**Inspection and Test Plan – Installation of Steel Beam Guard Fence**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Project no.** | | **CC-0374** | **Project name** | Pakenham Roads Upgrade | | **Date** |  | | **Approved by** | Damian Hagebols |
| **ITP no.** | 1630-P200-SYM-QAC-ITP-0031 | | **Revision date** | **REV: 00 15/01/2024** | **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-start activities** | | | | | | | | | | |
| **1.1** | **Safety**  Ensure that the following items have been actioned:  - SWMS if applicable  - Plant Pre-start Inspection  - Service locations identified  - Traffic Management Plans (if req’d)  - All staff inducted | SMP | SWMS/WMS submitted reviewed and accepted if required.  Plant inspections completed and entered.  TSA training completed. Pre-work briefings completed.  Service Diagrams available and services located | Once  (Pre-Start) | **H** | SE |  |  |  | Service map Attached.  □ |
| **1.2** | Excavation Permit | SMP | All identified underground services marked and potholed to confirm location and depth. No machine excavation within 1m of underground services. | Prior to start of works | **H** | SE |  |  |  | Permit No……………………… |
| **1.3** | Material Compliance – Steel | DoT Clause  708.05 (a) 708.05 (b)  708.04 | Submit to the Superintendent all test certificates related to the supply of steel for the Works at least 14 days prior to commencement of installation.  All testings shall be endorsed in accordance with the NATA registration for that lab.  Only safety barrier products listed in RDN 06-04 shall be used | 14 days  Prior to start of works | **H** | SE |  | **H** |  | Compliance/test certificates  Action point & linked.  □ |
| **1.4** | Material Compliance – W-beam Base Metal Mechanical Properties | DoT Clause  708.05 (a)  708.05 (c) (i) | Below information marked on steel W-beams, posts at both ends and all plastic components:  Name of the manufacturer;  batch numberstrength grade and base metal thickness of the steel W-Beams  W-beams to meets requirements of AS/NZS 1594 Grade HA350.  Mechanical Properties of Base Metal:   * Min. Yield Strength: 350MPa * Min. Elongation in 80 mm: 16% * Min. Tensile Strength: 430MPa   The base metal shall comply with the following tolerances when measured in accordance with the methods of AS/NZS 1365   * Base metal thickness 2.7 mm +0.21 mm or -0.10 mm * Mill camber tolerance on 2500 mm length 10 mm max * Mill tolerance on strip width +2.5 mm, -0.0 | Prior to start of works | **H** | SE |  |  |  | Compliance/test certificates  □ |
| **1.5** | Material Compliance – Steel Posts and Blocks | DoT Clause  708.05 (c) (ii) | Manufactured from steel which meets AS/NZS 1594 Grade HA250  Base material thickness shall be 6.0 mm +/-0.27 mm. | Prior to start of works | **H** | SE |  |  |  | Compliance/test certificates  □ |
| **1.6** | Material Compliance – Terminal Sections | DoT Clause  708.05 (c) (iii) | Manufactured from steel which meets AS/NZS 1594 Grade HA350 | Prior to start of works | **H** | SE |  |  |  | Compliance/test certificates  □ |
| **1.8** | Protective Treatment - Galvanising | DoT Clause  708.05 (d) | * Treatment should be in accordance with AS 1627 ‑ Parts 1 and 4 and finished by hot-dipped galvanising in accordance with AS/NZS 4680. * Hot-dipped galvanised coating on Bolts, Nuts and Washers shall comply with AS 1214. * All galvanised coatings shall be smooth, adherent, and free from stains, gross surface imperfections, markings, brand names and/or inclusions. Appearance is of prime importance and colour shall be uniform. * Where curved W-beam of less than 45 m curve radius is specified, the curving operation shall be carried out off site in a manner that will not result in damage to the galvanising. | Prior to start of works | **H** | SE |  |  |  | Galvanisation Compliance/test certificates  □ |
| **1.9** | Protective Treatment - repair | DoT Clause  708.05 (d) | * Repairs to a damaged galvanised coating to be done with zinc-rich inorganic Paint with a minimum of 2 coats in accordance with AS 3750.9 and one coat of aluminium paint. |  |  |  |  |  |  | Yes □ No □  N/A □  Photo Evidence |
