

---

# **Water Resource Management Design and Construction Manual**

Prepared for  
**City of Auburn, Alabama**

Revised December 2020



4121 Carmichael Road  
Montgomery, Alabama 36106

# Contents

---

<b>Section 1</b>	<b>General Information</b>	
1.1	Introduction .....	1-1
1.1.1	Purpose of the Manual.....	1-1
1.1.2	Use of the Manual.....	1-1
1.1.3	Authority .....	1-1
1.1.4	Fines and Penalties.....	1-2
1.2	Abbreviations, Acronyms, and Definitions .....	1-3
1.2.1	Purpose .....	1-3
1.2.2	Word Usage.....	1-3
1.2.3	Abbreviations and Acronyms .....	1-3
1.2.4	Definitions .....	1-7
1.3	Development Review Process .....	1-22
1.3.1	Overview .....	1-22
1.3.2	Site Plan Project.....	1-22
1.3.3	Subdivision.....	1-24
1.3.4	Development Review Team .....	1-27
1.3.5	Permits .....	1-33
1.4	Construction .....	1-37
1.4.1	Approved Plans and Revisions.....	1-37
1.4.2	Materials .....	1-37
1.4.3	Submittals .....	1-37
1.4.4	Installation Requirements .....	1-38
1.4.5	Inspection and Testing.....	1-38
1.4.6	Contacts .....	1-38
1.5	As-Built Drawings.....	1-39
1.5.1	Surveying.....	1-39
1.5.2	Engineering .....	1-42
1.5.3	Submittal.....	1-43
1.6	Easements.....	1-45
1.6.1	Discussion.....	1-45
1.6.2	Dedication by Document.....	1-46
1.6.3	Dedication by Plat.....	1-46
1.6.4	Easement Language .....	1-47
1.7	Agreements.....	1-48
1.7.1	Hold Harmless and Indemnity .....	1-48
1.7.2	Easement Encroachment .....	1-48
1.8	Acceptance .....	1-49
1.8.1	Authorities.....	1-49
1.8.2	Preliminary Acceptance.....	1-49
1.8.3	Final Acceptance .....	1-50
1.9	Warranty Period .....	1-51
1.10	Fees and Charges.....	1-52

1.11	1.10.1 Discussion.....	1-52
	1.10.2 Water and Sewer Fee Estimates .....	1-52
	Updates and Waivers to the Manual .....	1-53
	1.11.1 Updates.....	1-53
	1.11.2 Project-specific Waivers.....	1-53

## **Section 2 Water Design and Construction**

2.1	Introduction: Design Responsibility and Applicability of Requirements.....	2-1
2.2	General Considerations.....	2-3
	2.2.1 Existing Water Facilities .....	2-3
	2.2.2 Proposed Water Facilities .....	2-3
	2.2.3 System Demand Analysis.....	2-3
2.3	Submittal Requirements.....	2-5
	2.3.1 Overall Water Main Layout .....	2-5
	2.3.2 Water Main Profiles .....	2-5
	2.3.3 Fire-Flow Calculations.....	2-6
2.4	Water Design and Layout.....	2-8
	2.4.1 Water Main Location .....	2-8
	2.4.2 General Design Considerations .....	2-8
	2.4.3 Water Main Sizes .....	2-9
	2.4.4 Water Main Connections.....	2-10
	2.4.5 Cover Requirements .....	2-11
	2.4.6 Utility Crossings.....	2-12
	2.4.7 Road Bores and Casings .....	2-13
	2.4.8 Thrust Restraint Devices .....	2-14
	2.4.9 Water Valves .....	2-17
	2.4.10 Air Release Valves .....	2-18
	2.4.11 Pressure Reducing Valves .....	2-19
	2.4.12 Fire Hydrants .....	2-19
	2.4.13 Fire Protection and Fire Lines .....	2-20
	2.4.14 Water Meters .....	2-20
	2.4.15 Backflow Protection Devices.....	2-22
	2.4.16 Concrete Vaults.....	2-27
	2.4.17 Aboveground Enclosures .....	2-28
	2.4.18 Right-of-Way Permits for Utility Crossings.....	2-29
	2.4.19 Water Easements.....	2-29

## **Section 3 Sewer Design and Construction**

3.1	Introduction: Design Responsibility and Applicability of Requirements.....	3-1
3.2	General Considerations.....	3-2
	3.2.1 Existing Sewer Facilities .....	3-2
	3.2.2 Proposed Sewer Facilities .....	3-2
	3.2.3 System Capacity Analysis .....	3-2
3.3	Submittal Requirements.....	3-4
3.4	Gravity Sewer Design and Layout.....	3-5
	3.4.1 Sewer Main Location .....	3-5
	3.4.2 General Design Considerations .....	3-6

