

The Role of Pavement Marking in Local Area Traffic Management Schemes.

Perhaps the title for this paper should read "The Role of Effective, Unambiguous and Consistent Pavement Marking in Local Area Traffic Management Schemes." The modification to the title is suggested by the often-poor installations, inconsistent arrangements and the poor quality of maintenance of the scheme once in place.

A quick trip around most urban areas off our main roads will reveal a variety of Traffic Management Schemes that include:

- Speed Numerals
- School areas
- Stop and Give Way lines
- Parking restrictions/devices
- Traffic lights
- Bus stops, Taxi Stops
- Bike lanes
- Roundabouts
- Slow Points/Chicanes
- Road width restrictions
- Speed Humps
- Pedestrian refuges
- Platforms with or without pedestrian crossings
- Access/exit lanes for public facilities

Frequently, many of these devices are installed as "Traffic Calming" devices, although on many occasions, the plethora of devices along a particular route may have anything but a "calming" effect.

In his paper "Is the Design Practical" presented to the RIAA Conference of 1994, Nick Phillips of the RTA NSW highlighted 5 types of deficiency in some designs he had observed and which he described as "*Unrealistic, Unresearched, Confusing, Dangerous and Controversial*". He concluded that the installer was sometimes called on to resolve fundamental design questions on site when presented with a plan for installation. His conclusion was also that the installation of linemarking (pavement marking) is as much about resolving these and other questions as it is about materials, application techniques and maintenance.

Obviously, each one of these devices has a particular function within the broader overall scheme, and most will utilise delineation of signs and pavement marking. In residential streets, the overall scheme is usually more easily adopted as an entire area often will be treated, however, in the shopping "strip" and roads adjacent to large shopping centres, it is often more difficult to provide a proposal that satisfies all users, including motorists and cyclists, pedestrians, shop-keepers, bus traffic and emergency vehicles.

The requirements are for clear, unambiguous delineation, any other requirements, and above all, safety of all users. It is essential to ensure that there are not too many devices or markings that will cause confusion, or devices placed to prevent use by either large vehicles or cars to the detriment of the community. If large vehicles are excluded, how do emergency services quickly travel to an emergency? If cars are excluded, this may exclude police from chasing criminals or someone on a bike or motor bike.

In this paper, the role of vertical signage has been generally set aside, but it is emphasised that this should agree with the pavement marking message, be clear in its requirements and well maintained. Frequently, the messages of vertical delineation (signs and kerbs) and horizontal delineation (markings) conflict with each other, often because previous markings have not been

totally removed, because of replaced signs not identical to an earlier installation, or because the use of the various components has not been totally understood from the on-site perspective. There is also the question of the legal status of devices used not complying with Australian Standard or the State Road Authority Specification.

Having said that, it is important to understand the use and requirements of the pavement marking. This paper will not deliver a “one size fits all” scenario for materials to be used in particular types of devices; rather the engineer should select the pavement marking materials based on the requirements, knowledge and previous practice. The use of the best quality pavement marking materials, applied by competent personnel and regularly maintained will convey a distinct message to the road user.

However. The one overriding concept that must be remembered by all concerned is “What message are we trying to convey to the road user?” And “will the motorist understand clearly what is required of them?” There must be an automatic response to the scheme from motorists to assist compliance. Consistency will help avoid confusion. Well thought out, well-applied and maintained pavement marking materials are a vital part of guiding the motorist through the scheme safely.

It cannot be emphasised too strongly that LATM proposals may be as simple as the installation of speed numerals, school zones, Stop and Give Way lines, or extremely complex and dealing with multiple roads and intersections in an area with combination of many of the devices listed at the commencement of this paper. In dealing with a variety of issues, it is important that we consider the two aspects of construction and maintenance of the devices, including the markings and some of the factors that affect the role of the marking. Maintenance of the device, once constructed is vital for the device to continue to convey the required message.

