



8109 Insitu Lining of Existing Stormwater Main

REVISION 07/02/2024

8109.1 Introduction

This supplementary specification relates to the insitu lining or patch of existing stormwater mains, as a protective measure, prior to works over and around existing mains.

8109.1.1 Definition of Terms

The following terms apply specifically to this specification;

Term	Definition
Main	<i>In reference to this specification meaning any form of stormwater culvert</i>
Patch Lining	<i>Where an isolated section of culvert run (not full run) has been identified as requiring lining</i>
House Connections	<i>Refers to residential stormwater connections directly to stormwater mains</i>
Lateral Connections	<i>Connections of stormwater lines external to the specific asset being lined</i>
Works Site	<i>For the purpose of this specification to mean all areas which requires labour, plant, and materials to carry out the lining works including access to and area around the infrastructure to be insitu lined</i>

8109.2 Referenced Documents

This supplementary specification shall be read in conjunction with the following:

- Environmental Protection Act and Policies
- MRS01 *“Introduction to Specifications”*;
- MRTS01 *“Introduction to Technical Specifications”*;
- MRS03 and MRTS03 *“Drainage, Retaining Structures and Protective Treatments”*;
- MRS05 and MRTS05 *“Unbound Pavements”*;
- MRS30 and MRTS30 *“Dense Graded and Open Graded Asphalt Pavements”*;
- MRS70 and MRTS70 *“Concrete”*
- MRC Supplementary Specification 8105 *Alterations to Existing Drainage Structures”*
- AS/NZS 3725 *“Design for Installation of Buried Concrete Pipes”*
- **AS/NZS 2566.1** Buried Flexible Pipes – Part 1: Structural Design
- **AS 1462.22** Methods of test for plastic pipes and fittings
- **AS 3572** Plastics – Glass Filament Reinforced Plastics (GRP) Methods of Test
- **BS 2782** Methods of Testing Plastics
- Supplementary Specification 8119 CCTV Inspection of New Underground Stormwater Infrastructure



- Method 335A: Determination of flexural properties of rigid plastics
- Method 1003: Determination of tensile properties.
- **ASTM D638** Standard Test Method for Tensile Properties of Plastics
- **ASTM D790** Test Methods for Flexural Properties of Reinforced Plastics and Electrical Insulating Material
- **ASTM F1216- 16** Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
- **ASTM D2583** Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
- Water Services Association of Australia WSAA 05-2013 *“Conduit Inspection Reporting Code of Australia” latest version*; and
- the project Drawings

CHECK THE ABOVE REFERENCES

8109.3 Description of Work Items

Work items incorporated by this supplementary specification are identified in Section 8109.6 and 8109.7 with individual activities/tasks for measurement and payment sourced from the Bill of Quantities and listed in MRC Supplementary Specification Annexure 8109_1 Insitu Lining of Existing Stormwater Main Section 1

8109.4 Quality Systems Requirements

Quality Management - Plan & Methodology

In accordance with Clause 30 of the Conditions of Contract, the Contractor shall submit a Project Quality Plan to the Superintendent (including QA Checklists and ITP's) for review and acceptance by the Superintendent and / or Principal 4 weeks prior to the Pre-Start meeting and commencing work on site. (MILESTONE)

The Contractor's Quality Plan shall include as a minimum, the requirements as detailed in the Technical Specifications and the product, equipment and materials supplier specifications.

The Contractor shall ensure that subcontracted works and procured supplies are subject to appropriate quality assurance standards applicable to the various physical inspections called for, and compliance with applicable industry standards in order to comply with the requirements of this Contract.

The proposed QA methodology must identify how the following aspects will be sampled and assessed and reported on, the acceptance criteria proposed, and which standards/specifications will be referenced in doing so:

- CCTV camera speed;
- Use of proprietary software associated with CCTV condition assessment;
- Limiting conditions effecting CCTV work by rendering the continued application of CCTV non- viable;
- The adequacy of cleaning preparation prior to CCTV works and lining commencement;
- Assessment of installed liner strength and geometry;
- Control of internal lining temperature and pressure or UV application duration and intensity and pressure within acceptable limits for CIPP liners;
- Structural design of linings;
- Proofing of installed liner structural section properties; and,
- Proof of curing adequacy.



Quality Management - Inspection and Testing Plan

Separate Inspection and Test Plans for each construction activity shall address the acceptance criteria and shall contain as a minimum the following information for each significant activity identified in the relevant process:

- Elements of Work/Description of activity;
- Inspection and test type;
- Specification reference & requirements or other acceptance criteria;
- Training and oversight procedures
- Hold Points and Witness Points – e.g. Superintendent shall witness the first day of TV inspections to verify general compliance with the specifications. Submit first weeks' worth of data for approval of format by the Principal;
- Person responsible for activity (title);
- Activity checklists; and,
- Identification of relevant procedure and quality records.

All testing and inspections shall be arranged and carried out and recorded by the Contractor as required and all results and survey records made available to the Superintendent. The cost of all such testing and survey shall be borne by the Contractor.

During the Works, the Principal reserves the right to conduct audit inspections of any or all of the Works without prior notification. Section 8109.4.2 lists the minimum requirements for the Principals Inspections or Milestones, these are required by the Contractor to be included separate to the Contractors own Checklists and inspection verifications, minimum 24 hour notification will be required for all inspections listed.

8109.4.1 Std Test Methods (Testing Regime)

Unless otherwise approved by the Superintendent the following minimum testing regime applies to this specification:

8109.4.1.1 General

The contractor shall carry out testing on the lining material and its constituents.

The contractor shall give Principal 7 days' notice of the date, time and place of all tests on the lining following manufacture. All works on testing before and after installation is to be included in the Contractor's Quality Assurance System.

If any manufacturer's test data is being used to justify the suitability of the lining system for requirements mentioned in this specification this shall be submitted to the principal prior to commencement of lining manufacture, if no test result are available or submitted then the Principal may request the Contractor to retest any properties that cannot be verified by such test data.

Required testing on pipe materials for alternate materials follows:

Cured-in-Place Pipe Lining

- Hardness in accordance with ASTM D2583 Short Term Tensile Strength in accordance with ASTM D638 or BS 2782: Method 1003 (3 samples for each line being tested).
- Short Term Ring Stiffness in accordance with AS 3572.10.

Slip Lining

- Grout Cube Strength in accordance with BS 1881: Part 116 (three for each batch of grout with a maximum of six for any one length of lining).
- Grout Slump Test in accordance with BS 1881: Part 102 (one for each batch of grout).



These testing requirements assume the slip lining material is fully tested to confirm its tensile and flexural properties for each batch of pipes produced. It also assumes the pipes are not modified in any way by heat or temperature during installation.

