

VI. CITY WIDE TRAIL SYSTEM PLAN

Trails are an important component of the future park system, as they serve recreational, transportation and linkage purposes. In Cedar Hill the transportation and linkage aspects of a City-wide trail system will serve a local and regional purpose. The Dallas County Trail Plan shows the Ten Mile Creek Trail (Roy Orr Trail) having direct linkage to the Great Trinity Trail, an inter-regional trail which runs through North Central Texas via the Dallas-Forth Worth Metroplex to Lake Texoma, with the anticipation of extending into Oklahoma in the future.

PURPOSE OF THE TRAIL SYSTEM PLAN

First and foremost, the City Wide Trail System Plan will serve as a planning tool for Parks and Recreation Staff and the Cedar Hill Community Development Corporation. It will also serve to create a vision for a City-wide trails and greenway network and assist public and private entities who wish to contribute funds or resources to the development of the system. Another key purpose of the trail plan is to serve as a basis for coordinating with other City departments, to reduce conflicts with their development activities including utility installation, transportation, water quality, storm water runoff, planning services and other activities.

DESIGN CONSIDERATIONS

The following is a general discussion of the parameters associated with trail design and construction. The conclusion of this section contains recommendations for the design and construction of the Cedar Hill Trail System.

TYPES OF TRAILS

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| Separated Trails – | Separate trails and trail systems are provided for each type of trail user, e.g. bicyclist, pedestrian, skaters. |
| Shared Trails – | Trails are shared by two or more user groups but design parameters restrict the use of the trail by some groups. |
| Multi-Use Trails – | All trail user groups occupy the same trail or trail corridor. The physical design of the trail must be modified accordingly, to accommodate the demands of the expected user groups. |



TRAIL SURFACES *

Natural Surface – Most of Dallas County is on clay type soil, which is easily disturbed when wet. Side slopes should be stabilized to avoid being washed onto the trail during heavy rain. Drainage is key to trail corridor safety and maintenance. Use appropriate grading techniques and soil stabilization, such as, grass seeding, plantings, erosion control blankets or rock rip-rap to minimize hazards to users. Natural surface trails should not be used during periods of wet weather to prevent surface damage and should be so signed at trailheads.

Mulch – Mulching a trail can be an effective treatment for trails in clay soil areas. To avoid washouts and watershed deposits, mulching should be avoided in areas of steep terrain. Many types of mulch can work, but one of the most effective and least expensive, long-lasting treatments is hardwood mulch.

Board Walk – Trails should avoid sensitive environmental areas, low areas, wetlands or flood plains. However, trails in wetlands can be useful as educational corridors. Board walks allow existing drainage patterns and a site's hydrologic conditions to be preserved while providing access to areas of interest. Board walks minimize construction damage and prevent user disruption to fragile ecosystems. Areas for which boardwalks should be built include marshy or wet sites in the immediate vicinity.

Gravel – Gravel is a granular rock material used in non-rigid paved surfaces and generally defined as having a particle size between 2mm (fine gravel) and 20mm (medium to coarse gravel). When considered as a paving material, gravel has several desirable characteristics. Gravel drains well and is a pervious material, and the coarser the material the less the likelihood that it will be washed away by rainfall or flooding. It is readily obtainable in the Dallas area.

Its usefulness as a trail paving material is limited. Gravel is a non-compacting material that is loose and inhibitive to all forms of trail use other than casual foot traffic. Roller blades, bicycles and wheelchairs alike will not perform adequately on a gravel surface and are subject to skidding and a general lack of traction. Pedestrians tend to collect irritating gravel particles in their shoes, rendering the trail more or less a nuisance than



an enjoyable outdoor amenity.

When mixed with other material such as clay/silt particles, or other cement type material, gravel can be stabilized as a semi-rigid to rigid paved surface. Such a surface would be more accepting of wheeled and foot traffic.

