TABLE OF CONTENTS

EXECUTIVE SUMMARY 1
INTRODUCTION 1
STUDY OBJECTIVES..... 1
STUDY METHODOLOGY AND FINDINGS..... 1
STUDY CONCLUSIONS 3
STUDY RECOMMENDATIONS AND ACTION PLAN OUTLINE 5
RESEARCH SUMMARY 8
1. INTRODUCTION 9
2. PROJECT BACKGROUND 11
2.1 RURAL ITS PLANNING AND DEPLOYMENT HISTORY IN ARIZONA 11
2.2 RURAL ITS DEPLOYMENT MODELS 13
2.3 KEY ORGANIZATION ROLES 15
2.4 PRIOR AND CURRENT RURAL ITS ACTIVITIES 18
2.5 KINGMAN DISTRICT INNOVATIONS..... 19
3. STUDY METHODOLOGY 21
3.1 PROJECT APPROACH 21
3.2 EVALUATION METHODOLOGY 22
3.3 GOAL AREAS 23
3.4 PERFORMANCE MEASURES..... 23
3.5 STAKEHOLDERS AND INFORMATION RESOURCES 27
3.6 DATA COLLECTION PROCESSES 28
3.7 DPS, CVO AND PUBLIC SURVEYS AND RESPONSES..... 31
4. STUDY FINDINGS – OVERVIEW 37
4.1 INTRODUCTION 37
4.2 ADOT'S RURAL ITS PROGRAM..... 38
5. STUDY FINDINGS - SURVEILLANCE AND DATA COLLECTION SYSTEMS ..41
6. STUDY FINDINGS - INFORMATION FUSION AND DISSEMINATION SYSTEMS.....49
7. STUDY FINDINGS - TRAFFIC CONTROL AND COMMERCIAL VEHICLE ELECTRONIC CLEARANCE SYSTEMS.....65
8. STUDY FINDINGS - EMERGENCY DETECTION AND RESPONSE SYSTEMS .73
9. STUDY FINDINGS - OTHER ITI.....83
10. GAP ANALYSIS.....85
11. CONCLUSIONS AND RECOMMENDATIONS 89
11.1 CONCLUSIONS..... 89
11.2 RECOMMENDATIONS..... 92
11.3 SUMMARY..... 93
12. APPENDICES 95

LIST OF APPENDICES

APPENDIX A. RURAL ITS NEEDS, USER SERVICES, MARKET PACKAGES AND PROJECTS FROM THE 1998 STATEWIDE ITS STRATEGIC PLAN .. 97

APPENDIX B. UNMET NEEDS SCORING MATRIX..... 117

APPENDIX C. LIST OF DISTRICT INTERVIEWS 125

APPENDIX D. DISTRICT QUESTIONNAIRE..... 129

APPENDIX E. . FOLLOW-UP QUESTIONS TO DISTRICTS AND TO REGIONAL TRAFFIC ENGINEERING OFFICES 141

APPENDIX F. MVD AND NEIGHBORING STATE DOT SURVEY INSTRUMENTS..... 145

APPENDIX G. DPS, CVO AND PUBLIC SURVEY INSTRUMENTS 153

APPENDIX H. MAPS OF GROUP A ITI DEPLOYED AND PLANNED..... 157

APPENDIX I. UNIVERSAL PERFORMANCE MEASURE SCORES 163

APPENDIX J. MAPS OF GROUP B ITI DEPLOYED AND PLANNED 169

APPENDIX K. MAP OF GROUP C ITI DEPLOYED..... 175

APPENDIX L. MAP OF GROUP D ITI DEPLOYED..... 179

APPENDIX M. PROGRESS TOWARD MEETING NEEDS / REMAINING UNSATISFIED NEEDS 183

APPENDIX N. UNMET NEEDS – PRIORITIES, SCORES AND RANKINGS... 191

APPENDIX O. REFERENCES AND BIBLIOGRAPHY 201

LIST OF FIGURES

Figure 1: Statewide ITS Architecture Concept - in 1998 12
Figure 2: Geographic Distribution of DPS Survey Responses (N=70) 32
Figure 3: Geographic Distribution of CVO Survey Responses (N=87) 33
Figure 4: Geographic Distribution of General Public Survey Responses (N=373)..... 35
Figure 5: RWIS Sensor Assembly 41
Figure 6: Overhead Mounted Speed Detection and Feedback Sign 42
Figure 7: Roadside License Plate Readers..... 42
Figure 8: The HCRS-511 System Concept..... 49
Figure 9: Overhead VMS (Globe District) 50
Figure 10: Shoulder-Mounted VMS 50
Figure 11: Portable VMS 51
Figure 12: Highway Advisory Radio..... 51
Figure 13: Portable Traffic Signals..... 65
Figure 14: PrePass Detection on VMS in Arizona 66
Figure 15: EPIC Operator Interface (Partial)..... 67
Figure 16: Truck Escape Ramp Instrumentation 73
Figure 17: Callbox on US 93 74
Figure 18: Motorist Service Patrol Vehicle 75

LIST OF TABLES

Table 1: Key Rural ITI by Functional Groups 10
Table 2: Summary of ADOT's Rural ITS Deployment Models 13
Table 3: Major Project Activities and Accomplishments 21
Table 4: Universal Rural Intelligent Transportation System (ITS) 24
Table 5: Data Collection Activities Summary 29
Table 6: Group A ITI – Components and Functions 43
Table 7: Group A ITI – Quantity Deployed/Planned and Maintenance Arrangements ... 44
Table 8: Group A ITI – Enhancements, Integration and Standardization 45
Table 9: Group A ITI – Stakeholder Awareness and Usage 45
Table 10: Group A ITI – Costs and Benefits 46
Table 11: Group A ITI – Key Issues and Operational Status 47
Table 12: Group A ITI – Evaluation Based on Universal Performance Measures 48
Table 13: Group B ITI – Components and Functions 52
Table 14: Group B ITI – Quantity Deployed/Planned and Maintenance Arrangements .. 54
Table 15: Group B ITI – Enhancements, Integration and Standardization 55
Table 16: Group B ITI – Stakeholder Awareness and Usage 56
Table 17: Group B ITI – Costs and Benefits 58
Table 18: Group B ITI – Key Issues and Operational Status 60
Table 19: Group B ITI – Evaluation Based on Universal Performance Measures 63
Table 20: Group C ITI – Components and Functions 68
Table 21: Group C ITI – Quantity Deployed/Planned and Maintenance Arrangements .. 68
Table 22: Group C ITI – Enhancements, Integration and Standardization 69
Table 23: Group C ITI – Stakeholder Awareness and Usage 69
Table 24: Group C ITI – Costs and Benefits 70
Table 25: Group C ITI – Key Issues and Operational Status 71
Table 26: Group C ITI –Evaluation Based on Universal Performance Measures 72
Table 27: Group D ITI –Components and Functions 76
Table 28: Group D ITI – Quantity Deployed/Planned and Maintenance Arrangements . 77
Table 29: Group D ITI – Enhancements, Integration and Standardization 77
Table 30: Group D ITI – Stakeholder Awareness and Usage 78
Table 31: Group D ITI – Costs and Benefits 79
Table 32: Group D ITI – Key Issues and Operational Status 80
Table 33: Group D ITI – Evaluation Based on Universal Performance Measures 81
Table 34: Needs Ranking by the Technical Advisory Committee 86
Table 35: CVO and Public Respondents' Awareness and Usage of ITS Elements 90
Table 36: ITS Element Contribution to Goal Areas – Public and CVO Perception 91