LEVEL CROSSING REMOVAL PROJECT

METROPOLITAN ROADS PROGRAM ALLIANCE

Inspection & Test Plan - Concrete Coatings (Protective &/or Decorative)

Document No.:	Revision:	2
	Date:	11/12/2023

Legend: HP: Hold Point, HP* Internal Hold Point, WP: Witness Point, IP: Inspection Point, SP: Surveillance Point

Item	Task/Activity Description	Reference	Acceptance Criteria	Inspection / Test			Responsibility	Verifying Documents	Date Completed	Sign-off
				Method	Frequency	Category				
1	**Referenced Documentation**									
1.1	Non Dependent	VicRoads Section 685 November 2018	N/A	N/A	N/A	N/A	N/A	N/A	NA	N/A
1.2	Non Dependent	VicRoads Section 686 November 2018	N/A	N/A	N/A	N/A	N/A	N/A	NA	N/A
2	**Preliminaries**									
2.1	Anti-graffiti System Selection	IFC Drawings Coating System TDS Surface Cleaner TDS 685.04 685.06 (a) & (b) 686.04 686.05 (a) & (e)	The system shall be selected based on the following criteria: i. be either a film-forming or a penetrant system ii. be non-sacrificial, clear OR coloured (as noted on the IFC drawings or specification) iii. be an acrylic copolymer, acrylic epoxy, polyurethane or polyurea type with all coats be of the same brand and compatible iv. be non-yellowing, colour-fast and not subject to fading v. be guaranteed to have at least 8 cycles of graffiti defacement and removal from the date of application and last for 10 years of outdoor exposure vi. application thicknesses (film-forming): WFT total = 175µm min. OR WTF per coat = 88µm min. DFT total = 100µm min. vii. adhesion to substrate (film-forming): 0.75MPa min. viii. application rate (penetrants) as per the minimum thickness on the manufacturer's TDS Enter: Teambinder Material Approval number [free text box]:	Document Review	Once, for each coating system, 14 days prior to application	HP	Nominated Authority	ConQA Hold Point Release		

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2	**Preliminaries (Continued)**									
2.2	Decorative & Anti-carbonation System Selection	IFC Drawings Coating System TDS Surface Cleaner TDS 686.04 686.05 (a) & (b) Table 686.051	The system shall be selected based on the following criteria: i. be non-sacrificial, clear or coloured (as noted on the IFC drawings or specification) OR a combination of these to achieve the system ii. be water or acrylic based, solvent-free with all coats compatible with each other iii. have a minimum of 2 coats for the decorative/anti-carbonation component of the system iv. be non-yellowing, colour-fast and not subject to fading v. be guaranteed to last for 10 years of outdoor exposure vi. application thicknesses: WFT per coat = enough to achieve the total DFT DFT total = 150µm min. vii. adhesion to substrate: 0.75MPa min. viii. able to bridge cracks up to 0.3mm wide ix. able to be re-coated within 24 hours x. have a minimum pot life of 1 hour xi. compatibility to an alkaline surface xii. equivalent air thickness >150m xiii. equivalent concrete thickness >450mm xiv. CO_2 diffusion coefficient <2 x 10^{-7} cm^2/s xv. Water vapour equivalent air layer <4m Enter: Teambinder Material Approval number [free text box]:	Document Review	Once, for each coating system, 21 days prior to application	HP	Nominated Authority	ConQA Hold Point Release		

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2	**Preliminaries (Continued)**									
2.3	Decorative, Anti-carbonation & Anti-graffiti System Selection	IFC Drawings Coating System TDS Surface Cleaner TDS 685.04 685.06 (a) & (b) 686.04 686.05 (a) & (b) Table 686.051	The system shall be selected based on the following criteria: i. be non-sacrificial, clear or coloured (as noted on the IFC drawings or specification) OR a combination of these to achieve the system ii. be water or acrylic based, solvent-free with all coats compatible with each other iii. have a minimum of 2 coats for the decorative/anti-carbonation component of the system iv. be non-yellowing, colour-fast and not subject to fading v. be guaranteed to have at least 8 cycles of graffiti defacement and removal from the date of application and last for 10 years of outdoor exposure vi. application thicknesses: WFT per coat = enough to achieve the total DFT DFT total = 150µm min. vii. adhesion to substrate: 0.75MPa min. viii. able to bridge cracks up to 0.3mm wide ix. able to be re-coated within 24 hours x. have a minimum pot life of 1 hour xi. compatibility to an alkaline surface xii. equivalent air thickness >150m xiii. equivalent concrete thickness >450mm xiv. CO_2 diffusion coefficient <2 x 10^{-7} cm^2/s xv. Water vapour equivalent air layer <4m Enter: Teambinder Material Approval number [free text box]:	Document Review	Once, for each coating system, 21 days prior to application	HP	Nominated Authority	ConQA Hold Point Release		