When adding gravel or mulch to a trail, care should be taken to avoid excessive material depth, as this can impair even the hardest pedestrian. Of the many different types of gravel treatments available, some are much more conducive to trail use. Avoid pea-gravel for anything other than equestrian trails, and even then, use should be sparing. Aggregate, crushed or decomposed granite is a very effective trail surface and can easily be upgraded to hard surface. Although off road bicyclists can negotiate most well compacted gravel trails, access can be difficult for disabled users.

Asphalt –

Hot mix asphalt can be cost effective to install, but in areas of full sun, decomposition is accelerated by maintenance vehicle traffic. Edges require containment for stability and long term viability. Surface is softer for walking or jogging. Cold-mix asphalt is suitable for patching but is labor intensive. Asphalt is easy to patch or expand, but care should be taken to ensure an even surface for road bicyclists and wheelchair users.

Concrete –

While initially more expensive than other material choices, concrete is the longest lasting trail surface with an expected life span of 25 years or more. It requires the least maintenance of any trail surface material. Only saw cut expansion joints should be used to avoid differential settling due to freeze/thaw and wet/dry cycles. Concrete is suitable for poor sub-soil conditions, but is more expensive to repair. Non-skid medium broom finish is ideal for bicycle traffic. Concrete is less desirable for jogging paths.

* Excerpted from the Dallas County Trail Plan – Trails for the Twenty-First Century, Prepared for the Dallas County Commissioners Court and Dallas County Park and Open Space Program, prepared by Halff Associates, Inc. and Bowman – Melton Associates, Inc.



MULTI-USE TRAIL WIDTH

The most appropriate width for multi-use trails has been one of the most discussed topics of parks and recreation construction. The following are the widths required for several different scenarios of common trail usage.

- The minimum width to meet ADA (American Disability Act) guidelines is thirty-six inches (36"); however, this width does not allow traffic flow in both directions and therefore should not be considered.
- A six-foot width is the minimum width to allow wheelchairs traveling in opposite directions to pass unimpeded, even so, at this width the occupants must maneuver to the very edge of the trail.
- Two people walking side by side meeting a bicycle from the opposite direction would require a minimum width of eight feet (8') and comfortable width of ten feet (10'). However, two people walking side by side would require a comfortable width of twelve feet (12') because the bicycle passing them on the narrower width will result in the pedestrians being startled or require the bicyclist to slow excessively.
- Two bicyclists pedaling side by side require a minimum width of 5.3 feet and a comfortable width of eight feet (8'). ⁽¹⁾

Two bicyclists traveling in opposite directions require a minimum of 6.5 feet to pass and a comfort width of 10.9 feet. ⁽¹⁾

Two bicyclists traveling side by side, meeting a bicyclist from the opposite direction or another bicycle passing them requires a minimum width of nine feet (9') and a comfort width of twelve feet (12').

The North Central Texas Council of Governments' "Bicycle and Pedestrian Facilities Planning and Design Guidelines" states "The minimum width required for two opposing bicyclists to pass and share the path with a pedestrian is 12.5 feet. ⁽²⁾ The NCTCOG guidelines do stipulate that widths less than 12.5 feet may be acceptable given the following circumstances: (1) bicycle traffic is expected to be low, even on peak days or during peak hours; (2) pedestrian use of the facility is not expected to be more than occasional; (3) there will be good horizontal and vertical alignment, providing safe and frequent passing opportunities; (4) the path will not be subjected to maintenance vehicle loading conditions that would cause pavement edge damage and (5) access



maintenance or emergency vehicles are not needed. A multi-use pathway should never be less than eight feet (8') wide.

- (1) Bicycle Transit, It's Planning and Design, Bruce L. Balshone, Paul L. Deering, Brian D. McCarl Praeger Publishers, New York, 1975.
- (2) Bicycle and Pedestrian Facilities Planning and Design Guidelines, North Central Texas Council of Governments, December 1995.

