

## CHAPTER 7

**LANDSCAPING AND RECREATIONAL FACILITIES**

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## 7.1 GENERAL INFORMATION

All landscaping shall conform to the City Zoning Ordinance, the MCDOT Roadway Design Manual, the City's Approved Materials List for Landscaping, and the EDS&PM.

### 7.1.1 MAINTENANCE AND WARRANTIES

Prior to the start of the maintenance period, the City Landscape Inspector and representatives of the Parks & Recreation Department shall inspect all landscaping areas within rights-of-way that will be maintained by the City.

#### A. Private Development Projects

Areas in which landscaping is installed as part of a private development project that are to be maintained in the future by the City of Goodyear shall be clearly identified on the Approved Plans and are subject to the following requirements. These areas may include retention basins, parks, and street center median landscaping:

1. The Developer shall maintain and warranty all landscape improvements, including planted areas and irrigation systems, utility payments (water, electric), for a period of two years beginning immediately after the City issues the notification of 100 percent approval for the project.
2. During the maintenance and warranty period, the Developer shall be responsible for maintaining adequate protection to all areas. Any damaged planting and/or irrigation systems shall be immediately repaired or replaced at the Developer's expense.
3. Maintenance shall include continuous operations of watering, weeding, removal of dead plant material, mowing, rolling, fertilizing, spraying, insect and pest control, re-seeding, replacement, and all other measures necessary to ensure healthy, normal growth.
4. When the turf has established sufficient root structure and has reached an approximate height of 3 inches, mowing shall begin immediately to achieve a turf height of 2 inches; the turf shall be mowed thereafter to safely maintain the 2-inch height.
5. At the termination of the maintenance and warranty period, all turf areas shall be live, healthy, undamaged, and free of infestations. All areas shall be completely void of barren spots larger than 3 inches by 3 inches.
6. If all plantings are not acceptable at the end of the two-year period, the maintenance and warranty period shall continue until the landscaping meets City approval.

#### B. City Capital Improvement Projects

Areas in which landscaping is installed as part of a City CIP that are to be maintained in the future by the City of Goodyear Parks & Recreation Department shall be clearly identified on the approved plans and are subject to the following requirements. These areas may include retention basins, parks, rights-of-way, street center medians, and site landscaping:

1. The Contractor shall maintain and warranty all improved areas, including planted areas and irrigation systems, and utility payments (water, electric) for a period of one year beginning immediately after the City issues the notification of 100 percent approval for the project.
2. During the maintenance and warranty period, the Contractor shall be responsible for maintaining adequate protection to all areas. Any damaged planting and/or irrigation systems shall be immediately repaired or replaced at the Contractor's expense.
3. Maintenance shall include continuous operations of watering, weeding, removal of dead plant material, mowing, rolling, fertilizing, spraying (pre-emergent applied every 6 months), insect and pest control, re-seeding, replacement, and all other measures necessary to ensure normal healthy growth.
4. When the turf has established sufficient root structure and has reached an approximate height of 3 inches, mowing shall begin immediately to achieve a turf height of 2 inches; the turf shall be mowed thereafter to safely maintain the 2-inch height.
5. At the termination of the maintenance and warranty period, all turf areas shall be live, healthy, undamaged, and free of infestations. All areas shall be completely void of barren spots larger than 3 inches by 3 inches.
6. If all plantings are not acceptable at the end of the one-year period, the maintenance and warranty period shall continue until the landscaping meets City approval.
7. At the completion of the one-year warranty and maintenance period, park maintenance will be transferred from the Contractor to the Parks & Recreation Department.

## **7.2 MEDIAN AND RIGHT-OF-WAY LANDSCAPING**

### **7.2.1 PURPOSE**

This section provides standards for the landscape design of City rights-of-way and medians. It is intended for general use in the planning, design, and plan preparation processes. In addition to acquainting designers and developers with these standards, it should assist them in submitting plans through the plan review process in an efficient and timely manner.

It should be noted that areas within the City typically known as Overlay Districts have been designated as requiring special landscaping improvements. Documents that discuss in greater detail the median and right-of-way landscaping requirements for those areas can be provided by the City Development Services Department upon request.

## 7.2.2 GENERAL LANDSCAPE GUIDELINES

### A. Widths

1. Detailed information regarding median dimensions can be found in Chapter 4 (“Geometrics”) of this manual, and in the City Standard Details.
2. Median width is measured from back of median curb to back of median curb. The minimum width for a median is 3 feet. If the median is landscaped, a 4-foot minimum width is required. Trees shall not be planted in medians which are less than 10 feet wide. Shrubs shall not be planted in medians which are less than 4 feet wide unless otherwise approved by the Engineering Department.

### B. Ends of a Median

The first 10 feet and the last 10 feet of a median are to be decorative concrete (stamped, exposed aggregate, etc.) as approved by the City Landscape Plan Reviewer.

### C. Trees and Shrubs Placement

1. Refer to the ADWR’s “Low Water Use Drought Tolerant Plant List” for a list of plants and shrubs approved to be installed within the City right-of-way.
2. Refer to the City’s “Trees for Public Spaces” document for a list of trees allowed within the City right-of way.
3. See the City Standard Details for information regarding planting details of trees, shrubs, and groundcovers.
4. All plant material located on slopes shall be planted as indicated in the City Standard Details.
5. Trees shall be located a minimum of 5 feet from the back of any curb, sidewalk or wall.
6. Mature canopy size shall be considered in determining the location of trees. Trees may require a greater setback due to canopy size.
7. Landscape plans shall illustrate the location of trees and shrubs by showing their size at maturity.
8. Tree locations in medians shall be designed such that a minimum distance of 10 feet is provided between mature canopy widths.

9. All plant material shall be located such that, at maturity, a minimum 18-inch clearance is maintained to any face of roadway curb.
10. Shrubs shall be located to maintain a 7-foot clearance from any fire hydrant.
11. Shrubs shall be located to maintain a 3-foot clearance from any new or existing tree at maturity.

#### D. Tree Quantities and Sizes

The minimum tree size is 15 gallons, and 50% of all trees placed shall be 24-inch box or larger.

