



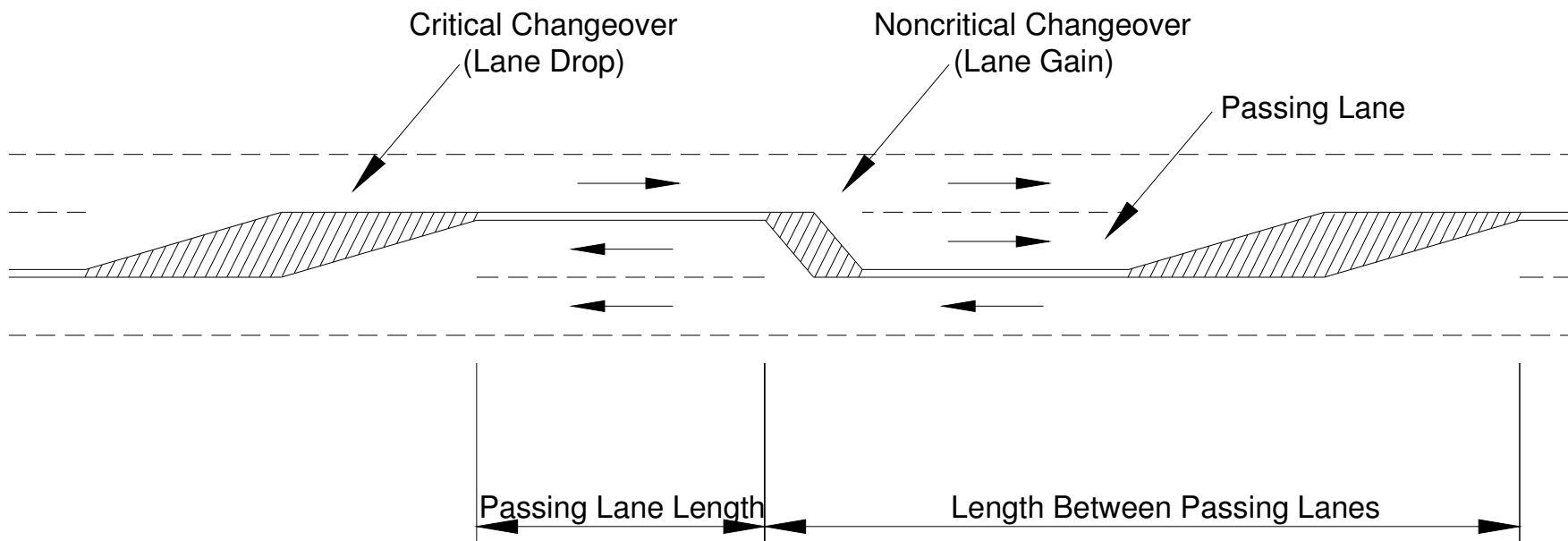
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What is a 2+1 Road?

- A road with two lanes in one direction and one in in the other
- The two lane section is provided alternately for each direction of travel- for overtaking
- A 2+1 road is a “divided road” with a narrow central reverse, usually with a safety fence



Schematic Layout of 2+1 Roads

Why Build 2+1 Roads?

- As an alternative to the Wide Single Carriageway
- To fill the gap between Standard Single and Dual Carriageways
- High collision rate on rural single carriageway roads in Ireland

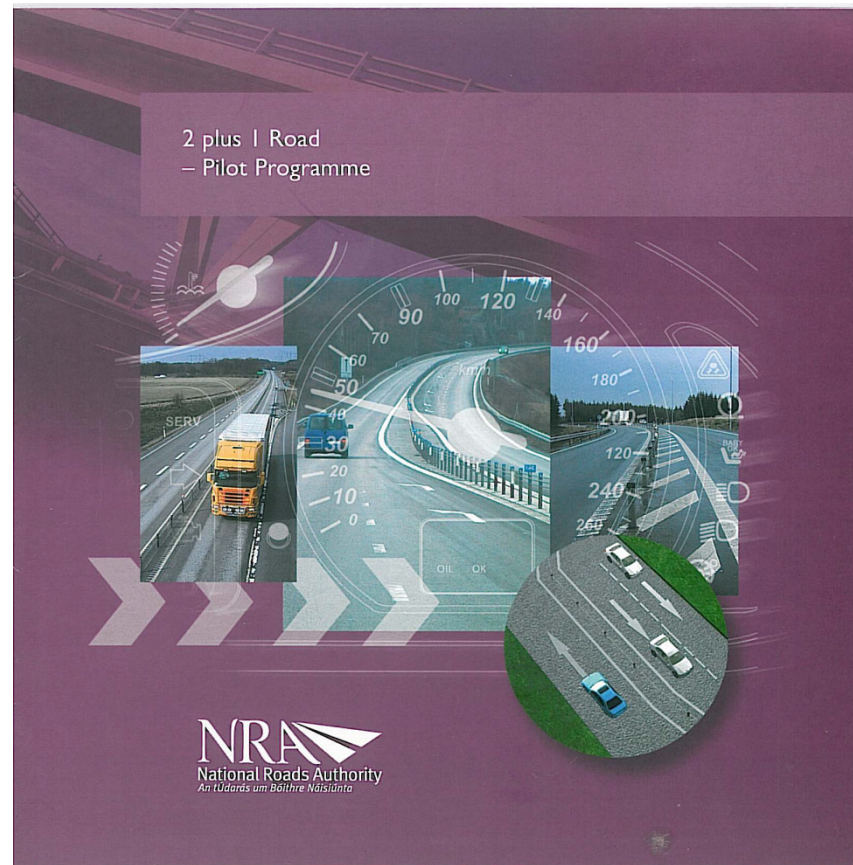
Collision rates (2008 to 2010 collision data)