VERTICAL CLEARANCE

The absolute minimum vertical clearance for multi-use trails is 8.2 feet, 9.5 feet is the minimum comfortable height ⁽¹⁾. The vertical clearance may need to be greater to permit passage of maintenance vehicles. ⁽²⁾ Clearance under crossings and tunnels should be ten feet (10') for adequate vertical shy distance ⁽²⁾.

LONGITUDINAL SLOPE (GRADE)

Grades on off-street paths should be kept to a minimum, especially on long inclines. Grades greater than five (5) percent are undesirable because the ascents are difficult for many bicyclists and the descents cause some bicyclists to exceed the speeds at which they are competent. ⁽²⁾ ADA guidelines stipulate that anything exceeding five percent (1 foot rise in 20 horizontal feet) is a ramp and must be constructed with handrails, a maximum rise of thirty inches (30") in a maximum length of thirty feet (30') and must have a 60" x 60" landing at the base and the top. Therefore to be in compliance with ADA guidelines trail ramps can not exceed an 8.33% slope (1 foot rise in twelve horizontal feet).

SIGNS

Adequate signs and markings are essential on multi-use trails, especially to alert users to potential conflicts and to convey regulatory messages to both users and motorist at street intersections. In addition, guide signs, such as those indicating destination, direction, distance, route numbers and names of cross streets, should be used in the same manner as they are on highways. ⁽²⁾

ACCESS POINTS

Although access to the trail will usually be available at every road crossing, the users of the trail should be



encouraged to enter the trail at specific access points. By designating specific points of access, there may be an elimination of possible encroachment on private property, as well as, preventing possible congestion at busy road crossings. (1)

LIGHTING

Lighting of the multi-use trail should be considered, especially if the off-street routes are intended for transportation purposes, many trail commuters may need to travel during poorly lit morning and evening hours. Fixed source lighting reduces conflicts along paths and at intersections. In addition, lighting allows the trail user to see the path direction, surface conditions and obstacles. Lighting should be considered through underpasses or tunnels and when night time security could be a problem. (2)

The standard horizontal illumination level is 5 lux (0.5 foot candle) to 22 lux (2 foot candles). Where special security problems exist, height illumination levels may be considered. (2)

LOCATION OF TRAIL IN THE CORRIDOR

In addition to locating the trail corridor from point of origination to destination, the specific alignment of the trail within the corridor must be determined. The following is a listing of items for consideration when selecting the actual alignment of the trail within the corridor as excerpted from the North Texas Council of Government's (NCTCOG's) "Bicycle and Pedestrian Facilities Planning and Design Guidelines."

- Always locate with trail drainage in mind; specifically water concentration, erosion control, sediment filtration, etc.
- Do not locate on extreme terrain.
- Locate at least one route which is suited to all-season use.
- Contour trail grades to fit existing topography and to reduce structures necessary to control drainage.
- Locate the trails far enough away from stream banks and shorelines of lakes to allow for natural vegetative filtration of the runoff water.
- Provide spur trails to points of interest in environmentally sensitive areas.
- Provide overlooks and observation points for scenic vistas and interpretive features.
- Provide safe, quick crossings of roads, railroads and utility right-of-way.



TRAFFIC CONTROL DEVICES

Pedestrian signals designed to accommodate a one meter (3.2 feet) per second walking speed, should be provided at major streets where traffic volume and speed is high. ADA stipulates that where provided, buttons shall be raised or flush and a minimum of 1.9 centimeters (3/4 inch) in the smallest dimension. The force required to activate controls shall be no greater than 22.2 N (5 lbs). Additionally, controls shall be located as close as possible to the curb ramp and, to the maximum extent feasible, shall permit operation from a level area immediately adjacent to the controls and a maximum of 122.7 centimeters (48.3 inches) high. ⁽²⁾

