Specification for the Reinstatement of Openings in National Roads
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Revision Table

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue 1</td>
<td>July 2011</td>
<td>First Publication</td>
</tr>
<tr>
<td>Issue 2</td>
<td>December 2013</td>
<td>Specification Updated</td>
</tr>
</tbody>
</table>

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# Table of Contents

## Foreword

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>F0.1</td>
<td>General</td>
<td>12</td>
</tr>
<tr>
<td>F0.2</td>
<td>The National Roads Authority</td>
<td>12</td>
</tr>
<tr>
<td>F0.3</td>
<td>Legal Background</td>
<td>13</td>
</tr>
</tbody>
</table>

## Definitions

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S0.1</td>
<td>General</td>
<td>19</td>
</tr>
<tr>
<td>S0.2</td>
<td>Definition of Roadworks</td>
<td>19</td>
</tr>
<tr>
<td>S0.3</td>
<td>Undertaker Obligations</td>
<td>19</td>
</tr>
<tr>
<td>S0.4</td>
<td>Outline of the Reinstatement Specification</td>
<td>19</td>
</tr>
<tr>
<td>S0.5</td>
<td>Outline of the Appendices</td>
<td>19</td>
</tr>
<tr>
<td>S0.6</td>
<td>Outline of the Notes for Guidance</td>
<td>19</td>
</tr>
<tr>
<td>S0.7</td>
<td>Using the Reinstatement Specification</td>
<td>19</td>
</tr>
<tr>
<td>S0.8</td>
<td>How to Specify the Appropriate Road Reinstatement</td>
<td>19</td>
</tr>
<tr>
<td>S0.9</td>
<td>Health and Safety Requirements</td>
<td>19</td>
</tr>
<tr>
<td>S0.10</td>
<td>Traffic Safety and Management Requirements</td>
<td>19</td>
</tr>
</tbody>
</table>

## Operational Principles

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1.1</td>
<td>General</td>
<td>27</td>
</tr>
<tr>
<td>S1.2</td>
<td>Maintenance Period</td>
<td>27</td>
</tr>
<tr>
<td>S1.3</td>
<td>Road Categories</td>
<td>27</td>
</tr>
<tr>
<td>S1.4</td>
<td>Footway, Footpath and Cycle Track Categories</td>
<td>27</td>
</tr>
<tr>
<td>S1.5</td>
<td>Excavation and Trench Categories</td>
<td>27</td>
</tr>
<tr>
<td>S1.6</td>
<td>Apparatus within Road, Footway and Cycle Track Structures</td>
<td>27</td>
</tr>
<tr>
<td>S1.7</td>
<td>Geosynthetic Materials, Geotextiles and Reinforcement Grids</td>
<td>27</td>
</tr>
<tr>
<td>S1.8</td>
<td>Trees</td>
<td>27</td>
</tr>
<tr>
<td>S1.9</td>
<td>Immediate Works</td>
<td>27</td>
</tr>
</tbody>
</table>

## Performance Requirements

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2.1</td>
<td>General</td>
<td>33</td>
</tr>
<tr>
<td>S2.2</td>
<td>Surface Profile</td>
<td>33</td>
</tr>
<tr>
<td>S2.3</td>
<td>Fixed Features</td>
<td>33</td>
</tr>
<tr>
<td>S2.4</td>
<td>Surface Regularity</td>
<td>33</td>
</tr>
<tr>
<td>S2.5</td>
<td>Structural Integrity</td>
<td>33</td>
</tr>
<tr>
<td>S2.6</td>
<td>Skid Resistance</td>
<td>33</td>
</tr>
<tr>
<td>S2.7</td>
<td>Sampling and Testing</td>
<td>33</td>
</tr>
</tbody>
</table>
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3</td>
<td>Excavation</td>
<td>49</td>
</tr>
<tr>
<td>S3.1</td>
<td>Breaking the Surface</td>
<td>50</td>
</tr>
<tr>
<td>S3.2</td>
<td>Excavation</td>
<td>50</td>
</tr>
<tr>
<td>S3.3</td>
<td>Excavated Material</td>
<td>50</td>
</tr>
<tr>
<td>S3.4</td>
<td>Side Support</td>
<td>51</td>
</tr>
<tr>
<td>S3.5</td>
<td>Drainage</td>
<td>51</td>
</tr>
<tr>
<td>S3.6</td>
<td>Shallow or Aborted Excavations</td>
<td>51</td>
</tr>
<tr>
<td>S3.7</td>
<td>Trenchless Pipelaying</td>
<td>52</td>
</tr>
<tr>
<td>S4</td>
<td>Surround to Apparatus</td>
<td>53</td>
</tr>
<tr>
<td>S4.1</td>
<td>General</td>
<td>54</td>
</tr>
<tr>
<td>S5</td>
<td>Backfill</td>
<td>55</td>
</tr>
<tr>
<td>S5.1</td>
<td>Backfill Material Classification</td>
<td>56</td>
</tr>
<tr>
<td>S5.2</td>
<td>Additional Requirements</td>
<td>56</td>
</tr>
<tr>
<td>S6</td>
<td>Flexible and Composite Roads</td>
<td>57</td>
</tr>
<tr>
<td>S6.1</td>
<td>Reinstatement Methods</td>
<td>58</td>
</tr>
<tr>
<td>S6.2</td>
<td>Sub-base Reinstatement</td>
<td>59</td>
</tr>
<tr>
<td>S6.3</td>
<td>Base Reinstatement</td>
<td>59</td>
</tr>
<tr>
<td>S6.4</td>
<td>Surface Reinstatement</td>
<td>59</td>
</tr>
<tr>
<td>S6.5</td>
<td>Base and Edge Preparation</td>
<td>63</td>
</tr>
<tr>
<td>S6.6</td>
<td>Tolerances</td>
<td>70</td>
</tr>
<tr>
<td>S6.7</td>
<td>Surface Course Restrictions – Wheel Track Zones</td>
<td>70</td>
</tr>
<tr>
<td>S7</td>
<td>Rigid and Modular Roads</td>
<td>73</td>
</tr>
<tr>
<td>S7.1</td>
<td>Reinstatement Methods</td>
<td>74</td>
</tr>
<tr>
<td>S7.2</td>
<td>Sub-base Reinstatement</td>
<td>75</td>
</tr>
<tr>
<td>S7.3</td>
<td>Concrete Road Slab Reinstatement</td>
<td>75</td>
</tr>
<tr>
<td>S7.4</td>
<td>Edge Support and Preparation</td>
<td>76</td>
</tr>
<tr>
<td>S7.5</td>
<td>Reinforcement</td>
<td>77</td>
</tr>
<tr>
<td>S7.6</td>
<td>Overlays</td>
<td>78</td>
</tr>
<tr>
<td>S7.7</td>
<td>Modular Roads</td>
<td>78</td>
</tr>
<tr>
<td>S7.8</td>
<td>Surface Course Restrictions – Wheel Track Zones</td>
<td>80</td>
</tr>
</tbody>
</table>
# Footways, Footpaths and Cycle Tracks

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S8.1</td>
<td>Reinstatement Methods</td>
<td>84</td>
</tr>
<tr>
<td>S8.2</td>
<td>Sub-base and Binder Course Reinstatement</td>
<td>85</td>
</tr>
<tr>
<td>S8.3</td>
<td>Surface Reinstatement</td>
<td>86</td>
</tr>
<tr>
<td>S8.4</td>
<td>Vehicular Trafficking</td>
<td>90</td>
</tr>
<tr>
<td>S8.5</td>
<td>Tolerances</td>
<td>90</td>
</tr>
</tbody>
</table>

# Verges and Unmade Ground

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S9.1</td>
<td>General</td>
<td>92</td>
</tr>
<tr>
<td>S9.2</td>
<td>Cultivated Areas</td>
<td>93</td>
</tr>
<tr>
<td>S9.3</td>
<td>Grassed Areas</td>
<td>93</td>
</tr>
<tr>
<td>S9.4</td>
<td>Verges, Ditches and Drainage Courses</td>
<td>93</td>
</tr>
</tbody>
</table>

# Compaction Requirements

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S10.1</td>
<td>Introduction</td>
<td>96</td>
</tr>
<tr>
<td>S10.2</td>
<td>Compaction of Materials</td>
<td>96</td>
</tr>
<tr>
<td>S10.3</td>
<td>Equipment Operation and Restrictions</td>
<td>97</td>
</tr>
</tbody>
</table>

# Ancillary Activities

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S11.1</td>
<td>Traffic Signs, Road Markings, Studs and Verge Markers</td>
<td>102</td>
</tr>
<tr>
<td>S11.2</td>
<td>Street Furniture and Special Features</td>
<td>104</td>
</tr>
<tr>
<td>S11.3</td>
<td>Traffic Sensors, etc.</td>
<td>104</td>
</tr>
<tr>
<td>S11.4</td>
<td>Water-related Matters</td>
<td>105</td>
</tr>
<tr>
<td>S11.5</td>
<td>Ironwork and Apparatus</td>
<td>105</td>
</tr>
<tr>
<td>S11.6</td>
<td>Test Holes</td>
<td>107</td>
</tr>
<tr>
<td>S11.7</td>
<td>Overbanding</td>
<td>108</td>
</tr>
</tbody>
</table>

# Remedial Works

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S12.1</td>
<td>General</td>
<td>110</td>
</tr>
<tr>
<td>S12.2</td>
<td>Repair of Cracking</td>
<td>110</td>
</tr>
<tr>
<td>S12.3</td>
<td>Repair of Settlement beyond Reinstatement Limits</td>
<td>111</td>
</tr>
<tr>
<td>S12.4</td>
<td>Repair of Other Significant Defects</td>
<td>112</td>
</tr>
</tbody>
</table>
# Contents

## Table of Contents

<table>
<thead>
<tr>
<th>S13</th>
<th>Works Near Road Structures</th>
<th>113</th>
</tr>
</thead>
<tbody>
<tr>
<td>S13.1</td>
<td>Introduction</td>
<td>114</td>
</tr>
<tr>
<td>S13.2</td>
<td>Road Structures</td>
<td>115</td>
</tr>
<tr>
<td>S13.3</td>
<td>Ancient Monuments and Listed Structures</td>
<td>117</td>
</tr>
<tr>
<td>S13.4</td>
<td>Specification for the Reinstatement of Openings in National Roads</td>
<td>117</td>
</tr>
<tr>
<td>S13.5</td>
<td>Responsibility for Damage</td>
<td>117</td>
</tr>
<tr>
<td>S13.6</td>
<td>Recognition of Structures</td>
<td>118</td>
</tr>
<tr>
<td>S13.7</td>
<td>Damage to Road Structures</td>
<td>118</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APPENDIX A0 – Road Categories</th>
<th>119</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0.0</td>
<td>122</td>
</tr>
<tr>
<td>A0.1</td>
<td>122</td>
</tr>
<tr>
<td>A0.2</td>
<td>122</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APPENDIX A1- Backfill Materials</th>
<th>123</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1.1</td>
<td>124</td>
</tr>
<tr>
<td>A1.2</td>
<td>124</td>
</tr>
<tr>
<td>A1.3</td>
<td>124</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appendix A2 - Key to Materials</th>
<th>127</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2.0</td>
<td>128</td>
</tr>
<tr>
<td>A2.1</td>
<td>128</td>
</tr>
<tr>
<td>A2.2</td>
<td>129</td>
</tr>
<tr>
<td>A2.3</td>
<td>130</td>
</tr>
<tr>
<td>A2.4</td>
<td>131</td>
</tr>
<tr>
<td>A2.5</td>
<td>131</td>
</tr>
<tr>
<td>A2.6</td>
<td>131</td>
</tr>
<tr>
<td>A2.7</td>
<td>133</td>
</tr>
<tr>
<td>A2.8</td>
<td>134</td>
</tr>
<tr>
<td>A2.9</td>
<td>134</td>
</tr>
<tr>
<td>A2.10</td>
<td>138</td>
</tr>
<tr>
<td>A2.11</td>
<td>139</td>
</tr>
<tr>
<td>A2.12</td>
<td>139</td>
</tr>
</tbody>
</table>
# APPENDIX A3 – Flexible Roads

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A3.0</td>
<td>Type 0 Flexible Roads</td>
</tr>
<tr>
<td>A3.1</td>
<td>Type 1 Flexible Roads</td>
</tr>
<tr>
<td>A3.2</td>
<td>Type 2 Flexible Roads</td>
</tr>
<tr>
<td>A3.3</td>
<td>Sub-base Construction Flexible Roads</td>
</tr>
<tr>
<td>A3.4</td>
<td>Width of Surface Course Reinstatement - Surface Course greater than 5 years old</td>
</tr>
</tbody>
</table>

# APPENDIX A4 – Composite Roads

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4.0</td>
<td>Type 0 Composite Roads</td>
</tr>
<tr>
<td>A4.1</td>
<td>Type 1 Composite Roads</td>
</tr>
<tr>
<td>A4.2</td>
<td>Type 2 Composite Roads</td>
</tr>
<tr>
<td>A4.3</td>
<td>Sub-base Construction – Types 0, 1 &amp; 2 Composite Roads</td>
</tr>
<tr>
<td>A4.4</td>
<td>Width of Surface Course Reinstatement - Surface Course greater than 5 years old</td>
</tr>
</tbody>
</table>

# APPENDIX A5 – Rigid Roads

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A5.0</td>
<td>Types 0 Rigid Roads</td>
</tr>
<tr>
<td>A5.1</td>
<td>Types 1 Rigid Roads</td>
</tr>
<tr>
<td>A5.2</td>
<td>Types 2 Rigid Roads</td>
</tr>
<tr>
<td>A5.3</td>
<td>Width of Surface Course Reinstatement - Surface Course greater than 5 years old</td>
</tr>
</tbody>
</table>

# APPENDIX A6 – Modular Roads

Not Used

# APPENDIX A7 – Footways, Footpaths and Cycle Tracks

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A7.0</td>
<td>Flexible Footways, Footpaths and Cycle Tracks</td>
</tr>
<tr>
<td>A7.1</td>
<td>Rigid Footways, Footpaths and Cycle Tracks</td>
</tr>
<tr>
<td>A7.2</td>
<td>Modular Footways, Footpaths and Cycle Tracks</td>
</tr>
</tbody>
</table>

# Appendix A8 - Compaction Requirements

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A8.1</td>
<td>Granular and Cement Bound Materials</td>
</tr>
<tr>
<td>A8.2</td>
<td>Bituminous Mixtures</td>
</tr>
</tbody>
</table>

# APPENDIX A9 - Alternative Reinstatement Materials (ARMs)

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A9.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>A9.2</td>
<td>General Requirements for FCRs</td>
</tr>
<tr>
<td>A9.3</td>
<td>Structural Materials for Reinstatements (SMRs)</td>
</tr>
</tbody>
</table>
# Table of Contents

## APPENDIX A10

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10.1</td>
<td>Not Used</td>
<td>-</td>
</tr>
</tbody>
</table>

## APPENDIX A11 - Bitumen Binder Equivalence

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A11.1</td>
<td>Introduction</td>
<td>172</td>
</tr>
<tr>
<td>A11.2</td>
<td>Base and Binder Course Materials</td>
<td>172</td>
</tr>
</tbody>
</table>

## Appendix A12 - Reinstatement of Modular Surface Layer

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A12.1</td>
<td>Interim Reinstatement</td>
<td>174</td>
</tr>
<tr>
<td>A12.2</td>
<td>Permanent Reinstatement</td>
<td>174</td>
</tr>
<tr>
<td>A12.3</td>
<td>Provision of Replacement Modules</td>
<td>177</td>
</tr>
<tr>
<td>A12.4</td>
<td>Pre-existing Surface Damage outside limits of the Works</td>
<td>177</td>
</tr>
</tbody>
</table>

## APPENDIX A13: Works Near Road Structures

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A13.1</td>
<td>Typical Structure Types and Restrictions</td>
<td>180</td>
</tr>
</tbody>
</table>

## Notes For Guidance

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG1</td>
<td>Introduction</td>
<td>194</td>
</tr>
<tr>
<td>NG2</td>
<td>Performance Requirements</td>
<td>199</td>
</tr>
<tr>
<td>NG3</td>
<td>Excavation</td>
<td>205</td>
</tr>
<tr>
<td>NG4</td>
<td>Surround to Apparatus</td>
<td>207</td>
</tr>
<tr>
<td>NG5</td>
<td>Backfill</td>
<td>209</td>
</tr>
<tr>
<td>NG6</td>
<td>Flexible and Composite Roads</td>
<td>211</td>
</tr>
<tr>
<td>NG7</td>
<td>Rigid and Modular Roads</td>
<td>217</td>
</tr>
<tr>
<td>NG</td>
<td>Section Title</td>
<td>Page</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>NG8</td>
<td>Footways, Footpaths and Cycle Tracks</td>
<td>219</td>
</tr>
<tr>
<td>NG9</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>NG10</td>
<td>Compaction Requirements</td>
<td>223</td>
</tr>
<tr>
<td>NG11</td>
<td>Ancillary Activities</td>
<td>229</td>
</tr>
<tr>
<td>NG12-13</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>NGA1</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>NGA2</td>
<td>Key to Materials</td>
<td>233</td>
</tr>
<tr>
<td>NGA3-11</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>NGA12</td>
<td>Reinstatement of Modular Surface Layers</td>
<td>235</td>
</tr>
<tr>
<td>NGA13</td>
<td>Not Used</td>
<td></td>
</tr>
</tbody>
</table>
Foreword

F0.1 General

The Specification for the Reinstatement of Openings on National Roads was prepared by Roughan & O’Donovan Consulting Engineers (ROD) on behalf of the National Roads Authority (NRA). The Reinstatement Specification was produced in response to the “Communications Regulation (Premium Rate Services and Electronic Infrastructure) Act 2010” introduced to accelerate the development of the communications network throughout Ireland using the national road network.

The Act states that a network operator shall not commence or carry out or cause to be commenced or carried out any road works unless prior written consent has been obtained from the relevant road authority, which in the case of a national road is the NRA. The NRA has published this Reinstatement Specification to outline the appropriate reinstatement procedures that each network operator must undertake and comply with on receipt of written consent in cases where the proposed work involves the opening of an existing national road.

This Reinstatement Specification, whilst developed in response to the Communications Act should also be applied to road works carried out by other utility companies, local authorities or other companies and individuals on national roads.

F0.2 The National Roads Authority

The National Roads Authority’s primary function is to secure the provision of a safe and efficient network of national roads (Section 17 of the Roads Act 1993). The NRA’s Mission Statement is to “improve quality of life and national economic competitiveness by developing, maintaining and operating the national road network in a safe, cost effective and sustainable manner.”
F0.3 **Legal Background**

The Communications Regulation (Premium Rate Services and Electronic Infrastructure) Act 2010 was introduced in March 2010. Section 21 of that Act amends part 5 of the Communications (Regulation) Act 2002, addressing the requirements of network operators in seeking to utilise the existing national road network for telecommunications infrastructure.

Under the previous legislation (Part V of the Communications Regulation Act 2002) local authorities were the sole authority responsible for granting consents to communications operators to carry out road works on all public roads. Section 21 of the Act amends this by designating the National Roads Authority as the relevant authority for granting of consent to interested parties to carry out road works on national roads (including motorways). Local authorities remain the overseeing authority for regional and local roads in relation to such consents.

Under the Road Traffic Act 1961 which was updated under Section 9 of the Dublin Transportation Authority (Dissolution) Act 1987, a local authority can issue directions in writing to persons carrying out road works in its functional area. The NRA under the Communications Regulation (Premium Rate Services and Electronic Infrastructure) Act 2010 is named as the overseeing authority in relation to any road works carried out by communications ‘Network Operators’ on national roads or motorways.

Under the Communications Regulation Act 2010 the National Roads Authority may now issue the following Directions in writing to communications ‘Network Operators’ carrying out road works in its functional area:

- Periods during which and the times at which road works shall or shall not be carried out,
- the manner in which road works shall or shall not be carried out,
- the requirements and standards in relation to the temporary or permanent reinstatement of a public road following the carrying out of road works,
- the requirements in relation to the giving of security for satisfactory reinstatement of a public road following the carrying out of road works,
- the requirements in relation to the control of traffic in the vicinity of road works.

The Local Authority is the overseeing organisation for all road works which do not fall under the Communications Regulation Act 2010. Section 13 (6) of the Roads Act, 1993 provides powers whereby a Local Authority may allow a person or group of persons carry out maintenance works on a local road.
# Definitions

<table>
<thead>
<tr>
<th><strong>Aggregate Abrasion Value (AAV)</strong></th>
<th>the standard measure of an aggregate’s resistance to abrasion.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>authority</strong></td>
<td>The authority shall be defined as the National Roads Authority for road works carried out under the Communications Act. The authority shall be defined as the relevant Local Authority for all other road works on national roads.</td>
</tr>
<tr>
<td><strong>Bond Coat</strong></td>
<td>bond coats are proprietary materials, generally formulated to enable heavier application rates than are possible with tack coats and to provide greater cohesion between bituminous layers.</td>
</tr>
<tr>
<td><strong>CBGM</strong></td>
<td>Cement Bound Granular Material.</td>
</tr>
<tr>
<td><strong>CBR</strong></td>
<td>Californian Bearing Ratio: a measure of the load bearing strength of a granular or unbound material.</td>
</tr>
<tr>
<td><strong>Composite construction</strong></td>
<td>a structure where the road is composed of lean mix concrete or other cement bound granular material, normally with bituminous surfacing layers.</td>
</tr>
<tr>
<td><strong>Cut-back</strong></td>
<td>see ‘stepped joint’.</td>
</tr>
<tr>
<td><strong>Cycle track</strong></td>
<td>a way constituting or comprised in a roadway, being a way over which the public have a right of way on pedal cycles only, with or without a right of way on foot.</td>
</tr>
<tr>
<td><strong>Deep openings</strong></td>
<td>all excavations and trenches in which the depth of cover over the buried apparatus is greater than 1.5 metres. Trenches with a depth of cover that is intermittently more than 1.5 metres for lengths of less than 5 metres are not deemed to be deep openings.</td>
</tr>
<tr>
<td><strong>Emergency works</strong></td>
<td>roadworks necessary to eliminate or reduce danger of risk to persons or property.</td>
</tr>
<tr>
<td><strong>Flexible construction</strong></td>
<td>a road structure where the Base is composed of either bituminous material or granular material, or a combination thereof.</td>
</tr>
<tr>
<td><strong>Footpath</strong></td>
<td>a way over which the public have a right of way on foot only, not being a footway.</td>
</tr>
<tr>
<td><strong>Footway</strong></td>
<td>a way comprised in a roadway, which also comprises a carriageway, being a way over which the public have a right of way on foot only.</td>
</tr>
<tr>
<td><strong>Geosynthetic materials</strong></td>
<td>a generic term describing a product at least one of whose components is made from a synthetic or natural polymer, in the form of a sheet or a 3D structure, used in contact with soil and/or other materials in geotechnical and civil engineering applications.</td>
</tr>
<tr>
<td><strong>HBM</strong></td>
<td>Hydraulically Bound Materials.</td>
</tr>
<tr>
<td><strong>HD</strong></td>
<td>Highway Design Standard- A section of the Design Manual for Roads and Bridges (DMRB) issued by the National Roads Authority (NRA).</td>
</tr>
<tr>
<td><strong>Immediate Temporary Reinstatement</strong></td>
<td>temporary works comprising the orderly placement of excavated or other material, reasonably compacted to finished surface level, usually with a cold-lay surfacing.</td>
</tr>
<tr>
<td><strong>INAB</strong></td>
<td>Irish National Accreditation Board, the organisation that has introduced a national scheme for the accreditation of Laboratories used for the testing of materials.</td>
</tr>
<tr>
<td><strong>Interim reinstatement</strong></td>
<td>the orderly placement and proper compaction of a combination of permanent and temporary reinstatement layers to the road surface level.</td>
</tr>
<tr>
<td><strong>Intervention</strong></td>
<td>restoration of a reinstatement which does not comply with the performance standards, to a condition complying with those standards.</td>
</tr>
<tr>
<td><strong>LA</strong></td>
<td>Los Angeles Abrasion Value – measure of the resistance to abrasion of an aggregate.</td>
</tr>
<tr>
<td><strong>Longitudinal Trench</strong></td>
<td>a longitudinal trench is a substantial cutting in a road, footway, footpath or cycle track which runs parallel to the vehicular or pedestrian traffic.</td>
</tr>
<tr>
<td><strong>Major projects</strong></td>
<td>standard works which have been identified specifically in the undertaker’s annual operating programme or which, if not specifically identified in that programme, are normally planned at least 6 months in advance of works commencing.</td>
</tr>
<tr>
<td><strong>Modular construction</strong></td>
<td>a structure where the surface is composed of setts, concrete blocks, brick pavers or paving slabs etc. laid on appropriate sub-construction.</td>
</tr>
<tr>
<td><strong>msa</strong></td>
<td>million standard axles.</td>
</tr>
<tr>
<td><strong>Narrow trenches</strong></td>
<td>all trenches of 300mm surface width or less, with a surface area greater than 2 square metres.</td>
</tr>
<tr>
<td><strong>NSAI Agrément</strong></td>
<td>National Standards Authority of Ireland Agrément is a recognised body giving approval for Products &amp; Processes</td>
</tr>
<tr>
<td><strong>Pen</strong></td>
<td>the penetration grade of a bituminous binder.</td>
</tr>
<tr>
<td><strong>Permanent Reinstatement</strong></td>
<td>the orderly placement and proper compaction of permanent reinstatement layers up to and including the finished road surface level.</td>
</tr>
<tr>
<td><strong>Permitted</strong></td>
<td>an allowable alternative to the preferred material – see also ‘Preferred’.</td>
</tr>
<tr>
<td><strong>Preferred</strong></td>
<td>the favoured choice between a number of options – see also ‘Permitted’.</td>
</tr>
<tr>
<td><strong>PSV</strong></td>
<td>Polished Stone Value.</td>
</tr>
<tr>
<td><strong>PTV</strong></td>
<td>Pendulum Test Value – a measure of the frictional properties of a surface using a Pendulum test device.</td>
</tr>
</tbody>
</table>
## Definitions

| **Public Road** | a road over which a public right of way exists and the responsibility for the maintenance of which lies on a road authority |
| **Rigid construction** | a structure where the surface slab also performs the function of the Base; is of pavement quality concrete and may be reinforced. Under certain circumstances, as defined in Section S7, a rigid road that has been overlaid may be deemed to be a composite construction for the purpose of this Reinstatement Specification. |
| **Road & footway structure** | includes the surface course, binder course, base and sub-base. |
| **Road** | (a) any road, street, lane, footpath, square, court, alley or passage,  
(b) any bridge, viaduct, underpass, subway, tunnel, overpass, overbridge, flyover, carriageway (whether single or multiple), pavement or footway,  
(c) any weighbridge or other facility for the weighing or inspection of vehicles, toll plaza or other facility for the collection of tolls, service area, emergency telephone, first aid post, culvert, arch, gulley, railing, fence, wall, barrier, guardrail, margin, kerb, lay-by, hard shoulder, island, pedestrian refuge, median, central reserve, channelliser, roundabout, gantry, pole, ramp, bollard, pipe, wire, cable, sign, signal or lighting forming part of the road, and  
(d) any other structure or thing forming part of the road and  
   (i) necessary for the safety, convenience or amenity of road users or for the construction, maintenance, operation or management of the road or for the protection of the environment, or  
   (ii) prescribed by the Minister; |
<p>| <strong>Small excavations</strong> | all openings with a surface area of 2 square metres or less. For the purposes of this Reinstatement Specification, test holes up to 150mm diameter are not excavations and shall be reinstated in accordance with the requirements of Section S11. |
| <strong>SRV</strong> | Skid Resistance Value – a measure of the frictional properties of a surface using a Pendulum test device. |
| <strong>Stepped joint</strong> | the practice whereby the width of the reinstatement of the binder course and/or surface course is made wider than the reinstatement below it to provide higher resistance to water ingress. |
| <strong>Tack Coat</strong> | conventional bitumen emulsions conforming to IS EN 13108 used to enhance the adhesion of the overlying bituminous layer which might be impaired due to minor dust problems or insufficient free bitumen on the surface of the layer to be overlaid. |</p>
<table>
<thead>
<tr>
<th><strong>The Act</strong></th>
<th>unless otherwise stated in this Reinstatement Specification and Definitions ‘the Act’ refers to the ‘Communications Regulation (Premium Rate Services and Electronic Infrastructure) Act 2010’</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traffic sign</strong></td>
<td>‘Traffic sign’ has the meaning assigned to it by Section 95 of the Road Traffic Act of 1961.</td>
</tr>
<tr>
<td><strong>Transverse Trench</strong></td>
<td>a transverse trench is a substantial cutting in a road, footway, footpath or cycle track which runs perpendicular to the vehicular or pedestrian traffic.</td>
</tr>
<tr>
<td><strong>Trimback</strong></td>
<td>the area between trim-lines excavated around a fixed feature to permit adequate reinstatement.</td>
</tr>
<tr>
<td><strong>Trim-line</strong></td>
<td>the cut face that defines the outer edge of an excavation.</td>
</tr>
<tr>
<td><strong>TRL</strong></td>
<td>Transport Research Laboratory.</td>
</tr>
<tr>
<td><strong>undertaker</strong></td>
<td>the ‘premium rate service provider’ as defined under the Communications Regulation Act 2010 for all works carried out under the Communications Regulation Act 2010. For all other works, the undertaker shall be defined as the party who is carrying out the works on a national road.</td>
</tr>
<tr>
<td><strong>Urgent works</strong></td>
<td>works which fall short of emergency works but are of sufficient urgency to warrant immediate action either to prevent further deterioration of an existing situation or to avoid becoming in breach of a statutory obligation.</td>
</tr>
<tr>
<td><strong>Verge</strong></td>
<td>that part of the road outside of the carriageway, which may be slightly raised but is exclusive of embankment or cutting slopes, and generally grassed.</td>
</tr>
<tr>
<td><strong>Wheel Track</strong></td>
<td>the two locations on each lane/carriageway where the wheels of the majority of traffic passes over (refer to Figure S6.8 for details).</td>
</tr>
<tr>
<td><strong>Wheel Tracking Performance</strong></td>
<td>Wheel Tracking Performance is a measure of the resistance of road layers (primarily surface courses) to deformation (rutting) determined by a test undertaken in accordance with IS EN 13108-20.</td>
</tr>
</tbody>
</table>

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December 2013
S0

Preamble to the Reinstatement Specification
Preamble to the Reinstatement Specification

S0.1 General
This Reinstatement Specification outlines the national standard applicable when carrying out reinstatement as a part of executing road works on national roads. Broadly, the Reinstatement Specification and its appendices prescribe materials that may be used, the expected standards of workmanship and performance standards to be complied with at both interim and permanent reinstatement stages for the duration of the Maintenance Period (defined in Section S1.2).

S0.2 Definition of Roadworks
For all works carried out under the Communications Regulation Act 2010, roadworks means the opening by excavation of a public road or any act or work that requires or causes the closing of a public road or part of a public road. Examples of such works include the opening or closing by backfilling of a public road or part of a public for the purpose of the establishment, extension, replacement, repair, removal or maintenance of electronic communications infrastructure.

