From Targets To Measures:

What Road Infrastructure Can Do For Safety

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Topics to discuss

- Ireland
- Current Road Safety Situation
- Targets of Road Safety Strategy
- Engineering Measures

Ireland

Ireland


Norwegian Sea
Reykjavik
ICELAND
NORWAY
SWEDEN
FINLAND
Tórshavn
Faroe Islands
(DENMARK)
SHETLAND ISLANDS
ORKNEY ISLANDS
Bergen
Oslo
Stockholm
Helsinki
Tallinn
ESTONIA
RUSSIA
Moscow
Rockall
HEBRIDES
Stavanger
Aberdeen
Glasgow
Edinburgh
North Atlantic Ocean
North Sea
Baltic Sea
Riga
LATVIA
LITHUANIA
Vilnius
Minsk
BELARUS
Belfast
UNITED
KINGDOM
Dublin
IRELAND
Leeds
Manchester
Liverpool
Birmingham
Cardiff
London
DENMARK
Copenhagen
Malmö
Kaliningrad
Gdańsk
Hamburg
Bremen
Berlin
Warsaw
POLAND
Łódź
Wrocław
Poznań
Brest
Kiev
Rivne
UKRAINE
Lviv
Amsterdam
NETH.
Rotterdam
Essen
Cologne
Leipzig
Celtic Sea
Brussels
Lille
BEL.
Bonn
GERMANY
Frankfurt am Main
Prague
CZECH REPUBLIC
Brno
Kraków
SLOVAKIA
Bratislava
Guernsey (U.K.)
Jersey (U.K.)
English Channel
Luxembourg
LUX.
Paris
Stuttgart
Munich
Strasbourg
Nantes
Vienna
AUSTRIA
Budapest
HUNGARY
Cluj-Napoca
ROMANIA
Chisinau
Iaşi
MOLDOVA
Zürich
Bern
SWITZ.
Geneva
Lyon
Milan
Venice
Turin
Ljubljana
SLOVENIA
Zagreb
Bucharest
Constanta
Black Sea
Bay of Biscay
FRANCE
A Coruña
Bilbao
Bordeaux
Toulouse
Genoa
CROATIA
Belgrade
SERBIA AND MONTENEGRO
Sarajevo
BULGARIA
Sofia
Varna
Istanbul
Andorra la Vella
ANDORRA
MONACO
Marseille
Florence
ITALY
Rome
Corsica
Adriatic Sea
Skopje
F.Y.R.O.M.
Tirana
ALB.
Thessaloniki
Bursa
Porto
Zaragoza
Madrid
PORTUGAL
Barcelona
Lisbon
SPAIN
Valencia
Balearic Sea
Sardinia
Tyrrhenian Sea
Naples
TURKEY
Izmir
GREECE
Athens
Aegean Sea
BALEARIC ISLANDS
Cagliari
Palermo
Ionian Sea
Sevilla
Gibraltar (U.K.)
Málaga
Mediterranean Sea
Sicily
Rhodes

