

MAINTENANCE BUILDING EXPANSION
AND YARD IMPROVEMENTS
AT DIVISION 12 - LONG BEACH
FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

BID DUE DATE March 1, 1990

BID NO. CA-05-0133-J

February 1, 1990



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NOTICE

Bidders are strongly encouraged to attend the Pre-Bid Conference to become fully informed of the District's plans, specifications and policies.



SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

NOTICE INVITING BIDS FOR
MAINTENANCE BUILDING EXPANSION
AND YARD IMPROVEMENTS
AT DIVISION 12 - LONG BEACH

FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

BID NO. CA-05-0133-J

BID DUE DATE MARCH 1, 1990

Sealed bids will be received by the Southern California Rapid Transit District at the reception desk of the Office of Contracts, Procurement and Materiel (OCPM) located at 470 Bauchet Street, Los Angeles, California 90012 until 3:00 P.M. on the above stated Due Date for the MAINTENANCE BUILDING EXPANSION AND YARD IMPROVEMENTS AT DIVISION 12 - LONG BEACH in accordance with plans and specifications therefor.

Any bid received after that time will not be considered. The only acceptable evidence to establish the time of receipt will be the date/time stamp on the bid package by the date/time stamp recorder at the OCPM reception desk.

Copies of the plans and specifications may be obtained at the office of the Director of the Office of Contracts, Procurement and Materiel (OCPM), 470 Bauchet Street, Los Angeles, California 90012.

Work consists of demolition, site work, paving, concrete, steel framing, roofing, drywall, painting, tilework, doors and windows, electrical, mechanical, plumbing and other related work as per plans and specifications.

Refer to Specifications for complete details and bid requirements. Specifications and this Notice shall be considered as part of any contract made pursuant thereto.

The Southern California Rapid Transit District hereby notifies all bidders that it will affirmatively insure that in regard to any contract entered into pursuant to this advertisement, Disadvantaged Business Enterprise will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

All bidders will be required to comply with the Disadvantaged Business Enterprise (DBE) Policy as set forth in Section 20 of the Specifications.



All bidders will be required to certify that they are not on the Comptroller General's list of ineligible contractors.

The contract to be let is subject to a financial assistance contract between the District and the United States Department of Transportation and shall be governed by all applicable laws of the State of California.

Pursuant to Section 8136 of the Department of Defense Appropriation Act for the Fiscal Year 1989, the District acknowledges that this procurement is 80% funded with UMTA assistance and is part of a \$14,984,163.00 total Project Funding Assistance.

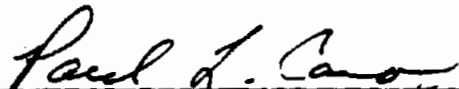
The successful bidder will be permitted to substitute securities for any monies withheld by District to ensure performance under the contract pursuant to Section 4590 of the California Government Code.

Full compliance with all applicable safety and health standards, and Equal Employment Opportunity laws and regulations will be required of the successful bidder.

The successful bidder shall possess a valid contractor's license in the State of California, Classification B at the time the contract is awarded. The license should be maintained valid throughout the duration of the contract.

A Pre-Bid Conference to familiarize prospective bidders with the District's policies and the "Nature of Work" will be held at the Division 12 Transportation Building, 970 West Chester Place, Long Beach, California on Thursday, February 8, 1990. Conference time is at 10:00 A.M.

DATED: February 1, 1990



Paul L. Como, Director
Office of Contracts, Procurement
& Materiel
SOUTHERN CALIFORNIA RAPID
TRANSIT DISTRICT



BID PROCEDURES & FORMS



SECTION 1

INSTRUCTIONS TO BIDDERS

1. General

Contract documents (each set consists of one each Specifications and one each plans) may be obtained at no charge at the Southern California Rapid Transit District, 470 Bauchet Street, Los Angeles, California. Additional sets may be obtained at a charge of sixty dollars (\$60.00) for each set.

The information concerning the Work required is described in the specifications and is believed to be correct; however, each bidder will be solely responsible for having acquainted himself thoroughly, with all conditions affecting the Work. Each bidder will also be held solely responsible for having estimated the cost of the Work as well as the difficulties and contingencies attendant upon the Work.

2. Discrepancies

If a bidder becomes aware of any discrepancy, ambiguity, error or omission, it shall be reported immediately to the Contracting Officer who will determine the necessity for clarification.

3. Addenda

Clarification or any other notice of a change in the Contract Documents will be issued only by the District's Contracting Officer and only in the form of written addenda mailed or otherwise delivered to the address of record of each bidder. Each addendum will be numbered, dated and identified with the Project. Under extreme circumstances, an addendum may be in the form of a telegram. Oral statements or any instructions in any form, other than addenda as above described, shall have no consideration.

Each addendum received during the bidding period shall be acknowledged in the designated space in the Bid Form with the information therein requested. If none are received, the words "no addenda received" shall be written in the said space.



4. Pre-Bid Conference

A pre-bid conference to familiarize prospective bidders with the District's policies and the "Nature of the Work" will be held at the Division 12 Transportation Building, 970 West Chester Place, Long Beach, California on Thursday, February 8, 1990 . Conference time is at 10:00 A.M.

5. SUBMITTAL

Bids shall be submitted only on one copy of the bid form furnished to bidders herewith. No other form of bid or proposal will be acceptable. The only acceptable method for modifying a bid is by letter, if it is received by the person assigned to open the bids prior to the time set for opening of bids.

Bid Forms shall be carefully and completely filled out with ink or typewriter only. All signatures shall be in longhand.

Every designated space or list noted with a number ¹ on the Bid Form shall be filled in or otherwise marked to show the bidder's intention clearly. Interlineations, alterations, erasures, or any other change may constitute unacceptable irregularities in the bid. In any case, such erasure, interlineation or other change must be clearly initialed by the bidder. All amounts shall be stated in figures.

6. Identification of Bidders

Each bid shall contain the following:

- a. The full business address of the bidder.
- b. A concise description of the legal nature of the entity submitting the bid.
- c. The name and official title of each person signing, typed or printed below the signature.

7. Signatures

- a. Bid Forms submitted by individuals shall be signed by the individuals making the bids or by the persons authorized to sign for the individuals. If signatures other than those of the bidders appear, the authority for such signatures must be attached to the Form.



b. Bids signed for a corporation shall bear the signature of the president or other authorized officer, written in longhand below the corporation name and following the word "BY" signature . If such bid is signed by an individual other than the president, a certified copy of a resolution of the board of directors of the corporation, evidencing the authority of that individual to sign, shall be attached to the Bid Form. Such bids shall also bear the attesting signature of the secretary and the impression of the corporate seal.

8. Unit Prices

When unit prices are called for in the Bid Form, complete all designations using amounts that include all costs for completed work in place, with taxes, overhead, profits and other costs covered. The Southern California Rapid Transit District is exempt from payment of Federal Excise and Transportation taxes, so such taxes must not be included in proposed prices.

9. Bid Bond

Each bidder shall furnish at his own expense a bid bond satisfactory to the District, in the form presented herewith; or cash, certificate of deposit, cashiers' or certified check, equal to 10% of the full amount of the bid.

10. Marking and Mailing Bids

Each bid, together with the bid bond, when required, shall be securely sealed in a suitable envelope and marked:

MAINTENANCE BUILDING EXPANSION
AND YARD IMPROVEMENTS
AT DIVISION 12 - LONG BEACH

BID NO. CA-05-0133-J

in capital letters on front and back of the envelope. That envelope shall also include the following:

Name and address of bidder.

Name and address of mailing as follows:

Southern California Rapid Transit District
470 Bauchet Street
Los Angeles, California 90012

ATTENTION: Director, Office of Contracts,
Procurement and Materiel



11. Delivery of Bids

Bids shall be delivered to:

Southern California Rapid Transit District
470 Bauchet Street
Los Angeles, California 90012

ATTENTION: Director, Office of Contracts,
Procurement and Materiel

Bids must be received by 3:00 P.M. Bids received after this time cannot be considered and will be returned to contractor.

12. Receiving Bids

Bids received will be kept unopened until the time fixed for the bid opening. The person whose duty is to open the bids will determine when the time stated above has arrived and no bid received thereafter will be considered. All bids will be opened in public at the bid opening. At that time, any person present shall have the right to have any part of the bids read aloud.

13. Withdrawal of Bids

Bids may be withdrawn only by signature of bidder, provided the request is received by the person whose duty is to open bids, prior to the time fixed for bid opening. Each bid opened will be considered to be a valid offer, and may not be withdrawn for a period of sixty consecutive calendar days following the opening bids, unless the bidder is given written notice that his bid is unacceptable.

14. Award or Rejection of Bid

Award will be made within sixty days to the Lowest Responsible Bidder or Bidders. The District reserves the right to reject any, or all bids, or to waive any irregularity or informality in bids when it is in the interest of the District as required by PUC - Section 30570.

Any bid conditioned in whole or in part on the revision or omission of any requirement or provision in the Contract Documents or on the inclusion of an escalation clause of any other requirement or provision not contained in the bidding or Contract Documents, will be rejected.

The District reserves the right to require, prior to the award of a contract, presentation of evidence in detail, describing the business and technical organization and plant of a bidder, including the financial resources, experience, and ability of the organization.



It is the intention of the District to award a contract on the basis of the "Total Contract Price", rather than award separate contracts for the various separate items; however, the District reserves the right to award contracts for all or a portion of the items or to delete items from the contract, if such action is in the District's best interest.

After award of the contract, the District will provide the Contractor, at no charge, with the following items:

- 1) One set of full size blueprints
- 2) One set of specifications

The extra plans and specifications left over after the bidding process may be available to the Contractor at cost.

15. Responsive Bidder

This project is being carried out under the District's Disadvantaged Business Enterprise (DBE) Program. A participation goal for this project has been established and is shown on the Bid Form. A responsible bidder as defined in Section 20.3 of the Specifications must either meet this goal or submit with his bid a Good Faith Efforts Certificate and after requesting by the District, submit full documentation evidencing good faith efforts within forty-eight (48) hours.

16. Bid Package

- A. Bidder's Certification Regarding Ineligible Contractors (Page 11)
- B. Bid Form (Pages 12-13)
- C. List of Subcontractors, if any (Page 14)
- D. List of DBE Subcontractors or Suppliers (Page 14a)
- E. Good Faith Efforts Certificate (Page 14b)
- F. Bid Bond or Cashier's Check in the amount of 10% of the bid price (Page 15)
- G. Workers' Compensation Certificate (Page 16)
- H. Buy America Certificate (Page 17)



17. Instruction for Filling in Bid Package

Certain parts of the Bid Package have caused problems to bidders. Since each of these parts must be completed, and completed correctly, we are going to review each of them separately and give you instructions on how they should be filled in. All blanks which must be filled in are on colored sheets. Fill in the blanks as follows:

BID FORM

1. Name of Bidder
2. Amount of Bid
- 2A Percentage of dollar amount of bid assigned to Disadvantaged Business Enterprise
3. If you did not receive an addendum, write "No addenda received".

If you did receive one or more, list each addendum and the date it was received by you.
4. Bidder's Contractor's License Number.
5. Type of Contractor's License.
6. Name of Bonding or Insurance Company which will write your Faithful Performance and Contractor's Payment Bond if you are awarded the contract.
7. Address of Bonding or Insurance Company.
8. Telephone Number of Bonding or Insurance Company.
9. Name of Bidder.
10. Signature of Authorized Representative of Bidder.
11. Title of Authorized Representative of Bidder.
12. Address and Telephone Number of Bidder.
13. Date of Signature.



LIST OF SUBCONTRACTORS

14. List name and locations* of, and type of work to be performed by subcontractors on your job. If you will not subcontract any of the work, write "None" on this form. In any case you must return this form with the bid package. This form is required by California law (commencing with Public Contract Code Section 4100).

*Location is defined as one of the following:

- a. City and state
- b. County and state, if located in an unincorporated area
- c. Complete street address

LIST OF DBE SUBCONTRACTORS OR SUPPLIERS

15. Refer to Section 20 of the General Provisions when completing this form. This form must be submitted for all projects with DBE goal .



MAINTENANCE BUILDING EXPANSION
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AT DIVISION 12 - LONG BEACH
FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

BIDDER'S CERTIFICATION
REGARDING
INELIGIBLE CONTRACTORS

Provide the following information if you are not on the comptroller's ineligible contractor and/or company debarred list.

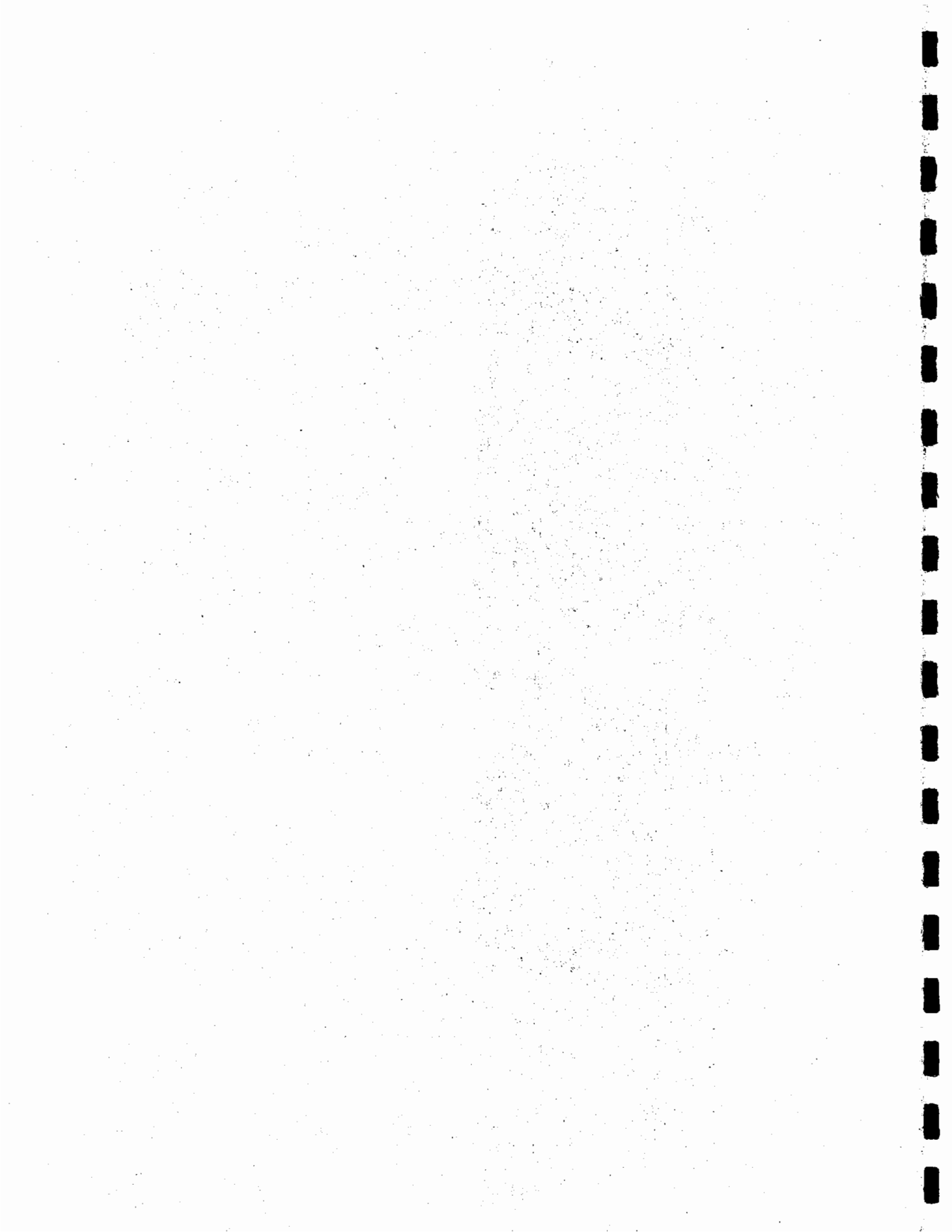
Contractors or firms who are included on the U. S. Comptroller General's list of persons or firms currently DEBARRED for violations of various public contracts incorporating Labor Standard Provisions cannot be awarded this contract.

BIDDER'S NAME

SIGNATURE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

TITLE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

DATE OF SIGNATURE



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AT DIVISION 12 - LONG BEACH
FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

BID FORM

The Contractor shall furnish, as part of this bid, all of the following information. Failure to fill in all the blanks or lists will result in rejection of the bid.

Bidder: 1 _____
having examined the Contract Documents attached hereto and entitled "DOCUMENT AND SPECIFICATIONS -- MAINTENANCE BUILDING EXPANSION AND YARD IMPROVEMENTS AT DIVISION 12 - LONG BEACH" and having examined all conditions affecting the work hereby proposed, agrees to furnish all labor, materials, equipment and other services including taxes and import duties, which are necessary for the completion of the work.

TOTAL LUMP SUM:

2 \$ _____
2A _____ %DBE

PERCENTAGE OF DOLLAR AMOUNT
ASSIGNED TO DISADVANTAGED FIRMS
OF THE LUMP SUM OF BID:

DBE GOAL

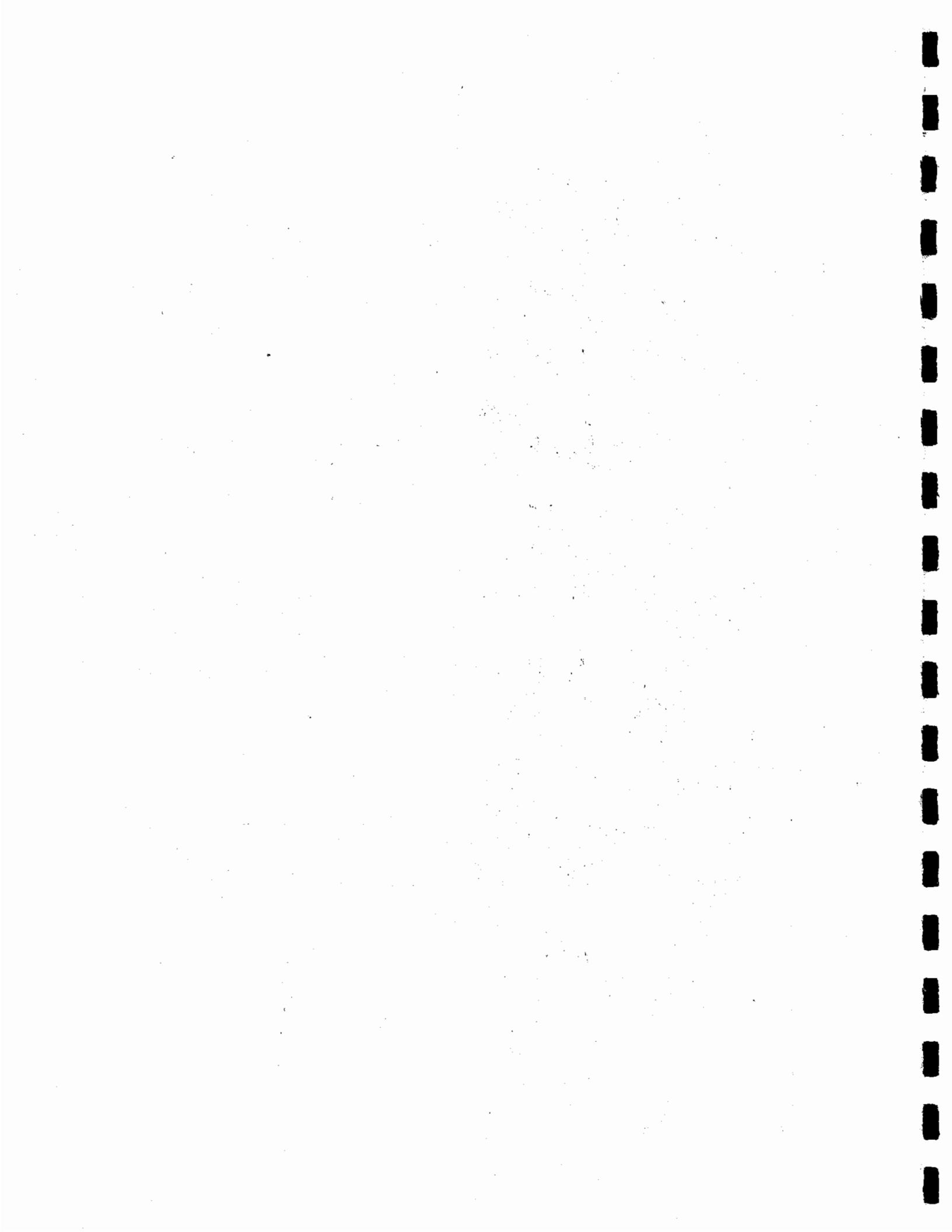
The District has established goal for participation by Disadvantaged Business Enterprises (DBEs) for this contract as set forth below. Please refer to Section 20 of the General Provisions for a full discussion of the DBE bidding requirements applicable to this project.

DBE GOAL 20 %

APPLICABLE IF DBE GOAL IS NOT MET

Reference Section 20.4 paragraph 3, of the General Provisions, the District has determined that in the event the DBE goal is not met for this contract, the following constitutes "sufficient and reasonable" number of DBE firms which the Bidder should have contacted as part of his/her good faith efforts to meet the above stated goal. (These figures represent a threshold, and may be exceeded; however, no credit is allowed for exceeding the threshold).

TOTAL NUMBER OF DBE's 29



MAINTENANCE BUILDING EXPANSION
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FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

BID FORM

(Continued)

ADDENDA RECEIVED

Addendum No. (3) _____

Date Received: _____

Contractor's License No. (4) _____

Type (5) _____

Bonding Company to be used if successful bidder.

(6) _____
Name

(7) _____
Address

Telephone: (8) _____

Bidder: (9) _____

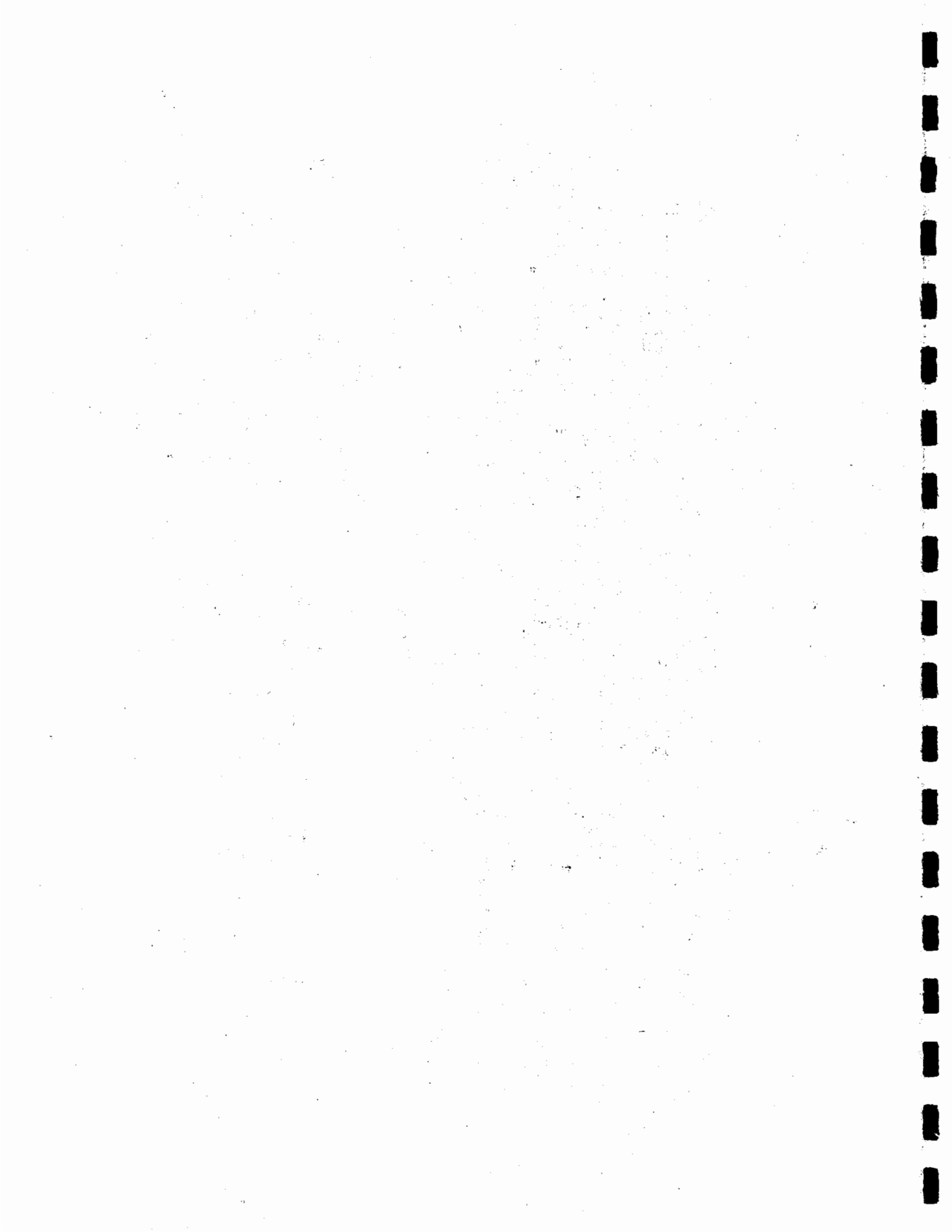
By: (10) _____
(Signature)

Title: (11) _____

Address: (12) _____

Telephone: _____

Dated (13) _____, _____, 19__



MAINTENANCE BUILDING EXPANSION
AND YARD IMPROVEMENTS
AT DIVISION 12 - LONG BEACH
FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

LIST OF SUBCONTRACTORS

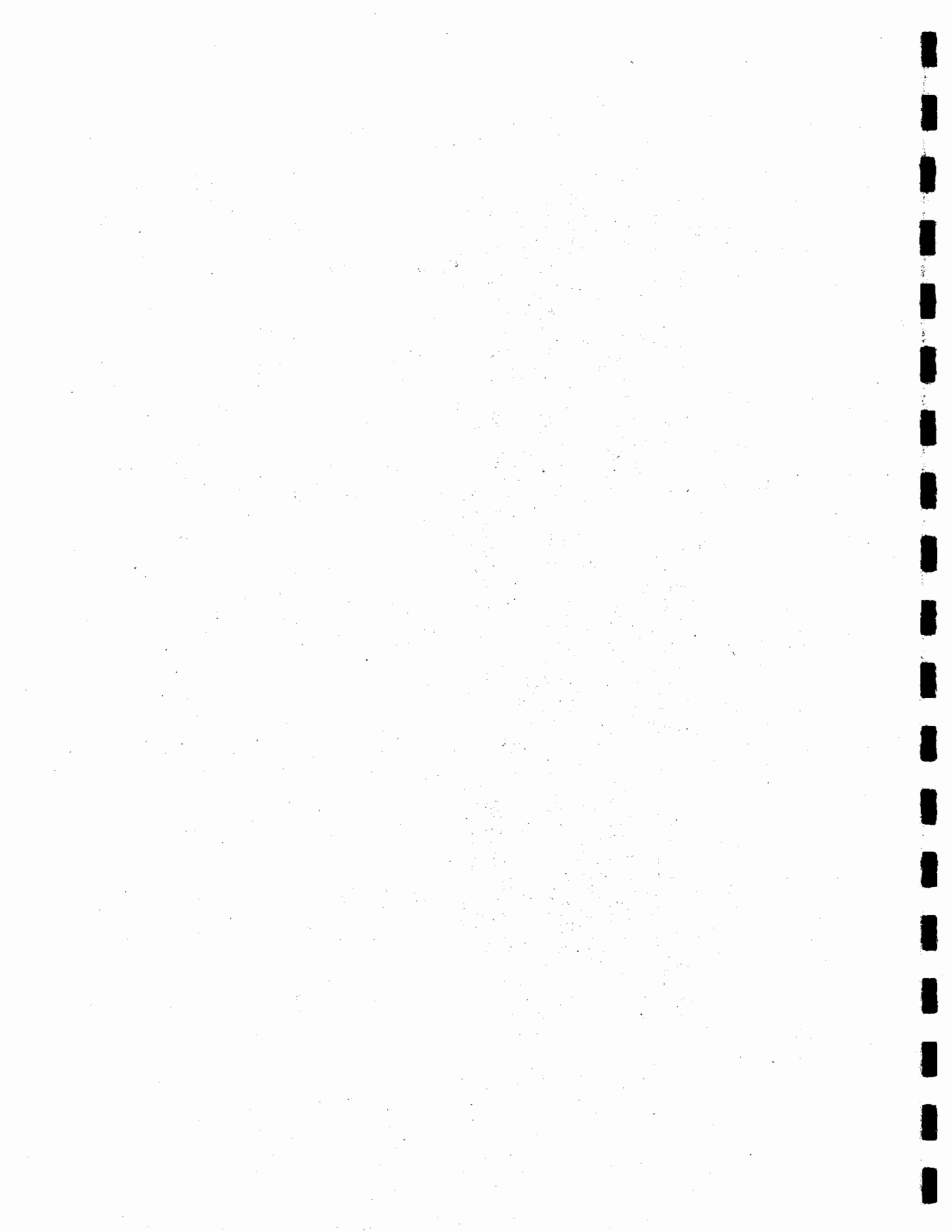
NAME

ADDRESS

TYPE OF WORK

14

List only those subcontractors whose participation of the work will amount to one-half of one percent (1/2%) or more of the total contract.



SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

15

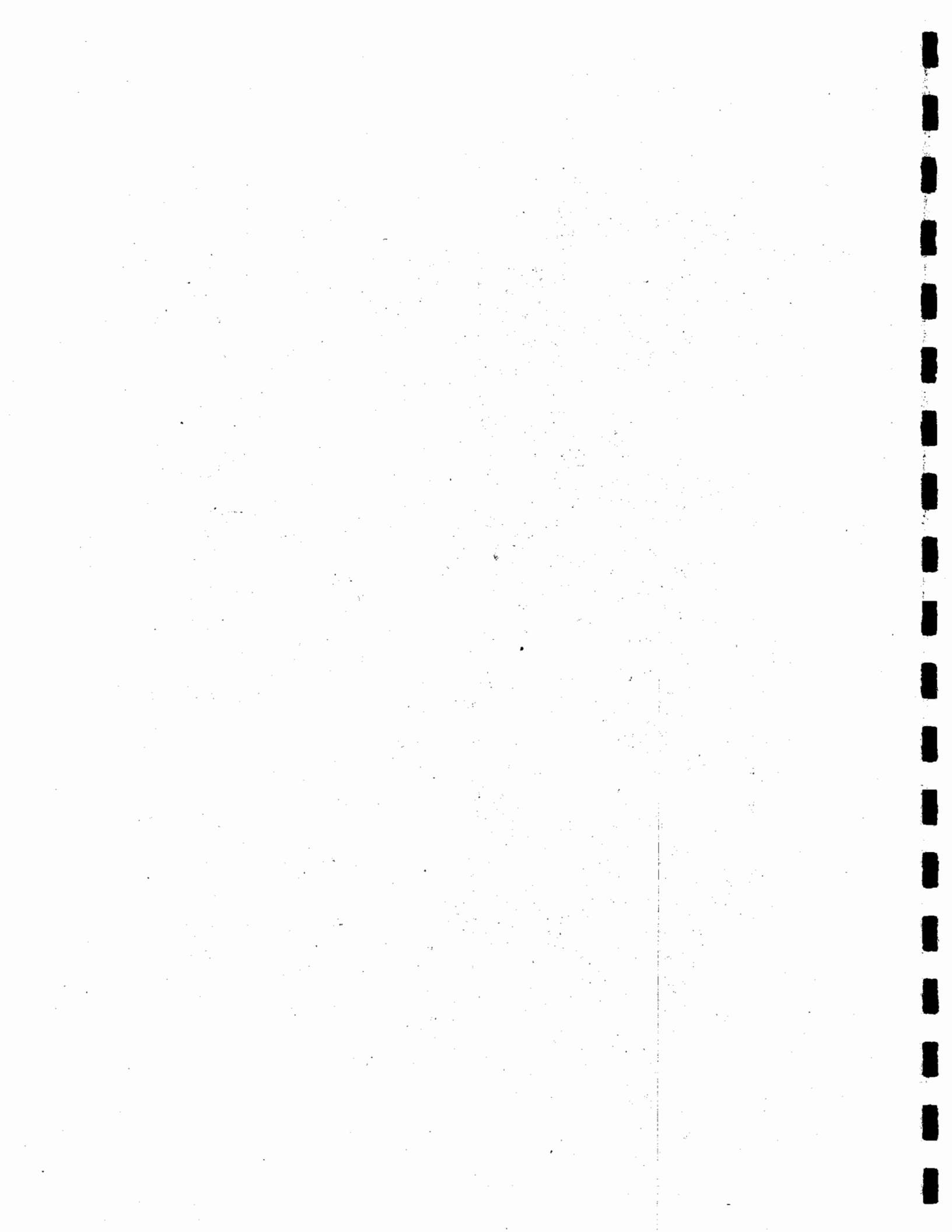
LIST OF DBE/WBE SUBCONTRACTORS OR SUPPLIERS

DBE/WBE firms will participate in this contract as follows (check all options applicable to this bid):

- The Bidder is a DBE or WBE firm. (Attach a statement in accordance with Section 20.3, para. 1., c.); and/or
- The Bidder is a joint venture. One or more of the joint venture partners is a DBE or WBE. (Submit "Schedule B" certification application form in accordance with Section 20.7 of the General Provisions.); and/or,
- The Bidder intends to meet the DBE/WBE goals by sub-contracting to the DBE/WBE firms listed below:

NAME OF DBE/WBE SUB-CONTRACTOR OR SUPPLIER	ADDRESS	WORK TO BE PERFORMED MATERIAL SUPPLIED	% PARTICIPATION	CHECK ONE	
				DBE	WBE

List all DBE/WBE subcontractors and suppliers, regardless of percentage of participation. Refer to Section 20.6 of the General Provisions for instructions on calculation of goal. Information disclosed on this form must be legible and complete in order to make a determination of bid responsiveness.



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GOOD FAITH EFFORTS CERTIFICATE

The bidder or offeror hereby certifies that while the DBE goal was not met as reflected on the List of DBE Subcontractors or Suppliers form, the good faith efforts listed in Subarticle 20.4 of the General Provisions were made.

The bidder or offeror further certifies that the documentation to support the undertaking of these good faith efforts will be submitted to the District within forty-eight (48) hours after request by the District.

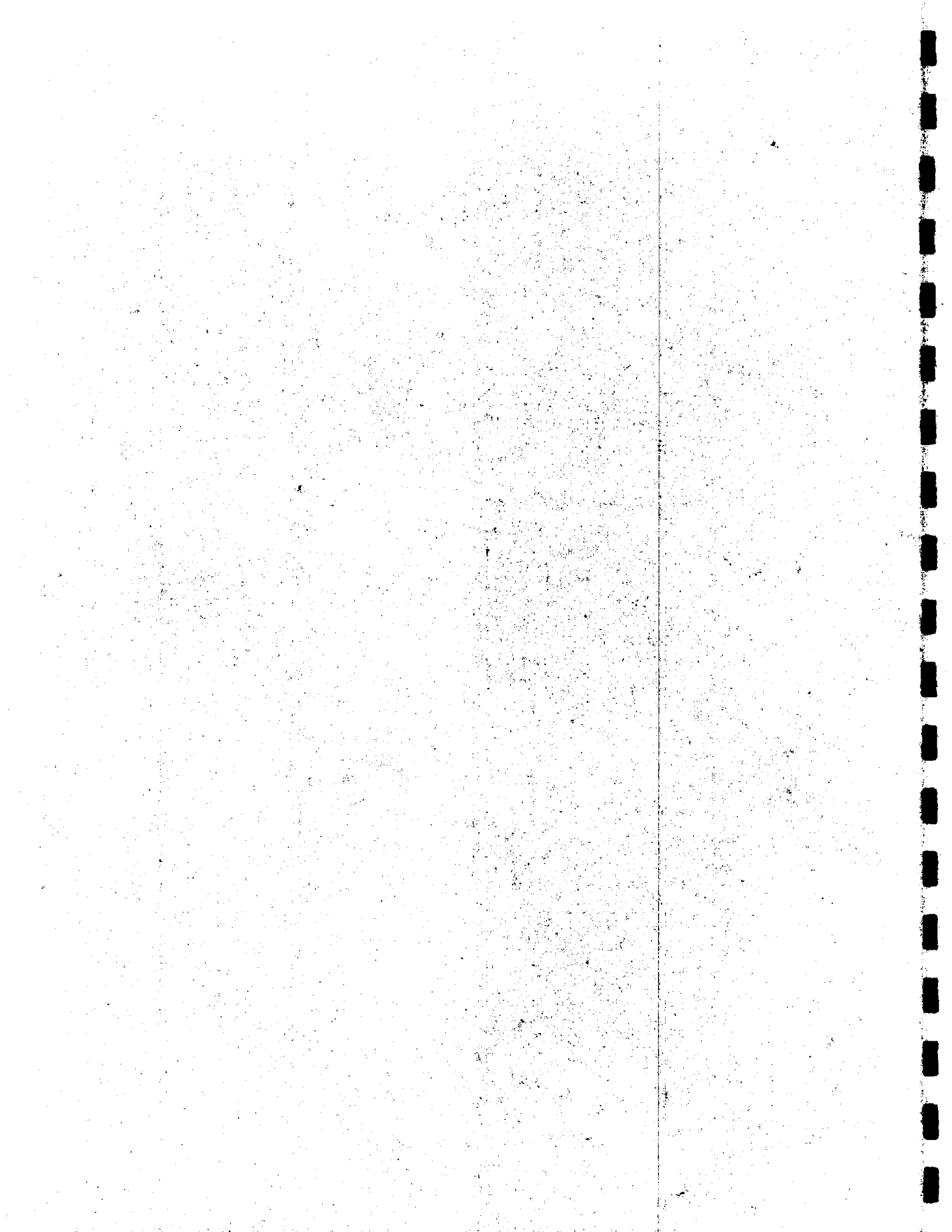
BIDDER'S NAME

SIGNATURE OF BIDDER'S AUTHORIZED
REPRESENTATIVE

NAME AND TITLE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

DATE OF SIGNATURE

This certificate is not required to be submitted if the bidder meets or exceeds the specified goal by utilizing DBE subcontractors who have already been certified by the District.



This form must be completed and attached to Bid unless a certified check is attached. (See Paragraph 9 of "Instructions to Bidders.")