#### E. Median Grading

1. Median finished grades within curb separations greater than 7 feet shall be lower in the center, with slopes of 8 %. The finished grade at the edges shall be designed at a 1-inch depth below the top of adjacent curbs, includes finish grade granite.
2. In narrower medians, the finished grade shall be a smooth, flat, and uniform surface at an elevation of 1-inch below the top of curb, finish grade includes granite.

#### F. Median Trees

1. Trees located within medians shall have single trunks.

#### G. Decomposed Granite

1. Decomposed granite shall be 3/4-inch screened.
2. Decomposed granite shall be selected from the City Approved Materials List for Landscaping.
3. A minimum 2 inches of decomposed granite shall be provided unless a greater thickness is required per plan.
4. Subgrade to be landscaped with decomposed granite shall be treated (by a licensed professional) with a pre-emergent that is listed in the City's Approved Materials List for Landscaping, after placement of the decomposed granite. A certificate of application document (pre-emergent certification) shall be provided to the City Landscape Inspector prior to the acceptance of the start of any maintenance and warranty period.

#### H. Boulders

1. One-third of any boulder is to be set in the ground.
2. Vertical exposure shall be a maximum of 18 inches above grade in sight visibility areas.

## I. Turf

Turf will not be allowed within the City right-of-way.

### 7.2.3 RECOMMENDED PLANTS

#### A. Approved Materials

See the City's "Trees For Public Spaces" list and ADWR's "Low Water and Drought Tolerant Plant List" for approved plant material information.

### 7.2.4 SIGHT VISIBILITY

#### A. Sight Visibility Areas

1. Residential street sight visibility areas shall be determined per Chapter 4 of this manual.
2. Arterial and collector roadway sight visibility areas shall be determined using the criteria set forth in the City Standard Details.

#### B. Planting within Sight Visibility Areas

1. Shrubs and groundcovers planted within SVT shall have a mature height of not more than 18 inches. Height shall be measured from the edge of pavement, and total height shall include the height of any mounding.
2. Trees planted within SVT shall have a clear trunk pruned to a height of 7 feet or greater upon installation. Height shall be measured from pavement surface.

### 7.2.5 COMPLETION REQUIREMENTS

#### A. Alterations

If field conditions require relocation of a water meter, backflow prevention device, controller, valve, or any other major component of the irrigation system as shown on the Approved Landscape Plans, contact the City Landscape Inspector at 623-882-7979 prior to any installation.

#### B. As-Builts

The Contractor shall provide an accurate set of as-built drawings as identified in Chapter 10 of this manual.

#### C. Maintenance and Warranty

1. See the section on maintenance and warranty located at the beginning of this chapter.

## 7.3 PARK FACILITIES

### 7.3.1 GENERAL INFORMATION

#### A. Purpose

The Park Facilities portion of the Engineering Standards has been established to ensure that the City's Parks & Recreation Department provides quality and safe experiences for its citizens. These standards and policies are not intended to provide specific design criteria, but to serve as a guide during the design phase. The design review of each park will be done on an individual basis.

### 7.3.2 PARK MASTER PLAN DEVELOPMENT PROCESS

#### A. Master Plan

A Master Plan shall be developed for each park to help guide the planning of facilities and infrastructure. Contact the City Development Services Department and Parks & Recreation Department for detailed information regarding this process.

### 7.3.3 CITY PARK DESIGN

#### A. Development Review

Park design must be approved by the Development Policy Committee before any development occurs on the park site.

#### B. Park Development

1. Park land ratio is encouraged to consist of open space (25%), passive space (25%), and facility space (50%).
2. Whenever possible, parks shall be located adjacent to school sites in order to create a fluid joint use between the park and school facilities.
3. Sidewalks
  - a. Designated multi-use paths shall be a minimum of 10 feet in width. See Chapter 4 ("Transportation") of this manual and Section 7.4 of this chapter for bike paths and multi-use paths.
  - b. Sidewalks utilized specifically for pedestrians shall be a minimum of 8 feet in width.
  - c. All multi-use paths shall be located a safe distance away from active courts or fields.
4. Playgrounds



- a. Playgrounds shall contain some type of shading, either from ramadas (16 feet x 16 feet minimum) and/or non-deciduous trees (30-inch boxes minimum).
  - b. An engineered wood fiber, as identified in the City's Approved Materials List for Landscaping, shall be provided for all play areas that are not turf or other approved hardscape surface.
  - c. Playground equipment and surfaces shall meet or exceed all current CPSC, ADA, and ASTM standards.
5. Softball/Baseball Fields
- a. All fields shall be lighted to meet all current Illuminating Engineering Society (IES) and City Zoning Ordinance standards and shall utilize effective shielding systems to reduce spill light off play areas.
  - b. Infields shall be constructed with an approved non-toxic organic binder, red in color. This mixed material shall be specially prepared for ball fields and shall be a minimum of 4 inches in compacted depth. Material should be bound by crushing aggregate screenings down to 1/4-inch or 3/8-inch fine particles. See Approved Material List.
  - c. Home plate and Little League pitcher's mounds shall be filled with a minimum of 2 inches of fine gray brick clay (no black gumbo permitted) incorporated at a uniform rate with established infield red mix. Infields and outfield turf areas shall consist of a Tifwey 419 Hybrid Bermuda Grass.
6. Court Facilities
- a. All courts facilities shall be lighted to meet all current IES Standards and City Zoning Ordinance standards.
  - b. Sand volleyball courts shall consist of sand at a depth of 12 inches.
7. Irrigation
- a. All systems shall be capable of interfacing with a Calsense computerized central system per the Approved Materials List for Landscaping.
  - b. Irrigation guidelines, except as noted below, shall comply with Section 7.9 ("Landscape Watering Systems") of this chapter.
    - (1) All irrigation pipe shall be 1-inch diameter or larger.
    - (2) All valve boxes shall be jumbo in size and set at grade and supported by blocks to prevent crushing by construction and maintenance equipment.

