Technical Note 155

Wide Centre Line Treatment – Interim Advice

April 2017
1 Purpose of Technical Note

This Technical Note provides interim guidance on the utilisation of a Wide Centre Line Treatment (WCLT) together with audio tactile line marking (ATLM) (where required) to establish a uniform state-wide application for this treatment. The information in this technical note is additional to that in the Transport and Main Roads Guidelines for Road Design on Brownfields Sites and supersedes some of the information within that document.

2 Background and Objective

A WCLT is a ‘widened’ dividing line, including audio tactile line marking where applicable. This treatment provides additional separation between vehicles travelling in opposite directions to improve safety, in particular reducing the potential for head on crashes.

The use of the WCLT together with ATLM, as shown in Figure 2, has demonstrated a substantial reduction in the number of crashes on higher volume two-lane rural roads. In particular the use of a WCLT on 10.0 m and 10.5 m wide sealed carriageways in high speed areas is considered to be a viable alternative that reduces the crash potential for a wide range of traffic volumes. In these circumstances, it may be appropriate on existing roads to sacrifice some lane and shoulder width to achieve a WCLT.

The reduction in potential cross-centreline crashes must be weighed against the potential for increased run off road crashes.

Figure 2 - Wide Centre Line Treatment with audio tactile line marking

It is understood that painted islands used as medians have different road rules associated with them compared to a WCLT. Furthermore, installation (now or in the future) of a barrier system in the middle of a WCLT changes the treatment from WCL to median. Therefore, to avoid confusion this technical note will only provide guidance on a WCLT.
3 Application

The implementation of WCLT standards should consider all the benefits and costs of the particular application for a network or link in the context of the above objectives. The timing of the implementation at specific locations should also consider the remaining life of the existing asset and to coordinate any enhancement (such as widening seals) with rehabilitation or programmed maintenance activities thereby achieving improved delivery efficiency.

Therefore any decision to implement the WCLT should be made on a network or link basis and should consider maximising the rollout of WCLT and delivery cost effectiveness of enhancement work at specific locations.

Where road widening or shifting the edge line out is required to implement WCLT, consideration should be made to the impacts to existing roadside amenities such as parking and bus bays, designated cycle routes, turning paths to accesses and intersections, clearance to street light poles, offsets to roadside barriers and sign posts, hazards within the new clear zones, working widths to structures and impacts to drainage (flood afflux, structure ends, aquaplaning).

Furthermore, existing pavement configuration should be checked as treatments move the wheel paths (and loadings) of vehicles wider on the carriageway. This also applies to certain bridge structures (in particular those with cantilevered piers).

4 Dimensions and Design of a WCLT

Minimum length of WCLT

The minimum length that a WCLT should be installed over is 2 km (inclusive of intersections and other structure treatments).  

Cross section of WCLT

The dimensions related to WCLT and application of ATLMs is detailed in Table 4.1 below.

Table 4.1 - WCLT Dimensions and ATLM Application

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>WCLT(1)</th>
<th>ATLM</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 km/h and greater</td>
<td>1.0 m</td>
<td>Yes</td>
</tr>
<tr>
<td>70 – 80 km/h</td>
<td>0.8 m</td>
<td>No</td>
</tr>
<tr>
<td>60 km/h</td>
<td>0.6 m</td>
<td>No</td>
</tr>
</tbody>
</table>

Notes to Table:
1. WCLT is width between the centres of the lines at either side of the treatment.
2. ATLM to be applied if section is immediately adjacent to a 90 km/h or higher speed zone (transitioning drivers between high and low speed zones) or there is a history of fatigue related crashes.

It is important to note that the WCLT widths above are based on providing similar travel times across the treatment. Other factors such as driver behaviour and driver’s perception to determine when a vehicle will not return to the correct side of the road has not been considered and further research is required.

Recommended dimensions for road cross sections incorporating a WCLT on a straight section of road with posted speeds of up to 110 km/h are detailed in Table 4.2 for Normal Design Domain (NDD), and
Table 4.3 for Extended Design Domain (EDD). These dimensions supersede advice provided in the Transport and Main Roads Guidelines for Road Design on Brownfields Sites, July 2013.

On horizontal curves, the road cross-section should also include the need for curve widening to accommodate large vehicles.

The cross sections in Tables 4.2 and 4.3 represent the minimum WCLT cross-section based on general road use only. Where the sealed shoulder is used for other purposes such as for cycling (for example on the Principal Cycle Network (PCN) or as part of other cycle networks), for parking and so on, the shoulder widths in Tables 4.2 and 4.3 should be extended to accommodate these requirements. The appropriate sealed shoulder widths for these requirements are detailed in the Road Planning and Design Manual. Particularly on the PCN, the department's policy requires explicit provision for cycling on PCN routes and that this will affect the applicable minimum seal widths.

