MANUAL OF GUIDELINES AND STANDARDS

PART I GUIDELINES AND PRINCIPLES
PART II STATION RECONNAISSANCE (Discontinued)
PART III STATION MODERNIZATION PROGRAM (Discontinued)
PART IV COMPONENTS
PART V GRAPHICS
PART VI LIGHTING
PART VII MATERIALS
PART VIII ACOUSTICS
PART IX SERVICE FACILITIES
PART X SITE PLANNING AND NEW STATIONS
PART XI VENTILATION
GENERAL INTRODUCTION

The Massachusetts Bay Transportation Authority has found it both necessary and possible to concentrate attention on the complex needs of people. Programs to improve service must now include a new emphasis on the quality of the transportation experience. In effect, transportation engineering has been joined by human engineering and environmental design.

This manual provides a framework for the continued coordination of all those elements in the system that affect human comfort.

Many of the criteria involved are common to all environments, such as the control of light, noise, humidity, temperature, wind, and odors, or the need for orderliness, through clear and easy circulation and clean appearance. Other criteria that are more specific to the transportation environment are such needs as safety, traffic handling capability, spatial variety, consistently available information, and orientation.

The most important single criterion that has guided the preparation of this manual is the need for orientation. The rider must not only be physically comfortable, he must also know in the fullest sense where he is and where he is going.

Since to the layman a public transportation system is to a large extent an invisible skeleton of the city and metropolitan region, the comprehension of that structure generates an awareness and appreciation of the city itself, and an appreciation of travel through it.

There are many aspects to achieving this orientation. Circulation at all points must be direct and open. Spaces should relate visually to their surrounding environment, either through direct openings to adjacent spaces and structures, or in the case of platforms, by graphic reflection through photographic murals.

Above all, the need for orientation places great emphasis on maps and a consistent system of identification and directional signing. Graphics then emerges as a major factor in the design of each environment, a factor that must be given high priority in the early design phases of each project.

It is hoped that all participants in all programs will familiarize themselves with the entire manual, so that the implications of each decision can be understood in a system-wide context.

The standards and guidelines presented here are not inflexible rules. They are a framework for meaningful development and variety, and offer no restriction to the capacity of each participant to evolve better solutions to old or new problems.

As new solutions are developed and approved, revised and additional pages for the manual will be issued to all participants.
Part I of the Manual illustrates certain defects in the present station environment and establishes principles through which improvement may be achieved, as part of the Station Modernization Program. It further sets down various dimensional standards and limitations pertaining to each of the existing lines.

Further general guidelines will be added to this Part, regarding the new stations.
PART I GUIDELINES AND PRINCIPLES

A. Circulation
   1. Direct Circulation
   2. Direct Circulation
   3. Cross Circulation
   4. Right Hand Circulation
   5. Circulation Space
   6. Frustrated Entry
   7. Useless Options
   8. Escalators

B. Openness
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   4. Surveillance
   5. Waiting Areas
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  1. Advertising and Information
  3. Advertising Location
  5. Sign Location
  6. Sign Location
  7. Sign Location
  8. Map Space
  (Pages 1.1, 1.2, 2, 4 Deleted)

I. Restored Architecture (Deleted)
SYMBOL KEY

☐ Change Booth
► Entrance Turnstile
★ Passimeter
★ Exit Gate
↓ Graphics
Advertising
—— Entrance Circulation
+++ Exiting Circulation
Clarify circulation by eliminating unnecessary and disorienting turns.

Example used: Kenmore

DIRECT CIRCULATION
Existing Proposed

Improve circulation by providing adequate space to eliminate bottlenecks.

Example used: Arlington

DIRECT CIRCULATION

GUIDELINES AND PRINCIPLES
Relocate fare collection components to avoid cross circulation at constricted decision points.

Example used: Maverick

CROSS CIRCULATION
Provide right hand circulation, by relocation of change booth.

Example used: Beachmont

RIGHT HAND CIRCULATION
Provide adequate space in mezzanines and entrance lobbies for queuing outside fare collection.

CIRCULATION SPACE
Relocate exit barriers to be visible from street so as to minimize frustrated entry attempts.

Example used: Essex

FRUSTRATED ENTRY
Clarify circulation by eliminating useless options, and where space is adequate, by combining entrance and exit circulation.

Example used: Essex
Provide escalators, whenever possible.

Example used: Airport
Open double entrance stairs to daylight, where possible. Reduction in sidewalk area will require approval of local traffic authorities.

When roofs are removed, drainage and installation of new means of snow melting must be considered.

OPEN ENTRANCES
Proposed

Visually open end-loaded platforms to eliminate blind spots, where possible.

Example used: Broadway

PLATFORM OPENNESS
Improve circulation spaces by eliminating unsupervisable passageways and stairs, where possible.

Example used: Essex

SURVEILLANCE
Provide open waiting areas, with infra-red heating and wind screens. Eliminate closed waiting rooms which are impossible to supervise.

Example used: Columbia

WAITING AREAS
Relate freestanding components sympathetically to structure and circulation. Reduce blindspots to ease surveillance.

Example used: Columbia

COMPONENT RELOCATION
Build-in components, such as change booths, to relate to structure, where appropriate. Reduce clutter in confined areas.

Example used: Arlington

COMPONENT RELOCATION
Existing busway

Proposed busway

Re-locate components to relate to existing structure.

Example used: Field's Corner

COMPONENT RELOCATION
Cover up exposed runs of conduit, wherever possible, in neat new ducts or chases. When this is not possible, design new conduit and relocate.

Where such covering is provided, it must be adequately vented and drained to prevent collection of gas from leaks and of seepage and condensation. It should be removable for cable access.

SCREENING OF CONDUIT
Example Used: Arlington

SURFACE STRUCTURE SIMPLIFICATION
1. Yellow safety strip
2. Flooring
3. 9" colored porcelain enamel identity band
4. 3" laminated wood bench
5. Porcelain enamel mural
6. Ceramic tile
7. 6" White porcelain enamel information band
8. White painted walls and ceilings
9. Continuous fluorescent fixture w/ speakers and emerg. lights
10. Advertising frames
11. Acoustic treatment beneath overhang
1. Green Line: Existing stations vary from 135' to 440'. Minimum length for 2-3 car trains @ 45'/car plus 30'=300'. Each station should be reviewed with the Authority for special conditions.

2. Red Line: Existing stations vary from 267' to 435'. Stations will be lengthened to allow for 6 car trains @ 70'/car plus 20'=440'. New stations (South Shore and Alewife extensions) should be designed for ultimate use of 8 car trains = 580' though initial construction will be for 6 car trains.

3. Blue Line: Existing stations vary from 187' to 350', which will accommodate 4 car trains @ 50'/car. Ultimately longer trains of larger cars may be necessary so existing platform lengths, and possibility for lengthening should be maintained.

4. Orange Line: Existing stations vary from 305' to 480' and are presently served by 4 car trains @ 55'/car. Existing subway stations will be lengthened, and all new stations (Haymarket-Charlestown, North, and Southwest extensions) designed to allow for 6 car trains @ 65'/car plus 20' = 410'.
Clearances shown are for new facilities. Existing clearances and absolute minimum clearances for special conditions must be obtained from the MBTA. Track and platform alignment and profile is determined by the engineers in conjunction with the Station Architects and the MBTA. For platform widths see Part IV Components. Structural dimensions shown are minimum unless otherwise noted.

REQUIRED CLEARANCES - Red Line
Clearances shown are for new facilities. Existing clearances, and absolute minimum clearances for special conditions must be obtained from the MBTA. Track and platform alignment and profiles are determined by the engineers in conjunction with the Station Architects and the MBTA. For platform widths see Part IV Components. Structural dimensions shown are minimum unless otherwise noted.

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REQUIRED CLEARANCES - Orange Line
**ORANGE LINE · No.12 Car**

- Top of glass: 9'-5 3/4" above top of rail
- Bottom of glass: 6'-9 3/4" above top of rail
- Floor: 3'-8 3/4" above top of rail
- Platform: 3'-6" above top of rail

**GREEN LINE · LRV**

- Top of glass: 8'-10" above top of rail
- Bottom of glass: 5'-7" above top of rail
- Floor: 2'-10" above top of rail
- Platform: 0"-3" above top of rail

*SIGHTLINES FROM CARS*

Scale 1/8" = 1'-0"
**RED LINE · No.1 South Shore Car**

- Top of glass: 9'-9" above top of rail
- Bottom of glass: 6'-10" above top of rail
- Floor: 4'-1" above top of rail
- Platform: 3'-11½" above top of rail

**BLUE LINE · No.4 Car**

- Top of glass: 9'-2½" above top of rail
- Bottom of glass: 6'-6½" above top of rail
- Floor: 3'-5½" above top of rail
- Platform: 3'-3" above top of rail

*SIGHTLINES FROM CARS*

Scale: 1/8" = 1'-0"
Proposed

Provide new walls on platforms for station identification and orientation graphics.