- (3) The tops of all valve boxes shall be set at the same elevation as the top of adjacent finished grade (i.e. flush with adjacent decomposed granite).
8. Landscaping

Plant material shall consist of low water use, drought-tolerant species. Plants and shrubs shall be selected from the ADWR “Low Water and Drought Tolerant List”. Trees shall be selected from the City’s “Trees for Public Spaces List”.
9. Construction Material
  - a. Park fixtures and ramadas shall consist of steel, metal, aluminum or recycled material or approved equal; wood will not be permitted.
  - b. Headers consisting of concrete or brick shall be installed between turf and landscaped areas.
  - c. All drinking fountains installed in parks shall be chilled and shall meet all ADA Standards.
10. Signage
  - a. The standard park sign will be located at the main entrance of every neighborhood and community park. The mold shall be pre-cast with the park name engraved into the mold. The park sign mold can be obtained from the City’s Parks & Recreation Department.
  - b. Specialty parks may deviate from standard park signage with approval from the Parks & Recreation Department. A marquee meeting the City’s Sign Ordinance may be acceptable with the approval of the Development Services Department and will require a City Sign Permit.
  - c. All signage must meet the City’s Sign Zoning Ordinance. Ordinance information can be obtained at the Development Services Department at 623-932-3494.
11. Parking
  - a. All parking shall meet the City’s parking requirements stipulated in the Parks Master Plan and City zoning requirements.
  - b. Parking lot lights shall meet all current IES and City Zoning Ordinance standards and City zoning requirements.
  - c. Thornless, single trunk, non-deciduous trees (24-inch boxes minimum) shall be planted adjacent to parking lots to provide shading. An acceptable ratio is one tree per every five parking stalls.

## 7.4 LANDSCAPING FOR FLOOD RETENTION BASINS

### 7.4.1 GENERAL INFORMATION

This section provides guidance and minimum design criteria for the modification and construction of landscaping features in flood retention basins constructed within the City of Goodyear. It is intended for general use in the planning, design, and plan preparation processes.

### 7.4.2 LANDSCAPING SPECIFICATIONS FOR FLOOD RETENTION BASINS

#### A. Native Desert Landscaping

Native desert landscaping may be used where a retention basin is located directly adjacent to native landscape desert preserve lands. Other applications of native desert landscaping in public retention basins must be approved by the City Landscape Plan Reviewer. Native desert landscaping shall be reviewed on a case-by-case basis.

#### B. Granite Landscaping

Granite is an acceptable landscaping material for flood retention basins. Granite landscaping shall be reviewed on a case-by-case basis. Approved granite colors are identified in the City's Approved Materials List for Landscaping. Where granite is used, plant materials will need to be enhanced appropriately.

#### C. Turf Landscaping

Turf is an acceptable landscaping material for flood retention basins. The following specifications provide a guide for construction of turf within retention basins:

##### 1. Turf Construction

###### a. Materials

- (1) Seed - The kind of seed planted shall be appropriate for the planting season, and shall be one of the seeds identified in the City's Approved Materials List for Landscaping. Winter grass seed is not acceptable as a permanent turf seed.
- (2) Mulch - Mulch shall be decomposed, stabilized, fortified, and treated (nitrolized) wood products with no more than 1% nitrogen after treatment. Acceptable mulches are identified in the City's Approved Materials List for Landscaping.

##### 2. Soil Test in Lieu of Removing and Replacing Topsoil - If the Developer has a specific reason for not removing and storing the

topsoil, he may request to perform grading without replacing topsoil. If the City concurs, upon final grading of the site, the Developer may sample soils for analysis and make recommendations for improving the soil; if necessary, these analyses will be made by an independent soils lab. Any recommendations must be implemented by the Developer and inspected by the City prior to proceeding with lawn construction.

3. Moisture Content - The soils shall not be worked when the moisture content is so great that excess compaction occurs, or when it is so dry that dust will form in the air or clods will not break readily. Water shall be applied if necessary to provide ideal moisture content for tilling and for planting as herein specified.
4. Where soil tests show that existing topsoil is satisfactory, a seedbed shall be prepared by scarifying to a depth of at least 3 inches and dragging to a smooth surface. Where existing soil ("caliche type") is cemented, it shall be excavated to a depth of 6 inches, removed from the site, and replaced with acceptable topsoil. Irregularities in the surface shall be leveled before the commencement of seeding operations.
5. After raking, the entire area shall be rolled in 2 directions at approximate right angles with a water ballast roller weighing 100 to 300 pounds. Any irregularities that develop shall be re-raked, scarified for bond, and again rolled until the area is true and uniform and free from lumps or depressions. Water shall be applied to the surface whenever necessary to ensure proper working of soil. No heavy objects except lawn rollers shall be taken over these areas. Grade and compaction must be approved by the City prior to planting.
6. Planting
  - a. Just prior to broadcasting the seed, apply and lightly rake into the surface the soil amendments identified in the City's Approved Materials List for Landscaping.
  - b. After the City has approved the areas to be seeded, the seed will be broadcast at the rate of 3 1/2 pounds Bermuda per 1,000 square feet. One half of the seed will be sown with the sower moving in one direction, and the other half shall be sown with the sower moving at right angles to the first sowing. Broadcasting shall not be done in windy weather.
  - c. Bermuda seeding will not be allowed between the months of September and May. A minimum nighttime ambient temperature of 80 degrees is required prior to seeding.
7. Fertilizing

- a. Top dress all seeded areas with a fertilizer as identified in the City's Approved Materials List for Landscaping.
  - b. Lightly roll all areas and thoroughly water with a fine spray. Turf shall then be kept continually moist by watering as often as required.
8. Any areas that do not root properly shall be replanted at 10-day intervals until an acceptable stand of grass is obtained.

### 7.4.3 PLANTING OF TREES, SHRUBS AND GROUNDCOVER

#### A. General

1. All retention basins shall be landscaped with trees, shrubs, and other plant material approved for use in the City. Landscaping densities and type shall meet the needs of the basin's use.
2. All plant material located on slopes shall be planted as indicated in the City Standard Details.

#### B. Quality and Size

1. Fifty percent (50%) of all trees shall be a minimum size of 15 gallons; the remainder of the trees shall be a minimum of 24-inch box as outlined in the City Zoning Ordinance. They shall have sufficient roots to hold the earth together after removal from the containers, but shall not be root-bound. Plants shall have been grown in pots, cans or boxes for a minimum of three months and a maximum of one year.
2. All plants shall exhibit normal growth and shall be sound, healthy, vigorous, and free from disease, insect infestations, or weeds.
3. Trees shall have a straight trunk throughout their height, and shall be in accordance with the American Standard for Nursery Stock. Multi-trunk trees are not permitted.

