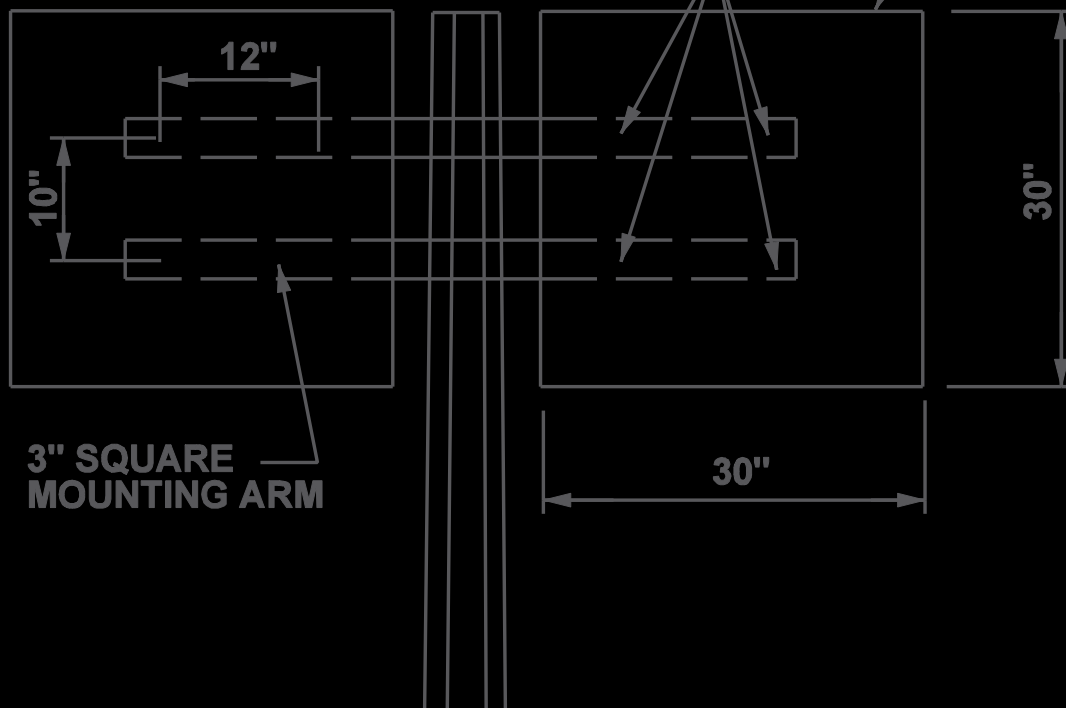


2014

Airport Standards and Signing Guidelines

Washington Dulles International Airport

Design Manual: IAD Vol. 1



METROPOLITAN WASHINGTON AIRPORTS AUTHORITY

PREFACE

THE *DESIGN MANUAL*

As part of the ongoing design and construction programs at Ronald Reagan Washington National Airport and Washington Dulles International Airport, the Metropolitan Washington Airports Authority (the Authority), Office of Engineering, has developed and adopted a series of documents that describe the codes, standards, details, products, and practices to be followed by Architect/Engineers (A/E)s. These documents apply to all design of construction at all facilities on property owned by the Authority. Facilities constructed or modified on the site occupied by the National Air and Space Museum located at Washington Dulles International Airport are exempt from the requirements of the Authority *Design Manual*.

The *Design Manual* has been developed to assist Architects/Engineers (A/E)s in understanding the practices and policies that must be incorporated into each project. The *Design Manual* contains a number of specific requirements that must be followed on all projects, as described above. These can be either Authority contracted projects, Authority direct-constructed projects, and tenant contracted projects.

APPLICABILITY OF THE *DESIGN MANUAL*

The requirements for design and construction incorporated into the *Design Manual* and Supporting Volumes are regulations approved by the Metropolitan Washington Airports Authority Board of Directors and shall be considered contract requirements for all A/E)s who are performing services under contract to the Authority. Although A/E)s who are under contract to tenants of the Authority may not be working under contract provisions that make compliance with these requirements mandatory, the Authority reserves the right, as owner of all airport facilities, and land on which tenant buildings are constructed, to reject any design or work that does not comply with the requirements of the *Design Manual* and its supporting volumes. It is, therefore, required that all A/E)s performing work that will be constructed on airport property shall perform services consistent with the Authority policies, standards, procedures, and construction requirements contained in the *Design Manual* and its supporting volumes. The *Design Manual* should be considered equivalent to the building codes. The *Design Manual* in effect at the 30% submittal will remain the *Design Manual* of record up to the 100% final submittal.

ORGANIZATION OF THE *DESIGN MANUAL*

The *Design Manual* is made up of seven volumes.

Basic policies, procedures and standards for both Airports:

- *Design Manual*

Requirements for Ronald Reagan Washington National Airport:

- DCA Vol. 1 – Airport Design Standards and Signing Guidelines
- DCA Vol. 2 – Tenant Design Standards

Requirements for Washington Dulles International Airport:

- IAD Vol. 1 - Airport Design Standards and Signing Guidelines [THIS DOCUMENT]
- IAD Vol. 2 - Main Terminal/Concourse Z Tenant Design Standards
- IAD Vol. 3 - Concourse B Tenant Design Standards

Requirements for All Projects:

- CADD – CADD Design Standards

The seven volumes are intended to supplement each other and must be used together, as appropriate for each airport, to achieve the desired goals of the Authority.

An electronic version of the *Design Manual* and Supporting Volumes is available on CD-ROM, which may be obtained by contacting the Authority Office of Engineering. It is also available on the Authority website at www.mwaa.com under “Publications”.

OTHER DOCUMENTS

In addition to the *Design Manual*, the Authority also requires compliance for design and construction with additional policies, procedures, and standards that are published by other departments. These documents include:

- Construction Safety Manual
- Owner Controlled Wrap-Up Insurance Program Manual
- Building Codes Manual
- Contractors Safety and Security Information (Washington Dulles International Airport)
- Safety Policy, Procedures, and Practices by the Risk Management Department
- MASTERSPEC© Specifications Sections specifically edited for Authority projects (primarily Division 01, but including specific technical specification sections)
- Ronald Reagan Washington National Airport and Washington Dulles International Airport Survey Control Data “To-Reach” Descriptions (two separate volumes) Note that the “To-Reach” documents for Washington Dulles International Airport are no longer provided on the CD-ROM version of the *Design Manual*. These documents are available through the Authority. The CD-ROM contains information directing the A/Es to the proper group within the Authority to obtain this document.

ACCEPTABLE STANDARDS

The standards established by the above referenced documents, together with Federal Aviation Administration (FAA), National Fire Protection Agency (NFPA), Virginia Uniform Statewide Building Code (USBC), Construction Specifications Institute (CSI), and other referenced materials establish the minimum level of quality and detail required of all Authority projects. These standards in many instances may exceed those used in non-Authority design and construction projects and are often above those established as "Code Minimums," "Standards of the Industry," or "generally accepted practices."

DESIGN MANUAL REVISIONS

This edition of the *Design Manual* incorporates the modifications and additions that were developed during the Authority annual review of the previous year's *Design Manual*. This review includes an analysis of the existing standards and an evaluation of the suggested revisions.

If you feel that a standard or procedure stipulated in this edition of the *Design Manual* should be revised, we would like to know. To facilitate this, we have included a *Design Manual* review form that will place your idea in the appropriate hands. All suggestions received will be reviewed and researched and a written response will be provided.

DESIGN MANUAL REVISION FORM

SUGGESTED REVISION TO THE *DESIGN MANUAL*

Date:

Log Number:

14-

To:

Ms. Diane R. Hirsch, PE
Manager of Design
Metropolitan Washington Airports Authority
Ronald Reagan Washington National Airport
Washington, DC 20001

From:

***Design Manual* Volume & Section:**

***Design Manual* Paragraph:**

***Design Manual* Page:**

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2014 Design Manual Text:

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Proposed 2015 Design Manual Text:

[Use RED text, normal font not bold, to indicate added language. Use “strikethrough” to indicate deleted language. Do not use “track changes”.]

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INTRODUCTION

GUIDE TO THIS VOLUME OF THE *DESIGN MANUAL*

Washington Dulles International Airport consists of the following sections:

- IAD Vol. 1 – Airport Design Standards and Signing Guidelines [THIS VOLUME]
- IAD Vol. 2 – Main Terminal/Concourse Z Tenant Design Standards
- IAD Vol. 3 – Concourse B Tenant Design Standards

This volume consists of design standards, design criteria, procedures, and products for Washington Dulles International Airport, and relates to all areas of the Airport, including the Main Terminal/Concourse Z and the Concourse B Tenant Design Standards.

This volume consists of two sections:

Section I **Airport Design Standards**

Chapter 1:	Airport Area Standards
Chapter 2:	Building Design Standards
Chapter 3:	Civil Standards
Chapter 4:	Landscape Standards
Chapter 5:	Site Detail Standards
Chapter 6:	Parking Facilities Standards
Chapter 7:	Life-Safety Standards
Chapter 8:	Public Facilities Standards

Section II **Signing Standards**

Chapter 1:	Signing Approach and Philosophy
Chapter 2:	General Requirements and Procedures
Chapter 3:	Common Design Elements
Chapter 4:	Design Criteria
Chapter 5:	Sign Applications
Chapter 6:	Commercial Signing Guidelines

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SECTION I: Airport Design Standards

CHAPTER 1 Airport Area Standards

The Authority directs and controls the use of its property in a manner consistent with the historic, aesthetic, and functional qualities of the Airport. These Airport Area Standards derive from the Airport Layout Plan (ALP) of the Washington Dulles International Airport, adopted on November 14, 1989 by the Authority. The Standards are also based upon the Airport Master Plan dated September 1985, the Master Plan Regulations dated January 1964, and the North Area Development Plan, dated April 1994.

1.1 Site Plan

1.1.1 General: All design and construction on the Airport shall proceed on the basis of a site plan approved by the Authority.

1.2 Development Considerations

1.2.1 General: Federal, state and local statutes and regulations may also apply within the boundaries of each Airport and may restrict development. The A/E should consider the following additional factors.

1.2.2 Height Restrictions: Structures and objects are height restricted to avoid interfering with air navigation, consistent with Federal Aviation Regulations Part 77, flight and navigation surfaces, and radar shadowing. In addition, the traffic controllers shall be able to view all aircraft operating pavements under their control from the Airport Traffic Control Tower. Buildings are not permitted within the building restriction lines shown on the Airport layout plan.

1.2.3 Noise Exposure: Facilities within the Airport may be subject to an average noise exposure from airport operations in excess of 65 db. Activities that are sensitive to excessive noise are discouraged within these areas, and structures accommodating noise sensitive uses must be soundproofed to reduce interior noise in accordance with

applicable codes and standards. FAA Advisory Circular 150/5020-1, Appendix 1, contains a table indicating the compatibility of different activities and land uses with different levels of noise exposure. It also prescribes the noise attenuation that should be achieved in each zone.

1.2.4 Wetlands and Flood Plain Areas: Federal regulations control the development and use of land that is designated as either wetland or flood plain areas to avoid environmental hazards and to protect environmentally sensitive areas from encroachment by development. Tenants and A/Es are required to submit an engineering study showing, to the satisfaction of the Authority, the effects of proposed grading and drainage modifications on existing flood plain and wetland areas, proposed mitigation of these impacts, and the effect of these development and mitigation efforts on development of facilities elsewhere on the Airport.

1.2.5 Erosion and Sediment Control Plan: Refer to *Design Manual*, Section III, Paragraph 3.2.3.

1.2.6 Storm Water Management Plan: Refer to *Design Manual*, Section III, Paragraph 3.2.

1.2.6.1 Additional Storm Water Management

Requirements: Development of each individual project within Washington Dulles International Airport shall comply with the following storm water management requirements:

- A.** A storm water management plan shall be developed for each project so that the post-development peak runoff rate from a two-year storm and a 10-year storm, considered individually, shall not exceed their respective pre-development rates.
- B.** The design storms shall be in accordance with the Virginia Department of Conservation and Recreation Storm Water Management Regulations, Part II Technical Criteria.

C. Site development shall include an adequate drainage conveyance system (such as ditches, pipes) for release of site runoff so as to not adversely affect the airport.

1.2.7 Historic District: Historic districts have been designated by Federal and State agencies to protect, enhance and perpetuate the noteworthy examples or elements of the cultural and architectural history having State and National significance. Elements of the original 1964 Master Plan for the Airport are eligible for listing on the National Register of Historic Places, in accordance with the National Historic Preservation Act of 1966. The boundaries of the Dulles Airport Historic District and its contributing historic properties are shown in **Exhibit I-1-1**. All development affecting these areas must comply with the rules, regulations and procedures of the Authority, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation, providing for consultation, identification, and treatment of historic and archaeological resources located on Airport property.

1.2.8 Archaeologically Significant Areas: Much of the Airport contains areas of significant historic and prehistoric activity. Accordingly, the Authority requires that an archaeological investigation be completed, in accordance with "Archaeological and Historic Preservation: Secretary of the Interior's Standards and Guidelines", and that the results be presented to the Virginia State Historic Preservation Officer for review prior to the issuance of a construction permit. Areas that have a high probability of containing undiscovered resources requiring preservation are shown on large-scale maps maintained by the Authority.

1.2.9 Access and Parking: Planning of parking areas, numbers of parking spaces to be provided with improvements to Airport property and access from properties onto Airport roadways is critical to the proper operation of the Airport. The North Area Development Plan contains guidance on access and parking requirements within the north airport area refer to **Section 1.3**.

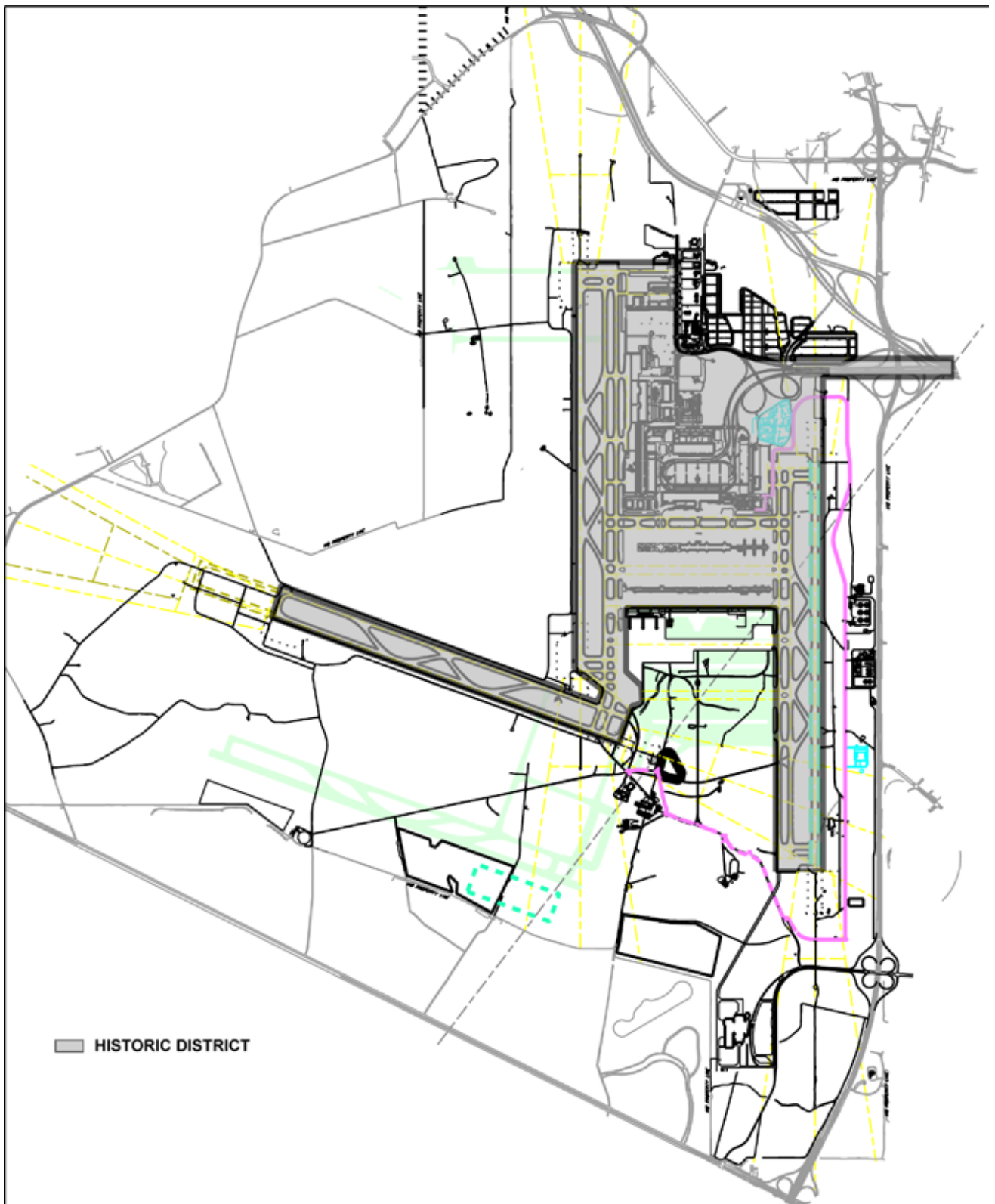
1.2.10 Lease, Pavement Setbacks and Building

Setback Lines: Exhibits I-1-1 through I-1-18 indicates lease lines, pavement setback lines and building setback lines, primarily in the currently developed areas of the airport. These exhibits are general depictions of the sites and these various lines must be interpreted specifically for each site by the designer in consultation with the Authority.

1.2.10.1 Lease Lines: The lease lines depicted herein are illustrative of the relationship of leasable property with landscape features, paving, and building setback lines; actual lease limits are as stated in the contract or lease.

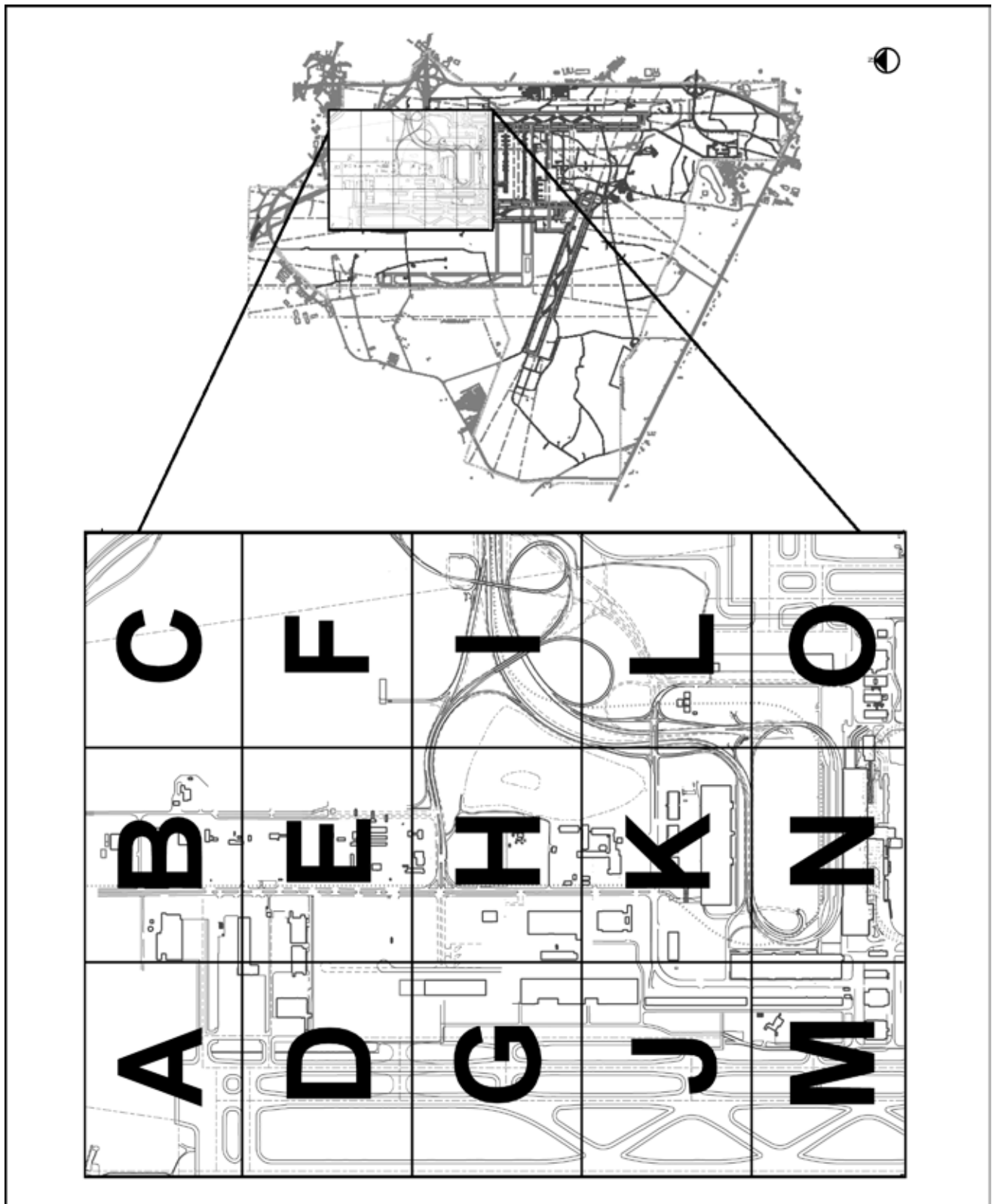
1.2.10.2 Building Setback Lines: Building setback lines are the lines that establish the minimum dimensions of structures from the lease lines. No structure shall be constructed outside of the setback lines. Structures need not be built on the setback line except as noted below, such as structures may have a smaller footprint than the setback limits and may be set back further from the lease line than the setback lines would otherwise require. Unenclosed appurtenant structures, such as exterior stairs, walkway and stairway canopies, fascias, dock canopies, **car canopies** etc., may extend in front of the building frontage line (but not in front of any lease line), on the façade facing the public right-of-way only, up to a maximum projection of 5'. The maximum frontal area of such projection(s) shall total less than 5% of the total frontal area of the façade facing the public right-of-way. The maximum vertical dimension of any such projections shall not exceed 4' – 0"; length is unlimited. Projections whether extending beyond the building frontage line or not, shall be of noncombustible and permanent construction, incorporating materials consistent with and matching the exterior of the structure to which they are attached. Canvas or tent structures are not permitted, except for temporary structures upon specific approval of the Authority.

1.2.10.3 Pavement Setback Lines: Pavement setback lines are those lines that establish the minimum dimension of paved areas. No paving shall be located between the edge of pavement and the lease line, except for permitted vehicle access entrances to the property.



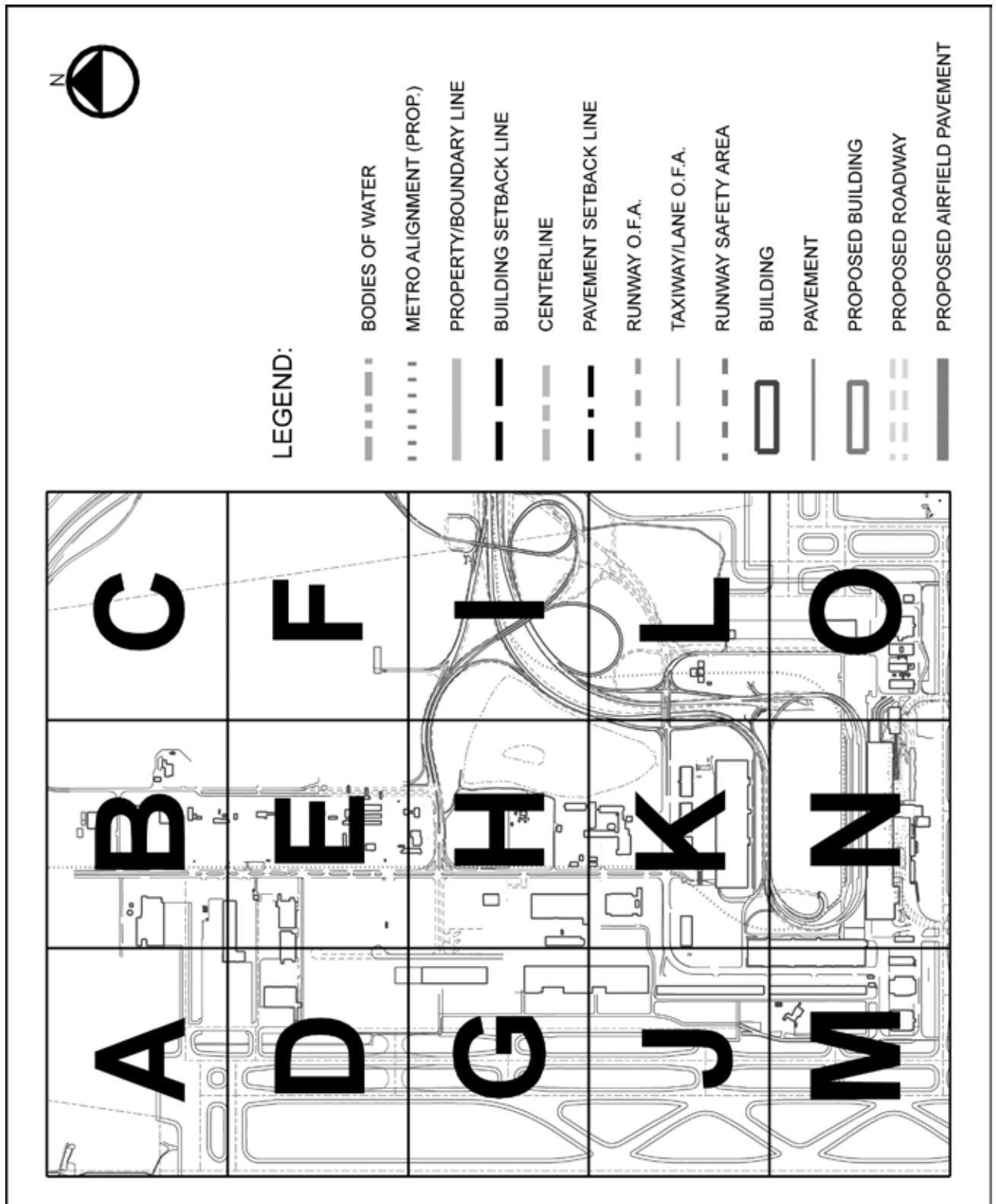
Historic District

Exhibit I-1-1



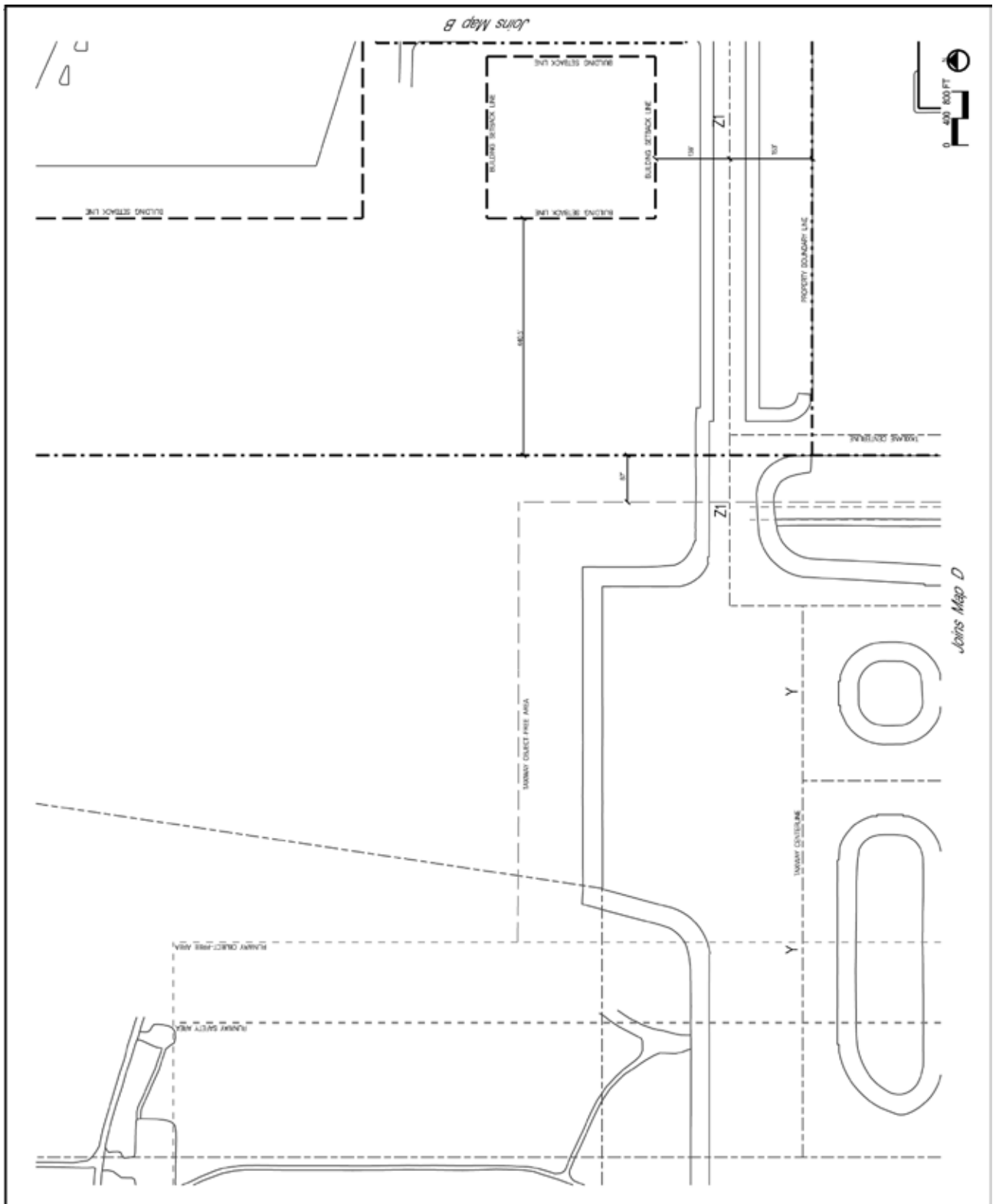
North Airport Area Development Criteria Location Map

Exhibit I-1-2



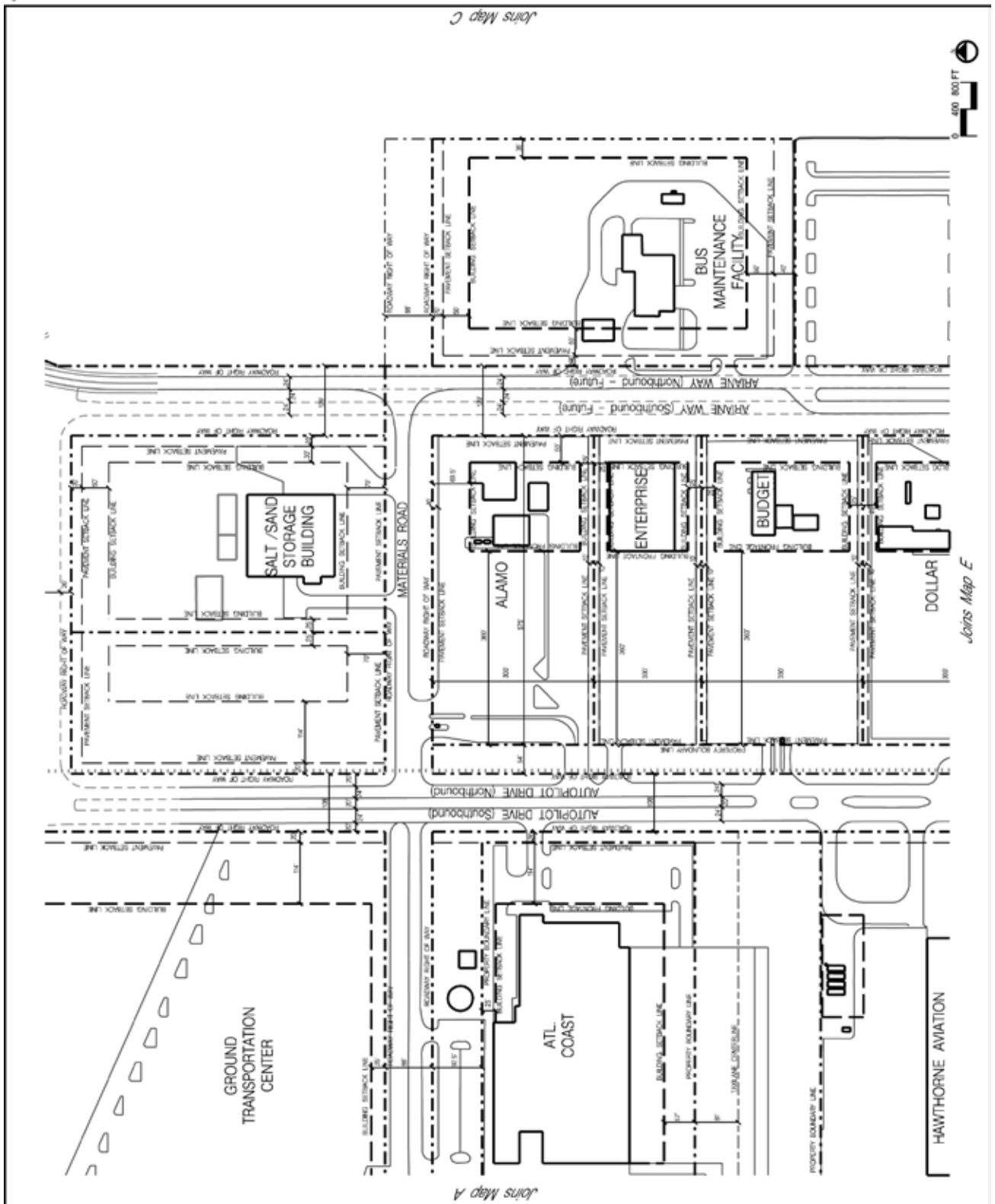
North Airport Area Development Criteria Key Map

Exhibit I-1-3



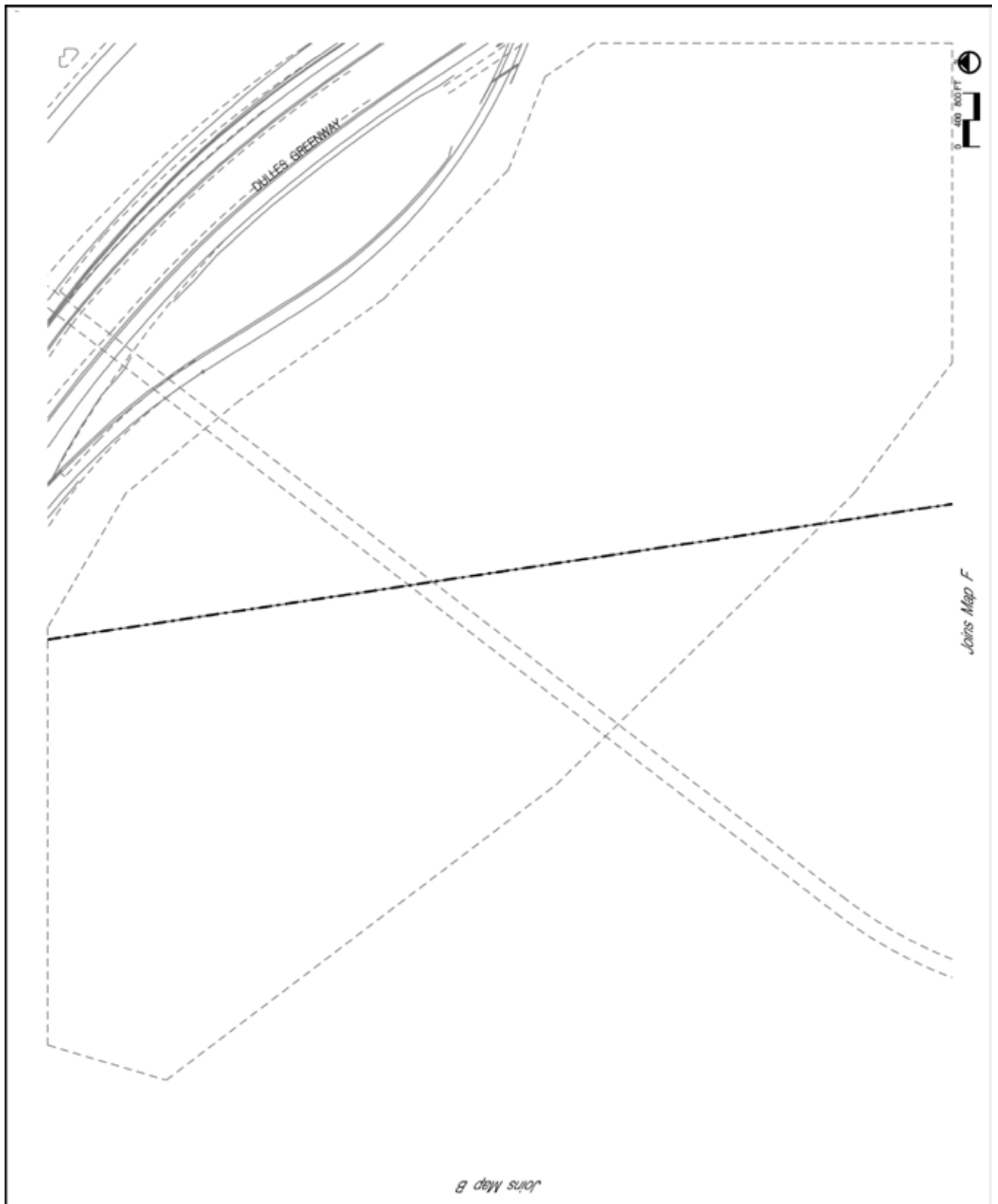
Development Criteria Plan, Area A

Exhibit I-1-4



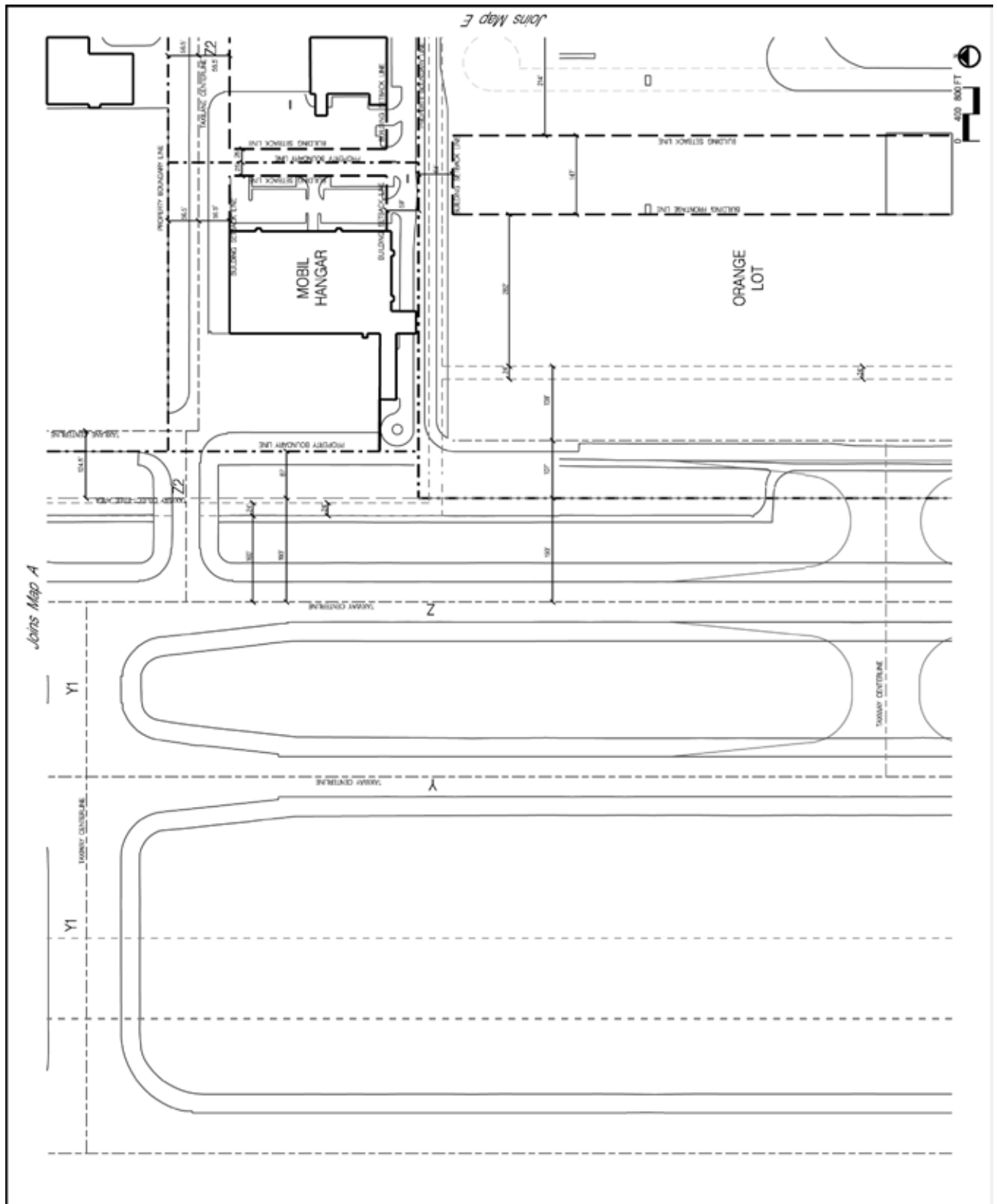
Development Criteria Plan, Area B

Exhibit I-1-5



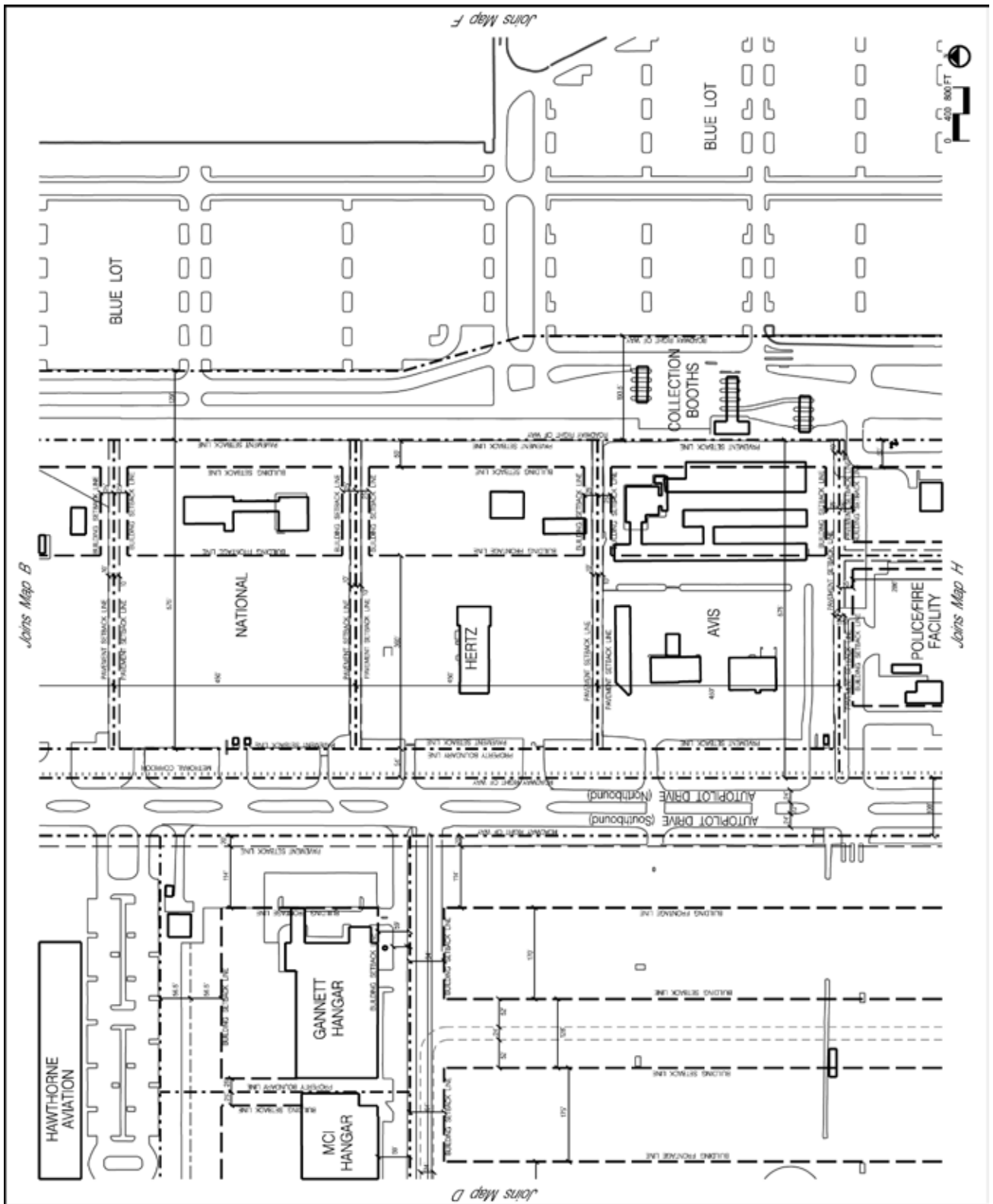
Development Criteria Plan, Area C

Exhibit I-1-6



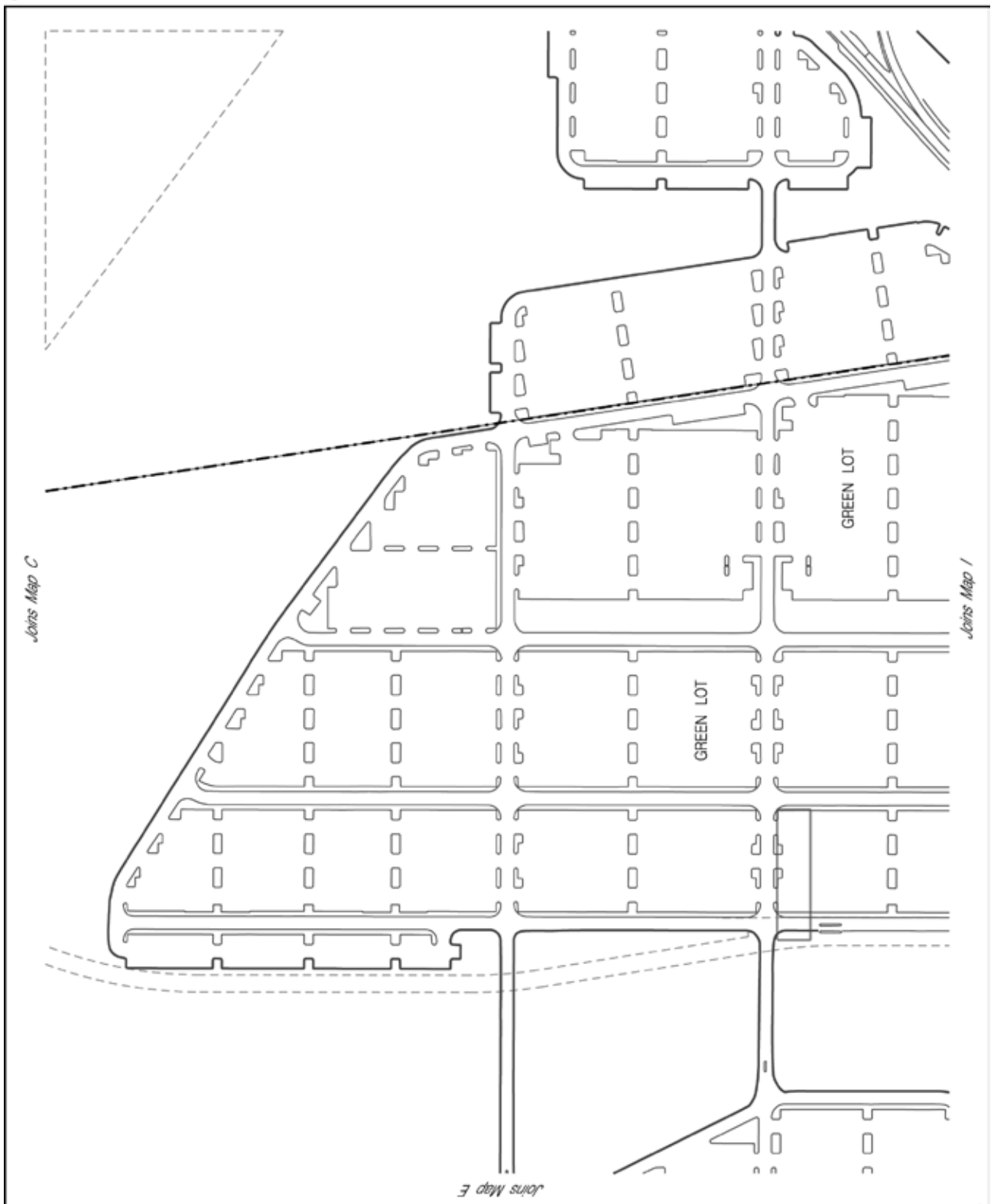
Development Criteria Plan, Area D

Exhibit I-1-7



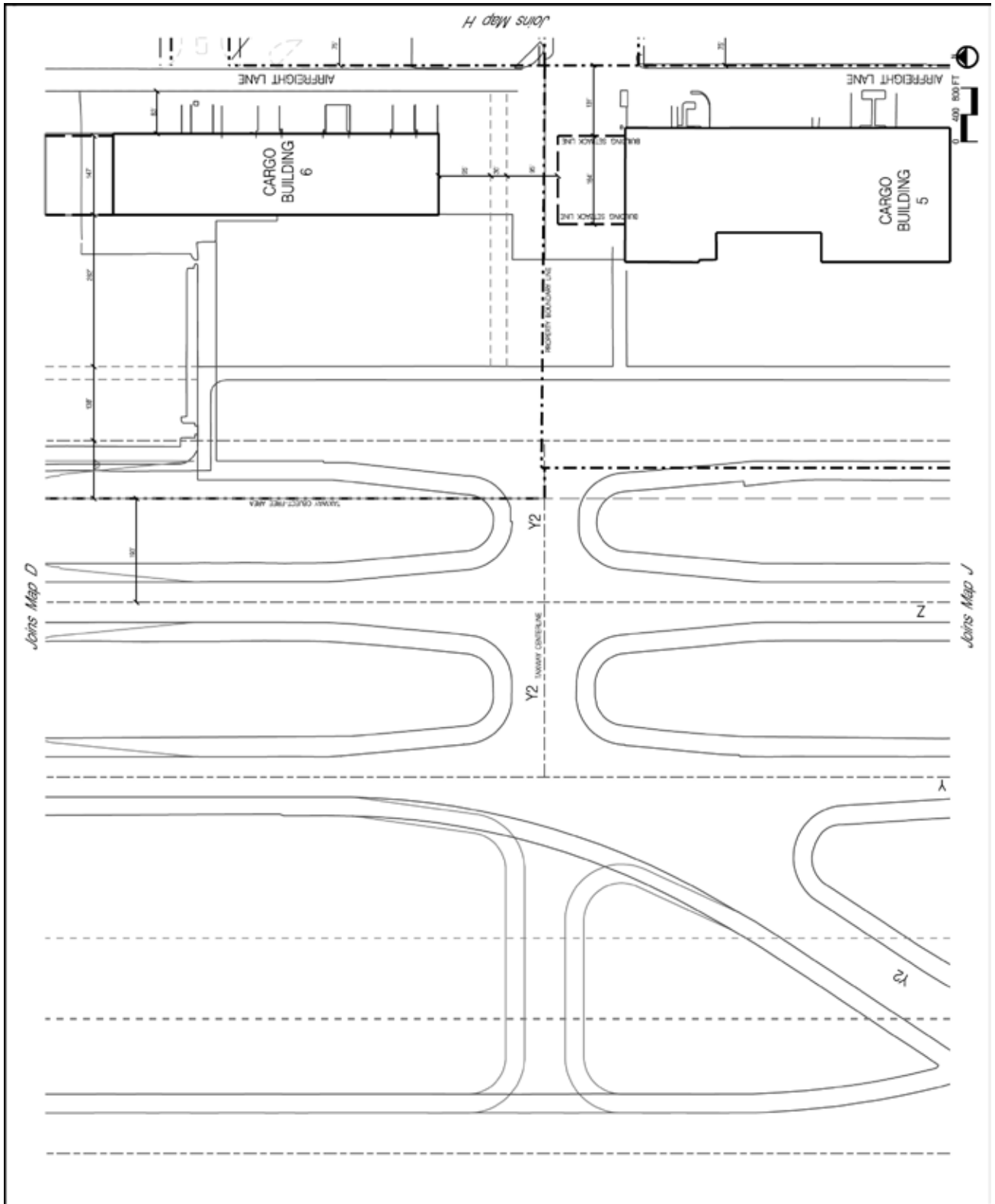
Development Criteria Plan, Area E

Exhibit I-1-8



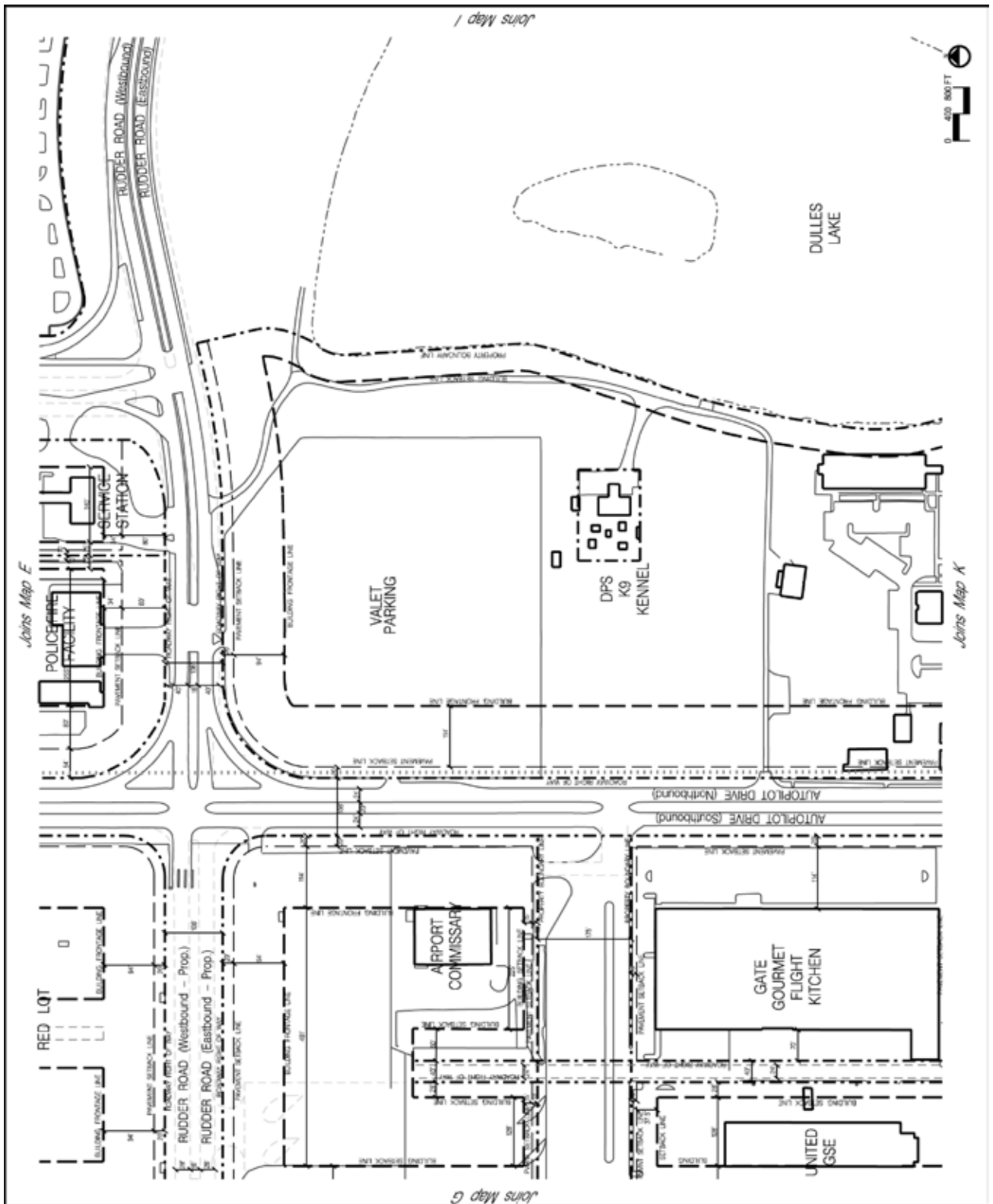
Development Criteria Plan, Area F

Exhibit I-1-9



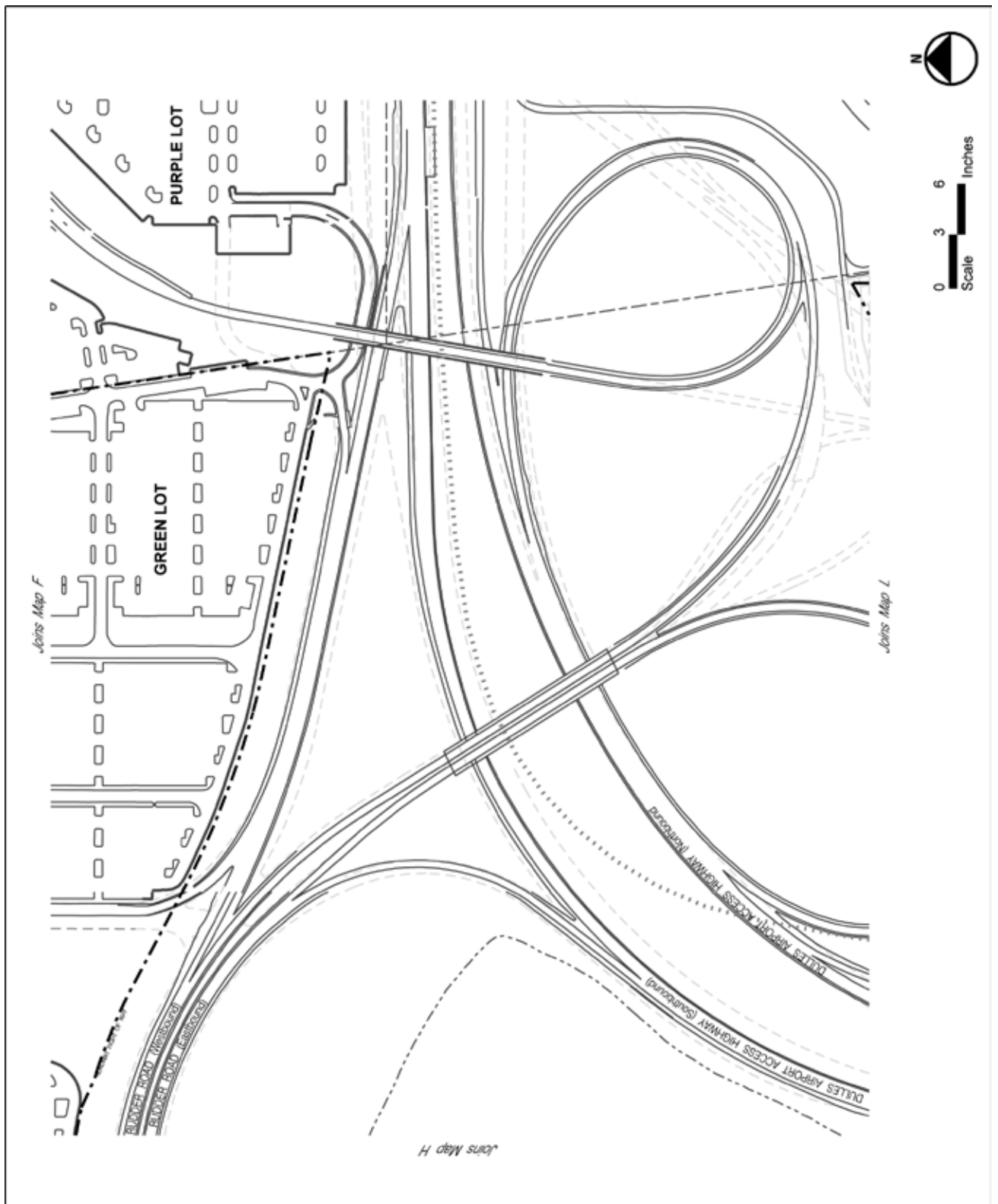
Development Criteria Plan, Area G

Exhibit I-1-10



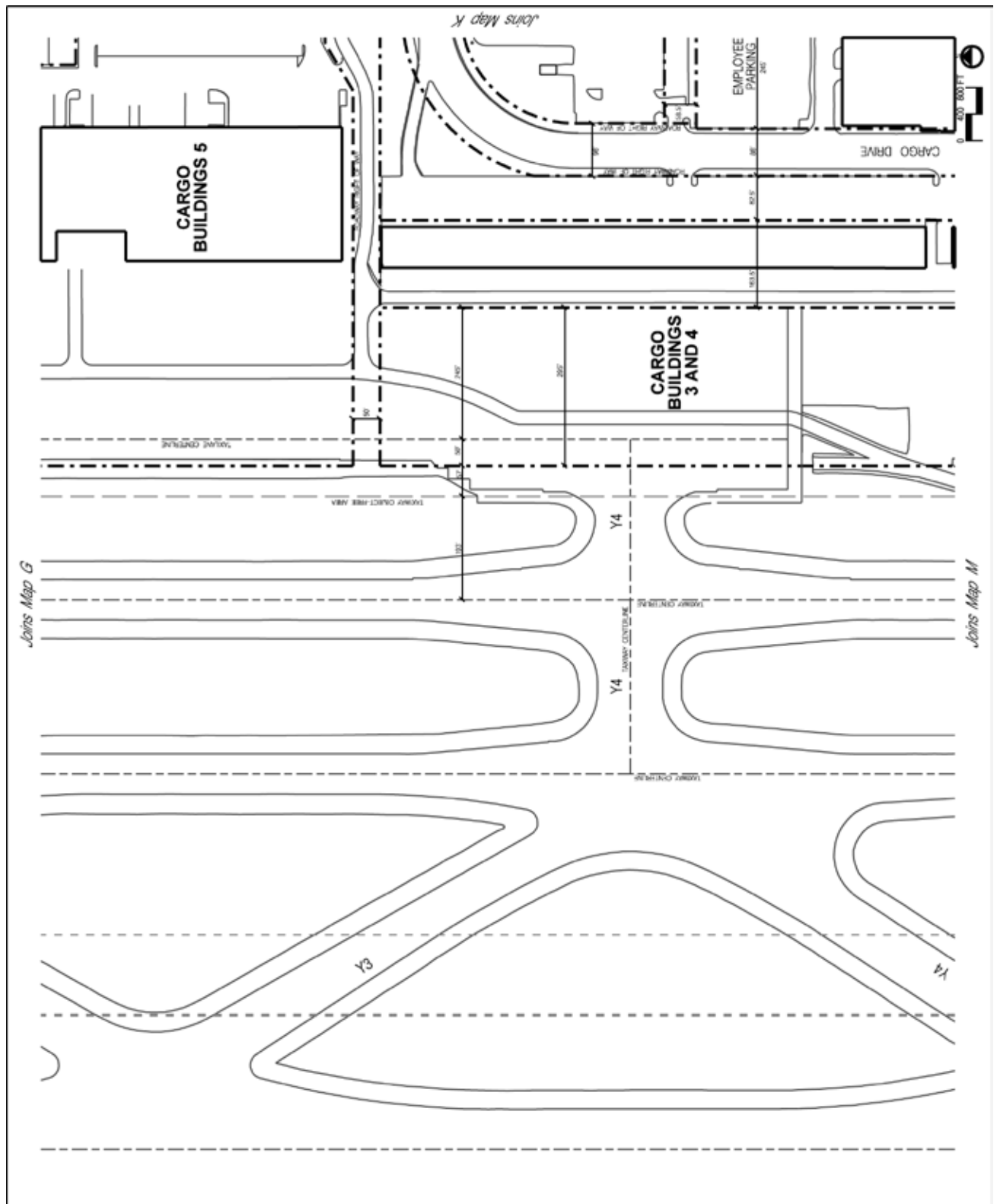
Development Criteria Plan, Area H

Exhibit I-1-11



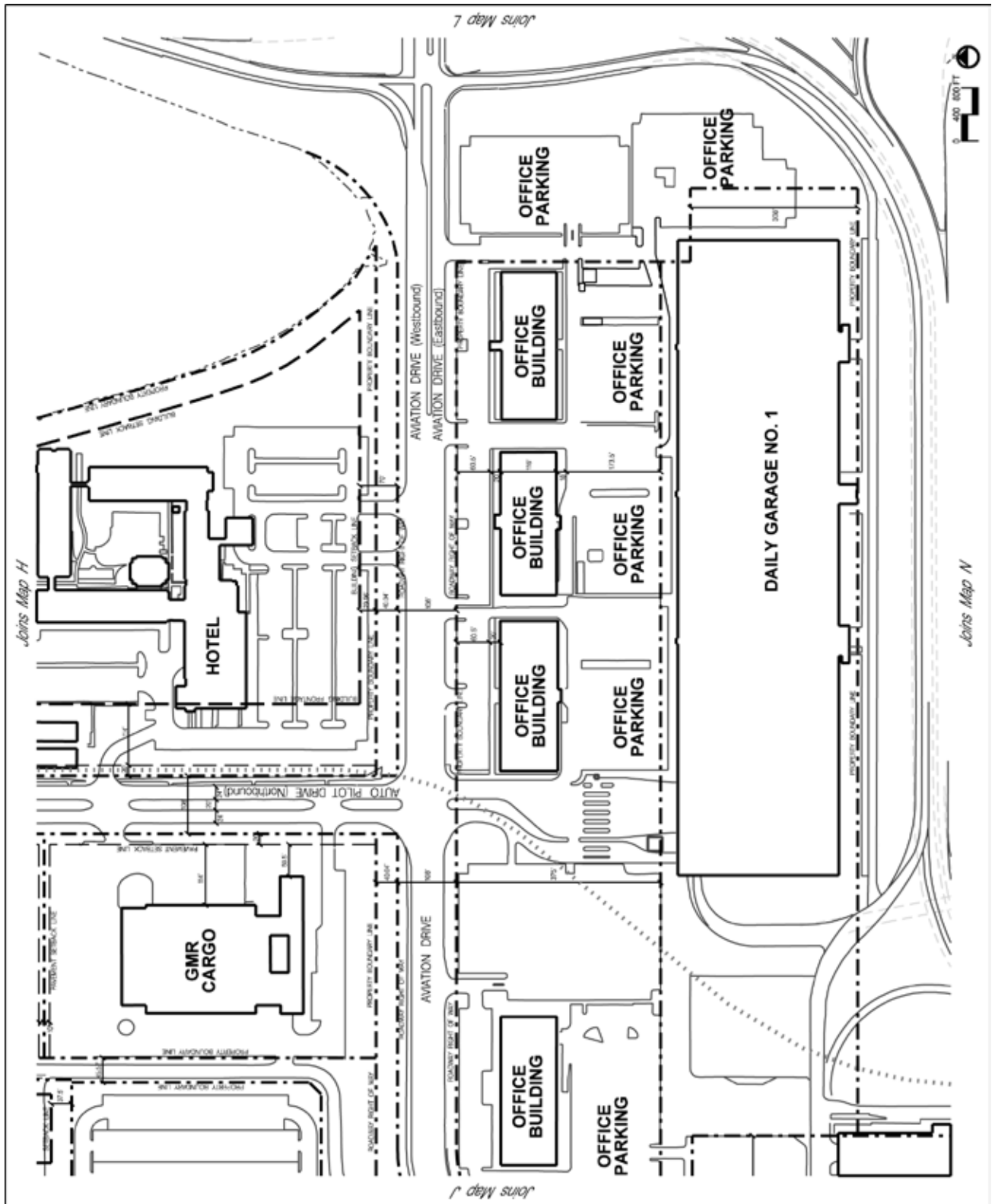
Development Criteria Plan, Area I

Exhibit I-1-12



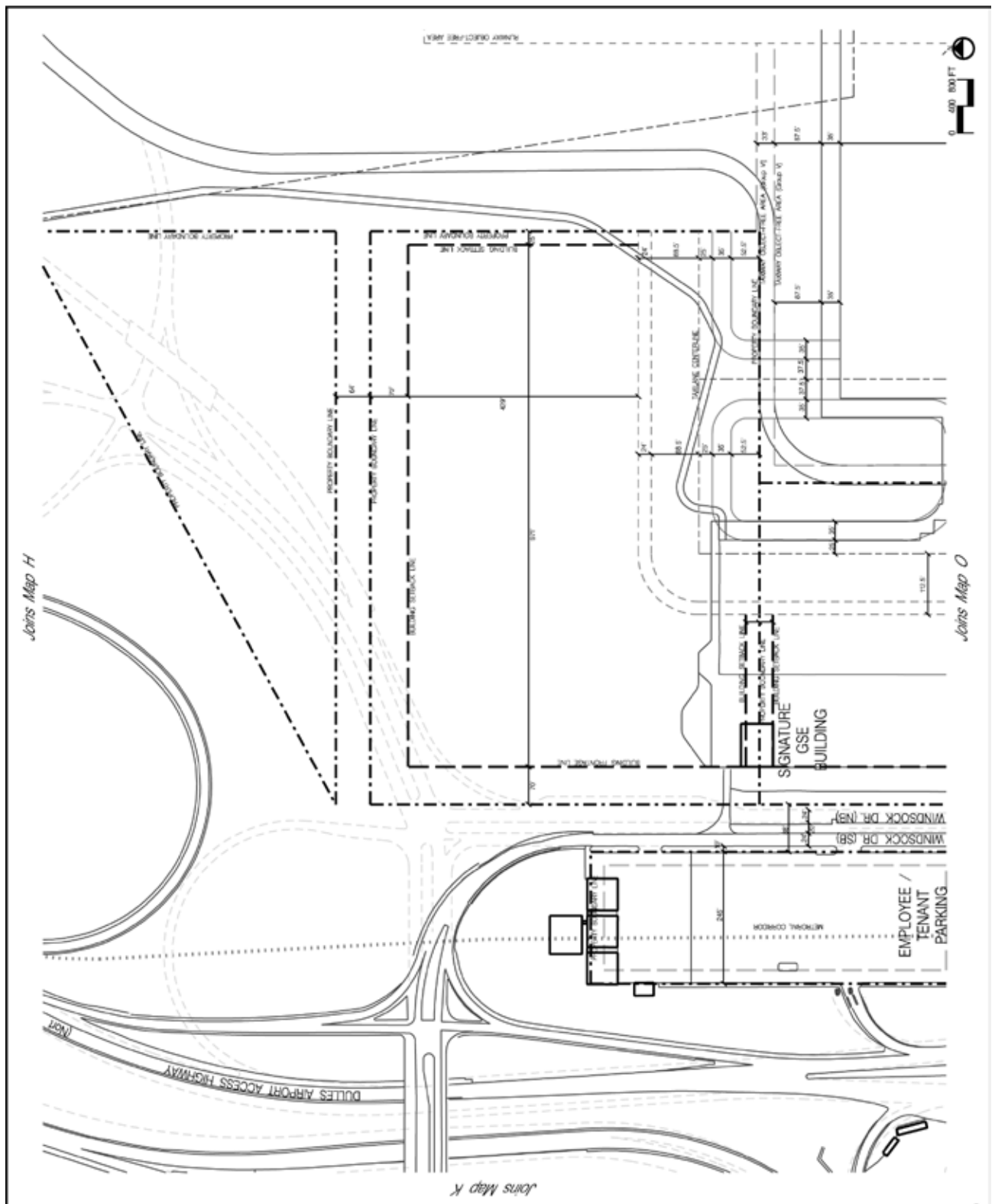
Development Criteria Plan, Area J

Exhibit I-1-13



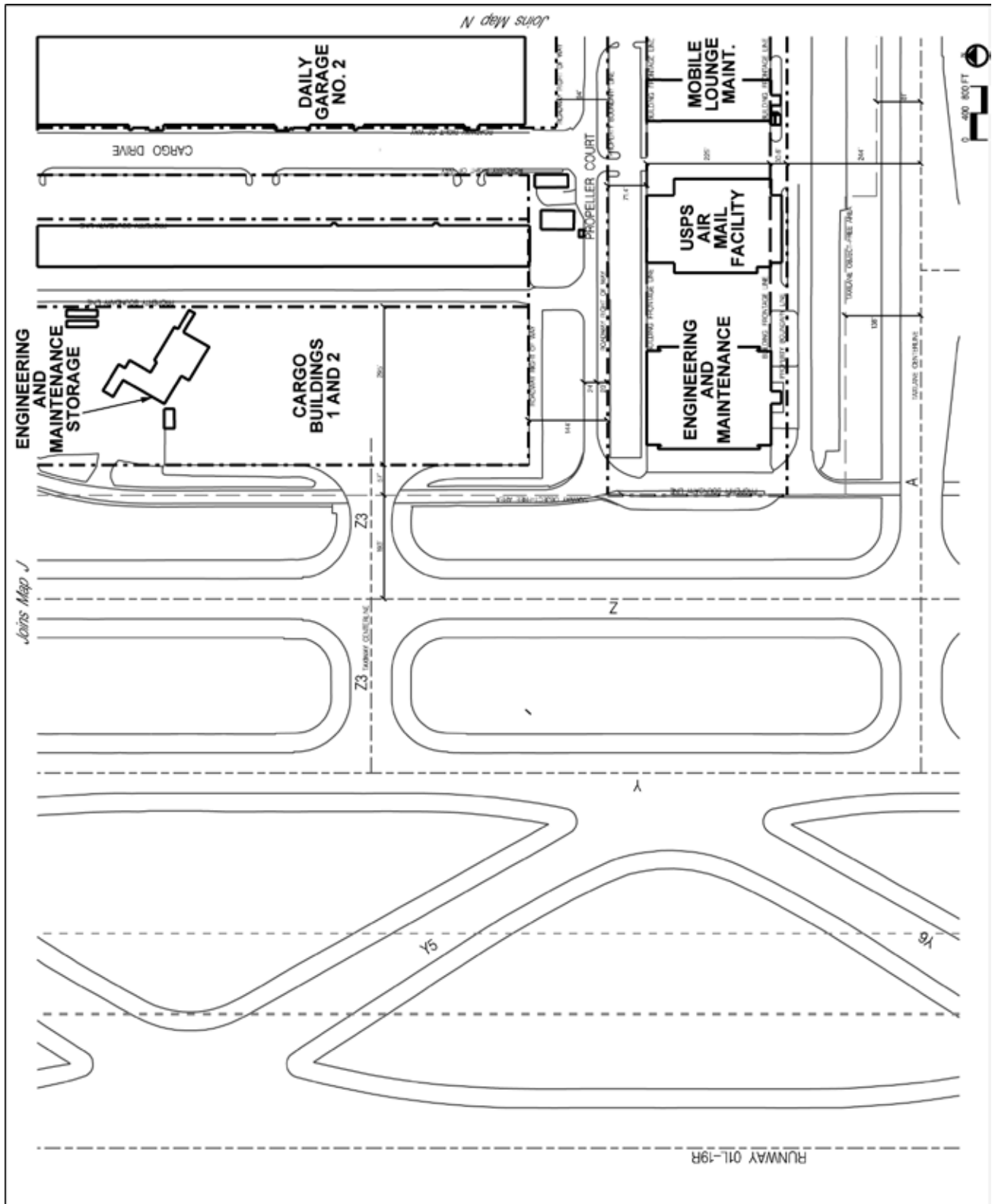
Development Criteria Plan, Area K

Exhibit I-1-14



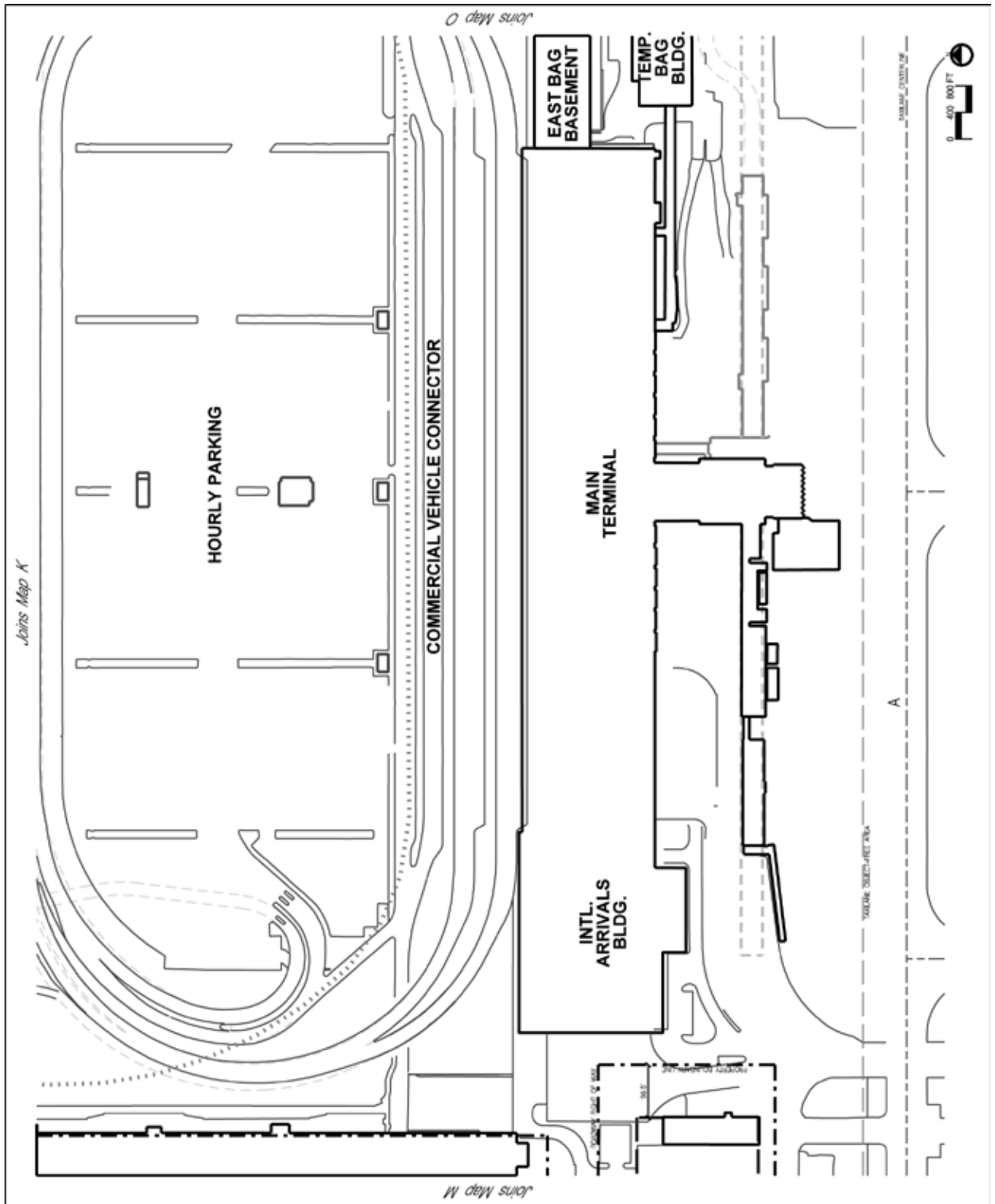
Development Criteria Plan, Area L

Exhibit I-1-15



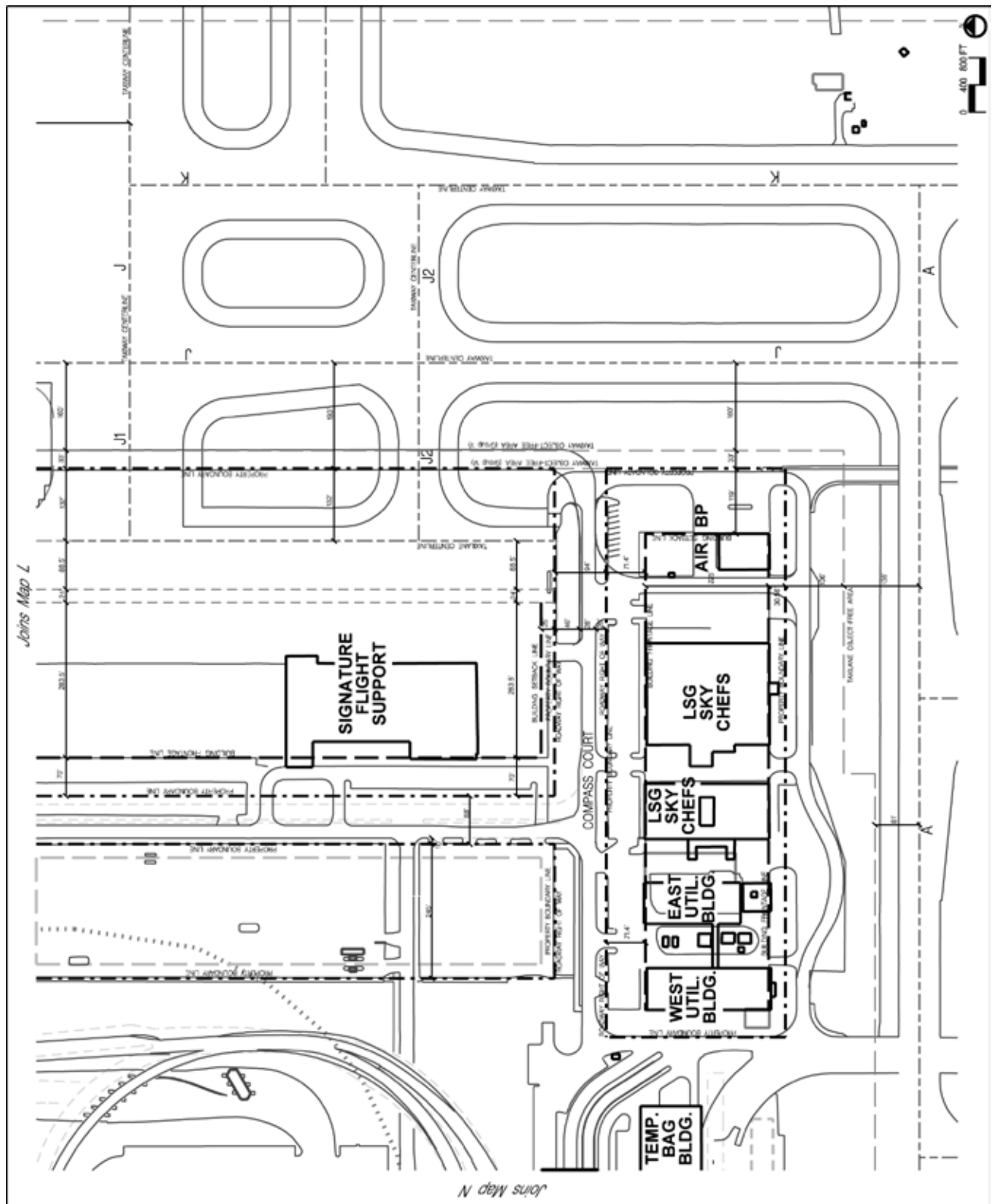
Development Criteria Plan, Area M

Exhibit I-1-16



Development Criteria Plan, Area N

Exhibit I-1-17



Development Criteria Plan, Area O

Exhibit I-1-18

1.3 North Airport Area

1.3.1 General: The airport area standards apply throughout Washington Dulles International Airport. A Sub-Area Plan, known as the North Airport Area Development Plan, has been prepared for the North Airport Area. It outlines guidelines that are used to establish the limit and setback lines shown in the *Design Manual*. Copies of the North Area Development Plan are available from the Authority's Planning Department. The general North Airport Area is shown on **Exhibit I-1-1** and is subdivided into larger scale Area Plans **Exhibits I-1-2 through I-1-18** that outlines development criteria.

1.4 South Airport Area

1.4.1 General: The airport area standards apply throughout Washington Dulles International Airport. Although the Sub-Area Plan for the South Airport Area Plan is not fully developed, it is anticipated that the developmental elements and the associated design requirements in this area will generally be similar to those of the North Airport Area. A preliminary overview of the general site constraints and the anticipated development criteria will be published in the future.

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CHAPTER 2 Building Design Standards

All design must be undertaken independently by the consulting professionals and the criteria and standards set forth below do not relieve the designer-of-record from the responsibility to meet all functional and legal requirements of any project.

2.1 Basic Building Characteristics

2.1.1 Buildings and Facilities: All buildings and facilities shall be designed to be ancillary to the Main Terminal building at the airport. This means that all facilities on the airport shall be “background” structures that do not compete with the Main Terminal or with each other for attention, expression or effect. All ancillary facilities are merely an ensemble, working together to emphasize the uniqueness of the Main Terminal.

2.1.2 Architectural Characteristics: Essential architectural characteristics include the following:

2.1.2.1 Planar: Planar, skin-dominated architecture.

2.1.2.2 Massing: Cubic, rectangular, simple massing.

2.1.2.3 Overhangs: No emphatic overhangs or cantilevers.

2.1.2.4 Shadow Liner: No dramatic shadow lines.

2.1.2.5 Exterior Vocabulary: Simple vocabulary of exterior materials and textures.

2.1.2.6 Windows and Other Fenestration: Windows and other fenestration should be expressed as continuous or nearly-continuous bands or as large surfaces; they should not be expressed as punctures in an otherwise monolithic surface.

2.1.2.7 Exterior Storage: All outside storage areas, dumpster areas, trash compactors, satellite antennas,

fueling islands and similar areas shall be screened from public view.

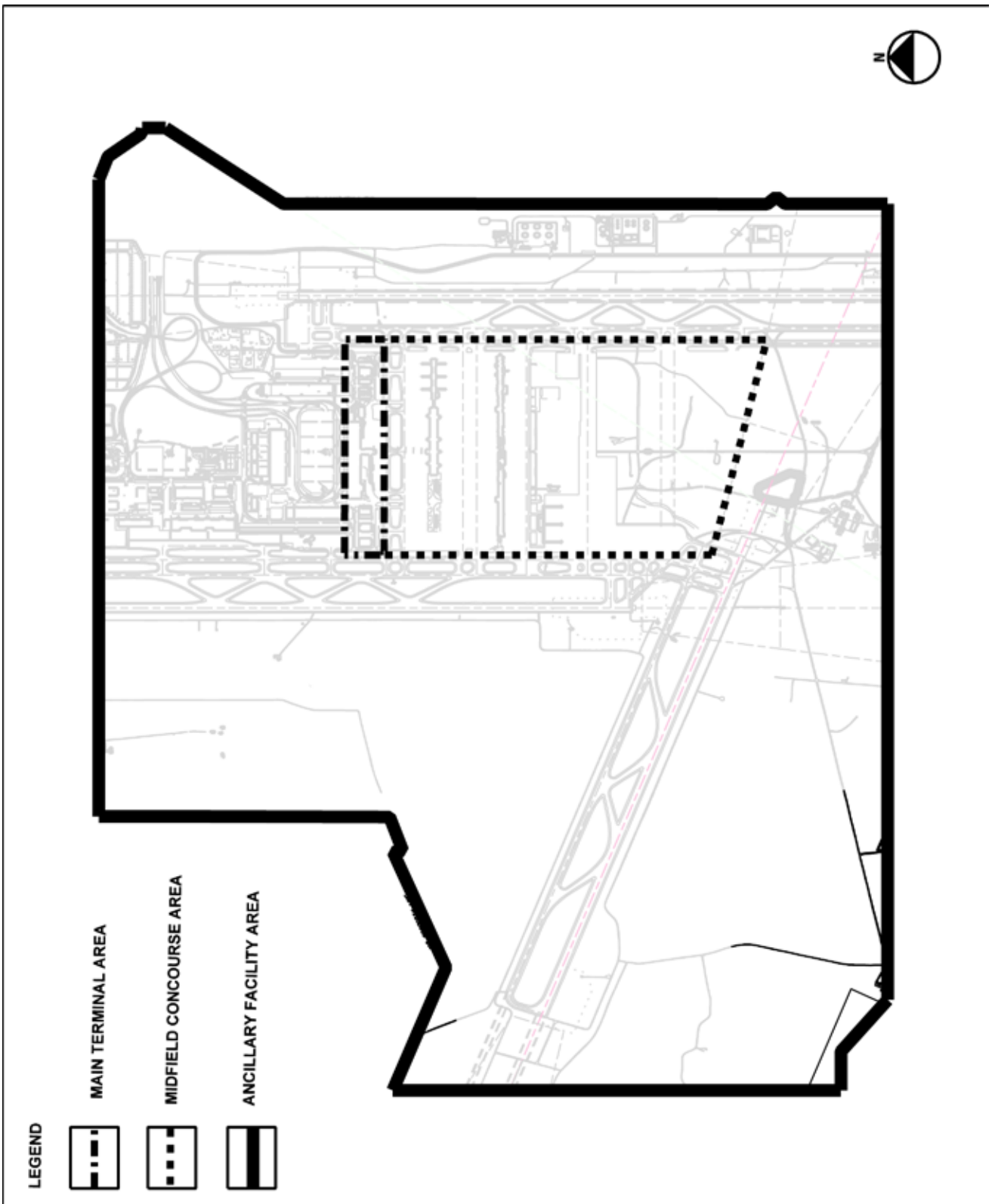
2.1.3 Building Heights: Building heights shall be compatible with other Airport facilities serving similar functions. Rental car facilities shall be limited to one-story buildings. For other uses, higher buildings will be permitted when justified by functional requirements, such as service bay heights.

2.2 Materials

2.2.1 Types of Exterior Materials: The Washington Dulles International Airport facility campus consists of three principle design areas:

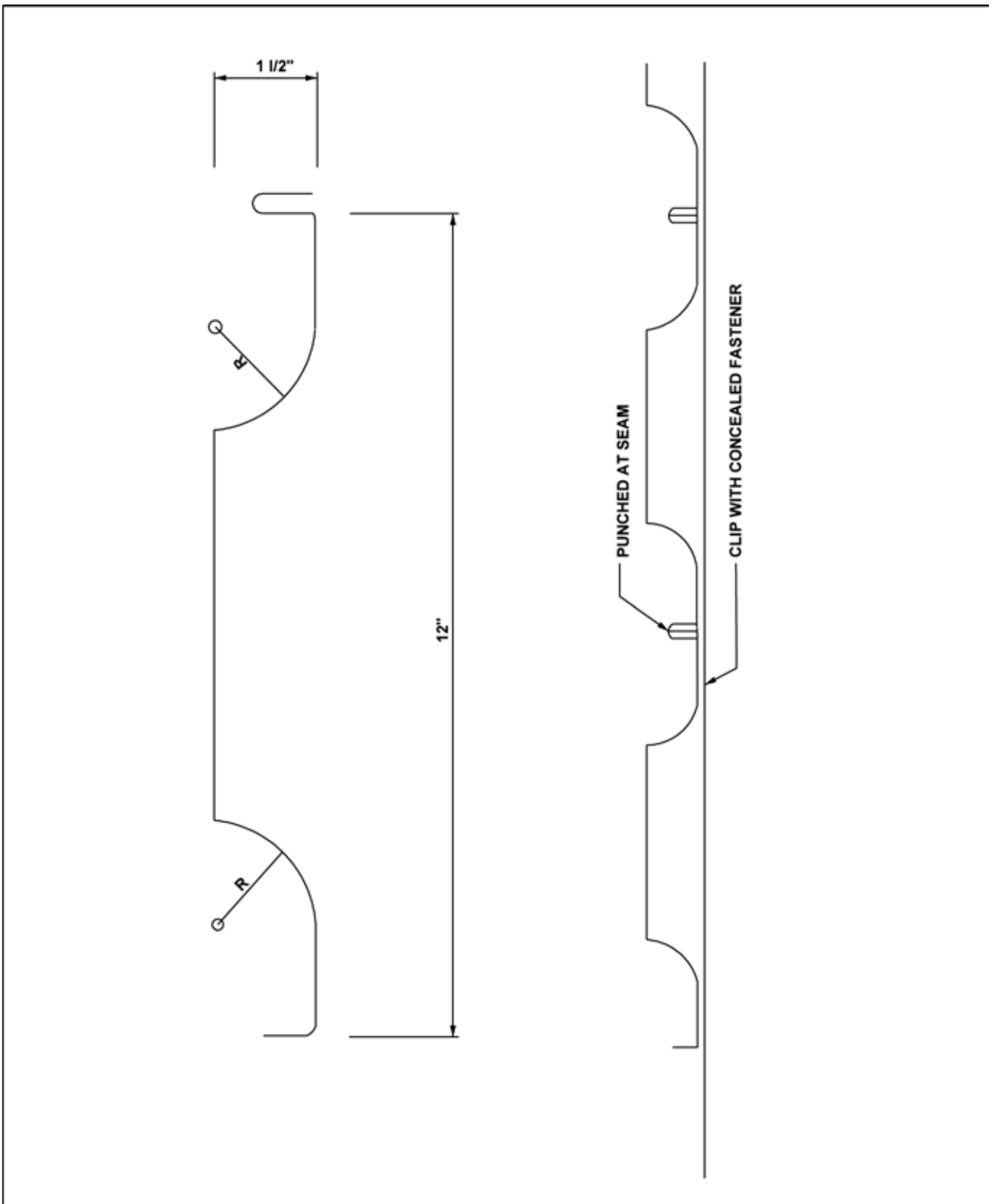
2.2.1.1 Main Terminal Area: The Main Terminal Area as being defined by **Exhibit I-2-1** and consisting primarily of the Main Terminal and the ancillary buildings related to the Main Terminal. The basic exterior materials shall consist of natural dolomite limestone aggregate concrete, either cast-in-place or precast, vertical metal siding, concrete masonry units, Dulles Gray aluminum storefront glazing systems and gray-tinted glass. The profile of the vertical metal siding shall conform to the standard shown on **Exhibits I-2-2 and 1-2-3**.

2.2.1.2 Midfield Area: The Midfield Concourse Areas defined by **Exhibit I-2-1** and as the midfield areas to the south of the Main Terminal and consisting of the Midfield Concourses. The basic exterior materials shall consist of gray toned concrete or concrete masonry units, gray toned aluminum composite panels and curtain wall systems with gray-tinted glass. Alternative exterior systems may be submitted by the A/E to the Authority for consideration.



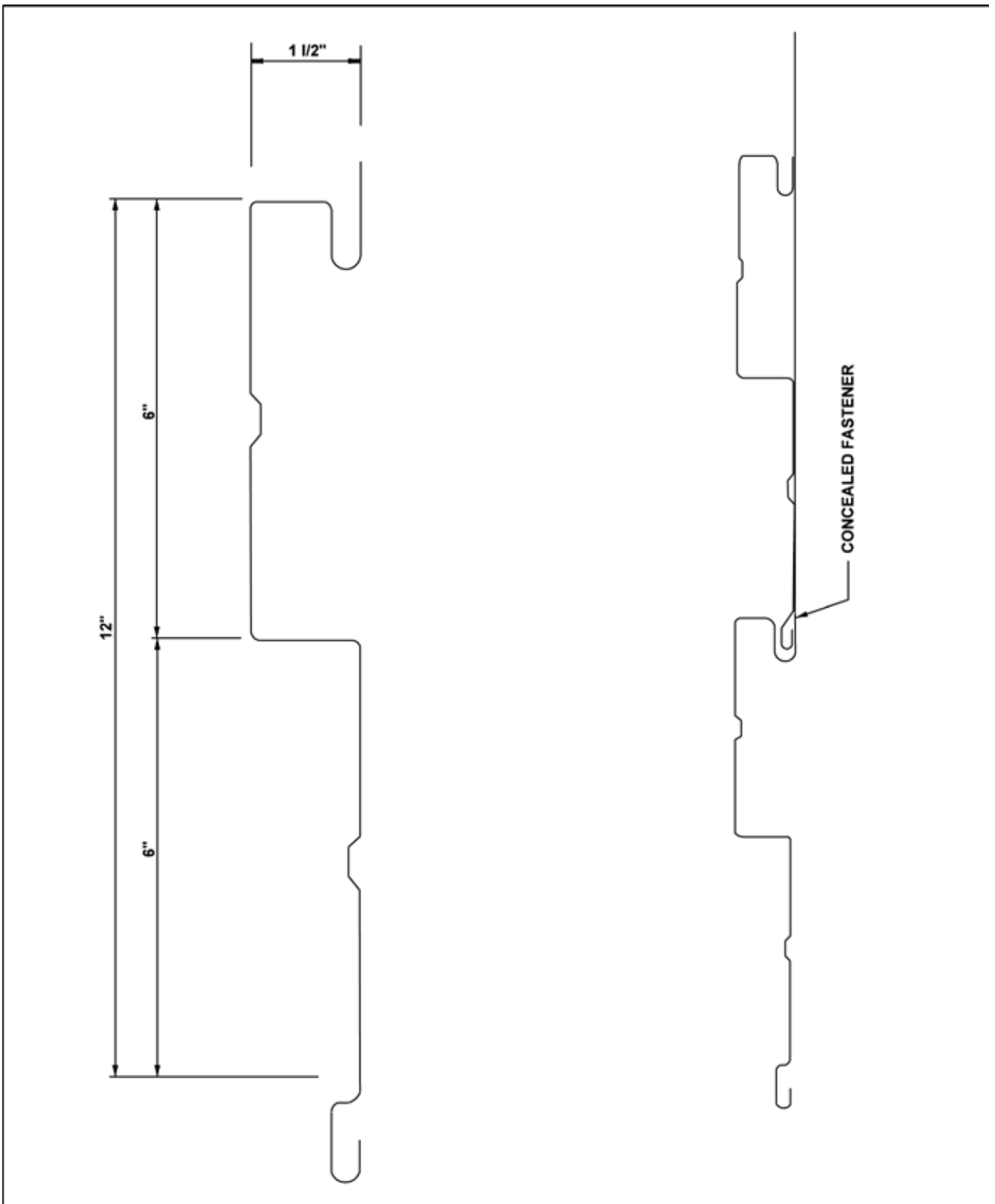
Principle Design Areas

Exhibit I-2-1



Profile of Metal Panel with Concealed Fasteners (A)

Exhibit I-2-2



Profile of Metal Panel with Concealed Fasteners (B)

Exhibit I-2-3

2.2.1.3 Ancillary Facility Areas: Ancillary facility areas defined as the support areas and facilities located north of the Main Terminal Area and the areas outside of the Midfield Concourse Areas. The facilities typically provided are for operational support such as the Airfield Rescue and Fire Facility (ARFF), maintenance facilities, utility structures, rental car facilities, cargo hangars, etc. The basic exterior materials shall consist of gray toned concrete or concrete masonry units, vertical metal siding panels and fixed or operable metal windows with gray-tinted glass. The profile of the vertical metal siding shall conform to **Exhibit I-2-3**. Alternative exterior building systems may be submitted by the A/E to the Authority for consideration.