Folded and Formed Lining

- Short Term Tensile strength in accordance with ASTM D638.
- Short Term Flexural Stiffness in accordance with ASTM 2412 or WIS 4-34-04
- Short Term Ring Stiffness in accordance with AS 3572.10.

Samples for these tests may be taken from excess sections extracted from near the bottom of one of the access chambers. Sections where samples are to be removed are to be insulated with sandbags or the like to simulate the temperature conditions of the lining in the pipe during reversion.

Wound Lining

- Impact Test in accordance with WIS 4-31-05 with the impact weight contacting with the joint between strips.
- If applicable, Grout Cube and Slump tests as for slip linings.

Samples may be produced by extending the lining into the access chamber at the opposite end to the winding machine.

Samples for testing may be prepared using the procedure given in Appendix B of WIS 4-34-04 and undertaken by a third party materials testing laboratory.

8109.4.1.2 Testing and Acceptance

8109.4.1.2.1 Pre and Post Lining CCTV

Following the installation of the liner a CCTV inspection, by use of a panning head camera of each segment of the lined stormwater (access chamber to access chamber) shall be carried out in accordance to the WSA 05-2013 system to establish that the lining has been installed and all live junctions have been reconnected and operating as specified.

In general terms standards for CCTV inspection are established under Supplementary Specification 8119 CCTV Inspection of New Underground Stormwater Infrastructure.

The Contractor shall deliver the post installation CCTV report to the Superintendent for approval as soon as possible, but no later than 24 hours after each segment of the work has been completed to allow for prior Contractor QA review on the segment. (HOLD POINT)


The delivery of the CCTV report shall be formalised by submission of a signed version of the Lot ITP which States that the completed CCTV works and the physical lining works has been quality assessed in terms of the approved Quality Assurance Plan and compliance to specification.

The Superintendent shall review the CCTV and advise the Contractor should any defect be detected that requires rectification.

This will eliminate the unnecessary delay in the Superintendent receiving the final CCTV evidence and will speed up the approval of payments.

Failure to submit video evidence of the completed work will result in non-payment for the segments of work claimed.

All CCTV works should be compatible with the MRC asset management system (Assetic). All the inspection headers should have the MRC asset management system ids.

Unless otherwise requested, post-line CCTV reports are to be submitted to MRC on  drive in pdf, drop box/cloud based submissions, video and WinCam V8 format for integration into the Council records.



CCTV files shall be named as follows:

[Asset ID] [Year]_[Month] Postline

8109.4.1.2.2 Testing for Ovality and diameter

Ovality testing of the carrier pipe shall be undertaken as part of preline CCTV inspection.

At the completion of the rehabilitation works for each segment of work (access chamber to access chamber), the Contractor shall carry out testing for the ovality of the liner. The Contractor shall test for ovality by Laser Profiling or by taking measurements of the size the lined pipe at intervals of no greater than 5.0 metres or shall demonstrate compliance to this clause using a proofing disc not lesser than 5% smaller in size in perpendicular direction to the cross section or diameter, width or Height to have successfully passed through the relined segment. (HOLD POINT)

The pass criteria for testing for ovality is Average ID/Nominated ID shall be greater than or equal to 0.95.

In the event that the average ID criteria is satisfied but point to point cross section assessment identified any incidence of an average point ID less than 0.95 but greater than 0.9 then in accordance with Clause 30.5 the Principal Reserves the right to consider partial payment for work under the Contract that is delivered that is not in accordance with the Specification. A price reduction factor may be applied for liner bore localised construction on condition that the Principal is satisfied that the number and position of such constricted sections does not in itself create any operational issues.

Consideration will be given by the Superintendent should the carrier pipe exhibit initial out of ovality criteria.

In the event that the Contractor cannot provide Laser Profiling then the alternative method nominated by the Contractor at tender Stage shall be utilised subject to Superintendent acceptance.

8109.4.1.2.3 Testing of Lined Stormwater Mains

The contractor shall on completion of lining operations and prior to cutting out and reinstatement of property connections, for each segment of the lined stormwater (access chamber to access chamber) undertake testing of the in-situ lining to attest to the seal that has been obtained

8109.4.1.2.4 Vacuum Testing

The following procedure is to be followed prior to cutting lateral connections. (HOLD POINT)

- Plug the test section at all openings;
- Connect the test equipment to the section under test;
- Extract air from the section under test to a vacuum of negative 30kPa (-30 kPa);
- Monitor the vacuum gauge for a minimum period of 3 minutes; and
- The stormwater under test shall be deemed to have passed the test if the vacuum does not drop by more than 5kPa over the 3-minute period.

8109.4.1.2.5 Pressure Testing

On completion of lining operations, the following procedure shall be conducted prior to cutting lateral connections. (HOLD POINT)

- Plug the test section at all openings;
- Couple test equipment to the section under test;
- Raise the air pressure and stabilise it at 30 kPa; and
- Measure the pressure resulting after increments of one (1) minute up to the times listed below for the corresponding pipe sizes.



A test will be accepted if the measured pressure after the following times is not less than 30 kPa.

Diameter (mm)	Time / Duration
100, 150 and 225	3 minutes
300, 375 and 450	5 minutes
600 and greater	7 minutes

8109.4.1.3 Tests and Test Records

The Contractor shall give the Superintendent one (1) working days’ notice of the intention to undertake testing of each segment of relined stormwater.

In general, the Superintendent will undertake witnessing of the tests on an audit basis, the frequency of these audits will be determined by the success to failure ratio. (WITNESS POINT)

The Contractor shall undertake all testing as detailed in this specification and any other tests it requires to meet its Quality Plan and provide a copy of these results to the Superintendent. Costs for these shall be borne by the Contractor and deemed to be included in the scheduled rate. (HOLD POINT)

8109.4.2 Hold Points, Witness Points and Milestones

Separate to the Contractors inspections and checklists the following table represents the Superintendents minimum inspection and milestone requirements relating to the works as laid out for this specification;

Activity	Inspection Type	When
Preliminary Documentation (Refer to 8109.5)	Milestone	4 Weeks prior to commencement of work
Liner material specification compliance report	Milestone	At time of tender
Cleaning of culvert/s prior to lining taking place	Witness Point	Prior to lining commencing
Prelining CCTV	Hold Point	After cleaning prior to lining commencing
Culvert and/or junction rehab works	Hold Point	Prior to lining approval to proceed
Lining Works Approval to proceed	Hold Point	After prelining CCTV and any culvert rehab works carried out
Lining of culverts	Witness Point	During lining process to audit submitted procedure is being complied with
Monitoring longitudinal shortening	Hold Point	30 days after lining occurred
Plugging and Blocking culverts	Hold Point	Approval of Superintendent



