City of Lewisville

Parks and Recreation

Design Standards

Adopted 2/22/23

Updated 07/22/2024


PLAY
LEWISVILLE
PARKS & RECREATION DEPARTMENT
VISION & MISSION STATEMENT
CAPRA
ACCREDITED
We will create a thriving community for all through nature and play by being the best Parks and Recreation Department in the State of Texas.
We will achieve this vision and mission by:
Connecting communities through recreational and educational opportunities
Developing and maintaining parks, trails, and public spaces
Preserving and restoring our natural resources
EVERYONE PLAYS | EVERYONE IS WELCOME & SAFE | EVERYONE KNOWS

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LEWISVILLE
Deep Roots. Broad Wings. Bright Future.

Section 1 – Introduction

A. What is the purpose of this document?

The City of Lewisville Park and Recreation Standards Manual (Standards) aims to ensure that all park facilities in the City are of consistent quality and appearance. In addition, these Standards guarantee compliance with equitable accessibility and safety guidelines for all visitors. This document is a practical companion to the Healthy Infrastructure Plan. These standards follow and complement the City of Lewisville Unified Development Code (UDC), and the Development Guideline story map. Department Standards have designated timeframes for review and updates. If no changes to the Standards are necessary at the time of review, the effective date of the document will not be changed.

B. Who is this document intended for?

Employees at all levels, including directors, program managers, recreation coordinators, operations supervisors, consultants, contractors, and developers benefit from the creation of this handbook. Employees who maintain or construct features in city parks are key users of the Design Standards and are directly involved in the decision-making process.

C. Why was this document created?

The best solutions are frequently interpreted by city employees for the public. The planning process relies heavily on observation, internal and external input, and documentation. In preparation for proposed construction or enhancements, this handbook will assist employees in examining site construction interrelationships and the best solutions for each site.

D. When should this document be utilized?

The planning and budgeting process is where the handbook is best utilized. When construction or enhancements are first considered, it will provide guidance on which areas to observe, evaluate, and document. It is advantageous to develop a plan for the development of the park's subsequent phases, even in the event that suggestions for enhancements to the park exceed the available funding.

Section 2 - Park Development Considerations

The purpose of this section is to provide an outline for planning new park amenities, facilities, or sites. These considerations are only an outline and should be analyzed before choosing the best solutions and moving forward with any design or construction. In addition, all development proposals reflect the goals of the Healthy Infrastructure Plan and must follow the City of Lewisville Unified Development Code (UDC).

A. Existing Site Conditions and Analysis

The first step in the design and implementation of new park amenities is to understand the existing site conditions that can impact any proposed design, construction, and use of facilities. For the City of Lewisville, nine factors are to be considered, whether the project is a new park, or constructing a new playscape. Since each location is different, additional factors may need to be considered.

These factors are:

- Site Documentation and Connectivity
- Existing Adjacent Properties and Land Uses
- Existing Access
- Existing Park Facilities
- Existing Utilities
- Existing Soils
- Site Drainage
- Existing Wetlands and Wildlife Habitat
- Existing Vegetation and Tree Canopy

1. Site Documentation and Connectivity

All data available through city resources should be researched and collected to provide a history and past usage of the property. These can be gathered through various departments and can include Information Technology (GIS), Planning and Zoning, Public Services, Engineering, and Parks and Recreation.

Site Documentation Checklist

Boundary Survey	
Zoning	
Plats	
Easements	
Flood plain maps	
Connectivity to surrounding area	
Parks and recreation administrative files	

2. **Existing Adjacent Properties and Land Uses**

   Understanding the context of the proposed improvements is critical to determining proper access, parking, and the placement of new recreation amenities.

Adjacent Property Checklist

What types of properties/amenities are nearby?	
Will they have a negative impact on the Park?	
Can new park activities have a negative impact on the adjacent properties?	

3. **Existing Access**

   How will park patrons reach the proposed facilities? Consider existing vehicular, pedestrian, micro-mobility access, and accessible routes.

Access Checklist

Do existing facilities comply with Texas Accessibility Standards?	
Are there adjacent streets? Are adjacent streets busy?	
Do they have traffic signals or stop signs at	

intersections? Are there crosswalks?	
Are there sidewalks with proper ADA ramps? With accessible parking spaces?	
Are there trails, bikeways, or parks that should be linked to the new facilities?	
Can vehicle access and parking be shared?	
What is the current speed limit?	

4. Existing Park Facilities

The type of existing park facilities can vary widely from restrooms to aquatic facilities or athletic fields. It is important to understand the function of existing facilities, their related service utilities, and access routes. It may be that existing facilities present obstructions to the construction of new facilities or may represent an opportunity to have joint usage.

Existing Facility Checklist

Do existing facilities meet CPSC[1] safety criteria?	
Will the new activities enhance or conflict with use of the existing facilities?	
Will construction of the new facilities conflict with existing facilities and utilities?	

5. Existing Utilities

Safety is the most important concern related to existing utilities. It is critical to protect team members, park users, and workers through the location and mapping of existing utilities. For the purpose of park improvements in Lewisville, existing utilities are divided into two basic categories: overhead utilities and underground utilities. Each category includes multiple utility types. One way to help locate utilities is by researching easements that may run across the site,

[1] The Consumer Product Safety Commission (CPSC)

overhead or underground. A surveyor will be able to perform the research. Also, state law requires that the contractor call “811” to have underground utilities located before beginning digging or excavation. Doing this in the planning and the design stage will help save time later in the project.

Existing Utilities Checklist
Overhead Utilities

Electrical lines	
Telephone and cable TV lines	
Lighting fixtures	
Wi-Fi routers	
Other	

Underground Utilities

Water lines	
Sanitary sewer lines	
Storm drain lines	
Natural gas lines	
Electrical lines	
Telephone, data, and cable TV lines	
Irrigation lines	
Other	

6. **Existing Soils**

Existing soils “tell a story” about construction constraints, and also indicate the suitability for certain trees and grasses. Soils and soil characteristics range widely throughout Lewisville from Blackland Prairie and Eastern Cross Timbers which both may consist of a mix of clay, loam, sand, and silt. The existing soil can influence the design of footings, drainage, plantings. Clay soils have a high

"shrink – swell potential" as soil moisture changes that may require drilled pier footings for buildings or be unsuitable for swimming pools. Sandy soils are highly erosive and leach nutrients easily. Loamy Soils generally have mild slopes and are very suitable for the development of athletic facilities or other park amenities. It is important to understand the characteristics and limitations of soils at each specific site before launching design and construction operations. In addition to reviewing the considerations listed above, a Geotechnical Engineer should be employed on each project with a significant capital expenditure or building structure, including light poles. A soil core sample should be sent to Texas Agriculture Life Extension (Agri-Life) for analysis for all in-house projects.

Existing Soils Checklist

What are the existing soil types?	
Is the soil easily eroded? Is there visible erosion?	
Is the soil expansive?	
Does the soil retain nutrients?	
What is the best foundation or footing for each soil type?	
Has soil sample been sent to Agri-Life for analysis?	

7. **Site Drainage**

Whether the planned improvements are large scale major investment projects or simple minor enhancements, the way drainage is managed will contribute to the success or failure of it. It is important to understand the source and patterns of "offsite drainage" which can enter the project area from uphill /upstream sources or can result from water "backing up" to inundate a site. Sources of information regarding general drainage patterns include on-site observations, City of Lewisville drainage and utility maps and Federal Emergency Management Agency (FEMA) maps, which are accessible via the City website. Large scale projects should have a topographic and boundary survey performed to document existing grades and drainage patterns. This should address any issues with

drainage to existing structures or current drainage problems in the park. Even small projects, such as playgrounds or picnic shelters need to include a grading and drainage assessment to provide positive drainage away from the new improvements.

Existing Drainage Checklist

Is runoff flowing into the project area? If so, from where?	
Is runoff going to backflow or surge onto the site, If so, how often?	
In flat areas, how is the site going to drain to enable use most of the time?	
In steep areas, how will erosion be addressed?	

8. Existing Wetlands, Wildlife Habitat and Historic or Cultural

Review potential wetland and habitat impacts during the planning, design, and construction of new facilities. Large scale projects, at major investment parks, may need to have environmental assessments and / or wetland determinations to ensure compliance with federal and state regulations. More importantly, these studies may identify unique features that can enhance the value of resident's outdoor recreation experiences and learning opportunities.

Wetlands & Habitat Checklist

Are wetlands present that are indicated on National Wetland Inventory (NWI) maps?	
Are there other wetlands on site or that may be impacted by construction?	
Does the project drain into a "Waters of the United States"?	
Does the project require a USACE permit or other regulatory agency approval?	
Has a wildlife expert or other qualified naturalist been	

contacted?	
What are the potential wetlands and wildlife habitat impacts?	
Are there any identified or suspected historical properties, archeological sites or other cultural resources present or affected by the project?	
Does site or project require an official review under Section 106 of the National Historic Preservation Act and/or Antiquities Code of Texas?	

9. Existing Vegetation and Tree Canopy

The City of Lewisville is located at the convergence of three significant ecosystems: the Blackland Prairie, the Cross Timbers and the Elm Fork of the Trinity River. It is important to protect, conserve and restore elements of each system.

