Inspection and Test Plan – Foam Bitumen Pavement at McGregor Road North Entry Ramp

Project no. CC0374 **Project name** Pakenham Roads Upgrade **Date** 4/03/2024 **Approved by** _____

ITP no. 1630-P200-SYM-QAC-ITP-0024 **Revision date** 4/03/2024 **Plant and equipment used** _____

Lot no. _____ **Location (chainages, detailed description or marked up plan)** _____

Attach Dockets, Certificates and QA Documents to ITP

					Verification of acceptance by					Remarks/record (eg. Test frequency reports, certificates, checklist etc)
					Symal			Superintendent		
Item no.	**Activity**	**Ref docs**	**Acceptance criteria**	**Freq**	**Key**	**Resp**	**Initial/ date**	**Key**	**Sign/ date**	
1.0 Pre-Construction Activities										
1.1	Safety – SWMS developed and reviewed	SWMS	Specific SWMS for work task has been developed and reviewed by all parties involved in the works.	Prior to works	**R**	SE				☐ **SWMS approved and ready for task**
1.2	Previous layer conformance	Quality Documents	Previous layer has been signed off and approval for foam bitumen layer is approved by MRPV	Each Lot and prior to works	**H**	SE		**H**		Previous lot ref: ……
1.3	Laboratory Testing – PSD Testing of pulverised pavement stockpile	Test Reports	Particle size distribution testing has been completed on the pulverised pavement stockpile. Results from testing have been received and passed on to MRPV for review prior to beginning works.	Prior to works	**H**			**H**		☐ **PTC PSD and PI Reports (Pre-Construction)**
1.4	Laboratory Testing – Retained modulus of foamed bitumen volume expansion	PTC Test Reports	Testing for retained modulus has been completed and results received for the foam bitumen volume expansion retained modulus. **Minimum retained modulus value: >0.5**	Prior to works	**H**			**H**		☐ **PTC Retained Modulus Test Reports (Pre-Construction)**
1.5	Mix Design Approval	DTP 308.06 754-MELGE305662BV_rev3 DTP 308.05 DTP 308.06 HP	Mix design has been received and reviewed by Symal, to ensure it complies with VicRoads Standard Section 308. **The Contractor shall not commence work until all mix design details have been presented to the Superintendent showing compliance with the requirements of Clause 308.05 and approval has been given for stabilisation work to proceed.**	Prior to works	**H**			**H**		☐ **Mix design, Tetra Tech Coffey Design Report**

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					Symal			Superintendent		
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			Mix Design approved? **Yes** ☐ **No** ☐ **Mix Design Reference:** …… ……							
1.6	Lot Map	Design Documents	Lot map and area has been established.	Each Lot	**R**	SE				☐ **Lot map**
2.0 Construction Activities										
2.1	Pavement Temperature	DTP308.08 (b) Table 308.151	At the commencement of the shift, pavement temperature shall be measured at a minimum of ten random places. Depth of temperature reading: **50mm** Minimum temperature reading before proceeding: **10 Deg C** **Details of procedures for measuring pavement temperature and ceasing operations in the event of rain or strong wind shall be submitted to the Superintendent for review.**	Prior to works start	**R**	SE		**W**		
2.2	Layer placement		Pulverised pavement profilings to be placed in a 190mm thick layer. Class 3 crushed rock to be placed in an 80mm thick layer. Layer thickness to be verified during install by survey/GPS.	During works	**W**	SE		**W**		

