ROAD DESIGN NOTE

Accessible tram stops in medians

1. Purpose

This Road Design Note (RDN) provides guidelines for the design of road infrastructure associated with accessible tram stops located in medians of dual carriageway roads.

Accessible tram stops provide a platform and associated ramps/pedestrian facilities that comply with the requirements of the *Disability Discrimination Act* (1992) *Disability Standards for Accessible Public Transport (*2002) (DSAPT) and referenced Australian Standards.

This RDN should be read in conjunction with the *Client (DOI) Design Requirements for Accessible Tram Stops (*2006) which will include this RDN in an appendix.

2. Scope

This RDN is applicable for tram stops in medians:

- Where posted speed limits are between 60 km/h and 80 km/h.
- At intersections and mid-block between intersections.

This RDN provides guidelines on:

- Road safety barrier requirements.
- Traffic lane width reduction and traffic lane realignment where the platform cannot be contained within the existing median.
- Signing and line marking requirements.
- Intersection sight line requirements.

3. Road safety barriers

Road safety barrier requirements are dependent on the following factors:

- Posted speed limit.
- Tram Stop usage and road conditions.
- Platform level relative to adjacent road pavement.
- Presence of other shielding features.

Appendix A provides details of road safety barrier requirements for different speed zones.

Appendix B provides details of acceptable layouts for road safety barriers and platform terminations.

4. Traffic lane width reduction & realignment

Widths required for platforms are provided in the DOI design guidelines referenced in Section 1.

Wherever possible, traffic lanes should be left unaltered with the platform fitted into the existing median.

Where encroachment of the platform into traffic lanes is necessary, changes to lane arrangements shall consider:

- Traffic lane width requirements. Refer to Section 4.2.5 (Urban Road Widths) of *Austroads Guide to Road Design – Part 3: Geometric Design.*
- Lane alignment. Any lateral shifts in traffic lanes adjacent to platforms shall include appropriate changes to the lane alignment on both the approach and departure sides of the platform. These changes can be achieved by adopting:
  - Horizontal geometry as defined in *Austroads Guide to Road Design – Part 3: Geometric Design and VicRoads Supplement to the AGRD* based on a speed equal to the speed limit plus 10 km/h.
- Pavement width requirements for turning movements at intersections. Refer *Austroads Design Vehicles and Turning Path Templates* (2006) and applicable VicRoads Region for advice on appropriate design vehicles.
- Method of removal of redundant line marking. The extent and method of redundant line marking removal is subject to the approval of VicRoads. The practices usually adopted for VicRoads projects shall be used. Placement of asphalt overlays for the full width of pavement to cover redundant line marking may be required where substantial shifts in lane lines are required.

Proposals for changes to traffic lane widths and/or alignments are subject to the approval of VicRoads.

5. Signing & line marking

Signing and line marking shall comply with the requirements of *VicRoads' Traffic Engineering Manual Volume 2 - Signs and Markings.*

Where platforms are within the existing median, edge lines will usually be required. Where platforms cannot be accommodated within the existing median, edge lines, diagonal markings, RRPMs and chevron hazard marker signing may be required.

6. Intersection sight line requirements

Sight line requirements at intersections and mid-block locations are defined in *Austroads Guide to Road Design – Part 3: Geometric Design and VicRoads Supplement to the AGRD.*

Platform stops and associated pedestrian railing, shelters, etc. shall not reduce sight distances currently available, unless agreed otherwise with VicRoads. Any reduction in sight distances shall be subject to the approval of VicRoads.

7. Approval process

The DOI design guidelines referenced in Section 1 include a detailed design workflow. This workflow shall include road safety audit and all changes to road infrastructure associated with each tram stop. Approval of DOI, Yarra Trams and VicRoads is required for concept designs before proceeding to detail design.

VicRoads approvals shall be obtained from the relevant VicRoads Region.

References

Supersedes – RDN 03-32 (Nov 2006)

VicRoads Standard Drawings for Road Works

Approved by

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Road Design Notes are subject to periodic review and may be superseded.

APPENDIX A: Road Safety Barrier Requirements

APPENDIX B: Layouts for Road Safety Barriers & Platform Terminations

Appendix A

Road safety barrier requirements

Road safety barrier requirements will vary depending on site conditions and the design of the platform. Two categories of road safety barrier treatment are possible. These are:

Category 1 - Full length barriers

This Category requires road safety barriers for the full length of the platform including protection of the end facing approaching traffic.

