

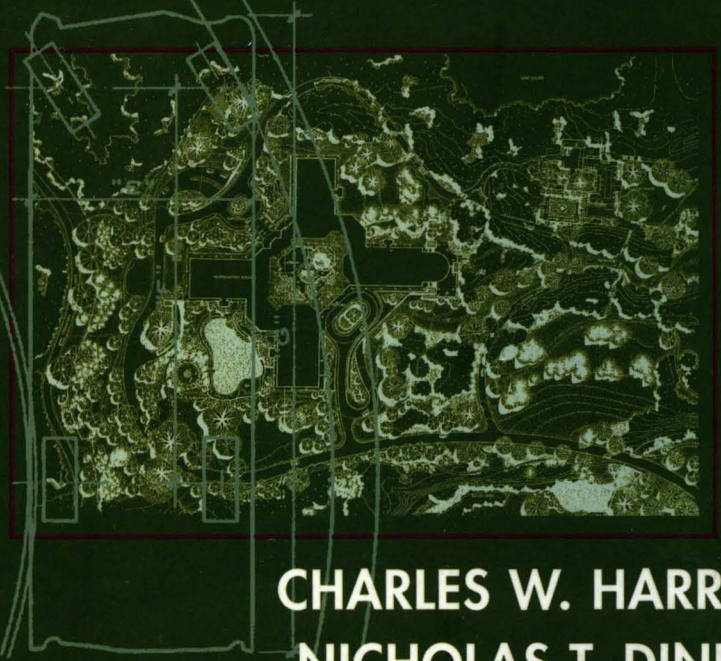
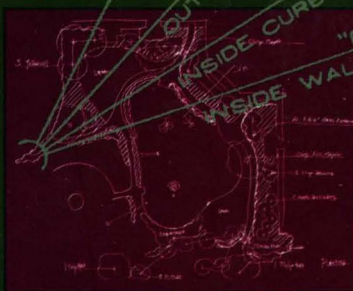
**TIME-SAVER**

**STANDARDS**

**SECTION-1**

**FOR  
LANDSCAPE  
ARCHITECTURE**

*second edition*



**CHARLES W. HARRIS  
NICHOLAS T. DINES**

**EXTENDED LENGTH VEHICLES  
DIMENSIONS AND TURNING RADII**

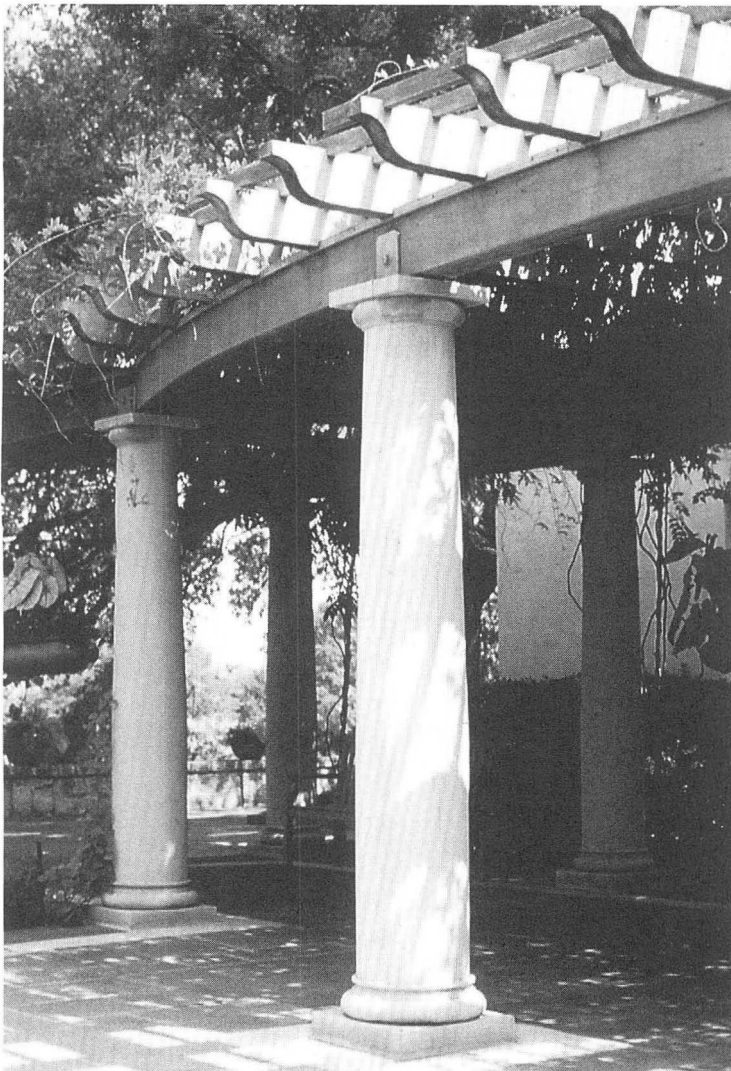
MAKE OF CAR	"A"	"B"	"C"	"D"	"E"	"F"	"G"
Cadillac	30'-0"	28'-6"	18'-11 1/2"	18'-9"	6'-11"	13'-0"	20'-10 1/4"
Dodge	23'-4"	21'-9"	13'-4 1/2"	12'-10 3/4"	6'-8"		18'-4"

# **TIME-SAVER STANDARDS**

## FOR LANDSCAPE ARCHITECTURE:

DESIGN AND CONSTRUCTION DATA

■ **Second Edition** ■



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Nicholas T. Dines

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**SECTION 640****Disturbed Landscapes**

1.0	Introduction . . . . .	640-2
2.0	Reclamation Process . . . . .	640-2
3.0	Protection of Soil, Water Quality, and Adjacent Undisturbed Areas . . . . .	640-4
4.0	Landshaping and Stratigraphy . . . . .	640-11
5.0	Surface Conditioning . . . . .	640-12
6.0	Planting . . . . .	640-17
	References . . . . .	640-19

**SECTION 660****Sound Control**

1.0	Introduction . . . . .	660-2
2.0	Physics of Sound . . . . .	660-2
3.0	Noise . . . . .	660-3
4.0	Noise Estimations and Calculations . . . . .	660-3
5.0	Noise Control Standards . . . . .	660-5
6.0	Control of Noise-Outdoors . . . . .	660-5
7.0	Design Principles . . . . .	660-8
8.0	Design Application (Case Studies) . . . . .	660-10
9.0	Maintenance Considerations . . . . .	660-13
	References . . . . .	660-16

**DIVISION 700 Site Utilities****SECTION 710****Water Supply**

1.0	Introduction . . . . .	710-2
2.0	Standards and Criteria . . . . .	710-2
3.0	Sources of Water . . . . .	710-5
4.0	Constraints on Well Development . . . . .	710-11
5.0	Groundwater Flow Analysis . . . . .	710-14
6.0	Well Recharge Area Analysis . . . . .	710-15
7.0	Reservoir Design Considerations . . . . .	710-16
	References . . . . .	710-19

**SECTION 720****Sewage Disposal**

1.0	Introduction . . . . .	720-2
2.0	Description of Sewage System Processes . . . . .	720-2
3.0	System Alternatives . . . . .	720-2
4.0	Design of Septic Tanks and Leaching Systems . . . . .	720-7
5.0	Aerobic Systems with Surface Infiltration . . . . .	720-13
6.0	Aerobic Systems with Evapotranspiration Systems . . . . .	720-15
7.0	Aerobic Systems with Surface Water Discharge . . . . .	720-15
	References . . . . .	720-16

**SECTION 740****Recreational Water Bodies**

1.0	Introduction . . . . .	740-2
2.0	Evaluative Criteria for Recreational Water Bodies . . . . .	740-2
3.0	Swimming Waters . . . . .	740-2
	References . . . . .	740-6

**SECTION 750****Irrigation**

1.0	Introduction . . . . .	750-2
2.0	Water Sources . . . . .	750-2
3.0	Design Criteria . . . . .	750-3
4.0	Types of Irrigation . . . . .	750-6
5.0	Application and Design . . . . .	750-8

# Construction Documents

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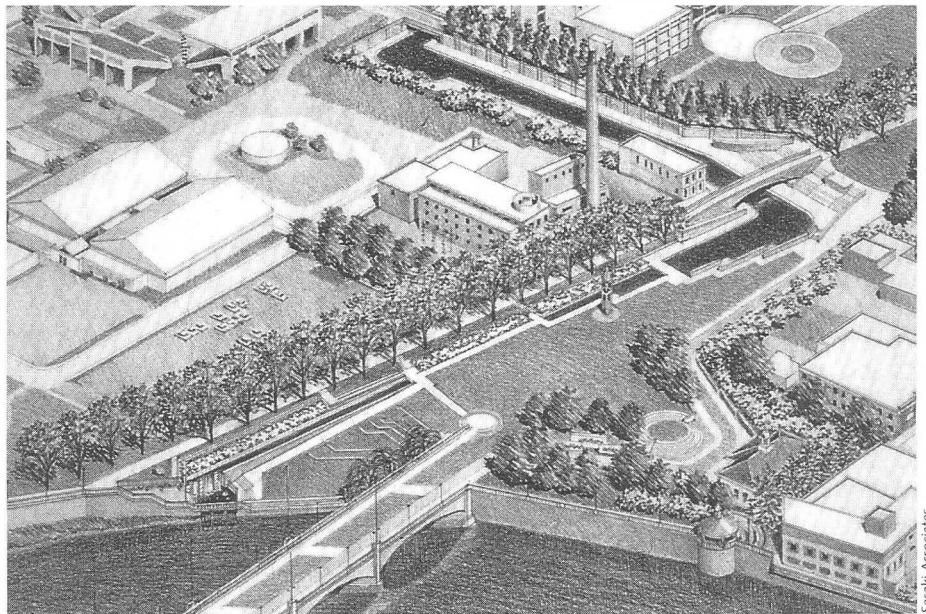
Cambridge, Massachusetts

Nelson Hammer

Hammer Design

Cambridge, Massachusetts

The illustrations for this section were supplied by Sasaki Associates, Inc., Watertown, Massachusetts and Wallace Roberts and Todd, Philadelphia, Pennsylvania.