For all other works, roadworks is defined as repairs, maintenance, alterations, improvements, installations or any other works to, above, adjacent to or under a national road or motorway.

S0.3 Undertaker Obligations
The undertaker who has been granted consent from the authority to commence road works must comply with this document and the following requirements:

S0.3.1 Motorway/Dual Carriageway Restrictions
Works to be carried out on motorways, rural dual carriageways and rural 2+1 dual carriageways are to be located in the verge and are not permitted in the carriageway or hard shoulder.

S0.3.2 Reinstatement Width (Surface Course)
Full lane width reinstatement (Surface Course) shall apply where works are carried out in a lane of a national road (including hard shoulder). The width of a surface course reinstatement may be reduced for trench works located in carriageways where an existing surface course is greater than 5 years old. For details see Figures S6.2, S6.4, S6.5, S6.6 and S6.7 for flexible roads and Figures S7.2, S7.3, S7.4 and S7.5 for rigid roads.

Full width reinstatement (Surface Course) shall apply for all footways, footpaths and cycle tracks, See Chapter 8 for details.

Survey of Existing Road Condition
The undertaker shall carry out a condition survey of the existing road in advance of the commencement of works.
S0.3.3

The survey shall include a description of all existing defects together with photographs. The surveys shall be carried out two weeks prior to any work that will affect the road. Two copies of the survey reports shall be submitted to the authority. A further copy shall be retained by the undertaker.

The survey record shall record the condition of the existing road pavement and shall include the following:

1. Description of the road and general condition of all defects recorded
2. Description of the road markings and general condition of all defects recorded
3. Length and width of all cracking
4. Condition of surrounding pavements

Within two weeks of completing the permanent reinstatement, the undertaker shall repeat items 1 to 4 above and issue two copies of the report to the authority.

Failure to provide such reports and photographic evidence will confirm to the authority that all areas in its charge, affected by or adjacent to the works, are in pristine condition.

S0.4

Outline of the Reinstatement Specification

The Reinstatement Specification ‘S’ Sections are logically ordered, reflecting what practitioners need to know before commencing works, what will be required in order to complete the works and what are the obligations once the works are completed.

Sections S1 and S2 respectively set out in advance of any reinstatements, the general parameters associated with reinstatements and the expected performance requirements.

Sections S3, S4 and S5 follow the normal sequence of operations to be carried out when breaking up or opening up the road, namely, excavation, surround to apparatus and the backfilling of the opening to the underside of the specified unbound and bound material layers, which comprise the designed structure of the reinstatement.

Sections S6 and S7 set out the detailed requirements and permissible reinstatement methods for the bound materials in carriageways. Limitations on the use of preferred and permissible materials are described further in Appendices A1 and A2. Sections S8 and S9 similarly set out the requirements for reinstatements in footways and verges.

Section S10 sets out the fundamental requirements for compaction of all permissible reinstatement materials, thereby supporting the required end performance of the whole reinstatement.

Sections S11 and S12 respectively cover ancillary activities which might be encountered during road works and the prescribed remedial measures in the event that the reinstatement is defective and/or causes settlement beyond the limits of the reinstatement.
Section S13 gives guidelines to be followed when works are near road structures. This section sets out what structures may be encountered and what consultation with the NRA is required.

**S0.5 Outline of the Appendices**

The Appendices are an integral part of this Reinstatement Specification, setting out significant amounts of technical detail, including the design of different reinstatements using materials and thickness specified in the Appendices. This reflects the various categories of surfaces normally encountered in reinstatements, which includes carriageways, footways and verges.

Incorporation of this type of detail into the Reinstatement Specification ‘S’ Sections was considered likely to impede the general flow of those clauses. Whilst the Appendices stand alone as sections of the Reinstatement Specification, they in essence complement the Reinstatement Specification ‘S’ Sections.

**S0.6 Outline of the Notes for Guidance**

Where considered beneficial, Notes for Guidance sections complementary to the Reinstatement Specification ‘S’ Sections and some of the Appendices have been included in this document. However, Notes for Guidance are by definition notes or details which are thought to be useful to support practitioners to both understand and use the Specification sections of this document and Appendices.

**S0.7 Using the Reinstatement Specification**

Specific to the reinstatement-related aspects within this document, reference is made to reinstatement materials in numerous parts of the Specification ‘S’ Sections and Appendices. These include:

- the overall class of materials, such as Hot Rolled Asphalts, Polymer Modified Stone Mastic Asphalts, Asphalt Concretes and traditional Concretes used in some roads;
- different types of mixture within each class of material, such as Asphalt Concrete Surface Course and Asphalt Concrete Binder Course – these tend to relate to the relative position of the mixture within the overall reinstatement (generally the layer) and reflect the design function of the layer;
- different preferred (and permissible) mixtures for different layers;
- different thicknesses of mixture layers;
- specific requirements and limitations for surface courses.
Each of the above references has been intentionally assigned to different parts of the Reinstatement Specification and it is essential that these are all taken into account when selecting the correct reinstatement design in a specific category of surface.

The reinstatement of flexible roads (and footways) is particularly more complex at the reinstatement design selection stage. To assist practitioners, Figure S0.1 sets out the intended materials selection process for flexible (and composite) carriageways.

### Figure S0.1 Flexible Reinstatement Material Selection Process

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Carriageway</strong></td>
<td>Confirm Existing Carriageway Construction → Where no specific data available, authority to confirm any existing construction issues</td>
</tr>
<tr>
<td></td>
<td>Confirm Road Category and select Permissible Reinstatement Appendix → Select Road Category – S1.3 &amp; Figure A0.1 Flexible Roads – Appendix A3.0 to A3.4 Composite Roads – Appendix A4.0 to A4.4</td>
</tr>
<tr>
<td><strong>Base Course &amp; Binder Course Reinstatement</strong></td>
<td>Identify ALLOWABLE Base Course and Binder Course Material Types permitted under Appendices A3 or A4 → Flexible Roads – Appendix A3.0 to A3.2 Composite Roads – Appendix A4.0 to A4.2</td>
</tr>
<tr>
<td></td>
<td>Select proposed Base Course and Binder Course Material Type and preferred/permissible Mixture Series 900 of the NRA Specification for Road Works → Asphalt Concrete Binder – Appendix A2.3.2 Asphalt Concrete Base – Appendix A2.3.3</td>
</tr>
<tr>
<td><strong>Surface Course Reinstatement</strong></td>
<td>Confirm Existing Carriageway and age of Surface Course → Flexible Roads – Appendix A2.1.1, A2.2.1 &amp; A2.3.1 Composite Roads – Appendix A2.1.1, A2.2.1 &amp; A2.3.1</td>
</tr>
<tr>
<td></td>
<td>Select proposed Surface Course Material Type and preferred/permissible Mixture under Appendix A2 → Hot Rolled Asphalt SC – Appendix A2.1.1 Polymer Modified SMA SC – Appendix A2.2.1 Asphalt Concrete SC – Appendix A2.3.1</td>
</tr>
<tr>
<td></td>
<td>Check Exceptions (limitations) for Surface Course Layer → Hot Rolled Asphalt SC – Section S6.4.1 Polymer Modified SMA SC – Section S6.4.2 Asphalt Concrete SC – Section S6.4.3</td>
</tr>
<tr>
<td></td>
<td>Where Exceptions (limitations) exist, Re-Select proposed Surface Course Material/ Mixture as above</td>
</tr>
</tbody>
</table>
How to Specify the Appropriate Road Reinstatement

Example: N20 – Mallow, Co. Cork to Patrickswell, Co. Limerick.

This section provides users with an example of how to specify the appropriate reinstatement for road works on a national road in accordance with the Specification. The user should adopt the steps outlined in the following example: The reinstatement of a section of road located on the N20 between Mallow and Patrickswell.

Step 1: Confirm Existing Carriageway Construction

The undertaker shall confirm the existing carriageway construction by consulting as-built drawings or by carrying out trial pits, cores or other investigation method. No trial pits or cores etc shall be taken before a road licensing agreement is issued by the authority. The age of the surface course shall also be confirmed by consulting as-build drawings and the authority. This is to be carried out to determine the extent of surface course reinstatement as outlined earlier in S.0.3.2

Step 2:

Identify Road Type on Road Categorisation Map Figure A0.1 (Found in Appendix A0)

The N20 between Mallow in Co. Cork and Patrickswell in Co. Limerick is classified as a type 0 road (30-125msa). The road in question can be seen from Figure S0.2.
Step 3:
Identify materials for surface course, binder course and base course which are to be adopted in the road reinstatement. Refer to the flow chart shown in Figure A2.3 where appropriate materials can be selected. The full list of approved materials can be found in Appendix A2. An example of materials can be seen below:

- **Surface Course**: HRA 30/14 F surf 40/60 (See section A2.1.1 (i) (a))
- **Binder Course**: AC 20 dense bin 40/60 rec (See section A2.3.2 (i))
- **Base Course**: AC 32 dense base 40/60 rec (See section A2.3.3 (i))

Step 4:
The material thickness for each required layer can be established by consulting Appendix A3.0 to A5.2 depending on the road type. Appendix A3.0 should be consulted for the example given above. The construction method used will determine the thickness of each material used, more details regarding construction methods can be found in Section S6 and S7.

See below for layer thickness to be used in this example.

The individual layer thicknesses to be adopted in the road reinstatement are:

Construction Method A to be used (Refer to Appendix A3.0):

- **Surface Course**: 40mm
- **Binder Course**: 60mm
- **Base Course**: 245mm
- **Sub Base**: 150mm
- **Backfill**: Varies depending on trench depth

**Health and Safety Requirements**

All users are required to comply with current health and safety legislation which is administrated and enforced by the Health and Safety Authority (www.hsa.ie).

This Specification should be read in conjunction with the following documents:

(i) S.I. No. 504 Safety, Health and Welfare at Work (Construction) Regulations, 2006;

All works carried out on public roads shall be supervised by a competent person who has been issued with a valid construction skills registration card (CSCS certificate) in accordance with the ‘Guidelines for Working on Roads’ S.I. No. 423 of 2008. There shall be on site, at all times when these works are in progress, at least one person who has been issued with a valid construction skills registration card, in accordance with the above regulations.
All construction workers on site shall conform to the ‘Safe-Pass’ requirements and operatives shall be suitably qualified/certified to undertake any operation with which they are or become involved. The undertaker will be responsible for ensuring workers compliance with Statutory Requirements. Particular attention is drawn to the third and fourth schedule of the Safety, Health and Welfare at Work (Construction) Regulations, 2006.

S0.10 **Traffic Safety and Management Requirements**

The undertaker shall be responsible for the planning, design, implementation, maintenance and removal of traffic safety and management measures required in order to facilitate the work. All traffic management plans shall be prepared by a person who has been issued with a valid construction skills registration card (CSCS) in accordance with the ‘Guidelines for Working on Roads’ S.I. No. 423 of 2008.

The undertaker shall comply at all times with the requirements of Chapter 8 of the Department of Transport Traffic Signs Manual, published by the Department of Transport and any additional requirements detailed in the NRA Design Manual for Roads and Bridges and the Guidance for the Control and Management of Traffic at Roadworks published by the Department of Transport.
S1 Operational Principles

S1.1 General

This Reinstatement Specification incorporates new terminology introduced under the European EN 13108 series of standards for asphalt, the term asphalt in this case referring to mixtures of bituminous binder and aggregate. These became effective in January 2008. New terms used in this Reinstatement Specification;

| "asphalt concrete" | replaces the previous | "coated materials (bituminous mixtures) to BS4987" |
| "base" | replaces the previous | "base (roadbase)" |

Note that reference to “asphalt” is NOT limited to “hot rolled asphalt”.

S1.1.1 When executing road works the excavation and reinstatement shall be carried out in accordance with this Reinstatement Specification. Where this Reinstatement Specification allows alternatives, a permitted option shall be selected. Regardless of which alternative is selected, the performance of the reinstatement shall be guaranteed to the relevant standards, for the relevant maintenance period.

S1.1.2 If, at any time during a maintenance period, the reinstatement fails the relevant performance requirements of this Reinstatement Specification, remedial action shall be carried out to restore the reinstatement to a compliant condition. An interim reinstatement shall be made permanent within 6 months unless otherwise agreed in writing by the authority.

S1.2 Maintenance Period

S1.2.1 Any interim reinstatement shall conform to the prescribed standards until the permanent reinstatement is completed. An interim pavement shall be made permanent within 6 months. In exceptional circumstances this may be extended if agreed in writing by the authority. The permanent reinstatement shall conform to the prescribed standards throughout the maintenance period.

S1.2.2 The maintenance period shall begin when the authority receives written notification that the permanent works are complete and shall run for 2 years, or 3 years in the case of deep openings (as described in S1.5.4). Where it is necessary to re-excavate a reinstatement to carry out an engineering investigation or to repair a defect, the reinstatement shall be deemed to be new and the maintenance period shall begin again when the authority receives written notification of the completion of the permanent works.
S1.3 Road Categories

S1.3.1 Roads are categorised by this Reinstatement Specification into three types, each with a limiting capacity expressed in millions of standard axles (msa) as shown in Table S1.1.

Table S1.1

<table>
<thead>
<tr>
<th>Road Category</th>
<th>Road Type</th>
<th>Traffic Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 0</td>
<td>Motorways (1)</td>
<td>Roads carrying between 30 and 125 msa</td>
</tr>
<tr>
<td></td>
<td>Dual Carriageways (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single Carriageways</td>
<td></td>
</tr>
<tr>
<td>Type 1</td>
<td>Single Carriageways</td>
<td>Roads carrying between 10 and 30 msa</td>
</tr>
<tr>
<td>Type 2</td>
<td>Single Carriageways</td>
<td>Roads carrying up to 10 msa</td>
</tr>
</tbody>
</table>

Notes: (1) All dual carriageways and motorways are to be categorised as Type 0 where the traffic capacity is below 125 msa. Refer to S1.3.2 for all roads carrying in excess of 125 msa.

S1.3.2 Roads carrying in excess of 125 msa are not included in this Reinstatement Specification. Reinstatement designs for such roads shall approved by the authority on an individual basis.

S1.3.3 For details of the categorisation of all national roads in Ireland, Figure A0.1 should be consulted. Road categories defined in Figure A0.1 are based on the National Traffic Management Study 2006. Where Figure A0.1 does not classify a road where a road opening licence is sought, the classification of these roads shall be calculated in accordance with NRA Addendum; HD 24/06 Pavement Design and Maintenance Traffic Assessment. Calculations verifying this classification shall be submitted to the authority for approval. Works can only begin once approval from the authority has been issued.

S1.3.4 The reinstatement shall be designed using materials referred to in Appendices A1, A2, A9 and A11. The overall layer thickness shall be as specified in Appendices A3 to A7 for the various categories of road, footway, footpath, cycle track. Verge and unmade ground reinstatement shall be carried out in accordance with Section S9 and Figure S9.1. Compaction requirements shall be in accordance with Section S10 and Appendix A8.
S1.4  **Footway, Footpath and Cycle Track Categories**

Footways, footpaths and cycle tracks are categorised by this Reinstatement Specification as follows:

S1.4.1 High duty – routes which are used by an exceptionally large number of pedestrians and/or cyclists.

S1.4.2 High amenity – routes surfaced with one of the following surfacings, and which have been constructed and maintained to a high standard:

1. Surfaces chosen specifically for decorative purposes, with special colours, textures or surface finishes.
2. Flexible surfaces with a particular texture or distinctive coloured finish. Such surfaces will usually be situated in conservation, leisure or ornamental areas, pedestrian precincts or where an authority has maintained high quality paving.

S1.4.3 Other – those that are neither high duty nor high amenity.

S1.4.4 Where an authority is able to demonstrate that a high amenity or high duty footway has been constructed and maintained to a standard in excess of that prescribed in Sections S2.2 and S2.3 then in these instances the reinstatement shall meet the authority’s standard of maintenance and their declared intervention criteria.

S1.5  **Excavation and Trench Categories**

Excavations and trenches are categorised by this Reinstatement Specification as follows:

S1.5.1 Excavations shall not be located within the wheel tracks of the carriageway. Where this is not practical the undertaker shall justify why this cannot be accomplished to the written confirmed satisfaction of the authority.

S1.5.2 Small Excavations – all openings with a surface area of 2 square metres or less. For the purposes of this Reinstatement Specification, test holes up to 150mm diameter are not excavations and shall be reinstated in accordance with the requirements of Section S11.6.

S1.5.3 Narrow Trenches – all trenches of 300mm surface width or less, with a surface area greater than 2 square metres.

S1.5.4 Deep Openings – all excavations and trenches in which the depth of cover over the buried apparatus is greater than 1.5 metres. Trenches with a depth of cover that is intermittently more than 1.5 metres for lengths of less than 5 metres are not deemed to be deep openings.

S1.5.5 Other Openings – all excavations and trenches with a surface area greater than 2 square metres.
S1.6 Apparatus within Road, Footway and Cycle Track Structures

S1.6.1 Any apparatus greater than 20mm external diameter will not be permitted within road, footway or cycle track structures unless special circumstances exist (for example shallow cover over culverted watercourses, utility apparatus, etc). In these special circumstances the utility provider (undertaker) must consult with the authority whose written approval must be sought.

S1.6.2 Apparatus of 20mm external diameter or less shall not be permitted above or within 20mm of the following levels within a road structure, see Figure S1.1:

1. The underside of the base course in a flexible structure.
2. The underside of the concrete slab in a rigid structure.

S1.6.3 Where other existing apparatus or surrounds occur within the road structure, the method of reinstatement shall be determined by agreement.
S1.7 Geosynthetic Materials, Geotextiles and Reinforcement Grids

S1.7.1 If inaccurate or no information is provided by the authority of the existence of any of the above materials prior to the commencement of the works, but they are encountered during the works, the authority shall be informed immediately so that an appropriate reinstatement method can be agreed.

S1.8 Trees

S1.8.1 When working near trees, the National Joint Utilities Group publication Volume 4 “NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees” should be adopted. The publication gives comprehensive advice and should be followed in its entirety. Relevant extracts are reproduced in Notes for Guidance NG1.8.

S1.8.2 In addition to the recommendations of the NJUG guidelines, the use of tree root barriers may be considered. Specialist advice from an Arboriculturist should be sought.

S1.9 Immediate Temporary Works

S1.9.1 There are circumstances where it will be necessary to immediately carry out a temporary reinstatement of an excavation, regardless of the material availability etc., to enable traffic or pedestrian movement to occur on a traffic sensitive route. In such circumstances, reinstatements may be temporarily carried out using excavated or other materials (excluding materials listed as unacceptable in Appendix A1.2), properly compacted in 100mm layers, with a minimum surfacing thickness of 40mm of bituminous material.

S1.9.2 Materials so placed, which are not in compliance with the requirements of this Specification shall be removed and the subsequent reinstatement shall be carried out to the appropriate interim or permanent standard in accordance with this Specification. The removal of unacceptable materials and subsequent reinstatement in accordance with this Specification shall be carried out as soon as practicable, but within a maximum of 72 hours of the immediate temporary reinstatement. Any exception to this must be agreed in writing with the authority in advance of the immediate temporary reinstatement.
S2
Performance Requirements
S2 Performance Requirements

S2.1 General

S2.1.1 Performance requirements shall apply to interim and permanent reinstatement of excavations.

(1) For all interim reinstatements, the main consideration as to meeting the performance requirements generally set out in Section S2 is primarily one of maintaining road safety.

(2) If the surface profile of a reinstatement exceeds any intervention limit during any maintenance period, remedial action shall be carried out to return the surface profile of the reinstatement to the as-laid condition defined in Section S2.2.1.

S2.1.2 No new maintenance period shall be required unless the cumulative settlement intervention limit is exceeded and an engineering investigation has been completed in accordance with Section S2.5. Requirements for the re-excavation and subsequent reinstatement, as determined from the results of an engineering investigation, shall be agreed and completed in accordance with Section S2.5.

S2.1.3 Reinstatement of Modular Surface Layers is described in Appendix A12. For all modular surfaces the effective width of a reinstatement shall be taken as the width of the footpaths or cycle tracks and not the trench. The effective length of the reinstatement is calculated as the length of the reinstatement plus 2m or to the nearest kerb or natural end point within the 2m. See Figure S2.1 for details.

![Figure S2.1 Effective Width of Reinstatement – Modules](image)

**Figure S2.1 Effective Width of Reinstatement – Modules**

- **W** = FULL WIDTH REINSTATEMENT REQUIRED FOR MODULAR FOOTPATH, FOOTWAY AND CYCLE TRACKS
- **L** = EFFECTIVE LENGTH OF EXCAVATION PLUS 2M OR TO THE NEAREST KERB OR NATURAL END POINT WITHIN THE 2M
S2.1.4 Where it is agreed by the authority that surface deformation has resulted from vehicles over-running reinstatements within paved areas, any deformation in paved footways, including footpaths and cycle tracks, shall be excluded from all measurements carried out for the purposes of monitoring the reinstatement surface performance, unless such reinstatements have been carried out under the provisions of Section S8.4.

S2.1.5 However, properly constructed paved footways and their reinstatements shall withstand occasional overrun by non-commercial vehicles (less than 1.5 tonnes un-laden). Where it is shown that deformation has occurred over the trench and its immediate surrounds to a pavement within a paved footway and the authority has formed the view that this is not caused by over-run by commercial vehicles alone and the adjacent surfaces do not show any significant associated surface deformation, the authority may notify that a reinstatement to the as-laid profile shall be provided.

S2.2 Surface Profile

S2.2.1 As-laid Profile

(1) The reinstatement of any surface shall be completed so that it is as flat and flush as possible with the surrounding adjacent surfaces. There should be no significant depression or crowning in the surface. Construction tolerances at the edges of the reinstatement shall not exceed 0/+3mm.

(2) Once the reinstatement is registered as completed and opened to traffic, the Intervention Limits specified in Sections S2.2.2 to S2.2.5 and not the construction tolerance figure shall apply.

(3) At the end of the maintenance period, where the profile of the existing surfaces adjacent to the reinstatement is uniform and the surface of the reinstatement is outside the intervention limits, remedial works shall be carried out to restore the surface profile of the reinstatement to a condition consistent with the adjacent surfaces.

(4) It should be recognised that the surface profile of reinstatements carried out in restricted areas (for example, around surface boxes and fixed features) using hand tools may be difficult to match with adjacent machine-laid surface profiles. In these cases, localised variations in the hand-laid surface profile should be acceptable to the authority provided that they are within the specified tolerances. A Mastic Asphalt in accordance with IS EN 13180 ‘Bituminous Mixtures – Material Specifications – Part 6: Mastic Asphalt’ or other proprietary product may be used around ironwork to a maximum width of 200mm around the ironwork in question.
**S2.2.2 Edge Depression – Intervention**

(1) An edge depression is a vertical step or trip at the interface of the reinstatement and the existing surface or a trip at the junction between ironwork and reinstatement.

(2) Intervention shall be required where the depth of any edge depression exceeds 5mm over a continuous length of more than 100mm in any direction; see Figure S2.2.

---

**S2.2.3 Surface Depression – Intervention**

(1) A surface depression is a depressed area within the reinstatement having generally smooth edges and gently sloping sides, forming a shallow dish; see Figure S2.3.

(2) Intervention shall be required where the depth of any area of surface depression spanning more than 100mm in any plan dimension exceeds the intervention limit X shown in Table S2.1.
Intervention Limits – Surface Depression (To be read in conjunction with S2.2.5)

<table>
<thead>
<tr>
<th>Reinstatement Width W (mm)</th>
<th>Intervention Limit X (mm)</th>
<th>Combined Defect Intervention Limit (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 400</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Over 400 to 500</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Over 500 to 600</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Over 600 to 700</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Over 700 to 800</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Over 800 to 900</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Over 900</td>
<td>15</td>
<td>12</td>
</tr>
</tbody>
</table>

(3) At any time during the maintenance period, the authority may undertake a test by applying water over the surface area of the reinstated trench and adjacent surface area to determine whether standing water is present. Early intervention is required if results show standing water wider than 500mm or exceeding one square metre in area remains for a period of 2hrs or more.

**S2.2.4 Surface Crowning – Intervention**

(1) Surface crowning is where the reinstatement is above the mean level of the existing adjacent surfaces; see Figure S2.4.

(2) Intervention shall be required where the height of any area of surface crowning spanning more than 100mm in any plan dimension exceeds the intervention limit Z shown in Table S2.2.
Table S2.2

<table>
<thead>
<tr>
<th>Reinstatement Width W (mm)</th>
<th>Intervention Limit Z (mm)</th>
<th>Combined Defect Intervention Limit (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 400</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Over 400 to 500</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Over 500 to 600</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Over 600 to 700</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Over 700 to 800</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Over 800 to 900</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Over 900</td>
<td>15</td>
<td>12</td>
</tr>
</tbody>
</table>

(3) At any time during the maintenance period, the authority may undertake a test by applying water over the surface area of the reinstated trench and adjacent surface area to determine whether standing water is present. Early intervention is required if results show standing water wider than 500mm or exceeding one square metre in area remains for a period of 2hrs or more.

S2.2.5 Combined Defect – Intervention

(1) A combined defect is an area within the reinstatement where any combination of edge depression, surface depression or surface crowning overlap exists.

(2) Where combined defects occur, the intervention limits for surface depression and surface crowning, shown in Tables S2.1 and Table S2.2 (Referred to as X and Z limits), shall be reduced by 20% and rounded up to the nearest whole number, subject to a minimum of 10mm.

(3) Intervention shall be required where the extent of any individual defect, spanning more than 100mm in any plan dimension, exceeds the combined defect intervention limit for the relevant defect, as defined in Section S2.2.2 (2), Table S2.1 and Table S2.2. The individual defects shall be measured, and the 20% reduction in intervention limits applied, as shown in Section NG2.2.5.
S2.2.6 Condition at End of Maintenance Period

(1) At the end of the maintenance period the condition of the reinstatement shall not be required to be superior, in any respect, to the condition of the adjacent surfaces away from and not impacted upon by the trench and reinstatement work.

(2) Where the profile of the existing surfaces adjacent to the reinstatement is uniform and substantially superior to the surface of the reinstatement, remedial work shall be carried out to restore the surface profile of the reinstatement to a condition consistent with the adjacent surfaces, including excavation and replacement as may be required by the authority.

S2.3 Fixed Features

S2.3.1 As-Laid Profile

All fixed features, such as edgings, channel blocks, drainage fixtures, surface boxes and ironware etc., should be as level and flush as possible with the adjacent surfaces and shall be installed to meet the following level criteria:

(1) Fixed features shall be laid to coincide with the mean level of immediately adjacent surfaces.

(2) The construction tolerance between the levels of the fixed feature (excluding drainage features) and immediately adjacent surfaces shall not exceed +/- 3mm.

(3) Drainage features shall be set flush with the adjacent surface and subject to a construction tolerance of not more than 6mm below the level of the adjacent surface. Such apparatus shall not protrude above the adjacent surface.

(4) At a pedestrian crossing point that is flush with the adjacent surfaces, the kerbs shall be relaid flush with the adjacent surfaces to a tolerance of 0 to +3mm.

Figure S2.5 illustrates the relationship between immediately adjacent surfaces and the surround reinstatement to a newly constructed Apparatus when setting the level of access covers and frames to the Apparatus.
**Figure S2.5** As-Laid Profile Of Fixed Features And Relationships With Immediately Adjacent Surfaces - Examples

**EXISTING SURFACE**

**MEAN LEVEL OF IMMEDIATE ADJACENT SURFACES**

**EXISTING SURFACE**

**EXCAVATION OUTLINE**

**EXCAVATED CONDITION (1)**

**FULL LANE REINSTATEMENT REQUIRED WHERE SURFACE IS 5 YEARS OLD OR LESS**

**SUB-BASE REINSTATEMENT**

**CHAMBER WALLS AND BASE**

**CONSTRUCTION OF CHAMBER AND REINSTATEMENT (TO TOP OF SUB-BASE) (2)**

**REINSTATEMENT LAID TO MEAN LEVEL LINE A TO B**

**FULL LANE REINSTATEMENT REQUIRED WHERE SURFACE IS 5 YEARS OLD OR LESS**

**BINDER/BASE COURSE**

**FRAME AND COVER SET IN LINE WITH MEAN LEVEL OF IMMEDIATE ADJACENT SURFACES (IN ORTHOGONAL DIRECTIONS/PLANES)**

**PERMANENT REINSTATEMENT (AND FRAME AND COVER SETTING) (3)**
Figure S2.5 continued

REINSTATEMENT SETTLES IMMEDIATELY ADJACENT TO CHAMBER FRAME

BINDER/BASE COURSE

FULL LANE REINSTATEMENT REQUIRED WHERE SURFACE IS 5 YEARS OLD OR LESS

INTERVENTION MEASURED AT POINT

DEPRESSION OF SURROUND REINSTATEMENT (SURFACE LEVELS OF CHAMBER UNCHANGED) (4)

ORIGINAL MEAN LEVEL OF IMMEDIATE ADJACENT SURFACES

BINDER/BASE COURSE

FULL LANE REINSTATEMENT REQUIRED WHERE SURFACE IS 5 YEARS OLD OR LESS

REINSTATEMENT SETTLES ‘WITH’ CHAMBER

BASE OF CHAMBER ‘PUNCTURED’ THROUGH FORMATION LEADING TO APPARENT SETTLEMENT OF COVER AT SURFACE LEVEL

SETTLEMENT OF CHAMBER BUT NO INTERVENTION TO REINSTATEMENT AT POINTS A AND Y (5)
(MEASURE DEPRESSION ACROSS MEAN LEVEL OF IMMEDIATE ADJACENT SURFACES BETWEEN POINTS A AND B TO S2.2.3)

Figure S2.5 - INDIVIDUAL SUB-FIGURES SEQUENCING

(1) EXCAVATED CONDITION
(2) CONSTRUCTION OF CHAMBER AND REINSTATEMENT (TO TOP OF SUB-BASE)
(3) PERMANENT REINSTATEMENT (AND FRAME AND COVER SETTING)
(4) DEPRESSION OF SURROUND REINSTATEMENT (SURFACE LEVELS OF CHAMBER UNCHANGED)
(5) SETTLEMENT OF CHAMBER BUT NO INTERVENTION TO REINSTATEMENT
S2.3.2 Intervention

(1) Intervention is required where the mean level of edgings, channel blocks, surface boxes and ironware etc., does not coincide with the mean level of the immediately adjacent surfaces, within a tolerance of ± 3mm.

(2) In the case of drainage fixtures, intervention is required where the mean level does not coincide with the mean level of the immediately adjacent surfaces, within a tolerance of 0mm above to - 6mm below.

(3) In the case of a pedestrian crossing point, intervention is required where the depth of any edge depression at the interface between the paving (which can include tactile units) and the dropped kerb exceeds 3mm over a continuous length of more than 100mm in any direction.

S2.4 Surface Regularity

S2.4.1 Requirements

At any time during the maintenance period, the longitudinal regularity in the direction of traffic flow at the surface of the permanent reinstatement in the road and the adjacent wheel track shall comply with the following requirements:

(1) The number of longitudinal surface irregularities along a permanent reinstatement should not exceed the lower limit shown in Table S2.3 and requirements given in S2.4.2 and S2.4.3.