| **1.10** | Material Compliance – Breakaway Cable Terminal | DoT Clause  708.05 (f) | The wire rope shall comply with the requirements of AS3569 and the details shown on Drawings.  Wire ropes used in proprietary devices must comply with the manufacturer’s recommendations. | Prior to start of works | **H** | SE |  |  |  | Compliance test certificates  □ |
| **1.11** | Material Inspection, Handling and Storage | DoT Clause  708.06  708.11  708.13  IFC Drawings | * Items are loaded, transported, unloaded, stacked, and handled in such a way to protect items from distortion and that galvanised surfaces are protected from damage. * All materials stored to prevent damage and corrosion at least 200 mm above the ground on platforms, slabs, or other supports. * Rusted, bent, or damaged steel shall be rejected. * If stacks located behind a serviceable road safety barrier system, the clear space must allow for dynamic deflection and proper functioning of the end treatments. * Ensure that materials are in compliance with VicRoads specifications and IFC Drawings. * Ensure there are no hard objects within the deflection zone of the barrier. | Prior to start of works  &  Throughout construction process | R  I | SE |  |  |  | Incoming Material Checklist  □ |
| **1.12** | Pre-Construction Planning | DoT Clause  708.07 (a), (c) & (d) | * Plan and execute the work in a manner that prevents damage to underground and above ground facilities. Construct a guard fence to form a smooth line vertically and horizontally, when viewed along the line of the installation, free of humps, sags, or other irregularities, within tolerances. * Any component of a guard fence must not be welded, or flame cut in the field under any circumstances. Welding and flame cutting may only be conducted when shown on drawings in accordance with the manufacturer’s recommendations. * End treatments and transitions commissioned at the earliest practicable time where the guard fence is being constructed on a road open to traffic. Temporary end treatments to the satisfaction of the Superintendent to be provided until the permanent treatments are complete.   Removal of an existing installed safety barrier system includes:   * Dismantling or demolition of safety barriers, transitions, and end treatments * Extracting all posts, anchors and other in-ground components and materials * Removing all components and waste materials from the site * Cleaning, backfilling and mechanically compacting all excavations and holes in 150 mm layers to not less than the density of the surrounding layers. * Stacking or disposing of components and waste materials | Prior to start of works | I | SE |  |  |  |  |
| **1.13** | Associated Pavement Shoulder widening | VR 708.15  VR AGRD 06 | Where required, widening of the existing shoulder on the median or outer verge applications adjacent to locations where guard fence is to be installed, shall be completed.   * The edge of shoulder shall be saw-cut to provide a neat straight edge against which the additional pavement can be placed. * Pavement layers shall be stepped a minimum 150 mm horizontally to enable new widening to be keyed into the existing pavement.   Has the above been completed?  □ Yes □ No □ N/A | Prior to start post install | H | SE |  |  |  |  |
| **2.0 Guard Fence Post Installation** | | | | | | | | | | |
| **2.1** | Set Out | DoT Clause  708.08 | Prior to installation, the required location and length of all guard fence to be confirmed with the Superintendent. | Each lot  &  Each possession | H | SE |  | **H** |  |  |
| **2.2** | Posts – Installation | DoT Clause  708.08 (a)  708.08 (e)  VicRoads AGRD | * Installed to a depth not less than shown on IFC drawings/manufactures * Posts orientated to the direction of traffic as shown on drawings. * Posts shall be installed by driving, provided there is no distortion or damage which may reduce their effectiveness. * If site conditions dictate that the posts cannot be driven, then the posts shall be installed in holes. The bottom of the holes shall be adequately compacted to achieve the same density as the surrounding soil. * Posts in rock – 75 mm clearance from back of post to face of the hole. * Posts shall be installed such that the back of post is not less than 500 mm from hinge point.   Refer to figure 1 at the back of this document for post offsets requirements. | Each lot  &  Each possession | I | SE |  |  |  |  |