- 2 plus 1 Collision Rate =
4.413 per 100 million km of travel
- Rural Dual Collision Rate =
3.991 per 100 million km of travel
- Motorway Collision Rate =
2.288 per 100 million km of travel
- Rural 2Lane Collision Rate =
11.261 per 100 million km of travel

Fatalities rate (2008 to 2010 collision)

- **2 plus 1 Collision Rate = 0.000 per 100 million km of travel (i.e.. 10^8)**
- **Rural Dual Collision Rate = 0.194 per 100 million km of travel**
- **Motorway Collision Rate = 0.078 per 100 million km of travel**
- **Rural 2Lane Collision Rate = 0.871 per 100 million km of travel**

2+ 1 brochure



Design Standards for 2+1 Roads

- **MAIN ELEMENTS of ROAD LINK DESIGN for 2+1**

- Capacity
- Cross-section
- H+V Alignment
- Changeovers
- Junctions
- Safety Barriers



4 Pilots Schemes



- **N20 Mallow to Rathduff (Retrofit)**
- **N2 Castleblaney Bypass**
- **N24 Piltown Fiddown (Retrofit)**
- **N24 Cahir Bypass Link**

Design Standards for 2+1 Roads

- **NRA TD 9**
- **New Road Type, Retrofit / Green field**
- **Stand alone document**
- **Includes junction strategy**