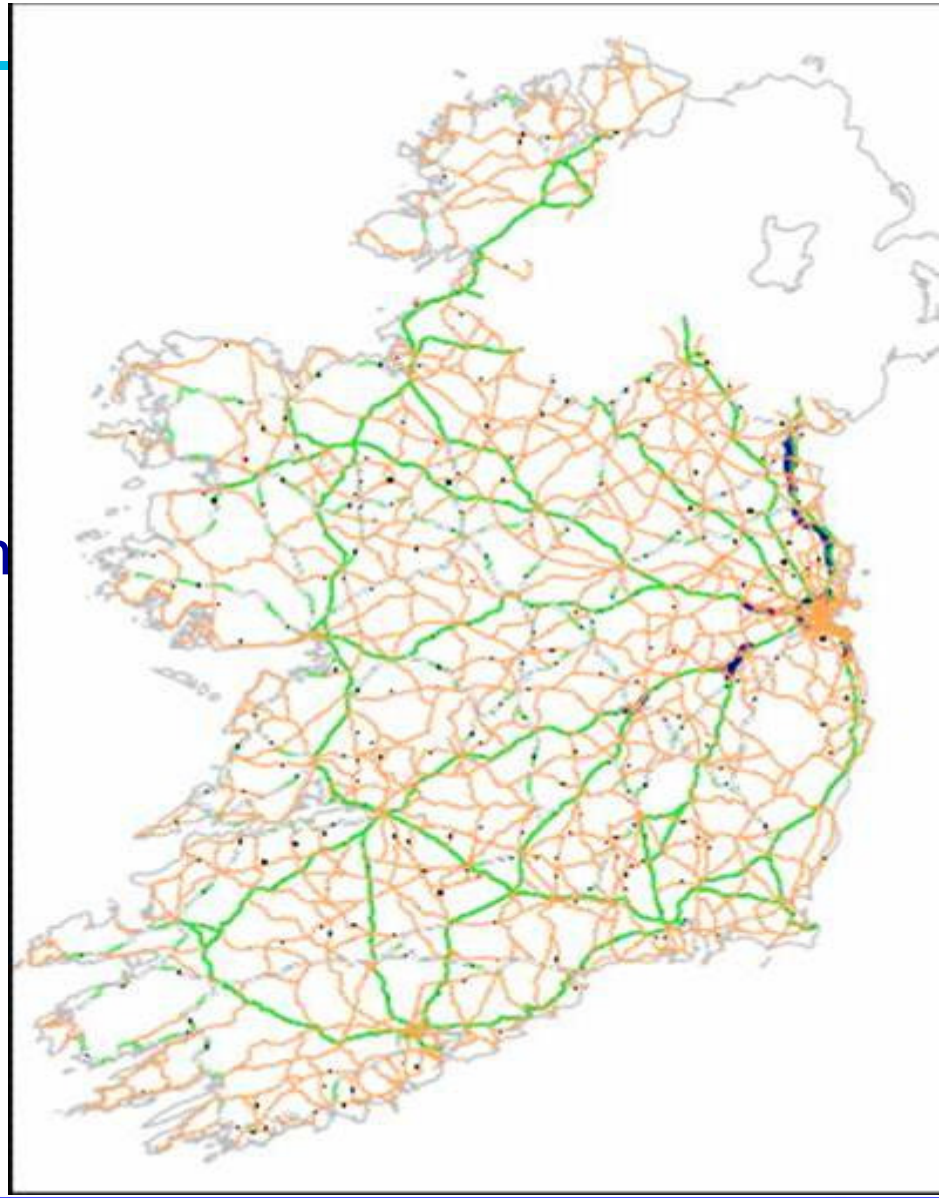
Ireland

- Population 4.13 Million
- 2.2 Million Driving Licences
  - 83% Full Licence
  - 17% Provisional Licence
- 2 Million Vehicles
  - 1,500,000 Private Cars
  - 268,000 Goods Vehicles
  - 76,000 Agricultural Vehicles
  - 34,000 Motorcycles
  - 4% Annual Increase

Ireland

Road Network

- 5,420 km National Roads
  - Motorway 191 km
  - Dual Carriageway 285 km
  - Single Carriageway 4944 km
- 94,000 km Other Roads "Non National"