Pumping and bypass of stormwater system (Procedure and Approval)	Hold Point	Procedure submitted 5 days prior to pumping and bypassing required
Approval of pumping and bypass	Hold Point	After secondary pump is on site as standby
Patch Lining	Hold Point	Approval of material prior to use
Ovality	Hold Point	At completion of lining segment installation
Vacuum Test	Hold Point	After Installation prior to cutting lateral connections
Pressure Test	Hold Point	After Installation prior to cutting lateral connections
No Movement after 14 days	Hold Point	14 days after completion of liner activities prior to practical completion
Geometrics Compliance	Hold Point	At completion of lining works
Culvert Lining Acceptance	Hold Point	Prior to practical completion
Lateral connections	Hold Point	After pressure testing and vacuum testing
Connections at access chambers	Hold Point	After pressure testing and vacuum testing
Post Liner CCTV	Hold Point	After installation of liner no later than 24 hours after section complete
Defect identification and rectification process	Hold Point	After post CCTV has been carried out and submitted
Reinstatement of s/water drainage infrastructure	Hold Point	During construction
Reinstatement of private property	Hold Point	During Construction not later than 72 hours after liner works complete.
Prepour inspection concrete pours to pit, also including kerbing (as required)	Hold Point	prior to concrete pours on pits which have been modified for the works
Pavement installation (as required)	Hold Point	Prior to sealing
Asphalt reinstatement (As required)	Hold Point	Seal
As Constructed documentation submitted and accepted	Hold Point	4 weeks prior to Works as Executed inspection request

8109.4.3 Construction Geometric Requirements and Tolerances

Unless otherwise approved by the Superintendent the following construction requirements and tolerances shall apply to this Supplementary Specification;

- As required by Section 8109.4.3.1



The extent of the works and rectification required by the lining activity outcome shall not depart from the widths, lengths, heights, and shapes specified by the relevant specifications as applies to this specification; (HOLD POINT)

- Concrete tolerances in accordance with MRTS70 Concrete.
- Earthworks tolerances in accordance with MRTS04 General Earthworks.
- Kerbing tolerances in accordance with MRTS03
- Pavement tolerances in accordance with MRTS05 Unbound Pavement
- Asphalt surfacing in accordance with MRTS30 Asphalt

Geometric requirements and tolerances specific to the project are detailed on the design drawings or documents and are included in Clause 2 of MRC Supplementary Specification Annexure 8109_1 Insitu lining of Existing Stormwater Main.

8109.4.3.1 Culvert Lining Acceptance Criteria

Acceptance of the liner will be in accordance with the following conditions: (HOLD POINT)

- The finished liner thickness is to be $\geq 90\%$ of nominal liner thickness;
- The finished liner thickness around the circumference of the pipe shall not vary by more than 20% of mean lining thickness;
- The- ratio of diameters in any two direction as per the ovality test does not change by more than 10% after relining
- The average ID of the liner is to be not less than 95% of the value specified by the Contractor at Tender stage, or as adjusted later based on actual host pipe measurement.
- No movement of the liner at access chambers and lateral connections when inspected 14 days after completion of the liner installation and prior to Practical Completion. Should movement of the liner be detected at the access chambers and/or lateral connections, the Contractor will be required to submit to the principal for approval a procedure to rework the connections prior to rectification works commencing;
- No leakage through welded, glued or mechanical locking joints;
- Acceptable results through either vacuum or pressure testing to prove the integrity of the liner.
- No irregularities along the bore of the liner;
- Flow from the stormwater service connections into the main line is not to be inhibited by the rehabilitation method. Constrictions and protrusions that could catch solid material and cause obstruction of the junction are not acceptable;
- Rendering of access chamber channels and benching remains intact and there is no cracking or delamination;
- The liner satisfies the structural strength requirements;
- For CIPP & Thermoform lines – the record is available that the Contractor installed instruments to continuously monitor and record the liner temperature and internal pressure to demonstrate that the required curing/setting/forming duration, temperature, UV light catalyst intensity and pressure has been achieved across the full extent of the liner.
- Inspection of all post-rehabilitation CCTV inspection CD and approval of the works has taken place by the Principal.

8109.5 Preliminary

The Contractor is to submit the following documentation 4 weeks prior to commencing work or a prestart is conducted. (MILESTONE):



- Lining material properties (report on compliance with this specification requirements)
- Works procedure – all activities and order of construction
- Environmental Management Plan
- Erosion and Sediment Control Plan (as required for site/s)
- Traffic Management Plan and TGS's
- Quality Plan detailing requirements of 8109.4.

Other preliminary requirements unique to the project will be listed in the MRC Supplementary Specification Annexure 8109_1 Insitu lining of Existing Stormwater Main (MILESTONE)

The contractor is to ensure their construction activities are based on the design drawing or documentation requirements. Alternate construction materials and procedures are not acceptable unless site conditions dictate and at the Superintendents approval.

8109.5.1 Materials, Design & Manufacture

Supply of all materials to site shall be as per the relevant specification and is the responsibility of the Contractor at their cost including but not limited to the lining of the stormwater culverts, reinstatement of stormwater pits, kerbing, pavement and surfacing, verge areas, and public and private infrastructure.

8109.5.1.1 Lining Materials

The rehabilitation system offered shall be such that all materials shall be chemically resistant to withstand exposure to chemicals commonly found in stormwater discharges including hydrogen sulphide, carbon monoxide, carbon dioxide, methane, traces of mercaptans, petrol, saturation with moisture, dilute sulphuric acid (20%), Sodium and Ammonium Hydroxides (5%), as well as external exposure to soil bacteria and any chemical attack which may be due to residues remaining on the pipe wall or materials in the surrounding ground as determined using ASTM F1216-16.

The liner system shall have a design life of no less than 50 years under the design conditions detailed in this specification. The two-year ring bending stiffness values are to be considered representative of the fifty-year buried pipe stiffness used in section 8109.5.1.3

The value of the effective Soil Modulus shall be 2.0 Mpa.

Design shall assume that the permanent water table is at ground surface level (submerged pipes)

The finished liner should be sufficiently strong to withstand monthly pipeline cleaning using water jetting nozzles for pressure up to 170 Bar for the design life.

8109.5.1.2 Liner Pipe Design

The pipe should be designed to withstand earth pressures from full height of soil above without reduction for trench effects and the hydrostatic pressure from water table.

Particulars of the materials to be supplied and associated liner calculations must be provided as part of Tender Schedule 1.

Design method and formulae shall be in accordance with Clause 4.7.2 of AS/NSZ 2566.1, "Buried flexible pipelines: - Structural Design" from the maximum load produced by combination of soil loadings, hydrostatic loading and traffic surcharge based on appropriate of following design loads as per AS5100.2:

- Main Road- single or dual lane of SM1600
- Light Road- Maximum load case for SM1600 single lane
- Field load - M1600 truck loading or 75% of the W80 wheel load in accordance with AS500.2 whichever is greater

The lining shall be designed as a flexible pipe and shall be capable of supporting all imposed loads in its own right so effectively designed as a deteriorated pipe scenario.