Sasaki Associates

## CONTENTS

### 1.0 Introduction

#### 1.1 General

#### 1.2 Example Project: Central Indianapolis Waterfront

### 2.0 Construction Documents

#### 2.1 Purpose

Legal Responsibilities  
Cost Estimates

#### 2.2 Construction Operations Represented by Drawings

Preliminary Surveying  
Tree Protection, Temporary Conditions, Erosion Control, and Transplanting  
Clearing, Grubbing, and Demolition  
Topsoil Stripping and Stockpiling

Rough Grading

Finish Grading

Installation of Site Improvements

Planting and Seeding

#### 2.3 Drawing Organization

Sheet Information  
Primary Drawings  
Additional Drawings  
Cover or Index Sheet  
Existing Conditions  
Demolition Plan  
Site Preparation Plan  
Layout and Materials Plan  
Grading and Drainage Plan  
Planting Plan and Details  
Utility Plan  
Site Details and Sections

Plan Enlargements

Road Profiles and Sections

Shop Drawings

Record (As-Built) Drawings

### 3.0 Specifications

#### References

are designated on the drawings for removal by the contractor.

**Topsoil Stripping and Stockpiling:**

The contractor removes all topsoil within the grading limits and stockpiles the soil in whatever areas will be convenient for future respreading at the completion of the project.

**Rough Grading:**

By blasting, trenching, backfilling, and cutting and filling to the proposed new sub-

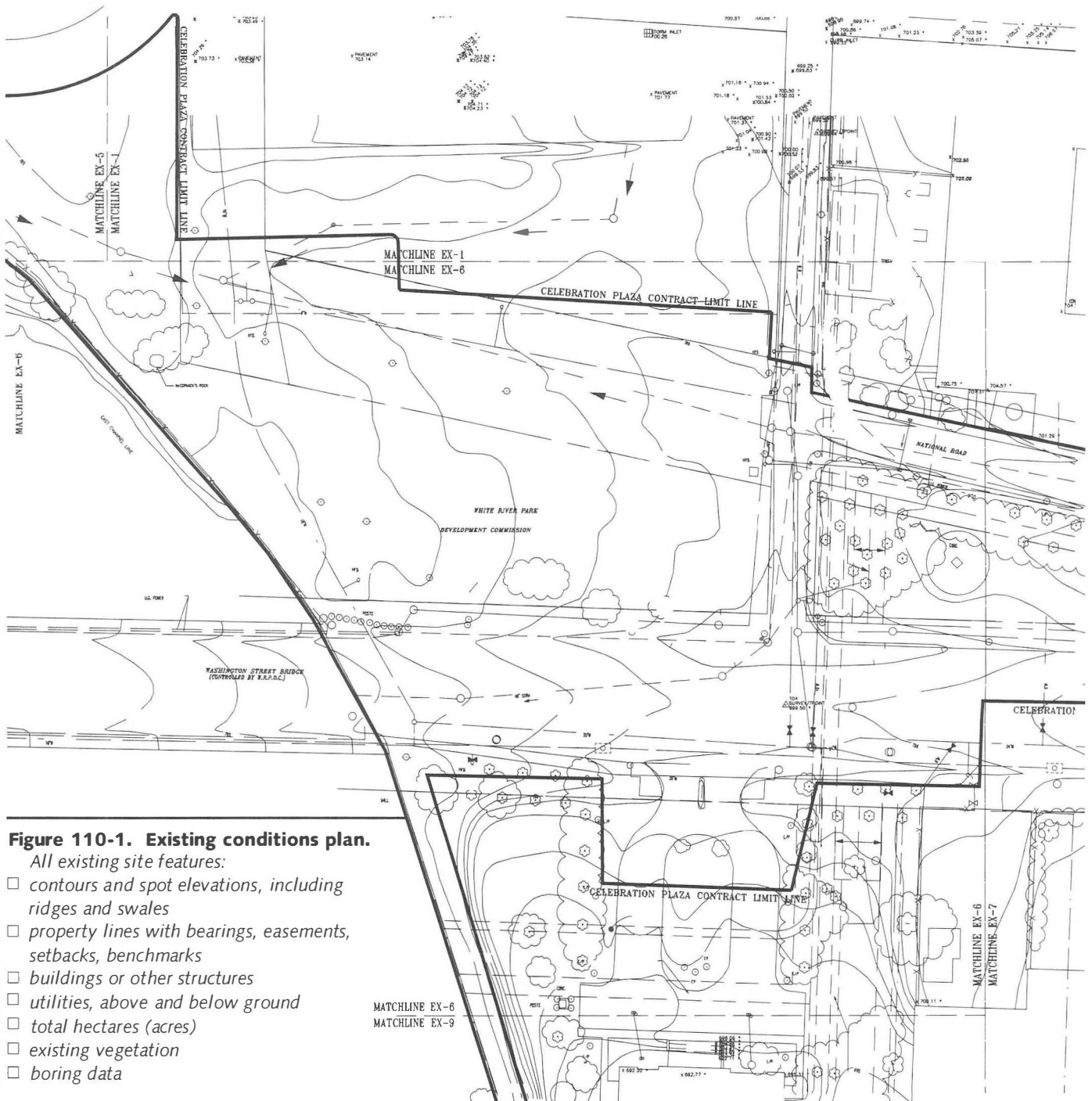
grade, the contractor prepares all subgrade surfaces to receive foundation footings and subbase material for below- and on-grade structures. Trenching for utility lines also occurs at this stage. The top elevations of manholes and drains are set at their approximate grades without final brick course shims or rims.

At the completion of the rough grading, all exterior surfaces are cut or filled to specified rough-grade tolerances [ $\pm 150$  to  $300$  mm (6 to 12 in)]. They are then ready for final grading prior to placing the topsoil

and the wearing surfaces (concrete, asphalt, brick, etc.).

**Finish Grading:**

The project is staked out and resurveyed to establish the finished geometry and the elevations of walks, roads, and other edges. The paved areas are then graded to finer tolerances, and base material is installed. Topsoil is spread over the rough grades in the planted areas to within a tolerance of  $\pm 25$  to  $75$  mm (1 to 3 in).



**Figure 110-1. Existing conditions plan.**

All existing site features:

- contours and spot elevations, including ridges and swales
- property lines with bearings, easements, setbacks, benchmarks
- buildings or other structures
- utilities, above and below ground
- total hectares (acres)
- existing vegetation
- boring data

# Site Construction Operations

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Sarah Gronquist

## CONTENTS

### 1.0 Introduction

- 1.1 General
- 1.2 Operations Objectives
- 1.3 Contractor's Perspective
- 1.4 Common Work Sequence

### 2.0 Contractor's Responsibilities

- 2.1 Bid Preparation
- 2.2 Pricing
- 2.3 Project Organization
- 2.4 Final Clean-up, Inspection, and Payment
  - Punch List
  - Mechanic's Liens

### 3.0 Site Preparation

- 3.1 Preliminary Layout, Survey and Staking

- Plan discrepancies
- Limit-of-Work Line
- 3.2 Site Clearing
  - General Demolition
  - Selective Demolition
  - Clearing and Grubbing
- 3.3 Topsoil Stripping and Stockpiling

### 4.0 Site Improvements

- 4.1 Earthwork
  - Cut Operations
  - Fill Operations
  - Types of Fill
- 4.2 Drainage and Utilities
  - Structures
  - Electrical and Telecommunication Lines
  - Irrigation Systems
- 4.3 Grading

- Rough Grading
- Finish Grading
- 4.4 Paving and Surfacing
  - Aggregate Base Placement
  - Wearing Surface Placement
- 4.5 Site Furnishings
- 4.6 Planting Installation
  - Trees
  - Shrubs
  - Groundcovers and Herbaceous Plants
  - Seeding and Sodding