Example used: Savin Hill

NEW WALLS
Provide unbroken walls for identity bands, maps, orientation graphics, or benches, by eliminating advertising recesses and other miscellaneous changes of plane.

PLATFORM SIDE WALLS
Provide unbroken platform walls for identity bands, maps, orientation graphics, or benches, by eliminating unnecessary openings or niches. This also aids station maintenance.

Example used: Beachmont
Provide open view of end walls, with transparent stairs or other devices.

Example used: Arlington
PLATFORM END WALLS
Provide new end walls to define platform space and to mask-off unsightly utility elements.

PLATFORM END WALLS
Simplify public spaces by closing-off areas and passageways no longer in use.

Example used: Field's Corner

UNUSED FACILITIES
Close-off, with new walls, spaces not used by the public.

Example used: Maverick
Eliminate unnecessary fences that have unpleasant visual and psychological effects. In this example, an unimportant option of circulation has been removed.

Example used: Orient Heights

UNNECESSARY BARRIERS
Existing

Proposed

Simplify circulation spaces by eliminating and relocating barriers.

Example used: Copley

UNNECESSARY BARRIERS

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

GUIDELINES AND PRINCIPLES
I

UNNECESSARY ELEMENTS
G4
Eliminate unnecessary barriers that have unpleasant visual and psychological effects. In this case relocation of the exit gate makes possible the replacement of a fenced passageway with a hand rail safety barrier.

Example used: Field's Corner

UNNECESSARY BARRIERS
Segregate advertising from information graphics by locating advertising across from waiting areas and information graphics across from trains.
Relate advertising to structure, and in groups of units.

Refer to Part V: Graphics.
Walls at ends of passageways, opposite major entrances, or leading to exits, or opposite turnstiles, should be kept free of miscellaneous doors and advertisements so that they may be used for information graphics.

SIGN LOCATION
Provide illuminated signs at station entrances. (See components and graphics sections.)
Locate information signs at decision points for maximum visibility. In this example the sign has been raised above head height.

Example used: Government Center Over

SIGN LOCATION
Provide map space immediately inside and outside of fare collection.

Example use: Prudential

MAP SPACE
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
GUIDELINES AND STANDARDS
PART IV
COMPONENTS
REVISED 1977
MANUAL OF GUIDELINES AND STANDARDS

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Part IV of the Manual illustrates a number of elements and conditions which occur repeatedly throughout the System. It establishes recommended treatments for these conditions, gives layout information for required station equipment, and describes the specially designed components that have been adopted as Authority standard. The intent is that similar situations in different stations receive similar treatment, with resulting advantages in large volume purchasing, increased clarity for subway users, and an intensified sense of unity among the variety of station types.

Refer to Part V: Graphics, and Part VI: Lighting, for other standardized elements.
PART IV COMPONENTS

A. Surface Structures

1. Explanation
2. Glass - vaulted (Type 1)
3. Low-walled (Type 2)
4. Control House (Type 3)
5. Controlling factors - width of sidewalk
5.1 Controlling factors - building projections
5.2 Controlling factors - visual sight lines
6. Special situations
7. Station closures
8. Identification Signs - T sign Description
8.1 Identification Signs - T Sign Location
8.2 Identification Signs - T Sign Anchor Detail
8.3 Identification Signs - Station Identification Signs
8.4 Identification Signs - Station Identification Signs
8.5 Identification Signs - Station Identification Signs

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1. Explanation - Basic Fare Structure
   1.1 Explanation - Methods of Collection
2. Design Criteria
   2.1 Design Criteria - Fare Collection Sequence
   2.2 Design Criteria - Fare Collection Circulation
   (Inner City)
   2.3 Design Criteria - Fare Collection Line (Inner City)
   2.4 Design Criteria - Fare Collection Circulation
   In Suburban
   2.5 Design Criteria - Fare Collection Circulation
   In Suburban
   2.6 Design Criteria - Fare Collectors Sight Lines
   2.7 Design Criteria - Queue Space
3. Collection Booth - General
   3.1 Collection Booth - Freestanding (General Description)
   3.2 Collection Booth - Freestanding (Inner City)
   3.3 Collection Booth - Freestanding & Built In
   (Suburban)
   3.4 Collection Booth - Details
   3.5 Collection Booth Equipment
   3.6 Collection Booth Equipment
   3.7 Collection Booth - Countertop Coin Plate
   3.8 Collection Booth - Cabinet
4. Turnstile - Existing
   4.1 Turnstile - New
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5. Fare Box
6. Barriers - Pass Gate
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   6.3 Barriers - Suggested Details
   (Pages 1.2, 1.3, 2.6, 4.3, 4.4, 6.4 Deleted)
C. Circulation Elements

1. Rotary Exit Gate
   1.4 Rotary Exit Gate - Special Installations
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   3.3 Stairs - Stair Treads
   3.4 Stairs - Handrails
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   4.1 Escalators - Layout
   4.2 Escalators - Stair - Escalator Relationship
   4.3 Escalators - Emergency Shut-Off Switch
   4.4 Escalators - Control Criteria
   4.5 Escalators - Design Criteria
5. Ramps and Passages - Design Criteria
6. Fence - Description
   6.1 Fence Construction
   6.2 Fence - High Fences
   6.3 Fence - Modification of Existing Fences
7. Guard Rails - Suggested Detail
   7.1 Guard Rails - Suggested Detail
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D. Station Furnishings

1. Explanation - Public Convenience Facilities
   2. Benches - Wall-mounted
      2.1 Benches - Wall-mounted
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   5. Internally-Illuminated Signs
      5.1 Internally-Illuminated Signs
      5.2 Internally-Illuminated Signs
   6. Commercial Facilities - Explanation
      6.1 Commercial Facilities - Newstands
      6.2 Commercial Facilities - Newstands
      6.3 Commercial Facilities - Telephone Booths
      6.5 Commercial Facilities - Other Facilities
      (Pages 3, 4, 6.4, 7, 7.1, 7.2, 7.3, deleted --
       Pages 7.1 thru 7.3 covered in Vol. V)
E. Safety - Emergency - Control

1. Emergency Requirements
   1.1 Station Emergency Egress
   1.2 Station Emergency Egress
   1.3 Station Emergency Egress
   1.4 Station Emergency Egress
General Description

These structures provide access to below grade platforms and may also function as exits. They are important street elements and careful consideration should be given to their relationship to other street furnishings and to the character of the street as a whole. In order to insure a consistency from station to station, they should be the types described in this Section.

Special situations: A different type may be approved by the Authority and their consultants.

Definitions

Entrance - a surface structure without roof, simply serving as entrance or exit for fare collection facilities below. Station close-off occurs below the surface.

Headhouse - a surface structure serving the same function as an entrance, but with a roof and surface level close-off. Escalator installations require headhouses.

Control House - a larger headhouse, housing a fare collection line and, sometimes, service facilities and concessions.

EXPLANATION
The Type 1 steel and glass structure permits maximum visibility of the surrounding area and also permits maximum light penetration to the lower level, while providing complete weather protection.

This type has been installed at Central Square

GLASS VAULTED TYPE 1 scale 1/8" = 1'-0"

HEADHOUSE
The Type 2 structure provides access to stations by means of a minimal surface structure. It should be used where the vaulted type would result in a physical or visual interference with surrounding elements.

Type 2 is normally used only with stairs, since escalators require overhead protection and surface level close-off. Parapet walls must be high enough to make sitting difficult.

LOW WALLED TYPE 2 scale 1/8" = 1'-0"
The Control House Type differs from the purely entrance and exit surface structures by the inclusion of a fare collection area. The dimensional recommendations contained in the section on fare collection apply.

This type is used in the design for North Station.
The following factors will control the choice of type and/or the dimensions of a surface structure.

Width of Sidewalk  In situations with narrow sidewalks the minimum width of the surface structure should be selected so that sidewalk circulation will be least restricted. Approval of local traffic authorities is required.

CONTROLLING FACTORS  scale 1/8" = 1'-0"
Building projections - existing signs, lights, and similar elements should be considered when selecting the surface structure. Close proximity or actual contact of MBTA structures with nearby elements should be avoided.

CONTROLLING FACTORS  scale 1/8" = 1'-0"

COMPONENTS  IV

SURFACE STRUCTURES  A5.1
Visual Sight Lines - It is important that visual conflict between MBTA structures and surrounding signs and buildings be avoided. The architect should make the necessary field investigations to insure that no conflicts will exist the selected surface structure.

CONTROLLING FACTORS scale 1/8" = 1'-0"
The following situations apply only at certain stations. Proposed designs will require special review and approval by the Director, and often by local authorities.

Entrance Through Buildings

In many cases access to stations will be through existing or new structures. In this event the design will be largely determined by existing conditions.

Historical Area

Occasionally surface structures are located in areas of historical importance. In such cases the character and materials of the surrounding area will determine the design approach.