The Blackland Prairie is characterized by grasses and forbs adapted to grow during periods of rain and drought. Big Bluestem, Indian Grass, Little Bluestem, Beebalm, Prairie Foxglove, Prairie Foxglove, Prairie Larkspur, Narrowleaf Coneflower, Prairie Clover, and many others (including some woody vegetation - sumac, wild plum and possumhaw). Lowland tallgrass prairie stands may include Prairie Cordgrass, Eastern gamagrass, sedges, lowland switchgrass, and Black-eyed susan. An assessment of the vegetation on site should be conducted by a master naturalist. Reference materials can be found in the LLELA and Thrive Nature Park restoration plans.

Understanding an urban forest's structure, function, and value can promote management decisions that will improve human health and environmental quality of the City of Lewisville and its residents. The urban tree canopy includes individual or small clusters of trees that have attained a size to produce a discernible tree canopy on aerial imagery. The City recommends protection of high value replacement trees such as pecans, cedar elm, post oak, and live oak

to contribute and protect and grow the tree canopy of Lewisville. A tree assessment or survey shall follow UDC and City of Lewisville Tree Management plans and guidelines to determine protection or removal of trees.

Existing Vegetation and Tree Canopy Checklist

Are there pollinators or plants or prairie grasses?	
Are there existing trees at site?	

Existing Tree Canopy and Preservation Plan

Purpose - The purpose of this chapter is to preserve, protect and enhance existing trees and the city's natural landscapes to contribute to and improve the overall quality of life, public health, and environment. Trees are an integral part of healthy upland habitats as weak stream and river corridors. In addition, trees are beneficial in:

- reducing stormwater runoff
- improving water quality,
- recharging groundwater,
- controlling erosion and dust,
- abating noise,
- improving air quality through removal of pollutants and provision of oxygen,
- sequestering carbon,
- reducing the urban heat island,
- reducing building energy costs,
- enhancing property values,
- and providing wildlife habitat, including for migratory birds.

The natural environment and native tree species shall be preserved to the greatest extent possible during and after development or redevelopment.

- **Clear-Cutting Prohibited –** No clearcutting of land is allowed.

- **Removal of protected trees shall require prior city approval in the form of a tree survey and tree preservation plan or tree removal permit, as provided for herein unless otherwise exempted:**
- **New Development and Redevelopment –** Protected trees may be removed as part of new development or redevelopment only in accordance with a tree survey and tree preservation plan, meeting the requirements of this article which is approved as part of the development plan and platting process.
- **All Other Protected Tree Removal –** A tree removal permit must be approved prior to removal of individual protected trees from properties to which Section 4.A.1 does not apply.
- **Underbrush and Unprotected Trees –** An underbrush removal permit is required when access to a property being considered for development is needed to perform soil borings, property boundary surveys, to prepare a tree survey, or similar actions and such access requires the removal of underbrush and unprotected trees.
- **Exemption –** Notwithstanding the requirements of this article, no permit shall be required for the tree removal activities as listed in the UDC Section 9. below:

Exemptions – Mitigation shall not be required in the following circumstances, though tree removal permit or tree preservation plan requirements still apply:

Public Utilities – In any existing right-of-way or easement dedicated to a public entity. Mitigation is required for trees in any newly required easements.
When Required by City – If the city requires removal of a protected tree(s).
Removal by Franchised Utility – In addition to rights granted by any applicable easement, utility companies franchised by the city may remove protected trees during or following a period of an emergency that are determined by the company to be a danger to public safety and welfare by interfering with utility service.

Dead or Diseased Trees – If the city approves a tree survey and report from a certified arborist showing that the protected trees proposed to be removed are already dead, dying, or fatally diseased. The city can request any other information deemed necessary to prove the protected trees are dead, dying, or fatally diseased.

As Required by Law – As required by Texas Local Government Code, Section 212.905(h).

Tree Removal Permits

1. An application for a tree removal permit shall be submitted to the Planning Director and shall include:
   a. The number, species, and health of the protected trees to be removed.
   b. The location of each protected tree to be removed.
   c. The size of the land area from which protected trees will be removed; and
   d. The location of floodplain, open drainageways, or creeks, if any, on the property.
2. In determining whether to grant a tree removal permit, the Planning Director shall consider whether the tree mitigation requirements outlined in this article are met.

Underbrush Removal Permit

1. An underbrush removal permit shall be submitted to the Planning Director and shall include:
   a. The land area of the site;
   b. The area that will be impacted by underbrush and unprotected tree removal activities; and
   c. The location of floodplain, open drainageway, or creeks, if any, on the property.

Tree Survey and Tree Preservation Plan

1. Tree Survey and Tree Preservation Plan Not Required.
   For properties with no trees, the applicant shall indicate such on the concept plan or engineering site plan, but no tree survey or tree preservation plan is required.

2. **Tree Survey and Tree Preservation Plan Required**
    a. Tree surveys and tree preservation plans must be prepared by a civil engineer, certified arborist, landscape architect, or surveyor.
    b. The following information is required for tree surveys and tree preservation plans, but city staff may require additional information as deemed necessary:
3. **Tree survey –** The exact location, size, condition and common name of each tree that is eight (8) inches DBH and larger. Trees within rights-of-way and other city easements do not have to be shown. If an area is to be left in its natural state and undisturbed during and after construction, the area may be designated as such on the tree survey, and individual identification of protected trees within the area is not required.
4. **Tree preservation plan –** The exact location of all trees, whether each tree is to be preserved or removed, and the methods by which the trees will be protected during construction.
5. **Tree Survey Not Required/Tree Preservation Plan Required –** If a property has ten or fewer trees, the DBH and species may be shown on the concept plan or engineering site plan and supplemented with an aerial image instead of a tree survey. A tree preservation plan is required.
6. **Mitigation Required –** The removal, or damage or destruction during construction, of protected trees requires mitigation in the form of either replacement of the protected trees or payment of a tree mitigation fee in lieu of the replacement of the protected trees as outlined herein.

B. Park Boundaries

1. **Spatial Definition -** Spatial definition involves the delineation of activity areas and perhaps property boundaries and may be accomplished in many ways.
    - groupings of trees,
    - Unmowed grass areas or tree lines to separate spaces, spatial definition brings outdoor spaces down to human scale.

2. **Boundary Definition and Access Control -** A number of devices and strategies may be employed to define park boundaries and control access. Ideally the devices used will reflect the character of the park facility as well as the context of the surrounding properties. Recommended elements for boundary definition include:

   - **Fences & Gates**

   Hot dip galvanized metals will serve well and will blend into the landscape once the metal weathers to a soft gray patina.

   - **Bollards**

   Bollards are generally used to define and set the perimeter for parking lots and drives and may be manufactured from wood, concrete, metal pipe, and stone – or a combination thereof. Bollards may be used for low level area lighting as well. Bollards may be whimsical and define the facility's purpose, such as the "Baseball" bollards. Parks lend themselves to the use of natural materials for bollards in a creative manner. The materials used for bollards should reflect the location of each park facility. Key considerations in the selection and installation of bollards are the availability of the bollard materials and the ability of Parks staff to install, maintain, and repair the bollards in-house.

   - **Other elements may be considered with Director Approval**

C. Coordination with other City Departments

Other City departments, particularly Engineering, Public Services, Planning, and the Information Technology Services (ITS), may have programs or plans that compliment or may facilitate park facility improvements. While this applies primarily to large, major investment projects, smaller projects should also include review by other City departments, including Police and Fire to contribute information regarding emergency access, security enhancements, water conservation initiatives, bicycle trail linkage, and other related information.

Departmental Coordination

Emergency access	**Fire**	
Access, linkage - Wetland Management	**Engineering and Public Services**	
Security enhancements	**Police**	
Access and Connectivity	**Planning & Zoning**	
Permitting	**Neighborhood Services**	
Technology	**ITS**	
Existing Public Infrastructure	**Public Services**	

D. Regulatory Compliance or Approvals

a. City of Lewisville
b. United States Army Corps of Engineers (USACE)
c. Texas Parks and Wildlife Department (TPWD)
d. Texas Department of Transportation (TxDOT)
e. Texas Department of License and Regulation (ADA compliance)
f. Texas Historical Commission (THS)

Section 3 - Park Facility Standards

The purpose of this section is to provide guidelines for selecting new park elements, amenities and structures. These considerations are only an outline and should be analyzed before choosing the appropriate solutions for each site.

A. Access

1. General

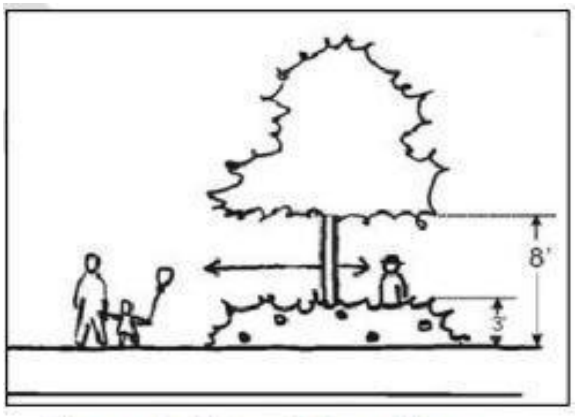
Access to City park facilities includes more than connections to sidewalks, walkways, trails, and streets. Safe Routes to Parks[2] is achieved through engagement of the community to properly assess, plan, implement, and sustain

[2] Link to Safe Routes to Parks, NRPA

safe and equitable park access utilizing evidence and best practice-based approach.

