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SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

Metro Rail Project

Procurement Specifications Book Contract No. A660

FARE COLLECTION

MAY, 1986

INDUSTRY REVIEW DRAFT

GENERAL CONSULTANT:

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

FARE COLLECTION
INDUSTRY REVIEW DRAFT PROCUREMENT SPECIFICATIONS BOOK

CONTRACT A660

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Prepared by
METRO RAIL TRANSIT CONSULTANTS
Systems Design Division
May 1986

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

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LETTER TO PROSPECTIVE CONTRACTORS

The Southern California Rapid Transit District (District) will receive proposals for the fare collection system for the Metro Rail Project.

The District has scheduled a Preproposal Conference at which the scope of the Work and the requirements of the Proposal will be discussed. The Conference will be held at _____ local time on _____, 198_, in the District's Board Room on the 2nd floor of the SCRTD Administration Building, 425 South Main Street, Los Angeles, California 90013. Interested parties are invited and encouraged to attend.

The District will receive proposals until 2:00 P.M. local time on _____, 198_. Proposals shall be addressed to:

MR. THURMOND JOHNSON, ASSISTANT DIRECTOR
OFFICE OF CONTRACTS, PROCUREMENT AND MATERIEL
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
124 WEST FOURTH STREET, 4TH FLOOR
LOS ANGELES, CALIFORNIA 90013

Proposals will only be considered if received in District hands by the deadline prescribed above. Proposals shall be submitted in accordance with, and subject to, the conditions contained in the Request for Technical Proposal. Only those proposers having a proposal evaluated as being acceptable in all respects will be invited to submit a price bid for the Contract. The District will finance the Contract in part by means of a grant from the United States Department of Transportation, Urban Mass Transportation Administration (UMTA). The bidding procedures, evaluation of bids, and award of the Contract shall be governed by both applicable California law and the federal law and regulations applicable to grants to state and local governments.

Proposal Documents may be examined in the Plan Room at the SCRTD Administration Building, 425 South Main Street, Los Angeles, California 90013, and at certain public and private plan rooms. Copies of the documents may be either requested in person or by mail addressed to the Director, Office of Contracts, Procurement and Materiel at the 124 West Fourth Street address. One copy of each document will be required to prepare a proposal. Documents

requested by mail will be packaged and sent postage prepaid. Requests must be accompanied by a certified check, cashier's check, or postal money order drawn in favor of the Southern California Rapid Transit District. Monies paid for Proposal Documents will be nonrefundable.

The following is a list of the available Proposal Documents and their respective costs:

One set of Proposal Documents, Forms For Bidding, Specifications, and half-size Contract Drawings ---------- $100.00

Insurance Specifications ---------- No Charge

SCRTD 5-001 Guidelines for Preparation of Safety and System Analyses ---------- No Charge

Construction Safety and Security Manual ---------- No Charge

Additionally, a selected set of detail drawings of MOS-1 stations containing all information required for Fare Collection Installation will be available for examination at the Plan Room, or may be purchased in half- or full-size:

One set of half-size drawings of MOS-1 Stations ---------- $20.00

One set of full-size drawings of MOS-1 Stations ---------- $60.00

Dated at Los Angeles, California, this ____ day of _____, 198_.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

Thurmond Johnson
Assistant Director, Office of Contracts,
Procurement and Materiel

END OF LETTER TO PROSPECTIVE CONTRACTORS

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

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INFORMATION FOR PROPOSERS

Contract Scope

The Southern California Rapid Transit District (District) is requesting proposals, fully compliant with the Request for Technical Proposal (RFTP), for supply and installation of the fare collection system for use on the Minimum Operational Segment (MOS-1) of the Metro Rail Project. Additionally, the scope of work shall include option(s) to purchase additional fare collection equipment for use on the MOS-1 or other operating segments. The District desires to purchase a fare collection system of a design fully proven in rail transit passenger service, modified only as necessary to meet the requirements of the Technical Provisions.

The following sections provide general information to the proposers regarding this RFTP.

Contract Type

The fare collection system will be procured under a firm fixed-price contract. The Contract will contain the standard articles for a firm fixed-price contract as delineated in the Special Provisions, General Provisions, and Technical Provisions contained in this RFTP. The Proposal, as modified during the technical evaluation, will become one of the Contract Documents. The Contract will include Buy America provisions, Affirmative Action provisions, and contractual pricing, data, and audit requirements which follow UMTA procedures and guidelines now in effect on rail transit projects.

Two-step Procurement Process

The District will award the Contract under a two-step formal advertising procurement process. The first step includes District receipt and evaluation of proposals submitted by prospective prime contractors, and determination of acceptable proposals by the District. The second step includes issuance of Invitations to Bid to qualified proposers whose proposals were determined to be acceptable, submittal of bids by those proposers, evaluation of the bids by the District, and subsequent execution of the Contract.

Step One - Requirements

Proposers are required to follow the guidelines detailed in these instructions in order to facilitate timely review of all proposals by the District.

The Proposer shall submit a proposal that is responsive and fully compliant in all respects with the requirements of the RFTP. Proposals will be received and evaluated only from firms or joint ventures who will serve as sole or prime contractor for the design, manufacture, furnish, install, test, and support of the fare collection system as defined in the Contract Documents.

Firms submitting proposals must propose to assume full responsibility to the District for the execution of the Work. Proposers must demonstrate experience in the engineering, management, and execution of major transit fare collection projects.

Explanations

Prospective proposers who wish explanations or clarifications of the RFTP documents, or of these instructions or other procurement procedures, must submit their inquires in writing to:

DIRECTOR, OFFICE OF CONTRACTS, PROCUREMENT AND MATERIEL
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
124 WEST FOURTH STREET, 4TH FLOOR
LOS ANGELES, CALIFORNIA 90013

Any such request shall identify the particular portion of the RFTP documents affected.

Any response that the District may choose to make will be by a written addendum to the RFTP. The District will not be bound by information, explanation, clarifications, and oral or written interpretation, by whomsoever made, that is not incorporated into an addendum to the RFTP. Addenda will be issued by the District to all prospective proposers who have obtained copies of the RFTP from the District.

Changes to the RFTP

The District may make such changes to the RFTP during the proposal evaluation period as it deems appropriate. All changes in the RFTP will be made by written addenda which will be sent to all prospective proposers who obtained the RFTP documents from the District offices.

Any prospective proposer may request a change to the RFTP. Any such request shall be in writing, shall identify the particular proposal documents affected, shall contain the specific language requested to effect the change, and shall contain a statement of

justification which establishes the advantage to the District to make the change. The District has sole right to accept or reject the requested change. If it is accepted, it will be implemented by an addendum to the RFTP.

Supplements to the Proposal

Proposers may submit for consideration, alternate designs that may not be fully compliant with the Technical Provisions. The alternate shall be presented as a supplement to the Proposal. To be considered, the alternate must accomplish the basic intent of the Technical Provisions without adverse effect on overall performance of the Metro Rail System.

Supplements shall clearly define the difference with the Proposal and shall contain a statement as to the advantage accruing to the District from the alternate design. For each alternate design included for consideration, clear instructions are required to show changes to be made to the Proposal if the alternate is selected for incorporation.

If a proposed alternate design does not fully meet the requirements of the Technical Provisions, the Proposer shall include in the supplement, the specific wording changes needed in the Technical Provisions to allow the alternate design to conform. The District has the sole right to accept or reject the supplement. Any accepted changes to the Technical Provisions will be implemented as addenda.

Codes and Standards

Substitute codes and standards shall not be used unless approved by the District. Proposals for substitutions shall include a paragraph-by-paragraph comparison with the specified document, an explanation of differences, and a rationale for making a substitution. All such proposals shall be in the English language. Unless the Proposal clearly indicates that proposer is offering a substitute code or standard, the Proposal shall be considered as adhering to the codes and standards referenced in the Specifications.

Evaluation of Technical Proposal

Prior to detailed technical assessment of the Proposal, a preliminary evaluation will be made to determine whether proposers have the basic qualifications, including comparable experience and technical competence, and have available to them the organizational structure, personnel, and resources to undertake a project of the size, scope, and complexity defined in the Contract Documents. Proposals which are determined to be so deficient and nonresponsive to the requirements of the RFTP as to remove them from further consideration will be rejected as unacceptable.

Proposals not rejected will be further reviewed and evaluated by the District to accomplish the following objectives:

A. Assure that the proposed fare collection system meets all requirements of the Technical Provisions and is fully compliant with the RFTP. Each qualified proposer will have an opportunity to make a presentation of its proposal to the District. At that time, the District will attempt to assure that the Proposer fully understands all requirements of the procurement, and has proposed a fare collection system that conforms thereto.

B. Determine what changes, if any, should be made to the requirements of the Special Provisions, General Provisions, and Technical Provisions in order to obtain lower prices or greater utilization of reliable, proven equipment. If changes to the requirements are determined to be beneficial, addenda to the RFTP will be issued to allow all proposers to modify their proposals before final determination of acceptability of proposals are made.

C. Assure, by thorough evaluation and discussions of the management aspects of each proposal, that the Proposer has personnel, facilities, experience, and plans for the project that will enable successful completion of the Work if the Contract is awarded to it.

During this evaluation period, proposers will be given the opportunity to modify their proposals, if necessary, to make them acceptable to the District.

Final determination of acceptability of proposals will be made by the District on the information contained in the initial written proposal and subsequent written modifications. Final acceptability of a proposal will be based upon the District's satisfaction that:

1. The proposed fare collection system meets the technical requirements of the Technical Provisions and is fully compliant with the RFTP. The extent to which proposers offer proven systems and equipment is a significant factor in this evaluation.

2. The Proposer has plant, equipment, personnel, and facilities available to perform the Work specified by the Contract, and to furnish, install, and test the fare collection system within the schedule given in the Special Provisions.

3. The Proposer has a satisfactory record of past performance on similar rail transit projects.

The District's determination of acceptability will be final.

Step Two - Requirements

Each proposer will be notified in writing whether its proposal has been determined to be acceptable or unacceptable. Only those proposers having acceptable proposals will be issued Invitations to Bid inviting them to submit sealed, competitive bids to the District in accordance therewith.

Bid

Bids will be received from preapproved bidders up to the date and time specified in the Invitation to Bid. The bids will be publicly opened at the time and place specified in the Invitation to Bid.

Bid Award

The Bid will be awarded to the responsive and responsible Bidder who has the lowest Bid Total as identified in the Bid Forms. The lowest Bid Total will be based upon the total price for the supply and installation of the fare collection system for use on the MOS-1 segment of the Metro Rail Project.

END OF INFORMATION FOR PROPOSERS

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

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REQUIREMENTS FOR TECHNICAL PROPOSAL

The Proposal shall contain concise written material and drawings that enable a clear understanding and evaluation of both the capabilities of the Proposer, as well as the hardware, software, and subsystems of the fare collection equipment being proposed. Elaborate format is not necessary. Legibility, clarity, and completeness of the technical approach are essential. Do not provide promotional or advertising information.

Five copies of the Proposal are required. The Proposal should consist of not more than 300 8½- by 11-inch pages of text, plus drawings, graphs, and tables as needed to clearly describe the supply and performance. The proposal should consist of two separately bound volumes of text plus attachments. A Technical Volume should contain approximately 225 pages of text and cover the material required by sections 2 through 16, 18, and 20 of the Requirements For Technical Proposal. A Management Volume should contain approximately 75 pages of text and provide information required in sections 17, 19, and 21 of the Requirements. Proposals shall be written in the English language. Dimensions shall be in the U.S. inch-pound system.

THE TECHNICAL PROPOSAL MUST NOT CONTAIN
ANY REFERENCE TO PRICE OR COST

The Proposal shall specify the name of the subcontractors and suppliers for the major subsystems and equipments. The Proposal shall clearly describe the role of the Proposer and detail the interfaces with all potential subcontractors.

The Proposer may not wish to commit to a specific subcontractor's equipment, but instead, offer alternatives from other suppliers. The Proposer must furnish the required information for each supplier's equipment. Descriptions for alternate equipment may be contained in enclosures to the Proposal. Limit to three the number of possible suppliers for any particular equipment or subsystem.

1.0 GENERAL INSTRUCTIONS

1.1 Contents

The following subjects should be covered in the Proposal:

A. Technical description of fare collection equipment

B. Management approach to the Work
C. Qualifications of firms

D. Qualifications of personnel

E. Appendixes and supplements.

The specific information required is specified in sections 2.0 through 21.0 of these Requirements For Technical Proposal.

1.2 Submittal Instructions

The Proposer shall provide detailed information as specified in sections 2.0 through 21.0. As a minimum, the Proposal must address all specific requirements identified therein. The topic and numbering system of the Proposal shall correspond to that of the following sections, which also correspond with the same numbered sections of the Technical Provisions. The Proposer shall include sufficient information to permit a thorough understanding of its offering without the need for additional information or discussion. Do not repeat the requirement from the specification unless it is done as part of an elaboration. Where the Proposal is silent on requirements, the District will assume the requirements will be met and will look to the proposal information to support that assumption. Corresponding Technical Provision section numbers shall be referenced if helpful in understanding the material.

The extent to which Proposers offer proven systems and equipment will be a significant factor in the evaluation of acceptability of Proposals. For proven equipment, the Proposer should indicate:

- Name and type of units that have been in operation and for how long

- The names of the transit properties where the equipment has been in service

- The operating experience on those properties

- o Critical performance parameters in comparison with those to be experienced on the Metro Rail System

When proposing to use existing equipment, provide manufacturer's data sheets and other experience-related data with such proposals.

Any new hardware or software system development needed to meet the requirements should be highlighted. The programs to qualify such items for use on the project should be discussed in detail as required in Section 19.

The District recognizes that there may be elements of the Proposal that will be considered proprietary. Any information or design detail considered to be proprietary shall be identified. The District will endeavor to protect such information and design details against unnecessary disclosure.

2.0 GENERAL REQUIREMENTS

A. Provide drawings that demonstrate the proposed equipment is within the dimensional allowance for all conditions given in the Technical Provisions and Contract Drawings.

B. Provide drawings, renderings, and/or photographs showing the exterior appearance design of the proposed equipment.

C. Provide renderings or photographs of the patron interfaces to include the front of the fare collection equipment and applicable faces of the gate equipment. Also, provide similar portrayals of typical graphics and displays.

D. Provide a description of the proposed control logic, and data processing hardware and software for each piece of equipment.

E. Provide a description of proposed software languages and the techniques for modifying application software to update fare structure and fare zones, and to obtain ad hoc central computer reports. Describe the software compilers and assemblers that are required to develop and modify the software for each piece of processor-based equipment.

F. Provide a description and performance capability of electromechanical and electronic registers. Describe how the Proposal satisfies the requirements of Article 2.7.5.B.

G. Describe the security system. Include type of locking devices, mechanical interlocks, methods to prevent unauthorized access, and methods to detect, record, and report intrusions.

H. Electromagnetic Interference (EMI) - Provide results of interaction analysis and testing on other properties of proposed proven equipment with regard to frequency distribution, amplitude, and harmonic content. Describe proposed procedures for EMI interface control and how EMI will be minimized with respect to other Metro Rail systems.

I. Describe how the proposal meets the requirements of Articles on Cash Containers and Security.

3.0 TICKET VENDING MACHINE

A. Provide a detailed description of the physical appearance and complete performance data on all functions including transactions, replenishment, and rate of reading, encoding, and printing media.

B. Describe the appearance and operation of patron-operated control devices.

C. Describe capabilities to handle specified payment sequences and coin processing.

D. Provide a scenario that covers each possible interaction with a patron including the initiation of a function or malfunction, and the resulting displays and reactions of the equipment.

4.0 BILL ACCEPTOR

Describe the Bill Acceptor and its performance capabilities.

5.0 GATE/CONSOLE EQUIPMENT

A. Describe the equipment and its performance capabilities.

B. Provide a scenario that covers each possible interaction with a patron including the initiation of a function or malfunction, and the resulting displays and reactions of the equipment.

6.0 ADD FARE MACHINE

Describe the equipment and its performance capabilities.

7.0 PASSENGER ASSISTANCE CENTER

A. Describe the equipment and its performance capabilities.

B. Provide a scenario that covers each possible interaction with a patron, including the presentation of a problem or query, and the resulting displays and responses.

8.0 STATION FARE COLLECTION CONTROL UNIT

A. Describe the equipment, its performance capabilities, ventilation requirements, and size.

B. Provide a description of control logic and data processing elements.

9.0 FARE COLLECTION CENTRAL COMPUTER

A. Describe equipment hardware and software and their ability to meet the performance requirements of:

1. Control of station equipment
2. Interrogation of both data in computer and remote equipment
3. Data handling
4. Processor loadings
5. Processor logic and memory.

B. Provide a detailed description and drawings of the following equipments:

1. Console arrangement with dimensions
2. Video display
3. Printer
4. Keyboard
5. Processor file storage devices.

C. Provide sample formats for recording of monetary, patronage, service, and maintenance data.

10.0 FARE MEDIA

A. Describe proposed media, including encoding data field, and provide samples.

B. Provide list of prospective suppliers with a history of experience for each.

11.0 TICKET ENCODING MACHINES

Describe the equipment proposed for both of the ticket encoding machines. Describe their ability to meet the

performance requirements, their sizes, and their electrical power requirements.

12.0 REVENUE CART

A. Describe the equipment, including braking system, cart wheels, and stationary foot.

B. Provide a preliminary weight and load analysis, including escalator loading, complete with assumptions used as the basis for the estimate.

13.0 TEST EQUIPMENT

A. Describe each item of portable and bench diagnostic equipment, including its function, capacity/range, and manufacturer.

B. Describe the functioning of the programming equipment and its source.

14.0 FILLER PANELS

Describe the panels and provide source of production.

15.0 FENCING

A. Describe proposed fencing and provide source of production.

B. Provide proposed interfacing with walls and floors.

16.0 COMPONENT DESIGN AND FABRICATION

A. Provide a list of nonmetallic materials, including quantities and where used. Describe the capability of the proposed equipment to meet the requirements for safety, fire, and smoke.

B. Describe what construction materials will be used (steel, aluminum, plastics, elastomers, etc.) for the equipment. For all materials requiring verification of physical or chemical properties, the Proposer shall state whether existing or future test data is to be used as evidence of compliance. If the verification is to be by future testing, give reasons for anticipating that the materials will pass the tests. Identify any material not conforming to the Specifications.

C. Provide a list of places and firms where manufacturing and assembling will be performed. The list shall

indicate which major component, subassembly, and assembly is processed at each plant.

17.0 INSTALLATION

Provide a list of previous fare collection or similar systems installed by the Proposer and major subcontractors used on those projects. The list shall indicate the owner with address, installation location, type and number of significant items of equipment.

18.0 SYSTEMS ASSURANCE

A. Provide a description of the Proposer's system assurance program to meet the requirements of the Technical Provisions. Provide samples of formal policies and procedures that are being used on similar programs, and a description of the program to be followed to satisfy the system safety requirements.

B. Provide a discussion of expected reliability including actual experience with identical equipment on other properties. Discuss plans for monitoring reliability of subcontractor-supplied equipment. Describe how subsystems will be upgraded when necessary.

C. Provide design values for each item of equipment for Mean Transactions Per Failure (MTF) independent chargeable and nonchargeable failures and Mean Time Between Failures (MTBF), as appropriate.

D. Describe accessibility for maintenance as provided for each item of equipment including ease of connection and readout of portable diagnostic instrumentation.

19.0 MANAGEMENT PROGRAM

19.1 Management Approach

This Section shall present the management approach to be followed in executing the Work. The Proposer must demonstrate sufficient understanding of the management techniques required for proper implementation and control of the Work. As a minimum, the following items must be provided:

A. A project organization chart supplemented with a definition of the responsibilities of all parties shown thereon.

B. A master program schedule with key contract milestones emphasized. Include a schedule for engineering manpower utilization leading to the final design release.

Engineering manpower resource plans for the major subcontractors and suppliers are also required.

C. A flow chart of project task scheduling which depicts interactive information requirements and integration among all tasks.

D. A description of the Proposer's method of critical path network planning with special emphasis on Contract Data Requirements, control of systems engineering and design, development and verification of new processor software, modification of existing processor software, and planning for the integrated test program. This should be brief, but with sufficient detail to facilitate an understanding of the Proposer's approach to fulfillment of the Contract requirements.

E. A copy of the configuration management plan the Proposer is presently using. In addition, provide a brief description of any changes to the plan that will be made for the Metro Rail Project.

F. A description of the process to be used to identify and manage multiparty interfaces including those between major subsystems and components of the Work. The Proposer shall clearly describe its role in the project and clearly define the interfaces with all potential major suppliers.

G. Detailed development programs for any unproven hardware or software being proposed for the project. Identify all equipment to be modified and provide specific plans for doing so. Include a discussion and assessment of the degree of risk associated with the development and indicate what contingency plans exist in the event the development is not successful. The program should contain a schedule for the development and a description of the testing required for qualifying the design and the product. Pass/fail test criteria should be given.

19.2 Qualification of Firms

This Section shall describe the general experience and background of proposers and associated firms or joint ventures. Include a brief description of similar projects performed in the past 10 years with the names and addresses of the organizations for which the work was performed. Provide information to demonstrate that the Proposer has the capability in terms of financial responsibility, facilities, and personnel required to accomplish the proposed work.

A. Provide a completed "Qualifications and Business References Questionnaire." Use form included with the Proposal Forms.

B. Complete the List of Proposed Subcontractors the Contractor will use for the project. Use form included with the Proposal Forms. Upon reviewing the list, the District may request that additional items of supply be added. The Contractor must provide names of prospective subcontractors for those items before the District gives final acceptance to the list.

C. Provide a description of the way the requirements for DBE/WBE participation in the program will be achieved. Provide names of such firms to be involved and type of work each will be doing.

19.3 Qualifications of Personnel

A. The Proposal shall contain the names of key managerial and technical personnel to be assigned to the project. Furnish information about the positions they will fill, and the percentage of time they are expected to work on the project. Include subcontractor key personnel.

B. The Proposer shall provide the personal resumes of key managerial and technical personnel to be assigned to the project, including key subcontractor personnel. Resumes should contain information on their education, technical background, related experience, accomplishments, and other pertinent information. Particular emphasis should be placed on experience in the rapid transit industry.

20.0 TEST PROGRAM

A. Provide a description of the proposed test program including verification and validation of computer software. Use of block diagrams and brief narratives to show relationship between various types of tests is acceptable.

B. Provide samples of test specifications and test procedures utilized on past projects. Provide these for various types of tests; i.e. qualification, production acceptance, installation acceptance, etc.

C. Describe the proposed test organization.

D. Describe any special test facilities to be used for the program, including environmental testing.

E. Provide a matrix overview showing the types of tests to be run for each of the equipments to be supplied.

21.0 SYSTEM SUPPORT

21.1 Technical Support

A. Describe plans for provision of on-site personnel as required by Section 21.3.1 of the Technical Provisions. Provide the number of each type of personnel, their qualifications, and the planned manning schedule throughout the project.

B. Describe the on-call pool of technical personnel to be available during the project. Of interest is the type, number, and location of personnel.

21.2 Manuals and Catalogs

Provide a listing and brief description of the content of each manual and catalog that will be provided. Furnish representative samples of manuals provided on similar programs.

21.3 Training

A. Describe training program experience and capability. Include descriptions of any training programs given in the past. Include names of clients and briefly describe the programs and results in terms of numbers and types of people trained.

B. Provide representative samples of training materials: lesson plans, training records, training schedules, etc.

21.4 Special Test Equipment and Tools

Provide a list of special test equipment and tools to be provided under the contract. Discuss the purpose of, and provide a brief description of, each item on the list. Indicate which items are proven equipment and which, if any, require development.

21.5 Microprocessor-based Products

Provide a complete list of any equipments utilizing microprocessors. Discuss methods that will be used to support software for such equipment. Means of implementing, verifying and documenting changes should be covered in the discussion. Provide samples of software documentation and control procedures used for this purpose by the Proposer on other projects.

END OF REQUIREMENTS FOR TECHNCIAL PROPOSAL

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

II. PROPOSAL FORMS

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

BID/PROPOSAL DATED _____

Contractor _____

QUALIFICATIONS AND BUSINESS REFERENCES QUESTIONNAIRE

This questionnaire is intended as a basis for establishing the qualifications of Contractors for undertaking work under the jurisdiction of the Southern California Rapid Transit District.

If a Contractor has submitted a completed questionnaire to the District within 6 months prior to the date of the Bid/Proposal, it may refer to that submittal in lieu of submitting a new questionnaire. The District requires that a current questionnaire be on file. Contractors shall submit a new questionnaire whenever major changes have occurred in their organization, financial position, and experience.

The District will, to the extent permitted by law, treat this information as confidential, except that parts of it may be discussed with persons and firms referenced by the Contractor. If the Contractor is a joint venture, each joint venturer shall prepare and submit a separate form.

Note: If the form provided in the questionnaire is not large enough for all information the Contractor wishes to furnish, the excess may be on supplemental pages. The extra information should be referenced by questionnaire section designation for ease of review by the District.

I. ORGANIZATION

A. Legal Name and Address of Contractor:

_____

_____

B. Name, Title, and Address of Contractor's Local Representative:

_____

_____

C. _____Corporation _____Partnership
_____Joint Venturer (Check One)

C.1 If a Corporation--State:

Date of Incorporation _____

State in which Incorporated _____

Name and Title Principal Officers	Date of Assuming Position
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

C.2 If Partnership--State:
Date of Organization _____ Nature of Partnership (General, Limited, or Association) _____

Names and Addresses of all Partners

_____

_____

_____

If a Joint Venture--State:
Full Names and Addresses of Joint Venturers.

_____

_____

Names and Titles of Principal Officers.

_____

_____

_____

II. GENERAL

A. Describe facilities to be utilized for significant portions of the Work including subcontractors' facilities. Indicate location, work to be done, length of time facility has been in operation to do such work, and whether facility is owned or leased. _____

_____
_____
_____

B. Is any member of your organization employed by the SCRTD or in any way officially connected with the SCRTD? _____
If yes, explain:
_____
_____

C. Give name and data about any contracts you have failed to complete, including any terminations for default (use separate sheet if necessary).
_____
_____

D. Has your organization or any of its Directors, Officers, Partners, or Supervisory Personnel ever been party to any criminal action relating directly or indirectly to the general conduct of your business?
If yes, explain:_____
_____

E. Has your organization ever been denied an award on which you were lowest bidder?_____ If yes, explain: _____
_____
_____

F. Have you ever been assessed actual or liquidated damages for late completion? _____ If so, give full particulars.
_____
_____

III. FINANCIAL

A. Provide financial data for your organization to show the financial capability to perform a project of the magnitude being contemplated. The District is particularly concerned that your organization has adequate working capital and trade credit to meet the needs of the project described in the soliciation for the Bid/ Proposal. _____
_____
_____
_____
_____
_____
_____
_____

B. Give total sales by your organization in each of the last 3 years:
_____ 19__, _____ 19__, _____ 19__

C. Give contract value of work presently being accomplished by, or pending award to your organization: _____
_____ Date _____

D. Give value of any judgements or liens outstanding against your organization: _____

E. Has any bonding company refused to write you a bond on any construction work? _____ If yes, explain. _____
_____
_____

F. Give maximum value of contract work for which you could obtain bond: _____

G. Name, address, and phone number of bonding company to be used if successful bidder:
_____
_____

IV. EXPERIENCE

A. Indicate type of contracting undertaken by your organization and number of years of experience:

Prime Contractor: No. Years _____
Subcontractor: No. Years _____
Type of Work: _____ No. Years _____

B. State transit supply experience of principal members of your organization:

Name and Current Title (As Pres.,Mgr.,etc.)	Experience (Years)	Type of Transit Project	In What Capacity (Foreman, Supt.,etc.)

C. Give any special qualifications of firm members (Registered Engineer, Surveyor, etc.): _____

_____

_____

_____

_____

D. List some principal projects completed by your organization:

Name of Work	_____	_____	_____	_____
	_____	_____	_____	_____
Prime or Sub (If sub, what type of work)	_____	_____	_____	_____
	_____	_____	_____	_____
Contract Amount	_____	_____	_____	_____
	_____	_____	_____	_____
Year	_____	_____	_____	_____
Authorities Name and Address	_____	_____	_____	_____
	_____	_____	_____	_____

E. If Prime Contractor, list some subcontractors in various fields who have worked under you: _____

_____

_____

_____

F. If subcontractor, list some Prime Contractors for whom you have worked: _____

_____

_____

_____

_____

G. Project Monetary Value Considerations:

1. What is the value of the largest project accomplished by your Organization? _____

2. Maximum project value in last 3 years: _____

3. Maximum project value you prefer to undertake: _____

4. Price range of work your organization is deemed best adapted to undertake: _____

H. Quality:

1. List any quality program standards or in-house quality assurance programs that you have used to control quality activities on past projects:

Examples: MIL-Q-9858, ANSI/ASQC Z1.15, ANSI/IEEE 730 (Software).

_____

_____

_____

2. Submit evidence that your firm has a quality assurance and inspection program and quality assurance personnel to assure compliance with the quality assurance requirements for this Contract.

I. Give number, type, and effective date of any State of California Contractors' licenses applicable for your organization to this Project: _____

_____

The undersigned states that he/she is legally authorized by the Contractor to make the statements and representations contained in this document, and represents and warrants that the foregoing information is true and accurate to the best of his/her knowledge, and intends that the District rely thereon in awarding the Contract. The undersigned further understands that any misrepresentation made in this form shall be a basis for rejection of the Bid/Proposal.

Dated at _____ this ____ day of _____ 19__.

By _____

_____
(Type or Print Name)

_____
(Title)

_____
(Name of Organization)

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

REQUEST FOR TECHNICAL PROPOSAL DATED _____

Proposer _____

LIST OF PROPOSED SUBCONTRACTORS

List all subcontractors with significant participation in the Work. List all DBE/WBE subcontractors regardless of degree of participation.

Name	Address	Type of Work	Identify Whether DBE or WBE Firm

END OF PROPOSAL FORMS

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

III. BIDDING REQUIREMENTS

NOTE: BIDDING REQUIREMENTS ARE INCLUDED ONLY FOR INFORMATION. Proposers submitting acceptable proposals will be invited to bid in Step Two of this procurement.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID

TO: (Name and Address of Prospective Bidder)

The Southern California Rapid Transit District (District) is requesting sealed bids for the fare collection system for the Los Angeles Metro Rail Project. Bids are being requested from all firms having acceptable proposals in response to the Request for Technical Proposal for this procurement.

Your firm is requested to submit a bid based upon your proposal identified as (identify specifically). If you are the successful Bidder and a contract is awarded, said Proposal will become part of the Contract.

The District will receive bids until 2:00 P.M. local time on _____, 198_, at which time the Bids will be publicly opened in the District's Board Room on the second floor of the SCRTD Administration Building, 124 West Fourth Street, Los Angeles, California, 90013. Bids shall be submitted in accordance with, and subject to the conditions in, the Instructions to Bidders. The Bids will be publicly opened and read aloud at the time specified in the Bid Documents.

The agreement entered into by and between the successful Bidder and the District will be subject to the requirements of a grant between the District and the U.S. Department of Transportation. Contractor and its subcontractors performing work at the worksite will be required to pay California sales, and other applicable taxes, and to pay for permits, licenses and fees required by the municipalities in which the Work will be located. Contractor will be required to furnish a performance bond in an amount equal to 100 percent of the Bid Total.

Bidder must certify that it has examined the Bid Documents, the worksite, and the conditions affecting the Work; that it is not listed on the U.S. Comptroller's General Consolidated list of Persons or Firms Currently Debarred for Violations of Various Public Contracts; and, should it become the Contractor, that it will not prosecute the Work using facilities which have been listed on the Environmental Protection Agency's List of Violating Facilities.

Dated at the Los Angeles, California, this ____ day of _____, 198_.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

Thurmond Johnson
Assistant Director, Office of Contracts,
Procurement and Materiel

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INSTRUCTIONS TO BIDDERS

To be considered, Bids must be made in accordance with these Instructions to Bidders.

1.0 CONTRACTOR'S LICENSING LAWS

Attention is directed to the provisions of Chapter 9 of Division 3 of the Business and Professions Code concerning the licensing of contractors. All bidders and contractors shall be licensed in accordance with the laws of the State of California and any bidder or contractor not so licensed is subject to penalties imposed by such laws.

2.0 DOCUMENTS

All forms required for bidding are included with this Invitation to Bid. The bids being requested are for the supply of a fare collection system and related work in accordance with the Specifications and as defined by the Bidder's Proposal evaluated during Step One. The identification of the Proposal to be bid (title, revision, and date) shall be provided by each eligible bidder. The prices to be provided in the Bid Forms shall be clearly related to that proposal.

3.0 EXAMINATION

Bidders must carefully examine the Bid Documents and the worksite to obtain first-hand knowledge of existing conditions. Bidders will be expected to be aware of local labor availability, means of transportation; necessity for security, laws and codes, local permit requirements, wage scales, local tax structure, contractors' licensing requirements, availability of required insurance, and other factors that could affect the Work. Bidders are responsible for examining and understanding all requirements of the Procurement Specifications Book.

4.0 EXPLANATIONS

Prospective bidders who wish explanations or clarifications of the Contract Drawings, Specifications, or other Bid

Documents, or of these Instructions to Bidders or other procurement procedures, must submit their inquiries in writing to:

DIRECTOR, OFFICE OF CONTRACTS, PROCUREMENT AND MATERIEL
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
124 WEST FOURTH STREET, 4TH FLOOR
LOS ANGELES, CALIFORNIA 90013

Any response that the District may choose to make will be by written addenda to this Invitation to Bid or other written response sent to listed holders of the Bid Documents. The District will not be bound by informal explanation, clarification, or interpretation, oral or written, by whomsoever made, that is not incorporated into an addendum to this Invitation to Bid. No response will be made to inquiries received by the District less than 15 calendar days before the scheduled Bid Opening.

5.0 PROTESTS

A protest or objection directed to the Bid or Contract Documents, or other requirements of the Invitation To Bid must likewise be submitted in writing to the Director, Office of Contracts, Procurement and Materiel, at the address in the Article entitled Explanations, and must be received at least 15 calendar days before the scheduled Bid Opening. The protest or objection must be sent by certified mail, return receipt requested. Such protest or objection must be supported by sufficient information to enable the District to consider it. A protest or objection will be considered sufficient for review if it contains information specifically detailing the exact nature of the problem, including all relevant factual information necessary for the District to identify the problem. No protest or objection will be considered if it is insufficiently supported, or if it is received less than 15 calendar days before the Bid Opening, or if requested supporting information is received less than 15 calendar days before the Bid Opening.

6.0 PREPARATION OF BIDS

Bids should be accompanied by the following documents: Proposal Letter, Schedules of Bid Items and Prices (Bid Forms), and Buy America Certificate, all as included in Forms For Bidding. In addition, the required Bid Security must accompany the Bid. Submittal of these documents and Bid Security is a condition of the Bidder's responsiveness and failure to do so will be cause for rejection of the Bid.

6.1 Instructions for Completion of Forms For Bidding

Bidders are requested to observe the following instructions in completing the Forms For Bidding; failure to do so will not necessarily preclude consideration of their bids, but may result in irregularities serious enough that their bids cannot be considered:

A. The Bidder shall not delete, modify, or supplement the printed matter on the forms or make substitutions thereon.

B. The Forms For Bidding shall be completed in ink or by means of typewriting.

C. Receipt of addenda must be acknowledged in the spaces provided on the Proposal Letter by entering the number of each and the dates received.

D. Identifying information, such as the Bidder's name, address, and state of incorporation, should be entered in the spaces provided on the Proposal Letter.

E. Bid Security is required and alternative forms are acceptable. Bidders are requested to indicate the form furnished.

F. Forms For Bidding must be signed where indicated by an officer of the Bidder's organization who has authority to contractually bind the organization.

G. Corrections should be initialed by the person who signs the forms.

H. Evidence shall be submitted that the person signing the Forms For Bidding has the authority to act on behalf of the Bidder.

I. Unit, lump sum, and other prices must be entered in the appropriate spaces provided. Unit prices should be multiplied by the amount or quantity, and the product inserted in the "Total Price" column shown on the Schedule of Bid Items and Prices.

J. In the case of bid items for which a fixed amount predetermined by the District has already been entered on the Bid Form, the amount so entered shall be conclusive on Bidders as the price for such item, and shall not be revised unless the District directs a change in the scope of the Work affecting the item to which such amount relates.

K. Options to purchase additional quantities of bid items, delineated on the Schedules of Bid Items and Prices (Bid Forms D, E, F, and G) shall be in accordance with the conditions established thereon. Failure to supply prices for all option items will be cause for the Bid to be considered nonresponsive. Option prices submitted on the Bid Forms will not be considered in determining the Bid Total for purposes of the Award.

6.2 Buy America Certificate

Buy America requirements as indicated in the Special Provisions and in 49 CFR Part 661 apply to the Contract. Submittal of the Buy America Certificate is a condition of the Bidder's responsiveness and failure to submit the certificate will be cause for rejection of the Bid.

6.3 Disadvantaged/Women Business Enterprise (DBE/WBE) Utilization

The Special Provisions of the Contract set forth the goals established by the District for DBE/WBE utilization. The General Provisions set forth the additional information required from an apparent low bidder. All bidders should be prepared after the Bid Opening to submit within 48 hours of notice from the District, the information required in Parts I and II of the Responsive Bidder's Report as identified in Article 37.0 of the General Provisions of the Contract. A DBE/WBE must be certified by the District prior to receiving any credit toward meeting the established goals. Application for certification may be obtained by submitting to the District completed copies of Exhibit 1 or 2 of the General Provisions.

7.0 BID SECURITY

Bidders are required to furnish Bid Security in an amount not less than 5 percent of the Bid Total, and in favor of the Southern California Rapid Transit District. The Bid Security must be in the form of a cashier's check, a certified check, a bid bond, or a combination thereof. If a bid bond is furnished, it must conform to the form provided with the Bid Documents, and the surety thereon must be a corporation or corporations acceptable to the District and authorized to issue surety bonds in the State of California. The Bid Securities of the bidders submitting the three lowest Bid Totals will be retained until either the successful Bidder has signed the Contract Agreement and has furnished a Performance Bond, or within 60 calendar days after the Bid Opening date, whichever is sooner; other Bid Securities will be returned within 10 calendar days after the Bid Opening date.

Bid Securities being held pending the signing of the Contract Agreement and the furnishing of other documents will be returned within 3 calendar days thereafter. Each bidder agrees that if awarded the Contract and within the time stipulated fails to execute the Contract Agreement, and to furnish the other required documents, the District will retain the Bid Security as liquidated damages, and not as a penalty.

8.0 SUBMITTALS

A. All Forms For Bidding and the Bid Security should be submitted in accordance with the Invitation to Bid, and in an opaque, sealed envelope addressed as noted in the Article entitled Explanations.

B. The lower left corner of envelope should be marked as follows:

BID FOR CONTRACT A660 - FARE COLLECTION

C. Hand-carried bids shall be delivered to the Director, Office of Contracts, Procurement and Materiel; either to the address specified in the Article entitled Explanations, before the Bid Opening or, at Bid Opening time, or as specified in the last of any addenda changing such place. No bid, whether mailed or hand carried, will be considered unless it is received and in the District's hands no later than the time specified for the Bid Opening.

9.0 WITHDRAWAL

9.1 Signed Withdrawal

Bids may be withdrawn after they have been submitted, but only before the Bid Opening date and time. Withdrawn bids may be resubmitted, provided they are received by the District no later than the time specified for the Bid Opening. Withdrawals must be signed by the Bidder. Bids may not be withdrawn between the Bid Opening and 60 calendar days thereafter, except as may be agreed upon by a written agreement between the Bidder and the District.

Envelopes containing withdrawals should be addressed as noted in the Article entitled Explanations, and should be identified in the lower left corner as follows:

WITHDRAWAL OF OUR BID FOR CONTRACT A660 - FARE COLLECTION

9.2 Telegraphic Withdrawal

Telegraphic withdrawals will be honored only if the District is satisfied that a written confirmation of the telegraphic withdrawal was mailed prior to the Bid Opening, signed by the original Bidder, and received within 5 calendar days after the Bid Opening.

10.0 BID OPENING

Bids will be opened publicly at the time and place stated in this Invitation to Bid, or in the last of addenda changing such time or place.

11.0 DISQUALIFICATION

The District reserves the right to disqualify bids, before or after the Bid Opening, upon evidence of collusion with intent to defraud or other illegal practices on the part of the Bidder.

12.0 PRE-AWARD SURVEY

After bids have been opened and before an award is made, the District will evaluate the bid prices, the Bid Total, and other data relating to bidders' responsibility and qualifications to perform the Work in accordance with the requirements of the Contract Documents. The District reserves the right to make site investigations as it may deem necessary to evaluate and discuss those qualifications. The District shall be the sole judge of whether the Bidder meets these qualifications.

13.0 EVALUATION AND AWARD

13.1 Bid Evaluation

Each bid timely received by the District at the time set for the Bid Opening shall constitute an offer to perform the Contract on the terms and conditions thereof, in strict accordance with the Contract Documents, and other requirements, all for the Bid Total. Bidder promises and agrees that the Bid shall be irrevocable for a period of 60 calendar days after the Bid Opening and shall not be withdrawn or modified during that time. The District may accept the Bid by giving the Bidder notice of award during that time. If necessary, the period of time specified may be extended by written agreement between the District, by and through its Director, Office of Contracts, Procurement and Materiel, and the Bidder or Bidders concerned. The District reserves the right to reject a bid with prices that appear to be unbalanced, and to reject any or all bids, or parts thereof, if it

determines, in its sole discretion, that such rejection is in its best interest.

Bids will be evaluated on the basis of determining the lowest Bid Total of a bidder whose bid is responsive to the solicitation, and who is as determined by the District to be technically, financially, and otherwise responsible to perform the Work in accordance with the Contract Documents.

Extensions of the unit prices shown and the subsequent addition of extended amounts will be verified by the District. In the event of a discrepancy between the unit price bid and the extension, the unit price bid will be deemed intended by the Bidder and the extension shall be adjusted. In the event of a discrepancy between the sum of the extended amounts and the Bid Total, the sum of the extended amounts shall govern. The District reserves the right, nevertheless, to accept a bid other than the apparent lowest bid, if it determines that the lowest Bidder is not responsive or responsible and that the public interest will best be served by doing so.

13.2 Single Bid

Where only a single responsible and responsive bid is received, the District reserves the right to make a cost analysis of the Bid and may conduct same. The analysis may take place at the Bidder's facility with supporting information and financial data furnished by the Bidder as required.

14.0 EXECUTION OF CONTRACT

The Bidder to which an award, if any, is made shall execute the Contract Agreement and furnish the required Performance Bond in the amount of 100 percent of the Contract price within 10 calendar days after being given notice of the award. The District may require appropriate evidence that the persons executing the Contract Agreement and the bond for both the Bidder and its surety or sureties are duly empowered to do so. Bond shall conform to the form provided with the Bid Documents, and the surety or sureties shall be a corporation or corporations authorized to act as such in the State of California, and acceptable to the District.

END OF INSTRUCTIONS TO BIDDERS

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

IV. FORMS FOR BIDDING

NOTE: FORMS FOR BIDDING ARE INCLUDED ONLY FOR INFORMATION. THEY MUST NOT BE SUBMITTED WITH THE PROPOSAL.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

PROPOSAL LETTER

In response to the above referenced Invitation to Bid and in accordance with the accompanying Instructions to Bidders, the undersigned hereby proposes to the Southern California Rapid Transit District (District), to furnish all plant, labor, technical and professional services, supervision, materials, and equipment, (other than materials and equipment specified as furnished by others) and to perform all operations necessary and required to perform the Work in accordance with provisions of the Contract Documents and any addenda thereto and at the prices stated opposite the respective items set forth in the Schedules of Bid Items and Prices attached hereto, and incorporated by reference herein.

The Bidder agrees that this proposal constitutes a firm offer that cannot be withdrawn for 60 calendar days from the Bid Opening or until a contract for the Work is fully executed, between the District and a third party, whichever is earlier.

The Bidder certifies that it has examined and is familiar with all provisions of the Contract Documents and any addenda thereto; that it has carefully checked all of the words and figures shown in its Schedules of Bid Items and Prices; that it has carefully reviewed the accuracy of all statements in this proposal and attachments hereto; and that it has by careful examination of the Bid Documents and any addenda thereto, and by examination of the actual site conditions, satisfied itself as to the nature and location of the Work, the general conditions to be encountered in the performance of the Work, the requirements of the Contract, and all other matters which can in any way affect the Work or the cost thereof.

The Bidder further certifies that the only persons or firms interested in this proposal as principals are those listed as such in the Qualifications and Business References Questionnaire; that this proposal is made without collusion with any other person, firm, corporation, or other party; that neither the undersigned Bidder nor any principal is included on the United States Comptroller General's Consolidated List of Persons or Firms Currently

Debarred for Violations of Various Public Contracts; and that it will not prosecute the Work using facilities which have been listed on the Environmental Protective Agency's List of Violating Facilities.

If awarded a Contract, the undersigned agrees to execute the Contract and deliver it to the District within 10 calendar days after notice of award of the Contract, with the necessary Performance Bond. Bidder will proceed with the Work upon receipt of a Notice To Proceed in accordance with the General Provisions of this Contract. Bidder provides the following information:

Bidders California Contractor's License No. _____
License Expiration Date _____ Type of License _____

Attached hereto and by this reference incorporated herein and made a part of this proposal are the Schedules of Bid Items and Prices (Bid Forms), Buy America Certificate, and Bid Security.

The undersigned affirms that its supply for this Contract will be in accordance with its proposal as acceptable to the District following the evaluation process in response to the RFTP. This proposal is specifically identified as (**********).

The undersigned acknowledges receipt, understanding, and full consideration of the following addenda to the Contract Documents:

Addendum No. _____	Date _____
Addendum No. _____	Date _____
Addendum No. _____	Date _____
Addendum No. _____	Date _____
Addendum No. _____	Date _____
Addendum No. _____	Date _____

Bidder _____

Signed by _____
(Type or Print Name)

_____
(Title)

Date _____

_____
(Bidder's Business Address)

_____

_____

State of Incorporation _____

NOTE: Signature must be notarized. Use appropriate attached certificate. Per Instructions to Bidders, where person executes Proposal Letter on behalf of Bidder, include proof of authority to act on behalf of Bidder.

Attachment I;

Certificate of acknowledgement; corporation.

State of _____,
SS. County of _____

On this ____ day of _____, in the year ____, before me the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person who executed the within instrument as president (or secretary) or on behalf of the corporation therein named and acknowledged to me that the corporation executed it.

_____
Signature of Notary

Attachment II;

Certificate of acknowledgement; partnership.

State of _____,
SS. County of _____

On this ____ day of _____, in the year _____, before me the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me (or proved to me on the basis of satisfactory evidence (to be the person that executed this instrument, on behalf of the partnership and acknowledged to me that the partnership executed it.

_____
Signature of Notary

Attachment III;

Certificate of acknowledgement; joint venture.

State of _____,
SS. County of _____

On this ____ day of _____, in the year ____, before me the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person that executed this instrument, on behalf of the joint venture and acknowledged to me that the joint venture executed it.

_____
Signature of Notary

Attachment IV;

Certificate of acknowledgement; individual.

State of _____,
SS. County of _____

On this ____ day of _____, in the year _____, before me the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person that executed this instrument, and acknowledged to me that he (she or they) executed it.

_____
Signature of Notary

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

SCHEDULE OF BID ITEMS AND PRICES - BASE
(Bid Form A)

CONTRACT PRICE - BID TOTAL

Full compensation to the Contractor for full and complete performance of the Work, compliance with all terms and conditions of the Contract, and payment by the Contractor for all obligations incurred in, or applicable to, the Contractor's performance of the Work shall be the sum of the following bid items, which include all delivery costs and applicable taxes:

Item	Description	Unit	Quantity (See Note 3)	Unit Price	Total Price
1.	System Engineering, Project Management, Test and Installation Procedures, and all associated data as defined in the Technical Provisions and Table TP-22-1, Contract Data Requirements List.	Lump Sum	1		$_____
2.	Ticket Vending Machine	Each	27	$_____	$_____
3.	Add Fare Machine	Each	1	$_____	$_____
4.	Bidirectional Gate	Each	2	$_____	$_____
5.	Bidirectional Console	Each	5	$_____	$_____
6.	Entry Gate	Each	24	$_____	$_____
7.	Exit Gate	Each	2	$_____	$_____
8.	Exit Console	Each	17	$_____	$_____
9.	Dummy Gate	Each	10	$_____	$_____

Bid Form A (Cont'd.)

Item	Description	Unit	Quantity (See Note 3)	Unit Price	Total Price
10.	Station Fare Collection Control Unit (Containing Free Area Passenger Assistance Center)	Each	9	$_____	$_____
11.	Passenger Assistance Center - Paid Area (Cabinet-Type)	Each	10	$_____	$_____
12.	FCCC and Peripherals	Each	1	$_____	$_____
13.	Revenue Cart	Each	10	$_____	$_____
14.	Central Ticket Encoding Machine	Each	1	$_____	$_____
15.	Handicapped Fare Gate	Each	5	$_____	$_____
16.	Emergency Exit Gate	Each	21	$_____	$_____
17.	Booth Ticket Encoding Machine	Each	2	$_____	$_____
18.	Filler Panel (4 ft by 6 ft-6 in. - No Cutout)	Each	43	$_____	$_____
19.	Filler Panel (4 ft by 6 ft-6 in. - Cutout)	Each	22	$_____	$_____
20.	Filler Panel (2 ft by 6 ft-6 in. - No Cutout)	Each	37	$_____	$_____
21.	Fence - Type A	Each	20	$_____	$_____
22.	Fence - Type B	Each	86	$_____	$_____
23.	Fence - Type C3	Each	20	$_____	$_____
24.	Gatepost - Type P1 (See Note 2)	Each	12	$_____	$_____
25.	Gatepost - Type P2 (See Note 2)	Each	12	$_____	$_____
26.	Gatepost - Type P3 (See Note 2)	Each	19	$_____	$_____

Bid Form A (Cont'd.)

Item	Description	Unit	Quantity (See Note 3)	Unit Price	Total Price
27.	Underfloor Door Closer	Each	31	$_____	$_____
28.	Fence Base Support (See Dwg. F-013)	Each	106	$_____	$_____
29.	Fare Media - Bid Form "B"	Lump Sum	1		$_____
30-37	Installation/Testing for Bid Items 30 through 37. Install and test all equipment as specified in Appendix B and the Technical Provisions. Furnish and install all installation hardware and cabling as required.				
30.	Union Station	Lump Sum	1		$_____
31.	Civic Center	Lump Sum	1		$_____
32.	5th/Hill	Lump Sum	1		$_____
33.	7th/Flower				
34.1	MOS-1 Equipment	Lump Sum	1		$_____
34.2	LACTC Equipment (See Note 1)	Lump Sum	1		$_____
35.	Wilshire/Alvarado	Lump Sum	1		$_____
36.	Fare Collection Central Computer (FCCC) and any other equipment not installed in a specific station location.	Lump Sum	1		$_____
37.	Software development system(s) for FCCC and all other processor-based equipment.	Lump Sum	1		$_____
38.	Test Equipment and Special Tools	Lump Sum	1		$_____

Item	Description	Unit	Quantity (See Note 3)	Unit Price	Total Price
39.	Training Program	Lump Sum	1		$_____
40.	Manuals	Lump Sum	1		$_____
41.	Spare Parts - Bid Form "C"	Lump Sum	1		$_____

BID TOTAL, Base (Sum of Items 1 through 41) ..... $_____

Bidder shall supply a price for the following item. Note that this price will not be considered in determining the Bid Total for purposes of the award:

Item	Description	Unit	Quantity (See Note 3)	Unit Price	Total Price
1.	Full Size Mock-up of each type of Equipment	Lot set	1	$_____	$_____

Note 1: The work designated by this bid item consists of installing the equipment items identified by Appendix B of the Special Provisions to accommodate the Los Angeles County Transportation Commission (LACTC) Light Rail Project.

Note 2: Each Gatepost top unit (P1, P2, P3) requires a universal bottom unit for a complete assembly (See Contract Drawing F-017).

Note 3: Equipment quantities are based on use of turnstile barriers. Should the bidder wish to propose use of biparting leaf barriers, since quantities of equipment will be different than those specified, the bidder shall provide, as a part of his bid, layouts of the two required fare arrays for each MOS-1 station, as well as the two required LACTC fare arrays at the 7th/Flower Station. These layouts shall be based on the required aisles, gates and patron flow characteristics indicated in Contract Drawings F-023 through F-034, and shall indicate the type and quantity of each equipment, location of each ticket insert slot, and any modifications required in gates, gate posts, or fence module quantities or locations.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

FARE MEDIA REQUIREMENTS - BASE
(Bid Form B)

Item	Description	Unit	Estimated Quantity (in thousands)	Unit Price	Total Price
1.	Single-trip Ticket	Each	7,000	$_____	$_____
2.	Bus/Rail Monthly Pass	Each	720	$_____	$_____
3.	Regional Monthly Pass	Each	12	$_____	$_____
4.	Employee Pass	Each	10	$_____	$_____
5.	Exit Card	Each	2	$_____	$_____
6.	Metro Rail Exit Card	Each	350	$_____	$_____

TOTAL PRICE (Items 1 through 6), Enter Amount on Bid Form A, Item 29. $_____

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

SPARE PARTS REQUIREMENTS
(Bid Form C)

Item	Description	Unit	Quantity	Unit Price	Total Price
	Ticket Vending Machine and Add Fare Machine				
1.	Coin Acceptor	Each	6	$_____	$_____
2.	Coin Sorter	Each	3	$_____	$_____
3.	Coin Escrow	Each	3	$_____	$_____
4.	Change Dispensing Assembly	Each	3	$_____	$_____
5.	Recirculating Change System	Each	3	$_____	$_____
6.	Change Storage Unit (Nickels)	Each	3	$_____	$_____
7.	Change Storage Unit (Dimes)	Each	3	$_____	$_____
8.	Change Storage Unit (Quarters)	Each	3	$_____	$_____
9.	Change Storage Unit (Susan B. Anthony Dollar Coins)	Each	3	$_____	$_____
10.	Ticket Issuing Unit	Each	3	$_____	$_____
11.	Ticket Handler	Each	3	$_____	$_____
12.	Electronic Unit (c/w P.C. Cards)	Each	3	$_____	$_____

Bid Form C (Cont'd.)

Item	Description	Unit	Quantity	Unit Price	Total Price
13.	Overflow Cash Container	Each	6	$_____	$_____
14.	Patron Interface Panel (TVM only) (c/w Graphics, Patron-operated Controls, Patron-related Input/Output Openings, and Information Display Units)	Each	3	$_____	$_____
15.	Power Supply Equipment	Each	3	$_____	$_____
16.	Bill Validator	Each	4	$_____	$_____
17.	Bill Stacker	Each	2	$_____	$_____
18.	Storage Bin	Each	2	$_____	$_____
19.	Cabinet	Each	2	$_____	$_____
Gates					
20.	Ticket Handler	Each	3	$_____	$_____
21.	Ticket Bin	Each	3	$_____	$_____
22.	Fence: Type A	Each	2	$_____	$_____
	Type B	Each	8	$_____	$_____
	Type C3	Each	2	$_____	$_____
23.	Turnstile, (c/w Arms), If Required	Each	3	$_____	$_____
24.	Biparting Leaves, (c/w Motor & Circuitry) If Required,	Each	6	$_____	$_____
25.	Display Unit (Ends)	Each	3	$_____	$_____
26.	Display Unit (Top)	Each	3	$_____	$_____
27.	Electronic Unit (c/w P.C. Cards)	Each	3	$_____	$_____
28.	Power Supply Equipment	Each	3	$_____	$_____
29.	Cabinet	Each	3	$_____	$_____

Bid Form C (Cont'd.)

Item	Description	Unit	Quantity	Unit Price	Total Price
Doors					
30.	Handicapped Fare Gate	Each	1	$_____	$_____
31.	Emergency Exit Gate	Each	1	$_____	$_____
32.	Gate post (Handicapped Fare Gate and Emergency Exit Gate)				
	Type P1	Each	2	$_____	$_____
	Type P2	Each	2	$_____	$_____
	Type P3	Each	2	$_____	$_____
33.	Underfloor Door Closer	Each	3	$_____	$_____
Fare Collection Central Computer					
34.	Modem/Data Set	Each	1	$_____	$_____
35.	Disks (Removable)	Each	2	$_____	$_____
36.	Disks (Fixed)	Each	2	$_____	$_____
37.	Electronic Unit (c/w P.C. Cards)	Each	1	$_____	$_____
38.	Power Supply Equipment	Each	1	$_____	$_____
Passenger Assistance Center					
39.	Ticket Handler	Each	1	$_____	$_____
40.	Electronic Unit (c/w P.C. Cards)	Each	1	$_____	$_____
41.	Power Supply Equipment	Each	1	$_____	$_____
42.	Patron Interface Panel (c/w Graphics, and Ticket/Pass Reader Plate)	Each	2	$_____	$_____
43.	Cabinet	Each	1	$_____	$_____
Test Equipment					
44.	Portable Test Unit (TVM/AFM)	Each	1	$_____	$_____

Item	Description	Unit	Quantity	Unit Price	Total Price
45.	Portable Test Unit (BA)	Each	1	$_____	$_____
46.	Portable Test Unit (Gates)	Each	1	$_____	$_____
47.	Portable Test Unit (SFCCU)	Each	1	$_____	$_____
48.	Bench Test Equipment	Each	3	$_____	$_____
49.	PROM Programmer	Each	2	$_____	$_____
50.	Test Unit (FCCC)	Each	1	$_____	$_____
	Station Fare Collection Control Unit				
51.	Display Unit (CRT)	Each	1	$_____	$_____
52.	Electronic Unit (c/w P.C. Cards)	Each	1	$_____	$_____
53.	Power Supply Equipment	Each	1	$_____	$_____
54.	Modem/Data Set	Each	1	$_____	$_____
55.	Patron Interface Panel (c/w Graphics, and Ticket Pass Reader Plate)	Each	2	$_____	$_____
56.	Cabinet	Each	1	$_____	$_____
	Central Ticket Encoding Machine				
57.	Ticket Feeder/Handler with Printer	Each	1	$_____	$_____
58.	Audit Printer	Each	1	$_____	$_____
59.	Electronic Unit (c/w P.C. Cards)	Each	1	$_____	$_____
60.	Power Supply Equipment	Each	1	$_____	$_____
	Booth Ticket Encoding Machine				
61.	Ticket Feeder/Handler with Printer	Each	1	$_____	$_____

Bid Form C (Cont'd.)

Item	Description	Unit	Quantity	Unit Price	Total Price
62.	Audit Printer	Each	1	$_____	$_____
63.	Electronic Unit (c/w P.C. Cards)	Each	1	$_____	$_____
64.	Power Supply Equipment	Each	1	$_____	$_____
		TOTAL PRICE, SPARE PARTS (Enter as Item No. 41 on Bid Form A).			$_____

Note 1: The figure c/w, as used above, indicates "complete with."

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

SCHEDULE OF BID ITEMS AND PRICES - OPTION 1
(Bid Form D)

CONTRACT PRICE - BID TOTAL

Full Compensation to Contractor for full and complete performance of the Work, compliance with all terms and conditions of the Contract, and payment by Contractor for all obligations incurred in or applicable to the Contractor's performance of the Work shall be the sum of the following bid items, which include all delivery costs and applicable taxes.

OPTION - TERMS

This option is for the purchase of the listed goods and services. The option may be exercised up until 3 years after the date of execution of the base contract. Delivery to commence no later than 1 year and to be completed no later than 3 years after option is exercised. Options should be quoted in present dollars. The price for an option, if exercised, will be subject to Economic Price Adjustment, in accordance with the Article so titled in the Special Provisions.

Item	Description	Unit	Quantity	Unit Price	Total Price
1.	Ticket Vending Machine	Each	59	$_____	$_____
2.	Add Fare Machine	Each	48	$_____	$_____
3.	Bidirectional Gate	Each	4	$_____	$_____
4.	Bidirectional Console	Each	7	$_____	$_____
5.	Entry Gate	Each	29	$_____	$_____
6.	Exit Gate	Each	9	$_____	$_____

Bid Form D (Cont'd.)

Item	Description	Unit	Quantity	Unit Price	Total Price
7.	Exit Console	Each	18	$_____	$_____
8.	Dummy Gate	Each	8	$_____	$_____
9.	Dummy Console	Each	1	$_____	$_____
10.	Station Fare Collection Control Unit	Each	10	$_____	$_____
11.	Passenger Assistance Center (Freestanding Cabinet Type)	Each	13	$_____	$_____
12.	Handicapped Fare Gate	Each	7	$_____	$_____
13.	Emergency Exit Gate	Each	10	$_____	$_____
14.	Filler Panel (4 ft by 6 ft-6 in. - No Cutout)	Each	8	$_____	$_____
15.	Filler Panel (2 ft by 6 ft-6 in. - No Cutout)	Each	2	$_____	$_____
16.	Fence - Type A	Each	26	$_____	$_____
17.	Fence - Type B	Each	122	$_____	$_____
18.	Fence - Type C3	Each	26	$_____	$_____
19.	Gatepost - Type P1 (See Note 1)	Each	13	$_____	$_____
20.	Gatepost - Type P2 (See Note 1)	Each	13	$_____	$_____
21.	Gatepost - Type P3 (See Note 1)	Each	5	$_____	$_____
22.	Underfloor Door Closer	Each	18	$_____	$_____
23.	Fence Base Support (See Dwg. F-013)	Each	159	$_____	$_____
24.	Fare Media - Bid Form "E"	Lump Sum	1		$ N.A.

Item	Description	Unit	Quantity	Unit Price	Total Price
25-36	Installation/Testing for Bid Items 25 through 36. Install and test (or remove) all equipment as specified in Appendix C and the Technical Provisions. Furnish and install all installation hardware and cabling as required. Modify and retest previously furnished equipment as necessary, to be identical and fully compatible with equipment furnished for this option in accordance with the Technical Provisions. All features identified in the Technical Provisions as "provided for" in MOS-1 equipment shall be implemented in Option 1 equipment.				
25.	Union Station	Lump Sum	1		$_____
26.	Civic Center	Lump Sum	1		$_____
27.	5th/Hill	Lump Sum	1		$_____
28.	7th/Flower	Lump Sum	1		$_____
29.	Wilshire/Alvarado	Lump Sum	1		$_____
30.	Wilshire/Vermont	Lump Sum	1		$_____
31.	Wilshire/Normandie	Lump Sum	1		$_____
32.	Wilshire/Western	Lump Sum	1		$_____
33.	Wilshire/Crenshaw	Lump Sum	1		$_____
34.	Wilshire/La Brea	Lump Sum	1		$_____
35.	Wilshire/Fairfax	Lump Sum	1		$_____
36.	Fairfax/Beverly	Lump Sum	1		$_____

BID TOTAL, Option 1 (Sum of Items 1 through 36) ..... $_____

NOTE 1: Each Gatepost top unit (P1, P2, P3) requires a universal bottom unit for a complete assembly (See Contract Dwg. F-017).

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

FARE MEDIA REQUIREMENTS - OPTION 1
(Bid Form E)

Item	Description	Unit	Estimated Quantity	Unit Price	Total Price
1.	Single-trip Ticket	Each	TBD	$_____	$_____
2.	Bus/Rail Monthly Pass	Each	TBD	$_____	$_____
3.	Regional Monthly Pass	Each	TBD	$_____	$_____
4.	Employee Pass	Each	TBD	$_____	$_____
5.	Exit Card	Each	TBD	$_____	$_____
6.	Metro Rail Exit Card	Each	TBD	$_____	$_____

TOTAL PRICE, Option 1 (Items 1 through 6), Enter Amount on Bid Form C, Item 24. $ N.A.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

SCHEDULE OF BID ITEMS AND PRICES - OPTION 2
(Bid Form F)

CONTRACT PRICE - BID TOTAL

Full compensation to Contractor for full and complete performance of the Work, compliance with all terms and conditions of the Contract, and payment by Contractor for all obligations incurred in or applicable to the Contractor's performance of the Work shall be the sum of the following bid items, which include all delivery costs and applicable taxes.

OPTION - TERMS

This option is for the purchase of the listed goods and services. The option may be exercised up until 5 years after the date of execution of the base contract. Delivery to commence no later than 1 year and to be completed no later than 3 years after option is exercised. Options should be quoted in present dollars. The price for an option, if exercised, will be subject to Economic Price Adjustment, in accordance with the Article so titled in the Special Provisions.

Item	Description	Unit	Quantity	Unit Price	Total Price
1.	Ticket Vending Machine	Each	44	$_____	$_____
2.	Add Fare Machine	Each	20	$_____	$_____
3.	Bidirectional Gate	Each	5	$_____	$_____
4.	Bidirectional Console	Each	5	$_____	$_____
5.	Entry Gate	Each	30	$_____	$_____
6.	Exit Gate	Each	11	$_____	$_____

Item	Description	Unit	Quantity	Unit Price	Total Price
7.	Exit Console	Each	15	$_____	$_____
8.	Dummy Gate	Each	5	$_____	$_____
9.	Station Fare Collection Control Unit	Each	6	$_____	$_____
10.	Passenger Assistance Center (Freestanding Cabinet Type)	Each	10	$_____	$_____
11.	Handicapped Fare Gate	Each	5	$_____	$_____
12.	Emergency Exit Gate	Each	6	$_____	$_____
13.	Fence - Type A	Each	20	$_____	$_____
14.	Fence - Type B	Each	96	$_____	$_____
15.	Fence - Type C3	Each	20	$_____	$_____
16.	Gatepost - Type P1 (See Note 1)	Each	10	$_____	$_____
17.	Gatepost - Type P2 (See Note 1)	Each	10	$_____	$_____
18.	Gatepost - Type P3 (See Note 1)	Each	2	$_____	$_____
19.	Underfloor Door Closer	Each	12	$_____	$_____
20.	Fence Base Support (See Dwg. F-013)	Each	124	$_____	$_____
21.	Fare Media - Bid Form "G"	Lump Sum	1		$ N.A.
22-38.	Installation/Testing for Bid Items 22 through 38. Install and test (or remove) all equipment as specified in Appendix D and the Technical Provisions. Furnish and install all installation hardware and cabling as required. Option 2 equipment shall be identical to Option 1 equipment.				

Bid Form F (Cont'd.)

Item	Description	Unit	Quantity	Unit Price	Total Price
22.	Union Station	Lump Sum	1		$_____
23.	Civic Center	Lump Sum	1		$_____
24.	5th/Hill	Lump Sum	1		$_____
25.	7th/Flower	Lump Sum	1		$_____
26.	Wilshire/Alvarado	Lump Sum	1		$_____
27.	Wilshire/Vermont	Lump Sum	1		$_____
28.	Wilshire/Normandie	Lump Sum	1		$_____
29.	Wilshire/Western	Lump Sum	1		$_____
30.	Wilshire/Crenshaw	Lump Sum	1		$_____
31.	Wilshire/La Brea	Lump Sum	1		$_____
32.	Wilshire/Fairfax	Lump Sum	1		$_____
33.	Fairfax/Beverly	Lump Sum	1		$_____
34.	Fairfax/Santa Monica	Lump Sum	1		$_____
35.	La Brea/Sunset	Lump Sum	1		$_____
36.	Hollywood/Cahuenga	Lump Sum	1		$_____
37.	Universal City	Lump Sum	1		$_____
38.	North Hollywood	Lump Sum	1		$_____

BID TOTAL, Option 2 (Sum of Items 1 through 38) ..... $_____

Note 1: Each Gatepost top unit (P1, P2, P3) requires a universal bottom unit for a complete assembly (See Dwg F-017).

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

FARE MEDIA REQUIREMENTS - OPTION 2
(Bid Form G)

Item	Description	Unit	Estimated Quantity	Unit Price	Total Price
1.	Single-trip Ticket	Each	TBD	$_____	$_____
2.	Bus/Rail Monthly Pass	Each	TBD	$_____	$_____
3.	Regional Monthly Pass	Each	TBD	$_____	$_____
4.	Employee Pass	Each	TBD	$_____	$_____
5.	Exit Card	Each	TBD	$_____	$_____
6.	Metro Rail Exit Card	Each	TBD	$_____	$_____

TOTAL PRICE, Option 2(Items 1 through 6), Enter Amount on Bid Form F, Item 21. $ N.A.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

BUY AMERICA CERTIFICATE

The Bidder hereby certifies that it will comply with the requirements of Section 165 (a) of the Surface Transportation Assistance Act of 1982 and the regulations in 49 CFR Part 661.

Date _____

Signature _____

Title _____

or

The Bidder hereby certifies that it cannot comply with the requirements of Section 165 (a) of the Surface Transportation Assistance Act of 1982, but may qualify for an exception to the requirement pursuant to Section 165 (b) of the Surface Transportation Assistance Act and regulations in 49 CFR 661.7.

Date _____

Signature _____

Title _____

This form must be completed and attached to Bid unless a cashier's check or certified check is attached. (See Article entitled Bid Security of Instructions to Bidders.)

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we _____ as Principal, hereinafter called the Principal, and _____, a corporation duly organized under the laws of the State of _____ as Surety, hereinafter called the Surety, are held and firmly bound unto the Southern California Rapid Transit District, hereinafter called the Obligee, in the sum of _____ Dollars ($_____.____), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for _____.

NOW, THEREFORE, if the Obligee shall accept the Bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this ____ day of _____, 19__.

(SEAL)

_____
Principal

By: _____

_____
(Type Name and Title)

And: _____
Surety

By: _____

_____
(Type Name and Title)

END OF FORMS FOR BIDDING

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

V. CONTRACT FORMS

NOTE: These forms are for reference only, and will only be required for execution by the successful bidder.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

CONTRACT AGREEMENT

THIS CONTRACT IS entered into, on _____ , by and between Southern California Rapid Transit District (District) whose address is 124 West Fourth Street, Los Angeles, California 90013, and _____
(hereinafter referred to as "Contractor") whose address is:_____
_____

In consideration of the agreements herein contained, the parties hereto contract and agree as follows:

1.0 CONTRACT. This Contract shall consist of this Contract Agreement and the following documents, including all exhibits, drawings, specifications, and documents referred to therein, and all attachments thereto, all of which by this reference are incorporated herein and made a part of this Contract:

1. Completed Forms For Bidding
2. Contract Documents (as defined in Article I of the General Provisions)
3. All Addenda to Bid/Proposal Documents
4. Contractor's Proposal identified as: _____

2.0 SCOPE OF WORK. Except as otherwise expressly provided elsewhere in the Contract, Contractor shall supply all goods, services, and items of expense necessary to perform, and shall perform, the following Work:

FURNISH AND INSTALL FARE COLLECTION SYSTEM

said Work being more particularly described in the Specifications and herein referred to as "Work."

3.0 CONTRACT PRICE. Contractor's full compensation for full and complete performance by Contractor of all the Work in compliance with all terms and conditions of this Contract shall be the total sum of:

_____

_____ Dollars $ _____

IN WITNESS WHEREOF, the parties hereto have executed this Contract on the day and year written below, but effective as of the day and year first set forth above. If the Contractor hereunder is comprised of more than one legal entity, each such entity shall be jointly and severally liable hereunder.

Southern California Rapid Transit District	Contractor
By _____	By _____
_____ (Typed Name)	_____ (Typed Name)
Title _____	Title _____
Date _____	Date _____
Attest: _____	Attest: _____

Approved as to legal form:

_____
SCRTD Counsel

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

FARE COLLECTION

CONTRACT A660

INVITATION TO BID DATED _____

Bidder _____

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS:

THAT _____
_____
_____, as Principal,
and _____
_____, a corporation duly organized
under the laws of the State of _____ as Surety, are
held and firmly bound unto the Southern California Rapid Transit
District (District), a public corporation of the State of Califor-
nia, in the sum of _____
_____
Dollars ($_____.__) for the payment of which we
hereby bind ourselves, our heirs, executors, administrators, and
assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated _____
entered into a Contract with District, which Contract is by
reference made a part hereof, and is hereinafter referred to as
the Contract.

The condition of the foregoing obligation is such that if the said Principal shall perform all things agreed to in said Contract to be done and performed, then this obligation is to be void; otherwise to remain in full force and effect;

PROVIDED,

A. Any alteration in the Work to be done, or the material to be furnished, which may be made shall not in any way release the Principal or the Surety hereunder, nor shall any extensions of time granted release either the Principal or the Surety, and notice of such alterations or extensions of the Contract is hereby waived by the Surety.

B. Whenever Principal shall be, and is declared by District to be in default under the Contract, the District having performed District's obligations thereunder, the Surety may promptly remedy the default or shall promptly:

1. Complete the Contract in accordance with its terms and conditions, or

2. Obtain a bid or bids for submission to the District for completing the Contract in accordance with its terms and conditions, and upon determination by District and Surety of the lowest responsible bidder, arrange for a contract between such bidder and District, and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the Contract price," as used in this paragraph, shall mean the total amount payable by District to Principal under the Contract and any amendments thereto, less the amount properly paid by District to Principal.

Signed and sealed this ____ day of _____, 19__.

_____
(Principal)

By: _____

_____
(Type Name and Title)

(SEAL)

And: _____
(Surety)

By: _____

_____
(Type Name and Title)

END OF CONTRACT FORMS

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

VI. SPECIAL PROVISIONS

SPECIAL PROVISIONS

TABLE OF CONTENTS

SPECIAL PROVISIONS

FARE COLLECTION SYSTEM

1.0 STATEMENT OF WORK

The Work under this Contract consists of providing management, engineering, manufacturing and field labor, plant, materials, and such other services and facilities required by the Technical Provisions, Contract Drawings, and applicable references therein, to do the following tasks:

A. Design and furnish the fare collection system and equipment.

B. Install and test the fare collection system and equipment as specified in the Equipment Matrixes (Appendixes B, C, and D). Remove and reuse equipment items so designated. Provide and install power wiring from existing electrical panels to each piece of equipment requiring power. Provide and install signal wiring from each piece of equipment to station fare collection control unit. Core drill holes where required for installation. Provide and install reuseable fence barrier modules and filler panels as required for each station. In any exercised option, modify and retest previously furnished equipment as necessary, to be fully compatible with equipment furnished.

Contractor shall have a full-time qualified fare collection engineer on its staff at the Project Site during installation and testing of equipment.

C. Attend or conduct meetings at the places specified for design reviews, program reviews, interface management, and other contract-related purposes.

D. Deliver drawings, schedules, reports, specifications, procedures, plans, computer and microprocessor software documentation, and other data as specified in the Contract Documents and Contract Data Requirements List (CDRL) in the Technical Provisions.

E. Provide manuals. Prepare and deliver training material. Conduct training program(s).

F. Provide test equipment and special tools.

G. Provide spare parts.

H. Provide trained and qualified personnel to perform checkout, testing, and final acceptance of the fare collection system at the Project Site. Provide test equipment and any material required for this purpose.

I. Provide personnel and material to fulfill the warranty obligations of the Contract.

J. Provide any required temporary facilities including electric power and sanitary service.

K. Provide personnel and materials other than spare pavers (DFE) to restore station floor in fare gate array area to its original condition after installing fence and gatepost bases.

2.0 DELIVERY REQUIREMENTS

2.1 Station Equipment - Base Contract

Appendix A, Installation and Testing Schedule, provides installation access dates and completion of testing requirements for the MOS-1 segment of the Project. The station equipment shall be delivered, installed, and tested to meet the required dates. The Contractor's Installation Plan, as identified in the Technical Provisions, shall delineate Contractor's plan for satisfying this requirement.

Appendix B, Equipment Matrix, identifies the equipment requirements for each station of the MOS-1 segment. Those equipments not identified as belonging to any particular station shall be delivered to the District prior to completion of testing of the first station equipment set on the Project Site. Keys in quantities indicated in Section 2 shall be delivered at time of initial equipment installation.

2.2 Test Equipment and Special Tools

The total complement of diagnostic and test equipment and special tools shall be delivered at the same time as delivery of the first station equipment set to the Project Site.

2.3 Manuals

Copies of approved final drafts of the Manuals in quantities specified in Section 21 of the Technical

Provisions, shall be delivered 10 days prior to the start of delivery of equipment to the Project Site. Final approved Manuals shall be printed in the quantities specified in Section 21 of the Technical provisions and delivered 90 days after the completion of testing of the first station equipment set on the Project Site.

2.4 Instructors/Training Materials

All instructors and training materials shall be ready for the training of District personnel 10 days prior to delivery of equipment to the Project Site.

2.5 Spare Parts

Spare parts shall be delivered between months 26 and 32 after NTP. The Contractor shall secure District approval before starting to deliver spare parts.

There shall be an adequate supply of Contractor-owned spares for use in warranty repairs, prior to delivery of the station equipment to the Project Site. District-owned spare parts shall not be used for warranty work.

2.6 Fare Collection Central Computer (FCCC) and Peripherals

The FCCC and peripherals shall be installed and locally tested in the Rail Control Center within the date specified in Appendix A for completion of testing of the first station equipment.

3.0 DISADVANTAGED/WOMEN'S BUSINESS ENTERPRISE REQUIREMENTS

The Disadvantaged/Women's Business Enterprise (DBE/WBE) participation goals for this Contract have been established as indicated below:

DBE goal	10.0 percent
WBE goal	1.0 percent

4.0 BUY AMERICA

A. This procurement is subject to the UMTA Buy America Requirements in 49 CFR Part 661.

A Buy America Certificate, in accordance with the format in the Bid Documents, must be completed and submitted with the Bid. A bid that does not include the certificate will be considered non-responsive.

To meet requirements of 49 CFR Part 661, all steel and manufactured products, as defined in Section 661.3, used in the Contract shall be produced in the United States.

B. A waiver from the Buy America provisions may be sought if grounds for the waiver exist. 49 CFR Part 661, Section 661.7, covers exceptions to the general requirements.

5.0 PAYMENT

5.1 Progress Payments

Progress payments will be made on the basis of delivery and acceptance of the items of work delineated in the Schedules of Bid Items and Prices. The value of each item shall be as contained therein.

5.2 Payment Schedule

The Contractor shall submit to the District for approval not more than 15 working days after Notice To Proceed, a detailed Schedule of Values to be used as a basis for determining progress payments on the Contract for any designated lump sum bid item. The Schedule of Values shall break down costs of the designated lump sum, to identify major products and operations for which the Contractor seeks to receive progress payments. This schedule shall provide for payments equal in total for each lump sum bid item and be in such form and in sufficient detail to satisfy the District that it reasonably apportions payment of the lump sum amount.

5.3 Spare Parts, Test Equipment, and Special Tools

The spare parts, tools, and test equipment will be paid for on a per item basis when delivered and accepted at the District's property.

5.4 Request for Payment

Request for progress payments will be processed in accordance with the Article of the General Provisions entitled Payment.

6.0 WARRANTY PERIOD

6.1 Equipment

The warranty period for the equipment and installation shall extend for 2 years after the date of Notice of

Acceptance or 1 year after start of revenue service for the equipment, whichever occurs first. Acceptance will be by written communication from District to Contractor.

6.2 Spare Parts

The warranty period for spare parts shall extend for 2 years after each part is put into service on the system or for 3 years after delivery, whichever occurs first.

6.3 Test Equipment and Tools

The warranty period for test equipment and special tools shall extend for 3 years after acceptance.

6.4 Warranty Replacement Parts

The warranty period for each part supplied to replace a defective part under this warranty shall be for the remainder of the warranty period on the part replaced or for 1 year after the replacement part is installed, whichever occurs last.

6.5 Additional Warranty

In addition to the warranties specified above, the Contractor shall further warrant the fare collection equipment against excessive failure rates.

