SPECIFICATION FOR INSTALLATION OF RAISED PAVEMENT MARKERS

1 SCOPE

This specification shall apply to the installation of raised pavement markers.

2 DEFINITIONS

Type A Marker - Retroreflective raised pavement marker, or Reflective marker in TNZ M/12 terminology

Type B Marker - Non retroreflective raised pavement marker or ceramic marker in TNZ M/12 terminology.

3 SET-OUT AND TOLERANCES

3.1 Where paint markings exist, or are to be marked on completion of a new surfacing, the Contractor shall set-out markers from the paint markings according to details in Appendix 1**.**

In all other cases the extra set-out required will be specified by the Engineer.

3.2 Dimensional Tolerances; Markers Placed in Conjunction with Paint Markings

(a) longitudinal position ± 300 mm;

(b) transverse position when placed between continuous double lines ± 5 mm, otherwise ± 20 mm;

(c) for reflective markers the reflective axis shall be within 5° of the tangent to the line delineated.

3.3 Markers Placed Without Paint Markings

Unless specified separately, where markers are placed instead of paint roadmarking the Contractor shall set-out all markers from pilot marks provided by the Engineer. The pilot marks will be placed along each line at not more than 10 m intervals on curve sections and 20 m intervals on straight sections. Set-out will be according to the TNZ *Manual of Traffic Signs and Markings Part 2 Markings* with details provided for any sections not covered by the manual. In this case the tolerances shall be:

(a) gap length between groups ±300 mm;

(b) longitudinal dimensions within a group ±25 mm;

(c) transverse position ±20 mm.

3.4 Full Contractor Set-Out

Where the Contractor is required to provide all set-out this will be separately specified.

Additional requirements on transverse position are the final location of all markers shall be within 50 mm of the specified location and the line defined by the markers shall appear by eye to be straight or a true curve.

3.5 Any markers placed outside the permitted tolerances shall be removed, the pavement repaired to the satisfaction of the Engineer, and a new marker installed in the correct location**.**

4 MATERIALS

4.1 Markers

All markers shall have current type approval in terms of TNZ M/12, Specification for Raised Pavement Markers or provisional approval as detailed in TNZ M/12 notes.

Before commencing installation the Contractor shall advise the Engineer in writing the brand and type of marker to be used. The brand and type shall not be changed without written approval.

4.2 Marker Body Colour

Plastic markers with mono or bidirectional yellow reflectors shall have a yellow body, two colour markers may have body colours corresponding to the reflector colour, otherwise the body of plastic markers shall be white.

4.3 Adhesive

At time of tender the Contractor shall provide:

(a) written details of the adhesive proposed for fixing the markers to the pavement surface together with the method of handling, mixing, application and other relevant procedures; and

(b) written confirmation from the adhesive manufacturer that it is suitable for long term fixing of markers to road pavements.

Should an adhesive prove clearly unacceptable for long term fixing of markers to a pavement surface the Engineer may withdraw the approval and require the Contractor to obtain approval for an alternative adhesive with a proven record of use.

The adhesive and method of use shall not be changed without the written approval of the Engineer.

5 SUPPLY OF LABOUR, PLANT AND MATERIALS

The Contractor shall supply all labour, plant and materials necessary to install and maintain the markers.

6 TRAFFIC CONTROL

At all times during the construction of the works included in this specification, the Contractor shall take responsibility to ensure all traffic control is carried out in accordance with the Specification for Temporary Traffic Control, TNZ G1.

7 PREPARATION OF ROAD SURFACE

(a) Unless otherwise specified, or markers are to be placed on a new chipseal, accumulations of coarse material will be removed by the Engineer. All remaining loose material shall be removed before fixing the marker to the road surface.

(b) No markers shall be installed on a wet or frosty surface.