2. **Safety**

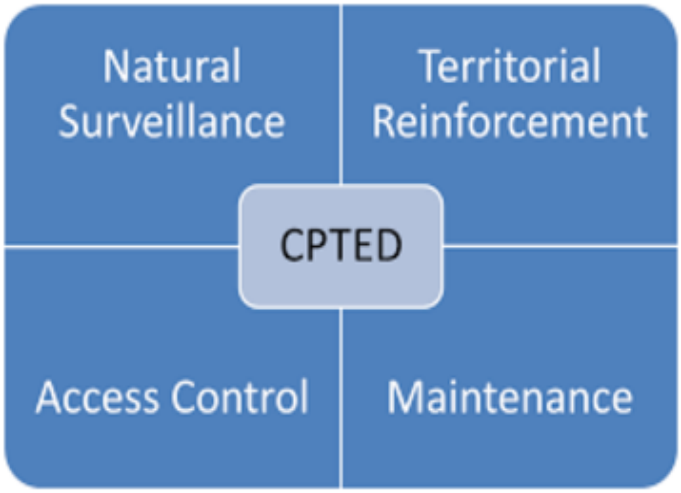
The safety of park patrons is a fundamental consideration in park design. Community Crime Prevention Through Environmental Design (CPTED) is a multidisciplinary and collaborative design approach to foster positive social interactions and deter criminal behaviors in communities. Proponents of CPTED promote proper design, use and management of the built environment to reduce the frequency of criminal activity and the fear of crime, thereby improving community vitality and quality of life. Include CPTED review and participation in each park design effort. Key considerations related to park design and operations include several factors:



- **Natural Surveillance** – design to eliminate hiding places, optimizing visibility and the perception of human activity and supervision as seen in the figure to the right.
- **Natural Access Management** – site design and operation to create real or perceived barriers such as fencing and / or plantings in conjunction with lighting, signage, and artwork to provide pedestrian orientation and wayfinding. By creating a pedestrian friendly environment to make suspicious activity more obvious.
- **Territorial Reinforcement** – use of physical elements, such as art, signage, landscaping, and boundary treatments, to define borders, express ownership, and demonstrate that the space is cared for and protected.
- **Physical Maintenance** – demonstrates community pride of ownership. Incorporation of low maintenance landscaping and building materials, along

with trash pick-up and removal suggests that the community will not accept vandalism or criminal activity.

- **Civility Maintenance** – in addition to posting rules and regulations, proper maintenance and attention to minor violations will reduce inappropriate activities. This includes the use of vandal and graffiti resistant materials and products. Civility Maintenance also includes the imposition of quick, fair and consistent consequences for offenders.
- **Activity Support** – plan and implement safe activities. Foster increased use of a facility by holding special events or celebrations, organized use of sports facilities and supporting use of the facilities by people of all ages and interests.



CPTED Basics

3. Pedestrian and Bicycle Access

Pedestrian access is to be designed for children, adults, and people with disabilities. All parks and facilities must conform to the Texas Accessibility Standards, available at: www.tdlr.texas.gov/ab/abtas.htm

Pedestrian, bicycle, and streetscape improvements are required and determined to be adequate when the proposed new development meets the requirements for new streets and trails in accordance with Articles IX and X of the Lewisville UDC.

A. Sidewalks and Trails – Sidewalks and trails shall be installed in accordance with Articles IX and X of the City of Lewisville UDC

requirements as well as the Texas Accessibility Standards, PROWAG, the Healthy Infrastructure Plan, and the City's standard details.

B. Walkways
   a. Walkways shall be no less than four (4) feet in width.
   b. Walkways shall be required:
      i. Connecting any existing or future sidewalk, trails, parks or greenways and primary entrances of all buildings on the site.
      ii. Connecting building entrances to all on-site facilities, such as parking lots, bicycle facilities, and open space.
      iii. Up to the building lot line in a manner which will allow walkway connection between adjoining properties and buildings; and
   c. Walkways shall be distinguished from any driving surfaces through the use of colored pavements, bollards, grade changes, pavement markings or combination of treatments.

C. Pedestrian and bicycle access locations should be selected and designed to give the greatest amount of residents access within a 10 Minute Walk to the Park.

4. Vehicles and Parking

Parking and landscaping requirements are outlined in the City's Unified Development Code (UDC).

Table A4 - Recommendations for Parking and Access

Facility Type	Pocket Parks	Neighborhood Parks	Community Parks	Regional Parks	Linear Parks	Nature & Preserve Parks	Special Use Parks
Entrance Driveway Width	No off street parking	No off street parking	24 ft. Wide Entrance and Exit Drive	24 ft. Wide Entrance and Exit Drive	No off street Parking	24 ft. Wide Entrance and Exit Drive	24 ft. Wide Entrance and Exit Drive
Park Drive Width	No off street parking	No off street parking	24 feet	24 feet	24 feet	24 feet	24 feet
Required Parking	No off street	No off street	N/A	N/A	N/A	N/A	N/A

Spaces	parking	parking					
Emergency Service Access	No off street parking	No off street parking	Point of access	Point of access	N/A	point of access	Point of access
Parking Lot Landscaping	No off street parking	No off street parking	5% of parking lot	5% of parking lot	N/A	5% of parking lot	5% of parking

B. Grading and Drainage

1. General

Site grading is frequently disregarded as a crucial design component. The best use of facilities is made possible by proper site grading, which also creates a tidy, appealing appearance. By removing muddy patches and rutting brought on by maintenance equipment, proper site grading also reduces maintenance. The "Grade to Drain" strategy is straightforward but effective. Always make sure there is an outfall, whether it be for surface drainage or subsurface drainage. Regarding the site, to create high and low points for positive drainage is frequently the most cost-effective option. Importing fill should be considered if regrading to provide positive drainage is not an option. Consideration should be made to consider swales and berms to facilitate drainage. If the site must remain "flat," and surface slopes are unsuitable for positive drainage, subsurface drainage should be considered. Subsurface drainage options include:

- Inlets, piping, and outfalls
- French drains, piping, and outfalls

The French drain system can be used as part of a storm water detention system and to improve storm water quality, whereas a system with inlets enables rapid drainage. In either scenario, the piping needs to exit into a space that directs stormwater away from the construction site.

The current Texas Accessibility Standards must be followed by all facilities. Every project with a construction value over $50,000 must be examined by an RAS Inspector who has been duly registered. Skate parks and amphitheaters are examples of special use facilities that demand individualized consideration by design and engineering experts with a track record in facility design.

Table B1 – Recommended Minimum and Maximum Slopes for Park Facilities			
Facility Type	**Minimum Slope**	**Maximum Slope**	**Comments**
Parking Areas	1%	6%	Handicap parking spaces and aisles must not exceed a 2% slope in any direction.
Trails and Walkways	0.5%	8%	Trails and walkways with a slope greater than 5% are considered ramps. These must have landings and slopes of 2% or less in all directions at 200 ft. intervals. The minimum recommended width is 5 feet to allow a wheelchair to turn around. Trails and walkways should not be designed at the max percentage in order to mitigate ADA compliance issues. This allow for additional leeway during the construction phase.
Playgrounds & Fitness Stations	0.5%	0.5%	Subsurface drainage system required to prevent ponding.
Softball/Baseball Fields	1%	2%	Infield areas that are at 1% should have a subsurface drain system and “infield conditioner” to facilitate drying and maximum field availability.
Football/Soccer Fields	1% (with subdrains)	1.5% (without subdrains)	Football fields should be crowned. Federation Internationale de Football Association (FIFA) regulations allow soccer fields to be sloped in numerous ways. Sloping soccer fields, end-to-end or side-to-side are preferred.
Tennis & Pickleball Courts	0.8%	0.8%	Conform to United States Tennis Association (USTA) and United Pickleball Association (UPA) standards.
Picnic Areas	1%	4.5%	Attempt to avoid ramps by providing walkways, trails, and walking surfaces with slopes within this range.
Splash Pads & Swimming Pool Decks	1%	1%	Conform to 2012 TAS Standards and Texas Administrative Code. Title 25, Chapter 265.
General areas such as Memorials, Community Gardens, and overlooks	1%	4.5%	Grading and drainage must be considered in the design and operation of each project and facility.

2. Design for Accessibility

Projects with a construction budget of $50,000 or less are not required to have a "Texas Accessibility Standards (TAS) review. However, all projects must comply with TAS. Current standards are available on line at https://www.tdlr.texas.gov/ab/

C. Trails and Walkways

Pedestrian trails and walkways can be made of different materials depending on the area, the intended users, safety considerations, and accessibility. While concrete is best for durability and accessibility, it is not the best material for running trials. Design and construction of trail to be consistent with AASHTO recommendations and TMUTCD standards. Private trail agreements should incorporate maintenance requirements so that vegetation bordering the area does not impede public mobility or visibility. Public Art incorporation in trails should be considered.