### References

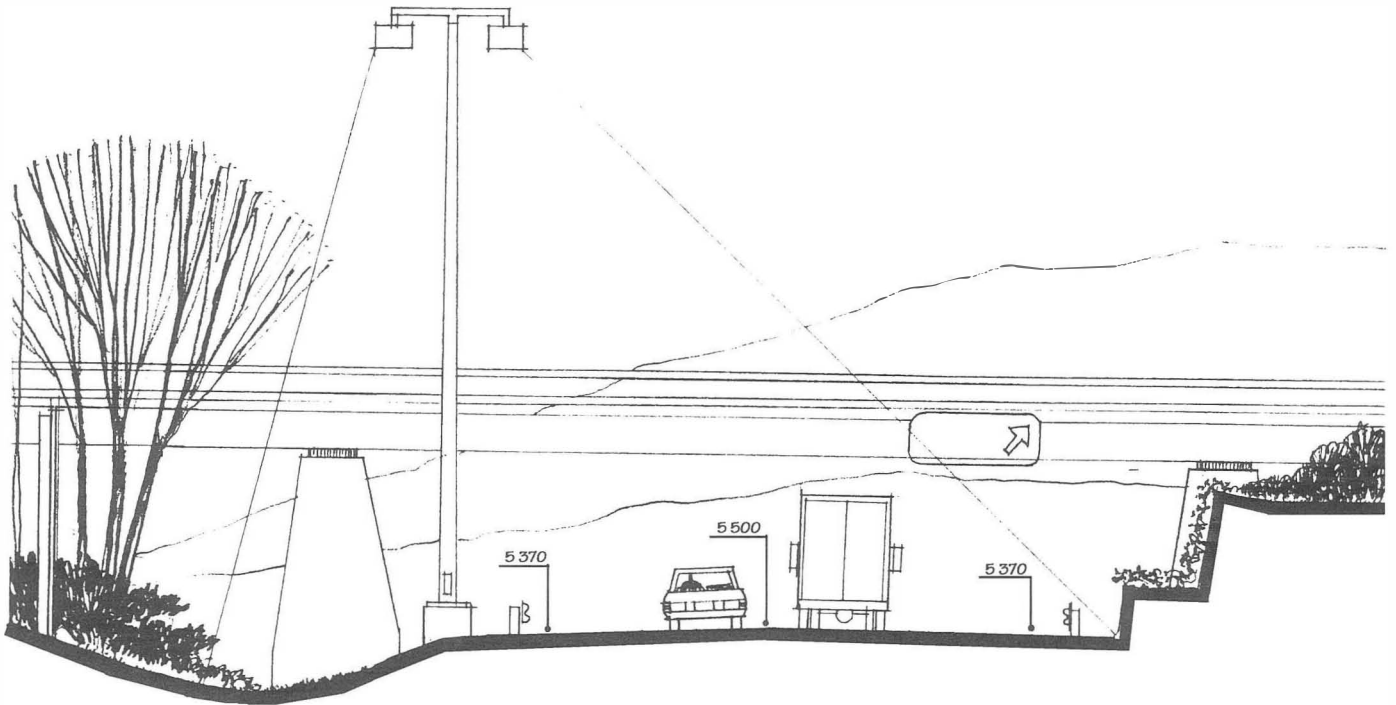


Figure 130-1 a. A typical design cross section emphasizing finished surface elevations.

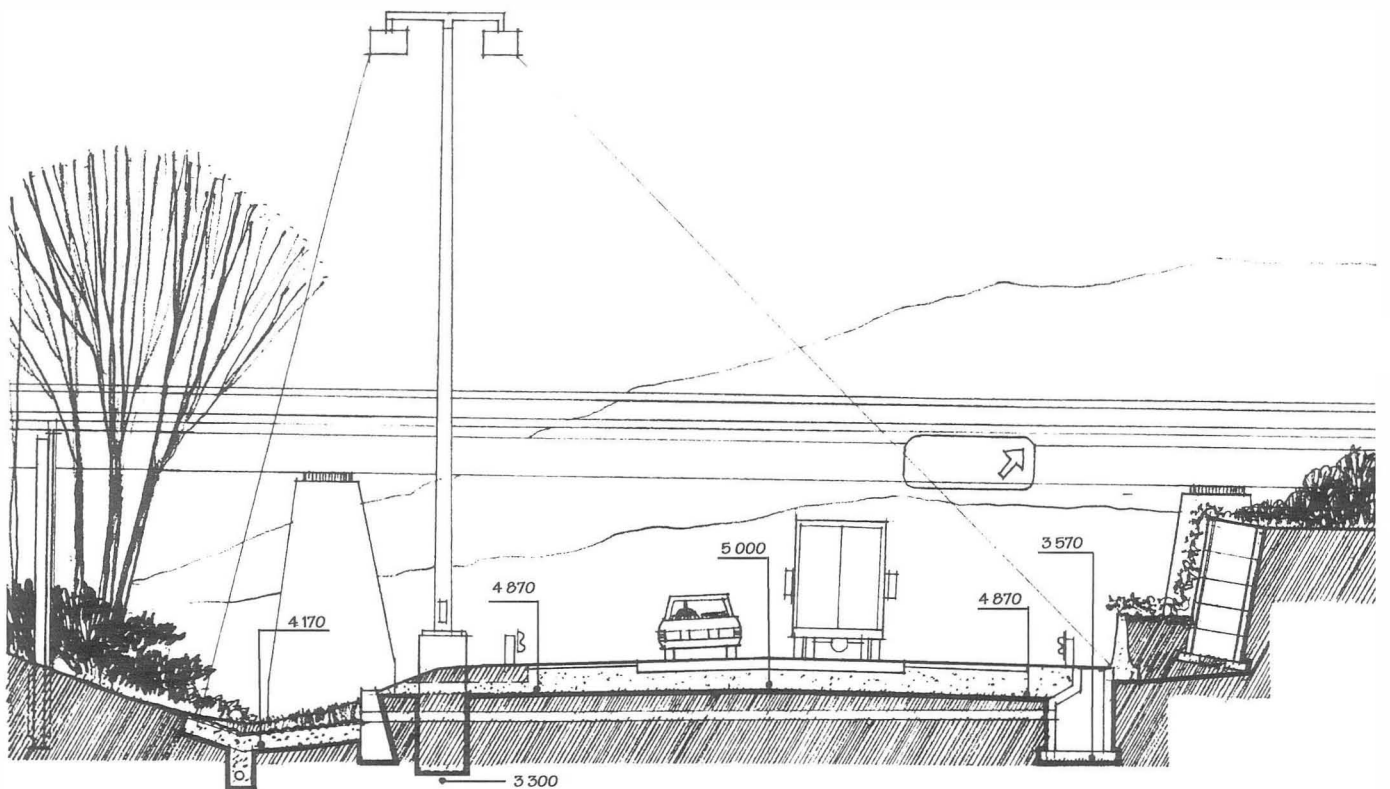


Figure 130-1 b. A contractor's analysis of the same design with emphasis on the subgrade elevations.

# Spatial Standards

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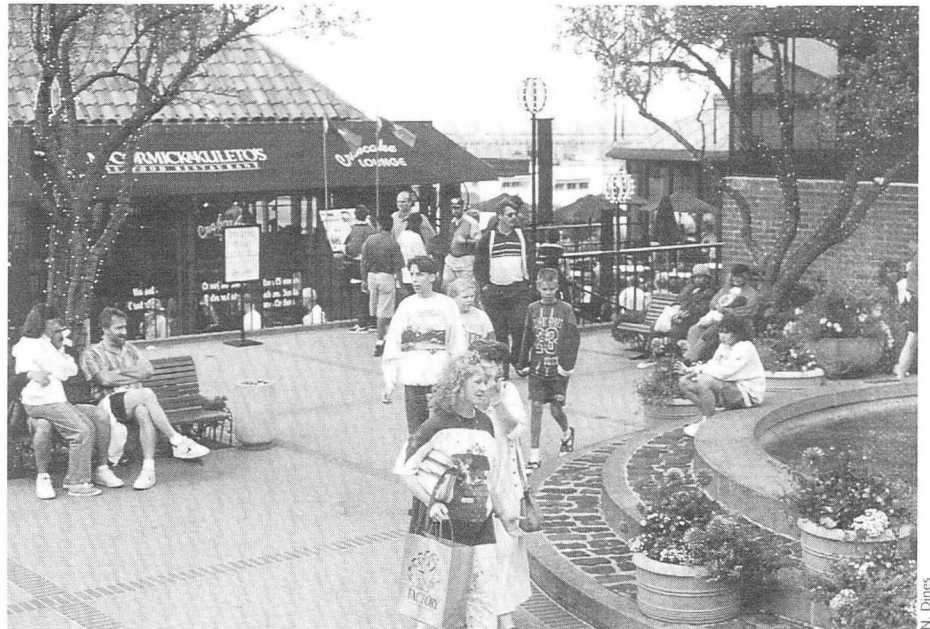
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## CONTENTS

### 1.0 Introduction

### 2.0 Applications

#### 2.1 Human Spatial Settings

Ergonomic Measurements

Peripheral Vision

Intimate Garden Scale

#### 2.2 Vehicular Dimensions and Spatial

Requirements

Automobiles

Parking and Maneuvering Patterns

Parking Dimensions

Trucks and Transport

Boats and Docks

### 3.0 Community Planning Data

### References



1.0 INTRODUCTION

Human spatial standards are derived from ergonomic and cultural data and vary widely across cultures and land-use settings. Standards are often established to provide:

1. Minimal safety clearances (ergonomic/legal)
2. Perceived user comfort (psychological/perceptual)
3. Ceremonial protocol (cultural/ritual)
4. Aesthetic choice (personal/cultural)

Most "normative" standards require cultural adjustment before being applied to a particular design setting. Cultural standards are often referred to as the "hidden dimension," and at times may contradict strictly

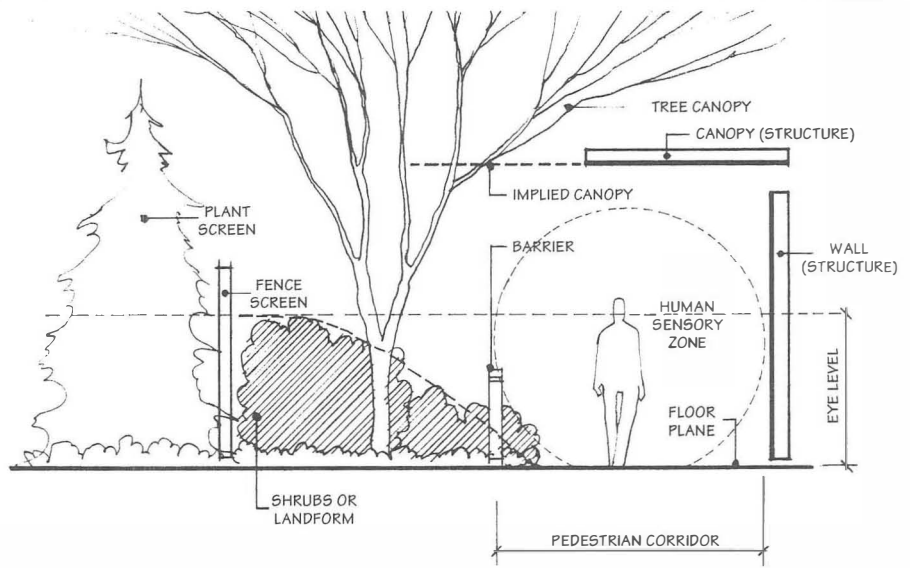


Figure 210-1. Elements of spatial enclosure: floor, wall, canopy, modified by time, light, climate, and intensity of activity.