The liner shall not rely on the existing pipe support and shall be capable of supporting the applied dead and live loads.

The lining shall be designed to satisfy the critical performance criteria of:

- Deflection

The predicted long-term vertical deflection shall be less than 6% of the diameter of the lining when calculated in accordance with AS/NSZ 2566.1: 1998, Section 5.2.

- Strength

The Contractor shall specify the permissible long-term strain value for the lining material. The long-term flexural strain developed in the wall of the lining under load shall not exceed this value when calculated in accordance with Section 5.3 of AS/NZS 2566.1

- Buckling

The lining shall be designed so that its buckling capacity is greater than the buckling load when calculated in accordance with AS/NSZ 2566.1: 1998.

8109.5.1.3 Intact Design Check

The liner design shall be checked for the “Intact” condition although designed for the “deteriorated” scenario, where the liner is designed to support only the hydrostatic loads imposed from the water table above the existing pipe.

The stiffness of the liner shall be calculated in accordance with the following equation:

$$q_{all} \leq \frac{C}{F_s} * \frac{24}{(1-\nu^2)} * K * S_{DL} * 10^{-3}$$

Where q_{all} = hydrostatic load on the liner

$$= \gamma_L * \left(H_w + \frac{D_e}{2} \right)$$

γ_L = unit weight of water (= 9.8 kN/m³)

H_w = height of water table above liner (m)

D_e = Outside diameter of the liner (m)

F_s = Factor of Safety taken as 2.5

C = Factor for liner ovality, which shall be taken as 0.64, corresponding to 5% ovality

K = buckling enhancement factor

= 7.0 when the liner is in intimate contact with existing pipe or annular gap is grouted = 4.0 when the annular gap exceeds a mean value of 1mm or is un-grouted.

ν = Poisson’s Ratio for the lining material

S_{DL} = long term rig bending stiffness of the lining (/m)

8109.5.1.4 Structural and Hydraulic Requirements

Prior to installation of the liner, the Contractor shall provide evidence to the Superintendent and/or Principal that the proposed liner is capable of satisfying the following structural and hydraulic requirements:

- Flexural Modulus greater than 900MPa determined in accordance with WIS 4- 3404 or BS EN ISO 178.



- When the liner passes through a centreline radius of 100mm, the maximum height of any wrinkles or corrugations in the liner wall will not be greater than 5mm.
- The hydraulic roughness of a straight section of liner shall be less than a Manning's 'n' value of 0.013
- The lining system shall not reduce the internal diameter of the existing pipe by more than 10 percent for pipes below 500mm or 5% for pipes above 500mm diameter- unless otherwise approved by the Principal.
- Any localized protrusions, deformations and sharp edge obstruction and laterals shall not reduce the pipe diameter by more than 10%, for up to 2m around the obstructions unless otherwise approved by the Principal.
- In any case, flow capacity shall not be reduced without written permission from the superintendent.
- The proposed system for sealing the liner to host pipe and access chamber walls at the access chambers penetrations shall be of a type proven to provide a long term seal against water ingress or egress under hydrostatic pressure.

Appropriate evidence shall be independent test reports, demonstration of installation or the provision of samples demonstrating that the lining system is capable of meeting the above criteria.

The lining material shall be such that the reduction in capacity owing to reduction in diameter shall be made up by improvement in Manning's "n" value (refer to Manning's formula for hydraulic calculations of flow in pipes and channels).

Should an insertion liner be the selected option, then the liner shall be fabricated to a size that, when installed, will neatly fit the internal surface of the conduit being lined. Allowances for longitudinal and circumferential stretching of the liner shall be made by Contractor so as to achieve a neat fit in the host pipe.

8109.5.1.5 Manufacture

Do not manufacture linings before written approval of the liner design and installation method is provided by the Superintendent.

The manufacture of the lining shall be carried out in accordance with a specification purpose written for the particular system by the Contractor and approved by the Superintendent. This specification shall detail all labour, materials and equipment required to combine the various ?????

The purpose written specification shall also include testing and inspection work carried out to verify the dimensions and quality of the manufactured lining. The Contractor upon request by the Superintendent shall provide a copy of this specification.

The Contractor shall be responsible for measuring the dimensions of the existing stormwater prior to fabrication, to ensure that proper fit is achieved. This shall include measurement of the horizontal and vertical alignment at changes in direction.

All work involved in the measurement, inspection and testing of the lining during manufacture shall be included in the Contractor's Project Quality Plan and be inclusive of this specifications requirements.

8109.6 Construction

This specification relates to the carrying out all works associated with the installation of the lining of the stormwater main as specified on project drawings or documents, including required access works and reinstatement works. All materials, plant, and labour required to carry out the works under this Specification is to be supplied by the Contractor at no cost to the Principal.



This section lays out the works operations with more detail based on specific requirements of this supplementary specification. Some activities may appear to include items which are stated within other specifications, the purpose is to reinforce that requirement specific to this supplementary specification.

8109.6.1 Work Operations

Work operations incorporated in this item include:

- a) Work Operations included in Clause 2.1.5 of MRS01 “Introduction to Specifications”;
- b) Supply of all materials - 8109.5.1
- c) Maintenance of the worksite, existing facilities and services – 8109.6.1.1
- d) Removal of stormwater inlets or lids and any other part of the pit to allow access to the works – 8109.6.2.1
- e) Excavation if required to allow access to the works – 8109.6.2.1
- f) Cleaning of stormwater main prior to lining – 8109.6.2.2
- g) Pre-installation CCTV inspection – 8109.6.2.3
- h) Identified remediation of stormwater main – 8109.6.2.4
- i) Installation of lining or patch liner - 8109.6.3 and subsections
- j) Undertake testing on completion of lining – 8109.4.1
- k) Reinstatement of property service connections – 8109.6.3.2
- l) Post-installation CCTV inspection – 8109.4.1.2.1
- m) Cleaning, after installation is complete – 8109.6.3.11
- n) Reinstatement of the stormwater pit and site – 8109.6.1.1, 8109.6.1.2, and 8109.6.2.1
- o) Providing CCTV and Quality Assurance documentation prior to payment for the item – 8109.7

8109.6.1.1 Maintenance of the Worksite, Existing Facilities and Services, and Reinstatement

The worksite will have meaning as defined in the General Conditions of Contract AS 2124 with amendments, Clause 2 Interpretation, “site” and will include private property.