MAINTENANCE BUILDING EXPANSION
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FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

BID BOND

KNOW ALL PEOPLE 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,
as Obligee, 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 _____

(Principal) (Seal)

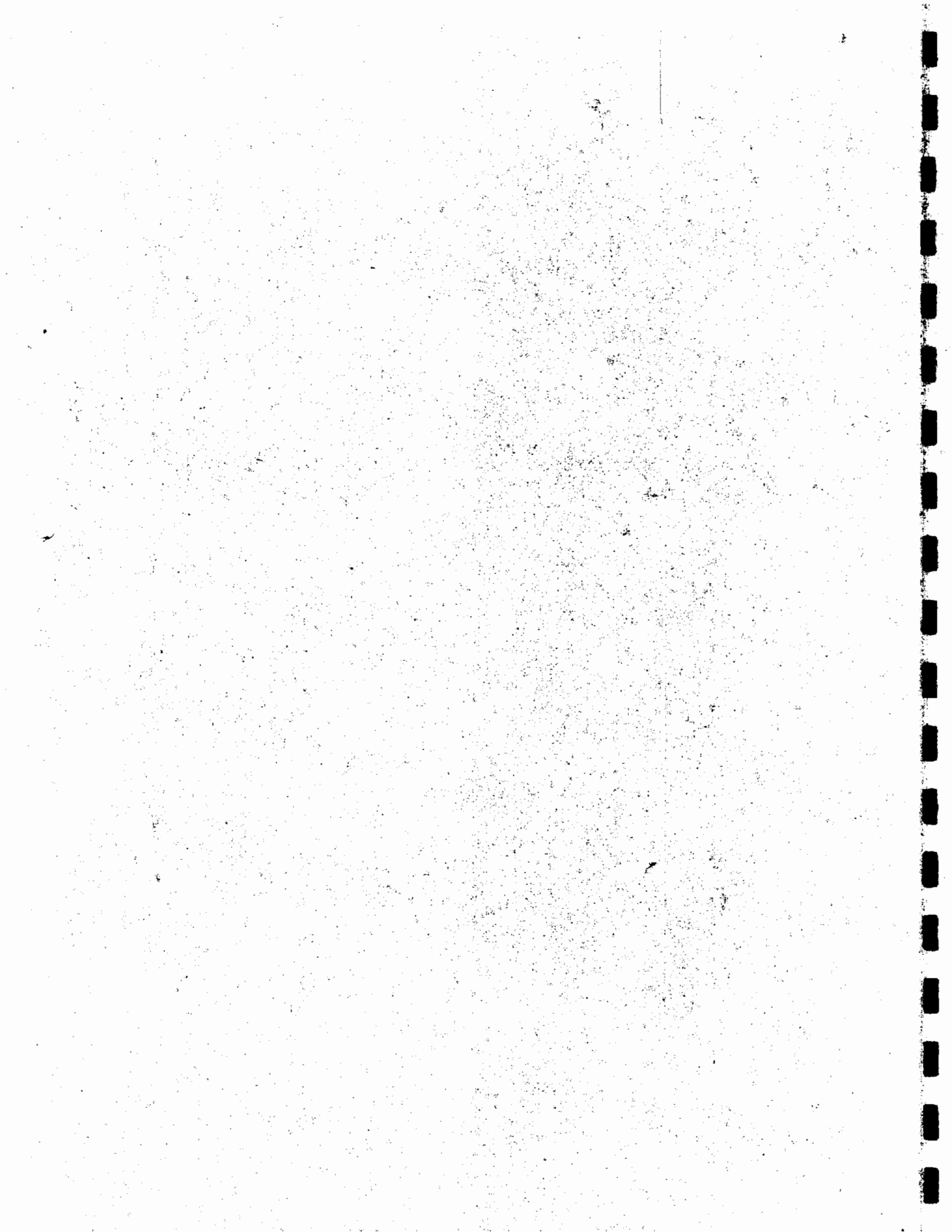
(Witness)

(Title)

(Surety) (Seal)

(Witness)

(Title)

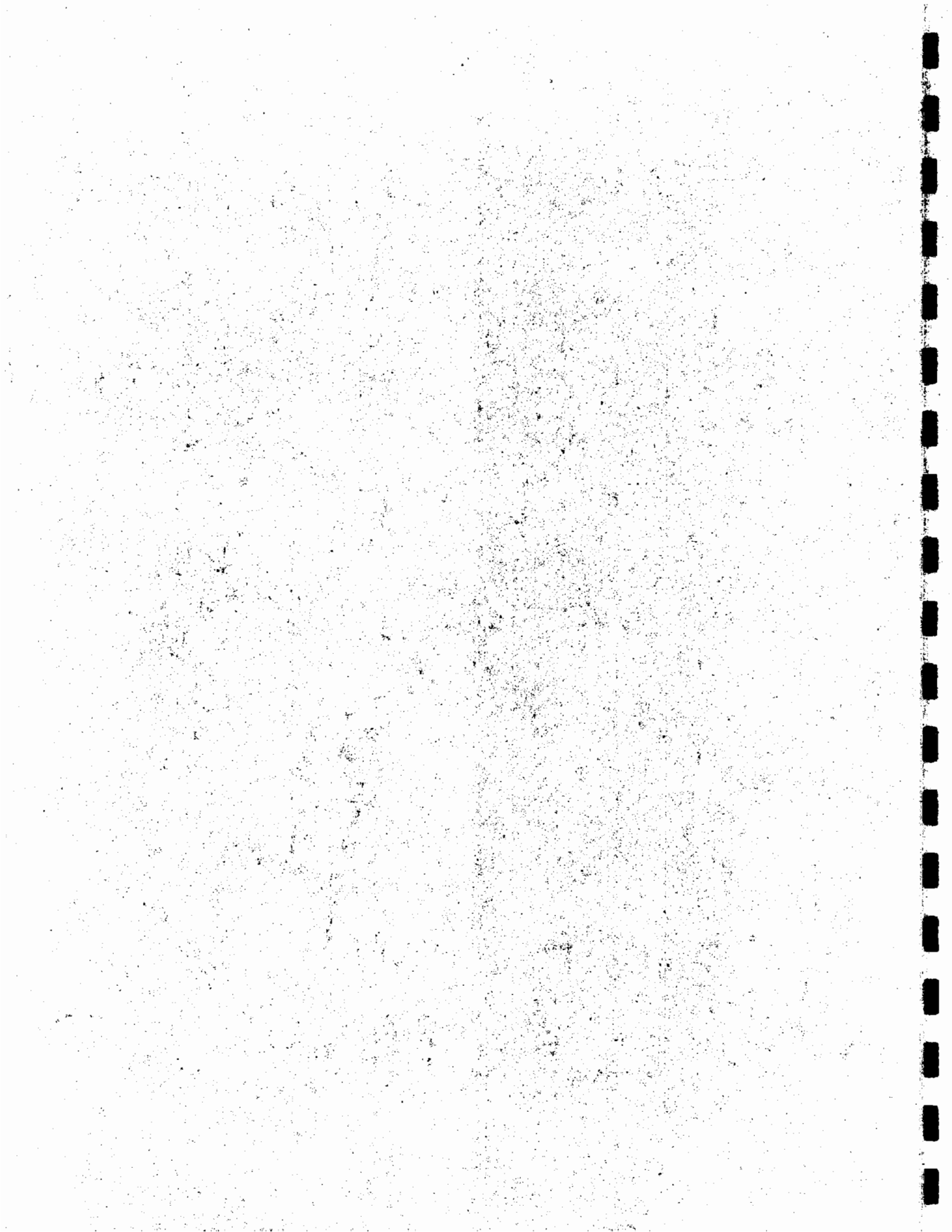


MAINTENANCE BUILDING EXPANSION
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FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
WORKERS' COMPENSATION CERTIFICATE

"I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract".

SIGNED: _____
(contractor)

DATED: _____



MAINTENANCE BUILDING EXPANSION
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BUY AMERICA CERTIFICATE

OF COMPLIANCE WITH SECTION 165(a)

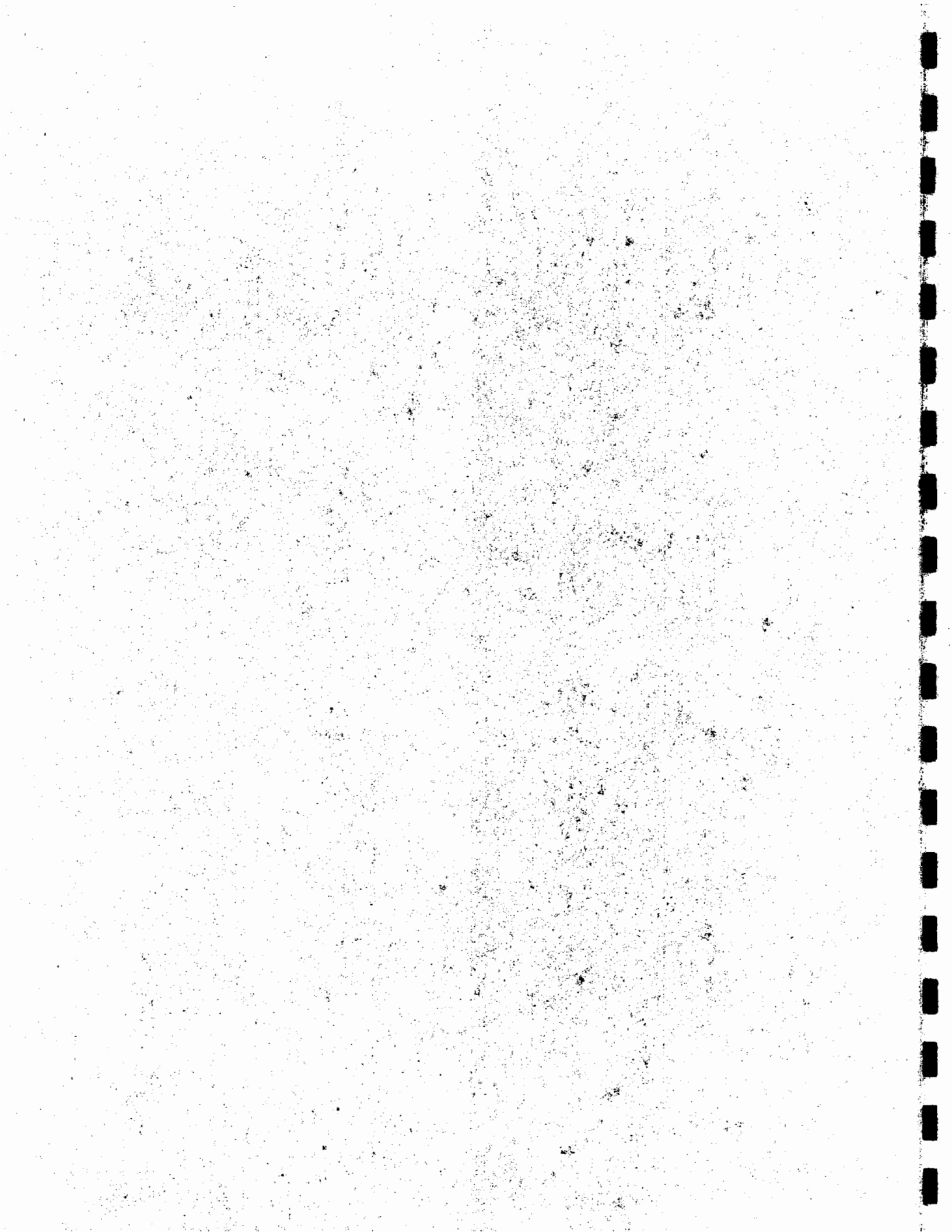
The bidder hereby certifies that it will comply with the requirements of Section 165(a) of the Surface Transportation Assistance Act of 1982 and the applicable regulations in 49CFR Part 661.

BIDDER'S NAME

SIGNATURE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

TITLE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

DATE OF SIGNATURE



MAINTENANCE BUILDING EXPANSION
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AT DIVISION 12 - LONG BEACH

FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

FAITHFUL PERFORMANCE BOND

KNOW ALL PEOPLE BY THESE PRESENTS:

That _____, as Principal, and _____, as Surety, are held and firmly bound unto the SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT, as Obligee, in the just and full amount of _____ for the payment whereof we _____ (words and figures) hereby bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Given under our hands and sealed with our seals this _____ day of _____, 19__.

The condition of the foregoing obligation is such that, WHEREAS, the above-named Principal is about to enter into a contract with the Southern California Rapid Transit District whereby said Principal agrees to _____

_____ as provided in said contract, which said contract is hereby referred to and made a part hereof to the same extent as if the same were herein specifically set forth;

NOW THEREFORE, if the said Principal shall well and truly do and perform all things agreed by it/him in said contract to be done and performed, then this obligation is to be void; otherwise to remain in full force and effect;

PROVIDED, that 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.

WITNESS our hands this _____ day of _____ 19__.

Principal Surety

By _____ By _____

And _____



MAINTENANCE BUILDING EXPANSION
AND YARD IMPROVEMENTS
AT DIVISION 12 - LONG BEACH

FOR THE
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

CONTRACTOR'S PAYMENT BOND

KNOW ALL PEOPLE BY THESE PRESENTS:

That _____, as Principal, and
_____, as Surety, are held and firmly
bound unto the SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT, as
Obligee, in the just and full amount of _____

_____ for the payment whereof we
(words and figures)
hereby bind ourselves, our heirs, executors, administrators,
successors and assigns, jointly and severally, firmly by these
presents.

Given under our hands and sealed with our seals this _____
day of _____, 19__.

The condition of the foregoing obligation is such that, WHEREAS,
the above-named Principal is about to enter into a contract with the
Southern California Rapid Transit District whereby said Principal
agrees to _____

as provided in said contract, which said contract is hereby referred
to and made a part hereof to the same extent as if the same were
herein specifically set forth;

NOW THEREFORE, if the said Principal or his Subcontractors fail
to pay for any materials, provisions, provender or other supplies, or
teams used in, upon for, or about the performance of said work
contracted to be done, or for any work or labor thereon of any kind,
or for amounts due under the Unemployment Insurance Code with respect
to such work or labor, the Surety will pay for the same in an amount
not exceeding the sum hereinabove specified, and in case suit is
brought hereon, a reasonable attorney's fee to be fixed by the Court,
otherwise this Bond shall be void and of no effect;



PROVIDED, that 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.

This Bond shall inure to the benefit of any and all persons entitled to file claims under Section 3181 et. seq. of the Civil code of the State of California, and shall give a right of action to such persons or their assigns in any suit brought upon this Bond.

WITNESS our hands this _____ day of _____ 19__.

Principal

By _____

And _____

Surety

By _____



GENERAL PROVISIONS



SECTION 2

SCOPE OF WORK

The work herein proposed consists of all work and operations including but not limited to labor, transportation, materials, equipment and supplies necessary for the construction of Maintenance Building Expansion and Yard Improvements at Division 12, 970 West Chester Place, Long Beach, California in accordance with the plans and specifications.

SECTION 3

DEFINITIONS

The following definitions are used in these documents:

Government	Federal Government
District	Southern California Rapid Transit District. When "Owner" is used, it shall mean "District".
Contracting Officer	Director of Office of Contracts, Procurement and Materiel for the Southern California Rapid Transit District or his authorized representative.
Engineer	Chief Engineer - Facilities Engineering Department for the Southern California Rapid Transit District or his authorized representative. When "Architect" is used, it shall mean "Engineer".
DOT	United States Department of Transportation
UMTA	Urban Mass Transportation Administration or the U.S. Department of Transportation
EEO	Equal Employment Opportunity
CAL/OSHA	California Occupational Safety and Health Act.
OFCC	Office of Federal Contract Compliance
Standard Specifications	Standard Specifications for Public Works Construction, 1985 Edition
Contract Documents	The written documents consists of the formal District-Contractor Contract, the Specifications and the Plans and all addenda issued prior to and all modifications and Change Orders issued after execution of the Contract.

SECTION 3

DEFINITIONS
(Continued)

Specification(s)	General Provisions, Supplementary General Provisions and Technical Provisions of the Specifications.
Plan(s)	The drawings, profiles, cross sections, working drawings and supplementary drawings or reproductions thereof, approved by the Engineer, which show locations, character, dimensions, or detail of work.
Contractor	The individual, partnership, corporation, joint venture or other legal entity entering into a contract with the District.
Subcontractor	The individual, partnership, corporation, joint venture or other legal entity entering into a contract with the Contractor to perform a portion of the work.
Working Day	Every single day, except Saturdays, Sundays, State of California legal holidays and non-operational days as determined and approved by the Engineer.

SECTION 4
CONTROL OF WORK

4.1 When "Specifications" is used, it shall mean the Documents and Specifications entitled "MAINTENANCE BUILDING EXPANSION AND YARD IMPROVEMENTS AT DIVISION 12 - LONG BEACH".

4.2 The work embraced herein shall be done in accordance with the Specifications, ASTM Standards, Uniform Building Code, local City Building Code and Fire Code and all other standards herein referenced, as the same may apply, and in accordance with the following conditions.

4.3 The Contract Documents including Drawings are complementary, any item that is required or specified by one document shall be as binding as if required or specified by all.

4.4 COORDINATION AND INTERPRETATION OF PLANS AND DRAWINGS

In case of conflict between any of the documents described in Paragraph 4.2, the Specifications shall take precedence over and be used in lieu of such conflicting portions. In case of conflict between General Provisions and Technical Provisions, the Technical Provisions shall take precedence. In case of conflict on the drawings, the details shall take precedence over plans; and large scale details shall take precedence over small scale details. In case of conflict between the Drawings and Specifications, the Drawings shall take precedence.

4.5 AUTHORITY OF THE ENGINEERS

Contractor's work shall be under the direction of the Engineer and the Engineer shall exercise such authority as is necessary to assure compliance by the Contractor with the Contract Specifications. The Engineer may direct the removal or replacement of nonconforming work. Inspections and acceptance of the work will be completed by the Engineer in such a manner and within such time constraints as are necessary to support the orderly prosecution of the work. All correspondence from the Contractor to the District shall be considered delivered when received by the Engineer.

The Engineer shall interpret the Drawings and Technical Specifications on behalf of the District, approve shop drawings and other required submittals, approve progress payments, order tests and make acceptances of materials incorporated within the work, and issue notices of changed or extra work.

Construction Contract Change Orders covering such changed or extra work shall be subject to approval of the Contracting Officer. Claims and waivers of liquidated damages shall be resolved by the Engineer in conjunction with and subject to the approval of the Contracting Officer.

SECTION 5

ORDINANCES, PERMITS AND INSPECTIONS

- 5.1 The District will not be required to obtain a building permit for the on site work from the Building and Safety Department of the City of Long Beach. However, all municipal, county and state laws, rules and regulations governing or related to any portion of this work are hereby incorporated into and made a part of these Specifications.
- 5.2 All other permits, licenses and inspections required by municipal, county and state authority 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.
- 5.3 The Contractor shall obtain and pay for all permits and bonds required for all off-site work including all utility connections, traffic signal, street lighting relocation and installation, and street improvement work.

SECTION 6

INDEMNITY

- 6.1 Contractor shall indemnify and hold the District, its officers, its consultants and employees harmless from and against all claims, losses, actions and expenses (including attorney's fees), on account of bodily injury to or death of any person (including employees of District) or for damage to or loss of use of property (including property of District) arising out of or in any way connected with the work and services to be performed under the agreement, unless caused solely by the negligence of the District, its officers, its consultants or employees.

SECTION 7

INSURANCE

7.1 Contractor shall, at its own expense, procure and maintain during the term of this agreement liability insurance coverage of the following types and with not less than the following limits of liability:

Comprehensive Public Liability and Property damage, including Automobile	\$1,000,000 Combined Single Limit
--	---

7.2 Prior to the commencement of work, Contractor shall furnish the District with a Certificate of Insurance evidencing the above coverage requirements.

The Certificate shall make provision for cross liability, and shall contain the following language:

- (1) "The Southern California Rapid Transit District is an additional insured."
- (2) "The liability assumed by Contractor under the provisions of the hold harmless and indemnity clause contained in the contract is covered by the terms of the policy."
- (3) "The Contractor's policy is primary over any other insurance carried by the District."
- (4) "The policy will not be cancelled or materially changed without thirty days prior written notice to the District."

7.3 As required by Section 1860 of the California Labor Code, the Contractor shall secure the payment of Workers' Compensation to his employees in accordance with the provisions of Section 3700 of the California Labor Code and shall furnish the District with a certificate evidencing such coverage together with a verification thereof prior to the commencement of work in the form presented on Page 16.

SECTION 8

COOPERATION AND COORDINATION

8.1 Cooperation and Coordination with Other Contractors

8.1.1 During the progress of work under this contract it will be necessary for other contractors and persons employed by the District to work in or about the project. The District reserves the right to put such other contractors to work and to afford such access to the site of the work to be performed hereunder at such times as the District deems proper. The contractor shall not impede or interfere with the work of such other contractors engaged in or about the work and shall so arrange and conduct his work that such other contractors may complete their work at the earliest date possible. The cooperation and coordination of the Contractor with other contractors and District employees is mandatory.

8.1.2 The Contractor shall attend such meetings and conferences arranged by the Engineer for the purpose of coordinating project work. One such conference shall be a pre-construction meeting.

The pre-construction meeting shall be held within ten working days after award of the Contract to discuss the following aspects of the project.

- a. Project schedule
- b. Sequence and staging of construction
- c. Administrative procedures
- d. Cost breakdown
- e. List of Subcontractors

8.2 Contractor's Representative

The Contractor shall at all times be represented at the project site of the work in person or by a competent superintendent satisfactory to the Engineer. The Contractor's representative shall have authority to act for the Contractor in all matters concerning the work, and shall have the ability to so organize the work and the work of the subcontractors as to attain complete cooperation and minimize delays.

SECTION 9

SUBCONTRACTOR REQUIREMENTS

- 9.1 All sections of these Specifications shall apply to subcontractors in addition to the prime contractor.

SECTION 10

TEMPORARY FACILITIES

- 10.1 The Contractor shall provide and maintain such lights, protective devices, barricades and warning signs as are required by the Engineer and as are otherwise necessary for the safety of personnel and the public. The Contractor shall be responsible for the timely erection and removal of such safeguards without specific instructions from the District, or anyone else.
- 10.2 No signs, billboards or any type of advertising is permitted on, about or adjacent to the premises, or on any structure on the premises, except by written consent of the Engineer.
- 10.3 The Contractor shall keep work areas free of accumulations of rubbish and surplus material obstructions. No rubbish or waste or debris shall be burned on the site.
- 10.4 The Contractor shall provide a Type "B" officer for his staff in the field as specified in Section 8-2.2 of the Standard Specifications.
- 10.5 The Contractor shall determine the need for temporary utility services required by him and shall make all arrangements with utility companies and governmental agencies to secure such services. All costs incurred shall be at the sole expense of the Contractor. All temporary services shall be furnished, installed, connected and maintained by the contractor in a workman-like manner, satisfactory to the Engineer and shall be removed by the Contractor in like manner at his expense prior to final acceptance except for such temporary facilities as may be specified to remain in place.
- 10.6 Adequate sanitary conveniences of an approved type for the use of persons employed on the site, and properly secluded from public observation, shall be provided and maintained by the Contractor in such a manner and at such points as shall be required by the Engineer. These conveniences shall be maintained at all times without nuisance and their use shall be strictly enforced. Upon completion of the work, they shall be removed from the premises, leaving the premises clean and free from nuisance.

SECTION 11

CONSTRUCTION SAFETY AND HEALTH STANDARDS

- 11.1 The Contractor shall conform to all applicable occupational safety and health standards, rules, regulations, and orders established by the State of California, and the United States Federal Register Sections 1910 and 1926. He shall submit the minutes of his weekly safety meetings to the Engineer along with his weekly payroll for record.
- 11.2 It shall be a condition of the contract to be entered into, and shall be made a condition of each subcontract entered into pursuant to this 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 conditions which are unsanitary, hazardous or dangerous to his or her health or safety. Contractor shall be solely responsible for maintaining safe working conditions at the work site.
- 11.3 Pursuant to the requirements of Code of Regulation, Title 26, Section 8-5194, the Contractor is hereby notified that the site of work may contain hazardous substances to which tradesmen or craftsmen may be exposed while performing the work of this contract. The District has developed a Hazard Communication Program which contains a list of hazardous substances known to be present, methods of identification and some suggestions for protective measures to be observed when these substances are encountered. The Contractor shall obtain and review a copy of the said plan which is available in the Office of Contracts, Procurement and Materiel (OCPM).
- 11.4 Contractor shall hold the District harmless from any claims or charges by reason of Contractor's or any subcontractor's failure to comply with the above acts 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.
- 11.5 The Contractor shall require that all employees, tradesmen, visitors, and others engaged in any work or business at the site wear approved head protection (hard hats) at all times, as directed by the Engineer. The Contractor shall also require that employees wear all other required personal protective equipment dependent upon the type of exposure present.

SECTION 12

PATENT RIGHTS

- 12.1 The Contractor agrees to defend and pay the entire cost of defending any claim or suit whenever or wherever made or brought against the District based upon infringement or alleged infringement of such letters patent, and to indemnify and save harmless the said District from and against any and all liability, damage, loss or injury adjudged or sustained in any such claim or suit, or adjudged or sustained by reason of the equipment to be furnished hereunder constituting an infringement of any letters patent, or adjudged or sustained by reason of inability of said District to use said equipment because of any infringement or alleged infringement of any letters patent.

SECTION 13

CONTRACT DURATION

- 13.1 If awarded the Contract, the Contractor shall furnish the necessary bonds and insurance certificates within eight working days. District may withdraw award if required bonds/insurance are not received within this period. The District will review and accept necessary bonds and insurance certificates and issue Notice to Proceed. Contractor shall commence work within five working days after date of Notice to Proceed and shall diligently prosecute the work to completion.
- 13.2 A delay of starting the work after date of Notice to Proceed due to circumstances under the control of the Contractor shall not be a cause for granting a time extension.
- 13.3 The Contractor shall diligently prosecute the work to completion within 160 working days from date of the Notice to Proceed. This shall include time required to obtain permits as required by any regulatory agencies. Refer to Section 29 for Liquidated Damages to be paid to the District by the Contractor for delays of completing the project beyond the number of days as stipulated herein.

SECTION 14

CONTRACT CHANGES

14.1 CHANGE ORDERS -- GENERAL

The District reserves the right to order in writing changes in the plans and specifications, at any time prior to the acceptance of the work without voiding the contract, and Contractor shall comply with such order. Changes or deviations from the plans and specifications shall not be made without authority in writing from the District. On the basis set forth herein, contract price shall be adjusted for any change order requiring labor, material, equipment or quality of materials or equipment over and above that originally required or result in lesser quantity or quality thereof. Whenever it appears to the District that a change is necessary, and when so ordered by District, Contractor shall halt work in the area that may be affected. Changed work shall be performed in accordance with original requirements of the contract subject to the sole exception that if previously modified by change order, then in accordance with such original requirements as so modified.

14.2 CHANGE ORDERS -- ORDINARY

- A. Procedure -- Proposed Change Orders: Subject only to the provisions of Section 14.3, changes in the contract requirements and contract price will be effected as set forth herein.

Contractor will be issued a proposed change order request describing intended change upon which, and within 15 days, he shall indicate his proposed price to be added or deducted from contract sum due to the change, supported by full and completely detailed estimates of cost by contractor, subcontractor, vendor or supplier, and any adjustment in time of final completion of the entire work which is directly attributable to changed work. Contractor shall upon request by District permit inspection of his original contract estimate, subcontract agreements or purchase orders relating to the change. If agreement is reached as to the adjustment in compensation for performance of changed work, but agreement is not reached as to the time adjustment for such work, then Contractor shall proceed with the work at the agreed price reserving to Contractor the right to further pursue his claim for time adjustment.

If Contractor fails to submit his cost estimate within such 15-day period, or there is failure to agree to such cost, the District has the right to order contractor, in writing, to commence work immediately and contract price shall be adjusted in accordance with District's estimate of cost, unless, within 15 days following completion of added work or with written notice to delete work, Contractor presents proof that District's estimate was in error.

- B. Procedure -- Failure to Agree as to Cost: If the District and Contractor fail to agree as to the cost of the proposed change order, Contractor upon written order from the District shall proceed immediately with changed work. Contractor shall maintain daily job record in quadruplicate containing detailed summary of labor, materials, and equipment required for the changed work. Upon being signed and agreed to by the District and Contractor at the end of each day's performance, it will become the basis for payment for the changed work. Upon completion of the work under the change order, Contractor shall submit his invoice therefore containing only the items of labor, materials and equipment which are in addition to requirements of the contract and as approved by both parties, together with allowable mark-ups.

When there has been failure to agree as to cost, no payment will be made to Contractor until completion of work called for in the change or in the written order authorizing performance of the work, except that when performance of such work continues for more than 90 days after date of written order to proceed, or aggregates a cost of \$10,000 or more, then in either such case, Contractor may request progress payments for work already accomplished. Written request shall be accompanied by detailed breakdown of labor, materials and equipment used, based on daily job cost record agreed on by both parties to the contract. Progress payments will be limited to those portions of such work as to which Contractor and District can agree on the value of work payable under the contract.

When proposed change order contains deletion of any work and District and Contractor are unable to agree upon the cost thereof, the District's estimate shall be deducted from contract price, unless within 15 days Contractor presents proof that District's estimate is in error.

C. Allowable Costs Upon Change Orders: The only costs which will be allowed because of changed work and the manner in which such costs shall be computed are set forth in this paragraph. Where the term "actual cost" is used in this Subparagraph C, it shall be read to mean "estimated cost" where adjustment in contract price is in fact to be based upon estimated costs.

1. Labor: The Contractor will be paid the cost of labor for workmen (including foremen when authorized by the District), used in the actual and direct performance of the work. The cost of labor, whether the employer is the Contractor, Subcontractor, or other forces, will be the sum of the following:

- a. Actual Wage -- The actual wages paid shall include any employer payments to or on behalf of the workman for health and welfare, pension, vacation and similar purposes.
- b. Labor Surcharge -- To the actual wages, as defined in la. will be added a labor surcharge not to exceed 20%. Said surcharge shall constitute full compensation for all payments imposed by State and Federal laws and for all other payments made to, or on behalf of, the workmen, other than actual wages as defined in la. and subsistence and travel allowance as specified in lc.
- c. Subsistence and Travel Allowance -- The actual subsistence and travel allowance paid for such workmen.

2. Materials: Actual cost to Contractor for materials directly required for performance of changed work. Such cost of materials may include costs of procurement, transportation and delivery if incurred. If trade discount by actual supplier is available to Contractor, it shall be credited to the District. If materials are obtained from supply or sources owned wholly or in part by Contractor, payment therefor will not exceed current wholesale price for such materials. The term "trade discount" does not include the concept of cash discount. If, in the opinion of the District, the cost of materials is excessive, or if Contractor fails to furnish satisfactory evidence of cost to him

from actual supplier thereof, then in either case cost of materials shall be deemed to be lowest current wholesale price at which similar materials are available in quantities required. The District reserves the right to furnish such materials required by the change order as he deems advisable, and Contractor shall have no claims for costs or profits on material furnished by District.

3. **Equipment:** Actual cost to Contractor for use of equipment directly required in performance of the changed work as specified herein. In computing hourly rental of equipment, any time less than 30 minutes shall be considered one-half hour. No payment will be made for time while equipment is inoperative due to breakdowns or for nonworking days. In addition, rental time shall include time required to move equipment to the work from nearest available source for rental of such equipment, and to return it to the source. If such equipment, is not moved by its own power, then loading and transportation costs will be paid in lieu of rental time therefor. However, neither moving time nor loading and transportation costs will be paid if the equipment is used on the project for any portion of the work other than upon the changed work. Individual pieces of equipment having replacement value of \$100 or less shall be considered to be tools or small equipment, and no payment therefore will be made. The Contractor shall be paid the actual cost of equipment rentals except that such rates paid to the Contractor will not exceed the rental rates listed for such equipment in the Department of Transportation publication entitled "Equipment Rental Rates and General Prevailing Wage Rates", which is in effect on the date upon which the work is accomplished and which is a part of the contract. If such equipment is owned by the Contractor, the above-mentioned Department of Transportation rates shall be used. If it is deemed necessary by the District to use equipment not listed in the said publication, a suitable rental rate for such equipment will be established by the District. The Contractor may furnish any cost data which might assist the District in the establishment of such rental rate.

Rate to be paid to Contractor for use of equipment as set forth above shall constitute full compensation to Contractor for cost of fuel, power, oil lubrication, supplies, small equipment, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance and any and all costs to Contractor incidental to use of such equipment. Operators of rental equipment will be paid for as provided in Section 1 - Labor.

4. Subcontractors: Actual cost to Contractor for work performed by subcontractor. Subcontractor shall compute his costs as set forth in Paragraphs 1, 2, 3, and 5.

5. Mark-ups:

For added or deleted work: When work is added or deleted, mark ups to allowable costs may be added as follows:

- a. Labor -- an amount not to exceed 15 percent for overhead and profit.
- b. Materials and Equipment -- an amount not to exceed 15 percent for overhead and profit.
- c. Subcontractors -- an amount not to exceed 5 percent for overhead and profit.
- d. Profit Mark-up Limitation -- the mark-up for profit shall in no case exceed 10% of the direct cost portion of any Change Order. Contractor shall itemize the profit mark-up of a Change Order as a separate item.

The actual amount of the markup shall be approved by the District and will be commensurate with the scope of the change.

6. General Limitation: In no event shall actual cost to Contractor for added work be recognized in excess of market values prevailing at time of the change, unless Contractor can establish to the complete satisfaction of the District that

he investigated all possible means of obtaining such work at prevailing market values and that the excess cost could not be avoided by him notwithstanding actual charges to Contractor for overhead and profit on work performed or furnished to him by others, no such mark-ups will be recognized or considered in excess of those prevailing in the trade or industry. Lump sum quotations may be accepted at the option of the Engineer. When change order deletes work from contract, computation of cost thereof shall be values which prevailed at time bids for the work were opened.

- a. Allowable Time Extensions: For change in the work, Contractor shall be entitled only to such adjustments in time by which completion of the entire work is delayed due to performance of changed work. Each estimate for change in the work submitted by Contractor shall state amount of extra time that he considers should be allowed for making requested change. An extension in time commensurate with the delay in completion. Failure to request extra time when submitting such estimate shall constitute waiver of the right to subsequently claim adjustment in the time for final completion based upon such changed work.

14.3 EMERGENCY CHANGES

Changes in the work made necessary due to unexpected or unforeseen site conditions, discovery of discrepancies or errors in plans or specifications requiring immediate clarification in order to avoid serious work stoppage are types of emergency changes which may be authorized by the Engineer in writing to Contractor. Contractor shall commence performance of emergency change immediately upon authorization. Daily job record shall be maintained in such manner as required by Section 14.2B.

14.4 CHANGED WORK -- EFFECT ON SURETIES

All alterations, extensions of time, extra and additional work, and other changes authorized by these specifications or any part of the contract may be made without securing consent of surety or sureties on contract bonds.

14.5 CONTRACTING OFFICER'S APPROVAL

All contract change orders modifying the contract price and contract duration are subject to approval of the Contracting Officer.

14.6 CLAIMS

A. Notice of Potential Claim

1. The Contractor shall not be entitled to additional compensation otherwise payable for any act or failure to act by District, the occurrence of any event or any other cause, unless it shall have given the District a written notice of potential claim within five working days after the occurrence of the act or event.
2. The written notice of potential claim shall set forth the reasons the Contractor believes additional compensation is or will be due, the nature of the costs involved, and insofar as possible, the amount of the potential claim. If based on an act or failure to act by District, the written notice shall be given to the District prior to the time that the Contractor has started performance of Work giving rise to the potential claim for additional compensation.

B. Submittal of Claims

1. Claims shall be filed by the Contractor within 30 days after the occurrence of the event and shall be in sufficient detail to enable the District to ascertain the basis and amount of the claims. The Contractor shall furnish, when requested by the District further information and details required to determine the facts or contentions involved in the claims. Failure to submit the information and details will be sufficient cause for denying the Contractor's claims.

2. Each claim the Contractor makes for equitable adjustment on account of delay for any cause shall be accompanied by a revised progress schedule, in such detail as is required by the District, reflecting the effects of the delay and proposals to minimize the effects. If no analysis of the progress schedule has been previously submitted to the District reflecting conditions prior to and after the delay for which relief is sought, then such an analysis reflecting those conditions shall be prepared and submitted with the claim. Failure to submit the analysis will be sufficient cause for denying the Contractor's claim.
3. In no event shall claims be made after final payment is made.
4. Contractor shall continue to perform the work during the pendency of the claim.
5. Adjustment in the Contract Price or Schedule arising out of a claim shall be effective only if expressly agreed to by the District by the issuance of a Change Order.

14.7 DISPUTES

- A. 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 sub-article 14.7.B.
- B. Each determination made by the District pursuant to sub-article 14.7.A shall be set forth in a written notice thereof to the Contractor and, within 30 days after the receipt of such notice, the Contractor may 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, the District shall respond, in writing, to the response. Contractor's failure to respond to the District's determination within the thirty day period shall be deemed an acceptance thereof. No further responses 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.

- C. Disputes subject to this Article shall be governed by California law. 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 United States Government relating to this Contract, and with the laws and regulations governing such grants and the relationship between the District and the United States Government in all other respects, questions arising in connection therewith shall be governed by the applicable Federal law.

SECTION 15

INSPECTIONS

15.1 Government Inspections: The Government shall have access to the site of construction and shall have the right to inspect all project works.

15.2 Construction Inspections:

- A. In order to allow for inspection by the Engineer, by the local City or any inspection required elsewhere in these specifications, the Contractor shall notify the Engineer a sufficient length of time in advance of the permanent concealment of any materials or work by other materials or work.
- B. Whenever the Contractor desires to carry on the work of this Contract at night or on a Saturday, Sunday, or holiday, he shall request authorization in writing from the Engineer for such work at least twenty-four (24) hours in advance so that inspection may be provided for if authorization is granted.
- C. If any work is concealed or performed without the prior notice specified above, then the work shall be subject to such tests or exposure as may be necessary to prove to the Engineer that the materials used and the work done are in conformity with the plans and specifications. All labor and equipment necessary for exposing and testing shall be furnished by the Contractor at his expense. The Contractor shall replace, at his own expense, any materials or work damaged by exposure and any faulty materials or workmanship evidenced by such exposure or testing.
- D. When in order to comply with the intent of the specifications, and when not otherwise specified, inspection must be made at the plant or mill of the manufacturer or fabricator of material. The Contractor shall notify the Engineer a sufficient length of time in advance to allow for arrangements to be made for such inspection.
- E. Any inspection or approval by Engineer will not relieve the Contractor of the responsibility of incorporating in the work only those materials which conform to the specifications, and any nonconforming materials shall be removed from the site whenever identified, at the expense of the Contractor.

SECTION 16

INTEREST OF MEMBERS OF CONGRESS

16.1 No member of or delegate to the Congress of the United States shall be admitted to any share or part of this contract or to any benefit arising therefrom.

SECTION 17

PROHIBITED INTEREST & CODE OF CONDUCT

- 17.1 No member, officer or employee of the District, or of a local public body, during his tenure or for one year thereafter shall have any interest, direct or indirect, in this contract or the proceeds thereof.
- 17.2 To the District's or Contractor's knowledge, 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 interest comes to the knowledge of either party at any time, a full and complete disclosure of all such information will be made in writing to the other party, even if such interest would not be considered a conflict under Article 4 of Chapter 1 of Division 4 of Title 1 (commencing with Section 1090) and Title 9, Article 7 (commencing with Section 87100) of the Government Code.
- 17.3 The District adheres strictly to the "Code of Conduct" as adopted by the Board of Directors of the Southern California Rapid Transit District on February 13, 1986, as Section 16 of the District's Rules and Regulations. The Code of Conduct is reproduced hereafter on page 47-a through page 47-x.

XVI. CODE OF CONDUCT

16.1 This Code of Conduct shall govern the conduct of all employees, consultants, and members of the Board of Directors of the Southern California Rapid Transit District.

16.2 There are numerous laws and regulations which govern the conduct of public officers and employees and which are applicable to the SCRTD. Because they are contained in various California Code sections and District policy statements, it is desirable to set them forth in one document for ready reference so that all persons affected can more easily become familiar with them.

16.3 The complete texts of the foregoing laws and regulations are attached hereto as Appendix A. When in doubt as to the applicability of any law or regulation to any particular situation, the potentially affected officer or employee should request an advisory opinion from the District's Legal Department.

Comment: The comments and examples which follow do not have the force and effect of the sections of the Code to which they pertain, but are intended as an aid in interpreting the Code.

16.4 The following sections, which summarize laws and regulations pertaining to conduct of public officers and employees, govern the conduct of District Board members, officers, employees, and

consultants. All Board members, District officers and employees and consultants shall be familiar with the provisions of this Code of Conduct.

A. Board members, and District officers and employees shall not be financially interested in any contract made by them in their official capacity. Board members, District officers, or employees shall not be purchasers at any sale or vendors at any purchase made by them in their official capacity.

A contract made in violation of these sections may be voided by the Board of Directors. (Government Code §1090 et seq.).

Comment: Board members, officers, and employees (hereinafter called officers) are prohibited from having any interest in a contract "made by them in their official capacity". Cases applying this language have not confined it to the narrow and technical interpretation of the word "made". Rather if an officer was in any way involved with the contract through planning, preliminary discussions, compromises, drawing of plans and specifications, solicitation of bids or award of the contract, that officer has "made"

the contract under Section 1090. In such circumstances the District cannot enter into the contract. Should the contract be executed it would be void and the officer would be subject to a fine of up to \$1,000 or imprisonment and would be forever disqualified from holding any office in this state. (Section 1097). If a Director is involved, the mere fact that he/she is a member of the Board constitutes participation in the award of a contract, irrespective of whether the Director abstains from discussion or voting. An officer is not deemed to be "interested" in a District contract if his/her interest is remote. These remote interests are set forth in Section 1091 in the appendix.

Similarly, an officer is viewed as having no interest whatsoever if he/she falls within one of the categories set forth in Section 1091.5 in the appendix.

Examples:

1. An officer of the District is a

member of a staff committee which will recommend 5 medical clinics to give physical examinations for District employees. The officer's wife, a physician, is part owner of one of the clinics. The District is prohibited from contracting with that clinic.

2. A member of the Board of Directors is a partner in a real estate venture which buys and sells commercial property. The District is accepting bids for the sale of an abandoned division site. Bids from the firm in which the Board member has an interest cannot be accepted.

- B. District Board members or employees shall not engage in any employment or activity for compensation which is inconsistent or incompatible or in conflict with his or her duties as a District Board member or employee or with the duties of his appointing power or agency by which he is employed.

Comment: The purpose of this section is to insure that District personnel do not accept other employment that will impair their ability to exercise an independent,

objective judgment in their official roles and is based on the fundamental theory that a person cannot serve equally two masters. Incompatible employment may exist by virtue of a physical inability to execute diligently the functions of both jobs or because the duties and functions of each are inherently inconsistent or repugnant. The inherent inconsistency which makes employment incompatible lies in a potential conflict of interests or duties, as where one job is subject in some degree to the supervisory control of the other or where one activity will require a person to disclose confidential information which he has gained by reason of his other position or employment with the District.

Examples:

1. An Assistant Counsel of the District is retained by a homeowners' group to advise it in how to proceed in opposing a proposed Metro Rail station. The

attorney must terminate one of the relationships because he/she could not possibly give undivided loyalty to both employers.

2. A senior planner is asked to provide consultant services in his spare time to cities forming a transportation zone. The planner must abandon one of his occupations because they are incompatible.

For District employees, the General Manager may determine through written regulations or delegate to Department Heads the authority to determine outside activities which are incompatible with their duties as District employees.

Employees may appeal the determination of incompatible activities through the Non-Contract Grievance Procedure or through the particular grievance procedure applicable to them. (Government Code §§1126 and 1128)

- C. Board members, and all employees and consultants required to file Disclosure statements pursuant to the District's Conflict of Interest Code, shall disqualify themselves from making, or participating in the making of, or in any way attempting to use their official position to influence, a governmental decision in which they know or have reason to know they have a financial interest. (Government Code §87100).

All persons holding designated positions shall comply

with the District's Conflict of Interest Code.

Comment: This section of the Code of Conduct as well as the District's Conflict of Interest Code, is derived from Government Code Section 87100 et seq., which is the Initiative Measure approved in the primary election of June 1974. An officer is deemed to have a financial interest if the decision to be made will have a material financial effect on:

- (a) Any business entity in which the public official has a direct or indirect investment worth \$1,000 or more.
- (b) Any real property in which the public official has a direct or indirect interest worth \$1,000 or more.
- (c) Any source of income, other than gifts and other than loans by a commercial lending institution in the regular course of business on terms available to the public without regard to official status, aggregating \$250 or more in value

provided to, received by or promised to the public official within 12 months prior to the time when the decision is made.

(d) Any business entity in which the public official is a director, officer, partner, trustee, employee, or holds any position of management.

(e) Any donor of, or any intermediary or agent for a donor of, a gift or gifts aggregating \$250 or more in value provided to, received by, or promised to the public official within 12 months prior to the time when the decision is made.

As provided in Section 87103, "indirect investment or interest means any investment or interest owned by the spouse or dependent child of a public official, by an agent on behalf of a public official, or by a business entity or trust in which the official, the official's agents, spouse, and dependent children own directly, indirectly, or beneficially a

10-percent interest or greater".

