Texas Department of Transportation

Technical Provisions

Book 2

Attachment 15-1

Fort Worth District
Texas Department of Transportation

LANDSCAPE AND AESTHETICS MASTER PLAN

____, 2007

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INTRODUCTION

The Texas Department of Transportation (TxDOT) is the state agency that is charged with the construction and maintenance of major connecting highways in the state. TxDOT's Mission is to work cooperatively to provide safe, effective and efficient movement of people and goods. The Fort Worth District of TxDOT is comprised of nine counties containing approximately 3100 centerline miles of roadway and 32,000 acres of unpaved right-of-way.

Over the years, the visual character of our roadways has become increasingly important and it is anticipated that it will continue to do so in the future, especially in the more urbanized areas. A negative result of urbanization has been a deterioration of air quality in the highly populated urban centers of the State. The use of plant material and aesthetic treatments can provide a positive impact for both the visual character of the roadway network and as a method to help improve air quality.

Because of the size and diversity of the state, different regions often have completely different characteristics with respect to climate, soil conditions, social makeup, etc. In order to properly address the needs of a particular geographic area, the specific and unique characteristics of that area must be assembled and evaluated. From such an evaluation, localized policy can be developed to provide guidance which will integrate the needs and expectations of the community with the resources and intent of the District. It will also promote a degree of consistency throughout the District in the application and distribution of aesthetic treatments and features. This plan establishes the landscape and aesthetic improvements policy for the Fort Worth District of the Texas Department of Transportation.

It is anticipated that these guidelines will initiate cooperative partnerships where highway landscape and aesthetic issues can be discussed and considered early in the decision-making process. Common landscape and aesthetic goals can be achieved as community growth is anticipated and matched with the District's resources. Through implementation of definitive landscape and aesthetic procedures, the community and the District will be able to accomplish and maintain a mutually beneficial aesthetic character for the area.

GOALS AND OBJECTIVES

The main emphasis in landscape and aesthetic design within the State rights-of-way is to support the mission of the Texas Department of Transportation. The Fort Worth District is, therefore, committed to the design, construction and management of highway systems that provide a safe and maintainable transportation network. It is also committed improving air quality as well as making a positive contribution to the visual character of our communities and our regional landscape. To fulfill this commitment, the following roadway landscape development goals are established.

Goal: Promote Transportation Safety and Management Efficiency

Objectives:

- Design structures and roadsides for sustainability, emphasizing safety and operational efficiency with minimal on-going maintenance.
- Keep roadside management costs at the lowest practical levels by adopting consistent and proven design and maintenance criteria.

Goal: Minimize Negative Visual and Environmental Impacts which result from Transportation Facility Construction and Maintenance, and Provide a Highway System which is both Safe and Attractive

Objectives:

- Promote aesthetic harmony and visual continuity within the roadway corridor.
- Protect and restore native plant communities as appropriate.
- Supplement the visual character of the highways with native and adapted plant materials and appropriate hardscape elements.
- Reduce water pollution through stormwater runoff, erosion control, and slope stabilization measures.
- Minimize the use of scarce water resources in the on-going maintenance of aesthetic treatments.

Goal: Promote Cooperation among Governmental and Community Groups in the Implementation and Management of Roadside Aesthetics

Objectives:

- Encourage departmental, interagency, and public participation in the design and maintenance process through presentations, hearings, and committee activities.
- Utilize programs that enable and encourage citizen participation in the development and maintenance of roadside aesthetics such as Landscape Cost Sharing, Governor's Community Achievement and Adopt-a-Highway.
- Provide a forum whereby specific community needs may be identified and community character may be expressed.

AESTHETICS PLANNING PROGRAM

The primary purpose of this plan is to identify opportunities and establish aesthetic improvement guidelines for application to the District's rights-of-way. In order to accomplish this, a series of diverse elements have been identified and evaluated. Aesthetic treatment is broadly termed landscaping and includes the application of both organic and non-organic (hardscape) materials in development.

FUNCTIONAL USES FOR LANDSCAPING

Landscaping may be defined as the aesthetic improvement of structures and landforms through the application of color, texture and form to provide a pleasing appearance which will complement the setting in which it is placed. The application of landscaping to highway rights-of- way must necessarily encompass an integration of natural and constructed elements. There are three primary functional uses for landscaping in a highway environment: erosion control, aesthetics and air quality.

EROSION CONTROL

Erosion control may be accomplished through organic and man-made (constructed) methods or a combination of both. Landscaping is one of the means by which erosion control may be accomplished and may include organic, manufactured or constructed processes. Organically, erosion may be controlled by the use of plant materials such as trees, shrubs and grasses. Soils may also be amended by incorporating compost and covered with a layer of mulch to help in controlling erosion resulting from water runoff and wind. Concrete channels and velocity baffles may be constructed in severe runoff situations to help control erosion.

Native and Introduced Grasses and Other Plant Materials

The planting of native and introduced grasses is the primary means the Texas Department of Transportation uses to control runoff erosion. The root systems of grasses hold soil particles tightly and the stems and blades help slow the velocity of running water on the soil surface. Other plant materials introduced into the rights-of-way also help control erosion by binding soil particles with their root systems.

Compost for Erosion Control

Compost is the result of decaying organic matter. When mixed with existing soil, the resulting soil structure is changed and significantly improved. Compost mixed with clay soils is able to absorb water more rapidly and efficiently as well as creating pockets where air and moisture can be captured. In sandy areas, the compost gives the relatively large sand particles more body and slows down the otherwise rapid dispersion of water. In all cases, the compost also provides readily usable nutrients as it continues to decompose and allows vegetation to germinate and mature more quickly.

AESTHETICS

A second functional use of landscaping in the highway environment is to provide aesthetics to the surrounding environs. Aesthetics may be associated with the visual integration of highways and other transportation facilities into the fabric of the adjacent setting. The view to and from highways often reflect or set the community values and quality. Landscaping is the means by which aesthetic qualities of a roadway may be integrated into the surrounding area and it can occur with both natural elements (trees, grasses, etc.) and constructed elements such as bridges, retaining walls and columns.

Aesthetic properties of a highway facility have purpose beyond simply creating a pleasing view. An aesthetically pleasing highway should help provide its users a clear picture of what is going on around them and what is expected of them. This may be accomplished by using techniques and materials which help reduce user stress that can result from operating a vehicle in a very complex environment.

AIR QUALITY

Regardless of location, air quality is impacted by the operation of motor vehicles. The extent of such impacts is determined by the level of vehicle usage and many other factors such as geographic location, climatic conditions and the efficiency and output emissions of the vehicle engine. Urbanized areas may be subject to higher levels of vehicle produced pollutants than the rural areas simply because of the greater number and higher usage of motor vehicles. Texas contains several geographical areas in which pollution levels are not in compliance with Federal Clean Air standards that are directly attributable to motor vehicle usage. In the Fort Worth District, Tarrant County is a non-attainment county and Johnson, Hood and Parker counties have been designated as near non-attainment. The non-attainment and near non-attainment status is for ozone levels. The proximity of the Fort Worth District with adjacent non-attainment and near non-attainment counties in the Dallas District has exacerbated the problem of air quality concerns for the north central Texas region.

Although landscaping in the form of plant material can be used to help filter some pollutants from vehicle emissions, it will not in and of itself solve the problem. It can, however, be used in combination with other measures to comprise an overall program to help reach mandated air quality attainment levels.

LIMITING FACTORS

Designing landscape for highway rights-of-way is somewhat different from designing landscapes for homes, business parks, etc. The integration of aesthetic planning with the highway system must consider the safety to the user first and incorporate those concepts which will protect the public and the land, provide mitigation to impacts of the roadway on the environment, enhance the aesthetic qualities of the area and provide a favorable public perception. Each of these qualities is discussed in the following sections.

SAFETY

The most important consideration for any aspect of the highway system is to promote and provide a high level of safety for the traveling public and those who maintain the facilities. The ability to combine an understanding of vehicle performance, driver capabilities and design, both geometric and landscape, and to be able to mold them into a functional and safe roadway facility is a demanding challenge. Of prime importance to roadway safety are the requirements for minimum setbacks and adequate sight distance. All TxDOT landscape projects consider and adhere to these established engineering standards.

Setbacks

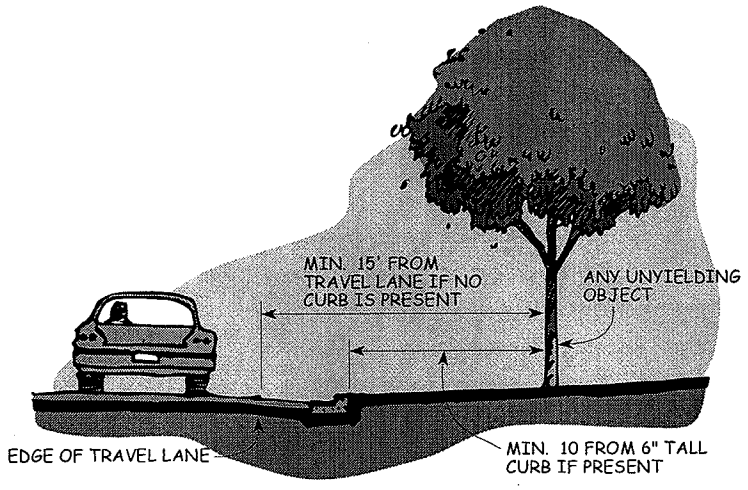
Setbacks (often referred to as Clear Zones) occur on both rural and urban roadways, including freeway frontage roads. Setbacks delineate an area reserved for the safe recovery of an errant vehicle, measured from the edge of the travel lane. Setback and sight distance standards are described in Chapter 2 of the TxDOT Roadway Design Manual. Non-yielding objects placed within the right-of-way are governed by setback standards which are summarized below.

The following table gives minimum setbacks for roadways in rural and urban areas

Minimum Clear Zone Setbacks for Freeways			
Rural Areas		**Urban Areas**	
Main Lanes	**Frontage Rd.**	**Main Lanes**	**Frontage Rd.****
30 feet	30 feet	30 feet	No curb: 15' min. Curbed: 10' min.

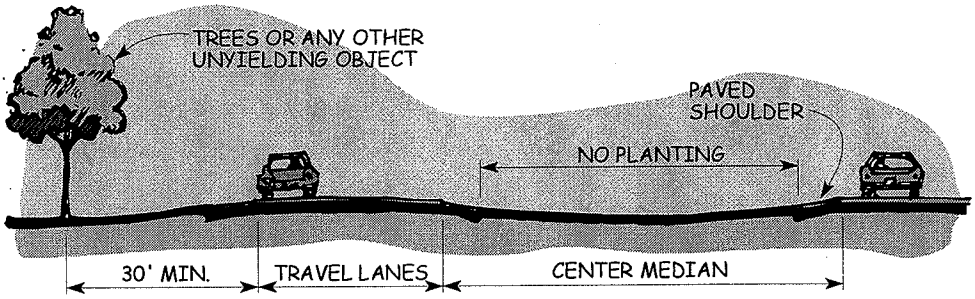
**The minimum clear-zone setback for frontage roads on urban freeways is 15 feet from the edge of the travel lane where no curb exists or 10 feet from the back of the curb if one is present. Roadway edges with vertical face curbs will be treated the same as non-curbed travel lanes.

Roadway conditions can create a variety of situations that will be considered when introducing landscape elements into the roadway. Setback distances may be modified in some situations, either lesser or greater, by design speed, average daily traffic, attenuating devices present, slope of the roadside, and engineering judgment. Tree canopy size and growth characteristics will also be considered in determining setbacks.



Unyielding objects (this includes any tree with a caliper diameter greater than 4 inches or stone landscape walls greater than 3' in height.) located within the setback area must be adequately protected by concrete barrier, guardrail, or some other protecting device. In

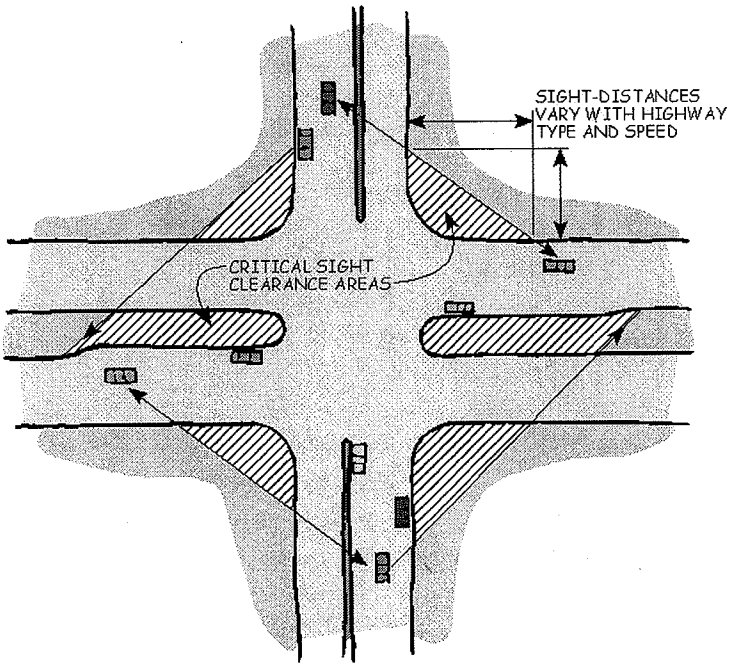
landscape project areas, the inclusion of protecting devices will only be considered to provide protection against existing trees, walls, etc. All new landscape design will include appropriate setbacks that will eliminate the need for new safety protection devices.



The above drawing shows the required setback for a roadway with a design speed of 50 mph or greater.

Sight Distance

The intersections of roadways present the increased possibility of conflicts for both vehicles and pedestrians. Along with other traffic control devices, the provision of clear fields of view is critical to creating safe intersections. The designer must make sure that any proposed landscape development does not negatively impact the area referred to as the sight-triangle. The computation of this sight-triangle uses specific formulae designed to consider many variables. (Refer to ASHTO guidelines.)



STEWARDSHIP RESPONSIBILITIES

The Texas Department of Transportation is the steward of a vast amount of publicly owned right-of-way. The conservation of the land, water, air and cultural resources is essential to the long-term sustainability of the State's transportation system. TxDOT's stewardship responsibilities are enumerated in a series of statutory mandates including the National Environmental Policy Act of 1969, the Clean Water Act of 1977 and 1987, the Clean Air Act as amended 1990 and 23 CFR Part 771-Highways.

As caretaker of public lands upon which the highway system is constructed, TxDOT has a responsibility to practice land conservation, promote and protect air and water quality as it relates to highways, and to recognize that cultural influences, including social and historical conditions, exist within and adjacent to highway corridors. These influences and conditions must be handled in a sensitive manner.