Your Plan - Your Future



European Union

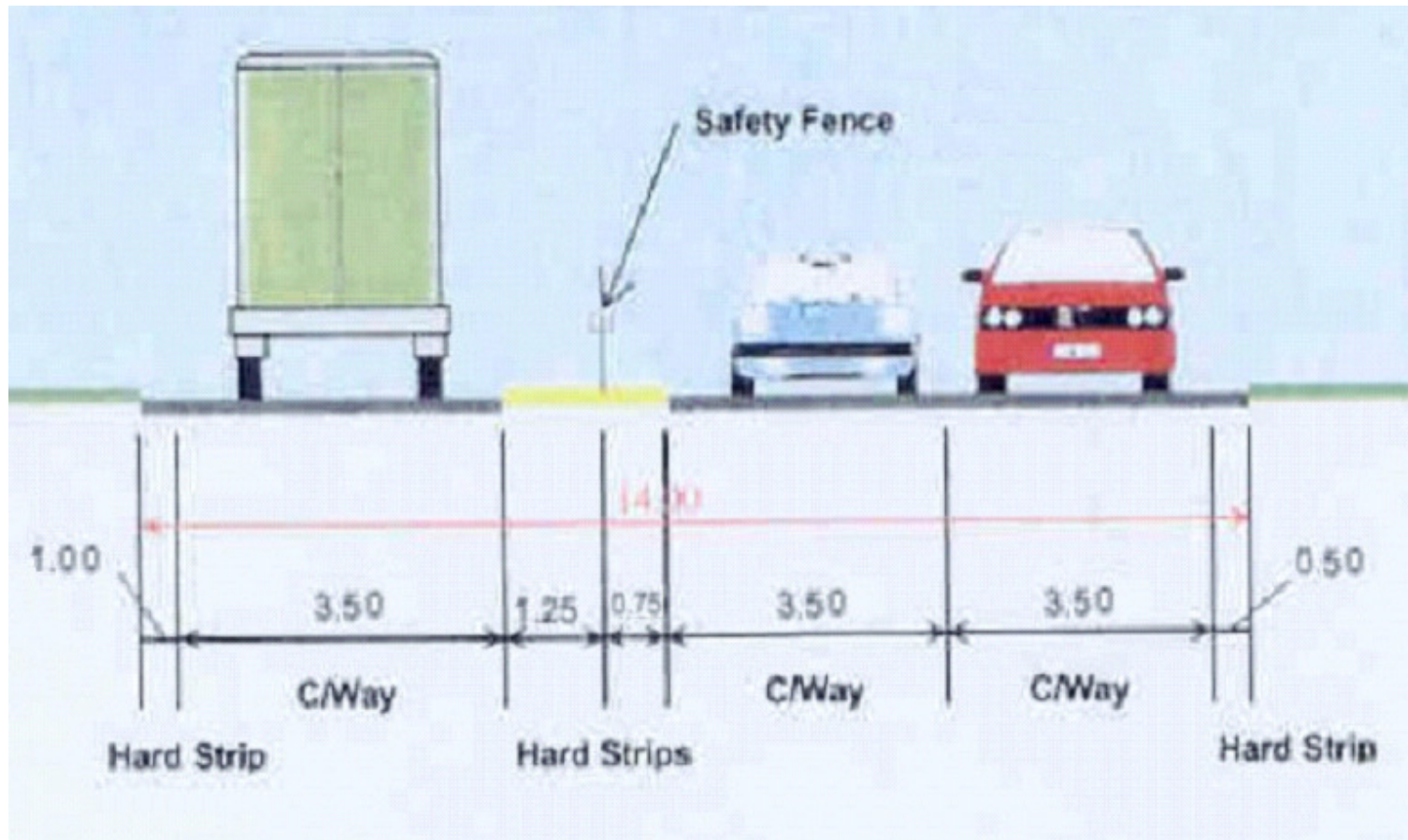


Capacity of 2+1 Roads (ref. Table 4)

Road Type	Capacity (AADT)	Length / Road Type
Standard two lane	11,600	750 km
Wide two lane	13,800	
2+1	17,250	850 km
Dual carriageway (At Grade)	26,500	
Dual carriageway (Grade Sep)	42,000	1200 km
Motorway	55,500	

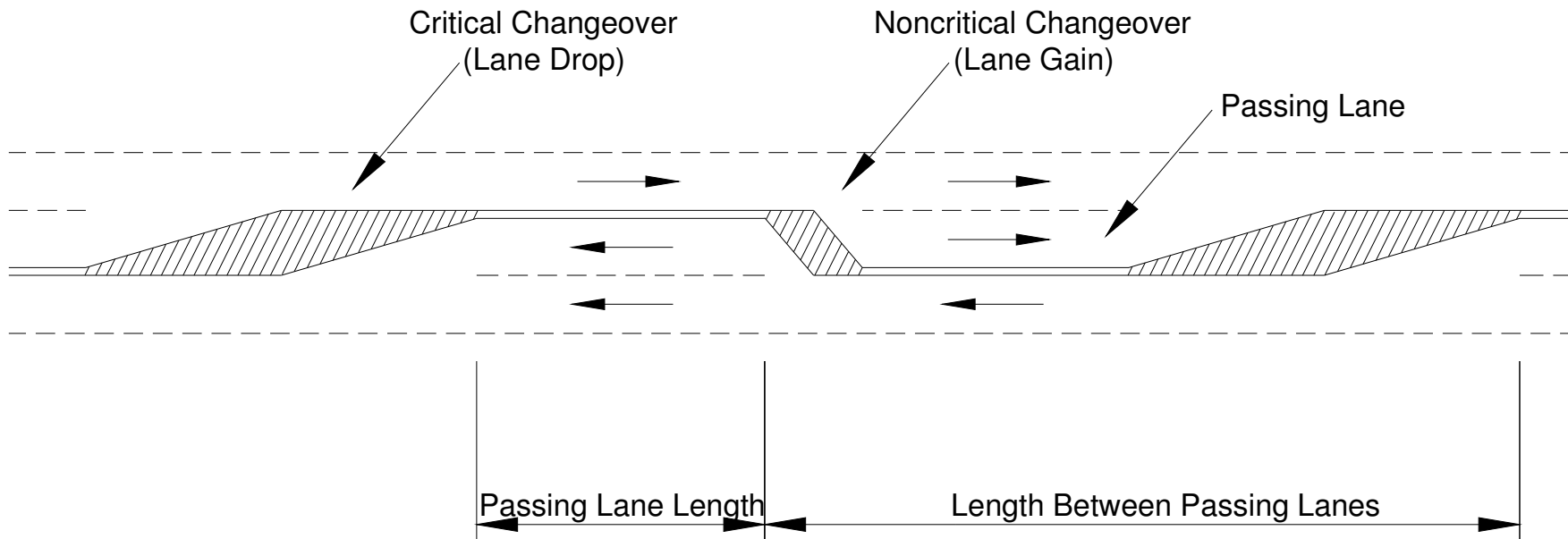


***2+1 Cross Section :
14m paved width***



2+1 Roads on National Routes

- 2+1 are not to be used in urban areas
- Minimum length 5km , desirable 10 km
- 1+1 sections at pinch points,e.g structure
- 2+2 sections for long uphill sections
- Frontage access and multiple junctions