It should be noted that, by virtue of Section 87101, an officer is not prohibited from making a decision if his participation is legally required in order for the decision to be made. In such case, the officer must disclose the nature of the financial interest before he/she participates in the making of the decision. However, the fact that the officer's vote is needed to break a tie does not make his participation "legally required". This section applies primarily to the need of a body to have a quorum present. The regulations defining the terms used in these sections are attached.

Examples: The above disclosure and non-participation requirements would apply to the following individuals:

1. A Board member owns shares valued at \$2,500 in General Motors who has submitted a low bid of \$1,700,000 in a District bus

procurement. The Board member must disclose the interest and disqualify him/herself from voting because the effect of the award would increase General Motors' gross revenue by over \$100,000. (See Appendix B, Page 3).

2. A member of a staff committee selecting possible sites for a new division owns land valued at \$10,000 adjacent to one of the sites. To have the division next door would increase the fair market value of the staff member's property by over 1/2 of one percent. (See Appendix B, Page 3).

- D. No Board member or employee shall participate in the award or selection of a contract supported by federal funds if a real, or apparent, conflict of interest would be involved, as conflict is defined in §10, UMTA C4220.1A. (UMTA Circular 4220.1A)
- E. No Board member, employee or agent of the District shall solicit or accept gratuities, favors or anything of monetary value from contractors/consultants, potential contractors/consultants or subcontractors/consultants. (§10 UMTA Circular 4220.1A). An unsolicited gift of a value less than twenty-five dollars shall be considered to be of

nominal intrinsic value and not in violation of this section, provided, however, that each District department shall set more restrictive requirements regarding unsolicited gifts as directed by the General Manager.

Examples:

1. A Board member or officer is invited by a District consultant to attend a \$100 a plate dinner for an elected official. Assuming the value of the dinner is less than twenty-five dollars, the District representative may attend since the balance constitutes the consultant's contribution to the elected official's campaign fund.

2. A Board member running for office may not solicit or knowingly accept campaign donations from a person doing business with the District. There is, obviously, no violation if the Board member neither solicits nor is aware of the contribution; however, once it is discovered, it should be returned.

F. All inquiries from any proposer, bidder, or prospective bidder or proposer to any Board member or employee to discuss any RFP, specification, bid or proposal shall be

referred to the Office of Contracts, Procurement and Materiel. No actions shall be taken, or information provided, for or on behalf of any prospective contractor or vendor which interferes with free and open competition for District contracts. No Board member or employee shall disclose or otherwise use confidential information acquired by virtue of his/her position or employment with the District for his/her or another person's private gain.

16.5 In addition to the above requirements of Section 16.4c, Board members, employees and consultants shall conduct themselves as follows whenever the member, employee or consultant has, or may have, a financial interest in making or participating in the making of any governmental decision.

- A. Directors: Unless his/her participation is legally required, when the matter comes up on the agenda, the Director shall:
 - 1. Disclose his/her interest
 - 2. refrain from participating in any way in the decision making process
 - 3. withdraw from the room if the subject is being discussed in closed session.
- B. Employees: The employee shall immediately report the nature of the matter and the existence of a conflict to his/her superior so that the work may be assigned to another.
- C. Consultants: The consultant shall immediately report the nature of the matter and the existence of the conflict to

the General Manager.

16.6 No Board member, officer, or employee shall by his conduct give reasonable basis for the impression that any person improperly can influence him or unduly enjoy his favor in the performance of his official acts or actions, or that he is affected unduly by the kinship, rank, position of, or association with, any person.

16.7 A. An employee who violates any of the standards of conduct set forth herein is subject to discipline, up to and including discharge, in addition to any penalties provided by law.

B. If a Board member or consultant violates any of the standards of conduct set forth herein, the matter shall be referred to the Administration, Efficiency and Economy Committee of the Board which shall, following investigation and review, make a recommendation to the full Board for action to be taken, in addition to any penalties provided by law.

APPENDIX A

GOVERNMENT CODE

§1090 Conflicts of Interest; Contracts, Sales and Purchases

Members of the Legislature, state, county, district, judicial district, and city officers or employees shall not be financially interested in any contract made by them in their official capacity, or by any body or board of which they are members. Nor shall state, county, district, judicial district, and city officers or employees be purchasers at any sale or vendors at any purchase made by them in their official capacity.

As used in this article, "district" means any agency of the state formed pursuant to general law or special act, for the local performance of governmental or proprietary functions within limited boundaries.

§1090.1 Acceptance of Commissions for Placement of Insurance

No officer or employee of the State nor any Member of the Legislature shall accept any commission for the placement of insurance on behalf of the State.

§1091 Remote Interest of Officer or Member

(a) An officer shall not be deemed to be interested in a contract entered into by a body or board of which the officer is a member within the meaning of this article if the officer has only a remote interest in the contract and if the fact of such interest is disclosed to the body of the board of which the officer is a member and noted in its official records, and thereafter the body or board authorizes, approves, or ratifies the contract in good faith by a vote of its membership sufficient for the purpose without counting the vote or votes of the officer or member with the remote interest.

(b) As used in this article, "remote interest" means any of the following:

(1) That of a nonsalaried officer of a nonprofit corporation, except as provided in paragraph (8) of subdivision (a) of Section 1091.5.

(2) That of an employee or agent of the contracting party, if such contracting party has 10 or more other employees and if the officer was an employee or agent of such contracting party for at least three years prior to the officer initially accepting his or her office.

For the purpose of this paragraph, time of employment with the contracting party by the officer shall be counted in computing the three-year period specified in this paragraph even though such contracting party has been converted from one form of business organization to a different form of business organization within three years of the initial taking of office by such officer. Time of employment in such case shall be counted only if, after the transfer or change in organization, the real or ultimate ownership of the contracting party is the same or substantially similar to that which existed before such transfer or change in organization. For the purposes of this paragraph, stockholders, bondholders, partners or other persons holding an interest in the contracting party are regarded as having the "real or ultimate ownership" of such contracting party.

(3) That of a parent in the earnings of his or her minor child for personal services.

(4) That of a landlord or tenant of the contracting party.

(5) That of an attorney of the contracting party.

(6) That of a member of a nonprofit corporation formed under the Food and Agricultural Code or a nonprofit corporation formed under the Corporations Code for the sole purpose of engaging in the merchandising of agricultural products or the supplying of water.

(7) That of a supplier of goods or services when such goods or services had been supplied to the contracting party by the officer for at least five years prior to his or her election or appointment to office.

(8) That of a person subject to the provisions of Section 1090 in any contract or agreement entered into pursuant to the provisions of the California Land Conservation Act of 1965.

(9) That of an officer, director or employee of a bank, bank holding company, or savings and loan association with which a party to the contract has the relationship of borrower or depositor, debtor or creditor.

(10) That of an engineer, geologist, or architect employed by a consulting engineering or architectural firm. This paragraph applies only to an employee of a consulting firm who does not serve in a primary management capacity, and does not apply to an officer or director of a consulting firm.

(c) The provisions of this section shall not be applicable

to any officer interested in a contract who influences or attempts to influence another member of the body or board of which he or she is a member to enter into the contract.

(d) The willful failure of an officer to disclose the fact of his or her interest in a contract pursuant to this section shall be punishable as provided in Section 1097. Such violation shall not void the contract, however, unless the contracting party had knowledge of the fact of the remote interest of the officer at the time the contract was executed.

§1091.1 Interest in Contracts; Subdivided Lands

The prohibition against an interest in contracts provided by this article or any other provision of law shall not be deemed to prohibit any public officer or member of any public board or commission from subdividing lands owned by him or in which he has an interest and which subdivision of lands is effected under the provisions of Division 2 (commencing with Section 66410) of Title 7 of the Government Code or any local ordinance concerning subdivisions; provided, that (a) said officer or member of such board or commission shall first fully disclose the nature of his interest in any such lands to the legislative body having jurisdiction over the subdivision thereof, and (b) said officer or member of such board or commission shall not cast his vote upon any matter or contract concerning said subdivision in any manner whatever.

§1091.5 Ownership of Corporate Shares; Reimbursement for Expenses; Recipient of Public Services; Landlord or Tenant Contracting with Federal or State Agencies; Employment of Spouse; Officer, Director, or Employee of Bank or Savings and Loan Association

(a) An officer or employee shall not be deemed to be interested in a contract if his or her interest is any of the following:

(1) The ownership of less than 3 percent of the shares of a corporation for profit, provided the total annual income to him or her from dividends, including the value of stock dividends, from the corporation does not exceed 5 percent of his or her total annual income, and any other payments made to him or her by the corporation do not exceed 5 percent of his or her total annual income.

(2) That of an officer in being reimbursed for his or her actual and necessary expenses incurred in the performance of official duty.

(3) That of a recipient of public services generally provided by the public body or board of which he or she

is a member, on the same terms and conditions as if he or she were not a member of the board.

(4) That of a landlord or tenant of the contracting party if such contracting party is the federal government or any federal department or agency, this state or an adjoining state, any department or agency of this state or an adjoining state, any county or city of this state or an adjoining state, or any public corporation or special, judicial, or other public district of this state or an adjoining state unless the subject matter of such contract is the property in which such officer or employee has such interest as landlord or tenant in which event his or her interest shall be deemed a remote interest within the meaning of, and subject to, the provisions of Section 1091.

(5) That of a tenant in a public housing authority created pursuant to Part 2 (commencing with Section 34200) of Division 24 of the Health and Safety Code in which he or she serves as a member of the board of commissioners of the authority or of a community development commission created pursuant to Part 1.7 (commencing with Section 34100) of Division 24 of the Health and Safety Code.

(6) That of a spouse of an officer or employee of a public agency in his or her spouse's employment or officeholding if his or her spouse's employment or officeholding has existed for at least one year prior to his or her election or appointment.

(7) That of a nonsalaried member of a nonprofit corporation, provided that such interest is disclosed to the body or board at the time of the first consideration of the contract, and provided further that such interest is noted in its official records.

(8) That of a noncompensated officer of a nonprofit, tax-exempt corporation, which, as one of its primary purposes, supports the functions of the body or board or to which the body or board has a legal obligation to give particular consideration, and provided further that such interest is noted in its official records.

For purposes of this paragraph an officer is "noncompensated" even though he or she receives reimbursement from the nonprofit, tax-exempt corporation for necessary travel and other actual expenses incurred in performing duties of his or her office.

(b) An officer or employee shall not be deemed to be interested in a contract made pursuant to competitive bidding under a procedure established by law if his or her sole

interest is that of an officer, director, or employee of a bank or savings and loan association with which a party to the contract has the relationship of borrower or depositor, debtor or creditor.

§1092 Avoidance of Contracts

Every contract made in violation of any of the provisions of Section 1090 may be avoided at the instance of any party except the officer interested therein. No such contract may be avoided because of the interest of an officer therein unless such contract is made in the official capacity of such officer, or by a board or body of which he is a member.

§1092.5 Lease, Purchase or Encumbrance of Real Property; Avoidance

Notwithstanding Section 1092, no lease or purchase of, or encumbrance on, real property may be avoided, under the terms of Section 1092, in derogation of the interest of a good faith lessee, purchaser, or encumbrancer where the lessee, purchaser, or encumbrancer paid value and acquired the interest without actual knowledge of a violation of any of the provisions of Section 1090.

§1093 Warrants and Other Evidences of Indebtedness, Private Use or Benefit

The State Treasurer and Controller, county and city officers, and their deputies and clerks shall not purchase or sell, or in any manner receive for their own or any other person's use or benefit any State, county or city warrants, scrip, orders, demands, claims, or other evidences of indebtedness against the State, or any county or city thereof. This section does not apply to evidences of indebtedness issued to or held by such an officer, deputy or clerk for services rendered by them, nor to evidences of the funded indebtedness of the State, county, or city.

§1094 Accounts; Certificate as Prerequisite to Allowance

Every officer whose duty it is to audit and allow the accounts of other state, county, or city officers shall, before allowing such accounts, require each of such offices to make and file with him an affidavit or certificate under penalty of perjury that he has not violated any of the provisions of this article, and any individual who willfully makes and subscribes such certificate to an account which he knows to be false as to any material matter shall be guilty of a felony and upon conviction thereof shall be subject to the penalties prescribed for perjury by the Penal Code of this State.

§1095 Warrants and Other Evidences of Indebtedness; Restrictions on Payment

Officers charged with the disbursement of public moneys shall not pay any warrant or other evidence of indebtedness against the State, county, or city when it has been purchased, sold, received, or transferred contrary to any of the provisions of this article.

§1096 Accounts; Suspension of Settlement or Payment; Prosecutions

Upon the officer charged with the disbursement of public moneys being informed by affidavit that any officer, whose account is about to be settled, audited, or paid by him, has violated any of the provisions of this article, the disbursing officer shall suspend such settlement or payment, and cause the district attorney to prosecute the officer for such violation. If judgment is rendered for the defendant upon such prosecution, the disbursing officer may proceed to settle, audit, or pay the account as if no affidavit had been filed.

§1097 Penalty for Violations

Every officer or person prohibited by the laws of this state from making or being interested in contracts, or from becoming a vendor or purchaser at sales, or from purchasing scrip, or other evidences of indebtedness, including any member of the governing board of a school district, who willfully violates any of the provisions of such laws, is punishable by a fine of not more than one thousand dollars (\$1,000), or by imprisonment in the state prison, and is forever disqualified from holding any office in this state.

Activity or Enterprise by Local Agency Officer or Employee

(a) Except as provided in Section 1128, a local agency officer or employee shall not engage in any employment activity, or enterprise for compensation which is inconsistent, incompatible, in conflict with, or inimical to his or her duties as a local agency officer or employee or with the duties, functions, or responsibilities of his or her appointing power or the agency by which he or she is employed. Such officer or employee shall not perform any work, service, or counsel for compensation outside of his or her local agency employment where any part of his or her efforts will be subject to approval by any other officer, employee, board, or commission of his or her employing body, unless otherwise approved in the manner described by subdivision (b).

(b) Each appointing power may determine, subject to approval of the local agency, and consistent with the provisions of Section 1128 where applicable, those outside activities which, for employees under its jurisdiction, are inconsistent with, incompatible to, or in conflict with their duties as local agency officers or employees. An employee's outside

employment, activity, or enterprise may be prohibited if it: (1) involves the use for private gain or advantage of his or her local agency time, facilities, equipment and supplies; or the badge, uniform, prestige, or influence of his or her local agency office or employment or, (2) involved receipt or acceptance by the officer or employee of any money or other consideration from anyone other than his or her local agency for the performance of an act which the officer or employee, of not performing such act, would be required or expected to render in the regular course or hours of his or her local agency employment or as a part of his or her duties as a local agency officer or employee or, (3) involves the performance of an act in other than his or her capacity as a local agency officer or employee which act may later be subject directly or indirectly to the control, inspection, review, audit, or enforcement of any other officer or employee or the agency by which he or she is employed, or (4) involves such time demands as would render performance of his or her duties as a local agency officer or employee less efficient.

The local agency may adopt rules governing the application of this section. Such rules shall include provision for notice to employees of the determination of prohibited activities, of disciplinary action to be taken against employees for engaging in prohibited activities, and for appeal by employees from such a determination and from its application to an employee.

§1128 Agency Employed Attorneys; Service on Boards, etc.

Service on an appointed or elected governmental board, commission, committee, or other body by an attorney employed by a local agency in a non-elective position shall not, by itself, be deemed to be inconsistent, incompatible, in conflict with, or inimical to the duties of the attorney as an officer or employee of the local agency and shall not result in the automatic vacation of either such office.

§87100 Public Officials; State and Local; Financial Interest

No public official at any level of state or local government shall make, participate in making or in any way attempt to use his official position to influence a governmental decision in which he knows or has reason to know he has a financial interest.

SECTION 10

CODE OF CONDUCT. Grantees shall maintain a written code or standards of conduct which shall govern the performance of their officers, employees or agents engaged in the award and administration of contracts supported by Federal funds. No employee, officer or agent of the grantee shall participate in selection, or in the award or administration of a contract supported by Federal funds if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when:

- a. The employee, officer or agent;
- b. Any member of his immediate family;
- c. His or her partner; or
- d. An organization which employs, or is about to employ, any of the above, has a financial or other interest in the firm selected for award.

The grantee's officers, employees or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from contractors, potential contractors, or parties to subagreements.

Grantees may set minimum rules where the financial interest is not substantial or the gift is an unsolicited item of nominal intrinsic value.

To the extent permitted by State or local law or regulations, such standards of conduct shall provide for penalties, sanctions, or other disciplinary actions for violations of such standards by the grantee's officers, employees, or agents, or by contractors or their agents.

APPENDIX B

CHAPTER 7. CONFLICTS OF INTEREST

Article 1. Conflicts of Interest; General Prohibition

16700. Public Official Making, Participating in Making, or Using His Official Position to Influence a Governmental Decision (87100).

The provisions herein define terms as used in Chapter 7 of the Political Reform Act of 1974, as amended, Government Code Sections 87100-87312.

(a) "Public official at any level of state or local government" means every natural person who is a member, officer, employee or consultant of a state or local government agency.

(1) "Member" shall include, but not be limited to, salaried or unsalaried members of boards or commissions with decision-making authority. A board or commission possesses decision-making authority whenever:

(A) It may make a final governmental decision;

(B) It may compel a governmental decision; or it may prevent a governmental decision either by reason of an exclusive power to initiate the decision or by reason of a veto which may not be overridden; or

(C) It makes substantive recommendations which are, and over an extended period of time have been, regularly approved without significant amendment or modification by another public official or governmental agency.

(2) "Consultant" shall include any natural person who provides, under contract, information, advice, recommendation or counsel to a state or local government agency, provided, however, that "consultant" shall not include a person who:

(A) Conducts research and arrives at conclusions with respect to his or her rendition of information, advice, recommendation or counsel independent of the control and direction of the agency or of any agency official, other than normal contract monitoring; and

(B) Possesses no authority with respect to any agency decision beyond the rendition of information, advice, recommendation or counsel.

(b) A public official "makes a governmental decision, except as provided in subsection (d) of this section, when he or she, acting within the authority of his or her office:

(1) Votes on a matter;

(2) Appoints a person;

(3) Obligates or commits his or her agency to any course of action;

(4) Enters into any contractual agreement on behalf of his or her agency;

(5) Determines not to act, within the meaning of sub-paragraphs (1), (2), (3) or (4), unless such determination is made because of his or her financial interest. When the determination not to act occurs because of his or her financial interest, the official's determination must be accompanied by disclosure of the financial interest, made part of the agency's official record or made in writing to the official's supervisor, appointing power or any other person specified in a conflict of interest code adopted pursuant to Government Code Section 87300.

(c) A public official or designated employee "participates in the making of a governmental decision" when, acting within the authority of his or her position, he or she:

(1) Negotiates, without significant substantive review, with a governmental entity or private person regarding the decision; or

(2) Advises or makes recommendations to the decision-maker, either directly or without significant intervening substantive review, by:

(A) Conducting research or making any investigation which requires the exercise of judgment on the part of the official or designated employee and the purpose of which is to influence the decision; or

(B) Preparing or presenting any report, analysis or opinion, orally or in writing, which requires the exercise of judgment on the part of the official or designated employee and the purpose of which is to influence the decision.

(d) Making or participating in the making of a governmental decision shall not include:

(1) Actions of public officials which are solely ministerial, secretarial, manual or clerical;

(2) Appearances by a public official as a member of the general public before an agency in the course of its prescribed governmental function to represent himself or herself on matters related solely to his or her personal interests; or

(3) Actions by public officials, employees, or employee representatives relating to their compensation or the terms or conditions of their employment or contract.

(e) "In any way attempting to use his or her official position to influence a governmental decision" shall include furthering or attempting to affect in any manner any decision:

(1) Within or before his or her agency; or

(2) Before any agency which is appointed by or subject to the budgetary control of his or her agency.

(f) "In any way attempting to use his or her official position to influence a governmental decision" shall not include:

(1) Appearances by a public official as a member of the general public before an agency in the course of its prescribed governmental function to represent himself or herself on matters related solely to his or her personal interest;

(2) Actions by public officials, employees or employee representatives relating to their compensation or the terms or conditions of their employment or contract.

NOTE: Authority cited: Section 83112, Government Code. Reference: Section 87100, Government Code.

History: 1. Repealer and new section filed 12-17-76, as an emergency; effective upon filing (Register 76, No. 51). For prior history, see Register 76, No. 40.

2. Certificate of Compliance filed 3-31-77 (Register 77, No. 14).

18702 Material Financial Effect.

(a) The financial effect of a governmental decision on a financial interest of a public official is material if the decision will have a significant effect on the business entity, real property or source of income in question.

(b) In determining whether it is reasonably foreseeable that the effects of a governmental decision will be significant within the meaning of the general standard set forth in paragraph (a), consideration should be given to the following factors:

(1) Whether, in the case of a business entity in which the public official holds a direct or indirect investment of one thousand dollars (\$1,000) or more or in the case of a business entity in which the public official is a director, officer, partner, employee, trustee or holds any position of management, the effect of the decision will be to increase or decrease:

(A) The annualized gross revenues by the lesser of:

1. One hundred thousand dollars (\$100,000); or
2. One percent if the effect is one thousand dollars (\$1,000) or more; or

(B) Annual net income by the lesser of:

1. Fifty thousand dollars (\$50,000); or
2. One half of one percent if the effect is one thousand dollars (\$1,000) or more; or

(C) Current assets or liabilities by the lesser of:

1. One hundred thousand dollars (\$100,000); or
2. One half of one percent if the effect is one thousand dollars (\$1,000) or more.

Current assets are deemed to be decreased by the amount of any expenses incurred as a result of a governmental decision.

(2) Whether, in the case of a direct or indirect interest in real property of one thousand dollars (\$1,000) or more held by a public official, the effect of the decision will be to increase or decrease:

(A) The income producing potential of the property by the lesser of:

1. One thousand dollars (\$1,000) per month; or
2. Five percent per month if the effect is fifty dollars (\$50) or more per month; or

(B) The fair market value of the property by the lesser of:

1. Ten thousand dollars (\$10,000); or
2. One half of one percent if the effect is one thousand dollars (\$1,000) or more.

(3) Whether, in the case of a source of income, as defined in Government Code Section 57103(c), of two hundred fifty dollars (\$250) or more received by or promised to a public official within 12 months prior to the time the decision is made:

(A) The effect of the decision will be to directly increase or decrease the amount of income (other than rents) to be received by the official, or to confer a financial benefit or detriment upon the official or a member of the official's immediate family, in an amount of one hundred dollars (\$100) or more; or

(B) There is a nexus between the governmental decision and the purpose for which the official receives income; or

(C) In the case of a source of income which is a business entity, the business entity will be affected in a manner described in subsection (b) (1) above; or

(D) If the source of income is not a business entity, the decision will have a significant effect on the source.

(c) Subsections (a) and (b) of this section notwithstanding, the making or participation in the making of a governmental decision by a contract consultant or by a person retained to provide information, advice, recommendation or counsel has no material financial effect on a business entity or source of income in which such consultant or person retained is an officer, employee, sole proprietor or partner, if the only financial effects of the decision are the modification, perpetuation or renewal of the contractual or retainer agreement and/or the opportunity to bid competitively on a project or contract.

SECTION 18

CONTRACTOR PARTICIPATION

- 18.1 The Contractor shall perform with his own staff, work equivalent to at least 20% of the total amount of construction work at the site. The percentage of participation will be evaluated on the basis of the dollar value of work determined from the cost schedule required in Section 42.

SECTION 19

PERFORMANCE AND PAYMENT BONDS

- 19.1 The successful bidder shall furnish at his own expense a Faithful Performance Bond satisfactory to the District in the form presented herewith, (Page 18) equal to 100% of the full amount of the contract as a guarantee of good faith on behalf of the Contractor that the terms of this contract shall be complied with in every particular and Contractor's Payment Bond (Pages 19-20) in an amount of not less than 100% of the full amount of the contract as security for the payment of all persons performing labor or furnished material used in this contract. Such bonds shall meet the requirements set forth in Civil Code Section 3247 et seq.

SECTION 20

DISADVANTAGED AND WOMEN'S BUSINESS ENTERPRISE

20.1 Policy and Obligation

It is the policy of the Southern California Rapid Transit District (District) and the United States Department of Transportation that Disadvantaged and Women's Business Enterprises (DBEs and WBEs), as defined in the federal regulations published at 49 CFR Part 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 Part 23 apply to this Contract.

Each bidder agrees to ensure that DBE/WBE's as defined herein have the maximum opportunity to participate in the performance of the District's contracts and subcontracts. In this regard, Bidders shall take all necessary and reasonable steps in accordance with 49 CFR Part 23 to ensure that DBE/WBE's have the maximum opportunity to compete for and perform contracts.

Bidders shall not discriminate on the basis of race, age, creed, color, national origin, sex or handicapped status, in the award and performance of the District's DOT-assisted contracts.

20.2 Goals

The District will establish goals for participation by DBE and WBE firms in contracts where appropriate and feasible.

The District has established DBE/WBE participation goals for this contract as indicated on the BID FORM.

Bidders are to refer to Section 20.6 of these General Provisions for guidance in calculating DBE/WBE participation.

20.3 Responsive Bidder

To be responsive, a Bidder must meet the DBE/WBE goals set forth on the BID FORM of this solicitation, or if the goals are not met, full documentation evidencing good faith efforts to meet the goal must be submitted as stated in Section 20.4 below.

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 meet all other DBE/WBE participation requirements as discussed in section 20.6 below, the Bidder need not submit evidence of good faith efforts to meet the goal.

If, however, the bidder submits a bid which lists DBE/WBE subcontractors, joint venture partners or material suppliers who are not currently certified by the District, the Bidder must submit evidence of good faith efforts to meet the goal if these

firms cannot be certified, thereby causing the Bidder to not meet the goal.

Submittal of good faith efforts documentation will be in accordance with section 20.4 below.

The Bidder shall furnish the LIST OF DBE/WBE SUBCONTRACTORS AND SUPPLIERS FORM AS PART OF THE Bid.

The Bidder shall furnish the GOOD FAITH EFFORTS CERTIFICATE form as part of the Bid only if the DBE/WBE goal is not met, or if any of the firms listed on the LIST OF DBE/WBE SUBCONTRACTORS AND SUPPLIERS form which are being credited toward the goal are not certified by the District.

The Bidder shall furnish the forms listed in items 1.a. and 1.b. below as part of his/her bid. Submittal of the forms listed in items 1.c. and 2 below, is contingent on the conditions stated therein.

1. DBE/WBE - Related Bid Forms

The Bidder shall clearly reflect his/her commitment to DBE/WBE participation in the following bid forms.

- a. BID FORM: The DBE/WBE level of participation shall be expressed as a percentage of the total bid price.
- b. LIST OF DBE/WBE SUBCONTRACTORS AND SUPPLIERS: The Bidder shall list all DBE/WBE subcontractors and suppliers which he/she intends to use to meet the goal, including those whose participation in the contract is less than one-half of one percent. 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 Identify whether DBE or WBE
 - o Percentage of Participation in the Contract

Bidders may enter into joint venture agreements with DBE/WBEs, and in that event, the DBE/WBE joint venture partner shall comply with item 1.c, below.

- c. DBE/WBE Prime Bidder's Statement: If the Bidder is a DBE or WBE, (including joint venture partners) he/she shall

attach to the LIST OF DBE/WBE SUBCONTRACTORS AND SUPPLIERS form, a statement describing the scope of work and percentage of total bid price which the bidder intends to do with its own workforce.

2. Good Faith Efforts Certificate: The Bidder shall submit this form with the bid if the LIST OF DBE/WBE SUBCONTRACTORS AND SUPPLIERS reflects:
 - a. That the total DBE participation is less than the DBE goal set forth on the BID FORM.
 - b. That the total WBE participation is less than the WBE goal set forth on the BID FORM.
 - c. That one or more of the firms credited toward the DBE on WBE goal are not currently certified by the District.

20.4 Good Faith Efforts

As stated in the Good Faith Efforts Certificate, Bidders who have not met the DBE/WBE goal or who have credited firms toward the goal that are not currently certified by the District, will be required to submit evidence of good faith efforts within 48 hours from the District's request.

Following is a description of "good faith efforts" and the types of documentation necessary to evidence such efforts:

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, publication for the shorter available time is acceptable. These ads shall include the following information:
 - (a.) Project Name and Location;
 - (b.) Indication of SCRTD as Owner;
 - (c.) Location where Plans and Specifications may be obtained or viewed;
 - (d.) Sub-Bid Due Date;
 - (e.) Trades or Scopes of Work for which Sub-Bids are being solicited;
 - (f.) Statement that Bid solicitation is in response to SCRTD DBE/WBE Program; and
 - (g.) Statement that Bidder intends to seriously negotiate with DBE/WBE firms for participation on the project.

Documentation: Affidavits of Publication in minority focus media and trade publications or copies of tear sheets showing date and name of publication.

2. 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. Where appropriate, breaking down subcontracts into economically feasible units to facilitate DBE/WBE participation.

Documentation: Provide a narrative stating whether the bidder decided to breakdown any sub-trades into smaller units to facilitate DBE/WBE participation. Also, include a narrative stating the work that the bidder intends to perform with its own workforce and areas of work which the bidder has identified for DBE/WBE joint venture partnership or subcontracting.

3. Extension of written invitations to DBE/WBE firms for at least the number of trades, subcontractors, or material quotations identified in the Special Conditions of this solicitation, including for trades or areas selected by the bidder for joint venturing or subcontracting as specified in response to good faith effort (b), above. Written invitation shall be such that receipt by DBE 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.

Documentation: A list of DBE/WBE firms which the bidder identified (from the RTD listing and through the DBE/WBE associations and sources contacted in response to 20.4.6., below) to solicit interest in the contract. Copies of letters, mail receipts or postcards sent to these DBE/WBE firms.

4. 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. A written record of any oral followup is required.

Documentation: Records which can be verified to document contact with these DBE/WBE firms (e.g., copies of phone bills highlighting DBE/WBE firms telephone number and date called; letters of followup; minutes or notes of meetings held with DBE/WBE firms; copies of responses from DBEs/WBEs; telephone logs). Altogether, this documentation must record the following:

- (a.) Name of DBE/WBE firm contacted, contact person, telephone number, date and time of the contact;
- (b.) A description of the information provided to the DBEs/WBEs regarding the work to be performed;

- (c.) A statement of any other subject matter discussed with DBEs/WBEs contacted (e.g., bonding, entertaining quotations on portions of the work);
 - (b.) A list of DBEs/WBEs who submitted quotations, the work on which they bid.
 - (e.) A list of DBEs/WBEs who were contacted but who did not bid and the reasons therefor.
5. Assistance to DBEs/WBEs contacted who request assistance in obtaining bonding, lines of credit or insurance, if required by the bidder. The bidder shall contact on behalf of the DBEs/WBEs bonding companies, lenders and insurance companies. The bidder, as an alternative, may waive such requirements for the DBEs/WBEs interested in bidding. Concerning assistance with bonding, the bidder as an alternative may refer the DBEs/WBEs to the resource agencies listed in Attachment I to these General Provisions.

Documentation: Statement of bidder's decision to waive any of these requirements. If the bidder required bonding, insurance, etc., provide a list of DBEs/WBEs who requested assistance in these areas and evidence of any assistance provided by the bidder.

6. Notification of minority and women contractor, trade and professional associations and other DBE/WBE sources, at least 20 calendar days prior to bid opening and effective utilization of services offered to the bidder by these organizations and other sources. If 20 calendar days are not available, notification for a shorter time is acceptable. This contact must be verifiable.

Documentation: Records or correspondence which confirm notification of the association, contact person, telephone number, dates and times contacted. Information provided to these associations and other sources that provide assistance in the recruitment, outreach, and technical assistance to DBE's and WBE's. If the association or other source responded to the Bidder, evidence of how the Bidder used the information and assistance provided. If the bidder solicited sub-bids through these associations' publications, provide copies of the publication's page displaying this ad, and a narrative stating known response thereto. If the Bidder received names of members, clients or other businesses known to that association or source in addition to those identified in 20.4.3 above, please list name of firm and source of referral.

7. Verifying with the District, the current DBE/WBE certification status of prospective subcontractors. Encouraging those not currently certified, with whom the bidder might subcontract, to apply for certification with the District.

Taking reasonable steps to ascertain that purported DBE/WBE subcontractors are such.

Documentation: Evidence that the Bidder has contacted the District's Department of Equal Opportunity prior to the bid date in order to ascertain certification status of its proposed DBE/WBE subcontractors. Include copies of letters sent to the EO Department requesting verification of DBE/WBE firms' certification status with the District and reply thereto.

Include names of DBE/WBE subcontractors not certified which bidder queried about the ownership and control of their 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.

20.5 Definitions

The following definitions apply to the terms as used in this DBE/WBE solicitation provision.

1. "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.
2. "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.
3. "Small business concern": means a small business as defined pursuant to section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.
4. "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 Americans, 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:

- (a) "Black Americans," which includes persons having origins in any of the Black racial groups of Africa;
 - (b) "Hispanic Americans," which includes persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race;
 - (c) "Native Americans," which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;
 - (d) "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
 - (e) "Asian-Indian Americans," which includes persons whose origins are from India, Pakistan, and Bangladesh.
5. 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, determined by SBE or the District to meet the social and economic disadvantage criteria described below.

Social Disadvantage

- a. 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.
- b. The individual must demonstrate that he/she has personally suffered social disadvantage, not merely claim membership in a group which would be considered socially disadvantaged.
- c. The individual's social disadvantage must be rooted in treatment which he/she has experienced in American society, not in other countries.
- d. The individual's social disadvantage must have negatively affected his/her entry into, and/or advancement in, the business world.
- e. A determination of social disadvantage must be made before proceeding to make a determination of economic disadvantage.

Economic Disadvantage

- a. 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.

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

(1) With respect to the individual:

- (a) availability of financing
- (b) Bonding capability
- (c) availability of outside equity capital
- (d) available markets

(2) With respect to the individual and the business concern:

- (a) personal and business assets
- (b) personal and business net worth
- (c) personal and business income and profits

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

20.6 Method of DBE/WBE Goal Calculation

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

1. A DBE or WBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor or vendor of materials or supplies.
2. 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.
3. 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;
4. 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.
5. 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.

6. 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.
7. 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.
8. In calculating the total DBE and WBE utilization percentages, the bidder shall include:
 - (a) The dollar value of all DBE and WBE sub-bids;
 - (b) The dollar value of all materials and supplies to be supplied by DBEs and WBEs (to be credited as noted in item 4, above).
 - (c) 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, he/she shall include only DBE or WBE proportionate interest in the joint venture.

20.7 DBE/WBE Certification

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

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 Section 20.4, of these General Provisions if any of these DBE/WBE firms are not certified during the bid evaluation period.

If during the consideration by the District of Bidder's good faith efforts to meet the DBE/WBE goals, a proposed subcontractor/supplier becomes certified by the District causing the Bidder to meet the goal, the Bidder shall be deemed to be in compliance with the requirements of Section 20.3 of these General Provisions.

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.

The District's List of Certified DBE 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, CA 90013
(213) 972-6454

Application for certification by the District may be obtained by submitting Schedule A or Schedule B forms (copies attached).

Within five (5) working days of date of request of the Assistant General Manager, Equal Opportunity, a Bidder who is requested to do so shall cause each of its subcontractor DBE and WBE firms to submit to the Equal Opportunity Department information to confirm DBE or WBE status. Schedule A and Schedule B (attached to this section) with supporting documentation shall be submitted for each DBE/WBE firm or DBE/WBE joint venture not already certified.

The District may require that this information be submitted within a shorter timeframe in the interest of expediting contract award and meeting project schedules.

20.8 SUBSTITUTION OF SUBCONTRACTORS

If a Bidder should request 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. These efforts shall be similar to those specified in Section 20.4.

20.9 CONTRACT COMPLIANCE

1. Contract Compliance Reporting Requirements

The contractor shall submit to the Equal Opportunity Department, a progress report on its DBE/WBE participation which shall include:

- ° Name of each DBE/WBE subcontractor;
- ° General work assignment of each DBE/WBE subcontractor;
- ° The specific portion of work executed by each DBE/WBE subcontractor during the report period;
- ° The dollars committed to each DBE/WBE subcontractor;
- ° The dollars paid to each DBE/WBE subcontractor during the reporting period;
- ° The dollars paid to date as a percentage of the total commitment to each DBE/WBE

2. Noncompliance

Failure to carry out the requirements of this section constitute a breach of contract and, after notification of 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 Section 23.43(c).

ATTACHMENT I

DBE/WBE RESOURCE ORGANIZATIONS

One of the good faith efforts that firms bidding on RTD contracts can take in order to solicit interest from potential DBE/WBE subcontractors, is to outreach to these firms through minority and women contractor associations, professional associations, and public and private entities which provide technical assistance to minority and women businesses. Listed below are some of these resources.

RTD is not responsible for changes in the contact person, address, or telephone number for these organizations subsequent to the publication of this list. Contractors are encouraged to maintain on-going contact with these organizations as needed.

MINORITY CONTRACTORS ASSOCIATIONS

1. ASIAN BUSINESS ASSOCIATION
Attn: Clifton Mizokami A.B.A., Director
7876 Berner St.
Long Beach, CA 90808
(213)598-3782
2. BLACK BUSINESS ASSN. of Los Angeles
5140 Crenshaw Blvd., Suite B
Los Angeles, CAa 90043
(213)292-0271
(213)385-0351
3. CALIFORNIA ASSOCIATION OF MINORITY CONTRACTORS
Celso Martinez, Executive Director
670 Monterey Pass Road
Monterey Park, CA 91754
(818)282-3109
4. LATIN BUSINESS ASSOCIATION
P.O. Box 7095
Los Angeles, Ca 90022
(213)260-7138
5. MINORITY CONTRACTORS ASSOCIATION OF LOS ANGELES
John Thompson
3707 West Jefferson Boulevard
Los Angeles, CA 90016
(213)737-7952

6. ORIENTAL BUILDERS ASSOCIATIONS
Mr. George Sunabe
Aloha Electric Company
1100 S. Lincoln Avenue
Monterey Park, CA 91754
(213) 283-1572
7. SO. CALIFORNIA CHI-AM CONSTRUCTION/PROFESSIONAL ASSOCIATION
Mr. Johnny Li, V.P.
Li & Associates, Architects
716 Monterey Pass Road
Monterey Park, CA 91754
(213) 265-3298
8. UNITED INDIAN DEVELOPMENT ASSOCIATION
Walter I. Hare, Jr.
1541 Wilshire Blvd, Suite 418
Los Angeles, CA 90017
(213)483-1460

WOMEN'S CONTRACTORS/BUSINESS ASSOCIATIONS

1. ASSOCIATION FOR WOMEN IN ARCHITECTURE
c/o The Tanzmann Associates
The Bradbury Bldg.
304 South Broadway, Suite 524
Los Angeles, CA 90013
(213)598-3782
2. NATIONAL ASSOCIATION OF WOMEN BUSINESS OWNERS
5300 Beethoven Street
Los Angeles, CA 90066
3. NATIONAL ASSOCIATION OF WOMEN IN CONSTRUCTION
Roz Lang, Region 12 Director
c/o Levine Seegel Assoc.
2601 Ocean Park Blvd., Suite 212
Santa Monica, CA 90405
(213)450-1990
4. WOMEN CONSTRUCTION OWNERS & EXECUTIVES, USA
Nina S. Tate, Natl. President
P.O. Box 91464
Long Beach, CA 90809
(818)240-2630
5. F.M. ASSOCIATES
Connie McDowell
121 West Whittier Blvd.
La Habra, CA 9-631
(213)690-3418

OTHER RESOURCES

1. U.S. SMALL BUSINESS ADMINISTRATION
Attn: Kiyo Kaneshiro
World Trade Center
350 S. Figueroa St. Ste. 600
Los Angeles, CA 90071
(213)688-2960
2. BUSINESS DEVELOPMENT CENTER OF SOUTHERN CALIFORNIA*
Mr. Cleveland O. Neil, Executive Director
2651 South Western Avenue, Suite 300
Los Angeles, California 90018
(213) 731-2131
3. EQUIVEST ASSOCIATES (U.S. DOT PROGRAM MGMT. CENTER)
Attn: Michiko Brazzee
307 N. Santa Anita Ave.,
Arcadia, CA 91006
(818)445-7193
4. LOS ANGELES MINORITY BUSINESS DEVELOPMENT CENTER*
3460 Wilshire Boulevard, Suite 1006/7
Los Angeles, California 90010
(213) 382-5032
5. MAYOR'S OFFICE OF SMALL BUSINESS ASSISTANCE
Attn: Will Marshall
Room 1400, City Hall
Los Angeles, CA 90012
(213)485-6142
6. PDCD (METRO RAIL CONSTRUCTION MGMT. CONSULTANT)
Attn: Evelyn Martinez
100 W. Walnut St.
East Annex 509
Pasadena, CA 91124
(213)440-3437

* For a list of other Minority Business Development Centers funded by U.S. Department of Commerce, Minority Business Development Agency (MBDA). (Consult MBDA at (213)688-7157.

vh
EEO:20



ATTACHMENT II

SCHEDULE A

APPLICATION FOR
DISADVANTAGED BUSINESS ENTERPRISE (DBE)
AND
WOMEN'S BUSINESS ENTERPRISE (WBE)
CERTIFICATION
(Individual Business Concern)

Are you bidding/proposing on a current RTD Contract at this time?

Yes
 No

If yes, please complete the following.

Project Name: _____

RTD Bid/Proposal Number: _____

S/20:3



Dear

As part of our continuing outreach effort, the Disadvantaged Business Enterprise Department of the Southern California Rapid Transit District is soliciting for certification purposes Disadvantaged and Women-Owned Businesses who are interested in bidding for District contract opportunities.

If your firm is a Disadvantaged or Women Business Enterprise and you are interested in potential participation in the District's procurement activities, we invite you to apply for certification. You may apply by submitting copies of the following items in addition to a signed and notarized Schedule A.