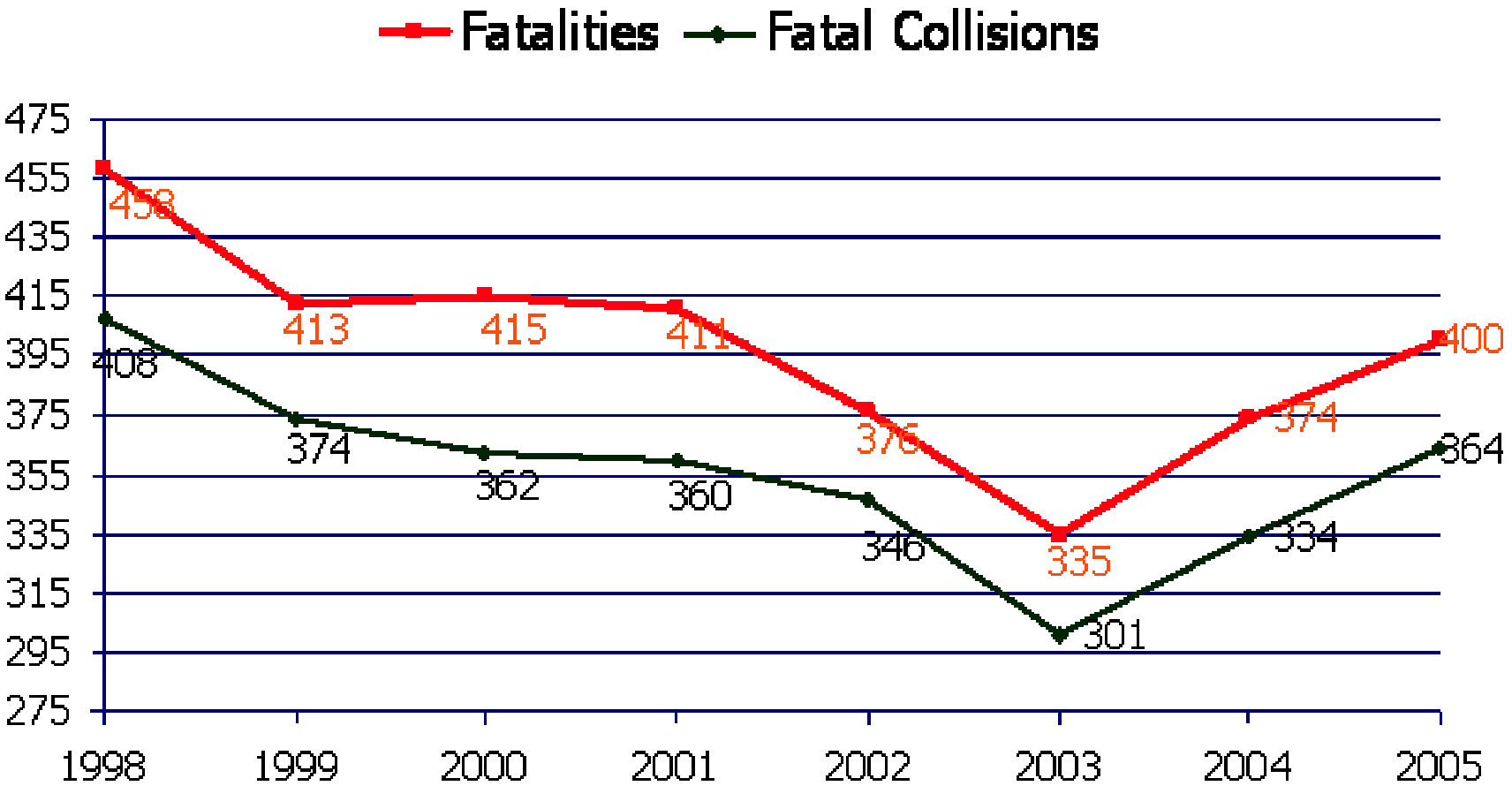


Current Road Safety Situation

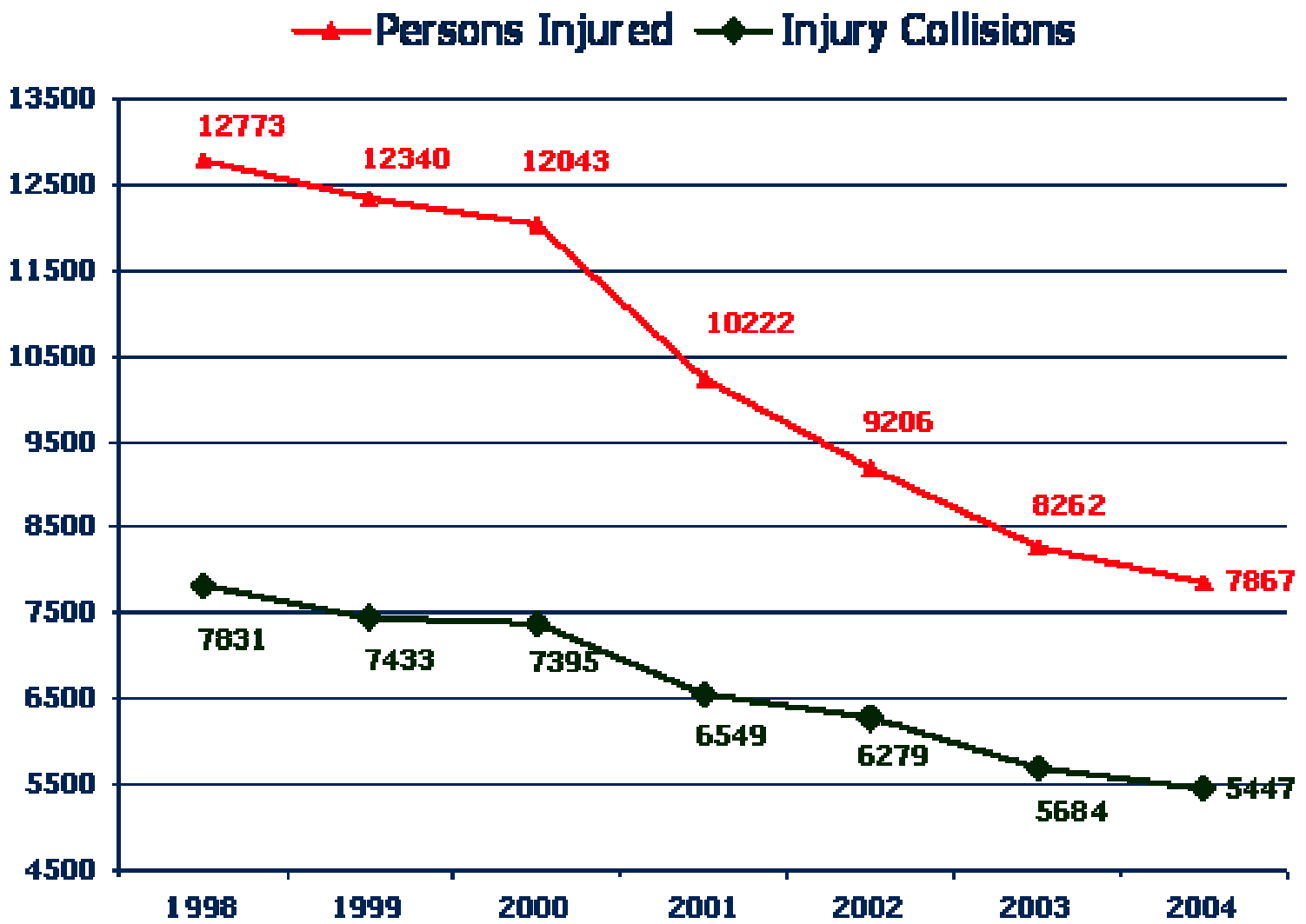
Collision Statistics

- 2004
  - 334 Fatal Collisions,
  - 662 Serious Injury Collisions,
  - 4,785 Minor Injury Collisions
  - 374 people killed
  - 7,867 people injured
- 2003
  - 8.4 deaths per 1,000,000 population
  - 1.5 collisions per 1,000 population
  - 8th out of 15 EU countries in 2003