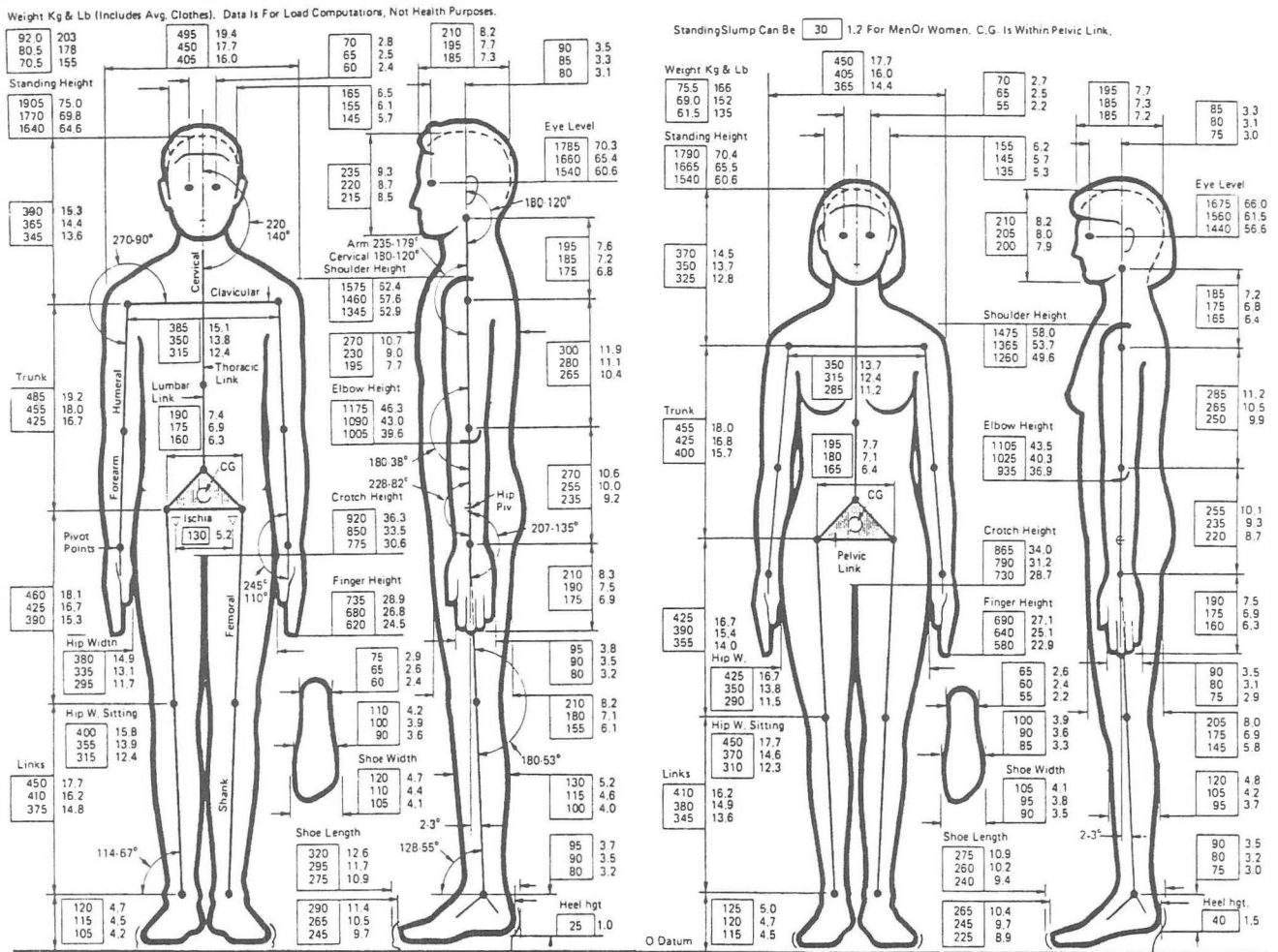


Figure 210-2. Standing adult male and female dimensions. (Anthropometric data provided by Henry Dreyfuss Associates).

# Energy and Resource Conservation

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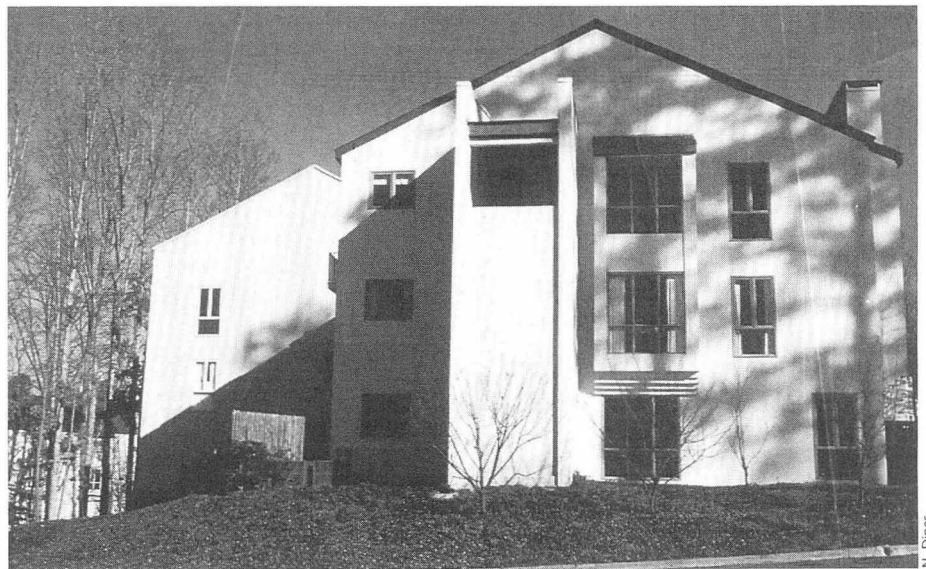
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## CONTENTS

### 1.0 Introduction

### 2.0 Site Analysis and Assessment

### 3.0 Site Development and Layout

#### 3.1 Infrastructure

Transportation

Utilities

#### 3.2 Building and Site Requirements

Land Features

Building Orientation

Site Improvements

Construction Methods and Materials

### 4.0 Bioclimate Fundamentals

#### 4.1 Bioclimatic Strategies

Hot Arid Regions

Hot Humid Regions

Temperate and Cold Regions

#### 4.2 Human Comfort Factors

#### 4.3 Solar Path, Receipt and Shadows

Tree Shadows

Building Spacing

#### 4.4 Wind Management

Shelterbelt Design

Structural Orientation to the Wind

#### 4.5 Earth Shelter Strategies

#### References

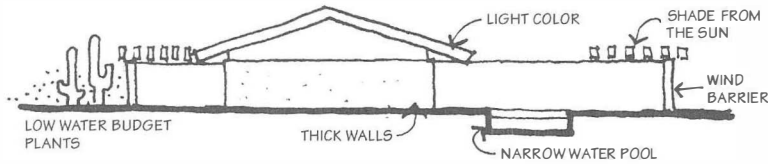


Figure 220-5. General site design strategies for hot arid regions.



Figure 220-6. General site design strategies for hot humid regions.

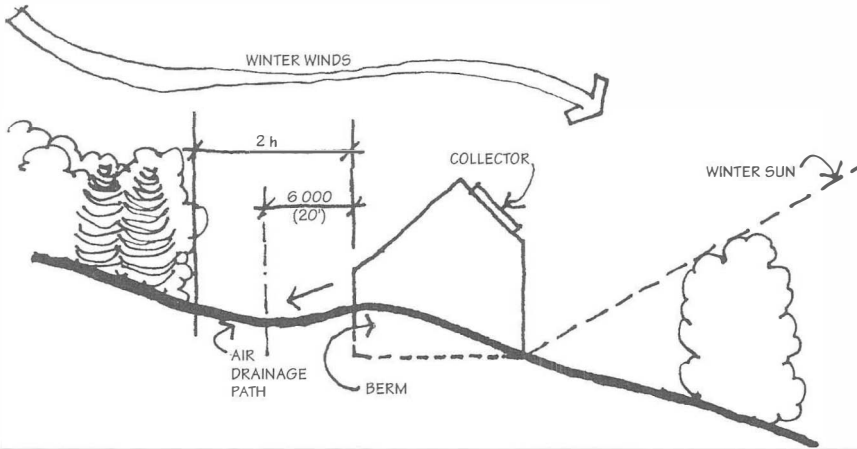


Figure 220-7. General site design strategies for temperate and cold regions.

storing energy, increasing humidity, and diverting desiccating winds.

**Hot Humid Regions:** Characterized by hot summer temperatures [ $>20^{\circ}\text{C}$  ( $68^{\circ}\text{F}$ )] and mild to cool winters [ $>0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ )]. Annual precipitation and humidity are high, with frequent rain showers. Freezing temperatures are uncommon, and relatively minor diurnal temperature fluctuations are typical. Site planning and design should seek to increase shade, cooling from evaporation, and breezes.

**Temperate Regions:** Characterized by hot, often humid, summers [ $>20^{\circ}\text{C}$  ( $68^{\circ}\text{F}$ )] and cold winters [ $<0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ )]. Annual precipitation is fairly high. The region is subject to repetitive freezing/thawing action, and significant seasonal temperature fluctuations are common. Site planning and design should seek to promote shade and evaporative cooling in warm periods, and block winds and promote heat gain in cool periods, without disrupting favorable summer wind pattern.

