Junction Design – Conundrums for Road Safety Auditors

A Presentation to CIHT, Society of Road Safety Auditors,

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by

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Is Safety Built into UK Design Guidance?

Design Manual for Roads and Bridges

- Safety chapter in many TDs
- Safety chapter focuses on features that minimise the risk of drivers making a mistake – e.g. improve visibility to signals heads and pedestrians, improving skid resistance on high speed approaches or approaches to pedestrian facilities
- What about offenders/risk takers?

Aim

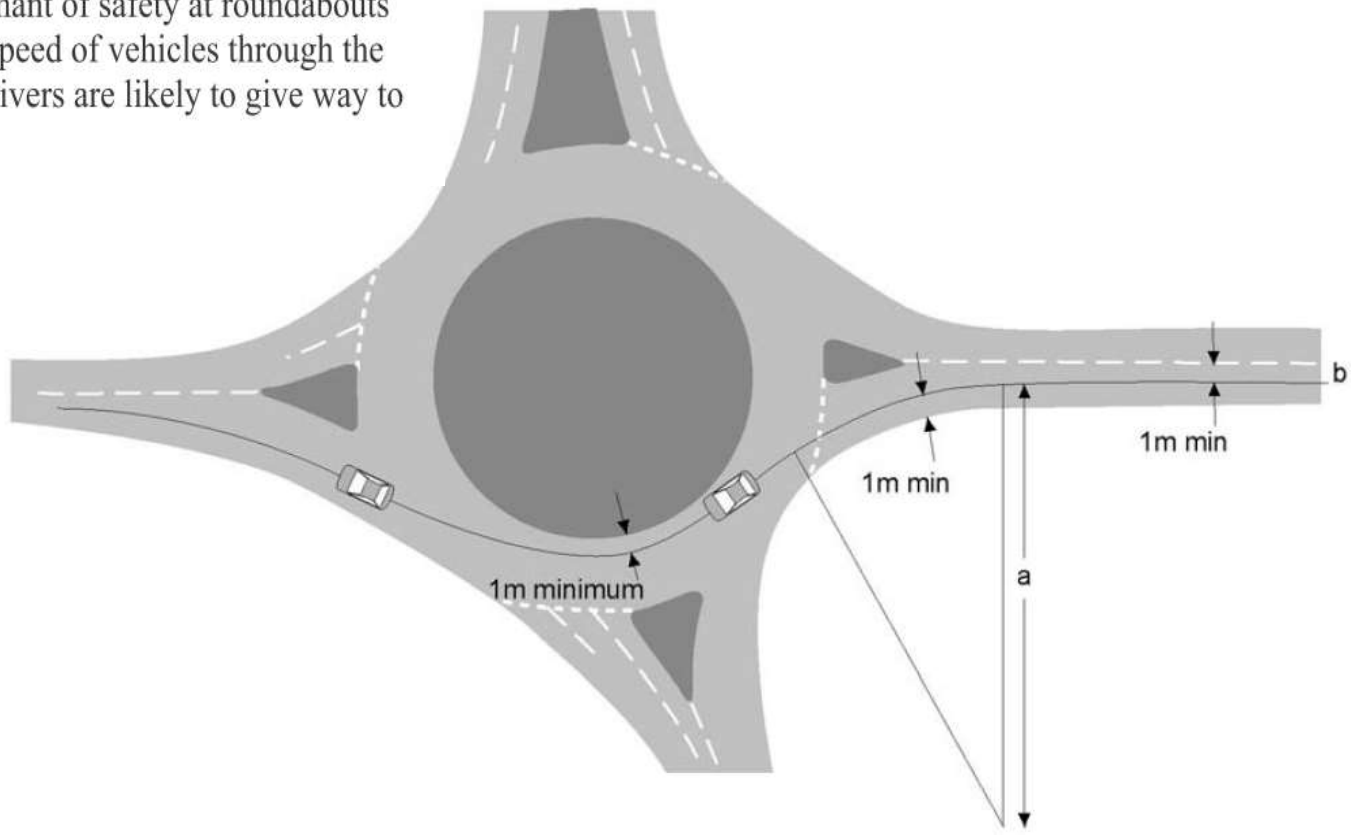
To examine and challenge some design standards and their design principles to understand how they maximise safety

To give examples that illustrate that nothing should be considered straight forward!

