METRO RAIL PROJECT FARE COLLECTION STUDY

RTD

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FARE COLLECTION STUDY

PRESENTED TO:

BOARD OF DIRECTORS
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

BY:

BOOZ · ALLEN & HAMILTON INC.

DECEMBER 2, 1982

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PURPOSE OF PRESENTATION

TODAY WE WOULD LIKE TO DISCUSS :

- **SCOPE**
- **APPROACH**
- **FINDINGS**
- **CONCLUSIONS**
- **RECOMMENDATIONS**

SCOPE OF STUDY

THE STUDY IS PROCEEDING AS FOLLOWS :

PHASE 1

- REVIEW OF CONCEPTS AND EXISTING SYSTEMS - COMPLETE

- ANALYSIS OF ALTERNATIVES FOR METRO RAIL - THIS PHASE

- SELECTION OF PREFERRED FARE COLLECTION SYSTEM - JANUARY

PHASE 2

- DEVELOPMENT OF OPERATIONAL AND DESIGN CRITERIA - FEBRUARY

- PREPARATION OF SPECIFICATIONS, DESIGNS AND DRAWINGS (KAISER ENGINEERS) - MARCH

ALTERNATIVES ANALYSIS

OUR APPROACH TO THE ALTERNATIVES ANALYSIS HAS BEEN TO :

- INDENTIFY THE OBJECTIVES
- DEVELOP SYSTEM ALTERNATIVES FROM PROVEN TECHNOLOGY
- ANALYZE AND EVALUATE THE ALTERNATIVES

ONCE THE PREFERRED ALTERNATIVES IS SELECTED, DESIGN OPTIONS WILL BE EXAMINED FURTHER FOR SYSTEM REFINEMENT

OBJECTIVES OF THE SYSTEM

- A FARE COLLECTION SYSTEM MUST ENSURE THAT PATRONS PAY THE PROPER FARE FOR THEIR TRIP

- FOR RTD, IT SHOULD ALSO PROVIDE THE MAXIMUM FLEXIBILITY PRACTICAL TO SET AND ADJUST THE FARE STRUCTURE

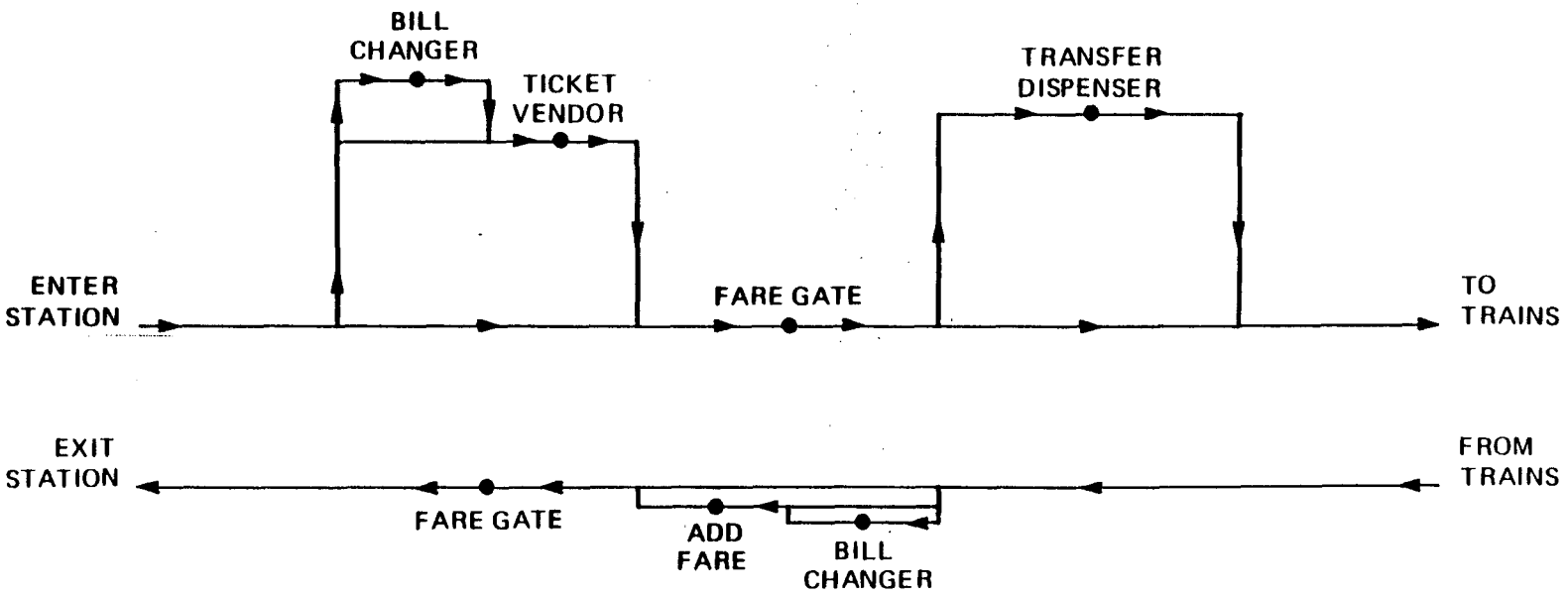
  - FUTURE UNCERTAINTIES MAKE IT INADVISABLE TO SELECT A SYSTEM THAT WOULD "LOCK IN" A SPECIFIC FARE STRUCTURE
  - RECENT EXPERIENCE IS INDICATIVE OF FUTURE FINANCIAL PRESSURES
  - THE PHYSICAL CAPABILITIES OF THE FARE COLLECTION SYSTEM SHOULD NOT UNDULY INFLUENCE RTD FARE POLICY DECISIONS