The Contractor shall make corrections when the failure rate of any Lowest Level Replaceable Unit (LLRU) is excessive. If the failure rate of any LLRU exceeds 15 percent of the population of the item in any single year during the general warranty period, the Contractor shall make necessary corrections at no charge to the District. Such corrections shall be made in a manner acceptable to the District and shall be made to all station equipment including those for which the warranty has expired.

7.0 LIQUIDATED DAMAGES

If any testing of the fare collection system is not completed by the times specified in Appendix A, the District will be damaged. The damage may include but not be limited to:

A. Loss of revenue

B. Increased cost because of need to compress the period of prerevenue operations

C. Increased cost because of impact on other contracts

D. Increased cost of contract administration, construction management, etc.

The extent of such damages will be difficult or impossible to determine accurately.

7.1 Just Compensation

In lieu of actual damages, if the Contractor is late with completion of acceptance testing, the Contractor hereby agrees to pay the District an amount of money as a reasonable estimate of just compensation for the damages contemplated in this Article. The value agreed is (TBD) dollars per day per station (including the RCC) for each day the completion of acceptance testing of a station complement of equipment, or portion thereof, is late relative to the requirements in Appendix A.

7.2 Limitation of Liability

Liquidated damages will be limited for all causes, to a maximum of TBD percent of the Total Price of the Contract. This limitation is applicable to all option quantities on the same basis.

7.3 Payments

The Contractor agrees to make payment in the above amounts in the event of late delivery and agrees that the District may withhold monies for such from any funds due.

7.4 District Rights

Application of the "Liquidated Damages" provisions of the Contract in no way alters the District's rights under the Article of the General Provisions entitled Termination for Default.

8.0 PLACE OF DELIVERY

The place of delivery for all material other than that which the Contractor installs will be provided to the Contractor within 90 days after NTP. The Contractor shall obtain approval from the District prior to beginning shipment of any such equipment. Material shall be shipped FOB destination within the consignee's premises. Instructions for marking shipments will be provided by the District.

9.0 FACILITIES FOR DISTRICT REPRESENTATIVES

At each of the Contractor's facilities, where significant production or fabrication activities take place,

the Contractor shall provide and estimated 400 sq ft of office space, and adequate parking space for the District representatives. Accommodations shall be equivalent to those used by the Contractor's staff and acceptable to the District.

10.0 ECONOMIC PRICE ADJUSTMENT

A. The options have been priced with the original Contract on a basis of value of money at bid time. Accordingly, should the options be exercised, the option bid prices will be adjusted for escalation to the date the option is exercised. Following said adjustment, there will be no further economic price adjustment.

B. The Contractor shall certify that the option prices do not include allowance for contingency to cover increased costs due to escalation for the time period between the award of Contract and the exercise date of options.

C. The following indices shall be used for determining the amount of adjustment in option prices, if any. Adjustments shall be up or down in accordance with the resulting computations per the formula.

1. Materials Index: Producer Price Index Electrical Machinery and Equipment (Code 117) furnished monthly by the United States Department of Labor, Bureau of Labor Statistics.

2. Labor Index: Average hourly earnings for Office, Computing, and Acounting Machines Group (SIC Code 357) furnished monthly by the Bureau of Labor Statistics.

D. The following procedure will be used to calculate the amount of adjustment to the option prices.

1. Regardless of actual costs, for the purpose of determining adjustment in this Article, the materials portion of the price to be adjusted shall be 0.55 times the Contract option price and the labor portion of the price to be adjusted shall be 0.45 times the Contract option price.

2. The Base Index shall be the arithmetic average (rounded to two decimal places) of the value for the month the Contract was executed and the values for the 2 prior months.

3. The Adjustment Index shall be the arithmetic average (rounded to two decimal places) of the value for the month the option is exercised and the values for the 2 prior months.

4. The adjustment Ratio shall be determined by the following formula:

$$\text{Adjustment Ratio} = \frac{\text{Adjustment Index} - \text{Base Index}}{\text{Base Index}}$$

5. The adjustment Amount shall equal the Adjustment Ratio for materials multiplied by the material portion of the option price plus the Adjustment Ratio for labor multiplied by the labor portion of the option price.

6. The Contract Amendment for an option shall be executed at the quoted option price. The Adjustment Amount shall be determined when the final indices for the appropriate months are published and the amount added to the Contract by amendment at that time.

7. If the Bureau of Labor Statistics discontinues determining either of the indices cited herein, the parties shall mutually agree on an appropriate substitute for the discontinued index.

8. If the Bureau of Labor Statistics alters its method of calculating either of the indices, appropriate adjustments in the affected index shall be agreed upon by the parties, to put it on a comparable basis with the index before the change.

11.0 INCREASED OR DECREASED QUANTITIES

A. This Article only applies to unit prices contained in this Contract as shown on the Bid Forms and control payments or credits for variations between estimated quantities and actual quantities required to complete the Work. Increases or decreases will be determined by comparing the actual quantity required to the Estimated Quantities in the Bid Forms and adjusting the Contract Amount to reflect the actual quantities used.

This Article applies to District-initiated additions to or deletions from the Work even though the additions or deletions may be distinct, or separate structures, or activities, and regardless of the fact that the addition or deletion is a result of field adjustments, site conditions, a design change, or any other cause.

B. The District may wish to increase or decrease the quantity of spare parts listed on the bid form. Any such change will be in accord with the unit prices given therein.

12.0 CONTRACTOR'S TECHNICAL PROPOSAL

A. The Contractor's Proposal becomes a Contract Document on execution of the Contract, and all materials and services proposed therein must be provided to the District as proposed.

B. The Precedence of Contract Documents Article of the General Provisions provides the order of Precedence for Contract Documents when resolving conflicting requirements. The Contractor's Proposal shall be placed in the precedence list under the Technical Provisions and above the Contract Drawings.

APPENDIXES

APPENDIX A

INSTALLATION AND TESTING SCHEDULE

Item	Description	Station Access Date[1]	Local Testing Completion Date
1.	Union Station	02/90	03/90
2.	Civic Center	02/90	06/90
3.	5th/Hill	02/90	06/90
4.	7th/Flower	02/90	04/90
5.	Wilshire/Alvarado	02/90	09/90
6.	RCC	TBD	11/90

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[1] It is expected that, by the station access dates shown, the worksite will be made available for fare collection system installation, including necessary electrical panels and conduits. Access to the station at any time is nonexclusive, although the District will coordinate, insofar as possible, the access by all contractors to minimize interference.

APPENDIX B

EQUIPMENT MATRIX/BASE

MOS-1 SEGMENT

Note: This matrix identifies equipment requirements for each station of the MOS-1 Segment. Equipments not identified as belonging to any particular station (i.e., Revenue Carts) shall be considered as systemwide Contract deliverables.

	Stations				LACTC		
Equipment	Union Station	Civic Center	5th/ Hill	7th/ Flower	7th/ Flower	Wilshire/ Alvarado	Total
Ticket Vending Machine	9	4	4	4	0	6	27
Bidirectional Gate	0	0	0	0	2	0	2
Bidirectional Console	1	1	1	1	0	1	5
Entry Gate	4	4	4	4	4	4	24
Exit Gate	0	0	0	0	2	0	2
Exit Console	3	3	3	3	2	3	17
Dummy Gate	2	2	2	2	0	2	10
Station Fare Collection Control Unit	2	2	2	2	0	1	9
Passenger Assistance Center	2	2	2	2	0	2	10
Handicapped Fare Gate	1	1	1	1	0	1	5
Emergency Exit Gate	5	2	6	4	2	2	21
Filler Panels:							
(4' x 6'-6" No Cutout)	12	4	10	7	0	10	43
(4' x 6'-6" With Cutout)	4	4	6	4	0	4	22
(2' x 6'-6" No Cutout)	9	4	10	6	0	8	37
Fence:							
Type A	4	4	4	4	0	4	20
Type B	20	22	13	12	0	19	86
Type C3	4	4	4	4	0	4	20
Gateposts:							
Type P1	2	2	2	2	2	2	12
Type P2	2	2	2	2	2	2	12
Type P3	4	2	7	4	0	2	19
Underfloor Door Closer	6	4	9	6	2	4	31
Base Support - Fence	24	26	17	16	0	23	106
Central Ticket Encoding Machine	-	-	-	-	-	-	1
Booth Ticket Encoding Machine	-	-	-	-	2	-	2
Revenue Cart	-	-	-	-	-	-	10
FCCC and Peripherals	-	-	-	-	-	-	1

APPENDIX C

EQUIPMENT MATRIX

OPTION 1

Note: This table identifies equipment requirements for each station of the Option 1 Contract.

Equipment	Union Station	Civic Center	5th/ Hill	7th/ Flower	Wilshire/ Alvarado	Wilshire/ Vermont	Wilshire/ Normandie	Wilshire/ Western	Wilshire/ Crenshaw	Wilshire/ La Brea	Wilshire/ Fairfax	Fairfax/ Beverly	Total (Net)
	STATIONS												
Ticket Vending Machine	4	3	5	3	4	9	4	6	5	4	7	5	59
Add Fare Machine	4	4	6	4	4	4	2	4	4	4	4	4	48
Bidirectional Gate	1	0	2	1	0	0	0	0	0	0	0	0	4
Bidirectional Console	0	0	0	0	0	1	1	1	1	1	1	1	7
Entry Gate	0	0	0	1	1	5	2	4	4	4	4	4	29
Exit Gate	1	0	1	2	1	1	0	2	0	0	1	0	9
Exit Console	0	0	0	0	0	3	1	2	3	3	3	3	18
Dummy Gate	(1)	0	0	(1)	0	2	1	1	0	2	2	2	8
Dummy Console	0	0	0	0	0	0	0	1	0	0	0	0	1
Station Fare Collection Control Unit	0	0	0	0	0	2	1	1	1	1	2	2	10
Passenger Assistance Center	0	0	0	0	0	2	1	2	2	2	2	2	13
Handicapped Fare Gate	0	0	0	0	0	1	1	1	1	1	1	1	7
Emergency Exit Gate	0	0	0	0	0	2	1	2	1	1	2	1	10
Filler Panels:													
(4' x 6'-6" No Cutout)	(4)	(3)	(5)	(3)	(4)	7	2	7	3	2	4	2	8
(4' x 6'-6" With Cutout)	(4)	(4)	(6)	(4)	(4)	0	0	0	0	0	0	0	0
(2' x 6'-6" No Cutout)	(2)	(3)	(4)	(3)	(4)	5	1	4	2	1	3	2	2
Fence:													
Type A	0	0	0	0	0	4	2	4	4	4	4	4	26
Type B	(3)	0	(3)	(3)	(2)	17	10	20	22	22	20	22	122
Type C3	0	0	0	0	0	4	2	4	4	4	4	4	26
Gateposts:													
Type P1	0	0	0	0	0	2	1	2	2	2	2	2	13
Type P2	0	0	0	0	0	2	1	2	2	2	2	2	13
Type P3	0	0	0	0	0	2	1	1	0	0	1	0	5
Underfloor Door Closer	0	0	0	0	0	4	2	3	2	2	3	2	18
Base Support - Fence	0	0	0	0	0	21	12	24	26	26	24	26	159

( )- Indicates equipment items to be removed from their respective stations, and utilized in stations requiring said equipment item. For equipment items removed and not required in any subsequent station, District will advise Contractor regarding its disposition.

APPENDIX D

EQUIPMENT MATRIX

OPTION 2

Note: This table identifies equipment requirements for each station of the Option 2 Contract.

	STATIONS																	
Equipment	Union Station	Civic Center	5th/ Hill	7th/ Flower	Wilshire/ Alvarado	Wilshire/ Vermont	Wilshire/ Normandie	Wilshire/ Western	Wilshire/ Crenshaw	Wilshire/ La Brea	Wilshire/ Fairfax	Fairfax/ Beverly	Fairfax/ Santa Monica	La Brea/ Sunset	Hollywood/ Cahuenga	Universal City	North Hollywood	Total (Net)
Ticket Vending Machine	2	(1)	1	1	1	2	1	3	1	0	1	0	6	3	4	10	9	44
Add Fare Machine	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	20
Bidirectional Gate	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	5
Bidirectional Console	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	5
Entry Gate	2	0	1	1	1	1	0	0	1	0	0	0	4	4	4	5	6	30
Exit Gate	0	1	2	0	2	2	1	0	0	0	0	0	1	0	0	1	1	11
Exit Console	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	15
Dummy Gate	0	0	(1)	0	(1)	0	0	0	0	0	0	0	2	2	2	1	0	5
Station Fare Collection Control Unit	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	6
Passenger Assistance Center	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	10
Handicapped Fare Gate	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	5
Emergency Exit Gate	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	6
Filler Panels:																		
(4' x 6'-6" No Cutout)	(2)	0	(1)	(1)	(1)	(2)	(1)	(3)	(1)	0	(1)	0	2	1	2	2	4	0
(2' x 6'-6" No Cutout)	(4)	(1)	(3)	(1)	(1)	(2)	(1)	(2)	(1)	(0)	(2)	(1)	1	0	1	4	2	0
Fence:																		
Type A	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	20
Type B	0	(2)	(2)	(1)	(2)	0	0	(1)	0	0	0	0	20	22	22	19	21	96
Type C3	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	20
Gateposts:																		
Type P1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	10
Type P2	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	10
Type P3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2
Underfloor Door Closer	0	0	0	0	0	0	0	0	0	0	0	0	3	2	2	3	2	12
Base Support - Fence	0	0	0	0	0	0	0	0	0	0	0	0	24	26	26	23	25	124

( ) - Indicates equipment items to be removed from their respection stations, and utilized in stations requiring said equipment item. For equipment items removed and not required in any subsequent station, District will advise Contractor regarding its disposition.

END OF SPECIAL PROVISIONS

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

VII. GENERAL PROVISIONS

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GENERAL PROVISIONS

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Section 1 of the General Provisions applies to all Metro Rail Procurement Contracts whether for the supply of equipment, installation of equipment, or both supply and installation of equipment. In addition, when the Contract requires installation work at the Project Site, the articles of Section 2 of the General Provisions are applicable to the Work performed at the Project Site.

1.0 ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

The more common abbreviations, acronyms, and definitions used in the Contract Documents are summarized as follows:

1.1 Abbreviations

Cal/OSHA	California Occupational Safety and Health Administration, Department of Industrial Relations
CFR	Code of Federal Regulations
CM	Construction Manager
CDRL	Contract Data Requirements List
DBE	Disadvantaged Business Enterprise
DOT	United States Department of Transportation
EPA	United States Environmental Protection Agency
FAR	Federal Acquisition Regulations
FPR	Federal Procurement Regulations
GC	General Consultant
HDBK	Handbook
HVAC	Heating, Ventilation and Air Conditioning
ICC	Interstate Commerce Commission
ITB	Invitation To Bid
NTP	Notice To Proceed
OSHA	Occupational Safety and Health Administration, United States Department of Labor; Occupational Safety and Health Act
PUC	State of California Public Utilities Commission
SCRTD	Southern California Rapid Transit District
TTC	Transportation Test Center (FRA Test Facility at Pueblo, Colorado)
UMTA	Urban Mass Transportation Administration (DOT)
US	United States of America
USC	United States Code
WBE	Women Business Enterprise

1.2 Definitions

Technical definitions are contained in the Technical Provisions.

Acceptance. Written documentation attesting to the act of an authorized representative of the District, by

which all Work or a specific portion thereof, under the Contract has been identified as complete to the satisfaction of the District.

Addenda. Written interpretations, revisions, or additions to any of the Bid or Contract Documents issued by the District prior to the Bid Opening.

Award. Written notification to a Contractor of acceptance by the District of the Bid of the lowest responsive, responsible Bidder for the Work, subject to the execution and approval of a satisfactory contract therefor, and bond to secure the performance thereof, and to such other conditions as may be specified or otherwise required by law.

Bid. The formal response, or offer of a bidder for supply of the goods and services called for in the Invitation to Bid at a definite price, submitted on the prescribed Bid Form, properly signed, dated, guaranteed, and within the time limit specified.

Bid Bond. The security in the form approved by the District, executed by the Bidder and Bidder's surety, as a guarantee that the Bidder will enter into a contract with the District.

Bid Documents. Documents provided by the District for the purpose of soliciting bids for the procurement. Bid Documents will include, as applicable, the Invitation to Bid, Instructions to Bidders, unexecuted Contract Documents, and forms for the submittal of bids.

Bidder. An individual, firm, partnership, or corporation, or combination thereof, submitting a written proposal or offer for a contemplated procurement.

Change Order. A written order directing the Contractor to make a change that the Changes Article authorizes the District to make without the Contractor's consent. The effective date of the Change Order shall be the issue date of said order.

Conformed Contract Documents. True copies of the Procurement Specifications Book and Contract Drawings revised to incorporate all changes made to the Bid Documents or Contract Documents by addenda or as indicated on the bid or contract form, as well as true copies of fully executed contract modifications.

Construction Manager (CM). The Joint Venture of Ralph M. Parsons Company, Dillingham Construction, Inc., and DeLeuw, Cather and Company doing business as PDCD, engaged by the District as the Construction Manager, and its successors, if any, acting directly or through

properly authorized agents within the scope of the particular duties delegated to them by the District.

Contract. The written agreement executed by the District and the Contractor which sets forth the rights and obligations of the parties relative to the performance of the Work.

Contract Amendment. A document that changes the Contract by alteration in the specifications, delivery point, rate of delivery, contract period, price, or quantity, whether accomplished by Change Order or by mutual action of the parties to the Contract.

Contract Data Requirements List (CDRL). The listing identified as an Appendix or Table (so titled) in the Technical Provisions, which codifies, defines, and schedules deliverable data requirements.

Contract Documents. The completed and executed Contract Agreement, Performance Bond, DBE/WBE Certification, Special Provisions, General Provisions, Technical Provisions, Contract Drawings, Insurance Specifications, and additional documents incorporated by reference into the Contract Agreement or any other Contract Document.

Contract Drawings. The drawings which show configuration, character, general arrangement, dimensions, and details of the Work. Contract Drawings will either be included in, or enclosed with, the Procurement Specifications Book.

Contract Milestone. An established event or occurrence that is associated with the contract schedule as documented in the Procurement Specifications Book.

Contracting Officer. The person with the authority to execute the contract and make related determinations and findings thereto on behalf of the District.

Contractor. The individual, partnership, firm, corporation, or combination thereof, who has entered into a contract with the District to provide the required services and products.

Critical Path Network. The documents required under the Contract which depict key activities and events, the order and interdependence of planned activities as well as activities by others which affect the Contractor's planning, and the critical path by which the Contractor intends to prosecute the Work.

Days. Unless otherwise designated, days mean calendar days.

District. The Southern California Rapid Transit District or its authorized representatives.

District's Authorized Representative (DAR). The person designated by the District acting within prescribed limits of authority in the management of the Contract.

Equipment. A general term including material, fittings, devices, appliances, fixtures, apparatus, and the like used in the performance of a specific function or functions.

Execution of Contract. The validation by both the District and the Contractor of the Contract Agreement obligating the Contractor to furnish the supplies or services and the District to pay for them.

General Consultant (GC). Metro Rail Transit Consultants, a joint venture composed of the firms Daniel, Mann, Johnson & Mendenhall (DMJM): Parsons, Brinckerhoff, Quade & Douglas, Inc. (PBQD); Kaiser Engineers (California) Corporation (KE), and Harry Weese & Associates (HWA), doing business as "Metro Rail Transit Consultants," engaged by the District as the General Consultant and its successors, if any, acting directly or through properly authorized agents within the scope of the particular duties delegated to them.

General Provisions. The provisions of a contract which describe the contractual relationship of the parties and their rights and responsibilities to each other.

Government. The government of the United States of America.

Indicated. Indicated means, as shown on the Contract Drawings, or as described or specified in the Technical Provisions, or as required by other Contract Documents.

Invitation To Bid (ITB). The advertisement for bids describing the general nature and character of the Work. The invitation includes all documents (whether attached or incorporated by reference) furnished to prospective bidders for the purpose of bidding, including the time and place for Bid Opening.

Insurance Specifications. The document specifying the insurance coverage to be provided by the District and the insurance coverage to be provided by the Contractor.

Metro Rail System. The District's Heavy Rail Rapid Transit System including right-of-way, pavement, tracks, structures, equipment, appurtenances, and other property and fixtures associated therewith.

Notice of Acceptance. Formal written acceptance by the District of the Contractor's Notice of Completion.

Notice of Award. Notice to a bidder of the acceptance of its offer and the intent to execute a contract.

Notice of Completion. Written notice from the Contractor specifying that the Work is fully completed as specified in the Specifications.

Notice of Termination. Written notice from the District to the Contractor and its surety terminating the Contract completely or partially for convenience of the District or default due to the Contractor's failure to perform its contractual obligations.

Notice To Proceed (NTP). Written notice from the District to the Contractor of the date to proceed with the Work specified by the Contract Documents.

Procurement Specifications Book. A set of documents issued by the District for the Work, which includes the Invitation To Bid, Special Provisions, General Provisions, Technical Provisions, Contract Drawings (as applicable), Bid Forms, Contract Forms, Appendixes, and other forms and exhibits identified therein.

Project Site. The right-of-way, tracks, maintenance facilities, and all other property of the District where Work will be performed under the Contract.

Reference Drawings. Those drawings, other than the Contract Drawings, listed in the index that are provided to the Contractor as part of the Bid Documents, for information which depict the major areas of system interface peculiar to the procurement.

Right-of-Way. Real property, and interests therein, acquired by the District.

Special Provisions. Special requirements peculiar and applicable to individual contract packages which supplement or modify the General Provisions.

Specifications. The directions, provisions, and requirements contained or referred to in the Procurement Specifications Book, pertaining to the manner of performing the Work, or to the quantities of Work.

State. The State of California.

Subcontractor. Any individual, partnership, firm, or corporation who undertakes integrally on the Project, the partial or total design, manufacture, or performance of one or more items of Work under the terms of the

Contract. As used herein, the terms subcontractor and supplier are synonymous.

Supplemental Agreement. A contract modification that is accomplished by the mutual action of the parties and signed by both the Contracting Officer and the Contractor.

Surety. The corporate body bound with and for the Contractor, for the full and complete performance of the Contract and for the payment of all debts pertaining to the Work. When applying to the Bid Bond, it refers to the corporate body which acts as guarantor that the Bidder will enter into a contract with the District.

Technical Provisions. Requirements that set forth the details of the Work including design, performance, material, testing, methods of manufacture, and other requirements peculiar to the procurement.

United States Department of Transportation. The Secretary of the US Department of Transportation and other persons who may at the time be acting in the capacity of the Secretary or authorized to perform the functions to be performed hereunder by DOT, including representatives of the Urban Mass Transportation Administration (UMTA).

Work. The furnishing of all the products, materials, equipment, data, and services in accordance with the Contract Documents including changes thereto.

2.0 INTENT OF THE CONTRACT

It is the intent of the Southern California Rapid Transit District (District) that this procurement Contract result in delivery to the District of the specified equipment that is, in all respects, suitable for its intended use on the Metro Rail System. The Technical Provisions and Contract Drawings are intended to be generally complete and comprehensive, but do not show all details of the Work required to be performed. The Contractor, based on its experience, shall complete the detail design as necessary to supply equipment in conformance with the Technical Provisions and Contract Drawing.

The Contractor shall be solely responsible for the design of the equipment. If at any time the Contractor finds that any requirement of these Specifications appears to be in error or in conflict with the general intent of the Contract, it shall expeditiously bring such conflict to the attention of the District's Authorized Representative (DAR) in writing for resolution.

3.0 PRECEDENCE OF CONTRACT DOCUMENTS

The Special Provisions, General Provisions, Technical Provisions, Contract Drawings, and all other Contract Documents referenced therein are part of the Contract. They are intended to describe the Work and be complementary.

Any inconsistency in requirements of the documents shall be resolved by giving precedence in the following order:

A. Executed Contract Agreement
B. Forms for Bidding
C. Special Provisions
D. General Provisions
E. Technical Provisions
F. Contract Drawings
G. Cited Codes and Standards

All Contract Documents shall take precedence over approved Contractor drawings. In case of differences between small and large scale drawings, the large scale drawings shall govern. Written dimensions on drawings shall have precedence over scaled dimensions in case of a discrepancy.

4.0 CONTRACT DRAWINGS

Contract Drawings are those drawings and revision levels identified and contained either in the Procurement Specifications Book or Contract Drawing Book. These drawings are complementary but subsidiary to the Specifications. Anything mentioned in the Specifications (including General and Technical Provisions) and not shown on the Contract Drawings, or shown on the Contract Drawings and not mentioned in the Specifications, will be of like effect as if shown in both.

5.0 DISTRICT'S AUTHORIZED REPRESENTATIVE

Administration of the Contract for the District shall be through the District's Authorized Representative (DAR). The DAR shall be designated by the District and act under the authority delegated by the District. A written description of the DAR's authority to act in administration of this Contract will be furnished to the Contractor with the Notice To Proceed.

6.0 CONTRACTOR'S PROJECT MANAGER

The Contractor shall provide, within 10 days after notice of award, the name and resume (including title, qualifications, and experience) of its Project Manager (PM) to the District for approval. Once approved, the PM shall devote full time to the project until all

program plans and schedules have been submitted and approved by the District. Should the Contractor later wish to reduce the level of PM effort to part-time, it may do so only with prior approval of the District. The PM shall not be reassigned from the project without concurrence of the District.

A written description of the authority of the Contractor's PM shall be provided to the District.

7.0 PERFORMANCE BOND

The Contractor shall provide, within 10 days after notice of award, a performance bond in the amount of 100 percent of the total contract price. The performance bond shall be on the form provided by the District, and shall be executed as surety by a corporation or corporations authorized to issue surety bonds in the State of California, and satisfactory to the District.

The provisions of the bond shall be such that alterations, extensions of time, extra and additional work, and other changes authorized by the Contract Documents may be made without the consent of the surety or sureties. The bond shall remain in force until the warranty obligation is completed, but the amount of bond may be reduced to 10 percent of the total Contract Price after final acceptance.

8.0 INSURANCE

8.1 Within 10 days after award of the Contract and before any part of the Work is commenced, the Contractor shall, at the Contractor's sole cost, cause to be issued and maintained during the entire progress of the Work, not less than the insurance coverages set forth below:

A. Worker's Compensation, including Employer's Liability, in the minimum amount of $1,000,000, in states where employees are working under the Contract.

B. Comprehensive General Liability including Contractual Liability and Products Liability covering bodily injury, including death, and property damage in the single limit per occurrence amount of $5,000,000.

C. Comprehensive Automobile Liability including owned, nonowned, and hired vehicles covering bodily injury, including death, and property damage in the single limit per occurrence amount of $5,000,000.

8.2 The policy of insurance which affords Comprehensive General Liability shall contain a provision or endorsement stating that such insurance:

A. Applies to the liability assumed by the Contractor under this Contract, subject to all of the terms and provisions of such insurance.

B. Does not contain any exclusion as to loss or damage to property caused by explosion or resulting from collapse of buildings or structures or damage to property underground, commonly referred to by insurers as the "XCU" hazards.

8.3 Certificates of Insurance satisfactory in form to the District shall be supplied by the Contractor to the District evidencing that the required insurance is in full force, that the District and the DAR have been made additional insureds on, or are indemnified under, said policies in respect of liabilities to third parties, and that not less than 30 days prior written notice will be given the District before any cancellation or restrictive modification of the policies.

The Certificates of Insurance shall include a statement that said insurance is primary over any insurance which may be obtained by the District.

8.4 None of the requirements contained herein as to types, limits, and the District's approval of insurance coverage to be maintained by the Contractor are intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by the Contractor under the Contract.

9.0 NOTICE TO PROCEED

The District will issue a Notice To Proceed (NTP) within 30 days of Execution of Contract, provided the Contractor has delivered the required bond and certificates, and has designated a Project Manager. The Contractor is not authorized to perform Work under the Contract prior to receiving the NTP. Upon receipt of the NTP, the Contractor shall commence the Work and shall diligently prosecute the Work to completion in accordance with the delivery requirements specified in the Contract documents.

10.0 DOCUMENTATION

10.1 All official correspondence and documentation transmitted to the District shall be in the English language.

10.2 Unless stated otherwise in the Contract Documents, the District will respond to all correspondence submitted

for District action within 30 calendar days of the date the correspondence is received by the District. The District will only be bound to this period of time for review and response if the Contractor submits its documentation in accordance with the dates for submittals shown in the approved project schedule.

10.3 Should the Contractor make submittals at a rate that differs from the schedule, which rate results in placing higher peak loading on the District's resources than submittals to the approved schedule would cause, the District will make its best efforts to respond within 30 days. If, however, the District is unable to respond within that period, the Contractor shall not be entitled to any extra time.

11.0 WARRANTY

11.1 Except where longer periods of warranty are specified in the Special Provisions, the Contractor warrants all equipment, materials, and labor furnished or performed under the Contract shall be satisfactory for their intended purposes and shall be free of all defects in the design, materials, and workmanship for a period of 1 year from and after final acceptance under the Contract, regardless of whether the same were furnished or performed by the Contractor or by any of its subcontractors of any tier. Upon receipt of written notice from the District of any defect in any such equipment, materials, or labor during the applicable warranty period, due to defective design, equipment, materials, or workmanship, the affected item or parts thereof shall be redesigned, repaired, or replaced within a time period and in a manner acceptable to the District.

11.2 The Contractor shall perform such tests as the District may require to verify that such redesign, repairs, and replacements comply with the requirements of the Contract Documents. All costs associated with such redesign, repair, replacement, and testing, including the removal, replacement, and reinstallation of equipment and materials necessary to gain access, shall be borne by Contractor. The Contractor warrants such redesigned, repaired, or replaced work against defective design, materials, and workmanship for the remainder of the warranty period or a period of 1 year from and after the date of acceptance thereof, whichever occurs later. Should the Contractor fail to promptly make the necessary redesign, repair, replacement, and test, the District may perform or cause to be performed the same at the Contractor's expense.

11.3 District-owned spare parts will not be used for warranty purposes. The Contractor shall maintain a sufficient quantity of replacement parts on hand at or near the

District repair facility to repair warrantable failures and defects. The security, control, shipping, and disposition of Contractor-owned parts shall be the responsibility of the Contractor.

Contractor personnel will be entitled to use District facilities and special equipment to perform warranty work, provided that such work is conducted during normal hours, does not interfere with other District activities, and is performed in accordance with District policies and directions. Damages to District property caused by Contractor representatives shall be the sole responsibility of the Contractor, and shall be corrected at the Contractor's expense.

11.4 The Contractor and its surety or sureties, shall be liable for the satisfaction and full performance of the warranties as set forth herein.

12.0 PAYMENT

12.1 The Contractor shall submit its progress payment request to the District for payment, no later than the 25th of each month. Invoices shall be of a format acceptable to the District. The District will make partial payment to the Contractor within 30 days after receipt of and based on the progress payment request as approved by the District. Approval of requests for payment is subject to District verification of the accuracy of the data presented. Said verification will be accomplished by whatever reasonable means the District deems necessary. The District will retain 10 percent of the amount of each request as partial security for the fulfillment of the Contract by the Contractor unless otherwise specified by applicable law. However, the total amount retained will not exceed 5 percent of the total Contract Price. Monies shall be retained until the District has given final acceptance to the Contractor's Notice of Completion, unless otherwise specified in the Special Provisions.

12.2 Funds retained by the District as security for the Contractor's full and faithful performance of the Contract may be released to the Contractor upon District acceptance of a substitute security offered by the Contractor pursuant to and in accordance with the provisions of California Government Code Section 4590.

12.3 Whenever the Work is substantially complete, the District, at its sole discretion, if it considers the amount retained to be in excess of the amount adequate for the protection of the District, may release to the Contractor all or a portion of such excess amount.

12.4 With each invoice submitted (except the initial invoice), the Contractor shall provide a certification that it has paid to its subcontractors that portion of funds received from the District to which they are entitled by the terms of their contracts. The Contractor shall promptly provide documentary evidence to substantiate the certification if the District requests same.

13.0 NOTICE OF COMPLETION, FINAL ACCEPTANCE, AND PAYMENT

13.1 When the Contractor determines that the Work is fully completed, including satisfactory completion of such inspections, tests, and documentation as are specified in the Contract Documents, the Contractor shall give a written Notice of Completion specifying the Work completed and the date it was completed.

Within 30 calendar days after receipt of said Notice of Completion, the District will inspect the Work and shall either reject the Notice of Completion and specify defective or uncompleted portions of the Work, or shall issue the Contractor a written Notice of Acceptance of the Work. The warranty period for the Work starts with the issuance of the Notice of Acceptance.

13.2 If the District rejects the Notice of Completion and specifies defective or uncompleted portions of the Work, the Contractor shall promptly remedy such defective and uncompleted portions of the Work. Thereafter, the Contractor shall again give the District a written Notice of Completion of the Work, specifying a new date for the completion of the Work based upon the date such defective or uncompleted portions of the Work were corrected. The foregoing procedure shall apply again and successively thereafter until the District has given the Contractor written Notice of Acceptance for purposes of final payment and final acceptance.

13.3 The final retention invoice shall contain a complete itemized listing of progress payment invoices by number, date, gross amount, retention amount, and the total amount of sums retained and due. It shall also contain, or be supported by, a written Notice of Acceptance of the Work signed by the District for purposes of final payment and a final payment certification.

13.4 The District shall not be obligated to make final payment to the Contractor until the Contractor has delivered to the District a certificate and release satisfactory to the District stating that the Contractor has fully performed under the Contract, that all Contractor claims for the Work are satisfied upon the making of such final payment, and that no property used

in connection with the Work is subject to any unsatisfied lien or claim as a result of the performance of the Work.

13.5 Unless otherwise specified by law, final payment will be made not less than 35 calendar days after acceptance of the Contractor's Notice of Completion. In the event of disagreement on the amount of final payment, payment will be made within 10 calendar days after written concurrence with any amendments to the final invoice and documents, but not earlier than the 35 calendar days.

13.6 Any failure by the District to inspect or to reject the Work or to reject the Contractor's Notice of Completion as set forth above, shall not be deemed to be acceptance of the Work by the District nor imply acceptance of or agreement with said Notice of Completion.

14.0 CHANGES

14.1 Directed Changes

The DAR may, at any time and without notice to the sureties, by written order designated as a Change Order, make any change in the Work within the general scope of the Contract, including but not limited to changes in:

A. Drawings, designs, or Specifications

B. Method of shipment

C. Place of delivery

D. Time of performance and schedules.

If implementing any Change Order causes an increase or decrease in the cost of or the time required for the performance of any part of the Work under the Contract, an equitable adjustment will be made and the Contract will be modified accordingly. Any request for adjustment by the Contractor under this Article shall be asserted within 30 days from the date of receipt by the Contractor of the notification of change.

Failure to agree to any adjustment shall be considered a dispute covered under the Article entitled DISPUTES in these General Provisions. Nothing, however, shall excuse the Contractor from proceeding immediately with the Work as changed by the Change Order.

Except as herein provided, no order, statement, or conduct of the DAR or any other person shall be treated as a Change Order under this Article, or entitle the Contractor to an equitable adjustment hereunder.

14.2 Proposed Changes

In addition to Directed Changes specified under Subarticle 14.1, changes within the general scope of the Contract may be proposed by either the District or the Contractor. In either case, the Contractor shall prepare a change proposal and submit it to the District. In the case of a District-requested change, the change proposal shall be submitted within 30 days of a written request for a proposal. The proposal shall describe the change and include any proposed adjustment in price and terms. The proposal shall remain valid for a period of 30 days or any mutually agreeable longer period.

During this validity period, the District may:

A. Accept the proposal by submitting a signed supplemental agreement for execution by the Contractor.

B. Begin good-faith negotiations of the Contractor's proposal leading to the execution of a Supplemental Agreement.

C. Notify the Contractor that the change will not be implemented.

If the Contractor's proposal is accepted in whole or in part, such acceptance will be implemented by a Contract Amendment.

15.0 PRICING ADJUSTMENTS

The price of Work added, deleted, or changed will be determined by negotiation of requests for adjustment submitted by the Contractor.

Such requests shall be in sufficient detail to permit cost or price analysis by the District. The Contractor shall provide adequate cost backup data to enable the District to ascertain that the price is fair and reasonable. The District shall be the sole judge of the adequacy of the pricing data. The pricing of adjustments in the Contract price is also governed by the Article entitled PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA in these General Provisions.

16.0 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA

16.1 Applicability

This Article applies to any modification of the Contract which involves aggregate increases (or decreases) in costs in excess of $100,000 if the pricing is not based on adequate competition, established catalog or market

prices of commercial items, or prices set by law or regulation.

For such modifications, the Contractor shall submit a Certificate of Current Cost or Pricing Data. In this certificate, the Contractor shall certify that, to the best of its knowledge, the cost or pricing data furnished or identified in the Contractor's request for adjustment are accurate, current, and complete as of the date the Contract is amended for said adjustment. Certificates from subcontractors are required if the price adjustment includes subcontracts or changes to subcontracts.

16.2 Adjustment .

If any price, including profit or fee negotiated in connection with any modification under this Article, was increased because:

A. The Contractor or a subcontractor furnished cost or pricing data that were not complete, accurate, and current as certified in its Certificate of Current Cost or Pricing Data; or

B. A subcontractor or prospective subcontractor furnished to the Contractor cost or pricing data that were not complete, accurate, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data; or

C. Any of these parties furnished data of any description that were not accurate; then

the price or cost shall be reduced accordingly and the Contract shall be modified to reflect the reduction.

This right to a price reduction is limited to that resulting from defects in data relating to modifications for which this Article is applicable in accordance with Subarticle 16.1. Failure to agree on a reduction shall be considered a dispute covered under the Article entitled DISPUTES in these General Provisions.

17.0 EXTENSION OF TIME

Except with respect to defaults of subcontractors at any tier, the Contractor will be granted an extension of time and will not be assessed liquidated damages for any portion of a delay in completion of the Work if the failure to perform arises from causes such as acts of God, acts of governments, acts of the public enemy, fires, floods, earthquakes, epidemics, quarantine restrictions, strikes and labor disputes, freight embargoes, or weather substantially more severe than the

norm, provided that the aforesaid causes were not foreseeable and did not result from the fault or negligence of the Contractor, and provided further that the Contractor has taken reasonable precautions to prevent further delays arising from such causes and has notified the District in writing of the cause or causes of delay within 5 days from the beginning of any such delay.

Within 30 days after the end of the delay, the Contractor shall furnish the District with detailed information concerning the causes and circumstances of the delay, the number of days actually delayed, the appropriate Contract references, and the measures taken to prevent or minimize the delay. Failure to submit all such information within the 30-day period will be sufficient cause for denying the claims for an extension of time. The District will ascertain the facts and the extent of the delay and its findings thereon will be final and conclusive subject to provisions of the Article entitled DISPUTES in these General Provisions. Neither a delay nor an extension of time granted pursuant to this Article shall be the basis of a claim for additional compensation or damages, and no damages or costs of any kind or nature will be paid for any delay or extension of time. Time extensions must be approved by the District prior to the interim or final completion date being extended.

18.0 STOP WORK ORDER

18.1 Notice

The DAR may, at any time, by written order to the Contractor, require the Contractor to stop all or any part of the Work called for by the Contract, for a period of up to 90 days and for any further period to which the parties may agree. Any such order will be specifically identified as a Stop Work Order, issued pursuant to this Article. As a minimum, any such Stop Work Order shall include the following written information:

A. A clear description of the Work to be suspended;

B. Instructions regarding Contractor's purchased materials and services;

C. Guidance as to action to be taken on subcontracts;

D. Other suggestions to the Contractor for minimizing cost.

Upon receipt of such order, the Contractor shall immediately comply with its terms and take all reasonable

steps to minimize the incurrence of costs allocable to the Work covered by the order during the period of work stoppage. Within the period of the Stop Work Order, or within any extension of that period to which the parties shall have agreed, the DAR shall either:

A. Cancel the Stop Work Order, or

B. Terminate the Work covered by such order as provided in the Article entitled TERMINATION FOR CONVENIENCE in these General Provisions.

18.2 Cancellation of Stop Work

If a Stop Work Order issued under this Article is cancelled, or the period of the order or any extension thereof expires, the Contractor shall resume the Work. An equitable adjustment to the Contract shall be made if:

A. The Stop Work Order results in an increase in the time required for, or in the Contractor's cost properly allocable to, the performance of any part of the Contract, and

B. The Contractor submits a claim for such adjustment within 30 days after the Stop Work Order is cancelled.

18.3 Termination

If a Stop Work Order is not cancelled and the Work covered by such order is terminated, the reasonable costs resulting from the Stop Work Order shall be allowed in arriving at the termination settlement.

19.0 TERMINATION FOR CONVENIENCE

The Contract may be terminated in whole or in part by the District whenever termination is in its best interest. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which performance of Work under the Contract is terminated and the effective date.

19.1 Contractor's Obligation

After receipt of a Notice of Termination, and except as otherwise directed by the DAR, the Contractor shall:

A. Stop Work on the date and to the extent specified in the Notice of Termination.

B. Place no further orders or subcontracts for materials, services, or facilities, except that

which is necessary to complete the portion of the Work that is not terminated.

C. Terminate all orders and subcontracts to the extent that they relate to the performance of Work terminated by the Notice of Termination.

D. Assign to the District, in the manner, at the times, and to the extent directed by the DAR, all of the rights, title, and interest of the Contractor under the orders and subcontracts so terminated. The District may, at its discretion, settle or pay any or all claims arising out of the termination of such orders and subcontracts.

E. Settle outstanding liabilities and claims arising out of the termination of orders and subcontracts with the approval or ratification of the DAR, which approval or notification shall be final for the purposes of this Article.

F. When directed by the DAR, transfer title and deliver to the District the following:

1. The fabricated or unfabricated parts, Work in process, completed Work, supplies, and other material procured as a part of, or acquired in connection with, the performance of the Work terminated, and

2. The completed or partially completed plans, drawings, information, and other property, which, if the Contract had been completed, would have been required to be furnished to the District.

G. When directed by the DAR, use best efforts to sell, in the manner, at the times, to the extent, and at the price or prices directed or authorized by the DAR, property of the types referred to in this Article, provided, however, that the Contractor:

1. Shall not be required to extend credit to any purchaser, and

2. May acquire any such property under the conditions prescribed and at a price or prices approved by the DAR.

H. Complete performance of each part of the Work which is not terminated.

I. Take action necessary, or as the DAR may direct, to protect and preserve the property related to the

Contract which is in the possession of the Contractor and in which the District has or may acquire an interest.

The proceeds of any transfer or disposition of property of the types referred to in this Article shall be applied in reduction of any payments to be made by the District to the Contractor under the Contract, or will otherwise be credited to the price or cost of the Work covered by the Contract, or paid in such other manner as the DAR may direct.

19.2 Termination Claim

A. After receipt of a Notice of Termination, the Contractor shall submit to the DAR its termination claim, in the form and with certification prescribed by the DAR. Such claim shall be submitted promptly, but in no event later than 1 year from the effective date of termination, unless extensions are granted by the DAR. Upon failure of the Contractor to submit its termination claim within the time allowed, the DAR may determine, on the basis of information available, the amount (if any) due the Contractor by reason of the termination. The District may thereupon pay the Contractor the amount so determined.

B. Subject to the above, the Contractor and the DAR may agree upon the whole or any part of the amounts to be paid to the Contractor by reason of the total or partial termination of Work pursuant to this Article. Such amount or amounts may include an allowance for profit on Work done, providing that such agreed amount or amounts, exclusive of settlement costs, shall not exceed the total Contract price as reduced by the amount of payments otherwise made and as further reduced by the Contract Price of Work not terminated. The Contract will be amended accordingly and the Contractor will be paid the agreed amount.

C. Failure of the Contractor and the DAR to agree upon the whole amount to be paid the Contractor, by reason of the termination of Work pursuant to this Article, shall be considered a dispute covered under the Article entitled DISPUTES in these General Provisions.

19.3 In arriving at the amount due the Contractor under this Article, there will be deducted:

A. The amount of any claim which the District has against the Contractor in connection with the Contract; and

B. The agreed price for, or the proceeds of sale of materials, supplies, or other things acquired by the Contractor or sold, pursuant to the provisions of this Article, and not otherwise recovered by or credited to the District.

19.4 If the termination hereunder is partial, prior to the settlement of the terminated portion of the Contract, the Contractor may file with the DAR a written request for an equitable adjustment of the price or prices specified in the Contract relating to the continued portion of the Contract (the portion not terminated by the Notice of Termination), and an equitable adjustment may be made in the price or prices.

19.5 The District may from time to time, under terms and conditions it prescribes, make partial payments and payments on account against costs incurred by the Contractor in connection with the terminated portion of the Contract whenever, in the opinion of the District, the aggregate of payments does not exceed the amount to which the Contractor is entitled. If the total of the payments is in excess of the amount finally agreed upon or determined to be due under this Article, the excess shall be paid by the Contractor to the District upon demand, together with interest at the rate of 10 percent per annum, for the period from the date the excess payment is received by the Contractor to the date on which the excess payment is repaid to the District.

19.6 For a period of 3 years after the effective date of final termination settlement, the Contractor shall preserve all its books, records, documents, and other evidence bearing on its costs and expenses incurred for the terminated portion of the Contract. When requested, the Contractor shall make such information available at all reasonable times, at the office of the Contractor, and at no charge, to the District or its agents.

19.7 The Contractor shall include, or have included, the requirements of this Article in all subcontracts of any tier. The Contractor shall communicate any Notice of Termination issued by the District to the affected subcontractors of any tier, immediately upon its receipt.

19.8 Under no circumstances shall the Contractor be entitled to anticipatory or unearned profits or consequential damages as a result of a termination or partial termination under this Article.

20.0 TERMINATION FOR DEFAULT

20.1 District's Rights in Default

The District may, by written Notice of Termination to the Contractor, terminate for default the Contractor's right to proceed with the Work or any part of the Work which is in default if:

A. The Contractor fails to make delivery of the supplies or to perform the services, including installation and test, within the time specified herein or any extension thereof; or

B. The Contractor fails to perform any of the other provisions of the Contract, or so fails to make progress as to endanger performance of the Contract in accordance with its terms; and

C. The Contractor does not remedy such failure or commence, within a period of 5 days after receipt of notice, to remedy such failure and proceed with diligence to complete the remedy on a schedule set by the District.

If the District terminates the Contract in whole or in part as provided in this Article, the District may procure supplies or services similar to those so terminated. The Contractor shall be liable to the District for any excess costs for such similar supplies or services.

The Contractor shall continue the Work not terminated.

20.2 Rights and Obligations in Termination for Default

On receipt of a Notice of Termination from the District, the Contractor shall:

A. Stop Work on the date of, and to the extent specified in, the Notice of Termination;

B. Place no further orders or subcontracts for materials, equipment, services, or facilities except that which is necessary to complete the portion of the Work which is not terminated;

C. Terminate all orders or subcontracts to the extent that they relate to the performance of Work terminated by the Notice of Termination;

D. Comply with all other requirements of the District specified in the Notice of Termination.

If the Contract is terminated as provided in this Article, the District may require the Contractor to transfer title and deliver to the District, as directed by the DAR, the following:

A. Any completed supplies, and

B. Such partially completed supplies and materials, installations, parts, tools, dies, jigs, fixtures, plans, drawings, information, and contract rights (hereinafter called "manufacturing materials") that the Contractor has specifically produced or acquired for the terminated portion of this Contract. The Contractor shall also protect and preserve property in its possession in which the District has an interest.

20.3 Payment

Payment for completed supplies delivered to and accepted by the District shall be at the Contract price.

Payment for manufacturing materials, work-in-process, and partially completed installations delivered to and accepted by the District shall be in an amount agreed upon by the Contractor and the DAR. Failure to agree on an amount shall be considered a dispute covered under the Article entitled DISPUTES in these General Provisions.

The District may withhold from amounts otherwise due the Contractor for such completed supplies or manufacturing materials such sum as the DAR determines to be necessary to protect the District against loss because of outstanding liens or claims of former lienholders.

20.4 Exception in Default

The Contractor's rights to proceed may not be terminated for default arising out of delay, and the Contractor may not be charged with resulting damages, if a delay qualifies for an extension of time in accordance with the Article entitled EXTENSION OF TIME in these General Provisions.

If, after Notice of Termination of the Contractor's right to proceed under the provisions of this Article, it is determined that the Contractor was not in default or that the Contractor was entitled to an extension of time under the Article entitled EXTENSION OF TIME in these General Provisions, the rights and obligations of the parties shall be the same as if the Notice of Termination had been issued pursuant to the Article entitled TERMINATION FOR CONVENIENCE in these General Provisions.

20.5 Nonexclusive Remedy

The rights and remedies of the District provided in this Article shall not be exclusive and are in addition to any other rights and remedies provided by law or under the Contract.

21.0 CLAIMS

21.1 Notice of Claim

Claims for additional compensation or time for an act or failure to act on the part of the District, shall be by a written notice of the claim. This provision does not apply for claims arising out of events covered by the Article entitled CHANGES in these General Provisions.

The notice of claim shall set forth the reasons for which an adjustment is due, the nature of the costs involved, and an estimate of the amount of the potential claim. Notice shall be given to the DAR within 15 days after the occurrence of the event giving rise to the claim and prior to the start of any Work because of it.

Requirements of this Article are intended to enable the District to investigate the facts on a timely basis in order to minimize or avoid any effects of a claim. Failure of the Contractor to make the required notice on time is likely to disadvantage the District. Therefore, no claim will be considered unless the Contractor has given notice within the time allotted.

21.2 Submittal of Claim

Claims filed by the Contractor shall be in sufficient detail to enable the District to ascertain the basis for both the claim and the amount claimed. When requested, the Contractor shall furnish any further information and details required by the District to determine the facts or evaluate the contentions involved in the claim. Failure to submit such information will be cause for denying the claim.

A claim shall be submitted within 30 days after notice of claim unless an extension of time is authorized by the DAR. Upon the District's acknowledgement that the claim has merit, the parties shall negotiate an equitable adjustment and the Contract will be amended accordingly.

Contractor shall continue to perform its obligations in a timely manner during any claims proceedings unless the District directs otherwise by written instruction.

22.0 DISPUTES

If a dispute arises, every effort shall be made to resolve the dispute through negotiation. However, in the absence of settlement, the District may, upon its own initiative or promptly upon the written request of the Contractor, make a determination thereof and such determination shall immediately be complied with by the Contractor pending resolution pursuant to the provisions of the following paragraphs of this Article.

Each determination made by the District will be set forth in a written notice thereof to the Contractor. Within 30 days after the receipt of such notice, the Contractor shall respond to the District, in writing, either accepting the determination or stating in general terms the Contractor's factual or legal objections to the determination. If the response is an objection to the determination, in whole or in part, the District will respond, in writing, to the objection within 30 days after the District receipt thereof. The Contractor's failure to respond to the District's determination within the 30 day period shall be deemed an acceptance thereof. No further response by either party shall be required.

Thereafter, either party may seek a judicial determination of a dispute, except when the Contractor accepts the District's determination or fails to respond to the District's determination within the 30 day time limit. Neither the District's determination, nor either party's response, nor the continued performance of the Contract shall constitute an admission as to any factual or legal position in connection with the dispute, or a waiver of rights under this Contract or at law. Disputes subject to this Article shall be governed by the article entitled GOVERNING LAW in these General Provisions.

23.0 RECORDS AND AUDIT RIGHTS

23.1 The Contractor shall make available and permit authorized representatives of the City of Los Angeles, the County of Los Angeles, the District, the California Department of Transportation, the US Department of Transportation (DOT) and the Comptroller General of the United States at its office at reasonable times, to inspect and audit all data and records of the Contractor relating to its performance under the Contract until 3 years after the final payment or, if the Contract is terminated in whole or in part, until 3 years after final termination settlement. Records pertaining to appeals under the Article entitled DISPUTES or to litigation or to the settlement of claims arising under or relating to the performance of the Contract shall be

made available until disposition of the appeals, litigation, or claims. The Contractor shall include, or have included, the requirements of this Article in all subcontracts of any tier.

23.2 Cost or Pricing Data - If the Contractor has submitted cost or pricing data in connection with the pricing of any modification to the Contract, unless the pricing was based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation, each agency listed in this Article shall have the right to examine and audit books, records, documents, and other data of the Contractor (including computations and projections) related to negotiating, pricing, or performing the modification in order to evaluate the accuracy, completeness, and currency of the cost or pricing data.

24.0 INSPECTION

24.1 In addition to the inspection and test required to be performed by the Contractor, all equipment (which term throughout this Article includes without limitation raw materials, components, intermediate assemblies, and end products) shall be subject to inspection and test by the District, to the extent practicable, at all reasonable times and places including the period of manufacture, and, in any event, prior to acceptance.

24.2 If equipment is defective in material or workmanship or otherwise not in conformity with the requirements of the Contract Documents, the District shall have the right either to reject it (with or without instructions as to its disposition) or to require its correction. Equipment which has been rejected or required to be corrected shall be removed or, if permitted or required by the DAR, corrected in-place by and at the expense of the Contractor, promptly after notice, and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. If the Contractor fails to promptly remove such supplies or lots of supplies which are required to be removed, or promptly to replace or correct such supplies or lots of supplies, the District may, either by contract or otherwise, replace or correct such supplies and charge to the Contractor the cost occasioned the District; or terminate this Contract for default, as provided in the Article entitled TERMINATION FOR DEFAULT in these General Provisions. Unless the Contractor corrects or replaces such equipment within the Contract schedule, the District may require the delivery of such equipment at a reduction in price which is equitable under the circumstances. Failure to agree to such reduction of price shall be a dispute under the Article entitled DISPUTES in these General Provisions.

24.3 If any inspection or test is made by the District on the premises of the Contractor or a subcontractor, the Contractor shall provide all reasonable facilities and assistance for the safety and convenience of the District in the performance of its duties. All inspections and tests by the District will be performed in a manner not to unduly delay the Work. The District reserves the right to charge to the Contractor any additional cost of District inspection and test when equipment is not ready at the time such inspection and test is requested by the Contractor, or when reinspection or retest is necessitated by prior rejection. Acceptance or rejection of the equipment shall be made as promptly as practicable after delivery, except as otherwise provided in this Contract. Failure of the District to inspect and accept or reject equipment shall neither relieve the Contractor from responsibility for equipment not in accordance with the requirements of the Contract Documents, nor impose liability on the District thereto.

24.4 The inspection and test by the District does not relieve the Contractor from any responsibility regarding defects or other failures to meet the requirements of the Contract Documents.

24.5 The operations of the Contractor, its subcontractors and suppliers shall be subject at any time to District audit and verification of compliance to all requirements of the Contract Documents relative to practices, methods, procedures, and documentation.

25.0 DISTRICT-FURNISHED EQUIPMENT

The District may provide equipment for installation or other use by the Contractor in carrying out the Work under the Contract. When such District-Furnished Equipment (DFE) is provided for any purpose, the Contractor shall have responsibility as follows:

A. The schedule for delivery of the DFE to the Contractor will be mutually determined by the District and the Contractor. The Contractor shall provide required delivery dates in the master program schedule, as defined in the Technical Provisions. Once the District has accepted and approved the schedule, the delivery dates for DFE will become Contract Milestones. When appropriate, schedules for the return of any DFE from the Contractor will be established in a like manner.

B. DFE will be shipped FOB destination by common carrier to the location specified by the Contractor. The Contractor shall bear responsibility for unloading, handling, storage, and for all

expense of same. Risk of loss shall lie with the Contractor from receipt until return to the District.

C. The Contractor shall also bear responsibility and all expense of same for pick-up from District storage facilities, located within the Los Angeles area, any DFE to be installed by the Contractor at the Project Site.

D. Should DFE be lost or damaged from any cause after receipt by the Contractor, the District shall be notified immediately. The Contractor shall replace or repair it in a manner acceptable to the District. If the District is subjected to extra expense because of such loss or damage, those costs will be recovered from monies due or becoming due to the Contractor.

26.0 PACKING AND SHIPPING

26.1 Authorization

Certain items require District inspection prior to shipment, in accordance with the requirements of the Contract Documents. For such items, the Contractor shall, at least 10 days prior to the estimated shipping date, request authorization to ship. The request shall state the date equipment will be ready for inspection by the District and list exceptions or waivers for any Work not completed. The District may elect to conduct or waive inspection at the source prior to authorization of the shipment. The District will either authorize the shipment in writing or advise the Contractor that it will conduct further inspection and do so to meet the estimated shipping date.

Shipment authorizations by the District prior to acceptance, as specified in this Article, with or without District inspection, shall in no way constitute acceptance or relieve the Contractor from fulfilling the requirements of the Contract Documents.

26.2 Shipping Costs

All shipments shall be at the Contractor's expense, FOB destination within the consignee's facility.

26.3 Packing

All shipments shall be packaged and packed in accordance with the best commercial standards to insure the integrity of equipment during transportation, handling, and storage. Due regard shall be given to protection from loss and pilferage, physical damage, and the effect

of the elements and environmental conditions. There shall be no on-deck shipments by cargo vessel without specific approval from the DAR. These requirements are in addition to any packaging requirements contained in the Special Provisions or Technical Provisions for specific items of equipment.

27.0 TITLE AND RISK OF LOSS OR DAMAGE

27.1 Title

As a security for partial, progress, or other payments, title to items for which such payments are made shall pass to the District at the time of payment. To the extent that title has not previously been vested in the District by reason of payments, title shall pass to the District when items are delivered to a carrier for transportation to the installation site (or other specified consignee) or at final acceptance, whichever occurs first. Items to which the District has received title by reason of progress or partial payments shall be segregated from other Contractor or subcontractor materials and clearly identified as District property.

27.2 Risk of Loss or Damage

Notwithstanding passage of title in whole or in part to the District, the risk of loss or damage shall remain with the Contractor until installation in the District facilities (when installation is in the Contractor's Scope of Work) or delivery to other specified points. At that event, the risk of loss shall pass to the District.

28.0 GOVERNING LAW

The Contract shall be governed by and interpreted in accordance with the laws of the State of California. The Contractor shall also abide by all applicable city and county ordinances. However, to ensure that the Contract is performed in all respects in compliance with the provisions of all capital grants between the District and the Government relating to this Contract, and the relationship between the District and the Government in all other respects, questions arising in connection therewith shall be governed by the applicable federal law.

29.0 CONSENT TO JURISDICTION

The Contractor, by entering into the Contract, consents and submits to the jurisdiction of the Courts of the State of California, over any action at law, suit in equity, or other proceeding that may arise out of the Contract. If the Contractor is a corporation, it agrees

during the periods of performance and of warranty, to maintain within the State of California an agent to accept service of legal process on its behalf.

30.0 ASSIGNMENT

The performance of the Work under the Contract may not be assigned except upon written consent of the District. Consent will not be given to a proposed assignment which would relieve the Contractor or its surety of their responsibilities under the Contract.

31.0 PAYMENT OF TAXES

The Contractor is responsible for paying all retail sales, income, real estate, sales and use, transportation, export, import, and special taxes and duties applicable to, and assessable against any materials, equipment, processes and operations incidental to or involved in the procurement. The Contractor is responsible for ascertaining and acquainting itself with such taxes and making all necessary arrangements to pay them. The prices established in the Contract shall include compensation for any taxes the Contractor is required to pay by laws and regulations in effect on the Bid Opening date.

32.0 ANTI-DUMPING

The Contractor represents and warrants that its prices do not violate the United States Anti-Dumping Act, 19 USC 160 et seq., as amended, and agrees to pay any duties assessed under said Act. The Contractor agrees to indemnify and hold harmless the District from any loss or expense, including, but not limited to, reasonable attorney's fees that the District may incur from any claim, demand, or investigation of alleged violation of said Act.

33.0 PATENTS AND COPYRIGHTS

The Contractor shall warrant that the materials, equipment, or devices used on or incorporated in the Work shall be delivered free of any rightful claim of any third party for infringement of any patent or copyright. The Contractor shall defend or may settle, at its expense, any suit or proceeding against the District or its representatives based on a claimed infringement which would result in a breach of this warranty. The Contractor shall pay all damages and costs awarded therein due to such breach.

The Contractor shall bear all costs arising from the use of patented materials, equipment, devices or processes

used on or incorporated in the Work. In case material, equipment, devices or processes are held to constitute an infringement and their use is enjoined, the Contractor, at its expense, shall:

A. Secure for the District the right to continue using said materials, equipment, devices or processes by suspension of the injunction or by procuring a license or licenses; or

B. Replace such materials, equipment, devices or processes with noninfringing materials, equipment, devices or processes; or

C. Modify them so that they become noninfringing or remove the enjoined materials, equipment, devices or processes and refund the sum paid therefore without prejudice to any other rights of the District.

The Contractor shall include, or have included, the requirements of this Article in all subcontracts of any tier.

34.0 RIGHTS IN TECHNICAL DATA AND COPYRIGHTS

34.1 Technical Data

Technical data, as used herein, means any form or format of technical writing, pictorial reproductions, drawings or other graphic representations, and documents of a technical nature, including computer software and program listings, which are developed or used pursuant to the Contract. The term does not include financial reports, cost analyses, and other information incidental to contract administration.

The District shall have the right, within the scope of the Contract and for the purpose of operating and maintaining the equipment supplied, to use, duplicate, or disclose the technical data listed below and the information conveyed therein, in whole or in part, in any manner and for any purpose whatsoever, and to have or permit others to do so:

A. Manuals or instructional materials prepared for installation, operation, maintenance, or training purposes;

B. Technical data pertaining to items, components, or processes which were prepared for the purpose of identifying sources, size, configuration, mating and attachment characteristics, functional characteristics and performance requirements;

C. Other technical data which have been or are normally furnished without restriction by the Contractor or subcontractors;

D. Computer and microprocessor software documentation including program design language or pseudo-code listings, fully annotated source code and machine level listings;

E. Other specifically described technical data which the parties have agreed will be furnished without restriction.

34.2 Data Covered By Copyrights

The Contractor shall agree to grant to the District and to its officers, agents, and employees acting within the scope of their official duties, a royalty-free license to publish, translate, reproduce, deliver, and use as it deems fit all technical data covered by copyright supplied for the Contract.

No such copyrighted matter shall be included in technical data furnished hereunder without the written permission of the copyright owner for the District to use such in the manner herein described.

The Contractor shall report to the District promptly and in reasonable written detail each notice or claim of copyright infringement received by the Contractor with respect to any technical data delivered hereunder.

35.0 INDEMNIFICATION

Contract shall indemnify, hold harmless and defend the District, the General Consultant (GC), GC members, the Construction Manager (CM), their officers, employees, agents, contractors, and subcontractors, individually, from and against all liability, claims, losses, actions and expenses (including attorney's fees), on account of bodily injury to or death of any person (including employees of the parties to be indemnified) or for damage to or loss of use of property (including property of District) arising out of or resulting from the acts or omissions to act of Contractor, its subcontractors, anyone directly or indirectly employed by any of them or anyone for whose acts any of them are liable, in the performance of the Work, unless caused solely by the negligence of the parties to be indemnified.

Claims against the parties to be indemnified by any employee of Contractor, its subcontractors, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, shall not limit the Contractor's indemnification obligation set

forth above in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or its subcontractors under workers' compensation acts, disability benefit acts or other employee benefit acts or insurances.

36.0 EQUAL EMPLOYMENT OPPORTUNITY

36.1 The Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, age, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during their employment, without regard to their race, religion, color, age, sex, or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause. The Contractor further agrees to insert a similar provision in all subcontracts, except subcontracts for standard commercial supplies or raw materials.

36.2 The Contractor agrees to abide by the provision of California Labor Code Section 1777.5 with respect to the employment of indentured apprentices.

36.3 The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, age, sex, or national origin.

36.4 The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this Article, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

36.5 The Contractor shall comply with all provisions of Executive Order 11246, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

36.6 The Contractor shall furnish all information and reports required by Executive Order 11246, as amended, and by rules, regulations, and orders of the Secretary of

Labor, or pursuant thereto, and shall permit access to its books, records, and accounts by the DOT and the Secretary of Labor for the purposes of investigation to ascertain compliance with such rules, regulations, and orders.

36.7 In the event of the Contractor's noncompliance with nondiscrimination clauses of the Contract or with any of the said rules, regulations, or orders, the Contract may be cancelled, terminated, or suspended in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

36.8 The Contractor shall include the provisions of Subarticles 36.1 through 36.7 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246, as amended, so that such provisions will be binding upon each subcontractor or vendor. The Contractor shall take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that if a Contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the Government to enter into such litigation to protect the interests of the Government.

37.0 DISADVANTAGED BUSINESS ENTERPRISE/WOMEN'S BUSINESS ENTERPRISE PROVISIONS

37.1 Policy and Obligation

A. It is the policy of the District and the DOT that the Disadvantaged and Women's Business Enterprises (DBE and WBEs), as defined in the federal regulations published at 49 CFR 23, shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with federal funds. Consequently, the DBE/WBE requirements of 49 CFR 23 apply to this Contract.

B. Contractor agrees to ensure that DBE/WBEs as defined herein have the maximum opportunity to participate in the performance of the District's contracts and subcontracts. In this regard, the Contractor shall take all necessary and reasonable steps in accordance with 49 CFR 23 to ensure that DBE/WBEs have the maximum opportunity to compete for and perform contracts. Contractor shall not

discriminate on the basis of race, religion, age, color, national origin, sex, or handicapped status, in the awarding or performance of DOT-assisted contracts.

37.2 Goals

A. In each Metro Rail construction contract, a goal for DBE/WBE participation shall be specified. DBE/WBE goals for this Contract have been established as indicated in the Special Provisions.

B. Bidders are to refer to Subarticle 37.9 for guidance in calculating DBE/WBE participation.

37.3 Responsive Bidder

A. To be responsive, a Bidder must meet the DBE/WBE goals set forth in the Special Provisions of this Contract, or, if the goals are not met, full documentation evidencing good faith efforts to meet the goal must be submitted with the Bid as stated in Subarticle 37.5 below.

B. If a Bidder submits a bid containing DBE/WBE subcontractors or joint venture partners which are certified as DBE or WBE by the District, and which meets all other DBE/WBE participation requirements as discussed in Subarticle 37.10 below, the Bidder need not submit evidence of good faith efforts to meet the goal.

C. If the Bid contains DBEs or WBEs which meet all other DBE/WBE requirements except that they are not certified by the District, but, if certified, would meet the DBE/WBE goal, submission of evidence of good faith efforts is not a mandatory requirement. Failure to submit evidence of good faith efforts will result in rejection of the Bid if the proposed DBE/WBEs are not certifiable and, as a result, the goal is not met, unless evidence of good faith efforts has been submitted with the Bid. Submission of evidence of good faith efforts with the bid is therefore strongly recommended.

D. The Bidder shall furnish the form listed in subarticle 37.4 below as part of the Bid. Documents to support the undertaking of good faith efforts referenced in Subarticle 37.5 below, shall be submitted in a separate sealed envelope concurrently with the Bid plainly marked "Good Faith Efforts Documentation".

37.4 DBE/WBE - Related Bidding Form

The Bidder's commitment to DBE/WBE participation shall be clearly reflected in the following:

A. List of Proposed Subcontractors - All DBE/WBE subcontractors and suppliers which the Bidder intends to use to meet the goal, including those whose participation in the Contract is less than one-half of one percent, shall be listed. This form shall include the following information for each DBE/WBE subcontractor and supplier listed:

- o Name of Subcontractor or Supplier;
- o Address;
- o Type of Work to be Performed;
- o Percentage of Participation in the Contract expressed as a percentage of the Bid Total;
- o Identify whether DBE or WBE;

B. Bidders may be DBE/WBEs or enter into joint venture agreements with DBE/WBEs, and in that event, the DBE/WBE or DBE/WBE joint venture partners shall comply as follows:

- o DBE/WBE Prime Bidder's Statement. If the Bidder is a DBE or WBE (including joint venture partners), the Bidder shall attach to the List of Proposed Subcontractors, a statement describing the scope of work and percentage of Bid Total which the Bidder intends to do with its own work force.

37.5 Good Faith Efforts

A. All bidders, except those who have met the DBE/WBE goals, must submit separately, but concurrently with the Bid, full documentation evidencing the efforts made to meet the goals. This evidence must be submitted in a sealed envelope separate from the Forms for Bidding and shall include narrative and affidavits of exhibits to support actions taken.

B. The following are examples of good faith efforts and the types of documentation necessary to evidence such efforts. They are not necessarily all required nor are good faith efforts limited to those listed:

1. Advertisements in newspapers of general circulation, trade association publications and minority focus media. The advertisements shall be placed in the business, classified, or request for sub-bid section and appear at least 20 calendar days before Bid Opening. If 20 calendar days are not available, publications for the shorter available time is acceptable. These advertisements shall include the following information:

    - o Project Name and Location;
    - o Indication of District as Owner;
    - o Location where Plans and Specifications may be obtained or viewed;
    - o Sub-Bid Due Date;
    - o Trade or Scopes of Work for which Sub-Bids are being solicited;
    - o Statement that Bid solicitation is in response to District DBE/WBE Program; and
    - o Statement that Bidder intends to seriously negotiate with DBE/WBE firms for participation on the project.

2. Proof of publication in newspapers of general circulation, minority focus media and trade publications or copies of tear sheets showing data and name of publication.

3. Selection of portions of the Work for which interest from DBE/WBE potential joint venture partners, subcontractors, or suppliers will be solicited in a manner to increase the likelihood of achieving the stated goal. Include a narrative stating the work that the Bidder intends to perform with its own work force and areas of Work which the Bidder has identified for DBE/WBE joint venture partnership or subcontracting.

4. Extension of written invitations to DBE/WBE firms for at least the number of trades, subcontractors, or material quotations identified on the Bid Form of this solicitation, including trades or areas selected by the Bidder for joint venturing or subcontracting as specified in response to good faith effort

as indicated above. Written invitations shall be such that receipt by DBE/WBE firms can be confirmed (e.g., Registered Mail, Certified/ Return Receipt Requested, self-addressed stamped postcards or letters requesting interest.) A listing of DBE/WBE certified contractors is available in the District's Equal Opportunity Department. Include a list of DBE/WBE firms which the Bidder identified to solicit interest in the Contract, and copies of letters, mail receipts or postcards sent to DBEs/WBEs.

5. Oral or written follow-up of initial solicitation to DBE/WBE firms by contacting them to determine with certainty whether they were interested in submitting a sub-bid, quotation, or participating as a joint venture partner, and the response by the DBE/WBE firms. A written record of any oral follow-up is required. Include records which can be verified to document contact with these DBE/WBE firms (e.g., letters; minutes or notes of meetings held with DBE/WBE firms; copies of responses from DBEs/WBEs).

6. Notification of minority and women contractor, trade and professional associations at least 20 calendar days prior to Bid Opening. If 20 calendar days are not available, notification for a shorter time is acceptable. This contact must be verified. Include records or correspondence which confirm notification of the associations, contact persons, telephone numbers, dates and times contacted. Incorporate information provided to these associations and other organizations that provide assistance in the recruitment and outreach of DBEs and WBEs. Record associations' response to the Bidder's contact. Also include evidence of the use of information provided by the associations in the Bidder's solicitation of DBE/WBE firms.

7. Encouraging DBE/WBEs not currently certified, with which the Bidder might subcontract, to apply for certification with the District. Include names of DBE/WBE subcontractors not certified which Bidder queried about the ownership and control of the business and prior certification by any other public agency; persons to whom Bidder spoke, dates contacted, questions asked, responses given and any encouragement and assistance provided

by the Bidder to the prospective subcontractor to apply to the District for certification.

37.6 Bid Evaluation - Evaluation of DBE/WBE - Related Forms

A. Based on a review of the information submitted on the Bid Forms referenced in Subarticle 37.4, if the District determines that the Bidder has met the goal and all DBE/WBE firms it intends to use are certified by the District during the bid evaluation period, the District will return, to the Bidder unopened, the second sealed envelope containing the documentation of good faith efforts which was submitted in response to the requirements of Subarticle 37.5

B. If, however, the Bidder does not meet the goal, or if any of the subcontractors identified in the List of Proposed Subcontractors are uncertifiable and therefore cause the Bidder to drop below the goal, the District will open the second sealed envelope and review the Bidder's claim of good faith efforts.

37.7 Evaluation of Good Faith Efforts

A. The District's DBE/WBE Officer will review the documentation submitted by the Bidder in support of its claim of good faith efforts. Verification of the information with third parties will be conducted if needed.

B. After all information has been evaluated, the District shall notify the Bidder of the District's decision concerning its responsiveness to the DBE/WBE requirements of the Bid. If it is determined that the Bidder is not responsive, the District will inform the Bidder that its bid will not be accepted, the reasons therefore, and its right to petition the Board of Directors when the Contract is scheduled to be acted upon.

37.8 Definitions

A. The following definitions apply to the terms as used in this Contract.

B. Disadvantaged Business Enterprise (DBE) means a small business concern: (a) which is at least 51 percent owned by one or more socially and economically disadvantaged individuals, or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more socially and economically disadvantaged individuals; and (b) whose management and daily business

operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

C. Owned and controlled means a business: (a) which is at least 51 percent owned by one or more minorities or women or, in the case of a publicly owned business at least 51 percent of the stock of which is owned by one or more minorities or women; and (b) whose management and daily business operations are controlled by one or more such individuals.

D. Small business concern means a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.

E. Socially and Economically Disadvantaged Individuals means those individuals who are citizens of the United States (or lawfully admitted permanent residents) and who are Black Americans, Hispanic Americans, Native Americans, Asian-Pacific America, or Asian-Indian Americans and any other minorities or individuals found to be disadvantaged by the Small Business Administration pursuant to Section 8(a) of the Small Business Act, or by the District pursuant to 49 CFR 23.62. Members of the following groups are presumed to be socially and economically disadvantaged:

1. Black Americans, which includes persons having origins in any of the Black racial groups of Africa;

2. Hispanic Americans, which includes persons of Mexican, Puerto Rican, Cuban, Central or South America, or other Spanish culture or origin, regardless of race;

3. Native Americans, which includes persons who are American Indians, Eskimos, Aleuts, or native Hawaiians;

4. Asian-Pacific Americans, which includes persons whose origins are from Japan, China, Taiwan, Korea, Vietnam, Laos, Cambodia, the Philippines, Samoa, Guam, the U.S. Trust Territories of the Pacific, and the Northern Marianas; and

5. Asian-Indian Americans, which includes persons whose origins are from India, Pakistan, and Bangladesh.

F. Other Socially and Economically Disadvantaged Individuals means those individuals who are citizens of the United States (or lawfully admitted permanent residents) and who, on a case-by-case basis, are determined by the Small Business Administration or the District to meet the social and economic disadvantage criteria described below.

1. Social Disadvantage

- The individual's social disadvantage stems from his/her color, national origin, gender, physical handicap, long term residence in an environment isolated from the mainstream of American society, or other similar cause beyond the individual's control.

- The individual must demonstrate that he/she has personally suffered social disadvantage.

- The individual's social disadvantage must be rooted in treatment which he/she has experienced in American society, not in other countries.

- The individual's social disadvantage must have negatively affected his/her entry into, and/or advancement in, the business world.

- A determination of social disadvantage shall be made before proceeding to make a determination of economic disadvantage.

2. Economic Disadvantage

- The individual's ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities, as compared to others in the same line of business and competitive market area who are not socially disadvantaged.

- The following criteria will be considered when determining the degree of diminished credit and capital opportunities of a person claiming social and economic disadvantages.

(a.) With respect to the individual:

- availability of financing
- bonding capability
- availability of outside equity capital
- available markets

(b.) With respect to the individual and the business concern;

- personal and business assets
- personal and business net worth
- personal and business income and profits

G. Women's Business Enterprise (WBE) means a small business concern that: (a) is at least 51 percent owned by one or more women in the case of a publicly-owned business, at least 51 percent of the stock of which is owned by one or more women; and (b) the management and daily business operations of which are controlled by one or more of the women who own it.

37.9 Method of DBE/WBE Goal Calculation

The Bidder shall be guided by the following criteria when calculating the DBE/WBE level of participation in its bid.

A. A DBE or WBE may participate as a prime contractor, subcontractor, or joint venture partner with a prime or subcontractor or vendor of materials or supplies.

B. A DBE or WBE joint venture partner must be responsible for a clearly defined portion of the Work to be performed, in addition to satisfying the requirements for ownership and control .

C. A DBE or WBE must perform a commercially useful function; that is, must be responsible for the execution of a distinct element of the Work and must carry out its responsibility by actually performing, managing and supervising the Work.

D. Credit for the participation of DBE or WBE vendors of materials and supplies is limited to 20 percent of the price unless the vendor manufactures or substantially alters the goods before resale.

E. The total dollar value of a contract with a DBE/WBE owned and controlled by Disadvantaged women is counted toward either the DBE goal or the WBE goal,

but not for both. The Bidder employing the firm may choose the goal to which the contract value is applied.

F. The total value of a contract with a WBE owned and controlled by Non-disadvantaged women is counted toward the goal for WBE only and cannot be counted toward the DBE goal.

G. The total dollar value of a contract to a DBE/WBE owned and controlled by both Non-disadvantaged women and Disadvantaged men is counted toward the goals for DBE and WBE, respectively, in proportion to the percentage of ownership and control of each group in the business.

H. In calculating the total DBE and WBE utilization percentage, the Bidder shall include:

1. The dollar value of all DBE and WBE sub-bids;

2. The dollar value of all materials and supplies to be supplied by DBEs and WBEs (to be credited as noted in Subarticle 37.9.D above); and

3. The dollar value of all work performed with Bidder's own forces if Bidder is a DBE or WBE. If the Bidder is a DBE or WBE joint venture, it shall include only DBE or WBE proportionate interest in the joint venture.

37.10 DBE/WBE Certification

A. DBE/WBE firms need not be certified by the District prior to the bid date.

B. However, in order for the Bidder to be determined to meet the DBE/WBE goals of this solicitation, the DBE/WBE firms bidder intends to credit toward the goal must be certified by the District prior to contract award. The District will review the Bidder's good faith efforts documentation referenced in Subarticle 37.5 if any of these DBE/WBE firms are not certified during the bid evaluation period.

C. If, during the consideration by the District of bidder's good faith efforts to meet the DBE/WBE goal, a proposed DBE or WBE subcontractor becomes certified by the District, causing the Bidder to meet the DBE/WBE goals, the Bidder shall be deemed to be in compliance with the requirements of these General Provisions.

D. Bidders are urged to encourage their prospective DBE/WBE subcontractors, joint venture partners or suppliers, who do not have current certification from the District, to apply for certification prior to the bid date.

E. The District's List of Certified DBEs and WBEs identifies firms which have been certified by the District. This directory may be obtained by contacting:

Southern California Rapid Transit District
Equal Opportunity Department, DBE Section
425 South Main Street
Los Angeles, California 90013
213/972-6454

F. Applications for certification by the District may be obtained by submitting Schedule A or Schedule B forms (attached hereto as Exhibit 1 and 2).

G. Within 5 working days of date of request of the District, a Bidder who is requested to do so shall cause each of its subcontractor DBE and WBE firms to submit to the District information to confirm DBE or WBE status. Schedule A and Schedule B with supporting documentation shall be submitted for each DBE/WBE firm or DBE/WBE joint venture not already certified.

37.11 Substitution of Subcontractors

If a Bidder requests a substitution of DBE or WBE subcontractors after the District has accepted the Bid and pursuant to the provisions of the California Government Code, Section 4107, the Bidder shall use efforts in cooperation with the District's staff to replace a DBE or WBE subcontractor with another DBE or WBE subcontractor subject to the approval of the District. Subarticle 37.3 requirements will apply in this case.

37.12 Contract Compliance Reporting Requirements

The Contractor shall submit to the District, quarterly progress reports on its DBE/WBE participation on the Summary Subcontracts Award and Paid Report (attached hereto as Exhibit 3).