2.2.2 Authority Review: The proportion of each basic material and where it is used within the overall design is subject to review and comment by the Authority.

2.3 Colors And Finishes

2.3.1 Color Designations: Color designations refer to the Authority Color Standards in **Section II Signing Design Guidelines** of this volume. Refer to Section II for physical paint samples for the various colors.

2.3.2 Architectural Concrete: Architectural concrete shall be natural dolomite limestone aggregate concrete finish to match the existing color of concrete at the Main Terminal. The concrete shall have no integral colorants and consists of a custom mix of gray and white cements with the aggregate.

2.3.3 Exterior Cladding: All vertical metal siding or other exterior cladding shall be color K-48 or within the range defined by K-55 to K-6 to K-48.

2.3.4 Concrete Block: All exterior exposed concrete block shall be color W-48.

2.3.5 Exposed Metal: Exposed structural steel, door sash and exterior light fixtures shall be color K-48, except for signposts and exterior light posts and masts, which shall be color K-61.

2.3.6 Glass: Glass varies among the buildings; refer to building specific standards. In the Terminal and Midfield Concourses the glass is clear thermal-pane units. In the office buildings the glass is medium to warm dark gray tinted, of a thickness appropriate to the application, but not less than 1/4" thick float glass.

2.3.7 Exterior Aluminum: Exterior aluminum glazing members, storefront, or cladding shall be K-61 (black) or color K-48 (warm dark gray).

2.4 Rooftop Equipment

2.4.1 Installations Not Permitted: Installation of mechanical equipment on the roof of buildings occupied by the Authority is not permitted unless required by unique project conditions. Rooftop equipment is permitted on buildings constructed and occupied by tenants if the equipment is completely screened from public view, including view from the airside. Equipment screens shall be of substantial construction using materials and colors appropriate to the structure on which they are located. All rooftop equipment and screens shall be designed to minimize vibration transfer to the structure. Pitch pockets are not acceptable for flashing at equipment supports or for any other type of roof penetration.

2.5 Street Furniture

2.5.1 Exterior Street Furniture: All outside benches, trash receptacles, express check-in boxes, etc. shall be designed to be consistent with the design, materials and colors of the facility.

2.6 Gatehouses

2.6.1 Locations: One gatehouse may be located at the entrance to each site along the boundary that parallels the public service road. The gatehouses shall be constructed with vertical metal siding and shall be color K-48. Gate arms shall have black and yellow diagonal striping.

2.7 Utility Services

2.7.1 Location: All utility distribution lines shall be underground.

2.8 Exterior Lighting

2.8.1 Lighting Pole Plan: Refer to the exhibits in **Chapter 3** of this appendix for additional requirements relating to light poles.

2.8.2 All poles shall be identified with adhesive labels, similar to 3M Engineering Grade reflective material, with 3" high characters. The identification shall consist of 2 alphabetic characters indicating the street name or parking lot name and one or two numbers as needed. Poles shall be numbered in sequence. Inside the pole base circuits shall be identified with labels similar to "E-Z tag" labels.

2.9 Waste Receptacles

2.9.1 General: Explosion Proof Receptacles shall be provided in areas prior to security screening at the main terminal and facilities within close proximity of the main terminal. Fiberglass receptacles may only be used in secured areas.

2.9.2 Fiberglass Waste Receptacles:

2.9.2.1 Criteria: Waste receptacles shall meet the following criteria:

A. Appearance: Cylindrical, Two Piece.

B. Capacity: Minimum Dimensions – Base 18" diameter X 26.5" H. Lid 18" diameter X 4.5" H with 12" diameter center top opening. Rigid plastic liner minimum 20 gallon for above dimensions.

C. Finish: High-Density Fiberglass.

D. Color: Dulles Gray or as approved in writing by the Authority.

2.9.3 Explosion Proof Waste Receptacles:

2.9.3.1 Criteria: Explosion Proof Trash Receptacles shall meet the following criteria:

A. Appearance: Cylindrical, with hinged, lockable lid.

B. Capacity: 40 gallon.

C. Finish: Exterior finish shall be stainless steel.

D. Explosive Charge: Design of the containers shall resist explosion of a 1.3 pound charge of TNT and shall direct the blast in an upward direction without failure of the container.

CHAPTER 3 Civil Standards

All landside (non-Air Operating Area) civil design must be similar to the criteria standards set forth below.

3.1 Culvert Endwall Structures

3.1.1 Circular Concrete Pipe Culverts: For circular concrete pipe culverts from 12" to 36" in diameter and for elliptical concrete pipe culverts from 23" x 14" to 53" x 34", for straight crossings and skew angles to 45°, where no wing-walls are required, use VDOT Road and Bridge Standard, Details No. EW-1 and 1A (Detail Drawing 101.01).

3.1.2 Circular Concrete Pipe Culverts: For circular concrete pipe culverts from 42" to 96" in diameter and for elliptical concrete pipe culverts from 60" x 38" to 106" x 68", for straight crossings and skew angles to 15° where wing-walls are required, use VDOT Road and Bridge Standard, Details No. EW-2 and 2A (Detail Drawing 101.03).

3.1.3 Circular Concrete Pipe Culverts: For circular concrete pipe culverts from 42" to 96" diameter, for 30° and 45° skews, where wingwalls are required, use VDOT Road and Bridge Standard, Detail No. EW-2S (Detail Drawing 101.08).

3.1.4 Multiple Circular Concrete Pipe Culverts: For multiple circular concrete pipe culverts from 12" to 36" in diameter, for straight crossings and skew angles to 15°, where no wing-walls are required, use VDOT Road and Bridge Standard, Detail No. EW-6 (Detail Drawing 101.11).

3.1.5 Multiple Circular Concrete Pipe Culverts: For multiple circular concrete pipe culverts from 12" to 36" in diameter, for skew angles from 15° to 37°-30', where no wing-walls are required, use VDOT Road and Bridge Standard, Detail No. EW-6S (Detail Drawing 101.13).

3.1.6 Multiple Circular Concrete Pipe Culverts: For multiple circular concrete pipe culverts from 12" to 36" in diameter, for skew angles from 37°-30' to 45°, where no

wing-walls are required, use VDOT Road and Bridge Standard, Detail No. EW-6S (Detail Drawing 101.14).

3.1.7 Multiple Circular Concrete Pipe Culverts: For multiple circular concrete pipe culverts from 42" to 96" in diameter, for straight crossings and skew angles to 15°, where wingwalls are required, use VDOT Road and Bridge Standard, Detail No. EW-7 (Detail Drawing 101.17).

3.1.8 Multiple Circular Concrete Pipe Culverts: For multiple circular concrete pipe culverts from 42" to 96" in diameter, for skew angles from 15° to 37°-30', where wing-walls are required, use VDOT Road and Bridge Standard, Detail No. EW-7S (Detail Drawing 101.19).

3.1.9 Multiple Circular Concrete Pipe Culverts: For multiple circular concrete pipe culverts from 42" to 96" in diameter, for skew angles from 37°-30' to 45°, where wing-walls are required, use VDOT Road and Bridge Standard, Detail No. EW-7S (Detail Drawing 101.20).

3.2 Curbs, Gutters, And Road Connections

3.2.1 Standard Curbs: Standard curbs shall be 6" or 4" high as detailed in VDOT Road and Bridge Standard" Detail No. CG-2 (Detail Drawing 201.01) and Detail No. CG-3 (Detail Drawing 201.02).

3.2.2 Standard Combination Curb-and-Gutters: Standard combination curb-and-gutters shall be 6" or 4" high as detailed in VDOT Road and Bridge Standard, Detail No. CG-6 (Detail Drawing 201.03) and Detail No. CG-7 (Detail Drawing 201.04).

3.2.3 Standard Entrance Gutters: Standard entrance gutters with flared opening for use across sidewalks shall conform to VDOT Road and Bridge Standard, Detail No. CG-9A (Detail Drawing 203.01).

3.2.4 Standard Entrance Gutters: Standard entrance gutters for use with unpaved space between curb and sidewalk shall conform to VDOT Road and Bridge Standard, Detail No. CG-9B (Detail Drawing 203.02).

3.2.5 Standard Method of Treatment: Standard method of treatment-connection for street intersections and commercial entrances shall conform to VDOT Road and Bridge Standard, Detail No. CG-11, (Detail Drawing 203.04).

3.2.6 Standard Perpendicular Curb Ramp: Standard perpendicular curb ramp, with an exposed aggregate finish, for access for mobility impairments shall conform to VDOT Road and Bridge Standard, Detail No. CG-12A (Detail Drawing 203.05, [Type A](#)).

3.2.7 Standard Commercial Entrance: Standard commercial entrance where heavy truck traffic is anticipated shall conform to VDOT Road and Bridge Standard, Detail No. CG-13 (Detail Drawing 203.09).

3.3 Curb Drop Inlets

3.3.1 Standard Curb Drop Inlets with Utility Space: For 12" to 30" pipe, with a maximum depth of 8', use VDOT Road and Bridge Standard Details DI-3D, DI-3E and DI-3F (Drawing 104.12, Sheet 1 of 2 and Drawing 104.13, Sheet 2 of 2). For 12" to 30" pipe, with depths from 8' to 20', use Details DI-3DD, DI-3EE and DI-3FF (Drawing 104.14, Sheet 1 of 1). For 36" to 48" pipe, with a maximum depth of 8', use VDOT Road and Bridge Standard Details DI-4D, DI-4E and DI-4F (Drawing 104.18, Sheet 1 of 2 and Drawing 104.19, Sheet 2 of 2). For 36" to 48" pipe, with depths from 8' to 20', use Details DI-4DD, DI-4EE and DI-4FF (Drawing 104.20, Sheet 1 of 1).

3.3.2 Standard Curb Drop Inlets for Constricted Areas: For 12" to 30" pipe, with a maximum depth of 8', use VDOT Road and Bridge Standard Details DI-3A, DI-3B and DI-3C (Drawing 104.09, Sheet 1 of 2 and Drawing 104.10, Sheet 2 of 2). For 12" to 30" pipe, with depths from 8'-20', use details DI-3AA, DI-3BB and DI-3CC (Drawing 104.11, Sheet 1 of 1). For 36" to 48" pipe, with a maximum depth of 8', use VDOT Road and Bridge Standard Details DI-4A, DI-4B and DI-4C (Drawing 104.15, Sheet 1 of 2 and Drawing 104.16, Sheet 2 of 2). For 36" to 48" pipe, with depths from

8' to 20', use Details DI-4AA, DI-4BB and DI-4CC (Drawing 104.17, Sheet 1 of 1).

3.3.3 Standard Combination (Curb Opening with Grate)

Inlets: For 12" to 24" pipe, with a maximum depth of 9', use VDOT Road and Bridge Standard Details DI-2A, DI-2B and DI-2C (Drawing 104.03, Sheet 1 of 2 and Drawing 104.02, Sheet 2 of 2). For 12" to 24" pipe, with depths from 9' to 20', use Details DI-2AA, DI-2BB and DI-2CC (Drawing 104.05, Sheet 1 of 1). For 30" to 48" pipe, with a maximum depth of 9', use VDOT Road and Bridge Standard Details DI-2D, DI-2E and DI-2F (Drawing 104.06, Sheet 1 of 2 and Drawing 104.07, Sheet 2 of 2). For 30" to 48" pipe, with depths from 9' to 20', use Details DI-2DD, DI-2EE and DI-2FF (Drawing 104.08, Sheet 1 of 1). Because the preferred locations of inlet structures are adjacent to and not beneath the roadway, these details should only be used under the MOST RESTRICTED site conditions.

3.3.4 Multi Grate Drop Inlets: For 12" to 72" pipe, with depths GREATER than 6'-6", use VDOT Road and Bridge Standard Details DI-12 and DI-12A (Drawing 104.30, Sheet 1 of 3, Drawing 104.31, Sheet 2 of 3 and Drawing 104.32, Sheet 3 of 3). For 12" to 36" pipe, with depths LESS than 6'-6", use VDOT Road and Bridge Standard Details DI-12B and DI-12C (Drawing 104.33, Sheet 1 of 2 and Drawing 104.34, Sheet 2 of 2).

3.4 Roadway Guardrails

3.4.1 Saarinen Circle: Guardrail for the Saarinen Circle in front of the Main Terminal shall be 6" x 6" standard box-beam rails as shown in [Exhibit I-3-1](#).

3.4.2 Vehicle Ramps: Guardrails for the vehicle ramps immediately in front of the Main Terminal are custom Saarinen designs.

3.4.3 W-beam Guardrail: Guardrail for all other areas of the Airport shall be W-beam guardrail and shall conform to VDOT Road and Bridge Standards. These include, but are not limited to: Detail GR-HDW (Drawing 501.01, Sheet 1 of 3, Drawing 501.02, Sheet 2 of 3 and Drawing 501.03, Sheet

3 of 3), Detail GR-2 and GR-2A (Drawing 501.04, Sheet 1 of 2 and Drawing 501.05, Sheet 2 of 2) and Detail GR-6 (Drawing 501.09, Sheet 1 of 2 and Drawing 501.10, Sheet 2 of 2). Due to local site conditions, other VDOT W-Beam Guardrail details may be required and should be conformed to accordingly.

3.5 Miscellaneous Details

3.5.1 Wheel Stops: Wheel stops shall conform to **Exhibit I-3-2, Precast Concrete Wheel Stop.**

3.5.2 Roadway Lighting: Roadway lighting shall conform to **Exhibit I-3-3, Roadway Lighting Pole.**

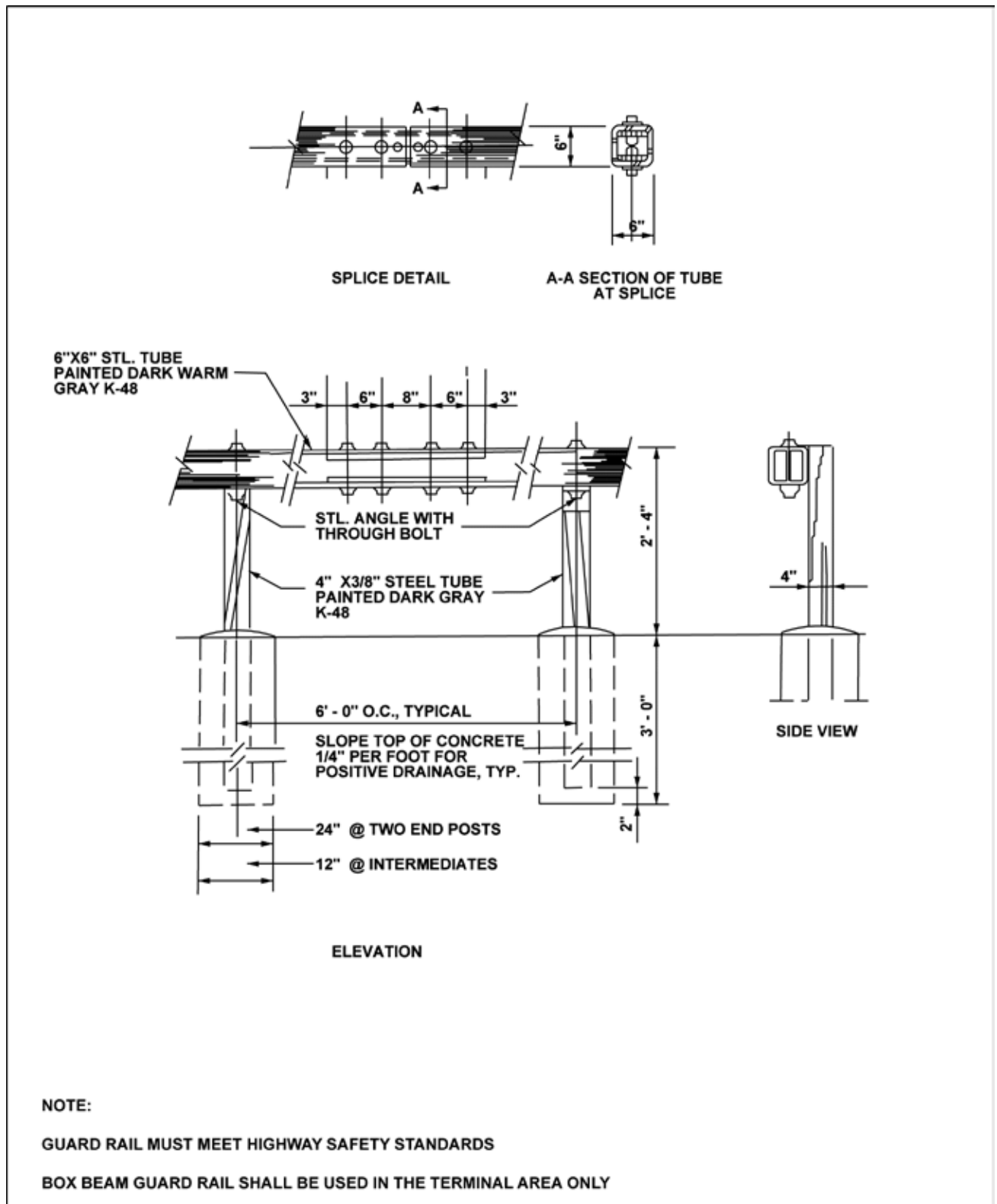
3.5.3 Parking Lot Lighting: Parking lot lighting shall conform to **Exhibit I-3-4.**

3.5.4 Parking Lot Lighting: Parking lot lighting shall conform to **Exhibit I-3-5, Main Terminal Parking Lighting Pole.**

3.5.5 Beam Barricades: Beam barricades shall conform to **Exhibit I-3-6, Beam Barricade.**

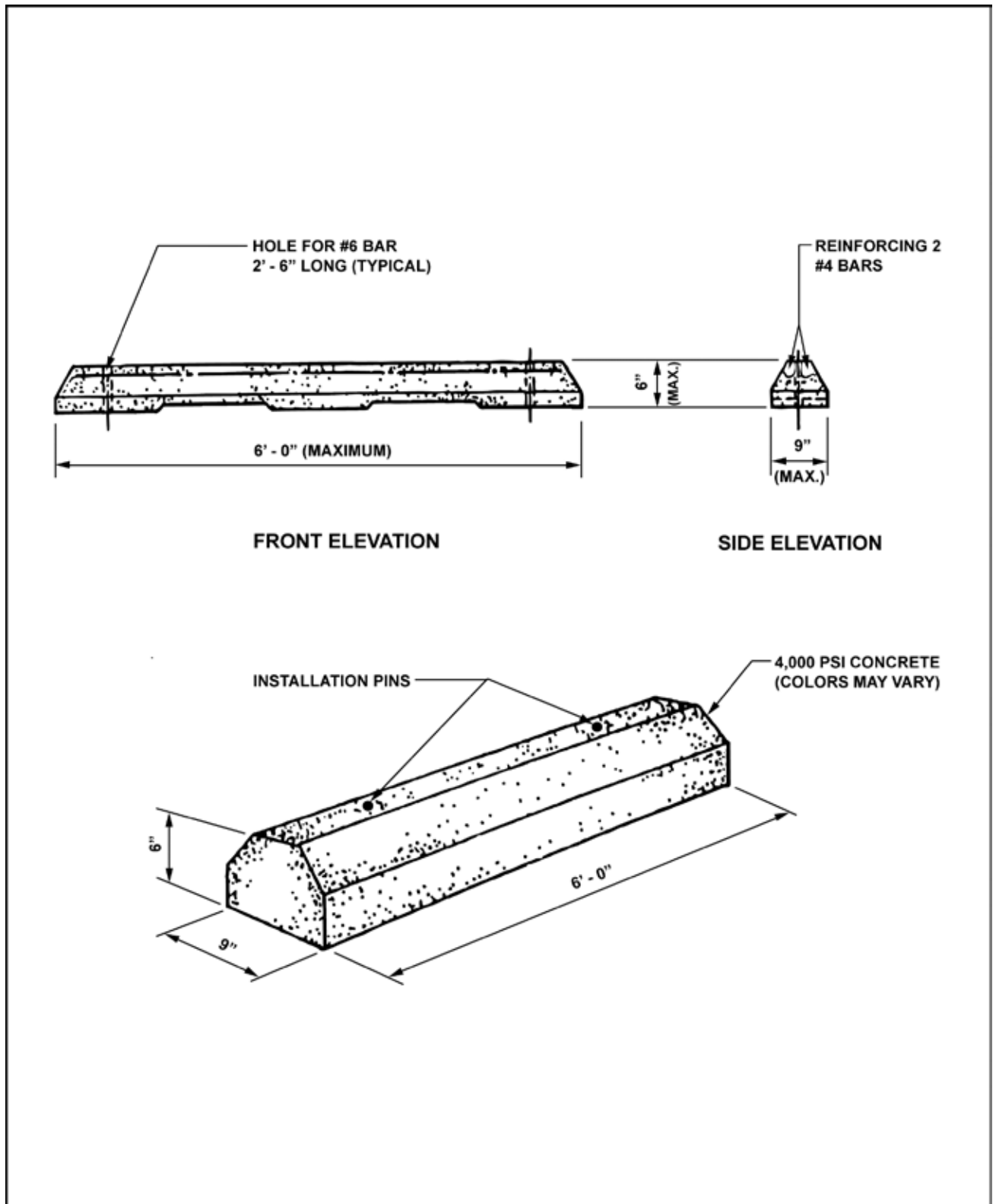
3.5.6 Spall Repair: Spall repair shall conform to **Exhibit I-3-7, Typical Spall Repair.**

3.5.7 Spall Repair: Spall repair shall conform to **Exhibit I-3-8, Typical Spall Repair.**



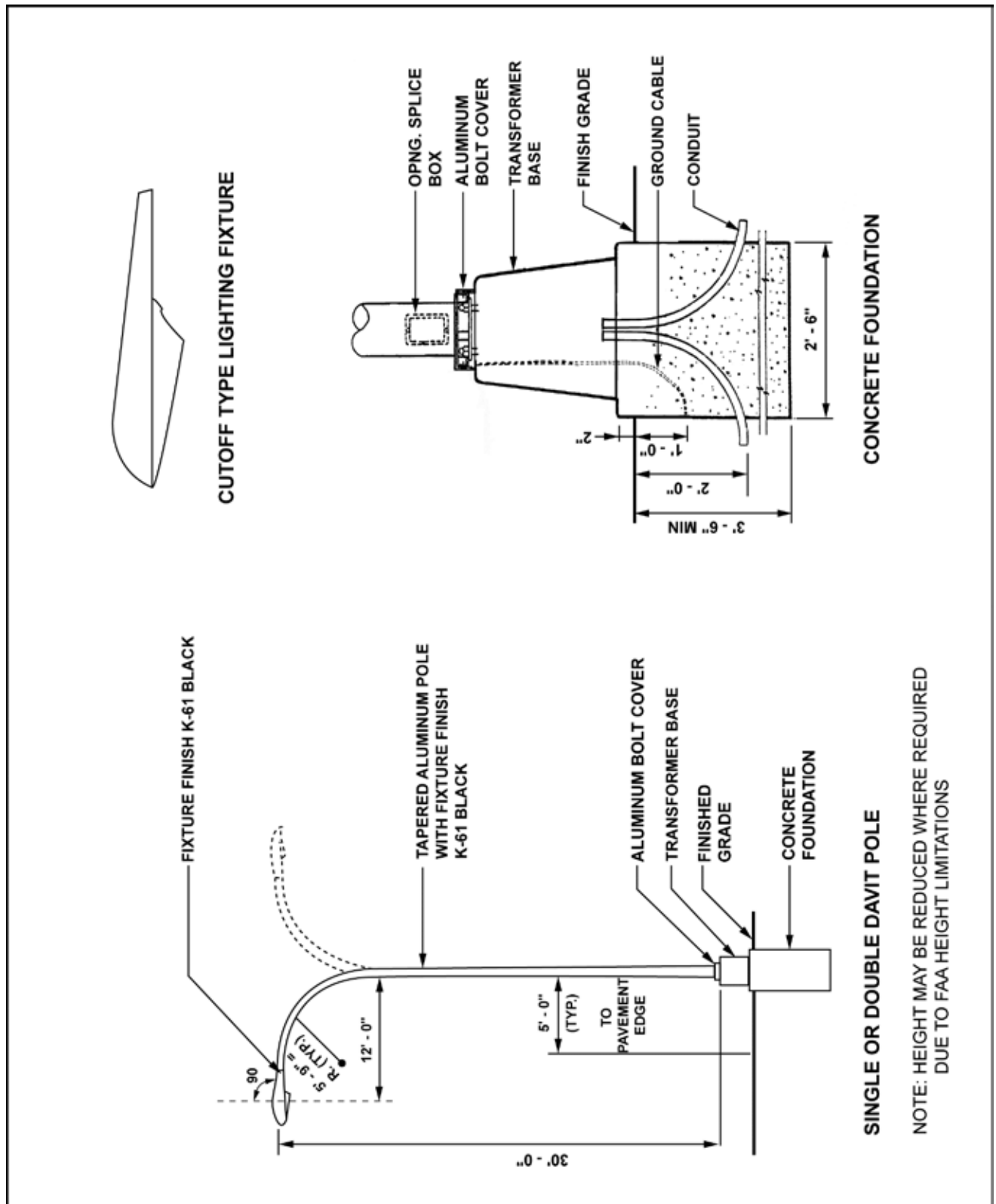
Standard Box Beam Guardrail

Exhibit I-3-1



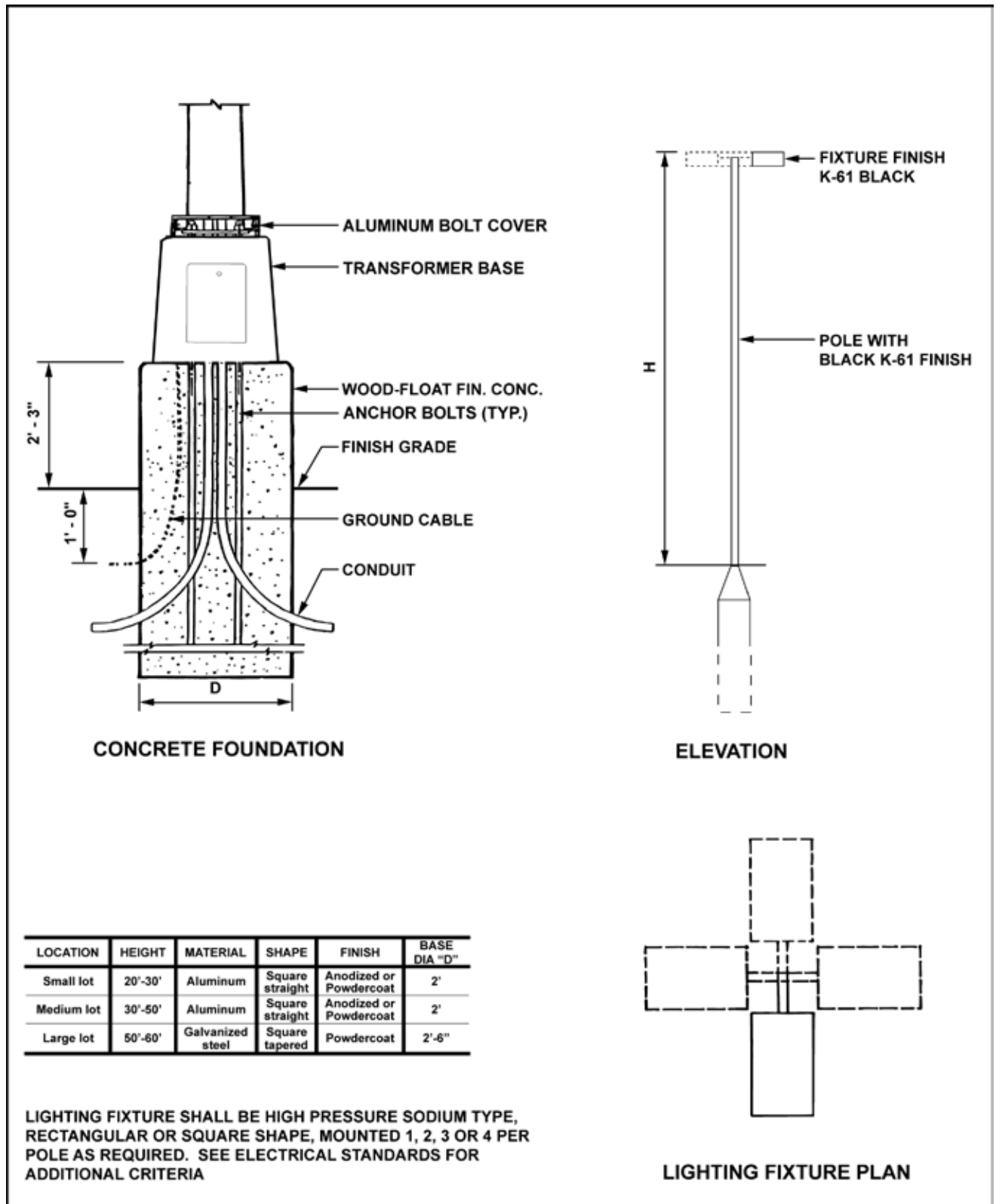
Precast Concrete Wheel Stop

Exhibit I-3-2



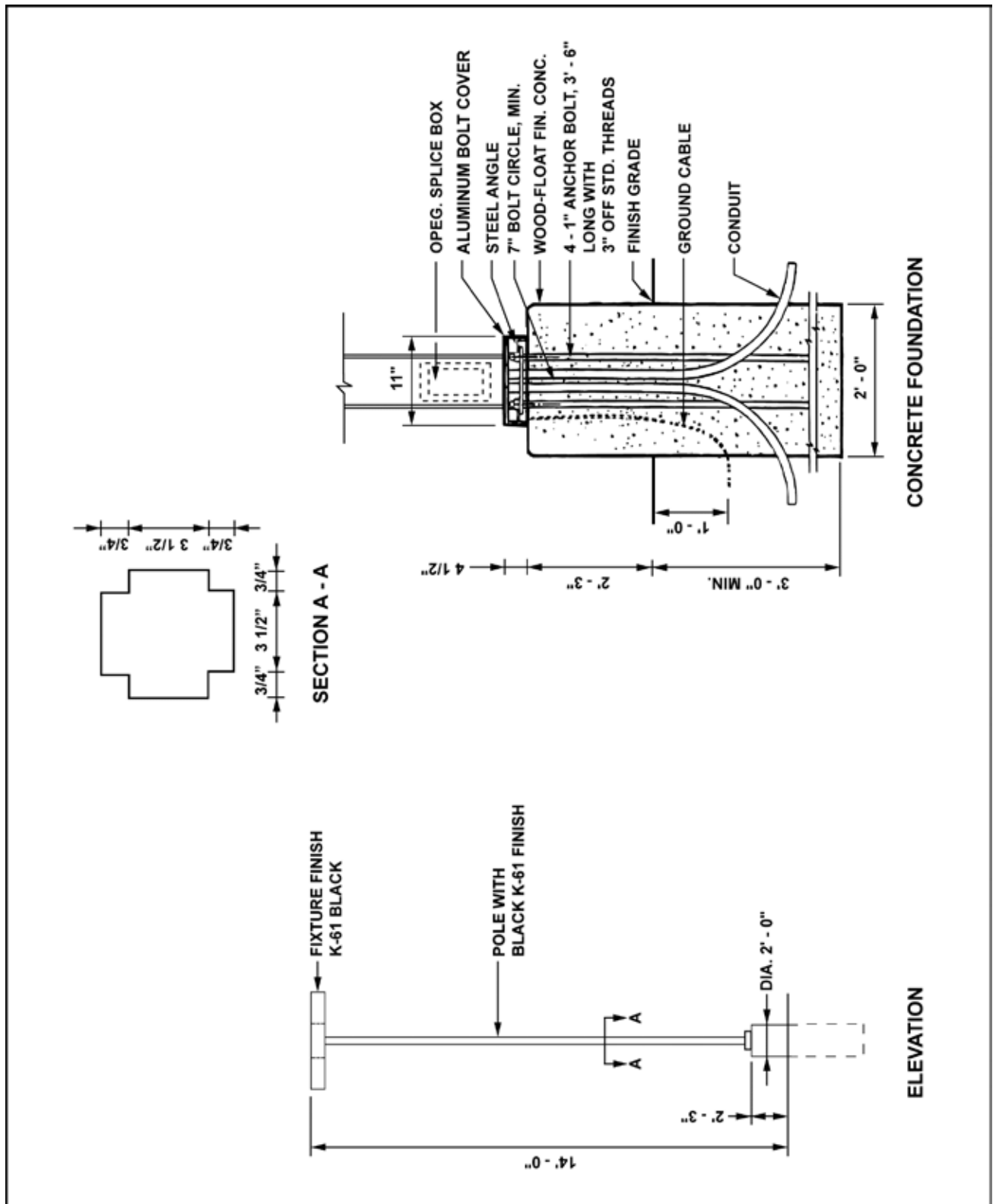
Roadway Lighting Pole

Exhibit I-3-3



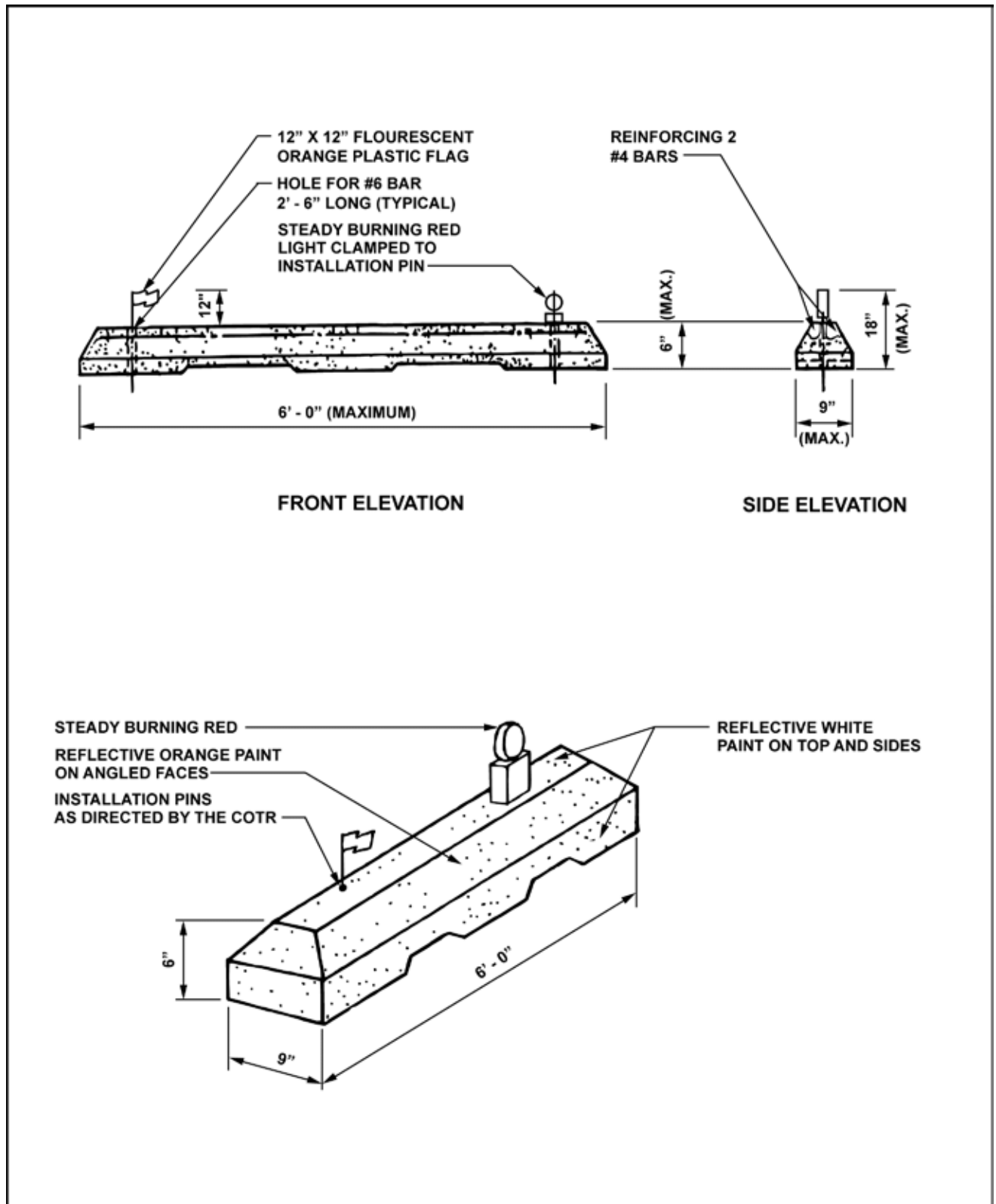
Driveway and Parking Lighting Pole

Exhibit I-3-4



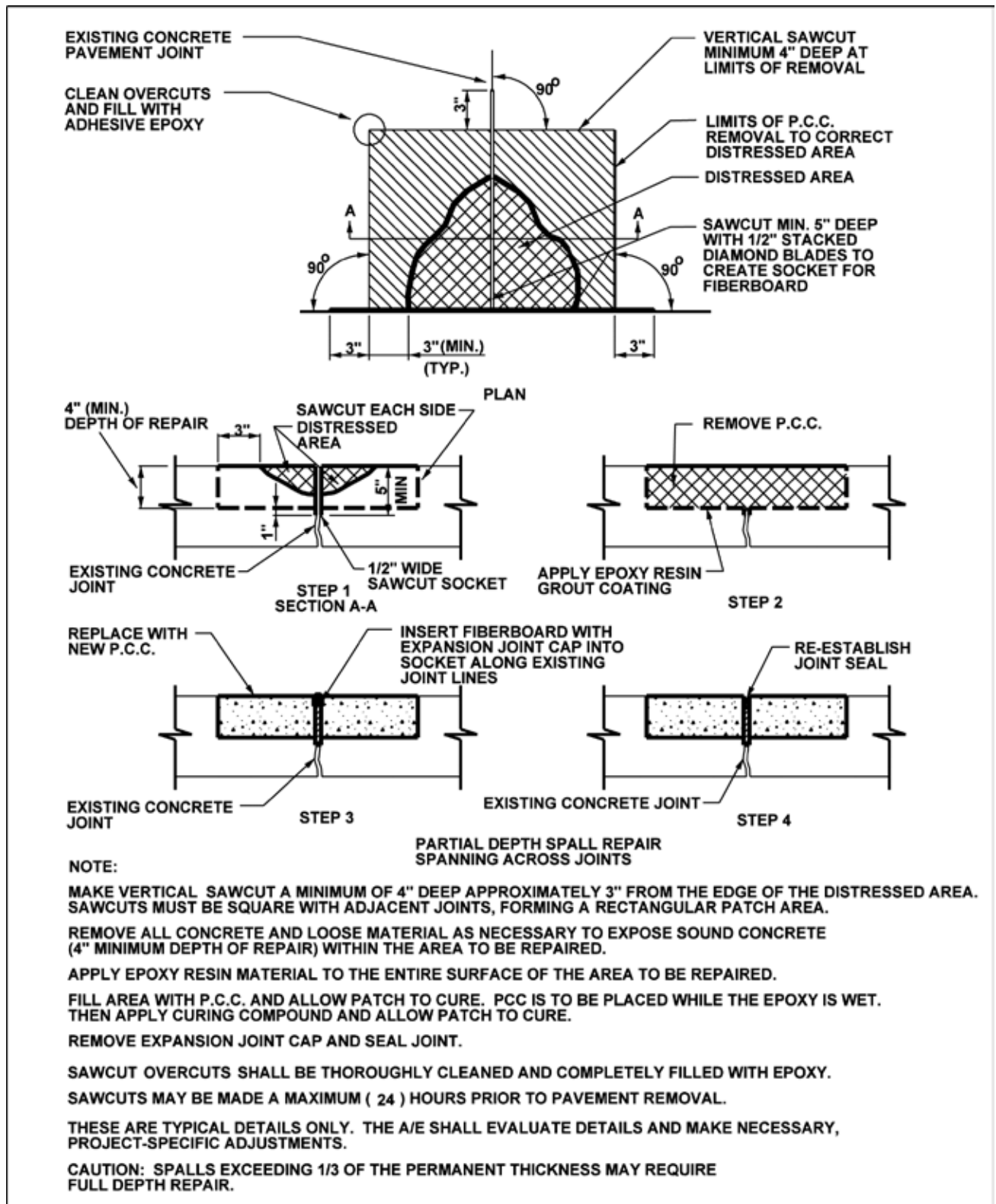
Main Terminal Parking Lighting Pole

Exhibit I-3-5



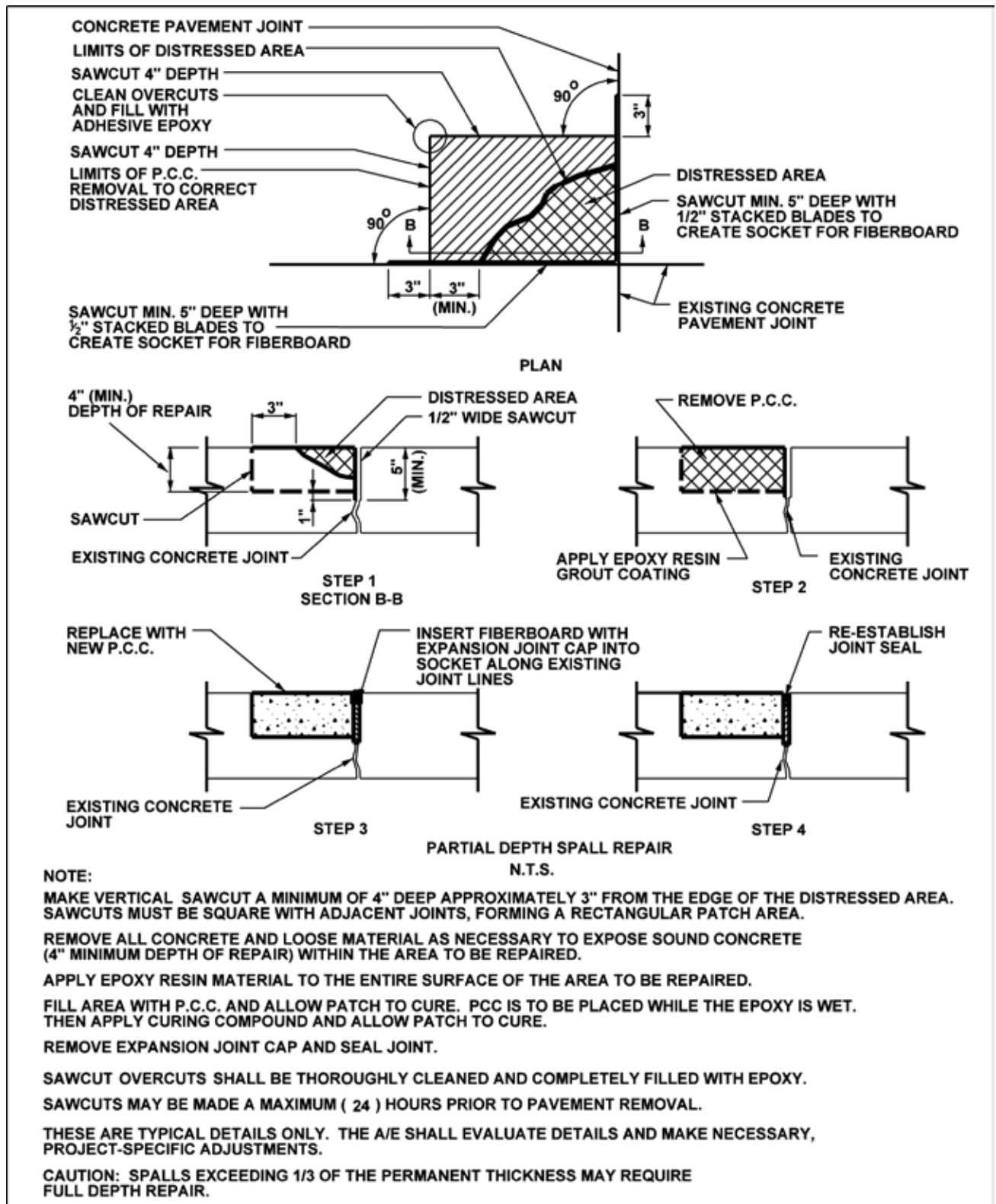
Beam Barricade

Exhibit I-3-6



Typical Spall Repair

Exhibit I-3-7



Typical Spall Repair

Exhibit I-3-8

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CHAPTER 4 Landscape Standards

4.1 General Criteria

4.1.1 Landscape Guidelines: The purpose of these landscape guidelines is to facilitate:

4.1.1.1 Design of Plantings: Design of plantings within developed landside areas.

4.1.1.2 Preservation and Promotion: Preservation and promotion of the health, safety, and general welfare of the public and employees.

4.1.1.3 Convenient, Attractive and Harmonious: Creation of a convenient, attractive, and harmonious landside airport campus.

4.1.1.4 Preservation and Enhancement: Preservation and enhancement of the Saarinen-Kiley historic Main Terminal environs.

4.1.1.5 Conservation of Natural Resources: Conservation of natural resources including adequate air and water quality and the appropriate use of land.

4.1.1.6 Reduction of Harmful Effects: Result in the reduction of the harmful effects of wind and air turbulence, heat and noise, and the glare of motor vehicle lights.

4.1.1.7 Preserve Underground Water Resources: Preserve underground water resources and permit the return of precipitation to the ground water strata.

4.1.1.8 Drainage: Act as a natural drainage system and ameliorate storm water drainage problems.

4.1.1.9 Carbon Dioxide: Reduce the level of carbon dioxide and return pure oxygen to the atmosphere.

4.1.1.10 Soil Erosion: Prevent soil erosion.

4.1.1.11 Shade: Provide shade.

4.1.1.12 Enhance Appearance: Enhance the appearance of the environs of buildings, parking lots, and streets and roadways.

4.1.2 Scope Guidelines: The scope of these guidelines includes vegetation preservation, planting design, and installation within existing developed and future landside areas of the airport. The guidelines focus on plantings within areas defined by the back of curbs or edge of pavements and the face of buildings or other structures within the landscape. Though landscape areas may also include constructed features, these guidelines do not specifically address site lighting, walls, fencing, pedestrian circulation, storm water management, and signage. These topics are only addressed as they relate to plantings. The *Design Manual* provides guidance regarding the planning and design of non-vegetated site development.

4.1.3 Future Landscape Design: The guidelines are intended to direct future landscape design and site planning of the landside areas of Washington Dulles International Airport. They were also used to guide the development of specific design recommendations included in this Landscape Master Plan. The landscape guidelines establish the approach to site and landscape planning, design, and construction. In addition, the guidelines address, to a limited extent, landscape maintenance. However, the guidelines should not be exclusively used to support landscape maintenance. Landscape maintenance procedures and operations should be guided by separate landscape maintenance guidelines developed based on existing vegetation and plantings.

4.1.4 Integration of the Landscape Guidelines: Integration of the landscape guidelines into the airport landside planning and design process is necessary to ensure that site and landscape development is consistent with and supports the principles established in this Landscape Master Plan. The landscape master plan principles include:

4.1.4.1 Preserve and Enhance Site Planning: Preserve and enhance the essential site planning and landscape design characteristics established by Saarinen and Kiley.

4.1.4.2 Saarinen and Kiley's Site Planning: Integrate Saarinen and Kiley's site planning and landscape design concepts into new development and rehabilitated areas.

4.1.4.3 Integrate Landscape Design: Integrate landscape design into an overall strategy for creating a distinct Dulles airport identity.

4.1.4.4 Landscape Strategies: Develop sustainable landscape strategies based on regional and site ecologies, airport maintenance capabilities, and safety requirements.

4.1.4.5 Utilize Landscape Strategies: Utilize landscape design strategies to support the role of the airport's arrival and departure experience as a significant international and national gateway.

4.1.4.6 Organize User-Friendly Airport: Organize the landscape to support a user-friendly airport environment.

4.2 Landscape Planning, Design, and Design Approval Processes

4.2.1 General: All landscape planning and design, including construction documentation and construction-period services, shall be undertaken by qualified professionals in accordance with Metropolitan Washington Airport Authority (Authority) policies, guidelines, and standards including, but not limited to, the latest edition of the *Design Manual*, except as amended below.

4.2.2 Role of Professionals: All landscape planning and design, including construction documentation and construction-period services, shall be undertaken by professionals qualified to undertake the design of all or selected elements of landscape projects.

4.2.2.1 Scope of Landscape Projects: the scope of landscape projects may include the following:

A. Boundary and Topographic Land Surveys.

B. Tree and Vegetation Surveys.

C. Maintenance of Traffic Plans and Details.

D. Erosion and Sediment Control Plans and Details.

E. Storm Water Management Plans and Details.

F. Grading Plans.

G. Layout and Horizontal Control Plans.

H. Pedestrian Circulation and Hardscape Plans and Details.

I. Landscape Structure Plans and Details (site walls, fencing, shelters, etc.).

J. Planting Plans and Details.

K. Site Furnishings Plans and Details.

L. Site Lighting Plans and Details.

M. Signage Plans and Details.

4.2.2.2 Architectural Design Documentation: All landscape architectural design and design documentation shall be prepared by landscape architects, architects, professional engineers, and land surveyors registered by the Commonwealth of Virginia. In addition, specialized services may be undertaken as follows:

A. Assessment and documentation of the condition of and recommendation for treatment of plants may also be undertaken by qualified arborists, horticulturists, and urban foresters.

B. Irrigation design may also be undertaken by qualified irrigation designers. However, only qualified professional engineers will be permitted to design the

water distribution and backflow prevention and electric service elements of irrigation systems.

C. Lighting design may be undertaken by qualified lighting designers.

D. Signage design may be undertaken by qualified environmental graphic designers.

4.2.3 Sealing of Plans: Sealing of Plans, Technical Reports, and Specifications Requirements are as follows:

4.2.3.1 Plans, Technical Reports and Specifications:

Plans, technical reports, and specifications for landscape projects shall be sealed by a qualified landscape architect, professional engineer, land surveyor, or architect duly registered to practice in the Commonwealth of Virginia in accordance with the latest Regulations of the Virginia Board of Architects, Professional Engineers, Land Surveyors, Certified Interior Designers, and Landscape Architects, except as follows:

A. Irrigation drawings, details, and specifications may be prepared by irrigation designers without a seal. However, documentation of water distribution, backflow prevention, and electric service elements of irrigation systems shall be sealed by a qualified professional engineer.

B. Lighting drawings, details, and specifications may be prepared by a lighting designer without a seal. However, all electric power and circuit design documentation shall be sealed by a qualified professional engineer.

4.2.3.2 Structural Drawings and Calculations: In addition, structural drawings and calculations for site structures including, but not limited to, freestanding and retaining walls (over two feet in height) and foundations, shall be sealed by a **structural engineer licensed in the Commonwealth of Virginia**.

4.3 Landscape Design and Management Issues Affecting Planting Design and Preservation of Vegetation

4.3.1 General: In addition to industry-standard landscape planning and landscape architectural design criteria, there are several airport-specific issues that must be considered as part of landscape planning and design processes. Following are recommendations concerning bird and wildlife habitat values in landside landscapes, Japanese beetle plant hosts, crime prevention, security design, sustainable landscape design and management, obstruction in navigable airspace, and preservation of historic plants and new design within the Historic District. Each topic area discussion focuses on considerations related to plants and does not include the full range of issues associated with each topic. Landscape planning, design, and management guidelines follow the topic overview.

4.3.2 Bird and Wildlife Habitats: Since bird collisions with aircraft are of paramount concern, consideration must be given to this issue as part of all landscape planning, design, and management. Washington Dulles International Airport (Dulles) provides a wide variety of natural and human-made habitats that offer food, water, and cover. Open water, wetlands, marshes, forested areas, grass cover, and even developed area landscapes serve as habitats for birds. In addition, these same habitat areas provide water and food including seeds, berries, grass, insects, grubs, earthworms, small birds, and small mammals. Birds are typically drawn to open water for drinking, bathing, feeding, loafing, roosting, and protection. Storm events and periodic rain result in overland surface flows that can contribute to temporary pooling. Ponds, lakes, and streams provide a variety of bird foods, including small fish, tadpoles, frogs, insect larvae, other invertebrates, and edible aquatic plants. Cover is critical to bird survival such as resting, roosting, and nesting. A wide variety of vegetation types provide cover including forested areas, woodlands, fields, wetlands, and the trees and shrubs of developed area landscapes.

4.3.2.1 Landscape Planning and Design

Recommendations: Landscape planning and design recommendations for the airport must incorporate habitat management practices aimed at creating landscape conditions less attractive to birds. Such practices include reducing instances of temporary standing water and permanent water surfaces, removing and/or selectively clearing of forested and wooded areas as well as specimen trees, and managing undeveloped areas to reduce or eliminate invader plants and successional growth. In addition, the landscape within developed areas requires management to reduce and eliminate decorative and functional plants that serve as bird habitat, such as controlling the height of field grass and turf areas through mowing. Lastly, bird habitat issues should be factored into landscape design criteria including plant types and characteristics, locations, species, and ease of maintenance.

A. The following guidelines should be considered during facility, site, and landscape planning and design as well as landscape management and maintenance:

- 1) Review all landscape plans with a wildlife damage management biologist.
- 2) Monitor all landscape areas on a continuing basis for the presence of hazardous wildlife.
- 3) Develop airport turf grass management plans in consultation with a wildlife damage management biologist on a prescription basis, specific to Dulles and the type of hazardous wildlife likely to frequent the airport.
- 4) Trees and shrubs that produce seeds and fruits attractive to birds should not be specified.
- 5) Dense stands of evergreen trees should be avoided.

6) Do not plant disturbed areas or areas in need of re-vegetating with seed mixtures containing large-seed producing grass.

7) Prevent plant maturation and seed head production in areas already planted with seed mixtures containing large-seed producing grasses by the use of mowing or other suitable landscape management practices.

8) Develop and implement a preferred/prohibited plant species list, reviewed by a wildlife damage management biologist that has been designed for Dulles to reduce the attractiveness of landscaped areas to hazardous wildlife.

9) Avoid installation of ponds, fountains, reflecting pools, and other water bodies as part of the airport's landscape.

10) Take care when selecting and spacing plants for airport landscaping. Avoid creation of dense cover for roosting. Thinning the canopy of trees, or selectively removing trees to increase their spacing, may be required to help eliminate bird roosts that form in trees.

11) The management of an airport's airside ground cover to minimize bird activity is a controversial subject in North America. The general recommendation, based on studies in England in the 1960s and 1970s, has been to maintain a monoculture of grass at a height of 6-10 inches (Transport Canada) or 7-14 inches (U.S. Air Force). Tall grass, by interfering with visibility and ground movements, is thought to discourage many species of birds from loafing and feeding. However, the limited studies conducted in North America have not provided a consensus of opinion on the utility of tall-grass management for airports. Finally, the maintenance of monotypic, uniform stands of tall (e.g., 10-inch) grass is difficult and expensive at most airports, requiring fertilizer, herbicides, and

water. A promising approach to reducing wildlife attraction to airport ground cover, irrespective of the height, is the use of vegetation that is undesirable or mildly toxic to wildlife. For example, there are varieties of fescue grass that contain fungal endophytes. Some of these endophytes are unpalatable to grazing birds as well as to rodents and deer. These endophytic grasses might also support fewer insect numbers. Until more research is completed, no general guidelines on grass height or vegetation type for airside ground cover will be made.

12) Consult with professional wildlife hazard management biologists and horticulturists to develop a vegetation type and mowing schedule appropriate for the growing conditions and wildlife at Dulles. The main principles to follow are to use a vegetation cover and mowing regime that do not result in a build-up of rodent numbers and the production of seeds, forage, or insects desired by birds.

13) Dense stands of trees and undergrowth on airport property can provide excellent cover for deer, coyotes, nesting geese and raptors, roosting blackbirds, rodents, and other wildlife. In general, clear or at least sufficiently thin these habitats to eliminate the desired cover and to allow easy visual and physical access by wildlife control personnel.

14) Remove all unnecessary posts, fences, and other structures that can be used as perches by raptors and other birds.

15) Control vegetation associated with fencerows and other unmanaged areas that typically provide excellent cover for wildlife.

16) Design and repair paved and vegetated areas to allow rapid drainage of depressions and

disturbed areas at construction sites that accumulate standing water after rain events.

17) Design storm water detention ponds to allow a maximum 48-hour detention period for the design storm. When feasible, avoid or remove retention ponds and detention ponds featuring dead storage to eliminate standing water. Design detention basins to remain totally dry between rainfalls. Where constant flow of water is anticipated through the basin, or where any portion of the basin bottom might remain wet, design the detention facility to include a concrete or paved pad and/or ditch/swale in the bottom to prevent vegetation that might provide nesting habitat.

4.3.3 Japanese Beetle Host Plants: The primary objective of the US Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Japanese Beetle Program Manual for Airports is to protect the agriculture of the Western United States by preventing the spread of the Japanese beetle from the Eastern United States via aircraft. The Japanese Beetle Program Manual for Airports and other related guidance documents and references should be consulted as part of airport landscape planning and design. The major landscape design issue is avoidance of retention and introduction of host plants. Host plant control measures principally include removal of existing host plants and specifying non-host and non-preferred host replacement and new plants. Reliable science-based reference data should be consulted to ensure that every effort is made to eliminate problematic existing plants and to ensure proper plants are specified as part of landscape planning and design efforts.

A. The following guidelines should be considered during facility, site, and landscape planning and design as well as landscape management and maintenance:

1) Reviews all landscape plans for Japanese beetle host plants and require re-design if host plants are included.

2) Undertake a survey of landscape areas for the presence of Japanese beetle host plants and prepare management plan for the removal and replacement of host plants.

B. The most recent science-based sources of plant hosting data should be consulted prior to design. In addition, Authority landscape management staff should be contacted regarding historical data on host plants at the airport.

4.4 Crime Prevention through Environmental Design

4.4.1 General: The design and management of the landside landscape is directly related to the safety and security of passengers, visitors, airport staff and employees, vendors, and contractors. In addition, to some extent, the protection of airport and private property is reliant upon the design and management of the airport landscape. Crime Prevention Through Environmental Design (CPTED) is based upon the belief that: "... the proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime and an improvement in the quality of life."

4.4.2 Landscape Security Design: The following landscape security design considerations are based on guidelines prepared by the Virginia CPTED Committee and the Virginia Crime Prevention Association (VCPA).

4.4.3 Three Interrelated Principles: There are three interrelated principles that comprise CPTED concepts and strategies:

4.4.3.1 Natural Surveillance.

4.4.3.2 Natural Access Control.

4.4.3.3 Territoriality.

4.4.4 Natural Surveillance: Natural surveillance is the placement of physical features, activities, and people in a way that maximizes visibility. This design concept is

directed towards keeping intruders under observation, and therefore less likely to commit criminal acts. Natural surveillance utilizes design features to increase the visibility of a property or a building.

4.4.5 Natural Access Control: Natural access control is the physical guidance of people coming and going from a space by the judicious placement of entrances, exits, fencing, landscaping, and lighting. This design concept is directed primarily at decreasing the opportunity for criminal activity by denying access to crime targets and creating a perception of risk for offenders. People are physically guided through a space by the strategic design of streets, sidewalks, building entrances, landscaping and gateways. Design elements are also useful tools to clearly indicate public routes and discourage access to private areas.

4.4.6 Use of Physical Attributes: Territoriality is the use of physical attributes that convey ownership such as fences, signage, and landscaping, lighting, and pavement designs. People take more interest in something when they have a sense of ownership or involvement. Therefore, the environment should be designed to clearly delineate private spaces. Users are encouraged to develop a sense of territorial control, while potential offenders, perceiving this control, are discouraged. This concept includes features that define property lines and distinguish between private and public spaces. This can be accomplished by such measures as landscape plantings, pavement designs, gateway treatments, appropriate signage, and "open" fences. In addition to creating areas of activity support, properly designed and maintained spaces also establish territoriality.

4.4.7 Main Principles Described: In addition to the three main principles described, two other ideas that support CPTED include Activity Support and Maintenance.

4.4.8 Activity Support in Public Spaces: Activity support encourages interaction by putting activities in public spaces that are intended for use by residents or customers and other legitimate users and, therefore, discourages criminal

acts. This is more effective when activities are planned for times when the use of a space is minimal.

4.4.9 Care And Maintenance: Care and maintenance enable continued use of a space for its intended purpose. Maintenance also serves as an additional expression of ownership. Deterioration indicates less concern and less control by the intended users of a site and can be a sign of a greater tolerance for disorder. Proper maintenance protects public health, safety, welfare, and establishes minimum requirements and acceptable standards.

4.4.10 Guidelines: The following guidelines should be considered during facility, site, and landscape planning and design as well as during landscape management and maintenance:

4.4.10.1 Plants And Landscape Features: Specify plants and landscape features such as walls, fences, and other structure to maintain open and clear sight lines and to avoid places of concealment.

4.4.10.2 Shrubs Trimmed: Keep shrubs trimmed to a maximum of three feet, or at least below windowsills, when safety is an issue.

4.4.10.3 Tree Canopies: Tree canopies should have a natural growth height of at least four feet from the ground when located around entrances, parking areas, and walkways, etc.

4.4.10.4 Elevate Tree Canopies: Elevate tree canopies to a height that provides adequate natural surveillance.

4.4.10.5 Choose Plants: Choose plants that will naturally grow to the desired form or height to reduce maintenance.

4.4.10.6 Landscape And Light Islands: When feasible, alternate landscape and light islands within parking areas to prevent trees from growing up into the light fixtures.

4.4.10.7 Provide Lighting Systems: Provide lighting systems that make pedestrians more visible to motorists

and illuminate other vehicles and objects that should be avoided.

4.4.10.8 Locate Lighting Systems: Locate lighting systems along walkways to permit pedestrians to see risks involved with walking at night.

4.4.10.9 Illumination: Illumination should fall throughout the parking area, along the walkway, along the building edge and building entrances.

4.4.10.10 Provide Lighting Systems: Provide lighting systems that will enhance the ability to observe surroundings.

4.4.10.11 Provide Lighting Systems That Minimize: Provide lighting systems that minimize glare, shadow, light pollution and light trespass, including impacts on aircraft operations, and are dark sky compliant.

4.4.10.12 Provide Lighting That Is Even: Provide lighting that is even, uniform and does not produce dark areas or sharp contrasts for concealment.

4.4.10.13 Creating Uniform Lighting: When creating uniform lighting consider the type of fixture, the height of the poles, the direction the light needs to go and the spacing of the fixtures.

4.4.10.14 Same Lamps Throughout Site: The lamps used throughout the site should be the same. Whether Metal Halide, High Pressure Sodium or another type of light is used, the emphasis is to have the same color of light throughout the site. This will provide good color rendition, help with visibility, and reduce contrasts.

4.4.10.15 Routine Maintenance of Lights: Routine maintenance of lights is necessary. A program should be implemented to review the lights regularly to determine if any have burnt out or been broken and need replacing.

4.4.10.16 Re-Lamp The Complex: A program should be established to re-lamp the complex, also known as group

re-lamping. This will better ensure the proper use of the light bulb, and will reduce costs when lights need to be replaced one at a time and each individual visit has to be paid for.

4.4.10.17 Globes: Globes should be cleaned to ensure full illumination from the light.

4.4.10.18 Trimming And Maintaining Tree Canopies:

A program should be established for trimming and maintaining tree canopies and other plant materials at and around the light poles, wallpacks, etc. Separate trees from light poles for effective lighting in a parking lot.

4.5 Site Security

4.5.1 General: The purpose of the Transportation Security Administration's (TSA) Recommended Security Guidelines for Airport Planning, Design and Construction, Revised June 15, 2006, is to provide guidance for airport managers and planning and design professionals responsible for the planning and design of airport facilities. These guidelines should be used when undertaking landscape planning, design, construction, and maintenance involving both landside and airside areas to ensure that security requirements are considered. Landscape-related security features that have been coordinated early in the landscape and facility planning and design process with TSA, Federal Aviation Administration (FAA) and other regulatory agencies, as well as with airport tenants and end-users are more likely to be successful.

4.5.1.1 Landscape Elements: Several landscape elements, including natural, planted, and constructed features and systems, are associated with airport landside security design. These include natural barriers, grading and constructed landforms, site walls, fencing, lighting, signs, and plantings. Site security design should be undertaken in concert with other crime prevention planning and design. CPTED guidelines focus more on security design considerations affecting public landside areas accessed by passengers and non-passengers. Though there is overlap between the CPTED and TSA design

approaches, the TSA landscape-related planning and design recommendations are principally concerned with controlling unauthorized access to non-public and other secure areas, blast protection through barrier design, avoiding conflicts between plantings, and security-related systems and features.

4.5.2 Natural Barriers: Landscape planning and design may involve incorporating natural features in an overall landscape plan and may also involve enhancements and alterations, including ecological management prescriptions. The use of natural barriers may be necessary or advantageous at airport landside areas that cannot structurally support physical barriers or fencing, or where the use of fencing or physical barriers would cause conflict with aircraft navigation, communications, or runway clear areas beneath approach paths. Natural barriers may include surface water, woodlands, marshes, and topographic features such as cliffs. Consideration must be given to wildlife habitat values and impact to airport operations when integrating natural features such as surface water, wetlands, and woodlands into security designs.

4.5.3 Grading and Landforms: Landscape planning and design may involve incorporating designed landforms in an overall landscape plan. Earthwork can include grading of soil to create visual barriers between public roadways and other public circulation and air operations areas. Creation of landforms can be accomplished through various methods such as cutting and filling of soil, including mounding, berming, and trenching. Cutting and trenching may be undertaken below the grade of adjacent airfield surfaces such as a perimeter road with side slopes that would prevent an individual from achieving a visual reference of the airfield. The mounding and filling of soil can also be used to create a visual barrier. In no case shall earthwork operations impact protected surfaces or create an impact to the safe and efficient operation of aircraft or any airport operation.

4.5.4 Site Walls: Landscape planning and design may involve addressing freestanding and/or retaining walls as

part of an overall landscape plan. The use of site walls as physical barriers and security boundaries may be a useful alternative security strategy. Site walls provide less visibility of storage and secured areas and can be designed and constructed to prohibit climbing. The tops of walls should be narrow to prevent perching. Blast walls can be designed to meet barrier requirements. With the exception of mowed grass, in many cases a zone clear of vegetation is required on both sides of the wall system.

4.5.5 Fencing: Landscape planning and design may involve addressing security fencing as part of an overall landscape plan. Fencing, typically chain link or metal picket, is a primary barrier type providing site security. Within critical areas, anchoring or burying the bottom edge of the fence fabric can prevent it from being pulled out or up to facilitate unauthorized entry. In addition, use of concrete mow strips below the fence line and/or burying the bottom of the fence fabric can also deter tunneling underneath the fence by persons and animals. Concrete mowing strips may also reduce security and maintenance man-hours and costs. With the exception of mowed grass, in many cases a zone clear of vegetation is required on both sides of the fencing.

4.5.6 Other Physical Barriers: Landscape planning and design may involve addressing physical barriers other than fencing and site walls such as permanent and movable planters and bollards.

4.5.7 Landscape Conflicts with Security Systems: Landscape planning and design, including landscape maintenance, may involve addressing existing and potential conflicts between landscape plantings and security systems. Plantings, including consideration of mature growth size and form, must not prohibit the functioning of electronic sensors, motion detectors, infrared sensors, security lighting, and regulatory signage.

4.6 Sustainable Landscapes

4.6.1 General: Sustainability is generally defined as meeting the needs of the present without compromising the

ability of future generations to meet their own needs. Landscape development and management within landside areas present the Authority with opportunities to reduce energy costs and to protect and enhance land and water resource within the boundary of Dulles and beyond that are critical to human survival. Increasingly, many state and local governments and private entities are adopting sustainable approaches to facility development and management. The Federal government has launched a nation-wide campaign towards more sustainable facilities initiated in part owing to the following Executive Orders:

4.6.1.1 Executive Order 13101: Executive Order 13101, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition, September 14, 1998

A. "Consistent with the demands of efficiency and cost effectiveness, the head of each executive agency shall incorporate waste prevention and recycling in the agency's daily operations and work to increase and expand markets for recovered materials through greater Federal Government preference and demand for such products. It is the national policy to prefer pollution prevention, whenever feasible. Pollution that cannot be prevented should be recycled; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner. Disposal should be employed only as a last resort."

4.6.1.2 Executive Order 13123: Executive Order 13123, Greening the Government Through Efficient Energy Management, June 3, 1999.

A. "The Federal Government, as the Nation's largest energy consumer, shall significantly improve its energy management in order to save taxpayer dollars and reduce emissions that contribute to air pollution and global climate change. With more than 500,000 buildings, the Federal Government can lead the Nation in energy efficient building design, construction, and operation. As a major consumer that spends \$200 billion annually on products and services, the Federal Government can promote energy efficiency,

water conservation, and the use of renewable energy products, and help foster markets for emerging technologies.”

4.6.1.3 Executive Order 13148: Executive Order 13148, Greening the Government Through Leadership in Environmental Management, April 21, 2000.

A. “The head of each Federal agency is responsible for ensuring that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision-making and long-term planning processes, across all agency missions, activities, and functions. Consequently, environmental management considerations must be a fundamental and integral component of Federal Government policies, operations, planning, and management.”

4.6.2 Sustainability Drivers: Sustainability drivers for Dulles include leadership, smart growth, economics, and stewardship. There are increasing expectations among the public, including international and national commercial aircraft passengers and regional and local communities, for environmental excellence and sustainability. As an international and national gateway, Dulles can serve as an example of American values regarding environmental stewardship. Facilities on the scale of Dulles need to reduce or contain rising costs for utilities and waste disposal and construct buildings and sites to reduce long-term operational costs. Dulles’s existing planned developed areas, including scores of buildings, miles of roadways and streets, acres of paved areas, and acres of managed landscapes, afford opportunities to address the challenges of growth and the need for more healthful and sustainable development through green building, low impact design, and natural resource protection and restoration.

The following guidelines focus on sustainable landscape and site design adapted from the University of Virginia’s Guidelines for Sustainable Building and Environmental Design.

4.6.3 Water Resources: Do not build on land areas critical to maintaining water balance.

4.6.3.1 Building Minimal Alterations: Select building sites that require minimal alterations and minimal ecological impacts on the watershed.

4.6.3.2 Vegetation: Retain or improve vegetation and pervious areas on any building site.

4.6.3.3 Free-Flowing Channels: Consider daylighting streams by taking them out of pipes and restoring them to open, free-flowing channels with floodplains to purify water runoff to rivers.

4.6.3.4 Off-Site Wetland: Use off-site wetland mitigation programs to account for wetland loss on airport grounds.

4.6.3.5 Enhance Existing Streams: Enhance existing streams and wetlands by planting native, water-tolerant species.

4.6.3.6 Buffer Zone: Create a riparian buffer zone (at least 100’ across) and minimize development adjacent to the buffer zone.

4.6.3.7 Minimize Impervious Paved Areas: Minimize impervious paved areas and create storm water recharge beds under porous areas of pavement where possible.

4.6.3.8 Vegetated Swales: Create vegetated swales or convert concrete channels to such.

4.6.3.9 Retrofit Streams And Wetlands: Retrofit streams and wetlands with biofiltration beds to recharge groundwater.

4.6.3.10 Irrigation: Make use of retention, detention, and other capture systems for irrigation and/or in dry wells to recharge groundwater.

4.6.3.11 Disperse Storm Water: Disperse storm water across vegetated areas with well-drained soils. Limit

erosion disturbance by minimizing grading and the removal of natural vegetation.

4.6.3.12 Incorporate Green (Planted) Roof Systems:

Incorporate green (planted) roof systems in new building design and consider redesigning the roofs of existing buildings to incorporate green roof systems where feasible.

4.6.3.13 Incorporate Green Infrastructure: Incorporate green infrastructure concepts into the overall landscape and site design of new facilities and the rehabilitation of existing facilities.

4.6.3.14 On-Site Water: On-site water reclamation and reuse should be encouraged and facilitated wherever possible. Sources include storm water runoff from roofs and other impervious surfaces and uses include irrigation.

4.6.4 Materials and Resource Conservation: Consider site planning and building configurations to accommodate later additions and alterations.

4.6.4.1 Life Cycle Costs: Select materials with low life-cycle costs.

4.6.4.2 Consumption of Natural Resources: Reduce the consumption of natural resources. Wherever possible, salvage reusable materials. Encourage on-site reuse of scrap and surplus materials.

4.6.4.3 Consider the Following: Consider and use the following:

- A. Salvaged materials.
- B. Remanufactured materials.
- C. Recycled-content materials and products (post-consumer is preferable to materials with pre-consumer content).
- D. Reusable, recyclable, and biodegradable materials.

E. Reuse of brick and concrete as crushed aggregate for new concrete and asphalt.

F. Materials made from renewable sources.

G. Wood from well managed forests certified in accordance with the rules of the Forest Stewardship Council.

4.6.4.4 Use Locally Manufactured Materials: Use locally manufactured materials with low embodied energy content.

4.6.5 Site Planning and Design: Guide development to appropriate sites where possible. Consider selecting a site that:

4.6.5.1 Previously Developed Sites: Has been previously developed.

4.6.5.2 Natural Conditions: Minimizes the need for significant grading of natural conditions.

4.6.5.3 Runoff and Erosion: Minimizes runoff and erosion on steep slopes (maximum slope of 3:1 for grassy slopes, or 2:1 slopes without turf or ground cover).

4.6.5.4 Ecological Disturbance: Remove ecological disturbance from the site where possible.

4.6.5.5 Site Preparation: Create site-preparation protocols that respect biodiversity and ecological systems.

4.6.5.6 Minimize Impacts: Minimize impacts upon habitat and natural systems.

4.6.5.7 Best Management Practices (BMP): Design the site with Best Management Practices (BMP) to protect site context, including wildlife habitat and riparian corridors.

4.6.5.8 Existing Corridors: Identify existing corridors for minimal disturbance during construction and enhance habitat post-construction.

4.6.5.9 Mature Trees: Be sensitive to locations with mature trees and those areas that may require major alterations of topography and vegetation.

4.6.5.10 Drought Tolerant Trees: Plant local and drought tolerant trees and other plant species.

4.6.5.11 Efficient Irrigation Systems: Use efficient irrigation systems with features such as drip irrigation, moisture sensors, and weather-sensitive (GPS) controllers. Maintain appropriate nozzles on irrigation heads.

4.6.5.12 Minimize Use Of Potable Water: Minimize use of potable water for irrigation by incorporating gray-water reuse systems and low-water use systems.

4.6.5.13 Reduce Direct Sunlight: Use the landscape where appropriate to reduce direct sunlight on the building and to create cooling and natural ventilation corridors in outdoor spaces.

4.6.5.14 Solar Orientation: Take advantage of solar orientation throughout the site, including outdoor spaces such as courtyards, so that seasonal solar access is maximized.

4.6.5.15 Heat Island: Avoid “heat island” effects by controlling external solar gain and temperature increases on flat and/or dark surfaces.

4.6.6 Local Climate and Climatic Design: Strategies for moderating temperatures in buildings relate to seasonal requirements. Site planning objectives in the winter are to protect buildings, walkways, entrances, and outdoor spaces from wind and to promote solar heat gain. Summer objectives are to prevent heat gain, and to encourage the cross circulation of breezes and evapotranspiration.

4.6.6.1 Wind Protection: Adjacent structures, landforms, and vegetation serve as wind protection in the winter (prevailing winter winds are from the northwest, summer winds from the southwest). Plan a site using existing buildings, tree stands, hedgerows, or other landforms.

4.6.6.2 Sun Control: Opportunities for sun control should be addressed at the beginning of site planning when shading with existing vegetation is considered, or when new trees, shrubs, and hedges can be planted. Sun angles in the summer are less acute than winter, and it is therefore feasible to shade spaces and building openings during the summer while allowing winter solar gain.

4.6.6.3 Trees: Plant tall deciduous trees on the south side of buildings to block sunlight in the summer and allow it to enter the building in the winter.

4.6.6.4 Afternoon Sunlight: Absorb afternoon sunlight by planting low trees and tall, dense shrubs on the west side of buildings. Vegetation may be evergreen, and can serve double duty as wind breaks in the winter.

4.6.6.5 Shading: Provide shading using overhead structures and plantings wherever possible.

4.6.6.6 Airflow: Guide airflow into building or outdoor space using “wind funnels”, such as rows of trees, hedges or parallel fences.

4.6.6.7 Breezes: Breezes that cross over vegetation are cooler than those that flow across pavement.

4.6.6.8 Air Dams: Create “air dams” that increase pressure for inflow to a building. Desirable inflow pulls cooler air into a building using surrounding landforms and structures.

4.6.6.9 Use Turf And Other Ground Cover: Use turf and other ground cover to provide site cooling. (Differences between surface temperatures for evaporative surfaces, such as grass, and non-evaporative surfaces, such as asphalt, can be greater than 25°F.)

4.6.6.10 Maximize Vegetation: Maximize vegetation where possible, and shade non-evaporative surfaces, such as streets, parking lots and rooftops, with trees and green roofs.

4.6.6.11 Irrigation: Provide adequate irrigation for vegetation to maximize evapotranspiration (applying water recycling techniques).

4.6.7 Transportation: Create pedestrian-friendly corridors to reduce traffic and energy use and to promote exercise.

4.6.7.1 Signalization: Install a system of sidewalks and provide adequate signalization and refuge islands at all major crosswalks and intersections.

4.7 Objects Affecting Navigable Airspace

4.7.1 General: The Code of Federal Regulations, Part 77, and Objects Affecting Navigable Airspace of Title 14: Aeronautics and Space establishes standards for determining obstructions to air navigation. The standards apply to existing and proposed man-made objects, vegetation, and terrain. They apply to the use of navigable airspace by aircraft, but also apply to air navigation facilities and air navigation aids.

4.7.1.1 Existing and Proposed Landscape: Existing and proposed landscape elements within landside areas that could impact air operations include natural, planted, and constructed features and systems. These include constructed landforms, site walls, fencing, lighting, signs, and plantings. Landscape design should be undertaken in compliance with Part 77 standards to ensure that aircraft pathways and lines-of-sight to navigation aids are not obstructed. Special attention to mature vegetation heights is critical as part of landscape design.

4.7.2 Code Compliance: All plantings shall be designed to comply with the Code of Federal Regulations, Part 77—Objects Affecting Navigable Airspace and shall be in accordance with Dulles-specific navigable airspace requirements.

4.8 Preservation of Historic Plants and New Plantings within the Historic District

4.8.1 General: Initial early 1960s building and site development associated with architect Eero Saarinen and landscape architect Dan Kiley is eligible for listing on the National Register of Historic Places as an historic district. Given the historical significance of the initial architecture and site development, including the Kiley-designed landscape, all new construction as well as renovation and repair of existing facilities and sites within and proximate to the designated Historic District should protect and enhance surviving historic resources. The guidelines below provide direction for new interventions within and proximate to the Historic District focusing on landscape resources.

4.8.1.1 Historic Landscape: Undertake all work involving surviving historic landscape resources and the design of new landscape interventions within historic areas in compliance with the Secretary of the Interior's Standards for the Treatment of Historic Properties, Guidelines for the Treatment of Cultural Landscapes.

4.8.1.2 Historic District: Retain the character of the historic landscape within the Historic District by protecting surviving historic individual elements as well as the overall landscape.

4.8.1.3 Ensure Compatibility: Ensure the compatibility of proposed landscape elements by appropriately responding to the historic character of the Historic District.

4.8.1.4 Base The Design: Base the design of all landscape treatments and new landscape construction within the Historic District on historic documentation.

4.8.2 Vegetation: Retain, where appropriate, existing historic plants and historic plant replacements.

4.8.2.1 Management Strategies: Undertake historic vegetation management strategies based on principles of sustainability.

4.8.2.2 Ecologically-Sound Removal Techniques:

Remove invasive exotic species identified during monitoring activities using ecologically-sound removal techniques.

Ecologically-sound removal techniques are those that will not cause damage to other resources, or whose impact on other resources has been assessed to determine whether the treatment provides benefits that outweigh the impact on other resources. Removal should be undertaken only after existing resources and landscape features and systems to remain have been protected. Biodegradable, systemic herbicides that break down into harmless components upon contact with the soil when properly applied may constitute an ecologically-sound removal technique. Ecologically-sound techniques also include repairing damage to resources and mitigating the impact of removal, such as the potential for soil erosion on steep slopes and elsewhere, and legally disposing of removed invasive exotic plants in a landfill.

4.8.2.3 Plant Species: Avoid threats to existing natural areas by selecting plant species for new plantings that are not invasive, diseased, or infected with any plant pathogen.

4.8.3 Visual Quality and Viewsheds: Retain and maintain surviving designed historic views of the Main Terminal from the Dulles Access Road and Saarinen Circle established in the Kiley-Saarinen site and landscape designs.

4.8.3.1 Historic Vistas: Consider historic vistas and views of the Main Terminal from all areas of the landscape when undertaking new development and landscape changes.

4.8.4 Role of Preservation Specialists: Undertake all landscape planning, design projects, and management efforts involving historic landscapes under the guidance of experienced specialists including historical landscape architects and qualified landscape specialists.

4.8.5 Documentation: Document through drawings, photographs, and notes, all landscape changes and treatments involving historic landscapes. Maintain records

of treatments and preserve documentation according to professional archival standards.

4.8.6 New Design and Construction Involving

Historic Landscapes: Introduce new features to minimize adverse impacts on the character and resources of the historic landscape.

4.8.6.1 Proposed New Uses: Evaluate all proposed new uses within the Historic District in consultation with a preservation specialist.

4.8.6.2 Landscape Changes: Avoid landscape changes that create a false sense of historical development, including the addition of conjectural, typical, or representative features.

4.8.6.3 Repair: Repair, rather than replace, deteriorated historic landscape features. Repair of deteriorated features should be based on documentary or physical evidence. Replacement of historic features, if necessary, also should be based on documentary or physical evidence. The new feature should match the old in design, color, texture, and, wherever possible, materials. Replaced features should be compatible with, but distinguishable from, original historic fabric.

4.8.6.4 Chemical Treatments: Avoid the use of chemical or physical treatments that cause damage to natural systems and landscape features.

4.8.6.5 Additions Or Alterations: Design and site new additions or alterations to the landscape within the Historic District to minimize impacts to historic materials, features, and spatial relationships that characterize the historic landscape. Design all new additions and alterations to be a product of their time, and to be compatible with the historic resources in materials, size, proportion, and massing. Differentiate new work from existing historic resources.

4.9 Planting Design

4.9.1 General: This section provides guidance and requirements regarding planting design as it relates to plant areas and various aspects of site and infrastructure planning and design. The following topics are covered and should be integrated with other plant-related topics included in these guidelines:

4.9.1.1 Planting:

- A. Irrigation.
- B. Grading and drainage.
- C. Erosion and sediment control and storm water management.
- D. Buildings and structures.
- E. Utilities and services.
- F. Lighting and signage.
- G. Water features.
- H. Pedestrian and vehicular circulation.
- I. Parking lots.
- J. Screening.

4.9.2 Tree, Shrub, and Groundcover Plantings

4.9.2.1 General: The Landscape Master Plan establishes the overall landscape concept, planting recommendations for specific precincts and subareas, and strategies for realizing the landscape concept for the Airport. In addition, the precinct-recommendations include specification of key and major plant species and the arrangement on the land. Planting design will necessarily require the integration and coordination with site planning and the design of drainage

and storm water management, buildings and structures, and pedestrian and vehicular circulation systems.

4.9.2.2 Planted Areas: The design of planted areas requires an understanding of the original design intent of Dan Kiley and also must consider the following factors:

- A. Adaptation capabilities of original Kiley-design landscape plan to renovate existing developed areas and future airport expansion areas.
- B. Relevant characteristics of original and existing plant selection and adaptation to current conditions.
- C. Utilization of large-scale plantings to compliment the terminal building and surrounding structures.
- D. Utilization of plants indigenous to the region or of similar visual characteristic to be compatible with the original planting design for the Main Terminal environs. These plants should establish a linkage to the surrounding landscapes.
- E. Existing and future building and facility development.
- F. Existing and future vehicular circulation patterns.

4.9.3 Overall Planting Design Criteria: Planting design criteria fall into two major categories: landscape architectural/horticultural and historic preservation.

4.9.4 Historic Preservation Design Criteria: For those areas within the current Historic District (see *Design Manual* for information on the designated Historic District) the planting design criteria include:

4.9.4.1 Planting Design: Plantings should enhance and reestablish the spatial character and structure of Kiley planting design.

4.9.4.2 Kiley-Specified Plants: Plantings should be replacements of the original Kiley-specified plants or in

cases when the original species do not meet the requirements of these Landscape Guidelines, the new plants should match the character of the original plants to the greatest extent feasible.

4.9.5 Landscape Architectural and Horticultural Design

Criteria: The following criteria shall be used to undertake planting design and to specify plants:

4.9.5.1 Microclimate Suitability.

- A. Pollution resistance.
- B. Winter hardiness (USDA Zone 7A).
- C. Summer heat tolerance.
- D. Wind/storm tolerance.
- E. Drought tolerance.
- F. Low maintenance.
- G. Pest and disease resistance.
- H. Controllable growth and minimal pruning.
- I. Minimal debris produced seasonally requiring clean-up.
- J. Minimal fruit/seed production requiring clean-up.
- K. Minimal root damage to underground structures and piping.

4.9.5.2 Visual Quality and Design Value in the Landscape.

- A. Scale of plant within a space.
- B. Eventual growth habit and size of plant.
- C. Color, shape, and texture in the environment.

D. Seasonal interest.

E. Natural or exotic combination of plants for effect.

4.9.5.3 Wildlife Value: Low Wildlife Value (to discourage bird nesting).

4.9.5.4 Japanese Beetle Host Value: Low Japanese Beetle Host Value.

4.9.5.5 Diversity: Species Diversity (for ecological strength and greater visual interest).

4.9.5.6 Slope Stabilization: Slope Stabilization (slopes > 4:1).

4.9.5.7 Distance Suitability: Sight Distance Suitability (to ensure vehicular and pedestrian safety).

4.9.5.8 Non-Invasive Species: Non-Invasive Species.

4.10 Soils

4.10.1 General: Soil conditions within landside areas are poor in many locations. The native soils are less suitable for landscape plantings and virtually all areas of the project area were disturbed through mass earthwork operations during the initial period of construction and subsequent phases of site development.

4.10.1.1 Existing Soils: Existing soils may have been impacted by a variety of conditions including, but not limited to:

- A. Lack of adequate soil preparation at the time of initial and subsequent periods of construction.
- B. Construction impacts including introduction of foreign matter such as construction aggregates.
- C. Soil compaction.
- D. Chemical de-icing treatments.

E. Varying landscape maintenance approaches and implementation from initial construction completion to the present.

4.10.2 Soil Testing: Testing of existing on-site soils and all imported soils is required for all projects to ensure proper plant specification and plant survival.

4.10.3 Maintenance Considerations: Plants shall be specified that:

4.10.3.1 Drought Tolerant: Are drought tolerant and winter hardy.

4.10.3.2 Pruning and Trimming: Require minimal pruning and trimming.

4.10.3.3 Reduced Pesticide Applications: Require reduced pesticide applications and can be sustained by non-chemical pest control methods.

4.10.3.4 Reduced Mowing: Require reduced mowing.

4.10.3.5 Japanese Beetle Hosts: Are not Japanese beetle hosts.

4.10.3.6 Attraction of Wildlife: Minimize the attraction of wildlife, particularly birds.

4.10.3.7 Salt Tolerant: Are salt tolerant.

4.10.3.8 Compaction: Can withstand compaction from vehicle and pedestrian access and snow-plowing operations when located proximate to roads, streets, and parking.

4.10.4 Edgings: Within developed areas edgings should be incorporated into planting bed design to create a distinct edge between lawns and planting beds. Edgings help to control lawn grasses from encroaching into planting beds, which reduces planting bed maintenance.

4.10.5 Mow Strips: Within developed area landscapes, mow strips should be constructed at the base of buildings when lawn areas abut the faces of buildings and other structures. Mow strips should be incorporated into planting designs to create a distinct edge between lawns and building facades. In addition, mow strips help reduce maintenance costs by eliminating the need for trimming grass against buildings and structures and reduces damage to building services resulting from mechanical trimming operations. Mow strips also contribute to reduced reliance on the use of herbicides that could harm soil, beneficial insects, and ground water. The integration of mow strips also contributes to enhanced landscape and architectural aesthetics. Mow strips can also be incorporated into security fencing when site security design required embedding fence fabrics into the ground.

4.10.5.1 Recommended mow strip types include:

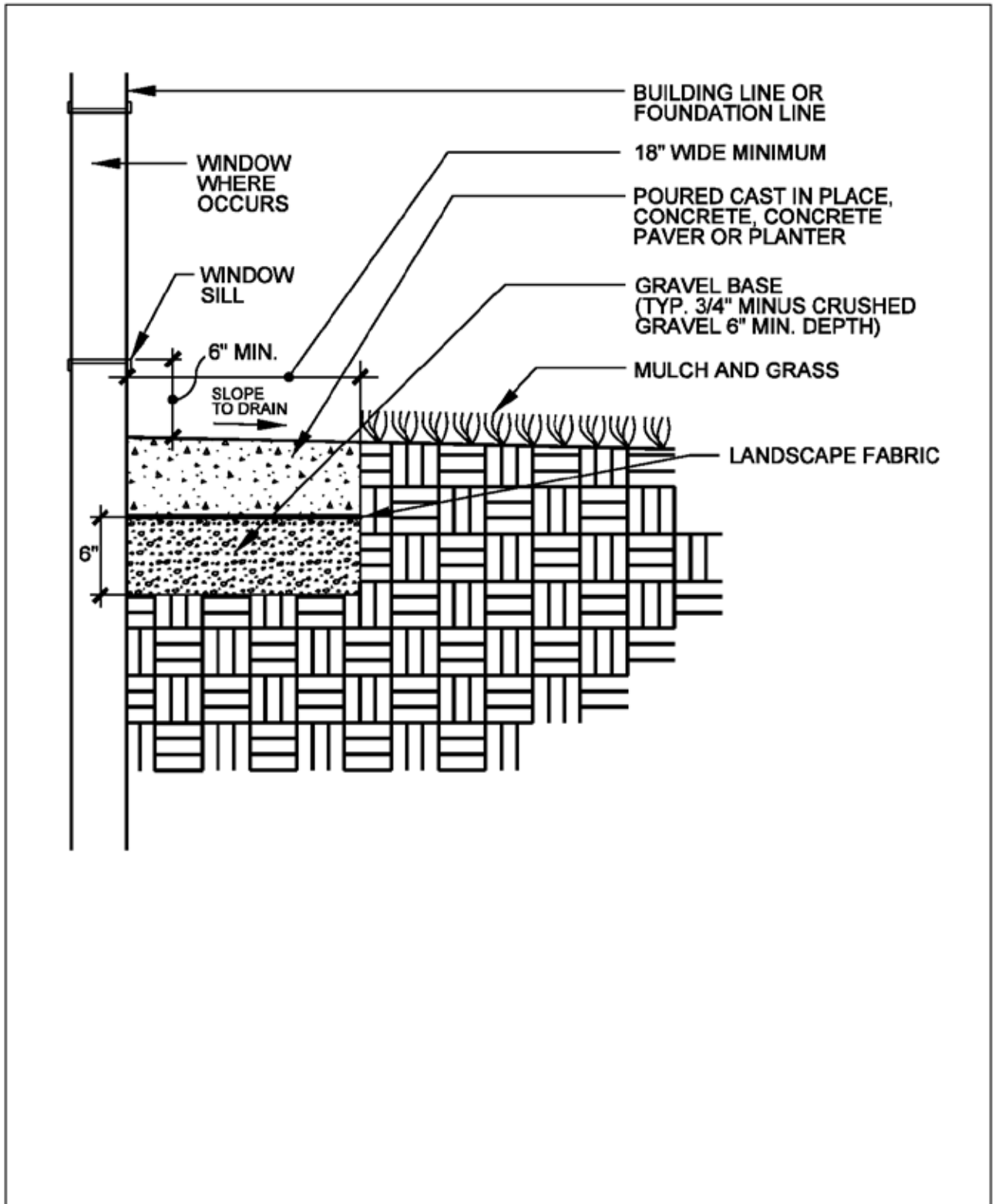
A. 18-inch wide cast-in-place concrete banding with soft broom finish over 6-inch compacted crushed aggregate base and prepared subgrade.

B. 18-inch wide pre-cast concrete pavers banding over concrete base, 6-inch compacted crushed aggregate subbase, and prepared subgrade. The color of the pavers should match the typical finish and color of cast-in-place concrete walks.

C. 18-inch wide 2-inch diameter white washed river gravel, 6 inches deep over separator fabric over 6-inch compacted crushed aggregate subbase, and prepared subgrade. The river gravel shall be edged with 6-inch deep ¼-inch thick steel edging systems coated black.

D. See **Exhibit I-4-1 Mow Strip**, for preferred design methods describing Paragraph A and B above.

4.10.6 Curbing: Curbing can play a role in protecting planted and lawn areas and irrigation systems from vehicle damage. Curbs can increase the protection of pedestrians and can contribute to increased aesthetic qualities of the landscape.



Mow Strip

Exhibit I-4-1

Landscape values should be factored into the decision regarding inclusion of curbing for the design of new development and renovation of existing developed and roadway sites. As irrigation systems are integrated into new and existing landscapes, the role of curbs in protecting irrigation systems and reducing repair costs should be considered.

4.10.6.1 Recommended curbing types include:

- A. VDOT-standard six-inch high cast-in-place curbs on streets and within site development.
- B. VDOT-standard six-inch high cast-in-place curbs with gutters on streets and within site development.
- C. Mountable VDOT-standard six-inch high cast-in-place curbs only along roadways.
- D. Mountable VDOT-standard six-inch high cast-in-place curbs with gutters only along roadways.

4.10.6.2 Asphalt, wood timber, and stone and other types of curbing should be avoided.

4.10.7 Movable Planters: All movable planters within public spaces should comply with *Design Manual* street furnishing standards. Movable planters may be appropriate within developed sites. However, the planter selection should be coordinated with proximate architectural design and plant selections should be coordinated with overall landscape design for the site. Permanent plantings are preferable to rotated seasonal plants. All planters should be designed or products should be selected that provide sufficient soil depth, drainage, and insulation against planter wall heating.

4.10.8 Temporary Plantings: The two major types of temporary plantings include rotated installation of annuals with other decorative non-woody plants and plantings intended to meet such needs as aesthetics and soil stabilization until permanent designs are implemented.

4.10.8.1 Rotated Annual Planting: The installation of rotated annual plantings—typically flowering annuals—is discouraged. The original landscape concept established by Dan Kiley and the concept established in the Landscape Master Plan focuses on the installation of a limited palette of massed shrubs, tree plantings, meadows, and other large-scale planted elements. The Landscape Master Plan provides recommendations and guidance regarding the specification of woody and perennial plants that offer seasonal interest including opportunities for dramatic uses of foliage and floral color.

4.10.8.2 Rotated Annual Non-Woody Plants: If rotated annual non-woody plants are integrated into existing and new landscapes, they should be limited to one or two plant types and should be planted in mass versus a handful of plants.

4.10.8.3 Planting On A Temporary Basis: Plantings that are installed on a temporary basis until future site conditions permit permanent plantings are encouraged. However, such plantings should not preclude future implementation of permanent design and should be in accordance with the Landscape Guidelines and the Landscape Master Plan recommendations for the precinct.

4.11 Irrigation

4.11.1 General: Poor soil conditions and lack of adequate irrigation have compromised existing plantings over time. Planted areas identified in the Landscape Master Plan to be irrigated shall be augmented by an irrigation system to ensure the continued growth of plant material and to minimize the cost of manual watering.

4.11.1.1 Landscape Master Plan: When identified for a specific precinct or area in the Landscape Master Plan, irrigation systems shall be either included in the scope of new development or included in the scope of a site or landscape renovation project. Strategies for low water use and the reuse of water (gray water) should be explored.

4.11.1.2 Integrate Irrigation Design: All new development shall integrate irrigation design into the overall site and landscape design with points-of-connection located within buildings whenever practicable.

4.11.1.3 Irrigation System: The irrigation systems shall be automated, below-ground systems with equipment, materials, and products that match existing systems at the Airport to ease maintenance and operation. The sprinkler heads shall be one or a combination of pop-up fixed-spray pattern heads, drip, and rotor-type heads.

4.11.2 Irrigation Design Criteria: All tasks involving installation of irrigation systems shall include verification of existing utilities to ensure the availability of adequate services necessary to support the operation of the system, and to ensure that construction does not damage any existing utility services.

4.11.2.1 Flow And Pressure Tests: Flow and pressure tests shall be provided to support design as required by the *Design Manual*.

4.11.2.2 New System: New systems shall match the existing systems design, equipment, and products currently in place.

4.11.2.3 Points Of Connection (POC): The new points of connection (POCs) will tee into existing water mains in the landscape or access building interior systems. When building water mains are accessed, the backflow preventer and related equipment shall be located in heated interior space.

4.11.2.4 Located In The Landscape: When located in the landscape, main shut-offs, water meters, and backflow devices will be located in a heated enclosure and will be require unions for ease of removal for maintenance, repair, and winterizing of the system.

4.11.2.5 Water And Irrigation Lines: Water lines and irrigation lines crossing roads will be via boring versus

trenching whenever feasible to assist in maintaining on-going traffic operations.

4.11.2.6 Lake Water: Lake water is not recommended for an irrigation source due to the inflow to the lake of de-icing chemicals used during the winter.

