ATTACHMENT D

WHITEMAN AIR FORCE BASE

LANDSCAPE DEVELOPMENT PLAN

Landscape Development Plan

for

Whiteman Air Force Base

prepared by
Harland Bartholomew & Associates, Inc.

August 1991

WHITEMAN AIR FORCE BASE
LANDSCAPE DEVELOPMENT PLAN

TABLE OF CONTENTS

1.0 INTRODUCTION 1.0-1
- 1.1 Goals and Objectives 1.0-2

2.0 THEME PLAN 2.0-1
- 2.1 Landscape Development Plans 2.0-7
- 2.2 Landscape Priority Plan 2.0-15

3.0 LANDSCAPE PLANT MATERIAL PALETTE 3.0-1

4.0 LANDSCAPE PLANTING DESIGN STANDARDS 4.0-1
- 4.1 Street Trees 4.0-2
- 4.2 Parking Lots 4.0-5
- 4.3 Foundation Plantings 4.0-13
- 4.4 Landscape Buffers 4.0-20
- 4.5 Open Space/Lawn Area Plantings 4.0-24
- 4.6 Pedestrian Areas 4.0-28

5.0 LANDSCAPE CONSTRUCTION DOCUMENT CRITERIA 5.0-1
- 5.1 Planting Plan Requirements 5.0-2
- 5.2 Sample Specification 5.0-8

6.0 LANDSCAPE MAINTENANCE 6.0-1
- 6.1 Lawn Maintenance 6.0-2
- 6.2 Tree and Shrub Maintenance 6.0-6
- 6.3 Ground Covers 6.0-8
- 6.4 Maintenance Summary 6.0-9

7.0 SITE DESIGN STANDARDS 7.0-1
- 7.1 Streets 7.0-2
- 7.2 Parking Lots 7.0-6
- 7.3 Pedestrian Walkways and Nodes 7.0-9
- 7.4 Site Furnishings 7.0-14
- 7.5 Lighting 7.0-17
- 7.6 Signing 7.0-18

WHITEMAN AIR FORCE BASE
LANDSCAPE DEVELOPMENT PLAN

LIST OF FIGURES

2.0-1	Theme Plan	2.0-2
2.0-2	Entrance and Streets	2.0-3
2.0-3	Formal Planting Areas	2.0-4
2.0-4	Informal Planting Areas	2.0-5
2.0-5	Naturalized Planting Areas	2.0-6
2.1-1/ 2.1-7	Landscape Development Plans	2.0-8
2.2-1	MCP Priority Plan	2.0-16
2.2-2	O&M Priority Plan	2.0-17
3.0-1	Large Trees Plant Matrix 1	3.0-3
3.0-2	Small Trees Plant Matrix 2	3.0-4
3.0-3	Large Shrubs Plant Matrix 3	3.0-5
3.0-4	Small Shrub Plant Matrix 4	3.0-6
3.0-5	Ground Cover Plant Matrix 5	3.0-7
5.1-1	Small Tree Planting Detail	5.0-4
5.1-2	Coniferous and Large Tree Planting Detail	5.0-5
5.1-3	Shrub Planting Detail	5.0-6
5.2-4	Ground Cover Planting Detail	5.0-7
6.4-1	Maintenance Schedule	6.0-10

LIST OF TABLES

2.2-1	Priority Listing MCP Landscape Projects	2.0-18
2.2-2	Priority Listing O&M Landscape Projects	2.0-20

1.0 INTRODUCTION

The purpose of the Landscape Development Plan is to provide a comprehensive approach to improving and maintaining a desired landscape character that is both functional and aesthetically pleasing at Whiteman Air Force Base.

Major considerations of past planting design have been the treatment of individual buildings and parking facilities. This has often produced inconsistent landscape designs and neglect of open areas between construction projects. To unify and improve the visual image of the base, the plan provides a theme or image that creates a hierarchy of landscape areas. The plan provides the means of coordinating new landscape projects and supplementing existing designs.

The theme plan is supported by General Landscape Development Plans that identify the overall landscape design by indicating the extent and character of plantings to be accomplished on defined portions of the base. The plan further identifies priority areas for which landscape projects are to be prepared. Identified projects and associated costs relate to FY Building and O+M-funded projects that will be completed over the next five years and beyond.

Specific landscape planting standards have been prepared for each theme area as they relate to acceptable plant material, spacing and layout of planting designs along streets, parking lots, building foundations, walks and open space. Base-wide guidelines are also developed and support the WHITEMAN DESIGN POLICY for the design and engineering of streets, parking lots, lighting, pedestrian map, street furniture and signing. These design standards are to improve the visual environment and coordinate new projects with existing completed projects.

The Landscape Development Plan is to be utilized to provide design guidance to provide visual unity and harmony throughout the base. It will only be effective if it is used by all designers, base personnel, contractors and the Plan Review Committee.

1.1 Goals and Objectives

The Landscape Development Plan for Whiteman Air force Base serves to address three major goals:

1. Improve the visual quality of the base.

2. Improve the environmental quality.

3. Reduce landscape maintenance requirements.

A comprehensive program for the selection, installation and maintenance for landscape development must be established and meet these goals and the following objectives:

Enhance the visual quality of Whiteman Air Force Base through the use of plant material

- Require that all new facility development and improvements include an adequate budget, plans and details for landscape projects.

- Utilize the landscape planting guidelines in developing landscape plans and plant schedules.

- Inspect and reject any plant material that is not to required landscape standards.

- Utilize overstory trees in lieu of flowering trees to provide visual definition, scale and visual relief in landscape projects.

- Utilize simple mass planting of trees, shrubs, and ground cover to integrate buildings and parking lots into the landscape.

- Use plant material to screen unsightly views, utilities, and service areas from circulation corridors and adjacent use areas.

Develop a hierarchy system of street tree plantings to visually reinforce the road system

- Provide large canopy trees that are uniformly spaced along both sides of primary roads. Identify one or two trees to be used consistently.

- Provide large canopy trees uniformly spaced along secondary roads.

- Provide large canopy trees that are variably spaced along tertiary roads.

- Utilize additional canopy trees to emphasize major intersections or points of decision. Trees should be located to provide unobstructed site lines for motorists.

- Work with local and state agencies to expand tree plantings outside the base to improve the visual appearance of approaches and entrance areas.

Enhance the environmental quality of Whiteman AFB through the use of plant material

- Utilize large canopy trees along roadways and in parking areas to provide shade while reducing glare and heat gain.

- Utilize deciduous plant material along the south and west side of buildings to shade from summer sun while allowing solar penetration during winter months.

- Utilize plant material to direct, orient and inhibit pedestrian traffic by using it as a barrier to contain pedestrians along dedicated pathways.

Preserve and maintain both existing and future plant material while reducing landscape maintenance

- Use plant material which is hardy to the local climate and resistant to pests and disease.

- Eliminate the need for extensive maintenance by selecting plant material which has an acceptable mature size for the given location and application.

- Utilize mass planting schemes of shrubs to eliminate unnecessary pruning, watering, and other maintenance activities required of individual shrubs.

- Restrict the use of high maintenance plant material and landscape design.

- Establish zones of maintenance based on visibility and use.

- Inventory existing plant material to determine condition and identify problems. Take appropriate actions to correct problems.

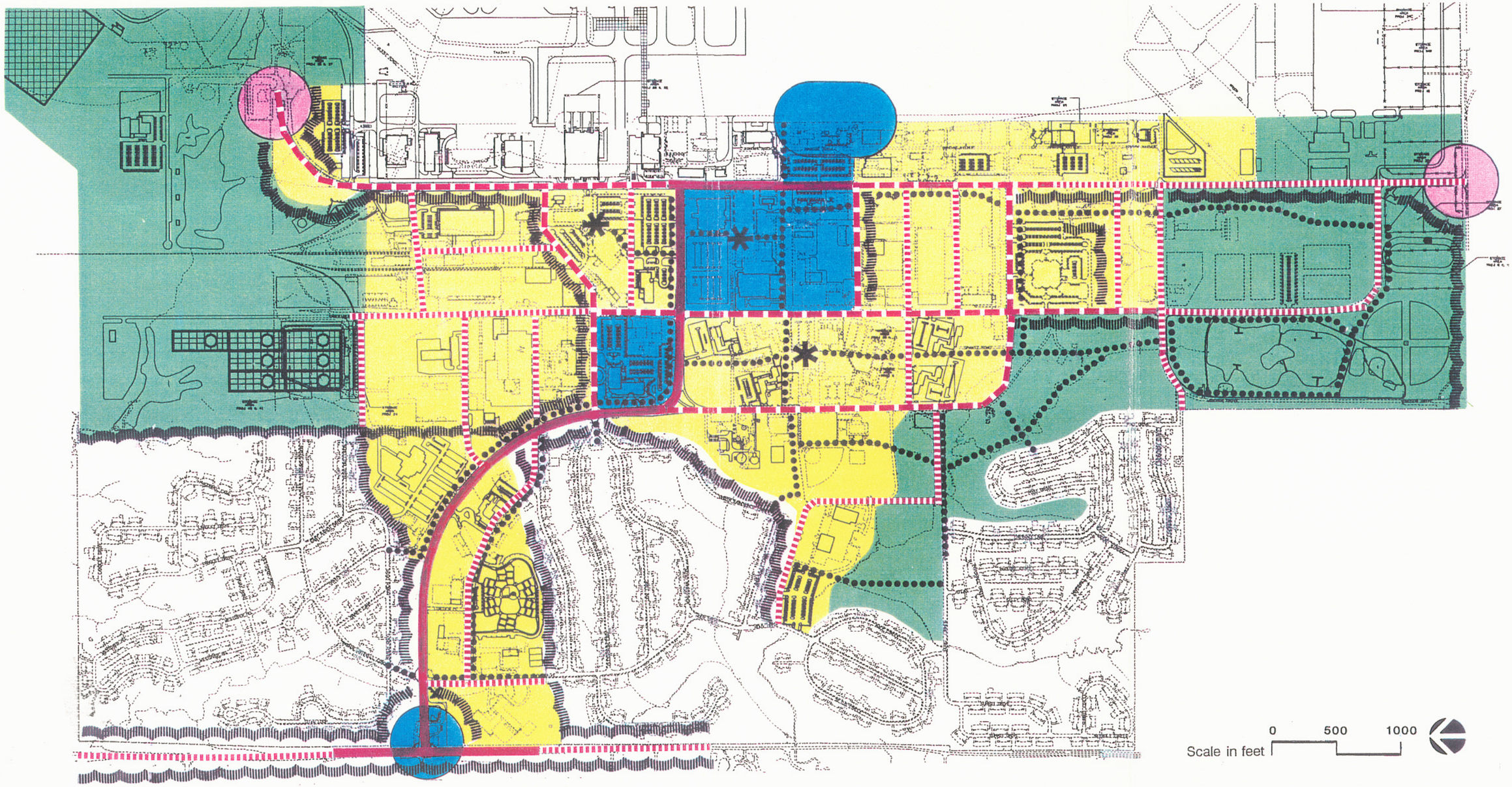
2.0 THEME PLAN

The Theme Development Plan (Figure 2.0-1) provides for a hierarchy of planting treatment and maintenance levels that respond to the character, function, location and visibility to base personnel and visitors. The plan identifies three landscape treatments: formal, informal, and naturalized zones. The plan also identifies a hierarchy of vehicular and pedestrian routes.

Formal landscape areas (Figures 2.0-2 and 2.0-3) are reserved for key administration and community support facilities and primary vehicular routes. Plantings consist mainly of trees in open areas and shrubs as foundation plantings arranged in symmetrically-ordered designs. Plant species are generally limited to provide a cohesive uniform appearance. Maintenance levels should be the highest to keep the area attractive and neat.

Informal landscape areas (Figure 2.0-4) include the airmen dorms, hospital, mission, and industrial land use areas. Plantings consist of overstory trees in open areas and shrub masses at building entrances arranged in asymmetrical or less formal design with moderate levels of maintenance.

Naturalized landscape areas (Figure 2.0-5) include passive and active recreational areas. Landscape planting consists mainly of overstory and evergreen trees. Maintenance of this area is low to moderate.



LEGEND

- Formal Landscape
- Informal Landscape
- Naturalized Landscape
- Major Street
- Secondary Street
- Tertiary Street
- Buffer Zone
- Pedestrian Walkway
- Pedestrian Node
- Major Entrance
- Secondary Entrance

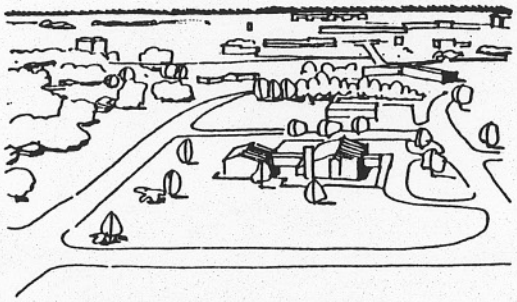
THEME DEVELOPMENT PLAN

WHITEMAN Air Force Base
Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

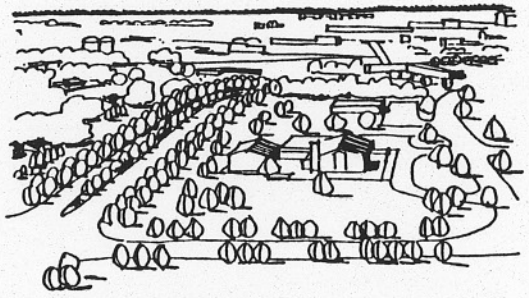
Prepared by Harland Bartholomew & Associates, Inc.

Figure 2.0-1

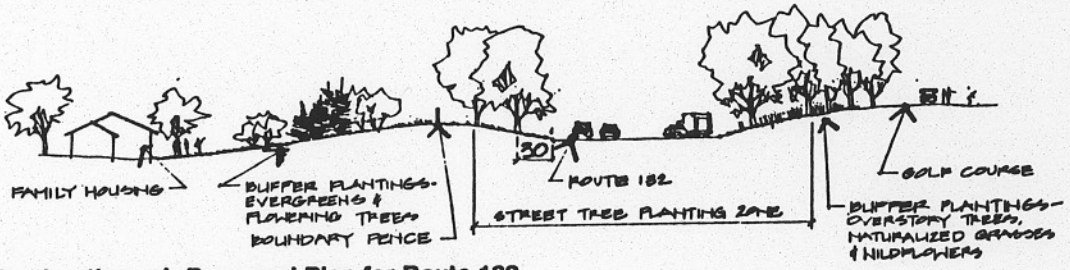


Existing View of Mitchell Avenue

Section through Proposed Plan for Mitchell Avenue



Proposed Mitchell Avenue Development



Section through Proposed Plan for Route 132

ENTRANCES & STREETS

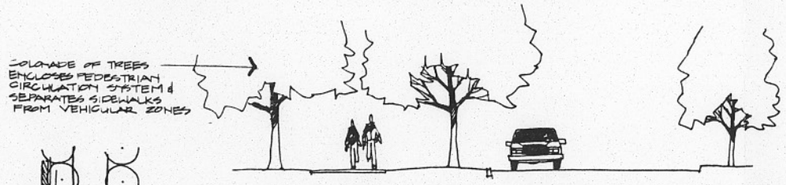
THEME CONCEPTS

WHITEMAN Air Force Base Knob Noster, Missouri

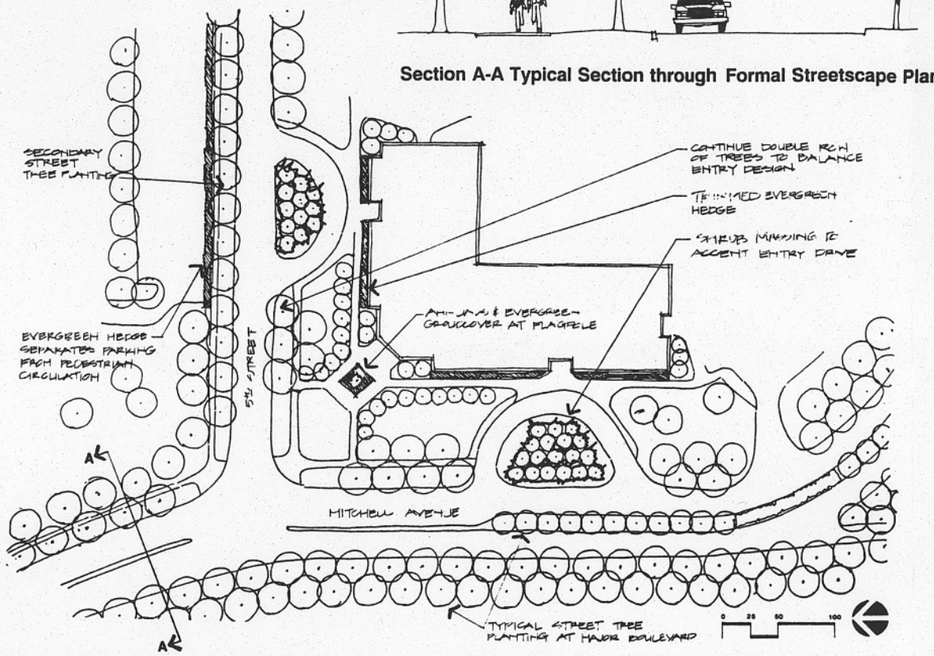
LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

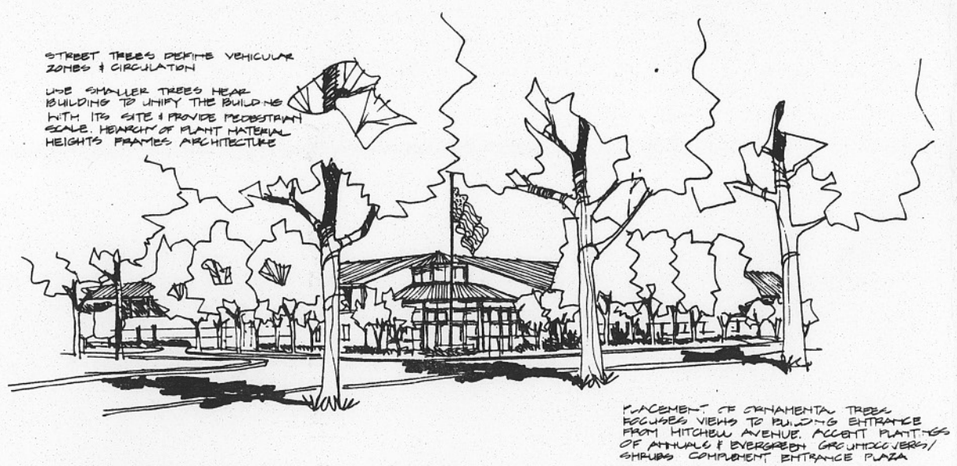
Figure 2.0-2



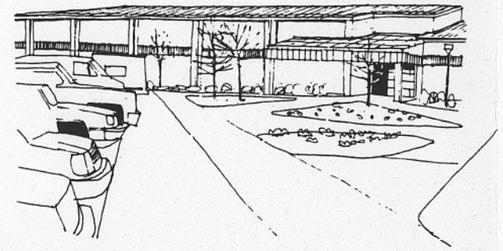
Section A-A Typical Section through Formal Streetscape Plan



Landscape Development Plan for Wing Headquarters Building



View of Proposed Wing Headquarters



LARGE EXPANSES OF CONCRETE WOULD VISUALLY BENEFIT FROM ADDITIONAL PLANTINGS

NEED SEPARATION OF VEHICULAR & PEDESTRIAN ZONES

HONEYLOCUSTS PROVIDE LITTLE SHADE

Existing View of B-2 FTD Building

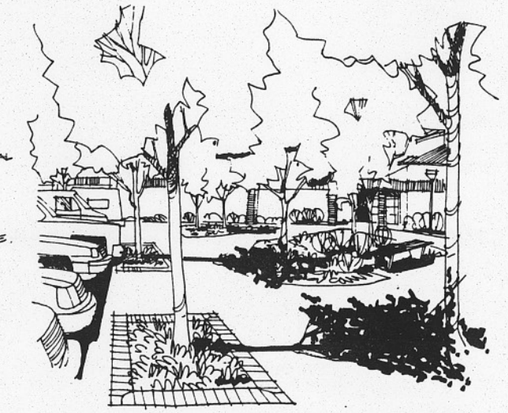
MAINTING BEDS & TREES SEPARATE VEHICLES FROM PEDESTRIAN SPACES

COMBINE PLANTING BEDS & INTRODUCE ADDITIONAL SHADE TREES TO ENCOURAGE PEDESTRIAN USES & ALLOW GROUNDCOVERS & ANNUALS TO FLOURISH UNDERNEATH CANOPY

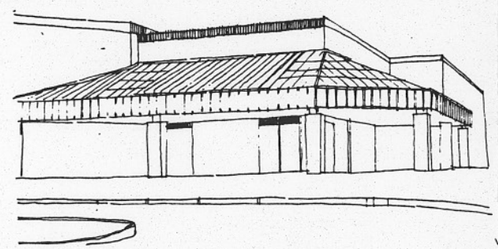
PEDESTRIAN AMENITIES INCLUDE BENCHES, SPECIAL PAVING & ACCENT PLANTINGS WHICH ACT AS AN EDGING RELATES BUILDINGS TO SITE.

MIX EVERGREEN SHRUBS & GROUNDCOVERS WITH ANNUAL DISPLAY AREAS TO PROVIDE YEAR-ROUND INTEREST IN EXISTING PLANTER BEDS

TREE WELLS MUST BE OF SUFFICIENT SIZE TO ALLOW ADEQUATE MOISTURE FOR TREES. (6'-0" x 6'-0" MINIMUM). SAWCUT & REMOVE EXISTING CONCRETE AT TREE WELLS & EXPANDED PLANTING BEDS



Proposed View of B-2 FTD Building



EXISTING SITE PRESENTS A HARSH VISUAL IMAGE & DETRACTS FROM BUILDING

LARGE EXPANSE OF CONCRETE & ASPHALT PROVIDES NO PEDESTRIAN SCALE/AMENITIES

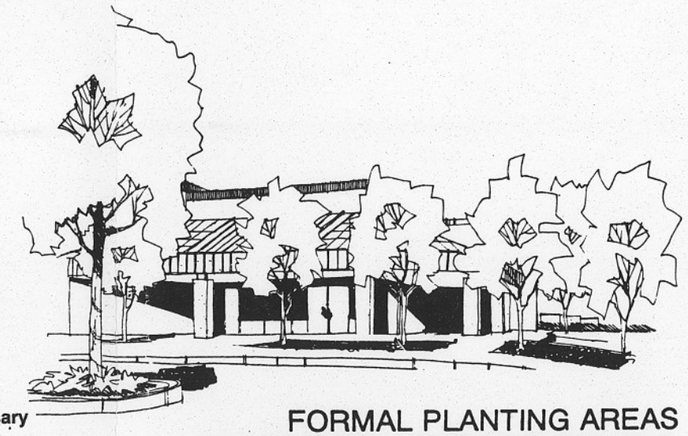
Existing View of Commissary

OVERSTORY TREES PROVIDE PEDESTRIAN SCALE & INTEGRATE THE STRUCTURE WITH ITS SITE

LANDSCAPED ISLANDS MUST BE OF SUFFICIENT SIZE TO ALLOW TREE ADEQUATE MOISTURE EXISTING CONCRETE TO BE SAWCUT & REMOVED

OVERSTORY TREES PROVIDE SHADE.

INCORPORATE END ISLANDS & TREE PLANTING IN PARKING LOT



Proposed View of Commissary

FORMAL PLANTING AREAS

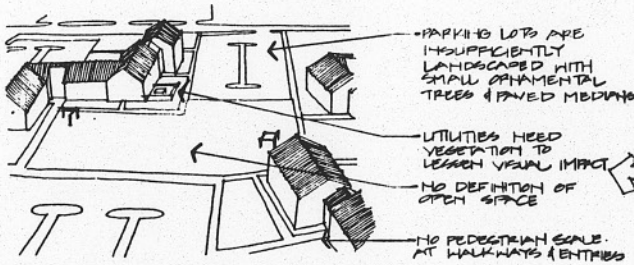
THEME CONCEPTS

WHITEMAN Air Force Base
Knob Noster, Missouri

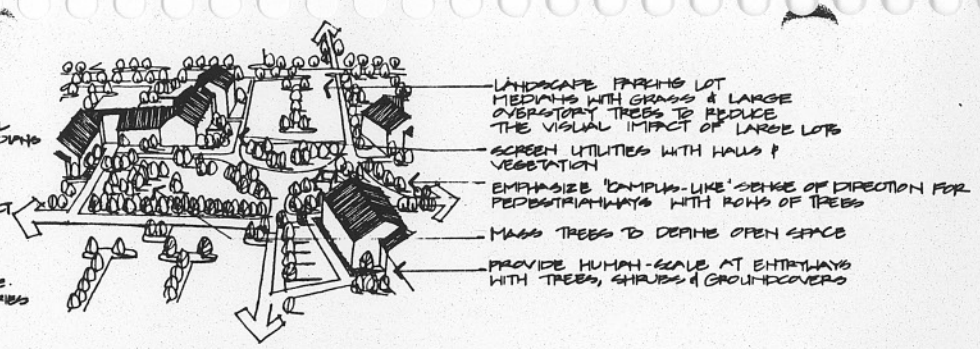
LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

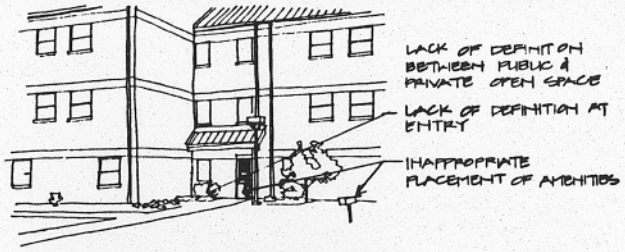
Figure 2.0-3



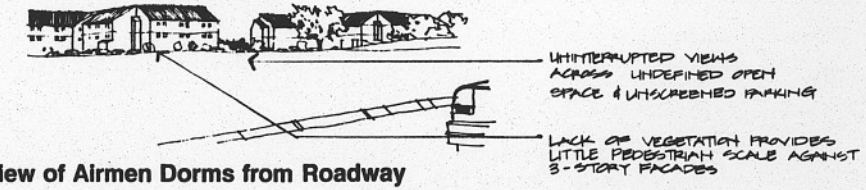
Existing Open Space Development



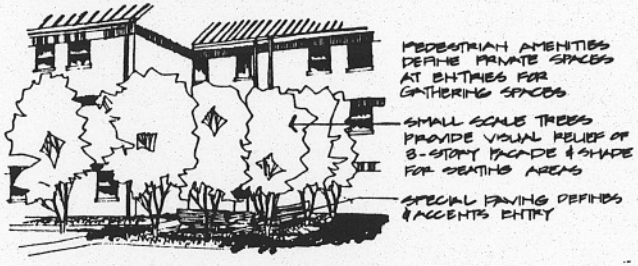
Proposed Open Space Development



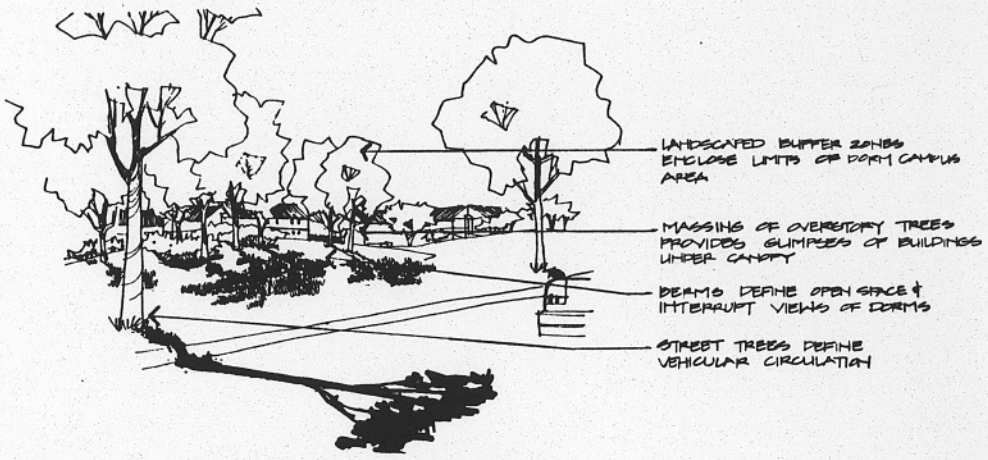
Existing Entrance to Airmen Dorms



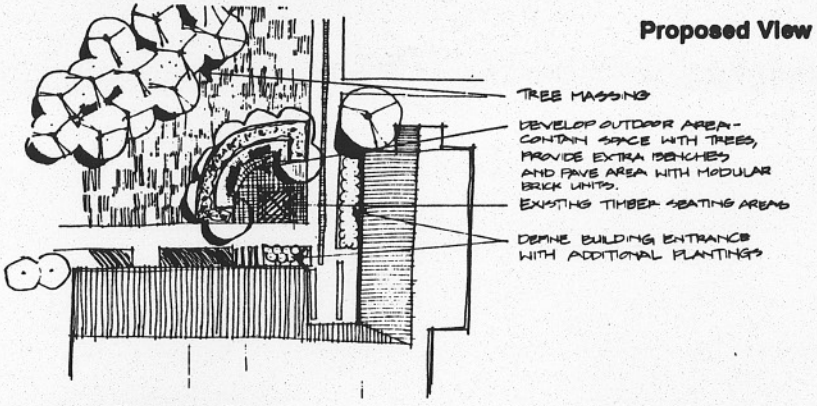
Existing View of Airmen Dorms from Roadway



Proposed Entrance to Airmen Dorms



Proposed View of Airmen Dorms from Roadway



Enlarged Entrance Plan

INFORMAL PLANTING AREAS

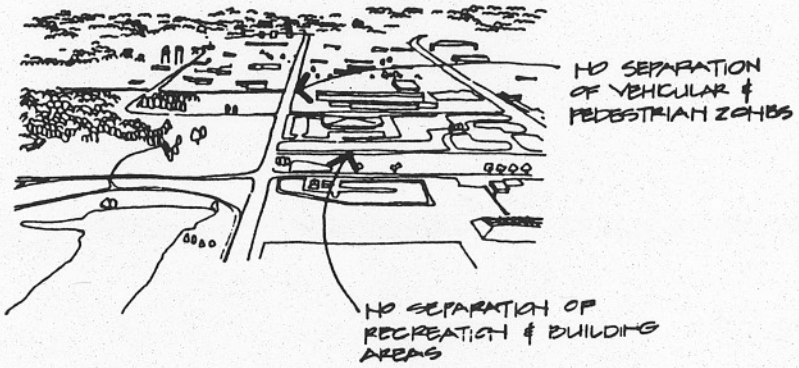
THEME CONCEPTS

WHITEMAN Air Force Base
Knob Noster, Missouri

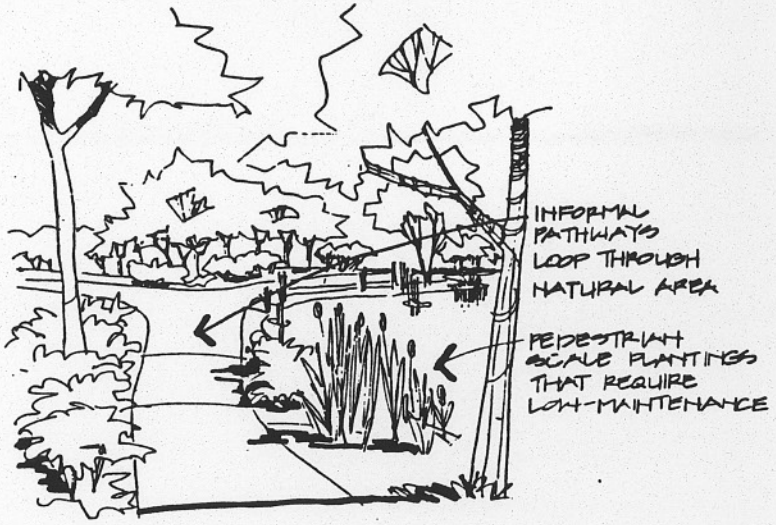
LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

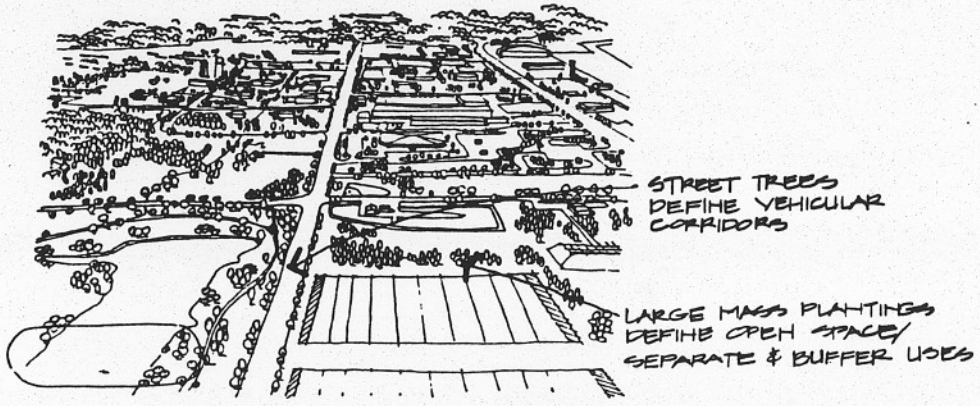
Figure 2.0-4



Existing Aerial View of Recreation Area



Typical Pedestrian Walkway/Path



Proposed Development of Recreation Area

NATURALIZED PLANTING AREAS

THEME CONCEPTS

WHITEMAN Air Force Base Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

Figure 2.0-5

2.1 Landscape Development Plans

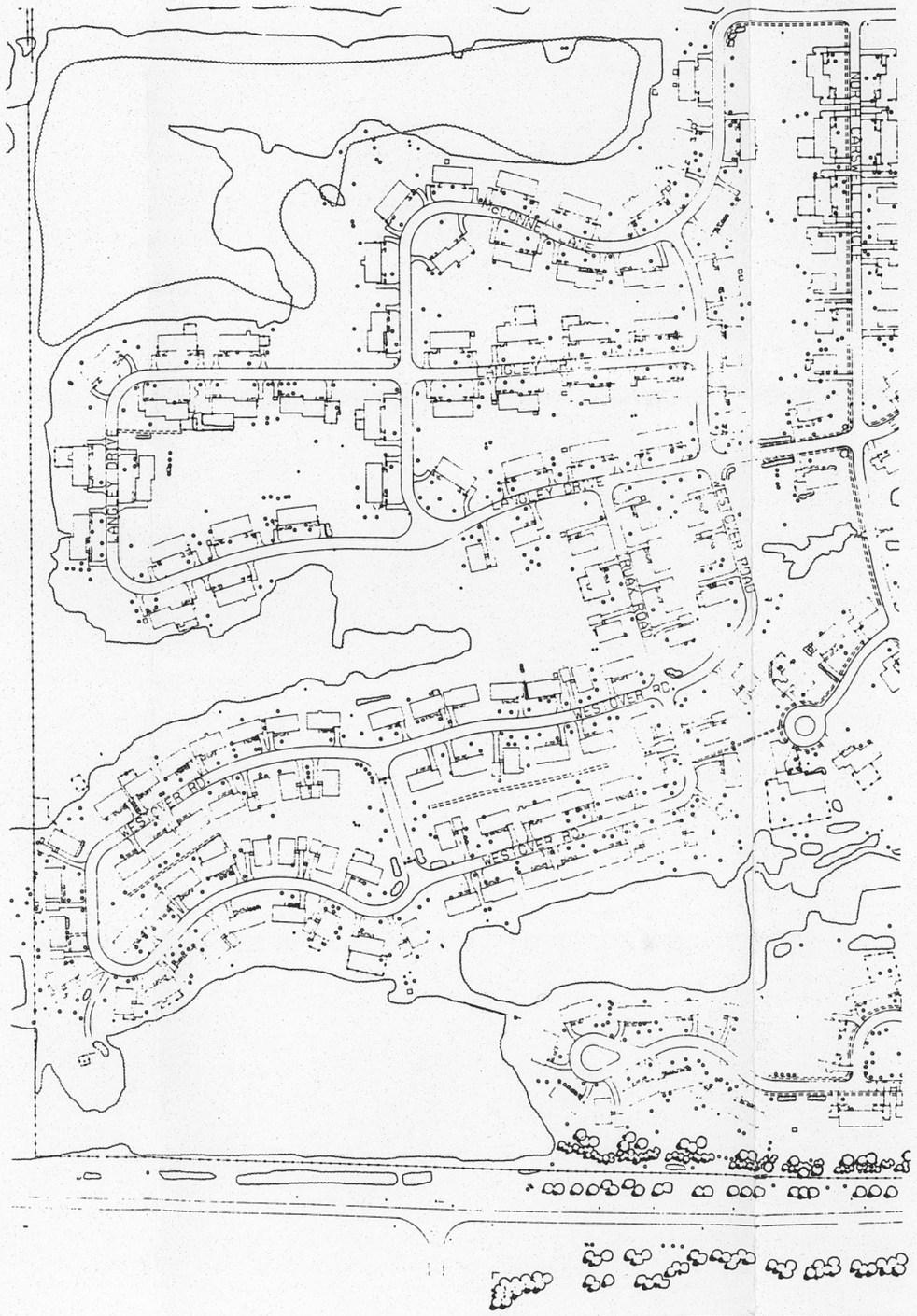
The landscape development plans (Figures 2.1-1 through 2.1-7) identify the overall character of landscape development at Whiteman Air Force Base. The plans were developed using the landscape planting design guidelines (see Section 4.0) and are intended to provide guidance in the development of landscape planting plans by identifying the general quantity, use, type, and arrangement of trees. Foundation planting areas are also identified, where appropriate.