Schematic Layout of 2+1 Roads

Design Speed and SSD for 2+1 Roads

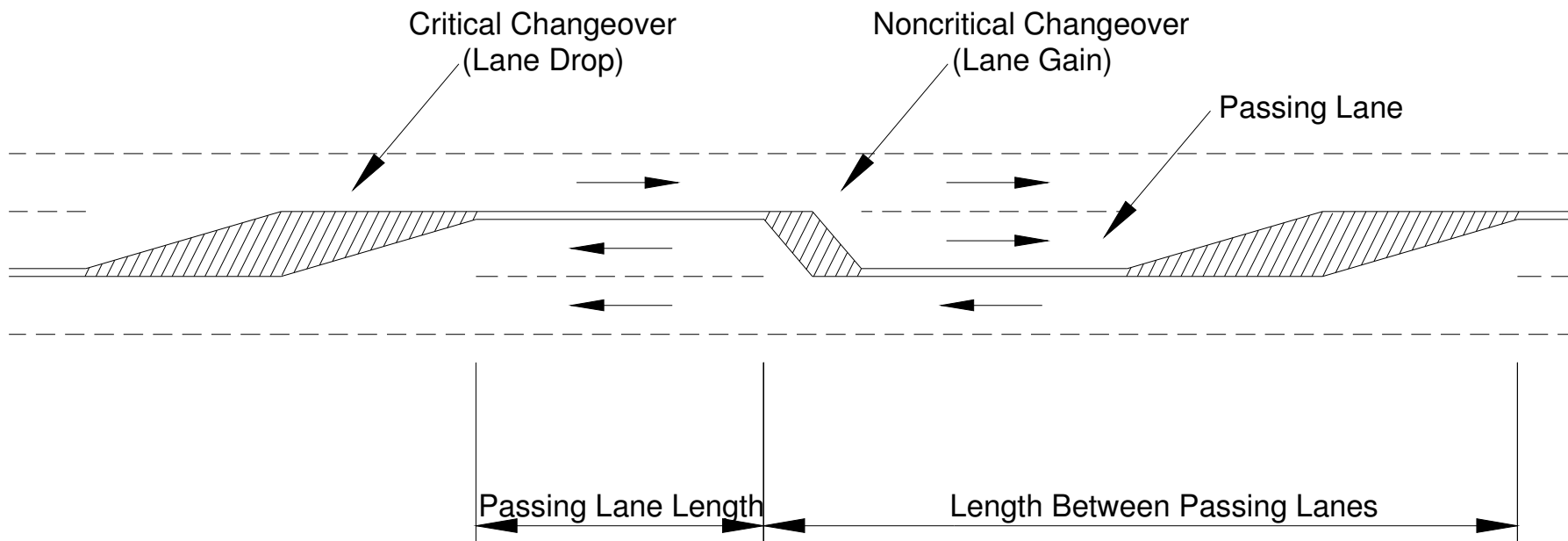
- New roads, design speed of **100 km /h**
- Desirable Minimum SSD to be provided
- Full Overtaking Sight Distance is not required on 2 +1 Roads