4.11.2.7 Electrical Power: Electrical power is typically available within existing and proposed buildings.

4.11.2.8 Sprinkler Heads: Sprinkler heads located in areas that do not include perimeter curbing shall be installed 12" to 18" from nearest pavement edge to avoid vehicular damage. The design shall allow for adequate backspray to serve plants abutting edge or pavements.

4.11.2.9 Existing Water Mains: All taps or tees into existing water mains shall be maximum 2.5 inch diameter.

4.11.2.10 Depth of Buried Mainlines: Depth of bury: mainlines- 16" to 20"; laterals- 14" to 16"; for ease of repair and maintenance (blown-out in Fall).

4.11.3 Recommended Irrigation Equipment and Products: Rain Master RME Eagle with Internet Central Control, and remote control capabilities. Installation of Rain Master controllers shall include installation of master valve and flow meter at each POC. Installation shall also include calculation of system operating schedules with the controller.

4.11.3.1 Wiring: Field wiring shall be minimum 14-gauge cable rated for direct burial. Spare wires shall be run for known future zones and at least 2 extra spare wires shall always be supplied throughout the system.

4.11.3.2 Spray Heads: RainBird 1800 series, Hunter I-20 and PGG stream rotors.

4.11.3.3 Electronic Remote Valves: Shall be RainBird PEB with PRS-D regulators where necessary.

4.11.3.4 Spray Heads: RainBird 1800 Series rotorheads; Hunter PGP and 120 Series.

4.12 Grading and Surface Drainage

4.12.1 General: In addition to the visual and aesthetic value of constructed landforms, they can serve as screening and transitional elements, guide direction of movement as wayfinding elements, offer limited sound and jet blast attenuation, support security design, and be integrated into surface drainage design and storm water management strategies.

4.12.1.1 Grading and Shaping: The grading and shaping of planted areas shall address the landscape design concepts and recommendations in the Landscape Master Plan. Landscape grading design shall be coordinated with planting design and the design of sites and buildings or other structures. In addition, overall landscape design, including grading design, shall be coordinated with storm water management design, and shall address requirements for controlling bird habitat and mosquitoes associated with water ponding.

4.12.2 Landscape Grading: Designing for overland sheet flow of water shall ensure that all landscape areas drain with no standing water or ponding after storm events. Landscape and site grading shall be designed to ensure that surface water drains away from buildings and structures. Avoid landscape grading that causes water to drain onto pedestrian pavements unless such pavement grades allow for adequate drainage. Ponding of water on pedestrian and vehicular pavements reduces life of the pavement and may result in hazardous conditions including ice (slipping). Minimum and maximum drainage slopes proximate to buildings and structures shall conform to *Design Manual* and building code requirements. Avoid very shallow slopes (less than three percent to ensure adequate surface drainage) and steep slopes (greater than 3:1 for groundcover and 4:1 in lawn areas it is preferable to limit slopes to no greater than 4:1 to ensure mowing safety). However, designed landforms of an architectural character may have slopes exceeding 3:1. Lastly, existing and

proposed topsoil and subsoil conditions must be factored into grading and drainage design of landscape areas.

4.12.3 Berms: The creation of soil landforms in conformance with the Landscape Master Plan recommendations affords opportunities for architectural and naturalistic landforms. Naturalistic landforms—those mimicking naturally occurring landforms—should be avoided except where overall landscape treatments attempt to blend into surrounding natural areas. The preferred landform strategy is to create architectural landforms within developed areas.

4.12.4 Swales and Ditches: The design of drainage swales and ditches should be integrated within overall site and landscape design including landscape grading and planting design. The design of these storm water conveyance features should blend into sites and landscapes. Since many of these drainage elements may be lined with grass and may also be lined with woody plants, the side slopes should be shallow versus steep to ensure safe and adequate plant maintenance including grass mowing. In addition, steep longitudinal slopes should be avoided to limit the paving or armoring of swale and ditch bottoms whenever feasible. It is preferable to have vegetated swales and ditches instead of paved or armored swales and ditches. Green swales and ditches afford greater opportunities for groundwater recharge and are less expensive to construct than paved systems.

4.12.5 Storm Water Management Facilities: All surface storm water management facilities involving grading should be addressed as part of the overall site and landscape design. The landform shapes, including configuration and slopes, shall be designed to be integrated with the landscape and site. In some cases, because of site constraints, these facilities will be visible to the public. For this reason, they should be addressed as landscape design opportunities instead of solely engineered systems.

4.13 Erosion and Sedimentation Control and Storm Water Management

4.13.1 General: Strategies for the control of run-off and management of storm water involve plants in many cases. It is preferable to undertake an integrated approach to site and landscape design involving permanent erosion control measures and green infrastructure. All permanent erosion control measures and storm water management facilities should address the landscape design concepts and recommendations in the Landscape Master Plan. In addition to the functional role of permanent erosion control measures and storm water management systems, they can also be designed to serve as visual and aesthetic landforms and planted design elements. Every effort should be made to design planted versus hardened surfaces of storm water management facilities. Lastly, site and landscape design should avoid solutions that require extensive complex erosion and sediment control measures such as avoidance of steep slopes and channeling of runoff.

4.13.1.1 Temporary and Permanent Erosion

Control Measures: Temporary and permanent erosion control measures that involve plants and planting operations include:

- A. Level spreaders.
- B. Vegetative streambank stabilization.
- C. Topsoiling.
- D. Temporary seeding.
- E. Permanent seeding.
- F. Sodding.
- G. Mulching.
- H. Soil stabilization blankets and matting.

I. Permanent vegetative cover (trees, shrubs, vines, and groundcover).

J. Vegetation and tree preservation and protection.

4.13.1.2 Erosion and Sediment Control: All landscape and site design involving erosion and sediment control measures should be undertaken using the guidance of the latest edition of the Virginia Erosion and Sediment Control Handbook.

4.13.1.3 Storm Water Management: Storm water management facilities, systems, and features that involve plants include:

- A. Detention basins.
- B. Constructed wetlands.
- C. Infiltration practices.
- D. Bio-retention.
- E. Vegetated filter strips.

4.13.1.4 Landscape And Site Design: All landscape and site design involving storm water management should be undertaken using the guidance of the latest edition of the Virginia Stormwater Management Handbook.

4.13.1.5 Storm Water Management: Storm water management facilities with permanent water surfaces that attract birds should be avoided.

4.14 Buildings and Structures

4.14.1 General: Buildings and other structures, such as structured parking garages, offer many opportunities to integrate plantings with architecture. Landscape architecture and architecture should be an integrated and coordinated design process to ensure appropriate and successful incorporation of plants with architecture. Qualified landscape architects should be integrated into

building and structure design teams early in the design process.

4.14.1.1 Opportunities for integrating plants into buildings and structures include:

- A. Green roofs to manage storm water and enhance insulation from heat and cold.
- B. Interior plants within fixed and movable planters to enhance indoor air quality.
- C. Planted courtyards to extend outdoor use and quality views from within buildings.
- D. Plantings integrated into architectural elements such as façade screens and planters reduce heating and cooling requirements by screening the sun and blocking the wind.

4.14.1.2 Planting Design: Planting design involving buildings and structure should avoid:

- A. Foundation shrub and tree plantings. Plants against buildings and structure do not comply with the overall design recommendations established in the Landscape Master Plan. In addition, such plants impact the condition of buildings by encouraging water at the base of buildings, marring the finish of buildings and structures, and creating of deep shade on surfaces resulting in biological growth.
- B. Plants on exterior surfaces (other than green roofs). The planting of vines or allowing vines to grow on exterior surfaces impacts the condition of buildings by encouraging water at the base of buildings, marring the finish of buildings and structures, and creating deep shade on surfaces resulting in biological growth.

4.15 Utilities and Services

4.15.1 General: Plantings as part of new development and new plantings proposed for existing landscapes must

take into consideration buried and above-ground utilities and services. Plants shall not obstruct access to buried utilities and above-ground utilities and services including fire hydrants, meters, backflow preventers, transformers, pedestals, and other components and systems. Trees shall not be located over buried utilities. Shrubs and ground cover may be permitted within buried utility easements and corridors with the approval of the Authority. Large trees and trees that will impact overhead utilities and services are not permitted under or proximate to such utilities. Small trees, shrubs and ground cover may be permitted with the approval of the Authority. Planting designs shall comply with the requirements of entities controlling utility and service easements and corridors.

4.16 Lighting and Signage

4.16.1 General: The design and sitting of all new and replaced site lighting and site signs should be integrated with planting design. Lighting and signage contribute to the visual quality of landscapes and plantings should enhance, not conflict with, signs and lighting. In addition, planting design can and should be integrated into wayfinding strategies.

4.16.2 Lighting: Site lighting is a critical component of site and vehicular system design and contributes to safety and security as well as the aesthetics of the developed landscape. However, site lighting should not compromise aircraft navigation, or contribute to unnecessary light trespass onto abutting non-airport properties and light pollution—illumination of areas and features not requiring illumination. **Site lighting shall be dark sky compliant.**

4.16.3 Coordination: The coordination of plantings and lighting is required to ensure that illumination levels and areas requiring illumination are maintained. In addition, such coordination will ensure that lighting design does not preclude the implementation of plantings required for shading and cooling of buildings and pavements, wind protection, screening of undesirable views, and storm water management.

4.16.4 Signage: Site signage is a critical component of site and vehicular system design and contributes to safety, security, and wayfinding. Signage impacts safety and wayfinding and contributes to the aesthetics of the developed landscape.

4.16.4.1 Coordination of Planting: The coordination of plantings and signage ensures that both are functional, visible, and integrated into the landscape. Plantings proposed for the environs of signs should be limited to one or two shrubs, ground cover, and/or annual/perennial species to reflect the landscape design character established for a given precinct in the Landscape Master Plan. In addition, signs sited within lawn areas with mow strips below sign supports are appropriate. Shrub, ground cover, and/or annual/perennial plantings in simple bed forms is recommended for site and facility identity signs. All other signs should be installed in lawn or other ground cover shrub massing. Plant sizes and heights should be coordinated with sign panel heights above finish grade to create a harmonious relationship and to ensure that the ultimate mature size of plants does not obscure or block the sign message.

4.17 Water Features

4.17.1 General: Water features such as ponds, pools, and fountains with standing water are not appropriate landscape elements for the airport. They should be avoided because of their potential for attracting birds and creating mosquito breeding environments.

4.18 Transportation Systems

4.18.1 General: The environs of pedestrian, bicycle, and vehicular and other circulation systems (i.e. future elevated and ground-level Metro alignments) typically include planted areas or preserved vegetated areas such as woodlands and fields. Given this relationship, planting design and transportation systems must be coordinated. Plantings not only provide a visually attractive environment, but they also contribute to user comfort (i.e. shade and wind protection) and impact public safety (i.e. sight distance).

4.18.1.1 Sidewalks and Paths: The renovation of existing landscapes and sites and the design of new developed areas and transportation corridors should accommodate existing and/or future pedestrian systems.

A. Plantings shall not preclude future pedestrian systems.

B. Plantings associated with pedestrian and vehicular circulation shall be sited and located to ensure adequate vehicular site distance at intersections and crosswalks.

C. Plantings shall not block views of pedestrians from vehicles.

D. Planting design for pedestrian circulation shall include narrow recovery zones of low vegetation heights along path and walk margins to accommodate pedestrians having to step off of paved surfaces.

4.18.1.2 Streets and Drives: The planting concepts, including recommended plant species, for streetscape environs is established in the Landscape Master Plan. The renovation of existing street-related landscapes and sites and the design of new transportation corridors should include the integration of landscape design considerations and planning efforts throughout the design process. This integrative and collaborative approach involving landscape architects and civil engineers is critical to ensure compliance with the requirements of the *Design Manual* and Landscape Master Plan.

A. Plantings shall not preclude future pedestrian systems.

B. Plantings associated with pedestrian and vehicular circulation shall be sited and located to ensure adequate vehicular site distance at intersections and crosswalks.

C. Plantings shall not block views of pedestrians from vehicles.

D. Plantings designed for pedestrians circulation shall include narrow recovery zones of low vegetation heights along path and walk margins to accommodate pedestrians having to step off of paved surfaces.

E. Plantings should screen guardrails whenever feasible without impacting safety standards. Considerations should be given to guardrails with materials that are the least visually intrusive such as weathering steel.

F. Developed areas shall include curb and gutter systems to, in part, protect planted areas and irrigation systems.

G. Whenever feasible, medians should be wide enough to accommodate plantings including street trees, flowering trees, shrub and ground cover massings, and lawn areas where appropriate.

4.18.1.3 Highways and Major Roadways: The planting concepts, including recommended plant species, for highway and roadways environs is established in the Landscape Master Plan. The renovation of existing road-related landscapes and sites and the design of new transportation corridors should include the integration of landscape design considerations and planning efforts throughout the design process. This integrative and collaborative approach involving landscape architects and civil engineers is critical to ensure compliance with the requirements of the *Design Manual* and Landscape Master Plan. In addition, all design of roadway environs involving public rights-of-way shall be in accordance with Loudoun and Fairfax county and Virginia Department of Transportation design standards.

A. Plantings shall not preclude future pedestrian systems where appropriate.

B. Plantings shall be sited and located to ensure adequate vehicular site distance at intersections and crosswalks.

C. Plantings shall not block views of pedestrians from vehicles.

D. Major roads within developed areas should include curb and gutter systems to, in part, protect planted areas and irrigation systems. Considerations should be given to employing mountable curb and gutter systems when curbing is determined to be appropriate.

E. Plantings should screen guardrails whenever feasible without impacting safety standards. Considerations should be given to guardrails with materials that are the least visually intrusive such as weathering steel over planted surfaces.

F. Whenever feasible medians should be wide enough to accommodate plantings including street and flowering trees, shrub and ground cover massings, and lawn areas where appropriate.

4.18.1.4 Interior Parking Lot Plantings: Any parking lot of 20 or more spaces shall be provided with interior plantings covering not less than five percent of the total area of the parking lot. Such plantings shall be in addition to any planting within six feet of a building or planting required as peripheral planting or screening.

A. The area to be counted as part of the parking lot is defined as the entire surface of the parking lot, loading spaces, drive-thru spaces, the exposed surfaces of parking decks, and any paved surface that serves exclusively as access to the parking lot, deck, loading area, or drive-thru.

B. Only those deciduous trees that provide shade directly to a portion of the area to be counted shall be credited toward meeting the required five percent.

C. A majority of the trees planted or preserved to meet the requirement shall be located in the interior portion of the parking area, and shall be reasonably dispersed throughout the parking lot. The Authority may approve alternative designs.

D. If existing forest trees are to be used to meet this requirement, only that portion of the preservation area located in the interior of or directly adjacent to the area to be counted may be credited.

E. The interior space of any planting area shall be no less than nine square feet and not narrower than three feet across its center.

F. The primary plants used in parking lots should be deciduous trees that are capable of providing shade at maturity. Shrubs, hedges, and other live plants may be used to complement the trees. Effective use of designed grading and existing topography is also encouraged as a component of the planting design.

G. The primary plants used in parking lots shall be trees that provide shade or are capable of providing shade at maturity. Shrubs and other live planting material may be used to complement the trees, but shall not be the sole contribution to the landscaping.

H. The planted areas shall be reasonably dispersed throughout the parking lot.

I. The interior dimensions of any planting area shall be sufficient to protect all plants. All parking lot interior planting areas should be protected from vehicle intrusion by a permanent barrier not less than four or more than eight inches high. Wheel stops or curbs or a combination of wheel stops and curbs are acceptable measures to protect plantings from vehicle overhang.

J. All end islands of parking rows and all areas not otherwise used for ingress, egress, aisles or parking should be planted.

K. The Authority may waive or modify the requirements of this section for vehicles parked or stored, provided the use is screened from view of all adjacent property and all public streets.

4.18.1.5 Peripheral Parking Lot Landscaping: If any parking lot contains 20 or more spaces and screening is not required, then peripheral parking lot plantings shall be required as follows:

A. When the property line abuts land not in the right-of-way of a street:

1) A planting strip four feet in width shall be located between the parking lot and the abutting property lines, except where driveways or other openings may necessitate other treatment.

2) At least one tree for each 50 feet shall be planted in the planting strip. However, this shall not be construed as requiring the planting of trees on 50-foot centers.

B. Where the property line abuts the right-of-way of a street:

1) A planting strip 10 feet in width, which shall not include a sidewalk or trail, shall be located between the parking lot and the property line.

2) At least one tree for each 40 feet shall be planted in the planting strip. However, this shall not be construed as requiring the planting of trees on 40-foot centers.

3) Where peripheral plantings required by this section conflict with planting regulations of the Virginia Department of Transportation, the regulations of the latter shall govern.

4.18.1.6 Temporary Parking Lots: Planting requirements for temporary parking areas will not be required. Temporary parking lots shall be any paved or unpaved area used to park or store vehicles that are developed to remain in use no longer than 24 months. Should any temporary parking lot remain in use beyond 24 months, such lot will be modified to provide landscape areas in accordance with the requirements for permanent parking lots.

4.19 Screening

4.19.1 General: Plantings and/or barriers shall be provided to screen views from public areas into service areas and other areas that detract from the overall visual quality of the landside areas of the airport campus. Service areas that require screening include vehicle repair and service facilities; material storage and stockpiling areas; refuge, garbage, and recycling handling facilities; above-ground utility facilities; storm water management facilities not integrated into an overall landscape design; and other facilities determined to require screening from public view by the Authority.

4.19.1.1 Vegetative Screening: Screening shall be required only at the outer boundaries of a developed site and shall be provided except where driveways or other openings may be required.

A. Screening may be provided within the building setback area.

B. Screening shall consist of an unbroken strip of open space a minimum of 25 feet wide and shall be planted with one large evergreen tree with an ultimate height of 40 feet or greater for every 10 linear feet, plus one medium evergreen tree with an ultimate height of 20 to 40 feet for every five linear feet or with approval of the Authority, one large deciduous tree with an ultimate height of 50 feet or greater for every 15 linear feet, plus one medium evergreen tree with an ultimate height of 20 to 40 feet for every five linear feet.

4.19.2 Screening Barriers: Barriers shall be generally located between the required screening and the use or activity where they will most adequately screen such activities from the existing or proposed first floor level of adjoining development as determined by the Authority. Any bracing, supports or posts shall be on the side of the barrier facing the use that must provide the barrier.

4.19.2.1 Unusual Circumstances: In certain unusual circumstances of topography, or to alleviate certain specific

problems (i.e., the blocking of glare, muting of noise, etc.) the Authority may require the use of an earth berm or more specialized fence material in lieu of, or in combination with, any of the barrier types set forth below. All barrier design involving secure areas shall be in accordance with Airport security design standards.

4.19.2.2 Alternative screening barrier types include:

A. 42-48 inch wall, brick or architectural block faced on the side facing the existing use and may be required to be so faced on both sides as determined by the Authority.

B. 42-48 inch solid wood or otherwise architecturally solid fence.

C. Evergreen hedge with an ultimate height of at least 42-48 inches and planted size of 36 inches.

D. 42-48 inch black-coated chain link fence and may be required by the Authority supplemented by trees and/or shrubs.

E. 6-foot high wall, brick or architectural block faced on the side facing the existing use and may be required to be so faced on both sides as determined by the Authority.

F. 6-foot high solid wood or otherwise architecturally solid fence.

G. 6-foot high black-coated chain link fence and may be required by the Authority supplemented by trees and/or shrubs.

4.20 Vegetation Preservation

4.20.1 Vegetation Preservation Area Selection: All vegetation preservation planning and design shall be undertaken by professionals qualified to undertake such work including foresters, ISA-certified arborists, horticulturalists, and/or landscape architects.

4.20.1.1 Identification of Vegetation Preservation

Areas: Individual plants and groups of plants to be preserved should be selected prior to design of construction plans. Selection of plants and groups of plants to be preserved should be accomplished through the use of tree surveys and vegetation mapping. Preservation areas that are woodlands and forest shall include all existing trees and understory vegetation. Preservation areas involving developed area landscapes shall include all tree, shrub, and other plantings located within the designated area.

4.20.1.2 Transplanting: Trees and shrubs that will be removed for development should be assessed to determine if they are suitable for transplanting to other locations on and/or off-site. Successfully transplanted trees and shrubs may be more valuable than smaller nursery stock and may provide a cost savings over the use of nursery stock.

4.20.1.3 Design and Demolition: No clearing and vegetation removal or damage to vegetation shall occur until the design of buildings, site circulation, and utility systems is final. Nor should any vegetation planned for preservation or translocation be destroyed or damaged during the demolition of any existing site features or structures.

4.20.1.4 Preservation of Sensitive Environments:

Critical areas, such as floodplains, streams and their associated steep slopes, and wetlands should be left in their natural condition, only partially developed as open space or re-naturalized after any disturbance to the greatest extent feasible.

4.20.1.5 Road Design: To the greatest extent feasible, roads should be located where they will cause the least damage to valuable vegetation. The road alignments should follow existing contours and landforms, as much as possible, to minimize cuts and fills.

4.20.1.6 Location of Preservation Areas: Every effort should be made in the planning and design phases to avoid fragmentation of preservation areas. To avoid plant mortality and windthrow hazards, the preservation of

individual trees or small stands of trees and other vegetation is not recommended when disturbance to the critical root zone will occur on more than two sides. Preservation areas should be located adjacent to existing forest or woodlands on adjacent properties. Individual trees that will have 40 percent or more of the critical root zone disturbed by construction are not generally recommended for preservation.

A. Critical root zone is defined as the area of undisturbed natural soil around a tree defined by a concentric circle with a diameter in feet equal to twice the number of inches of trunk diameter. The area within this circle is referred to as the critical root zone. A circle is graphically efficient to produce and represents the most likely configuration of a tree's root pattern even when the crown is skewed or one-sided. The ratio of circle diameter to trunk diameter is based on typical dripline distances noted on open grown trees with full crowns. The dripline standard for critical root zone area is being used as a practical matter despite the fact that a tree's roots often extend two to three times beyond the dripline.

B. Trenching should be minimized and excavations proximate to preservation areas should be located outside of the dripline of trees.

C. Construction material storage and vehicle and equipment parking shall be located where they will not cause soil compaction proximate to vegetation preservation areas.

D. When retaining existing islands of preserved vegetation in parking areas or other locations, sufficient undisturbed ground around each cluster or island of vegetation shall remain to allow for plant survival.

4.20.2 Site Planning for Vegetation Preservation:

Grading shall not take place within the dripline or critical root zone of trees and other plants to be preserved on or off-site.

4.20.2.1 Tolerance to Sudden Exposure: Consideration should be given to the tolerance of plant species to the new environmental conditions such as increased direct sunlight, increased radiant heat from proposed buildings and paved areas, and increased wind. New conditions created by clearing and grading should be factored into the design of preservation areas, site planning, design of new landscapes, and subsequent construction documentation.

4.20.2.2 Water Table and Surface Drainage:

Consideration should be given to the effect of grading on the local water table and surface drainage patterns. An increase or reduction in available water caused by grading may adversely impact trees and other vegetation proposed to be preserved.

4.20.2.3 Hazard Trees: When planning for the preservation of trees or groups of trees, trees that are potentially hazardous should be thoroughly evaluated prior to making decisions regarding preservation. A hazardous tree is one that: a) possesses an above and/or below ground structural defect that pre-disposes the tree or a portion of the tree to failure, and b) has the potential to strike and cause damage to an existing or proposed target such as a road, structure, pedestrian, etc. Any tree that possesses these two qualities shall be considered hazardous and shall be subject to removal or corrective action.

4.20.2.4 Energy Conservation: Consideration should be given to the location of trees to be retained in relation to the planned use of the site. With proper selection of species and location, trees provide decreased energy consumption in buildings they shade from summer heat, or serve to reduce wind speed.

4.20.2.5 Health and Disease Susceptibility: Trees and other vegetation should be checked for scarring caused by fire or lightning, insect or disease damage, and rotted or broken trunks or limbs. Preservation of plants that are in good condition and are resistant to pests and pollution is preferred.

4.21 Construction Phase Impacts

4.21.1 Trees and Construction: Construction activities expose trees to a variety of stresses resulting in injury ranging from superficial wounds to death. Understanding these stresses is critical to planning for tree preservation.

4.21.2 Surface Impacts: Forces exerted on the tree above the ground, such as those listed below, can cause significant damage and limit a tree's ability to survive construction.

4.21.3 Wind Damage: Removal of some trees from a forest will expose the remaining trees to greater wind velocities. Trees tend to develop anchorage where it is most needed. Isolated trees develop anchorage rather equally all around, with stronger root development on the side of the prevailing winds. The more a tree is protected from the wind in a forest, the less secure is its anchorage. Improper thinning or removal of adjacent vegetation often exposes trees to wind-throw. Knowledge of each species' susceptibility to wind-throw damage is important to selecting trees for preservation.

4.21.4 Excessive or Inappropriate Pruning: Trees are often topped or carelessly pruned to prevent interference with utility wires or buildings. Topping or the removal of a large percentage of the top of a tree to reduce its height is not an arboriculture industry-accepted practice. If too much green tissue is removed, the tree may not be able to sustain itself. If the pruning is done without considering the tree's growth habit, the tree may lose all visual appeal. If the branches are not pruned correctly, decay and invasion by pathogens and insect pests may occur and weaken the tree structurally.

4.21.5 Trunk Damage: Tree trunks are often wounded by being hit by vehicles or construction equipment. Such wounds provide points of entry for insects, diseases, and decay organisms thereby damaging vital conductive tissues. This damage can result in decline and death of the tree.

4.21.6 Lightning Hazards: The preservation of an individual tree may create a lightning hazard, especially if the individual tree was previously protected by other trees or is the tallest feature in the area. Lightning protection should be installed in individual trees that present a lightning hazard.

4.21.7 Root Zone Impacts: On construction sites it is often impossible to preserve the entire root zone of a tree. For open-grown trees, preservation of the root zone area within the dripline is usually sufficient for survival; for forest-grown trees, the entire critical root zone should remain undisturbed to ensure the tree's survival.

4.21.7.1 Raising The Grade: Raising the grade by placing fill over the root zone can retard the normal exchange of air and gases between the roots and soil. Roots may suffocate due to lack of oxygen, or be damaged by toxic gases and chemicals released by soil bacteria. Raising the grade may also elevate the water table that may produce intolerably wet conditions.

4.21.7.2 Lowering The Grade: Lowering the grade more than a few inches may sever or irreparably damage a significant portion of both the structural and absorbing roots. Shallow grading results in the removal of topsoil, leaf litter, understory vegetation and absorbing roots. The end result is a tree with reduced capacity to absorb water and nutrients, and reduced stability against wind-throw.

4.21.7.3 Water Table: Lowering the grade may lower the water table, inducing drought. This is a problem in large roadway cuts, underdrain installations, or other deep trenches.

4.21.7.4 Compaction: Compaction of the soil within the root zone of a tree by equipment operation, materials storage, parking, or paving can block off air and water from roots. Lack of oxygen and water can cause tree roots to die, resulting in tree decline and/or death.

4.21.7.5 Trenching: Trenching within the dripline or critical root zone of an existing tree is extremely detrimental

due to the partial or complete severing of roots and desiccation by exposure to sun and wind. When trenching activities sever 40 percent or more of a tree's critical root zone, the tree will likely die within two to five years. An alternative to trenching is tunneling, which causes less disturbance and mortality to the root system and lessens considerably the physical impact on the tree.

4.21.7.6 Refuse Disposed: Construction chemicals or toxic refuse disposed of in the soil can be taken up through a tree's roots causing decline and/or death of the tree.

4.22 Plant Selection

4.22.1 Plant Size: The mature height and spread of trees and shrubs shall be considered to ensure that they will not interfere with proposed structures and overhead or underground utilities. Root development shall be considered to ensure that tree and shrub placement will not cause interference with walls, walks, drives, fences, and other paved surfaces and structures or impact water and sewer lines, septic systems, underground drainage systems or storm water management facilities.

4.22.2 Site Conditions: The existing and proposed use(s) and condition(s) of the developed area, as well as the existing and future availability of light and water, shall be considered prior to plant selection. Trees and shrubs that exhibit a tolerance to air pollution should be selected. Trees and shrubs that are suitable for buffering or screening should be selected where noise or objectionable views are anticipated problems. Generally, evergreen plants provide better buffering and screening than deciduous plants. Trees, shrubs, and groundcover plants should be selected that can tolerate de-icing salts if there is a chance these will be used in close proximity.

4.22.3 Life Span: Preference should be given to plant species with long life spans.

4.22.4 Resistance to Disease and Insects: Plants that are known to be resistant to attacks by disease or insects

should be given preference over those known to be susceptible.

4.22.5 Japanese Beetle Host Plants: Plants that are known to host Japanese beetles shall not be specified or installed.

4.22.6 Native and Invasive Exotic Plants: Native plants should be used whenever possible. Exotic (non-native) species known to be invasive should not be planted. See attached list for a listing of known invasive exotic plants.

4.22.7 Aesthetics: Consideration should be given to flowering habits, autumn foliage, and bark and crown characteristics. These selection criteria shall be coordinated with guidelines concerning bird and wildlife habitat control and Japanese beetle insect control.

4.22.8 Wildlife Value: These selection criteria shall be coordinated with guidelines concerning bird and wildlife habitat control and Japanese beetle insect control.

4.22.9 Energy Conservation: Planting or preserving deciduous trees near buildings and other structures reduces heat absorption during the summer and allows for passive solar heating during the winter. Maximum cooling savings and minimum heating expenditures will result when deciduous trees shade the western, southwestern, and northwestern walls and windows of buildings. When choosing a planting location for energy conservation, the tree's form and ultimate size must be considered to minimize maintenance and assure healthy, long-term growth and survival.

4.22.10 Plant Diversity: In order to control the spreading of disease or insect infestation in a plant species, planting designs shall not be dominated by single genera. Planting design shall not exceed 70 percent of a single genus. The exceptions to this guideline are smaller scale projects that may involve limited plantings.

4.22.10.1 See the following list for recommended plant selection.

RECOMMENDED PLANTS LIST		
SCIENTIFIC NAME	COMMON NAME	COMMENTS
TREES		
Betula nigra	River Birch	Groves as noted in matrix
Carya ovata	Shagbark Hickory	As noted in matrix
Ilex x 'Nellie R. Stevens'	Nellie R. Stevens Holly	Groves in front of parking garages
Juniperus virginiana	Eastern Redcedar	Groves as noted in matrix
Metasequoia glyptostroboides	Dawn Redwood	Main terminal planters
Acer rubrum 'Red Sunset'	Red Sunset Maple	Street tree - Ariane Way, west end of Rudder Road, and road frontage along west side of blue lot
Acer x freemanii 'Armstrong'	Armstrong Maple	Street tree – Autopilot Drive
Ginkgo biloba	Ginkgo	Street tree – Compass Court & Propeller Court
Quercus phellos	Willow Oak	Street tree – Aviation Drive, Cargo Drive, and Windsock Drive
Zelkova serrata 'Village Green'	Village Green Zelkova	Saارين Circle parking lot and other lots
Acer rubrum	Red Maple	Pond edge
Carpinus caroliniana	American Hornbeam	Pond edge
Magnolia virginiana	Sweetbay Magnolia	Pond edge

RECOMMENDED PLANTS LIST		
SCIENTIFIC NAME	COMMON NAME	COMMENTS
<i>Nyssa sylvatica</i>	Black Gum	Pond edge
<i>Taxodium ascendens</i>	Pond Cypress	Pond edge
<i>Acer rubrum</i> 'October Glory'	October Glory Red Maple	Large shade tree
<i>Carpinus betulus</i> 'Fastigiata'	European Hornbeam	Upright shade tree
<i>Cladrastis kentuckea</i>	Yellowwood	Large shade tree
<i>Fraxinus americana</i>	White Ash	Large shade tree
<i>Gymnocladus dioica</i>	Kentucky Coffeetree	Large shade tree
<i>Quercus acutissima</i>	Sawtooth Oak	Large shade tree
<i>Zelkova serrata</i> 'Green Vase'	Green Vase Zelkova	Large shade tree
<i>Ilex opaca</i>	American Holly	Evergreen screen
<i>Juniperus virginiana</i>	Eastern Redcedar	Evergreen screen
<i>Pinus strobus</i>	White Pine	Evergreen screen
<i>Pinus virginiana</i>	Virginia Pine	Evergreen screen
<i>x Cupressocyparis leylandii</i>	Leyland Cypress	Evergreen screen
<i>Acer buergeranum</i>	Trident Maple	Small tree
<i>Chionanthus virginicus</i>	Fringetree	Small tree
<i>Lagerstroemia</i> spp.	Crape Myrtle	Small tree - verify Japanese Beetle resistant varieties base on attached list
<i>Magnolia x soulangiana</i>	Saucer Magnolia	Small tree
<i>Malus</i> spp.	Crabapple	Small tree - verify Japanese Beetle resistant varieties base on attached list
<i>Acer rubrum</i>	Red Maple	Woodland edges
<i>Acer saccharum</i>	Sugar Maple	Woodland edges
<i>Amelanchier arborea</i>	Serviceberry	Woodland edges
<i>Amelanchier laevis</i>	Allegheny Serviceberry	Woodland edges
<i>Carya glabra</i>	Pignut Hickory	Woodland edges
<i>Cercis canadensis</i>	Redbud	Woodland edges
<i>Hamamelis virginiana</i>	Common Witchhazel	Woodland edges
<i>Ilex opaca</i>	American Holly	Woodland edges
<i>Juniperus virginiana</i>	Eastern Redcedar	Woodland edges
<i>Liriodendron tulipifera</i>	Tulip Poplar	Woodland edges
<i>Pinus strobus</i>	White Pine	Woodland edges
<i>Pinus virginiana</i>	Virginia Pine	Woodland edges
<i>Quercus alba</i>	White Oak	Woodland edges
<i>Quercus coccinea</i>	Scarlet Oak	Woodland edges
<i>Quercus rubra</i>	Red Oak	Woodland edges
SHRUBS/GROUNDCOVERS		

RECOMMENDED PLANTS LIST		
SCIENTIFIC NAME	COMMON NAME	COMMENTS
<i>Euonymus fortunei</i> 'Coloratus'	Purple Leaf Wintercreeper	Groundcover - steep banks near main terminal
<i>Fothergilla gardenii</i> 'Mount Airy'	Mount Airy Fothergilla	Shrub - Saarinen circle and Flagpole Area
<i>Hamamelis vernalis</i>	Vernal Witchhazel	Median - Autopilot Drive
<i>Liriope spicata</i>	Creeping Lilyturf	Groundcover - parking islands, road and parking lot edge
<i>Nandina</i> spp.	Nandina species	Shrub - Saarinen Circle surrounding parking lot
<i>Panicum</i> spp.	Switchgrass	Ornamental grass - around flagpole and Access Road
Native grass seed mix	Native Grass Seed Mix	Woodland edges - road banks
Native meadow seed mix	Native Meadow Seed Mix	Woodland edges - road banks
<i>Cornus alba</i>	Tatarian Dogwood	Shrub
<i>Cornus sericea</i>	Redosier Dogwood	Shrub
<i>Cotinus coggygria</i> 'purpureus'	Purple Smoketree	Large shrub, small tree
<i>Cotoneaster horizontalis</i>	Rockspray Cotoneaster	Low shrub/ groundcover
<i>Fothergilla gardenii</i>	Dwarf Fothergilla	Shrub
<i>Hypericum</i> 'Hidcote'	Hidcote St. Johnswort	Shrub
<i>Hypericum calycinum</i>	Creeping St. Johnswort	Shrub
<i>Ilex glabra</i>	Inkberry Holly	Shrub
<i>Itea virginica</i>	Virginia Sweetspire	Shrub
<i>Rhus aromatica</i> 'Gro Low'	Gro Low Fragrant Sumac	Shrub
<i>Taxus baccata</i> 'Repandens'	Dwarf English Yew	Shrub
<i>Taxus cuspidata</i> 'Densa'	Japanese Yew	Shrub
<i>Taxus x media</i> 'Tauntonii'	Taunton Spreading Yew	Shrub
<i>Viburnum</i> spp.	Viburnum	Shrub
<i>Viburnum x pragense</i>	Prague Viburnum	Shrub
<i>Yucca filamentosa</i>	Adam's Needle Yucca	Shrub
<i>Euonymus americanus</i>	Strawberrybush	Woodland edges
<i>Hamamelis virginiana</i>	Common Witchhazel	Woodland edges
<i>Hydrangea quercifolia</i>	Oakleaf Hydrangea	Woodland edges
<i>Rhus typhina</i>	Staghorn Sumac	Woodland edges
<i>Calamagrostis acutiflora</i>	Feather Reed Grass	Ornamental grass
<i>Deschampsia cespitosa</i>	Tufted Hair Grass	Ornamental grass
<i>Molinia</i> spp.	Purple Moor Grass	Ornamental grass
<i>Panicum virgatum</i>	Switch grass	Ornamental grass
<i>Pennisetum</i> spp.	Fountain Grass	Ornamental grass
<i>Schizachyrium scoparium</i>	Little Bluestem	Ornamental grass
<i>Arctostaphylos uva-ursi</i>	Bearberry	Groundcover
<i>Genista lydia</i>	Lydia Broom	Groundcover
<i>Pachysandra terminalis</i>	Japanese Spurge	Groundcover

RECOMMENDED PLANTS LIST		
SCIENTIFIC NAME	COMMON NAME	COMMENTS
<i>Pachysandra procumbens</i>	Alleghany Spurge	Groundcover
<i>Sedum</i> spp.	Stone Crop	Groundcover
<i>Vinca minor</i>	Periwinkle	Groundcover
<i>Alchemilla mollis</i>	Lady's Mantle	Perennial/ groundcover
<i>Delosperma</i> spp.	Hardy Ice Plant	Perennial/ groundcover
<i>Galium odoratum</i>	Sweet Woodruff	Perennial/ groundcover
<i>Geranium</i> spp.	Cranesbill	Perennial/ groundcover
<i>Perovskia atriplicifolia</i>	Russian Sage	Perennial/ groundcover
<i>Rudbeckia fulgida</i> 'Goldsturm'	Blackeyed Susan	Perennial/ groundcover
<i>Stachys byzantina</i> 'Helene von Stein'	Lamb's Ear	Perennial/ groundcover
<i>Tiarella cordifolia</i>	Foamflower	Perennial/ groundcover

4.23 Planting Construction Documentation

4.23.1 General: All planting plan sheets, including plan views, sections and elevations, details, and schedules shall be in accordance with *Design Manual* standards for all phases of design and computer-aided design and drafting.

4.24 Drawing Requirements

4.24.1 Scale: The planting plan sheets shall be drawn at a scale equal to the site/grading plan sheets.

4.24.2 Plant Labels: Each plant to be planted shall be accurately located and labeled using the botanical species name or appropriate abbreviation. If symbols are used they shall be easily discernible, and a symbol key shall be provided on the right hand side of each landscape plan sheet.

4.24.3 Tree Canopies: The symbols used to locate trees shall be drawn to scale to accurately represent their projected 10-year tree cover area.

4.24.4 Plant Schedule: The planting documents shall include a plant schedule that shall include the minimum following information:

4.24.4.1 Names: Botanical and common names.

4.24.4.2 Quantity: Quantity of each plant.

4.24.4.3 Size: Stock size.

4.24.4.4 Type Of Rootstock: Type of rootstock to be planted (e.g., balled and burlapped (B&B), bareroot, container).

4.24.4.5 Characteristics: Any additional notes regarding the characteristics of the specified plant.

4.24.4.6 Plant Name Label: If a symbol is used instead of a plant name label on the plan, the symbol shall be included in the plant schedule. The plant schedule shall be organized by major plant types and then alphabetically within each plant type listing.

4.24.5 Plantings on Structure and Container Details: If plants are shown to be planted over structure, in containers

or planters, or other areas of restricted root growing space, planting details shall be provided that indicate the overall size, depth, soil mix, irrigation, and drainage of the planter or planting space. When minimum planting depths and areas cannot be provided, the Authority may approve alternative designs that provide the maximum possible planting depth and area.

4.24.6 Interior Parking Lot Landscaping: All calculations and illustrations for interior parking lot landscaping shall be provided on the landscape plan sheet.

4.24.7 Easements, Property Lines, Rights-of-Way, and Above and-Below-ground Utility Locations:

Designer shall be responsible for coordinating with existing utility easements in order to avoid conflicts with planting design. In addition, trees shall not be planted in an area that will interfere with existing or proposed utilities or obstruct or interfere with access of maintenance personnel or equipment.

4.24.7.1 Public Utility Easement: If trees are shown to be planted within an existing or proposed public utility easement, the planting plan shall contain a letter of permission from the owner of the easement.

4.24.8 Areas to be Planted With Seedlings: If areas are shown on the planting plans to be planted with seedlings, a legend shall be provided describing the species type(s) and stock type(s) to be used (bare root and/or containerized), seedling age, planting method, ground and/or soil treatment to be conducted, ground cover treatment if any, and timing relative to other construction activities. Regulatory signage shall be posted on all sides of areas planted with seedlings to restrict access and shall serve as a warning concerning the presence of seedlings. The planting plans shall show the location of all signage and a detail showing the size and text of the signs.

4.24.9 Areas to be Planted by Direct Seeding: If areas are shown on the planting plans to be planted using seeding methods, a description shall be provided of the seed mix content, seeding rate, application method, ground

and/or soil treatment, ground cover treatment, and timing relative to other construction activities. Regulatory signage shall be posted on all sides of seeded areas to restrict access and shall serve as a warning concerning the presence of seeding operations. The planting plans shall show the location of all signage and a detail showing the size and text of the signs.

4.24.10 Vegetation Protection Plan: A tree inventory survey and existing vegetative cover mapping shall be prepared. This information may be included as part of the site or land survey required for design and shall be included within the construction documentation. The vegetation preservation areas and measures may be incorporated into erosion and sedimentation control plans and specifications or may be stand-alone documents. The tree survey shall indicate the DBH (diameter breast height), species and location for all trees over three inches in diameter for all areas within the project area and any trees on adjacent property whose critical root zones extend onto Airport property within the project area. Vegetation areas by type shall be mapped as part of the tree survey. The vegetation mapping shall identify forest/woodlands, jurisdictional wetlands, surface water, successional areas, fields, and developed landscape areas (including trees of three inch DBH or greater, planting beds, shrub and ground cover massings, and lawn areas).

4.25 Construction Phase

4.25.1 General: All tree and vegetation protection measures shall be in accordance with the minimum standards established in the latest edition of the Virginia Soil Erosion and Sediment Control Handbook published by the Virginia Department of Conservation and Recreation and as indicated within this section.

4.25.1.1 Measures And Procedures: Measures and procedures for maintaining trees and vegetation prior to, during, and after construction shall be the responsibility of the contractor. An arborist certified by the International Society of Arboriculture shall supervise all tree maintenance measures. A tree and vegetation maintenance plan shall be

the responsibility of the contractor and shall be prepared by the contractor's qualified horticulturist and/or ISA-certified arborist and submitted to the Authority for approval prior to commencing clearing and demolition operations.

4.25.1.2 Mitigation And Treatments: The inspection, assessment, and prescribing of mitigation and other treatments shall be undertaken by professionals qualified to undertake such work including foresters, ISA-certified arborists, horticulturalists, and/or landscape architects.

4.25.2 Land Clearing and Demolition Operations:

Hazard trees or other vegetation that have become hazardous shall be removed prior to, during, and after construction. Trees and vegetation shall be removed by hand with a chain saw (trees sectioned and lowered) and stumps shall be ground below the existing grade. The removal of the trunk, stems, and branches of the trees and vegetation is not required within wooded areas, unless specifically required in the contract documents.

4.25.2.1 Demolition: If demolition of existing buildings, structures, pavements, utilities, and any other site feature is to occur next to vegetation to be preserved, vegetation protection measures shall be installed before demolition begins.

4.25.2.2 Clearing And Grading: Prior to land disturbing activities, root pruning with a vibratory plow, trencher, or similar device shall be conducted along the limits of clearing and grading adjacent to tree and vegetation preservation areas.

A. Trees being removed shall not be felled, pushed, or pulled into tree and vegetation preservation areas.

B. Equipment operators shall not clean any part of their equipment by slamming it against the trunks of trees to be retained.

C. Trees on the edge of the limits of clearing and grading shall be cut down by hand with a chain saw

(sectioned and lowered). Remaining stumps shall be ground below existing grade with a stump grinder.

D. Individual trees or groups of trees and/or areas of vegetation may be preserved over and above that indicated in Authority-approved plans. However, any additional tree and/or vegetation preservation area(s) shall be protected from construction activity in the same manner as areas indicated on the Authority-approved plans to be preserved.

E. Subsequent removal of individual trees or tree or vegetation preservation areas shown on the Authority-approved plans to be preserved must be pre-approved by the Authority before commencing with removal operations.

4.25.3 Treatment of Preservation Areas During Construction:

Vegetation protection devices shall be maintained until all work in the vicinity has been completed and shall not be removed or relocated without the consent of the Authority. If the Authority determines that the protective measures are insufficient, installation of additional protective devices may be required.

4.25.3.1 Protection Fencing: Tree protection fencing shall be erected at the critical root zone or beyond prior to the start of any clearing, grading or other construction activity. Signs stating "No Entry, Tree Protection Area, Call [Authority Resident Engineer Telephone Number] to report violations" are to be posted in both English and Spanish.

4.25.3.2 Specimen Tree Protection: Specimen tree protection shall be a minimum of six-foot high chain link fence mounted on vertical pipes driven two feet into the ground with no gates located along the dripline.

4.25.3.3 A Photographic Record: A photographic record (two shots) of all trees to be preserved over three-inch DBH after fence is installed shall be submitted by the contractor.

4.25.3.4 Unauthorized: Unauthorized individuals, equipment, vehicles, stockpiling of materials, deposition of

waste, cleared and demolished materials, or sediment shall not be permitted within tree and vegetation preservation areas. Any violation of this requirement shall result in a fine per day of violation established by the Resident Engineer.

4.25.3.5 Toxic Materials: Toxic materials shall not be stored within 100 feet of vegetation areas to be retained.

4.25.3.6 Burning Vegetation: The burning of vegetation shall not be permitted.

4.25.3.7 Objects and Devices: No objects and devices of any kind, including signs, shall be attached or affixed to trees or vegetation to be preserved.

4.25.3.8 Hazard Trees or Vegetation: Hazard trees or other vegetation that have become hazardous shall be removed prior to, during, and after construction. Trees and vegetation shall be removed by hand with a chain saw (trees sectioned and lowered) and stumps shall be ground below the existing grade. The removal of the trunk, stems, and branches of the trees and vegetation is not required within wooded areas, unless specifically required in the contract documents.

4.25.3.9 ISA-Certified Arborist: The contractor shall employ an ISA-certified arborist to root prune immediately beyond the limits of excavation to a depth of 18 inches, prior to excavation. During and after excavation all trees and roots greater than one inch in diameter that are exposed and/or damaged shall be trimmed cleanly, and covered temporarily with moist burlap or other suitable material to prevent the exposed roots from drying out until the final soil grade is restored.

4.25.3.10 Tree Wall: During construction, a tree wall shall be provided when necessary to maintain the limits of clearing and grading and tie into existing grades. A certified arborist should be consulted to determine the proper tree wall location to protect the structural integrity of the tree's root system, to help ensure the tree's survival, and to ensure public safety. Once a grade has been lowered for the construction of a tree wall, the wall shall be constructed

as soon as possible; and within two weeks. If the wall is over two feet in height a building permit is required.

4.25.3.11 Damage Inflicted: Any damage inflicted to the above- or below-ground portions of the trees shown to be preserved shall be repaired immediately. All damaged branches in the crown shall be cut off cleanly.

4.25.3.12 Damage to Tree being Preserved: Any damage to a tree being preserved shall result in a payment by the contractor to the Authority for the amount of damage based on the latest edition of The Council of Tree and Landscape Appraisers Guide for Plant Appraisals published by the ISA (International Society of Arboriculture). All trees are to be valued as Landscape Trees.

4.25.3.13 Tree Preservation Area: Any portion of a tree preservation area that is disturbed without prior approval of the Authority shall be mulched immediately with a minimum of four inches of wood chips or shredded hardwood mulch.

4.25.3.14 Trenching: Trenching shall be done only within the areas shown to be disturbed on the approved plans, unless otherwise approved by the Authority prior to commencing work.

4.25.3.15 Trenching or Tunneling: When trenching or tunneling, all tree roots greater than one inch in diameter that are exposed and/or damaged shall be trimmed cleanly, and covered temporarily with moist burlap or other suitable material to prevent the exposed roots from drying out until the soil grade is restored.

4.25.3.16 Trees or Preservation Areas: Trees or preservation areas that are damaged by trenching or tunneling shall be mulched immediately after the work is completed with wood chips or shredded hardwood mulch four inches deep and as wide as the area of disturbance to mitigate the impacts of disturbance.

4.25.3.17 Tree and Vegetation: Tree and vegetation protection shall not be removed until completion of all construction activity.

4.25.3.18 The Authority: The Authority shall approve any exceptions to the above requirements in advance.

4.25.4 Tree, Shrub, and Ground Cover Planting: Plants that are installed shall be of the species and size specified on the approved plans.

4.25.4.1 Plant Sizes: Plant sizes shall meet the standards specified in the American Association of Nurserymen's American Standard for Nursery Stock, (ANSI Z60.1-1996 or latest edition).

- A.** Plants shall be nursery grown unless otherwise approved and shall be healthy and vigorous, free from defects, decay, disfiguring roots, sun-scald, injuries, abrasions, diseases, insects, pests, and all forms of infestations or objectionable disfigurements as determined by the Authority. Plants shall be in conformance with American Standard for Nursery Stock, (ANSI Z60.1-1996).
- B.** Balled and burlapped trees and shrubs shall be dug using standard sizes with firm, natural balls of earth and securely wrapped in accordance with American Standard for Nursery Stock, (ANSI Z60.1-1996).
- C.** Bare root trees and shrubs shall be dug with adequate fibrous roots that shall be protected during handling and planting to guard against drying and physical damage.
- D.** Container grown stock shall have grown in a container long enough for the root system to hold its soil together.

4.25.4.2 Delivery and Temporary Storage: Plants shall be protected during delivery to prevent desiccation of leaves. Trees and shrubs should be planted on day of delivery. If this is not possible, the contractor shall protect unplanted plants by keeping them in shade, watered, and protected with soil, mulch, or other acceptable material. Trees and shrubs shall not remain unplanted for more than two weeks.

4.25.4.3 Planting: Soils testing is required for all planting projects prior to installation to determine recommended soil amendments. If planting in areas that have been previously compacted, the soil shall be properly prepared (tilled and amended as required based on soil samples) prior to installation of plants.

- A.** Due to the exposed wind conditions at the airport, the staking and guying of trees is required except where the Authority determines that site conditions do not warrant their use. All stakes and guys must be adequately marked to protect against personal injury and they must be removed within six months of plant installation.
- B.** Soil saucers around plants shall be avoided. If installed, they must be removed within six months of plant installation.
- C.** Wrapping of tree trunks should be avoided unless special conditions and plant species warrant this protection measure.
- D.** Cuts and wounds shall not be treated with tree wound dressing.

4.25.5 Mulching: All individual plants and planting beds shall be mulched after planting to a minimum depth of two inches, but no more than three inches, with appropriate mulch such as pine bark, pine straw, or shredded bark. Mulch shall cover the entire root area of plants; however, mulch shall not touch the plant stems or trunks.

4.25.6 Planting of Transplanted Plants: Plants to be transplanted shall be healthy without any significant defects and should be able to overcome root disturbance. The proposed transplant location(s) shall approximate the environmental tolerances the species is able to withstand.

4.25.6.1 Relocating deciduous trees and shrubs should be undertaken in late fall or early spring. Relocating evergreen trees and shrubs should be carried out in the early spring. Moving trees and trees in less than ideal periods of the

year may only be successful if extraordinary measures are undertaken.

A. Trees and shrubs to be transplanted shall be pruned and watered heavily before lifting. Immediately after planting, the trees or shrubs shall be irrigated and top dressed with two to three inches of mulch. Soil moisture levels shall be checked at least every two days and plants shall be irrigated as required.

B. Trees and shrubs to be transplanted should be placed in their permanent locations immediately. If this is not feasible, root balls of lifted balled and burlapped trees or shrubs should be placed in a storage area in temporary trenches dug deep enough to entirely surround the root ball, or encased in a minimum of 12 inches of composted mulch. Root balls of trees lifted with a tree spade shall be placed in temporary storage holes that are created with the same size tree spade. The storage area shall be well protected from construction equipment and unauthorized access, located in a shady environment, with a proximate water source. Soil moisture levels shall be checked at least every two days and plants shall be irrigated as required.

4.26 Post-Installation

4.26.1 Inspection: The contractor shall request an inspection when construction is completed to ensure that all work is in accordance with the Authority-approved plans.

4.26.2 Repair: All plants that have been damaged as a result of construction activity shall be replaced.

4.26.3 Warranty: All plants shall be under warranty for one full year after final completion (final acceptance) of project.

4.26.3.1 Trees and Shrub: Trees and shrub removal shall not result in damage to structures, site features, preserved vegetation, and plantings.

A. Trees and shrubs that are required to be removed shall be cut flush with the existing grade, and cut into movable lengths. The resulting rootball of newly installed trees and shrubs shall be removed. The stumps of existing trees and large shrubs shall be ground flush with the existing grade.

B. Removed plants, including but not limited to stumps, rootballs, trunks, stems, limbs, and branches, shall be properly disposed of offsite.

4.26.4 Pruning: All pruning shall be undertaken in accordance with the latest edition of the American National Standards Institute (ANSI) A300-1995 pruning standards. Pruning shall be undertaken by qualified landscape tradespersons under the direct supervision of qualified landscape professionals.

4.26.5 Trunk and Stem Damage: Cuts and wounds shall not be treated with tree wound dressing.

4.26.6 Climbing Spikes: Climbing or tree spikes shall not be used to climb live trees unless the tree is being removed.

4.26.7 Vertical Mulching: If the soil has become compacted over the root zone of any tree, the ground shall be aerated by vertical mulching. This treatment is accomplished by drilling one to two-inch diameter holes in the ground to a depth of one foot, and filling the holes with commercially available organic matter products, humus, composted manure, or other composted products. This procedure shall be repeated every 18-24 inches on-center within the dripline of the tree.

4.26.8 Resetting and Re-staking/Re-guying of Trees: Trees shall be re-set, re-staked, and/or re-guyed by the contractor as required. All staking and guying materials shall be removed within six months of planting.

4.27 Miscellaneous Details

4.27.1 Root Balls: Root balls of plant materials shall conform to **Exhibit I-4-2**.

4.27.2 Gravel Mowing Strips: Gravel mowing strips shall be provided around all ground-mounted structures and shall conform to **Exhibit I-4-3**.

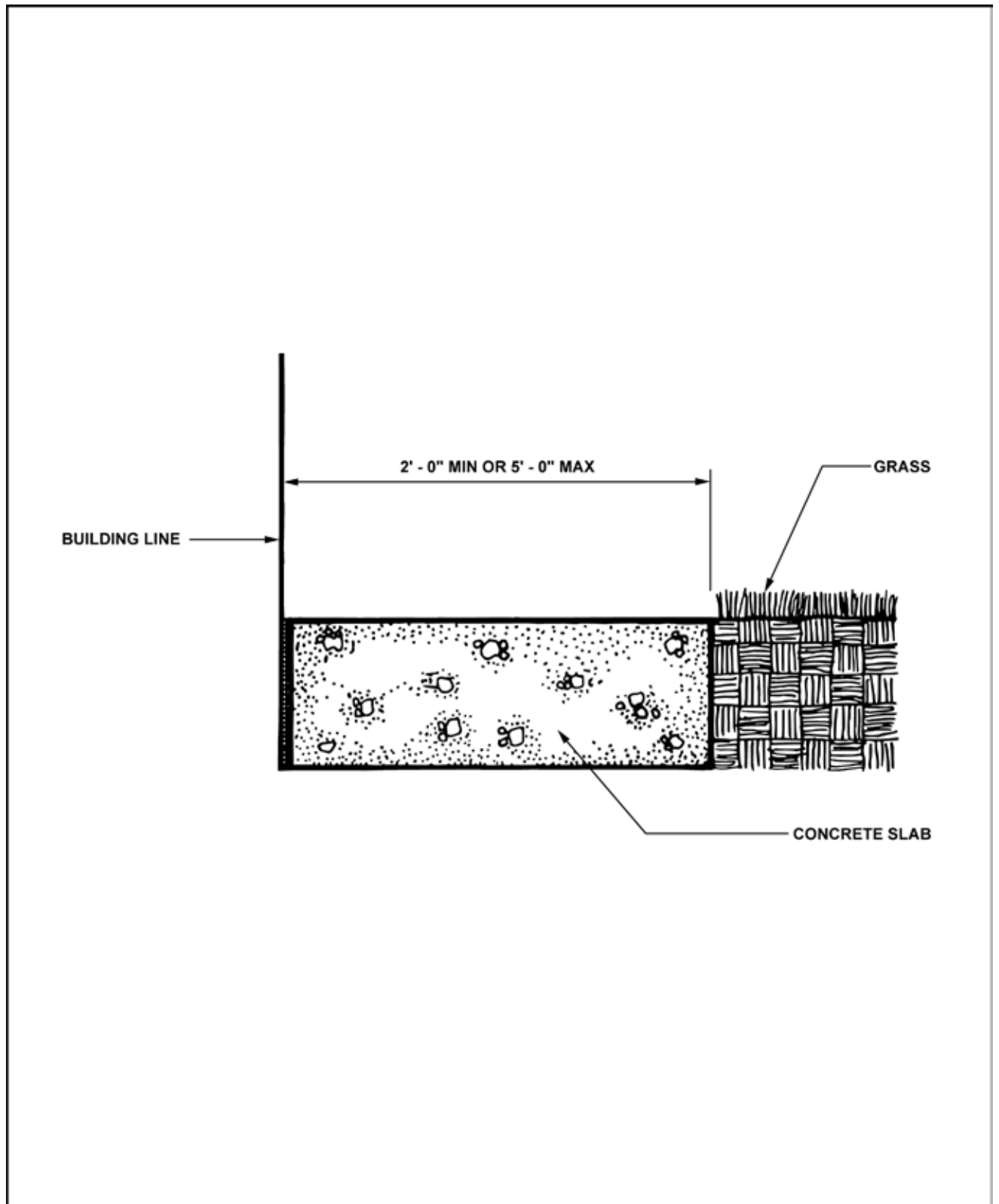
4.27.3 Structures: Planting on structures incorporated into building designs shall conform to **Exhibit I-4-4**.

4.27.4 Planting Boxes: Fixed, planting boxes shall conform to **Exhibit I-4-5**.

4.27.5 Movable Planting Boxes: Movable planting boxes shall conform to **Exhibit I-4-6**.

4.27.6 North Area: Planting plan for north area shall conform to **Exhibit I-4-7**.

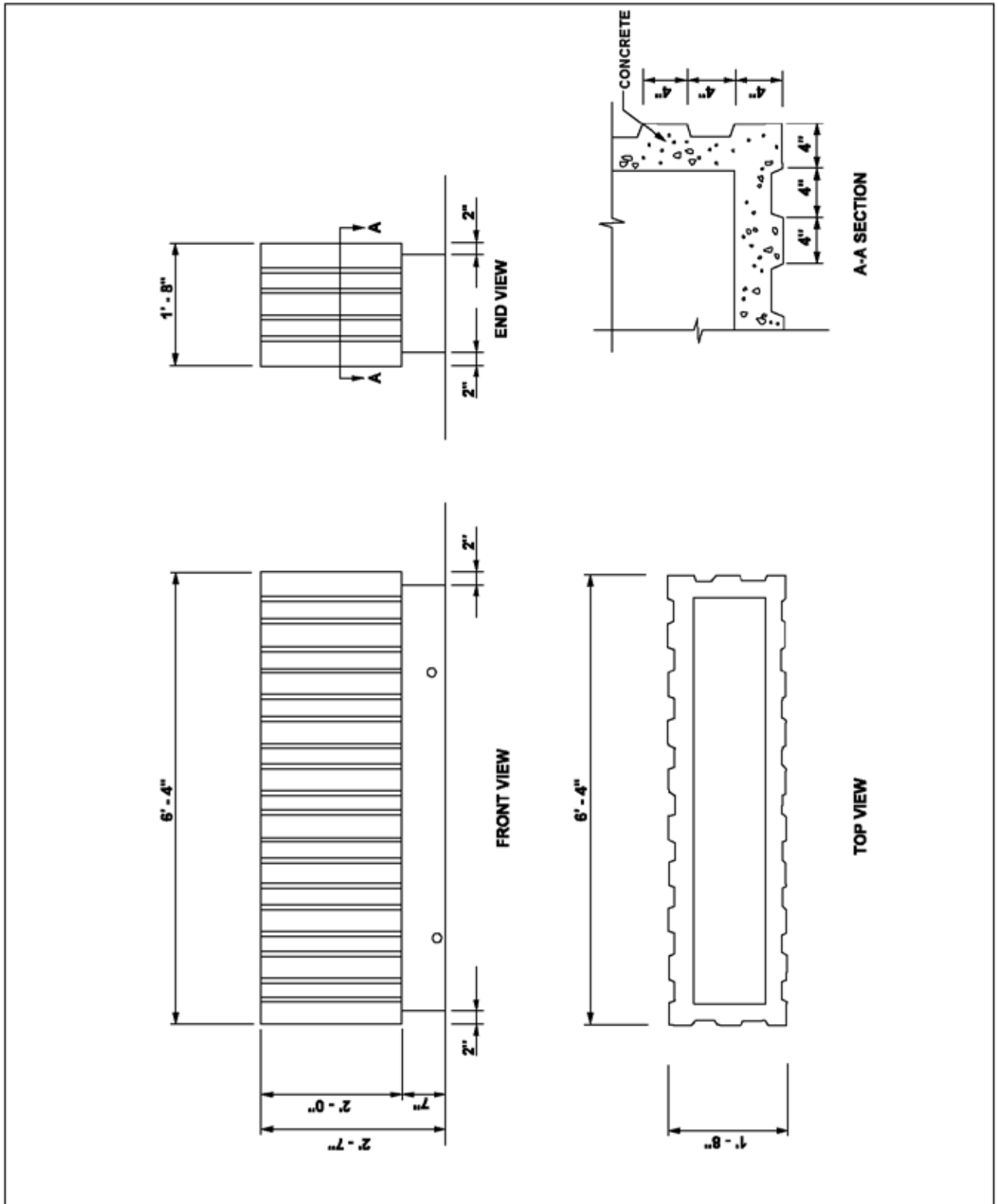
Root Ball Specifications **Exhibit I-4-2**



Mowing Strip

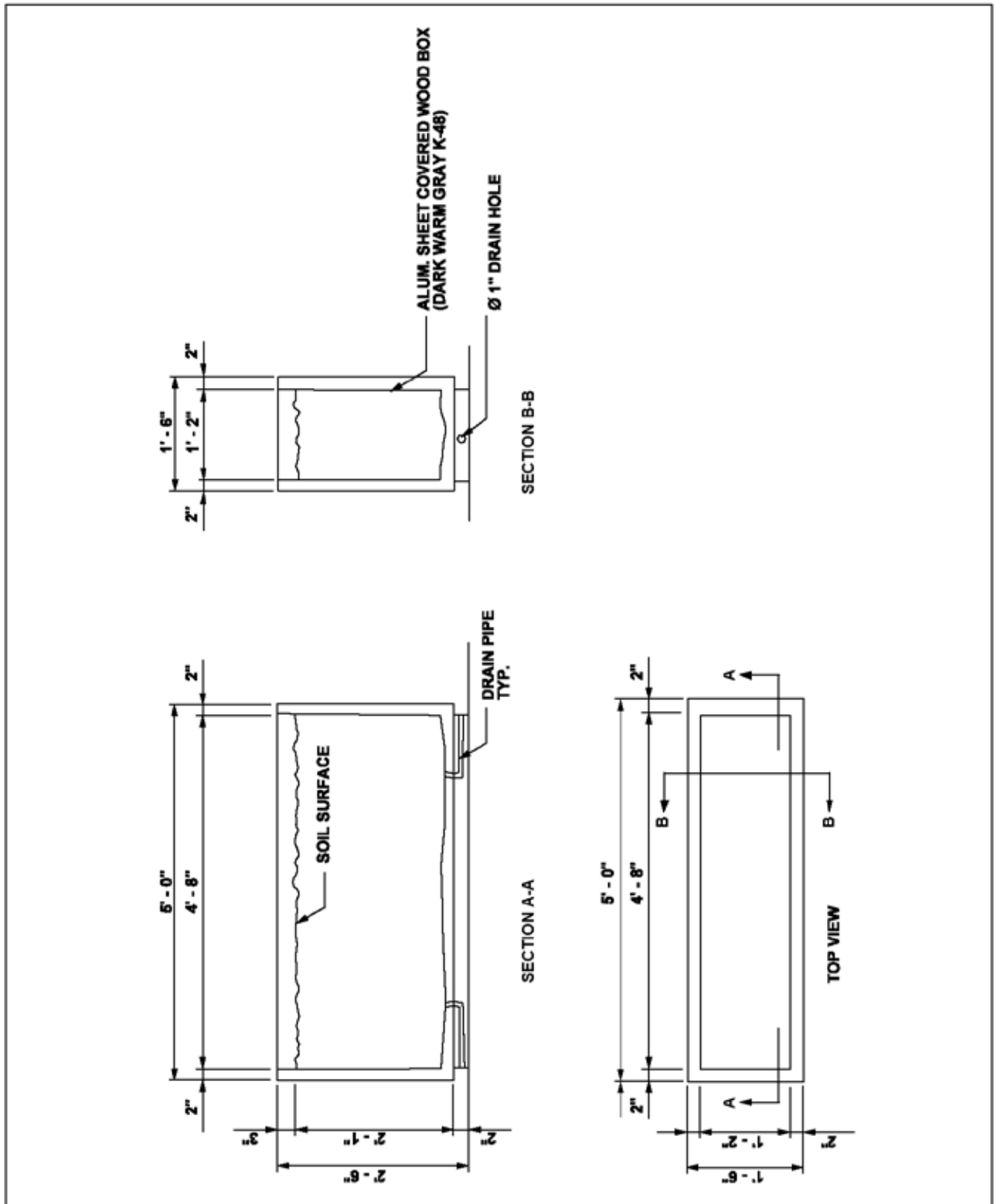
Exhibit I-4-3





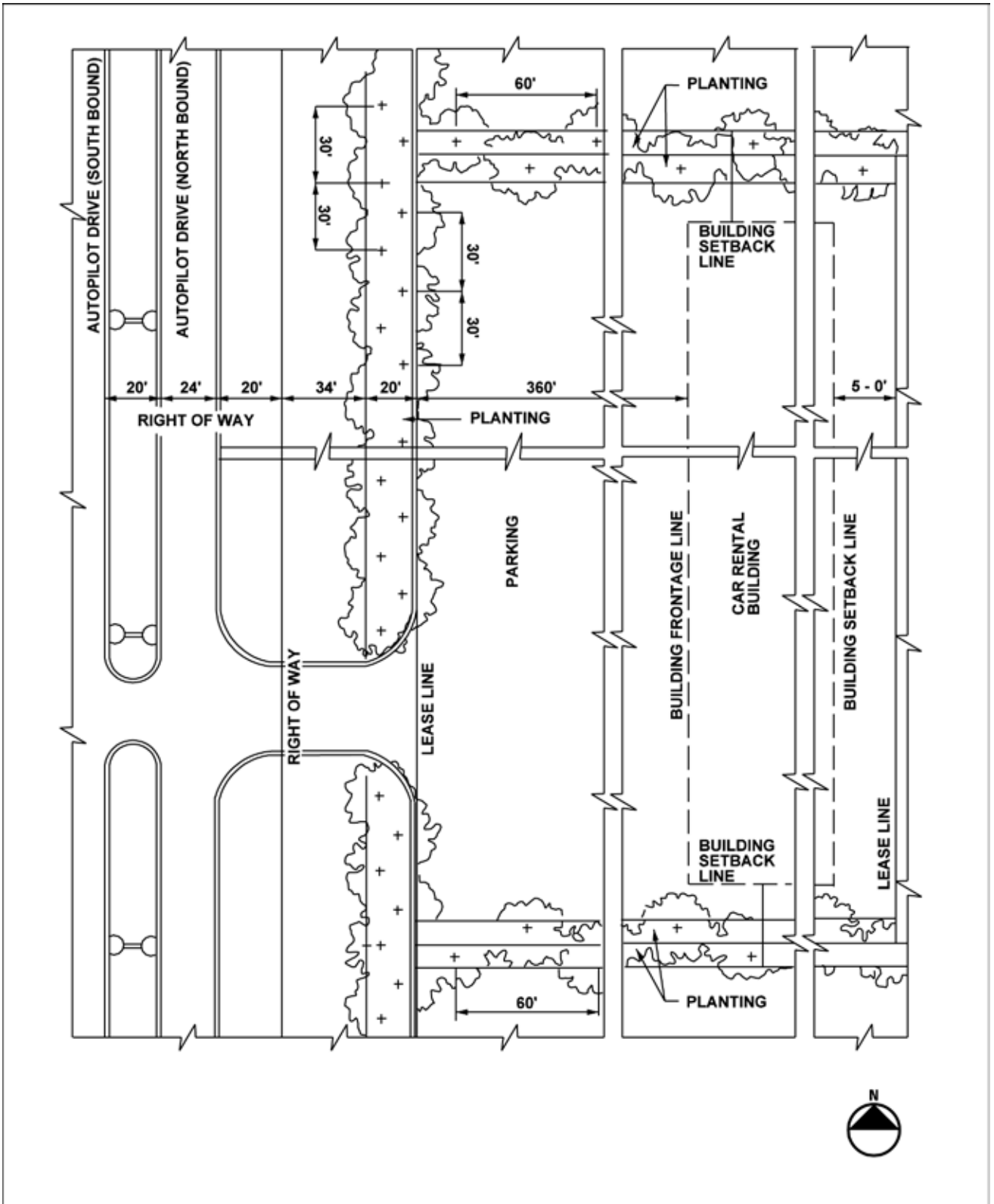
Fixed Planting Box

Exhibit I-4-5



Movable Planting Box

Exhibit I-4-6



Typical Planting Plan - North Area

Exhibit I-4-7

CHAPTER 5 Site Detail Standards

5.1 Exhibits: The following exhibits apply to miscellaneous aspects of the site or work.

5.1.1 Reserved Accessible Spaces, Exhibit I-5-1: All parking spaces required by code to accommodate disabled persons must be designed in accordance with the most recent edition of Americans with Disabilities Act (ADA), Accessibility Guidelines for Building and Facilities. The Authority has standardized mandatory signing, pavement markings, and wheel stops as shown in this detail.

5.1.2 Bollard and Set Hole, Exhibit I-5-2: All bollards shall be set in substantial, cast concrete set holes that act as post footings.

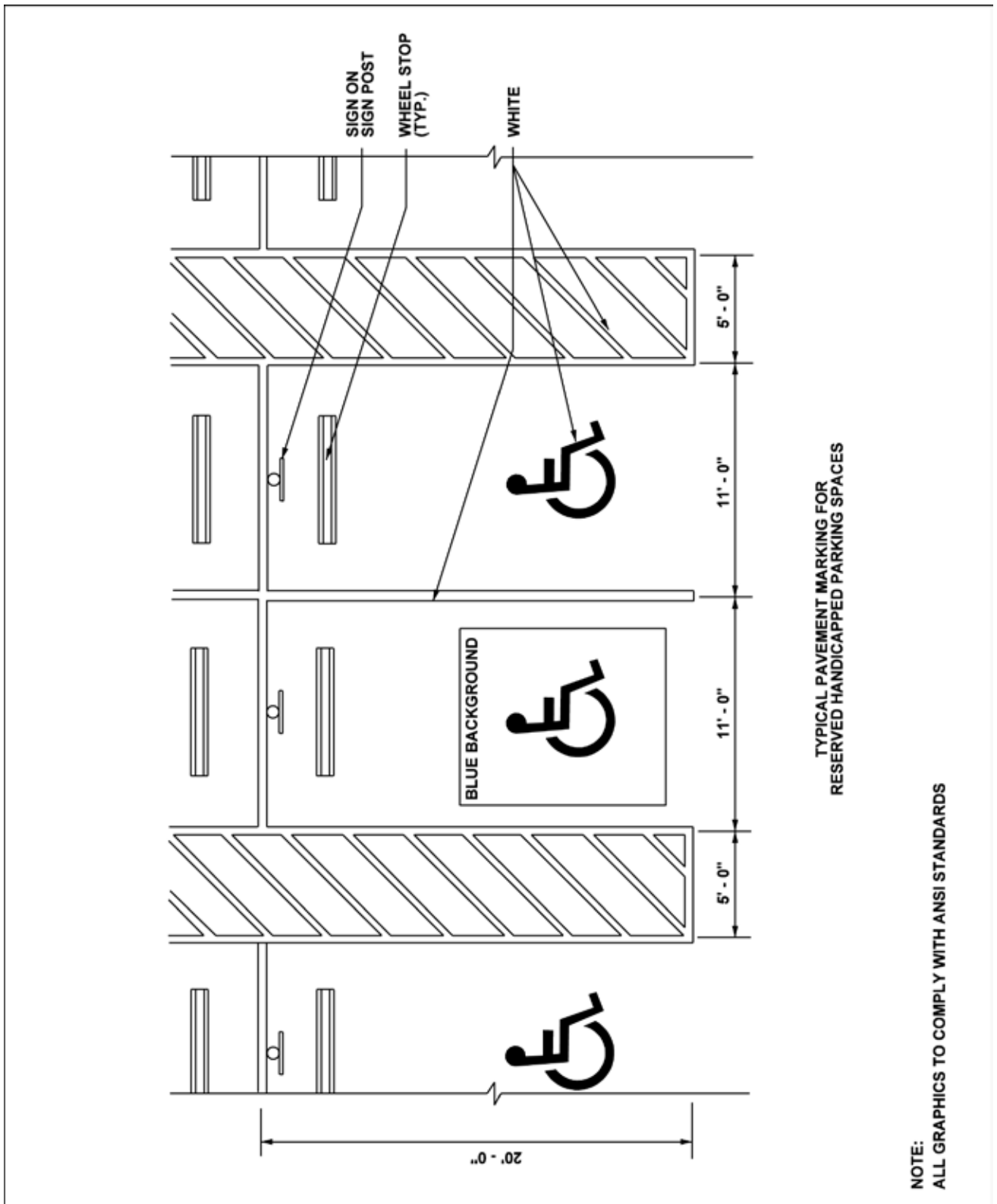
5.1.3 Concrete Bollards, Planters, Exhibit I-5-3: For use in public areas to protect ancillary structures or pedestrian safety zones from motorized vehicles. These bollards currently are used at all parking lot entrance and exit equipment islands to protect operating lot control equipment. Concrete shall be 3000 psi with 5 percent air and sealed.

5.1.4 Typical Pedestrian Walkway, Exhibit I-5-4: For all pedestrian crosswalks of paved roadways (not parking lots).

5.1.5 Pavement Markings, Exhibit I-5-5: For all marking within parking lots. Pedestrian walkways shall be white reflective paint; parking space lines shall be white paint; and "No-Parking" areas shall be yellow paint.

5.1.6 Pavement Markings, Exhibit I-5-6: For all marking within parking lot entrance and exit areas. Divisional islands for channelizing motorized traffic shall be yellow paint.

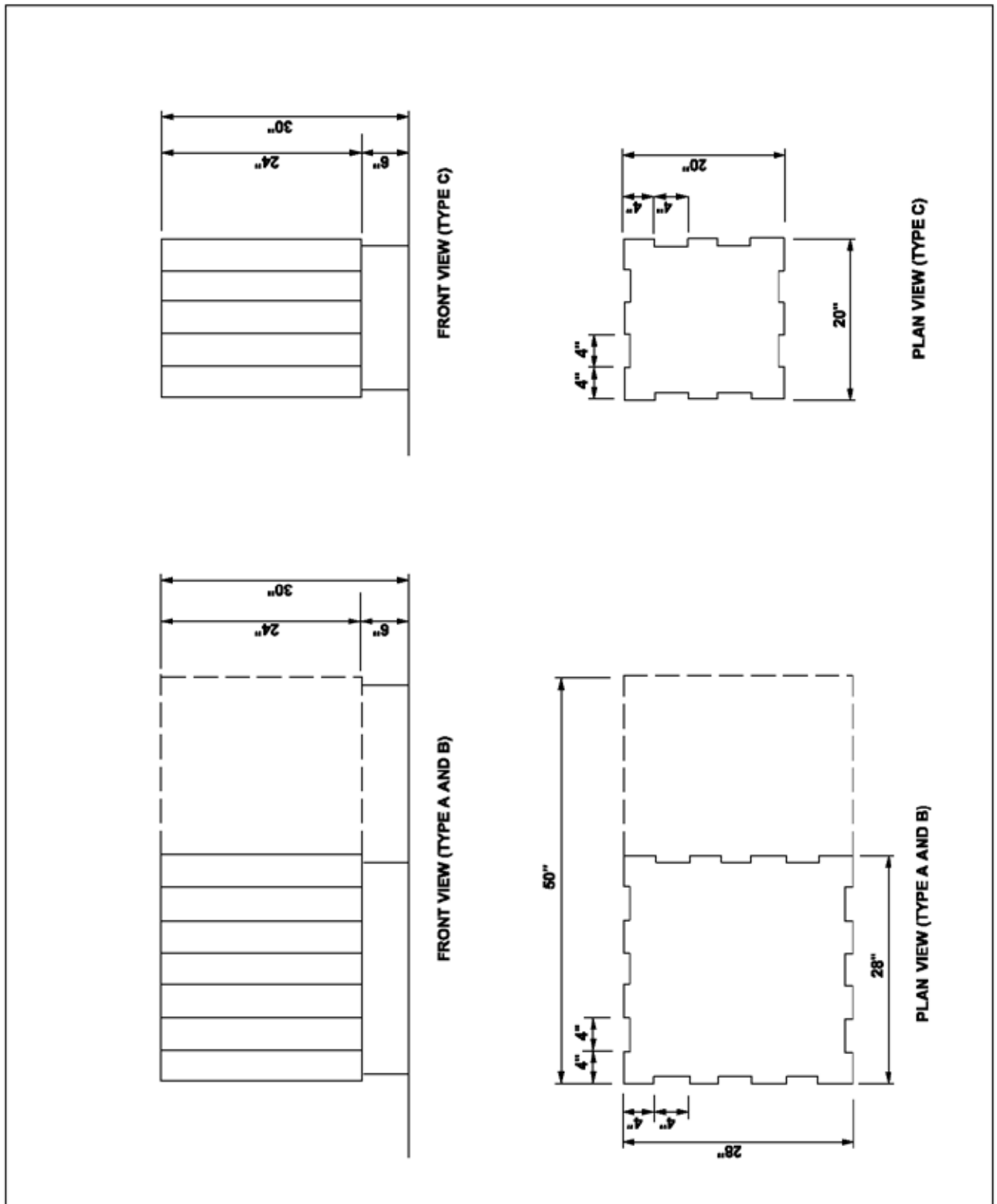
5.1.7 Flush Hydrant Painting Pattern, Exhibit I-5-7: Standard for all flush hydrant-fueling pits in the Air Operations Areas.



Reserved Accessible Spaces

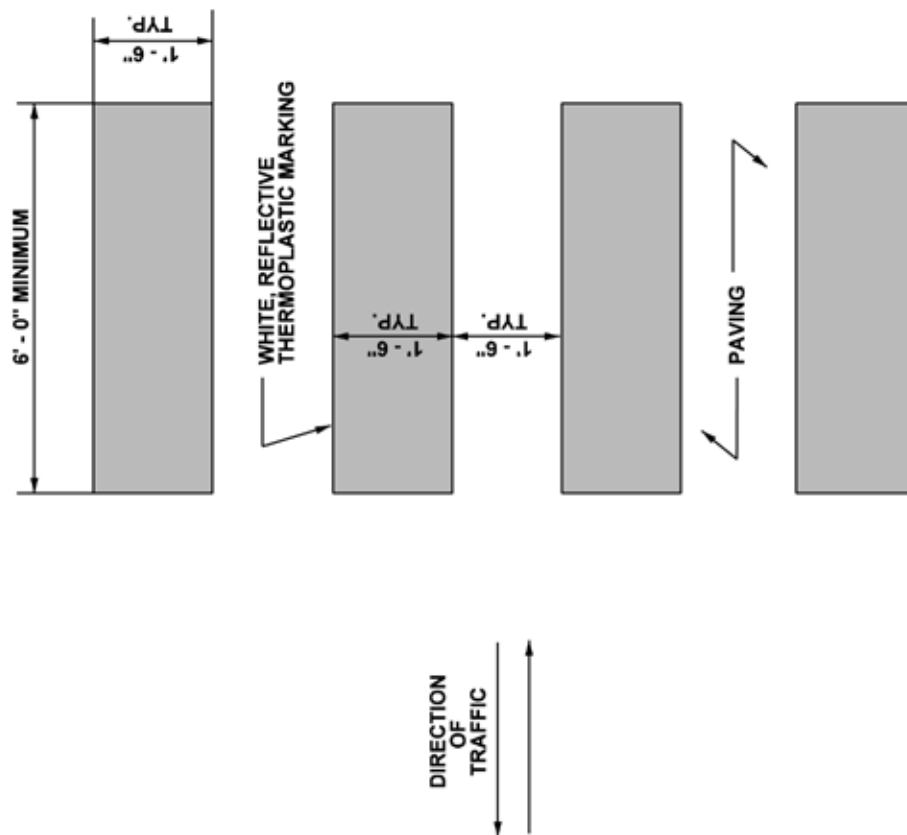
Exhibit I-5-1





Concrete Bollards, Planters

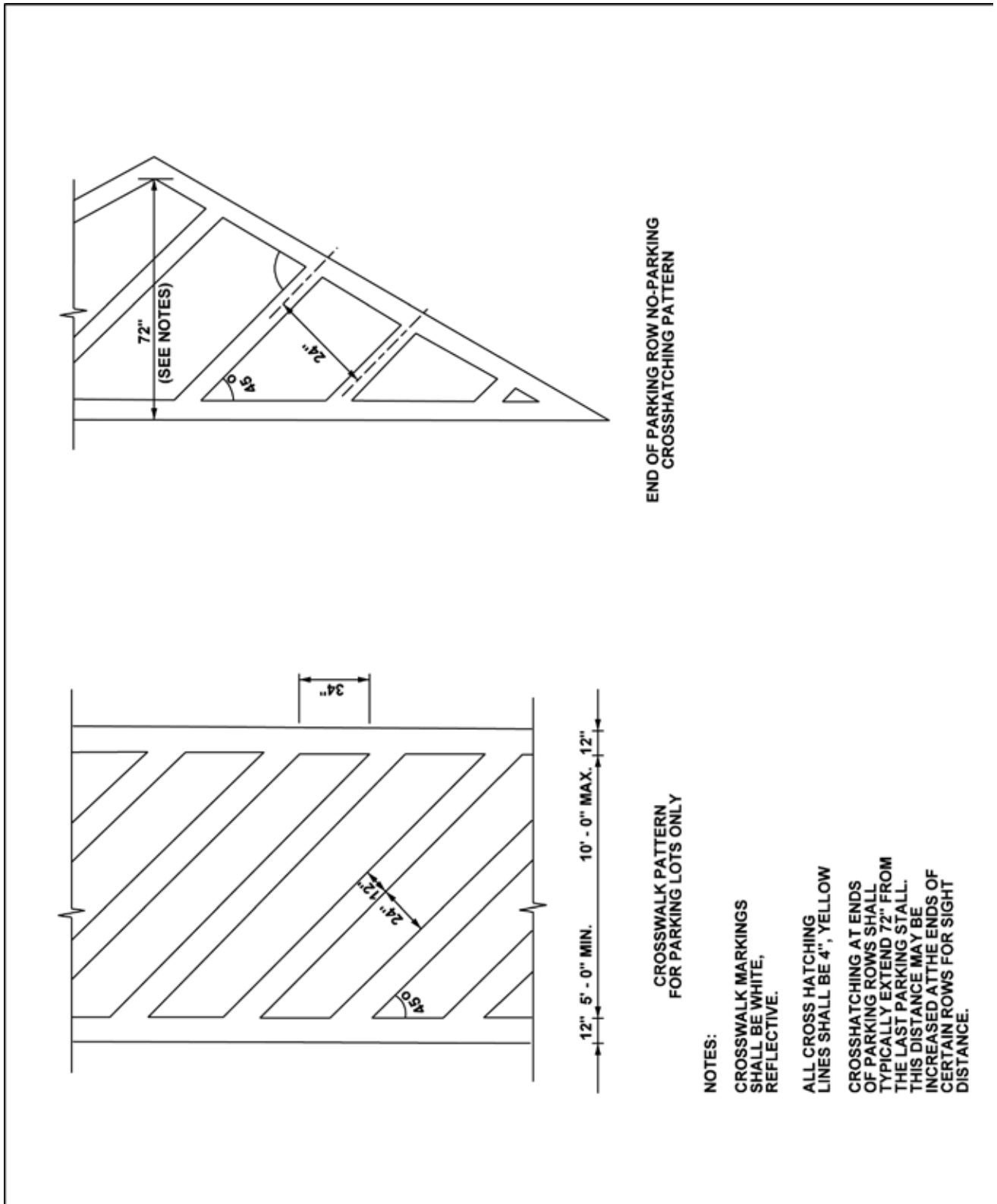
Exhibit I-5-3



NOTE:
USE FOR ROADWAY CROSSINGS ONLY

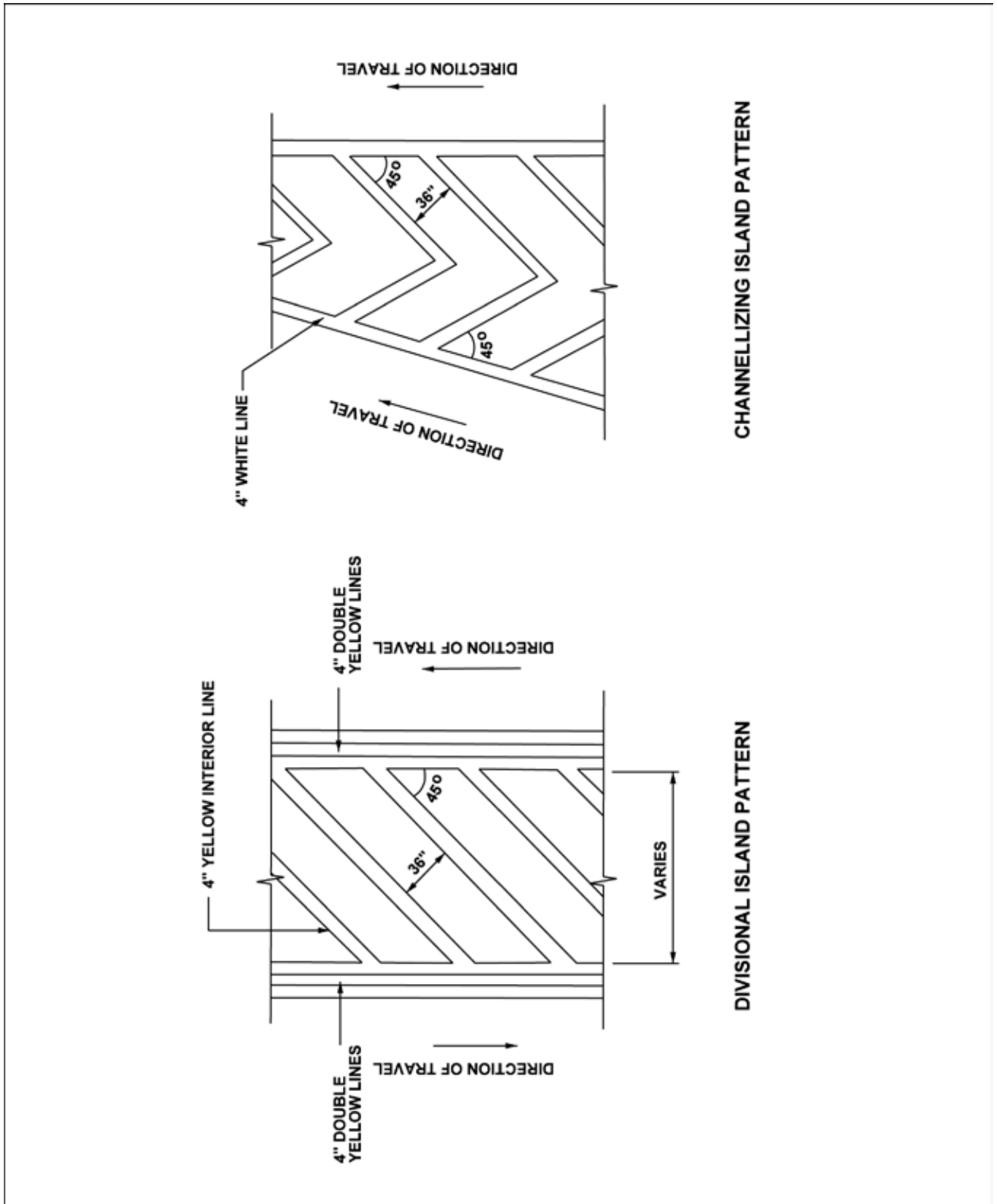
Typical Pedestrian Walkway

Exhibit I-5-4



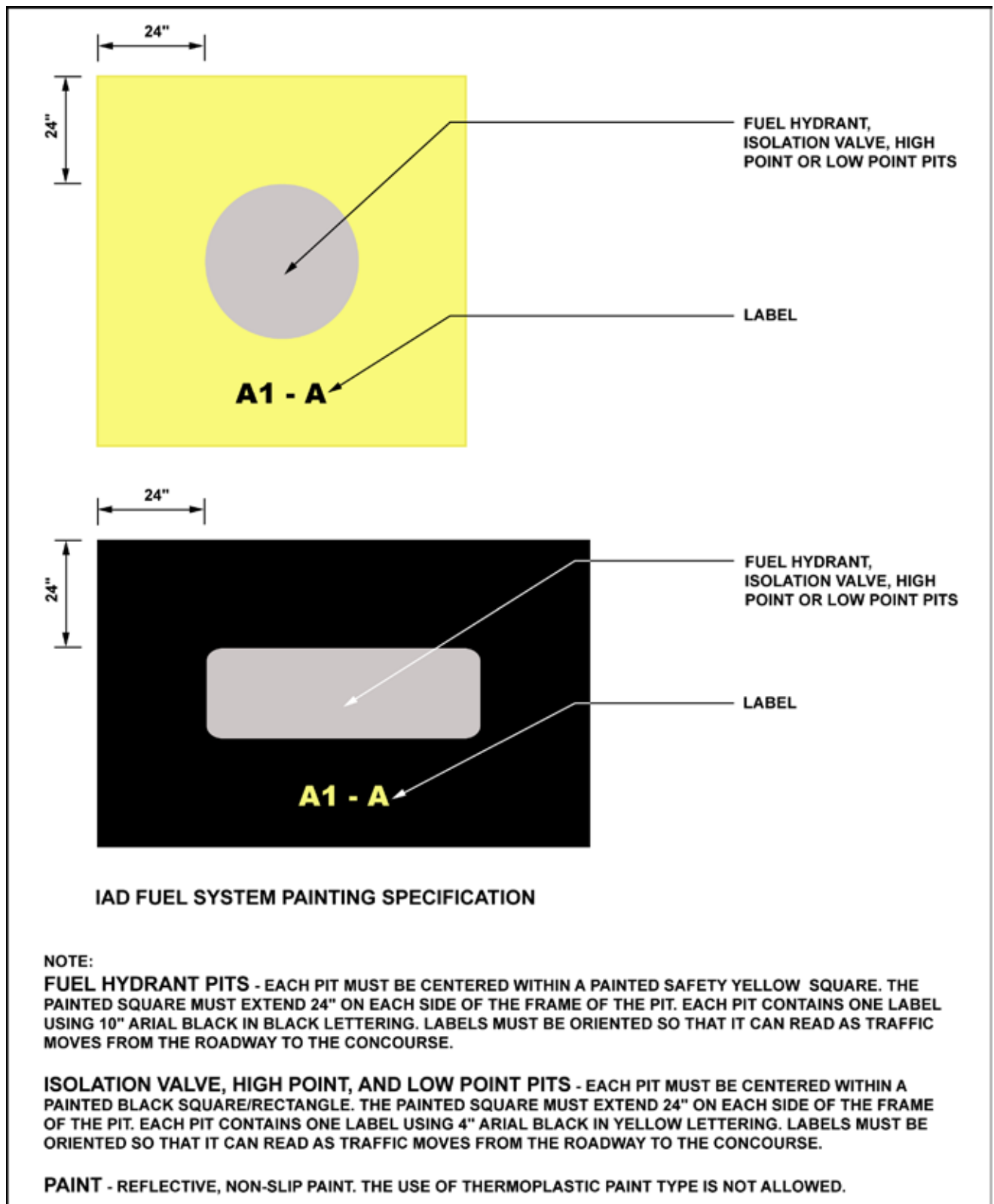
Pavement Markings (A)

Exhibit I-5-5



Pavement Markings (B)

Exhibit I-5-6



Flush Hydrant Painting Pattern

Exhibit I-5-7

CHAPTER 6 Parking Facilities Standards

6.1 General: These details apply to the facilities that are provided in public lots. All areas shall be standardized in order to maintain a consistent image and level of service to the Airport patron.

6.1.1 Toll Booth Exhibit I-6-1: Standard for all parking lot toll booths; manufacturer is Par-Kut International, Inc. 40961 Production Drive, Mt. Clemens, Michigan 48045-3443, Telephone (810) 468-2947, Fax (810) 463-6059; Serial No. 86089, Model No. 75; secure anchorage to island slab shall be designed to withstand all live loads, including impact and wind loads. Parking/revenue control equipment is provided by Ascom Trindel; contact the Contract Management Division of the Authority at (703) 572-0135.

6.1.2 Toll Booth – Elevations Exhibit I-6-2: Standard for all parking lot toll booths; manufacturer same as **Exhibit I-6-1**; secure anchorage to island slab shall be designated to withstand all live loads, including impact and wind loads; air conditioner sits on roof of unit, shielded from view by the fascia.

6.1.3 Bus Stop Shelter Exhibit I-6-3: Standard for all airport transport and shuttle-bus shelters; manufacturer is Columbia Equipment Company, Inc., 180-10 93rd Avenue, Jamaica, New York 11433-1499, Telephone (718) 658-5900, Fax (718) 526-4110; Double-Dome Model CTA-Dd Series; dimensions to be 8' - 6¾" overall length (outside of fascia to outside of fascia), 5' - 11¼" overall width (outside of fascia to outside of fascia), and 7' – 0" high to underside of fascia; non-cantilevered design with front windscreen; openings into shelter shall be a minimum width of 36" for ADA compliance; all glazing to be tempered glass units; provide aluminum bench along back wall; provide fluorescent light fixture with low-temperature, outdoor ballast; provide map display panel on side wall, facing into shelter; provide vinyl cut graphics on fascia (maximum of 30 characters); dome skylights to be white; aluminum to be Duranodic "Dark Bronze" color; secure anchorage to island slab shall be designed to withstand all live loads, including impact and wind loads.

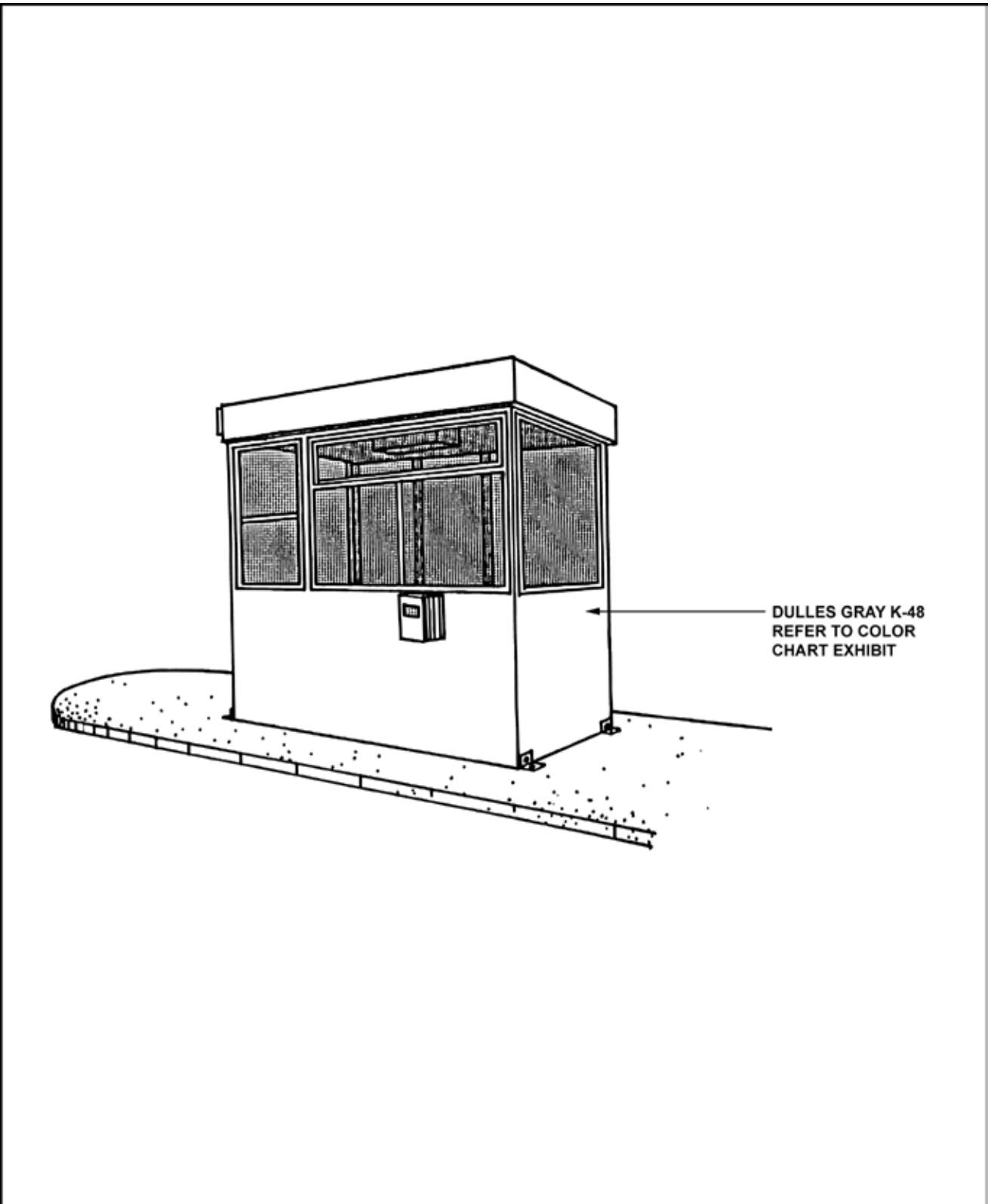
6.1.4 Bus Stop Shelter – Elevations Exhibit I-6-4:

Standard for all airport transport and shuttle-bus shelters; manufacturer same as **Exhibit I-6-3**; secure anchorage to island slab shall be designed to withstand all live loads, including impact and wind loads; electrical service shall run underground for the electrical light fixture in the unit.

