Junction Design

“Urban and Rural Junction Design”

(Version 1.0)

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Associate Director - CSEA

Wednesday, 2nd March 2016
Junction Design – Agenda

• Regulatory and Advisory Guidance Material
• Junctions Types
• Selecting the Appropriate Junction
• General Design Philosophy for Priority Junctions
  – General Information
  – Siting of Junctions
  – Design Speed
  – Right Turning Movements
  – Merging and Diverging Lanes
  – Traffic Growth Factors and Capacity
  – Safety
  – Vulnerable Road Users
  – Line Marking and Signage
• Geometric Design Considerations for Priority Junctions
  – Visibility
  – Visibility Splays
    • X Distances
    • Y Distances
  – Junction Radii
  – Approach Gradients
  – Stop and Yield Line Locations
  – Geometric Features of Ghost Island
• Cycling and Junction Design
• Worked Example from “Picady” : Priority Intersection Capacity and Delay
• Autoturn Examples
• Finalised Design Output Demonstration - Vissim
• Learnings
Junction Design: Designer Guidance (1)

- National, Secondary, Local and Urban Roads – Various Design Codes
  - Overview of Junction Design on National, Regional and Local Roads

Design Speeds (50 – 100 km/h)
Junction Design: Designer Guidance (2)

- NRA TD 16 - Roundabout Design
  - NRA TD 51 – Segregated Left Turn Lanes and Subsidiary Islands at Roundabouts

- NRA TD 22 – Grade Separated Junctions

- NRA TD 40 – Compact Grade Separate Junctions

- NRA TD 50 - Geometric Layout of Signalised Junctions

- NRA TD 301 – Geometric Design of Junctions
  (Not yet published by the TII)
Junction Design: Designer Guidance (3)

Overview of Junction Design on Urban Roads

Section D:
Chapters 8 and 9: Junctions

DMURS (2011):
Chapter 4: Street Design

Design Manual for Urban Roads and Streets

Design Speeds
(0 – 60 km/h)

National Cyclist Manual
(2010):
Section 4: Designing for the Bicycle
www.cyclemanual.ie
Junction Design: Designer Guidance (4)


Junction Design: Junction Types (1)

Simple T Junctions

Figure 1/1: Simple T-Junction

Staggered Junctions (Simple Right / Left)

Figure 1/6: Simple Right/Left Stagger
Junction Design: Junction Types (2)

Ghost Island Junctions

Figure 1/2: Ghost Island Junction

Single Lane Dualling

Figure 1/3: Single Lane Dualling
Junction Design: Junction Types (3)

Cross Roads

Figure 1/4: Crossroads

Left Hand Skew Junctions

Figure 1/5: Left Hand Skew Junction
Junction Design: Junction Types (4)

**Figure 2/3:** Major/Minor Priority Junction with Nearside Passing Bay for Roads without Hard Shoulders (Para 2.25)

**Figure 2/4:** Major/Minor Priority Junction with Nearside Passing Bay Option for Roads with Hard Shoulders (Para 2.25)
Junction Design: Selecting the Appropriate Junction (1)

• **Road Link Capacity: TA 79/99 Urban Roads**

Not Formally Applicable in Ireland
Reference Document Only

UAP1 – High standard Single I’ll annex the comments into my presentation. or Dual Carriageway carrying predominately through traffic with a speed limit 80-100 kph and limited side access

<table>
<thead>
<tr>
<th>Carriageway width</th>
<th>Two-way Single Carriageway - Busiest direction flow (Assumes a 60/40 directional split)</th>
<th>Dual Carriageway</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total number of Lanes</td>
<td>Number of Lanes in each direction</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2-3</td>
</tr>
<tr>
<td>6.1m</td>
<td>6.75m</td>
<td>7.3m</td>
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<td>7.3m</td>
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<td>10.0m</td>
</tr>
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<td>9.0m</td>
<td>10.0m</td>
<td>12.3m</td>
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<tr>
<td>10.0m</td>
<td>12.3m</td>
<td>13.5m</td>
</tr>
<tr>
<td>12.3m</td>
<td>13.5m</td>
<td>14.6m</td>
</tr>
<tr>
<td>13.5m</td>
<td>14.6m</td>
<td></td>
</tr>
<tr>
<td>14.6m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.0m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.75m</td>
<td>7.3m</td>
</tr>
<tr>
<td>11.0m</td>
<td>14.6m</td>
<td></td>
</tr>
<tr>
<td>14.6m</td>
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<td></td>
</tr>
<tr>
<td>18.0m</td>
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<td>6.75m</td>
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<td>10.0m</td>
<td></td>
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</tr>
<tr>
<td>12.3m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.5m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 Capacities of Urban Roads
One-way hourly flows in each direction