37.13 Noncompliance

Failure to carry out the requirements of this Article constitute a breach of contract and, after notification to the U.S. Department of Transportation, may result in

termination of the Contract by the District or imposition of other appropriate sanctions. This notice is given pursuant to 49 CFR 23.43 (c).

38.0 SUBCONTRACTORS

38.1 The Contractor shall select major subcontractors and suppliers from the list of such organizations submitted by the Contractor with its bid or proposal as reviewed and accepted by the District. Later additions to the list shall be specifically approved by the District.

38.2 The Contractor shall be solely responsible for the performance of subcontractors and the fulfillment of all requirements of the Contract Documents. The District will recognize only the Contractor.

38.3 No contractual relationship shall exist between the District or anyone acting on behalf of the District and the subcontractors or suppliers of the Contractor or any of their lower-tier subcontractors or suppliers with respect to the Work described in the Contract Documents.

39.0 USE OF DISTRICT NAME IN CONTRACTOR ADVERTISING OR PUBLIC RELATIONS

The District reserves the right to review and approve District-related copy prior to publication. The Contractor agrees not to allow District-related copy to be published in Contractor's advertisement or public relations programs until submitting such District-related copy and receiving prior written approval from the District. Contractor agrees that published information on the District or the District programs shall be factual and in no way imply that the District endorses the Contractor's firm, service, or product. The Contractor shall include, or have included, the requirements of this Article in all subcontracts of any tier.

40.0 GRATUITIES AND CONFLICTS OF INTEREST

40.1 The District may, by written notice to the Contractor, terminate the right of the Contractor to proceed under the Contract if it is found that gratuities (in the form of entertainment, gifts, or otherwise) were offered or given by the Contractor or any agent or representative of the Contractor to any director, officer or employee of the District or of any District's consultant or contractor with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending or the making of any determinations with respect to the performance of such contract. The determination of the District shall be final, subject only to judicial review.

40.2 If the Contract is terminated as provided in Subarticle 40.1, the District shall be entitled to pursue the same remedies against the Contractor as it could pursue in the event of a breach of the Contract by the Contractor.

40.3 No member, officer or employee of the District or of a local public body, during the tenure of that person or for 1 year thereafter, shall have any interest, direct or indirect, in the Contract or the proceeds thereof, but this provision shall not be construed to extend to the Contract if made with a corporation for its general benefit. A full and complete disclosure of any such interest shall be made in writing, to the other parties even if such interest would not be considered a conflict under Section 1090 et seq. or Section 87100 et seq. of the Government Code of the State of California. Local public body as used in this Article, means the state, any political subdivision of the state, or any agency of the state or any political subdivision thereof.

40.4 No member of or delegate to the Congress of the United States of America shall be admitted to any share or part of the Contract or to any benefit arising therefrom, but this provision shall not be construed to extend to the Contract if made with a corporation for its general benefit.

40.5 The Contractor or its employees shall not enter into any contract involving services or property with a person or business prohibited from transacting such business with the District pursuant to Sections 1090 et seq. and 87100 et seq. of the Government Code of the State of California. To the knowledge of the District or of the Contractor, no Board member, officer or employee of the District has any interest, whether contractual, non-contractual, financial or otherwise, in this transaction, or in the business of the Contractor, and if any such transaction, comes to the knowledge of either party at any time, a full and complete disclosure of all such information shall be made in writing to the other party, even if such interest would not be considered a conflict under Sections 1090 et seq. or Sections 87100 et seq. of the Government Code of the State of California.

40.6 The rights and remedies of the District provided in this Article are not exclusive and are in addition to any other rights and remedies provided by law or under the Contract.

41.0 RESERVED

42.0 SANCTIONS UPON IMPROPER ACTS

If the Contractor or any of its officers, partners, principals, or employees is convicted of a crime arising out of, or in connection with, the Work to be done or payment to be made under the Contract, the Contract, in whole or any part thereof, may, at the discretion of the District, be terminated.

43.0 COVENANT AGAINST CONTINGENT FEES

43.1 The Contractor warrants that no person or agency has been employed or retained to solicit or obtain this Contract upon an agreement or understanding for a contingent fee, except a bona fide employee or agency. For breach or violation of this warranty, the District may terminate this Contract without liability or, at its discretion, deduct from the Contract Price or consideration, or otherwise recover the full amount of the contingent fees.

43.2 Bona fide agency, as used in this Article, means an established commercial or selling agency, maintained by the Contractor for the purpose of securing business, that neither exerts nor proposes to exert improper influence to solicit or obtain District contracts nor holds itself out as being able to obtain any District contract or contracts through improper influence.

43.3 Bona fide employee, as used in this Article, means a person, employed by the Contractor and subject to the Contractor's supervision and control as to time, place, and manner of performance, who neither exerts nor proposes to exert improper influence to solicit or obtain District contracts nor holds out as being able to obtain any District contract or contracts through improper influence.

43.4 Contingent fee, as used in this Article, means any commission, percentage, brokerage, or other fee that is contingent upon the success that a person or concern has in securing a District contract.

43.5 Improper influence, as used in this Article, means any influence that induces or tends to induce a District employee or officer to give consideration or to act regarding a District contract on any basis other than the merits of the matter.

44.0 USE AND POSSESSION PRIOR TO COMPLETION

The District may take possession or use any completed or partially completed part of the Work. Such possession or use shall not be deemed an acceptance of any Work not completed in accordance with the requirements of the

Contract Documents. While the District is in possession, the Contractor shall be relieved of the responsibility for loss or damage to that part of the Work other than that loss or damage resulting from the Contractor's fault, negligence, or breach of warranty. If prior possession or use by the District delays the progress of the Work or causes additional expense to the Contractor, an equitable adjustment shall be made in the Contract Price or the time of completion of the Work.

45.0 RESERVED

46.0 ENVIRONMENTAL PROVISIONS

46.1 The Contractor shall submit evidence to the District that governing air and water pollution criteria will be met in accordance with criteria issued by the US Environmental Protection Agency (EPA). However, in locations where state or local air and water pollution regulations are in force, the more restrictive criteria shall govern.

This evidence and related documents will be retained onsite by the District for examination by appropriate governmental agencies.

46.2 Environmental Violations

For all contracts and subcontracts in excess of $100,000, the Contractor agrees to comply with all applicable standards, orders, or requirements issued under Section 306 of the Clean Water Act (42 USC 1857[h]), under Section 508 of the Clean Water Act (33 USC 1368), Executive Order 11378, and EPA regulations (40 CFR, 15) and specifically shall not use any facilities included on the EPA List of Violating Facilities. The Contractor shall report all violations to the District.

The Contractor shall promptly notify the District of receipt of any communications from the EPA's Director, Office of Federal Activities, or any successor agency, indicating that a facility to be utilized for the Contract is under consideration to be listed on the EPA List of Violating Facilities.

46.3 Subcontract Requirements

The Contractor shall include, or cause to be included, the requirements of this Article in every subcontract, of any tier, valued at more than $100,000, and further agrees to take such action as the District may direct as a means of enforcing those requirements.

47.0 CARGO PREFERENCE -- USE OF UNITED STATES FLAG VESSELS

The Contractor agrees:

A. To utilize privately owned, US flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners and tankers) involved, whenever shipping any equipment, materials, or commodities pursuant to the Contract, to the extent such vessels are available at fair and reasonable rates for US flag commercial vessels.

B. To furnish to the District within 30 days following the date of loading, for shipments originating within the US or within 30 working days following the date of loading for shipments originating outside the US, 4 legible copies of a rated, "on-board" commercial ocean bill-of-lading, in English, for each shipment of cargo described in paragraph A above (through the Contractor in the case of subcontractor bills-of-lading) and to:

Division of National Cargo,
Office of Market Development
MARITIME ADMINISTRATION,
Washington, DC 20230

marked with the appropriate identification of the Contract.

C. To include, or have included, the requirements of the Article in all subcontracts of any tier.

48.0 LABOR STANDARDS PROVISIONS

48.1 Overtime Requirements

The Contractor which may require or involve the employment of laborers or mechanics shall not require or permit any such laborer or mechanic, in any work week in which such laborer or mechanic is employed on the Work, to work in excess of 8 hours in any calendar day or in excess of 40 hours in any work week, unless such laborer or mechanic receives compensation at a rate not less than 1-1/2 times the basic rate of pay for all hours worked in excess of 8 hours in any calendar day or in excess of 40 hours in any work week, whichever is greater.

48.2 Violation; Liability for Unpaid Wages; Liquidated Damages

In the event of any violation of the clause set forth in Subparagraph (b)(1) of 29 CFR 5.5, the Contractor shall

be liable for the unpaid wages. In addition, the Contractor shall be liable to the US for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in Subparagraph (b)(1) of 29 CFR 5.5 in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of 8 hours or the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph (b)(1) of 29 CFR 5.5.

48.3 Withholding for Unpaid Wages and Liquidated Damages

The District shall, upon its own action or upon written request of the Department of Labor, withhold or cause to be withheld from any monies payable on account of Work performed by the Contractor under any such contract or any other federal contract with the same Contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the Contractor, such sums as may be determined to be necessary to satisfy any liabilities of the Contractor for unpaid wages and liquidated damages as provided in the clause set forth in Subparagraph (b)(2) of 29 CFR 5.5.

48.4 Requirements for Records

The Contractor and its subcontractors shall maintain payrolls and basic payroll records during the course of the Work for all laborers and mechanics, including guards and watchmen, working on the Contract. Such records shall contain, for each employee, the name and address, social security number, correct classification, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the records to be maintained under this Subarticle shall be made available by the Contractor for inspection, copying, or transcription by authorized representatives of DOT and the Department of Labor, and the Contractor shall permit such representatives to interview employees during working hours on the job.

48.5 Subcontracts

The Contractor shall include, or have included, the requirements set forth in Subarticles 48.1 through 48.4 in all subcontracts of any tier. The Contractor shall be responsible for compliance by any subcontractor or any lower-tier subcontractor with the clauses set forth in Subarticles 48.1 through 48.4.

END OF GENERAL PROVISIONS - SECTION 1

INSTALLATION PROVISIONS

The Articles in this Section of the General Provisions apply to installation work that takes place at the Project Site. For such work, both Section 1, with exceptions, and Section 2 of the General Provisions are applicable. The exceptions to Section 1 are Articles:

8.0	INSURANCE
36.0	EQUAL EMPLOYMENT OPPORTUNITY
46.0	ENVIRONMENTAL PROVISIONS
48.0	LABOR STANDARDS PROVISIONS

Similar Articles in Section 2 are applicable in place of those listed. In the event of any inconsistency between the provisions of any Articles in Section 1 and Section 2 of the General Provisions, the provisions in Section 2 shall take precedence with respect to installation Work.

49.0 EMERGENCIES

In an emergency affecting the safety of life, the Work, or adjacent property, the Contractor shall notify the District as early as possible that an emergency exists. In the meantime, without special instruction from the District as to the manner of dealing with the emergency, the Contractor shall act at its own discretion to prevent threatened loss or injury. As emergency work proceeds, the District may issue instructions that the Contractor shall follow.

50.0 SUPERINTENDENCE BY CONTRACTOR

50.1 The Contractor shall have a competent manager or superintendent designated as its authorized representative, satisfactory to the District, on the Project Site during progress of the Work, with authority to act for the Contractor.

50.2 Before starting Work, the Contractor shall designate, in writing, the name, title, qualifications, experience, and scope of authority of its proposed representative for approval by the District. A facsimile of the authorized representative's signature and initials shall be furnished to the District. The authorized representative or a designated substitute, acceptable to the District, shall be present at the Project Site when Work is actually in progress on the Contract. Arrangement for responsible supervision, acceptable to the District, shall be made for emergency work which may be required during periods when the Work is suspended.

51.0 SUBLETTING AND SUBCONTRACTING

The Contractor shall comply with Title 1, Division 5, Chapter 2 (Sections 4100 et seq.) of the California Government Code entitled Subletting and Subcontracting.

52.0 CONSTRUCTION STAGING

52.1 Work under the Contract shall be performed in accordance with requirements of the Contract and in accordance with a detailed plan of the Work in a logical sequence developed by the Contractor and approved by the District or its authorized representative.

52.2 The Contractor shall schedule its operations to minimize interference with other contractors and with District operations.

52.3 The Contractor shall comply with all scheduling requirements contained in the Special Provisions and in any other provision of the Contract.

53.0 CONDITIONS AND RISKS OF WORK

53.1 The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the Work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the Work or its cost, including, but not limited to: (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the Site; (4) the conformation and conditions of the ground; (5) the character of equipment and facilities needed preliminarily to and during Work performance; and (6) conditions bearing upon security and protection of material, equipment and work-in-progress.

53.2 The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the Site, including exploratory work done by the District as well as from the Contract Drawings and Technical Provisions made a part of this Contract. Any failure of the Contractor to take the actions described and acknowledged in this Article will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the Work, or of proceeding to successfully perform the Work without additional expense to the District.

53.3 The District assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the District, nor does the District assume responsibility for any understanding reached or representation made concerning conditions which can affect the Work by any of its officers or agents before the execution of the Contract, unless that understanding or representation is expressly stated in the Contract.

54.0 CONSTRUCTION SAFETY, SECURITY, AND HEALTH STANDARDS

54.1 The safety requirements for the Contract are specified in the District's Construction Safety and Security Manual. The District's Construction Safety and Security Manual is incorporated herein by this reference.

54.2 It shall be a condition of the Contract and shall be made a condition of each subcontract entered into pursuant to the Contract, that the Contractor and any subcontractor shall not require any laborer or mechanic employed in performance of the Contract to work in surroundings or under working provisions which are unsanitary, hazardous or dangerous to health or safety, as determined under the California Occupational Safety and Health Act of 1973 (Chapter 993, Statutes of 1973).

54.3 The Contractor shall hold the District and its authorized representatives harmless from any claims or charges by reason of the Contractor's failure or the failure of any of its subcontractors to comply with the above act or any regulations adopted pursuant thereto and shall reimburse the District for any fines, damages, or expenses of any kind incurred by it by reason thereof.

55.0 PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS

55.1 The Contractor shall comply with all applicable laws and regulations regarding precautions to be taken in the protection of existing vegetation, structures, utilities, and improvements.

55.2 The Contractor shall preserve and protect existing vegetation such as trees, shrubs, and grass on or adjacent to the Project Site which are not indicated to be removed and which do not substantially interfere with the construction work. The Contractor shall replace, at its own expense, in kind, damaged vegetation, shrubs, and grass.

55.3 The Contractor shall protect improvements at or near the Project Site from damage, and shall repair or restore

any damage to such facilities, except utilities, resulting from failure to comply with the requirements of the Contract, applicable laws or regulations, or the failure to exercise reasonable care in the performance of the Work. If the Contractor fails or refuses to repair any such damage promptly, the District may have the necessary Work performed and charge the cost thereof to the Contractor.

55.4 At points where the Contractor's operations are adjacent to utility facilities, damage to which might result in expense, loss, disruption of service or other undue inconvenience to the public or to the owners, Work shall not be commenced until all arrangements necessary for the protection thereof have been made by the Contractor. The Contractor shall be solely and directly responsible to the owners and operators of the utilities for any damage, injury, expense, loss, inconvenience, or delay, caused by the Contractor's operations.

A. Where public utilities or their appurtenances interfere with permanent construction, unless otherwise indicated in the Contract Documents, Work involved in permanently relocating or otherwise altering such public utilities and their appurtenances will not be a part of the Contract but will be done by utility owners at no cost to the Contractor. If the Contractor wishes to have any utilities temporarily relocated, it shall make necessary arrangements with owners and reimburse them at its own expense for cost of the Work. The Contractor shall keep the District advised of temporary relocation arrangements.

B. The Contractor shall not repair or attempt to repair utility damage but shall immediately contact the utility owner. The Contractor shall obtain the name, address and telephone number of each utility company that the Work will affect and the person in such utility company to contact. The Contractor shall submit to the District said names, addresses and telephone numbers.

55.5 In order to safeguard the owners and tenants of abutting property and, at the same time, prevent unjust or fraudulent claims against the Contractor, the District, or any other person or agency, the District will cause a detailed examination of abutting property to be made before construction is begun. The owner or tenant of each parcel or structure or their duly authorized representative will be invited to be present during the examination. A written notice of an examination and invitation to attend will be delivered by the District to a person in charge of the premises or structure, or its designee or by the mailing of the notice to the

owner at the premises. A complete record of the existing conditions of each parcel or structure will be made in triplicate, signed by the owner and the District, and one copy will be delivered to the owner, one to the Contractor, and one will be retained by the District. After construction has begun, if the District so directs, or upon the filing of a verified statement by the owner, tenant, lessee, operator or occupant of damage of any building or structure, and, in any event, upon the completion of any Work that, in the opinion of the District, might affect the abutting property, another detailed examination of such abutting property will be made. A complete record of the then existing conditions of said property will be made in triplicate, signed by the District, and one copy will be delivered to the owner, one to the Contractor, and one will be retained by the District. In any action that may be brought by any owner, tenant, lessee, operator, or occupant of adjacent property to recover for alleged damages arising out of the Work, the record of the existing conditions of each parcel will be prima facie evidence of the conditions thereof at the time of the making of the examination.

56.0 PROTECTION OF EQUIPMENT, MATERIALS, AND WORK

56.1 The Contractor shall, in accordance with the manufacturer's recommendation or industry standards and at no additional cost to the District, preserve and protect:

A. Equipment used by the Contractor in the execution of the Work from damage or loss due to the Contractor's operations, weather, fire, theft, unexplained disappearance, or other similar casualty.

B. Materials delivered and Work performed until completion and Final Acceptance of the Work, except the Work which has been accepted under Subarticle 56.3.

C. Materials not delivered to the Project Site, for which any progress payment has been made to the same extent as if the materials were so delivered.

D. District-furnished materials after delivery to the Contractor.

56.2 The Contractor shall bear the risk injury, loss, or damage to any and all parts of the Work for whatever cause, whether arising from the execution or from the nonexecution of Work, except as provided for in Subarticle 56.3. The Contractor shall replace, rebuild, repair, or restore Work and materials that have been damaged or destroyed from any causes before completion

and final acceptance of the Work and shall bear the expense thereof. The Contractor shall provide security and drainage and erect temporary structures as necessary to protect the Work and materials from damage.

56.3 Relief from Maintenance and Responsibility: The District may, in writing, upon written request from the Contractor, relieve the Contractor of the duty of maintaining and protecting certain portions of the Work, as described in this Article, which have been completed in all respects in accordance with the requirements of the Contract. In addition, such action by the District will relieve the Contractor from responsibility for injury or damage to the portions of the Work covered by this provision arising out of use by District or the public from any cause, except from injury or damage resulting from the Contractor's own operations or negligence. This Subarticle does not relieve the Contractor of responsibility for repairing or replacing defective Work, materials, and equipment in accordance with the Contract requirements.

57.0 CONTRACTOR'S CONSTRUCTION EQUIPMENT

Construction equipment obtained or furnished by the Contractor, which is to be used on the Project Site, shall conform to the California Occupational Safety and Health Administration (Cal/OSHA) requirements and be fit for uses for which it is intended. The equipment shall be subject to inspection and approval from time to time by (Cal/OSHA) or the District. Any equipment of the Contractor which is rejected by the District as not conforming with the foregoing shall be promptly removed by the Contractor and replaced with equipment acceptable to the District, without additional cost to the District and without delaying the schedule for performance of the Work by the Contractor.

58.0 RESERVED

59.0 MATERIALS AND WORKMANSHIP

59.1 Unless otherwise specifically provided in the Contract Document materials shall be new and of the grade specified for the purpose intended. References to material or patented process by trade name, make, or catalog number shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the District, is equal to that named in the Technical Provisions, subject to the requirements specified herein.

59.2 Approval of Materials

The Contractor shall obtain District approval of the machinery and mechanical and other equipment to be incorporated into the Work. When requesting approval, the Contractor shall furnish to the District the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment. When required by the Contract or by the District, the Contractor shall also obtain District approval of the materials or articles which the Contractor contemplates incorporating into the Work. When requesting approval, the Contractor shall provide full information concerning the materials or articles. When directed, the Contractor shall submit samples for approval at the Contractor's expense, with all shipping charges prepaid. If the Contractor installs or uses materials that are not approved by the District, it shall be at the risk of subsequent rejection by the District.

59.3 Approval of Alternate Materials

Within the scope of its authority, the District shall be the sole judge of the quality and suitability of any proposed alternative materials. The burden of proving the quality and suitability of an alternative shall be upon the Contractor. Information required by the District in judging an alternative shall be supplied by the Contractor at the Contractor's expense.

A. Where use of an alternative involves redesign of or changes to other parts of the Work, the cost and the time required to accomplish the redesign or change will be considered in evaluating the suitability of the alternative. Redesign and changes to other parts of the Work shall be at the Contractor's expense.

B. No action relating to the approval of an alternative will be taken by the District until the request for substitution is made in writing by the Contractor, accompanied by complete data as to the quality and suitability of the alternative proposed. The request shall be made in ample time to permit approval without delaying the Work.

C. Where classification, rating, or other certification by a body such as, but not limited to, UL, NEMA, or AREA is a part of the specification for any material, proposals for use of an alternative shall be accompanied by reports from the listed body, or equivalent independent testing laboratory, indicating compliance with Technical Provisions.

Testing required to prove equality of the alternative proposed shall be at the Contractor's expense.

D. Approval of an alternative will only be for the characteristics and use specifically stated in the approval, and shall not change or modify any Contract requirement or establish approval for the alternative to be used on any other Work.

E. The Contractor shall also comply with all additional provisions for approval of any alternative which appears in any other Contract Document.

59.4 Source of Supply and Quality of Materials

The Contractor shall furnish all materials required to complete the Work except those designated to be furnished by the District.

A. Notwithstanding prior inspection and approval by the District, only materials conforming to the requirements of the Contract shall be incorporated in the Work.

B. The materials shall be manufactured, handled, and incorporated so as to ensure completed Work in accordance with the Contract.

59.5 Defective Materials

Contractor-furnished materials not conforming to the requirements of the Contract will be rejected, whether in place or not. Rejected materials shall be removed immediately from the Site of the Work unless otherwise permitted in writing by the District. No rejected material, the defects of which have been subsequently corrected, shall be used in the Work unless approved in writing by the District. If the Contractor fails to comply promptly with a request by the District made under the provisions of this Article, the District may cause the removal and replacement of the rejected material by separate contract or otherwise, and the cost thereof will be deducted from any monies due or to become due the Contractor.

59.6 Handling of Materials

Materials shall be transported, handled, and stored by the Contractor in a manner which will ensure the preservation of their quality, appearance, and fitness for the Work. Materials shall be stored in a manner to facilitate inspection.

59.7 Source of Material

The District will have no responsibility to the Contractor concerning local sources of materials other than the responsibility involved in the designations of suitability for intended use. The Contractor shall make all necessary arrangements with sources. The Contractor shall pay all costs in connection with making such arrangements, exploring, developing, and using material sources, whether or not indicated, except costs which the District expressly agrees in writing to assume.

59.8 District-furnished Materials

District-furnished materials shall be stored and transported to the place of use by the Contractor at its expense, including necessary loading and unloading. The Contractor's cost for storing, transporting, handling, protecting, and installing District-furnished materials are included in the Contract price. The Contractor shall be responsible for materials furnished to it and shall pay for damage and storage charges incurred as a result of its failure to take delivery of District-furnished materials on the assigned date. The Contractor shall be liable to the District for the cost of replacing or repairing furnished materials lost or damaged from any cause whatsoever after receipt by the Contractor. The costs will be deducted from any monies due or to become due the Contractor, except those amounts constituting claims payments made under insurance policies furnished by the District.

59.9 Disposal of Materials Outside the Project Site

Unless otherwise specified in the Contract, the Contractor shall make its own arrangements for disposing of waste and excess materials outside the Project Site and shall pay all costs thereof. Prior to disposing of materials outside the Project Site, the Contractor shall obtain written permission from the owner on whose property the disposal is to be made. The Contractor shall file the permit, or a certified copy thereof, with the District, together with a written release from the property owner absolving the District from any and all liability in connection with the disposal of materials on said property.

60.0 AFFIRMATIVE ACTION REQUIREMENTS -- EQUAL EMPLOYMENT OPPORTUNITY

60.1 Requirements for Affirmative Action to Ensure Equal Employment Opportunity pursuant to Executive Order 11246, as amended apply to the Contract.

A. The Contractor shall comply with the Standard Federal Equal Employment Opportunity Construction Contract Specifications set forth herein.

B. As used in the Contract, the "covered area" is the area of jurisdiction of the Los Angeles Building and Construction Trades Council.

C. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all installation work in the covered area are as follows:

Goals and Timetables for Female Participation in the Construction Industry.

Timetable	Trade	Goal
From April 1, 1980 until current date	All	6.9%

Goals and Timetables for Minority Participation in Construction Industry.

Timetable	Trade	Goal
Until further notice by the Office of Federal Contract Compliance Programs (OFCCP)	All	28.3%

These goals are applicable to all the Contractor's installation work (whether or not it is federal or federally-assisted) performed in the covered areas. If the Contractor performs installation work in a geographical area located outside the covered area, it shall apply the goals established for such geographical area where the work is generally performed. With regard to the second area, the Contractor is also subject to the goals for both its federally-involved and non-federally-involved installation.

D. The Contractor's compliance with Executive Order 11246, the regulations in 41 CFR 60-4, and the District's Equal Employment Opportunity (EEO) Policy shall be based on its implementation of this Article, specific affirmative action obligations set forth in 41 CFR 60-4.3(a) and its efforts to meet the goals established for the covered area where the Contract Work is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract and in each trade, and the

Contractor shall make a good faith effort to employ minority persons and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goal shall be a violation of the Contract, Executive Order 11246, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

E. The Contractor shall provide written notification to the Director of the OFCCP within 10 working days of award of any installation subcontract in excess of $10,000 at any tier for installation work under the Contract. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

60.2 Standard Federal Equal Employment Opportunity Construction Contract Specifications Pursuant to 41 CFR 60-4.3 (a) and District policy applies.

A. As used in the following:

1. "Director" means Director, OFCCP, Department of Labor, and any person to whom the Director delegates authority.

2. "Employer Identification Number" means the Federal Social Security Number used on the Employer's Quarterly Federal Tax Return, US Treasury Department Form 941.

3. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origins);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

B. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the Work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of this Article and the notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this Contract resulted.

C. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the US Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan Area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in, and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure make good faith effort to achieve the Plan goals and timetables.

D. The Contractor shall implement the specific affirmative action standards provided in Subarticle 60.2.G herein. The goals set forth in this Contract are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

E. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall

excuse the Contractor's obligations under this Article, Executive Order 11246, or the regulations promulgated pursuant thereto.

F. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U. S. Department of Labor.

G. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with this Article shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these actions fully and implement affirmative action steps at least as extensive as the following:

1. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each installation project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

2. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

3. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was

sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

4. Provide immediate written notification to the District Manager of Contract Compliance and OFCCP Director when a union with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

5. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled above.

6. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the Contractor's newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the Contractor's EEO policy on bulletin boards accessible to all employees at each location where installation work is performed.

7. Review, at least annually, the Contractor's EEO policy and affirmative action obligations under this Article with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as superintendents, general foreman, etc., prior to the initiation of installation work

at any Project Site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

8. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.

9. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment sources, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

10. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the Project Site and in other areas of a Contractor's work force.

11. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR 60-3.

12. Conduct, at least annually, an inventory and evaluation of all minority and female personnel for promotional opportunities, and encourage these employees to seek or to prepare for (through appropriate training, etc.), such opportunities.

13. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the EEO policy and the Contractor's obligations under this Article is being carried out.

14. Ensure that all facilities and Contractor activities are non-segregated except that separate or single-user toilets and necessary changing facilities shall be provided to assure privacy between the sexes.

15. Document and maintain a record of all solicitations of offers for subcontracts from minority and female installation contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

16. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policy and affirmative action obligations.

H. The Contractor is encouraged to participate in voluntary associations which assist in fulfilling one or more of its affirmative action obligations. The efforts of a contractor association, joint contractor-union, contractor-community, or similar group of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under Subarticle 60.2.G, provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's, and a failure of such a group to fulfill its obligations shall not be a defense for the Contractor's noncompliance.

I. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive

Order if a specific minority group of women is underutilized).

J. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, age, sex, or national origin.

K. The Contractor shall not enter into any subcontract with any person or firm debarred from government contracts pursuant to Executive Order 11246, as amended by Executive Order 11375.

L. The Contractor shall carry out such sanctions and penalties for violation of this Article including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the OFCCP. The Contractor shall be in violation of this Article and Executive Order 11246, as amended, if it fails to carry out such sanctions and penalties.

M. The Contractor, in fulfilling its obligations under the Contract, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in Subarticle 60.2.G, so as to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or this Article, the Director will proceed in accordance with 41 CFR 60-4.8.

N. The Contractor shall designate a responsible person to monitor all employment-related activity to ensure that its EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the District and to keep records. Records shall include at least each employee's name, address, telephone number, construction trade, union affiliation (if any), employee identification number (when assigned), social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the Work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, the Contractor shall not be required to maintain separate records.

O. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon

the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

P. The Contractor shall provide the District, by the fifth day of each month following the preceding month's installation activity, the Monthly Construction Manpower Utilization Report, Department of Labor Form CC 257. This report shall contain information on all personnel in the Contract. Subcontractors shall be required to provide the same reports, through the Contractor, by the fifth day of each month. If the Contractor or a subcontractor is unable to submit its report on time, it shall notify the District Manager of Contractor Compliance and request additional time to submit its report. Failure of the Contractor to report in a timely manner shall result in a penalty of $10.00 per day per report.

61.0 LABOR STANDARDS PROVISIONS

61.1 Minimum Wages

A. Mechanics and laborers employed or working on the Project Site of the Work shall be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act, 29 CFR 3), the full amounts due at time of payment computed at wage rates not less than those contained in the wage determination decision of the Secretary of Labor applicable to the project, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. The wage determination decision shall be posted by the Contractor at the Project Site in a prominent place where it can be easily seen by the workers. For the purpose of this clause, contribution made or costs reasonably anticipated under Section 1 (b) (2) of the Davis-Bacon Act, 40 USC 276a (b) (2) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1) (iv). Also, for the purpose of this Article, regular contributions made or costs incurred for more than a weekly period under plans, funds or programs, but covering the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

B. Any class of laborers or mechanics, including apprentices and trainees, which is not listed in the wage determination and which is to be employed under the Contract, shall be classified conformably to the wage determination, and a report of the action taken will be sent by the District to DOT for submittal to the Secretary of Labor. If the interested parties cannot agree on the proper classification or reclassification of a particular class of laborers or mechanics, including apprentices and trainees, to be used, the question, accompanied by the recommendation of the District, will be referred to the Secretary of Labor for final determination.

C. Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly wage rate and the Contractor is obligated to pay a cash equivalent of such a fringe benefit, an hourly cash equivalent thereof shall be established. If the interested parties cannot agree upon a cash equivalent of the fringe benefit, the question, accompanied by the recommendation of the District, will be referred to the Secretary of Labor for final determination.

D. If the Contractor does not make payments to a trustee or other third person, it may consider as part of the wages of any laborer or mechanic, the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, or any bonafide fringe benefits not expressly listed in Section 1(b)(2) of the Davis-Bacon Act, or of a type listed in the wage determination decisions of the Secretary of Labor that is incorporated in the Contract, provided, however, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside a separate account of assets for the meeting of obligations under the plan or program.

61.2 Withholding

The District may withhold or cause to be withheld from the Contractor as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices and trainees, employed by the Contractor or any subcontractor on the Work the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice or trainee, employed or working

on the Project Site, all or part of wages required by the Contract, the District may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of further payment, advance or guarantee of funds until such violations have ceased.

61.3 Payrolls and Basic Records

A. Payrolls and basic records relating thereto shall be maintained during the course of the Work and preserved for a period of three years after final acceptance of the Work for all laborers and mechanics working at the Project Site. Such records shall contain the name and address of each employee, correct classification, rates of pay (including rates of contributions or costs anticipated of the types described in Section 1(b)(2) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Wherever the Secretary of Labor has found under 29 CFR 5.5-(a)(1)(iv) that the wages of any laborers or mechanics include the amount of costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible and has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

B. Each week, the Contractor shall submit a copy of all payrolls to the District for transmission to DOT. The copy shall be accompanied by a statement signed by the employer or his agent indicating that the payrolls are correct and complete, that the wage rates contained therein are not less than those determined by the Secretary of Labor and that the classifications set forth for each laborer or mechanic conform with the work performed. A submission of the "Weekly Statement of Compliance" which is required under the Contract and the regulations 29 CFR 3 of the Secretary of Labor and the filing with the initial payroll, or any subsequent payroll, of a copy of any findings by the Secretary of Labor under 29 CFR 5.5(a)(1)(iv) shall satisfy this requirement. The Contractor shall be responsible for the submission of copies of payrolls of any subcontractors. The Contractor will make the records required under the labor standards clauses of the Contract available for inspection by authorized representatives of DOT and the Department of Labor, and will permit such

representatives to interview employees during working hours on the job.

If the Contractor employs apprentices or trainees under an approved program, it shall include a notation on the first weekly certified payrolls submitted to the District, that their employment is pursuant to an approved program and shall identify the program.

61.4 Apprentices and Trainees

A. Apprentices shall be permitted to work at less than the predetermined rates for the work they performed when they are employed and individually registered with the Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training, or with a state apprenticeship agency recognized by the Bureau of Apprenticeship and Training, or when a person is employed in the first 90 days of probationary employment as an apprentice in such an apprenticeship program, which person is not individually registered in the program but has been certified by the Bureau of Apprenticeship and Training or a state apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen in any craft classification shall not be greater than the ratio permitted to the Contractor as to its entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not a trainee as defined in this Subarticle or is not registered or otherwise employed as stated above, shall be paid the wage rate determined by the Secretary of Labor for the classification of work he actually performed. The Contractor or subcontractor shall be required to furnish to the District or a representative of the Wage-Hour Division of the Department of Labor written evidence of the registration of its program and apprentices as well as the appropriate ratios and wage rates (expressed in percentages of the journeyman hourly rates) for the area of construction, prior to using any apprentices on the Work. The wage rate paid apprentices shall be not less than the appropriate percentage of the journeyman's rate contained in the applicable wage determination.

B. Except as provided in 29 CFR 5.15, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to, and individually registered in, a program which has received prior approval,

evidenced by formal certification, by the Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training. The ratio of trainees to journeymen shall not be greater than that permitted under the plan approved by the Bureau of Apprenticeship and Training. Every trainee must be paid at not less than the rate specified in the approved program for his level of progress. Any employee listed on the payroll at a trainee rate, who is not registered and participating in a training plan approved by the Bureau of Apprenticeship and Training, shall be paid not less than the wage grade determined by the Secretary of Labor for the classification of work he has actually performed. The Contractor or subcontractor will be required to furnish the District or a representative of the Wage-Hour Division of the Department of Labor, written evidence of the certification of its program, the registration of the trainees, and the ratio and wage rates prescribed in that program. In the event the Bureau of Apprenticeship and Training withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the Work performed, until an acceptable program is approved.

C. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR 30.

61.5 Compliance With Copeland Act and Regulations

The Contractor shall comply with the Copeland Act (18 USC 874) and regulations 29 CFR 3 of the Secretary of Labor, which are herein incorporated by reference.

61.6 Contract Work Hours and Safety Standards Act - Overtime Compensation (40 USC. 327-333)

This Contract is subject to the Contract Work Hours and Safety Standards Act and to the applicable rules, regulations, and interpretations of the Secretary of Labor. The Contractor or subcontractor contracting for any part of the Work which may require or involve the employment of the laborers or mechanics, shall not require or permit any laborer or mechanic in any work week in which the worker is employed on such Work, to work in excess of 8 hours in any calendar day or in excess of 40 hours in such work week, unless such laborer or mechanic receives compensation at a rate of pay not less than one and one-half times the workers

basic rate of pay for all hours worked in excess of 8 hours in any calendar day or in excess of 40 hours in such workweek, as the case may be.

61.7 Contract Termination; Debarment

A breach of Subarticles 61.1 through 61.6 may be grounds for termination of the Contract, and for debarment as provided in 29 CFR 5.6

61.8 Violation; Liability for Unpaid Wages; Liquidated Damages

In the event of any violation set forth in Subarticle 61.6, the Contractor and any subcontractor responsible therefore shall be liable to any affected employee for his unpaid wages. In addition, the Contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic employed in violation of Subarticle 61.6 in the sum of $10 for each calendar day on which such employee was required or permitted to work in excess of 8 hours or in excess of the standard work week of 40 hours without payment of the overtime wages required by Subarticle 61.6.

61.9 Withholding for Liquidated Damages

The District may withhold, from any monies payable on account of Work performed by the Contractor or any any subcontractor, such sums as may administratively be determined to be necessary to satisfy any liabilities of the Contractor or its subcontractors for liquidated damages as provided in the Article set forth in Subarticle 61.8

61.10 Final Labor Summary

The Contractor and each of its subcontractors shall furnish to the District, upon the completion of the Contract, a summary of all employment, indicating for the completed project the total hours worked and the total amount earned.

61.11 Final Certificate

Upon completion of the Contract, the Contractor shall submit to the District, with a voucher for final payment for Work performed under the Contract, a certificate concerning wages and classifications for laborers and mechanics, including apprentices and trainees employed on the Work, in the following form:

The undersigned, Contractor on

_____

(Contract No._____)

hereby certifies that all laborers, mechanics, apprentices and trainees employed by it or by any subcontractor performing work under the Contract have been paid wages at rates not less than those required by the Contract Provisions and that the work performed by each such laborer, mechanic, apprentice, or trainee conformed to the classifications set forth in the Contract or training program provisions applicable to the wage rate paid.

_____

Signature and Title

61.12 Notice to the District of Labor Disputes

Whenever the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of the Contract, the Contractor shall immediately give notice thereof, including all relevant information with respect thereto, to the District.

61.13 Disputes (Labor Regulations)

A. All disputes concerning the payment of prevailing wage rates or classifications shall be promptly reported to the District for its referral to DOT for decision or, at the option of the District, DOT referral to the Secretary of Labor. The decision of DOT or the Secretary of Labor, as the case may be, shall be final.

B. All questions relating to the application of interpretation of the Copeland Act (40 USC 276C), the Contract Work Hours Standards Act (40 USC 327-333), the Davis-Bacon Act (40 USC 276A), or Section 13 of the Urban Mass Transportation Act (49 USC 1609), shall be sent to UMTA for referral to the Secretary of Labor for ruling or interpretation, and such ruling or interpretation shall be final.

61.14 Convict Labor

In connection with the performance of the Work under this Contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment at hard labor. This does not include convicts who are on parole and probation.

61.15 Prevailing Wage Rates

Pursuant to Section 1770 of the California Labor Code, the District has ascertained the general prevailing rate of wages in Los Angeles County and which are listed in the Contract under wage rates.

61.16 Insertion in Subcontracts

The Contractor shall insert in all subcontracts of any tier the Subarticles set forth in 61.1 through 61.15 of these General Provisions and such other Articles as the District may by appropriate instructions require.

62.0 CERTIFIED PAYROLLS -- CONSTRUCTION PROJECTS

62.1 The Contractor and each subcontractor on any tier shall furnish a certified copy of each weekly payroll within 7 days after the regular payroll date. Following a review by the District for compliance with state and federal labor laws, the payroll copy shall be retained at the Project Site.

62.2 The Contractor may use Department of Labor Form WH-347, "Optional Payroll Form", which provides for all the necessary payroll information and certifications. This form may be purchased at nominal cost from:

Superintendent of Documents
U S Government Printing Office
Washington, D.C. 20402

However, the Contractor may use its own payroll form, provided it includes the same information and certifications as Department of Labor Form WH-348, "Statement of Compliance."

63.0 COOPERATION, ACCESS, AND COMMUNITY RELATIONS

63.1 The District may undertake or award other contracts for additional Work within the Project Site of the Contract. The Contractor shall fully cooperate with such other contractors and the District and carefully fit its own Work to additional work as may be directed by the District. Upon written notice, the District will review and resolve conflicts between contracts. The Contractor shall not perform any act which will interfere with the performance of work by any other contractor or by the District.

63.2 Work indicated to be performed on private property shall be accomplished in a manner which will minimize inconvenience to the property owner and property tenants. The Contractor shall not enter upon private property to

accomplish the Work without express prior written permission from the District.

63.3 Utility companies, railroads, and municipal agencies having facilities within the limits of Project Site shall have access to their facilities for inspection and repair.

63.4 The Contractor shall appoint a community relations representative, acceptable to the District. The representative shall coordinate with the District to address and answer valid requests and complaints. The Contractor shall correct conditions giving rise to valid complaints, to the extent that they arise from Work under the Contract. These requests and complaints, together with the information as to the disposition thereof by the Contractor, shall be furnished to the District. The name and telephone number of the community relations representative shall be furnished to residents and businesses in the immediate area of the work Project Site who might reasonably be expected to be affected by the Work.

63.5 Cal/OSHA shall have access to the Project Site as indicated in the Construction Safety and Security Manual. The Contractor shall maintain access to fire hydrants and fire alarm boxes throughout the prosecution of the Work. Hydrants, alarm boxes, and standpipe connections shall be kept clear and visible at all times, unless otherwise approved by the District. If visibility cannot be maintained, the Contractor shall provide clearly visible signs showing the location of the fire hydrant, fire alarm box, or standpipe connection.

64.0 PERMITS AND RESPONSIBILITIES

The District is not required to obtain certain permits such as building permits from governing agencies, except when construction is on the property of the permitting agency. Nevertheless, unless specifically exempted by the District, the Contractor shall comply with municipal, county, and state laws, rules and regulations governing or related to any portion of the Work, and they are hereby incorporated into and made a part of the Contract. Questions regarding whether any permit or other authority action is necessary shall be referred to the District for resolution. Permits, licenses, and inspections required by municipal, county and state authorities shall be obtained, maintained in force and paid for by the Contractor. Any tests required by such authorities shall be conducted in the presence of such authorities or their authorized representative. The Contractor shall indemnify and hold harmless the District and all persons and entities acting on its behalf

against claims and liabilities deriving from or based upon the violation of the requirements of the law or permits, whether by the Contractor, its subcontractors, or any person or entity acting on its behalf.

65.0 ENVIRONMENTAL COMPLIANCE

65.1 The Contractor agrees to comply with all applicable standards, orders, or requirements issued under the Clean Air Act (42 USC 1857 et seq.), the Clean Water Act (33 USC 1251 et seq.), Executive Order 11378, all applicable standards of the State of California, and all clarification, mitigation measures, and requirements approved by the District in accordance with state and federal laws.

65.2 Motor Vehicle Pollution Requirements: When new motor vehicles are purchased with project funds, the Contractor shall comply with California State Law regarding pollution controls.

65.3 Air Quality Control

A. The Contractor shall comply with all rules, regulations, and ordinances, including those of the South Coast Air Quality Management District and state statutes which apply to any Work performed pursuant to the Contract, including any air quality control rules, regulations, ordinances, and statutes specified in Section 11017 of the California Government Code. The Contractor and subcontractors shall submit evidence to the District that the governing air quality control criteria are being met, and such evidence will be retained by the District for on-site examination by UMTA.

B. In the absence of applicable air quality control rules, regulations, ordinances, or statutes governing solvents, used on the Contract, including, but not limited to, the solvent portions of paint, thinners, curing compounds, and liquid asphalt, the Contractor shall comply with the applicable material requirements of the South Coast Air Quality Management District. Containers of paint, thinners, curing compounds, and liquid asphalt shall be labeled to indicate that the contents fully comply with said requirements.

C. Material to be disposed of shall not be burned, either on or outside the Project Site.

65.4 The Contractor shall comply with the applicable regulations of the Environmental Protection Agency (EPA) (40 CFR 15) and, specifically, shall not use any facility in the performance of the Contract which is listed on the EPA List of Violating Facilities, unless and

until the EPA eliminates the name of such facility from such listing.

The Contractor shall promptly notify the District of the receipt of any communication from the Director, Office of Federal Activities, EPA, or any successor agency, indicating that a facility to be utilized by the Contractor is under consideration to be listed on the EPA List of Violating Facilities.

Contractor shall report violations to the District, to UMTA, and to the EPA Assistant Administrator for Enforcement (EN0329).

65.5 The Contractor shall include the requirements of Subarticles 65.1 through 65.4 in every subcontract the value of which is more than $100,000 and shall take such action as the District directs to enforce the requirements.

65.6 The Contractor shall comply with additional air, water, and noise pollution provisions set forth in the Technical Provisions.

66.0 HISTORICAL, SCIENTIFIC, AND ARCHAEOLOGICAL DISCOVERIES

Articles of historical, scientific, or archaeological interest uncovered by the Contractor during progress of the Work shall be preserved and reported immediately to the District. The further operations of the Contractor with respect to the find, including disposition of the articles, will be decided by the District.

67.0 CALIFORNIA STOP NOTICE

67.1 California Preliminary Notices in accordance with Section 3098 of the California Civil Code shall be filed with:

Assistant General Manager
Transit Systems Development Department
Southern California Rapid Transit District
425 South Main Street
Los Angeles, California 90013

67.2 Stop Notices in accordance with Section 3103 of the California Civil Code shall be filed with the Office of the District Secretary.

67.3 If a Stop Notice is filed against the project in accordance with Section 3103 of the California Civil Code, the District may retain from payments otherwise due the Contractor, in addition to any other amounts properly withheld under the provisions of the Contract, an amount equal to the amount or amounts claimed in the Stop

Notice. The District may, as an alternative, where applicable, accept a surety bond filed in accordance with Section 3196 of the California Civil Code.

68.0 RIGHTS IN LAND AND IMPROVEMENTS

The Contractor shall make no arrangements with any person to permit occupancy or use of land, structures, or building within the Project Site for any purpose whatsoever, with or without compensation. The Contractor shall not occupy District-owned property outside the Project Site without obtaining prior written approval from the District, nor shall the Contractor place any permanent structures, including concrete overpours, outside of the permanent right-of-way areas.

69.0 FEDERAL PARTICIPATION SIGNS

The Contractor shall erect and maintain signs on the Project Site as indicated, satisfactory to the District and UMTA, identifying the project and indicating federal participation.

70.0 ENERGY CONSERVATION

The Contractor shall comply with mandatory standards and policies relating to energy efficiency, which are contained in the State Energy Conservation Plan issued in compliance with the Energy Policy and Conservation Act (42 USC 6321 et seq.).

71.0 DIFFERING SITE CONDITIONS

71.1 The Contractor shall promptly, and before such conditions are disturbed, notify the District in writing of: (1) subsurface or latent physical conditions at the Project Site differing materially from those indicated in the Contract Documents, or (2) unknown physical conditions Project Site of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract. The District will promptly investigate the conditions and, if such conditions materially differ and cause an increase or decrease in the Contractor's cost of or the time required for performance of any part of the Work under the Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the Contract modified.

71.2 No claim of the Contractor under this Article shall be allowed unless the Contractor has given the notice required above and as specified in the Article entitled CLAIMS in these General Provisions.

71.3 No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under the Contract.

71.4 If the District is not given written notice prior to the conditions being disturbed, the Contractor shall be deemed to have waived its right to assert a claim for additional time and compensation arising out of such changed conditions.

72.0 OPERATIONS AND STORAGE AREAS

72.1 All operations of the Contractor, including storage of materials, shall be confined to areas authorized or approved by the District.

72.2 Temporary buildings such as storage sheds, shops, and offices may be erected by the Contractor only with the approval of the District and shall be built with labor and materials furnished by the Contractor without expense to the District. Such temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon the completion of the Work. With the written consent of the District, such buildings and utilities may be abandoned and need not be removed.

72.3 The Contractor shall, under regulations prescribed by the District, use only established roadways, or construct and use such temporary roadways as may be authorized by the District. Where materials are transported in the prosecution of the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any federal, state, or local law or regulation. When it is necessary to cross curbings or sidewalks, protection against damage shall be provided by the Contractor, and any damaged roads, curbing, or sidewalks shall be repaired by or at the expense of the Contractor.

73.0 CLEANING UP

73.1 The Contractor shall keep the installation area, including storage areas, free from accumulations of waste material or rubbish and, prior to completion of the Work, shall remove rubbish and all tools, scaffolding, equipment, and materials not the property of the District from the premises.

73.2 Upon completion of the Work, the Contractor shall leave the Project Site in a clean, neat, and workmanlike condition satisfactory to the District.

74.0 CONTINUATION OF WORK AGREEMENT

74.1 The District has entered into a Continuation of Work Agreement with the Los Angeles County Building and Construction Trades Council, AFL-CIO and its affiliated local unions to insure that installation work on the Metro Rail Project shall proceed economically, efficiently, and continuously, without interruption.

74.2 The Continuation of Work Agreement is incorporated into and is a part of the Contract, and a copy is included as a part of the Contract Documents. The Contractor, upon issuance of the Notice to Proceed, agrees to the provisions of the Continuation of Work Agreement and is bound by them in the same manner as any other provision of the Contract.

75.0 INSURANCE-INSTALLATION

The insurance requirements for the installation Work required by the Contract are specified in the District's Insurance Specifications. The Insurance Specifications are incorporated herein by this reference.

END OF GENERAL PROVISIONS - SECTION 2

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

EXHIBIT 1

SCHEDULE A

DISADVANTAGED BUSINESS ENTERPRISE (DBE)

AND

WOMEN'S BUSINESS ENTERPRISE (WBE)

CERTIFICATION APPLICATION FORM

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

EXHIBIT 2

SCHEDULE B

CERTIFICATION APPLICATION FORM

JOINT VENTURE

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

EXHIBIT 3

SUMMARY SUBCONTRACTS AWARD AND PAID REPORT

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

EXHIBIT 4

CONTINUATION OF WORK AGREEMENT

(Provided only when Scope includes installation)

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

EXHIBIT 5

MINIMUM WAGE RATES

(Provided only when Scope includes installation)

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT

VIII. TECHNICAL PROVISIONS

TECHNICAL PROVISIONS

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SCOPE

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SECTION 1

SCOPE

1.1 GENERAL

These Technical Provisions and Contract Drawings specify the design, material, and performance requirements for the fare collection system to be provided for the Southern California Rapid Transit District (SCRTD) Metro Rail System. The Work shall include design, manufacture, installation, test, and initial in-service support.

1.2 CITED REFERENCES

The publications, codes, and standards are applicable to the extent cited in these Technical Provisions. Where no specific date or issue of the publication is noted, the issue (and supplements thereto) in effect on the date of Invitation to Bid shall be considered the issue in effect.

1.3 METRO RAIL SYSTEM DESCRIPTION

The Metro Rail System is an 18-mi rail rapid transit line planned by the Southern California Rapid Transit District (SCRTD) from downtown Los Angeles via the Wilshire District, Fairfax area, and Hollywood to the San Fernando Valley. This line is planned to be the core element of a regional rail rapid transit system. In addition to the planned 18-mi line, two future extensions of the Metro Rail System have been identified as part of the regional rail rapid transit system. While the entire main line portion of the 18-mi line is planned as subway, the future extensions may involve surface or aerial segments, as determined by design development.

The first 4 mi of the line have been identified as the initial operating segment because there are currently insufficient federal funds to construct either the 18-mi Metro Rail System or the 8.8-mi minimum operable segment identified in the Federal Environment Impact Statement. This initial segment, identified as MOS-1, consists of double-track, main line subway from Union Station to Wilshire/Alvarado Station, with additional subway and surface track connecting to the Yard southeast of Union Station. It includes all Yard and shop facilities planned for the 18-mi system, with the exception of part

of the Yard storage tracks, which will be installed as warranted by system extension and fleet expansion.

The MOS-1 line has five stations. The main line route begins at Union Station, northeast of the Los Angeles Civic Center, and runs through the Central Business District, terminating on the west side at the Wilshire/ Alvarado Station. The rail line is entirely in subway, with line segments constructed by tunnel boring machines, and with stations and crossovers excavated by cut-and-cover construction techniques.

The five initial stations will be primarily of a double-ended design with two mezzanines, but one station, Wilshire/Alvarado, will be of the single-mezzanine design, characteristic of the majority of the stations on the 18-mi line. Each mezzanine free area will have ticket vending machines and will be separated from the paid area by one or two arrays of entry/exit faregate barriers. The fare structure for MOS-1 will be based on a single zone, but fare collection equipment will have multizone capability to accommodate Metro Rail system extension and the multi-farezones of a connecting Light Rail System. Escalators, stairs, and elevators will provide normal vertical circulation between surface, mezzanine, and platform levels. Some stations will have adjacent parking facilities, pick-up/drop-off areas, and/or bus pull-in areas to accommodate patrons arriving by automobile or bus.

Ridership on MOS-1 is projected to be approximately 54,000 per day. Service for MOS-1 is planned to consist of 4-car (two dependent-pair) trains operating at 5-min headways during peak hours, increasing to 20 min during evenings and weekends. However, 6-car (three dependent-pair) trains operating at 2-1/2-min headways will be required to serve projected demand for the 18-mi line.

1.4 FARE COLLECTION SYSTEM DESCRIPTION

1.4.1 General

The Fare Collection system shall be of the automatic barrier type. Tickets shall be magnetically encoded and will be required for entry and exit. Only regular fare Single-trip Tickets will be available for purchase at the stations. At off-site locations, regular-fare passes will be available, as well as special-fare passes and special-fare Single-trip Tickets. Senior citizens, handicapped patrons, and students will be eligible to purchase special-fare tickets and passes. Except for an interface with a barrier-free, light rail system at one

station (7th/Flower), the system will be capable of operating without attendants. A wall-mounted control panel at each fare gate array will allow station agent intervention under selected circumstances or for specific periods. The fare collection system will be fully accessible to the elderly and handicapped.

1.4.2 Components

The principal components of the fare collection system are:

A. Ticket Vending Machine (TVM)

B. Gate Equipment

C. Add Fare Machine (AFM)

D. Passenger Assistance Center (PAC)

E. Station Fare Collection Control Unit (SFCCU)

F. Fare Collection Central Computer (FCCC)

G. Fare Media

H. Central Ticket Encoding Machine (CTEM)

I. Booth Ticket Encoding Machine (BTEM)

J. Revenue Cart

K. Test Equipment

L. Filler Panels:

1. 4 ft x 6 ft-6 in. (No Cutout)

2. 4 ft x 6 ft-6 in. (with /Cutout)

3. 2 ft x 6 ft-6 in. (No Cutout)

M. Fencing.

1.5 ABBREVIATIONS AND DEFINITIONS

1.5.1 General

Wherever the following abbreviations, terms, and definitions, or pronouns in place of them, are used in these Technical Provisions, the intent and meaning shall be

interpreted as provided in this Section, unless otherwise stated.

1.5.2 Abbreviations and Acronyms

The abbreviations and acronyms used in these Technical Provisions are as defined in the text and as follows:

A/D	Analog-to-digital
AFC	Automatic Fare Collection
AFM	Add Fare Machine
BTEM	Booth Ticket Encoding Machine
CCC	Central Cash Counting
CDR	Conceptual Design Review
CDRL	Contract Data Requirements List
CIC	Communications Interface Cabinet
CP	Command Post
CRC	Cash Replenishment Container
CRT	Cathode Ray Tube
CTEM	Central Ticket Encoding Machine
CTS	Cable Transmission System
c/w	Complete With
D/A	Digital-to-analog
DAR	District's Authorized Representative
DFE	District-furnished Equipment
DTS	Data Transmission System
EMI	Electromagnetic Interference
EMP	Emergency Management Panel
EPROM	Erasable-Programmable-Read-Only Memory
FACI	First Article Configuration Inspection

FCCC	Fare Collection Central Computer
FDR	Final Design Review
LED	Light Emitting Diode
LLRU	Lowest Level Replaceable Unit
MCBF	Mean Cycles Between Failures
MOS-1	Minimum Operable Segment - 1
MTBF	Mean Time Between Failures
MTF	Mean Transactions Between Failures
MTTR	Mean Time To Repair
NIC	Not In Contract
NTP	Notice To Proceed
OCC	Overflow Cash Container
PA	Public Address
PAC	Passenger Assistance Center
PAI	Passenger Assistance Intercom
PDR	Preliminary Design Review
PROM	Programmable-Read-Only Memory
RAM	Random Access Memory
RCC	Rail Control Center
ROM	Read-only Memory
RTU	Remote Terminal Unit
SAPP	System Assurance Program Plan
SBA	Susan B. Anthony Dollar Coin
SST	Stainless Steel Tubing
TVM	Ticket Vending Machine

1.5.3 Definitions

Access Door - An external hinged cover panel on equipment located in public areas. It is secured by a lock and provides access to the internal parts and controls of the machine.

Accountability - A means by which recorded and/or registered values are totaled to ensure that the disposition of monies or equipment is assigned to new records or registers.

Active Repair Time - That portion of corrective maintenance (i.e., fault localization and/or isolation, repair or removal/replacement of the faulty item, and verification of proper operation subsequent to the fix) during which one or more repairpersons are working on failed equipment.

Aisle - The passageway between two adjacent fare gate cabinets.

Algorithm - A finite set of well-defined rules that gives a sequence of operations for performing a specific task.

Assembly - A physically self-contained or easily identified package whose integrated parts, devices, and structure perform a distinct function.

Audit - The actual counting of coins, bills, and tokens and the subsequent comparison with amounts currently on the books or in registers.

Bad Number Listing - A list of stolen or missing tickets that is contained in the logic memory by serial number as a means of detecting unauthorized use.

Barrier - The turnstile arm or set of leaves of gate equipment that protrudes into each aisle to prevent unauthorized entry or exit.

Baseline - A specification or product that has been formally reviewed and agreed upon, that thereafter serves as the basis for further development, and that can be changed only through formal change control procedures.

Biparting Leaves - Barrier devices incorporated in fare gate consoles which, when extended, block movement through the gate array aisles. Upon receipt of a valid

entry or exit signal, these devices are retracted into the consoles to allow patron passage.

Bit - The smallest unit of data encoded on a ticket/pass.

Cash Box - Cash containers and/or built-in holding bins within a TVM or AFM that are used for the storage of cash before manual removal from the machines for transfer to other machines or to CCC.

Cash Container - A secure device used in receiving, storing, and transporting coins and currency within and among TVMs, AFMs, revenue carts, and CCC.

Central Cash Counting - The central location from which ticket stock and monies are sorted, counted, stacked, or stored for distribution.

Central Control Computer - Primary computer used by the Communications System for processing data and providing an interface to the Rail Control Center room equipment.

Change Storage Area - A holding bin built into fare collection equipment and normally used as a change storage/dispense device.

Code - To represent data or a computer program in a symbolic form that can be accepted by a processor.

Command Post - Unit located on the mezzanine at each station. Used during an emergency for supervision and coordination of all personnel, equipment, and resources.

Compile - To translate a higher-order language program into its relocatable or absolute machine code equivalent.

Configuration Management - The process of identifying and defining the configuration items in a system, controlling the release and change of these items throughout the system life cycle, recording and reporting the status of configuration items and change requests, and verifying the completeness and correctness of configuration items.

Conformal Coating - An insulating protective coating that conforms to printed circuit boards to prevent malfunction due to environmental conditions.

Console - A fare gate cabinet which may or may not contain a ticket transport and its associated internal

mechanical/electrical equipment, but does not contain a barrier mechanism.

Core Drilling - The process of drilling holes in the floor to gain access to underfloor power and signal ducts.

Corrective Maintenance - The action taken to restore a failed item of equipment to an operable state.

Credit Memory - The banking of a valid entry/exit transaction, without the turnstile being rotated, such that the ticket of the next patron shall be accepted while the first passenger is passing through.

Critical Path Network - The documents that depict key activities and events, the order and interdependence of planned activities, as well as activities by Others that will impact the order of activities planned.

Daisy Chain - A group of items connected in series.

Data Dictionary - A collection of names of all data items used in a software system, together with relevant properties of these items; for example, length of data item, representation, etc.

Detect - An action by which a machine can self-diagnose or sense a condition within itself and automatically forward the information to Central Control.

Disposable Ticket - A ticket/pass type that is not recycled for further use.

Emergency Management Panel - Unit located on the mezzanine at each station. Used for management of emergency functions, including release of all fare gates in the station.

Encode - The process by which information is magnetically imprinted on the magnetic oxide strip on a ticket.

Erasable-Programmable-Read-Only Memory - A removable-type memory device that permits the erasure of logic and/or data previously encoded and the encoding of new logic and/or data. When inserted into a machine, it can only be read and not altered.

Equipment Off - A control command from a remote location to take an item of equipment out of service.

Escrow - A retention area for monies/tickets deposited prior to consummation or cancellation of a transaction.

Fare Media - Magnetically encoded tickets and passes.

Fare Table - A matrix of all fare charges between any two stations/zones of the Metro Rail and light rail systems.

Fault Code - A numeric code used to identify a malfunction by a device or a function to assist monitoring and maintenance personnel in diagnosing ticket/equipment problems.

Fencing - Fixed structures in line with gates that together form the gate array.

Fixed Data - Data, initially encoded on tickets/passes at the time of issue, which will not be magnetically altered while in use by the passenger by any other encoding/reencoding process.

Fixed Display - Visual presentation of information that will not change, such as operating instructions.

Flow Chart - A graphical representation of the definition, analysis, or solution of a problem in which symbols are used to represent operations, data, flow, and equipment.

Free Area - Station public area between gate array and station entrance.

Gate - A fare gate cabinet which contains a barrier mechanism and which may or may not contain a ticket transport and its associated internal mechanical/electrical equipment.

Gate Array - Assembly of gate equipment and fencing that creates a wall-to-wall divider between free and paid areas.

Handicapped Ticket - A special fare ticket that is sold to disabled patrons.

Ignore Entry/Exit Check On - A remote control command to a gate(s) to disregard entry/exit check restrictions with an otherwise valid ticket/pass for acceptance by a gate.

Ignore Time On - A remote control command to a gate(s) to disregard time restrictions associated with an otherwise valid ticket/pass for acceptance.

Ignore Zone On - A remote control command to a gate(s) to disregard zone restrictions with an otherwise valid ticket/pass for acceptance.

Interrogate - A communications protocol whereby a remote device polls each item or part of equipment requesting its status or the transmission of data stored for reporting.

Intrusion Code - A code issued by a fare collection item of equipment to indicate unauthorized entry.

Issue Code - A data code utilized as a security measure to allow determination that the ticket conforms to the current issue for that ticket type.

Jackpot - A failure category in which a machine dispenses more change than the transaction warrants.

Latent Display - A display in which the message is present and capable of being made visible, though not now normally visible or active.

Lowest Level Replaceable Unit (LLRU) - The lowest assemblage of components to which a malfunction can be isolated and that can be readily replaced in its field application.

Machine Code - Instructions and data that are directly executable by a computer.

Magnetically Encoded - See Encode.

Magnetic (Oxide) Strip - The portion of a ticket that is magnetized with encoded data.

Mean Time Between Failures (MTBF) - The arithmetic average of the times between successive failures of an individual item or of each of the members of a population of items, measured in like units. Actual observed test MTBF is the range of the true MTBF cumulatively demonstrated under test conditions.

Mean Time To Repair (MTTR) - The mean elapsed time required to perform the task of isolating an independent failure to the LLRU, to remove and replace the failed LLRU, and to verify the proper equipment function.

Mean Transactions Between Failures - The arithmetic average of the number of transactions between successive failures.

Module, Software - A program unit that is discrete and identifiable with respect to compiling, combining with other units, and loading.

Multimodal - A combination of several modes of transportation; e.g., bus, heavy rail, and light rail.

Nonresettable Electronic Register - A device contained in the logic that stores accumulative data that is not to be altered or erased.

Off-peak - Period(s) of day(s) when lower fares are charged.

Ongoing Remote Audit - An automatic means within each TVM and AFM for alternately drawing down each change storage area to empty so that a zero value audit can be performed. The audit is performed on each change storage area in turn, on a continuing basis, by routing coins to other areas and issuing change from the area to be audited next.

Overlap Time - Grace period in which tickets/passes of a previous issue will be accepted along with the current issue, as determined by the issue code.

Paid Area - The station area between the gate array and the train access area (platform).

Paper Stock - The material used for disposable tickets.

Parity - The status of being odd or even, used as the basis for detecting errors in binary coded data.

Parity Bit - A bit added to an array of bits to create an odd or even data check.

Parity Error Check - The process of searching for error by conducting a summation in which the bits in a character or block are added and matched against a single, previously set parity digit.

Pass - A ticket type utilized for unlimited rides under certain restrictions of time and zone.

Passback - The protective measure used to preclude the improper use of a ticket or pass to evade fare payment.

Patron - A person who, upon purchase and use of a ticket/pass to enter the paid area of a station, becomes a passenger.

Peak - Period(s) of day(s) when higher fares are charged.

Post - A freestanding supporting structure on both sides of a handicapped gate or service/emergency gate.

Program Design Language - A language with special constraints and, sometimes, verification protocols used to develop, analyze, and document a design.

Provisions For - Indicates future functions/requirements not needed for initial procurement, but for which software, cutouts, space, and wiring shall be provided to accommodate them when needed.

Pseudocode - A combination of programming language and natural language used for computer program design.

Rail Control Center - The facility from which rail system operation will be monitored and controlled.

Random-Access-Memory - Data processing capability where the time required for access to obtain data from or place data into storage is independent of the location of the data most recently obtained or placed in storage.

Read - The checking (decoding) of a magnetically encoded ticket for validation as acceptable media to enter/exit the rail system or for credit towards purchase.

Read-Only-Memory - That portion of the logic memory for which data can only be read but not altered.

Read/Sort - An operational mode of the ticket encoder machine that allows data to be read from a ticket and for all ticket types of the same kind to be separated as determined by that data.

Recirculation - The use of monies originally deposited in fare payment by one patron for the subsequent issuance of change to another patron. Automatic recirculation takes place within a given machine without intervention by personnel.

Register - An electromechanical device or data processing storage location used for recording and storing data for local readout or for transmission to remote location on command.

Register Data Request - An interrogation for the accumulated totals of the various categories of data that are stored in electronic registers in each item of equipment.

Remote Terminal Unit - A control and indication interface device that accepts inputs and provides outputs.

Retrofit - The modification of equipment to improve/restore performance or correct a defect.

Right-hand Rules - Three different right-hand rules exist in fare collection that are used to different degrees:

- Gate Hinging - When viewed from the free area, all hinged or rotating gates will be hinged or hung on the right side of the aisle they govern.

- Ticket Feed - Fare media will be inserted into a console on the right side of the aisle in order to release the gate mechanism of the aisle. Exceptions are the exit handicapped gates where the fare media is left-hand fed.

- Passenger Flow - Architectural design will generally provide for patron walk paths to keep to the right of opposing pedestrian flow. Selected exceptions may be needed to prevent or minimize cross flow patterns in stations.

Secure - A system of hardware and procedures by which bulk quantities of money (bills or coins) cannot be accessed or removed from fare collection equipment containers except by employees of Central Cash Counting (CCC). All movements and processing of money outside of CCC are made in containers, which must normally be fitted to a specially keyed mechanical interface in order to be opened.

Software - The media and documents that regulate and control the operation of a data processing system by specifying computer program, procedures, and rules. It includes compilers, library routines, manuals, and circuit diagrams.

Solid-state - A generic class of components whose operation relies on the control of electrical or magnetic phenomena in solids. Examples include transistors, crystal diodes, microprocessors, and ferroelectric cores.

Source Code - A computer program that must be compiled, assembled, or interpreted before being executed by a computer.

Special Fare - Passes and one-way tickets for student, elderly, and handicapped patrons which may be purchased only at off-site locations and which will require proper identification.

Stacker - A bill container used to receive paper currency in the TVMs and AFMs.

Station Agent - A District employee who moves about within a station or between stations to assist patrons with problems, put equipment in or out of service, remove ticket or coin jams, and report equipment malfunctions to RCC.

Status Indication Code - A numerical indicator displayed to enable monitoring and maintenance personnel to readily identify a problem area or malfunction device.

Status Request - An interrogation for a report of the condition that caused equipment to set an indicator.

Stored Value - A ticket type that registers an amount of money and is decremented by the exit fare gate for each usage until the balance no longer has any value.

Tamper-resistant - A type of device that has been manufactured so that opening it to gain access is not possible by other than authorized means or destruction.

Ticket - The fare medium issued to patrons for a one-way trip.

Ticket Agent - An agent residing in a booth at the 7th and Flower Station to exchange paper tickets from light rail transit passengers for magnetically encoded exit tickets. Agent encodes required data.

Time Value - A condition that makes a ticket valid for a defined time period.

Transaction - The series of steps involving one patron using one fare collection system machine, such as a TVM, AFM, or gate.

Transfer - A surcharged ticket for continuing by bus a trip that originated on Metro Rail. It is magnetically encoded for processing by gate equipment and printed for visual inspection by LRT Fare Inspector and bus driver.

Transfer Acceptance Time - A predetermined time period for which transfers from rail to bus are valid based on time of entry into the system through a gate.

Travel Time - The predetermined time required for a trip from any station/zone to another, including transfer to bus.

Tripod - The assembly of the three arms of a turnstile module configured so that each 120° rotation cause one of the arms to rest at a horizontal position with respect to the floor.

Turnstile - A gate module having three arms protruding into the aisle and set into a hub that rotates 120° when released to permit the passage of one person.

Usage-cycled - The testing of an item by repeated functional performance to determine its ability to meet performance standards.

Validation - The process of evaluating software at the end of the software development process to ensure compliance with software requirements.

Variable Data - Data encoded on tickets that may be altered as the ticket is processed.

Variable Display - A display that changes in response to certain inputs such as decrementing or incrementing on the deposit and validation of money inserted.

Verification - The process of determining whether or not the products of a given phase of the software development cycle fulfill the requirements established during the previous phase.

Zone - A fixed geographical sector with a boundary that delineates where additional payment is required for travel.

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SECTION 2

GENERAL REQUIREMENTS

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SECTION 2

GENERAL REQUIREMENTS

2.1 GENERAL

This Section defines the Fare Collection system, the operating environment, and the interfaces with other Metro Rail systems and District functions. The system and equipment provided shall be reliable, safe, durable, easy to use and maintain, and shall be adaptable to accommodate future technology, system expansion, and multimodal interfaces. General design and installation requirements shall be as specified.

2.2 FARE STRUCTURE

A. The fare structure shall be of the zone concept.

1. The MOS-1 opening segment shall constitute one zone for Metro Rail.

2. Connecting with Metro Rail, the Long Beach-Los Angeles light rail line will consist of six zones, with one zone coincident with the Metro Rail MOS-1 zone at the 7th/Flower Station.

3. Provision shall be made for four additional Metro Rail zones and six additional light rail zones for the Century Freeway line, for a total of 17 zones.

4. Wiring, connections, and programming shall be incorporated in the MOS-1 procurement for the 17-zone system.

B. The minimum fare required to enter the system shall be the fare for one trip within one zone, termed the base fare.

1. Base fare will change in accordance with time of entry into the system. That is, base fare will be higher in peak hours than in off-peak hours.

2. Peak hour fares shall be charged during two time periods of weekdays.

3. If a bus transfer is desired, a bus transfer surcharge will be added to the base fare before entry into the paid area.

C. The maximum fare chargeable for a trip on Metro Rail, or on the light rail lines, or on a combination of Metro Rail and the light rail lines, shall not exceed the base fare plus four zone increment charges.

1. If a bus transfer is also desired, a bus transfer surcharge will be added to the fare.

2. Equipment shall have the capability of allowing a maximum fare equal to the base fare plus up to six zone increment charges.

D. Payment for required fare may be made with coins, tokens, paper currency, fare media, or combinations thereof.

E. Fare classes shall be as follows:

1. Regular Fare

2. Special Fare (discount for senior citizens, handicapped patrons, and students)

3. No Fare (employees, dependents, etc.)

F. Types of tickets/passes to be used initially on the system shall be as described in Section 10.

G. It shall be possible to enter fare tables into the Fare Collection Central Computer (FCCC) and subsequently by the FCCC, uniformly into the SFCCUs, TVMs, AFMs, and gates. The tables shall contain fares for travel from each station/zone to all other stations/zones, for all fare classes, for defined periods of time. As part of each fare table, a matrix shall be provided that defines the station(s) for each zone.

1. Fare tables shall be able to accommodate fare charges over a range of $0.05 to $20.00, in increments of $0.05.

2. It shall be possible to load a new fare table prior to a time changeover period and to erase the old fare table upon expiration of a time changeover period such that changes in fare structure can be achieved from RCC uniformly on all equipment at the same time.

H. The Contractor shall revise fare structures, at the direction of the District, at any time up to 2 weeks before start of revenue service without any additional billing.

2.3 ENVIRONMENTAL CRITERIA

The fare collection equipment shall function as specified in the environmental conditions encountered in rail transit service, under the climatic conditions described below, plus any increments due to internally generated heat.

2.3.1 Air Temperature

Plus 20° to 110°F for station equipment; plus 40° to 100°F for revenue processing and centrally located ticket-encoding equipment.

2.3.2 Relative Humidity

Fifteen to 100 percent for station equipment; 20 to 90 percent for centrally located ticket-encoding and revenue processing equipment.

2.3.3 Airborne Dust

Air containing airborne dust particles, including metallic dust, shall not affect station equipment operation. Dust particle size may vary from 1 to 200 microns with a maximum concentration of 0.248 mg/cm^3.

2.3.4 Noise Levels

The noise emitted by a single unit of operating equipment installed in public areas shall not be greater than 55 dBA, measured at 3 ft from any exposed surface of the equipment at a height of 5 ft above the floor. This noise level shall apply with the equipment in either the quiescent state or during operation.

2.3.5 Seismic Protection

Equipment furnished, and as installed under this Contract, shall be able to withstand, without adverse effect on performance, operation, or life expectancy, seismic loading equivalent to 1 g horizontal and 1 g vertical acceleration.

2.3.6 Shock and Vibration

Floor-mounted equipment, including interior-mounted components and assemblies thereof, shall resist horizontal shocks equal to 0.5 g without permanent deformation or failure of the mounts. There shall be no permanent deformation or failure of mounts of any fare collection equipment under conditions simulated by a sinusoidal sweep vibration test at a sweep rate of 1/2 octave/min

from 5 to 25 to 5 Hz at a peak vibratory acceleration of 0.25 g when applied to each of the three axes. No assembly or component shall resonate under these conditions.

2.3.7 Ventilation

A positive-pressure ventilation system shall be provided for each item of equipment if a forced-air system is used. The ventilation system shall incorporate filtering to avoid intake of dust. Filters shall not require replacement more frequently than four times per year.

2.4 PATRON INTERFACE

2.4.1 General

The front of the fare collection equipment, except for the gate equipment, shall serve as the patron interface. The vertical ends and top of gate equipment shall serve as the patron interface. Openings and patron-operated control devices shall be provided on equipment and shall result in equipment that is easy to use and operate by the patron. Openings and devices shall not expose patron to any mechanical movement, sharp edges/protrusions, or allow insertion of human extremities.

2.4.2 Detailed Design

Based on the dimensions and configurations indicated, the Contractor shall submit detailed design for the patron interface panels of TVMs, AFMs, PACs, gates, and consoles, and for the control panel of SFCCUs for approval. (CDRL) Detailed design shall include as a minimum the following:

A. An overall layout of the patron interface and SFCCU control panels.

B. Step-by-step graphic instructions for operating each piece of equipment (except SFCCUs) integrated into the panel designs.

C. Location, size, type, and configuration of patron-operated controls and patron-related input-output openings.

D. Location, size, type, and configuration of controls and devices to be incorporated into the SFCCU control panel.

E. Location, size, and configuration of lighted information displays. Displays shall be LEDs or other means, if approved. When in use, displays shall be

lighted; when not in use, displays shall be unlighted and text of latent information shall not be discernible.

F. Size of lettering, numerals, and symbols used in the graphic instructions and for the messages in the information displays.

G. Materials to be used.

H. Text, graphics, type style, colors, and layout shall be coordinated with other station graphics.

2.5 INPUT/OUTPUT OPENINGS

2.5.1 Requirements

Openings in the equipment cabinets and facades shall be provided to accommodate insertion and retrieval of coins, tokens, paper currency, and media.

2.5.2 Handicapped Requirements

At least one item of each equipment type in each fare collection array in a station shall have openings and controls available within the reach limitations of 2 ft 6 in. minimum to 4 ft 6 in. maximum from the floor to accommodate wheelchair patrons. These reach limitations apply to TVMs, AFMs, PACs, and Handicapped Gates.

2.6 PATRON-OPERATED CONTROL DEVICES

Patron-operated control devices shall be provided to accommodate each patron choice that is available. Buttons shall be electrically isolated.

2.7 CONTROL LOGIC AND DATA PROCESSING

2.7.1 Control Functions

Access to control logic functions shall be restricted to maintenance personnel.

2.7.2 Memory

Solid-state memory support shall be provided to enable the execution of the specified functions of the equipment (including functions deferred in MOS-1).

2.7.3 Spare Memory

Provision shall be made for increasing memory capacity by 25 percent for both software and data storage.

2.7.4 Programming

A. Program logic within TVMs, AFMs, gates, SFCCUs, and test equipment shall be recorded on EPROMs.

B. The EPROM shall be easily removable to permit substitution of another EPROM, suitably programmed, when program changes are needed.

C. Remote input ports shall be provided in each item of equipment to accept data from the SFCCU, as specified (Reference: Section 8).

2.7.5 Registers

A. Modes: Registers shall be permanently identified and operated in one of the following two modes:

1. Cumulative Data: These registers shall accumulate lifetime totals. They shall be nonresettable and nondecrementable. For electromechanical registers, any resetting or decrementing shall result in a destructive impact on the register. An example of this type of data is the number of transactions.

2. Current Status: These registers can be incremented or decremented based upon input and output flows and can be reset through special procedures. Method(s) of reset shall be submitted for approval. (CDRL) Examples of this type of data are 1) number of coins in a container, and 2) transactions since last maintenance.

B. Types:

1. Electromechanical registers in station-located equipment shall be tamperproof, contain a readout display, and be situated within each item of equipment so that the display can be read in ambient light with the door open. Data, as defined in Appendix TP-2-A, shall be displayed in cumulative electromechanical registers. Electromechanical registers shall be eight digits.

2. Electronic registers shall be provided for each station-located item of equipment to record cumulative data, in accordance with the reporting and format requirements of Section 9. Registers shall be located at an approved

location. Upon request, the contents of each electronic data register shall be transmitted together with the station name, equipment type, and equipment number to the SFCCU.

3. Electronic registers shall be provided for each station-located item of equipment to record the content of status registers, in accordance with the reporting and format requirements of Section 9. Upon request, the contents shall be transmitted together with the station name, equipment type, and equipment number to the SFCCU.

C. The updating of patronage and revenue data registers in TVMs, AFMs, and gates shall be completed before the passenger interface on the next transaction is started and, for servicing, before the machine returns to normal operation.

2.7.6 Software Design

The software design shall be structured and top-down documentation shall be provided. Structure charts or top-level flow charts and program design language or pseudo code shall be provided. All source code in higher-level language or assembly language shall be fully annotated.

The design baseline for computer and microprocessor software shall be identified and the software changes shall be controlled through the verification and validation process.

2.8 CASH CONTAINERS

2.8.1 Identification

Three types of cash containers shall be provided. Each individual container shall be identified by a unique registration number that is permanently inscribed on the container. Each type of container shall have a different registration number series. The registration number shall be easily read when the container is in the fare collection equipment, with the front door open, from a distance of 3 ft under a station ambient light level of 15 fc minimum. The container types shall also be distinguished by fit, colors, shape or size so as to physically preclude interchanging types and be readily identified by employees. Containers of the same type shall be interchangeable.

2.8.2 Overflow Cash Container

The Overflow Cash Container (OCC) shall be a secure device for transferring a mix of coins, or a mix of coins and tokens, from the TVMs and AFMs to the revenue cart.