IMPACT MITIGATION

Whenever public necessity requires an action that impacts the environment or cultural resources negatively, the TxDOT is committed to minimizing the negative effects. Mitigation actions could include the construction of noise walls to reduce noise impacts on adjacent structures and neighborhoods or relocation assistance to those residents whose homes are required for highway improvements. It could also include the planting of a variety of trees and shrubs to offset the impacts to natural habitat that is lost during construction activities.

ENHANCEMENT OF AESTHETIC QUALITIES

The evolution of highway construction has engendered a greater sensitivity to the appearance of highway elements. It has moved beyond the unadorned, functional only approaches to design. In addition to the inclusion of landscaping within the right-of-way, structures are also being designed with textures and/or color. In areas where vegetation is difficult to sustain, decorative paving is often being used.

PUBLIC PERCEPTION

Highway landscapes are viewed in a different manner than individual unified landscape developments. Where the unified landscape development is intended to be viewed on a slower, pedestrian level scale, highway landscaping is typically viewed in a moving vehicle and as a sequence of visual experiences while moving through time and space. The aesthetic quality of a corridor, therefore, is the sum of the visual experience over distance and time and not as a single view. An important aspect of that condition is that a corridor may contain both pleasant and unpleasant elements and still provide an overall favorable visual impression.

A favorable public perception of a highway and its environs as it passes through a community, often provides a favorable impression for the community. Highway aesthetics, therefore, may play a significantly broader role than for the area contained only within the boundaries of the highway network.

LANDSCAPE/AESTHETICS DEVELOPMENT PROGRAM

This development program for landscaping and aesthetics identifies opportunity areas for aesthetic treatment and defines a series of development classifications that may be applied during the design process.

AESTHETIC DEVELOPMENT

A roadway corridor contains many areas of opportunity for aesthetic development. They include center medians, outer separations, parkways, intersections, interchanges, bridge structures and retaining walls.

Center Medians

The center median is located between the opposing direction traffic lanes in a divided highway. Landscape and aesthetic projects are significantly limited in center median areas because of safety, possible drainage conditions and facilities, median width and other considerations. Center medians of freeway sections are generally much more restrictive than highway arterials with center medians.

Outer Separations

The outer separation is located between the main traffic lane pavement edge and the inside pavement edge or curb of the frontage road. Due to their size and high development and maintenance costs, landscape and aesthetics projects are somewhat limited in these spaces. However, these areas provide an important visual connection to the surrounding landscape and figure prominently in any aesthetics program.

Parkways

Parkways are located between the outside curb or pavement edge of frontage roads and the right-of-way line. Commercial developments typically utilize the adjacent property access provided by frontage roads. These areas then become the front of their businesses which in turn gives the owners an incentive to care about how this area is treated. Parkways provide a degree of opportunity for aesthetic treatment by both public and private entities. Private input must be approved by and development coordinated with TxDOT prior to any construction activities on the right-of-way.

Intersections

At-grade or grade-separated intersections occur where highways and local streets meet. Intersections often become the focus of local activity. Early stage urban planning should recognize that intersections invariably become points of reference and that their aesthetic character will become increasingly important in the future. Slower vehicular movement through intersections provide the designer an opportunity to incorporate a greater level of aesthetic detail and character in those locations.

Interchanges

Interchanges occur where major highway corridors meet. They are typically high-speed and not signalized. These places are prime candidates for development that reinforce or accent their visual importance.

Interchanges are typically developed in one of two configurations: diamond or directional multi-leveled. The diamond design typically provides landscape opportunities in four quadrants, depending upon their exact layout and/or site limitations. Opportunity areas for structural aesthetics may also be available in this interchange configuration.

Directional, multi-level interchanges usually occur at the intersection of two major freeway corridors. They are typically high speed facilities, are not signalized and are located on large parcels. These type interchanges are extremely good candidates for development that reinforces or accents their visual importance. The large, open spaces afforded by these interchanges provide an opportunity for naturalized planting design which incorporate native plant materials. These type designs usually require little, if any, maintenance.

Bridge Structures and Retaining Walls

Bridge Structures and retaining walls present an opportunity for "dressing-up" through the use of color, texture and shape. The use of those elements also provides the opportunity to convey a specific character to the area.

AESTHETIC DEVELOPMENT CLASSIFICATIONS

Levels of land use development surrounding a roadway and associated maintenance requirements can be used to define an aesthetic classification system. Adjacent land use densities may range from dense to very sparse and maintenance levels for aesthetic improvements can range from intense to low. The Fort Worth District has identified the following adjacent land use categories and maintenance levels for use in evaluating and designing potential right-of-way landscaping and aesthetics improvements.

Level I (Undeveloped, Low Maintenance)

- Predominately undeveloped adjacent land with native vegetation or organized cropland.
- Future development is possible but not imminent.
- Light, locally destined traffic except for freeway, highway or interstate type roadways.
- Few areas with formalized landscape plantings and/or hardscape elements.
- TxDOT grass mixture specific to the District is the primary groundcover vegetation.
- Low maintenance requirements consisting primarily of mowing and herbicide use to control noxious weeds.
- Maintenance primarily the responsibility of TxDOT except where formal landscaping is requested and permitted, the requesting entity will be required to provide total maintenance of the landscaped and immediate area as a condition of the permit. A formal landscape maintenance agreement will be required.

Level II (Moderate Development, Low Maintenance)

- Some development concentrated primarily at the interchanges and along right-of-way corridor.
- Areas between major intersections may contain significant vacant properties.
- Additional development of adjacent property is possible within a ten to twenty year period.
- Moderate local traffic although the main highways may experience heavy through traffic.
- Few areas with formalized landscape plantings and hardscape elements.

- TxDOT grass mixture specific to the District is the primary groundcover vegetation on State right-of-way.
- Commitment to low maintenance requirements for vegetation which consists of mowing and herbicide use to control noxious weeds.
- Maintenance is primarily the responsibility of TxDOT except where formal landscaping is requested and permitted, the requesting entity will be required to provide the maintenance of the landscape and immediate area as a condition of the permit. A formal landscape maintenance agreement will be required.

Level III (Moderate Development, Moderate Maintenance)

- Some development concentrated principally at the interchanges and along right-of-way corridor.
- Areas between major intersections may contain a significant number of vacant properties.
- Additional development of adjacent property is possible within a ten to fifteen year period.
- Moderate local traffic although the main highways may experience heavy through traffic.
- Few areas with formalized landscape plantings and hardscape elements.
- TxDOT grass mixture specific to the District is the primary groundcover vegetation on State right-of-way. Some formal landscape plantings may be included in these areas. Where formal plantings are made by TxDOT, the plant material shall be hardy varieties which can survive on minimal maintenance after an initial establishment period.
- Moderate maintenance requirements consist of mowing and herbicide use to control noxious weeds and some formal plantings at selected locations. Where other (non-TxDOT) formal landscaping is requested and permitted, the requesting entity will be required to maintain the landscape and immediate area as a condition of the permit. A formal landscape maintenance agreement will be required.

Level IV (Urban, Low Maintenance)

- Numerous commercial/industrial, business or residential uses.
- Heavy local traffic on the highways or frontage roads and at intersections.
- Moderate to low pedestrian traffic.
- Few areas with formal landscape plantings
- TxDOT grass mixture specific to the District is the primary groundcover vegetation on State right-of-way.
- Aesthetics, if any, are typically limited to hardscape elements (pavers, colorized and/or textured concrete, etc.).
- Water will not be provided to the formalized landscape areas after the initial establishment period.
- Maintenance in the form of a normal District mowing schedule and herbicide use on noxious weeds is the responsibility of TxDOT. Where formal landscaping is requested and permitted, the entity requesting the permit will be required to maintain the area as a

condition of the permit. A formal landscape maintenance agreement will be required. Mowing beyond the normal District schedule may be permitted by enacting a written agreement with the local jurisdiction who will assume all mowing responsibilities for a specific area or route.

Level V (Urban, Moderate Maintenance)

- Numerous commercial/ indusrial, business or residential uses.
- Heavy local traffic on the highways or frontage roads and at intersections.
- Heavy to moderate pedestrian traffic.
- Some areas may contain formal landscape plantings.
- TxDOT grass mixture specific to the District is the primary groundcover vegetation on State right-of-way.
- Aesthetics may include hardscape elements (pavers, colorized and/or textured concrete, etc.) with some formal plantings where appropriate. If formal plantings are made by TxDOT, the plant material shall be hardy varieties which can survive on minimal maintenance including water after a short (two year) establishment period.
- A drip or bubbler watering system may be included as a part of the landscape development where a water source is readily available. No spray irrigation will be permitted. Alternative watering systems such as watering bags may be considered. A watering system requested as a part of a permit or agreement will be considered with the design, installation, maintenance and water cost being the responsibility of the requesting entity.
- Maintenance in the form of a normal District mowing schedule and herbicide use on noxious weeds is the responsibility of TxDOT. Where additional formal landscaping is requested and permitted, the entity requesting the permit will be required to construct and maintain the area in accordance with TxDOT regulations as a condition of the permit. A formal landscape maintenance agreement will be required. Mowing beyond the normal District schedule may be permitted by enacting a written agreement between TxDOT and the local jurisdiction who will assume all mowing responsibilities for a specific area or route.

Level VI (Urban, Intensive Maintenance)

- Numerous commercial/industrial, business or residential uses.
- Heavy local traffic on the highways or frontage roads and at intersections.
- Moderate to heavy pedestrian traffic.
- Some areas may contain intensive formal landscape plantings.
- TxDOT grass mixture specific to the District will be used in non-landscaped areas.
- Aesthetics may include hardscape elements (pavers, colorized and textured concrete, etc.). Formal plantings which require extensive maintenance will be the entire responsibility of the requesting entity. Where plantings are made by TxDOT, the plant material shall be hardy varieties which can survive on minimal maintenance including water after a short (two year) establishment period.
- A drip or bubbler type watering system may be included as a part of the landscape development. No spray type irrigation will be permitted on State right-of-way.

Alternative watering systems such as watering rings or bags may be considered. A watering system (including design, construction, maintenance and water costs) will be the entire responsibility of the requesting entity.

- Maintenance in the form of a normal District mowing schedule and herbicide use is the responsibility of TxDOT. Where additional formal landscaping is requested and permitted, the entity requesting the improvement will be required to design, construct and maintain the area in accordance with TxDOT regulations as a condition of its being placed on State right-of-way. Mowing levels beyond the normal District schedule may be permitted by enacting a written agreement between TxDOT and the local jurisdiction who will assume all mowing responsibilities for a specific area or route.

DESIGN CONCEPTS

CONTEXT SENSITIVE DESIGN

A traditional transportation design process which considers only the areas contained within the highway corridor has been expanded to recognize influences and impacts that extend beyond the right-of-way lines. The process was an outcome of the experiences gained while constructing the interstate highway system and urban freeway systems following World War II and extending to the present. During the early era of highway development, design was guided almost exclusively by considerations for cost effectiveness, safety and mobility. These limited, although extremely important, goals were often in conflict with community, environmental and other interests.

Context sensitive design is an effort to avoid such conflicts and move toward a partnership between the highway agencies and communities to meet transportation needs and user expectations. In landscape and aesthetic development, context sensitive design seeks to ensure the character of the transportation facility is appropriate to the surrounding landscape. This will provide a sense of visual unity and public acceptance. All landscape and aesthetic planning and design within the highway system of the Fort Worth District will use context sensitive design as a basis.

DESIGN ELEMENTS

Landscaping is defined as the art and science of creatively organizing, designing and applying aesthetic treatment to outdoor spaces to achieve a desired effect. The term landscaping can, therefore, be applied to a broad range of elements and not limited to a single element like plantings. The term is also not limited solely to the landscape design profession but could cover other design disciplines as well.

There are a series of design elements that comprise a transportation facility. These include bridges, retaining and noise walls, surface finishes, signals, signs, landscaping, landform and others. Coordinated design can assure that the various elements fit together into a unified end product that will be acceptable to the District, communities and the user public.

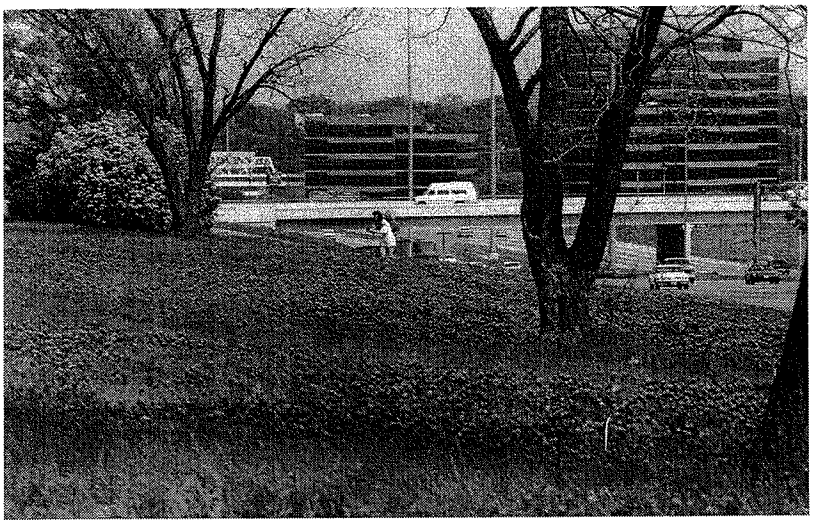
An aesthetically pleasing setting is one in which the various elements of the design, both internal and external, are in harmony with each other. Of significant importance is the visual impact offered by the integration of the diverse design elements.

NATURAL ENVIRONMENT

The natural environment of an area must be considered wherever possible. A highway network which blends into the natural setting of an area is much more palatable and accepted than one which is superimposed into an area without regard to its surroundings. The natural setting will be considered in designs that impact those areas.

Native Plant Communities

Native plant communities will be respected whenever possible, unless they are noxious weeds. New construction will include a revegetation of impacted areas with native plants of the type prevalent to the area. Existing species which are on the endangered, threatened or protected list will be avoided if possible.



Wildflowers

The Texas Department of Transportation has received nation-wide recognition for its roadside wildflower program. In addition to beautifying the rights-of-way, wildflowers, native grasses and legumes have contributed to the overall health of the plant community by providing the soil with specific nutrients. The wildflower program is an important part of the Department's vegetation management strategy.

Early in the Department's history, it was observed that wildflowers were one of the first forms of vegetation to reappear in construction disturbed areas. They became an important factor for erosion control within the highway rights-of-way.

In 1932, The Texas Highway Department recognized a need to establish a vegetation management policy for the Department. That policy was to include a roadside wildflower program. By 1934, State Highway Engineer Gibb Gilchrist issued orders to the highway workers to leave wildflowers intact on the rights-of-way. This was the beginning of the Department's tradition of not mowing until the wildflowers had set seed. He also began the practice of harvesting seed for replanting along State roadways.