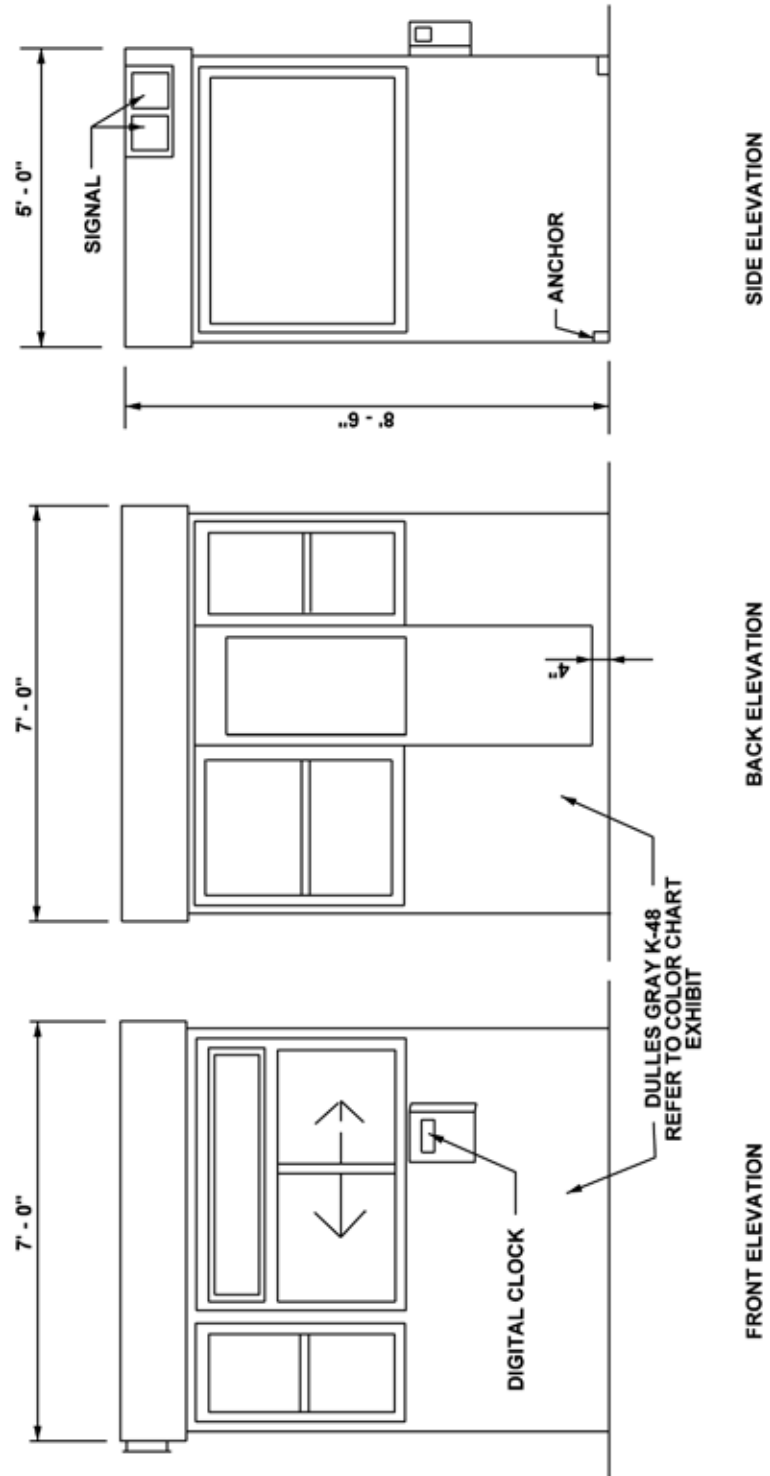
6.1.5 Parking Lot Entry Condition: The A/E shall consult with the Airport Financial Management Division to determine the current equipment and configuration requirements.

6.1.6 Economy Parking Row Sign Pole Exhibit I-6-5:

To be used in all Economy parking areas to support row identification.

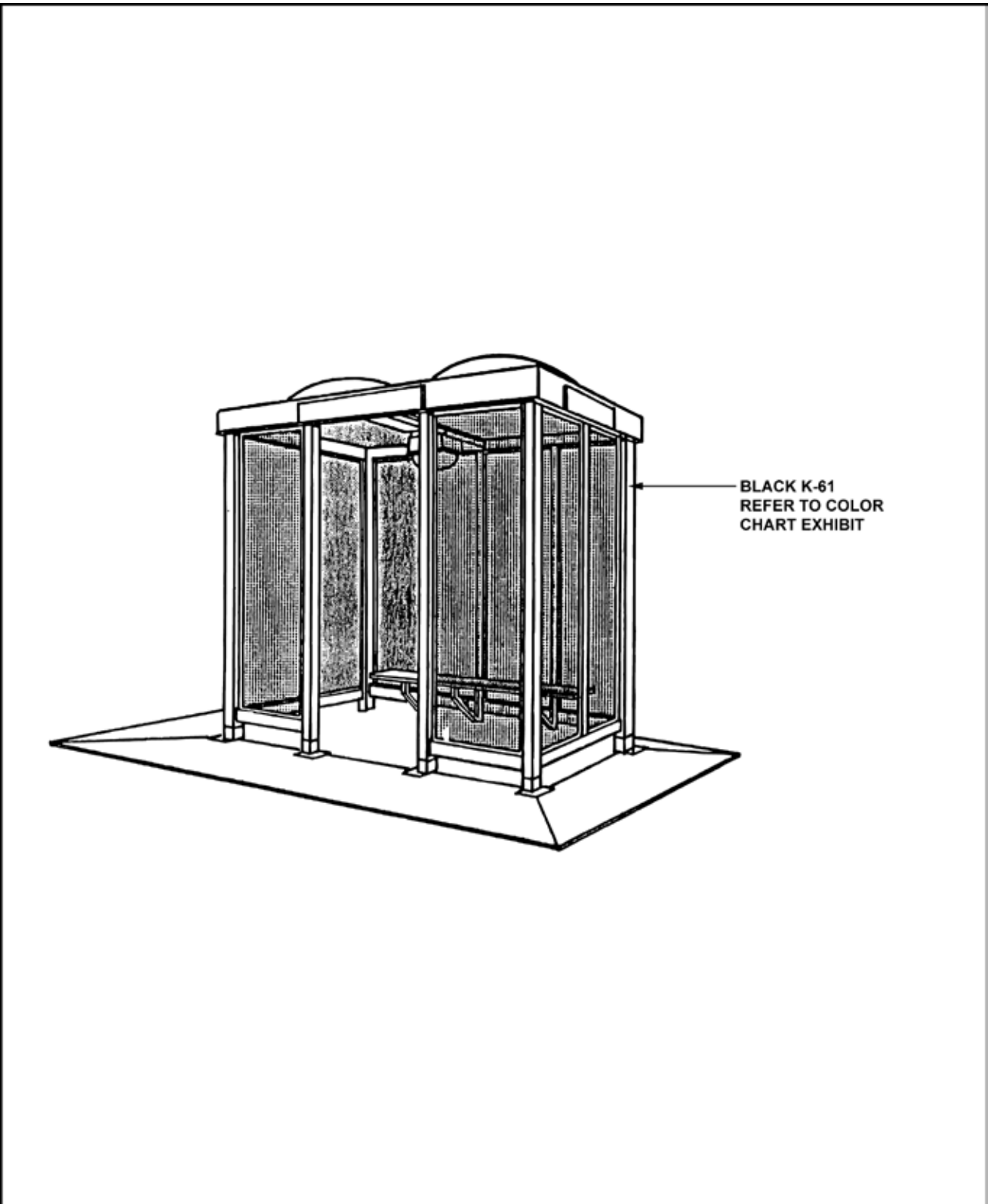


Toll Booth Exhibit I-6-1



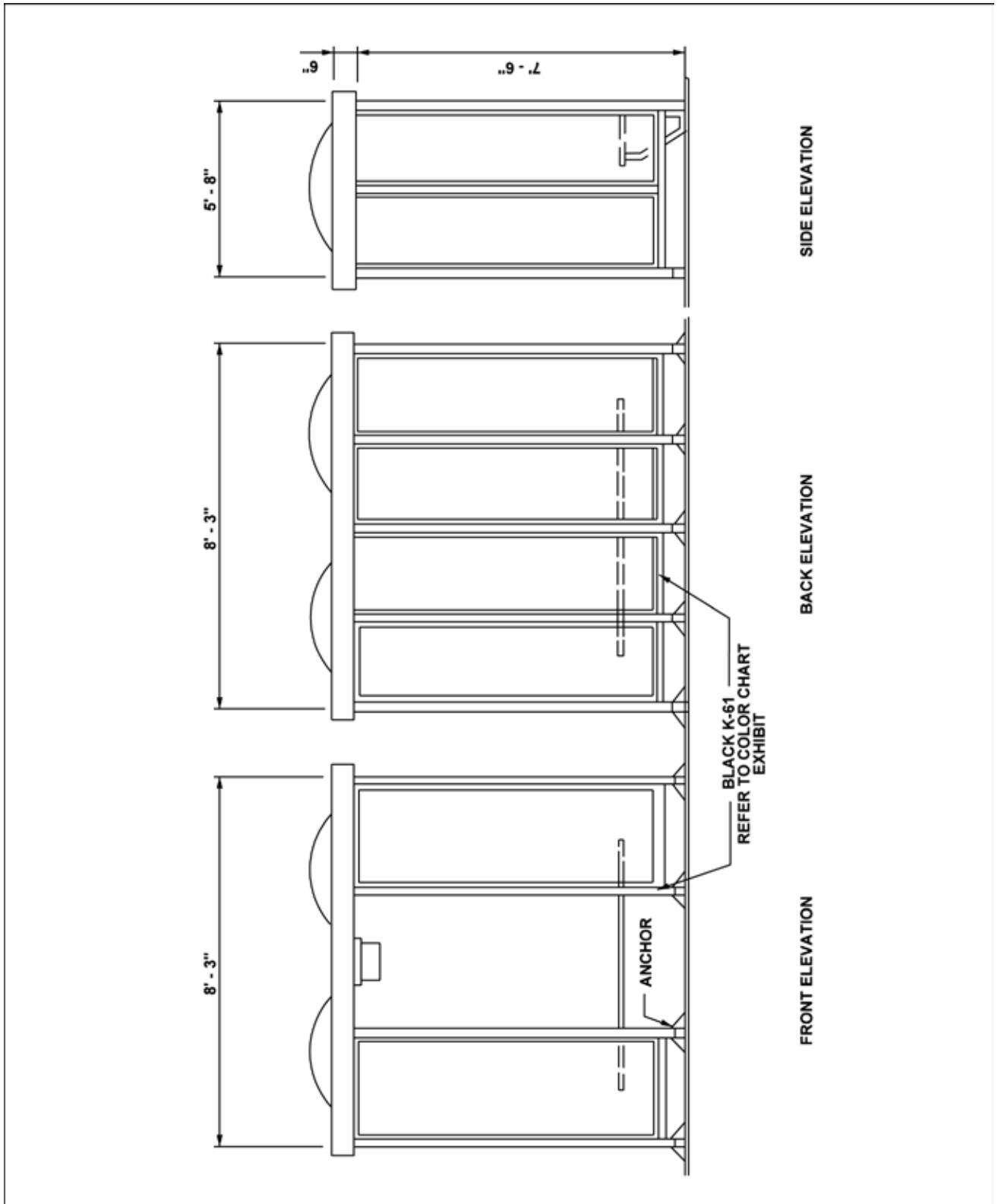
Toll Booth - Elevations

Exhibit I-6-2



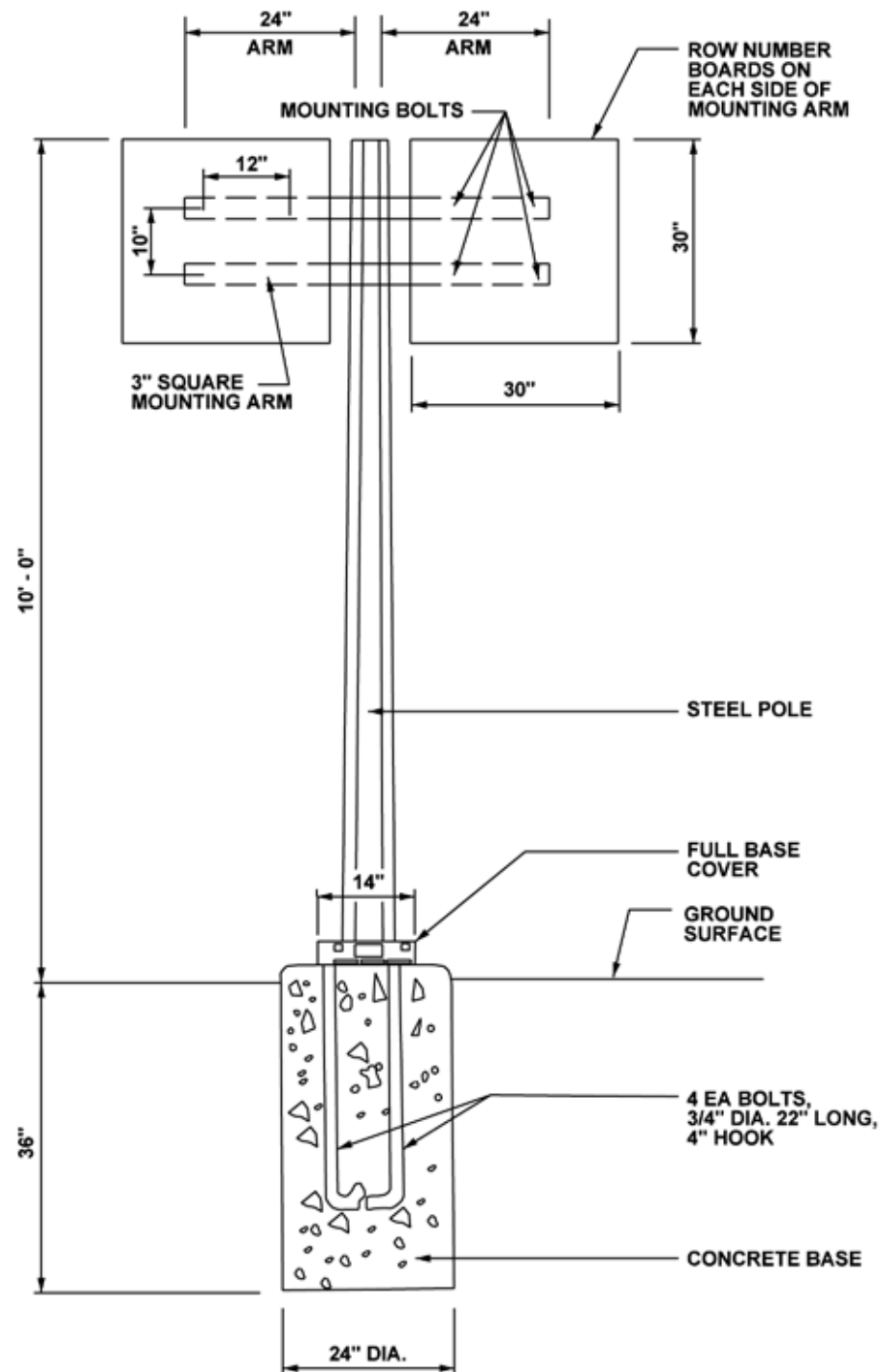
Bus Stop Shelter

Exhibit I-6-3



Bus Stop Shelter - Elevations

Exhibit I-6-4



Economy Parking Row Sign Pole

Exhibit I-6-5

CHAPTER 7 Life-Safety Standards

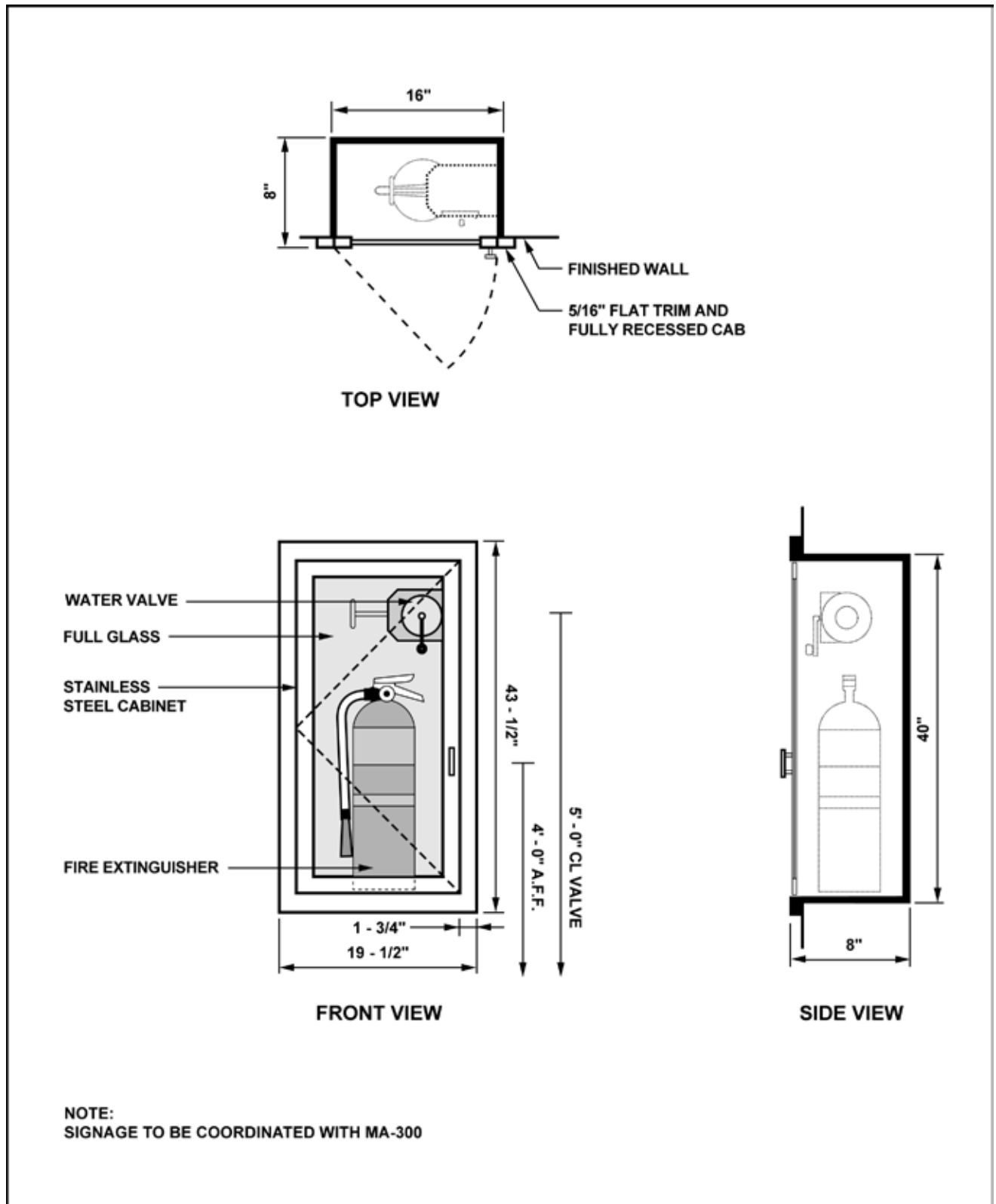
7.1 General: The following standards are established to meet the needs for emergency services at the Airport. Deviation from these standards will not be permitted.

7.1.1 Fire Extinguisher and Valve Cabinet Exhibit I-7-1:

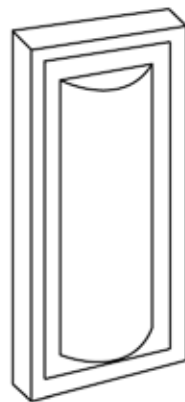
For use throughout the Airport; interior locations only.

7.1.2 Fire Extinguisher Cabinet, Exterior Applications

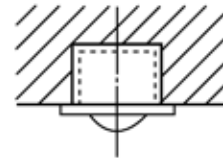
Exhibit I-7-2: For use throughout the Airport; exterior locations only.



Fire Extinguisher and Valve Cabinet Exhibit I-7-1



← #4 SATIN STAINLESS
STEEL CASING, 1/4"
FLAT TRIM



PLAN VIEW

NOTE:
TYPICAL FIRE EXTINGUISHER CABINET

180 DEGREE VISIBILITY

1/8" ONE PIECE CLEAR ACRYLIC DOOR

STAINLESS STEEL TRIM

SIGNAGE TO BE COORDINATED WITH MA-300

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CHAPTER 8 Public Facilities Standards

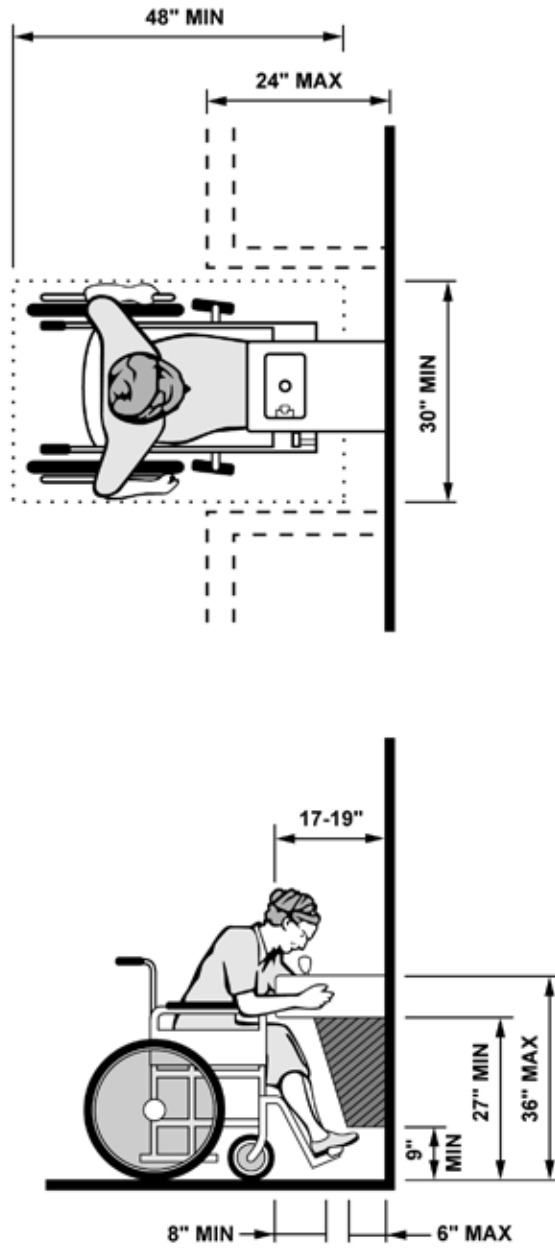
8.1 General: These standards consist of two classes. Public Service Devices and Miscellaneous Exterior Details. Public Service Devices are those that deal with public service areas used by the public on a regular basis. Examples of Public Service Areas are telephone areas and toilet rooms inclusive of the equipment in such areas. These areas establish a level of service and image throughout the Airport for the public. Miscellaneous exterior details are those that are generally seen throughout the Airport by the public, such as lighting fixtures.

8.1.1 Barrier-Free Water Cooler Exhibit I-8-1: To be used in all interior public area of the Airport; self-contained chiller unit.

8.1.2 Crowd Queuing Control Exhibit I-8-2: To be used in all interior public areas of the Airport.

8.1.3 Wall Corner Guard Exhibit I-8-3: For use in all public areas of the Airport.

8.1.4 Bollard Light Fixture, Type 1 Exhibit I-8-4: For use in public areas where only sidewalk lighting is required or preferred; alternate fixture.

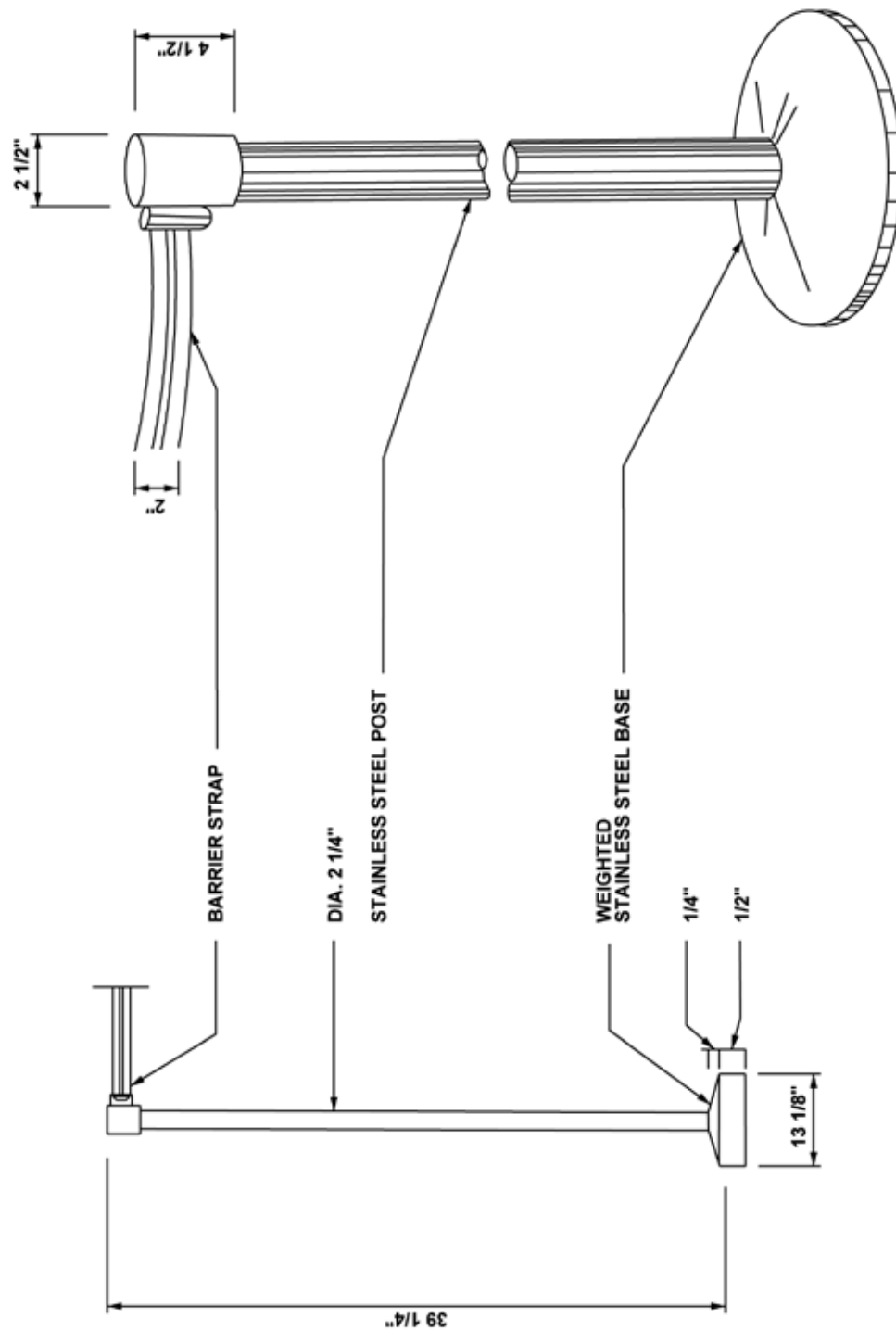


NOTE:

■ EQUIPMENT PERMITTED IN SHADED AREA

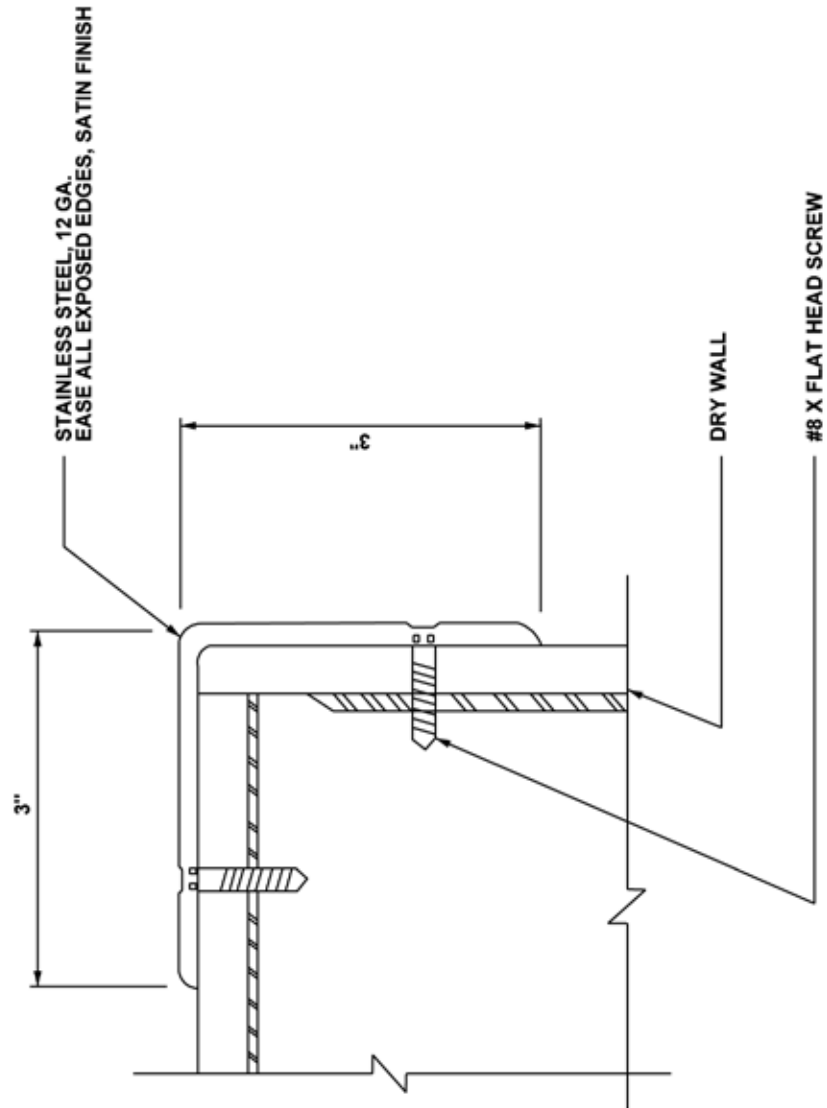
Barrier-Free Water Cooler

Exhibit I-8-1



Crowd Queuing Control

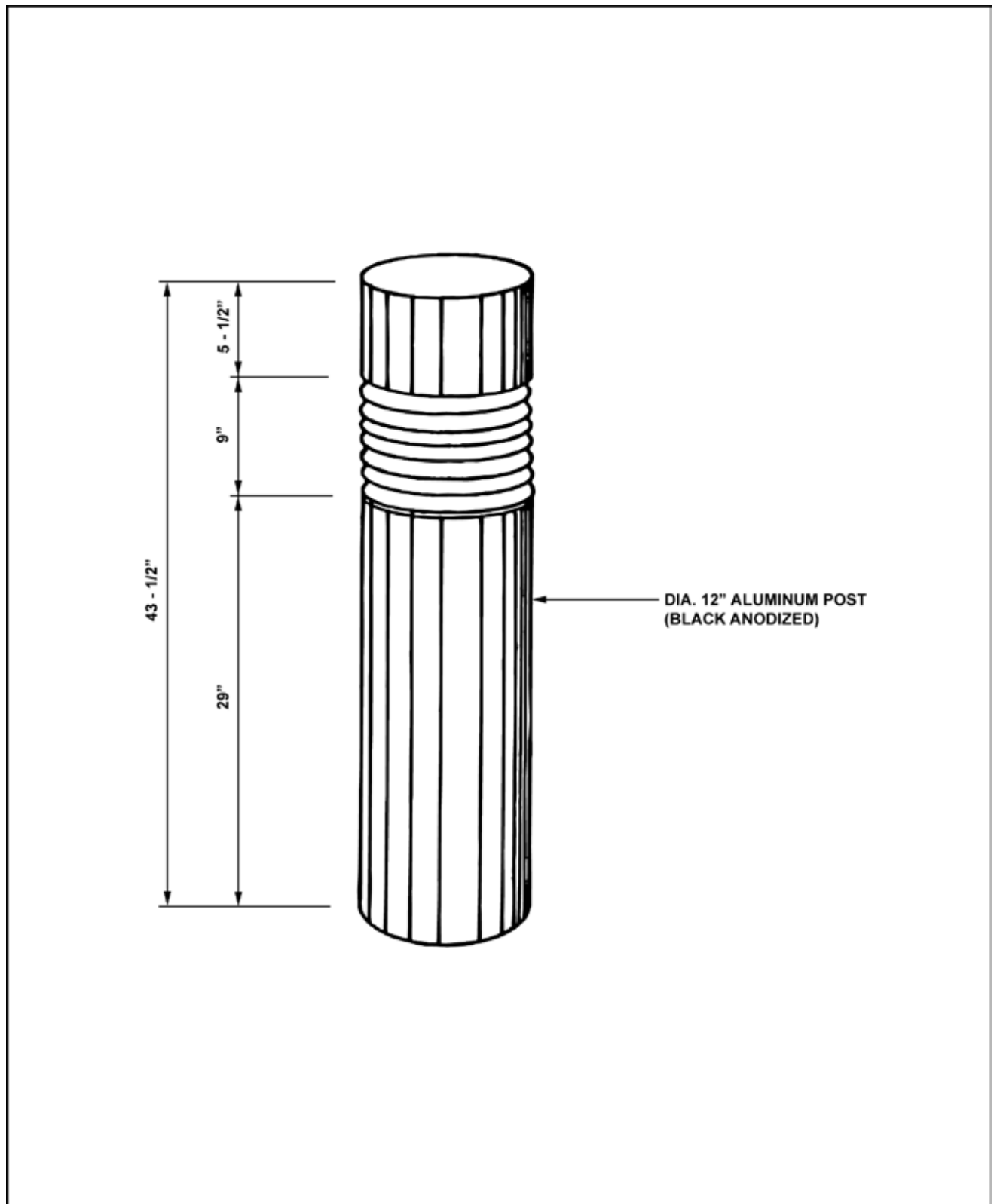
Exhibit I-8-2



NOTE:
HEIGHT AS REQUIRED

Wall Corner Guard

Exhibit I-8-3



Bollard Light Fixture, Type 1

Exhibit I-8-4

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SECTION II: Signing Design Guidelines

INTRODUCTION

The *Design Manual* represents a complete presentation of the signing standards at Washington Dulles International Airport. The philosophies of signing at Washington Dulles International Airport along with plans for major new development in the coming decade are included in the following chapters:

- 1.0 Signing Approach and Philosophy**
- 2.0 General Requirements and Procedures**
- 3.0 Common Design Elements**
- 4.0 Design Criteria**
- 5.0 Sign Applications**
- 6.0 Commercial Signing Guidelines**

The *Design Manual* will be issued to consultants at the discretion of the Metropolitan Washington Airports Authority (the Authority).

Also available is a process book that summarizes the many options considered when evaluating the signage needs. Copies may be obtained by written request submitted to the associated Design Department Functional Group Manager.

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CHAPTER 1 Signing Approach and Philosophy

Several signing and way finding philosophies are being introduced to Washington Dulles International Airport in an effort to bring more clarity and overall ease of use to the campus. The complexity of the environment at Washington Dulles International Airport necessitates visual consistency for ease of use for the passenger. Differences from sign to sign shall be minimized through the use of a highly structured, yet flexible grid system, a minimal group of panel sizes, and prescribed text heights. Limited choices for typography, symbols, arrows, colors, and structural elements shall create a comfortable and user-friendly environment in which passengers shall navigate. Way finding is spatial problem solving for Airport users consisting of decision-making, decision executing, and information processing. In order to minimize way finding problems, information must be presented in an organized manner. Signs shall follow a standard message hierarchy, consistent naming conventions, and proper use of sign types. Information to aid Airport users in finding their way shall be given twice whenever possible: once as an introduction before a decision point; and again as reinforcement at the decision point. This “bread crumb” approach gives Airport users only the information they need, when they need it. Passengers are more interested in reaching their final destination than how they are going to get there. The final destination should determine the message, not the route by which a passenger reaches his or her final destination.

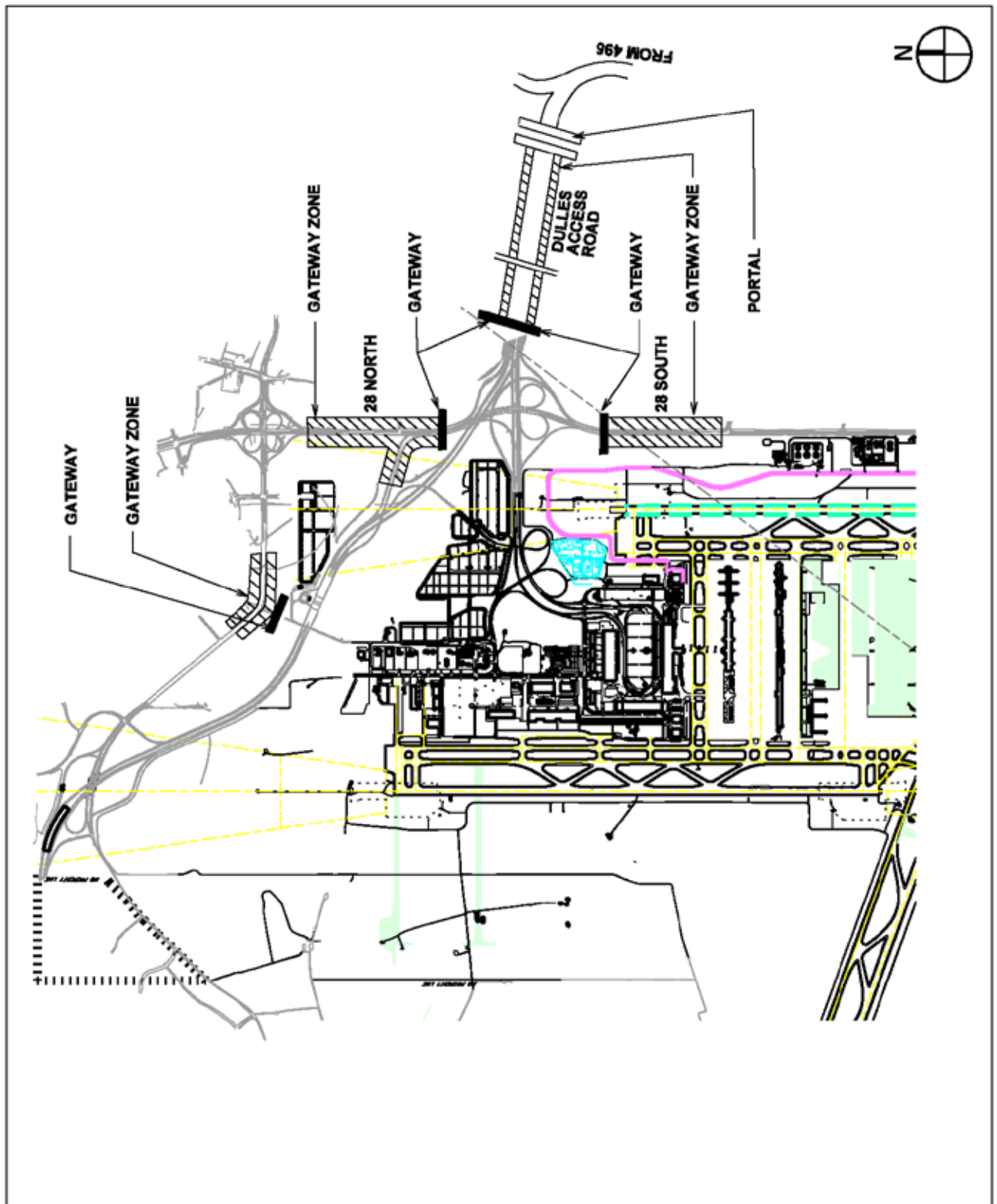
1.1 Planning Background

1.1.1 Eero Saarinen Design and Plan: In the early 1960s, Eero Saarinen designed and developed both interior and exterior signing systems for Washington Dulles International Airport. From 1962 to 1990, few major additions to the Airport were undertaken and the original Saarinen design intent remained remarkably intact. In recent years, the Authority has planned and undertaken substantial improvements and additions to the Airport campus. Saarinen intended to achieve a “campus” style for

all components of the Airport, including signing systems. Prior to undertaking the design of the Airport, Saarinen developed a highly detailed master plan to guide his own efforts on the various components of the design. After the initial Airport construction was completed in 1962, a follow-up master plan was prepared to guide future development. Consistent with the Saarinen design philosophy, these guidelines extend his principles to newly developed areas of the Airport. These guidelines require design approaches and design elements that are sympathetic to the original designs of Saarinen, without trying to mimic them.

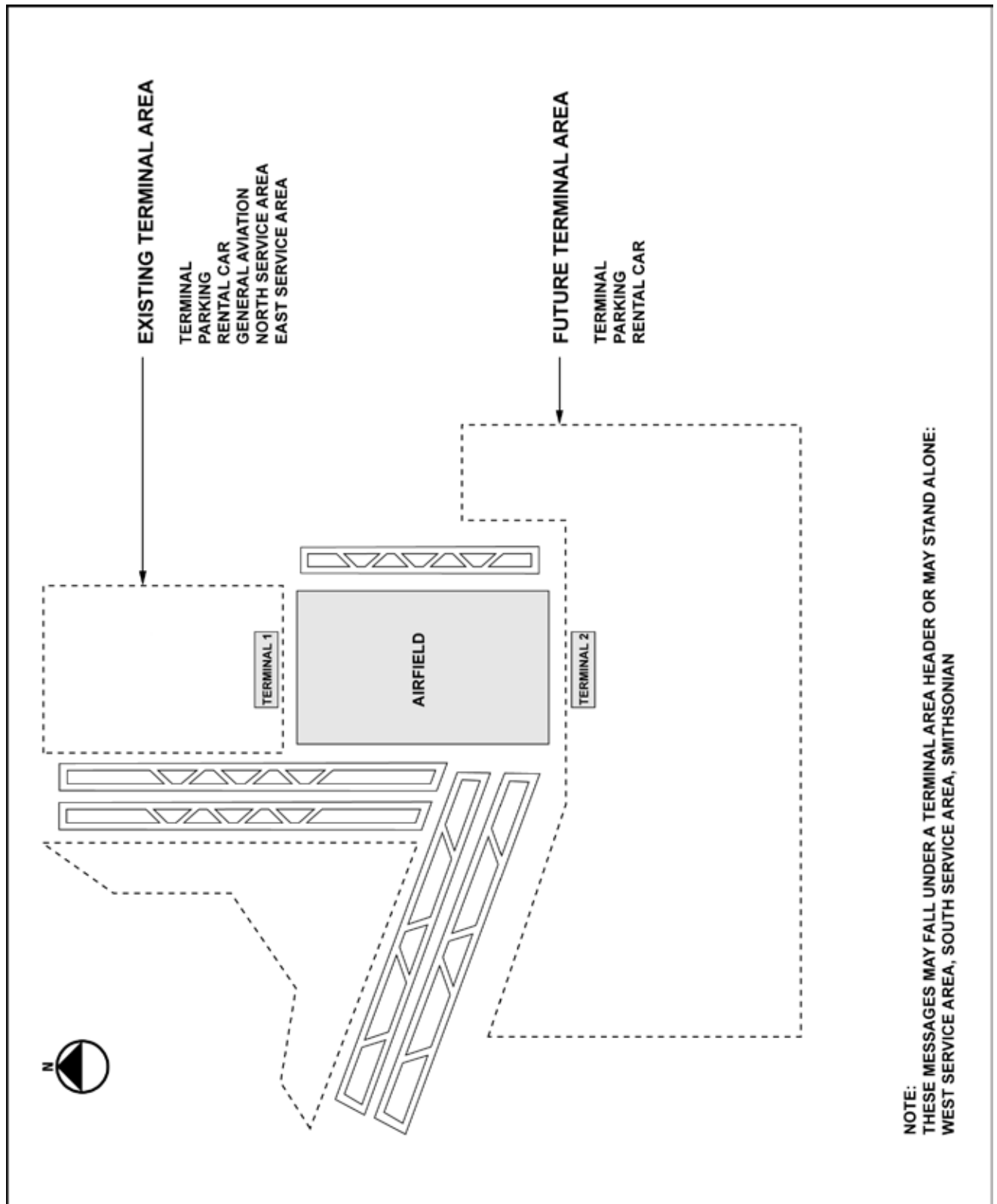
1.1.2 Gateways: A gateway is defined as a threshold that marks an arrival point at a particular destination. In the case of Washington Dulles International Airport, the destination is the Airport or “campus” rather than one specific building. A series of gateways have been identified along the roadways entering and exiting the Airport grounds (**Exhibit II-1-1**). The Gateways will have a specific site for a “Welcome” sign, as well as zones on either side of that specific site to prepare the traveler with all information necessary to make decisions regarding their ultimate destination. In instances where it is determined that signs must be placed off Airport property, close management and coordination shall occur between the Airport and VDOT. The Authority shall be the determining factor for placement of Airport signs off Airport property.

1.1.3 Terminal Areas: Currently, there is only one terminal and, therefore, all services (parking, rental car return, service station, etc.) support it as the single ultimate passenger destination. The need to define an area or “neighborhood” around the terminal is not necessary. However, the master plan includes a second terminal with its own support functions. With the addition of a second terminal, the need arises to identify the area around each terminal as a “neighborhood.” Services, such as parking, service station, and rental car return will be duplicated for each terminal and will be identified as part of each terminal’s surrounding neighborhood (**Exhibit II-1-2**).



Gateways

Exhibit II-1-1



Campus Diagram

Exhibit II-1-2

1.1.4 Service Areas: As described in **Paragraph 1.1.2**, each terminal will have a “neighborhood” area with its own support functions. The master plan, however, indicates that a third area—to the west of the existing airfield—will be introduced for airport-wide support. It is recommended that two Terminal campuses be created. The service area west of the existing airfield can be signed as a service destination for either campus, depending upon the development of the roadway system (**Exhibit II-1-2**).

1.1.5 Passenger Transportation Routes: The current modes of transportation to and around the Airport campuses will dramatically change over the next 10 years. Passengers will arrive and depart from the Airport via multiple routes and types of transportation, such as personal and rental cars, taxis, buses (commercial, chartered, shuttles, and public), the Metro, Amtrak, connecting flights, and even on foot. The recommendations proposed provide consideration for all modes of transportation and all routes for entering and exiting the Airport campuses.

1.1.6 Historical Continuity: Many realize the importance of the terminal building design itself, however few realize that Saarinen’s design intent stretched far beyond the limits of the building, and actually incorporated the entire campus. The intent was for the campus to provide a neutral background on which the Main Terminal building could shine as the crown jewel. All supporting buildings and signage were outlined to be the gray-painted metal that is known as “Dulles Gray.” Landscaping was placed to frame views of the terminal building beyond as passengers wind along the approach road and the circular pattern in front of the terminal. The Authority recognizes the significance of the original design intent for the signage and graphics, and is committed to ensuring that the original intent is evident in any new signage system proposed for the Airport campus. The proposed design standards re-introduce and incorporate many of the originally specified design elements, such as typography, color, and panel shape. Two goals are primary in consideration of a new graphic standard; first is to provide the groundwork for a clear way finding system; and second is to strengthen the existing

Dulles identity. Both goals can be achieved while still using many of the existing design elements.

1.1.6.1 Interior Signage: The signs supported the overall design intent by matching the “Dulles Gray” and by being integrated into the architecture wherever possible. In the Main Terminal, the interior and exterior canopies hold the destination and directional signage. The only real color found in the Main Terminal building was along the back wall of the ticketing counters where airline logos and names are prominently displayed. All materials and finishes were neutral in color with minimal pattern and texture.

1.1.6.2 Exterior Signage: The original exterior signage is found in two very distinct and different forms: the post-and-panel directional signs and the butterfly welcome and directional signs (**Exhibit II-1-3**). The butterfly sign establishes an identity for Washington Dulles International Airport as the passenger arrives on campus. This structure is reserved for special locations and carries limited information due to the elegant panel bearing one single line of text. The use of the butterfly signs also had strong links to the flight information boards that were originally introduced inside the terminal building. The posts-and-panels are unique in the use of two separate panels attached to a pair of posts. Each panel holds a different type of information; one is passenger oriented, one is cargo/services oriented. Both panels share the same appearance with a rectangular shape, gray field, and white letters.



**POST-AND-PANEL
DIRECTIONAL SIGN**



BUTTERFLY WELCOME SIGN



BUTTERFLY DIRECTIONAL SIGN

Historic Signs

Exhibit II-1-3

1.1.6.3 Typeface: The strongest elements that give the Airport its individuality are Dulles Gray and the Saarinen typefaces. Both of these elements are used in the historic sign system, and will continue to be used in the new sign system outlined in this section. Saarinen originally developed this font exclusively for use in this building. The font provides a style that is unique while also marking an invisible date on the design. Although the original use of the Saarinen typeface was limited to the Main Terminal building, the use of the font will be clarified and expanded for use in buildings beyond the Main Terminal in the new system. The new system will also continue the use of Helvetica, according to the original design standard. The Helvetica typeface is so widely used in so many different versions, that it is now necessary to clarify the use of Helvetica to ensure consistency across all Airport signage. This clarification is addressed in **Chapter 3, Paragraph 3.1.**

1.1.6.4 Color: The original plans for passenger travel did not anticipate the large and complex concourses used today at Washington Dulles International Airport. A color palette limited to black, gray and white served the purpose at the time of construction. Annual passenger volume has multiplied significantly over the years and an expanded color palette is required to aid in the psychology of understanding signs and to aid in basic way finding. The color palette is limited to four new colors, two grays (one being Dulles Gray), black, and white. Gray will continue to be the primary message field, with the colors being introduced as organizing tools associated with a neighborhood, terminal, or gate destination. The additional four colors are intended to be contemporary with Saarinen's Main Terminal and will further define Washington Dulles International Airport as a unique entity.

1.1.6.5 Sign Structures: Over the years, the use of a double panel for exterior post-and-panel signs has faded. Most signs now hold only one panel with varied message types combined. In the new system, the design references the original two-panel system through the use of two shades of gray to organize messages into primary and secondary passenger messages. This approach can simplify the way finding process. Reverting back to the

rectangular shape as opposed to the DOT radius corners is also incorporated as more congruent with the original design intent. In the ticketing level of the Main Terminal, the placement of primary way finding signage has always been problematic. Attachment to the building structure would damage not only the sweeping view, but would puncture the materials in a way that could damage the original building. This limitation has led to an absence of primary direction signage in the building, with the exception of messages that are placed on the interior canopies. However, with the expansion of the terminal building, the way finding must now assist passengers along 1,200 linear feet of building. The canopy signs running parallel to the length of the building no longer meet the signage needs for this area. A new floor mounted sign type is introduced that ties strongly to the original exterior butterfly structure in style.

1.1.6.6 Campus-Wide Identity: The new design standards were developed with reverence for Saarinen's original design intent. Great importance has been placed on developing a clear and distinct identity for the Airport. A series of mechanisms has been established to aid in reinforcing the Airport identity:

- A.** Gateways and terminal areas have been identified to delineate the Airport itself.
- B.** A limited palette of colors has been introduced with requirements for focused use.
- C.** The Saarinen typeface will be improved and a criterion for more widespread use has been developed.
- D.** And finally, the sign panel shape and organization will be more historically correct than the signs pre-dating these revisions.
- E.** This approach to developing new sign types in a method that is sympathetic to Saarinen's original design will provide a campus-wide identity and a strong link the historical roots of all design elements.

1.2 Referenced Standards

1.2.1 Use of Standards: The designer must use the appropriate standards for roadway sign designs and layouts, colors, overall sign shapes, dimensions, illumination/reflectorization, symbol designs, materials, finishes, supports, and clearances from roadways. The standards and requirements include those of the Federal Department of Transportation (DOT), the Virginia Department of Transportation (VDOT), and the American Association of State Highway and Transportation Officials (AASHTO). The following key documents have been referenced throughout these guidelines:

1.2.1.1 VDOT: Road and Bridge Specifications.

1.2.1.2 DOT: Manual On Uniform Traffic Control Devices (MUTCD) and the Virginia Supplement to the same.

1.2.1.3 DOT: Standard Highway Signs manual.

1.2.1.4 DOT: Standard Alphabets for Highway Signs Booklet (HTO-20).

1.2.1.5 AASHTO: A Policy on Geometric Design of Highways and Streets.

1.2.1.6 AASHTO: Standard Specifications for Structural Supports for Highway Signs, **Luminaires**, and Traffic Signals.

1.2.1.7 ADAAG: ADA Accessibility Guidelines.

1.2.1.8 AIGA: American Institute of Graphic Arts.

1.2.1.9 AAEE: American Association of Airport Executives.

1.2.2 Designers must consult the above standards as appropriate for final design.

1.3 ADA Guidelines

1.3.1 Definition: The design for all projects, accomplished by the Authority and tenants, shall conform, as a minimum, to the Americans with Disabilities Act (ADA) enacted July 26, 1990 and the federal guidelines developed there from.

1.3.1.1 Use of Symbols for Identification: If all entrances are not accessible, the International Symbol of Accessibility (ISA) shown in **Exhibit II-1-4** must be displayed at accessible entrances. Directions must be provided from inaccessible entrances to accessible ones. Restrooms and bathing facilities are bound by the same guidelines. The ISA must also be used to indicate accessible parking spaces and loading zones. It must be located so that a parked vehicle does not obscure it. The International Symbol of Accessibility for Hearing Loss must accompany any assistive listening device as well as a description of the specific brand of listening device. Text telephones must be identified with the International TDD Symbol. Volume control telephones must be identified by the International Symbol of Access for Hearing Loss (**Exhibit II-1-4**). Areas of rescue assistance must be identified with illuminated and non-illuminated signs. Instructions must be posted on how to use the area during emergencies. Inaccessible exits must be identified. Signs may be required to direct visitors to areas of rescue assistance. The matrix in **Exhibit II-1-5** is taken from ASI Sign Systems. Survey Form 19: Signage, Use with the Minimum Requirements Summary Sheets and ADAAG, **Exhibit II-1-6** is to be used as an ADA Checklist.



INTERNATIONAL SYMBOL OF ACCESSIBILITY



INTERNATIONAL TDD SYMBOL



INTERNATIONAL SYMBOL OF ACCESS FOR HEARING LOSS

MINIMUM SIGN REQUIREMENTS		PERMANENT ROOMS AND SPACES	DIRECTIONAL/INFORMATIONAL	OVERHEAD	TEMPORARY
TACTILE AND BRAILLE CHARACTERS					
CHARACTERS MUST BE RAISED MINIMUM 1/32"		●			
CHARACTERS MUST BE ACCOMPANIED BY GRADE 2 BRAILLE		●			
TYPESTYLES					
CHARACTERS MUST BE UPPER CASE AND SANS SERIF OR SERIF TYPESTYLE		●			
CHARACTERS MUST HAVE A WIDTH-TO-HEIGHT RATIO OF BETWEEN 3:5 AND 1:1			●	●	
CHARACTERS MUST HAVE A STROKE WIDTH-TO-HEIGHT RATIO OF BETWEEN 1:5 AND 1:10			●	●	
CHARACTER HEIGHT					
TACTILE CHARACTERS MUST BE MINIMUM 5/8" HIGH, MAXIMUM 2", ALL CAPS		●			
CHARACTERS MUST BE MINIMUM 3" HIGH			●	●	
CHARACTERS MUST BE SIZED TO VIEWING DISTANCE					
PICTOGRAMS (SYMBOLS)					
EQUIVALENT WRITTEN DESCRIPTION MUST BE PLACED DIRECTLY BELOW SYMBOL		●			
WRITTEN DESCRIPTION CANNOT BE WITHIN SYMBOL'S BACKGROUND FIELD		●			
BORDER DIMENSION OF SYMBOL BACKGROUND FIELD MUST BE MINIMUM 6" HIGH		●			
FINISH AND CONTRAST					
CHARACTERS AND BACKGROUND MUST BE EGGSHELL, MATTE OR OTHER NON-GLARE FINISH		●	●	●	
CHARACTERS MUST ADEQUATELY CONTRAST WITH BACKGROUND		●	●	●	
MOUNTING LOCATION AND HEIGHT					
MOUNTED ON WALL ADJACENT TO THE LATCH SIDE OF THE DOOR		●			
MOUNTED TO AVOID DOOR SWING AND PROTRUDING OBJECTS		●			
MOUNTING HEIGHT OF 60" FROM FLOOR TO CENTERLINE OF SIGN		●			
MINIMUM 80" CLEARANCE BETWEEN OVERHEAD SIGN AND FLOOR				●	

ADA Guidelines

Exhibit II-1-5

Survey Form 19: Signage, Use with the Minimum Requirements Summary Sheets and ADAAG.

Facility Name:		See Minimum Requirements Summary Sheets I and J for special requirements and exceptions which may be allowed in alterations and historic preservation. See also ADAAG 4.1.6 and 4.1.7.			
Facility Location:					
Section	Item	Technical Requirements	Comments	Yes	No
4.1.2(7) 4.1.3(16) 4.30.1	Directional and Informational Signs:	Do signs which provide direction to, or information about, functional spaces of the building comply with 4.30.2, 4.30.3, and 4.30.5 (See below)? EXCEPTION: Building directories, menus, and all other signs which are temporary are not required to comply.			
4.30.2	Character Proportion:	Do the letters and numbers on such signs have a width to height ratio between 3:5 and 1:1; and a stroke width-to-height ratio between 1:5 and 1:10?			
4.30.3	Character Size:	Are the characters on such signs sized according to viewing distance with characters on overhead signs at least 3 inches high?			
4.30.5	Finish:	Do the characters and backgrounds on such signs have a non-glare finish?			
	Contrast:	Do the characters contrast with their background (light-on-dark or dark-on-light)?			
4.1.2(7) 4.1.3(16) 4.30.1	Room and Space Identification Signs:	Do signs which designate permanent rooms and spaces comply with 4.30.4, 4.30.5, and 4.30.6 (See below)?			
4.30.4	Raised and Braille Characters:	Are the characters on such signs raised and accompanied by Grade II Braille?			
	Pictograms:	If a pictorial symbol (pictogram) is used to designate permanent rooms and spaces, is the pictogram accompanied by the equivalent verbal description placed directly below the pictogram? (The verbal description must be in raised letters and accompanied by Grade II Braille.) (If the International Symbol of Accessibility or other information in addition to room and space designation is included on the sign, it does not have to be raised and accompanied by Grade II Braille.)			
		Is the border dimension of the pictogram at least 6 inches high?			
	Character Size:	Are the raised characters on such signs between 5/8 inch and 2 inches high and raised at least 1/32 inch?			
	Upper Case:	Are the raised characters on such signs upper case, and sans serif or simple serif?			
4.30.5	Finish:	Do the characters and background on such signs have a non-glare finish?			
	Contrast:	Do the characters on such signs contrast with their background (light-on-dark or dark-on-light)?			
4.30.6	Mounting Location:	Are such signs mounted on the wall adjacent to the latch side of the door? (At double leaf doors, are the signs placed on the nearest adjacent wall?)			
	Mounting Height:	Are such signs mounted with their centerline 60 inches above the ground surface?			
	Approach:	Can a person approach to within 3 inches of such signs without encountering protruding objects or standing within the swing of the door?			

1.4 Future Plan

1.4.1 Planning Terms: There will be some terms in this manual that will be used in reference to future planning. This encompasses terms such as Terminal 1, Terminal 2, parking structure, people mover, and Metro. The Saarinen terminal may be referred to as Terminal, Terminal 1, or T1. The future terminal shall be referred to as Terminal 2 or T2. Parking structures are built, and they are called Daily 1 and Daily 2. The people mover is a loop train system that will be in place underneath the terminals, tiers, and airfield. This train will carry passengers to and from gates and the two terminals. The Metro is a form of public transportation in the greater Washington Metropolitan area and has service to Washington Dulles International Airport as a part of their future plan.

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CHAPTER 2 General Requirements and Procedures

Designers must conform to the following procedures during the design phases of all sign projects at Washington Dulles International Airport. All submittals shall conform to the requirements set forth in the *Design Manual*.

2.1 Design Submittals

2.1.1 General: Specific requirements include the following:

2.1.2 Project Design Report and Schedule: Prior to start of design, submit a project design report and schedule and receive the Authority's approval. The report shall detail the proposed Scope of Work, summarize major design issues, and state the basic design assumptions and criteria used to accomplish various project elements. The report shall present a schedule of performance, including design and review periods and projected fabrication and installation times.

2.1.3 Grid Layout: Prior to developing Contract Documents, the designer shall submit a layout document that demonstrates conformance to the grid requirements. The grid may be confirmed by producing layout documents printed with the grid for each sign panel, or a vellum overlay may be provided at an appropriate scale so that the Authority can overlay each sign layout to confirm that the appropriate grid layout has been used.

2.1.4 Typography Source: Each design consultant must confirm with the Authority that the proper source and weight of the type to be used matches that defined in the *Design Manual*. **Exhibit II-2-1** shows a combination of letters and numerals that should be precisely matched. The consultant shall replicate these characters using the typeface they intend to use in developing the project and shall provide a printout of these characters on a vellum sheet in the precise size and layout as is demonstrated in the exhibit to ensure consistency with text on exhibit.

2.1.5 Contract Documents: Contract Documents include signs and graphics, messages and symbols list, drawings, schedules, and specifications. All of these items shall be based on approved design development documents which set forth in detail the signs and graphic requirements for the project. Drawings shall include as a minimum: location plans, schedules, typical sign type layouts, elevations, sections, and details.

2.1.6 Digital Files: Consultants shall provide digital files of all sign layouts and sign message schedules. Sign layouts shall include full size text and graphics in outline form for sign fabrication. Sign layouts shall be vector-based and in encapsulated postscript (eps) format. Sign layout electronic files shall be provided on a CD-ROM formatted compatible with the Authority's and the sign vendor's computer platform. Sign message schedules shall be provided in Microsoft Access (Version 2002 or higher).

2.1.7 Numbers of Copies of Design Submittals: For reports, calculations, and records, provide the number of copies as specified in the Statement of Work for the Authority projects and 10 copies for tenant projects. For construction drawings, provide 10 full-sized and 15 half-sized sets of prints for each submittal. Presentations may be required throughout all phases of the work for models, renderings, samples, and presentation boards. When requested by the Authority, provide one original of each item and five photographic or xerographic copies of the originals in 8" x 11" format. For specifications, provide 25 bound copies.

2.1.8 Environmental Graphics Design:

Professionals shall be hired as consultants to any design team developing signage layouts for passenger wayfinding projects involving ten or more signs at Washington Dulles International Airport. Signage designers shall demonstrate experience in environmental graphic design and understanding of typography and graphic layout on similar project types. Specific requirements for selection of the design team will be outlined during the procurement process for each project.

Typography 23

TYPOGRAPHY 23

Typography Source

Exhibit II-2-1

2.1.9 Graphics Software: All sign layouts must be produced using 1 of the 4 industry standard software programs for graphic designers: Adobe Illustrator (version 10 or higher), Freehand (version 8.0 or higher), Corel Draw (version 8.0 or higher), or Vectorworks (version 10 or higher). Architectural CADD programs shall not be used to produce sign layouts because text manipulation and accurate representation are limited in these programs. CADD programs are permitted for the development of location plans and construction details at the designer's discretion. These programs may be utilized on either Macintosh or PC platforms.

2.1.10 Specifications: Design consultants shall incorporate the following requirements into their specifications to ensure that proper letter spacing and type source are being used by the selected vendor:

2.1.10.1 Full-Size Patterns: Provide full-size patterns of each sign with solid black letterforms and graphic elements on a white background with the sign face outlined. Pattern must be film positives, camera-ready artwork, or pen plots.

2.1.10.2 Cost Prohibitive: If providing full-size patterns is cost prohibitive or not feasible (due to quantity or overall size), a 3' x 3' section of a pattern may be submitted. Along with this full-sized pattern section, scaled patterns of each sign must be submitted to ensure proper layout of all signs.

2.1.10.3 Typography and Graphic Elements:

Typography and graphic elements must be represented on the patterns in exact position using exact element, typeface, and/or letter spacing.

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CHAPTER 3 Common Design Elements

The common elements described in these guidelines provide a set of consistent elements shared by all signs.

3.1 Typography

3.1.1 Typefaces: The two typefaces that are approved for use at Washington Dulles International Airport for interior and exterior signs are Saarinen and Helvetica Neue 55 Roman. To maintain visual continuity throughout the airport, the choice of a specific typeface is dependent upon the message and application. Sign text at the airport shall be created using digitized or vectorized typefaces. This requirement applies to phototype, cut vinyl letters, dimensional letters, and all layout artwork. All specifications for airport signs shall include this requirement and all vendors shall be required to demonstrate compliance.

3.1.2 Standard Typefaces:

3.1.2.1 Helvetica Neue 55 Roman: Exhibit II-3-1.

3.1.2.2 Saarinen (created by Eero Saarinen): Exhibit II-3-2.

3.1.3 Additional Typefaces are Allowed for Specific Regulatory Uses:

3.1.3.1 Standard Exit Sign Lettering: Exhibit II-3-3.

3.1.3.2 DOT Standard Alphabets and Numerals from Standard Alphabets for Highway Signs Booklet (HTO-20): Exhibit II-3-4.

3.1.4 No other weights or sources for these typefaces are allowed.

3.1.5 Approved Sources for Typefaces: For the Helvetica typeface family, only the Helvetica Neue 55

Roman created by the Adobe Typeface foundry is acceptable. The Authority owns the exclusive rights to the Saarinen typeface and will issue this digital typeface to vendors, as needed. Designers shall change all text to outlines prior to issuing digital artwork to vendors to ensure that type source, weight, and spacing remain constant between designer and fabricator. Standard exit sign lettering and DOT standard alphabets (The Standard Alphabets for Highway Signs Booklet-HTO-20) can be obtained from the Federal Highway Administration, Washington, DC 20590.

3.1.6 Typefaces for Dynamic Signage: Text on dynamic signs shall be treated as standard text, conforming to the guidelines provided for the sign on which it appears. When this requirement proves incompatible with sign technology (as may be the case with matrix or LED signs), designers shall employ a typeface or format suitable to the specific technology. These types of dynamic signs shall require approval by the Authority on a case-by-case basis. Designers shall describe the selection process that led to the recommended technology and type format.

3.1.7 Helvetica Typeface Uses: Helvetica Neue 55 Roman is the primary typeface for use in both interior and exterior signage. The Helvetica typeface shall be used for all messages, except when Saarinen is used, as outlined in Paragraph 3.1.6.

3.1.8 Saarinen Typeface Uses: Single numbers, such as baggage carousel numbers at the point of bag claim and curbside zones shall be Saarinen Regular typeface. Airline names, tenant names, and directional messages that are placed on the interior and exterior canopies of the Main Terminal shall be Saarinen Regular typeface. "Terminal," "Terminal 1," and "Terminal 2," when used as a parent message header, shall be Saarinen Exhibits II-3-5 through II-3-7.

abcdefghijklmnop
qrstuvwxyz
ABCDEFGHIJKLMN
OPQRSTUVWXYZ
1234567890 !@#\$
%^&*()_ - + = { } < > , . ? / ^ ~ `

Helvetica Neue 55 Roman

Exhibit II-3-1

A B C D E F G H I
J K L M N O P Q R
S T U V W X Y Z
1 2 3 4 5 6 7 8 9 0
! @ # \$ % ^ & * () _ - +
= { } [] < > , . ? / \ ' `

Saارين Regular

Exhibit II-3-2

EXIT

EXIT ONLY

Standard Exit Sign Lettering

Exhibit II-3-3

Highway B

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Highway c

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

HIGHWAY D

ABCDEFGHIJKLMNOPQRSTUVWXYZ

HIGHWAY E

ABCDEFGHIJKLMNOPQRSTUVWXYZ

HIGHWAY E/M

ABCDEFGHIJKLMNOPQRSTUVWXYZ

HIGHWAY F

ABCDEFGHIJKLMNOPQRSTUVWXYZ

UNITED AIRLINES
AIRLINE MESSAGE

WALDEN BOOKS
TENANT MESSAGE

TO ALL GATES
DIRECTIONAL MESSAGE

Saarinen Messages

Exhibit II-3-5

TERMINAL

TERMINAL 1

TERMINAL 2

Saarinen Parent Message Header

Exhibit II-3-6

Letterspace

acceptable letterspacing, based on software application's kerning tables

Letterspace

acceptable letterspacing
x=stroke width

Letterspace

acceptable letterspacing
x=stroke width

Acceptable Letter Spacing, Helvetica

Exhibit II-3-7

3.1.9 Regulatory and Warning Typeface Uses:

Traffic regulatory and warning signs shall conform to the standards set forth by the Manual on Uniform Traffic Control Devices (MUTCD), published by the U.S. Department of Transportation, Federal Highway Administration (FHA), as amended by the Virginia Department of Transportation (VDOT). Typefaces shall match the Standard Alphabets for Highway Signs-Booklet (HTO-20), using Series D, E, and E (M) with capitals only, or F, with capitals and lower case letters.

3.1.9.1 Exterior Regulatory Signs: Exterior regulatory signs such as speed limit postings and stop signs shall use DOT Standard typefaces

3.1.9.2 Interior Emergency Exit Signs: Interior emergency exit signs required by fire safety code, shall use standard EXIT sign lettering as mandated by the Virginia Uniform Statewide Building Codes (VUSBC)

3.1.9.3 Standards for Commercial Tenant Signage: Standards for commercial tenant signage are included in this section, **Chapter 6** "Commercial Tenant Guidelines," unless they fall within historic areas.

3.1.10 Typeface Exceptions: Standards for commercial tenant signage at lease line are included in this section **Chapter 6** "Commercial Tenant Guidelines," unless they fall within historic areas, such as the Main Terminal, where canopy signs use the Saarinen typeface.

3.1.11 Letter and Word Spacing: Each typeface shall be composed using pre-specified kerning or letter spacing tables that control letter spacing. All sign messages shall follow the spacing standards for "kerned" or "letter spaced" type. Drawings showing acceptable letter spacing for Helvetica and Saarinen typefaces are presented in **Exhibits II-3-8 and II-3-9**. Messages set according to "kerned" standards will not normally require adjustment of letter and word spacing; however, modification of spacing between individual letters may improve the appearance, legibility, and readability of a sign message. Designers shall

review sample messages for all sign projects and shall adjust spacing where it can be shown to be advantageous. Restricting acceptable letter spacing, such as fitting a lengthy message within a restricted area, is prohibited.

3.1.12 Typographic Restrictions: Typefaces or type weights not described in above may not be used at Washington Dulles International Airport, except as specifically permitted by these guidelines. Any modifications to the typefaces, such as manually condensing, expanding, or compressing shall be prohibited.

3.2 Arrows

3.2.1 Arrow Form: One arrow form shall be used for all directional sign applications. The approved arrow is the modified Saarinen arrow and is depicted in **Exhibit II-3-10**. All regulatory and warning signs shall conform to MUTCD standards. Modifications to this arrow form, such as the addition of a "tail" to extend the arrow length or to indicate an upcoming turn, are strictly prohibited. Digital artwork of the arrow shall be distributed along with the Saarinen typeface to vendors, as required. This digital arrow should not be modified in shape in any way.

3.2.2 Arrow Orientation: The arrow may be rendered in eight different orientations (**Exhibit II-3-11**). No alternative arrows are acceptable.

3.2.3 Directional Indications: For side arrow bands, an upward facing arrow shall be used to indicate "straight ahead." For bottom arrow bands, using a downward facing arrow (**Exhibit II-3-12**) indicates "straight ahead". For side arrow bands, an upward diagonal arrow shall be used to indicate a vehicular exit ramp or a destination directly off the main path of traffic. For bottom arrow bands, a downward facing arrow or a downward diagonal arrow shall indicate a vehicular exit directly off the main path of traffic (**Exhibit-II-3-13**).

LETTERSPACE

acceptable letterspacing, based on software application's kerning tables

x 2x
LETTERSPACE

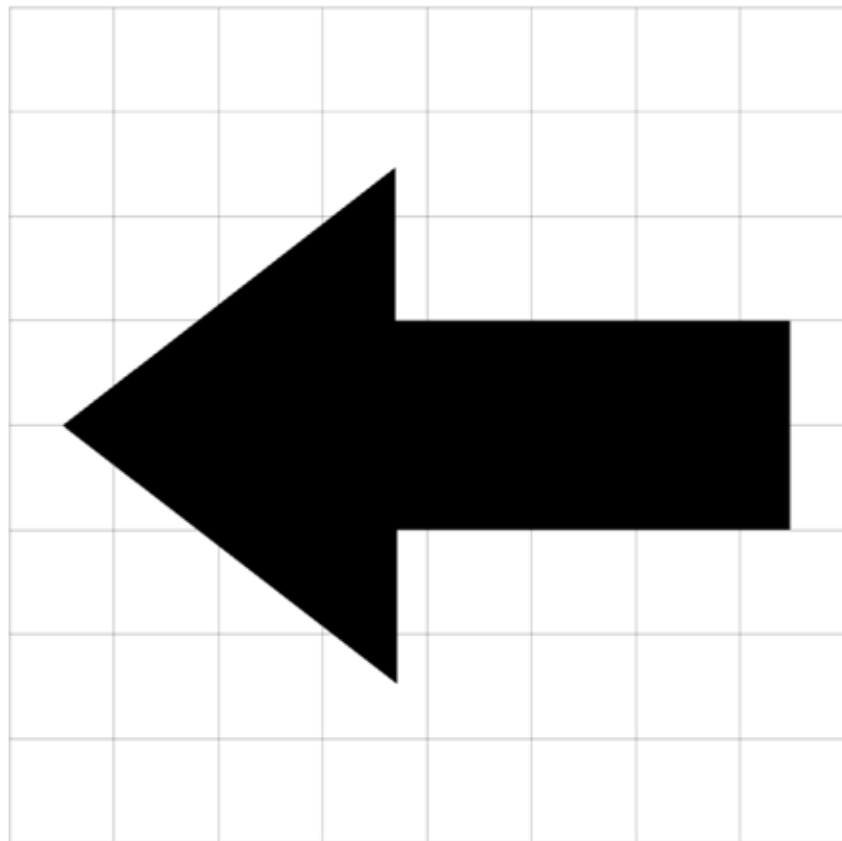
acceptable letterspacing
x=stroke width

x 250%x
LETTERSPACE

acceptable letterspacing
x=stroke width

Acceptable Letter Spacing, Saarinen

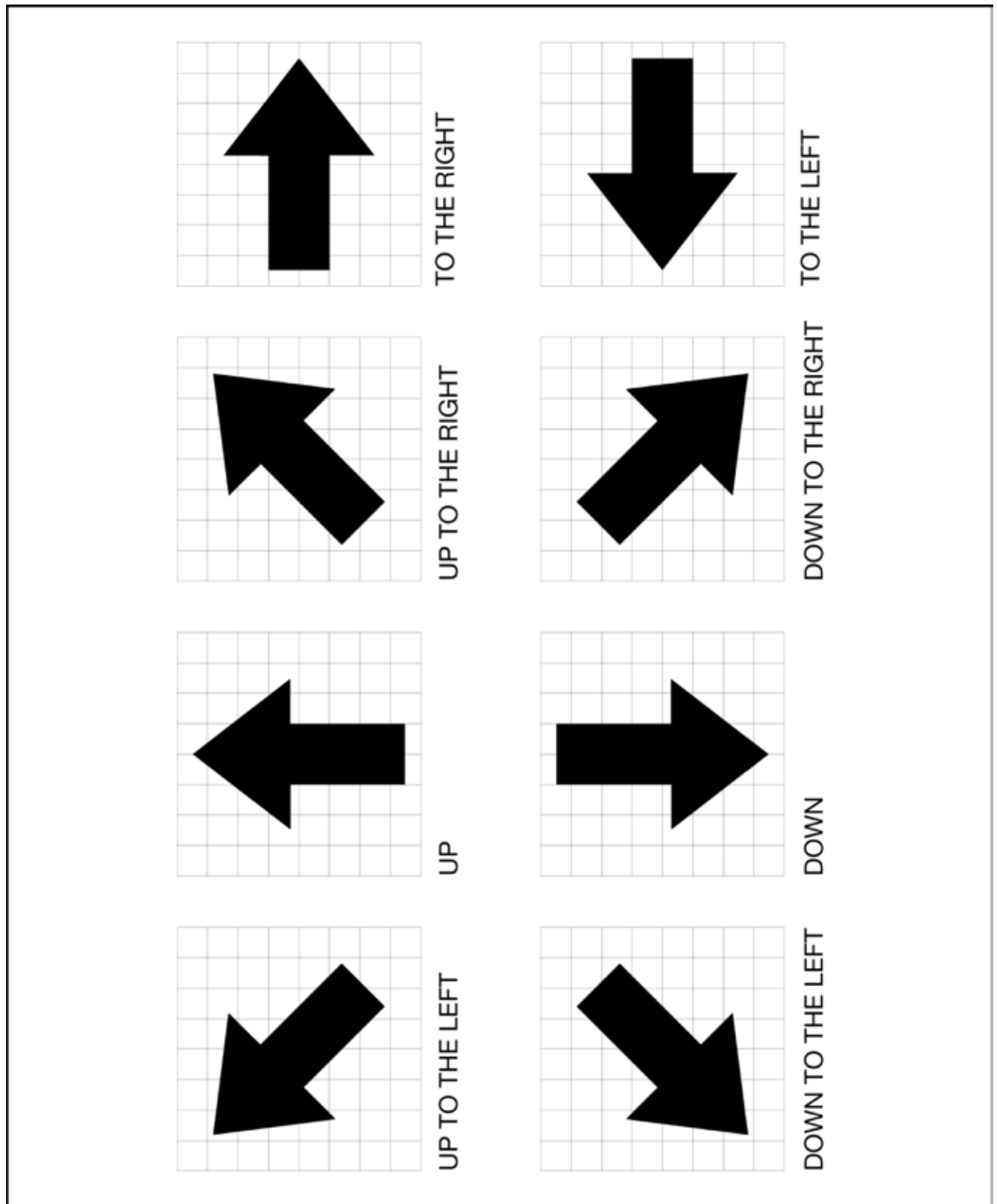
Exhibit II-3-8



STANDARD ARROW FORM

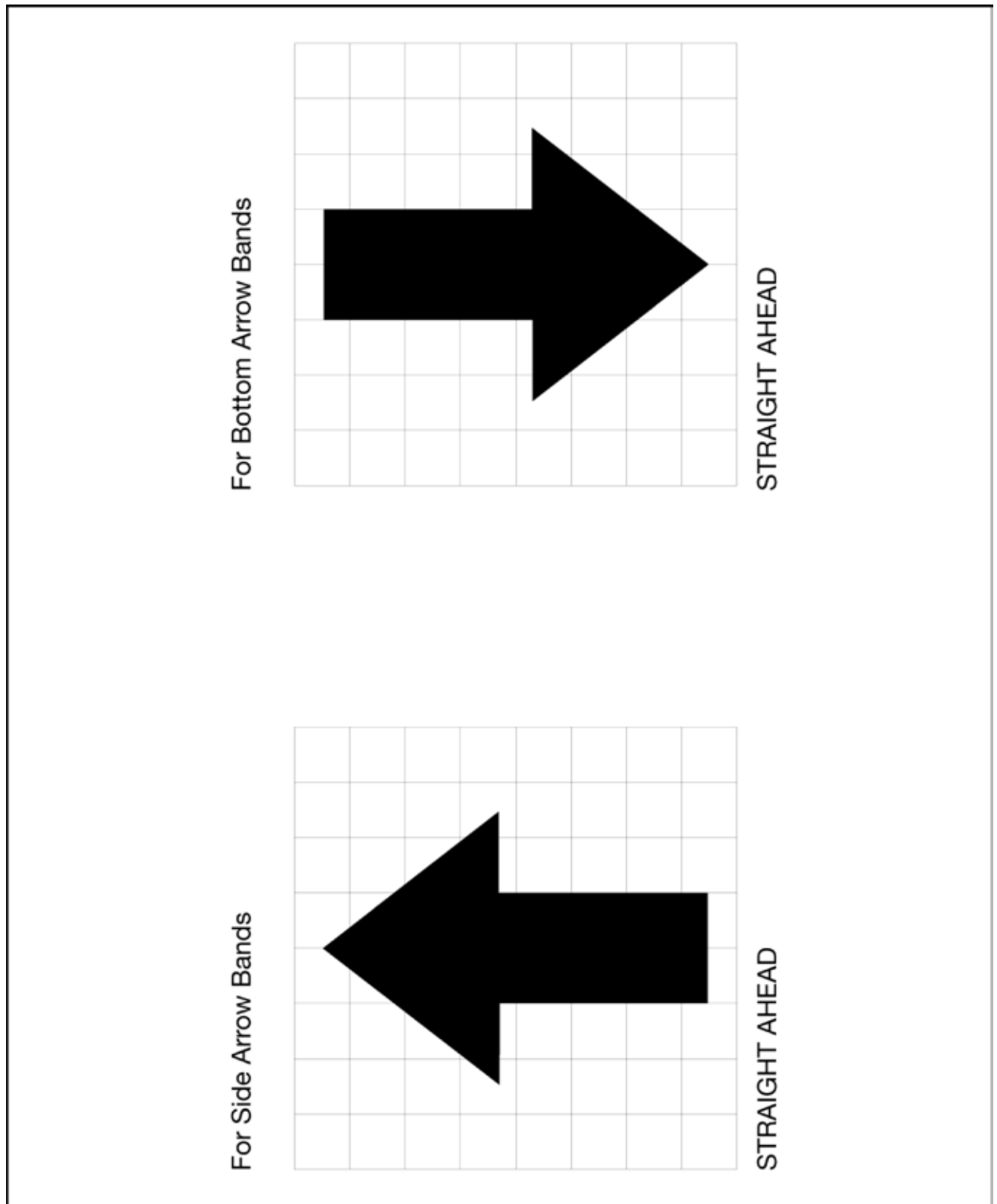
Modified Saarinen Arrow

Exhibit II-3-9

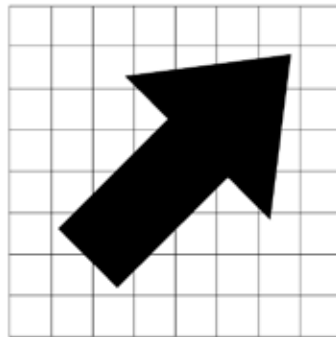


Arrow Orientation

Exhibit II-3-10

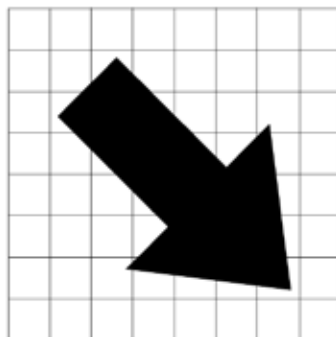


Directional Indications (A) Exhibit II-3-11



FOR SIDE ARROWS

VEHICULAR EXIT RAMP



FOR BOTTOM ARROWS

VEHICULAR EXIT OFF THE
MAIN PATH OF TRAFFIC

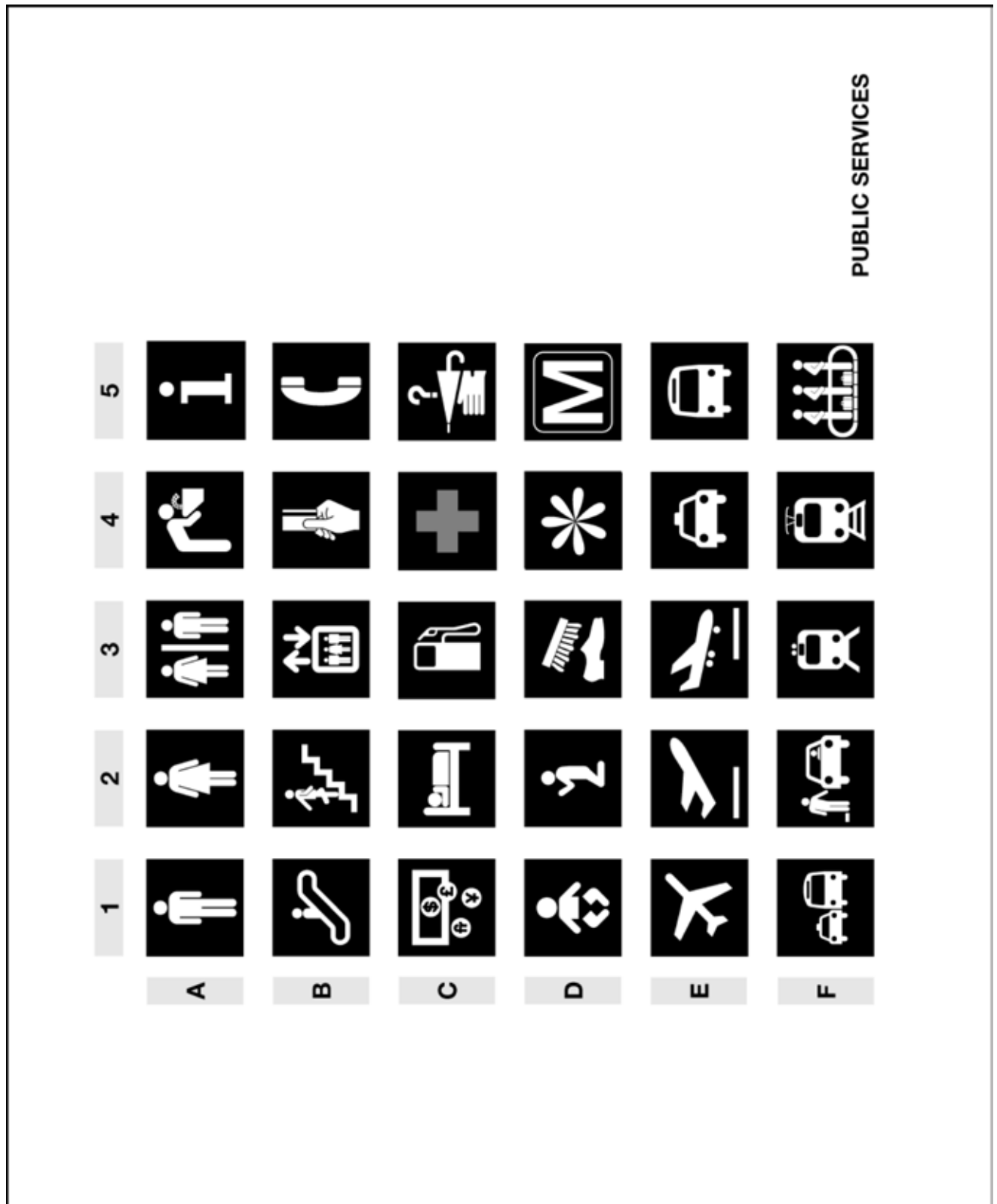


FOR BOTTOM ARROW BANDS

VEHICULAR EXIT DIRECTLY
UNDER THE MAIN PATH OF
TRAFFIC

Directional Indications (B)

Exhibit II-3-12



International Symbols (A)

Exhibit II-3-13

3.3 Symbols

3.3.1 Symbol Sets: Two sets of symbols shall be used at Washington Dulles International Airport—the international symbols and the symbols designating the terminal and gate destinations. All symbols on a sign are accompanied by one text message.

3.3.2 Symbol Form: All symbols are included in this section. Symbols are white and are on a square background. The background color varies. The Authority will provide symbols in digital file format to vendors as required. The shape of these symbols should not be altered in any way. Radiused corners on symbols are not permitted.

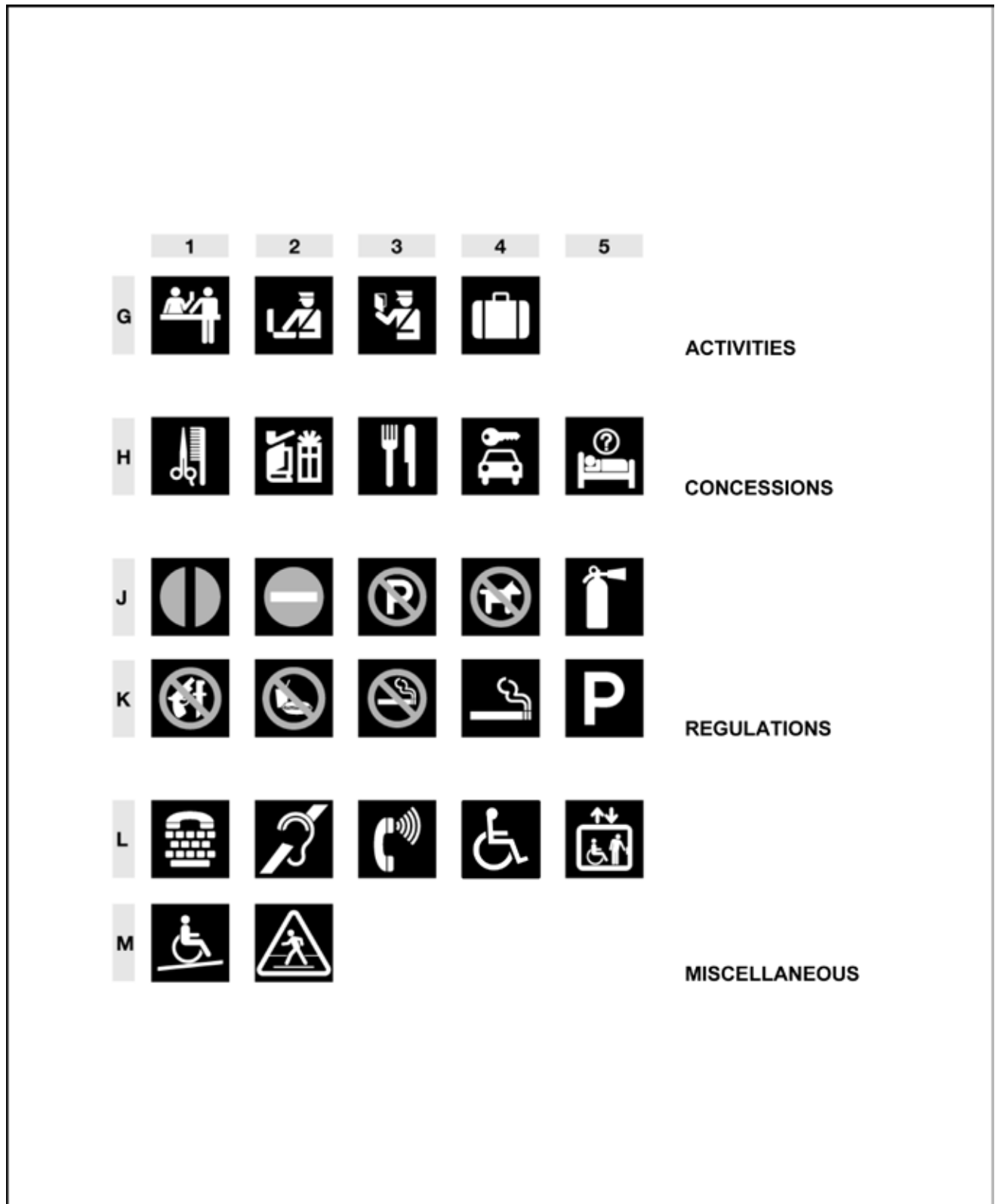
3.3.3 Regulatory and Warning Symbols on Exterior Signs: Symbols on exterior regulatory and warning signs are restricted to those shown in the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) and the Standard Highway Signs manual, as amended by VDOT. Symbols not conforming to the MUTCD and VDOT standards may be used only at building or facility entrances and only as approved by the Authority. Symbols shall always be used with text reinforcement, unless otherwise specified in these Guidelines. Symbols not described in this section, shall not be used.

3.3.4 International Symbol Set: Directional signs shall employ symbols selected from the set developed for the U.S. Department of Transportation by the American Institute of Graphic Arts and the Guidelines for Airport Signing and Graphics along with those developed specifically for use at Washington Dulles International Airport, as shown in **Exhibits II-3-14 and II-3-15**. Graphic symbols shall always be used together with text messages. Refer to this section, **Chapter 4, Paragraph 4.5** for a complete description and exhibits of all symbols with their appropriate messages. There are limited exceptions to this rule, as specified in this section **Chapter 5** "Public Signing Guidelines." Some messages may not have an international symbol designation, such as "North Services Area." These

messages shall not be used with a symbol. Examples of each symbol combined with text messages that are acceptable are shown in **Exhibits II-4-47 through II-4-52**.

3.3.5 Terminal and Gate Symbols: Symbols developed to designate a gate area or terminal building (**Exhibit II-3-16**), typical combinations only), shall accompany the text message in all circumstances, except when the terminal message is used as a parent message (**Exhibit II-3-17**). In the Terminal (Terminal 1) building the symbol consists of a square color-field with a single white Saarinen typeface letter graphically centered. In all other facilities the symbol consists of a square color-field with a single white Helvetica typeface letter graphically centered.

3.3.6 Parking Symbols: All signs directing drivers to parking lots shall use the standard parking symbol consisting of the letter "P"—or one of the appropriate memory tool symbols—accompanied by one of the parking lot designations. Detailed information regarding parking symbols and their use can be found in this section, **Chapter 4, Section 4.5**. A new set of symbols will be introduced for use in the Hourly, Daily, and Economy parking lots to aid as memory tools. These symbols shall never be accompanied by text that spells out or describes the symbol. Refer to **Exhibit II-3-17** for memory tool symbols and parking lot names. Final assignments or combinations are to be determined by the A/E or the Authority. Symbols will be assigned to parking bus routes as new parking areas are completed and open to the public. These memory tool symbols shall never be placed on primary directional signs on the roadways or outside the immediate parking areas, except where pedestrian paths split between multiple parking destinations (**Exhibit II-3-18**).







International Symbols (B)

Exhibit II-3-14

Terminal	T	Return to Terminal	T	A	Gates
Terminal 1	T1	Walk to Gates	Y	B	Gates
Gates	Y	Train to Gates	Z	C	Gates
Gates	Z	Ride to Gates	V	D	Gates
Terminal 2	T2			E	Gates
Gates	U			F	Gates
Gates	V			G	Gates
				H	Gates

Terminal and Gate Symbols


























Exhibit II-3-15

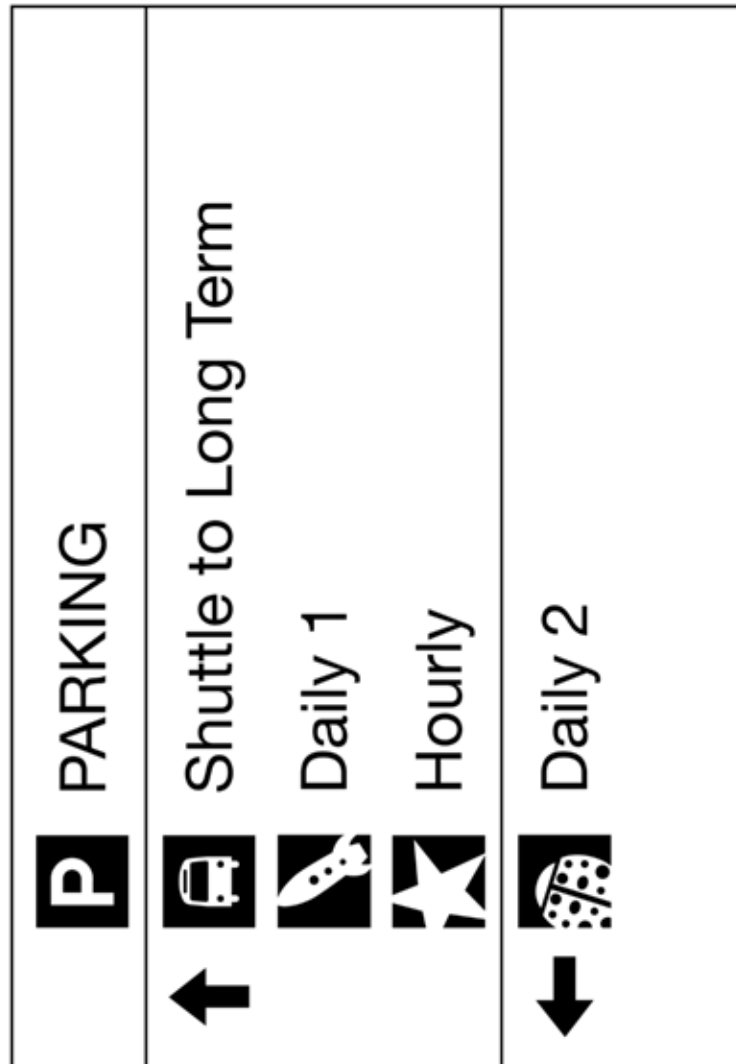
TERMINAL	
→ 	Terminal
	Text Message
	Text Message
	Text Message
→ 	Text Message
	Text Message

Terminal Symbol Usage

Exhibit II-3-16

FLIGHT RELATED OBJECTS/ALL THINGS SKY RELATED

					Hourly	Long Term 12
					Daily 1	Long Term 13
					Daily 2	Long Term 14
					Long Term 1	Long Term 15
					Long Term 2	Long Term 16
					Long Term 3	Long Term 17
					Long Term 4	Long Term 18
					Long Term 5	Long Term 19
					Long Term 6	Long Term 20
					Long Term 7	Long Term 21
					Long Term 8	Long Term 22
					Long Term 9	Long Term 23
					Long Term 10	Long Term 24
					Long Term 11	Long Term 25



Parking Directional Sign

Exhibit II-3-18

3.3.7 Building or Major Facility Signs: Logos and other graphic images are prohibited on curbside pedestal signs. Logos and other graphic images are permitted on building-mounted signs contingent upon satisfactory review and approval by the Authority. The single guideline appropriate for the use of graphic images or logos on building-mounted signs is that use of such graphics should be justified as reasonable and useful for the unique identification of the building or facility at Washington Dulles International Airport. The designer or tenant may create appropriate images, use business logos, and incorporate special typefaces into the design, but in all cases must submit their designs to the Authority for approval.