Horizontal and Vertical Alignment of 2+1

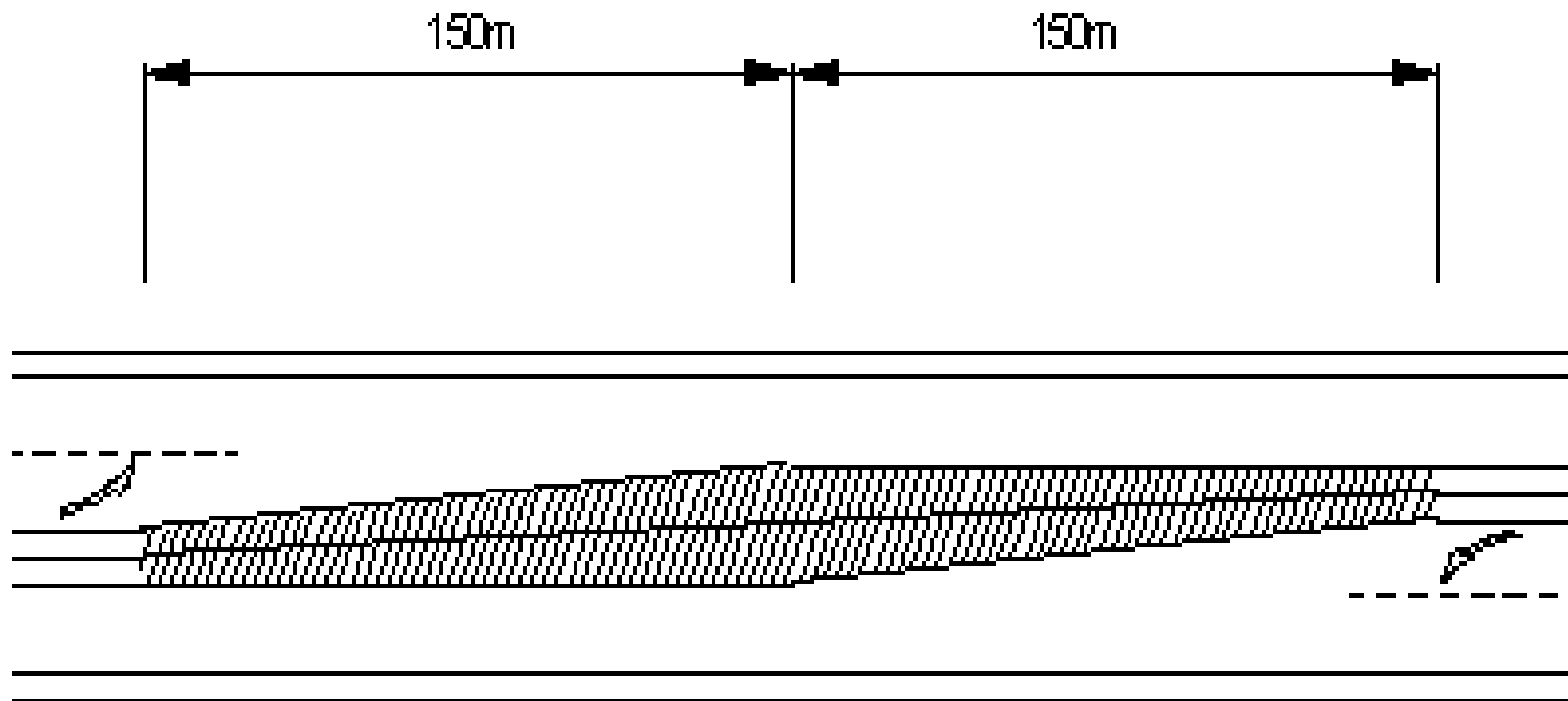
- Road Camber-cross fall within central reserve
- Mid range curves allowed (Band C Figure 24)
- WS2 conversions to 2+1 schemes
- Max desirable gradients - 4% greenfield
- 5% retrofit

Climbing Lanes on 2+1 roads

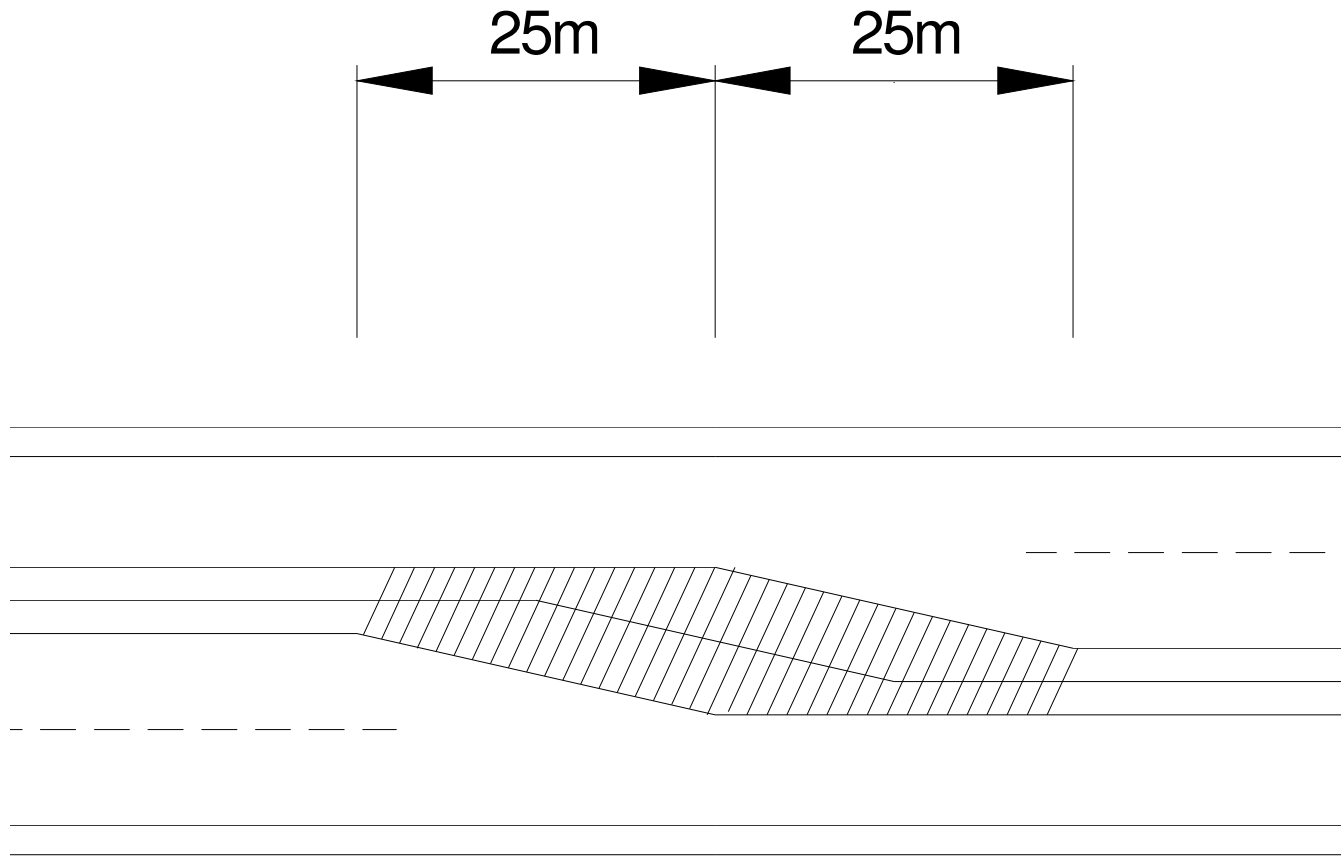
- Uphill gradients $> 2\%$ for $>500\text{m}$
Height risen 20m for traffic $> 11,000$ AADT
- Potential section of 2+2 on hilly terrain
- New NRA TD 9 and NTA TD 10 (www.nra.ie)
- Reverses current practice at end of climbing lane- overtaking lane merges with slow lane



