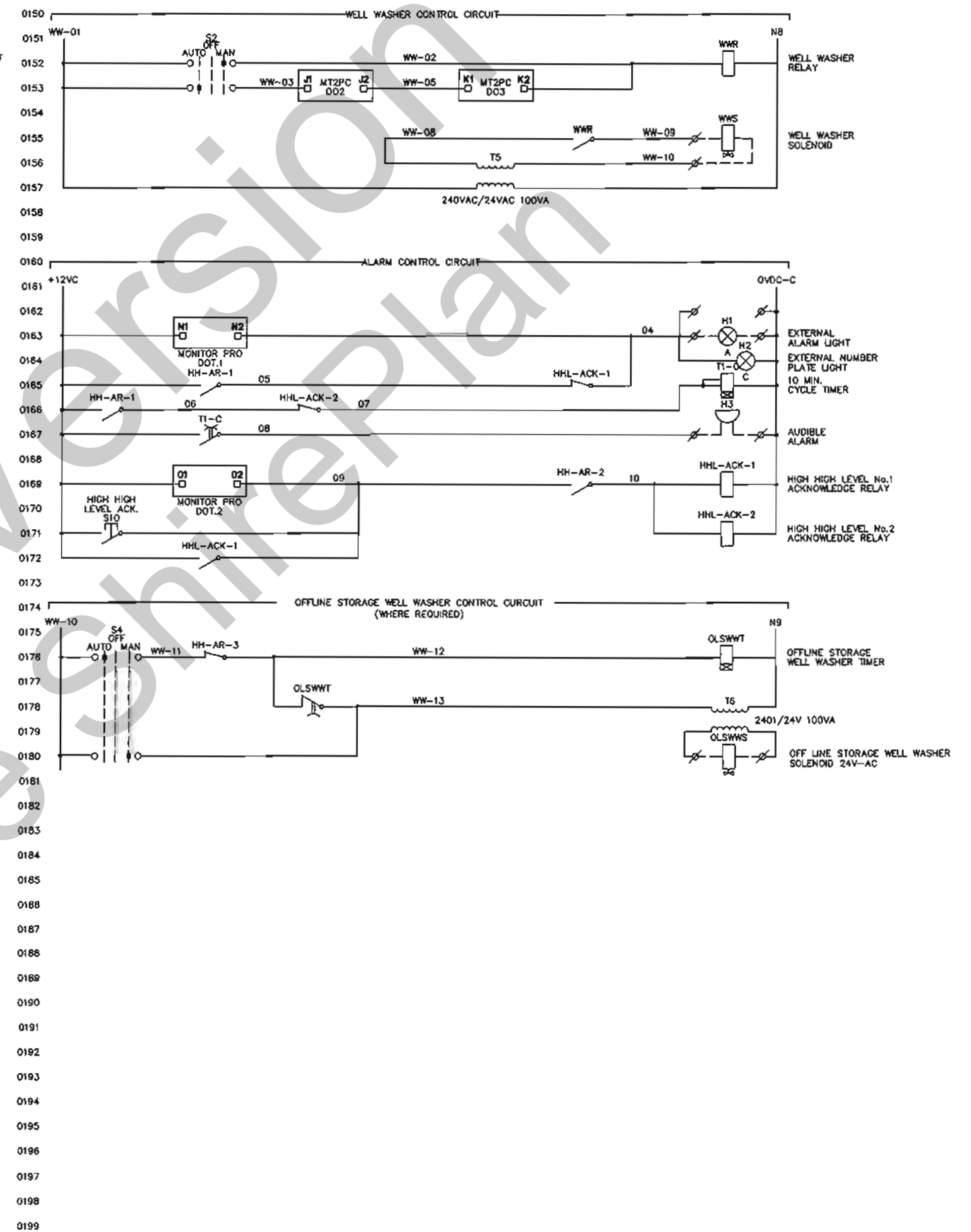
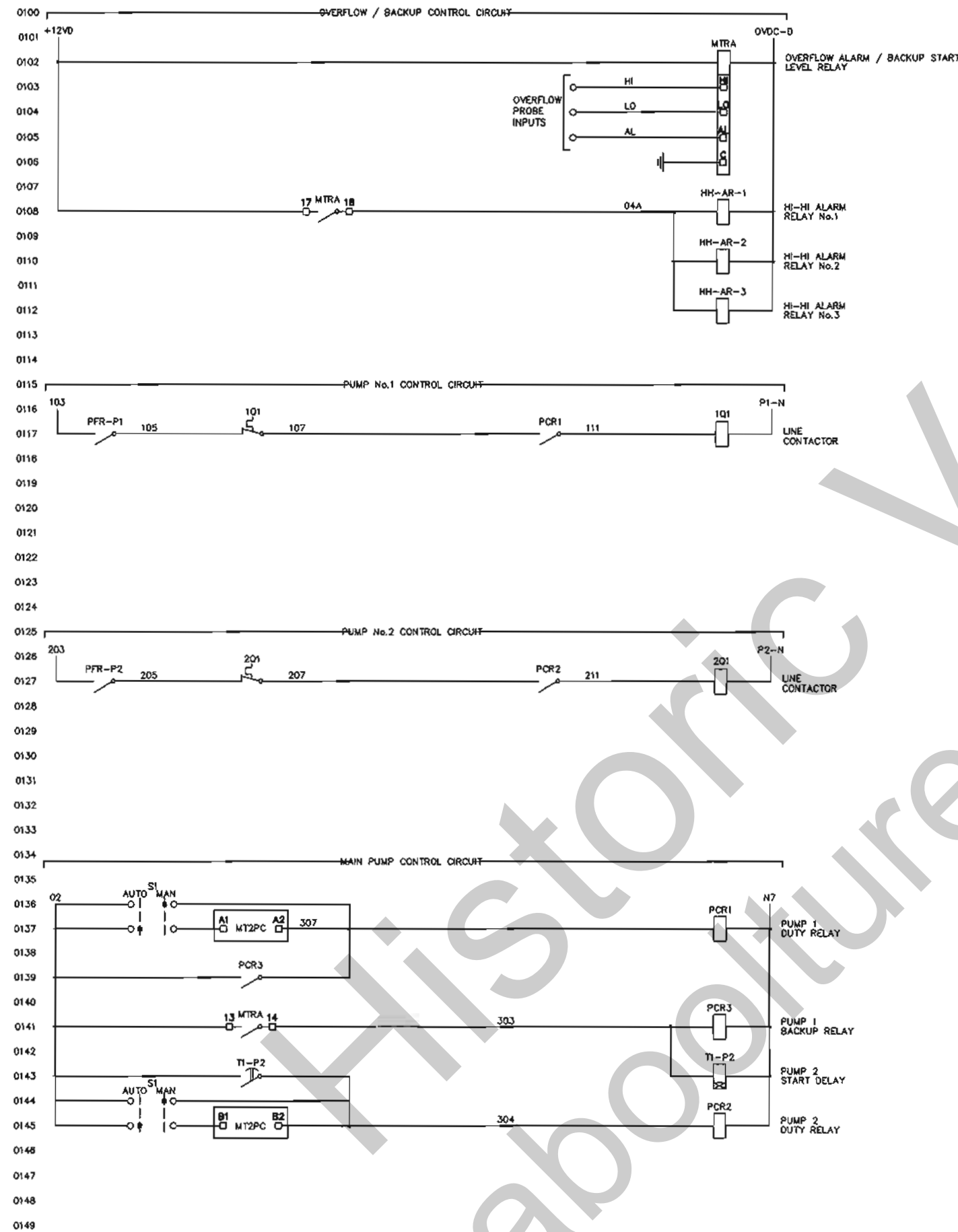
REVISIONS	INIT	DATE
B. MINOR AMENDMENTS	S.M.	01/08
A. CUTOUT WIDENED FOR SURGE DIVERITER & SEC. NOTES AMEND	M.T.	10/07
X. ORIGINAL ISSUE	M.T.	8/07