| **2.3** | Posts – Backfilling | DoT Clause  708.08 (a) | * Posts in rock – Except for anchorage posts, post holes backfilled with a granular material. * Other post holes backfilled with selected earth, free of rock. * Backfill shall be firmly compacted not exceeding 100 mm compacted layers. * Posts in paved areas shall be backfilled 50 mm below underside of such paving and remaining depth filled with paving material. | Each lot  &  Each possession | I | SE |  |  |  |  |
| **2.4** | Post – Foundation (Displacement Test) | DoT Clause  708.08 (a) | * Foundation displacement at ground level not to exceed 3 mm when a 1 kN. force is applied 200 mm below the top of the post in any direction.   Any failing post shall be rectified and retested plus one similar post within 5 m.  Rectification to be completed via re-compaction of material surrounding the post and/or removal and replacement of the post. | Each lot  &  Each possession | R | SE |  |  |  | Records |
| **2.5** | Non-Standard Post Lengths | DoT Clause  708.08 (a) | Where non-standard post lengths or other special measures are required (e.g., Shallow Concrete Foundations), details to be provided to the Superintendent.  Where shallow foundations that require a concrete ground beam are proposed to be constructed, the design shall be proof engineered by a VicRoads pre-qualified consultant. | Each lot  &  Each possession | H | SE |  | **H** |  | Yes □  No □  N/A □ |
| **2.6** | Bolted Connection In reinforced concrete beam | IFC Drawings  VR 670  VR 708 | Where posts are not required and guard rail is installed directly onto reinforced concrete:   * Confirm bolt size and grade are as per IFC drawings. * After the barrier has been installed and all connections made, the gap between the base plate and the top of concrete footing shall be completely filled with a flowable dual shrinkage compensating proprietary cementitious grout. * HP - Railing posts shall not be grouted until the Contractor provides a Survey Certificate verifying compliance with the specified tolerances on lines and levels. * Where Welding is required, welds shall be completed in accordance with “RAIL SPLICE DETAIL” as per 1630-P200-SYM-SBR-DRG-0461. * Where required, all damaged galvanised coatings to be repaired. | Each lot  &  Each possession | H | SE |  | **H** |  | Survey Conformance Check □ |
| **3.0 Guard Fence Installation** | | | | | | | | | | |
| **3.1** | Guard Fence/Rail - Installation | PS3060.06 (X)  DoT Clause  708.05 (d)  708.08 (b)  708.08 (e) | * Guard fence shall be installed at the offsets shown on Standard Drawing SD 3502 or as directed as per the IFC drawings * Guard Fence/Rail sections lapped so that the exposed ends face away from near sided approaching traffic. * Edges of guardrail fixed in contact with post or post blocks. * All bolts fully tightened. * All bolts on the traffic side of w-beam installations shall be flush with the w-beam. * Posts attached to bridges or culverts shall be bolted to supporting members as shown on drawings. * Where radius of curvature is 45m or less, guardrail sections shall be curved to shape prior to delivery to site. * End treatments constructed in accordance with the drawings. | Each lot  &  Each possession | H | SE  NA |  |  |  | Subcontractor Records |
| **3.2** | End Treatments | DoT Clause  708.08 (c) | * During installation of wire ropes in the end treatments of W-beam, ensure that no twisting of the rope occurs. * The anchorage cable shall be tightened sufficiently to remove slack. * When rope assemblies are used, the nuts at each end of the rope shall be tightened to a minimum torque of 50 Nm on the assemblies or as per the manufacturer’s requirements. | Each lot  &  Each possession | R | SE |  |  |  | Subcontractor Records |