OBJECTIVES OF THE SYSTEM

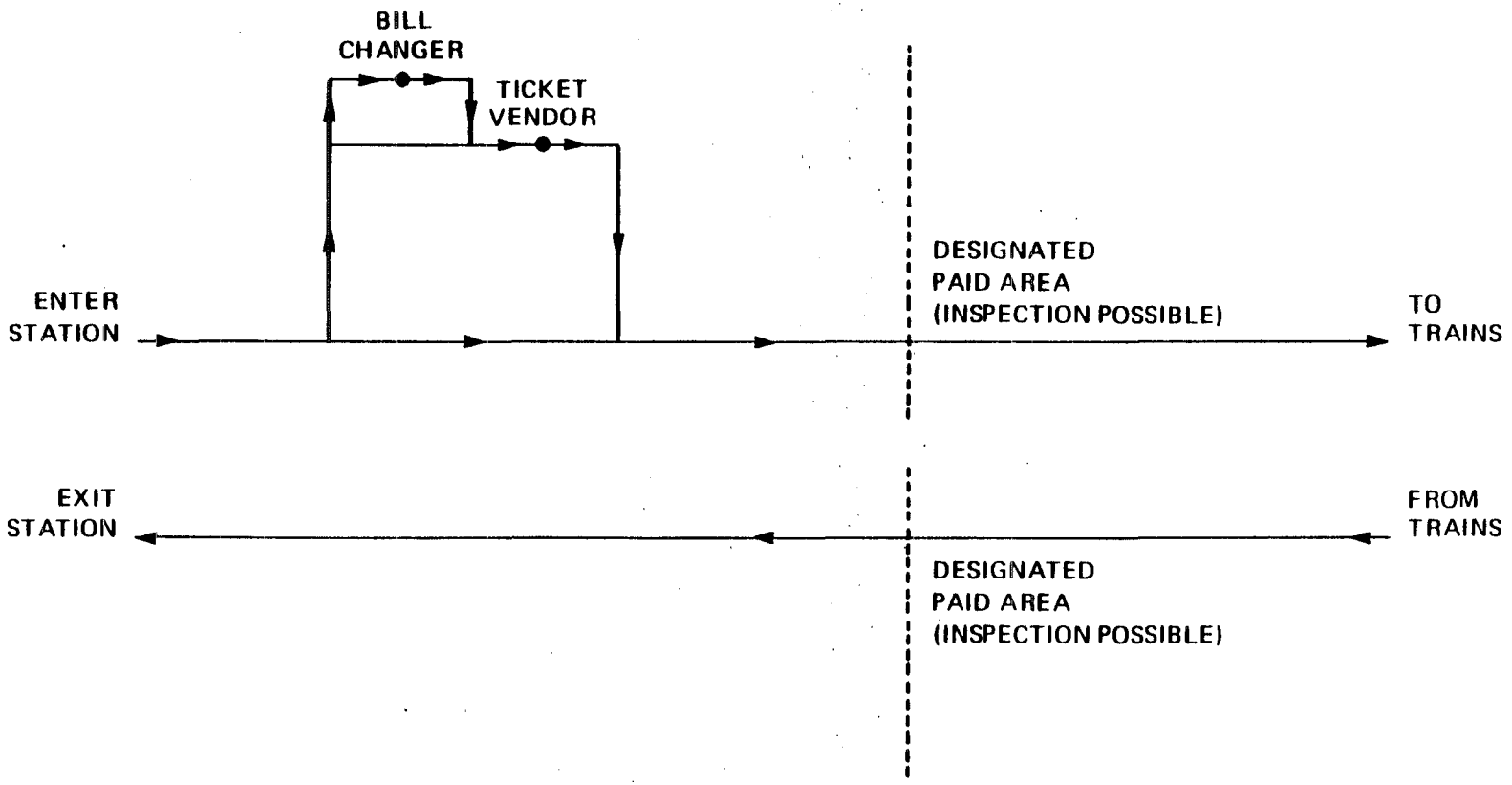
FARE POLICY ELEMENTS REGARDED AS IMPORTANT TO PROVIDE FLEXIBILITY INCLUDE THE FOLLOWING CAPABILITIES :