Fatal Collisions per Year



Injury Collisions per Year

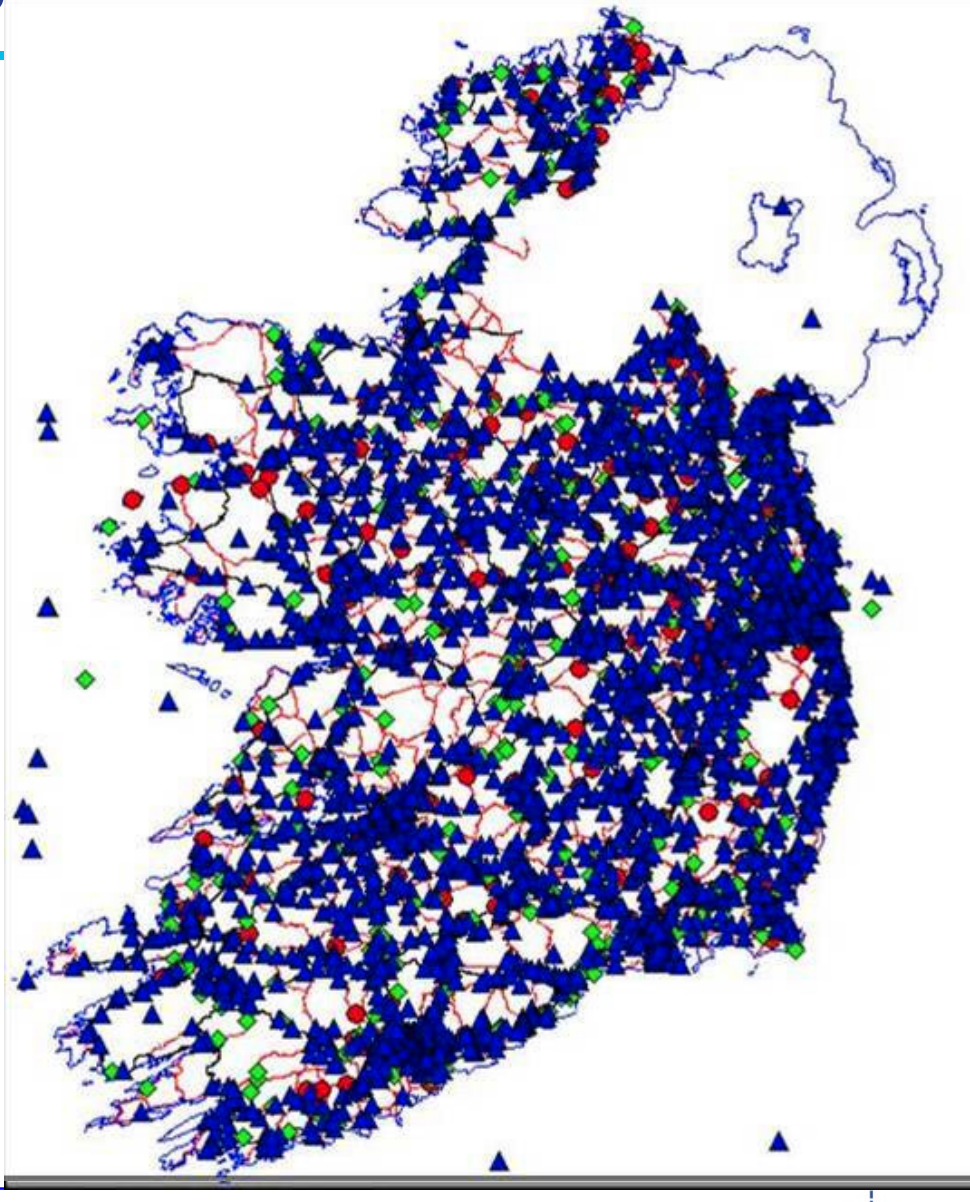


Accident Locations

2004

	Fatal	Serious	Minor
Motorway	**6**	**4**	**49**
Nat Primary	**93**	**136**	**778**
Nat Secondary	**36**	**73**	**442**
Other Roads	**199**	**449**	**3516**

Approximately 60% of all fatal collisions occur on Non National Roads



Targets

Road Safety Strategy 2004 – 2006

Specific Engineering Targets

- Complete 640 Low Cost Accident Remedial Schemes, 240 on National Roads, 400 on other roads
- Complete 20 Higher Cost Remedial Schemes
- Complete 60 new Traffic Calming installations

General Upgrading of National Road Network

- Complete approximately 1200 km of motorway / high quality dual carriageways.
- Construct approximately 400 km of “2+1” carriageways
- Continue procedure of Road Safety Audit on all new road schemes on national roads.