#### C. Nomenclature

For inspection and identification, durable legible labels shall be securely attached to the tree trunks for all trees delivered to the site. These labels shall state, in weather-resistant ink, the correct plant name and size, as specified in the ADWR plant list or "City Trees for Public Spaces" list.

1. Material for Planting
  - a. Mulch in planting basins - Mulch shall be evenly spread throughout the tree basin to a depth of 2 inches.
  - b. Prepared soil for backfilling tree pits - Prepared soil shall, by volume, be composed of 3 parts topsoil, 2 parts washed clean sand,

and 1 part humus; these components shall be thoroughly mixed to ensure uniformity. Topsoil shall be natural, fertile, friable soil, shall not be excessively acid or alkaline, shall not contain toxic substance harmful to plant growth, and shall be reasonably free of noxious weeds, clay lumps, clods, stones, roots, stumps, and debris of any kind.

- c. Agriform tablets or approved equivalent shall be included in the backfill for each shrub and tree. Include one tablet for shrubs/groundcovers and two or more tablets for trees; tablet quantity for trees shall be determined according to tree size.
- d. Staking materials
  - (1) Stakes for supporting trees shall be of the lodge pole style, 2 inches by 2 inches by 10 feet long, and shall be straight, sound, stout, and free of knots which may weaken the stake. Each tree shall receive two stakes, to be installed 12" beyond the outside of the root ball. All nursery stakes shall be removed at placement of permanent staking. See Landscape and Park Details 3600 Series.
  - (2) All tree and shrub site staking shall remain in place for a maximum of one year from the time of planting. If the tree is not stable enough after one year, stakes shall be replaced.
  - (3) Wire for fastening trunks to stakes shall be No. 12 gauge, annealed galvanized steel (not iron). One wire shall be placed at the top of the stake, and another halfway down the stake. If necessary, staple or tack wire to stakes to hold firm.
  - (4) Hose used to protect trunk from wire shall be new 2-ply reinforced rubber or plastic garden hose.
  - (5) As determined necessary by the City Landscape Inspector, stakes for supporting shrubs shall be 2 inches by 2 inches by 4 feet long, and shall be straight, sound, stout, and free of knots which may weaken the stake. Each shrub shall receive two or more stakes, to be installed outside of the root ball. All nursery stakes shall be removed at placement of permanent staking.
  - (6) Any landscape stake or associated wire or hose that is broken or otherwise needs to be replaced during the maintenance and warranty period shall be replaced by the Contractor within seven calendar days upon notification by the City Landscape Inspector.

#### D. Plant Material

1. For areas that will be City-maintained, a representative of the City shall accompany the Landscape Contractor to the nursery for tree

and/or plant selection. A minimum 72-hour notification will be required.

2. Unless otherwise indicated, all plant materials furnished shall be nursery-grown, well-branched, and well-proportioned. All plants are subject to inspection and approval before planting, whereupon all plants found unsuitable shall be removed and replaced.
3. For basins that will be City maintained, plant material shall be from those listed on the ADWR plant list. All trees within City maintained basins shall be listed on the City of Goodyear "Trees for Public Spaces" document.
4. Upon delivery to the site, all nursery stock shall be planted as soon as possible. Until planting, stock plants shall not be exposed to excessive sun or drying winds during planting operations.

#### E. Setting Plants

Unless otherwise specified, all plants shall be planted in pits and shall be set so that the finished grade level (after settlement) will be the same as that at which plants were grown. They shall be planted upright and faced to give the best appearance and relationship to adjacent plants or structures. All trees shall be set plumb and braced rigidly in position until the soil has been tamped solidly around the rootball. Plants shall be backfilled with planting soil which shall be thoroughly settled by watering and tamping to fill all voids. A water basin shall be created at the base of each tree, and shall be a minimum of 4 feet in diameter. Side slopes shall be no greater than 6:1. See Landscape and Park Details 3600 Series.

#### F. Cleanup

Any soil, manure, or other material dropped onto paved areas by hauling operations shall be removed promptly, as these areas are to be kept clean at all times. Upon completion of planting, all excess soil, stones, and debris not heretofore disposed of under this scope of work shall be removed from the site or disposed of as directed by the Developer.

#### G. Maintenance and Warranty

1. See the section on maintenance and warranty located at the beginning of this chapter.

#### H. Tree and Shrub List for Flood Retention Basins

1. See the City's Approved Plant Material List.
2. All trees with spreading habit, seed pods or thorns shall be planted a minimum of 15 feet from walls, walks, and pavements.

## **7.5 LANDSCAPE FOR FLOOD DRAINAGEWAYS**

Landscaping in drainageways shall be approved by the City's Development Services and Engineering departments.

## **7.6 LANDSCAPE WATERING SYSTEMS**

### **7.6.1 GENERAL INFORMATION**

#### **A. Purpose**

This section provides guidance and minimum design criteria for the modification and construction of landscape watering systems constructed within the City of Goodyear. It is intended for general use in the planning, design, and plan preparation processes.

### **7.6.2 WATERING SYSTEMS**

#### **A. Design Requirements**

All watering systems installed in the City shall conform to the following specifications:

1. The City will review and approve all watering systems prior to any installation. All watering systems shall be automatic and shall utilize a reduced pressure vacuum breaker (as required) before the remote control valves. All applicable codes shall be adhered to and a permit will be required.
2. All City-maintained landscape watering systems shall be independent of other users. Landscape dedicated to the City for maintenance shall have a power meter, irrigation control, and water meter separate from all other landscape watering systems.
3. Friction pressure loss calculations for the longest run in the system for both full-circle and part-circle circuits shall be provided along with all other details which may be required to verify the capabilities of the system.

#### **B. Plans**

1. Plans shall indicate existing, design, and minimum operating water pressure requirements.
2. The location of the power source shall be indicated and noted on the final landscape watering plans.
3. The water source and location of proposed tap is to be shown on final landscape watering plans.