- GRADUATED-FARE STRUCTURE
- INTERMODAL TRANSFERRING AMONG METRORAIL, BUS AND POSSIBLE FUTURE LIGHT RAIL
- REGULAR, ELDERLY/HANDICAPPED, STUDENT OR OTHER SPECIAL FARES
- SINGLE-TRIP, MONTHLY OR BIWEEKLY OR MULTITRIP FARES
- PEAK/OFF-PEAK PRICING STRATEGY
- TIME-OF-USE RESTRICTIONS ON REDUCED - FARE TICKETS

BARRIER SYSTEM PASSENGER FLOW CHART

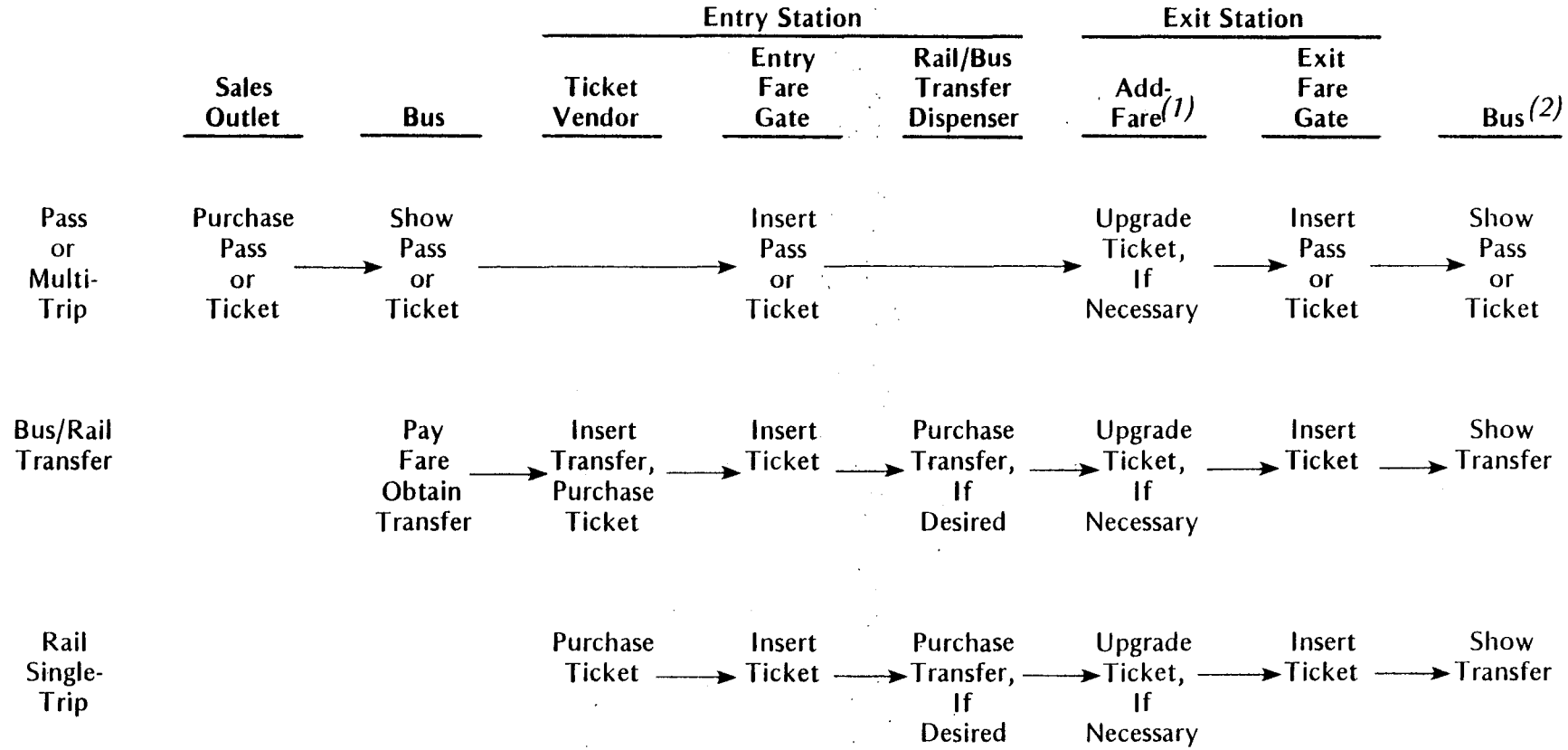


BARRIER - FREE SYSTEM PASSENGER FLOW CHART



DETAILED PASSENGER PROCEDURES

Automatic Barrier System:

