

## SELECTION OF CEMENTITIOUS BINDERS FOR STABILISATION OF PAVEMENT MATERIALS

### 1. PURPOSE

This Technical Note provides information to aid the selection of an appropriate cementitious binder for stabilisation of pavement materials having regard to the length of working time required and the time of year work is carried out. Information is also given on how to correct the field density ratio when the laboratory reference density is determined on a sample compacted after the maximum allowable working time for the binder has expired.

### 2. INTRODUCTION

General Purpose (Type GP) cement is widely used for insitu stabilisation of granular pavements and for cementitiously treating crushed rock or crushed concrete to produce a stiff, highly bound sub-base material for deep strength asphalt pavements. Type GP cement may not necessarily be the most appropriate cementitious binder type in cases where more than 2 to 3 hours is required to mix, trim and fully compact the material after the binder is added. Where the delay between mixing and compaction in the field exceeds the allowable working time for the binder, the full benefits of stabilisation may not be realised.

Technical Note 15<sup>1</sup> summarises VicRoads/Industry cooperative research work showing the reduction in density and strength for various cementitious binders with a delay in compaction of up to 24 hours. If a binder is used with an insufficient working time, difficulties may be experienced in achieving specification requirements for density, strength, impermeability and ride quality resulting in a significant loss of pavement life.

### 3. TYPES OF CEMENTITIOUS BINDERS

Cementitious binders include General Purpose Cement (Type GP), Blended Cement (Type GB), or a blend of Ground Granulated Blast Furnace Slag (GGBFS) with one or more of supplementary cementitious materials such as hydrated lime, fly ash, alkali activated slag or other pozzalanic material.

VicRoads Standard Specifications<sup>2</sup> have been recently amended to permit a range of cementitious binders to be used with allowable working times ranging from 2 to 12 hours depending on the time of year work is undertaken.

The type and content of cementitious binder required to optimise mix proportions are determined by using the procedure set out in VicRoads Test Method RC 330.01<sup>3</sup>.

### 4. MAXIMUM WORKING TIMES FOR TYPICAL CEMENTITIOUS BINDERS

The recommended maximum working times (from addition of binder to completion of trimming and compaction) for a range of commonly used cementitious binders are shown in Table A. When using Table A note the following points:

- Rapid setting binders are not suitable for deep-lift stabilisation (layer > 250 mm thick) because of the increased compaction time required.
- The prepared surface of pavements stabilised with slow setting binders may suffer traffic damage if cold wet conditions are experienced within 48 hours of placement.

**Table A - Maximum Working Times for Cementitious Binders**

| Cementitious Binder   |   | Maximum Allowable Working Time (hours) |                                 |
|-----------------------|---|--|---------------------------------|
|                       |   | Construction - October to April        | Construction - May to September |
| <b>Rapid Setting</b>  | Type GP Cement  | 2                                      | 3                               |
| <b>Medium Setting</b> | Type GB Cement<br>Cement/Slag blend (50 to 60 % cement content)<br>Cement/Fly ash blend (70 to 80 % cement content)<br>Cement/Slag/Fly ash blend (55 to 65% cement content) | 3                                      | 5                               |
| <b>Slow Setting</b>   | Slag / Lime Blend (10% to 30% lime content)<br>Lime (Hydrated & Quicklime)  | 8<br>12                                | 12<br>24                        |