Table D1 - Concrete, Asphalt Pavement Criteria

Facility Type	Thickness	Compressive Strength (PSI)	Reinforcing	Finish	Joints
Trails, Walkways and Paved Areas (More than 6 Ft. (Wide)	5 Inches Minimum	3,500 (min)	#3 rebar at 18" center each way	Medium brush finish	Expansion joints spaced 40 feet apart. Control joint spacing = trail width

Table D2- Decomposed Granite, Crushed Rock/Brick, Permeable Surface Criteria

Facility Type	Thickness	Compaction	Reinforcing	Finish
Multi-Purpose Trail, Walkways and General Areas	4 inches installed over Geotextile fabric	Machine compaction	Soil Stabilizer	Compact to a smooth, uniform finish that allows wheelchair and bicycle access

Table D3 - Other Material Criteria (Non-Accessible Routes)

Material	Use*	Minimum Thickness	Geotextile Underlayment	Max Longitudinal Slope	Max Cross Slope
Road Millings	T, NT, NC	4"	Yes	8%	3%

Shredded Bark Mulch	T, NT, NC	3”	No	8%	3%
Soil Cement (Polymer)	T, NT, NC, BT	4”	No	8%	3%
Soil (Grade/Compact)	T, NT, NC, BT	n/a	n/a	8%	3%
Recycled Concrete	T, NT, NC, BT	4”	Yes	8%	3%

Other Material Key*	
T	Trail
NT	Nature Trial
NC	Nature Center
BT	Bike Trail

Thrive Nature Park Trail

D. Site Furnishings

1. General

Bicycle racks, picnic tables, trash cans, benches, and water fountains are examples of site furnishings. These types of furniture encourage people to use parks and are an added benefit to their enjoyment. Lewisville PARD aims for consistency in site furnishing materials and workmanship. Below is a list of examples of recommended items for site furnishings and suggestions for a range of materials and cost (i.e. good, better, best).

Any deviation from these recommendations must be approved by the Director.

2. Standards and Equipment Recommendations

a. Bike Racks

Bike racks encourage cyclists to visit park facilities and provide secure parking for their bikes. Good bike racks are those that are double-sided and can hold multiple bikes, a better option is a visually more appealing wave rack. The best option are those that have a logo add-on option or can serve as public art. High traffic cycling areas should consider including a bike repair station.

Best Option for Bike Racks

b. Picnic Tables and Benches

Rectangle, Square, and Round, natural or recycled plastic panels, expanded metal tables and benches can be considered. UV protection is provided by galvanized dipped expanded metal picnic tables with synthetic planks on the tops and seating. The tops and seats allow for good air flow to stay cool in summer and are able to be power washed for easy cleaning.

Good	Better	Best
Composite Board/Galvanized frame	Recycled lumber construction Club Bench	Plaza Style Bench

Best Option for Benches

c. Trash Cans

The minimum weight and size of a trash can is 32 gal, the maximum weight and size of a trash can is 55 gal due to staff safety. Any trash can on USACE property must be covered (have a lid).

Good	Better	Best
Drum trash can - painted Purple	Covered trash cans black powder coated Composite/Recycled	Smart Bin or Composite/Recycled

Best Option for Trash Cans

d. Pet Waste Stations

Pet waste stations should be strategically located near entry and midpoint ways of trails for accessibility. If pet waste stations are stand alone they need to be adjacent to or be integrated with existing trash bins. Maintenance staff prefer not to have an integrated mini trash bin.

e. Restrooms

Public restrooms are an important amenity in large parks to cater visitors' basic needs.

Good	Better	Best
Portable	Composting	Utility Based

Public restrooms are not typically prescribed in small, neighborhood parks.

f. Drinking Fountains

- Drinking fountains should be located near an active water line and placed in high visibility areas preferably under shade and have the following features.
    - ADA & Pet accessible
    - Water Bottle filler
    - Mounted or stand alone

Best Option for Water Fountain

E. Picnic Pavilions and Shelters

Picnic pavilions and shelters are an important shade and comfort aspect of the parks in Lewisville. Pavilions and shelters should be constructed to complement the topography, withstand the weather, and provide a safe and comfortable environment for park users. Careful consideration should be given to the environment when selecting construction materials.

1. **Pavilions** - Suitable construction materials for picnic pavilions and shelters include:
    - Galvanized Steel
    - Timber
    - Concrete
    - Brick/stone Masonry
    - Synthetic building materials
        - Synthetic building materials consist of ultra violet (UV) stabilized plastics and recycled plastics are available for use as signs, benches, decking, and playground equipment. Many characteristics make synthetics and plastics very useful. Some considerations include:
            - UV Stabilized Materials
            - 20+ year average life
            - Easy to clean
            - Graffiti & Vandal resistant
            - Splinter free
            - 100% waterproof

- Does not need paint
- Critter Resistant
- Rust/Rot proof
- Impervious to insects
- Nontoxic
- No need for sealants or paint
- Various color choices
- Will not delaminate

2. **Fabric Shade Structures** - Fabric tensile shade structures are an excellent shade alternative to traditional materials of steel, wood, and canvass. Fabric adds colorful and unique dimensional designs to the traditional shade structure. An important element of fabric shade structures is the use of UV stabilized polyethylene or polypropylene shade netting that is held in place using metal cables and posts. Fabric shades are up to 15 degrees cooler than traditional metal roofs. High winds that are prevalent in Texas require shade structures to withstand winds from 80-130 miles per hour, per state windstorm regulations.

F. Playgrounds and Play Elements

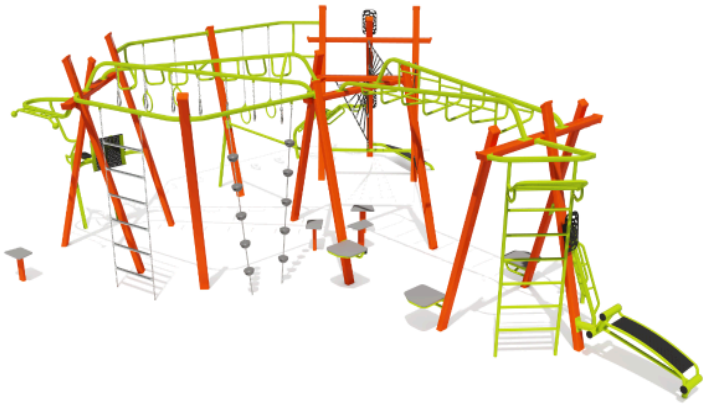
1. Materials and Finishes

Experience has shown that hot dip galvanized, or aluminum structural core park equipment is essential to withstand the Texas climate. The polyester powder coat on play equipment needs to be shielded from dents that could damage the galvanized base and expose the steel to corrosion. Sustainable practices should always be considered into parks and recreation design, operations, and management. Here is a summary of important criteria for playground furnishings and site decor:

Table F1 - Preferred Play Equipment Materials and Finishes			
Equipment	**Material**	**ASTM Designation**	**Comments**
All	Sustainable Manufacturing	ASTM Sustainability Standards	These standards will play a preeminent role in all aspects of sustainability and sustainable development.
Exposed Ferrous Metals	Hot- Dip Zinc Galvanized	ASTM A123	Hot Dip Zinc coating at 2 oz/sq ft. Galvanized after welding and fabrication.
Fasteners	416 Stainless Steel	ASTM A582	Vandal Resistant
Metal Play Element Fittings	Cast Aluminum	ASTM B179, ASTM B26, ASTM B108	-
Metal Play Elements	Extruded Aluminum 6061-T6, 6062-T6, or 6063-T6	ASTM B221	Minimum tensile strength = 39,000 psi
Metal Play Elements	Electrostatic Zinc Galvanized	ASTM B633	Electrostatic Zinc coating at 2 oz/sq ft. Galvanized after welding and fabrication.
Plastic Elements	UV Stabilized Polyethylene or Nylon	ASTM D1248, Type II, Class A, Grade G4	Minimum 5 mm or 3/16-inch wall thickness
Play Structure Finish Material	Polyester Powder Coat	ASTM D3359 for Adhesion, ASTM D822 for weatherability	No scratches allowed prior to acceptance and use by owner.

2. **Outdoor Fitness Equipment**

Having outdoor fitness equipment at local parks is essential for promoting physical activity, accessibility, inclusivity, community building, and improving mental health.The following NRPA Blog describes how to make outdoor gyms appealing to everyone. A good fitness equipment is one that has a sample package that covers all major muscle groups. A better fitness equipment is compact, with overhead ladder and available with integrated shade. The best fitness equipment is a comprehensive total body workout that is compact and can serve up to 20 people, also available with integrated shade.



Best Option for Outdoor Fitness Equipment

G. Safety Surfacing

Safety surfacing is an important and essential aspect to consider for all playgrounds to help prevent injuries to children and provide parents with peace of mind. There are a number of alternatives available; each product offers varying degrees of thickness to provide increasing levels of protection against falls. To determine the required thickness for each playground, the "fall height" is determined using the tallest piece of playground equipment. Below is an overview of each alternative suitable for playground safety surfacing and is listed in the preferred order of preference.

Poured-in-Place-Rubber (PIP) – Constructed from soft, durable rubber. Rubber is long lasting and can be custom designed. Rubber is a very durable, maintenance free surface that provides easy access for wheelchairs. Should have matting in High-Utilized playground areas such as the end of slide.

Playground Synthetic Turf – Synthetic Turf provides a soft, grass like feel without the maintenance required of real grass. Provides a shock absorbing area for running, jumping, landing, and falling, as well as meeting ADA guidelines for wheelchair access. Heat considerations for synthetic turf should be weighed when deciding on a safety surface for children.

Rubber Tiles – Rubber tiles can absorb the shock of running, jumping, and falling of children. Tiles are interlocking and come in a variety of colors. An affordable option that meets ADA guidelines for wheelchair access.