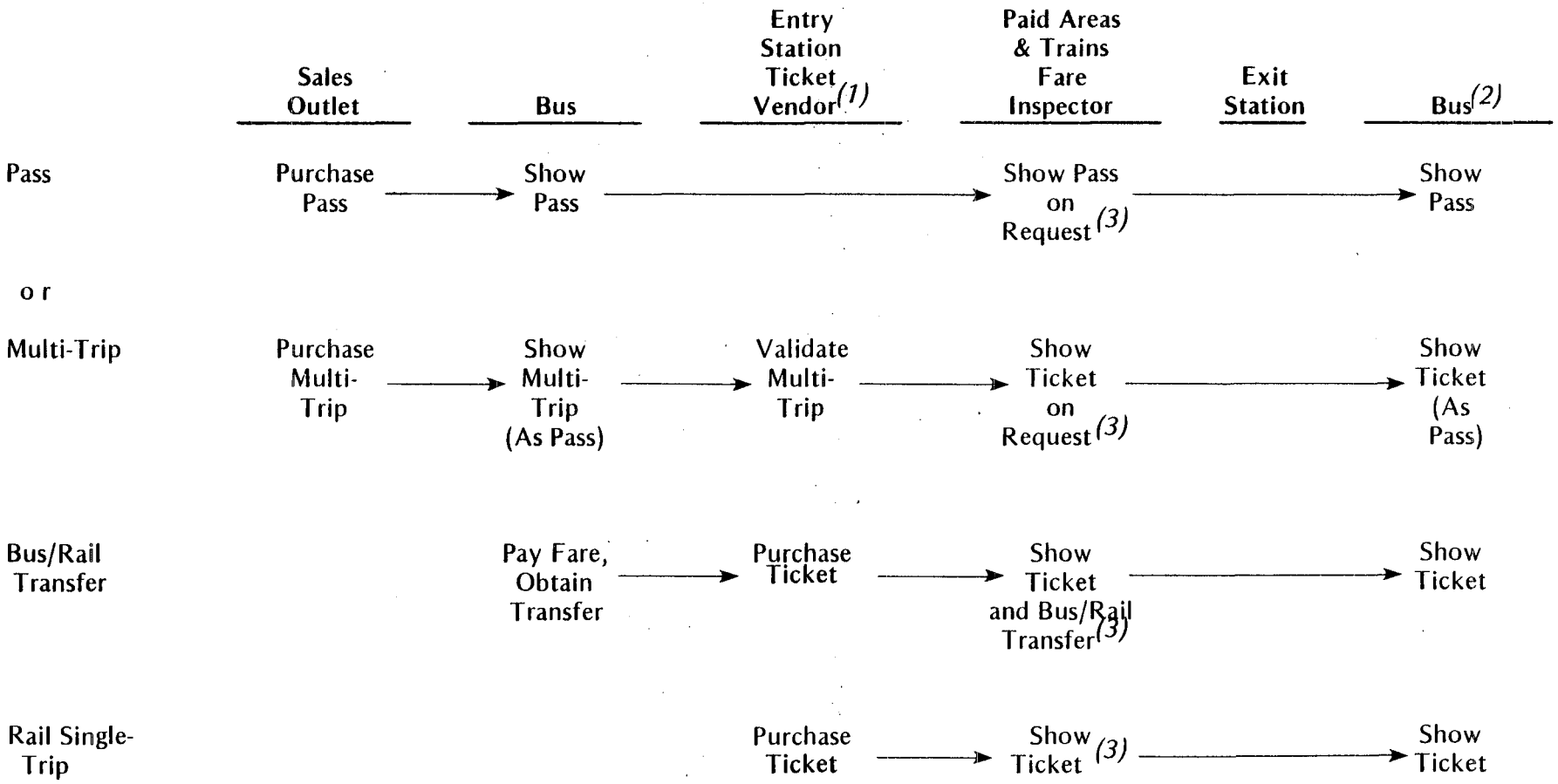


(1) Change dollar bills at Bill Changer.
(2) Rail/bus transfer option.