Since the mid 1930's, TxDOT has carried forward many of the Department's early wildflower policies and the tradition of propagating wildflowers along its rights-of-way for both functional (erosion control) and aesthetic purposes.

Benefits of implementing the Department's wildflower program include:

- Help blend the highway rights-of-way into the adjacent environment.
- Reduce erosion rates.
- Improve the aesthetic quality of the roadway corridor
- Add to the value of roadsides as wildlife habitat

Native and Introduced Grasses

The use of native grasses offers several advantages over non-native species in the highway environment. They include:

- Well adapted to the various Texas climates and soils.
- Provide excellent erosion control.
- Disease and insect infestations in established stands are minimized.
- They are long lived.
- Provide excellent wildlife habitat in the form of food and cover for some species.
- Resistant to invasion of noxious weeds.
- Low maintenance costs.

Native grasses commonly have a more extensive root system which can extend to a depth of five feet or more. For this reason, an established stand of native grasses can generally compete successfully with weeds for the essential nutrients and water in the soil.

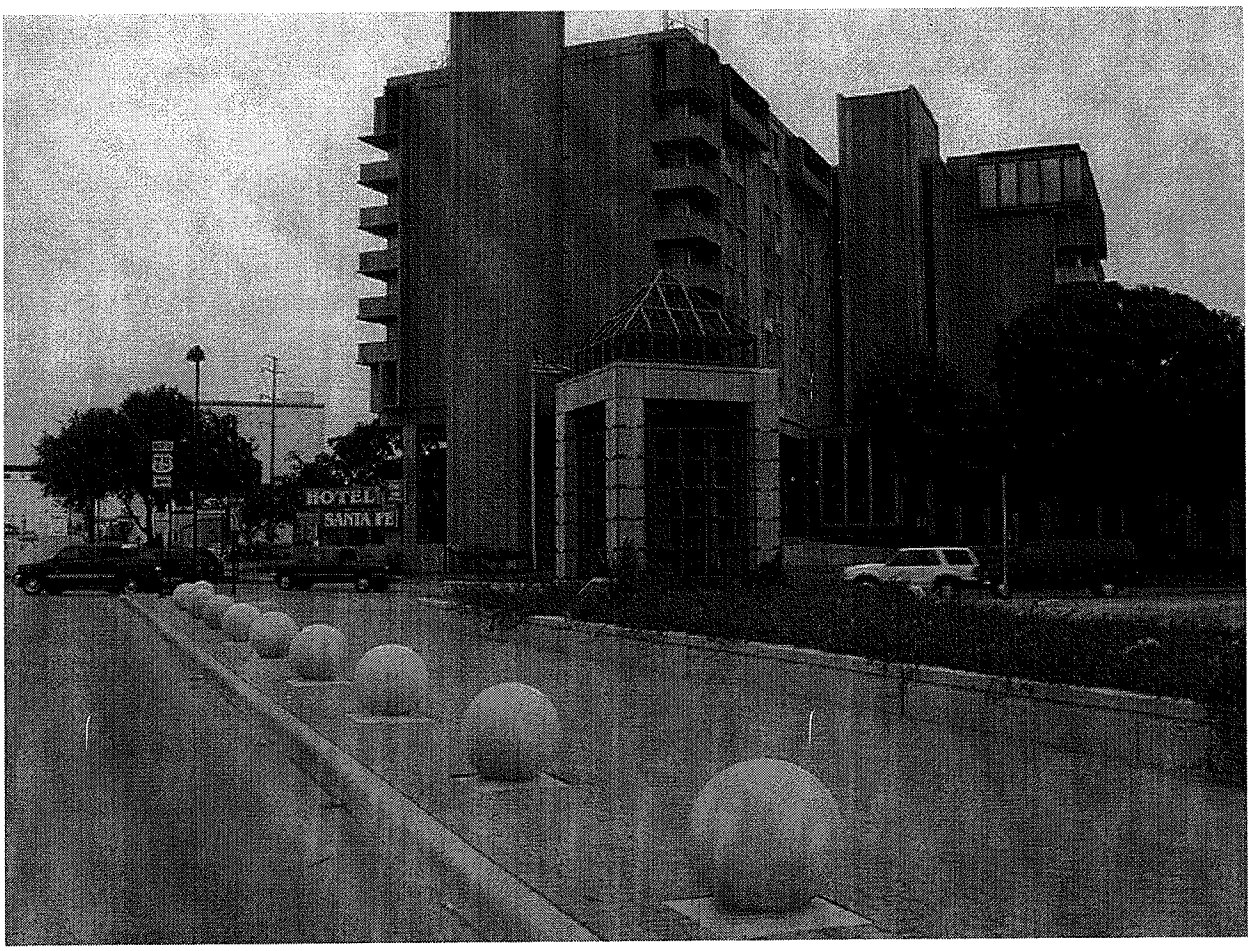
Some introduced grasses such as K.R. Bluestem and Bermuda grass are not natives but have adapted well to the Texas soil and climatic conditions. These non-native but well adapted grasses have been used extensively throughout the State's highway system. Unfortunately, some noxious grasses (such as Johnson grass) have also adapted well and have become an ongoing maintenance problem.

CONSTRUCTED ENVIRONMENT

The constructed environment includes any element that is built within the right-of-way. It can include bridges, roadway surface, retaining walls, columns and other hardscape elements (such as pavers). Aesthetic treatments including form, texture and/or color on bridges and retaining walls can be applied to many of these constructed elements. Form, texture and color may be similarly applied to planting areas although they are applicable in a slightly different manner than with the hardscape elements.

Hardscape

Hardscapes in highway design consists of the application of non-organic materials or processes for aesthetic purposes. It could include the use of pavers, texturized and colorized concrete or asphalt, decorative or functional bollards and similar landscape elements. The use of hardscape in highway design should be used to improve the aesthetics of more traditional solutions and for reducing maintenance costs. These could include sidewalks, pavers below overpasses where vegetation will not establish, and bollards for traffic control or strictly aesthetic purposes. The following photograph shows several hardscape treatments on a highway bridge structure in an urban area (US 75 in Dallas). The hardscape treatments used include bridge railings, retaining walls, a kiosk, decorative bollards, a sidewalk and a raised planter box.



The inclusion of decorative hardscape elements in a design can be used to introduce color and texture into the highway corridor. They can also be used to introduce or supplement a particular aesthetic character to an area.

Plantings

Plantings are another element of the constructed environment in highway design. Like hardscape elements, plantings may be used to add color, texture and form to enhance the appearance of an improvement and to convey a particular character to the area. The variety of plant materials available for use on a highway should typically be limited to those that are native or are well adapted to the specific geographical area in order to reduce ongoing maintenance requirements. A later section will identify a palette of plant materials which meet the low maintenance requirements and which are recommended for use within the Fort Worth District's highway corridors.

DESIGN CONFIGURATIONS

Several design configurations will be used in the Fort Worth District that will aid the designer in determining the level of aesthetic improvement to be incorporated in the design. These levels will also indicate the level of maintenance necessary, the responsible party and the funding

support required. The configurations are identified as (1) **Basic**-A standard development level that will be considered as the baseline level for which the District will take construction and maintenance responsibility, (2) **Basic Enhanced**-An enhanced level that requires TxDOT approval and which must be wholly or partially funded and maintained by others and (3) **Non-Standard**-A level which will require TxDOT approval and total funding and maintenance by others.

Basic

The Basic level is a design concept composed primarily of hardscape elements and the possible inclusion of a limited variety of plant materials. Funding and maintenance is totally a TxDOT responsibility. This is a standard design level which is supported by the District and a level which the District will not exceed unless it is either partially or fully funded and maintained by others.

Basic Enhanced

The Basic Enhanced level is permitted by the District when a non-departmental entity requests additional aesthetic improvements. These improvements may include plant materials from an approved plant list which are acceptable to the District (see Appendix C). A commitment by a non-departmental entity for funding and maintenance will be required. The construction of improvements may be done by TxDOT or assigned through written agreement to the local governmental jurisdiction. The improvement will be jointly funded by the Department and the non-departmental entity as may be determined by mutual agreement. Maintenance will be the total responsibility of the requesting non-departmental entity.

Non-Standard

The Non-Standard aesthetic improvement level is one in which a local jurisdiction requests the Department to permit the installation and subsequent maintenance of landscaping and other aesthetic elements on State right-of-way. The Non-Standard improvement will require TxDOT approval and a total commitment by the requesting entity for design, installation and maintenance. The Non-Standard level improvements are typically confined to parkway areas only although some median improvements may be considered.

AESTHETIC AND LANDSCAPE PROGRAMS

The Texas Department of Transportation supports several statewide landscape programs that provide funding for projects on State highway rights-of-way. They include the following:

GREEN RIBBON LANDSCAPE IMPROVEMENT PROGRAM

During the State's 77th legislative session, Rider 57 was added to TxDOT's appropriation legislation. The Rider required the expansion of the Houston District's Green Ribbon Project concept to other areas of the state and the allocation of funds for landscaping and other enhancement activities to districts that have air quality, non-attainment and near non-attainment counties.

In order to meet the requirements of the Rider, the department implemented the Green Ribbon Landscape Improvement Program. The program consists of two specific actions. One action is the development of landscape and aesthetic master plans in districts that have cities with populations of 100,000 or more. The other action is the allocation of funds to districts with non-attainment and near non-attainment counties to plant and establish trees and plants on the state highway system that help mitigate the effects of air pollution.

The program was reaffirmed by action of the 78th legislature and although it is still a temporary one, it is anticipated that it could become a permanent program through future legislative action.

This program is available for District use and allocation only.

STATEWIDE TRANSPORTATION ENHANCEMENT PROGRAM

The Statewide Transportation Enhancement Program was created with the passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), which required that 10% of surface transportation program funds apportioned to the states by Title 23, United States Code, be used for transportation enhancement activities. ISTEA expired in fiscal year 1997 and was reauthorized by the Transportation Equity Act for the 21st Century (TEA21).

Transportation enhancements are transportation-related activities that are designed to strengthen the cultural, aesthetic and environmental aspects of the Nation's intermodal transportation system. The program provides for the implementation of a variety of non-traditional projects, with examples ranging from the restoration of historic transportation facilities to bicycle and pedestrian facilities, landscaping and the mitigation of water pollution from highway runoff.

This is a federally funded program administered by the Texas Department of Transportation through the Federal Highway Administration (FHWA). The funding provided by this program is on a cost reimbursement basis. Projects undertaken with TEA 21 enhancement funds are eligible for reimbursements of up to 80 percent of allowable costs. At least 20 percent of the project's allowable costs must be provided by a public authority as a local match.

The enhancement program is a statewide competitive process. To be eligible for consideration for inclusion in the program, a candidate must demonstrate a strong relationship to the surface transportation system by function or impact, fit into one of the twelve eligible categories and go above and beyond standard transportation activities.

The Department has successfully completed a number of program calls. Projects have been selected in all districts and many are either completed or currently in development.

This program is available and open for city participation.

CONSTRUCTION LANDSCAPE PROGRAM

The Construction Landscape Program (CLP) was created at the direction of the Texas Transportation Commission in November, 1985 by Minute Order 83823. This statewide program allocates funds for each district for one fiscal year at a current amount of $5,000,000 for each year as part of the unified program call.

The CLP provides flexibility to the districts for funding landscape and aesthetic improvements to new as well as existing highway facilities. The design goals are to develop sustainable landscape and aesthetic improvements using native and adapted plant material, specialized surface treatments, and state of the art support systems, while applying current science and technology for resource efficiency. A landscape establishment allocation is also available to each district and is administered through the Design Division.

Examples of improvements funded by this program include tree planting for environmental mitigation, colored-textured hard surface areas to minimize long term maintenance expenditures, construction of earth berms and tree plantings to increase roadway compatibility with adjacent land use, and specialized surface treatments to renovate decaying concrete surfaces in urban areas.

Construction installation and plant establishment are accomplished through the department contract letting process. Each contract has specifications that include ninety (90) days of project establishment which follows the installation phase. Funds from the establishment allocation allow an extended maintenance contract typically for twelve (12) months or less. Districts are encouraged to develop long term maintenance agreements with local governments prior to initiating project design.

This program is available for District use and allocation only.

LANDSCAPE COST SHARING PROGRAM

In February, 1989, the Texas Transportation Commission established the Landscape Cost Sharing Program. The program was created to allow private businesses, civic organizations, and local governments an opportunity to support the landscape and aesthetic improvement of the State highway system by sharing the project development, establishment, and maintenance cost of landscaping the State highways. The program is administered in accordance with Sections

2.62 and 2.65 under Title 43 of the Texas Administrative Code. The Landscape Cost Sharing Program is a state funded bank balance program that is appropriated as part of the unified program call. The current program is funded for two fiscal years at $1,000,000 for each year. The Design Division is responsible for administration of the state contribution for each project based on 50% of the total estimated project cost as proposed and agreed upon by the contributor and TxDOT.

Landscape Cost Sharing projects are initiated by local governments (city or county) or, as of July 2002, by a private donor. The local government or donor submits an application to the appropriate TxDOT district office. The application documents the local government's donations toward the project. The local government or donor acts as a pass through in cases where private businesses or civic associations wish to participate in the program. Donations toward a project can be in the form of cash and non-cash services. Examples of non-cash services include development of a design plan, labor, materials and landscape maintenance activities. Applications are evaluated by the department and an agreed upon value is placed on the non-cash contributions to the project. Following evaluation of the application, an agreement is developed that stipulates the funding calculation for the project. Usually, the department matches the agreed value of the non-cash services and cash donations. The donor's cash contribution is then added to the department's match. The sum represents the total funding available for the project.

The local government or donor must agree to perform landscape maintenance during the lifetime of the project. The first two years of landscape maintenance are considered as an eligible non-cash contribution toward the project. All project activities, cash and non-cash donations, and landscape maintenance responsibilities are documented in a project agreement. The project agreement is executed by both parties prior to the initiation of any project activities.

This program is available and open for local government participation.

INCENTIVE AWARDS PROGRAM

The Governor's Community Achievement Awards (GCAA) Program was initiated in 1986 by the Texas Transportation Commission as a state-wide annual awards program in cooperation with Keep Texas Beautiful (KTB). Keep Texas Beautiful, a part of the Keep America Beautiful program, sponsors a competition each year among its member cities throughout Texas. The competition recognizes communities for local environmental improvement through litter prevention, solid waste management and recycling, beautification, public education and litter law enforcement. One winning city is chosen in each of nine population categories.