Multiple Use Structures

The design of surface structures for multiple use is desirable, provided that space is available, that the other use is suitable to a subway entrance, and that the identity of the MBTA elements is in no way compromised. Multiple use provides an active relationship between street and station, draws the public into the System, and furnishes full or part-time supervision by the concessionaire's personnel.

SPECIAL SITUATIONS
All surface structures are closed off during non-operating hours. Existing closures vary, being, typically: hollow metal swing doors or roll-down overhead doors at street level for headhouses and control houses, and steel plate swing doors at the bottom of stairs for entrances.

In many cases, it will be possible to refurbish the existing closure. Otherwise the preferred closure is a roll down grille, and where overhead clearance is insufficient, a swing gate. Gates and grilles should be open to passage of air. In the open position the closure should be recessed, if possible, to minimize obstruction to traffic.

Pantograph gates have been found too insubstantial for use as closures. Closures should have locks capable of operation from either side.

STATION CLOSURES
T Sign Description

An internally-illuminated T sign should be located at all surface entrance structures. It may be freestanding on the sidewalk provided it adheres to the clearances and mounting controls above. Where a freestanding sign is impractical for physical or visual reasons the sign may be wall-mounted.

The sign is double-sided. Each face is 3'3" in diameter and formed of white translucent plastic with a black T and circle on the surface. If it is freestanding it should be mounted 13'3" high from the ground plane to the top of the circle. The wall mounted sign should be mounted at the same height wherever possible.

The sign is a standard component with no variation permitted.

IDENTIFICATION SIGNS
T Sign Location Requirements

a. Parallel to curb - Allows sign support to be close to curb and still have vehicle clearance 1'-0" from curb edge.

b. Signs should be located so that they are visible from the sidewalk and not obstructed by building or projections.

c. Signs at the different entrances of an intersection should be oriented perpendicular to each other to be visible from both major directions.
ELECTRICAL SERVICE

2 - #12 wires
60 cycle - 110 volts - a.c.
Conduit to be installed in one run between junction box in sign face and nearest pullbox. No pullbox at base of sign.

Means of current supply is the responsibility of the installing contractor.

Detailed drawings are available from the Authority.

IDENTIFICATION SIGNS
Station Identification Signs

Internally-illuminated signs are to be used to identify the various stations and are located on both surface entrance and exit structures. The type of sign depends on the type of entrance structure. The type B sign also incorporates stair lighting.

Approval by traffic authorities is necessary for T sign location.

IDENTIFICATION SIGNS
ARLINGTON
THIS ENTRANCE WILL BE OPEN
5:15 A.M.-1 A.M. MON.-SUN.
BACK ILLUMINATED STATION SIGN (TYPE A or B)
CENTRAL
OPAQUE STATION SIGNS (TYPE A or B)
ARLINGTON
BACK ILLUMINATED STATION SIGN WITH DOWNLIGHT (TYPE B)
Station Identification Signs
Top band has background code color of the Line with station names in white letters.
Bottom band has white background with entrance information in black letters. The width of the sign varies with the entrance structures. The information provided on the lower band varies with the station.
For colors and lettering see Part V, Graphics.
Bottom band text will be furnished by the M3TA Planning Dept.

IDENTIFICATION SIGNS
White letters, colored field
Black letters, white field
\(\frac{1}{4}''\) acrylic plastic sign face masked and painted on inside surface.
A.C. Fluorescent Lamps
Conduit carried up into sign unbroken run from remote pullbox
Ballast
D.C. Lamp (Emergency)
A.C. Fluorescent lamps
Reflector
Aluminum frame
Removable louver
A.C. & D.C. Conduits behind finish surface.

Manufacturer's and underwriter's labels to be located inside of fixture.

Station Identification Sign Type B

Sign interior is schematic. In dimensions and appearance, this sign lighting fixture is a standard component with no variations permitted.

Fluorescent: 800 ma, full width of sign

Identification Sign

scale \(1\frac{1}{2}'' = 1' - 0''\)
Basic Fare Structure - Present System

The basic fare structure of the Massachusetts Bay Transportation Authority consists of a rapid transit rate and a surface rate. Therefore, transfer between surface and rapid transit lines requires the payment of an additional fare. However, free physical transfer is provided between all rapid transit lines.

The three rapid transit lines operate wholly within the rapid transit fare zones. Five street car lines, operating through the central subway, also charge the rapid transit rate while in the subway. When operating on the surface they are considered surface lines and charge the surface rate of fare.

A sixth car line, the Ashmont-Mattapan line, operates exclusively on private right-of-way in a suburban area as an extension of the Cambridge-Dorchester rapid transit line. A continuation ride on this line involves no additional fare. Local riding requires payment of a flat fare, equal to other surface lines of the system.

Fare paid within the street car subways are good for a ride as far as the first station outside the subway. The surface fare must be paid for riding beyond this point.

Basic Adult Rates of Fare

Urban Rapid Transit 25¢
Suburban Rapid Transit 50¢
Surface Bus * and Trackless Trolley 25¢
Surface Street Car 20¢
Highland Branch Express 50¢

*On Surface Bus, zone fares are changed on premium routes.

Discount Fares

Children Under 11
Students with T/Identification and Senior Citizens are one half the adult fare

Handicapped riders are one half adult fare except during rush hours. 7-9 a.m. and 4-6 p.m. when regular fare is charged.

Children under 11 and students are allowed free transfer by issuance of an identification check upon request.

EXPLANATION
Methods of Collection

A fare transaction involves one of the two following methods of fare collection:

Station Collector

Collectors function primarily as change makers. Collectors do collect half fares, inspect children's identification badges, and free riding passes. There is a turnstile at each primary collection booth as well as an International registering, coin return fare box in which half fares must be deposited.

Rapid transit collectors are on duty from 5:00 a.m. to 1:00 a.m. daily. Street care subway collectors work approximately the same hours.

Turnstiles and Rotary Coinpassers

The use of turnstiles is the most common method of fare collection and is responsible for about 90% of all fares collected. Most turnstiles are of the two-way entrance-exit type and were supplied by either Perey General Electric.

Rotary coinpassers are installed at unmanned entrances. They accept a quarter.

Street Car Operator

All street cars are equipped with Keene registering fare boxes.

EXPLANATION
Design Criteria

a. Selection of elements depends on:
   1. Whether paid or unpaid area
   2. Whether attended or unattended area

b. Although paid areas must be physically separated from unpaid areas, it may be desirable to visually de-emphasize the separation (or design for visual continuity). Various types of fences, fence fabric and methods of installation can be selected by the architect to achieve the desired degree of transparency.

c. The number of turnstiles or rotary coinpassers needed in any particular station will be determined by the MBTA Planning Dept.

d. Low fencing should be used between paid and unpaid areas only where it will be in the normal field of observation from a primary collection booth; otherwise high fencing is required. High fencing should be at least 6'-10" high, and should extend to the ceiling in low headroom areas.

e. A 9" high metal band appears at waist height (3'-2") in the turnstiles and on adjacent fencing. In fare collection lines, low fences should have a band of stainless steel, reflecting the adjacent turnstile band material and affording better durability in these high public contact areas. High fencing, if divided horizontally, should have a similar 9" band, painted with the fence frame, and set at the same 3'-2" elevation.

f. Emergency gates and maintenance gates may be combined at major access and egress points. As long as the opening is 4'-0" or more, one gate is sufficient for both functions.

g. Fences, gates, and solid barriers should be designed so that their height relates to the vertical dimensions established by the exit gates and other components.

h. Rotary coinpassers present a considerable obstruction to traffic flow, and should be used only where a fare collection line with turnstiles and collection booth is out of the question.
Fare Collection Sequence

The typical fare collection line consists of the following elements:

a. Primary collection booth
b. Children's turnstile and fare box
c. Pass gate
d. Token-operated turnstiles

Optional elements consist of a (1) secondary collection booth which generally operates during peak periods only and does not normally have a children's turnstile connected to it. (2) Emergency gate to provide access for emergency equipment and maintenance vehicles between the paid and unpaid areas. (3) Fare box used in conjunction with pass gate. The emergency gate does not normally occur in the fare collection line, but may be included when no other options exist.

DESIGN CRITERIA
Inn-City Station - Pay Enter, Free Exit

Fare Collection Circulation

The zones of typical circulation are shown and should be considered in any alteration of the typical line. Circulation paths should be kept clear and free from conflict.

Typical Layout
Inner City Station - Pay Enter, Free Exit

TYPICAL FARE COLLECTION LINE WITH DIMENSIONS
Suburban Station - Pay Enter and Exit

Fare Collection Circulation

TYPICAL LAYOUT
Paid Area

Number of turnstiles varies

- 7' 0"
- 2' 9"
- 2'
- varies 2' - 5"
- 2' - 5"
- 2' - 5"
- 4' 9"
- 2' 9"
- 7' 0"

4' 6" min.