- A. All disadvantaged and/or women-owned businesses must submit items 1-6.
 - 1. License to do business and/or fictitious name statement for sole proprietorship.
 - 2. Most recent federal tax return.
 - 3. Resumes of principals and key personnel.
 - 4. Third party agreements such as rentals, lease agreements and professional services agreements.
 - 5. Proof of ethnicity/gender (birth certificate, passport, etc.).
 - 6. Company profile including a description of the firm's product or services.

- B. Partnerships: Must submit the following items in addition to those required in A (1-6) above:

1. Partnership agreements and any other amendments thereto.
 2. Profit sharing agreements.
 3. Buy-out rights.
- C. Corporation: Must submit the following items in addition to those required in A (1-6) above:
1. Articles of Incorporation.
 2. By-laws.
 3. Stockholders options.
 4. Stockholders agreements.
 5. Stock certificates of each holder.
 6. Stock transfer ledger.
 7. Stock voting rights.
 8. Record of first organization meeting.

Claims of prior certification must be supported with documentary evidence. Where banks or business references are required, please provide the full address and name of contact person. This information should be forwarded to:

Southern California Rapid Transit District
Disadvantaged Business Enterprise Department
Attn: Virginia Heredia
DBE/WBE Programs
425 South Main Street
Los Angeles, CA 90013

Failure to apply for certification does not preclude your firm from competing for District contracts. However, as a federally funded agency we are required under the guidelines of 49CFR 23 to certify firms who wish to participate in our project as a Disadvantaged or Women Business Enterprise.

Should you need additional information and/or assistance concerning our certification procedure or DBE programs, please call the undersigned at (213)972-

Thank you for taking the time to apply for certification. We look forward to hearing from you and would also like to share with you the District's opportunities available to Disadvantaged and Women Business Enterprises.

Sincerely,

MEC:VH

EEO:26

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
DEPARTMENT OF EQUAL OPPORTUNITY

OFFICE OF DISADVANTAGED/WOMEN-OWNED BUSINESS ENTERPRISE

DISADVANTAGED AND WOMAN-OWNED BUSINESS ENTERPRISE
DISCLOSURE AFFIDAVIT



1. Certification Status Sought:

DBE WBE Dual Status

2. Business Name _____

Address _____

Telephone Number (____) _____

Contact Person _____

Title _____

Nature of Business _____

3. The business is organized as a:

Proprietorship Partnership

Joint Venture Corporation

Date Established _____

4. Person(s) qualifying firm as a DBE or WBE:

<u>Name</u>	<u>Length of Time with Firm</u>	<u>Date Controlling or Qualifying Interest Acquired</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

5. The business is 51 percent owned and controlled by one or more socially and economically disadvantaged individuals who are:

White Hispanic Black Native American
 Asian-Pacific American Asian-Indian American
 Other (specify) _____

6. The business is 51 percent owned and controlled by one or more women.

Yes No

7. The business is a small business concern as defined by the Small Business Administration in 13 CFR Part 21.

Yes No

If Firm is SBA Section 8(a) certified, attach copy.

7a. Total Number of employees for the business and its affiliates

7b. Average annual gross receipts for the past three years

8. Ownership

Identify below those who possess ownership of 5% or more of the firm

<u>Name</u>	<u>U.S. Citizen</u>		<u>Ethnicity</u>	<u>Sex</u>	<u>% Owned</u>
	<u>Yes</u>	<u>No</u>			
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

IF OWNER LISTED ABOVE IS NOT A U. S. CITIZEN, PROOF OF LEGAL RESIDENCE MUST BE SUBMITTED.

8a. Identify below all corporate officers or key personnel of the firm.

<u>Name</u>	<u>Ethnicity</u>	<u>Sex</u>	<u>Title</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

9. Are there any:

a. Outstanding stock purchase options, warrants or agreements for the issuance of such options for warrants? If yes, explain fully.

b. Shares pledged, subject to lien or agreement or beneficially owned by anyone other than the person in whose name it stands? If yes, explain fully.

10. State Contractor License or Professional Registration Number:

11. Local business License Number:

12. Federal Employer Tax Identification Number:

13. Does the firm own its offices?

_____ Yes _____ No

a. If the firm rents its offices, identify by name and address the owner of the premises and provide a copy of the rental agreement.

b. Identify any firms with whom you share office space.

14. State the total number of employees and the number of minority persons now employed by the firm in each of the following categories:

	<u>Total Employees</u>	<u>Minority Employees</u>
Management	<hr/>	<hr/>
Professional & Technical	<hr/>	<hr/>
Administrative	<hr/>	<hr/>
Supervisory	<hr/>	<hr/>
Clerical	<hr/>	<hr/>
Craftsmen & Laborer	<hr/>	<hr/>

15. Identify by name, address and employer, all persons who provided management or financial consulting services to the firm during the past 12 months.

16. Identify the individuals responsible for day to day management and policy decision making:

a. Financial Decisions

<u>Name</u>	<u>Title</u>	<u>Ethnicity</u>	<u>Sex</u>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>

b. Management Decisions

<u>Name</u>	<u>Title</u>	<u>Ethnicity</u>	<u>Sex</u>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>

c. Hiring and Firing of Management Personnel

<u>Name</u>	<u>Title</u>	<u>Ethnicity</u>	<u>Sex</u>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>

d. Marketing and Sales

<u>Name</u>	<u>Title</u>	<u>Ethnicity</u>	<u>Sex</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

e. Purchase of Major Items or Supplies

<u>Name</u>	<u>Title</u>	<u>Ethnicity</u>	<u>Sex</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

f. Supervision of Field Operations

<u>Name</u>	<u>Title</u>	<u>Ethnicity</u>	<u>Sex</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

17. Identify any outstanding loans greater than \$10,000:

<u>Amount</u>	<u>Lender</u>	<u>Guarantor(s)</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

18. List Major equipment owned or leased by the firm:

a. If any equipment is leased identify owner.

19. Identify the firm's Bonding or Business Insurance Carrier.

Name: _____

Address: _____

Bonding Limit _____

Type and Amount of Coverage _____

Contact Person _____

20. Identify the firm's bank _____

Name: _____

Branch: _____

Address: _____

Contact Person: _____

21. Have any of the officers or owners of the firm conducted business under another business name?

_____ Yes _____ No

a. If so, please provide the following:

<u>Business Name</u>	<u>Officer/Owner</u>	<u>Dates of Operation</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

22. If any owner of the firm is a business entity please provide the following:

Business Name	Address	Owner(s)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

23. Has the firm been previously certified as a DBE/WBE/MBE or SBA Section 8(a)?

Certifying Authority _____

Date Certified _____

ATTACH EVIDENCE OF PREVIOUS CERTIFICATION.

a. Has the firm ever been denied certification?

_____ Yes _____ No

ATTACH EVIDENCE OF DENIAL OF CERTIFICATION.

24. Describe or attach a copy of any stock options or other ownership options that are outstanding, and any agreements between owners, or between owners and third parties which restrict ownership or control of minority owners.

25. Identify any owner, or management official, of firm who is or has been an employee of another firm that has an ownership interest in, or a present business relationship with the named firm:

a. Owner/Management Official

b. Describe the nature of the ownership interest or present business relationship with the named firm.

c. Name of the firm which has an ownership interest or present business relationship with named firm.

AFFIDAVIT

I/We, the undersigned swear that the foregoing statements are true and correct and include all material information necessary to identify and explain the operations of _____

(Name of Firm)

as the ownership thereof.

Further, I/We the undersigned agree to provide through the prime contractor or, if no prime directly to the Southern California Rapid Transit District current, complete and accurate information regarding actual work performance on the project, the payment therefor and any proposed changes, if any, of the foregoing arrangement and to permit the audit and examination of books, records and files of the named firm. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State Laws concerning false statements.

Signature _____

Name _____

Title _____

Date _____

Corporate Seal (where appropriate)

Date _____

State of _____

County of _____

On this _____ day of _____, 19____, before me appeared _____

_____, proved to me on the basis of satisfactory evidence who being

duly sworn, did execute the foregoing affidavit, and did state that he/she was properly authorized by

_____ (Name of Firm) to execute the

affidavit and did so as his or her free act and deed.

Notary Public _____

Commission Expires _____



ATTACHMENT III

SCHEDULE B

APPLICATION FOR
DISADVANTAGED BUSINESS ENTERPRISE (DBE)
AND
WOMEN'S BUSINESS ENTERPRISE (WBE)
CERTIFICATION
(Joint Venture)

Are you bidding/proposing on a current RTD Contract at this time?

- Yes
 NO

If yes, please complete the following.

Project Name: _____

RTD Bid/Proposal Number: _____

S/20:3

Southern California Rapid Transit District
Human Relations Department
Minority Business Enterprise Section

SCHEDULE B

1. Name of Joint Venture Business _____
Business Address _____
City State & Zip Code _____

2. Nature of Joint Venture Business _____

3. List Products and/or Service Rendered: _____

4. Identify firms which comprise joint venture and provide a copy of joint venture agreement.

<u>Name of Firm</u>	<u>Minority</u>	<u>Female</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

A. Describe the role of the MBE/Female firm in the joint venture:

B. Briefly describe the experience and business qualifications of each Non-MBE/Female Joint Venture Partner:

5. What is the percentage of MBE/Female Ownership:

_____ %	_____ %
MBE	Female

6. Please fill in this part if ownership is not described in joint venture agreement:

<u>Name of Joint Venture Partners</u>	<u>Profit & Loss Sharing</u>	<u>Capital Contributions Including Equip.</u>	<u>Other Ownership Interest</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

7. Control of Joint Venture:

	<u>Name</u>	<u>Title</u>	<u>Business Name</u>	<u>Race</u>	<u>Sex</u>
A. Financial Decisions:	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
B. Management Decisions:					
1. Estimating	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
2. Marketing & Sales	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____

AFFIDAVIT

I/We, the undersigned swear that the foregoing statements are true and correct and include all material information necessary to identify and explain the operations of _____

(Name of Firm)

as the ownership thereof.

Further, I/We the undersigned agree to provide through the prime contractor or, if no prime directly to the Southern California Rapid Transit District current, complete and accurate information regarding actual work performance on the project, the payment therefor and any proposed changes, if any, of the foregoing arrangement and to permit the audit and examination of books, records and files of the named firm. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State Laws concerning false statements.

Signature _____

Name _____

Title _____

Date _____

Corporate Seal (where appropriate)

Date _____

State of _____

County of _____

On this _____ day of _____, 19____, before me appeared _____

_____, proved to me on the basis of satisfactory evidence who being

duly sworn, did execute the foregoing affidavit, and did state that he/she was properly authorized by

_____ (Name of Firm) to execute the

affidavit and did so as his or her free act and deed.

Notary Public _____

Commission Expires _____

SECTION 21

NOT USED

SECTION 22

NONDISCRIMINATION DURING THE PERFORMANCE OF THIS CONTRACT

- 22.1 The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor will take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action 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 non-discrimination clause.
- 22.2 The Contractor will, 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, sex or national origin.
- 22.3 The Contractor will send to each labor union or representative of worker with which he 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 section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 22.4 The Contractor will comply with all provisions of Executive Order 11246, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- 22.5 The Contractor will 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 will permit access to his books, records and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

- 22.6 In the event of the Contractor's noncompliance with nondiscrimination clauses of this Contract or with any of the said rules, regulations or orders, this 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, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- 22.7 The Contractor will include the provisions of Paragraph 22.1 through 22.8 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 will 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 United States to enter into such litigation to protect the interests of the United States.
- 22.8 The Contractor agrees to abide by the provision of Labor Code Section 1777.5 with respect to the employment of indentured apprentices.

SECTION 23

AFFIRMATIVE ACTION REQUIREMENTS
EQUAL EMPLOYMENT OPPORTUNITY

Part I Equal Employment Opportunity

A. Notice of Requirements for Affirmative Action to Ensure Equal Employment Opportunity pursuant to Executive Order 11246.

1. The bidder's attention is called to the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" (Part I.B) and the "Equal Opportunity Clause" (Part I.C) set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the Los Angeles County Area are as follows:

Goals and Timetables for Female Participation in the Construction Industry.

<u>Timetable</u>	<u>Trade</u>	<u>Goal</u>
From April 1, 1980 until March 31, 1981	All	6.9%

Goals and Timetables for Minority Participation in Construction Industry.

<u>Timetable</u>	<u>Trade</u>	<u>Goal</u>
Until further notice by OFCCP	All	28.3%

These goals are applicable to all the Contractor's construction work (whether or not it is federal or federally assisted) performed in the Los Angeles County Area. The Contractor's compliance with Executive Order 11246, the regulations in 41 CFR Part 60-4, and the Southern California Rapid Transit District's Minority Business Enterprise Policy shall be based on its implementation of the Equal Employment Opportunity Clause, specific affirmative action obligations required by the specifica-

tions set forth in 1.B below, and its efforts to meet the goals established for the Los Angeles County geographical area where the contract resulting from this solicitation 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 minorities 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 Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. 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.
4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is the area of jurisdiction of the Los Angeles Building and Construction Trades Council.

B. Equal Employment Opportunity Construction Contract Specifications Pursuant to 41 CFR 60-4.3 (a) and the Southern California Rapid Transit District Policy.

1. As used in the following specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted.

- b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP) United States Department of Labor, and any person to whom the Director delegates authority.
 - c. "Employer Identification Number" means the Federal Social Security Number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "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).
 - e. "District" means the Southern California Rapid Transit District (SCRTD).
 - f. "Administering Agency" means the Urban Mass Transportation Administration (UMTA).
2. 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 these specifications 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.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. 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 time-tables) 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 to take good faith efforts to achieve the Plan goals and time-tables.
4. The Contractor shall implement the specific affirmative action standards provided in Paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted 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 towards its goals in each craft during the period specified.
5. 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 these specifications, Executive Order 11246, the regulations promulgated pursuant thereto.
6. In order for the non-working 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.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications 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:
 - a. 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 construction 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.
 - b. 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.
 - c. 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, a 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 therefor, along with whatever additional actions the Contractor may have taken.

- d. Provide immediate written notification to the District's Manager of Human Relations and OFCCP's Director when the union or unions 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.
- e. 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 under 7b above.
- f. 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 company 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 company EEO Policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO Policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of

construction work at any job 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.

- h. 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.
- i. 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 source. 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.
- j. 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 site and in other areas of a Contractor's workforce.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
- l. Conduct, at least annually, an inventory and evaluation at least 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.

- m. 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 these specifications are being carried out.
 - n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female Contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO Policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). 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 7a through p of these specifications 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 workforce 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 failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. 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 non-minority. 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.
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, 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 Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in Paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO Policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, 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, contractors shall not be required to maintain separate records.
15. 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).
16. The Contractor shall provide the District, by the fifth day of each month, following the preceding month's construction activity, the Monthly Construction Manpower Utilization Report, Department of Labor Form CC 257. This report shall cover the Contractor's entire work force by trade performing under this contract. Subcontractors, also, shall 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's Manager of Human Relations, 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.

SECTION 24

WAGE SCALES

(Including Transmittal No. 49 of the General Wage Decision
No. CA89-2 dated December 22, 1989)



GENERAL WAGE DECISION NO. CA89-2

Supersedes General Wage Decision No. CA88-2

State: CALIFORNIA

County(ies): Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura

Construction Type: Building, Heavy, Highway, Residential & Dredging

* Construction Description: Building Construction; Heavy construction (does not include TV/Grout work or Water Well Drilling; and in Kern County, does not include oil well drilling); Highway construction; Residential construction (except for Inyo and Mono counties; Dredging. This decision does not include the installation of solar energy systems.

Modification Record:

No.	Publication Date	Page No.(s)
1	Feb. 24, 1989	47-64b
2	Mar. 17, 1989	54-64a
3	Apr. 21, 1989	54-55
4	Apr. 28, 1989	47-48
5	May 19, 1989	54-64d
6	May 26, 1989	44,52-53 56
7	June 2, 1989	44-46
8	Aug. 18, 1989	44-45
9	Sept. 15, 1989	44-45, 47, 50 52-55
10	Oct. 13, 1989	44-46, 48 52-55
11	Oct. 27, 1989	47-49, 55-56, 60
12	Nov. 17, 1989	52
13	Nov. 24, 1989	53-56, 63
14	Dec. 22, 1989	43-44, 46-64 f

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	Basic Hourly Rates	Fringe Benefits
ASBESTOS WORKERS	23.64	5.66
BOILERMAKERS	23.15	4.80
BRICKLAYERS; STONEMASONS:		
Area 1	19.55	4.40
Area 2	20.59	4.71
Area 3	23.60	4.12
Area 4A	22.37	4.95
Area 4B	25.45	4.70
Bricklayers; Stonemasons; Marble, Terrazzo and Tile Setters	20.88	4.90
Area 6	21.99	5.63
Area 7	22.75	3.27
Area 8	24.34	4.71
*BRICK TENDERS	16.16	8.76
CARPENTERS:		
Area 1:		
Bridge or dock Carpenter; Piledriver/ Derrick Barge; Heavy Framers and Rock Slinger	22.08	3.95
Shingler (commercial work)	24.08	3.95
Carpenters; Cabinet Installers and Insulation Installer	23.95	3.95
Hardwood Floor Layer and Acoustical Installer	24.15	3.95
Millwrights	22.45	3.95
Pneumatic Nailer or Power Stapler	24.20	3.95
Saw Filers	24.03	3.95
Table Power Saw Operator	24.05	3.95
Work on single family homes and apart- ments up to and including 3 stories:		
Framer and Finish Carpenter	19.09	4.02
Insulation and weatherstripping Installer	17.50	2.86
Shingler	18.42	3.11
Concrete	20.17	4.02
Cabinet Installer	19.945	4.02
Area 2:		
Bridge or dock Carpenter; Piledriver/ Derrick Barge; Heavy Framers and Rock Slinger	23.95	3.95
Shingler (commercial work)	22.08	3.95
Carpenters; Cabinet Installer; Insulation Installer	21.95	3.95
Hardwood Floor Layer and Acoustical Installer	22.15	3.95
Millwrights	22.45	3.95
Pneumatic Nailer or Power Stapler	22.20	3.95
Saw Filers	22.03	3.95
Table Power Saw Operator	22.05	3.95
Work on single family homes and apart- ments up to and including 3 stories:		
Framer and Finish Carpenter	19.265	3.285
Insulation and weatherstripping		



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Installer	17.975	2.475
Shingler	15.46	3.95
Concrete	20.645	3.285
Cabinet Installer	21.95	3.95
Area 3:		
Bridge or Dock Carpenter; Piledriver/ Derrick Barge; Heavy Framer and Rock Slinger	22.08	3.95
Shingler (commercial work)	23.51	3.95
Carpenters; Cabinet Installer; Insulation Installer	23.38	3.95
Hardwood Floor Layer and Acoustical Installer	23.58	3.95
Millwrights	22.45	3.95
Pneumatic Nailer or Power Stapler	23.63	3.95
Saw Filers	23.46	3.95
Table Power Saw Operator	23.48	3.95
Work on single family homes and apart- ments up to and including 3 stories:		
Framer and Finish Carpenter	17.09	4.02
Insulation and weatherstripping Installer	15.50	2.86
Shingler	12.09	3.11
Concrete	18.17	4.02
Cabinet Installer	17.945	4.02
Area 4:		
Bridge or dock carpenter; Piledriver/ Derrick barge; Heavy Framer and Rock Slinger	22.08	3.95
Shingler (commercial work)	21.51	3.95
Carpenters; Cabinet Installer; Insulation Installer	21.38	3.95
Hardwood Floor Layer and Accoustical Installer	21.58	3.95
Millwrights	22.45	3.95
Pneumatic Nailer or Power Stapler	21.63	3.95
Saw Filers	21.46	3.95
Table Power Saw Operator	21.48	3.95
Work on single family homes and apart- ments up to and incliding 3 stories:		
Framer and Finish Carpenter	19.09	4.02
Insulation and Weatherstripping Installer	17.50	2.86
Shingler	18.42	3.11
Concrete	20.17	4.02
Cabinet Installer	19.945	4.02
CEMENT MASONS:		
Area 1:		
Work on single family homes and apart- ments up to and including three stories:		
Cement mason; Curb and gutter machine operator; Clary and similar type screed operator (cement only); Grinding machine operator (all types); Jackson vibratory, Texas screed and similar type screed operator; Scoring machine operator	19.61	7.88
Cement Masons (Magnesite)	19.43	8.18

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Cement Masons (Floating & Troweling Machines)	19.56	8.18	
All other work:			
Cement mason; Curb and gutter machine operator; Clary and similar type screed operator (cement only); Grinding machine operator (all types); Jackson vibratory, Texas screed and similar type screed operator; Scoring machine operator	18.81	7.85	
Cement Masons (Magnesite)	18.93	7.85	
Cement Masons (Floating & Troweling Machines)	19.06	7.85	
Area 2:			
Work on single family homes and apartments up to and including three stories:			
Cement mason; Curb and gutter machine operator; Clary and similar type screed operator (cement only); Grinding machine operator (all types); Jackson vibratory, Texas screed and similar type screed operator; Scoring machine operator	19.01	5.85	
Cement Masons (Magnesite)	19.13	5.85	
Cement Masons (Floating & Troweling Machines)	19.26	5.85	
All other work:			
Cement mason; Curb and gutter machine operator; Clary and similar type screed operator (cement only); Grinding machine operator (all types); Jackson vibratory, Texas screed and similar type screed operator; Scoring machine operator	21.31	8.18	
Cement Masons (Magnesite)	21.43	8.18	
Cement Masons (Floating & Troweling Machines)	21.56	8.18	
DIVERS:			
Diver, Wet	49.16	3.95	
Diver, Stand-by	24.58	3.95	
Diver, Tender	23.58	3.95	
DRYWALL INSTALLERS/LATHER:			
Work on single family homes and apartments up to and including 3 stories (excluding Inyo, Kern and Mono Counties:			
Area 1	20.53	3.11	
Area 2	18.53	3.11	
All other construction:			
Area 1	25.235	3.95	
Area 2	23.235	3.95	
*ELECTRICIANS:			
Area 1:			
Electricians	18.00	3.90+	3%
Cable Splicers	18.45	3.90+	3%
Sound Installers	15.95	1.28+	3%
Utility Technicians (covers street lights, traffic signals, and underground systems in streets and/or established easements)	16.50	.47+	3%
*Area 2:			



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*Work on single family homes and apart- ments up to and including 3 stories	12.25	2.35+	4%
All other work:			
*Electricians	19.40	4.90+	4%
*Cable Splicers	21.37	4.90+	4%
Area 3:			
Electricians	23.00	5.24+	3%
Cable Splicers	23.00	5.24+	3%
Ground	23.00	6.93	
Sound Technician	23.00	6.93	
Street Lighting	23.00	6.93	
Industrial Maintenance	17.18	6.76	
Residential Electrician	13.50	3.27	
Maintenance	15.20	2.46	
Material Handler	8.05	1.90+	3%
Utility Technicians (covers the installation, maintenance, reno- vation and repair of street lighting and traffic signal work or systems, whether overhead or underground, including dusk to dawn lighting installations and ramps for access to or egress from freeways, but excluding installations of new freeway construction)	17.25	5.55+	3%
*Area 4:			
*Electrician	23.55	4.85+	3%
*Cable Splicer	24.63	4.85+	3%
Alarm Technician	11.75	.10	
Residential Electrician	14.50	1.45+	3%
Area 5:			
Electrician	20.54	5.20+	3%
Electronic Technician	16.59	3%+	1.57
Cable Splicers	21.04	5.20+	3%
Residential Electrician (3 stories or less)	12.63	2.42+	3%
Area 6:			
Work on single family homes & apart- ments up to & including 3 stories	12.50	1.50+	3%
Electrical Contracts over \$2 million:			
Electricians	20.80	5.88+	3%
Cable Splicer	21.30	5.88+	3%
Electrical Contracts \$2 million and under:			
Electricians	19.30	5.88+	3%
Cable Splicers	19.80	5.88+	3%
Sound Installer	16.59	1.57+	3%
Area 7:			
Work on single family homes & apart- ments up to & including 3 stories	13.90	4.11+	3%
Electrical Contracts over \$500,000:			
Electrician	23.40	4.06+	4%
Cable Splicer	25.74	4.06+	4%
Electrical Contracts \$500,000 or less:			
Electrician	17.90	4.06+	4%
Cable Splicer	19.69	4.06+	4%



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*Area 8:		
Electrical Contracts over \$375,000 with a main electrical service over 1600 amps:		
Electricians	22.87	4.67+ 3%
Cable Splicers	24.37	4.67+ 3%
Electrical Contracts of \$375,000 or less with a main electrical service of 1600 amps or less:		
* Electricians	18.90	4.67+ 3%
* Cable Splicers	20.31	4.67+ 3%
Work on single family homes and apartments 3 stories or less	12.70	3.17+ 3%
Area 9:		
Electrician	22.70	6.50
Cable Splicers	24.97	6.50
Ground	17.25	6.50
*Area 10:		
Electrical Contracts over \$375,000 with a main electrical service over 1600 amps:		
Electricians	26.62	4.67+ 3%
Cable Splicers	28.12	4.67+ 3%
Electrical Contracts of \$375,000 or less with a main electrical service of 1600 amps or less:		
Electricians	22.43	4.67+ 3%
Cable Splicers	23.85	4.67+ 3%
Work on single family homes and apartments 3 stories or less	12.70	3.17+ 3%
*Area 11:		
Work on single family homes and apart- ments up to and including 3 stories	13.25	2.35+ 4%
All other work:		
Electricians	23.15	4.90+ 4%
Cable Splicers	25.12	4.90+ 4%
*ELEVATOR CONSTRUCTORS:		
*Area 1:		
Mechanics	24.725	5.22+ a
Helpers	17.31	5.22+ a
Probationary Helpers	12.36	
Area 2:		
Mechanics	31.40	4.32+ a
Helpers	21.98	4.32+ a
Probationary Helpers	15.70	
*GLAZIERS:		
*Area 1	20.59	6.37
Area 2	21.27	3.81
Area 3	19.92	4.24
*IRONWORKERS:		
Excluding Vandenberg AFB:		
Fence Erectors	18.91	10.25
Ornamental, Reinforcing, Structural	19.80	10.25
*Vandenberg AFB Only:		
Fence Erectors	21.91	10.25
Ornamental, Reinforcing, Structural	22.80	10.25



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LINE CONSTRUCTION:

Area 1:

Transmission (69kv & up; Catenary work:

Line Technician; Heavy Equipment Operator	22.96	3.30+	4%
Ground; Truck Driver	12.40	3.30+	4%
Cable Splicer	23.26	3.30+	4%

All other commercial overhead line:

Line Technician; Heavy Equipment Operator	20.40	3.30+	4%
Ground; Truck Driver	12.40	3.30+	4%
Cable Splicer	20.70	3.30+	4%

All other commercial underground line:

Line Technician; Heavy Equipment Operator	16.40	3.30+	4%
Ground; Truck Driver	12.40	3.30+	4%
Cable Splicer	16.70	3.30+	4%

Area 2:

Ground	14.74	4.40+	4%
Line Worker; Heavy Equipment Operator	19.65	4.40+	4%
Cable Splicers	21.63	4.40+	4%

Area 3:

Line Worker	23.00	5.24+	3%
Cable Splicers	23.60	5.24+	3%
Ground	17.25	5.24+	3%

Area 4:

Line Worker	19.15	5.88+	4%
Cable Splicer	19.80	5.88+	4%
Ground	16.28	5.84+	4%

Area 5:

Cable Splicer	20.93	4%+	5.10
Ground	15.32	4%+	5.10
Line Worker	20.43	4%+	5.10

Area 6:

Ground	17.55	4.06+	4%
Line Worker; Line truck & equipment operators	23.40	4.06+	4%
Cable Splicers	25.74	4.06+	4%

Area 7:

Ground	15.75	5.27+	3%
Line Worker	21.75	5.27+	3%
Cable Splicers	23.93	5.27+	3%

*Area 8:

Line Worker; Equipment Operator	21.37	4.62+	4%
Cable Splicers	22.78	4.62+	4%
Ground; Ground Driver	16.02	4.62+	4%

*Area 9:

Ground	18.49	4.40+	4%
Line Worker; Heavy Equipment Operator	23.40	4.40+	4%
Cable Splicers	25.37	4.40+	4%

*Area 10:

Line Worker; Equipment Operators	24.90	4.62+	4%
Cable Splicers	26.31	4.62+	4%
Ground; Ground driver	19.56	4.62+	4%



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MARBLE SETTERS:		
Area 1	22.40	4.75
Area 2	22.22	3.80
MARBLE, TERRAZZO & TILE FINISHERS:		
Area 1	15.84	2.60
Area 2:		
Zone 1	13.46	3.70
Zone 2	16.46	3.70
MARBLE & TILE FINISHERS:		
Area 1	16.95	4.96
*PAINTERS:		
Area 1:		
Brush; Painter Burner	21.16	5.56
Paperhangers	18.87	4.67
Sandblaster; Iron, Steel and Bridge (swing stage)	19.37	4.67
Sheet Rock Tapers	20.80	5.56
Brush (swing stage); Spray	18.62	4.67
Steeplejack	20.02	4.67
Area 2:		
Work on wood frame motels and wood frame convalescent homes	16.50	3.68
Work on service stations and car washes; Construction up to and including 3 stories in height such as small shopping centers, small stores, small office buildings and small food establishments; and light metal buildings, small warehouses, small storage facilities and tilt-up buildings; and tenant improvement work such as repainting	17.50	4.68
All other work:		
Brush	22.16	4.58
Sandblast; spray; steeplejack	21.92	4.68
Paperhanger; swing stage	20.92	4.68
Paste machine operator	21.17	4.68
Taper	22.16	4.69
Area 3:		
Brush	17.95	3.32
Brush or roller (swing (stage): Paperhanger	18.45	3.32
Spray; Sandblaster; Taper	18.95	3.32
Spray and Sandblast (swing stage); Special coaters; Tapers with tools	19.45	3.32
Steeplejack; Structural steel or pipe in place	19.95	3.32
*Area 4:		
Work on single family homes and apartments up to and including 3 stories; and commercial work 3 stories and under:		
Painter	15.26	4.40
Spray painter	15.76	4.40
All other work:		
Painter; Pot Tender; (brush)	19.23	4.40
Paperhangers; Paste Machine Operator	19.48	4.40
Drywall finishers:		
Taper	22.66	4.15
Spray texturer	22.91	4.15
Spray texturer tenders	9.50	4.15



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Iron and steel/brush; pot tender/steel	20.48	4.77
Iron and steel/spray; Iron and steel sandblast power clean	20.98	4.77
Spray Painter; Sandblaster (non-steel); Waterblaster; Power cleaning (non-steel); Steam cleaning (non-steel)	19.73	4.40
Sign Painter	19.88	4.40
Steeplejack (non-steel); Iron and steel (spray); Iron and steel sandblast power clean	20.23	4.40
* High and Hazardous Pay: 4th and 5th Stories:		
Painter	19.60	4.40
Spray, sandblaster (non-steel), Waterblaster, power cleaning (non-steel), steam cleaning (non-steel)	20.10	4.40
Steeljack (non-steel)	20.60	4.40
* 6th to 10th Stories:		
Painter	19.98	4.40
Spray, sandblaster (non-steel), Waterblaster, power cleaning (non-steel), steam cleaning (non-steel)	20.48	4.40
Steeljack (non-steel)	20.98	4.40
* 10 Stories and over:		
Painter	20.48	4.40
Spray, sandblaster (non-steel), Waterblaster, power cleaning (non-steel), steam cleaning (non-steel)	20.98	4.40
Steeljack (non-steel)	21.48	4.40
High Iron and Steel Construction - Bridges over 30':		
Painter/brush	21.98	4.77
Painter Steel/ Spray; Sandblaster; Water Blaster; Power cleaning; Steam cleaning	22.48	4.77
Steeplejack: brush, spray, sandblast	23.48	4.77
*PARKING LOT STRIPING WORK AND/OR HIGH-WAY MARKERS:		
Group 1	17.18	3.80
Group 2	16.32	3.80
Group 3	14.60	3.80
Group 4	17.18	3.80
Slurry seal work:		
Sealer/mixer	15.58	3.80
Squeegee; applicator operator and shuttle	13.80	3.80
PLASTERERS:		
Area 1:		
Plasterers	21.23	5.26
Plasterers/Lathers working on single family homes and apartments up to and including 3 stories	18.23	5.26
Area 2:		
Plasterers	25.40	
Plasterers/Lathers working on single family homes and apartments up to		

and including 3 stories	22.40	
Area 3	21.77	
Area 4	18.07	3.35
Area 5	20.74	6.72
Area 6:		
Plasterers	15.57	4.41
Nozzle operator	15.695	4.41
*PLASTERERS' TENDERS:		
*Area 1-A:		
Work on single family homes and apart- ments up to and including 3 stories:		
Plasterers Tenders	19.13	8.49
Plasterers Clean-up Laborers	15.79	8.49
All other work:		
Plasterers Tenders	22.13	8.49
Plasterers Clean-up Laborers	18.79	8.49
*Area 1-B:		
Work on single family homes and apart- ments up to and including 3 stories:		
Plasterers Tenders	16.13	8.49
Plasterers Clean-up Laborers	12.79	8.49
All other work:		
Plasterers Tenders	19.13	8.49
Plasterers Clean-up Laborers	15.79	8.49
*Area 2	14.63	7.26
*Area 3:		
Plasterers Tenders	19.265	8.71
Plasterers Tenders working on single family homes and apartments up to and including 3 stories	15.115	8.26
*Area 4:		
*Work on single family homes and apartments up to and including 3 stories (does not apply to Vandenberg Air Force Base, Point Arguello, or Camp Roberts)	12.71	8.56
*All other work	15.56	8.56
*Area 5:		
Plasterers Tenders	16.56	8.56
Plasterers Tenders working on single family homes and apartments up to and including 3 stories	12.71	8.56
*Area 6	18.31	7.26
Area 7:		
Commercial	20.74	6.72
Residential	18.79	8.27
*PLUMBERS: STEAMFITTERS:		
Area 1		
Zone 1	21.48	9.42
Zone 2	23.73	9.42
Zone 3	24.98	9.42
*Area 2	19.46	4.58
*Area 3	24.46	4.58
PLUMBERS - LANDSCAPE & IRRIGATION WORK:		
Area 1	16.80	6.75
*REFRIGERATION AND AIR CONDITIONING:		
*Area 1	21.19	5.90



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Area 2	19.55	5.78 + 1%
*ROOFERS:		
Area 1	17.07	2.08
*Area 2	17.35	4.80
Area 3	18.15	6.00
*Area 4	17.52	8.735
Area 5	16.75	3.60
*SHEET METAL WORKERS:		
Area 1:		
Work on existing residential buildings, both single and multi-family where each unit is heated and/or cooled by a separate system; new single residential buildings including tracts; new multi-family residential buildings, not exceeding 5 stories of living space in height, provided each unit is heated or cooled by a separate system, not including hotels and motels; light commercial work, defined as being any sheet metal, heating and air conditioning work performed on a wood frame building up to and including 4 stories in height; and tilt-up or concrete block warehouses of any size. Hotels and motels are included in light commercial work provided they otherwise qualify by size and type of construction; tenant improvement		
work:	12.59	4.12
All other work	22.98	7.08
Area 2	24.30	7.38
Area 3	21.09	4.77
Area 4	22.10	6.53
Area 5	21.10	6.87
*Area 6	21.96	6.58
Area 7	20.31	6.81
SOFT FLOOR LAYERS:		
Area 1	18.45	3.94
Area 2	21.67	4.65
Area 3	17.62	4.44
SPRINKLER FITTERS:		
Area 1	24.18	3.90
Area 2	26.07	7.69
*TERRAZZO WORKERS:		
Area 1	22.40	4.75
*Area 2	24.22	3.80
*TILE SETTERS:		
Area 1	22.40	4.75
Area 2	22.41	4.30
Area 3-A	21.06	4.80
Area 3-B	21.54	4.80
Area 4-A	17.40	2.90
Area 4-B	20.40	2.90
*Area 5	22.25	5.06
*LABORERS:		
*Area 1:		
Group 1	18.66	8.76
Group 2	18.81	8.76
Group 3	19.01	8.76
Group 4	20.06	8.76
Group 5	20.26	8.76
* Watchperson	16.67	8.76
*Tunnel Laborers:		
Group 1	20.32	8.76



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Group 2	20.44	8.76
Group 3	20.60	8.76
Group 4	20.88	8.76
*Work on single family homes and apartments up to and including 3 stories:		
Landscape laborers, clean-up, fencing (chain link and wood)	14.84	8.76
* All other work on single family homes and apartments up to and including 3 stories		
	15.84	8.76
*Area 2:		
Group 1	15.66	8.76
Group 2	15.81	8.76
Group 3	16.01	8.76
Group 4	17.06	8.76
Group 5	17.26	8.76
* Watchperson	13.67	8.76
*Tunnel Laborers:		
Group 1	18.32	8.76
Group 2	18.44	8.76
Group 3	18.60	8.76
Group 4	18.88	8.76
*Work on single family homes and apartments up to and including 3 stories:		
Landscape laborers, clean-up, fencing (chain link and wood)	11.84	8.76
All other work on single family homes and apartments up to and including 3 stories		
	12.84	8.76
*GUNNITE LABORERS:		
Areas 1 & 2:		
Group 1	18.94	8.60
Group 2	17.99	8.60
Group 3	15.98	8.60
CONCRETE PUMPER:		
Group 1	20.75	7.30
Group 2	21.03	7.30
Group 3	21.81	7.30
Group 4	21.91	7.30
Group 5	22.81	7.30
POWER EQUIPMENT OPERATORS:		
DREDGING:		
Hydraulic Suction Dredges:		
Lever Operator	22.60	7.30
Deckmate; Watch Engineer; Welder	22.03	7.30
Winch (stern winch on dredge)	21.47	7.30
Bargehand; Deckhand; Firefighter:		
Oiler	20.93	7.30
Dozer	22.13	7.30
Clamshell Dredges:		



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Lever Operator	22.60	7.30
Deckmate; Watch Engineer	22.02	7.30
Barge Mate	21.54	7.30
Bargehand; Deckhand; Firefighter; Oiler	20.93	7.30

POWER EQUIPMENT OPERATORS:

Group 1	20.75	7.30
Group 2	21.03	7.30
Group 3	21.32	7.30
Group 4	21.46	7.30
Group 5	22.56	7.30
Group 6	21.68	7.30
Group 7	22.78	7.30
Group 8	21.29	7.30
Group 9	22.89	7.30
Group 10	21.91	7.30
Group 11	23.01	7.30
Group 12	22.08	7.30
Group 13	22.18	7.30
Group 14	22.21	7.30
Group 15	22.29	7.30
Group 16	22.41	7.30
Group 17	22.58	7.30
Group 18	22.68	7.30
Group 19	22.79	7.30
Group 20	22.91	7.30
Group 21	23.08	7.30
Group 22	23.18	7.30
Group 23	23.29	7.30
Group 24	23.41	7.30
Group 25	23.58	7.30

CRANES, PILEDIVING & HOISTING EQUIPMENT:

Group 1	20.75	7.30
Group 2	21.03	7.30
Group 3	21.32	7.30
Group 4	21.46	7.30
Group 5	21.68	7.30
Group 6	21.79	7.30
Group 7	21.91	7.30
Group 8	22.08	7.30
Group 9	22.25	7.30
Group 10	23.25	7.30
Group 11	24.25	7.30
Group 12	25.25	7.30
Group 13	26.25	7.30

TUNNEL GROUP:

Group 1	21.25	7.30
Group 2	21.53	7.30
Group 3	21.82	7.30
Group 4	21.96	7.30
Group 5	22.18	7.30
Group 6	22.29	7.30



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Group 7	22.41	7.30
Group 8	22.58	7.30
Group 9	22.71	7.30

TRUCK CRANE OPERATORS:

Group 1	20.90	7.30
Group 2	21.11	7.30
Group 3	21.26	7.30
Group 4	21.99	7.30
Group 5	22.05	7.30
Group 6	22.17	7.30
Group 7	22.34	7.30
Group 8	22.59	7.30
Group 9	22.84	7.30

*TRUCK DRIVERS:

Group 1	17.17	19.17
Group 2	17.25	19.25
Group 3	17.31	19.31
Group 4	17.40	19.40
Group 5	17.43	19.43
Group 6	17.45	19.45
Group 7	17.49	19.49
Group 8	17.50	19.50
Group 9	17.55	19.55
Group 10	17.58	19.58
Group 11	17.63	19.63
Group 12-A	17.65	19.65
Group 12-B	17.68	19.68
Group 13	17.70	19.70
Group 14	17.95	19.95
Group 15	18.20	20.20
Group 16	18.30	20.30
Group 17	18.40	20.40
Group 18	18.70	20.70
Group 19	19.20	21.20

FRINGE BENEFITS: \$9.26

WELDERS: Receive rate prescribed for craft performing operation to which welding is incidental.

DIVERS: Shall receive a minimum of 8 hrs. pay for any day or part thereof.