4. All plans submitted for approval must specify the following if applicable: brand, model, diameter, pressure rating, and/or size of each material item used in the construction of watering systems.
5. Final submittal for landscape watering system plans shall show details for irrigation controllers, controller valves, pressure regulators, backflow prevention devices, security enclosures, valve boxes, flush caps, trenching, backfill, controller security cabinets, sprinklers, emitters, bubblers, and all other details necessary and applicable for review and construction purposes.

### C. Construction Requirements

1. Workmanship
  - a. All workmanship shall conform to the requirements and recommendations of the Irrigation Association Standards, this manual, and the City Standard Details. All work standards shall be in compliance with ANSI Standards.
  - b. All workmanship shall be under warranty for a period of one year against defective workmanship for City CIP and two years for work within private development projects that will later be maintained by the City.
2. Pipes in Trenches - Pipes located in the same trench are to have a minimum vertical/horizontal separation of 4 inches.
3. Excavation, Backfilling, and Compaction - Trenches for irrigation lines, sprinkler lines, and control wiring shall be excavated to a minimum depth of 18 inches for mains under constant pressure and 12 inches for laterals not under constant pressure. When in common trenches, all control wires shall be placed first, followed by a layer of fine backfill; then the mainline shall be placed, followed by a minimum 6-inch lift of fine backfill; lastly the laterals shall be placed, followed by final backfill and compaction. Backfill shall be done in accordance with MAG Standard Specifications, Section 601.
4. Existing Utilities and Structures - The Developer shall protect existing structures and utility services and shall be responsible for their replacement. Minor adjustments to the system will be permitted to clear existing obstructions subject to the approval of the City.
5. Materials - Once the plans have been approved by the City, no substitutions shall be allowed, except when unavailable from the supplier, and another approved product is locally available. All such substitutions must be approved in writing by the City. All materials shall be new and the best of their class and kind. All materials shall be warrantied for a period of one year against defective materials for

City CIP and two years for materials within private development projects that will later be maintained by the City.

6. Power Source

- a. The Contractor is responsible for initiating account and service connection.
- b. A power cut-off switch is to be provided to each controller.
- c. All wiring (110 and 24-volt) is to be sleeved under right-of-way improvements such as pavement, sidewalks, etc.
- d. Power Sources for right-of-way landscaping - The power source shall be located within the median or within the right-of-way behind the curb. If the power source cannot be located within the right-of-way, a utility easement must be provided.

7. Water Source

- a. The Contractor is responsible for initiating account and service connection.
- b. Contact the City's Engineering department at 623-882-3110 for information on tapping into City waterlines for landscape watering purposes.

D. Inspections

The City shall inspect and approve the work at the following stages of completion. Any work completed without these inspections shall be removed prior to acceptance of that phase of the work. These stages are:

1. Completion of all trenching and installation of all control wires and mainlines prior to backfilling.
2. Installation of all mainline piping prior to backfilling, including the vacuum breaker, quick coupler circuits, and any shut-off valves. The mainline shall be pressure tested at 90 psi for two hours at this inspection.
3. Installation of all lateral valves, lines and heads.

E. Flushing and Testing

A City Inspector shall be present during system flushing. Control valves shall be opened completely and shall remain open until all debris and material is cleared from the system. After the system is thoroughly flushed, risers shall be capped off and the system pressure tested to the design pressure (at a minimum) prior to backfilling the laterals.

System flushing shall occur:

1. After all new watering system piping and risers are in place and connected, and
2. After all necessary division work has been completed, and
3. Prior to the installation of distribution mechanisms

#### F. As-Built Drawings

The Developer shall be responsible for providing blackline drawings of the system with all changes in location marked on the drawings. This shall be submitted to the City prior to final acceptance. See As-Built Requirements in Chapter 10 of this manual for specifics.

### 7.6.3 WATERING SYSTEM MATERIALS

#### A. Materials Overview

All materials shall conform to the requirements and recommendations of the Irrigation Association Standards unless otherwise indicated in the City's Approved Materials List for Landscaping.

All material specifications shall be based on ASTM, AWWA, other approved industry standards as applicable, or as otherwise identified in the City's Approved Materials List for Landscaping.

#### B. Control Cable

All wiring to be used for connection of the automatic controller to the electric solenoid actuated remote control valves shall be as required by the City's Approved Materials List for Landscaping. A maximum of 5 wires per color shall be used.

#### C. Sleeving Lines and Wires Below Paving

1. PVC pipes shall be installed within a separate Schedule 40 sleeve. Piping shall be installed by jacking, boring, or hydraulic driving.
2. All sleeves shall be 4 inches in diameter, have a minimum horizontal separation of 4 inches from all other sleeves, and have a minimum backfill cover of 24 inches.
3. Where needed, existing sleeving shall be extended under new paving to meet the requirements of this section.

#### D. Pipe

1. Pipe Routing
  - a. Meter to vacuum breaker - Copper
  - b. Vacuum breaker risers – Copper

- c. Copper or brass shall be used between water meter and backflow prevention device.
- d. Exposed pipe to booster pump (if required), Type K hard copper.
2. Galvanized pipe shall not be used.
3. Type K hard copper shall be used for all mainline piping above grade and shall extend 18 inches below finished grade.
4. Plastic Pipe
  - a. Plastic pipe shall be as described on the approved drawings. It shall be un-plasticized PVC extruded from virgin parent of the type specified on the plans. The pipe shall be homogeneous throughout and free from cracks, holes, foreign materials, blisters, deleterious wrinkles, and dents.
  - b. All pipes shall be continuously and permanently marked with the following information: Manufacturer's name, pipe size, schedule, type, working pressure at 73 degrees Fahrenheit, and NSF approval.
  - c. All solvent welded PVC pipe and joints are to be primed with pipe primer. The type of glue and primer shall be per the pipe manufacturer's recommendations or directions.
  - d. Plastic Pipe, Fittings and Connections on Mains - All pipe shall be approved Type 1, Grade 1, PVC, Schedule 40 pipe, conforming to ASTM D-1784 and D-2241, and shall be either solvent weld pipe or rubber ring joint pipe. When a connection is plastic to metal, either a PVC Schedule 80 nipple, brass nipple, or Schedule 80 male adapter shall be used. The male adapter shall be hand tightened plus one turn with a strap wrench.
    - (1) All risers shall be threaded, rigid PVC pipe.
    - (2) Compression couplings shall not be allowed on mainlines.
    - (3) All fittings shall be minimum Schedule 80 PVC.
- e. Plastic Pipe, Fittings and Connections On Laterals
  - (1) All plastic pipe and fittings shall be PVC pipe and shall meet the following requirements:
    - 1/2 to 2-inch = Schedule 40
    - 2-3" inch = Bell gasket
    - 3" & larger = Class 200
  - (2) All fittings shall be molded fittings manufactured of the same materials as the pipe and shall be suitable for either solvent

weld or screwed connections. Use male adapters as described above. Only Schedule 80 PVC pipe may be threaded.