Rectification works to reinstate drainage structures including backfilling and reinstatement of surfaces as a result of these relining works shall be carried out in accordance with MRC Supplementary Specification 8105 and it’s Annexure. (HOLD POINT)

The cost for the repair of any damage or remediation of any interference to existing services, structures, grounds, fences and landscaped areas will be borne entirely by the Contractor.

The Contractor will be responsible for clean-up of the work site at completion of works and to keep materials in locations such as to cause minimal inconvenience and maximise safety.

The Contractor will cause the least possible interference with existing amenities whether natural or man-made. The Contractor will take all practical steps to minimise the amount of noise caused by carrying out the Works.

The Contractor will keep work areas in a safe, clean and tidy condition.

The Contractor will remove rubbish, surplus materials or any other construction debris from such areas as may be attributable to this work under this Specification and generally leave them in a satisfactory condition and to the approval of the Superintendent.



8109.6.1.2 Protection and Restoration of Private Property

All surfaces, services and /or improvements on private property which are disturbed, destroyed or damaged by work under the contract shall be replaced, repaired, reinstated or otherwise restored as near as practicable to their pre-existing condition by the Contractor and at the Contractors expense. Improvements shall be deemed to include, but not be limited to, shrubs, gardens, irrigation systems, retaining walls, fences and other structures, including manholes. (HOLD POINT)

All repairs and re-instatements must be completed by no later than 72 hours after the liner is installed.

Full compensation for the protection and restoration of private property shall be deemed to be included in the scheduled Rates for Stormwater mains rehabilitation by structural lining.

8109.6.2 Preparation prior to Lining

8109.6.2.1 Preparation of Stormwater Pits for access

The contractor must allow for all preparation works to access stormwater pits with the required equipment for relining. This may include, but not be limited to:

- DBYD and service locations.
- Excavation around the stormwater pit.
- Removal of the stormwater pit inlet/lid structures and various components.
- Demolition of part of the concrete pit to gain access for the works.
- Restoration of pit and road surfaces to pre-existing standards and condition
- Earthworks and site access restoration to preconstruction condition

8109.6.2.2 Cleaning of Stormwater Main Prior to Lining

The cleaning of the stormwater main will include removal of silt and debris including cutting and removal of all tree roots penetrating the stormwater. All materials that are washed out of the mains are to be trapped in the downstream access chambers and removed, preferably by way of vacuum extraction.

Waste material retrieved from cleaning operations will be disposed of by the Contractor at a site approved by the Superintendent. As soon as access to remove this material is available, the material will be removed and disposed of in the approved manner.

The Superintendent will be advised immediately should the Contractor consider that any segment of stormwater main would not benefit from relining due to the reduction in capacity.

Passing material from access chamber to access chamber will not be permitted, except where access for material removal equipment is not available.

The Contractor, when using cleaning equipment or undertaking any of the associated cleaning activities, must take all necessary precautions to ensure that these activities do not:

- (a) Damage or flood public or private property;
- (b) Damage the stormwater pipe being cleaned or any associated pipes or structures; and
- (c) Cause any upstream inlets to surcharge due to flow restriction. The contractor will check with the Superintendent's representative as to the possible risk associated with this activity.

Should damage occur or the Contractor believe that to continue with the cleaning that damage may be caused to the existing stormwater assets, the Contractor shall immediately report this concern/damage to the pipeline to the Superintendent.

Where diversion or restriction of flow is necessary for the successful installation of the liner, this diversion and restriction will be the full responsibility of the Contractor.



8109.6.2.3 Pre-lining CCTV and Cleaning

The Contractor will thoroughly clean the stormwater main prior to undertaking the lining. CCTV inspection will be used to confirm that the pipe is sufficiently clean and can receive the liner. The Superintendent will be advised immediately that this has been completed. (WITNESS POINT)

The Contractor shall deliver the post cleaning CCTV report to the Superintendent for approval as soon as possible, but no later than 24 hours after each segment of the work has been completed to allow for prior Contractor QA review on the segment.

The delivery of the CCTV report shall be formalised by attachment of a covering Notice signed by the Contractor's designated supervisor/QA Manager which States that the completed CCTV works have been quality assessed in terms of the approved Quality Assurance Plan and compliance to specification.

The Superintendent shall review the CCTV and advise the Contractor should any defect be detected that requires rectification. (HOLD POINT)

This will eliminate the unnecessary delay in the Superintendent receiving the final CCTV evidence and will speed up the approval of payments.

Failure to submit video evidence of the completed work will result in non-payment for the segments of work claimed.

All CCTV works should be compatible with the MRC asset management system (Assetic). All the inspection headers should have the MRC asset management system ids.

Unless otherwise requested, pre-line CCTV reports are to be submitted to MRC in pdf, video and WinCam V8 format for integration into the Council records.

CCTV files shall be named as follows:

[Asset ID] [Year]_[Month] Preline

8109.6.2.4 Rehabilitation Procedures

Proprietary rehabilitation methods shall be carried out strictly in accordance with the manufacturer's written recommendations.

If at any stage, and in particular at the completion of the pre-rehabilitation CCTV Survey, the Contractor considers that rehabilitation of the stormwater could precipitate a collapse of the asset, then the Contractor will state this in writing to the Superintendent, together with a proposed work method to prevent collapse and shall not proceed with further work until the work method is approved in writing by the Superintendent.

Where infiltration or defects in the host pipe were identifiable in the information available to the Contractor at the time of tendering, any remediation necessary to allow successful installation of the liner system shall be deemed to be included in the unit rate for installation of the liner pipe.

If at the completion of the pre-rehabilitation CCTV survey the Contractor considers that spot repairs or other works are necessary prior to undertaking rehabilitation, then the Contractor will state this in writing to the Superintendent together with a proposed work method and shall not proceed with further work until the work method is approved in writing by the Principal. This shall include localised repairs to host pipe, defect stabilizations at locations spots of settlement and installation of pre-liner to restrict circumferential stretching or smoothen transitions at joints.

The Contractor shall be responsible for any collapse or damage to the stormwater system caused by the Contractor's operations including but not limited to mains, laterals and manholes.



8109.6.2.5 Repair of Stormwater Line Prior to Lining

Where a condition assessment has identified that, prior to lining, a junction requires replacement and/or the asset requires repair, the Superintendent retains the option to request a variation for this work. (HOLD POINT)

The materials used to complete these repairs must be approved by the Superintendent.

8109.6.3 Lining Works

The Contractor is solely responsible for the details of execution and suitability of methods and procedures used to satisfy the specific requirements of the liner material being used and the conditions of each segment. (WITNESS POINT)

The contractor shall carry out pre-lining CCTV of the main along with ovality check using laser profiling in accordance to the WSA 05-2013 system or alternative process as approved by the Superintendent.

No activity of the Contractor during preparation of the stormwater section and installation of the liner shall adversely affect existing structural integrity of the stormwater, unless agreed to by the Superintendent.