DETAILED PASSENGER PROCEDURES

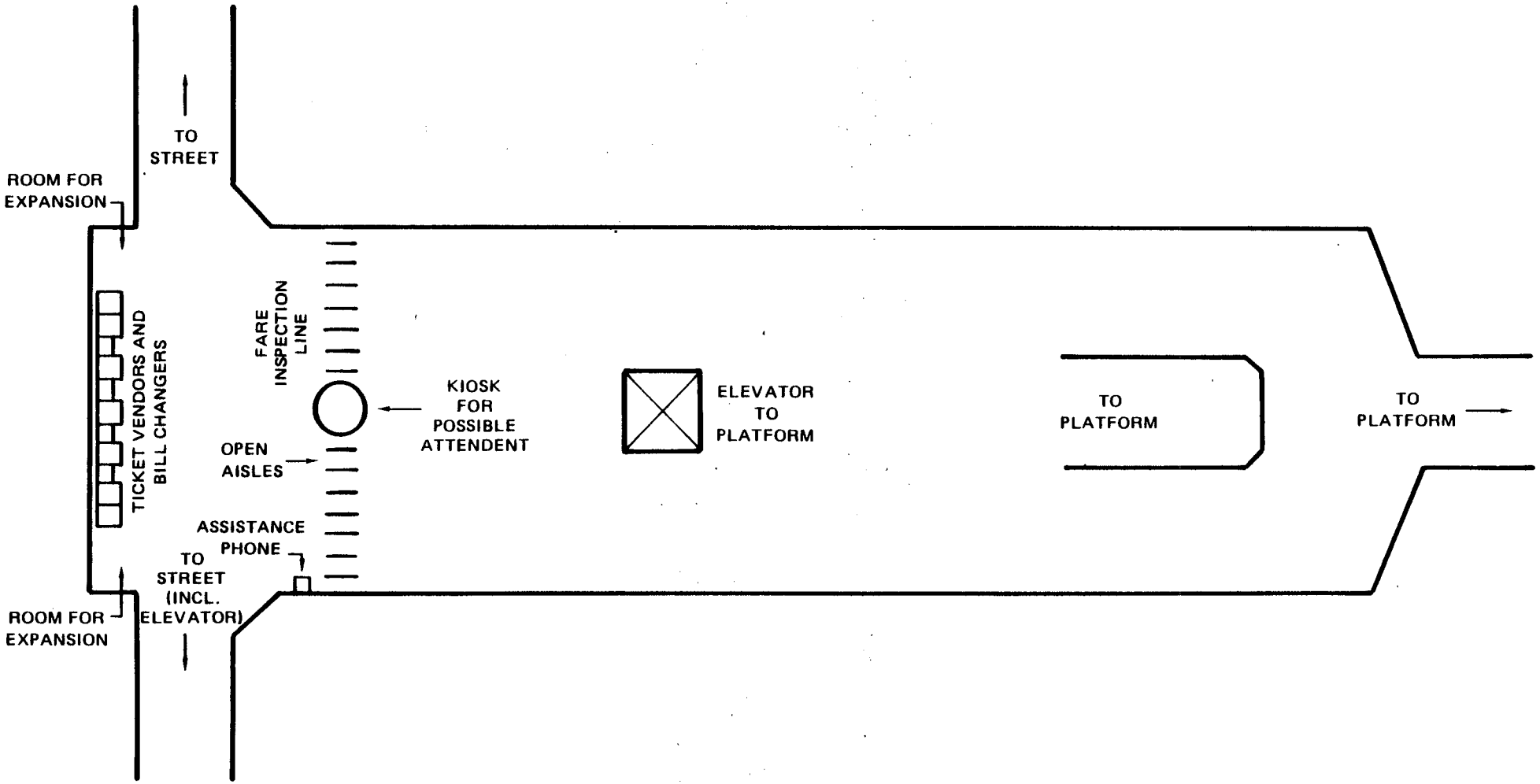
Barrier - Free System:

(Self - Service)

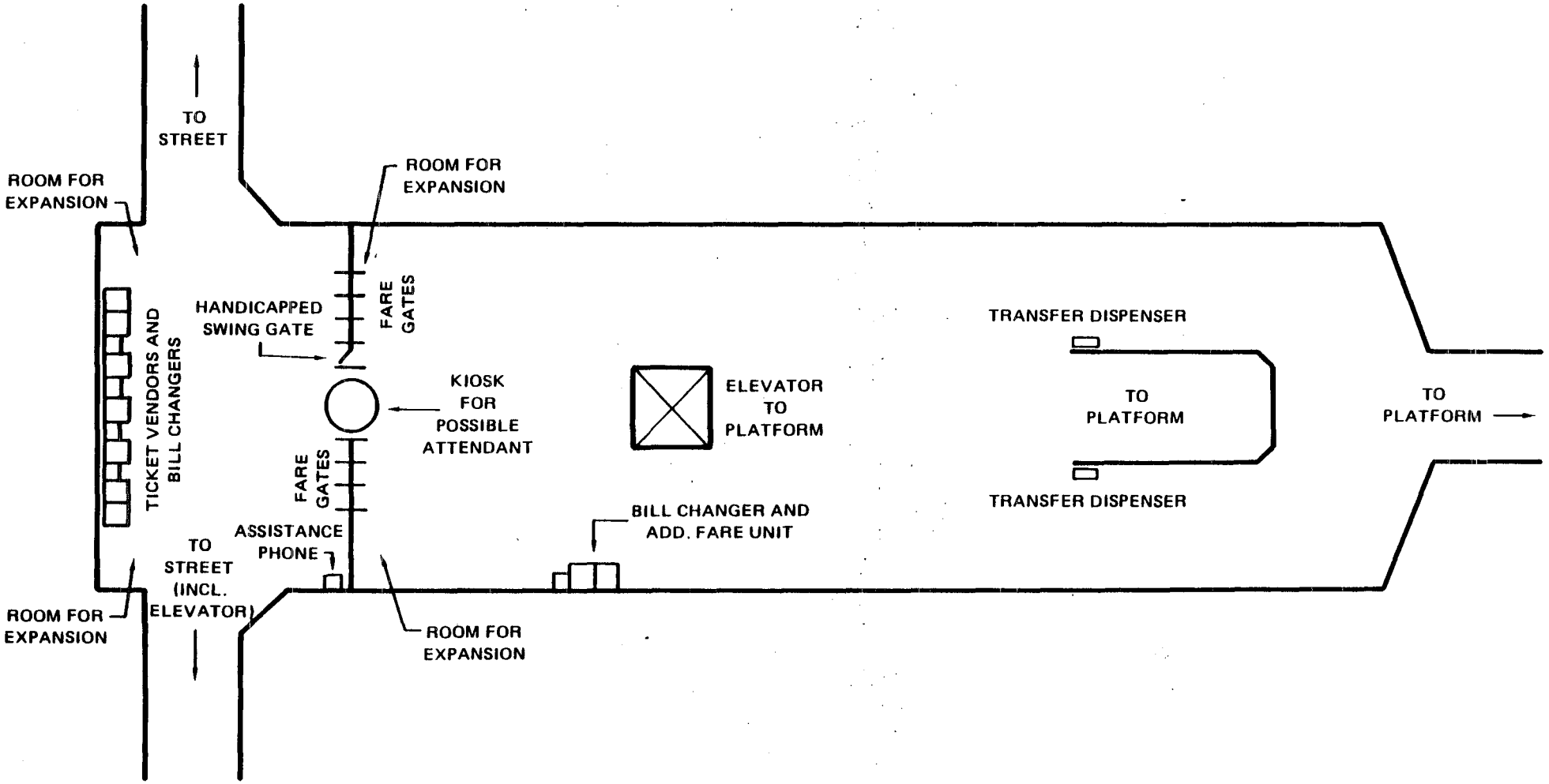


(1) Change dollar bills in bill changer.
(2) Rail/bus transfer option.
(3) If reduced fare, show proper ID.