The department participates in the program by designing and installing a landscape development project along the highway right-of-way in each winning city. The Travel & Information Division handles coordination with KTB including the annual awards presented by the Governor's office. Design Division works with the winning cities and TxDOT districts in the design and implementation of the landscape projects. Projects range from $60,000 for populations of 1,000 or less to $265,000 for populations greater than 250,001 with an annual funding amount of $1,000,000 provided by a Commission Minute Order. Construction is

accomplished through the department's statewide bid letting process and includes ninety days of project establishment. After this time, project maintenance responsibility is shared by the department and the winning city or assumed totally by the city, depending upon the policy of the particular district in which the project is located. In the Fort Worth District, the long term maintenance is the total responsibility of the local government.

The goal is to construct a project that fulfills the city's expectations and meets TxDOT design, safety, maintenance and funding requirements. For the communities that compete in the Governor's Community Achievement Awards program (GCAA), the awards carry a tremendous amount of prestige. For TxDOT, the program has exceptional public relations potential with the communities we serve, as well as the opportunity to build relationships with local leaders in a positive environment. The GCAA Program has seen steady growth through increased public participation.

This program is available and open for local governmental participation.

ADOPT-A-HIGHWAY FOR LANDSCAPING PROGRAM

The Adopt-A-Highway for Landscaping Program offers a uniform method for the department to enter into agreements with citizens in a community to enhance the highways through their city. The program basically outlines what work is to be done and who is going to do it. Groups can adopt areas for litter control and landscaping or just landscaping.

This program is patterned after the successful Adopt-A-Highway for Litter Control Program. The Adopt-A-Highway for Landscaping was created to allow groups already picking up litter on adopted rural highway sections the opportunity to landscape that section of the highway also.

This program is available and open for city and public participation.

AESTHETICS DESIGN GUIDELINES AND STANDARDS

LANDSCAPE AND AESTHETIC DESIGN MANUAL

A Landscape and Aesthetic Design Manual was prepared and adopted by the Department in November, 2001. The purpose of that manual is to provide guidance in the selection of landscape and aesthetic design criteria for highway and street project development. The manual contains landscape and aesthetic design information with chapters on: Introduction to Landscape and Aesthetic Design; Assessment, Planning and Design; Project Development Process; Landscape and Aesthetics Guidelines for Common Structural Elements; and Landscape and Aesthetics Guidelines for Common Transportation Features. The manual is accessible online at http://txdot-manuals/dynaweb/coldesig/lad.

The manual and its content is incorporated into this plan by reference.

STRUCTURES AND STRUCTURAL FEATURES

A principal objective for providing structural aesthetics is the development of a palette of architectural details that may be applied to structural elements within the roadway system. The following criteria have been established for the Fort Worth District.

MEDIAN TREATMENTS

Unless totally paved, all new medians will have a two foot wide mowing/maintenance strip, constructed of colored/stamped concrete, measured from the back of curb (***basic***). Mowing strips will have a cross-slope of 1.5-2.0 %. Landscape pavers may be considered instead of colored, stamped concrete if the City is willing to assume the long term maintenance (***basic enhanced***)

Within ten feet of any median opening or if the median width is 8' or less, that portion of the median will be 100% paved with colored/stamped concrete ***(basic)***. Landscape or brick pavers may be substituted under the conditions previously stated (***basic enhanced***). Optionally, the entire median or an expanded portion of it may be paved at TxDOT's option (***basic***) or if at the City's request (***basic enhanced***).

From ten feet to two hundred feet from any median opening, the area between the mowing/maintenance strips may consist of either grass (***basic***) or a combination of grass and ornamental shrubs (***basic enhanced***). The maximum allowable average mature height of any ornamental shrub within this area will be thirty inches (30") above the paved street surface at the curb line.

Grading of the median into a berm is acceptable, provided that the berm height plus any planting does not exceed thirty inches (30") height above the paved street surface at the curb line. The toe of the berm shall be at the back edge of the mowing strip (***basic enhanced***)

Median areas more than two hundred feet from any median opening and at least 8 feet wide or greater, may be treated with a combination of grass, ornamental shrubs and/or ornamental trees (mature trunk size less than four inch caliper). Raised planter beds are acceptable, subject to clear zone requirements (set back from the curb line greater than three feet and a height not to exceed 18 inches) (***basic enhanced***).

Paver or stain colors may be selected from a color palette developed by the District and shown in Section ▒ of this plan (***basic***)

PAVERS USED TO DELINEATE CROSSWALKS & GATEWAY INTERSECTIONS

There is some concern over the use of brick/concrete pavers or stamped concrete in crosswalks, due to the vibration problems for wheelchair user and other possible ADA concerns. An alternative may be to stamp or use pavers as a border to crosswalks, while providing a smooth surface within the crosswalk itself (***basic enhanced***). Contrasting colors are preferred for visibility, both for pedestrians and for motorists. TxDOT will provide painted or stained crosswalk markings (***basic***).

Inlays of pavers or stamped and stained concrete at "Gateway" intersections must be laid out in a pattern that is compatible with construction staging and Traffic Control requirements. Otherwise it will be difficult to contain pavers in these locations because edge restraints will be difficult to provide. Inlaid paver or stamped, colored concrete gateways or crosswalks will be the total cost and maintenance responsibility of the City (***non-standard***).

SIGNS AND MONUMENTS (***non-standard***)

Signs and/or monuments will not be permitted in the medians, subject to the conditions discussed in "Median Treatments" above.

Signs and/or monuments will be permitted in the border area (parkway) located between the roadway and the right-of-way line subject to District guidelines for city name monuments, District policy relative to "advertising" and compliance with clear zone requirements.

STRUCTURAL AESTHETICS

Structural fascia treatments that can be accomplished with form liners are acceptable (***basic***).

The District is currently considering development of a bridge rail standard that offers aesthetic options. At this time, the "Texas Classic" railing is the only approved architectural railing (***basic***). Special railings that meet minimum crash test criteria may also be considered ***(non-standard)***.

Stains and form liners may be selected from a palette shown in Section ▒ of this plan (***basic***). Selection requires TxDOT review and approval.

SIGNAL AND ILLUMINATION POLES

Ornamental signal and/or illumination poles will be considered, but must meet specific structural and electrical criteria (***non-standard***). Illumination poles will also be subject to clear zone criteria. The City must also agree to maintain a stockpile of replacement poles (***non-standard***).

Banner brackets will not be permitted on signal poles. Banner brackets may be permitted on ornamental illumination poles upon approval by TxDOT. Banners may not contain advertising or be of a commercial nature.

PUBLIC ART (***non-standard***)

Public art is considered by the Fort Worth District to be aesthetic elements or structures that convey an artistic theme. The inclusion of public art in the roadway should be considered carefully. Only those projects presented by incorporated municipal governing authorities will be considered and only then after careful review. The responsibilities of all parties must be clearly stated in writing through adoption of a formal agreement. In all cases, the District shall be responsible for determining the appropriateness of any proposed public art project. No art work will be funded, constructed or maintained by the Department. Any permitted artwork project will require the art work to be a part of a larger landscape development which must also be totally funded, constructed and maintained by the community. An exception would be the use of the Governor's Community Achievement Award funding which could permit such public art projects although the artwork itself would not be included in the funding, artwork foundation and landscaping could be included. Long term maintenance would require city commitment through a landscape maintenance agreement.

In addition to meeting common standards for appropriateness of subject matter, public art projects must meet the harsh environmental demands of the roadside and the minimum requirements governing safety, access, and management of the highway. Considerations in evaluating public art projects proposed for State rights-of-way will include as a minimum:

- Safety
- Maintenance
- Finishes
- Location
- Vandalism
- Theme

<u>Safety</u>

- Public access to artwork will not be allowed within the State right-of-way

- Polished or highly reflective surfaces, which may direct light into the eyes of the motorists, should be avoided so as to pose no hazard to highway users.

Maintenance

- Sponsoring organizations (local Governments) must be willing and able to assume all future maintenance of the work and associated landscaping.

Surface finishes

- Finishes should be evaluated for their durability and their ability to resist pollutants associated with highway environments.
- Finishes should be used that will allow repair if the structure or art piece is damaged.

Location

- The art work should not invite viewers to stop or access the area on foot unless an off-roadway parking facility is provided.
- All setback, and sight requirements must be met based on the type of highway.

Vandalism

- Avoid sites prone to vandalism.
- Select finishes that allow the removal of graffiti.
- Possibly provide lighting to discourage vandalism.

Theme

- Symbols, motifs, or colors must respect the cultural sensitivities of all members of the community in addition to being appropriate and acceptable to TxDOT. Art pieces, structures, or graphic symbols must not include colors, logos or images that could be considered racially or ethnically biased or which indicate the support or endorsement of any specific group

TxDOT will make the final determination of what will be permitted to be constructed on State rights-of-way.

PLANTINGS

PLANT SELECTION

Selecting plants for use on the right-of-way should be based on their intended use, safety considerations, climatic and environmental compatibility, and appearance. The following selection criteria should be considered when selecting plants for the right-of-way.

Hardiness

Plants are frequently classified by their hardiness, or ability to survive in specified climatic conditions. Typically this refers to a plant's ability to survive temperature fluctuations and average extremes, water requirements, frost and wind impacts, soil type and sunlight availability. In a highway setting, plants must have the ability to survive and thrive in a harsh

environment that typically includes significant vehicle emission pollutants, lack of organic material in the soils, high winds, intense sunlight and extreme temperature fluctuations.

The use of a native plant with an appropriate zonal hardiness rating does not necessarily assure the plants ability to withstand the highway environment. Care should be exercised in selecting plants for highway rights-of-way.

Water Requirements

Plants to be used on the highway right-of-way should have low water requirements and be able to survive on natural rainfall within two years of planting. Plant establishment watering should be by a bubbler system or more preferably by drip irrigation. Spray type irrigation will not be permitted.

Plant Characteristics

Plants should be selected for their special characteristics of color, texture, form, seasonal appearance, size and longevity, and their integration into an overall design or theme. Plant characteristics should typically reflect the mature plant in the designed environment and not the young plant which may have characteristics significantly different from those at maturity.

Color and Texture

The incorporation of seasonal color and leaf or bark texture into a planting scheme can provide a pleasing and soothing driving experience.

Form/Seasonal Appearance

Like color and texture, the form or shape of a plant can add visual interest to a planting design. Plants are classified as either evergreen (retaining their leaves and leaf color during the dormant season) or deciduous (losing their leaves during the dormant season). The skeletal form of a deciduous tree can be used to add a seasonal interest to an overall planting design.

Longevity

A plants longevity or life span is important in planting design. The use of long lived trees will benefit the appearance and environment for the longest period but such plants are generally slow growers. The use of fast growing but short lived species may be justified when trying to provide a more immediate visual impact during which time the slower, longer lived trees will have an opportunity to mature.

Planting Sizes

Planting sizes will vary according to the type of plant selected and its local availability. Plants selected for use on the right-of-way should be readily available within the geographical area where they are to be used and in sizes which will allow easier and faster establishment. Experience has shown that larger trees establish at a slower rate and are more susceptible to

transplant shock than smaller sized specimens. For urban reforestation designs, the use of small 5 gallon sizes may be appropriate while other specific design may require 15 to 30 gallon sizes. Sizes larger than 30 gallon or approximately three inch caliper are discouraged for highway designs.

Plant Location

Plantings (trees and shrubs) must have an average mature size that does not create an overhang into the travel lanes of the roadway. Acceptable setbacks will be required in the placement of all trees and shrubs within the right-of-way.

Root-Ball Planting Conditions

The three primary root-ball planting conditions usually encountered are container grown, containerized, and balled and burlapped. Bare-root is also a planting condition which is available for some species of plant materials. Bare-root should be avoided in highway planting designs.

Container Grown

Plants that have been grown in a container their entire life are referred to as being container grown. The greatest advantage of using container grown plants is that they can be transplanted with the least amount of shock. This is because their root systems are complete and generally undisturbed. Using container grown plant material is the preferred growing condition.

Containerized

Containerized plants have been grown the field, dug and transplanted into containers for a specified period of time. The process of removing plants from their natural growing area requires that roots be severed. That process usually produces a higher degree of transplant shock and generally necessitates a longer establishment period.

Balled and Burlapped

Balled and burlapped (B&B) plants are similar to containerized plants in that they have been dug from their original growing area. The main difference is in the way the rootball is prepared for transport. The rootball of a balled and burlapped plant has been wrapped in burlap and fastened to the ball by wire where the containerized plant is placed in a container, which is usually made of plastic. On larger sizes, B&B plants have their balls

wrapped in burlap and placed in a wire basket to prevent the ball from breaking. Like the containerized plants, there is a higher degree of transplant shock which usually necessitates a longer establishment period.

Container grown plant material is preferred, therefore, all plants specified for use in the right-of-way should be container grown if at all possible. Where container grown stock is specified but found to be unavailable, containerized or balled and burlapped stock will be considered with TxDOT approval. The Fort Worth District will only approve a change in root-ball condition after it is satisfied that all means have been exhausted in finding the plant in the condition in which it was specified.

Acceptable Plant List

A list of acceptable plant species has been developed by the District and is shown in Appendix C. Additional species may be suggested for consideration within a specific area. These will be subject to review and approval by the District.

Plant material must be low-maintenance or non-maintenance varieties (native or adapted plants for the geographical area and have low water requirements).

SOIL

Soil constitutes one of the most significant elements affecting plant growth and vitality. The soils existing on a highway right-of-way are frequently composed of re-consolidated and compacted substrate materials. Such materials generally make poor growing mediums for plant material.

Soil Condition

The quality and composition of the planting medium (soil) will usually determine the quality of the plant material growing in it. Because the soils in a highway environment are typically somewhat poorer than is optimum for good growth and support, they will usually require some form of soil amendment. Following are guidelines for amending existing right-of-way soils to create an acceptable soil that will encourage better plant growth.

Planting Bed Preparation

A soil analysis should be made to determine average existing conditions within the right-of-way.

Compost should be incorporated into all planting beds to supplement the existing soils. A ratio of one part, by volume of compost should be thoroughly mixed with three parts, by volume, of existing soil to produce the planting bed medium. Trace elements could be necessary as determined by the soil analysis. The inclusion of such additives may be considered subject to review and approval by the District.

Organic Mulches

Organic mulch acts as a protector of the topsoil, a conserver of moisture and as a guardian against weather extremes. It helps to prevent weed infestations, moderates the temperature of the soil and adds fertility through its eventual decomposition into a rich, soil building humus.

An organic mulch covering should be applied to the top of all planting beds in order to help reduce weed infestations and retain moisture in the prepared soils.

WATER APPLICATION

The application of water to sustain plant growth is an important consideration in any planting scheme. It is vitally important that water be provided throughout the establishment period.

