INTERIM REPORT - NICHOLSON STREET SAFETY BARS

Design

The safety bars are precast reinforced concrete, measuring 380 x 200 x 60 mm thick, and rebated into the road pavement by at least 10 mm. Design is based on the round-topped South Australian jiggle bars, and Australian Standard AS 1742 - 1975 (Part 1). Variations from the S.A. type include :-

rounded corners, to reduce corner breakages

vertical walls of 30 mm instead of 15 mm, to allow rebating into the pavement by up to 30 mm if necessary, to improve the overall strength of the unit, and to reduce the angle at which road tyres contact the rounded top of the bar.

The inwardly sloping ends of the bar are retained at the same slope as the S.A. type, as flattening this slope was found to affect the rear wheel of motor cycles when approached at certain angles. This steeper slope allows the wheel to climb over the bar rather than slip sideways. The length of the bar is restricted to 380 mm to allow placement just clear of the concrete tramway margin (to facilitate rebating), while the outer edge is 900 mm from the outer rail running edge (the minimum needed to enable trams to clear the overhang of vehicles located just clear of the bars).

Bars are spaced at 4.5 m centres. Trials proved the 1.5 m and 3.0 m spacings (recommended in AS 1742) to be too close for comfortable handling of a motor cycle, whereas the 4.5 m spacing proved satisfactory. Each section, or group of bars, is outlined on both sides by a 100 mm white line, and these outlines are joined together at both ends by a white painted splay nose.

Bars are acid etched prior to painting by applying a 1:1 Spirits of Salts/Water solution brushed into the surface, and flushed with water after 5-10 minutes. They are painted with golden yellow polyurethane paint (one coat Epithane primer, 1 or 2 coats Poly-U 200 top coat), applied by roller. Glass beads are not included, as trials proved these to retain dirt too readily. Instead, reflectorized road pavement markers are laid 0.5 m ahead of the outer edge of each bar.

Installation

Various methods were tried to provide for a rebate and a plane level surface for glueing. The method finally adopted involved using a curved spade bit on a jack hammer to excavate the asphalt pavement to a depth of about 30 mm. The excavated rebates were coated with Colas emulsion and a level pad constructed in the floor by use of fine (3 mm) hot-mix asphalt compacted by a slightly oversize flat plate fitted to a jack hammer. The amount of rebate thus obtained was approximately 10 to 20 mm below the road surface. The concrete bars were glued to the floor of the rebates by placing a large blob of epoxy glue under the four corners of each bar. Three types of epoxy glue were used in order to evaluate the type most suitable.

They were :-

Araldite LC 230

Araldite XC 508 (fast setting)

Epirez 712

Araldite LC 230 was found satisfactory for hand mixing, but a smaller pack size would make it more convenient. Araldite XC 508 was found to set too quickly for hand mixing, but would be quite suitable if a CRB-type epoxy dispenser was used. Epirez 712 was found to be the most convenient to use in hand-mixing, due to the smaller pack size. All three epoxies seem to be of adequate strength provided that sufficient quantities are used (two to three times the quantities recommended by the distributors). In cold weather it is best to glue the bars in place whilst the hot mix is still warm.

Dates of installation were :-

5th May - 78 - Victoria Pde., to Gertrude St.,

22nd May - 78 - Gertrude St., to Alexandra Pde.

Road Handling

On first seeing the safety bars, the average motorist is reluctant to drive over the bars when asked to do so. When he eventually does drive over them, he is usually disappointed. Small cars feel the impacts more than larger cars do. Steering is not seriously affected, except at very low speed. The effect is more of a regular bumping noise with some vertical julting - again more noticeable in the smaller vehicles at low speed. At high speed the bumping noise becomes more noticeable, and vertical julting almost disappears. (Compare with barrier kerbing where the effect is to deflect the vehicle back off the kerbing when mounted in the parallel direction).

Public Reaction

No adverse comments were received from passing motorists during the installation, whereas earlier separation works had. This is thought to indicate a change in public attitudes rather than a reaction to safety bars versus barrier kerbing ...(as no adverse comments were received with respect to the barrier kerbing extensions either). One local service station proprietor queried the legal significance of the double white lines (opposite one of his entrances).

Traffic Flow

Prior to the installation of the safety bars, M.C.C. had painted the lane lines (separating the two traffic lanes) through the trial area. It appeared that these lines alone had a very significant positive influence on lane discipline, and did much to reduce interference with trams before the bars were laid.

Overall, the safety bars seem to have exactly the same effect as barrier kerbing in keeping traffic, especially queued vehicles, clear of the tracks. The only misuse noted was that of right-turning vehicles overtaking long signal queues by driving through a gap in the bars then down the tram tracks and turning right at the street ahead of the signals. (This same misuse has also been noted with respect to barrier kerbing).

Occasionally vehicles entering Nicholson Street from a side street, noticeably left turners, do not notice the safety bars and drive over the first one or two, but are quick to move off them. Other motorists, on entering the trial section for the first time, exhibit an immediate natural response to steer their vehicle to the left of the bars.

Heavy traffic flow in the evening peak period, even in dark wintery conditions, is smooth and orderly.

Visibility

As a motorist approaching the trial section during daylight, the bright yellow intermittent domed shape of the bars is very noticeable against the flat black background of the asphalt roadway, and the white outline helps define each group of bars - giving the appearance of a narrow median with clearly defined openings at cross-streets. Under both wet and dry conditions at night the white reflectorized road markers are most noticeable, and the dome shaped top of the safety bars reflects light from the street lighting ahead and the headlights of opposing traffic.

(NOTE: The peaked bi-planner bars proposed by the C.R.B. would not have this ability). Unlike barrier kerbing, rain water does not collect along the alignment of the separators, so that even in very wet conditions at night the safety bars and their road reflectors are quite apparent. (In the case of barrier kerbing, distant street lighting and headlights from opposing traffic cause reflections from rain water lying either side of the kerbing, and this reflected light competes with that from the road reflectors and that reflected off the top of the kerbing).

Maintenance

Small quantities of tram sand tends to collect on the down-hill edge of each bar after rain, but the build-up does not seem significant enough to obstruct visibility or look unsightly. Rain water drains freely across the roadway between the bars, keeping the road fairly clean between the bars. Long periods without rain may lead to the need for regular sweeping, but this is not yet apparent. Wind-blown leaves and paper also pass freely between the bars without any build-up.

The only maintenance problems becoming apparent are the need for replacement of the bars due to failure of the epoxy glue, and the need to repaint the bars (on site) at regular intervals. In the first three weeks, about 5% of the bars had come loose, but this seems to be a problem caused by poor mixing or insufficient quantity of epoxy under each bar. (South Australian experience is that a small percentage of bars will normally come loose in the first few weeks). This problem could be reduced by use of a C.R.B. type epoxy dispenser. On close inspection of the polyurethane paint surface of the bars, some slight signs of wear are beginning to show, but this is not yet significant enough to warrant repainting. On any future projects, two good top coats of golden yellow would be worthwhile prior to installation.

R.G. Vanselow

20th June, 1978.