Table 4.2 - Normal design domain cross section for a WCLT - two lane, two way roads

<table>
<thead>
<tr>
<th>Design AADT</th>
<th>Vehicle routes</th>
<th>Sealed Shoulder Width (m) (2)(3)(4)</th>
<th>Lane Width (m) (1)</th>
<th>WCLT (m)</th>
<th>Total Seal Width (m) (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 - 4000</td>
<td>All vehicles up to B-double</td>
<td>1.75</td>
<td>3.25</td>
<td></td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>Type 1 Road Train</td>
<td>1.50</td>
<td>3.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 2 Road Train</td>
<td>1.25</td>
<td>3.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 4000</td>
<td>All vehicles up to B-double</td>
<td>1.75</td>
<td>3.25</td>
<td></td>
<td>11.0(5)</td>
</tr>
<tr>
<td></td>
<td>Type 1 Road Train</td>
<td>1.50</td>
<td>3.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 2 Road Train</td>
<td>1.25</td>
<td>3.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All vehicles up to B-double</td>
<td>2.00</td>
<td>3.25</td>
<td></td>
<td>11.5</td>
</tr>
<tr>
<td></td>
<td>Type 1 Road Train</td>
<td>1.75</td>
<td>3.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 2 Road Train</td>
<td>1.50</td>
<td>3.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer Notes below Table 4.3.
Table 4.3 - Extended design domain cross section for a WCLT - two lane, two way roads

<table>
<thead>
<tr>
<th>Design AADT</th>
<th>Vehicle routes</th>
<th>Sealed Shoulder Width (m)</th>
<th>Lane Width (m)</th>
<th>WCLT (m)</th>
<th>Total Seal Width (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 - 4000</td>
<td>All vehicles up to B-double</td>
<td>1.25</td>
<td>3.25</td>
<td></td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td>Type 1 Road Train</td>
<td>1.00</td>
<td>3.50</td>
<td></td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Type 2 Road Train</td>
<td>1.00</td>
<td>3.75</td>
<td></td>
<td>10.5</td>
</tr>
<tr>
<td>&gt; 4000</td>
<td>All vehicles up to B-double</td>
<td>1.25</td>
<td>3.25</td>
<td></td>
<td>10.0(5)</td>
</tr>
<tr>
<td></td>
<td>Type 1 Road Train</td>
<td>1.00</td>
<td>3.50</td>
<td></td>
<td>10.5(5)</td>
</tr>
<tr>
<td></td>
<td>Type 2 Road Train</td>
<td>1.00</td>
<td>3.75</td>
<td></td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>All vehicles up to B-double</td>
<td>1.50</td>
<td>3.25</td>
<td></td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Type 1 Road Train</td>
<td>1.25</td>
<td>3.50</td>
<td></td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>Type 2 Road Train</td>
<td>1.25</td>
<td>3.75</td>
<td></td>
<td>11.0</td>
</tr>
</tbody>
</table>

Notes to Tables 4.2 and 4.3:
1. In situations with more than one lane in a single direction, the lane width is the same for all lanes.
2. In situations with an auxiliary lane, a shoulder width of 1.0 m is often satisfactory. This width should be increased in areas of restricted visibility (e.g. around curves or safety barriers are present) and in the merge area at the end of the lane.
3. These shoulder widths are not sufficient to meet the specific requirements for cycling or other uses of the sealed shoulder. Where the route is part of a cycle network, additional sealed shoulder width needs to be included above that detailed.
4. The sealed shoulder width is the width to be provided where road safety barriers are not present. Where a road safety barrier is present and is less than 1 km in length, this width represents the clear width from the centre of the edge line, to the front face of the barrier. Where a road safety barrier is present and is greater than 1 km in length (continuous barrier, no break of 100 m or more, or a pull-off bay provided), this width is insufficient and needs to be increased to 3.0 m minimum. In both cases, the sealed shoulder width in these circumstances does not include any part of the shoulder / verge located behind the face of the barrier (supporting the barrier system).
5. These cross sections should only be used on roads in cuttings, or low embankments or where the batter slope is not steeper than 1V:4H. If roadside barriers are used, additional verge width should be applied to accommodate the barrier.
6. Total seal width is based on 1.0 m WCLT. Total width will reduce if speed zone is less than 90 km/h and utilises a reduced width WCLT (Table 4.1).