- f. All pipe (PVC or copper) installed in rocky or caliche (cemented) soils shall be thoroughly embedded and completely covered in sand or approved imported topsoil.
- g. Installation of Plastic Pipe - Plastic pipe shall be installed in a manner so as to provide for expansion and contraction as recommended by the manufacturer. Plastic pipe shall be cut with a hand saw or hack saw with the assistance of a squared-in sawing vise, or in a manner so as to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that a smooth, unobstructed flow will be obtained. Pipe for use with rubber gaskets will be tapered as recommended by the manufacturer.

#### E. Valves

Separate electric control valves shall be used to supply tree, shrub, and turf watering systems.

##### 1. Electric Control Valves

- a. Electric control valves shall be globe type valves of plastic construction, and have a minimum size of 1-inch.
- b. Electric control valves shall be of a manufacturer approved by the City and shall be installed per manufacturer's recommendations.
- c. A flow meter and master valve shall be installed between the backflow prevention device and the first electric control valve on systems that will be maintained by the City and will use Calsens controllers.
- d. A schedule 80 PVC ball valve shall be installed in front of all electric control valves with unions in before and after the valve.

##### 2. Ball Valves

- a. Ball valves shall be Schedule 80 PVC in sizes of 1/2-inch through 2 1/2 inches, and ductile iron in sizes of 3 inches through 12 inches.
- b. There shall be an isolation ball valve preceding every electric control valve.

##### 3. Check Valves

- a. Check valves 2 inches and smaller shall be swing type, bronze bodied with threaded connections and replaceable composition disc, rated at 150 pounds SWP.

- b. Check valves 2 ½ inches and larger shall be swing type iron body, bronze mounted with flanged or threaded connections and replaceable rubber disc, rated at 126 pounds SWP.

#### F. Valve Boxes

All valve boxes shall be jumbo in size and have bolt securing lids and meet the following specifications:

1. Rectangle Boxes
  - a. Turf areas - green
  - b. Granite areas - tan
  - c. Effluent uses - purple
2. Valve boxes shall be located in areas of decomposed granite wherever possible.
3. Round valve box (10-inch) shall be used for all isolation valves, wire splices, quick couplers, and flush caps.
4. All valve boxes shall have a 4-inch minimum pea gravel sump.
5. All valve boxes shall be permanently marked to identify irrigation zones types, station number, gate valves, wire splices, etc. Marking shall be performed as identified in the City's Approved Materials List for Landscaping.

#### G. Electric Controllers

1. Electric controllers shall be capable of operating on 115 volts, 60-cycle AC current, and shall provide output current of 25 to 26.5 volts at 1.1 amps for electric control valves, and 115 volts for a pump start circuit (if required). Controllers shall be pedestal mount or wall mount with factory supplied hardware for either. Controllers shall be sized to perform the watering efficiently and adequately.
2. The acceptable manufacturers and models are identified in the City's Approved Materials List for Landscaping.
3. A security cabinet is to be provided for each controller.
4. Controllers are to be grounded. Show details on final Irrigation Plans.

#### H. Backflow Prevention Devices

Only reduced pressure assemblies shall be used in the City.

1. Sizes shall be 1 inch to 2 inches.
2. Reduced pressure assemblies shall consist of an approved check valve, vacuum relief, inlet, discharge shutoffs and field testing cocks.

All nipples and other fittings shall be red brass. Reduced pressure assemblies shall be rated at 150 psi working pressure and shall withstand water temperatures to 160 degrees Fahrenheit.

3. Unions shall be installed on both the distribution side and discharge side of all reduced pressure assemblies.
4. A flow meter and a master valve shall be installed immediately following all reduced pressure assemblies that service the City-maintained areas.
5. The assembly shall be mounted 12 inches above the highest head in the system it is protecting, and adjacent to a fence or structure when available. Vacuum breakers must comply with local and state codes and the Foundation for Cross-Connection Control Research, USC.
6. Backflow prevention devices must be tested by a Certified Tester before the City accepts responsibility for maintenance of the system.
7. Backflow Prevention Assembly Enclosures
  - a. All reduced pressure assemblies shall have a security enclosure mounted on a concrete pad. See the City Standard Details.

#### I. Booster Pumps

If the pressure is not sufficient to operate the sprinklers efficiently, the City may require a booster pump. This pump must be enclosed within a 6-foot high slump block wall along with the controller, vacuum breaker and all electric controls. Access is to be by a 6-foot wrought iron gate with wooden slats and a lock. Acceptable booster pumps are identified in the City's Approved Materials List for Landscaping. If a booster pump is used, a reduced pressure backflow prevention assembly will be required in lieu of a pressure type vacuum breaker.

### 7.6.4 TURF WATERING SYSTEMS

#### A. Sprinkler Heads

1. Turf heads shall be rotary pop-up or gear drive sprinklers, both part circle and full circle types.
2. Acceptable sprinkler heads are identified in the City's Approved Materials List for Landscaping.
3. All heads of a particular type of function in the system shall be of the same manufacturer and shall be marked with the manufacturer's name and identification in such a position that they can be identified without being removed from the system. All sprinkler heads shall be set perpendicular to finished grades unless otherwise designated on the plans. Sprinkler heads shall be 4" from adjacent existing walks, curbs, or other paved areas shall be set to grade. All nozzles on rotary

pop-up sprinklers shall be tightened after installation. All sprinklers shall be tightened after installation. All sprinklers having an adjustment stem shall be adjusted on a lateral line for the proper radius, diameter and/or flow rate.