8' 0"

2' 1"

4' 0" clear

Secondary booth turnstile & farebox for emergency exit entry pass turnstile & primary booth

Children & local riders

Free Area

Suburban Station - Pay Enter and Exit

TYPICAL FARE COLLECTION LINE WITH DIMENSIONS

COMPONENTS

FARE COLLECTION IV B2.5
UNACCEPTABLE BOOTH

Fare Collector's Sight Lines

Variations on the fare collection line depend on the physical limitations of the station. In all cases the fare collector should be able to see clearly down the line of equipment without moving his head more than 45° from the frontal position as in A and B above. An angle of more than 45° as in C above is unacceptable.

DESIGN CRITERIA
1. In general, the primary collection booth should be on the right, to permit right hand circulation. If circulation is thereby improved, it can be on the left.

2. Required queue space: Dimensions A (20' minimum at downtown stations, 15' minimum at suburban stations). This space is in addition to required runoffs for stairs and escalators, and to such space for through circulation as may be required by the station plan. Queue space is required at both booths.

3. Individual station plans and expected rush hour circulation patterns will establish the position queues will take. Queues must not prevent patrons already possessing tokens from direct access to the turnstiles, nor obstruct exiting from swing-type exit gates that may be opened during rush hours.

DESIGN CRITERIA - Queue space
General Description

Collection booths are the major components in the fare collection line, and are required in every station. They are enclosures from which the collector sells tokens, and supervises the collection line. Booths are of two types, freestanding and built-in, with built-in preferred if circulation allows.

General Requirements

At each fare collection line there is one primary collection booth, which may be augmented by one or more other booths, called secondary collection booths. Secondary booths function only during peak circulation hours and do not usually have provision for the collection of children's fares. Secondary booths are also called token booths.

The location of the booth is of primary concern. It must be positioned to provide an easy and natural sequence from the purchase of tokens to the arrival at the platform.

The children's turnstile must be physically connected to the primary collection booth. In some heavy traffic situations, a children's turnstile may be installed with a secondary booth.

The collection booth requires special equipment consisting of controls, alarms, major switches, signal devices, public address equipment, and telephone. The primary booth contains a cash safe which the collector uses at the end of each shift. It may contain one or more TV monitors. When secondary collection booths are use, the operators of these booths use the cash safe in the primary collection booth.

Collection booths have floors raised by 4" or 6" above the mezzanine floor level, to permit better observation by the collector.
General Description

Freestanding collection booths of bullet-resistant design will be furnished by the Authority or the Contractor, and set up in place either by the Authority or by the Contractor. Certain equipment will be furnished with the booth, and the Contractor shall provide and connect power and communication lines to serve this equipment, as well to serve other items of equipment furnished by him. The secondary booth is similar to the primary except that certain items of equipment may be omitted, as explained below.

Equipment Furnished with the Booth

All conduit and pull for installed or anticipated Equipment, separate for AC, DC, and signal
1-Main Breaker Panel
1-Exterior Duplex Outlet
1-151 Watt Incandescent DC Emergency Fixture - 660 watt/600 Volt Socket, with Conduit and Junction Box
3-22 Watt Circular Flourescent Fixtures
Lighting Fixture W/2'- 24" Flourescent Lamps
Coinplate, Counter Tops, Cabinets, Coat Hooks
Heating, Ventilation & Air Conditioning Equipment

Temperature: Maintain 70°F minimum in winter months.
Maintain 78°F maximum in summer months.
Use water-cooled condensers below grade, and air-cooled condensers above grade with good ventilation. Heat pumps with supplemental electric heat.

Humidity: Fifty percent maximum in summer months; use electric reheat. No control in winter months.

Ventilation: Provide 20 to 25 CFM outside air. Maximum residual air velocity in occupied area of 50 feet per minute. Maintain small positive pressure in room. All ventilation shall be mechanical and run when booth is occupied.

Equipment Furnished by the Contractor
(primary booth only, unless otherwise noted)
1-Telephone (primary and secondary booths)
1-ADT Alarm (if required)
1-Starters Call Button (primary and secondary booths)
1-Starters Call Bell (mounted on the primary booth)
1-or more TV Surveillance system monitor sets and controls (if required)
1-or more emergency exit alarms (if required)
Sound System Equipment and Monitor Loudspeaker
Other equipment and connections as may be required

COLLECTION BOOTH - Freestanding
Built-in booth has similar requirements
All metal trim and frames to be black anodized aluminum.

Reference: T Drawing M-a-24368

INNER CITY STATION - Pay Enter, Free Exit

COLLECTION BOOTH - Freestanding
SUBURBAN STATION - Pay Enter and Exit

COLLECTION BOOTH - Freestanding and Built-in
Coin Plate Detail

2"x 2" x 3/16" anodized black aluminum frame

16 ga. st. steel over opaque armor

Coin plate is 1'-4" wide cash drawer below

Plan

Elevation

3 3/8" to booth floor

Booth Turnstile and Farebox - Inner City Station

COLLECTION BOOTH - Details
A. Environmental Control

1. Exhaust fan *
   - in built-in booths, the Authority will furnish a counter mounted fan.

2. Lighting - normal (AC) *
   - 1 Type N over counter and backlighting sign strip. Other fluorescent or incandescent as required.

3. Lighting - emergency (DC) *
   - 1 or more - 151 w. downlight, equal to McPhilben 3-10B

4. Heater *
   - 2 1000 w. equal to Chromo-lox HV 2411

5. Switches *
   - one each for lighting and each heater

6. Convenience outlet *
   - duplex

7. Fresh air supply *
   - wall or door grille. 6” max. in one dimension, or with steel protective grating
   - provide means of winter close off

B. Communication

1. Telephone
   - wall type, connected to central MBTA switchboard

2. ADT alarm **
   - connected to cash safe and ADT headquarters, via telephone lines.

3. Emergency exit alarm **
   - buzzer actuated by opening of emergency exit

4. TV surveillance system **
   - monitor set(s) counter mounted

5. Sound system
   - microphone, monitor loudspeaker, VU meter and variation control, volume control

6. Starters' call bell
   - button actuating remote call bell

COLLECTION BOOTH EQUIPMENT

COMPONENTS IV
FARE COLLECTION B3.5
C. Operating Aids

1. Coathook strip * (**) 3 hooks located away from public view

2. Bulletin board * (**) door or wall mounted, away from public view

3. Collection booth cabinet * see sheet B3.8

4. Cash safe (**) furnished by Authority

5. Children's turnstile with pedal, coin return (**) furnished by Authority

Refer to Sheet 3.4 for preferred equipment locations

All equipment listed is to be furnished by the Contractor, except: * items are Authority furnished with the free-standing booth only. Remarks therefore apply only to built-in booth.

All equipment listed is required in both primary and secondary booths, except:

** items are required in primary booth only.
3/8" safety glass
1/2" laminated maple counter
bent metal edge strip

Section at countertop

1" 11"

1" 1/2"

4" B wall 1'-4" cabinet

White marble coinplate,
polished w/eased edges.

A-A B-B

Sections at coinplate

COLLECTION BOOTH

COMPONENTS IV

FARE COLLECTION B3.7
Drawer Unit

coin plate

1' - 4"

Cash Drawer

1. All wood to be 3/4" hardwood or hardwood plywood, except drawer bottoms 1/2" and dividers 1/4".
2. Construction to be equal to American Woodwork Institute, Custom Grade.
3. All drawers to have pulls and nylon slides.
4. Personal property drawers to have cylinder locks.
5. Cash drawer divided into 4 bill compartments.

COLLECTION BOOTH - Details
Existing Turnstile

The coin-operated turnstile is the basic fare collection device in the transit system. Perley Model 97 Kompak Coin­passer turnstiles are used widely throughout the existing stations. Occasionally a station may have older electric GE turnstiles. The turnstiles are arranged for token operation in the entering direction and are free-turning in the existing direction. The mechanism is unlocked by an MBTA token only and requires no electrical connection.

TURNSTILES scale 1/2" = 1'-0"
New Turnstile

The coin-operated turnstile is the basic fare collection device in the transit system. Perey Model 97 Kompak Coin-passer turnstiles are used widely throughout the existing stations. Occasionally a station may have older electric GE turnstiles. Some modernized and new stations will have new turnstiles, as shown here. The turnstiles are arranged for token operation in the entering direction and are free-turning in the existing direction. The mechanism is unlocked by an MBTA token only and requires no electrical connection.
Turnstile Base Detail

Steel leg
1/4" fillet weld

Legs bolted into concrete with 1/2" expansion bolts -
4 in front leg, 3 in rear leg

3/8" steel plate - drilled for bolts
rubber flooring
shim and grout as required
concrete

TURNSTILES scale 3" = 1'-0"
Fare Box

At certain times of heavy use the passgates are opened and used for fare collection. The fare is placed in free-standing fare boxes which have tops that allow attendants to visually check fares and spot illegal coins. Fare box requires electrical connection (120 v AC, 1/20 hp motor)

FARE BOX scale 1" = 1'-0"
Pass Gate

On occasions such as sporting events or other peak circulation situations, the pass gate may be opened and fares collected by an attendant with a fare box. This gate may also be used to facilitate exiting in circulation surges.