Retrofitting to seals wider than specified for NDD or EDD

The dimensions presented in Tables 4.2 and 4.3 are the minimum requirements. Where the existing seal width is in excess of the required width, the additional width should be used to widen the sealed shoulders above the minimum listed. For example; an EDD situation (Table 4.3) on a B-double route, AADT of less than 4000, posted speed of 100 km/h and an existing seal width of 10.5 m, the additional width (0.5 m) over the EDD requirements should be utilised to widen the shoulders to 1.50 m wide.
5 WCLT at intersections

Figures 5.1 (CHR type) and 5.2 (BAR / BAL type) provide examples of how a WCLT is applied at intersections.

For CHR / CHR(s) intersections

Where double barrier line is to be applied in conjunction with chevron painted island (right turn intersections), Figure 5.3 shows the transition between double barrier line / painted island / WCLT.

For BAR intersections

With reference to Austroads Part 4A: Basic right (BAR) turn treatment on a two-lane rural road, dimension ‘C’ should be measured from the nearest side of the WCLT for NDD and EDD. This is to allow following vehicles to manoeuvre left to pass the vehicle turning right from within the through traffic lane. It cannot be assumed that turning vehicles will use the WCLT ‘space’ (even if permitted), while waiting to turn right.

For BAL intersections

With reference to Austroads Part 4A: Rural basic left-turn treatment (BAL), dimension ‘C’ should be measured from the nearest side of the WCLT for NDD and EDD. This is to allow following vehicles to remain in the through lane and pass the vehicle turning left without entering onto the WCLT.
Figure 5.1 - WCLT at channelised right turn intersections
Figure 5.2 - WCLT at basic right turn intersections and private property entrances
6 WCLT over narrow structures

The presence of culvert headwalls or narrow structures (bridges or floodways) are to be considered when installing a WCLT due to the proximity roadside hazards can have increasing the severity of crashes.

In these circumstances, the minimum shoulder and lane widths in Tables 4.2 or 4.3 apply and should be retained through the narrow structure. Therefore, to accommodate reduced formation widths, the WCLT is to be reduced as shown in Figure 6.1 until either the existing formation width or the standard barrier line configuration is achieved, which occurs first.

The reduction of the width of the wide centre line is achieved by tapering the centre dividing lines at 0.6 m/s lateral shift either side of the localised narrowing, as detailed in Figure 6.1. The tapering of the wide centre line must be complete before the localised narrowing (for example guardrail or culvert headwalls or bridge rails) starts. This approach minimises the lateral shift of vehicles while travelling over the structure.

Successive narrow structures

Where there are successive localised narrowings (eg two or more bridges / culverts) only a short distance apart, the WCLT treatment should not be marked over the short section to avoid unusual visualisation and excessive lateral shifting of vehicles. The WCLT treatment should only be marked between successive narrowings when a minimum length of 200 m of full width WCLT can be achieved as shown in Figure 6.2.

For example, for a 100 km/h posted speed this therefore requires that the localised narrowings are at least 320 m apart to allow for the 30 m minimum straight length either side of the narrowing and the 30 m transition length.
**Figure 6.1 - WCLT transition at a narrow structure (Not to Scale)**

<table>
<thead>
<tr>
<th>Width of WCLT (m)</th>
<th>Posted Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>60  70  80  90  100  110</td>
</tr>
<tr>
<td></td>
<td>20  20  25  25  30  30</td>
</tr>
</tbody>
</table>

*WCLT Transition Lengths (m)*

30m min.

WCLT transition length (m) *

*Shift based on 0.6 m/s lateral shift and value rounded.*
Figure 6.2 - WCLT transition at successive narrow structures (Not to Scale)

Notes:
1. The width of the WCLT over the narrow bridge structure is the residual width available while maintaining the lane and shoulder widths. These widths may vary at successive structures dependent on the residual width available.
7 WCLT at overtaking lanes / climbing lanes

At locations where an overtaking or climbing lane is provided in one direction, a WCLT may be installed for sections of road shorter in length than the 2 km minimum normally required (refer Section 4 of this interim guidance). Although it is preferred to extend the WCLT to a minimum 2 km length, it is acknowledged that in these cases the additional width provides significant benefit due to the operational and safety performance of these designs.

The WCLT is transitioned at either end of the overtaking lanes or climbing lanes, as illustrated in Figure 7.1.