TD 16/07 (Geometric Design of Roundabouts)

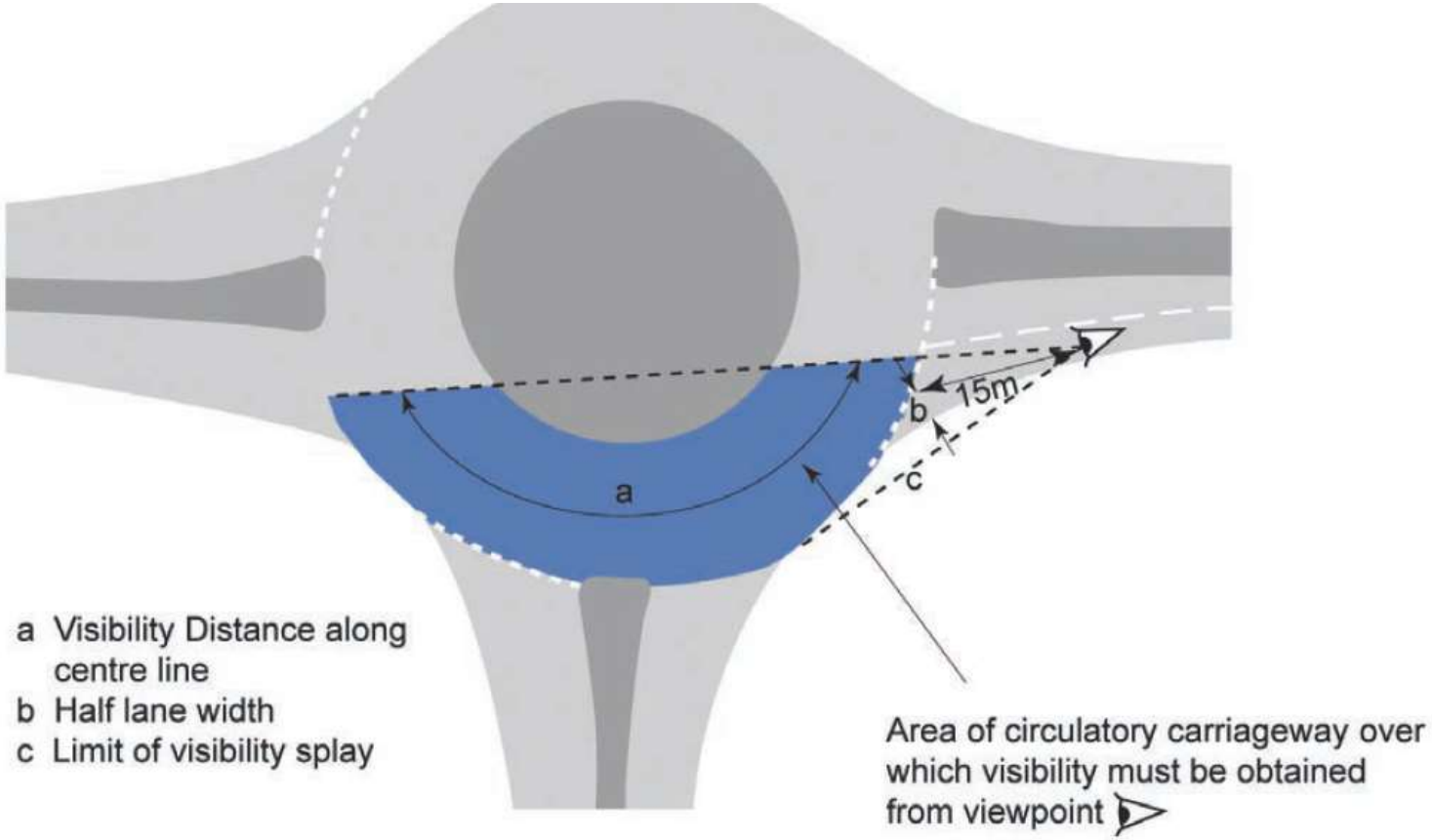
Entry Path Radius

7.51 The entry path radius (or its inverse, the entry path curvature) is a measure of the deflection to the left imposed on vehicles entering a roundabout. It is the most important determinant of safety at roundabouts because it governs the speed of vehicles through the junction and whether drivers are likely to give way to circulating vehicles.