3.4.3	Sanitary Sewer Connections.....	3-8
3.4.4	Sewer Size and Mains .....	3-9
3.4.5	Minimum Slopes .....	3-9
3.4.6	Cover Requirements .....	3-10
3.4.7	Sewer Manholes .....	3-10
3.4.8	Separation of Sewer and Water Lines.....	3-12
3.4.9	Road Bores and Casings .....	3-13
3.4.10	Sewer Laterals .....	3-13
3.4.11	Grease Traps.....	3-15
3.4.12	Oil and Grit Separators.....	3-17
3.4.13	Open Surface Drains .....	3-18
3.4.14	Pool Drains .....	3-18
3.5	Sanitary Sewer Pump Station and Force Main Design.....	3-19
3.5.1	Discussion.....	3-19
3.5.2	Submittal Requirements .....	3-19
3.5.3	General Design Considerations .....	3-20
3.5.4	Mechanical.....	3-20
3.5.5	Electrical .....	3-24
3.5.6	Structural .....	3-28
3.5.7	Piping.....	3-29
3.5.8	Site Design.....	3-30
3.5.9	Potable Water Requirements.....	3-32
3.5.10	Construction Submittals .....	3-32
3.5.11	Inspection and Acceptance.....	3-33

## **Section 4 Stormwater Quality, Erosion, and Sediment Control**

4.1	Introduction .....	4-1
4.1.1	Erosion and Sediment Control.....	4-1
4.1.2	Post-development Stormwater Quality Management .....	4-2
4.1.3	Importance of Compliance .....	4-2
4.1.4	Common Needs on Construction Sites .....	4-5
4.1.5	City of Auburn Requirements and Special Conditions under the Municipal Separate Storm Sewer System Designation by ADEM .....	4-7
4.2	City of Auburn Erosion and Sedimentation Control Permitting .....	4-9
4.2.1	Erosion and Sedimentation Control Ordinance .....	4-9
4.2.2	City of Auburn Erosion and Sedimentation Control Guidelines and Requirements .....	4-9
4.2.3	City of Auburn Design and Construction Standards .....	4-9
4.3	CBMPP Approval, Implementation, Inspection, and Maintenance Requirements .....	4-12
4.3.1	Submittals .....	4-12
4.3.2	Checklists.....	4-14
4.3.3	City of Auburn Inspection and Enforcement Program.....	4-15
4.4	Post-development Stormwater for Water Quality Management .....	4-23
4.4.1	Introduction.....	4-23
4.4.2	Stormwater Wetland.....	4-26

4.4.3	Bioretention Area (also known as Rain Garden or Biofiltration Device) .....	4-37
4.4.4	Wet Detention Basin (also known as Stormwater Retention or Detention Ponds).....	4-47
4.4.5	Grassed Swale (also known as Enhanced Swale or Biofiltration Swale).....	4-54
4.4.6	Infiltration Devices (Trench, Basin, or Dry Well) .....	4-59
4.4.7	Buffers (also known as Riparian Forested Buffers) .....	4-72
4.4.8	Permeable Pavement (also known as Pervious Pavement) .....	4-81
4.4.9	Sand Filter.....	4-86
4.4.10	Filter Strip (also known as Grass Filter Strip and Buffer Strip).....	4-104
4.4.11	Manufactured BMP Systems (known as Oil-grit Separator; Oil-water Separator).....	4-109
4.4.12	Dry Extended Detention Basin.....	4-111
4.4.13	Using Other or New Structural Stormwater Controls .....	4-114
4.5	Structural Stormwater Control Pollutant Removal Capabilities .....	4-116
4.6	Structural Stormwater Control Selection.....	4-118
4.6.1	General Application Control Screening Process.....	4-118
4.6.2	Limited Application Control Screening Process.....	4-124
4.6.3	Example Application .....	4-125
4.6.4	Online Versus Offline Structural Controls.....	4-128
4.6.5	Using Structural Stormwater Controls in Series.....	4-130
4.7	City of Auburn Site Development Review Tool .....	4-138
4.8	City of Auburn Conservation Subdivision Regulations.....	4-139
4.9	References .....	4-140