The gate must spring closed and the latch is always operated from the paid side of the gate. Install a hook and eye to hold the gate open.

BARRIERS
Emergency Gate - Low Type

Access for emergency and maintenance equipment must be provided from unpaid to paid area at or near every fare collection layout. Emergency gates are 4'-0" wide, clear, and are best located where they can be opened (and manned) for easy exiting during rush hours. Low type gates can be used only where they are in normal direct vision from collection booth.

Emergency gates should have a lock and a wall stop and holdback.

BARRIERS
Fixed Barriers - Low Level

The low type barrier separates the paid area from the unpaid areas in the fare collection line or in other supervised situations. It must relate to other fare collection elements (see fare collection line).
LOW BARRIER WITH PASS GATE

HIGH BARRIER

16 gauge stainless steel rail

1/2" x 1" steel bars 6" o.c.

2" square 16 gauge stainless steel tubes

SECTION

2" square steel tube frame and pickets painted black

BARRIERS - Suggested Detail
Stainless Woven Wire

Stainless woven wire will be used only in fare collection barriers. All other fences will be the steel picket type. The following specifications should be used for stainless woven wire fences.

Woven wire panels, fare, and partition inserts, shall be fabricated of stainless steel, and shall consist of stainless steel wire diamond mesh of #12 stainless wire 1-1/8" wheels-diamond mesh, set in steel channel (not stainless steel) frames, sized as indicated. They shall be manufactured by Acorn Wire and Iron Works, Haskins-Haire Wire Works, Bellis Wire Works, or equal approved by the Authority.

Framing for woven wire partitions, to receive steel channel frames mentioned in the previous paragraph, shall be fabricated of steel sections (not stainless steel) as shown, in accordance with the details. Include all posts, mullions, rails, sills, tubular headers, flat-plate headers, steel rod hangers (to ceiling), angles, flat stock, and all necessary fastening devices and anchors. Use continuously welded, ground-smooth construction throughout except where other methods are shown. Secure stainless steel inserts to steel framing by means of stainless steel flat head, bolts into tapped holes, following manufacturer's recommendations.

Stainless steel railing at low woven wire partitions shall be accurately formed to the dimensions shown, with welded-on end caps, and all welds ground smooth and finished to match the adjacent surface.

BARRIERS
Material:
Stainless steel and black painted steel.
Floor material continuous under exit gate.

Rotary Exit Gate
In situations where exits are located out of direct visual supervision, rotary exit gates should be installed. The shaft with gate arms is free to rotate in only one direction, permitting continuous egress from the paid area without permitting unpaid admittance.

ROTARY EXIT GATE Scale 1/4" = 1'-0"
a. PART TIME FARE COLLECTION LINE WITH ROTARY EXIT GATES

b. ROTARY EXIT GATE REMOTE FROM FARE COLLECTION LINE

Special Rotary Exit Gate Installation

a. At fare collection lines manned only during hours of peak traffic, rotary exit gates are installed to permit exiting at any hour. For such part-time collection lines, a rolldown or swing-out close-off must be provided to prevent access to the paid area.

b. At instances where the fare collection line is remote from an exit, and the line is manned only during peak hours, it is desirable to enclose as much of the corridor within the paid area as possible. In such cases a rotary exit gate would be installed close to the exit, with a swing gate which would be fixed open during the peak hours. No close-off at the collection line, as described in a. above would be required.

ROTARY EXIT GATE scale 1/4" = 1'-0"
EXIT GATE VISIBLE FROM SURFACE - Preferred

EXIT GATE NOT VISIBLE FROM SURFACE

Where a surface structure is used as an exit, a rotary exit gate may be installed near the surface level. This prevents entrance from the street level and discourages loitering in the stairs and passageways by making them paid rather than unpaid areas.

ROTARY EXIT GATE scale 1/8" = 1'-0"
Platform Lengths

1. Green Line: Existing stations vary from 135' to 440'. Minimum length for 4 LRV's @ 73'/car plus 8' = 300'. Each station should be reviewed with the Authority for special conditions.

2. Red Line: Existing stations vary from 267' to 435'. New and lengthened stations will allow for 6 car trains @ 70'/car plus 20' = 440'.

3. Blue Line: Existing stations vary from 187' to 350', which will accommodate 4 car trains @ 50'/car. Ultimately longer trains may be necessary. New and lengthened stations will allow for 6 car trains @ 50'/car plus 20' = 320'.

4. Orange Line: Existing stations vary from 305' to 480' and are presently served by 4 car trains @ 55'/car. New and lengthened stations will allow for 6 car trains @ 65'/car plus 20' = 410'.

5. See IV E2 for emergency exit criteria applicable to all stations.

PLATFORM AREAS - Design Criteria
Minimum Headroom Requirements

1. Structure over tracks -- 15' from top of rail.

2. Train platforms -- 9'-6" to structure, allowing 12' height for continuous lighting fixture at platform edge. See IV C2.2 for overhead clearance limitations where low ceiling over platform steps up to high ceiling over track.

3. Structure over busway -- 13'-6" above roadway. See IV C2.3.

4. Miscellaneous pedestrian circulation areas: for short distances (under beams, etc.) -- 7'-6", preferred minimum 8'-0".

PLATFORM AREAS - Design Criteria
Notes:
1) All clearances are for tangent track. Horizontal clearances increase on curves.

2) Dimensions shown apply to all lines unless otherwise noted.

3) At all locations where walls or furnishings such as signs and lights, are less than 8'-0" from track centerline, niches 1'-0" deep, 2'-0" wide, and 7'-0" high will be provided at least 20'-0" on center.

4) At locations where a continuous walkway is provided across the track from the platform, furnishings such as signs and lights attached to the wall must be at least 6'-6" from track center line, and must be at least 7'-0" above the surface of the walkway. Maximum height of walkway above top of rail is 1'-0".

5) Vertical clearances shown provide minimum of 8'-6" headroom over platform area.

Key:
R = Red Line
O = Orange Line
B = Blue Line
G = Green Line

PLATFORM AREAS - Clearance Requirements - Red, Orange, Blue & Green Lines
limit for structural elements, light fixtures, signs, & other furnishings

Notes:

*Bus stop signs may be located within this area, but sign panel should be at least 2'-0" from curb, and 7'-0" above platform.

PLATFORM AREAS - Clearance Requirements - Busways
Basic Objectives

Vertical circulation elements consist of stairs, escalators, ramps and elevators.

a. Stairs at entrances should provide clear and direct access to the fare collection area, with a minimum of unused alcoves and hidden corners, and decision points.

b. Stairs and escalators should be sized and located for expected traffic volumes and directions. Access to paid and unpaid areas should be clearly separated, with no possibility of cross connection within a station. It should be possible to correct a wrong turn, or to change directions between inbound and outbound, without crossing the paid-unnamed boundary.

c. Existing stairs and passageways should be walled off, or removed, if no longer required and if the basic clarity of circulation is thereby improved.

d. Existing stairs should be reconditioned and new treads and handrails installed.

e. Elevators will be installed at selected locations to meet the requirements for handicapped accessibility. When possible ramps will be used instead of elevators.

f. See IVE-2 for emergency exit criteria applicable to all stations.

VERTICAL CIRCULATION
Location

A minimum of two stairs is required to serve each platform or major public space. However in some stations one stair may be an emergency stair, or may be waived in favor of other means of egress, as determined by the Authority.

Design Criteria

a. Maximum capacity for a stair is 20 persons per foot of width per minute and absolute maximum in emergencies is 25. Station occupancy loads and allowable times for emptying the station will be furnished by the Authority.

b. Design capacity for a stair is 15 persons per foot of width per minute.

c. A pedestrian lane has a minimum clear width of 1'–10" (22").
Landings

Landings shall have a minimum length of 4'-6", and width equal to the stair.

Minimum Run-off (clear space) at tops and bottoms of stairs:

a. To a solid obstruction: Width x 1.7
b. To edge of queue space: 10'
c. To another stair or escalator: 30'

Note: run-off for stair and escalator in same well is the combined width x 1.7

Width and Headroom

a. Minimum width for new stairs: 6'-0". Handrails may encroach on each side a maximum of 3 1/2".
b. All stairs should have a minimum of 7'-0" clear headroom.

Treads and Risers

a. All risers in any stair must have a uniform height.
b. The minimum and maximum riser and tread shall be:
   Minimum riser 6"    Maximum tread 12 1/2"
   Maximum riser 7 1/2"   Minimum tread 10"
c. Treads and risers shall be proportioned so that the sum of two risers and one tread is not less than 24, not more than 25. Treads shall be measured from face to face of riser. Projecting nosings are not allowed.
d. Long flights must be subdivided, with intermediate landings, so that no flight has a greater rise than 8'-0". Stairs without landings must not have more than 15 risers. Short flights must have at least 3 risers.