Engineered Wood Fiber (EWF) – is one of the most popular choices for playground surfacing due to its price point, and ability to be replenished as needed. Fiber should be made of 100% virgin wood, sourced to keep out impurities. Wood fibers provide accessibility to support wheelchairs. However, the cons of Maintenance, Safety, and Appearance of EWF should be considered:https://simplifiedplaygrounds.com/blogs/blog/pros-and-cons-of-engineered-wood-fiber

EWF	Good	Better	Best
with Director Approval	Synthetic Turf	PIP	PIP with Reinforced Heavy Use Areas

H. Grasses and Turf Types

The types of turf grass that are planted at Lewisville parks and athletic fields are one of the most important features and must be able to withstand the volatile Texas weather. Buffalo grass is preferred for parks, medians and right of ways. There are two types of Bermuda grass, Common Bermuda for high traffic areas of parks and Tifway 419 Bermuda for athletic fields.

1. **Parks**
    a. Buffalo Grass, *Bouteloua dactyloides,* is a short sod-forming grass requiring as little as 12 inches of water per year. This sustainable, drought tolerant grass is resistant to most diseases and pests and does best when mowed infrequently.
    b. High traffic areas - Common Bermuda grass, *Cynodon dectylon L. Pers*, is a warm season, fine textured turf grass that spreads

laterally by rhizomes and stolons. Extremely drought tolerant, durable, and easy to establish, have deep roots and low disease potential. Not ideal for consistently shaded areas.

2. **Medians & Right of Ways** – Buffalo Grass, *Bouteloua dactyloides,* is a short sod-forming grass requiring as little as 12 inches of water per year. This sustainable, drought tolerant grass is resistant to most diseases and pests and does best when mowed infrequently.
3. **Pollinative Prairies** – native grasses and pollinator mixes are ideal for large open spaces, within the Green Centerpieces and in some medians and right of ways. See section J (page 38) for more detail.

I. Sports Fields

Sports fields' design and dimensions vary by the age, gender, and sponsoring league of the participants. Consideration will be given to recommendations from consultants and design professionals. Table 3 offers general guidelines for the actual playing field sizes. Tifway 419, *Tif 419*, is a Bermuda hybrid with a deep green with a fine texture. When cut at ¾ to 1 ½ inches, Tif 419 provides an excellent impact absorbing cushion. It has excellent weed and disease resistance and is a superior choice for athletics fields. In the fall, Tif 419 can be overseeded with Rye grass to protect the grass from winter play while dormant.

Table I1 - Recommended Criteria for Sports Fields

Facility Type	Adult	High School (14-18 years)	Youth	Natural Turf Type
Football	300 ft. x 150 ft.	300 ft. x 150 ft.	240 ft. x 120 ft.	Tif 419 Solid Sod
Soccer	360 ft. x 225 ft.	360 ft. x 225 ft.	180 ft. x 120 ft.	Tif 419 Solid Sod
	Fast Pitch Base Lines = 60 ft. Outfield = 225 ft. Slow Pitch Base Lines = 70 ft.	Fast Pitch Base Lines = 60 ft. Outfield = 225 ft.	N/A	Tif 419 Solid Sod

Softball	Outfield = 300 ft.			
Baseball	Base Lines = 90 ft. Foul Line = 300 ft. Center Field = 350 ft.	Base Lines = 90 ft. Foul Line = 300 ft. Center Field = 350 ft.	Base Lines = 60 ft. Outfield = 200 ft.	Tif 419 Solid Sod
Cricket	Min = 137 meter Max = 150 meter (Diameter)	Min = 137 meter Max = 150 meter (Diameter)	N/A	Tif 419 Solid Sod

J. Landscaping Standards Approved Trees, Shrubs

General - The purpose of this chapter is to establish standards for the installation and maintenance of trees, shrubs, and other plant material to improve the aesthetics, welfare, and natural environment of the city. The addition of trees and other plant materials help to filter air pollution, reduce energy consumption, reduce impacts of urban heat islands, provide a natural habitat for birds, insects, and other animals, increase property values, improve human health, and contribute to a livable community. These standards recognize the value and necessity of water conservation and the use of drought-tolerant plants and trees that are native or adapted to the region's climate, soils, and environment. Compliance with the UDC is required.

Link to UDC: https://library.municode.com/tx/lewisville/codes/unified_development_code

Texas A&M Forest Service Resource

1. Nursery Tree Quality

General - Proper Identification: All trees shall be true to name as ordered or shown on planting plans and shall be labeled individually or in groups by species and cultivar (as appropriate).

Compliance: All trees shall comply with federal and state laws and regulations requiring inspection for plant disease, pests, and weeds. Inspection certificates required by law shall accompany each shipment of plants.

Inspection: The buyer reserves the right to reject trees that do not meet specifications as set forth in these guidelines. If a defect or substandard element can be corrected easily, appropriate remedies shall be applied. If inspection of a root ball

is to be done, the buyer and seller shall have a prior agreement as to the time and place of inspection, number of trees to be inspected, and financial responsibility for the inspected trees.

Delivery: The buyer shall stipulate how many days prior to delivery that delivery notification is needed. Buyer shall stipulate any special considerations to the nursery prior to shipment.

2. Health and Structure Specifications

General - These specifications apply to deciduous, broadleaf evergreen, and coniferous species. They do not apply to palms. Note that leaf characteristics will not be evident on deciduous trees during the dormant season.

Crown: The form and density of the crown shall be typical for a young specimen of the species or cultivar. The leader shall be intact to the very top of the tree.

Leaves: The size, color, and appearance of leaves shall be typical for the time of year and stage of growth of the species or cultivar. Trees shall not show signs of moisture stress as indicated by wilted, shriveled, or dead leaves.

Branches: Shoot growth (length and diameter) throughout the crown shall be appropriate for the age and size of the species or cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.

Trunk: The tree trunk shall be relatively straight, vertical, and free of wounds (except properly made pruning cuts), sunscald areas, conks (fungal fruiting bodies), wood cracks, bleeding areas, signs of boring insects, cankers, girdling ties, or lesions (mechanical injury). The terminal bud on the leader shall be intact to the very top of the tree, and it shall be the highest point on the tree.

Roots: The root system shall be substantially free of injury from biotic (e.g., insects and pathogens) and abiotic (e.g., herbicide toxicity and salt injury) agents. Root distribution shall be uniform throughout the container substrate and shall be appropriate for the species or cultivar. At time of inspection and delivery, the root ball shall be moist throughout. Roots shall not show signs of excess soil moisture conditions as indicated by stunted, discolored, distorted, or dead roots. (Figure 7)

Figure 1.

Trees shall have one relatively straight central leader or be structurally pruned to only leave one central leader (Figure 1).

Figure 2.

Desirable Not desirable

Main branches (Figure 2) shall be well distributed along the central leader, not clustered together. They shall form a balanced crown appropriate for the cultivar or species.

Figure 3.

Desirable Not desirable

The diameter of branches (Figure 3) that grow from the central leader, or trunk, shall be no larger than two-thirds (one-half is preferred) the diameter of the trunk measured just above the branch.

Figure 4.

Desirable Not desirable

The largest branches shall be free of bark inclusions that extend into the branch union (Figure 4).

Figure 5.

Desirable Not desirable

Small-diameter branches (Figure 5), particularly on trees less than 1-inch caliper, should be present along the lower trunk below the lowest main branch. The trunk shall be free of wounds, sunscald areas, conks (fungal fruiting bodies), wood cracks, bleeding areas, signs of boring insects, cankers, or lesions. Properly made recent or closed pruning cuts are acceptable.

Figure 6.

The trunk caliper (diameter) and taper (Figure 6) shall be sufficient so that the tree remains vertical without a stake.

Figure 7.

The root collar (the uppermost roots) (Figure 7) shall be within the upper 2 inches of the soil media (substrate). The root collar and the inside portion of the root ball shall be free of defects, including circling, kinked, and stem-girdling roots. Roots at the surface should grow mostly straight to the side of the container. You may need to remove soil near the root collar to inspect for root defects.

The tree shall be well rooted in the soil media. Roots shall be uniformly distributed throughout the container, meaning that roots should not be concentrated at the bottom of the root ball. Some roots should contact the container wall in the top half of the root ball (Figure 7). When the container is removed, the root ball shall remain intact. When the trunk is lifted, both the trunk and root system shall move as one. The imprint of the liner or smaller container shall not be visible (Figure 7).

The root ball shall be moist throughout at the time of inspection and delivery. The roots shall show no signs of excess soil moisture as indicated by poor root growth, root discoloration, distortion, death, or foul odor. The crown shall show no signs of moisture stress as indicated by wilted, shriveled, or dead leaves or branch dieback.

Tree Planting

Selecting quality trees: Planting quality trees begins by selecting the right tree for the right location and choosing vigorous, structurally sound trees from the nursery.

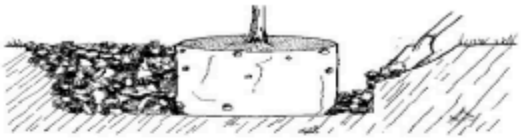


Figure 8. Loosening soil in a large area around the root ball allows for rapid root growth and quick establishment.

Digging the hole: A firm, flat-bottomed hole will prevent trees from sinking. Dig the hole only deep enough to position the root collar 1 to 2 inches above the landscape soil surface (Figure 8). Dig the hole 2 to 3 times the width of the root ball. This loose soil promotes rapid root growth and quick establishment.

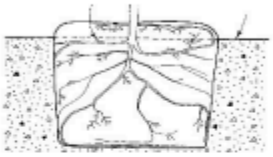


Figure 9. Remove soil and roots growing over the root collar and place collar 1 to 2 inches above soil surface.