## Appendices

### Appendix A Standard Details

#### Standard Water Details

Typical Deadman Thrust Restraint.....	200
Typical Concrete Thrust Block Design .....	202
Typical Concrete Thrust Block Layout .....	204
Typical End of Main Blowoff Assembly.....	206
Typical End of Main in Cul-de-sac.....	208
Bedding Requirements for Trenches.....	210
Typical Bore Encasement.....	212
Typical Fire Hydrant Installation.....	214
Typical Valve Box Installation.....	216
Typical Reduced Pressure Backflow Assembly (RPBA) .....	218
Typical Fire Protection System RPBA.....	219
Typical Double Check Backflow Assembly (DCBA) .....	220
Typical Fire Protection System DCBA .....	221

Typical Fire/Domestic Meter Vault (4" and Larger) .....	222
Typical Large Domestic Meter Vault (3" and Larger) .....	224
Typical 1.5" to 2.0" Meter Vault with DCBA .....	226
Typical 1.5" to 2.0" Meter Vault with RPBA .....	227
Typical Multiple Meter Vault .....	228
Typical Service Box and Lid .....	230
Typical ¾" to 1" Meter .....	232
Typical Automatic Air Release Valve .....	234
Typical Manual Air Release Valve .....	236
Typical 1" Service Connection .....	238
Typical 2" Service Connection .....	240
Typical Copper Repair (1" Only) .....	242
Typical Double Service Connection .....	244
General Service Connection Configurations .....	246
Typical HDPE to Ductile Iron Main Transition .....	248

### **Standard Sanitary Sewer Details**

Typical Drop Manhole .....	300
Standard Manhole .....	302
Typical Saddle Manhole .....	304
Typical 4" or 6" Drop Service Line .....	306
Bedding Requirements for Trenches .....	308
Typical Watertight Manhole Cover .....	310
Standard Manhole Ring and Cover .....	312
Manhole Adjustment Riser .....	314
Typical Grease Trap .....	316
Typical Oil/Grit Separator .....	318
Typical Stream Crossing .....	320
Typical Aerial Stream Crossing .....	322
Typical Bore Encasement .....	324
Typical Service Connection .....	326
Typical Service Line .....	328
Typical Cleanout .....	330
Typical Valve Box Installation (Force Main) .....	332
Combination Air Release and Air/Vacuum Valve (Force Main) .....	334
General Pump Station Site Plan .....	336
General Pump Station Site Section .....	338

### **Standard Erosion Control Details**

Erosion Control Notes .....	400
Silt Fence with Wire Mesh (ALDOT Type A) .....	402

Silt Fence with Polypropylene Mesh (GDOT Type C).....	404
Straw Roll.....	406
Construction Exit Pad (CEP) .....	408
Slope Installation.....	410
Channel Installation .....	412
Typical Check Dam (CD).....	414
Typical Curb Inlet Gravel Filter .....	416
Typical Excavated Drop Inlet Protection (EIP) .....	418
Silt Saver Round Frame .....	420
Typical Sediment Basin.....	422
Conventional Riser Outlet Structure.....	424
Control Structure at Detention Pond .....	426
"Skimmer" Outlet Structure.....	428
Triangular Silt Dike Installed on Concrete or Asphalt.....	430

## **Appendix B Standard Forms**

City of Auburn Site Development Plans Submittal Checklist .....	B-1
City of Auburn Subdivision Construction Plans Submittal Checklist .....	B-6
Development Application for Water and Sewer Service .....	B-11
Backflow Protection Information Form.....	B-14
Backflow Testing and Certification Form .....	B-15
AWWB Water Main Connection Permit Application .....	B-16
City of Auburn Sanitary Sewer Connection Permit Application.....	B-16
Pump Station Calculation Worksheet .....	B-18
Sample Standard Pump Station Completion Bond .....	B-20
Sample Standard Pump Station Warranty Bond.....	B-23
Grease Trap Size Calculation Data Sheet .....	B-25
Commercial Waste Manifest Form .....	B-26
Sample Standard Indemnity and Hold Harmless Agreement .....	B-27
Sample Standard Easement Encroachment Agreement.....	B-30
Request for Design and Construction Standard Waiver .....	B-32
Erosion and Sediment Control Inspection Checklist.....	B-33
City of Auburn Post-Development Water Quality Plan Submittal Form.....	B-35
Low Impact Development (LID)/Green Infrastructure (GI) Review Form .....	B-37

## **Appendix C Exhibits**

Site Plan Development – Utility Installation Flow Chart.....	C-1
Residential Subdivision – Utility Installation Flow Chart .....	C-2

