

AASHTO-AGC-ARTBA Joint Committee

Asset Management Data Collection Guide

Task Force 45 Report



June 2006

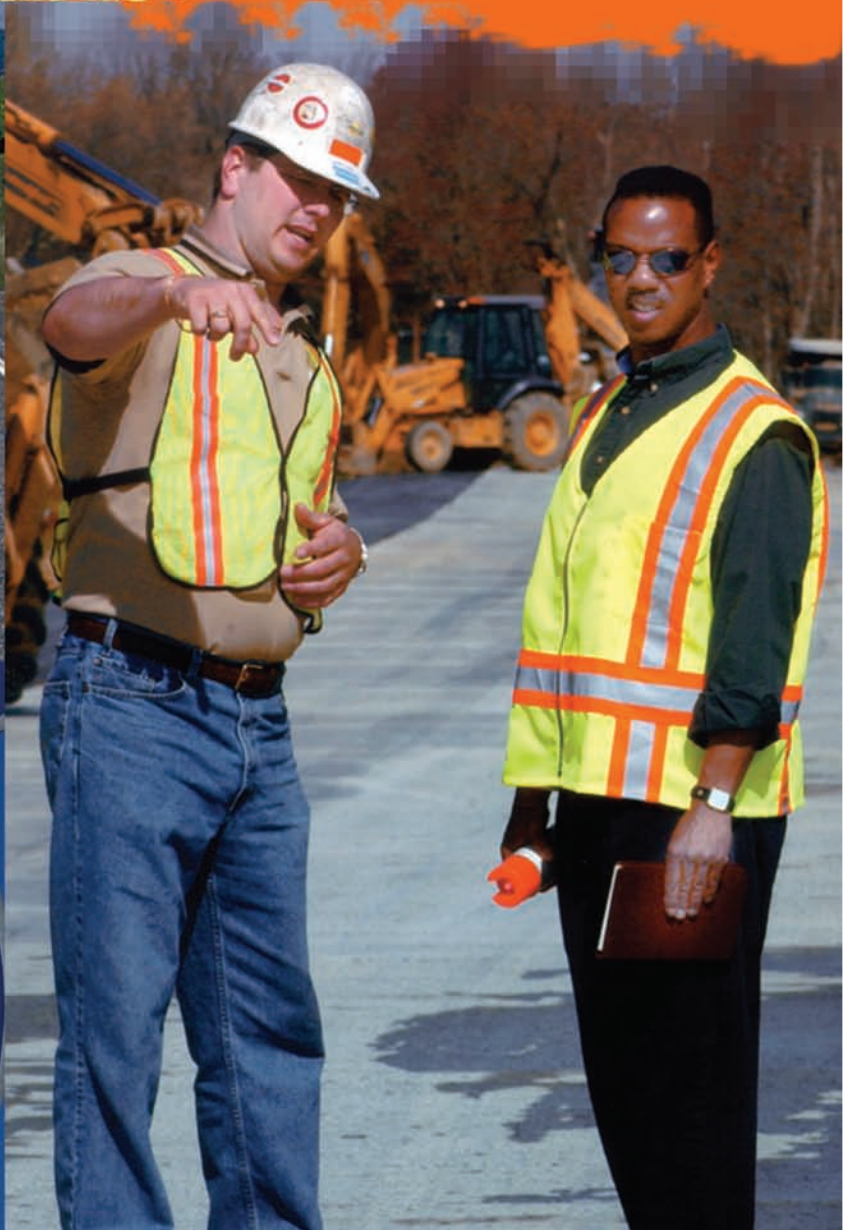


TABLE OF CONTENTS

CHAPTER 1: OVERVIEW	1
1.1 Purpose	1
1.2 Scope	2
1.3 Intended Users	2
CHAPTER 2: PRINCIPLES OF TRANSPORTATION ASSET MANAGEMENT	3
2.1 Definition and Key Elements	3
2.2 Principal Transportation Assets: Pavements, Bridges, Signs, Guardrails, Etc.	3
2.3 Data Collection Requirements	4
2.3.1 Data Collection Methods	5
2.4 Historical Progression of Data Collection Methods	7
2.4.1 Current State of the Practice for Data Collection	7
CHAPTER 3: DATA DICTIONARY FOR PRINCIPAL TRANSPORTATION ASSETS	13
3.1 Guidelines for Data Collection for Drainage Assets	13
3.1.1 Culverts—Cross Pipes and Box, Smaller than 36 Square Feet (36 ft ²)	13
3.1.2 Paved Ditches	16
3.1.3 Unpaved Ditches	20
3.1.4 Drop Inlets and Catch Basins	21
3.1.5 Edgedrains and Underdrains	22
3.1.6 Curb and Gutter	22
3.1.7 Sidewalks	26
3.2 Guidelines for Data Collection for Roadside Assets	27
3.2.1 Grass	27
3.2.2 Slopes	28
3.2.3 Fences	29
3.3 Guidelines for Data Collection for Pavement Assets	31