Schematic Layout of a 2+1 Road



Critical Changeover (lane drop)



Non-Critical Changeover (Lane Gain)



Junctions

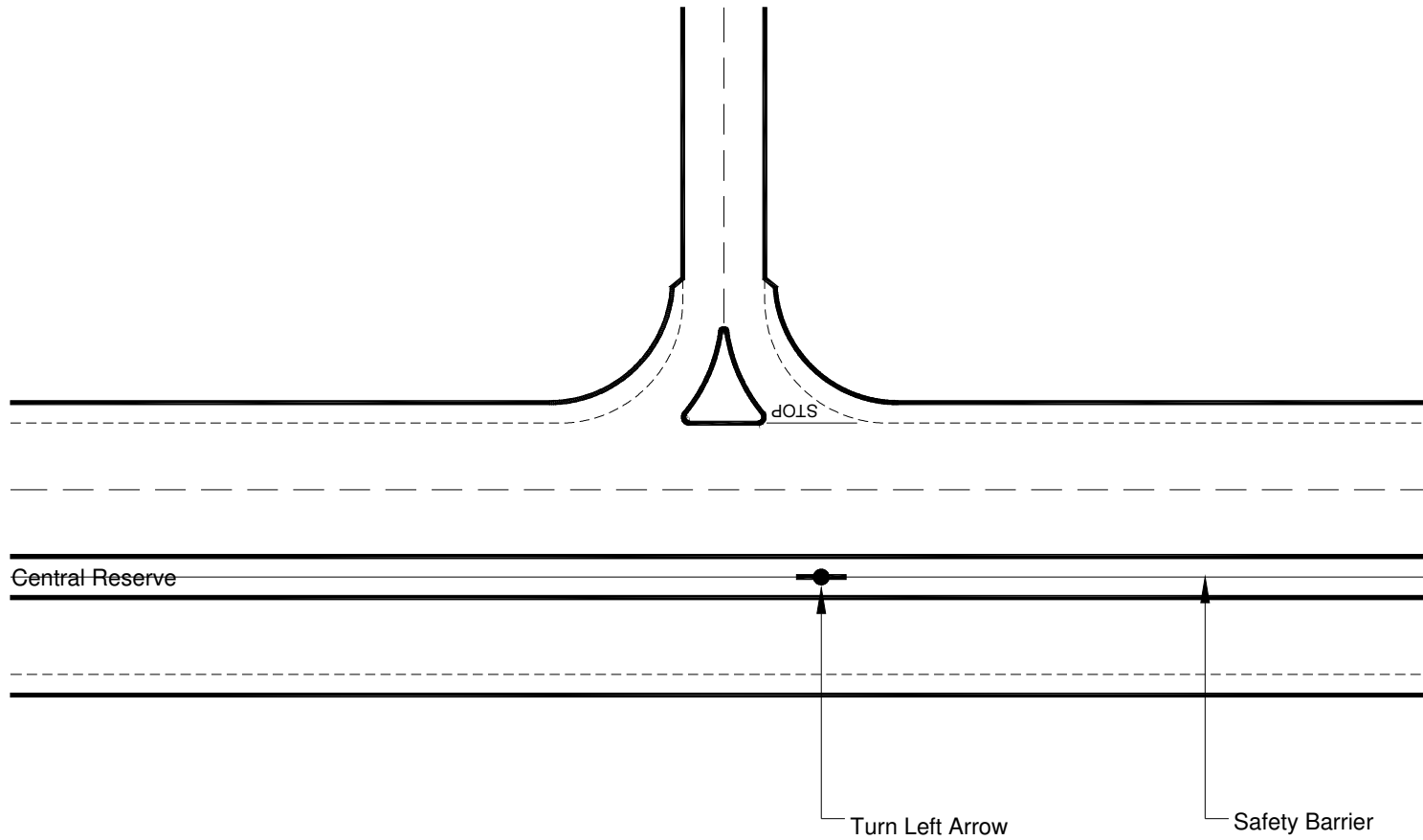


At Grade Junctions



Junction Strategy

- Left-in/left-out
- Right-turn priority junction with ghost islands
- Right-turn with U-turn facility
- Staggered junction with ghost islands;
- Roundabouts
- No Grade separation