*Figure 7.1 - WCLT treatment at overtaking / climbing lanes (Not to Scale)*

Notes:
1. A double barrier line is required if the warrants described in Transport and Main Roads MUTCD Part 2 are met.
2. “M” and “D” are the required merge and diverge distances calculated in accordance with the Transport and Main Roads *Road Planning and Design Manual* Volume 3, Part 3
3. The WCLT Transition lengths are as detailed in Figure 6.1.
4. Dimension C is as follows (sourced from Transport and Main Roads MUTCD Part 2)

<table>
<thead>
<tr>
<th>V85</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>km/h</td>
<td>m</td>
</tr>
<tr>
<td>&lt; 75</td>
<td>36</td>
</tr>
<tr>
<td>75-90</td>
<td>60</td>
</tr>
<tr>
<td>&gt; 90</td>
<td>96</td>
</tr>
</tbody>
</table>
At either end of the overtaking lane the WCLT must extend dimension ‘C’ past the diverge / merge as detailed in Figure 7.1 as adapted from MUTCD Part 2, Figure 4.21 - Overtaking lanes on two-lane rural roads. The WCLT transition is not included in this dimension.

At overtaking lanes or climbing lanes, the lane widths in the direction with the overtaking or climbing lane are all to be the same and should be in accordance with the NDD requirements in Table 4.2 or the EDD requirements in Table 4.3. These widths are required due to the potential for design vehicles to be travelling in either lane in the section with the overtaking or climbing lane.

Where the road is a four lane section with two lanes in each direction, a WCLT is not appropriate and either a barrier or a painted median treatment should be applied.

8 WCLT signage and ATLM requirements

Signs

For WCLT sign layouts and specific sign details refer to Transport and Main Roads Traffic Control sign drawings TC1979_1 to TC1979_9.

A maximum of four signs (one for each line marking change when drivers first encounter the change) should be erected along a link between significant towns or highway junctions. They should generally not be spaced any closer than 50 – 75 km apart (in many instances they will be greater than 100 km apart).

Audio Tactile Line Markings (ALTM)

The positioning and layout of ATLM at WCLT are detailed in Transport and Main Roads Traffic Control sign drawings TC1978_1 to TC1978_3. It is important to note that the ATLMs are located offset, not on top of, the associated line marking.

During the installation of a WCLT, it is acknowledged that ATLMs (where applicable) will be marked at a different time to the marking of the WCLT due to the application of different equipment for each marking type. In some cases if a reseal of the pavement is scheduled shortly after the installation of the WCLT, the installation of the ATLMs may be deferred until after the next reseal as economically viable.

9 Design Exceptions

Where seal widths less than the widths in Table 4.3 (EDD) are considered for a WCLT, these are considered a design exception. If a design exception for seal width only is being considered, the following are recommended:

- the condition of the unsealed shoulder must be taken into consideration and there should be no edge drop between the sealed and unsealed portion of the shoulder, and

- the verge / balance area will need to be regularly maintained due to vehicles travelling closer to the verge.

Temporary treatments

A temporary WCLT implementation for a period of time, prior to associated asset enhancement works, would be considered as a design exception. In these cases, if formations are adequate and the seal width does not meet EDD requirements, designs have been implemented as a temporary solution with a WCLT with shoulders narrower than specified. This implementation has been justified for a short
term basis until later upgrade to full NDD / EDD width as part of asset rehabilitation or programmed maintenance works.

The points for consideration to support such a decision are:

- the timing for when any widening is undertaken to reduce overall network costs
- funding decisions to support maximising the length of treatment
- the early implementation of the WCLT may offer benefits in some situations, and
- the condition of the unsealed shoulder and the Road Maintenance Performance Contract (RMPC) maintenance requirements.

There may be benefits in rapid implementation of WCLT, with widening completed at the most cost effective time. This design exception must be designed, approved and signed off in accordance with the appropriate processes.

10 Widening to incorporate a WCLT

The process to be applied in widening existing seal widths less than specified in Table 4.3:

i. where sufficient formation is available, the shoulders should be widened to at least the extent of the EDD width (minimum) or preferably to NDD, and

ii. where insufficient formation is available, the formation will require widening to allow the seal to the full NDD width.

If reconstruction of the road requires formation widening, the extent of the widening should be made sufficient to ensure at least one future overlay can be applied maintaining the appropriate cross-section dimensions, unless there are strong economic reasons not to do so.

11 Future development

Contents of this technical note will be considered for incorporation into future updates to the department’s Road Planning and Design Manual.

12 References

Transport and Main Roads publication references refer to the latest published document on the departmental website (www.tmr.qld.gov.au).


Transport and Main Roads Guidelines for Road Design on Brownfields Sites, Brisbane, Australia

Transport and Main Roads Queensland Manual of Uniform Traffic Control Devices, Part 2: Traffic control devices for general use, Brisbane, Australia

Transport and Main Roads Road Planning and Design Manual, Volume 3, Part 3: Geometric Design, Brisbane, Australia

Transport and Main Roads Traffic control drawings, Brisbane, Australia