Notes
1. Capacities are in vehicles per hour.
2. HGV ≤ 15%
3. (*) Capacities are excluded where the road width is not appropriate for the road type and where there are too few examples to give reliable figures.
Junction Design: Selecting the Appropriate Junction (2)

- Road Link Capacity: TA 46/97 Rural Roads

Table 2.1 Opening Year Economic Flow Ranges

<table>
<thead>
<tr>
<th>Carriageway Standard</th>
<th>Opening Year AADT Minimum</th>
<th>Opening Year AADT Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2</td>
<td>Up to 13,000</td>
<td></td>
</tr>
<tr>
<td>WS2</td>
<td>6,000</td>
<td>21,000</td>
</tr>
<tr>
<td>D2AP</td>
<td>11,000</td>
<td>39,000</td>
</tr>
<tr>
<td>D3AP</td>
<td>23,000</td>
<td>54,000</td>
</tr>
<tr>
<td>D2M</td>
<td>Up to 41,000</td>
<td></td>
</tr>
<tr>
<td>D3M</td>
<td>25,000</td>
<td>67,000</td>
</tr>
<tr>
<td>D4M</td>
<td>52,000</td>
<td>90,000</td>
</tr>
</tbody>
</table>

- Capacity Analysis calculated by Traffic Counts
- ATC’s (Automatic Traffic Counter)
- 7 Day Video Counts for Origin / Destination Matrix Calculations

Not Formally Applicable in Ireland Reference Document Only
Junction Design: Selecting the Appropriate Junction (3)

NRA TD 41/42 – Flow Chart Figure 2/1
### Junction Design: Selecting the Appropriate Junction (4)

- TD 41 - 42 – Table 2/1 Possible Junction Types for Different Carriageway Types

<table>
<thead>
<tr>
<th>Carriageway Type</th>
<th>Junction/Direct Access Type</th>
<th>Simple (Fig. 1/1)</th>
<th>Ghost Island (Fig. 1/2)</th>
<th>Single Lane Dualling (Fig. 1/3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>Location</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>S2 Urban</td>
<td>Yes</td>
<td>Yes</td>
<td>Maybe</td>
<td>Yes</td>
</tr>
<tr>
<td>S2 Rural</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Type 1 Dual</td>
<td>Yes†</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Type 2 Dual</td>
<td>Yes†</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Type 3 Dual</td>
<td>One lane</td>
<td>Yes†</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Type 3 Dual</td>
<td>Two lane</td>
<td>Yes†</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>D2M</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

| T | T-Junction | T | T | T | T | T | T | T | T |
| T | Staggered Junction | T | T | T | T | T | T | T | T |
| T | Crossroads | T | T | T | T | T | T | T | T |

† Left in/left out junctions or direct accesses only (see NRA TD9 Table 4 for more details by road type)

**Table 2/1: Possible Junction Types for Different Major Road Carriageway Types**
Junction Design: Selecting the Appropriate Junction (5)

- **TD 41/42 – Figure 2/2 Approximate level of Provision of T Junctions**

![Diagram showing traffic flow at junctions](image)

**Figure 2/2 : Approximate Level of Provision of T-junctions on New Single Carriageway Roads for Various Major and Minor Road Design Year Traffic Flows (Paras 2.20, 2.22)**

- Excellent capacity reference chart
- 13000 AADT (Key Number)
- Simple Junction AADT Minor Road – 300 Vehicles
- Additional Capacity provide by Nearby Passing – AADT increases to 1000 AADT on the minor road
- Ghost Island offers further increased capacity
Junction Design: Selecting the Appropriate Junction (6)

- TMG Guidelines Junction Type Assessment Chart (P 132) – Urban Roads

Priority junction

Diagram 8.1 Type of junction based on traffic flow levels

Junction choice is determined through assessment of all user needs, not just those of vehicular traffic.