2.8.3 Cash Replenishment Container

The Cash Replenishment Container (CRC) shall be a secure device for transferring single denomination coins from CCC to TVMs and AFMs via the revenue cart. It shall have a means for CCC to identify the coin denomination contained.

2.8.4 Bill Container

The Bill Container (BC) shall be a secure device for transferring paper currency from the TVMs and AFMs to CCC via the revenue cart. It shall have a means to identify the currency denomination contained within, if separate containers are provided for each denomination.

2.8.5 Design Requirements

A. Containers and their enclosures shall not have removable lids, covers, or other elements that may be detached. A container shall remain locked and sealed unless it is in a TVM, AFM, revenue cart receiver, or at CCC. Unauthorized access to a container shall not be possible except by destruction of it.

B. Loaded containers shall remain secure and operational when dropped onto concrete from a height of 3 ft in any orientation. Protective materials shall be provided on the exterior of the containers to minimize handling damage during normal use.

C. Containers shall include a built-in, easily gripped handle that provides adequate gloved-hand clearance.

D. Each coin container shall have a total useful interior volume such that the total weight of a full container shall not exceed 50 lb nor be less than 35 lb. The weight of the contents shall not be less than 75 percent of the total weight. Each bill container shall have a total useful interior volume such that a full container shall not exceed 50 lb nor contain less than 1,000 stacked bills.

E. Tampering with the container key mechanism shall result in failure of the container in the closed and locked position.

F. Containers shall be able to be inserted into their enclosures only in a single orientation.

G. The design of OCCs, CRCs, and BCs shall be submitted for approval. (CDRL)

2.9 SECURITY

2.9.1 General

Each item of equipment shall be designed to provide maximum security for coins, tokens, bills, fare media, and equipment. In addition to the actual incorporation of security features, the equipment shall be designed to give the outward appearance of being difficult to break into. Locks shall be provided as an integral part of the equipment.

2.9.2 Locking Devices and Keys

A. Doors, panels, and covers providing access to the inside of equipment shall have tamper-resistant, flush-mounted locks. Locking devices shall also be provided to activate and deactivate functions within the equipment. Lock types are listed in Table TP-2-1. Lock type locations and key identity are listed in Table TP-2-2. Key quantity and numbering are listed in Table TP-2-3.

B. Locks and mounting attachments shall be such that an attempted forced entry by punching the exterior surface, so as to remove the cylinder, shall not permit door opening.

C. Keys shall be delivered separate from delivery of fare collection equipment in a manner to be determined by the District.

2.9.3 Access Requirements

The equipment shall be designed to be accessible for servicing, as specified, and shall contain an Access/ Intrusion Detection System that shall operate as follows:

A. Gates, PACs, SFCCUs, CTEMs, and BTEMs:

TABLE TP-2-1

LOCK TYPES

Lock Type 1: This lock shall be a 7-pin tumbler cam lock or equivalent, as approved. This lock shall be used for Key Identity "01".

Lock Type 2: This lock shall be a 7-pin tumbler switch lock or equivalent, as approved. This lock shall be used for Key Identity "02."

Lock Type 3: This lock shall be a standard high-security lock used on similar money containers, as approved. The lock design shall permit replacement of the barrel assembly, or equivalent, in order to effect practically unlimited combination change. The Key Identities shall be "03," "06," and "07."

Lock Type 4: This lock shall be a single-bitted switch lock or equivalent, as approved. This lock shall be used for Key Identity "4."

Lock Type 5: This lock shall be a double-bitted switch lock or equivalent, as approved. This lock shall be used for Key Identity "05."

TABLE TP-2-2

LOCK LOCATION AND KEY IDENTITY

Equipment	Lock Type	Key Identity
TVM/AFM		
Front Door	1	01
Alarm Shunt	2	02
Interior Door(s)/Panel(s) Providing Access to Money, Cash Containers, and Ticket Stock	3	03
Gate Equipment		
Primary Cover	1	01
Alarm Shunt	2	02
Other Doors/Panels	1	01
PAC		
Front Door	1	01
Alarm Shunt	2	02
SFCCU		
Front Door	1	01
Alarm Shunt	2	02
ON/OFF - SFCCU	4	04
ON/OFF - Supervisor	5	05
CTEM and BTEM		
All Doors	1	01
Alarm Shunt	2	02
Revenue Cart		
All Doors	3	6
Cash Containers		
Covers	3	7

TABLE TP-2-3

KEYS TO BE FURNISHED

Key Identity	Lock Type	Quantity	Serially Numbered From
01	1	40	001-050
02	2	40	051-099
03	3	20	101-150
04	4	12	151-199
05	5	12	201-250
06	3	12	251-299
07	3	10	301-350

1. Front doors or primary covers of equipment shall contain a lock, requiring a key to open, thereby providing access to equipment mechanisms or control panels.

2. When front doors or primary covers have been opened, an audible alarm shall sound unless the alarm has been silenced by use of a shunt key in a separate and different lock, accessible only after the front door or primary cover has been opened. The alarm shall be initiated only after an adjustable time period (15 to 30 sec).

3. When front doors or primary covers have been opened and the alarm has been silenced within the allotted time period, it shall be termed an "Authorized Opening." It shall be detected, recorded, and announced at RCC in real time as an equipment NOT IN SERVICE indication together with a "Door Open" code.

4. When front doors or primary covers have been opened but the alarm has not been silenced within the allotted time period, it shall be termed an "Unauthorized Opening." It shall be detected, recorded, and announced at RCC in real time as an INTRUSION indication. In addition to the remote alarm at RCC, an audible alarm shall be initiated at the equipment and shall register 85 dB at 6 ft. The alarm shall sound for an adjustable time period (30 sec to 2 min) and then reset automatically when front door or primary cover is closed.

B. TVMs and AFMs:

1. Front doors shall contain a lock, requiring a key to open. In addition, since TVMs and AFMs contain money, cash containers, and ticket stock, to provide a higher degree of security a system of mechanical latches shall be utilized to provide strength and rigidity to the interface between the door and the cabinet structure to deter opening of the door by a crowbar or similar tool. The key that opens the front door shall simultaneously release an interlock on a shaft that can then be rotated by a T-shaped handle to retract the latches, and thereby allow the front door to be opened. Handles will be carried by station agents, maintenance personnel, and CCC personnel.

2. When front doors have been opened, an alarm shall sound unless silenced by a shunt key, as described above.

3. When front doors have been opened, and the alarm has been silenced, access shall be provided for station agents to ticket transports and money handling equipment associated with patron transactions, to facilitate clearing jams or to retrieve fare media trapped in escrow during power outages.

4. To obtain access to areas of the equipment containing money, cash containers, and ticket stock, the employee shall be required to:

   a. Input an identification code number into a keypad that shall be provided inside the equipment, accessible only after the front door is opened.

   b. Open an interior door or panel, accessible only after the front door is opened, that shall contain a lock requiring a different key to open than the key used to open the front door. Keys for this lock shall be issued only to maintenance personnel and CCC personnel.

5. When the interior door or panel is opened, an alarm shall sound unless a specific sequence of actions has been implicitly followed:

   a. Front door lock is released with a key

   b. Front door latches are retracted with T-shaped handle

   c. Front door is opened

   d. Front door alarm is silenced with shunt key

   e. Identification code number is input into keypad

   f. Interior door is opened.

6. Opening of interior doors or panels shall be termed "Authorized Opening" or "Unauthorized Opening," as described above, shall be detected, recorded, and announced at RCC in real time, with appropriate indications and codes,

and shall initiate an alarm at the equipment, as specified. Input of identification code number shall shunt the interior door or panel alarm.

C. Cash Containers: Covers of OCCs, CRCs, and BCs shall contain a lock, requiring a key to open. Locks and keys for all cash containers shall be identical. Keys to open cash containers will only be issued, or be available, to CCC personnel.

D. An Unauthorized Access Analysis describing potential types of unauthorized access and the methods taken to prevent such access shall be submitted for approval. (CDRL)

2.9.4 Personnel Requirements for Keys

Six categories of District personnel will require access, in various degrees, to fare collection equipment. Keys will be issued, or be available to these categories of personnel as follows:

		Key Identity
A.	Supervisor	01, 02,04, 05
B.	Station Agent	01, 02, 04
C.	Revenue Personnel	01, 02, 03, 06, 07,
D.	Ticket Agent (BTEM)	01, 02
E.	Maintenance Personnel	01, 02, 03, 04, 05, 06, 07
F.	Janitor (collect waste fare media)	01, 02

2.9.5 Authorized Operation

Fare collection equipment shall not be capable of operating when placed NOT IN SERVICE from the FCCC.

2.10 MAINTENANCE, REVENUE SERVICING, AND AUDIT DESIGN

2.10.1 Corrective Maintenance

A. Whenever an equipment problem occurs that prevents the equipment from performing its intended functions, the equipment shall automatically take itself out of service. The occurrence shall be

recorded and annunciated at the RCC. This requirement shall not apply to the CTEM.

B. Fault codes shall be provided by each piece of equipment to enable remote monitoring personnel to readily identify the nature of the equipment malfunction. Fault codes generated by the station equipment shall be available for reporting to the FCCC upon request.

C. Internal diagnostics shall be provided as part of the equipment. A maintenance diagnostics panel shall be provided inside the equipment. Panel indications shall be readily seen with the front door in the open position. The panel shall contain controls and indicators, and work in conjunction with test equipment to assist in troubleshooting and fault identification.

D. Test equipment required to enable maintenance personnel to readily identify the nature and area of the fault or condition causing equipment malfunction shall be provided, as specified (Reference: Section 13).

E. Equipment repairs shall be by modular replacement of LLRU. LLRU shall be of hand-carry size with weight not to exceed 35 lb.

2.10.2 Revenue Servicing and Accounting

A. The total value of coins, tokens, and bills deposited into cashboxes since insertion shall be monitored by the equipment. Preset values shall be capable of being set up within the equipment, which represents "nearly-full" and "full" conditions in the boxes. When the preset "nearly-full" value is reached, the occurrence shall be detected, recorded, and announced at the FCCC. When the preset "full" value is reached, the equipment shall automatically go NOT IN SERVICE. The preset values shall, as a minimum, be capable of being set to any value from 50 percent to 100 percent capacity in 10 percent increments.

B. Each TVM and AFM shall detect the presence of a cash container and require the input of the container's identification number for reporting back to the FCCC. The container's identification number shall be identical to its serial registration number. This input may be by automatic reading of the container, prompting of revenue collection

personnel, or other means. The method proposed shall be submitted for approval. (CDRL)

2.10.3 Audit Design

TVMs and AFMs shall be capable of being audited locally by draining change storage areas into cashboxes, as well as remotely by ongoing remote audit.

2.11 PHYSICAL REQUIREMENTS

2.11.1 Materials

A. The material and fabrication techniques for equipment cabinets shall be as specified (Reference: Section 16).

B. The equipment and materials provided shall result in a product that has a clean, solid appearance and styling consistent with all other requirements indicated. There shall be no exposed rivets, boltheads, nuts, sharp edges, sharp corners, or cracks on the outside surfaces of equipment facades.

2.11.2 Doors

Access doors on TVMs/AFMs/PACs/SFCCUs shall open at least 90 degrees. All doors shall be hinged on the right side as viewed from the front. Each door shall be equipped with a device(s) to hold the door fully open. An open door shall sustain a force of 200 lb, applied vertically to the corner away from the hinge, without causing buckling or any adverse effects on the hinges and other equipment.

2.11.3 Nameplates

An equipment identification number shall be placed on the outside of each item of equipment. The size and placement of the numbers shall be as indicated. A numbering system will be provided by the District. A metal label shall be permanently mounted inside each cabinet and shall contain the manufacturer's name and model or part number, plus month and year of manufacture, and any revisions incorporated.

2.11.4 Hardware Lifetimes

The following equipment shall be designed for regular use for the periods indicated below:

A. Cash Containers 20 years

B.	Transports	10 years
C.	Coin Validation Systems	10 years
D.	Bill Validation Systems	10 years
E.	Central Ticket Encoding Machine	10 years
F.	Booth Ticket Encoding Machine	10 years
G.	Gate Equipment	10 years
H.	All Other Equipment	20 years

2.12 ELECTRICAL REQUIREMENTS

2.12.1 Power Requirements

Each item of equipment shall operate from a DFE power source. A power panel, located in the station electrical room, will provide single-phase 120 V ac, 60 Hz, including a 20-A circuit breaker for each item of equipment. The maximum allowable demand for TVMs and AFMs is 1,200 W per item. Gates and other equipment shall operate at 600 W maximum.

2.12.2 Protective Devices

Electrical voltage surge suppressors and voltage regulators, as required, shall be provided to assure that electrical surges will not affect operation of the equipment.

2.12.3 Power Connection

Station equipment shall be provided with a junction box and connection shall be made from the junction box to the station electrical panel for each item.

2.12.4. Battery Backup

A rechargeable, nickel-cadmium, battery power source or equivalent shall automatically provide power to each item of equipment in the event of main line power interruption. The battery shall provide the capacity to retain memory data for a minimum period of 192 hr. An automatic, compatible battery charger shall be provided. The charger shall be capable of completely recharging a fully discharged battery in 14 hr upon reinstatement of power. One charger shall be included with each item of equipment requiring a battery. The Contractor may propose other means of providing power during power interruptions, for approval.

2.12.5 Convenience Outlets

One 120 V ac, 60 Hz convenience outlet shall be provided inside each item of station equipment for use by maintenance and service personnel.

2.12.6 Electromagnetic Interference

Electrical and electronic systems and subsystems shall operate in their intended operational environments without either suffering or causing harmful interference to or from other District equipment. An analysis of the EMI susceptibility and the EMI conductive or inductive radiation of the gate equipment, SFCCU, TVM, AFM, CTEM, BTEM, and PAC shall be submitted. (CDRL)

2.12.7 Equipment Compatibility

Equipment shall be protected from damage due to electrical transients. The functional electrical capability of the various subsystems and the electrical compatibility of the total system within its operating environment shall be demonstrated through the display of technical information and test results. Designs that limit equipment-generated voltage transients and exhibit tolerance to such transients shall be used.

2.12.8 Grounding Protection

Grounding shall be in accordance with NEC, CAL/OSHA, and local codes. The layout, detail design, and installation of the grounding and lightning protection connections and isolation shields, required in the signal circuits or cabinets, shall be submitted for approval. (CDRL)

A. Equipment Ground: Equipment enclosures, chassis, assemblies, panels, switch boxes, terminal boxes, and similar enclosures or structures shall be grounded. Protective grounding shall be provided to ensure that exposed metal equipment and metal fixtures are connected to a common ground point.

B. Electrical Connection to Ground: Each item of equipment shall have an equipment ground bus that connects the ground points together into a single-point ground configuration. Parts of the chassis that are contained in an equipment cabinet shall be electrically connected to one another and to the cabinet. The impedance between any two parts of the chassis, including the cabinet, shall be a maximum of 5 ohm.

C. Signal Ground: If a signal grounding system is used, the electronic and low-level electrical control circuits shall be connected to this grounding system. The signal ground system shall be isolated from other enclosures, trays, chassis, and structures, except at its grounding point.

APPENDIX TP-2-A

ELECTROMECHANICAL CUMULATIVE REGISTERS

Equipment	Register Number	Register Contents
TVM	1	Total Value of Sales
	2	Total Value of Change Loaded
	3	Total Value of Cash Removed
	4	Total Number of Single-trip Tickets Sold
	5	Total Number of Ticket/Pass Upgrades
AFM	1	Total Value of Sales
	2	Total Value of Change Loaded
	3	Total Value of Cash Removed
	4	Total Number of Ticket/Pass Upgrades
CTEM	1	Total Number of Special-fare Single-trip Tickets Encoded
	2	Total Number of Regular-fare Bus/Rail Monthly Passes Encoded
	3	Total Number of Special-fare Bus/ Rail Monthly Passes Encoded
	4	Total Number of Regular-fare Regional Monthly Passes Encoded
	5	Total Number of Special-fare Regional Monthly Passes Encoded
	6	Total Number of Exit Cards Encoded
Entry Gate	1	Total Passages
Exit Gate	1	Total Passages
Bi-Dir Gate	1	Total Passages - Entry
	2	Total Passages - Exit
Handicapped Fare Gate	1	Total Passages with Handicapped Fare Media
BTEM	1	Total MRT Exit Cards Issued

END OF SECTION

SECTION 3

TICKET VENDING MACHINE

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SECTION 3

TICKET VENDING MACHINE

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SECTION 3

TICKET VENDING MACHINE

3.1 GENERAL

This Section specifies the requirements for Ticket Vending Machines (TVMs) to be furnished and installed. TVMs shall be configured as indicated (Reference: Contract Drawings) and shall be located in the free areas of stations. A Bill Acceptor (BA) shall be integrated into TVMs (Reference: Section 4).

3.2 DESCRIPTION

TVMs shall vend Single-trip Tickets with or without Rail-to-bus Transfers and shall provide the following:

A. Graphics giving step-by-step instructions to patrons on how to use the machine.

B. Pushbuttons for selection of station/zone destination.

C. A lighted information display, indicating the required fare, following selection of a destination, and for other messages, such as NOT IN SERVICE, for patron information.

D. Bill Acceptor for acceptance of $1 or $5 bills toward payment of required fare.

E. Coin Acceptor for acceptance of coins or tokens toward payment of required fare.

F. Opening for acceptance of fare media already in the possession of a patron, for trade-in or upgrading toward payment of the required fare.

G. Coin return area for return of change to the patron when overpayment of the required fare has been made.

H. Rail-to-bus Transfer pushbutton, for use if patron desires a transfer. A surcharge will be made for transfers.

I. Cancellation pushbutton, for use by the patron to cancel the transaction.

J. Opening for issuance of Single-trip Tickets.

3.3 PERFORMANCE REQUIREMENTS

3.3.1 Transaction Rate/Description

A. The TVM shall be capable of processing 10 patrons in 150 sec (Reference: Section 20).

B. A process begins with patron selection of a destination, selection of an option, if desired, and includes insertion of fare payment, issuance of a ticket or retrieval of returned Bus/Rail Monthly Pass, dispensing of change if due, and concludes with the TVM in a ready state for the next transaction.

3.3.2 Replenishment/Loading Rates

A. Replenishment of change storage areas shall be capable of being accomplished at a minimum rate of 60 coins/min.

B. Replenishment of ticket stock ready for transaction processing shall not exceed 3 min.

C. Removal of a full OCC, emptying contents into the vault of a revenue cart and replacing the OCC in a TVM shall not exceed 3 min.

3.3.3 Acceptance/Rejection Rates/Description

A. At least 97 percent of all valid coins and tokens shall be accepted.

B. At least 99 percent of all foreign coins, common slugs, and all other foreign objects shall be rejected.

C. At least 97 percent of all valid bills, or fare media inserted for credit, shall be accepted, when properly inserted.

D. At least 99.7 percent of all invalid bills and fare media shall be rejected.

3.3.4 Ticket Processing Rates

A. Encoding, including verification of data encoded, in addition to printing, shall not exceed 2 sec.

B. Reading of an inserted fare media and display of value, code, or message shall not exceed 2 sec.

C. Ticket issue after fare payment acceptance shall not exceed 3 sec.

3.3.5 Patron Choice Change

Changes by the patron among destination or option choices shall be accepted as new (replacement) instructions to the machine, and shall not result in automatic return of escrowed money or media, provided that the machine has not already started to issue a ticket or that any money deposited is less than the required fare at that time.

3.3.6 Cancellation/Time-out Rate Description

Use of the cancellation pushbutton shall result in the TVM returning all monies and fare media inserted by the patron and returning the TVM to the ready state for the next transaction.

A. An automatic cancellation shall occur upon expiration of a time-out period due to patron inaction. The time-out period shall be adjustable between 4 and 60 sec (in 2-sec increments) and shall restart each time money or fare media is inserted or a patron choice (including a change) is made.

B. A transaction shall be capable of being cancelled by patron choice anytime prior to the machine starting to issue a ticket.

C. A transaction shall be cancelled automatically if the escrow capacities are exceeded. An appropriate message shall be displayed.

3.3.7 Power Interruption

In the event of a power interruption or outage occurring while a transaction is in progress, the TVM shall, during the outage, either cancel the transaction and return all money and media inserted by the patron, or complete the transaction. Alternatively, for power interruptions of less than 30 sec, the TVM shall complete the transaction when power returns; for power interruptions longer than 30 sec, the TVM shall remain in the NOT IN SERVICE state when power returns and retain money and fare media inserted by the patron in escrow. On request by the patron to RCC, via PAC in

SFCCU, a station agent will open the TVM, retrieve escrow contents, and return the contents to the patron.

3.4 GRAPHICS, CONTROLS, AND DISPLAYS

TVM graphics, controls, and displays shall include the following as a minimum:

A. Step-by-step directions for use of the TVM. Color coding of destination selection shall be provided, distinguishing between the Metro Rail zone and the light rail line zones.

B. The steps in the specific transaction sequence that must be followed. This sequence shall not allow the acceptance of any money unless a destination has been selected. Changes to that destination and/or the choice of Rail-to-bus Transfer may be made irrespective of whether any money has been deposited, as long as the fare for the destination selected is greater than the amount of money deposited.

C. Indication of fare due, on a lighted display panel, following choice of destination and choice of options. The TVM shall calculate and display peak fares during peak periods and off-peak fares during off-peak periods. Dollar and cents display(s) shall be variable and shall show values from $0.05 to $99.95 in $0.05 increments. For values less than $10.00, a blank shall be indicated to the left of the most significant figure. The values shall indicate AMOUNT DUE when the patron selects a destination, including any option. This amount shall decrement as money or fare media is inserted and accepted by the TVM. The display shall go blank when the transaction is completed.

D. Indication of denominations of US money and tokens that will be accepted.

E. Indication of where to insert money for fare due.

F. Indication of where to insert fare media for upgrading or trade-in.

G. Orientation of $1 and $5 bills and of fare media insertion.

H. Where to retrieve change, if overpayment of fare due has been made.

I. Lighted indication EXACT CHANGE ONLY when the TVM cannot dispense appropriate change shall be displayed. When this indication is displayed, acceptance of overpayment shall be possible but no change shall be given. When the TVM cannot accept any or all bill denominations due to a limiting condition, a lighted display shall indicate to the patron which denominations are acceptable, if any.

J. Indication of choices already made, i.e., destination and transfer pushbuttons shall light when depressed. Lights shall extinguish when transaction is completed or cancelled, or when a lighted pushbutton is depressed, thereby cancelling a choice previously made.

K. Pushbutton to cancel the transaction.

L. Where to retrieve Bus/Rail Monthly Passes inserted for upgrading.

M. Where to retrieve a new Single-trip Ticket after a Single-trip Ticket has been inserted for trade-in.

N. Appropriate information display messages, as specified.

3.5 TICKETING AND OPTIONS CHOICE DESCRIPTION

3.5.1 Single-trip Ticket

A Single-trip Ticket issued by the TVM shall contain encoded and printed information, as specified (Reference: Section 10).

3.5.2 Options

The TVM shall offer the following options to patrons:

A. Rail-to-bus Transfer (with Single-trip Ticket purchase).

B. Upgrading of Monthly Pass for one trip beyond the Pass zone limit.

C. Single-trip Ticket trade-in for Single-trip Ticket of greater value.

3.6 PAYMENT

When payment equals or exceeds fare amount due, the TVM shall reject further payment, or patron choices/changes

and issue fare media. Change will be given if appropriate.

3.6.1 Coins and Bills

Only US $1 and $5 bills, and $0.05, $0.10, $0.25, and SBA $1.00 coins shall be accepted by the TVM.

3.6.2 Tokens

Tokens of specified value, provided by the District, shall be accepted by the TVM towards payment. The specified value shall be settable from $0.05 to $99.95, in $0.05 increments. The size, weight, and metallic content of tokens shall be determined by the District.

3.6.3 Bus/Rail Monthly Pass Upgrade

The TVM shall accept a Bus/Rail Monthly Pass as payment towards a single trip beyond the zone limits of the pass as follows:

A. Upon validation, credit will be given to the zone limits indicated on the Bus/Rail Monthly Pass.

B. Upon patron selection of a destination beyond Bus/Rail Monthly Pass zone limits, the additional fare required will be displayed.

C. Upon acceptance of payment of the displayed additional fare due or overpayment, the TVM shall reencode the pass for a single-trip upgrade, return it to the patron, and issue change if overpayment has been made.

D. The Single-trip upgrade will be removed or cancelled by the exit gate, returning the pass to the patron in its original monthly zone-specific condition.

E. Downgrading shall not be possible.

F. There shall be no limit on the number of Single-trip upgrades that can be made on a Bus/Rail Monthly Pass.

3.6.4 Single-trip Ticket Trade-in

The TVM shall accept a Single-trip Ticket for credit toward a new Single-trip Ticket of greater value. Single-trip Tickets accepted for trade-in shall be retained in escrow as follows:

A. Captured and invalidated when a new ticket is issued. It shall not be possible to have a new ticket issued and the traded-in ticket returned in the same transaction.

B. Returned if transaction is cancelled.

3.7 CONTROL DEVICES

The following patron-operated control devices shall be provided:

A. Destination selection.

B. Rail-to-bus Transfer.

C. Cancel.

3.8 INPUT/OUTPUT OPENINGS

3.8.1 Coin Insertion

A single slot shall be provided for coin and token insertion. Retrieval of coins and tokens inserted into the slot shall not be possible by patron action other than by use of the cancel function.

3.8.2 Bill Insertion

A single slot shall be provided for insertion/rejection/return of up to five $1 or $5 bills, as specified (Reference: Section 4).

3.8.3 Money Retrieval Area

A money return/retrieval area shall be provided to receive dispensed change, rejected coins or tokens, returned escrow coins and tokens, and rejected foreign objects.

3.8.4 Ticket Issuance

A single opening shall be provided for the issuance of new tickets upon consummation of a transaction. If a slot is provided, the tickets shall protrude a minimum of 1 in. from the face of the opening.

3.8.5 Media Insertion and Retrieval

A single opening shall be provided to insert fare media for trade-in or upgrade, and for retrieval of upgraded passes. If a slot is provided, the returned media shall

protrude a minimum of 1 in. from the face of the opening. This opening may be the same opening as the one used for ticket issuance.

3.8.6 Drainage

Drainage shall be provided to channel any fluids placed in the insertion/retrieval areas directly to the floor, towards the front and exterior of the equipment.

3.9 MONEY PROCESSING

3.9.1 Validation

TVMs shall validate only US coins/bills and District tokens.

3.9.2 Rejection

Coins, tokens, and bills other than those described above shall be rejected. Additionally, passive checks shall be provided such that objects thicker or larger than the largest acceptable fare media shall be rejected.

3.9.3 Coin Design Standards

A Coin Standards Specification to be used in designing the money handling systems, including as a minimum, size, weight, and magnetic content for US coins, shall be submitted. (CDRL)

3.9.4 Escrow

A. Escrow areas shall be provided for retention of accepted money and fare media prior to consummation or cancellation of each transaction. Consummation shall occur upon receipt of the amount due or overpayment. Upon consummation of a transaction, money released from escrow shall be deposited directly into their respective change storage areas, cashboxes, or bill stackers, and escrowed media shall be processed and placed in a bin or returned to the patron.

B. A mix of $1 or $5 bills shall be accepted in escrow. If a transaction is completed, the bill(s) shall be transported to the bill stacker. If a transaction is cancelled, the bill(s) shall be returned to the patron from the same opening in which they were inserted.

C. Jam: When a coin jam is sensed prior to consummation of a transaction, the following means shall be provided to dislodge the jammed item:

1. Automatic: Equipment shall make a minimum of three attempts to unjam itself.

2. Manual: Patron activation of the cancel function.

Failure to unjam shall result in money retained in escrow to be returned, machine to shut down, and NOT IN SERVICE indication to be displayed.

D. Capacity: The coin escrow shall have a capacity to hold at least $20.00 in coins of mixed denomination, or 10 tokens. The bill escrow shall have the capacity to hold at least 5 bills. The fare media escrow shall have the capacity to hold one media.

E. Escrow Overflow: Means shall be provided to effect the return of all escrowed items when additional inserted money exceeds the capacity of any escrow area prior to the consummation of a transaction.

3.9.5 Change Making

Coins shall be dispensed on overpayment.

A. An internal recirculating system shall be provided. It shall recirculate $0.05, $0.10, and $0.25 coins only.

B. SBA $1.00 coins shall be dispensed as change on overpayment, but shall not be recirculated. Upon acceptance from a patron, SBAs shall be deposited directly from escrow into the Overflow Cash Container.

C. Upon acceptance from a patron, tokens shall be deposited directly from escrow into the Overflow Cash Container.

D. Change Replenishment: A closed change replenishment system shall be provided. It shall utilize Cash Replenishment Containers whose contents can be released into the change storage area for change-making. Change replenishment is also accomplished through patron insertion of coins for purchase of fare media.

E. Storage Capacity: The change storage areas provided shall accommodate the following amounts of each coin denomination as a minimum:

Nickels	$120.00
Dimes	$325.00
Quarters	$300.00

F. Dispense Preparation: Coins shall be available for dispensing and depositing into the coin retrieval area when overpayment is made.

G. Change Storage Area Overflow: Sensors shall be provided to detect when additional coins deposited into the change storage areas would exceed capacity. The machines shall protect themselves from exceeding their overflow capacities of change storage areas, cash containers, bill containers, escrow units, and ticket bins.

H. Accounting: Money that passes into and out of the change storage area, cashboxes, and escrow areas shall be counted.

I. A system shall be provided for both local and ongoing remote auditing of the coin storage and auditing systems.

J. No bills or tokens shall be dispensed as change.

K. The TVM shall accept overpayment and provide change only if the amount of change does not exceed settable limits (adjustable from $0.05 to $9.95 in $0.05 increments).

3.9.6 Fraud Protection

There shall be no operating scenario in any transaction that results in the issuing of change whose value exceeds the value of US money inserted and accepted by the TVM for the transaction.

3.9.7 Change Dispensing Security

Means shall be provided to prevent the dispensing of coins in the absence of an actual vend signal, or by kicking, prying, wedging, or otherwise attacking the TVM.

3.9.8 Cash Containers

Cash Containers provided shall be as specified (Reference: Section 2).

3.10 FARE MEDIA PROCESSING

3.10.1 Functions

The following functions shall be provided for fare media processing:

A. Accept and read magnetically encoded fare media for validation or rejection

B. Magnetically encode or reencode fare media

C. Magnetically encode one bit on Single-trip Tickets identifying the tickets as encoded in MOS-1 format.

D. Print on fare media issued by the TVM

E. Issue encoded or return reencoded fare media

F. Invalidate and capture traded-in Single-trip tickets.

3.10.2 Insertion Prevention

Means shall be provided to prevent the insertion of bills, coins, tokens, and/or fare media under the following conditions:

A. While the NOT IN SERVICE message is displayed

B. During the fare media issuing cycle

C. During power outage or interruptions, unless by design it is to complete a transaction.

3.10.3 Encode/Reencode/Print Data

The TVM shall encode, print, or reencode data on fare media, as specified (Reference: Section 10).

3.10.4 Encoding Checks

A. Media inserted for trade-in, or for upgrading shall be checked for parity errors, logical data, and proper security check codes. Media that fails these checks shall be returned to the patron within 2 sec.

B. The TVM shall read the data it encodes on new fare media prior to issue. If the data is determined to be incorrect, the media shall be captured and a new media issued. If, after three attempts, a correctly encoded media cannot be issued, the TVM shall go to NOT IN SERVICE.

C. The TVM shall read the data it encodes on inserted fare media prior to returning it to the patron. If the data is determined to be incorrect, the TVM shall attempt to properly reencode the fare media. If, after three attempts, the inserted media cannot be properly reencoded, the TVM shall:

1. Return the fare media to the patron.

2. Display an appropriate message(s) to the patron to the effect that the media could not be properly reencoded and the patron should call for assistance.

3. Retain the original encoded data of the inserted media in memory.

4. Automatically go to NOT IN SERVICE with identification available to RCC on the specific reason for the activation of that mode.

D. If the TVM either is unable to read the encoding on the inserted media or determines that the encoding is invalid for use even with upgrading, the TVM shall:

1. Return the fare media to the patron.

2. Display an appropriate message(s) to the patron to the effect that the media is invalid and the patron should call for assistance.

3.10.5 Dispense Ticket

Consummation of a transaction shall result in a requested ticket being dispensed.

3.10.6 Registration

Completion of a transaction shall include the updating of applicable registers.

3.10.7 Reset

Completion of a transaction shall cause the TVM to automatically return to a ready condition for the next transaction. A manually operated reset switch, accessible upon opening of front door, shall be provided. Upon activation, it shall return all money and fare media retained in escrow(s) and cause the TVM to be ready for the next transaction. Means shall be provided to reset the TVM from RCC if the TVM Is NOT IN SERVICE because a valid fare media could not be reencoded.

3.10.8 Storage

A. Fare media stock for issue shall be of the roll-feed type.

B. Provision to feed two rolls shall be made such that the exhaustion of one will cause an automatic switchover to the other.

C. Fare media storage capacity shall be 2,000 issues/ roll as a minimum.

3.11 INTERFACE REQUIREMENTS

3.11.1 Contact Switch Closure

A. Each TVM shall present contact switch closures for remote indication (Reference: Section 8) of the following conditions:

1. Intrusion (normally closed circuit)

2. Equipment Not In Service - Door Open

3. Equipment Not In Service - Ticket/Coin/Token/ Bill Jam

4. Equipment Not In Service - Maintenance Required

5. Equipment Not In Service - Revenue Service Required

6. Equipment Not In Service - Valid Media Could Not Be Reencoded

7. Equipment Requires Revenue Service (low ticket stock, BC or OCC nearly full, Exact Change Only mode)

8. Spare

B. Each TVM shall interface with the SFCCU at the mezzanine for the functions and controls specified (Reference: Section 8).

3.11.2 Clock

A. The Electronic Unit (EU) shall contain a crystal-controlled clock that maintains current date and time for use in encoding data and validating fare media. Current date and time shall be sent by the SFCCU at frequent intervals (at least once an hour) and any differences detected by the EU in each TVM shall result in the automatic correction of the clock contained in the TVM. In this manner, individual TVMs in a mezzanine shall remain in accurate synchronization while the SFCCU is functional, and shall continue to operate properly regardless of the status of the SFCCU. If the TVM is unable to correctly synchronize, it shall go to NOT IN SERVICE automatically.

B. The EU shall contain permanent memory data for the full calendar through the year 2020 or beyond, and shall not require any manual intervention to make adjustments for such times as leap year, end of year, end of month, and days of week. Plug-in chip replacement or alternative means shall provide for successive periods of not less than 10 yr, each beyond expiration of the calendar furnished initially.

3.12 CONTROL LOGIC

Control logic shall be provided, as specified (Reference: Section 2), to perform functions and performance requirements specified for the TVM.

END OF SECTION

SECTION 4

BILL ACCEPTOR

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SECTION 4

BILL ACCEPTOR

4.1 GENERAL

This Section specifies the requirements for Bill Acceptors (BAs) to be furnished and installed in TVMs and AFMs. A BA shall be integrated into each TVM and AFM, and become a visually integral component of the TVMs and AFMs, as indicated. The bill acceptor shall be of the high reliability, solid state, microprocessor controlled type.

4.2 DESCRIPTION

The purpose of the BA is to validate and accept US paper currency in $1 and $5 denominations, toward full or partial payment of a patron's required fare. Change, in coins, shall be returned to the patron when overpayment of the required fare has been made (Reference: Section 3). Provision shall be made for acceptance of $10 and $20 bills, in addition to $1 and $5 bills.

4.3 PERFORMANCE REQUIREMENTS

4.3.1 Transaction Rate

The BA shall be capable of processing one complete transaction in 8 sec maximum for $5 bills and one complete transaction in 5 sec maximum for $1 bills.

4.3.2 Acceptance/Rejection Rates

The BA shall accept, register, and place one or more valid bill(s) in escrow within 4 sec after insertion. Only valid US bills shall be accepted. Invalid bills shall be rejected and returned to the patron within 2 sec. Valid bills shall be accepted at a minimum rate of 95 percent on first attempt, and 97 percent on second attempt when properly inserted. Photocopy and imitation bills shall be rejected at a minimum rate of 99.75 percent.

4.3.3 Replenishment/Loading Rate

Removal/insertion of Bill Container (BC) shall occur within 3 min.

4.3.4 Equipment Repair Rate

The mean time to repair rate shall be as specified (Reference: Section 18).

4.3.5 Equipment Design

The BA shall be designed such that a degraded condition in the equipment associated with one bill denomination shall not affect the continuing operation of the equipment associated with the other bill denomination.

4.4 CONTROL LOGIC AND DATA

4.4.1 Logic and Data Requirements

Logic and data requirements provided shall be as specified (Reference: Sections 2 and 9).

4.4.2 Interface Requirements

Interface requirements shall be as specified (Reference: Section 3).

4.5 PATRON INTERFACE

The front of the BA shall serve as the patron interface and shall meet the requirements specified (Reference: Section 2) and as indicated.

4.5.1 Displays

Information on any degraded condition of the BA shall be provided to the patron via latent displays, which when illuminated, indicate NOT IN SERVICE, $1 BILLS ONLY, or $5 BILLS ONLY.

4.5.2 Input/Output Openings

A single input-output opening (Reference: Sections 2 and 3) shall be provided to accommodate insertion/rejection/return of bills.

4.5.3 Bill Insertion Orientation

Bill insertion orientation, if required, shall be pictorially displayed to indicate proper orientation.

4.6 BILL PROCESSING

The bill processing system shall validate, register, place in escrow up to 5 bills, and following completion

of a transaction, shall stack accepted bills. Provision shall be made to prevent retrieval of an accepted bill by fishing or any other unauthorized means.

4.6.1 Acceptance

Accepted bills shall be transported into one stacking area for all denominations. When change-giving capacity for a $5 bill cannot be met, the $5 bill shall not be accepted and the indication $1 BILLS ONLY shall be displayed. When stacking capacity for bills is reached, the indication COINS AND TOKENS ONLY shall be displayed to the patron.

4.6.2 Registers

Registers shall be provided to record data, as specified (Reference: Sections 2 and 9).

4.6.3 Stacking

Bill stacking area shall be located in close proximity to the validation area to store accepted and registered bills. Stacking shall not be accomplished by use of a foam or compression device.

4.6.4 Bill Stacking Capacity

Bill stackers shall provide for facing and stacking of not less than 1,000 bills.

4.6.5 Jams

Means shall be provided to detect and report a jammed bill.

4.7 SERVICE AND MAINTENANCE

Service and maintenance requirements shall be as specified (Reference: Section 2).

4.8 SECURITY

Security requirements, including locks, keys, access provisions, and intrusion detection, shall be as specified (Reference: Section 2).

4.9 PHYSICAL REQUIREMENTS

Physical requirements shall be as specified (Reference: Sections 2 and 16).

4.10 ELECTRICAL REQUIREMENTS

Electrical requirements shall be as specified (Reference: Section 2).

END OF SECTION

SECTION 5

GATE EQUIPMENT

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SECTION 5

GATE EQUIPMENT

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SECTION 5

GATE EQUIPMENT

5.1 GENERAL

This Section specifies the requirements for Gate Equipment to be furnished and installed.

5.2 DESCRIPTION

The purpose of the gate equipment and fencing is to form arrays to separate the free and paid areas of each station. The gates provided shall control passage to and from the paid area by checking the fare media of passengers to ensure payment of minimum fare on entry and proper fare on exit. Gates shall be provided with barriers. Barriers shall normally operate in a closed mode (locked in both entry and exit) until released. The Contractor may propose to use either turnstile or biparting leaf barriers. If gates are equipped with turnstile barriers, the following types of gate equipment shall be provided:

A. Bidirectional Gate/Console: Permits passage through an aisle while either entering or exiting, but not both at the same time, except as specified.

B. Entry Gate: Permits passage on entering only, except as specified.

C. Exit Gate/Console: Permits passage on exiting only.

D. Dummy Gate/Console: A Dummy Gate contains a barrier but no ticket transport. A Dummy Console contains no barrier or transport. Both are normally used for unidirectional aisles.

E. Handicapped Fare Gate: Permits passage of patrons on entering or exiting upon validation of Handicap-coded Ticket. It can also be used as a service gate for maintenance personnel or as an Emergency Exit Gate.

F. Emergency Exit Gate: Permits passage of patrons on exiting by use of approved mechanical release panic hardware, hereinafter termed a panic bar. It can also be used as a service gate for maintenance personnel.

5.3 PERFORMANCE REQUIREMENTS

5.3.1 Transaction Rates

A. Gates provided shall process a minimum continuous passenger throughput of 27 passengers/min, including validation and printing.

B. Read/encode rates shall be the same as described for the TVM.

5.3.2 Media

A. The media to be accepted by the gates shall be as specified (Reference: Section 10).

B. Transport-equipped gates shall accept valid fare media. The Console associated with the Handicapped Fare Gate shall release the Handicapped Fare Gate upon validation and acceptance of handicap-coded fare media.

5.3.3 Barrier Release

The barrier shall be released or opened upon occurrence of any of the following:

A. Acceptance and retrieval of valid fare media.

B. Loss of power. This shall cause a turnstile to freewheel on both entering and exiting. Biparting leaves shall retract and remain in the fully open position

C. Remote commands resulting in the following operational configurations:

1. "Open Exit/Close Entry"

   a. Turnstiles shall freewheel on exiting. Entry shall be closed either by prevention of ticket insertion or returning fare media to patrons unaltered.

   b. Biparting leaves shall open and remain open.

2. "Lock Entry/Normal Exit"

   Valid tickets shall be accepted and processed on exiting only. Entry shall be closed either

by prevention of ticket insertion or returning fare media to patrons unaltered.

3. "Open Entry/Open Exit"

Turnstiles shall freewheel on entering and exiting. Biparting leaves shall open and remain in the fully open position.

D. Remote command to a specific gate to release for one passage entering or exiting.

5.3.4 Barrier Interface

Each gate shall present contact switch closures for the following remote indications:

A. Intrusion (normally closed circuit)

B. Equipment Not In Service - Door Open

C. Equipment Not In Service - Ticket Jam

D. Equipment Not In Service - Maintenance Required

E. Equipment Not In Service - Revenue Service Required

F. Equipment Requires Revenue Service (captured ticket bin nearly full)

G. Spare

H. Spare.

Each gate shall interface with the SFCCU at the mezzanine for functions and controls, as specified (Reference: Section 8).

5.4 CONTROL LOGIC

5.4.1 Criteria

A. Control logic shall be provided to check basic data encoded on fare media and/or modify data and/or encode new data and/or print new data, and to perform operations to meet the fare media validation and processing requirements, as specified (Reference: Section 10).

B. Passage through an aisle shall be dependent upon insertion and acceptance of fare media into the controlling gate. Each gate shall include a

complete ticket handling system that shall accept and process the fare media when inserted in the correct orientation. The gate shall read magnetic data contained on the fare media to establish its validity and change data or record new data once its validity has been determined.

C. Fare media used to enter the system shall be returned to the passenger by the Entry Gate. Fare media captured by the Exit Gate shall be invalidated for further use on the system.

D. Unacceptable fare media returned to the patron shall be accompanied by an audible tone together with a visually displayed message directing the patron to the Passenger Assistance Center.

E. Gates shall process the following ticket types:

1. Single-trip Ticket, regular or special-fare
2. Bus/Rail Monthly Pass, regular or special-fare
3. Regional Monthly Pass
4. Employee Pass
5. Exit Card
6. MRT Exit Card.

F. The gate shall check that the fare media contains all required data, that the data is accurate within the established limits of reading reliability, that all security checks are satisfied, and that the fare media type and fare classes are acceptable at the time and date presented. Only if all of these checks are satisfied shall the following additional acceptance criteria and processing apply.

G. Fare media shall be checked for issue date and to verify that the present date is within the validity period set for each media type. Fare media shall be valid through an adjustable time period following the expiration date to provide for a grace period. This period shall be down loaded from the SFCCU and shall be adjustable from 1 to 720 hr in 1-hr increments.

H. The gate ticket encoding system shall not modify, reencode, or alter certain fixed data initially encoded on the fare media. The fixed data includes

fare media type, fare class, and identification number.

5.4.2 Ticket Operations - Entry

The gate shall perform, as a minimum, the following on entering:

A. Check for fare media type, minimum value, entry/exit sequence (code for entry), bad number, and time and period validity.

B. Check for handicapped code (Console associated with Handicapped Fare Gate only).

C. Encode station, date, and time of entry.

D. Print station, date, and time of entry (5/H, 08-17-92, 1610) on Single-trip Tickets.

E. Reject and return invalid fare media to the patron

F. Return valid fare media to the patron.

G. Release barrier for one passage, for each validated fare media; relatch or close after use.

H. When released remotely, the Handicapped Fare Gate Console shall encode the next ticket inserted to allow exit through a Handicapped Fare Gate.

I. Encode passback control on time value/Employee Passes.

Single-trip Tickets shall be acceptable only if the value of the ticket equals or exceeds an entry base value. Time value Passes shall be acceptable only if the time of entry is within the time limits. It shall be possible to download from the SFCCU an adjustable entry base value from $0.05 to $99.95 in $0.05 increments.

5.4.3 Ticket Operations - Exit

The gate shall perform, as a minimum, the following on exiting:

A. Check for fare media type, station, and time of entry, ticket value, period validity, and entry/exit sequence (code for exit).

B. Check for handicapped code (Console associated with Handicapped Fare Gate only).

C. Validate travel time and sufficient fare payment.

D. Reject and return undervalue and nonreadable fare media to patron and display appropriate message.

E. Return valid fare media to the patron that remains valid for subsequent travel on bus or LRT.

F. Capture and deposit into a removable bin fare media that is no longer valid.

G. Provide software expansion capability to accept Single-trip Tickets encoded with a single bit identifying the tickets as encoded in MOS-1 format.

H. Erase time value pass upgrade code.

I. Check passback control on time value/Employee passes. Reject fare media used more than once in an allotted time period.

J. Reject fare media listed in bad number memory.

K. Release barrier for one passage, relatch or close after use.

5.4.4 Passback Control

Provision shall be made to preclude the acceptance of fare media for two or more consecutive uses in the entry or exit direction of any gate in the system. Provision shall also be made to preclude the acceptance of a time value pass or Employee Pass at any station in the system more than once in an adjustable time period. The time period shall range between 5 and 30 min, in 5-min increments, and shall be downloaded from the SFCCU. Where there are two SFCCUs in a station, the SFCCUs shall be coordinated for this passback control.

5.4.5 Bad Number Memory

A bad number memory shall be provided to maintain a current listing of fare media types and serial numbers of fare media that have been stolen or are fraudulent. When groups of fare media are involved, only the start and end numbers of each group need be stored. The gates shall accept/update the listing downloaded from the SFCCU. The listing shall contain a minimum of 100 numbers.

5.4.6 Fare Table

Fare table requirements shall be as specified (Reference: Section 2).

5.4.7 Clock

Clock requirements shall be as specified (Reference: Section 3).

5.4.8 Registration

Registers shall be provided for each gate, as specified (Reference: Section 2).

5.5 GRAPHICS AND DISPLAYS

5.5.1 Gate Equipment End Displays

The displays on the vertical ends of gate equipment shall illuminate to indicate to the patron that the aisle to the left of the gate in which ticket is inserted is available for use in entry/exit or closed to traffic. It shall not be possible for both the arrow and the closed sign within a display to be illuminated at the same time. The arrow display shall flash simultaneously on the free and paid sides of the gate equipment to indicate special fare media has been used to enter. It shall be visible for 180° and shall flash for 10 sec following insertion of fare media, or until the release of the gate for the next patron.

5.5.2 Gate Equipment Top Displays

The displays on top of gate equipment shall indicate the following as a minimum:

A. Pictorial orientation for ticket insertion, if required

B. GO if inserted ticket is acceptable

C. STOP if ticket is not acceptable (accompanied by an audible tone and message)

D. GO TO PASSENGER ASSISTANCE CENTER/INTERCOM as appropriate

E. NOT IN SERVICE (closed sign on vertical end of gate/console shall also be used to indicate NOT IN SERVICE condition)

F. GO TO ADD FARE (exit only): Not utilized in MOS-1.

5.5.3 Input/Output Openings

A. Openings shall be provided (Reference: Section 2) for insertion and return of fare media, as specified.

B. Insertion slots shall not accept two fare media items stacked, one atop of the other.

C. Returned fare media shall protrude a minimum of 1 in. such that retrieval by passengers shall be accomplished with minimum effort.

5.6 HANDICAPPED FARE GATE

5.6.1 Gate Release

A. The Handicapped Fare Gate shall unlatch upon the following:

1. Insertion and acceptance of a valid handicap-coded fare media in the Console, on the right side of the gate when entering, and on the left side of the gate when exiting

2. Remote unlatch command

3. Operation of panic bar.

B. When unlatched, the gate shall be capable of swinging in both directions for entry and exit. It shall not require a force more than 5 lb applied at the center of the gate to move the gate to its fully open position.

5.6.2 Gate Closure

The gate shall close and relatch from the fully open position within 3 sec after release.

5.6.3 Mounting

The Handicapped Fare Gate shall be mounted between two posts. The hinge post shall be located to the right of the gate as viewed from the free area and immediately adjacent to a Console. The latch post shall contain the latching device, and a local alarm key switch on both the free and paid sides of the post.

5.6.4 Local Alarm

An audible local alarm shall be provided which shall be activated as follows:

A. Gate is unlatched via operation of the panic bar.

B. Gate remains unlatched, following valid opening, exceeding an adjustable time period between 10 sec and 30 sec. Alarm shall sound for a minimum of 10 sec or until the gate relatches.

C. Alarm shall not sound when panic bar is inadvertently activated during valid opening (fare media accepted, retrieved; gate unlatched, relatched).

D. Alarm shall not sound when deactivated by key switch, which will allow panic bar to be activated for one unlatch/latch sequence.

5.7 EMERGENCY EXIT GATE

The requirements for the Emergency Exit Gate are the same as for the Handicapped Fare Gate, except there are no requirements for unlatching by remote command or for unlatching by insertion of valid fare media in an associated console.

5.8 SERVICE AND MAINTENANCE

Access provisions for service (removing captured fare media) shall be such that access to other areas of the equipment without an appropriate key shall not be possible. Absence of ticket bin shall cause gate to go NOT IN SERVICE.

5.8.1 Maintenance

In addition to maintenance provisions (Reference: Section 2), the following shall be provided for gate equipment:

A. Control Switch: A control switch shall be provided inside the equipment to enable:

1. Normal operation

2. Testing or troubleshooting in local mode

3. Setting the NOT IN SERVICE condition.

B. Media Jam: Neither disassambly nor hand tools shall be required to remove jammed media.

5.8.2 Diagnostics

Diagnostic provisions shall be made such that whenever a gate shutdown condition exists, the cause shall be displayed at the maintenance diagnostic panel upon command. Individual codes shall be displayed for each condition or fault. For each condition, a unique message shall also be transmitted to the SFCCU. In the event that more than one diagnostic code is detected, all shall be displayed. Shutdown because of a RAM or EPROM error shall not occur unless there have been three such errors in the preceding 24-hr period.

5.9 SECURITY

Detection of unauthorized entry into the gates shall be as specified (Reference: Section 2).

5.10 PHYSICAL REQUIREMENTS

Dimensions of gate equipment shall be as indicated. Conventional gates shall be mounted on 32-in. centers. Minimum aisle width between two gates shall be 20 in. Handicapped Fare Gates and Emergency Exit Gates shall provide a minimum clear width of 44 in. when fully open.

5.10.1 Access Doors and Covers

Gate cabinets shall have hinged doors and covers opening at least 120 degrees, be capable of easy removal from the hinges, and provide direct access to the assemblies. The break line for access doors shall be at locations indicated unless otherwise approved. Doors shall be equipped with devices to hold them in the fully open position and to prevent them from opening to a position that would interfere with normal movement of the gate barrier. Hinges shall be concealed. The closing joint shall prevent unauthorized entry and also prevent dirt, dust, and moisture from entering the cabinet. Open doors with one surface greater than 4 ft^2 shall sustain a force of 150 lb applied vertically to the door corner away from the hinge, without damage, including buckling and adverse effects on hinges and equipment.

For maintenance work, the doors and covers shall be designed and located such that it is possible to conduct maintenance on one gate while patrons are using adjacent gates in a routine manner.

5.10.2 Turnstile Arms

Turnstile arms, if used, shall be round in cross-section. The arms shall be fabricated of stainless steel and finished as specified. The arms shall be between 1-1/2 and 2 in. in outside diameter and, when in the horizontal position, shall extend to a distance so that the total width of the gap between cabinet and adjacent barrier arm is less than 2 in.

5.10.3 Biparting Leaves

Biparting leaves, if used, shall be essentially pie-shaped wedges with rounded edges, approximately 1-1/4-in. thick, clad in plastic, as indicated. Leaves shall pivot out from adjacent consoles, on command, approximately halfway into adjoining aisles to block patron passage, and retract into consoles, on command, to allow patron passage. Distance between tips of leaves, when extended to block patron passage, shall be a minimum of 1/2-in. and a maximum of 2 in.

5.10.4 Structural Strength

A. Gate cabinets, including structural frame and the base, shall withstand a concentrated load of 200 lb applied to any one area or applied uniformly over the entire surface at 50 psf without causing damage or permanent deformation.

B. A Handicapped Fare Gate, or an Emergency Exit Gate, or a turnstile barrier, locked with an arm in the horizontal position, or biparting leaves barriers in the closed position shall sustain impacts equivalent to a 200-lb person traversing an aisle at 5 mi/hr. Striking the gate or the barrier at the center line of the aisle shall cause no permanent deformation or damage to the barrier, or any part of the gate. A 300-lb downward force on a gate or barrier shall also cause no damage.

C. When in the closed position, biparting leaves shall withstand a force of 50 lb applied horizontally to the tips of each leaf without being pushed apart a total distance exceeding 1/2 in.

5.11 ELECTRICAL REQUIREMENTS

Electrical requirements shall be as specified (Reference: Section 2) and as indicated.

END OF SECTION

SECTION 6

ADD FARE MACHINE

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SECTION 6

ADD FARE MACHINE

6.1 GENERAL

This Section specifies the requirements for the Add Fare Machines (AFMs) to be furnished and installed. A Bill Acceptor (BA) shall be integrated into AFMs (Reference: Section 4). AFMs will not be required for MOS-1 operation.

6.1.1 Description

AFMs will be located in the paid areas of stations. The purpose of the AFM is to enable patrons holding fare media of insufficient value, to pay the additional fare required to exit at that specific Metro Rail Station. When fare media is inserted, the AFM will read the value of the fare media and display the amount of additional fare required for exit. When payment is complete, the AFM shall magnetically reencode the fare media and return it to the patron for use in exiting. If overpayment is made, change will be dispensed. All valid fare media shall be accepted and upgraded, without penalty, according to the fare table. Upgrading to peak, when appropriate, shall be automatic.

6.2 PERFORMANCE REQUIREMENTS

Requirements, functions, and references as specified for TVMs and as described (Reference: Section 2) shall apply for AFMs, but shall be simplified by deletions and/or modifications as follows:

A. No printing

B. No ticket issue

C. Fewer patron-operated control devices and openings, as indicated

D. Fare table requirements shall be the same as for the exit gates.

6.2.1 Transaction Rate

Each AFM shall have the capability of processing one complete upgrade transaction within 16 sec. To meet this test requirement, a transaction shall consist of

inserting fare media for reencoding, depositing five coins of the same or mixed value, dispensing the reencoded fare media, and dispensing change of four coins.

6.3 PAYMENT

Payment shall be made in US coins/$1 or $5 bills, tokens, fare media residual value, or any combination thereof.

6.3.1 Payment Sequence

The payment sequence for upgrading fare media shall be as follows:

A Insert fare media into machine

B. Fare AMOUNT DUE for exit displayed by machine

C. Insert amount due or overpayment

D. Fare media reencoded and returned to patron

E. Change given if required.

6.4 INTERFACE REQUIREMENTS

The interface requirements for the AFM to the SFCCU at the mezzanine shall be the same as for the TVM.

END OF SECTION

SECTION 7

PASSENGER ASSISTANCE CENTER

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SECTION 7

PASSENGER ASSISTANCE CENTER

7.1 GENERAL

This Section specifies the requirements for Passenger Assistance Centers (PACs) to be furnished and installed. In the Contract Drawings, PACs are entitled "Assistance Intercom."

7.2 DESCRIPTION

The purpose of the PAC is to provide patrons with a voice communications link to RCC for information and problem resolution.

A. The PAC shall contain a ticket reader for analysis of ticket/pass media inserted.

B. The PAC located in the paid area of a station mezzanine shall be installed in a freestanding cabinet in the fare media vending array area.

C. The PAC located in the free area of a station mezzanine shall be contained in the wall-mounted SFCCU, which is located in close proximity to the fare gate array.

D. PACs in both locations shall have a common external appearance.

7.3 PERFORMANCE REQUIREMENTS

7.3.1 Passenger Assistance Intercom

The operation of the Passenger Assistance Intercom (PAI), after patron activates the PUSH TO CALL button, shall be a hands-free operation.

7.3.2 Ticket Reader

A. The ticket reader contained in the PAC shall be capable of reading data encoded on media, as described herein (Reference: Section 10), as encoded by TVMs, AFMs, gates, CTEMs, and BTEMs for remote readout via a buffer with RS-232-C output to the RCC and the SFCCU (free area PAC only). The software to read media data at the SFCCU and at

CCTV operators' voice/data terminals shall be provided.

B. The ticket reader shall process and return one fare media within 5 sec after insertion.

C. Fare media data shall be retained in the buffer for 30 sec, or until the next fare media is inserted, or the reader loses power, whichever occurs first.

D. The ticket reader shall be activated when fare media is inserted in the correct orientation. When necessary, the patron will be instructed by the RCC operator to insert the fare media into the reader for analysis.

7.3.3 Data Processing

A. Data processing shall be in accordance with the requirements, as specified (Reference: Section 10). Tickets and passes shall be read and decoded from binary to their user-oriented operational description. Both the binary coded digital (BCD) and the decoded description shall be available for remote transmission from each PAC for display at the RCC, and also for display at each SFCCU from the immediately adjacent PAC. Except for data field errors (see below), problems encountered in decoding the data from one field shall not hinder the decoding of data from other fields.

B. Media error codes to be detected are as follows, as a minimum:

1. Security Code Error: Fare media is not accepted because it contains an outdated or invalid security code.

2. Basic Data Field Error: A subquality fare media resulting in an unacceptable decoding due to insufficient or too many data bits. Only the BCD data needs to be displayed in this case.

3. Parity Error: Fare media not valid because of a parity error.

4. Wrong Entry/Exit Code: Ticket/pass was last used for entry yet is being read in free area, or reverse (exit, paid area).

5. Insufficient value for exit or entry at this station at this time.

6. Passback: Attempted use of a pass during the antipassback control period.

7. Bad Number Pass: Pass listed as stolen or fraudulent (downloaded from SFCCU).

C. Present value of fare media shall also be read and transmitted.

7.4 PATRON INTERFACE

Front panel requirements shall consist of the following:

A. Graphics shall be provided, as indicated.

B. A ticket reader insertion opening shall be provided to accommodate the media, as indicated.

C. It shall be possible to insert and read tickets and passes that have been previously bent or folded in use and subsequently reflattened.

7.5 CONTROL LOGIC

Control logic shall be provided to perform functions specified above and herein (Reference: Section 2).

7.6 INTERCOM INSTALLATION

7.6.1 District-furnished Equipment

The following DFE equipment will be mounted/located in the PAC:

A. PAI assembly

B. Maintenance telephone jack.

7.6.2 Wiring and Hookup

A. Wiring and connections to the telephone jack and PAI will be provided by the District.

B. Access space, mounting holes, and other mounting requirements for hookup and cable tiedown shall be provided by the Contractor. Detail drawings of the PAI assembly and telephone jack will be provided by the District.

7.7 SERVICE AND MAINTENANCE

Service and maintenance requirements shall be as specified (Reference: Section 2).

7.8 SECURITY

7.8.1 Locks

Locking devices and keys shall be provided, as specified (Reference: Section 2).

7.8.2 Intrusion Detection

Intrusion detection shall be provided, as specified (Reference: Section 2).

7.9 PHYSICAL REQUIREMENTS

7.9.1 Materials

Materials used in the PAC shall be as specified (Reference: Section 16) and as indicated.

7.9.2 Dimensions

Dimensions shall be as indicated.

7.9.3 Nameplates

Nameplates shall be designed and permanently attached to each PAC, as specified (Reference: Section 2).

7.10 ELECTRICAL REQUIREMENTS

Electrical requirements shall be provided, as specified (Reference: Section 2).

END OF SECTION

SECTION 8

STATION FARE COLLECTION CONTROL UNIT

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SECTION 8

STATION FARE COLLECTION CONTROL UNIT

8.1 GENERAL

This Section specifies the requirements for the Station Fare Collection Control Units (SFCCU) to be furnished and installed. Installation shall be as specified and as indicated.

8.2 DESCRIPTION

The purpose of the SFCCU is to serve as the local control center for the fare collection equipment in the mezzanine and, as a minimum, as the remote control and data interface between mezzanine fare collection equipment, FCCC, EMP, CP, and RCC. The SFCCU shall be contained in a wall-mounted cabinet in the free area, in close proximity to a gate array.

8.3 CITED REFERENCES

Organization	Number	Title
EIA	RS-232-C	Interface Between Data Terminal Equipment Employing Serial Binary Data Interchange

8.4 PERFORMANCE REQUIREMENTS

The SFCCU, in response to local or remote input, shall:

A. Collect, store, and transmit on request, monetary, patronage, sales, revenue service, and maintenance data from the mezzanine fare collection equipment to the FCCC.

B. The logic shall provide for means to compare time signals generated by the clock of the SFCCU with time signals generated by the station located equipment. The logic shall be required to provide means by which periodic time checks are conducted (at least once every hour). If the time discrepancy exceeds 1 min, the logic shall address the appropriate equipment and affect time synchronization. In a similar manner, the SFCCU shall synchronize its time with the FCCC, which shall

contain the master clock for the entire fare collection system.

C. Command gate equipment or a specific gate to ignore time, zone, or entry/exit checks on fare media, either continuously or by instance.

D. Command a specific gate to release for one passage with or without the insertion of fare media.

E. Automatically change gate array configuration for a minimum of three times a day for each day of a year for the next 10 yr following installation, to accommodate the following passenger flow patterns: Peak Entry, Peak Exit, and Balanced.

F. Change gate array configuration to meet special passenger flow patterns.

G. Receive, store, and download new fare tables and bad number listings to TVMs, AFMs, and gates.

H. Display data from fare media inserted at adjacent PAC in the format specified for remote reading.

8.5 INTERFACE REQUIREMENTS

8.5.1 SCADA

A. The SFCCU interface with RCC shall be via the SCADA subsystem via contact switches and hard wiring to RTUs. The District shall provide data sets, CICs, RTUs, CTS system, and operator consoles. The SFCCU shall contain contact switch closures (including interposing relays) and shall be available for interrogation by SCADA. It shall have RS-232-C ports to monitor and implement those functions, controls, indications, and alarms, as specified (Reference: Table TP-8-1).

B. Intrusion circuits shall be normally closed and when unauthorized entry occurs, contacts shall be opened sending the proper indication to the CIC. Other vital maintenance and revenue service circuits shall be normally open and when the proper conditions exist, the contacts shall close. Contact opening and closing shall be rated for 10 A, 0.10-ohm resistance maximum with contacts closed, greater than 50 Mohm with contacts open. Intrusion circuits shall be wired in series such that only one indication per mezzanine is presented to RCC.

TABLE TP-8-1

SFCCU INTERFACE REQUIREMENTS

Function/Control/ Indication/Alarm	From	To	Interface RS-232-C	Interface Contact Closure
INTRUSION	All	SFCCU	X	X
	SFCCU	SCADA		X
	SFCCU	FCCC	X	
IN SERVICE INDICATION	All	SFCCU	X	X
	SFCCU	SCADA		X
	SFCCU	FCCC	X	
On/Off Commands	SFCCU	All	X	
	FCCC	All	X	
Revenue Service Required	All (Except BTEM)	SFCCU	X	X
	SFCCU	SCADA		X
	SFCCU	FCCC	X	
Not In Service - Door Open	All	SFCCU	X	X
	SFCCU	SCADA		X
	SFCCU	FCCC	X	
Not In Service - Revenue Service Required	All (Except BTEM)	SFCCU	X	X
	SFCCU	SCADA		X
	SFCCU	FCCC	X	
Not In Service - Maintenance Service Required	All	SFCCU	X	X
	SFCCU	SCADA		X
	SFCCU	FCCC	X	
Not In Service - Jam	All	SFCCU	X	X
	SFCCU	SCADA		X
	SFCCU	FCCC	X	

Legend:

PACTKRDR	= PAC Ticket Reader
All	= TVM, AFM, BTEM, Gates, PAC
RS-232-C	= 4 wires per machine
Contact Closure	= 2 wires per function per equipment
SCADA	= CICs, RTUs, data sets, CTS system, console positions, EMP, and CP.

TABLE TP-8-1 (Cont'd.)

SFCCU INTERFACE REQUIREMENTS

Function/Control/ Indication/Alarm	From	To	Interface RS-232-C	Interface Contact Closure
STATUS REQUEST	SFCCU	All/PACTKRDR	X	
	FCCC	All/PACTKRDR	X	
DATA REQUEST	SFCCU	All/PACTKRDR	X	
	FCCC	All/PACTKRDR	X	
TIME REFERENCE	SFCCU	All/PACTKRDR	X	
	FCCC	SFCCU	X	
FARE TABLE	SFCCU	All	X	
	FCCC	All via SFCCUs	X	
STATION/EQUIPMENT NUMBER	All/PACTKRDR	SFCCU	X	
	SFCCU	FCCC	X	
BAD NUMBER LIST	SFCCU	Gates	X	
	FCCC	SFCCU	X	
IGNORE TIME CHECK	FCCC/SFCCU	Gates	X	
IGNORE ENTRY/EXIT CHECK	FCCC/SFCCU	Gates	X	
IGNORE ZONE CHECK	FCCC/SFCCU	Gates	X	
SET ENTRY MODE	FCCC/SFCCU	Gates	X	
SET EXIT MODE	FCCC/SFCCU	Gates	X	
RELEASE FOR ONE PASSAGE	FCCC/SFCCU	Gates	X	
OPEN EXIT (Close Entry)	SFCCU/EMP/SCADA	Gates		X
LOCK ENTRY (Normal Exit)	SFCCU/EMP/SCADA	Gates		X
OPEN ENTRY (Open Exit)	SFCCU/EMP/SCADA	Gates		X

8.5.2 FCCC Interface

The SFCCU shall interface with the FCCC via CTS and as specified (Reference: Table TP-8-1). The SFCCU shall also contain provisions to download data accumulated to a portable disk file plugged into the SFCCU.

8.5.3 Man/Machine Interface

The SFCCU shall contain keyboard, control switches, CRT, buttons, and key switches to accommodate local input by District personnel. Initial display at the CRT shall provide a visual indication of the status of fare collection equipment at the mezzanine where it is located.

8.5.4 Check/Change Functions

Separate means shall be provided to enable the following set of functions to be manually checked or changed on one or all mezzanine equipment:

A. Check or change fare table

B. Check or set ignore time/zone/entry/exit checks

C. Check or update/delete bad number listing.

8.5.5 Station Mezzanine Equipment Interface

A. The SFCCU shall interface with the mezzanine equipment in conformance with EIA RS-232-C Standard. Data from the equipment to the SFCCU shall be considered a response. Response from each item of equipment to the SFCCU shall be the same as that defined for responding to the FCCC (Reference: Section 9) for each item of equipment. Signals from the SFCCU to the equipment shall be considered as a transmission.

B. SFCCU shall also interface with the mezzanine equipment via direct wiring and binary switches.

C. SFCCU shall interface with adjacent PAC ticket reader (Reference: Section 7).

8.6 MAINTENANCE TELEPHONE JACK

Provisions shall be made to accommodate a maintenance telephone jack on the control panel, as indicated. Jack, mounting, wiring, and installation to be provided by the District.

8.7 SECURITY

Locks and keys shall be provided to access the equipment, as specified (Reference: Section 2).

8.8 PHYSICAL REQUIREMENTS

8.8.1 Materials

Materials used in the SFCCU shall be as specified (Reference: Section 16) and as indicated.

8.8.2 Dimensions

Dimensions shall be as indicated.

8.8.3 Nameplates

Nameplates shall be designed and permanently attached to each SFCCU, as specified (Reference: Section 2).

8.8.4 Electrical Requirements

Electrical requirements shall be provided, as specified (Reference: Section 2).

END OF SECTION

SECTION 9

FARE COLLECTION CENTRAL COMPUTER

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SECTION 9

FARE COLLECTION CENTRAL COMPUTER

9.1 GENERAL

9.1.1 Scope

This Section specifies the requirements for the Fare Collection Central Computer (FCCC).

9.1.2 Cited References

Organization	Number	Title
EIA	RS-232-C	Interface between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange
UMTA	49 CFR 630	Uniform System of Accounts and Records and Reporting System

9.2 DESCRIPTION

The purpose of the FCCC is to serve as a data/status acquisition system with remote control function over station equipment.

The data recorded, processed, displayed, and printed shall be the monetary, patronage, service, and maintenance information necessary to manage, control, and maintain the fare collection system.

The FCCC shall be installed in the data processing room at the RCC.

9.3 PERFORMANCE REQUIREMENTS

9.3.1 Functional Criteria

A. Interrogation:

1. The FCCC shall be capable of interrogating each item of equipment individually at a set time

interval and in a certain order. There shall be two types of interrogations:

a. Register Data Request

b. Status Request.

2. When an item of equipment receives an interrogation, it shall respond with a prescribed communication protocol as described below. The following types of equipment shall be interrogated:

a. Station Fare Collection Control Unit (SFCCU)

b. Ticket Vending Machine (TVM)

c. Add Fare Machine (AFM)

d. Gates (all types)

e. Central Ticket Encoding Machine (CTEM)

f. Booth Ticket Encoding Machine (BTEM).

3. The monetary, sales, patronage, revenue service, and maintenance data items to be recorded and reported shall be as specified.

4. Report Content:

a. The Register Data Request asks for the accumulated totals of the various categories that are stored in registers in each item of equipment.

b. The Status Request asks for a report of the condition that caused the equipment to set an indicator. The conditions that shall cause an indicator to be set are abnormal or major change of state situations that should be reported immediately.

c. Each equipment type report shall specify the register data and status data that it will store and report when appropriately interrogated.

B. Processing: The data received by the FCCC shall be recorded, with a time reference, on suitable magnetic media. This recorded data shall be

accessible for recall, display, and/or printout. As the data is received, it shall be possible to display the information on a video display and/or print it out on a printer connected to the processor. It shall be possible to remove the recorded data and to mount the magnetic media, used to store the data, on another processor to retrieve the recorded information, as specified. The printout will be used by the District to monitor the revenue collected, patronage data, equipment operation and maintenance, and planning.

C. The FCCC shall be capable of performing remote control functions specified for the SFCCU from Data Phone Terminals (DFE) via dial-up link.

9.3.2 Data Handling Criteria

A. Data Description: The FCCC shall collect and store monetary, sales, patronage, revenue service, and maintenance data obtained in the responses to its interrogations as follows:

1. The monetary data shall consist of amount of money collected, money stored, change replenished, and change returned, by denomination and value.

2. The sales data, as a minimum, shall consist of: fare media vended, by type; bus/rail passes upgraded; and tickets exchanged.

3. The patronage data, as a minimum, shall consist of: entering patrons at a mezzanine, by fare type; exiting patrons at a mezzanine by fare type and by station of origin.

4. The revenue service data, as a minimum, shall consist of ticket stock, and cash replenishment and removal by equipment and container number.

5. The maintenance data, as a minimum, shall consist of the time and type of fault or condition that caused the equipment to go out of service, and when service was restored by time and date.

B. Register Data Request: Each item of equipment shall respond to interrogation from the FCCC by transmitting total data accumulated since the last interrogation. Each item of equipment shall be addressed by its unique number. The period for

successive addresses to each item of equipment shall be settable by program from once every 5 min to once every 24 hr. It shall be possible to vary the interrogation interval for different times of day and days of the week, as well as stop all interrogations. It shall be possible to select equipment for interrogation by station, by type of equipment, by fare control area, by groups, or individually as may be desired. When there is no interrogation, each item of equipment shall accumulate the various data in its registers.

C. Status Request: At least once every 60 sec, a Status Request shall be transmitted to interrogate each item of equipment to which it is programmed. Any item of equipment interrogated, when its status indicator is set, shall respond with the data that caused the status indicator to be set. When the FCCC receives a status indicator response with an equipment number, the FCCC shall stop the sequential interrogation and request the responding equipment to transmit its data. The data transmitted shall be as specified (Reference: Section 8, each equipment section, and Section 2). The FCCC shall transmit major status indications to appropriate Data Phone Terminals (DFE) via dial-up link.

D. Data Reception: All received data shall be displayed, or printed on command, and stored in the FCCC file, along with time of reception.

9.3.3 Processor Criteria

The FCCC provided shall be capable of servicing up to 700 pieces of equipment at up to 23 SFCCU locations. Provisions to expand by 25 percent shall be provided. FCCC shall contain logic, memory, file, video display, printer, and keyboard.

A. Logic: The logic shall perform logical functions necessary to obtain data from various equipment, to display and print this data as required, and to store this data in a file. The logic shall control interrogation and communication protocol associated with data from the various station equipment in accordance with the following outline:

1. The logic shall formulate the address of each item of equipment and shall cause the address to be transmitted to the equipment being interrogated. When the communication protocol is completed for an interrogation, the FCCC

shall formulate the address for the next item of equipment to be interrogated and transmit its code.

2. Register Data Request:

   a. The Register Data Request interrogation shall ask for all register data in an equipment to be transmitted.

   b. When the equipment addressed with the Register Data Request recognizes the interrogation, it shall respond with the equipment number and then transmit its register data. The logic shall move on to the next equipment after the register data transmission has been completed and an acknowledgement has been sent.

3. Status Request:

   a. The Status Request interrogation shall ask for current status information. When the status indication is set in an item of equipment, the equipment shall respond with the status indication code and equipment number. When the equipment has transmitted the status information and received an acknowledgement from the FCCC, its status data shall be erased.

   b. Failure to obtain a response from the equipment interrogated shall cause the FCCC logic to record, print, and display the equipment number with the response condition that has been recognized.

4. For interrogations, a repeat interrogation shall be transmitted if the parity does not check. If correct parity is not received after the third try, the equipment number of the involved equipment shall be recorded together with a code to denote "failed parity check." The failure information and the time of failure shall be accessible for printout and display on the FCCC video display.

5. When an IGNORE TIME ON, IGNORE ZONE ON, IGNORE ENTRY/EXIT ON, NOT IN SERVICE, or EQUIPMENT OFF signal is received from a Status Request interrogation, it shall be stored in the memory until the IGNORE TIME OFF, IGNORE ENTRY/EXIT

OFF, IN SERVICE, or EQUIPMENT ON signal is received. The FCCC shall print a report of these exceptional conditions at an adjustable time period of 1 hr or 24 hr. If none exists, the report shall so indicate.

6. When a fault, revenue or service condition, or employee's number is received from a Status Request interrogation, it shall be held in the processor memory for print at hourly intervals. The FCCC shall print a separate report for any faults, any monetary situations, any service conditions, and current employee's number at that location at hourly intervals.

7. Each item of equipment shall transmit the contents of its registers in response to a Register Data Request, or data relating to a Status Request. Sufficient capacity shall be provided in the memory to store the necessary program steps, current time, received data, and other information to enable the FCCC to perform its specified tasks.

8. The logic shall make three attempts to obtain data from any equipment before proceeding to the next. When three attempts have failed, the logic shall cause equipment number and failed response code to be recorded, with current time displayed, and printed.

9. Time data shall be obtained from the SFCCU at each fare control area. This time data shall be recorded in the file as well as retained in the memory to accompany displays and printouts. The FCCC shall contain a crystal-controlled master clock that maintains current date and time. Current date and time shall be sent by the FCCC at frequent intervals, and any differences detected by the logic unit in each SFCCU shall result in the automatic correction of the clock contained in the SFCCU. By this process, the SFCCUs shall remain in accurate synchronization while the FCCC is functional, but shall continue to operate independently regardless of the status of the FCCC. If the SFCCU is unable to correctly synchronize, it shall notify the FCCC.

   The logic unit shall contain permanent memory data for the full calendar through the year 2020, or beyond, and shall not require any

manual intervention to make adjustments for such times as leap year, end of year, end of month, and days of week. Plug-in chip replacement, or alternative means subject to District's acceptance, shall provide for successive periods of not less than 10 yr each beyond expiration of the calendar furnished initially. Any replacement chip shall have at least 1 mo overlap with the chip replaced. Additionally, the FCCC shall perform this reset function.

10. The memory shall hold the data that is coming into the FCCC when a file is removed. The FCCC shall not recommence interrogations until a replacement file is in place. When the unused file is in place, the interrogations shall resume where they were terminated.

11. The logic, together with manipulation of the controls on the FCCC, shall enable the FCCC to extract data from any selected equipment and display and/or print as desired. Such interrogation shall be either Register Data Requests or a Status Request. The data obtained from any manual interrogation shall be recorded in the same way as a processor-controlled interrogation.

12. When fare tables are to be changed, it shall be possible to enter the new fares into the memory manually through the controls on the FCCC. As fare level responses are received from Status Request interrogations, they shall be compared against the internally stored levels and the results printed, indicating the equipment numbers compared and any variations noted.

13. Whenever an employee identification number is received in response to a Status Request, the number shall be displayed and/or printed with equipment number and current time. It shall be stored in the file for later reference.

14. The logic, together with manipulation of the controls, shall enable the following data to be extracted from the file displayed and/or printed as needed. The classifications of data to be extracted, displayed, and printed (by equipment number) are:

a. Most recent status report with time, or status data by time up to the file limit, or latest register data by time

b. Monetary data by equipment, by time, or by station, by time up to the file limit

c. Fault data, by equipment, by time up to the file limit

d. Service data, by equipment by time, or by station by time up to the file limit

e. Patronage data, by equipment by time, or by station by time up to the file limit

f. Employee number, by equipment by time up to the file limit

g. IGNORE TIME ON data by station by time

h. EQUIPMENT OFF data by equipment by time

i. No parity check data by equipment by time up to the file limit

j. No reply data by equipment by time up to the file limit

k. Fare level changes by supervisor by equipment by time comparing the response with the fare levels stored in memory

l. Agent's number, by station SFCCU, location by time

m. Total inventory of tickets by type by agent by time

n. MRT exit cards issued by agent

o. Register Data Request by time up to the file limit

p. Status Request by time by equipment up to the file limit.

B. Memory: The FCCC memory shall have sufficient capacity to store all data, codes, time, and program steps to enable the logic to be performed, as specified.

When the FCCC has been without power long enough to discharge the RAM battery, the equipment shall be restarted as follows:

1. The power shall be turned on and the time shall be keyed in manually.

2. The RAM shall be reloaded with the necessary data to enable it to operate on interrogation responses, including such items as fare levels and agents' numbers (of those on duty).

3. The logic shall be set to begin the Status Request interrogations. The Register Data Request interrogations shall begin as determined by the time.

C. File: The FCCC file shall consist of two magnetic storage devices, one of which shall be removable. The FCCC shall have the capability of storing data in and retrieving data from the storage device. The data received from interrogations, as well as the data locally input, by manual and software means, shall be stored. The removable storage device shall normally store one week's activities. It shall be able to be removed and replaced, as required. The fixed storage device shall accumulate data such that any data needed for servicing and maintaining the equipment, which may cover more than one day or one weekend, can be available from the fixed storage device. Reference data, such as fare levels, shall be stored in the fixed device. Software programs and program data shall also be stored in the fixed storage device.