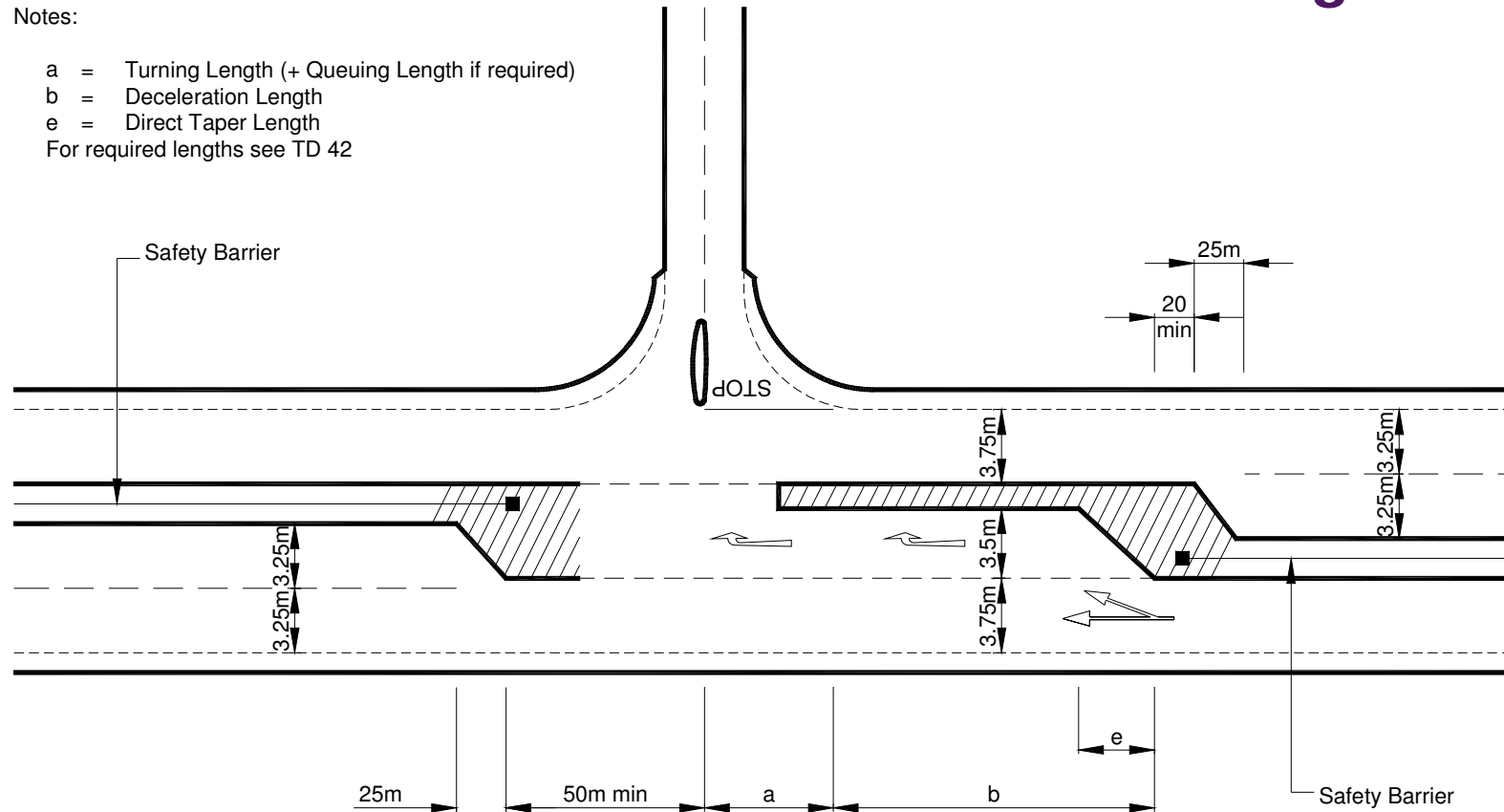


Junction at Passing Lane (Left in / Left out)