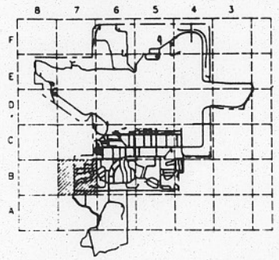
The plans and design standards place emphasis on the use of large deciduous trees as the framework for the landscape development at Whiteman Air Force Base. Smaller deciduous and evergreen trees and shrubs are to act as supporting elements. Large trees will provide greater amounts of shade, require less maintenance, and visually have a longer-lasting impact, therefore, having a greater dollar value than other material which is shorter lived and requires greater maintenance.

Small trees and shrubs should be reserved for use adjacent to buildings to provide accent and integrate it into the landscape. Evergreen trees should primarily be used to provide winter accent or buffer obtrusive views.

As shown on the plans, tree plantings are intended to be massed in groups to provide visual impact. Individual and spotty-type plantings should be avoided.

The plans are also provided as an overlay to the PIMS so that they may be updated periodically as landscape planting projects are completed.





Landscape Legend

Tree Type

- Large Deciduous Trees
- Small Deciduous Trees
- Evergreen Trees

Functional Use

- Street Tree
- Parking Facility Trees
- Pedestrian Way Trees
- Buffer Trees
- Open Space/Lawn Area Trees
- Foundation Plantings

North

0 50 200
20 100 400
Scale in feet

HARLAND BARTHOLOMEW & ASSOCIATES ST. LOUIS, MISSOURI	US ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI
DESIGNED BY:	US Army Corps of Engineers — WHITEMAN Air Force Base, Knob Noster, Missouri LANDSCAPE DEVELOPMENT PLAN
DRAWN BY:	
CHECKED BY:	SCALE: 1"=100' — SHT NO.: B-7 — PLOT SCALE:
SUBMITTED BY:	DATE: August 1991 — TAB NO.: L-1 — DESIGN FILE:
	DWG. NO.: — FILE NO.:

$$$$$$SYTIME$$$$$

Figure 2.1-1

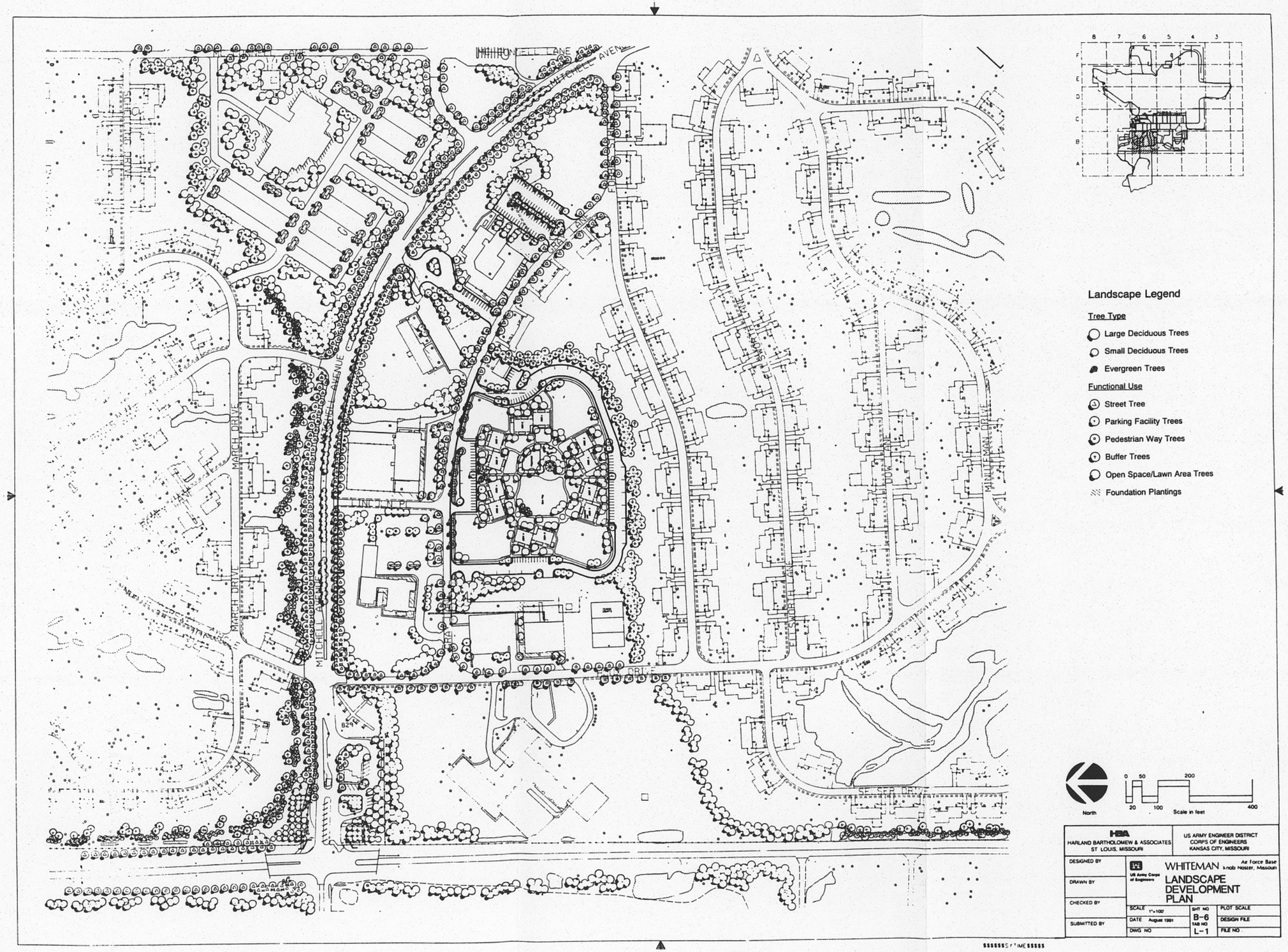

MITCHELL LANE
MITCHELL AVENUE
MARCH DRIVE
LINCOLN PL
MITCHELL AVENUE
MINUTEMAN DRIVE
DOVE LANE
B24
Landscape Legend
Tree Type
Large Deciduous Trees
Small Deciduous Trees
Evergreen Trees
Functional Use
Street Tree
Parking Facility Trees
Pedestrian Way Trees
Buffer Trees
Open Space/Lawn Area Trees
Foundation Plantings
North
0 50 200
20 100 400
Scale in feet
HBA
HARLAND BARTHOLOMEW & ASSOCIATES
ST. LOUIS, MISSOURI
US ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
US Army Corps of Engineers
WHITEMAN Air Force Base
Knob Noster, Missouri
LANDSCAPE DEVELOPMENT PLAN
SCALE 1"=100'
DATE August 1991
DWG NO
SHT NO B-6
TAB NO L-1
PLOT SCALE
DESIGN FILE
FILE NO.

Figure 2.1-2

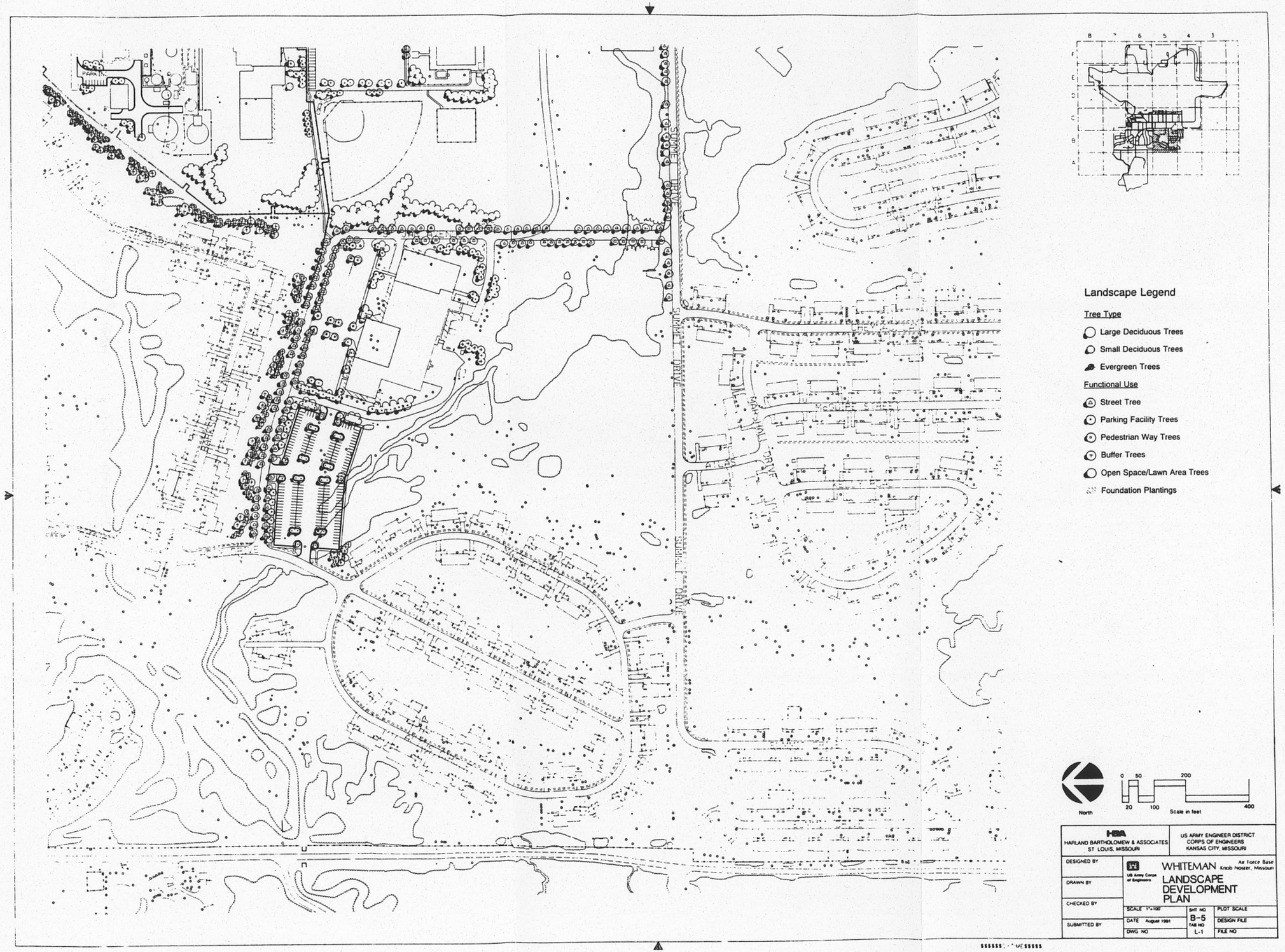

Landscape Legend
Tree Type
Large Deciduous Trees
Small Deciduous Trees
Evergreen Trees
Functional Use
Street Tree
Parking Facility Trees
Pedestrian Way Trees
Buffer Trees
Open Space/Lawn Area Trees
Foundation Plantings
SUMMIT DRIVE
MAIN MALL DRIVE
North
0 50 200
20 100 400
Scale in feet
HARLAND BARTHOLOMEW & ASSOCIATES
ST. LOUIS, MISSOURI
US ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
US Army Corps of Engineers
WHITEMAN Air Force Base
Knob Noster, Missouri
LANDSCAPE DEVELOPMENT PLAN
SCALE 1"=100'
DATE August 1991
DWG NO
SHT NO B-5
TAB NO L-1
PLOT SCALE
DESIGN FILE
FILE NO

Figure 2.1-3

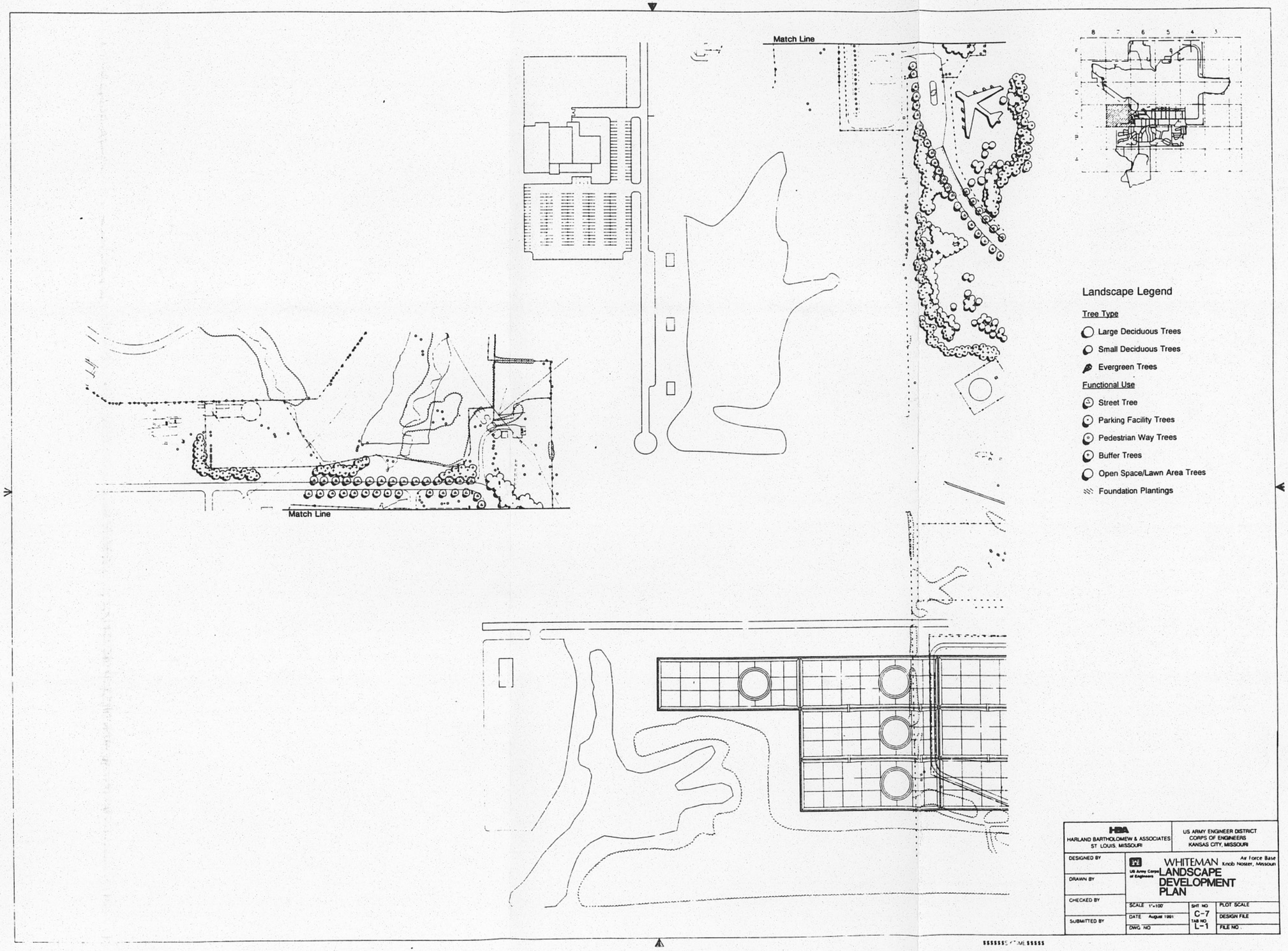

Match Line
Match Line
Landscape Legend
Tree Type
Large Deciduous Trees
Small Deciduous Trees
Evergreen Trees
Functional Use
Street Tree
Parking Facility Trees
Pedestrian Way Trees
Buffer Trees
Open Space/Lawn Area Trees
Foundation Plantings
HARLAND BARTHOLOMEW & ASSOCIATES
ST. LOUIS, MISSOURI
US ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
US Army Corps of Engineers
WHITEMAN Air Force Base
Knob Noster, Missouri
LANDSCAPE DEVELOPMENT PLAN
SCALE 1"=100'
DATE August 1991
DWG. NO.
SHT. NO. C-7
TAB NO. L-1
PLOT SCALE
DESIGN FILE
FILE NO.

Figure 2.1-4

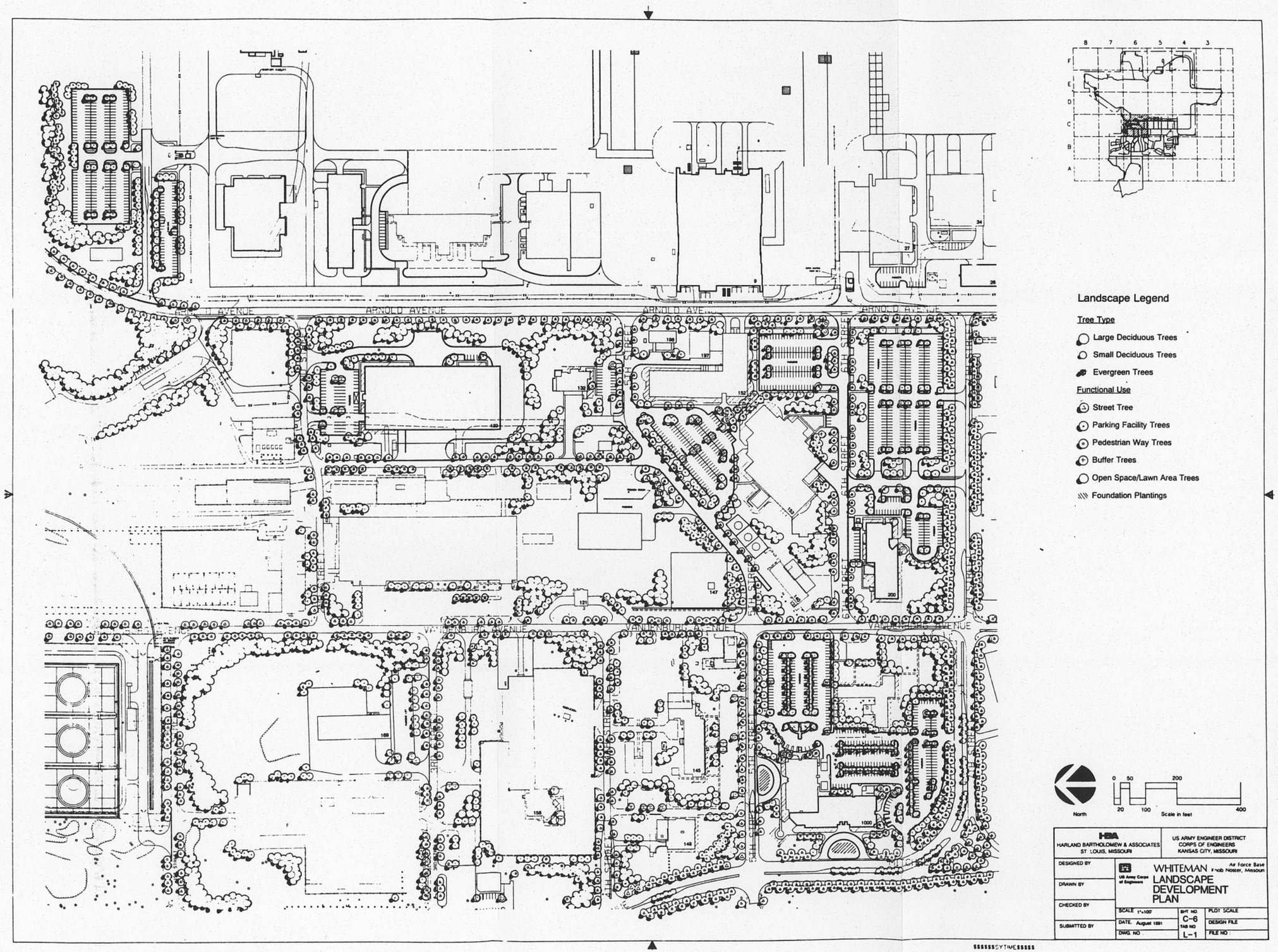

ARNOLD AVENUE
VANDENBURG AVENUE
5TH STREET
6TH STREET
Landscape Legend
Tree Type
Large Deciduous Trees
Small Deciduous Trees
Evergreen Trees
Functional Use
Street Tree
Parking Facility Trees
Pedestrian Way Trees
Buffer Trees
Open Space/Lawn Area Trees
Foundation Plantings
North
0 50 200
20 100 400
Scale in feet
HBA
HARLAND BARTHOLOMEW & ASSOCIATES
ST LOUIS, MISSOURI
US ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
US Army Corps of Engineers
WHITEMAN Air Force Base
Knob Noster, Missouri
LANDSCAPE DEVELOPMENT PLAN
SCALE 1"=100'
DATE August 1991
DWG. NO.
SHT NO. C-6
TAB NO. L-1
PLOT SCALE
DESIGN FILE
FILE NO.
$$$$$$SYTIME$$$$$$

Figure 2.1-5

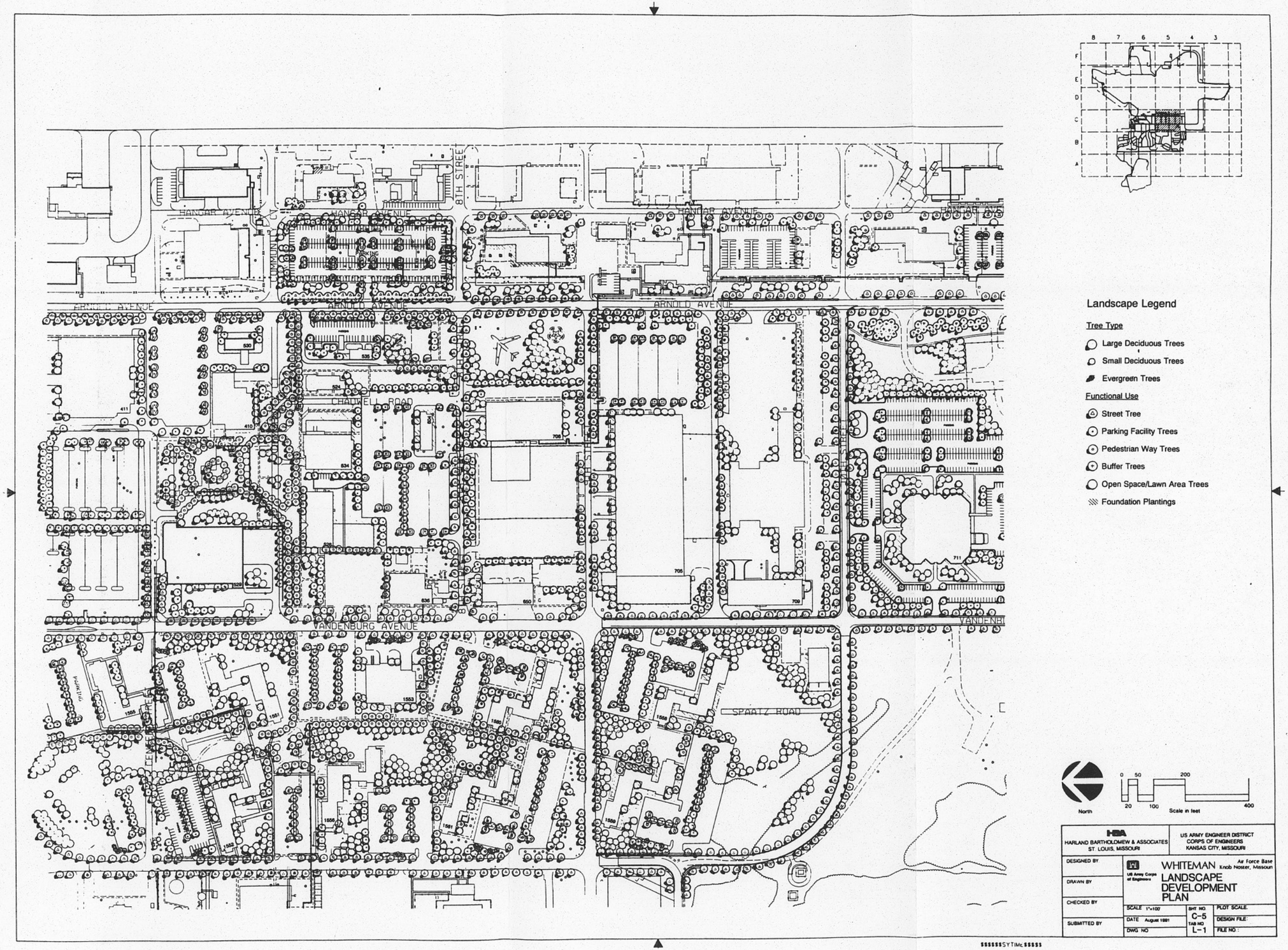

HANGAR AVENUE
8TH STREET
ARNOLD AVENUE
CHADWELL ROAD
VANDENBURG AVENUE
SPAATZ ROAD
Landscape Legend
Tree Type
Large Deciduous Trees
Small Deciduous Trees
Evergreen Trees
Functional Use
Street Tree
Parking Facility Trees
Pedestrian Way Trees
Buffer Trees
Open Space/Lawn Area Trees
Foundation Plantings
North
0 50 200
20 100 400
Scale in feet
HARLAND BARTHOLOMEW & ASSOCIATES
ST. LOUIS, MISSOURI
US ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
US Army Corps of Engineers
WHITEMAN Air Force Base
Knob Noster, Missouri
LANDSCAPE DEVELOPMENT PLAN
SCALE 1"=100'
DATE August 1991
DWG NO
SHT NO. C-5
TAB NO L-1
PLOT SCALE
DESIGN FILE
FILE NO.

Figure 2.1-6

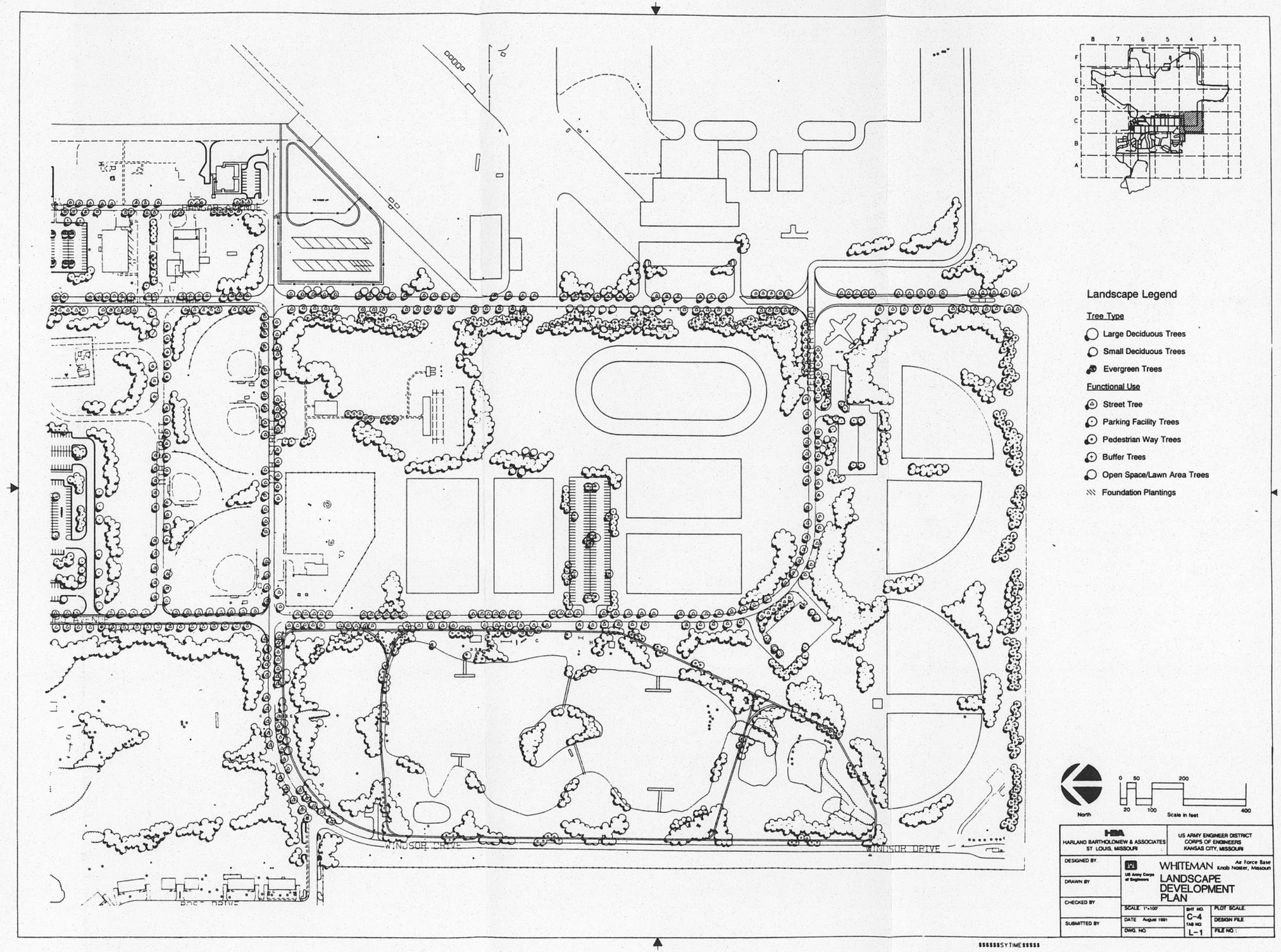

Landscape Legend
Tree Type
Large Deciduous Trees
Small Deciduous Trees
Evergreen Trees
Functional Use
Street Tree
Parking Facility Trees
Pedestrian Way Trees
Buffer Trees
Open Space/Lawn Area Trees
Foundation Plantings
WINDSOR DRIVE
WINDSOR DRIVE
North
Scale in feet
HARLAND BARTHOLOMEW & ASSOCIATES
ST. LOUIS, MISSOURI
US ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
WHITEMAN Air Force Base
Knob Noster, Missouri
LANDSCAPE DEVELOPMENT PLAN
SCALE 1"=100'
DATE August 1991
DWG. NO.
SHT NO. C-4
TAB NO. L-1
PLOT SCALE
DESIGN FILE
FILE NO.

Figure 2.1-7

2.2 Landscape Priority Plan

To make an impact with landscape plantings at Whiteman, it is important that a planting program be followed. Ineffective landscaping will result if a landscape budget is not adequate or spread too thinly over large portions of the base. Priority areas need to be established to derive maximum benefit from the resources expended.

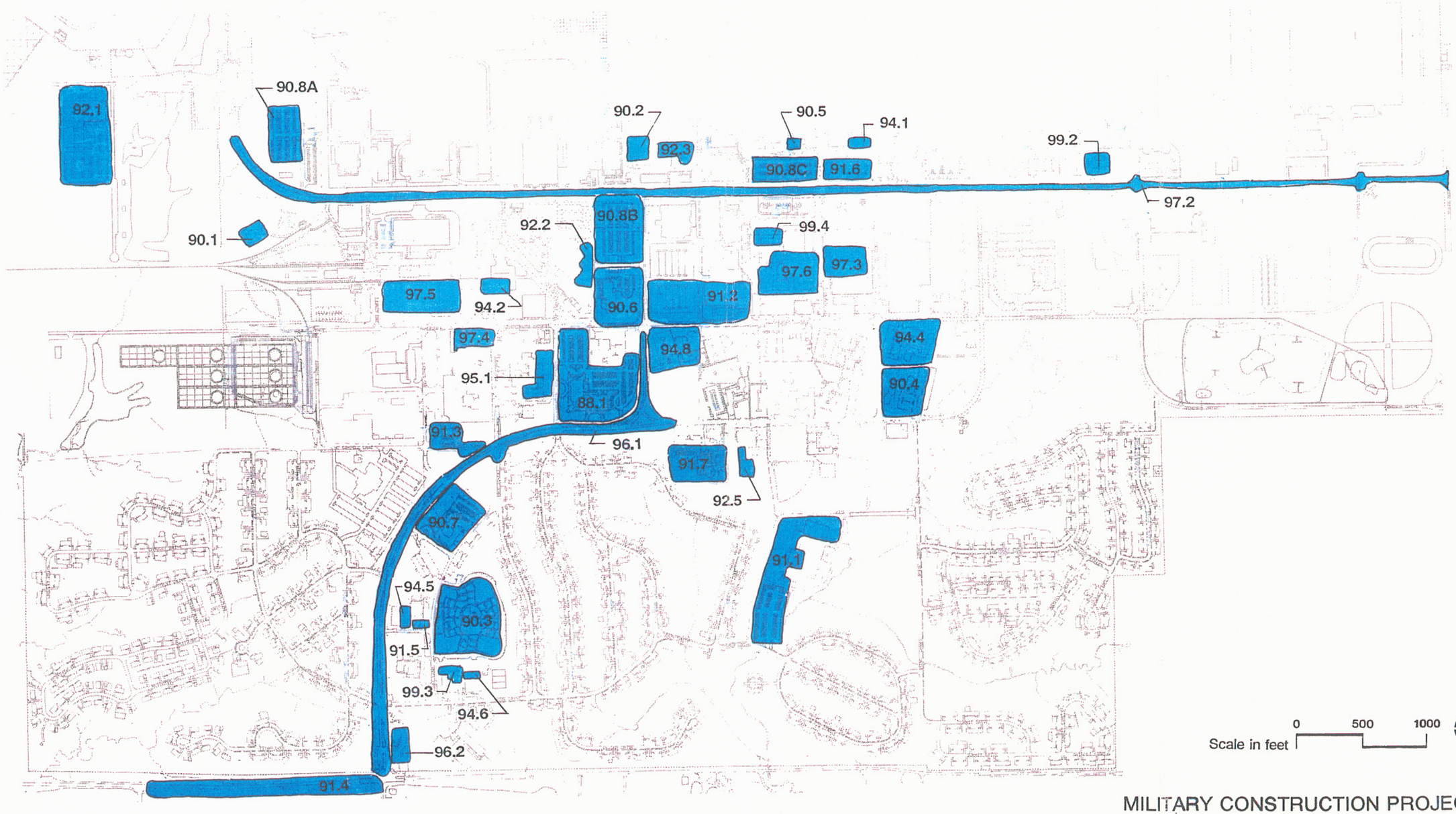
The Landscape Priority Plan presents an organized approach to establishing the phasing for landscape development projects at Whiteman AFB. Projects are organized by the type of funding anticipated to be utilized for implementation, either Military Construction Project (MCP) funding (Figure 2.2-1) or Operation and Maintenance (O+M) funding (Figure 2.2-2).