*FOOTNOTES:

- a. Employer contributes 8% of basic hourly rate for over 5 years' service and 6% of basic hourly rate for 6 months' to 5 years' service as Vacation Pay Credit. Seven Paid Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Friday after Thanksgiving Day and Christmas Day



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AREA DESCRIPTIONS

BRICKLAYERS; STONEMASONS:

- Area 1: Imperial County
- Area 2: Inyo, Kern, and Mono Counties (excluding Edwards AFB and China Lake Naval Weapons Center)
- Area 3: Los Angeles County
- Area 4A: Riverside and San Bernardino Counties (Except China Lake Naval Weapons Center, Ft. Irwin Training Center, and 29 Palms Marine Base)
- Area 4B: China Lake Naval Weapons Center, Ft. Irwin Army Training Center, and 29 Palms Marine Base, in Riverside and San Bernardino Counties
- Area 5: (Bricklayers; Stonemasons; Marble, Terrazzo and Tile Setters) San Luis Obispo and Santa Barbara Counties
- Area 6: Ventura County
- Area 7: Orange County
- Area 8: Edwards Air Force Base and China Lake Naval Weapons Center, in Inyo and Kern Counties

CARPENTERS:

- Area 1: Vandenberg Air Force Base, Point Arguello, Point Conception, Camp Roberts, U.S. Naval Air Facility, El Centro, George Air Force Base, Fort Irwin, Nebo Marine Ballistic Base, (Yermo), 29 Palms Marine Base
- Area 2: Remaining Counties and parts of Counties
- Area 3: China Lake Naval Weapons Center, Edwards Air Force Base, North Edwards Air Force Base, Mountain Warfare Training Center, Bridgeport
- Area 4: Inyo, Kern and Mono Counties

CEMENT MASONS:

- Area 1: Remainder of area
- Area 2: Camp Roberts, China Lake, Edwards Air Force Base, El Centro, Fort Irwin, George Air Force Base, Marine Corps Supply Center, Naval Air Facility, Naval Ordnance Test Station, North Edwards Air Force Base, Point Arguello, Point Conception, and Vandenberg Air Force Base

DRYWALL INSTALLERS/LATHERS:

- Area 1: Vandenberg Air Force Base, Point Arguello, Point Conception, Camp Roberts, U.S. Naval Air Facility, El Centro, George Air Force Base, Fort Irwin, Nebo Marine Ballistic Base (Yermo), 29 Palms Marine Base, China Lake Naval Weapons Center, Edwards Air Force Base, North Edwards Air Force Base, Mountain Warfare Training Center, Bridgeport
- Area 2: Remaining Counties and parts of Counties

ELECTRICIANS:

- Area 1: Imperial County and San Diego
- Area 2: Kern County (Remainder of County)
- Area 3: Los Angeles County
- Area 4: Orange County
- Area 5: Riverside County
- Area 6: Inyo, Mono, and San Bernardino Counties
- Area 7: San Luis Obispo County
- Area 8: Santa Barbara (Remainder of County)



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Area 9: Ventura County

Area 10: Point Arguello and Vandenberg Air Force Base

Area 11: China Lake Naval Ordnance Test Station and Edwards Air Force Base

ELEVATOR CONSTRUCTORS:

Area 1: Imperial and Inyo Counties; Kern County (south of Tehachapi Range); Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties

Area 2: Kern County (north of Tehachapi Range)

GLAZIERS:

Area 1: Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, and Ventura Counties

Area 2: Imperial County

Area 3: Inyo, Kern, Mono and San Luis Obispo Counties

LABORERS:

Area 1: Point Arguello, Camp Roberts, Edwards Air Force Base, Naval Ordnance Test Center, Inyo-Kerns, Vandenberg Air Force Base

Area 2: Remainder of Counties

***LINE CONSTRUCTION:**

Area 1: Imperial County

Area 2: Kern County (excluding Edwards Air Force Base and China Lake Naval Weapons Center)

Area 3: Los Angeles County

Area 4: Inyo, Mono, and San Bernardino Counties

Area 5: Riverside County

Area 6: San Luis Obispo County

Area 7: Ventura County

*Area 8: Santa Barbara (Remainder of County)

Area 9: Edwards Air Force Base and China Lake Naval Weapons Center

*Area 10: Point Arguello and Vandenberg Air Force Base

MARBLE SETTERS:

Area 1: Imperial County

Area 2: Remaining Counties

MARBLE, TERRAZZO AND TILE FINISHERS:

Area 1: Imperial County

Area 2: Inyo, Kern and Mono Counties

Zone 1: Remainder of area

Zone 2: China Lake Naval Weapons Center and Edwards Air Force Base

MARBLE AND TILE FINISHERS:

Area 1: Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura Counties

PAINTERS:

Area 1: Imperial, Orange, and Riverside Counties; Los Angeles County (Pomona Area); San Bernardino County (excluding western portion)

Area 2: Inyo County; Los Angeles County (except Pomona Area); Mono County; San Bernardino County (west of a line north of Trono including China Lake Area, Johannesburg, Boron, south including the Wrightwood Area); Kern County (east of the Los Angeles Aqueduct)



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- Area 3: Kern County (except the portion lying east of the Los Angeles Aqueduct)
- Area 4: San Luis Obispo, Santa Barbara, and Ventura Counties

PLASTERERS:

- Area 1: Los Angeles, Orange, Riverside and San Bernardino Counties
- Area 2: Imperial County
- Area 3: San Luis Obispo County
- Area 4: Santa Barbara County
- Area 5: Ventura County
- Area 6: Kern, Inyo, and Mono Counties

PLASTERERS' TENDERS:

- Area 1-A: Fort Irwin, George Air Force Base, Marine Corps Air Station 29 Palms, Marine Corps Logistics Supply Base, Mountain Warfare Training Center, Naval Air Facility Seeley, U.S. Marine Corps Pickle Meadows
- Area 1-B: Remainder of Imperial, Inyo, Mono, Riverside, and San Bernardino Counties
- Area 2: Kern County
- Area 3: Los Angeles and Orange Counties
- Area 4: San Luis Obispo County and Santa Barbara County (north part)
- Area 5: Santa Barbara County (south part)
- Area 6: China Lake Naval Ordnance Test Station and Edwards Air Force Base
- Area 7: Ventura County

PLUMBERS; STEAMFITTERS:

- Area 1: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties
- Zone Definitions:
 - Zone 1: Remainder of area
 - Zone 2: Camp Roberts, George Air Force Base and Vandenberg Air Force Base
 - Zone 3: Fort Irwin Army Base, Marine Corps Logistic Base at Nebo, Marine Corps Logistic Base at Yermo, San Nicolaus Island, 29 Palms Marine Base
- Area 2: Inyo, Kern, and Mono Counties
- Area 3: China Lake Naval Weapons Center and Edwards Air Force Base

PLUMBERS - LANDSCAPE AND IRRIGATION WORK:

- Area 1: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara and Ventura Counties

REFRIGERATION and AIR CONDITIONING:

- Area 1: Los Angeles and Orange Counties
- Area 2: Riverside and San Bernardino Counties

ROOFERS:

- Area 1: Imperial County
- Area 2: Inyo, Kern, and Mono Counties
- Area 3: Riverside and San Bernardino Counties
- Area 4: Los Angeles, Orange, and Ventura Counties
- Area 5: San Luis Obispo and Santa Barbara Counties

SHEET METAL WORKERS:

- Area 1: Imperial County



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Area 2: Kern County and all of Inyo and Mono Counties; Los Angeles County (that portion north of a straight line drawn between Gorman and Big Pines)

Area 3: Los Angeles County (Remaining portion)

Area 4: Orange County

Area 5: Riverside and San Bernardino Counties

Area 6: San Luis Obispo, Santa Barbara, and Ventura Counties

Area 7: Edwards Air Force Base and China Lake Naval Weapons Base

SOFT FLOOR LAYERS:

Area 1: Imperial County

Area 2: Los Angeles, Orange, Riverside, Santa Barbara,

San Luis Obispo, San Bernardino, and Ventura Counties

Area 3: Inyo, Kern and Mono Counties

SPRINKLER FITTERS:

Area 1: Imperial, Inyo, Kern, and Mono Counties, Orange County (except Santa Ana), Riverside County, San Bernardino County (except Ontario); San Luis Obispo, Santa Barbara and Ventura Counties

Area 2: Los Angeles City and area within 25 miles and Pomona Area; Orange County (Santa Ana); San Bernardino County (Ontario); and Ventura County (Santa Paula, Point Mugu and Port Hueneme)

TERRAZZO WORKERS:

Area 1: Imperial County

Area 2: Remaining Counties

TILE SETTERS:

Area 1: Imperial County

Area 2: Los Angeles, Orange, and Ventura Counties

Area 3-A: Riverside and San Bernardino Counties (excluding China Lake Naval Base, the Fort Irwin Training Center, and 29 Palms Marine Base)

Area 3-B: China Lake Naval Weapons Center in San Bernardino County; and the Ft. Irwin Training Center, and 29 Palms Marine Base

Area 4-A: Inyo, Kern and Mono Counties (excluding China Lake Naval Weapons Center and Edwards Air Force Base)

Area 4-B: China Lake Naval Weapons Center in Inyo and Kern Counties, and Edwards Air Force Base

Area 5: San Luis Obispo and Santa Barbara Counties

TRUCK DRIVERS:

Area 1 - Excluding All areas Listed In Area 2

Area 2 - Vandenberg AFB, Point Arguello, Point Conception, China Lake, Camp Roberts, Edwards AFB, Nebo Maine Ballistic Base (Yermo), Mountain Warfare Training Center, Bridgeport, Fort Irwin, Georgia AFB, Naval Air Facility, El Centro, 29 Palms Marine Base.

DEFINITION OF GROUPS

ELECTRICIANS:

Area 1: Sound technician: Terminating, operating and performing final checkout

Sound Person B: Wirepulling, splicing, assembling and installing devices



Utility Technician # 1: Installation of street lights and traffic signals, including electrical circuitry, programmable controller, pedestal mounted electrical meter enclosures and laying of pre-assembled cable in ducts. The layout of electrical systems and communication installation including proper position of trench depths, and radius at duct banks, location for manholes, street lights and traffic signals

Utility Technician # 2: Distribution of material at job site, installation of underground ducts for electrical, telephone, cable television, and communication systems. The setting, leveling, grounding, and racking of precast manholes, handholes and transformer pads

LABORERS
AREAS 1 and 2

Group 1: Cleaning and Handling of Panels Forms; Concrete Screeding for rough strike-off; Concrete, water curing; Demolition Laborer, the cleaning of brick and lumber; Dry packing of concrete, plugging, filling of Shee-bolt Holes; Fire Watcher, Limber, Brush Loaders, Pilers and Debris Handlers; Gas, oil and/or water pipeline Laborer; Laborer, general or construction; Laborer, general cleanup; Laborer landscaping; Laborer, jetting, temporary water and air lines; Material Hose operator (walls, slabs, floors, and decks); Rigging and Signaling; Scaler; Slip Form Raisers; On highways, slurry seal crews (Mixer Operator, Applicator Operator, Squeegee operator, Shuttle, Top); Striper, Concrete or other paved road surfaces; Tar and Mortar; Tool Crib or Tool House Laborer on highways; Traffic Delineating Device Applicator; Window Cleaner; Wire Mesh, pulling all concrete pouring operations

Group 2: Asphalt Shoveler; Cement Dumper (on 1 yard or larger Mixer and handling bulk cement); Cesspool Digger and Installer; Chucktender; Chute handler, pouring concrete, the handling of the Chute from Ready Mic Trucks, such as walls, slabs, decks, floors, foundations, footings, curb, gutters, and sidewalks; Concrete Curer, Impervious Membrane and Form Oiler; Cutting Torch Operator (demolition); Fine Grader, highways and street paving, airport, runways, and similar type heavy construction; Gas, oil and/or water Pipeline Wrapper; Pot Tender and Form; Guinea Chaser; Headerboard, asphalt; Laborer, packing rod steel and pans; Power Broom Sweepers (small); Riprap Stonepaver, placing stone or wet sacked concrete; Roto Scraper and Tiller; Sandblaster (Pot Tender); Septic Tank Digger and Installer (Lead); Tank Scaler and Cleaner; Tree Climber, Faller, Chain Saw Operator, Pittsburgh Chipper and similar type Brush Shredders; Underground Laborer, including Caisson Bellower

Group 3: Asphalt Raker, Lute, Ironer and Asphalt Spreader Boxes (all types); Buggymobile; Concrete Core Cutter, Grinder or Sander; Concrete Cutting Torch; Concrete Saw, cutting, scouring old or new concrete; Driller, Jackhammer, 2 1/2 ft. drill steel or longer; Dri Pak-it Machine; Gas, oil and/or water Pipeline Wrapper, 6" pipe and over, by any method, inside and out; Hydro Seeder and similar type; Impact Wrench Multi-plate; Kettle, Pot and asphalt appliers, Lay-kold, creosote, lime caustic and similar type materials ("applying")



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means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); Operators of pneumatic, gas, electric tools; Vibrating Machines, Pavement Breakers, Air Blasting, Come-alongs, and similar mechanical tools not separately classified herein; Pipelayer's Backup, coating, grouting, making of joints, sealing, caulking, diapering and including Rubber Gasket Joints, pointing and any and all other services; Rock Slinger; Rotary Scarifier or Multiple Head Concrete Chipping Scarifier; Steel Headerboard and Guideline Setter; Tampers, Barko, Wacker, and similar type; Trenching Machine, hand propelled

Group 4: Cribber, Shorer, Lagging, Sheeting and Trench Bracing, hand-guided Lagging Hammer; Head Rock Slinger; Over-size Concrete Vibrator Operator, 70 lbs. and over; Pipelayer, including water, sewage, solid, gas or air; Prefabricated Manhole Installer; Sandblaster (Nozzle, water blasting); Welding in connection with Laborers' work

Group 5: Blaster Powder, all work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Driller; All power drills, excluding Jackhammer, whether Core, Diamond, Wagon, Track, Multiple Unit, and any and all types of mechanical drills

GUNNITE

Group 1: Nozzle and Rod

Group 2: Gun

Group 3: Rebound

LABORERS - TUNNEL

Group 1: Batch Plant Laborers; Bull Gang Mucker, Track; Concrete Crew, including Rodders and Spreaders; Changehouse; Dump; Dump (outside); Swamper (Brake and Switch on tunnel work); Tunnel materials handling; Tool worker

Group 2: Cable Tender; Chuck Tender; Nipper; Steel Form Raiser and Setter's Tender; Vibrator operator, Jackhammer, pneumatic tools (except Driller; Loading and unloading Agitator Cars; Pot Tender, using mastic or other materials

Group 3: Blaster, Driller, Powder; Chemical Grout Jet; Cherry Picker; Grout Gun; Grout Mixer; Grout Pump; Jackleg Miner; Jumbo; Kemper and other pneumatic concrete Placer Operator; Miner, tunnel (hand or machine); Powder (Primer House); Primer; Shotcrete; Steel Form Raiser and Setter; Timber; Retimber (wood or steel); Tunnel Concrete Finisher; Nozzle; Operating Troweling and/or Grouting Machine; Sandblaster

Group 4: Shaft, Raise Miner; Diamond Driller



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PARKING LOT STRIPING WORK AND/OR HIGHWAY MARKERS

Group 1: Striper: layout and application of painted traffic stripes and marking; hot thermo plastic; tape traffic stripes and marking

Group 2: Traffic delineating device applicator; layout and application of pavement markers, delineating signs, rumble and traffic bars, adhesives, guide markers; other traffic delineating devices; includes all related surface preparation (sandblasting, waterblasting, grinding) as part of the application process

Group 3: Traffic surface abrasive blaster: removal of traffic lines and markings; preparation of surface for coatings

Group 4: Traffic protective delineating systems installer: removes, relocates, installs; permanently affixed roadside and parking delineation barricades; fencing, guard rail, cable anchor, retaining walls, reference signs, monument markers

POWER EQUIPMENT OPERATORS-CONCRETE PUMPERS:

Group 1: Compressor operator, Concrete pump operator (small portable, pea gravel), Engineer oiler, Heavy duty repairperson helper

Group 2: Conveyor operator

Group 3: Heavy duty repairperson

Group 4: Heavy duty repairperson/welder

Group 5: Concrete pump operator (truck mounted), concrete pump and separate placing boom, concrete pump, Large trailer type (large rock)

*POWER EQUIPMENT OPERATORS

Group I: Barge, Brake, Compressor Operator (when more than five (5) 600 CFM or larger units, additional Operator required), Ditch Winch, with seat or similar type equipment, Elevator Operator - inside, Engineer Oiler, Generator Operator, Generator, Pump or Compressor Plant Operator, Heavy Duty Repair Helper, Pump Operator, Signal, Switch

*Group II: Concrete Mixer Operator - Skip Type, Conveyor Operator, Firefighter, Hydrostatic Pump Operator, Diler Crusher (asphalt or concrete plant), Rotary Drill Helper (Oilfield), Skiploader (when wheel type up to 3/4 yd. without attachment), Soils Field Technician, Tar Pot Firefighter, Temporary Heating Plant Operator, Trenching Machine Operator

*Group III: Equipment Greaser (rack), Ford Ferguson (with dragtype attachments), Helicopter Radioperson (ground), Power Concrete Curing Machine Operator, Power Concrete Saw Operator, Power - Driver Jumbo Form Setter Operator, Stationary Pipe Wrapping and Cleaning Machine Operator



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*Group IV - Asphalt Plant Fire, Backhoe Operator (mini-max or similar type), Boring Machine Operator, Box or Mixer (asphalt or concrete), Building Construction Inspector, Chip Spreading Machine Operator, Concrete Pump Operator (small portable), Drilling Machine Operator, Small Auger Types (Texoma Super Economatic, or similar types - Hughes 100 or 200, or similar types - drilling depth of 30' maximum), Equipment Greaser (grease truck), Guard Rail Post Driver Operator, Highline Cableway Signalman, Hydra-Hammer-Aero Stomper, Power Sweeper Operator, Roller Operator (compacting), Screed Operator (asphalt or concrete), Trenching Machine Operator (up to 6 ft.)

Group V - Equipment Greaser (grease truck/multi shift)

*Group VI - Asphalt Plant Engineer, Batch Plant Operator, Bit Sharpener, Concret Joint Machine Operator (canal and similar type), Concrete Planner Operator, Deck Engine Operator, Derrick (oilfield type), Drilling Machine Operator, Bucket or Auger Types (Caldwell 100 Bucket or similar types - Watson 1000 Auger or similar types - Texoma 330,500 or 600 Auger or similar types - drilling depth of 45' maximum), Drilling Machine Operator (including water wells), Hydrographic Seeder Machine Operator (straw, pulp or seed), Jackson Track Maintainer, or similar type, Kalamazoo Switch Tamper, or similar type, Machine Tool Operator, Maginnis Internal Full Slab Vibrator, Mechanical Berm, curb or gutter (concrete or asphalt), Mechanical Finisher Operator (concrete, Clary-Johnson-Bidwell or similar type), Pavement Breaker Operator (truck mounted, Oiler or Journeyman trainee required), Road Oil Mixing Machine Operator, Roller Operator (asphalt or finish), Rubber-Tired Earth Moving Equipment (single engine, up to and including 25 yds. struck), Self-Propelled Tar Pipelining Machine Operator, Skiploader Operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.), Slip Form Pump Operator (power driven hydraulic lifting device for concrete forms), Tractor Operator - Bulldozer, Tamper-Scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types), Tugger Hoist Operator

Group VII - Welder - General (multi-shift)

*Group VIII - Asphalt or Concrete Spreading Operator (tamping or finishing), Asphalt Paving Machine Operator (Barber Greene or similar type), Backhoe Operator (up to and including 3/4 yd.), Small Ford, Case or similar, Cast in Place Pipe Laying Machine Operator, Combination Mixer and Compressor Operator (gunite work), Compactor Operator (self propelled), Concrete Mixer Operator Paving (Oiler or Journeyman - trainee required), Crushing Plant Operator (Oiler or Journeyman trainee required), Drill Doctor, Drilling Machine Operator, Bucket or Auger Types (Caldwell 150 bucket or similar types - Watson 1500, 2000, 2500 Auger or similar types - Texoma 700, 800 Auger or similar types - drilling depth of 60' maximum), Elevating Grader Operator, Grade Checker, Gradall Operator (Oiler or Journeyman trainee required), Grouting Machine Operator, Heavy Duty Repair, Kalamazoo Balliste Regulator or similar type, Kolman Belt Loader and similar type (additional employee required on two (2) or more, Le Tourneau Blob Compactor or similar type, Loader Operator (Athey, Euclid, Sierra and similar types), Pneumatic Concrete Placing Machine Operator (Hackley-Presswell or similar type), Pumpcrete Gen Operator, Rotary Drill Operator (excluding Caisson type)



- Oiler or Journeyman trainee required), Rubber-Tired Earth Moving Equipment Operator (single engine, Caterpillar, Euclid, Athey Wagon, and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck), Rubber-Tired Earth Moving Equipment Operator (multiple engine up to and including 25 yds. struck), Rubber-Tired Scraper Operator (self loading paddle wheel type - John Deere, 1040 and similar single unit), Self-Propelled Curb and Gutter Machine Operator, Skipload Operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.), Surface Heaters and Planer Operator, Tractor Compressor Drill Combination Operator, Tractor Operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar - Bulldozer, Tamper, Scraper and Push Tractor single engine), Tractor Operator (boom attachments), Traveling Pipe Wrapping, Cleaning and Bending Machine Operator, Trenching Machine Operator (over 6 ft. depth capacity, manufacturer's rating - Oiler and Journeyman trainee required)

*Group IX - Heavy Duty Repairperson (multi-shift)

*Group X - Drilling Machine Operator, Bucket or Auger Types (Caldwell 200 B Bucket or similar types - Watson 3000 or 5000 Auger or similar types - Texoma 900 Auger or similar types - drilling depth of 105' maximum), Dual Drum Mixer (Oiler or Journeyman trainee required), Heavy Duty Repair-Welder Combination, Monorail Locomotive Operator (diesel, gas or electric), Motor Patrol - Blade Operator (single engine), Multiple Engine Tractor Operator (euclid and similar type - except Quad 9 Cat.), Rubber-Tired Earth Moving Equipment Operator (single engine, over 50 yds. struck), Rubber-Tired Earth Moving Equipment Operator (multiple engine, Euclid, Caterpillar and similar over 25 yds. and up to 50 yds.), Tower Crane Repairman, Tractor Loader Operator (crawler and wheel type over 6-1/2 yds.), Woods Mixer Operator (and similar Pugmill equipment)

*Group XI - Heavy Duty Repairperson - Welder Combination (multi-shift)

Group XII - Auto Grader Operator (grade checker and one (1) additional employee required), Automatic Slip Form Operator (grade checker and one (1) additional employee required), Drilling Machine Operator, Bucket or Auger Types (Caldwell, Auger 200 CA or similar types - Watson Auger 6000 or similar types - drilling depth of 175' maximum), Hoe Ram or similar with Compressor, Mass Excavator Operator (less than 750 cu. yds. two (2) Operators and Oiler or Journeyman trainee required), Mechanical Finishing Machine Operator, Mobile Form Traveler Operator, Motor Patrol Operator (Multi-engine), Pipe Mobile Machine Operator (two (2) operators required), Rubber-Tired Earth Moving Equipment Operator (Multiple engine, euclid, caterpillar and similar type, over 50 cu. yds. struck), Rubber-Tired Self-Loading Scraper Operator (paddle-wheel-auger type self loading - two (2) or more units)

Group XIII - Rubber-Tired Earth Moving Equipment Operator operating equipment with push-pull system, (single engine, up to and including 25 yds. struck)

Group XIV - Canal Liner Operator (not less than (4) four employees - Operator, Oiler, Welder, Mechanic, Grade Checker required), Canal Trimmer Operator (Operator, Oiler, and (2) two other employees



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covered by this Agreement required), Remote Control Earth Moving Equipment Operator, Wheel Excavator Operator, (over 750 cu. yds. per hour - two (2) Operators and one (1) Oiler or Journeyman-trainee, and two (2) Heavy Duty Repairmen required)

Group XV - Rubber-Tired Earth Moving Equipment Operator, operating equipment with Push-Pull System (single engine, Caterpillar, Euclid, Athey Wagon, and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck), Rubber-Tired Earth Moving Equipment Operator, operating equipment with Push-Pull System (multiple engine - up to and including 25 yds. struck)

Group XVI - Rubber-Tired Earth Moving Equipment Operator, operating equipment with Push-Pull System (single engine, over 50 yds. struck), Rubber-Tired Earth Moving Equipment Operator, operating equipment with Push-Pull System (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

Group XVII - Rubber-Tired Earth Moving Equipment Operator, operating equipment with Push-Pull System (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck), Tandem Tractor Operator (operating crawler type tractors in tandem - Quad 9 and similar type)

Group XVIII - Rubber-Tired Earth Moving Equipment Operator, operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

Group XIX - Concrete Pump Operator, truck mounter (Oiler required when boom over eighty-five (85 feet), Rubber-Tired Earth Moving Equipment Operator, operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - single engine, Caterpillar, Euclid, Athey Wagon, and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck), Rubber-Tired Earth Moving Equipment Operator, operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck)

Group XX - Rubber-Tired Earth Moving Equipment Operator, operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck)

Group XXI - Rubber-Tired Earth Moving Equipment Operator, operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

Group XXII - Rubber-Tired Earth Moving Equipment Operator, operating equipment with the Tandem Push-Pull System (single engine, up to and including 25 yds. struck)

Group XXIII - Rubber-Tired Earth Moving Equipment Operator, operating equipment with the Tandem Push-Pull System (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck).



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Rubber-Tired Earth Moving Equipment Operator, operating with the Tandem Push-Pull System (multiple engine, up to and including 25 yds. struck)

Group XXIV - Rubber-Tired Earth Moving Equipment Operator, operating equipment with the Tandem Push-Pull System (single engine, over 50 yds. struck), Rubber-Tired Earth Moving Equipment Operator, operating equipment with the Tandem Push-Pull System (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

Group XXV - Rubber-Tired Earth Moving Equipment Operator, operating equipment with the Tandem Push-Pull System (Multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

POWER EQUIPMENT OPERATORS - CRANES, PILEDIVING,
AND HOISTING EQUIPMENT

Group 1: Engineer Oiler, Fork Lift Operator (under 5 tons capacity)

Group 2: Truck Crane Oiler

Group 3: A-frame or Winch Truck Operator, Ross Carrier Operator (jobsite)

Group 4: Bridge-Type Unloader and Turntable Operator, Helicopter Hoist Operator

Group 5: Stinger Crane (Austin-Western or similar type), Tugger Hoist Operator (1 drum)

Group 6: Bridge Crane Operator, Cretor Crane Operator, Forklift Operator (over 5 tons), Hoist Operator (Chicago Boom and similar type), Lift Mobile Operator, Lift Slab Machine Operator (Vagtborg and similar types), Material Hoist Operator, Shovel, Backhoe, Dragline, Clamshell Operator (over 3/4 yd. and up to 5 cu. yds. MRC), Tugger Hoist Operator

Group 7: Pedestal Crane Operator; Shovel, Backhoe, Dragline, Clamshell Operator (over 5 cu. yds. MRC), Tower Crane Repair, Tugger Hoist Operator (3 Drum)

Group 8: Crane Operator (up to and including 25 ton capacity), Crawler Transporter Operator, Derrick Barge Operator (up to and including 25 ton capacity), Hoist Operator, Stiff Legs, Guy Derrick or similar type (up to and including 25 ton capacity), Shovel, Backhoe, Dragline, Clamshell Operator (over 7 cu. yds. MRC)

Group 9: Crane Operator (over 25 tons, up to and including 50 ton MRC), Derrick Barge Operator (over 25 tons, up to and including 50 ton MRC), Highline Cableway Operator, Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 25 tons, up to and including 50 ton MRC), K-Crane Operator, Polar Crane Operator, Tower Crane Operator



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- Group 10: Crane Operator (over 50 tons, up to and including 100 ton MRC), Derrick Barge Operator (over 50 tons, up to and including 100 ton MRC), Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 50 tons, up to and including 100 ton MRC)
- Group 11: Crane Operator (over 100 tons, up to and including 200 ton MRC), Derrick Barge Operator (over 100 tons, up to and including 200 ton MRC), Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 100 tons, up to and including 200 ton MRC), Mobile Tower Crane Operator (over 100 tons, up and including 200 ton MRC).
- Group 12: Crane Operator (over 200 tons, up to and including 300 ton MRC), Derrick Barge Operator (over 200 tons, up to and including 300 ton MRC), Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 200 tons, up to and including 300 ton MRC), Mobile Tower Crane Operator (over 200 tons, up and including 300 ton MRC).
- Group 13: Crane Operator (over 300 tons), Derrick Barge Operator (over 300 tons), Helicopter Pilot, Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 300 tons), Mobile Tower Crane Operator (over 300 tons)

*POWER EQUIPMENT OPERATORS - TUNNEL GROUP

- Group 1: Heavy duty repair person helper or welder helper
- Group 2: Truck crane oiler (25 tons & under)
- Group 3: Truck crane oiler (over 25 tons)
- Group 4: Heavy duty repairperson and/or welder
- Group 5: Truck crane operator (up to and including 25 tons)
- Group 6: Truck crane operator (over 25 tons capacity up to & including 80 ton mrc)
- Group 7: Mobile tower crane
- Group 8: Tunnel mole boring machine operator

*POWER EQUIPMENT OPERATORS - TRUCK CRANE OPERATOR

- Group 1: Heavy duty repair person helper or welder helper
- Group 2: Truck crane oiler (25 tons & under)
- Group 3: Truck crane oiler (over 25 tons)
- Group 4: Heavy duty repairperson and/or welder
- Group 5: Truck crane operator (up to and including 25 tons)
- Group 6: Truck crane operator (over 25 tons capacity up to

& including 80 ton mrc)

Group 7: Mobile tower crane

Group 8: Truck crane operator (over 80 ton mrc up to and including 200 ton mrc)

Group 9: Truck crane operator (over 200 ton mrc); mobile Tower crane (over 200 ton mrc)

TRUCK DRIVERS

Group 1: Teamster

Group 2: Driver of vehicle or combinations of vehicles of 2 axles (including all vehicles less than 6 tons); Traffic Control Pilot Car, excluding moving heavy equipment permit load

Group 3: Truck mounted power Broom

Group 4: Drivers of vehicles or combination of vehicles of 3 axles

Group 5: Boot; Cement Distributor; Fuel Truck; Water Truck, 2 axle

Group 6: Dump, less than 16 yards

Group 7: Transit-mix, under 3 yards; Dumpcrete, less than 6 1/2 yards

Group 8: Truck Repair Helper

Group 9: Water Truck, 3 or more axles

Group 10: PB and similar type truck when performing within the Teamsters' jurisdiction; Pipeline and Utility working Truck including Winch, but limited to truck applicable to Pipeline and Utility work, where a composite crew is used; Slurry Driver; Truck Greaser and Tire worker (50c per hour additional for tire)

Group 11: Transit-Mix, 3 yards or more; Dumpcrete, 6 1/2 yards and over

Group 12A: Driver of vehicle or combination of vehicles of 4 or more axles

Group 12B: Driver of oil spreader truck

Group 13: Dump, 16 yards but less than 25 yards

Group 14: A-Frame or Swedish Crane, or similar type of equipment Driver; Fork Lift Driver; Ross Carrier, highway

Group 15: All off-highway equipment within Teamsters' jurisdiction (off highway combination of vehicles or equipment with multiple power sources, \$1.00 per hour additional); Dump, 25 yds. or more; Truck Repair



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Group 16: Truck Repair Welder

Group 17: Low Bed Driver, 9 axle or over

Group 18: Water Pull, single engine with attachments

Group 19: Water Pull, twin engine with attachments

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR, 5.5 (a)(1)(ii)).

SECTION 25

LABOR PROVISIONS

25.1 Minimum Wages - Davis-Bacon Act (40 U.S.C. 276a-276a-7)

- (a) All laborers and mechanics employed or working upon the site of the work, will 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 Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b) (2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (d) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled "Apprentices and Trainees." Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (b) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(b)(1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator of the Wage and Hour Division, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator for determination. The Administrator of the Wage and Hour Division, or an authorized representative, will issue a determination within

30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

- (4) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (b) (2) or (b) (3) of this clause, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- (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 rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- (d) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, that the Secretary of Labor has found, upon the written request of the Contractor, that applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.
- (e) Paragraphs (a) through (d) of the clause shall apply to this contract to the extent that it is (1) a prime contract with the Government subject to the Davis-Bacon Act, or (2) a subcontract also subject to the Davis-Bacon Act under such prime contract.

25.2 Contract work Hours and Safety Standards Act-Overtime Compensation (40 U.S.C. 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.

- (a) Overtime requirements. No Contractor or subcontractor contracting for any part of the contract work which may require or involve the

employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 8 hours in any calendar day or in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 8 hours in any calendar day or in excess of forty hours in such workweek, whichever is greater.

- (b) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the provisions set forth in paragraph (a) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) 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 provisions set forth in paragraph (a) of this clause, in the sum of \$10 for each calendar day for which such individual was required or permitted to work in excess of 8 hours or in excess of the standard workweek of 40 hours without payment of the overtime wages required by provisions set forth in paragraph (a) of this clause.
- (c) Withholding for unpaid wages and liquidated damages. The Contracting Officer shall upon his/her own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same Prime Contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same Prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the provisions set forth in paragraph (a) of this clause.

- (d) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the provisions set forth in paragraphs (a) through (d) of this clause and also a clause requiring the subcontractors to include these provisions in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the provision set forth in paragraphs (a) through (d) of this clause.

25.3 Apprentices and Trainees

- (a) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bone fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who 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 on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the

journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (b) Trainees. Except as provided in 29 CFR 5.16, 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 U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee's rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee

performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination of the work actually performed. In the event the Employment and Training Administration 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) Equal employment opportunity. 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 Part 30.

25.4 Payrolls and Basic Records

- (a) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b) (2) (B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under paragraph (d) of the clause entitled "Davis-Bacon Act" that the wages of any laborer or mechanic include 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, 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 that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and

certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b) (1) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraphs (a) of this clause. The information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents, Government Printing Office. The Contractor is responsible for the submission of copies of payrolls by all subcontractors.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause entitled "Payrolls and Basic Records" and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or case equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

- (3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (b) (2) of this clause.
 - (4) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.
- (c) The Contractor or subcontractor shall make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer of the Department of Labor or their authorized representatives. The Contractor and subcontractors shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

25.5 Compliance with Copeland Act Requirements.

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

25.6 Withholding.

The Contracting Officer shall upon his/her own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United

States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Prime Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

25.7 Subcontracts.

The Contractor or subcontractor shall insert in any subcontracts the clauses entitled "Davis-Bacon Act", "Contract Work Hours and Safety Standards Act-Overtime Compensation", "Apprentices and Trainees", "Payrolls and Basic Records", "Compliance with Copeland Act Requirements", "Withholding", "Subcontracts", "Contract Termination-Debarment", "Disputes Concerning Labor Standards", "Compliance with Davis-Bacon and Related Act Requirements", and "Certification of Eligibility", and such other clauses as the Contracting Officer may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all the contract clauses cited above.

25.8 Contract Termination; Debarment.

A breach of the contract clauses entitled "Davis-Bacon Act", "Contract Work Hours and Safety Standards Act-Overtime Compensation", "Apprentices and Trainees", "Payrolls and Basic Records", "Compliance with Copeland Act Requirements", "Subcontracts", "Compliance with Davis-Bacon and Related Act Requirements", and "Certification of Eligibility", may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

25.9 Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6 and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, of the employees or their representatives.

25.10 Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3 and 5 are herein incorporated by reference in this contract.

25.11 Certification of Eligibility.

- (a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a) (1).
- (b) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a) (1).
- (c) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

SECTION 26

CERTIFIED PAYROLLS -- CONSTRUCTION PROJECTS

- 26.1 Each Contractor and subcontractor shall furnish a certified copy of each weekly payroll within seven 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. Failure to provide such certified payrolls may be the basis for withholding progress payment to the Contractor.
- 26.2 A Contractor may use the Department of Labor Form WH-347, "Optional Payroll Form", which provides for all the necessary payroll information and certifications. This Department of Labor form may be purchased at nominal cost from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. However, the Contractor may use his own payroll form provided it includes the same information and certifications as the Department of Labor Form WH-348, "Statement of Compliance".

SECTION 27

FEDERAL PARTICIPATION SIGNS

- 27.1 The District will erect and maintain signs on the job site, satisfactory to UMTA, identifying the project and indicating Federal participation.

SECTION 28

WARRANTY

- 28.1 The Contractor warrants that the work performed, and all materials furnished hereunder by Contractor or his sub-contractors or suppliers will be free from defects in design, material and workmanship for a period of one year from the date of final acceptance unless otherwise specified in the Technical Provisions.
- 28.2 The Contractor shall remedy any such defect at his own expense.
- 28.3 Work which has been abused or neglected by the District is excluded from this warranty.
- 28.4 The Contractor shall furnish written warranties required by the respective sections of the Specifications for time stipulated therein. These warranties shall be in writing, on the Contractor's letterhead.
- 28.5 Nothing in these requirements, conditions or specifications including the District's right to a complete inspection shall constitute a disclaimer to or limit, negate, exclude or modify in any way any warranty created hereunder.

SECTION 29

LIQUIDATED DAMAGES

29.1 TIME IS OF THE ESSENCE IN THIS CONTRACT

In case all the work called for under the Contract is not completed before or upon the time limit as set forth in the specifications, damage will be sustained by the District. It is, and will be, impracticable to determine the actual damage which the District will sustain in the event of and by the reason of such delays; and it is therefore agreed that pursuant to Government Code Section 53069.85 the Contractor will pay the District the sum of \$100 for each and every working day that the project is delayed beyond the 160 working days stipulated in Section 13, subject to extensions granted thereto in writing. The Contractor agrees to pay such liquidated damages as herein provided and, in case the same are not paid, agrees that the District may deduct the amount thereof from any money due or to become due the Contractor under the Contract.

29.2 The Contractor will be granted an extension of time and will not be assessed with liquidated damages or the cost of engineering and inspection for any portion of the delay in completion of the work beyond the time named in these specifications caused by acts of God, or of the public enemy, fire, floods, epidemics, quarantine, restrictions, strikes, labor disputes, shortage of materials and freight embargoes, or other causes beyond his reasonable control, provided that the Contractor shall notify the Engineer in writing of the causes of delay within 15 days from the beginning of any such delay. The Chief Engineer shall ascertain the facts and extent of the delay, and his findings thereon shall be final and conclusive. Contractor has the burden of proof that the delay was beyond his control.

SECTION 30

AIR QUALITY CONTROL

- 30.1 The Contractor shall comply with all South Coast Air Quality Management District rules, regulations, ordinances, and 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. All Contractors and Suppliers shall be required to submit evidence to the Engineer that the governing air quality control criteria will be met.
- 30.2 In the absence of any applicable air quality control rules, regulations, ordinances or statutes governing solvents, all solvents, including but not limited to the solvent portions of paint, thinners, curing compounds and liquid asphalt used on the project, shall comply with the applicable material requirements of the South Coast Air Quality Management District. All containers of paint, thinner, curing compound, or liquid asphalt shall be labeled to indicate that the contents fully comply with said requirements.
- 30.3 Material to be disposed of shall not be burned, either inside or outside the site.

SECTION 31

PAYMENT

31.1 Contractor shall submit to the Engineer a progress payment request, based on the estimated percentage of completion of each item or work, not later than the 25th day of each month. The District will make partial payment to the Contractor by the 25th day of the following month, based on the progress payment request as approved by the Engineer. The District shall retain 10% of the value of all of the work done and materials installed as part security for the fulfillment of the contract by the Contractor. However, at any time 50% of the work has been completed, if the Chief Engineer finds that satisfactory progress is being made, the District may reduce the amount of the retention withheld to 5% of all of the work performed and materials installed and may retain 5% in lieu of the 10% retention for the remainder of the project. Contractor shall notify Engineer, in writing, when the work is deemed completed. The Engineer shall inspect the work and prepare a punch list of items to be corrected prior to the District's acceptance upon compliance of the punch list items, the work will be inspected again by the Engineer. If the work is satisfactory to the Engineer, he shall accept the same in writing and immediately file a Notice of Completion.

31.2 Withholding Partial Payment

Pursuant to the requirements of Government Code Section 4590, upon the Contractor's request, the District will make payment of funds which would otherwise be withheld from progress payments upon the following conditions:

- A. The Contractor deposits in escrow with the District Treasurer or with a bank acceptable to the District either:
 - 1. Securities eligible for the investment of funds under Government Code Section 16430 or,
 - 2. Bank or savings and loan certificates of deposit.
- B. The Contractor shall bear the expense of the District and the escrow agent, either the District Treasurer or the bank or savings and loan, in connection with the escrow deposit made.

- C. Securities or certificates of deposit to be placed in escrow shall be of a value equivalent to the amounts of retention to be paid to the Contractor pursuant to Section 6.2B.
- D. The Contractor shall enter into an escrow agreement satisfactory to the District, which agreement shall include provisions governing at least the following:
 - 1. the amount of securities to be deposited;
 - 2. the providing of powers of attorney or other documents necessary for transfer of the securities to be deposited;
 - 3. the conditions under which the securities will be converted to cash to provide funds to meet defaults by the Contractor, such as cessation of work; termination of Contractor's control over the work; stop notices filed pursuant to law; assessment of liquidated damages; or other amounts to be kept or retained under the provisions of the contract;
 - 4. decrease in value of the securities on deposit;
 - 5. the termination of the escrow upon completion of the contract.
- E. The Contractor shall obtain the written consent of the surety to such agreement. The Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall be refunded said securities along with any interest thereon upon the satisfactory completion of the contract.

31.3 After acceptance by the Engineer of all work, the Engineer will prepare a final statement of all costs for work performed by the Contractor, including any retentions, change orders, extra work, or other amounts the District is obligated to pay by virtue of work performed by the Contractor and file a Notice of Completion with the County Recorder. Within 30 days after said final statement is submitted to the Contractor, the Contractor shall submit to the Engineer his written approval of said final statement, or a written statement of any claims he may have arising under or by virtue of said contract. Thirty-five (35) days after the filing of Notice of Completion, but not prior to the receipt of the final statement from the Contractor, the District will

make final payment of the total retention, along with any other amounts due and payable under this contract, based upon the Engineer's final statement, of all costs. In the event of disagreement on the Engineer's final statement, payment will be made within ten days for all amounts not in dispute. In no case will payment be made earlier than 35 days after filing Notice of Completion.

- 31.4 Contractor shall be charged a penalty of \$10.00 per day for each day beyond the 5th day of each month in submitting all CC 257 Forms that are required. Such penalty may be deducted from any progress payment due or from the final payment.