3.3.8 The Use of Symbols on Exterior Roadway Signs: Different people access information in different ways. The sign system for Washington Dulles International Airport shall have a similar layout from interior signs to exterior signs. By including international symbols on both exterior and interior sign types, the option to read the text message or the symbol message is available to everyone. Symbols restate the text message in a visual form. Using text and symbol on all sign types throughout the Airport is beneficial to everyone.

3.3.9 Use of MUTCD/VDOT Symbols, Shields, or Markers: The use of city destinations and route numbers on signs and messages that accompany them will vary depending upon the distance from the destination. The city destination or the route number will be seen accompanying the route number symbol on these sign types (**Exhibit II-3-19**).

3.4 Color

3.4.1 Allowed Colors: Eight colors are allowed as part of the Washington Dulles International Airport sign system: Dark Gray, Light Gray, Orange, Green, Red, Blue, White, and Black. The uses and descriptions of each color are described in this section. An outline of the process for

quantifying accurate color matching, a painting specification, technical information regarding color matching can be found in this section. Certain revisions are being considered to discontinue the use of light gray, orange, green, red, and blue color applications. These colors shall not be utilized without written approval from the Authority.

3.4.2 Dark Gray: This is the primary color for the signage system at Washington Dulles International Airport, also known as “Dulles Gray.” Dark gray is the field color for all interior and exterior primary messages, all interior plaque signs, all tertiary signs, all building ID or monument signs, and all sign canopies at the historic Saarinen Terminal. Exterior overhead sign structures, including cantilever sign structures, shall be painted dark gray. Formulas for this color can be found in **Exhibit II-3-20**. For a list of interior and exterior messages that are to be placed in the primary, dark gray message area, refer to **Chapter 4, Paragraph 4.5**, in this section.

3.4.3 Signage Light Gray: The signage light gray color shall be used as a field color for secondary messages on interior and exterior directional sign panels. Formulas for this color can be found in **Exhibit II-3-20**. For a list of interior and exterior messages that are to be placed in the secondary, light gray message area; refer to **Chapter 4, Paragraph 4.5**.

3.4.4 Signage Orange: Signage orange shall be the organizing color for the exterior “Terminal” (and future “Terminal 1”) neighborhood. The color shall also be used for interior terminal and terminal gate symbols, as defined below:

3.4.4.1 Exterior Signs: On exterior signs, signage orange shall be used as the field behind a “Terminal” or “Terminal 1” parent message in parking signs, such as shuttle stop signs and row identification signs and for the curbside zone signs at the Terminal (future Terminal 1).











CLOSER TO AIRPORT PROPERTY



FURTHER FROM AIRPORT PROPERTY

Washington Dulles International Airport - Color Chart

Color	Pantone	Matthews	Munsell	cieL*A*B*	CMYK	RGB	Authority Code
	717C	MP00170	Value 2.52YR Hue 5.56 Chroma 11.06	L 57.3 A 34.68 B 51.56	C 18 M 56 Y 80 K 0	R 209 G 110 B 49	K-10
	384C	MP11447	Value 1.39GY Hue 6.08 Chroma 5.36	L 62.52 A -12.36 B 37.94	C 21 M 20 Y 48 K 19	R 150 G 154 B 82	K-20
	632C	MP07932	Value 6.6B Hue 5.9 Chroma 7.45	L 60.75 A -17.76 B -25.42	C 69 M 33 Y 20 K 5	R 61 G 156 B 189	K-30
	704C	MP00226	Value 4.04R Hue 3.96 Chroma 9.81	L 40.8 A 42.75 B 18.13	C 20 M 58 Y 56 K 16	R 162 G 64 B 70	K-40
	432C	MP41525	Value 3.06BG Hue 3.5 Chroma 0.15	L 35.98 A -0.74 B -0.03	C 20 M 19 Y 20 K 46	R 84 G 85 B 85	K-48
	430U	MP09648	Value 9.17B Hue 5.44 Chroma 0.85	L 56.08 A -1.49 B -2.88	C 23 M 21 Y 19 K 25	R 128 G 134 B 138	K-55
	426C	41306SP	Value 2.75PB Hue 2.44 Chroma 0.18	L 25.01 A -0.07 B -0.82	C 20 M 20 Y 19 K 55	R 61 G 61 B 62	K-61
	n/a	6425SP	Value 6.49BG Hue 9.41 Chroma 0.26	L 95.09 A -1.54 B -0.14	C 7 M 5 Y 5 K 0	R 237 G 241 B 240	n/a

Color Chart

Exhibit II-3-20

3.4.4.2 Interior Signs: On interior signs, signage orange color shall be used as the field color for the symbol designating “Terminal,” future “T1,” and the gates within the Terminal; “Y” and “Z.” The future train platform for the people mover at the current Main Terminal shall also use orange sign bands as an architectural design feature to emphasize the platform as a major destination. Formulas for this color can be found in **Exhibit II-3-20**.

- A. Sign bands will consist of the appropriate gate symbol and word “Concourse” to signify destination. Sign size will be based on a 5" letter height.

3.4.5 Signage Green: Signage green shall be the organizing color for the exterior “Terminal 2” neighborhood. The color shall also be used for interior terminal and terminal gate symbols, as defined below:

3.4.5.1 Exterior Signs: On exterior signs, signage green shall be used as the field behind a “Terminal 2” parent message in parking signs, such as shuttle stop signs and row identification signs, and for the curbside zone signs at Terminal 2.

3.4.5.2 Interior Signs: On interior signs, signage green shall be used as the field color for the symbol designating “Terminal 2” and the gates within the Terminal; “U” and “V.” The future train platform for the people mover at Terminal 2 shall also use green sign bands as an architectural design feature to emphasize the platform as a major destination. Formulas for this color can be found in **Exhibit II-3-20**.

- A. Sign bands will consist of the appropriate gate symbol and word “Concourse” to signify destination. Sign size will be based on a 5" letter height.

3.4.6 Signage Blue: Signage blue shall only be used on interior signage as the field color on symbols noting gate areas A, B, C, and D, as shown in **Exhibit II-3-15**. Formulas for this color can be found in **Exhibit II-3-20**.

3.4.7 Signage Red: Signage red shall only be used on interior signage as the field color on symbols noting gate

areas E, F, G, and H as shown in **Exhibit II-3-15**. Formulas for this color can be found in **Exhibit II-3-20**.

3.4.8 Signage Black: Signage black shall be used as the field color for all international symbols on both interior and exterior applications. The Saarinen “Butterfly” signs structures; exterior ground mounted sign structures, light poles, traffic signal poles, and masts shall also be painted signage black.

3.4.9 Signage White: Signage white shall be used for all text, all symbol images, and for horizontal and vertical dividing lines that divide messages by direction.

3.4.10 Color References: All approved colors are indicated in **Exhibit II-3-20**. The Signing Guidelines are based upon 3 color-quantifying systems:

3.4.10.1 CIE L*A*B*: Spectrographically defined color.

3.4.10.2 Munsell Spectrograph: Munsell Spectrographically defined color.

3.4.10.3 Pantone Matching System (PMS): The (PMS) is a color system used by the printing industry that is based upon transparent inks, and is indicated in the signing color chart in **Exhibit II-3-20**.

3.4.10.4 MUTCD: The standard MUTCD traffic control color definitions.

3.4.11 Sign Colors: The sign colors shall be subject to the following uses:

3.4.11.1 Sign Types: For transilluminated and translucent materials and for sign types based upon acrylic sheet goods from Rohm & Haas, with headquarters in Philadelphia, Pennsylvania.

3.4.11.2 Painted Field Color: As painted field color on sheet metal for all interior and exterior field color.

3.4.11.3 Website: To post on the Authority website for passenger information about the airport.

3.4.11.4 Printed Maps: On printed maps for passenger information.

3.4.12 Color Matching Guidelines: The following paragraphs outline in detail the process for attaining accurate color matching at the Airport. Consultants, vendors, and fabricators shall adhere to this process to ensure consistent and precise colors throughout the Airport campus. A microscopic paint analysis has been conducted on the colors specified in the *Design Manual*. A report, control samples, and a list of approved color labs can be obtained from the Authority. The report of the paint analysis provides scientific reference values in two color systems for each color match: (1) CIE L*A*B*, and 2) Munsell. The L*A*B* values are tied in with the use of a spectrophotometer. The system allows more accuracy of color evaluation and specification. It enhances the ability to maintain quality control for assessment of color matches.

3.4.12.1 Control Samples: Control samples of all colors outlined for use in these guidelines shall be on file with the Authority in lightproof black envelopes for use in reviewing submittals. Contractors shall provide their preferred paint manufacturer, dealer, or vendor with control samples obtained from the Authority. The control sample and the CIE L*A*B* color reference values shall be forwarded to the paint company's color lab for accurate color matching. Contractors shall also provide the paint company representative with "Technical Information for Color Matching" (**Paragraph 3.4**). This paragraph describes specifications that the paint company's color lab needs to follow in order to efficiently and cost effectively provide an accurate color match. Contractors shall request that the paint company submit draw downs or brush-outs of their color matches. These will demonstrate the paint company's attempt to match the color in the desired product.

3.4.12.2 Evaluation of Draw downs: Contractors shall send the paint company's draw downs and the control sample to a third-party color lab to be evaluated both

visually and spectrophotometrically. Contractors shall request a certificate of color match along with the color lab's evaluation. A printout of the spectral data obtained by the spectrophotometric measurement must accompany each report of certification. This process will eliminate any conflict of opinion between all parties by introducing an independent, quantified, and certified assessment.

3.4.12.3 Field Verification: The final acceptance of all samples for color and appearance shall be from field-applied samples. Contractor shall prepare a draw downs on a coated draw downs card of each color of paint brought to the job. Contractor shall provide the dried field-applied draw downs to the architect for their visual comparison with the paint company's Submittal. Finally, the Contractor shall submit the field-applied draw downs and the paint company's Submittal to the third-party color lab to verify that the paint on the job is identical to the paint company's Submittal. Although this may seem like a lengthy and involved procedure, it is necessary for several reasons:

- A.** If the paint applied does not exactly match the color specified it defeats the purpose of a design standard. This quality control safeguards the Airport's investment.
- B.** It is important that the color of paints that are supplied by different manufacturers and applied by different contractors match exactly. If not, mismatch will be noticeable.
- C.** When an exact color match is used from the beginning it is easier to maintain in the future.
- D.** The Contractor shall provide final paint and color formulation on each color in a letter to the Authority. This information will be used for any maintenance painting in the near future.

3.4.13 Technical Information for Color Matching for the Paint Manufacturer, Dealer or Vendor: The samples provided are supplied by the Washington Dulles International Airport. They are supplied in a satin finish. Each color is identified by two color systems: Munsell and

CIE L*A*B*. In matching the paint, use the color sample and L*A*B* values as the color and color reference standards. These are the numbers that shall be used to assess the color match. L*A*B* reference values shall be obtained from an X-Rite(r) 968 (or comparable) spectrophotometer: 0 – 45° geometry. Each draw downs submitted shall be evaluated both visually and instrumentally with a spectrophotometer. The standard conditions of illumination shall apply—average daylight and tungsten light (3000K) for visual evaluation and illuminate/observer C2 and specular component excluded (SCE) for spectrophotometric measurement. Do not use fluorescent illumination in the color matching process. All color matches shall be visually matched, as well technically matched. The visual differences between colors with different gloss levels will be taken under consideration. Tolerances: the tolerancing method used shall be L*A*B* and the limits on each color match shall be 1 unit for L*, A* and B*. The delta E shall not exceed 1. With prior approval, however, the Authority will allow exceptions to this for dark and very saturated colors. In such cases, the Authority may increase the tolerances to 2 units or less. Prepare several draw downs of the color match and submit them to the Authority client so they can forward one to an independent color lab for comparison measurement. Submit a certificate of color match and an evaluation report of how the product should be specified to match this color.

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CHAPTER 4 Design Criteria

4.1 Graphics Formats

4.1.1 Layout and Graphic Elements: This section describes the layout and graphic elements used for major categories of airport signs. Detailed information about application of these concepts and elements can be found in **Section II, Chapter 5 "Sign Applications"** and **Chapter 6 "Commercial Signing Guidelines."**

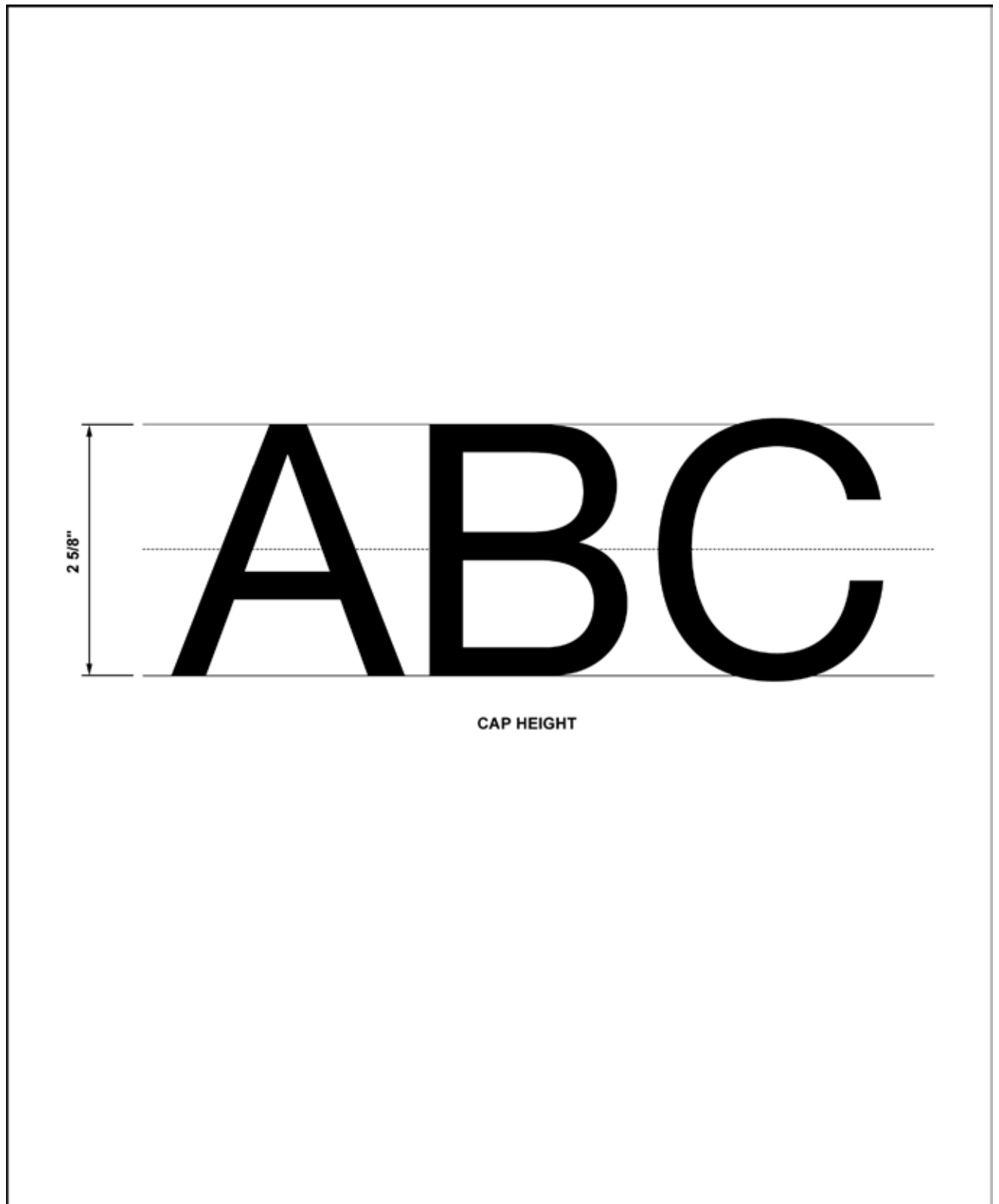
4.1.2 Layout of Common Graphic Elements: Sign layouts shall group and provide consistent locations for graphic elements. Arrows shall always be located in "arrow bands" and similarly, text and symbols shall be located in assigned areas common to every sign.

4.1.2.1 Text Height: Text height is determined by a number of factors, including approaching speed, distance from sign, number of messages, and regulatory guidelines. Determining the text height shall be the first step in developing a sign layout. Text height represents the height of capital letters, such as "ABC," as demonstrated in **Exhibit II-4-1**. The following text heights and uses are acceptable on the Airport property for directional signage:

- A. 5/8" text height for code required wall plaques, such as restroom and stair identification.
- B. 3" text height for interior and exterior pedestrian overhead signs.
- C. 5" text height for interior pedestrian overhead signs.
- D. 5" text height for vehicular signs.
- E. 8" text height for vehicular signs in low speed areas.
- F. 10" text height for vehicular signs in high speed areas and/or post-and-panel signs.
- G. 12" text height for vehicular signs in high speed areas and/or overhead signs.

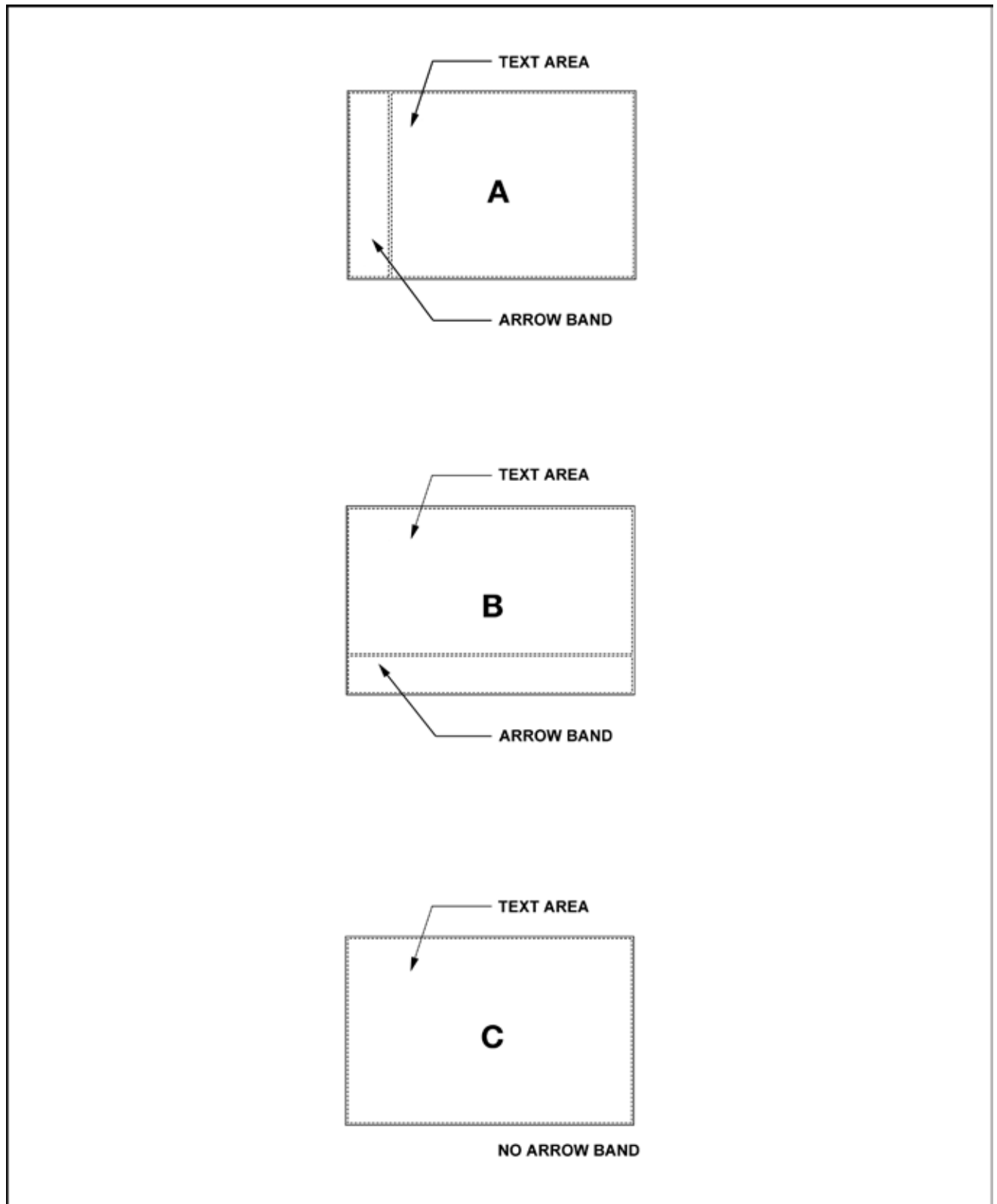
4.1.2.2 Arrows: All sign types with a side arrow band shall be called Type "A" signs. All sign types with a bottom arrow band shall be called Type "B" signs. All signs that do not use arrows of any kind shall be Type "C" signs. These designations only address the overall layout type and do not address the specific uses of each sign. Diagrammatic examples of A, B, and C sign types are included in **Exhibit II-4-2**. Arrows will be placed within one arrow band for each sign panel. Placement of the arrow band is determined by sign type:

- A. Exterior Overhead Sign Truss panels shall be Type "B", which incorporate an arrow band along the bottom section of the full width of each sign panel (**Exhibit II-4-3**).
- B. Exterior post-and-panel sign panels shall be Type "A," which will have an arrow band located vertically on the left-hand side of the panel that will hold all arrows, regardless of arrow direction (**Exhibit II-4-4**).
- C. Interior overhead primary directional Type "A" signs shall have one arrow band located vertically on the left-hand side of the panel that will hold all arrows, regardless of arrow direction (**Exhibit II-4-5**).
- D. Interior overhead primary directional Type "B" signs are located only where the primary flow of traffic is transitioning between floor levels. At these points, such as escalators or monumental stairs, the sign panel layout shall follow the guidelines established for the overhead sign trusses that have an arrow band along the bottom edge of the sign panel. The Authority must approve the use of interior Type "B" signs (**Exhibit II-4-6**).
- E. Secondary sign types, both interior and exterior shall be Type "A" and shall have one arrow band located vertically along the left-hand side of the sign panel (**Exhibit II-4-7**).



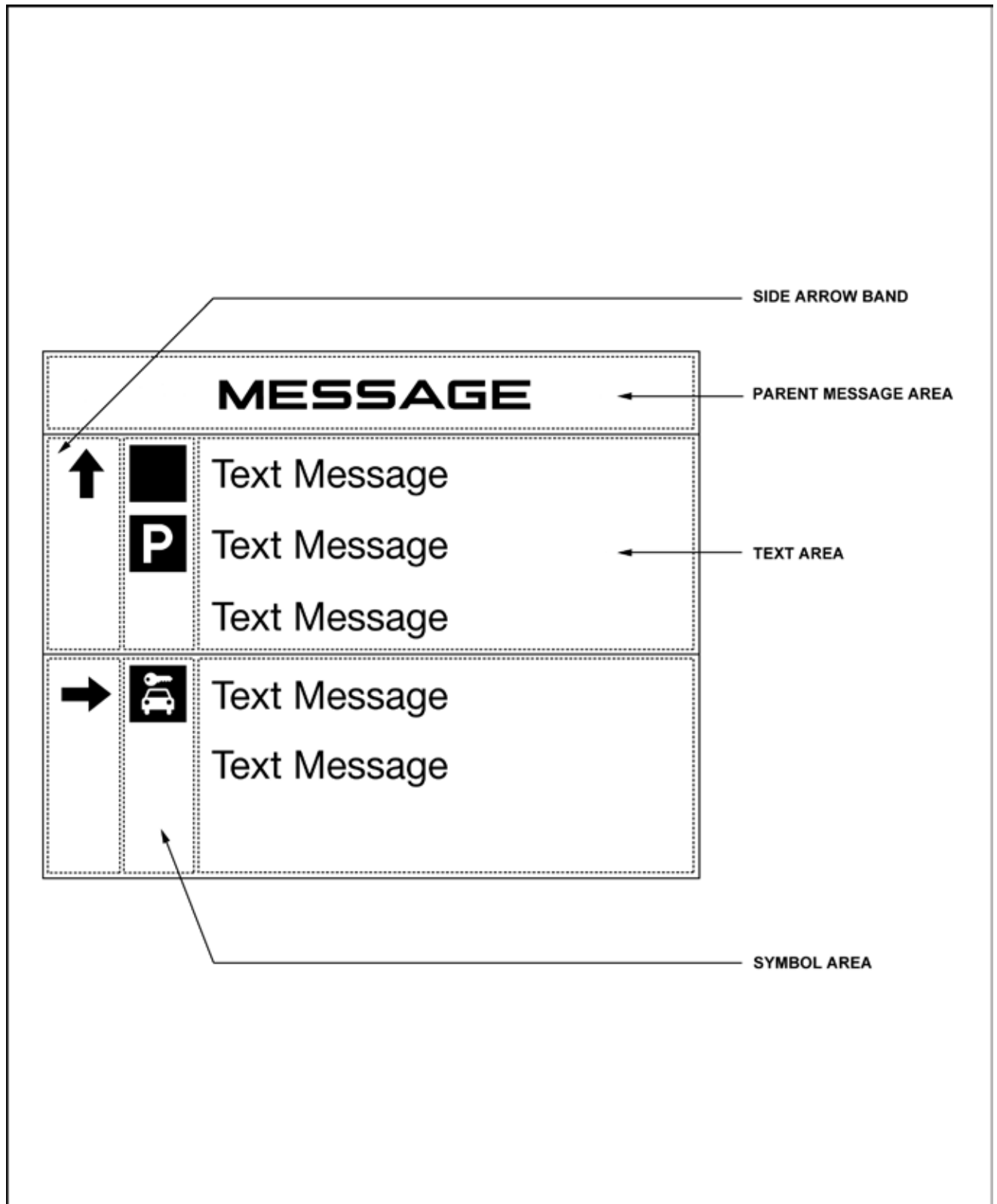
Cap Height Illustration

Exhibit II-4-1



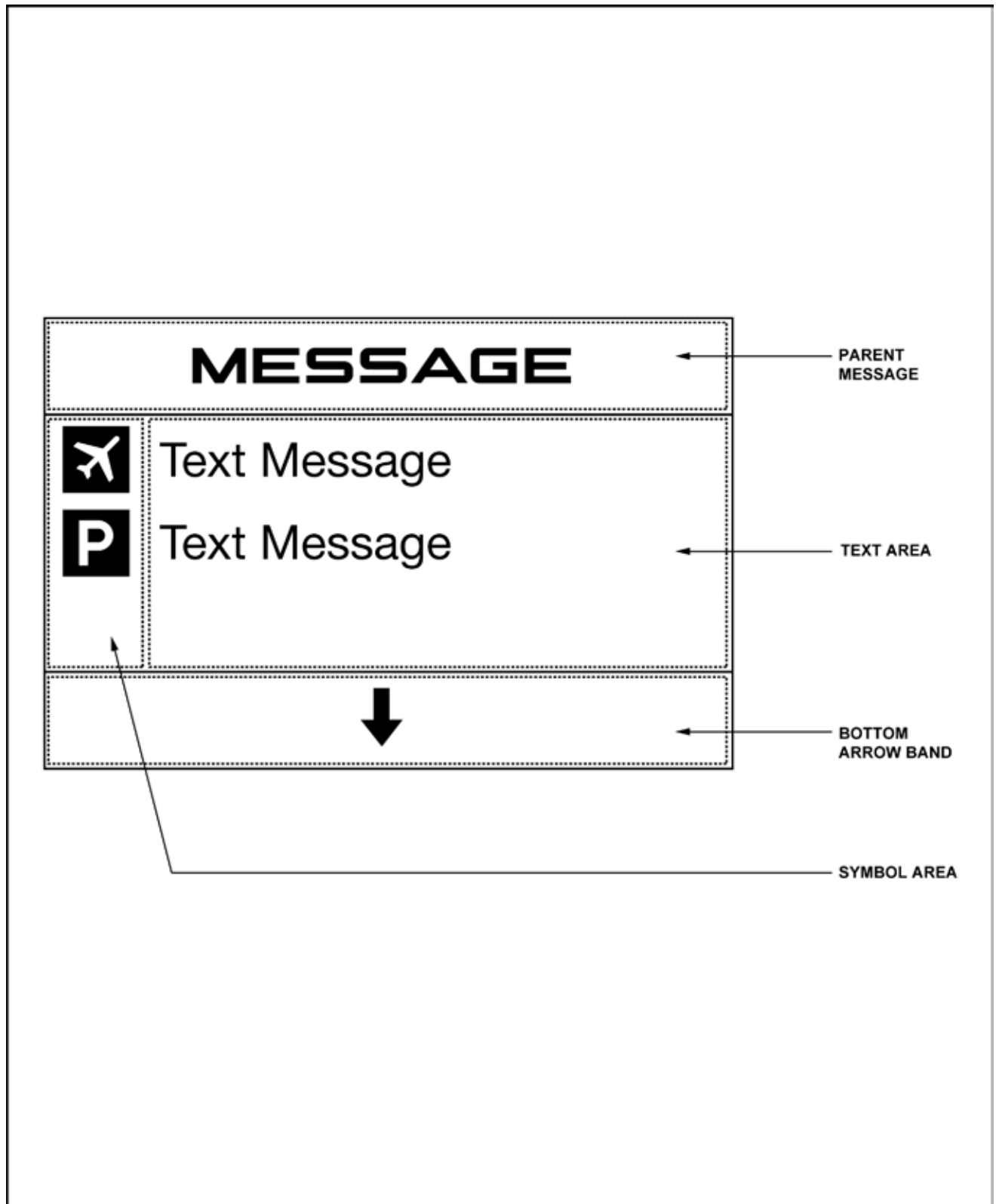
Typical Sign Diagrams

Exhibit II-4-2



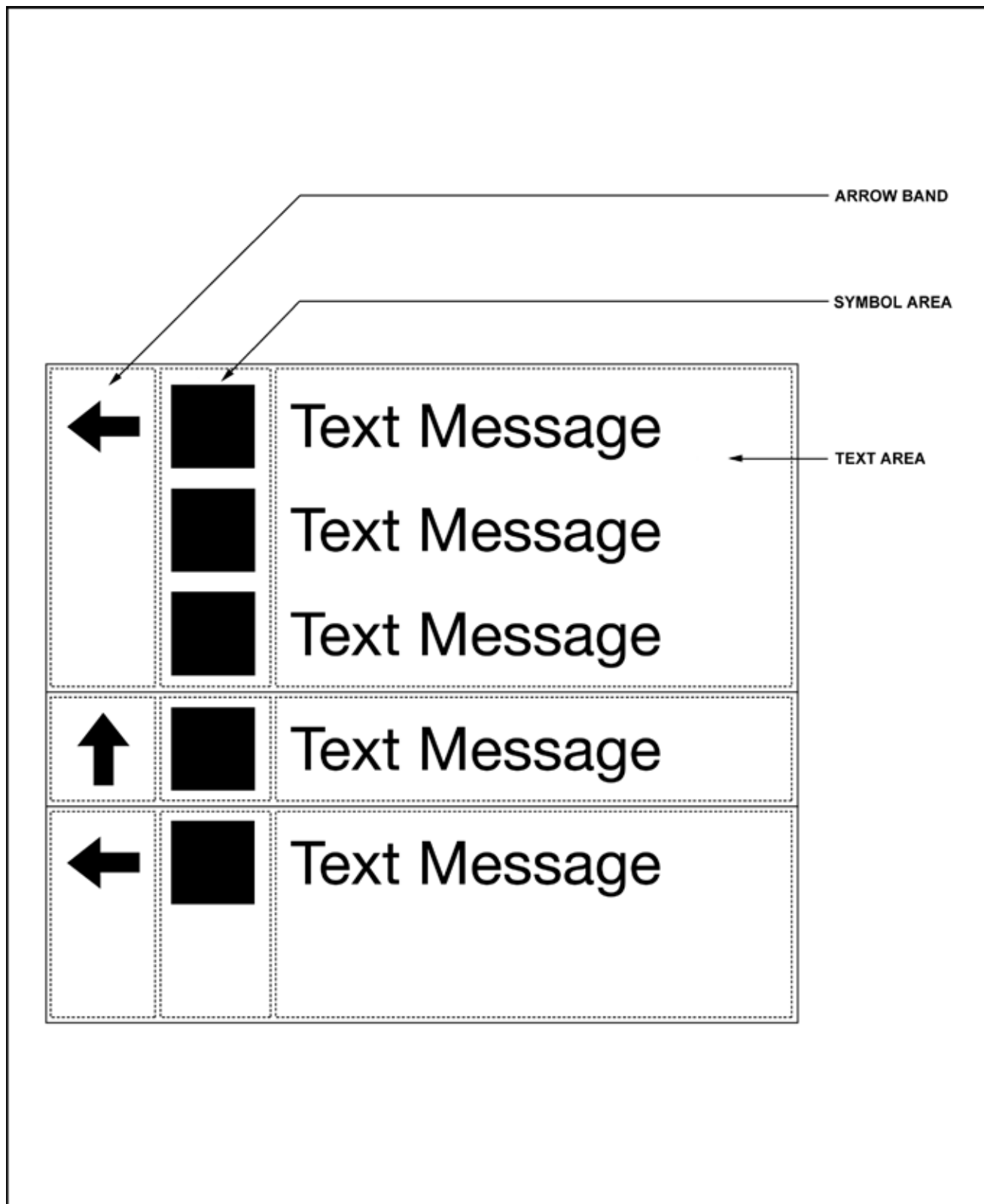
Exterior Overhead Type B

Exhibit II-4-3



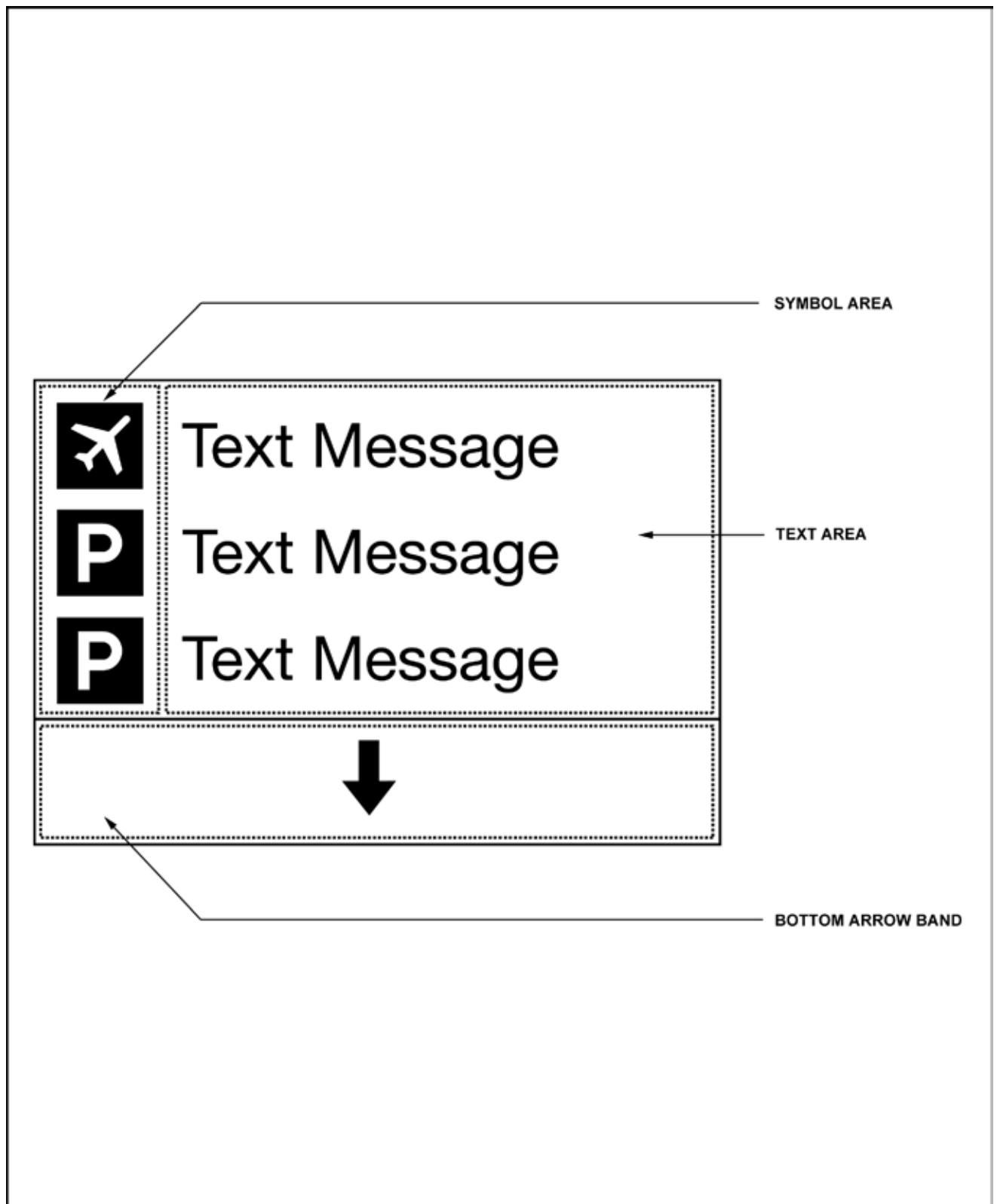
Exterior Post-and-Panel Type A

Exhibit II-4-4



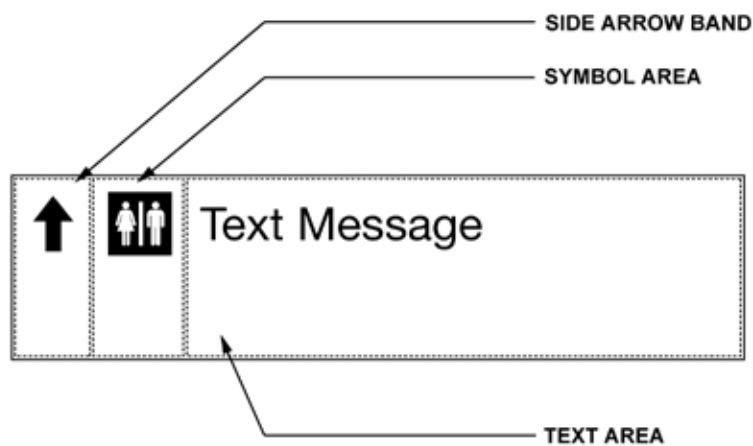
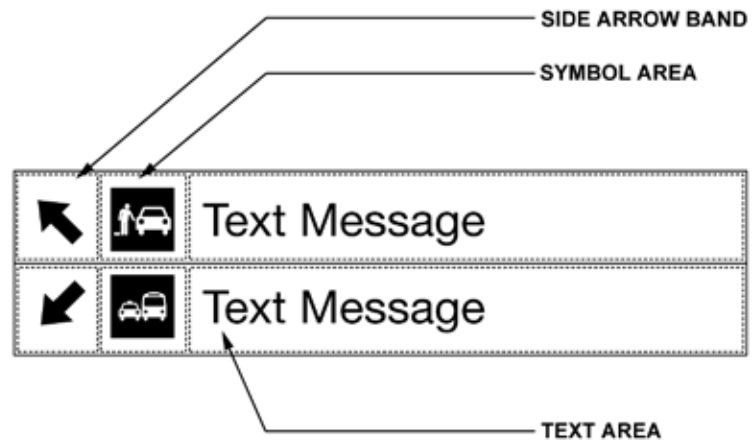
Interior Overhead Type A

Exhibit II-4-5



Interior Overhead Type B

Exhibit II-4-6



Secondary Overhead Type A

Exhibit II-4-7

F. Temporary signs that are mounted onto interior construction barricades shall move the arrow band to the right hand side of the message if the directional messages occur at the edge of barricade, as shown in **(Exhibit II-4-8)**.

G. Under no circumstances shall any sign panel have arrows on both the right and left-hand sides of the body of text on that panel. Panels that are mounted side-by-side, such as is found in the lower level of the Main Terminal, shall be constructed of the same sign type, and therefore, shall have consistent arrow placement from one panel to the adjacent panel **(Exhibit II-4-9)**.

4.1.2.3 Symbols: The sign system places an emphasis on the symbol by aligning all symbols vertically to the left of each message. The result is an organized alignment of the symbols. Refer to **Exhibits II-4-3 through II-4-10** for examples of symbol placement for all standard sign types.

4.1.2.4 Dividing Lines: A white rule shall be used to separate messages with varying directions or lane designations and to separate field colors used to organize messages into primary, secondary, and parent message bands. For all sign types, messages are grouped by a common arrow direction. Each time a new arrow direction or change in background field color occurs, those messages are separated from the messages above with a single white horizontal line. For overhead signs on roadways, a vertical dividing line is used to separate messages horizontally across multiple panels, and to organize messages over a highway lane **(Exhibit II-4-10)**. Dividing lines shall be 0.5x. For interior signs, they shall be made of PVC unless the text height is smaller than 3". In this case, vinyl is to be used for the dividing line. For exterior signs, all dividing lines shall be vinyl. No borders around the outside face of panels shall be used on any Washington Dulles International Airport non-regulatory sign panels. Layout and design elements for regulatory sign panels shall be dictated by MUTCD and VDOT standards.

4.1.2.5 Colors: Of the two field colors, the dark gray shall always be placed with a higher priority. Where there are

messages of both primary and secondary importance, the primary messages and, therefore, the dark gray color, shall always be placed first on, or at the top of the sign panel. Text message and international symbol colors shall never change, regardless of the priority given to a message.

4.1.3 The Grid: The layout of each sign is regulated by a grid format that specifies the relationship between text height, arrow height, symbol height, and the spaces that separate them **(Exhibit II-4-11 through II-4-21)**.

4.1.3.1 Grid Elements

A. "x" is 1 unit size on the grid. The value of "x" is derived from a text height chosen from the acceptable text heights, described in **Paragraph 4.1.2.1**.

B. The units combine to create 1 module size: 10x.

C. Each line of text is composed of 10x modules placed next to one another. Each line is 10x in height and varies in length based on the length of the actual text message. Final length of a sign is determined by the longest message on a sign panel **(Exhibit II-4-11)**.

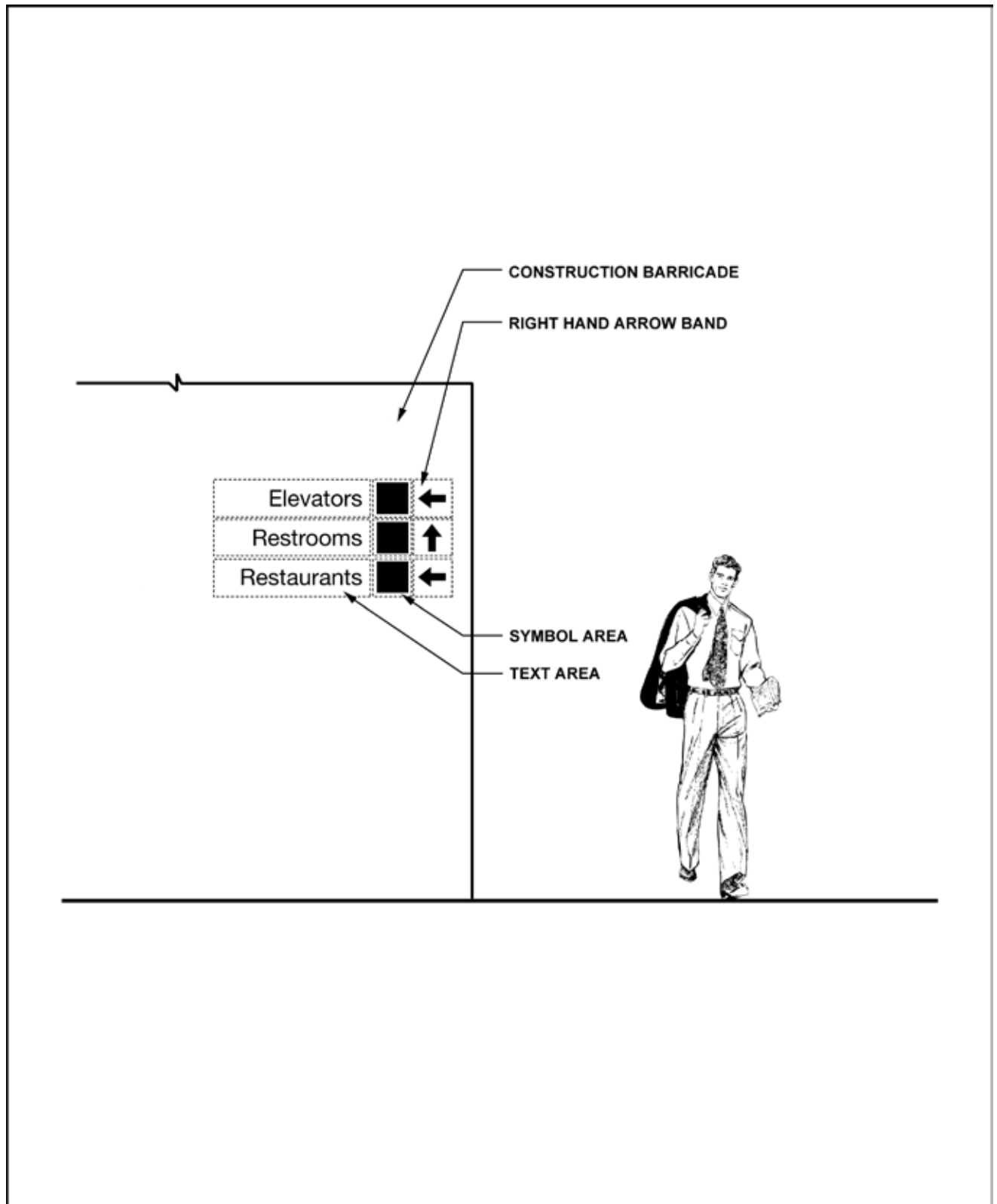
D. All text is 4x high **(Exhibit II-4-12)**.

E. All symbols shall be 8x in height and width.

F. The arrow is contained within an 8x "arrow field" **(Exhibit II-4-13)**.

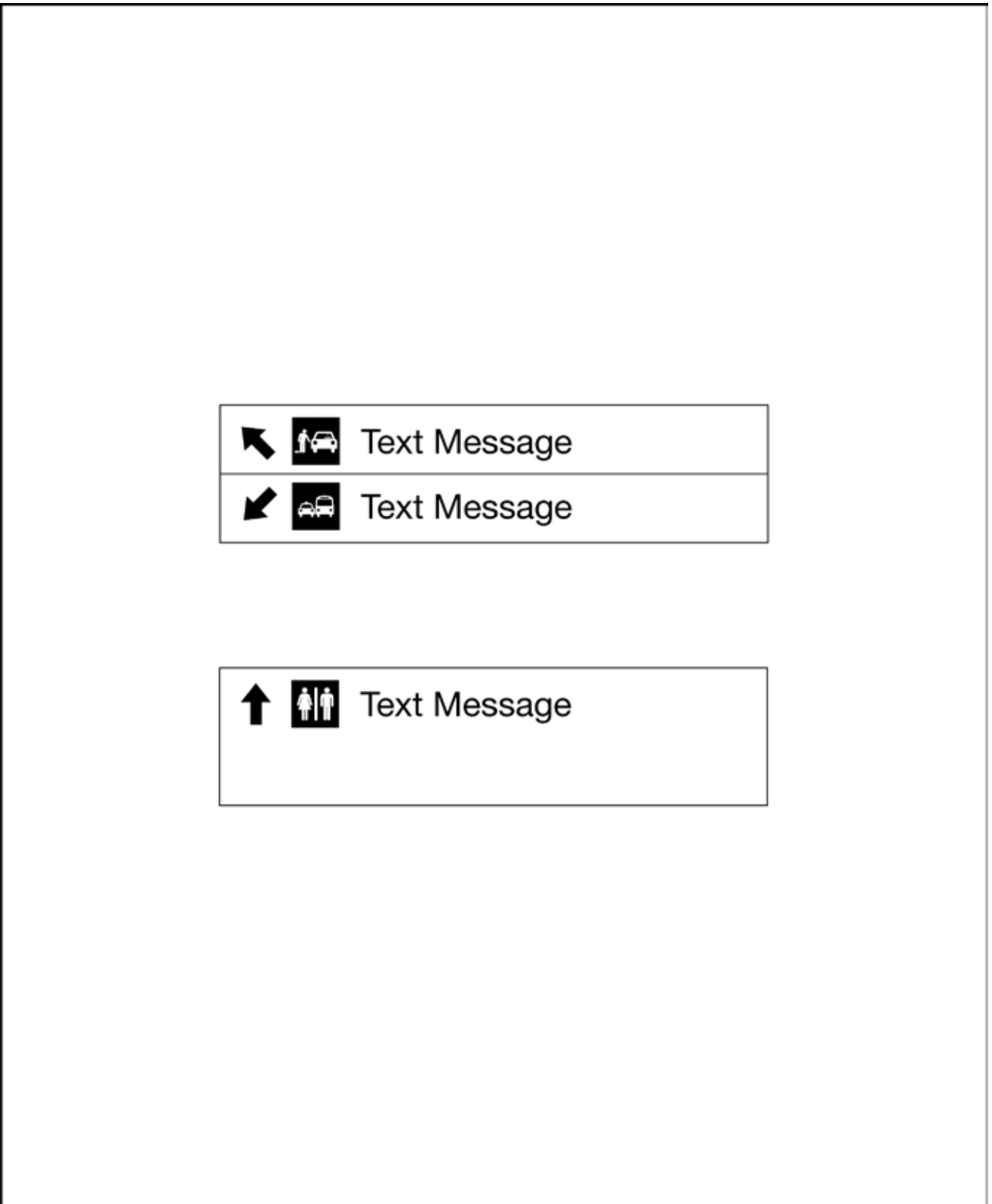
G. A rule line is equal to .5x. This rule line is then centered within 1x that is placed between two 10x-message lines **(Exhibit II-4-14)**.

H. A 1x border is placed around the entire sign once it is completely laid out. This 1x border visually completes the layout of the sign with an even and distributed appearance **(Exhibit II-4-15)**.



Temporary Signs

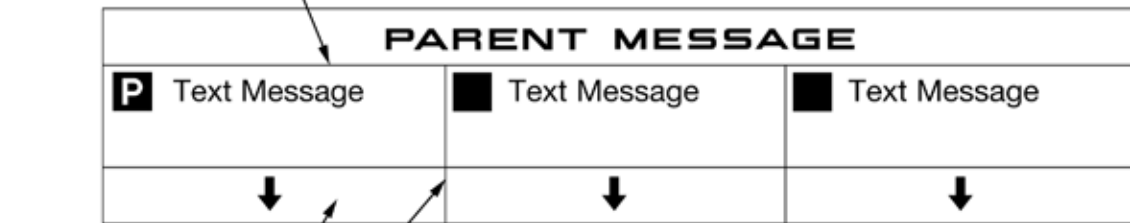
Exhibit II-4-8



Adjacent Panels

Exhibit II-4-9

FIELD COLOR CHANGE

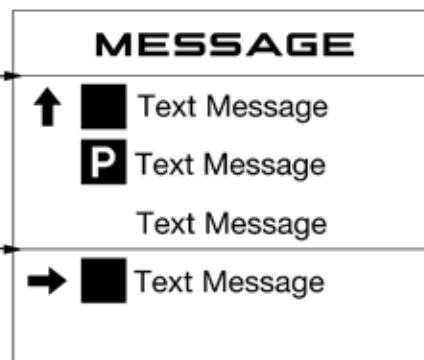


ARROWBAND

DIVIDE MESSAGES

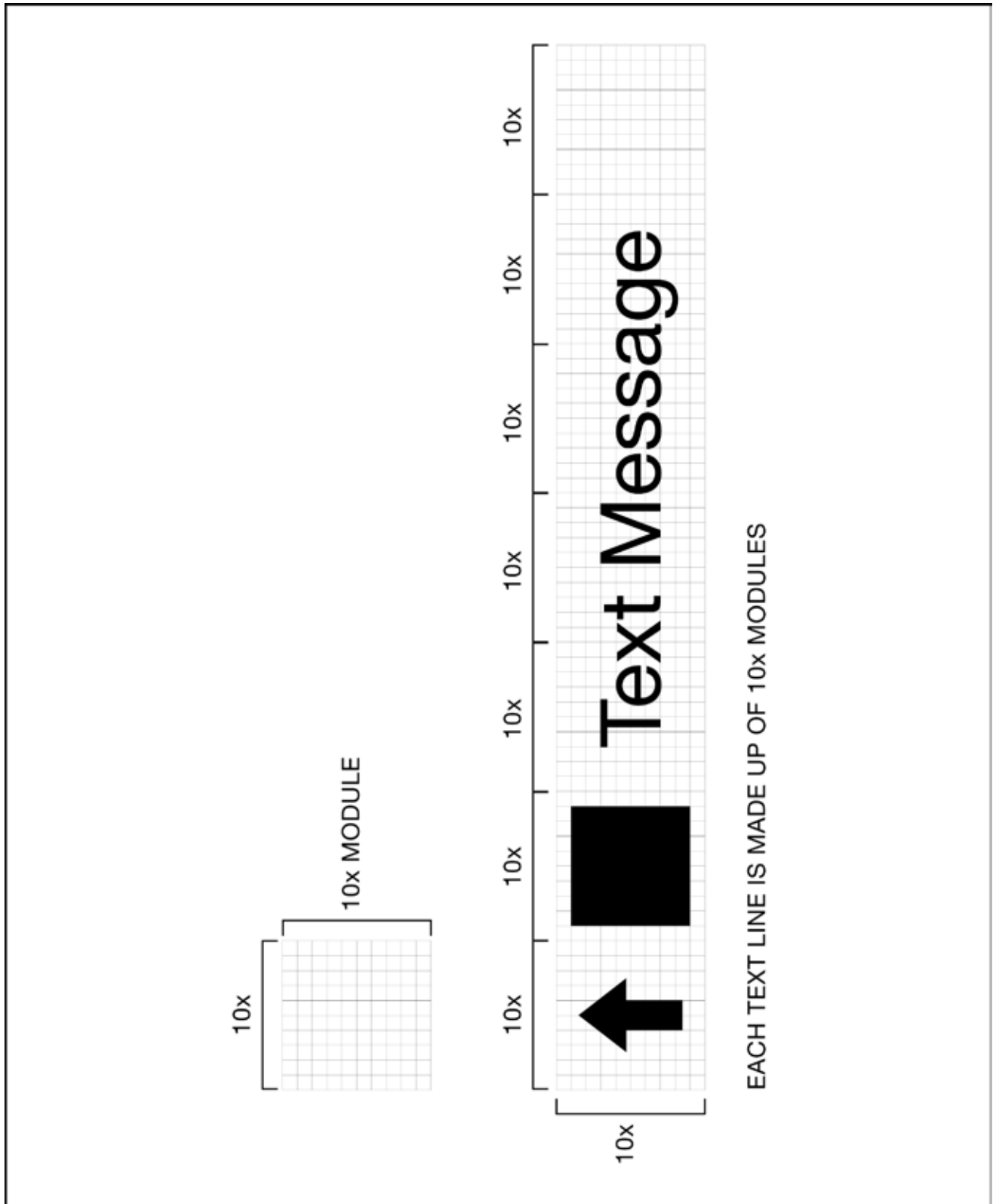
FIELD COLOR CHANGE

DIRECTIONAL CHANGE



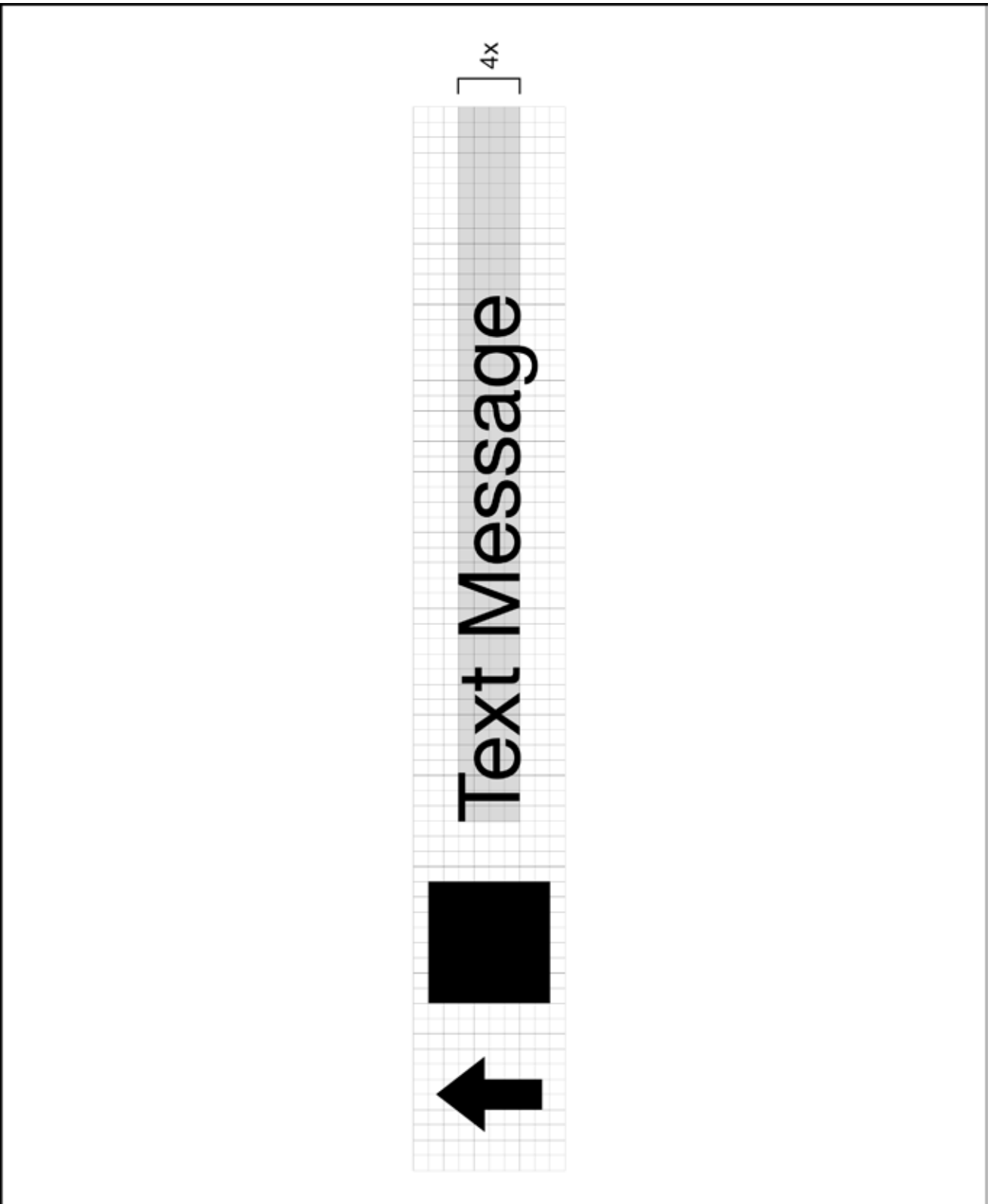
Dividing Lines

Exhibit II-4-10



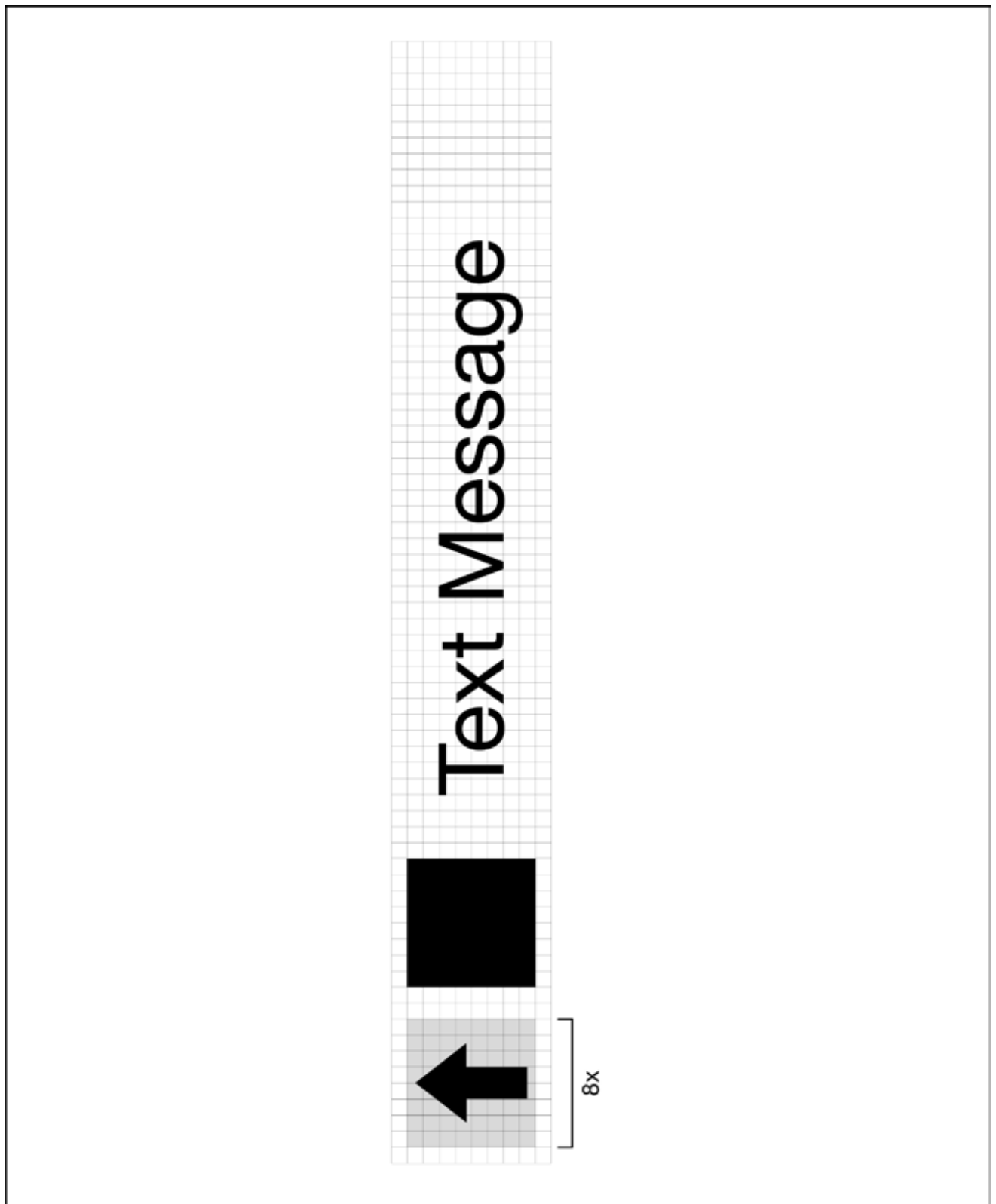
Grid Elements - 10x Module and Text Line

Exhibit II-4-11



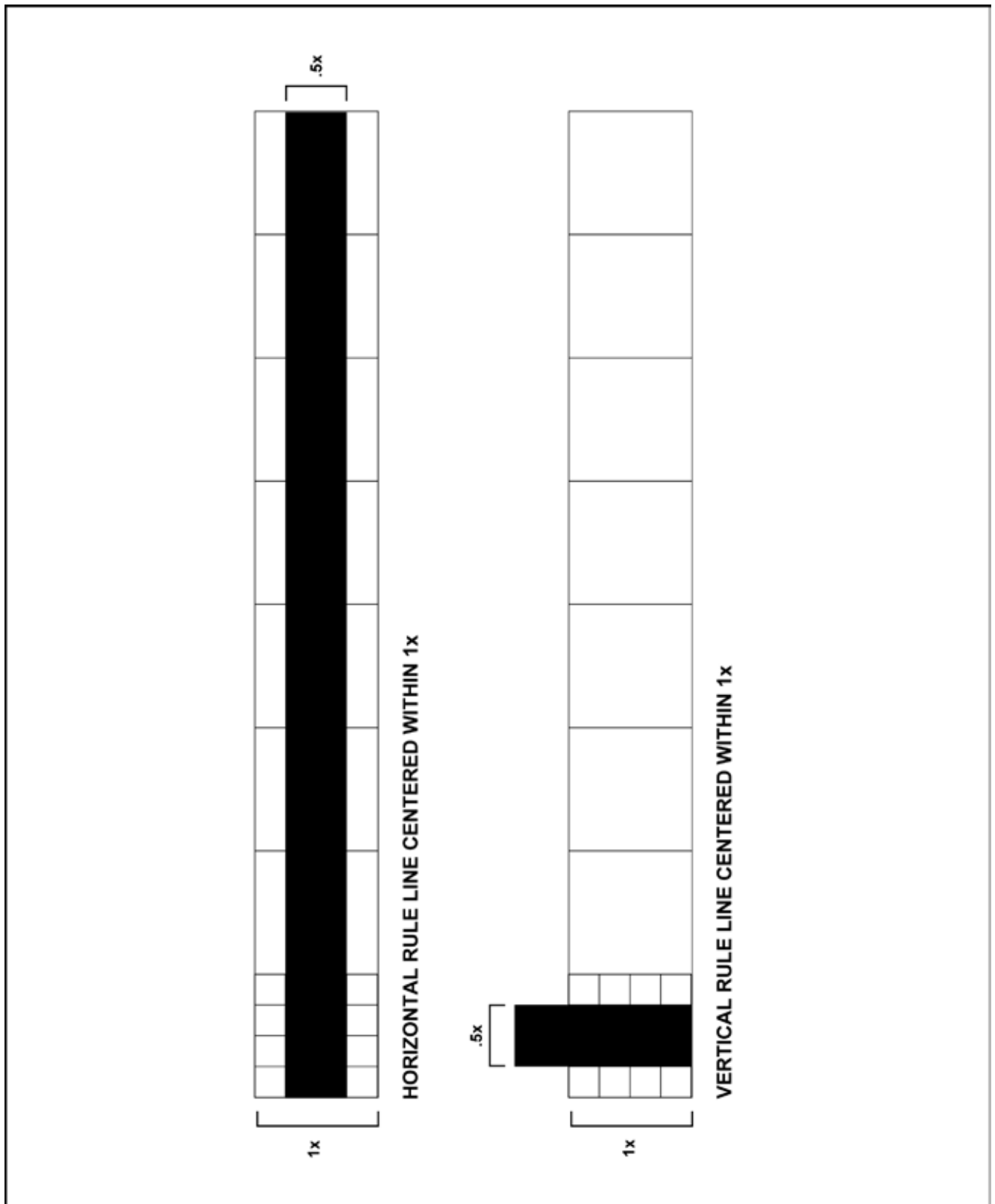
Grid Elements

Exhibit II-4-12



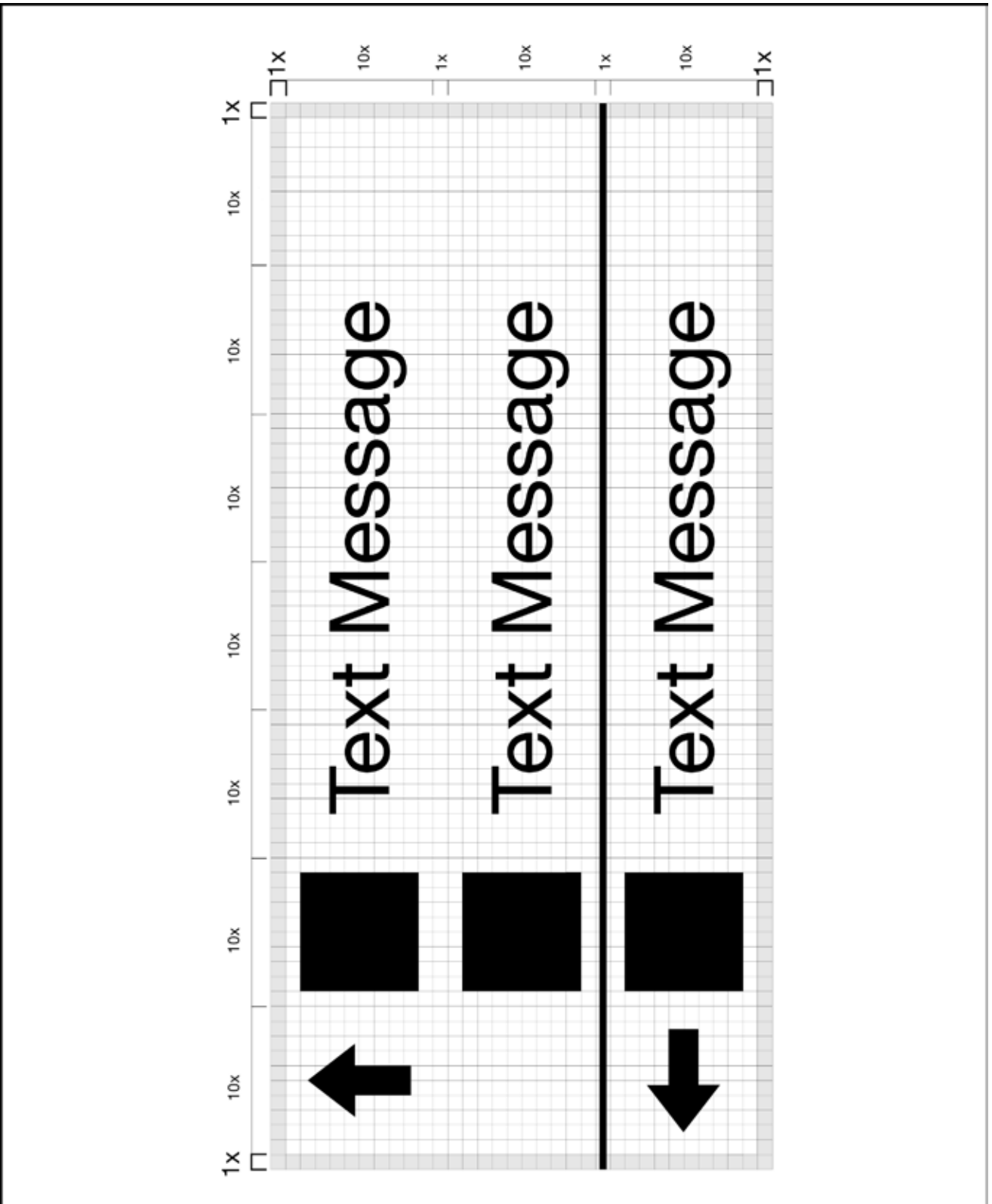
Grid Elements - Arrow Field

Exhibit II-4-13



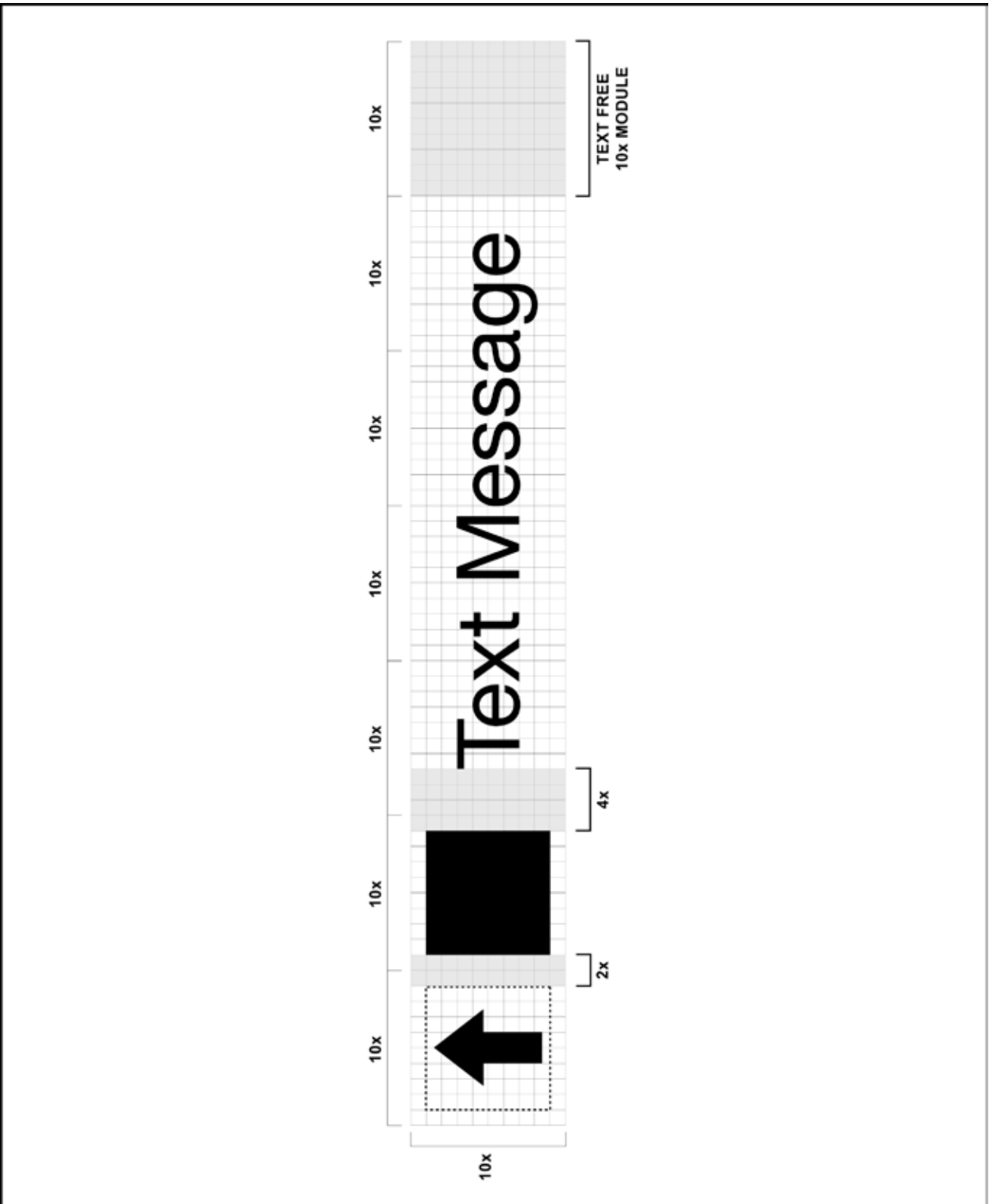
Grid Elements - Rule Line

Exhibit II-4-14



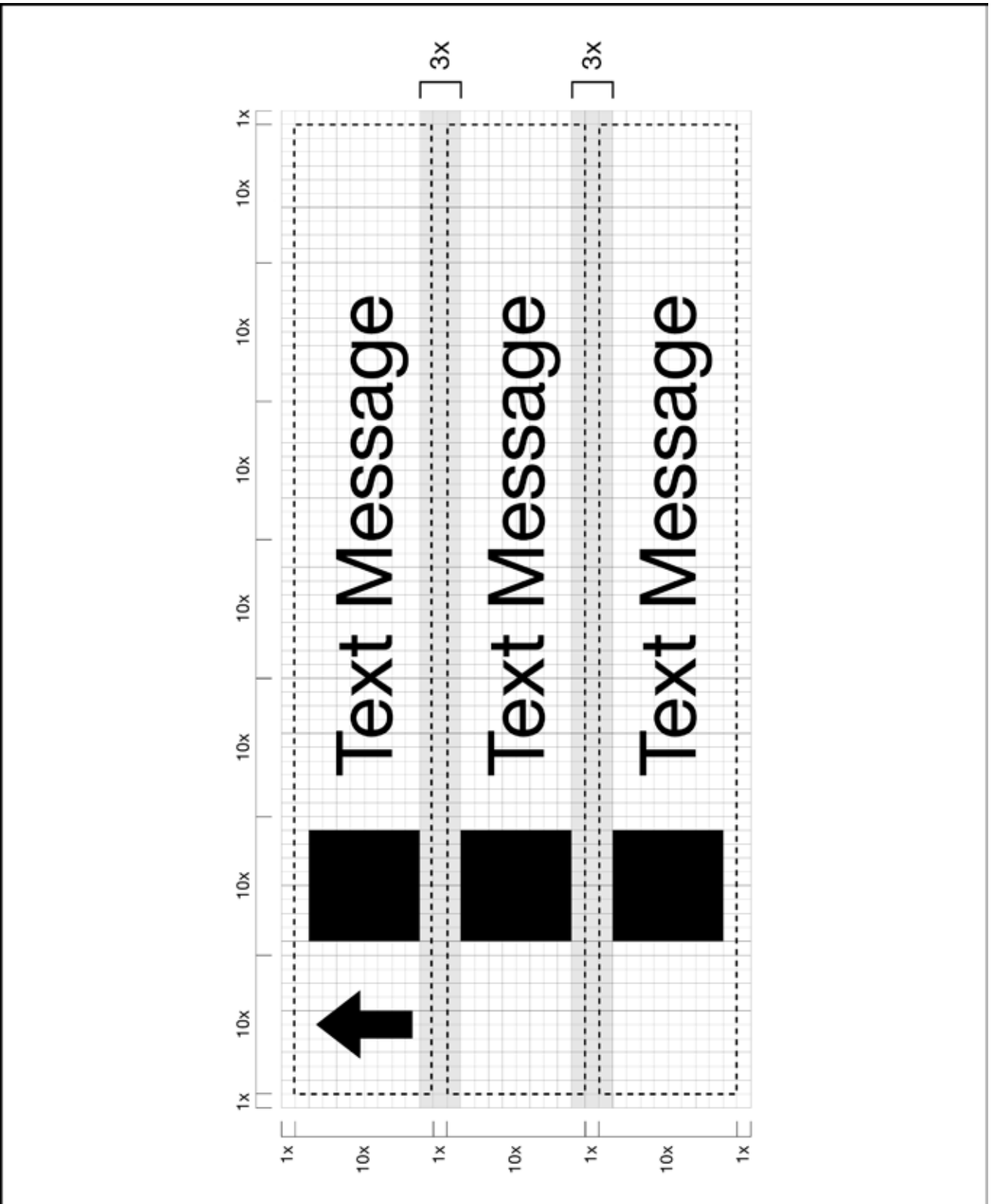
Grid Elements- Border

Exhibit II-4-15



Grid Elements - Horizontal

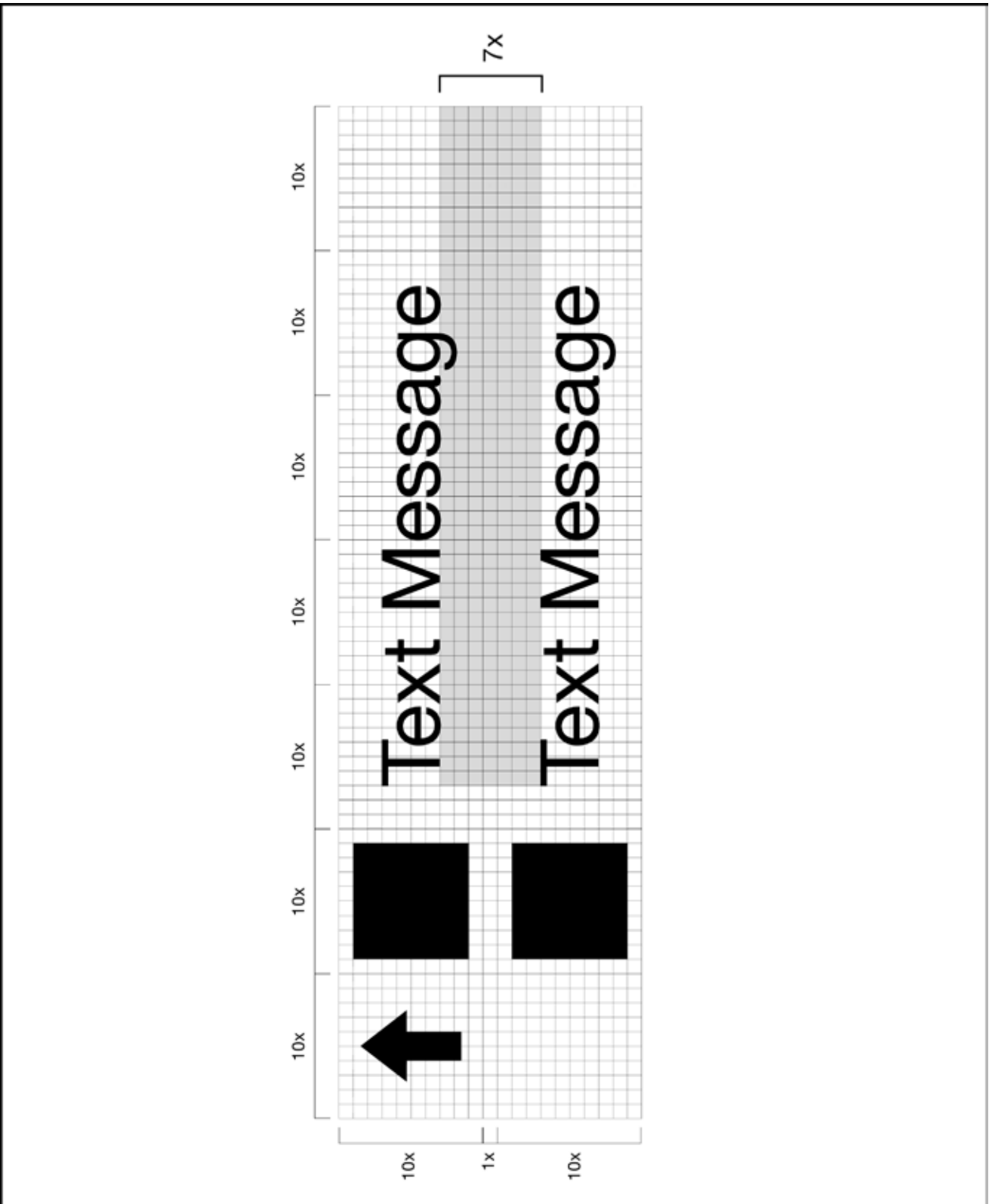
Exhibit II-4-16



Grid Spacing - Vertical




Exhibit II-4-17









Grid Spacing - Vertical

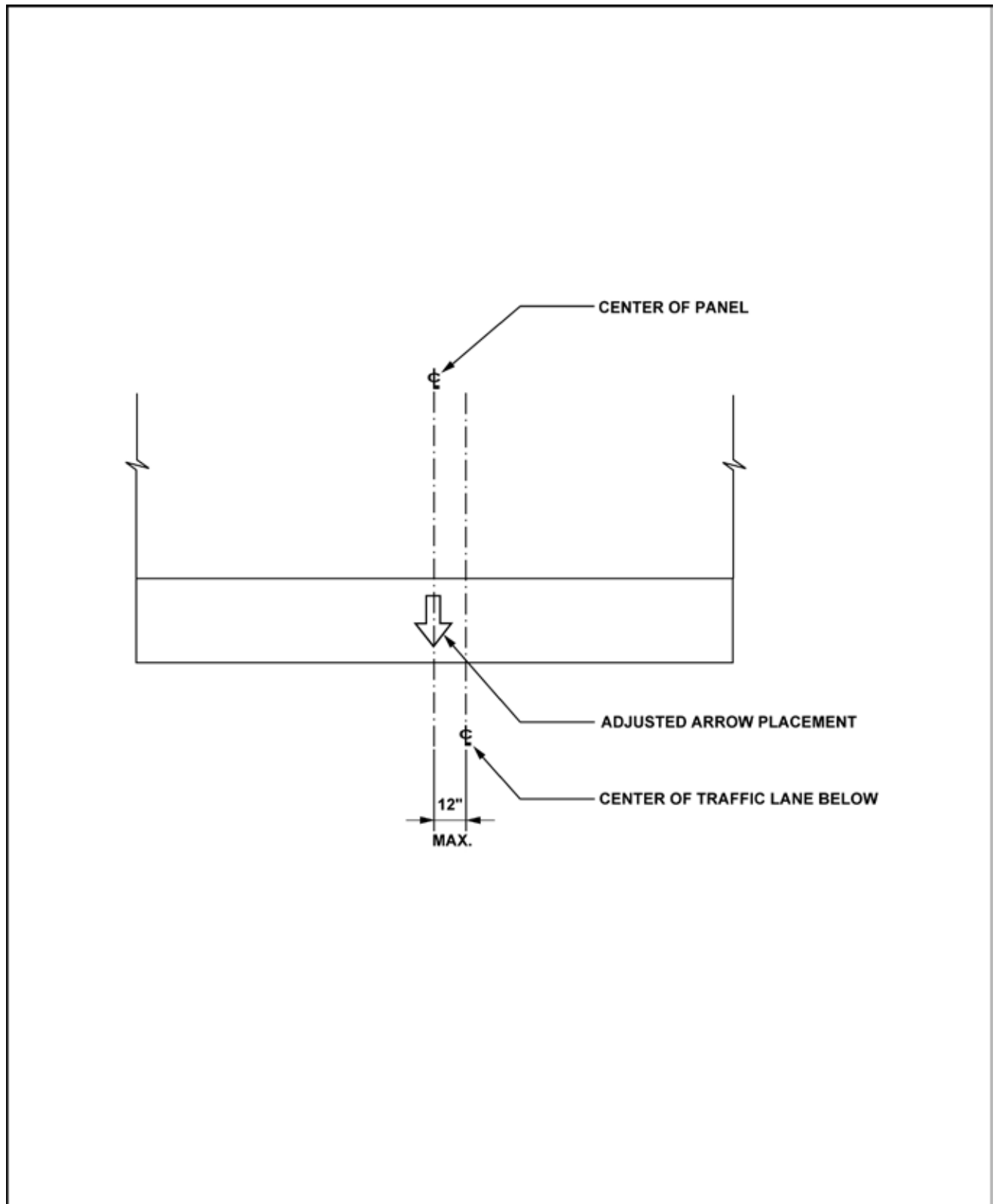
Exhibit II-4-19

TERMINAL 1	<div><div> All Flights</div><div> Hourly Parking</div><div>Daily Parking</div></div>		INCORRECT SYMBOL USAGE
-------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	------------------------

TERMINAL 1	<div><div> All Flights</div><div> Hourly Parking</div><div> Daily Parking</div></div>		CORRECT SYMBOL USAGE
-------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------	----------------------

Symbol Usage

Exhibit II-4-20



Horizontal Arrow Placement

Exhibit II-4-21

4.1.3.2 Grid Spacing

- A.** The spacing between arrow field and international symbol field shall be 2x (**Exhibit II-4-16**).
- B.** The spacing between international symbol and text message shall be 4x (**Exhibit II-4-16**).
- C.** Once the arrow (where applicable), symbol, text, and spaces have been placed according to the module, the overall length of the panel shall be adjusted to ensure one full text-free module of 10x (**Exhibit II-4-16**). Refer to this section, **Paragraph 4.1.5** for more information on overall panel size.
- D.** When lines of text are placed on top of one another, there is to be 3x between all symbol and arrow squares (**Exhibit II-4-17**). Therefore, when one 10x module is placed on top of another to create the grid for the sign layout, an additional 1x must be added in between the 10x modules to create the 3x spacing.
- E.** One additional unit (x) is added to the overall width of a panel for each vertical rule line (**Exhibit II-4-18**).
- F.** When lines of text are placed on top of one another, there is to be 7x from baseline to the top of the cap height (**Exhibit II-4-19**).

4.1.3.3 Additional Guidelines

- A.** All international, terminal, and gate symbols shall be left aligned to the left of the text message.
- B.** Each change in arrow direction and change in field color is marked by a horizontal rule.
- C.** Within each field color, no duplication of arrows in the same direction will be allowed.
- D.** Messages in the same field color following the same path shall be combined under one arrow.

E. If necessary, it is acceptable to duplicate symbols that have messages that are similar but not exactly the same. Such as would be used for parking or bag claim directional signs (**Exhibit II-4-20**).

F. All text messages shall be left aligned, even if some messages are not accompanied by a symbol.

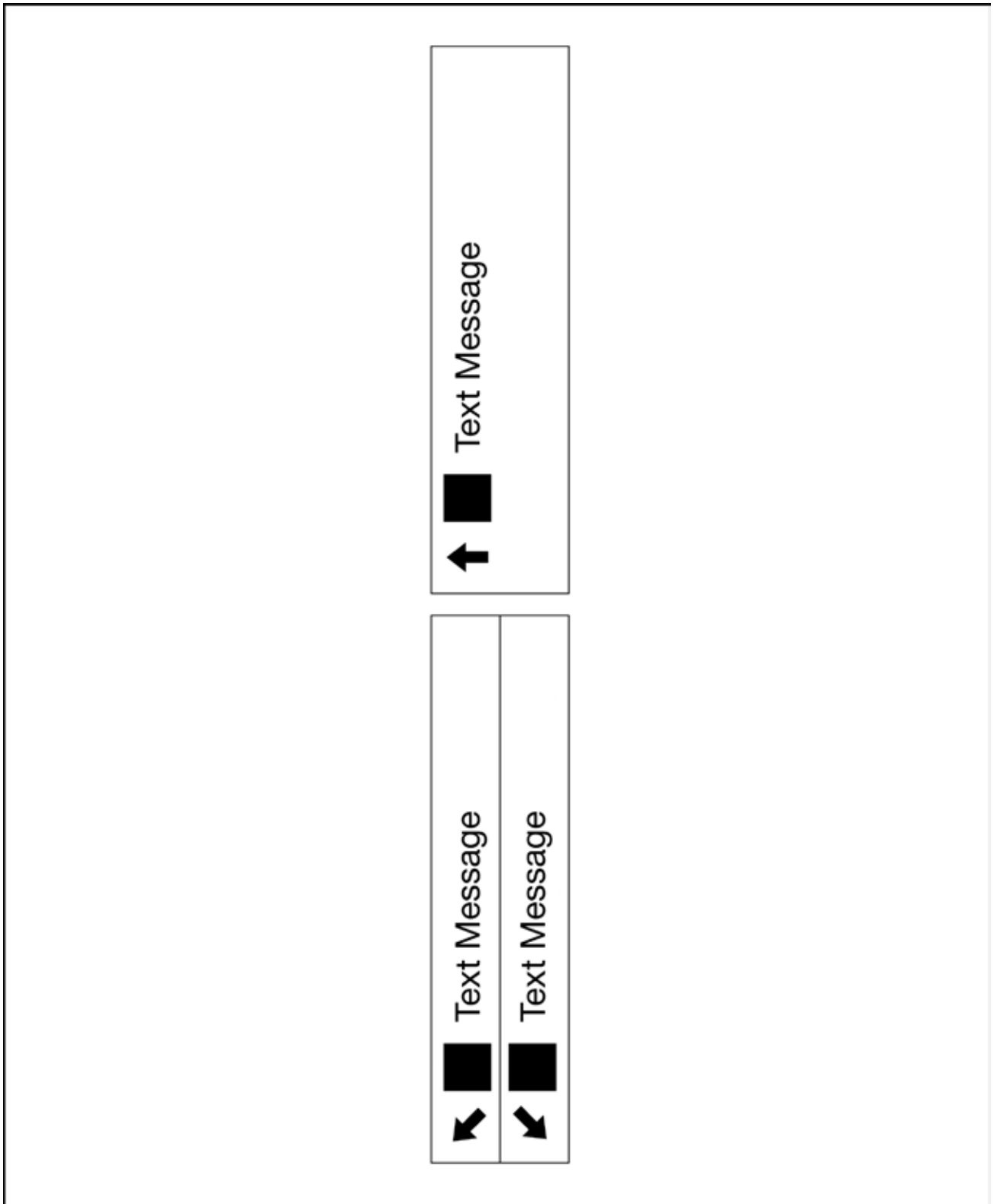
G. For signs that include a list, the grid is no longer based on the 10x module. The grid for a sign with a list is based on the individual unit x. This sign has 4x between each message from baseline to the top of the cap height. The layout of the rest of the sign follows all of the standard rules above.

H. A list may consist of business names that are always listed in alphabetical order. A sign without an arrow band and several text messages without symbols are also considered a list.

I. There is always one blank text line at the bottom of a sign that has a side arrow band. The exception to this rule is interior signs in low overhead conditions (**Exhibit II-4-22**).

4.1.3.4 The following rules apply specifically to exterior overhead truss signs, exterior-cantilevered signs, and interior overhead Type “B” signs:

A. All arrows on exterior overhead truss signs, cantilevered signs, and interior overhead Type “B” signs shall have an arrow band along the bottom of the sign panel.



Low Overhead Conditions

Exhibit II-4-22

B. Arrows shall be centered over the traffic below. This layout will result in varying placements of the arrow. The arrow may or may not be centered with the text in the panel or placed under the symbol in the panel. If possible, try to be consistent with the placement of the arrows in adjacent panels. Where the center of the panel is within 12" of the center of the lane, the arrow may slide to be centered on the sign panel (**Exhibit II-4-21 and II-4-23**). Sign designers must closely coordinate their work with roadway truss or bridge designers to ensure this sign-to-lane alignment.

C. The field color for the arrow band shall match the field color of the message directly above the arrow band.

D. A vertical rule shall be placed between each lane message (**Exhibit II-4-24**).

E. A parent message may continue across multiple panels on overhead truss signs where all destinations on that truss are directed to the same terminal area. Where multiple terminal area destinations exist on the same sign truss, each panel shall have its own parent message (**Exhibit II-4-22 through II-4-25**).

4.1.3.5 The following rules apply specifically to exterior post-and-panel signs and interior Type "A" signs:

A. All arrows on exterior post-and-panel signs and on interior way finding Type "A" signs shall be placed in an arrow band on the left-hand side of the panel.

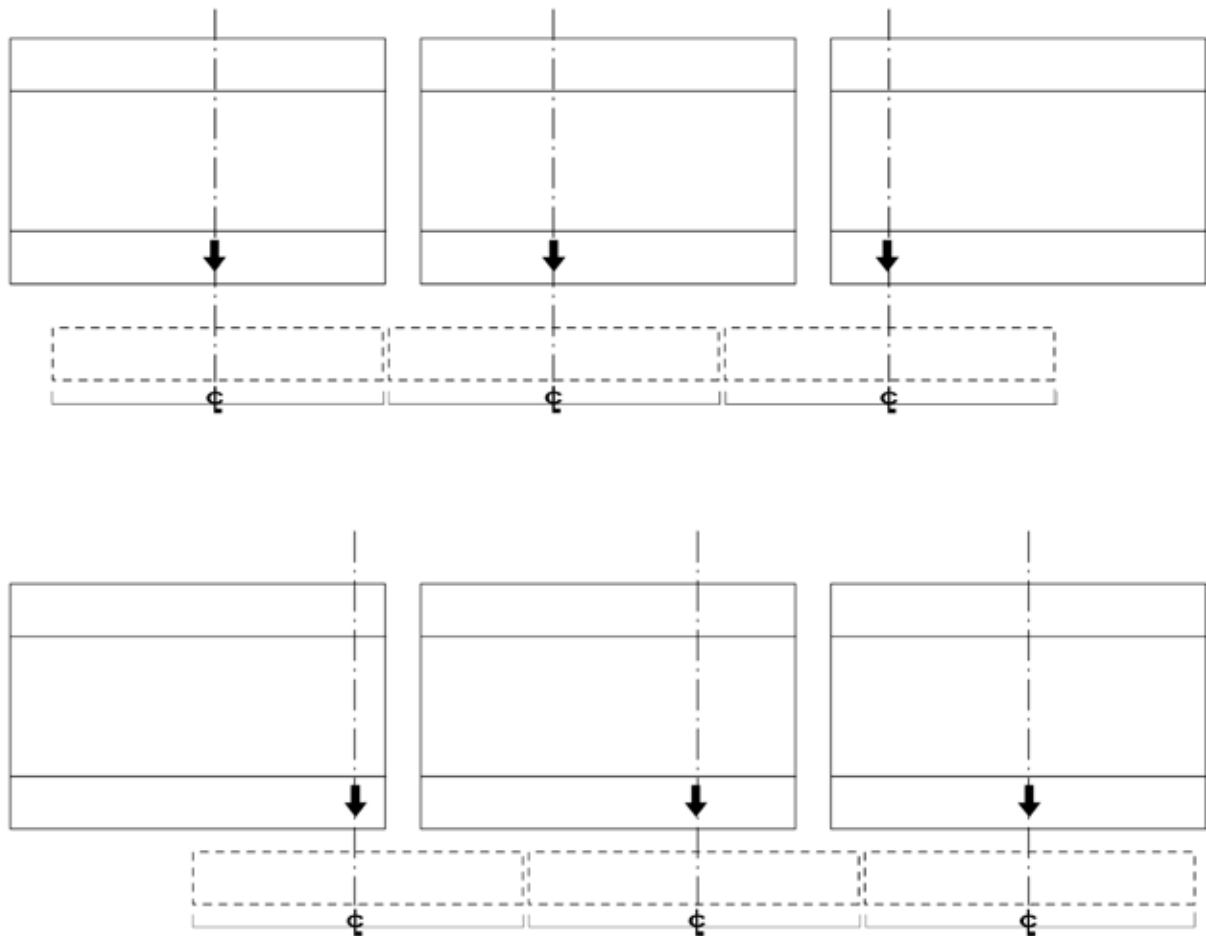
B. When an arrow represents more than one message, the arrow shall be placed on the line of the first message with blank spaces in the arrow band below (**Exhibit II-4-26**).

4.1.4 Panel Shape: All Washington Dulles International Airport signs shall have square corners. All traffic regulatory and warning signs shall have rounded corners. The corner radii shall match those specified in MUTCD with VDOT Supplement.