Category 2 - Barriers at Approach Ends Only

This Category only requires road safety barrier protection for the end of the platform facing approaching traffic.

Platforms shall be designed with Category 1 barriers where any of the following conditions apply, except where omission of barriers is acceptable as described in Section A3 below:

- The Design Speed Limit is greater than 60 km/h – refer Section A1 below for definition of Design Speed Limit.
- Stop usage and road conditions warrant Category 1 barriers – refer Section A2 below.
- The platform is below the level of the adjacent road pavement. This condition applies when the platform edge closest to the road is below the adjacent pavement level.

Category 2 barriers shall be adopted for all other sites, except where omission of barriers is acceptable as described in Section A3 below.

A1. Design speed limit

Design speed limit is the posted speed limit applicable at the platform site, except as follows:

Where the platform is located within 250m of a change in speed limit with the platform in the lower speed zone (e.g. platform in 60 km/h zone, near 70 km/h zone), design should be based on the higher speed limit when:

- The platform is downstream of a reduction in speed limit and road/traffic conditions indicate that the reduced speed limit has not substantially reduced vehicle speeds at the platform site, or
- The platform is upstream of an increase in speed limit and road/traffic conditions indicate that vehicle speeds at the platform site are already close to those expected in the higher speed zone.

Examples of road conditions which may warrant designing for the higher speed limit include downhill grades, widening cross section (e.g. added lanes), changed parking restrictions.

A2. Stop usage & road conditions warranting Category 1 barriers

Some stops typically attract high numbers of waiting passengers. Examples are near schools, universities, retail centres and near interchanging train, tram and Principal Public Transport Network bus services.

The road alignment and cross section at the site and on its approaches should be designed to minimise the vulnerability of the platform to errant vehicles.

However, even with a 60 km/h speed limit, Category 1 barriers shall be adopted if the stop is one typically attracting high passenger numbers, and any of the following road conditions apply:

- Where the platform is contained within the existing median and existing traffic lanes deviate around the platform site, the deviation does not meet the desirable standard for lane realignment defined in Section 4.
- Any traffic lane width reduction and/or realignment required to accommodate the platform does not meet desirable standards. Desirable standards for lane realignment are defined in Section 4.
- The platform is located on the outside of a curve of radius less than 500m.

A3. Omission of road safety barriers

Road safety barriers may be omitted from the design when site conditions are such that the platform is effectively shielded from errant vehicle impacts by other features in the road reserve not associated with the platform stop. Where these features are themselves roadside hazards (e.g. trees, poles, etc.) which could be shielded by barriers otherwise required for protection of the platform, then the barriers shall be installed. Where minor modification/ extension of barriers required to protect the platform would provide protection of existing roadside hazards, then this modification/extension shall be adopted.

Any proposals to omit road safety barriers shall be considered on a site by site basis and submitted to VicRoads for approval.