3.3.1	Flexible Pavement	32
3.3.2	Shoulder Assets	35
3.3.2.1	Paved Shoulders	35
3.3.2.2	Unpaved Shoulders	38
3.4	Guidelines for Data Collection for Traffic Assets	39
3.4.1	Signs	40
3.4.2	Pavement Markings	42
3.4.3	Pavement Markers	44
3.4.4	Guardrail	45
3.4.5	Guardrail Treatment	48
3.4.6	Traffic Barriers	49
	CHAPTER 4: EVALUATION AND SELECTION OF ASSETS	51
4.1	Asset Selection Criteria	51
4.2	Evaluation and Scoring Procedures	52
	CHAPTER 5: DATA COLLECTION AND PROCESSING METHODS FOR SELECTED ASSETS	55
5.1	Data Collection Frequencies	55
5.1.1	Inventory	55
5.1.2	Inspection (Condition Assessment)	57
5.1.3	Sampling Strategy	59
5.2	Equipment/Technology Used to Acquire Data	64
5.2.1	Description/Method of Collection	64
5.2.2	Hardware/Software	65
5.3	Pre-processing, Storage, and Analysis Procedures	67
5.3.1	Data Quality Control and Quality Assurance.	67
5.3.2	Storage Media	75
5.3.3	Data Formats	76
5.3.4	Data Reduction/Synthesis	77
5.3.5	Data User Access and Communications	79

5.4	Industry Protocols for Data Collection	79
CHAPTER 6: DATA INTEGRATION FOR ASSET MANAGEMENT		83
6.1	Accurate Location Information	84
6.2	Comprehensive and Complete Information	86
6.3	Compatible Databases	87
6.4	Easy Access to Data	88

LIST OF FIGURES

Figure 3-1. Cross pipe with Standing Water	15
Figure 3-2. Debris and Silt Clogging Pipe Barrels	15
Figure 3-3. Barrel End Protection Loose	15
Figure 3-4. Barrel Deterioration	16
Figure 3-5. Joint Material Missing or Broken	16
Figure 3-6. Evidence of Erosion	16
Figure 3-7. Depression in Roadway Caused by Pipe Settlement	16
Figure 3-8. Settlement of Paved Ditch	17
Figure 3-9. Settlement of Paved Ditch	18
Figure 3-10. Undermining or Undercutting Causing Settlement and Cracking	18
Figure 3-11. Paved Ditch with Spalling	18
Figure 3-12. Paved Ditch Obstruction	18
Figure 3-13. Example of Inadequate Drainage	19
Figure 3-14. Erosion along Ditch Line	19
Figure 3-15. Slope Slippage along Ditch Line	19
Figure 3-16. Depressions and High Spots Present	19
Figure 3-17. Erosion along Unpaved Ditch	21
Figure 3-18. Ditch Outfalls Blocked	21
Figure 3-19. Obstruction of Unpaved Ditch Due to Sedimentation	21
Figure 3-20. Evidence of Flooding and Insufficient Capacity	23
Figure 3-21. Open Drain to Assess Chamber Blockage	23
Figure 3-22. Grate Broken	23
Figure 3-23. End protection Damaged/Missing	23
Figure 3-24. Opening Crushed	23
Figure 3-25. Pipe Blockage Causing Standing Water	23
Figure 3-26. Undermining or Erosion Present	25
Figure 3-27. Obstruction Impeding the Flowline	25
Figure 3-28. Spalling that Affects Flowline	25

