TABLE OF CONTENTS

FOREWORD

TABLE OF CONTENTS I

INTRODUCTION 1

LANDSCAPE DESIGN 3

1 OBJECTIVES 3

1.1 WATER USE AND COST REDUCTION 3

1.2 CODES 4

2 QUALIFICATIONS OF LANDSCAPE DESIGN PROFESSIONAL 5

2.1 QUALIFICATIONS AND EXPERTISE 5

2.2 EXPERIENCE LEVEL 6

3 SOILS 7

3.1 EXISTING CONDITIONS 7

3.2 TESTING 8

3.3 AMENDMENTS 9

4 SITE CONDITIONS 9

4.1 LOW IMPACT DEVELOPMENT (LID) 10

4.2 EROSION 11

4.3 WEED CONTROL WITH CHEMICALS 11

4.4 MULCHING 12

5 DRAINAGE 12

5.1 DETENTION AREA 13

5.2 RETENTION PONDS 13

5.3 BIO SWALES 14

5.4 RAIN GARDENS 15

5.5 PERMEABLE PAVING 16

6 PLANT CONCEPTS AND SELECTION 17

6.1 CONCEPTS 18

6.2 SELECTION 20

6.3 TURF GRASS 21

LANDSCAPE INSTALLATION 25
7 OBJECTIVES 25
8 QUALIFICATIONS OF LANDSCAPE INSTALLATION PROFESSIONAL 25
8.1 LICENSURE AND CERTIFICATION 25
8.2 EXPERIENCE LEVEL 26
9 CONSTRUCTION METHODS 27
9.1 PLANT INSTALLATION 27
9.2 NEW PLANT IRRIGATION 28
9.3 SLOPE INSTALLATION 28
9.4 SOIL COMPACTION 29
10 WEED CONTROL 29
11 CONSTRUCTION OBSERVATION/MANAGEMENT 32
LANDSCAPE MANAGEMENT 34
12 OBJECTIVES 34
13 QUALIFICATIONS OF LANDSCAPE MANAGEMENT PROFESSIONAL 34
13.1 LICENSURE AND CERTIFICATION 34
13.2 EXPERIENCE LEVEL 35
14 MANAGEMENT PLAN AND OUTCOME 36
14.1 SOIL MANAGEMENT 36
14.2 PLANT MANAGEMENT 38
14.3 RECORD KEEPING 41
LANDSCAPE MAINTENANCE 43
15 OBJECTIVES 43
15.1 DESIGN PLAN REQUIREMENTS 43
15.2 MAINTENANCE PLAN REQUIREMENTS 44
16 QUALIFICATIONS OF LANDSCAPE MAINTENANCE PROFESSIONAL 44
16.1 LICENSURE AND CERTIFICATION 44
16.2 EXPERIENCE LEVEL 45
17 FERTILIZATION 45
18 SOIL MAINTENANCE PRACTICES 46
19 MOWING PRACTICES 47

20 SHRUBS 47
21 TREES 48
22 RECORD KEEPING 49
IRRIGATION DESIGN 50
23 OBJECTIVES 50
23.1 WATER CONSERVATION & SUSTAINABILITY 50
23.2 CODES 51
24 QUALIFICATIONS OF AN IRRIGATION DESIGN PROFESSIONAL 51
24.1 LICENSURE AND CERTIFICATION 51
24.2 EXPERIENCE LEVEL 53
25 WATER SOURCE 53
25.1 MUNICIPAL WASTE WATER (REUSE WATER) 53
25.2 CONDENSATE/ RAIN WATER CATCHMENT 55
25.3 DESALINATED WATER 57
25.4 SURFACE WATER 58
25.5 GROUND WATER 58
25.6 POTABLE WATER 59
26 TESTING 60
26.1 WATER SOURCE 61
26.2 SOIL STRUCTURE 62
27 DESIGN CONCEPTS AND GUIDELINES 62
27.1 EFFICIENCY 62
27.2 HYDROZONING 63
27.3 PRECIPITATION RATE (P.R.) & DISTRIBUTION UNIFORMITY (D.U.) 64
27.4 EQUIPMENT SELECTION 65
27.5 DELIVERY DEVICES 68
27.6 TRENCHING/BACKFILL 70
27.7 TESTING REQUIREMENTS 71
27.8 SUBMITTALS 73
27.9 CONSTRUCTION OBSERVATION 74
27.10 FINAL ACCEPTANCE 75