1. General.

Those responsible for the design, installation or maintenance of any scheme on a public road have many issues to consider, including:

- Will the road user receive the message?
- Does it comply with the relevant Standards or Specifications?
- What is the most effective way of implementing the scheme?
- Are there any other impacts that will reduce the effectiveness of the scheme?
- How do we overcome those impacts?
- When do we install the scheme or have the whole plan re-assessed?
- Is there a better alternative to the proposal?
- Is there sufficient time to allow the proposal to be re-assessed?
- Is the plan clear and concise for those involved in construction to be able to understand and quote on?
- Will it be possible to remanufacture, replace or maintain the sign or traffic facility as it was designed, at a reasonable cost?
- The use of long-life materials compared to pavement life, ie, whole of life costing.
- Type and location of the device
- Requirements of the device
- What will be the approaching vehicle speed?
- What is the anticipated vehicle volume?
- Adjacent surface type and condition
- Environmental factors such as sun blinding drivers at times of the day and year
- Will any excess noise be generated?
- Sight distance restrictions through topography and curvature
- Lighting or night-time issues
- Inclement weather
- Overhanging or obstructing trees
- What services are affected or will affect the scheme?
- Likely response by traffic to changes

➤ Availability of materials

It is not intended to discuss and specify what materials the complete devices should be constructed from in this section, as the decision should have been made based on factors including those listed above. However, some thought should also be given to what maintenance may be required to the materials from which the devices are constructed. It is obvious that devices required to be durable for many years should be constructed from longer lasting materials such as concrete or dense grade asphalt (depending on the type of device), while devices only required for shorter terms may be constructed from materials such as preformed recycled rubber, etc.

Many areas use the “mountable” device to allow larger vehicles to negotiate the LATM scheme, however, these must be of a suitable material. Often an asphalt “dome” is used with or without false brick or similar marking materials but with circular pavement marking. In the latter case, there must be consistent maintenance to ensure that the device functions correctly.

2. Discussion about the work

It is assumed that when devices are installed, the appropriate investigations and consultations have been thoroughly carried out with regard to the overall scheme. Within the one designing body, it is often possible for different personnel to be working on two or more different proposals for the same portion of road or area.

Several years ago, there was an incident where two different branches in the same road authority had designed two different proposals for the same portion of road. One was related to bicycle lanes, while another was related to providing better access and exit facilities for a large education facility. In this instance, the two designers (one being a consultant who had little experience with pavement marking) were unaware that the other was working on a proposal for the same portion of road, and when finally approved were issued to two different supervisors. It was indeed fortunate that the two designs arrived at the reputable pavement-marking contractor's office on the same day and a meeting of the supervisors and contractor was hastily organised to sort out the clashes. The result of this was many thousands of dollars being saved in eliminating removal and re-application of the various markings that would have been freshly applied. But what if two different contractors had been engaged????

3. Checking – site visits

It is also advisable that once the plans are finalised, a brief site visit is conducted prior to any work being carried out. On many occasions, considerable sums will be saved when conflicting proposals are modified before any work commences.

By way of example, a small pavement-marking proposal with a budget of approximately \$1500 increased by over \$12000 when the designers failed to comprehend that moving of a concrete island would result in pavement arrows, chevrons and median outlines having to be removed and re-applied in a new location, together with associated other marking devices, so that they were not in the lane of opposing traffic. Unfortunately in this case, neither the designer nor the contractor visited the site prior to work commencing and as a result, the labourers simply carried out what they believed was correct (and it was). The main agony came when the account arrived including all the additional work.

Perhaps these are some very strong recommendations that the author can make:

- Ensure that the plans are of good quality, well researched and accurate and the order and plans are issued early enough for the pavement marking applicator to visit the site prior to application and seek clarification of anything on which he is unsure or where there appears to be a conflict.