Where an access chamber has to be altered by the Contractor to allow lining to take place, the contractor shall seek approval from the principal of the change and any alterations shall be reinstated within 72 hours to the satisfaction of the Superintendent.

The lining shall be designed and fabricated in a manner that, when installed, it will neatly fit the internal wall and length of the pipe being lined. Where required, suitable allowance shall be provided for longitudinal and circumferential distortion of the lining during installation.

A lining shall be considered to neatly fit if it has “Intimate Contact” with the host pipe in accordance with industry best practice.

The seal between the liner at the access chamber shall be waterproof and shall be bonded and shall have a design life no less than that of the liner i.e. >50 years.

All liners shall be sealed at the access chamber to provide a permanent watertight seal between the outside of the liner and the host pipe to prevent in-filtration and ex-filtration. The composition of the material forming the seal shall be compatible with the liner material and the access chamber. The seal shall have an expected life equal to that of the liner. The sealing system shall not rely on the use of polyurethane grout.

It is desirable that the Superintendent views the CCTV camera as it proceeds through the cleaned main. However, if this is not possible for any reason, the Contractor shall clean the stormwater immediately prior to lining and shall record the inspection on video and shall hand this to the Superintendent. The location of all house service connections and sidelines shall be identified and physically recorded at this time. The lining system shall not rely on dimpling or indentations to determine the location of the house service connections or sidelines entering the stormwater main.

The Contractor shall install instruments to continuously monitor and record the liner temperature and internal pressure and application of UV energy to demonstrate that the required curing/setting/forming duration, temperature or UV light catalyst intensity and pressure has been achieved across the full extent of the liner. It shall be ensured that there is no stress built in due to rapid cooling.

No lining work is to be undertaken without prior approval of the Superintendent unless otherwise agreed in writing. It shall be the responsibility of the Contractor to apply for this approval. (HOLD POINT)

Flow in stormwater service connections and the Principals stormwater main should be isolated during the lining operation to ensure that no debris may get trapped between the liner and the original pipe.

Where diversion or restriction of flow is necessary for the successful installation of the liner, this diversion and restriction shall be the full responsibility of the Contractor.



The installation procedure shall be executed to prevent both infiltration into, and migration through the annular space between the existing pipe and the lining.

The thickness of the installed liner shall not vary by more than 10% of the thickness stated in the Design, unless otherwise approved by the Principal.

The Contractor shall immediately inform the Principal of any liner defects. Any defects which in the opinion of the Principal will affect, in the foreseeable future, integrity or strength of the lining, shall be repaired at the Contractor's expense.

Any fins, depressions, protrusions, splitting, narrowing of liner wall thickness, etc., that are identified because of the Contractor's failure to correctly measure the internal dimensions of the host pipe will be treated as defects just the same as if they had occurred for any other reason.

All the coupons cut-out (if exists) from lateral connections shall be recovered, marked and measured to record and substantiate that specified liner thickness has been achieved.

In the absence of house connections or such samples being obtainable an intact full circumference sample is to be obtained by the Contractor by means of a Restrained Sample and a Plate Sample for host pipes of greater than DN 300 per WIS 34-04 -04. This can be substituted for manufacturer's certified thickness measured for each batch.

If test results do not compare favourably with the Type Test results the Superintendent may direct the Contractor to carry out additional samples at the cost of the contractor, without re-imburement.

8109.6.3.1 Monitoring of Longitudinal Shortening

For liners, which may be subject to shrinkage, monitoring of longitudinal shortening shall be carried out and reported for on the frequency of one report per twenty segments for each profile type with minimum one measurement for each profile.

Lining shall be initially cut off at their ends with 100mm of additional length protruding into the access chamber at each end of lined section. Fix marks shall be placed on the liner and access chamber wall to allow measurement of longitudinal movement.

An acceptable change of length shall be less than 1mm for every 2m of liner length assessed over a thirty (30) day period.

The lining shall be cut to its final length and resealed at the access chamber wall, if necessary, following acceptance by the Superintendent of the longitudinal monitoring results. (HOLD POINT)

8109.6.3.2 Lateral Connections

All live connections must be re-connected to the lined main. Completed works are to be inspected by the Principal or Superintendent. (HOLD POINT)

Each required opening shall have an initial rough cut on the day of lining and be 100% completed by close of business on the day that the lining has reached its final dimensions allowing sufficient time for curing, shrinkage, thermal contraction, stress recovery, mechanical adjustment etc, as necessary. Liners, which have been heated during installation, shall be left to cool for the minimum period recommended by the manufacturer before any cutting to reconnect house services.

There shall be no discontinuity between the lining material at the cut hole and the lateral. The Contractor shall ensure that each hole cut in the lining will not inhibit flow into the Principal's stormwater from the junction, cause any constrictions or be such that it will catch solid material and cause a choke.

The short form liner must be installed using a packer capable of forcing excess resin into the gap between the stormwater line and the host pipe at the connection.



When installed, the short form liner must be free of any protrusions or defects that may inhibit flow into the lined stormwater, or cause accumulation of debris.

The method of sealing is to be approved by the Superintendent prior to use. Flood grouting methods will not be approved.

The tendered rates for the re-instatement of lateral connection to be inclusive of the removal of tree roots from within the stormwater service connection to enable the successful completion of the stormwater service connection sealing works.

The cutting equipment shall be capable of reinstating the opening into the stormwater for sloped and / or square connections. The cutting tool shall leave a smooth, bevelled edge free of any protrusions. The cut out shall be flush with the inside surface of the lateral connections. In addition to the requirements specified in 6.1.3, there should be no reduction or sharp changes in flow area of the lateral more than 10% flow area.

8109.6.3.3 Connections at Access Chambers

All liners must be sealed at both access chamber entrances to provide a permanent water tight seal between the outside of the liner and the host pipe to prevent infiltration and ex-filtration. The seal shall be for a minimum length of 300mm from the access chamber using approved, shrinkage free filler. The composition of the material forming the seal must be compatible with the liner material and the access chamber. Any sealant injected between liner and original pipe for sealing should be injected at minimum pressure of 70kPa.

The seal must have a design life equal to that of the liner, i.e.>50 years. The sealing system must not rely on the use of polyurethane grout. Full details of the proposed access chamber sealing methodology are to be provided for Superintendent and or Principal approval.

Liners that have a polyethylene outer sleeve must have the polyethylene coating removed for a minimum of 300mm along the full circumference of the liner at both access chamber ends. Removal of the polyethylene sleeve is to enable sufficient adhesion between the liner, end seal material and inside of the deteriorated pipeline.

The transition between the liner and the channel or floor in the access chamber base must be rendered smooth to prevent siltation of the stormwater.