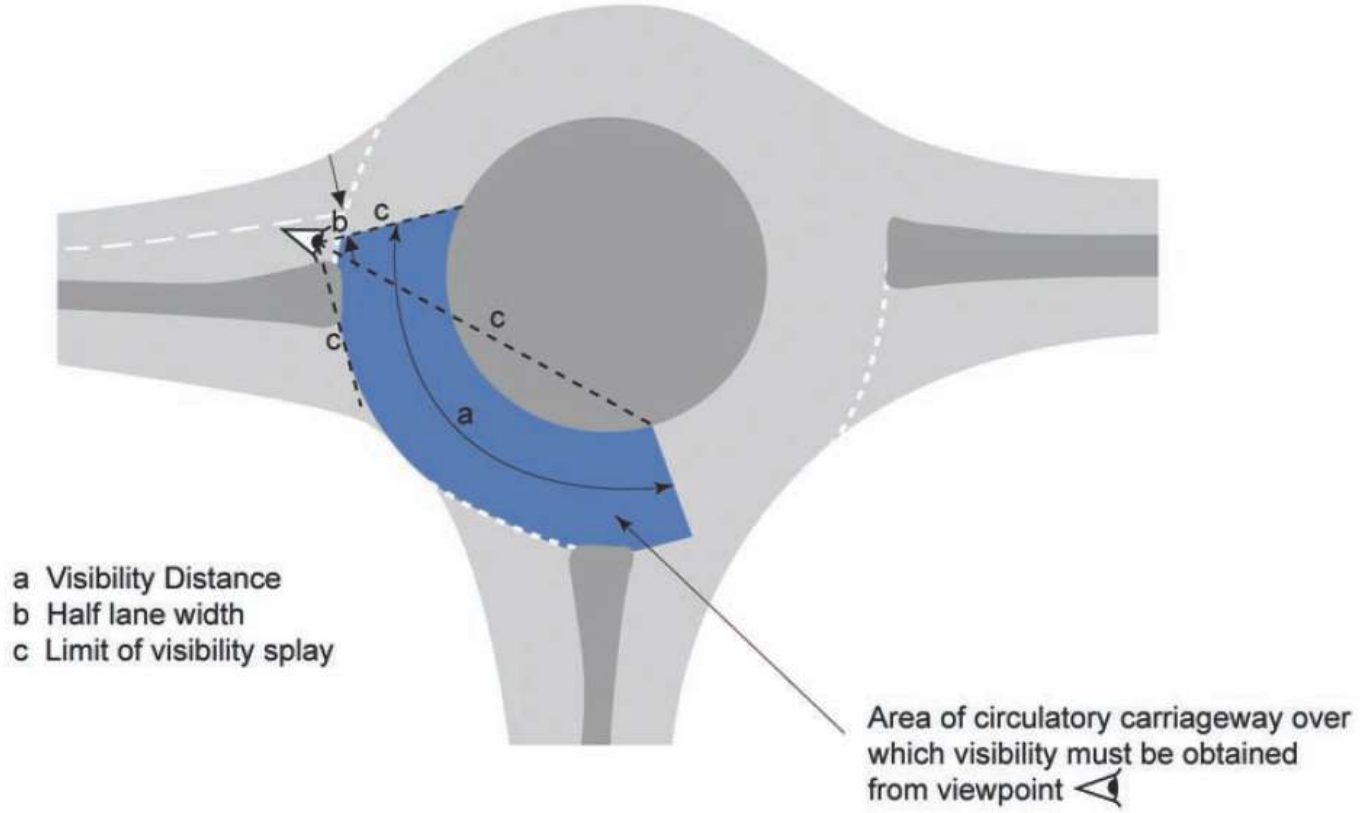
TD 16/07 (Cont)

Forward Visibility at Entry



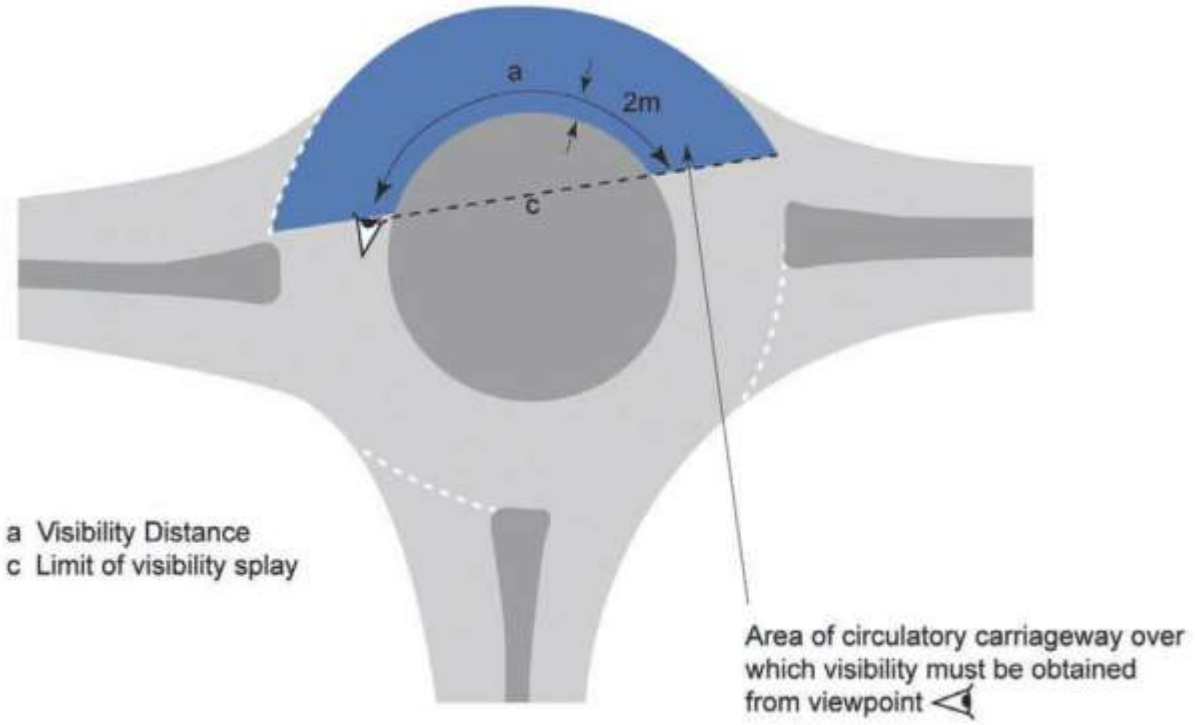
TD 16/07 (Cont)