- **Given just for information**
- Would caution designers, when considering capacities at the upper end of each junction type (Safety Concerns)
- Assessment must be made considering the hierarchy of road users
Junction Design: Design Philosophy (1)

• **Introduction**
  – Priority Junctions are the most common form of junction arrangement
  – They require one or more minor road to yield or stop for the major road traffic flow
  – Delay to Major Road Traffic minimised
  – Drivers are discouraged from overtaking in the vicinity of priority junctions
  – Obstructions are precluded / restricted in the visibility triangle
  – A major proportion of accidents occur at these locations so it’s important that they are designed correctly
  – Cost Effective in term of land use and ongoing maintenance
  – In urban areas where congestion is experienced, they often operated outside the design capacity
  – Capacity Checks are carried out using what’s called the RFC Factor (Ratio of Flow to Capacity)
    – < 0.85 in the DESIGN YEAR

• **Siting**
  – Avoid siting on Bends
  – Avoid on crest curves where the perception of approaching traffic is difficult to assess
  – If a minor road approach exceeds 2.5% gradient, need to provide a landing platform for 15m (Relaxation to 10m in difficult circumstances)

• **Design Speed**
  – Design speed of both the Major and Minor Road need to be calculated considering the requirements outlined in NRA TD 09:
    • Layout Constraint (Lc)
    • Alignment Constraint (Ac)
Junction Design: Design Philosophy (2)

- **Merging and Diverging Lanes**
  - Can be used to increase junction flow capacity but other safety concerns need to be carefully addressed during the design process (e.g. Diverging Lanes obscuring the visibility triangle)

- **Growth Factors for Capacity Checks (Design Year)**
  - Adequate Capacity should be provided to ensure all junctions can cope with the intended traffic volumes in the opening design year
    - Calculate the “Design year / Opening year”
    - Growth Factors for both [Urban and Rural](#) junctions can be calculated by reference to the NRA Project Appraisal Guidelines Unit 5.5

[www.tii.ie/tii-library/strategic-planning/project-appraisal-guidelines/Unit-5.5-Link-Based-Traffic-Forecasting.pdf](http://www.tii.ie/tii-library/strategic-planning/project-appraisal-guidelines/Unit-5.5-Link-Based-Traffic-Forecasting.pdf)
• National Traffic Model Growth Factors (Low Medium and High Values)

Growth Factors for **Urban Junctions** can also be refined by reviewing local area plans, predicted population growth areas, approved planning applications, CSO census data, existing traffic counts, etc.

  – Recent Example: Cherrywood SDZ lands, Traffic Impact Assessment
Junction Design: Design Philosophy (4)

- **Safety**
  - Safety Considerations are critical to all junction designs
  - Designers must consider the “Prioritise Road User Hierarchy”
  - Using Channelising Islands can reduce collisions on the minor road by as much as 50% (Pedestrian Refuge)
  - Designers should consider a “Stage F Safety Audit”, At a minimum carry out Stages 1-3 (Some being mandatory on NRA DMRB funded schemes (HD 19 – Appendix A), advisory on NTA funded schemes)
  - The RSA, TII, DTTAS, Local Authority websites gives data on collision statistics, collision types and fatalities.