Treads on stairs exposed to the weather should be slightly pitched, for self-draining.

Where open riser stairs are used to permit through-visibility, treads must overlap each other at least 3". Such stairs can be used only when there is an optional route with closed riser stairs (or ramps) available.
SECTION, STEEL

Steel tread, as required flange must be shallow enough to be hidden rubber nosing

SECTION, CONCRETE

Black rubber face on riser

Stair Tread

Rubber Stair Treads: "Rub-Bub" Heavy Duty Safety Step Plates, consisting of rubber surfacing chemically and mechanically molded to a stainless steel backing plate with double ribbed "Dri-Foot" tread design, as manufactured by Ace Rubber Products, Inc., or equal approved by the Authority. Integral colored rubber strip in each tread shall be bright safety yellow color of dimension and position shown.

STAIRS scale 3" = 1'-0"

1 1/2"=1'-0" PLAN

COMPONENTS IV
CIRCULATION ELEMENTS C3.3
Handrails

a. Height: 2'-9", measured vertically from the top of the tread at the nosing, to the top of the handrail. (3'-0" at landings and at top and bottom of runs).

b. Handrails may extend a maximum of 3 1/2" into required stair width.

c. At landings of 6' length and less, the handrails, both wall and post mounted, should continue across the landing without break, unless the swing of a close-off gate requires that a break be made.

d. Wherever support conditions allow, each wall-mounted handrail should extend horizontally at a height of 3'-0" for a distance of 1'-6", at both top and bottom of runs. The purpose is to afford a firm grip before the ascent or descent begins.

e. Handrails must be provided on both sides of all public stairs. Center handrails must be provided at all stairs wider than 7'-4", so that such stairs are divided into lanes between handrails of 7'-4" maximum width and 4'-0" minimum width.

f. The sides of all stairs must be protected below handrail height. Steel pickets at 6" spacing may be used. Pipe rails, if used, should have an intermediate rail 1'-7" above the top of tread at the nosing, and a maximum opening between rails, or between rails and curb, of 10".

g. Handrails must be shaped and sized so that they afford a firm grip to all users. The following designs are acceptable:

h. The handrail must be stainless steel or hardwood. The supporting structure may be stainless steel or black painted galvanized steel. All pipe rail joints must be welded and ground smooth.

STAIRS
Design Criteria

a. Location and capacity: Up escalators should be used where the rise is 12' or more. Down escalators should be used where the rise is 24' or more. Maximum capacity for an escalator of 4'-0" nominal tread width and speed of 120' per minute is 135 persons per minute. *The absolute maximum in emergencies for a standing escalator is 90 persons per minute. Use 100 persons per minute for design capacity.

b. Dimensions: 4'-0" nominal tread width, required in all new installations. Overall width varies 5'-8" to 6'-0".
Slope 30°
Minimum clear headroom 7'-0"

c. Minimum Run-off (clear space) at tops and bottoms of escalators:

1. To a solid obstruction: 15'
2. To edge of queue space: 10'
3. To another escalator or stair: 30'

d. Moving sidewalks shall conform with the above requirements (maximum slope 15°).

e. Exposed metal (deckplates, interior panels, newels, etc.) shall be #4 finish stainless steel. When exterior paneling is required (i.e. when an escalator is open on one or both sides), it shall be stainless steel to match the other parts, and be of flush butt-jointed construction, with no exposed fasteners, and no battens or joint covers. Paneling should be adequately reinforced to prevent oil-canning, and noisemaking when struck. Deck plates should meet the wall in a flush, gasketed detail to prevent dirt infiltration into the machinery. Stainless steel anti-slide knobs are required on the deckplates.

f. Ventilation for machinery, and access for periodic maintenance must be provided, preferable from a room beneath the escalator. Floor pits will generally require a sump pump, and floor access doors must be designed to receive whatever floor material is used.

g. All escalators will be the reversible type. Escalators shall be able to be operated down at a slower speed than up. Control switches should be located in a room beneath the escalator, or in another service room. The Authority has a standard specification covering all functional aspects of the escalator.

h. Emergency shut-off switches are required at the head and base of each escalator. Typically they will be recessed in the wall construction. See sheet C 4.3 for this switch.

i. See Part V: Graphics, for signing at escalators.

ESCALATORS
*Consult manufacturers catalogues.

**Escalator pits must be designed to fit any currently available escalator. The supporting beams will be located in the field after a particular machine has been obtained.
Stair - Escalator Relationship

Where stairs occur along side an escalator, the rise/run of the stair should be set to closely match the 30° escalator slope, and the stair itself so located that the handrail remains below the escalator deckplate.
Recess box in wall, at both top and bottom of escalator, maximum of 10'-0" from the escalator, and at a maximum of 5'-0" above the floor.

See Part V: Graphics, for required sign.
Escalator Control Criteria

The following criteria will apply to all new escalators used in Authority facilities. In addition, the design will meet the requirements of the "State Building Code", and planning criteria shown elsewhere in the Manual (see I-Guideline & Principles, other parts of IV Components, and X Site Planning & New Stations)

1) All escalators will be reversible and will be operable in both directions at a speed of 90 and 120 feet per minute.

2) Control for the direction and speed of escalators will be in locked cabinets, duplicated at each end of the escalator, and located to facilitate supervision of the escalator when a change of direction is made. (Authority personnel could block persons from entering the escalator, then reverse when clear.)

3) Emergency stop buttons for public use will be located at each end of the escalator. They should be placed to prevent accidental actuation by the users of the escalator.

4) Escalator stop controls, and pilot lights indicating a stopped escalator, will be located at the primary collection booth and other locations designated by the Authority. Capability of a tie-in to the control center will be provided.

5) Escalator's feeding into a subway station platform or lobby should be tied-into the fire and smoke detection and other emergency alarm system's as required, so that they will be stopped when such systems are actuated. Escalators are acceptable means of emergency egress from a station.

6) At locations where locked doors or gates close-off access from an escalator, the control of the escalator must be interlocked with the locking system for the doors or gates to prevent operation of the escalator in a direction which could trap people.

7) At escalator's which are intended for reversible operation as a normal routine (say up in the morning rush and down in the evening), back-lit directional signs (See V Graphics) with latent display capability will be tied-into the escalator control.

8) Acceptance tests of completed escalator installations will include testing of the escalator in both directions of travel, at both speeds, and tests of all related control devices, interlocks, signs, etc.

ESCALATORS
a) Elevators are used only when required to meet the requirement for handicapped accessibility. Normally they are located to connect a free area with a free area, or to connect a paid area with a paid area. In special situations a double door elevator may serve both these functions (see Oak Grove Station). In existing stations it may be necessary to connect a paid and free area, which requires special pass-reading equipment at the entry in the free area.

b) It is desirable to locate elevators so that they can be observed directly by station personnel or by closed circuit television. Elevators shall not be located where they would interfere with the normal pedestrian flow within the station.

c) Doors to elevators in new stations shall provide a clear opening of 3'-0" minimum width. Doors to elevators in stations which are being altered, remodeled, or undergoing a change of use shall provide a clear opening of 2'-8" minimum width, only if 3'-0" is not possible.

d) Cab size: minimum interior dimensions of the elevator cab measured wall to wall (excluding the rub rail) shall be 4'-0" wide by 4'-6" deep minimum in new construction; and 4'-0" x 4'-0" minimum in existing construction.

e) Controls (including emergency telephone) of automatic elevators shall be located no higher than 5'-0" and no lower than 3'-2" above the floor of the elevator. Numbers and letters shall be large raised or recessed for use by visually handicapped.

f) All controls for the elevators shall have large raised or recessed numbers/letters and light on dark background for use by the visually handicapped; and there shall be no ashtrays or other obstacles placed directly below or above. Audible signals shall be provided and the "up" signal shall be different from the "down" signal. Floor numbers shall be provided at each level on the elevator entrance jamb located on the right side when exiting and shall be raised or recessed and light on dark background.

g) Rub rails shall be secured to all walls of the cab and located 3'-0" above the cab floor.

h) Doors shall have a sensitive safety edge. Doors shall have a sensing device to prevent closing while entering or exiting. Doors shall be set to close in not less than six (6) seconds.
Design Criteria

1. Passages:
   a. 10' preferred minimum width in new construction, but in no case less than that of stairs served. Absolute minimum width 6'-0".