Visibility to the Right Required at Entry



TD 16/07 (Cont)

Circulatory Visibility



TD 16/07 and TD 54/07 (Design of Mini-Roundabouts

Crossfall on the Circulatory Carriageway

Normal Roundabouts:

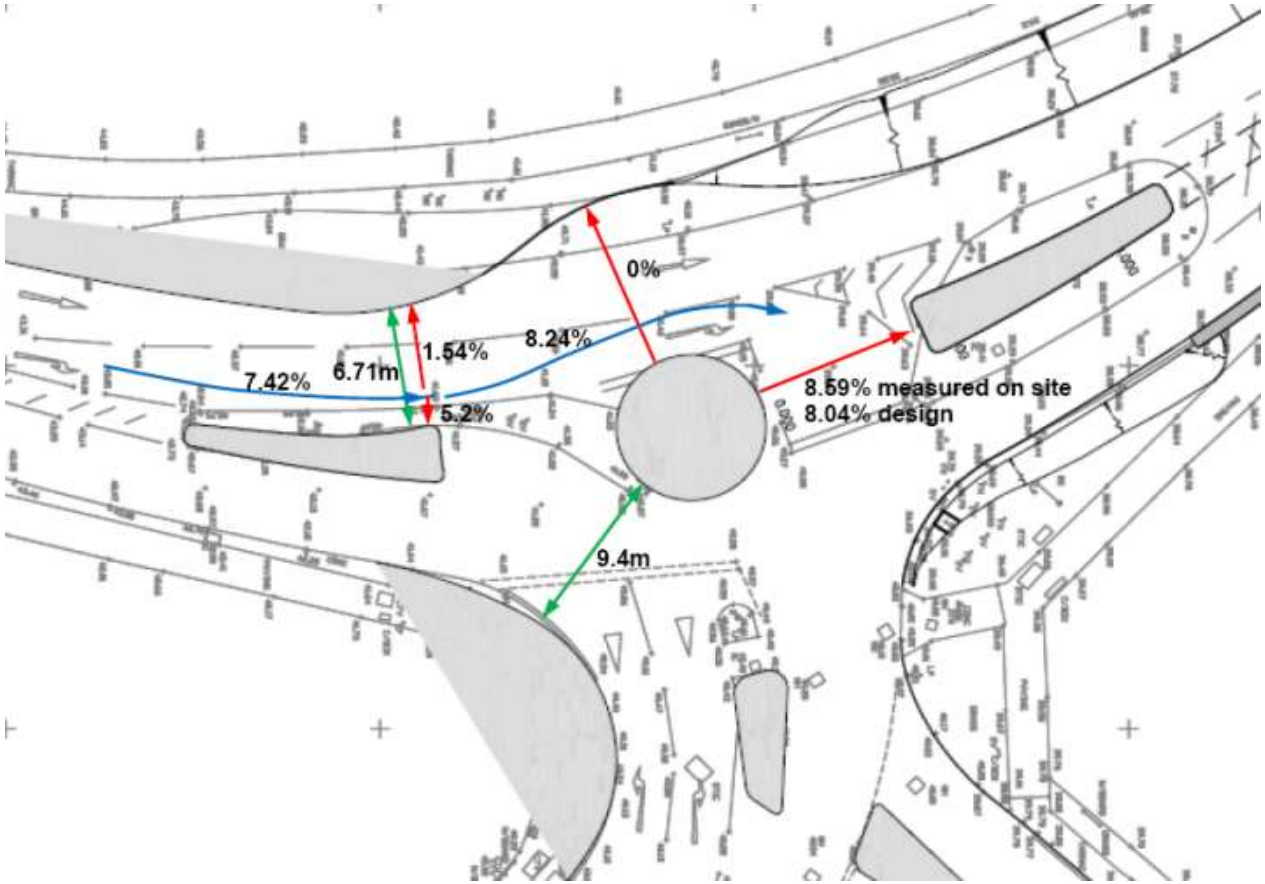
8.18 Except on large Grade Separated Roundabouts (where long sections of circulatory carriageway should have appropriate superelevation), crossfall is required to drain surface water on circulatory carriageways. The normal value is 2% (1 in 50). It should not exceed 2.5%