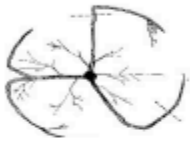


Figure 10. Cut roots at to form new roots that grow away from the trunk. Do not cut roots at since the root defects will regrow.

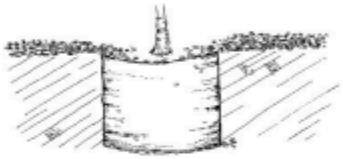


Figure 11. Mulch shall taper to a slightly thinner layer on top of the root-ball.

Installing the tree: Remove soil and roots from the top of the root ball to expose the root collar; cut away any roots that grow over the collar (Figure 9). Cut any roots that circle or mat along the sides and bottom of the root ball (Figure 10). The root collar shall be 1 to 2 inches above the landscape ground level to allow for settling after planting (see Figure 9). Backfill with soil removed from the hole. Minimize air pockets by packing gently and applying water. Build a berm around the root ball to help force water through the root ball.

Mulching: A layer of organic mulch, such as leaf litter, shredded bark, or wood chips, helps protect tree roots from temperature extremes and conserves soil moisture. Mulch also helps prevent grass from competing with the tree for water and nutrients. The mulched area makes it easier to operate mowers and weed eaters without hitting the trunk and compacting soil. Apply mulch to a depth of 2 to 3 inches (Figure 11). Mulch should be kept away from contact with the trunk.

Figure 12. Double

Figure 13. Double staked with splint stake.

Figure 14. Single staked with splint stake.

Staking: The method of staking is dependent on a tree's ability to stand on its own and the location of the planting site. If the tree can stand on its own, it does not need to be staked. Staking is used to hold trees erect, allow the root ball to anchor, and protect the trunk from damage by equipment. The ties around the trunk and to the stakes should not be tight – the tree should be able to move slightly in the wind. Stakes should be removed when the tree can stand on its own and the root ball is anchored. Stakes should be positioned away from the tree and secured to the trunk at the point where the tree stands straight. Do not use wire or any strap that will

girdle the tree or damage the bark. Acceptable staking examples may be seen in Figures 12, 13, and 14. Another acceptable method of staking is the use of tree anchor stakes which are driven completely through the root ball into the firm soil below.

Tree Training in the Early Years

Figure 15. Good tree structure (left); poor structure (right).

Trees with branches spaced along the central leader, or trunk (Figure 15) are stronger than trees with branches clustered together (Figure 15). Prune trees at planting to one central leader by removing or shortening (shown) competing stems (Figure 16). All branches and stems shall be considerably shorter than the central leader after pruning is completed (Figure 16).

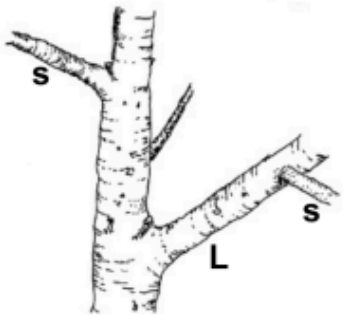


Figure 17. Only large branches need pruning (L). Small branches (S) do not need to be pruned.

Remove or shorten branches that are larger than half the trunk diameter at planting. (Figure 17). The central leader shall be more visible in the crown center after pruning. Only large-diameter branches need to be pruned because they compete with the leader and could be weakly attached (Figure 17, L). Small branches (Figure 17, S) do not need pruning because they will not compete with the leader.

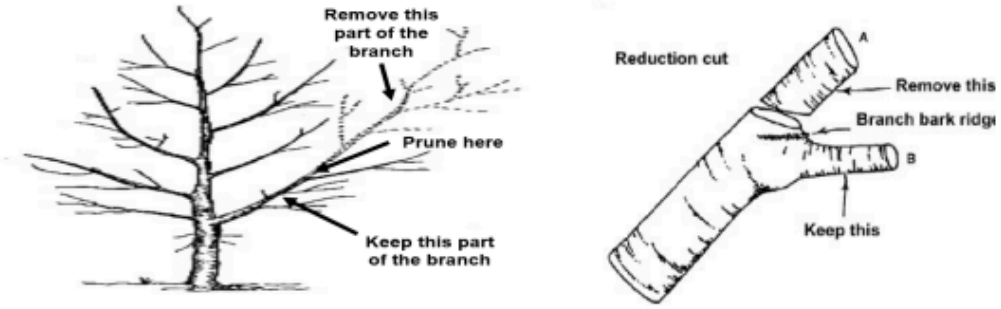


Figure 18. Shortening larger low branches concentrates growth in the leader and improves tree structure.

The best way to shorten large or long stems and branches is to cut them back using a reduction cut to a live lateral branch (Figure 18). This slows growth on the pruned parts and encourages growth in the dominant leader creating sound structure. Reduction cuts can be used on trees at planting to subordinate branches that are codominant (Figure 18). Some upright stems and branches can be removed entirely back to the trunk.

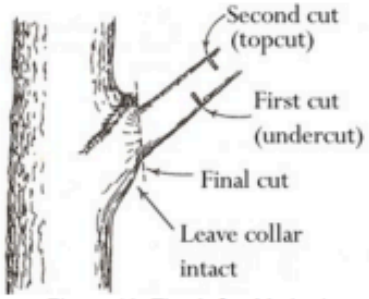


Figure 19. The 3-Cut Method

Remove larger branches by making three cuts (Figure 19). This prevents the bark from peeling or splitting off the trunk below the cut. Make the final cut back to the branch collar (enlarged area around union of branch where it joins the trunk).

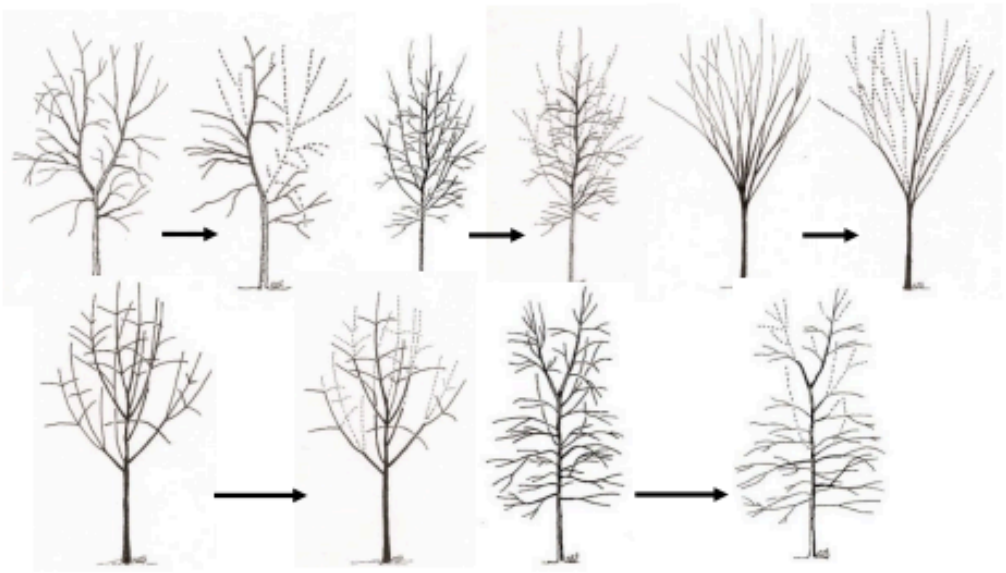


Figure 20. Before and after pruning at planting

Structural Pruning Checklist

1. Develop and maintain a central leader.
2. Prevent branches below the permanent crown from growing larger than half the trunk diameter.
3. Space main branches along the central leader.
4. Reduce vigorous upright stems back to lateral branches or remove entirely (Figure 20).

City of Lewisville Approved Plant Materials Lists

Below is a table of the approved Plant Materials, the most preferred trees are Live Oak, Cedar Elm, Bald Cypress, Bur Oak, Pecan.

EXHIBIT VIII.3.3-2 APPROVED SHADE TREES

SHADE TREES	
Common Name	Scientific Name
Afghan Pine	*Pinus eldarica*
American Elm[1,2]	*Ulmus americana*
Austrian Pine	*Pinus nigra*
Bald Cypress[1]	*Taxodium distichum*
Bigelow Oak[1]	*Quercus sinuate var. brevilba*
Black Hickory[1,2]	*Carya texana (aka Carya buckleyi)*
Black Locust	*Robinia pseudoacacia*
Bur Oak[1]	*Quercus macrocarpa*
Caddo Maple	*Acer saccharum "Caddo"*
Cedar Elm[1,2]	*Ulmus crassifolia*
Chinquapin Oak[1]	*Quercus muhlenbergii*
Durrand Oak[1]	*Quercus sinuata var. sinuata*
Green Ash[1]	*Fraxinus pennsylvanica*
Japanese Black Pine	*Pinus thunbergii*
Lacebark Elm[2]	*Ulmus parvifolia*
Lacey Oak[1]	*Quercus fusiformis*
Live Oak[1]	*Quercus virginiana*
Mexican Sycamore	*Platanus mexicana*
Monterey Oak (aka Mexican White Oak)[1,2]	*Quercus polymorpha*
Pecan[1]	*Carya illinoinensis*
Pond Cypress	*Taxodium accendens*
Post Oak[1]	*Quercus stellata*
Sawtooth Oak	*Quercus accutissima*
Shumard Red Oak (aka Texas Red Oak)[1,2]	*Quercus shumardii (aka texana)*
Southern Magnolia[1,2]	*Magnolia grandiflora*
Sweetgum[1]	*Liquidambar styraciflua*
Texas Ash1[1,2]	*Fraxenis texensis*
Texas Walnut[1]	*Juglans microarpa*
Willow Oak[1,2]	*Quercus phellos*
Winged Elm[1,2]	*Ulmus alata*