SELF - SERVICE, BARRIER - FREE SYSTEM
TYPICAL STATION LAYOUT



AUTOMATIC BARRIER SYSTEM
TYPICAL STATION LAYOUT



SYSTEM ALTERNATIVES

SYSTEM REQUIREMENTS

AUTOMATIC-BARRIER

- MACHINE READABLE/ENCODABLE TICKETS, PASSES, TRANSFERS
- EQUIPMENT INCLUDES * :
  - TICKET VENDORS (146)
  - FARE GATES (190)
  - ADD-FARE MACHINES (48)
  - TRANSFER DISPENSERS (47)
  - BILL CHANGERS (93)
  - HIGH-SPEED ENCODERS (3)
  - CENTRAL AND LOCAL CONTROL EQUIPMENT

BARRIER-FREE

- PRINTED TICKETS, PASSES, TRANSFERS
- EQUIPMENT INCLUDES * :
  - TICKET VENDORS (165)
  - BILL CHANGERS (81)
  - CENTRAL CONTROL EQUIPMENT

* Equipment Requirements Developed Assuming 16 Stations and Daily Ridership of 309,000

EVALUATION CRITERIA

- SYSTEM FLEXIBILITY
- SYSTEM COST
- FARE ENFORCEMENT
- ADMINISTRATIVE REQUIREMENTS
- PASSENGER CONVENIENCE
- SYSTEM RELIABILITY

EVALUATION OF ALTERNATIVES

ANTICIPATED COSTS OF EACH SYSTEM : (1995 REQUIREMENTS IN 1982 DOLLARS)

	BARRIER	BARRIER-FREE
CAPITAL	$18.2 Million	$7.1 Million
O&M	$ 4.9-5.5 Million	$ 4.4-5.2 Million
LIFE CYCLE	$ 7.3-7.8 Million	$ 5.3-6.1 Million

ANNUAL OPERATING AND MAINTENANCE COST ESTIMATE
BARRIER-FREE SYSTEM
(1982 DOLLARS)

Item	Quantity	Unit Cost	Total Cost
Labor Requirements			
. Field Technicians	15	$ 34,000	$ 510,000
. Shop Technicians	3	40,800	122,400
. Equipment Servicers	4	34,000	136,000
. Supervisors, Maintenance	3	40,400	121,200
. Revenue Servicers	3	28,700	86,100
. Transit Police	8	30,500	244,000
. Fare Inspectors	39	27,700	1,080,300
. Supervisors, Inspectors	4	30,500	122,000
. Bill Handling Clerks	12	28,700	344,000
. Revenue Clerks	8	28,700	229,600
. Revenue Supervisors	3	31,600	94,800
Overhead Burden		25%	772,600
Materials and Supplies			
. Ticket Supply	—	151,500	151,500
. Parts and Miscellaneous	—	117,800	117,800
Contingency	—	15%	619,900
Total			$4,752,200

OPERATING AND MAINTENANCE COST VARIATIONS
(1982 DOLLARS)

Barrier System		
Anticipated O&M Cost	$5,340,000	
Best Reliability Estimate	(425,000)	
Lower Cost Range		$4,915,000
Anticipated O&M Cost	$5,340,000	
Worst Reliability Estimate	106,000	
Upper Cost Range		$5,446,000
Barrier-Free System		
Anticipated O&M Cost	$4,752,200	
Best Reliability Estimate	(127,452)	
Lower Evasion Rate (4%)	(276,648)	
Lower Cost Range		$4,348,100
Anticipated O&M Cost	$4,752,200	
Worst Reliability Estimate	81,000	
Increased Inspection Rate (9%)	359,600	
Upper Cost Range		$5,192,800