Figure 3-29. Crack Greater than 0.5 in. in Gutter	26
Figure 3-30. Unsealed Cracks Greater than 1/4 in.	26
Figure 3-31. Large amount of surface spalling	28
Figure 3-32. Settlement greater than 1/2 in.	28
Figure 3-33. Slope Erosion	28
Figure 3-34. Damaged Fence Allowing Accessibility	30
Figure 3-35. Excessive Vegetation Causing Fence to Lean	30
Figure 3-36. Shoulder Edge Drop Off	35
Figure 3-37. Rumble Strip Deterioration Limits Functionality	35
Figure 3-38. Alligator Cracking	36
Figure 3-39. Rutting	36
Figure 3-40. Pothole	36
Figure 3-41. Concrete Spalling and Joint loss	36
Figure 3-42. Evidence of Water Pumping	36
Figure 3-43. Joint Separation	36
Figure 3-44. High Shoulder Drop Off	39
Figure 3-45. Reverse Slope Causing Improper Drainage	40
Figure 3-46. Unpaved Shoulder Corrugation	40
Figure 3-47. Damaged Sign Panels	40
Figure 3-48. Greater than 5 Percent of Sign is Dirty	40
Figure 3-49. Sign Not Reflective at 120 ft (Letters Have Faded)	40
Figure 3-50. Pavement Edge Markings Covered by Debris	43
Figure 3-51. Missing Pavement Markings	43
Figure 3-52. Missing Markers	44
Figure 3-53. Damaged Marker	44
Figure 3-54. Example of a Low Guardrail	44
Figure 3-55. Types of Damage that Can Reduce Structural Integrity of Guardrails	47
Figure 3-56. Rusted Guardrail Section	47
Figure 3-57. Damaged Guardrail Posts	47
Figure 3-58. Guardrail End Treatment Missing	47

Figure 3-59. Settlement greater than $\frac{1}{2}$ in.	47
Figure 3-60. Misaligned Barrier	48
Figure 3-61. Misalignment and Settlement	48
Figure 3-62. Missing and Damaged Glare Foils	48
Figure 5-1. Example of Surveyed Sample units based on 30-Percent Sampling Rate (a) Two Lane, Two-way Roadway or Two Lanes in Both Directions (b) Three Lanes in One Direction	63
Figure 5-2. Overview of QA application RIP-DATA	66
Figure 5-3. Steps in Data Mining Process	68
Figure 5-4. Example of Data Flow Diagram: Bridge Evaluation	78
Figure 5-5. Example of Web-enabled GIS Application Displaying Location of Right-of-Way Images Superimposed with Roads and Orthophotos Layers	80
Figure 5-6. WSPMS Graphics Showing a Cross Section View of Interstate 90, Mileposts 12.99 to 15.45	80

LIST OF TABLES

Table 2-1. Basic Inventory Attributes for Transportation Assets	6
Table 2-2. Advantages and Disadvantages of Particular Collection Techniques	9
Table 2-3. Suitability of Asset Data Collection Techniques for Transportation Assets	10
Table 3-1. Summary of Data Elements for Non-structural Culverts	14
Table 3-2. Summary of Data Elements for Paved Ditches	17
Table 3-3. Summary of Data Elements for Unpaved Ditches	19
Table 3-4. Summary of Data Elements for Drop Inlets and Catch Basins	20
Table 3-5. Summary of Data Elements for Edgedrains and Underdrains	24
Table 3-6. Summary of Data Elements for Curb and Gutter	24
Table 3-7. Summary of Data Elements for Sidewalks	26
Table 3-8. Summary of Data Elements for Grass	29
Table 3-9. Summary of Data Elements for Slopes	31
Table 3-10. Summary of Data Elements for Fences	31
Table 3-11. Summary of Data Elements for Flexible Pavements	31
Table 3-12. Summary of Data Elements for Paved Shoulders	33
Table 3-13. Summary of Data Elements for Unpaved Shoulders	34
Table 3-14. Summary of Data Elements for Signs	41
Table 3-15. Summary of Data Elements for Pavement Markings	42
Table 3-16. Summary of Data Elements for pavement Markers	43
Table 3-17. Summary of Data Elements for Guardrail	45
Table 3-18. Summary of Data Elements for Guardrail End Treatments	46
Table 3-19. Summary of Data Elements for Traffic Barriers	49
Table 4-1. Asset Selection Criteria, Category Levels, Rank, and Relative Weight	52
Table 4-2. Sample Application of Asset Evaluation and Selection Criteria	53
Table 5-1. Inventory Attributes	56
Table 5-2. Data Collection Cycle for Inventory	60
Table 5-3. Sample Segment Distribution in 2004 for VDOT	61

Table 5-4. Summary of Major LTPP Photographic Distress QC/QA Elements	69
Table 5-5 Selected Standards for Drainage and Roadside Assets	70
Table 5-6. Selected Standards Measures for Pavement Assets	71
Table 5-7. Selected Standards for Bridges	72
Table 5-8. Selected Standards for Traffic Assets	73
Table 5-9. Selected Standards for Special Facilities	75