D. Video Display: The FCCC shall be equipped with a video display capable of displaying programs and data to enable the software to be changed and data to be introduced. Output data shall also be able to be displayed either together with the printout or separately.

E. Printer: The FCCC shall be equipped with and drive a printer through an EIA RS-232-C standard interface up to 60 characters/sec. The FCCC shall be programmed, as required, to print out the data recorded on each device. Each different data item shall be identified. The quantities of data printed shall be in decimals. The current time (military) shall be printed by month, day, and time to the nearest sec.

F. Keyboard: A complete ASCII keyboard shall be provided for entering and extracting data from the memory.

9.4 INTERFACE REQUIREMENTS

9.4.1 Cable Transmission System

The Cable Transmission system (CTS), will be used to communicate between the FCCC and the operating equipment. The channel will be the equivalent of a four-wire, full duplex channel (Bell System 3002 4-wire). A party line, or daisy chain, hookup shall be employed in each station. The data transmitted over the channels shall conform to EIA RS-232-C standards at a 1200 to 2400 baud rate. Interface requirements shall be as specified (Reference: Section 8).

9.4.2 Power

Power for the FCCC shall be provided by the District within the RCC and shall be as specified (Reference: Section 2).

9.4.3 SCADA

The design of the FCCC shall not preclude computer-to-computer link between the FCCC and SCADA via RS-232-C standards (not required for MOS-1).

9.4.4 Data Phone Terminals

The FCCC shall interface with up to seven Data Phone Terminals (DFE) at remote locations via RS-232-C link to Data Sets (DFE). Links between Data Sets and Data Phone Terminals to be furnished by the District. Provision shall be made for interface with up to 15 Data Phone Terminals.

9.4.5 SCRTD

The FCCC shall interface with the TRANSMIS computer located at 425 S. Main Street via RS-232-C link to Data Set (DFE). Link between Data Set and TRANSMIS to be furnished by the District.

9.5 SOFTWARE

9.5.1 Requirements

A software package, suitable to perform the specified monitoring, audit, and control functions by the FCCC,

shall be provided. Software for Data Phone Terminals shall also be provided. The programs shall be recorded in EPROM and shall include periodic diagnostic tests.

9.5.2 Formats

A. The formats for the monetary and patronage data displays shall meet the requirements of Subparts B and C of 49 CFR 630. Proposed forms for service and maintenance data shall be submitted for approval. (CDRL)

B. Listings and examples of typical formats for reports, data, and alarms are included in Appendix TP-9-A. The reports, registers, and alarms, as listed, are minimum requirements. The report formats are provided as examples and may be adjusted in order to be compatible with the system, as furnished.

9.5.3 Performance Monitoring

The contractor shall provide software to continuously monitor hardware and software performance with a minimum of interference with the normal functions of the system. The time periods over which statistics are gathered shall be adjustable, and the accumulated statistics shall be reset at the start of each period.

9.5.4 Maintenance Diagnostics

The contract shall provide on-line software of the maintenance of the data base, video display, and logs. Each unit of maintenance software will be password-protected to protect against operation by unauthorized individuals. In addition, on-line and off-line software to check the operation of the system hardware shall be provided.

9.5.5 Utilities

The contractor shall supply efficient, reliable, well-documented, user-oriented software utilities that provide the services required to maintain and modify the FCCC Software. The contractor's standard software utilities shall be used as much as possible. Any additional utilities, not explicitly required herein, that the contractor requires to conform to this Specification for normal software maintenance, shall be included.

9.5.6 Programming Support

The contractor shall provide support software that shall access to all software services defined in this Specification. In addition, any alterations of improvements made by the contractor's FCCC vendor to software initially supplied with the system that are directly applicable shall be available without charge to the District.

END OF SECTION

APPENDIX TP-9-A

FARE COLLECTION CENTRAL COMPUTER REPORT FORMS

APPENDIX TP-9-A

CONTENTS

Booth @ 7/F

CONTENTS (Cont'd.)

1. AUTOMATIC POLL SCHEDULE REPORT

23-MAY-90 (Oper.) 12:20:20

DAY	TIME	FIRST STATION	LAST STATION	POLL TYPE	INTERVAL
MON	0:00	1	16	REGISTER	1
MON	0:15	2	6	REGISTER	2
MON	0:00	2	6	REGISTER	2
MON	0:00	2	6	STATUS	1
WED	12:00	2	2	STATUS	1
WED	12:00	2	2	REGISTER	5
WED	12:00	5	6	STATUS	1
WED	12:00	5	6	REGISTER	5
WED	13:50	2	2	STATUS	2
WED	13:50	2	2	REGISTER	2
THU	11:40	8	10	STATUS	7
THU	11:45	8	10	STATUS	26
THU	12:00	2	2	STATUS	3
THU	12:00	2	2	REGISTER	3

2. POLL LOG REPORT

23-MAY-90 (Oper.)

Start Time 0:00
End Time 12:51

TIME	STATION	POLL RQST	POLL TYPE	POLL RESULT
12:35	Union Station	AUTO	STAT	OKAY
12:35	Civic Center	AUTO	STAT	OKAY
12:35	5th/Hill	AUTO	STAT	OKAY
12:35	7th/Flower	AUTO	REG	OKAY
12:35	Union Station	AUTO	REG	OKAY
12:35	Civic Center	AUTO	REG	OKAY
12:36	5th/Hill	AUTO	STAT	OKAY
12:36	7th/Flower	AUTO	STAT	OKAY
12:36	Union Station	AUTO	STAT	OKAY
12:36	Civic Center	AUTO	REG	OKAY
12:36	5th/Hill	AUTO	REG	OKAY
12:36	7th/Flower	AUTO	REG	OKAY
12:37	Union Station	AUTO	STAT	OKAY
12:37	Civic Center	AUTO	STAT	OKAY
12:37	5th/Hill	AUTO	STAT	OKAY
12:37	7th/Flower	AUTO	REG	OKAY
12:37	Union Station	AUTO	REG	OKAY
12:37	Civic Center	AUTO	REG	OKAY
12:38	5th/Hill	AUTO	STAT	OKAY
12:38	7th/Flower	AUTO	STAT	OKAY
12:38	Union Station	AUTO	STAT	OKAY
12:38	Civic Center	AUTO	REG	OKAY
12:38	5th/Hill	AUTO	REG	OKAY
12:38	7th/Flower	AUTO	REG	OKAY
12:39	Union Station	AUTO	STAT	OKAY
12:39	Civic Center	AUTO	STAT	OKAY
12:39	5th/Hill	AUTO	STAT	OKAY
12:39	Union Station	AUTO	REG	OKAY
12:39	Civic Center	AUTO	REG	OKAY
12:39	5th/Hill	AUTO	REG	OKAY
12:40	7th/Flower	AUTO	STAT	OKAY

3. LATEST REGISTER DATA REPORT

23-MAY-90 (Oper.) 13:14:54

UNION STATION

EQUIP	NR	1ST REG	VALUES				
SFCCU	1	1:	65793	153586	257	2457	3814
SFCCU	1	6:	257	514	512	1137	1138
SFCCU	1	11:	589	590	591	900	551
SFCCU	1	16:	552	553	554	555	16
SFCCU	1	21:	131072	513	514	515	516
SFCCU	1	26:	517	100	110	120	130
SFCCU	1	31:	140	512	513	514	515
SFCCU	1	36:	516	517	518	519	520
SFCCU	1	41:	10	108	322	510	512
SFCCU	1	46:	100	557	558	559	560
SFCCU	1	51:	534	513	514	515	736
SFCCU	1	56:	2695	848	519	520	-
GATE	1	1:	768	769	770	947	772
GATE	1	6:	773	774	775	776	843
GATE	1	11:	778	1024	1025	1026	1023
GATE	1	16:	1028	1029	1030	1031	1032
GATE	1	21:	1033	257			
TVM	1	1:	11	12	13	14	15
TVM	1	6:	21	22	23	24	25
TVM	1	11:	31	32	33	34	35
TVM	1	16:	41	42	43	44	45
TVM	1	21:	51	52	53	54	55
TVM	1	26:	61	62	63	64	65
TVM	1	31:	71	72	73	74	75
TVM	1	36:	81	82	83	84	85
TVM	1	41:	110005	25	10	10	5
TVM	1	46:	5	0	1	1	1
TVM	1	51:	1	1	0	48096	41
TVM	1	56:	65536	55			

4. IGNORE TIME MODE REPORT

23-MAY-90 (Hrly.) 13:00:03

Start Time 12:00
End Time 13:00

Station	Equip. Type	Equip. Nr.	Status Code	Start --Time--	Stop
Union Station	SFCCU	1	3	12:39	12:40

5. EQUIPMENT OFF REPORT

23-MAY-90 (Hrly.) 13:00:08

Start Time 12:00
End Time 13:00

Station	Equip. Type	Equip. Nr.	Status Code	Start --Time--	Stop
Union Station	SSFCCU	1	6	12:39	12:40

6. FAULT DATA REPORT

23-MAY-90 (Hrly.) 13:00:16

Start Time 12:00
End Time 13:00

Station	Equip. Type	Equip. Nr.	Status Code	Start --Time--	Stop
Union Station	GATE	1	2	12:55	
Civic Center	TVM	2	6	12:38	
Civic Center	TVM	1	22	12:38	12:40
5th/Hill	TVM	3	13	12:36	
7th/Flower	GATE	2	6	12:36	
7th/Flower	GATE	1	2	12:35	12:45
Wilshire/Alvarado	SFCCU	1	10	12:35	12:36

7. TRANSMISSION ERRORS (PARITY) REPORT

23-MAY-90 (Oper.) 13:35:11

Start Time 0:00
End Time 13:35

Station	Equip. Type	Equip. Nr.	Status Code	Start --Time--	Stop
Union Station	SFCCU	1	12	13:24	13:24
Civic Center	SFCCU	1	12	13:23	13:23
5th/Hill	SFCCU	1	12	13:22	13:22
7th/Flower					

8. TRANSMISSION ERRORS (NO REPLY) REPORT

23-MAY-90 (Oper.) 13:15:56

Start Time 0:00
End Time 13:15

Station	Equip. Type	Equip. Nr.	Status Code	Start --Time--	Stop
Union Station	SFCCU	1	11	13:08	13:08
Union Station	SFCCU	1	11	13:08	13:08
Civic Center	SFCCU	1	11	13:08	13:08
Civic Center	SFCCU	1	11	13:08	13:08
5th/Hill	SFCCU	1	11	13:07	13:07
7th/Flower	SFCCU	1	11	13:07	13:07

9. WEEKLY FAULT DATA SUMMARY REPORT

23-MAY-90 (Oper.) 13:52:13

For the WEEK of

Station	Equip. Type	Equip. Nr.	Status Code	Nr. of Occurrence.
Union Station	GATE	16	2	3
Union Station	GATE	16	6	1
Civic Center	SFCCU	1	7	2
Civic Center	TVM	3	6	1
5th/Hill	TVM	3	13	1
7th/Flower	TVM	3	6	1
7th/Flower	SFCCU	1	10	1
Wilshire/Alvarado	TVM	2	22	1

10. MONTHLY FAULT DATA SUMMARY REPORT

23-MAY-90 (Oper.) 13:52:32

For the MONTH of 01-MAY-90 to 23-MAY-90

Station	Equip. Type	Equip. Nr.	Status Code	Nr. of Occurence.
Union Station	GATE	16	2	4
Union Station	GATE	16	6	2
Civic Center	SFCCU	1	7	3
Civic Center	TVM	3	6	2
5th/Hill	TVM	3	13	2
7th/Flower	TVM	3	6	2
7th/Flower	SFCCU	1	10	2
Wilshire/Alvarado	TVM	2	22	2

11. SERVICE DATA REPORT

23-MAY-90 (Hrly.) 13:00:21

Start Time 12:00
End Time 13:00

Station	Equip. Type	Equip. Nr.	Status Code	Time	Value
Union Station	TVM	3	64	12:41	
5th/Hill	TVM	4	5	12:38	
7th/Flower	GATE	4	5	12:37	2564

12. EMPLOYEE PASS USAGE REPORT

23-MAY-90 (Hrly.) 13:00:28

Start Time 12:00
End Time 13:00

Station	Time	Pass Numbers
Union Station	12:35	2501 4100

13. FARE TABLE REPORT

22-NOV-90 (Oper.) 00:10:32

UNION STATION

Type	Initial Fare	Zone 1-2	Zone 2-3	Zone 3-4	Zone 4-5	Transfer
Adult (Peak)	0.75	0.10	0.15	0.25	0.25	0.10
Adult (Off peak)	0.75	0.10	0.15	0.25	0.25	0.10
E and H	0.25	0.05	0.10	0.15	0.15	0.00
Student (With ID)	0.50	0.00	0.00	0.00	0.00	0.00

Record Identification

11-22-90 4:45 p.m. PEAK Day Code (Cur = 5 Hi = 40 Lo = 1)

14. SYSTEM FARE TABLE REPORT

23-MAY-90 (Oper.) 13:53:08

Type	Initial Fare	Zone 1-2	Zone 2-3	Zone 3-4	Zone 4-5	Transfer
Adult (Peak)	0.60	0.10	0.15	0.25	0.25	0.10
Adult (Off peak)	0.40	0.10	0.15	0.25	0.25	0.10
E and H	0.20	0.05	0.10	0.15	0.15	0.00
Student (With ID)	0.40	0.00	0.00	0.00	0.00	0.00

15. MONETARY DATA: REVENUE OPERATIONS REPORT

23-MAY-90 (Oper.) 13:16:35

UNION STATION

Start Time 0:00
End Time 13:14

Equip. No.	TVM DATA Sales Revenue	Cashbox Take	SFCCU DATA Amt. Under	Amt. Over
1	1100.00	500.96	22.00	33.00
2	550.00	500.96		
TOTAL	1650.00	1001.92		

16. MONETARY DATA: SYSTEM REVENUE REPORT

23-MAY-90 (Oper.) 13:17:06

Start Time 0:00
End Time 13:17

STATION	TVM REVENUE	AFM REVENUE
7th/Flower	1650.00	231.00

17. TVM TICKET REPORT
MONETARY DATA
ONE-WAY PEAK

23-MAY-90 (Oper.) 13:27:26

CIVIC CENTER

Start Time 0:00
End Time 13:27

TIME TO ZONE:	1	2	3	4	5
12:35	0.00	0.00	0.00	0.00	0.00
12:36	0.00	0.00	0.00	0.00	0.00
12:37	0.00	0.00	0.00	0.00	0.00
12:38	0.00	0.00	0.00	0.00	0.00
12:39	0.00	0.00	0.00	0.00	0.00
12:40	0.00	0.00	0.00	0.00	0.00
12:42	0.00	0.00	0.00	0.00	0.00
12:44	0.00	0.00	0.00	0.00	0.00
12:46	0.00	0.00	0.00	0.00	0.00
12:50	0.00	0.00	0.00	0.00	0.00
12:52	0.00	0.00	0.00	0.00	0.00
12:54	0.00	0.00	0.00	0.00	0.00
12:56	0.00	0.00	0.00	0.00	0.00
12:58	0.00	0.00	0.00	0.00	0.00
13:00	0.00	0.00	0.00	0.00	0.00
13:02	0.00	0.00	0.00	0.00	0.00
13:04	0.00	0.00	0.00	0.00	0.00
13:10	0.00	0.00	0.00	0.00	0.00
13:12	0.00	0.00	0.00	0.00	0.00
13:14	0.00	0.00	0.00	0.00	0.00
13:16	0.00	0.00	0.00	0.00	0.00
13:22	15.00	17.50	21.25	60.50	74.25
12:24	15.00	17.50	21.25	60.50	74.25

18. WEEKLY REVENUE SUMMARY REPORT

23-MAY-90 (Oper.) 13:52:40

For the WEEK of

STATION	TVM REVENUE	AFM REVENUE
Union Station	0.00	0.00
Civic Center	0.00	0.00
5th/Hill	0.00	0.00
7th/Flower	0.00	0.00
Wilshire/Alvarado	24.60	793.52
Wilshire/Vermont	100.00	-0.50
Wilshire/Normandie	0.00	0.00
Wilshire/Western	0.00	0.00
Wilshire/Crenshaw	0.00	0.00
Wilshire/LaBrea	0.00	0.00
Wilshire/Fairfax	0.00	0.00
Fairfax/Beverly	0.00	0.00
Fairfax/Santa Monica	0.00	0.00
LaBrea/Sunset	0.00	0.00
Hollywood/Cahuenga	0.00	0.00
Hollywood Bowl	0.00	0.00
Universal City	0.00	0.00
North Hollywood	100.00	100.00

19. MONTHLY REVENUE SUMMARY REPORT

23-MAY-90 (Oper.) 13:52:47

For the MONTH of 01-MAY-90 to 23-MAY-90

STATION	TVM REVENUE	AFM REVENUE
Union Station	0.00	0.00
Civic Center	0.00	0.00
5th/Hill	0.00	0.00
7th/Flower	0.00	0.00
Wilshire/Alvarado	24.60	793.52
Wilshire/Vermont	100.00	-0.50
Wilshire/Normandie	0.00	0.00
Wilshire/Western	0.00	0.00
Wilshire/Crenshaw	0.00	0.00
Wilshire/LaBrea	0.00	0.00
Wilshire/Fairfax	0.00	0.00
Fairfax/Beverly	0.00	0.00
Fairfax/Santa Monica	0.00	0.00
LaBrea/Sunset	0.00	0.00
Hollywood/Cahuenga	0.00	0.00
Hollywood Bowl	0.00	0.00
Universal City	0.00	0.00
North Hollywood	100.00	100.00

20. MONETARY DATA: LRT STATION AGENT REPORT

22-NOV-90 (Oper.) 00:08:50

7th/FLOWER STATION

Start Time 0:00
End Time 1:02

TIME	ADULT	E & H	STUDENT	UP GRADE				
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

21. TICKET INVENTORY REPORT

22-NOV-90 (Oper.) 13:39:21

Start Time 0:00
End Time 13:39

Station	Agent	MRT Exit Card - to zone					
		1	2	3	4	5	Time
7th/Flower	096320	513	514	515	516	517	12:26

22. TICKET DISTRIBUTION REPORT

23-MAY-90 (Oper.) 13:39:33

Start Time 0:00
End Time 13:39

			MRT Exit Card - to zone					
			1	2	3	4	5	6
7th/Flower Sta.	Agent:	096320						
Sold			0	0	900	900	900	900
Issued Free			0	0	0	0	0	0
7th/Flower Sta.	Agent:	000000						
Sold			0	0	50	50	50	50
Issued Free			0	0	0	0	0	0
7th/Flower Sta.	Agent:	096321						
Sold			0	0	50	50	50	50
Issued Free			0	0	0	0	0	0
7th/Flower Sta.	Agent:	000000						
Sold			0	0	0	0	0	0
Issued Free			0	0	0	0	0	0
7th/Flower Sta.	Agent:	000000						
Sold			0	0	0	0	0	0
Issued Free			0	0	0	0	0	0

23. ENTERING PATRONAGE DATA REPORT

23-MAY-90 (Oper.) 13:30:38

UNION STATION

Start Time 0:00
End Time 13:30

FARE MEDIA TYPE

TIME	SNGL. TRIP	B/R MNTH. PASS	RGNL. MNTH. PASS	EMPL. PASS
12:35	0	0	0	0
12:36	0	0	0	0
12:37	0	0	0	0
12:38	0	0	0	0
12:39	0	0	0	0
12:40	0	0	0	0
12:42	0	0	0	0
12:44	0	0	0	0
12:46	0	0	0	0
12:48	0	0	0	0
12:50	0	0	0	0
12:52	0	0	0	0
12:54	0	0	0	0
12:56	0	0	0	0
12:58	0	0	0	0
13:00	0	0	0	0
13:02	0	0	0	0
13:04	0	0	0	0
13:10	0	0	0	0
13:12	0	0	0	0
13:14	0	0	0	0
13:16	0	0	0	0
13:22	100	25	10	5
13:24	100	25	10	5
13:26	100	25	10	5
13:28	100	25	10	5

24. PATRONAGE DATA
ORIGIN/DESTINATION REPORT
ONE-WAY PEAK

23-May-90 (Oper.) 13:31:74

CIVIC CENTER

Start Time 0:00
End Time 13:31

TIME	TO ZONE:	1	2	3	4	5
12:35		0	0	0	0	0
12:36		0	0	0	0	0
12:37		0	0	0	0	0
12:38		0	0	0	0	0
12:39		0	0	0	0	0
12:40		0	0	0	0	0
12:42		0	0	0	0	0
12:44		0	0	0	0	0
12:46		0	0	0	0	0
12:48		0	0	0	0	0
12:50		0	0	0	0	0
12:52		0	0	0	0	0
12:54		0	0	0	0	0
12:56		0	0	0	0	0
12:58		0	0	0	0	0
13:00		0	0	0	0	0
13:02		0	0	0	0	0
13:04		0	0	0	0	0
13:10		0	0	0	0	0
13:12		0	0	0	0	0
13:14		0	0	0	0	0
13:16		0	0	0	0	0
13:22		25	25	25	55	55
13:24		25	25	25	55	55
13:26		25	25	25	55	55
13:28		25	25	25	55	55

25. PATRONAGE DATA SPECIAL PROCESSING REPORT

23-May-90 (Oper.) 13:33:56

7th/FLOWER

Start Time 0:00
End Time 13:33

TIME	RAIL TO BUS	E&H	STUDENT	LRT TO MRT
12:35	9	5	4	10
12:36	9	5	4	10
12:37	9	5	4	10
12:38	9	5	4	10
12:39	9	5	4	10
12:40	9	5	4	10
12:42	9	5	4	10
12:44	9	5	4	10
12:46	9	5	4	10
12:48	9	5	4	10
12:50	9	5	4	10
12:52	9	5	4	10
12:54	9	5	4	10
12:56	9	5	4	10
12:58	9	5	4	10
13:00	9	5	4	10
13:02	9	5	4	10
13:04	9	5	4	10
13:10	9	5	4	10
13:12	9	5	4	10
13:14	9	5	4	10
13:16	9	5	4	10
13:22	0	0	0	0
13:24	0	0	0	0
13:26	0	0	0	0
13:28	0	0	0	0
13:30	0	0	0	0

26. WEEKLY PATRONAGE DATA SUMMARY REPORT

23-May-90 (Oper.) 13:52:54

UNION STATION

For the WEEK OF

Trip Type	Number of Passengers Entering	Number of Passengers Leaving
Number of single trip tickets	244	222
Number of bus/rail monthly passes	240	218
Number of regional monthly passes	236	214
Number of employee passes	230	208

27. MONTHLY PATRONAGE DATA SUMMARY REPORT

23-May-90 (Oper.) 13:53:02

UNION STATION

For the MONTH of 01-May-90 to 23-May-90

Trip Type	Number of Passengers Entering	Number of Passengers Leaving
Number of single trip tickets	732	666
Number of bus/rail monthly passes	720	654
Number of regional monthly passes	708	642
Number of employee passes	690	624

28. STATION AGENT REPORT

23-MAY-90 (Hrly.) 13:05:24

Start Time 12:00
End Time 13:35

Station	Agent No.	Start ---Shift---	End
7th/Flower	096321	12:37	
Wilshire/Alvarado			12:35

29. COMMUNICATION STATUS REPORT

23-MAY-90 (Oper.) 13:01:15

Station Z	NR	Station	State SR	Status --Interval &	Register Changes--
1	2	Union Station	1TT	1 (1)	3 (4)
1	3	Civic Center	1FF	1 (0)	2 (0)
1	4	5th/Hill	1FF	1 (0)	2 (0)
1	5	7th/Flower	1TT	1 (1)	2 (2)
1	6	Wilshire/Alvarado	1TT	1 (1)	2 (2)

Permit: T Stats: 8 Now: 781 Next Event: 59 Monitor: 0

SECTION 10

FARE MEDIA

TABLE OF CONTENTS

SECTION 10

FARE MEDIA

10.1 GENERAL

This Section specifies the requirements for Fare Media to be provided. The media shall be compatible with each item of fare collection equipment, as specified.

10.2 DESCRIPTION

The fare media shall be magnetically encoded tickets and passes.

10.3 FARE CLASSES

The fare classes (Reference: Section 2) shall be identified through the use of various fixed and variable encoded data, in addition to visual color coding and graphics.

10.4 TICKET/PASS TYPE DESCRIPTION

Ticket/pass types required to accommodate the fare classes are as follows:

A. Single-trip Ticket: A ticket which, when issued by a TVM, has its value calculated from station of issue to patron-selected destination, including options. Special-fare Single-trip Tickets are sold off-site only.

B. Bus/Rail Monthly Pass: A time value pass valid for travel between two specific zones, both regular and special-fare. Used on rail and all local and limited local bus service. Encoded by the CTEM for off-site sale only.

C. Regional Monthly Pass: A time value pass, both regular and special-fare, valid for travel anywhere on the SCRTD system. Encoded by the CTEM for off-site sale only.

D. Employee Pass: A time value pass, encoded by the CTEM and valid for travel anywhere on the SCRTD system.

E. Exit Card: A ticket encoded by the CTEM, carried by Station Agents, which shall allow a patron to

exit once at any fare barrier. An Exit Card is used in place of a lost ticket, or when an entry gate fails to return valid fare media.

F. Metro Rail (MRT) Exit Card: A ticket encoded by a Ticket Agent using the Booth Ticket Encoding Machine at the 7th/Flower Station. An MRT Exit Card allows entry into the 7th/Flower Metro Rail Station within a District-set time period (equivalent to a bus transfer time limit) and contains encoding which allows the patron to exit at a Metro Rail destination zone. It is given at no cost by a Ticket Agent in exchange for a printed LRT ticket.

10.5 PERFORMANCE REQUIREMENTS

The fare media shall provide a reliable and secure means to collect fares and minimize fraud and abuse.

10.5.1 Statistical Data

The media shall provide a reliable method of collecting and sorting out data related to number and classes of patrons, both systemwide and by mode; traffic patterns by time, zones, and modes; and all the statistical data relevant to the use of the system by patrons.

10.5.2 Single-trip Tickets

Regular-fare Single-trip Tickets and special-fare Single-trip Tickets shall withstand the following processing three times as a minimum before becoming magnetically or physically inefficient (invalid):

A. Initial encoding and reading for verification

B. Entry gate reading/encoding/reading for verification/printing

C. Exit gate reading/encoding/reading for verification/printing

D. TVM/AFM reading/encoding/reencoding/reading for verification

E. Repeat Exit gate reading/encoding/reading for verification/printing.

10.5.3 Time Value Passes

A. Bus/Rail Monthly Passes and Regional Monthly Passes shall withstand the above processing a minimum of

250 times before becoming magnetically or physically inefficient.

B. Employee Passes shall withstand a minimum of 2,000 uses without becoming magnetically or physically inefficient.

10.5.4 Ticket Usage Criteria

A. The surface finish and printing method shall permit the number of uses described above for each media type without deterioration or erasure of the printing.

B. Fare media shall withstand handling and containment in the pocket or purse with credit cards and personal effects without becoming damaged beyond gate readability or becoming magnetically corrupted.

C. Fare media shall not be affected by normal variations caused by humidity or temperature and shall withstand the following environmental considerations:

1. Temperature: 0° to 125°F

2. Relative Humidity: 10 to 100 percent including condensation.

10.6 DATA REQUIREMENTS

All of the magnetic code storage area, except a 1/4-in. space at both the leading edge end and trailing edge end, shall be capable of being encoded (written), decoded (read), and erased by means of read, write, and erase heads in fare media handling equipment.

10.6.1 Encoding

Encoded data as a minimum shall be as follows:

A. Fixed Data:

1. Discount codes

2. Security code

3. Single-trip Ticket flag (capture on exit).

B. Variable Data (may be altered by AFM or gates):

1. Station of entry

2. Time of entry

3. Bus transfer paid

4. Parity code

5. Time/date of last exit (passback control).

10.6.2 Printing

Printed data shall be as follows:

A. Zone(s) paid for

B. Bus transfer paid for

C. Peak fare

D. Ticket used for entry (symbol)

E. Time/date/remaining zones of valid bus or LRT transfer

F. Discount type (if any).

Each portion of printed data shall not overlap the area of another portion.

10.6.3 Description

The Contractor shall submit for approval a comprehensive Description and Analysis of Data Encoding Parameters relating to equipment furnished in the Contract that has a printing, encoding, or reading function. This analysis shall describe how the method meets the requirements to provide a reliable and secure means to collect fares, minimize fraud and abuse, and provide for collection of statistical data. (CDRL)

10.7 **MATERIAL AND FINISHES**

10.7.1 Ticket/Pass Materials

Disposable tickets and passes shall be provided for use on the Metro Rail system. A disposable ticket/pass is one that is not recycled by the District; it is either captured by the fare gate when no longer valid and disposed of by the District, or returned to and disposed of by the patron.

A. The Single-trip Ticket, Exit Card, and MRT Exit Card shall be made of paper stock treated to retard size variations from humidity or temperature changes and to improve wet strength and durability during handling. The surface shall accept ink from printing mechanisms within the TVMs, gates, CTEMs, and BTEMs. Paper opacity shall be such that detection of any orientation hole in gate consoles shall work reliably. The grain on the paper shall be in the direction of the long dimension of the ticket.

B. Plasticized paper shall be provided for Bus/Rail Monthly Passes and Regional Monthly Passes and shall meet the above requirements.

C. Employee Passes shall be of mylar or equivalent polyester.

10.7.2 Magnetic Material

One or more oxide stripes shall be located along the length of the top or bottom surface of the fare media. The location and number of the stripe(s) and their widths shall be in accordance with the fare media size and characteristics of the fare collection equipment. The ferromagnetic material of the stripe(s) shall be dispersed evenly on the fare media and the surface of the material shall be of sufficient nonabrasive quality to minimize magnetic head wear. The magnetic stripe(s) shall be black or brown in color. The material shall have a nominal intrinsic coercive force (magnetic strength) of 290 Oersted and shall be compatible with the magnetic heads of the ticket handling equipment.

10.7.3 Finish

A surface finish and other physical properties that permit the fare media to perform reliably in the fare collection equipment shall be provided. The finish of both sides of fare media shall have a consistent coefficient of friction to allow reliable handling in the equipment. The fare media edges, including corners, shall be smooth and free from burrs and shall be straight, square, and parallel. Fare media shall be free of holes, other than any required orientation hole, electrically conducting particles, slime spots or brittle areas, and shall not contain residual chemicals, fuzz, or loose dust. The fare media shall not contain creases. The fare media shall have a composition and/or finish so that, if exposed to an open flame and then removed, will self-extinquish. Materials and finish shall be nontoxic.

10.7.4 Graphics

Graphics for each of the fare media versions shall be District-approved. Tools, camera-ready artwork, and graphic materials necessary to produce complete printed and individually cut fare media or rolls of Single-trip Tickets ready for magnetic encoding shall be provided. Fare media shall be furnished printed with two colors on the face and a single color on the reverse side. Print and stock colors shall be approved. Each fare media shall contain identification letters and numbers identifying the type of media and the production run in which the media was produced. Each Bus/Rail Pass, Regional Pass, and Employee Pass shall be serialized with a six-digit number. Character size, style, and location of this number shall be subject to approval. No manufacturer's logo or name shall appear on the media. Fare media shall incorporate security features within the graphics to facilitate fraud detection. Method proposed to be employed for fraud detection shall be submitted for approval. (CDRL)

10.8 PHYSICAL REQUIREMENTS

10.8.1 Dimensions and Tolerances

A. Dimensions: All fare media shall be furnished in credit card size. Thickness shall be determined by Contractor to meet requirements of ticket handling equipment.

B. Tolerances shall be provided by the Contractor and shall be compatible with the equipment capabilities.

10.9 SUBMITTALS

10.9.1 Sample Approval and Testing

A. Full-size proofs of each version of fare media shall be submitted for approval prior to supplying samples. (CDRL)

B. A minimum of 100 samples of each fare media version specified shall be supplied. These samples shall be submitted for approval of graphics and general appearance. (CDRL)

C. Preproduction samples shall be produced to permit demonstration and testing of fare collection equipment. Quantities of each fare media version shall be established by the Contractor to provide adequate testing of equipment. Samples for

evaluation and approval shall be in addition to the quantities provided for testing. (CDRL)

D. Sufficient quantities of preproduction samples shall be tested in the first article fare collection equipment, to assure that the preproduction sample fare media is compatible with each item of the fare collection equipment. During the process of this evaluation and testing, signal quality standards and fare media testing and acceptance procedures shall be established. The sample tickets/passes used for this testing shall meet production standards, except in respect to final graphics.

10.9.2 Fare Media Specifications

Detailed specifications for fare media, including a list of names and addresses of at least three suppliers in the US who have furnished fare media of acceptable quality to US properties comparable to the District, shall be submitted. The specifications shall include sufficient detail to permit the District to procure future supplies of fare media by the competitive bidding process to a standard that will ensure compatibility with the fare collection equipment. (CDRL)

A. Material: The specification for material shall include parameters for the following:

1. Basic weight
2. Bursting strength and tear resistance
3. Stiffness
4. Coefficient of friction
5. Grain
6. Curl/flatness/curvature
7. Dimensional changes for variations in relative humidity and temperature
8. Color
9. Paper opacity
10. Preferred manufacturing method
11. Static electrical properties

12. Adhesive force between stacked media.

B. Magnetic Stripe: The specification for the magnetic stripe shall include, in addition to dimensional and tolerance figures, properties of the deposited oxide or ink, including residual magnetic flux and saturation-erased noise levels, abrasion resistance, and criteria for adhesion and surface projection.

C. Signal Standards: The specification shall contain signal standards and testing procedures that ensure consistent quality of magnetic fare media for satisfactory operation in the fare collection equipment.

10.10 PRODUCTION FARE MEDIA

Fare media shall be supplied demagnetized and free of magnetic encoding. Delivery and packaging shall be as determined by the District.

END OF SECTION

SECTION 11

TICKET ENCODING MACHINES

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SECTION 11

TICKET ENCODING MACHINES

11.1 GENERAL

This Section specifies the requirements for the Central Ticket Encoding Machine (CTEM) and the Booth Ticket Encoding Machine (BTEM) to be furnished and installed. The CTEM shall be installed at a District facility and the BTEM shall be installed in the ticket booth at the 7th/Flower Station.

11.2 CENTRAL TICKET ENCODING MACHINE

11.2.1 Description

The purpose of the CTEM is to encode all Metro Rail tickets and passes that will be sold at off-site locations.

A. Functions: The CTEM shall provide high-speed printing and encoding of fixed and variable data onto the magnetic stripe of the fare media, as specified (Reference: Section 10). The CTEM shall automatically feed, encode, print, and stack the fare media for distribution.

B. Components: The CTEM shall be modular in construction and shall be comprised of the following modules:

1. Input feeder
2. Output stacker/cartridge
3. Reject stacker
4. Ticket handler
5. Ticket guillotine (for roll-fed stock)
6. Electronic unit.

C. Operating Sequence: The CTEM shall automatically feed the stock from either an input hopper or be roll-fed past a single magnetic write head, a single magnetic read head, a printer, and diverters to either the output stacker/cartridge or to a reject stacker.

The equipment operator will program the data to be encoded and printed by keying it into the CTEM menu. The CTEM shall accept tickets in either roll form or cut to size. The CTEM shall be programmable to process any quantity of tickets in a given stack and run. The CTEM shall also accept plastic time value passes cut to size. It shall also read, sort, and verify previously encoded tickets/passes.

11.2.2 Performance Requirements

The equipment shall meet or exceed the performance requirements, as specified.

A. General Functions and Capabilities:

1. The CTEM shall continuously feed, magnetically encode, verify, print, stack, and audit at a rate of not less than 7,000 tickets or passes/hr.

2. Fare media that are encoded singly shall be encoded and printed within 2 sec.

3. The CTEM shall accept stock that has been cut to size and stacked, ticket stock in roll form, and manually fed individual tickets and passes.

4. The CTEM shall magnetically encode the required data on a single data track on the magnetic stripe. The program card that is fed into the CTEM prior to encoding shall define the specific data that is to be encoded. The density of data recorded shall not exceed 64 bits/in. The CTEM shall verify that the magnetic signal strength is at a level greater than is required for the fare media to be read successfully by any applicable piece of fare collection equipment in the system, as specified (Reference: Section 10).

5. The CTEM shall provide complete accountability for all operations and provide registers and a printout for auditing purposes. Also, it shall be able to communicate with the FCCC for central accounting and data gathering functions, as specified (Reference: Section 9).

6. The CTEM shall include detection capabilities to sense a jam, a cartridge or stacker overflow, and an empty stock supply. The transport handling components shall stop upon the detec-

tion of any one of these conditions and require action by the operator to be restarted.

7. The CTEM shall function in the environmental conditions, as specified (Reference: Section 2).

8. A self-contained power source shall be provided to maintain memory for 100 hr minimum in the event of power interruption.

B. Input Feeder:

1. The input feeder device shall have a stack capacity of not fewer than 1,000 tickets/passes or a stack roll capacity of not fewer than 2,000 tickets.

2. Uninterruptible feeding shall be provided while additional stock supplies are loaded. If a roll feed is furnished, then accommodation for a second roll shall be provided which automatically switches over to supply stock when the first roll is depleted. Sensors shall be provided to detect when the ticket supply is empty, and shall cause the equipment to shut off.

C. Output Stacker:

1. The CTEM shall have at least one output stacker with a capacity of not fewer than 1,000 tickets or passes. The stacker shall stack tickets with same-face orientation as they are received from the input feeder. Cartridges may be supplied instead of a stacker and shall be loaded automatically, one at a time, with each cartridge having a capacity of at least 100 tickets or passes.

2. The removal of fare media from the CTEM shall be possible while stacking is in progress. A sensor shall be provided to detect when the stacker is full and shall cause the equipment to shut off.

3. Cartridges, if used, shall be easily mounted to and detached from an output fixture without the use of tools.

D. Reject Stacker:

1. The reject stacker shall have a capacity of not fewer than 100 units to receive items that are rejected as improperly encoded.

2. Rejected items shall be counted on a separate register. Three successive rejections shall result in a malfunction detection, except when the CTEM is in the read/sort mode. A sensor shall be provided to detect when the reject stacker is full and shall cause the equipment to shut down.

E. Ticket Handler and Printing:

1. The printing mechanism shall not print the visual data in any manner or location on the stock that would affect the magnetically encoded data. There shall be conformity between printed data and encoded magnetic data. The printing ink shall be suitable for clear definition and fast drying on the surface used. The print shall not fade over a 6-mo period if exposed to dampness or sunlight. Printing shall conform to the specified requirements (Reference: Section 10).

2. The handler shall prevent simultaneous double feed or detect if more than one ticket has been simultaneously fed from the input feeder. Either condition shall cause the feeding operation to cease and result in malfunction detection.

3. If an orientation hole is utilized, the handler's sensor shall detect media without the hole and initiate a malfunction procedure.

4. The handler's drive mechanism shall not adversely affect the magnetic material or the data recorded on the data track.

F. Ticket Guillotine: Roll-fed media shall be cut to the correct length, as specified (Reference: Section 10).

G. Logic:

1. The logic shall control all functions of feeding, encoding, verification, printing, stacking or loading cartridges, jam detection,

program loading registration, and audit printing.

2. The logic shall consist of a removable assembly held in place with quick release fasteners and with plug connectors for input and output signals. The disassembly shall incorporate separately pluggable, printed circuit boards containing discrete functions.

H. Audit Requirements:

1. Registers: A nonresettable, tamperproof, electromechanical six-digit register with electrical readout shall be provided that continuously accumulates the total number of tickets and passes encoded. In addition, resettable electronic registers of six digits each with electronic readouts shall accumulate the following:

   a. Number of tickets and passes encoded successfully and processed into the output stacker, or cartridges, by type of fare media, by run.

   b. Value of tickets and passes processed, by type, by run.

2. Clock: A clock shall be incorporated in the CTEM and the time shall be recorded with each register readout, including the elapsed time for each run. The time of day shall be expressed to the nearest minute on a 24-hr basis and elapsed time in 0.1-hr increments. Clock shall be capable of being reset.

3. Output Interface: A port in the cabinet with RS-232-C receptacle shall be provided to permit remote readout of the registers for audit purposes.

4. Printouts: The following printouts shall be provided upon command:

   a. Audit ticket printed at the start of each run. It shall portray the following:

      1) Current register readings

2) Time of start; two digits each for year (yy), month (mm), date (dd), hour (hh), and minute (mm)

3) Operator's identifier

4) All other data keyed in.

b. Audit ticket printed at the end of each run. It shall provide the following:

1) Final register readings

2) Time at end (yy, mm, dd, hh, mm)

3) Elapsed time (hh, mm)

4) Operator's identifier

5) All other data keyed in

6) Number and value of all tickets and passes produced

7) Registration numbers of fare media.

5. Data Retention: Upon the completion of a run and after the final audit ticket has been printed, all stored data, except data on the registers, shall be erased.

I. Maintenance Panel: A maintenance panel shall be provided that contains controls and indicators to assist the maintenance personnel with trouble-shooting and fault identification. The panel shall include means to check voltage levels, monitor verification data read back from the tickets, and other applicable general requirements, as specified (Reference: Section 2).

J. Electrical Power: The electrical requirements shall be provided, as specified (Reference: Section 2).

11.2.3 Physical Requirements

A. Materials:

1. Materials shall be as specified (Reference: Section 16) except for the encoder magnetic heads.

2. The CTEM magnetic heads shall be of ceramic construction or of a material with equal long-life wear characteristics, as approved by the District.

B. Dimensions: Overall dimensions shall not exceed 66 in. in height, 68 in. in length, and 36 in. in depth. All controls, indicators, stackers, and hoppers shall be located 30 in. minimum above the floor.

C. Nameplates: Nameplates shall be designed and permanently attached to each CTEM cabinet, as specified (Reference: Section 2).

D. Field Disassembly: Modules that require frequent replacement in the field shall be provided with quick disconnect fasteners.

E. Finish: There shall be no sharp edges, corners, or protrusions on the exterior cabinetry of the CTEM. The finish shall be as specified (Reference: Section 16).

11.3 BOOTH TICKET ENCODING MACHINE

The following Articles specify the requirements for the BTEM to be furnished and installed.

11.3.1 Description

The purpose of the BTEM is to encode and print data on an MRT Exit Card which will allow an LRT patron to enter the Metro Rail System at the 7th/Flower Station and exit at a Metro Rail destination zone, with or without a rail-to-bus transfer. The Ticket Agent at the ticket booth in the 7th/Flower Station will exchange the MRT Exit Card for a valid LRT ticket on which the correct Metro Rail destination and choice of transfer option has been printed.

11.3.2 Performance Requirements

A. MRT Exit Cards shall be encoded by the BTEM and shall perform in all Metro Rail fare collection equipment exactly the same as Single-trip Tickets issued from TVMs.

B. The Ticket Agent interface with the BTEM shall be via keyboard inputs.

C. The BTEM ticket issue cycle shall not exceed 2 sec after the appropriate keyboard control button(s) has been activated.

D. Data to be encoded on MRT Exit Cards shall be as follows, as a minimum:

1. Media type
2. Number of zones
3. Date and time
4. Serial number
5. Valid entry/exit code
6. Destination zone
7. Exit code.

E. The following information, as a minimum, shall be printed on MRT Exit Cards:

1. Media type
2. Zone to zone
3. Date and time
4. Serial number.
5. Rail-to-bus transfer.

F. The BTEM shall be able to display, to the Ticket Agent, data encoded in readable English letters and Arabic numerals. Display shall time out in 30 sec or initiation of next operation, whichever occurs first.

G. The electrical interface/requirements, including auxiliary power, shall be as specified (Reference: Section 2).

H. The interface with the SFCCU shall be via an RS-232-C interface. Responses to interrogation shall be as specified (Reference: Sections 8 and 9).

I. Full accountability of tickets issued shall be provided.

J. Control logic shall be provided as specified (Reference: Section 2) and shall include acting upon the following input control functions and responses as a minimum:

1. Inputs:

- o Keyboard activation
- o Interrogation request from SFCCU
- o Clock synchronization from SFCCU
- o Fare table downloaded from SFCCU
- o Power ON from SFCCU
- o Power OFF from SFCCU
- o Reset.

2. Responses: The logic shall respond as follows:

- o Display data
- o Encode, print, check read
- o Cancel transaction
- o Repeat a transaction
- o Not In Service
- o In Service
- o Detect and display faults
- o Accumulate data (tickets issued)
- o Transmit status and register data on request
- o Respond to control signals.

K. The dimensions and location of the keyboard, controls, indications, and displays shall be submitted to the District for approval. (CDRL)

11.4 SECURITY

Security features shall be incorporated in the CTEM/BTEM to ensure that each item encoded is accounted for and access is limited to authorized personnel. All covers shall be secured with a key-operated lock, as specified (Reference: Section 2).

11.5 SUBMITTALS

11.5.1 Encoding and Verification Specification

A specification shall be provided defining the standards of encoding and the basis of verification. This document shall reference representative encoded fare media from other properties. Typical examples shall be supplied to the District. The extent of acceptable deviations in encoding quality due to wear and usage shall be defined. The document shall contain sufficient

information to enable the maintenance staff to verify that MRT Exit Cards are being encoded at a quality level adequate to permit reading in all TVMs, AFMs, PACs, and gates in the Metro Rail System. (CDRL)

11.5.2 Software

The software design, including any self-diagnostic and test software for the CTEM/BTEM shall be provided for review and approval. (CDRL)

END OF SECTION

SECTION 12

REVENUE CART

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SECTION 12

REVENUE CART

12.1 GENERAL

This Section specifies the requirements for Revenue Carts to be furnished.

12.2 DESCRIPTION

The purpose of the revenue cart is to transfer items listed below to and from Central Cash Counting and the mezzanine level of the Metro Rail stations via a revenue transport vehicle (armored truck).

The revenue cart shall be capable of being pushed/pulled by one person. It shall be a four-wheeled vehicle that contains a coin vault into which contents of an OCC are dumped and which can be loaded with the following in a secure, enclosed manner:

A. Empty and/or full bill stackers

B. Empty and/or full CRCs to/from the TVMs and AFMs.

C. Ticket replenishment stock

D. Space for discarded, captured, and invalidated fare media.

12.3 DESIGN CRITERIA

12.3.1 Performance Requirements

The cart shall be capable of performing the following:

A. Negotiate a 3-in. horizontal gap with a vertical height differential of ±1 in.

B. Stop, by braking, within a distance of 2 ft from a velocity of 3 mi/hr, while fully loaded on a level surface.

C. Hold, by set brakes, on an inclined floor of 6 percent grade, while fully loaded.

D. Interface with a conveyor belt mechanism at CCC that provides for the contents in the cart vault to be released through an opening in the bottom of the cart onto the belt.

E. Started, stopped, and maneuvered, while fully loaded, by an average person without unreasonable effort. The maximum operator thrust to start a fully loaded cart on a level, normal surface shall be no more than 30 lb when the wheels are in line with the thrust. Maneuverability shall permit entry and removal from revenue transport vehicles as well as access to the elevators and escalators specified in MOS-1 Metro Rail stations without unreasonable effort.

F. Function in the environmental conditions specified (Reference: Section 2).

G. Negotiate an escalator rise angle of 30 degrees maximum without tipping over, due to sudden starting or stopping of the escalator.

H. A fully loaded cart shall be able to withstand a drop of 3 ft on any corner onto a concrete surface without failure of any function or component.

12.3.2 Configuration and Functional Requirements

A. Cart Capacity: The cart shall be equipped with individual cell-type compartments with capacity for the following, as a minimum:

1. One coin vault

2. 16 bill stackers

3. Six CRC containers

4. Six ticket rolls or 12 cartridges.

B. Cart Handle: The cart handle shall be a spring-action push or pull type, which shall act as a "deadman" brake actuator when released.

C. Cart Wheels and Stationary Foot: Each revenue cart shall have four pneumatic wheels and one stationary foot. Wheels shall caster 360 degrees; those below the cart handle shall be lockable into a fore-and-aft position. The swivels and axles shall have sealed ball bearings. Each wheel shall have a 700-lb minimum load capacity. Tires shall be

demountable. The stationary foot shall be of rigid construction to allow it to balance the cart on escalator steps without bending or buckling. The shape of the foot shall be such that it rests on the edge of the step that the cart straddles to provide cart stability while the escalator is in motion.

D. Cart Brakes: Brakes shall be the direct wheel-contact type, actuated by the cart handle.

E. Cart Compartments: The compartments shall be compatible and interface correctly with the items specified. Each compartment shall safely and securely hold and allow easy access to each item transported. Also, these items shall be removable from the cart without the use of tools. The arrangement of the compartments on the cart shall be such that the resultant force of a fully loaded cart shall not exceed 500 lb over either the front or back set of wheels in any situation, including transport on the escalator. The compartment dividers shall provide a cell-like effect to assure stiffness and resistance to bending and twisting and shall divide the internal volume to secure and support the intended loads with maximum convenience for the servicing person. Compartments, into which the fare collection equipment items are to be placed, shall be held in place by supports that mate with the transported item's supporting flanges. Each compartment shall conform in size to every other compartment intended to hold an identical piece of equipment. The sides of the compartments shall be in vertical alignment whenever possible. Access to the compartments shall be through lockable doors, whose frames shall be gasketed to protect the contents from inclement weather.

F. Coin Vault: The coin vault shall contain a receiver, such that insertion and emptying of an OCC shall be accommodated without exposure of its contents. The vault shall be designed such that its contents shall be completely dumped through an opening at the bottom of the cart located and dimensioned as indicated. The coin vault shall be able to securely hold not fewer than 60 lb of coins of mixed denomination. The transferring of the contents of an OCC into the coin vault shall take no more than 8 sec per transaction.

G. Bumpers: A wraparound, resilient nonmetallic bumper shall be provided to prevent damage to vertical surfaces from impact with the metallic exterior of the cart. Bumpers shall be detachable and replaceable.

H. Dimensions and Weight: Overall cart dimensions shall not exceed 40 in. in height, 36 in. in length, and 28 in. in width. Compartment dimensions shall be such that those items outlined herein shall be contained within the cart in a secure manner. A full revenue cart shall not exceed a maximum total loaded weight of 600 lb, including the weight of the cart.

12.3.3 Materials and Fabrication Requirements

A. Materials: The cart and compartments shall be of welded steel construction and shall be corrosion-resistant and fire-resistant.

B. Finish: The cart's exterior shall be smooth, free of rust, scale, pitch, abrasion, buckles, and other imperfections. Welds shall be ground smooth and sharp edges and corners shall be rounded or chamfered. Interior and exterior edges shall not be hazardous to personnel. The cart shall be coated with a baked enamel finish or approved equivalent and shall be a color chosen by the District.

C. Marking: Each cart shall be permanently marked with the Contract number, cart number, month and year of manufacture, and the manufacturer's name or trademark so that the supply source can be determined.

D. Graphics: Each cart shall be numbered with a three-digit designation at two locations, as indicated. Numbers shall be 2 in. in height.

12.4 SECURITY

Security features shall be incorporated to ensure that access to the contents of the cart is limited to authorized personnel. Doors shall be securely closed with key-operated locks. Keying shall be as indicated (Reference: Section 2). The coin vault's collection chamber shall be accessed through authorized security key engagement only at Central Cash Counting. The coin vault's receiver shall have an interlock door action for container transfer. Removal action shall automatically

close and lock the opening to the coin chute as well as the container opening.

12.5 SUBMITTALS

12.5.1 Weight and Load Analysis

A Weight and Load Analysis (CDRL) shall be submitted. The calculations shall provide data reflecting load distribution and weight limitations, as specified, and are subject to approval by the District.

12.5.2 Cart Configuration

The configuration of the cart, including location and arrangement of access doors, shall be submitted for approval. (CDRL)

END OF SECTION

SECTION 13

TEST EQUIPMENT

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SECTION 13

TEST EQUIPMENT

13.1 GENERAL

13.1.1 Scope

This Section specifies the Test Equipment and tools to be supplied to support the Fare Collection system maintenance activities. The items to be provided include portable test equipment, shop test equipment, support documentation required to operate and maintain the test equipment, and special tools.

13.1.2 Design Criteria

A. The portable test equipment shall be designed and constructed to perform reliably in the transit station environment, as indicated (Reference: Section 2). The equipment shall be resistant to vibration stresses resulting from transportation of the equipment.

B. The shop test equipment, including programming apparatus, shall be designed to perform reliably in the transit shop environment.

13.1.3 Cited References

Organization	Number	Title
EIA	RS-232-C	Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange
IEEE	488	Digital Interface for Programmable Instrumentation

13.2 PORTABLE TEST EQUIPMENT

13.2.1 Functional Requirements

A. Portable test equipment shall be designed to support the equipment's internal diagnostic circuits and to be carried by field maintenance personnel for the purpose of assisting in the

testing and fault-diagnosis of the fare collection equipment. Controls and displays located either in the portable test equipment or the equipment being tested shall be used to operate equipment subassemblies, simulate all functions, and to perform cycling operation on the equipment's subassemblies.

B. Data transmission and reception test equipment shall be provided to both simulate and verify data inputs and outputs for the equipment in the Fare Collection system.

C. The portable test equipment shall be designed with the following requirements as a minimum:

1. Not more than two multipin connectors shall be provided for making connections to the subassembly under test.

2. The use of a portable test device shall not require removal or disconnection of any component, printed circuit board, wire chassis, terminal, or cable in order to perform troubleshooting, calibration, maintenance, or test procedures.

3. The test device shall produce the operating commands and other input signals necessary to exercise all functions and components of the particular equipment or subassembly under test.

4. The test device shall measure or indicate all signals, responses, and outputs of a properly functioning subassembly by means of lamps, meters, oscilloscopes, gauges, or other approved means.

5. The user shall be able to check out the equipment being tested and to locate and replace any removable subassembly that has failed by following the test device operating instructions.

6. Indicators and input signal generators shall be built into the test device to the maximum extent possible.

7. The test equipment shall have an accuracy commensurate with the tolerances built into the equipment being tested.

8. Power for the test equipment shall be derived from a 120 V ac, 60 Hz source or from the

equipment being tested when the power required is contained in the multipin connectors used for testing.

13.2.2 Physical Requirements

The portable test equipment shall be housed in an enclosure with a removable cover. The weight shall not exceed 30 lb unless otherwise approved. Except for the power connection and connection to subassembly under test, no connections to other apparatus will be allowed, unless approved.

13.3 SHOP TEST EQUIPMENT

13.3.1 General Requirements

A. Test equipment shall have the capability to test, calibrate, and program the fare collection equipment such that its performance is equal to that attainable by the manufacturer.

B. Test equipment shall include the capability of setting input levels and making connections between the equipment under test and the appropriate power supplies, input signal generating devices, and output signal and response measuring devices. The test equipment shall be such that equipment calibrated may be placed into service without need for additional calibration.

C. Bench test units shall not occupy a floor area greater than 300 ft^2.

D. The shop test equipment includes bench test equipment, printed circuit board testers, programming equipment, and special tools, as specified.

13.3.2 Special Tools

Special tools, other than standard tools, shall be supplied. They shall include portable test equipment and devices required for alignment and calibration of mechanical subassemblies.

13.3.3 Bench Test Equipment

Bench test devices, other than the standard equipment described, shall be supplied for the purpose of operating, testing, troubleshooting, aligning, and calibrating electronic and mechanical subassemblies in the fare collection equipment.

13.3.4 Printed Circuit Board Testing

A. The equipment shall be designed to be tested using District automatic test equipment. The District utilizes the Beaver-Major MDS Model EM57900, manufactured by ATE Systems, Inc., to perform automatic assembly and circuit board testing to the component level.

B. Modular construction shall be used in all circuit boards, major components, and test points provided to ensure compatibility with the automatic test equipment.

Two approved sets of test fixtures and software shall be furnished to support test requirements outlined below. Flow charts, test points, pictorial diagrams, schematics, and operating procedures shall be provided for circuit boards containing active components to permit fault diagnosis to the component level.

1. Provide a fully automatic test capability to component level using the Beaver-Major if more than 500 assemblies or circuit boards containing active components (including spares) of the same type will be used on the 18-mi line.

2. For all other assemblies or circuit boards containing active components, provide one of the following alternatives:

   a. A built-in diagnostic capability to detect faults to the LLRU or circuit board level

   b. Test equipment (hardware, software, fixtures, and documentation) capable of diagnosing faults to at least circuit board level, with two sets of software, fixtures, and documentation

   c. Two sets of test fixtures and software capable of performing a functional and diagnostic test using the District Automatic Test Equipment, with interface accomplished via the connectors on the assembly or circuit board.

C. Provide technical assistance to the District, on an as-needed basis, to facilitate District development of further fault diagnostic and test equipment. Such assistance shall include clarification of flow charts and component characteristics.

13.3.5 EPROM and PROM Programming Equipment

Equipment shall be provided that will perform programming of PROMs and initial and reprogramming of EPROMs. Equipment shall interface with data from a computer (NIC) that can be downloaded into the PROMs and EPROMs and verified. RS-232-C interface shall be provided.

13.4 TEST EQUIPMENT DOCUMENTATION

13.4.1 Drawings and Manuals (CDRL)

Portable and bench test equipment shall be accompanied by drawings and manuals prepared in accordance with the format indicated (Reference: Section 21). Manuals accompanying commercially manufactured equipment may be acceptable, subject to approval.

13.4.2 Accessories (CDRL)

Documentation shall be provided for operation and use of accessories required for test devices and adaptors and shall include the following, as a minimum:

A. Complete diagrams, schematics, assembly and construction drawings/sketches, and maintenance and calibration instructions for the device

B. Complete maintenance, calibration, and troubleshooting procedures for the associated subassembly and its circuit boards, written around use of the test device

C. Special tools, gauges, and other required accessories to interface with the fare collection subassembly connections.

13.5 STANDARD TEST EQUIPMENT AND TOOLS LIST (CDRL)

A list of additional standard support equipment required to operate and maintain the equipment shall be provided. Standard support equipment includes equipment or tools that are commercially available from three identified potential sources. The list shall include necessary equipment and tools, such as: oscilloscopes, function generators, power supplies, multimeters, and tools for electrical, electronic, and mechanical maintenance.

END OF SECTION

SECTION 14

FILLER PANELS

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SECTION 14

FILLER PANELS

14.1 GENERAL

This Section specifies the requirements for Filler Panels to be furnished and installed. The purpose of the filler panels is to enclose empty spaces in ticket vending and add fare arrays where fare collection equipment may be installed in the future. Filler panels shall be designed to be removable for reinstallation at another location.

14.2 DESIGN REQUIREMENTS

Panels shall be constructed of stainless steel and shall have a brushed finish, as specified (Reference: Section 16).

The panels provided shall include supporting structure, base channel, installation angle, graphic panel (where required), and mounting hardware, as indicated:

Type	Description
1	4 ft by 6 ft with no cutout or graphic panel
2	4 ft by 6 ft with cutout and graphic panel
3	2 ft by 6 ft with no cutout or graphic panel

Each panel shall withstand a force of 200 lb applied over a 12 in.^{2} area at any location without permanent deformation.

14.3 INTERFACE REQUIREMENTS

Filler panels, including graphics panels, shall be provided at vending arrays where indicated. Use of the cutout area has not yet been determined. Possibilities are use of the graphics panels as backup for graphic card inserts (advertisements, public announcements, patron messages/instructions), and replacement of the graphics panels with a brochure case or bus route rack, all to be furnished and installed by the District.

14.4 REQUIREMENTS BY INDIVIDUAL STATIONS

Tables defining filler panel requirements by station location are included in Appendix SP-B.

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SECTION 15

FENCING

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SECTION 15

FENCING

15.1 GENERAL

This Section specifies the requirements for Fencing to be furnished and installed. Fencing is used in association with gates to separate the paid area from the free area of the station and to channel patrons through the fare collection array.

15.2 PHYSICAL REQUIREMENTS

15.2.1 Materials

Fencing shall be constructed of stainless steel tubing and shall have a finish as specified (Reference: Section 16).

15.2.2 Design

A. The fencing shall be designed and constructed, as indicated.

B. Each fence module shall be designed to withstand a horizontal impact force of 200 lb and a downward force equivalent to a 200-lb weight dropped from a height of 2 ft over any 6-in. portion of the top horizontal member of the module without permanent deformation. This requirement applies to free-standing and installed conditions.

C. Other fencing design systems which provide essentially the same appearance, and which comply with the Technical Provisions herein, may be proposed by the Contractor, for approval.

15.2.3 Hardware

Connecting hardware between individual fence modules, between fence modules and gateposts, and between fence modules and station structure shall be provided. Hardware shall be as specified (Reference: Section 16).

15.3 INTERFACE REQUIREMENTS

15.3.1 Interfaces With Structure

Typical station interface requirements for station walls and floors shall be as indicated.

15.3.2 Interfaces With Equipment

Interface requirements between the fence and each type of gate equipment shall be as indicated.

15.4 REQUIREMENTS BY INDIVIDUAL STATION ARRAYS

The fencing at each station shall be as indicated (Reference: Contract Drawings).

END OF SECTION

SECTION 16

COMPONENT DESIGN AND FABRICATION

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SECTION 16

COMPONENT DESIGN AND FABRICATION

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SECTION 16

COMPONENT DESIGN AND FABRICATION

16.1 GENERAL

This Section specifies the Design and Fabrication requirements for the fare collection equipment components. Description includes materials applicable to equipment specified in other sections. Products shall be new, free from defects impairing performance, durability, or appearance.

Cited References:

Organization	Number	Title
ANSI	As applicable	As applicable
ASTM	A36	Structural Steel
ASTM	A167	Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM	A269	Stainless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM	A366	Commercial Quality Cold-Rolled Sheet Carbon Steel
ASTM	A480	Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM	A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM	B33	Tinned Soft or Annealed Copper Wire for Electrical Purposes
ASTM	B172	Rope-Lay-Stranded Copper Conductors having Bunch-Stranded Members, for Electrical Conductors

ASTM	B174	Bunch-Stranded Copper Conductors for Electrical Conductors
ASTM	D704	Melamine-Formaldehyde Molding Compounds
AWS	D1.1	Structural Welding Code
IPC	As applicable	As applicable
NEMA	LI-1	Industrial Laminated Thermosetting Products
U.S.	FS TT-S-227	Sealing Compound, Rubber Base Two Component
U.S.	FS TT-S-230	Conductors Synthetic-Rubber Base, Single Component, Chemical Curing
U.S.	MIL-R-5757	Electromagnetic Relay Terminal, Lug and Splice, Crimp-Style Copper
U.S.	MIL-T-7928	Terminal, Lug and Splice, Crimp-Style Copper
U.S.	MIL-STD-275	Printed Wiring for Electrical Equipment
U.S.	MIL-STD-1472	Human Engineering Design Criteria for Military Systems
U.S.	MS 25036	Terminal, Lug, Crimp Style, Copper, Insulated, Ring Tongue, Bell Mounted, Type II, Class I

16.2 COMPONENT DESIGN REQUIREMENTS

16.2.1 Interchangeability

Assemblies, modules, and components that perform identical functions shall be mechanically and electrically interchangeable. Keying shall be utilized for replaceable modules to prevent inadvertant placement in incorrect locations. Standardized, commercially available components shall be used wherever possible, particularly for items that require replacement at predictable cycle or time intervals.

16.2.2 Modular Design

Modular design shall be employed throughout the equipment. Modular design is defined as packaging electrical and mechanical components together, in replaceable subassemblies, according to the logical function which they perform, and using standardized dimensions and components to achieve flexibility in use.

16.2.3 Design and Construction

The design and construction of equipment shall be such that routine maintenance, including servicing, repair, replacement, and most major repairs, can be performed by District personnel in District maintenance facilities. Replaceable and repairable modules and subassemblies shall be used to simplify troubleshooting and reduce downtime. The capability to repair equipment in-place with simple standard tools, except security provisions, shall be incorporated into the design to the maximum extent possible.

A. Roll-out Slides: Rack-mounted assemblies that must be removed for shop maintenance shall not weigh more than 50 lb. Assemblies weighing 15 lb or more, which are to be serviced in the operating equipment enclosure, shall be provided with roll-out slides or hinges or handles so that they may be pulled out without lifting. Slides shall be capable of locking the assembly into the test or maintenance position required.

B. Plug-in Units: Components or subassemblies requiring removal for preventive maintenance or replacement shall be plug-in type units or units that require the insertion of a plug(s) into the subassembly.

C. Work Positions: Assemblies and subassemblies shall be designed to allow handling in various work positions without damaging components and without affecting adjustments.

D. Designations: Assemblies, subassemblies, and modules shall be designated by appropriate part number.

16.2.4 Accessibility

Subassemblies and modules shall be accessible for testing or replacement. If removal of components or

subassemblies is required, such components and subassemblies shall be of the plug-in type.

16.2.5 Test Points

Test points shall be provided for troubleshooting and routine maintenance. Selected test points essential for checks while in service shall be terminated at an accessible test panel.

Test points shall be accessible when equipment is opened or oriented in the maintenance position.

Test points shall be capable of accepting probes and connectors used with standard testing equipment, such as voltmeters and oscilloscopes, except where special test equipment and connectors, approved by the District and provided by the Contractor, are required. Access to test points shall not expose personnel to voltage terminals presenting potential hazard to life.

16.3 ELECTRICAL AND ELECTRONIC COMPONENTS

16.3.1 Semiconductor Devices

Semiconductor devices, unless otherwise approved, shall have a JEDEC number and shall be available from more than one manufacturer. Semiconductor devices shall be used within their published ratings and the maximum recommended operating power shall be at least 1.25 times the actual operating power. Integrated circuits shall be protected against overvoltage noise and turn-on/turn-off overshoots in the designed installation.

16.3.2 Resistors

Resistors shall be rated to dissipate a minimum of twice the maximum power that they shall be required to dissipate in operation, including temperature compensation.

16.3.3 Capacitors

Capacitors shall have a maximum tolerance of plus or minus 20 percent. Capacitors shall be rated for transients at least twice the maximum peak voltage that they will be subjected to in normal operation. Capacitors shall not be applied at continuous voltages greater than 80 percent of rated working voltages.

16.3.4 Inductors

Inductors shall have vacuum-impregnated windings. Inductors shall be rated to withstand a minimum of twice the maximum peak-to-peak voltage that they will be subjected to in operation. The temperature class shall not be less than 150°C.

16.3.5 Transformers

Transformers shall have vacuum-impregnated windings. Minimum interwinding breakdown voltage shall be 600 V dc. Transformers shall not emit audible noise in excess of 60 dBA at a distance of 2 ft while operating at rated voltage and load. The temperature class shall not be less than 150°C.

16.3.6 Printed Circuit (PC) Boards

PC boards shall be of glass epoxy construction and shall meet the requirements of NEMA Grade FR-4 per NEMA Pub. LI-1 and shall have a nominal thickness of 0.063 in. PC boards shall have circuits formed by etching. Conductor material shall be copper. The thickness and width of the conductors shall be determined on the basis of the current carrying capacity and reliability.

A. MIL-STD-275, Figure 1, shall be used as a reference. The minimum conductor width shall be per MIL-STD-275 and the minimum conductor thickness shall be 0.002 in.

B. PC boards and components shall be covered with a conformal coating between 0.003- and 0.007-in. thick. Test points and indicator lights shall be provided at visible and accessible places of each PC board for necessary maintenance and trouble-shooting. Sample quantity and functional test selection shall be subject to approval.

C. Edge connectors and PC boards shall be keyed to prevent the insertion of a board in the wrong position, mounted for ease of board removal, replacement, and for use of board extenders.

D. Edge connectors shall have gold or approved equal plating of at least 0.0005-in. thick.

E. Modifications: Modifications to existing manufactured printed circuit board assemblies shall be subject to approval and shall meet applicable IPC Standards.

F. Interfaces which shall be accommodated are as follows:

1. RS-232-C for all serial interfaces

2. EIA STD-488 for all programmable external instrumentation

3. Data transmission rate of 9600 baud

4. Logic and analog circuit testing range from 100 microV to 100 V

5. Dual internal thresholding capability on all lines from 0 to +10 V in 100-mV steps

6. High-speed serial conditioning digital patterns to 1 MHz rates by 256 bits long and broadside arrays to 64 pins wide

7. Storage capacity for 790 individual tests without media reload

8. Unit test program loading into RAM via 3-1/2-in. floppy disk

9. Interactive intelligent terminal programming, using a combination of English language and standard electronic engineering terms.

G. Integrated circuit packages with more than 24 pins shall be mounted in sockets and not soldered directly to the printed circuit boards. Sockets with a circular internal cross section shall be the preferred choice.

H. Integrated circuits containing microprocessor firmware shall be mounted in sockets to permit removal for reprogramming. The integrated circuits shall be positively identified with the configuration revision of embedded software. The microprocessor software shall include provisions to inhibit equipment operation unless a correctly configured set of integrated circuits, containing the firmware, is inserted into the correct sockets on the printed circuit boards.

16.3.7 Switches and Relays

Toggle switches and circuit breakers shall be mounted so that the handle moves vertically and the "up" position shall indicate ON.

A. Switches: Switches shall be an approved heavy-duty, commercial type, with contacts rated for switching peak currents and for continuous duty at the assigned loads.

B. Circuit Breakers: Circuit breakers shall be an approved type of high shock-resistant design. They shall clearly indicate whether ON, TRIPPED, or OFF. Breakers shall be selected to meet the installation requirements of the District-furnished circuit breaker panel.

C. Relays and Contactors: The terms "relay" and "contactor" denote a magnetically operated device for repeatedly establishing and interrupting an electric power circuit. The term relay is employed for devices below 500 W power handling capacity and the term contactor employed for devices controlling power above 500 W. The relay and/or contactor shall be of the wiping-action type.

1. Low-current relays, less than 10 A per pole, shall meet the requirements of MIL-R-5757.

2. Relays shall be plug-in type where practical, and be secured into their position by a mechanical restraint.

16.4 ELECTRICAL CONNECTING DEVICES

16.4.1 Connectors

A. General: Equipment enclosure and junction boxes shall be fitted with terminal devices. Each terminal device shall have at least 10 percent spare terminals or a minimum of two spare terminals, whichever is larger. Separate terminal devices shall be used for low-voltage circuits.

B. Wire Terminations: Wire terminations shall be crimp-style terminal lugs in accordance with MS 25036 or approved equal and applied by tools conforming to MIL-T-7928 or approved equal. Unless otherwise specified, solder connections shall not be permitted except for internal PC connections.

C. Terminal Blocks: Terminal blocks shall be modular, with solderless connection of the pressure-clamp type. Insulating material shall be pressure-molded melamine or equal (noncarbonizing) and shall meet the requirements of ASTM D704, Type 6.

D. Multipin Connectors: Multipin connectors shall meet AN standards.

16.4.2 Wiring Requirements

A. Conductors shall be of soft, annealed, tinned copper conforming to ASTM B33. Minimum stranding shall conform to ASTM B172 Class K, for AWG 4/0 to AWG 8; ASTM B174 Class K, for AWG 10 to AWG 22; and ASTM B174 Class L, for AWF 24, or as approved.

B. The Contractor shall submit certification identifying the characteristics of each type of conductor used. (CDRL) Items to be included, as a minimum, are:

1. Insulation Material/Resistance
2. Ratings
3. Jacket Thickness
4. Shielding
5. Dielectric
6. Air Aging
7. Cold Bend
8. Chemical Resistance
9. Corrosivity Resistance.

C. The Contractor shall submit a wiring marking and installation specification for approval. (CDRL)

16.5 MECHANICAL FASTENINGS

Mechanical fasteners shall conform to applicable ANSI Standards. Proposed fastening and finish hardware shall be incorporated into prototype equipment for demonstration and testing, including fastenings, bezels, escutcheons, slides, rollers, hinges, and similar components.

16.5.1 Joints, Fasteners, and Protective Coatings

No exposed fastenings shall be permitted on the exterior of equipment, unless otherwise approved. No projections, sharp edges, or corners that may cause injury or damage to passengers, property, or maintenance personnel shall be permitted. Exposed fasteners shall be of stainless steel, unless otherwise approved. The Contractor shall provide a list of various fastening devices used including: (CDRL)

A. Type of bolts, screws, nuts to be used, with the appropriate standards defined

B. Anchor bolts and adhesive cartridge embedded studs to be used, with the appropriate standards defined

C. Use of pop rivets and Allen head fasteners to be identified with appropriate standards

D. Use of adhesives, if any, with proposed standards.

16.5.2 Equipment Markings

No company logo, name, or other company identifications shall be visible on surfaces of equipment exposed to public view.

16.6 PUSHBUTTONS

The pushbutton operation controls shall be provided as specified and as indicated (Reference: Section 2).

16.6.1 Indicators

Indicators, except combination pushbutton/indicators, shall display no wording unless illuminated from behind. When not illuminated, indicators shall appear blank. Indicator coloring shall conform to MIL-STD-1472 color coding requirements.

16.6.2 Lamps

Lights in the pushbuttons/indicators shall be relamped from the front. The lamps used shall be of the low-voltage, low-wattage, long-life type, with clear lamps and colored filters to produce the appropriate indications. Appropriate light blocks shall be provided between adjacent indicator lamps. A lamp test push-button shall be provided.

16.7 METAL FABRICATION

16.7.1 General

A. Comply with the requirements of the AWS D1.1 as applicable for Structural Welded Connections.

B. Fabrications shall be complete with anchors, inserts, and hardware.

C. Materials shall be free from mill pitting, mill scale, and flake rust.

D. Fabrications shall be formed and finished to shape and size with accurate angles and lines.

E. Plates shall be welded on for mounting of hardware. Drill or punch holes for bolts and screws. Conceal fastenings wherever practicable.

F. Exposed edges shall be ground smooth. Exposed joints shall be constructed to exclude water.

G. Brackets, lugs and similar accessories required for installation shall be included as a part of the fabrication.

H. Intersections of fabricated tubing shall be neatly coped and mitred, fully welded and ground smooth and flush.

16.7.2 Condition of Finish

Weld marks, burrs, discolorations, or distortions resulting from fabrication, shipment, or installation shall be repaired.

16.7.3 Graphics

Information and identification graphics shall be as indicated.

16.8 MATERIALS

16.8.1 Fence Modules, Latch Posts, Hinge Posts, and Turnstile Arms

A. Stainless steel tubing complying with ASTM A269, Type 304L, No. 4 finish, Schedule 10 unless otherwise indicated, 60,000 psi minimum yield point.

B. Joints shall be fully welded and ground smooth and flush.

C. Intersections shall be neatly capped, fully welded, and ground smooth and flush.

16.8.2 Handicapped Gate and Emergency Exit Gate

A. Stainless steel tubing and fabrication shall be as specified below.

B. Stainless steel plates, shapes, and bars shall be in accordance with ASTM A167, Type 304L, Number 4 finish.

C. Panic bars shall be U.L. listed.

D. Gate closer cover plate shall be in accordance with ASTM A167, Type 304L, Number 4 finish, and shall be installed flush with top surface of pavers.

16.8.3 Fare Collection Equipment Cabinets

Cabinets shall be provided for the following equipment items:

A. Ticket Vending Machines
B. Add Fare Machines
C. Fare Gates (all varieties including dummy consoles)
D. Passenger Assistance Centers
E. Station Fare Collection Control Units.
F. Central Ticket Encoding Machines
G. Booth Ticket Encoding Machines

All sides of each TVM, AFM, PAC, SFCCU, CTEM, BTEM and gate equipment (top, bottom, front, back, and sides) shall be steel. Exposed panels shall be stainless steel and nonexposed panels may be either carbon steel or stainless steel.

16.8.4 Acrylic

Where acrylic is used, the acceptable type shall be high-impact Plexiglass 70 as manufactured by Rohm and Haas, or approved equal. Acrylic shall meet the requirements of NFPA 101, Class A, and UBC Chapter 42, Class I.

16.8.5 Polycarbonate

Where colorless protective shields or viewing ports are required, polycarbonate sheets shall be mar-resistant-type Lexan MR-5000 as manufactured by General Electric Corporation, or approved equal. Polycarbonate shall meet the requirements of NFPA 101, Class A, and UBC Chapter 42, Class I.

16.8.6 Sealants

A. Horizontal Joints Subject To Traffic: Polyurethane-based, either one-part elastomeric sealant, complying with FS TT-S-230, Class A, Type I, or two-part elastomeric sealant, complying with FS TT-S-227, Type I, and as recommended by manufacturer for application indicated. Sealants shall meet the requirements of NFPA 101, Class A, and UBC Chapter 42, Class I.

B. Colors: Provide exposed materials in colors to match the color of adjacent grouted joints. Provide concealed materials in natural colors.

C. Compatibility: Provide materials compatible with adjacent materials.

16.8.7 Stainless Steel

A. Sheet: ASTM A167, Type A304L for welding.

B. Plates, Shapes, and Bars: ASTM A167, Type 304L.

C. Tubing: ASTM A269, Type 304L. Use Type 304L for welding.

D. Continuous Hinge: Fabricated from ASTM A167, Type 304L.

E. Screws and Other Fasteners: Stainless steel of size and head type suitable for the intended purpose. If required at visible surfaces, screws and fasteners shall be countersunk and tamper-resistant.

F. Finish: ASTM A480, No. 4 Finish, 120 to 150 grit. The direction of finish shall be as follows:

1. Posts and tubes: Lines running lengthwise.

2. Flatwork:

a. Vertical surfaces: use vertical grit, i.e., lines running perpendicular to floor plane.

b. Horizontal surfaces: lines running parallel to longer edge of surface.

3. Sheet, plates, shapes, and bars that are concealed shall have a mill finish.

16.8.8 Carbon Steel

Steel that is not indicated as stainless steel shall be carbon steel and shall be either galvanized coated or enamel coated with rust-inhibitive primer.

A. Structural Shapes, Plates: ASTM A36.

B. Structural Tubing: ASTM A500, Grade B, yield point 46,000 psi min, cold formed.

C. Sheet: ASTM A366, E finish, suitable for paint finish.

D. Screws, Bolts and Other Fasteners: Galvanized or cadmium-plated steel.

END OF SECTION

SECTION 17

INSTALLATION

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SECTION 17

INSTALLATION

17.1 GENERAL

This Section specifies the requirements for Installation and Connection of the fare collection equipment. All installation work shall be performed as indicated. Materials used in installation shall conform to the requirements specified (Reference: Section 16), and as indicated.

An Installation Plan shall be submitted for approval. (CDRL) It shall be coordinated with the equipment matrix defined in Appendix SP-B. The Plan shall include detailed plan view drawings of each vending equipment array, each fare gate array (Reference: Contract Drawings), each RCC arrangement, and power and control diagrams for each MOS-1 station. Each point of interface with other Contractors shall be indicated. Arrangements of equipment for each array will be provided by the District.

17.2 SITE INSPECTION

17.2.1 Acceptable Conditions

Two weeks prior to performing any work at a station or interface point, the Contractor shall review the site to verify that it is sufficiently complete for installation of the equipment. Any problems identified shall be brought to the immediate attention of the District.

17.2.2 Other Contractors

The exchange of engineering data between the Contractor and interfacing Contractors shall be through the District.

17.3 DISTRICT-FURNISHED ITEMS

17.3.1 Mounting Surface

A finished floor surface for installation of all station equipment except the SFCCU, complete with conduit and underfloor ducts as specified and as indicated, will be provided at each station by the District, including spare pavers required to restore the finished floor.

17.3.2 Other Interface Items

In addition to the mounting surface, the following will be furnished by the District:

A. Duct Locations: Provide information on the location of underfloor ducts to accommodate core drilling to access the ducts.