BARRIER SYSTEM LIFE-CYCLE COST RANGE
(1982 DOLLARS)

Lower Range

Annualized Capital Cost Estimate:	
$18,220,000 * 0.133879 = (12%, 20 yrs.)	$2,439,275
Present Value of Salvage Value:	
($18,220,000 * 0.05) * 0.103667 =	$ 94,441
Annual O&M Costs:	$4,915,000
Life-Cycle Cost Estimate:	$7,259,834

Upper Range

Annualized Capital Cost Equivalent:	
$18,220,000 * 0.133879 =	$2,439,275
Present Value of Salvage Value:	
($18,220,000 * 0.05) * 0.103667 =	$ 94,441
Annual O&M Costs:	$5,446,000
Life-Cycle Cost Estimate:	$7,790,834

BARRIER-FREE SYSTEM LIFE-CYCLE COST RANGE

Lower Range

Annualized Capital Cost Estimate:

(7,092,500 * 0.133879 = $ 949,537

Present Value of Salvage Value:

($7,092,500 * 0.05) * 0.103667 = $ 36,763

Annual O&M Costs: $4,348,100

Life-Cycle Cost Estimate: $5,260,874

Upper Range

Annualized Capital Cost Equivalent:

$7,092,500 * 0.133879 = $ 949,537

Present Value of Salvage Value:

($7,092,500 * 0.05) * 0.103667 = $ 36,763

Annual O&M Costs: $5,192,800

Life-Cycle Cost Estimate: $6,105,574

EVALUATION OF ALTERNATIVES

	BARRIER	BARRIER-FREE	CONCLUSION
SYSTEM FLEXIBILITY	HIGH	HIGH	BOTH PERFORM WELL
SYSTEM COST (LIFE CYCLE)	$7.3-7.8 million	$5.3-6.1 million	WHILE BARRIER IS HIGH, THE DIFFERENCE SHOULD NOT DICTATE SELECTION
FARE ENFORCEMENT	ALL PATRONS INSPECTED	SMALL PERCENTAGE OF PATRONS INSPECTED-- LEGAL COMPLICATIONS	BARRIER IS SUPERIOR
ADMINISTRATIVE REQUIREMENTS	ADDITIONAL MEDIA-HANDLING REQUIREMENTS	ADDITIONAL EVASION-RELATED REQUIREMENTS	BOTH SYSTEMS HAVE SIMILAR DISADVANTAGES
PASSENGER CONVENIENCE	2-6 STEPS	0-3 STEPS	BARRIER-FREE PERFORMS BETTER
SYSTEM RELIABILITY	200-800 PATRON TRIPS PER FAILURE	500-2000 PATRON TRIPS PER FAILURE	BARRIER IS GOOD; BARRIER-FREE IS BETTER

CONCLUSIONS

- THE AUTOMATIC BARRIER SYSTEM OFFERS A MORE TRADITIONAL APPROACH TO FARE COLLECTION
  - PROVEN EXPERIENCE
  - PROVIDES FLEXIBILITY
  - MINIMIZES EVASION
  - ADMINISTRATIVE EASE
  - GREATER CONTROL
- THE AUTOMATIC BARRIER SYSTEM HAS SEVERAL DISADVANTAGES AS WELL
  - SOMEWHAT HIGHER COST
  - LOWER CONVENIENCE

CONCLUSIONS

- BARRIER-FREE HAS SOME ADVANTAGES OVER BARRIER
  - MORE CONVENIENT
  - SOMEWHAT LOWER COST
  - BETTER RELIABILITY
- THE LACK OF SUFFICIENT EXPERIENCE WITH BARRIER-FREE FARE COLLECTION IN A MAJOR METROPOLITAN AREA IS A KEY CONCERN
  - LACK OF EXPERIENCE
  - FARE ENFORCEMENT AND EVASION
  - JUDICIAL REQUIREMENTS
  - REVENUE RECOVERY
  - SOCIAL ACCEPTABILITY

RECOMMENDATIONS

- DESIGN SYSTEM TO ACCOMMODATE AUTOMATIC BARRIER SYSTEM
- DEVELOP OPERATIONAL AND DESIGN CRITERIA FOR BARRIER SYSTEM
- CONTINUE TO MONITOR EXPERIENCE WITH BARRIER-FREE FARE COLLECTION ON OTHER NORTH AMERICAN SYSTEMS