| **3.3** | Height of guard fence/rail | DoT Clause  708.08 (d)  708.08 (f) | * Top of Rail shall be within 25 mm of the specified level. * Rail shall be within 50 mm of the specified line. * Variations in line and level shall not occur at a rate exceeding 15 mm in any 5 m length. * Top of bolt head relative to w-beam -0 mm, +5 mm   Notwithstanding the above, the line and level shall be adjusted to provide a smooth and even vertical and horizontal alignment.  **Guard rail install location:**  □ **within 0 to 1 m behind the back of kerb:**  mounting height (vertical dimension from ground surface to centre of w beam) shall be measured from the lip of kerb.  □ **within 1.5 m from edge of carriageway without kerb:**  mounting height (vertical dimension from ground surface to centre of w beam) shall be measured from the lip of kerb.  □ **Distances beyond 1.5m**  the mounting height shall be measured from the nominal ground surface at the guard fence location. | Each lot  &  Each possession | H | SE |  |  |  | As-built survey and tabulations verifying compliance (Survey Conformance Report)  □ |
| **3.4** | Motorcyclist Safety | DoT Clause  708.09  IFC Drawing | Where specified, steel rub rail or other proprietary under-run systems, as listed in RDN 06‑04 to be at attached to Guard Fence on nominated sections of barrier as shown on the drawings only.  A 50 mm gap shall be provided between the rub rail and the ground to allow for passage of water. | Each lot  &  Each possession | R  I | SE |  |  |  |  |
| **3.5** | Installation of Delineators | DoT Clause  708.11 | * Delineators to be as per VicRoads Supplement to AS 1742.2 Clause 4.2.5.4(b). * Contractor to supply and fasten flexible plastic mounting brackets fitted with 100 cm2 of Class 1A retro-reflective material, as defined in AS/NZS 1906.2. * Red delineators on the left side of one-way and two-way roadways. * White delineators on the right side of two-way roadways; and * Yellow delineators on the right side of one-way roadways * Delineators not required where Guard Fence offset is greater than 4 m from the traffic lane.   White guideposts with delineators shall be installed in accordance with VicRoads Supplement to AS 1742.2 Clause 4.2.4 – Guideposts. | Each lot  &  Each possession | R  I | SE |  |  |  | Subcontractor Records |
| **3.6** | Concrete maintenance strips | DoT Clause  708.12 | Concrete used for guard fence maintenance strips shall comply with AS1379 and VR 703.  Concrete maintenance strips beneath all steel beam guard fence railing shall meet the following requirements:   * 300 mm clear of the rear of the post and 300 mm clear from the face of w‑beam * Bedding to be 75mm thick of class 3 crushed rock * Concrete shall be 75mm thick and 20MPa Strength. * Edges of infill boarded up prior to pour. * Edge board shall be parallel with steel beam guard rail fencing. * Surface finished with a wooden float to produce a lightly textured finish. * Shall be constructed with a minimum 2% cross fall away from the road and shall be flush with the adjacent ground level so the finished level does not impede road runoff.   Where maintenance strip is adjacent to kerb or pavement, cork expansion joint or approved alternative shall be placed in between kerb / pavement and infill area.  Where crushed rock is used, provide Incoming material testing requirements for Class 3 material.  Where concrete is to be used, testing of concrete shall be conducted as per 703.11.  Frequency of testing:   * 1 test per lot; or * 1 test for every 50m3 of concrete. | Each lot  &  Each possession | R  I | SE |  |  |  | Material Delivery Dockets –  Concrete □  Crushed Rock □  Subcontractor Records  Concrete test results (if required) □  Class 3 Crushed Rock Material Certification (if required) □ |