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2.3	Supply of Hydrated Lime	DTP 308.04 (b)	All quicklime and hydrated lime supplied to the job shall be provided with delivery docket showing an assigned ALI at the start of each production week. The assigned ALI shall be determined by averaging the six most recent test results for ALI. A test certificate for determination of the ALI shall be made available on request	Each Lot						☐ **ALI Test Certificate**
2.3	Secondary Stabilising Agent	DTP 308.14 (a) (c)	Binder (Lime) shall be spread at specified rate on mix design. **Spread rate:……** Mat test shall be completed prior to commencement of spreading secondary stabilising agent. **Mat Test completed?** **Yes** ☐ **No** ☐ No. tests? Lime to be uniformly spread over the unbound pavement material. Mixing to commence as soon as practical No trafficking (other than construction traffic) to be allowed after spreading of secondary binder.	SE	**H**			**H**		
2.4	Uniformity of spreading of secondary binder	754-MELGE305662BV_rev3 DTP 308 Table 308.151	After the spread rate is confirmed using three trays or mats not less than 1 m2 as per Clause 308.14, three randomly selected supplementary binder spreader runs should be tested per lot as per Clause 308.14 unless the forward speed of travel of spreader or the rate of spread of the spreading unit is changed, then the above process shall be repeated for the new forward speed of travel or new rate of spread. Exception: where calibrated load cell computerised spreading devices are fitted with a system to continuously monitor the spread rate every 100 m, recorded on a daily report sheet. The Contractor shall have a current certificate of calibration for the computerised spreading equipment and shall produce evidence of the actual running spread rate when requested by the Superintendent.	Every 100m of spreading	**W**	SE		**W**		☐ **Calibration Certificate** ☐ **Daily Report Sheet**

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2.5	Initial blending uniformity	DTP 308.08 (d) and (f) and (g)	After lime stabilising has been completed, a small area to be hand-dug to confirm the material has been blended uniformly to full depth. The incorporation of the bitumen is to be carried out to the specified thickness in one or more mixing passes. Foam bitumen stabilisation should not proceed if the bitumen temperature does not comply with the specified bitumen temperature included in the test certificate required in Clause 308.04(a). Where indicated by visual inspection that the foamed bitumen is not uniformly mixed and/or the moisture distribution throughout the layer is variable, Re-mixing to take place improve the uniformity of material, bitumen and/or moisture. Inspection is to be a visual inspection by Symal Supervision. Pavement is to be lightly compacted.	Prior to foam bitumen	**W**	SE, LH		**H**		☐ **Symal/ MRPV Visual Witness of Hand-Dug Trench**
2.6	Relative Moisture Ratio (RMR)	754-MELGE305662BV_rev3 DTP 308.08 (g)	Prior to the incorporation of the foam bitumen the Relative Moisture Ratio (RMR) shall satisfy the below: RMR: **Between 55% and 75%** The RMR is to be taken as the ration of the in situ moisture content prior to the incorporation of foam bitumen, and the material OMC, as a percentage. $$RMR\ (\%) = \frac{In\ Situ\ Moisture\ Content}{Material\ OMC}$$ The relative moisture ratio (RMR) prior to incorporation of the foamed bitumen shall be not less than 55% or greater than 75% of optimum moisture content (OMC) of the material. **OMC**:…… **Moisture Content**:……	Prior to Foam Bitumen	**H**	SE		**W**		

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					Symal			Superintendent		
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			RMR:……. **Confirm above RMR is within specifications prior to foam bitumen?** **Yes** ☐ **No** ☐							
2.7	Bitumen Supply	DTP 308.04 (a), 308.08 (e), 308.14 (c)	Bitumen shall comply with the requirements of Section 175. The Contractor is permitted to incorporate bitumen foaming additives to the bitumen provided a test certificate is produced confirming that the half-life and expansion ratio as specified in Clause 308.14(c) are met at the bitumen foaming temperature. The test certificate shall include: (i) The form of the foaming additive i.e. a solid, liquid or paste (ii) Chemical and physical properties of the additive (iii) Method of handling and mixing (iv) Dosage rate for bitumen used (v) Mixing time and effective life in the bitumen (vi) Shelf life (vii) Half-life in seconds and expansion ratio of bitumen with additive and the specified bitumen temperature (viii) Materials Safety Data Sheet. Requirements: Minimum Expansion Ratio: **10** Minimum Half-Life: **20 Seconds**	Each Tanker						☐ **Bitumen Test Certificates**
2.8	Primary Stabilisation Agent (Foam Bitumen)	DTP 308.08 (g)	The foam bitumen agent shall be incorporated and mixed into the full depth of the pavement material. Ensure supplier bitumen complies with the specified temperature. Uniformity of mixing is to be completed by way of visual inspection.	Each run	**W**	SE		**W**		