- Don't leave it until the last minute, as this is just the time that things will go wrong when you have the least amount of time to fix them. Give the contractor/applicator time to program the work so that there is no delay to this work or his other customers.
- Small and faxed plans are often difficult to read correctly, so the larger the better.
- A Hold Point should be established for any new markings to be installed as soon as the set out/spotting is completed. The information obtained at this time would enable adjustments to be made prior to the application of all the markings.
- It is essential that the pavement marking contractor engaged has sufficient and correct resources to carry this out, as well as complete the work to the required standard. This should be a requirement of any contract.

In this way, many thousands of unbudgeted funds will be saved, not to mention the embarrassment that follows such problems occurring.

4. Surfaces

A major influence on the use of the pavement marking materials is the surface to which they are being applied. Assuming that the LATM device is being constructed from dense grade or open grade asphalt or concrete, then suitable long-life materials should be used to maximise durability and cost effectiveness. Obviously in the case of simple schemes using Stop or Hold lines, speed numerals etc the materials used should be appropriate for the surface and its condition and in many cases this may be water borne paint or similar. However, in many instances even on a sprayed seal surface or similar, it may be more cost effective to use a long-life material such as thermoplastic or cold applied plastic to maximise life where every vehicle traversing the device must cross it. This should save repeated cyclic applications of shorter life materials and thus save precious funds over the life of the device.

Previous RIAA conferences and seminars have discussed the problems of adhesion and compatibility of materials and surfaces, and reference should be made to those papers for further details. In these cases, the asset owner should request a minimum 12 month guarantee on the adhesion of the materials used by the pavement marking contractor, and be prepared to enforce it if failure occurs. For example, much has been written about the adhesion of thermoplastic to concrete and curing compounds used on the concrete, yet if treated correctly, there should be minimal problems. Put simply, the pavement marking materials must be matched to the type of materials used in construction and expected life given the conditions at the location where the device is placed.

5. Appropriate Standards and Specifications

The use of the appropriate Standards and Specification should be a "given", however, on many occasions, Councils have adopted their own Specification and set out.

This covers several areas:

- The actual material to be used. Does this comply with the relevant State Road Authority Specification, or the relevant Australian Standard? Local Government, private developers and contractors are strongly urged to ensure that they have a complete specification within a contract document that clearly spells out what is to be done by whom, by when, with what, any locations applicable. This should include the details set out in the paper "Pavement Marking Specifications – What to Look for". If there is nothing or very little in writing, there's not many other people to blame when the work goes wrong or there is a disagreement. Examine the paperwork and note if it complies with what was seen on site. Ask the applicator for some bead samples, note the batch numbers on the paint or thermoplastic or cold applied plastic.

- The use by some Councils of their own design for items such as pavement marking warning of speed humps or set out of bicycle lanes. Some speed humps and raised platforms have been noted as a solid “block” on the approach face that quickly soils and often becomes indistinguishable from the rest of the road. Some locations use a “chequerboard” pattern, others a transverse zigzag. Other local government areas use “Piano Keys” that are upside down when compared to the Australian Standard. One unusual warning noted recently was the words “SLOW DOWN” painted on the pavement in 300mm high letters, beside the speed hump and in a 60-km/hr zone. I think we can agree that the wording is useless. Another item frequently noted is the use of Council’s corporate colours on signs, chevrons etc for traffic calming devices.
- In some locations there is a requirement for the Local Government area to comply with the Australian Standard, while the relevant State Road Authority uses a different specification and nomenclature. An example of this is in New South Wales where many Councils use the nomenclature of items like DWBL (Double White Barrier Line), HL (Hold Line), EL (Edge Line) while the RTA uses codes of BB, TB, E1, E2, E3 etc for the same items on drawings. I feel sorry for those contractors who are located near state borders (eg Albury/Wodonga, Queanbeyan/Canberra) and who have to deal with the differing codes for the lines for the various locations. It is easy to say, but nationally we should be using the same markings and the same codes. Failing that, road asset owners should ensure that the Specification and drawings are understood by the relevant applicators in their area.
- The final matter here relates to previous attempts to provide a national pavement marking specification through an umbrella body. In the past these have not been relevant to all state requirements and have become long out of date. Asset owners should periodically check that if they are using this type of specification it is still up to date and that accepted practice has not “moved on”. It may cost more money not to be current with materials and techniques and the result may not be as effective as it should be.