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2	**Preliminaries (Continued)**									
2.4	Atmospheric & Splash Zone (Dual Protective) System Selection	IFC Drawings Coating System TDS Surface Cleaner TDS 685.04 685.06 (a) & (b) 686.04 686.05 (a) & (b) Table 686.051 686.05 (c) (i) & (iii)	The system shall be selected based on the following criteria: i. be a dual protective coating system, consisting of a pore-lining penetrant and at least 2 coats for the decorative/anti-carbonation film-forming top coat ii. all coats to be compatible with each other Penetrants: iii. active ingredients: Silane = at least 95% Solid silane & silane cream = at least 80% Silane-siloxane & siloxane = not specified iv. application rates: Silane = 2 applications of 0.3L/m² min. Solid silane & silane cream = 1 application of 0.4L/m² min. Silane-siloxane & siloxane = as per the rates on the manufacturer's TDS Film-forming coat: v. to be non-sacrificial, clear or coloured (as noted on the IFC drawings or specification) vi. to be water or acrylic based, solvent-free vii. to be non-yellowing, colour-fast and not subject to fading viii. to be guaranteed to have at least 8 cycles of graffiti defacement and removal from the date of application and last for 10 years of outdoor exposure ix. application thicknesses: WFT per coat = enough to achieve the total DFT DFT total = 200µm min. x. adhesion to substrate: 0.75MPa min. xi. able to bridge cracks up to 0.3mm wide xii. able to be re-coated within 24 hours xiii. have a minimum pot life of 1 hour xiv. compatibility to an alkaline surface xv. equivalent air thickness >150m xvi. equivalent concrete thickness >450mm xvii. CO_2 diffusion coefficient <2 x 10^{-7} cm^2/s xviii. Water vapour equivalent air layer <4m xix. Chloride diffusion coefficient <5 x 10^{-9} cm^2/sec xx.Water absorption value >0.01ml m^{-2} sec^{-1} at 10 minutes	Document Review	Once, for each coating system, 21 days prior to application	HP	Nominated Authority	ConQA Hold Point Release		

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2	**Preliminaries (Continued)**									
2.5	Quality Documentation	685.05 686.04	The quality documentation shall demonstrate compliance with the specifications and is to be submitted for review to the Nominated Authority. Enter: Enter: Teambinder Hold Point number [free text box]	Document Review	Once, for each coating system, 21 days prior to application	HP	Nominated Authority	ConQA Hold Point Release		
2.6	Coating Personnel & Equipment	Coating System TDS Surface Cleaner TDS 685.16 686.19	The coatings supervisor and surface preparation personnel shall have a minimum of 5 years experience and demonstrated competency for the preparation and application techniques. Application personnel require 2 years minimum experience. The supervisor shall remain present at all times. Where spaying is the intended application method, the spray equipment shall be fit for purpose, have an airline filter and the nozzle size should match the requirements of the Product's TDS.	Document Review	Once, prior to application.	IP	SE/PE/SPE	This ITP		
2.7	Protection of Adjacent Works & Property	685.17 686.10	Protection shall be implemented for existing coated surfaces, services, bearings, joints, signs and nameplates during the surface preparation, abrasive blasting and coating application processes. No spraying shall be performed within 10m of buildings, footpaths, roadways, pedestrians or vehicles without protective measures in place. Where these instances are expected, the protective methods shall be submitted for review to the Nominated Authority.	Visual Document Review	Where applicable, 2 days prior to application.	HP	Nominated Authority	ConQA Hold Point Release		