Table 2.3

<table>
<thead>
<tr>
<th>Surface Irregularities not less than (mm)</th>
<th>Irregularities per section (See S2.4.3 for details)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower Limit</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

(2) Where the number of longitudinal surface irregularities along a permanent reinstatement exceeds the lower limit shown in Table S2.3, the number of irregularities along the adjacent wheel track shall be recorded, in the same direction of traffic flow, for comparison.

(3) Where the number of surface irregularities along a permanent reinstatement and the adjacent road both exceed the lower limit shown in Table S2.3, the number of longitudinal surface irregularities recorded along the reinstatement should not exceed the product of the number measured along the adjacent road and the multiplier shown in Table S2.3.
**S2.4.2 Measurement**

(1) Surface irregularities may be measured using the TRL rolling straightedge. However, the rolling straightedge shall not be used to determine surface regularity where:

(a) The line of a trench is parallel to the centreline of the road for less than 30 metres length.

or

(b) The line of a trench is parallel to the line of traffic flow for less than 30 metres length.

or

(c) The line of a road and/or the trench follows a bend with a radius of less than 250 metres.

or

(d) The number of surface irregularities recorded along the adjacent road exceeds the upper limit shown in Table S2.3.

(2) Where the rolling straight edge cannot be used, the surface regularity shall be assessed by another method agreed with the authority.

**S2.4.3 Monitoring**

For the purposes of monitoring the surface regularity of road reinstatements, relevant lengths of the trench should be divided into test sections of 30 metres in length. The upper and lower limit values for surface irregularities, for each 30 metre section length, are shown in Table S2.3. For the final section length, which may exceed 30 metres but will be less than 60 metres, the limits should be calculated pro rata, and rounded up to the nearest whole number.

**S2.5 Structural Integrity**

The requirements for structural integrity are applicable to both paved and unpaved surfaces.

**S2.5.1 Cumulative Settlement**

(1) The cumulative settlement of any reinstatement is the perpendicular distance, from the level of the adjacent surfaces, to the original surface of the reinstatement; refer to Figure S2.6. This measurement will effectively include the thickness of any additional materials added during any preceding remedial work.
(2) If the cumulative settlement of a reinstatement, as shall be determined by the authority, exceeds the limits shown in Table S2.4 at any time within the maintenance period, an agreed engineering investigation as specified by the authority shall be carried out, jointly with the authority. The investigation should establish whether settlement is likely to continue and determine the extent of remedial action required.

**Table S2.4**

<table>
<thead>
<tr>
<th>Structural Integrity</th>
<th>Reinstatement Width (mm)</th>
<th>Intervention Limit Q</th>
<th>Normal Ground Conditions</th>
<th>Bad Ground Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 1000</td>
<td>1.5% U or 30 mm</td>
<td>whichever is greater</td>
<td>2.5% U or 30 mm</td>
</tr>
<tr>
<td></td>
<td>Over 1000</td>
<td>1.5% U or 35 mm</td>
<td>whichever is greater</td>
<td>2.5% U or 35 mm</td>
</tr>
</tbody>
</table>

**Figure S2.6 Cumulative Settlement (Q)**
(3) Where it is necessary to re-excavate a reinstatement to carry out an engineering investigation, the subsequent permanent reinstatement shall be deemed to be new and the maintenance period shall begin again.

(4) Where very deep excavation work is carried out in bad ground, consideration should be given to an agreed extension of the interim reinstatement period. An appropriate extension will allow the reinstatement and surrounding ground to achieve an acceptable degree of stability before permanent reinstatement is required. The performance requirements of Section S2 shall apply throughout the extended interim period.

**S2.5.2 Bad Ground**

Bad ground is deemed to be natural or made-up ground between the base of the excavation and the binder course level, which contains any of the following:

(1) Unacceptable Materials, as specified in Appendix A1.

(2) Materials that are loose or friable in their natural state and are not self-supporting at an exposed face.

(3) An excessive amount of rocks or boulders, loose random rubble, penning, setts or cobbles etc, at any depth where their removal during excavation could cause loosening of the ground adjacent to the excavation.

(4) Materials that are saturated, regardless of whether free or running water is present.

**S2.6 Skid Resistance**

**S2.6.1 General**

The texture depth, Polished Stone Value (PSV) and Aggregate Abrasion Value (AAV) at the running surface of all interim and permanent reinstatements in all roads shall comply with Series 900 of the NRA Specification for Road Works.

**S2.6.2 Texture Depth**

(1) Subject to the requirements of Section S2.6.1, for all bituminous surface course materials permitted in Appendix A2 and for rigid roads where the surface of the concrete road slab is the running surface of the road, the texture depth shall comply with the requirements of Table S2.5.
If the cumulative settlement of a reinstatement, as shall be determined by the authority, exceeds the limits shown in Table S2.4 at any time within the maintenance period, an agreed engineering investigation as specified by the authority shall be carried out, jointly with the authority. The investigation should establish whether settlement is likely to continue and determine the extent of remedial action required.

### Table S2.5

<table>
<thead>
<tr>
<th>Texture Depth</th>
<th>Texture Depth (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinstatement Location</td>
<td>Chipped HRA, Surface Dressings &amp; Asphalt Concrete</td>
</tr>
<tr>
<td>Roads where speed limit &gt; 60 kph</td>
<td>Refer to Table 9/14 of Series 900 of the NRA SRW</td>
</tr>
<tr>
<td>Roads where speed limit ≤ 60 kph</td>
<td>Refer to Table 9/14 of Series 900 of the NRA SRW</td>
</tr>
</tbody>
</table>

The average depth of carriageway surface macrotexture shall be measured using a volumetric patch technique described in the NRA Specification for Road Works Series 900 for bituminous surfacings and Series 1000 for concrete surfacings.

For the purposes of monitoring texture depth, the entire reinstatement shall be divided into notional units of 18 square metres and tested at evenly spaced intervals as follows:

- Reinstatement of small excavations – single measurement centred within the reinstatement
- Reinstatement of between 2m² and 18m² – 3 measurements
- Reinstatement greater than 18m² – 3 measurements per 18m²
- Trenches 300mm wide or less – as above but centred along the centreline of the trench

Figure S2.7 illustrates the requirements of Section S2.6.2 (3) excluding small excavations.

The TRL mini texture meter may be used by agreement. The subsequent permanent reinstatement shall be deemed to be new and the maintenance period shall begin again.
S2.6.3 **Polished Stone Value (PSV)**
Polished stone value for aggregate used in bituminous mixes shall be in accordance with Series 900 of NRA Specification for Road Works and NRA Addendum; HD 36 Surfacing Materials for New and Maintenance Construction.

S2.6.4 **Aggregate Abrasion Value (AAV)**
Subject to the requirements of Section S2.6.1, for all bituminous surface course materials permitted in Appendix A2, the AAV of all precoated chippings and noncoated chippings used in the running surface shall comply with the requirements of Series 900 of the NRA Specification for Road Works.

S2.7 **Sampling and Testing**
S2.7.1 All checking and testing of materials used in the reinstatement of road openings shall comply with the NRA Specification for Road Works.
S3

Excavation
S3 Excavation

S3.1 Breaking the Surface

S3.1.1 Care must be taken when cutting surface layers to avoid undue damage to the running surface or to the bond between the surface course and binder course materials. Cutting by machine, e.g. road saw, coring equipment or planer, is preferred (other methods may only be used if approval in writing is received in advance from the authority). All loose materials shall be removed to ensure that the trench edge is in a safe and stable condition.

S3.1.2 When excavating in modular construction, the existing modules shall be lifted carefully, and stored for re-use. Where pre-existing damage has resulted in fragmentation or breakage of modules made out of natural materials the fragments shall be removed and stored, unless agreed otherwise with the authority.

S3.1.3 The authority shall be informed of any material, natural material, cobbles or setts encountered that may be of historical or archaeological interest and shall be afforded the opportunity to inspect the material prior to it being excavated.

S3.1.4 Modules shall be reinstated in accordance with Appendix A12.

S3.2 Excavation

S3.2.1 All excavations in the road should be carried out in a manner that avoids undue damage.

S3.2.2 The trench width should be such that adequate access is available for compaction of the surround to apparatus.

S3.2.3 The trench walls should be excavated so as no undercutting of the running surface occurs. If undercutting occurs and compaction is impossible, measures should be taken to trim back trench walls to the surface layer in accordance with Figure S6.3 so as adequate compaction is achieved.

S3.2.4 Excavations shall be protected, as far as is reasonably practicable, from the ingress of water, and water running into them shall be drained or pumped to an approved disposal point. Any drainage sumps shall be sited so as to prevent damage to the excavation.

S3.3 Excavated Material

S3.3.1 All excavated material shall be removed from site as soon as practicable. Excavated material retained on site shall be stockpiled within the confines of site barriers, at a safe distance from the trench edge and prevented, so far as is practicable, from entering any drainage system or water course.
S3.4  Side Support

S3.4.1  The sides of all excavations in soft or loose ground shall, ordinarily, be provided with a side support system. The support system shall be properly designed and installed to restrain lateral movement of the sidewalls, and should be installed without delay.

S3.4.2  Supports shall be progressively withdrawn as backfilling and compaction progresses, and all voids carefully filled.

S3.5  Drainage

S3.5.1  All reasonably practicable measures to prevent the permanent disturbance of artificial or natural drainage systems/paths shall be carried out. Where disturbance does occur it shall be notified immediately to the owners of the system and any landowners who are affected. Disturbed systems shall be restored to the requirements of the owner; see Section S11.4.

S3.5.2  For any works site where the possibility of flooding or drainage problems may occur, the undertaker shall request information from appropriate parties in advance of the works. The undertaker shall also consult with any parties and the authority so as a suitable method of working can be determined.

S3.5.3  If site conditions indicate that the use of some sub-base materials may be detrimental to drainage, advice on the selection of suitable materials should be sought from the authority.

S3.5.4  See also Section S11.4 for other water-related matters.

S3.6  Shallow or Aborted Excavations

S3.6.1  No shallow or aborted excavation shall be permitted to undermine the integrity of the remaining road structure. Any excavation terminated at an incomplete stage or depth for whatever reason shall, depending on the layer at which the excavation was terminated, be reinstated in accordance with the following requirements:

(1)  Where reinstatement can be achieved by laying a thicker surface course in accordance with the thickness requirements of Appendix A2 and, in the case of small excavations and narrow trenches, in accordance with Section S6.4.9, no further excavation is required.

(2)  In all other cases, the binder course shall be excavated to allow a binder course layer to be reinstated in accordance with Appendix A2. Where the existing depth of excavation is greater than 100mm and the additional depth is less than the minimum layer thickness of base material a thicker binder course may be laid.
(3) In deeper excavations, no further excavation shall be required. Reinstatement shall be carried out in accordance with the relevant requirements of Sections S5 to S9 inclusive, as appropriate.

(4) A reinstatement of the surface course is still to be carried out in accordance with Figures S6.2, S6.4, S6.5, S6.6 and S6.7 for flexible roads or Figures S7.2, S7.3, S7.4 and S7.5 for rigid roads even if excavation is shallow or works are aborted.

(5) A full width surface reinstatement of all footpath, footway and cycle tracks shall be carried out in accordance with Figure S8.1 even if excavation is shallow or works are aborted.

S3.7 Trenchless Pipelaying

S3.7.1 Moleploughing uses a ploughing machine to pull a flexible pipe or cable below ground. It is employed in unmade ground and may be used in the verges of roads. The moleplough creates a slit in the surface of the ground, which should not require reinstating provided that the surface profile is restored in accordance with Section S9. However, where connections are made to apparatus installed by moleploughing techniques, excavations shall be carried out and reinstated in accordance with this Reinstatement Specification.

S3.7.2 Soil Displacement moling and other trenchless methods do not create an excavation and, when carried out in a proper manner, do not require reinstatement (Grouting may be required due to oversize drill bit being used, approval from authority is required if grouting is used). However, reinstatement shall be carried out in accordance with this Reinstatement Specification at the launch and receive pits and at any intermediate excavations where connections are made to apparatus installed by soil displacement moling and other trenchless techniques.

S3.7.3 Where, as a result of the use of trenchless methods for the installation of apparatus under a road, the authority has reasonable cause to believe that damage may have been caused to the structure of the road, an investigation shall be carried out. Any remedial work agreed between the authority and the undertaker to be necessary, if carried out by the undertaker, shall be in accordance with this Reinstatement Specification at the undertaker’s expense.
S4

Surround to Apparatus
Surround to Apparatus

S4.1 General

S4.1.1 Surround to the apparatus may be laid to a maximum thickness of 250mm above the crown of the apparatus. The surround to apparatus shall not intrude into the road structure. It may be necessary on occasions for the apparatus to be laid deeper, should there be a need to include surround to their apparatus. A minimum cover of 1.2m (measured from the crown) shall be provided where apparatus is under trafficked areas and a minimum cover of 0.75m (measured from the crown) should be provided under non trafficked areas or as directed by the authority.

S4.1.2 Laying and compaction procedures used for all materials laid as surround to the apparatus shall be the responsibility of the undertakers.

S4.1.3 The selection of materials for the surround to apparatus shall be the responsibility of the relevant undertaker. However, all materials used for the surround to apparatus shall comply with the following requirements:

(1) Unacceptable Materials, as defined in Appendix A1, and materials that contain particles greater than 37.5mm nominal size shall not be used as surround to the apparatus.

(2) Preformed modules as used by utility companies or other protective measures may be placed within the surround to apparatus, according to the relevant requirements.

(3) The use of sand to surround the apparatus is not permitted as sand is liable to be washed away which can cause a cavity in the road structure.
S5
Backfill
S5 Backfill

S5.1 Backfill Material Classification

S5.1.1 General

All backfill material shall be in accordance with Clause 804 of Series 800 of the NRA Specification for Road Works except where foamed concrete is used (see Appendix A9).

All Clause 804 backfill material which is to be placed with 500mm of cement bound materials, concrete pavements, concrete structures or concrete products shall comply with Clause 808 of Series 800 of the NRA Specification for Road Works.

S5.1.2 Unacceptable Materials

Materials listed as unacceptable in Series 600 of the NRA Specification for Road Works shall not be used, at any level, within the permanent structure of any reinstatement. Materials classified as unacceptable are listed in Appendix A1.

S5.1.3 The requirements of Appendix A1 shall apply to unbound backfill materials.

S5.1.4 Backfill materials, shall be compacted in accordance with Appendix A8.

S5.2 Additional Requirements

S5.2.1 Surround to Apparatus as Backfill

Where the excavation depth does not allow the use of a separate backfill layer, the sub-base layer shall be laid directly onto the surround to apparatus. In such cases, the surround material shall represent backfill material and shall be classified in accordance with Section S5.1, the requirements for the reinstatement of the sub-base shall comply with S6.2.

S5.2.2 Protective Measures to Apparatus

Preformed modules or other protective measures may be placed within the backfill, according to relevant requirements.
Reinstatement Methods

General

(1) Reinstatement shall be carried out in accordance with one of the following methods and should endeavour to achieve the greatest degree of immediate permanent reinstatement. Reinstatement methods are listed in Appendix A2.11, Table A2.4.

(2) Permitted materials and layer thickness are specified in Appendices A1 to A4, A9 and A11 respectively.

(3) The undertaker shall determine if the site has a high sulphate level and the appropriate measures shall be agreed with the authority. Consultation with the authority of these findings is required.

Method A – All Permanent Reinstatement

The excavation shall be reinstated to a permanent standard at the first visit.

Method B – Permanent Binder Course Reinstatement

(1) The backfill, sub-base, base and binder course shall be reinstated to a permanent standard at the first visit.

(2) The permanent binder course material, or an alternative interim material, shall be extended to the surface as the interim surface course, with or without a thin separating material layer of sand at the position of the binder course/surface course interface.

(3) On the second visit, all interim surfacing materials shall be removed, to the top of the binder course, typically by cold planing, and a permanent surface course shall be laid.

(4) Prior to the reinstatement of the permanent surface course the surface shall be brushed clean and a tack coat applied.

Method C – Permanent Base Reinstatement

(1) The backfill, sub-base and base shall be reinstated to a permanent standard at the first visit.

(2) The interim surface course shall be the extension of the base course to the surface course level.

(3) On the second visit, all interim surfacing materials shall be removed, to the top of the Base level, and a permanent binder course and surface course shall be laid.

Method D – Permanent Reinstatement incorporating Interim Surface Overlay

Not applicable in flexible and composite roads.
S6.2 **Sub-base Reinstatement**

S6.2.1 **General**
Permitted options are shown in Appendix A3.3 & A4.3.

In addition to the above options, a Cement Bound Granular Material, Category B (CBGM B) sub-base of 150mm thickness may be used in small reinstatements, small excavations and narrow trenches regardless of whether the existing sub-base is cement bound. Where this option is utilised, the base material shall also be a bound material.

S6.3 **Base Reinstatement**

S6.3.1 **General**
Permitted options are shown in Appendices A3 and A4, subject to the following exceptions:

S6.3.2 **CBGM B in Flexible and Composite Roads**

(1) Where a CBGM B Base is used, the reinstatement may either be surfaced on the same day or the CBGM B shall be allowed 7 days to cure before surfacing is undertaken. In either case, the CBGM B shall be allowed 7 days to cure before the road is opened to traffic.

(2) All composite roads constructed with a Base of CBGM B lean-mix concrete or equivalent shall be reinstated with a CBGM B Base.

(3) In composite roads, the reinstated CBGM B Base shall be laid flush with the top of the existing cement-bound Base.

(4) Special conditions will apply to such reinstatement work and must be agreed with the authority. Continuously reinforced concrete bases that have been connected with dowel bars are not covered by this section. Special conditions will apply to a continuously reinforced concrete reinstatement and shall be agreed with the authority.

S6.4 **Surface Reinstatement**

Permitted options are shown in Appendices A2 to A4 inclusive, subject to the following exceptions:

S6.4.1 **Hot Rolled Asphalt (HRA) Surface**

The following applies to Type 0, 1 & 2 roads:

(1) Where the existing surface course is HRA; the reinstated surface must be HRA.

(2) Where the existing surface course is surface dressed, the surface reinstatement shall be Polymer Modified Stone Mastic Asphalt (PMSMA).
Where the existing surface course is an Asphalt Concrete, the surface reinstatement may be HRA.

### S6.4.2 Polymer Modified Stone Mastic Asphalt Surface Course (PMSMA) and Thin Surface Course Systems

(1) Where the existing surface course material is PMSMA, a thin surface course (TS) system or the surface course is surface dressed the road shall be reinstated either with PMSMA surface course or, at the authority’s request, with thin surface course, subject to the following requirements:

(a) Generic PMSMA or thin surface course mixtures shall match the existing nominal aggregate size of the existing surface course material. Reduction in nominal aggregate size shall only be where agreed with the authority and shall take into account texture depth requirements.

(b) The standard combined thickness of binder course and PMSMA surface course shown in Appendices A3.0 to A3.2 shall be 100mm.

(2) Edge and base preparation for permanent PMSMA reinstatements shall be as follows:

(a) All edges shall be saw cut or trimmed by saw, to a depth of 40mm or the thickness of the surface course, prior to permanent reinstatement.

(b) A polymer modified bituminous tack coat to IS EN 13108 shall be applied in accordance with Section S6.5.1.

(c) An edge sealant shall be applied in accordance with Section S6.5.2.3.

(3) Where the authority has a policy to grit or otherwise treat newly laid Polymer Modified Stone Mastic Asphalt surfacing, it should advise of the required method and materials which comply with this policy.

### S6.4.3 Asphalt Concrete Surface Course Materials

Where the existing surface course material is asphalt concrete or where existing surface course is surface dressed it may be reinstated with any of the surface course options in Appendix A2 to A4.

Asphalt concrete surface course materials shall be AC 14 close surf 70/100 rec, in accordance with the 900 series of the NRA Specification for Road Works. Asphalt Concrete is not permitted to be used on high speed roads i.e. roads with a design speed ≥ 85km/hr.

### S6.4.4 Asphalt Concrete Binder Course Materials

Where asphalt concrete binder course is to be used as the running surface for a period in excess of 6 months, the supplier declared target binder content shall be increased by 0.5%.
S6.4.5 Other Bituminous Materials

Where it is necessary to use bituminous materials not included in Appendix A2, they shall be used in accordance with the following:

S6.4.5.1 General Requirements

(1) Where existing road surfaces have been treated or constructed with high friction surfacings, porous asphalt or coloured surfacings and local custom and practice has been to complete all previous resurfacing with like materials, their permanent reinstatement shall be carried out in accordance with the following requirements:

(a) High friction surfacings shall be permanently reinstated with like materials, or an agreed alternative material, in accordance with Section S6.4.5.2.

(b) In the event of notification by the authority the reinstatement of any existing porous asphalt surface course shall be reinstated with porous asphalt, in accordance with S6.4.5.4.

(c) Coloured surfacings shall be permanently reinstated with like materials, or an agreed alternative material, in accordance with Section S6.4.5.3

(2) When requested, the authority shall identify an appropriate source of suitable or alternative materials, wherever possible. Where the authority is unable to identify an appropriate source of suitable material, a suitable material on the basis of best reasonable endeavours shall be provided.

(3) Where existing road surfaces have been treated or constructed with high friction surfacings, porous asphalt or coloured surfacings and local custom and practice has not been to complete all previous resurfacing with like materials, the authority shall be consulted to determine appropriate reinstatement requirements.

S6.4.5.2 High Friction Surfacings

(1) High friction surfacings shall be permanently reinstated with a suitable material within 15 working days following the date of completion of the reinstatement, unless the prevailing weather conditions or other site circumstances mitigate against the successful application of the high friction surfacing. Where this occurs, the permanent reinstatement shall be deferred until such time as the unfavourable weather conditions or other site circumstances abate. Site circumstances justifying delaying the reinstatement of the high friction surfacing include the need for the new surface course material to be trafficked and/or aged prior to the application of a cold-applied material if this is specified by the system supplier.

(2) Prior to the application of the permanent, or any interim, friction surfacing, warning signs shall be displayed indicating a potential slippery road surface.
(3) All high friction surfacing applied to any roads shall be produced and manufactured by a company independently accredited to ISO 9001 or equivalent quality management system. These materials shall be laid by a contractor approved by the authority and be in accordance with Clause 924 of Series 900 of the NRA Specification for Road Works.

(4) Some high friction surfacing materials have a limited manufacturer’s maintenance and may be subject to wear and abrasion during the maintenance period as defined in section S1.2 of this document. However, the reinstated area shall not be inferior to the adjoining surface during the maintenance period.

S6.4.5.3 Coloured Surfacing

Coloured surfacings used to highlight road features such as speed warnings, bus or cycle lanes, ‘gateways’ etc. shall be permanently reinstated using like materials of equivalent type and similar colour, subject to the following requirements:

(a) Where the coloured surfacing is overlaid onto a road surface, a coloured overlay shall be applied to the same thickness.

(b) Where the coloured surfacing is laid full depth, a coloured material shall be laid to the same thickness, wherever possible and practical. Where it is not possible or practical, the coloured surfacing material shall be reinstated by agreement.

(c) Some high friction surfacing materials that are coloured have a limited manufacturer’s maintenance and may be subject to wear and abrasion during the maintenance period as defined in Section S1.2 of this document. However, the reinstated area shall not be inferior to the adjoining surface during the maintenance period.

S6.4.5.4 Porous Asphalt

Where the existing surface course material is porous asphalt it shall be reinstated with porous asphalt so as to facilitate drainage requirements.

S6.4.6 Surface Treatments

In Type 0, 1 & 2 roads, where an existing surface treatment is readily apparent, an equivalent surface treatment shall be applied. If the existing surface course is surface dressed PMSMA shall be used as the surface reinstatement. If requested by the authority, an appropriate timing and methodology for the works shall be jointly agreed.

S6.4.7 Coated Chippings

(1) All pre-coated chippings shall be as specified in Appendix A2 and Series 900 of the NRA Specification for Road Works.

(2) Where pre-coated chippings are to be embedded into a road surface, they shall be spread to give a chipping density reasonably matching that of the existing surface, notwithstanding the requirements for surface texture specified in Section S2.6.
S6.4.8 Composite Roads

The total combined thickness of the reinstated binder course and surface course shall match the existing bituminous thickness. Wherever practicable, the required surface course thickness should be maintained by adjustment of the binder course thickness.

S6.4.9 Small Excavations, Narrow Trenches and Access Chamber Covers

(1) A permanent surface course material in accordance with Appendix A2 may be laid in place of a permanent binder course material at base and/or binder course level in:

(i) small excavations and narrow trenches (as defined in Sections S1.5.2 & S1.5.3);

(ii) within 350mm of access chamber covers

(2) Where this option is used there shall be no substitution of bitumen binder equivalence, as permitted under Appendix A11.

(3) A tack coat or bond coat shall be applied prior to placement of the permanent surface course layer.

S6.5 Base and Edge Preparation

S6.5.1 Base Preparation

(1) All surfaces shall be free of contamination prior to the application of a tack coat complying with IS EN 13808. This is especially important after the removal of a sand separation layer.

(2) A tack coat or bond coat shall be applied to the surface of all bound layers prior to overlaying in all circumstances.

(3) The tack coat or bond coat shall be applied at a rate to ensure a residual bitumen content of 0.15 kg/m².

(4) A bitumen emulsion edge sealant may be used as a tack coat or bond coat in small excavations and narrow trenches.

S6.5.2 Edge Preparation

S6.5.2.1 Edge Regularity – All Layers Except Surface Layer

The edges of excavations may need to be trimmed at all bound layers (except surface) level to meet the following requirements:

(1) All bound edges shall be essentially straight, smooth and vertical.

Edge regularity requirements are intended to provide a shape that will not hinder the compaction of material adjacent to the reinstatement edge. Overlapping edge cuts and corner
cut outs should be minimal and all cuts extending into the existing surface shall be filled with flexible bituminous sealant.

(2) The internal corners and edges of a reinstatement shall be as square as possible.

(3) There shall be no requirement to trim the sides of trench excavations solely to provide a uniform width, provided that individual projections are not less than 250mm length, measured parallel to the nominal centreline of the trench. Refer Figure S6.1 - Example 1.

(4) There shall be no requirement to trim a small excavation solely in order to provide a square or rectangular shape. Any shape, in any excavation, with included angles which may be less than 90º, with no projection less than 250mm length, may be considered to be regular. Refer Figure S6.1 - Example 2.

(5) Where the existing road construction materials are sound at the corners of an excavation, there shall be no necessity to cut out to a corner; a regular chamfer may be preferable.

The final shape of the excavation when viewed from above should be governed by the above principles rather than by aesthetic considerations (see Figure S6.1).

(6) Existing binder course layer to be exposed as per Figure S6.4 so as to provide a stepped joint.

**S6.5.2.2 Edge Regularity – Surface Course**

The edge of the surface excavation require to be saw cut and trimmed at surface course level to meet the following requirements:

(1) All bound edges shall be essentially straight, smooth and vertical.

Edge regularity requirements are intended to provide a shape that will not hinder the compaction of material adjacent to the reinstatement edge. Overlapping edge cuts and corner cut outs should be minimal and all cuts extending into the existing surface shall be filled with flexible bituminous sealant.

(2) The internal corners and edges of a reinstatement shall be as square as possible.

(3) The surface course overlay is to be applied as shown in Figure S6.4.
Figure S6.1 Examples of Prepared Edge - Example 1

SHADED AREA DENOTES ZONE OF TRIMMING BACK FROM EXCAVATED EDGE TO ‘REGULARISED’ EDGE IN BINDER COURSE

PROJECTIONS TO BE MEASURED PARALLEL WITH TRENCH, 250mm MINIMUM

EXCAVATED EDGE

SEE NOTE 1

PROJECTIONS DO NOT HAVE TO BE UNIFORM IN WIDTH - BOTH ARRANGEMENTS ACCEPTABLE

EXAMPLE 1 - LONGER TRENCH OPENING

NOTE 1: ALTERNATIVE TRIMMED EDGE OUTLINE AVOIDS SQUARED-OFF AREAS AND IMPROVES EASE OF COMPACTION

INCLUDED ANGLES LESS THAN 90 DEGREES PERMITTED, SUBJECT TO S6.5.2.1(2)

SEE NOTE 1

EXCAVATED EDGE

Examples of Prepared Edge - Example 2

SHADED AREA DENOTES ZONE OF TRIMMING BACK FROM EXCAVATED EDGE TO ‘REGULARISED’ EDGE IN BINDER COURSE

SEE NOTE 1

EXAMPLE 2 - SMALLER PATCH OPENING

NOTE 1: ALTERNATIVE TRIMMED EDGE OUTLINE AVOIDS SQUARED-OFF AREAS AND IMPROVES EASE OF COMPACTION
S6.5.2.3  Edge Sealing

(1) All edges shall be adequately prepared prior to application of edge sealant e.g. free of contamination, loose material, and the like. In all cases the manufacturer’s instructions shall be followed.

(2) At any interim stage and at the time of permanent reinstatement, the top 100mm, at least, of all bound vertical edges at surface course and binder course levels, and the equivalent area on kerbs and exposed fixed features, shall be painted with a bitumen based edge sealant or otherwise prepared with an edge sealing system or equivalent material. There shall be no significant splashing, spillage or any deliberate over painting of the adjacent road surface, subject to the requirements of Section S11.7.

(3) Tack coat, bond coat or overbanding material shall not be used as an edge sealant.

(4) There should be visible evidence of the use of sealant. The fact that a core may separate is not, on its own, evidence that no edge sealant has been used.

S6.5.2.4  Proximity to Road Edges, and Fixed Features (Surface Course)

(1) The surface course reinstatement shall be, as detailed in Figure S6.4.

(2) Where the “trimmed” edge of any excavation is within 250 mm of the road edge, kerbing, other fixed features or another reinstatement, the trim-line shall be extended to the interface with the road edge, kerbing etc. See Figure S6.2.

(3) The surface course must be extended to fixed features to within 250mm of edge of the reinstatement provided the lower layers have not been damaged. Where the lower layers are damaged repair is required.

(4) Where an existing fixed feature is immediately adjacent to another fixed feature (e.g. road gully, stop-cock valve cover, etc.) material selection shall be appropriate to ensure adequate compaction and surface profile – Section S2.2.1 (4) refers.
Figure S6.2 Edge Requirements and Trim Lines in Carriageways

NOTES:
1) SURFACE COURSE TO BE EXTENDED TO IRON WORKS AS REQUIRED
2) BINDER COURSE/BASE COURSE TO BE TRIMMED BACK TO ADJOINING IRON WORK
3) ALTERNATIVE TRIMMED EDGE OUTLINE AVOIDS SQUARED-OFF AREAS AND IMPROVES EASE OF COMPACTION.
4) BINDER COURSE/BASE COURSE TO BE TRIMMED SQUARE TO EXISTING TRENCH OUTLINE
5) TRIM LINES DO NOT HAVE TO BE UNIFORM OR SQUARE TO RUNNING/PROJECTED EDGE - BOTH ARRANGEMENTS ACCEPTABLE
6) TRIM LINES TO LARGE CIRCULAR IRONWORK (>450mm DIA) TO EXTEND A MINIMUM OF 250mm AROUND OUTER CIRCUMFERENCE
7) FULL LANE REINSTATEMENT OF SURFACE COURSE IS REQUIRED WHERE SURFACE IS 5 YEARS OLD OR LESS.