- **Vulnerable Road Users**
  - Requirement to consider pedestrians and cyclists and other vulnerable road users
  - Traffic volume considerations (Iterative Process)
  - Lighting and Drainage Requirements
  - Mobility Impaired User Facilities

- **Road Markings and Signage (Traffic Signs Manual - Regulatory and Advisory Signs)**
  - National Traffic Signs Manual is Published by the DTTAS
  - **Regulatory Sign**
    - Chapter 5: 5.1 General Information
    - Chapter 5: 5.2 Stop Signs
    - Chapter 5: 5.3 Yield Signs
Junction Design: Design Philosophy (5)

Table 2.2.1: Colour Schemes for Directional Information Signs

<table>
<thead>
<tr>
<th>Route Indicated</th>
<th>Background Colour</th>
<th>Colour of Text, Border, Arrow and Route Number</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional (R)</td>
<td>WHITE</td>
<td>BLACK</td>
<td></td>
</tr>
<tr>
<td>Local (L)</td>
<td>WHITE</td>
<td>BLACK</td>
<td></td>
</tr>
</tbody>
</table>

Design Speed Dependent

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Note: The bracketed figures apply where greater prominence is required for conditions, or where greater emphasis is needed.
Junction Design: Design Philosophy (6)

- Road Markings – Traffic Signs Manual
  - Chapter 7: 7.11 Road Markings for Priority Junctions
  - Chapter 7: 7.12 Road Markings for Signal Controlled Junctions
  - Chapter 7: 7.13 Road Markings for Roundabouts
  - Chapter 7: 7.14 Road Markings for Grade Separated Junctions
Visibility

Overview

- Forward Visibility or Forward Sight Distance (FSD) is the unobstructed view of a driver
- Visibility needs to be checked in both the vertical and horizontal planes
- TRL Research (Manual for Streets-2007) “Reducing visibility is the single most important way to reduce speed”
- TRL Research only for Roads with a demonstrable design speed of 60kph or Less
- Stopping Sight Distance is the minimum level of forward visibility required along a street for a driver to stop safely should an object enter its path. It’s based on three constituent parts:
  - Perception Distance
  - Reaction Distance
  - Braking Distance

SSD’s Calculation

- SSD = vt + v^2/2d  \( (a) \) – Manual for Streets: Adds in Gradient in Calculation

Where:

v = Vehicle Speed (m/s)

\( t \) = Driver Perception Reaction Time (s)

\( d \) = Deceleration Rate (m/s^2)

\( g \) = Deceleration due to gravity 9.81m/s^2

\[ 0.25 \, (g) = 2.45m/s^2 \quad 0.375 \, (g) = 3.68m/s^2 \quad 0.45 \, (g) = 4.41m/s^2 \]
Table 4.2: Reduced SSD standards for application within cities, towns and villages. Reduced forward visibility increases driver caution and reduces vehicle speeds.

<table>
<thead>
<tr>
<th>Design Speed (km/h)</th>
<th>SSD Standard (metres)</th>
<th>Design Speed (km/h)</th>
<th>SSD Standard (metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>7</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>20</td>
<td>14</td>
<td>20</td>
<td>15</td>
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<tr>
<td>30</td>
<td>23</td>
<td>30</td>
<td>24</td>
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<tr>
<td>40</td>
<td>33</td>
<td>40</td>
<td>36</td>
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<tr>
<td>50</td>
<td>45</td>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td>60</td>
<td>59</td>
<td>60</td>
<td>65</td>
</tr>
</tbody>
</table>

Table 7/1: ‘y’ Visibility Distances from the Minor Road (Para. 7.7c)

<table>
<thead>
<tr>
<th>Design Speed of Major Road (kph)</th>
<th>‘y’ Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>50</td>
</tr>
<tr>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>70</td>
<td>120</td>
</tr>
<tr>
<td>85</td>
<td>160</td>
</tr>
<tr>
<td>100</td>
<td>215</td>
</tr>
</tbody>
</table>

NRA TD 301 – Table 7/1 Updated to include design speeds up to 120 km/h
Visibility Splays
• Visibility Splays are included at junction to provide sightlines along intersection roads and Streets. They consist of two elements, the X and Y distances:
  – X Distance
    » Measured along the minor arm
    » Normally measured from the continuation of the nearside edge of the major arm including hard strips or shoulders
    » Object height is defined in NRA TD 9 – Driver’s eye height of 1.05m to an object height of 0.26m, can be relaxed to an object height of 0.6m in the DMRB. DMURS requirements are 1.05m to 0.6m
    » Desirable Minimum “X” distance for all junctions is 3.0m
    » Yield type Junction have an desirable minimum “X” distance of 9m and guidance would suggest its inadvisable to provide more than the minimum
    » Stop type Junctions have a desirable minimum “X” distance of 3.0 m but can be relaxed to 2.4 m for simple junctions
    » DMURS states that all urban junctions should be stop type junctions
    » DMURS allow an X distance reduction to 2.0m in certain circumstances (Legacy footpath widths)