Mini-Roundabouts:

6.37 Mini-roundabouts have often been superimposed on the existing carriageway profile with little or no change in level. Channels, which may give the impression of a former priority junction layout, should be eliminated. Where the carriageway levels are re-profiled, crossfall towards the centre island should be avoided. Ideally, some outward sloping crossfall assists conspicuity of the junction (see paragraph 7.16).

Example – ‘Hybrid’ Roundabout on an 8% Longitudinal Grade

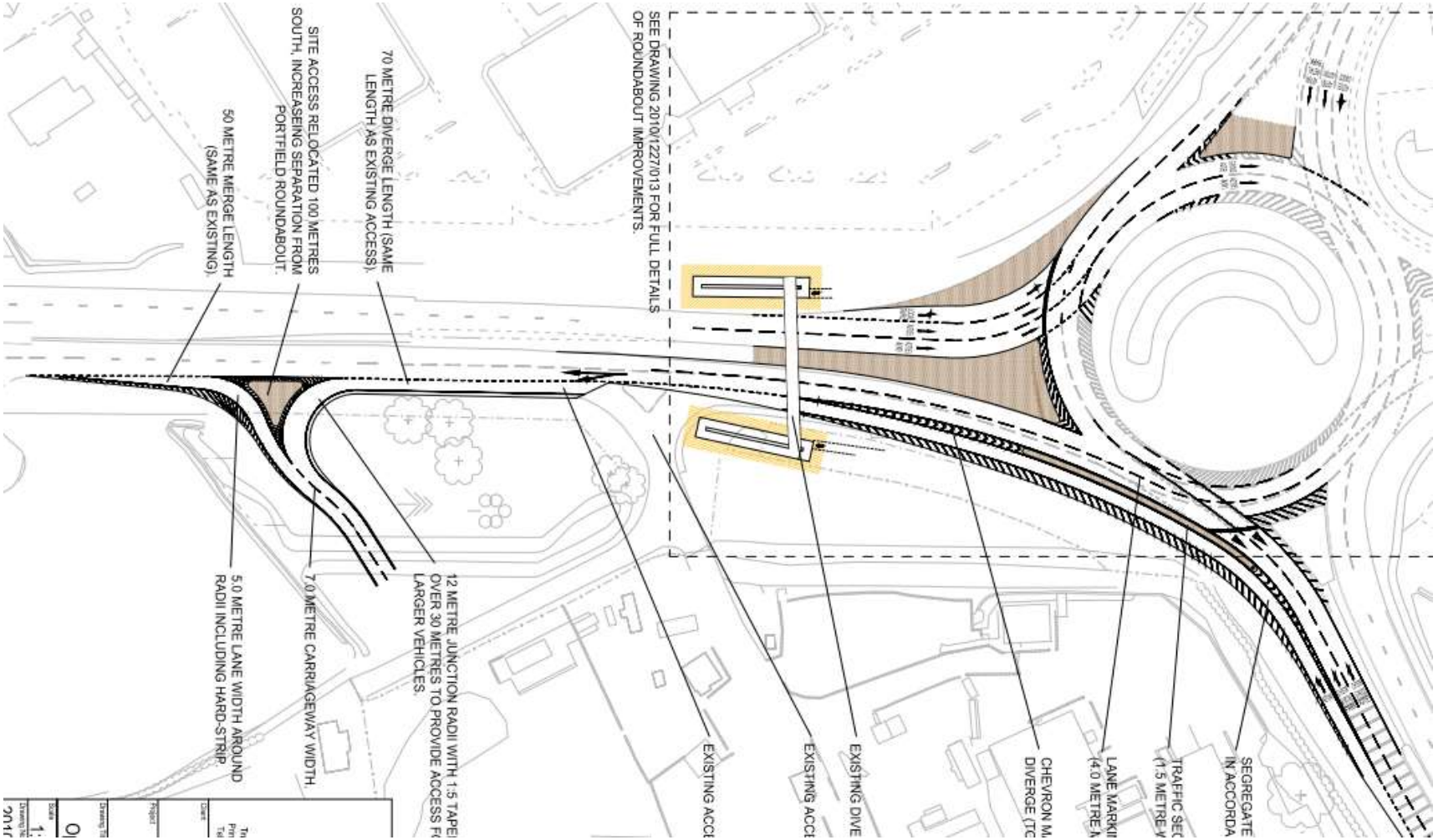
‘Hybrid’ design, 26m ICD, solid central circular island (not over-runnable)