4. Swing Joints - All sprinklers and quick couplers shall be installed on prefabricated swing joints.

### 7.6.5 IRRIGATION SYSTEMS

#### A. Irrigation Systems in Medians

The irrigation system is to be located entirely within the median, with the exception of control valves which may remain in the right-of-way behind the curb & gutter.

#### B. Irrigation Systems for Trees and Shrubs

Watering systems for trees and shrubs shall use separate electric control valves.

1. An emitter system with electric control valves, Y-strainer, and pressure regulating valve.
2. A bubbler system with electric control valves shall be used for palm trees only.
3. A drip system with electric control valves using a multi-port distributor, and 1/4-inch poly tubing shall convey the water. No length of poly tubing shall be longer than 6 feet.
4. A “deep watering system” shall consist of a 4-inch diameter perforated pipe. The pipe shall be buried 18 inches deep with the end of the 1/4-inch emitter distribution line at the bottom. A 4-inch drain grate shall be used to cover the top opening of the pipe. The perforated pipes shall be located 1 foot outside the drip line.

## 7.7 NON-PAVED TRAILS

### 7.7.1 GENERAL INFORMATION

#### A. Purpose

This section describes the City’s Non-Paved Trail Design Standards. It is intended for general use in the planning, design, and plan preparation processes. In addition to acquainting designers and developers with these standards, it should assist them in submitting plans through the plan review process in an efficient and timely manner.

#### B. Definitions



1. Trail - For the purposes of this document, a trail shall be defined as a route or path which has been prepared or designated for recreational functions. This manual presents guidelines applicable to foot, horse, and bicycle trail usage that can occur on an unpaved trail surface. Trails are not simply avenues to get from one place to another; rather they offer the user opportunities to participate in numerous recreational activities. Providing quality recreational opportunities while protecting the resource is a major trail management concern and challenge. The information in this manual should be used as a guideline. Each trail needs its own plan of operation.
2. Urban Trail - Urban trails are those trails which occur in areas of urban or suburban densities, or where improvement of the trail surface is necessitated by the nature of the development within which it occurs.
3. Rural Trail - Rural trails are those trails which occur in natural washes or other natural areas, and require little improvement of the trail surface.
4. History of Use Corridor - These trails are those trails which have been established by historical use, however are not currently protected by right-of-way or some similar method to preserve the use.
5. Supplemental Trails/Urban Easements - These are additional trails which provide access to the main trail network. These may also include existing equestrian easements. These are normally provided for and maintained by the adjoining landowners.

#### 7.7.2 LOCATION STANDARDS

##### A. Urban Trails

Urban trails provide readily available recreation and aesthetic amenities by enhancing natural or manmade open spaces. These trails can also provide for possible routes for non-motorized circulation throughout the urban network. Refer to the City's General Plan for designated trail locations.

##### B. Supplemental Trails

Additional trails shall be required in areas where development would block access to the main trail system.

##### C. Underpasses/Overpasses

Grade-separated crossings shall be provided for crossing major streets where the crossing does not occur at a signalized intersection and where there is no safe alternative.

##### D. Bridges

These should be used to cross major barriers such as the Roosevelt Irrigation Canal. Site design and landscaping shall provide for the maximum possible retention of native plant materials on the site.

### 7.7.3 TRAIL NODES

#### A. Hiking Support Site

Facilities include year-round shade and water. Vehicular parking, not to exceed four spaces, is optional.

#### B. Equestrian Support Site

Facilities include water for people and horses, hitching posts, year-round shade, two to five parking spaces for trailers, and up to four spaces for regular parking.

#### C. Major Trail Head Site

Facilities include a corral, rest rooms, water for people and horses, year-round shade, five to eight trailer parking spaces, and eight to twelve regular parking spaces.

#### D. Design

All facilities shall be compatible with adjacent development.

### 7.7.4 TRAIL DESIGN

#### A. Urban Trails

##### 1. Minimum Clearances

- a. 15-foot minimum right-of-way or easement for trails.
- b. 8-foot minimum width of clear trail surface.
- c. 10-foot vertical clearance from surface.
- d. 3-foot lateral clearance from edge of trail 3-foot above surface.
- e. Distance from back of curb to edge of trail
  - (1) 25 feet along expressways, freeways, and parkways
  - (2) 15 feet along arterials
  - (3) 9 feet along major collectors
  - (4) Elsewhere - maximum distance feasible

##### 2. Sight Distance

- a. As a trail approaches within 100 feet of a street intersection, the maximum height of landscaping and wall between the trail and the curb shall be 4 feet.
  - b. Trail facilities shall not infringe upon typical sight distance.
3. Alignment
- a. Except in areas of steep grades, trail alignments should not weave excessively or abruptly.
  - b. Grade changes should not be abrupt.
  - c. Where alignment changes are necessarily abrupt or tight, additional clear trail surface(s) should be provided.
  - d. Where applicable, grades shall meet current ADA accessibility requirements. In other areas, grades shall not exceed a maximum of 12%. This grade may be able to be increased for short distances, with approval from the City Engineering Department.
  - e. Clear trail surfaces shall flare to 14 feet wide within 24 feet of signalized intersection crossings.
4. Drainage
- a. Trails should not occur within detention or retention basins. Any exceptions must have Engineering Department approval.
  - b. Grading and surface treatments adjacent to the trail should not allow impounding of water or excessive erosion of soil material onto the path.
  - c. Where trail grades are greater than or equal to 6%, water bars shall be provided at 100-foot intervals in order to control erosion of the trail.
  - d. When a trail occurs in a developed drainageway, nuisance water bars shall be provided at 100-foot intervals in order to control erosion of the trail.
  - e. Where drainage structures or culverts block trails in drainageways, bypass routes are to be provided around the obstruction.
5. Trail Surface
- a. Native soil is to be used whenever possible.
  - b. Decomposed granite or gravel can be used, if compacted; maximum size of gravel is 3/8-inch.
  - c. Where concrete surfacing is required (e.g. bridges, underpasses, crossings, etc.), only rough (broom) finished or other approved texturing will be accepted.

- d. Stable earth, chopped branches and leaves, or other finely ground organic materials may be used on the trail if they are worked into the top 2 to 4 inches of soil under the trail.