Measures

Measures

Low Cost
Accident Remedial Measures

Past Ten Years of Remedial Measures

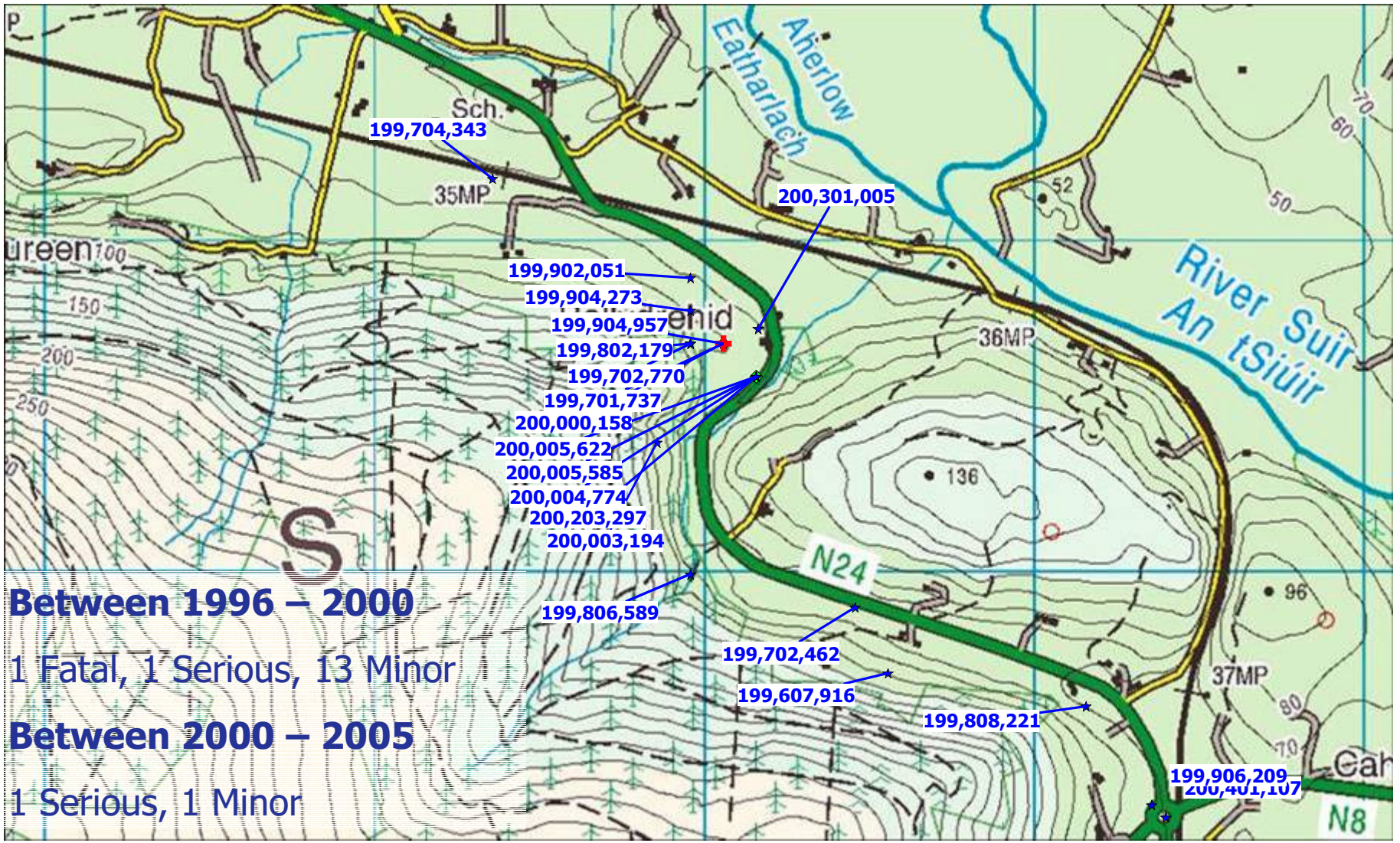
On National Roads

Year	No. of Schemes	Funding(€)	Cost per scheme
94–95	129	1,350,000	10,400
96–97	160	1,850,000	11,600
1998	93	1,350,000	14,700
1999	106	1,850,000	17,400
2000	83	2,000,000	24,100
2001	71	2,000,000	28,200
2002	72	2,100,000	28,900
2003	97	2,850,000	29,400
2004	123	2,450,000	20,100
2005	**113**	**2,450,000**	**21,900**