| **3.7** | Expansion Joints perpendicular to the line of Guard Fence | DoT Clause  708.12  SD 3503  1120-SYM-RFI-0074 | Full depth expansion joints (cork or approved equivalent) shall be provided, perpendicular to the line of the steel beam guard fence, 200mm each side of every post. alternatively, the following 2 options could also be considered:  (i) a 75% depth (56mm) saw cut (200mm each side of every post) for the full width of the maintenance strip;  (ii) a leave-out area around the post filled with 75mm thick low strength concrete mix (less than 0.85mpa)  Additional option approved as per 1120-SYM-RFI-0074:  - Similar to the method used for Kerb, a guillotine cut between 40-70% to be completed during concreting works  - Following this a tooled edging to a depth of 20mm to produce a neat groove not less than 5mm wide on the exposed surface as seen on kerb profiles | Each lot  &  Each possession | R  I | SE |  |  |  |  |
| **3.8** | Delineators | DoT Clause  708.11 | * Delineators to be as per VicRoads Supplement to AS 1742.2 Clause 4.2.5.4(b). * Contractor to supply and fasten flexible plastic mounting brackets fitted with 100 cm2 of Class 1A retro-reflective material, as defined in AS/NZS 1906.2. | Prior to start of works | R | SE |  |  |  | Delineators Compliance test certificates □ |
| **4.0 Completion of Steal Beam Guard Fence** | | | | | | | | | | |
| **4.1** | Guard Fence Tolerances | DoT Clause  708.08 (d) | The guard fence shall be installed at the positions so confirmed and shall be constructed true to line and level and to the following tolerances:   1. Variation from true plan position of posts ±20 mm 2. Variation of line of w-beams from specified vertical profile ± 10 mm. 3. Variation of w-beams from specified horizontal alignment ± 20 mm. 4. Variation of posts from vertical (measured at top of the post) ± 15 mm. 5. Orientation of block and/or post to w-beam +0 mm, -15 mm measured at the point of greatest offset between the block or post to the w-beam) 6. Dimension of holes -0 mm, +50 mm   Top of bolt head relative to w-beam -0 mm, +5 mm. | Each lot  &  Each possession | R  I | SE |  |  |  | Survey Conformance Report  □ |
| **4.2** | Safety Barrier Compliance Audit | DoT Clause  708.10  Table PS3090.021  VR 708.10 | After Completion, arrange for a safety barrier compliance audit on all proprietary guard fence end treatments constructed under the Contract. The audit shall be undertaken, and a report prepared by the Australian Licensed Supplier of the safety barrier system.  In addition, complete and submit to the Superintendent, compliance certificates for review.  The CoC need to be signed by both Symal representative and the Supplier. | Each lot  &  Each possession | H | SE |  | **H** |  | Compliance Audit and Certificate of Compliance  □ |
| **4.3** | Reinstated Works | DoT Clause  708.17  708.18  708.19  708.20 | All existing signs and markings, median crossings and existing vegetation removed due to Guard Fence installation shall be reinstated.  Any damage to existing vegetation shall be rectified immediately to the satisfaction of the Superintendent.  Reinstatement inspection not applicable for areas where guard rail is installed prior to landscaping works being completed – landscaping to be completed in accordance with the IFC Drawings and inspection to be covered in landscaping ITP. | Each lot  &  Each possession | **H** | SE |  | **H** |  |  |
| **5.0 Work Lot Close Out** | | | | | | | | | | |
| **5.1** | Test Reports | VIC Roads Specifications | All Test reports received and Reviewed | Each lot | R | SE |  |  |  | NATA Endorsed Test Reports  □ |
| **5.2** | Product Non-Conformance | QMP | All Product Non-Conformance(s) recorded and closed (if applicable) | Each lot | R | SE |  |  |  | NCR reports |
| **5.3** | Quality Representative to check the above criteria and records to confirm | CQMP  Lot Records | All above criteria met, and records identified attached. | Each lot | R | SE |  |  |  | Completed Checklist (if applicable) and reports and other compliance records attached. |

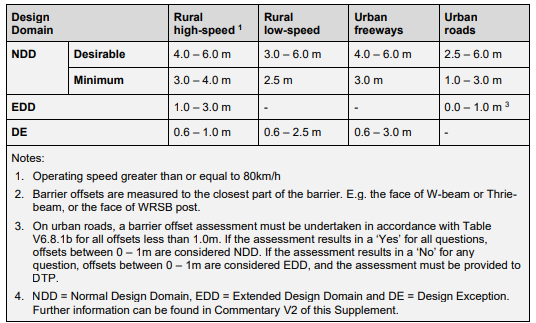
|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Works complete (signer SS)** | |  | | | **Date works complete** | |  | | | |
| **Lot conforms (signer PE)** |  | | **Date lot closed** |  | | **NCR/s no. raised** | |  | **Date NCR closed for this lot** |  |

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

**S –** Superintendent

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

**Figure 1 -** *Table V6.8.1a: Offset from the traffic lanes (m)* from *VicRoads ARGD06*

****