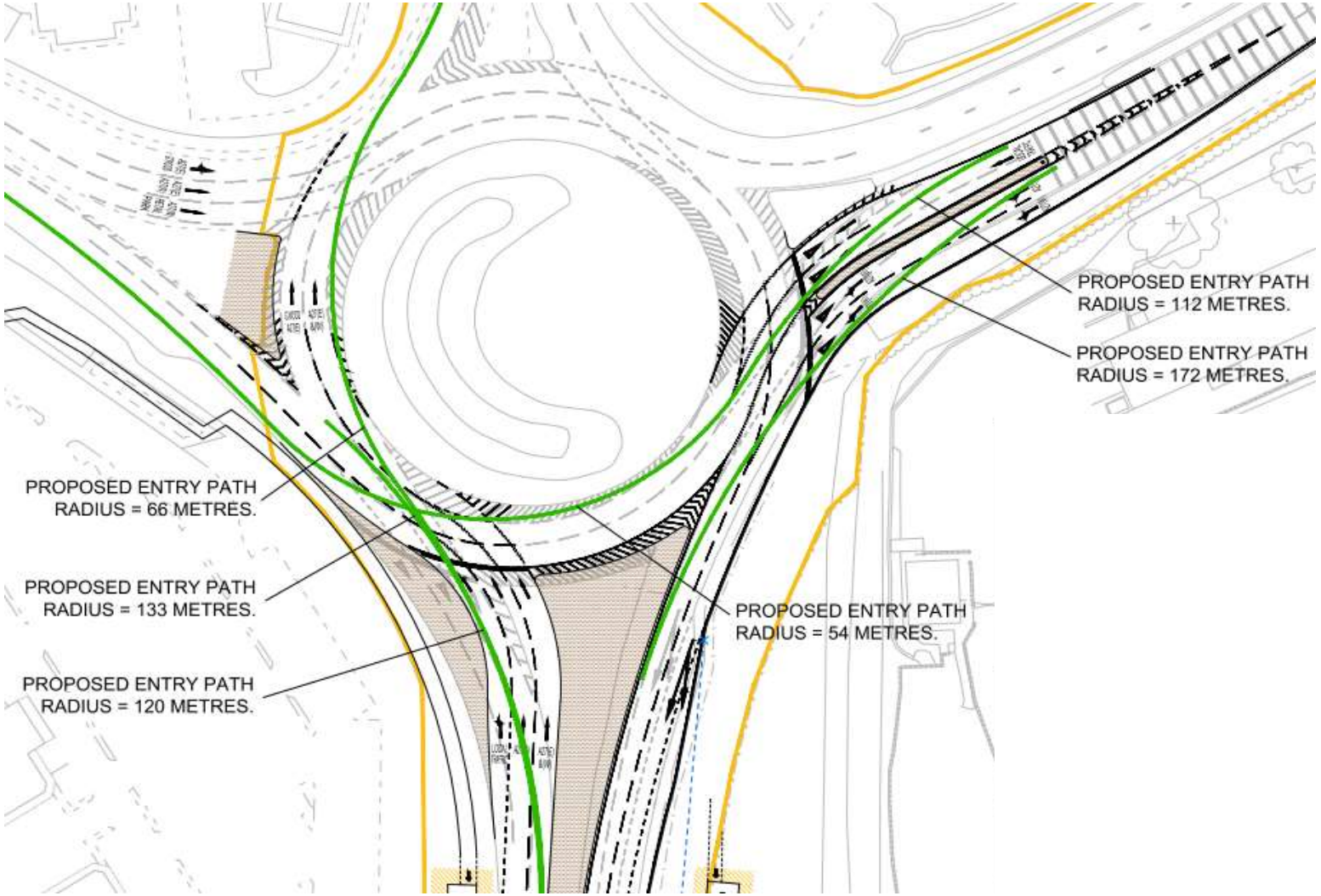
After Construction – Downhill Entry 8%

After Construction – 2.5% Adverse Circulatory

TD 51/03 - Segregated Left Turn Lane