Watering for initial revegetation of rights-of-way is normally handled by the project contractor through a process which usually involves the application of water to the seedbed through watering truck. The application of sufficient (or appropriate amounts of) water has generally been a hit and miss process. The watering requirements for grass germination and establishment are dependent on several factors including time of year, Pan Evaporation rates and actual rainfall. In simple terms, the amount of vegetative watering that needs to be applied weekly is equal to the Pan Evaporation rate + 1", minus actual rainfall during the week. Since the amount of rain that will fall later in any given week is unknown, all determinations will be based on the previous 7 day rainfall totals. A spreadsheet calculator (Vegetative Watering Calculator) has been developed for use in calculating the amount of vegetative watering required.

Using the Vegetative Watering Calculator to determine the amount of vegetative watering that should be applied, locate the row in the calculator that corresponds to the month in which the majority of the week in question occurs and enter the amount of rainfall that actually occurred during the previous 7 days. The calculator will show the rate (gallons) that should be applied per acre. Enter the area of seeding or sod to be watered (in acres). This will provide the actual volume of water (in gallons) needed by the contractor to adequately water that area. For weeks in which two watering cycles are required (the first four weeks after seeding or sodding operations or during the months of July and August) the rate per cycle is obtained by dividing the computed rate or volume in half. The Vegetative Watering Calculator form is shown in Appendix F.

For designated landscape planting areas, the Fort Worth District often includes a drip irrigation system which will last through the establishment period (approximately 2 years). After the two year establishment period, the irrigation system can theoretically be turned off and the plants left to survive on the natural rainfall. In actual practice, the irrigation system may be turned off after the two years but it is not removed, providing the opportunity to supply supplemental water in

extreme drought periods unless water for such uses is curtailed or rationed or the system becomes inoperable.

WATER METHODOLOGY

Providing water to plants may be accomplished in one of several ways. Permanent spray irrigation is not permitted within the District but drip irrigation which serves individual planting areas is acceptable. In rural areas, where water sources are not readily available, alternate methods of watering such as watering rings or watering bags may be the most feasible option. Three methods of watering newly planted areas in the Fort Worth District include drip irrigation, bubblers and watering rings/bags.

Drip Irrigation

Drip irrigation is a low-pressure, low-volume watering system that is used in planting beds and around individual trees. Because the water is applied through a drip process, the ground is penetrated directly without water loss from evaporation or run-off. This type system may be placed either on the surface or subsurface of the planting bed and covered with a top-dressing of mulch. Drip irrigation is the preferred water application method within the Fort Worth District.

Bubblers

A bubbler watering system consists of one or more bubbler heads mounted on a riser and contained within a perforated PVC sleeve. The sleeve is filled with gravel which permits the water to percolate into the adjacent soil. The sleeve is mounted vertically in the ground with the top of the sleeve approximately one inch above the normal ground line.

Watering Rings or Bags

In areas where there is not an available water source to provide a drip or bubbler system, watering rings or bags are a feasible alternative. These consist of individual water containers which dispense water through small weep holes or emitters. They function similar to the way a drip system works except they must be manually filled with water.

Watering rings or bags are attached to or placed around the trunk of newly planted trees and filled with water. The watering rings/bags remain around or attached to the tree throughout the establishment period. The container needs to be filled once or twice per week, depending upon the climatic conditions of the geographical area in which they are located.

CONTROL SYSTEM

Irrigation control may be handled by using an automatic irrigation controller connected to electric remote control valves (RCV) and an acceptable water source. The controllers may be powered by electricity derived from an available power source, battery or solar energy. There are advantages and disadvantages for each.

Electric Controllers

Individual electric powered controllers may serve multiple electric remote control valves which may be present in large interchange or open areas. A disadvantage is the initial installation and power hook-up cost and ongoing cost of providing power.

Battery Powered Controllers

Battery powered controllers come in a variety of configurations. The use of drip systems allows much lower flow volumes through the remote control valves. This permits an overall system to be served with far fewer valves and a more localized controller. Individual battery operated controllers such as the "Rainbird TBOS" controller or "Nelson DuroLife 8014"controller are available for mounting directly into a valve box and require standard nine volt batteries or have long life factory installed lithium batteries. Such units are very cost effective and have low maintenance requirements. This is the preferred control method for drip systems in the Fort Worth District.

Battery operated controllers which serve multiple valves at higher water pressures and flow volumes should be avoided because of the limited battery life and specialized battery requirements. Electric or solar powered controllers may be better for these type functions.

Solar Powered Controllers

Solar powered controllers are a viable alternative control method, especially in those areas which serve multiple valves at higher pressures and flow volumes. Cost is a factor in the selection and use of this type unit.

Both battery and solar powered control systems work well in areas where electric power is not readily available.

WATERING GUIDELINES

Permanent spray irrigation will not be used on the right-of-way in the Fort Worth District except by special permission from the Area Engineers or the District Engineer.

Temporary (above ground) spray irrigation systems may be permitted in the Fort Worth District on a short term basis for plant establishment, but must be removed when required by the Department. Temporary system spray heads must not distribute water in a manner that is considered detrimental to safe traffic operations or maintenance functions.

Low volume, low pressure drip irrigation will be permitted within State right-of-way. Bubbler systems may also be considered on an individual site basis. Alternative watering devices such as watering rings or bags may be used in specialized situations when approved by TxDOT.

Furnishing water taps, meter connections and paying impact fees will be the responsibility of the requesting entity at their cost. They will also be required to furnish all water used for irrigation

after the 90 day initial plant establishment period as defined in the construction specifications. Water during the initial plant establishment period will be the contractor's responsibility including cost and delivery.

Controller units may be powered by standard electrical connections, solar or battery. The use of a standard electrical connection will require an initial and an ongoing commitment by the local governmental entity to provide the hook-up and to purchase the electricity.

Irrigation systems should be designed to operate a minimum of two years to assure a minimum period of plant establishment.

Irrigation lines which pass under streets, driveways or sidewalks must be bored and encased in a minimum 4" Schedule 40 PVC sleeve. Open cutting, jetting or missiling will not be permitted. The bores under streets and driveways will be a minimum depth of 18 inches below the bottom of the paved surface and extend 12 inches beyond the driveway, street edge or back of curb. When installed in new construction, open cut placement is acceptable, but the lines must be placed in sleeves and at the depths shown in the plans. Sleeves, whether placed by boring or laid during construction must be 4" Schedule 40 PVC and must extend a minimum of 12 inches beyond the back of curb. Uncurbed roadway sections will require special written instructions on sleeve depth and extension location from the area engineer.

MAINTENANCE

Maintenance is one of the most critical functions of an overall aesthetics program for State roadways. Although it is relatively easy to design and install aesthetic treatments and plantings, it is much harder to assure that they remain viable and attractive. It is especially so with an agency such as TxDOT that does not have a dedicated department with staffing or budgeting to perform the intensive gardening type maintenance that is typically required.

The following policy guidelines have been established to assure that aesthetic treatments and plantings receive the necessary maintenance:

All plant material used in a design should be native or well adapted to soil and climatic conditions prevalent in the portion of the District in which it is being used. Approval by TxDOT will be required.

A separate landscape maintenance agreement which supplements and functions as an addendum to existing municipal maintenance agreements will be required for all approved highway landscape projects.

The city or other non-departmental entity must accept long-term maintenance responsibility for all landscape features (except structural elements of bridges and structural retaining walls) including plantings and aesthetic components of crosswalks and intersection pavement such as stamped/stained concrete or pavers.

TxDOT will retain maintenance responsibility for bridges and structural retaining walls and for routine pavement maintenance.

SUPPORTING FUNCTIONS

Several other functions also support and contribute to the overall aesthetic qualities of the highway system. Among the more important are vegetation management and the issuance of landscape permits.

VEGETATON MANAGEMENT

Vegetation management is an important and vital part of the TxDOT maintenance and highway aesthetics program. It has been established for the following reasons:

Enhance the safety of the traveling public by providing adequate sight distances and overhang clearances.

Enhance environmental quality through the propagation and encouragement of native plant species; the enhancement of water quality and control; adherence to recognized pruning standards and the safe use of pesticides.

Reduce the damage to highway infrastructure caused by erosion
Promote coordination and efficiency in maintenance activities through the establishment of standardized practices.

A manual which defines statewide vegetation management guidelines, standards and policy for TxDOT was prepared in response to Executive Order 1-92 authorized on May 13, 1992. That manual entitled "Roadside Vegetation Management, a Volume of the Infrastructure Maintenance Manual" was adopted and issued to the Districts in November. 1993. The manual includes guidelines and standards for mowing; herbicide operations; use and protection of native grasses, wildflowers and legumes; wildlife habitat; pruning and brush management. The manual is incorporated into this plan by reference. It is accessible online at **http://txdot-manuals/dynaweb/colinfra/veg.**

Mowing

The Fort Worth District adopted a District mowing policy in October, 1996. The following is a statement of that policy.

Purpose: The purpose is to provide a clear understanding of the Fort Worth District's policy on mowing and how it is to be uniformly applied throughout the District.

Types of Mowing: Two types of mowing being utilized in the District; Full Width Mowing and Spot Mowing for Safety.

Full Width Mowing: Full width mowing includes all unpaved right of way, except for designated non-mow areas. Non-mow areas may include sections of right-of-way where the grade is too steep or the area is covered with desirable plants (such as stands of wildflowers). The number of cycles of full width mowing is dependent upon the level of adjacent development (urban or rural) to that roadway.

Spot Mowing for Safety: Spot mowing will be performed when and where necessary to maintain adequate sight distances for inside curves, off-ramps, on-ramps, intersections, private entrances, and some appurtenances. Spot mowing is generally performed when safety needs arise between scheduled mowing cycles. Spot mowing will only be used to eliminate unsafe conditions at the designated locations and will not be used to add a cycle or to otherwise supplement full width mowing.

Commencement of Mowing Operations: Current season full width mowing operations will only commence after the District Vegetation Manager, with approval of the District Director of Maintenance, issues a letter to all maintenance sections designating the earliest start date. The date will be established by observations of the grass conditions but shall never be earlier than the day after "Earth Day". A general time frame for beginning mowing operations is normally around mid-May. Spot mowing for safety can be scheduled at any time it becomes necessary.

The maintenance supervisors may commence a mowing cycle at any appropriate time after the earliest begin date is issued. They may issue orders for follow-up cycle begin dates as they may deem necessary within the total number of yearly cycles allocated.

Mowing Frequency: Mowing frequency is based on whether the roadway segment being mowed is designated as an urban segment or a rural segment. The designation of each roadway will be shown on the highway limits table included in the individual mowing contract documents and will also be designated on the Vegetation Management Plan Map of the District. The recommended designation will be determined by the District's Vegetation

Manager (working with the Area Engineers and Maintenance Section Supervisors) and approved by the Director of Maintenance and District Engineer.

The following mowing frequency designations have been adopted by the Fort Worth District:

Rural Segment: A rural segment is one in which the character of the adjacent area is predominantly rural in nature. Small towns or portions of larger cities could be considered as rural segments depending upon the predominant adjacent conditions. A rural segment has a maximum of two (2) full width mowing cycles per growing season.

Urban Segment: An urban segment is one in which the character of the adjacent area is fully or predominantly developed with houses, businesses and/or other urban activities. Being within a corporate limits of a municipality alone does not necessarily constitute an

urban segment. An urban segment has a maximum of three (3) full width mowing cycles per growing season. Under some circumstances, one additional mowing cycle may be added during a two year contract period if approved by the Director of Maintenance.

Non-Mow Areas: Non-mow areas are determined by the Maintenance Supervisor or his designated representative. The designation of non-mow areas may include steep slopes, wide areas of right-of-way, areas covered by desirable vegetation, wildlife habitat, areas with slope erosion conditions not conducive to mowing operations or other similar conditions. Non-mow areas will be conspicuously marked in order to alert mowing contractors to their presence. Mowing contractors should also be informed of the locations prior to any mowing operations.

Transitions: Whenever transitioning from a mowed area into an unmowed area (such as occurs during spot mowing operations), a smooth and gradual transition will be made to provide a visual blend of the two areas. The rate of transition will be not less than 5:1, five (5) feet parallel to the roadway for every one (1) foot increase or decrease in offset width.

Mowing Heights: In order to avoid weakening a stand of grasses, it is important that they not be cut too short. Mowing contractors should adjust their mowing heights to achieve as near seven (7) inches (180 mm) as possible on generally level ground.

Hand Trimming: Hand trimming will be required on all mowing cycles unless specifically excluded in the individual contract documents. Hand trimming is required around signs, trees and any other appurtences which are present or which are subsequently placed on the right-of-way.

Mowing when Soil is Wet: Mowing activities will be delayed when soil is wet and in the opinion of the Maintenance Supervisor or his designated representative (typically the Mowing Inspector), will cause damage to the right-of-way and its vegetation or be a safety hazard for the public, TxDOT employees or the contractor. Mowing activities may resume

when, in the opinion of the Maintenance Section Supervisor, or his designated representative, the conditions are acceptable to resume mowing.

Mowing Steep Slopes: Avoid mowing steep slopes (3:1 ratio or steeper) with tractor type equipment. Mowing steep slopes with that type equipment increases compaction which can result in slope failure and rutting, and decreases the vigor of the vegetation. Loss of plant growth results in slope erosion. Any required mowing must be done with hand held equipment.

Coordination with Herbicide Operations: The application of herbicide should be coordinated with mowing operations in order to assure that applied herbicide will have an opportunity to be effective. Mowing immediately before applying the herbicide or within ten (10) days after an application should not be performed.

Herbicide use

Vergetation Control: The control of vegetation may be accomplished by physical (mowing) or chemical means. Chemical control is sometimes more effective and economical than the physical mowing option. Modern herbicides have been developed to control weed problems with minimal impact to the environment. The appropriate use of herbicides is an integral part of the Department's vegetation management strategy.

The application of herbicides and spray additives will be made in a manner consistent with all current and pertinent laws and regulations as established by the Texas Department of Agriculture (TDA) and in compliance with all label directions.

Applicator Qualifications: The control program is generally performed "in-house" with licensed applicators. All TxDOT applicators are required, through interagency agreement with the Texas Department of Agriculture, to be licensed and to complete a yearly continuing education training program for license renewal.

Coordination With Mowing Operations: The application of herbicide must be coordinated with mowing operations. Foliar-applied herbicide operations should not be performed less than 10 days before any mowing activities nor immediately after the mowing operations have taken place. Mowing grass first and then applying herbicide is not appropriate since mowing reduces the leaf area of the plant to be eliminated and severely affects the effectiveness of the type of herbicide used by TxDOT.