LEGEND:
- SURFACE COURSE: (SEE NOTE 1)
- BINDER COURSE/BASE COURSE: (SEE NOTE 2)
- TRENCH WIDTH
- IRON WORKS
- MH ETC.
- EXISTING IRONWORKS, MANHOLE, TRENCH REINSTATEMENT ETC.

WHERE FULL LANE REINSTATEMENT IS REQUIRED IRON WORKS IN ADJACENT LANE IS TO BE INCLUDED IN TRIM BACK WORKS (SEE NOTE 7)

SURFACE COURSE TO BE LAID IN ACCORDANCE WITH FIGURES S6.4 - S6.7

TRIM LINE TO LARGE CIRCULAR IRONWORK TO EXTEND A MINIMUM OF 250mm AROUND OUTER CIRCUMFERENCE

TRIM LINES TO LARGE CIRCULAR IRONWORK (>450mm DIA) TO EXTEND A MINIMUM OF 250mm AROUND OUTER CIRCUMFERENCE
### S6.5.2.5 Undercutting

(1) All bound edges shall be essentially smooth and vertical with no significant undercutting, as shown in Figure S6.3.

**Figure S6.3** Example of Need for Trimback due to Undercutting

![Diagram of trimback due to undercutting](image)

### S6.5.2.6 Stepped Joints

The stepped joint shall be applied on Type 0, 1 and 2 roads, refer to Figure S6.4. A stepped joint is not required for small reinstatements and narrow transverse trenches.

**Figure S6.4** Surface Reinstatement with Stepped Joints in Base Course Layer in Carriageway Types 0, 1 & 2

![Diagram of surface reinstatement with stepped joints](image)
Figure S6.5  Surface Course Reinstatement - Transverse Trench

NOTES:
1. A MINIMUM OF 0.5m OF ADDITIONAL SURFACE COURSE LENGTH IS REQUIRED AROUND EDGE OF TRENCH (REFER TO APPENDIX A3)
2. REFER TO FIGURE S6.4 & S6.7 FOR DETAILS OF SURFACE COURSE REQUIREMENTS

Figure S6.6  Surface Course Reinstatement - Longitudinal Trench

NOTES:
1. A MINIMUM OF 0.5m OF ADDITIONAL SURFACE COURSE LENGTH IS REQUIRED AROUND EDGE OF TRENCH (REFER TO APPENDIX A3)
2. REFER TO FIGURE S6.4 & S6.7 FOR DETAILS OF SURFACE COURSE REQUIREMENTS
S6.6 **Tolerances**

(1) All tolerances for all bituminous materials permitted in Appendix A2 in the reinstatement of flexible and composite roads, shall be in accordance with the requirements of the NRA Specification for Road Works.

(2) Tolerances permitted for all other bituminous materials shall be by agreement.

S6.7 **Surface Course Restrictions – Wheel Track Zones**

Surface course reinstatement shall be carried out in accordance with Figures S6.2 to S6.6. The construction joint between the newly laid surface course and the existing surface course shall not be located within the wheel track zone as outlined in Figure S6.7. This only applies to reinstatement works on surface courses over 5 years old, i.e. where a full lane reinstatement is not required as outlined in Section S0.3.2 of this Specification.
Figure S6.7  Surface Course Restrictions – Wheel Track Zone

Correct Location of Trench Joints Outside Wheel Track Zone

Correct Placement of Joint in Surface Course Reinstatement

Incorrect Placement of Joint in Surface Course Reinstatement

Surface Course Amended to Comply with Wheel Track Requirements
**S7**  
**Rigid and Modular Roads**

**S7.1**  
**Reinstatement Methods**

**S7.1.1**  
**General**

1. When the total thickness of any bituminous overlay is 100mm or more, it shall be reinstated as a composite road in accordance with Section S6.

2. Some modern road constructions incorporating special design philosophies are outside the scope of this Reinstatement Specification and reference should be made to Section NG 7.1.

3. The reinstatement shall be carried out in accordance with one of the following methods and should endeavour to achieve the greatest degree of immediate permanent reinstatement. Reinstatement methods are listed in Appendix A2 Table A2.4.

4. Permitted materials and layer thickness are specified in Appendices A1, A2, A5, A9, A11 and A12.

5. Where the authority knows of any site with high sulphate levels, it should advise interested parties in advance of the works so that appropriate measures may be taken.

**S7.1.2**  
**Method A – All Permanent Reinstatement**

The excavation and concrete road slab shall be reinstated to a permanent standard at the first visit. The bituminous overlay shall not be laid until the cured road slab has achieved a crushing strength of 25N/mm².

**S7.1.3**  
**Method B – Permanent Binder Course Reinstatement**

Not applicable

**S7.1.4**  
**Method C – Permanent Base Reinstatement**

Not applicable

**S7.1.5**  
**Method D – Permanent Reinstatement incorporating Interim Surface Overlay**

1. The excavation and concrete road slab shall be reinstated to a permanent standard at the first visit. The surface overlay shall be reinstated to an interim standard with the following bituminous surface overlays provided at the first visit;

   - AC 32 Dense Base 40/60 rec
   - AC 32 Dense Base 70/100 rec

2. The interim bituminous overlay shall be removed at a later date, to the top of the concrete road slab, and a permanent bituminous overlay reinstated.
S7.2  Sub-base Reinstatement

S7.2.1  General

(1) In a rigid road, the sub-base is deemed to be any layer of imported granular or cement bound material existing immediately below the base of the concrete road slab. Where such a sub-base layer exists, Clause 804 (complying with Clause 808) material in accordance with Series 800 of the NRA Specification for Road Works shall be laid to match the existing thickness subject to a minimum thickness of 150mm.

(2) Permitted options are shown in Appendix A5, subject to the following exception: A CBGM B sub-base of 150 mm thickness may be used in small excavations and narrow trenches regardless of whether the existing sub-base is cement bound.

S7.3  Concrete Road Slab Reinstatement

S7.3.1  General

Permitted options are shown in Appendix A5, subject to the following exceptions:

S7.3.2  Concrete Specification

(1) The concrete road slab shall be reinstated using C32/40 concrete mixed in accordance with NRA Specification for Road Works Series 1000, with an air entrainment admixture used in at least the top 50mm of the road slab.

   Exceptionally, where agreed, the concrete road slab may be reinstated using an alternative material, to suit site conditions, e.g. a high early strength mix may be agreed to allow an earlier re-opening of a heavily trafficked road.

(2) Where concrete is mixed off site, Quality Assurance Certificates detailing the specifications against which the concrete has been ordered and supplied should be obtained to confirm the material quality. Where possible, the concrete should be obtained from a plant which holds a valid Quality Assurance Certificate.

(3) In the case of small excavations, a site-batched equivalent to C32/40 concrete may be used.

S7.3.3  Joints

All expansion, contraction and warping joints removed or otherwise damaged during the excavation must be replaced or reconstructed to a similar design, using equivalent materials, at the time of permanent reinstatement.
S7.3.4 Membranes

(1) Any slip membrane shall be reinstated beneath the road slab and a curing membrane shall be used above the road slab.

(2) Impermeable polythene or similar sheeting may be used for both the slip and curing membranes.

Sprayed plastic film may be used as a curing membrane by agreement.

S7.3.5 Texture Depth

The finished surface shall comply with Table S2.5.

S7.3.6 Opening to Traffic

The cured road slab may be opened to traffic as soon as a crushing strength of 25 N/mm² has been achieved.

S7.4 Edge Support and Preparation

The edges of all excavations in rigid roads shall comply with the following requirements:

S7.4.1 Edge Support – Dowel Bar Support

(a) Where the surface of the road slab is the running surface of the road, the excavation shall be delineated by pavement saw, to the maximum depth of the concrete layer.

(b) In all excavations, a row of horizontal holes shall be drilled along the centreline of the exposed faces, to provide a sliding fit for steel dowel bars. Bar sizes are to be a minimum size of 20mm or to match existing whichever size is greater.

(c) All holes shall be drilled at 600mm ± 100mm centres, with the holes along one face offset or staggered, relative to the opposite face, by at least 200mm when viewed from above; see Figure S7.1. The nominal hole depth shall be equal to 50% of the dowel bar length ± 50mm.

(d) The maximum dowel bar length shall be 400mm; minimum dowel bar length shall be equal to the width of the reinstatement less 50mm.
**S7.4.2 Edge Preparation**

The edges of the reinstatement shall be trimmed, where necessary over part or all of the thickness of the concrete road slab, to comply with the following requirements:

1. The edge regularity shall comply with the requirements of Section S6.5.2.
2. Any undercutting shall comply with the requirements of Section S6.5.2.5.
3. Cracking within the adjacent road slab, resulting from the excavation operation, shall require the relevant area of the slab to be removed and included within the area to be reinstated.
4. Where, following trimming, the excavation extends to within 300mm of the road slab edge, joint, other reinstatement or ironwork, the relevant area of the slab shall be removed and included within the area to be reinstated.
5. All edges shall be cleaned and wetted prior to the placement of the concrete.

**S7.5 Reinforcement**

Where steel reinforcement is within the existing concrete road slab and has been cut, new steel reinforcement of equivalent weight shall be provided. All steel reinforcement design for the reinstatement is to be approved by the authority before works can commence.
S7.6 Overlays

S7.6.1 General

(1) Where the surface of the concrete road slab or the modular surface layer is overlaid with a bituminous material or surface treatment, a matching thickness of a similar or equivalent material shall be laid.

(2) Wherever practicable, the required surface course thickness should be maintained, by adjustment of the binder course thickness. The surface course and binder course materials shall not be laid to a thickness less than that required by Appendices A2 and A3 for the nominal size of each material laid.

(3) Where the surface of the concrete road slab or modular surface has had a surface treatment including overlay, an equivalent surface treatment or overlay shall be applied.

S7.6.2 Surface Reinstatement

Permitted options are shown in Appendix A5, subject to the following exceptions:

(1) Edge preparation shall be carried out in accordance with Section S6.5, except that the existing edge of the overlay shall be trimmed by a distance equal to the nominal thickness of the surface course, or 40mm, whichever is the greater.

(2) Surface reinstatement shall be carried out in accordance with the requirements of Section S6.4.

S7.7 Modular Roads

S7.7.1 General

(1) Types 0, 1 and 2 modular roads are not included in this Reinstatement Specification and reinstatement designs shall be in accordance with BS 7533:Part 3, BS 6717:Part 1 & BS 6667:Part 1.

(2) Details should be submitted of the proposed reinstatement methods for Types 0, 1 and 2 modular roads to the authority for approval prior to the commencement of works.
Figure S7.2  Surface Course in Carriageway Types 0, 1 & 2 (Rigid Road Detail)

- **EXISTING CONCRETE**
- **EXISTING SUB-BASE**
- **200mm OF EXISTING SURFACING COURSE TO BE CUT BACK**

NOTE:
1. DOWEL BARS USED IN CONCRETE LAYER ARE TO BE IN ACCORDANCE WITH S7.4 AND FIGURE S7.1 WHERE REQUIRED
2. FULL LANE WIDTH REINSTATEMENT REQUIRED WHERE EXISTING SURFACE COURSE HAS BEEN LAID IN THE PREVIOUS 5 YEARS. WHERE EXISTING SURFACE COURSE IS OLDER THAN 5 YEARS A REDUCED SURFACE REINSTATEMENT WIDTH MAY BE PROVIDED AS OUTLINED IN FIGURE A4.4 IN APPENDIX A4

Figure S7.3  Surface Course Reinstatement - Transverse Trench

- **SEE NOTE 1**
- **ROAD CENTRELINE**
- **EDGE OF ROAD**

NOTES:
1. A MINIMUM OF 0.5m OF ADDITIONAL SURFACE COURSE LENGTH IS REQUIRED AROUND EDGE OF TRENCH (REFER TO APPENDIX A5)
2. REFER TO FIGURE S7.2 & S7.5 FOR DETAILS OF SURFACE COURSE REQUIREMENTS

LEGEND:
- **REINSTATED TRENCH TO SURFACE LAYER**
- **EXISTING SURFACE COURSE**
- **EXTENT OF ADDITIONAL SURFACE REINSTATEMENT (REFER TO FIGURE S7.2 & S7.5 FOR DETAILS)**
Surface Course Restrictions - Wheel Track Zone

Surface course reinstatement shall be carried out in accordance with Figures S7.2 to S7.4. The construction joint between the newly laid surface course and the existing surface course shall not be located within the wheel track zone as outlined in Figure S7.5. This only applies to reinstatement works on surface courses over 5 years old, i.e. where a full lane reinstatement is not required as outlined in Section S0.3.2 of this Specification.
Figure S7.5  Surface Course Restrictions - Wheel Track Zone

Correct Location of Trench Joints

Correct Placement of Joint in Surface Course Reinstatement

Incorrect Location of Trench with Joint Located in Wheel Track Zone

Incorrect Placement of Joint in Surface Course Reinstatement

Surface Course Amended to Comply with Wheel Track Requirements
S8

Footways, Footpaths and Cycle Tracks
S8.1 Reinstatement Methods

S8.1.1 General

1. Reinstatement shall be in accordance with one of the following methods and should endeavour to achieve the greatest degree of immediate permanent reinstatement. Reinstatement methods are listed in Appendix A2 Table A2.4.

2. The footway, footpath and cycle tracks are to be reinstated to the full width of the element in question, see Figure S8.1 and Figure S8.2 for details.

3. In the event of prior notification by the authority, where local custom and practice has been to surface footways, footpaths and cycle tracks with aggregates of a certain colour and/or minimum PSV, then equivalent aggregate, at the time of permanent reinstatement, subject to the requirements of Section S2.6.1 shall be provided.

4. Permitted materials and layer thickness are specified in Appendices A1, A2, A7, A9, A11 and A12. In all flexible reinstatements, the Surface Course material may also be used at Binder Course level, as shown in Appendix A7.0.

5. Cycle tracks that are part of the carriageway shall be reinstated to carriageway standards.
Method A – All Permanent Reinstatement
The excavation shall be reinstated to a permanent standard at the first visit.

Method B – Permanent Binder Course Reinstatement
(1) In flexible structures, the backfill, sub-base and the binder course shall be reinstated to permanent standard at the first visit.

(2) The permanent binder course material, or an alternative interim material, shall be extended to the running surface, with or without a thin separating medium at the binder course/surface course interface. The alternative interim material may be a bituminous mixture.

(3) On the second visit, all interim surfacing materials shall be removed, to the top of the binder course, and an appropriate permanent surface course laid.

(4) Prior to the reinstatement of the permanent surface course, the surface of the binder layer is to be brushed clean and a tack coat applied.

Method C – Permanent Base Reinstatement
Not applicable in footways, footpaths and cycle tracks

Method D – Permanent Reinstatement incorporating Interim Surface Overlay
Not applicable in footways, footpaths and cycle tracks

Sub-base and Binder Course Reinstatement

General

(1) In a footway, footpath or cycle track, the sub-base is any layer of imported granular or cement bound material existing immediately below the surfacing materials. Where such a sub-base layer exists, Clause 804 material in accordance with Series 800 of the NRA Specification for Road Works shall be laid to a thickness of 150mm, or to match the existing, whichever is less, subject to a minimum of 100mm of Clause 804 Graded Granular Material.

(2) Permitted options are shown in Appendix A7, subject to the exceptions described in Sections S8.2.2 and S8.2.3.

Small Reinstatements
In small excavations and narrow trenches, the following options shall be permitted, regardless of whether the existing sub-base is a bound material:
(a) A CBGM B sub-base of 100mm thickness.
(b) An Asphaltic Concrete Binder Course (AC Bin) material of 40mm thickness.
(c) Three equal layers of HRASC, ACSC or PMSMA material may be laid to a total thickness of 100mm, as a combined sub-base, binder course and surface course.

S8.2.3 Reinstatements Adjacent to Roads

Where road construction layers, foundation platforms, structural courses, kerb beams and/or backing providing the edge support to the road structure are found to extend below an adjacent footway, footpath, cycle track or verge, any reinstatement therein shall take account of such provisions.

In such cases, the sub-structure of the footway, footpath, cycle track or verge shall be reinstated to match the existing layer thickness with similar or equivalent materials.

S8.3 Surface Reinstatement

S8.3.1 General

Surface reinstatement options are shown in Appendix A7, subject to the following exceptions outlined in S8.3.2 to S8.3.6 below.

S8.3.2 Areas Surfaced with Asphalt Concrete

Footways, footpaths or cycle tracks surfaced with Asphalt Concrete shall be reinstated with AC 6 dense surf in accordance with the NRA Specification for Road Works Series 900 unless the existing surface is an asphalt that is significantly finer than 6mm nominal size, in which case it may be regarded as either Asphalt Concrete or Hot Rolled Asphalt and reinstated accordingly.

S8.3.3 Other Asphalt Areas

(1) Where the authority has maintained a policy of using and reinstating with a specific type of asphalt surfacing on footways (e.g. asphalt concrete, sand asphalt, etc.), unless otherwise agreed with the authority, all reasonable measures should be taken to reinstate excavations with such material.

(2) The authority, when requested, shall provide any details they have on suitable suppliers and specifications. In the absence of such a policy or where no practicable source of supply can be found the reinstatement shall be undertaken in accordance with Section S8.3.2.

(3) All other asphalt footways, footpaths or cycle tracks shall be reinstated with Hot Rolled Asphalt, chipped as necessary to match the existing surface.
Areas Constructed in Concrete

(1) Concrete footways, footpaths or cycle tracks shall be reinstated with C32/40 minimum strength concrete, to match the existing thickness. For small excavations, a site-batched concrete of equivalent strength may be used.

(2) Where the authority knows of any site where air entrained concrete has been used it should advise in advance of the works.

(3) Where the existing concrete has been air entrained, then air-entrained concrete, to NRA Specification for Road Works Series 1000, shall be used. Air-entrained concrete may be used elsewhere, subject to the approval of the authority.

(4) Jointing in concrete shall be provided such that the length/width ratio shall be not greater than 2.0 or as described by the authority.

Modular Footways, Footpaths and Cycle Tracks

(1) Modular footways, footpaths and cycle tracks shall be reinstated in accordance with the permitted materials and layer thickness specified in Appendix A7.2.

(2) The modular surface layer shall be reinstated in accordance with Appendix A12. The requirements and recommendations for the provision of replacement modules are shown in Appendix A12.

(3) Specific to the reinstatement of natural stone modular surfaces, the following shall apply:
   (i) Natural stone modules within the area to be excavated shall be removed and stored by for reuse.
   (ii) Modules shall be reinstated in accordance with Appendix A12.
   (iii) Pre-existing damage may have resulted in fragmentation or breakage of modules. Where the authority has a policy which seeks to reuse damaged modules, the parts or fragments shall also be removed and stored for reuse. The authority shall be notified and the method of reinstatement of these materials shall be agreed, including any limitation on the size of the fragments.
   (iv) Where it has been agreed that damaged modules are to be reused as part of the permanent reinstatement, the surface profile at the end of the maintenance period is not required to be superior to that existing at the time of excavation.
   (v) It should be attempted to match existing profiles and meet the tolerances specified in Section S2, but subject also to the limitations outlined in Appendix A12.
S8.3.6 **Edge Requirements**

1. For all footways, footpaths and cycle tracks, the edge regularity and any undercutting shall comply with the requirements specified in Sections S6.5.2.

2. For all flexible footways, footpaths and cycle tracks, the edge sealing shall comply with the requirements specified in Section S6.5.2.3 and any overbanding shall comply with the requirements specified in Section S11.7.

3. For all concrete footways, footpaths and cycle tracks, the treatment of any cracking shall comply with the requirements specified in Section S7.4.2 (3).

4. For all footways, footpaths and cycle tracks, where trim-lines for the lower course reinstatement edges are within 150mm of an edge, kerb, ironwork or other reinstatements, the trim-lines shall be extended to the interface of the edge, kerb etc. Refer Figure S8.2.

5. Fixed features in the footway such as sign posts, lamp columns, stop-cock valve boxes, etc. that are less than 250mm diameter or less than 250mm in width on the side facing the reinstatement, are exempt from the trim-line extension.
Figure S8.2 Edge Requirements and Trim Lines in Footways, Footpaths and Cycle Tracks

1) Full width reinstatement of surface course of the footway, footpath or cycle track is required.

2) Binder course/base course where present to be trimmed back to adjoining iron work.

3) Alternative trimmed edge outline avoids squared-off areas and improves ease of compaction.

4) Trim line not extended to existing iron work (of parallel side <250mm) within 150mm of edge of new reinstatement.

5) Trim line to be extended to existing iron work (of parallel side >250mm) within 150mm of edge of new reinstatement.

6) Trim line to be extended to existing iron work (nearest approximate parallel >250mm) some of which is within 150mm of edge of new reinstatement.

7) Trim line to be extended to existing iron work (both sides >250mm) within 150mm of edge of new reinstatement.

8) Street lighting column (for reference).

9) Trim line to be extended to existing iron work nearest approximate parallel within 150mm of edge of new reinstatement.

10) Existing C/WAY full width reinstatement of surface course required.
**S8.4 Vehicular Trafficking**

**S8.4.1 Commercial Access**

(1) Where a recognised route for commercial vehicles crosses a footway, footpath or cycle track, including specified pedestrian areas and precincts, it shall be assumed that provisions for commercial vehicle loading were incorporated in the original design.

(2) The reinstatement of such areas shall comply with the relevant requirements of Sections S6 or S7, as appropriate.

**S8.4.2 Domestic Access**

(1) Where a recognised domestic vehicle crossing or occasional emergency service vehicle access route crosses a footway, footpath or cycle track, including specified pedestrian areas or precincts, the existing structure may include thicker layers, higher quality materials or other strengthening measures.

(2) The reinstatement of such areas shall match the existing layer thickness, with similar or equivalent materials.

**S8.4.3 Other Trafficking**

(1) Where a footway, footpath or cycle track, including specified pedestrian areas or precincts, is subjected to regular vehicle overrunning or parking, the existing structure may include thicker layers, higher quality materials or other strengthening measures.

(2) The reinstatement of such areas shall match the existing layer thickness, with similar or equivalent materials.

**S8.5 Tolerances**

**S8.5.1** Performance requirements and tolerances permitted in the reinstatement of footways, footpaths and cycle tracks shall be in accordance with the requirements of Section S2 and Appendix A2.
S9

Verges and Unmade Ground
S9 Verges and Unmade Ground

S9.1 General

All backfill materials shall comply with the requirements of Section S5 and Figure S9.1.

(1) Topsoil within 200mm of the surface shall be stored and reused. Where insufficient topsoil is available from the excavation, imported topsoil may be used to a depth of 100mm or to match the existing depth, to a maximum depth of 250mm.

(2) Care shall be taken to ensure that imported topsoil is not contaminated with non-organic material, noxious weeds or non-native invasive species.

(3) The re-use of excavated materials as backfill material in unmade ground is to be encouraged as part of a policy of environmentally sustainable construction.

(4) Where invasive plant species are identified within the excavated materials, these materials shall not be re-used in the reinstatement. Appropriate advice may be sought from the NRA guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads.

Figure S9.1 Verge Reinstatement Adjacent to Edge of Road
S9.2 Cultivated Areas

Unless otherwise agreed, cultivated areas containing shrubs, plants or bulbs shall be reinstated utilising the same or similar species. Thereafter the undertaker or its agent shall maintain the area for a period of 24 months and within that period any new plants that are deemed to have died shall be replaced. The undertaker or its agent shall be responsible to seek any information from surveys or other sources including the authority's archive in regard to any special features in verges (e.g. orchid sites etc) in advance of the works. Expert advice shall be obtained by the undertaker or its agent if so required by the authority in order to assist devising the most appropriate works programme for the particular species involved.

S9.3 Grassed Areas

1. Grassed areas shall be reinstated using the original turf, replacement turf or lawn seed mixes such as robust low-maintenance grassland seed mix as described in the NRA document A Guide to Landscape Treatments for National Roads Schemes in Ireland, depending on weather and growing season. In all cases, a reasonable growth shall be established within the following 12 months.

2. Where grassed areas have previously been mown, the reinstated surface shall be demonstrably left free from stones greater than 20mm nominal size. All other debris arising from the works shall be removed from the site. It should be recognised that stones in grassed areas tend to migrate to the surface over a period of time and this should not lead to repeated intervention.

S9.4 Verges, Ditches and Drainage Courses

Verges, ditches and drainage courses shall be restored to their original profile, unless otherwise agreed.
S10 Compaction Requirements

S10.1 Introduction

(1) All compaction equipment covered by this Reinstatement Specification shall comply with the NRA Specification for Road Works and be checked, adjusted, maintained and operated in accordance with working practices, maintenance schedules, operating procedures and vibrating frequencies recommended by the equipment manufacturer. Relevant records shall be provided on request within a reasonable period of time to the authority.

(2) If submitted, records can demonstrate to the authority that calibrated equipment is being used. Increased monitoring by the undertaker will apply in the event of non-availability of maintenance records.

(3) All equipment and operating procedures used for the compaction of all reinstatement materials laid above the surround to apparatus shall comply with the following requirements:

S10.2 Compaction of Materials

For all materials, compaction shall be carried out in accordance with the requirements of Appendix A2 and/or Appendix A8, immediately after the material has been placed.

S10.2.1 Unbound Granular Materials

All backfill materials shall be compacted in accordance with the relevant requirements of Series 800 of the NRA Specification for Road Works and Appendix A8 of this Reinstatement Specification. Where access is restricted, including small excavations and trenches less than 200mm wide, compaction shall be in accordance with the restricted access provisions of Appendix A8, Table A8.1.

S10.2.2 Alternative Reinstatement Materials

Foamed concretes (FCRs) shall not be compacted or tamped unless specifically required by the manufacturer. If so required, such FCR materials shall be placed and compacted in accordance with the manufacturer’s recommendations and with due regard to the requirements of Appendix A9 and Series 1000 of the NRA Specification for Road Works.

S10.2.3 Bituminous Materials

(1) All bituminous materials permitted by Appendix A2 shall be laid and compacted in accordance with the relevant requirements of Appendix A2, Tables A2.1, A2.2, Appendix A8 and the NRA Specification for Road Works.

(2) The in-situ air voids content for all bituminous materials as permitted in Appendix A2 shall comply with the requirements of the 900 Series of the NRA Specification for Road Works.
To determine the in-situ air void content core samples shall be taken in accordance with Series 900 of the NRA Specification for Road Works with a minimum of two number core samples taken along the length of the trench where the total length is less than 1000m.

In accordance with Series 900 of the Specification for Road Works an indirect density gauge in accordance with BS 594987 shall be used to determine in-situ air void content and shall be continually checked against the in-situ air void content of core samples taken.

Unless agreed otherwise, all air voids testing shall be carried out by a laboratory holding current INAB accreditation for the specified test methods.

### S10.2.4 Cementitious Materials

(1) Pavement quality concrete, laid as the surface slab of road, footway, footpath or cycle track reinstatements, shall be compacted using a proprietary vibrator, selected and operated in accordance with the manufacturer’s recommendations. However, proprietary vibrators may be unsuitable for concrete sections less than 100mm wide or less than 0.5 square metres in area. In such cases, as a minimum requirement, all concrete shall be thoroughly tamped by hand.

(2) Cement-bound granular materials, including CBGM B shall be compacted in accordance with the relevant requirements of Series 800 of the NRA Specification for Road Works.

### S10.2.5 Modular Surfacing Materials

Compaction equipment shall be operated in accordance with the manufacturer’s instructions.

### S10.3 Equipment Operation and Restrictions

(1) All compaction equipment shall be used in accordance with the requirements of Series 800 of the NRA Specification for Road Works and Appendix A8 of this document.

(2) Additional guidance on compaction procedures is included in Section NG10.3.

### S10.3.1 Hand Rammers

Except as permitted in Sections S2.2.1 (4), S10.2.2 and S10.2.4 (1), hand rammers shall be permitted to assist the initial placement of material only. For all materials, full compaction shall be applied, in accordance with the relevant requirements of Appendix A8.
S10.3.2 Percussive Rammers

Percussive rammers shall be permitted for the compaction of reinstatement materials, in accordance with the following requirements:

(a) The nominal mass shall not be less than 10 kg.
(b) The width of the foot shall not exceed 200mm.
(c) The contact length of the foot shall not exceed 200mm.

S10.3.3 Vibrotampers

Vibrotampers shall be permitted for the compaction of reinstatement materials, in accordance with the following requirements:

(1) 50 kg Minimum Nominal Mass
   (a) The width of the foot shall not exceed 5mm per kg of the nominal mass.
   (b) The contact length of the foot shall not exceed 350mm nor be less than 175mm.
   (c) The foot contact area shall not exceed 1000 sq. mm per kg of the nominal mass.
   (d) The mass of any extension leg shall not exceed 10% of the nominal mass.

(2) 25 to 50 kg Nominal Mass – permitted in areas of restricted access only
   (a) The width of the foot shall not exceed 150mm.
   (b) The contact length of the foot shall not exceed 200mm.

S10.3.4 Vibrating Rollers

Vibrating rollers shall be permitted for the compaction of reinstatement materials, in accordance with the following requirements:

(1) Single-Drum Vibrating Rollers
   (a) Single drum vibrating rollers shall include a mechanical means of applying vibration to the roll. Single-drum rollers without a specific vibration unit shall be considered to be single-drum deadweight rollers and shall not be permitted for reinstatement purposes.
   (b) The minimum mass of a single-drum vibrating roller shall be 600kg per metre (kg/m) width.

(2) Twin-Drum Vibrating Rollers
   (a) Twin-drum vibrating rollers shall include two vibrating rolls. Twin-drum rollers in which only one roll vibrates shall be considered to be single-drum vibrating rollers.
   (b) The minimum mass of a twin-drum vibrating roller shall be 600 kg/m width.
(3) All Vibrating Rollers

(a) The mass per metre width of a vibrating roller shall be calculated by dividing the total mass supported by the roll(s) by the total width of the roll(s).

(b) A minimum mass of 600 kg/m width is required for vibrating rollers for the compaction of bituminous material. Where existing roads, footways, footpaths or cycle tracks may be marked or otherwise damaged by the use of 600 to 1000 kg/m vibrating rollers, the undertaker shall notify the authority, whereupon the use of lower weight vibrating rollers shall be agreed.

S10.3.5 Vibrating Plate Compactors

Vibrating plate compactors of 1400 kg/m² minimum mass shall be permitted for the compaction of reinstatement materials.

S10.3.6 Other Compaction Equipment

Other compaction equipment, including machine-mounted compactors and all other compaction devices not specifically referenced within Appendix A8, may be permitted for the compaction of reinstatement materials, subject to the requirements of Section NG10.
S11
Ancillary Activities
S11 Ancillary Activities

S11.1 Traffic Signs, Road Markings, Studs and Verge Markers

S11.1.1 General

(1) Permanent traffic signs are to be in accordance with TS4: Guidelines, Certification Scheme and Specification for Construction of Traffic Signs, the current issue of the Traffic Signs Manual and other appropriate requirements in series 1200 of the NRA Specification for Road Works.

(2) Prior to the opening of any works to traffic, all traffic signs, road markings, studs and verge markers removed during the works shall be reinstated to a permanent or temporary standard. Temporary traffic signs, road markings, studs and verge markers shall be permitted for a maximum of 15 working days following completion of the permanent reinstatement.