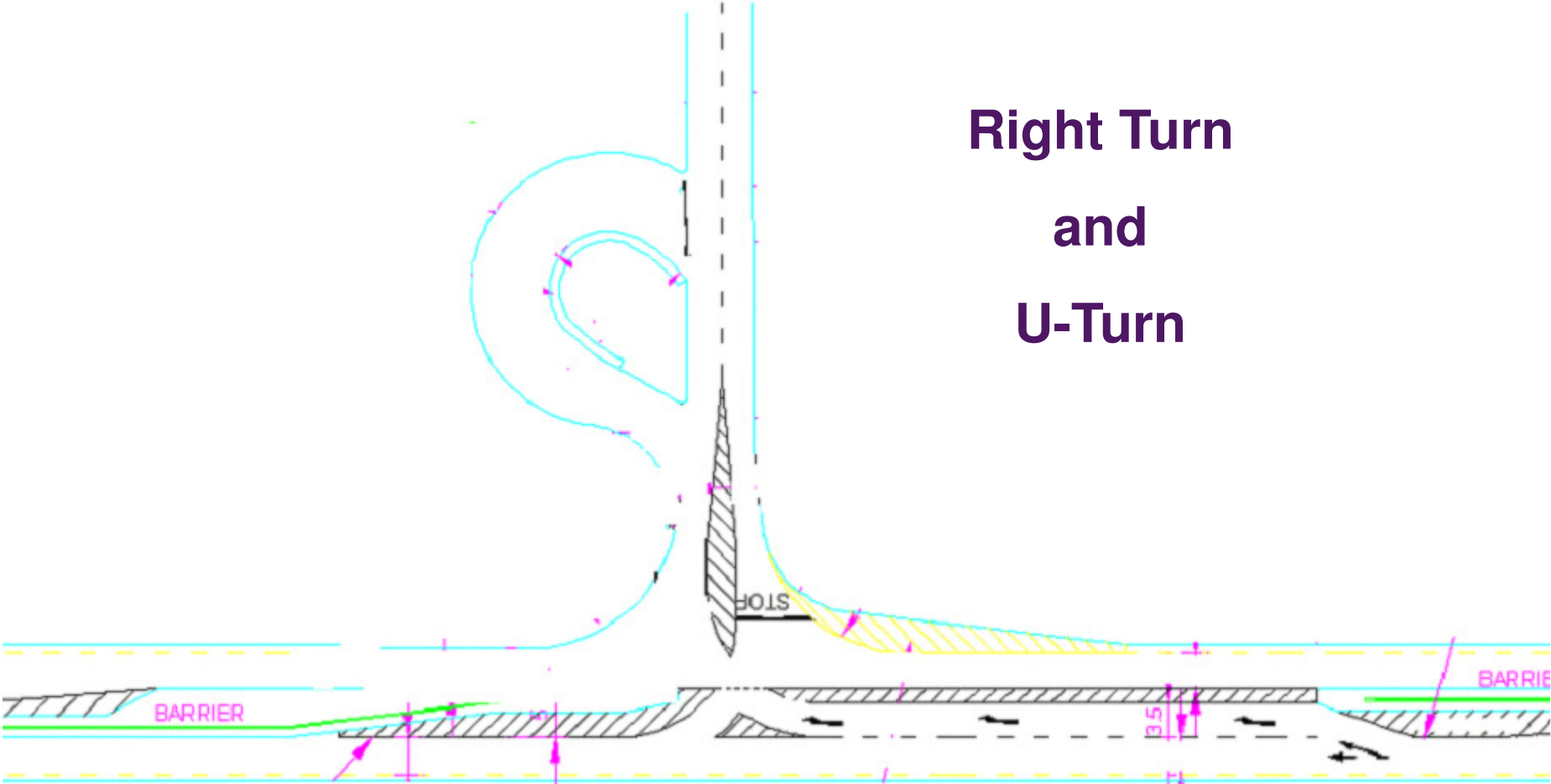
Junction at Non-critical Changeover

Notes:

- a = Turning Length (+ Queuing Length if required)
 - b = Deceleration Length
 - e = Direct Taper Length
- For required lengths see TD 42



Right Turn and U-Turn



Accesses

- As few as possible
- Restrict development
- Left in /Left out only
- Provision for U-turns
- Teardrop for local traffic





Your Plan - Your Future



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Safety Barriers

- N2 Containment Level
- Impact Severity Rating of A
- Working Width of W6 not $> 2.1\text{m}$
- EN 1317 –2
- Barrier width not $> 0.25\text{m}$
- Special performance requirements for emergencies











EVALUATION of 2+ 1 projects

- New Road Type , similar to Climbing Lanes with wire rope
- Pilot Retrofit Schemes were evaluated
- Too much frontage access in Ireland
- Maintenance of wire rope
- Critical changeover and traffic uncertainty

NRA 2 +2 brochure

NRA New Divided Road Types:
Type 2 and Type 3 Dual-carriageways



NRA
National Roads Authority
An tÚdarás um Bóithre Náisiúnta



26/10/2010 12:06



N4 Dromod Roosky









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