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			Mixing shall cease if streaks or blotches are observed in the material. Works shall recommence once the Superintendent is satisfied that uniformity of mixing has been achieved.							
2.9	Bitumen Application Rate		One test per continuous spraying run ascertaining the quantity of bituminous binder sprayed per m2 by either: ☐ dipping the bituminous binder supply tanker at the start and end of each spraying run; or ☐ a calibrated computerised measuring device which continuously monitors the bitumen spray rate per continuous spray run, recorded on a daily report sheet. The Contractor shall have a current certificate of calibration for the computerised bituminous spray monitoring device and shall produce evidence of actual running spray rate when requested by the Superintendent.							☐ **Calibration Certificates**
2.10	Testing for Bitumen Foaming Characteristics	DTP 308 Table 308.151 Austroads Test Method AGPT/T301 Section 8. 'Procedure' 754-MELGE305662BV_rev3	Test the **half-life** and **expansion ratio** of the bitumen from the test inspection nozzle on the stabilisation machine before the bitumen is used in the mixer and with the tanker connected to the stabilisation machine. Frequency of testing: **Every tanker load of Bitumen supplied.** For foam bitumen, the minimum expansion ration shall be 10 and the minimum half-life shall be 20 seconds. In accordance with AGPT/T301, the following test information shall be reported: a) Date the test was performed b) Reference to this test method c) Reference to the foaming unit used d) Reference to the dipstick used or the ruler used e) Identification of the bitumen used f) Identification of any foaming agent used and the amount added g) Temperature of the bitumen at the time of foaming h) For each water injection rate report the following:	Every tanker load supplied						

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			1. The water injection rate during the production of the foamed bitumen 2. The mass of bitumen and condensed moisture discharged 3. The three individual foam expansion rations (to the nearest whole number) 4. The three individual half-lives (to the nearest second) 5. The average maximum foam expansion ratio (to the nearest whole number) 6. The average half-life (to the nearest second)							
2.11	Jointing	DTP 308.09	Longitudinal joints shall be avoided by completing a full carriageway width each day. Joints shall be formed by cutting back into the fully compacted previously stabilised material by a minimum of 100 mm. The level and shape of the surface at all joints shall be within the limits specified in Clause 308.03	Each run	**W**	SE, LH		**W**		
2.12	Initial Trimming and Compaction		The stabilised area shall be initially compacted as soon as possible after mixing and within the allowable working time. Initial compaction to eliminate height differences through the stabilised area. The surface is to be trimmed with a grader to the approximate alignment, height and shape.	Prior to conform-ance check						
2.13	Conformity with Drawings	DTP 308.03 (a) – (e) Table 308.031 Table 308.032	Checking of layer thickness, alignment, and width to be undertaken by surveyor prior to final compaction. This check is to be confirmed by Surveyor and Symal Engineering and Supervision team.	Prior to final compaction	**W**	**SE, LH**				☐ **Survey Report**

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2.14	Final Trimming and Compaction	DTP 308.08 (i) and (h) 308.03	Final compaction to commence as soon as possible after mixing and within the allowable working time. Surface shall be free of loose pockets, holes, and bumps. Compaction and trimming shall be carried out in a continuous operation until completed. Finished surface shall be left smooth.	Each lot	**PE/SE**	W				
2.15	Proof Roll	DTP 308.10	Stabilised layers shall pass test rolling in accordance with Section 173, prior to acceptance of the layer. Any unstable areas detected by test rolling shall be rectified. Proof roll checklist to be attached to lot.	Each lot	**SE**	H		**H**		☐ **Proof roll Checklist**
3.0 Testing Required										
3.1	Compaction Testing and Relative Moisture Ratio (RMR)	754-MELGE305662BV_rev3 DTP 308.13 (b)	Compaction testing Requirement: **Scale A, Modified Compactive effort**. Characteristic Density Ratio: **98.0%** RMR (post compaction): **Between 55% and 75% of OMC** No. of tests required: **6 tests per lot.** Maximum Lot Size: **4,000m2** **Determination of reference density** **Sample to be taken from field to lab within 3 hours due to decay factor, to verify assigned values of material.** Density ratio to be determined in accordance with VR Section 176. **Determination of Relative moisture Ratio** $RMR\ (\%) = \frac{In\ Situ\ Moisture\ Content}{Material\ OMC}$ **Has compaction testing been completed?** **Yes** ☐ **No** ☐	Each Lot	SE	R		**H**		☐ **Compaction Test Reports**