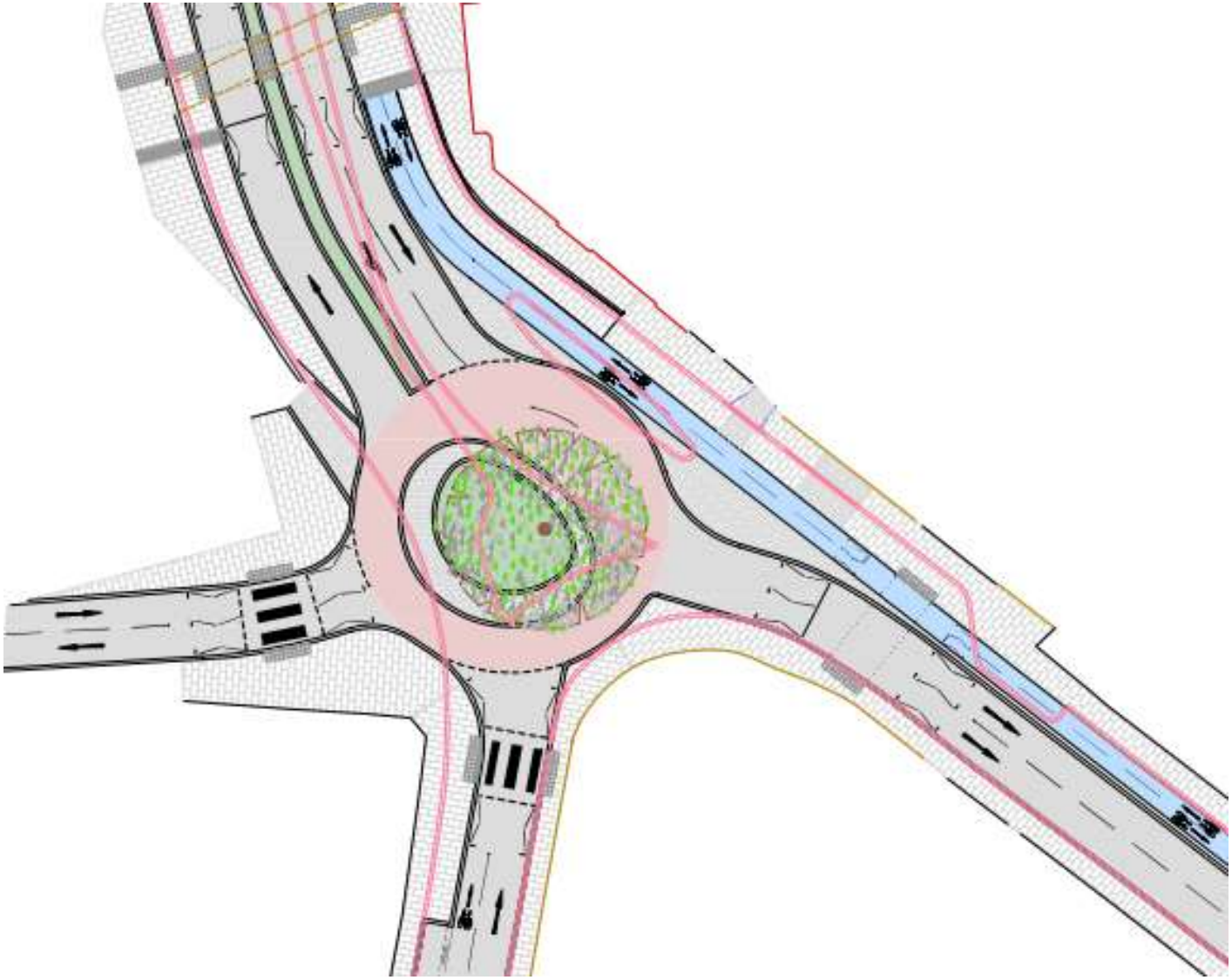
Solution – Remove Segregated Left Lane, Widen to 4 lanes and install subsidiary deflection island