B. SFCCU Blockout: Wall blockout, and power/signal conduits to accommodate the SFCCU interface with underfloor duct and with the CIC to be provided by the District. Fare collection contractor shall furnish and install SFCCU cabinet, complete with stainless steel front panel.

C. Power Panel: Electrical panel providing ac power and circuit breaker for each item of equipment, including a power outlet at remote location for the Central Ticket Encoding Machine.

D. Cable Transmission System: Cable transmission system between each station and the RCC.

E. Communications Interface Cabinet: Communications Interface Cabinet (CIC) for connection between SFCCU and CTS.

F. Signage Header/Enclosure Panels: Signage header and end enclosure panels (Add Fare arrays only) for vending machine arrays.

G. Power/signal conduits to location of Ticket Agent's booth at the 7th/Flower Station for BTEM(s).

17.4 SYSTEM INSTALLATION

17.4.1 Scope

Equipment shall be installed in the quantities and locations as indicated for each station. Tools, rigging, equipment, and personnel required to unload and move equipment into place shall be provided. Installation work shall be performed in conformance with CAL/OSHA and the District Safety Manual requirements.

17.4.2 Access

Use of escalators and/or elevators, if available, to move equipment to mezzanines, shall be coordinated with the District. If elevators and escalators are not available for use during installation, stairs will be available for transporting equipment down to installation locations.

The Contractor's objective shall be to disturb the station finished floor the fewest number of times possible and to the least extent possible. Initial installation of gateposts and the fence modular system requires lifting the pavers and excavating to structural slab only once, as indicated. Gatepost bases, fence module bases, and underfloor closer mechanisms for Handicapped Fare Gates and Emergency Exit Gates shall be installed, set in concrete, then spare pavers shall be installed to restore floor to its original finish. When additional consoles or fare gates are needed in Options 1 and 2, fence modules will be removed, as required, and consoles or fare gates installed in their place. It will not be necessary to further disturb the finished floor in this process, as the console or fare gate housings cover the small open hole left in the finished floor when the fence module is removed.

17.4.3 Damage and Restoration

The Contractor shall restore at its expense any damage that occurs during the installation activities. The restored condition shall be of the same quality and appearance as originally constructed.

17.4.4 Duct Access

Access to underfloor ducts for power and signal wire runs shall be accomplished by core drilling. The SFCCU, which is wall-mounted, shall have access to ducts via conduit to the nearest underfloor duct junction box.

17.4.5 Connections

Wire shall be provided and connections made as follows:

A. Power: From the station fare collection electrical panel to each item of fare collection equipment requiring power.

B. Signal:

1. From each item of equipment to the SFCCU.

2. Connections from the SFCCUs to nearest CIC and RTU shall be provided by the District.

17.4.6 Anchoring

A minimum of four anchor bolts or adhesive cartridge embedded studs and nuts shall be utilized in securing each item of equipment to the floor to meet the requirements of Section 2.

17.4.7 Leveling

The top surface of all fencing, gates, and consoles shall be level and aligned at the same elevation as adjacent gates and/or fence. Vertical surfaces shall be plumbed.

All vending machines within an array shall be aligned with front and top surfaces flush with each other, and with the signage headers provided by the District. Slopes in floor surfaces shall be accommodated with built-in leveling devices. Vertical surfaces shall be plumbed.

17.4.8 Sealant

A sealant that is flexible, durable, and fireproof shall be applied to the base of each item of equipment and to duct openings to prevent entrance of liquids under the equipment or into ducts.

17.4.9 Testing

Startup and test following installation shall be as specified (Reference: Section 20).

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SECTION 18

SYSTEMS ASSURANCE PROGRAM

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SYSTEMS ASSURANCE PROGRAM

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SECTION 18

SYSTEMS ASSURANCE PROGRAM

18.1 GENERAL

This Section specifies the requirements for a Systems Assurance Program, encompassing safety, reliability, maintainability, and quality assurance to be applied to all suppliers, subcontractors, and phases of the Contract, including in-service support, warranty, retrofits, and field modifications.

Cited References:

Organization	Number	Title
CAC	Title 8	Occupational Safety and Health Administration
IEEE	730	Software Quality Assurance Plans
SCRTD	5-001	Guidelines for the Preparation of Safety and Systems Assurance Analyses

18.2 SYSTEMS ASSURANCE PROGRAM PLAN (CDRL)

A Systems Assurance Program Plan (SAPP) shall be submitted for approval. Following approval, the SAPP shall be established and shall be maintained throughout the Contract. The SAPP shall include individual program plans for the following disciplines:

A. Safety

B. Reliability

C. Maintainability

D. Quality Assurance (QA).

18.2.1 Systems Assurance Approach

The safety, reliability, maintainability, and QA activities require:

A. Thorough planning and effective management

B. Definition of the major safety, reliability, maintainability, and QA tasks and their place as an integral part of the design and manufacturing process

C. Evaluation of hardware and software safety, reliability, maintainability, and quality through analysis, test, review, and assessment

D. Timely status indication, by formal documentation and other reporting, to assist in the implementation of the safety, reliability, maintainability, and QA efforts

E. Compatible requirements among manufacturing, test, and operational facilities

F. Implementation of quality controls to adequately verify compliance with the requirements of the Contract Documents.

18.2.2 General Systems Assurance Program Plan Objectives

The objectives of the SAPP are to ensure that:

A. Hazards are identified and resolved

B. Reliability and quality assurance requirements specified are achieved

C. Systems, subsystems, and components are maintainable, and that the maintainability requirements specified are achieved

D. Quality controls are implemented and compliance with the requirements herein is verified.

18.2.3 General Systems Assurance Program Plan Requirements

The SAPP shall identify the activities, organization, and means of implementing each discipline of the program. The SAPP shall address the following in the plan for each discipline, as applicable:

A. Program objectives

B. Program organization, including the authority, duties, qualifications, and responsibilities of personnel

C. Interfaces, including the lines of authority and relationship of each program with the Contractor

Management Program, subcontractors, suppliers, each other program specified, design, component selection, procurement, manufacture, assembly, installation, testing, logistics planning, other elements of the organization, in-service support, and warranty-related support

D. Tasks and procedures needed to establish the program:

1. Translation of these Technical Provisions into detailed design (where required), including evaluating the resultant design and proposed engineering changes

2. Analyses and predictions

3. Subcontractor and supplier evaluation, selection, and control

4. Tests, inspections, and verifications

5. Methods of identifying, evaluating, reporting, and correcting deficiencies

6. Audits, design reviews, and program documentation.

E. Program schedule, which includes identification of milestone submittal schedules for analysis, major inspections, tests, and audits

F. Logistic considerations, including activity sites and facilities.

18.2.4 Systems Assurance Management and Documentation

Each discipline shall be managed to ensure that the objectives of the Systems Assurance Program are attained. The following shall be accomplished as a minimum:

A. Support design reviews with documentation and with personnel cognizant of relevant design issues.

B. Submit Systems Assurance reports as a part of the Monthly Progress/Status Reports and the Quarterly Progress Reviews (Reference: Section 19). Provide an accounting of progress, results, problem areas, actions proposed or being taken to resolve problems, and the overall status of the Systems Assurance Program. Define significant work planned,

work accomplished, and planned activities for the next reporting period.

C. Document incidents and malfunctions that occur during acceptance and subsequent tests. Where required, submit reports in accordance with District requirements.

D. Maintain and submit Action Item Lists resulting from design reviews, and lists of open or unresolved issues. (CDRL)

E. Perform scheduled and unscheduled systems assurance audits on the design, manufacturing, inspection, and test programs, including subcontractors and suppliers. Submit Audit Reports. (CDRL)

F. The District may conduct unscheduled audits (Reference: General Provisions). Follow-up action shall require the Contractor to take corrective measures deemed necessary by the District to comply with the requirements. Corrections shall be at the Contractor's expense.

G. Maintain documentation and records from the Systems Assurance Program, and provide to the District on request.

18.2.5 Design Reviews

Systems Assurance participation in design reviews shall include the following as a minimum:

A. Safety, reliability, maintainability, and QA requirements

B. Pertinent analyses, as defined herein

C. Trade-off studies and recommendations

D. Action items resulting from design review comments

E. Design review checklists, action item lists, and lists of open or unresolved issues

F. Audit reports.

18.2.6 Safety Program, Reliability Program, and Maintainability Program General Requirements

The program plans for safety, reliability, and maintainability shall include, in matrix form (or equivalent

format), the title of each task to be covered as part of each program with the following information about each task:

A. Personnel involved in the execution of each task

B. Program procedures and instructions which describe how each task is performed

C. Start and completion schedule of each task, including program schedule or milestone which the task supports

D. Output products of each task, including identification of deliverables and dates.

18.3 SAFETY PROGRAM

Describe how the identification, elimination, and control of hazards, which could lead to injury, loss of life, or damage to equipment, will be achieved.

Work performed on District property shall comply with CAC Title 8.

18.4 RELIABILITY PROGRAM

18.4.1 General

Describe the relationships of reliability activities with other systems assurance activities.

18.4.2 Quantitative Requirements

The requirements listed herein shall be met or exceeded during the reliability demonstration test by the Contractor.

A. The following items shall be measured in Mean Transactions Per Failure (MTF). Test failures shall be identified as hard or soft failures (Reference: Section 20):

Item	MTF (HARD FAILURES ONLY)	MTF (HARD AND SOFT FAILURES)
Entry Gate	240,000	17,000
Ticket Vending Machine (With Bill Acceptor NOT IN SERVICE)	118,000 (219,000)	2,700 (6,300)

Add Fare Machine	133,500	2,900
Exit Gate	246,000	18,600
Central Ticket Encoding Machine	TBD	TBD
Booth Ticket Encoding Machine	330,000	16,300
PAC Ticket Reader	575,000	12,500

B. The following item shall be measured in Mean Time Between Failures (MTBF):

Item	MTBF (hr)
SFCCU	8,000

18.4.3 Reliability Analyses (CDRL)

A. Identify the reliability allocation of equipment components in a reliability block diagram and system apportionment. Use the block diagram for reliability prediction, reliability allocation, and criticality study. The format shall include:

1. Title containing kind or type of operation, mode of operation, and identification of the item under consideration

2. Statement of characteristics

3. Description of operation

4. Statement of conditions

5. Reliability allocation

6. Diagram blocks.

B. Identify single-point failures in Single-Point Failure Summaries. Format shall be approved.

C. Provide a FMECA prepared in accordance with SCRTD 5-001. Evaluate each potential failure to determine its effect on the system, subsystem, assembly, and component operation, and rank as to its criticality. Provide for the design improvements and corrective actions required to either eliminate the causes or reduce risks to an acceptable level.

D. Reliability of microprocessor software shall be predicted from previous experience with similar software in rail transit revenue service, or by a reliability evaluation methodology based upon the number of errors detected in each phase of the

software development cycle. The improvement in operational reliability provided by fault tolerance features shall be quantified.

18.4.4 Reliability Demonstration Plan (CDRL)

Reliability demonstration testing shall be as specified (Reference: Section 20). The Reliability Demonstration Plan shall include:

A. Demonstration test schedule. Identify facility and resource needs, support equipment, and coordination with the District.

B. Description of major requirements relative to the tests, test philosophy and policy, technical data, spare/repair parts, and support equipment.

C. Test planning administration and control.

D. Description of recommended pass/fail criteria, demonstration test methods, preparation of facilities, and acquisition of support requirements.

E. Identification of test environment that must be maintained during testing.

F. Method of any necessary reliability simulation, type and format of data requirements, data collection, and data reduction and analysis.

G. Detailed test procedures.

H. Recommended pass/fail decision criteria that can be quantitatively measured and that can be quantified to the specified parameters.

I. Requirements for preparation of a final test report covering reliability demonstration test results and supporting data.

18.5 MAINTAINABILITY PROGRAM

18.5.1 General

Describe the relationships of maintenance activities with other systems assurance activities.

18.5.2 Quantitative Requirements

Maintainability requirements stated in Maximum Baseline Time to Repair (MAXMBTTR) are established below. The MAXMBTTR values represent the 90th percentile of the

distribution of baseline time to repair, in hours, for major subsystems. These requirements shall be met or exceeded during the maintainability demonstration test by the Contractor.

Subsystem		MAXMBTTR (hr)
A.	Gate	0.5
B.	Ticket Vending Machine	0.6
C.	Add Fare Machine	0.4
D.	Central Ticket Encoding Machine	0.4
E.	SFCCU	0.3
F.	PAC Ticket Reader	0.5
G.	Booth Ticket Encoding Machine	0.5
H.	Light Bulbs	0.1

18.5.3 Maintainability Analyses (CDRL)

A. Allocate quantitative maintainability values to significant functional levels of the system, subsystem, and equipment.

B. Provide predictions to determine the adequacy of the design to meet required maintainability quantitative values.

C. Provide predictions to identify design features requiring corrective action during early stages of design and development.

D. Using the FMECA, identify significant corrective maintenance tasks to be performed on the system. Significant tasks are those identified as catastrophic or critical in the FMECA. A summary of Critical and Common Failure Modes shall be submitted in accordance with SCRTD 5-001. (CDRL)

E. Provide Corrective Analyses and Preventive Maintenance Schedules prepared in accordance with SCRTD 5-001. (CDRL)

18.5.4 Maintainability Demonstration Plan (CDRL)

Maintainability demonstration testing shall be as specified (Reference: Section 20). The Maintainability Demonstration Plan shall include:

A. Demonstration test schedule. Identify facility and resource needs, personnel selection, support equipment, and coordination with the District.

B. Description of the major requirements relative to the tests, maintenance concept and policy, technical data, spare/repair parts, and support equipment.

C. Test planning, administration, and control.

D. Description of recommended demonstration methods, corrective- and preventive-task selection, personnel training, preparation of facilities, and acquisition of support requirements.

E. Methods of task simulation, type and format of data requirements, data collection, and data reduction and analysis.

F. Proposed selection of representative tasks (corrective- and preventive-maintenance tasks) that constitute the maintainability demonstration sample. For purposes of maintainability demonstration, a task is defined as all necessary steps (i.e., troubleshooting, disassembling, removing, replacing, repairing, and verifying) that constitute one sample demonstration task.

G. Detailed test procedures.

H. Recommended pass/fail decision criteria for the demonstration test that can be quantitatively measured.

I. Requirements for preparation of a final test report covering demonstration test results and supporting data.

18.6 QUALITY ASSURANCE PROGRAM

18.6.1 General

A. Base the total Quality Assurance (QA) concept on the principle that quality is a basic responsibility of each segment of the organization and shall be evidenced by:

1. Producible and inspectable designs

2. Established specifications for procurement and job performance

3. Established procedures for transmission of information and data to subcontractors and ensuring their compliance with the procedures

4. Adequate inspection and testing programs for manufacturing and installation activities to ensure repetitive product conformity to design requirements

5. Program surveillance, with configuration control and verification of physical conformance of equipment manufactured and installed under the Contract.

B. Apply QA to all activities related to quality of items, including designing, purchasing, inspecting, handling, assembling, fabricating, testing, storing, shipping, installation, and warranty repair/rework.

18.6.2 Program Implementation

Provide and maintain the QA Program to regulate methods, procedures, and processes.

A. Clearly define the QA Organization. (CDRL) QA personnel shall have sufficient, well-defined responsibility and organizational freedom to identify and evaluate quality problems; to initiate, recommend, or provide solutions; to verify implementation of solutions; and to control further processing, delivery, or installation of a nonconforming item until proper disposition has been obtained. Quality shall not be compromised for schedule or cost purposes. QA management personnel shall have direct contact with Contractor's Management at a level where appropriate action can be obtained. Responsibility for the QA program shall be set forth on the Contractor's policy and organization chart.

B. Prepare and submit for approval written QA Procedures. (CDRL) Include, as a minimum, control of subcontractors; receiving, first article, in-process, and final inspection; production and process control; functional test; control of nonconformances; corrective action; calibration and certification of measuring and test equipment; drawing and configuration control; QA records; shipping inspection; and other quality activities necessary to ensure compliance with requirements.

C. For microprocessor-based equipment, a Software QA Plan shall be submitted based on IEEE Std-730 or based on a comparable standard. The comparable standard shall be proposed for District approval no later than the Conceptual Design Review. (CDRL)

D. The Contractor shall maintain an auditing system to assure that software activities follow an adequate development methodology. This shall combine effective tools, techniques, and methods that will be inspected by the District during the development phases of the software.

18.6.3 Certificates of Compliance

When approved, certificates of compliance for certain equipment or materials and products may be accepted in lieu of the specified sampling and testing procedures. Maintain certificates required for demonstrating proof of compliance. As a minimum:

A. Include the heat, batch, lot, or serial number of the equipment or material represented to provide traceability

B. Have each certificate signed by an authorized representative of the Contractor or supplier

C. Include certified documentation of test results or state that such test results are upon file and will be furnished to the District upon request. Include information specified for samples, the name and address of the organization performing the tests, the date of the tests, and the quantity of equipment or materials represented with the documentation of test results.

18.6.4 Calibration/Certification of Measuring Equipment and Tools

Establish and maintain an effective time- or usage-cycled calibration/certification program. Ensure validity of measurements and tests through the use of suitable inspection, measurement, and test equipment of the range and type necessary to determine conformance of items with requirements.

A. At intervals established to ensure continued validity, verify or calibrate measuring devices against certified standards that have a known traceable relationship to the National Bureau of Standards. Include tooling and fixtures used as media of inspection in this program. Every device so verified shall bear an indication attesting to the current status and showing the date (or other basis) on which inspection or recalibration is next required.

B. Promptly recalibrate devices suspected of being out of calibration before the stated recalibration date. Promptly reinspect items on which inspections have been performed with devices proven to be out of calibration.

C. Record calibration certifications and include in QA records.

18.6.5 Quality Assurance Records

Maintain adequate records in a retrievable manner to provide documented evidence of quality and accountability. Include results of inspections and tests, process controls, certification of processes and personnel, nonconforming material (including records of disposition), and other quality requirements defined in the Contract. As a minimum, indicate on inspection records the inspection instructions reference, nature of the observation, the number of observations made, the number and types of nonconformances found, and the specified requirements. Indicate on inspection records the acceptability of work or products and any action taken in connection with the correction or disposition of nonconformances. Test records shall include information specified (Reference: Section 20).

18.6.6 Verification

The QA operations of the Contractor and suppliers will be subject to District verification at any time. The verification will include surveillance of the operations to determine that practices, methods, and procedures of the QA program are being properly applied; inspection to measure quality of items to be offered for acceptance; inspection of items awaiting release for shipment; and audits to ensure compliance.

18.6.7 Qualification and Certification of Personnel

QA personnel performing inspections and tests shall be qualified for such work by virtue of those skills that are obtained by experience or training. Manufacturing personnel performing special processes, such as welding and brazing, shall be certified to acceptable standards for such work.

A. Develop a procedure that encompasses the certification and qualification of such personnel, based on experience, indoctrination, training, testing, and evaluation of performance. Establish minimum

data requirements for certification records in the procedure.

B. The records of personnel certifications shall be maintained and monitored by QA personnel. Records shall be available for review upon request.

18.6.8 Special Processes

Personnel certified to acceptable standards shall perform processes such as heat treating, welding, plating, and nondestructive testing, in accordance with approved documented procedures.

18.6.9 Procurement Quality Assurance

Describe the methods to be used for the Selection and Control of Procurement Sources (suppliers) (CDRL) and include a description of the following in a procedure that outlines:

A. Selection of qualified suppliers

B. Evaluation and assessment of the supplier's QA system

C. Method of transmitting design and quality requirements to suppliers

D. Method of transmitting authorization to suppliers to implement product improvements or changes to design, quality, and test requirements

E. Inspections and tests that verify the procured items meet subcontract or purchase order requirements and specifications

F. Method to evaluate inspection and test results

G. Method of monitoring supplier's quality performance (utilize source inspection and auditing techniques)

H. Method of obtaining early and effective information feedback from the supplier

I. Corrective action and material review activities

J. Maintenance of inspection records, certificates, and corrective action documentation.

18.6.10 Inspection and Test

A. Inspect and physically or functionally test all items to be delivered (Reference: General Provisions and Section 20). Provide for reporting nonconformances or questionable conditions to the District in the inspection and test instructions.

1. Requests by the Contractor for District attendance at inspections and tests shall be in writing or by telephone notification followed by written confirmation a minimum of 10 days prior to the event. (CDRL) Except as otherwise agreed, inspections and tests to be witnessed by the District shall be performed during regular business hours. If, after proper notification, the District does not attend the inspection or test, Contractor may proceed with the inspection or test as scheduled.

2. Certificates of compliance or formal test reports shall accompany shipments when required.

B. Inspection shall occur at appropriate points in the manufacturing and installation sequence to ensure compliance with drawings, test specifications, process specifications, and quality standards. The District may designate inspection hold points in the manufacturing, installation, or inspection planning.

C. Perform and document in-process tests, including tests of raw materials.

1. Tests shall provide a measure of overall quality of the product. Perform tests so that end product use and function are simulated to a sufficient degree. When modifications, repairs, or replacements are required, reinspect or retest the affected characteristics.

2. Submit test results as specified herein (Reference: Section 20).

18.6.11 Receiving Inspection

Inspect incoming materials to preclude the use of nonconforming materials. Ensure that only correct and accepted items are used and installed. Retain material certifications and test reports used as the basis for acceptance. Identify items at each stage of production

to an applicable drawing, specification, or other pertinent technical document. Use permanent physical identification to the maximum extent possible.

18.6.12 Production Operations

Ensure that machining, wiring, batching, shaping, and other basic production operations, together with processing, fabricating, and installing, are accomplished under controlled conditions.

A. Controlled conditions include documented work instructions, inspection instructions, adequate production and inspection equipment, and necessary special working environment.

B. Use documented work instructions as the criteria for production, process, and fabrication work. Effectively monitor the issuance of, and compliance with, these instructions.

C. Use quality inspection procedures where applicable. Accomplish physical examination, measurement, or tests of the equipment or materials or products processed in a suitable systematic manner subject to District audit and surveillance.

D. Take corrective action when nonconformance occurs.

E. Provide Inspection Pass/Fail Criteria for approval. (CDRL)

18.6.13 Shipping Inspection

Provide and enforce procedures for the inspection of deliverable products to ensure completion and conformance prior to shipment. Assure shipments are prepared as required to preclude damage during shipment. Verify inspection and preparation for shipment by QA personnel. Documented District authorization to ship shall be obtained prior to shipment.

18.6.14 Final Inspection

Final inspection shall be based on completion of inspections and/or tests, as appropriate. Verification of final inspections and test will be subject to review by District personnel.

18.6.15 Statistical Sampling Plans (CDRL)

Statistical sampling used in inspection shall be documented and approved. The Plan shall be based on generally recognized and accepted statistical practices. The quality levels, selected from the sampling plan, shall ensure cost-effective verification of conformance.

18.6.16 Changes to Drawings and Specifications

Ensure that inspection and acceptance tests are based on the latest revision or change to drawings and specifications. Maintain a procedure that ensures adequacy, completeness, and currency of drawings, and the control of changes (Reference: Section 19). Ensure that requirements for the effectivity point of changes are met and that obsolete drawings and change requirements are promptly removed from all points of issue and use. Employ a means of recording the effectivity points. Provide procedures for evaluation of the design and for determining the adequacy of proposed changes to design drawings and specifications. Ensure that there is complete compliance with requirements for proposing, approving, and effecting engineering changes. The responsibility for drawings and changes shall extend to the drawings and changes provided by the suppliers.

18.6.17 Identification of Inspection Status

Maintain a system for identifying the inspection status of equipment, materials, components, subassemblies, and assemblies as to their acceptance, rejection, or noninspection. Ensure that required inspections and tests are performed, and that the status of items with regard to inspections and test performance is known throughout manufacturing, installation, and test. Identify nonconforming items by physical segregation and status indicators (e.g., tags, serialization, markings, stamps, and inspection records). Ensure that only items that have passed the required inspections and tests are used or installed.

18.6.18 Identification and Control of Items

A. Identify production items, including raw materials (batch, lot, component, part), from the initial receipt and fabrication up to and including installation and use. Relate each item to an applicable design or other pertinent specifying document. Use physical identification to the maximum extent possible.

B. When used, apply identification markings using materials and methods that provide a clear and legible identification and do not detrimentally affect the function or service life of the item. Transfer markings to each part of an identified item when subdivided. Markings shall not be obliterated or hidden by surface treatment or coatings, unless other means of identification are substituted.

C. When specified by codes, standards, or specifications that include specific identification or traceability requirements (such as identification or traceability of the item to applicable specification and grade of material; heat, batch, lot, part, or serial number; or specified inspection, test, or other records), design the QA program to provide such identification and traceability control.

D. Where specified, identify and control items having limited calendar or operating life or cycles to preclude use of items whose shelf life or operating life has expired.

18.6.19 Handling, Storage, and Delivery

Provide for adequate work, surveillance, and inspection instructions for handling, storing, preserving, packaging, packing, marking, and shipping to protect the quality of products, as required.

18.6.20 Corrective Action

Establish, implement, and maintain procedures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, and defects in equipment and material are identified and corrected. Ensure that the cause of the condition is determined and corrective action is taken to preclude repetition of such conditions. Document corrective action and related information and make available upon request. Extend corrective action to the performance of suppliers. Include, as a minimum:

A. Analysis of data and examination of nonconforming products to determine extent and causes

B. Introduction of required improvements and correction, initial and follow-up review of the adequacy of such measures, and monitoring of the effectiveness of corrective action taken

C. Analysis of trends in processes or performance of work to prevent nonconforming products.

18.6.21 Nonconformance

Establish, implement, and maintain an effective and positive system for controlling nonconforming material, including procedures for its identification, segregation, and disposition. Repair or rework of nonconforming material shall be in accordance with documented procedures approved by the District. The acceptance of nonconforming supplies is a prerogative of and shall be as prescribed by the District. All nonconforming supplies shall be positively identified to prevent unauthorized use.

18.6.22 Audits

Establish a comprehensive system of planned and periodic internal and external audits to verify compliance with, and to determine the effectiveness of, the QA Program. Prepare an audit procedure with a preliminary audit schedule. (CDRL) Perform audits with qualified personnel having no direct responsibilities in the areas audited. Document audit results and review with personnel responsible for the area audited. Follow-up action, including reaudit of deficient areas, shall be approved. Submit audit reports (CDRL) and follow-up action reports.

18.6.23 Defects in Materials or Work

If damage, defect, error, or inaccuracy is found in equipment, material, item, or part, the District has the right to reject (with or without instructions as to disposition) or to require correction of the defective part (Reference: General Provisions).

END OF SECTION

SECTION 19

MANAGEMENT PROGRAM

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SECTION 19

MANAGEMENT PROGRAM

19.1 GENERAL

This Section defines the Management Program required to provide planning, scheduling, controlling, and reporting for the Fare Collection system.

19.2 CONTRACT MANAGEMENT

19.2.1 Project Manager

A Project Manager, who shall be the formal contact between the Contractor's organization and the District, shall be designated, in accordance with the General Provisions. The Contractor's management structure shall enable the Project Manager to manage the work of this Contract. Formal communication, including correspondence, submittals, or other exchanges affecting program cost, schedule, technical, administrative or other parameters, shall be between the Project Manager and the District.

19.2.2 Management Plan (CDRL)

Submit a Management Plan. The plan shall be explicit in the areas of organization, controls, planning, and schedules as defined in this Section. The plan shall include, but not be limited to:

A. An organization chart of the Contractor's management team, including a definition of the responsibilities of personnel therein .

B. Identification of all subcontractors

C. The methods and communications to be employed to monitor, oversee, and control the program schedule, technical performance, program changes, subcontracts, materials procurement, in-service support, warranty, and systems assurance analyses, tests, and demonstrations

D. A master program schedule, with key milestones and events emphasized

E. A flow chart of project task scheduling that depicts integration of, and interactive information requirements among, all tasks

E. A schedule of items of design and manufacture that require approval, including documents and drawings

F. Data management

G. Document tree reflecting the hierarchy of documents and plans.

19.2.3 Progress Reviews and Reports

A. As a minimum, Progress Reviews shall be held on a quarterly basis. When reviews are directed, support the reviews with technical and management expertise as dictated by program issues. The reviews may be held at either the Contractor's or the District's facilities, as directed by the District.

B. Provide Monthly Progress/Status Reports. (CDRL)

1. The reports shall be based on actual progress in the planned areas and on schedule status. Information provided shall include progress of scheduled activities of subcontracts, labor, submittals, design releases and reviews, District review/approval items, and other activities that offer a potential impact to maintaining approved schedules.

2. The reports shall include the status of CDRL submittals required herein, listing the required CDRLs, due dates, and actual state of completion.

3. Problem areas and plans for the forthcoming period shall also be included.

4. Special reports may also be requested, depending on problem areas.

19.2.4 Schedules and Project Control

A. Submit a schedule that provides the critical paths of project activities associated with fare collection design, manufacture, delivery, and installation. (CDRL)

B. Within the constraints defined above, bar chart schedules or the equivalent may be used for scheduling and reporting purposes.

19.3 INITIAL ACTIVITIES MEETING

This meeting shall take place no later than 15 days after NTP at a location designated by the District for the purpose of introducing the District's personnel to the Contractor's management team. Formal channels of communication will be established and procedures for letter and meeting numbering, etc., will be agreed upon. During this meeting, the Contractor shall present the proposed project control methodology and convey the plans for initial activities. (CDRL) Also during this meeting, the Contractor will be acquainted with the District's philosophies relating to operations, reliability, maintainability, and quality assurance. Meeting minutes reflecting agreement, plans, and open items will be distributed by the District.

19.4 MANUFACTURING PLAN (CDRL)

Prepare and submit a Manufacturing Plan. This plan shall be developed in concert with the quality assurance requirements stipulated herein and shall contain the following:

A. An overall flow diagram displaying manufacturing sequences from receipt of subsupplier materials and components to shipment to the District

B. Identification and description of final assembly site and work to be accomplished at this location.

19.5 INDUSTRIAL DESIGN

19.5.1 General

Industrial design principles shall be employed throughout the design and manufacturing processes. These principles shall include, as a minimum, person/equipment interfaces, use of materials, and graphics.

19.5.2 Design Review

Industrial design shall be part of the scheduled design review meetings. Special industrial design review meetings shall be held, as required, to settle issues in a timely manner.

19.5.3 Samples

Submit sample materials for approval during the design process. Samples shall be of a size commensurate with

that portion of the fare collection equipment being represented. (CDRL)

19.5.4 Presentations

The Contractor shall make presentations to the District as required, and support the District's efforts in making presentations to others. Drawings and color renderings shall be submitted in support of these presentations. (CDRL)

19.6 CONFIGURATION MANAGEMENT PROGRAM

19.6.1 Configuration Management Plan (CDRL)

Submit a Configuration Management Plan that illustrates how the requirements of this Section will be met.

19.6.2 General Requirements

Establish and maintain a Configuration Management Program encompassing system hardware and interfaces between equipment.

A. Maintain accurate and current configuration records, which shall be made available upon request.

B. The Configuration Management Program shall be comprised of the elements of configuration identification, configuration control, configuration accountability, and design.

19.6.3 Configuration Identification

The technical documentation shall define the approved configuration of system equipment under production, test, installation, and operational use.

19.6.4 Release Records and Documentation

The release records and documentation shall provide the capability of identifying the following:

A. The composition of any part, component, subassembly, or assembly, at any level, in terms of subordinate part numbers

B. Next assembly part, component, subassembly, or assembly of any part

C. The specification documents, specification control drawings, or source control drawing numbers associated with any subcontractor or vendor, industry standard or government standard items, part numbers, or assemblies

D. Engineering changes and records of superseded configuration requirements affecting items that will be submitted for acceptance or that have been accepted by the District.

19.6.5 Drawing and Part Numbering

Include, as a separate section in the Configuration Management Plan, the primary drawing numbering system to be utilized, including the significance of numbering characters. Nameplates on major equipment items shall provide space for District numbers to be added by the Contractor.

A. Assign discrete serial numbers in sequence for the model series of each type of equipment to be serialized

B. Submit a list of the items to be serialized and a description of the serialization method to be used. (CDRL)

19.6.6 Drawing List

Submit a drawing tree and list. (CDRL) The list shall provide space for tracking the submittal status of each drawing. The list shall provide a subsystem orientation of drawings arranged in an hierarchical format.

19.6.7 Production Baseline

For the purposes of change control, the production baseline shall be established at First Article Configuration Inspection (FACI). Changes beyond FACI shall be documented in the form of Engineering Change Proposals (ECP) and be submitted for approval. A proposed ECP form shall be submitted as part of the Configuration Management Plan. Control of designs prior to baselining shall be by design review activity, drawing revision, and document control.

19.6.8 Configuration Accountability

Maintain records such that the configuration of any item delivered or installed shall be identifiable in terms of its component part numbers. This system of accountabil-

ity shall be included in the Configuration Management Plan and shall indicate the requirements for the control of equipment modifications at the District facility or during operations at facilities other than Contractor's plant areas.

19.6.9 Design and Configuration Reviews

The Contractor shall conduct the design and configuration reviews specified herein.

A. General: These reviews shall be conducted to evaluate the progress and technical adequacy of the design and compatibility with the performance requirements of the Contract Documents. Prior to each review, submit a data package that includes the CDRL and other items required for the review. Minutes of review meetings will be distributed by the District.

B. Design Review Schedule: (CDRL) Submit design review schedule for approval. The initial schedule shall be tentative and shall be updated as necessary to provide minimum notice of 30 calendar days for each scheduled review.

C. Conceptual Design Review (CDR): This design review shall be held no later than 60 days after NTP.

1. The CDR shall be conducted at or near District facilities

2. Initial design concepts for major systems proposed by Contractor and subcontractors shall be presented for discussion

3. The CDR design review support data package shall include outlines of the initial Contractor and subcontractor proposals. (CDRL)

D. Preliminary Design Review (PDR):

1. The PDR shall be conducted to evaluate the progress and technical adequacy of the selected design approach and its compatibility with the performance requirements and interfaces of the Contract. The review shall be conducted on mutually agreeable dates at the Contractor's facilities.

2. Design data shall be submitted prior to the PDR. (CDRL) This data shall be to a level of

detail consistent with the preliminary stages of design. Each data submittal shall contain, as a minimum, a subsystem functional description, schematics, appropriate drawings, and applicable engineering calculations. Data requirements shall include:

a. Description of the microprocessor hardware components and second sources of component supply

b. Description of the programming language to be used

c. Specifications for each of the software modules utilized that define the module requirements.

3. As a part of the PDR, the Contractor shall present, for approval, preliminary drawings of the proposed patron interface designs for TVMs, AFMs, PACs, and gates, as well as the proposed design for the SFCCU control panel. The presentation shall consist of full-scale drawings, in color, and comply with the requirements of Paragraph 2.4.2 herein.

E. Final Design Review (FDR):

1. The FDR shall be conducted when detail design is essentially complete and prior to the release of drawings for production. The FDR shall determine that the detail design will satisfy the design requirements established herein and establish the exact interface relationships. The review shall be held on a mutually agreeable date at the Contractor's facility.

2. Data submitted for the PDR shall be updated to a level of detail consistent with final engineering and submitted for the FDR. (CDRL)

3. Microprocessor software documentation submitted for the PDR shall consist of:

a. Input data definitions

b. Output data definitions

c. Completed algorithms, expressed in pseudo-code, written in the English language in a structured fashion

d. Program parameters

e. Diagnostic routines

f. Error handling routines

g. Main program and module level flowcharts.

4. As a part of the FDR, the Contractor shall present, for approval, three-dimensional mock-ups, representing with reasonable accuracy the final proposed patron interface designs for the TVMs, AFMs, PACs, and gates, as well as the final proposal for the design of the control panel of the SFCCU, in full-scale drawing form. The design shall comply with the requirements of Paragraph 2.4.2 herein.

F. First Article Configuration Inspection (FACI):

1. FACI shall take place at the point of assembly, whether at the subcontractor's or the Contractor's facility, after completion of acceptance tests on first production hardware.

2. The District shall be notified a minimum of 10 days prior to the dates of FACIs. (CDRL) The Contractor will be advised regarding District attendance.

3. FACI shall verify that production hardware complies with production drawings as agreed upon during FDR.

4. Data that include the latest drawings, specifications, and quality documentation required for adequate check-out of the equipment under inspection shall be submitted. Also included shall be an indentured list of drawings, identified by revision, complete to the LLRU. (CDRL)

19.6.10 Drawing Requirements

A. Drawings for review shall include the following:

1. Drawings of major equipment components showing:

a. Overall dimensions, structure, and mechanical and electrical interfaces

b. Parts list

c. Location of access doors and covers showing the relation to equipment inside the enclosure, and space required for opening doors and covers

d. Location and space requirements for ventilation intake and exhaust and for cable entrances.

2. Single-line control schematics and functional block diagrams for each subsystem. Electrical wiring diagrams and schematics for electrical circuits.

3. Installation drawings showing required interfaces and bill of materials.

B. Drawings shall be dimensioned in English system units (ft, in.). Electrical schematics shall be drawn in accordance with IEEE standards and need not be shown with components physically oriented.

C. Submit six full-size copies of each drawing for review in orderly groups. (CDRL)

D. Drawings shall provide a space of at least 3 by 4 in. near the title block for use by the District.

E. The review of drawings shall neither be construed as permitting any departure from the Contract, nor as relieving the Contractor of the responsibility for any error, including details, dimensions, and materials.

F. Submit final (as-built) manufacturing drawing reproducibles with changes incorporated. (CDRL)

19.6.11 Interface Management

Interfaces exist within the system that shall be controlled to assure that hardware functions as intended when integrated into the system at installation. Define, as part of the Configuration Management Plan, how interfaces are to be controlled. As a minimum, each interface between systems, software, and services external to the design shall be identified and documented to allow the District and others involved in the

interface to concur with the requirement. Each of these interfaces shall be documented on an approved Interface Data Requirements Form. (CDRL)

END OF SECTION

SECTION 20

TEST PROGRAM

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SECTION 20

TEST PROGRAM

20.1 GENERAL

This Section specifies the requirements for the Test Program. The program shall provide assurance that the parameters established herein are maintained throughout the design, manufacturing, and installation activities. Tests shall demonstrate whether or not the requirements have been complied with.

The test program shall consist of the items outlined below.

20.1.1 Test Program Elements

A. Submittal of test program plan and test procedures

B. Qualification tests

C. Production acceptance tests

D. Installation acceptance tests

E. Revenue service reliability and maintainability demonstration test.

20.1.2 Environmental Test Conditions

Unless otherwise specified, measurements and tests shall be made at ambient temperature, atmospheric pressure, and relative humidity. Whenever conditions must be controlled in order to obtain reproducible results, a reference temperature of 73°F, a relative humidity of 50 percent, and an atmospheric pressure of 29.90 in. of mercury shall be used. Ambient test conditions shall be recorded periodically during the test.

20.1.3 Notification

The District shall be notified of the time and location of each test at least 10 days prior to the scheduled test date. (CDRL)

20.1.4 Test Reports

Test reports shall be submitted to the District within 30 days of test completion. (CDRL)

20.2 TEST PROGRAM/PROCEDURES PLAN

20.2.1 Program Plan

Submit a Test Program Plan for approval. (CDRL) The purpose of this plan is to ensure that all of the testing requirements are fulfilled. The plan shall contain, as a minimum, the following data:

A. The test schedule with milestones.

B. A flow chart indicating the logical sequence of specified tests. The flow chart shall indicate the relationship between test performances and design reviews, inspection and installation milestones, and submittal of test procedures.

C. A description of the in-plant and field test organizations, including personnel, roles, and responsibilities.

D. A description of the system for configuration control of equipment throughout the program.

E. A description of the system to be instituted to ensure resolution of test failures during the program.

20.2.2 Procedures

After the test program plan is approved and 60 days prior to each test, individual test procedures for each test classification and for each type of equipment shall be submitted. (CDRL) Each test procedure shall be subject to approval prior to commencement of the test, and shall contain, as a minimum, the following information:

A. Objective of the test

B. Test environmental conditions

C. A list and description of equipment to be tested

D. A list and description of Contractor-furnished equipment and supplies required to perform the test to include as a minimum:

1. Test equipment

2. Tools

3. Technical publications

4. Spares and consumables

5. Other supplies (money, tickets, etc.).

E. Personnel requirements and qualifications

F. District support requirements, including personnel and facilities

G. Location of test

H. Diagrams and schematics of test setup

I. Detailed procedure of test including the sample quantity for qualification tests, unless specified herein

J. Pass/fail criteria

K. Test data recording methodology and test data sheet format

L. The level and schedule of preventive maintenance during the test

M. Retesting procedures.

20.3 QUALIFICATION TEST

20.3.1 Purpose

The purpose of this test is to demonstrate whether or not the equipment design will meet the specified performance and reliability requirements under specified environmental conditions. This test shall be conducted on equipment that is representative of final production configuration, contains all specified features and options required for the planned 18 mile Metro Rail System, and has been fabricated using production methods to the greatest extent possible. Testing of the equipment shall not start until the design reviews have been completed and the design is approved by the District.

20.3.2 Acceptance and Modification

A. Acceptance of the qualification test results is a necessary requisite to proceed with production. The District will identify required modifications to be made and demonstrated before approving the results of the test.

B. Should a major design change be made after the test, the performance of the modified equipment shall be demonstrated and the test results submitted for approval.

C. Tested units shall be delivered as production units after incorporation of required changes and refurbishment. After refurbishment, the units shall successfully complete the production acceptance test prior to shipment. Replacement parts required for refurbishment shall be furnished.

20.3.3 General Procedures

A. The qualification test shall consist of six test categories: functional, cycling, environmental, maintainability, destruction, and interface tests. Each type of fare collection equipment will be subjected to one or more of these categories, as specified.

B. Each equipment item shall have passed the functional test prior to the cycling test. Functional and cycling tests shall be passed before the environmental tests are performed.

C. Processed fare media (tickets and money) shall be registered by the equipment with appropriate registers being updated. No registration errors shall be permitted. An audit test program shall be provided for each test. Full change storage area to be provided at start of tests.

20.3.4 Failure Categories for Qualification Tests

Failures shall be categorized as independent chargeable or independent nonchargeable. Detailed classification of typical failures shall be proposed and submitted for approval as part of the test program plan.

A. Independent Chargeable: Failures refer to failures that can be expected to occur in revenue service operations and are the responsibility of the Contractor. These shall include:

1. Malfunction(s) of an AFC subsystem or component on its own as a result of normal operation

2. Malfunction(s) due to error on the part of operation and maintenance documentation

3. Malfunction(s) caused by inserting fare media that are within the functional tolerances of the specification (e.g., bent coins, worn tickets, dirty bills, etc.)

4. Malfunction(s) that cannot be duplicated or are still under investigation, or for which no cause can be determined (intermittent)

5. Malfunction(s) related to equipment design, equipment manufacture parts design, and software errors

6. Any failure to operate in a normal manner or allow passage because of inoperative mechanical or electrical components

7. Failure of TVM and AFM to resist unauthorized entry. It is recognized that the TVM and AFM will no longer be operational following the specified test.

B. Independent Nonchargeable Failures: Events and/or incidents that are considered nonchargeable are:

1. Malfunction(s) due to oversight or error on the part of maintenance personnel

2. Malfunction(s) due to oversight or error in nontechnical functions of the AFC equipment

3. Malfunction(s) caused by improperly inserting fare media that are outside the functional tolerances of the specification.

20.3.5 Ticket Vending Machine (TVM)

A. Ticket Vending Machine (TVM) Tests:

1. Functional Test: The equipment shall be operated under ambient conditions and shall perform all functions specified, including limiting conditions. These functional demonstrations shall test fare structures, fare levels, ticket types, and transaction rates.

2. Cycling Test: The TVM shall be subjected to tests specified below, performed under ambient conditions. The test shall be programmed to have the TVM issue Single-trip Tickets representative of maximum encoding and printing to be issued in revenue service.

a. Processed tickets shall be retained for inspection. Of tickets vended, 2 percent shall be selected on a random basis and checked for accuracy of magnetic encoding, and 1 percent shall be selected on a random basis and evaluated for print accuracy. No encoding and no printing error on vended tickets shall be permitted.

b. If a coin fails on the first insertion, it shall be reinserted for a second attempt. A tally shall be kept for the number of second attempts to accept the coin. Up to 2 percent of the total coin insertions requiring a second attempt to be accepted shall be permitted without charging a failure. Thereafter, each second attempt shall be counted a failure. No more than 20 failures shall be permitted. No coin shall be used more than twice during the test.

c. Only one independent chargeable failure that requires corrective maintenance, and no more than two intermittent failures which do not require corrective maintenance shall be permitted for every 6,000 tickets issued.

d. A maximum of 1 hr shall be permitted for preventive maintenance for each TVM subjected to test.

Conduct the following transactions:

Run No.	No. of Transactions	Destination	Bus Transfer	Mode	Fare	$1 Bills	$5 Bills	Fare Payment Q	D	N
1	1,000	M5	No	Exact	1.40	1		1	1	1
2	1,000	M5	No	Change	1.40	2				
3	1,000	M5	Yes	Exact	1.55			4	4	3
4	1,000	M5	Yes	Change	1.55	2				
5	1,000	M4	No	Exact	1.50	1		1	2	1
6	1,000	M4	No	Change	1.50			5	3	
7	1,000	M4	Yes	Exact	1.65			5	4	
8	1,000	M4	Yes	Change	1.65	1		3		
9	1,000	M1	No	Exact	1.80	1		2	1	4
10	1,000	M1	No	Change	1.80			7	1	
11	1,000	M1	Yes	Exact	1.95			6	4	1
12	1,000	M1	Yes	Change	1.95			6	5	
13	1,000	L3	No	Exact	1.80	1		3		1
14	1,000	L3	No	Change	1.80			5	6	
15	1,000	L3	Yes	Exact	1.95			7		4
16	1,000	L3	Yes	Change	1.95				20	
17	1,000	L5	No	Exact	1.80	1		1	4	3
18	1,000	L5	No	Change	1.80	2				
19	1,000	L5	Yes	Exact	1.95			4	6	7
20	1,000	L5	Yes	Change	1.95	1		4		
21	200	M3	No	Exact	1.60	1		3		
22	200	M3	No	Exact	1.60			3		
23	200	C5	No	Exact	5.25	5				
24	200	C5	No	Exact	5.25		1	1		

Notes: Run 21 - includes 15¢ overpayment
Run 22 - all monies to be returned after time out
Run 23 - all bills to be returned after time out

For test purposes only, representative zone destinations on the Metro Rail, Long Beach, and Century lines, and typical fares have been used as a basis for the above transactions. In the Installation Acceptance Tests (Reference: Section 20), a fare table will be loaded, providing the correct initial fares for the various zones.

3. Environmental Test: Environmental conditions shall be varied, as specified. The fare media to be used shall be left in the test chamber, unwrapped and uncovered, during the entire test period.

   a. Requirements for ticket inspection are the same as specified in the cycling test above.

   b. Failure of coins to register shall be as specified.

   c. Only one independent chargeable failure that requires corrective maintenance, and no more than two intermittent failures that do not require corrective maintenance, shall be permitted.

   d. No preventive maintenance shall be permitted during the running of the environmental test.

   e. Conduct the following tests:

      1) Reduce the ambient temperature to 20°F (cold soak temperature, low humidity) and hold for 2 hr. Humidity need not be held constant during this test cycle. At the end of this period, vend 10 percent of the ticket quantities specified in the cycling tests.

      2) Increase the ambient temperature to 120°F (high, hot soak temperature) and set the relative humidity to 50 percent and hold 2 hr. At the end of this period, vend 10 percent of the ticket quantities specified in the cycling tests.

      3) Reduce the ambient temperature to 90°F (low, hot soak temperature) and increase the relative humidity to 95 percent (high humidity) and hold for 2 hr. At the end of this period, vend 10 percent of the ticket quantities specified in the cycling tests.

      4) Reduce the ambient temperature to 20°F (cold soak temperature) and hold

for 2 hr. Humidity need not be held constant. At the end of this period, vend 10 percent of the ticket quantities specified in the cycling tests.

5) Repeat Tests 1) and 2) above with supply voltage at nominal +10 percent and again at nominal -10 percent.

B. Bill Acceptor (BA) Tests:

1. Functional Test: The BA shall be operated under ambient conditions and shall be demonstrated to perform specified functions, including limiting conditions and transaction rates.

2. Cycling Test: The BA shall be subjected to the cycling tests specified below. These tests shall be performed under ambient conditions.

a. At least 500 different $1 bills and 500 different $5 bills shall be used in the test. The condition of these bills shall vary from crisp, clean, mint bills to well-used, dirty, limp bills.

b. Failure of bills to be accepted on the first insertion shall not be counted as a failure, but a record of these insertions shall be kept. If more than 3 percent of the bills fail to register on the second insertion, they shall be counted as bill acceptor failures. No more than 20 bill acceptor failures shall be permitted.

c. Only one independent chargeable failure that requires corrective maintenance and no more than eight intermittent failures that do not require corrective maintenance shall be permitted for each 50,000 bill transactions. Any failures above these quantities shall require corrective action subject to the approval of the District.

d. A maximum of 0.5 hr shall be permitted for preventive maintenance during the running of the test.

3. Environmental Test: Environmental conditions shall be varied as specified below:

a. The currency to be used shall be left in the test chamber unwrapped and uncovered during the entire test period.

b. The bills used in the cycling test shall also be used in this test. Those used for each test shall be randomly selected and all bills shall be used twice in the test.

c. Failure of bills to be accepted on first insertion shall not be counted as failures, but a record of these failures shall be kept. If more than 3 percent of the bills fail to register on second insertion, they shall be counted as bill acceptor failures. No more than five bill acceptor failures shall be permitted.

d. Only one independent chargeable failure that requires corrective maintenance and no more than two intermittent failures that do not require corrective maintenance shall be permitted.

e. No preventive maintenance shall be permitted during the test.

f. Conduct the following tests:

1) Reduce the ambient temperature to 20°F (cold soak temperature, low humidity) and hold for 2 hr. Humidity need not be held constant during this test cycle.

2) At the end of this period, conduct 1 percent of transactions specified in the cycling test.

3) Increase the ambient temperature to 120°F (high, hot soak temperature) and set the relative humidity to 50 percent (low humidity level) and hold 2 hr. At the end of this period, conduct 1 percent of the transactions specified in the cycling test.

4) Reduce the ambient temperature to 90°F (low, hot soak temperature) and increase the relative humidity to 95 percent (high humidity) and hold

for 2 hr. At the end of this period, conduct 1 percent of the transactions specified in the cycling test.

5) Reduce the ambient temperature to 20°F (cold soak temperature) and hold for 2 hr. Humidity need not be held constant. At the end of this period, conduct 10 percent of the transactions specified in the cycling test.

6) Repeat 1), 2), and 3) above with the supply voltage at +10 percent of nominal and again at -10 percent of nominal.

C. Destruction Test: The TVM shall be subjected to Burglary Classification TL-15 Test, Underwriters Laboratories, Inc., as modified below.

1. Objective: To demonstrate that a TVM will offer protection against unauthorized entry when attacked using the tools specified in Paragraph 20.3.5.C.4, below, for a net working time of 15 min.

2. Samples: Three TVMs, shown to be fully representative of TVMs to be produced and installed under this Contract shall be submitted for test.

3. Test Conditions:

a. TVMs shall be mounted side-by-side on concrete in the manner identical to that planned for installation in District stations.

b. Gaps between TVMs shall be the same as anticipated in actual station installation.

c. Object of the test shall be only the center TVM, although the TVMs on each side may sustain some damage.

4. Test Equipment:

a. Common Hand Tools: chisels, punches, wrenches, screwdrivers, pliers, hammers, sledges (not exceeding the 8-lb size), and

pry bars and ripping tools (not exceeding 3 ft in length)

b. Portable Electric Tools: electric hand drills (not exceeding 1/2-in. in size).

5. Test Procedures: Since the object of the investigation is to arrive at conclusions as to the resistance of a TVM to expert attack, the testing party, consisting of two skilled operators, may select any variety of attacks they deem to be productive, using any or all of the tools specified for the full allotted time, with the proviso that the drill may only be used against the TVM front door lock barrel.

6. Pass/Fail Criteria: The product shall be considered acceptable if it resists entry, i.e., if the front door remains locked and interior mechanisms are not exposed to pilferage for the net working time specified.

7. Net Working Time: The net working time shall be only the period during which the attack is actively in progress on the sample and shall be exclusive of preparations for test, time required for safety precautions, and delays that cannot be anticipated.

8. Test Personnel: Test shall be performed by District Security personnel.

20.3.6 Gate Equipment

A. Functional Test: The gate equipment shall be operated under ambient conditions and shall perform all specified functions. These functional demonstrations shall test fare structures, fare levels, ticket types, and transaction rates.

B. Cycling Test:

1. The gate equipment listed shall be subjected to cycling tests, as specified. The cycling test shall be performed under ambient conditions. All processed tickets shall be retained for inspection.

2. An indication shall be provided for tripod release or by opening biparting leaves. A time

reference shall be established prior to beginning the tests.

3. Time shall be checked 20 times periodically during the conduct of this test. The time shall not vary more than 2 min from time reference.

4. Only one independent chargeable failure that requires corrective maintenance and no more than two intermittent failures that do not require corrective maintenance shall be permitted per 30,000 tickets processed per each unit. No printing and/or encoding errors shall be permitted.

5. A maximum of 1 hr shall be permitted for preventive maintenance for each type of gate subjected to the test.

6. Process the following cycling transactions:

   a. 7,500 Single-trip Tickets (regular fare) processed in entry and exit. Tickets shall be divided equally among zones.

   b. 7,500 Single-trip Tickets (special fare) processed in entry and exit. Tickets shall be divided equally among zones.

   c. 7,500 Single-trip Tickets with transfer (regular fare) processed in entry and exit. Tickets shall be divided equally among zones.

   d. 7,500 Single-trip Tickets with transfer (reduced fare) processed in entry and exit. Tickets shall be divided equally among zones.

   e. 1,500 Exit Cards.

   f. 7,500 MRT Exit Cards.

   g. 100 Employee Passes, each processed 500 times for entry and exit.

   h. 250 Bus/Rail Monthly Passes (regular fare) processed 60 times for entry and exit.

   i. 250 Bus/Rail Monthly Passes (special fare) processed 60 times for entry and exit.

j. 250 Regional Monthly Passes processed 60 times for entry and exit.

C. Environmental Test: Environmental conditions shall be varied as specified below. The fare media to be used shall be left in the test chamber, unwrapped and uncovered, during the entire test period.

1. The tripod barrier shall be rotated for each transaction. Biparting leaves shall open and close for each transaction, except when the number set in credit memory is between 2 and 10 for either type.

2. Time shall be checked periodically eight times during the processing of the fare media. Time shall not vary by more than 2 min in order to pass the test.

3. Only one independent chargeable failure requiring corrective maintenance, and no more than two intermittent failures that do not require corrective maintenance, shall be permitted to pass the environmental tests. No barrier failures shall be permitted.

4. No preventive maintenance shall be permitted during conduct of environmental tests.

5. The following types of fare media shall be used in the test:

   a. Single-trip Ticket (regular fare)

   b. Single-trip Ticket (special fare)

   c. Single-trip Ticket with transfer (regular fare)

   d. Single-trip Ticket with transfer (special fare)

   e. Bus/Rail Monthly Passes (regular fare)

   f. Bus/Rail Monthly Passes (special fare)

   g. Exit Card

   h. Employee Pass

   i. Regional Monthly Pass

j. MRT Exit Card.

6. Vary the environmental conditions as specified for the TVM environmental test. At the end of each temperature soak period, process 10 percent of the fare media specified in the gate equipment cycling test.

D. Structural Tests:

1. Turnstile or Biparting Leaf Barrier Strength Test: The requirements described herein (Reference: Section 5) shall be demonstrated. Following this test, the assembly shall be disassembled down to the parts level for a detailed inspection to determine the barrier's structural integrity.

2. Handicapped Fare Gate and Emergency Exit Gate Stress Test: Dynamic stress tests shall be conducted on one Handicapped Fare Gate and on one Emergency Exit Gate. If the gates are of similar design, the District may waive testing of one of the gates and allow the test to be performed on one typical installation. The requirements described herein shall be demonstrated (Reference: Section 5).

The test shall demonstrate the strength and rigidity of the gate and its supporting posts to withstand the stated loads without incurring any permanent yield or damage.

20.3.7 Add Fare Machine (AFM)

A. Functional Test: Test shall be performed as specified for TVM.

B. Cycling Test: Tests shall be performed as specified for TVM with the exception of ticket printing, which does not apply.

C. Environmental Test: Tests shall be performed as specified for TVM with the exception of ticket print inspection.

D. Destruction Test: Test shall be performed as specified for TVM. (This test may be waived if the construction/assembly of TVMs and AFMs are identical, subject to District approval.)

20.3.8 Passenger Assistance Center (PAC)

A. Functional Test: Perform test as specified for TVM.

B. Cycling Test:

1. The PAC ticket reader shall be subject to a cycling test. The cycling test shall be performed under ambient conditions.

2. The cycling test shall consist of reading all fare media fare structures, fare levels, and types.

3. Failure of fare media to be read correctly on the first insertion shall not be counted as a failure, but a record of these insertions shall be kept. If more than five fare media fail to be read on the first insertion or 2 percent fail to be read on the second insertion, they shall be counted as one relevant failure.

4. Only one independent chargeable failure that requires corrective maintenance and no more than two intermittent failures that do not require corrective maintenance shall be permitted for each 15,000 fare media processed. Any failures above these quantities shall require corrective action subject to approval.

5. A maximum of 0.5 hr shall be permitted for preventive maintenance during the running of the test.

6. Process 200 of each fare media type specified.

C. Environmental Test:

1. Environmental conditions shall be varied as specified below. The fare media to be used shall be left in the test chamber, unwrapped and uncovered, during the entire test period.

2. Failure of fare media to be read correctly on the first insertion shall not be counted as failures but a record of these insertions shall be kept. If more than five fare media fail to be read on the first insertion or 2 percent fail to be read on the second insertion, they shall be counted as one relevant failure.

3. Only one independent chargeable failure that requires corrective maintenance and no more than two intermittent failures that do not require corrective maintenance shall be permitted for each 15,000 fare media processed. Any failures above these quantities shall require corrective action subject to approval.

4. No preventive maintenance shall be permitted during the environmental test.

5. Vary the environmental conditions as specified for TVM environmental test. The cycling quantities shall be 10 percent of the fare media processed in the cycling test above.

20.3.9 Station Fare Collection Control Unit (SFCCU)

A. Functional Test: Perform test as specified for TVM.

B. Environmental Test:

1. Functional tests shall be performed on the SFCCU in the varied environmental conditions specified for the TVM environmental test. At the end of each temperature soak period, the unit shall transmit and receive data from other fare collection equipment, accumulate and store data received, and perform the specified station equipment control functions.

2. Processed data shall be registered by the SFCCU (Reference: Section 8). No registration errors shall be permitted.

3. Only one independent chargeable failure that requires corrective maintenance and no more than two intermittent failures shall be permitted during the test. Any failures above this quantity shall require corrective action subject to approval.

4. No preventive maintenance shall be permitted during the environmental test.

20.3.10 Ticket Encoding Equipment

A. Functional Test: The ticket encoding equipment functions, including limiting conditions, shall be demonstrated on one TEM and one BTEM under ambient conditions. These functional demonstrations shall

also test all fare structures, fare levels, and ticket/pass types.

B. Cycling Test:

1. The cycling test shall be performed under ambient conditions.

2. Five percent of each fare media type produced shall be selected on a random basis and checked for magnetic encoding and printing accuracy. Of the fare media selected, no encoding and no more than one printing error shall be permitted.

3. Only one independent chargeable failure that requires corrective maintenance and no more than two intermittent failures that do not require corrective maintenance shall be permitted with every 25,000 fare media produced. Any failures above these quantities shall require corrective action, subject to approval.

4. A maximum of 0.5 hr shall be permitted for preventive maintenance during the test.

5. Produce 4,000 tickets, passes, and cards of each type, as specified (Reference: Section 11).

C. Environmental Test:

1. Repeat the functional test and 10 percent of the cycling test for each of the environmental conditions specified for the TVM environmental test.

2. Encoding functions shall not be inhibited and failure rate shall not exceed 1 percent of the cycling test limits.

20.3.11 Revenue Cart

The revenue cart shall be demonstrated to perform as specified. The revenue cart shall be equipped with a full complement of money containers, all fully loaded, and with the coin vault fully loaded, for the demonstration.

20.3.12 Test Equipment

The test equipment specified shall be demonstrated to perform the required functions.

20.3.13 FCCC Computer

The FCCC shall be demonstrated to perform the required functions (Reference: Section 9) and as specified throughout these Specifications.

20.3.14 Maintainability Demonstration Test

A. General: A Maintainability Demonstration Test shall be conducted as part of the qualification test specified herein. The test shall demonstrate that each of the fare collection equipment types meets the MAXMBTTR requirements.

B. The following tests shall be performed as controlled simulation tests:

1. Simulation shall be accomplished using failed components to the maximum extent feasible.

2. The Contractor's maintenance personnel shall receive no prior information on the simulated failures.

3. The test shall be initiated during qualification tests. More than one equipment unit for each equipment type under test may be used.

4. One hundred corrective maintenance actions shall be included for this demonstration. Duplication of maintenance actions shall not be permitted. The tests shall be performed on each equipment type specified for maintainability testing in the qualification test. The maintenance actions shall be distributed among the equipment types and their constituent modules/components in proportions to their expected failure rates, in accordance with their MTF requirements.

5. Consequences of Accept/Reject Decisions: An accept decision shall terminate the test. Document and submit the results as provided herein. In the event of a reject decision, document and submit the results, then prepare recommendations for corrective action within 15 working days. After approval, implement the recommendations within 20 working days, then repeat the test of the rejected equipment type. In the event of a reject decision or failure to approve recommended action, terminate the test

until the problem is resolved to the District's satisfaction.

20.3.15 Seismic, Shock and Vibration Tests

Seismic, Shock and Vibration tests (Reference: Section 2) shall be conducted. The District shall have the right to test and inspect for compliance. These tests shall be conducted as part of the qualification tests specified. The tests shall demonstrate that each of the fare collection equipment types meet the requirements.

20.3.16 Interface Test

Upon successful completion of required functional, cycling, environmental, and maintainability testing, an integrated system test shall be performed by connecting the components of the fare collection system as they will be when installed, and then redoing the specified functional tests on each component. Failure of the system to perform interdependent functions, such as reporting conditions and data or responding to instructions, shall require further interface analysis and corrective action until successful retest.

20.3.17 Qualification Other Than by Test

Where mature equipment has been previously qualified for other programs and has demonstrated successful operation for extended periods, retest may not be required, subject to District approval. Copies of previous test results that justify not retesting the specific article(s) may be submitted. Where previous test results are used to qualify equipment for use, specific information shall be furnished that equates the equipment and previous experience to Metro Rail use. This information shall demonstrate specifically that:

A. Configurations of the previous unit and that used on this Contract are identical, or differences are identified and justified to the District's satisfaction as functionally insignificant.

B. Environmental requirements of previous tests meet or exceed requirements of this Contract.

Where it is intended to qualify equipment by other than test, include the intent with summary justification in the test plan for District approval. Formal data shall be included in the test report.

20.4 PRODUCTION ACCEPTANCE TEST

20.4.1 Description

Each equipment unit shall be subjected to a production acceptance test after final assembly. This test shall be a functional test, exercising all modes of operation for the type of equipment being accepted. This test shall be satisfactorily completed prior to shipment.

20.4.2 Modifications

When necessary, the District will identify modifications to meet specified performance. These modifications shall be made and the required performance demonstrated prior to acceptance for shipment.

20.5 INSTALLATION ACCEPTANCE TESTS

20.5.1 Production Acceptance Test

The production acceptance test shall be repeated on each piece of equipment after installation. The District shall be permitted to check the performance of the equipment. Should any equipment fail to perform properly, the failure shall be corrected and the installation test repeated.

20.5.2 Station Acceptance Test

After completion of unit acceptance tests, a station acceptance test shall be conducted at every station to verify that the equipment is installed properly, interfaces properly with other station and remote equipment, and performs as specified.

20.5.3 System Acceptance Test

After all stations have successfully completed the station acceptance tests, a system acceptance test shall be performed. The functional characteristics of all the equipment installed in the system shall be verified in this test and the equipment shall conform to the specifications. Control of all stations from RCC, accumulation and display of data at RCC, and the compatibility of all fare media from station to station shall be verified.

20.6 REVENUE SERVICE RELIABILITY DEMONSTRATION TEST

20.6.1 Revenue Service Reliability Demonstration Test

A. General:

1. After an initial revenue operations break-in period of approximately 90 days, the fare collection equipment and maintenance support equipment/tools shall undergo a 180-day revenue service reliability demonstration test under normal patronage operational conditions.

2. The demonstration test shall verify achievement of the reliability requirements specified.

3. During the test period, a record of failures and corrective maintenance actions shall be maintained by the Contractor. A Failure Review Board, made up of two persons from the Contractor's staff, as approved by the District, and two District personnel, shall review the data collected during the test period.

4. The total population of operating equipment installed in revenue service shall be monitored and system performance reported by the Contractor. The MTBF and MTF, as applicable for each equipment type, shall meet the specified requirements (Reference: Section 18).

20.6.2 Reliability Demonstration Test Procedure (CDRL)

The Reliability Demonstration Plan (Reference: Section 18) and procedure that shall govern the conduct of activity, surveillance, direction, and methods of recording pertinent data shall be prepared. The following elements shall be included, as applicable, in the procedure:

A. The reliability demonstration objectives, including the accept/reject criteria, data collection methdology, unit of measure, and the qualitative/quantitative requirements to be verified

B. Support and calibration tools and instrumentation

C. Technical publications

D. Spares and consumables

E. Maintenance facilities

F. Technician level requirements

G. The format and specific reliability data to be collected during the test period and the method used to report the test results

H. The preventive maintenance tasks to be performed during the reliability demonstration test period

I. Procedures to be used for correction maintenance actions when failure occurs.

20.6.3 Failures

All failures shall be categorized as Hard or Soft and Test or Nontest:

A. Hard Failures generally include the following:

1. A failure in which an element of a system failed to perform the function intended by the design, and thereby caused the unit in which it occurred to fail to meet specification (does not include jams caused by external conditions).

2. A failure rendering an AFC equipment inoperative, that required adjustment, repair, or part replacement to restore the equipment to normal service.

3. A failure not caused by malfunction of other equipment, component abuse, incorrect maintenance procedures, or errors (e.g., intermittent failures and fare media, bill, token, and coin jams).

4. A failure in which any one or a multiple number of machine function modules within the equipment ceased to function and required repairs by a trained maintenance technician.

5. Any failure to operate in a normal manner or allow passage because of inoperative mechanical or electrical components (jams due to media are not considered chargeable).

6. Failures that are considered nonchargeable failures are:

a. Equipment failures caused by externally applied overstress condition in excess of specification requirements (e.g., bent coins, worn bills, etc.)

b. Failures caused by incorrect operating, maintenance, or repair procedures

c. Failures due to vandalism (such as stuffing pieces of paper in coin and/or bill mechanisms)

d. Failures due to media

e. Failures of items having a specified life expectancy, when operated beyond the defined replacement time of that item.

B. Soft Failures generally include the following:

1. A failure caused by patrons improperly inserting fare media, such as bent coins, mutilated tickets, passes, or farecards, torn or worn bills, etc.

2. A failure due to oversight or error on the part of maintenance personnel

3. A failure resulting from damage due to vandalism (e.g., stuffing paper in media or revenue slots)

4. A failure due to oversight or error in nontechnical functions of the machine (e.g., improper loading of ticket stock, out-of-tickets, etc.).

C. Test Failures: For purposes of the MTF and MTBF calculations, only test failures will be used. An incident will be defined as a test failure when the failure of an item is either a hard or soft failure that results in a loss of function of that item.

D. Nontest Failures: Any incident or condition of an item not included in the definition of test failure, such as the following:

1. A failure caused by malfunction of other equipment

2. A failure caused by human error, except as noted in Article 20.6.3.A.6.b above

3. A failure caused by accidents not associated with the normal operation of the item

4. A failure caused by operating the item outside of design or environmental specification limits.

20.6.4 Accept/Reject Decision

A. A MTF/MTBF accept decision shall be based upon observed tests with results equal to or exceeding the specified requirements. This shall be determined and documented as specified.

B. In the event of an MTF/MTBF reject decision, the Contractor shall document and submit the results and then, within 10 working days, analyze the cause of the deficiency and prepare recommendations within 15 working days.

C. A second reject decision, or failure of the District to approve recommended action, shall require the Contractor to resolve the problem to the District's satisfaction.

20.7 FAILURE ACTIONS

Corrective actions for failures during testing shall be determined and recommendations shall be promptly submitted for approval. Modifications for correction of problems are subject to approval. Upon completion of the corrective action, the testing shall be repeated.

END OF SECTION

SECTION 21

SYSTEM SUPPORT

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SECTION 21

SYSTEM SUPPORT

21.1 GENERAL

This Section specifies the requirements for technical support, operating and maintenance manuals, training, test equipment, special tools, and spare parts to be provided by the Contractor.

Cited References:

Organization	Number	Title
ANSI	Y14.5	Dimensioning and Tolerancing
ANSI	Y32.14	Graphic Symbols, Printed Wiring Design Guide

21.2 SYSTEM SUPPORT PLAN (CDRL)

A System Support Plan shall be submitted for approval. The plan shall identify the activities, organization, schedule, and means for providing each element of system support.

21.3 TECHNICAL SUPPORT

In addition to training District personnel, technical support shall be available to the District from the time the equipment is installed through the acceptance testing and warranty periods.

21.3.1 On-site Personnel

On-site Contractor personnel shall be qualified to operate and maintain the fare collection equipment, including computer equipment and related software. The personnel shall assist with District-run tests and with resolving operations and maintenance problems. The number and qualifications of on-site personnel shall be approved and shall include the following for each shift of operations:

A. Field service engineers

B. Technicians

C. Repair personnel.

21.3.2 On-call Personnel

During the tests on District property and the warranty period, Contractor specialists, including subcontractor and supplier technical personnel, shall be on District property within 48 hr of a request to the Contractor for additional technical assistance and for warranty-related repairs.

21.4 MANUALS

21.4.1 General

A. Provide one master reproducible and the noted quantities for each of the following approved manuals:

1. Repair, Maintenance and Service Manual: 25 copies

2. Operating Instructions Manual: 100 copies

3. Parts Catalog: 10 copies

4. Test Equipment and Special Tools Manual: 10 copies

5. Maintenance Manual for Microprocessor-based Products: 25 copies

B. Separate sections in each manual shall be furnished for each type of equipment to be provided. If required due to thickness, separate binding shall be provided for each portion of the manual.

C. A preliminary draft of each manual shall be submitted for approval of proposed content, format, and binding. The text may be in outline form. Preliminary drafts shall be submitted no later than 180 days prior to the training course materials delivery date established in the Contract Data Requirements List. (CDRL) Preliminary drafts of each manual shall be revised until approved.

D. Final drafts of each manual, complete in every respect, shall be submitted for approval no later than 90 days prior to the training course materials' delivery date. (CDRL) Final drafts of each manual shall be revised until approved.

E. Approved final drafts of the manuals and approved printed manuals shall be delivered in accordance with Special Provisions, Article 2.3. (CDRL)

21.4.2 Manual Structure

The manuals, except for Parts Catalog, shall be structured as follows:

A. A physical description of the subsystem and pertinent technical characteristics

B. A description of the functions the subsystem is designed to perform and the general methods employed to accomplish those functions

C. Detailed discussion of the theory of operation

D. Interface between subsystem components. Photographs labeled as figures, block diagrams, exploded views, illustrated part breakdowns, and schematic drawings shall be used, as appropriate, to facilitate descriptions of assemblies and the relationships of components, subsystems, and systems

E. Signal flow sequence correlated to block diagram(s)

F. Turn-on and turn-off procedures

G. Detailed operational instructions for each operational mode

H. Preventive maintenance procedures and schedules

I. Fault isolation and analysis procedures

J. Corrective maintenance and repair procedures

K. System calibration and test procedures

L. Parts listing

M. Safety warnings and instructions, where applicable.

21.4.3 Functional Requirements

A. The Repair, Maintenance, and Service Manual shall contain information required to perform scheduled maintenance, overhaul, and unscheduled repairs, including inspection, lubrication, adjustment, and parts removal. Schematic and system operation information required to accomplish on-line

troubleshooting, fault isolation, and repair shall be addressed. The manual shall cover emergency procedures, safety requirements and provide drawings depicting layout and location of controls/indicators. The manual shall also contain assembly and exploded views, where required, to facilitate maintenance operations, and detailed step-by-step instructions for the removal, repair, and replacement of subsystems and components.

B. The Operating Instructions Manual shall contain instructions that will enable personnel to become familiar with and have a basic understanding of equipment operation. Methods of correcting soft failures shall be included. The data shall also include a general description of each subsystem of the fare collection equipment, set-up and shutdown procedures, emergency procedures, safety requirements and drawings depicting layout and location of controls/indicators.

C. The Parts Catalog shall enumerate and describe each replaceable unit with its related component(s) and part(s), including the supplier's number, the Contractor's number, the commercial equivalents, and provision for entry of the District's unique part I.D. number. Cut-away and exploded drawings shall be used to permit identification of all parts. Parts common to different components (e.g., bolts and nuts) shall bear the same number with a reference to the other components in which they are found. Each part or component shall be identified as being part of the next larger assembly.

D. The Test Equipment and Special Tools Manual shall provide application, operation, usage, adjustment, inspection, maintenance, troubleshooting, repair, storage instructions, and spare parts catalogs. Each part shall be referenced by assigned part number and, where applicable, by manufacturer's part number in the spare parts catalog.

E. The Maintenance Manual for Microprocessor-based Equipment shall provide a complete set of the configured documentation developed in preliminary and final design, and modified thereafter.

In addition to the design documentation that includes pseudocode or program design language, system level structure charts or flow charts, data flow diagrams and the data dictionary, the manuals shall contain:

1. A complete listing of fully configured and annotated source code

2. A full description of interrupt sequences and other protocols

3. A complete listing of machine code, indicating location in the processor memory hardware

4. Memory maps and input-output maps

5. Full documentation of software development tools required to modify, compile, assemble, test and evaluate the software.

All development software used in the processor software development shall be furnished and details of any special development hardware provided. The equipment required to reprogram the processor firmware shall be provided.

Guidelines shall be provided for modification of the software, including limits and impacts of parameter modification, and for reconstruction of software self-checks such as checksums.

21.4.4 Manual Format

A. Manuals shall be designed for continuous, long-term service in a maintenance-shop environment. Covers shall be black with white lettering, shall lie flat when opened, shall permit adding and replacing pages, and shall be oil-, water-, and wear-resistant.

1. Material shall be indexed. Divider pages shall be white, 60-lb minimum, with white 3/8-in. rounded corner tab extension. Tabs shall be mylar-reinforced, with bold, black capital printing on both sides, and shall be in banks of five.

2. Pages, including drawings and schematics, shall be on approved-grade paper and bound either in loose-leaf form with reinforced punch holes, or, if approved, in five- or seven-ring binders. Pages shall be 8-1/2-in. wide by 11-in. high, except for certain figures and the Operating Instruction Manual. Pages shall be printed on both sides. Sides of pages intentionally left blank shall be so noted.

3. Figures, including diagrams, drawings, illustrations, and schematics, shall be labeled as figures. If approved, figures may be 11-in. high by 17-in. wide, and folded to 8-1/2-in. format with the identification displayed. A list of figures with page references shall be near the front of each manual.

4. The Operating Instruction Manual shall be approximately 4-in. high by 7-in. wide.

B. Revisions to final drafts and to approved printed manuals as required for all design changes, retrofits, and errors based on changes generated during the test programs shall be recorded on a control list in the front of each manual. The list shall be issued with each revision and shall show the date of each revision and the page reference. Updated lists and revisions shall be maintained in the manuals by the Contractor until the warranty period expires.

21.4.5 Electrical Diagrams and Schematics

The following types of analog and digital circuit diagrams and schematics shall be included in the manuals to support the description of electrical and electronic systems and the explanation of their operation.

A. Block diagrams shall be used in the descriptive portion of the manuals to simplify complex circuits such that nonspecialist personnel can obtain an understanding of the function and operation of the system, subsystem, or component. Block diagrams shall show the arrangement of system components and current/signal flow through the system.

B. When the complexity of a system requires a general orientation for the understanding of the interrelation of components within the system, subsystem, or subsystems, a simplified schematic shall be provided. Schematic diagrams shall be broader in scope than the block diagrams. The circuit shall be presented without regard to unit location, but be electrically accurate to provide a clear presentation of the overall circuit. Schematics shall show the electrical operation of the system, subsystem, or component, and their interconnections. Schematics shall be suitable for training, to provide a more detailed understanding of the operation of the system.

C. For digital circuits only, logic schematics, prepared in accordance with ANSI Y32.14, shall be provided to depict electronic systems and components that use logic or two-state devices in their construction. Logic schematics shall be designed to aid in understanding the function and operation of a circuit, without showing the physical construction.

21.4.6 Other Requirements

Requirements relating to dimensional drawings, weights, and measurements, are:

A. When dimensioned drawings are used, tolerancing shall be shown in accordance with ANSI Y14.5, or other equivalent national standards approved by the District.

B. Weights and measurements shall be shown in text and illustrations in the English system of weights and measurements.

21.5 TRAINING

A program shall be provided to train District personnel in the Fare Collection system and in the details of fare collection equipment to enable them to satisfactorily operate the system and service and maintain the equipment.

21.5.1 Training Program Plan

A Training Program Plan shall be detailed as an element of the System Support Plan, and shall be conducted in two activities:

A. Familiarization Course

B. Course to train District personnel to train others.

21.5.2 Students

A. Students entering the program will be District personnel who have the basic skills pertinent to their job classification, but do not necessarily have a knowledge of the Fare Collection system or fare collection equipment.

B. Qualification requirements regarding education, experience, and skill levels will permit selection of suitable personnel for training.

21.5.3 Familiarization Course

The course shall be designed to provide District personnel with an overall understanding of the Fare Collection system and the interrelationships of the equipment with the passengers. The instruction shall include a description of the fare collection equipment and demonstrations of its operation. Personnel attending the familiarization course may include: management, public relations, community relations, and other administrative personnel.

21.5.4 Course to Train District Personnel to Train Others

The course shall be designed to train District instructors to train others in:

A. System Operations: The course shall be designed to prepare the student to operate the Fare Collection system in revenue service. The course shall include overall familiarization with the system, instruction in equipment operation, and the interrelationship of the equipment with the passengers. Troubleshooting methodology instruction, including simulated conditions and scenarios, shall be provided. A separate course shall be conducted for operation of the FCCC. The training shall enhance the student's abilities to diagnose and counteract equipment failures, and to resolve potential passenger or equipment problems. Personnel attending the system operations course will include: operations personnel, station agents, ticket agents, RCC operators, revenue personnel, and District security personnel.

B. Field and Shop Maintenance: The course shall be designed to prepare the student to maintain the fare collection equipment during revenue service. The course shall include overall familiarization with the system, instruction in the basic fundamentals of the equipment and in-depth maintenance, and the use of all test equipment and special tools furnished under the Contract. Service, routine maintenance, heavy repair, troubleshooting, and unscheduled maintenance shall be covered through the LLRU. Simulated and artificially-created failures that require the use of test equipment, special tools, and diagnostic techniques shall be used as follow-up to classroom instruction. The training shall enhance the student's abilities to perform preventive and corrective maintenance on the fare collection equipment. Personnel attending

the field and shop maintenance courses will include: engineers, maintenance supervisors, and maintenance technicians.

21.5.5 Training Material Development

Training material shall be developed and provided, as specified.