– Y Distance
  » Measured along the major arm
  » It is normally measured nearside kerb or edge of roadway
Figure 7/1: Visibility Standards (Para 7.7)
Junction Design: Geometric Considerations (6)

- **Junction Kerb Radii**
  - NRA DMRB Approach: Where no provision is made for larger commercial vehicles, it is recommended that corner radii for simple junction be 6m in urban areas and 10 meters in rural areas. Where provision is to be made for larger vehicles, the DMRB is very prescriptive in terms of radii and tapers. Reference should be made to section 7.27 of NRA TD 41 - 42.

  - For example: For a simple urban junction
    - 10m radii at urban simple junction, followed by a taper at 1:5 for a distance of 30m
• DMURS Approach: Reducing corner radii at junctions will significantly improve pedestrian and cyclist safety at junctions by lowering speeds at which vehicles can negotiate the turns.

• DMURS allows designers flexibility to choose tighter radii based on the volume of vehicles, the class of vehicles and the sweep path.

• Autoturn (Software) – Driver speed setting are important
**Approach Gradients**
- NRA DMRB offers guidance in relation to approach gradients to junction. DMURS is not as prescriptive, however it is good practice to employ NRA DMRB guidance in urban situations
- Gradients on minor road shall be in accordance with TD 09 (0.5% - 6% but can be up to 10% on Direct Accesses)
- Dwell area shall be provided on the Minor Road approach
- Dwell areas length of 15 m with a relaxation to 10 m and should have a gradient in the range of + or – 2.5% depending on the situations

**Stop and Yield Lines Locations (Traffic Signs Manual)**
- Setback - 600mm
- Urban Areas – Kerb line represents the edge of pavement
- Two Stage movement (NCM)

![Figure 7/19: Major/Minor Priority Junction Stop Line with Hard Shoulder or Hard Strips (Para 7.84)](image)

![Figure 7/20: Major/Minor Priority Junction Stop Line with no Hard Shoulder or Hard Strips (Para 7.84)](image)
Junction Design: Geometric Considerations (9)

- **Geometric Features of Ghost Islands**
  - NRA DMRB again offers geometric guidance in relation to the design of Ghost Island. DMURS is not as prescriptive, however, designers should be aware of the design principles applied and consider these principles when designing Ghost Islands Priority Junctions in urban areas.

  **Geometric Features to consider:**

  ![Diagram of a Ghost Island Junction](image)

  **Figure 7/9: Major/Minor Priority Junction with a Ghost Island (Paras 7.29 – 7.60)**

  - **a** Turning Length (+ Queuing length, if required, but see para 7.41)
  - **b** Deceleration Length
  - **c** Through Lane Width
  - **d** Turning Lane Width
  - **e** Direct Taper Length
“a” – Turning Length
- Its function is to allow long vehicles position themselves on the CW
- 10m long in all junction cases and measured from the centreline of the minor road

“b” – Deceleration Length
- Table 7/6 Gives the deceleration length “b”
- Function of the gradient
- In urban junction it’s a function of queue length (Traffic Modelling Output)

<table>
<thead>
<tr>
<th>Design Speed (kph)</th>
<th>Up Gradient</th>
<th></th>
<th></th>
<th></th>
<th>Down Gradient</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-4%</td>
<td>Above 4%</td>
<td></td>
<td>0-4%</td>
<td>Above 4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>25</td>
<td>25</td>
<td></td>
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<td></td>
<td>80</td>
<td>80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: In difficult circumstances, the Design Organisation may relax the deceleration length by one design speed step as a relaxation.