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2	**Preliminaries (Continued)**									
2.8	Minimum Concrete Curing Period	685.08 686.16	Concrete shall not be coated until the minimum concrete curing times have elapsed: Standard cured concrete = 28 days Accelerated cured concrete = 14 days Repaired concrete = 14 days (if repaired with a patching product) or 28 days (if repaired with concrete) Note: All durations may be reduced by 50% if the moisture content is less than 10% when measured with a moisture meter.	Visual Document Review	Once, prior to application.	IP	SE/PE/SPE	This ITP		
2.9	Trial Application (or Past Performance) Inspection	685.11 686.13	A full coating system, inclusive of any primers, under-coats and sealers, shall be conducted on either a 10m² area of the element to be coated or on a test panel made from the same substrate. Alternatively, close-up photographs or inspection of previous projects, applied by the same coating contractor, using the same system onto the same substrate should suffice this requirement. Attach: Inspection Photographs OR Enter: Teambinder Hold Point number [free text box]	Document Review	Once, for each coating system, 7 days prior to full coating application	HP	Nominated Authority	ConQA Hold Point Release		
3	**Pre-application Activities**									
3.1	Material Records	Coating System TDS Surface Cleaner TDS 685.10 686.12	Materials shall be brought to site in unopened, sealed containers, clearly marked with: the manufacturer's name & address product reference batch number quantity manufactured in the batch date of manufacture Product beyond the manufacturer's shelf life shall not be used. Each product shall be traced to final location.	Visual	Prior to application	IP	SE/PE/SPE	This ITP		

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3	**Pre-application Activities (Continued)**									
3.2	Weather Conditions	Coating System TDS Surface Cleaner TDS 685.09 685.12 (a) 686.11 686.14 (a) (iii)	Coating systems shall not be applied under any of the following conditions: i. windy conditions where spray/splatter may be generated ii. when wind-borne debris is likely to contaminate the uncured surface iii. when the ambient temperature exceeds 35°C or is below 10°C unless the Coating System TDS states otherwise iv. when the surface temperature of the substrate is less than 3°C above the dew point or exceeding 40°C v. when the relative humidity exceeds 85% or is expected to exceed 85% within 12 hours of coating vi. when rain splatter, water run-off or water deposits onto the surface and affects adhesion to the substrate vii. when the substrate surface is wet or damp (unless it is required for the coating system) Weather conditions are to be recorded.	Visual Measure	Prior to application and every 4 hours per shift	IP	SE/PE/SPE	This ITP		
3.3	Surface Preparation	Surface Cleaner TDS Coating System TDS 685.05 686.06	The surface shall be prepared in accordance with the Coating System TDS, but as a minimum, all dust, dirt and other surface contaminants such as release agents and curing compounds shall be removed by appropriate means. The surface shall then be flushed with water. Any concrete defects exposed during the surface preparation shall be repaired accordingly.	Visual	Once, prior to application.	IP	SE/PE/SPE	This ITP		
3.4	Surface Moisture Testing	685.12 (a) 686.14 (a) (iii)	The substrate is free from back water pressure and the surface moisture conditions shall satisfy the Coating System TDS. Surface moisture conditions are to be recorded.	Test	Immediately prior to application, test 1m²	IP	SE/PE/SPE	This ITP		

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4	**Application Activities**									
4.1	Method of Application	Coating System TDS 685.07 686.07 686.09	Application should be carried out to the Manufacturer's TDS within 24 hours after completing the surface preparation so that the desired, uniform surface finish is achieved. Re-coating shall be within the recommended timeframe from the TDS and only if any defects or damage to the previous layer have been rectified. For penetrants, the material shall be applied at the lowest point, proceeding upwards to higher elevations and saturated enough so that a "wet look" can be observed for at least a few seconds after application. Times of coating(s), material names, locations coated and volumes used shall be recorded. Attach: Coating Application Record	Visual Measure	Each coat	IP	SE/PE/SPE	This ITP		
4.2	Wet Film Thickness (WFT) Testing	Coating System TDS 685.12 (b) (ii) 686.14 (b) (ii)	Film-forming anti-graffiti coatings shall have a combined thickness of 175µm, for all other applications, the WFT shall be measured and be in accordance with the Product TDS. Attach: WFT Test Results	Test	Where applicable, 3 no. tests every 50m² or part thereof	IP	SE/PE/SPE	This ITP		
4.3	Inspection & Defect Identification	685.07 685.13 (d) 686.07 686.15	The work shall be inspected for uniformity, colour, gloss, opacity and appearance between coats. Defects such as lumps, bubbles, inclusions, ripples, sags, runs and air holes shall be removed and re-application at those areas may be required.	Visual	After each coat	IP	SE/PE/SPE	This ITP		
4.4	Drying and Curing	Coating System TDS 685.17 686.09	Coatings shall be protected from adverse conditions, dust and debris during the curing period.	Visual	After each coat	IP	SE/PE/SPE	This ITP		