(3) A survey shall be carried out by the undertaker prior to any works to record positions of any signs or road markings which may be affected by the subsequent works. All traffic signs, road markings, studs and verge markers removed during works shall be reinstated at their original location, wherever possible. Where any traffic signs, road markings, studs or verge markers cannot be reinstated at their original locations, they shall be permanently reinstated to a new layout in accordance with the Traffic Signs Manual and submitted in writing to the authority and approved before any works can commence. All traffic signs, road markings, studs and verge markers reinstated shall be in good working order regardless of previous condition.

(4) Where the authority deems the layout of existing traffic signs, road markings, studs or verge markers are not placed in accordance with the Traffic Signs Manual or are inappropriate for the current road layout, the authority shall notify relevant parties prior to the commencement of works and instruct that the position and design of the traffic signs, road markings, studs or verge markers should be changed to the authorities design. In this event, if the authority provides any new traffic signs, studs or verge markers, to replace obsolete or previously damaged items removed during the works, then such items should be installed as part of the permanent reinstatement of the works.

S11.1.2 Traffic Signs, Studs and Verge Markers

Wherever possible, all traffic signs, studs and verge markers removed during the works shall be re-erected or re-installed on completion. Where the original items cannot be re-erected or re-installed, they shall be replaced using items of equivalent type, colour, performance and dimensions.
### S11.1.3 Road Markings – General

1. Prior to permanent reinstatement, temporary road markings may be made using retro-reflective quick drying, durable paint, adhesive strip or like materials of similar colour and dimensions to the original markings.

2. Road markings removed during the works shall be permanently reinstated using materials as detailed in the Traffic Signs Manual and Tender Documentation for road making materials.

3. Except where otherwise specified by the NRA, the retro-reflectivity and skid resistance of all yellow and white lines be covered by a durability guarantee period of 2 years and shall comply with IS EN 1436, as follows:
   a) Dry retro-reflectivity:
      - Yellow – Class R1
      - White – Class R2
   b) Chromaticity to be in accordance with values specified in Table 6 of IS EN 1436
   c) Luminance:
      - White Material B4:
        - Texture depth <2mm - $D> 50$
        - Texture depth > 2mm - $D> 40$
      - Yellow Material B2:
        - All texture depths - $D> 30$
   d) Wet skid resistance:
      - Yellow – Class S2
      - White – Class S3
   e) Durability: 2 years

4. Unless otherwise agreed by the authority, all white thermoplastic road markings shall be treated with surface-applied glass beads so as to achieve the performance requirements listed in section 3 above and carry a 2 year quality guarantee.

   Hot-applied thermoplastic road marking materials with synthetic resin binder shall be laid to the following thickness:
   a) Screed lines – 4.0mm ± 1.5mm
   b) Extruded lines – 4.0mm ± 0.5mm

5. Cold applied road markings (e.g. Methylmethacrylate) may be used as an alternative to hot-applied thermoplastic materials provided that they at least match the appropriate IS EN 1824 durability and IS EN 1436 performance requirements as set out in this Section.
(6) The performance requirements for permanent road marking materials shall have been established from road trials in accordance with IS EN 1824. The material used to reinstate road markings shall be in accordance with Table S11.1.

Table 11.1

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<td>0</td>
<td>P5</td>
</tr>
<tr>
<td>1, 2 &amp; f’ways/cycle tracks</td>
<td>P4</td>
</tr>
</tbody>
</table>

(7) Coloured or antiskid surfacing may need special marking material or pre-treatment before marking to ensure adequate adhesion.

S11.1.4 Road Markings – Small Reinstatements

Road markings for small excavations (as defined in Section S1.5.2) shall meet the criteria in Section S11.1.3

S11.2 Street Furniture and Special Features

Street furniture and other special features, such as tactile paving removed to facilitate road works, shall be replaced in the same position and layout before opening the road to traffic and pedestrians except where otherwise agreed with the authority. A survey shall be carried out to record street furniture and other special features position before works begin, this should be carried out using photographic or video equipment and submitted to the authority. Items removed to facilitate road works must be carefully stored and maintained during the works. Advice on replacement may be provided by the authority.

S11.3 Traffic Sensors, etc.

Where excavation is planned at or near to traffic sensors etc, advice regarding precautions to avoid damage shall be sought from the relevant authority before work commences.
S11.4 Water-related Matters

S11.4.1 Water Egress (Reinstatements)

(1) If water issues from a reinstatement, the road authority shall initiate an investigatory works procedure to determine the cause and source of the water egress. Prior to commencement of the investigatory work, the authority should contact any relevant bodies/organisations which it believes may be responsible for the egress of water. Undertakers shall cooperate with the authority in its investigation and may take trial holes.

(2) If following the investigation, the authority has reasonable cause to believe that water egress has been caused by reinstatement operations; remedial measures shall be decided by the authority and shall be at the undertaker’s cost.

S11.4.2 Water Egress (Road Surface and Utility Apparatus)

Notes for Guidance are provided to cover situations where water issues from the road surface or apparatus.

S11.4.3 Existing Drainage Outlets

All existing drainage cuts into ditches which are located adjacent to the works shall be identified prior to any works being carried out and shall be reinstated to good working condition.

S11.5 Ironwork and Apparatus

S11.5.1 Access Covers, Frames and Surround

The installation, construction and maintenance of apparatus such as access covers and frames are an integral part of road works. Works undertaken to apparatus shall be to the standard and specification of the owner of the apparatus.

The sub-structure of an underground chamber supporting an access cover and frame is constructed in such a way that it is not usually possible to achieve a full depth reinstatement in the area defined as the ‘access surround’. The access surround is the width between the fixed feature (access frame) and the point at which a full depth reinstatement can be achieved with a full load transfer. The ‘access surround’ width will vary depending on the size of the access frame and cover.

Figures S11.1 (Example 1) and S11.1 (Example 2) show a typical construction detail relating to a large road access cover and frame of a minimum 600mm dimension with the access surround constructed in flowable and asphaltic material.
S11.5.1.1 Trimback

The width of trimback required will be the width of the frame base plus the width of the compaction tool sole plate plus 50mm. Typically, a frame which has a 150mm flange will require 350mm width of trimback to accommodate a compaction tool sole plate of 150mm.

S11.5.1.2 Excavation

(1) Edge preparation of the excavation shall comply with Section S6.5.2 for flexible roads and Section S7.4.2 for rigid and modular roads.

(2) All loose excavation material and the existing frame shall be removed and the structure prepared to receive the new frame.

(3) All loose supporting materials e.g. proprietary packing materials, engineering bricks etc., shall be removed.
S11.5.1.3 **Reinstatement Materials**

(1) Bedding material, including C32/40 strength concrete may be used to fill the excavation to within 100mm of the road surface within 350mm of the edge of the access chamber frame cover.

(2) A suitable edge sealant shall be applied, and where necessary a primer applied to the frame and bedding materials.

(3) All bedding materials shall be allowed to cure prior to the application of the surfacing.

S11.6 **Test Holes**

Test holes greater than 150mm diameter are regarded as excavations and shall be reinstated to comply with this Reinstatement Specification. Test holes of nominal 150mm diameter or less are not excavations for the purposes of this Reinstatement Specification and shall be reinstated to a permanent standard within 10 working days of completion of all associated work on the site.

(1) General

(a) Prior to reinstatement, all test holes should be made safe and maintained in a safe condition.

(b) Test holes up to 25mm diameter shall be reinstated to an immediate permanent standard.

(c) Test holes larger than 25mm diameter may be reinstated to an interim standard, if required.

(d) In modular surfaces, preference should be given, by the undertaker, to the lifting of individual modules prior to the drilling of test holes, whenever reasonably practical.

(e) In unmade ground, test holes shall be tamped closed or filled with appropriate materials.

(2) 50mm Diameter or Less

Test holes shall be reinstated to finish flush with the surface by any of the following methods:

(a) Using a fine aggregate, bound with cement or bitumen for the upper layers, as appropriate, and compacted in layers of 100mm thickness, or less.

(b) Using a self compacting proprietary product.

(c) Using a flexible sealing plug. The void beneath the flexible sealing plug shall be reinstated using sand and cement mix or a proprietary product.

(i) In bituminous surfaces, all sealing plugs shall be coloured black (or dark grey).

(ii) In modular or concrete surfaces, sealing plugs shall be coloured white (or light grey) or black (or dark grey) as appropriate.
(d) If a flexible sealing plug should become dislodged during the maintenance period, the plug should be replaced by the undertaker.

(3) 50 to 150mm Diameter

In paved surfaces, test holes shall be reinstated using a fine aggregate, appropriately compacted in layers of 100mm thickness, or less, and surfaced with appropriate cementitious or hot-lay bituminous materials to finish flush with the surface.

S11.7 Overbanding

Overbanding or coating of the road surface is not permitted, but is required between remaining road construction layers (base course and binder course). The overbanding or coating should be placed at the interface between the existing road layers and the reinstatement edge and should be undertaken in accordance with series 900 of the NRA Specification for Road Works.

All materials used for overbanding shall have a current NSAI Agrément Certificate or equivalent. In the event that no such approvals have been issued, then it shall not be used without the approval of the authority.
S12
Remedial Works
### S12 Remedial Works

#### S12.1 General

**S12.1.1** Reinstatements shall comply with the required performance criteria throughout the interim reinstatement and maintenance periods.

**S12.1.2** When determining whether a reinstatement requires any remedial action, the quality of the reinstatement shall be assessed relative to the condition of the adjacent surfaces.

#### S12.2 Repair of Cracking

**S12.2.1** Interface Cracking

Cracking along the reinstatement interface, greater than 2.5mm open width at the surface for more than the maximum permitted length shown in Table S12.1, shall require remedial action in accordance with the requirements of Section S12.2.3.

<table>
<thead>
<tr>
<th>Table 12.1</th>
<th>Interface Cracking</th>
</tr>
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<tbody>
<tr>
<td>Reinstatement</td>
<td>Surface</td>
</tr>
<tr>
<td>Small Excavations to S1.5.2</td>
<td>All Surfaces</td>
</tr>
<tr>
<td>Narrow Trenches to S1.5.3 and All Other Openings to S1.5.5</td>
<td>Footway</td>
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<td></td>
<td>All Carriageway Types</td>
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**S12.2.2** Cracking Beyond Reinstatement Limits

Cracks remote from the reinstatement interface, greater than 2.5mm open width at the surface for more than 2 metres of continuous length, shall also require remedial action in accordance with the requirements of Section S12.2.3, provided it can reasonably be shown that such cracks occurred directly as a result of the reinstatement works (see also Section S10.3.4 (3) b). Reference shall be made to the condition survey carried out as per Section S0.3.3 of this Specification.
S12.2.3 Repair of Interface Cracking

(1) Cracking along the interface of the reinstatement shall be repaired in accordance with the following methods:

(a) Cracks of between 2.5mm and 10mm open width at the surface shall be repaired by filling with a flexible bituminous sealant, subject to the requirements of Section S11.6.

(b) Cracks between 10mm and 15mm open width at the surface shall be repaired by filling with a flexible bituminous sealant incorporating suitable fine aggregate filler, which shall comply with S2.6 of this document.

(2) Cracks of greater than 15mm open width shall be repaired by planing out the defected area and removing affected layers where cracking is present. All materials shall be re-laid and compacted in accordance with this Specification. The surface layer shall be planed out to full carriageway width and to a minimum length of 15m and resurfaced in accordance with Section S6.

(3) Where, as a result of reinstatement works, a crack requiring repair in accordance with Section S12.2.3 exists within 300mm of another similar crack repair, the intermediate area shall be included in the new repair.

S12.2.4 Cracking within High Friction Surfacing

Where cracks appear in high friction surfacing provided that it is well bonded to the substrate and determined by the authority, the cracking may be sealed using a suitable epoxy or similar resin and the high friction surfacing made good. Guidance on this should be sought either from the system supplier or the NSAI Agrément Certificate.

S12.3 Repair of Settlement beyond Reinstatement Limits

(1) Where significant settlement of the surface beyond the edges of the reinstatement can reasonably be shown to have occurred as a direct result of the works (reference to survey carried out under S0.3.3 should be consulted), the effective width of the reinstatement shall be revised to include the actual width of the settled area. The relevant requirements of this Reinstatement Specification shall apply over the revised width of the reinstatement.

(2) The extent of any significant settlement beyond the reinstatement limits shall be assessed, by agreement, from consideration of the following:

(a) The apparent extent of any excessive areas of standing water following heavy rainfall.

or

(b) The apparent extent of any significant deterioration of road shape compared with the existing profile remote from the excavation.
or

(c) The true extent of any significant deterioration of road shape determined by profile measurements taken before and after the reinstatement works.

S12.4 Repair of Other Significant Defects

(1) The requirement for, and extent of, any repair shall be determined by the authority, from a consideration of the existing and adjacent surfaces.

(2) Where it can reasonably be shown by the authority that a repair is required, as a direct result of the reinstatement works, remedial works shall be carried out as necessary at undertaker’s expense.
Works Near Road Structures
Introduction

It shall be ensured that a submission issued for NRA approval to undertake road works on national routes is compliant with this Section and applies the requirements of the NRA with regard to the protection of structures.

The Section addresses in particular the installation and maintenance of underground apparatus in close proximity to existing road structures, and should be applied equally to any other engineering structure that might be affected by the proposed works.

Although this Section has been prepared primarily for the protection of structures owned by National Road Authority, the same principles apply to structures owned and maintained by other authorities, and therefore all references in this Appendix to “road structures” should be deemed to apply equally to structures associated with the road but owned by other authorities.

Purpose

The purpose of this Section is to recommend ways in which to minimise the risk of damage to road structures from works by providing information on how to identify structures, then to advise on safety measures to avoid damage occurring.

It also seeks to promote uniformity of approach amongst the relevant authorities and parties towards the provision of services across or alongside road structures.

In order to avoid damage to road structures, personnel engaged in works should be able to:

(a) appreciate the likelihood of road structures being affected by works, the need for special care to be taken and the damage which can easily result from a moment’s carelessness or ignorance.

(b) recognise types of road structure and be aware of the problems and damage that can arise if the correct procedures are not followed and also be able to recognise parts of the structure that may be exposed by excavation during works.

(c) be aware that works adjacent to road structures are subject to the requirements of the road authority and any proposed works need to comply with the NRA procedures before road works may commence.

(d) be aware that traffic management arrangements during works may redirect traffic onto weak areas of a structure.
S13.1.2 Scope

This Appendix should be considered when new services are to be provided or when apparatus is to be exposed or maintained in proximity to any existing road structure.

S13.1.3 Background

Road structures form an essential part of the road infrastructure that require special consideration and care when work is undertaken in the road.

Society expects the provision of services (electricity, gas, water, sewerage, telecommunications etc) each of which requires an extensive distribution network.

Space is often very restricted in and adjacent to road structures and services may have to share a congested service bay within the structure. In order to satisfactorily install, operate and maintain services in such situations, the needs of the structure owner, road authority and other relevant parties must be jointly understood and appropriate precautions taken to minimise the risk of damage.

The interpretation and application of this section (S13) should be tempered at all times by good engineering judgement. The emphasis throughout is on the need for local liaison and consultation.

S13.2 Road Structures

Road structures may be of various different forms, sizes and degrees of importance. They all need great care to be taken by those executing road works in their vicinity. They may be composed of a variety of materials, e.g. brick, stone, concrete, steel, wrought or cast iron, timber or a combination of these and other materials.

They include, among other things:

- bridges (road, rail)
- sign-gantries
- flyovers
- tunnels
- underpasses
- pipes
- subways
- corrugated steel pipes
- viaducts
- footbridges
- aqueducts
- safety barriers
- culverts
- retaining walls
- cattle-creeps
- high mast lighting columns
- cellars
- Varriable Message Signs (VMS)
- reinforced earth structures
- Emergency Roadside Telephones (ERT).
Road structures are expensive and intricate, requiring great care and attention on the part of those installing services or repairing apparatus in their vicinity. What might appear to be minor and insignificant damage to a vital structural element may affect its safety and durability and thus substantially reduce the serviceable life of the structure. Such minor damage may remain undetected for years, but the consequences and the ultimate cost of repair could be severe.

Modern road structures have a design life of 120 years. Most are unique, though a large proportion of structures will fall into one of a small number of structural types. Using a few basic principles and working methods will help to safeguard their structural integrity and preserve them from damage. Appendix A13 shows typical structure types and restricted zones that may be designated by the owning authority.

Many other structures are either structures of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest protected under the Local Government (Planning and Development) Acts, 1963 to 1999 or listed structures in the local County Development Plan. Refer Section S13.3.

Particular care must be taken with the reinstatement of ‘high amenity surfaces’ on or adjacent to road structures designated as scheduled ancient monuments or listed buildings or located in a conservation area where their contribution to the special architecture or historic interest may be very significant.

Some structures are protected by a waterproof membrane to combat the effects of corrosive de-icing salts which may penetrate the road surface. The membrane may be mastic asphalt, rubber or polymerised sheet or a thin spray-on layer. Even minor damage to this during installation of a service can cause the problems highlighted in S13.2 resulting in serious consequences to the integrity of the structure and its service life.

Similarly many structures have movement joints either at or below the carriageway surface to accommodate expansion and contraction. There are many different types of joint: some buried, some exposed, some open and some sealed to prevent ingress of water. Minor damage to these can also have serious long-term consequences to the integrity of the structure and its service life.

During the installation of services and maintenance of apparatus, the type of plant and equipment used for excavation and breaking out may potentially be very damaging to structures and their components unless operated with extreme caution.

During construction of a new bridge or major maintenance work to an existing bridge, effective planning and liaison between road authorities and relevant parties such as utility providers etc will often prevent future disruption and possible damage if additional ducts are incorporated within the structure at an appropriate stage.

When planning a traffic management scheme for road works at or adjacent to a road structure
it is important to discuss signing, lighting and guarding arrangements with the road authority. Apart from following the requirements, it is important to ensure that diverted traffic is not directed onto weak parts of the structure. It may also be necessary to erect screens to avoid debris falling through or over bridge parapets.

It is also important to ensure that cables linking sets of temporary traffic signals used in connection with the road works are not allowed to sag over parapets and touch live overhead rail traction cables or other electric cables.

S13.3 Ancient Monuments and Listed Structures

Many road structures are scheduled ancient monuments or listed buildings and protected against unauthorised road works that may damage their archaeological importance or special architectural interest. They range from milestones and mileposts to extensive medieval causeways and bridges. The undertaker shall consult the relevant County Development Plan and if necessary liaise with the relevant planning authority as invariably specific consent is required before work on them may be undertaken.

S13.4 Specification for the Reinstatement of Openings in National Roads

Relevant parties whom propose to carry out works are under a duty to carry out their proposals to prescribed standards. This Reinstatement Specification provides guidance on excavation, backfilling and reinstatement of the road.

S13.5 Responsibility for Damage

The authority, other service providers and any other relevant authority shall be compensated for any loss caused by the execution of the road works. This obligation is subject to the proviso that the authority itself has not, by negligence or misconduct, contributed to the loss. These provisions should encourage all parties to liaise and co-operate fully in all cases where it is known that sensitive structures may be at risk from road works.
S13.6 Recognition of Structures

Vigilance is required in the planning and execution of work. Many road structures are large and easily recognisable but a great number are not apparent to the casual observer. Cellars, culverts and tunnels are frequently not visible from the road or verge and it is not unknown for excavation to damage underpasses or bridges without operatives becoming aware.

The undertaker should consult with the authority in whose area the works are to be undertaken so as to establish the location of road structures in its ownership of which it is aware. The undertakers should also consult with the owners of other state owned structures and privately owned structures to establish if location and ownership. Reference may also be made to other available information such as Ordnance Survey plans and records of previous installations.

It is important that notification procedures are correctly followed. Unclear or inaccurate notices may mean that the road authority is unable to spot a potential risk to a structure or, at best, unable to determine how a structure may be affected by the proposals.

On national routes, low points may indicate probable culvert locations where watercourses pass under the road. In hilly terrain, retaining walls may be found which both support the road and adjacent land higher than the road.

Parties are reminded of their responsibility to recognise when their proposed road works will affect a structure and to consult the bridge owner before giving notice.

S13.7 Damage to Road Structures

This Section sets out the precautions that should be taken in order to avoid damage to road structures during road works. It also stresses the fact that apparently minor and insignificant damage to a vital structural element may substantially reduce its serviceable life and seriously affect its safety.

Even after taking all procedures and safety precautions into account, there may be occasions when damage nevertheless occurs. When this happens it is absolutely essential that the authority owning the structure is advised of the damage without delay so that timely repairs may be carried out. Minor damage can sometimes remain undetected for years, whilst the serviceable life and safety of the structure will deteriorate and repairs, when they are finally made, will undoubtedly prove very much more extensive and costly than if carried out immediately.
Appendix A0 – Road Categories

Figure A0.1 Ireland Map

continued on page 121
A0.0 **Introduction**

The national road network has been classified into “Road Types” 0, 1 or 2 which correspond to the number of millions of standard axles it will carry over a 20 year period.

The traffic loading is calculated in accordance with NRA standard “HD 24/06 Pavement Design and Maintenance Traffic Assessment”.

A0.1 **Calculation**

As noted above, the millions of standard axles (msa) values have been calculated using HD 24/96 which account for the following:

(a) 24 hour annual average daily flow (AADF) of commercial vehicles in one direction.

(b) Average vehicle axle factor over a 20-year service life.

(c) Actual sustained annual growth rate of commercial vehicles.

The “Road Type” assigned to each road can be seen in Figure A0.1.

It should be noted that the road reinstatement for national roads classified to be carrying over 125msa are not included in this Reinstatement Specification and consultation with the National Roads Authority should be carried out before any road works can commence.

A0.2 **Existing Carriageway Construction**

It is not possible to match the engineering integrity of existing well-consolidated unbound layers with unbound reinstatement materials. Therefore there may be significant differences between the existing carriageway construction and the requirements of the Reinstatement Specification. The increased thickness of reinstatement materials compensate for this.
Appendix A1 – Backfill Materials

A1.1 Backfill Materials

Backfill material must be in accordance with Clause 804 of Series 800 of the NRA Specification for Road Works. All Clause 804 backfill material which is to be placed with 500mm of cement bound materials, concrete pavements, concrete structures or concrete products shall comply with Clause 808 of Series 800 of the NRA Specification for Road Works.

A1.2 Unacceptable Materials

The following materials are listed as unacceptable in Series 600 of the NRA Specification for Road Works and shall not be used at any level within the permanent structure of any reinstatement:

1. Peat and materials from swamps, marshes or bogs.
2. Logs, stumps and perishable materials.
3. Materials in a frozen condition. (Such materials, if otherwise suitable, shall be classified as suitable when unfrozen.)
4. Clays having a liquid limit exceeding 80, determined in accordance with BS1377: Part 2, or a Plasticity Index exceeding 55, determined in accordance with BS1377: Part 2.
5. Materials susceptible to spontaneous combustion.
6. Materials having hazardous chemical or physical properties requiring special measures for excavation, handling, storage, transportation, deposition and disposal.

The use of sand or any material which is liable to be easily washed away should not be used at any level within the permanent structure of any reinstatement. The use of such material may result in a cavity forming which in turn may cause settlement in the reinstatement.

A1.3 Field Identification Test

The following identification test must be carried out immediately prior to the placement and compaction of the backfill material.

Field Identification Test – Granular Condition

Granular materials such as Clause 804 must be compacted near to their optimum moisture content. The optimum moisture content can vary considerably depending on the average particle size and to a much smaller extent, on the type of mineral or rock involved. However, a laboratory compaction test is invariably carried out on a sample of material from which the larger particles have been
removed. The sample is always compacted in a small smooth sided steel cylinder and the standard methods of compaction bear little similarity with current compaction plant.

Granular materials suitable for compaction by pedestrian controlled plant can usually be identified by a simple visual examination. Typically, the test will identify materials within 1% to 1.5% of the field optimum moisture content depending on the mineral type. Experience has shown that compaction within this visual moisture range will not normally show any significant reduction in compaction performance. The test cannot indicate the actual moisture content of any material but this is rarely of any relevance as far as an operator is concerned.

**Preparation**

Depending on the size of the stockpile, dig out representative samples from beneath the outer surface, at several positions around the outside in a conical shape.

**Test – Coarse Aggregate**

Examine several of the medium- and larger-sized particles from each sample extracted.

**Result**

Material within the target moisture content range will show a dull sheen when viewed obliquely against the light, with all fines adhering to the larger particles, and no free water will be visible. Material at the dry limit will not show the characteristic sheen, fines will not be strongly adherent and many of the fines will be free. Material at the wet limit will begin to show free moisture collecting in surface grooves or amongst the fines, fines will not be strongly adherent and many of the fines will amalgamate as soggy clusters. Any result between the wet and dry limits is acceptable provided the bulk of the sample is reasonably well graded.
Appendix A2 - Key to Materials
Appendix A2 – Key to Materials

A2.0 Introduction

(1) This Reinstatement Specification covers the reinstatement of excavations made in national roads. Whilst the Reinstatement Specification captures all forms and sizes of excavations, the substantial majority of reinstatements carried out are small rectangular-type openings and trenches. By implication these reinstatements can be considered to be carried out in restricted or confined areas.

(2) A significant proportion of road reinstatements adopt hand laying operations, rather than machine laying operations, which are allied to new build and larger surface area situations, i.e. those which are not necessarily restricted or confined. In addition to the final compaction of asphalt layers, hand laying operations also include the on-site transportation and handling of the asphalt materials.

(3) The preferred and permissible materials set out in this Appendix are predominantly for hand laying operations, and have been selected accordingly, which supports other end-performance criteria, generally set out through the Reinstatement Specification. Materials for the surface course are chosen for their suitability in machine laying operations (refer to Figures S6.4 to S6.6).

A2.0.1 Roads – General

In small excavations and narrow trenches, the preferred binder course mixture may be replaced by any surface course mixture that complies with the Reinstatement Specification for the respective road type, provided that the same mixture is used as the surface course, see Section S6.4.9.

A2.0.2 Footways, Footpaths and Cycle Tracks – General

In all excavations, the preferred binder course mixture may be replaced by any surface course mixture that complies with this Appendix and with Section S8. This substitution is limited solely to the binder course layer.

A2.1 Hot Rolled Asphalt (HRA) Mixtures

(1) All HRA shall conform to IS EN 13108-4. Conformity shall be established in accordance with IS EN 13108-20 and IS EN 13108-21. Natural gravels are not permitted as coarse aggregate for use in Types 0, 1 and 2 roads.

(2) Requirements for deformation resistance as assessed by wheel tracking performance (WTR) are in accordance with IS EN 13108-20.

(3) Chippings for surface application to HRA surface course mixtures shall be coarse aggregate conforming to IS EN 13108-4.
A2.1.1 **HRA Surface Course Mixtures**

The following HRA surface course mixture options are permitted.

(i) Roads Type 0, 1 and 2
   (a) HRA 30/14 F surf 40/60
   (b) HRA 35/14 F surf 40/60

(ii) Footways, Footpaths and Cycle Tracks
    Not used

A2.1.2 **HRA Binder Course Mixtures**

Not permitted

A2.1.3 **HRA Base Course Mixtures**

Not permitted

A2.2 **Polymer Modified Stone Mastic Asphalt (PMSMA) Mixtures**

(1) PMSMA shall conform to IS EN 13108-5 and Series 900 of the NRA Specification for Road Works. The following PMSMA mixtures are permitted by this Reinstatement Specification, depending upon the detailed requirements of the relevant section.

(2) Requirements for deformation resistance as assessed by wheel tracking performance (WTR) are in accordance with IS EN 13108-20.

A2.2.1 **PMSMA Surface Course Mixtures**

The following PMSMA surface course mixture options are permitted.

(i) Roads Type 0, 1 and 2
    The permitted mixtures are:
    (a) SMA 10 surf PMB 65/105-60 des
    (b) SMA 14 surf PMB 65/105-60 des

(ii) Footways, Footpaths and Cycle Tracks
    Not used
A2.2.2    **PMSMA Binder and Base Course Mixtures**

As Series 900 of the NRA Specification for Road Works only specifies PMSMA as a Surface Course, PMSMA Binder Courses and Base Courses are not specified in this document.

A2.3    **Asphalt Concrete (AC) Mixtures**

(1) All asphalt concrete shall conform to IS EN 13108-1. Conformity shall be established in accordance with IS EN 13108-20 and IS EN 13108-21. The following coated mixtures to IS EN 13108-1 are permitted by this Reinstatement Specification depending upon the detailed requirements of the relevant section.

(2) Where the existing mixture is HDM (Heavy Duty Macadam to the now superseded BS 4987-1) or HMB (High Modulus Base) and the authority requires the reinstatement to be completed using a similar mixture, the authority shall notify the relevant parties accordingly.

(3) Requirements for deformation resistance as assessed by wheel tracking performance (WTR) are in accordance IS EN 13108-20.

A2.3.1    **Asphalt Concrete Surface Course Mixtures**

(i) All Road Types

The coated surface course mixtures to IS EN 13108-1 shall be:

   AC 14 Close Surf 70/100 rec

Note: Asphalt concrete is not permitted on high speed roads i.e. roads with a design speed of ≥85km/hr.

(ii) Footways, Footpaths and Cycle Tracks

   (a) The preferred coated surface course mixtures shall be AC 6 dense surf 70/100 or AC 6 dense surf 160/220.

   (b) The preferred mixture may be replaced by other agreed, alternative materials where the existing surface is a coated mixture to the now superseded BS 4987 or current IS EN 13108-1 of aggregate size significantly finer than 6mm nominal size, see Section S8.3 3.

A2.3.2    **Asphalt Concrete Binder Course Mixtures**

(i) Road Types 0 and 1

   AC 20 dense bin 40/60 rec is the preferred binder course as shown in Appendix A11 and Appendix A3.0 and A3.1.

(ii) Road Type 2
AC 20 dense bin 70/100 rec is the preferred binder course as shown in Appendix A11 and Appendix A3.2

Note: Alternative binder course design mixes require approval by the authority before they can be used in any reinstatement works.

**A2.3.3 Asphalt Concrete Base Course Mixtures**

(i) Road Types 0 and 1

AC 32 dense Base 40/60 rec is the preferred base course as shown in Appendix A11 and Appendix A3.0 and A3.1

(ii) Road Type 2

AC 32 dense Base 70/100 rec is the preferred base course as shown in Appendix A11 and Appendix A3.2.

**A2.4 Porous Asphalt**

Porous asphalt is only to be adopted in the surface reinstatement where the existing surface course is porous asphalt.

(i) Road Types 0, 1 and 2

PA 14 surf PMB des is the only permitted porous asphalt design mix to be used.

**A2.5 Cold-lay or Deferred Set Mixtures Surfacing Materials**

Not Permitted

**A2.6 Structural Layer Thickness Tolerances**

(1) Several individual layers of material, commonly termed “lifts”, may be required to reinstate a structural layer.

(2) The thickness of each complete structural layer is specified as a nominal value.

(3) The lower tolerance for the thickness of a structural layer shall be as follows:

   (a) -5mm for the surface course

   (b) -10mm for any other structural layer comprising bound material

   (c) -20mm for any other structural layer comprising unbound material
(4) The upper tolerance for a structural layer thickness is not subject to any restriction although an excessive thickness of surface course is not expected.

Where large thicknesses of surface course are used:

(a) the requirements for compacted lift thicknesses under Appendix A2.6 shall be met, as shall the in-situ air-voids through the full depth of the as-laid surface course layer, as set out in Section S10.2.3.