Application Procedures: Procedures for herbicide application on State rights-of-way are detailed in the latest issue of TxDOT's "Herbicide Operations Manual". That guideline manual is incorporated into this plan by reference.

Wildflowers

TxDOT's long established program of protecting and distributing native and some introduced wildflower species has received full public endorsement and the program will be continued. Right-of-way mowing should not begin until the wildflowers have had an opportunity to finish blooming and set seed. Late blooming varieties should also be protected and preserved during mowing operations. It should be noted that all patches of wildflowers cannot be preserved but it should be endeavored to protect significant patches by leaving those areas unmowed until the next cycle. In areas where safety is concerned, the wildflowers should be mowed but only in the amount necessary to remove the safety hazard.

In areas where wildflowers are lacking, the Department should pursue a program to introduce a variety of native types. Wildflowers should be especially introduced into areas with large sections of rights-of-way such as in interchanges. Center medians are another candidate for significant wildflower displays as those areas are easily seen from traffic flowing from both directions.

The Fort Worth District is located in Region 5 of the designated Vegetation Areas of Texas which is known as the "Cross Timbers and Prairies" region. A list of some of the more popular wildflower species found in the region is shown in Appendix 2.

Native and Adapted Grasses

The advantages that native and adapted grasses offer, such as their ability to cope with varying climatic and soil conditions within the State, provide excellent erosion control, contend with disease and insect infestations, provide wildlife habitat, resist invasion of noxious weeds and incur low maintenance costs, is a tremendous benefit for the Department's vegetation management program. Because of these benefits, the right-of-way should contain native grasses whenever possible and be supplemented by introduced grasses which are well adapted to the climate and soil conditions. A notable exception is Johnson grass (non-native but very well adapted grass) which has become a nuisance throughout the State and is the subject of a Departmental program for eradication.

A listing of recommended grasses for the various districts statewide is contained in the Department's Standard Specifications under Item 164 (1993 specification book or subsequent future editions)"Seeding for Erosion Control". From this listing, grass species may be selected individually or as a mix. Selecting a seed mix is generally better than the selection of individual species since some verities are better suited for certain locations than others. The mix permits the best species for the conditions prevalent such as in the bottom of drainage swales or on sloped areas.

Seed mixes recommended for the Fort Worth District based on seasonal application, geographic location and soil condition are shown in Appendix A.

LANDSCAPE PERMITS

All landscaping elements (including sidewalks, irrigation systems, plantings, city name monuments and other landscape related items) which are proposed for location on State rights-of-way and are not a part of a TxDOT construction project, must be approved in advance of the construction by the State. Construction will not be allowed on State right-of-way without State approval. Evidence of approval will be by the issuance of a written permit from TxDOT. All unauthorized construction on State right-of-way is subject to removal at the entire cost of the developing or constructing body.

When the improvement is to be located on State owned right-of-way, the issuance of a permit by a local governmental entity (city, county, etc.) other than the State does not relieve the developer or constructing body from obtaining a State permit prior to construction.

The following are general guidelines for obtaining a sidewalk, irrigation, landscape or city name monument permit to be located on State right-of-way in the Fort Worth District. The guidelines provide general criteria and requirements for submitting plans and obtaining a permit. Each

submission is evaluated individually for compliance with State requirements and the site may be inspected by State personnel to ensure compliance. Depending upon the particular on-site situation, deviations from the guidelines herein presented may be considered. If proposed deviations are found by TxDOT to be acceptable or warranted, they may, at TxDOT's option, be approved from time to time. In all cases, the Texas Department of Transportation shall be responsible for determining the appropriateness of any development and will make the final decision on what may and may not be placed on the State's right-of-way.

Specific questions relating to constructing sidewalks, irrigation, landscape planting or city name monuments on State right-of-way should be directed to the Fort Worth District Landscape Architect , Area Engineer or Director of Maintenance.

Requests for such permits should include the following information:

- Name and mailing address of the permit applicant (Group or individual to whom the permit will be issued, typically this is the property owner).
- Name of the development and address of the property for which the permit will be issued.
- Name and telephone number of a contact person to answer questions, if necessary.

The average time for obtaining a landscape permit (including sidewalks, irrigation, plantings and city name monuments) is approximately 10 working days after receipt of the plans. That time may vary depending upon the then current workload of the permit office or other factors such as required plan revisions and resubmittals that may be necessary to satisfy State requirements.

The issuance of a permit for installation of facilities on State rights-of-way does not grant any right, claim, title, or easement in or upon the highway through the implementation of the proposed construction. In addition, TxDOT assumes no responsibility or liability for damage to, or repair or replacement of any permitted improvements which might result or be necessitated from its work on its own right-of-way.

Plans submitted for permit should be on readable half scale (11"x17") plan sheets. Plan sheets should be sealed and signed by an appropriate licensed professional depending upon discipline.

SIDEWALK PERMIT

The State does not typically require sidewalks, although another governmental entity (city or county) may require the developer or adjacent property owner to provide one as a condition of development. The State will cooperate with the governmental entity by allowing sidewalks on its rights-of-way as long as doing so does not present a safety hazard and the improvements meet all State and ADA standards. Where conflicts exist between city requirements and State requirements, the State requirements shall govern.

General Requirements/Conditions

The developing entity must submit a plan to the State which shows the proposed sidewalk location, configuration and size. The plan should also show all physical elements located within the right-of-way

such as wooden poles, traffic signal standards (poles), controller boxes, manholes, ground boxes, telephone pedestals, significant grade changes, etc. The plan must be transmitted with a letter requesting a sidewalk permit.

The minimum sidewalk width is five (5) feet remote from curb, or six (6) feet for sidewalks placed immediately adjacent to a curb.

The intersection of sidewalks with driveways and streets shall be provided with sidewalk ramps which are approved by TxDOT and which meet all current ADA standards and TDLR (Texas Department of Licensing and Regulation) requirements. TxDOT may, at its option, require evidence that the plans have been approved by TDLR before construction can begin. It is the permit applicant's responsibility to determine the TDLR requirements and submit the appropriate data to that agency.

Sidewalks in State right-of-way should be located immediately adjacent to or preferably five (5) feet of the face of curb. If existing conditions indicate a need for a different configuration, changes to the requirement may be considered and evaluated by the State on an individual submittal basis. The use of serpentine designs will not be permitted.

After the submission of plans, the State may make a visit to the site in order to obtain additional evaluation information.

Construction of the sidewalk will conform to construction and design detail requirements of the Texas Department of Transportation as shown in standard detail sheets CSDD-00 (FW) and PED-05.

Costs for constructing sidewalk improvements will be the total responsibility of the permit applicant or developer.

The permit will state the specific conditions under which the sidewalk construction will be allowed.

The permit will provide the names and telephone numbers of persons within TxDOT which must be contacted prior to beginning construction. A time frame for contacting the persons will also be given. The permit will not be in effect until after the time period specified in the permit. Typically, the time period is 48 hours prior to the anticipated starting time of any phase of the sidewalk construction and in all cases, after the required notifications are made. Any required plan revisions must be made and resubmitted before a permit will be issued.

The permit or a copy of it must be available for inspection on site during the period of construction.

IRRIGATION PERMIT

To obtain an irrigation permit, the developing entity must submit a plan to TxDOT which shows the proposed irrigation system. The plan should also show all physical elements located within the right-of-way such as wooden poles, traffic signal standards and controller boxes, manholes, ground boxes, telephone pedestals, significant grade changes, etc. The plan must be transmitted with a letter requesting permission to install an irrigation system on State right-of-way.

Construction of the irrigation system should conform to all construction and design detail requirements of the City in which it is to be located, with the following exceptions. There may occasionally be city requirements which are different from the State requirements. In such

cases, the State requirements shall govern for the portion of development located on State right-of-way.

What is Permitted

Irrigation permits for spray irrigation systems will not be issued for locations on State rights-of-way in Tarrant County. Only drip irrigations systems will be considered in this county.

In other District locations, spray or lawn type irrigation may be permitted but only in those areas which are adjacent to individual properties when specifically requested by that property owner as an extension of their system. Properties without curb and gutter will not be permitted to install heads near the shoulder pavement. Special rules will apply for such installations and TxDOT should be contacted prior to the design of such facilities in order to avoid any delays in approval or unnecessary revisions to plans.

Spray or lawn type irrigation will not be permitted on any other parts of the right-of-way such as medians or interchange areas although low volume drip or bubbler type systems will be permitted where approved by TxDOT. Medians or interchanges will not be considered for any irrigation improvements when requested by adjacent property owners. Irrigation improvements in medians may only be considered when specifically requested by a governmental entity for public use and at their total design, installation, water, maintenance and connection and impact fee costs.

General Requirements/Conditions

Where spray irrigation is allowed, the spray irrigation heads located on State right-of-way must be adjusted in such a way that they will not, at any time, spray water onto the paved surface of the roadway. A manual shut-off valve is required within State right-of-way which will shut off the water flow to heads located in the right-of-way. That valve must be placed where it is easily accessible to TxDOT maintenance section personnel.
Any spray heads in the vicinity of signal or street lighting equipment must be adjusted in such a way that they do not spray onto the electrical and electronic parts or a technician when the equipment is being maintained.

Any water lines which cross under existing driveways, sidewalks or across existing paved roadways or streets within the State right-of-way must be bored and encased in a minimum 4 inch Schedule 40 PVC sleeve which extends twelve (12) inches beyond the driveway edges or back of curb. The bores shall be a minimum of eighteen (18) inches deep. Jetting or missiling will not be permitted.

The adjacent property owner will be responsible for all costs associated with the installation and maintenance of the irrigation system. Future additions to the system within State right-of-way will require a new permit.

Where the installation is a part of a joint City/State effort or City initiative alone, the City must agree (through a written maintenance agreement) to maintain the system and provide water totally at their cost before construction of the improvements are allowed.

The installation shall not damage any part of the highway and adequate provisions must be made to cause minimum inconveniences to traffic and adjacent property owners.

The permits will state other specific conditions under which the irrigation construction will be allowed.

The permit will provide the names and telephone numbers of persons within TxDOT which must be contacted prior to beginning construction. A time frame for contacting the persons will also be given. The permit will not be in effect until after the time period specified in the permit. Typically, the time period is 48 hours prior to the anticipated starting time of any phase of the irrigation construction aqnd in all cases, after required notifications are made.

The permit or a copy of it must be on site during the period of construction.

Specific questions about obtaining an irrigation permit should be directed to the Fort Worth District Landscape Architect, Area Engineer or Maintenance Director.

LANDSCAPE PLANTING PERMIT

The State may, at its option, permit the construction of landscaping on State right-of-way within the Fort Worth District under TxDOT approved design, aesthetic and locational conditions. The following criteria should be used as a guideline in designing and locating such landscaping plantings.

Definitions:

Non-yielding: Any objects which are rigid such as poles, planter boxes or plant material which has a single trunk caliper (measured 12 inches from ground level) equal to or greater than 4 inches at maturity. Plant material will be judged on the basis of typical mature size and not planted size. Any object determined by TxDOT to be non-yielding will be required to meet specific setback requirements.

Design Criteria and Requirements:

The area in which the landscaping is to be located should contain sufficient right-of-way to reasonably permit the landscape construction and maintenance operations without conflicting with safety, geometric and right-of-way maintenance considerations.

The use of native or adapted plant materials should be used to minimize maintenance requirements.

The design must adhere to the setback requirements shown in the Required Setbacks section of these guidelines.

Any landscaping permitted on State right-of-way will require that the adjacent property owner or city (depending on the requesting party) maintain the landscaped area and immediately surrounding environs at his/their cost.

The landscape design should be of a scale, color, subject matter and configuration which is appropriate for the area in which it is to be placed. Considerations in evaluating the acceptability of a design will include safety, maintenance, location and style as a minimum.

Irrigation of the landscaping area will be permitted, but only to water trees and shrubs. See irrigation limitations under the Prohibited Design Features section of these guidelines.

Required Setbacks:
All setbacks are based on distances from the travel lane to non-yielding objects and are identified in the Roadway Design Manual, Table 2-11.

Freeway Mainlanes, Minimum setbacks for non-yielding objects, including plant material is 30 feet from the nearest edge of the travel lane Ref. Roadway Design

Freeway Ramps, Minimum setbacks for any plant material is 16 feet from the ramp travel lane or as determined by TxDOT.

Other State Roadways, Minimum setbacks for other (non-freeway) types vary by location, traffic volumes and design speed. TxDOT should be contacted for specific setback information on those facilities

Medians, Minimum setbacks for medians also vary by location, traffic volumes and design speed. TxDOT should be contacted for setback information. Median landscaping by adjacent property owners will not be allowed.

Medians and Parkways, Any plant material which hangs over or has the potential to hang over the curb line at maturity will require appropriate setbacks based on average mature size and approval by TxDOT.

Sight Distance Requirements:

Sight distances must be maintained at all intersections or crossovers. This is especially important at those locations not specifically controlled by traffic signals. Based on prevailing traffic speed and roadway configuration, sight distance requirements will vary by location. No landscaping that obstructs vision will be permitted within areas where the view of drivers entering, exiting or turning onto or from the roadway will be affected. Sight-distance studies may be required from the entity requesting the permit to support the design conclusions.

Prohibited Design Features:

The following items will not be allowed within State right-of-way unless specifically approved in writing by the Texas Department of Transportation or permitted by an existing TxDOT program with appropriate TxDOT approval.

- Flagpoles or Pennant poles
- Statues, monuments or other art work
- No landscaping of medians or freeway sections between service roads unless approved in writing by TxDOT. Design and construction in these areas is generally reserved for TxDOT only.
- Designs that require extensive and/or intensive maintenance to ensure success. Examples include seasonal color flower beds, rose gardens, large ground cover areas, etc.
- Full width or lawn type irrigation systems. Only irrigation systems that are designed to provide water to tree or shrub groups are permitted. Such systems could include bubbler or drip systems but not spray systems.
- Fountains or other water features.
- Lighting will not be permitted
- No benches, parking or other similar facilities which encourage pedestrian activity around the landscaping will be permitted.

Obtaining a Landscape Permit

A detailed plan must be submitted to the State which shows the proposed landscape planting plan. The plan should include the location, layout configuration and irrigation (if included). The plan should be sufficiently detailed that it may be thoroughly evaluated. The landscape plan should show the layout, location, type and size of plant materials and any other elements of the overall design being proposed.

The plan should also show all existing physical elements located within the right-of-way such as poles, traffic signal standards and controller boxes, manholes, ground boxes, telephone pedestals, significant grade changes, trees, etc. The plan must be transmitted with a letter requesting a landscape permit and including the following information:

- Name and mailing address of the permit applicant.
- Location (address preferable) of the proposed landscaping.
- Name and telephone number of a contact person to answer questions, if necessary.