1 Native species, which is preferred but not required.
2 Species approved for planting within the right-of-way along Streets and Thoroughfares

EXHIBIT VIII.3.3-3 APPROVED UNDERSTORY TREES

UNDERSTORY TREES	
Common Name	Scientific Name
Carolina Buckthorn[1]	*Rhamnus caroliana*
Chittamwood[1]	*Sideroxylon lanugi-nosum (aka Burmelia lanuginose)*
Crepe Myrtle (tree form)	*Lagerstroemia indica*
Desert Willow[1]	*Chilopsis linearis*
Eastern Redbud[1]	*Cercis canadensis*
Eastern Red Cedar[1]	*Juniperus virginiana*
Eve's Necklace[1]	*Sophora affinis*
Hawthorne[1]	*Crataegus spp.*
Hollywood Juniper	*Juniperus chinensis 'Torulosa'*
Little Gem Magnolia	*Magnolia grandiflora 'Little Gem'*
Mexican Buckeye[1]	*Ungnadia speciosa*
Mexican Plum[1]	*Prunus mexicana*
Mexican Redbud[1]	*Cercis canadensis var. mexicana*
Possumhaw Holly (aka Deciduous Yaupon Holly) [1]	*Ilex decidua*
Prairie Flameleaf Sumac[1]	*Rhus lanceolata*
Red Buckeye[1]	*Aesculus pavia*
Roughleaf Dogwood[1]	*Cornus drummondii*
Rusty Blackhaw Viburnum[1]	*Viburnum rufidulum*
Texas Buckeye[1]	*Aesculus arguta/glabra*
Texas Mountain Laurel[1]	*Sophora secundiflora*
Texas Persimmon[1]	*Diospyrus texana*
Texas Redbud[1]	*Cercis canadensis var. texenis*
Thornless Common Hon-eylocust1	*Gleditsia triacanthos var. inermis*
Wax Myrtle1	*Myrica cerifera*
Western Soapberry[1]	*Sapindus drummondii*

1 Native species, which is preferred but not required.

EXHIBIT VIII.3.3-4 APPROVED SHRUBS

Shrubs	
Common Name	Scientific name
Agarita*[1]	*Berberis trifoliolata*
American Beautyberry*	*Callicarpa americana*
Apache Plume*	*Fallugia paradox*
Aromatic Sumac*	*Rhus aromatica*
Coralberry*[1]	*Symphoricarpos orbiculatus*
Dwarf Wax Myrtle*[1]	*Myrica pusilla*
Dwarf Yaupon Holly*	*Ilex vomitoria 'Nana'*
Evergreen Sumac*[1]	*Rhus virens*
Flame Acanthus*	*Anisacanthus quadrif-idus*
Flowering Quince	*Chaenomeles japonica*
Fragrant Mimosa*	*Mimosa borealis*
Indian Hawthorn[1]	*Rhapiolepis indica*
Lindheimer Nolina*[1]	*Nolina lindheimeri*
Tam Juniper[1]	*Juniperus sabina 'Tamariscilfolia'*
Texas Nolina*[1]	*Nolina texana*
Turks Cap*	*Malvaviscus drummondii*

** Native species, which is preferred but not required.*

1 Considered Evergreen

K. Native Plants and Pollinative Prairies

General – Ensure the economic, ecological, and social sustainability of Lewisville's parks, recreation, and open space system.

- A list of eligible small pollinators plant list is attached in the appendix.
- A list of Invasive species to avoid is attached in the appendix.

An "invasive species" is defined as a species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

1. Site requirements

a. The site should be at least 10,000 square feet.

b. The site should be in a sunny area.

c. The site should be 60 feet from any residential home.

d. An initial plant survey should be done to assess how many current invasive and native species are at the proposed site.

2. **Site preparation**
    a. The site will be mowed twice before its seeded.
        i. After the initial mowing, wait two-three weeks then mow again.
        ii. Mow as low as possible without destroying equipment.
    b. When applicable till the site using the PTO-60 at a 2 inch depth.
    c. Butterfly Retreat and Blackland Prairie mixes should be used at the lawn and garden rate for establishment.
3. **Seeding the site**
    a. New sites should be seeded starting in August and completing by the end of November.
    b. The seeds should be mixed with vermiculite at a 50/50 ratio.
    c. The seed mixture will be put out with the Z-spreader.
        i. The first pass will be north to south.
        ii. The second pass will be east to west.
    d. Once the seeds have been sown, they will be rolled with a sod roller.
    e. Attach the sod roller to the gator and make several passes to ensure good seed to soil contact.
4. **Maintenance**
    a. Sites will be monitored once a month for invasive species.
    b. Invasive species will be addressed according to their severity.
        i. Invasive should account for no more than 20% of the total population.
    c. Sites will be mowed once a year in January.
    d. For the first 5 years sites will be over seeded after the January mowing at the range land rate.
    a. Mature plants might be needed to establish founder colonies.
    b. Seed collection should be done twice a year, June and October.
    c. Seed collection should be done with the aid of volunteers.

L. Illumination

Shielded lighting fixtures shall be used to illuminate portions of the park including parking lots and designated areas, efficient lighting sources should be used such as;

- Light Emitting Diode (LED) fixtures and
- "Dark Sky" elements should be used.
    - Useful
    - Targeted
    - Low Level
    - Controlled
    - Warm Colored
- LED lights can last for well over 100,000 hours and generally pay for themselves with reduced energy use over a period of a few years. LED lights can also be selected for "whiteness", color rendition, and contrast, making them ideal for use in public spaces. The "Dark Sky" approach to illumination results in all light being directed toward the ground surface and no higher than 90 degrees from the light source. This results in the use of more efficient fixtures and lamps which do not waste electricity by projecting light into the sky. According to the International Dark Sky Association, installing quality outdoor lighting could cut energy use by 60–70 percent.

Solar Viper LED Solar Lighting

Lighting selection will be evaluated by the Parks and Recreation staff for approval, below are examples of NRPA Low Energy Light Recommendations.

NRPA Low Energy Light Recommendations

Name/Website	Phone Number
Echelon Corporation	408.938.5200
Ephesus Lighting Inc.	315.579.2873
Landscape Forms	800.430.6209
Lithonia Lighting	800.922.9641
Musco Lighting	800.825.6030
Schreder Lighting LLC	847.621.5130
Sol Inc.	800.959.1329

M. Irrigation

1. **General** - It is important for Park Maintenance to have a consistency in the installation, repair and service of their irrigation systems. Below are standards and specific brands used for the parks, ballfields, and flower gardens for the City of Lewisville. The software, controllers and flow meters listed are essential for monitoring the health and efficiency of the irrigation system that can detect flow rates, water leaks and usage. Full Irrigation Specifications for City Parks, Medians, and Facilities can be found here: Irrigation Specifications for City Parks, Medians and Facilities.pdf
2. Standards & Equipment Recommendations
    - Irrigation
        - Hunter Industries - Sprinkler heads, nozzles, bubblers, valves, and wire.
    - Software

- ICC Software - powerful graphic interface allows insertion of actual site photographs, maps, and project renderings. IRRInet-FIU uses wireless and cellular connections.

- Controllers
  - IRRInet systems utilize Motorola controllers to control water functions and reporting to ICC software.
- Flow Meters
  - ARAD Hydrometer used to meter water and electrically activated double chambered irrigation valves.

N. Green Infrastructure & Sustainability

General – The City of Lewisville adopted a Sustainability Master Plan in May 2021. This plan covers how the city as a whole can incorporate sustainability practices. The Parks and Recreation Department continues to develop parks to support sustainability and ecology efforts throughout the city. Strategies are:

a. Parks for Stormwater Management

Parks can be designed to support stormwater management and reduce water consumption. Parks that continually flood can be evaluated and converted into “sponge parks” to absorb water through the incorporation of interpretive wetlands and boardwalks.

b. Low Impact Development

Low Impact Development (LID) is an alternative design strategy that uses natural and engineered infiltration and storage techniques. Typically, these types of techniques are used in developed areas to filter stormwater run-off prior to it re-entering the water system. Park development can utilize LID in a variety of ways:

- **Parking Lots:** Parking lots can utilize a variety of LID techniques such as permeable pavers, porous concrete, gravel lots, or the use of rain gardens/bioretention for landscaped islands. These techniques are used to either capture or slow down water prior to enter the aquifers.

By slowing down this process, native vegetation can break down and filter pollutants out of the water.