The MCP priority plan identified 40 projects for the Fiscal Years 1988-1999 and have been prioritized to correspond with MCP construction programming. A total of 59 O&M landscape projects have been identified for facility, street tree, and open space improvement projects. O&M priority assignments are based on visual impact, anticipated MCP construction, visual benefit for expenditure of funds, and necessity to complete for coordination or functional reasons.

Cost estimates have been prepared for each identified MCP and O&M project (Table 2.2-1 and 2.2-2). An estimated cost of $2,254,970 will be required to complete MCP landscape improvements, while $3,310,895 will be required to implement O&M-funded projects.

The cost estimates for each identified project were developed by using the quantity of plant materials identified on the Development Plans (Figures 2.1-1 through 2.1-7), the plant sizes recommended in the guidelines, and 1991 average unit costs that include material, installation, and a one year warranty and maintenance period.

The priority plans provide the Air Force with the ability to program budgets for future years and to quickly prioritize landscape projects if unanticipated funds become available. The plan also allows flexibility to modify priorities in future years as situations change.



LEGEND

90.2 Fiscal Year 1990-Priority Number 2

Project Limits

MILITARY CONSTRUCTION PROJECTS

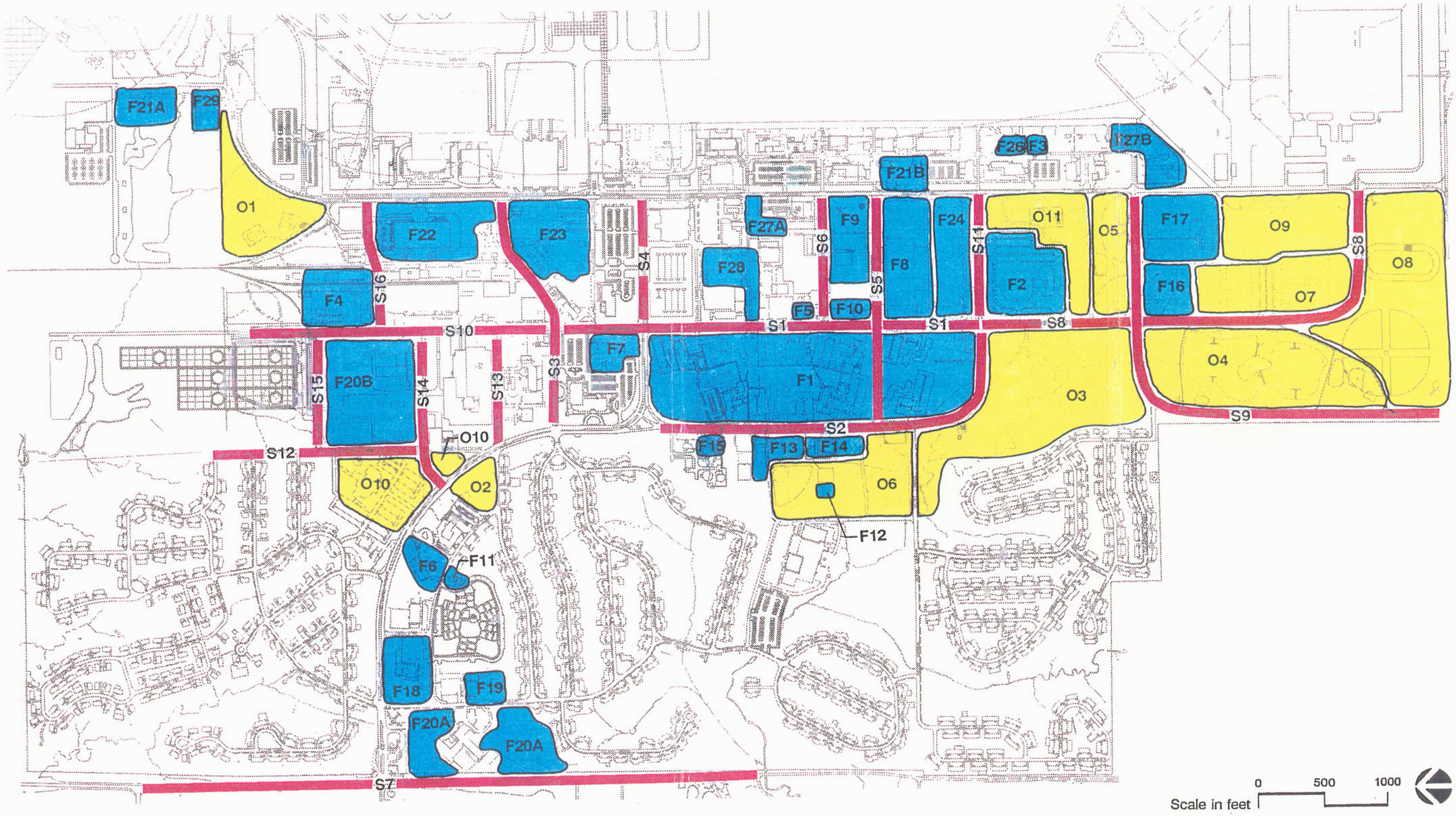
PRIORITY PLAN

WHITEMAN Air Force Base Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

Figure 2.2-1



LEGEND

- O — Open Space Project
- S — Street Tree Project
- F — Facility Project

OPERATIONS & MAINTENANCE PROJECTS

PRIORITY PLAN

WHITEMAN Air Force Base Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

Figure 2.2-2

TABLE 2.2-1

PRIORITY LISTING - LANDSCAPE DEVELOPMENT
MILITARY CONSTRUCTION PROJECT FUNDING
Whiteman Air Force Base, Missouri

Fiscal Year Priority Project	Project Name/ PIMS Identification No.	Estimated Cost (1991 dollars)	Fiscal Year Total
88.1	Wing HQ and Consol. Wing Maintenance/727	$176,255	$176,255
90.1	Expand Utilities/34B	11,425	
90.2		18,912	
90.3	TLF/55	128,460	
90.4	UEPH/54	72,236	
90.5	Airfield Vault Addition/127	8,510	
90.6	Mission Operations Center/35	42,608	
90.7	VOQ/56	49,873	
90.8A	Parking Lot	53,200	
90.8B	Parking Lot	41,750	
90.8C	Parking Lot	84,150	511,124
91.1	Hospital Addition/121	145,485	
91.2	Base Exchange/122	115,395	
91.3	Shopette/89	25,368	
91.4	Highway 132	105,125	
91.5	Child Care/128	8,693	
91.6	Avionics Shop/61	23,906	
91.7	Water Treatment Plant/64	58,958	482,930
92.1	Missouri Guard Armory/134	$85,230	

Fiscal Year Priority Project	Project Name/ PIMS Identification No.	Estimated Cost (1991 dollars)	Fiscal Year Total
92.2	ADAL Flight Simulator	23,713	
92.3		15,185	
92.4	Hazardous Storage/49	33,237	
92.5	ADAL Physical Fitness Center/95	27,958	185,323
94.1	Base Operation/117	6,400	
94.2		6,663	
94.4	UEPH	71,636	
94.5	Child Care	5,445	
94.6	ADAL Youth Center/92	4,440	
94.8	Transient Airmen Quarters/66	59,836	154,420
95.1	ADAL Library/Education Center/101	23,895	23,895
96.1	Mitchell Ave. Extension/58	294,625	
96.2	Visitor Center	19,600	314,225
97.2	Arnold Ave. Extension/114	127,200	
97.3	ADAL CBPO Addition/120	37,300	
97.4	ADAL Vehicle Maintenance Facility/102	18,708	
97.5	Mobility Center	58,560	
97.6	ADAL Recreation Center/98	89,650	331,418
99.2	ADAL Communication Center/63	22,108	
99.3	ADAL Youth Center/92	6,550	
99.4	ADAL Bowling Center/90	46,725	75,383
TOTAL MCP LANDSCAPE DEVELOPMENT COST			**$2,254,970**

TABLE 2.2-2

PRIORITY LISTING - LANDSCAPE DEVELOPMENT
OPERATION AND MAINTENANCE PROJECTS
Whiteman Air Force Base, Missouri

Priority Number	Project Name	Estimated Cost (1991 Dollars)	Total
FACILITY PROJECTS:			
F1	UEPH Area	$623,120	
F2	Security Police	174,350	
F3	Helo Support Area	6,290	
F4	--	24,580	
F5	Recreation Center Annex	19,700	
F6	VOQ	23,047	
F7	SATAF	62,560	
F8	BCE Complex	73,567	
F9	Building 706	78,000	
F10	Auto/hobby Shop	27,115	
F11	Housing Management	12,893	
F12	Tennis Courts	6,919	
F13	Fitness Center	23,685	
F14	Pool Area	19,858	
F15	Bank Facility	5,350	
F16	Missle Bunker/OSCAR One	956	
F17	Firing Range	43,243	
F18	Chapel	36,971	
F19	Youth Center	17,983	
F20A	--	31,423	
F20B	Base Civil Engineering Support	78,572	
F21A	Heritage Center	26,225	

Priority Number	Project Name	Estimated Cost (1991 Dollars)	Total
F21B	Missile Operations	30,425	
F22	Supply Complex	85,640	
F23	CCTS/FTD Area	114,425	
F24	Missle Maintenance	122,545	
F26	Load Testing Storage	7,030	
F27A	Base Theater	33,250	
F27B	Aircraft Pavement	20,018	
F28	Base Exchange	63,900	
F29	Credit Union	26,318	1,919,960
STREET PROJECTS:			
S1	Vandenburg Ave. Phase 1	44,850	
S2	Mitchell Drive	50,700	
S3	5th Street	25,675	
S4	7th Street	39,600	
S5	9th Street	25,300	
S6	Summit Drive	15,600	
S7	Highway 132	166,575	
S8	Vandenburg Ave. Phase 2	63,350	
S9	Windsor Drive/12th St.	5,775	
S10	Vandenburg Ave. Phase 3	24,475	
S11	10th Street	15,925	
S12	McConnell Lane	10,750	
S13	4th Street	11,000	
S14	3rd Street	14,300	
S15	1st Street	12,100	
S16	2nd Street	10,175	536,150

Priority Number	Project Name	Estimated Cost (1991 Dollars)	Total
OPEN SPACE PROJECTS:			
O1	Knob Noster Open Space	60,800	
O2	Mitchell/4th Ave.	14,875	
O3	Passive Recreation Area	88,800	
O4	Lake Area	152,375	
O5	Ballfields	18,525	
O6	Gym Ballfields	46,535	
O7	Soccer Fields	28,450	
O8	Recreation Area	198,875	
O9	Track	72,725	
O10	O'Club	94,650	
O11	11th Street Open Area	78,175	854,785
TOTAL OPERATION AND MAINTENANCE PROJECTS			**$3,310,895**

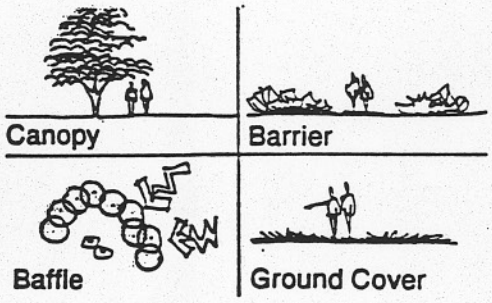
3.0 PLANT MATERIAL PALETTE

The proper selection of trees, shrubs and ground covers is critical to good landscape design, development and maintenance. This chapter discusses the criteria for selection of plant material and presents a plant material selection matrix for tree, shrub and ground cover plantings. (Figures 3.0-1 through 3.0-5).

The ability of plant material to perform a desired landscape function is dependent upon the plant's hardiness in relation to local climatic and specific site conditions. Major factors affecting plant survival are soils, temperature, moisture and light. These climatic conditions can be modified by specific site conditions, such as wind protection, solar orientation and planting design, to create micro-climates. The type of soil and its organic content are other site specific conditions having major effects on plant survival.

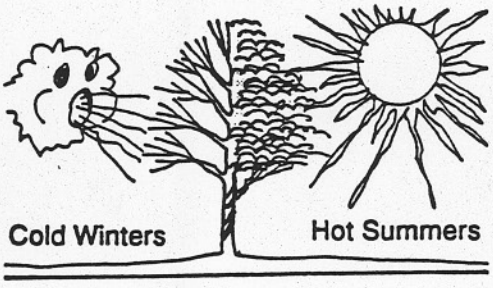
Trees, shrubs, ground cover and turf are the major elements of a planting composition. Design objectives for plantings include creating a unified composition by limiting the varieties of plants to reduce clutter, incompatible colors, textures and forms. Consistent use of similar plant materials, with occasional contrast for accent, contributes to this objective.

Selecting the correct plant for a design is just as important as the design itself. Proper use of plants in design requires an understanding of each plant's characteristics and environmental needs as well as how each plant relates to, compliments or detracts from other plants in the design. Plants are used in five basic architectural forms: (1) canopy, (2) barrier, (3) screen, (4) baffle, and (5) ground cover.



The plant material selection matrices are designed to help the designer choose the best plant for each particular set of design requirements. To use them effectively, the design requirements must be well defined for the specific landscape development site.

The plants which appear on the matrices were selected for their ability to survive the climatic conditions found at Whiteman Air Force Base. They are all hardy which means that they are capable of withstanding the adverse conditions of local climate, such as cold winters, hot summers and occasional drought.



Large Trees

BOTANICAL NAME	COMMON NAME	SIZE	TYPE		SHAPE								GROWTH		FLOWER			INTEREST			RESISTANCE				SOIL			LIGHT			THEME			PLACEMENT		FUNCTION										REMARKS
			Evergreen	Deciduous	Conical	Vase	Round	Oval	Weeping	Upright	Horizontal	Irregular	Fast	Slow	Spring	Summer	Fall	Foliage	Bark	Flower	Disease	Drought	Wet Sites	Wind	Moist	Average	Dry	Sun	Sun/Shade	Shade	Formal	Informal	Naturalized	Massing	Specimen	Major Street	Secondary Street	Tertiary Street	Parking Lot Islands	Buffer Zone	Visual Screening	Accent Planting	Barrier Planting	Residential	Generally Available	
			CHARACTERISTICS																		CULTURE										USE															
Acer platanoides	Norway Maple			●			●							●	●			●		●		●				●	●	●				●	●		●			●		●		●		●	●	Good yellow fall color, Shallow roots
Acer saccharum	Sugar Maple			●			●							●				●							●	●			●		●	●	●		●		●	●		●		●		●	●	Can be difficult to establish, Excellent fall color
Betula nigra	River Birch			●				●					●						●				●		●	●			●			●	●	●	●					●		●		●	●	Interesting bark, Multi-stemmed
Celtis laevigata	Sugar Hackberry			●			●						●								●	●		●	●	●	●	●				●	●	●	●		●	●		●				●		Fruit attracts birds
Celtis occidentalis	Hackberry			●				●					●						●			●		●	●	●	●	●				●	●	●	●			●		●				●	●	Drought and wind tolerant
Fraxinus americana	White Ash			●			●						●					●							●	●		●			●	●		●	●	●	●	●	●	●		●		●	●	Excellent fall color
Fraxinus pennsylvanica	Marshall Seedless Green Ash			●								●	●									●	●		●	●	●	●				●	●	●			●	●	●	●				●	●	Specify seedless variety 'Marshall Seedless'
Gingko biloba (male)	Gingko (male)			●	●									●				●			●	●			●	●	●	●				●	●		●					●		●			●	Use male only, Excellent fall color
Gleditsia triacanthos 'Moraine'	Moraine Honeylocust			●		●							●					●				●			●	●	●	●			●			●			●	●						●	●	Finely textured, Filtered shade
Gymnocladus dioicus	Kentucky Coffee Tree			●				●						●					●		●	●			●	●	●	●					●		●					●		●				Needs room, Coarse outline
Koelreuteria paniculata	Goldenraintree			●			●						●			●		●		●	●	●		●	●	●	●	●			●	●	●	●			●	●	●		●		●	●	Showy flowers, Small shade tree
Liriodendron tulipifera	Tulip Tree			●				●					●		●			●		●					●	●		●				●	●		●					●		●			●	Needs room, Yellow fall color
Liquidambar styraciflua	Sweetgum			●	●		●							●				●							●	●		●				●	●	●	●					●		●		●	●	Excellent fall color, Needs room, Messy fruit
Pinus nigra	Austrian Pine		●		●									●				●				●			●	●		●				●	●	●						●	●		●	●	●	Susceptible to Tip Blight if not treated
Pinus strobus	White Pine		●		●								●					●			●	●			●	●	●		●		●	●	●	●						●	●		●	●	●	Avoid wet sites & windy conditions
Pinus sylvestris	Scotch Pine		●		●									●				●			●	●				●	●	●				●	●	●						●	●		●	●	●	Irregular in old age
Platanus x acerifolia 'Bloodgood'	Bloodgood Planetree			●								●	●						●		●	●			●	●	●	●			●	●	●		●	●	●	●	●	●				●	●	Durable shade tree, Interesting bark
Prunus avium 'plena'	Mazzard Cherry			●	●								●		●					●					●	●			●			●	●	●	●					●		●		●		Showy flowers
Quercus coccinea	Scarlet Oak			●			●							●				●				●			●	●	●		●		●	●	●	●	●	●	●	●		●		●		●		Excellent fall color, Can be difficult to establish
Quercus palustris	Pin Oak			●	●								●								●		●		●	●		●			●	●	●	●	●	●	●	●	●	●	●			●	●	Branches to ground, Can be limbed up
Quercus rubra	Red Oak			●			●						●					●			●					●	●	●			●	●	●	●	●		●	●		●		●		●	●	Avoid high pH soils
Salix alba 'Tristis'	Golden Weeping Willow			●			●						●					●					●		●			●					●	●	●					●	●	●				●	Attractive, but somewhat Short-Lived
Sophora japonica	Japanese Pagodatree			●			●						●			●						●				●	●	●				●	●	●						●		●		●		Durable tree, Sometimes not available
Taxodium distichum	Baldcypress			●	●								●					●	●			●	●	●	●	●	●	●				●	●	●						●	●					●	Deciduous conifer, Durable tree
Tilia cordata 'Greenspire'	Greenspire Linden			●				●					●			●		●		●					●	●		●			●				●	●	●	●	●			●		●	●	Formal lawn & Street tree
Tilia tomentosa	Silver Linden			●				●					●			●		●		●		●			●	●		●			●				●	●			●			●		●		Heat & Drought Tolerant Street Tree

All deviations from the plant material matrix must be approved by the LARC prior to specification.

PLANT MATRIX 1

WHITEMAN Air Force Base Knob Noster, Missouri

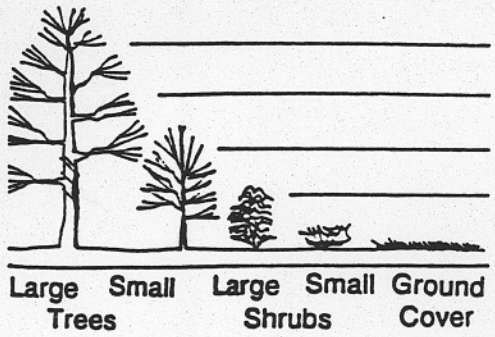
LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

Figure 3.0-1

This select group was then divided into five categories: (1) large trees, (2) small trees, (3) large shrubs, (4) small shrubs, and (5) ground covers.

On each matrix, the plants appear in alphabetical order by their botanical name, followed by their common name, design characteristics, cultural information, recommended use and miscellaneous notes.



Small Trees

BOTANICAL NAME	COMMON NAME	SIZE	TYPE		SHAPE								GROWTH		FLOWER			INTEREST			RESISTANCE				SOIL			LIGHT			THEME			PLACEMENT		FUNCTION										REMARKS
			Evergreen	Deciduous	Conical	Vase	Round	Oval	Weeping	Upright	Horizontal	Irregular	Fast	Slow	Spring	Summer	Fall	Foliage	Bark	Flower	Disease	Drought	Wet Sites	Wind	Moist	Average	Dry	Sun	Sun/Shade	Shade	Formal	Informal	Naturalized	Massing	Specimen	Major Street	Secondary Street	Tertiary Street	Parking Lot Islands	Buffer Zone	Visual Screening	Accent Planting	Barrier Planting	Residential	Generally Available	
			CHARACTERISTICS																		CULTURE										USE															
Acer campestre	Hedge Maple			●			●							●				●			●				●	●	●		●		●	●			●		●	●						●		Good small tree, Single trunk
Acer ginnala	Amur Maple			●			●							●	●			●		●	●				●	●			●		●	●		●						●	●	●		●	●	Lower limbs pruned for foundation plantings
Acer tataricum	Tatarian Maple			●			●							●	●			●		●	●	●			●	●	●		●			●			●					●				●		Small specimen tree
Amelanchier arborea	Serviceberry			●			●						●		●			●		●			●		●	●			●			●	●	●						●				●	●	Attracts wildlife, Good fall color
Carpinus caroliniana	American Hornbeam			●			●							●				●	●				●		●	●				●		●	●		●					●	●	●		●		Attractive bark, Tolerates wet sites
Cercis canadensis	Redbud			●			●						●		●					●					●	●			●			●	●	●	●					●		●		●	●	Needs room, Low Branching Habit
Cladrastis lutea	Yellowwood			●			●						●		●			●		●	●				●			●			●	●	●		●					●				●		Nice tree but often not available
Cornus florida	Flowering Dogwood			●			●							●	●			●		●					●				●		●	●	●	●	●					●		●		●	●	Needs protected site & moist soils
Cornus kousa	Kousa Dogwood			●			●							●		●		●	●			●	●		●			●				●	●	●	●					●	●	●		●		Hardy dogwood
Crataegus crusgalli 'inermis'	Cockspur Hawthorne			●			●							●	●			●		●					●	●		●			●	●	●	●						●				●	●	Horizontal habit, Thornless, Can be limbed up
Crataegus lavallei	Lavalle Hawthorne			●				●						●	●					●					●	●		●			●	●	●	●	●					●		●		●		Thorned tree
Crataegus phaenopyrum	Washington Hawthorne			●				●						●	●			●		●					●	●		●			●	●	●	●	●					●		●	●	●	●	Hardy tree, Thorned, Showy red fruit
Ilex pendunculosa	Longstalk Holly		●									●		●				●				●	●	●	●	●		●			●	●		●							●				●		Hardy evergreen, Showy red fruit
Macckia amurensis	Amur macckia			●			●							●		●			●	●					●	●		●			●	●			●		●							●		Small specimen tree
Malus x spp	Crabapple			●	●	●	●	●	●					●	●					●	●				●	●		●			●	●	●	●	●					●		●		●	●	Showy flowers, Showy fruit, See below*
Nyssa Sylvatica	Sour Gum			●			●							●				●							●	●			●			●	●		●					●		●		●	●	Can be difficult to transplant, Needs protected site
Ostrya virginiana	Ironwood			●	●		●							●											●	●			●			●	●		●					●	●			●		Handsome Gray Bark
Pyrus calleryana 'Bradford'	Bradford Pear			●				●					●		●			●		●	●	●			●	●	●	●			●				●	●	●	●	●		●			●	●	Durable tree, Red purple fall color
Pyrus calleryana 'Redspire'	Redspire Pear			●	●								●		●			●		●	●	●			●	●	●	●			●				●	●	●	●	●		●			●	●	Durable tree, Yellow fall color
Rhus typhina	Staghorn Sumac			●								●	●					●				●	●		●	●	●	●		●			●	●						●	●	●			●	Best in mass planting, Can be limbed up

*Disease Resistant Crabapples:
Adams, Ames White, Baskatong, Beverly, Burton, Candied Apple, Centennial, David, Dolgo, Donald Wyman, Floribunda, Gibbs' Golden Gage, Golden Gem, Henry Kohankie, Indian Magic, Liset, Mary Potter, Mount Arbor Special, Pink Spires, Professor Sprenger, Profusion, Red Jewel, Red Splendor, Robinson, Sargentii, Tschonoskii, White Angel, Winter Gold.

All deviations from the plant material matrix must be approved by the LARC prior to specification.

PLANT MATRIX 2

WHITEMAN Air Force Base Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

Figure 3.0-2

Large Shrubs

BOTANICAL NAME	COMMON NAME	SIZE	TYPE		SHAPE								GROWTH		FLOWER			INTEREST			RESISTANCE				SOIL				LIGHT			THEME			PLACEMENT		FUNCTION											REMARKS
			Evergreen	Deciduous	Conical	Vase	Round	Oval	Weeping	Upright	Horizontal	Irregular	Fast	Slow	Spring	Summer	Fall	Foliage	Bark	Flower	Disease	Drought	Wet Sites	Wind	Moist	Average	Dry	Sun	Sun/Shade	Shade	Formal	Informal	Naturalized	Massing	Specimen	Foundation Planting	Hedge Planting	Planting Beds	Parking Lot Islands	Buffer Zone	Visual Screening	Accent Planting	Barrier Planting	Residential	Generally Available	
			CHARACTERISTICS																		CULTURE										USE																
Acer ginnala	Amur Maple			●			●							●	●			●		●	●				●	●	●		●			●	●	●				●			●			●	●	Adaptable, multi-stemmed, red fruits
Aronia arbutifolia 'brilliantisima'	Red Chokeberry			●						●				●	●			●		●	●	●	●		●	●	●		●				●	●				●		●						Attracts wildlife, Good near water's edge
Berberis x mentorensis	Mentor Barberry			●						●			●					●			●				●	●	●		●		●	●		●		●	●	●	●		●		●	●	●	Needs protected site, Thorned
Calycanthus floridus	Common Sweetshrub			●			●							●	●					●					●	●	●		●				●	●				●		●						Durable plant, Naturalized areas only
Cornus sericea	Redosier Dogwood			●			●						●		●			●	●	●	●	●	●		●	●	●		●			●	●	●				●		●		●	●	●	●	Red stems in winter, Suckers freely
Euonymus alatus	Burning Bush			●			●							●				●			●				●	●	●		●			●	●	●	●			●		●	●	●	●		●	Needs room, Scarlet fall color
Euonymus alatus 'Compacta'	Dwarf Burning Bush			●			●							●				●			●				●	●	●		●		●	●	●	●		●	●	●	●	●	●	●	●	●	●	Excellent shrub, Scarlet fall color
Forsythia x intermedia 'Karl Sax'	Karl Sax Forsythia			●						●			●		●					●	●	●			●	●	●	●				●	●	●				●		●		●	●	●	●	Hardy flowers, Do not shear
Ilex verticulata	Winterberry Holly			●				●						●									●		●	●			●				●	●				●		●	●					Use in mass planting, Wet sites
Juniperus chinensis	Chinese Juniper		●			●								●				●				●			●	●	●	●			●	●		●		●	●	●	●	●	●			●	●	Do not shear, See text for varieties
Ligustrum obtusifolium 'regelicinum'	Border Privet			●							●		●					●				●	●		●	●	●		●			●		●			●		●	●	●		●	●	●	Makes a good hedge
Lonicera fragrantissima	Winter Honeysuckle			●								●	●		●					●		●			●	●	●		●				●	●				●		●						Durable plant, Naturalized areas only
Malus sargentii	Sargent Crabapple			●								●			●					●					●	●		●				●	●	●	●			●		●	●	●		●	●	Needs room & evergreen backdrop, Showy flowers
Pyracantha coccinea 'Yukon'	Yukon Bell Pyracantha		●										●					●								●	●	●				●						●		●	●	●	●	●	●	Showy orange fruit, Thorned
Rhus typhina	Staghorn Sumac			●								●	●					●				●	●		●	●	●	●	●				●	●				●		●		●			●	Can be pruned, Good fall color
Spirea x vanhouttei	VanHoutte Spirea			●		●							●		●					●		●			●	●	●	●				●		●				●		●		●		●	●	Showy flowers
Viburnum burkwoodii	Burkwood Viburnum			●						●				●	●			●		●					●	●	●		●			●	●	●				●		●				●	●	Showy flowers. Do not shear
Viburnum dentatum	Arrowwood Viburnum			●			●							●	●			●		●	●	●			●	●	●		●		●	●	●	●			●	●	●	●	●			●	●	Makes a good hedge
Viburnum opulus	Cranberrybush Viburnum			●			●							●	●					●			●		●	●	●		●				●	●	●			●		●	●	●		●	●	Showy red fruit
Viburnum plicatum tomentosum	Mariessi Doublefile Viburnum			●							●			●	●			●		●	●				●	●		●			●	●	●	●	●	●		●		●	●	●		●	●	Specify variety 'Mariessi', Showy flowers & fruit
Viburnum rhytidophyllum	Leatherleaf Viburnum		●							●				●	●					●	●				●	●				●	●	●	●	●		●		●	●	●			●	●	Needs protected site & shade

All deviations from the plant material matrix must be approved by the LARC prior to specification.

PLANT MATRIX 3

WHITEMAN Air Force Base Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

Figure 3.0-3

Small Shrubs

BOTANICAL NAME	COMMON NAME	SIZE	TYPE		SHAPE									GROWTH		FLOWER			INTEREST			RESISTANCE				SOIL			LIGHT			THEME			PLACEMENT		FUNCTION											REMARKS
			Evergreen	Deciduous	Conical	Vase	Round	Oval	Weeping	Upright	Horizontal	Irregular	Fast	Slow	Spring	Summer	Fall	Foliage	Bark	Flower	Disease	Drought	Wet Sites	Wind	Moist	Average	Dry	Sun	Sun/Shade	Shade	Formal	Informal	Naturalized	Massing	Specimen	Foundation Planting	Hedge Planting	Planting Beds	Parking Lot Islands	Buffer Zone	Visual Screening	Accent Planting	Barrier Planting	Residential	Generally Available	
			CHARACTERISTICS																		CULTURE										USE																
Berberis julianae 'Nana'	Wintergreen Barberry		●							●				●				●			●				●	●	●		●		●	●		●			●	●	●		●		●	●		Barrier plant, Hardy evergreen
Berberis thunbergii	Japanese Barberry			●			●							●				●				●			●	●	●	●			●	●		●		●	●	●	●		●	●	●	●	●	Very adaptable, Thorned plant
Cotoneaster apiculatus	Cranberry Cotoneaster			●							●			●	●			●		●		●			●	●			●		●	●		●		●			●					●	●	Needs protected site
Euonymus alatus 'Rudy Haag'	Compact Winged Euonymus			●			●							●				●			●				●	●	●		●		●	●		●		●	●	●	●		●		●	●	●	Scarlet fall color, Durable shrub
Euonymus kiautschovicas 'DuPont'	DuPont Euonymus			●							●		●									●			●	●	●		●			●		●		●	●	●	●		●					Avoid seating & entrance areas
Ilex glabra 'Compact'	Compact Inkberry		●							●				●				●			●		●		●	●			●		●	●		●		●	●	●	●		●		●	●	●	Avoid high pH soils, Needs protected site
Ilex verticillata 'Nana'	Compact Winterberry		●					●						●				●					●		●	●			●			●	●	●		●		●		●	●	●		●		Lustrous dark green foliage, Abundant red fruits
Juniperus chinensis	Chinese Juniper		●								●			●				●			●	●			●	●	●	●			●	●		●		●		●	●	●	●			●	●	Durable, Salt tolerant, Do not shear, See text for varieties
Juniperus sabina	Savin Juniper		●								●			●				●			●	●			●	●	●	●			●	●		●		●		●	●	●	●			●	●	Durable plant, Do not shear. See text for varieties
Kerria japonica	Japanese Kerria			●						●				●	●				●	●	●	●			●	●	●			●			●	●				●		●						Needs moist site
Rhus aromatica	Fragrant Sumac			●								●		●				●			●	●			●	●	●		●			●	●	●				●		●		●			●	Stabilizes banks, Good fall color
Taxus cuspidata 'Densa'	Dense Japanese Yew		●								●			●				●			●				●	●			●		●	●		●		●	●	●	●		●		●	●	●	Needs protected site, Shear only as a hedge
Taxus media	Anglojap Yew		●								●			●				●			●				●	●			●		●	●		●		●	●	●	●		●		●	●	●	Many varieties available, Shear only as hedge
Viburnum acerifolium	Mapleleaf Viburnum			●								●	●			●		●		●	●				●	●				●			●	●				●		●						Tolerates shade
Viburnum opulus 'compactum'	Compact Cranberrybush			●							●			●	●			●		●	●		●		●	●	●		●			●		●		●		●		●	●			●	●	Showy flowers & fruit

All deviations from the plant material matrix must be approved by the LARC prior to specification.

PLANT MATRIX 4

WHITEMAN Air Force Base Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

Figure 3.0-4

Groundcover

BOTANICAL NAME	COMMON NAME	SIZE	TYPE		SHAPE								GROWTH		FLOWER				INTEREST			RESISTANCE				SOIL				LIGHT			THEME			PLACEMENT		FUNCTION											REMARKS
			Evergreen	Deciduous	Conical	Vase	Round	Oval	Weeping	Upright	Horizontal	Irregular	Fast	Slow	Spring	Summer	Fall	Foliage	Bark	Flower	Disease	Drought	Wet Sites	Wind	Moist	Average	Dry	Sun	Sun/Shade	Shade	Formal	Informal	Naturalized	Massing	Specimen	Foundation Planting	Bank Cover	Planting Beds	Parking Lot Islands	Buffer Zone	Visual Screening	Accent Planting	Barrier Planting	Residential	Generally Available	
Ajuga reptans	Bugleweed			●							●		●		●			●		●	●				●				●		●	●		●		●		●				●		●	●	Needs protected site
Berberis candidula	Paleleaf Barberry		●						●					●	●			●		●	●				●				●		●	●	●	●				●	●	●	●		●	●		Thorned evergreen, Withstands pruning
Cotoneaster apiculatus	Cranberry Cotoneaster			●							●			●	●			●		●		●			●	●			●		●	●		●		●	●		●					●	●	Needs protected site
Cotoneaster dammeri 'Lowfast'	Lowfast Cotoneaster			●							●		●		●			●		●					●	●	●		●		●	●	●	●		●	●		●	●				●	●	Fast growing
Cotoneaster horizontalis	Rockspray Cotoneaster			●							●			●	●			●		●					●	●	●	●			●	●	●	●		●	●		●			●		●	●	Cascading effect, Bank cover
Euonymus fortunei 'coloratus'	Purpleleaf Wintercreeper		●								●		●					●							●	●	●		●		●	●	●	●		●	●	●	●	●	●	●		●	●	Purple foliage, Vigorous grower
Hedera helix	English Ivy		●								●		●					●							●	●				●	●	●	●	●		●	●	●	●	●	●			●	●	Needs shade, Can climb
Juniperus horizontalis	Creeping Juniper		●								●			●				●				●		●		●	●	●			●	●	●	●		●	●	●	●	●				●	●	See text for varieties
Liriope spicata	Liriope			●							●			●		●				●	●	●			●	●	●		●		●	●	●	●		●		●	●	●		●		●	●	Deciduous grassy groundcover
Polygonum reynoutria	Compact Fleeceflower			●							●		●			●	●			●	●	●				●	●		●				●	●			●			●	●			●	●	Vigorous grower, Can climb
Polygonum cuspidatum	Low Japanese Fleeceflower			●							●		●			●	●			●	●	●				●	●		●				●	●			●			●	●			●		Low growing variety compactum , Can climb
Rhus aromatica	Low Grow Sumac			●							●			●				●				●	●		●	●	●		●			●	●	●			●	●	●	●		●		●		Glossy foliage, Fall color
Viburnum opulus 'Nanum'	Dwarf Cranberry Viburnum			●							●			●											●	●	●	●				●		●		●		●						●		Avoid wet sites, Densely Branched

All deviations from the plant material matrix must be approved by the LARC prior to specification.