**Cold Regions:** Characterized by mild summer temperatures [ $>10^{\circ}\text{C}$  ( $50^{\circ}\text{F}$ )] and very cold winters [ $<0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ )]. Annual precipitation is typically low. Region is subject to extreme freezing/thawing action. Site planning and design should seek to control winter winds, and promote solar gain and storage.

Figure 220-2 illustrates a topographic section showing the theoretical "most favorable" microclimate location for each climate region. Hot Arid climates favor the eastern slope base to avoid harsh sun and to receive cool diurnal air drainage for the upper slope. Hot Humid climates favor the top of the eastern slope to avoid harsh west sun and to receive the evaporative cooling effect of winds due to turbulence at the hilltop. Temperate climates are most favorable at the south-east "military crest" to receive both sun and breezes, but to avoid cold winds at the true crest. Cold climates are ideal on the south to south-western lower slope to receive solar radiation and be protected from winter winds, but high

Table 220-01. SUMMARY OF REGIONAL BIOCLIMATIC STRATEGIES

Factors Modified by Landform, Vegetation, and Structures	Climate Zones			
	Hot Arid	Hot Humid	Temperate	Cold
<b>Sun</b>	<ul style="list-style-type: none"> <li>Avoid heat absorbing materials use, thick walls or earthshelters</li> <li>Use pergola and trellis structures for shade</li> <li>Provide large overhangs on buildings</li> <li>Avoid large area of exposed glass</li> </ul>	<ul style="list-style-type: none"> <li>Maximize shade through the use of plantings</li> <li>Use pergola and trellis structures for shade</li> <li>Screened terraces provide relief from direct heating of main structure</li> <li>Provide large overhangs on buildings</li> <li>Use high ceilings and vent all roof systems</li> </ul>	<ul style="list-style-type: none"> <li>Site structures on southerly slopes for solar gain in winter</li> <li>Avoid northern entrances to buildings</li> <li>Plant deciduous trees for afternoon shade</li> <li>Use earthshelters to protect from summer sun</li> </ul>	<ul style="list-style-type: none"> <li>Site structures on southerly slopes for solar gain in winter</li> <li>Cold climate siting benefits from steeper slopes for better solar access</li> <li>Avoid northern entrances to buildings</li> <li>Plant deciduous trees for afternoon shade</li> <li>Use earthshelter to protect from summer sun</li> </ul>
<b>Wind</b>	<ul style="list-style-type: none"> <li>Site structures at toe of slopes for exposure to cold air flows at night</li> <li>Use plant material to block desiccating winds</li> <li>Deflect hot winds with walls and screens</li> </ul>	<ul style="list-style-type: none"> <li>Site structure at top of slope for exposure to breezes</li> <li>Avoid excessive earthmounding that may trap moist air</li> <li>Maximize breezes through use of high canopy trees and with a loose open planting pattern</li> <li>Avoid tall solid walls that block wind</li> </ul>	<ul style="list-style-type: none"> <li>Site structure on middle to upper slope for access to light winds, but protection from high winds</li> <li>Landforms, plants, and structures can be used to divert northerly winter winds while allowing cooling summer breezes</li> <li>Use earthshelters to protect from winter winds</li> </ul>	<ul style="list-style-type: none"> <li>Site structure on middle to lower slope for wind protection</li> <li>Plant coniferous shelter belts to block cold winds</li> <li>Avoid topographic depressions that collect cold air</li> <li>Use earthshelters to protect from winter winds</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>Use moisture conserving plants-xeriscape</li> <li>Limit impervious surface to minimize runoff-porous paving can be used</li> </ul>	<ul style="list-style-type: none"> <li>Avoid siting next to stagnant bodies of water</li> <li>Maximize infiltration of stormwater runoff</li> </ul>	<ul style="list-style-type: none"> <li>Use of retention/detention ponds for stormwater provides for evaporative/cooling of the site</li> <li>Foundations for structures and pavement must drain well to prevent damage from frost/thaw action</li> </ul>	<ul style="list-style-type: none"> <li>Use of retention/detention ponds for stormwater provides for evaporative cooling of the site</li> <li>Foundations for structures and pavement must drain well to prevent damage from frost/thaw action</li> </ul>

# Outdoor Accessibility

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## CONTENTS

### 1.0 Introduction and Purpose

### 2.0 Important Design Concepts

- 2.1 Universal Design
- 2.2 Accessible Route
- 2.3 Graduated Difficulty of Access

### 3.0 Design Considerations for Accommodating Disabilities

- 3.1 Visual Impairments
- 3.2 Mobility Impairments
- 3.3 Hearing Impairments
- 3.4 Manual Impairments
- 3.5 Learning Impairments

### 4.0 Design Elements and Details

- 4.1 Walkways, Street Crossings, and Paved Surfaces
  - General
  - Tactile Warning Strips
- 4.2 Outdoor Stairs and Landings
  - Stairways
  - Landings
- 4.3 Outdoor Ramps

### 4.4 Handrailings

### 4.5 Walls, Benches, and Outdoor Seating

### 4.6 Walkway Furnishings

- Walkway Furnishings
- Bollards
- Chain barriers

### 4.7 Parking and Passenger Loading Zones

### 4.8 Bus Shelters and Lifts

### 4.9 Outdoor Plantings, Lawns, and Gardens

- Gardens
- Plantings
- Lawns
- Gardens

### 4.10 Outdoor Lighting

### 4.11 Signage

- International Symbols
- Placement of Signage

### 5.0 Accessible Recreation

- 5.1 Outdoor Recreation Access Route
- 5.2 Hiking Trails
  - General
  - Signage

### Trail Planning Classification System

### 5.3 Interpretive Trails

- General
- Signage

### 5.4 Outdoor Camping and Picnicking

- Camping
- Picnicking
- Cooking Facilities

### 5.5 Swimming Facilities

- Swimming Pools
- Beaches

### 5.6 Fishing and Boating

- Fishing
- Boating

### 5.7 Spectator Areas

- Additional Recommendations

### 5.8 Parks and Playgrounds

### 5.9 Jogging Paths

### Agencies and Organizations

### References

## 1.0 INTRODUCTION AND PURPOSE

Passage of the Americans with Disabilities Act in 1990 has produced both published legal guidelines and recommendations for access to the U. S. outdoor environment. This section focuses on accessibility within outdoor environments such as parks, playgrounds, gardens, wilderness areas, beaches, and common urban environments. Specific design recommendations for fully accessible environments and additional guidelines based on a number of important design concepts and principles are provided.

Many individuals are unable to independently obtain access to the landscape because of barriers. Barriers in the landscape include designed surfaces which are not wheelchair-negotiable and misplaced bollards which create obstacles undetectable by cane. Yet barriers can often be avoided by creative or simple design solutions which take into account different users' needs. The concept of "Universal Design" has emerged to help designers address issues of concern to the widest possible range of individuals without segregating different users.

Information in this section has been prepared to complement the Uniform Federal Accessibility Standards (UFAS) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG). Currently, the UFAS applies to many federal agencies while the ADAAG applies to the private sector. State or local government entities may follow either set of standards, but a site design must be uniform in application (i.e. the UFAS and ADAAG guidelines cannot be "mixed and matched" within one site).

For further information including specific recommendations, the Office of the Americans with Disabilities Act may be contacted directly. Expert guidance is available regarding the application of the Americans with Disabilities Act, the Americans with Disabilities Act Accessibility Guidelines (ADAAG), and the Uniform Federal Accessibility Standards (UFAS). Contact:

The Office of the Americans with Disabilities Act  
Civil Rights Division  
US Department of Justice  
P.O. Box 66118  
Washington, DC 20035-6118  
1 (800) 514-0301  
1 (800) 514-0383 TTD  
1 (202) 514-6194 (Electronic Bulletin Board)  
website: [www.usdoj.gov](http://www.usdoj.gov)

The Uniform Federal Accessibility Standards (1984) were developed to minimize the differences between the standards previously used by four federal agencies (the General Services Administration, the Department of Housing and Urban Development, the Department of Defense, and the U.S. Postal Service), and the standards recommended for facilities that are not federally funded or constructed. The UFAS include architectural and transportation guidelines as well as a large amount of basic information useful for formulating minimum dimensional criteria for many situations.

The Americans with Disabilities Act Accessibility Guidelines (1991) was subsequently developed by the US Architectural and Transportation Barrier Compliance Board. The ADAAG incorporates ANSI A117.1-1980, which were developed by the American National Standards Institute. The ADAAG sets guidelines for accessibility for the private sector, under the Americans with Disabilities Act of 1990. At this writing, it seems likely that the ADAAG will soon replace the UFAS as the single accessibility guideline standard in the U.S.

Copies of the UFAS standards may be acquired by contacting the US Architectural and Transportation Barriers Compliance Board.

## 2.0 IMPORTANT DESIGN CONCEPTS

Several concepts related to accessibility are important to understand prior to reviewing the guidelines outlined in this section.

### 2.1 Universal Design

Universal Design is a philosophical approach to design which seeks to eliminate barriers while providing access and usability to the broadest possible range of people. A key to Universal Design is becoming aware of the wide variety of disability concerns. Designers following the UFAS or ADAAG standards may find that while the dimensional guidelines are highly useful, following UFAS or ADAAG does not automatically create an accessible or usable space. Understanding different types of impairments and how they might affect access is necessary in order to create usable landscapes. In addition, the guidelines permit flexibility, if equal or greater accessibility can be provided by a different or more creative design solution.

### 2.2 Accessible Route

Providing an accessible route is the most important way to ensure universal access. It connects the primary elements and spaces of a site, parking, entrances, facilities, and buildings. An accessible route must be provided which is continuous and free from obstructions, as specified in the ADAAG section 4.3 Accessible Route. This route must coincide with the route planned for the general public to the maximum extent feasible (Figure 240-1).