6. Consistency

Within one small district, it is often possible to find that differing markings and devices are used to convey the same message. It is little wonder that the motorist becomes confused when he/she encounters several different types of markings within metres of each other, even from one side of a device to another!

Recently, examples of 4 different types of roundabout markings and construction were seen, each within a 150 metres of each other. On one of these roundabouts, 3 differing types of pavement marking were used on a roundabout with four roads entering. What chance does the motorist have to clearly understand and react appropriately to our intentions?

Within the same area, a roundabout has been installed as only a painted circle, with traffic generally continuing straight ahead without deviation for the majority of the time. We have to ask what then is the benefit of this device?

It is only fair that the motorist receives a clear, unambiguous and consistent message at each device. Accidents will result if there is confusion, and this is possible if the traffic devices of the same type are not generally the same.

While on the subject of consistency, the author believes that there should be consistent markings used at all similar devices nationally. This will give greater comfort to interstate visitors and provide visitors to Australia with a better chance of understanding instantly what message we are trying to deliver.

7. Integration of adjacent schemes

It is desirable for all traffic measures to be installed for a scheme at the same time, particularly if several devices are installed near to each other on the one road.

One example in which the author was involved related to two slow points to be installed approximately 80 metres apart. There was some confusion over the lack of integration of the two devices and in the end this was accomplished by extending the barrier lines and separation lines over a small crest to provide advance warning to motorists. In this proposal, no long-life materials were used as pavement resurfacing and repairs were likely within a reasonably short period.

It is important for nearby schemes to be separately and collectively evaluated to ensure that they work together. It may be as simple as extending some lines to get the correct effective result.

8. What about the neighbours?

Many of the comments made above are particularly appropriate if a LATM scheme involves roads that impact on neighbouring Local Government areas. Very little benefit is obtained if the neighbouring area is unwilling to become involved in the proposals, and provide the same type of markings throughout both areas. It will only cause confusion if the delineation is not of the same standard and set out.

Moral: discuss everything clearly with the neighbours and work to the appropriate Standard and Specifications.

9. Pavement Marking Materials

As has been stated previously, the materials should comply completely with the relevant Specification and should be accompanied by the appropriate test certificates. Another paper at these seminars deals with specifications and other factors in a contract situation. Also stated previously has been the recommendation that the materials used be matched to the expected life of the device – lower grade materials are generally satisfactory for temporary devices, long-life materials for permanent devices or where there is a high wear rate. If the materials have been used elsewhere and the markings are proving to be unsatisfactory, it is best to consider changes to ensure that dependable and cost effective materials are used.

In most cases, the use of raised pavement markers are a good enhancement to the white markings and are frequently used. However, there are some types of larger markers that do not perform well (adhesion problems where traffic frequently strikes them) or possibly cause damage to vehicles or cause them to be thrown off track. One “must watch” item here is the requirement to ensure that these larger markers are not required to adhere to a painted line, as there is often a danger that the paint adhesion to the surface may fail, or the adhesive itself may fail. This may cause a local widening of a painted median to accommodate these if positioned in the centre of the road. Is there sufficient space for vehicles to safely negotiate past such a widened median?

The asset owner for the work will often be approached by the applicator or a representative of a supplier to use a particular product. A complete investigation should be made of the claims for a change, including a visit to where it has been applied previously. Don't rely on the word of an interested party – information can be “slanted” to tell a particular story. Visit the site yourself. Ask also for sites where the product may not have been as successful as it should have been and visit them as well – there may well be good reasons for a lack of performance that have nothing to do with the product. Best of all, visit the sites at night.