8 FIXING MARKERS TO ROAD SURFACE

The following requirements shall be met:

(a) any voids in the base of the marker shall be filled with adhesive before placing the marker on the road surface unless written approval has been obtained from the Engineer to an amended procedure. Generally the Engineer will require a written recommendation from the marker manufacturer to justify the amended procedure;

(b) excess adhesive shall be placed on the marker or the road surface such that after placing the marker on the road surface the following requirements are met:

(i) there are no voids in the adhesive beneath the marker;

(ii) a small bead of adhesive has exuded from the full perimeter of the marker base;

(c) should the bead of adhesive required in (b) rise above the base of the marker on any edge beneath reflective elements the excess adhesive shall be removed;

(d) any adhesive on the body or lens of the marker shall be removed without damaging the marker;

(e) where stem type markers are installed the hole to accommodate the stem shall be filled with the same adhesive used to fix the marker to the pavement.

9 REPAIR OF PAVEMENT SURFACE

Where a marker has been removed:

(a) by the Contractor; or

(b) by traffic during the maintenance period

the pavement shall be promptly repaired to the satisfaction of the Engineer. Requirements for pavement repair will include ensuring pavement is waterproof and filling any hole with material similar to the parent pavement and compacting it.

10 MAINTENANCE

10.1 General

This section on maintenance shall override other sections of the contract documents for markers in respect of maintenance and retentions.

10.2 Maintenance Period

The maintenance period shall be six months commencing:

(a) for contracts of three months or less the maintenance period will commence at completion of fixing all markers to the road;

(b) where the contract period exceeds three months the Contractor may apply to have the maintenance period commence on any completed section of marking at three monthly intervals.

10.3 Retentions

Ten percent of the value of work completed for fixing markers to the pavement shall be retained until the completion of the maintenance period for all the markers.

10.4 Defect Types

There shall be two categories of defective markers:

(a) minor defects such as cracked body or cracked lens, but the whole marker remains in place and by eye the night time headlight visibility appears unaffected; and

(b) major defects — a marker shall be considered to have a major defect if it is missing, has moved so that its location no longer meets the requirements for dimensional tolerances, or physical damage has reduced the night time headlight visibility such that the difference is visible by eye. Note, the reduction in night time headlight visibility due to normal gradual wear shall not be considered a defect in terms of this contract.

10.5 Maintenance Requirements

Defective markers shall be located by the Contractor and replaced with new markers. The maintenance period for all markers in any section shall be deemed to continue until seven days after all defective markers have been replaced and the Engineer has been advised in writing. The Contractor shall also replace any markers that fail during this period of seven days.

Where two or more consecutive markers have a major defect they shall all be replaced within 72 hours of notification of the general location.

Where the Contractor can show that a whole marker has broken away from the pavement, the fracture surface is within the pavement material, and the adhesive has not had a detrimental effect on the pavement material then replacement shall be at the Engineer's expense.

11 REMOVAL OF MARKERS FROM SURFACING

Defective markers may remain on the pavement subject to the following:

(a) up to 2 defective Type A Markers may remain on the surfacing at any Type A Marker location. Should a third Type A Marker at any location fail, all 3 markers shall be removed prior to placement of the new marker;

(b) where a defective bi-directional Type A Marker requires replacement the new marker shall be placed 1.0 m from the first failed Marker, along the line of the markers;

(c) where a defective mono-directional Type A Marker requires replacement the new marker shall be placed immediately in front of the failed marker.

Where a Type B Marker has failed the remains of the marker, if any, shall be removed and the new marker fixed in the same location.

12 PERIODIC MAINTENANCE OF EXISTING MARKERS

12.1 Scope

This section applies to markers in place before the contract commenced or those for which the maintenance period has ended.

12.2 General

Isolated defective markers shall be replaced at locations as directed by the Engineer.

12.3 Completion Time

Periodic maintenance of existing markers shall be completed according to the urgency allocated by the Engineer:

(a) normal periodic maintenance shall be completed within three weeks of advice of the requirement;

(b) urgent work shall be completed within 72 hours of advice of the requirement.