Appendix B

Layouts for road safety barriers and platform terminations

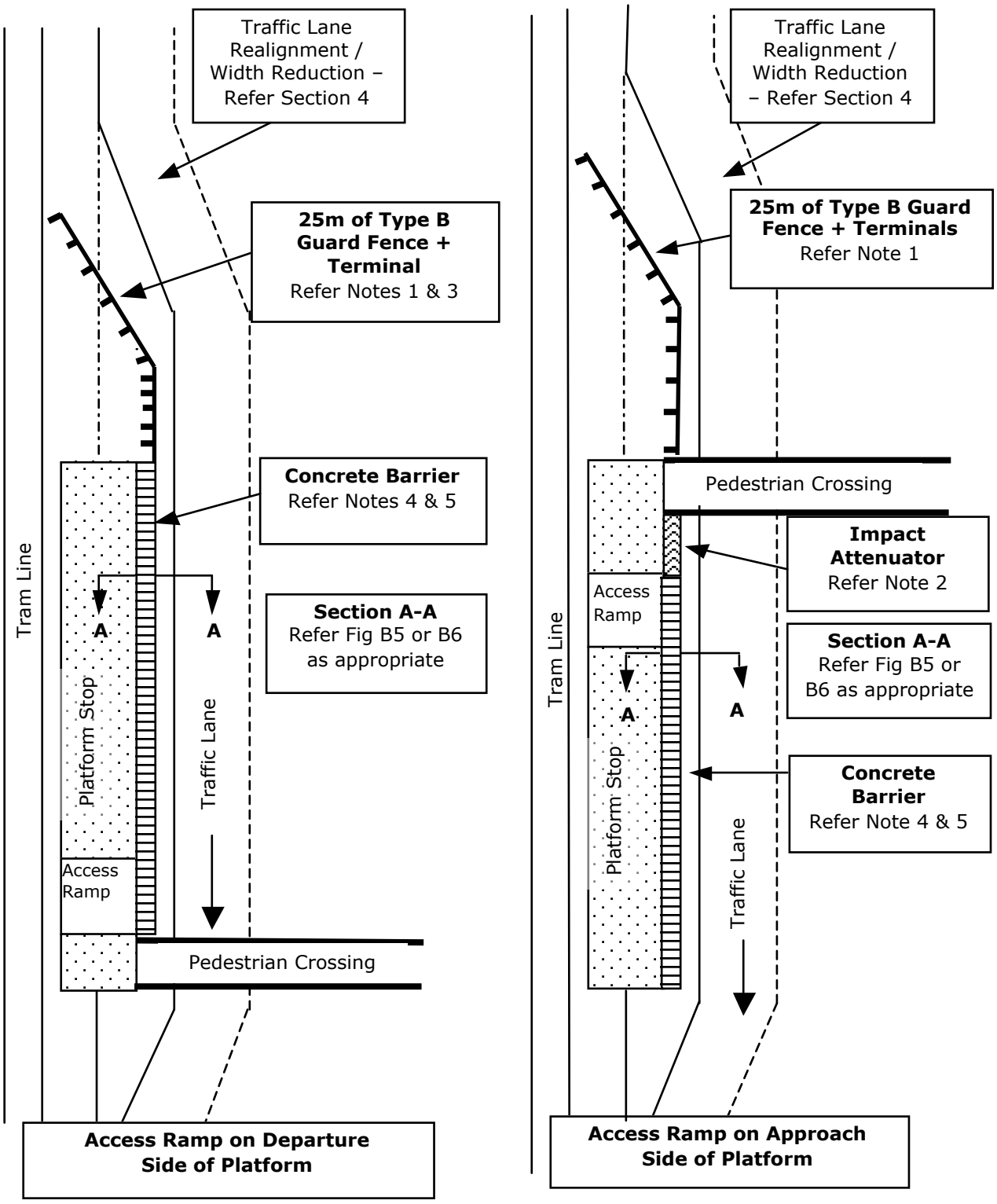

Fig B1 – Mid-Block Tram Stops with Category 1 Barriers

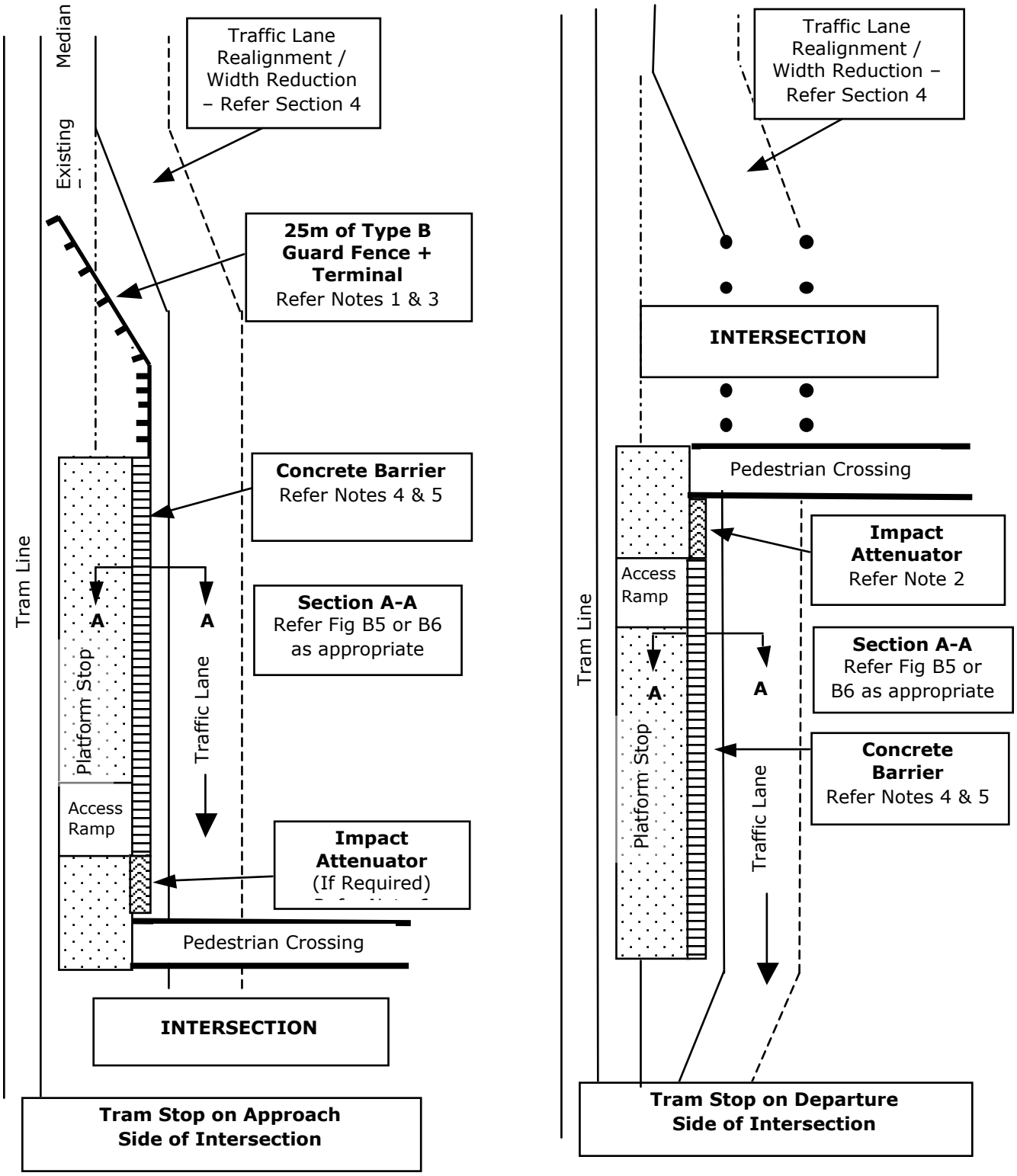

Fig B2 – Intersection Tram Stops with Category 1 Barriers

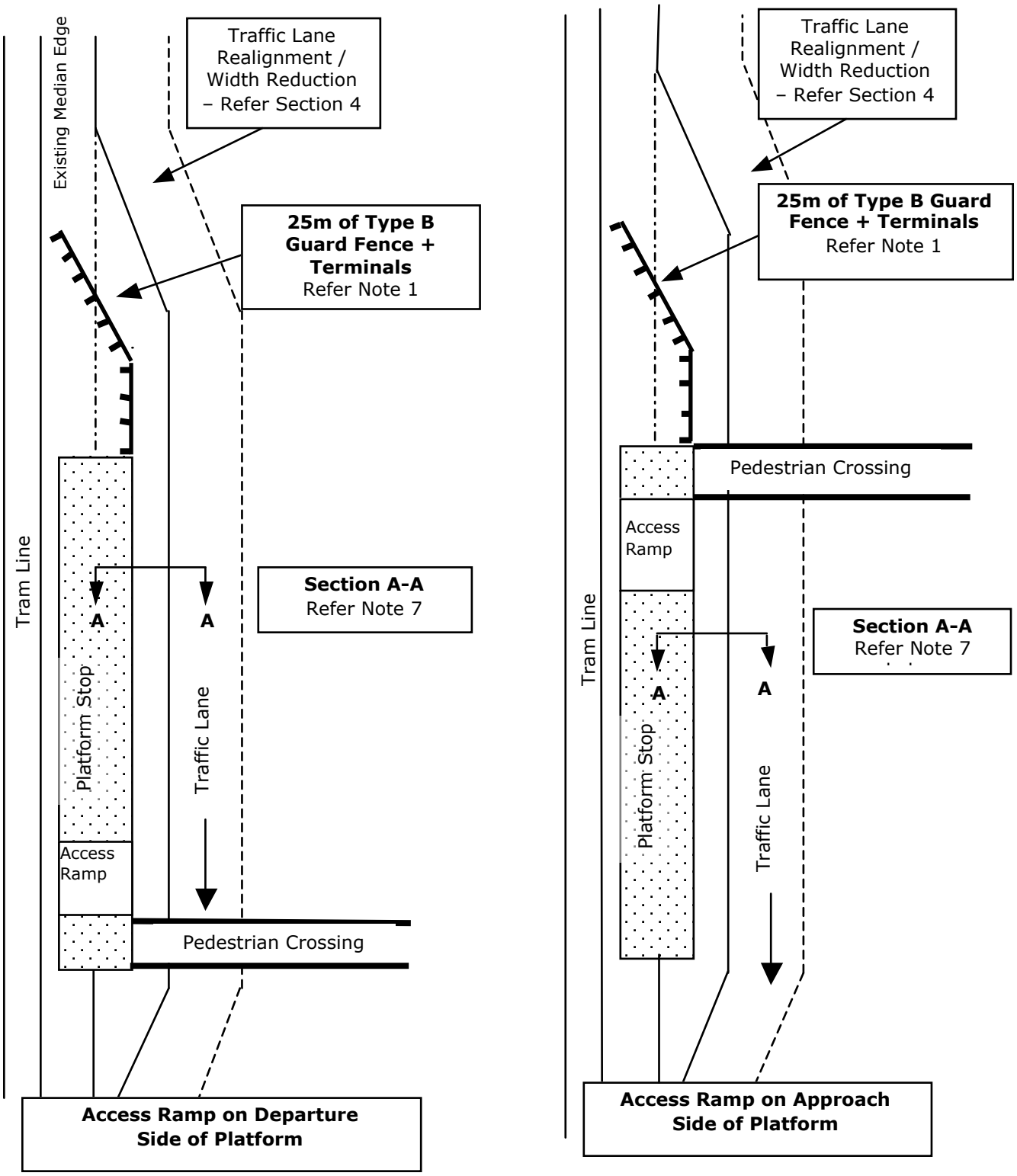

Fig B3 – Mid-Block Tram Stops with Category 2 Barriers

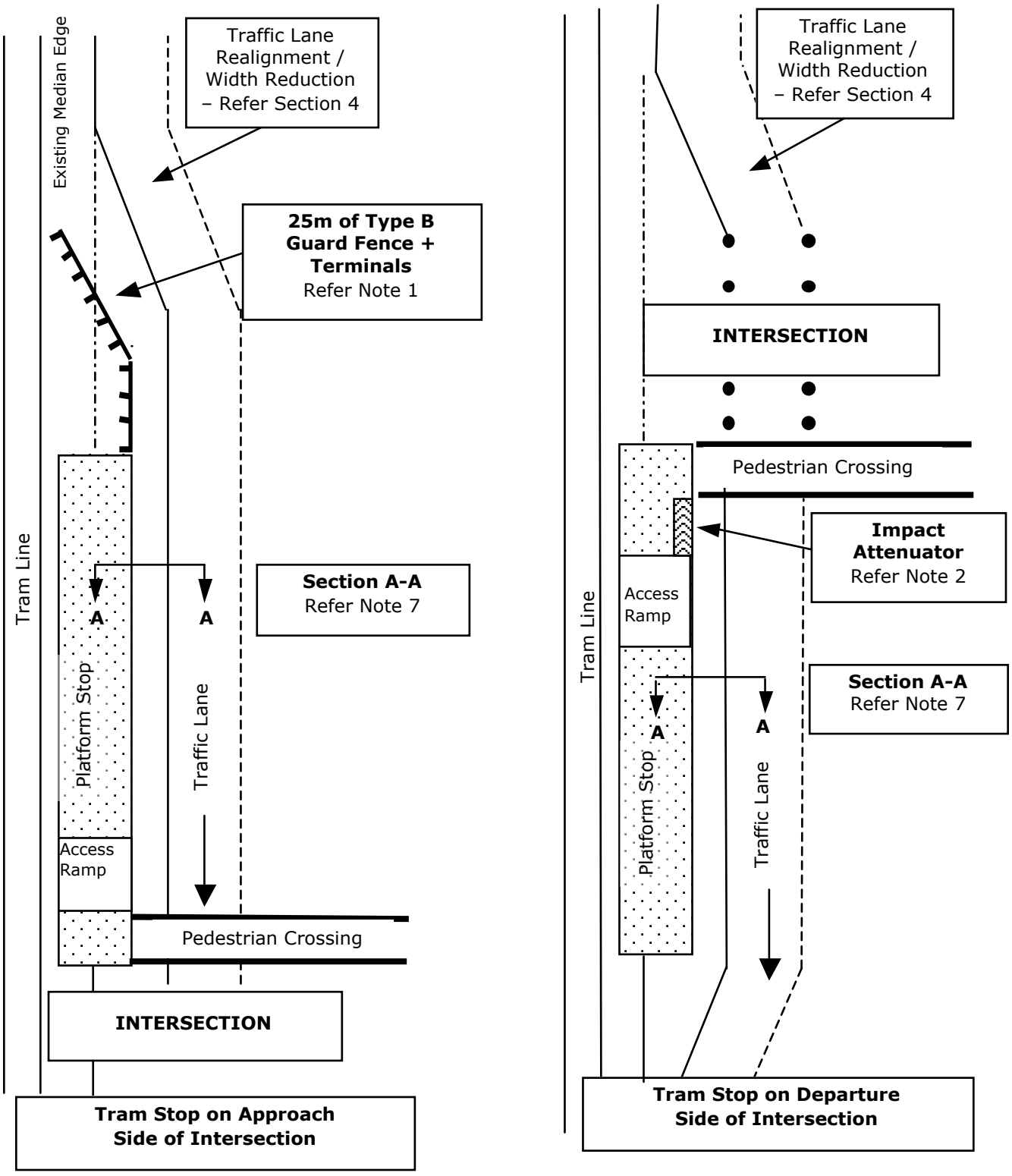

Fig B4 – Intersection Tram Stops with Category 2 Barriers

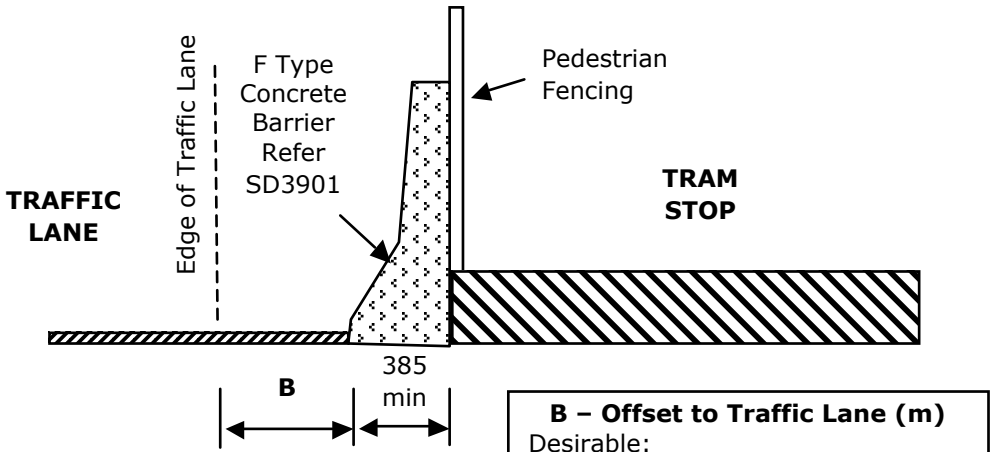

Fig B5 - Platforms with F Type Concrete Barrier

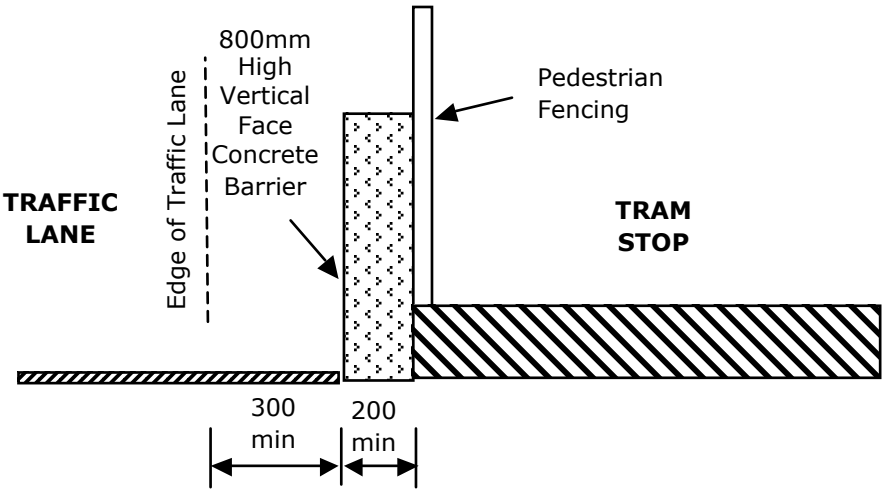

Fig B6 - Platforms with Vertical Face Concrete Barrier

NOTE: Refer Note 4 for conditions on use of Vertical Face Concrete Barrier

Notes to Figures B1 to B6 – Layouts for road safety barriers and platform terminations