SECTION 32

MATERIAL, WORKMANSHIP, SHOP DRAWINGS, SAMPLES AND RECORD DRAWINGS

- 32.1 All materials, parts and equipment furnished by the Contractor shall be new, high grade and free from defects. Workmanship shall be in accordance with generally accepted standards. Materials and workmanship shall be subject to the Engineer's approval.
- 32.2 Materials and workmanship not conforming to the requirements of the Plans and Specifications shall be considered defective and will be subject to rejection.
- 32.3 If the Contractor fails to replace any defective or damaged work or material after reasonable notice, the Engineer may cause such work or materials to be replaced. The replacement expense shall be deducted from the amount to be paid to the Contractor.
- 32.4 Unless otherwise specifically provided in the Plans and Specifications reference to any equipment, material, article or patented process, by trade name, made or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor may, at his option, use any material, article or process which, in the judgment of the Engineer, is equal to that named. The Contractor shall furnish, at his own expense, all information necessary or related thereto as required by the Engineer. The Engineer shall be the sole judge as to the comparative quality and suitability of alternative equipment or articles or materials and his decision shall be final.
- 32.5 SHOP DRAWINGS
- A. The Contractor shall submit one clear reproducible copy and three (3) copies of blue prints of all shop drawings required in these specifications to the Engineer for approval unless specified otherwise. These drawings shall be complete and detailed. Shop drawings shall consist of fabrication, erection and setting drawings and schedule drawings, manufacturer's scale drawings, and wiring and control diagrams, cuts or entire catalogs, pamphlets, descriptive literature, and performance and test data. The Contractor shall submit six (6) copies each of those Shop Drawings that cannot be submitted in clear reproducible form such as cuts or entire catalogs, pamphlets, descriptive literature, and others. The drawings

shall be submitted completely identifying the name of project, Contractor, supplier, location of project and date of submittal.

- B. Drawings and schedules shall be checked and coordinated with the work of all trades involved, before they are submitted for the approval of the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval may be returned to the Contractor for resubmission.
- C. The Contractor shall submit all drawings and schedules sufficiently in advance of construction requirements to permit no less than fifteen (15) working days for checking and appropriate action.
- D. The approval of drawings and schedules will be general, but approval shall not be construed:
 - 1. as permitting any departure from the Contract requirements;
 - 2. as relieving the Contractor of the responsibility for any errors, including details, dimensions, and materials;
 - 3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.
- E. If drawings show variations from the Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in the letter of transmittal. If acceptable, the Engineer may approve any or all such variations, subject to a proper adjustment in the Contract. The Contractor's failure to describe such variations shall not mean relief from the responsibility for executing the work in accordance with the Contract, even though such drawings have been approved.
- F. If the drawings or schedules as submitted describe variations per Subparagraph E above and show a departure from the Contract requirements, which the Engineer finds to be in the interest of the District and to be so minor as not to involve a change in the Contract price or time for performance, the Engineer may approve the drawings.

- G. After reviewed by the Engineer, the shop drawings will be stamped and dated for the action required. If corrections are required, resubmittals will be handled in the same manner as first submittals. On resubmittals, the Contractor shall direct specific attention in writing or on resubmitted shop drawings, to revisions other than the corrections required by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, notice shall be promptly given to the Engineer. The reproducible shop drawings will be returned to the Contractor.
- H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.
- I. Before final payment is made, the Contractor shall furnish to the Engineer one set of record shop drawings, all clearly revised and completed and brought up to date, showing the permanent construction as actually made. Drawings shall be clear reproducible form.
- J. The Contractor shall be responsible for, and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of the work prior to the approval by the Engineer of the necessary shop drawings.
- K. For additional information and requirements of shop drawings, see Technical Provisions.

32.6 SAMPLES

- A. When specified or requested by the Engineer, typical samples of materials and appliances, properly identified by tags, name of project, contractor, material, supplier, location in project and date of submittal, shall be submitted in triplicate by the Contractor for approval by the

Engineer. Samples shall be of size indicated in Technical Provisions, or, where no size is indicated, shall be of sufficient size to permit evaluation. Samples shall be submitted sufficiently in advance of the time when they are to be used so that rejections thereof will not delay the approved construction schedules. Allow fifteen (15) working days for checking and appropriate action. Approved samples will be so labeled and dated, and a transmittal of approval will be sent to the Contractor. One approved sample will be sent to the Contractor. One approved sample will be sent to the Engineer's field office, and one will be kept at District Headquarters.

32.7 RECORD DRAWINGS

For requirements of record drawings, refer to Technical Provisions.

SECTION 33

PROTECTION OF EXISTING IMPROVEMENTS

- 33.1 The Contractor shall be responsible for the protection of existing improvements within and adjacent to the job site and shall exercise due caution to avoid damage to such improvements.
- 33.2 Unless otherwise provided, the Contractor shall repair or replace all existing improvements damaged or removed as a result of his operation. Repairs and replacements shall be at least equal to existing improvements, and shall match them in finish and dimension.
- 33.3 All costs for protecting, removing and restoring existing improvements shall be at the sole expense of the Contractor.

SECTION 34

ASSIGNMENT AND TERMINATION OF CONTRACT

34.1 ASSIGNMENT OF CONTRACT

The performance of part or all of this contract may not be delegated or assigned except upon prior written consent of District's Board of Directors; except that Contractor may assign monies due or to become due hereunder, to the extent permitted by law, without such Board of Directors' consent.

34.2 TERMINATION OF CONTRACT

The District may terminate this contract for convenience at any time by giving Contractor written notice thereof. Upon termination, District shall pay Contractor its allowable costs incurred to date of termination and those costs deemed reasonably necessary by District to effect the Title 48 - Federal Acquisition Regulation, Part 49 or other applicable portions of federal regulations. In addition, District shall pay Contractor a mutually agreed upon percentage of profit which related to the contract work accomplished to date of termination. The effective date of such termination for convenience shall be the date of Notice of Termination.

In the event the Contractor breaches the terms or violates the conditions of the contract and does not within ten (10) days thereafter correct such breach or violation, the District may immediately terminate the contract for default. Contractor shall be liable for any and all such costs incurred by the District as a result of such default.

SECTION 35

AUDIT AND INSPECTION

- 35.1 The Contractor shall permit the authorized representatives of the District, the U.S. Department of Transportation and the Comptroller General of the United States to inspect and audit all data and records of the Contractor relating to its performance under this contract.

SECTION 36

PROGRESS SCHEDULE

36.1 The Contractor shall submit, within ten (10) working days after Notice of Award, a Progress Schedule satisfactory to the Engineer, showing the proposed order of work and the time required for the completion. Modified progress schedules shall be submitted if any major items of work are re-scheduled.

The format and work breakdown structure of the progress schedule shall be coordinated with the Engineer and shall relate to the Schedule of Values required under Section 42 of these specifications.

SECTION 37

CONSTRUCTION STAGING

- 37.1 All work under this Contract shall be performed in accordance with requirements as specified in these specifications and as required by the Contract Drawings, and in accordance with a detailed plan of the work in a logical sequence developed by the Contractor and approved by the Engineer. This plan shall be used in developing the Progress Schedule required in Section 36 of these specifications.
- 37.2 The Contractor shall schedule his operations so as to minimize interference with other Contractors and with the District operations.
- 37.3 The Contractor shall indicate by the progress schedule his anticipated dates for completing the various stages of construction and shall keep the District informed of any delays in his schedules.
- 37.4 For additional information and requirements, see Technical Provisions.

SECTION 38

PROJECT SITE MAINTENANCE

- 38.1 Throughout all phases of construction, and until final acceptance of the project, the Contractor shall keep the work site clean and free from rubbish and debris. The Contractor shall also abate dust nuisance by cleaning, sweeping and sprinkling with water.
- 38.2 The Contractor shall take care to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned.

SECTION 39

SURVEY

- 39.1 All labor requirements specified in Section 22 - "Nondiscrimination During the Performance of This Contract", Section 23 - "Affirmative Action Requirements - Equal Employment Opportunity", Section 24 - "Wage Scales", Section 25 - "Labor Provisions", and Section 26 - "Certified Payrolls - Construction Projects", are applicable to the survey work.
- 39.2 Surveying adequate for construction will be done by the Contractor. The Contractor shall be responsible for preserving construction survey references and marks for the duration of their usefulness. If any construction survey references are lost or disturbed and need to be replaced, such replacement shall be by the Contractor at his own expense.
- 39.3 All work upon completion shall conform to the lines and elevations shown on the plans. Any variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error of the finished work, and replace such work to comply with specification requirements at his own expense.

SECTION 40

SUBSURFACE DATA

- 40.1 Subsurface data is available for this project. Contractor shall perform all work per information provided in the Technical Provisions. When additional soils information is found necessary and is agreed upon by the Engineer during the construction, the District will be responsible for the ordering and supplying of such information.

SECTION 41

WAIVER OF CONDITIONS

41.1 The waiver of any provision, term or condition herein by the District on any occasion shall not constitute a general waiver and shall not release the Contractor from the obligation of otherwise performing or observing such provision, term or condition.

SECTION 42

SCHEDULE OF VALUES

- 42.1 The Contractor shall submit to the engineer within ten (10) working days after award of contract, a detailed breakdown of values to be used only as a basis for determining progress payments on a lump sum contract or any designated lump sum bid item. This breakdown of values should equal the total lump sum bid and be in such format and sufficiently detailed that it represents a reasonable apportionment of the lump sum and is subject to approval of the Engineer.

SECTION 43

CALIFORNIA MECHANICS LIEN

- 43.1 Preliminary 20-day Notices in accordance with Sections 3098 of the California Civil Code shall be filed with the Engineer.
- 43.2 Stop Notices in accordance with Chapter 4, Title 15, Part 4 of the California Civil Code, commencing with Section 3179, shall be filed with Office of the Secretary of the Southern California Rapid Transit District.

SECTION 44

BUY AMERICA

- 44.1 Steel or manufactured products are governed by Section 165 of the Surface Transportation Assistance Act of 1982, and regulations in 49 CFR Part 661.
- 44.2 All bidders must submit a signed Buy America Certificate with their bid submittal. (Copy of certificate is attached.)
- 44.3 If a bidder feels that a waiver from the Buy America requirements is necessary, a waiver from the Buy America provision will be sought if the grounds for a waiver exist.

BUY AMERICA CERTIFICATE
OF COMPLIANCE WITH SECTION 165(a)

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 applicable regulations in 49 CFR Part 661.

BIDDER'S NAME

SIGNATURE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

TITLE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

DATE OF SIGNATURE

BUY AMERICA CERTIFICATE
FOR NON-COMPLIANCE WITH SECTION 165(a)

The bidder hereby certifies that it cannot comply with the requirements of Section 165(a) of the Surface Transportation Assistance Act of 1982, but it may qualify for an exception to the requirements pursuant to Section 165(b)(2) or (b)(4) of the Surface Transportation Assistance Act and regulations in 49 CFR Part 661.7.

BIDDER'S NAME

SIGNATURE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

TITLE OF BIDDER'S
AUTHORIZED REPRESENTATIVE

DATE OF SIGNATURE

SECTION 45

VALUE ENGINEERING PROPOSALS

45.1 VALUE ENGINEERING PROPOSALS -- GENERAL

The Contractor may submit to the Engineer, in writing, value engineering proposals for modifying the plans and specifications of the contract for the purpose of reducing construction costs. The value engineering proposal shall not impair the essential functions or characteristics of the project, including service life, economy of operation, ease of maintenance, desired appearance, or design and safety standards.

45.2 VALUE ENGINEERING PROPOSALS -- CONTENTS

Value engineering proposals shall contain the following information:

- a. A general description of the original contract requirements for the work and the proposed changes.
- b. An itemized list of all the proposed modifications to the drawings and specifications.
- c. An itemized list of all contract work items affected by the value engineering proposal.
- d. A detailed estimate of the construction costs based on the original contract requirements and based on the proposed changes, along with any requested time extensions to the contract duration or contract milestones. The detailed estimate shall be supported by full and completely detailed estimates of costs by the contractor, subcontractors, vendors and suppliers. The estimates of costs shall be determined in the same manner as if the work were to be paid as a contract change pursuant to the provisions of Section 14.2 C - "Allowable Costs Upon Change Orders." The Contractor shall, upon the request of the District, permit inspection of his original contract bid estimate, subcontractor contract agreements or purchase orders relating to the value engineering proposal. The contractor's cost of preparing the value engineering proposal shall be excluded from consideration in determining the estimated net savings in construction costs.

- e. The date by which the Contractor requires a decision from the Engineer concerning the value engineering proposal.

45.3 VALUE ENGINEERING PROPOSALS -- DISTRICT REVIEW

The Engineer shall be the sole judge of the acceptability of the value engineering proposal and the estimated net savings in construction costs from the acceptance of all or any part of the proposal. In determining the estimated net savings, the District reserves the right to disregard the original contract bid estimate for any work items, which in the judgement of the Engineer, does not represent a fair measure of the value of the work. The District will not be liable for delays or damages to the Contractor resulting from the District's failure to accept or act upon any value engineering proposal submitted pursuant to this section. If a value engineering proposal is submitted similar to a contract change already under consideration by the District, the District reserves the right to make such changes pursuant to the provisions of Section 14 - "Contract Changes".

45.4 CONTRACT CHANGE ORDERS - DISTRICT ISSUANCE

If the value engineering proposal is acceptable to the District, in whole or in part, such acceptance will be by issuance of a contract change order which shall specifically state that it is executed pursuant to Section 45 - "Value Engineering Proposals". Such change order shall identify all the changes in the plans, specifications, contract duration and contract milestones; shall specify net savings in construction costs; and shall provide that the Contractor be paid 30% of the said net savings amount.

45.5 CONTRACT CHANGE ORDERS -- CONTRACTOR REVIEW

The Contractor shall respond to any contract change order executed pursuant to this section within five (5) working days of the receipt date from the District. The Contractor must either accept or reject, in whole, any change order executed pursuant to this section. Failure of the Contractor to respond, in writing, to the contract change order within the stipulated five (5) working days period will constitute Contractor acceptance of the proposal. The District reserves the right to reissue, under the provisions of Section 14 - "Contract Changes", any contract change order executed

pursuant to Section 45 - "Value Engineering Proposals" which is rejected by the Contractor. Contractor acceptance of any contract change order executed pursuant to this section shall constitute full compensation to the Contractor for all work pursuant thereof.

TECHNICAL PROVISIONS

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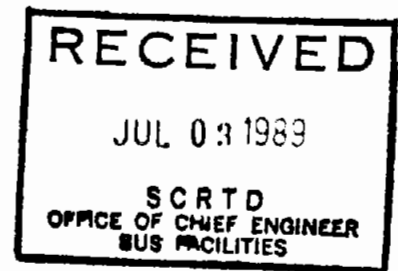


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DOCUMENTS 0-1
GENERAL PROVISIONS

DOCUMENTS 0 - GENERAL PROVISIONS

When "Documents 0" is used, it shall mean General Provisions as covered in this document and specification. The General Provisions are hereby made a part of this specification and contract except as modified by the Technical Provisions hereunder. As a part of this specification and contract they shall apply to the General Contractor and all his Subcontractors.

END OF SECTION

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SECTION 01010-1
SUMMARY OF WORK

1.00 GENERAL

1.01 DESCRIPTION

- A. Documents 0 and Division 1 shall form an integral and essential part of each section of the specifications.

2.00 CONTRACT DRAWINGS

2.01 INDEX OF DRAWINGS

- A. Drawings which form a part of the Contract Documents are listed in the Index of Drawings on the Drawings.

3.00 SCOPE OF GENERAL CONTRACT

- A. The Contractor shall include all services, labor, materials, appliances, appurtenances, and incidental costs, including all other fees and costs necessary to complete the work indicated for the Project, and all work as listed, required and described in the various sections of the specifications and shown on the drawings.
- B. Below ground work for connection to main lines for storm drains shall be part of this work.
- C. The specifications are separated into sections of the work required under this Contract. Such separation shall not obligate the Engineer to define or establish the limits of any Contract between the General Contractor and Subcontractor, and each Subcontract shall depend upon its own Contract Agreements.
- D. The General Contractor shall act as coordinator for the work and shall cooperate with any and all other contractors so that the work will proceed without any unnecessary delays or hindrances. The Contract contemplates a complete project, ready for use.

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SECTION 01010-2
SUMMARY OF WORK

- E. All contractors and subcontractors shall visit the site and familiarize themselves with all conditions. Under no circumstances will additional compensation be allowed for work necessary to be done to carry out the full purpose and intent of the drawings and specifications; all as necessary to provide and finish the work in a complete first-class manner, whether or not such work is indicated on the drawings, or specified herein.

4.00 WORK NOT IN GENERAL CONTRACT

- A. Payments for initial testing and inspections.

5.00 SEPARATE CONTRACTS

- A. For any items of work not in the General Contract, the separate contractors shall be permitted to install such work without any hindrances or delay. The General Contractor shall cooperate to the fullest extent possible with such separate contractors for storage of materials, completion of their work, and coordination of their work into the work schedule of this contract.

6.00 MISCELLANEOUS REQUIREMENTS

- A. Before ordering any material, or doing any work, the Contractor shall verify all measurements shown on the plans and shall be responsible for the correctness of same.

7.00 INTENT OF DRAWINGS AND SPECIFICATION

- A. Reference must be made to the drawings for all dimensions. The dimensions given on the drawings shall be checked by the Contractor before proceeding with the work and any discrepancy shall be reported at once to the Engineer.

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SECTION 01010-3
SUMMARY OF WORK

- B. Should it appear that the proposed work is not clearly called out, or any of the matters relative thereto are not sufficiently detailed or explained on the drawings, or in the specifications, or if the Contractor has, in his opinion, a better construction technique or procedure, the Contractor shall apply to the Engineer for such further drawings or explanations or submit drawings and procedures as applicable as may be necessary, and shall conform to the same as far as they shall be consistent with original drawings. In the event of any questions arising with respect to the true meaning of the drawings and specifications, reference shall be made to the Engineer whose decision shall be final and conclusive. In no case shall any work proceed in uncertainty.
- C. It is the intention of this specification and the accompanying drawings to provide a job complete in every respect. Contractor shall be responsible for this result and to turn over the project in complete operating condition regardless of whether the drawings and specifications cover every individual item in minute detail.
- D. Do not scale drawings. In the event figures are missing, consult the Engineer. In the event of a conflict between the specifications and the drawings, or similar discrepancies, consult the Engineer.

8.00 PROCEDURE IN CASE OF ERRORS

- A. Should an error or conflict appear on the drawings, in the specifications, or in the work done by others affecting this work, the Contractor shall notify the Engineer at once and he will issue instructions as to procedure. If the Contractor proceeds with the work so affected without instructions from the Engineer, he shall make good any resulting damage or defects. This includes typographical errors in the specifications and notational errors on the drawings where interpretation is doubtful.
- B. Contractor, when bidding this job, shall ascertain that the drawings and specifications which he has received are complete and do conform to the respective indexes. If he finds that the printers inadvertently left out a drawing or specification page, he shall advise the Engineer immediately.

9.00 STANDARD SPECIFICATIONS

- A. References to Standard Specifications, Regulatory Agencies' requirements, Federal Specifications, Handbooks, codes, etc., throughout these specifications shall apply to the latest applicable issue, addenda, amendments or errata; the latter shall govern unless they are conflicting with the building code.

10.00 EXISTING UTILITIES

- A. All known existing underground utilities are shown on the drawings. The Contractor shall notify the Engineer of his construction schedule so that arrangements can be made with the Division Operations Manager to close the bus lanes in accordance with the schedule as set forth on the Construction Phasing Plan. Carefully protect all conduits, drains, pipes and wires that are to remain operational at all times. When underground utilities are encountered other than those known or shown on drawings, notify the Engineer for instructions before proceeding.
- B. Coordinate work with that of other sections in order to minimize any interruptions in utility services.
- C. Repair any damage to existing utilities resulting from work under this Contract.

11.00 JOB LAYOUT - UTILITY EASEMENTS

- A. Contractor shall verify all conditions and dimensions on the job.
- B. Examination: Carefully examine the documents and the construction site to obtain first hand knowledge of existing conditions. No extra payments will be given to the Contractor for conditions which can be determined by examining the site and documents.
- C. Survey Data: The Contractor shall lay out all lines and grades required for the work in this contract in accordance with the property survey and applicable drawings and he shall be responsible for their accuracy and proper correlation with control lines, monuments and datums of the survey.

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SECTION 01010-5
SUMMARY OF WORK

- D. Lines and Levels: Contractor shall employ a licensed Engineer to lay out the work and establish all points, grades and levels. If points, grades and levels which are shown on drawings do not conform with the physical conditions of the proposed work immediately notify the Engineer who will make the necessary revisions or corrections. Set all grade stakes and protect them in place as long as may be required by all trades and crafts.

12.00 MATERIALS

- A. Material Lists: Material lists shall be submitted in accordance with the General Provisions.
- B. Ordering of Materials: Order all materials and equipment for the work as soon as possible after the award of the contract. It shall be the duty of the Contractor to keep the Engineer continuously informed of the availability of all specified materials and equipment.

13.00 FIRE PROTECTION

- A. Immediately following the initial delivery and storage of combustible material at the site of the work, and throughout the construction period thereafter, the Contractor shall supply and maintain suitable means of approved fire protection until adequate means of such protection are made permanently available for uninterrupted service.

14.00 SUBCONTRACTORS LIST

- A. The General Contractor shall submit to the Engineer a list of all subcontractors and suppliers and materials contemplated for use, before proceeding with the work.

15.00 TIME SCHEDULE

- A. The Contractor shall prepare and submit to the Engineer for approval, in a form as directed, prior to starting construction work, a time schedule showing the time necessary to complete this Contract.

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SECTION 01010-6
SUMMARY OF WORK

16.00 WORKMANSHIP

- A. All work and materials covered by the drawings and specifications shall conform to the highest standards of the crafts involved and must meet with the approval of the Engineer.

17.00 DECISION OF THE ENGINEER

- A. The Engineer shall have access to the work at all times, and shall have authority to accept or reject any material supplied or workmanship performed under the Contract.

18.00 EXISTING CONDITIONS

- A. Where drawings have existing conditions indicated, these conditions were copied from drawings of previous work. These existing conditions are not guaranteed to be accurate and variations may occur. The District is not liable for these variations. The Contractor shall notify the Engineer of these variations for further directions if any changes or corrections are required.

19.00 SHORING

- A. Contractor shall coordinate all shoring work required during the demolition and construction work. Coordinate work with all other required trades.

20.00 BUSINESS AS USUAL

- A. Contractor is hereby made aware of the 24-hour "Business As Usual" policy of all of existing facilities on the project site. Employees, patrons and visitors shall have unobstructed ingress and egress. Coordinate work with the District so that all work is performed properly, in proper order and to keep existing facilities operating at all times.

END OF SECTION

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SECTION 01011-1
PHASES OF CONSTRUCTION

1.00 GENERAL

1.01 DESCRIPTION

- A. Criteria for scheduling phases of the project work with operations of the District.
- B. Scheduling operations and completion of project work, as defined in the General Requirements, are the responsibility of the Contractor. The phasing sequence outlined in these specifications is not intended to cover all necessary minute details required to accomplish the intended result of keeping the existing facility completely operable at all times except for shutdown time required to disconnect existing services and making new connections. It is the responsibility of the Contractor to coordinate his work in such a manner that the shutdown time is minimal. The schedule for shutdown shall be approved by the District.
- C. All work is to be staged so that daily bus traffic is maintained within and around the facility throughout the duration of the project.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Demolition - refer to Section 02050.
- B. Earthwork - refer to Section 02220.
- C. Trenching, Backfilling and Compacting - refer to Section 02221.
- D. Portland Cement Concrete Pavement - refer to Section 02615.

1.03 GENERAL NOTES FOR STAGES OF CONSTRUCTION

- A. This project has been divided into five (5) phases of construction so as to create minimum interference with the District's operation. Each phase is described hereafter.
- B. The construction phasing is intended to provide general guidance as to the sequence of construction. The Contractor may elect to deviate from this construction sequence and in such event, the final construction phasing sequence becomes the responsibility of the Contractor, who must obtain the approval of the District.
- C. Construction shall be started with Phase I work and continuing through each of the subsequent phases, unless otherwise approved by the Engineer. The Contractor shall be responsible for scheduling, coordination and completion of all work required for each phase.

- D. The existing washer and vacuum facility and fuel station shall be maintained in continuous operation at all times. All work required within and around the existing facilities shall be undertaken in such manner as to minimize the effect on the facility's operation. Provide access to and from the existing maintenance building at all times.
- E. The Contractor shall provide for the continuous access to from and around all existing facilities. Steel plates with a thickness capable of sustaining bus wheel loads shall be placed across all open trenches at close of work and as may be required to provide for continuous access.

1.04 DESCRIPTION OF THE PHASES OF CONSTRUCTION

A. Phase 1:

During Phase 1, the Contractor shall undertake the following work:

1. Prior to commencement of demolition work, the Contractor shall install temporary construction fencing around the area delineated on the drawings as Phase 1.
2. Remove the asphalt pavement and base material within the limits of Phase 1. The Contractor has the option to remove only that portion of asphalt pavement and base material within ten (10) feet around the maintenance building expansion and patio, repair area and the tire shop and storage areas. The remaining removals to be undertaken after the foundations and slabs on grade for these facilities have been completed. Obtain approval from the Engineer prior to exercising this option.
3. Undertake construction of the maintenance building expansion and patio, repair area and tire shop and storage areas.
4. Install underground utilities in accordance with the drawings within the limits of Phase 1 only.
5. Undertake site grading, scarification and compaction.

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SECTION 01011-3
PHASES OF CONSTRUCTION

6. Construct concrete curb and gutter.
7. Construct 8" P.C.C. pavement.
8. After the P.C.C. pavement has attained 60% of the required 28-day compressive strength, but not before seven (7) calendar days has elapsed and approval obtained from the Engineer, the Phase 1 P.C.C. pavement may be opened for vehicular use.
9. Dismantle the temporary construction fence and reuse on Phase 2.

B. Phase 2:

During Phase 2, the Contractor shall undertake the following work:

1. Prior to commencement of demolition work, the Contractor shall install temporary construction fencing around the area delineated on the drawings as Phase 2. The fencing shall be placed so as not to impede bus access to and from the existing washer and vacuum and bus movement around the southerly side of the existing maintenance building. These facilities must remain operational at all times.
2. Remove the asphalt pavement and base material within the limits of Phase 2.
3. Install the 2-1/2" water line, 1-1/2" gas line, (2) 1" and (1) 1" schedule 80 pipe connections from the maintenance building expansion to the existing maintenance building. Coordinate the trenching across Phase 3 with the Engineer to minimize the impact on the bus movement to and from the existing maintenance building. Protect existing facilities to remain in place.
4. Undertake the grading, scarification and compaction.

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SECTION 01011-4
PHASES OF CONSTRUCTION

5. Construct 8" P.C.C. pavement. Use early strength concrete.
6. After P.C.C. pavement has attained 60% of the required 28-day compressive strength, but not before seven (7) calendar days has elapsed and approval obtained from the Engineer, the Phase 2 P.C.C. pavement may be opened for vehicular use.
7. Commence demolition work and new construction within the existing maintenance building.
8. Dismantle the temporary construction fence and reuse on Phase 3.

C. Phase 3:

During Phase 3, the Contractor shall undertake the following work:

1. Prior to commencement of demolition work, the Contractor shall install temporary construction fencing around that portion of the area not fenced from previous phases.
2. Remove the asphalt pavement and base material within the limits of Phase 3.
3. Undertake the grading, scarification and compaction.
4. Install trench grate.
5. Construct concrete curb and gutter.
6. Adjust existing tank covers to grade. Protect existing facilities to remain in place.
7. Construct 8" P.C.C. pavement.
8. After the P.C.C. pavement has attained 60% of the required 28-day compressive strength, but not before seven (7) calendar days has elapsed and approval obtained from the Engineer, the Phase 3 P.C.C. pavement may be opened for vehicular use.

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SECTION 01011-5
PHASES OF CONSTRUCTION

9. Dismantle the temporary construction fence and reuse on Phase 4.

D. Phase 4:

During Phase 4, the Contractor shall undertake the following work:

1. Prior to commencement of demolition work, the Contractor shall install temporary construction fencing around that portion of the area not fenced from previous phases.
2. Remove the asphalt pavement, and base material within the limits of Phase 4.
3. Undertake the grading, scarification and compaction.
4. Install trench grate.
5. Construct 8" P.C.C. pavement.
6. After the P.C.C. pavement has attained 60% of the required 28-day compressive strength, but not before seven (7) calendar days has elapsed and approval obtained from the Engineer, the Phase 4 P.C.C. pavement may be opened for vehicular use.
7. Dismantle the temporary construction fence and reuse on Phase 5.

E. Phase 5:

During Phase 5, the Contractor shall undertake the following work:

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SECTION 01011-6
PHASES OF CONSTRUCTION

1. During this Phase, it will be necessary to partially close the west end of the existing fuel station. The Contractor shall coordinate the shutdown time with the Engineer such that the shutdown time is minimized.
2. Prior to commencement of demolition work, the Contractor shall install temporary construction fencing around that portion of the area not fenced from previous phases.
3. Remove the asphalt pavement and base material within the limits of Phase 5.
4. Undertake the grading, scarification and compaction.
5. Construct remaining portion of 2 1/2" water line and make connection as shown on drawings.
6. Construct 8" P.C.C. pavement. Use early strength concrete.
7. After the P.C.C. pavement has attained 60% of the required 28-day compressive strength, but not before seven (7) calendar days has elapsed and approval obtained from the Engineer, the Phase 5 P.C.C. pavement may be opened for vehicular use.
8. Dismantle the temporary construction fence and remove from the project site.

1.05 SCHEDULE

- A. It is the Contractor's responsibility, in full cooperation with the District to schedule the phases of the project as outlined.
- B. Following the schedule of operations is imperative. All work must be performed during the hours of 7:30 a.m. to 3:30 p.m., five (5) days per week. Any deviation from this schedule must be approved by the Engineer.

1.06 SPECIAL CONSTRUCTION REQUIREMENTS

- A. Upon completion of each phase of work, Contractor shall, at his own expense, remove all his tools, materials and other articles in the work area. The completed work in each phase shall be thoroughly cleaned with protective coverings in place prior to beginning the next phase of work. Contractor shall obtain final approval of all work from the Engineer.

END OF SECTION

1.00 GENERAL

1.01 DESCRIPTION

- A. This section covers general requirements for regulatory requirements pertaining to the work and is supplementary to regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.02 CODES AND STANDARDS

- A. Requirements of Regulatory Agencies: Pertaining ordinances, laws, rules, regulations, standards and orders of public agencies and authorities having jurisdiction of the Work are intended where reference is made in either the singular or plural to the Code or Building Code, unless otherwise specified, including but not limited to, the following listing. Contractor shall make available at the site such copies of the latest issue of listed documents applicable to the work as the Engineer may request.

- * Los Angeles County Building Code.
- * City of Long Beach Building Code.
- * Title 8, Industrial Relations, CAC, Chapter 4, Div. of Industrial Safety, Safety Orders (CAL/OSHA).
- * California Administration Code (CAC), Title 22 and 24
- * Title 19, Public Safety, CAC.
- * Los Angeles County Mechanical Code
- * Uniform Mechanical Code.
- * The National and Uniform Electrical Codes
- * Los Angeles County Plumbing Code
- * Uniform Plumbing Code.
- * National Fire Protection Association
- * Los Angeles County Fire Code
- * State and Local Public Health Codes.
- * State of California Energy Code
- * Standard Specifications for Public Works Construction (Green Book)

All other laws, regulations, rules orders, codes, and ordinances specified in other sections of these specifications or bearing on the work.

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SECTION 01060-2
REGULATORY REQUIREMENTS

- B. Standard and Reference Type Specifications: Specifying by reference to standard and reference type specification documents or to another part of the contract documents shall be the same as if the document or portion referred to were exactly repeated at the place where reference is made. In case of conflict between any applicable code, law, ordinance, rule, regulation, or order and referenced standard or reference type specification documents, the Contractor shall conform to the "Specifications" as stated in the General Provisions. Standard or reference type specification documents shall be those of the current issue at time the Construction Documents are issued for bidding, unless otherwise specified. Contractor shall make available at the site such copies or referenced standard type specification documents as the Engineer may request.
- C. Abbreviations used to indicate or specify standard and reference specification documents shall be interpreted according to their recognized and well-known technical, industry, or trade meanings; such abbreviations include but are not limited to the following:
- | | |
|------------|---|
| A.S.M.E. | American Society of Mechanical Engineers |
| A.S.T.M. | American Society of Testing & Materials |
| C.A.C. | California Administrative Code |
| C.S.I. | Construction Specifications Institute |
| O.S.H.A. | Occupational Safety and Health Act |
| S.S.P.W.C. | Standard Specifications for Public Works Construction |
| U.B.C. | Uniform Building Code |
- 2.00 PRODUCTS (Not Applicable)
- 3.00 EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01071-1
DEFINITIONS

1.00 GENERAL

1.01 DESCRIPTION

- A. This section covers additional definitions supplementary to those given in the Conditions of the Contract.

1.02 DEFINITIONS

- A. Drawings: Words such as "shown", "indicated", "detailed", "noted", "schedule", or words of similar import shall mean that reference is made to the information on the drawings unless stated otherwise.
- B. Actions of the Engineer: Such words as "directed", "designated", "selected", and words of similar import shall mean that the direction, designation, selection, or similar action of the Engineer is intended unless stated otherwise.
- C. Engineer shall mean the Chief Engineer of Facilities Engineering Department for the Southern California Rapid Transit District or his authorized representative.
- D. Required: The word "required" and words of similar import shall mean "required to complete the work" and "required by the Engineer", as is applicable to the context of the place where used, unless stated otherwise.
- E. Perform: The word "perform" shall be understood to mean that the Contractor shall perform, at his expense, all the operations necessary to complete the work or mentioned portions of the work, including furnishing and installing materials as are indicated, specified, or required to complete such performance.
- F. Provide: the term "provide" shall be understood to mean that the Contractor, at his expense, shall furnish and install all labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations of the work and the mentioned portion of the work, complete and ready for the intended use. These definitions apply the same to future, present, and past tenses except "provided" may mean "contingent upon" where such is the context.

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SECTION 01071-2
DEFINITIONS

- G. Equal: Terms such as "equal", "approved equal", "equivalent", and all terms of similar import shall be understood to be followed by the phrase "in the opinion of the Engineer" unless stated otherwise.
- H. Submit: Such words as "submit", "submittal", "submission" and terms of similar import shall include the meaning of the phrase "submit to the Engineer for his approval" unless otherwise stated.
- I. Expense: Such terms as "at no extra cost to District", "with no extra compensation to Contractor", "at Contractor's expense", or phrases of similar import shall be understood to mean that the Contractor shall perform or provide the operation or Work with no increase to the Contract Sum stated in the Agreement.
- J. Language: Specifications are written in a modified brief style consistent with clarity. Generally, the words "the", "shall", "will" and "all" are not stated. Words requiring an action or performance, such as "perform", "provide", "erect", "install", "furnish", "connect", "test", "coordinate", and words and phrases of similar import, shall be understood to be preceded by the phrase "The Contractor shall" unless otherwise stated. The requirements indicated and specified apply to all work of the same kind, class and type, even though the word "all" is not stated.
- K. "As shown", "as detailed", "as indicated" or words of similar import mean as shown, as detailed, or as indicated on the drawings.
- L. "As selected", "as approved", "as accepted" or words of similar import mean as selected by, as approved by, or as accepted by the Engineer.
- M. "Shall" means mandatory.
- N. "As necessary" means essential to the completion of the work.

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SECTION 01071-3
DEFINITIONS

2.00 PRODUCTS (Not applicable)

3.00 EXECUTION (Not applicable)

END OF SECTION

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SECTION 01340-1
SHOP DRAWINGS, PRODUCT
DATA AND SAMPLES

1.00 GENERAL

1.01 DESCRIPTION

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of General Provisions and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Shop drawings.
- D. Product or catalog data.
- E. Samples.

1.02 CONFORM WITH REQUIREMENTS OF THE GENERAL PROVISIONS

1.03 GENERAL REQUIREMENTS

- A. Construction Data: Shop drawings, samples, brochures, calculation, test, reports, catalogs, equipment lists and all other similar required items are referred to hereinafter as construction data.
- B. Where samples, shop drawings and other construction data are interrelated, submit all such data in one package.
- C. Where manufacturers' printed literature is required to be submitted to Engineer, it shall be submitted in original forms. Fading type reproductions will not be acceptable.
- D. Contractor is responsible for proper coordination of all parts of the project under his Contract to the extent shown or indicated in the Specifications and on the Drawings. Contractor shall furnish to each of his subcontractors such copies of shop drawings and other construction data supplied by other subcontractors as are needed for coordination of trades involved. Successful Bidder will be required to review and accept special conditions, schedules, terms of payment and shop drawings prepared and submitted by subcontractor. Review and acceptance are a prerequisite to award of this Contract.

- E. Contractor will be held responsible for any delay in progress of the work due to his failure to observe requirements of this Section; time for completion of his Contract will not be extended on account of his failure to submit construction data promptly.
- F. The Engineer will review shop drawings and samples only for conformance with design concept of the Project and with the information given in the Contract Documents. The Engineer's review of a separate item shall not indicate approval of an assembly in which the item functions.
- G. The Contractor shall make any corrections required by the Engineer and shall resubmit the required number of corrected copies of shop drawings or new samples until accepted. The Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections requested by the Engineer on previous submissions.
- H. The Engineer's review of construction data shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Engineer in writing of such deviation at the time of submission and the Engineer has given written acceptance to the specific deviation, nor shall the Engineer's acceptance relieve the Contractor from responsibility for errors or omissions in the construction data.
- I. No portion of the work requiring a submission shall be commenced until the submission has been reviewed by the Engineer. All such portions of the work shall be in accordance with approved construction data.

1.04 SUBMITTALS

- A. Contractor Review: All construction data shall be stamped approved by Contractor in conformance with requirements of General and Supplementary Provisions, prior to submitting same to Engineer for review. Failure to comply with this requirement will result in immediate return of submittal with no action taken by Engineer.

- B. Submittal Schedule: Contractor shall submit a progress schedule for himself and from each of his subcontractors and suppliers, showing dates for submittal of construction data. This schedule shall allow for lead time, including lead time required by subcontractors and material and equipment manufacturers, fabricators and suppliers; delivery of affected materials and equipment in sufficient time for installation without delaying any portion of the work; and sufficiently in advance of construction requirements to permit no less than fifteen (15) working days for checking and appropriate action by the Engineer.
- C. Letters of Transmittal: Construction data submittals must be accompanied by subcontractor's letter of transmittal and Contractor's letter of transmittal addressed to the attention of the Engineer. Letters of transmittal shall contain all information necessary for identification, including a listing of construction data transmitted; name of Project, Contractors', subcontractors' and manufacturers' or fabricators' names; Engineer's job identification number; applicable Contract drawing number and Specifications section and paragraph; ASTM, Federal Specifications, and other "standard" type specifications; and such additional information as required to identify the submittal.
- D. Time for Submittals: Each submittal must be received by the Engineer, no less than fifteen (15) working days in advance of construction requirements to allow him adequate time for his review. If a submittal is not received in time to allow specified time for Engineer's review without delaying construction, Contractor shall reimburse the District for Engineer's costs incurred by checking on an accelerated basis. The responsibility for time consumed in review of construction data and any claim made by Contractor (including subcontractor and supplier) that such time is excessive and has caused, or will cause, delay in completion of the work, will only be considered as starting from the time drawings, samples, and other construction data are correct in all respects and so submitted and signed as approved by Contractor. Preliminary and incomplete or incorrect submittals of said drawings and samples shall not be considered as official approval time.

1. "Sufficient time", as used herein, shall mean a minimum of 15 working days as indicated in Section 32 of Supplementary General Provisions; the maximum working days required by the Engineer cannot be established due to such intangibles as the completeness and legibility of the construction data; the type of material, equipment, and system or work delineated.
- E. Method of Delivery: Send submittals by first class mail, UPS Blue Label, or hand carry to Engineer's office.
- F. Number of copies required:
 1. Shop Drawings: The Contractor shall submit 1 sepia and 3 prints for review. Revisions and corrections will be indicated on the sepia. Prints will be retained by the Engineer. The reviewed sepia will be returned to the Contractor, who shall then reproduce prints from the accepted sepia for his use and distribution.
 2. Brochures, Catalogs and Similar Data: Contractor shall submit a minimum of 6 copies each. After review, the Engineer will retain 3 copies and 3 copies will be returned to the Contractor.
- G. Number of Samples: The Contractor shall submit 6 samples. After selection, the Engineer will retain 2 samples, and the remaining samples will be returned to the Contractor.

1.05 MATERIALS LIST

- A. The Contractor shall submit a list of proprietary products he proposes to use within 30 days after award of Contract.

1.06 SAMPLES

- A. When samples are required, materials and their installation shall conform in all respects to samples selected by the Engineer. Written acceptance of samples is required.
- B. Failure of samples to conform with specified requirements may, at the Engineer's option, constitute a bar against submission of other samples by same manufacturer, vendor or supplier.

- C. Acceptance of samples will not preclude rejection prior to final acceptance of completed work of any material upon discovery of defect in material which said sample failed to represent, even though such material or equipment has been installed or erected in place.
 - D. After material has been reviewed, no change in brand or make will be permitted unless satisfactory written evidence is presented to, and accepted by the Engineer that manufacturer cannot make scheduled delivery of approved material, or that material delivered has been rejected and substitution of an alternate material is an urgent necessity, or that other conditions are apparent which indicated acceptance of such substitute material to be in the best interest of the District.
 - E. All samples shall have physically attached to it, in a manner not easily removable, a label bearing the following information:
 - 1. Project identification.
 - 2. Contractor's and subcontractor's identification.
 - 3. Sample identification, including full information as to manufacturer, model, catalog number, finish numbers, and other required information.
 - 4. Spaces for the Engineer's review stamp.
 - F. When samples are rejected by Engineer, submit new samples immediately after notification of rejection, and mark them "Resubmitted Sample", in addition to other information required, on label.
 - G. Right is reserved to require submission of samples of any material or any material lists, whether or not particularly mentioned in Specifications.
- 1.07 SHOP DRAWINGS
- A. Before submitting shop drawings, check said drawings and subcontractors' work for accuracy. See that work contiguous with and having bearing upon work indicated on shop drawings is accurately and distinctly illustrated, and that indicated work complied with Contract requirements. Shop drawings must bear Contractor's stamp of approval.