The particular site context usually dictates design strategies. Therefore, design considerations for continuous accessibility should emphasize specific elements and details. These elements relate to spaces such as interiors, waiting and rest areas, and parking; specific transition points at building entries and curb ramps; clearances between buildings and on paved surfaces, and details including lighting and signage. Pedestrian circulation systems should include loops rather than dead ends.

### 2.3 Graduated Difficulty of Access

A system of graduated difficulty of access is most applicable to the design and management of outdoor recreational facilities, particularly to hiking and camping areas (See 5.0 Accessible Recreation in this section for further information). The objective is to provide a wide variety of trail types with a range of opportunities and experiences to accommodate or challenge all abilities. The diversity of trail types is characterized by variations in degree of difficulty (with varying surfaces, widths, slopes, cross-slopes, lengths, edges, number of rest stops, etc.). A good system of signage is necessary for user selection of trail type. Such a system does not compromise the recreational experience for anyone, nor segregate users.

## 3.0 DESIGN CONSIDERATIONS FOR ACCOMMODATING DISABILITIES

The range of abilities among people is highly varied. The guidelines in this section address specific categories of impairment and design strategies required to accommodate them. They include visual, mobility, hearing, manual, and learning impairments. Other areas of concern include lack of stamina and extremes in size and weight. Hearing and manual impairments are sometimes accommodated by specific devices. Learning and mental impairments in the outdoor environment are often addressed by clarity of signage or the use

# Natural Hazards: Earthquakes

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## CONTENTS

### 1.0 Introduction

### 2.0 Causes of Earthquakes

- 2.1 Plate Tectonics
- 2.2 Other Causes

### 3.0 Measurement

### 4.0 Effects of Earthquakes

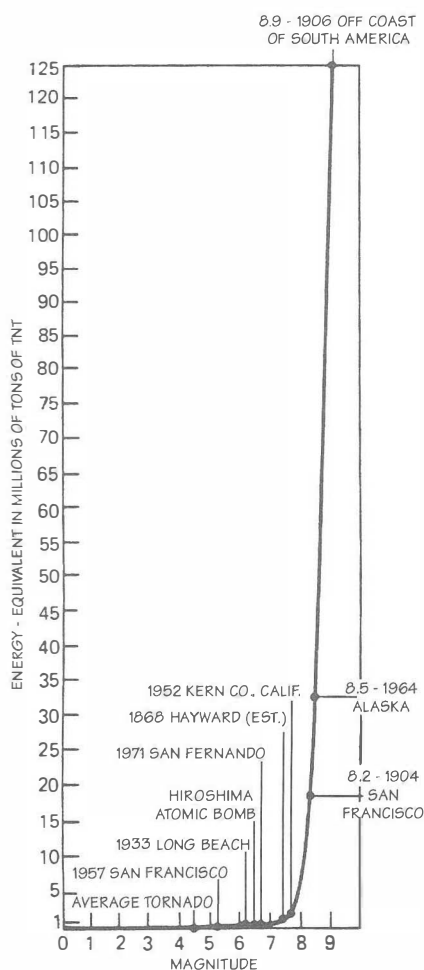
- 4.1 Faults and Fault Displacements
- 4.2 Ground Shaking & Directions of Seismic Waves
- 4.3 Earthquake-Induced Ground Failures
  - Liquification
  - Lateral Spreads
  - Flow Failure

### 5.0 Assessing Earthquake Risks And Losses

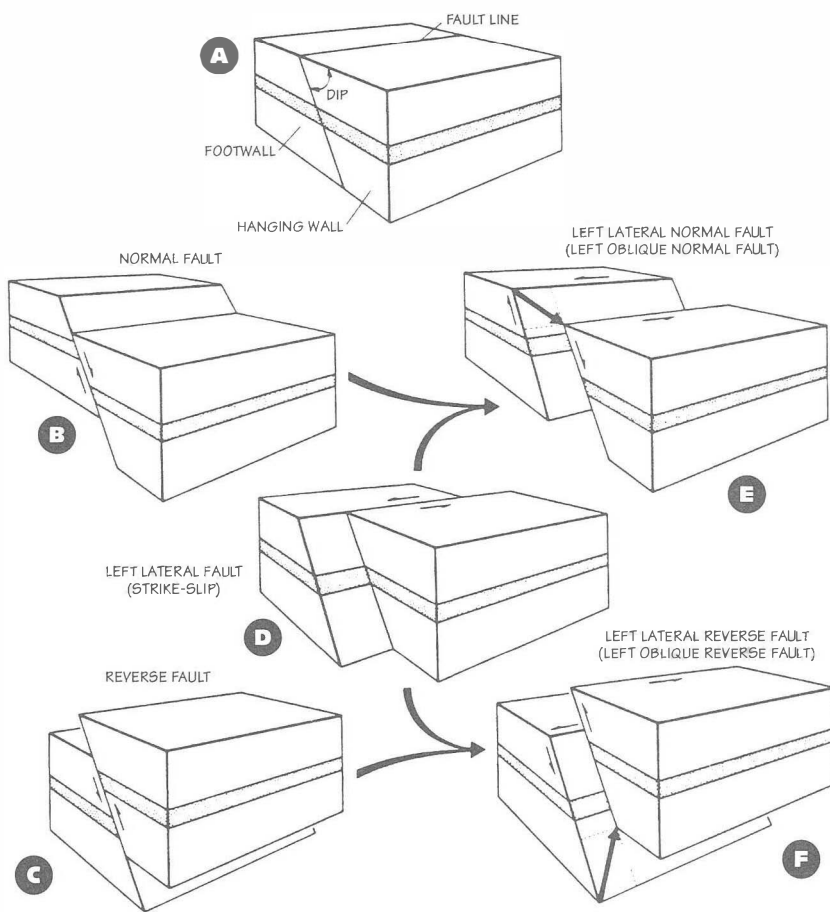
### 6.0 Land Planning, Design & Construction in Seismic Zones

- 6.1 Responses to Potential Ground Failures & Faults
- 6.2 Dangers of Hilltops and Graded Hillsides
- 6.3 Retaining Walls and Similar "Devices"
- 6.4 Bridges and Similar Structures
  - Earth Settlement and Loss of Support
  - Bridge Structures Moved Off Support
- 6.5 Buildings and Other Major Structures
- 6.6 Building Codes

Sources of Technical Information and Assistance  
References



**Figure 252-3. Richter magnitude scale.** This graph shows the amount of energy released by earthquakes of different magnitudes.



**Figure 252-4 Types of faults:** (a) names of components, (b) normal fault, (c) reverse fault, (d) left-lateral strike-slip fault, (e) left-lateral normal fault, and (f) left-lateral reverse fault.

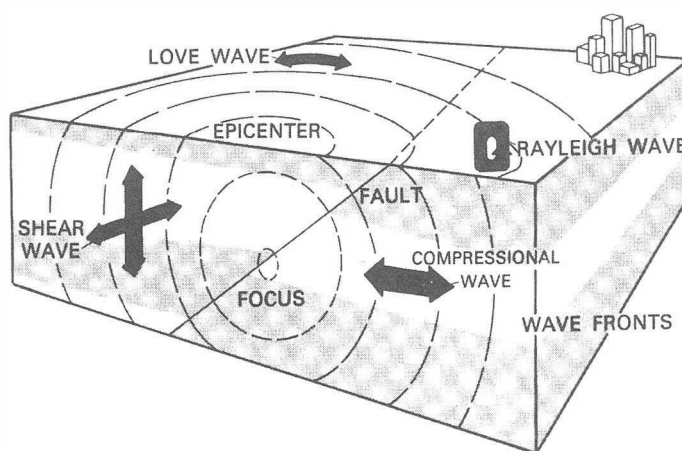
seismic energy increases as it nears the tip of the layer. Again, structures located above this zone can be subjected to much higher seismic energies and become more susceptible to structural and other types of damage.

### 4.3 Earthquake-Induced Ground Failures

There are three major types of ground failures. All have some connection with the liquefaction of underlying geological materials.

#### Liquefaction:

Liquefaction is a temporary condition when seismic waves pass through saturated layers of granular materials (such as sand or silt). These waves cause the voids in this material to collapse, or for a short time, causes the material to behave as a fluid and as a result lose its bearing capabilities. This material must be within about 30 m (100



**Figure 252-5. Directions of vibration** caused by body and surface seismic waves generated during an earthquake. When a fault ruptures, seismic waves are propagated in all directions, causing the ground to vibrate at frequencies ranging from about 0.1 to 30 Hz.