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			Date of testing:……							
3.2	Ride Quality Testing	DTP Section 180 DTP 308 754-MELGE305662BV_rev34.3	Ride Quality Testing Requirement: **Scale A** Lot Size: **Freeway Ramp** Shoulders and turn lanes excluded from testing. **The Contractor shall provide 24 hours notice to the Superintendent of when ride quality testing will be undertaken and the limits for each lot.** The maximum individual lane roughness for any 100m segment of road and mean lane roughness shall be as per Table 1 in the appendix. The resulting roughness, after removal of areas of exclusions, shall be processed and reported for each 100 m sub-section.	Each Lot	SE	R				☐ **Ride Quality Test Reports**
3.3	Ride Quality Testing – Re-testing after rework	754-MELGE305662BV_rev34.3	**Is rework required on any sublots tested for Ride Quality Testing?** **Yes** ☐ **No** ☐ If no, section is N/A. If yes, proceed as per below. Symal shall re-test the lot following completion of any rectification work and shall re-submit Individual Lane Roughness and Mean Lane Roughness for the lot. Symal shall comply with the requirements for both the Maximum Individual Lane Roughness and Maximum Mean Lane Roughness for the lot after rectification works have been completed.	Each Lot	SE	R				☐ **Ride Quality Test Reports (if applicable)**

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3.4	Resilient Modulus Testing	754-MELGE305662BV_rev3, DTP Table 308.05 (a), 308.15	Resilient Modulus testing of core samples is to be taken at the completion of the works each day. Laboratory testing to show that design modulus has been achieved in the field. **Retained Modulus > 0.5 (ratio wet modulus to dry modulus)** Core samples shall be collected at a minimum of 6 locations per lot for resilient modulus testing and in-situ density testing at each of the three testing stages. To confirm the stabilised layer has is uniform and consistent, core samples are to be measured in 2 halves: 1 test on the top half and 1 test on the bottom half. **Has the above testing procedure been completed?** **Yes** ☐ **No** ☐	Each Lot	SE	R				☐ **Resilient Modulus Test Reports**
3.5	Dryback Test	DTP Section 310 Table 310.031 754-MELGE305662BV_rev3 4.4.2.1	The uppermost pavement layer after preparation of the surface and prior to priming or primer sealing shall be allowed to dry back so the moisture content of the layer shall achieve the following moisture requirements in accordance with Table 310.031 of DTP Section 310 (see appendix): Requirement: **Scale A** Mean Moisture Ratio: **Less than 60%** Max of any Individual result: **70%** **The mean Moisture Ratio shall be determined from six randomly selected sites.** **Has the above testing procedure been completed?** **Yes** ☐ **No** ☐	Each Lot	SE	R				☐ **Dryback Test Reports**

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3.6	Ball Penetration Test	DTP Section 310 754-MELGE305662BV_rev3 4.4.2.2	Pavement embedment shall be assessed by Ball Penetration testing when required as detailed in Table 310.031. Ball Penetration testing shall be undertaken on the prepared surface in accordance with Austroads test method AG:PT/T251 - Ball Penetration Test at **six randomly selected sites**. No individual test result shall exceed the maximum penetration detailed in Table 310.031. Requirement: **Scale A** Ball Penetration Max Individual Result: **3mm** **Has the above testing procedure been completed?** **Yes** ☐ **No** ☐	Each Lot	SE	R				☐ **Ball Penetration Test Reports**
3.7	Falling Weight Deflectometer Testing	Austroads Test Method AG: AM/T006	Falling Weight Deflectometer (FWD) testing should be undertaken in accordance with relevant Australian State Road Authority Standard or Austroads Test Method AG:AM/T006. The FWD testing shall be taken at nominal drop stress of 566kPa (40kN nominal drop load) at the following locations: • All lanes and shoulders on the Ramp; and • At 10m intervals along both wheel paths. FWD deflections are to be measured with minimum 7 deflection sensors at 0mm, 200mm, 300mm, 400mm, 600mm, 900mm and 1500mm distance from the centre of the applied load. **Has the above testing procedure been completed?** **Yes** ☐ **No** ☐ FWD Testing to be reviewed through benchmarking of deflection data and back calculation of layer moduli to	Each Lot	SE	R				☐ **Falling Weight Deflectometer Test Reports**