Typical Low Cost Remedial Measure

N24, Ballydrehid Bends

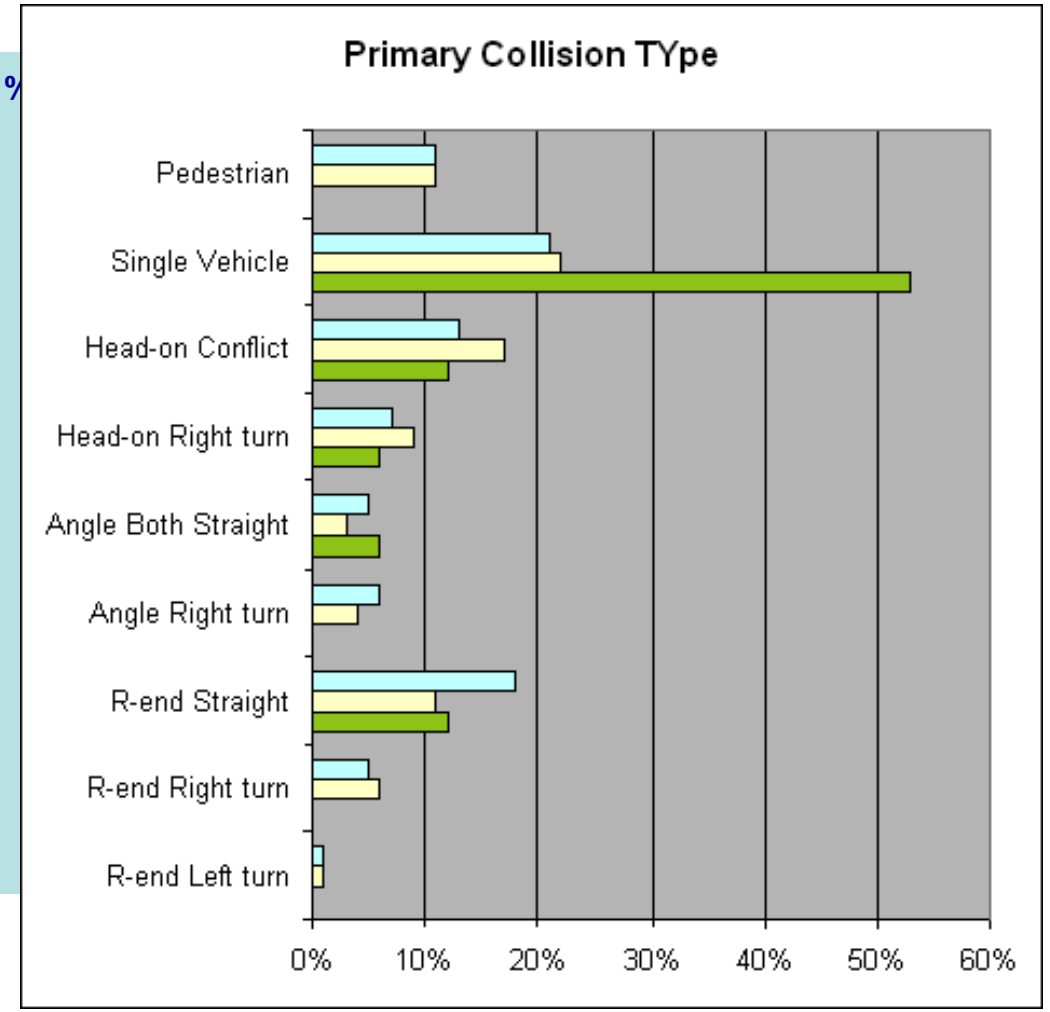
Ballydrehid Bends



Ballydrehid Bends, Data Comparison

Primary Collision Type

Collision Type	Number	%	Route %	National %
Pedestrian	0	0%	11%	11%
Single Vehicle	9	53%	22%	21%
Head-on Conflict	2	12%	17%	13%
Head-on Right turn	1	6%	9%	7%
Angle Both Straight	1	6%	3%	5%
Angle Right turn	0	0%	4%	6%
R-end Straight	2	12%	11%	18%
R-end Right turn	0	0%	6%	5%
R-end Left turn	0	0%	1%	1%



Ballydrehid Bends, Measure

Evaluation of Remedial Measures

- Review of Programme 1 (1994-1995) **129 Schemes**
  - Reduction of 25 fatal collisions
  - Reduction of 41 serious injury collisions
  - Increase of 3 minor injury collisions
- Review of Programme 2 (1996-1997) **160 Schemes**
  - Reduction of 18 fatal collisions
  - Reduction of 43 serious injury collisions
  - Increase of 22 minor injury collisions
- Review of Programme 3 is currently underway
- Conclusion: Effective and cheap, but getting less so

Evaluation of Remedial Measures

- Effective measures
  - Signing and lining
  - Improving sight distance
  - Average Yearly Rate of Return 300%
- Not so effective measures
  - Crash barrier
  - Pedestrian crossings
  - Sometimes negative rates of return

Evaluation of Remedial Measures

- Treatable Problems
  - Pedestrian collisions
  - Rear end right turn collisions
- Problems that are difficult to treat
  - Single vehicle collisions
  - Head on collisions