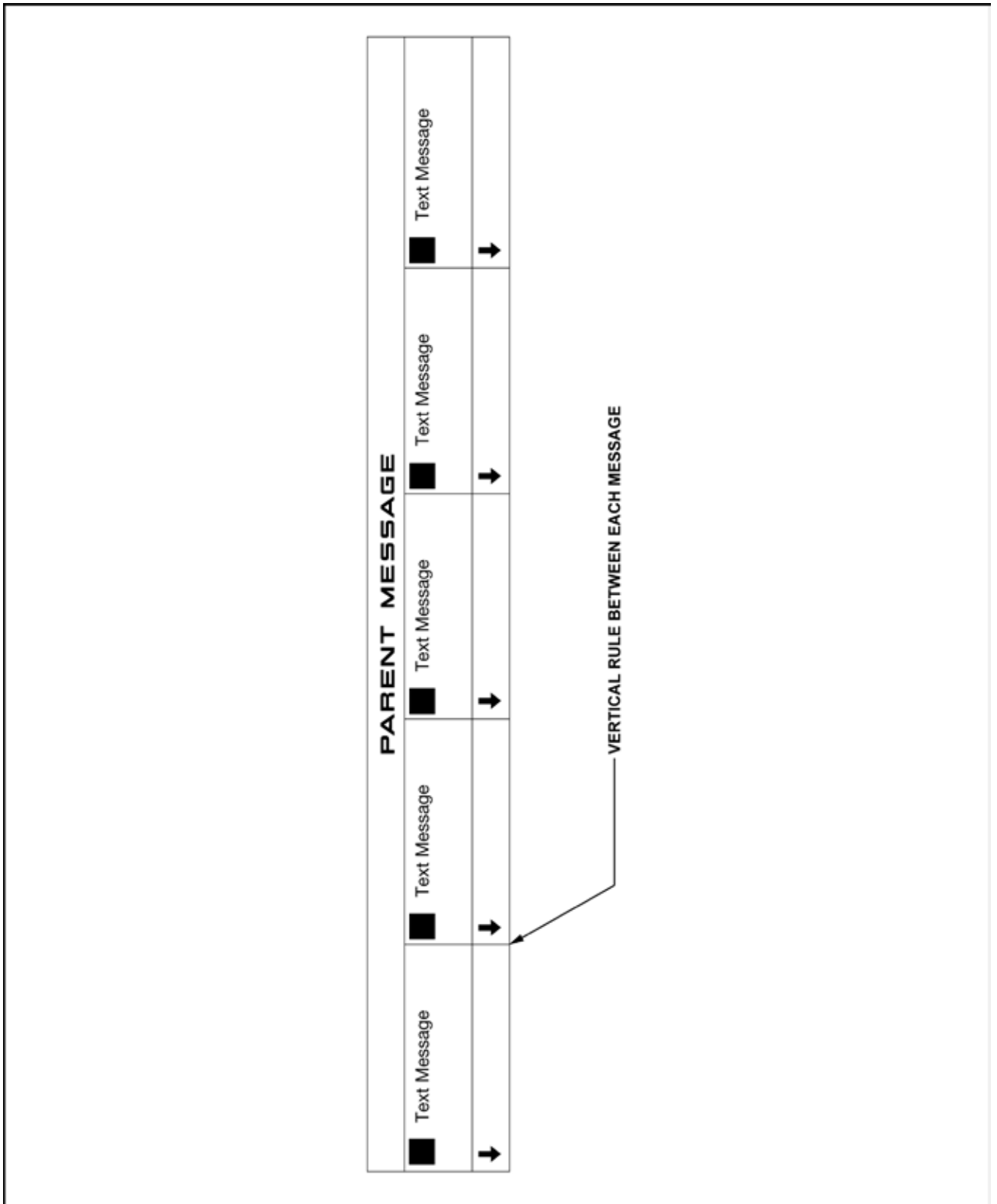
4.1.5 Overall Panel Size: Any sign panels that are mounted adjacent or in close proximity to one another, such as on a truss or along the length of a corridor, shall match in overall panel size and in mounting height. If one panel holds more messages, and/or horizontal rules than the other, the sign panel with fewer messages shall use the dimensions of the sign panel with the most messages (**Exhibit II-4-22**).

4.1.6 Panel Widths: The grid module and length of message determine all panel widths. Even with a limited number of text heights and allowable messages, exterior panel sizes will vary somewhat due to the addition of vertical rules. Parent messages can also determine the length of a sign. If they are the longest message, there should always be at least 1 10x module—as explained in **Paragraph 4.1.3**—clear on each end of the centered parent message (**Exhibit II-4-27**). In addition to the primary directional signs, some tertiary sign types may have two columns of text messages. An applications for this sign type is outlined in this section, **Chapter 5, Paragraph 5.2**.

4.1.7 Panel Heights: The number of messages determines all panel heights. Interior signs are allowed more messages per panel due to the extended time a passenger has to read and absorb the information. The specific location of a sign always dictates the panel height and the additional guidelines for each sign. The maximum number of message lines for an exterior overhead sign is five. This includes both the "parent" message along with the arrow band. The maximum number of message lines for an exterior post-and-panel sign is eight. This includes the "parent" message along with the blank line at the bottom of the sign. The maximum number of messages of an interior sign in high overhead applications is 10. This includes the blank line at the bottom of the sign. The maximum number of messages for a low overhead interior sign is two. These sign types do not include any blank lines (**Exhibit II-4-28**). For more information regarding messages refer to **Paragraph 4.5.9** in this section.

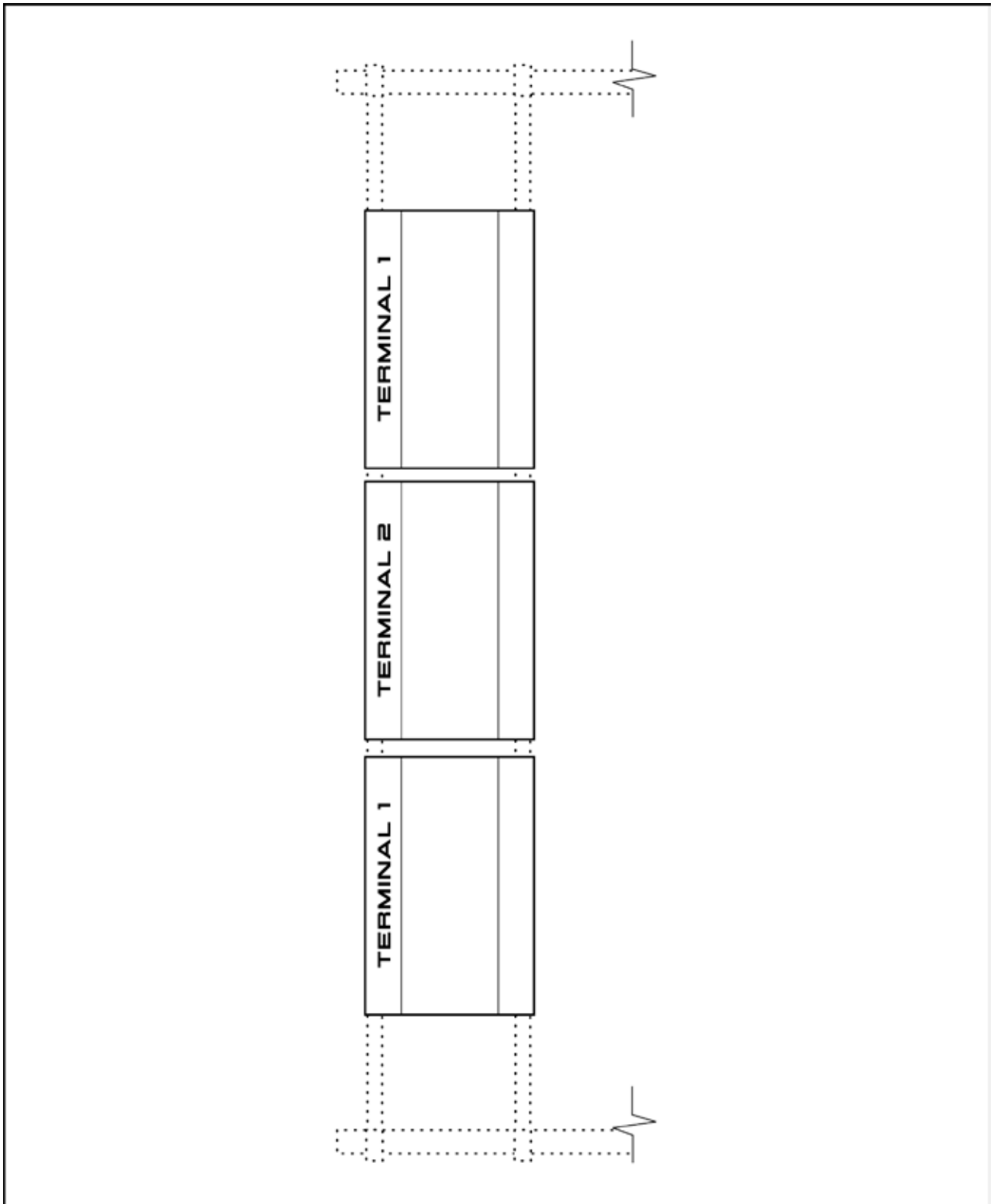


NOTE:
BASED ON 12' WIDE LANE



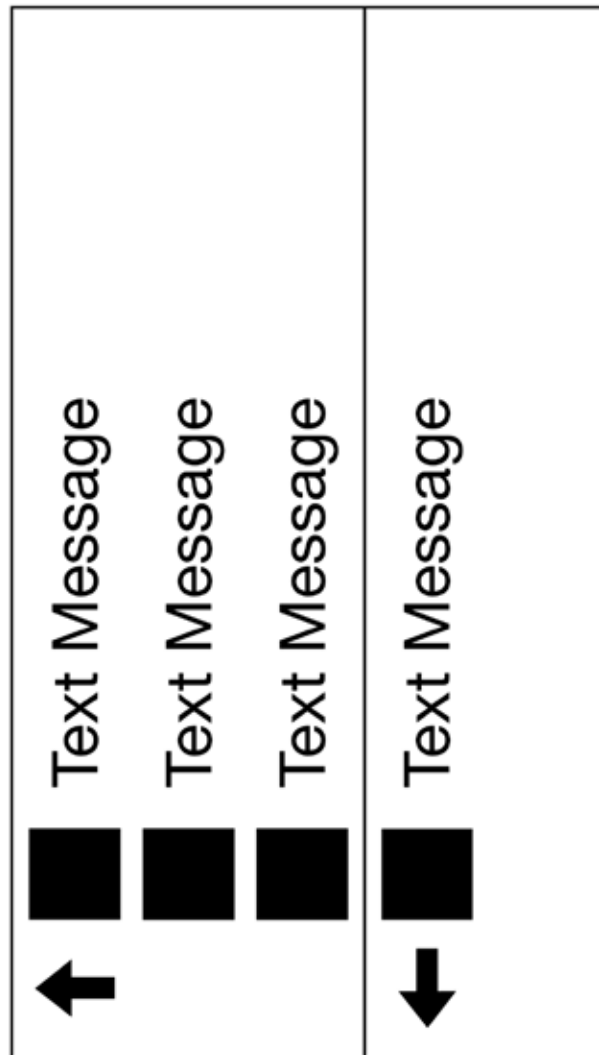
Vertical Rule Line Placement

Exhibit II-4-24



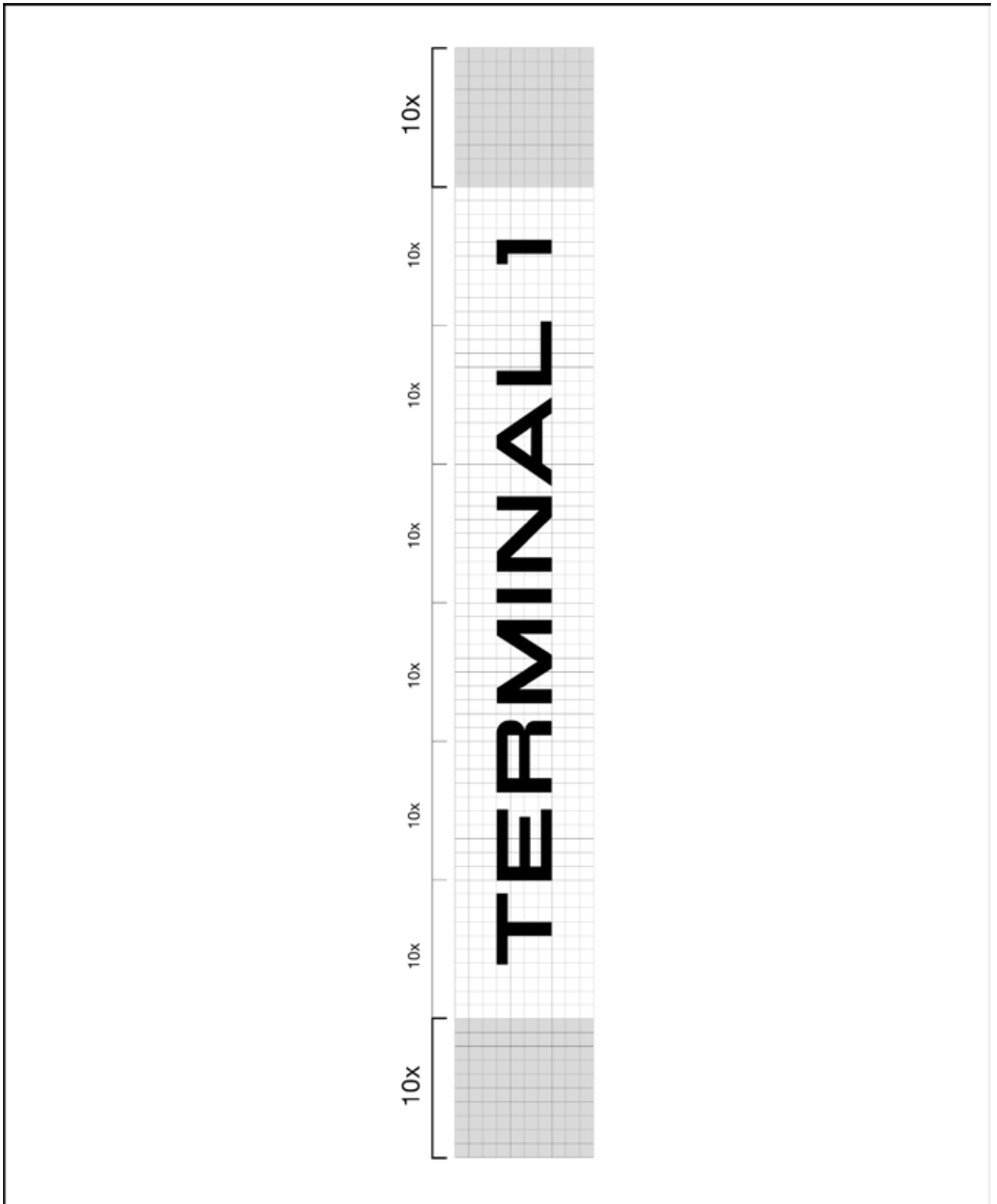
Individual Parent Message

Exhibit II-4-25



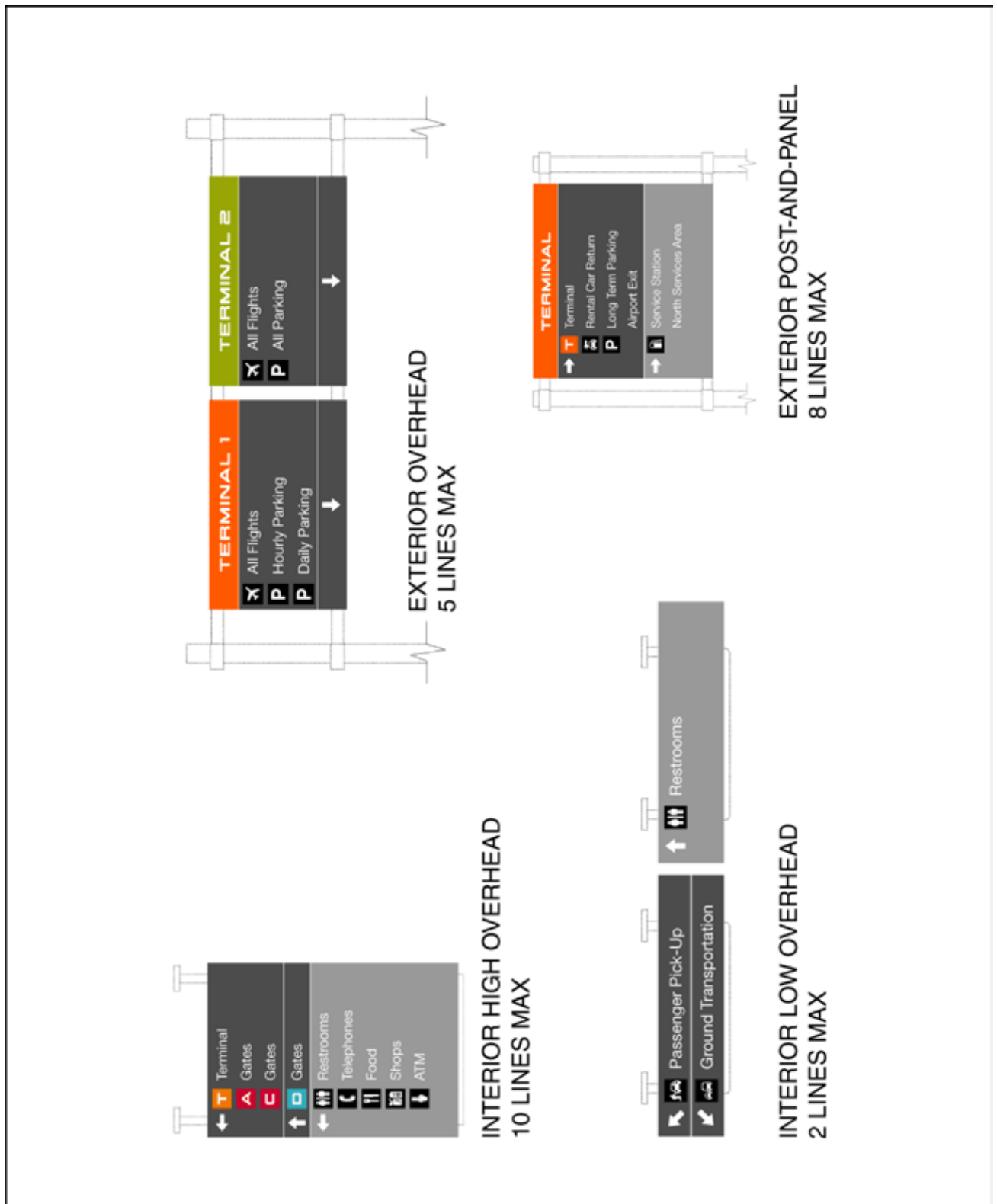
Vertical Arrow Placement

Exhibit II-4-26



Panel Widths

Exhibit II-4-27



Panel Height

Exhibit II-4-28

4.2 Materials and Finishes

4.2.1 Material: Materials for signs shall be readily available, easily fabricated, cost effective, and durable. Interior sign materials shall relate to the materials and design theme of the building in which they are located. Exterior sign materials should generally be painted metals and applied adhesive vinyl. In the case of internally illuminated signs, signs may be fiber-reinforced polyester or acrylic. Temporary signs can be made of wooden materials with paint.

4.2.2 Paint Finishes: The following primers and sealant shall be used on all metal sign panels and steel sign structures to ensure acceptable weathering and durability.

4.2.2.1 Acrylic Linear Polyurethane Enamel: Two components, acrylic aliphatic isocyanate/acrylic polyurethane having ultraviolet (UV) inhibitors and engineered for exterior application by Matthews Paint Company or approved equal.

4.2.2.2 Primer for Aluminum: Two-part component primer: One-coat Matthews 74-734 and 74-735 Metal Pretreat at .25 mils dry film thickness or one-coat Matthews 74-793 Spray Bond at .15 to .25 mils dry film thickness or Wyandotte/AKZO Grip-Guard Wash Primer (2Afy-31284) with Grip-Guard Wash Primer Hardener (10AFK-31285) combined and applied per manufacturer's specifications or approved equal (primer) for the application of the pre-approved and pre-formulated paint system.

4.2.2.3 Primer for Steel: Two-part component primer: One-coat Matthews 74-734 and 74-735. Metal Pretreat at .25 mils dry film thickness or Wyandotte/AKZO Grip-Guard Wash Prime (2Afy-31284) with Grip-Guard Wash Primer Hardener (10AFK-31285) combined and applied per manufacturer's specifications or approved equal (primer) for the application of the pre-approved and pre-formulated paint system.

4.2.2.4 Clear Sealers: Crystal clear matte polyurethane sealers by Matthews Paint Company or approved equal.

Sealers are to resist rust and corrosion associated with exposure to air. As required and of highest quality available, applied per manufacturer's specifications.

4.2.2.5 Temporary Signs: Where wood panel construction is used, the field color shall be painted with a minimum of two coats of gloss alkyd paint. The sides and back shall be painted the same color as the face of the sign. All posts shall be painted signage black to seal and protect the wood. Graphics may be vinyl durably adhered or painted with alkyd gloss or semi-gloss paint. The Authority construction project identification sign shall include a decal provided by the Authority.

4.2.3 Adhesive Vinyl Sheet Materials:

4.2.3.1 Vinyl Lettering: Vinyl lettering shall be used to depict text, symbol images, and arrows on all signs. For exterior signs, dividing lines will also be made of vinyl materials. All vinyl shall be white. All grays, black, and colors defined for use on airport property are intended to be paint. The type of vinyl used varies based on sign type, placement, and illumination. All interior signs shall use 3M Scotchcal Electrocut Graphic Marking Film in non-reflective Matte White 7725-20. The 7725 series vinyl is designed for pre-spaced, electronically cut graphics with a permanent application. A transparent synthetic liner allows for improved cutting, weeding, and lay-flat characteristics. The film is a 2 mil, opaque vinyl, with an overall thickness of 3-4 mils with adhesive that is clear and pressure sensitive and a transparent synthetic liner (for cutting, weeding and lay-flat characteristics). Exterior signs with face illumination shall use 3M Scotchlite Engineer Grade Reflective Sheeting 3290 White. This vinyl is applied with a pressure-sensitive adhesive and is permanent. It has excellent reflectivity when wet and retains reflectivity when viewed at wide entrance angles. The thickness with adhesive is 7 mil, the adhesive is white, and the liner is white craft paper. The application temperature is 65° F minimum. This product carries a seven year warranty. Also allowed for this application is 3M Scotchlite Reflective Sheeting for Gerber Scientific electronic cutting equipment. This material should only be used when the machinery does not accept the 3290

product. This material retains 90 percent of its retro-reflectivity when totally wet, is a permanent application, and resists cracking in cold climates. It is intended for use on pre-spaced electronically cut graphics. The thickness is 7-8 mils with adhesive, the adhesive is clear, pressure sensitive, and the liner is 78 lbs. white craft paper. The product warranty is five years on signs. Use 3M Scotchlite High Intensity Grade Reflective Sheeting 3870 Silver on exterior signs that are not illuminated or in areas with ambient lighting. This product provides the highest brightness, is for permanent applications, and uses a pressure sensitive adhesive. It has excellent reflectivity when totally wet and retains reflectivity when viewed at wide entrance angles. The thickness with adhesive is 10 mil, the adhesive is tan, and the liner is clear polyolefin. This vinyl uses the series 880 clear or colored over laminate. The application temperature is 65° F minimum and carries a warranty of 10 years.

4.2.4 Panel Materials

4.2.4.1 In general, all roadway signs, materials, and finishes shall meet the following standards:

- A. VDOT: Road and Bridge Specifications.
- B. DOT: The Manual On Uniform Traffic Control Devices (MUTCD) and the Virginia Supplement to the Same and the Standard Highway Signs manual.
- C. AASHTO: A Policy on Geometric Design of Highways and Streets.
- D. AASHTO: Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals.

4.2.4.2 A summary of basic requirements is given below. The designer must consult the above standards for final design.

4.2.4.3 Overhead Sign Panels: Panels shall be fabricated from 0.063" aluminum face-sheet and 0.040" aluminum

back-sheet laminated to 2" thick waterproof paper or aluminum honeycomb core, edged with extruded aluminum channels.

4.2.4.4 Ground-Mount-Signs: Sign panels shall be fabricated from a 0.063" aluminum face-sheet and 0.040" aluminum back-sheet laminated to 2" thick waterproof paper or aluminum honeycomb core material, edged with extruded aluminum channels. Regulatory signs shall consist of a single metal plate fabricated from 0.080" aluminum sheet.

4.2.4.5 Temporary Ground-Mount Signs: Sign panels shall be constructed of MDO plywood. Temporary signposts may be wood timber supports, sized according to MUTCD standards, to support each sign depending upon size and weight of sign. But in no case shall the post be smaller than 4" x 4" (nominal). The posts shall also be structurally sound and free of imperfections such as splits, cracks, or checks.

4.2.4.6 Construction Barricade Signs: All interior construction barricades shall be wrapped in one of three murals provided by the Authority: d² program artwork, public relations campaign artwork, or commercial programs including "Coming Soon" artwork for storefront barricades during tenant build-out. All murals shall be digitally printed on 3M Scotchprint or equal vinyl material. The vinyl grade shall be determined based on the level of traffic in the area and the amount of direct sunlight striking the wall area. Barricade substrates are to be determined by the A/E and shall be submitted to the Authority for approval in writing.

4.3 Structure And Mounting

4.3.1 General: Sign structures and mountings shall support signs for good visibility, facilitate illumination where required, and complement buildings and landscaping. They shall be fabricated from commonly available materials, shall be easily maintained, and shall not obstruct or pose any hazard to vehicular or pedestrian traffic. The new sign structures are designed to give the airport signs a distinctively different look from the VDOT signage on nearby highways to reinforce the sense that a driver has

arrived on the Airport campus. The new system also addresses the ongoing need to change sign messages frequently by introducing a modular construction system. The attachment details are unique for interior and exterior sign types, and are described in the modular overview sections below. Consultants, vendors, and/or fabricators shall be responsible for engineering of all interior and exterior sign elements. All specific conditions shall be verified and coordinated with record drawings, construction drawings, and/or actual site conditions, as necessary.

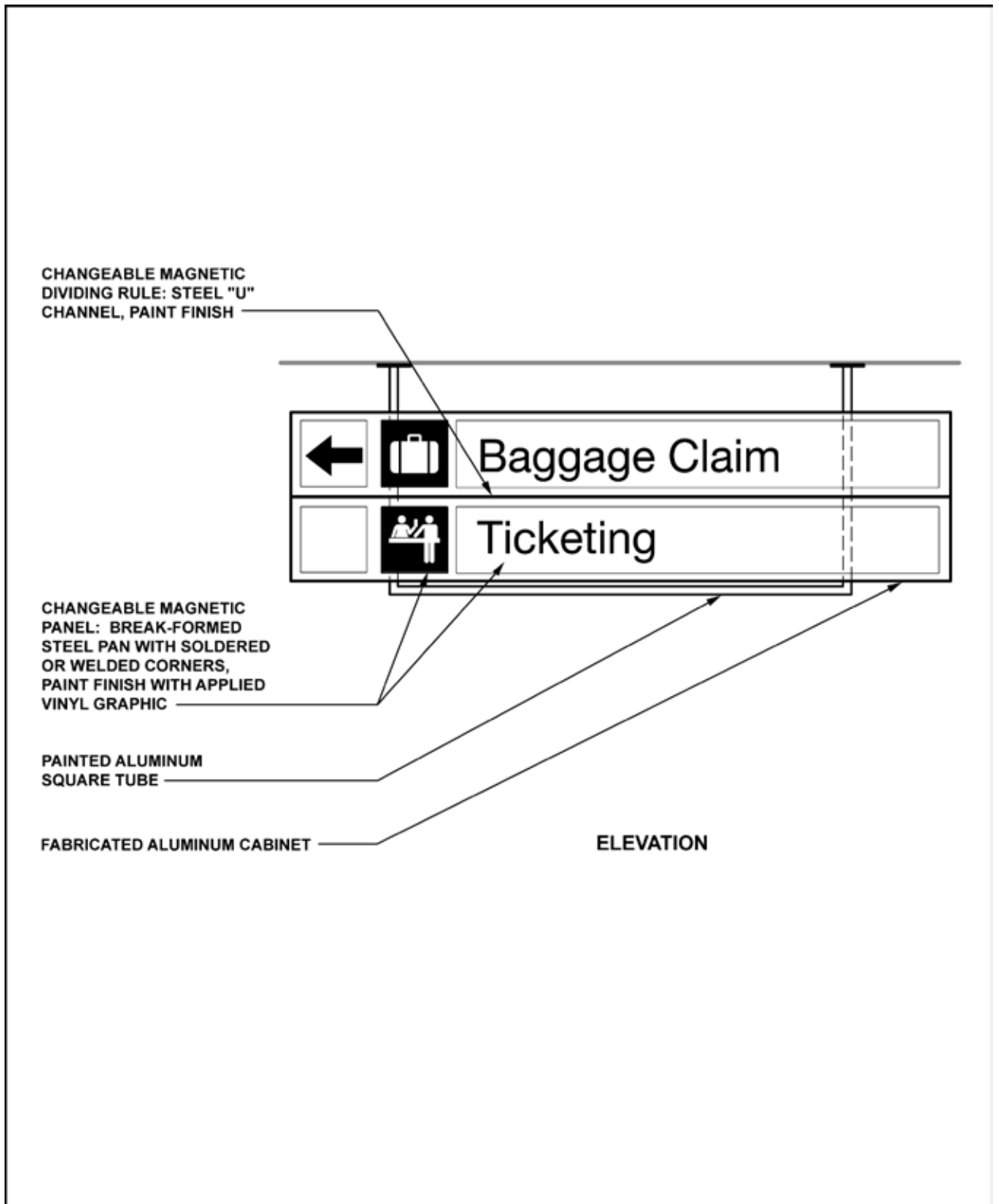
4.3.2 Interior Modular Construction: In general, all directional interior signs will be constructed using a base panel, with a top panel that carries a message, symbol, or arrow. The two panels are attached using a male-female connection, reinforced with magnetic plates. The base plate is a dimensional sign cabinet created using aluminum channels and front and back aluminum face panels. All fasteners are concealed. Attached to one face of the cabinet is a PVC (male) block to correspond to each and every potential arrow, symbol, and text message for that sign face. The PVC is mechanically fastened to the aluminum face panel and is painted to match the base panel color. In addition to these blocks, a linear strip is also attached in between each potential line of text where a horizontal dividing line would be placed. All of these attachments are equipped with magnetic plates and strips applied with adhesive to the outer face of all attachments. Each symbol, arrow, text message, and dividing line is placed on a steel pan (female). These elements can be snapped into place over the PVC/magnetic blocks and can be replaced without replacing the entire sign or through obvious “Band-Aid” solutions. Blank spaces that occur when multiple messages share one arrow direction shall be covered with a blank cover pan painted to match the text message field color. Where dividing lines are used, the steel cover pan shall be mechanically fastened to back panel and shall be painted white on all sides. Where a dividing rule is not needed, a horizontal cover pan painted to match the text message field color shall be placed over the linear strip dividing each message line. The base paint shall always match the color of the faceplate text message field. The horizontal-dividing rule serves as the separating

line between colors on the face of the panel. Each two-sided sign shall have a vertical structural member enclosed between two base panels, except for butterfly signs, where the structural members support from the side. The modular construction described will be repeated for the second sign base panel or sign face (**Exhibits II-4-29 through II-4-33**).

4.3.2.1 Wall Mount Signs: Wall mounting shall be determined based on wall construction and architectural conditions.

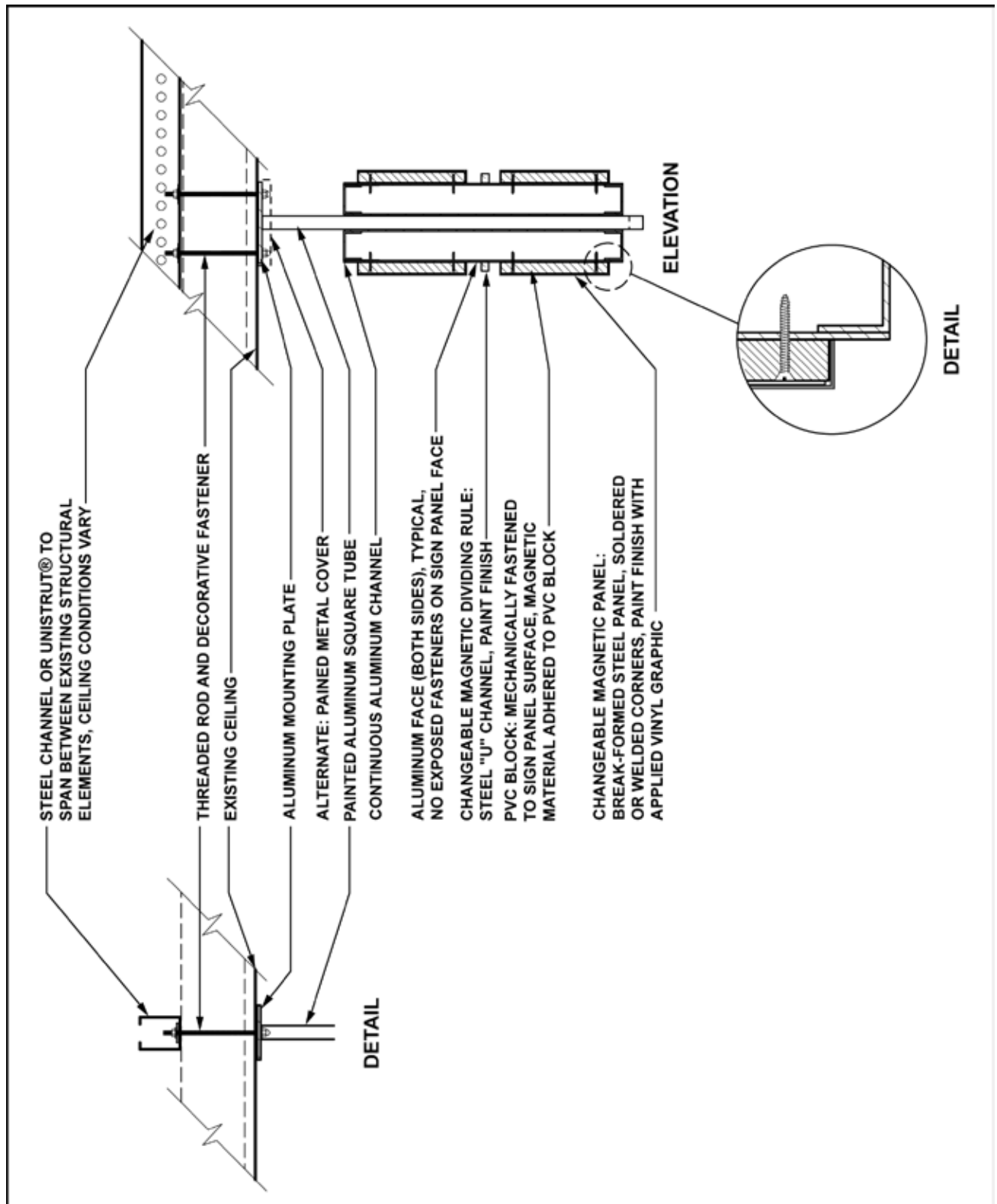
4.3.2.2 Mounting Heights for Interior Terminal Signs: Recommended mounting clearances (to finished floor):

- A. Primary and secondary overhead: 9' - 0".
- B. Primary and secondary wall mount: 8' - 0".
- C. Tertiary wall mount: 5' - 0".
- D. Tertiary counter mount: 3' - 6".
- E. Blade Signs: 8' - 0".



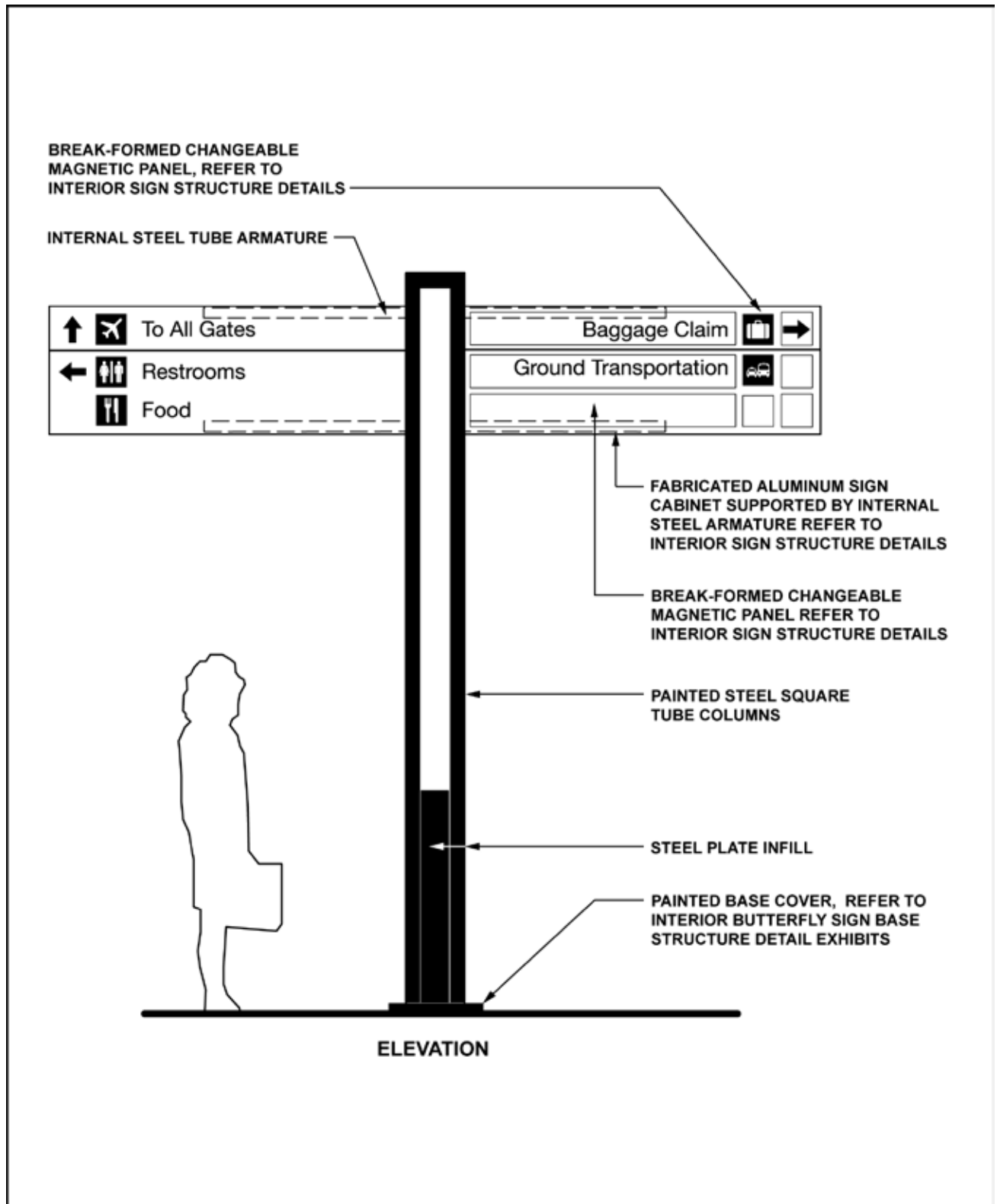
Interior Sign Structure

Exhibit II-4-29



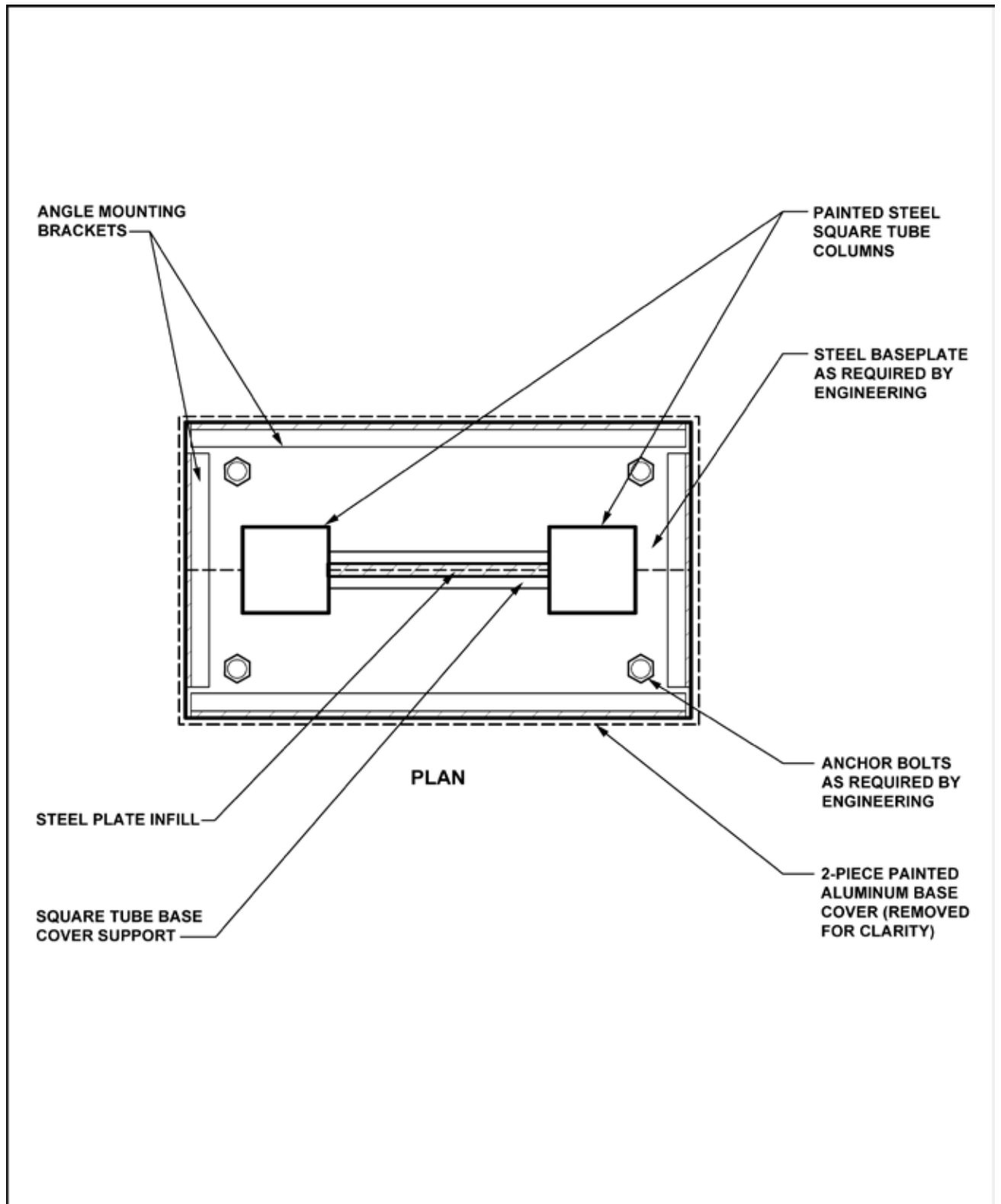
Interior Sign Structure Details

Exhibit II-4-30



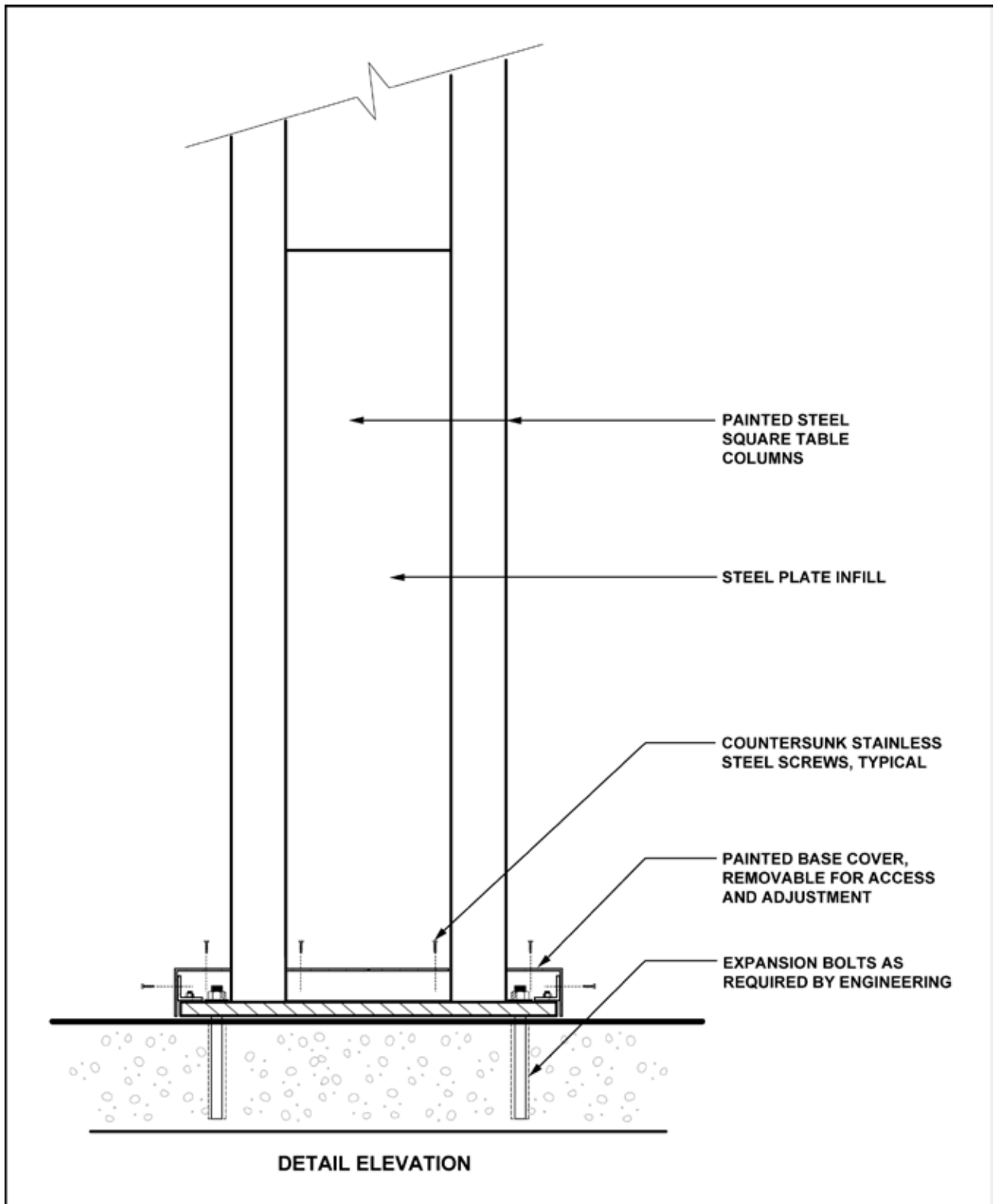
Interior Butterfly Sign Structure

Exhibit II-4-31



Interior Butterfly Sign Base Structure

Exhibit II-4-32



Interior Butterfly Sign Base Structure - Elevation

Exhibit II-4-33

4.3.3 Exterior Modular Construction: In general, all directional exterior signs will be constructed using a base panel, with an applied first surface panel that carries a message, symbol, or arrow. The first surface panels are attached with a simple screw connection and are intended to allow messages to change without prompting the replacement of the entire panel. The base plate varies based on the type of sign. Post-and-panel type signs have a base panel mounted to a rigid steel tube frame on all sides creating a cabinet construction. Overhead signs incorporate a base panel but have an added layer of backing material creating rigidity to decrease the possible effects of “oil canning.” All fasteners are painted to match the face material it is attaching. Where messages, arrows, or symbols will not be used, the base panel shall be left exposed; no blank plate shall be used. The base paint shall always match the color of the faceplate text message field. The horizontal-dividing rule serves as the separating line between colors on the face of the panel. The dividing lines will be vinyl applied directly to the base panel. On exterior signs, the structural members shall all be painted signage black. Where steel tube framework that holds the main sign panel is visible from the side, that framework, and the back panel, which is blank, shall be, painted Dulles Gray. The structure is intended to be a design element in the new sign standard. The collar connection on Post-and-Panels and on overhead truss signs does not serve a structural purpose, but reinforces the distinction between VDOT highway signs and the Washington Dulles International Airport campus. The connection of these elements shall be carefully crafted to ensure that they do not deteriorate signs in any way. The placement of signs relative to the roadways shall follow VDOT and MUTCD standards.

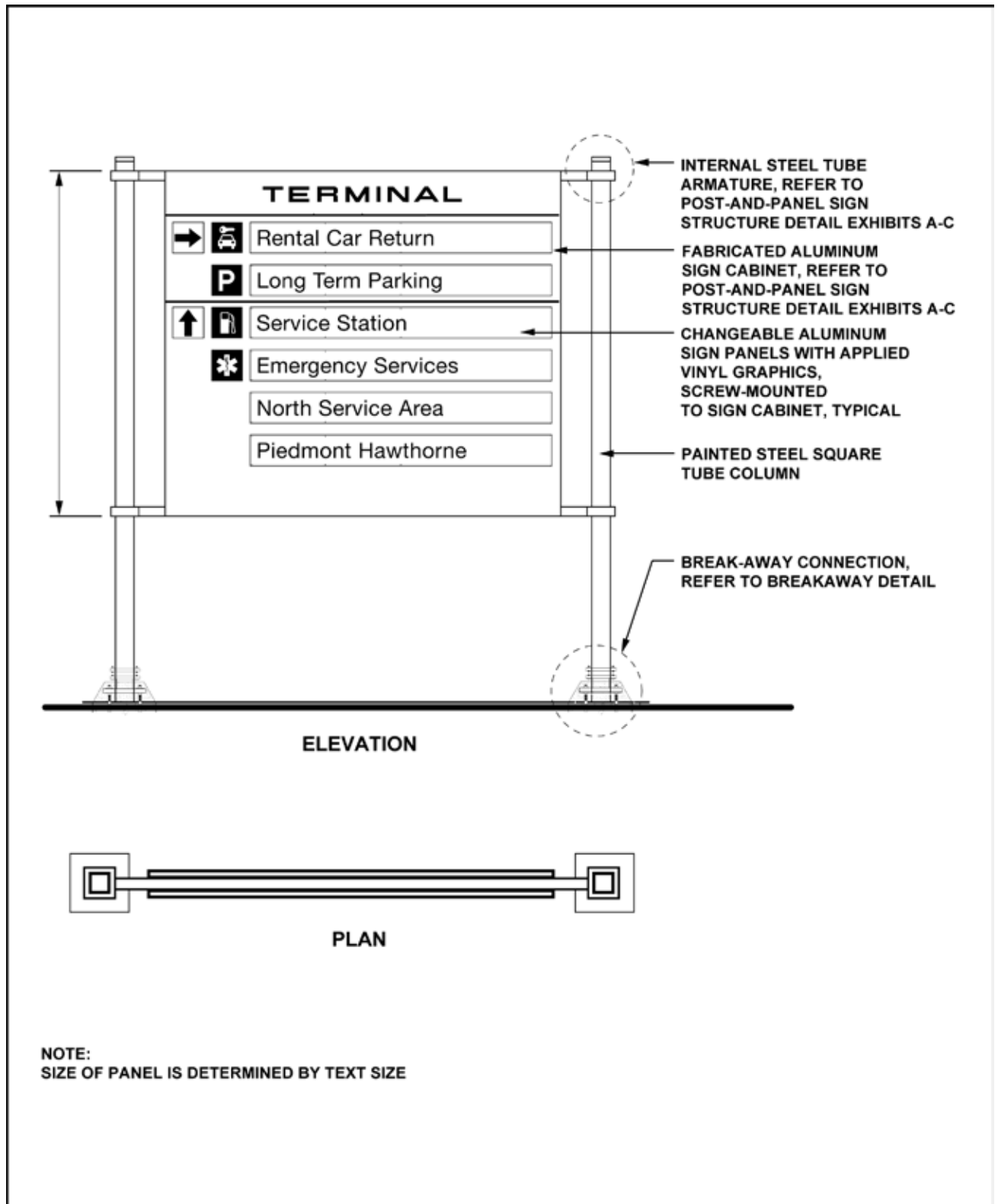
4.3.3.1 Post-and-Panel Signs: Post-and-panel signs are for exterior roadway use and use a two-post system with one message panel, as shown in **Exhibit II-4-34**. The top and bottom of the sign panel shall be flush with the top and bottom horizontal chords. A blank painted panel that precisely matches the panel size and material of the front message panel shall be placed on the backside of each sign, unless dynamic sign technology is used. If dynamic

signage is mounted as part of the message panel, no back panel will be placed to allow for maintenance and varying thicknesses of the dynamic element (**Exhibits II-4-34 through II-4-37**).

4.3.3.2 Overhead Directional Truss Signs: Overhead truss signs shall be used for primary directional information. This sign type will be the predominant sign type across all roadways for permanent signs. Truss structures shall be calculated individually by a structural engineer licensed in the Commonwealth of Virginia based on the span, number of sign panels, and specific sign placement. The design intent is to produce the trusses using square and rectangular steel tubing, arranged in a rectangular cabinet configuration. Diagonal structural members shall be discouraged from a style standpoint. Sign support structures shall be square steel tube, painted signage black (**Exhibits II-4-38 through II-4-39**).

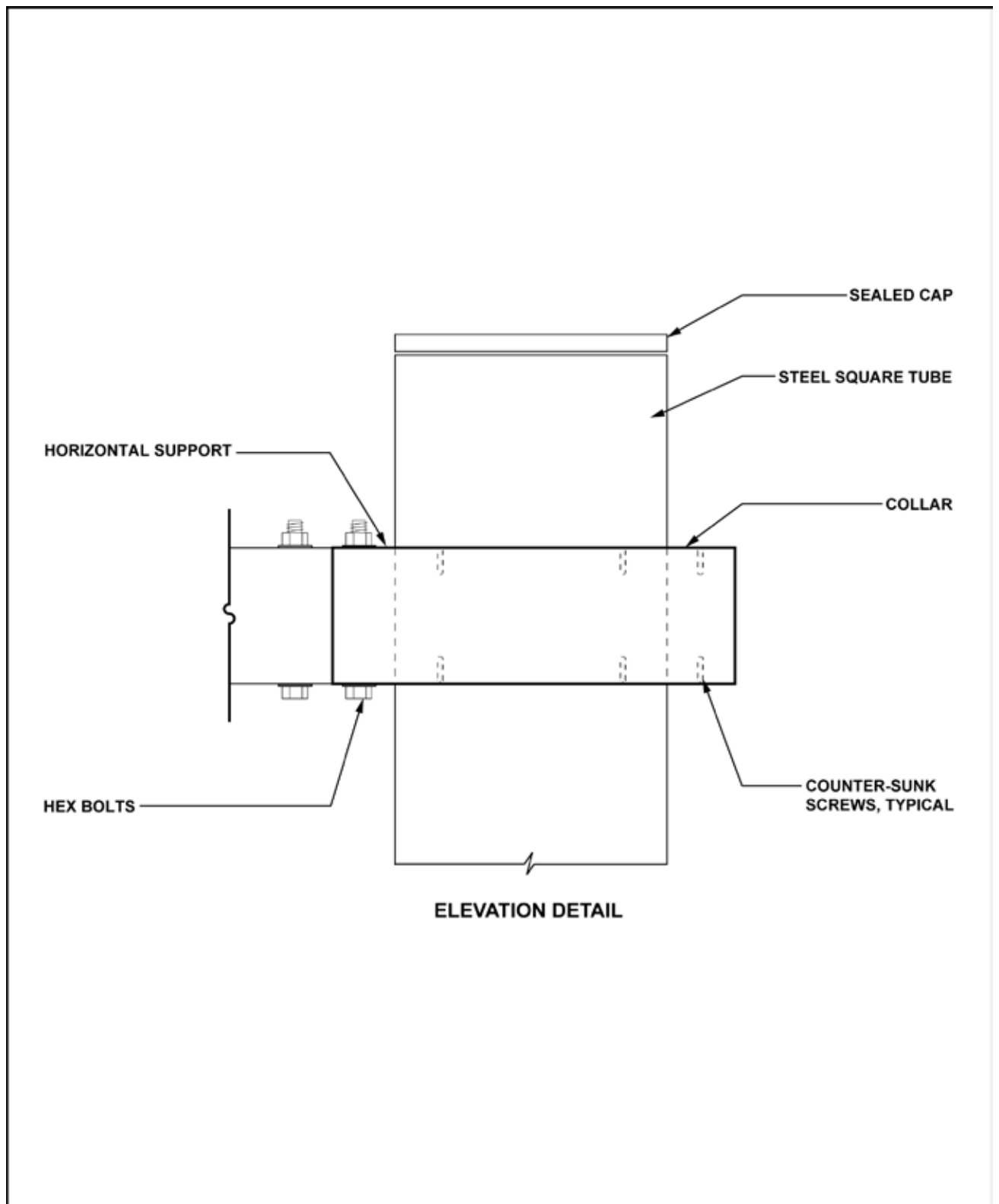
4.3.3.3 Overhead Cantilever Signs: Overhead cantilever signs shall be used for primary directional information. This sign type will be one of the predominant sign types across all roadways for permanent signs. Overhead cantilever structures shall be calculated individually by a structural engineer licensed in the Commonwealth of Virginia based on the span, mounting detail, and specific sign placement. The design intent is to produce the overhead cantilevers using square and rectangular steel tubing, arranged in a rectangular cabinet configuration and painted signage black. Diagonal structural members shall be discouraged. Cantilever signs shall hold a maximum of one sign panel (**Exhibit II-4-40**).

4.3.3.4 Butterfly Signs: This sign type is a new interpretation of the historic butterfly signs, which can still be found on parts of the Airport property. The structure includes two vertical square tube support posts, placed close together and adjoined with horizontal bands at a mid point and with a welded tube at the top. Two-sign cabinets, with internal structural framing as required, project out from vertical posts. All structural elements shall be painted signage black (**Exhibit II-4-41**).



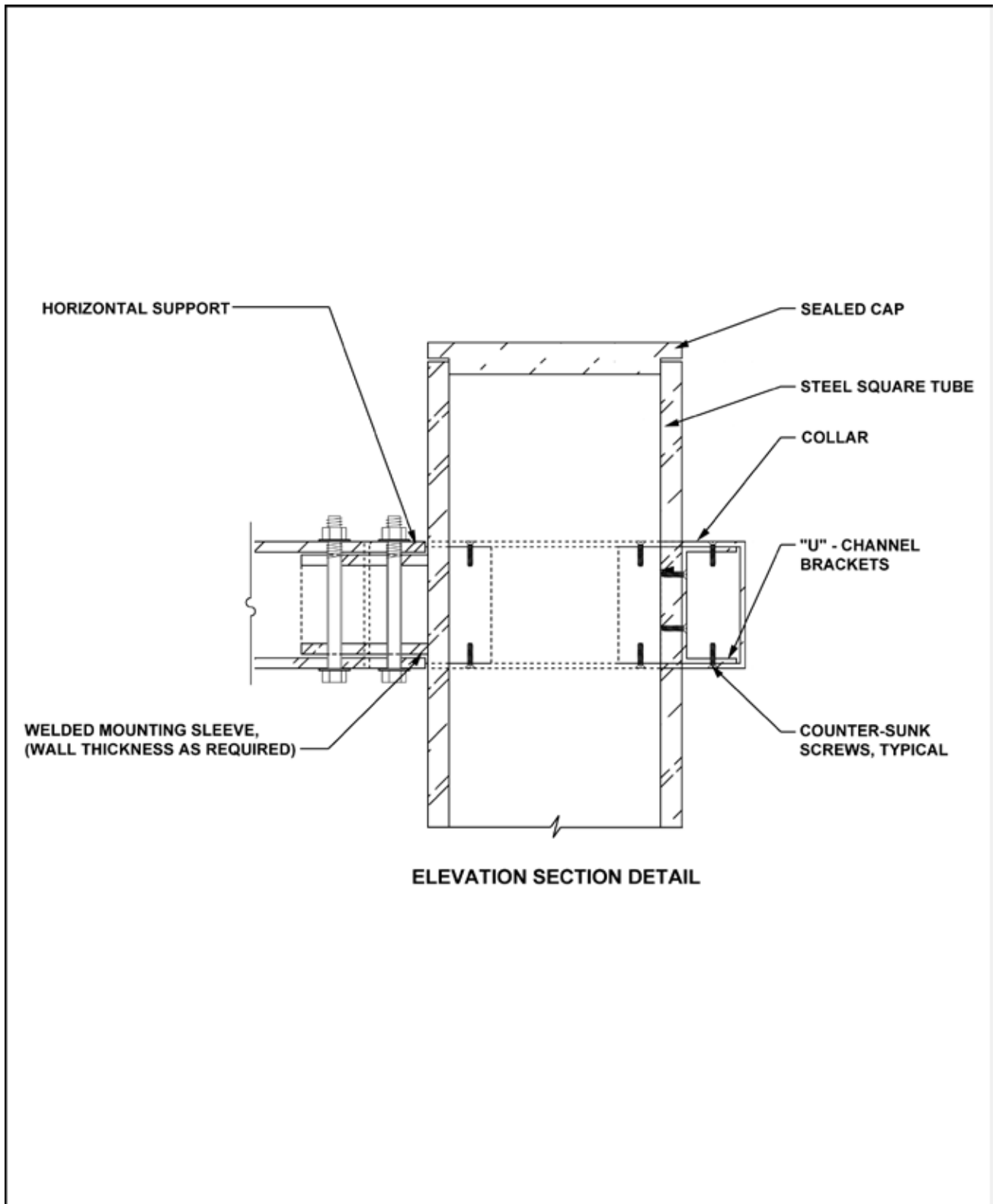
Post-and-Panel Sign Structure

Exhibit II-4-34



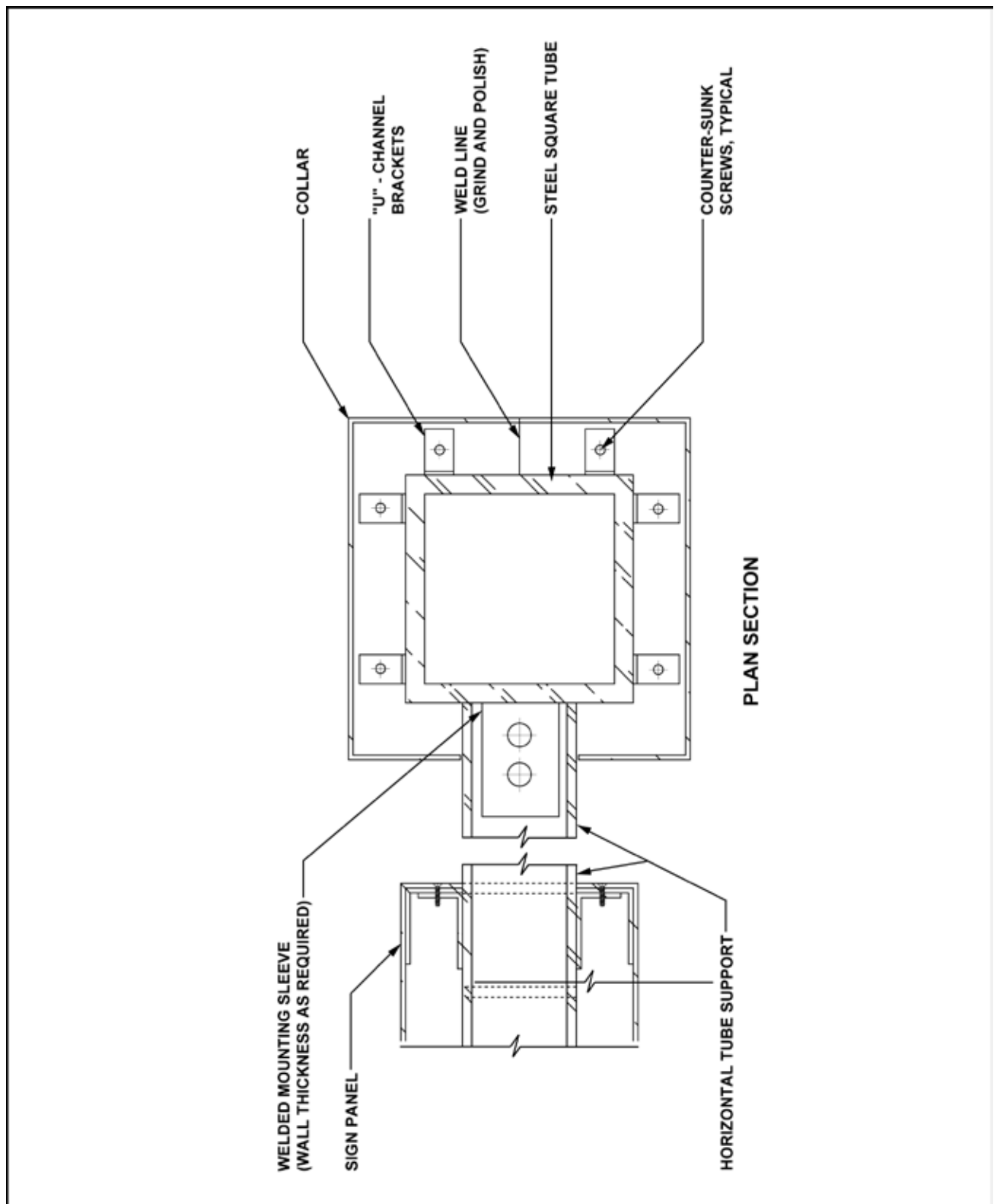
Post-and-Panel Sign Structure Detail (A)

Exhibit II-4-35



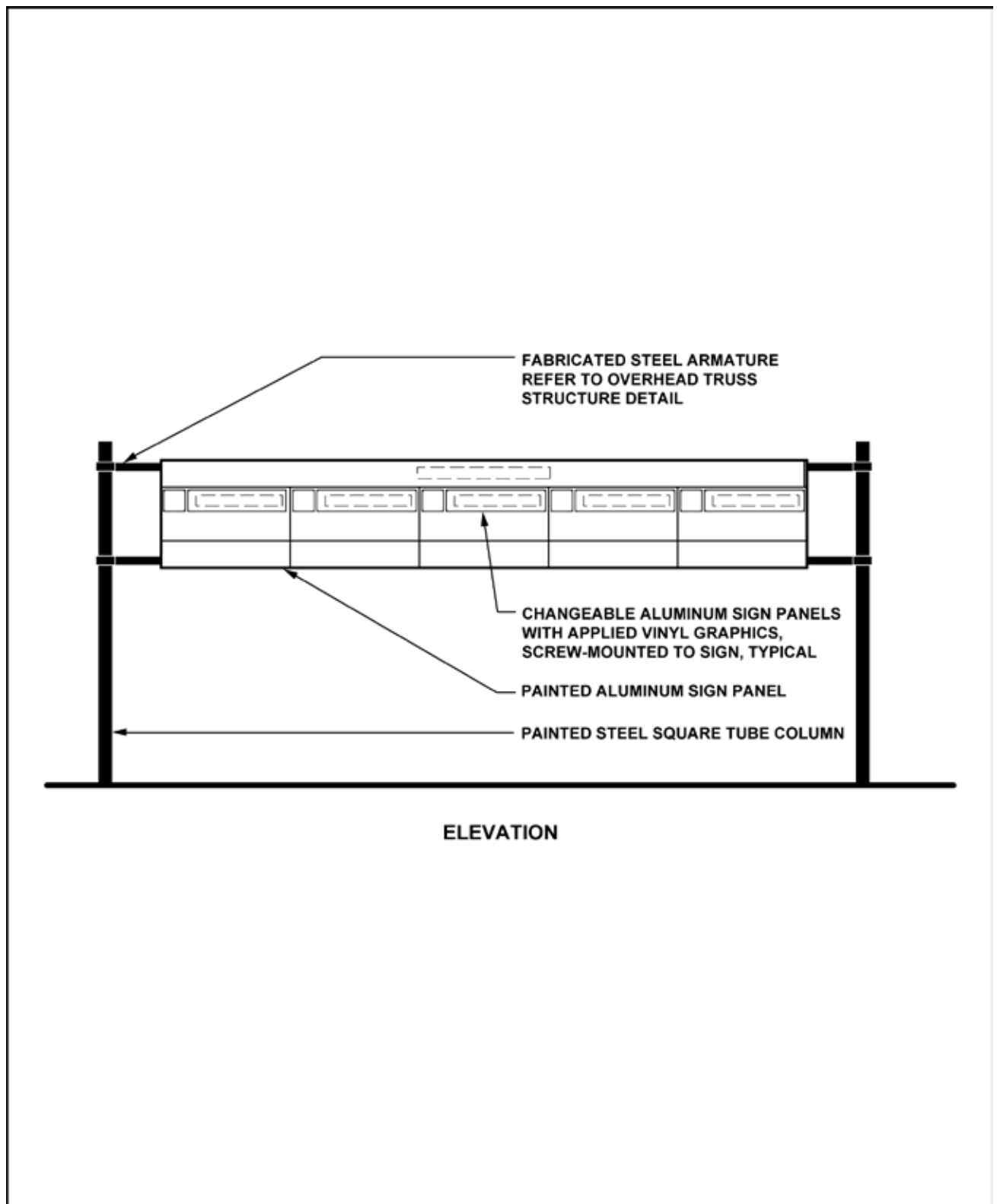
Post-and-Panel Sign Structure Detail (B)

Exhibit II-4-36



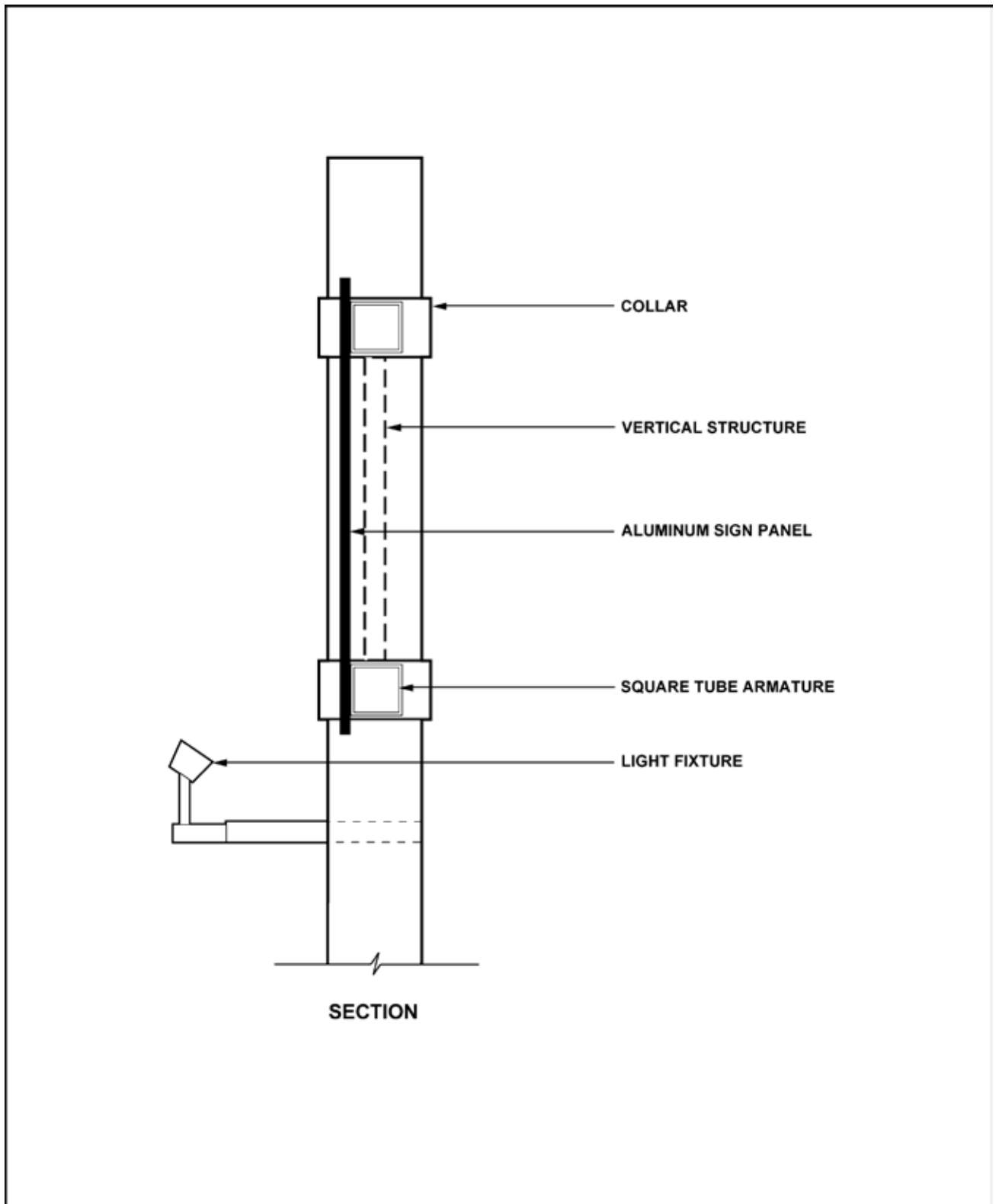
Post-and-Panel Sign Structure Detail (C)

Exhibit II-4-37



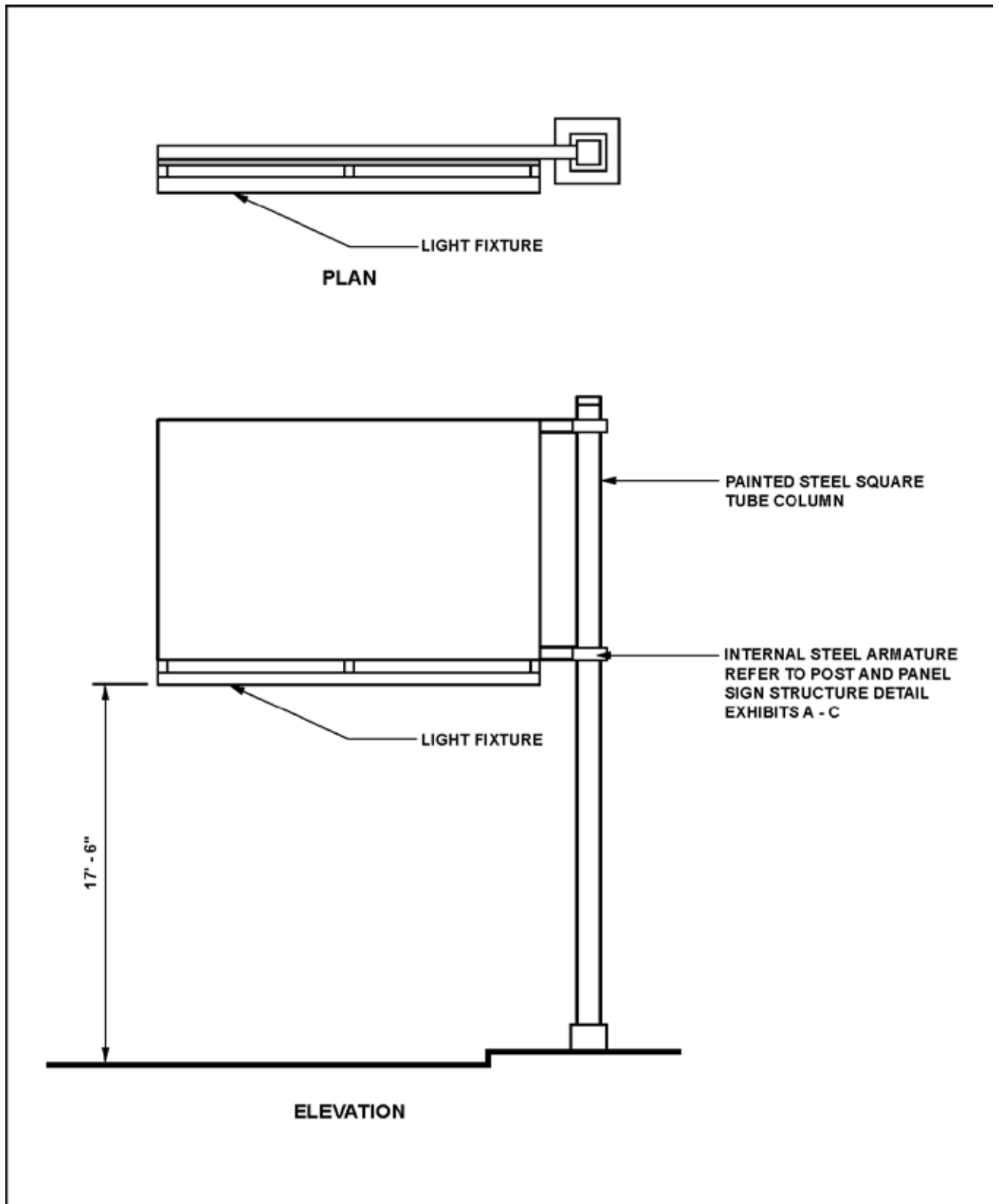
Overhead Direction Truss Sign Structure

Exhibit II-4-38



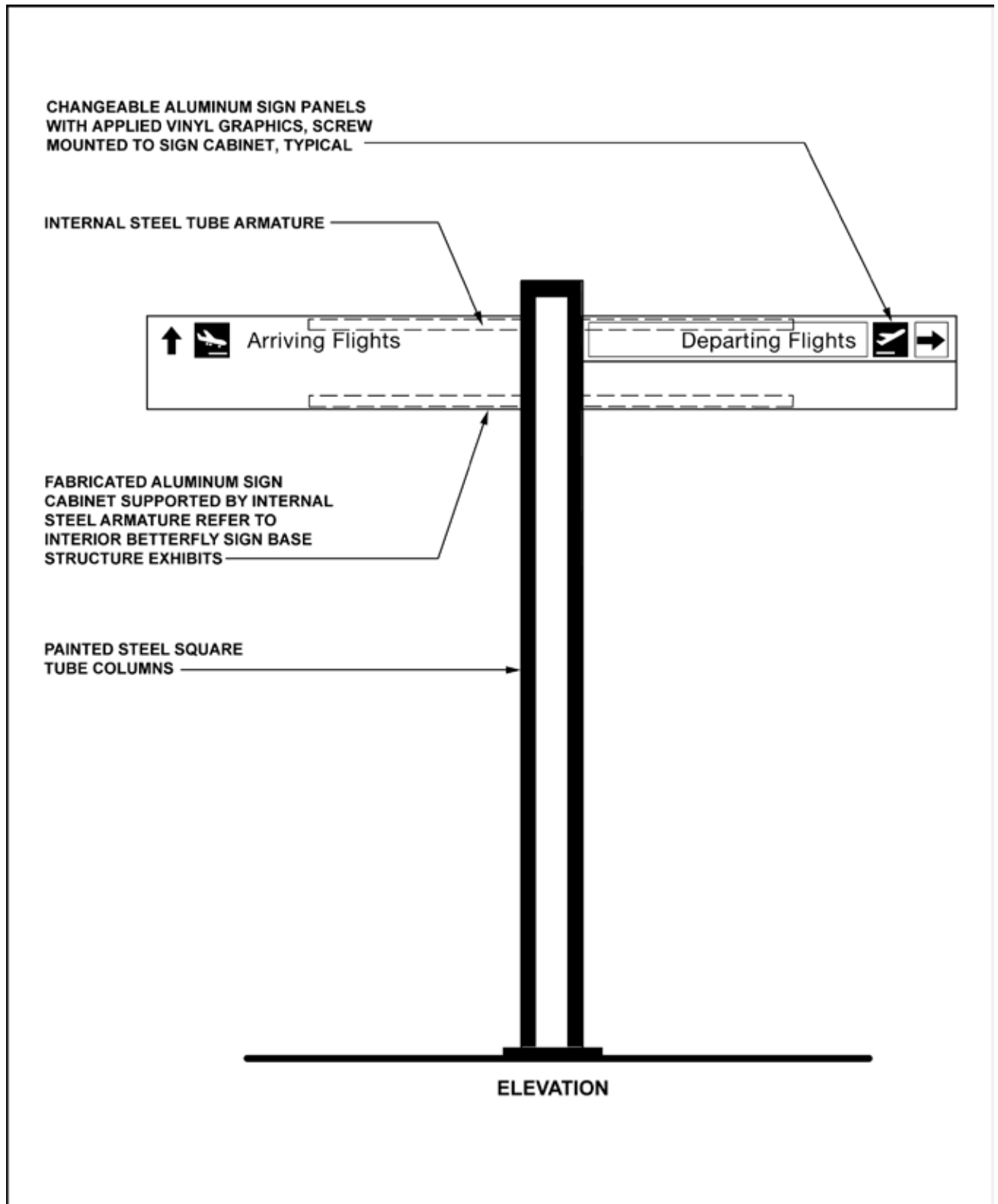
Overhead Truss Structure Detail

Exhibit II-4-39



Overhead Cantilever Structure

Exhibit II-4-40



Exterior Butterfly Sign Structure Exhibit II-4-41

4.3.3.5 Single Post Signs: Any single-post ground-mount sign that is not used for regulatory signs, such as parking row identification, shall use a smaller scale version of the butterfly signs. All structural elements shall be painted signage black. Signposts shall be square steel tube supports, sized according to MUTCD standards to support each sign, depending upon size and weight of sign. But in no case shall the post be smaller than a 2" x 2" square steel tube with a wall thickness of 3/16" (**Exhibit II-4-42**).

4.3.3.6 Roadway Signs: In general, all roadway sign supports and clearances shall meet the following standards:

A. VDOT: Road and Bridge Specifications and all supplements to the MUTCD.

B. DOT: Manual On Uniform Traffic Control Devices MUTCD and the Virginia Supplement to the same.

C. AASHTO: A Policy on Geometric Design of Highways and Streets.

D. AASHTO: Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals.

4.3.3.7 A summary of basic requirements is given below. The designer must consult the above standards for final design. Basic structure and mounting types used on airport roadways are as follows: full span overhead, cantilever overhead, double-post, and single-post ground-mount supports. Structure and mounting selection: although site conditions vary and may dictate otherwise, the following mounting conditions generally should be followed. Use full span or cantilever overhead structures for primary signs that sort traffic at key decision points to the terminal and parking roadways. Use ground-mounts for secondary signs. Use single-post ground-mounts or wall-mounted signs for regulatory and warning signs.

A. Minimum vertical clearances:

1) Overhead directional truss signs and/or cantilever signs: 17' - 6" from roadway to bottom of any overhead obstruction or structure (**Exhibit II-4-43**).

2) Post-and-Panel Signs: 5' - 0" from ground to bottom of sign (**Exhibit II-4-43**).

3) Single Post Signs: 7' - 0" from ground to bottom of sign (**Exhibit II-4-43**).

B. Minimum setbacks from guardrails or curbs:

1) Overhead directional truss signs and/or cantilever signs: 3' - 0" minimum from face of guardrail to column (**Exhibit II-4-43**).

2) Post-and-Panel Signs 3' - 0" minimum from face of guardrail or from curb to edge of sign (**Exhibit II-4-43**).

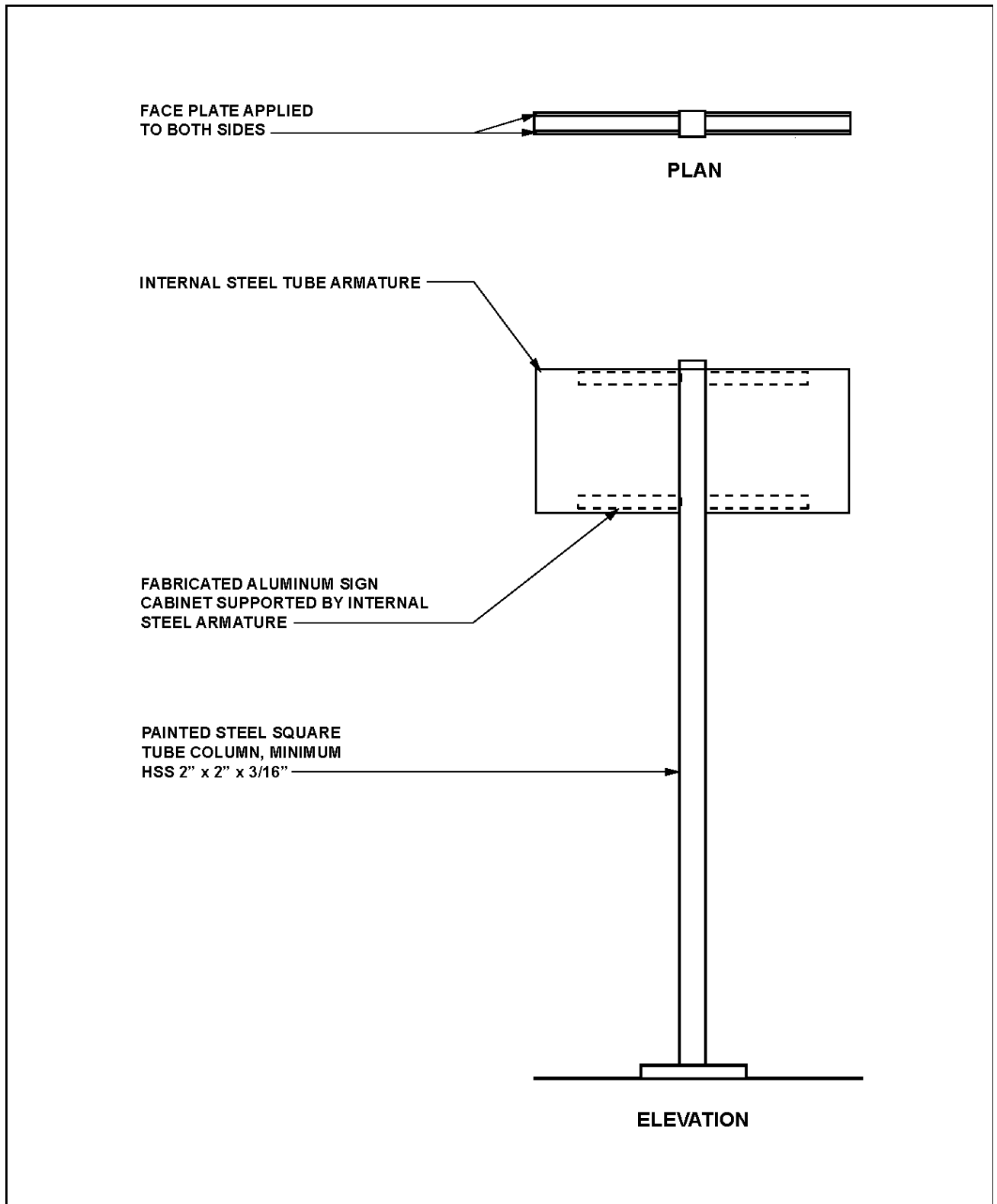
3) Single Post Signs: 3' - 0" minimum from face of guard-rail to edge of sign or 2' - 0" from curb to edge of sign (**Exhibit II-4-43**).

C. Minimum mounting separations:

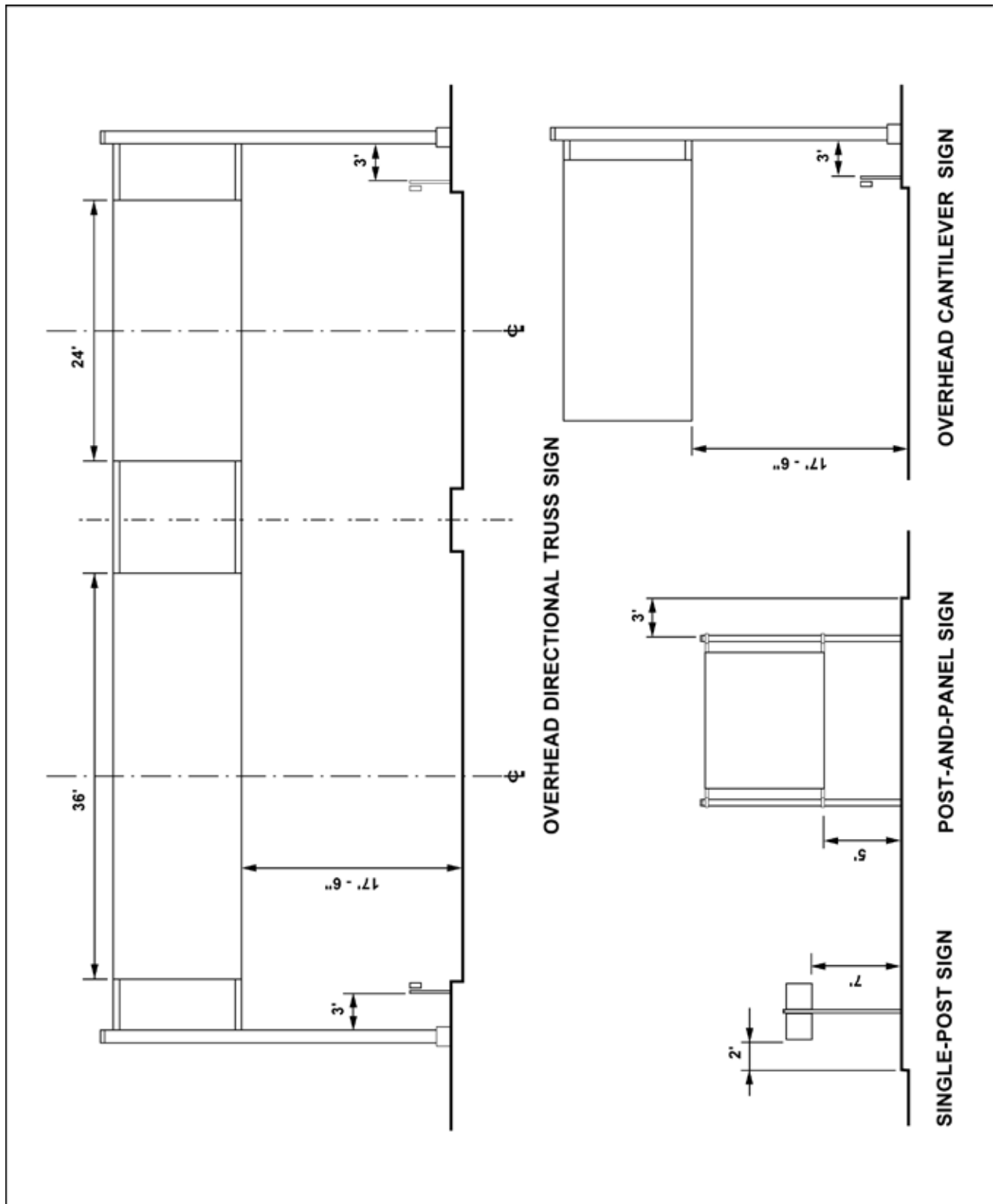
1) Overhead Signs: 400' – 0".

2) Primary ground-mounts: 400' – 0".

3) Secondary ground-mounts: 200' – 0".



Single Post Sign Structure Exhibit II-4-42



Exterior Sign Clearance and Setbacks

Exhibit II-4-43

D. Design plans, structural calculations, and details for signs on the Dulles Access Highway shall comply with VDOT Road and Bridge Specifications and with AASHTO Standard Specifications for Structural Supports for Highway Signs, **Luminaires**, and Traffic Signals. Structural sign supports shall be custom designed and dimensioned for each sign. For typical details refer to **Exhibit II-4-34**. For overhead truss and cantilever sign structures, refer to **Exhibit II-4-38**. For post-and-panel ground-mount signs using two posts, refer to **Exhibit II-4-34**. Breakaway details are required for signs not protected by guardrails, refer to **Exhibit II-4-44**. Reinforced concrete sign support foundations and breakaway details for the column/foundation connection shall conform to Section 1300 of the VDOT Road and Bridge Standards. Exposed electrical conduit shall not be used on signs to the extent possible. Concrete base pads, top flush with surrounding grade, shall be specified to prevent grass from growing next to sign and to facilitate mowing. Wooden posts may be used to support temporary signing, including construction, detour, project construction, or similar signs. Size of posts shall be determined by design, but shall be no less than 4" x 4" (nominal). If wooden posts are located such that vehicles may accidentally strike them, they shall be cut or notched to provide breakaway capability. Temporary posts shall be painted black to match permanent sign structures.

4.3.4 Temporary Signs and Project Construction Signs:

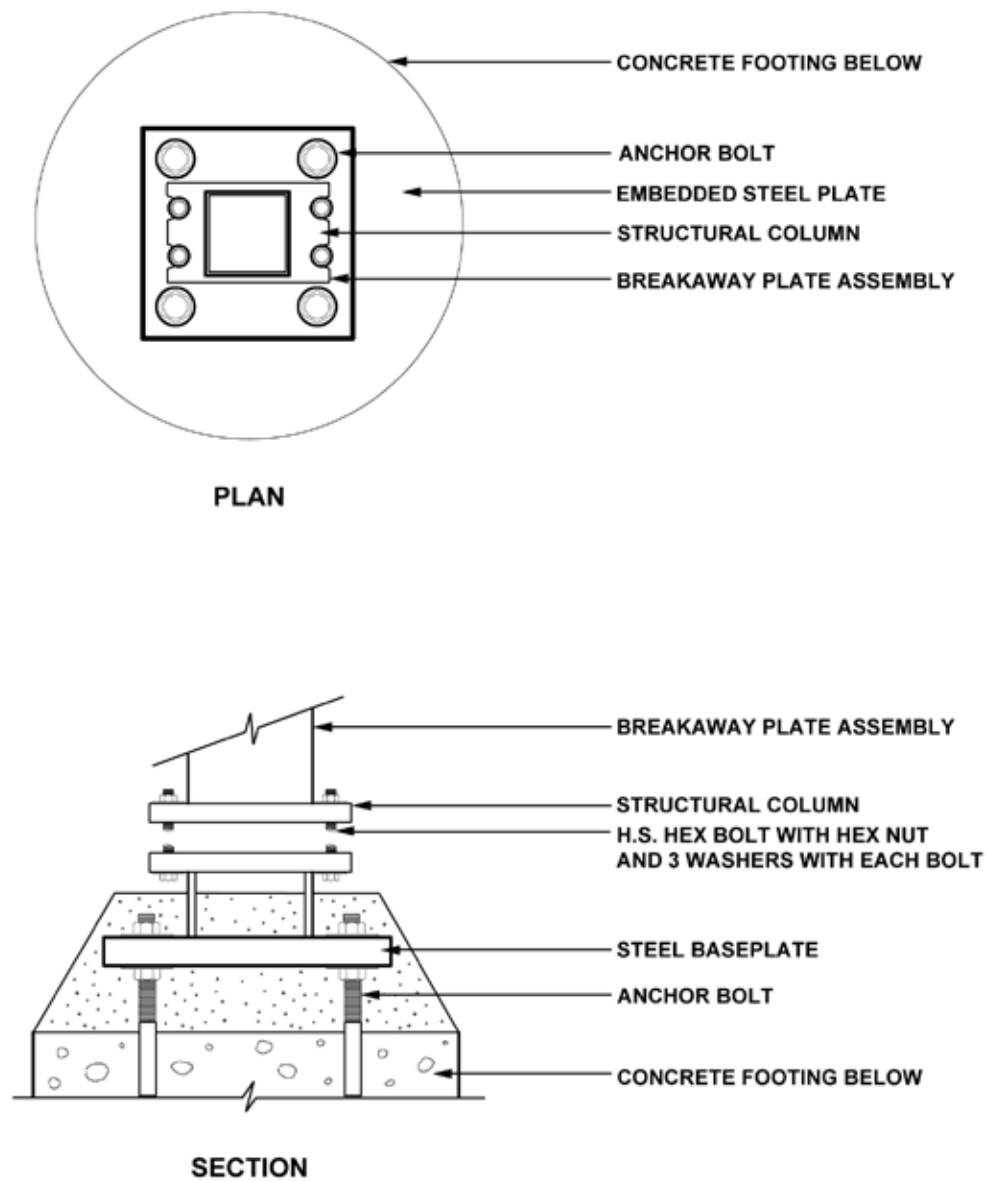
Temporary stanchions and sign stand cardholders shall be located in such a manner as to not obstruct egress paths and to not create a tripping, tipping, or falling hazard to patrons and staff.

4.3.5 Bridge and Tunnel Signs (section for future use)

4.4 Illumination

4.4.1 General: Primary roadway signs shall be externally illuminated by metal-halide fixtures, providing a bright, cool-white light that contrasts with the warm, sodium-vapor

lights used to illuminate the roadways. Signs that are existing transilluminated signs (such as historic exterior butterfly signs) shall be internally illuminated by tungsten-halogen, metal-halide, or fluorescent fixtures, providing a cool-white light. If fluorescent fixtures are used, the color temperature shall be 3500K or 4100K. High-powered electronic ballast shall be rated for cold weather starting and shall be suitable for -20° F starting temperature. If metal-halide fixtures are used, high-powered electronic ballast shall be rated for cold weather starting and shall be suitable for -20° F starting temperature. Lamp and/or fixture must be periodically shut down to prevent non-passive end of life failure. Lamp shall be protected by a clear or prismatic glass or UV stabilized polycarbonate enclosure. All fixtures shall be UL (or code recognized equivalent) listed suitable for wet location mounting. All exposed metal parts (except fasteners which shall be stainless steel) shall be finished to match surrounding sign. Upon initial installation all lamps shall be from the same batch to ensure consistency in color and strength. Photo sensors shall be installed as necessary to illuminate when light levels are low, conserve energy, and to prevent continuous operation of lamps. Primary interior signs shall be externally illuminated by tungsten halogen lamp or fluorescent fixtures, providing a cool-white light that provides an accurate depiction of color. No transillumination is permitted on interior signs. The Authority may determine that some areas provide adequate ambient lighting, and, therefore, that some directional signs will not be face illuminated. Other airport signs, including tertiary signs of all types, street signs, minor building signs, traffic regulatory, warning and guidance signs, and interior informational signs will not be illuminated, except by ambient lighting. In general, signs may be non-illuminated, illuminated, or transilluminated, but shall not be exposed neon; highly focused, columnated, or laser light; nor programmed for flashing, blinking, progressive blinking, or movement of light.