1. A minimum 25m "length of need" of Type B guard fence aligned as per VicRoads standard drawing SD 3511 (latest version) shall be provided where the median slope is appropriate for a Line A installation. An equivalent Line B installation as per VicRoads standard drawing SD 3521 (latest version) shall be provided where the median slope is not suitable for a Line A installation. Where there is adequate clearance between the guard fence "start of need" point and the tram line, a BCTA terminal as shown on SD 3511 (latest version) and SD 3541 (latest version) may be adopted. Where the clearance between the guard fence "start of need" point and the tram line is inadequate for a BCTA terminal, an appropriate proprietary guard fence terminal may be adopted. Refer 06-04 for acceptable alternative terminals. Note that an "Omni Stop Terminal" is not an acceptable terminal for speed limits between 60 and 80 km/h. Where the guard fence terminates at the platform concrete barrier, refer to Note 3 below. Guard fence terminating prior to a platform or pedestrian crossing point shall include a BCTB terminal as per SD 3511 (latest version).
2. Acceptable impact attenuators, or crash cushions, are listed in RDN 06-04. Impact attenuators shall be suitable for design speeds of at least the speed limit plus 10 km/h. Energy absorbing bollards are not an acceptable substitute for impact attenuators.
3. Where guard fence is used to provide end protection for stops that require concrete barrier protection, the guard fence shall be connected to the concrete barriers. Refer standard drawing SD 4084 (latest version) for details. The reduced post spacing shown on SD 4084 (latest version) shall apply for the first 10m of guard fence beyond the concrete barrier, however the guard fence alignment shall be as per SD 3511 (latest version).
4. F type concrete barrier as shown in Figure B5 and VicRoads standard drawing SD 3901 (latest version) shall be adopted as the preferred concrete barrier profile where site constraints permit. In 60 km/h zones where the available