NOT TO SCALE

Cabwater Manager
Planning & Design Manager
Design Engineer
CABOOLTURE SHIRE COUNCIL

CABWATER
STANDARD DRAWING
PUMP STATION - ELECTRICAL
PANEL GENERAL ARRANGEMENT & CONSTRUCTION NOTES

DRAWING No.
CAB-S24
ORIGINAL SHEET SIZE
A3



CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

REVISIONS	INIT	DATE
ORIGINAL ISSUE	B.M.	01/08

NOT TO SCALE

Cabwater Manager

Planning & Design Manager

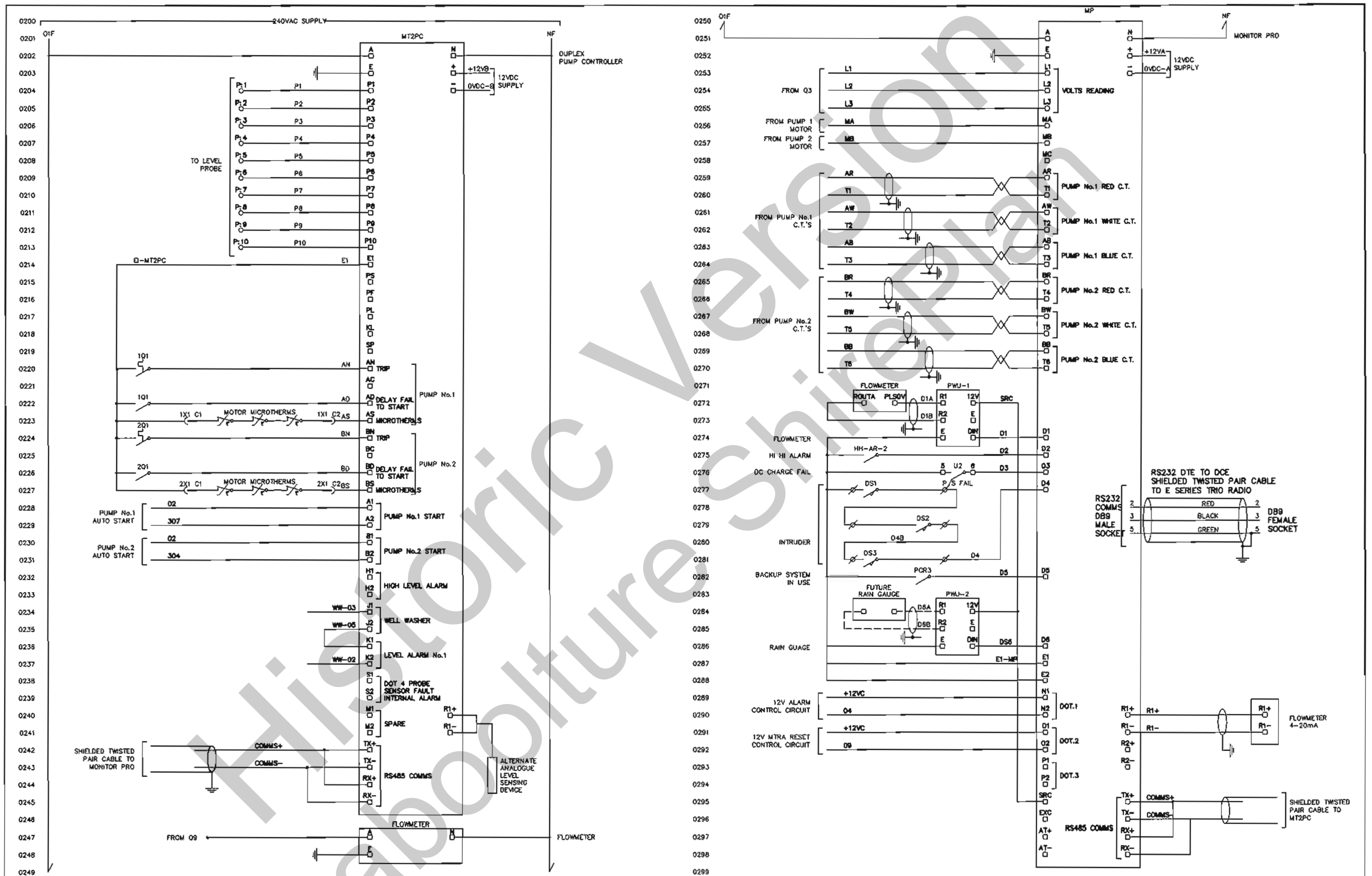
Design Engineer

CABOOLTURE SHIRE COUNCIL

DUPLEX P.S. <5.5KW SCHEMATIC SINGLE LINE DIAGRAM SHEET 2

CABWATER
STANDARD DRAWING
PUMP STATION ELECTRICAL

DRAWING No.	REV.
CAB-S26	
ORIGINAL SHEET SIZE	A3



CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

REVISIONS	INIT	DATE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		

NOT TO SCALE

Cabwater Manager

Planning & Design Manager

Design Engineer

CABOOLTURE SHIRE COUNCIL

CABWATER
STANDARD DRAWING
PUMP STATION - ELECTRICAL
DUPLEX P.S. <5.5Kw SCHEMATIC SINGLE LINE DIAGRAM SHEET 3

DRAWING No. CAB-S27
REV. A3
ORIGINAL SHEET SIZE

