

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>1. INTRODUCTION.....</b>	<b>3</b>
<b>2. BRIDGE MANAGEMENT SYSTEM .....</b>	<b>5</b>
<b>2.1 Structure of BMS.....</b>	<b>6</b>
2.1.1 Administration module.....	8
2.1.2 Inventory module .....	8
2.1.3 Inspection module .....	8
2.1.4 Maintenance module .....	10
2.1.5 Prioritisation module .....	10
<b>2.2 Supporting materials .....</b>	<b>11</b>
2.2.1 Catalogue of defects .....	11
2.2.2 Cost catalogue .....	12
<b>2.3 Cost categories .....</b>	<b>12</b>
2.3.1 Agency costs .....	12
2.3.2 User costs .....	13
2.3.3 Other costs .....	14
<b>2.4 Bridge life cycle cost analysis.....</b>	<b>14</b>
<b>2.5 Decision making processes within BMS.....</b>	<b>17</b>
2.5.1 Bridge (project) level.....	17
2.5.2 Network level .....	18
<b>3. STATE OF THE ART .....</b>	<b>19</b>
<b>3.1 Literature review - reports.....</b>	<b>19</b>
3.1.1 Management of Highway structures. A code of Practice (UK).....	19
3.1.2 Review of methods for deciding whether to repair, replace or strengthen a bridge (BRIME, 4FP).....	29
3.1.3 Multi-objective optimization for bridge management systems (NCHRP 590).....	35
3.1.4 Bridge Life-Cycle Cost Analysis (NCHRP 483).....	49
3.1.5 Optimised condition assessment and structural safety assessment of highway structures (SAMARIS) .....	53
3.1.6 Bridge management and assessment of existing structures (SAMCO) .....	58
3.1.7 Numerical techniques for safety and serviceability assessment (COST 345).....	60
<b>3.2 Literature review - conference papers.....</b>	<b>65</b>
3.2.1 Basic parameters of optimum, cost-effective bridge maintenance and rehabilitation (EPAM 3) .....	65
3.2.2 Development of the Hungarian highway asset management (EPAM 3) .....	67
3.2.3 Bridge management plan and strategy (EPAM 3).....	68
3.2.4 Integration of pavement management systems and bridge management systems (EPAM 3).....	70
3.2.5 Multidimensional approach to describe bridge deterioration (EPAM 3) .....	72
3.2.6 An LCCA algorithm for bridges: a comprehensive approach (TRB).....	73

3.2.7 How safe are our existing bridges? (TRA) .....	75
<b>3.3 National reports .....</b>	<b>78</b>
3.3.1 The Czech Republic .....	78
3.3.2 Slovakia .....	79
3.3.3 Bulgaria .....	79
3.3.4 Latvia .....	79
3.3.5 Estonia .....	80
3.3.6 Italy .....	80
3.3.7 France .....	80
3.3.8 Other countries .....	81
<b>3.4 Questionnaire survey .....</b>	<b>82</b>
3.4.1 Summary of the questionnaire survey .....	83
<b>4. RECOMMENDATION ON BMS .....</b>	<b>86</b>
<b>4.1 Introduction .....</b>	<b>86</b>
<b>4.2 Recommendation to New member states .....</b>	<b>86</b>
4.2.1 Connection to current system .....	86
4.2.2 Structure of BMS .....	87
4.2.3 Decision making processes within BMS .....	90
4.2.4 Asset management .....	91
<b>5. CONCLUSIONS .....</b>	<b>92</b>
<b>6. REFERENCES .....</b>	<b>93</b>
<b>APPENDIX A: NATIONAL REPORTS .....</b>	<b>95</b>
A.1 Czech Republic .....	95
A.2 Slovakia .....	105
A.3 Bulgaria .....	110
A.4 Latvia .....	115
A.5 Estonia .....	121
A.6 Italy .....	125
A.7 France .....	136
<b>APPENDIX B: QUESTIONNAIRE SURVEY - EMPTY FORM .....</b>	<b>145</b>
<b>APPENDIX C: QUESTIONNAIRE SURVEY - ANSWERS .....</b>	<b>157</b>