Breakaway Detail Exhibit II-4-44

4.4.2 Roadway

4.4.2.1 Overhead Signs: For externally illuminated signs, provide metal-halide lamps mounted to the sign structure and concealed in housings (**Exhibit II-4-38**). The lighting levels shall conform to the IESNA Lighting Handbook (current edition) for areas of medium to low ambient luminance. Depending upon surrounding ambient light levels, average maintained sign illuminance shall be between 10 and 40 footcandles and average maintained sign luminance shall be between 2.2 and 8.9 candelas per square foot. These design limits apply to white letters. Uniformity of illumination or luminance on the sign face shall be no greater than 5 to 1 (maximum to minimum) and should be designed to be approximately 4 to 1. Fixtures shall be fixed to a catwalk structure in such a way that the catwalk elements do not cast shadows against the sign panel. For internally transilluminated signs, provide lamps mounted within the sign cabinet. Depending upon surrounding ambient light levels, average maintained sign luminance shall be between 24 and 52 candelas per square foot. These design limits apply to white letters and borders. Uniformity of luminance on the sign face shall be no greater than 6 to 1 (maximum to minimum) and should be designed to be approximately 4 to 1. No adjacent area 1 sq. ft. in size should have a luminance difference greater than 20% and the average luminance contrast between the legend and the background or field shall not exceed 10 to 1.

4.4.2.2 Ground-mount Directional Signs:

Ground-mount signs shall be face illuminated. Lighting shall meet the requirements for externally illuminated curbside pedestal signs.

4.4.3 Terminals

4.4.3.1 Canopy Signs: Terminal canopy signs shall be transilluminated. Provide a maximum surface luminance of 25 to 35 candelas per square foot and the uniformity ratio of surface luminance shall be no greater than 1.3 to 1.

4.4.3.2 Interior Signs: These signs will not normally be illuminated. Designers of signing should coordinate their

work with building lighting in order to provide ambient lighting of signs of at least 25 footcandles with appropriate color characteristics. Primary signs shall be externally illuminated or transilluminated. In either case, a maximum of 25% of the total sign area may exceed a surface luminance of 30 candelas per sq. ft. No part of the sign shall exceed a surface luminance of 50 candelas per square foot and the uniformity ratio of surface luminance shall be no greater than 1 to 5.

4.4.3.3 Bridge/Tunnel Signs: These signs shall be treated the same as other interior signs.

4.4.4 Parking Structures: Parking structure signs will not normally be illuminated. Review site conditions to ensure that adequate illumination will be provided by ambient light from ceiling-mount fixtures or vehicle headlights.

4.4.5 Surface Parking Lots: Surface parking lot signs will not normally be illuminated. Review site conditions to ensure that ambient light, roadway and lot lighting, and/or vehicle headlights will provide adequate illumination at sign faces.

4.5 Terminology

4.5.1 General: Standard terminology and editorial guidelines apply to all sign messages in use at Washington Dulles International Airport. Use of these standard terms promotes consistency and provides the public with a coherent sequence of messages.

4.5.2 Terminal Messages: The Saarinen Terminal shall be known as "Terminal" until the second Terminal is developed, at which time the name shall be changed to "Terminal 1." The future terminal shall be named "Terminal 2." These terminal messages may appear either as a general text message or as a parent message to denote that all messages listed below is within that terminal neighborhood (**Exhibit II-4-45**). When used as a parent message, Saarinen typeface is used and a color (either signage green or signage orange) designated for that terminal area is used as the field color. The area known as

“International Arrivals Building” shall not be formally named in any way finding signage. The destination shall be “International Arrivals” with the International symbol designated for Customs. The abbreviation “IAB” and the phrase “International Arrivals Building” shall not appear on any directional signage that can be viewed by the traveling public. General Aviation (currently, Piedmont Hawthorne and Signature Flight), is currently located in the Terminal 1 neighborhood, but is not consolidated along the same path. Where possible, the two current operators shall be referred to as “General Aviation” until the point where more specific direction must be given. The message “General Aviation” shall never appear in the Saarinen typeface and shall never appear as a parent message.



4.5.2.1 Curbsides shall be identified as follows:

- A. Upper Terminal Level: Departing Flights.
- B. Middle Terminal Level: Arriving Flights (exterior signs) or Passenger Pickup (interior signs).
- C. Lowest Terminal Level: Commercial Curbside (exterior signs) or Ground Transportation (interior signs).

4.5.2.2 Mobile Lounge/Transporter Shuttle gates shall be identified with the name of the concourse that shuttle is serving. Example: “Shuttle to C Gates.” No alphanumeric designation for these gates shall be used as long as the shuttle is delivering passengers to a concourse building. Mobile Lounge Shuttles from the Terminal directly to aircraft, which are often referred to as hardstands, shall be named alpha-numerically beginning at the east end of the building. The current naming is “M” combined with the appropriate numeral. In the next six years and prior to the arrival of the Metro-line extension, the hardstand shuttles shall be renamed to “Y Gates” (**Exhibit II-4-46**). The existing “T” Gates, which is located below the existing Main Terminal tower, shall be renamed to “Z” Gates no later than in conjunction with the first installation of the new interior signage system that uses a “T” symbol to designate the Terminal Building. Baggage claim areas shall be identified

with sequential, numeric carousel designations, beginning at the East End of the Terminal (such as Baggage Claim 1, Baggage Claim 2, etc.). The abbreviated message “Bag Claim” is not permitted in any signage visible to the traveling public. Signing for areas within the International Arrivals Building is not included in this design guideline.

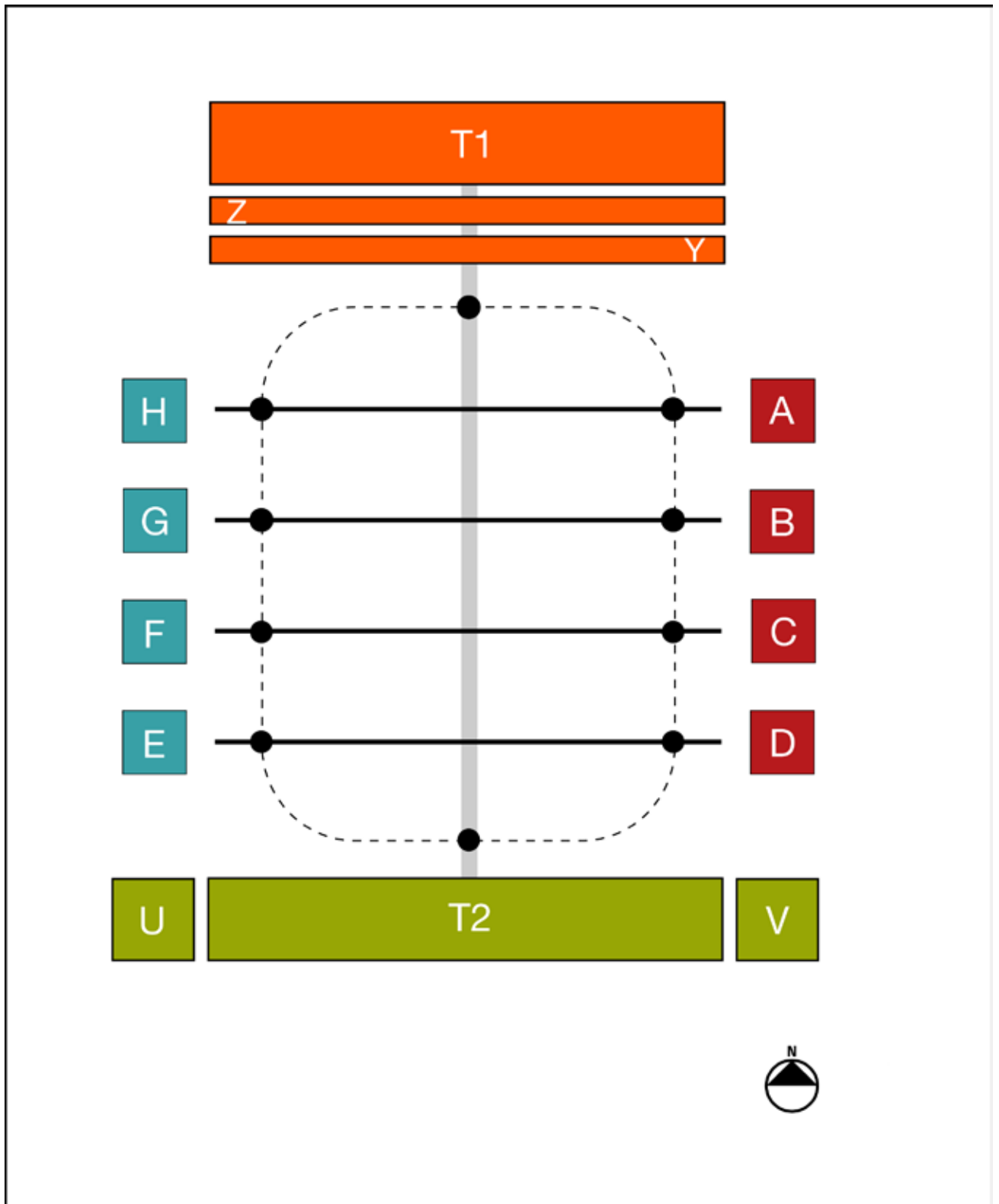
4.5.3 Parking Naming Conventions: Parking offerings shall be designated as: Hourly Parking, Daily Parking, and Economy Parking. The designation of parking areas within each offering will use both a numerical and alphabetical system. The Hourly Parking will not use a numerical designation due to the limited routes that passengers follow to arrive at this lot; all passengers walk directly to their car via surface or by taking the one walking tunnel provided. The two Daily Parking structures will be designated Daily 1 (North Flank Garage), Daily 2 (West Flank Garage) and Daily 3 (in the event that a future East Flank Garage is provided). Each bus route for the Long-Term parking areas will have its own numerical designation. This designation shall begin with Economy 1 with the possibility of adding additional new parking areas, as needed. In addition to the use of the naming conventions stated above, the use of graphic symbols as memory tools will also be used, as is outlined in **Paragraph 3.3.6**. At no time shall the image represented on the parking symbol be spelled out. For example, a symbol with an image of the sun would never be accompanied with the words “Sun Lot” or “Sunshine Lot.” These symbols are for visual purposes only. Shuttle stops for all parking areas served by shuttles will be named by the rows that the shuttle stop serves by closest proximity. Where parking management signs are used to indicate the availability of parking in a particular offering or lot, the words “open” and “full” are to be used in all capital letters using digital signage as outlined in **Paragraph 5.5**.

TERMINAL	
➔ T	Terminal
	Rental Car Return
P	Long Term Parking
	Airport Exit
➔ 	Service Station
	Cargo

"TERMINAL" AS A PARENT MESSAGE

← T	Terminal
	Airport Exit
➔ 	Rental Car Return
	Piedmont Hawthorne
←	Cargo

"TERMINAL" AS GENERAL TEXT MESSAGE



Future Gate Naming Diagram Exhibit II-4-46

4.5.3.1 Surface Parking Lot Messages: Parking rows shall be identified with a single or double capital alphabet character for each double-banked line of striped spaces (aisle). Row assignments shall correspond with their appropriate shuttle stops. Note that letter sequences will vary somewhat depending on lot configuration. Area identifications must always be sequential, beginning with “A” to “Z”, then “AA”, etc., in a logical location.



















4.5.3.2 Parking Structure Messages: Signage within the new parking structures shall consist of directional signage, row identification, parking level identification, and shuttle stop markers.

4.5.4 Airline Names: Air-carriers shall be listed on roadway signs with the simplest possible identifications. Words, such as “Airline,” “Shuttle,” “Connection”, “Express”, etc. shall not appear on public signs. Subsidiaries, divisions and affiliates of major air-carriers will not be identified on public signs unless such listings are essential for public way finding. No more than 15 characters, including spaces between multiple words will be allowed for any Airline Representation on way finding signage.

4.5.5 Hangar Building Messages: Administrative, tenant, and service areas will be identified in accordance with the guidelines in this section **Chapter 6** "Commercial Signing Guidelines." Airline and/or tenant names shall conform to the editorial standards provided for roadway signs in **Paragraph 4.5.9**. Commercial tenants and services shall be identified by service type (such as Air Cargo) and not by company name on airport directional signs. Exceptions to this guideline will not be permitted unless public way finding will be compromised by the absence of trade or company names.



















4.5.6 Roadway Messages: In all cases, roadway exit routes shall be described under the parent message “Airport Exit”, in addition to specific route or destination messages. In lieu of an international symbol, the MUTCD or VDOT highway or roadway symbol shall be used.

4.5.7 Standard Naming Conventions: All airport signs shall employ common, approved terms for text. Deviations from these standard terms will not be permitted. The following standard terms shall be employed for all sign messages at the Airport. All messages and appropriate symbol use for each can be found in **Exhibits II-4-47 through II-4-52**.
















 Terminal	 Ticketing
 Return to Terminal	 Metro
 Terminal 1	 Parking
 Terminal 2	 To All Parking
 Gates	 Hourly Parking
 Walk to Gates	 Daily Parking
 Train to Gates	 Walk to Daily Parking
 Ride to Gates	 Ride to Daily Parking
 Baggage Claim	 Long Term Parking

 = INTERCHANGEABLE WITH SEVERAL SYMBOLS AND MESSAGES









Symbols with Messages (A) Exhibit II-4-47








	Ride to Long Term Parking		Hotel
	Employee Parking		On-Airport Hotel
	Ground Transportation		Off-Airport Hotels
	Rental Car		Men
	Passenger Pick-Up		Women
	Taxi		Food
	Bus		Telephones
	Hotel Information		Information
	Restrooms		Shops

 = INTERCHANGEABLE WITH SEVERAL SYMBOLS AND MESSAGES















	ATM		To All Flights
	Currency Exchange		Return to Airport
	Service Station		Departing Flights
	Hair Salon		Arriving Flights
	Barber		Customs
	Florist		Immigration
	Changing Room		International Arrivals
	Chapel		

Symbols with Messages (C) Exhibit II-4-49

-  Stairs
-  Accessible Access
-  Post Office
-  Shoe Shine
-  Lost and Found
-  Moving Walkway
-  Smoking Lounge
-  Emergency Services

-  Access Elevator
-  Crosswalk
-  Ramp
-  Drinking Fountain
-  TDD
-  Assisted Listening
-  Volume Telephone

Symbols with Messages (D) Exhibit II-4-50

	First Aid		To I-495
	No Food or Drinks		To I-66
	Exit		To Toll Road
	Do Not Enter		To Route 28
	No Parking		To Route 50
	No Dogs		To Route 7
	No Weapons		
	No Smoking		

Symbols with Messages (E)

Exhibit II-4-51

<input type="checkbox"/> Cargo	<input type="checkbox"/> Fire Station
<input type="checkbox"/> Airport Exit	<input type="checkbox"/> General Aviation
<input type="checkbox"/> Piedmont Hawthorne	<input type="checkbox"/> To Washington DC
<input type="checkbox"/> Airmail Services	
<input type="checkbox"/> North Services Area	
<input type="checkbox"/> South Services Area	
<input type="checkbox"/> West Services Area	
<input type="checkbox"/> = MESSAGE WITHOUT A SYMBOL	

Symbols with Messages (F) Exhibit II-4-52

4.5.7.1 Interior Primary Messages (dark gray field):

- A. Terminal
- B. Terminal 1
- C. Terminal 2
- D. To All Gates
- E. Concourse
- F. Gates
- G. Ground Transportation
- H. Baggage Claim
- I. Ticketing
- J. Walk to Terminal
- K. Walk to Gates
- L. Shuttle to Terminal
- M. Shuttle to (insert Concourse designator) Gates
- N. Train to Gates
- O. Ride to Gates
- P. Passenger Pickup
- Q. Rental Cars
- R. Rental Car Information
- S. Taxi
- T. Parking
- U. Pay & Go

V. Washington Flyer Bus

W. Bus

X. Metro

Y. Hotel

Z. Hotel Information

AA. Walk to Daily Parking

BB. Ride to Daily Parking

CC. Economy Parking

DD. Caution: Walkway Ends in (insert number of feet)
Feet

EE. Do Not Enter

FF. Walkway

4.5.7.2 Interior Secondary Messages (light gray field)

A. Restrooms

B. Men

C. Women

D. Food

E. Shops

F. Telephones

G. Elevator

H. Information

I. ATM

J. Currency Exchange

K. Chapel

L. Shoe Shine

M. Drinking Fountain

N. Barber

O. Florist

P. Hair Salon

Q. Changing Room

Note: the language used on the interior MUFIDS systems, such as “Boarding” is not covered in this section.

L. Airport Exit

M. Return to Terminal

N. Curbside Zones

O. Road designations:

1) To I-495

2) To I-66

3) To Route 28

4) To Toll Road

5) To Route 50

6) To Route 7

7) To Washington DC

4.5.7.3 Exterior Primary Messages (dark gray field)

A. Terminal

B. Terminal 1

C. Terminal 2

D. Rental Car Return

E. All Flights

F. Departing Flights

G. Arriving Flights

H. Parking

I. Hourly Parking

J. Daily Parking (with appropriate lot number)

K. Economy Parking (with appropriate lot number)

4.5.7.4 Exterior Secondary Messages (light gray field)

A. Service Station

B. Emergency Services

C. General Aviation

D. North Services Area

E. South Services Area

F. West Services Area

G. Signature Flight

H. Piedmont Hawthorne

I. On-Airport Hotel

J. Off-Airport Hotels

- K. Cargo
- L. Cargo Buildings 1-4
- M. Cargo Buildings 5-6
- N. Air Mail Services
- O. Fire Station
- P. Employee Parking
- Q. Flight Kitchens
- R. GMR
- S. Maintenance Facility
- T. Utility Plant

4.5.8 Message Hierarchy and Development: Message hierarchy is determined by importance of message within “primary” and “secondary” categories provided. To determine field color, refer to, **Paragraph 4.5.7** of this section. Direction is also a factor in determining message placement, as all messages along the same route are grouped together with one arrow. To determine appropriate message hierarchy, all messages to be placed on a panel must be determined. The message appearing highest on the “primary” list in **Paragraph 4.5.7**, will be placed highest on the sign panel with all other messages that share arrow direction following in the order that they appear on the hierarchy list. From the remaining messages, the message that now appears highest on the list and the messages that share the arrow direction will be placed in the secondary position on the sign. This method also applies to interior signs and to secondary messages that fall in the light gray field on a panel. Another factor in determining the order of messages on a sign panel is whether or not the sign consists of a list. All lists are to be in alphabetical order, as well as gate destinations sharing the same arrow direction. A list may consist of airline names, rental car names, or a list of tenant names on a building identification sign. For

exterior way finding signs, the secondary messages may be separated onto a separate sign panel on a separate truss placed at a distance that will allow adequate viewing time.

4.5.8.1 Primary Sign Messages: Primary sign messages should normally include the following:

- A. Directional information (to major destinations)
- B. Airline directories
- C. Garage/Parking Lot/Rental Car identification, Ticketing/Check-In and Baggage Claim
- D. Ground Transportation

4.5.8.2 Secondary Sign Messages: Secondary sign messages should normally include the following:

- A. Identification of services
- B. Concession identification
- C. Ground transport information and vendor identification
- D. Parking area identification and information
- E. Security and regulatory information
- F. Restrooms, telephones, lockers, etc.

4.5.8.3 Tertiary Sign Messages: Tertiary sign messages should normally include the following:

- A. Building directories
- B. Room numbers
- C. Tenant/occupant names
- D. Non-public area information and identification

E. Equipment information

4.5.8.4 Other Sign Messages: Safety/hazard information (unless conditions demand greater prominence).

4.5.9 Editorial Guidelines: Two-line messages shall not be used. Messages shall be rendered without punctuation, such as periods, apostrophes, or ellipsis marks (**Exhibits II-4-47 through II-4-52**). Messages shall be limited to a maximum of 30 total characters. All “lists” are to be in alphabetical order, as well as gate destinations sharing the same arrow direction. A list may consist of airline names, rental car names, or a list of tenant names on a building identification sign. Interior sign panels are allowed a maximum of eight message lines per sign panel, with the exception of low overhead areas. In low overhead areas, a maximum of two message lines is acceptable. Exterior post-and-panel road signs shall not exceed eight message lines per panel, including the parent Terminal message. Exterior overhead and cantilever signs shall not exceed five message lines per panel, including the parent terminal message.

4.5.10 Abbreviations: Messages shall not be abbreviated unless abbreviations are commonly accepted by the public (such as ATM, known as Automated Teller Machine) or if the abbreviation is noted on the list of acceptable sign messages (**Exhibits II-4-47 through II-4-52**). Abbreviations in sign messages shall normally be rendered without punctuation (periods, apostrophes, or ellipsis marks).

4.5.11 Capitalization: The initial letter of each word in a message shall be rendered using an upper-case letter, followed by all lower-case letters. The only exception is the use of “parent messages” that are rendered in all upper-case lettering and minor words (such as prepositions and conjunctions) which shall be rendered in all lower-case lettering, unless that word leads the message (example: “To All Gates”). The Saarinen typeface is a capitals-only

font, and, therefore, messages using Saarinen must be rendered in all upper-case formats.

4.5.12 Editorial Restrictions: Numbers, such as gate or floor numbers, shall never be rendered in words (such as, seven, twelve).

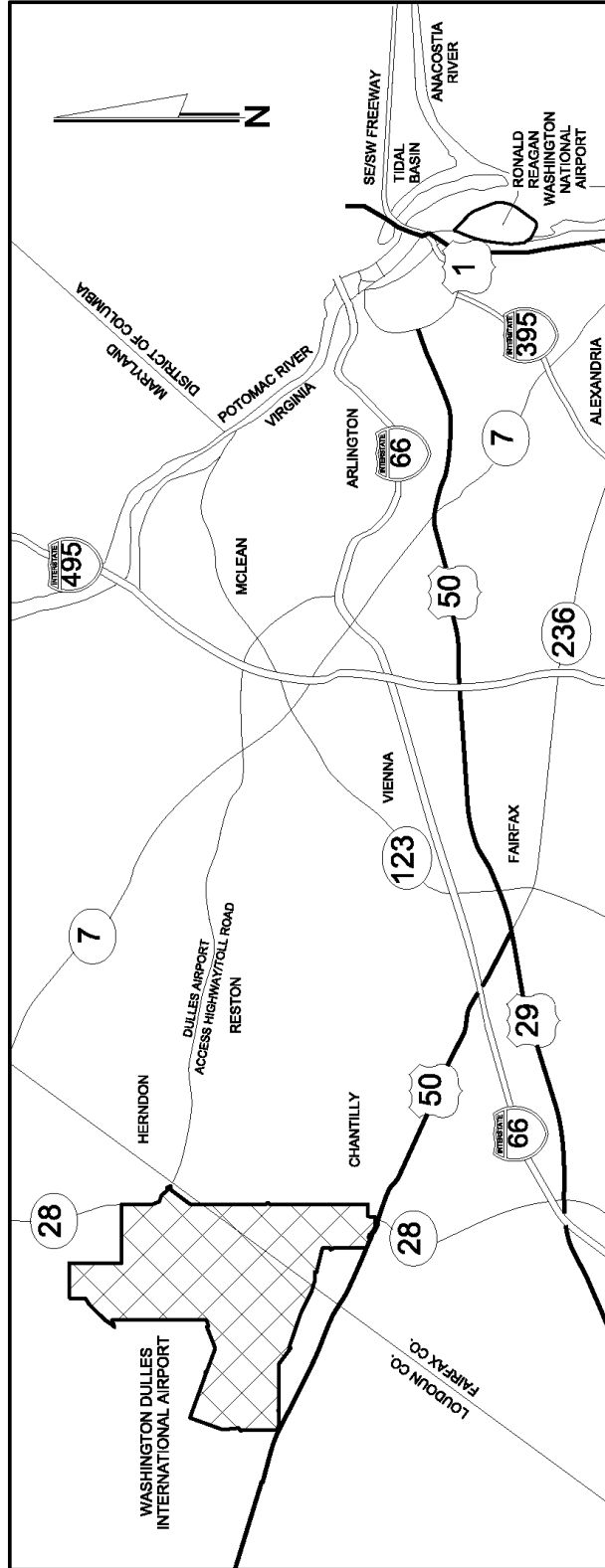
4.6 Roadways

4.6.1 General: Roadway signage is classified by its locations along the Airport road system. Although all roadway signs share common design elements, certain formats apply to specific road segments. All primary directional signs on the Washington Dulles International Airport Access Highway (the Access Highway) will be mounted overhead on roadway bridge structures, sign truss structures, or cantilever structures. Ground-mount signs provide primary directional information along all other Airport roads. Refer to this section, **Chapter 3**, “Common Design Elements,” for airport-wide standards for typefaces, arrows, symbols, and color. Refer to this section, **Chapter 4**, “Design Criteria,” for sign materials, mounting, illumination, and specific airport terminology. Overhead signs are closely integrated with road-spanning truss structures, overhead bridges, and roadway lane geometry. Refer to this section, **Chapter 2**, “General Requirements and Procedures,” for coordination information that is essential to every roadway sign task.

4.6.2 Access Highway and Primary Approach Roads:

The Access Highway starts at the Washington Dulles International Airport and extends to the east, ending at Route 66 (**Exhibit II-4-53**). Route 28 from both north and south directions is the secondary approach road. Future passenger access to the Airport will exist at a junction adjacent to the Route 28 and Route 50 interchange, which may cause Airport directional signage to exist on Route 50.

VICINITY MAP



Access Highway Map

Exhibit II-4-53

4.6.2.1 Three types of directional signs are permitted along the approach highways, as follows:

- A.** Full span overhead signs, mounted on a bridge or sign-truss structure
- B.** Cantilever overhead signs
- C.** Double-post ground-mount signs

4.6.2.2 Signs along these routes provide direction to the current terminal area, the future terminal area, and the future services area by:

- A.** Preparing drivers for the split between the terminal approach road and the parking area roads
- B.** Sorting traffic into passenger and non-passenger traffic
- C.** Providing airline information to separate current terminal and future terminal traffic

4.6.2.3 Driver orientation on the main entrance road must remain clear and uncluttered. All Access Highway signs conform to the MUTCD as amended by VDOT standards for limited access freeways (**Exhibit II-4-53**). All Access Highway signs shall be coordinated closely with the signs along the parallel Washington Dulles International Airport Toll Road (the Toll Road) to provide clear and uncluttered signs for both routes, without confusing drivers in adjacent roadways. Regulatory signs, such as speed limit signs, shall allow single-post-mounted signs. Exceptions to these design standards shall incorporate VDOT standard signs (interstate green sign fields). Otherwise, except as noted, all signs bearing Airport information shall match the standards for Airport signs; and all Airport exit information inside Route 28 and any located outside Route 28, that are adjacent to other Airport informational signs, shall follow Airport guidelines.

4.6.3 Terminal Approach Roads: This segment is shown in **Exhibit II-4-54**. There are four main sign tasks along the terminal approach road:

4.6.3.1 To prepare drivers for the split between the terminal ramps, daily parking, and hourly parking.

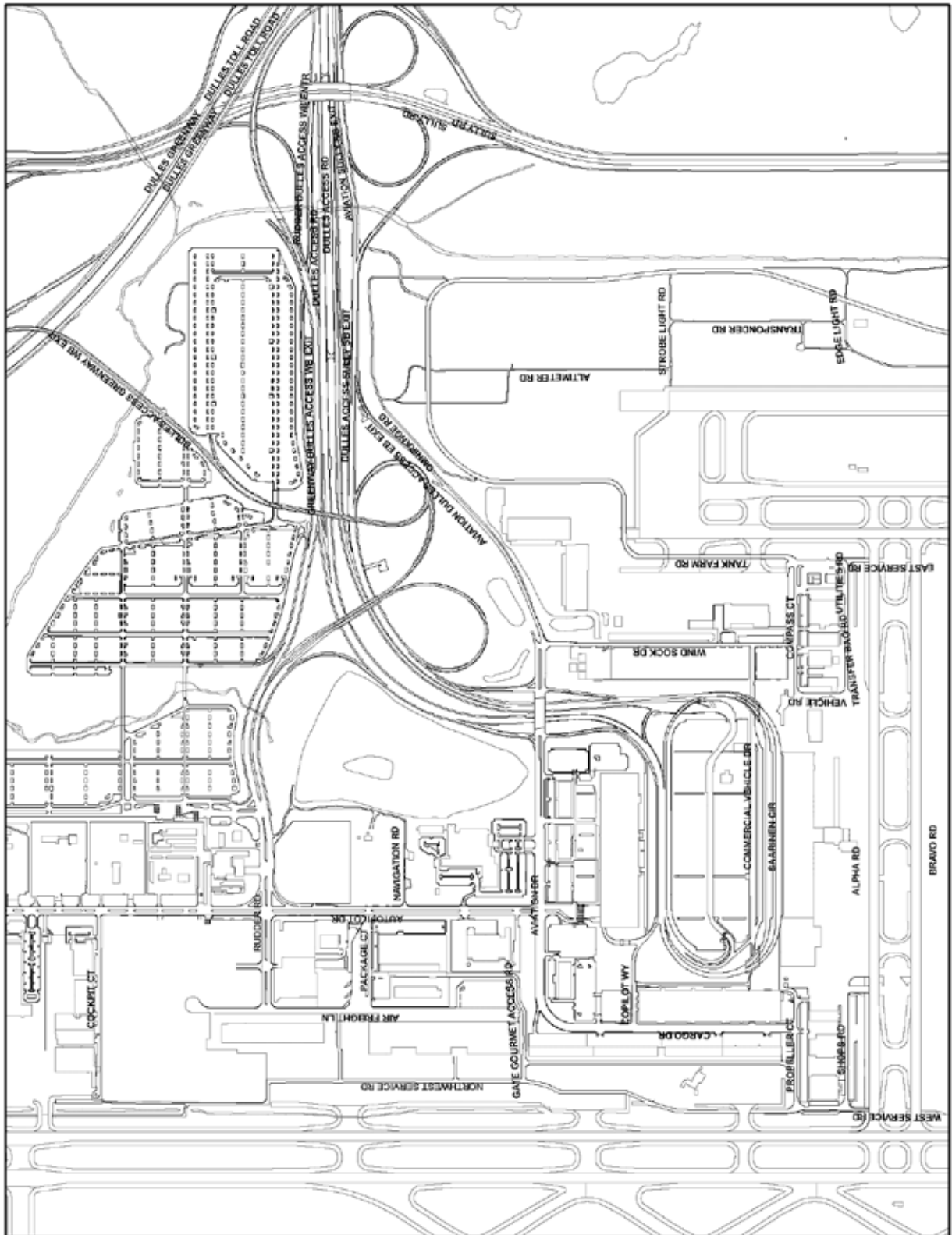
4.6.3.2 To manage the sorting of traffic bound for the departing flight curbside and the arriving flight curbside for the terminal.

4.6.3.3 To manage the sorting of traffic bound for hourly parking and daily parking.

4.6.3.4 To provide curbside zoning information relative to airline ticket counters.

4.6.4 Terminal Curbsides: There are six main sign tasks along the terminal curbside roads:

- A.** To sort drivers to curb areas by airline name.
- B.** To direct through-traffic to left lanes.
- C.** To prepare drivers for the Airport exit/recirculation traffic split at the end of the terminal.
- D.** To designate the various pick-up areas for pedestrians.
- E.** To clarify for pedestrians the various modes and destinations of ground transportation at passenger arrival (pick-up) curbsides at both the upper (private vehicle) level and the lower (commercial vehicle) level.
- F.** To regulate the parking and standing of vehicles on the ramp.



Terminal Approach Roads Exhibit II-4-54

4.6.4.2 Terminal curbside signs shall be designed to integrate with the terminal canopies, architectural details, historic building architecture, and roadway structures.

4.6.5 Exit/Re-circulation Roads: This segment is shown in **Exhibit II-4-55**. There are two major sign tasks along the terminal exit/re-circulation roads:

4.6.5.1 To split traffic between the Airport exit and re-circulation ("Return to Terminal"), calling out off-Airport destinations and return to the Terminal, parking and rental car locations.

4.6.5.2 To manage and direct traffic to services located in the Terminal 1 area (such as, the service station, rental car return, and parking offerings).

4.6.6 Rudder Road and Parking Entrances: There are six main sign tasks along the Rudder Road and Parking Entrances:

4.6.6.1 To sort traffic to various parking offerings.

4.6.6.2 To reinforce the notion of parking being designated by length of stay.

4.6.6.3 To provide hourly, daily, and Economy parking rates.

4.6.6.4 To sort traffic to hourly parking, daily parking, long-term parking, and rental car return.

4.6.6.5 To provide dynamic panels to announce lot-full conditions and redirect drivers to "next best" alternate parking sites.

4.6.6.6 To prepare drivers for the Airport exit/recirculation traffic split at the parking exits.

4.7 Facilities

4.7.1 Terminal: The primary goal of signs in the Main Terminal and other major public buildings at the Airport is to

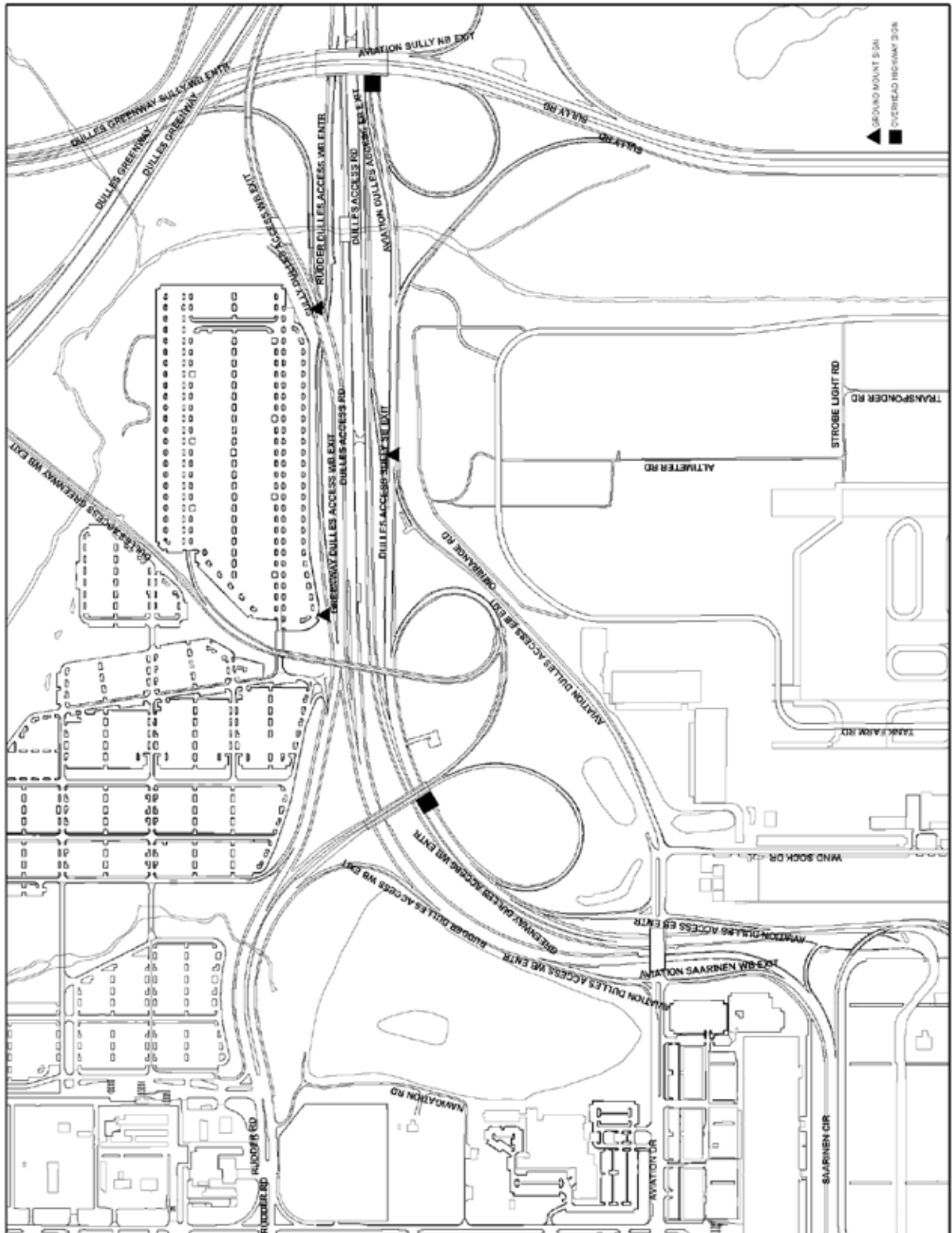
satisfy public way finding needs. Interior and exterior sign design must be an integral part of the building, canopy, concourse, and curbside designs.

4.7.1.1 Exteriors: Exterior signs must identify the functions of the various exits and entrances, either by airline name or by pick-up source (domestic or international arrivals).

4.7.1.2 Canopy Signs: Canopy signs must assist in sorting drivers and passengers to each curbside area nearest the airline of their choice, identify the locations of air-carriers along the curbside, zone the curbside for various functions and uses, and identify the locations of different services and areas along the curb.

4.7.1.3 Interiors: Interior signs must direct users to major destinations within the buildings (ticketing, check-in, concourses, gates, services, facilities, etc.); direct users to major destinations outside the Terminal (Parking, Rental Cars, public transportation, curbside areas, etc.); and direct the transferring of passengers to major Terminal areas (International Arrivals, Baggage Claim, etc.).

4.7.1.4 Airside Signs: Airside gate number signage is not included in these guidelines.



Exit and Recirculation Roads Exhibit II-4-55

CHAPTER 5 Sign Applications

This Chapter describes the basic sign types for all non-regulatory signage. The grid system defined is,

Paragraph 4.1.2 and applies to all signs. The known sign types are listed below along with examples of how the grid applies to each layout. For any sign type that is not defined below, the signage designer shall work with the grid as defined to arrive at a layout.

5.1 Sign Types A, B, C, N, And R

5.1.1 General: All sign types with a side arrow band shall fall under the umbrella of type “A” signs. All sign types with a bottom arrow band shall fall under the umbrella of type “B” signs. All signs that do not use arrows of any kind shall be type “C” signs. These designations only address the overall layout type and do not address the specific uses of each sign. Diagrammatic samples of A, B, and C sign types are included in **Exhibit II-5-1**. All anticipated airport sign types are listed below with a three-character code. The first character designates exterior or interior; R for roadway, N for interior. The second character numerically tracks the hierarchical order of the sign. The third character notes the overall layout relative to arrow bands. A family of sign types can be seen in **Exhibits II-5-2 and II-5-3**.

5.2 Exterior Sign Types

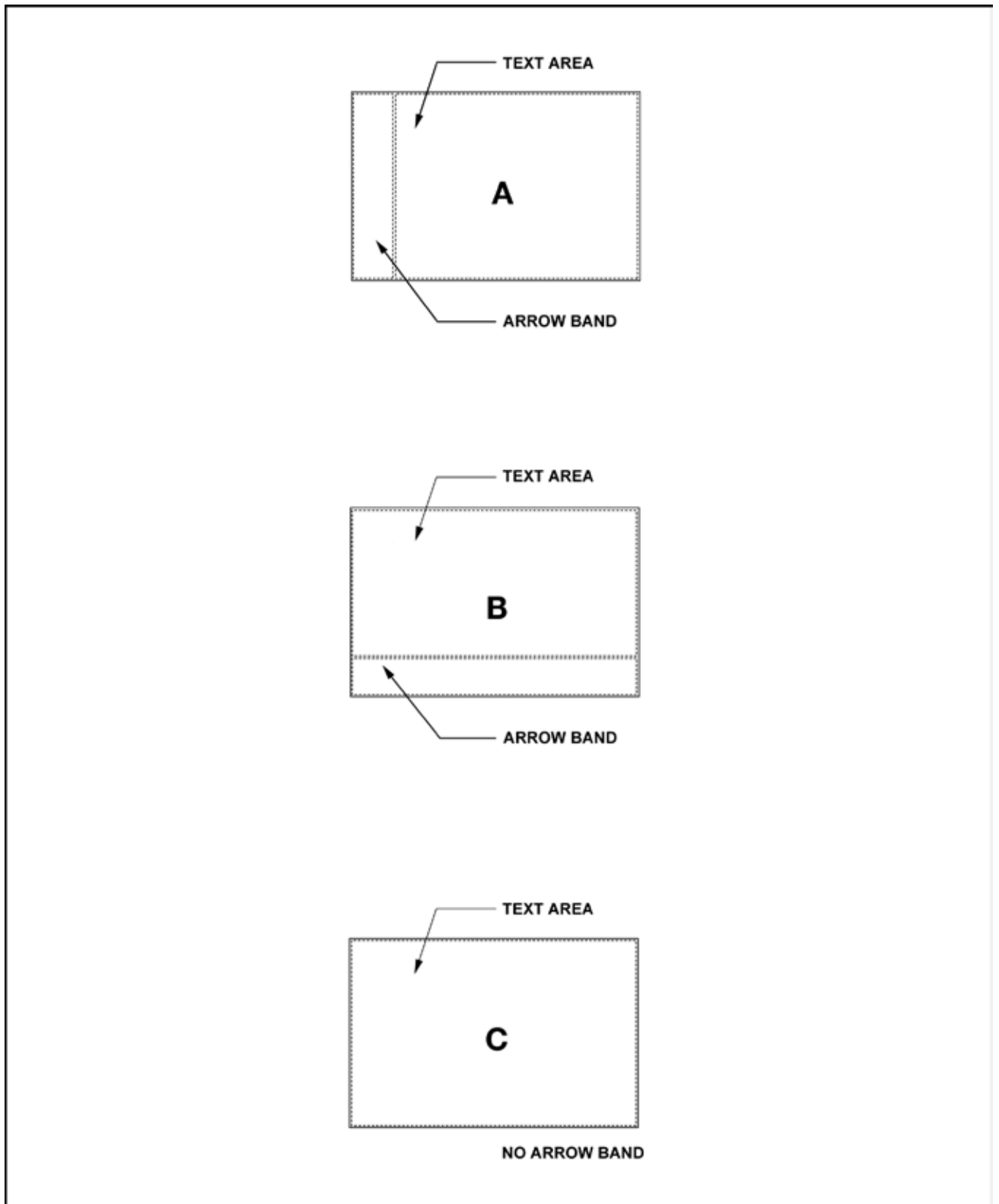
5.2.1 General: All signs follow the guidelines established in **Chapters 3 and 4**, for overall consistency and conformance with the signage design standards. Each sign description in this section outlines conditions that are specific to each sign type.

5.2.2 Gateway Signs - Type R-1-C: Gateway signs shall be used at all vehicular entries to the Airport. Based upon the historical identification signs that exist, all R-1-C signs shall be butterfly type signs. This sign is an exterior sign only and shall be internally illuminated (**Exhibit II-5-4**).

5.2.3 Terminal Designation Signs – Type R-2-C: On each major roadway approach, a set of signs will be placed

to introduce the airlines that operate out of each of the two terminals. These signs may have more than one column of messages, will have a terminal parent message, and will not use not use any international symbols. Panels may be either overhead or post-and-panel, depending upon site conditions. Use changeable aluminum message strips finished to match fixed sign face. Changeable strips shall have pre-drilled holes to allow the strip to be easily and accurately mounted to threaded studs projecting from fixed sign face. Painted cap nuts secure the strip to fixed sign and should be replaced each time sign strips are replaced. At the Authority’s discretion, airline names may also be shown using dynamic sign technology (**Exhibit II-5-5**). Airline names shall be organized alphabetically by column according to the guidelines established for lists, as opposed to individual messages.

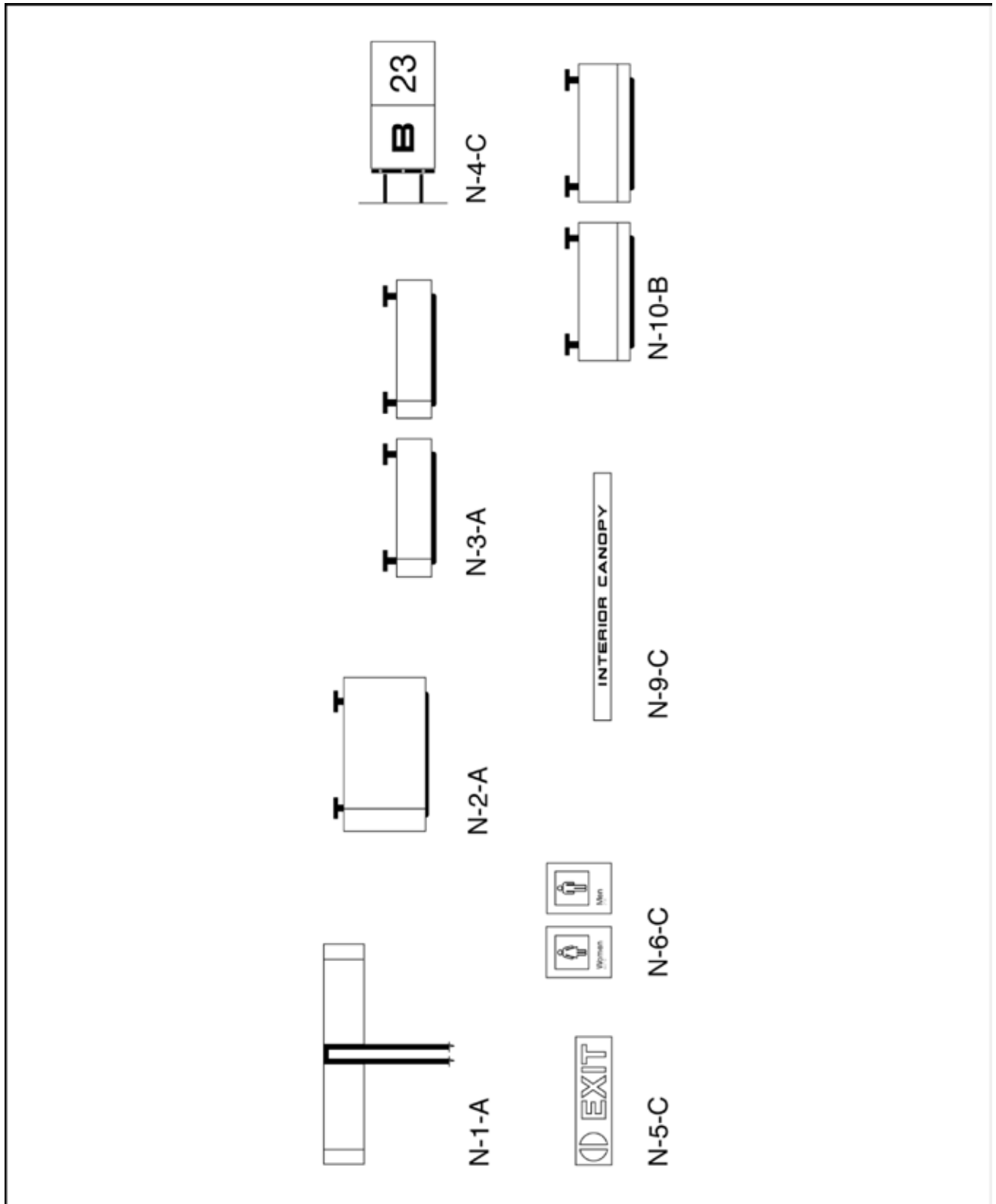
5.2.4 Curbside Zone Signs – Type R-3-C: On each major terminal roadway approach, a set of signs will be placed to introduce a curbside zone that allows the passenger to be dropped off at the closest door to their specific airline ticket counter and/or baggage claim area. This sign may have more than one column of messages and may have a parent terminal message, a sub-parent message to state “Curbside Zone,” and may use an alphabetical symbol combined with the terminal symbol for the curbside blade signs. The size and placement of these symbols varies from the layout grid due to the use of two symbols combined. The zone designation shall be consistent through both arriving flight and departing flight levels of the terminal building(s). The only exception is the message “International Arrivals,” which shall exist on the arriving flights level, but will not exist on the departing flights level signage. A vertical color band may be used on the left side of the panel to reinforce the terminal destination. Signs may be either overhead or post-and-panel, depending upon site conditions. Use changeable aluminum message strips, finished to match fixed sign face. Changeable strips shall have pre-drilled holes to allow the strip to be easily and accurately mounted to threaded studs projecting from the fixed sign face.



Typical Sign Type Diagrams

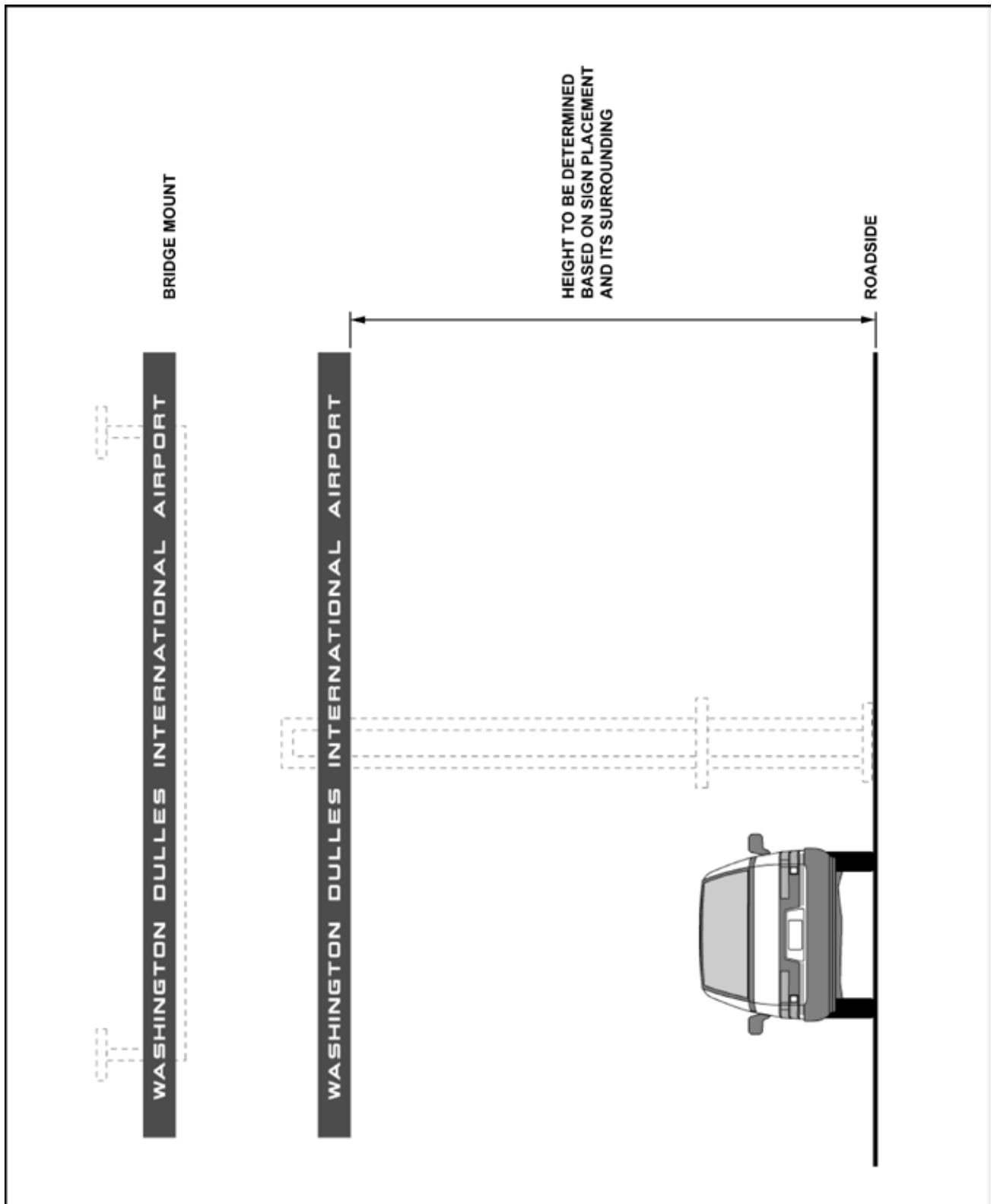
Exhibit II-5-1





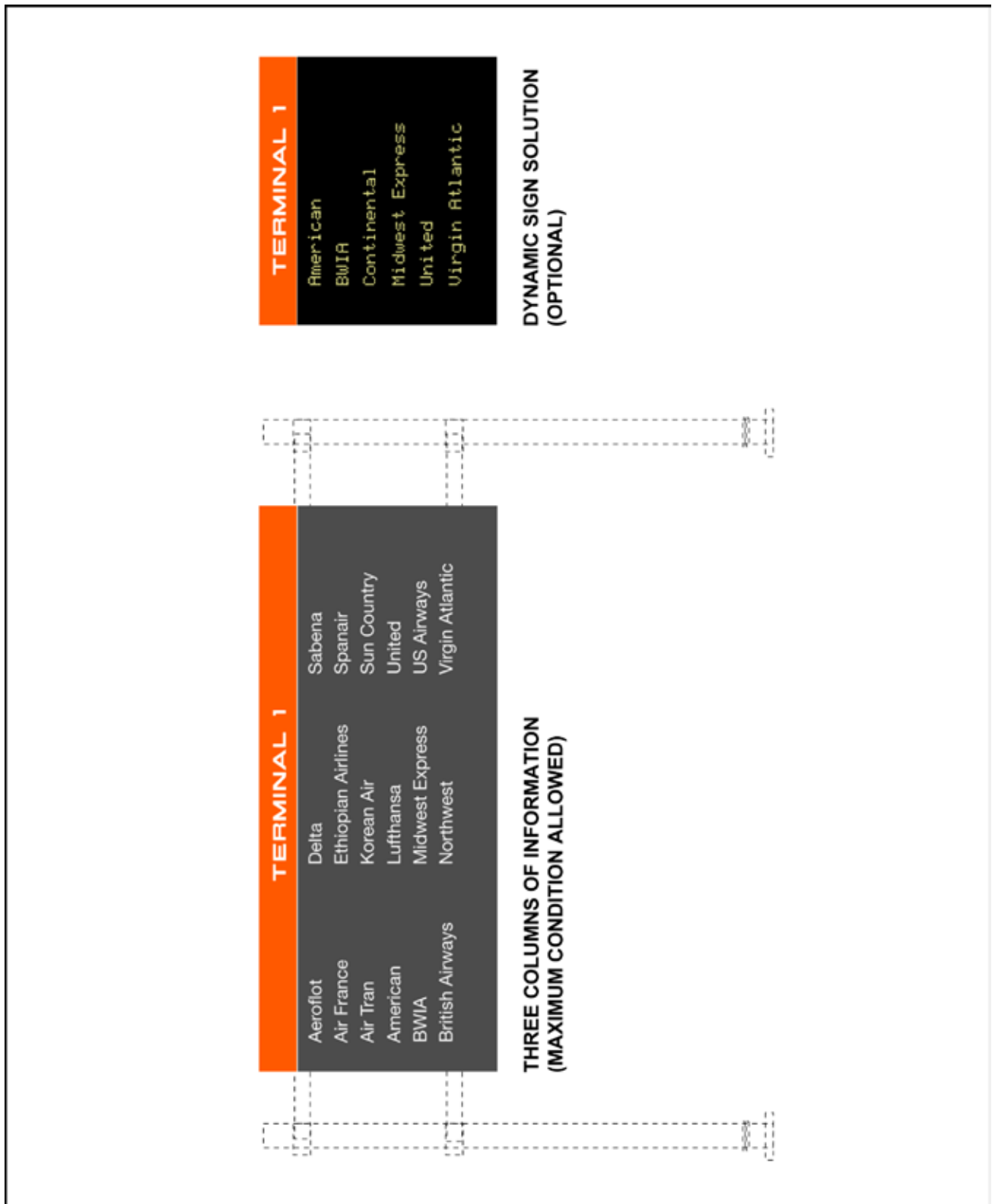
Interior Sign Type Diagrams

Exhibit II-5-3



Gateway Signs

Exhibit II-5-4



Terminal Destination Signs

Exhibit II-5-5

Painted cap nuts secure the strips to the fixed sign, and should be replaced each time sign strips are replaced. At the Authority's discretion, airline names may also be shown using dynamic sign technology. All airline names shall be listed alphabetically within the column of text. Airline names shall be organized alphabetically by column according to the guidelines established for lists, as opposed to individual messages. Options for this sign type are included in **Exhibits II-5-6 and II-5-7**.

5.2.5 Overhead Terminal Area Directional Signs – Type

R-4-B: Roadway panels with destinations that are within one of the two terminal areas shall have a terminal color band parent message, a maximum of three text messages, and one bottom arrow band. Where all panels spanning a roadway carry messages with the same terminal destination, those headers may be combined to allow the terminal message to be stated once, centered across all panels (**Exhibit II-5-8**). Where destinations for a terminal are not all grouped together, each individual lane shall have its own terminal parent message header. At no time should two "Terminal 1" parent messages be combined if a third panel for the same terminal destination also exists on the same truss (**Exhibit II-5-9**). Where panels have different lane designations, but similar terminal destinations, separate panels shall be used for each terminal destination (**Exhibit II-5-9**). Where two terminal destinations are on the same truss span and they fall along the same path, but all panels for each terminal are adjacent to one another, the parent messages for that terminal shall also be combined and centered over the two or three panels for that terminal destination (**Exhibit II-5-10**). Where similar terminal destinations exist on the same truss, but are separated by a different terminal destination, signs should not be combined (**Exhibit II-5-11**). Vertical rules are to be used to separate messages and to clarify the message and arrow connection over each traffic lane. Airline names shall be organized alphabetically by column according to the guidelines established for lists, as opposed to individual messages.

5.2.6 Post-and-Panel Terminal Area Directional Signs –

Type R-5-A: Roadway panels with destinations that are within one of the two terminal areas shall have a terminal

color band parent message, a maximum of six text messages, and one side arrow band (**Exhibit II-5-12**).

5.2.7 Cantilever Terminal Area Directional Sign – Type

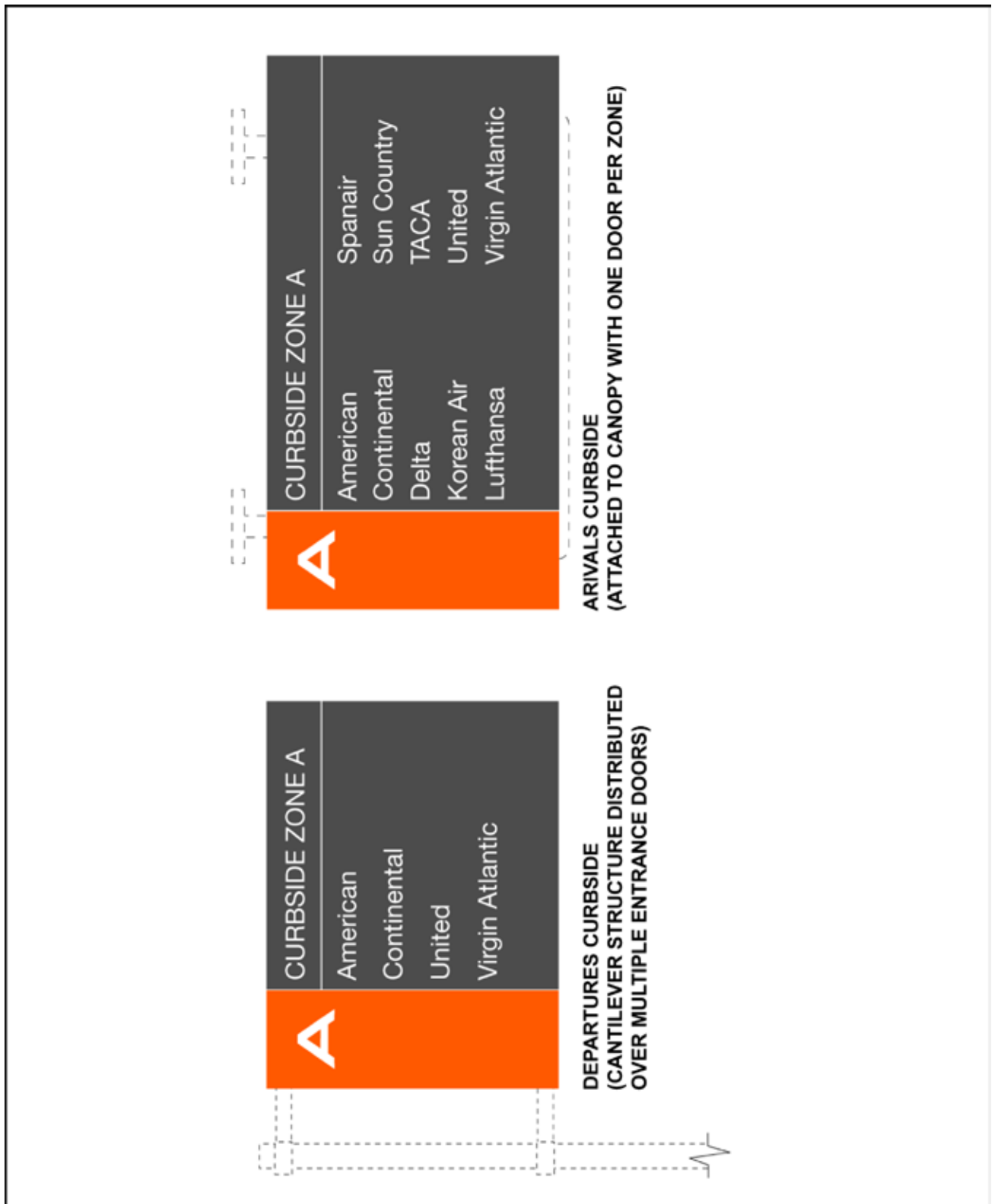
R-6-B: Roadway panels with destinations that are within one of the two terminal areas shall have a terminal color band parent message, a maximum of three text messages, and one bottom arrow band. Where only one panel is needed, a cantilevered structure shall be used. Arrows shall be centered over traffic lane (**Exhibit II-5-13**).

5.2.8 Overhead Parking Management Signs –

Type R-7-C: Roadway panels that provide dynamic information about the availability of parking may be mounted to overhead truss or cantilever structures. Parking messages will fall under a parent message that reads "parking" in Helvetica, all-caps. This panel is designed to only provide the messages described. This panel may not combine parking management information with other terminal area destinations.

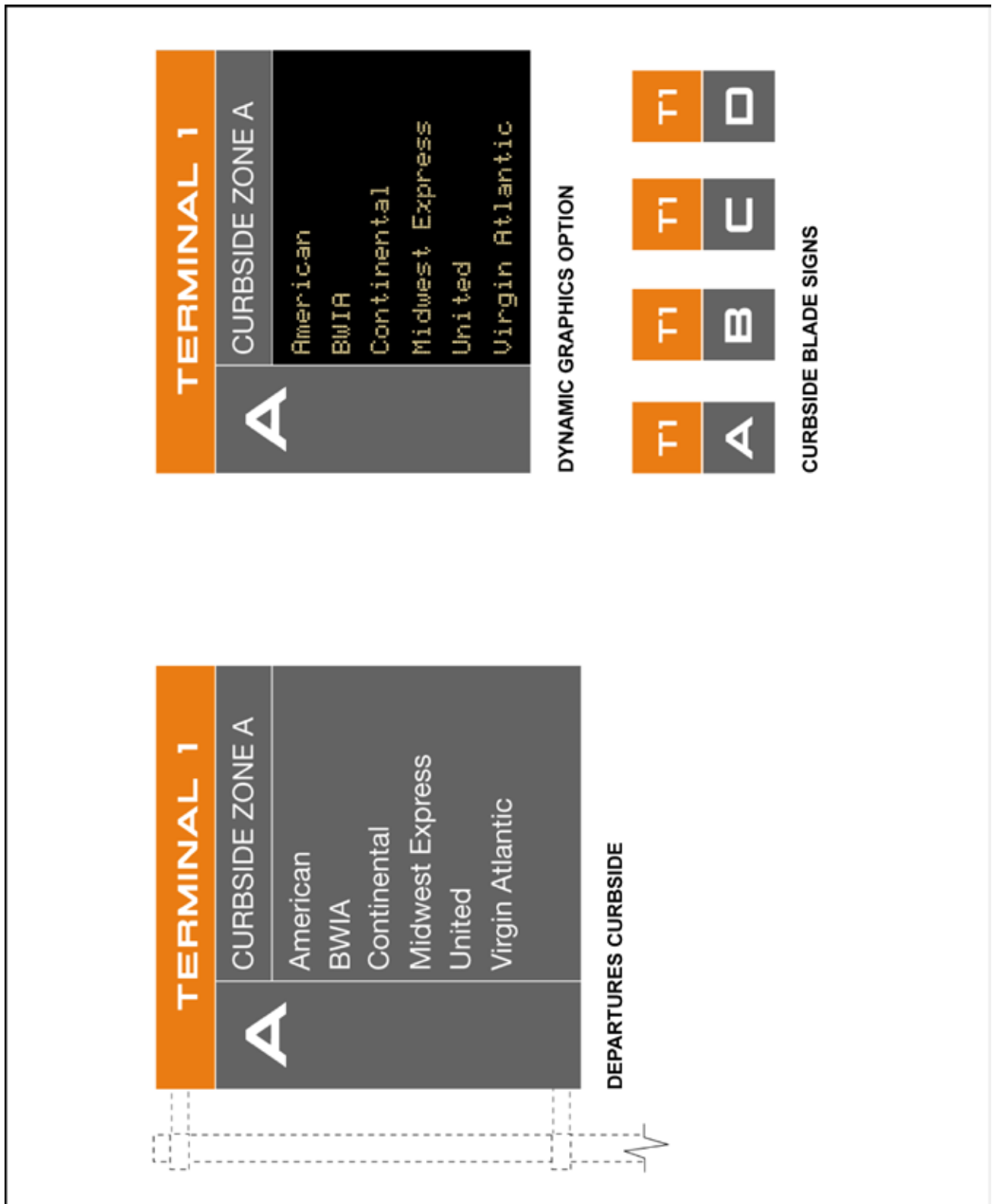
5.2.8.1 Messages Allowed: The messages allowed on approach signs to the Airport are:

- A. **Terminal** Parking + Open/Full
- B. **Garage** Parking + Open/Full
- C. Economy Parking + Open/Full
- D. Valet parking + Open (Valet parking is always available)



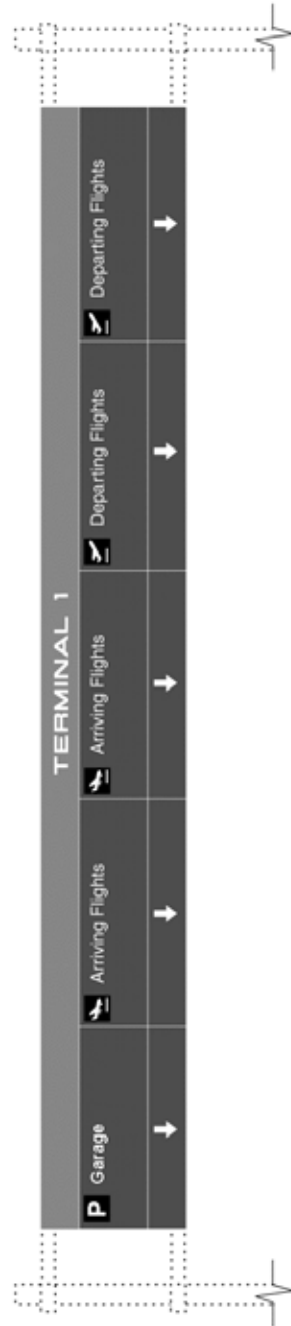
Curbside Zone Signs (A)

Exhibit II-5-6

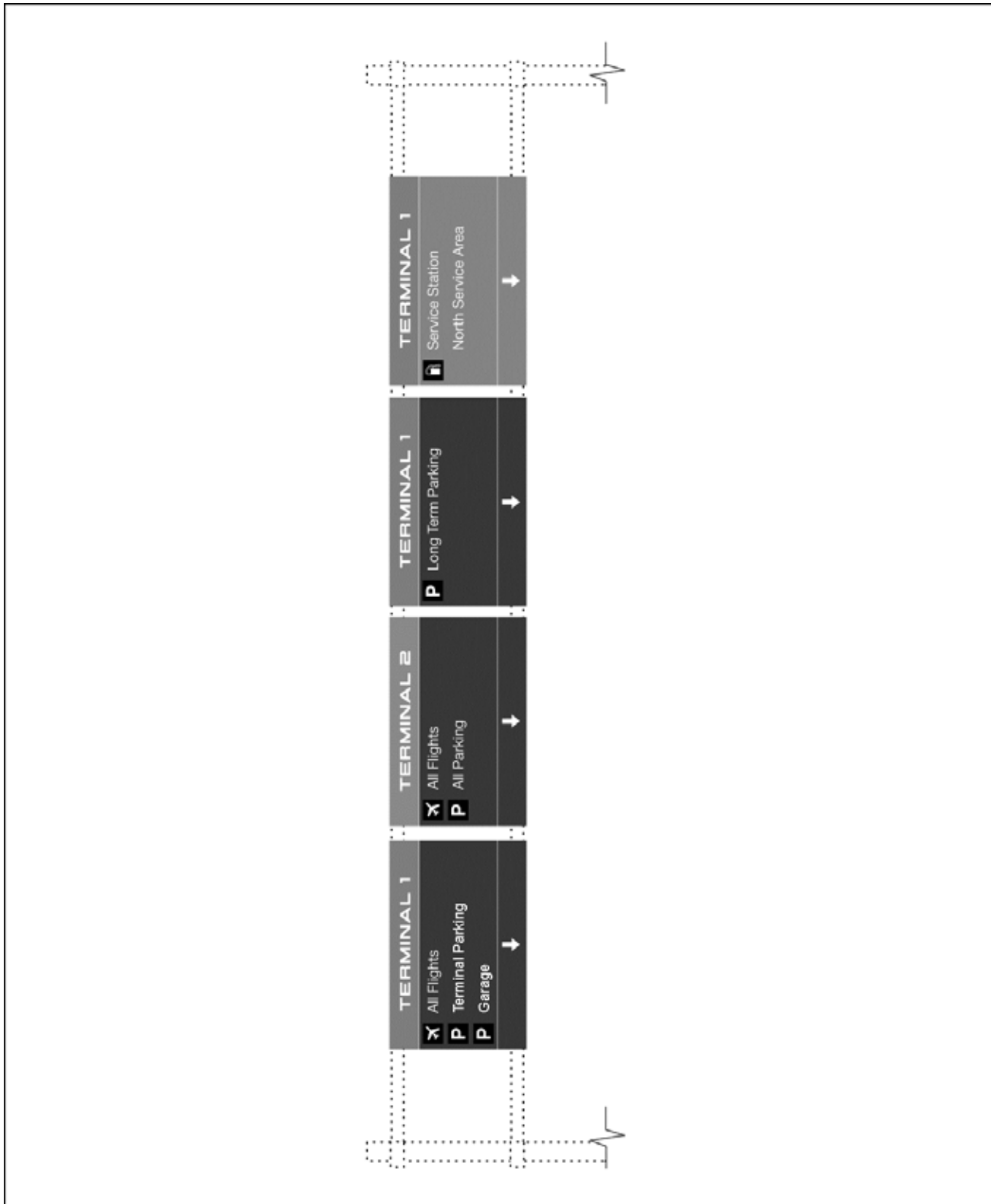


Curbside Zone Signs (B)

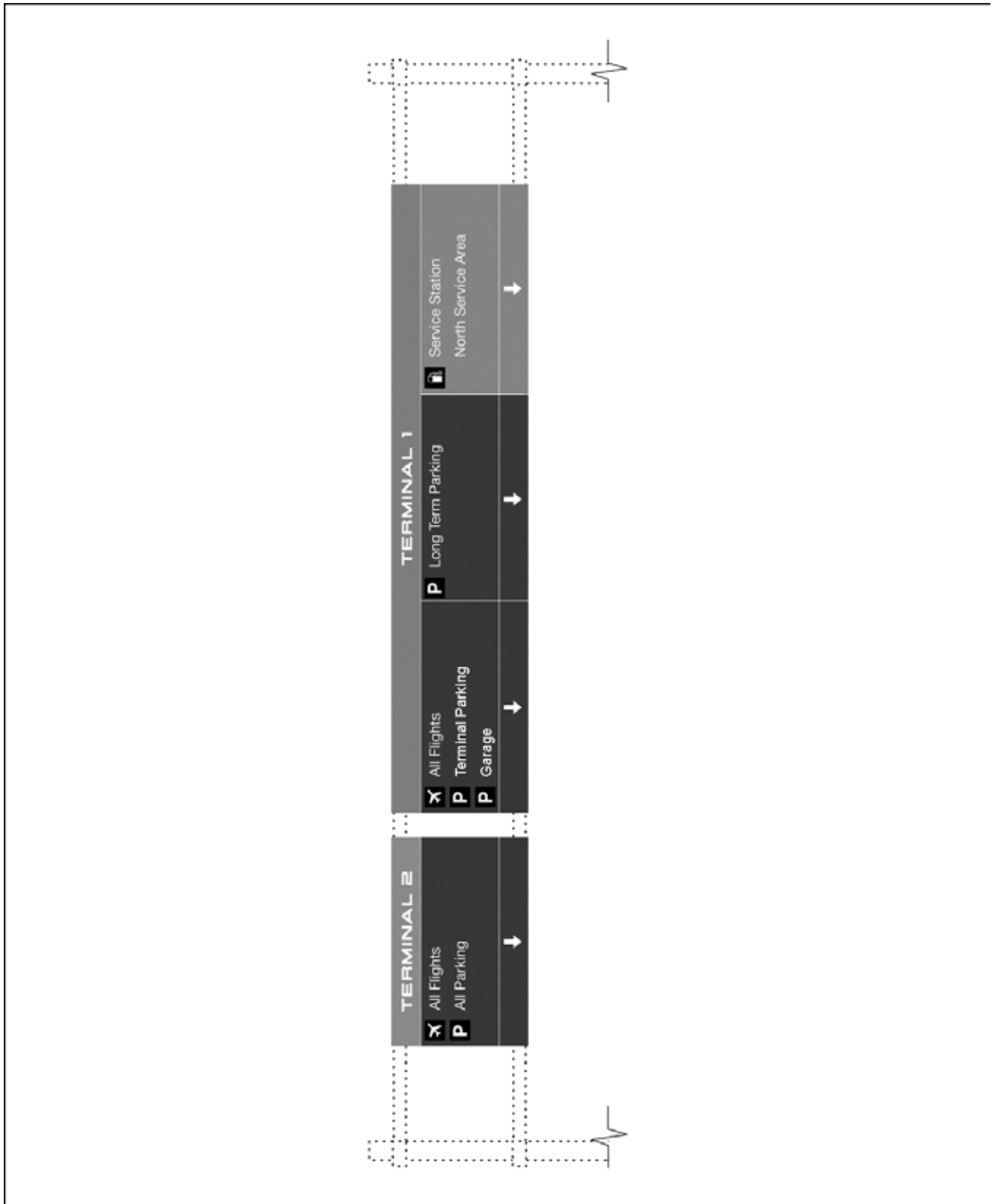
Exhibit II-5-7



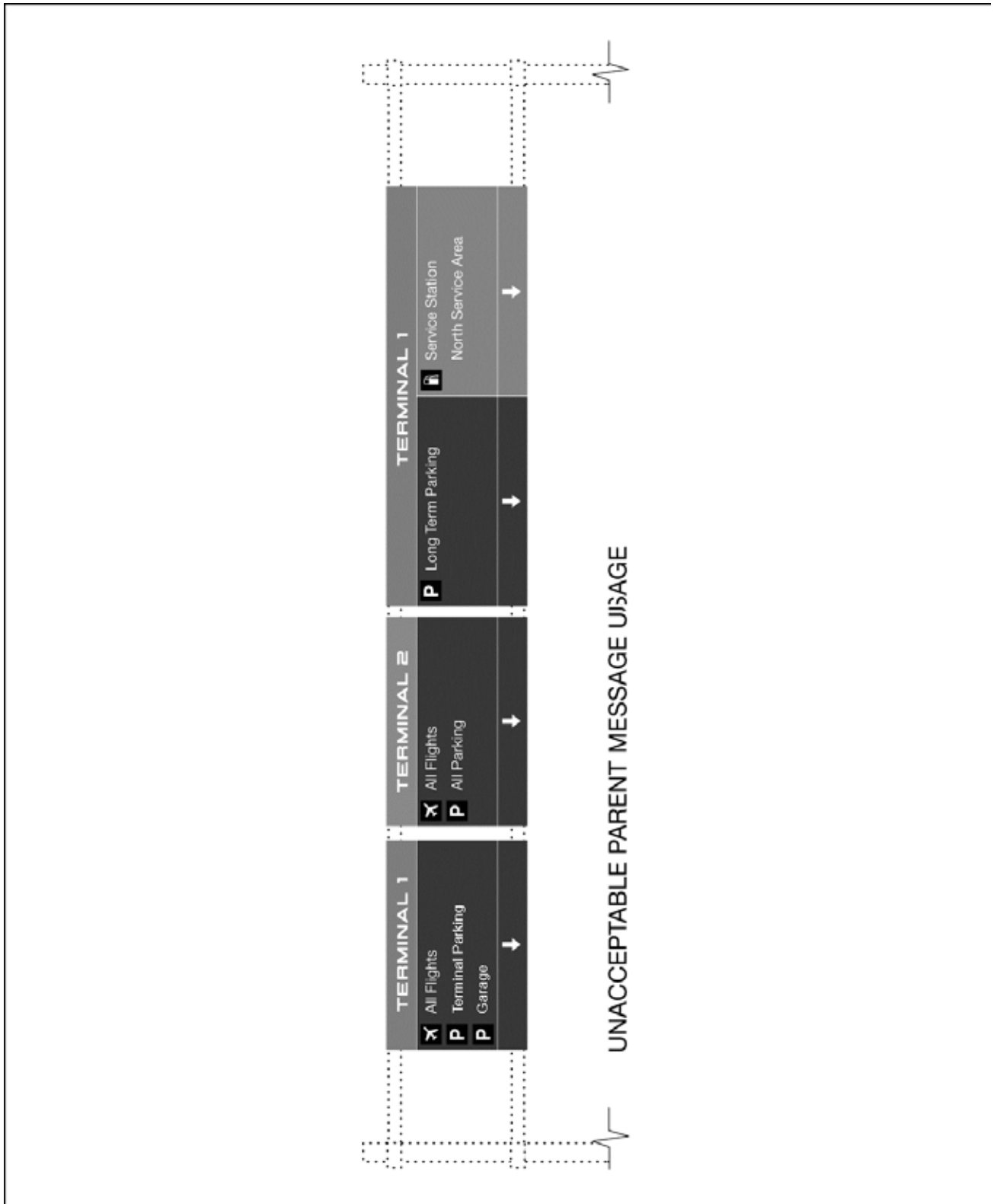
Overhead Terminal Directional Sign (A) Exhibit II-5-8



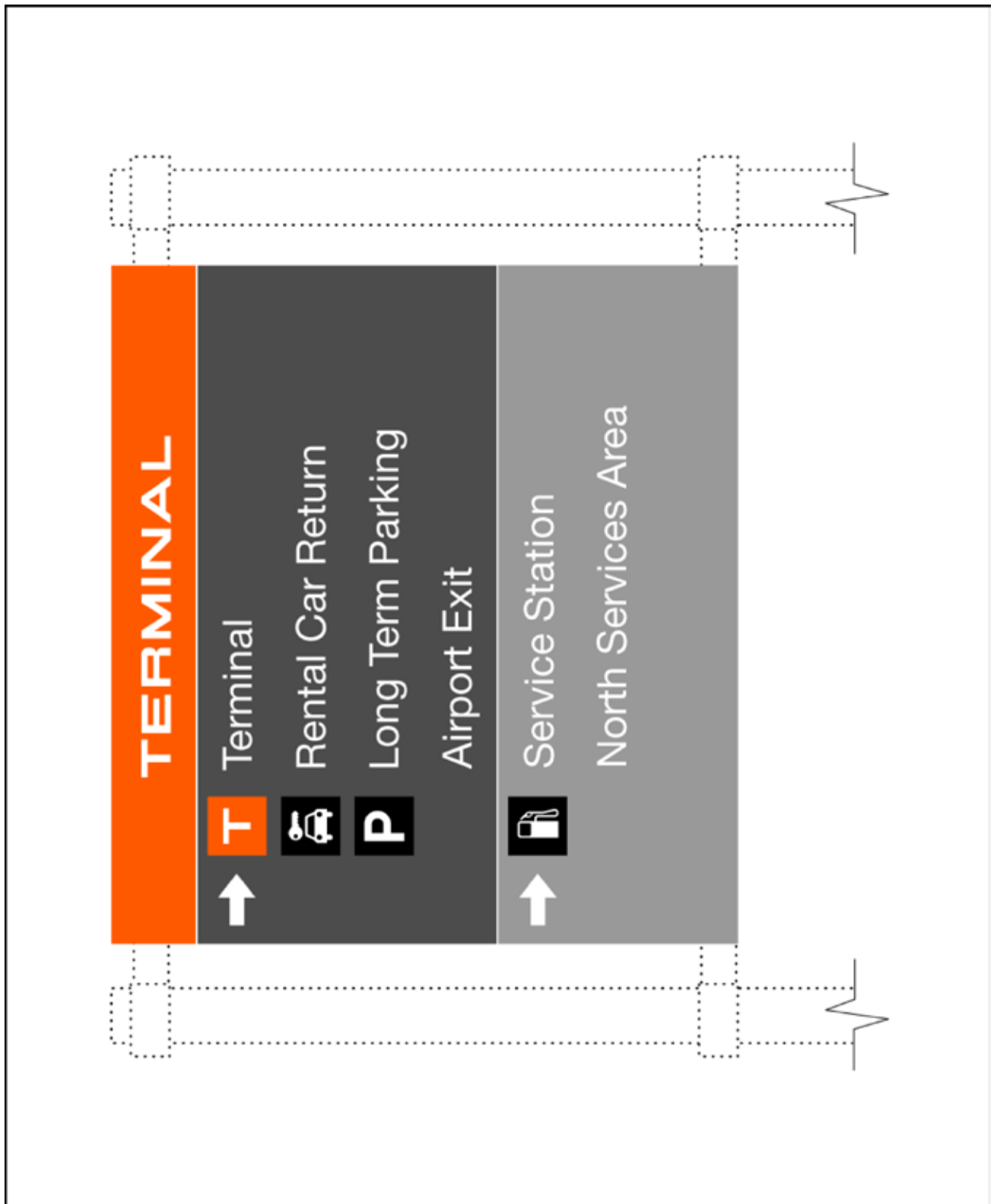
Overhead Terminal Directional Sign (B) Exhibit II-5-9



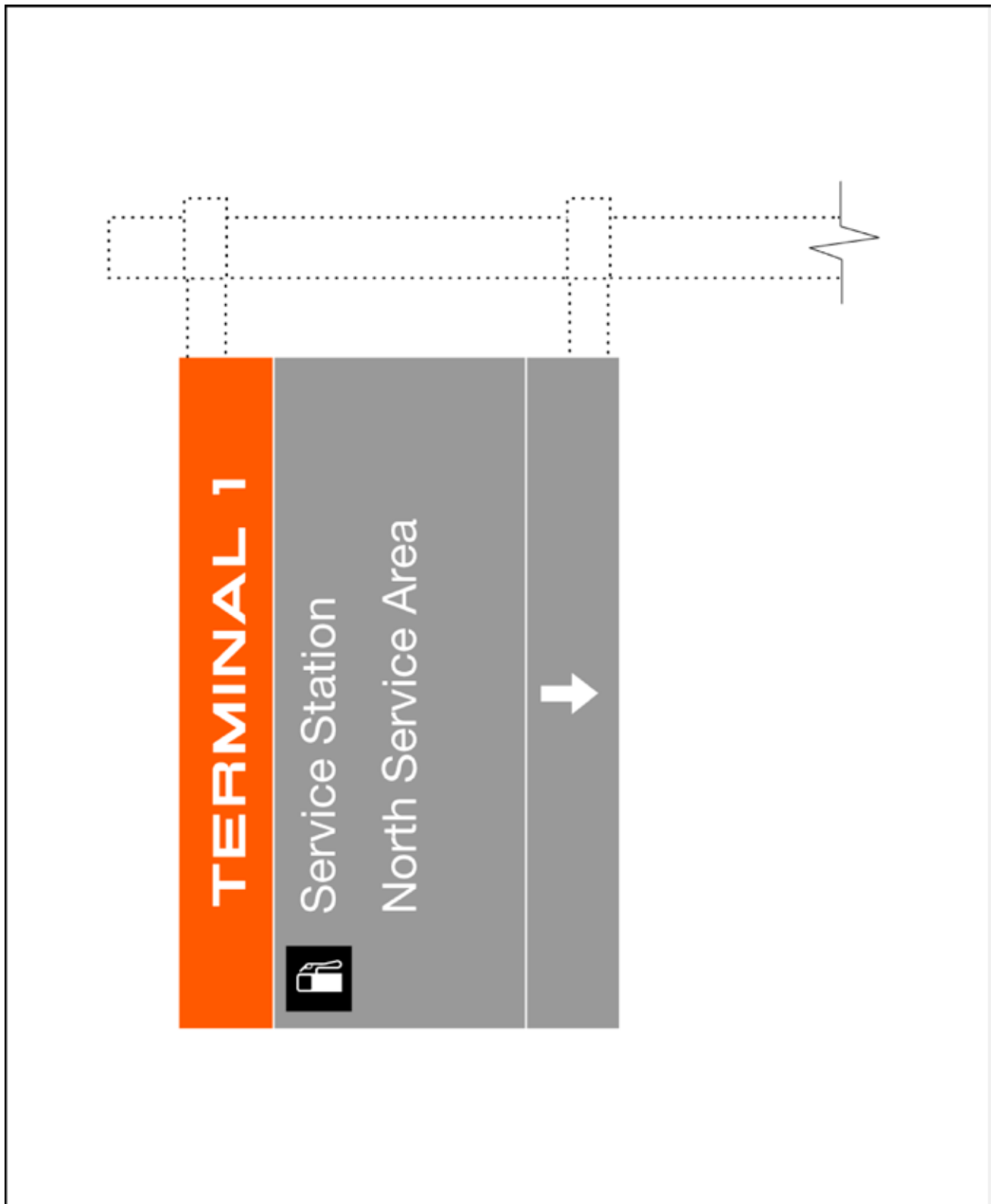
Overhead Terminal Directional Sign (C) Exhibit II-5-10



Unacceptable Parent Message Use Exhibit II-5-11



Post-and-Panel Terminal Area Exhibit II-5-12



Cantilever Terminal Area, Directional

Exhibit II-5-13

5.2.8.2 Dynamic signs shall be used to designate “open” or “full” status of each parking area. Face field color shall match field color of static sign: text color shall be red for “full” messages and green for “open” messages. The layout for signs, including a dynamic sign used to designate “open” or “full,” shall follow the standard layout of a sign as outlined in **Paragraph 4.1**. The open/full message shall always be placed to the left of the text message that it accompanies. This layout allows the dynamic messaging area of the sign to be neatly organized in a column in reference to the international symbols used elsewhere in the system. This sign type is intended to provide passengers with parking availability only and does not include directional arrows. Sign types R-9-A and R-10-A include arrow directional information. Variable components shall be remotely activated from the airport parking management system and shall include a manual override switch that is accessible from the ground. Messages on this panel are accompanied by the international parking symbol only, not by any memory tool symbols (**Exhibit II-5-14**).

5.2.9 Overhead Parking Management Directional Signs

– **Type R-8-B:** Roadway panels that provide dynamic information about the availability of parking may be mounted to overhead truss or cantilever structures. Parking messages will fall under a terminal header panel. This panel is designed to only provide the messages described. This panel shall not combine parking management information with other terminal area destinations.

5.2.9.1 The messages allowed on approach signs to the Airport are:

- A. Terminal** Parking + Open/Full
- B. Garage** Parking + Open/Full
- C. Economy** Parking + Open/Full
- D. Valet** parking + Open (Valet parking is always available).

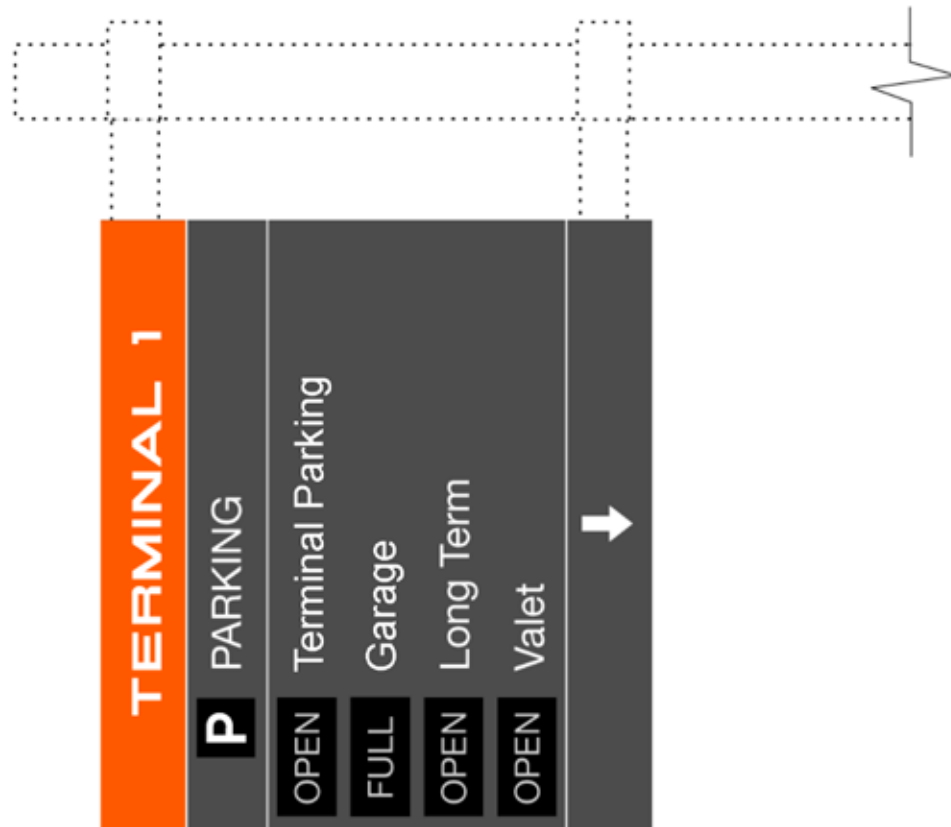
5.2.9.2 Dynamic signs shall be used to designate “open” or “full” status of each parking area. Face field color shall match field color of static sign: text color shall be red for “full” messages and green for “open” messages. The layout for signs, including a dynamic sign used to designate “open” or “full,” shall follow the standard layout of a sign as outlined in **Paragraph 4.1**. The open/full message shall always be placed to the left of the text message that it accompanies. This layout allows the dynamic messaging area of the sign to be neatly organized in a column in reference to the international symbols used elsewhere in the system. Variable components shall be remotely activated from the airport parking management system, and shall include a manual override switch that is accessible from the ground. Messages on this panel are accompanied by the international parking symbol only, not by any memory tool symbol (**Exhibit II-5-15**).

5.2.10 Post-and-Panel Parking Management Signs –

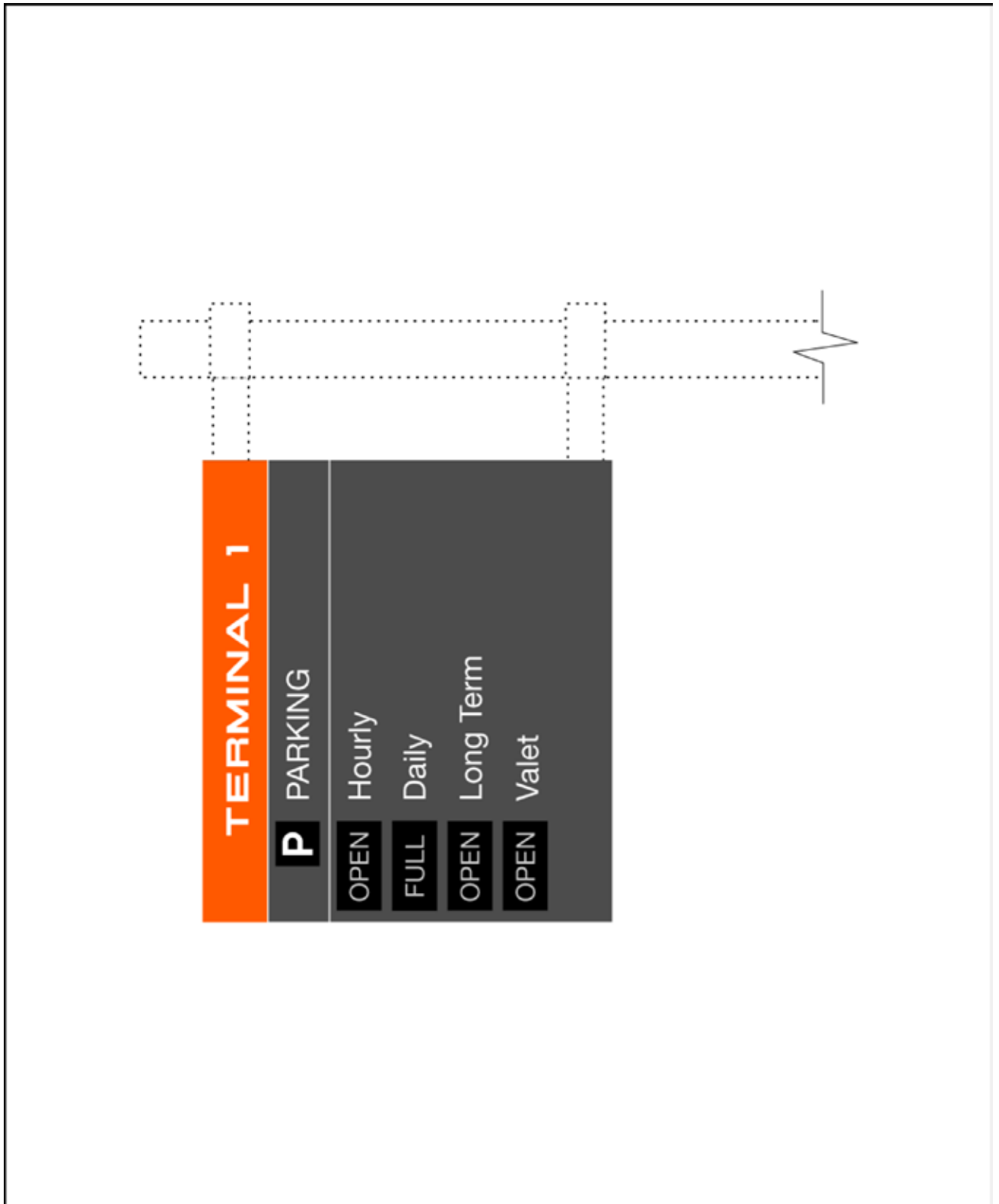
Type R-9-A: Parking management signs are roadway panels that provide dynamic information about the availability of parking. Parking messages will fall under a terminal parent message. This panel is designed to only provide the messages described. This panel shall not combine parking management information with other terminal area destinations.

5.2.10.1 The messages allowed on approach signs to the Airport are:

- A. Terminal** Parking+ Open/Full
- B. Garage** Parking+ Open/Full
- C. Long-Term** Parking+ Open/Full
- D. Valet** Parking+ Open (Valet parking is always available).



Overhead Parking Management (A) Exhibit II-5-14



Overhead Parking Management (B) Exhibit II-5-15

5.2.10.2 Dynamic signs shall be used to designate “open” or “full” status of each parking area. Face field color shall match field color of static sign: text color shall be red for “full” messages and green for “open” messages. The layout for signs, including a dynamic sign used to designate “open” or “full,” shall follow the standard layout of a sign as outlined in **Paragraph 4.1**. The open/full message shall always be placed to the left of the text message that it accompanies. This layout allows the dynamic messaging area of the sign to be neatly organized in a column in reference to the international symbols used elsewhere in the system. Variable components shall be remotely activated from the airport parking management system, and shall include a manual override switch that is accessible from the ground. Messages on this panel are accompanied by the international parking symbol only, not by any memory tool symbol (**Exhibit II-5-16**).

5.2.11 Butterfly Directional Signs – Type R-10-A:

Butterfly signs shall be used to reinforce messages. Messages appearing on these signs shall also appear on primary directional signs prior to the butterfly sign location. The placement of these signs shall be at points where lanes split or fork into two different directions. Parent messages are used for terminal areas. Arrow bands on this sign type shall vary from the standard in placement: on the right hand panel, the arrow band, symbol placement, and text messages shall be right justified (**Exhibit II-5-17**).

5.2.12 Airport Exit Overhead Directional Signs – Type

R-11-B: In place of a terminal parent message, this sign type shall have a parent message that reads “AIRPORT EXIT” in all capitals using the approved Helvetica typeface. The color and layout of this sign panel shall match all other Washington Dulles International Airport signs. In place of the international symbol shall be the appropriate MUTCD “shield” with the highway or roadway number. When designating a direction for a state highway road, the next city destination shall be used, such as “Herndon” or “Chantilly.” For designating a direction for an interstate highway, the compass direction shall be used, such as “I-66 East” or “I-66 West” on the Airport Access Road, beyond the Route 28 interchange (**Exhibit II-5-18**).