After the submission of plans, the State may make a visit to the site to obtain additional evaluation information.

Costs for constructing the landscaping will be the total responsibility of the requesting entity.

The permit will state the conditions under which the landscape construction will be allowed.

The permit will provide the names and telephone numbers of persons within TxDOT which must be contacted prior to beginning construction. A time frame for contacting the persons will also be given. The permit will not be in effect until after the time period specified in the permit. Typically, the time period is a minimum of 48 hours prior to the anticipated starting time of any phase of the proposed construction and in all cases, after required notifications are made.

The permit or a copy of it must be present on site for inspection during the period of construction.

Specific questions relating to landscaping on State right-of-way or the issuance of a landscape permit should be directed to the Fort Worth District Landscape Architect, Area Engineer or Director of Maintenance.

CITY NAME MONUMENT PERMIT

The following are general guidelines for obtaining a city name monument permit proposed for location on State right-of-way in the Fort Worth District. Although these guidelines provide general criteria and requirements for submitting plans and obtaining a permit, each submission will be evaluated individually for compliance with State requirements and may be inspected by State personnel to ensure compliance. In all cases the Texas Department of Transportation shall be responsible for determining the appropriateness of any development and will make the final decision on what may and may not be placed on State right-of-way.

General Requirements/Conditions

The State may, at its option, permit the construction of a city name monument on State right-of-way within the Fort Worth District under TxDOT approved design, aesthetic and locational criteria. The following should be used as a general guideline in designing and locating city name monuments.

City name monument permits will only be issued to incorporated cities, towns, or villages recognized and duly franchised by the State. The State will make the final determination about who may or may not erect city name monuments on its rights-of-way.

The monument must be included as a part of a larger landscape development. A monument by itself will not be acceptable, it must also include supplemental landscaping elements. A meeting with the State is recommended to discuss specific monument and landscape requirements.

Monuments and associated amenities must be located beyond a required 30 feet safety clear zone. That is, a monument may not be located closer than 30 feet from the edge of any driving lane.

The area in which the monument is to be located should contain sufficient right-of-way to reasonably permit the monument and landscaping operations without conflicting with safety, geometric and maintenance considerations.

The use of native or adapted plant materials should be used to limit maintenance requirements.

The only permitted wording will be the city's name. "Welcome to" or other wording will not be allowed .

A city logo may, at TxDOT's sole option, be permitted as a part of the signage or used alone without wording on the monument. The State will determine the acceptability of the logo relative to design, size, color and location.

The monuments should be of a scale, design and contain a lettering style and size which is dignified and appropriate for the area in which it is to be placed.

Lettering should be constructed of an acceptable metal obtained from an acceptable source and be mountable to the monument surface. Lettering which is painted onto the monument surface will not be allowed. Letters should be proportional to the monument size but shall not exceed twelve inches (12") in height under any circumstance. The color, style and lettering size and location on the monument will require approval by the State prior to installation.

Lighting will be permitted only with specific TxDOT review and approval.

The city must agree to maintain the monument, landscaping and grounds around the monument as long as it remains on State right-of-way.

Prohibited Design Elements

Billboard style signs will not be considered as a monument sign and will not be approved.

City name monuments will not, in general, be permitted in roadway medians.

The monument design and/or coloring must not divert a driver's attention and create a safety hazard. Monuments which, in the opinion of TxDOT, create an actual or potential safety hazard will not be allowed on State right-of-way.

Other signs of advertising or local entities/organizations (attached to the monument or separate) such as chamber of commerce, Lions Club, etc., will not be permitted on State right-of-way.

Drip irrigation will be allowed as a part of the design but no spray type irrigation of grassed or other areas will be permitted.

No banner, pennant or flag poles will be permitted.

No fountains or water features will be permitted.

No statuary, sculpture or other art objects will be permitted unless specifically approved by TxDOT.

No benches, parking or other facilities which encourage pedestrian activity around the monument will be permitted.

Obtaining a Permit

The city must submit a detailed plan to the State which shows the proposed city name monument design, location, layout configuration, landscaping plan, irrigation (if included) and size. The plan should be sufficiently detailed that it may be thoroughly evaluated. The monument design should show the monument location, size, materials to be used, lettering style and proposed elevations. The landscape portion of the plan should show general layout with the monument location shown, location, type and size of plant materials and any other elements of the overall design being proposed.

The plan should also show all existing physical elements located within the right-of-way such as poles, traffic signal standards and controller boxes, highway signage, manholes, ground boxes, telephone pedestals, significant grade changes, trees, etc. The plan must be transmitted with a letter requesting a city name monument permit and include the following information:

- Name and mailing address of the permit applicant (City).
- Location of the proposed city name monument (narrative description and a map).
- Name and telephone number of a contact person to answer questions, if necessary.

After the submission of plans, the State may make a visit to the site to obtain additional evaluation information.

Costs for constructing the city name monument, landscaping and plan preparation will be the total responsibility of the requesting city.

The permits will state the conditions and requirements under which the city name monument construction will be allowed.

The average time for obtaining a city name monument permit is approximately 30 days after receipt of the plans. That time may vary depending upon the then current workload of TxDOT or other factors such as required plan revisions and resubmittal to meet State requirements.

The permit will provide the names and telephone numbers of persons within TxDOT which must be contacted prior to beginning construction. A time frame for contacting the persons will also be

given. The permit will not be in effect until after the time period specified in the permit. Typically, the time period is a minimum of 48 hours prior to the anticipated starting time of any phase of the proposed construction.

The permit or a copy of it must be on site during the period of construction. Each proposed location will require a separate permit submittal and separate permits will be issued for each location.

Specific questions relating to landscaping on State right-of-way or the issuance of a city name monument permit should be directed to the Fort Worth District Landscape Architect, Area Engineer or Director of Maintenance.

OPPORTUNITY AREAS

A number of opportunity areas for landscaping and aesthetic treatments are present within TxDOT right-of-way. The following section identifies generalized locations where those opportunities currently exist or in the future may be available for consideration.

LANDSCAPE PLANTING AREAS

- Landscape planting should be limited to locales where there is a sufficient right-of-way land mass to support the development in full accordance with safety considerations. Areas that have sufficient right-of-way to accommodate a planting design typically occur in freeway interchange areas, along arterial streets where they intersect with other arterial streets or along streets where wide medians are present. Any landscape planting design must consider the mature size of plant materials and their impact on safety and maintenance issues in both the short and long term.
- Planting areas should not be placed in locations where parkways and/or medians are narrow. These type areas are more suited for TxDOT's standard right-of-way grasses or hardscape treatments (see page ▒ for TxDOT's ***"basic"*** design configuration classification).

HARDSCAPE ELEMENTS

Hardscape elements include concrete pavers, colored and textured concrete or asphalt paving, planter boxes or other similar features. The use of hardscape elements should be in accordance with the "Guidelines and Standards" section of this plan.

- Hardscape treatment should be considered for all areas under bridge structures or other areas where grasses will not grow and in medians and triangle areas that are too small to mow efficiently with normal bat-wing type mowing equipment. Aesthetic treatments in the form of textures, decorative designs and colors may be considered for bridge elements, retaining walls and noise wall structures.
- Hardscape treatments in the form of pavers, textures/colored concrete pavement or planter boxes may be considered at any location on the right-of-way where it will visually enhance the area, that meets safety standards and which is approved by TxDOT.
- One of the easiest ways to add texture to tilt-up, cast in place and precast concrete structures is through the use of form liners. Form liners are available in many textures including stone, wood, granite and rope as well as many of the standard fractured fin patterns. Form liners may be used for aesthetic purposes on bridge aprons, bridge columns and retaining walls. They may be attached to the forming system or casting bed prior to concrete placement. Custom form liners can be manufactured to cast unusual patterns, graphic illustrations or even city logos in concrete structures for unique finishes.

IMPLEMENTATION

Upon adoption, this plan will become the general guideline for all aesthetic and landscape development within the entire Fort Worth District. It meets the requirements of the Green Ribbon program to develop a master plan for cities within the District with populations of 100,000 or more because both cities in the District which meet that criteria (Fort Worth and Arlington) are included. It will also serve those cities which are located within the populous Tarrant County area but which have not reached the 100,000 population plateau.

The plan is intended to be dynamic in that when conditions or situations with in the District change, the plan may change accordingly.

The plan will serve planners and designers, both on-staff and consultants, to guide their efforts in a coordinated and consistent manner.

COST PARTICIPATION

TxDOT's participation in landscape and aesthetic enhancement costs is limited to approximately 1% of the project cost. This may be used for hardscape items, for plantings and irrigation, or a combination thereof.

- TxDOT will pay for any landscape pavers or textured colored concrete surfaces used in the medians as described in "Median Treatments" on Page __ of this plan.
- TxDOT may participate with local jurisdictions in the cost of landscape plantings, planter boxes and irrigation systems as a part of a roadway construction or reconstruction, through TxDOT's Landscape Cost Sharing Program, or other programs which may become available.
- TxDOT will pay for any structural aesthetic treatments, such as form liners and stains, that do not add substantially to the cost of those features. Special structural elements, such as pilasters and special railings, will be at the local jurisdiction's expense. **[Note: TxDOT will participate in railing costs only up to the estimated cost for installing T411/C411 "Texas Classic Railing"]**
- TxDOT will not participate in the cost of any ornamental or special illumination or signal poles.
- TxDOT will not participate in the cost of pavers or stamped & stained concrete in crosswalks or intersections.
- TxDOT will not participate in any special designs used as decorations on bridges or retaining walls which reflect city symbols, logos or artwork.

MAINTENANCE

For landscape projects, a landscape maintenance agreement which supplements and basically functions as an addendum to the existing municipal maintenance agreements will be prepared by TxDOT and submitted to the local government for execution prior to any development/construction. The agreement must be approved and in effect before any landscape items are constructed.

TxDOT will perform right-of-way mowing through a private mowing contract in accordance with mowing guidelines and frequencies established for the District. Jurisdictions desiring additional mowing cycles will be permitted to take over the mowing responsibility for specified segments of the right-of-way through written agreement with TxDOT. Existing municipal maintenance agreements currently specify the responsibilities of both the State and the city with regard to mowing State right-of-way.

TxDOT will perform chemical control of noxious weeds through herbicide spraying operations. Such operations will be performed to protect pavement edges and control infestations of Johnson grass and other noxious and undesirable plants. The applicators will be required to hold applicator licenses authorized through the Texas Department of Agriculture. All licensed applicators will be required to pass an initial test and obtain yearly continuing education training for license renewal.

PERMITS

Landscape permits will be issued by the Fort Worth District for sidewalks, irrigation, landscape planting and city name monuments in accordance with the guidelines specified in this plan.

PROJECT PRIORITIZATION

COMMUNITY PARTICIPATION

TxDOT recognizes the role of the highway in helping form the visual character of our cities. It also recognizes the importance of participation and cooperation of the community in setting and reaching sustainable goals for the appearance for our highways. The Fort Worth District of TxDOT will work with community governments and agencies to include landscape and aesthetic elements in proposed and existing highway projects. This will be accomplished as part of the public hearing procedures associated with a proposed project or as a review of individual landscape projects.

Landscape development requires community participation in the maintenance that will be required. This will mean that the local community must commit to the maintenance responsibility before TxDOT will include a landscape element in a highway project. In some instances where improved aesthetics are needed and the community declines or is not able to commit to maintenance responsibilities, the landscape development may consist of elements which require little or no maintenance such as including hardscape elements only.

Should future conditions render the participating agency unable or unwilling to carry out the agreed upon participation agreement, the District may re-design or remove the landscaping as may be needed to match its very limited maintenance resources.

FUNDING PROGRAMS

As identified in another section of this Plan, TxDOT provides the following programs to assist communities in the development of landscape and aesthetic improvements on the State highway system.

NEW HIGHWAY CONSTRUCTION

New highway plans include the consideration of landscape and aesthetic improvements as part of the entire highway development project. This is the most opportune time to develop long-term or special landscape programs. All highway development projects are subject to public review and comment and TxDOT encourages the community to use these venues to make known their wishes. Detailed information about public hearings or any other highway landscape project may be obtained by calling the Public Information Office at (817) 370-6846.

CONSTRUCTION LANDSCAPE PROGRAM

This program provides funding to each TxDOT District for landscape development projects on a funds-available basis. The funds available will vary based on levels of new construction and other factors. These funds may be used for new construction or for existing highways.

LANDSCAPE COST SHARING PROGRAM

The Landscape Cost Sharing Program was established in 1989 by the Texas Highway Commission. This program set aside State funds for jointly sharing costs of beautification projects between the Cities and the Texas Department of Transportation.

GOVERNOR'S COMMUNITY ACHIEVEMENT AWARD PROGRAM

The Governor's Achievement Award Program is a grant program sponsored by "Keep Texas Beautiful" that recognizes the beautification and clean-up efforts of cities. The award consists of a monetary grant that is allocated to landscape improvements on the State highway system within the winning community.

Information regarding any of these programs or processes may be obtained from the Fort Worth District offices of the Texas Department of Transportation at (817) 370-6500.

APPENDICES

Appendix

APPENDIX A

Standard Seed Mixes, Dates and Rates
for the Fort Worth District
Based on Item 164"Seeding for Erosion Control"
2004 Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges

The rates in this table are shown in pounds of Pure Live Seed (PLS) per acre. It is based on a coverage density of 20 live seed per square foot of ground surface.

Permanent Rural Seed Mix

Dates	Clay Soils		Sandy Soils	
Feb 1 To May 15	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoaks Gramma (El Reno)	2.7	Sand Lovegrass	0.5
	Bermudagrass	0.9	Bermudagrass	1.8
	Little Bluestem	1.0	Weeping Lovegrass (Ermelo)	0.8
	Blue Grama (Hachita)	0.9	Sand dropseed	0.4
	Illinois Bundleflower	1.0	Partridge Pearl	1.0
	Total	6.8	Total	4.8

Permanent Urban Seed Mix

Dates	Clay Soils		Sandy Soils	
Feb 1 To May 15	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoaks Gramma (El Reno)	3.6	Sideoats Grama (El Reno)	3.6
	Bermudagrass	2.4	Bermudagrass	2.1
	Buffalograss (Texoka)	1.6	Sand Dropseed	0.3
	Total	7.9	Total	6.3

Temporary Cool Season Seeding			Temporary Warm Season Seeding		
Dates			**Dates**		
Sep 1 To Nov 30	Tall Fescue	4.5	May 1 to Aug 31	Foxtail Millet	3.4
	Western Wheatgrass	5.6			
	Cereal Rye	3.4			
	Total	13.5		Total	3.4

APPENDIX B

Wildflowers for Texas Vegetational Area 5
Cross Timbers and Prairies Region

Bluebonnet (Lupinus texensis)
Indian Blanket (Gaillardia pulchella)
Purple Coneflower (Echinacea purpurea)
Pink Evening Primrose (Oenothera speciosa)
Thickspike Gayfeather (Liatris pycnostachya)
Purple Prairie Clover (Petalostemum purpureum)
Standing Cypress (Ipomopsis rubra)
Planes Coreopsis (Coreopsis tinctoria)
Blue Sage (Salvia farinacea)
Scarlet Sage (Salvia coccinea)
Black-Eyed Susan (Rudebeckia hirta)
Mexican Hat (Ratibida columnaris)
Sunflower (Helianthus annuus)
Yarrow (Achillea millefolium)
Moss Verbena (Verbena tenuisecta)
Wild Foxglove ((Penstumon cobaea)
Lemon Beebalm (Monarda citriodora)
Toad Flax (Linaria maroccana)
Indian Paintbrush (Castilleja indivisa)

The above is a partial listing of the most prominent wildflower species which are readily found and available for Texas Vegetational Area 5.