The contractor shall remove and reinstate to the satisfaction of the Superintendent all ~~back drops~~ sub soil entries into access chambers.

Completed works are to be inspected by the Principal or Superintendent. (HOLD POINT)

8109.6.3.4 Localised Repairs by Patch Lining

Short form patch lining is deemed an acceptable method of localised repair either of the Contractors mainlining system and/or as a repair system of localised pipe defects packaged together by the Principal. The use of a short form patch lining system is subject to the approval by the Principal and must be in accordance to the following criteria: (HOLD POINT)

- The short form patch lining system must be a cured-in-place liner, and must be designed to the same criteria as the stormwater main liners covered by this Specification;
- The Contractor must ensure that resins and methods used meet WH&S requirements. Only nontoxic type resins must be used in the composition of the short form patch liner;
- The short form patch liner must extend for a minimum of 500mm either side of the pipe defect, and must have a minimum total length of 1,200mm;
- The Contractor must supply full details of the proposed short form patch lining system prior to its use, in order for the Principal to properly assess and approve the system.



8109.6.3.5 Grouting

At times grouting may be required as follows:

- Where grouting of the annulus between the Contractor's lining system and host pipe is required in order to meet the liner design requirements and / or;
- Where grouting of pre-detected voids around the outside of the host pipe has been requested by the Principal.

In both instances, the use of grouting is subject to the approval by the Principal and must be in accordance to the following criteria:

- It is recognised by the Principal that any grouting works undertaken during the life of the contract will be for a void filling operation only. Under no circumstances will grouting operations be accepted by the Principal as a stand-alone structural solution to identified defects (such as flood grouting or sealing of joints using a grout agent), nor to enhance the liner strength where it is assumed a bond will be created between the liner, grout and host pipe;
- The Contractor must provide technical data on the characteristics and performance of the grouting materials to be used for any void filling operation. Setting agents and filling materials as well as reinforcing agents may be used, but in each case the Contractor must submit to the Principal documentary evidence to establish the properties of the proposed material(s), past experience and acceptance by appropriate Authorities for the use in void filling operations;
- Where grouting has been used in order for the liner to meet liner design requirements, it is the Contractor's responsibility to ensure there is no leakage of grout into the lined stormwater and if so that any leakage be properly removed prior to acceptance final CCTV operations.
- For any grouting operation, the Contractor is required to provide to the Principal grout log sheets in digital format showing the line identification numbers, and quantity and type of grout injected.

Responsibility for the design of the liner shall remain solely with the Contractor. The Principal and the Contractor acknowledge and agree that:

- The Principal shall not be bound to check any design undertaken by the Contractor for errors, omissions or compliance with the requirements of the Contract; and
- The Principal's receipt or review of, comment on, or failure to comment on any design undertaken by the Contractor, shall not relieve the Contractor from the responsibility for any design, errors or omissions in any design, or compliance with the requirements of the Contract.

8109.6.3.6 Abandonment of Repair

If, after commencement of the work any breakdown or failure of equipment occurs, the Contractor shall ensure that all lining material is speedily removed from the stormwater pipe, with particular attention to the in-chamber washing of the reject liner. The Contractor shall expeditiously remove all equipment from the pipe so that the stormwater can function normally and not cause any undue interference with the drainage service.

The Contractor is to implement the procedure that is to be adopted should a failed liner be required to be removed from the existing stormwater main. In this scenario bypass pumping will have to be employed. The contractor must notify the Superintendent of any failure of equipment as part of the procedure and actions intended. (HOLD POINT)

8109.6.3.7 Maintenance of Stormwater flows.



The Contractor shall ensure that the stormwater drainage system stays operational at all times during the work (including CCTV).

If the relining technique requires no or minimal flow the proposed method and details for achieving this shall be submitted to the Superintendent. The Contractor shall obtain the direction of the Superintendent whether the proposed method and details for plugging or bypassing are acceptable or not acceptable.

The Contractor shall provide bypass facilities where necessary to prevent overflows or back flows within the stormwater mains or house service lines.

Where diversion of flow is necessary for the successful cleaning and CCTV inspection, this diversion shall be the full responsibility of the Contractor.

8109.6.3.8 Plugging and Blocking

All line plugs used to control flow are to be inserted only on the upstream side of the access chamber.

All plugs used by the Contractor shall be designed so that:

- All or any portion of the flow can be slowly released, if and when required; and
- Provision is made to adequately secure the plug-in position and retrieve the plug when required.

The duration of the Plugging and/or Blocking shall be kept to a minimum and should be approved by the principal prior to deployment. (HOLD POINT)

8109.6.3.9 Pumping and Bypassing

When pumping and /or bypassing is to be used, the Contractor shall supply all pumps, conduits and other equipment, including tankers if necessary, as well as all labour, traffic control, environmental plans, protection and supervision to divert the stormwater flow around the access chamber section in which the work is to be performed, and for the discharge of stormwater flow downstream of the work area.

Should the contractor choose to carry out lining with pumping out the existing flows, the Contractor shall provide, on site, a standby pump with the same capacity as the duty unit approved for use by the Superintendent. This standby unit shall remain on site for the duration of the bypass works and shall be ready for instantaneous use should the original pump fail.

The Superintendent will not permit any pumping or bypassing to commence if the standby pump is not on site and ready for instantaneous use. (HOLD POINT)

The Contractor shall submit to the Superintendent for approval the proposed plan for the bypass works five (5) working days prior to undertaking the works. (HOLD POINT)

This plan shall clearly state the following:

- Section of main proposed to be bypassed;
- Location and segment/s number/s;
- Asset number of access chambers involved;
- Details of duty pump, including maximum noise level (dB) when operating;
- Details of standby pump, including maximum noise level (dB) when operating.

8109.6.3.10 Contractor to Take Precautions

The Contractor will assume that all stormwater mains have potential for explosive gases. The Contractor is to assume that all stormwater mains have potential for high hydrogen sulphide levels. The Contractor is to apply an appropriate methodology to test for both hydrogen sulphide and explosive gases when



opening any manhole and undertaking works. Methods of hazard control must be applied where risk is detected.

When flow in the line is plugged, blocked, pumped and / or bypassed, sufficient precaution must be taken to protect the line from surcharging and damage. Precaution must also be taken to ensure that control operations do not cause flooding or damage to public and private properties.

The Contractor must ensure that surcharges or overflows in the stormwater system, including lateral connection do not occur as a result of insufficient capacity of the bypass system.

The Contractor shall take all-necessary measures to avoid blockage including the installation of appropriate strainers upstream of the pump suction hose inlet point.

The Contractor shall ensure that, at any time during bypass operations, the storage access chamber immediately upstream of the section being bypassed is continuously monitored, and the depth of storage is maintained within 1.5 times the diameter of the upstream stormwater.