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5	**Post-application Activities**									
5.1	Clean-up & Waste Disposal	685.09 (c) 686.10	All coating drips, smudges and over-spray shall be removed from all surfaces, including surfaces not being treated. All rubbish and remaining coating products shall be removed from site.	Visual	At completion of Works	IP	SE/PE/SPE	This ITP		
5.2	Dry Film Thickness (DFT) Testing	685.12 (b) (iii) 686.14 (b) (iii)	The total DFT of the system shall be tested to ensure that it meets the required minimum application thicknesses: i. Anti-graffiti system = 100µm Ii. Decorative & anti-carbonation = 150µm iii. Decorative, anti-carbonation & anti-graffiti = 150µm iv. Atmospheric & splash zone (dual protective) = 200µm No more than 15% of the readings shall be less than 90% of the required thickness. Attach: DFT Test Results	Test	Where applicable, 3 no. tests every 50m² or part thereof	IP	SE/PE/SPE	This ITP		
5.3	Adhesion Bond Strength Testing	685.12 (b) (i) 686.14 (b) (i)	A minimum of 14 days after application, the bond-strengths between: i. the coating system to the substrate, and ii. Separate coating layers shall be tested using 50mmØ aluminium dollies. The subsequent results shall be greater than 0.75MPa. Attach: Adhesive Bond Strength Testing Results	Test	Where applicable, 3 no. tests every 50m² or part thereof	IP	SE/PE/SPE	This ITP		
5.4	Penetration Depth Testing	685.12 (b) (v) 686.14 (b) (v)	Where a penetrant is applied, a 50mmØ core sample, 50mm depth, is to be taken and immersed in a fugitive dye to determine the depth of penetration. The subsequent results shall be: i. Sprayed anti-graffiti penetrants = unspecified (as long as it is visible) ii. Silane, Solid Silane or Silane Cream = 5mm min. iii. Silane-Siloxane or Siloxane = 3mm min. Attach: Penetration Depth Testing Results	Test	Where applicable, 3 no. tests every 50m² or part thereof	IP	SE/PE/SPE	This ITP		

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5	**Post-application Activities (Continued)**									
5.5	Non-conforming Coatings	685.14 686.17	Should any of the coating application Work be found to be non-compliant with the specifications, the areas shall be repaired. Such Work may include removal of the coating, surface preparation and re-application. Non-compliant Work includes, coating failure to yellowing, loss of adhesion, penetration of graffiti into the coating, loss of solvent resistance and colour change during the contract liability and/or guarantee period.	Visual	Where required	IP	SE/PE/SPE	This ITP		
5.6	Coating Application Guarantee	685.06 (b) 686.05 (a)	Application shall be guaranteed to last for 10 years of outdoor exposure and for anti-graffiti coatings, have at least 8 cycles of graffiti defacement and removal from the date of application. Attach: Coating Application Guarantee	Document Review	At completion of Works	SP	SE/PE/SPE	This ITP		
5.7	Repair to Damaged Coating	686.17	Any damage to the coating during the construction period shall be repaired to the full extent of the system requirements.	Visual	Where required	IP	SE/PE/SPE	This ITP		
5.8	Non-conformance Report (NCR) Closure	MRPA Quality Management Plan	Ensure that any NCRs pertaining to the lot / element / Work area that this ITP covers, have been closed in CAMs.	Document Review	Once, prior to closure of this lot / element / Work area	HP*	SE/PE/SPE	This ITP		
	Final Inspection									
	On behalf of Metropolitan Roads Program Alliance, it is hereby certified that the Works represented by the item of work listed have been tested in accordance with the Project Quality Plan and conform in all respects with the requirements of the Contract.									
	Print Name:	Position:	Signature:	Date: / /						