APPENDIX C

Acceptable Plant Species
Fort Worth District

This is a partial listing of plant species which may be used within the right-of-way in the Fort Worth District. Other native or adapted plants may be considered if approved by TxDOT. Generally, plants with high maintenance and/or water requirements should be avoided. Long lived trees are preferred but short-lived, rapid growth trees may be used on an interim basis to provide short term coverage while the slower growing plants have a chance to mature. Species which are generally considered native are denoted with an "N".

TREES

Texas Ash (Fraxinus texensis) N
Eastern Red Cedar (Juniperus virginiana) N
Bald Cypress (Taxodium distichum) N
Lacebark Elm (Ulmus parvifolia sempervirens)
Possum Haw/Deciduous Holly (Ilex decidua) N
Caddo Maple (Acer barbatum) N
Burr Oak (Quercus macrocarpa) N
Durrand Oak Quercus durandii) N
Shumard Oak (Quercus shumardi) N
Common Persimmon (Diospyros virginiana) N
Pecan (Carya illinoinensis) N
Eldarica/Mondell Pine (Pinus eldarica)
Mexican Plum (Prunus Mexicana) N
Redbud (Cercis Canadensis) N
Sycamore (Platanus occidentalis) N
Desert Willow (Salix babylonica) N
Deodar Cedar (Cedrus deodara)
Crapemyrtle (Lagerstroemia indica)
Cedar Elm (Ulmus crassifolia) N
Eve's Necklace (Sophoria affinis) N
Black Locust (Robinia pseudo-acacia) N
Wax Myrtle (Myrica centera) N
Chinkapin Oak (Quercus muhlenbergi) N
Live Oak (Quercus virginiana) N
Callery Pear (Pyrus calleryana)
Texas Persimmon (Diospyros texana) N
Austrian Pine (Pinus nigra)
Chinese Pistache (Pistacia chinensis)
Purple Leaf Plum (Prunus cerasifera)
Sweetgum (Liquidambar styraciflua)
Vitex/Chaste Tree (Vitex agnus-castes)

SHRUBS

American Beautyberry (Callicarpa Americana) N
Coralberry (Symphoricorpos orbiculatus) N
Forsythia (Forsythia intermedia)
Indian Hawthorn (Raphiolepis indica)
Cherry Laurel (Prunus caroliniana)
Nandina (Nandina domestica)
Fraser's Photinia (Photinia x 'Fraseri')
Flameleaf Sumac (Rhus copallina) N
Softleaf Yucca (Yucca gloriosa)
Texas Mountain Laurel (Sophora secundiflora) N
Carolina Buckthorn (Rhamnus caroliniana) N
Rock Cotoneaster (Cotoneaster horizontalis)
Yaupon (Ilex vomitoria) N
Leather Leaf Mahonia (Mahonia bealei)
Texas Sage (Leucophyllum frutescens) N
Smooth Sumac (Rhus glabra) N
Red Yucca (Hesperaloe parviflora) N
Hard Yucca (Yucca aloifolia)
Tam Juniper (Juniperus □apill 'Tamariscifolia')
Gray Santolina (Santolina chamaecyparissus)

ORNAMENTAL GRASSES

Pampas Grass (Cortaderia selloana)
Mexican Feather Grass (Stipa (Nasella) tenuissima)
Hameln Dwarf Fountain Grass (Pennisetum alopecuroides 'Hameln'
Morninglight Miscanthus (Miscanthus sinensis 'Morning Light')
Eulalia/Compact Maiden Grass (Miscanthus sinensis 'Adagio')
Japanese Silver Grass (Miscanthus sinensis 'Cosmopolitan')
Gulf Muhly (Muhlenbergia □apillaries)
Weeping Lovegrass (Eragrostis curvula)

APPENDIX D

Planting Standards

PLANT SELECTION

Plants should be selected on the basis of their adaptability to the roadway environment, root ball condition, water requirements, planting size, longevity, location within the right-of-way and long-term maintenance requirements.

Plants should be able to survive the relatively harsh environment present on the highway right-of-way. High winds, exhaust fumes, intense sunlight, heat and generally poor soil conditions make plant establishment difficult for even the hardiest of plants. No plant material will be installed during the most severe period of summer (approximately June 15 through September 15) without TxDOT permission.

TxDOT prefers a plant's rootball condition to be "container grown" whenever possible. Where container grown is not possible, "balled and burlapped" (B&B) stock may be considered when approved in writing by TxDOT. "Containerized" stock will not be used except under special circumstances and then only when specifically authorized in writing by TxDOT. All plant materials will be required to meet the plant to container size ratios recommended by the "American Standard for Nursery Stock".

A plant's water requirement is a very important consideration for plant selection. The plant materials selected should be location hardy and able to generally maintain themselves on the natural rainfall of an area after a two year establishment period during which supplemental water is generally provided.

Research has shown that planting smaller sized stock generally establishes more quickly and is less susceptible to transplant shock than larger sizes. Planting sizes greater than 3" caliper should be done sparingly if at all.

Plant selection should generally be limited to long lived varieties. Occasionally, rapid growth but relatively short lived species may be selected to provide more immediate aesthetic impact while the long lived, but slower growth varieties have an opportunity to mature. If done for this reason, the short life span could be an acceptable expenditure.

All plants should be heavy, symmetrical, tightly knit and so trained or favored in development and appearance as to be superior in form, number of branches, compactness and symmetry. They should be sound, healthy and vigorous, well branched and densely foliated when in leaf, free of disease, insect pests, eggs or larvae and have healthy, well developed root systems.

The location of plants within the right-of-way will be based on mature plant size and its impact on safety and maintenance conditions. Appropriate setback requirements will be a major locational factor.

Plant material should be able to survive with little to no maintenance after an initial two year establishment period. Some areas designated for reforestation such as in larger interchange areas, should be maintenance free as soon as possible.

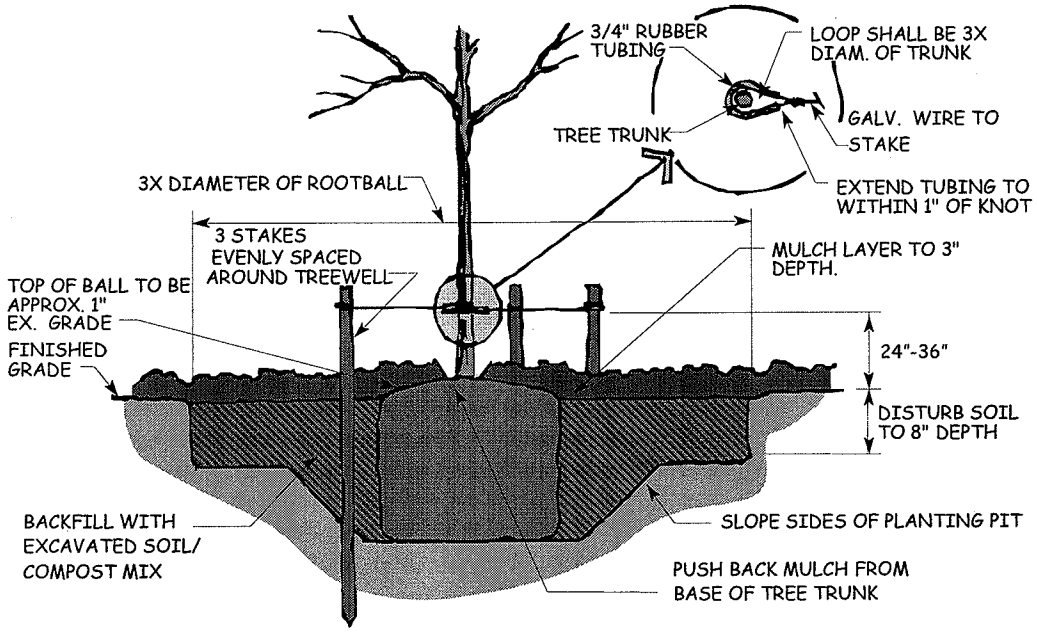
PLANTING BED PREPARATION

Composts and mulches are important in soil building. Compost is the decomposed remains of waste organic materials. When worked into the soil, compost loosens the soil for easier penetration of plant roots, water and air. It also increases the soil's water holding capacity. Each planting bed (and planting backfill mix) will consist of a mixture of one part compost (by volume) to three parts existing soil (by volume). Compost must meet the Requirements of TxDot's Standard Specification 161. Planting beds will be a minimum of six (6) inches into the existing soil.

Mulches are surface coverings applied to soil. They help in decreasing weed seed germination, moderate the soil temperatures and retain moisture. All planting beds (including individual tree watering saucers) are to include a three (3) inch top dressing of shredded hardwood mulch. Mulch should be pushed back from the trunks of trees and shrubs to ground level (see drawing below)

Planting pits are to be the depth of the plant rootball minus one-half (1/2) inch for shrubs and one (1) inch for trees. The preferred pit configuration is shown in the drawing below. Vertical sided pits may be used where there are site constraints. Each pit shall include fertilizer tablets based on the Fertilizer Schedule and placed in accordance with the drawing.

Tree plantings will generally be massed into larger planting beds configured with sweeping curves which will allow large bat-wing type mowers to mow grassed areas outside the beds without difficulty.



PREFERRED TREE PLANTING PIT CONFIGURATION

APPENDIX F

This is the format for the Water Requirements Calculator. A working calculator is online at _____. It calculates the weekly water requirements for the initial revegetation of TxDOT rights-of-way in the Fort Worth District

WATER REQUIREMENTS CALCULATOR

FOR 1" NEW WATER PER WEEK

MONTH	MONTHLY PAN EVAP. AVG.* (Inches)	WEEKLY PAN EVAP. AVG.** (Inches)	WEEKLY PAN EVAP.+ 1" NEW WATER (Inches)	PREVIOUS 7 DAY RAINFALL (Inches)	REQUIRED GALLONS*** PER WEEK (For 1 Acre)	INPUT TOTAL ACRES TO WATER	TOTAL GALLONS*** REQUIRED FOR WEEK
JAN	3.1	0.70	1.70		46,162		0
FEB	3.7	0.93	1.93		52,271		0
MAR	6.3	1.42	2.42		65,783		0
APR	7.5	1.75	2.75		74,674		0
MAY	9	2.03	3.03		82,338		0
JUN	10.4	2.43	3.43		93,048		0
JUL	12.5	2.82	3.82		103,798		0
AUG	11.7	2.64	3.64		98,893		0
SEP	8.5	1.92	2.92		79,272		0
OCT	6.5	1.47	2.47		67,009		0
NOV	4.1	0.96	1.96		53,131		0
DEC	3	0.68	1.68		45,549		0

For Calculator Use Instructions, go to **Instructions Tab**

BASIS: 1" WATER PER ACRE = 27,154 GALLONS

* Average Tarrant County Monthly Pan Evaporation from TxDOT "Climate Data for Texas", Sept. 1993

** Tarrant County monthly average Pan-Evaporation divided by the number of days per month x 7 days

*** If previous 7 day rainfall exceeds weekly Pan Evaporation + 1", no additional water is required

LEGEND

	Indicates Information Input Area
82,388	Identifies Gallons of Water Required

Date: _____

Inspector: _____
Signature

APPENDIX E

FUNDING RESPONSIBILITY

Improvement Item	Basic (TxDOT)	Basic Enhanced (TxDOT/ City)	Non-Standard (City)	Funding Responsibility Breakdown
2' wide median mow strip (textured, colored concrete)	X			
10' median nose paving (textured, colored concrete)	X			
Pave entire median or portions if 8' or less (textured, colored concrete)	X			
Pave all or portions of median if greater than 8' (textured, colored concrete)	X TxDOT option			
Pave all or portions of median if greater than 8' (textured, colored concrete)		X If requested by City		TxDOT - Only amount for 2' mow strip adjacent to curb (materials and installation) City - Remainder of paving cost
Substitute pavers for textured, colored concrete		X City option		TxDOT - Materials and Installation City - Paver maintenance
Median/Parkway standard surface treatment Grass –seeded or turf	X			
Median/Parkway Landscaping – Other than grass (may include drip irrigation) TxDOT furnishing materials and Installation		X TxDOT option for participation		TxDOT - Materials and Installation City - Maintenance
Median/Parkway Landscaping – Other than grass TxDOT/City cost sharing		X TxDOT option for participation		TxDOT - Sharing cost of materials and Installation City - Sharing cost of Materials and Installation + Maintenance
Median/Parkway Landscaping – Other than grass (Specific request from City – no TxDOT participation except permit issuance)			X No TxDOT participation	TxDOT - Issuance of permit City - Material, installation and maintenance
Sidewalks if constructed as a part of a project (5' wide minimum, 6' wide if adjacent to a curb, with ADA approved ramps where required)	X			
Sidewalk if requested by city or adjacent property owner (Use TxDOT standards and obtain TxDOT permit)			X	TxDOT - Issuance of permit City or adjacent property owner/developer - Material, Installation and Maintenance
Crosswalk delineation (painted - standard crosswalk markings	X			

Appendix E - Funding Responsibility cont'd.

Improvement Item	Basic (TxDOT)	Basic Enhanced (TxDOT/ City)	Non-Standard (City)	Funding Responsibility Breakdown
Crosswalk delineation (Other than the standard crosswalk markings)			X	TxDOT - Approve changes City - Materials, installation and maintenance
Bridge Railing - TxDOT standard railing	X			
Bridge Railing - other than TxDOT standard bridge railing (must meet crash testing criteria)			X	TxDOT - cost of standard TxDOT bridge Railing City - cost above standard TxDOT bridge railing plus crash testing costs

Master

Improvement Item	Basic (TxDOT)	Basic Enhanced (TxDOT/ City)	Non-Standard (City)	Funding Responsibility Breakdown