PLANT MATRIX 5

WHITEMAN Air Force Base Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

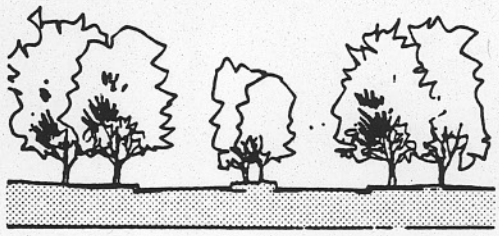
Figure 3.0-5

4.0 LANDSCAPE PLANTING DESIGN STANDARDS

The landscape planting design standards for Whiteman Air Force Base provide guidance to produce a uniform and consistent appearance between landscape construction projects within each theme development area. The design standards provide recommended plant material as well as minimum plant sizes, spacing, layout and other design criteria relating to planting design for streets, parking lots, building foundations, walks, and open space.

When implemented, the standards will develop a hierarchy of landscape development between theme areas as they relate to visibility and importance.

4.1 Street Trees

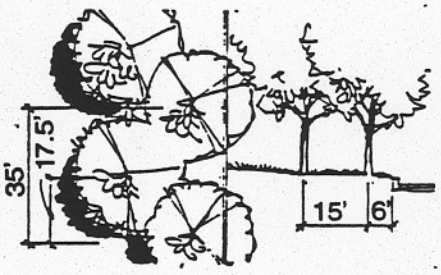


Street tree plantings are used to visually define and reinforce the basic roadway organization of the base. They provide the ordering element that orients and directs vehicular traffic as well as defining roadway hierarchy. Street trees provide visual scale, reduce roadway glare, heat gain, and physically separate pedestrian and vehicular circulation.

4.1.1 Relationship to the Theme Plan. The theme plan identifies three different roadway classifications: (1) primary, (2) secondary, and (3) tertiary. Various levels of landscape treatment are proposed for each roadway that will provide visual clues to their hierarchy and help orient and direct vehicular traffic.

4.1.2 Primary Roads

4.1.2.1 Layout: To emphasize visual effect and channel views, an offset double row of large deciduous trees should be planted along each side of the street. Tree spacing should be 30-35 feet on center, with the first row of trees planted a minimum of six feet from the back of curb. The second row should be located an additional fifteen (15) feet from the first. Nominal spacing variations may occur to maintain rhythm while avoiding curb cuts and utilities.

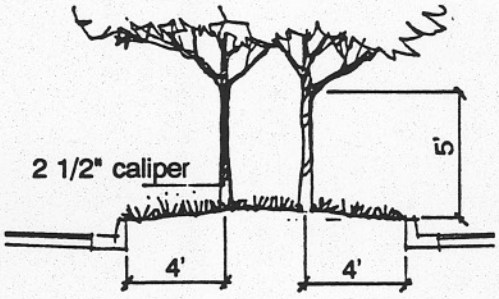


4.1.2.2 Size: Trees planted along major streets should have a minimum caliper of three inches and have a clear trunk of six feet.

4.1.2.3 Plant Material: One tree should be selected from the approved tree list below and used continuously along the designated street.

Bloodgood Planetree
Greenspire Linden
Red Oak
Scarlet Oak

4.1.3 Medians



4.1.3.1 Layout: Trees should be planted in median planting areas in clusters of double offset rows. Typical spacing between trees in one row should be 25 feet. Trees should be offset from the curb a minimum of four feet. A

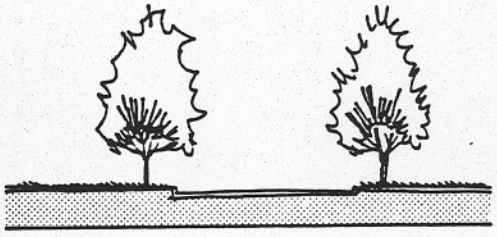
minimum of six trees should be planted in each cluster. Spacing between clusters should not exceed 60 feet.

4.1.3.2 Size: Trees planted in median planting areas should be selected to provide a uniform appearance and have a minimum caliper of 2-2½ inches and a clear trunk of five feet.

4.1.3.3 Plant Material: One tree should be selected from the approved tree list below and used continuously in the median areas along a given road.

White Ash
Silver Linden
Bradford Pear
Redspire Pear

4.1.4 Secondary Streets

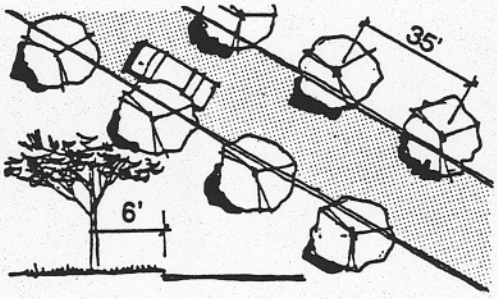


4.1.4.1 Layout: A single row of street trees should be planted along both sides of designated secondary streets. Typical spacing should be 35 feet on center with a minimum setback of six feet from the curb edge. Nominal variation may occur to maintain rhythm (i.e., spacing) while avoiding curb cuts, utilities, or sidewalks.

4.1.4.2 Size: Trees planted along secondary streets should have a minimum caliper of 2½ inches and have a clear trunk of five feet.

4.1.4.3 Plant Material: For any given length of street between intersecting street, single tree species should be planted. Trees should be selected from the approved plant list below:

<u>Large Trees</u>



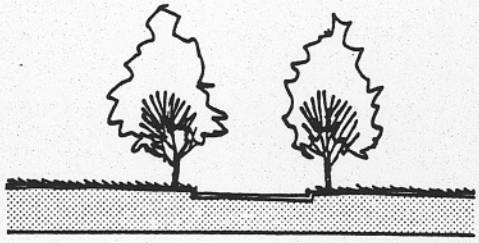
Norway Maple
Sugar Maple
Sugar Hackberry
White Ash
Seedless Green Ash
Greenspire Linden

Honeylocust
Bloodgood Planetree
Red Oak
Pin Oak
Scarlet Oak

Small Trees

Hedge Maple
Bradford Pear
Redspire Pear

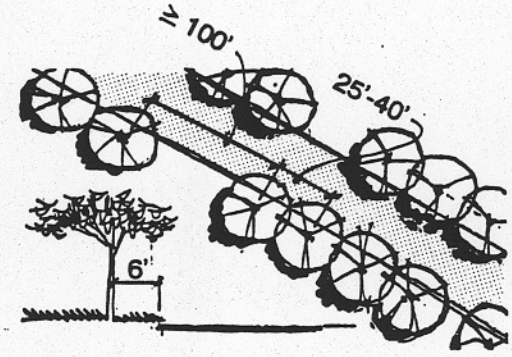
4.1.5 Tertiary Streets



4.1.5.1 Layout: Street trees planted along tertiary streets should be planted in a single row of three or more tree groupings planted on 25-40 centers. Spacing between groupings should not exceed 100 feet except to avoid curb cuts, drainage ditches, or utilities. A setback of six feet from the road edge should be maintained.

4.1.5.2 Size: Trees should have a minimum caliper of two inches and a clear trunk of five feet.

4.1.5.3 Plant Material: Large deciduous trees should be planted except where specific site limitations dictate the use of a smaller tree. Only one species of tree should be used along any section of street between intersections. When tree replacement is necessary, the same species of tree should be used to replace the one removed. Trees should be selected from the approved list.



Large Trees

Norway Maple
Sugar Maple
Sugar Hackberry
Hackberry
Seedless Green Ash
Greenspire Linden
Moraine Honeylocust
Goldenraintree
Bloodgood Planetree
Pin Oak
Red Oak
Scarlet Oak

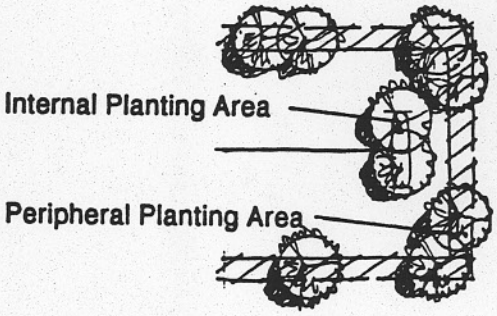
Small Trees

Hedge Maple
Amur macckia
Bradford Pear
Redspire Pear

4.2 Parking Lots

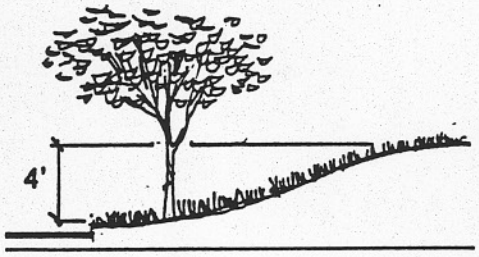
Parking lots are often the least attractive elements on a military installation. The use of landscape plant material and earth berming can greatly improve the appearance of these areas as well as help define circulation and reduce heat gain during summer months.

4.2.1 Relationship to the Theme Plan. Parking lots are found in all three theme areas. The following describe various levels of landscape development and establish requirements for peripheral and internal landscape plantings. Peripheral plantings are those plantings that are required at the perimeter of the parking lot and are intended to screen the lot from adjacent uses. Internal plantings are located in curbed islands and medians and are useful in providing shade and reducing glare, while helping to define internal circulation.

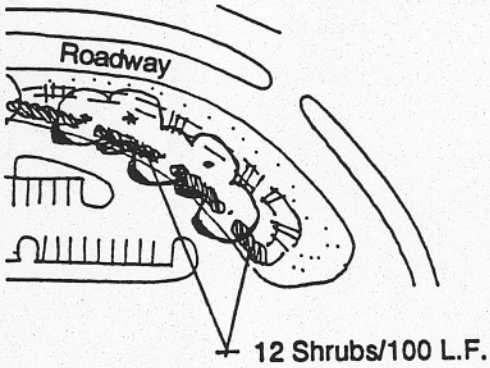


4.2.2 Formal Areas - Peripheral Landscape Treatment

4.2.2.1 Earth Berms: Where parking lots are adjacent to roadways, earth berms should be used to screen parked vehicles. Berms should not exceed four feet in height and have a maximum side slope of 3 to 1. Berms should be graded to provide a uniform appearance. Slopes should be planted with ground cover and turf lawn.



4.2.2.2 Hedges: Where parking lots are adjacent to roadways, a landscape hedge should be used in addition to berms to screen parked vehicles. For every 100 linear feet of parking lot perimeter, 12 shrubs are to be planted and located where they will screen a majority of the parking area from the roadway. Plantings should not impede or block site lines at driveway/street intersections. Hedges should be set back from the parking lot curb a minimum of four feet. Plants used should be of a single species to provide a uniform formal appearance. All plants will be matched in size and habit a minimum of 18 inches in height and planted not more than 24 inches on center at the time of planting. In no case should shrubs be spaced to appear as individual plants. Plants which are selected for use as hedges in formal parking lots include the following:



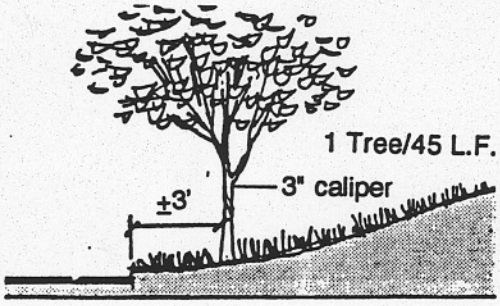
Large Shrubs

Mentor Barberry
Dwarf Burning Bush
Mint Julep Juniper
Sea Green Juniper
Arrowwood Viburnum

Small Shrubs

Wintergreen Barberry	Compact Inkberry
Japanese Barberry	Dense Japanese Yew
Anglojap Yew	Compact Winged Euonymus
Compact Pfitzer Juniper	Sargent's Juniper
Broadmoor Juniper	

4.2.2.3 Trees: For every 45 linear feet of parking lot perimeter, including service areas and drop off, one deciduous three inch caliper tree should be planted. Trees may be clustered or regularly spaced around the perimeter of the parking area. All trees should be located a minimum of three feet from the parking lot curbs. One tree should be used consistently around the perimeter of any one parking lot and be selected from the list below.



Large Trees

Sugar Maple	Pin Oak
White Ash	Red Oak
Goldenraintree	Greenspire Linden
Bloodgood Planetree	Silver Linden

Small Trees

Bradford Pear
Redspire Pear

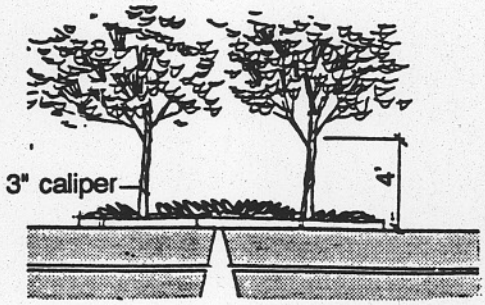
4.2.2.4 Lawn/Ground Cover: Grass or ground cover should be planted on all portions of the parking lot perimeter not covered by shrubs, trees or paving material. Plants should be selected from the approved list below:

Paleleaf Barberry	Purpleleaf Wintercreeper
Cranberry Cotoneaster	English Ivy
Lowfast Cotoneaster	Liriope
Rockspray Cotoneaster	Andorra Juniper
Bar Harbor Juniper	Blue Chip Juniper

Emerson Juniper
Skandia Juniper
Blue Rug Juniper

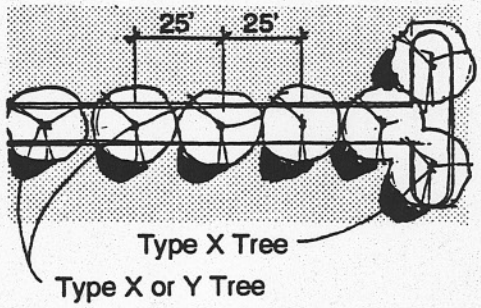
4.2.3 Formal Areas - Interior Landscape Treatment

4.2.3.1 Trees: Each full bay parking island will be planted with two deciduous trees, with one tree required in a half bay island. Medians shall be planted with one deciduous tree for every 25 linear feet of length. Spacing should be regular. Trees planted in parking lots shall be a minimum caliper of three inches with a clear trunk of at least four feet. One tree should be consistently planted in the median areas in any given parking lot, but may be different from island plantings.



Large Trees

White Ash
Goldenraintree
Bloodgood Planetree
Pin Oak
Greenspire Linden
Silver Linden



Small Trees

Bradford Pear
Redspire Pear

4.2.3.2 Shrubs and Groundcovers: Islands and medians should be planted with approved ground cover or single species shrubs. Shrubs shall be matched in size and habit, have a minimum height of 18 inches, and be spaces not more than 30 inches on center at the time of planting. Vine type ground covers should be spaced on 12 inch centers. All planted areas should be covered with wood bark; mulch a minimum of three inches in depth. Plants should be selected from the list below:

Large Shrubs

Mentor Barberry
Dwarf Burning Bush
Mint Julep Juniper
Sea Green Juniper
Arrowwood Viburnum

Small Shrubs

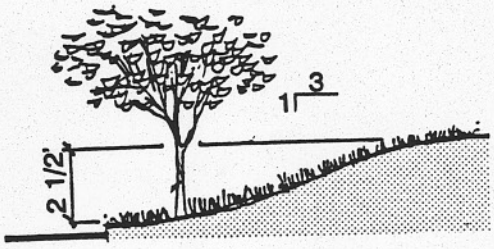
Wintergreen Barberry
Japanese Barberry
Compact Pfitzer Juniper
Sargent's Juniper

Cranberry Cotoneaster	Broadmoor Juniper
Dense Japanese Yew	Compact Winged Euonymus
Compact Inkberry	Anglojap Yew

Groundcovers

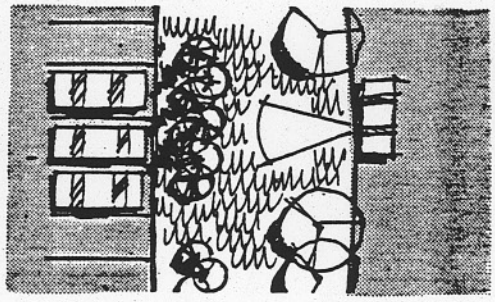
Paleleaf Barberry	Purpleleaf Wintercreeper
Cranberry Cotoneaster	English Ivy
Lowfast Cotoneaster	Liriope
Rockspray Cotoneaster	Andorra Juniper
Bar Harbor Juniper	Blue Chip Juniper
Emerson Juniper	Blue Rug Juniper
Skandia Juniper	

4.2.4 Informal Areas - Peripheral Landscape Treatment



4.2.4.1 Earth berms: Where parking lots are adjacent to roadways, earth berms should be used to screen parked vehicles. Berms should be a minimum of 2½ feet in height and not to exceed four feet, with a maximum side slope of 3 to 1. Berms may have a uniform appearance. Slopes should be planted with ground cover or turf lawn.

4.2.4.2 Trees: For every 60 linear feet of parking lot perimeter including service areas and drop offs, one deciduous 2½ inch caliper tree should be planted. Trees should be arranged in clusters or groups of three to five trees. Trees should be located within 3½ to 10 feet of the back of the parking lot curb. No more than two species of tree may be used per parking area. Trees should be selected from the following list:



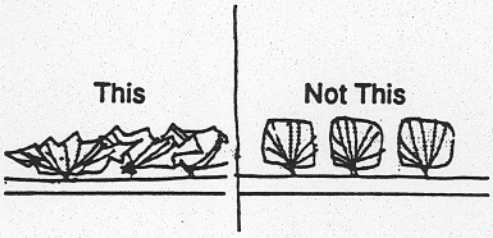
For every 12 linear feet of parking lot adjacent to a roadway, 1-6 foot high evergreen trees should be used for additional screening. Trees should be spaced on 8-10 foot centers and located where they will screen a majority of the parking area from the road.

Large Trees

White Ash	Sugar Maple
Seedless Green Ash	River Birch
Goldenraintree	Hackberry
Bloodgood Planetree	Green Ash
Pin Oak	Norway Maple
Ginkgo	Mazzard Cherry

Norway Maple	Red Oak
White Pine	Austrian Pine

4.2.4.3 Shrubs: Shrub plantings are optional; however, if used, should be massed in groupings of five to seven plants to provide an opaque screen. In no case are shrubs to be spaced to appear as individual plants. No more than two species of shrubs should be used per parking area. All shrubs should have a minimum height of 18 inches. Plantings should be located a minimum of three feet from the curb and should not impede or block site lines at entrances. Shrubs should be selected from the list below:



Large Shrubs

Mentor Barberry	Dwarf Burning Bush
Sea Green Juniper	Border Privet
Burkwood Viburnum	Arrowwood Viburnum
Mariessi Viburnum	Leatherleaf Viburnum
Mint Julep Juniper	

Small Shrubs

Wintergreen Barberry	Japanese Barberry
Cranberry Cotoneaster	Compact Winged Euonymus
DuPont Euonymus	Compact Inkberry
Compact Pfitzer Juniper	Sargent's Juniper
Broadmoor Juniper	Dense Japanese Yew
Anglojap Yew	

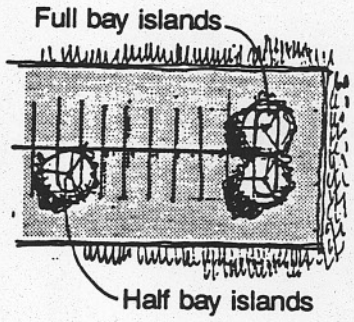
4.2.4.4 Lawn/Ground Cover: Grass or ground cover should be planted on all portions of the parking lot perimeter not covered by shrubs or paving material.
Plants should be selected from the approved list below:

Ground Cover

Paleleaf Barberry	Cranberry Cotoneaster
Lowfast Cotoneaster	Rockspray Cotoneaster
English Ivy	Purpleleaf Wintercreeper
Low-Gro Sumac	Liriope
Andorra Juniper	Bar Harbor Juniper
Blue Chip Juniper	Emerson Juniper
Blue Rug Juniper	Skandia Juniper

4.2.5 Informal Area - Interior Landscape Treatment

4.2.5.1 Trees: Full bay parking islands should be planted with two deciduous trees, with one tree required in half bay islands. Median areas shall be planted with one deciduous tree for every 25 linear feet of length. Spacing on center may vary but should not exceed 40 feet. Trees should have a minimum caliper of two inches and have a clear trunk of four feet. Trees should be set back a minimum of three feet from the back of adjacent walks or curbs. No more than three species from the list below may be used in any parking area.



Large Trees

White Ash	Seedless Green Ash
Goldenraintree	Bloodgood Planetree
Pin Oak	

4.2.5.2 Shrubs/Ground Cover: Islands and medians may be planted with shrub masses or ground cover. Shrubs should not be less than 18 inches in height. No more than four species may be used within a single parking area, and no more than two species may be used in any massing. All plants should be selected from the approved plant list below.

Large Shrubs

Mentor Barberry	Dwarf Burning Bush
Sea Green Juniper	Border Privet
Burkwood Viburnum	Arrowwood Viburnum
Mariessi Viburnum	Leatherleaf Viburnum
Mint Julep Juniper	

Small Shrubs

Wintergreen Barberry	Japanese Barberry
Cranberry Cotoneaster	Compact Winged Euonymus
DuPont Euonymus	Compact Inkberry
Compact Pfitzer Juniper	Sargent's Juniper
Broadmoor Juniper	Dense Japanese Yew
Anglojap Yew	

Ground Cover

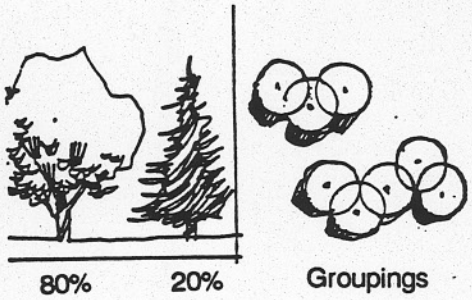
Paleleaf Barberry	Cranberry Cotoneaster
Lowfast Cotoneaster	Rockspray Cotoneaster

English Ivy	Purpleleaf Wintercreeper
Low-Gro Sumac	Liriope
Andorra Juniper	Bar Harbor Juniper
Blue Chip Juniper	Emerson Juniper
Blue Rug Juniper	Skandia Juniper

4.2.6 Naturalized Area - Peripheral Landscape Treatment

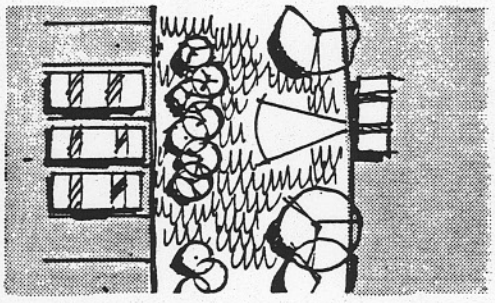
4.2.6.1 Earth Berms: Earth berming is an optional treatment around parking lots. If berms should are used, they be graded to have a naturalistic, free-flowing appearance and should not exceed four feet in height. The maximum allowable side slope shall be 4 to 1.

4.2.6.2 Trees: For every 85 linear feet of parking lot perimeter, one 2 inch caliper deciduous and/or evergreen tree a minimum of four feet in height should be planted. Trees should be planted in groups of three to five trees. A mixture of 80% deciduous and 20% evergreen trees should be achieved around a single parking lot. All trees should be selected from the approved plant list below:



Goldenraintree	Seedless Green Ash
Bloodgood Planetree	Pin Oak
Norway Maple	Sugar Maple
River Birch	Sugar Hackberry
Hackberry	Ginkgo
Austrian Pine	White Pine
Scotch Pine	Mazzard Cherry
Red Oak	

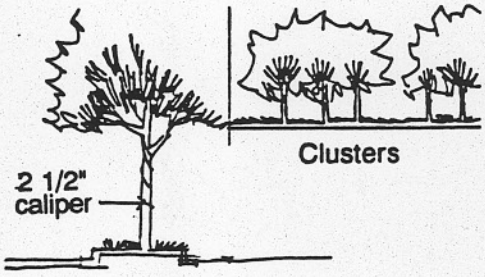
4.2.6.3 Shrubs: For every 25 linear feet of a parking lot's perimeter, one shrub 24 inches in height should be planted. Shrubs should be planted in groups of five to seven plants at a maximum of three feet on center to provide opaque screens. Plantings should be located where shrubs will screen a majority of the parking area from roadway and activity areas. However, such plantings should not impede drivers' site lines at driveway entrances. Shrub plantings should be limited to two to three species per parking lot and left unsheared. Shredded bark mulch beds should be used to eliminate lawn maintenance and lower limb damage to shrubs. Plants should be selected from the approved list below:



Red Osier Dogwood	Dwarf Burning Bush
Sargent Crabapple	Burkwood Viburnum
Arrowwood Viburnum	Leatherleaf Viburnum

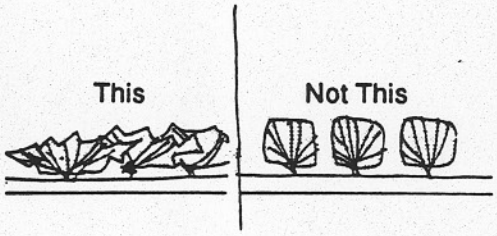
4.2.7 Naturalized Area - Interior Landscape Treatment

4.2.7.1 Trees: If landscape islands are provided, two deciduous trees should be planted in full bay islands with one tree in each half bay. Medians should be planted with one deciduous tree for every 25 linear feet of length. Trees should be arranged in a clustered/staggered arrangements setback from the pavement edge a minimum of 2½ feet. Deciduous trees should have a minimum caliper size of two inches. Plants should be selected from the list below:



Seedless Green Ash
Goldenraintree
Bloodgood Planetree
Pin Oak

4.2.7.2 Shrubs: Shrubs may be planted in island and median areas. If used, shrubs should be planted in masses of three to five plants on 36 inch centers and be limited to two species. Shrubs should not be less than 24 inches in height. Plants which may be used should be selected from the approved list below:

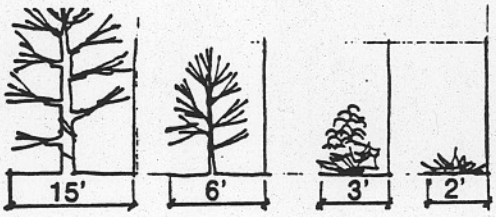


Dwarf Burning Bush
Arrowwood Viburnum

4.3 Foundation Plantings

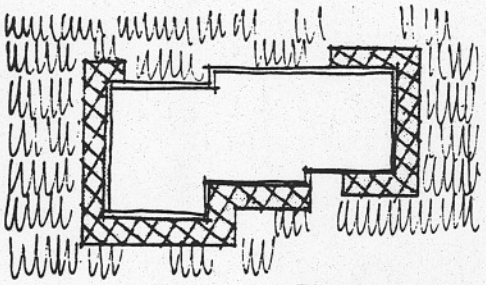
Foundation plantings are those which occur along building entrances and walls. Their purpose is to visually integrate the structure into the landscape or to accent special areas such as building entrances. Foundation plantings are plantings next to or within 15 feet of a building wall, and may consist of trees, shrubs, groundcovers and/or annual plantings used solely or in combination. All structure on base should incorporate some level of foundation plantings.

4.3.1 Relationship to Theme Plan. Foundation plantings have been categorized into formal, informal and naturalized areas. The process of preparing a landscape development plan should begin with the theme plan to identify which of these zones has been identified for a particular site.



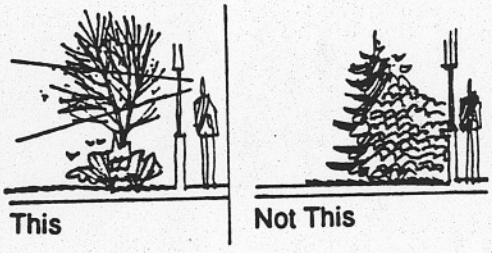
4.3.2 Formal Foundation Plantings

4.3.2.1 Layout of Planting Beds: The layout of foundation plantings beds around buildings designated as formal areas by the theme development plan should parallel building walls. The minimum width of such areas shall be 15' for large trees, 6' for small trees, 3' for shrubs and 2' for groundcover plantings. Formal building areas should receive foundation planting beds within 15'-0" of building walls along a minimum of 75% of the building perimeter. The layout of planting beds should allow mower access to all lawn areas which are adjacent to building walls.



Planting Bed =
75% of Building Perimeter

4.3.2.2 Design Considerations: The selection of appropriate foundation planting materials depends largely on the building facade. A hierarchy of plant types and heights should be used to frame and enhance the building. For instance care must be taken to select plants which at mature size will not block views from windows or access to building entrances. Large shrubs and evergreen trees should generally be reserved for use along blank facades. Deciduous trees in conjunction with low shrubs and groundcover will allow filtered or open views from windows. Year round interest should be provided by using a combination of deciduous and evergreen plant materials. Plant materials which are selected as foundation plantings in formal areas should (a) be limited to two species from each of the plant matrices per building; (b) individual beds should include no more than three plant species along formally landscaped buildings. Plants of the



same species should be matched in size and habit and arranged in a linear fashion.

4.3.2.3 Placement of Plant Materials: Correct placement of plant material is crucial to the success of foundation plantings. Evergreen trees, and low branched trees and shrubs should be centered a minimum of one-half the distance of their mature spread size away from entrances and walks. This minimizes potential conflicts between mature plants and pedestrian circulation. Recommended spacing for plant types is as follows:

Large trees:	20'-0" on center
Small trees:	12'-0" on center
Large shrubs:	3'-0" on center
Small shrubs:	2'-0" on center
Groundcovers:	15" on center

4.3.2.4 Plant Material Selection: Plant selection in formal foundation plantings shall be limited to the following species lists. Specific plant selection must be made with regard to site suitability requirements as referenced in the plant material matrices.

Large Trees

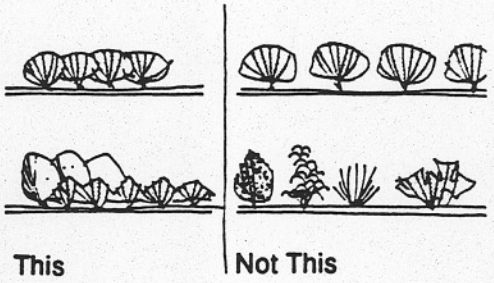
White Ash	Moraine Honeylocust
Goldenraintree	Red Oak
Greenspire Linden	Silver Linden
White Pine	

Small Trees

Hedge Maple	Amur Maple
Yellowwood	Flowering Dogwood
Lavalle Hawthorne	Kousa Dogwood
Washington Hawthorne	Longstalk Holly
Amur macckia	Bradford Pear
Redspire Pear	Crabapple
Thornless Cockspur Hawthorne	

Large Shrubs

Mentor Barberry	Dwarf Burning Bush
Sea Green Juniper	Leatherleaf Viburnum
Mariesii Doublefile Viburnum	Mint Julep Juniper



Small Shrubs

Japanese Barberry	Cranberry Cotoneaster
Compact Inkberry	Compact Winged Euonymus
Sargent's Juniper	Compact Pfitzer Juniper
Broadmoor Juniper	Dense Japanese Yew
Japanese Yew	

Groundcovers

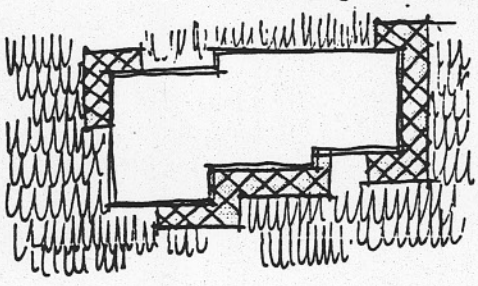
Bugleweed	Cranberry Cotoneaster
Lowfast Cotoneaster	Rockspray Cotoneaster
English Ivy	Purpleleaf Wintercreeper
Liriope	

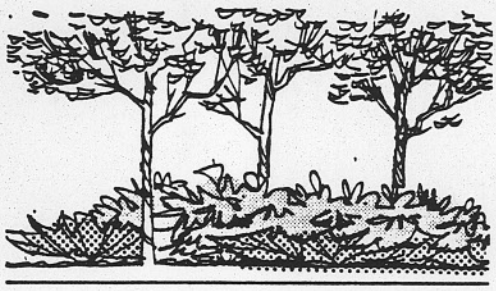
4.3.2.5 Plant Maintenance and Related Issues: Formal use areas will receive the highest level of maintenance provided on the base. Plant materials have, however, been specifically chosen to minimize the need for extensive maintenance. Trimming of hedges and the use of annual plantings is appropriate in formal use areas, although not required depending on the plant material selections. See the plant material matrices for plant materials which can be used as hedges and/or sheared. The use of plants with thorns and/or messy fruits should be avoided near building entrances. Planter boxes and raised planter beds should also be avoided. All planting beds should edged and mulched to reduce landscape maintenance. Shredded bark chip is recommended as an appropriate mulch material for foundation planting beds.

4.3.3 Informal Foundation Plantings

4.3.3.1 Layout of Planting Beds: Layout of planting beds around informal buildings should concentrate development at the entrances and main facade of the structure. The layout should complement the building design and can be rigidly geometric or curvilinear in nature. The minimum width of planting beds shall be 15' for large trees, 6' for small trees, 3' for shrubs and 2' for groundcover plantings. Informal building areas should receive foundation planting beds within 15'-0" of building walls along a minimum of 50% of the building perimeter. The layout of planting beds should allow mower access to all lawn areas which are adjacent to building walls. Small lawn areas adjacent to buildings should be avoided.

Planting Bed =
50% of Building Perimeter





4.3.3.2 Design Considerations: The selection of appropriate foundation planting materials depends largely on the building facade. A hierarchy of plant types and heights should be used to frame and enhance the building. Care must be taken to select plants which at mature size will not block views from windows or access to building entrances. Large shrubs and evergreen trees should generally be reserved for use along blank facades. Deciduous trees in conjunction with low shrubs and groundcover will allow filtered or open views from windows. Year round interest should be provided by using a combination of deciduous and evergreen plant materials. Plant materials which are selected as foundation plantings in informal areas should (a) be limited to no more than two species from each of the plant matrices per building; (b) individual beds should include no more than five plant species along informally landscaped buildings; (c) each grouping shall include not less than three individual plants of each selected shrub species.