A. Instructor Material: Instructor material shall be provided for each course and shall include the identification of potential safety problems, and training in handling them if they occur.

B. Course Outline: A course outline with learning objectives shall be submitted for approval 90 days prior to scheduled delivery of first equipment. (CDRL) The system operations course outline shall provide a topic outline for each item of fare collection equipment. The maintenance course shall include a section covering system fault analysis and troubleshooting. The learning objective shall be stated for each topic.

C. Lesson Plans: Lesson plans shall be prepared and submitted for approval at least 60 days prior to the start of training. (CDRL) The lesson plans shall include an in-depth outline of the material to be presented for each course and a listing of the training aids to be used. The lesson plans shall be in sufficient detail to be used by student instructors, after completing the training, to train others. Each student instructor shall receive a copy and reproducible of each lesson plan.

D. Grading System: A grading system shall be submitted for approval at least 60 days before start of training. (CDRL) The grading system will be used to report the progress of each student during the program. Grading shall be kept confidential and furnished only to personnel designated by the District.

E. Training Aids:

1. The training program shall include the use of catalogs, drawings, actual equipment, film strips, flip charts, manuals, mock-ups, models, slides, transparencies, video cassettes, and other training aids, as required. Training aids shall be of durable construction and shall

be turned over to the District at the completion of the program.

2. Optimum use of visual aids shall be developed for each topic. The District will provide training equipment, such as slide projectors, movie projectors, screens, easels, and similar equipment, as required.

3. Each complete course shall be videotaped using Contractor-furnished equipment, materials, and personnel. The completed and edited tapes shall be provided for future use in the District's training program.

F. Instructional Material: The primary source of instructional material shall be the applicable equipment operation and maintenance manuals. In addition, for each course specified, the Contractor shall develop notebooks containing drawings, descriptive information, and procedures necessary to ensure that all learning objectives are met in an orderly and timely manner. Notebook materials shall be arranged by each item of equipment and sequenced according to the topic outline.

G. Instructional Equipment: Training shall be conducted utilizing installed equipment in normal operating conditions, except in the case of shop maintenance instruction, where equipment awaiting installation shall be utilized. In the event such equipment has been accepted by the District, the equipment will be made available to the Contractor for training purposes. The Contractor shall restore such equipment to normal operating condition at the end of the training course. Use of the equipment for training purposes shall not void or otherwise modify the warranty. Tools and test equipment shall be provided on the same basis as the operating equipment.

H. Scope: The training program shall be as follows:

Title	Length of Course (Hr)	No. of Students Per Course	No. of Courses	Total Training Course Hours
Familiarization Course	2	35	1	2

System Operations Course	16	10 - 12	1	16
FCCC Operating Course	16	4-6	1	16
Field & Shop Maintenance Course	160	10 - 12	1	160

Practical training on equipment shall constitute no less than 40 percent of the course duration.

I. Instructors: Experienced and qualified instructors shall be provided to teach the courses, as outlined. Instructors' resumes shall be submitted for approval 45 days prior to the beginning of the training course. (CDRL) Courses shall be conducted in the English language. Command of the English language shall be a requirement of instructors.

J. Location: Training classes will be conducted at facilities provided by the District.

K. Times: Class times will be at the convenience of the District. Instruction shall not exceed 8 hr/day.

21.6 SPARE PARTS

This section specifies the requirements for spare parts provisioning for the Fare Collection system. Spare parts provisioning shall meet the requirements given below.

21.6.1 General

A. Spare parts shall be interchangeable with their corresponding parts.

B. Packaging shall consider the reliability of the parts and the requirements for inspecting and inventory (e.g., the packaging selected for highly reliable parts shall be such that the parts can be identified, inspected, and stored for long periods, and endure multiple inventories).

21.6.2 Recommended Parts List

A list of recommended spare parts shall be submitted no later than 270 days after NTP. (CDRL) The spare parts

shall be considered sufficient to support the maintenance needs for 1 yr of revenue service. Quantities, unit prices, and information for ordering and procuring shall be included. The recommendation shall include the following:

A. Grouping by subsystem, test equipment, and special tools for stocking identification.

B. Component name, description, rating, accuracy, Contractor's part number, manufacturer's name, manufacturer's part number, drawing references, and correlation with the maintenance manual.

C. Correlation of the recommended quantities with reliability requirements, with lead time, and in consideration of the following classifications:

1. Wear: Components that may be expected to require regular replacement under normal maintenance schedules, such as mechanical parts subject to continuous operation.

2. Consumables: Components with an expected life of less than 5 yr, such as indicator lamps.

3. One-shot: Components that normally require replacement after performing their function one time, such as fuses.

4. Long-lead: Components that are not readily available from distributors or the manufacturer, such as specially made components.

5. Exchange Assemblies: Assemblies that will be exchanged with malfunctioning units on the supplied equipment and that must be inventoried as complete assemblies.

D. Where replacement components are common to more than one subsystem (whether equipment, diagnostic test equipment, or special tool), include a cross-reference and indexing system. Such components shall have only one part number.

21.6.3 Provisioning

The District will review the recommendations for initial provisioning of parts and determine the items and quantities to be procured. The District will request a

proposal for those items in accordance with the Article of the Contract entitled "Pricing of Adjustments."

END OF SECTION

SECTION 22

CONTRACT DATA REQUIREMENTS LIST

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SECTION 22

CONTRACT DATA REQUIREMENTS

22.1 GENERAL

Contractor shall comply with the requirements for the submission of schedules, reports, certificates, and other data listed in these Technical Provisions.

22.2 TECHNICAL DATA REQUIREMENTS

Technical data to be submitted shall be in accordance with the Contract Data Requirements List, Table TP-22-1. Column title definitions are:

A. Item No: Numeric identifier

B. Title: CDRL item

C. Reference Paragraph: Item's location in Technical Provisions

D. Format/Quantity: Submittal format and quantity

E. Scheduled Submittal Date/Frequency/Approval: Number of days after NTP for initial submittal, frequency of submittal, and approval requirement.

TABLE TP-22-1

CONTRACT DATA REQUIREMENTS LIST

ITEM NO. (a)	TITLE (b)	REFERENCE PARAGRAPH (c)	FORMAT/ QUANTITY (d)	SCHEDULED SUBMITTAL DATE/ FREQUENCY/APPROVAL (e)
201	Detailed Design, Patron Interface Panels	2.4.2	Drawings Mock-up	PDR/1 time/Approval required FDR/1 time/Approval required
202	Register Method of Reset	2.7.5	Letter/3 copies	PDR/1 time/Approval required
203	Cash Containers Design	2.8.5	Drawings and Technical Data/ 3 copies	PDR/1 time/Approval required
204	Unauthorized Access Analysis	2.9.3	Report/5 copies	PDR/1 time/Approval required
205	Method to Identify Cash Containers to FCCC	2.10.2	Report/5 copies	PDR/1 time/Approval required
206	EMI Analysis	2.12.6	Report 5/copies	PDR/1 time/Approval required
207	Grounding Protection	2.12.8	Technical Data/ 3 copies	PDR/1 time/Approval required
301	Coin Standards Specification	3.9.3	Specification/ 5 copies	PDR/1 time/Approval required
901	Proposed Forms for Service and Maint-enance Data Storage	9.5.2	Form/3 copies	PDR/1 time/Approval required
1001	Description and Analysis of Data Encoding Parameters	10.6.3	Report/5 copies	PDR/1 time/Approval required
1002	Ticket Security Features Method	10.7.4	Technical Data/ 3 copies	PDR/1 time/Approval required
1003	Full-size Ticket Proofs	10.9.1	Ticket/5 copies	60 days prior to FDR/1 time/ Approval required

TABLE TP-22-1 (Cont'd.)

ITEM NO. (a)	TITLE (b)	REFERENCE PARAGRAPH (c)	FORMAT/ QUANTITY (d)	SCHEDULED SUBMITTAL DATE/ FREQUENCY/APPROVAL (e)
1004	Sample Tickets	10.9.1	Ticket/100 copies	30 days prior to FDR/1 time/ Approval required
1005	Preproduction Ticket Samples	10.9.1	Ticket/5 copies	30 days prior to Qualification Test/ 1 time/Approval required
1006	Fare Media Specifications	10.9.2	Specification/ 5 copies	PDR/1 time/Approval required
1101	Configuration of BTEM	11.3.2	Drawings and Technical Data/ 3 copies	PDR/1 time/Approval required
1102	Encoding and Verification Specification	11.5.1	Specification/ 5 copies	PDR/1 time/Approval required
1103	Software Design	11.5.2	Technical Data/ 3 copies	PDR/1 time/Approval required
1201	Weight and Load Analysis	12.5.1	Technical Data/ 3 copies	PDR/1 time/Approval required
1202	Cart Configuration (Drawings)	12.5.2	Technical Data/ 3 copies	PDR/1 time/Approval required
1301	Test Equipment Documentation (Drawings and Manuals)	13.4.1	Technical Data/ 3 copies	(Reference: Special Provisions)/ 1 time/Approval required
1302	Test Equipment Documentation (Accessories/ Documentation)	13.4.2	Technical Data/ 3 copies	(Reference: Special Provisions)/ 1 time/Approval required
1303	Standard Test Equipment and Tools List	13.5	List/5 copies	PDR/1 time/Approval required
1601	Conductor Characteristics Certification	16.4.2	Certification/ 3 copies	PDR/1 time/Approval required

TABLE TP-22-1 (Cont'd.)

ITEM NO. (a)	TITLE (b)	REFERENCE PARAGRAPH (c)	FORMAT/ QUANTITY (d)	SCHEDULED SUBMITTAL DATE/ FREQUENCY/APPROVAL (e)
1602	Wire Marking and Installation Specification	16.4.2	Specification/ 3 copies	PDR/1 time/Approval required
1603	Fastening Device List	16.5.1	List/5 copies	PDR/1 time/Approval required
1701	Installation Plan	17.1	Plan/5 copies	90 days/1 time/Approval required
1801	System Assurance Program Plan (SAPP)	18.2	Plan/5 copies	90 days/1 time/Approval required
1802	Action Item List	18.2.4	Report/5 copies	30 days/Monthly/Information
1803	Audit Reports	18.2.4	Report/5 copies	60 days/As required/Information
1804	Reliability Analyses	18.4.3	Report/5 copies	90 days/1 time/Approval required
1805	Reliability Demonstration Plan	18.4.4	Plan/5 copies	90 days/1 time/Approval required
1806	Maintainability Analyses	18.5.3	Report/5 copies	90 days/1 time/Approval required
1807	Critical and Common Failure Modes Summary	18.5.3	Report/5 copies	120 days/1 time/Approval required
1808	Corrective Analyses and Preventative Maintenance Schedules	18.5.3	Report/5 copies	120 days/1 time/Approval required
1809	Maintainability Demonstration Plan	18.5.4	Plan/5 copies	90 days/1 time/Approval required
1810	Quality Assurance Organization	18.6.2	Plan/5 copies	90 days/1 time/Approval required
1811	Quality Assurance Procedures	18.6.2	Plan/5 copies	90 days/1 time/Approval required

TABLE TP-22-1 (Cont'd.)

ITEM NO. (a)	TITLE (b)	REFERENCE PARAGRAPH (c)	FORMAT/ QUANTITY (d)	SCHEDULED SUBMITTAL DATE/ FREQUENCY/APPROVAL (e)
1812	Software QA Plan	18.6.2	Plan/5 copies	45 days/1 time/Approval required
1813	Procurement Quality Assurance	18.6.9	Procedure/ 5 copies	90 days/1 time/Approval required
1814	Inspections and Tests (Request for District Attendance)	18.6.10	Letter/3 copies	10 days prior to inspections and tests/As required/Information
1815	Inspection Pass/ Fail Criteria	18.6.12	Letter/3 copies	With test procedures/As required/ Approval required
1816	Statistical Sampling Plan	18.6.15	Plan/5 copies	90 days/1 time/Approval required
1817	QA Program Audit Procedure with Preliminary Audit Schedule	18.6.22	Procedure/ 5 copies	90 days/1 time/Approval required
1818	QA Program Audit Reports	18.6.22	Schedule Report/ 5 copies	As required/1 time/Approval required
1901	Management Plan	19.2.2	Plan/5 copies	30 days/1 time/Approval required
1902	Monthly Progress/ Status Reports	19.2.3	Report/5 copies	30 days/Monthly/Information
1903	Critical Path	19.2.4	Schedule/5 copies	90 days/Update every 60 days/Approval required
1904	Initial Activities Plan	19.3	Plan/5 copies	15 days/1 time/Information
1905	Manufacturing Plan	19.4	Plan/5 copies	120 days/1 time/Approval required
1906	Submission of Material Samples	19.5.3	Samples/3 sets	As required/1 time/Approval required
1907	Drawings and Color Renderings for Presentation	19.5.4	Drawings/5 copies	As required/1 time/Approval required

Table TP-22-1 (Cont'd.)

ITEM NO. (a)	TITLE (b)	REFERENCE PARAGRAPH (c)	FORMAT/ QUANTITY (d)	SCHEDULED SUBMITTAL DATE/ FREQUENCY/APPROVAL (e)
1908	Configuration Management Plan	19.6.1	Plan/5 copies	90 days/1 time/Approval required
1909	Serialized Items List and Method	19.6.5	List/5 copies Plan/5 copies	160 days/1 time/Approval required
1910	Drawing Tree and List	19.6.6	List/5 copies	90 days/1 time/Approval required
1911	Design Review Schedule	19.6.9	Schedule/5 copies	30 days/Update as necessary/Approval required
1912	CDR Data Package	19.6.9	Data/10 copies	10 days prior to CDR/1 time/Approval required
1913	PDR Data Package	19.6.9	Data/10 copies	20 days prior to PDR/1 time/Approval required
1914	FDR Data Package	19.6.9	Data/10 copies	30 days prior to FDR/1 time/Approval required
1915	FACI Inspection Notification	19.6.9	List/3 copies	10 days prior to inspection/1 time/ Approval required
1916	FACI Indentured Drawing List	19.6.9	List/5 copies	30 days prior to FACI/1 time/Approval required
1917	Drawings	19.6.10	Drawings/5 copies	As required/1 time/Approval required
1918	As-built Manufac-facturing Drawings	19.6.10	Drawings/5 copies	90 days after acceptance of system/ 1 time/Approval required
1919	Identify and Document Interfaces	19.6.11	Data Form/ 5 copies	90 days/1 time/Approval required
2001	Test Notification	20.1.3	Letter/3 copies	10 days prior to test/As required/ Information
2002	Test Reports	20.1.4	Report/5 copies	30 days after test completion/As required/Approval required

Table TP-22-1 (Cont'd.)

ITEM NO. (a)	TITLE (b)	REFERENCE PARAGRAPH (c)	FORMAT/ QUANTITY (d)	SCHEDULED SUBMITTAL DATE/ FREQUENCY/APPROVAL (e)
2003	Test Program Plan	20.2.1	Plan/5 copies	90 days/1 time/Approval required
2004	Test Procedures	20.2.2	Procedure/ 5 copies	60 days prior to each test/As required/Approval required
2005	Reliability Demonstration Test Plan/ Procedures	20.6.2	Plan/5 copies Procedure/5 copies	90 days/1 time/Approval required
2101	System Support Plan	21.2	Plan/5 copies	90 days/1 time/Approval required
2102	Preliminary Drafts of Manuals	21.4.1	Manual/10 copies	180 days prior to Training Course Materials Delivery/As required/ Approval required
2103	Final Drafts of Manuals	21.4.1	Manual/10 copies	90 days prior to Training Course Materials Delivery/As Required/ Approval required
2104	Approved Final Drafts of Manuals and Approved Printed Manuals	SP 2.3	Draft Manuals/ Printed Manuals/ Quantity as specified in 21.4.1	(Reference: Special Provisions)/ 1 time/Approval required
2105	Course Outline	21.5.5	Schedule/5 copies	90 days prior to first equipment delivery/1 time/Approval required
2106	Lesson Plans, Course Materials	21.5.5	Report/5 copies	60 days prior to start of training/ 1 time/Approval required
2107	Grading System	21.5.5	System/5 copies	60 days prior to start of classes/ 1 time/Approval required
2108	Instructor Resumes	21.5.5	Resume/3 copies	45 days prior to start of training course/1 time/Approval required
2109	Recommended Spare Parts List	21.6.2	List/5 copies	270 days/1 time/Approval required

END OF SECTION

INDEX OF DRAWINGS

SHEET NO.	DRAWING NO.	FARE COLLECTION CONTRACT DRAWINGS
1	F-001	INDEX OF DRAWINGS
2	F-002	TYPICAL FARE GATE ARRAY
3	F-028	TYPICAL ADDFARE ARRAY
4	F-025	TYPICAL VENDING EQUIPMENT ARRAY
5	F-005	FARE GATE — TURNSTILE VERSION
6	F-006	HANDICAPPED FARE GATE
7	F-007	EMERGENCY EXIT GATE
8	F-026	TICKET VENDING MACHINE
9		NOT USED
10	F-027	ADDFARE MACHINE.
11	F-011	PASSENGER ASSISTANCE CENTER
12	F-012	STATION FARE COLLECTION CONTROL UNIT (SFCCU)
13	F-013	FENCING DETAILS-SHEET No. 1
14	F-014	FENCING DETAILS-SHEET No. 2
15	F-015	CONDUIT AND UNDERFLOOR DUCT REQUIREMENTS
16	F-016	FARE GATE — BI-PARTING LEAF VERSION
17	F-017	GATEPOST DETAILS AND VARIATIONS
18	F-018	LONGITUDINAL SECTION THROUGH GATEPOST
19	F-019	TRANSVERSE SECTION THROUGH GATEPOST
20	F-020	POWER AND CONTROL DIAGRAM
21	F-021	VENDING MACHINE FILLER PANEL — CONSTRUCTION AND INSTALLATION
22	F-022	TYPICAL REVENUE CART

SHEET NO.	DRAWING NO.	FARE COLLECTION CONTRACT DRAWINGS
23	F-023	FARE GATE ARRAY - - CIVIC CENTER STATION - NORTH - ARRAY #1
24	F-029	FARE GATE ARRAY - - CIVIC CENTER STATION - SOUTH - ARRAY #2 (TBD)
25	F-030	FARE GATE ARRAY - - UNION STATION - EAST - ARRAY #1 (TBD)
26	F-031	FARE GATE ARRAY - - UNION STATION - WEST - ARRAY #2 (TBD)
27	F-032	FARE GATE ARRAY - - FIFTH & HILL STATION - SOUTH - ARRAY #1 (TBD)
28	F-033	FARE GATE ARRAY - - FIFTH & HILL STATION - NORTH - ARRAY #2 (TBD)
29	F-034	FARE GATE ARRAY - - SEVENTH & FLOWER STATION - EAST - ARRAY #1 (TBD)
30		FARE GATE ARRAY - - SEVENTH & FLOWER STATION - WEST - ARRAY #2 (TBD)
31	F-036	FARE GATE ARRAY - - SEVENTH & FLOWER STATION - EAST - ARRAY #1 (LACTC) (TBD)
32	F-037	FARE GATE ARRAY - - SEVENTH & FLOWER STATION - WEST - ARRAY #2 (LACTC) (TBD)
33	F-038	FARE GATE ARRAY - - WILSHIRE/ALVARADO STATION - WEST - ARRAY #1 (TBD)
34	F-039	FARE GATE ARRAY - - WILSHIRE/ALVARADO STATION - EAST - ARRAY #2 (TBD)
		REFERENCE DRAWING:
35	N-081	COMMUNICATIONS/FARE COLLECTION INTERFACE BLOCK DIAGRAM

NOTE:

DRAWING NUMBERS F-003, F-004, F-008, F-009, F-010, AND F-024 ARE NOT USED.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY P. Kardam
DRAWN BY E. Brooks
CHECKED BY C. Williams
IN CHARGE J. M. Brown
DATE 16 JUL 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

RTD

SUBMITTED _____

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

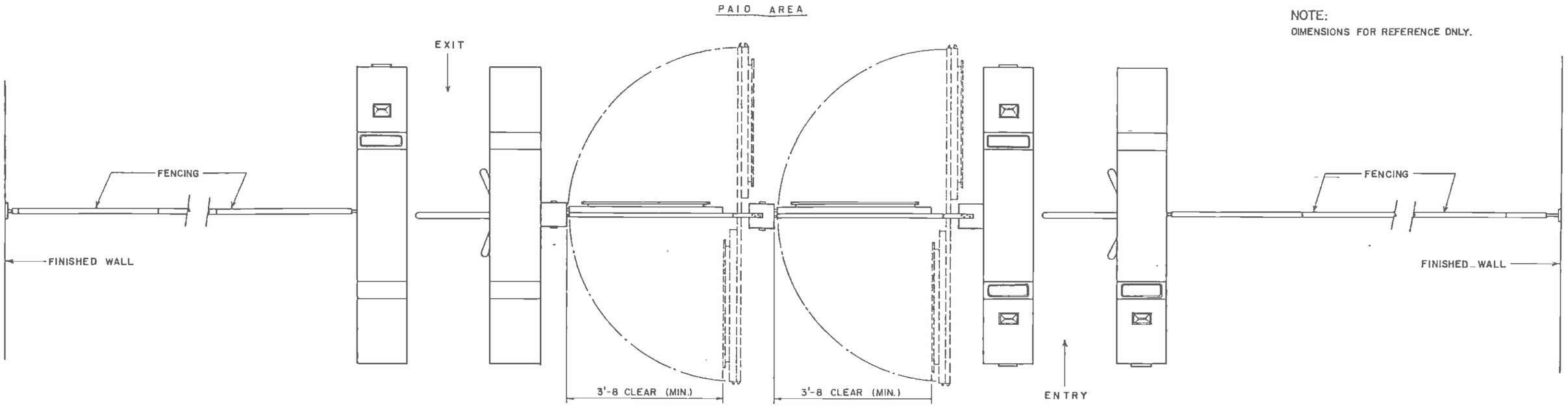
APPROVED _____

FARE COLLECTION
INDEX OF DRAWINGS

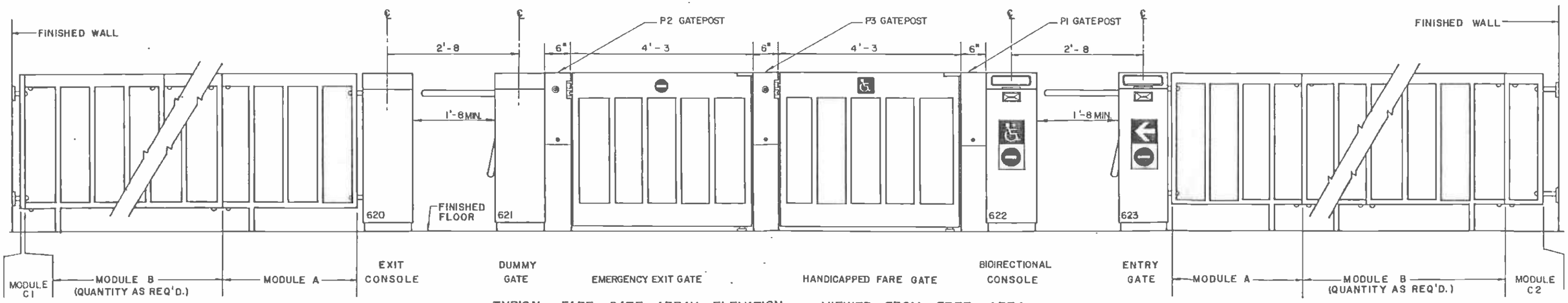
CONTRACT NO. A660
DRAWING NO. F-001
REV.
SCALE NO SCALE
SHEET NO. 1

FONG GRAPHICS 03024

NOTE:
DIMENSIONS FOR REFERENCE ONLY.



PLAN VIEW



TYPICAL FARE GATE ARRAY ELEVATION — VIEWED FROM FREE AREA

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

DESIGNED BY
DRAWN BY E. Acosta
CHECKED BY C. Hsu
IN CHARGE J. M. Brown
DATE 25 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

SUBMITTED

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

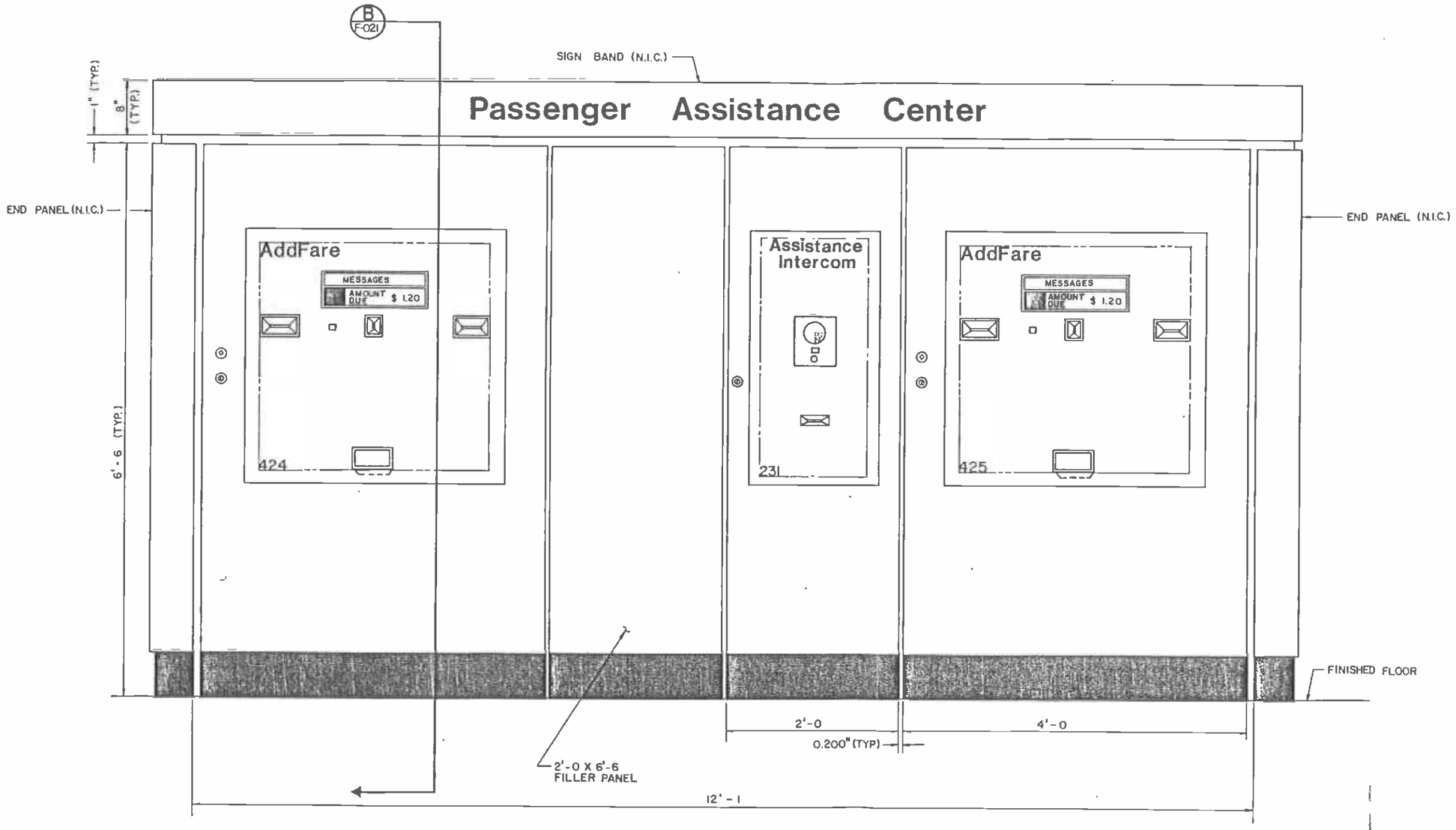
APPROVED

FARE COLLECTION
TYPICAL FARE GATE ARRAY

CONTRACT NO. A660
DRAWING NO. F-002
REV.
SCALE NO SCALE
SHEET NO. 2

NOTES:

1. IN MOS-1 ONLY THE ASSISTANCE INTERCOM CABINET WILL BE OPERABLE. A BLANK PANEL SHALL BE PROVIDED FOR THE AFM BY THE FARE COLLECTION CONTRACTOR.
2. BLANK PANELS FOR AFMS ARE PROVIDED IN 2 TYPES. ONE COMPLETELY BLANK, THE OTHER WITH CUT-OUT TO ACCOMODATE INFORMATION PANEL TO BE PROVIDED BY THE DISTRICT.



THIS WAS FORMERLY DRAWING NO. F-003 AND F-024

REV	DATE	BY	SUB	APP	DESCRIPTION

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

DESIGNED BY P. Karlen
DRAWN BY O. Snopkowski
CHECKED BY P. Karlen
IN CHARGE J. M. Breton
DATE 20 MAY 86

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

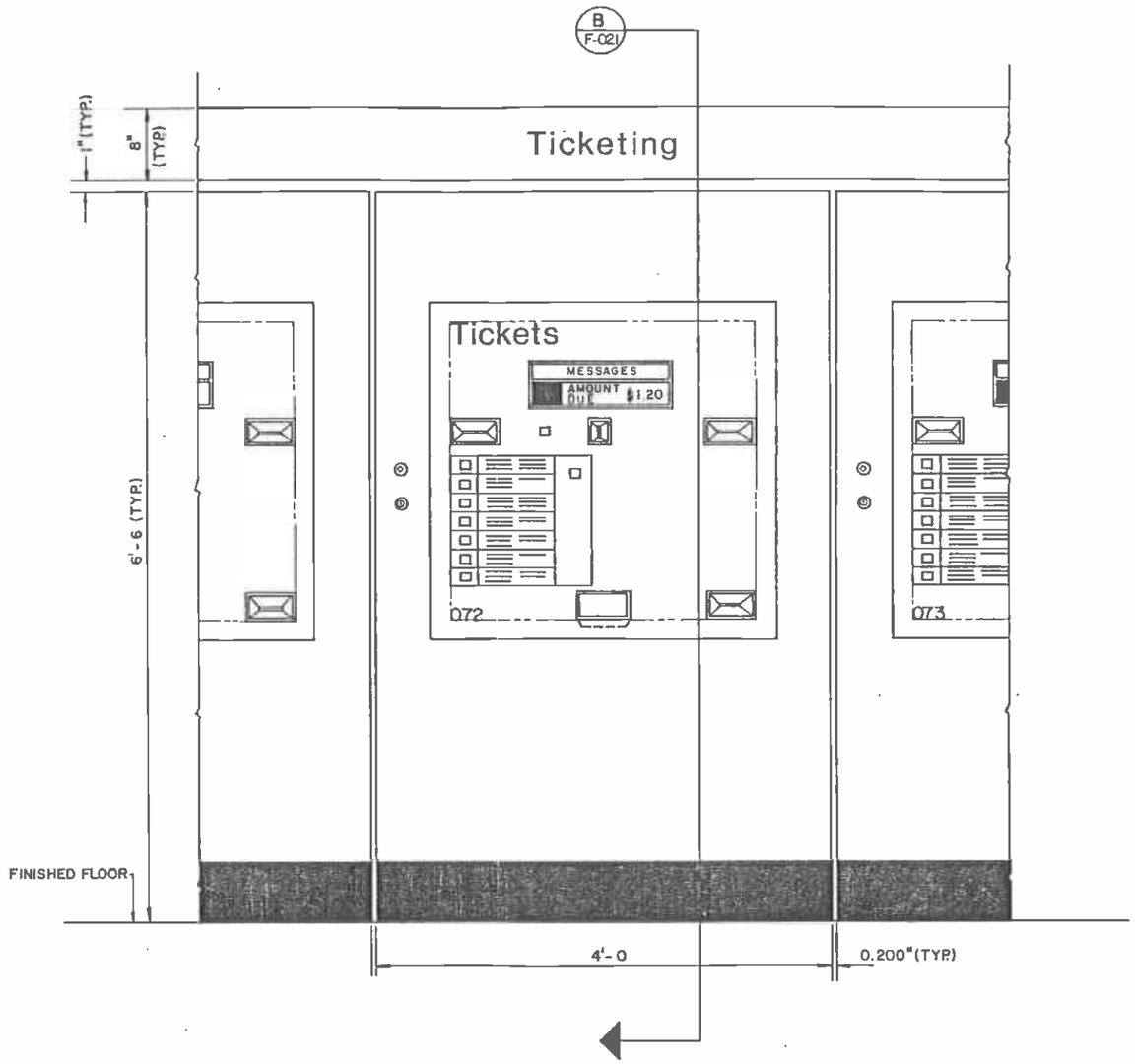
SUBMITTED _____

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

APPROVED _____

FARE COLLECTION TYPICAL ADDFARE ARRAY

CONTRACT NO A660
DRAWING NO F-028
REV
SCALE NO SCALE
SHEET NO. 3



THIS WAS FORMERLY DRAWING NO. F-004.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

DESIGNED BY M.R.T.C.
DRAWN BY Eduardo Acosta
CHECKED BY
IN CHARGE J. N. Brown
DATE 11 APR 86

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

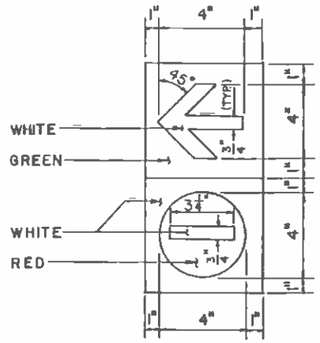
SUBMITTED

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

APPROVED

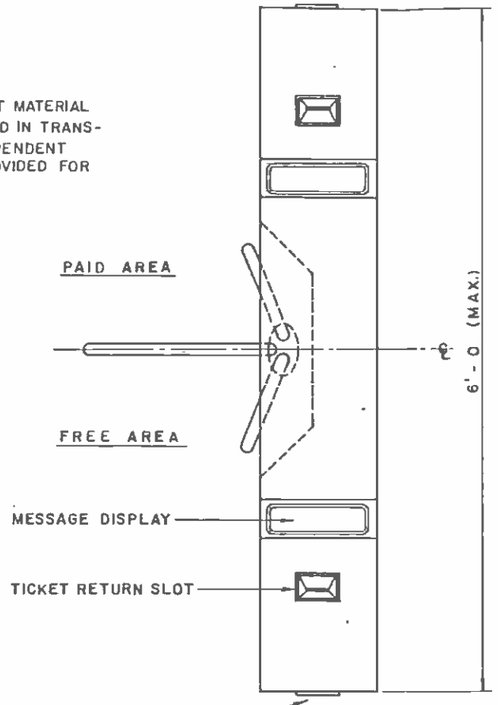
FARE COLLECTION
TYPICAL VENDING EQUIPMENT ARRAY

CONTRACT NO A 660
DRAWING NO F-025 REV.
SCALE NO SCALE
SHEET NO 4



GRAPHIC DETAILS
NO SCALE

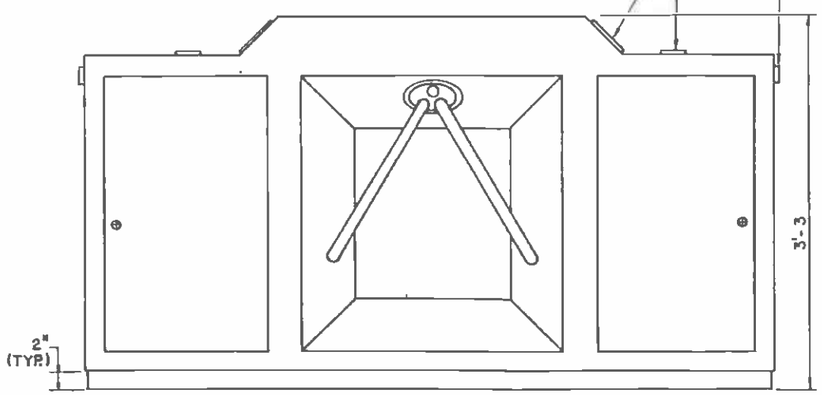
SYMBOLS SHALL BE TRANSLUCENT MATERIAL SILK-SCREENED ON OR EMBEDDED IN TRANSLUCENT WHITE MATERIAL. INDEPENDENT BACK-LIGHTING SHALL BE PROVIDED FOR EACH SYMBOL.



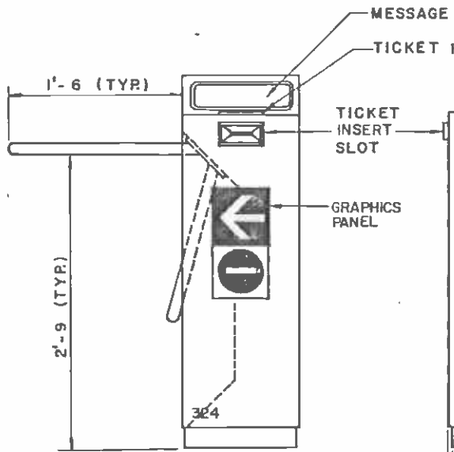
PLAN VIEW

NOTES:

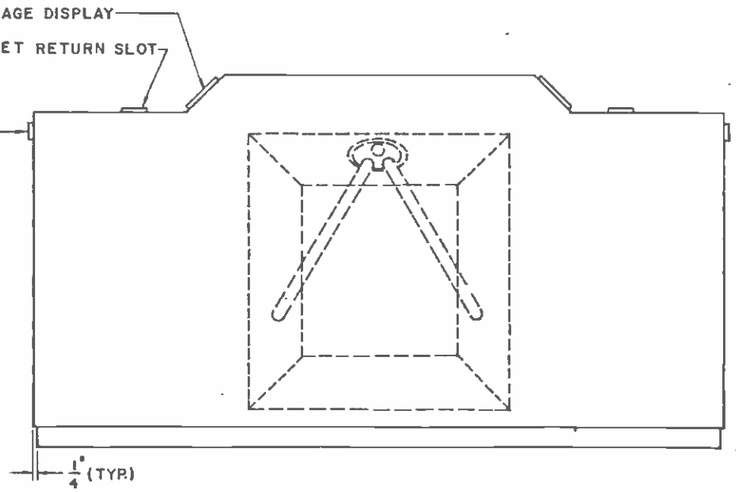
1. GRAPHICS PANEL, MESSAGE DISPLAY, TICKET ENTRY SLOT AND TICKET RETURN SLOT SHALL BE DELETED FROM FREE AREA END OF "EXIT" CONSOLES IN ARRAY, AND FROM PAID AREA END OF "ENTRY" CONSOLES IN ARRAY.
2. END DISPLAYS SHALL FLASH WHEN DISCOUNT TICKETS ARE USED.
3. EXCEPT FOR GRAPHIC ELEMENTS, ALL MACHINE COMPONENTS EXPOSED TO THE PUBLIC SHALL BE TYPE 304 STAINLESS STEEL, NO. 4 FINISH.



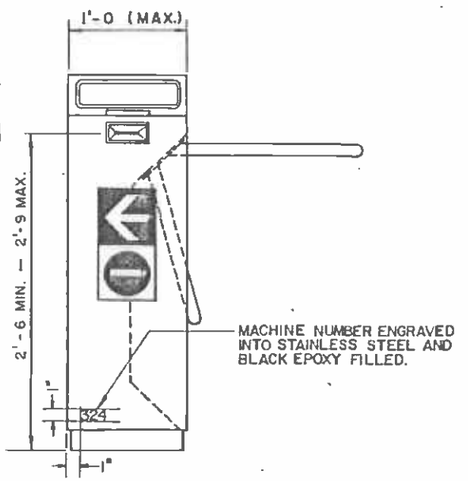
LEFT SIDE VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

DESIGNED BY
DRAWN BY E. Acosta
CHECKED BY
IN CHARGE V. H. Brom
DATE 26 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

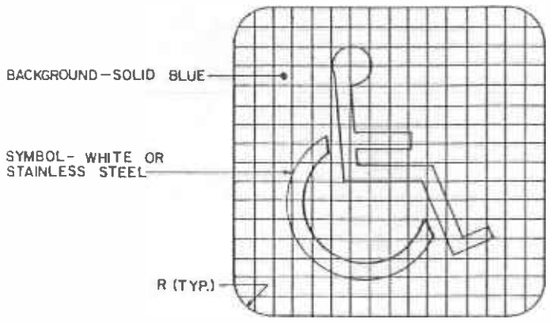
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED _____
APPROVED _____

FARE COLLECTION
FARE GATE
TURNSTILE VERSION

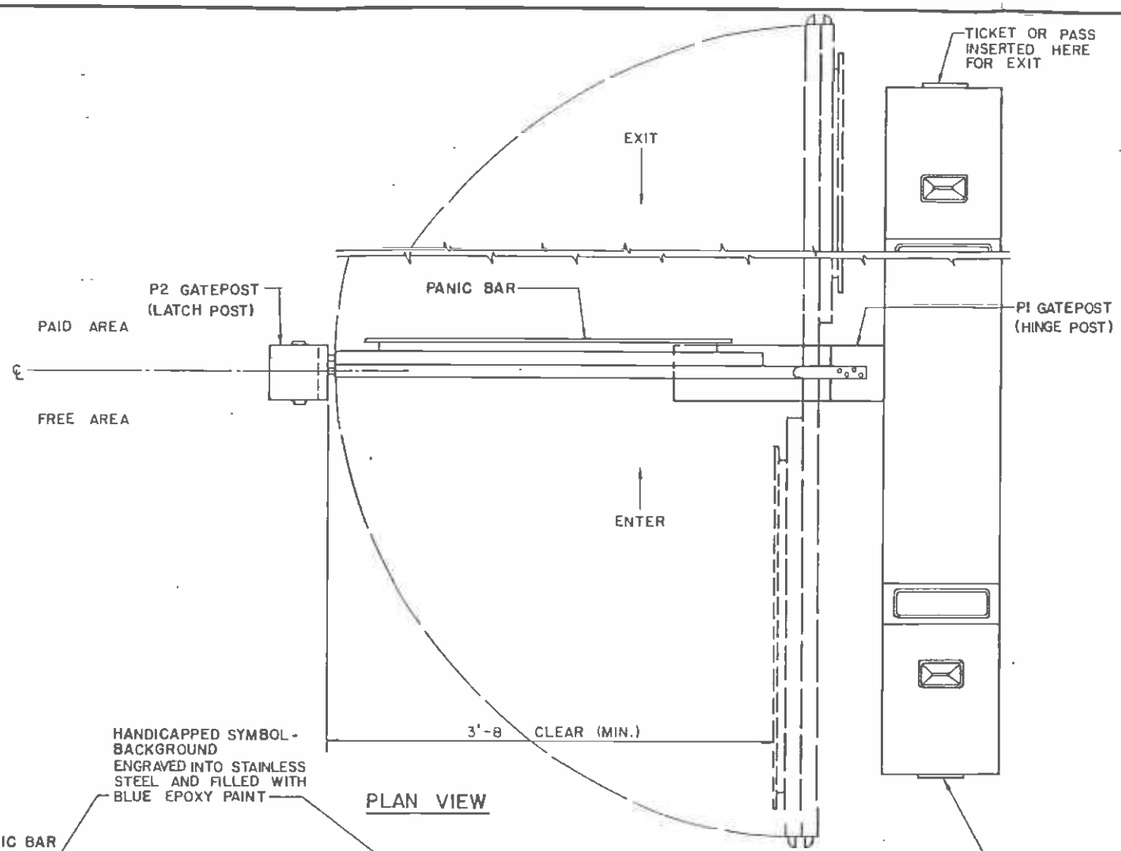
CONTRACT NO A660
DRAWING NO. F-005 REV.
SCALE NO SCALE
SHEET NO. 5

FCMG (GRAPHICS) 0.82/M



HANDICAPPED SYMBOL
GRAPHIC DETAILS
SCALE : FULL SIZE

GRID OVERLAY SHOWN ONLY FOR PROPORTIONAL RELATIONSHIP OF FIGURE TO SQUARE



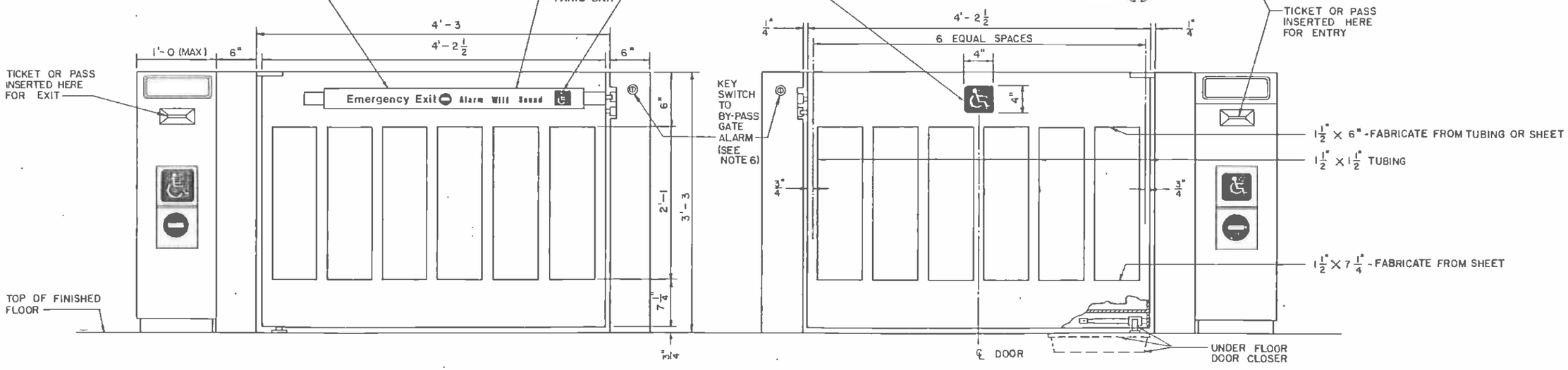
PLAN VIEW

NOTES:

1. GATE, HINGE POST, LATCH POST AND FITTINGS SHALL BE CONSTRUCTED OF TYPE 304 STAINLESS STEEL, NO. 4 FINISH.
2. GATE SHALL BE CONSTRUCTED OF TUBING WITH 0.120" WALL, SHEET AND PLATE, AS REQUIRED, AND SHALL BE OF FULLY WELDED CONSTRUCTION.
3. HINGE POST AND LATCH POST SHALL BE CONSTRUCTED OF PLATE, THICKNESS AS REQUIRED, AND SHALL BE OF FULLY WELDED CONSTRUCTION.
4. CRASH BAR SHALL BE ALUMINUM WITH CLEAR ANODIZED FINISH, WITH STAINLESS STEEL TOUCH BAR SURFACE.
5. FOR GRAPHIC DETAILS NOT SHOWN ON THIS DRAWING, SEE DWG. F-005.
6. KEY SWITCH SHALL ONLY BE INSTALLED ON HANDICAPPED GATEPOST (LATCHPOST) WHEN NO EMERGENCY EXIT GATE IS INCLUDED IN ARRAY.

SYMBOL AND HELVETICA MEDIUM COPY ENGRAVED INTO STAINLESS STEEL TOUCH BAR AND EPOXY PAINT FILLED:

- SYMBOL-RED – 2" DIAM.
- "EMERGENCY EXIT" – BLACK – 1¼" HIGH CAPITAL
- "ALARM WILL SOUND" – BLACK – ¾" HIGH CAPITAL



ELEVATION – VIEW FROM PAID AREA

ELEVATION – VIEW FROM FREE AREA

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

DESIGNED BY	
DRAWN BY	
CHECKED BY	
IN CHARGE	
DATE	27 JUN 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

SUBMITTED

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

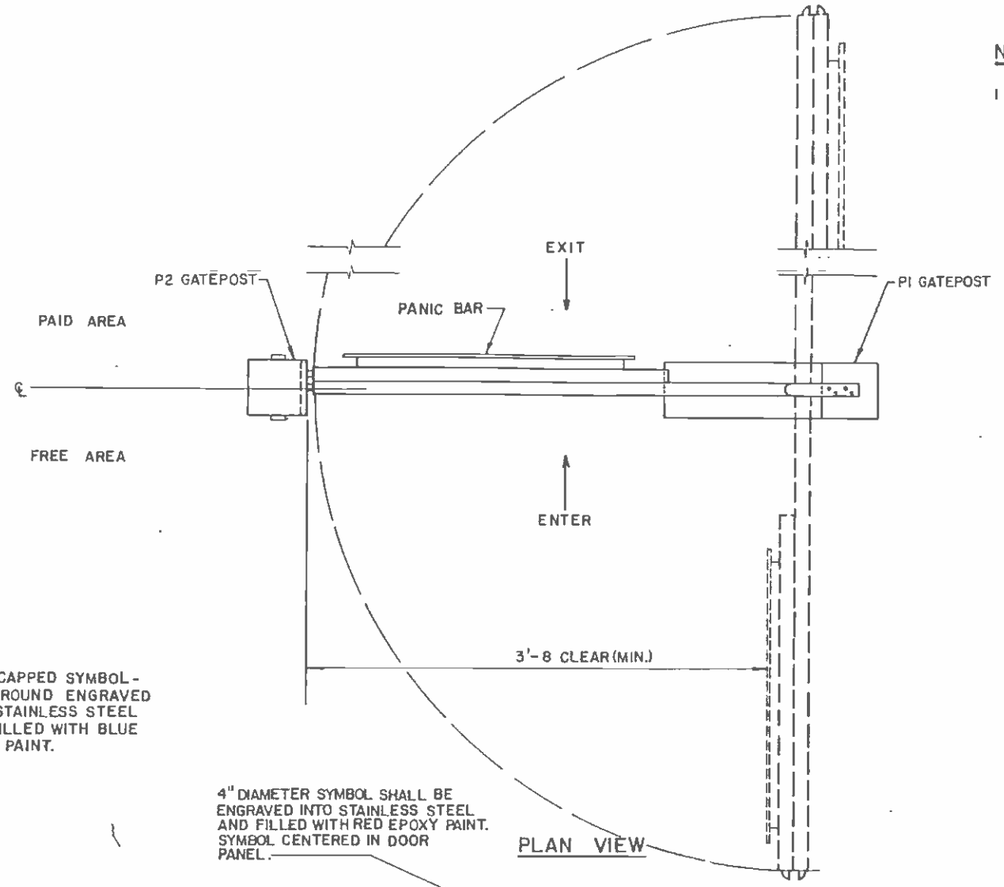
APPROVED

FARE COLLECTION
HANDICAPPED FARE GATE

CONTRACT NO	A660
DRAWING NO	F-006
REV.	
SCALE	NO SCALE
SHEET NO.	6

NOTES:

1 EMERGENCY EXIT GATE SHALL BE IDENTICAL IN SIZE, MATERIALS, FINISH AND CONSTRUCTION TO HANDICAPPED GATE (DWG. F-006), DIFFERING ONLY IN GRAPHICS.



PLAN VIEW

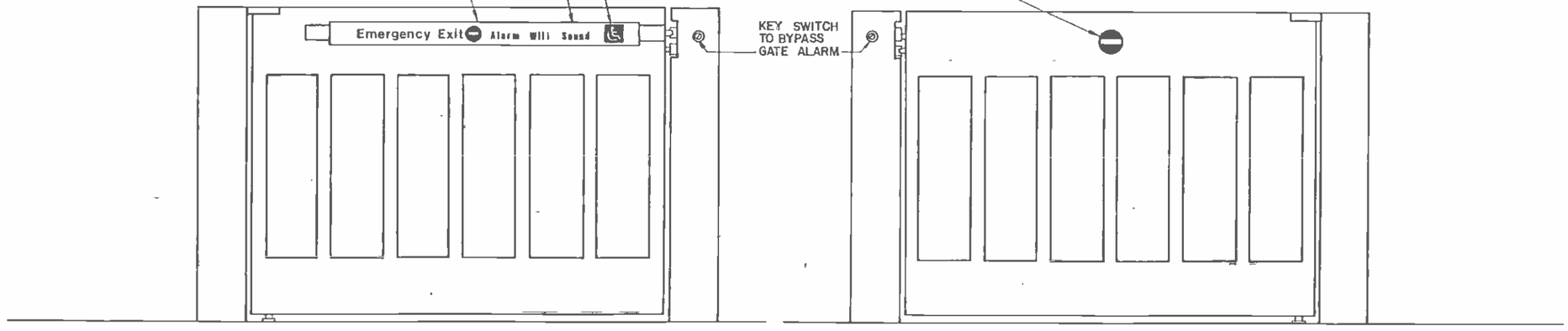
SYMBOL AND HELVETICA MEDIUM COPY ENGRAVED INTO STAINLESS STEEL TOUCH BAR AND EPOXY PAINT FILLED:
- SYMBOL – RED – 2" DIA.
- "EMERGENCY EXIT" – 1 1/4" HIGH CAPITAL
- "ALARM WILL SOUND" – 3/4" HIGH CAPITAL

HANDICAPPED SYMBOL - BACKGROUND ENGRAVED INTO STAINLESS STEEL AND FILLED WITH BLUE EPOXY PAINT.

4" DIAMETER SYMBOL SHALL BE ENGRAVED INTO STAINLESS STEEL AND FILLED WITH RED EPOXY PAINT. SYMBOL CENTERED IN DOOR PANEL.

PANIC BAR

KEY SWITCH TO BYPASS GATE ALARM



ELEVATION-VIEW FROM PAID AREA

ELEVATION-VIEW FROM FREE AREA

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY
DRAWN BY A. VINCENSON
CHECKED BY C. Wine
IN CHARGE J. M. Braun
DATE 26 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED

APPROVED

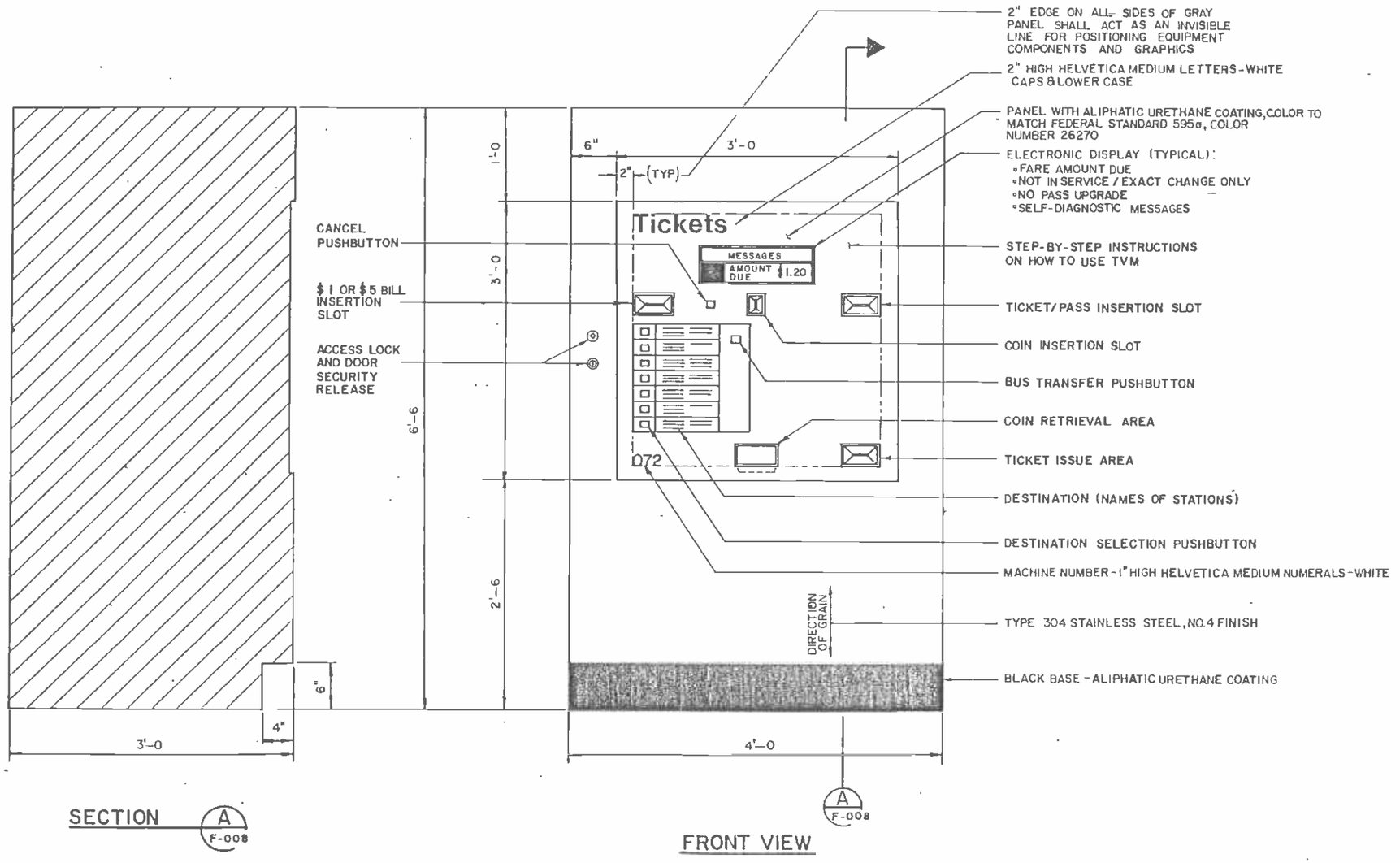
FARE COLLECTION EMERGENCY EXIT GATE

CONTRACT NO. A660
DRAWING NO. F-007
REV.
SCALE NO SCALE
SHEET NO. 7

FORD GRAPHICS, LOS/M

NOTES:

1. TO ACCOMMODATE HANDICAPPED REACH LIMITATIONS, I.E., THE HEIGHT OF PASSENGER FUNCTIONS SHALL BE NO LOWER THAN 2'-6 AND NO HIGHER THAN 4'-6 ABOVE FINISHED FLOOR.
2. ENTIRE HOUSING, EXCEPT FOR GRAY CONTROL PANEL AND BLACK BASE SHALL BE TYPE 304 STAINLESS STEEL, NO. 4 FINISH.



This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE 26 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

DMJM/PBQD/KE/HWA
• JOINT VENTURE
GENERAL CONSULTANTS

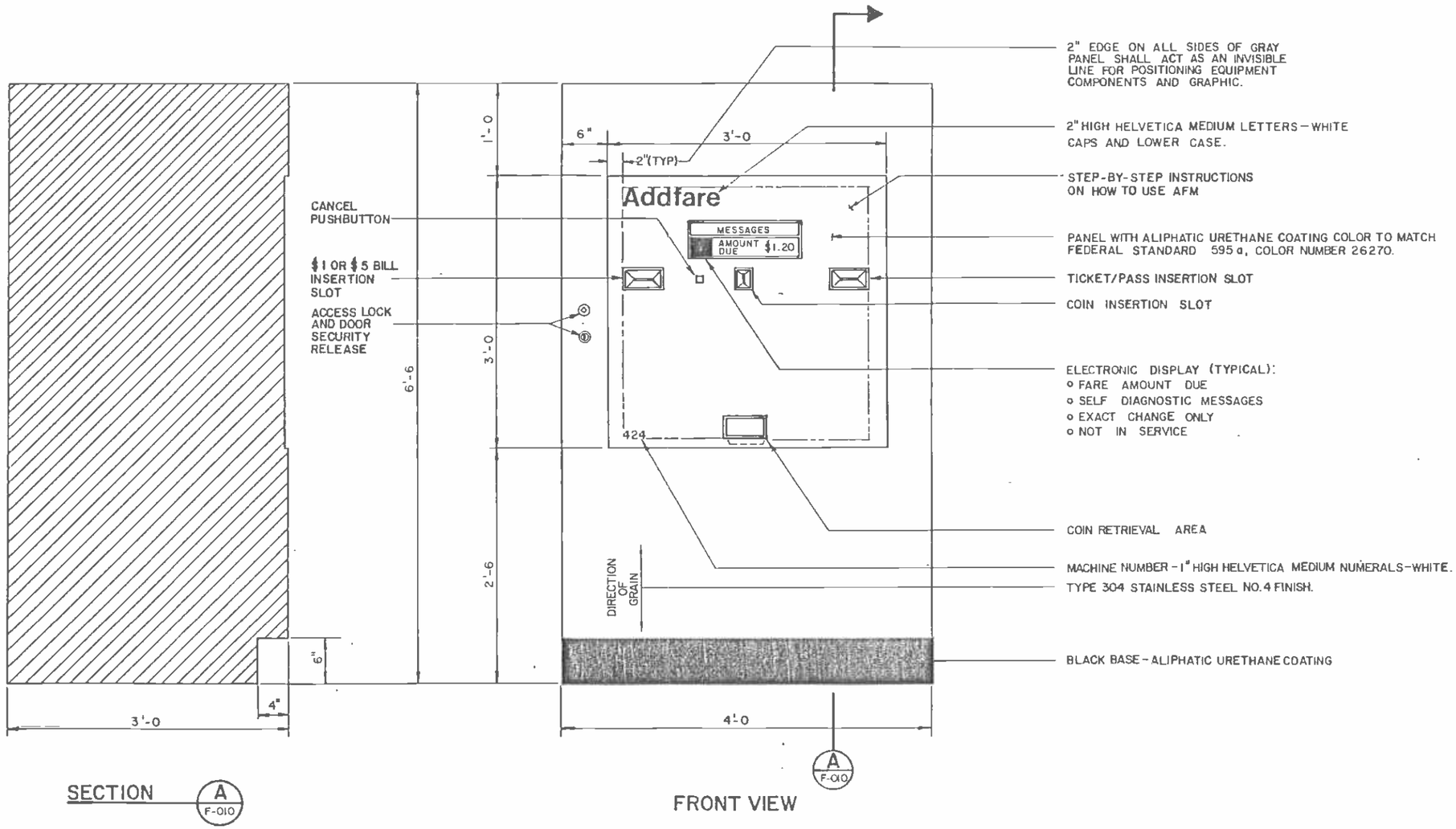
SUBMITTED _____
APPROVED _____

FARE COLLECTION
TICKET VENDING MACHINE

CONTRACT NO. A660
DRAWING NO. F-008
REV.
SCALE NO SCALE
SHEET NO. 8

NOTES:

1. TO ACCOMMODATE HANDICAPPED REACH LIMITATIONS, I.E. THE HIGHT OF PASSENGER FUNCTIONS SHALL BE NO LOWER THAN 2'-6 AND NO HIGHER THAN 4'-6 ABOVE FINISHED FLOOR.
2. ENTIRE HOUSING, EXCEPT FOR GRAY CONTROL PANEL AND BLACK BASE, SHALL BE TYPE 304 STAINLESS STEEL, NO. 4 FINISH.



This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY C. Hawe
IN CHARGE J. M. Brown
DATE 26 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

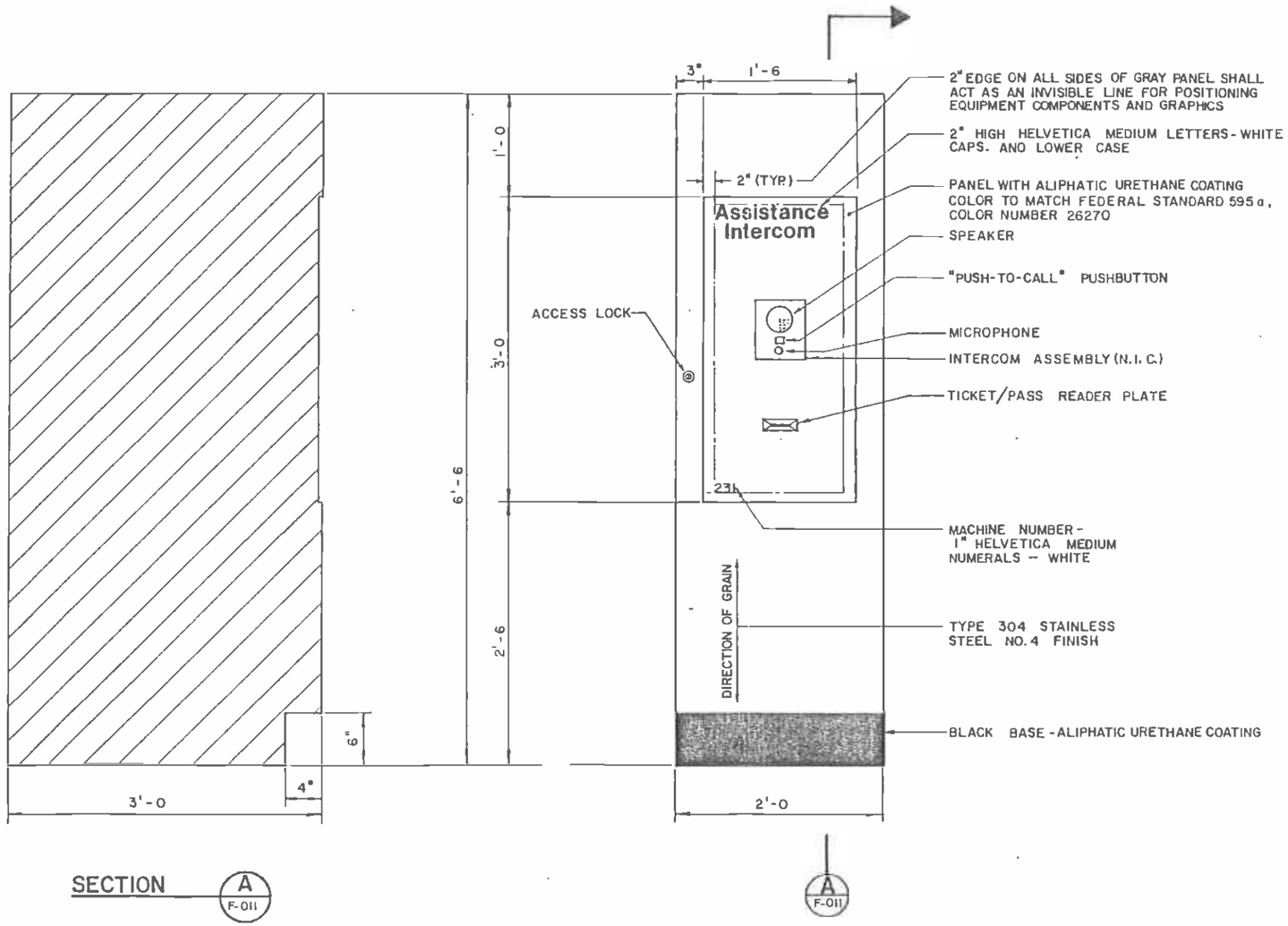
SUBMITTED _____
APPROVED _____

FARE COLLECTION
ADDFARE MACHINE

CONTRACT NO. A660
DRAWING NO. F-010 REV.
SCALE NO SCALE
SHEET NO. 10

NOTES:

1. TO ACCOMMODATE HANDICAPPED REACH LIMITATIONS, THE HEIGHT OF PASSENGER FUNCTIONS SHALL BE NO LOWER THAN 2'-6 AND NO HIGHER THAN 4'-6 ABOVE FINISHED FLOOR.
2. ENTIRE HOUSING, EXCEPT FOR GRAY CONTROL PANEL AND BLACK BASE, SHALL BE TYPE 304 STAINLESS STEEL, NO. 4 FINISH.



SECTION A F-011

A F-011

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY C. Hom
IN CHARGE J. M. Blocker
DATE 25 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

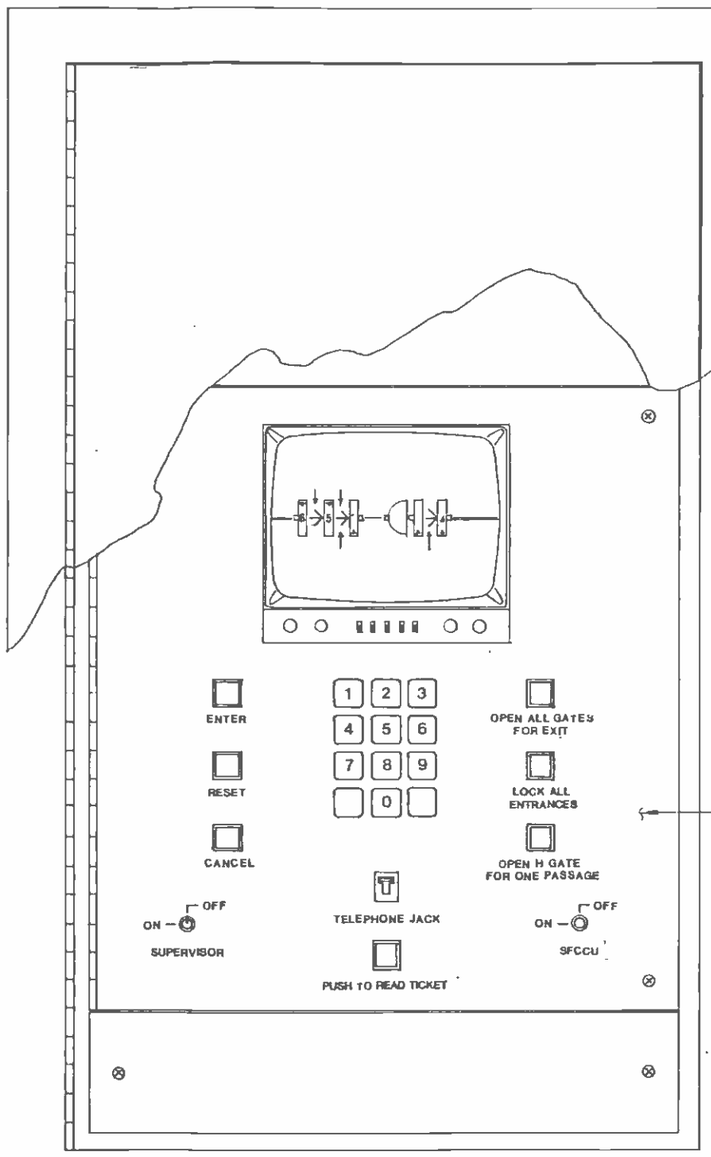
SUBMITTED

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

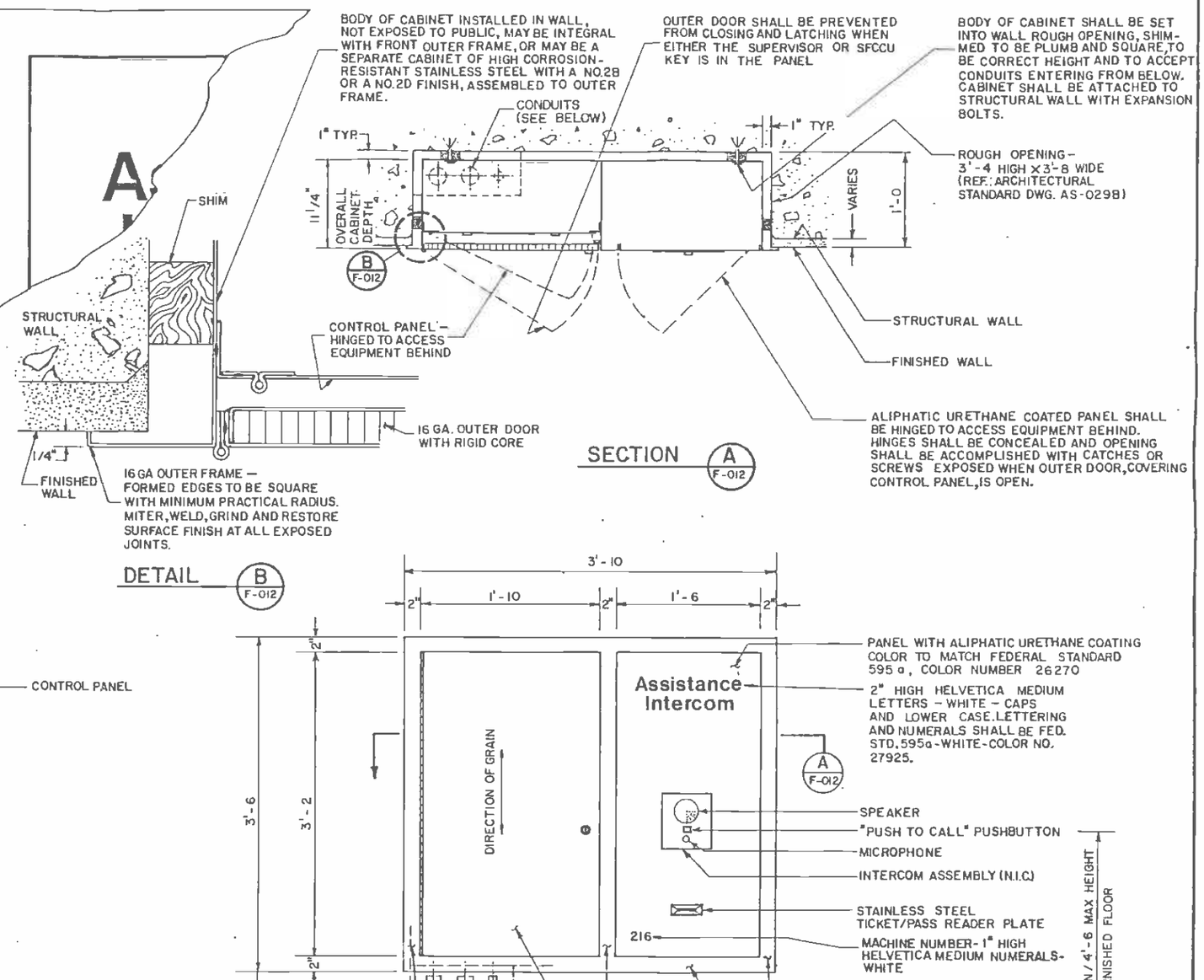
APPROVED

FARE COLLECTION PASSENGER ASSISTANCE CENTER

CONTRACT NO. A660
DRAWING NO. F-011 REV.
SCALE NO SCALE
SHEET NO. 11

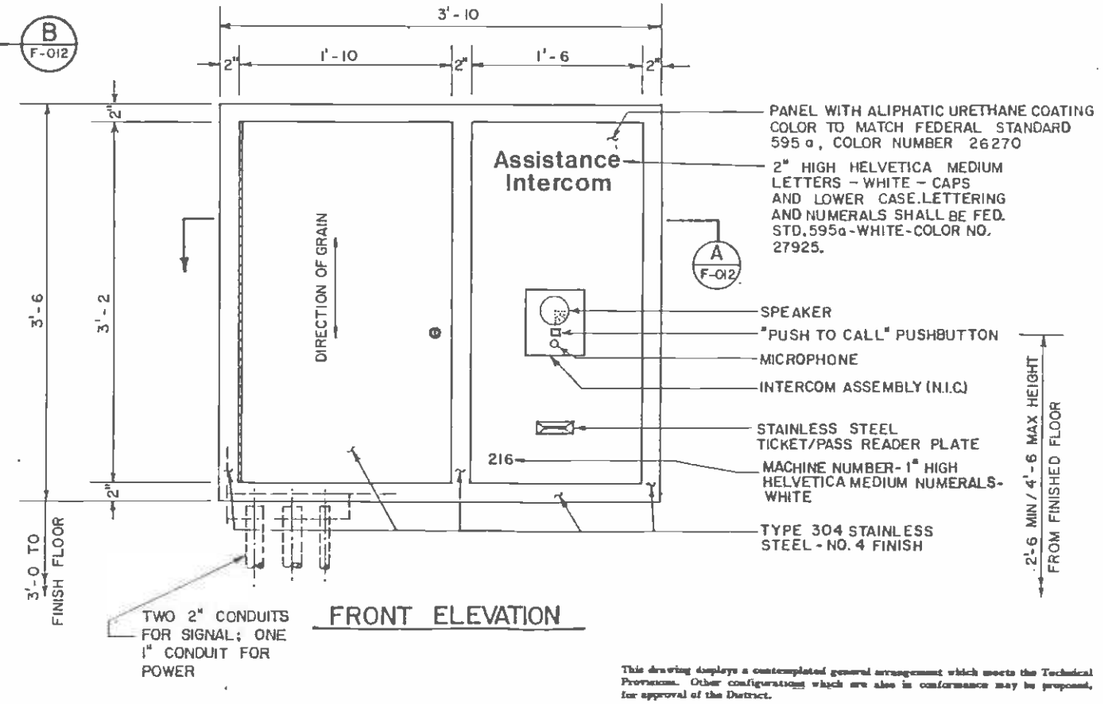


TYPICAL OPERATING CONTROLS



SECTION A F-012

DETAIL B F-012



FRONT ELEVATION

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY P. Kuller
DRAWN BY E. Acosta
CHECKED BY C. Wilkins
IN CHARGE J.M. Brown
DATE 15 JUL 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

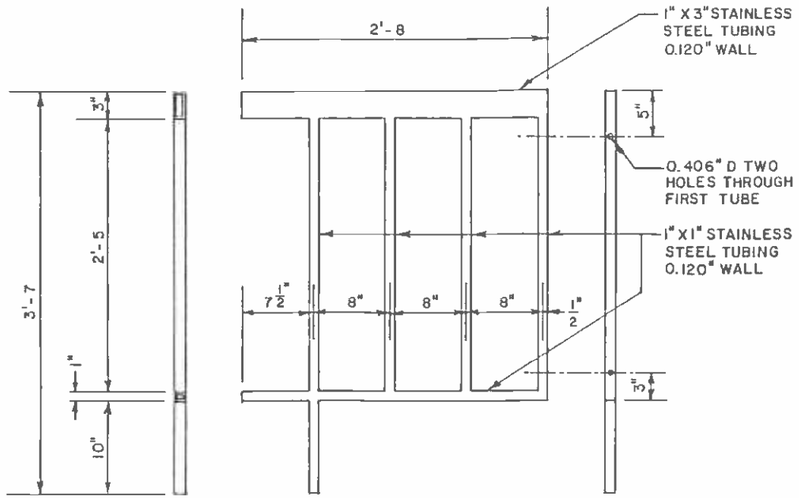
SUBMITTED

APPROVED

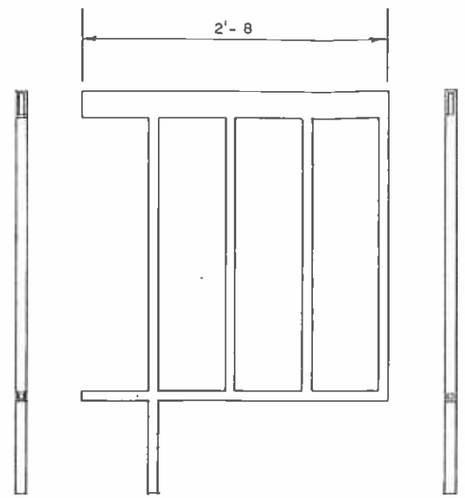
FARE COLLECTION
STATION FARE COLLECTION CONTROL UNIT (SFCCU)

CONTRACT NO A660
DRAWING NO. F-012
REV.
SCALE NO SCALE
SHEET NO. 12

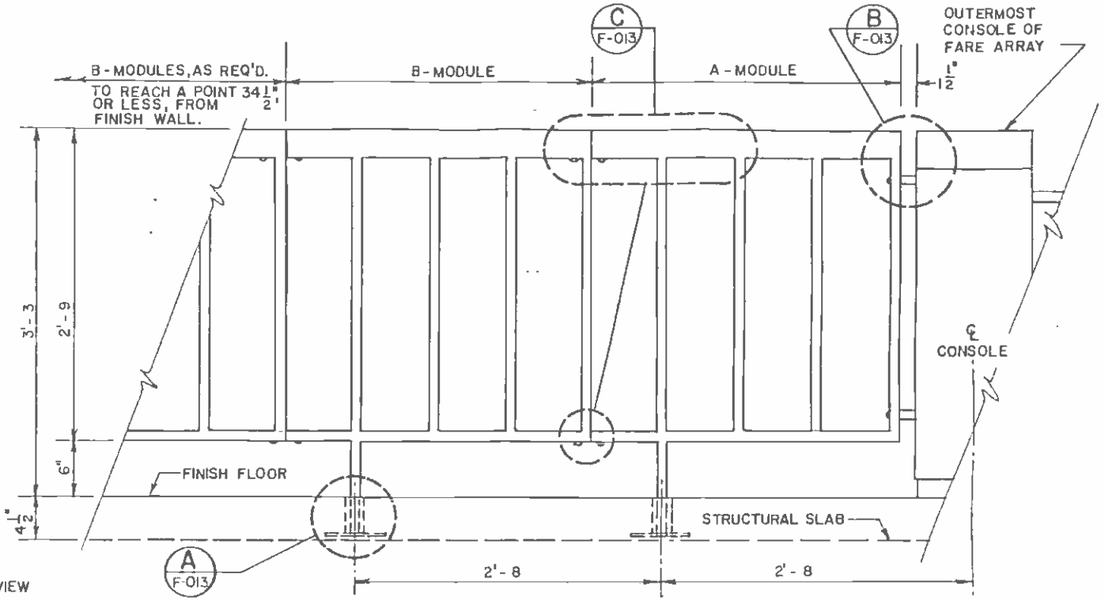
FORD GRAPHICS, D.S.U. 14



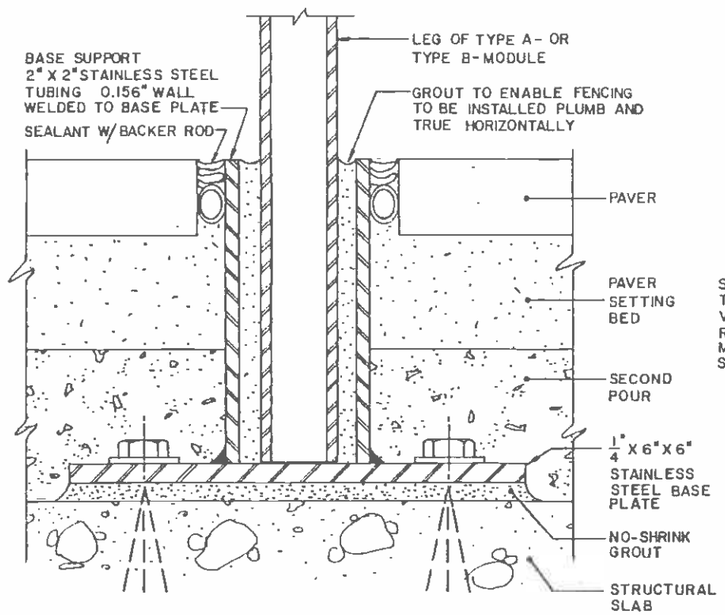
TYPE A-MODULE



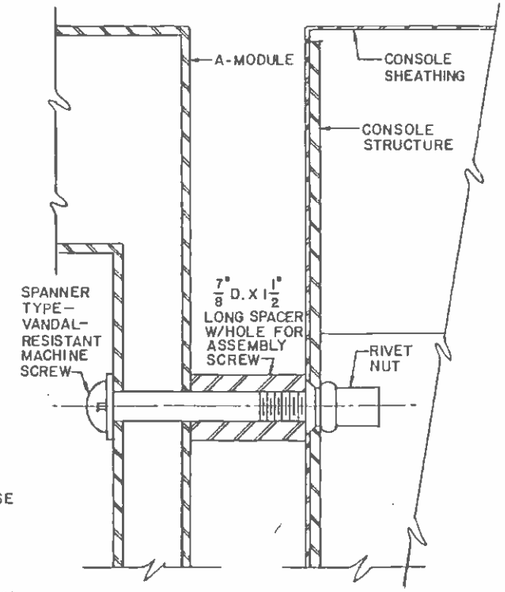
TYPE B-MODULE



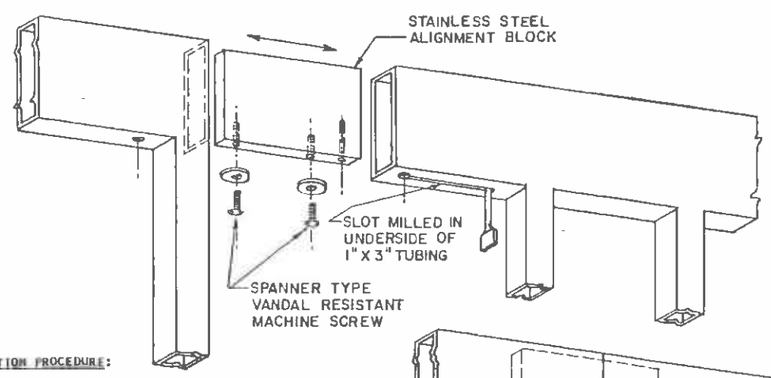
TYPICAL INSTALLATION OF FENCING AT OUTERMOST CONSOLE OF FARE ARRAY



DETAIL A F-013

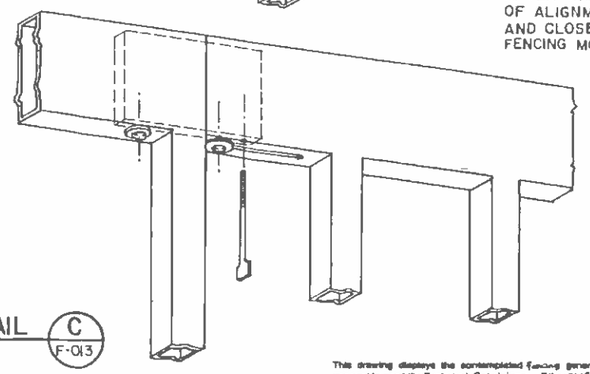


DETAIL B F-013



STAGE I
BEFORE INSTALLATION OF ALIGNMENT BLOCK

STAGE II
AFTER INSTALLATION OF ALIGNMENT BLOCK AND CLOSE-UP OF FENCING MODULES



INSTALLATION PROCEDURE:

ALIGNMENT BLOCK, SIZED FOR A TIGHT SLIDING FIT INSIDE 1" X 3" TUBE, IS LUBRICATED AND SLID INTO SLOTTED MODULE. LEG OF MODULE IS THEN INSERTED INTO BASE SUPPORT; ENTIRE FENCING - - - FROM OUTERMOST CONSOLE OF FARE ARRAY TO FINISH WALL, IS INSTALLED IN SIMILAR FASHION AND SET UP PLUMB AND TRUE HORIZONTALLY AT A HEIGHT OF 3'-3" ABOVE FINISH FLOOR, SECURED IN POSITION BY TEMPORARY SUPPORTS, AS REQUIRED. ALIGNMENT BLOCKS ARE THEN PARTIALLY SLID INTO ADJACENT MODULE AND SCREWS SECURELY TIGHTENED. LEGS OF MODULES ARE THEN GROUTED INTO BASE SUPPORTS. WHEN GROUT HAS SET, TEMPORARY SUPPORTS ARE REMOVED. A SIMILAR ALIGNMENT BLOCK, OPERATING IN A SIMILAR MANNER IS USED INSIDE THE 1" X 1" TUBING AT THE BOTTOM OF THE FENCING.