New products often have different influences on a particular site as compared to previously used materials. These require to be checked. For example, the use of different edge lines (say profile materials) may have an effect not previously considered - noise, while some asphalt materials may react with cold applied plastics causing a lack of curing. In the case of raised pavement markers, the use of a large reflective "sail" may cause confusion with the background, or it may just simply be what the site requires. But above all, the message to the motorist by day and night must be clear, unambiguous and effective.

10. State Road Authority vs Local Council Traffic Committee

Apart from the potential difference in Specifications between the State Road Authority and Local Government addressed earlier, there is also a possible conflict between the State Road Authority requirements and the local council Traffic Committee. Again this is an area that has to be carefully considered, particularly where an LATM scheme may be in close proximity to a State Road Authority controlled road. It is essential that signage and pavement marking is consistent and that it functions correctly.

11. Removal of redundant markings

One of the major complaints from motorists concerning traffic devices (and all roads for that matter) is the proliferation of redundant linemarking including "blacked-out" lines that have become visible again or the lighting conditions showing the "blacked out" line as an existing line. Where lines and markings are redundant, they must be totally removed to prevent confusion. Other papers address the removal subject, so it will not be dwelt on again here.

However, it is also important to reinstate any markings that may be obliterated and which form part of the final scheme. Maintenance carried out, even by other authorities or during resealing should allow for the markings for be reinstated quickly after work is finished so that the device returns to complete effectiveness.

12. Contractors and applicators

The crew carrying out the application of the pavement marking should be skilled in the work to be performed. An unskilled crew may not interpret the plans correctly, and worse, may place the markings in the wrong locations or in a manner that may cause accidents. Adequate traffic control should be used, and preferably a traffic control plan for the work. Most State Road Authorities now insist on the use of traffic control plans together with accredited traffic control personnel. Many suburban roads are busy enough to warrant these same requirements for any work.

It is of vital importance that the contractor or crew carrying out the pavement marking should be reliable (attending site when required at the appointed time) and have the correct equipment for completion of the work. Several instances have been noted where the linemarking truck is driven "against the traffic" to apply left hand lines as the equipment is only fitted to the driver's side of the vehicle. Suitable equipment also means having vehicle mounted equipment for areas where pedestrian equipment will not provide the correct result or is inappropriate such as long stretches of road for applying centre or edge lines.

Materials to be used are addressed in other papers, however, the equipment used must be appropriate, and particularly for pedestrian equipment where the surface applied glass beads are often placed in the manner that has been described as "feeding the chooks".

Contractors and applicators that work WITH the client rather than FOR the asset owner will usually produce a more mutually satisfying and professional result. Working with the asset owner will enable issues to be discussed and resolved before they become a headache.

As part of the auditing process, the asset owner should ensure that the correct markings have been applied in the correct positions. Again, opportunities for mistakes are reduced if the set out/spotting of the markings is inspected prior to application of the final work. At the set out/spotting time, it would also be possible to ensure that the work proceeds efficiently. An example of this would be the use of a “cone” end at the end of a painted median, rather than a “bull nose”. The former may be applied by vehicle-mounted equipment as part of the longitudinal works, while the latter would generally be applied as a separate operation with pedestrian equipment at an extra cost.

Also it is essential for the designer to ensure that the equipment available can apply the markings required. Truck mounted equipment is unlikely to apply a circle of very tight radius for example.

One question frequently asked is “when to install the markings” Many asset owners now ask for the bulk (if not all) of the pavement marking to be applied before any other work commences at the site. If this is able to be done, it does offer greater safety to motorist and worker alike.

13. Maintenance Budgets and Asset Information

It goes without saying that once the device is constructed, even if it is simply application of speed numerals or stop/holding lines, maintenance will be required at some point. There have been many occasions when funds have been provided for the construction of a device, however, no increase in the maintenance budget has been allowed for. With the division of responsibility in many areas today, this becomes increasingly difficult to alleviate, however, it is something that must be taken into account.