To provide clear visibility of pedestrians approaching intersection crosswalks at night, the approaches and all street corners should be well illuminated. All intersection lighting should illuminate the crossing and waiting areas and/or create backlighting to make the pedestrian silhouette clearly visible on approach. All commercial, entertainment, school and other pedestrian traffic generating corridors and spaces should be well illuminated. Raised islands in crossings should be cut through level with the street or have curb ramps or other sloped area at both sides. There should be a level area 121.9cm (48 in) long minimum and a minimum of 91.4cm (36 in) wide in the part of the island intersected by the crossings. ⁽²⁾

Cedar Hill Trail System Design Recommendations

The above outlined design parameters which are specific in nature, shall be followed as delineated. The following recommendations delineate the selected design criteria for the above outlines parameters which were general in nature or which gave several options.

Off-Street Trail Width

In off-street applications the trails shall be a minimum of ten feet (10') wide; where feasible the more comfortable 12 foot width shall be used.

On-Street Trail Width

In on-street applications the ten-foot width will not be feasible due to the limited width of the parkway (street side right-of-way). A minimum width of six feet (6') shall be maintained for all on-street trails, where the locale allows trail width shall be expanded to eight feet (8') (ten feet (10') adjacent to large lot residential development). In most residential areas an eight-foot (8') maximum width should be maintained as it is felt this will tend to reduce the velocity of bicycle traffic.



TRAIL SURFACE

All multi-use trails within the Cedar Hill trail system shall be constructed of concrete.

ACCESS POINTS/TRAIL HEADS

Trail heads shall be served by parking lots accommodating ten to twenty parking spaces. Trail heads should be located adjacent or a short distance from main trail corridors and located at each main trail terminus. Design elements of trail heads should include a drinking fountain, benches, stretch post or other equipment to encourage and facilitate stretching exercises and a mounted map of the trail system with their present location indicated.

TRAIL SIGNS

Warning signs shall consist of the traffic control signage and devices indicated in the design guidelines.

Directional signs are imperative to facilitate user comfort and confidence, thereby ensuring optimal use of the trail from the standpoint of participation/occupancy levels and enjoyment level of the participants. At trail intersections signs should be provided that indicate destinations; of the various trail branches and a distance to each destination, the cardinal directions should also be indicated. Consideration should be given to providing a map of the trail system at each intersection of major trail branches.

Within residential neighborhoods, in addition to the aforementioned signage, the pavement surface shall be demarked in such a manner that trail users will be able to follow the trail routing through the neighborhood without becoming confused and possibly taking a wrong turn.

Spur trails linking neighborhoods to parks and schools shall have a definite indication at the trail terminus so trail users unsuspectingly traveling into the neighborhood are made aware that the trail system ends at that location. Provision of a map indicating the direction to the main branch of the trail would be beneficial at these locations.



Trail System Plan Approach

Citizen input with regard to the development of the City Wide Trail System Plan was collected in connection with the citizen /public hearings conducted for the Parks, Recreation and Open Space Master Plan. It was felt that the Trail System Plan is an integral part of the City's parks and recreational system.

Even though the needs analysis has identified the need for trails as high priority in the above defined categories, creating a network of trails in a highly urbanized City such as Cedar Hill will be difficult, considering the lack of vacant parcels in some sections of the City and the high cost of acquiring land.

The Trail Master Plan illustrates the future location for pedestrian trails. The primary purpose of the Trail Master Plan is to guide the City in acquisition and development of a trail system which will provide pedestrian access and recreation opportunities to the citizens of Cedar Hill.

The City has identified a segment of trail as the "Cedar Hill Core Trail". This trail begins at the northwest section of the City at the Cedar Hill State Park and continues to the southeast section of the City. The core trail connects public and private parks, major retail and the Government Center.

With the existing trails and previously planned trails located, trail alignments were studied which would implement the priorities as delineated. Specifically, alignments were charted which connected the residential neighborhoods to the parks and schools, provided linkage from park to park and finally loops were provided, facilitating movement throughout the City via non-motorized transportation.



Trail Master Plan Map