Measures

High Cost
Accident Remedial Measures

Higher Cost Measures

- Some sites need higher level funding
  - Single sites with high cost solutions
  - Treatment of entire routes with low cost measures
- Expected rate of return much lower
- Proposed to complete 10 measures per year

Higher Cost Measures. Example

- 1.5km length of
  and nearest villa

Measures

Traffic Calming of Towns and Villages on National Roads

Traffic Calming Schemes

- Treatment of small towns and villages that have not been bypassed
  - To reduce number and severity of accidents
  - To reduce speeds through towns and villages
  - Provide uniform layout with urban character for approach to village
  - Manage road space for traffic inside village
- 60 new schemes to be completed 2004-2006
  - In recent years approx 25 schemes annually

Gateway at Start of Speed Limit Zone

- Aim is to reduce speed of approaching traffic
- Road Narrowing
- Urban appearance – vertical elements
- Band of lighting

Gateway (Before)

Gateway (After)

Inside Gateway

- Aim is to keep speeds low
- Retain road narrowing
- Pedestrian facilities
- Manage road space
  - Separate parking areas
  - Central lanes for right turns
  - Reduce junction radii

Side Buildout, Central Island, Parking

Narrowing Junction Mouth

Smaller junction mouth

- Reduces crossing distance for pedestrian
- Reduces vehicle speeds at junction

Evaluation of Traffic Calming Measures

- Review of 21 schemes constructed 1993 - 1996
- Speed reductions of between 8 and 16 km/h
- Average annual accident reduction of
  - 1.5 Fatal collisions
  - 1.3 Serious Injury collisions
  - 2.8 Minor Injury collisions
- Pedestrian accidents decreased
- Head-on accidents decreased
- Rear-end accidents decreased
- Single vehicle accidents decreased in severity but increased slightly in number

Measures

Road Safety Audit

Road Safety Audit

- Procedure within design and construction process of new road projects
- Checks safety of new schemes
- Prevents new schemes from becoming future accident sites
- In long term will reduce need for Accident Remedial Measures

Road Safety Audit

- Mandatory on National Roads since 2001
- Adopted by some Local Authorities for other roads
- All changes to road layout
  - New road construction, realignment, widening
  - New junction
  - Changes to junction layout
  - Changes to lining layouts
  - Pedestrian crossings, traffic calming
  - New accesses for commercial development

Road Safety Audit

- Four stages within design and construction process
  - Stage F at feasibility
  - Stage 1 at outline design
  - Stage 2 at detailed design
  - Stage 3 at opening
- Stages can be combined for smaller schemes
- Monitoring after 3 years – “Stage 4”
- Consistent systematic approach to all schemes
  - Based on tried & tested safety principles – experience and research
  - From point of view of all road users: car driver, HGV driver, pedestrian, cyclist, motorcyclist, horse rider….

Road Safety Audit. Typical Problems

Obscured sign

Road Safety Audit. Typical Problems

Confusing sign

Road Safety Audit. Typical Problems

No protection from drop

Road Safety Audit. Typical Problems

No sight distance for pedestrians

Road Safety Audit. Typical Problems

Ponding in pedestrian route

Road Safety Audit. Typical Problems

“See-through” at roundabout

Evaluation of Road Safety Audit

- No formal evaluation yet
- RSA has been integral part of design and construction process for almost six years
- RSA has influenced methods and standards of design over this time
- Designers now more likely to consider road safety automatically during design process

Summary

- Low Cost Remedial Measures
  - Very effective in terms of Cost-Benefit
  - Less effective now than ten years ago
- High Cost Remedial Measures
  - No evaluation yet
  - Good public response
- Traffic Calming Schemes
  - Reduced speed
  - Reduced collisions
- Road Safety Audit
  - No evaluation yet in Ireland

Conclusion

- Specific engineering measures at selected sites are having a positive impact on road safety
- We are continuing with these measures and are committed to complete a certain number annually
- Inclusion of road safety audit within road building process has had positive effect on this process

Final Point to Remember

Greatest reduction in fatalities and injuries was achieved in 2003.

Due mainly to change in behaviour of our road users.

In October 2002 licence penalty points for speeding were introduced, and for the next six months the driving public responded.

Large reduction in number of fatal and serious injury collisions for these months, enough to affect annual figures significantly.

From Targets To Measures

Thank you

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