4.3.3.3 Placement of Plant Materials: Correct placement of plant material is crucial to the success of foundation plantings. Evergreen trees, and low branched trees and shrubs should be centered a minimum of one-half the distance of their mature spread size away from entrances, walks and building walls. This minimizes potential conflicts between mature plants and pedestrian circulation. Recommended spacing for plant types is as follows:

Large trees:	20'-0" on center
Small trees:	12'-0" on center
Large shrubs:	3'-0" on center
Small shrubs:	2'-0" on center
Groundcovers:	15" on center

4.3.3.4 Plant Material Selection : Plant selection in informal foundation plantings shall be limited to the following species lists. Specific plant selection must be made with regard to site suitability requirements as detail referenced in the plant material matrices.

<u>Large Trees</u>

River Birch	Sugar Hackberry
Hackberry	White Ash
Goldenraintree	Mazzard Cherry
Pin Oak	Red Oak

Japanese Pagoda Tree	Austrian Pine
White Pine	Scotch Pine
Marshall Seedless Green Ash	

Small Trees

Hedge Maple	Amur Maple
Tatarian Maple	Serviceberry
American Hornbeam	Redbud
Yellowwood	Longstalk Holly
Flowering Dogwood	Kousa Dogwood
Lavalle Hawthorne	Washington Hawthorne
Longstalk Holly	Amur macckia
Ironwood	Crabapple
Thornless Cockspur Hawthorne	

Large Shrubs

Mentor Barberry	Dwarf Burning Bush
Sea Green Juniper	Leatherleaf Viburnum
Mariessi Doublefile Viburnum	Mint Julep Juniper

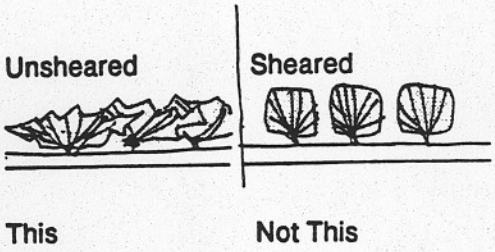
Small Shrubs

Japanese Barberry	Cranberry Cotoneaster
Dupont Euonymus	Compact Winged Euonymus
Compact Inkberry	Compact Pfitzer Juniper
Sargent's Juniper	Broadmoor Juniper
Dense Japanese Yew	Japanese Yew
Compact Cranberrybush Viburnum	

Groundcovers

Bugleweed	Cranberry Cotoneaster
Lowfast Cotoneaster	Rockspray Cotoneaster
English Ivy	Purpleleaf Wintercreeper
Liriope	Dwarf Cranberry Viburnum
Andorra Juniper	Bar Harbor Juniper
Blue Chip Juniper	Emerson Juniper
Blue Rug Juniper	Skandia Juniper

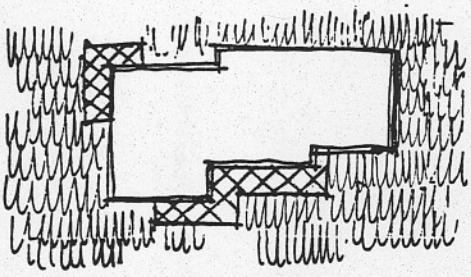
4.3.3.5. Plant Maintenance and Related Issues: Informal use areas will receive mid-level maintenance. Plant materials have been specifically chosen to minimize the need for extensive maintenance. Shearing of hedges is inappropriate in informal use areas. The use of plants with thorns and/or messy fruits should be avoided near building entrances.



Planter boxes and raised planter beds should also be avoided. All planting beds should be contained by edging and mulched to reduce landscape maintenance. Bark chip is recommended as an appropriate mulch material for foundation planting beds.

4.3.4 Naturalized Foundation Plantings

4.3.4.1 Layout of Planting Beds: The use of foundation plantings in naturalized zones should be reserved for entrances to buildings only. Planting areas should be a minimum of three feet in width. Naturalized buildings should receive foundation plantings within 15'-0" of the building wall along a minimum of 25% of the building perimeter.



Planting Bed = 25% of Building Perimeter

4.3.4.2 Design Considerations: The selection of appropriate foundation planting materials depends largely on the building facade. Care must be taken to select plants which at mature size will not block views from windows or access to building entrances. Plant materials which are selected as foundation plantings in naturalized areas should be limited to a maximum of two species.

4.3.4.3 Placement of Plant Materials: Correct placement of plant material is crucial to the success of foundation plantings. Shrubs should be centered a minimum of one-half the distance of their mature spread size away from entrances, walks and building walls. This minimizes potential conflicts between mature plants and pedestrian circulation. Recommended spacing for shrubs is 3'-0" on center.

4.3.4.4 Plant Material Selection: Plant selection in naturalized foundation plantings shall be limited to the following species list. Specific plant selection must be made with regard to site suitability requirements as detail referenced in the plant material matrix.

<u>Large Trees</u>

River Birch	Goldenraintree
Pin Oak	Hackberry

<u>Small Trees</u>

Washington Hawthorn	Redbud
Flowering Dogwood	Kousa Dogwood
Serviceberry	

Large Shrubs

Amur Maple	Mariessi Doublefile Viburnum
Dwarf Burning Bush	Leatherleaf Viburnum

Small Shrubs

Fragrant Sumac
Japanese Kerria
Mapleleaf Viburnum

4.3.4.5 Plant Maintenance and Related Issues: Naturalized areas should be designed to receive the lowest level of maintenance provided on the base. Plant materials have been specifically chosen to minimize the need for extensive maintenance. Shearing of plant materials and the use of annual plantings is inappropriate in naturalized areas. The use of plants with thorns and/or messy fruits should be avoided near building entrances. Planter boxes and raised planter beds are also inappropriate in naturalized areas.

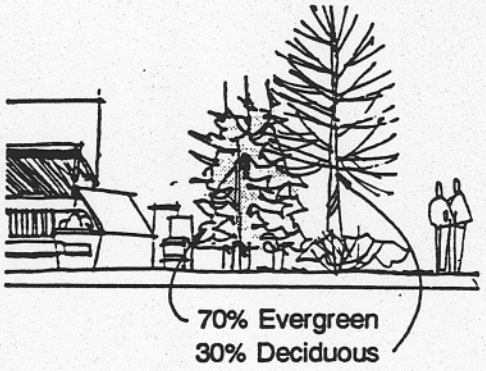
4.4 Landscape Buffers

The landscape theme plan identifies buffer areas that are intended to screen and separate use areas on the base. When effectively implemented, buffers can be classified as (1) visual screens, and (2) edge treatments.

4.4.1 Relationship to the Theme Plan. Visual screens are intended to separate incompatible land uses or activity areas. This separation would commonly occur in formal and informal areas. Edge treatments are typically used to define the perimeter of the base and where a naturalized landscape appearance is desired.

4.4.2 Visual Screens

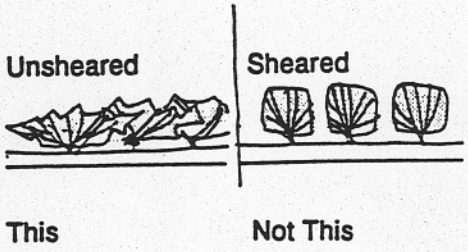
4.4.2.1 Design: Plantings used to provide visual screens should be upright and dense material planted close together. Evergreen trees are typically used; however, mass plantings of shrubs can be used to screen views below eye level. Deciduous trees should be planted in the foreground to provide seasonal interest. Visual screens should consist of 70% evergreen and 30% deciduous plant materials.



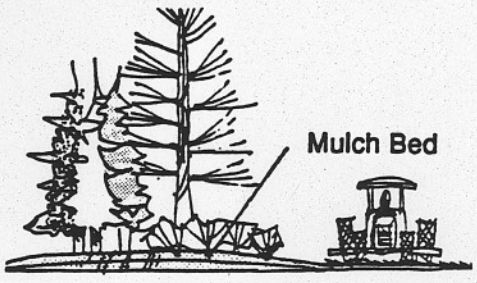
4.4.2.2 Evergreen trees: For every 100 linear feet of area to be screened, a minimum of 10 evergreen trees should be planted in a staggered row and arranged to visually block a majority of the area to be screened. Trees should be typically planted on center at 8-10 feet. Plantings should be integrated into the total landscape design. Trees should vary in height and be a minimum of six feet high.

4.4.2.3 Deciduous trees: For every 100 linear feet of area to be screened, a minimum of three deciduous trees should be planted for accent and visual interest. Trees should be a minimum caliper of two inches.

4.4.2.4 Shrubs: Shrub plantings, when used to provide a low screen, should be tightly spaced at no more than three feet on center and left unsheared to create a solid mass and eliminate added maintenance. In no case are shrubs to be spaced to appear as individual plants. No more than two species of shrubs should be used in any one mass planting. Shrubs should not be less than 18 inches in height at the time of planting.



4.4.2.5 Planting Beds: Spade cut planting beds are recommended around visual screen plantings to eliminate damage to plant material by mowing operators. Planting beds should be mulched with shredded bark to a minimum depth of three inches.



4.4.2.6 Plant Selection: All plantings should be selected from the approved plant list below. Specific plant selection shall depend on site suitability and location on the theme plan.

Large Trees

Austrian Pine	White Pine
Scotch Pine	Pin Oak
Bald Cypress	Golden Weeping Willow

Small Trees

Amur Maple	American Hornbeam
Kousa Dogwood	Longstalk Holly
Ironwood	Bradford Pear
Redspire Pear	Staghorn Sumac

Larger Shrubs

Amur Maple	Mentor Barberry
Burning Bush	Dwarf Burning Bush
Winterberry Holly	Sea Green Juniper
Border Privet	Sargent Crabapple
Yukon Bell Pyracantha	Arrowwood Viburnum
Cranberrybush Viburnum	Mariessi Viburnum
Leatherleaf Viburnum	Mint Julep Juniper

Small Shrubs

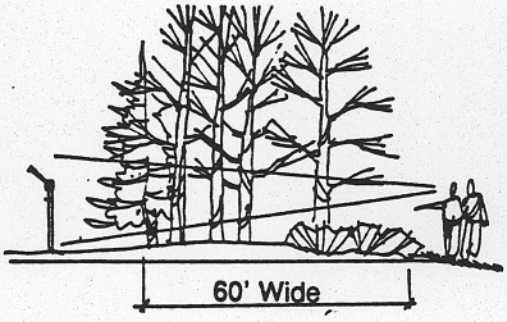
Wintergreen Barberry	Japanese Barberry
DuPont Euonymus	Compact Winged Euonymus
Compact Inkberry	Sargent's Juniper
Broadmoor Juniper	Japanese Kerria
Dense Japanese Yew	Anglojap Yew
Compact Cranberrybush	

Groundcovers/Vines

Paleleaf Barberry	Purpleleaf Wintercreeper
English Ivy	Compact Fleeceflower
Low Japanese Fleeceflower	

4.4.3 Edge Treatment Plantings

4.4.3.1 Design: Plantings used to provide edge treatment buffers are generally more open than visual screen plantings and are intended to allow filtered views into areas beyond. Plantings should consist of approximately 70% large overstory deciduous trees with 30% evergreen trees, flowering trees and shrub masses as accent.



4.4.3.2 Plant Placement: Edge treatment planting areas should typically be a minimum of 60 feet wide. For every 200 linear feet of area, a minimum of 15 large overstory trees should be planted in a loose arrangement or grouping. On-center spacing may or may not vary. Trees should range in caliper size from 1½ to 3 inches. No more than three species of trees may be used in any one buffer planting.

4.4.3.3 Evergreen Trees: Evergreen trees, if used, should be arranged in groupings of three to five plants at 6-12 feet on center. Trees should vary from 4-8 feet in height and be located as a back-drop element.

4.4.3.4 Flowering Trees: Small flowering trees, if used, should be groupings of three to five trees spaced 8-10 feet on center. Trees should be located on the edge of the buffer. Trees should have a minimum caliper of one inch.

4.4.3.5 Shrubs: Shrubs, if used, may be deciduous and/or evergreen and should be planted and spaced to create a solid mass and left unsheared for a naturalistic appearance. In no case are shrubs to be spaced to appear as individual plantings. Planting beds are recommended around shrub masses to eliminate damage by mowers. Beds should be mulched or treated with a herbicide to eliminate grass growth.

4.4.3.6 All plant material used in edge treatment planting should be selected from the approved list below. Specific plant selection shall depend on site suitability and location on theme plan.

<u>Large Trees</u>

Norway Maple	Sugar Maple
River Birch	Sugar Hackberry
Hackberry	White Ash
Seedless Green Ash	Ginkgo
Kentucky Coffee Tree	Goldenraintree

Tulip Tree	Black Gum
Austrian Pine	White Pine
Scotch Pine	Bloodgood Planetree
Mazzard Cherry	Bur Oak
Bald Cypress	Japanese Pagodatree
Golden Weeping Willow	

Small Trees

Amur Maple	Tatarian Maple
Serviceberry	American Hornbeam
Redbud	Yellowwood
Flowering Dogwood	Kousa Dogwood
Cockspur Hawthorne	Lavalle Hawthorne
Washington Hawthorne	Ironwood
Staghorn Sumac	Crabapple

Large Shrubs

Red Chokeberry	Common Sweetshrub
Red Osier Dogwood	Burning Bush
Dwarf Burning Bush	Karl Sax Forsythia
Winterberry Holly	Sea Green Juniper
Border Privet	Winter Honeysuckle
Sargent Crabapple	Yukon Bell Pyracantha
Staghorn Sumac	VanHoutte Spirea
Burkwood Viburnum	Arrowwood Viburnum
Mariessi Viburnum	Cranberrybush Viburnum
Leatherleaf Viburnum	Mint Julep Juniper

Small Shrubs

Sargent's Juniper	Compact Pfitzer Juniper
Broadmoor Juniper	Japanese Kerria
Fragrant Sumac	Mapleleaf Viburnum
Compact Cranberrybush	

Ground Covers

Paleleaf Barberry	Lowfast Cotoneaster
English Ivy	Purpleleaf Wintercreeper
Compact Fleeceflower	Liriope
Low-Gro Sumac	Low Japanese Fleeceflower
Andorra Juniper	Bar Harbor Juniper
Blue Chip Juniper	Emerson Juniper
Blue Rug Juniper	Skandia Juniper

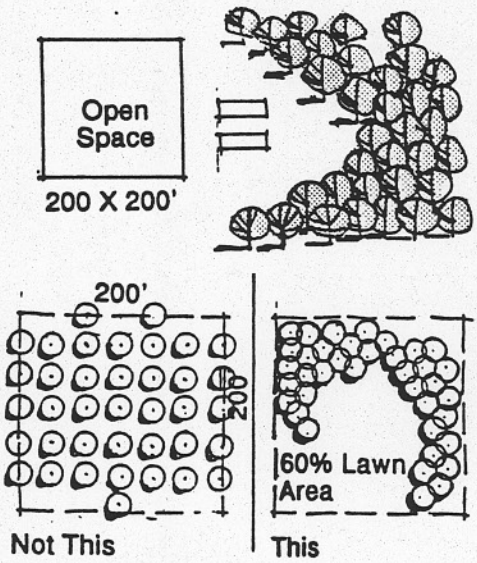
4.5 Open Space/Lawn Area Plantings

Open space/lawn areas are to be considered as areas on the base not covered by buildings or parking lots, and fall outside the standards developed for buffers, foundations, or pedestrian area plantings.

4.5.1 Relationships to the Theme Plan. Open space/lawn area plantings are intended to tie the various areas of the base together by providing scale and spatial enclosure. These plantings are also useful in modifying the microclimate around adjacent facilities by reducing glare and providing shade during summer months.

4.5.2 Formal Areas

4.5.2.1 Quantity: For every acre of open area, a minimum of 38 trees should be planted. This is equal to approximately 40 percent of the lawn area being under tree canopy.



4.5.2.2 Trees: Planting should be limited to deciduous trees. Flowering trees may be used for accent and seasonal interest.

4.5.2.3 Plant Placement: Trees should be in a geometric arrangement with a minimum on center spacing of 20 feet. Any arrangement or grouping should be a minimum of five trees. Groupings should be limited to a single species. Consideration should be given to the location of the trees so they do not interfere or restrict the use of the open space.

4.5.2.4 Size: Large deciduous trees planted in open areas should have a minimum caliper of 2½ inches and be selected for their uniform appearance. Flowering trees should have a minimum caliper of 1½ inches.

4.5.2.5 Plant Selection: All trees should be selected from the list below, with regard to their site suitability requirements.

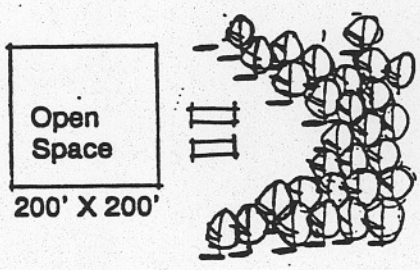
Sugar Maple	Pin Oak
White Ash	Red Oak
Moraine Honeylocust	Greenspire Linden
Goldenraintree	Silver Linden
Bloodgood Planetree	Ginkgo

Small Trees

Hedge Maple	Amur Maple
Yellowwood	Flowering Dogwood
Cockspur Hawthorne	Lavalle Hawthorne
Washington Hawthorne	Amur macckia
Bradford Pear	Redspire Pear
Crabapple	

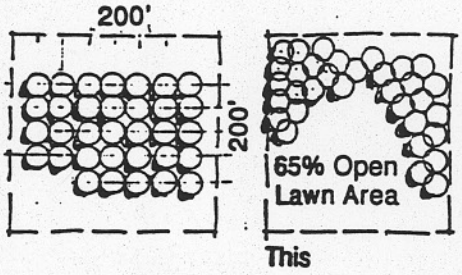
4.5.3 Informal Areas

4.5.3.1 Quantity: For every one acre of open area, a minimum of 33 trees should be planted. This is equal to approximately 35% of the open area being under tree cover. Plantings should be limited to deciduous trees. Flowering trees may be used to provide seasonal interest and accent.



4.5.3.2 Earth berms: Earth berms may be used to help define and add interest to open areas. Berms should be integrated into the existing topography. The maximum height should not exceed six feet; side slope should not exceed 3 on 1.

4.5.3.3 Placement: Trees should be uniformly and asymmetrically spaced and arranged to contain and define lawn areas. On center spacing may vary from eight to 35 feet. Any arrangement or groups should be a minimum of seven trees. No more than two species may be used in a grouping.



4.5.3.4 Size: Large deciduous trees planted in open areas should have a minimum caliper of two inches. Flowering trees should have a minimum caliper of 1½ inches.

4.5.3.5 Plant Selection: All trees should be selected from the plant list below, with regard to their site suitability requirements.

Large Trees

Norway Maple	White Ash
Sugar Maple	Seedless Green Ash
River Birch	Ginkgo
Sugar Hackberry	Goldenraintree
Hackberry	Tulip Tree
Black Gum	Bloodgood Planetree
Mazzard Cherry	Pin Oak

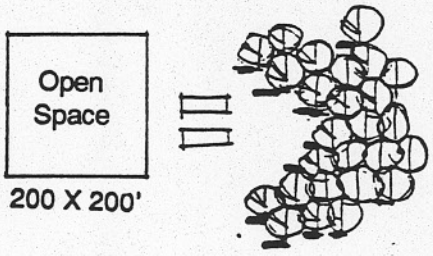
Red Oak	Japanese Pagodatree
Baldcypress	

Small Trees

Hedge Maple	Amur Maple
Tatarian Maple	Serviceberry
American Hornbeam	Yellowwood
Redbud	Flowering Dogwood
Lavalle Hawthorne	Cockspur Hawthorne
Amur macckia	Washington Hawthorne
Crabapple	Ironwood

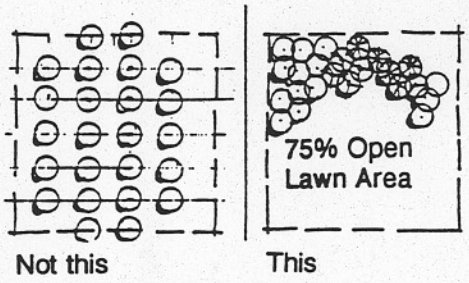
4.5.4 Naturalized Areas

4.5.4.1 Quantity: For every acre of open area, 24 trees should be planted. This is equal to approximately 25 percent of the area being under trees.



4.5.4.2 Placement: Plantings may be a mix of plantings with 60% being large deciduous, 25% flowering trees, and 15% evergreen trees. Their layout should be a mix to provide a naturalized appearance. Generally, flowering trees should be massed and located to provide accents while evergreens are planted for a back drop.

4.5.4.3 Size: Large deciduous trees should vary in size from 1½ inches to three inches in caliper, flowering trees should have a minimum caliper of 1½ inches, while evergreens should vary in height from six to eight feet.



4.5.4.4 Plant Selection: All trees should be selected from the list below, with regard to their site suitability.

Large Trees

Norway Maple	Seedless Green Ash
Sugar Maple	Ginkgo
River Birch	Kentucky Coffee Tree
Sugar Hackberry	Goldenraintree
Hackberry	Tulip Tree
Black Gum	Austrian Pine
White Pine	Scotch Pine
Bloodgood Planetree	Mazzard Cherry

Bur Oak	Pin Oak
Red Oak	Golden Weeping Willow
Japanese Pagodatree	Baldcypress

Small Trees

Serviceberry	Crabapple
American Hornbeam	Ironwood
Redbud	Staghorn Sumac
Yellowwood	Lavalle Hawthorne
Flowering Dogwood	Cockspur Hawthorne
Washington Hawthorne	

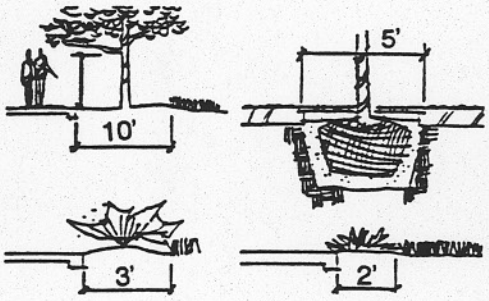
4.6 Pedestrian Areas

Pedestrian areas on the base fall into one of two categories: (a) pedestrian nodes and (b) pedestrian walkways. Pedestrian nodes are those areas which by nature of their location and proximity to major pedestrian circulation routes have an increased concentration of pedestrian activity. Such areas represent potential sites for the development of outdoor plazas and gathering spaces. The second category of pedestrian walkways includes sidewalks, low use building entrances, and nature/jogging trails.

4.6.1 Relationship to Theme Plan. Pedestrian areas have been classified as nodes and walkways as illustrated in the theme development plan. The process of preparing a site development plan for pedestrian areas should begin with the theme plan to identify whether the pedestrian area is located in a formal, informal or naturalized zone.

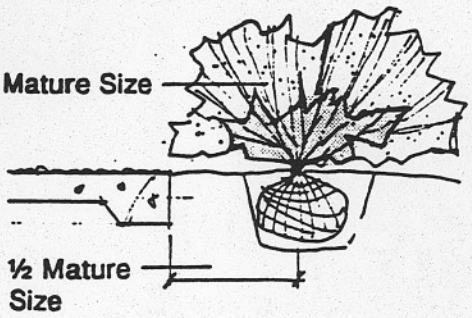
4.6.2. Formal Areas - Pedestrian Nodes

4.6.2.1 Layout: Planting beds in formally designed pedestrian node areas should be linear arrangements of single species per plant matrix category. A hierarchy of plant materials should be developed to frame and enhance the adjacent structure. Shade trees shall be located in beds of not less than 10'-0" in width. In areas near direct pedestrian access, tree grates of a minimum 5'-0" diameter are recommended. Shrub planting beds shall be a minimum of 3'-0" in width and groundcovers beds shall be a minimum of 2'-0" in width.



4.6.2.2 Design considerations: Accent plantings should be encouraged to enhance the plaza as a visual focal point. In general accent plantings would include mass plantings of a single species with outstanding plant characteristics such as flower, foliage, bark and/or branching patterns. Accent plantings can include trees, shrubs, groundcovers or annual plantings. Such plantings should provide year round interest by incorporating evergreen materials within accent planting beds. Plant materials which are selected for use in plazas should (a) include no more than two species from each of the plant matrices per plaza; individual beds should (b) include no more than two plant species along formally landscaped buildings. Plants of the same species should be matched in size and habit and arranged in a linear fashion.

4.6.2.3 Placement of Plant Materials: Correct placement of plant material is important in high use pedestrian areas. Care should be taken to choose plant materials whose mature size will not exceed the limits of the planting beds and thereby restrict pedestrian movement. Evergreen trees and low branched trees should be centered a minimum of one-half the distance of their mature spread size away from entrances, walks and building walls. Trees should be specified with a 6'-0" clear trunk to avoid conflicts with pedestrians and low branching patterns. Recommended size/spacing for plant types is as follows:



Large trees:	2½" cal., 20'-0" on center
Small trees:	2" cal., 12'-0" on center
Large shrubs:	24" H., 3'-0" on center
Small shrubs:	18" H., 2'-0" on center
Groundcovers:	15" on center

4.6.2.4 Plant Selection: Plant Selection Plant selection in formal pedestrian areas shall be limited to the following species. Specific plant selection must be made with regard to site suitability requirements as referenced in the plant material matrices.

Large Trees

Sugar Maple	White Ash
Moraine Honeylocust	Goldenraintree
White Pine	Bloodgood Planetree
Red Oak	Greenspire Linden
Silver Linden	

Small Trees

Hedge Maple	Amur Maple
Yellowwood	Flowering Dogwood
Lavalle Hawthorne	Washington hawthorne
Longstalk Holly	Amur macckia
Crabapple	Redspire Pear
Bradford Pear	Thornless Cockspur Hawthorne

Large Shrubs

Mentor Barberry	Dwarf Burning Bush
Sea Green Juniper	Arrowwood Viburnum
Leatherleaf Viburnum	Mariesii Doublefile Viburnum
Mint Julep Juniper	

Small Shrubs

Wintergreen Barberry	Japanese Barberry
Cranberry Cotoneaster	Compact Winged Euonymus
Compact Inkberry	Compact Pfitzer Juniper
Sargent's Juniper	Broadmoor Juniper
Dense Japanese Yew	Japanese Yew

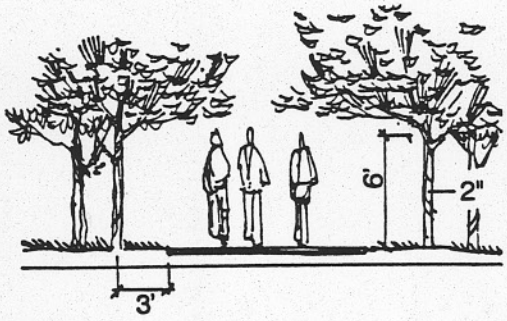
Groundcover

Bugleweed	Cranberry Cotoneaster
Lowfast Cotoneaster	Rockspray Cotoneaster
English Ivy	Purpleleaf Wintercreeper
Liriope	Andorra Juniper
Bar Harbor Juniper	Blue Chip Juniper
Emerson Juniper	Blue Rug Juniper
Skandia Juniper	

4.6.2.5 Maintenance: Formal use areas will receive the highest level of maintenance provided on the base. Plant materials have, however, been specifically chosen to minimize the need for extensive maintenance. Trimming of shrubs to form clipped hedges and the use of annual plantings is appropriate in formal use areas, although not required depending on the plant material selections. See the plant material matrices for plant materials which can be used as hedges and/or sheared. The use of plants with thorns and/or messy fruits should be avoided near building entrances. Planter boxes and raised planter beds should also be avoided. Shredded bark chip is recommended as an appropriate mulch material for planting beds.

4.6.3 Formal Areas - Walkways

4.6.3.1 Layout: Formal pedestrian walkways shall be lined with a single or double row of street trees on both sides of the walk. Trees shall be setback a minimum of 3'-0" from the edge of walk. Shrubs may be used when necessary in a linear arrangement and centered at a distance of 2'-0" from the edge of walkways. In no case shall shrub planting beds be less than 3'-0" in width.



4.6.3.2 Design Considerations: Plant materials which are selected for use along formal walkways shall be limited to (a) a single species overstory tree, and when appropriate (b) a single species shrub suitable for hedges.

Plants of the same species should be matched in size and habit.

4.6.3.3 Placement of Plant Materials: Care should be taken to select plant materials whose mature size will not exceed the limits of the planting bed and thereby restrict pedestrian movement. Trees should be specified with a 6'-0" clear trunk to avoid conflicts with pedestrians. Recommended size/spacing for plant types is as follows.

Large trees:	2" cal., 25'-0" on center
Large shrubs:	24" H., 3'-0" on center
Small shrubs:	18" H., 2'-0" on center
Groundcovers:	15" on center

4.6.3.4 Plant Selection: Plant selection in formal walkway plantings shall be limited to the following species lists. Specific plant selection must be made with regard to site suitability requirements as detail referenced in the plant material matrices.

Large Trees

Sugar Maple	White Ash
Moraine Honeylocust	Bloodgood Planetree
Red Oak	Greenspire Linden
Silver Linden	

Shrubs

Mentor Barberry	Dwarf Burning Bush
Sea Green Juniper	Arrowwood Viburnum
Wintergreen Barberry	Japanese Barberry
Compact Inkberry	Compact Winged Euonymus
Dense Japanese Yew	Japanese Yew
Mint Julep Juniper	

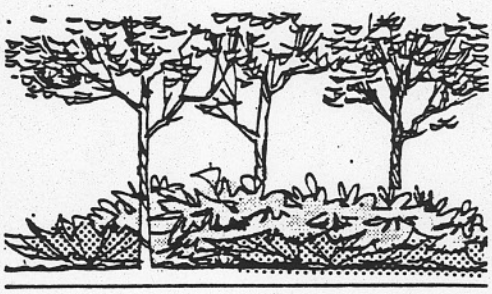
Groundcover

Paleleaf Barberry	Cranberry Cotoneaster
Lowfast Cotoneaster	Rockspray Cotoneaster
English Ivy	Purpleleaf Wintercreeper
Liriope	Andorra Juniper
Bar Harbor Juniper	Blue Chip Juniper
Emerson Juniper	Blue Rug Juniper
Skandia Juniper	

4.6.4. Informal Areas - Pedestrian Nodes

4.6.4.1 Layout: Planting beds in informal pedestrian node areas should be in non-linear arrangements. A hierarchy of plant materials should be developed to frame and enhance the adjacent structure. Shade trees shall be located in beds of not less than 10'-0" in width. In large paved areas, trees may be located in tree pits of bark mulch or groundcover plantings with a minimum diameter of 5'-0". Shrub planting beds shall be a minimum of 3'-0" in width and groundcover beds shall be a minimum of 2'-0" in width.

4.6.4.2 Design Considerations: Accent plantings should be encouraged to enhance the node areas. In general accent plantings would include mass plantings of less than 2 species with outstanding plant characteristics such as flower, foliage, bark and/or branching patterns. Accent plantings can include trees, shrubs, groundcovers or annual plantings. Such plantings should provide year round interest by incorporating evergreen materials within accent planting beds. Plant materials which are selected for use in informal node areas should (a) include no more than two species from each of the plant matrices per node area; (b) individual beds should include no more than five plant species along informally landscaped buildings; (c) each grouping shall include not less than three individual plants of each selected shrub species. Plants of the same species should be matched in size and habit.



4.6.4.3 Placement of Plant Materials: Care should be taken to choose plant materials whose mature size will not exceed the limits of the planting beds and thereby restrict pedestrian movement. Evergreen trees and low branched trees and shrubs should be centered a minimum of one-half the distance of their mature spread size away from entrances, walks and building walls. Trees should be specified with a 6'-0" clear trunk to avoid conflicts with pedestrians and low branching patterns. Recommended size/spacing for plant types is as follows:

Large trees:	2½" cal., 20'-0" on center
Small trees:	1½" cal., 12'-0" on center
Large shrubs:	24" H., 3'-0" on center
Small shrubs:	18" H., 2'-0" on center
Groundcovers:	15" on center

4.6.4.4 Plant Material Selection: Plant selection in informal pedestrian node planting areas shall be limited to the following species lists. Specific plant selection must be made with regard to site suitability requirements as referenced in the plant material matrices.

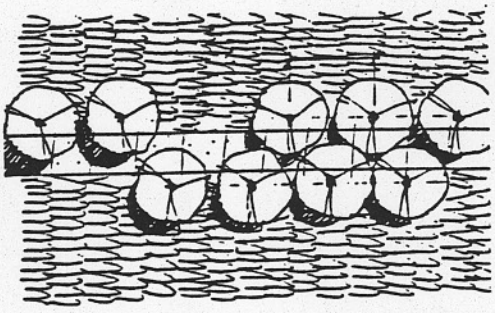
Large Trees

Norway Maple	Sugar Maple
River Birch	Sugar Hackberry
Hackberry	White Ash
Seedless Green Ash	Ginkgo
Goldenraintree	Black Gum
Austrian Pine	White Pine
Sargent's Juniper	Broadmoor Juniper
Fragrant Sumac	Dense Japanese Yew
Japanese Yew	Compact Cranberrybush

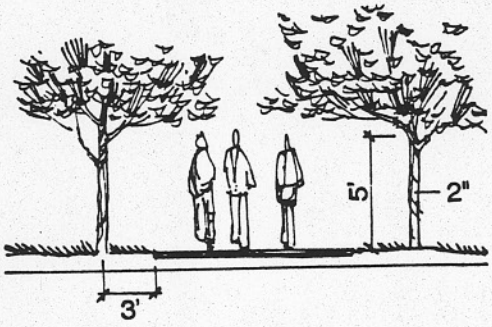
Groundcover

Bugleweed	Paleleaf Barberry
Cranberry Cotoneaster	Lowfast Cotoneaster
Rockspray Cotoneaster	Purpleleaf Wintercreeper
English Ivy	Low-Gro Sumac
Liriope	Andorra Juniper
Bar Harbor Juniper	Blue Chip Juniper
Emerson Juniper	Blue Rug Juniper
Skandia Juniper	Dwarf Cranberry Viburnum

4.6.5 Informal Areas - Walkways



4.6.5.1 Layout: Plant materials along informal walkways should be limited to a linear arrangement of overstory trees in irregular groupings on both sides of walkways where possible. Major pedestrian routes should receive a greater concentration of such trees than less important walkways. Trees shall be setback a minimum of 3'-0" from the edge of walk.



4.6.5.2 Design Considerations: Trees which are selected for use along informal walkways shall be limited to two or three species which are similar in habit and matched in size. The use of shrubs and groundcovers should be discouraged along these walkways.

4.6.5.3 Placement of Plant Materials: Trees should be specified with a 5'-0" clear trunk to avoid conflicts

between pedestrians and low branching habits. Recommended spacing for trees in groupings is 25'-0" on center.

4.6.5.4 Plant Selection: Plant selection in informal walkways shall be limited to the following species lists. Specific plant selection must be made with regard to site suitability requirements as detail referenced in the plant material matrices.

Norway Maple	Sugar Maple
Sugar Hackberry	Hackberry
Goldenraintree	Marshall Seedless Green Ash
Ginkgo	Tulip Tree
Bloodgood Planetree	Red Oak
Scarlet Oak	

4.6.6 Naturalized Areas - Pedestrian Nodes

4.6.6.1 Layout: Naturalized pedestrian nodes can consist of a single paved areas with the possibility of a central planting bed where paths intersect. The design should be curvilinear and freeform in nature. Planting areas shall be a minimum of 3'-0" in width.