The Contractor may select, by mutual agreement with the Superintendent's Representative on site, an access chamber, other than the first upstream access chamber, for the purpose of monitoring the internal storage.

Bypass systems shall be operated in a manner that prevents overflow of the stormwater system downstream of the bypass system delivery point. If the capacity of the Contractors bypass system is exceeded, the Contractor shall either:

- Cease work at the earliest time appropriate to the current operation, and reinstate flow in the main line; or
- Continue work by increasing the capacity of the diversion system to match the higher actual or anticipated flow rate.

The Contractor shall be responsible for the cost of all clean up, restorations of any areas affected by the surcharge or overflows associated with works under the Contract and shall perform such clean up works required or ordered by the Superintendent or that may be ordered by the responsible State Authority to rectify the effects of the spillage.

The Contractor shall at the pre-start meeting submit an Environmental Management Plan for inclusion in the Principal's records.

Copies of the Environmental Management Plan should be held on site available for inspection.

The Contractor shall keep complete and accurate records, including but not limited to, risk assessments, traffic management plans, environmental management plans etc. of all diversion and flow control activities. These records shall be furnished to the Superintendent immediately following the diversion work, and in any case within 24 hours.

8109.6.3.11 Cleaning After Lining

On completion of the lining process, the stormwater shall be cleaned of any waste material before becoming operational. It may be permissible to allow the discharge of this waste residue into the stormwater providing that the by-products meet the requirements of the Councils stormwater admission standards, and do not cause any operational problems. However, toxic, corrosive or carcinogenic material, which does not meet the requirements of Council's stormwater admission standards, shall require the Superintendent's written approval prior to commencement of work.

8109.6.3.12 Clean Work Site

The site is to be cleaned of all debris, excavated material, and construction materials and returned to its natural state prior to works occurring.



Disturbed areas are to be rehabilitated as required by the design drawings and erosion and sediment control measures installed as per the Contractors approved Erosion and sediment control Plan and as directed by the Superintendent. (HOLD POINT)

8109.6.4 Defects

The finished lining shall be free of all defects, which affect long-term strength, hydraulic performance or may cause accumulation of solids.

This shall include, but not be limited to, defects arising from sub-standard materials, faulty or inaccurate manufacture, inadequate pipe preparation, faulty installation or workmanship, or inadequate curing.

Defects that are considered unacceptable in all liners include, but are not limited to, the following:

- Under strength finished lining materials
- Foreign inclusions
- Irregularity in lining caused by inadequate pipe preparation
- Leakage through the lining
- Inadequate material curing
- Inadequate resin impregnation
- Excessive resin loss during installation
- Dry spots, bubbles, cracks or de-laminations; Pinholes
- Leakage through welded, glued or mechanical locked joints
- Poor quality cut outs
- Inadequate seals at access chambers
- Any other defect not nominated as inherent to the lining system

The following will be considered as unacceptable defects if they exceed the limits given in brackets below:

- Inadequate lining thickness (finished thickness < 90% of nominal lining thickness)
- Excessive variation in thickness around the liner circumference after completion of the cut-outs at access chambers or cut-outs.

Defects which may be nominated as inherent for the proposed lining system may include although not necessarily be limited to the following:

- Incomplete grouting of annular gap, if the design requires grouting;
- Bulges <5%;
- Longitudinal or circumferential wrinkling;
- Longitudinal or circumferential shrinkage; and
- Excessive annular gap between the outside of the lining and the inside of the original pipe.

Any work, which is defective, will be evaluated and if accepted the Principal at its sole discretion reserves the right to reduce the value of associated payment.

Liners (including point patches) with unacceptable defects shall be removed and replaced, and damage caused to the stormwater main in the removal of the defective liner shall be repaired at the cost of the Contractor and no variation to the scheduled rates will be made.

8109.6.4.1 Remediation of Defects

In accordance with the General Conditions of Contract AS2124 with amendments; Quality System Requirements – Submission Terms, the Contractor shall report on and supply details of any nonconformance within 1 day of each non-conformance, together with a report proposal as to whether the non - conformance is proposed as a “Use as is” or “Repair” non-conformance. (HOLD POINT)



The acceptance or rejection of the non-conformances shall be at the discretion of the Principal or Superintendent with all unacceptable defects being remediated.

The maximum time period allowed before work commences on defect remediation for defects identified during the progress of the Contract shall be:

- 5 working days for minor defects
- For major defects – the lesser of:
- as required to prevent any deterioration in the prospect of carrying out a successful repair/replacement during which intervening time all necessary spillage prevention and bypass pumping measures shall be deployed.
- 24 hours subject only to conditions outside of the control of the Contractor and which could not reasonably have been foreseen and contingency arrangements put in place.

8109.7 Post construction

a) Reduced Payment based on Acceptance Testing

As required by section 8109.4 and 8109.6 acceptance testing results and inspections shall determine any reduced payment for the works, this is to be resolved through the submission of the test results and CCTV video and report. Based on the significance of the defect or non-complying test result the Superintendent if accepting of the defects shall determine the reduced payment for the works.

b) Collection and submission of all As Constructed data including QA data requirements.

Contractor is to supply and submit Works as Executed documentation as required by *MRC D20 - Drawings and Documentation* for approval by the Superintendent 4 weeks prior to requesting a practical completion inspection.

Format of submitted “As Constructed” documentation shall be compliant with MRC Supplementary Specification 8919. (HOLD POINT)

c) Monitoring of Longitudinal Shortening of Liner

Where the type of liner is subject to shrinkage, monitoring for shrinkage shall occur as per 8109.6.3.1 with acceptance of the longitudinal monitoring result by the Superintendent. (HOLD POINT)

8109.8 Measurement and Payment

Provision for these works shall be included in the scheduled unit rate for the items show in Clause 8208.3 of this Supplementary Specification and Annexure. No separate payment will be made for the works specified within this Supplementary specification or it’s annexure.

Where patch liner installation is ordered the lineal metre rate shown is for the full length of the main to be treated, however, the tendered rate shall be adjusted so that the total cost amount shown shall be to provide and install a 0.5 m lineal metre patch when measured along the centreline of the pipe at each failure location based on preliminary CCTV data provided.

Should individual patch liner locations require large patch length coverage than the 0.5 m specified, or additional failure locations are discovered following cleaning and pre install CCTV inspections the Contractor shall lodge with the Superintendent a variation claim based on data which indicated the lengths and quantities of the patch liner used to frame the initial tender together with proposed methods of treatment and associated costs.



Scheduled rates for insitu and patch lining shall cover all costs related to cleaning, pre and post CCTV inspection as well as the lining activities itself (including site stormwater control measures) and all restoration activities.

Version Control:

Version	Description	Reviewed / Endorsed	Date
1.0	Original issue		12.03.2021
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