While not fully on the subject of pavement marking, maintenance costs may be simply removing weeds from beside concrete, or trimming the proliferation of planted vegetation that exists on some roundabouts, splitter islands and medians. The author has noted that there are occasions when the flowers planted on a splitter island have obscured the concrete outline, and even the painted lines and raised pavement markers. This is not effective pavement marking.

To aid the various personnel in budgeting for the maintenance on LATM devices, an up to date asset system should be kept, and this should include such information as plans, products used, remarking intervals, sign life and replacement history. In his paper “The Needs of the Local Government Customer”, Ian Monaghan comments: *“I am sure that there are many people involved who do not know where to find the original warrants that led to the installation of a line, sign or facility and identifies the approved marking for a location that must be maintained. It must improve road safety if maintenance times do not include excessive time to identify what must be replaced.”*

14. Inspections

The paper “Pavement Marking Specifications – What to Look For” details the inspections during the pavement marking application process. Further to these, however, should be inspection of the site in daylight, at night and in inclement weather prior to commencing work, the set out/spotting of the markings, and an inspection immediately at the conclusion of the work. This latter inspection should include a nighttime “drive through” to ensure that the messages being conveyed are as equally visible at night as during the day. Any problems that arise can be solved at each of these inspections.

Following completion of the work, regular inspections should take place in all light and weather conditions to ensure that the device is functioning as designed. Over time, maintenance matters will be noted, and these should be attended to as quickly as possible to prevent any problems getting worse, or to prevent compromise to the safety aspects. It has been noted that frequently other bodies such as electricity, gas or telecommunications may work in proximity to

the device, and may cause damage, particularly in the event of excavation and surface reinstatement. Where this occurs and markings are removed or obliterated, it will be necessary to reinstate these urgently or to make arrangements for some form of temporary replacement.

15. Legal Obligations

Three aspects of this must be considered:

- The legal obligation for any design faults, omissions or faulty installation/application. In New South Wales, for example, it is illegal to cross a painted median even to turn into a driveway. What then of a LATM scheme that causes motorists to cross such a median to turn into a squash centre and church?

What is the legal situation concerning a Slow Point inadequately delineated and signed when a vehicle proceeds straight ahead (no deviation) and knocks over a pedestrian or collides with a parked car?

While it is agreed that the more markings and signs applied at a device cause more construction and maintenance costs, there is a time when adequate attention must be given to the clear and unambiguous delineation. This must include the total removal of redundant lines and the application of high quality markings and markers.

- Materials used on LATM schemes should comply with the relevant Australian Standard or Specification. If they don't and there is a failure or an accident, the legal practicalities will be expensive to unravel.
- The final aspect relates to maintenance of the device, including any markings. Whose liability is it when markings deteriorate to a point where they are ineffective during the day, let alone at night? We don't have to drive very far to see this situation, obviously caused by the pressures of the ever-shrinking funds available for maintenance. Is it worth the cost of finding out in court? For a relatively small sum, the markings can be again made effective.

16. What Can We Do To Improve?

Over the years, many devices have originated, and often these are "modified" on site because of conditions or due to factors such as the concreter having only certain types of formwork available, "lets finish the job and get out of here quickly" attitudes, cutting corners, lack of thought, or simply a "I don't care attitude". How many times have we seen sharp edges to the concrete finish where no finishing tool has been used to provide a neat, professional and less damaging finish to an edge?

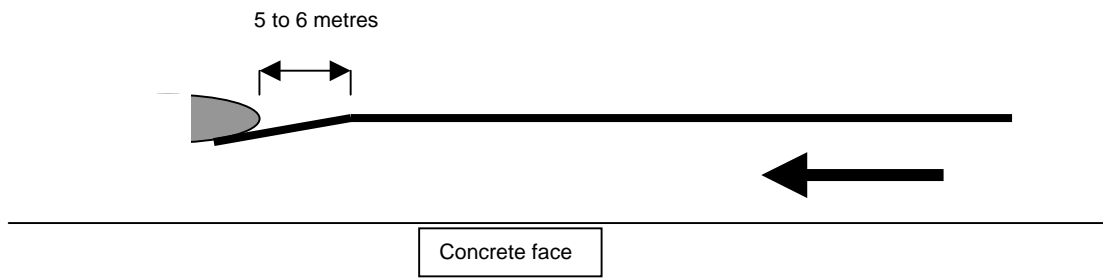
But there are some issues with pavement marking as well:

- On many occasions, the transition or deflection length is curved over the last 5 or 6 metres on the centreline approach to a splitter island. In some locations, this is not curved at all and runs to the centre of the island. In other locations, for example on a curve, there may be a "case" to "flatten" the curve or re-examine the location of the pavement marking. A gentle curve, correctly positioned will provide motorists with a guide to the lateral placement on their road and clear of the concrete islands. At night, reflective raised pavement markers enhance the visibility.

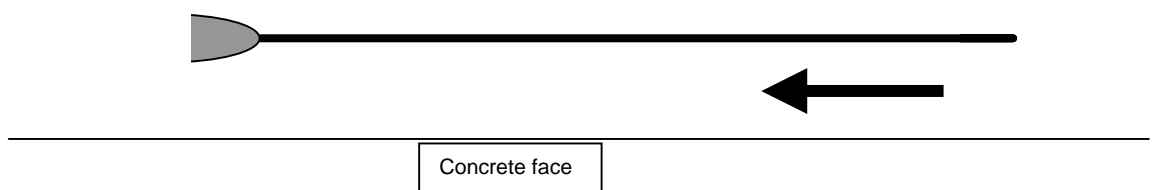
Preferred



Not

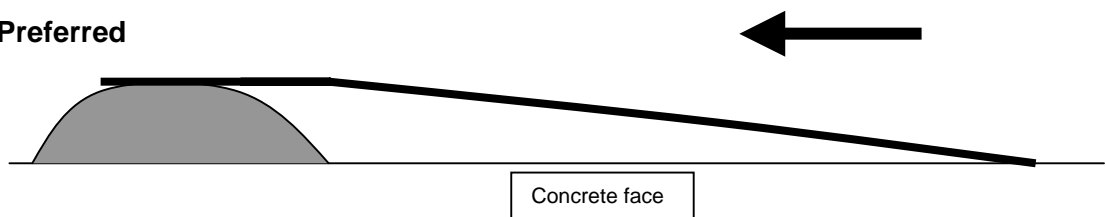


Or

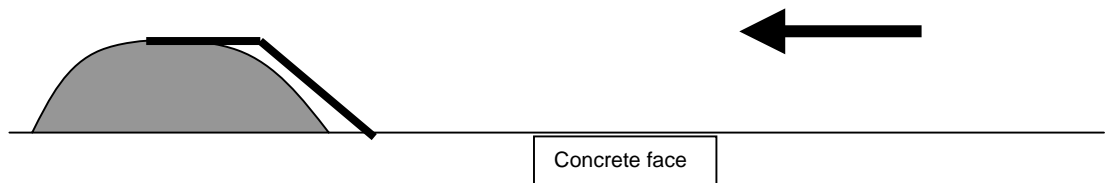


- The curvature of the pavement marking to the outside of concrete islands (and of sufficient width to retain clearance to any “rumble bars”) is as important as the alignment of the centre lines to the splitter islands.

Preferred



Not



- Where concrete islands such as splitter islands and pedestrian refuges occur, it is important to run the pavement marking to the “traffic” side of the island to guide the traffic. Examination of many concrete islands within LATM devices will show how vehicles are striking them, as the guidance is not correct. The markings must provide sufficient clearance to allow safe travel.
- It is usually important to extend the pavement marking to provide the motorist with a greater length of line to provide more gradual and safer guidance. Often devices are placed on crests, or just over the crest, or with other restricted sight distance. In these situations, the pavement marking is of vital safety importance. The illustrations above also show these lines extended. These situations can be usually resolved on site before application once all the conditions can be seen “in-situ”.