- B. Shop drawings shall be dated and shall clearly delineate the following:
1. The District's name.
 2. Project name, address, and Engineer's or Architect's name and job number.
 3. Drawing title, number, date and scale (number drawings consecutively).
 4. Names of Contractor, subcontractor and fabricator, if applicable.
 5. Working dimensions.
 6. Reference to applicable plan, elevation, section, or detail on Contract Drawing to which shop drawing, or portion thereof, applies.
 7. Necessary details, including complete information for making connections with work of other trades; list name or names of all subcontractors involved.
 8. Kinds of materials and finishes.
 9. Show descriptive names of materials and equipment, and locations at which materials or equipment are to be installed in the work. Use same reference identification as shown on Contract Drawings.
- C. Do not re-submit shop drawings unless Engineer so directs on his "Construction Data Review Stamp". If shop drawings are re-submitted without Engineer's instructions to do so, they will be returned to Contractor without being rechecked and restamped by Engineer. If, for any reason, Contractor changes and re-submits previously submitted shop drawings which have been returned to the Contractor marked "Review Completed, Do Not Resubmit", Contractor shall, in his transmittal letter accompanying the re-submittal, fully describes the changes made and the reasons for making them.

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SHOP DRAWINGS, PRODUCT
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- D. Cost of changes in construction due to improper checking and coordination by Contractor shall be paid for by him. Contractor shall be responsible for all additional costs, including coordination and supervision.
- E. If shop drawings show variations from Contract requirements because of standard shop practice, or any other reason, make specific mention of variations in transmittal letter to the Engineer as well as encircle variations on shop drawings to identify and call them to the Engineer's attention.
- F. Unless Contractor has notified Engineer in writing of variations, deviations, or omissions, and received his approval, Contractor will be required, at his sole expense, to repair, replace, furnish whatever materials are required, and perform all work, including adjacent work of other trades affected thereby necessary to rectify such deviations and variations, all as directed by Engineer at time such variations and omissions are discovered by Engineer even though this does not occur until after said shop drawings have been stamped "Review Completed" and work in question has been completed. Replacement and repair will be mandatory in such instances, and shall be performed at no cost to the District.
- G. Engineer's review of shop drawings will be general, for design, arrangement and appearance only, and shall not relieve Contractor of responsibility for accuracy of such shop drawings, dimensions, proper fitting, construction of work, providing materials required by the Contract Documents, even though such materials and their installation are not indicated on shop drawings. Engineer's review of shop drawings shall not be construed as approving departure from Contract requirements or as acceptance of any responsibility by the District for any errors, omissions, or discrepancies shown thereon.
- H. Engineer's review of shop drawings and schedules shall not relieve Contractor from responsibility for any violation indicated on shop drawings, or other construction data, of local, county, state or federal laws, rules, ordinances, or rules and regulations of commissions, boards or other authorities or public utilities having jurisdiction.

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SHOP DRAWINGS, PRODUCT
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1.08 SUBMITTALS FOR MECHANICAL AND ELECTRICAL WORK

- A. In connection with mechanical and electrical work, Contractor shall submit complete list of materials and other required information as listed under respective mechanical and electrical sections of these Specifications, within 30 days after receipt of notice to proceed. No consideration will be given to partial lists submitted from time to time without Engineer's prior acknowledgement.

END OF SECTION

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SECTION 01400-1
TESTS AND INSPECTIONS

1.00 GENERAL

1.01 DESCRIPTION

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of General Provisions and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. The testing laboratory will provide all services, plant, labor, materials, transportation and equipment necessary to perform all testing, inspection, supervision and reporting specified herein and as otherwise required.

1.02 SUBMITTALS

- A. Submit shop drawings, manufacturer's technical data and material specifications, and samples, as applicable.

1.03 SPECIAL PROVISIONS

- A. Testing laboratory or testing agency will be a qualified independent testing laboratory or agency selected by the Engineer and approved by the Engineer. Laboratory inspectors assigned to the project shall be Deputy Inspectors licensed by the City of Long Beach Building Department.
- B. Reports shall be executed immediately upon conclusion of each procedure, stating conformance to requirements, and forwarded to the Engineer.
- C. Payment: Costs of all testing procedures initiated by the District will be paid by the District. Costs of retests resulting from failure of initial tests shall be borne by the Contractor.
- D. Tests and inspections shall be made in accordance with the requirements stipulated in the Technical Specifications.

- E. The Engineer reserves the right to demand for test or special examination of any material or part thereof to insure compliance with the specification, and may reject for satisfactory replacement of any material or part judged defective as a result thereof. This applies also to unidentified materials, or sources of same substituted for those previously approved. Such tests and examinations, and retests of defective materials, even though not specified, shall be performed as and when required. Costs of these tests and re-tests shall be paid by the Contractor.

2.00 EXECUTION

2.01 SITEWORK

Refer to "Earthwork", "Trenching", "Crushed Aggregate Base" and "Portland Cement Concrete Pavement" sections.

- A. Earthwork operations of the Project are subject to inspection and testing by a Soils Engineer. The Soils Engineer shall be employed and paid for by the District. However, expenses incurred by retesting if failed portions of the earthwork shall be borne by the Contractor.
- B. Compaction: Referred to herein as ASTM D1557 and specified densities relate to maximum dry densities obtained thereby. If another method is used, degree of compaction shall be comparable to those specified according to this method.
- C. The Soils Engineer shall be notified by the Engineer prior to commencement of earthwork and shall perform and report the following procedures. Contractor shall notify the Engineer of such service 48 hours in advance.
 - 1. Inspect and approve on-site material and imported borrow and backfill material and perform suitability tests as required.
 - 2. Perform field density tests on samples from in-place material as required.
 - 3. Inspections: Required as indicated below:
 - a. Site excavation, and trenching.

- b. Scarifying and recompactng cleaned subgrade, periodic inspection as required.
- c. Specified density fills and backfills, periodic inspection.
- d. Structural excavation and approval of bearing material for all concrete pavement prior to placing of any concrete.

2.02 REINFORCING STEEL: REFER TO "REINFORCING STEEL" SECTION

- A. Reinforcing Steel (Bars): All material shall be tested prior to use for compliance with requirements of ASTM Designation A615, Grade 40 and 60. Material identified to mill test reports shall require testing for each 10 tons of fraction thereof. Supplier shall furnish mill test reports to laboratory. All identified steel shall be tagged at fabricator's shop by laboratory as being identified or sampled, and any material arriving on job without tags shall be sampled and tested as unidentified materials. Sample and test unidentified stock for each 2-1/2 tons or fraction thereof. Tests of unidentified reinforcing steel shall be paid by the Contractor.
- B. When special tests are ordered by the Engineer, samples shall be selected by representative of testing laboratory from material at the building site or place of distribution; to consist of 2 pieces, each 18" long of each size, furnished, cut and prepared for testing by Contractor, marked and delivered by representative of testing laboratory.
- C. Tests: Make one tensile and one bend test for each size of reinforcement.
- D. Inspections: The District will provide and pay for continuous inspection for all welding and placing of reinforcing steel by Laboratory Inspector.

2.03 CONCRETE

Refer to "Portland Cement Concrete Pavement", and "Concrete" sections.

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SECTION 01400-4
TESTS AND INSPECTIONS

- A. Tests: All concrete materials shall be tested and reported by the Contractor prior to any use of same. All tests shall be in accordance with Section 201-1.1.4 of the Standard Specifications for Public Works Construction.
- B. Inspections: Inspections shall be performed by either the District's staff or a qualified inspection and testing agency employed and paid for by the District.
- C. Portland Cement: Shall be sampled and tested in accordance with Section 201-1.2.1 of the Standard Specifications for Public Works Construction.
- D. Aggregate - Required Tests for Mix Designs in accordance with Sections 1201-1.2.2 and 201-1.3.2 of the Standard Specifications for Public Works Construction.
- E. Laboratory Test Design Mixes: In accordance with Section 201-1.1.2 of the Standard Specifications for Public Works Construction.
- F. Molded Concrete Cylinders: In accordance with Section 201-1.2.2 of the Standard Specifications for Public Works Construction. The testing of concrete cylinders shall be paid for by the District.
- G. Compressive Strength: In accordance with Section 201-1.1.3 of the Standard Specifications for Public Works Construction.
- H. Core Tests: In accordance with Section 201-1.1.4 of the Standard Specifications for Public Works Construction, only if and as required by the Engineer because of low cylinder test results. Results of core tests will be evaluated by the Engineer. Costs of these tests shall be paid by the Contractor.
- I. When air entrained concrete is used, air content tests shall be made in accordance with Section 201-1.2.4 (b) of the Standard Specifications for Public Works Construction. Cost of retests for non-conforming work shall be paid by the Contractor.
- J. Placement Inspection: Required for all concrete and to be performed by Laboratory Inspector. He shall ensure concrete is of required quality and consistency. He shall make slump tests and prepare all samples. He shall have authority to reject inferior or non-conforming workmanship and materials.

2.04 MASONRY WORK: REFER TO "MASONRY" SECTION

A. Concrete Masonry Units:

1. Supplier of units shall furnish recent (within one month) representative test reports and certificates of compliance to the test requirements specified below. If units are not certified, laboratory shall sample and test units at Contractor's expense.
2. Sample and test in accordance with ASTM C140 to comply with requirements of ASTM C90.

B. Cement: Test or certify as specified hereinbefore in Paragraph 2.03B.

C. Mortar: Laboratory Inspector shall sample and test 2 x 4 cylinders, one pair made on each of the first 3 consecutive days of work.

D. Grout: Sample and test prisms, sampled by Laboratory Inspector at same frequency as mortar, made by filling cells in concrete block used for construction. Molds broken away after specimen has set. Tested in vertical position.

E. Composite Prisms: Test fully grouted prisms per U.B.C. Section 2404 (c).

F. Core Tests: Required only because of questionable workmanship or materials: Not less than two; diameter not more than $\frac{2}{3}$ wall thickness, but not less than 6" taken, prepared and tested as specified for concrete. Shear test cores shall be 6" diameter. Results of core tests will be evaluated by the Engineer for acceptance. Costs of these tests shall be paid by the Contractor.

2.05 STRUCTURAL STEEL: REFER TO "STRUCTURAL STEEL" SECTION

A. Duties of Testing Laboratory: Inspect stock, mark identified stock, select and mark test specimens as required, perform required tests, inspections as specified, furnish required reports and certificates.

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SECTION 01400-6
TESTS AND INSPECTIONS

- B. Structural steel to conform to ASTM A36 or A572, Grade 50 as called for on the drawings. Make one tensile and one bend for each 5 tons or fraction thereof as each shape or size of unidentified stock. Identified stock accompanied by mill test reports must be certified for compliance by the testing laboratory. Testing of unidentified steel shall be paid by the Contractor.
- C. Shop welding inspection is required to be made by a qualified Inspector licensed by the City of Long Beach, and paid for by the Contractor. Single pass welds may be inspected after completion of welding, before painting. Multiple pass welds and groove welds where required shall be continuously inspected. The Contractor shall submit evidence of qualified welders and certification of structural welds to the Engineer.
- D. Field Welding: All field welding of structural steel shall be performed under continuous inspection by the Inspector of the testing laboratory and paid for by the District. All partial and full penetration groove welds require ultrasonic inspection per AWS D1.1-72. Reinspection of non-conforming or defective welds shall be paid by the Contractor.
- E. Nondestructive Testing:
 - 1. Welded connections between the primary members of ductile moment-resisting space frames shall be tested by nondestructive methods for compliance with UBC Standard No. 27-6 and job specifications.
 - 2. All complete penetration groove welds contained in joints and splices shall be tested 100% either by ultrasonic testing or by radiography.
 - 3. Partial penetration groove welds when used in column splices shall be tested either by ultrasonic testing or radiography when required by the plans and specifications.
 - 4. Base metal thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such welds after joint completion.
 - 5. Any material discontinuities shall be accepted or rejected on the basis of the defect rating in accordance with the (larger reflector) criteria of Table No. 27-6-E of UBC Standard No. 27-6.

F. High Strength Bolts and connections:

1. Testing and inspection is required for all bolts and bolt connections.
2. Test each lot of bolts in accord with ASTM A325, Article 7.
3. Testing of torquing of field high-strength bolted connections will be performed under continuous inspection by testing laboratory inspectors.
 - a. Provide periodic inspections of high strength bolting in shop or field prior to using.
 - b. The Contractor shall permit laboratory inspector to calibrate torque wrenches, and check calibration of impact wrenches with a Skidmore-Wilhelm hydraulic bolt tension calibrator every morning and mid-day of work-day, before wrenches are used.
 - c. At least 10% of all connectors in every shop and field connection will be checked with a manual torque wrench.
 - d. If bolting is done using Coronet load indicators inspection may be done on a periodic basis, but each connector in every connection will be visually examined, and a minimum of 10% of connectors in each joint checked with a Coronet gap gauge.
4. Testing laboratory will certify in writing at completion of work, that high-strength bolting has been done in accord with Contract requirements and applicable standards.

2.06 METAL DECK AND METAL WALL SIDING: REFER TO "METAL DECK" AND "METAL WALL SIDING" SECTIONS

- A. Steel Decking and Siding: The Contractor shall furnish certificates of compliance and test reports to the Engineer certifying that all decking conforms to specified requirements. Test Reports and certification shall be identified with the material used to satisfaction of the Engineer.

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SECTION 01400-8
TESTS AND INSPECTIONS

- B. Welding Steel Decking and Siding: The Contractor shall provide to the Engineer the qualification of sheet metal welders for this work. The inspector of Testing Laboratory check for use of proper electrodes at the beginning of welding the deck and shall perform continuous visual inspection of all welding of the deck.
- 2.07 WELDING METAL STUDS: REFER TO APPLICABLE PORTIONS OF PARAGRAPH 2.05 AND 2.06
- 2.08 MECHANICAL SYSTEM TESTS
 - A. The tests required to be performed for all piping systems and equipment or apparatus therein, as specified in the Technical Provisions, shall be performed by the Contractor at his expense.
- 2.09 REFER TO EACH AND EVERY SECTION OF TECHNICAL PROVISIONS FOR OTHER SPECIFIC TESTS AND INSPECTION REQUIREMENTS.
- 2.10 ALL APPROVALS AND REJECTIONS SHALL BE AT THE DISCRETION OF THE ENGINEER AND HIS DECISION SHALL BE FINAL.
- 3.00 EXECUTION
 - Not applicable to this section.

END OF SECTION

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SECTION 01500-1
CONSTRUCTION FACILITIES AND
TEMPORARY CONTROLS

- 1.00 GENERAL
- 1.01 DESCRIPTION
 - A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
 - B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- 1.02 PROTECTION AND BARRICADES
 - A. Provide, install, and maintain for the duration of the work as required all lawful or necessary barricades, steel plates fences and railings. Furnish temporary lights, warning signs and signals and take all other precautions as may be required to safeguard persons, the site and adjoining property, including improvements thereon, against injuries and damage of every nature whatsoever.
- 1.03 CONSTRUCTION OFFICE
 - A. Provide a temporary construction office and the necessary storage space for tools and materials at an approved location on the site.
- 1.04 WATCHMAN SERVICES
 - A. Provide watchman service as deemed necessary to properly safeguard materials, tools, appliances.
- 1.05 RESPONSIBILITY FOR ACCESS IN THE PROJECT AREA
 - A. Maintain roads in work area or areas.
 - B. Provide and maintain access as required to carry out construction work by all trades connected with the project.
- 1.06 TEMPORARY CONSTRUCTION

- A. Provide all temporary construction as may be necessary for the performance of the contract. Such facilities shall be of type and arrangement as required for their specific use, substantially constructed throughout and strongly supported, well secured and complying with all applicable rules and regulations of the Industrial Accident Commission of the State of California and all local laws and ordinances.
- B. Arrange for construction equipment access to areas which may be partly blocked by existing obstructions.

1.07 TEMPORARY TOILET FACILITIES

- A. Provide and maintain temporary and complete toilet facilities in quantities as required to comply with Code and job requirements.

1.08 TEMPORARY WATER: Provide and maintain necessary water service, meters, temporary supply connections, piping, fittings, etc. as necessary for the project. Before final acceptance, remove all temporary connections and piping in a manner satisfactory to the Engineer. Monthly charges shall be paid for by the Contractor.

1.09 Provide and maintain temporary and complete toilet facilities in quantities as required to comply with Code and job requirements.

1.10 TEMPORARY ELECTRICITY

A. Description of System:

1. Service Required: Provide temporary electric power as required. Provide power for construction site offices and for other temporary storage and construction buildings.
2. Capacity: Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary.
3. Power Source: Provide 120/240 volt, 1 phase, 3 wire power service.
4. Power Costs: Pay all costs of temporary electrical power used during construction, as well as cost of setting and removing temporary service.

- B. Use of Permanent System: Operate any part of the permanent electrical system which is used for construction purposes in a manner so as to insure the safety of all personnel and to prevent interference with the orderly progress of the work.
 - C. Materials:
 - 1. The materials may be new or used, but must be adequate in capacity for the purposes intended and must not create unsafe conditions or violate the requirement of applicable codes.
 - 2. At the contractor's option, patented specialty materials may be used if UL approved.
 - D. Equipment: Provide appropriate enclosures for the environment in which used in compliance with NEMA Standards.
 - E. General:
 - 1. Install all work in a neat and orderly manner.
 - 2. Make system physically sound and secure throughout.
 - 3. Maintain to give continuous service and to provide safe working conditions.
 - 4. Modify system as job progress requires.
 - F. Installation: Provide all required facilities, including transformers, conductors, poles, conduits, raceways, fuses, switches, fixtures, and lamps.
 - G. Locate so that interference with cranes and materials handling equipment, storage areas, traffic areas and work under other contracts is avoided.
- 1.11 REMOVAL
- A. Remove all temporary equipment and materials completely upon completion of construction.
 - B. Repair any damage caused by the installation and restore the premises to a satisfactory condition as approved by the Engineer.

END OF SECTION

1.00 GENERAL

1.01 DESCRIPTION

- A. Definitions, guarantees, submittals, clean-up, as built and all other applicable requirements of Document 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Performance and quality of materials, equipment and workmanship as specified in the General Provisions, Section "Materials, Workmanship, Samples and As-Built Drawings".
- D. Material handling and storage.

1.02 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. The intent of these drawings and specifications is to provide the Contractor a complete set of project documents to allow him to perform with extreme care to properly complete this Contract.
- B. All the minute details of the work embodied in this Contract are not covered by these drawings and specifications. The correct installation of all subtrade materials necessitates installation by skilled workmen under the supervision of skilled foremen, and the juncture of one material or subtrade with another, supervised by a skilled superintendent.
- C. The drawings and specifications endeavor to show all details, in their proper relationships, one to another, and with adequate backing, spacing, etc., in order to achieve the design solution for the work. It is the responsibility of the Contractor to use skilled workmen, working under skilled experienced foremen and superintendents to make these things work.
- D. Any detail or condition indicated on the drawings and specifications that the Contractor deems inappropriate to the stated intent shall be brought to the Engineer's attention prior to commencing the work.

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SECTION 01600-2
MATERIALS, EQUIPMENT AND
WORKMANSHIP

- E. The intent of all Contract Documents is to follow the rules, regulations and laws applicable to this project.

2.00 PRODUCTS

2.01 MATERIALS

- A. First quality, as specified in the various technical sections of these specifications.

3.00 EXECUTION

3.01 MATERIAL HANDLING AND STORAGE

- A. Deliver material to the site in original packages, each bearing manufacturer's name or trademark.
- B. Take all necessary measures to protect material from mechanical damage or deterioration of exposed parts or surfaces.
- C. Store materials in a manner accepted and approved by the Engineer.
- D. All materials must be kept clean, dry and properly protected.
- E. Handling shall be done with equipment of adequate size to perform its intended work safely.

END OF SECTION

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SECTION 01630-1
SUBSTITUTIONS

1.00 GENERAL

1.01 DESCRIPTION

- A. Definitions, guarantees, submittals, clean-up, as built and all other applicable requirements of Document 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.

1.02 MATERIALS

- A. The term "product" includes materials, systems and equipment. Products shall be new, of the types specified, and furnished in ample quantities to facilitate proper and timely execution of the work.
- B. Use products of one manufacturer for each specific purpose, insofar as practicable.

1.03 Contractor's Options:

- 1. For products specified only by reference standards, select any product meeting standards, by any manufacturer.
- 2. For products specified by naming several products or manufacturers, select any product manufacturer named.
- 3. For products specified by naming one or more products, but indicating the option of selecting equivalent products by stating "or equal", "equal to", "or approved equal", "equivalent to", Contractor must submit request, as required for substitution, for any product not specifically named.

1.04 SUBSTITUTIONS

- A. During bidding, Engineer will consider written requests from Contractor for substitutions received at least 16 days prior to bid date. Requests received after that time will not be considered except for the following conditions:

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SECTION 01630-2
SUBSTITUTIONS

1. Production discontinued.
 2. Insufficient Quantity: Except the following will not establish cause for substitution: Failure to award subcontract in sufficient time; or failure to place orders for products so as to insure delivery without delaying work.
 3. Delays beyond Contractor's control, such as strikes, lockouts, storms, fires, or acts of God, which may preclude the procurement and delivery of products for purposes of the Project.
 4. Other reasons as the Engineer may deem justifying the Contractor in such action.
- B. Submit 6 copies of request for substitution. Include in request:
1. Complete data substantiating compliance of proposed substitution with Contract Documents.
 2. For products:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature, including product description, performance and test data, and reference standards.
 - c. Samples.
 - d. Name and address of similar projects on which product was used, and date of installation.
 3. For Construction Methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating method.
 4. Itemized comparison of proposed substitution with product or method specified.

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SECTION 01630-3
SUBSTITUTIONS

5. Data relating to changes in construction schedule.
 6. Accurate cost data on proposed substitution in comparison with product or method specified.
 7. Relation to separate Contracts, when applicable.
- C. In making request for substitution, Bidder/Contractor represents:
1. He has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified.
 2. He will provide the same warranty for substitution as for product or method specified.
 3. He will coordinate installation of accepted substitution into work, making such changes as may be required for work to be complete in all respects.
 4. He waives all claims for additional costs related to substitution which consequently becomes apparent.
 5. Cost data is complete and includes all related costs under his Contract, and costs under separate contracts, when applicable.
- D. Substitutions will not be considered if:
1. They are indicated or implied on shop drawings or project data submittals without formal request submitted in accord with Article 1.04 of this Section.
 2. Acceptance will require substantial revision of Contract Documents.
- 1.05 REIMBURSEMENT TO THE DISTRICT
- A. The Contractor shall reimburse the District for costs of additional engineering services necessitated by substitutions during the construction period.

END OF SECTION

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SECTION 01700-1
PROJECT CLOSEOUT

1.00 GENERAL

1.01 DESCRIPTION

- A. Definitions, guarantees, submittals, clean-up as built and all other applicable requirements of Document 0 and Division 1 apply to the work of this Section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this Section.
- C. Project Closeout.

1.02 FINAL CLEAN-UP

- A. After the completion of the work, the Contractor shall remove all temporary structures and equipment built or furnished by him, all debris, and all surplus materials of all kinds, from the site of the work and storage areas, and shall dispose of them in a manner satisfactory to the Engineer. The Contractor shall perform the final clean-up of the Project with meticulous care. The installed equipment shall be thoroughly cleaned, dust-free and scratch-free prior to final acceptance of the work. Such clean-up includes, but is not limited to, all ductwork piping, conduits, cabinets, control panels, switchboards, panelboards, lighting fixtures, motors, compressors, louvers windows, furniture concrete work and structures. The catch basins shall be cleaned, the new pavement surfaces swept, and the adjacent areas returned to the original smooth appearance.

1.03 INSPECTION, TESTING AND START UP

- A. Inspection and Testing: Final inspection of the work by the Engineer will be made within 10 days after receipt of the Contractor's written request thereof. The work will be deemed complete as of the date of such inspection if, upon such inspection, the Engineer finds that no further work remains to be done. Before final payment will be made, any defects or omissions noted on this inspection must be made good by the Contractor without additional compensation.

B. Field Tests, Adjustments, and Start Up:

1. All mechanical and electrical equipment, and machine tools, shall be tested by the Contractor to the satisfaction of the Engineer before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.
2. At least 90 days before the time allowed in his construction schedule for commencing testing and start-up procedures, the Contractor shall submit to the Engineer, in duplicate, details of the procedures he proposes to adopt for testing and start-up of all equipment, excepting when such procedures have been covered in the Specifications.
3. The Contractor's testing and start-up procedures shall include detailed descriptions of all preoperation electrical, mechanical and instrumentation testing work. Each control device, item of mechanical, electrical and instrumentation equipment, and all control circuits shall be considered in testing procedures, which shall be designed in a step by step, logical sequence to ensure that all equipment has been properly serviced, aligned, connected, calibrated and adjusted prior to operation. The Contractor is advised that failure to observe these precautions may place the acceptability of the subject equipment in question and he may either be required to demonstrate that the equipment has not been damaged, or replace it as determined by the Engineer. Testing procedures shall be designed to duplicate as nearly as possible all conditions of operation, and shall be carefully selected to ensure that the equipment is not damaged. Once the testing procedures have been accepted by the Engineer, the Contractor shall produce check-out alignment and adjustment and calibration sign-off forms for each item of equipment, which shall be used in the field by the Contractor and the Engineer jointly to ensure that each item of electrical, mechanical and instrumentation equipment has been properly installed and tested.

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SECTION 01700-3
PROJECT CLOSEOUT

4. During the testing of the mechanical, instrumentation and electrical equipment, the Contractor shall make available, as necessary, representatives of the manufacturers of all the various pieces of equipment, or other qualified persons who shall instruct the District's personnel in the operation and care thereof. Instructions shall include written step-by-step operation and trouble-shooting procedures with a complete description of all necessary test equipment and all protective device settings.

1.04 OPERATION AND MAINTENANCE MANUALS

Where operation and maintenance manuals are required, submit in quadruplicate, bound in clear plastic covers, folded where required so that the size of the manuals does not exceed 8-1/2" x 11". Identify each manual on cover with project name and contents.

END OF SECTION

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SECTION 01720-1
RECORD DOCUMENTS

1.00 GENERAL

1.01 DESCRIPTION

- A. Definitions, guarantees, submittals, clean-up, as built and all other applicable requirements of Document 0 and Division 1 apply to the work of this Section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Maintenance, recordation and final documentation of construction as-built drawings for the purpose of future reference.

1.02 RECORD DRAWINGS

- A. Upon request, the Contractor shall be furnished 1 set of blueline prints for the purpose of maintaining an accurate record of construction that deviates from the Contract Documents.
- B. When supplementary or revised drawings are issued by addendum, change order or clarification, 1 copy of each such drawing will be provided for inclusion in the record drawings.
- C. This set of drawings shall be separately maintained. The Contractor shall suitably identify this set of drawings and they shall not be used for general reference, other than to verify previous work accomplished.
- D. Recordation:
 - 1. All work accomplished in variance from the Contract Documents shall be entered on the record drawings.
 - 2. All buried or concealed work shall be located on the record drawings. Their locations shall be indicated dimensionally from a fixed point or permanent structure, and in case of buried elements, their depths shall be indicated.

3. The posting of this as-built information shall be accomplished on a minimum daily basis. Applications for payment will not be approved when record drawings are not up-to-date.
- E. At the completion of construction activities, and when the record drawings are up-to-date, all said drawings shall be signed by the General Contractor and the applicable subcontractors.

1.03 FINAL DOCUMENTATION

- A. After completion of the record drawings, the Engineer will review for general conformance with his log and record of the project. The Contractor shall not incorporate the Engineer's notations on the record drawings.
- B. Upon request, the Contractor will be furnished 1 set of paper transparencies (sepias) of the Contract Documents for the purpose of final documentation of the record drawings.
- C. The Contractor shall have the recorded conditions transferred to the transparencies by a competent draftsman. The transparencies shall be noted "as-built" and signed as specified above for the record drawings.
- D. All changes accomplished by addenda, change orders, supplementary drawings and revised drawings shall be incorporated into the final documentation on the transparencies.
- E. The Contractor shall then cause the final distribution of the record drawings as follows:
 1. One set of blueline prints made from the transparencies, the transparencies, and the original record drawings to the Engineer.
- F. Final record drawings shall be acceptable to the Engineer, and the final payment is contingent upon this acceptance.

END OF SECTION

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SECTION 02050-1
DEMOLITION

1.00 GENERAL

1.01 DESCRIPTION: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this Section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Perform Demolition:
 - 1. Demolish and remove all existing pavement as indicated on the drawings.
 - 2. Other demolition and removal work as shown on Drawings or as required to complete work of this Contract, or as directed by the Engineer.
 - 3. Obtain demolitionn and disposal permits for this work as required.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Earthwork - refer to Section 02200.
- B. Trenching, Backfilling & Compacting - refer to Section 02221.

1.03 REFERENCED SPECIFICATIONS: SSPWC - Standard Specifications for Public Works Construction, 1985 Edition.

1.04 REQUIREMENTS

- A. Description of Site:
 - 1. The Contractor shall accept the site as it exists on the first day of work under this Contract.
 - 2. Examine the site and the conditions pertaining thereto and determine the extent of work to be done. All existing conditions are not necessarily shown on the drawings or noted herein and can be determined only by examination of the premises by the Contractor.

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SECTION 02050-2
DEMOLITION

B. Protection:

1. Contractor shall be responsible for all existing improvements within or outside working area including damages by him or by his subcontractors or agents. Repair or replace existing damaged improvements that are to remain with material of same kind, quality and size.
2. Provide barricades and fences with substantial gates and equipment with good locks. Keep working area locked when work is not in progress.
3. Provide signs to exclude unauthorized persons from entering working area.
4. Executive work to protect adjacent surface improvements and buildings from damage.

C. Utilities:

1. Notify Utility Companies and owner of all utilities to be cut off, modified or relocated. Maintain active utilities and protect same.
2. Active Utilities: Protect and maintain existing active utilities indicated to remain throughout the construction period. Any utility which is damaged or broken shall be repaired at no cost to the Owner.

- D. Examine the Contract Drawings to establish the extent of demolition work and extent of existing improvements to remain. Where questions or discrepancies exist, obtain the Engineer's ruling on the extent or intent of such discrepancies before commencing work.

2.00 PRODUCTS - None required.

3.00 EXECUTION

3.01 DEMOLITION

- A. Drawings indicate general character, scope and extent of the demolition work to be accomplished.

- B. Saw Cutting and Removing Concrete or Asphalt Concrete: Perform all saw cutting of concrete using concrete cutting saws with diamond or abrasive blades utilizing wet cut. Make cuts clean and even to permit perfect mating if new concrete elements where required. After the saw cuts have been made, the concrete or asphalt concrete pavement to be removed can be broken by use of jack hammers or other means.
- C. All portions of the asphalt concrete pavement, within the limits shown on the plans, shall be demolished and removed from the property and all debris from the demolition shall be cleaned up and also removed from the property.
- D. Removal of catch basins, grates, piping and the like. Salvage grates and reuse or storage at the District Salvage Yard.

3.02 TEMPORARY SHORING AND BRACING

- A. Take precautions to guard against movement, settlement or collapse of any adjacent construction, buildings, services, concrete pavement or utilities. Provide adequate bracing and shoring to safeguard the existing facilities and personnel.
- B. Take precautions to provide necessary bracing or shoring during the course of any demolition. If at any time the safety of personnel would appear to be endangered, cease operations and notify the Engineer. Do not resume operations until safe conditions have been reestablished and permission has been granted to resume operations.
- C. Obtain and pay for any permits required for shoring or barricades.

3.03 DISPOSAL AND CLEANUP

- A. Burning combustible rubbish on site is prohibited.
- B. Haul rubbish, debris and broken concrete away from site promptly and dispose of legally.
- C. Dust Abatement: During entire period of demolition and during loading, keep area and material being loaded sprinkled to reduce dust in air and annoyance to premises. Maintain effective dust palliation and good housekeeping program to prevent contamination of adjoining buildings.

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SECTION 02050-4
DEMOLITION

3.04 DUST PROTECTION

- A. Dust, dirt and debris cannot be tolerated in the adjacent buildings. Partition off all dirt or dust producing operations from occupied space before beginning work. Design of dust barrier partitions shall be submitted to the Engineer for approval prior to installation.
- B. Provide and maintain suitable cleaning equipment, vacuum cleaners, chemically treated dust cloths, foot wipers, brooms, brushes, etc., as necessary for complete control of dust and dirt.

END OF SECTION

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SECTION 02200-1
EARTHWORK

1.00 GENERAL

1.01 DESCRIPTION: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this Section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Site earthwork includes site excavation of all material on-site and off-site to the depths indicated on the Drawings, or as directed by the Engineer, scarifying and compacting the upper 6" below the exposed bottom limit of excavation, and the filling and compacting of suitable on-site or imported soil material as shown on the Drawings or specified herein. However, nothing within these Specifications or indicated on the Drawings shall be interpreted to mean that all items requiring removal are shown or described. All materials resulting from earthwork, except as indicated or specified otherwise, shall become the property of the contractor upon receipt of Notice to Proceed. The District shall not be responsible for the condition, loss or damage to such property found on the site. In general, all work shall be performed in an orderly and careful manner, with due consideration for occupants of adjacent property, and the public. At no time shall contractor perform work outside the limit or outside District property unless authorized in writing by the Engineer and the required Permits have been obtained from government regulatory agencies by the Contractor and paid by the District.
- D. Structural excavation and backfilling for underground facilities.
- E. Preparation of subgrade under pavement.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Demolition - Refer to Section 02050.
- B. Trenching, Backfilling and Compacting - Refer to Section 02221.
- C. Tests and Inspections - Refer to Section 01400.

1.03 REFERENCE SPECIFICATIONS

- A. Standard Specifications SSPWC "Standard Specifications for Public Works Construction", 1985 Edition.

1.04 SUBMITTALS

- A. Submit proposed earthwork procedures for all phases of work to the Engineer for approval before work is started. The procedures shall provide for safe conduct of the work, careful removal, proper disposal, protection of property which is to remain undisturbed, coordination with other work in progress and timely disconnection of utility services (where applicable). The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations.

1.05 PROTECTION

- A. Protection of Existing Facilities: Before beginning work, the Contractor shall carefully survey the existing facilities and examine the Drawings and Specifications to determine the extent of the work.

The Contractor shall take all necessary precautions to insure against damage to existing work to remain in place (including sub-surface utilities), and any damage to such work shall be repaired or replaced with new materials as necessary to restore damaged areas or surfaces to a condition equal to and matching that existing condition prior to damage or start of work on this Contract as approved by the Engineer at no additional cost to the District. The Contractor shall carefully coordinate the work of the section with all other work and construct and maintain shoring, bracing and supports, as required. The Contractor shall insure that structural elements are not over-loaded, be responsible for increasing structural supports or adding new supports as may be required, and repair any damage as a result of any work performed under any part of this Contract at no additional cost to the District. Unshored banks shall not have a slope greater than 1.5 vertical to 1 horizontal.

- B. Fence and Barriers: Provide and maintain during work, all protection and fences required by Specifications and Drawings and the State Accident and Safety Commission and all other governmental agencies having jurisdiction over this work.

- C. Environmental Protection: Comply with all applicable City, State, and Federal Codes and assume responsibility for obtaining any permits that may be required.

1.06 HISTORICAL OR ARCHAEOLOGICAL FINDINGS DURING CONSTRUCTION

- A. There are no known historical or archaeological remainst at the project site. Should any skeletons, artifacts, items of historical interest and the like be uncovered, the Contractor shall suspend operations at the site of discovery and continue operations in other areas. The Contractor shall notify the Engineer immediately of the discovery and shall include a written statement of the findings and a location sketch.
- B. Should the discovery site require archaeological studies resulting in delays and/or additional work, the Contractor will be compensated by an equitable adjustment under the General Provisions of the Contract. All such historical and archaeological remains found at the site shall be the property of the District.

1.07 VERIFY CONSTRUCTION LIMITS

- A. Verify all dimensions shown on the drawings for the establishment of the construction limits from control points shown on the Drawings.

1.08 BURNING

- A. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.09 USE OF EXPLOSIVES

- A. Use of explosives will not be permitted unless approved of in writing by the City of Los Angeles and the District.

1.10 SAFETY

- A. General: Comply with all applicable City, State, and Federal regulations governing safety.

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SECTION 02200-4
EARTHWORK

- B. Hazardous Openings: Holes, open trenches, and other hazardous openings shall be clearly marked with warning signs. Contractor shall be liable for any injuries resulting from inadequate protection around such areas.

1.11 DUST CONTROL

- A. From time to time as directed and as required by weather conditions and the condition of the ground surface, for the purpose of preventing objectionable and injurious dust conditions, the Contractor shall wet down such objectionable areas by means of hose or tank truck. Objectionable dust conditions shall be allayed at all times at no additional cost to the District.

1.12 CONTROL OF SURFACE AND GROUNDWATER

- A. Allow no water to stand in, on or near construction areas at any time during period of contract.
- B. Keep all excavations free from seepage, overflow, and standing water at all times, either by well points, pumps, natural drainage or whatever devices Contractor elects to provide to accomplish purpose. In no case shall fill, concrete or other materials be deposited or placed in any excavation unless such excavations are thoroughly free of water. Contractor shall provide, maintain and remove all necessary pumping equipment at no cost to the District.

1.13 GENERAL REQUIREMENTS

- A. Soil Information:
 - 1. Information on the Drawings does not constitute a guarantee of uniformity of soil conditions over the construction site. All unusual soil conditions encountered by the Contractor shall be immediately reported to the Engineer.
 - 2. The geotechnical investigation report prepared by Schaefer Dixon Associates, dated January 17, 1998, and all amendments thereto, is hereby referenced and made part of this Specification, and a copy follows hereafter. The Contractor shall conform with the requirements set forth therein.

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SECTION 02200-5
EARTHWORK

B. Special Conditions:

1. Earthwork operations shall conform to the applicable portions of Section 300 of the "Standard Specifications" and to the special requirements set forth herein and upon the Drawings.

2.00 PRODUCTS

2.01 The on-site base and sub-base materials can not be reused as base material but may be used as backfill to bring the excavated areas to subgrade level. All excess materials must be removed from the site.

2.02 Sand backfill shall be placed in accordance with Section 306-1.3.2 of the Standard Specifications for Public Works Construction.

3.00 EXECUTION

3.01 SITE EXCAVATION:

A. Contractor shall excavate from exposed rough grade after demolition to the limits and dimensions indicated on the Drawings in accordance with Sub-section 300-2 of the Standard Specifications. All soil material to be reused as fill shall be stocked at a location within the area being built. All other unsuitable material and debris shall be disposed of as described in Paragraph 3.05 in this Section.

B. Contractor shall remove all foreign material uncovered during excavation. These materials shall be disposed of as described in Paragraph 3.05 at no extra cost to the District.

3.02 SITE COMPACTED FILL:

A. Scarifying and Compaction: The 6" below the subgrade for the new concrete pavement and excavation under catch basins shall be scarified and compacted to 90% relative density prior to backfilling and pouring concrete.

B. Control: Place all fill under the inspection of a Soils Engineer employed by the District. Prior to placing, all fill material, on-site soils or imported materials, shall meet the approval of the Soils engineer, who shall perform the necessary tests and inspections so that upon completion it can be certified as controlled compacted fill. No fill shall be placed without the Soils Engineer being present.

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SECTION 02200-6
EARTHWORK

- C. Compaction: Place all fill in loose layers not exceeding 8 inches in thickness, moisten as required and compact to specified density. Flooding or jetting will not be permitted.
- D. Density: Compact all fill to least 90 percent of maximum density determined by ASTM, D1557-78 compaction test method. Moisture content shall not vary more than 2 percent above or below optimum moisture content.
- E. Rough Grading: Shall be finished sub-grade or bottom of pavement elevation indicated within one tenth of a foot. Grade areas to drain water away from existing structures. Existing grades which are to remain but are disturbed by the Contractor's operations shall be graded as directed. Protect newly graded areas from traffic, erosion, and settlements that may occur.

3.03 STRUCTURAL EXCAVATION AND BACKFILLING

- A. After site earthwork is completed, the Contractor shall examine the rough grading and correct all unsatisfactory conditions as outlined by the Engineer. Thereafter, placement of base material can commence.
- C. Should suitable bearing, as determined by the Soils Engineer, not be encountered at the depth indicated on the drawings for concrete pavement or catch basins, do not proceed further until instructions are given by the Engineer and the necessary measurements made for the purpose of establishing the additional volume of excavation. The Contractor will be compensated for any extra structural excavation and backfilling under the General Provisions of the contract.
- D. The bottom of all concrete pavement section excavations shall be level, be free of loose material and standing water, and be 90% compacted and approved by the Soils Engineer.
- E. Remove excavated materials not suitable for backfill from the site and dispose of without any additional cost for the District.
- F. Provide any shoring necessary to maintain the banks of excavations and to prevent any sloughing or caving-in, and as necessary to prevent damage of any kind which may occur in connection with this work.

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SECTION 02200-7
EARTHWORK

3.04 TEST

- A. Submit copies of certified compaction test reports in accordance with Standard Specifications Sub-section 211-2 Tests and reports will be prepared by District employed Soils Engineer.

3.05 DISPOSAL

- A. Removal Items: All items called for removal shall be disposed of off District property. Such removals shall be on a daily basis and under no circumstance shall debris and rubbish be allowed to accumulate in building or on site.
- B. Debris Control: Remove and transport debris in a manner as to prevent spillage on streets or adjacent areas.
- C. Regulations: State and local regulations regarding hauling and disposal apply. All permits as required for clearing, grubbing, demolition, and disposal of off-site work are the responsibility of the Contractor.