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			assess layer strength. This is to be conducted by pavement designer (Tetra Tech) and MRPV to assess.							
4.0 Conformance and Approval										
4.1	As Built	DTP Section 308.03 Conformity with Drawings Table 308.031 Table 308.032	**Pavement Tolerances:** • **Finished Surface Level** o For Base layer: o Scale A o -5mm / +10mm o Table 308.031 (See Appendix) • **Thickness** o Not less than 0mm pavement makeup o Not more than 15mm over pavement makeup • **Alignment** o 50mm +/- from design line • **Width** o Not less than a max of 50mm o Not greater than a max of 100mm • **Shape** o For Base layer: o Scale A o Max. +/- 5mm deviation from 3m straight edge placed in any direction along surface o Table 308.032 (See Appendix)	Each Lot	H	SE		**H**		☐ **Conformance Reports**
4.2	Test Reports		All test reports conforming and attached to lot	Each Lot	H	SE		**H**		□ **Test Reports**
4.3	NCR	QMP	All Product Non-Conformance(s) recorded and closed out (if applicable)	Each Lot	R	SE				□ **NCR Attached**

Works complete (signer SE) _____ **Date works complete** _____

Lot conforms (signer PE) _____ **Date lot closed** _____ **NCR/s no. raised** _____ **Date NCR closed for this lot** _____

Responsibility (Resp.) Key: **PM**-Project Manager, **PE**-Project Engineer, **SE**- Site Engineer, **CS**-Civil Superintendent, **SS**-Site Supervisor, S**V**-Surveyor, **CR**-Client Representative

NA – Nominated Authority **SEST**- Symal Environmental Sustainability Team

Inspection Key: W – Witness, **H –** Hold Point, **S –** Surveillance, **R –** Review Point, **I –** Inspection Point

Appendix

Table 1 – Maximum Roughness Limits

Road Category	Maximum Individual Lane Roughness for any 100m Segment	Maximum Mean Lane Roughness Value for Lot
	IRI m/km/lane (max)	New Works – IRI m/km/lane (max)
Freeway Ramps - Scale B	2.30	1.60

Table 308.031 Finished Surface Levels Tolerances for Stabilised Layers

Road Category	Base	Subbase
Scale A All Freeways and Class M roads	-5 to +10 mm	-5 to +15 mm
Scale B All freeway ramps **Rural Roads** All Class A Arterials Class B and C Arterials where the posted speed of travel is 80 km/h or more, with an AADT of greater than 1000 vpd or greater than 75 HVs/day **Metropolitan Roads and Roads in Provincial Towns and Cities** All Arterials with a speed limit of greater than 60 km/h All other Urban Arterial Roads with a speed limit of more than 60 km/h and an AADT greater than 20,000 vpd or greater than 1000 HVs/day	-5 to +15 mm	
Scale C **Rural Roads** All other Class B and C Arterials **Metropolitan Roads and Roads in Provincial Towns and Cities** All other Arterials with a speed limit of less than or equal to 60 km/h		

Table 308.032 Shape Tolerances for Stabilised Layers

Road Category	Base	Subbase
Scale A All Freeways and Class M roads	5 mm	8 mm
Scale B All freeway ramps **Rural Roads** All Class A Arterials Class B and C Arterials where the posted speed of travel is 80 km/h or more, with an AADT of greater than 1000 vpd or greater than 75 HVs/day. **Metropolitan Roads and Roads in Provincial Towns and Cities** All Arterials with a speed limit of greater than 60 km/h All other Urban Arterial Roads with a speed limit of more than 60 km/h and an AADT greater than 20,000 vpd or greater than 1000 HVs/day	8 mm	15 mm
Scale C **Rural Roads** All other Class B and C Arterials. **Metropolitan Roads and Roads in Provincial Towns and Cities** All other Arterials with a speed limit of less than or equal to 60 km/h.	15 mm	15 mm

Table 310.031 Requirements for Pavement Dryback and Embedment

Testing Scale	Pavement Dryback		Pavement Embedment
	Mean Moisture Ratio	Maximum of any individual result	Ball Penetration Maximum individual result
A	Less than 60%	70%	3 mm
B	Less than 60%	70%	Not required
	Less than 65%	70%	3 mm
C	Less than 65%	70%	Not required