# Natural Hazards: Landslides and Snow Avalanches

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## CONTENTS

### 1.0 Introduction

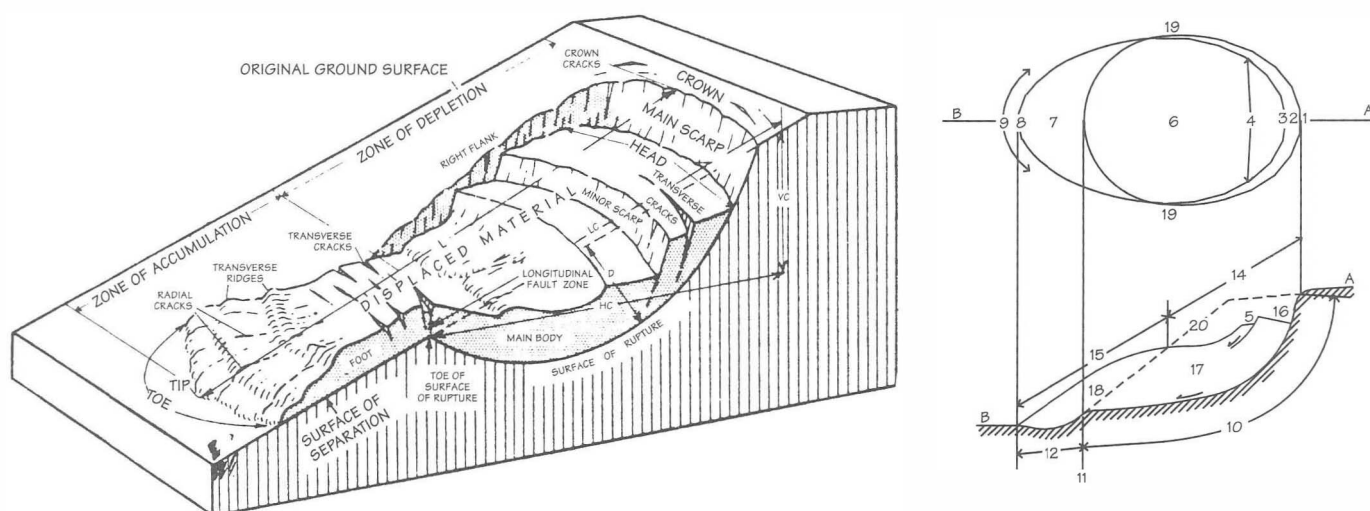
### 2.0 Landslides

- 2.1 Types of Landslides
- 2.2 Causes of Landslides
- 2.3 Estimation of Landslide Hazard
- 2.4 Landslide Loss Prevention and Reduction
  - Regulation
  - Prevention and Correction
  - Stabilization of Soil Slopes
  - Stabilization of Rock Slopes

### 3.0 Snow Avalanches

- 3.1 Causes and Types of Snow Avalanches
- 3.2 Estimation of Avalanche Hazard
- 3.3 Avalanche Loss Prevention and Reduction
  - Regulation
  - Prevention and Correction
- Sources of Technical Information and Assistance
- References





NUMBER	NAME	DEFINITION
1	Crown	Practically undisplaced material adjacent to highest parts of main scarp
2	Main scarp	Steep surface on undisturbed ground at upper edge of landslide caused by movement of displaced material (13) away from undisturbed ground; it is visible part of surface of rupture (10)
3	Top	Highest point of contact between displaced material (13) and main scarp (2)
4	Head	Upper parts of landslide along contact between displaced material and main scarp (2)
5	Minor scarp	Steep surface on displaced material of landslide produced by differential movements within displaced material
6	Main body	Part of displaced material of landslide that overlies surface of rupture between main scarp (2) and toe of surface of rupture (11)
7	Foot	Portion of landslide that has moved beyond toe of surface of rupture (11) and overlies original ground surface (20)
8	Tip	Point on toe (9) farthest from top (3) of landslide
9	Toe	Lower, usually curved margin of displaced material of a landslide, most distant from main scarp (2)
10	Surface of rupture	Surface that forms (or that has formed) lower boundary of displaced material (13) below original ground surface (20)
11	Toe of surface of rupture	Intersection (usually buried) between lower part of surface (10) of a landslide and original ground surface (20)
12	Surface of separation	Part of original ground surface (20) now overlain by foot (7) of landslide
13	Displaced material	Material displaced from its original position on slope by movement in landslide; forms both depleted mass (17) and accumulation (18)
14	Zone of depletion	Area of landslide within which displaced material (13) lies below original ground surface (20)
15	Zone of accumulation	Area of landslide within which displaced material lies above original ground surface (20)
16	Depletion	Volume bounded by main scarp (2), depleted mass (17), and original ground surface (20)
17	Depleted mass	Volume of displaced material that overlies surface of rupture (10) but underlies original ground surface (20)
18	Accumulation	Volume of displaced material (13) that lies above original ground surface (20)
19	Flank	Undisplaced material adjacent to sides of surface of rupture; compass directions are preferable in describing flanks, but if left and right are used, they refer to flanks as viewed from crown
20	Original ground surface	Surface of slope that existed before landslide took place

Figure 253-1. Common features of a landslide.

# Site Grading

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## CONTENTS

### 1.0 Introduction

- 1.1 Importance of Grading
- 1.2 Functional and Aesthetic Reasons for Grading

### 2.0 Standards

- 2.1 Abbreviations on Grading Plans
- 2.2 Methods of Expressing Slope
  - Percentage (of Slope)
  - Proportion (of Slope)
  - Degree (of Slope)
  - Spot Elevations
- 2.3 Making a Contour Map
  - Field Survey
  - Plotting Contours

### 3.0 Grading Concepts

- 3.1 Schematic Grading Alternatives for a Defined Area
  - Perimeter Edge Level
  - Two Perimeter Edges Level
  - Entire Area Level
- 3.2 Schematic Grading Alternatives for Open Areas
- 3.3 Preparing a Site Grading Plan
  - Site Analysis
  - Site Use Concept

- Schematic Grading Plan
- Grading by Spot Elevations
- Preliminary Cut-and-Fill Calculations
- Final Grading Plan

### 4.0 Grading Criteria

- 4.1 General Landscape Elements
  - Recommended Gradients
  - Earth Fill against Buildings
- 4.2 Athletic Fields
  - Recommended Gradients for Outdoor Sports
  - Baseball and Softball
  - Football/Soccer/Field Hockey
  - Court Games
- 4.3 Roadways
  - Grading and Alignment
  - Criteria for Road Design
- 4.4 Details and Special Conditions
  - Swales and Ditches
  - Drainage Channels with Unprotected Soil
  - Culverts and Headwalls
  - Slopes and Berms
  - Stairs and Ramps
  - Existing Trees

- Erosion Control by Grading
- Grading for Porous Paved Surfaces
- Parking Areas

### 5.0 Earthwork Processes

- 5.1 Grading As Part of a Sequential Design Process
  - Preparation of the Site
  - Excavation and Preparation of Subgrade
- 5.2 Earth and Rock Moving Equipment
- 5.3 Information on Soil and Rock Material
  - Sources of Information
  - Typical Soil Profile
  - Rock in Relation to Grading
  - Swell and Shrinkage
  - Weights of Soil and Rock Material
- 5.4 Estimating Cut and Fill
  - General Considerations
  - Estimating Required Grading Quantities
    - Grid or Borrow Pit Method
    - Average End-Area Method
    - Contour Method

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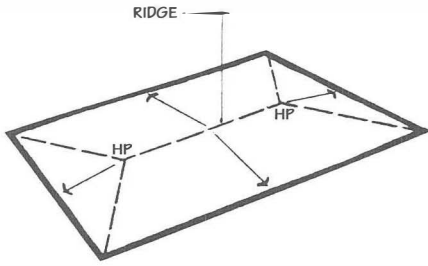


Figure 320-14. Perimeter edge level—drain from ridge line to all edges.

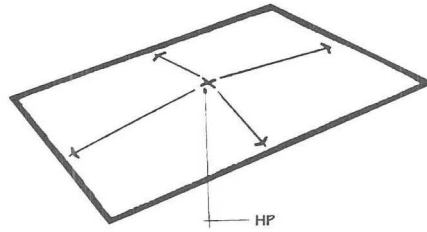


Figure 320-15. Perimeter edge level—drain from single high point.

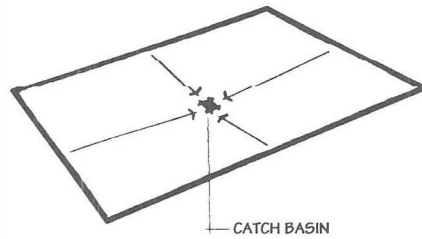


Figure 320-16. Perimeter edge level—slope to center drain inlet.

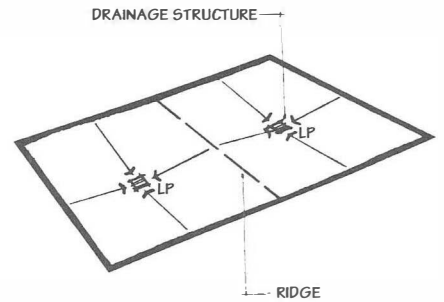


Figure 320-17. Perimeter edge level—all slopes to drain inlets at the same gradient.

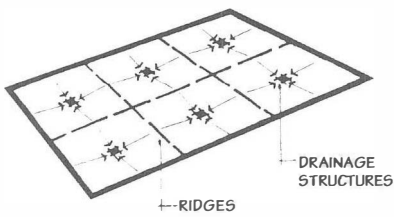


Figure 320-18. Perimeter edge level—all slopes to drain inlets at the same gradient.

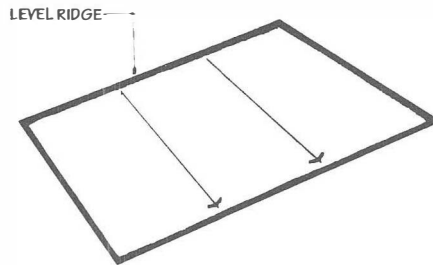


Figure 320-19. Perimeter edge level—slope away at uniform gradient.

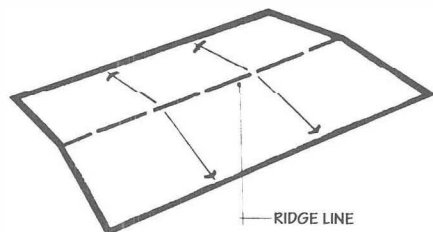


Figure 320-20. Two perimeter edges level—slope from ridge line.

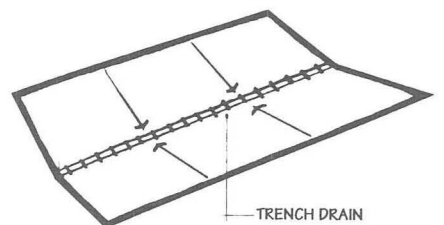


Figure 320-21. Two perimeter edges level—minimum slopes to trench drain.