- We often see LATM devices (for example pedestrian refuges) placed near an intersection. At these locations, it is then often necessary to break the pavement marking across the intersection, which in turn disrupts the alignment that the motorist is following. Great care is needed where this occurs if other conditions such as sight distance restrictions occur, and it may be necessary to re-locate the complete device to a more suitable location.
- Often, better information can be provided to the driver by the use of wider lines. In the NSW scene, Double Barrier centre lines of 80mm width are often used on the approach to LATM devices. In many situations, the delineation would be far more effective if a single 200mm wide line had been used.
- Combined with signs, there are often times when the information conveyed to the motorist is far too great to be absorbed in the very short period available as an LATM device is approached. Recently the author noted 7 different signs on the immediate approach to a raised platform pedestrian crossing, together with a school zone marking and other markings on the pavement.
- Perhaps the biggest issue with pavement marking and LATM's today is the lack of maintenance to the marking. The signs may be replaced because they have been damaged, but frequently the markings are left untouched. It is quite possible that some of the damage is occurring because the motorist is getting the incorrect message from the markings. It is reasonable to say that if there are tyre marks on the faces of the concrete, over the concrete, or the signs have been damaged, there is either some maintenance required to the markings, or the markings need re-adjustment.

17. What Else is There?

Recent years have seen the application of coloured materials as bus lane or cycle lane delineation, pedestrian crossings and as LATM thresholds. Many applications of a cold applied plastic material have been made to resemble brick paving etc. In some cases, coloured concrete materials have also been used. Care should be taken with any materials mentioned in this section to ensure that the materials and surfaces are compatible, and that the appropriate effective message is provided to drivers.

Overseas there has been a trend to eliminate maintenance items by using various materials to provide a seamless, jointless surfacing. Often they are hot applied and provide excellent durability with minimal, if any maintenance and accept pavement marking well.

One product of interest in this area in the U.K. but not yet in Australia is "Rippleprint" , a traffic calming surface that provides an audible and tactile warning to the driver while being virtually silent to nearby people. This is not strictly a pavement marking product, but is a surfacing applied over the entire surface of the road using a sinusoidal profile with specific profiles to achieve the desired effect. Pavement marking can also be used with this to give the appearance of road narrowing or to highlight speed zones.

In the UK, another product known as "Colourbright" has been introduced as reflective coloured surfacing. Previously, coloured surfacing was non reflective at night and thus the benefits of the colouring have been generally lost. In the case of Colourbright, clusterbeads in red, green, yellow and white reflect the headlight beam back to the driver as coloured light. This product has been used for traffic calming and delineation adding to the road safety tools available to our industry.

CONCLUSION

The purpose of markings used in LATM devices is to assist drivers and pedestrians to travel safely by providing consistent, effective and unambiguous delineation.

The construction of LATM schemes must be constantly under review and not static. This should include all aspects of the physical construction, with particular attention to the pavement marking to ensure that users are being provided with the correct message.

The construction and maintenance of these to high standards requires attention from all involved. Working together, we can all benefit.

The quality of maintenance works on LATM devices has deteriorated, particularly in relation to the maintenance of the white pavement marking and the reflective raised pavement markers. This requires urgent attention to ensure safety to users.

Travelling home tonight through LATM schemes, objectively assess their message.

References:

“The Needs of the Local Government Customer”
Ian Monaghan

“Making the Lines Fit the Road”
Ian Monaghan

“Is the Design Practical?”
Nick Phillips

Tasman Associates Pty Ltd is a specialist consultant operating in the areas of road and bridge maintenance and construction, with special emphasis on delineation aspects of rural and urban roads. Our personnel have been involved with the preparation of a Performance Based Specification for Pavement Marking for Australian and New Zealand Road Authorities, as well as the preparation of reports on pavement marking and signage condition, preparation of specifications and contract documentation, supervision of the application of pavement marking and retroreflectivity measurements and interpretation.