IRRIGATION INSTALLATION 76
28 OBJECTIVES 76
28.1 DESIGN PLAN REQUIREMENTS 76
28.2 VALUE ENGINEERING 76
29 QUALIFICATIONS OF IRRIGATION INSTALLATION PROFESSIONAL 76
29.1 LICENSURE AND CERTIFICATION 77
29.2 EXPERIENCE LEVEL 78
30 CONSTRUCTION METHODS 78
30.2 PIPE CONNECTIONS 80
30.3 FLUSHING 80
30.4 VALVE INSTALLATION 81
30.5 PROPER VALVE FLOW CONTROL ADJUSTMENT 81
30.6 DELIVERY DEVICES 81
30.7 SENSORS 82
30.8 FILTRATION 82
30.9 IN-GROUND EQUIPMENT ACCESS 83
30.10 COORDINATION 83
31 CONSTRUCTION OBSERVATION 83
IRRIGATION MANAGEMENT 85
32 OBJECTIVES 85
33 QUALIFICATIONS OF IRRIGATION MANAGEMENT PROFESSIONAL 85
33.1 LICENSURE AND CERTIFICATION 85
33.2 EXPERIENCE LEVEL 86
34 MANAGEMENT PLAN 87
34.1 WRITTEN MANAGEMENT PLAN 87
34.2 RECORD KEEPING 88
35 MANAGEMENT CONCEPTS 89
35.1 IRRIGATION SCHEDULING 89
35.2 EVAPOTRANSPIRATION (ET) 90
35.3 HISTORICAL VS. ACTUAL 90
35.4 ET SOURCES 91

35.5 Cycle/Soak 91
35.6 Water Budgets 92
35.7 Smart Technology 93
35.8 Central Control 94
35.9 Sensors 95
35.10 System Checks 96
35.11 Audits 96
Irrigation Maintenance 98
36 Objectives 98
36.1 Design Plan Requirements 98
36.2 Management Plan Requirements 98
37 Qualifications of Irrigation Maintenance Professional 99
37.1 Licensure and Certification 99
37.2 Experience Level 100
38 Soils 100
38.1 Use of Soil Probe 100
39 Preventative Maintenance 101
39.1 Irrigation Audit 102
39.2 Dry Checks 102
39.3 Sensor Calibration 103
39.4 Valve Service 104
39.5 Water Source Check 104
39.6 Controller Operation 105
Landscape and Irrigation Checklists 106
40 Landscape Checklist 106
40.1 Design 106
40.2 Installation 106
40.3 Management 107
40.4 Maintenance 107
41 Irrigation Checklist 108
41.1 Design 108

41.2 INSTALLATION 108
41.3 MANAGEMENT 109
41.4 MAINTENANCE 109
LANDSCAPE AND IRRIGATION DETAILS 111
42 LANDSCAPE DETAILS 111
42.1 SHRUB/GROUND COVER INSTALLATION 111
42.2 TREE INSTALLATION 112
43 IRRIGATION DETAILS 113
43.1 MAINLINE PIPING 113
43.2 REMOTE CONTROL VALVES 114
43.3 MASTER VALVES 115
43.4 ISOLATION VALVES 115
43.5 DELIVERY DEVICES 116
43.6 SENSORS 117
44 SPECIALIZED/CUSTOM DETAILS 118
44.1 ALTERNATIVE WATER SOURCES 119
COMMON FIELD ISSUES 120
45 LANDSCAPE DESIGN 120
45.1 COMMUNICATION 120
45.2 PLANT GROUPING 120
45.3 POOR PLANT SPACING & USAGE 120
46 LANDSCAPE INSTALLATION 122
46.1 WEATHER PATTERNS/SEASONAL TIMING 122
46.2 PLANT SELECTION 122
46.3 PLANT AVAILABILITY 123
46.4 PLANS/FIELD OBSTRUCTIONS/ COMPLICATIONS 123
46.5 IMPROPERLY STAKING TREES 124
46.6 NOT INSTALLING THE DESIGN PER PLANS 125
46.7 CONSTRUCTION OBSERVATION 125
47 LANDSCAPE MANAGEMENT 126
47.1 NATURAL AREAS VS. HIGH INTENSIVE, SENSITIVE AREAS 126

47.2 Excessive Fertilization/Chemical Use 127
47.3 Proper Identification of Pests 127
48 Landscape Maintenance 128
48.1 Poor Mowing Practices 128
48.2 Poor Mulching practices and Weed Control 128
49 Irrigation Design 129
49.1 Poor Hydrozoning 129
49.2 Poor Pressure 130
49.3 Improper Component Selection or Sizing 130
49.4 Poorly Placed Sensors 130
49.5 Isolation Valves 131
50 Irrigation Installation 131
50.1 In line Drip Tubing Installation 132
50.2 Component Depth 132
50.3 Incorrect Materials 132
50.4 Poor Head/Nozzle Adjustment 133
51 Irrigation Management 133
51.1 Scheduling parameters ignored or not used 133
51.2 "Set it and forget it" 133
51.3 Weather adjustments not utilized 134
51.4 Poorly monitored leaks/breaks 134
52 Irrigation Maintenance 135
52.1 Replacement of materials with non-like items 135
52.2 Incorrect replacement of nozzles 135
52.3 Sunken/tilted heads 136
52.4 Wet checks vs Dry Checks 136
Glossary of Terms 137