DETAIL C F-013

This drawing displays the contemplated fencing general arrangement required to meet the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY D. Barker
DRAWN BY D. Barker
CHECKED BY C. Wilson
IN CHARGE J. N. Brown
DATE 19 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

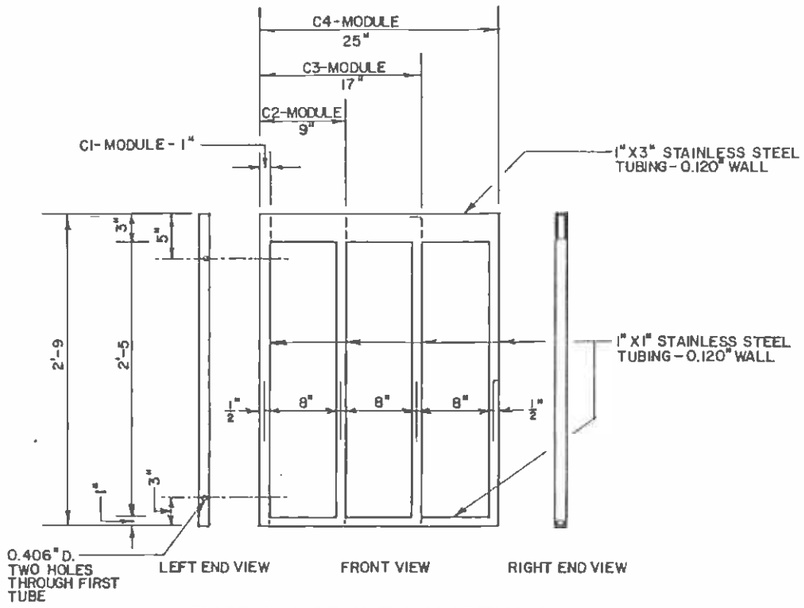
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED _____
APPROVED _____

FARE COLLECTION FENCING DETAILS
SHEET NO. 1

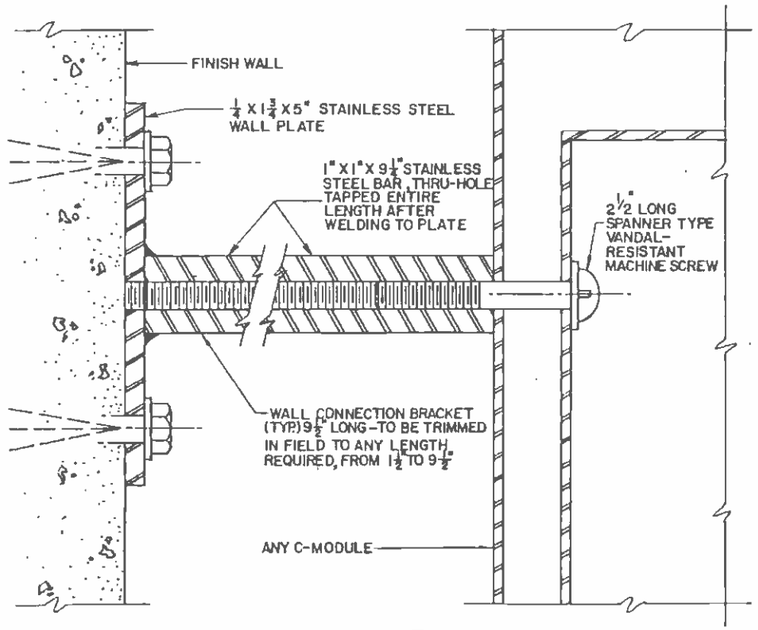
CONTRACT NO. A660
DRAWING NO. F-013
REV.
SCALE NO SCALE
SHEET NO. 13

FILMED GRAPHICS 0-80-14

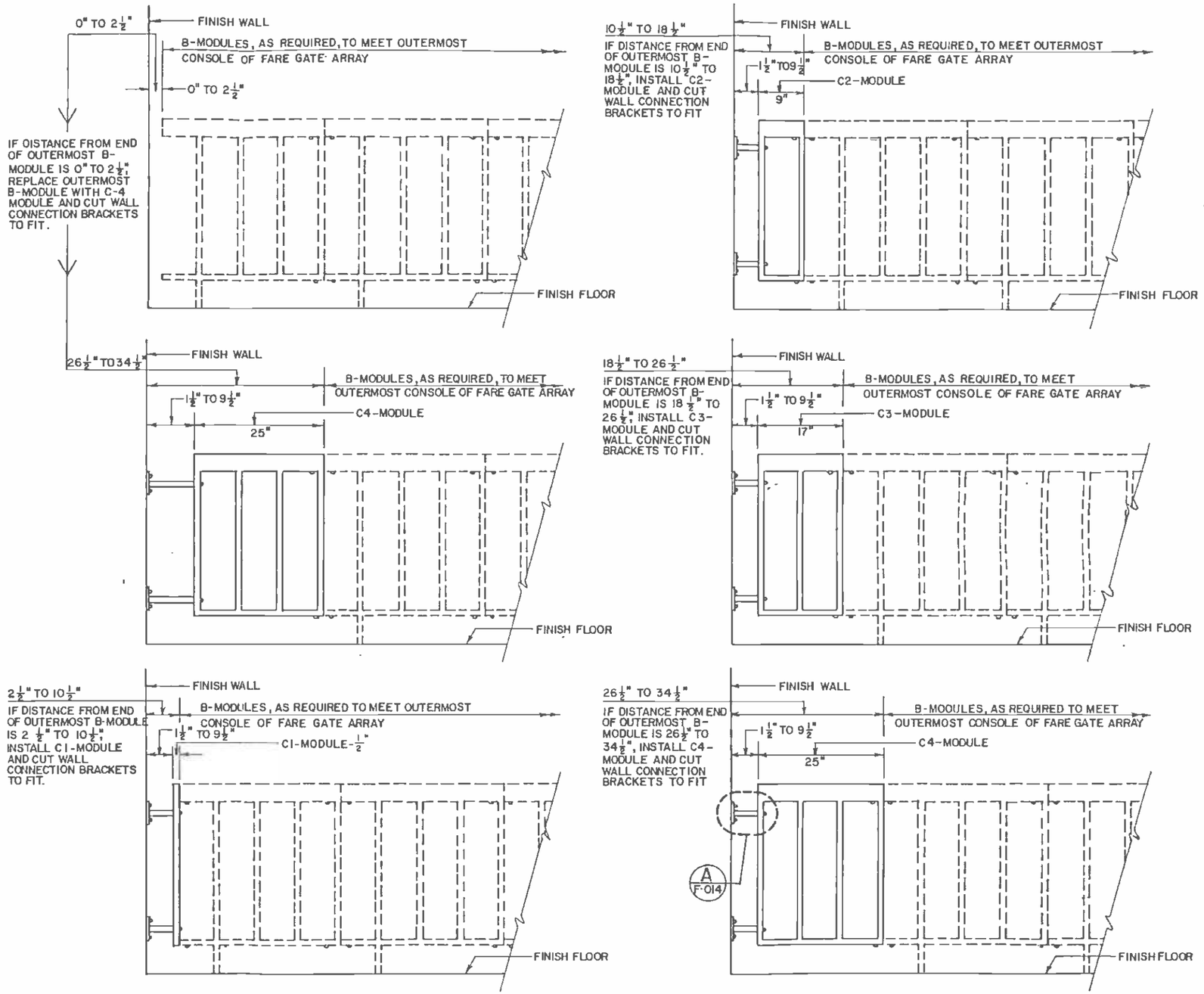


TYPE C-MODULE VARIATIONS

TRIM AT POINTS TO OBTAIN C-MODULE VARIATIONS



DETAIL A / F-014



METHOD FOR COMPLETING FENCING AT FINISHED WALL

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY C. Williams
IN CHARGE J M Brown
DATE 19 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

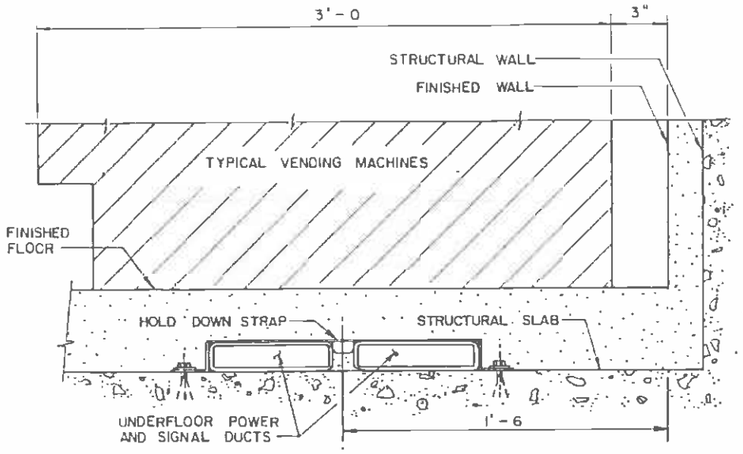
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED _____
APPROVED _____

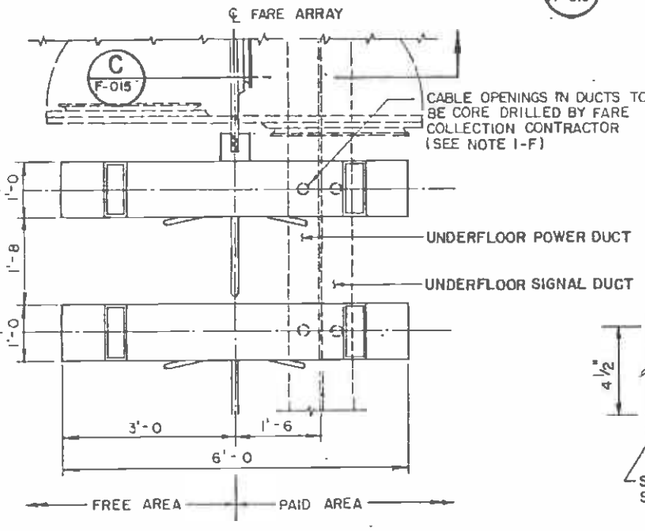
FARE COLLECTION
FENCING DETAILS
SHEET NO. 2

CONTRACT NO. A660
DRAWING NO. F-014
REV.
SCALE NO SCALE
SHEET NO. 14

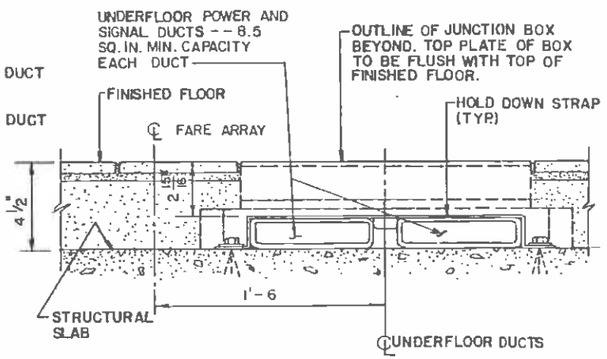
FORM GRAPHICS 02/84



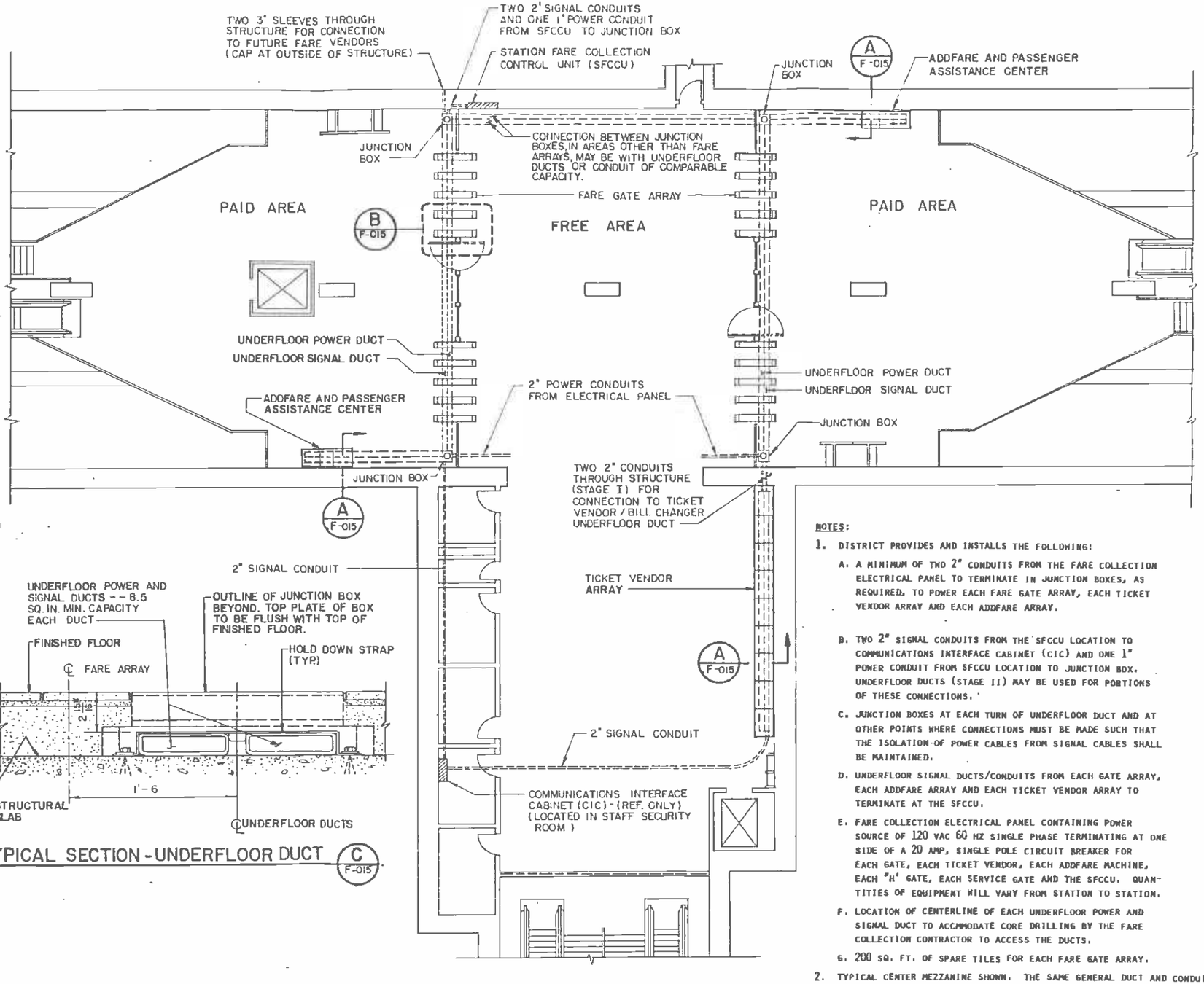
TYPICAL SECTION
UNDERFLOOR DUCT - AT VENDING MACHINE (A / F-015)



TYPICAL DETAILED PLAN VIEW (B / F-015)



TYPICAL SECTION - UNDERFLOOR DUCT (C / F-015)



NOTES:

1. DISTRICT PROVIDES AND INSTALLS THE FOLLOWING:
   - A. A MINIMUM OF TWO 2" CONDUITS FROM THE FARE COLLECTION ELECTRICAL PANEL TO TERMINATE IN JUNCTION BOXES, AS REQUIRED, TO POWER EACH FARE GATE ARRAY, EACH TICKET VENDOR ARRAY AND EACH ADDFARE ARRAY.
   - B. TWO 2" SIGNAL CONDUITS FROM THE SFCCU LOCATION TO COMMUNICATIONS INTERFACE CABINET (CIC) AND ONE 1" POWER CONDUIT FROM SFCCU LOCATION TO JUNCTION BOX. UNDERFLOOR DUCTS (STAGE II) MAY BE USED FOR PORTIONS OF THESE CONNECTIONS.
   - C. JUNCTION BOXES AT EACH TURN OF UNDERFLOOR DUCT AND AT OTHER POINTS WHERE CONNECTIONS MUST BE MADE SUCH THAT THE ISOLATION OF POWER CABLES FROM SIGNAL CABLES SHALL BE MAINTAINED.
   - D. UNDERFLOOR SIGNAL DUCTS/CONDUITS FROM EACH GATE ARRAY, EACH ADDFARE ARRAY AND EACH TICKET VENDOR ARRAY TO TERMINATE AT THE SFCCU.
   - E. FARE COLLECTION ELECTRICAL PANEL CONTAINING POWER SOURCE OF 120 VAC 60 HZ SINGLE PHASE TERMINATING AT ONE SIDE OF A 20 AMP, SINGLE POLE CIRCUIT BREAKER FOR EACH GATE, EACH TICKET VENDOR, EACH ADDFARE MACHINE, EACH "H" GATE, EACH SERVICE GATE AND THE SFCCU. QUANTITIES OF EQUIPMENT WILL VARY FROM STATION TO STATION.
   - F. LOCATION OF CENTERLINE OF EACH UNDERFLOOR POWER AND SIGNAL DUCT TO ACCMMODATE CORE DRILLING BY THE FARE COLLECTION CONTRACTOR TO ACCESS THE DUCTS.
   - G. 200 SQ. FT. OF SPARE TILES FOR EACH FARE GATE ARRAY.
2. TYPICAL CENTER MEZZANINE SHOWN. THE SAME GENERAL DUCT AND CONDUIT ARRANGEMENT SHALL BE ADAPTED TO END MEZZANINE STATIONS.

REV	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB	APP.	DESCRIPTION

DESIGNED BY
DRAWN BY Y. B. and Kelly
CHECKED BY C. Wilmes
IN CHARGE J. M. Braun
DATE 19 MAR 85

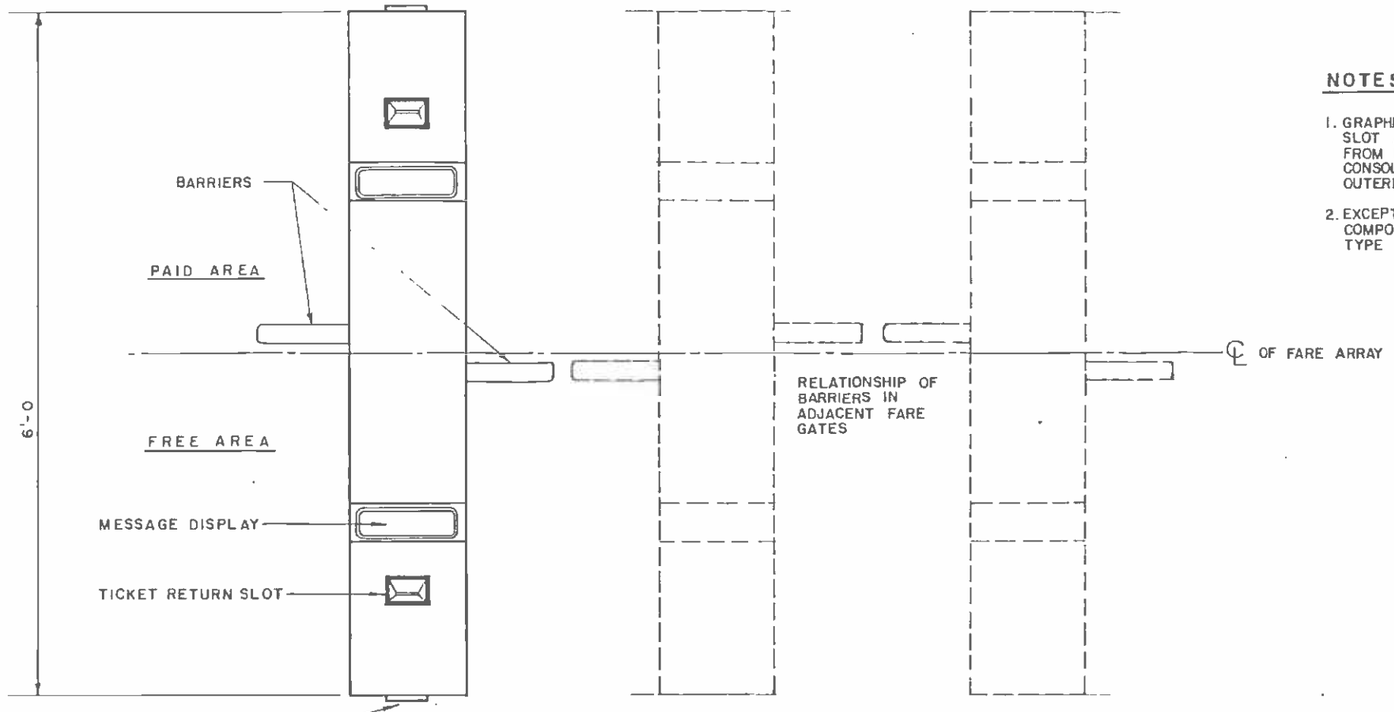
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED _____
APPROVED _____

FARE COLLECTION
CONDUIT AND UNDERFLOOR DUCT REQUIREMENTS

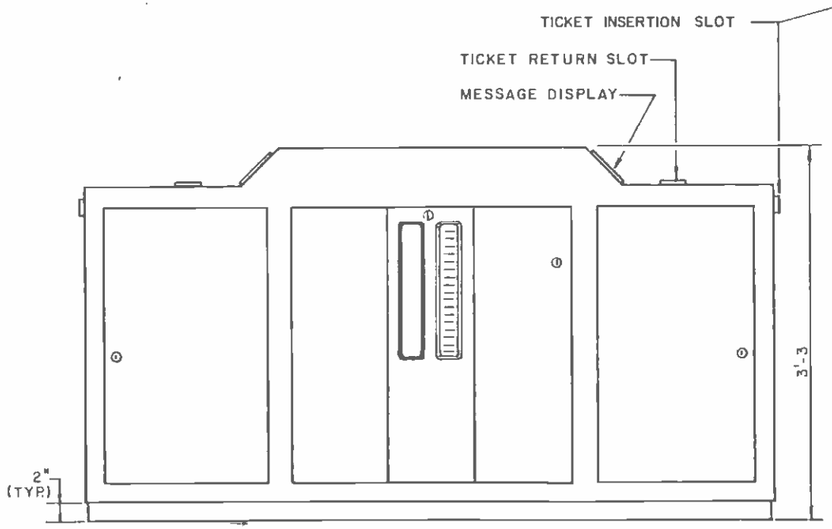
CONTRACT NO. A660
DRAWING NO F-015
REV
SCALE NO SCALE
SHEET NO 15



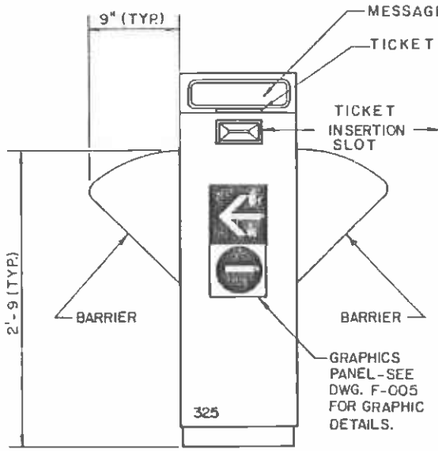
PLAN VIEW

NOTES:

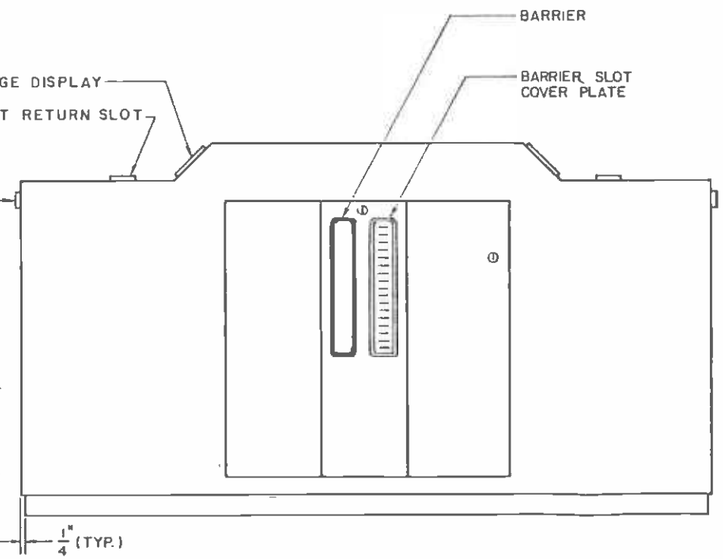
1. GRAPHICS PANEL, MESSAGE DISPLAY, TICKET ENTRY SLOT AND TICKET RETURN SLOT SHALL BE DELETED FROM FREE AREA END OF OUTERMOST "EXIT" CONSOLE IN ARRAY, AND FROM PAID AREA END OF OUTERMOST "ENTRY" CONSOLE IN ARRAY.
2. EXCEPT FOR GRAPHIC ELEMENTS, ALL MACHINE COMPONENTS EXPOSED TO THE PUBLIC SHALL BE TYPE 304 STAINLESS STEEL, NO. 4 FINISH.



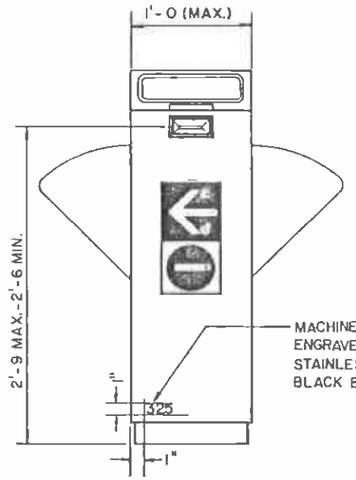
LEFT SIDE VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY P. Kaelin
DRAWN BY E. Acosta
CHECKED BY C. Wilson
IN CHARGE V. N. Brown
DATE 24 JUL 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

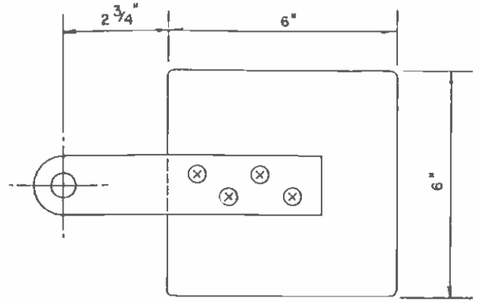
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED _____
APPROVED _____

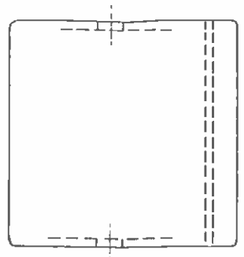
FARE COLLECTION
FARE GATE
BI-PARTING LEAF VERSION

CONTRACT NO. A660
DRAWING NO. F-016
REV.
SCALE NO SCALE
SHEET NO. 16

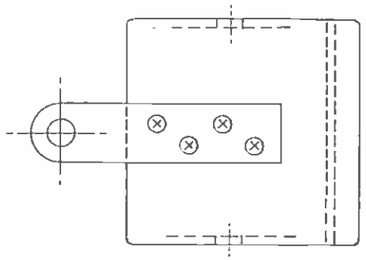
CAD GRAPHICS DGN #



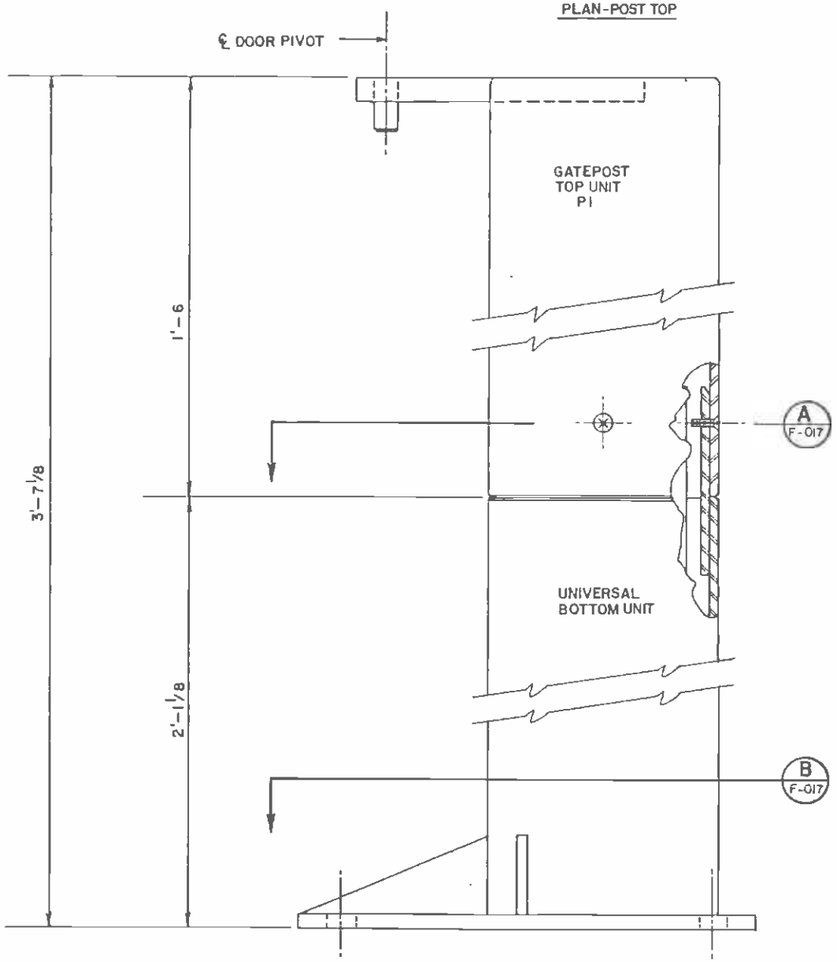
PLAN-POST TOP



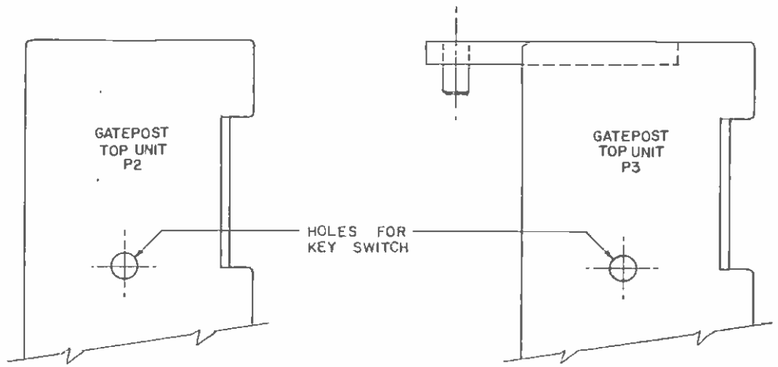
PLAN POST TOP

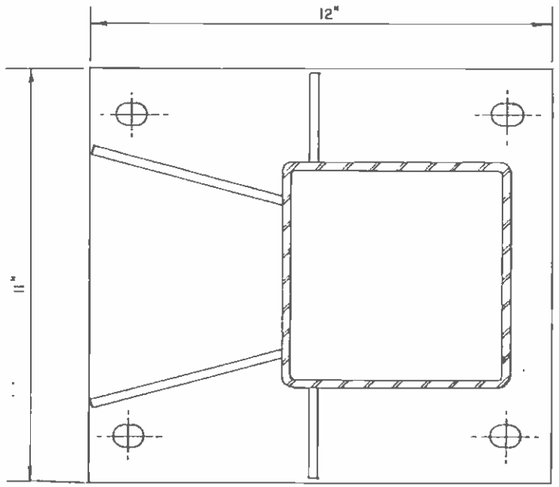


PLAN POST TOP

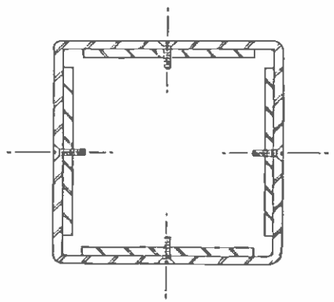


FRONT VIEW-FROM FREE AREA





DETAIL B F-017



SECTION A F-017

NOTES:

1. GATEPOST TOP UNITS P1, P2 AND P3, SHALL BE INTERCHANGABLE, AND SHALL BE READILY MOUNTED ON UNIVERSAL BOTTOM UNIT, AS REQUIRED.
2. METHOD USED TO ASSEMBLE ANY OF THE TOP UNITS TO THE UNIVERSAL BOTTOM UNIT SHALL PROVIDE STRUCTURE REQUIRED TO ADEQUATELY SUPPORT HANDICAPPED FARE GATE (DWG. F-006) OR EMERGENCY EXIT GATE (DWG. F-007)
3. GATEPOSTS AND ALL FITTINGS VISIBLE TO THE PUBLIC SHALL BE TYPE 304 STAINLESS STEEL, NO. 4 FINISH.

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY P Farlow
DRAWN BY P Farlow
CHECKED BY C. Wilson
IN CHARGE J.N. Brown
DATE 20 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

SUBMITTED _____

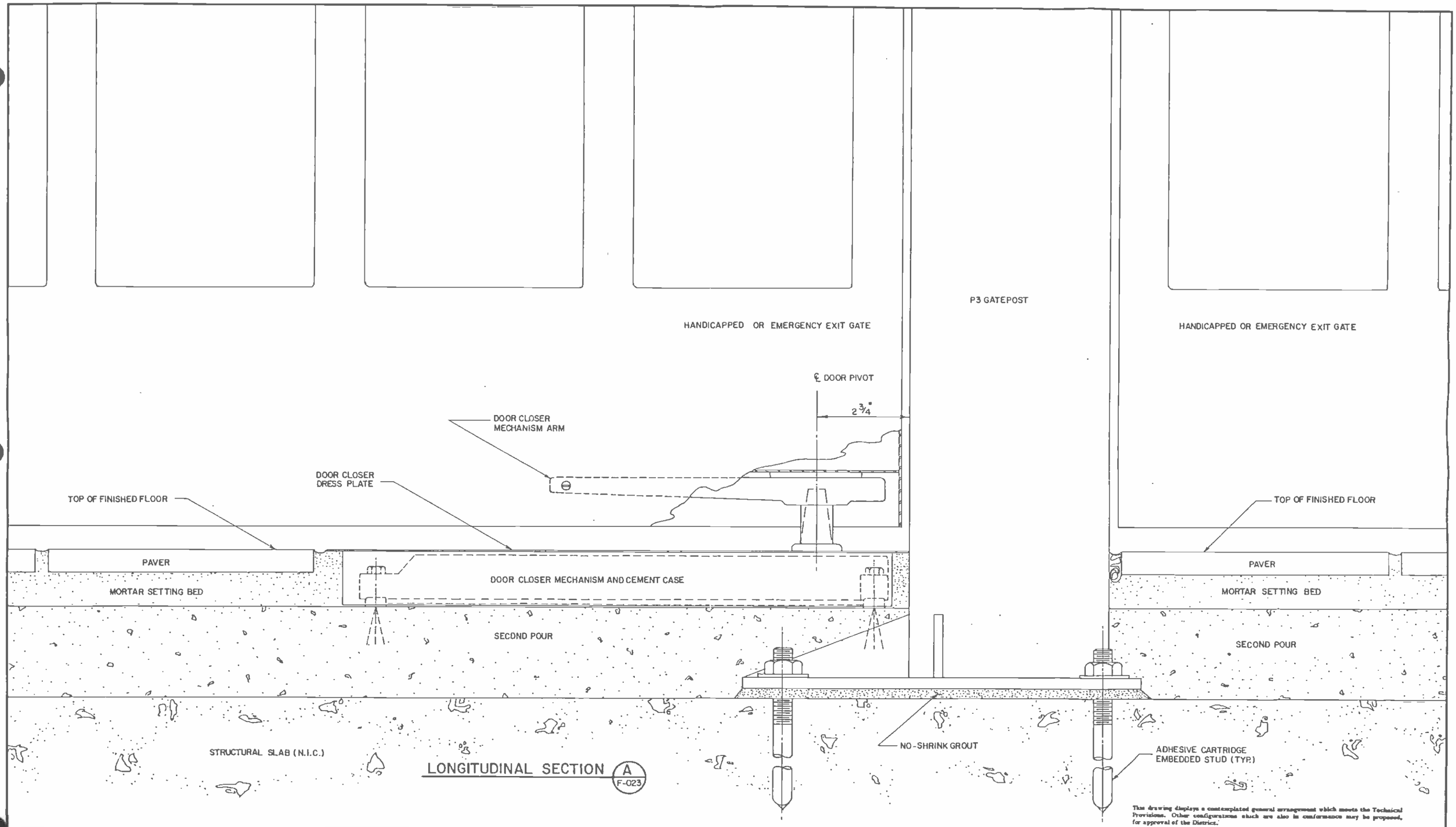
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

APPROVED _____

FARE COLLECTION
GATEPOST DETAILS AND VARIATIONS

CONTRACT NO. A660
DRAWING NO. F-017
REV.
SCALE NO SCALE
SHEET NO. 17

FILE: GRAPHICS DGN



LONGITUDINAL SECTION A F-023

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY P Varlow
DRAWN BY P Varlow
CHECKER BY C Williams
IN CHARGE J.N. Brown
DATE 20 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

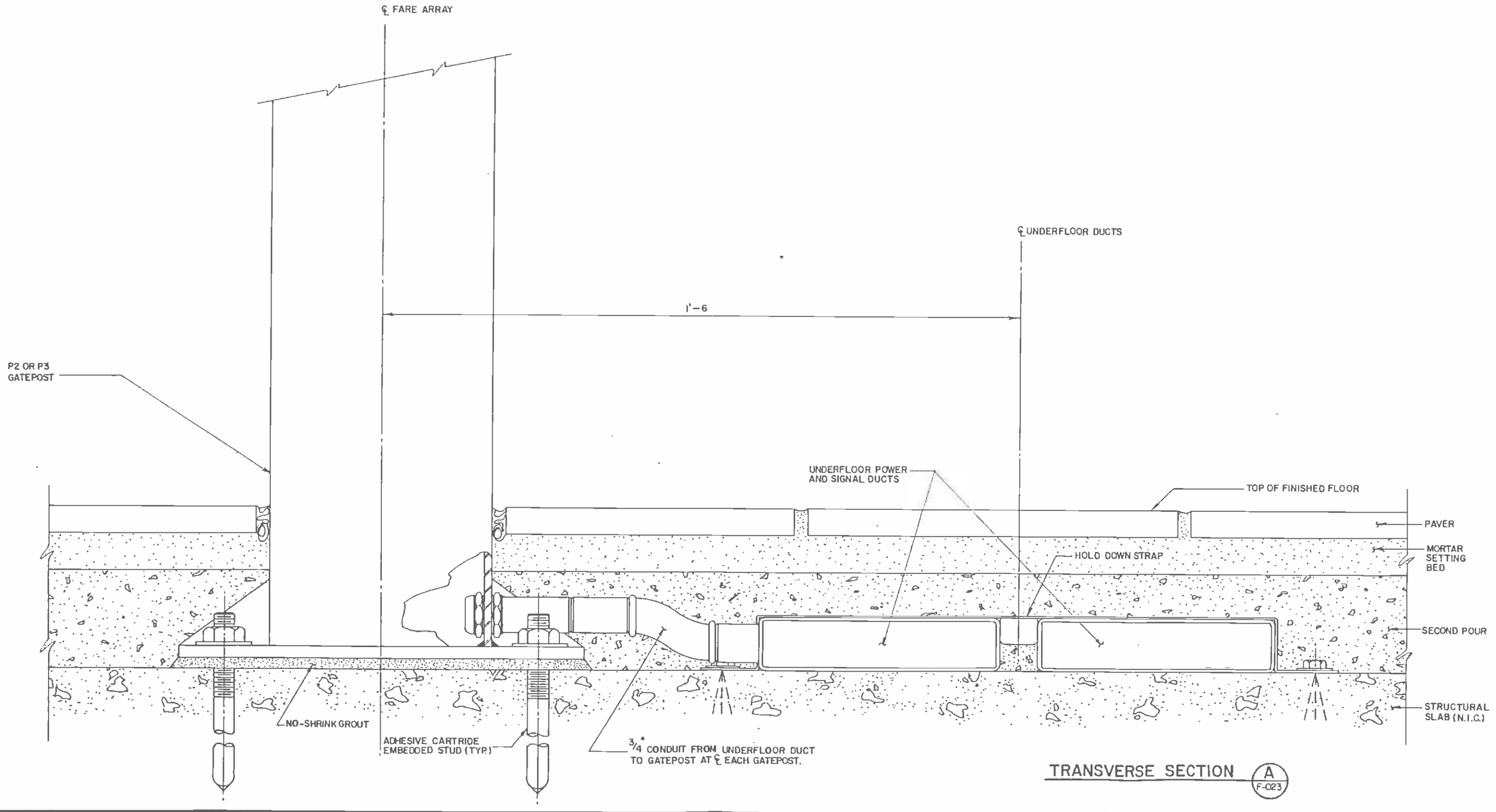
DMJM/P&OD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED _____
APPROVED _____

FARE COLLECTION
LONGITUDINAL SECTION THROUGH GATEPOST

CONTRACT NO. A660
DRAWING NO. F-018 REV.
SCALE NO SCALE
SHEET NO. 18

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.



TRANSVERSE SECTION A / F-023

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY Z Warken
DRAWN BY Z Warken
CHECKED BY C. Walia
IN CHARGE J. N. Brown
DATE 20 MAR 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

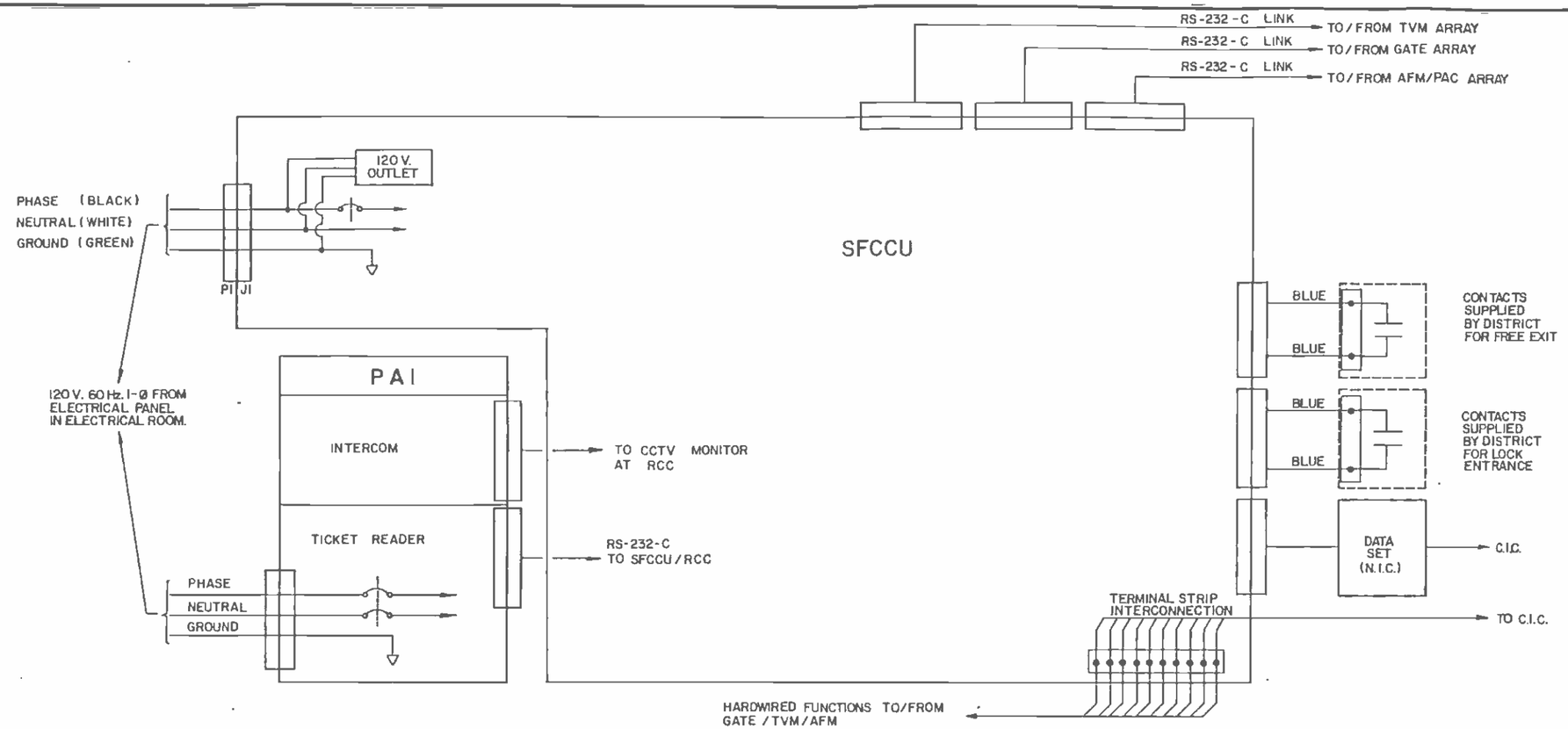
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED _____
APPROVED _____

FARE COLLECTION
TRANVERSE SECTION
THROUGH GATEPOST

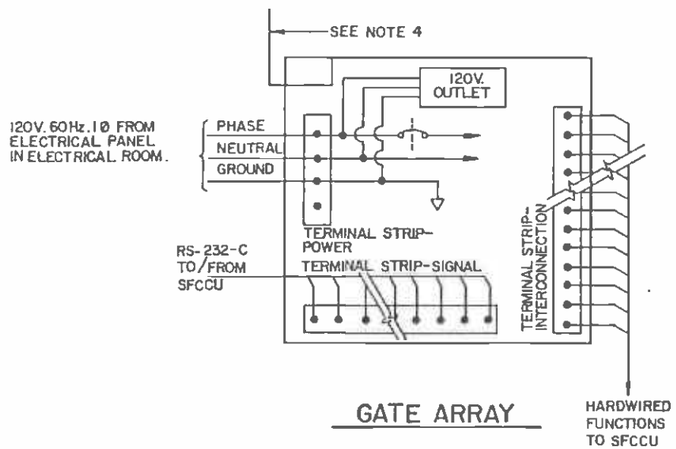
CONTRACT NO. A660
DRAWING NO. F-019
REV.
SCALE NO SCALE
SHEET NO. 19

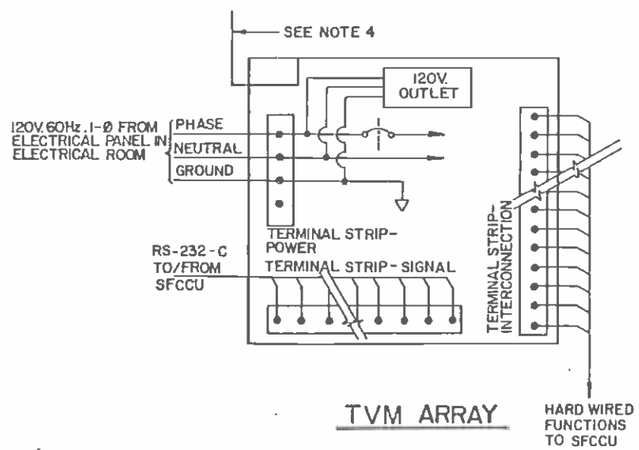
F19F1 CAD/PROJ.S. 02/2/84

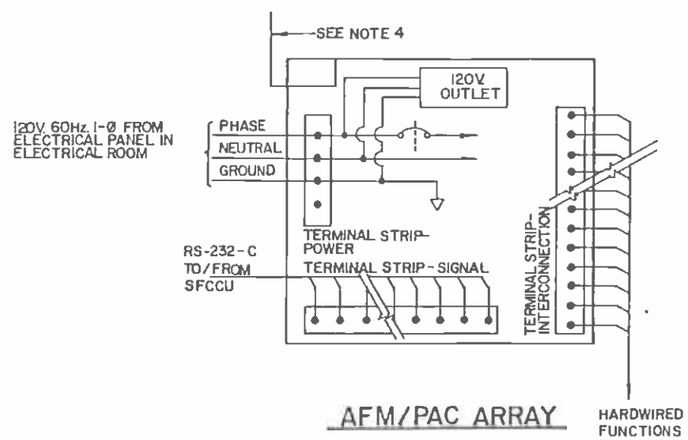


NOTES:

1. EMBEDDED CONDUIT AND UNDERFLOOR DUCT BY DISTRICT.
2. CABLE TRANSMISSION SYSTEM AND INTERFACE CABINET PROVIDED BY DISTRICT.
3. CONTRACTOR SHALL INSTALL AND CHECK OUT WIRING BETWEEN ELECTRICAL PANEL (PROVIDED BY DISTRICT) AND EACH EQUIPMENT, AND FROM SFCCU TO CIC/RTU
4. CONTRACTOR TO FURNISH AND INSTALL ELECTRICAL CONNECTIONS TO STATION GROUND.
5. PAI IS CONTAINED IN THE SFCCU CABINET.







REV.	DATE	BY	SUB.	APP.	DESCRIPTION

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

DESIGNED BY C. Williams
DRAWN BY M. Hudgens
CHECKED BY P. Vaile
IN CHARGE J. D. Brown
DATE 4 OCT 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

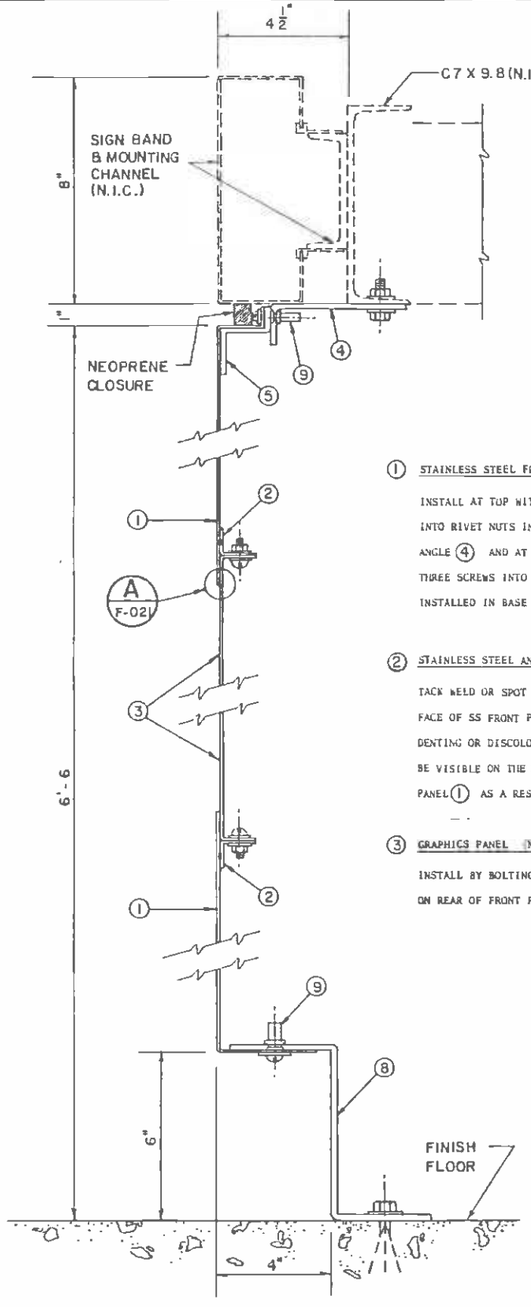
SUBMITTED _____ APPROVED _____

FARE COLLECTION POWER AND CONTROL DIAGRAM

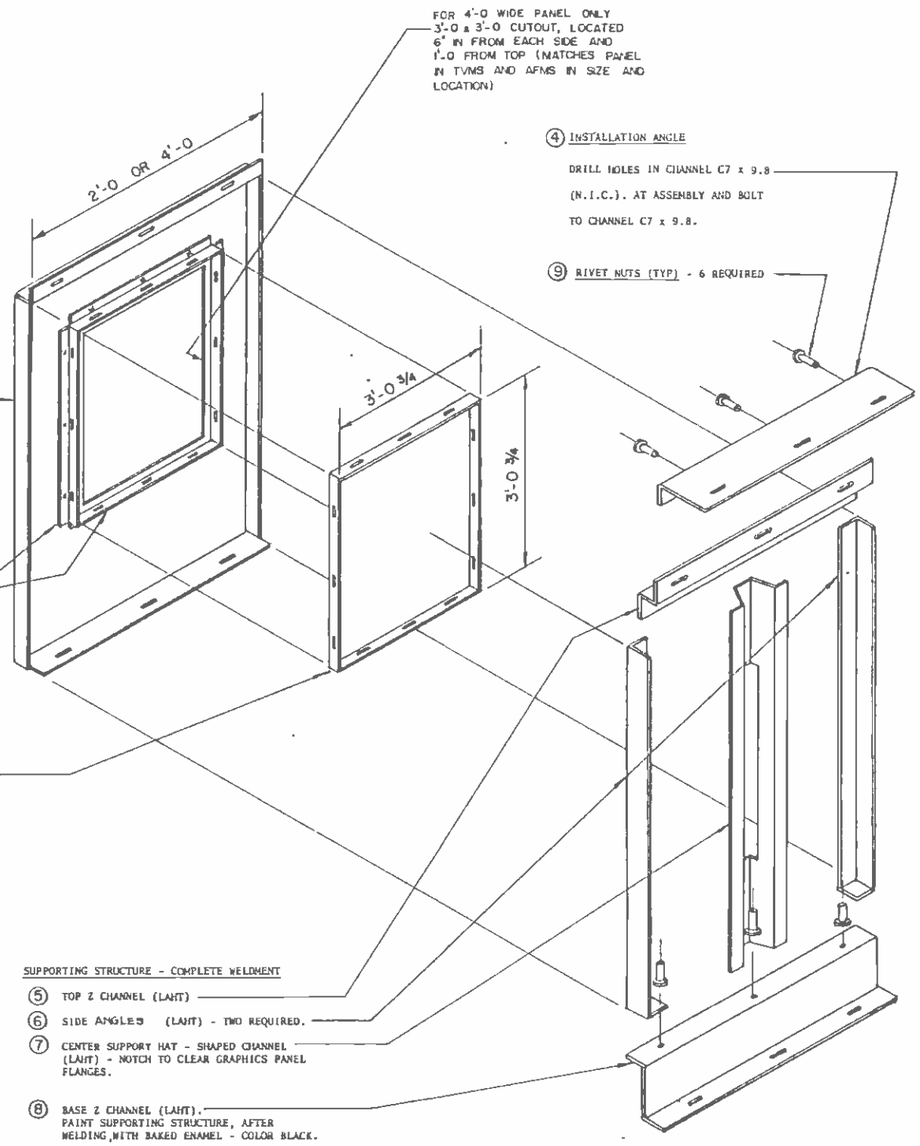
CONTRACT NO. A660
DRAWING NO. F-020
REV.
SCALE NO SCALE
SHEET NO. 20

FORD GRAPHICS 030/M

This drawing displays a contemplated general arrangement which meets the Technical Provisions. Other configurations which are also in conformance may be proposed, for approval of the District.



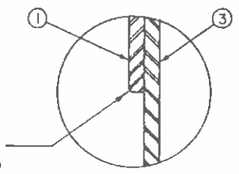
SECTION (B) F-025, F-028



FILLER PANEL CONSTRUCTION AND INSTALLATION - SEEN FROM REAR

NOTE:

1. ITEMS 1 AND 2 SHALL BE TYPE 304 STAINLESS STEEL, NO. 4 FINISH. ITEMS 4,5,6,7 AND 8 SHALL BE LOW-ALLOY HIGH TENSILE (LAHT) STEEL, PAINTED.



DETAIL (A) F-021

INSTALLATION PROCEDURE:

a. WELD ANGLES ② TO BACK OF FRONT PANEL ① ;

b. BOLT GRAPHICS PANEL ③ INTO FRONT PANEL (IF GRAPHICS PANEL REQUIRED);

c. WELD TOP CHANNEL ⑤ TO SIDE ANGLES ⑥ AND CENTER CHANNEL ⑦, AND SIDE ANGLES AND CENTER CHANNEL TO BASE CHANNEL ⑧ TO FORM A COMPLETE SUPPORTING STRUCTURE. AFTER WELDING, PAINT STRUCTURE;

d. INSTALL RIVET NUTS IN INSTALLATION ANGLES ④. DRILL HOLES IN CHANNEL C7 x 9.8 (N.I.C.);

e. INSTALL RIVET NUTS IN BASE CHANNEL ⑧ ;

f. BOLT INSTALLATION ANGLE ④ TO CHANNEL C7 x 9.8 (N.I.C.);

g. BOLT BASE CHANNEL ⑧ OF SUPPORTING STRUCTURE TO STRUCTURAL SLAB WITH EXPANSION BOLTS;

h. PLACE FRONT PANEL ① OVER SUPPORTING STRUCTURE ⑤, ⑥, ⑦ AND ⑧ AND FASTEN AT TOP WITH THREE MACHINE SCREWS THROUGH STRUCTURAL CHANNEL ⑤ TO RIVET NUTS IN INSTALLATION ANGLE ④;

i. FASTEN FRONT PANEL ① AT BOTTOM TO RIVET NUTS IN BASE CHANNEL ⑧ WITH THREE MACHINE SCREWS;

j. INSTALL VERTICAL NEOPRENE CLOSURE STRIPS BETWEEN MACHINE UNITS, AND A HORIZONTAL NEOPRENE CLOSURE STRIP BETWEEN TOPS OF MACHINES AND UNDERSIDE OF GRAPHIC SIGN BAND (N.I.C.);

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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DESIGNED BY
DRAWN BY E. Acosta
CHECKED BY C. Mathias
IN CHARGE V. M. Brown
DATE 12 JUL 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

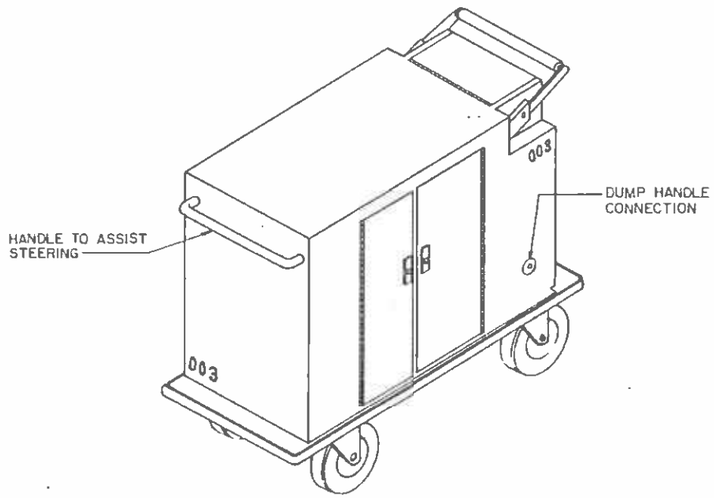
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

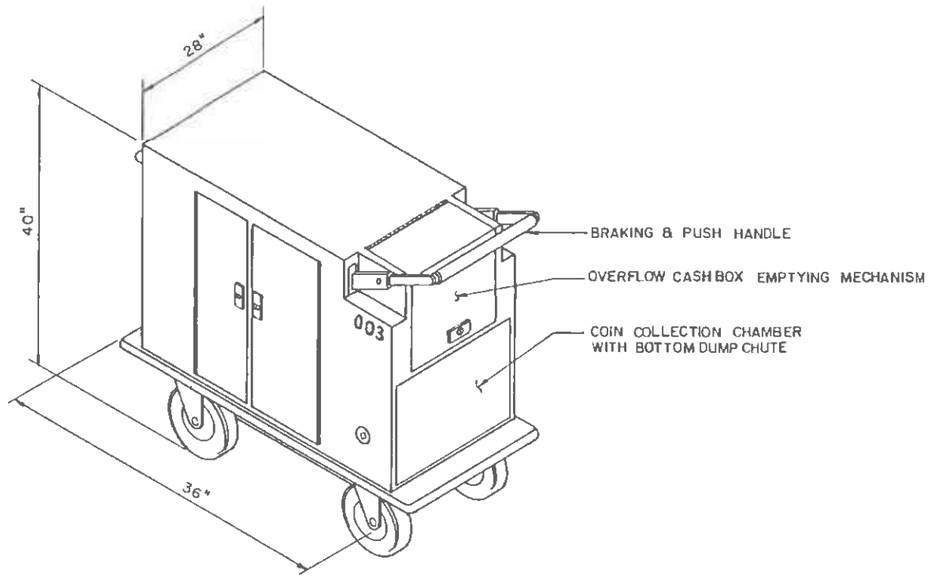
SUBMITTED

APPROVED

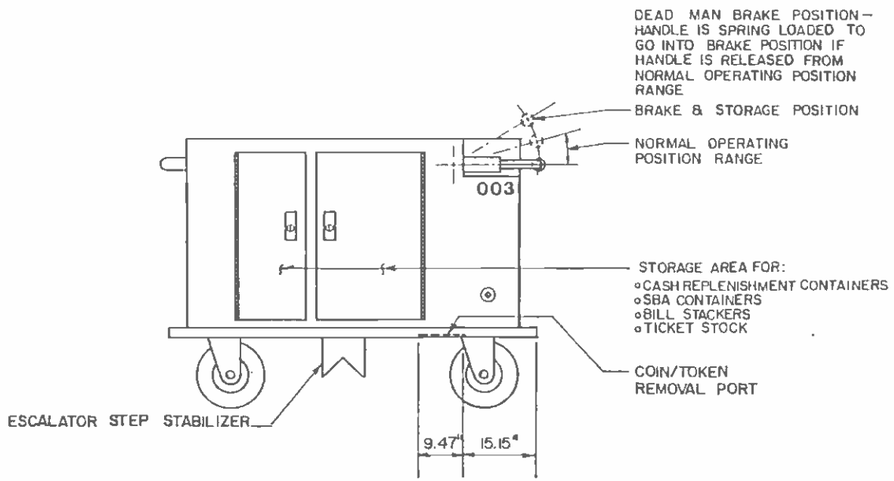
FARE COLLECTION VENDING MACHINE FILLER PANEL CONSTRUCTION AND INSTALLATION

CONTRACT NO. A660
DRAWING NO. F-021
REV.
SCALE NO SCALE
SHEET NO. 21

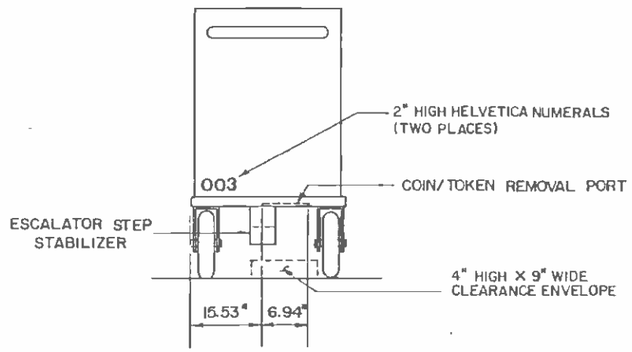




NOTE:
ALL DOORS ON CART SHALL BE KEYED ALIKE.



SIDE VIEW



FRONT VIEW

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY D Karlen
DRAWN BY P Lindquist
CHECKED BY C. Miller
IN CHARGE J. M. Brown
DATE 4 OCT 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

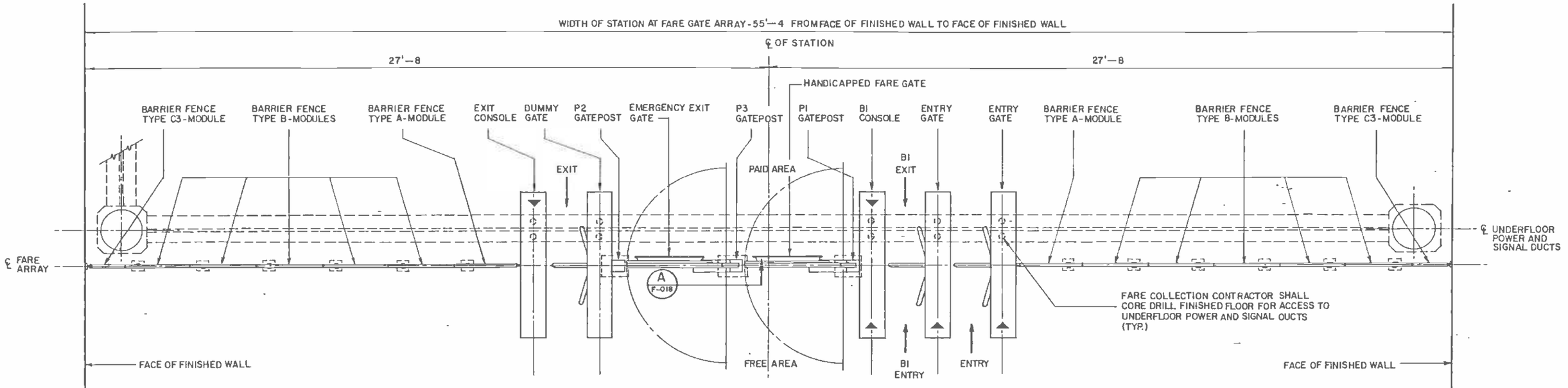
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED _____

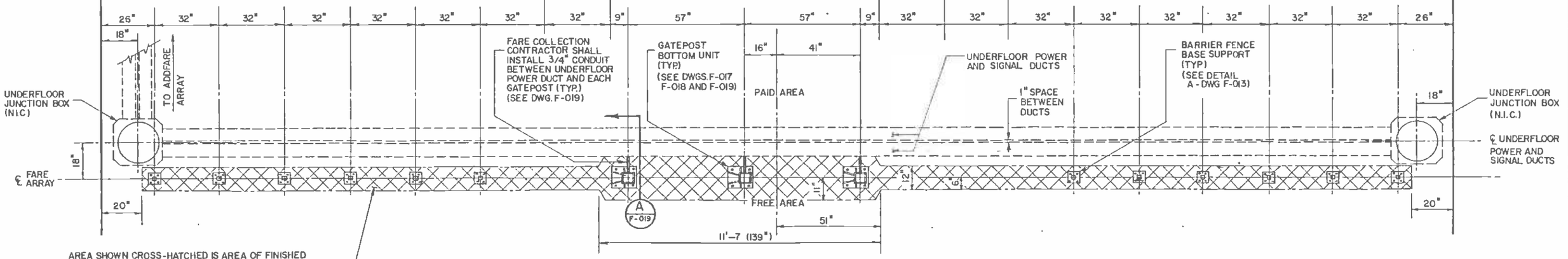
APPROVED _____

FARE COLLECTION TYPICAL REVENUE CART

CONTRACT NO. A660
DRAWING NO. F-022
REV.
SCALE NO SCALE
SHEET NO. 22



PLAN - EQUIPMENT TO BE INSTALLED BY FARE COLLECTION CONTRACTOR ABOVE FINISHED FLOOR



AREA SHOWN CROSS-HATCHED IS AREA OF FINISHED FLOOR WHICH MUST BE REMOVED INITIALLY BY FARE COLLECTION CONTRACTOR (DOWN 4 ½" TO STRUCTURAL SLAB) IN ORDER TO INSTALL BARRIER FENCE BASE SUPPORTS, GATEPOST BOTTOM UNITS AND 3/4" CONDUIT BETWEEN UNDERFLOOR POWER DUCT AND GATEPOST BOTTOM UNITS.

PLAN - EQUIPMENT TO BE INSTALLED BY FARE COLLECTION CONTRACTOR BELOW FINISHED FLOOR

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

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REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE 4 OCT 85

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

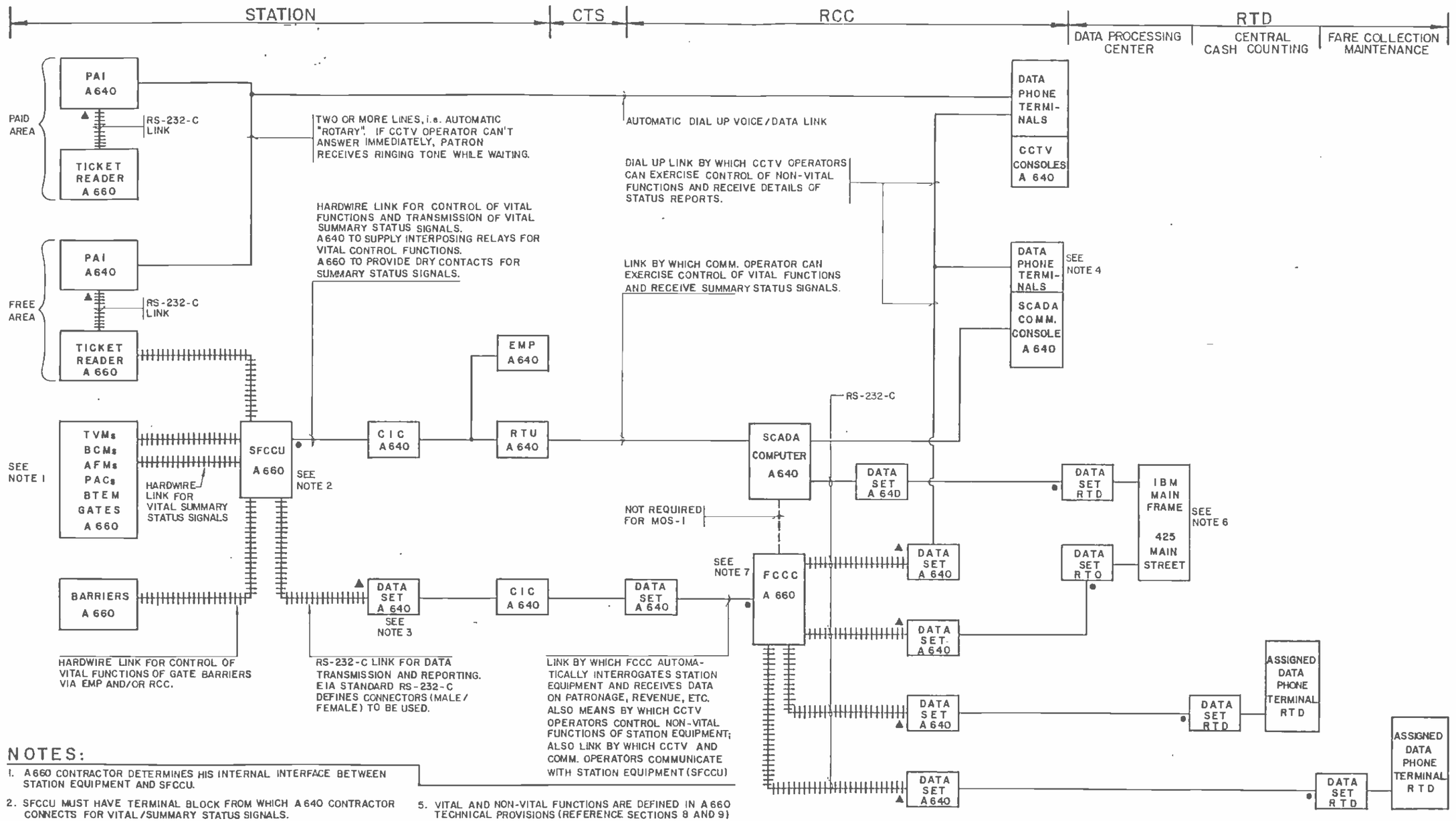
DMJM/PBQD/KE/HWA
A JOINT VENTURE
GENERAL CONSULTANTS

SUBMITTED

APPROVED

FARE COLLECTION
FARE GATE ARRAY
CIVIC CENTER STATION-NORTH-ARRAY #1

CONTRACT NO. A660
DRAWING NO. F-023
REV.
SCALE NO SCALE
SHEET NO. 23



NOTES:

1. A660 CONTRACTOR DETERMINES HIS INTERNAL INTERFACE BETWEEN STATION EQUIPMENT AND SFCCU.
2. SFCCU MUST HAVE TERMINAL BLOCK FROM WHICH A640 CONTRACTOR CONNECTS FOR VITAL/SUMMARY STATUS SIGNALS.
3. A660 CONTRACTOR'S TRANSMISSION RATE MUST CONFORM TO DATA SET RATES OF 2.4, 4.8 OR 9.6 Kbps.
4. FAMILY OF COMPUTERS TO WHICH DATA PHONES ARE COMPATIBLE TO BE DEFINED BY THE DISTRICT.
5. VITAL AND NON-VITAL FUNCTIONS ARE DEFINED IN A660 TECHNICAL PROVISIONS (REFERENCE SECTIONS 8 AND 9)
6. STANDARD RS-232-C INTERFACE TO BE DEFINED COMPATIBLE WITH THE DISTRICT'S IBM.
7. FCCC TO BE PROGRAMMED TO AUTOMATICALLY DIAL-UP ASSIGNED DATA PHONE(S) UPON RECEIPT OF ALARM/STATUS INDICATION.

KEY:

- A660 LINK
- A640 LINK
- ▲ INTERFACE BY A660
- ● INTERFACE BY A640

REV	DATE	BY	SUB	APP.	DESCRIPTION

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REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED BY M.R.T.C.
DRAWN BY Eduardo Acosta
CHECKED BY S. Sarkem
IN CHARGE J. M. Brown
DATE 14 JAN 86

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
RTD

SUBMITTED _____

DMJM PBQD/KE/HWA
GENERAL CONSULTANTS

APPROVED _____

COMMUNICATIONS FARE COLLECTION INTERFACE BLOCK DIAGRAM

CONTRACT NO A640
DRAWING NO N-081
REV
SCALE NO SCALE
SHEET NO 35