Table 7/6: Deceleration Length (m) for Ghost Island (Paras 7.45 and 7.68)
Junction Design: Geometric Considerations (11)

- **c – Through Lane Width**
  - Shall be in accordance with TD 9 (Lane widths vary from 3.0m – 3.65m)

- **d – Turning Lane Width**
  - Desirable width of 3.5m but can be relaxed to 3.0m
  - Widths in excess of 3.65m are inadvisable in rural contexts

- **e – Direct Taper Length & Ghost Island Taper**
  - Length over which the right turn develops
  - Ghost Island allows the direct taper to form part of the deceleration length
  - Table 7/5 gives the length of the taper (Function of the Design Speed)

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<table>
<thead>
<tr>
<th>Design Speed (Kph)</th>
<th>Taper for Ghost Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1:20</td>
</tr>
<tr>
<td>60</td>
<td>1:20</td>
</tr>
<tr>
<td>70</td>
<td>1:20</td>
</tr>
<tr>
<td>85</td>
<td>1:25</td>
</tr>
<tr>
<td>100</td>
<td>1:30</td>
</tr>
</tbody>
</table>

*Note: In difficult circumstances, the Design Organisation may relax the taper value by one design speed step as a relaxation.*

*Table 7/4: Tapers for Central Islands*

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**Figure 7/12: Ghost Island Development and Taper (Para 7.37)**

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**Table 7/5: Direct Taper Length (Para 7.42)**
Junction Design: Cycling (1)

- **National Cyclist Manual**
  - Promote Cycling and Modal Shift
  - Excellent guidance document
  - Gives comprehensive and heuristic guidance information including geometric guidance

- **Junction Introduction**
  - Critical issues for Cyclists at Junctions
    - Merging and Splitting
    - Side Swipe
    - Eye Contact
  - Understanding Bicycle Operation at Junctions
    - Loss of Momentum
    - Loss of Stability
    - Impact of Delay
    - Cyclist Skill Level

- **Geometric Guidance**
  - ASL's (Advanced Stacking Locations)
    - Useful at Signalised Junction to facilitate stacking of high volumes of straight ahead and right turning cyclists
    - At grade approach to signals
    - 4.0m Advanced Stop Line Area
    - 24 m Red Resin Surfacing to prioritise cyclists
• **Left Turns**
  – Grade separations on approach and re-establish cyclist on-road
  – 20 metre radii horizontal curvature to maintain momentum
  – Ramp to re-establish on road position
Junction Design: Cycling (3)

- **Right Turns**
  - Example of a dedicated right turn with ASL’s where the cyclist is at grade
  - Blue Resin Road surface to prioritise cyclists in conflict zones
  - And again a 4.0m ASL area

- **Crossings**
  - Jug Turn
  - Cyclist STAY LEFT TO GO RIGHT
Junction Design: Cycling (4)

- **Side Roads T Junctions**
  - General Principles of Priority Junctions with Cyclists
  - Two stage manoeuvre at the stop line for vehicles
  - Red Resin road surfacing through the junction
  - Tight radii to reduce approach speeds and improve safety
Junction Design: Autoturn
Junction Design: Picady (Worked Example)

- Simple T Junction Example (Clyde Road & N11) “Noted the current arrangement is a signalised junction”
- Project Description
- Geometry
- Demand Set Definitions – AM / PM
- Junction Network
  - Arms
  - Streams
- Crossings (If required)
- Traffic Flows (AADT / PCU’s, Etc.)
- Vehicle Mix (HGV’s/ LV’s)
- Results and Analysis
Junction Design: Vissim

- **Vissim Video File:**
Junction Design: Learnings

• **So what factors are critical to Junction Design?**
  – Capacity
  – Sightlines / Visibility
  – Turning Circles or Manoeuvrability

• **Now that you’re all fledgling Junction Designers, you might place greater emphasis on:**
  – Safety (Hierarchy of Road Users)
  – Speed Considerations (Traffic Calming along with Signage and Markings)
  – Coherence and Legibility
  – Forgiveness (Mistakes happen – Need to include safety redundancy)
  – Directness
  – Comfort (Merrion Gates- Merging lane)
  – Impact on existing junctions (Building lines, bridge abutments)
THANK YOU

QUESTIONS & COMMENTS?