(b) the required combined binder and base course material thickness is still required, unless the binder course mixture is replaced with surface course mixture, as permitted by Appendix A2.0.1 and A2.0.2.

(c) the surface profile performance requirements set out in Section S2.2 shall not be exceeded.

(5) The combination of permitted tolerances for the thickness of each structural layer of bituminous and/or cement bound mixtures shall not result in any of the following:

(a) An overall reduction in thickness of the bound pavement, excluding the sub-base, of more than 15mm from the specified nominal thickness in a road, subject to an absolute minimum of 100mm of bound materials.

(b) An overall reduction in the thickness of the bound pavement, excluding the sub-base, of more than 10mm from the specified nominal thickness in a footway, subject to an absolute minimum of 60mm of bound materials.

(c) A non-compliance with the Reinstatement Specification if the combined thickness of the relevant layers equals or exceeds that of the Reinstatement Specification requirements, provided that each individual lift meets the thickness requirements of Tables A2.1 or A2.2 and the bituminous mixtures meet the void requirements of S10.2.3.
A2.7 Compacted Lift Thickness

The compacted thickness of all individual lifts of reinstatement mixtures, within all reinstatement structural layers, shall be in accordance with the following requirements:

A2.7.1 Bituminous Mixtures

The compacted thickness of all individual 'lifts' of bituminous mixtures shall be in accordance with Table A2.1 (See Table A2.3 for key to reinstatement materials).

Table A2.1

<table>
<thead>
<tr>
<th>Material Type</th>
<th>IS EN 13108 Reference</th>
<th>Compacted Lift Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Minimum at any point</td>
</tr>
<tr>
<td>30/14 HRA</td>
<td>HRA 30/14 F surf 40/60</td>
<td>35</td>
</tr>
<tr>
<td>35/14 HRA</td>
<td>HRA 35/14 F surf 40/60</td>
<td>45</td>
</tr>
<tr>
<td>10mm PMSMA</td>
<td>SMA 10 surf PMB 65/105-60 des</td>
<td>20</td>
</tr>
<tr>
<td>14mm PMSMA</td>
<td>SMA 14 surf PMB 65/105-60 des</td>
<td>30</td>
</tr>
<tr>
<td>6mm AC*</td>
<td>AC 6 dense surf - 70/100 rec, or 160/220 rec</td>
<td>15</td>
</tr>
<tr>
<td>14mm AC**</td>
<td>AC 14 close surf - 70/100 rec</td>
<td>35</td>
</tr>
<tr>
<td>20mm AC</td>
<td>AC 20 dense bin 40/60 rec or 70/100 rec</td>
<td>40</td>
</tr>
<tr>
<td>32mm AC</td>
<td>AC 32 dense Base 40/60 rec or 70/100 rec</td>
<td>55</td>
</tr>
<tr>
<td>14mm Porous Asphalt</td>
<td>PA 14 surf PMB des ***</td>
<td>25*</td>
</tr>
</tbody>
</table>

* Only for use in footways, footpaths and cycle tracks

** Not permitted on high speed roads i.e. roads with a design speed of ≥ 85km/hr

*** Where porous asphalt surfaces are encountered refer to S6.4.5. (IS EN 13108 – 7 contain specifications for this group of asphalts and guidance on the appropriate material should be obtained from the authority).

A2.7.2 Non-Bituminous Materials

The compacted thickness of all individual 'lifts' of non-bituminous materials shall be in accordance with Table A2.2 (See Table A2.3 for key to reinstatement materials).
### Table A2.2

<table>
<thead>
<tr>
<th>Material</th>
<th>Compacted Lift Thickness (mm)</th>
<th>Minimum at any point</th>
<th>Nominal Lift Thickness</th>
<th>Maximum at any point</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBGM B 75</td>
<td></td>
<td>75</td>
<td>100 to 150</td>
<td>200</td>
</tr>
<tr>
<td>C32/40 Concrete</td>
<td></td>
<td>100</td>
<td>As Required</td>
<td>As Required</td>
</tr>
<tr>
<td>GSB1</td>
<td></td>
<td>75</td>
<td>100 to 150</td>
<td>200</td>
</tr>
<tr>
<td>Clause 804</td>
<td></td>
<td>75</td>
<td>100 to 150</td>
<td>200</td>
</tr>
</tbody>
</table>

#### A2.8 Bituminous Laying Temperatures

The laying temperatures for bituminous mixtures shall be in accordance with Series 900 of the NRA Specification for Road Works.

#### A2.9 Identification of Structural Layers

##### A2.9.1 Road Structures

(1) For the purposes of defining permissible material options, layer thickness etc, this Reinstatement Specification classifies road structures as being of flexible, composite, rigid or modular design. The road structures assumed to be representative of each of these designs are shown in Figure A2.1. For each design, a typical reinstatement structure, identifying the principal structural layers, is also shown.
Figure A2.1 — Typical Reinstatement Structure within recognised Road Designs

- **Surface Course**
- **Binder Course**
- **Base**
- **Sub-base** (CL 804)
- **Backfill** (CL 804)
- **Surround to Apparatus**

For width of surface and binder course reinstatement see Figures S6.2, S6.4, S6.5, S6.6 and S6.7.
(2) Permitted materials and layer thickness for road structures are specified as follows:

(a) Flexible Design – see Appendix A3.0 to A3.2
(b) Flexible Sub-structure – see Appendix A3.3
(c) Composite Design – see Appendix A4.0 to A4.2
(d) Composite Sub-structure – see Appendix A4.3
(e) Rigid Design – see Appendix A5.0 to A5.2

(3) All layer thicknesses are in millimetres.

**A2.9.2 Footway, Footpath and Cycle Track Structures**

(1) For the purposes of defining permissible material options, layer thickness, etc. this Reinstatement Specification classifies footway, footpath and cycle track structures as being of flexible, rigid or modular design. The structures assumed to be representative of each of these designs are shown in Figure A2.2. For each design, a typical reinstatement structure, identifying the principal structural layers, is also shown.

(2) Permitted materials and layer thickness for footway, footpath and cycle track structures are specified as follows:

(a) Flexible Design see Appendix A7.0
(b) Rigid Design see Appendix A7.1
(c) Modular Design see Appendix A7.2.

(3) All layer thicknesses are in millimetres.
Figure A2.2  Typical Reinstatement Structure within recognised Footway Designs
A2.10  Key to Materials

(1) For the purposes of defining the main material options, layer thickness, etc. required by this Reinstatement Specification, Appendices A3 to A7, inclusive, show the principal structural layers within cross-sections of typical reinstatement designs in each of the main surface categories. Materials are denoted by the symbols in Table A2.3.

(2) Proprietary asphalt materials are not included in Table A2.3, given their specialist and limited application, an example being flowable mastic asphalts, which may be used in footway surface courses and access surrounds to larger apparatus in roads.

(3) ARMs are not shown, given the wide range of options and material variations.

Table A2.3  Key to Reinstatement Materials

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRASC</td>
<td>Hot Rolled Asphalt Surface Course</td>
</tr>
<tr>
<td>AC BIN</td>
<td>Asphalt Concrete Binder Course</td>
</tr>
<tr>
<td>AC BASE</td>
<td>Asphalt Concrete Base Course</td>
</tr>
<tr>
<td>CONCRETE</td>
<td>Concrete - Pavement Quality Concrete to SRW Series 1000</td>
</tr>
<tr>
<td>CBGM B</td>
<td>Cement Bound General Material Category B to SRW Series 800</td>
</tr>
<tr>
<td>CLAUSE 804</td>
<td>Granular Sub-base Material To SRW Series Clause 804</td>
</tr>
<tr>
<td>CLAUSE 804</td>
<td>Granular Backfill Material See Appendix A1.1</td>
</tr>
</tbody>
</table>

* Not permitted on high speed roads i.e. roads with a design speed of ≥ 85km/hr
A2.11 **Key to Reinstatement Methods**

Sections S6.1, S7.1 and S8.1 set out the permissible reinstatement methods for all of the main types of construction categories covered by this Reinstatement Specification. Appendices A3 to A7, inclusive, indicate different materials and material thicknesses for each permissible reinstatement method, which may also vary between different Road Categories. Table A2.4 summarises these permissible reinstatement methods.

A2.12 **Summarised Selection Process for Hot Lay Flexible Materials**

Specific to the hot-lay reinstatement of flexible roads and footways (including footpaths and cycle tracks), different parts of this Reinstatement Specification and the NRA Specification for Road Works set out the following criteria:

- overall class, layer designation and mixture design for Hot Rolled Asphalts, and Asphalt Concretes (Series 900 of the NRA Specification for Road Works);
- different thicknesses of mixture layers (A3 and A7);
- specific requirements and limitations for surface courses (Sections S6.4 and S8.3).

The overall process for selecting the correct materials to reinstate flexible roads and footways is particularly more complex at the reinstatement design selection stage. Figure S0.1 provides a generic overview of this process, but to assist practitioners, Figure A2.3 sets out the summarised overall processes specific to:

- Types 0 and 1 Flexible Roads
- Types 2 Flexible Roads

Permitted materials for hot lay flexible for footways (including footpaths and cycle tracks) are shown in Appendix A7.0 to A7.2. These materials shall comply with Series 900 of the NRA Specification for Road Works.
Existing Carriageway Construction | Confirm Road Category and Select Permissible Reinstatement Appendix | Identify ALLOWABLE Bound Course Options and relevant Specification under Appendices A2 and A3
--- | --- | ---
Flexible | Types 0, 1 & 2 | Type 0 – Appendix A3.0
 |  | Type 1 – Appendix A3.1
 |  | Type 2 – Appendix A3.2
Surface Course (Types 0, 1 & 2) | HRASC | 40mm
PMSMA | 40mm for 14mm PMSMA
 | 30mm for 10mm PMSMA
ACSC (See Note 1) | 40mm
 | 6mm (See Note 2)
Binder Course (Types 0, 1 and 2) | AC Bin | Type 0 – 60mm
 | Type 1 – 60mm
 | Type 2 – 60mm
Base Course (Types 0, 1 and 2) | AC Base | Type 0 – 245mm
 | Type 1 – 220mm
 | Type 2 – 185mm

Notes:
1) Asphalt Concrete Surface Course (ACSC) is not permitted on high speed roads (i.e. roads with a design speed $\geq$ of 85km/hr)
2) AC 6 dense surf materials are not permitted on any road types and are only permitted on footways, footpaths and cycle tracks.
## Mixture Options

<table>
<thead>
<tr>
<th>Mixture Options</th>
<th>Restrictions at Surface Course</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HRA 30/14 F surf 40/60</strong></td>
<td><strong>Type 0, 1 &amp; 2 Roads</strong> — If existing Surface Course is HRA then reinstated Surface Course <strong>MUST</strong> be HRA.</td>
</tr>
<tr>
<td>Appendix A2.1.1 (i) (a)</td>
<td></td>
</tr>
<tr>
<td><strong>HRA 35/14 F surf 40/60</strong></td>
<td></td>
</tr>
<tr>
<td>Appendix A2.1.1 (i) (b)</td>
<td></td>
</tr>
<tr>
<td><strong>SMA 10 surf PMB 65/105-60 des</strong></td>
<td><strong>Type 0, 1 &amp; 2 Roads</strong> — If existing Surface Course is PMSMA, then reinstated Surface Course <strong>MUST</strong> be PMSMA.</td>
</tr>
<tr>
<td>Appendix A2.2.1 (i) (a)</td>
<td></td>
</tr>
<tr>
<td><strong>SMA 14 surf PMB 65/105-60 des</strong></td>
<td></td>
</tr>
<tr>
<td>Appendix A2.2.1 (i) (b)</td>
<td></td>
</tr>
<tr>
<td><strong>AC 14 Close surf 70/100 rec</strong></td>
<td><strong>Type 0, 1 &amp; 2 Roads</strong> — ACSC is a permissible Surface Course option in existing low speed roads which are surfaced with Asphaltic Concrete Mixtures. ACSC is not permitted on high speed roads i.e. roads with a design speed &gt; of 85km/hr.</td>
</tr>
<tr>
<td>Appendix A2.3.1 (i)</td>
<td></td>
</tr>
<tr>
<td><strong>AC 6 Dense surf 70/100 rec or 160/220 rec</strong></td>
<td><strong>Footways, Footpaths and Cycle Tracks</strong> — AC 6 dense surf 70/100 rec and 160/220 rec is not permitted on any road types.</td>
</tr>
<tr>
<td>Appendix A2.3.1 (ii)</td>
<td></td>
</tr>
<tr>
<td><strong>AC 20 dense bin 40/60 rec</strong></td>
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</tr>
<tr>
<td>Appendix A2.3.2 (i)</td>
<td></td>
</tr>
<tr>
<td><strong>AC 20 dense bin 70/100 rec</strong></td>
<td></td>
</tr>
<tr>
<td>Appendix A2.3.2 (ii)</td>
<td></td>
</tr>
<tr>
<td><strong>AC 32 dense base 40/60 rec</strong></td>
<td></td>
</tr>
<tr>
<td>Appendix A2.3.3 (i)</td>
<td></td>
</tr>
<tr>
<td><strong>AC 32 dense base 70/100 rec</strong></td>
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</tr>
<tr>
<td>Appendix A2.3.3 (ii)</td>
<td></td>
</tr>
</tbody>
</table>

**Footways, Footpaths and Cycle Tracks** — AC 6 dense surf 70/100 rec and 160/220 rec is not permitted on any road types.
<table>
<thead>
<tr>
<th>Reinstatement Method (At First Visit)</th>
<th>Flexible &amp; Composite Roads Section S6</th>
<th>Flexible (Appendix A3.0-A3.2 incl.)</th>
<th>Composite (Appendix A4.0-A4.2 incl.)</th>
<th>Rigid (Appendix A5.0-A5.2 incl.)</th>
<th>Modular (See S7.7 for details)</th>
<th>Bituminous Base (Roadbase)</th>
<th>Composite Base (Roadbase)</th>
<th>Granular Base (Roadbase)</th>
<th>N/A</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Permanent</td>
<td>Method A (Types 0-2 incl.)</td>
<td>Method A (Types 0-2 incl.)</td>
<td>Method B (Types 0-2 incl.)</td>
<td>Method C (Types 0-2 incl.)</td>
<td>Method A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Method A</td>
<td>N/A</td>
</tr>
<tr>
<td>Interim with Permanent Binder Course</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Method B</td>
<td>N/A</td>
</tr>
<tr>
<td>Interim with Permanent Base</td>
<td>N/A</td>
<td>N/A</td>
<td>Method B (Types 0-2 incl.)</td>
<td>Method C (Types 0-2 incl.)</td>
<td>Method A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Method B</td>
<td>N/A</td>
</tr>
<tr>
<td>Permanent incorporating Interim Surface Overlay</td>
<td>N/A</td>
<td>N/A</td>
<td>Method B (Types 0-2 incl.)</td>
<td>Method C (Types 0-2 incl.)</td>
<td>Method A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Method B</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Key to Reinforcement Methods

- Flexible & Composite Roads Section S6
- Rigid & Modular Roads Section S7
- Footways, Footpaths & Cycle Tracks Section S8
Appendix A3 - Flexible Roads
Appendix A3 – Flexible Roads

**Figure A3.0 Flexible Roads Type – '0'**

**NOTES:**
1) SUB-BASE IN ACCORDANCE WITH APPENDIX A3.3
2) AC SURFACE COURSE NOT PERMITTED ON HIGH SPEED ROADS (REFER TO A2.3)
3) WHERE 10mm PMSMA IS USED ON THE SURFACE COURSE THE THICKNESS IS REDUCED TO 30mm AND THE BINDER COURSE INCREASED ACCORDINGLY
4) REFER TO FIGURE S6.4 FOR FURTHER DETAILS ON SURFACE COURSE REINSTATEMENT AND STEPPED JOINTS AT BINDER COURSE LEVEL
5) REFER TO FIGURE A3.4 OF THIS APPENDIX FOR DETAILS ON REINSTATEMENT REQUIREMENTS AT LOCATIONS WHERE EXISTING SURFACE COURSE MATERIAL IS GREATER THAN 5 YEARS OLD
6) FOR ALTERNATIVE REINSTATEMENT MATERIALS REFER TO APPENDIX A9

---

**METHOD A**
ALL PERMANENT

**METHOD B**
PERMANENT BASE / BINDER COURSE

**METHOD C**
NOT PERMITTED

**REINSTATEMENT WIDTH (SEE NOTE 5)**

HRASC
ACSC (SEE NOTE 2)
PMSMA (SEE NOTE 3)
AC BASE
AC BIN

**FIGURE NOT DRAWN TO SCALE**
NOTES:
1) SUB-BASE IN ACCORDANCE WITH APPENDIX A3.3
2) AC SURFACE COURSE NOT PERMITTED ON HIGH SPEED ROADS (REFER TO A2.3)
3) WHERE 10mm PMSMA IS USED ON THE SURFACE COURSE THE THICKNESS IS REDUCED TO 30mm AND THE BINDER COURSE INCREASED ACCORDINGLY
4) REFER TO FIGURE S6.4 FOR FURTHER DETAILS ON SURFACE COURSE REINSTATEMENT AND STEPPED JOINTS AT BINDER COURSE LEVEL
5) REFER TO FIGURE A3.4 OF THIS APPENDIX FOR DETAILS ON REINSTATEMENT REQUIREMENTS AT LOCATIONS WHERE EXISTING SURFACE COURSE MATERIAL IS GREATER THAN 5 YEARS OLD
6) FOR ALTERNATIVE REINSTATEMENT MATERIALS REFER TO APPENDIX A9

FIGURE NOT DRAWN TO SCALE
NOTES:
1) SUB-BASE IN ACCORDANCE WITH APPENDIX A3.3
2) AC SURFACE COURSE NOT PERMITTED ON HIGH SPEED ROADS (REFER TO A2.3)
3) WHERE 10mm PMSMA IS USED ON THE SURFACE COURSE THE THICKNESS IS
   REDUCED TO 30mm AND THE BINDER COURSE INCREASED ACCORDINGLY
4) REFER TO FIGURE S6.4 FOR FURTHER DETAILS ON SURFACE COURSE
   REINSTATEMENT AND STEPPED JOINTS AT BINDER COURSE LEVEL
5) REFER TO FIGURE A3.4 OF THIS APPENDIX FOR DETAILS ON REINSTATEMENT
   REQUIREMENTS AT LOCATIONS WHERE EXISTING SURFACE COURSE MATERIAL IS
   GREATER THAN 5 YEARS OLD
6) FOR ALTERNATIVE REINSTATEMENT MATERIALS REFER TO APPENDIX A9

FIGURE NOT DRAWN
TO SCALE
A3.3 Sub-base Construction Flexible Roads

Figure A3.3 Sub-base Construction Flexible Roads

CLAUSE 804 (MIN REQUIRED) CLAUSE 804 (BACKFILL)

150mm LEVEL OF BASE COURSE VARIES

SEE NOTE 1

NOTES:
1) WHERE ADJOINING ROAD CONSTRUCTION LAYERS EXIST SUCH AS CAPPING, A 75mm STEP IN THE CL804 BACKFILL IS REQUIRED.

FIGURE NOT DRAWN TO SCALE
A3.4 **Width of Surface Course Reinstatement - Surface Course greater than 5 years old**

**Notes:**
1. The total surface course reinstatement width may be reduced when the existing surface course material which is to be replaced is greater than 5 years old (agreement with the Authority is required).
2. The same material requirements outlined in Figures A3.0 to A3.3 apply to reduced width reinstatement.
3. Refer to appropriate figures for various material thicknesses etc.
4. Refer to figure S6.7 for guidance on location of construction joint in surface course.

**Figure A3.4** Width of Surface Course Reinstatement - Surface Course greater than 5 years old
Appendix 4 - Composite Roads
A4 Appendix 4 – Composite Roads

**A4.0 Type 0 Composite Roads**

**Figure A4.0 Composite Roads – Type 0**

**NOTES:**
1) SUB-BASE IN ACCORDANCE WITH APPENDIX A4.3
2) AC SURFACE COURSE NOT PERMITTED ON HIGH SPEED ROADS (REFER TO A2.3)
3) WHERE 10mm PMSMA IS USED ON THE SURFACE COURSE THE THICKNESS IS REDUCED TO 30mm AND THE BINDER COURSE INCREASED ACCORDINGLY
4) REFER TO FIGURE S6.4 FOR FURTHER DETAILS ON FULL LANE SURFACE COURSE REINSTATEMENT AND STEPPED JOINTS AT BINDER COURSE LEVEL
5) REFER TO FIGURE A4.4 OF THIS APPENDIX FOR DETAILS ON REINSTATEMENT REQUIREMENTS AT LOCATIONS WHERE EXISTING SURFACE COURSE MATERIAL IS GREATER THAN 5 YEARS OLD
6) FOR ALTERNATIVE REINSTATEMENT MATERIALS REFER TO APPENDIX A9

**METHOD A**

ALL PERMANENT REINSTATEMENT WIDTH (SEE NOTE 5)

**METHOD B**

PERMANENT BINDER COURSE

**METHOD C**

PERMANENT BASE

**SUB BASE**

AS EXISTING

1st VISIT 2nd VISIT

150mm 300mm

150mm

300mm

150mm

150mm

300mm

AS EXISTING

150mm

40mm

150mm

300mm

SUB BASE

AS EXISTING

150mm

40mm

150mm

300mm

SUB BASE

AS EXISTING

150mm

40mm

AS EXISTING

150mm

40mm

AS NEEDED

40mm

CBGM B

HRASC

ACSC (SEE NOTE 2)

PMSMA (SEE NOTE 3)

AC BASE

AC BIN

NOTES:
1) SUB-BASE IN ACCORDANCE WITH APPENDIX A4.3
2) AC SURFACE COURSE NOT PERMITTED ON HIGH SPEED ROADS (REFER TO A2.3)
3) WHERE 10mm PMSMA IS USED ON THE SURFACE COURSE THE THICKNESS IS REDUCED TO 30mm AND THE BINDER COURSE INCREASED ACCORDINGLY
4) REFER TO FIGURE S6.4 FOR FURTHER DETAILS ON FULL LANE SURFACE COURSE REINSTATEMENT AND STEPPED JOINTS AT BINDER COURSE LEVEL
5) REFER TO FIGURE A4.4 OF THIS APPENDIX FOR DETAILS ON REINSTATEMENT REQUIREMENTS AT LOCATIONS WHERE EXISTING SURFACE COURSE MATERIAL IS GREATER THAN 5 YEARS OLD
6) FOR ALTERNATIVE REINSTATEMENT MATERIALS REFER TO APPENDIX A9

FIGURE NOT DRAWN TO SCALE
A4.1  Type 1 Composite Roads

Figure A4.1  Composite Roads – Type ‘1’
A4.2 Type 2 Composite Roads

Figure A4.2 Composite Roads – Type ‘2’
CLAUSE 804

CLAUSE 804 (MIN REQUIRED)

CLAUSE 804 (BACKFILL)

NOTES:
1) WHERE ADJOINING ROAD CONSTRUCTION LAYERS EXIST SUCH AS CAPPING, A 75mm STEP IN THE CL804 BACKFILL IS REQUIRED

SEE NOTE 1

LEVEL OF CBGM B

Sub-base Construction – Types 0, 1 & 2 Composite Roads

Figure A4.3 Sub-Base Construction - Composite Roads – Type ‘0’, ‘1’ and ‘2’
### Width of Surface Course Reinstatement - Surface Course greater than 5 years old

**Method A**

- All permanent reinstatement width (See Note 1)
- 40mm
- Subbase 150mm
- 200mm

**Method B**

- Permanent binder course
- 1st Visit
- 2nd Visit
- 200mm
- 200mm

**Method C**

- Permanent base
- 1st Visit
- 2nd Visit
- 200mm
- AS needed

**Notes:**

1. Total surface course reinstatement width may be reduced when the existing surface course material which is to be replaced is greater than 5 years old (agreement with the authority is required).
2. The same material requirements outlined in figures A4.0 to A4.3 apply to reduced width reinstatement.
3. Refer to appropriate figures for various material thicknesses etc.
4. Refer to figure S6.7 for guidance on location of construction joint in surface course.

---

**Figure A4.4**

Figure not drawn to scale.
Appendix A5 – Rigid Roads
**A5 Appendix A5 – Rigid Roads**

**A5.0 Type 0 Rigid Roads**

**Figure A5.0 Rigid Roads Type – ‘0’**

- **NOT PERMITTED**
  - All Permanent
  - 150mm
  - Strength AS Existent

**NOTES:**
1. CBGM B if existing.
2. AC surface course not permitted on high speed roads (refer to A2.3).
3. Where 10mm PMSMA is used on the surface course the thickness is reduced to 30mm and the binder course increased accordingly.
4. Method D – permanent reinstatement incorporating interim surface overlay is only a reinstatement method option for rigid roads.
5. Refer to Figure S7.2 for further details on full lane reinstatement and stepped joints at binder course level.
6. Refer to Figure A5.3 of this appendix for details on reinstatement requirements at locations where existing surface course material is greater than 5 years old.
7. For alternative reinstatement materials refer to Appendix A9.
8. Where steel reinforcement is encountered refer to Section S7.5 of this specification for details.

- **METHOD A**
  - All permanent reinstatement width
  - As existing
  - 150mm
  - 75mm

- **METHOD B**
  - Not permitted
  - All permanent
  - As existing
  - 100mm
  - 30mm

- **METHOD C**
  - Not permitted
  - All permanent
  - As existing
  - 150mm
  - 75mm

- **METHOD D**
  - Permanent reinstatement incorporating interim surface overlay
  - 1st Visit
  - 150mm
  - 75mm
  - 40mm

*Figure not drawn to scale*
A5.1 Type 1 Rigid Roads

Figure A5.1 Rigid Roads Type – ‘1’

- **Method A**: All permanent reinstatement (see note 1).
  - 300mm as existing (see note 1).
  - 150mm as existing (see note 1).

- **Method B**: Not permitted.

- **Method C**: Not permitted.

- **Method D**: Permanent reinstatement incorporating interim surface overlay.
  - First visit: 150mm as existing (see note 1).
  - Second visit: 150mm as existing (see note 1).
  - 75mm as existing (see note 1).
  - 75mm as existing (see note 1).

**Notes:**
1) CBGM B if existing.
2) AC surface course not permitted on high speed roads (refer to A2.3). Where the AC is used, the thickness should be increased by 50mm.
3) Where 10mm PMSMA is used on the surface course, the thickness of the binder course should be increased by 30mm.
4) Method D is only a reinstatement method option for rigid roads. Refer to Figure A5.2 of this appendix for details on reinstatement requirements at locations where high speed surface course integrity is at risk.
5) Refer to Figure A5.3 of this appendix for details on reinstatement requirements at locations where existent materials exceed 5 years old.
6) Refer to Figure as 3 of this appendix for further details on full lane reinstatement and stepped joints at binder course level.
7) For alternative reinforcement materials refer to appendix A9.
8) Where steel reinforcement is encountered refer to section S7.5 of this specification for details.

**Layers:**
- HASC (see note 2)
- ACSC (see note 2)
- PMSMA (see note 3)
- AC bin
- AC base
- Concrete
- Clause 804 (required)
- Clause 804 (backfill)

**Materials:**
- Concrete (clause 804)
- ACSC (see note 2)
- PMSMA (see note 3)
- AC bin
- AC base
- HRASC
- HRASC (see note 1)
A5.2 Type 2 Rigid Roads

Figure A5.2 Rigid Roads Type – ‘2’

NOTES:
1) CBGM B IF EXISTING.
2) AC SURFACE COURSE NOT PERMITTED ON HIGH SPEED ROADS (REFER TO A2.3).
3) WHERE 10mm PMSMA IS USED ON THE SURFACE COURSE THE THICKNESS IS REDUCED TO 30mm AND THE BINDER COURSE ACCORDINGLY.
4) METHOD D - PERMANENT REINSTATEMENT INCORPORATING INTERIM SURFACE OVERLAY IS ONLY A REINSTATEMENT METHOD OPTION FOR RIGID ROADS.
5) REFER TO FIGURE S7.2 FOR FURTHER DETAILS ON FULL LANE REINSTATEMENT AND STEPPED JOINTS AT BINDER COURSE LEVEL.
6) REFER TO FIGURE A5.3 OF THIS APPENDIX FOR DETAILS ON REINSTATEMENT REQUIREMENTS AT LOCATIONS WHERE EXISTING SURFACE COURSE MATERIAL IS GREATER THAN 5 YEARS OLD.
7) FOR ALTERNATIVE REINSTATEMENT MATERIALS REFER TO APPENDIX A9.
8) WHERE STEEL REINFORCEMENT IS ENCOUNTERED REFER TO SECTION S7.5 OF THIS SPECIFICATION FOR DETAILS.
A5.3 Width of Surface Course Reinstatement - Surface Course greater than 5 years old

Figure A5.3 Width of Surface Course Reinstatement - Surface Course greater than 5 years old

NOTES:
1) TOTAL SURFACE COURSE REINSTATEMENT WIDTH MAY BE REDUCED WHEN THE EXISTING SURFACE COURSE MATERIAL WHICH IS TO BE REPLACED IS GREATER THAN 5 YEARS OLD (AGREEMENT WITH THE AUTHORITY IS REQUIRED)
2) THE SAME MATERIAL REQUIREMENTS OUTLINED IN FIGURES A5.0 TO A5.2 APPLY TO REDUCED WIDTH REINSTATEMENT
3) REFER TO APPROPRIATE FIGURES FOR VARIOUS MATERIAL THICKNESSES ETC.
4) REFER TO FIGURE S7.5 FOR GUIDANCE ON LOCATION OF CONSTRUCTION JOINT IN SURFACE COURSE

METHOD A

METHOD B

METHOD C

METHOD D

NOT PERMITTED

NOT PERMITTED

NOT PERMITTED

NOT PERMITTED

REINSTATEMENT WIDTH (SEE NOTE 1)

REINSTATEMENT WIDTH (SEE NOTE 1)

REINSTATEMENT WIDTH (SEE NOTE 1)

REINSTATEMENT WIDTH (SEE NOTE 1)

TOTAL REINSTATEMENT WIDTH MAY BE REDUCED WHEN THE EXISTING SURFACE COURSE MATERIAL WHICH IS TO BE REPLACED IS GREATER THAN 5 YEARS OLD (AGREEMENT WITH THE AUTHORITY IS REQUIRED)

THE SAME MATERIAL REQUIREMENTS OUTLINED IN FIGURES A5.0 TO A5.2 APPLY TO REDUCED WIDTH REINSTATEMENT

REFER TO APPROPRIATE FIGURES FOR VARIOUS MATERIAL THICKNESSES ETC.