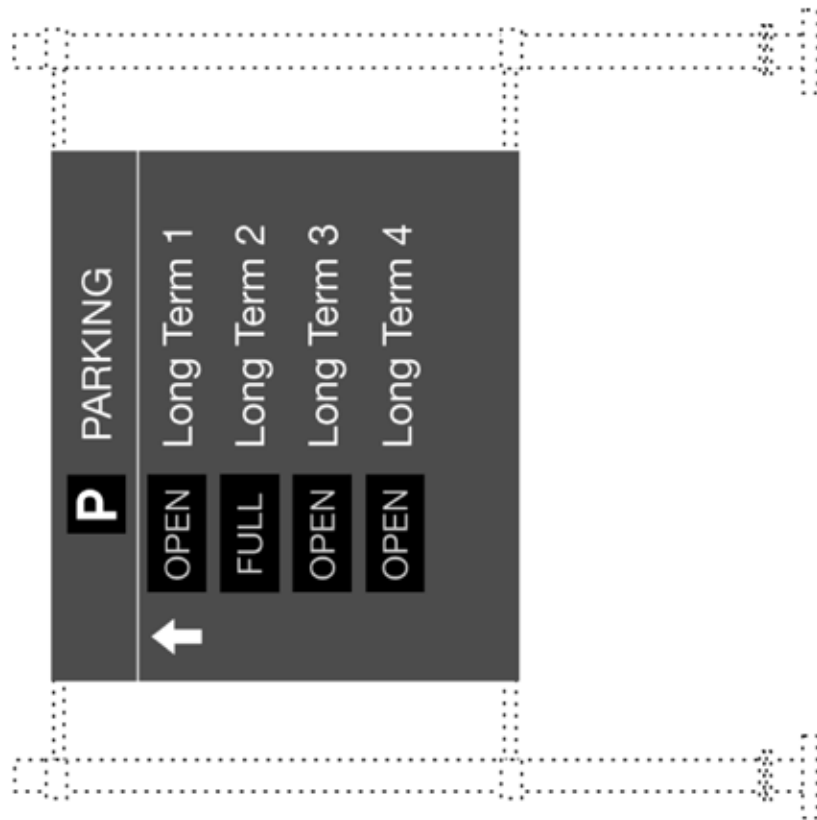
5.2.13 Ground Transportation Curbside Signs – Type

R-12-C: These signs, although exterior, are actually designed for pedestrian viewers, because all vehicles are commercial at this level. Each sign is a two-part component: an oversized international symbol and a text message panel listing the commercial vehicles serving that curb. The designs are intended for use with the future canopies that are designed to replace the existing red canopy at the center median. The international symbol shall match the height of the adjacent text message panel. The largest text message panel determines the height of all signs along the length of the canopy. All forms of commercial transportation will make two stops along the length of the building, once at the East End and once at the West End. The signage should reflect this. The international symbol shall be placed toward the terminal and the text panel shall be placed toward the curb it is serving.

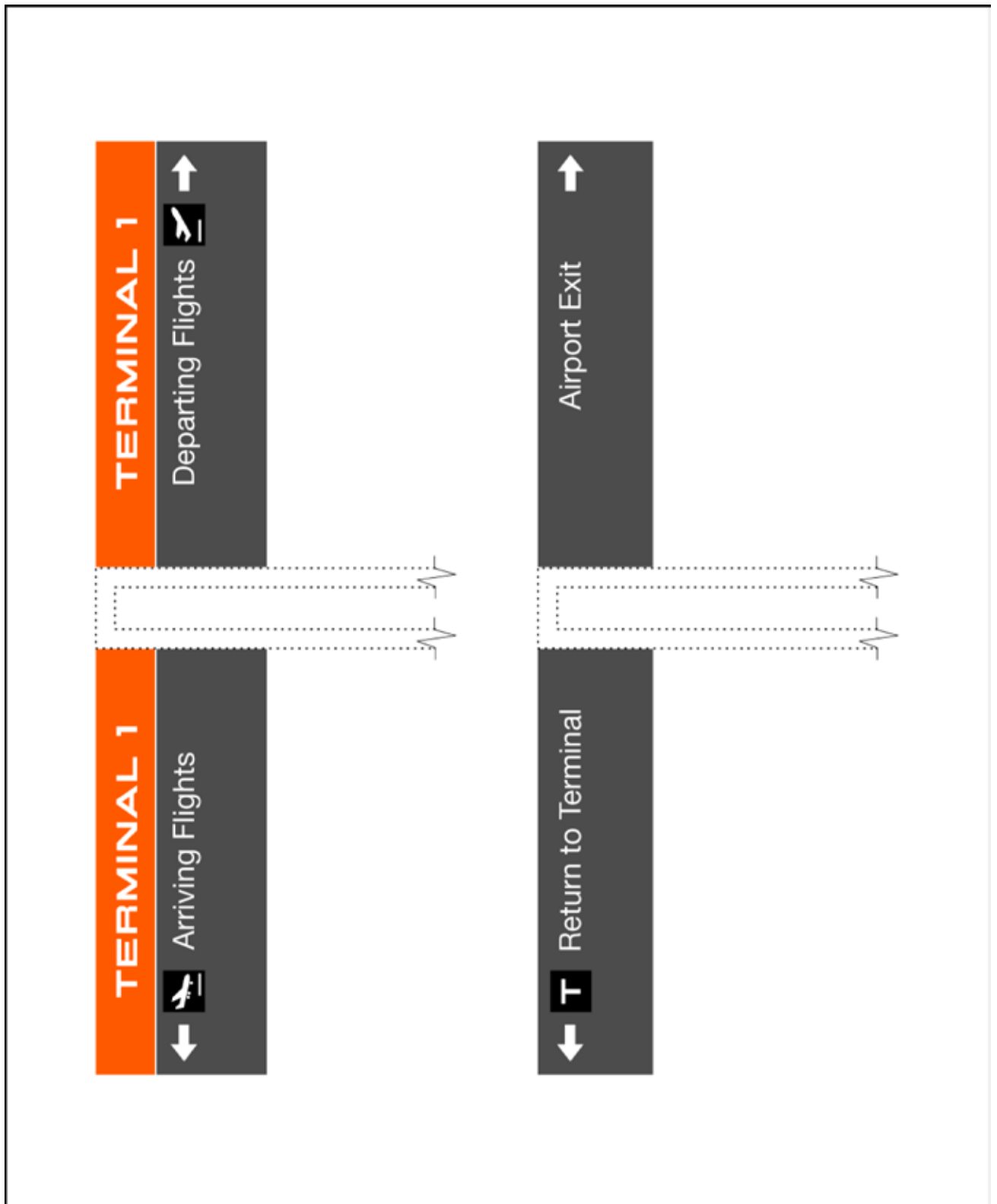
5.2.13.1 The curbs shall be organized into the following uses:

- A.** Taxis and Buses
- B.** Rental Car Shuttles
- C.** Parking Shuttles
- D.** Commercial Shuttles

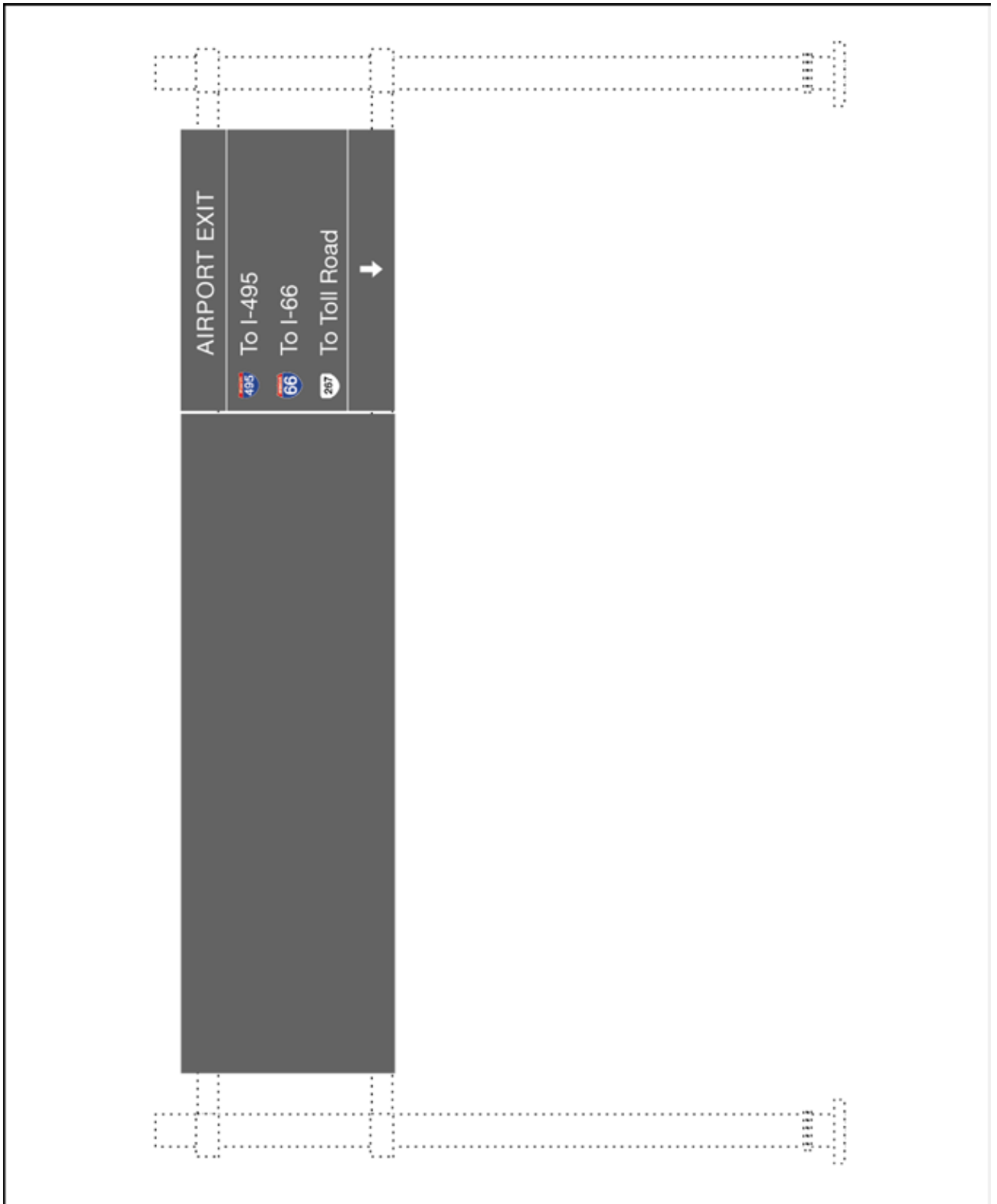
5.2.13.2 These uses, as listed above, shall become the parent message for each panel. The business names shall be listed below using the approved Helvetica typeface. Business names shall be organized alphabetically by column according to the guidelines established for lists, as opposed to individual messages. No logos or corporate colors will be permitted on the commercial curbside signage (**Exhibit II-5-19**). All businesses are encouraged to place signage on the commercial vehicles that service the curbside.



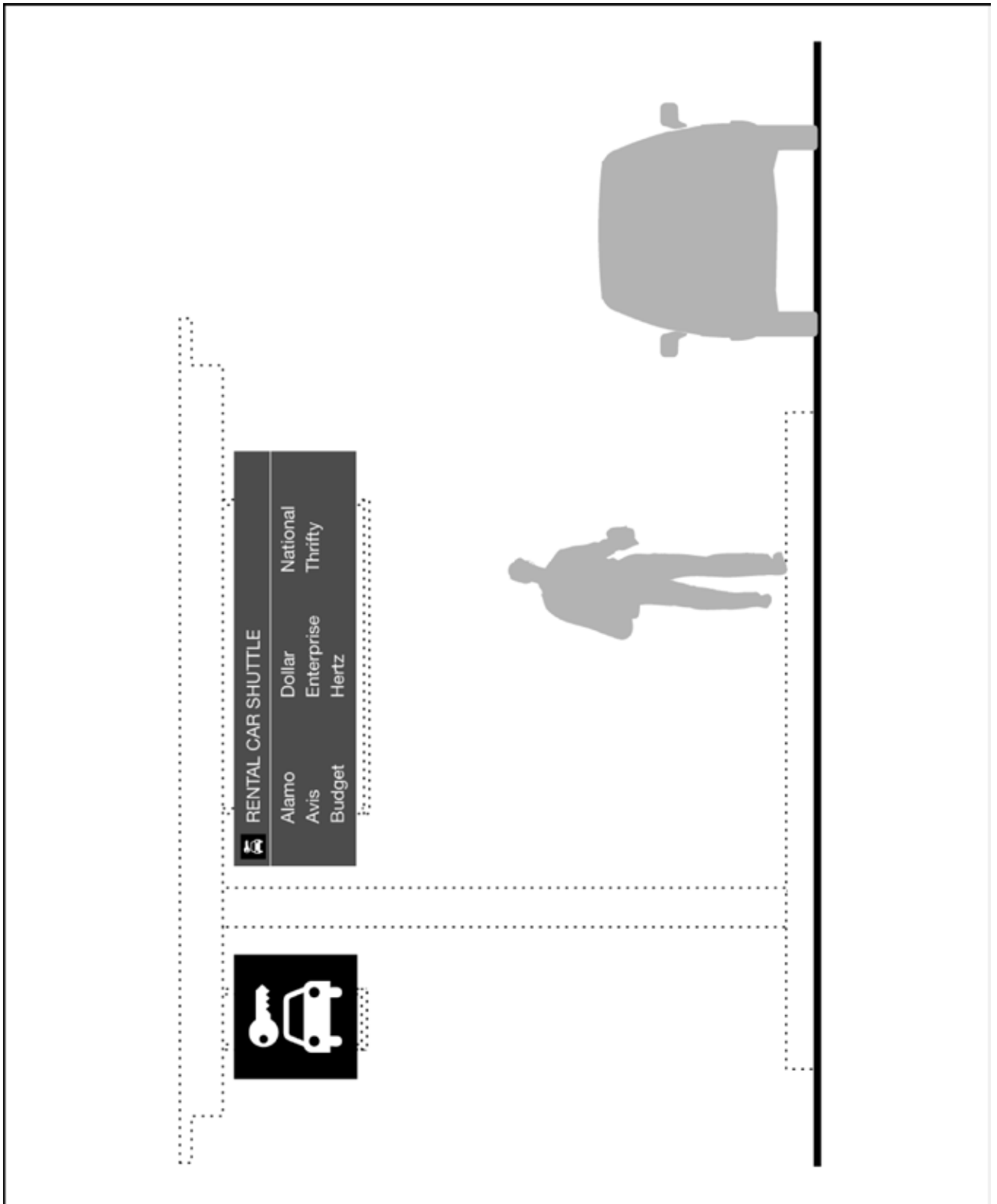
Post-and-Panel Parking Management Exhibit II-5-16



Butterfly Directional Exhibit II-5-17



Exit Overhead Directional Exhibit II-5-18



Ground Transportation Curbside Exhibit II-5-19

5.2.14 Parking Lot Row Identification Signs – Type R-13-C: Row identification signs shall be single post signs as outlined in **Paragraph 4.3.3.5**. Each row identification sign shall have a background color that corresponds to the terminal area color, a message band along the top edge, and a symbol field below. Row identification signs shall appear in pairs along the length of parking rows. Messages and symbols shall alternate in pairs along the length of the rows. The first pair of row identification signs shall state lot name centered left-to-right in the message band across the top (for example “Economy 2”) and shall carry the memory tool symbol in the symbol field below. To achieve a symmetrical appearance, the memory tool symbol shall crop on the left-hand side when appearing on the left and shall crop on the right-hand side when appearing on the right. The second pair of row identification signs shall state “ROW” centered left-to-right in the message band across the top and shall carry the alphanumeric row designation in Helvetica Neue Roman 55, in the symbol field below (**Exhibit II-5-20**).

5.2.15 Parking Shuttle Stop Identification Signs – Type R-14-C: Each parking shuttle stop shall be marked by the rows that it is serving, the parking lot name, and the parking lot symbol. The terminal area color shall be used to reinforce the neighborhood as shown in **Exhibit II-5-21**.

5.2.16 Parking Structure Directional Signs – Type R-15-A: Directional signs within the parking structures shall be used to indicate additional parking areas and the garage exit. Signs shall be overhead, centered over the path of traffic. Minimum clearances established by the garage criteria shall be maintained by all overhead signage elements. Color bands, parking lot names, and parking lot symbols shall not be used on parking directional signs (**Exhibit II-5-22**).

5.2.17 Parking Structure Level Identification Signs – Type R-16-C: The parking level shall be noted at the elevator lobbies, stair vestibules, and as a part of the row identification signs that are in the parking structures (**Exhibit II-5-23**).

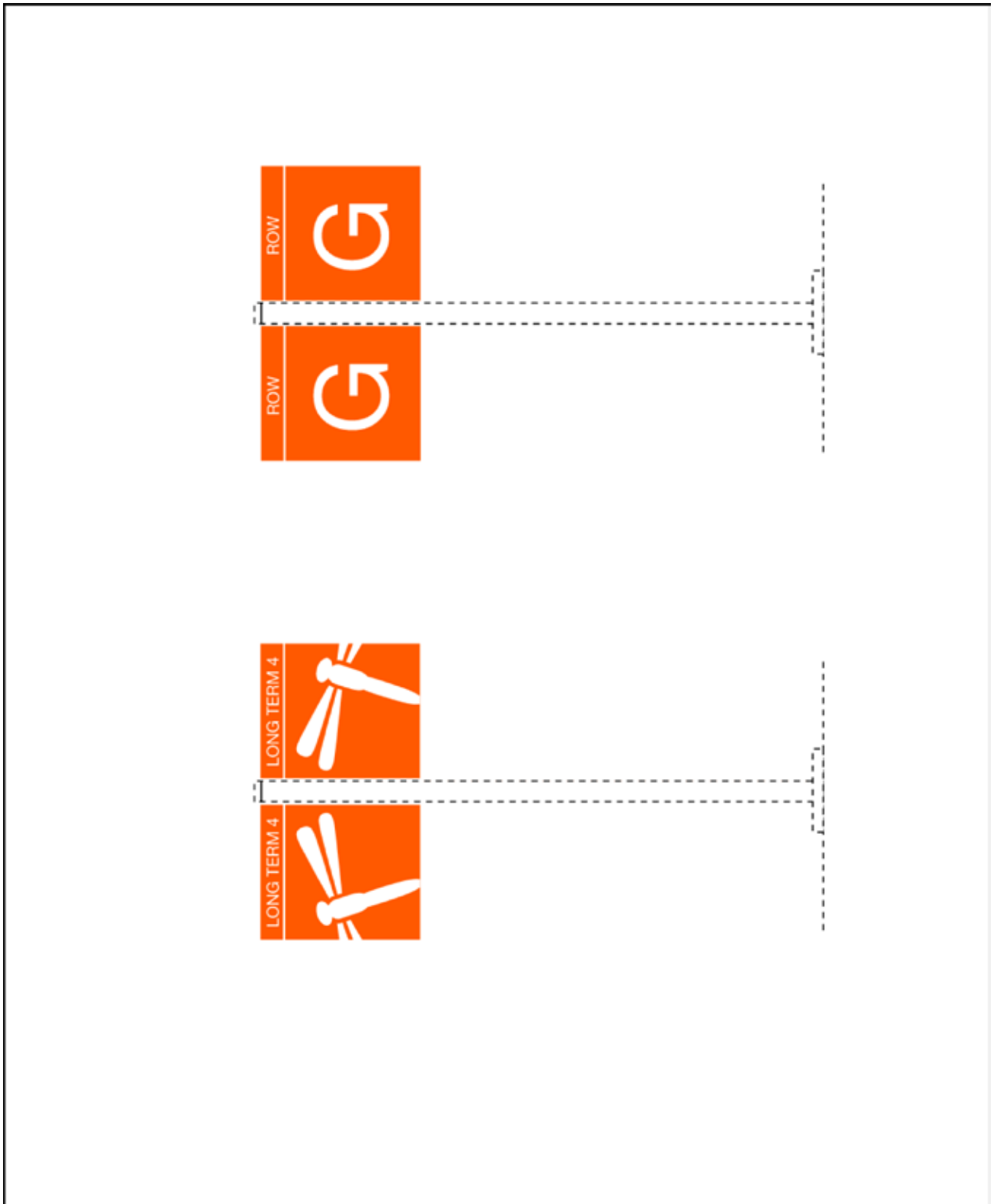
5.2.18 Parking Structure Row Identification Signs – Type R-17-C: Each row shall have an alphabetical designation that is represented by a Helvetica capital letter. The letter shall be placed on a color field that corresponds to the terminal area color combined with the numerical level identification (**Exhibit II-5-24**).

5.2.19 Parking Structure Elevator Identification Signs – Type R-18-C: The elevator doors at each level shall be used to demonstrate the memory tool symbol in a large format on the terminal area field color. Inside the elevator cabs, lot names and memory tool symbols shall be reinforced (**Exhibit II-5-25**).

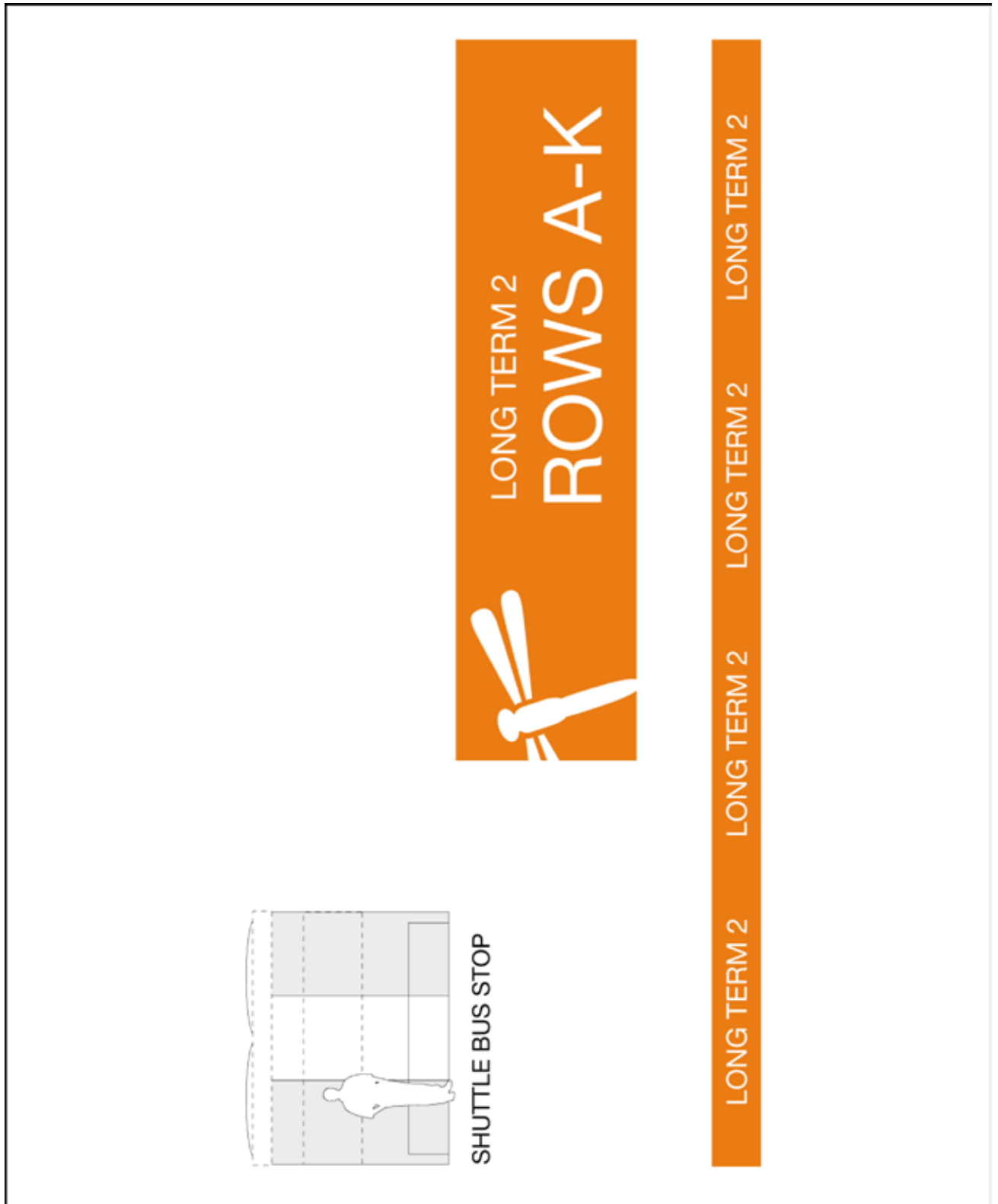
5.2.20 Building Identification Signs – Type R-19-C: Building identification signs shall primarily take the form of a low tenant pylon sign. The building address and building tenants may be listed using all Helvetica typefaces as shown in **Exhibit II-5-26**. In addition to these signs, tenants may place the business name in one location attached to the building façade, as approved by the Authority. Rental car facilities and single tenant buildings along Aviation Drive may show the business name on the building mounted signage using corporate colors.

5.2.21 Exterior Canopy Signs – Type R-20-C: The text on exterior canopies at the Main Terminal departure curb shall be Saarinen typeface. The text height shall be 25% of the canopy fascia height and shall be centered top-to-bottom within that fascia height (**Exhibit II-5-27**).

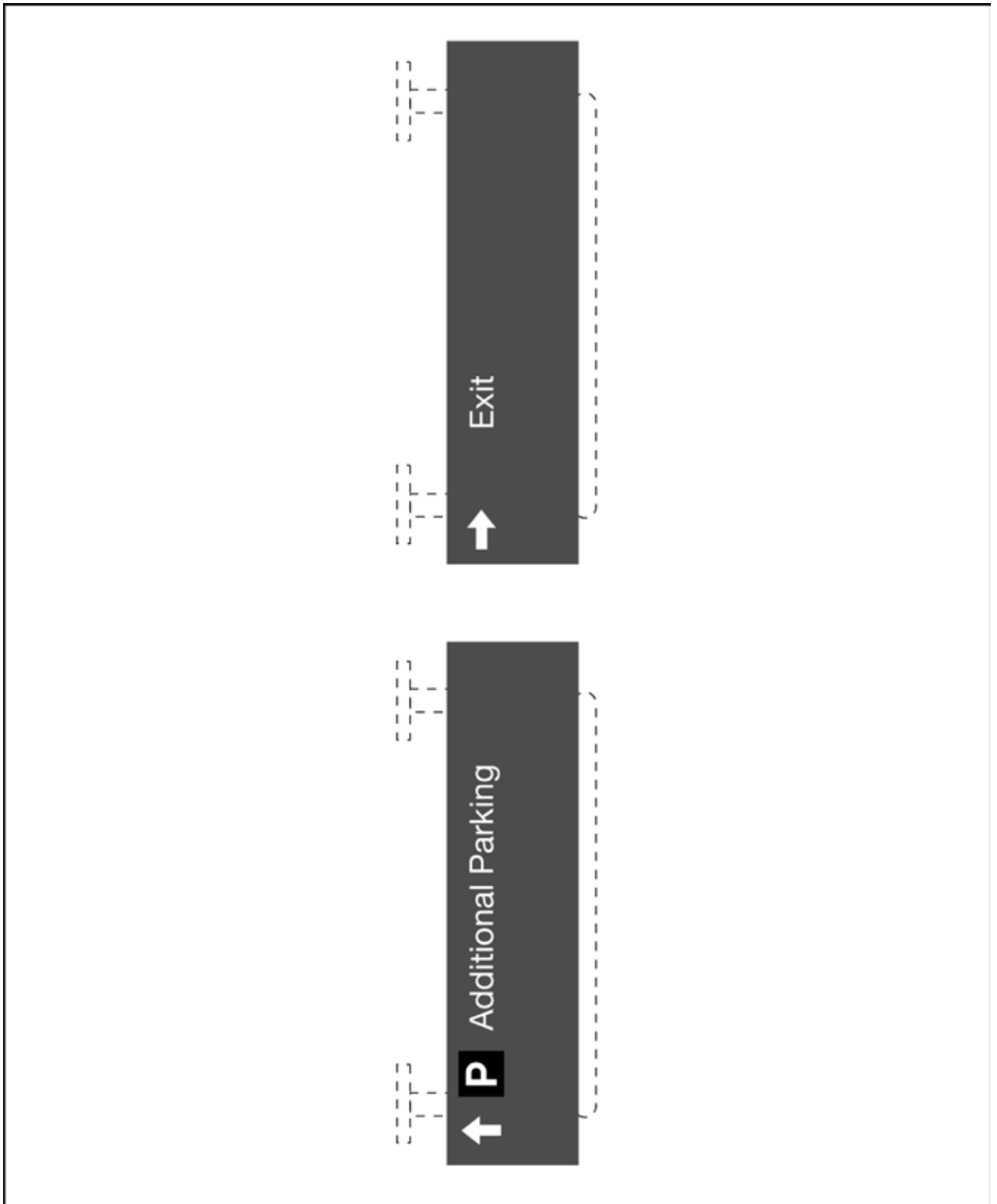
5.2.22 Building Wall-mounted Identification Sign Formats: Exterior building identification signs employed for the building, building title, or major facility identification shall be a wall-mounted sign. Tenant, concessionaire, and commercial signs are permitted only as building wall-mounted identification signs. Such signs may include business logos.



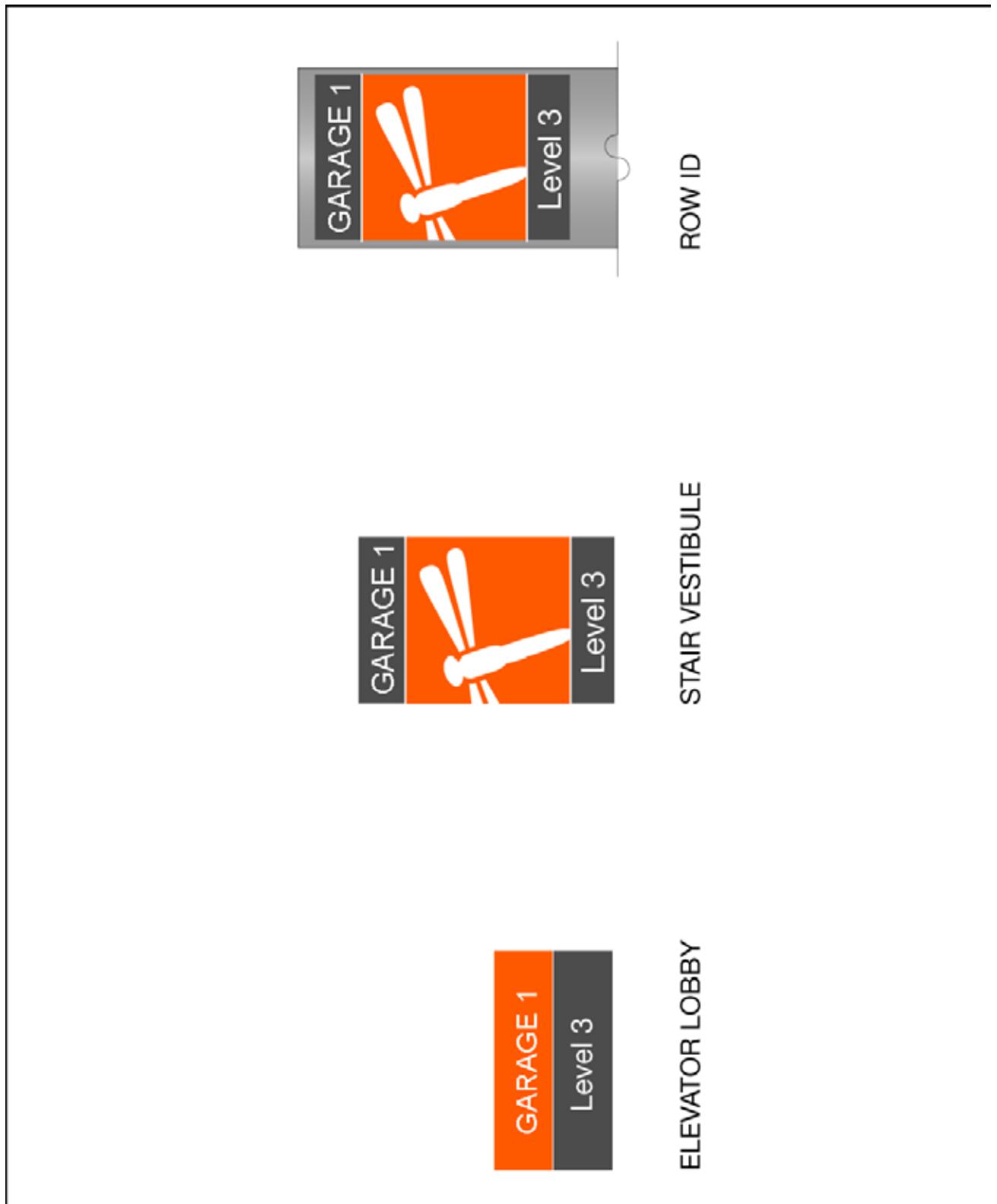
Parking Lot Row ID Exhibit II-5-20



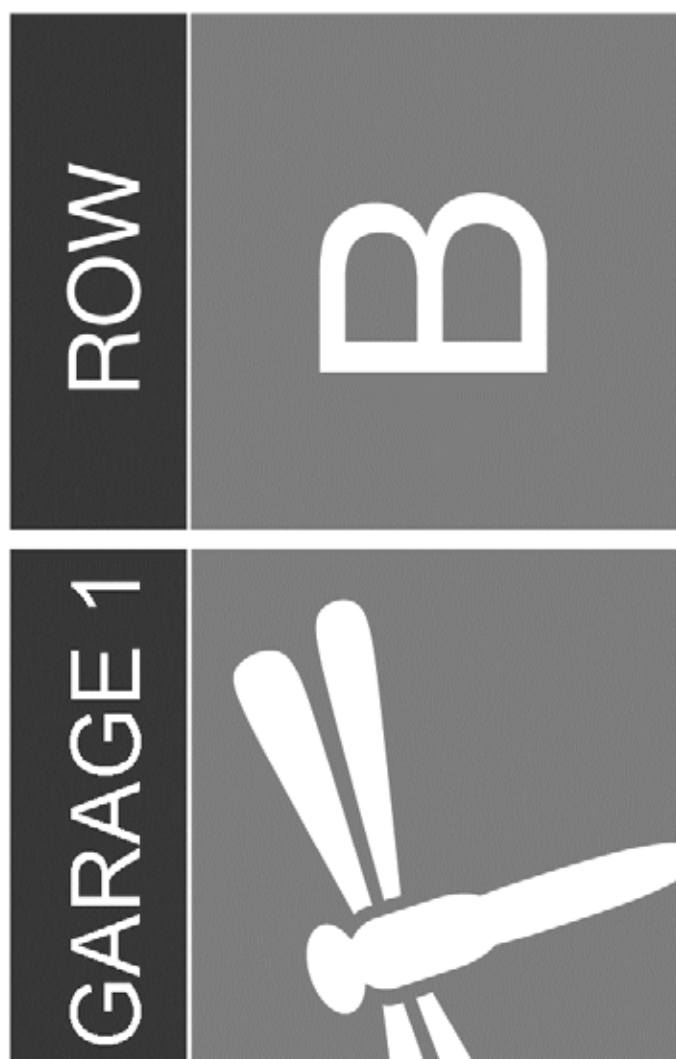
Parking Shuttle Stop ID Exhibit II-5-21



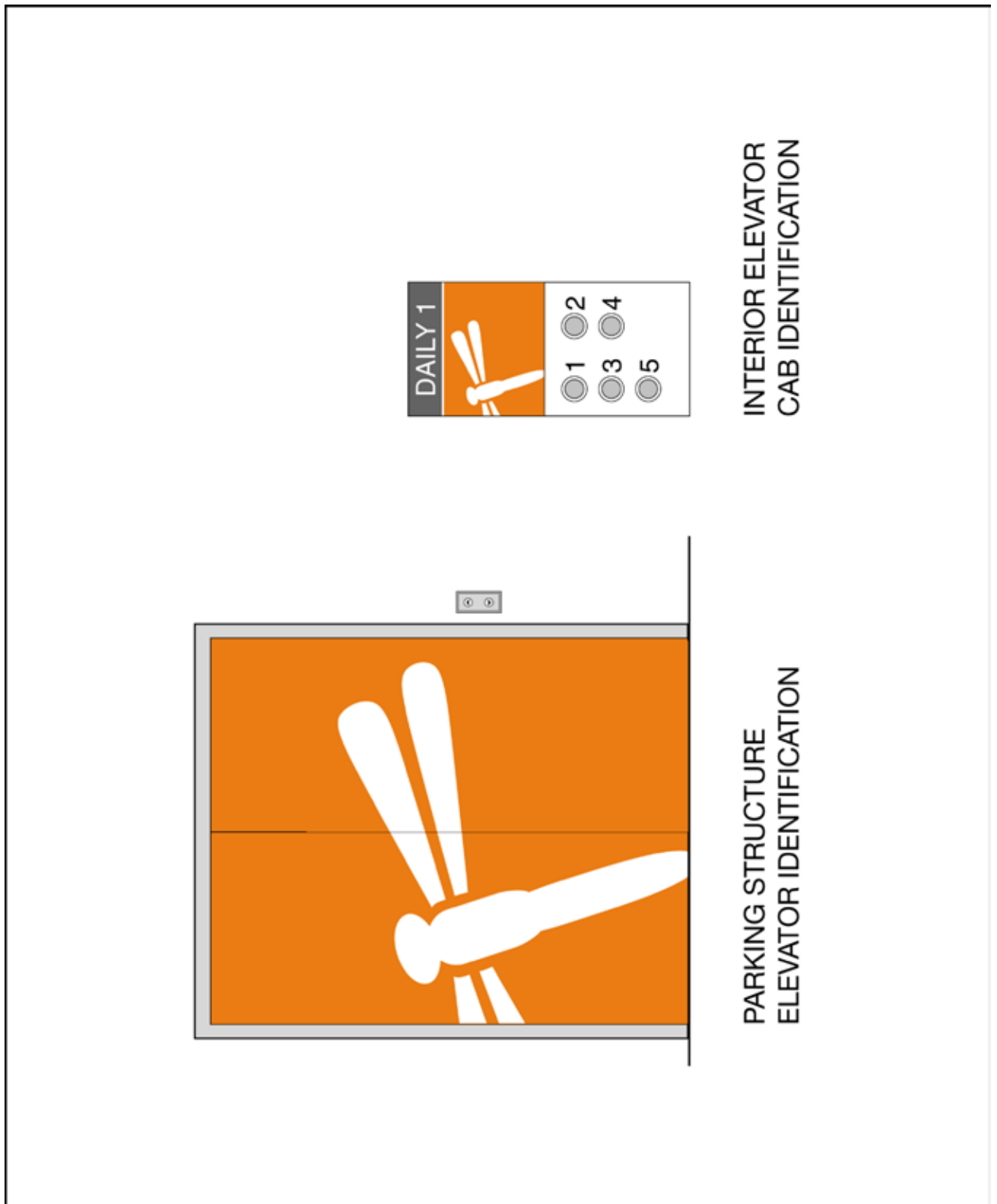
Parking Structure Directional Exhibit II-5-22



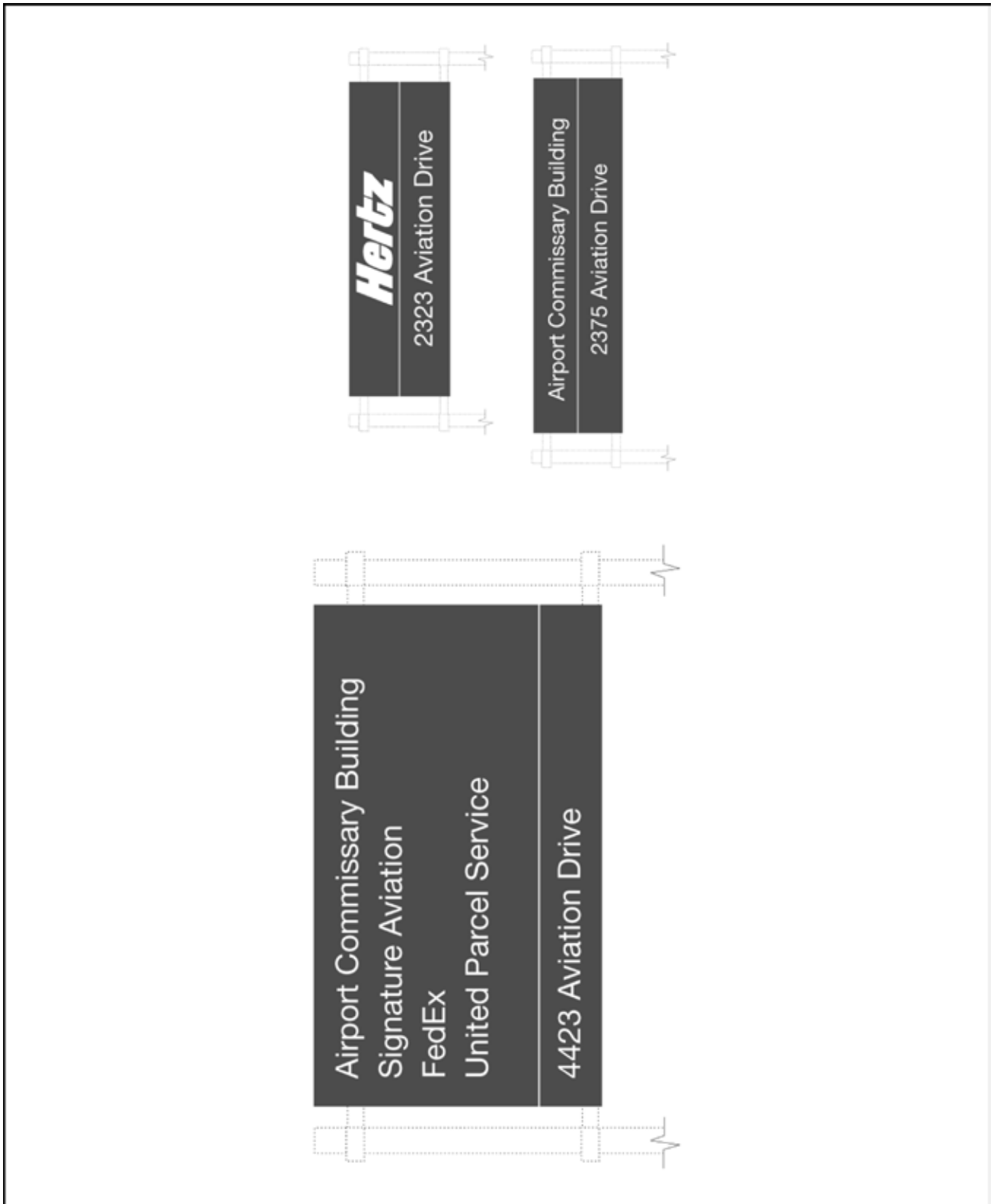
Parking Structure Level IDs Exhibit II-5-23



Parking Structure Row IDs Exhibit II-5-24



Parking Structure Elevator IDs Exhibit II-5-25



Building IDs Exhibit II-5-26



The diagram shows a rectangular sign with a dashed border. Inside, the word "UNITED" is on the top line and "US AIRWAYS" is on the bottom line. Both are in a bold, sans-serif font. The text is centered within the sign's dimensions.

UNITED
US AIRWAYS

NOTE:
TOTAL HEIGHT OF TEXT TO BE 25% OF THE CANOPY HEIGHT

Interior Canopy Sign Exhibit II-5-27

However, the name of the building or facility should always avoid the use of commercial abbreviations (such as “Inc.” or “Ltd.”), slogans, and registered trade names. The horizontal text element may appear on a building wall-mount sign panel. The building title or name, facility identification, or major business name that is most closely and uniquely associated with the building shall appear on the sign panel. The full text should be kept as short as possible, usually to no more than three words or an abbreviation. The signs may be non-illuminated or face-illuminated. Illumination shall never be exposed neon, columnated light, laser light, nor programmed for blinking, flashing, progressive blinking, or movement of light. Two signs are permitted on any single structure. If a single sign is proposed, it must be mounted on the building exterior wall facing either the major street or the aircraft apron. If two such signs are proposed, they must be on separate façades of the building, facing the major street, and/or the aircraft apron. Wall-mount signs are required to be visible from the main approach to the facility. Sign designers must closely coordinate their work with building planners, designers and related trades to ensure visibility. Five-digit street address numbers shall be mounted on the face of each building at the Airport.

5.2.22.1 The following materials should be used:

- A. Matte finish
- B. White acrylic numbers
- C. Concealed pin-mounted directly on the building
- D. 8" high characters
- E. Adobe
- F. Helvetica Neue Roman 55 typeface

5.2.22.2 Numbers shall be used for all building mounted addresses. Numbers shall not be spelled out.

5.2.22.3 Location: Numbers shall be centered over the main entry to the building, visible from the street; however,

each building should be considered individually to ensure attention is given to any unique feature or condition. Buildings which are located far enough off the public roadway that building-mounted addresses are not visible, shall incorporate street numbers on the curbside pedestal signs. In those cases, numbers shall be Adobe Helvetica Neue Roman 55, 4" high white numerals (**Exhibit II-3-1**).

5.2.22.4 Exterior Temporary Signs and Construction

Signs: Temporary signs and construction signs include all other miscellaneous signs to be temporarily used in public areas of the Airport, excluding traffic control warning and construction signs, which shall comply with MUTCD requirements. Such signs shall generally be ground-mounted signs on wooden posts. The signs shall follow all guidelines for grid organization, color, and message content, as described for permanent airport directional signs. The materials may change to wood face and wood posts all to be painted to match permanent sign structures. To the extent possible, the mounting details shall be crafted to closely match those of the permanent sign structures. Sign content and design shall be closely integrated with other signs in the vicinity of the proposed temporary sign. If more than one temporary sign appears on a site, all signs must be similar in design. No exceptions to this guideline will be permitted. Temporary sign locations are required to be visible from the main approach to the site and shall be coordinated with other signs in the vicinity and with vehicular and pedestrian approaches to the sign. Sign designers must closely coordinate the sign mounting and location to ensure visibility.

5.3 Interior Sign Types

5.3.1 General: All signs follow the guidelines established in this Section, **Chapters 3 and 4** for overall consistency and conformance with the signage design standards. Each sign description in this section outlines conditions that are specific to each sign type.

5.3.2 Butterfly Directional Signs – Type N-1-A: Butterfly signs shall be used to reinforce messages. Messages appearing on these signs shall also appear on primary

directional signs prior to and after the butterfly sign location. The placement of these signs shall be in the Main Terminal at main pedestrian intersections where multiple way finding decisions might be made. Parent messages shall not be used. Arrow bands on this sign type shall break from the standard guidelines; on the right hand panel, the arrow band, symbol placement, and text messages shall be right justified (**Exhibit II-5-28**).

5.3.3 Overhead Vertical Directional Signs – Type N-2-A:

This sign type is to be used in high ceiling height areas, such as the current “B” Concourse (**Exhibit II-5-29**). Elements used to create this sign can be found in this section, **Chapter 3** “Common Design Elements.” Layout guidelines and recommendations can be found in this section, **Chapter 4** “Design Criteria.” The connection of sign elements to existing ceiling conditions shall take into consideration pattern, reveals, lighting, and engineering systems and shall be closely coordinated.

5.3.4 Overhead Horizontal Directional Signs –

Type N-3-A: This sign type is to be used in low ceiling height areas, such as the ground transportation center. Elements used to create this sign can be found in this section, **Chapter 3**. Layout guidelines and recommendations can be found in this section, **Chapter 4**. Spacing between panels shall be 12" maximum and 3" minimum (**Exhibit II-5-30**). The connection of sign elements to existing ceiling conditions shall take into consideration pattern, reveals, lighting, and engineering systems and shall be closely coordinated.

5.3.5 Gate Identification Signs – Type N-4-C: All hold rooms shall be identified with a gate identification sign. A gate number shall accompany the gate symbol. The gate identification sign shall be two-sided (**Exhibit II-5-31**). Elements used to create this sign can be found in this section, **Chapter 3**. Layout guidelines and recommendations can be found in this section, **Chapter 4**.

5.3.6 Exit Signs–Type N-5-C: Exit signs shall use the international exit symbol and have special lettering

(**Figures 1 and 2, Exhibit II-5-32**). Minimum height of letters shall meet the **Virginia Construction Code (VCC)** standards and shall be 6", 8", or 10" high, depending upon distance of view. Lettering shall appear red (Plexiglas #2415 - Red) on a white field and shall be illuminated according to the **Virginia Construction Code** standards.

5.3.7 Code Required Room Identification Signs – Type

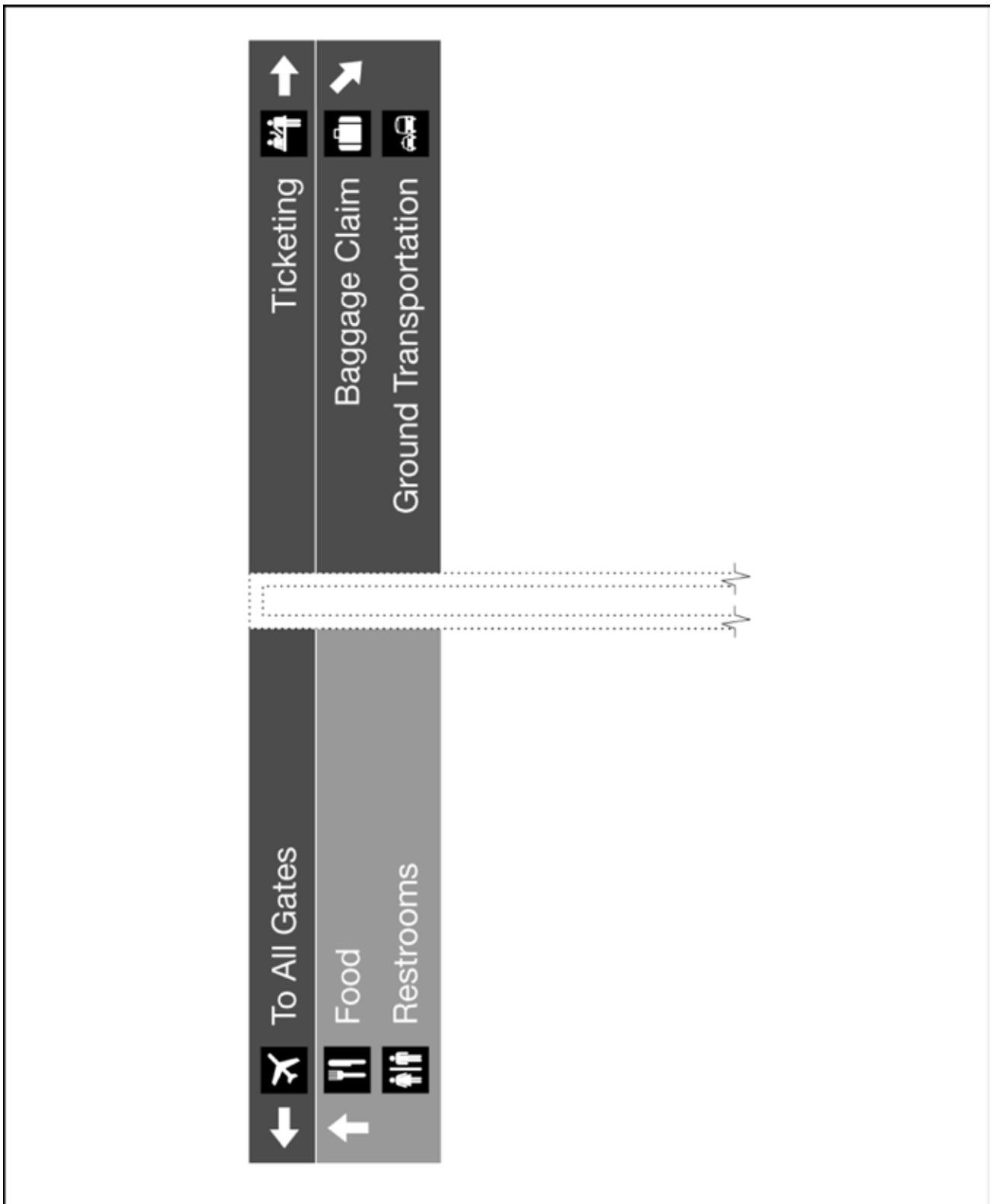
N-6-C: According to ADA standards, all permanent rooms shall be signed with a room identification sign (**Exhibit II-5-33**). ADA guidelines and recommendations can be found in **Chapter 1, Paragraph 1.3**. The sign shall carry the name of the room in tactile lettering, the Braille equivalent, and any required symbols. Elements used to create this sign can be found in this section, **Chapter 3** “Common Design Elements.” Layout guidelines and recommendations can be found in this section, **Chapter 4** “Design Criteria.”

5.3.8 Federally required signing is required at the following locations:

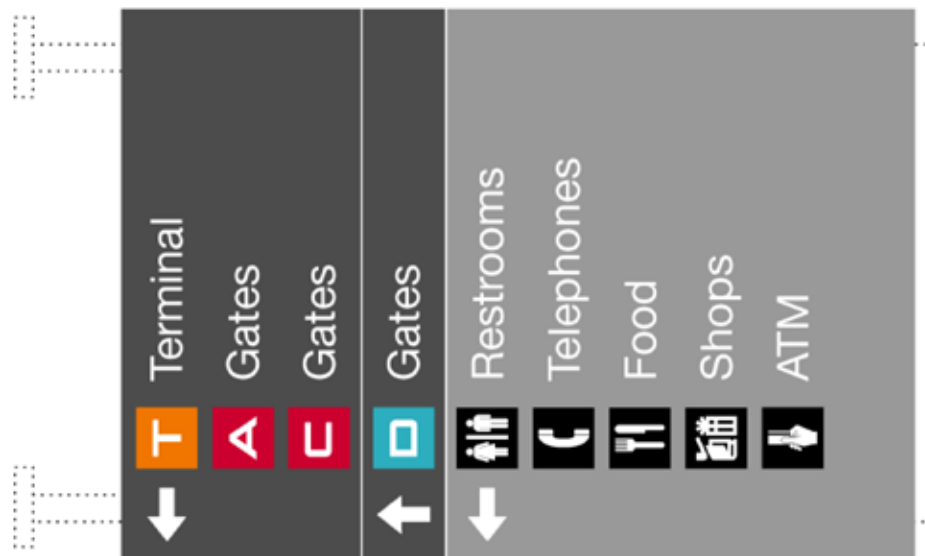
5.3.8.1 Terminals and Concourses: Notices and information required by Code of Federal Regulations (CFR), United States Customs and Border Protection (CBP) and Federal Aviation Regulation (FAR) at curbside check-in, ticket counter, security checkpoints and boarding gates.

5.3.8.2 Curbside Check-in Points:

- A. Hazardous Materials (49 CFR 175.25).
- B. Firearms/Checked Bags (FAR 108.1 1 (c)).
- C. Transportation of Currency.
- D. False Statements recommended but not required by law.

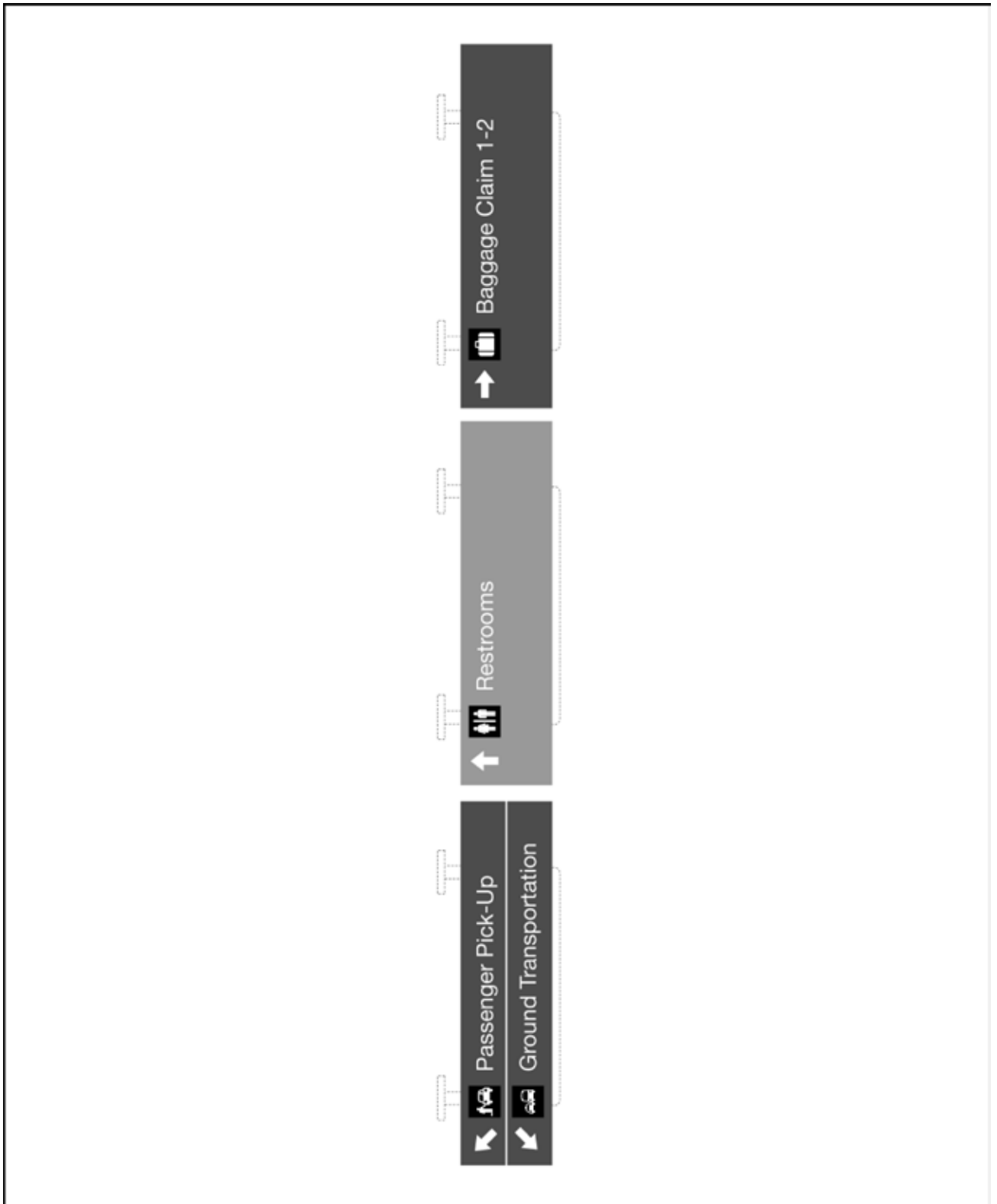


Interior Butterfly Directional Sign Exhibit II-5-28

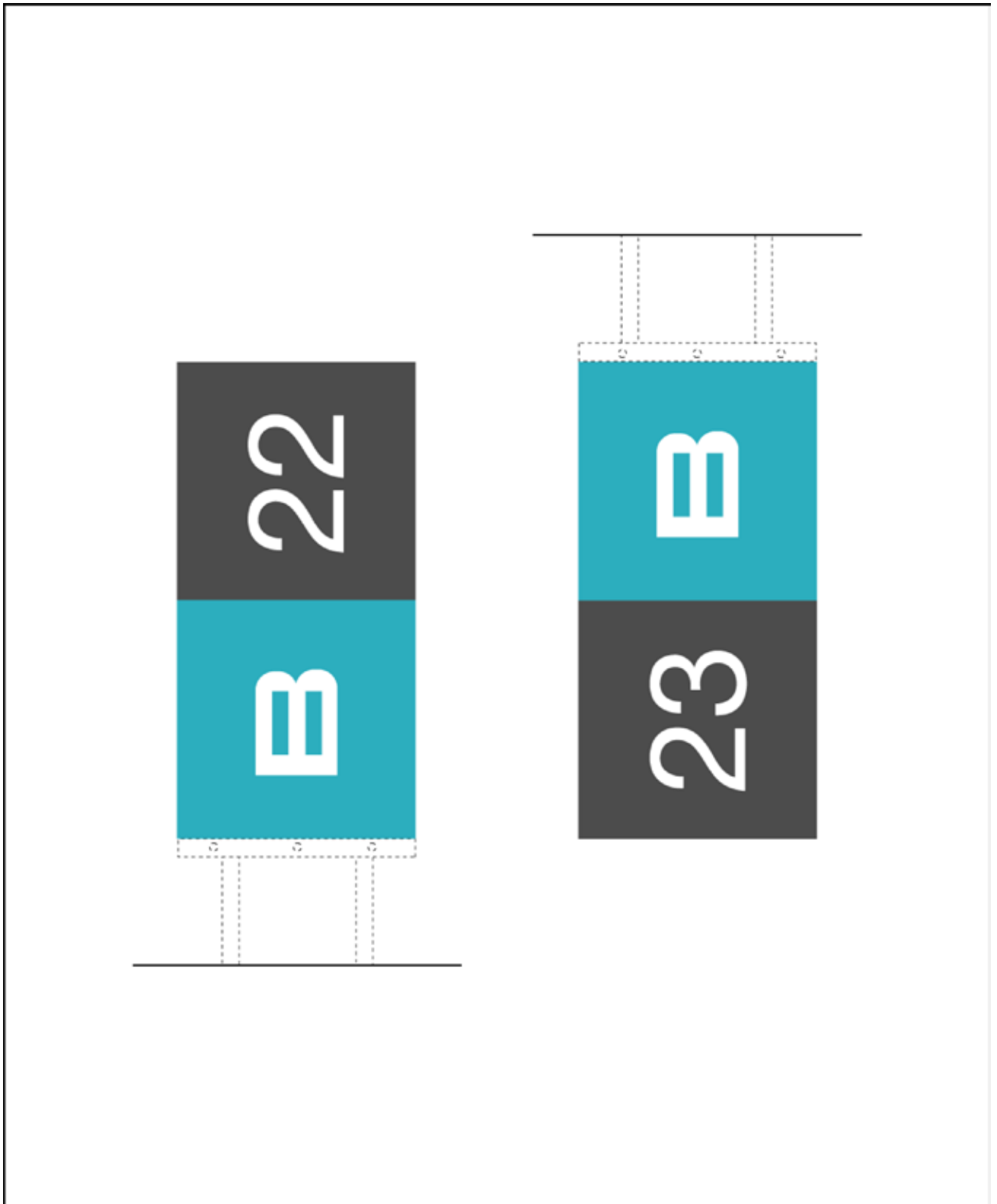


Overhead Vertical Directional

Exhibit II-5-29



Overhead Horizontal Directional Exhibit II-5-30



Gate ID Sign Exhibit II-5-31

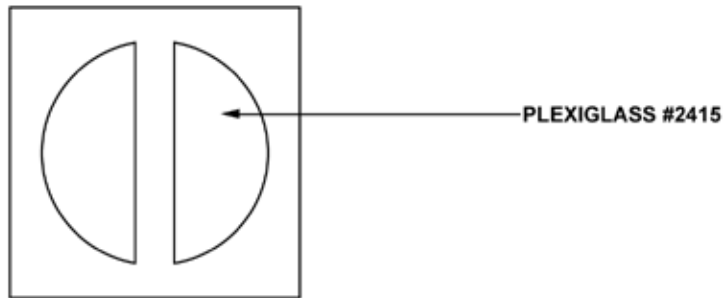
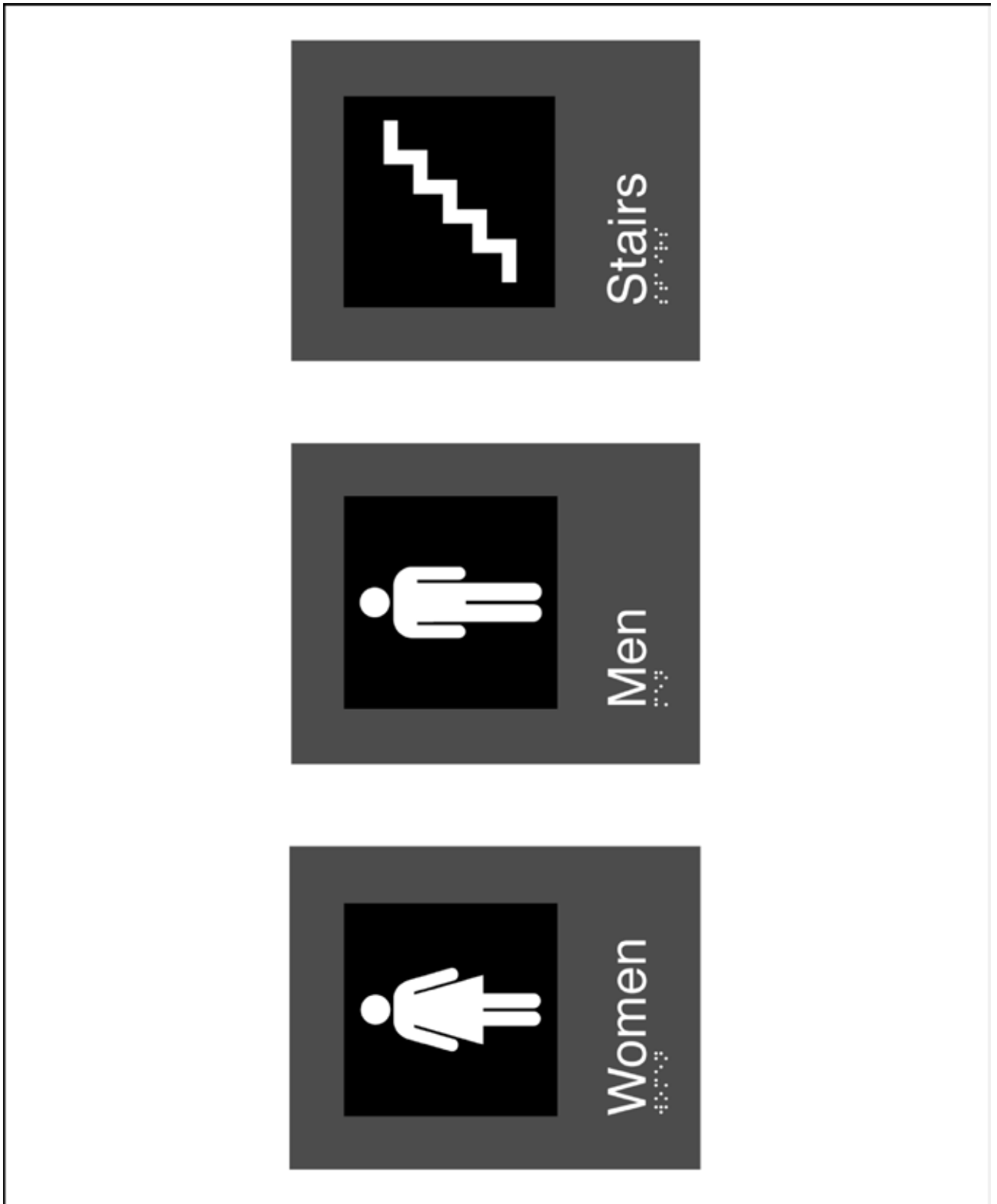


FIGURE 1



FIGURE 2



Code Required Room IDs Exhibit II-5-33

5.3.8.3 Ticket Counters:

- A. Hazardous Materials (49 CFR 175.25).
- B. Firearms/Checked Bags (FAR 108.1 1 (c)).
- C. Transportation of Currency.
- D. Public Tariffs (14 CFR 221.173).
- E. Liability, Death, Injury (14 CFR 221.175).
- F. Liability for Baggage (14 CFR 221.176).
- G. Overbooking (14 CFR 250.1 1).
- H. False Statements recommended but not required by law.

5.3.8.4 Security Points:

- A. Hazardous Materials (49 CFR 175.25).
- B. Consent to Search (FAR 108.9 (b) (1) (2)).
- C. Inspection (FAR 108.17).
- D. X-Ray Film (FAR 108.1 1 (a)).
- E. Weapons on Board (FAR 108.1 1 (c)).

5.3.8.5 Boarding Gates:

- A. Hazardous Materials (49 CFR 175.25).
- B. Firearms/Checked Bags (FAR 108.1 1 (c)).
- C. Transportation of Currency.

5.3.9 Lettering: Lettering on federally-required signs shall be at least 1/4" high. All lettering of the first three paragraphs of the hazardous materials sign must be at

least 3/8" high. All lettering must be displayed on a background of contrasting color. Locate federally-required signs so as to be clearly readable to the traveling public in the area where the signing is required. Suggested locations are described in **Exhibits II-5-34 through II-5-37**.

5.3.10 Interior Canopy Signs – Type N-9-C: The text on interior canopies shall be Saarinen typeface. The text height shall be 6.5: on the Arrivals level, 6" on the Departures level and shall be centered top to bottom within that fascia height with the exception of airline names on the Departures level on the east and west end of the kiosks. This text height shall be 3.5". (**Exhibit II-5-38**).

5.3.11 Overhead Sign Type C – Type N-10-B: This sign type is to be used in areas where a bottom arrow band is necessary to clarify way finding, such as an overhead condition in a stairwell or escalator well (**Exhibit II-5-39**).

5.4 Traffic Regulatory Signs

5.4.1 General: Traffic regulatory signs are a special class of ground-mount signs that include regulatory signs, warning signs, road marker signs, and construction and maintenance signs. Message length controls the overall sign dimensions. When possible, the overall dimensions of the sign panel shall be in multiples of 6". For standard sign panel text, shapes, symbols, colors, dimensions, and layouts, refer to MUTCD and the Virginia Supplement to the same. All standard sign lettering shall be uppercase letters, except where VDOT standards permit city destination names to be initial capitals, with lowercase lettering.

5.5 Dynamic and Changeable Signs

5.5.1 General: Dynamic signs convey messages that change on an hourly, daily, or weekly basis, such as parking availability and flight, gate, and baggage claim information. Dynamic signs shall, to the extent possible, match fixed-sign typefaces, formats, colors, materials, and mounting details.



THE FOLLOWING STATEMENTS ARE REQUIRED UNDER THE CODE OF FEDERAL REGULATIONS (CFR) TO BE POSTED AT EACH AIRLINE TICKET COUNTER. THE STATEMENTS ARE:

- CBP TEXT: REPORTING IS REQUIRED UNDER THE CURRENCY AND FOREIGN TRANSACTION REPORTING ACT (PL 97-258, 31 U.S.C. 5311, ET SEQ.)
- PUBLIC INSPECTION OF TARIFFS (40 CFR 221.173)
- LIABILITY FOR DEATH OR INJURY (14 CFR 221.176)
- LIABILITY FOR BAGGAGE (14 CFR 221.176)
- NOTICE--OVERBOOKING OF FLIGHTS (14 CFR 250.11)

EACH AIR CARRIER AND FOREIGN AIR CARRIER THAT, TO ANY EXTENT, AVAILS ITSELF OF LIMITATIONS ON LIABILITY FOR LOSS OF, DAMAGE TO, OR DELAY IN DELIVERY OF BAGGAGE, SHALL POST THESE STATEMENTS AT LOCATIONS THAT ARE IN THE CHARGE OF A PERSON EMPLOYED EXCLUSIVELY BY IT, OR BY IT JOINTLY WITH ANOTHER PERSON, OR BY AN AGENT EMPLOYED BY SUCH AIR CARRIERS OR FOREIGN AIR CARRIER TO SELL TICKETS TO PERSONS OR ACCEPT BAGGAGE FOR CHECKING.

STATEMENTS SHALL BE POSTED SO AS TO BE CLEARLY VISIBLE AND CLEARLY READABLE TO THE TRAVELING PUBLIC.

MINIMUM REQUIREMENTS ARE ONE (1) COMBINED STATEMENT PER TICKET COUNTER MODULE. ALL TICKET COUNTERS AT AN AIRPORT MUST DISPLAY THESE STATEMENTS. ADDITIONAL REQUIREMENTS ARE: ONE(1) STATEMENT AT EACH AIRLINE CITY TICKET OFFICE OR OTHER LOCATIONS WHERE TICKETS ARE SOLD.

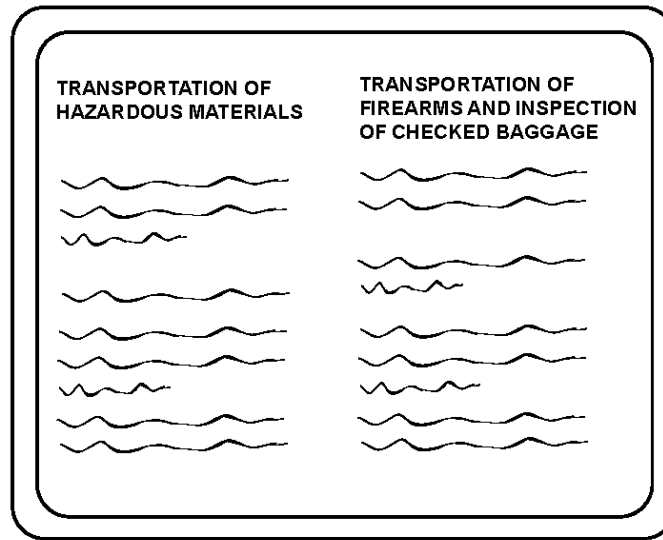
FEDERALLY REQUIRED SIGNS WILL BE PROVIDED ON 3MM SINTRA OR .063 ALUMINUM FINISHED TO MATCH CASEWORK OR TICKET PODIUMS.

PANELS TO BE ADHERED WITH DOUBLE SIDED FOAM TAPE AND SILICONE ADHESIVE. TAMPER PROOF SCREWS MAY ALSO BE USED.

TEXT WILL BE APPLIED IN THE HELVETICA TYPEFACE. PREFERRED COPY APPLICATION IS SILK-SCREENED USING EPOXY BASED INK.

NOTE:
FINAL LANGUAGE WILL MATCH EXACT WORDING PROVIDED BY THE MOST CURRENT TSA, FAA, CBP SPECIFICATIONS

Advice to Passengers, Notice at Ticket Counters, Type A Exhibit II-5-34



THE "TRANSPORTATION OF HAZARDOUS MATERIALS" STATEMENT IS REQUIRED UNDER THE CODE OF FEDERAL REGULATIONS (49 CFR 175.25).

THE "TRANSPORTATION OF FIREARMS AND INSPECTION OF CHECKED BAGGAGE" STATEMENTS ARE REQUIRED UNDER FEDERAL AVIATION REGULATIONS (FAR 108.11-C AND FAR 108.13-B RESPECTIVELY).

CBP TEXT: REPORTING IS REQUIRED UNDER THE CURRENCY AND FOREIGN TRANSACTION REPORTING ACT (PL 97-258, 31 U.S.C. 5311, ET SEQ.)

NOTICE SHALL BE PROMINENTLY DISPLAYED IN A CONSPICUOUS PLACE AT EVERY AIRLINE TICKET COUNTER TO NOTIFY PASSENGERS OF REGULATIONS. NOTICE SHALL HAVE A MINIMUM REQUIREMENT OF ONE (1) PER AIRLINE TICKET-COUNTER BACKWALL LENGTH. AN ACCEPTABLE MINIMUM WOULD BE PLACEMENT OF ONE (1) SIGN PER THIRTY (30) LINEAR FEET OF BACKWALL.

IF SPACE IS LIMITED, STATEMENT MAY BE PLACED IN TWO (2) 10" X 16" FIXTURES RATHER THAN ONE (1) 16" X 20" FIXTURE AS SHOWN, FIXTURES MAY THEN BE STACKED.

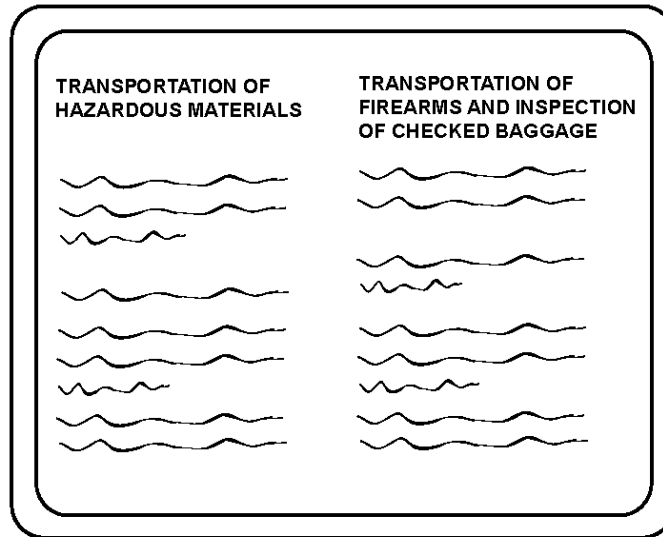
ALTERNATE LOCATIONS FOR POSTING THIS NOTICE ARE ON THE FRONT OF THE TICKET COUNTER OR ON THE SIDE WALL OF THE BAGGAGE WELL.

FEDERALLY REQUIRED SIGNS WILL BE PROVIDED ON 3MM SINTRA OR .063 ALUMINUM FINISHED TO MATCH CASEWORK OR TICKET PODIUMS.

PANELS TO BE ADHERED WITH DOUBLE SIDED FOAM TAPE AND SILICONE ADHESIVE. TAMPER PROOF SCREWS MAY ALSO BE USED.

TEXT WILL BE APPLIED IN THE HELVETICA TYPEFACE. PREFERRED COPY APPLICATION IS SILK-SCREENED USING EPOXY BASED INK.

NOTE:
FINAL LANGUAGE WILL MATCH EXACT WORDING PROVIDED BY THE MOST CURRENT TSA, FAA, CBP SPECIFICATIONS



THE "TRANSPORTATION OF HAZARDOUS MATERIALS" STATEMENT IS REQUIRED UNDER THE CODE OF FEDERAL REGULATIONS (49 CFR 175.25).

THE "FIREARM/WEAPONS ON BOARD," "INSPECTION --CONSENT TO SEARCH" AND "X-RAY FILM" STATEMENTS ARE DERIVED FROM FEDERAL AVIATION REGULATIONS (FAR 108.11-A, FAR 108.9-B9(1)(2); FAR 108.13B AND FAR 108.17 RESPECTIVELY).

CBP TEXT: REPORTING IS REQUIRED UNDER THE CURRENCY AND FOREIGN TRANSACTION REPORTING ACT (PL 97-258, 31 U.S.C. 5311, ET SEQ.)

NOTICE SHALL BE PROMINENTLY DISPLAYED IN A CONSPICUOUS PLACE AT EVERY SECURITY INSPECTION POINT TO NOTIFY PASSENGERS OF REGULATIONS.

NOTICE SHALL BE PLACED ON SECURITY DEVICES, ADJACENT WALLS, OR HUNG FROM CEILINGS PRIOR TO PENETRATING SECURITY CHECK POINT.

IF SPACE IS LIMITED, STATEMENT MAY BE PLACED IN TWO (2) 10"X16" FIXTURES RATHER THAN ONE (1) 16"X20" FIXTURE AS SHOWN. FIXTURES MAY THEN BE STACKED.

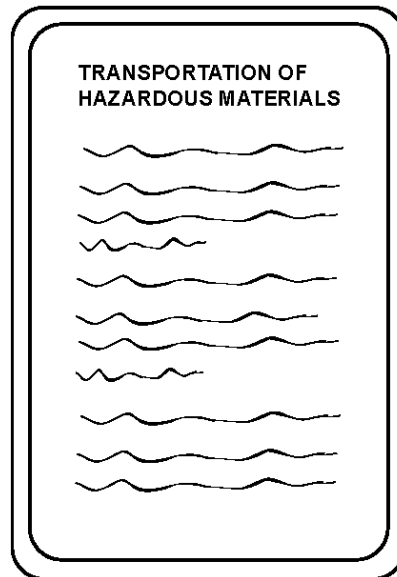
FEDERALLY REQUIRED SIGNS WILL BE PROVIDED ON 3MM SINTRA OR .063 ALUMINUM FINISHED TO MATCH CASEWORK OR TICKET PODIUMS.

PANELS TO BE ADHERED WITH DOUBLE SIDED FOAM TAPE AND SILICONE ADHESIVE. TAMPER PROOF SCREWS MAY ALSO BE USED.

TEXT WILL BE APPLIED IN THE HELVETICA TYPEFACE. PREFERRED COPY APPLICATION IS SILK-SCREENED USING EPOXY BASED INK.

NOTE:

FINAL LANGUAGE WILL MATCH EXACT WORDING PROVIDED BY THE MOST CURRENT TSA, FAA, CBP SPECIFICATIONS



THE "TRANSPORTATION OF HAZARDOUS MATERIALS" STATEMENT IS REQUIRED UNDER THE CODE OF FEDERAL REGULATIONS (49 CFR 175.25). EACH AIRCRAFT OPERATOR WHO ENGAGES IN FOR-HIRE TRANSPORTATION OF PASSENGERS SHALL DISPLAY NOTICES TO PASSENGERS CONCERNING THE REQUIREMENTS AND PENALTIES ASSOCIATED WITH THE CARRIAGE OF HAZARDOUS MATERIALS ABOARD AIRCRAFT.

CBP TEXT: REPORTING IS REQUIRED UNDER THE CURRENCY AND FOREIGN TRANSACTION REPORTING ACT (PL 97-258, 31 U.S.C. 5311, ET SEQ.)

NOTICE SHALL BE PROMINENTLY DISPLAYED IN EACH LOCATION AT AN AIRPORT WHERE THE AIRCRAFT OPERATOR ISSUES TICKETS, CHECK BAGGAGE, AND MAINTAINS AIRCRAFT BOARDING AREAS.

ALTERNATE LOCATION OF POSTING THIS NOTICE ARE : ONE ON THE FRONT OF THE TICKET LIFT COUNTER OR ON THE BACK SCREEN.

FEDERALLY REQUIRED SIGNS WILL BE PROVIDED ON 3MM SINTRA OR .063 ALUMINUM FINISHED TO MATCH CASEWORK OR TICKET PODIUMS.

PANELS TO BE ADHERED WITH DOUBLE SIDED FOAM TAPE AND SILICONE ADHESIVE. TAMPER PROOF SCREWS MAY ALSO BE USED.

TEXT WILL BE APPLIED IN THE HELVETICA TYPEFACE. PREFERRED COPY APPLICATION IS SILK-SCREENED USING EPOXY BASED INK.

NOTE:
FINAL LANGUAGE WILL MATCH EXACT WORDING PROVIDED BY
THE MOST CURRENT TSA, FAA, CBP SPECIFICATIONS

Advice to Passengers, Boarding Gates, Type D Exhibit II-5-37

NEWSSTAND

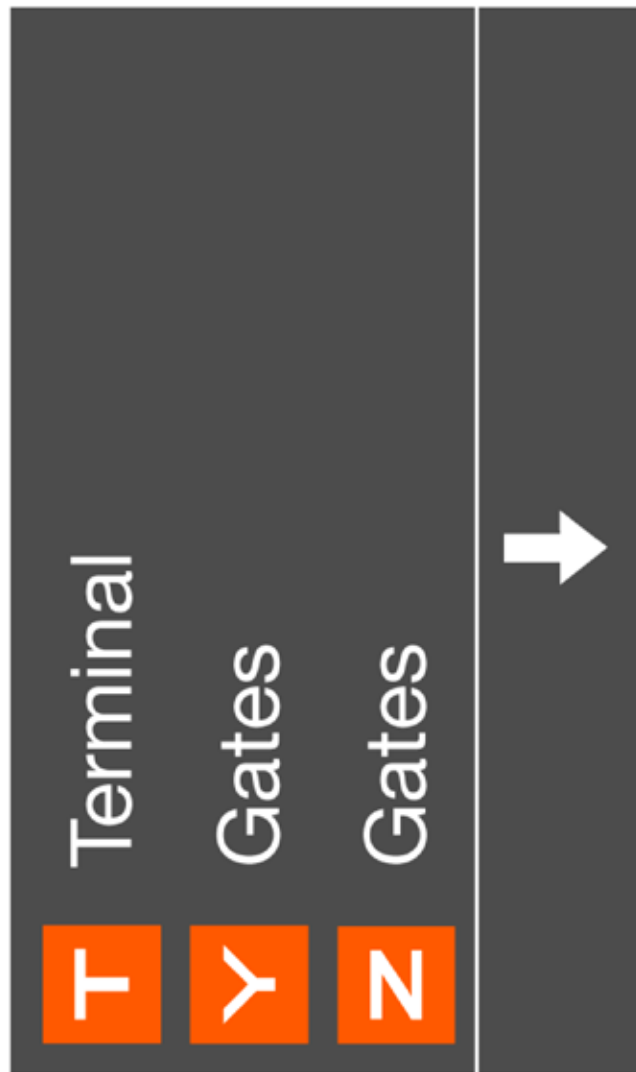
RESTROOMS

LOUNGE

NOTE:

TOTAL HEIGHT OF THE TEXT TO BE 50% OF THE CANOPY HEIGHT AND CENTERED WITHIN THE DESIGNATED PANEL

Exterior Canopy Signs Exhibit II-5-38



Overhead Sign, Type C Exhibit II-5-39

In any case, dynamic sign elements shall be highly legible and aesthetically coordinated with static sign components and other architectural elements. Dynamic sign elements shall allow sign messages to be changed easily (preferably by a single laborer). Dynamic signs should be used where they are clearly necessary to accommodate a changing state of operations and to provide convenient and timely information to passengers and patrons. The specific type of dynamic signing device utilized shall be the one determined to be most appropriate for the specific application in question. In all cases, the dynamic signing equipment for exterior applications shall be capable of remote operation and be fully weather proof. Additionally, the sign field and text shall match as closely as possible to the adjacent static sign field and text (**Exhibit II-5-40 and II-5-41**). The following sections outline appropriate uses for dynamic signs, along with a recommendation for the most appropriate technology at the time this section was written.

5.5.2 Exterior Dynamic Sign Applications: The following uses are potential candidates for exterior dynamic sign applications:

5.5.2.1 Welcome/Special Announcements

5.5.2.2 Traffic Management (Kiss and Fly)

5.5.2.3 Parking Management (Open/Full)

5.5.2.4 Toll Booth Lane/Price Information

5.5.2.5 Airlines at Curbside Zone Signs

5.5.2.6 Weather and Roadway Emergency Information

5.5.2.7 Construction VMS/Special Events

5.5.2.8 RIDS (Ramp Information Display Systems – Airside)

5.5.2.9 Parking Shuttle Bus Stops

5.5.2.10 Ground Transportation Curb

5.5.2.11 Parking Shuttles to Designate Lot Name

5.5.3 Interior Dynamic Sign Applications

5.5.3.1 Time Clocks

5.5.3.2 FIDS/MUFIDS/BIDS

5.5.3.3 Visual Paging Systems

5.5.3.4 Speaking Sign Systems

5.5.3.5 Customs Checkpoints—"US Citizens", "Non-US Citizens," and Alphabetical Organization

5.5.3.6 Weather and Emergency Information

5.5.3.7 Airline Names at Ticket Counters

5.5.3.8 Advertising

5.5.3.9 Queuing at Ticket Counters

5.5.3.10 Baggage Claim with Flight Information

5.5.3.11 Mobile Lounges for Shuttle Departures

5.5.3.12 "Train Arriving" Message at Train Platforms

5.5.3.13 Airline/Flight Information at Hold rooms

5.5.3.14 Deplaning Passenger Information: Terminal Destination (future)

5.5.3.15 Gate Numbering for Both Interior and Airside

5.5.3.16 Touch Screen for Airport Information/Directories

5.5.3.17 Touch Screen for Tourist Information: Hotels, Rental Cars, etc.

Dynamic Graphics: Opportunities at Dulles Airport

	LED	LCD mosaic	CRT	Fiber Optics	Plasma	TFT-LCD	LCD Rear Projection	Flip Dot
EXTERIOR								
welcome	✓			•				✓
traffic management (kiss & fly)	✓							✓
parking management (open/full)	•			✓				•
toll booth lane information	•			✓				•
toll booth price information	✓			•				•
airlines at zone signs	✓							•
weather and emergency information, announcements	✓							•
bus stops	•							
GT Curb	•							
construction VMS	•							
RIDS	•							
INTERIOR								
at the ticket counters for queuing	✓			•				
baggage claim with flight information*			✓		•	•	•	
mobile lounges for shuttle departures	•				•	•	•	
messages at the peoplemover platforms	•		✓		•	•	✓	
airline/flight information at holdrooms*	•		•		•	•	✓	
deplaning passenger information (future)			✓		•	•	✓	
gate numbering for jetways*	✓							
touchscreen for airport information/directories			✓			✓		
touchscreen for tourist information			✓			✓		
IAB status board	•		✓		•	•	✓	
time clocks	✓							•
on parking shuttles for lot name	•							
on parking shuttles for lot symbol				✓				
FIDS/MUFIDS/BIDS*	✓		✓		•	•	✓	
visual paging system*	✓		✓		•	•	✓	
immigrations checkpoints								
airline logos at ticket counters								
flight information at jetway	✓						✓	

✓ = recommendation

• = potential use

Dynamic Graphic Chart (A) Exhibit II-5-40

Dynamic Graphics: Comparison Chart

	LED	LCD Mosaic	CRT	Fiber Optics	Plasma	TFT-LCD
Cost	\$\$-\$\$\$	\$	\$	\$-\$\$	\$\$\$	\$\$
Viewing angle	varied, narrow (15°-20°) to wide (120° for outdoor, or 170° for indoor)	120°	90°	narrower than LED, about 10°-30°	wide, about 160°	90°-120° new wide angle design goes to 170°
Intensity/Brightness	very bright	not as bright	bright	very bright on axis view	can be very bright	not as bright
Life	11+ years	100,000 hrs	15,000 hrs	8-10 years	----	----
Maintenance	medium	----	low	medium	medium	medium-high
Power consumption	higher (but still only 20%-30% of neon and 10%-20% of incandescent)	lowest in comparison	----	about the same as LED	lower than LED but higher than LCD	2nd lowest in comparison
Resolution	relatively poorer	poor	good	good	very good	very good
Size	various	----	various sizes, at least 2' in depth	various	35" - 50" displays 3" - 4" deep	14"-20" displays 2"-3" deep

\$ low
 \$\$ medium
 \$\$\$ high
 ---- no data

Dynamic Graphic Chart (B) Exhibit II-5-41

5.5.3.18 International Arrivals Building Status Board

5.5.4 Determining Factors: There are several factors to take into account when considering the use of dynamic graphic displays. Refer to **Exhibits II-5-40 and II-5-41** for a comparison chart across sign technology types. Below is a list of all things to consider when selecting a specific type of dynamic graphics:

5.5.4.1 Cost and budget**5.5.4.2 Viewing Distances and Angles****5.5.4.3 Space Allotted for Installation of Technology and the Space Required for Certain Technologies****5.5.4.4 Location of Input Device for Updating Graphics****5.5.4.5 Lighting Conditions in the Area****5.5.4.6 Location:** Exterior or interior**5.5.4.7 Electrical Power Consumption of the Device****5.5.4.8 Maintenance Required****5.5.4.9 Permanence** of Information in Case of Power Failure**5.5.4.10 Type of Information** to be Conveyed and how Frequently the Information Changes**5.5.4.11 A uniform application of technologies:**

Using the same type of technology for similar information Airport-wide

5.5.5 Layout Concept: The layout of each sign will vary by sign function and the information to be conveyed. If a dynamic sign replaces a fixed sign, the layout and format of information on the dynamic sign shall correspond to the layout and format requirements for the fixed sign being replaced, unless sufficient justification can be made as to the merits of changing layout and format.

5.5.5.1 The criteria for judging the merits of such a change in format are:

- A.** Presence or absence of other fixed signs of similar function on the Airport
- B.** Visibility and readability of the proposed layout and format

5.5.5.2 Recommended practices for standard formats include the following elements:

Information Element Format Note

Time	nnnn
Destination/Origination	aaaaaaaaaaaaa *1
City	aa(a)
Carrier Company Code	xnnnx
Flight Number	a
Gate Area	a-xxx *2
Boarding Area/Gate	xxxxxxxxxxxxxx *1
Information	x-xxxxx *3
Remarks	aaa-xnnnx *4
Baggage Claim Directory	
Baggage Claim Symbol	

Legend:

a = alpha character n = numeral x = alphanumeric character

* 1: Length of field may vary

* 2: Concourse designation, dash, gate number

* 3: Carousel designation, dash, location

* 4: Carrier Company Code, dash, flight number

5.5.6 Panel Widths and Heights: Overall size for electronic dynamic signs will vary for each situation. The proportions of text height, spacing, and overall panel size shall follow the guidelines established by the layout grid.

5.5.7 Message Fields: The maximum length of characters per line shall be 53 plus any character spaces for column separators.

5.5.8 Design Coordination: There are existing dynamic signs in use at Washington Dulles International Airport. Added dynamic signs must correspond and relate not only to the other fixed signs adjacent to the proposed dynamic sign location, but also to the existing dynamic signs in the Main Terminal. Depending upon the technology used in the dynamic signs, the designer shall consider the requirements for sign enclosure ventilation and filtering of outside air to prevent damage to sign components by heat, humidity, fumes, or dust.

5.5.9 Site Coordination: Design and installation details for dynamic signs must be carefully coordinated with support structures, due to the weight of such signs.

CHAPTER 6 Commercial Signing Guidelines

6.1 Roadways

6.1.1 General: Public way finding needs are paramount on all roadways. As a result, the Authority maintains complete control over all signs on Airport roadways. Commercial signs are prohibited or restricted on all airport roadways.

6.2 Main Terminal

6.2.1 General: Commercial signs in the Main Terminal building are restricted to specific locations and applications. Certain types of commercial signs may be supplied by the tenants or leaseholders. Every such sign must be reviewed and approved by the Authority. This review extends to all signs, even those on machinery, equipment, and furnishings (such as, automatic teller machines, telephones, vending machines, hand-out boxes, kiosks, etc.). Such review will include form, size, graphic imagery, text, color, readability, legibility, and illumination.

6.2.2 Exterior Signs: Commercial signs are generally prohibited on the exterior of the Main Terminal or the International Arrivals Building, except for certain airport-installed tenant signs (such as, signs listing airline names), tenant-supplied signs specifically approved by the Authority, and the names of specific tenants or public transportation providers. However, these names may appear only on information signs when required to sort Airport users to two or more locations (such as, Washington Flyer buses should be identified by name, but not by logo, since their locations are different from all other buses).

6.2.3 Air-Carrier Identification: Company logos and typefaces are permitted on ticketing counter back walls, gate area check-in backscreens, and single-carrier hold rooms. The following table sets forth all restrictions for the locations and size of these identification signs.

6.2.3.1 Air-Carrier Identification Restrictions:

Commercial signs, including air-carrier identifications signs, are prohibited in concourse circulation areas, lobbies, and other public areas of the terminal, except as permitted by this section:

Location	Logos	Max. Logo Height	Carrier Name Sign	Max. Letter Height	Remarks
Ticketing Back Wall	1 per 20 If Counter Length	24"	1 per 20 If Counter Length	18"	Rendered in one (1) type face only.
Ticketing Over-Counter	None Permitted	- - -	None Permitted	2"	Rendered in Helvetica medium only.
Gate Check-In	1 per Counter	14"	1 per Counter	10"	Rendered in one (1) type face only.
Hold Room Wall	1 per Hold Room	24"	1 per Hold Room	18"	Located on end wall.
Special Service Counter	- - -	- - -	1 per Service Counter	18"	Rendered in one type face only.

Location	Logos	Max. Logo Height	Carrier Name Sign	Max. Letter Height	Remarks
Baggage Claim Devices	1 per Claim Device	24"	1 per Claim Device	18"	On Carrier Claim Devices. Mounted in or on a clear 16 inch (width) by 22 inch (height) by 5 inch (depth) acrylic or Lucite sign box.
Multiple Gate Hold Room Wall	2 per Hold Room	24"	2 per Hold Room	18"	Located on end walls.

6.2.3.2 Company slogans are prohibited throughout the Airport. Sign inserts in gate areas may include company typefaces and colors if they are in accordance with the standards for size, color, graphics, and mounting. All such installations are subject to the review and approval of the Authority. At ticketing counters, the over-counter Visiontron signing shall be colored K-48 Warm Dark Gray and all lettering shall be Helvetica Medium rendered in white. Airline names, logos, custom letters, or graphics of any kind are not permitted.

6.2.4 Rental Car Agencies: Company typefaces and colors are permitted, subject to restriction.

6.2.5 Concessions: Company typefaces and colors are permitted on the façades of leased spaces. Logos may be allowed within the retail areas only. Sign sizes, materials, and mountings must conform to Airport design standards.

6.2.6 Ground Transportation Providers: Company typefaces and colors are permitted on the façades of leased spaces. Logos are not permitted within the Main Terminal.

6.2.7 Revenue Advertising: Advertising signs are permitted in the Main Terminal building, but only in the areas specifically designated by the Authority, and such signs shall follow Signing Design Guidelines. All such signs

must be coordinated with the Authority and are subject to review and approval by the Authority.

6.3 Structured Parking (Under Development)

6.4 Other Structures

6.4.1 Surface Parking Lots: Commercial signs in surface parking lots, shuttle-bus shelters, and toll-area structures are prohibited.

6.4.2 Taxi Parking Structure or Lots: Commercial signs in these areas are prohibited.

6.4.3 Other Buildings and Areas

6.4.3.1 Office Buildings: The office buildings along the Cargo Drive and Aviation Drive shall have no exterior building-mounted signing of any kind. All signing for these structures shall consist of a single curbside pedestal sign at each major vehicular access point. The curbside pedestal sign shall identify the building in generic terms (building name, address, or single major tenant). No commercial logos shall appear on pedestal signs.

6.4.3.2 Air Cargo Buildings: Air cargo buildings shall have limited exterior building signing. The name of each tenant may be displayed on the canopy fascia or on a

horizontal band that is an architectural feature of the building in a single location facing the airside and in a single location facing the landside. All lettering shall be Saarinen Extended colored white and of maximum height of 8". No commercial logos shall appear on exterior building signing. A three-digit dock number may be stenciled immediately below the dock opening in letters that are similar to Helvetica Medium colored white and of maximum height of 6". Up to two supplemental informational signs may be located adjacent to each loading dock door for truck drivers. Such supplemental signs shall be on aluminum metal blanks meeting the requirements for Traffic Regulatory Signs (refer to **Chapter 4, Paragraphs 4.1.4 and 4.2.4.4**); shall use the standard Series D DOT Typeface; shall be rendered in white reflective letters on a K-48 Warm Dark Gray field; shall have a border and layout similar to DOT sign type R-10-8; and shall have a maximum size of 18" x 24". Such supplemental sign may contain informational text only; no commercial logos are permitted.

6.4.3.3 Other Buildings: Commercial signs on or in other buildings or areas are restricted to one type of tenant identification sign only. For buildings with a single-tenant, the tenant, as permitted by lease agreement, may be identified on a flush, wall-mounted sign on the building façade or canopy rendered by one consistent typeface of the tenant's choice and may include one graphic tenant logo. One such tenant identification sign may appear facing the airside and one may appear facing the main landside entrance). Maximum size of the sign shall be 5' x 40'. The logo size shall conform to the Design Standard. Signing illumination shall comply with **Paragraph 4.4** of these Guidelines.

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