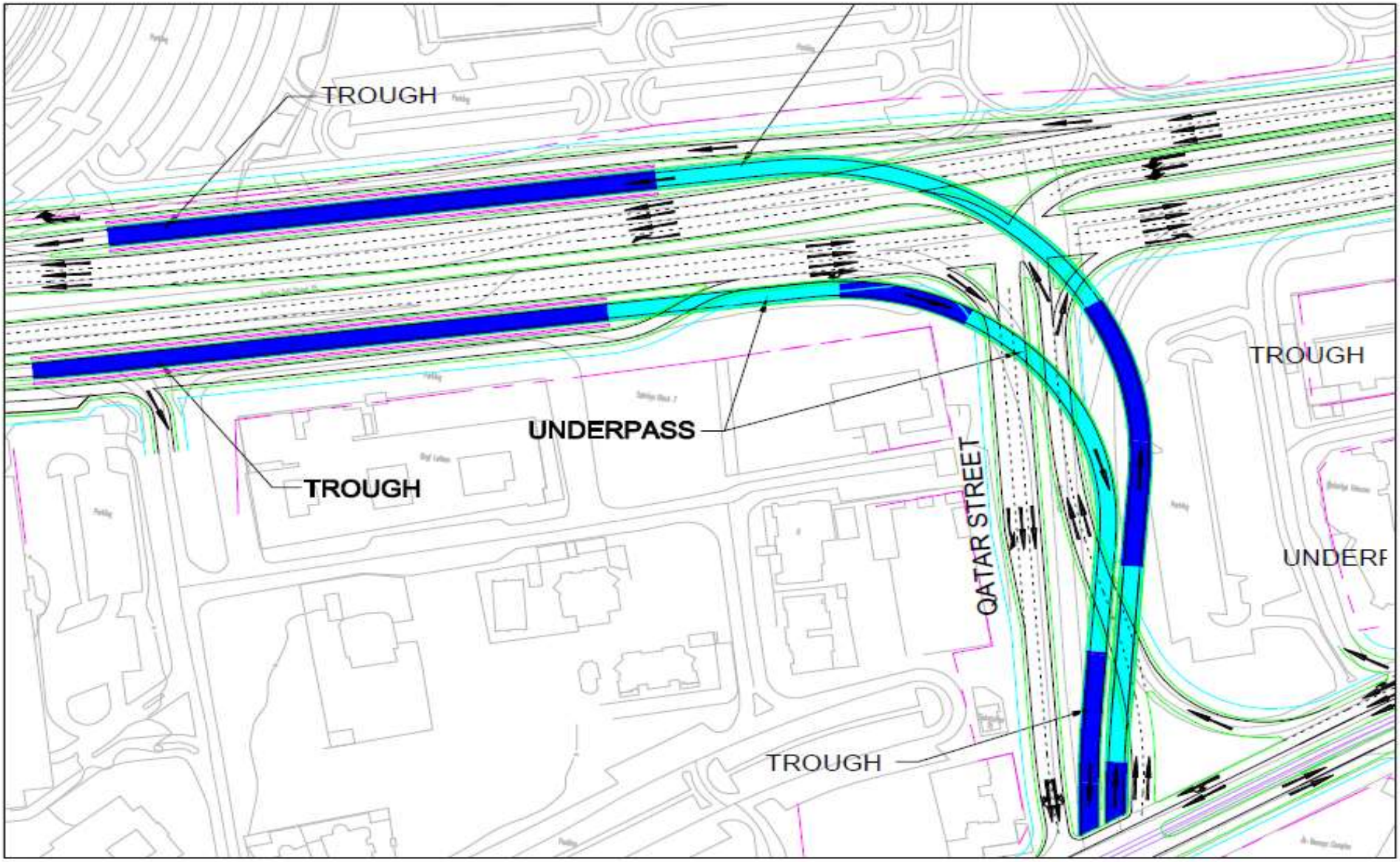
TA 86/03 - Through-about?

Issues: uncontrolled circulatory stop positions and uncontrolled slip roads

DMRB or Manual for Streets 2?



Example Problems & Recommendations



Example Problems & Recommendations Qatar St junction with Arabian Gulf Rd

Weaving

Scheme shows short weaving distances with large traffic flows – exit from Marina Mall has a 65m weave (185m weave at present causes problems)

Recommendations

1. Make right turning Gulf Road traffic use the Mall road to turn right by inserting a median strip between the exit lane from the Mall and the other 3 lanes at the junction (allowing straight on and right turn only)
2. Advanced signals for Mall traffic.

Fast lane Merge

Left tuners from Qatar Street merging into fast moving, free-flowing Gulf Road traffic – high differential in speed – no separation whilst accelerating

Recommendations

1. Lowest Risk Option – Make westbound Gulf Road traffic stop for left turners
2. Medium Risk Option – Lane drop/lane gain on Gulf Road i.e no forced merge
3. Higher risk option – Lengthen the acceleration lane as much as possible and insert a median strip to allow speeds to equalise before merging

Conclusions

DMRB has safety built in…….

- but only to a certain extent
- tries to allow for mistakes and succeeds
- does not seem to allow for contraventions

- designs need advice from road safety professionals
- DMRB is a useful tool to compare to other national design standards where no standards exist
- Manual for Streets does build in safety

And finally …

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