4.6.6.2 Design Considerations: Planting beds in naturalized areas can include accent plantings of trees, shrubs, groundcovers or flowers. Naturalized plantings of daffodils or wildflowers should be used in lieu of annual plantings. Accent plantings include plants with outstanding plant characteristics such as flower, foliage, bark and/or branching patterns. Such plantings should provide year round interest by incorporating evergreen materials within beds. Plant selection for node areas should include no more than 3 species from each of the plant matrices per plaza; individual beds should include no more than 2 plant species at node areas. Plants should be placed in a non-linear arrangement and grouped in mass.

4.6.6.3 Placement of Plant Materials: Correct placement of plant material is important in pedestrian areas. Care should be taken to choose plant materials whose mature size will not exceed the limits of the planting beds and thereby restrict pedestrian movement. Evergreen trees and low branched trees should be centered a minimum of one-half the distance of their mature spread size away from walkways. Trees should be specified with a 4'-0" clear trunk when located close to walks. Recommended size/spacing for plant types is as follows:

Large trees:	2" cal., 25'-0" on center
Small trees:	1½" cal., 15'-0" on center
Large shrubs:	24" H., 4'-0" on center
Small shrubs:	18" H., 3'-0" on center
Groundcover:	2'-0" on center

4.6.6.4 Plant Selection: Plant selection in naturalized node areas shall be limited to the following species lists. Specific plant selection must be made with regard to site suitability requirements as detail referenced in the plant material matrices.

Large Trees

Norway Maple	Sugar Maple
River Birch	Sugar Hackberry
Ginkgo	Marshall Seedless Green Ash
Kentucky Coffee Tree	Goldenraintree
Tulip Tree	Black Gum
Austrian Pine	White Pine
Scotch Pine	Bloodgood Planetree
Mazzard Cherry	Bur Oak
Pin Oak	Red Oak
Baldcypress	Japanese Pagodatree
Golden Weeping Willow	

Small Trees

Serviceberry	American Hornbeam
Redbud	Yellowwood
Flowering Dogwood	Kousa Dogwood
Lavalle Hawthorne	Staghorn Sumac
Washington Hawthorne	Crabapple
Ironwood	Thornless Cockspur Hawthorne

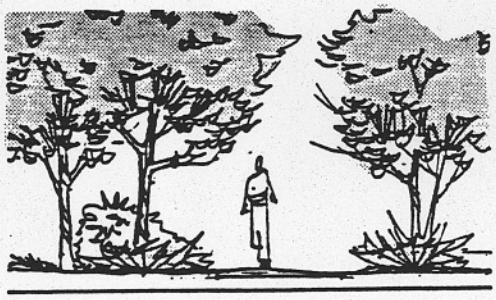
Shrubs

Amur Maple	Red Chokeberry
Common Sweetshrub	Red Osier Dogwood
Burning Bush	Dwarf Burning Bush
Karl Sax Forsythia	Winterberry Holly
Winter Honeysuckle	Sargent Crabapple
Staghorn Sumac	Burkwood Viburnum
Arrowwood Viburnum	Cranberrybush Viburnum
Leatherleaf Viburnum	Japanese Kerria
Fragrant Sumac	Mapleleaf Viburnum
Mariessi Doublefile Viburnum	

4.6.6.5 Maintenance: Naturalized pedestrian areas should receive the lowest level of maintenance required on the base. Plant materials have been specifically chosen to minimize the need for extensive maintenance. Trimming or shearing of plant materials and the use of annual plantings is inappropriate in naturalized areas.

4.6.7 Naturalized Areas - Walkways

4.6.7.1 Layout: Plant material should be placed along walks in naturalized groupings.



4.6.7.2 Design Considerations: Plant materials selected for use along naturalized walkways should be irregular groupings to produce a natural setting. Each grouping should have no less than 3 of any particular species which is selected. Plant materials of a single species should be of mixed size and habit.

4.6.7.3 Placement of Plant Materials: Care should be taken to place plant materials whose mature size will not inhibit pedestrian movement. Large size trees should be limbed to a clear trunk of 6'-0" to avoid conflict with pedestrians. Recommended minimum size/spacing for plant types is as follows.

Large trees:	2" cal., 25'-0" on center
Small trees:	1½" cal., 15'-0" on center
Large shrubs:	24" H., 4'-0" on center
Small shrubs:	18" H., 2'-0" on center
Groundcovers:	2'-0" on center

4.6.7.4 Plant Selection: Plant selection in naturalized pedestrian walks shall be limited to the following species lists. Specific plant selection must be made with regard to site suitability requirements as detail referenced in the plant material matrices.

<u>Large Trees</u>

Norway Maple	Sugar Maple
River Birch	Sugar Hackberry
Hackberry	Marshall Seedless Green Ash
Ginkgo	Kentucky Coffee Tree
Goldenraintree	Tulip Tree
Black Gum	Austrian Pine
White Pine	Scotch Pine

Bloodgood Planetree	Mazzard Cherry
Bur Oak	Pin Oak
Red Oak	Golden Weeping Willow
Japanese Pagodatree	Baldcypress

Small Trees

Serviceberry	American Hornbeam
Redbud	Yellowwood
Flowering Dogwood	Kousa Dogwood
Lavalle Hawthorne	Staghorn Sumac
Washington Hawthorne	Crabapple
Ironwood	Thornless Cockspur Hawthorne

Shrubs

Amur Maple	Red Chokeberry
Common Sweetshrub	Red Osier Dogwood
Burning Bush	Dwarf Burning Bush
Karl Sax Forsythia	Winterberry Holly
Winter Honeysuckle	Sargent Crabapple
Staghorn Sumac	Burkwood Viburnum
Arrowwood Viburnum	Cranberrybush Viburnum
Mariessi Viburnum	Leatherleaf Viburnum
Japanese Kerria	Fragrant Sumac
Mapleleaf Viburnum	

Groundcover

Paleleaf Barberry	Lowfast Cotoneaster
Rockspray Cotoneaster	Purpleleaf Wintercreeper
English Ivy	Compact Fleeceflower
Liriope	Low Japanese Fleeceflower
Low-Gro Sumac	Andorra Juniper
Bar Harbor Juniper	Blue Chip Juniper
Emerson Juniper	Blue Rug Juniper
Skandia Juniper	

4.6.7.5 Maintenance: Naturalized pedestrian areas will receive the lowest level of maintenance provided on the base. Plant materials have been specifically chosen to minimize the need for maintenance. Trimming or shearing and the use of annual plantings is inappropriate in naturalized areas.

5.0 LANDSCAPE CONSTRUCTION DOCUMENT CRITERIA

The landscape construction document criteria provides the designer with minimum plan requirements/details and a sample landscape specification that can be used when preparing a planting plan. The designers should be aware that each planting plan is unique and the construction document will have to be modified to meet each specific design plan.

5.1 Planting Plan Requirements

5.1.1 Planting Plan

Planting plans must convey a tremendous amount of information. The sheet layout and the arrangement of all plan components should be taken into careful consideration. Landscape planting plans are to be prepared at a scale of 1"=20' or 30'. The following outline contains the components which are to be identified on and included with planting plan submittals. Landscape plans will be provided for presentation to the Whiteman LARC at the 90% project design stage. Presentations shall be made by the landscape architect with the AE Project Manager and Design Agent (MRO/MRK) Project Manager in attendance. It should be noted that landscape plans requiring revisions will not delay completion of the building construction documents.

5.1.1.1 North Arrow and Scale: Both written and graphic

5.1.1.2 Existing plant material

5.1.1.3 Legend (existing and proposed)

5.1.1.4 Plants to be removed or relocated

5.1.1.5 Structures, overhangs, paving, utilities, windows, and entrance locations (both existing and proposed)

5.1.1.6 Site grading plan

5.1.1.7 Enlarged area plans and details where needed to convey the intent of plantings around major entrances and planting beds

5.1.1.8 Building Elevations

5.1.1.9 Small orientation map:

5.1.1.10 Title block:

A. Name of project
B. Address of project
C. Landscape architect
   (1) Name and address of firm
D. Name or initials of draftsman
E. Date and Sheet Number

5.1.1.11 Plant Schedule:

A. Item number (or symbol if used)
B. Number of plants
   (1) Plants should be numbered on the plan
   (2) Plant totals on schedule
C. Plant name
   (1) Common name
   (2) Botanical name
   (3) Variety name
D. Size and condition of plant
   (1) Size expressed in terms of:
      (a) Size of container
      (b) Height of plant, or
      (c) Caliper of tree
   (2) Condition expressed in terms of:
      (a) Size of container
      (b) Ball and burlap (B & B)
      (c) Bare root (B.R.)
E. Spacing for shrubs and ground cover
F. Notes when required, such as "Multi-trunk" or "espaliered"
G. Plant divisions (list should be divided according to trees, shrubs, and ground covers)
H. Cost estimate (or space for contractor-bidder to supply cost figures

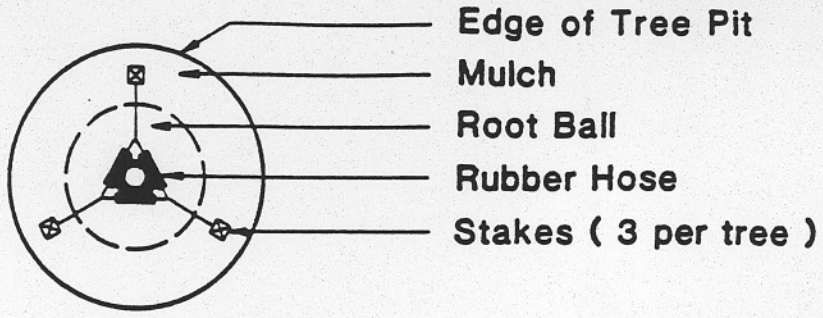
5.1.1.12 Turf areas: (both on plan and in plant schedule. If turf is existing, it only should appear on the plan as existing.)

5.1.2 Planting Details and Specifications

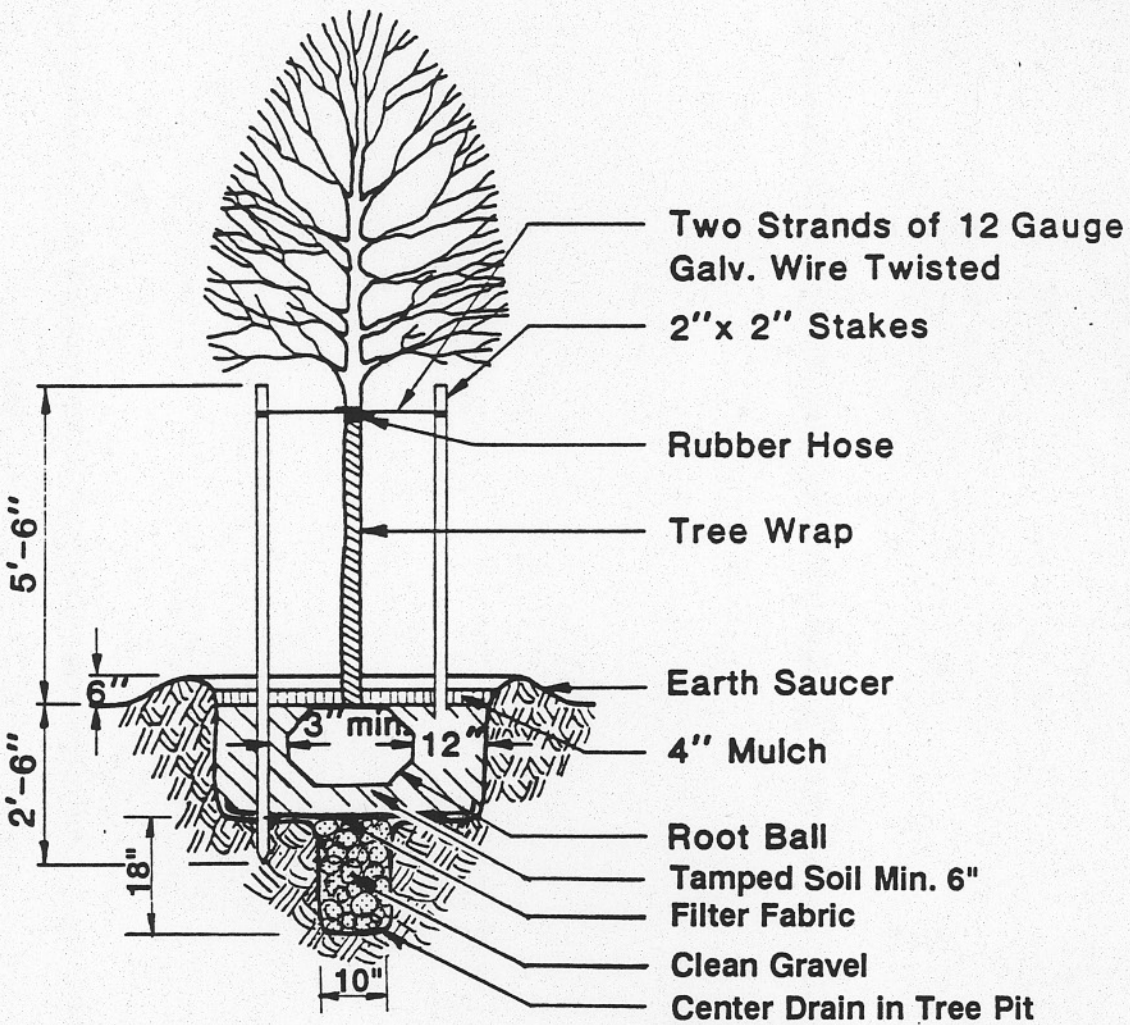
5.1.2.1 Installation: The actual installation of plant materials should follow generally accepted practices for landscape plantings.

5.1.2.2 Details: Shown on the following pages are planting details which should be utilized when packaging a landscape project for bidding and then followed during installation. (See Figures 5.1-1 through 5.1-4.)

5.1.2.3 Specifications: A specification is provided which should be used as the base for all landscape planting projects. For each project, this specification should be marked up by eliminating work not included and adding additional items as needed.



Plan



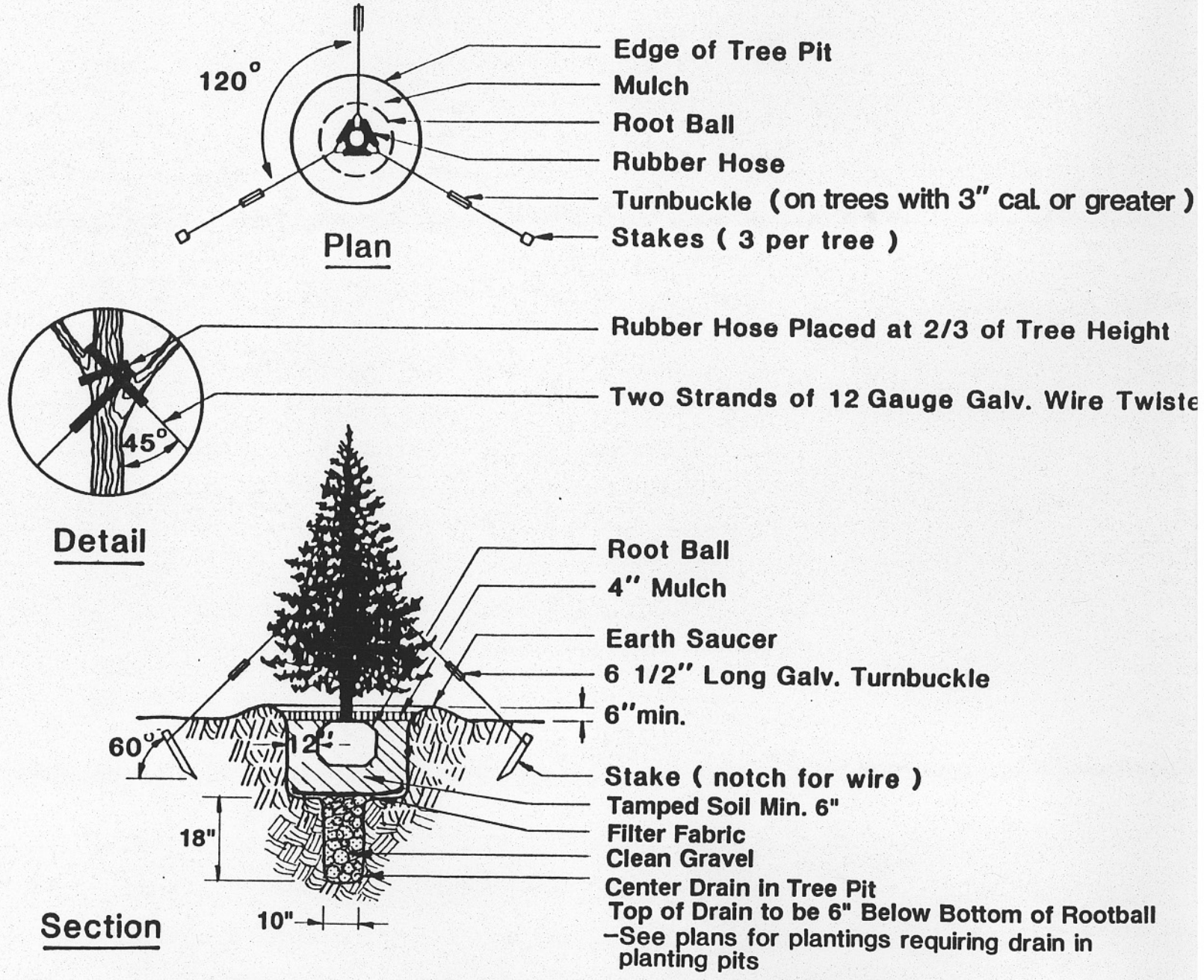
Section

Small Tree Planting Detail

Not to Scale

See plans for plantings requiring drains

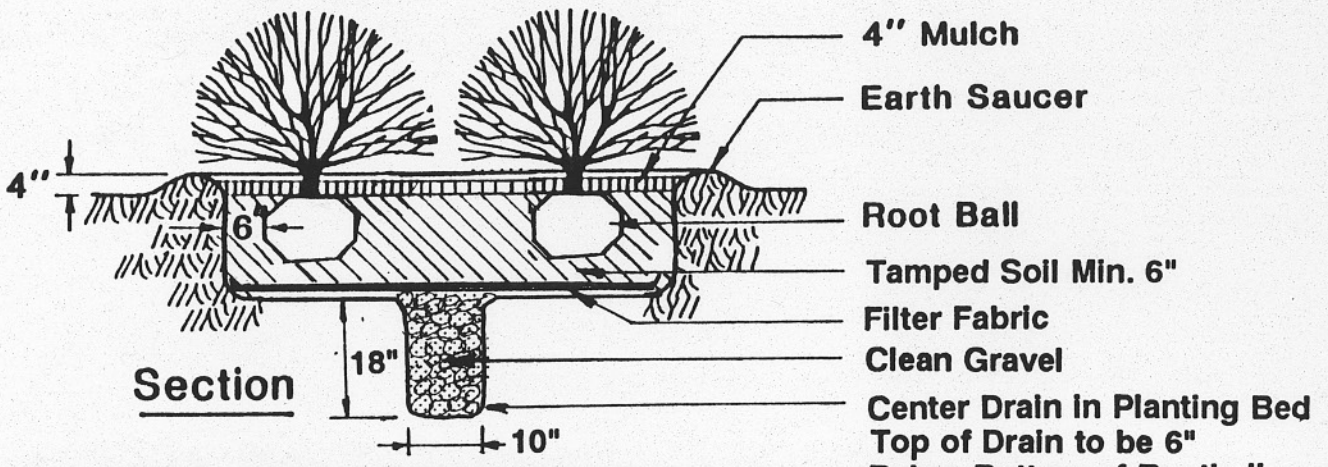
Figure 5.1-1



Coniferous and Large Tree Planting Detail

Not to Scale

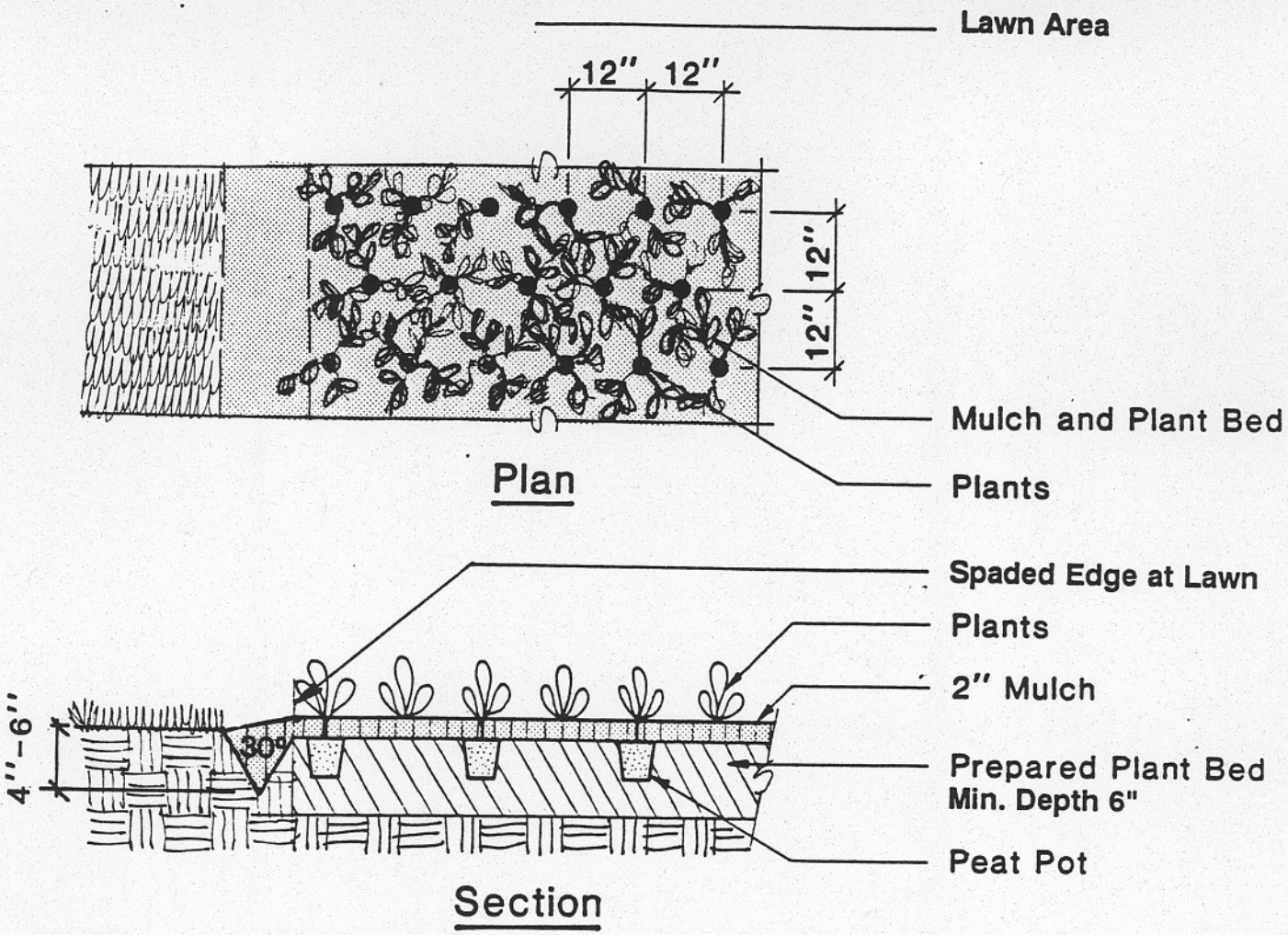
Figure 5.1-2



Shrub Planting Detail

Not to Scale

Figure 5.1-3



Groundcover Planting Detail

Not to Scale

Figure 5.1-4

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. American National Standards Institute (ANSI); ANSI Z60.1; (1986) Nursery Stock

2. American Society for Testing and Materials (ASTM); ASTM D 2607; (1969) Peats, Mosses, Humus, and Related Products

3. Federal Specifications (FS); FS O-F-241; (Rev D) Fertilizers, Mixed, Commercial

1.03 DESCRIPTION OF WORK

A. Work covered by this section consists of furnishing all labor, equipment and materials necessary to perform all operations required for landscaping hereinafter specified, or as known, or both.

B. Extent of landscape development work is shown on drawings and in the schedules. This work includes:

1. Finish grading
2. Spreading topsoil
3. Seedbed preparation
4. Layout and/or staking of plants and areas
5. Seeding and sodding of new lawns
6. Ground cover plantings
7. Shrub plantings
8. Tree plantings
9. Landscape edges
10. Maintenance period
11. Landscape warranty

1.04 QUALITY ASSURANCE

A. Landscape work must be completed by a firm or firms specializing in landscape work.

B. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

C. Do not make substitutions. If specified landscape material is not obtainable, submit proof of nonavailability to Contracting Officer or his representative, together with proposal for use of equivalent material.

D. Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

E. Topsoil: Before delivery of topsoil, furnish Contracting Officer or his representative with written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past two years. The source of the topsoil shall be subject to inspection by the Contracting Officer.

F. Trees, Shrubs and Plants: Provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock." Provide healthy, well-formed, vigorous stock, that has been transplanted or root pruned at least once in the three-year period immediately prior to the current season of growth. Stock should be free of disease, insects, eggs, larvae and defects such as knots, sun-scale, injuries, abrasions or disfigurement.

G. Digging and preparation for shipment shall be done in a manner that will not cause shock or damage to branches, trunk, or root systems.

1. Balled and Burlapped (BB) Plants: Ball size and ratio shall be provided as recommended by ANSI Z 60.1. The ball shall be of a diameter and depth to encompass enough fibrous and feeding root system necessary for the full recovery of the plant. Removal shall be accomplished by hand digging or mechanical devices. Center the plant stem or trunk in the ball and clean cut all roots at the ball surface. No roots shall be pulled from the ground. The root ball shall be completely wrapped with burlap or other suitable material and securely laced with twine.

2. Container-Grown (C) Plants: Container size shall be provided as recommended by ANSI Z60.1. Plants shall be grown in a container sufficiently long for new fibrous roots to have developed and for root mass to retain its shape and hold together when removed from container. Container shall be sufficiently rigid to hold ball shape and protect root mass during shipping.

H. Label each tree and shrub with securely attached waterproof tag bearing legible designation of botanical and common name. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.

I. Inspection: The Contracting Officer or his representative may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Contracting Officer or his representative retains right to further inspect trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

J. Care shall be taken to avoid injury to plants. Material shall not be dropped from vehicles. Balled and burlapped plants shall be handled carefully to avoid cracking or breaking of earth balls and container-grown plants handled by the container. Plants shall not be handled by the trunk of stems.

1.05 SUBMITTALS

A. Certification: Submit certificates of inspection issued by the State Nursery Inspectors, Department of Agriculture, to the Contracting Officer upon delivery of stock declaring that plants are free of insects and disease. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

B. SD-17, Manufacturer's Catalog Data. Manufacturer's literature discussing physical characteristics, application and installation instructions for edging material and erosion control material shall be submitted.

C. SD-42, Construction Equipment List. A list of the proposed pesticide application equipment to be used in performance of the planting work, including descriptive data and calibration tests.

D. SD-62, Work Plan. The following work plans shall be submitted for approval before work is started.

1. Delivery Schedule. Submittal of the delivery schedule shall be at least 10 days prior to the intended date of the first delivery.

2. Pesticide Treatment Plan. Pesticide Treatment Plan shall be submitted with proposed sequence of pesticide treatment work. The pesticide trade name, chemical composition formulation, concentration, application rate of active ingredients and methods of application for all materials furnished, and the name and state license number of the state certified applicator shall be included.

E. SD-70, Test Reports. An independent testing agency shall submit certified reports of inspections and laboratory tests, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

F. SD-76, Certificates of Compliance. Prior to the delivery of materials, certificates of compliance shall be submitted certifying that materials meet the requirements specified. Certified copies of the reports for the following materials shall be submitted.

1. Topsoil. For pH, chemical analysis, mechanical analysis and particle size. A soil test shall be provided prior to delivery of topsoil to the job site.

2. Fertilizer. For chemical analysis and composition percent.

3. Agricultural Limestone. For sieve analysis and calcium carbonate equivalent.

4. Peat. For compliance with ASTM D2607.

5. Plant Materials. For botanical and common name, size, quantity by species, grade, nursery grown.

6. Pesticide Material. For EPA registration number and registered uses.

G. SD-91, Records

1. Monthly Maintenance Report. Typed written record shall be furnished monthly of maintenance work performed the previous month, anticipated maintenance, and quantity of plant losses and replacements.

2. Plant Establishment Period. Written calendar time period shall be furnished for the beginning of the plant establishment period. When there is more than one establishment period, describe the boundaries of the planted areas covered for each period.

3. Maintenance Instruction. Typed written instructions shall be furnished for year-round care of installed plants to be followed by the owner for maintaining plant material for one year following the warranty/maintenance period by the Contractor.

4. Weekly Work Schedule. A work schedule for each project area shall be provided weekly identifying tasks accomplished during that week. The Contractor will modify the schedule daily noting tasks completed, problems encountered, and recommendations.

1.06 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site.

B. Sod: Time delivery so that sod will be placed within 24 hours after stripping. Protect sod against drying and breaking of rolled strips.

C. Trees and Shrubs: Provide freshly dug trees and shrubs with ball sizes and ratios as recommended by ANSI Z60.1. Do not prune prior to delivery unless otherwise approved by Contracting Officer or his representative. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

D. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than six hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.

E. Do not remove container grown stock from containers until planting time.

F. Pesticides shall be delivered to the site in the original unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration numbers and the registered uses.

G. Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments amy be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.07 JOB CONDITIONS

A. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

B. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, or obstructions, notify Contracting Officer or his representative before planting.

D. Planting Time: Plant or install materials during specified planting seasons for each type of landscape work required. Correlate planting with specified maintenance periods of provide maintenance from date of substantial completion.

E. Coordination with Lawns: Planting of trees and shrubs will occur after lawn work is completed. Protect lawn areas and promptly repair damage to lawns resulting from planting operations, unless otherwise directed by the Contracting Officer.

1.08 SPECIAL PROJECT WARRANTY

A. Warranty lawns through specified lawn maintenance period and until final acceptance.

B. Warranty furnished trees and shrubs to be healthy and in a vigorous growing condition for a period of one year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control.

C. Remove and replace trees, shrubs or other plants found to be dead or in unhealthy condition during warranty period. Make replacements as weather permits and within the specified planting season. Replace trees and shrubs which are in doubtful condition during warranty period; unless, in opinion of Contracting Officer or his representative, it is advisable to extend warranty period for a full growing season. Another inspection will be conducted at end of extended warranty period, if any, to determine acceptance or rejection. Only one replacement (per tree, shrub or plant) will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Topsoil for landscape work is not available at site and must be furnished as specified.

B. Acceptable topsoil includes selectively excavated topsoil material that is representative of local soils that produce heavy growths of crops, grass, or other vegetation, and free from underlying subsoil, clay lumps, weeds, litter, brush, matted roots, toxic substances, or any material harmful to plant growth or which would hinder grading, planting, or maintenance operations. Topsoil shall not contain more than five (5) percent by volume of stones or other such objects larger than one-half (½) inch in any dimension for lawn seeded and field seeded areas.

2.02 SOIL AMENDMENTS

A. Lime: Natural dolomitic limestone containing not less than 85% of total carbonates with a minimum of 30% magnesium carbonates, ground so that not less than 90% passes a 10-mesh sieve and not less than 50% passes a 100-mesh sieve.

B. Aluminum Sulfate: Commercial grade.

C. Peat Humus: FS Q-P-166 decomposed peat with no identifiable fibers and with pH range suitable for intended use.

D. Bonemeal: Commercial, raw, finely ground 4% nitrogen and 20% phosphoric acid.

E. Superphosphate: Soluble mixture of treated minerals; 20% available phosphoric acid.

F. Sand: Clean, washed sand, free of toxic materials and at least 95% by weight shall pass through a 10 mesh sieve and 10% by weight shall pass a 16 mesh sieve.

G. Manure: Well rotted, unleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

H. Mulch: Ground or shredded bark mulch free from deleterious materials and suitable for top dressing of trees, shrubs or plants.

I. Commercial Fertilizer: Complete fertilizer of neutral character that is free-flowing, uniform in composition and conforming to FS O-F-241. Fertilizer should contain some elements derived from organic sources and containing following percentages of available plant nutrients:

1. Dry Fertilizer:

   (a) Granular fertilizer for trees and shrubs: Consists of nitrogen-phosphorous-potassium ratio: 5 percent nitrogen, 10 percent phosphorous, and 5 percent potassium.

   (b) Controlled-Release Fertilizer: Consists of nitrogen-phosphorous-potassium ratio: 5 percent nitrogen, 10 percent phosphorous, and 5 percent potassium. Controlled-release fertilizer may be in packet or tablet form.

2. Liquid Fertilizer for trees and shrubs: Commercially available liquid fertilizer shall consist of completely soluble plant foods suitable for application as foliage spray.

3. Fertilizer for lawns shall be a standard commercial product which when applied at the proper rate will supply the quantity of actual nitrogen (N), available phosphoric acid (P_2O_5) and soluble potash (K_2O) as called for in the application rates. Materials may be accepted on the basis of bag label analysis, or suppliers certification, or certified laboratory sample test.

4. Application rates for fertilizer for lawn areas shall be:

   (a) Initial or seeding application. This application should include the following amounts:

   1 pound of actual nitrogen (N) per 1000 sq. ft.
   1.5 pounds of available phosphoric acid (P_2O_5) per 1000 sq. ft.
   .8 pound of soluble potash (K_2O) per 1000 sq. ft.

   (b) Maintenance application. This application should include the following amounts:

1 pound of actual nitrogen (N) per 1000 sq. ft.
1 pound of available phosphoric acid (P_2O_5) per 1000 sq. ft.
1 pound of available potash (K_2O) per 1000 sq. ft.

2.03 PLANT MATERIALS

A. Varieties. Plants shall be nursery grown stock conforming to ANSI Z60.1 and shall be of the varieties and size specified in the plant list bearing botanical names listed in one or more of the publications listed under "Nomenclature" in ANSI Z60.1.

B. Substitutions. Substitutions will not be permitted without written request from the contractor for approval by the Contracting Officer and only then if the material is unavailable to the extent that completion of the project would be materially delayed or beyond a 500 mile radius from the job site.

C. Growing Conditions. Plants shall be grown under climatic conditions similar to those in the locality of the project.

D. Quality. Well shaped, well grown, vigorous, healthy plants having healthy and well branched root systems shall be provided. Plants shall be provided free from disease, harmful insects and insect eggs, sun-scaled injury, disfigurement and abrasion. Plants shall be provided that are typical of the species or variety and conforming to standards as set forth in ANSI Z60.1 and as specified herein.

1. Shade and Flowering Trees. A height relationship to caliper shall be provided as recommended by ANSI Z60.1. Height of branching should bear a relationship to the size and variety of tree specified with the crown in good balance with the trunk. Trees shall not be "poled" or the leader removed.

   (a) Single stem. Trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

   (b) Multi-stem. All countable stems, in aggregate, shall average the size specified. To be considered a stem, there should be no division of the trunk which branches more than six inches from ground level.