## Tables

2-1	Minimum Cover.....	2-11
2-2	External Thrust Restraint for Bends and Dead Ends (Linear Feet of Restraint Required on each Side of the Fitting along the Main Line) .....	2-15
2-3	External Thrust Restraint for Cut-In Tees on Existing Mains (Linear Feet of Restraint Required along the Branch Line Only) .....	2-15
2-4	External Thrust Restraint for Tees on Proposed Mains (Linear Feet of Restraint Required along the Branch Line in Addition to 20-feet of Restraint on Both Sides of the Tee along the Main Line).....	2-16
2-5	External Thrust Restraint for Reducers (Linear Feet of Restraint Required on the Large Side of the Reducer).....	2-16
2-6	Maximum Valve Spacing .....	2-17
2-7	Meter Selection.....	2-21
2-8	Maximum Number of ¾-inch and 1-inch Meters Allowed by Service Line Size.....	2-22
3-1	Minimum Separation Between Sewer Mains and Permanent Structures.....	3-6
3-2	Minimum Sewer Slopes.....	3-10
4-1	Recommended Design Criteria for Stormwater Wetlands .....	4-31
4-2	Filter Strip Sizing.....	4-46
4-3	Example Maintenance Schedule for Bioretention Areas.....	4-47
4-4	Stream Buffer Width based on Drainage Area .....	4-76
4-5	Stream Buffer Width based on Drainage Area .....	4-76
4-6	Required Maintenance Activities for Permeable Pavement Installations.....	4-85
4-7	Stormwater BMP Performance Characteristics.....	4-117
4-8	BMP Selection Matrix .....	4-120
4-9	Location and Permitting Checklist .....	4-123
4-10	Limited Application BMPs.....	4-126
4-11	Sample Structural Control Selection Matrix .....	4-127

## Figures

1-1	Development Review Process.....	1-32
2-1	Double Check Backflow Assembly (DCBA) .....	2-24
2-2	Reduced Pressure Backflow Assembly (RPBA).....	2-25
3-1	Fullport Backwater Valve.....	3-8
4-1	Constructed Wetland, National Museum of the American Indian in Washington, D.C.....	4-27
4-2	Schematic of Shallow Wetland.....	4-36
4-3	Bioretention in Parking Lot Island.....	4-37
4-4	Bioretention Applications.....	4-39
4-5	Bioretention Example Site Plan.....	4-43
4-6	Bioretention Facility Layout.....	4-45
4-7	Bioretention Facility Typical Section .....	4-45

4-8	Permanent Pool of Water in Wet Detention Basin .....	4-48
4-9	Recently Constructed Grassed Swale in Residential Area, Pembroke Woods Subdivision in Emmitsburg, MD.....	4-54
4-10	Typical Infiltration Trench .....	4-60
4-11	Typical Infiltration Basin with Sand Filter .....	4-60
4-12	Infiltration Trench Example Site Plan.....	4-66
4-13	Infiltration Trench Site Plan .....	4-68
4-14	First Flow Diversion Structure (Point A) .....	4-69
4-15	Second Flow Diversion Structure (Point B).....	4-70
4-16	Forested Buffer with Well-developed Streambank Vegetation.....	4-73
4-17	Parking Lot with Interlocking Concrete Grid Installation.....	4-82
4-18	Typical Permeable Paver Design .....	4-85
4-19	Typical (Open) Sand Filter .....	4-87
4-20	Surface or Open Sand Filter Volumes .....	4-90
4-21	Perimeter or Closed Sand Filter Volumes.....	4-91
4-22	Typical Sand Filter Media Cross Sections .....	4-92
4-23	Detail for a Surface Sand Filter Perforated Standpipe .....	4-94
4-24	Sand Filter Example Site Plan .....	4-96
4-25	Head Diagram.....	4-99
4-26	Flow Diversion Structure .....	4-100
4-27	Sand Filter Site Plan View and Profile.....	4-102
4-28	Filter Strip in Residential Area.....	4-105
4-29	Dry Extended Detention Basin with Shallow Marsh .....	4-112
4-30	Example of Online versus Offline Structural Controls .....	4-128
4-31	Pipe Interceptor Diversion Structure.....	4-129
4-32	Surface Channel Diversion Structure .....	4-130
4-33	Outlet Flow Regulator .....	4-130
4-34	Generalized Stormwater Treatment Train .....	4-131
4-35	Examples of Structural Controls Used in Series .....	4-132
4-36	Example Treatment Train-Residential Subdivision.....	4-133
4-37	Example Treatment Train-Commercial Development .....	4-134
4-38	Example Treatment Train-Commercial Development .....	4-134
4-39	Curve Number Adjustment Factor.....	4-137