2. Ramps:
   a. Should be used at small changes in level in preference to short runs of stairs, and for long inclines where the desired slope is attainable without resort to stairs.
   b. Provide same minimum run-offs as with stairs. Minimum clear width is 4'-0"
   c. Absolute maximum slope 1:12 (8.33%) 
   d. At slopes steeper than 1:20 wall mounted handrails should be provided, on both sides of the ramp.
   e. Ramps steeper than 1:20 require landing of 5'-0" min. length every 34' of run.
   f. Maximum capacity of passages and ramps is 25 persons per foot of width per minute, and absolute maximum in emergencies is 30.
   g. Design capacity is 20 persons per foot of width per minute.
Fence components include low and high fences, and guard rails. Fences consist of a horizontal rail, and either balusters or infill panels. Guard rails consist of only a horizontal rail, and posts if required.

a. Fences are used to separate paid and unpaid areas, and to prevent accidents where a change in level occurs. When separating paid and unpaid areas, low fences may be used only where continuous supervision by Authority personnel is available.

b. Guard rails are used to control circulation patterns within the paid or unpaid areas, to prevent track crossing, and to prevent accidental trespass onto danger areas. They are a less emphatic barrier than fences, and are intended simply to serve notice of forbidden access, not to physically prevent it.
a. The following fence constructions are approved by use, both in low (3'-2'') and high (6'-10'' or to ceiling) types.
   1. Steel picket
   2. Others subject to approval by Authority

b. Low fencing at or near the fare collection line should incorporate a 9'' deep band of stainless steel, set at the same height as the matching band on the turnstiles. Nearby high fencing, if divided horizontally, should have a similar 9'' band, painted with the fence frame, and set at the same 3'-2'' height.

c. One type of fence should be used consistently throughout a station, or area of a station. The Authority will consider other fence constructions provided that the requirements of strength, durability, and maintainability are adequately met, and that the fence material is suitable in scale and transparency. Many spaces within the subway are small, and contorted in plan; therefore additional screens (fencing) set within these spaces should detract as little as possible from clarity of circulation, and ease of maintenance and surveillance.

d. Present fencing is typically of the picket type. In many places, it can be converted by installing a 9'' metal band, as shown on Sheet C-6.3.

e. Parapets or external railings of overhead walkways, balconies, or open parking garages should be 3'-0'' high with minimum opening of 10''.

f. Where overhead walkways or mezzanine structures cross tracks, barriers or fences must be at least 7'-0'' high. Minimum opening is 6''.

g. Where smoke barriers are required, see IV E1.2, wire glass may be used. Maximum size of individual glazing elements is 9 sq. ft.

FENCE CONSTRUCTION
High Fences

Much of the fencing is not directly related to the fare collection line. These fences can be of the steel picket type with a 9" continuous band relating to established heights.

FENCE - Suggested detail
Existing Picket Fence Modification

Where an extensive amount of wrought iron fence exists, this may be simply painted, or modified and relocated as shown in schematic station design.

FENCE  scale 1/4" = 1'-0"
Guard rails are used to separate low level platforms, closures beneath stairs, restricted areas.

**GUARD RAILS** - Suggested detail
Guard rails Between Walls

a. Between walls or columns
b. Section at wall
c. Elevation at wall
d. Cross section

GUARD RAILS - suggested detail
Public Convenience Facilities

This section covers all components that are generally considered to be "public convenience facilities". There are essentially two types of facilities:

a. Station furnishings which are provided and maintained by the Authority.

b. Commercial facilities, which may or may not be provided by the Authority, but which are operated and maintained by a concessionaire.

Station furnishings will be provided at every station for the use of waiting passengers. Commercial facilities will be located within stations only after market analysis by the Authority.

Commercial facilities should be planned adjacent to the traffic flow, but with sufficient space for people to move out of active circulation. They should never be permitted to interfere with the normal flow of circulation even at rush hour, nor with information graphics, and should never occur on platforms in positions where they might interfere with circulation to and from trains.

Platform components have been selected and/or designed to relate vertically to other elements, especially on platform sidewalls, and where such components occur, the design of platform sidewalks (e.g. the location of the station identity band) should be modified to accommodate them.

Refer to Part IX: Service Facilities, for public toilets.
Wall-mounted laminated wood benches are the preferred type. Cantilever support facilitates cleaning, but requires secure anchorage into a concrete wall.

Benches should be located, in general, only at platform level, and concentrated where trains normally stop during all hours.
Existing concrete wall
Existing furred wall
Bench: Laminated Northern Hard Maple with 1/2" radius all edges
Bracket from 6" x 3" x 1/2" L
with 1/2" x 6" x 6" end plate, 4 M.B. into expansion shields, brackets hot dip galvanized
fasten brackets to exist. concrete.
Flooring base height varies with platform slope

Installation Detail
natural finish, heavy duty varnish

BENCHES scale 1 1/2" = 1'-0"
Heavy Timber Bench

Used in areas exposed to rainfall. When long continuous bench is used, timber joints should be staggered.

*On sloping sites, or where many benches are available, height may be varied.

**BENCHES** Scale 1/2" = 1'-0"
Suggested detail
Sign conceals junction box. Wiring exposed in one straight run, or preferably concealed behind finish.

At Platform Area

Sign 8'-6" Preferred

At low headroom area

Sign 7'-5" Minimum

Signs generally give directions to exits, or to connections with other lines. In some cases signs will have two sets of copy to be turned on and off as desired circulation may vary during the day. For such signs, switch wiring should be concealed, with key-operated switches located in service rooms.

For colors and lettering, see Part V, Graphics.

INTERNALLY-ILLUMINATED SIGNS
Station Interior
BERKELEY ST. EXIT

Black paint on one tube at overlap

Overlap lamp vertically by minimum practicable distance

Longitudinal Section - at lapped lamps, where sign length does not accommodate standard lamp lengths.

10"

\( \frac{1}{4} \)" clear acrylic plastic sign face for full length of sign, masked and painted on inside surface. Lettering black, background white.

800 ma. lamp

Ballast

Structure as required

Black aluminum

Transverse Section

Both single faced and double faced (as shown) signs may be required. For lettering and layout measurements see Part V, Graphics Manual.

Sign Exterior is schematic only. In dimensions and appearance this sign is a standard component with no variation permitted.

Internally-Illuminated Signs
Black paint on one tube at overlap

Overlap lamp vertically by minimum practicable distance

Longitudinal Section - at lapped lamps, where sign length does not accommodate standard lamp lengths.

1" clear acrylic plastic sign face for full length of sign, masked and painted on inside surface. Lettering white, background black.

800 ma. lamp

Ballast

Structure as required

Black aluminum

Transverse Section

Both single faced and double faced (as shown) signs may be required. For lettering and layout requirements see Part V, Graphics Manual.

Sign interior is schematic only. In dimensions and appearance this sign is a standard component with no variation permitted.

Internally-Illuminated Signs
Design Criteria

Commercial Facilities occur in many stations. They generally consist of the following:

a. Newsstands
b. Lockers (Coin-operated)
c. Public telephones

Other commercial enterprises, or concessions, occur in certain stations but are not typical. The inclusion of such enterprises within stations is desirable, provided that adequate space is available, that the proposed enterprise is suitable in terms of appearance, clientele, and function to a station, and that the identity of MBTA elements is in no way impaired. Inclusion of new or different enterprises will depend on a market analysis by the Authority and on the availability of interested concessionaires.
Newsstands

a. The number and location of newsstands will vary. Smaller stations may have only newsboys or coin operated racks; larger stations may require several newsstands, both inside and outside the paid area.

b. Most newsstands sell magazines, newspapers, candy, tobacco, and similar items. The area required varies considerably.

c. Newsstands must be specially designed, or modernized, for each different installation. The design intention is that they be compact, without clutter or fussiness, and constructed of black metal and stainless steel, as are most other components. Where newsstands can be built in, they should utilize the adjacent wall materials, and be designed to fit with the other wall elements.

d. Since most newsstands operate only during rush hours, a system of demountable or sliding security panels must be provided for closing during non-operating hours.

e. Newsstands should be highly illuminated, and include an electric heater.

f. Newsstand graphics, see Part V, Graphics. The 9" fascia band will incorporate an illuminated sign, to match similar sign situations in other components.

g. Design and location of newsstands must be carried out in collaboration with the Concessionaire and the MBTA Planning Dept.

COMMERCIAL FACILITIES
Newsstands

COMMERCIAL FACILITIES
Suggested Design
Telephone Booths

Design Criteria

a. Use of wall-mounted telephones in the subway system is currently discouraged. Glazed booths, without shelves or seats, are recommended. These may be freestanding, mounted against a wall or recessed.

b. Booths should be located where they will receive maximum public exposure, but not where they will actually interfere with circulation. They must be under continuous observation by Authority personnel, which will mean that in most cases they will occur only in mezzanines, near the fare collection line.

c. Where close to components such as collection booths and exit gates, the telephone booths should receive a black metal cap, which will strengthen them and relate them to the other tall components with similar caps.

d. If possible, booths should serve paid and unpaid areas. Failing that, serving the paid area is preferable.

e. Building-in of booths is desirable. If this is not practicable, they should be located to minimize small, hard to clean spaces behind and between booths.

f. Booth installation and maintenance is by the Telephone Company. Raceways should be provided either in the floor, overhead within lighting fixtures, or within walls, so that exposed wiring is, at most, a simple straight run.
Other Commercial Facilities

Concessions such as bakeries, flower shops, quick-lunch stands, etc. require such different facilities and occur in such a variety of situations that each must be treated as a separate problem, and specially designed, in accordance with the following guidelines.