   (c) Specimen. A plant shall be provided that is well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

2. Deciduous Shrub. Plants shall be provided that have the height and number of primary stems as recommended by ANSI Z60.1. An acceptable plant shall be well shaped with sufficient well-spaced side branches recognized by the trade as typical for the variety grown in the region.

3. Coniferous Evergreen. Trees shall be provided that have the height-to-spread ratio as recommended by ANSI Z60.1. Trees shall not be "poled" or the leader removed. An acceptable plant shall be exceptionally heavy, well shaped and

trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

4. Broadleaf Evergreen. Plants shall be provided that have ratio of height-to-spread as recommended by ANSI Z60.1. An acceptable plant shall be well shaped and recognized by the trade as typical for the variety grown in the region.

5. Groundcovers and Vines. Plants shall be provided with the minimum number of runners and length of runner as recommended by ANSI Z60.1. Plants shall be furnished that have heavy, well developed and balanced top with vigorous well developed root system and shall be furnished in containers.

E. Size. Plants shall be furnished in sized indicated. Plants larger in size than specified may be provided at no additional cost to the Government.

F. Measurement. Plants shall conform to the measurement on the landscape plan plant schedule. The caliper of the tree trunk shall be the diameter of the trunk measured six (6) inches above the natural surface of the ground for deciduous trees up to and including 4-inch caliper size. Plant measurements for height and ball size shall be in accordance with ANSI Z60.1 and as follows:

1. Shade Trees:

Caliber	Min. Height	Minimum Diameter of Ball
1½ - 2"	10'	21"
2 - 2½"	12'	24"
2½ - 3"	13"	28"
3 - 3½"	14"	32"
3½" - 4"	15"	36"

2. Flowering Trees and Shrubs:

Heights	Minimum Diameter of Ball
18 - 24"	10"
2 - 3'	12"
3 - 4'	13"
4 - 5'	15"

Heights	Minimum Diameter of Ball
5 - 6'	16"
6 - 7'	18"
8 - 10'	22"
2 - 2½"	24"
2½ - 3"	28"

3. Evergreen (Spreading):

Diameter of Spread	Diameter of Ball
24 - 30 "	13"
30 - 36"	15"
36 - 42"	16"

4. Evergreen Trees (Upright):

Height of Tree	Diameter of Ball
4 - 5'	17"
6 - 7'	21"
8 - 10'	28"
10 - 12'	33"

2.04 GRASS MATERIALS

A. Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Recommended varieties of seed and rate of application/1000 sq. ft.

1. For Sun/Shade:

Kentucky Bluegrass (Baron, Glade, Adelphi, Monopoly, Victa, Bristol), 4 lbs/1000 sq.ft.

Perennial Ryegrass (Regal, Manhattan II, Omega II, Palmer, Turfstar, Premier), 5 lbs/1000 sq.ft.

Fescue (fine turf) (Rebel II, Tribute, Bonanza, Apache), 5 lbs/1000 sq.ft

2. For Shade: Creeping Red Fescue, 5 lbs/1000 sq.ft.

3. For Athletic Fields and Parks: Bermuda Grass (Cheyenne), 2 lbs/1000 sq.ft.

B. Sod:

1. Provide strongly rooted sod, not less than 2 years old, free of weeds and undesirable native grasses and machine cut to pad thickness of 3/4" (± 1/4"), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).

2. Provide sod of uniform pad sizes with maximum 5% deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10% of pad will be rejected.

3. Provide sod composed principally of following:

Kentucky Bluegrass (Poa pratensis).
Bermuda grass (Cynodon dactylon).
Fescue (Festuca arundinaceu)

2.05 GROUND COVER

A. Provide plants established and well-rooted in removable containers or integral peat pots and with not less than minimum number and length of runners required by ANSI Z60.1 for the pot size shown or listed.

2.06 MISCELLANEOUS LANDSCAPE MATERIALS

A. Steel Edging: Commercial steel edging of size shown on drawings fabricated in sections with loops pressed from or welded to face of sections at 2'-6" o.c. to receive stakes. Provide tapered steel stakes 16" long. Finish edging sections and stakes with manufacturer's standard green-black paint.

B. Anti-Erosion Mulch: Provide clean, seed-free salt hay or threshed straw of wheat, rye, oats or barley. Apply at the rate of 2.0 tons per acre.

C. Asphalt Emulsion Anchor: An asphalt emulsion shall be used to anchor the straw/hay mulch and shall be of a quality equal to SS-1, SS-1h, CSS-1, or CSS-1h conforming to the requirements of AASHTO M140 or AASHTO M208.

D. Hydro Mulch Fibers: Provide "Conwed Hydro Mulch 2000 Fibers with Tackifier." The mulch materials shall consist of virgin wood fibers manufactured expressly from whole wood chips. The chips shall be processed in such a manner as to contain no growth or germination inhibiting factors. Tickifier shall be a Colloidal Polysaccharide type adhered to the fibers during manufacturing. Application rate: 2000 lbs. of mulch per acre.

E. Anti-Desiccant: Emulsion type, film-forming agent designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.

F. Filtration/Separation Fabric: Water permeable filtration fabric of polypropylene fabric weighing a minimum of 4 ounces per square yard and be a minimum of 28 mils thick.

G. Wrapping: Tree wrap shall be two thicknesses of crinkled paper cemented together with a layer of bituminous material. Wrapping materials shall be a minimum of 4 inches in width and have a stretch factor of 33-1/3 percent. Twine for tying shall be lightly tarred medium or coarse sisal yarn.

H. Gravel: Clean 3/4" -1½" size range, free of fines and toxic material.

I. Guying and Staking Material:

1. Stakes. Stakes for tree support shall be rough sawn wood, free from knots, rot, cross grain, or other defects that would impair the strength. Standard stakes shall be hardwood or fir treated with pentachlorophenol.

   (a) Bracing stakes. Bracing stakes shall be a minimum of 2 inches by 2 inches or 2½ inches in diameter by 8 feet long and pointed at one end.

   (b) Ground Stakes. Ground stakes shall be a minimum of 2 inches by 2 inches or 2½ inches in diameter by 3 feet long and pointed at one end.

2. Guying Material.

   (a) Guying Wire. Guying wire shall be 12-gauge annealed galvanized steel wire.

   (b) Guying Cable. Guying cable shall be a minimum of five-strand, 3/16-inch diameter cadmium plated steel cable.

3. Chafing Guard. Hose chafing guards shall be new or used 2-ply reinforced rubber or plastic hose and shall be all the same color on the project. Length shall be 1½ times the circumference of the plant at its base.

4. Flags. Flags to be fastened to guys shall be white surveyor's plastic tape, 6 inches in length.

5. Turnbuckles. Turnbuckles shall be galvanized or cadmium-plated steel and have a 3-inch minimum lengthwise opening fitted with screw eyes.

J. Water. Water shall not contain elements toxic to plant live.

K. Tree Wound Dressing. Tree wound dressing shall be a black asphalt-base antiseptic paint or a black paint consisting of Bordeaux mixture, raw linseed oil, and lamp black.

L. Pesticide. Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide, and miticide. Pesticide material shall be labeled for use and applied only as registered by EPA and approved herbicide, insecticide, fungicide, nematocide, rodenticide, and miticide.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify Grades. The Contracting Officer shall verify the finished grades are as indicated on the drawings, and the placing of topsoil and smooth grading has been completed in accordance with Section 02210, Grading.

B. Underground Obstructions to Planting. The location of underground utilities and facilities shall be verified.

C. Digging Permits. Obtain digging permit prior to beginning any excavation for planting. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.02 SITE PREPARATION

A. Layout. Plant material locations and bed outlines shall be staked on the project site seven days before any excavation is made. Obtain Contracting Officer or his representative's acceptance before start of planting work. Plant material locations may be adjusted by the Contracting Officer to meet field conditions.

B. Protection of Existing Vegetation. If lawns have been established prior to planting operations, the surrounding turf shall be covered before excavations are made in a manner that will protect turf areas. Existing trees, shrubbery, and beds that are to be preserved shall be barricaded in a manner that will effectively protect them during planting operations.

C. Preparation for Planting Lawns:

1. Loosen subgrade of lawn areas to a minimum depth of 4". Remove stones over 1-1/2" in any dimension and sticks, roots, rubbish and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.

2. Spread top soil to minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement. Add specified soil amendments and mix thoroughly into upper 4" of topsoil.

D. Preparation of Unchanged Grades: Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn planting as follows: Till to a depth of not less than 6"; apply soil amendments and initial fertilizers as specified; remove high areas and fill in depressions; till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.

Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of Owner's property; do not turn over into soil being prepared for lawns.

Allow for sod thickness in areas to be sodded.

Apply specified commercial fertilizer at rates specified and thoroughly mix into upper 2" of topsoil. Delay application of fertilizer if lawn planting will not follow within a few days.

E. Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

F. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil conditions.

3.03 EXCAVATION

A. Obstructions Below Ground. When obstructions below ground affect the contract operation, proposed adjustments to plant location, type of plant and planting method shall be submitted to and approved by the Contracting Officer.

B. Turf Removal. Where planting beds occur in existing turf areas, the turf shall be removed to a depth that will ensure the removal of the entire root system.

C. Plant Pits. Plant pits shall be dig to produce vertical sides and flat, uncompacted bottoms. When pits are dug with an auger and the sides of the pits become glazed, the glazed surface shall be scarified. The minimum allowable dimensions of plant pits shall be 6 inches deeper than the depth of ball or the depth of base roots; for ball or root spreads up to 2 feet, pit diameters shall be twice the root spread; for ball or root spreads from 2 to 4 feet, pit diameters shall be 2 feet greater; for ball or root spreads over 4 feet, pit diameters shall be 1½ times the ball root spread

D. Gravel Drain for Tree Planting. Where indicated on plans, provide a 10-inch diameter hole by 18 inches deep drain hole in center of tree planting pit. Fill hole with clean gravel (3/4" - 1½" size). Place soil separation fabric over top of pit. Complete tree planting operation.

E. Gravel Drain for Shrub Beds. Where indicated provide 10 inch wide by 18 inches deep trench in planting bed. Fill trench with clean gravel (3/4" - 1½"), place minimum 24" wide soil separation fabric over top of trench and finish shrub planting operations.

3.04 PLANTING TIMES AND CONDITIONS

A. The season for planting shall be as follows:

1. Deciduous Trees and Shrubs:

   Fall planting: October 15 to December 15
   Spring planting: March 1 to May 15

2. Evergreen Trees, Shrubs and Ground cover:

   Fall: September 1 to October 31
   Spring: April 1 to May 15

B. Planting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted to and approved by the Contracting Officer.

3.05 INSTALLATION

A. Setting Plants. Arrange plants so as to take full advantage of individual habitat and character of each plant in relationship to other plants and best arrangement in accordance with the planting plan. Plants shall be set plumb and held in position until sufficient soil has ben firmly placed around roots or ball. Plants shall be set in relation to surrounding grade so that they are even with the depth at which they were grown in the nursery, or container. Deep plantings are not acceptable.

B. Starter Fertilizer. Controlled-release fertilizer shall be placed in packet or tablet form in the plant pit in the immediate vicinity of the feeding roots in accordance with the manufacturer's recommendations.

C. Balled and Burlapped Plants. Materials shall be removed that are metal, plastic, nylon or treated burlap, prior to backfilling. Balled and burlapped stock shall be backfilled with topsoil to approximately 2/3 of the depth of the ball and then tamped and watered. Biodegradable burlap and tying material shall be carefully opened and folded back. The backfill shall be completed, tamped and watered. A 4-6 inch high

earth saucer shall be formed around individual plants. The saucer shall be on the outside of the backfilled area.

D. Container-Grown Plants. Non-biodegradable containers shall be removed without damage to the plant or root system. Biodegradable containers shall be split. The backfill shall be completed as specified for B and B plants.

E. Groundcover Bed:

1. Plant Beds in Existing Soil. Beds shall be tilled to a minimum depth of 6 inches where existing soil is to be used in place. Selected soil amendments shall be spread uniformly over the bed. Selected soil amendments shall be incorporated for 1000 square feet as follows:

   One cubic yard of sand
   One cubic yard of peat
   One cubic yard of manure
   One cubic yard of topsoil
   50 lbs. of bone meal

   The mixture shall be thoroughly incorporated into the soil to a minimum depth of 6 inches using a roto-tiller or other method to obtain a uniform and well pulverized soil mix. All sticks, stones, roots and other objectionable materials shall be removed from the surface. The bed shall be brought to a smooth and even surface blending to existing areas.

2. Plant Beds in Replaced Soil. When soil replacement is required, the existing soil shall be excavated and removed to a minimum depth of 6 inches and topsoil shall be placed on previously scarified subsoil to a minimum depth of 6 inches. Selected soil amendments shall be incorporated with each cubic yard of topsoil, as follows:

   ¼ cubic yard of sand
   ¼ cubic yard of peat
   1 cubic yard of manure
   50 lbs. of bone meal

3. Groundcover:

   (a) Space plants as shown on the plant schedule.

   (b) Dig hole large enough to allow for spreading of roots and backfill with loose soil. Work soil around roots to eliminate air pockets. Leave slight indentation around plants to hold water. Water thoroughly after planting taking care not to cover crowns of plants with wet soil.

   (c) Mulch area between ground cover; place not less than depth identified on drawings.

(d) Groundcover may be planted after the mulch is in place. Contaminating the mulch with soil shall be avoided.

F. Staking and Guying:

1. Tree Bracing Stakes. Trees over 6 feet tall shall be held in place with three bracing stakes placed equally around the planting pit. The tree shall be held firmly between the stakes with a double strand of wire. Chafing guards shall be used where the wire contacts the tree. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or roots.

2. Three Guying Wires. Trees shall be held firmly in place with three guying lines of double strand wire spaced equidistantly around the tree. The line shall be anchored with ground stakes. The line shall be anchored to the tree at a point equal to one half its height. Chafing guards shall be used where the line contacts the tree. One turnbuckle shall be centered on each line for tree straightening purposes. Ground stakes shall be driven into firm ground outside the earth saucer and plant pit with the top of the stake flush with the ground surface.

G. Flags. A flag shall be securely fastened to each guying line to be visible by pedestrians.

3.06 FINISHING

A. Plant Beds.

1. Planted areas shall be uniformly edged to provide a clear-cut division line between the planted area and the adjacent turf area and to provide a shape as indicated. The entire planted area shall be raked and smoothed while maintaining the earth saucers.

2. Edging material, if shown on the drawings, shall be installed in accordance with the manufacturer's recommendations and/or as indicated.

B. Pruning. The total amount of foliage shall be pruned by one-fourth to one-third on installed trees and shrubs to compensate for loss of roots and transplanting shock. The typical growth habit of individual plants shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth shall not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned to "topped off." Cuts or wounds measuring a minimum ½-inch in diameter shall be painted with the specified tree wound dressing. Remove and replace excessively pruned or misformed stock resulting from improper pruning.

C. Mulch. Mulch shall be spread in planting pits, trenches and planted areas to a uniform thickness of 4 inches within 48 hours after planting. Mulch shall be kept out of the crowns of shrubs and off buildings, sidewalks and other facilities.

D. Geotextile. When required for weed control, geotextile shall be placed prior to mulching activities in accordance with the manufacturer's recommendations and/or as indicated.

E. Trunk Wrap. The trunks of 2" caliper and larger deciduous trees shall be wrapped within 24 hours after planting. Start at the ground and cover trunk to the height of the first branch. Wrapping should be neat, snug with one inch overlap, and securely attached every 18 inches. Inspect tree trunks for injury, improper pruning, insect infestation, and take corrective measures before wrapping.

F. Water. Plants shall be watered as necessary to maintain an adequate supply of moisture within the root zone. Run-off, puddling and wilting shall be prevented.

3.07 SEEDING NEW LAWNS

A. Sow seed at the rates specified on the schedule Section 4), using either the mechanical drill seeding method or the hydro-seeding method. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

B. Mechanical Drill Seeding Method:

Sow seed using mechanical power drawn drills or other approved seeding machine which places seed into the soil. Markers or other means shall be provided to insure that the successive seeded strips will overlap or be separated by a space no greater than equipment row spacings. Drill seeding shall be accomplished with drills set no more than 6 inches apart. Hand broadcasting shall be limited to areas not accessible with other equipment. Seed mixture shall be sown at the rate of seven pounds per 1000 square feet.

All seeding is to be done in dry or moderately dry soil, and at times when wind velocity does not exceed five miles per hour. Distribute seed evenly over entire areas by sowing an equal quantity in two directions at right angles to each other. Final direction of sowing shall be done perpendicular to the ground slope.

Seed shall be covered by soil to an average depth of 1/4 to 3/8 inches by an approved method.

Protect seeded areas against erosion by spreading specified lawn mulch after completion of seeding operations. Spread uniformly to form a continuous blanket not less than 1-1/2" loose measurement over seeded areas.

Anchor mulch by spraying with asphalt emulsion at the rate of 4 to 6 gallons per 1000 sq. ft. Take precautions to prevent damage or staining of construction or other plantings adjacent to mulched areas.

C. Hydroseeding New Lawns:

Mix specified seed, fertilized and pulverized mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

Apply slurry uniformly to all areas to be seeded. Rate of application as required to obtain specified seed sowing rate.

3.08 SODDING NEW LAWNS

A. Lay sod within 24 hours from time of stripping. Do not plant dormant sod or if ground is frozen.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.

Anchor sod on slopes with wood pegs to prevent slippage.

C. Water sod thoroughly with a fine spray immediately after planting.

3.09 RECONDITIONING EXISTING LAWNS

A. Recondition existing lawn areas damaged by Contractor's operations including storage of materials and equipment and movement of vehicles. Also recondition existing lawn areas where minor regrading is required.

B. Provide fertilizer, seed or sod and soil amendments as specified for new lawns and as required to provide a satisfactorily reconditioned lawn. Provide new topsoil as required to fill low spots and meet new finish grades.

C. Cultivate bare and compacted areas thoroughly to provide a satisfactory planting bed.

D. Remove diseased and unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations including oil drippings, stone, gravel and other loose building materials.

E. Where substantial lawn remains (but is thin), mow, rake, aerate if compacted, fill low spots, remove humps and cultivate soil, fertilize and seed. Remove weeds before seeding or if extensive, apply selective chemical weed killers as required. Apply a seedbed mulch to maintain moist condition.

F. Water newly planted areas and keep moist until new grass is established.

G. Antidesiccant Application. Apply antidesiccant using power sprayer to provide an adequate film over trunks, branches, stems, twigs and foliage. If deciduous trees and shrubs have been transported in full leaf prior to planting, spray again in two weeks after planting.

3.10 MAINTENANCE DURING PLANTING OPERATION

A. Installed plants shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed and shall continue until the plant establishment period commences. The maintenance includes watering, pruning, wound dressing, straightening and other necessary operations. Plant beds and earth saucers shall be kept free of weeds, grass and other undesired vegetation. Plants shall be checked for settlement and shall be reset at proper grade as necessary. Runoff, puddling and wilting shall be prevented.

3.11 CARE OF EXISTING PLANT MATERIAL

A. Identification. Existing plant material to be treated shall be tagged on the site and/or as indicated.

B. Fertilizing Existing Trees. Holes shall be dug by hand or mechanical devices, a minimum 1½ inches in diameter and 19 inches deep, distributed evenly at not more than 2 feet on center throughout the outer half of the branch spread zone of each tree.

C. Dry Fertilizer. Dry fertilizer shall be placed in the hole to within 4 inches of the surrounding grade.

D. Application. Packet, tablet or edge-form fertilizer shall be applied in accordance with manufacturer's recommendations.

E. Backfill. Topsoil or sand shall be used as backfill in the hole and shall be blended to the surrounding grade.

3.12 APPLICATION OF PESTICIDE MATERIAL

A. When pesticide becomes necessary to remove a disease or pest, a state-certified applicator shall apply required pesticide in accordance with State EPA label restrictions and recommendations. Hydraulic equipment shall be provided for the liquid application of pesticides with a leak-proof tank, positive agitation methods, controlled application pressure and metering gauges. A pesticide treatment plan shall be provided to the Contracting Officer as specified in paragraph "Submittals."

3.13 RESTORATION AND CLEAN UP

A. Restoration. Turf areas, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the contractor's expense.

B. Clean Up. During landscape work, keep pavement clean and work area in an orderly condition. Excess and waste material from the planting operation shall be removed and disposed of off the site. Adjacent paved areas shall be cleared.

3.14 PLANT MAINTENANCE PERIOD

A. Commencement. On completion of the last day of the planting operation, the period for maintaining installed plants in a healthy growing condition shall commence and shall be in effect for a time period not to exceed 12 months. When the planting operation extends over more than one season or there is a variance to the planting times, plant establishment periods shall be established for the work completed, as directed. Written calendar time period shall be furnished to the Contracting Officer for the beginning of the plant maintenance period. When there is more than one plant maintenance period, describe the boundaries of the planted area covered for each period.

B. Maintenance.

1. General. Maintenance of plants shall include straightening plants, resetting to proper grade, restoration of plant saucers, tightening stakes and guying material, repairing tree wrapping, protecting plant areas from erosion, maintaining erosion control material, supplementing mulch, fertilizing, accomplishing wound dressing, removing dead or broken tip growth by pruning, maintaining edging of beds, checking for girdling of plants, and maintaining plant labels, watering, weeding, removing and replacing unhealthy plants. Spray as required to keep trees and shrubs free of insects and disease.

2. Water. The plants shall be watered as necessary to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is estimated to be the equivalent of one inch of absorbed water per week delivered in the form of natural rain or augmented as required by periodic waterings. Run-off, puddling and wilting shall be prevented.

3. Weeding. Planted areas shall be kept free of weeds and grasses.

4. Unhealthy Plants. A plant shall be considered unhealthy or dead when the main leader has died back, or 25 percent of the crown is dead. Determine the cause for an unhealthy plant. Unhealthy or dead plants shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

5. Fertilizing. The plants shall be topdressed at least once during the period of establishment with dry fertilizer at rates recommended by the manufacturer and worked into the mulch surface. Dry fertilizer adhering to plants shall be flushed off. The application shall be timed prior to the advent of winter dormancy.

6. Settlement. Topsoil shall be added to maintain grade and to maintain earth saucers. Serious settlement affecting the setting of the plant in relation to the

depth at which it was grown requires replanting in accordance with paragraph, "Installation."

7. Pesticide Treatment. Treatment for diseases or pests shall be in accordance with paragraph, "Application of Pesticide Material."

8. Maintenance Report. A written record shall be furnished to the Contracting Officer of the maintenance work performed, the quality of plant losses, cause for plant loss and replacements made on each site visit.

9. Maintenance Instructions. Written instructions shall be furnished to the Contracting Officer for year-round care of installed plants.

10. Replacement Plants. Plants shall be provided for replacement in accordance with Section 2.04 Plant Material. Replacement plants shall closely match adjacent specimen of the same species. The contractor shall replace unhealthy plants as soon as weather permits, and within the specified planting period all plants that are not in a vigorous, thriving condition as determined by the Contracting Officer or his representative throughout the maintenance period. Replacements shall be subject to all requirements stated in the specifications sections. The Contractor shall make all necessary repairs due to plant replacement. Such repairs shall be done at no extra cost to the Owner.

3.15 LAWN MAINTENANCE

A. General. Maintain lawn areas by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, regrading, and replanting as required to establish a smooth acceptable lawn free of eroded or bare areas. Apply maintenance fertilizer after second mowing and when grass is dry. The Contractor shall make certain this fertilizer application does not burn or harm the grass or adjacent plant material.

B. Maintenance Period. Maintain lawns for not less than the period stated below and longer as required to establish an acceptable lawn.

1. Seeded lawn areas shall be maintained through 3 maintenance cuttings, but not less than 60 says after substantial completion.

2. If seeded areas are completed in the fall and not given a full 60 days, or if not acceptable at that time, continue maintenance the following spring until an acceptable maintenance is established.

3. Sodded lawns, not less than 30 days after substantial completion.

3.16 FINAL ACCEPTANCE

A. Preliminary Inspection. Prior to the completion of the contract, the plant establishment period or whichever occurs first, a preliminary inspection shall be held by the Contracting Officer. Time for the inspection shall be established in writing. The

quantity and type of plants installed and the acceptability of the plants in accordance with the plant establishment period shall be determined.

B. Final Inspection. A final inspection shall be held by the Contracting Officer to determine that deficiencies noted in the preliminary inspection have been corrected. Time for the inspection shall be established in writing. Acceptance of the planting operation is subject to the guarantee of plant growth.

END OF SECTION 02480

6.0 Landscape Maintenance

The general objectives of a maintenance plan are to ensure the orderly and efficient care of the grounds, to protect the safety of people using the area and to save the environment from harm. Specific objectives must be formulated to suit each situation. The type and intensity of maintenance will vary widely. Some areas may require weekly attention, while others can be left in their natural state. Good judgment must be used in setting up and following the objectives.

The recommendations include a summary explanation of the maintenance practices that should be followed, and a "maintenance chart" which identifies desired times throughout the year specific maintenance should be undertaken.

By using the maintenance chart and program, all aspects of landscape maintenance at the base can be improved. Materials and supplies can be ordered in a timely fashion, manpower needs can be calculated and anticipated, and most importantly, a correlation between the level of maintenance and costs for that level derived.

A basic component of the maintenance plan is the division of the base into maintenance areas. Each area, based upon the intensity of use, receives a predetermined degree of maintenance. Following the Theme Plan, formal and informal areas receive the highest degree of maintenance. The naturalized areas are left in a more naturalized state, except those used for active recreational purposes. By using this system, time can be spent proportionate to the use and visibility of an area. Limits for each of the three areas are depicted on the theme plan. These area limits are suggestions and they may be revised based on manpower commitments, costs and the perception and acceptance by the base.

6.1 Lawn Maintenance

In order to develop and maintain a pleasing and attractive lawn, more than fertilization and mowing is required. Procedures for soil analysis and amendments, aerification, and reseeding and mowing must be followed regularly. The maintenance schedule prioritizes these tasks in a cost-efficient manner.

6.1.1 Soil Analyses. Prior to the beginning of the growing season, soil analyses of the turf areas must be made to determine the soil pH, and levels of nitrogen, phosphorus, and potassium. Areas known to have done poorly during the previous season should also be checked for problems related to texture (for example, compacted clay), drainage (excessive or inadequate), erosion, etc. Based on the testing and analysis, specific soil corrections can be determined.

6.1.2 pH Adjustment. For the specific grasses grown on the base, the required pH level should be maintained at 6.0 through 6.5. If the pH is below the desired level, lime may be added at the rate of up to 1 ton of lime per acre. For areas with a high pH, sulphur is used at the rate of one-half ton per acre for every one point above the desired pH level. Once the desired amount of lime is determined, it should be applied two to three months prior to the first application of fertilizer. After the correct pH level is achieved, lime may not be needed or applied more than once every three to six years.

6.1.3 Nutrients, Fertilizers are necessary to produce good growth, retard senescence and wear, help prevent weeds and disease. They also replace nutrient loss caused by processes of leaching, fixation and thatching. The three primary nutrients provided by commercial fertilizers are: nitrogen, phosphorus and potassium.

6.1.3.1 Nitrogen: Available nitrogen determines plant color, density of root and shoot growth, resistance to disease and tolerance to cold, heat and drought.

6.1.3.2 Phosphorus: Phosphorus is necessary for seedling development and production. In adequate levels, phosphorus promotes rooting and improved root branching while a deficiency in phosphorus can cause reductions in leaf moisture.

6.1.3.3 Potassium: Potassium improves the plant's resistance to heat, cold and frost conditions. It also increases tolerance to wear and encourages rooting.

6.1.3.4 Application: Fertilization of turf areas should be done after determining nutrient deficiencies based upon the least fertile soil within the projected zone. Two applications per year (spring and fall) will provide adequate growth support without excessive cost. Applications should follow a soaking rain to prevent burning but, to the greatest extent possible, should not be made if rain is expected in the following 2-3 days. Applications of roughly 100 pounds per acre are recommended unless tests clearly indicate more is required. Nitrogen-rich applications are recommended in spring; more balanced applications are recommended in the fall.

6.1.4 Aerification and Vertical Cutting

6.1.4.1 Aerification: The removal of soil cores allows air, moisture and nutrients to reach the roots more easily, reduces maintenance costs and the amount of water and fertilizer lost due to runoff. Aerification and vertical cutting of lawn areas are ways to encourage more porous soil and resilient turf. The susceptibility to disease and drought will also be reduced, enabling the turf to withstand more vigorous use. Aerification is done annually, either during the early spring (February or early March), prior to fertilization of the lawn, or in fall (mid to late September), when root growth is enhanced.

6.1.4.2 Vertical Cutting: The removal of thatch which has accumulated on lawn areas is referred to as vertical cutting. Accumulations of thatch in depths of greater than one-half inch cause poor aeration and short roots, which worsen drought problems and winter desiccation. Thatch can also cause young plants to be weak and susceptible to disease or insects. Weak, new plants harbor disease and insects. During the winter months, turf plants may suffer due to accumulation and retention of ice by heavy thatch. Removal of this thatch is recommended in the fall to be used for compost in the spring.

6.1.5 Mowing. Mowing of lawn areas is a frequent and vital part of good turf maintenance. The appearance of turf is affected by the height of the cut. The minimum height of the types of turf grown on the base should not be below

two to 2-1/2 inches. During summer months, the minimum mower height should be three inches. Lower clipping will starve roots causing the turf to thin out and allow weed infestation. Mowing should occur when the new growth of the grass leaves are equal to twice the desired height. Proper mower settings favor deeper roots and, therefore, increase resistance to drought and reduce watering costs.

6.1.6 Reseeding. Reseeding of turf areas becomes necessary when the turf is thin and weedy. In sunny areas, topseeding with Rebel II or Tribute fescue mixed with common bluegrass is recommended. Where there is an abundance of overstory trees, shade-tolerant varieties of bluegrass are desirable, such as Aboretum, Nugget, A34, Fylking and Glade. Reseeding of areas is generally recommended in the late summer or early fall after dethatching has occurred. Bluegrass is applied at 2-3 lbs/1,000 square feet while fescue is applied at 3-5 lbs/1,000 square feet.

6.1.7 Watering. Good watering practices are essential to maintain green, healthy and vigorous turf during the growing season. Maintenance costs of turf areas are also reduced with proper watering.

Water should be applied to turf areas during the early morning hours so that quantities can be reduced. Irrigation of turf areas at other times is costly due to the amount of water lost through evaporation. Also, watering during the early morning hours permits leaf blades to dry during the day and reduces susceptibility to disease. In turf areas, soil should be moistened to a depth of three to five inches. Deep watering reduces watering costs and general maintenance of lawn areas. Light, daily watering discourages plant roots from reaching deep into the soil and places them in competition with surface feeder roots of trees present in the lawn. For every 1,000 square feet of lawn area, it requires 500 to 750 gallons of water to wet the soil to a depth of three to five inches. This is the equivalent of 3/4 to 1-1/4 inches of rain.

Unless otherwise indicated by poor plant growth, watering should be done to supplement rainfall, i.e., if the growing season begins with a two-inch moisture deficit, an early application should be made which removes that deficit. Thereafter, twice-monthly applications should be made to remove deficits or to compensate for excessive evapotranspiration.

6.1.8 Weed Control. Weed control is essential to a neat, healthy and attractive lawn. Normal maintenance procedures such as fertilization, mowing to a proper height, aeration and watering will encourage vigorous turf growth and inhibit weeds.

6.2 Tree and Shrub Maintenance

6.2.1 Fertilization. As with grasses, fertilization of small trees and shrubs is usually necessary. Slow release type fertilizers are recommended and should be applied in late September when root growth is active and spring, when all growth is stimulated. Prepared fertilizers containing nitrogen, phosphate and potash (N.P.K.) are usually sufficient to provide good growth. Nitrogen encourages rapid growth and leaf production. Phosphorus stimulates root growth and formation of flower buds. Potassium increases resistance to disease and winter damage. Soil samples should periodically be taken to determine the amounts required. Applications of fertilizers (usually at a rate of 10-6-4) to small trees and shrubs should be in a circle 1-1/2 feet beyond the spread of the canopy. Plant beds and trees should be watered thoroughly afterwards.

6.2.2 Watering. The watering requirements of trees and shrubs differ greatly than those of turf lawns. Trees and shrubs, especially newly planted ones, require greater amounts of water than lawns and should be watered separately. Irrigation of shrub beds and new trees should be applied slowly to avoid runoff. Water should be allowed to permeate into the soil five to six inches. Watering of large lawn trees is necessary during times of drought. Application of water should again be slow and deep. The infrequent soakings will reduce competition between the tree and turf roots for water. Watering evergreens is essential during dry winter months as long as temperatures are above freezing.

6.2.3 Pruning. Pruning of trees and shrubs is done to ensure well developed branching, maintain desired shape and remove dead branches or those damaged by storms. Pruning is beneficial for old and new plantings. Pruning of existing overstory trees should be done primarily in the event of death, disease infestation due to pests, or damage from storms.

Proper removal of the desired branches is necessary to ensure continued health of the tree. The removal of the desired branch is a three-cut process. Start the first cut on the underside of the limb, about one foot from the trunk and saw through one-third of the branch. Start the second cut on top of the branch, about three inches out from the bottom cut, sawing until the branch splits off at the parallel point of the two cuts. Saw off the stub at the branch collar without damaging the collar.

The new plant material which was chosen for foundation planting and shrub beds was selected for its ease of pruning maintenance. Many of the selections require little or no pruning to maintain their form.

6.3 Ground Covers

Although ground covers do not require pruning, they may be periodically dug up in the spring or fall for propagation and to prevent overcrowding in their desired beds.

6.4 Maintenance Summary

An effective landscape maintenance program provides a guide with which to program and manage the physical environment. (See Figure 6.4-1.) By using the maintenance program, all aspects of landscape maintenance can be improved while saving in overall maintenance costs. By dividing the base into zones based upon frequency of exposure and relating the degree of maintenance to these zones, high visibility areas will be well maintained while low visibility areas will be left to grow in their natural state.

Good judgment must be used in setting up and following the objectives of the maintenance plan. Minor revisions may be required in the scheduling of activities. As important as the maintenance plan is, its success will depend on the dedication and commitment of those following it.

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
LAWN		Test soil to determine nutrient requirements. Adjust soil pH.	Aerate Formal Zones prior to fertilizing. Sharpen mower blades	Apply high nitrogen fertilizer in Formal and Informal Zones. Apply application of pre-emergent herbicide to control crabgrass in Formal Zones. Water thoroughly after application. Service all equipment for summer use.	Examine lawn areas for disease and pest problems treat as required.		Raise mower height to 3" during hot/dry months.			Lower mower height to 2"-2 1/2" mow as required.	Remove fallen leaves before snowfall.	Winterize lawn equipment.
					Treat lawn pests during hot/dry months.							
					Edge along walks once a month.							
					Apply post-emergent herbicide to control broadleaf weeds and crabgrass in Formal and Informal Zones.			Dethatch Formal and Informal Zones. Add to Compost.				
				Supplement rainfall as required Formal and Informal Zones.								
				Mow lawn in Formal and Informal Zones.								
				Set mower height to 2"-2 1/2".	Mow lawn in Naturalized Zones.		Mow lawn in Naturalized Zones.	Reseed Formal and Informal Zones where needed with bluegrass, fescue mix.	Mow lawn in Naturalized Zones.	Apply balanced fertilizer in Formal and Informal Zones.		
TREES & SHRUBS	Water evergreens during dry winter months when temperatures are above freezing.		Fertilize shrub beds in Formal and Informal Zones with 10-6-4.	Replenish mulch beds to maintain 3" depth.	Prune trees to thin or shape after flowering.				Thin overcrowded groundcover beds and replant in lean areas.		Water evergreens during dry winter months when temperatures are above freezing.	
					Weed mulch beds as needed.							
				Flowering shrubs may be pruned after flowering.								
					Water newly planted trees and shrubs weekly to a depth of 5"-6".	Watch for wilt--all trees and shrubs will need watering during severe drought.						
					Treat diseased trees and shrubs as problems appear to control spreading.				Dispose of infected limbs after removing (do not use as bed material).			