13 CONTRACT DIARY

The Contractor shall maintain a diary showing date, location, general weather condition, marker brand and type, number fixed, and adhesive used. Where all these factors are constant diary records may be aggregated for lengths up to 4.0 km.

This diary shall be submitted in support of Contractor's claims for payment and shall be available for checking at all times.

14 URGENT WORK

Urgent work applies to that work which may be required for new surfacing or other requirements defined by the Engineer to be urgent.

Urgent work shall be completed by the Contractor within 72 hours of:

(a) completion of the new surfacing; or

(b) the time of notification that urgent work is required.

For new surfacing the Engineer will notify the Contractor the programmed time of the surfacing construction and again when the construction date is firmly known, although the second advice may be at the time the construction commences. On receipt of the firm notification the Contractor shall notify the Engineer of the location of his work site at that time.

Replacement of failed markers required under maintenance (Clause 10) shall not be considered urgent work for payment purposes.

15 PROGRAMME OF WORK

15.1 All markers shall be installed progressively along the length of the road. Where the contract abuts existing raised pavement markers the installation shall commence at this location**.**

15.2 The Contractor will be provided with a schedule to indicate the general location, type of work and the periods in which the work is to be carried out**.**

Based on this information the Contractor shall submit a detailed programme before commencing work.

16 FAILURE TO COMPLETE REQUIREMENTS ON TIME

Should the Contractor:

(a) fail to complete maintenance requirements (Clause 10) by the required time; or

(b) fail to complete periodic maintenance (Clause 12) within the periods specified; or

(c) fail to complete urgent work (Clause 14) within the 72 hours specified; or

(d) fail to repair the pavement surface promptly;

the Engineer may have the work carried out by others and deduct the cost from payments due to the Contractor.

17 BASIS OF PAYMENT

Payment rate shall be per marker installed for each type of marker. Unit rates will be in full compensation for supplying all labour, plant and materials necessary to install and maintain the markers, and repair the pavement surface if required.

For periodic maintenance of existing markers or urgent work an allowance for travel will be paid as detailed below. For all other work the unit rate shall include allowance for travel costs. The unit rate shall also include allowance for all such items as overheads and contingencies.

17.1 Travel

For periodic maintenance or urgent work an allowance for travel shall be paid on the whole distance in kilometres in addition to the unit rate for installation of the markers.

The amount paid shall be calculated on the distance travelled within the contract area by the shortest route from the current work site to the site of the markers requiring installation and return to the original work site.

17.2 Extra Payment for Urgent Work

Payment will be made for each parcel of urgent work required. A parcel of urgent work may include several work sites. No payment will be made unless all the work in the parcel is completed within the required 72 hours. No time extension will be given for unsuitable weather if the road surface is suitable for installation of the markers for eight hours during the period of 72 hours.

APPENDIX 1

1. Pattern of Type A Markers

The arrangement of Type A Markers shall be such as to show the following pattern of reflective faces to approaching traffic:

(a) lane lines and normal centrelines; white reflective faces located centrally in every second gap between paint stripes, ie, nominal 20 m spacing;

(b) no overtaking lines; yellow reflective faces at nominal 10 m spacing;

(c) no overtaking advance warning lines; yellow reflective faces at nominal 20 m spacing.

Markers shall be placed centrally in the gaps between paint markings (See Figure 1).

The pattern of markers shall not be interrupted except where paint markings are stopped at intersections. Type A Markers shall be placed on solid white paint lines approaching intersections or at any other location where the centreline is a solid white line.

At intersections Type A Markers shall be placed at the intersection end of each solid paint line approaching an intersection. The Type A Markers shall be placed on the solid paint line at equal intervals not exceeding 20 m to suit the location of the first (or last) marker located on the adjacent normal centreline.

The patterns of Type A Markers required are illustrated in Figure 1.