1. Where more than one concessions (including newsstands) occur in a station, they should be located together for mutual reinforcement.

2. Concessions should be located where they will have maximum exposure to the public, especially to the public while waiting for trains, but should not interfere with station circulation. In many cases this will severely limit their size and shape.

3. Where concessions can be built-in, they should utilize the adjacent wall material, and be designed to fit with the other wall elements. Free-standing concessions should be constructed of the same black metal and stainless steel as are most other non-built-in components, and incorporate the same 9" high fascia.

4. Each concession must have a means of secure closure for non-operating hours. This closure should leave none of the concessionaire's graphics, glass display windows or other materials exposed to view or vandalism when closed. It should, furthermore, minimize the dirty and deserted appearance of a concession not presently rented.

5. The 9" fascia would contain an appropriate sign, back-lighted by the lighting within the concession. This, unlighted, would be the only sign exposed to view when the concession is closed.

6. The concession itself, and its internal graphics should be highly illuminated, during operating hours.

7. All appliances, for cooking, space heating, etc., must be electrical. Location for concessions, and internal subdivisions therein, must take into consideration delivery requirements, waste storage and disposal, as well as the ease of providing water supply and drainage, if required.
List of Items

A number of items dealing with safety, emergencies, and control occur consistently throughout the stations, and may be considered as components. These items are more precisely described in other parts of the Manual. The following list is intended as a brief introduction and referral.

Safety/Emergencies

a. Emergency lighting - required throughout each station. Refer to Part VI.
b. Emergency egress - Refer to this part.
c. Platform edge strip (safety yellow color) - Refer to Part VII. Strip 1'-6" wide. Surface texture must contrast with that of adjacent flooring.
d. Fire Extinguishers - required in electrical rooms. Refer to Part IX.
e. Dry standpipe system with connections at each lobby and platform.
f. Sprinklers and detector heads - not presently in use. Circumstances may require them in special areas.
g. Fire alarms and police call boxes - use as directed by the Authority.
h. ADT alarm - required on safe in primary collection booth. Refer to Part IX.
i. Escalator safety switches - required at top and bottom of escalators. Refer to this Part.
j. "B switch" to disconnect 3rd rail in station area located at leaving end of each platform.
k. Warning and forbidden access signs - Refer to Part V.

Control

a. Television surveillance system - required at some stations Refer to Part IX.

EXPLANATION
b. Paging and announcing system - required in all stations. Refer to Part XIII.

c. Starters call bell system - required in all stations. Refer to Part IX.

d. Emergency exit alarm - required on all emergency exits. Refer to Part IX.

Introduction

Authority facilities are subject to the requirement of the "State Building Code", though the code does not have provisions which apply specifically to rapid transit stations. In order to adequately handle emergencies involving fire and smoke in subway stations, the following criteria have been developed by the Authority in coordination with the Massachusetts Department of Public Safety and will be utilized in the design of new facilities.

Egress Requirement for Subway Stations:

Use of this method will provide egress facilities which will have sufficient capacity to provide safe, fast egress from the station under the worst combination of circumstances.

1) Determine net area of platform in square feet, deducting the space occupied by stairways, escalators, elevators, structure, furnishings, concession or service spaces, and the 1'-6" platform edge safety stripe.

2) Divide the net area of the platform by 3 sq. ft. per person to determine the population to be evacuated.

3) Allow 3 minutes' time to clear the platform.

4) Assume a maximum rate of flow for emergency situations for vertical circulation elements including stairs, escalators, and ramps, of 45 persons per minute per 22 inch (1'-10") egress unit. (Horiz. passage, 60 p.p.m.)

Sample Calculation:

Net area of platform 9000
9000 sq. ft. ÷ 3 sq. ft per person = 3000 people
3000 people ÷ 3 minutes = 1000 persons per minute
1000 persons per minute ÷ 45 persons per minute = 22.2
say 22.5 egress units (at 22 inches)

EXPLANATION
As a shortcut, divide the net area of the platform by 405 to obtain the number of egress units. Note that one half an egress unit must be 12 inches or more in width.

Criteria for Location and Design of Egress Facilities for Subway Station

Vertical and horizontal circulation elements will be designed to meet the requirements of this manual (see Vol. IV Components) and the "State Building Code", as interpreted in this section to apply to subway stations.

1) Maximum distance on a platform to an exit is 150 feet, assuming no sprinkler system. (Thus, the maximum distance between exits equals 300 feet) The track tunnel is not counted as an exit.

2) "Dead end" spaces at the end of a platform exceeding 20 feet in length are not permitted, thus there must be a normal or emergency exit at each end of a platform.

3) End of station emergency exits should be easily accessible to the platform and tunnel but separated from them by walls and doors having a 2-hour rating. Such exits may also connect with lobby areas, but also require a 2-hour rated separation. When emergency exits are combined with vent shafts, they must be separated by a 2-hour rated wall.

4) A station lobby (mezzanine) must have access to the outside of sufficient capacity to handle the emergency flow fed to it from the train platforms.

5) A mezzanine may be open to the platform and trainway if its area is less than one-third of the platform and trainway which it covers. If there are two separate mezzanines, their total area should not exceed one-third of the area covered below.

6) Exits from a lobby (mezzanine) to the outside should be capable of being closed-off at the lobby level to prevent intrusion of smoke in emergency situations. (For security, a means of closing entrances at surface level is also required.) When mezzanines are larger than stated in item 5 above, they must be separated from the platform, preferably with doors at the platform level.

7) Absolute minimum width of an emergency exit stair is two
22 inch egress units or 44" (3'-8") wall to wall. Preferred minimum is 3 egress units or 5'-6", which allows enough space for easy maneuvering of stretchers and other emergency gear. The absolute minimum width of stairs for normal use is 5"-6" wall to wall. Actual width should be designed to meet requirements of peak traffic flow and emergency egress criteria.

8) At all subway stations with connecting underground busways or other vehicular circulation elements, or with connecting passageways to other uses, such as stores or office buildings, a separation between the train platform/lobby complex and these other activities will be provided to prevent intrusion of smoke.

9) All construction of service rooms and concessions within the station complex should meet a 2-hour rating.

Related Mechanical Systems for Subway Stations

Ventilation and fire detection, alarm, and suppression systems are described elsewhere in the Manual (see IX Service Facilities and XI Ventilation), and in the "IRT Handbook for Subway Ventilation". The foregoing criteria for egress assumes that the following facilities or systems are provided:

1) A mechanically operated exhaust system for the station operating independently of that provided in the tunnels. In the train and platform area exhaust inlets should be spaced along the platform so that smoke does not have to be drawn a long distance through an occupied area. At high platform stations (Red, Orange, Blue Line) the preferred location of the exhaust duct is under the platform. At low platform (Green Line) stations other locations are possible. This system will be used for both emergency and normal ventilation and will be both locally and remotely controlled. Exhaust ducts or fans may be required at other locations within the platform and lobby complex.

2) A mechanically operated fresh air supply system for the station is also required. In emergencies it should be able to supply 50 percent more air than the exhaust system can remove, thus pressurizing the occupied space. As in the case of the exhaust system, local and remote control is required.
3) A smoke and fire detection system will be provided in the train tunnel, and in stations. In addition to the trainway, this system should be installed in concession areas, service rooms, and mechanical/electrical rooms where fires could occur. All systems will be tied to the control center.

4) A dry standpipe system will be installed in the train tunnel and in stations, with connections at 100 foot intervals.

5) A fire alarm system connected to the Authority control center and to local fire departments will be provided at all stations.

Egress Requirements for Outdoor Stations:

Stations located in open cut, at grade, or on viaduct structures do not experience the same exposure to fire and smoke hazards that subway stations are subjected to. Therefore, platforms with or without canopy or windbreak structures will be considered to be outdoor areas and not subject to the egress criteria for subways. Enclosed lobbies above or below the track level should be treated as occupied spaces and have egress with sufficient capacity to handle a maximum occupancy at 3 sq. ft. per person spread over the net floor area of the lobby, and a maximum evacuation time of 3 minutes. The platform, being outside, would be considered as a safe area. Lobby spaces in these stations are normally closed off from the platform and outdoor areas for security and weather protection. Smoke and fire detection systems, and a mechanical ventilation system will be provided for the lobby and other enclosed service spaces. At outdoor stations where platform areas are not directly accessible to fire apparatus (for example, due to presence of walls, structures, main line railroad tracks, etc.) a dry standpipe system will be provided.

Exceptions to this Criteria

In situations where severe restraints occur which make it impossible to meet the criteria described in this section, the appeal process may be used.