MAINTENANCE SCHEDULE

WHITEMAN Air Force Base Knob Noster, Missouri

LANDSCAPE DEVELOPMENT PLAN

Prepared by Harland Bartholomew & Associates, Inc.

Figure 6.4-1

7.0 SITE DESIGN STANDARDS

The site design standards in this section are intended to help assist in the planning and design of new construction renovation and on-going maintenance in regards to streets, pedestrian walkways and nodes, site furnishings, signing, and lighting. The standards are not intended to be a complete set of design guides but will help in providing a unified visual appearance by providing standards in the selection of color, material, and siting elements. Additional DOD documents and the Whiteman Design Policy should be referred to for specific design criteria not covered in this section.

7.1 Streets

Streets provide the primary vantage point in which visitors observe the base. The consistent treatment to a street is important in providing a means of orientation and making a positive first impression to visitors.

7.1.1 Relationship to the Theme Plan. The theme plan identifies three types of streets: (1) primary, (2) secondary, and (3) tertiary. When treated with varied intensities of landscape development, lighting, building and parking lot setback, pedestrian walkways, and other elements, a street hierarchy is easily identifiable.

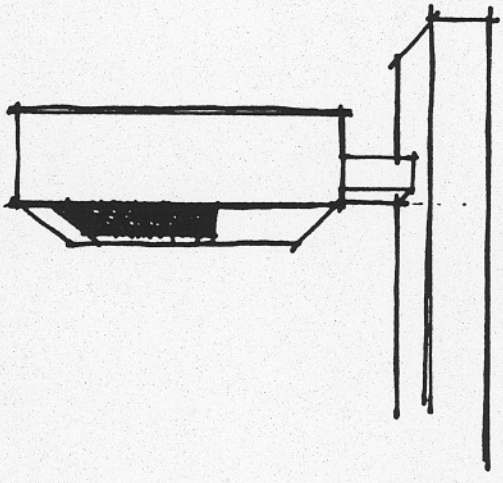
7.1.2 Primary Streets. Primary streets are identified on the theme plan and include Mitchell Drive from Mitchell Gate to 7th Street, 7th Street to Arnold Avenue, and Arnold Avenue from 7th to 8th Streets.

7.1.2.1 Design Criteria: Refer to the Whiteman Design Policy regarding road width, curbing, and paving requirements.

7.1.2.2 Landscape Planting: Refer to Section 4.1.2 for landscape treatment, acceptable plant materials, and spacing.

7.1.2.3 Pedestrian Walks: The theme development plan identifies pedestrian walks along Mitchell Drive and 7th Avenue. These walks should be concrete and a minimum of six feet wide, separated from the road by a nine foot grass planting strip. Pedestrian ramps and crosswalks should be provided at all driveway and street intersections. Where walks are intended to be used jointly by pedestrians and bicyclists, the walks should be increased in width by two additional feet.

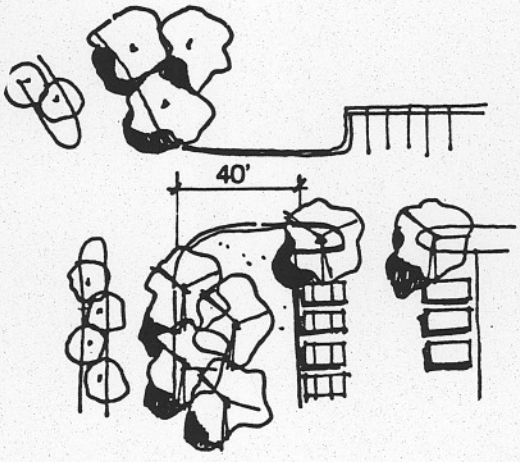
7.1.2.4 Lighting: Lighting should be provided to illuminate all primary streets for safety and nighttime orientation. Poles should be uniformly located and setback from the curb edge a minimum of four feet. Aluminum poles and fixtures should be of a uniform type and height with a dark brown finish. A shoe box type fixture mounted on a 25-40 foot pole is recommended. All light sources should be standardized to high pressure sodium.



7.1.2.5 Signing: Signing along primary streets should be limited to base identification signs at entrances,

directional signs that identify major destination points, and regulation signs that prescribe rules of travel. All signs should be located back from the curb edge so that they do not impede pedestrian travel or block site lines.

7.1.2.6 Utilities: All above-ground utilities including steam, electric lines, and drainage ditches should be relocated away from primary streets or placed underground. When this is not possible, all attempts should be made to screen the utility from view with landscape planting that conforms to approved buffer treatment standards.



7.1.2.7 Setbacks: All building and parking lots should maintain a minimum setback of 40 feet to accommodate landscape plantings and pedestrian walks. Where possible, existing parking lots should be redesigned or relocated to meet this standard.

7.1.3 Secondary Streets. Secondary streets are identified on the Theme Development Plan and include Arnold Avenue from the Arnold Gate to 7th Street, Arnold from 8th Street to 10th Street, Vandenburg from 5th to 12th Street, Mitchell from 7th Street to 10th, 2nd, 8th and 10th Streets.

7.1.3.1 Design Criteria: Refer to the Whiteman Design Policy regarding road width, curbing and pavement requirements.

7.1.3.2 Landscape Planting: Refer to Section 4.1.4 for landscape treatment, acceptable plant material, and spacing.

7.1.3.3 Pedestrian Walks: Pedestrian walks along secondary streets should be concrete paving with a minimum width of six feet and separated from the road edge by a six foot wide grass planting strip. Pedestrian ramps and crosswalks should be provided at all street intersections.

7.1.3.4 Lighting: Lighting should be provided to illuminate all designated secondary streets to provide safety and nighttime orientation. Light poles should be uniformly spaced on one side of the street and setback a minimum distance of four feet from the curb edge. Aluminum poles and fixtures should be of uniform type and height with a dark brown finish. All light sources should be standardized to high-

pressure sodium. A shoe box type fixture on a 25 foot high square pole is recommended.

7.1.3.5 Signing: Signing along secondary streets should be minimized to avoid visual clutter . Applicable types of signs include directional, building identification and regulatory signs. All signs should be located so they do not impede pedestrian movement or block motorist site lines.

7.1.3.6 Utilities: All above-ground utilities including steam, electric lines, and drainage ditches should be relocated away from primary streets or placed underground. When this is not possible, all attempts should be made to screen the utility from view with landscape planting that conforms to approved buffer treatment standards.

7.1.3.7 Setback: All building and parking lots should maintain a minimum setback of 30 feet to accommodate landscape plantings, berming, and pedestrian walks. When possible, existing parking lots should be redesigned or relocated to meet this standard.

7.1.4 Tertiary Streets. Tertiary streets can be considered as those streets not previously identified including those in the residential areas.

7.1.4.1 Design Criteria: Refer to Whiteman Design Policy regarding road width, curbing, and paving requirements.

7.1.4.2 Landscape Planting Refer to Section 4.1.5 for landscape treatment and spacing.

7.1.4.3 Pedestrian Walks: Pedestrian walks along tertiary should be concrete paving in formal and informal landscape areas. Asphalt paving may be used in natural areas. Walks should be a minimum of four feet wide with a minimum four foot wide grass planting strip separating it from the road edge. Where the walk is intended to be used for bicyclists, the path should be widened an additional two feet. Pedestrian ramps should be provided at all street intersections.

7.1.4.4 Lighting: Lighting should be used along tertiary roads where there is a need for security or where pedestrian movement occurs at night. Aluminum poles and fixtures should be of a uniform type with a dark brown finish.

A shoe box type fixture on a 25 foot square pole is recommended. All light sources should be high pressure sodium.

7.1.4.5 Signing: Signing along tertiary streets should be minimized to avoid visual clutter. Applicable types of signs include directional, building identification and regulatory signs. All signs should be located so they do not impede pedestrian movement or block motorist site lines.

7.1.4.6 Utilities: All utilities should be screened from view with landscape plantings that conform to approved buffer treatment standards.

7.1.4.7 Setback: All buildings and parking lots should maintain a minimum setback of 25 feet to accommodate landscape plantings. Where possible existing parking lots should be redesigned to meet this standard.

7.2 Parking Lots

Sensitive design to these lots is an integral part of the site design process. Parking lots that are properly designed and located with a good relationship to building entrances are easy to use and limit pedestrian vehicular conflicts.

7.2.1 Relationship to the Theme Plan. The landscape design standards identified in Section 4.2 address varied planting requirements for parking lots in the three identified areas of the base. The site design standards address issues regarding layout, lighting, islands, etc. that are common to all areas of the base. All lots should provide sufficient, well-designed off-street parking to meet their particular need.

7.2.2. Parking Requirements. Refer to DOD 4270.1-M for criteria to determine the number of parking spaces for nonorganizational vehicles.

7.2.2.1 Allocate 400 square feet per car (including access drives and planting islands) for preliminary planning process.

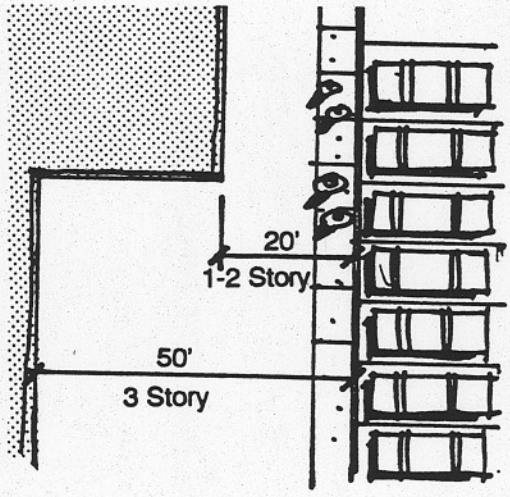
7.2.2.2 Small parking lots are preferable to large lots because they enhance the visual environment by increasing the amount of landscape plantings.

7.2.3 Location/Layout. Locate and layout lots for convenience and safety. Proper location and circulation can reduce the visual impact as well as improve the internal function of the lot.

7.2.3.1 Minimize conflicts with street intersections. Entrances and exits should be minimized, yet handle peak use periods. Locate entrances/exits a minimum of 60 feet from street intersections. Provide adequate setback for landscape plantings.

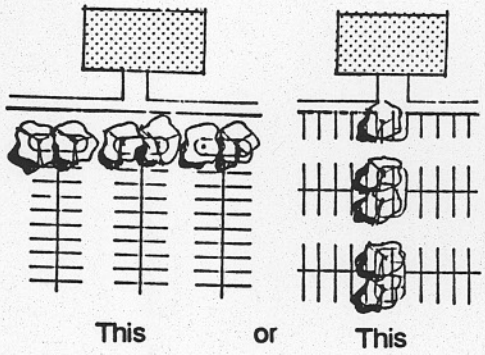
7.2.3.2 Avoid placing parking stalls immediately adjacent to a building. Provide a minimum of 20 feet for plantings, loading, and pedestrian circulation along one- and two-story buildings and 50 feet from three-story buildings.

7.2.3.3 Walks immediately adjacent to parking areas should be a minimum of six feet wide.



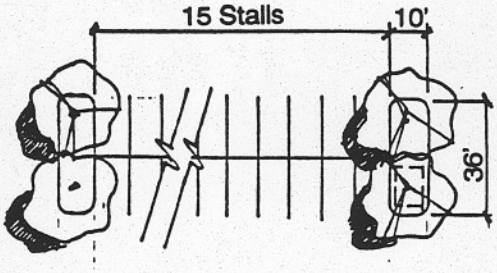
7.2.3.4 Parking lots should be laid out with 90 degree stalls and two-way circulation for ease of circulation and economy of space where users are anticipated to stay all day. Angled parking (45° or 60°) may be used where high turnover (one hour or less) and site limitations restrict the use of 90° parking stalls.

7.2.3.5 Parking aisles should be oriented perpendicular to building entrances. Where this is not possible or feasible, internal walkways delineated by islands should be used.



7.2.4 Landscape Islands. Islands provide the means of defining vehicular movement and when planted greatly reduce the visual impacts for parking lots.

7.2.4.1 Islands should be provided at the end of all rows. Islands should be a minimum width of 10 feet by 36 feet long measured from inside curb edge. A continuous poured-in-place concrete curb should be provided to define the island and prevent vehicle intrusion.



7.2.4.2 Where parking aisles exceed 15 stalls, intermediate islands, a minimum of 10 feet wide, should be used to help define circulation and reduce the appearance of the parking lot. Islands in formal areas should be regularly located while islands in informal and naturalized areas may be staggered and irregular.

7.2.4.3 To reduce the appearance of large parking areas, medians should be used after every four parking aisles. All medians should have a minimum width of 12 feet.

7.2.4.4 All parking islands and medians should provide a minimum 6' x 6' unpaved planting area for each tree that is required to be planted, per the landscape design standards, Section 4.2.

7.2.5 Signing. Signing of parking lots should be minimized. When stalls are reserved to assure available parking in an immediate area, curb markings are recommended.

7.2.6 Lighting. A shoe box type fixture on a 25 foot square pole should be used to illuminate parking lots in formal and informal areas. Naturalized areas should be illuminated if used at night. All fixtures and poles should have a dark

bronze finish. Poles should be located in islands or at the edge of the parking area. When located in paved areas, poles should be placed on top of round 24" high concrete piers to eliminate damage by automobiles.

Building-mounted lights may be used in industrial areas of the base. Fixtures should be shoe box type to relate to pole-mounted design.

7.3 Pedestrian Walkways and Nodes

Pedestrian-oriented site planning and design contribute to the comfort and enjoyment of outdoor activities. Walkways should be safe to use, properly constructed of durable material, and free from obstructions and hazards.

7.3.1 Relation to the Theme Plan. The Theme Plan identifies major pedestrian walkways that are intended to connect major origin and destination points on the base. Nodes are identified as areas where walkways intersect or where pedestrians tend to gather. The primary factors relating the theme plan will be the use of layout, materials, and amenities provided.

7.3.2 Formal Areas - Pedestrian Walkways

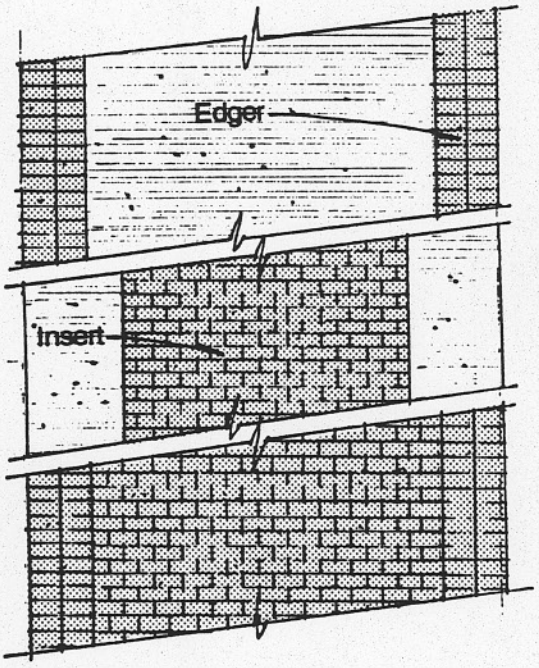
7.3.2.1 Layout: Formal pedestrian walkways should be laid out along axis lines relating to adjacent building entry plazas or streets. Walkways should be sized to accommodate anticipated pedestrian use. The minimum width of a walk should be six feet, with a maximum width of 10-12 feet in high use areas.

7.3.2.2 Materials: Formal sidewalks should be troweled or broom finished grey concrete with appropriate expansion and construction joints. In high visibility areas, a medium brown color brick with grouted joints should be used as edgers or inset panels. Brick walks should have sand swept, dry laid joints. Paving patterns should be limited with the following being recommended:

Edgers:	double header course on each side
Inset:	running bond perpendicular to traffic flow
Full Walk:	running bond perpendicular to traffic flow with double header on each side

7.3.2.3 Building Entrances: Sidewalk at building entrances should be widened to six to 12 feet to create a visual statement and sense of place, while providing space for informal meeting and conversation areas.

7.3.2.4 Handicapped Access: All major pedestrian pathways should be designed to accommodate wheel chairs, especially at building entrances and access to parking lots. Gradients must not exceed seven percent.



Full Sidewalk

7.3.2.5 Seating Areas: Seating areas should be placed at regular intervals along formal walks. When located, seating areas should be located parallel to the walk and facing the flow of pedestrian traffic. Benches should be located at least 12 inches back from the edge of the walk so they do not impede pedestrian movement. Refer to Section 7.4 for additional information.

7.3.2.6 Landscape Planting: Landscape plantings should be used and incorporated in walkway design to create an enjoyable pedestrian environment. Refer to Section 4.6 for additional information.

7.3.2.7 Lighting: Pedestrian scale lighting should be used to provide safety and security when walks are not aligned with streets. Refer to Section 7.5 for additional information.

7.3.3 Formal Area Pedestrian Nodes

7.3.3.1 Layout/Size: Formally designed pedestrian node areas should be laid out in geometric forms along building axis lines and in a manner which complements the building's lines and forms. Locate in areas for maximum year-round use. Provide for shade during summer months and maximum solar gain during winter months. Provide adequate sized gathering areas to accommodate anticipated user's need.

7.3.3.2 Materials: Formal node areas should be aesthetically compatible with material used in adjacent buildings and walks. Paving materials should be selected from the following list as appropriate for the project.

1. Medium brown brick in running bond pattern.

2. Broom-finished concrete with double header course edger and bands.

7.3.3.3 Seating Areas: Seating areas should be located in formally designated pedestrian node areas. Such arrangements should be removed from the main flow of pedestrian circulation and located in a geometric or linear configuration which compliments the overall design of the plaza. Benches should be the base standard and in an arrangement which faces views of focal points or pedestrian or vehicular traffic. When possible group benches in arrange-

ments which allow user interaction such as L-shaped configurations. Provide a choice of sun and shade locations.

7.3.3.4 Landscape Planting: Landscape plantings should be used and incorporated in node design to create an enjoyable pedestrian environment. Refer to Section 4.6 for additional information.

7.3.3.5 Pedestrian scale lighting should be provided for safety and security when node areas are to be used at night. Refer to Lighting Standards, Section 7.5 for additional information.

7.3.4 Informal Area Pedestrian Walkways

7.3.4.1 Layout: Informal walkways should be laid out to relate building entrance, plaza areas, or streets but may be less direct and curvilinear than formal walkways. Walkways should be sized to accommodate anticipated pedestrian use. The minimum width of a walk should be six feet, becoming as wide as 10-12 feet in high use areas.

7.3.4.2 Material: Walks should be troweled or broom finished concrete with appropriate expansion and construction joints. In high use/visibility areas, concrete pavers may be used as a edger or internal band treatment. When pavers are used, the following patterns should be used.

1. Edger: double header course on each side

2. Band in middle of walk--running bond perpendicular or parallel with pedestrian flow.

7.3.4.3 Building Entrances: Sidewalk at building entrances should be widened to six to 12 feet to create a visual statement and sense of place, while providing space for informal meeting and conversation areas.

7.3.4.4 Handicapped Access: All major pedestrian pathways should be designed to accommodate wheel chairs, especially at building entrances and access to parking lots. Gradients must not exceed seven percent.

7.3.4.5 Seating Areas: Seating areas should be placed at key points along formal walks, including intersections and across from building entrances. When located, seating areas should be located parallel to the walk and facing the

flow of pedestrian traffic. Benches should be located at least 12 inches back from the edge of the walk so they do not impede pedestrian movement. Refer to Section 7.4 for additional information.

7.3.4.6 Landscape Planting: Landscape plantings should be used and incorporated in walkway design to create an enjoyable pedestrian environment. Refer to Section 4.6 for additional information.

7.3.4.7 Lighting: Pedestrian scale lighting should be used to provide safety and security when walks are not aligned with streets. Refer to Section 7.5 for additional information.

7.3.5 Naturalized Pedestrian Walkways

7.3.5.1 Layout: Walkways in naturalized areas are primarily used for recreational functions. The course of the walkway should have a meandering, curvilinear alignment. To avoid a rigid appearance, paths should have a minimum setback from the road edge of 10 feet with 20 feet preferable.

7.3.5.2 Size/Width: Walkways should have a minimum width of six feet. Where paths are to be used bicyclists, the width should be increased an additional three feet for each bike lane.

7.3.5.3 Materials: Walks in naturalized areas should be constructed of bituminous asphalt.

7.3.5.4 Handicapped Access: Walkways should be accessible to wheel chair uses. Provide curb cuts at all street crossings. Gradients should not exceed seven percent.

7.3.5.5 Seating Areas: Seating areas should be placed at key points along walks. When located, seating areas should be located off the walk to provide small sitting areas or parallel to the walk. Benches should be located at least 12 inches back from the edge of the walk so they do not impede pedestrian movement. Refer to Section 7.4 for additional information.

7.3.5.6 Landscape Planting: Landscape plantings should be used and incorporated in walkway design to create an enjoyable pedestrian environment. Refer to Section 4.6 for additional information.

7.3.5.7 Lighting: Pedestrian scale lighting should be used to provide safety and security when paths are to be used at night. Refer to Section 7.5 for additional information.

7.4 Site Furnishings

Site furnishings include utilitarian items such as benches, trash receptacles, bike rack, tree grates, walls and static displays. Site furnishings should fulfill an intended function and contribute positively to the visual quality, image and identification of the base.

7.4.1 Relation to the Theme Plan. Site furnishings are selected for their compatibility including materials, forms and colors, and harmonize with building and open areas in each theme development area.

7.4.2 Benches. Benches should be installed in areas of high probable use, including building entries, pedestrian nodes and walkways. Orient seating to user needs for socializing and relaxing and provide pleasant setting and views.

7.4.2.1 Benches similar to the one manufactured by Landscape Forms, Plexus collection, are recommended for formal and informal areas. All benches should be black in color

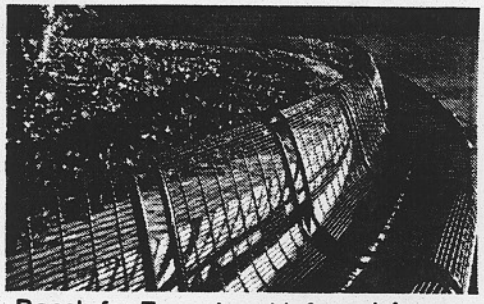
7.4.2.2 Wood slat benches similar to the one manufactured by Victor Stanley, Inc., Model No. 8 and Model 4 are recommended for use in naturalized areas.

7.4.2.3 Wood tables and seats similar to the one manufactured by Victor Stanley, Inc., Model No. CP-4, are recommended for use in informal areas where outdoor eating areas are desired.

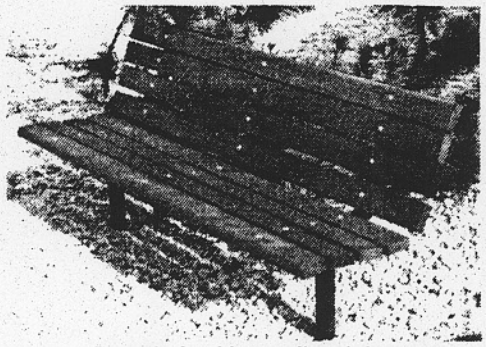
7.4.2.4 Wood picnic tables similar to the one manufactured by Victor Stanley, Inc., Model No. WT-6, are recommended for use in naturalized areas where outdoor eating areas are desired.

7.4.3 Trash Receptacles. Trash receptacles which are compatible with other furnishings should be located in high use areas including building entrances, pedestrian nodes, walkways, and recreation areas.

7.4.3.1 Steel trash receptacles similar to the one manufactured by Landscape Forms, Model No. PK5002-20-42 are recommended for use in formal and informal areas. All receptacles should have a powder coat black color finish.



Bench for Formal and Informal Areas



Bench for Naturalized Areas

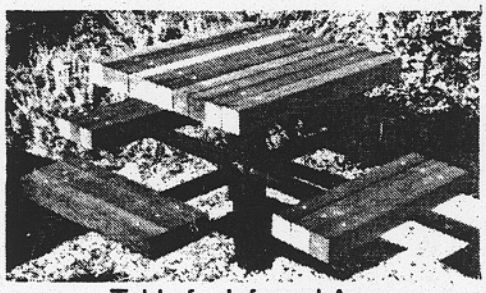


Table for Informal Areas

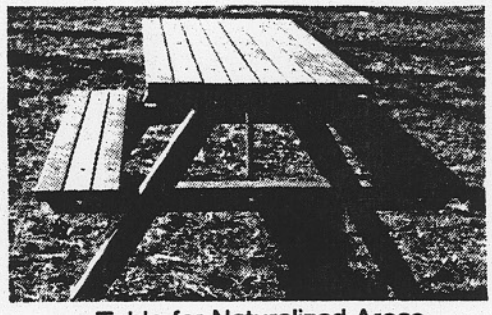


Table for Naturalized Areas

7.4.3.2 A wood slat trash receptacle similar to the one manufactured by Victor Stanley, Inc., Model No. R-316 with steel dome top is recommended for use in naturalized areas.

7.4.4 Bike Racks. Bike racks should be provided in community and commercial areas, parks, and near buildings where there is a high number of bicyclists. Bike racks should be located on paved areas where they will not impede pedestrian movement or block building entrances.

7.4.4.1 A low profile, concrete bike rack similar to the one manufactured by Alpha Precast - Bicycle Base is recommended for use in all areas of the base.

7.4.5 Tree Grates. Tree grates should be used when installing trees in paved areas such as pedestrian plazas, walks, and at entrances to buildings. Tree grates and planting pits should be a minimum of 5'x5'.

7.4.5.1 Tree grates similar to the grate manufactured by Neenah Foundry Co., Model No. R8752-A, 180° square, is recommended for use in all areas of the base.

7.4.6 Walls. Walls are used where strong physical separation is required for visual screening, security, or enclosure of a space. Walls should not dominate a space but rather provide a natural foreground and harmonize with the surrounding building and areas.

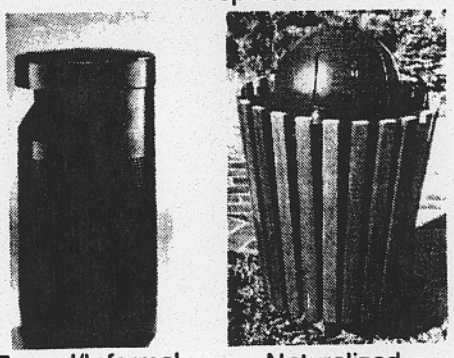
7.4.6.1 Refer to the Whiteman Design Policy for wall standards.

7.4.6.2 Walls used to screen service areas or trash enclosures should incorporate landscape plantings to help reduce the visual appearance of these areas.

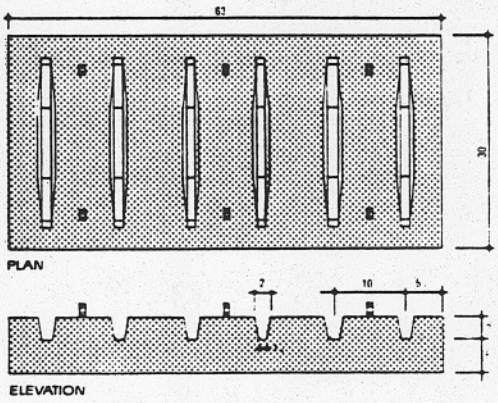
7.4.7 Static Displays and Monuments. Static displays and monuments should be carefully designed and integrated into areas of the base if they are to serve as visual focal points. Landscape plantings that are in scale with the display or monument should be used to provide a visual backdrop and integrate the element into the landscape.

7.4.8 Planters. When planted with annual flowers, movable planters may be used outside of building entrances in formal and informal areas to provide seasonal color and

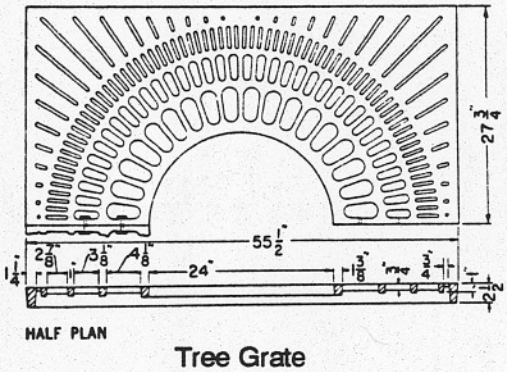
Trash Receptacles



Formal/Informal Naturalized



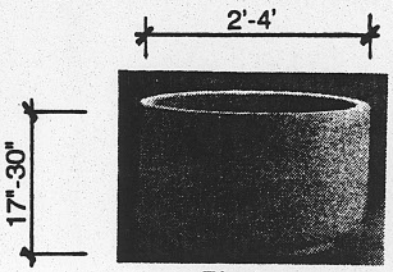
Bike Rack



Tree Grate

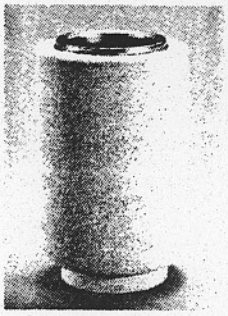
interest. Planters should be located so they do not impede pedestrian movement. Several planters should be grouped together and vary in size.

7.4.8.1 A round planter similar to the one manufactured by Dura Art Stone, Design Model D, should be used. The planters should have a tan color with a light sand-blasted finish. Planters should have a minimum height of 17 inches.



Planter

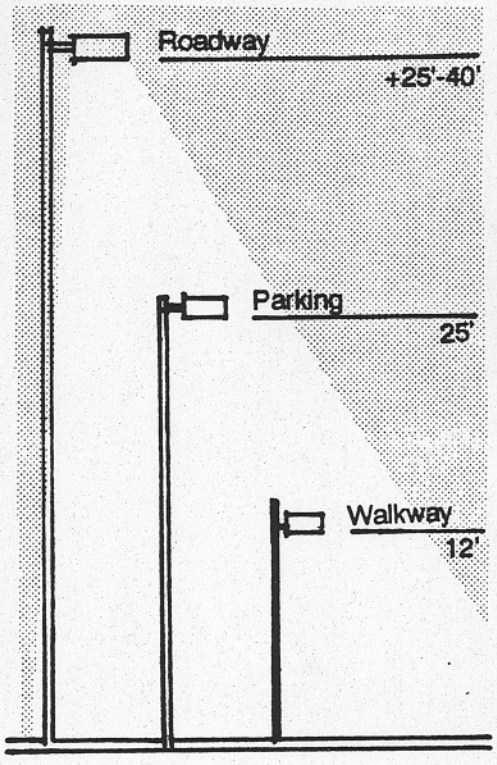
7.4.8.2 A freestanding ash urn similar to the one manufactured by Dura Art Stone, Model AU-D, should be used in conjunction with or without planters at entrances to buildings. The color and finish should match the planter.


Ash Urn

7.4.9 Raised Planters. Raised planter walls may be used adjacent to building entrances or to define pedestrian nodes. Planters should be 18"-22" in height by 12" wide to provide additional outdoor seating areas. The finish material should be light grey concrete with a medium sand-blasted finish.

7.5 Lighting

Lighting systems should provide adequate illumination for nighttime safety, security and pathfinding. The use of standard light fixtures and poles, illumination levels, and light sources can provide uniformity and improve the appearance of the base during the day as well as at night.



7.5.1 Relationship to the Theme Plan. In order to achieve visual continuity in lighting design, the following design standards should be used consistently throughout the base.

7.5.1.1 Roadway lighting: Roadways are best illuminated by lights mounted on poles on an average height of 25-40 feet. The height is dependent on areas of use and spacing. High pressure sodium should be used as the primary light source. Anodized dark bronze aluminum shoe box type fixtures and square poles are recommended to be used along all streets to be illuminated at night. Existing brushed aluminum pole and cobra head fixture should be painted dark brown to be visually compatible with the recommended lighting. This will also help reduce their visual appearance during the day.

7.5.1.2 Parking Lot Lighting: Parking lot lighting should be anodized dark bronze aluminum shoe box type fixtures and square tapered poles with a mounting height of 25 feet. High pressure sodium should be the standard light source.

7.5.1.3 Walkway and Plaza Lighting: Anodized dark bronze aluminum shoe box type fixtures mounted on 12-15 foot square poles should be used along walks and plazas. Metal Halide should be the standard light source.

7.5.1.4 Illumination Levels: Adequate lighting should be provided in areas that receive heavy pedestrian and vehicular use at night. Illumination levels are based on expected use and follow IES Lighting Handbook Standards.

	High Activity Areas	Medium Activity Areas	Low Activity Areas	Security Areas
Building Entrances	5.0	1.0	0.5	5.0
Parking Lots	2.0	1.0	0.5	2.0
Roads				
Primary	2.0	1.4	1.0	2.0
Secondary	1.2	0.9	0.6	1.2
Tertiary	0.9	0.6	0.4	0.9
Pedestrian Areas	0.9	0.6	0.2	2-4

Minimum Average Footcandles for Activity Areas

7.5.1.5 Suggested Sources: The following lighting manufacturers are recommended to provide fixtures and poles:

Kim Lighting	Devol Lighting Corp.
McPhilben	QL, Inc.

7.6 Signing

An effective sign system can make the base and facilities more inviting, attractive and easier to use.

7.6.1 Relationship to the Theme Plan. An effective sign system provides a hierarchy of sign types that effectively direct personnel and visitors from gate areas to their final destinations on the base. Signing should be standardized and applied in a coordinated manner throughout the entire base. Refer to Air Force Sign Standards AP 88-40 for additional information.

7.6.2 Types of Signs. Three categories of signs are needed: (1) identification, (2) directional, and (3) regulatory. Informational and motivational signs may be used as needed, but they should not add confusion and clutter to the base.

7.6.2.1 Identification Signs: These signs identify the base entrance, major facilities, principal organizations and important buildings. Recommended colors to be used are a tan panel with dark brown helvetica letters. Signs for nonmilitary functions (credit union, banks, fast food operations, etc.) should follow AFP 88-40 which prohibits use of private signs. Landscape plantings should be used as a backdrop to integrate the sign into the surroundings.

7.6.2.2 Directional Signs: Effective directional signs avoid confusion and frustration experienced by motorists in finding major building complexes of facilities. Directional signs should identify areas or activities of interest to new personnel and visitors, such as the commissary, hospital, in processing, etc. The legibility, location, and ordering of information is critical to their effectiveness.

No more than four destinations should appear on one sign. All graphics, messages, arrows and rules should be white reflective material to be visible at night. The background color should be dark brown, with upper- and lowercase Helvetica lettering.

7.6.2.3 Regulation Signs: These signs establish the rules for vehicular travel, parking and exhibit base regulations. Included in this category are speed limit, lane usage, turning movement, and base warning or restriction signs. Standard highway signs should conform with the Manual of Uniform Traffic Control Devices. Base warning

signs should conform with TM AFP 88-40. Signs are typically read and black lettering on a white background.