- **Ponds:** Pond areas can include diverse riparian buffers to provide enhanced quality and benefits before run-off enters pond areas.
- **Watering:** A variety of water-saving measures can be utilized, including the incorporation of rain barrels and cisterns to collect run-off from rooftops and the utilization of no-mow/natural areas. Rain barrels and cisterns can supplement watering measures for gardens and smaller vegetated spaces.

c. Sustainability and Technology in Parks

How parks are designed and maintained have an impact on sustainability and water consumption. Technology should be a key component in the parks system to ensure efficient watering practices and reduced energy needs. Examples of improved technology in parks include, but are not limited to:

- **Maintenance:** By utilizing automatic watering systems and improving monitoring resources for irrigation, streamline watering practices and reduce unnecessary watering.
- **Surfaces:** Utilize alternative surfaces for fields and play structures that require less maintenance and watering. For example, play fields can be replaced with artificial turf.
- **Native Planting:** Native species provide a more natural habitat for wildlife, are compatible with the climate (i.e., drought tolerant) and typically require less watering, maintenance, and fertilizers. Local plants are more resistant to insects and support local biodiversity. The city should continue to incorporate native plantings into their parks and open spaces.

d. Pervious Pavement for Parking and Walkways

Permeable paving not only reduces storm water runoff rates, by allowing water to soak into the ground it helps reduce pollution from runoff with oils

and grease from vehicles. As shown in Protection can be used near trees to protect roots and allow oxygen exchange.

e. Recycled Materials

Several recycled materials are being used frequently throughout Texas, including reclaimed asphalt pavement, crushed concrete, and fly ash. Each of these has different permeability characteristics, depending on the gradation and installation. However, they can be used to create a paving that reduces runoff and helps maintain a more natural appearance than concrete or asphalt pavement.

f. Bioswales

Bioswales can be an important part of the storm water detention and storm water quality systems for new construction when incorporated into the project early in the site planning process.

g. Air and Heat Monitors

Install air quality and ambient temperature monitors during an improvement project.

- Air quality sensor: https://www2.purpleair.com/products/purpleair-flex
- The temperature sensor: https://www.onsetcomp.com/products/data-loggers/mx2301a
- The solar radiation shield: https://www.onsetcomp.com/products/mounting/m-rsa

O. Signage, Wayfinding, and Graphics

a. General

Signage, wayfinding, and graphics must have clear messaging and consistency. The Lewisville Parks and Recreation Department has established standards that help orient users to parks, trails, and community amenities; support accessibility for all users; and incorporate the department's brand (PLAY Lewisville) using common design language, fonts, and colors.

b. Standards

The City of Lewisville has two documents that reference signage, wayfinding, and graphics to be used in parks, trails, and community amenities and are attached in the appendix.

- Park and Trail Wayfinding Signage & landscape Standards
- PLAY Lewisville Marketing Manual

Section 4 - PARK TYPOLOGY

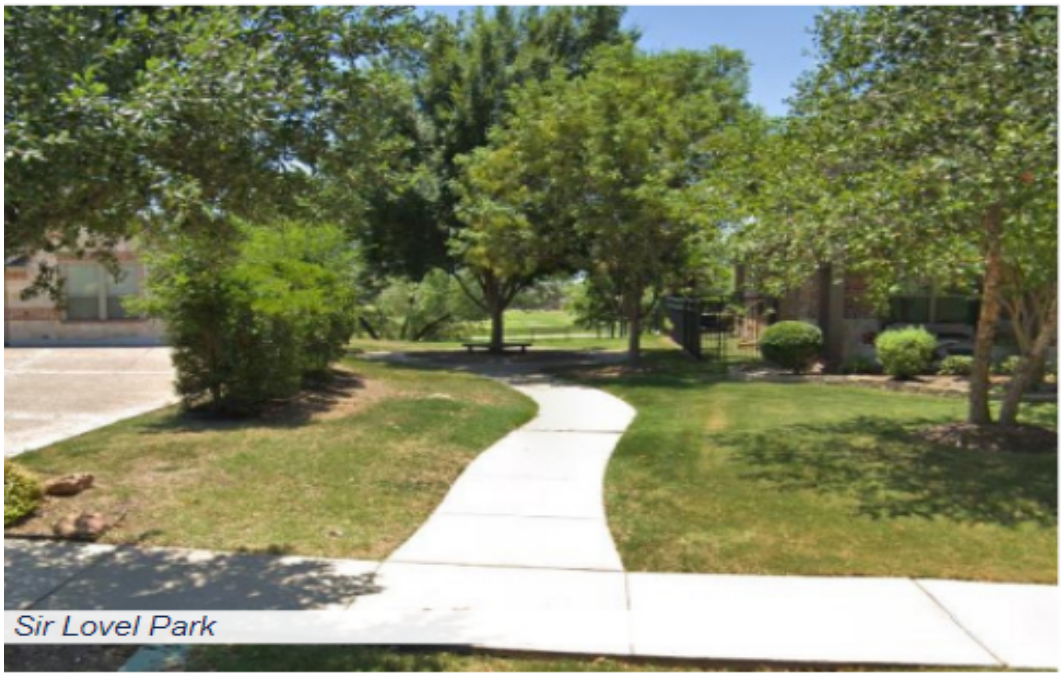
Pocket Parks (P)

Size: One acre or less

Service Area: Serves a one-quarter mile radius

Definition:

Pocket parks provide limited or unique recreation opportunities for higher density areas of the city. Pocket parks may be active or passive and are designed in a way that reflects the needs of the surrounding population. They may have limited amenities that include small pavilions, picnic areas, park benches, and walking paths to create connections. Off-street parking is typically not provided and parklets are often utilized in more dense locations. In urban areas, pocket parks can be in the form of parklets, which are public spaces created by converting parking spaces into pedestrian areas, which may include designated seating, greenery and/or bike racks to accommodate unmet demand for public space in areas with restrained space for a larger park.



Sir Lovel Park

Neighborhood Parks (N)

Size: Typically, 1 to 15 acres

Service Area: Serve residents within a one-quarter to one-half mile radius

Definition:

Neighborhood parks serve diverse groups of residents within a limited area or neighborhood. Neighborhood parks intend to provide nice balance of active and passive space; utilizing facilities, amenities, and open space based on the needs of the surrounding community. Neighborhood parks include areas for recreation activities such as sports or multi-use fields, sports courts, playgrounds, etc. Passive recreational activities may include walking trails, seating, and public gathering spaces. Facilities are generally unlighted, and off-street parking is not provided since neighborhood parks typically serve patrons within a walking distance.


Dragon Park

Community Parks (C)

Size: Typically, 16 to 99 acres

Service Area: Serve residents within a one- to two-mile radius

Definition:

Community parks often include specific programming and more active recreation amenities for the community at large. These recreation activities may include spaces for competitive and non-competitive sports, playgrounds, and multi-use fields. Passive recreation may include walking trails, seating, and public gathering spaces. Facilities are generally lighted and have support facilities like bathrooms or concessions based on need. Community parks typically include off-street parking.

Central Park

Regional Parks (R)

Size: 100 acres or large

Service Area: Serve the entire city and capture regional visitors

Definition:

Regional parks provide both active and passive recreation opportunities, with a wide selection of facilities for all age groups. They can include active recreation, passive recreation, and may utilize open space for conservation or natural areas. Active recreation in the developed area utilizes a variety of outdoor recreation activities such as sports fields and playgrounds. They may also include areas of nature preservation for activities such as trails for walking, sightseeing through distinct topography, natural areas, wildlife habitat, and conservation areas. National Recreation and Park Association (NRPA) standards for regional parks vary due to the specific site characteristics and natural resources; and as such, do not provide specific standards and criteria regarding park size.

Lake Park

Linear Parks (L)

Size: Varies

Service Area: Serve residents within a one-quarter to one-half mile radius

Definition:

Linear parks are built connections or natural corridors that link parks together through a greenway. Typically, the linear park is developed for one or more modes of active or recreational travel such as walking, jogging, biking, in-line skating, hiking, horseback riding, or canoeing. Linear parks may include active play areas. The NRPA does not stipulate specific standards for linear parks other than they should be sufficient to protect the resource and provide maximum usage.

Copperas Branch Trail

Nature Parks/Preserves (NP)

Size: Varies

Service Area: Serve the entire city and capture regional visitors

Definition:

Nature parks include areas for protection and management of the natural/cultural resources with recreational use as a secondary objective. Recreational use might include passive recreation such as walking trails that can be paved or soft surface hiking trails, or paddling trails for viewing and studying natural wildlife habitats. The NRPA does not indicate specific acreage or size standards for nature parks/preserves other than they should be sufficient to protect the resource and provide appropriate usage

Special Use Parks (SU)

Size: Varies

Service Area: Serve the entire city and capture regional visitors

Definition:

Special use areas and parks are designed and programmed for specialized or single-purpose recreation activities. The NRPA defines these parks as historical areas, nature centers, marinas, golf courses, zoos, conservatories, arboretums, arenas, amphitheaters, plazas, water parks, or community squares.

Wayne Ferguson Plaza

School Parks (SP)

Size: Varies

Service Area: Serve residents within a one-quarter to one-half mile radius

Definition:

School yards include facilities and open space areas that have been designated for use as public parks in out-of-school times (after school, weekends, summers, holidays). An interlocal agreement with the school district or an individual school is required to grant public access. Development of any amenities are programmed in conjunction with school officials.

P. APPENDIX

- List of Acronyms
- Park Project Checklist
- "Good, Better, Best" Park Dev - Bike Rack and Fitness Equip
- Lewisville Unified Development Code Park Development Regulations
- Replacement of Protected Trees and Credits for Preserved Trees
- Lewisville Pollinator Plants
- Lewisville Invasive Species - https://www.texasinvasives.org/plant_database/index.php
- Parks and Recreation Wayfinding & Signage Plan
- Healthy Infrastructure Plan