REFER TO FIGURE S7.5 FOR GUIDANCE ON LOCATION OF CONSTRUCTION JOINT IN SURFACE COURSE

FIGURE NOT DRAWN TO SCALE
Appendix 7 - Footways, Footpaths and Cycle Tracks
A7.0 Flexible Footways, Footpaths and Cycle Tracks

Figure A7.0 Flexible Footways, Footpaths and Cycle Tracks

NOTES:
1) CBGM B IF EXISTING
2) FOR ALTERNATIVE REINSTATEMENT MATERIALS REFER TO APPENDIX A9

METHOD A
ALL PERMANENT
OR
FULL WIDTH REINSTATEMENT

METHOD B
PERMANENT BINDER COURSE

METHOD C
FULL WIDTH REINSTATEMENT

FIGURE NOT DRAWN TO SCALE

NOT PERMITTED

AC BIN

HR ASC PRSSMA

PARTIAL REINSTATEMENT

30mm

50mm

60mm

80mm

AS EXISTING (SEE NOTE 1) (MIN. 100mm)
A7.1 Rigid Footways, Footpaths and Cycle Tracks

Figure A7.1 Rigid Footways, Footpaths and Cycle Tracks

METHOD A

ALL PERMANENT

FULL WIDTH REINSTATEMENT

AS EXISTING (MIN. 100mm)

METHOD B

NOT PERMITTED

METHOD C

NOT PERMITTED

CONCRETE CLAUSE 804 (MIN REQUIRED)

NOTES:
1) CBGM B IF EXISTING
2) FOR ALTERNATIVE REINSTATEMENT MATERIALS
   REFER TO APPENDIX A9

CLAUSE 804 (BACKFILL)

FIGURE NOT DRAWN TO SCALE
A7.2 Modular Footways, Footpaths and Cycle Tracks

Figure A7.2 Modular Footways, Footpaths and Cycle Tracks

NOTES:
1) CBGM B IF EXISTING
2) FOR ALTERNATIVE REINSTATEMENT MATERIALS REFER TO APPENDIX A9

CLAUSE 804 (MIN REQUIRED)
CLAUSE 804 (BACKFILL)

METHOD A
FULL WIDTH REINSTATEMENT
ALL PERMANENT
MODULES AND BEDDING AS EXISTING
SEE NOTE 1 (MIN 100mm)

METHOD B
NOT PERMITTED

METHOD C
NOT PERMITTED

FULL WIDTH REINSTATEMENT
MODULES AND BEDDING AS EXISTING
SEE NOTE 1 (MIN 100mm)

FIGURE NOT DRAWN TO SCALE
Appendix A8
Compaction Requirements
Appendix A8 - Compaction Requirements

A8.0 Granular and Cement Bound Materials

All graded granular, granular materials and cement bound materials laid above the surround to apparatus shall be compacted in accordance with the relevant Series of the NRA Specification for Road Works. Alternative compaction plants for areas of restricted access are as described in Table A8.1.

<table>
<thead>
<tr>
<th>Table A8.1</th>
<th>Compaction Requirements for Restricted Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alternative compaction plant for areas of restricted access (including small excavations and trenches less than 200mm width)</td>
</tr>
<tr>
<td></td>
<td>Vibrotamper 25kg minimum</td>
</tr>
<tr>
<td></td>
<td>Percussive Rammer 10kg minimum</td>
</tr>
<tr>
<td></td>
<td>Minimum of 6 compaction passes.</td>
</tr>
<tr>
<td></td>
<td>Maximum of 100mm compacted lift thickness</td>
</tr>
</tbody>
</table>

A8.2 Bituminous Mixtures

All bituminous mixtures for permanent reinstatements permitted in Appendix A2 shall be compacted to the in-situ air void requirements of Series 900 of the NRA Specification for Road Works.

Compacted materials shall be capable of being wet flush cored as for hot materials, upon reaching ambient temperature.
Appendix A9 - Alternative Reinstatement Materials (ARMs)
Appendix A9 - Alternative Reinstatement Materials (ARMs)

A9.1 Introduction

(1) Foamed Concrete is an alternative material that has been approved by the authority for use in the reinstatement in openings in national roads. This material may allow more rapid, reliable and cost-effective reinstatements, with less dependence on the skill and physical effort of the operators.

(2) Foamed Concretes for Reinstatements (FCRs) are cement-bound materials that have been prepared off-site, generally as “prescribed” mixes, at an approved mixing plant and under appropriate quality control procedures. They are flowable in nature and should not require compaction when placed. Such materials manufactured under these conditions, and any foamed concretes conforming to Series 1000 of the NRA Specification for Road Works are deemed to be approved for use as ARMs. FCRs do not necessarily incorporate a coarse aggregate. Layer thickness and compressive strength requirements shall be in accordance with Table A9.1.

FCR permissible constituents shall exclude potash and bottom furnace ash.

A9.2 General Requirements for FCRs

(1) Alterations to the proven mix formulations, mix proportions, aggregate type, admixtures, etc. shall not be undertaken without confirmation of their suitability, obtained by further development and testing. The approval of the authority is required prior to the use of any FCR, subject to the trial procedure, whose formulation has been altered.

(2) FCRs used within 450mm of the road surface shall be non-frost susceptible.

(3) Where the authority is aware of areas with drainage or groundwater problems, it should notify relevant parties. Following such notification the following shall be provided, at backfill and sub-base levels within trench reinstatements, ARMs that are permeable to a degree not less than the surrounding ground. A backfill layer of pea gravel, of 100mm minimum thickness and surrounded by a geotextile filter fabric where appropriate, may be considered to offer equivalent drainage potential.

(4) Where high sulphate levels are found following requirements under Section S6.1.1 (3) of this Specification, any Ordinary Portland Cement based binders in the ARMs shall be replaced with cement having a high sulphate resistance.

(5) Surfacing materials shall not be reinstated until the ARM has attained sufficient strength to allow adequate compaction of asphalt materials and to sustain adequate traffic loading. A simple penetration or indentation or bearing capacity test appropriate to the ARM is recommended to allow confirmation of adequate strength prior to surfacing. Any appropriate standardised test procedure may be used and, with prior experience, will indicate the earliest time at which surfacing should be carried out.
FCRs may flow into damaged drainage or ducting within, or adjacent to, the excavation. Where required, plastic sheeting etc. may provide adequate protection during pouring and curing.

### A9.3 Structural Materials for Reinstatements (SMRs)

#### A9.3.1 Permitted Uses of SMRs

1. SMRs may be used in any combination of the following, regardless of the nature of reinstatement materials used above and below:
   - **(a)** At any position within the surround to apparatus and/or backfill as the entire layer or combined with any other permitted backfill materials, in any proportion, within any reinstatement.
   - **(b)** As a sub-base within any reinstatement.
   - **(c)** As a combined sub-base and base within any reinstatement in Road Types 1 & 2.
   - **(d)** As a combined sub-base and binder course, within any reinstatement in footways, footpaths and cycle tracks.

2. SMRs shall not be used in place of surface course materials.

#### A9.3.2 General Requirements for SMRs

1. SMRs shall comply with the minimum layer thickness and compressive strength (Rc Class) requirements shown in Table A9.1.

2. Where the total thickness of SMR laid exceeds 1000mm, the minimum crushing strength requirement of C4 shall apply to the top 1000mm only and a minimum of C2 below this depth.

### Table A9.1

<table>
<thead>
<tr>
<th>Layer</th>
<th>Road Type</th>
<th>Footway Footpath or Cycle Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Binder Course &amp; Sub-base</td>
<td>NP</td>
<td>NP</td>
</tr>
<tr>
<td>Base</td>
<td>NP</td>
<td>NP</td>
</tr>
<tr>
<td>Base &amp; Sub-base</td>
<td>NP</td>
<td>450mm C4</td>
</tr>
<tr>
<td>Sub-base &amp;/ or Below</td>
<td>150mm C2</td>
<td>150mm C2</td>
</tr>
<tr>
<td>Crushing Strength at 28 days</td>
<td>C4 Minimum to C12 Maximum C2 Minimum to C12 Maximum</td>
<td></td>
</tr>
</tbody>
</table>

Note to Table A9.1: NP = Not Permitted (see A9.3.1)
A9.3.3 Particular Requirements for FCRs and FSMRs (Flowable SMRs)

(1) The compressive strength shall be determined in accordance with the principles of IS EN 12390 part 3, with the following exceptions or options:

(a) Test specimens may be prepared at the time of placement by casting within a test mould, or recovered from site after placement by the extraction of cores from the reinstatement.

(b) Specimen shape and dimensions shall be in accordance with IS EN 12390 part 1 with the addition that specimens may also be manufactured with an aspect ratio of 1. Flowable SMR (FSMRs) moulds may be manufactured from cellular foam (preferably polystyrene) and include a cellular foam lid. The samples shall not be compacted, except for minimal tamping to allow the mould to be filled without leaving excessive areas of voids.

(c) Core test specimen top and bottom surfaces may be grouted to ensure flat, parallel loading surfaces.

(d) Following preparation or recovery, the test samples shall be stored upright at either 20°C or 40°C, depending on the nature of the material, and tested in compression at 28 days after placement of the material on site.

(2) Experience suggests that results obtained from 150mm test cubes in moulds with cellular foam lids, stored at ambient temperature, are most representative of in-ground conditions.

(3) FCRs and FSMRs shall not normally be tamped or compacted.

(4) FCRs and FSMRs of density less than 1000 kg/m³ may not displace standing water. In excavations containing water, the minimum recommended density for foam concretes is 1050 kg/m³. FCRs may flow into, and block, damaged drainage or ducting within, or adjacent to, the excavation. Where required, plastic sheeting etc. may provide adequate protection during pouring and curing.

(5) FCRs and FSMRs are unlikely to provide significant load bearing capacity for several hours after placement, depending on the ambient temperature. During this time, unguarded reinstatements may be a hazard to children and animals etc and should be protected.

A9.3.4 SMR Material Production

A9.3.4.1 FCR Material Production

(1) FCRs shall be produced to prescribed mix formulations by an approved mixing plant, in accordance with approved manufacturing processes under quality control procedures.

(2) The wet density of the FCRs should be checked prior to placement. Depending on the method of manufacture, the quality of the foaming agent added at site should be checked prior to being incorporated in the mix. Any on-site addition of a foaming agent must be in accordance with the approved mix design.
A11 Appendix 11 - Bitumen Binder Equivalence

A11.1 Introduction

In some road types, particular binder grades are not permitted or are only permitted for areas of hand lay where machine laying is not possible. In general, hand laying is not recommended but maybe used where the material is likely to be difficult to compact adequately, especially in cold conditions.

A11.2 Base and Binder Course Materials

Binder grades permitted for Base and Binder Course materials are shown in Table A11.1, provided that the layer thickness is amended to what is shown in the table. Approval must be received from authority for any other binder course designs to be used in road reinstatement works.

Table A11.1

<table>
<thead>
<tr>
<th>Material Used in Base &amp; Binder layers</th>
<th>Bitumen Pen Grade</th>
<th>Combined Base/Binder Course (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Road Type</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>20mm AC Binder</td>
<td>40/60</td>
<td>60mm Binder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60mm Binder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60mm Binder</td>
</tr>
<tr>
<td>32mm AC Base</td>
<td>40/60</td>
<td>245mm Base</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200mm Base</td>
</tr>
<tr>
<td></td>
<td></td>
<td>140mm Base</td>
</tr>
<tr>
<td>Total (Binder + Base)</td>
<td>-</td>
<td>305mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>260mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200mm</td>
</tr>
<tr>
<td>20mm AC Binder</td>
<td>70/100</td>
<td>60mm Binder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60mm Binder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60mm Binder</td>
</tr>
<tr>
<td>32mm AC Base</td>
<td>70/100</td>
<td>280mm Base</td>
</tr>
<tr>
<td></td>
<td></td>
<td>225mm Base</td>
</tr>
<tr>
<td></td>
<td></td>
<td>165mm Base</td>
</tr>
<tr>
<td>Total (Binder + Base)</td>
<td>-</td>
<td>340mm H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>225mm H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>165mm H</td>
</tr>
</tbody>
</table>

Notes to Table A11.1:

1. H = Hand Lay. Only permitted in areas where machine laying is not possible –not recommended in hot weather & not permitted for machine lay.

2. Figures given in brackets are combined binder and base materials. A binder material can be used for total thickness if desired rather than including a base layer.
Appendix A12 - Reinstatement of Modular Surface Layer

A12.1 Interim Reinstatement
Where an interim reinstatement is required, the existing modules should be reused, including the use of broken modules. Where damage has resulted in fragmentation or widespread breakage of modules (subject to the special case of natural material modules (as set out in Appendix A12.2.2)), then bituminous mixtures may be used for interim reinstatement, provided they meet the performance requirements of Section S2 and that compaction of such mixtures does not result in further damage to adjacent modules.

A12.2 Permanent Reinstatement

A12.2.1 General

(1) Permanent reinstatement of modular surface layers should be generally carried out in accordance with BS 7533.

(2) Permanent reinstatement of modules shall include all modules, which are situated within the effective width of the reinstatement (W) described in Section S2.1.3 and shall also include any other modules which are disturbed in the course of carrying out the excavation or reinstatement.

(3) Clean undamaged modules shall be re-used for permanent reinstatement. Broken modules shall not be used for permanent reinstatement and shall be replaced.

(4) Laying course material shall be sand or mortar, to match the characteristics of the existing type and thickness. Unless otherwise notified by the authority, where sand is present, laying course and jointing materials shall be in accordance with BS 7533:Part 3. For footways, the grading of the laying course material shall be in accordance with Table D.3 Category II. Jointing materials to Section D1.2, shall be applied to gaps between individual modules at the time of permanent reinstatement. Where mortar has been used for laying course material guidance should be sought from the authority as to the specification to be used. This information shall not be unreasonably withheld.

A12.2.2 Requirements for Natural Material Modules

A12.2.2.1 General for whole Natural Material Modules

(1) The reinstatement of whole natural material modules shall be in accordance with the general requirements of Appendix A12.2.1.

A12.2.2.2 Damaged Natural Material Modules

(1) Where damaged modules are to be re-used in the reinstatement, a joint inspection shall be arranged prior to the commencement of excavation, to agree the extent of usage of damage modules and the minimum size acceptable for re-use.
Photographic records should be taken at the joint inspection which should be agreed with the authority.

The best endeavours to match existing profiles and meet the tolerances specified in Section S2 shall be made by the relevant party. However, where the pre-existing profile of damaged modules is near or in excess of current intervention and construction tolerances specified in Section S2, it will be difficult to construct a complying reinstatement. It shall also be ensured that the interface between its reinstatement and the adjoining surfaces avoid creating hazardous trips.

### Infills in Modular Reinstatements

#### General

(1) Gaps greater than 5mm between the nearest module and the immediately adjacent fixed feature (such as edgings, channel blocks, drainage features, surface boxes, ironware) or boundary feature (such as walls, fences and the like), which are caused as a direct result of any works, should be filled to the full depth of the adjacent paving module, as follows:

(a) for smaller gaps, or infills a 1:4 cement:sand mortar should be used;

(b) for larger gaps or infills, where aggregate can be used a 1:5:3 cement:sand:aggregate concrete infill should be used, with a maximum aggregate size of 10mm.

(2) Infills should be generally as small as possible, subject to the proviso that where the physical characteristics of the bond, fixed feature, or proximity of other fixed features do not allow for a small infill, then best endeavours should be used to achieve the smallest infill possible.

(3) Infills should match existing work by the authority.

#### Infill Widths and Limitations

(1) Where possible, infills should be limited to a maximum width of 50mm in all modular areas, irrespective of whether the existing footway area was originally constructed in accordance with BS7533.

(2) In the case of modules where one side of the module is greater than 300mm, there are instances where it shall be permissible to increase the width of the infill to a maximum of 150mm, in order to achieve a better engineering and aesthetically pleasing reinstatement. These include instances where the intervening distance is less than 150mm:

(a) between the newly laid apparatus and the nearest module (on any side), or

(b) between two or more pieces of newly laid apparatus, or

(c) to an existing fixed or boundary feature.
Where it can be shown to be acceptable custom and practice, in exceptional cases, the maximum permissible infill width may be increased to 200mm, for irregularly shaped apparatus. Typical examples are in Notes for Guidance Section NGA12.

(3) In the case of modules where all sides are 300mm or less, there are similarly instances where it is permissible to increase the width of the infill to the same as the full width of module (measured on the shortest side), again in order to achieve a better engineering and aesthetically pleasing reinstatement. These include instances where the intervening distance is less than the full width of a module plus 25mm (measured on the shortest side):

(a) between newly laid apparatus and the nearest module (on any side), or

(b) between two or more pieces of newly laid apparatus, or

(c) to an existing fixed or boundary feature.

Typical examples are in Notes for Guidance Section NGA12.

A12.2.3.3 Acceptable localised loss of Modular Pattern

(1) Physical characteristics may prevent or limit the possibility of completing a uniform and closely matching modular reinstatement immediately adjacent to features. The physical characteristics of the module itself, the existing as-laid bond, as well as the physical characteristics of the fixed or boundary feature, may individually or collectively contribute to such a situation.

(2) In all instances, it should be attempted to minimise the width of the infill. However, the following exceptions are permissible:

(a) Where the above physical characteristics are present, permanently reinstated modules immediately adjacent to the feature may be laid with a degree of localised loss of bond pattern. The introduction of a stringer (or in some cases, soldier) course immediately adjacent to the feature should not be considered as a loss of bond pattern. The loss of bond pattern should be limited, where practicable, to the first two rows beyond any stringer course, being laid in such a manner as to aesthetically integrate with the surrounded bond pattern. Typical examples are indicated in Notes for Guidance Section NGA12.

(b) If adjacent modules abut an existing, contiguous infill, such as at a property boundary, then the infill shall match the existing.

(c) In the case of fixed features that are not rectangular, there is no requirement to cut modules to match the edge profile of the fixed feature to otherwise reduce the infill at irregular edges.

(d) Where localised custom and practice adopted by the authority for its own works differs to the above, infills may be laid to a standard consistent with that of the authority.
A12.3 Provision of Replacement Modules

(1) Where insufficient modules remain for reinstatement use and identical replacement modules are no longer available, then a reasonably similar colour, shape and size shall be the preferred order of criteria in the choice of acceptable replacements.

(2) Where replacement modules are required due to breakage at some time prior to the works, the Local Authority may provide suitable replacements to the relevant parties.

(3) Where replacements modules are required due to breakages caused during the course of the works, the reinstatement shall be completed using modules purchased at the Contractors expense or purchased from the Local Authority at reasonable cost.

(4) Local Authorities are recommended to retain stocks of modules used within their areas to enable them to provide replacements when required. Where no stocks of suitable replacements are available, Local Authority’s should assist the relevant party in locating a source of suitable replacement modules. This is becoming especially prevalent with the proliferation of modules sourced from around the world.

A12.4 Pre-existing Surface Damage outside limits of the Works

(1) Some modular surfaces outside the limits of the works may be broken or have settled or deformed. Where the existing profiles are near or exceed the current intervention and construction tolerances specified in Section S2, it will be difficult to construct a complying reinstatement. Subject to the authority agreeing to meet the costs of the works necessary to reinstate the surfaces outside the limits of its works, the reinstatement shall extend to include such surfaces. In the absence of agreement, there shall be no obligation whatsoever to extend the reinstatement works. The best endeavours to ensure that the interface between its reinstatement and the adjoining surfaces avoid creating hazardous trips shall be exhausted. In such situations, it must be recognised that it may be necessary to install different sized modules or fillets to minimise surface irregularities at the interfaces. To as much as possible the reinstatement shall match existing materials and profiles and meet the tolerances specified in Section S2.

(2) Where the area of permanent reinstatement needs to be substantially extended, to include an existing area of broken or settled modular surfacing, the authority shall be notified prior to the commencement of works.
A13

Works Near Road Structures
Appendix A13: Works Near Road Structures

A13.1 Typical Structure Types and Restrictions

(a) Figures A13.1 to A13.11 show some common types of road structures that may be encountered, the terminology used, a typical Restricted Zone that may be designated by the owning authority, typical locations of bridge waterproofing membranes and some of the constraints that the authority may place on the installation of services within it. These are not exhaustive but purely indicative.

(b) Figure A13.1 shows a typical Restricted Zone that may be designated by a bridge authority. It will normally cover the entire width of the road and its length will extend a certain distance beyond each end of the parapet or rail. However, the extent of a designated Restricted Zone is subjective and shall be determined by the authority on request and all parties should adopt a flexible approach when considering individual circumstances to reduce the risk of damage to the structure during road works.

(c) All dimensions in Figures A13.1 to A13.11 are in millimetres.
Figure A13.1 (a) Typical Plans on Restricted Zones at Structures - Single Span ('Old' Arch or Culvert)

Figure A13.1 (b) Typical Plans on Restricted Zones at Structures - Multi Span ('Modern' Bridge)
Figure A13.2 (a) Typical Subway/Box Culvert - Elevation

Figure A13.2 (b) Typical Subway/Box Culvert - Cross Section (Parallel to Road)

Figure A13.2 (c) Typical Subway/Box Culvert - Cross Section (At Right Angle to Road)
Figure A13.3  
(a) Typical Stone/Brick Arch or Culvert - Elevation

Figure A13.3  
(b) Typical Subway/Box Culvert - Cross Section

Figure A13.3  
(c) Typical Subway/Box Culvert - Cross Section (At Right Angle to Road)
Figure A13.4 (a) Typical Single Span Concrete Bridge - Elevation

![Diagram of a Typical Single Span Concrete Bridge - Elevation](image)

- **Restricted Zone**
- **Parapet**
- **Safety Barrier**
- **Abutments**
- **Bridge Deck**
- **Wing Walls**

# Note: Restricted Zone
Restricted zone adjacent to safety fence refer FIG A13.10

* Note: Restricted Zone
Authority to be consulted concerning restricted zone for each individual structure

Figure A13.4 (b) Typical Single Span Concrete Bridge - Cross Section with Service Bays

![Diagram of a Typical Single Span Concrete Bridge - Cross Section with Service Bays](image)

- **Waterproof membrane (see Fig A13.8)**
- **Parapet (steel or aluminium)**
- **Service bays**
Figure A13.5 (a) Typical Multi Span Steel Concrete Composite Bridge - Elevation

Figure A13.5 (b) Typical Multi Span Steel Concrete Composite Bridge - Cross Section (Precast Concrete Beams)

Figure A13.5 (c) Typical Multi Span Steel Concrete Composite Bridge - Cross Section (Steel Beams)
Figure A13.6 (a) Typical Retaining Walls - Reinforced Concrete with Masonry Facing

* Note: Restricted Zone
Authority to be consulted concerning restricted zone for each individual structure

Figure A13.6 (b) Typical Retaining Walls - Reinforced Brick or Stonework

* Note: Restricted Zone
Authority to be consulted concerning restricted zone for each individual structure
Figure A13.6 (c) Typical Retaining Walls - Crib Wall

Figure A13.6 (d) Typical Retaining Walls - Mass Concrete

Figure A13.6 (e) Typical Retaining Walls - Stone Wall
Figure A13.7  Typical Reinforced Earth Retaining Walls

*NOTE: RESTRICTED ZONE
Authority to be consulted concerning restricted zone for each individual structure

- Steel or aluminium parapet
- Verge
- Carriageway
- Reinforced concrete anchor slab
- Precast concrete facing units
- Services may be placed in this area of verge only with great care and after prior discussion with the Street or Bridge Authority
- Metal or carbon fibre anchor straps
Figure A13.8  (a) Typical Waterproof Membrane Protection - Type A

Bituminous macadam varies 75–600 approx
Sand asphalt carpet (black or red tinted) (not always used)
Waterproof membrane
Concrete bridge structure
Orange glass fibre indicating mesh (Not always used)
Carriageway level

Figure A13.8  (b) Typical Waterproof Membrane Protection - Type B

Bituminous macadam varies 75–600 approx
Bitumen impregnated board or rubber sheet protective layer
Waterproof membrane
Carriageway level
Figure A13.9 (a) Typical Expansion Joints - Exposed Joint

Commonly metal rails possibly with compressible material between

Carriageway level

Waterproofing membrane

Bituminous macadam
varies 75–600 approx

Bridge deck

Figure A13.9 (b) Typical Expansion Joints - Buried Joint

Buried joint

Possible crack or sealed cut in surfacing visible

Carriageway level

Protective layers and waterproofing

Bituminous macadam
varies 75–600 approx

Bridge deck
Figure A13.10  Typical Safety Fence

*NOTE: RESTRICTED ZONE

Authority to be consulted concerning restricted zone for each individual structure
NG1

Notes For Guidance

Introduction
NG1 Notes for Guidance - Introduction

NG1 Introduction

NG1.1 General

(1) The primary objectives of this Reinstatement Specification are to ensure that all reinstatements are completed to a permanent standard, as soon as is practical and to a consistent high quality. All personnel involved should work together, in close co-operation, in order to achieve these objectives.

(2) This Reinstatement Specification may require a joint inspection of any reinstatement site, depending on the existing site conditions, before the commencement of works. Such joint pre-inspections may be of an informal nature, by agreement, and should be carried out at the earliest convenience of both parties. Where either party fails to attend any agreed pre-inspection, or where existing site conditions warrant concern, it is recommended that interested parties should retain a photographic record of the existing surfaces, prior to the commencement of works.

(3) This Reinstatement Specification may require a formal notification of circumstances or other requirements, depending on the existing conditions of any reinstatement site, prior to the commencement of works. Such pre-notifications should be issued at the earliest possible opportunity. Undertakers shall comply with such notification issued, and should make reasonable efforts to comply with any notification issued thereafter.

(4) Where this Reinstatement Specification allows several options, it is recommended, wherever practicable, to agree a preferred option from the alternatives available. This principle should be applied to all sections where alternatives are provided.

NG1.2 Maintenance Period

(1) Where an authority intends to resurface or reconstruct a section of road, the undertaker may complete any reinstatement to an alternative interim standard, by agreement. The maintenance period shall thereafter be waived, unless the undertaker’s reinstatement can be shown to be grossly substandard. It is expected that agreement to this procedure will be conditional upon all savings in costs made by not carrying out a permanent reinstatement being shared, equally, between the undertaker and the authority.

(2) In designated high amenity locations and areas with high quality surfaces there is benefit in completing the permanent reinstatement immediately or as expeditiously as possible. To facilitate a permanent reinstatement, materials need to be identified and ordered early in the works planning process. Advance notification through the normal co-ordination process is necessary to achieve this and the authority should assist the undertaker to locate sources of suitable similar or equivalent modules, especially if no stocks are available from the authority itself.
NG1.3 Uncategorised Roads
For roads not categorised in Figure A0.1, valid traffic flows shall be assessed by using the NRA projected growth rates. Consultation with the authority is required before works may commence.

NG1.4 There are no Notes for Guidance

NG1.5 There are no Notes for Guidance

NG1.6 Apparatus within the Road Structure
Some apparatus may already be present at shallow depth, within many existing road structures and special requirements may apply to their reinstatement. Both the undertaker and the authority are likely to have particular criteria and this Reinstatement Specification may be altered, or supplemented, subject to prior agreement, to accommodate any such requirements.

NG1.7 Geosynthetic Materials, Geotextiles and Reinforcement Grids
Where these materials are used, the manufacturer’s instructions shall be followed, particularly in relation to appropriate overlaps, fixing and the like.

NG1.8 Trees

NG1.8.1 Prohibited, Precautionary and Permitted Zones
PROHIBITED ZONE – 1m from trunk. Excavations of any kind must not be undertaken within this zone unless full consultation with the Local Authority is undertaken. Materials, plant and spoil must not be stored within this zone.

PRECAUTIONARY ZONE – beneath canopy or branch spread. Where excavations must be undertaken within this zone the use of mechanical excavation plant should be prohibited. Precautions should be undertaken to protect any exposed roots. Materials, plant and spoil should not be stored within this zone. Consult with Local Authority if in any doubt.

PERMITTED ZONE – outside of precautionary zone. Excavation works may be undertaken within this zone however caution must be applied and the use of mechanical plant limited. Any exposed roots should be protected.
NG1.8.2 Precautions during Excavation and Reinstatement

(1) THE PROHIBITED ZONE

Don’t excavate within this zone.
Don’t use any form of mechanical plant within this zone.
Don’t store materials, plant or equipment within this zone.
Don’t move plant or vehicles within this zone.
Don’t lean materials against, or chain plant to, the trunk.
Do contact the local authority or owner of the tree if excavation within this zone is unavoidable.
Do protect any exposed roots uncovered within this zone with dry sacking.
Do backfill with a suitable inert granular and top soil material mix as soon as possible on completion of the works.
Do notify the local authority or the tree’s owner of any damage.

(2) THE PRECAUTIONARY ZONE

Don’t excavate with machinery. Where excavation is unavoidable within this zone excavate only by hand or use trenchless techniques.
Don’t cut roots over 25mm in diameter, unless advice has been sought from the local authority.
Don’t repeatedly move / use heavy mechanical plant except on hard standing.
Don’t store spoil or building material, including chemicals and fuels, within this zone.
Do prune roots which have to be removed using a sharp tool (e.g. secateurs or handsaw). Make a clean cut and leave as small a wound as possible.
Do backfill the trench with an inert granular material and top soil mix. Compact the backfill with care around the retained roots. On non road sites backfill only with excavated soil.
Do protect any exposed roots with dry sacking ensuring this is removed before backfilling.
Do notify the local authority or the tree’s owner of any damage.
(3) **THE PERMITTED ZONE**

**Don’t** cut roots over 25mm in diameter, unless advice has been sought from the local authority.

**Do** use caution if it is absolutely necessary to operate mechanical plant within this zone.

**Do** prune roots which have to be removed using a sharp tool (e.g. secateurs or handsaw). Make a clean cut and leave as small a wound as possible.

**Do** protect any exposed roots with dry sacking ensuring this is removed before backfilling.

**Do** notify the local authority or the tree’s owner of any damage.

**NG1.9 Immediate Works**

The minimum thickness of bituminous surfacing material, required by Section S1.9.1 for the reinstatement of all immediate works, is 40 mm. A greater thickness may be required, in areas subject to frequent or heavy traffic. Further remedial works, during the 72 hour permitted duration of immediate works, are to be avoided.
NG2

Notes For Guidance

Performance Requirements
NG2 Performance Requirements

NG2.1 There are no Notes for Guidance

NG2.2 Surface Profile

NG2.2.1 There are no Notes for Guidance

NG2.2.2 Edge Depression – Intervention

Freedom from excessive edge depressions, or ‘trips’, for all pedestrians and two wheeled vehicles, is considered to be one of the most important performance requirements. Given that pedestrians and various two wheeled vehicles are likely to use or cross any roads, footways and cycle tracks, it is considered necessary to set a single limit for all edge depressions.

NG2.2.3 Surface Depression – Intervention

Excessive surface depressions will reduce ride quality and give rise to noise and vibration. The maximum depth of surface depression within the area of a reinstatement is limited to approximately 2.5% of the width of reinstatement, which represents a mean slope of 1 in 20 (5% gradient). In order to prevent excessive areas of standing water, it is considered necessary to limit the maximum depth of a surface depression to 15mm, regardless of the reinstatement width.

NG2.2.4 Surface Crowning – Intervention

Excessive surface crowning will reduce ride quality and give rise to noise and vibration. The maximum height of crowning within the area of a reinstatement is limited to approximately 2.5% of the width of the reinstatement, which represents a mean slope of 1 in 20 (5% gradient). In order to prevent excessive surface irregularity, it is considered necessary to limit the maximum height of crowning to 15mm, regardless of the reinstatement width as described in Section S2.2.4.