cross section width is restricted and adoption of F type barriers would require reduction of traffic lane widths, vertical face concrete barriers as shown in Figure B6 may be adopted. Vertical face concrete barriers may only be adopted in 70 or 80 km/h zones where the stop is located adjacent to a right turn lane, the available cross section width is restricted, and adoption of F type barriers would require reduction of traffic lane widths. Vertical face concrete barriers shall be designed to provide the same containment as F type barriers.

   Concrete barriers shall not be installed behind new kerb and channel. Any existing kerb and channel in front of proposed concrete barriers shall be removed and the area between the pavement and barrier paved, unless the offset between the barrier and the face of kerb is greater than shown in Table 1.

Table 1: Minimum offset between concrete barriers and face of existing kerb

Speed limit (km/h)	Minimum offset from barrier to face of kerb (m)
60	1.5
70 or 80	2.1

5. Where Category 1 safety barriers are required and the stop is either at mid-block with the access ramp on the departure side, or on the approach side of an intersection, guard fence may be used in lieu of concrete barriers where at least 300mm clearance can be provided between the back of the guard fence posts and the platform.
6. Where concrete barriers are used at stops on the approach side of intersections, an assessment must be made on whether or not protection of the concrete barrier end facing the intersection is required. Where this assessment determines that the concrete barrier end is vulnerable to end on errant vehicle impacts, then impact attenuator protection shall be provided.
7. Where Category 2 barriers are adopted, the offset between the platform and the nearest adjacent traffic lane should be as large as possible. The minimum offset between a platform and traffic lane is 0.3m.