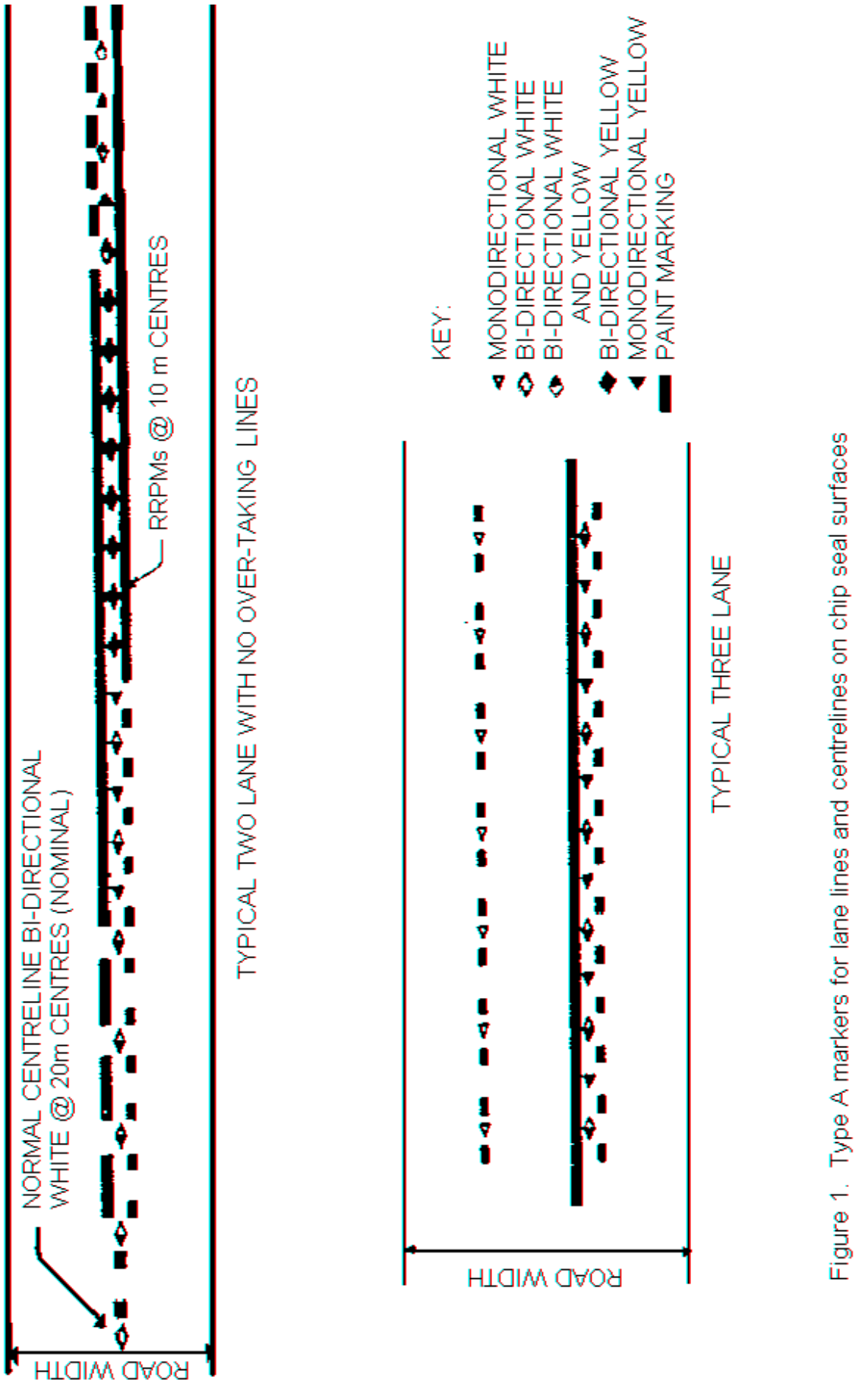

Figure 1. Type A markers for lane lines and centrelines on chip seal surfaces