NG2.2.5 Combined Defect – Intervention

The intervention limits specified for surface depressions and surface crowning include a reduction in the intervention limit, to 80% of the tabulated value, subject to a minimum of 10mm, where surface depressions and/or crowning and/or edge depressions abut. The individual features shall be measured, and the reduction applied, as follows:

(1) Combination Depressions

Where an edge depression abuts an area of surface depression, then the area of abutting depression should be measured as shown in Figure NG2.2. Any surface crowning also abutting the area of combined depressions should be measured separately, as shown in Figure NG2.3. The permitted depth of a combination depression is further limited if the depression results in standing water.
E = Edge Depression Contribution = 10mm
S = Surface Depression Contribution = 10mm or 80% of tabulated value

(2) Combination Crowning

Where an area of surface crowning abuts an edge depression, or a surface depression, or any combination thereof, then the area of abutting crowning should be measured as shown in Figure NG2.3. The area of abutting depression should be measured separately, as shown in Figure NG2.2. The maximum height of combination crowning is further limited if the crowning results in standing water.

C = Surface crowning contribution = 10mm or 80% of tabulated value, whichever is greater.

NG2.6 There are no Notes for Guidance
NG2.3 Fixed Features

Fixed features, e.g. kerbstones and related precast concrete products, channel blocks and drainage fixtures, surface boxes and ironware, should be bedded on a sound foundation, in accordance with the owner’s requirements. In order to prevent excessive areas of standing water, it is considered necessary to set separate intervention limits for channel blocks, drainage fixtures, surface boxes and ironware.

NG2.4 Surface Regularity

Where the use of a rolling straightedge is not permitted, the surface regularity shall be assessed on an agreed basis. One method could be the use of a two metre or three metre straightedge.

NG2.5 Structural Integrity

(1) Reinstatement materials and compaction requirements have been specified in order to safeguard the pavement structure, both within and adjacent to the reinstatement. Any substantial or rapid settlement within a reinstatement may therefore indicate a potential reduction in the stability of the adjacent pavement structure, as well as potential defects within the reinstatement.

(2) There will be cases, in adverse circumstances, where the correct application of this Reinstatement Specification, in all respects, will still result in levels of settlement within the reinstatement that do not meet the requirements of Section S2.5, Structural Integrity. For example, the type and condition of the adjacent ground and/or pavement structure may limit the degree of compaction that can be achieved, so influencing the amount of settlement that could occur.

(3) Any engineering investigation is intended only to determine the likelihood and extent of any further settlement, and the most cost-effective and convenient method of restoring the structural stability and surface performance of failed sections of a reinstatement, to a satisfactory condition.

(4) In the case of large or deep excavations, it may be appropriate for an authority and an undertaker to agree an extended interim maintenance period, with additional interim surfacing materials laid to restore the running surface. When no further consolidation or settlement is considered likely, a permanent binder course and surface course may be laid, and the permanent maintenance period initiated. In any event, the location and extent of any re-excavation should be mutually agreed, taking full advantage of any bound materials already in place.
**NG2.6 Skid Resistance**

(1) An adequate skid resistance of the reinstated running surface must be maintained, by selection of the polished stone value (PSV), aggregate abrasion value (AAV) and texture depth of the aggregate exposed at the road surface. The exposed aggregate may be precoated chippings rolled into the surface (HRA), coarse aggregate within the surface course, coated material to BS 594987 or any chippings or other aggregate applied in any form of surface dressing or slurry sealing treatment.

(2) Smaller reinstatements constitute a much lower degree of skidding risk. However, material requirements and laying conditions remain unchanged and it is expected that the skid resistance of smaller reinstatements will not be significantly different.

(3) For the purposes of identifying reinstatement sites where the risk of skidding is potentially high, sections of carriageway of greater than 10% gradient should be identified from existing steep hill warning signs or by notification from the authority. Similarly, bends of less than 100 metres radius in roads where the speed limit is greater than 60 kph should be identified from existing bend, double bend or chevron warning signs or by notification from the authority.

(4) Given good site conditions, it is possible to obtain reasonably representative measurements of skid resistance. The TRL Mini Texture Meter and TRL Rolling Straightedge should always be fully contained within the limits of the reinstatement. The actual minimum practicable width for these instruments will depend on the trench alignment and radius of curvature. Measurements can be particularly difficult when testing on tight radius bends.

(5) The suppliers of bituminous materials shall be required to regularly supply details of the constituent materials within their bituminous mixtures and in particular PSV/AAV test results for the coarse aggregate in Surface Course mixtures and the aggregate used for precoated chippings in HRA.

**NG2.7 There are no Notes for Guidance**
NG3 Notes for Guidance - Excavation

**Excavation**

**NG3.1 Breaking the Surface**

**NG3.1.1 High Amenity and Natural Materials Surfaces**

(1) When excavating in modular construction within high amenity areas, or in natural materials within any footway area (as defined in Section S1.4), the undertaker shall lift the existing modules carefully and store for re-use.

(2) More recent construction tolerances of existing modules in NG3.1.1 (1) often make it unlikely that the first module in an individual excavation can be lifted without the module itself being damaged. In such circumstances, this damage may be inevitable, but it is expected that the damage is limited to only one module in an individual excavation.

**NG3.2 Excavation**

(1) Where possible, all excavations should be planned before commencement of works on site.

(2) Work must be undertaken and supervised by properly qualified personnel.

**NG3.3 There are no Notes for Guidance**

**NG3.4 Side Support**

Where required, there must be sufficient quantities of appropriate materials available to provide safe trench support.

**NG3.5 There are no Notes for Guidance**

**NG3.6 There are no Notes for Guidance**

**NG3.7 There are no Notes for Guidance**
NG4

Notes For Guidance
Surround to Apparatus
NG4 Notes for Guidance - Surround to Apparatus

NG4 Surround to Apparatus

NG4.1 General

(1) It is often necessary for an undertaker to require a specific type or quality of material, and/or special protective components, to be laid within the immediate vicinity of certain types of underground apparatus. This material is usually referred to as the surround to the apparatus, and may include fine unbound granular materials (usually termed ‘finefill’), bound materials, tiles, covers, tubular shields, etc., or any combination thereof. It should be noted that sand is not permitted to be used as a Surround to Apparatus material. The resulting surround may be required for a variety of reasons, including structural support, low corrosion potential, protection for non-metallic materials or special coatings, etc.

(2) The nature of the undertakers apparatus, and/or the protective features of the surround, especially any fine unbound granular materials used within the surround, may impose additional restrictions on the type of compaction equipment that can be used and the necessary operating procedures. However, the entire surround will effectively form a foundation structure for the remainder of the reinstatement and must be capable of providing adequate support for all loading imposed on the reinstatement surface, as well as the weight of the reinstatement structure.

(3) In selecting a material for the surround to apparatus, undertakers should be mindful of the potential for the migration of fines from the adjacent ground, and/or the overlying backfill, into any surround material that is open-textured. Such migration will normally result in settlement of the adjacent ground, and/or the backfill. Migration of fines can be prevented by using a close textured surround or, if this is undesirable, by enclosing the surround within a suitable filter membrane.
NG5

Notes For Guidance
Backfill
Backfill

NG5.1 Backfill Material Classification

The assumed limiting performance of the two classes of backfill material defined in Appendix A1 is shown in Table NG5.1.

<table>
<thead>
<tr>
<th>Backfill Material</th>
<th>Material Performance % CBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clause 804</td>
<td>Over 15</td>
</tr>
<tr>
<td>Unacceptable material</td>
<td>Less than 2</td>
</tr>
</tbody>
</table>

NG5.2 There are no Notes for Guidance
NG6
Notes For Guidance
Flexible and Composite Roads
NG6

Flexible and Composite Roads

NG6.1 There are no Notes for Guidance

NG6.2 Sub-base Reinstatement

(1) It may be reasonable to expect that an adequately compacted sub-base should achieve an in-situ CBR value in excess of 30%.

(2) It is expected that a bituminous sub-base will only be selected where the Base is also bituminous.

(3) When placing bituminous material directly on to the backfill it is important to ensure that the exposed surface of the backfill has been compacted. This operation is essential to minimise the risk of a build up of pore water pressure causing the subgrade to become spongy. It is also imperative that construction is phased such that excavated areas are covered, on the same day, with the first layer of bituminous material, to prevent the ingress of water. Care should be taken in the compaction of this first layer. If pore water pressure builds up in the backfill at this stage, then rolling should cease and the material left overnight, or longer if necessary, prior to the placement of any further layers.

(4) The condition of Clause 804 material can be assessed using the Field Identification Test in Appendix A1.

NG6.3 There are no Notes for Guidance

NG6.4 Surface Reinstatement

NG6.4.1 There are no Notes for Guidance

NG6.4.2 to NG6.4.5.1 There are no Notes for Guidance

NG6.4.5.2 High Friction Surfacing

(1) High friction surfacings will usually have been laid for safety reasons and should be reinstated as soon as is practicable.

(2) Performance on concrete may not be as good as on bituminous surfacings and the suitability of a system should be checked by reference to its NSAI Agrément Certificate or equivalent.

(3) Suppliers of some high friction surfacing systems may have specific requirements relating to the condition of the surface to which it is to be applied. Guidance on this should be sought either from the supplier or the NSAI Agrément Certificate or equivalent.
(4) It is recommended that high friction surfacing systems are applied to a surface course that has been trafficked for some weeks. This is to help prevent cracking extending into the surface course induced by the application of a newly laid high friction surface.

NG6.4.5.3 Coloured Surfacing

(1) Coloured surfacings are sometimes used for marking bus lanes, accident prevention measures, traffic prioritisation schemes, etc. The use of warning signs, e.g. “Temporary Road Surface”, should be considered until the special surface can be restored.

(2) It may not be possible to obtain coloured surfacings in a wide selection of colours and Authorities may have to accept limitations in colour matching. In addition, coloured surfacings can fade or undergo other changes in colour as the materials age.

NG6.4.6 to NG6.4.9 There are no Notes for Guidance

NG6.5 Base and Edge Preparation

NG6.5.1 There are no Notes for Guidance

NG6.5.2 Edge Preparation

(1) Edge sealant materials are generally based on rapid curing bitumen emulsions to IS EN 13808, typically in the range 40 to 100 pen and approximately 70% bitumen content, or hot bitumens to IS EN 12591 typically 50 or 70 pen. An increasing number of high build and rubberised edge sealants are becoming available and, in general, are preferred. Alternatives to these materials exist and, if there are any doubts as to their effectiveness, they may be used on a trial basis.

(2) When using edge sealant materials, strict adherence to manufacturer’s instructions is essential. Dependant on weather conditions brushed sealant drying times may vary between 5 minutes and 2 hours, whilst spray sealant times may vary between 1 and 15 minutes before reinstatement can take place.

Additionally prior to application:
- All excess water and loose material should be removed from the cut faces of the reinstatement;
- All bound vertical edges must be clean and free from slurry and dust etc. with the stone in the existing layers clearly visible.

(3) The following case study data sheets illustrate the results of edge sealant application under different edge conditions:
- Example 1 – dry and clean;
- Example 2 – wet;
- Example 3 – dirty and damp.
Example 1

**EXAMPLE 1**

**DRY/CLEAN EDGE CONDITIONS**

GOOD BONDING

(Weather: dry, warm, overcast)

---

**Photo A**

Clean and dry saw-cut edge

**Photo B**

First application of sealant

**Photo C**

Second application of sealant to top of reinstatement edge following compaction of first reinstatement lift.

**Photo D**

- Core taken through joint shows sealant has adhered to vertical edge.
- A good bond observed between reinstatement and adjacent surfacing.

**Overall Comments:**

Reinstatement edge was clean, free of dust or ‘caked’ saw coolant.
EXAMPLE 2

WET EDGE CONDITIONS
POOR BONDING
(Weather: dry, hot, sunny)

Photo A
Coating of wet slurry on saw-cut edge.

Photo B
First application of sealant. (Only 5 minutes of drying time allowed before reinstatement commenced).

Photo C
Second application of sealant to top of reinstatement edge following compaction of first reinstatement lift. (Only 2 minutes of drying time allowed before reinstatement commenced.)

Photo D
- Core taken through joint shows that sealant has not adhered to vertical edge.
- No bond observed between reinstatement and adjacent surfacing.

Overall Comments:
- Reinstatement edge should have been washed and substantially dried before application of spray sealant.
- Allowed drying time does not conform with Manufacturer’s instructions.
- Incorrect application of edge sealant could permit water penetration into joint, potentially leading to early life edge deterioration, settlement of trench and future (avoidable defects).
**Example 3**

**DIRTY/DAMP EDGE CONDITIONS**

**POOR BONDING**

*(Weather: light rain)*

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**Photo A**
Coating of wet slurry on saw-cut edge.

**Photo B**
First application of sealant. (Only 5 minutes of drying time allowed before reinstatement commenced).

**Photo C**
Second application of sealant to top of reinstatement edge following compaction of first reinstatement lift. (Only 2 minutes of drying time allowed before reinstatement commenced.)

**Photo D**
- Core taken through joint shows that sealant has not adhered to vertical edge.
- No bond observed between reinstatement and adjacent surfacing.

**Overall Comments:**
- Reinstatement edge should have been washed and substantially dried before application of spray sealant.
- Allowed drying time does not conform with Manufacturer’s instructions.
- Incorrect application of edge sealant could permit water penetration into joint, potentially leading to early life edge deterioration, settlement of trench and future (avoidable defects).
NG7

Notes For Guidance
Rigid and Modular Roads
Rigid and Modular Roads

Reinstatement Methods

(1) The requirements of this Reinstatement Specification shall apply to all rigid roads up to 125 msa traffic flow. All rigid roads with existing traffic flows exceeding 125 msa must be identified by the authority, prior to the commencement of works, so that reinstatement requirements can be agreed.

(2) Some modern concrete roads, constructed in accordance with current Government standards and specifications, may incorporate special design philosophies that are beyond the scope of this Reinstatement Specification. Similarly, there may be other existing rigid road designs that will also require the use of particular reinstatement methods. Such roads must also be identified by the authority, prior to the commencement of works, so that reinstatement requirements can be agreed.

Modular Roads

(1) When excavating in modular roads, the existing modules shall be lifted carefully and stored for re-use.

(2) It is particularly important to ensure that bedding and jointing sands should meet the performance demands in areas subject to heavy vehicular traffic.
NG8

Notes For Guidance
Footways, Footpaths
and Cycle Tracks
NG8 Notes for Guidance - Footways, Footpaths and Cycle Tracks

NG8 Footways, Footpaths and Cycle Tracks

NG8.1 There are no Notes for Guidance

NG8.2 Sub-base and Binder Course Reinstatement

NG8.2.1 to NG8.2.3 There are no Notes for Guidance

NG8.2.4 Excavations Adjacent to Roads

The most heavily stressed area of a road is usually the inside wheel track adjacent to the road edge. Depending on ground conditions, it is often necessary to support the road edge by providing lateral restraint within the adjoining footway, footpath, cycle track or verge. The most common form of edge support is a section of unbound or cement bound granular materials. This construction will most commonly be encountered when the horizontal distance, between the edge of the undertakers’ excavation and the edge of the road surface, is less than the expected depth of cover of the undertakers’ apparatus.

NG8.3 Surface Reinstatement

NG8.3.1 There are no Notes for Guidance

NG8.3.2 Areas Surfaced with Asphalt Concrete

A wide range of surface treatments exist and where available, a similar surface finish will be reinstated. The surface course material may be reinstated using any of the allowed binder course or surface course materials, with a final surface treatment applied as soon as practicable following the laying of the permanent surface course.

NG8.3.3 Other Asphalt Areas

Mastic asphalt is sometimes used as a footway surfacing material for its appearance and durability. Where an authority has a policy of using this material and reinstating with it then it is reasonable to expect the undertaker to similarly comply with this. However, the cost of small quantities of mastic asphalt is disproportionate to the size of the reinstatement and can result in significant wastage. Consequently it is not unreasonable for an undertaker to wish to compile a programme of such works to achieve an efficient utilisation of resources. Therefore an authority should expect such work to be programmed so that sites requiring mastic asphalt are batched to produce a package of work.
NG8.3.4 Areas Constructed in Concrete

(1) In general, reinstatements in a concrete footway, footpath or cycle track should match the existing surfacing as closely as is practicable.

(2) Generally, the use of all flexible permanent reinstatements in overlaid concrete, mastic asphalt, asphalt carpet, sand carpet or other derivative surfaces etc., has proven to be entirely adequate in practice.

NG8.3.5 to NG8.3.6 There are no Notes for Guidance

NG8.4 There are no Notes for Guidance
NG10
Notes For Guidance
Compaction Requirements
NG10  Compaction Requirements

NG10.1  Introduction

(1) Research has shown that failure to operate and maintain compaction equipment in accordance with manufacturer’s schedules and recommended practices is likely to result in inadequate compaction with serious implications for the short term performance of individual structural layers and the long term integrity of the entire reinstatement.

(2) All compaction equipment covered by this Reinstatement Specification must be frequently checked, adjusted and maintained, as necessary, in accordance with the manufacturer’s recommended practices, in order to ensure that the manufacturer’s recommended operating frequency is maintained throughout each compaction operation.

(3) All compaction equipment covered by this Reinstatement Specification must be used in accordance with the manufacturer’s recommended operating procedures.

NG10.2  Compaction of Materials

NG10.2.1  Unbound Granular Materials

For granular materials, a vibrating roller may be unsuitable in small excavations because of the restricted manoeuvrability of large heavy rollers required to achieve adequate levels of compaction with an acceptable number of passes.

NG10.2.2  There are no Notes for Guidance

NG10.2.3  Bituminous Mixtures

(1) With some combinations of compaction plant and certain types of bituminous mixtures if compaction is continued as the material approaches its maximum density the following may result:

(a) The migration of fines or binder to the surface.

(b) The development of shear surfaces and or crushing of aggregates.

(2) Provided that the material has been laid and compacted within the appropriate temperature range, fewer passes will be required and signs of distress should not become apparent. This highlights the need to lay material at the appropriate temperature so as numerous extra passes are not required which may cause distress to the surface.

(3) Asphalt maximum density values, used in the calculation of air voids content, are specific to particular asphalt mixtures incorporating constituents from specific sources. Any variation in mix proportions or constituents requires the maximum density to be re-established.

(4) Although consistent asphalt supply may allow an established maximum density for a particular mixture and source to be used for some time in routine situations, the definitive
method to be used in the event of dispute will require the maximum density to be determined for the mixture actually used. The maximum density may be determined from bulk samples, if available, or from material obtained from additional core samples.

(5) When taking cores near surface apparatus a minimum clearance of 100mm to avoid damaging the apparatus or structure is required. However it is possible that some surface apparatus may have wider than normal flanges and there may be instances where a greater clearance is required to avoid damage. If doubt exists, liaison with the owner of the apparatus should be undertaken in advance.

NG10.2.4 There are no Notes for Guidance

NG10.2.5 Modular Surfacing Materials

Depending on the size and type of paving module to be laid, and/or the extent of the area to be surfaced etc., the use of additional mechanical compaction may become necessary.

NG10.3 Equipment Operation and Restrictions

(1) A single pass of any compaction plant is deemed to be completed when the foot, roll or plate of the compactor has impacted the entire surface area of the layer.

(2) Where the excavation width is more than 50mm greater than the foot, roll or plate width (i.e. side clearances between the compacting surface and the wall of the excavation exceed 25mm per side), two or more traverses of the compaction device will be required to ensure coverage of the entire surface and all will be deemed to constitute a single pass.

(3) Compaction plant should be steered along a line offset from that steered on the previous pass so that alternate passes are run close in to each side wall of the excavation.

(4) Small items of compaction plant will frequently be required and additional provisions must be considered for use in trenches of less than 200mm width, small excavations and other areas of restricted access. In general, lightweight vibrotampers and poletampers are capable of achieving the same degree of compaction as the heavier items of plant specified in Appendix A8. However, small plant is usually not self-advancing and therefore more difficult to operate effectively.
NG10.3.1 **Hand Rammers**

(1) Hand rammers may be used for initial tamping of fine fill material or immediately adjacent to street furniture, reinstatement edges etc.

(2) In all cases, full machine compaction complying with Appendix A8 will normally be applied immediately after the required thickness of material has been built-up. However, hand ramming alone may be necessary around standpipes and other isolated fixed features.

NG10.3.2 **Percussive Rammer**

(1) A percussive rammer is deemed to be a hand-held and/or pedestrian guided machine in which an electric, pneumatic or hydraulically operated reciprocating mechanism acts on a plate or ‘foot’.

(2) Percussive rammers may only be used to provide full machine compaction in areas where restricted access prevents the effective use of conventional compaction equipment.

NG10.3.3 **Vibrotamper**

(1) A vibrotamper is deemed to be a free-standing, pedestrian guided machine in which a reciprocating mechanism, driven by an integral engine or motor, acts on a spring system through which oscillations are set up in a base plate or ‘foot’.

(2) Vibrotampers are not preferred for any permanent surface course application or any other application involving a layer thickness of less than 50mm.

NG10.3.4 **Vibrating Roller**

(1) A vibrating roller is deemed to be a self-propelled, pedestrian steered machine with a means of applying mechanical vibration to one or more rolls.

(2) Vibrating rollers should be operated in the lowest available gear, except for the first pass, which should be at maximum forward speed.

(3) All compaction passes should be carried out with full vibration, except for the first pass, which should be carried out without vibration in order to nip in the material adjacent to the reinstatement edges and to prevent uneven displacement of material within the remainder of the reinstatement area.

(4) Vibrating rollers are the preferred method of compaction for all permanent surface courses.

(5) The use of twin drum rollers is preferred to single drum for the compaction of bituminous mixtures and will improve the quality of the permanent surface course. However, single drum vibrating rollers are permitted, as detailed in Appendix A8.
NG10.3.5 **Vibrating Plate Compactor**

1. A vibrating plate compactor is deemed to be a pedestrian guided plate equipped with a source of vibration consisting of one or more rotating, eccentrically weighted shafts.

2. Vibrating plate compactors should be operated in the lowest available gear, except for the first pass, which should be at maximum forward speed.

NG10.3.6 **Other Compaction Equipment**

Compaction plant not referenced in Appendix A8, including machine-mounted, modified and other alternative compaction equipment, may be permitted for the compaction of reinstatement materials, in accordance with the following relevant requirements:

1. **Machine-Mounted Compactors**

   A machine-mounted compactor is deemed to be any compaction equipment that is mounted, as an attachment or accessory, to the chassis or front or rear booms of an excavator, tractor, skid-steer vehicle or other proprietary vehicle, for the purposes of compaction.

   All machine-mounted compactors, whether integral to the vehicle design or special attachments for front or rear mounting to the chassis or booms of any excavator, tractor or skid-steer vehicle etc. should be operated in accordance with the recommendations of the compactor or attachment manufacturer, to the relevant compaction procedure required by Appendix A8. However, other operational variables should also be considered prior to the operation of such plant as follows:

   (a) **Compactor Downforce**

      The total downforce will vary depending upon the weight of the vehicle chassis or compactor frame, and any additional downforce applied by hydraulic rams etc. However, changes in the configuration of any vehicle, by the addition or removal of other accessories etc, changes in the width of the vibrating foot, roll or plate etc, movement of any boom resulting in a significant change of loading geometry or outreach etc, attaching of the compactor to other vehicles of differing types or weights etc, can all result in a significant reduction of compactive performance that is seldom apparent. All operators should be aware of the potential reduction in compactive performance resulting from such changes in configuration.

   (b) **Applied Downforce**

      The mounting of compaction equipment to the front loader arms of an excavator, where the downforce is sensibly limited by the lifting of the front wheels, is preferred. All compactors mounted to the backhoe of an excavator should be fitted with a downforce-limiting device, correctly set, or with a simple indicating device allowing the amplitude to be estimated.
(c) Compactor Set-up

Where vibration frequency or amplitude, or any other parameter affecting the dynamic output of a compactor, is expected to be adjusted on a routine basis, all parameters should be set in accordance with the manufacturer’s recommendations.

(2) Modified Compaction Equipment

Modified compaction equipment shall include any proprietary vibrotamper, vibrating roller, vibrating plate compactor, percussive rammer or other compaction plant which has been adapted, converted, revised or otherwise changed from the original manufacturer’s Reinstatement Specification, resulting in a significant change to the original configuration, dimensions, operational weight or power output.

Modified compaction equipment shall be permitted on the condition that the original manufacturer shall provide written confirmation that the modified compaction equipment, operated in accordance with the original compaction procedure, is capable of achieving the same degree of compaction as any other option permitted in Appendix A8.
NG11

Notes For Guidance
Ancillary Activities
NG11.1 Traffic Signs, Road Markings, Studs and Verge Markers

NG11.1.1 General
In the interests of safety generally and particularly in the interests of people with disabilities, all traffic signs, road markings, studs and verge markers removed during the course of the works should be replaced immediately following completion of works.

NG11.1.2 There are no Notes for Guidance

NG11.1.3 Road Markings – General
Cold applied road markings (e.g. Methylmethacrylate) are often laid thinner than thermoplastic materials and may require longer setting or curing times. Different glass beads and other surface treatments, e.g. for skid resistance, may need to be applied to these materials. Guidance on this shall be sought from the manufacturer of the material and this guidance must be followed.

NG11.1.4 There are no Notes for Guidance

NG11.2 Street Furniture and Special Features
In the interests of safety generally, and particularly in the interests of the disabled, all street furniture, tactile paving and any other special features removed during the course of works should be replaced immediately following the completion of works.

NG11.3 Traffic Sensors etc.
(1) Examples of sensors include ice warning sensors, buried queue and traffic detectors, other electronic detectors and various data collection devices.

(2) The replacement of some traffic sensors may require the use of specialist contractors.

NG11.4 Water-related Matters

NG11.4.1 There are no Notes for Guidance

NG11.4.2 Water Egress (Road Surface and Utility Apparatus)
(1) If water issues from the road surface or an undertaker’s apparatus, the authority shall initiate an investigatory works procedure to determine the cause and source of the water egress. Prior to commencement of the investigatory work, the authority should contact any undertaker or undertakers which it believes may be responsible for the egress of water.
Undertakers shall cooperate with the authority in its investigation and may take trial holes and check apparatus for water leakage or surcharge through the apparatus, ducts and surround to the apparatus.

(2) If following the investigation, the authority has reasonable cause to believe that water egress is caused or associated with the undertaker’s apparatus, remedial measures shall be agreed between the authority and the undertaker and shall be at the undertaker’s cost.

NG11.5 Ironwork and Apparatus

NG11.5.1 Access Covers, Frames and Surround

(1) The access surround is a critical feature because of the load transfer and point loads impacting on the fixed feature and as a potential point of weakness. It is therefore important that the surround is constructed to adequately withstand and transfer the applied loads.

(2) The access surround should be of sufficient width to enable adequate compaction if constructed in an asphaltic material or a flowable material.

There are no Notes for Guidance

NG11.5.1.3 Reinstatement Materials

(1) Apparatus bedding materials should be compliant with the current version of HA104 and used in accordance with its requirements.

(2) If the bedding material depth is greater than the manufacturers recommendations, an appropriate product should be used to infill this gap. e.g. C32/40 strength concrete.

There are no Notes for Guidance

NG11.6 Overbanding

No surface course overbanding is permitted. Overbanding on binder and base layers is permitted under this Reinstatement Specification.
NGA2

Notes For Guidance
Key to Materials
NGA2 Notes for Guidance - Key to Materials

NGA2 Key to Materials

NGA2.0 Introduction
For guidance on the terminology for asphalt mixtures refer to IS EN 13108.

NGA2.1 to NGA2.5 There are no Notes for Guidance

NGA2.6 Structural Layer Thickness Tolerances
Excessive layer thicknesses of HRA surface course can lead to localised rutting likely to exceed the surface profile performance requirements set out in Section S2.2.

NGA2.7 to NGA2.12 There are no Notes for Guidance
Notes For Guidance
Reinstatement of Modular Surface Layers
NGA12 Notes for Guidance - Reinstatement of Modular Surface Layers

NGA12 Reinstatement of Modular Surface Layers

NGA12.1 General

(1) For the purposes of this Reinstatement Specification, modules where one side of the module is generally greater than 300mm, are expected not to rely on infill sand between the vertical faces of the modules. Rather, the gaps between these modules are normally filled, or pointed, with a cement: sand mortar.

(2) Modules with sides generally up to and including 300mm rely on jointing sand between the vertical faces of the modules, normally affected through vibration methods, with jointing sand subsequently brushed into joints upon completion. It is essential that the jointing sand is kiln dried and free flowing. Sharp sand or building sand are not normally deemed to meet these requirements, although in some situations the use of sharp sand has been found to provide increased durability.

(3) It should be noted that there may be a need to revisit sites to top up jointing sand following subsequent trafficking.

(4) It should also be noted that there may be a need for the application of a sealant on sites subject to mechanical/vacuum sweeping.

NGA12.2 Examples of Cement or Concrete Infills

Figures NGA12.1 to NGA12.3 provide guidance as to acceptable treatment of cement or concrete infills between the nearest practical module and the immediately adjacent fixed feature or boundary feature, as described in Appendix A12. Figures NGA12.1 and NGA12.2 show fillets in modules of one side greater than 300mm, whilst Figure NGA12.3 shows fillets in modules with sides up to and including 300mm.

NGA12.3 Examples of Reinstatement of Modular Patterns

Figures NGA12.4 to NGA12.6 provide guidance as to acceptable treatment of modular patterns in localised reinstatements immediately adjacent to fixed features or boundary features. The principle of an acceptable loss of local pattern is indicated, together with the use of larger cut and/or shaped pavers, both leading to an improved aesthetic and structural arrangement of the modules within the reinstatement.
Figure NGA 12.1 Extension of Infill Concrete – Modules up to 300mm [Picture 1]

Infill concrete extended to nearest module to accommodate irregular shape of ironwork and avoid ‘cutting’ or ‘trimming’ of modules [modules of side greater than 300m in this example].

Maximum width of infill measured orthogonally from ironwork face increased to 200mm (maximum) to accommodate irregular shape.
Infill concrete extended to nearest module to accommodate irregular shape of ironwork and avoid ‘cutting’ or ‘trimming’ of modules (modules of side greater than 300m in this example).

Use of varying width of infill limits ‘cutting’ or ‘trimming’ of existing surround modules (half-size in this example).
Use of varying width concrete to form an ‘external’ regular boundary shape (rectangular) with existing modules avoids ‘cutting’ or ‘trimming’ of existing surround modules.

Infill concrete extended to nearest appropriate (full) module to accommodate orientation of ironwork and avoid ‘cutting’ or ‘trimming’ of modules to undesirable small sizes [modules of side up to 300mm in this example].

Maximum width of infill measured orthogonally from ironwork face up to module width + 25mm.
Use of larger cut/shaped blocks leads to acceptable loss of local pattern (herringbone in this example). This is preferred to small and/or angular cut blocks otherwise necessary to maintain regularity of existing block paver pattern.
Use of grouped larger cut/shaped blocks leads to acceptable loss of local pattern (herringbone in this example). This is preferred to small and/or angular cut blocks otherwise necessary to maintain regularity of existing block paver pattern.

Use of larger cut and/or shaped blocks leads to preferable arrangement of block pavers at corner to stringer course.
Use of cut 'half' blocks (100mm x 100mm) minimises apparent loss of local pattern (herringbone in this example).

Use of larger cut and/or shaped blocks leads to preferable arrangement of block pavers as surround to small Stop-Cock type apparatus.