## 6. Trail Construction

- a. Provide 1/2-inch crown on graded slopes of less than 3% grade.
- b. Provide 2- to 3-inch out-slope on steeper graded trails.
- c. Stake the trail alignment until all adjacent development and construction is completed.

## 7. Safety Barriers

- a. Application criteria - Structural safety barriers or suitably dense landscaping shall be required on the street side of trails:
  - (1) The trail is closer to the roadway than the suggested design criteria by the City
  - (2) If the trail shares an underpass or overpass with a roadway
  - (3) Where the trail is elevated above an adjacent roadway and the side slope is steeper than 6:1.
  - (4) These railings are to be compatible with neighborhood development and/or topography.
- b. Minimum Height:
  - (1) 4.5 feet, if structural
  - (2) 5 feet, if landscaping
- c. Design - The materials and character of such barriers shall be compatible with adjacent development and landscaping.

## B. Rural Trails

1. Minimum clearances
  - a. 15-foot minimum right-of-way or easement for trails not in street or scenic corridor right of way.
  - b. 8-foot minimum width of cleared trail surface.
  - c. 10-foot vertical clearance from surface.
  - d. Distance from back of curb to edge of trail – maximum distance feasible
2. Alignment - The trail should follow the contours of the natural topography whenever reasonable.

3. Drainage
    - a. Erosion control measures are to be provided wherever the trail grades exceed 12%. Logs, railroad ties, and hand-set boulders may be used.
    - b. Where roadways obstruct trails in washes, bypass routes are to be provided.
  4. Trails Surface - Larger native rocks are to be moved to the side of trail tread.
  5. Trail Construction - Trail improvement is to be generally limited to brush clearing, branch trimming, and signage.
  6. If a trail follows a roadway, locate the trail as far as possible from the roadway.
- C. Underpasses / Undercrossings
1. Dimensions
    - a. 12-foot minimum trail width.
    - b. 8-foot minimum height above trail surface at 4 feet from trail centerline.
    - c. 10-foot minimum height above surface within 3 feet of trail centerline.
  2. Lighting - Light wells shall be provided at the median location on arterials and expressways. Such wells shall be covered by a grate, flush with the top of the median curb and with a maximum gap opening of 1 inch.
  3. Drainage
    - a. The underpass design shall not allow nuisance water to stand on the path. If water does not drain from the underpass by gravity flow, a system must be provided to pump water from the underpass.
    - b. The design of the approaches shall preclude the erosion of local soil or vegetation material into the underpass.
  4. Surface - The trail surface shall be sand, compacted decomposed granite, or brushed concrete. Nuisance water shall not be allowed to stand on the surface.
- D. Overpasses/Bridges
1. Dimensions

- a. 15-foot minimum width.
- b. Minimum railing height:
  - (1) 10 feet on structures over streets, canals or washes
  - (2) 4.5 feet elsewhere
2. Alignment
  - a. Helical approaches are not allowed.
  - b. Extend approach railings a minimum of 12 feet from the end of the structure.
  - c. Maximum grade on ramped approaches is 12%.
  - d. Extend approach railing to beginning of ramp.
  - e. Flare approach railing except where no room is available next to roadways.
  - f. Any bank slopes at the approaches shall be protected to avoid excessive erosion.
3. Drainage - The design shall not allow nuisance water to stand on the trail.
4. Construction
  - a. Use a solid concrete barrier base between the trail and the roadway when the trail bridge is built as an integral part of a roadway bridge.
  - b. If the trail surface grade on an overpass or bridge is less than 2 %, drains shall be provided to avoid ponding on the trail surface. The drain shall be covered by a non-skid grate which is flush with the surface of the trail.
  - c. The overpass type of cross section on railing shall be used wherever the trail crosses over a street or canal or is built as part of a street bridge.
  - d. The trail surface on a structure using the overpass type of cross section shall be broom-finished concrete. Creosote-treated wood is also acceptable on structures using the bridge type cross section if the maximum trail grade on the structure is less than 6%.

### 7.7.5 SIGNAGE

#### A. Locations

1. Trail crossing sign shall be 50 feet from street crossings
2. Trail markers

- a. At trail intersections
- b. At abrupt or major changes in trail direction
- c. At intervals no less than 1000 feet, if that frequency is appropriate. Effort should be made to only use signs when required for safe trail use and to guide along the trail.
- d. At trail access points/trail heads.

#### B. Locating

1. On wall side of trail when wall is on one side only.
2. Staggered on both sides elsewhere.

#### C. Posts and Signs

1. Post burial depth: 2.5 feet
2. Installed height: 2.5 feet or 8 feet
3. Materials – note that other material can be approved by the City Engineering department:
  - a. 3-inch diameter metal tubing or pipe
  - b. 4-inch diameter treated wood posts
  - c. 0.080-gauge aluminum sign blanks
4. Construction
  - a. Lettering, markings, and border on trail markers is white, background is dark green.
  - b. Trail crossing signs standard highway type warning sign.
  - c. When signage is to be located within 9 feet of back of curb, install to a height of 8 feet.
  - d. Typical trail markers are installed to a height of 2.5 feet.
  - e. Smaller signage may be used on rural trails or as approved by the City Engineering department.

### 7.7.6 TRAIL ACCESS GATES

#### A. General Information

1. These gates are to discourage motor vehicle access to trails, except as required under City Ordinance. They should be located at trail heads, where trails cross major roads, and at other points where vehicles are likely to try to access a trail. These structures should be made of heavy gauge metal, concrete, native boulders, or other durable and maintenance-free materials.

2. Native boulders used for gates shall be approved by the City Engineering Inspector.

#### 7.7.7 RESTRICTED LANDSCAPING

It is recommended that plants that may be harmful to humans and animals not be located in close proximity to trails. Plant material recommended to be located at least 8 feet from the edge of the cleared or designated trail tread can be found in ADWR's "Low Water & Drought Tolerant Plant List" and the City's "Trees for Public Spaces". In natural areas this shall not be construed to encourage the removal of native plants.

### 7.8 NATIVE PLANT SALVAGE

#### 7.8.1 GENERAL

Prior to clearing or grading native desert lands, it is recommended that the Arizona Department of Agriculture be contacted to determine what requirements, if any, may need to be followed for the salvaging of native protected plants.