# Stormwater Management

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## CONTENTS

### 1.0 Introduction

### 2.0 Design Informants

- 2.1 Hydrologic Cycle
- 2.2 Precipitation and Runoff
- 2.3 Watershed Conditions

Land Cover  
Soils and Infiltration  
Imperviousness  
Moisture Conditions  
Slope

### 3.0 Stormwater Design Issues

- 3.1 Flood Protection
  - Minor System
  - Major System
- 3.2 Water Quality Protection
  - Sediment
  - Oxygen Demand
  - Nutrients
  - Heavy Metals
  - Chemical Contaminants
  - Pathogens
  - Thermal Pollution
- 3.3 Groundwater Recharge

### 3.4 Soil Stability

### 3.5 Wildlife Habitat

### 3.6 Water Supply

### 3.7 Quality-of-Life

### 4.0 Design Procedures

#### 4.1 Data Gathering & Mapping

Rainfall Data  
Storm Works and Flow Data  
Topography  
Land Cover  
Soils

#### 4.2 Bedrock and Water Table Depths

#### 4.3 Base Line Runoff Analysis

Watershed Boundary Delineation  
Soil-Cover Classification

#### 4.4 Schematic Design Strategies

Reproducing Pre-Development  
Hydrological Conditions  
Place Development in Least  
Critical Areas  
Fit Development to Terrain  
Utilize the Natural Drainage System

#### 4.5 Types of Runoff Analyses

### 5.0 Runoff Calculations

#### 5.1 Runoff Terms

#### 5.2 Converting Rainfall to Runoff

#### 5.3 Design Storms

U.S. Weather Bureau Maps  
Steel Formula

#### 5.4 Time of Concentration Techniques

Sheet Flow  
Shallow Concentrated Flow  
General Overland Flow

#### 5.5 Soil Conservation Service Runoff

Curve Number Method (U.S. Units)  
SCS Runoff Volume Calculations  
SCS Curve Numbers  
SCS Graphical Peak Discharge  
Calculations

#### 5.6 Rational Method

Applications and Limitations  
Runoff Coefficients  
Peak Discharge Calculations

#### 5.7 Small Storm Hydrology

Schueler's Short Cut Method  
Small Storm Hydrology WQV Method

# Pedestrian Circulation

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Kyle D. Brown

## CONTENTS

### 1.0 Introduction

- 1.1 *General*
- 1.2 *The Pedestrian Experience*
  - Convenience
  - Amenities
  - Spatial Considerations
  - Sensory Stimuli and Related Considerations

### 2.0 Physical Characteristics of the Pedestrian

- 2.1 *Dimensional Criteria*
  - Human Dimensions and Activity
  - Forward Spatial Bubbles
- 2.2 *Movement Criteria*
  - Walking Rates
  - Acceptable Walking Distances

Pedestrian Density Criteria

- 2.3 *Visual Criteria*
  - Eye Levels and Cone of Vision
  - Visual Perception

### 3.0 Spatial Standards

- 3.1 *Pathway Width and Slope Criteria*
  - General Considerations
  - Calculation of Walkway Width (by Formula)
  - Walkway Slope Criteria
- 3.2 *Stairways*
  - Widths
  - Tread-Riser Ratios
  - Height between Landings
- 3.3 *Ramps*

Widths

- Slope Criteria
- Distance between Landings

- 3.4 *Seating Criteria*
- 3.5 *Handrailings*
- 3.6 *Pedestrian Signage*

### References

# Bicycle Circulation

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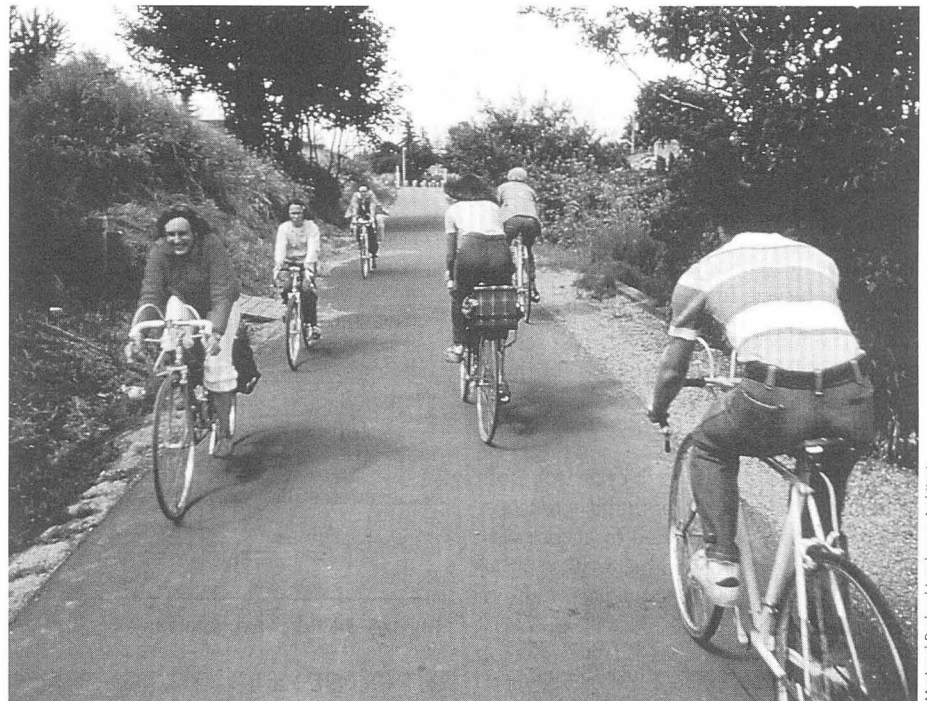
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## CONTENTS

### 1.0 Introduction

### 2.0 Types of Users

#### 2.1 Bicyclists

#### 2.2 Mountain Bikes

### 3.0 Primary Types of Bikeways

#### 3.1 Bicycle Path

#### 3.2 Bicycle Lane

#### 3.3 Wide Outside Lane

#### 3.4 Shared Roadway

### 4.0 Route Selection and Planning

#### 4.1 Bicycle Traffic Generators

#### 4.2 Scenic and Recreational Amenities

#### 4.3 Terrain

#### 4.4 Continuity

#### 4.5 Width of Bikeways

#### 4.6 Negative Factors

### 5.0 Design Criteria

#### 5.1 Bicycle Speed

#### 5.2 Sight/Stopping Distance

#### 5.3 Curve Radii

### General

#### Minimum Curve Radii for Unbraked Turns

### 5.4 Intersections

#### Conflicts at Intersections

#### Bicyclists Turning Left across Traffic Vehicular Traffic Entering from or

#### Turning to the Right

#### Midblock Crossings

#### Freeway Ramp Crossings

#### Underpasses and Overpasses

#### Curb Ramps

### 6.0 Design Elements

#### 6.1 Paving and Surfacing

##### Asphalt

##### Concrete

##### Soil Cement

##### Stone Chip Aggregate

##### Stabilized Earth

#### 6.2 Drainage of Bikeway Surfaces

#### 6.3 Information Systems

##### Traffic Control Devices

##### Types of Signage

##### Placement of Signs

##### Pavement Markings

#### 6.4 Site Furnishings

##### Racks and Locking Devices for Bicycles

##### Fixtures for Bicycle Routes

##### Bikeway Lighting

#### 6.5 Barriers and Separators

##### Fences and Planting

##### Painted Lines

##### Traffic Buttons

#### 6.6 Bikeway Plantings

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# Vehicular Circulation

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## CONTENTS

### 1.0 Introduction

- 1.1 General
- 1.2 Classification of Vehicular Circulation Systems
- 1.3 Circulation Patterns
- 1.4 Basic Design Guidelines and Principles

### 2.0 Design Controls

- 2.1 General Roadway Standards
- 2.2 Driver Characteristics
  - Reaction to External Stimuli
  - Visual Factors in Perception and Identification
  - Total Driver Response Time
  - Variability of Drivers
  - Behavior of Drivers
  - Effect of Climate on Drivers
- 2.3 Vehicular Characteristics
  - Design Vehicle
  - Operating Characteristics
- 2.4 Design Speed (by Roadway Types)
- 2.5 Sight Distance
  - Criteria for Measuring Sight Distance

Sight/Stopping Distance  
Passing Sight Distance

### 3.0 Roadway Design Elements

- 3.1 Horizontal Alignment
  - General Design Criteria for Horizontal Alignment
  - Components of Horizontal Alignment
  - Calculation of Circular Curves
  - Superelevation
  - Pavement Widening on Curves
  - Sight Distance on Curves
- 3.2 Vertical Alignment
  - Components of Vertical Alignment
  - Calculation of Symmetrical Vertical Curves
  - Calculation of Unsymmetrical Vertical Curves
  - Minimum Crest Vertical Curves
  - Passing Sight Distance on Vertical Curves
  - Minimum Sag Vertical Curves
- 3.3 Cross-Sectional Elements

Pavement Widths  
Pavement Crowns

### 3.4 Intersection Design Elements

- Types of Grade Intersections
- Intersection Curves
- Alignment and Profile at Intersections
- Sight Distances at Intersections

### 4.0 Parking

- 4.1 Site Planning Considerations
- 4.2 General Layout of Parking Areas

### 5.0 Pavements and Curbs

- 5.1 Pavements: General Considerations
  - Rigid Pavements
  - Flexible Pavements
- 5.2 Shoulders: General Considerations
  - Shoulder Widths
  - Shoulder Cross Slopes
- 5.3 Curbs: General Considerations
  - Types of Curbs
  - Curb Materials

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