3.06 CLEAN UP

- A. Remove all rubbish and debris from site at completion of work for each phase as specified herein.

END OF SECTION

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- 1 Vicinity Map
- 2 Location of Borings
- 3 Driven Pile Capacities

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- A FIELD EXPLORATION
- B LABORATORY TESTING

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation performed by Schaefer Dixon Associates, Inc. (SDA) for the proposed expansion of the maintenance building and yard improvements at the Southern California Rapid Transit District (RTD) Division 12 in Long Beach, California. The approximate location of the project site is shown on the attached Plate 1, "Vicinity Map".

The objectives of this investigation were (1) to evaluate the nature and engineering properties of encountered subsurface materials, and (2) to provide recommendations for the design of foundations and other geotechnical considerations.

The scope of the authorized investigation included field exploration, laboratory testing, engineering analyses, and preparation of this Geotechnical Investigation Report.

This report has been prepared for Benito A. Sinclair & Associates, Inc., to be used solely in the design of the project described herein. This report does not contain sufficient information for other uses or for the purposes of other parties.

2.0 PROJECT DESCRIPTION

Based upon the provided information, the project will consist of remodeling of the existing maintenance building, construction of a new maintenance structure, and improvement to the existing yard pavement within the site. The proposed new building will be a one-story metal walled structure with slab-on-grade construction. Wall and column loads are currently assumed to be less than 3 kips-per-lineal-foot and 100 kips, respectively.

3.0 SITE DESCRIPTION

RTD Division 12 is located between Chester Place and 7th Street, adjacent to the west side of the Long Beach Freeway, in the City of Long Beach, California. The site encompasses an area of approximately five acres, and is currently being utilized for RTD bus parking and mechanical maintenance. Existing above-grade features within the site include a one-story transportation building, a one-story block maintenance building, enclosed structures for bus repair/maintenance and washing, a temporary trailer, and asphalt concrete pavements. The site also contains several underground fuel containers. The existing pavements have been patched at various locations in recent years. However, the pavements still exhibit signs of distress and deflection.

4.0 GEOTECHNICAL BACKGROUND

Previous geotechnical studies conducted at the site included investigations completed by Maurseth & Howe (1964) and by Converse Consultants Pasadena (1986). The complete titles and dates of these investigation reports are summarized in the section of References attached to the end of this report. Subsurface information and laboratory test results presented in the referenced reports were reviewed and used as supplemental data for the investigation addressed in this report.

5.0 FIELD AND LABORATORY INVESTIGATION

5.1 Subsurface Exploration

The field exploration was performed on 12 December 1988. A total of eight exploratory borings (B-1 through B-8) were drilled on the site, using a truck-mounted rotary drilling machine equipped

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Schaefer Dixon Associates ;

with six-inch hollow-stem augers. Borings B-1 and B-2 were drilled in the area of the proposed building, to a depth of about 26.5 feet below existing grade. The remaining borings (B-3 through B-8) were drilled in the pavement area, to a relatively shallow depth of about three feet. The approximate locations of the borings are shown on Plate 2, "Location of Borings". A description of the exploration program and the boring logs are presented in Appendix A of this report.

5.2 Laboratory Testing

Selected samples obtained during the exploration were tested in the laboratory to aid in evaluating the engineering properties of the subsurface materials at the site. Tests performed included moisture content and dry density, direct shear and resistance values. Concentrations of soluble sulfate and minimum resistivity of selected samples were also evaluated. A description of the laboratory testing and the test results are presented in Appendix B of this report.

6.0 SUBSURFACE CONDITIONS

Fill soils were encountered in Borings B-1 and B-6 to a depth of about two and three feet below the existing ground surface, respectively. The fill soils were comprised of silty fine sand with some gravel and brick debris.

Natural soil deposits encountered in the borings consisted of alternate layers of sand, silty sand, sandy and clayey silt. The upper ten to 15 feet of soils were generally soft or loose in their present condition. Materials below the upper zone were generally medium dense and stiff. Groundwater was encountered in B-1 and B-2 at a depth of approximately 20 and 25 feet below ground surface.

Upon completion of drilling, the water level in Boring B-2 was observed to rise to a depth of about 16 feet.

7.0 DESIGN RECOMMENDATIONS

7.1 General

Results of the field exploration and laboratory testing indicate that the upper ten to 15 feet of soils at the site will not provide adequate foundation support for the proposed maintenance building. Therefore, pile foundations are recommended to support the structural load of the proposed building.

The following sections present specific recommendations for the design of pile foundations, slabs-on-grade, pavements, cement type and drainage.

7.2 Pile Foundations

7.2.1 Static Axial Capacity -- Allowable static axial capacity for 12-inch-square, reinforced concrete driven piles are depicted by the curve shown on Plate 3, entitled "Driven Pile Capacities". Vertical capacities for other types of driven concrete or steel piles can be provided upon request. In any case, all piles should penetrate to at least ten feet below final grade.

The capacities indicated on the curve are for total dead and normal vertical live loads. The values may be increased by one-third for short duration of dynamic loads including the effect of wind or seismic forces.

Piles should be spaced at a minimum distance of 2.5 pile widths center to center, and when so spaced, no reduction in downward or upward capacities need be considered for group action. If structural design indicates that pile groups may be required and spacing is critical, the group action can be evaluated after the total column load and geometric constraints are determined.

No piles should extend deeper than the depth of exploration conducted for this study. This will limit pile lengths to depths not exceeding approximately 25 feet below existing grade. If longer piles are desired, it will be necessary to drill deeper borings at the site.

No appreciable pile settlement is anticipated for piles designed in accordance with these recommendations.

It should be noted that the data presented on the design curve are based on load transfer to the supporting soils. Design considerations should be given to pile as a structural member.

7.2.2 Static Lateral Capacity -- The allowable lateral capacities for 12-inch-square, reinforced concrete driven piles may be obtained from Table 1, entitled "Laterally Loaded Pile Capacities". These capacities are applicable to the case where lateral loads are applied at the pile cap and are based on a deflection of one-quarter-inch at the pile cap for both free and fixed head conditions. A fixed head condition denotes that the pile cap is free to translate, but is fixed against rotation.

TABLE 1
 LATERALLY LOADED PILE CAPACITIES
 12-INCH-SQUARE PRECAST CONCRETE DRIVEN PILES

Minimum Pile Length (feet)	17.0	
Fixity at Head(1)	<u>Free</u>	<u>Fixed</u>
Allowable Lateral Load for 0.25" deflection (kips) (2)	4.0	10.0
Maximum Positive Moment (kip-ft.) (3)	3.3	1.0P
Maximum Negative Moment (kip-ft.) (3)	-	3.8P
Depth to Maximum Positive Moment (ft.)	5.5	9.2
Depth to Inflection (ft.)	-	4.8
Depth to Zero Moment (ft.)	17.0	16.4

- Notes: (1) Fixed head condition denotes that the head is free to translate, but is fixed against rotation.
 (2) If greater deflection can be tolerated, the load may be increased in proportion to the deflection.
 (3) P is the lateral load in kips.

If greater deflection can be tolerated, lateral loads can be increased directly in proportion to the deflection. Deflection estimates and moment diagrams for specific lateral loads and moment combinations, pile stiffnesses, and lengths may be provided upon request.

Group action should be considered when the pile spacing, between piles, in the direction of loading is less than eight-diameters. Lateral capacities provided in Table I should be reduced using the reduction factors provided below for the given pile spacing, in the direction of lateral load:

<u>Pile Spacing in Direction of Load (pile diameters)</u>	<u>Lateral Load Reduction Factor Applied to Table I Capacities (percent of single pile capacity)</u>
8	100
6	80
4	60
2.5	40

Interconnection of pile caps by ties is not considered necessary for the free-head condition, provided that adequate and sufficient resistance to lateral loads is provided by a combination of lateral pile capacity, passive soil resistance and/or other means.

7.2.3 Pile Installation -- Adequate pile driving equipment will be required to penetrate to the design tip elevation, or until adequate driving resistance is obtained for the given design capacity, using the modified "Gates" formula published in the November 1967 Journal of ASCE Soil Mechanics and Foundation Division, by R.E. Olson and K.S. Flaate, incorporating a factor of safety of three. Pile driving equipment data and the rated energy range for the pile driver should be provided to SDA prior to the start of pile driving.

7.3 Concrete Slabs-On-Grade

Due to the very loose surficial soils at this site, the upper 18-inches of subgrade materials underlying the floor slab should be removed. The exposed surface should then be compacted to at least 90 percent of the maximum dry density determined by ASTM D 1557-78. The excavated materials may be used for backfill provided they are free of any deleterious substances.

Laboratory tests indicate that the surficial soils exhibit a low potential for expansion. Therefore, if these materials are utilized for backfill, they should be moisture conditioned to at least 10 percent over optimum and compacted to at least 90 percent, but no greater than 92 percent of the ASTM D 1557-78 maximum dry density. In addition, the slabs should have a minimum reinforcement of No. 3 bars spaced 24 inches, both ways.

If a moisture sensitive floor covering is to be used, the floor slab should be underlain by an impermeable polyethylene membrane, at least 6-mil in thickness and covered by a 2-inch layer of moistened (not saturated) sand to aid in curing of the concrete. It might be prudent to provide a thin layer of sand beneath the membrane to mitigate any damage from the underlying materials.

7.4 Pavements

Design of pavements depends upon many factors including anticipated traffic volume, vehicular loadings and engineering properties of supporting materials. For the purposes of this report, an R-value of 50 and 78 are used in the calculation for the prepared subgrade soils and the aggregate base materials, respectively. Since the volume of traffic at this site is not

available, several pavement sections are being provided based on assumed traffic indexes. If the actual volume of traffic along with the number of axles is known, a traffic index can be determined and unique sections provided.

7.4.1 Subgrades -- The structural section for pavements may be placed upon an 18-inch thick properly prepared subgrade. The minimum compaction requirement for subgrade preparation should be 90 percent relative compaction of the laboratory maximum dry density determined by ASTM D 1557-78. At the time of covering, the subgrade should be compacted at least to the required density at the optimum moisture content, and should be firm and relatively unyielding.

7.4.2 Asphalt Concrete Pavement (ACP)-- Assuming a traffic index (T.I.) of 6, 8 and 10, the following ACP sections are recommended.

<u>T.I.</u>	<u>Full Depth Asphalt Concrete (feet)</u>	<u>ACP With Base</u>	
		<u>Asphalt Concrete (feet)</u>	<u>Aggregate Over Base (feet)</u>
6	0.50	0.25	0.35
8	0.70	0.35	0.55
10	1.00	0.45	0.75

Base course should be crushed aggregate base conforming with Sections 200-2.2 or 200-2.4 of "Standard Specifications for Public Works Construction (1988)", and should be compacted to 95 percent of ASTM D 1557-78 maximum dry density.

Other design and construction criteria for asphalt pavements, such as mix design, placement, curbing, drainage, maintenance, etc., should conform to current specifications of the City of Long Beach.

7.4.3 Portland Cement Concrete Pavement (PCCP) -- Assuming a T.I. ranging from 6 to 10, the following PCCP sections are recommended according to the 1988 CALTRANS Highway Design Manual.

T.I.	PCCP (feet)	Asphalt Treated Permeable Base (feet)	Aggregate Subbase (feet)	or	PCCP (feet)	Aggregate Base (feet)
6-7	0.50	0.35	-		0.50	0.45
7.5-8	0.60	0.35	-		0.60	0.45
8.5-10	0.70	0.25	0.35		0.70	0.65

Other design and construction criteria for concrete pavements, such as concrete strength, mix design, joints, durability, and/or reinforcement, should conform to current specifications of the City of Long Beach.

7.5 Soluble Sulfate

Based on the laboratory test results, no special Portland cement will be necessary for concrete in contact with native soils.

7.6 Drainage

Positive surface drainage should be provided around the proposed building and pavements to reduce water infiltration into underlying soils. Finish subgrade adjacent to the building should be sloped down and away to facilitate drainage. All drainage should be directed offsite via non-erosive devices. In addition, a regular maintenance program should be implemented at all times.

8.0 POST INVESTIGATION SERVICES

Post investigation services are an important and necessary continuation of this investigation, and that it is important that Schaefer Dixon Associates, Inc. (SDA) be retained to perform such services.

Final project plans and specifications should be reviewed prior to construction to confirm that the full intent of the recommendations presented herein have been applied to the designs.

Following review of plans and specifications, sufficient and timely observation during construction should be performed to correlate the findings of this investigation with the actual subsurface conditions exposed during construction.

Observation and testing should be performed by SDA during construction to confirm that foundations are founded in and penetrate the recommended materials and that the subgrade materials are properly prepared and compacted at the recommended moisture content.

9.0 CLOSURE

The conclusions, recommendations and opinions presented herein are (1) based upon an evaluation and interpretation of the findings of the limited field and laboratory programs, (2) based upon an interpolation of subsurface conditions between and beyond the explorations, (3) are subject to confirmation by the actual conditions encountered during construction, and (4) are based upon the assumption that sufficient observation and testing will be provided during construction.

17 January 1989

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If parties other than Schaefer Dixon Associates, Inc. are engaged to provide construction geotechnical services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the findings and recommendations in this report or providing alternative recommendations.

Any person using this report for bidding or construction purposes should perform such independent investigations as they deem necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

If conditions are encountered during construction that appear to be different than indicated by this report, please immediately contact this office.

The following are attached and complete this report:

References

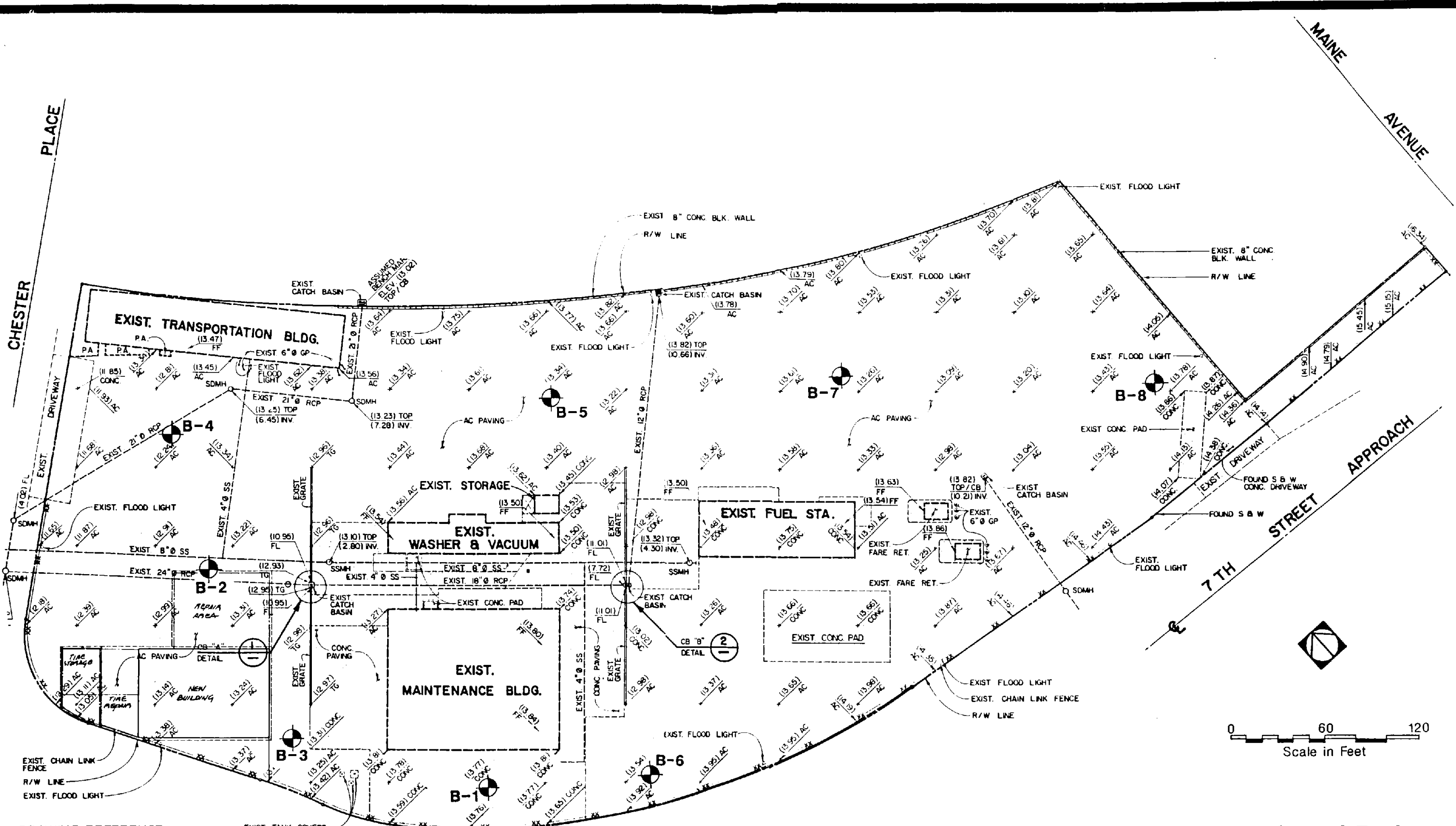
Plate 1, Vicinity Map
Plate 2, Location of Borings
Plate 3, Driven Pile Capacities
Appendix A: Field Exploration
Appendix B: Laboratory Testing



DRAWING REFERENCE:
 U.S.G.S. 7.5 Minute Topographic
 Quadrangle Map of Long Beach, CA.

Vicinity Map

Schaefer Dixon Associates

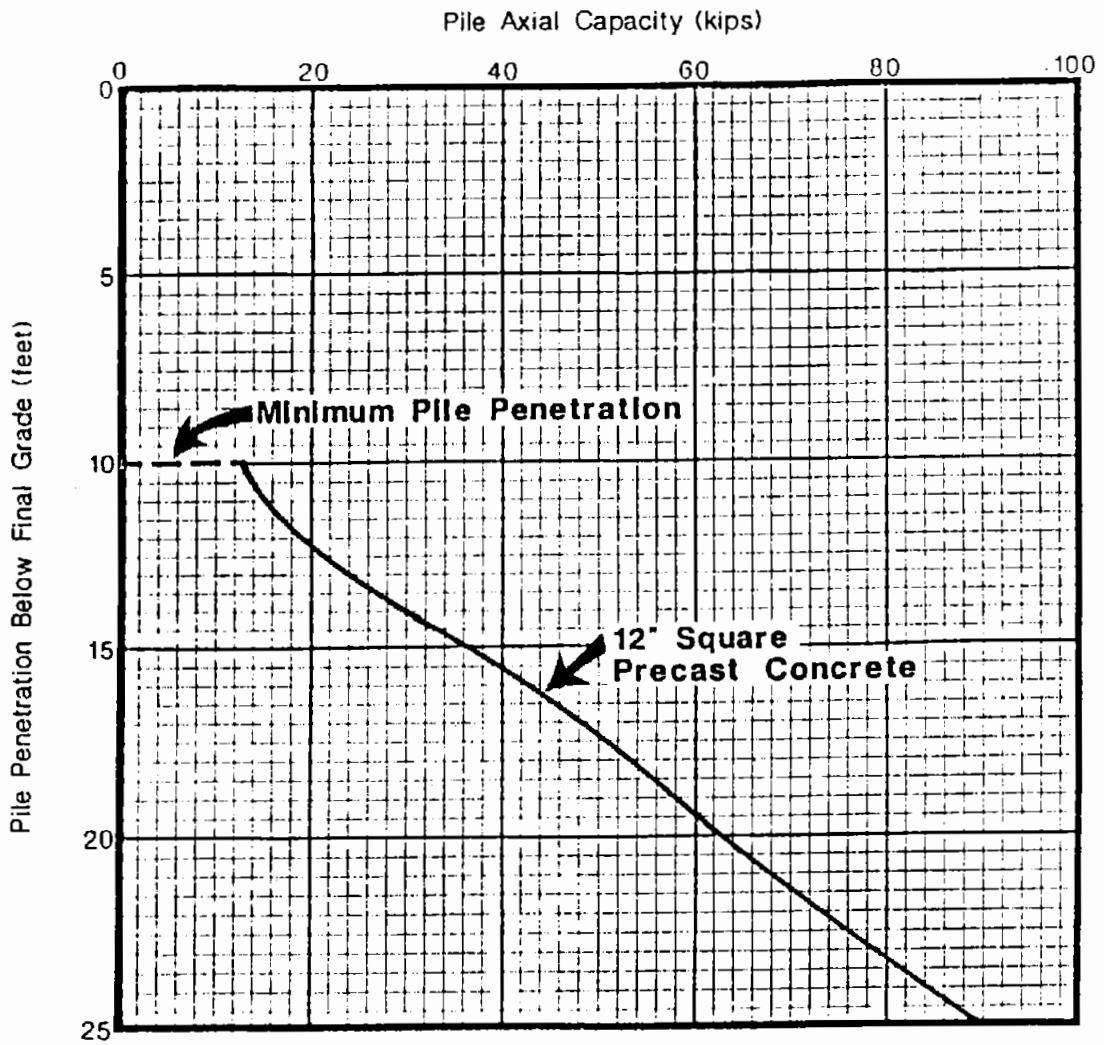


DRAWING REFERENCE:
 "Site Survey", by Benito A. Sinclair & Associates, Inc.; sheet CS-001, dated 11/30/88.

Schaefer Dixon Associates

Location of Borings

DRAWN BY WES APPROVED FOR PUBLICATION SIL



NOTES:

- 1) Pile capacities indicated above are based on encountered soil. Actual pile capacity may be limited by pile strength or other conditions.
- 2) Piles should be spaced at least 2.5 pile widths center to center.

Driven Pile Capacities

APPENDIX A
FIELD EXPLORATION

The field exploration was conducted by a field engineer from Schaefer Dixon Associates, Inc. (SDA). Subsurface conditions encountered during exploration were logged by the field engineer and the earth materials were classified in accordance with the Unified Soil Classification System (ASTM D 2488). Relatively undisturbed samples of the encountered soils were obtained at selected intervals in the boring as noted on the boring logs. The sampler was driven into the soil by successively dropping a 140-pound hammer a height of about 30 inches. The number of blows required for the last 12-inches penetration was recorded during exploration and is indicated on the boring logs. The relatively undisturbed soil samples were retained in brass rings of 2.41 inches in diameter and 1.00 inch in height, and placed in sealed plastic cans to prevent moisture loss. Selected bulk soil samples also obtained and placed in polyethylene containers.

Standard Penetration Tests (SPT's) were performed in selected borings. The SPT test consists of a 140-pound hammer falling 30 inches to drive a standard sampling tube into the bottom of boring a total depth of 18 inches. The number of blows required to drive the sampler the last 12 inches is indicated in the boring logs.

As shown on the boring logs, an "R" sample indicates a ring sample; an "S" sample indicates an SPT sample; and a "B" sample indicates a bulk sample. All samples were transported to the laboratory for testing.

The borings were backfilled and normally compacted with the auger attachment of the drilling equipment upon completion of drilling and sampling.

The boring logs are presented in the following Plates A-1 through A-10.

A-1

PROJECT #: 21L-009

DRAWN BY: RP/WES APPROVED BY: SIL

FIELD LOG BY: MR

Boring: B-1
 Date Drilled: 12-16-88
 Elevation: 13.8 FEET (±)

BLOWS/FOOT
OR (N VALUE)
 FIELD
MOISTURE
(% DRY WT.)
 DRY DENSITY
(LBS./CU. FT.)

Depth in Feet	Soil Type	Description	BLOWS/FOOT OR (N VALUE)	FIELD MOISTURE (% DRY WT.)	DRY DENSITY (LBS./CU. FT.)
0 - 1	FILL	6" Concrete Over 3" Base			
1 - 5	S-1	Brown, fine SILTY SAND (SM) with brick fragments			
5 - 13	R-2	NATURAL Brown, SANDY SILT (ML) Loose, gray, fine SAND (SP) Olive gray, CLAYEY SILT (ML)	(10)	17	
13 - 16	R-2	Light gray/brown, fine SAND (SP)	13	14	93
16 - 18	S-3	Medium stiff, dark gray, CLAYEY SILT (ML) slightly porous with few decayed organics	(5)	36	
18 - 20	R-4	Red/brown, SANDY SILT (ML)	41	17	116
(continued)					

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
 DROPPED 30 INCHES
 (See Appendix Text for Details)

LOG OF BORING

Schaefter Dixon Associates 1

PLATE: A-1

PROJECT #: 9L-009

DRAWN BY: RP, WES APPROVED BY: SIL

FIELD LOG BY: HR

Boring: B-1 (continued)
 Date Drilled: 12-16-88
 Elevation: 13.8 FEET (±)

BLOWS/FOOT
OR IN VALUE)

FIELD
MOISTURE
(% DRY WT.)

DRY DENSITY
(LBS./CU. FT.)

20	S-5	NATURAL	Stiff, gray/brown, CLAYEY SILT (ML)	(13)	25	
	R-6		Gray/brown, fine to medium SAND (SP) trace SILT	21	24	99
END OF BORING AT 26½ FEET GROUNDWATER ENCOUNTERED AT 20 FEET BORING BACKFILLED AND PATCHED						
25						
30						
35						
40						

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
 DROPPED 30 INCHES
 (See Appendix Text for Details)

LOG OF BORING

Schaefer Dixon Associates

PLATE: A-2

PROJECT #: 91L-009

DRAWN BY: RP/WES APPROVED BY: SIL
 FIELD LOG BY: MR

Boring: B-2 Date Drilled: 12-16-88 Elevation: 13.0 FEET (±)			BLOWS/FOOT OR (N VALUE)	FIELD MOISTURE (% DRY WT.)	DRY DENSITY (LBS./CU FT.)
0	NATURAL	4" Asphalt Pavement Over 3" Base Brown, SANDY SILT (ML)			
		R-1 Loose, light gray, fine SAND (SP)	18	11	97
5	S-2	Dark gray, SANDY SILT (ML)	(7)	17	
10	R-3	Brown and gray/brown, fine to medium SILTY SAND (SM), porous	30	15	112
15	S-4	Very stiff, brown and olive gray, CLAYEY SILT (ML), trace SAND	(33)	19	
20		Gray/brown, SANDY SILT (ML)			
(continued)					

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
 DROPPED 30 INCHES
 (See Appendix Text for Details)

LOG OF BORING

Schaefer Dixon Associates

Boring: B-2 (continued)
 Date Drilled: 12-16-88
 Elevation: 13.0 FEET (±)

BLOWS/FOOT OR (N VALUE)
 FIELD MOISTURE (% DRY WT.)
 DRY DENSITY (LBS./CU. FT.)

20	R-5	NATURAL	Gray brown, SANDY SILT (ML)	41	23	107
			Gray/brown, CLAYEY SILT (ML), trace SAND			
	S-6		Medium dense, light gray/brown, fine SAND (SP), trace SILT	(15)	29	
25			END OF BORING AT 26½ FEET GROUNDWATER ENCOUNTERED AT 25 FEET, ROSE TO 16 FEET BORING BACKFILLED AND PATCHED			
30						
35						
40						

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
 DROPPED 30 INCHES
 (See Appendix Text for Details)

LOG OF BORING

Schaefer Dixon Associates ;

PROJECT #: 9L-009

DRAWN BY: RP/WES APPROVED BY: SIL

FIELD LOG BY: MR

Boring: B-3
 Date Drilled: 12-16-88
 Elevation: 13.2 FEET (±)

BLOWS/FOOT
OR IN VALUE)

FIELD
MOISTURE
(% DRY WT.)

DRY DENSITY
(LB./CU. FT.)

0	B-1	NATURAL	5½" Asphalt Pavement Over 2½" Base Light gray/brown SILT (ML), trace SAND		
5			END OF BORING AT 3 FEET NO GROUNDWATER ENCOUNTERED BORING BACKFILLED AND PATCHED		
10					
15					
20					

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
 DROPPED 30 INCHES
 (See Appendix Text for Details)

LOG OF BORING

Schaefer Dixon Associates

Boring: B-4
 Date Drilled: 12-16-88
 Elevation: 12.5 FEET (±)

BLOWS/FOOT
OR (IN VALUE)

FIELD
MOISTURE
(% DRY WT.)

DRY DENSITY
(LBS./CU. FT.)

0	B-1	NATURAL	5" Asphalt Pavement Over 2" Base Gray/brown, SANDY SILT (ML)			
5			END OF BORING AT 3 FEET NO GROUNDWATER ENCOUNTERED BORING BACKFILLED AND PATCHED			
10						
15						
20						

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
 DROPPED 30 INCHES
 (See Appendix Text for Details)

LOG OF BORING

PROJECT # 91L-009

DRAWN BY: B.L. WES APPROVED BY: S.L.L.
FIELD LOG BY: B.K.

Boring: B-5
Date Drilled: 12-16-88
Elevation: 13.3 FEET (±)

BLOWS/FOOT
OR (IN VALUE)
FIELD
MOISTURE
(% DRY WT.)
DRY DENSITY
(LBS./CU. FT.)

0	B-1	NATURAL	3 1/2" Asphalt Pavement Over 2" Base Gray/brown SANDY SILT (ML)			
			Light brown, fine, SILTY SAND (SM)			
5			END OF BORING AT 3 FEET NO GROUNDWATER ENCOUNTERED BORING BACKFILLED AND PATCHED			
10						
15						
20						

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
DROPPED 30 INCHES
(See Appendix Text for Details)

LOG OF BORING

Schaefter Dixon Associates

PLATE: A-7

PROJECT #: 9L-009

DRAWN BY: RE/WES. APPROVED BY: SIL

FIELD LOG BY: MR

Boring: B-6
 Date Drilled: 12-16-88
 Elevation: 13.7 FEET (±)

BLOWS/FOOT
OR (N VALUE)
 FIELD
MOISTURE
(% DRY WT.)
 DRY DENSITY
(LBS./CU. FT.)

0	B-1	FILL	6" Asphalt Pavement Over 2" Base Brown and red/brown, fine SILTY SAND (SM) with some GRAVEL		
5			END OF BORING AT 3 FEET NO GROUNDWATER ENCOUNTERED BORING BACKFILLED AND PATCHED		
10					
15					
20					

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
 DROPPED 30 INCHES
 (See Appendix Text for Details)

LOG OF BORING

Schaefer Dixon Associates

PLATE: A-8

PROJECT #: 2L-009

DRAWN BY: RP/WES APPROVED BY: SIL

FIELD LOG BY: MR

Boring: B-7
Date Drilled: 12-16-88
Elevation: 13.4 FEET (±)

BLOWS/FOOT
OR (IN VALUE)
FIELD
MOISTURE
(% DRY WT.)
DRY DENSITY
(LBS./CU. FT.)

0	B-1	NATURAL	3" Asphalt Pavement Over 3" Base Brown, fine SILTY SAND (SM)			
			Light gray, fine SAND (SP)			
5			END OF BORING AT 3 FEET NO GROUNDWATER ENCOUNTERED BORING BACKFILLED AND PATCHED			
10						
15						
20						

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
DROPPED 30 INCHES
(See Appendix Text for Details)

LOG OF BORING

Schaefer Dixon Associates

PROJECT #: 2L-009

DRAWN BY: RP/WES APPROVED BY: SIL

FIELD LOG BY: MR

Boring: B-8
Date Drilled: 12-16-88
Elevation: 13.6 FEET (±)

BLOWS/FOOT
OR (N VALUE)
MOISTURE
(% DRY WT.)
FIELD
(LBS./CU. FT.)
DRY DENSITY

0	B-1	NATURAL	3" Asphalt Pavement Over 2" Base Brown and red/brown, fine SILTY SAND (SM)			
			END OF BORING AT 3 FEET NO GROUNDWATER ENCOUNTERED BORING BACKFILLED AND PATCHED			
5						
10						
15						
20						

NOTE: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

DRIVE WEIGHT 140 POUNDS.
DROPPED 30 INCHES
(See Appendix Text for Details)

LOG OF BORING

Schaefer Dixon Associates

PLATE: A-10

APPENDIX B
LABORATORY TESTING

General

A description of the laboratory tests performed in conjunction with the investigation and the test results are presented below.

Moisture and Density

The field moisture and density were determined for selected samples in accordance with ASTM D 2216. The results are shown on the "Log of Boring", Plates A-1 through A-10.

Direct Shear Test

Direct shear tests were performed on selected relatively undisturbed samples with a direct shear machine at a constant rate-of-strain. The machine is designed to test the samples partially extracted from a sample ring in a single shear configuration. A normal stress was applied vertically to the soil sample, which was sheared in a horizontal direction. The shear strength of the sample was measured at a displacement of about 0.25 inches. Samples were tested at field moisture content. The test results are presented on Plate B-1.

Chemical Testing

Selected samples were tested to evaluate the concentration of soluble sulfates. The results are presented below:

<u>Boring Number</u>	<u>Sample Number</u>	<u>Sample Depth (feet)</u>	<u>Soil Description</u>	<u>Soluble Sulfate Concentration (parts-per-million)</u>
B-1	S-3	10	Clayey Silt	900
B-1	S-5	20	Clayey Silt	500
B-2	S-2	5	Sand	250
B-2	S-4	15	Clayey Silt	150

B-1

Resistivity

Selected samples were tested to determine the minimum resistivity in general accordance with ASTM G 57-78 procedures. The results of the test are as follows:

<u>Boring Number</u>	<u>Sample Number</u>	<u>Sample Depth (feet)</u>	<u>Soil Description</u>	<u>Minimum Resistivity (ohm-centimeters)</u>
B-1	R-4	15	Clayey Silt	1200

Expansion Index

Selected samples were tested to determine the Expansion Index (EI) in accordance with the Uniform Building Code Standard Number 29-2. The test results are tabulated below.

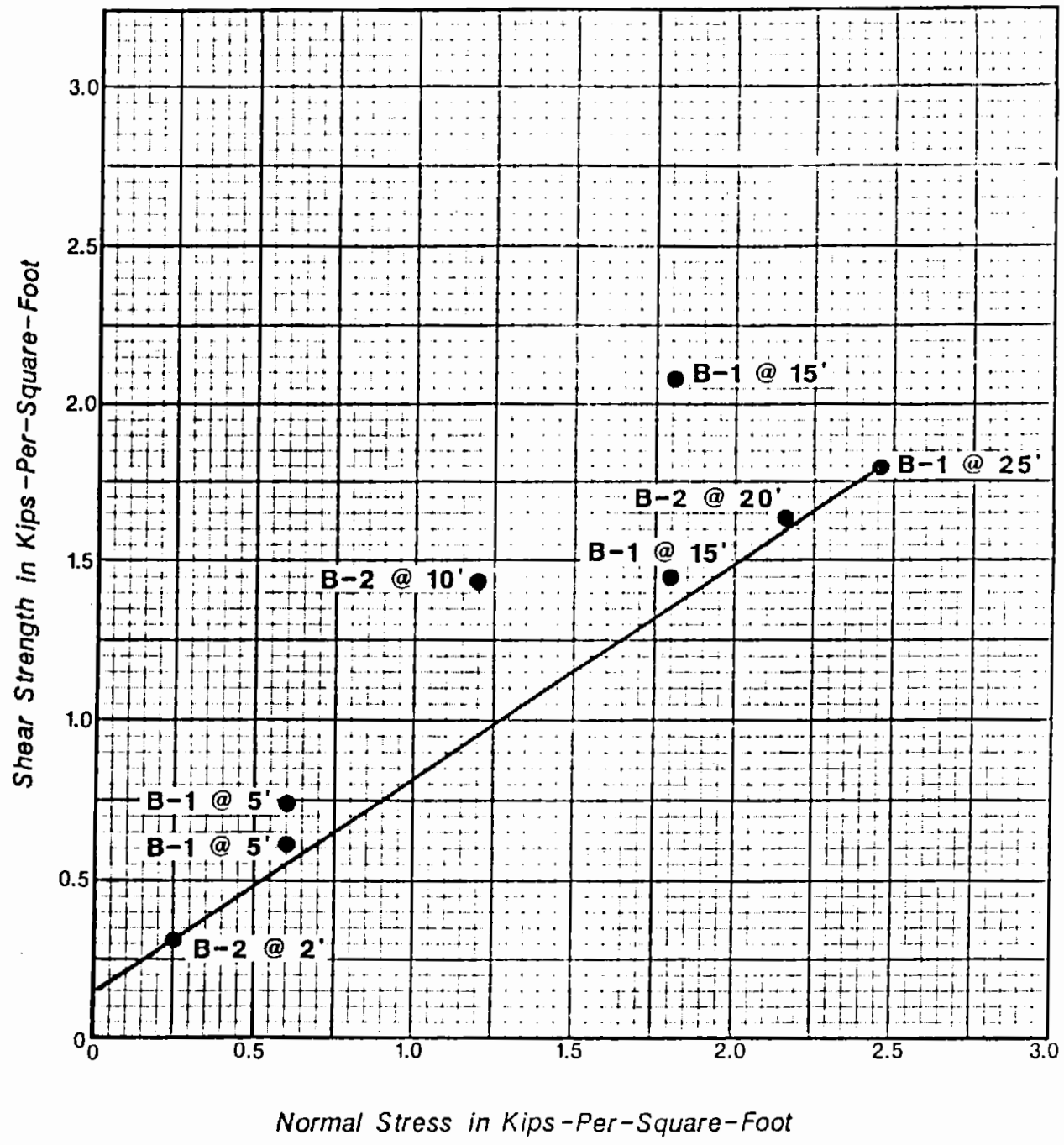
<u>Boring Number</u>	<u>Sample Number</u>	<u>Sample Depth (feet)</u>	<u>Soil Description</u>	<u>EI</u>
B-3	B-1	1-3	Silt	36

Resistance R-Value

Selected samples were tested to determine the resistance R-value according to the California Department of Transportation Test 301. The test results are presented below:

<u>Boring Number</u>	<u>Sample Depth (feet)</u>	<u>Soil Description</u>	<u>R-Value</u>
B-4	1-3	Sandy Silt	64
B-7	1-3	Silty Sand	59

B-2



DIRECT SHEAR TEST DATA

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MAINTENANCE BUILDING FACILITY &
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LONG BEACH, CALIFORNIA

SECTION 02221-1
TRENCHING, BACKFILLING
AND COMPACTING

1.00 GENERAL

1.01 DESCRIPTION: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this Section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Excavation for underground utilities, and appurtenant structures.
- D. Backfilling and compacting

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 01400: Tests and Inspections
- B. Section 02200: Earthwork
- C. Section 02400: Storm Drain Lines
- D. Section 02552: Domestic Water Distribution System
- E. Section 02560: Sanitary Sewer Lines
- F. Section 02611: Crushed Aggregate Base

1.03 REFERENCE SPECIFICATIONS: SSPWC "Standard Specifications for Public Works Construction", 1982 Edition.

1.04 SOILS INSPECTION AND TESTING: Inspection and testing of the work of this section will be performed by a testing agency in accordance with Section 01400.

1.05 SAFETY MEASURES

- A. Maintain at the job site a copy of all applicable portions of the "OSHA" regulations and any other special regulations as may be required by the Engineer.
- B. Before commencing any excavation 5 feet or more in depth, submit a detailed shoring plan showing depth and limits of excavation (including drawings if necessary) to the Engineer for approval. Excavation shall not commence prior to receipt, in writing, of these approvals from the Engineer.

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LONG BEACH, CALIFORNIA

SECTION 02221-2
TRENCHING, BACKFILLING
AND COMPACTION

- C. The Contractor shall pay for performing all work necessary to provide safety measures, including required engineering services and permits.
- 1.06 CONTRACTOR SUBMITTALS: Submit a worker's protection plan as set forth in Subsection 1.05B herein.
- 2.00 PRODUCTS
 - 2.01 BEDDING MATERIALS: Sand or Crushed Aggregate; Standard Specification Subsection 306-1.2.1.
 - 2.02 BACKFILL MATERIALS
 - A. Sand Backfill: Standard Specification Sub-Section 306-1.3
- 3.00 EXECUTION
 - 3.01 PREPARATION AND LAYOUT
 - A. Establish extent of trench excavation by area and elevation; designate and identify datum elevation.
 - B. Set required lines and levels.
 - C. Maintain bench marks, monuments, and other reference points.
 - 3.02 EXISTING UTILITIES: Protect all existing utilities in place and maintain operational at all times.
 - 3.03 TRENCHING: Excavate in accordance with Standard Specification Subsection 306-1.1.
 - 3.04 BEDDING
 - A. Place bedding in accordance with Standard Specification Subsection 306-1.2.
 - B. Compact sand or crushed aggregate bedding to not less than 90 percent.
 - 3.05 BACKFILLING AND COMPACTION
 - A. Backfill and compact in accordance with Standard Specification Subsection 306-1.3.

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SECTION 02221-3
TRENCHING, BACKFILLING
AND COMPACTING

- B. Compact backfill starting 1 foot above pipe to 6 inches below pavement subgrade to not less than 90 percent.
- C. Compact backfill 6 inches below pavement subgrade to not less than 95 percent.

END OF SECTION

SCRTD - DIVISION 12
MAINTENANCE BUILDING FACILITY &
YARD IMPROVEMENTS
LONG BEACH, CALIFORNIA

SECTION 02355-1
DRIVEN PILES

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of General Provisions and Division 1 apply to the work of this section.
- B. Furnish and install all precast prestressed concrete piles, complete and as necessary to assure the indicated construction.
- C. Excavate to grade beam bottom elevations as necessary for pile installation.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Testing and inspection - refer to Section 01400.
- B. Reinforcement for grade beams - refer to Section 03200.
- C. Concrete for grade beams - refer to Section 03300.

1.03 SUBMITTALS

- A. Concrete mix design in conformity with Section 03300.
- B. Precast prestressed concrete pile shop drawings.
- C. Description of driving equipment including hammer type with model number and manufacturer, rated driving energy, stroke, weight of ram, driving cap weight, and description of cushion.
- D. Driving record of each pile, including location, pile length before cutoff, final tip elevation, final cutoff or top of pile elevation, starting and finishing driving times, number of blows per each foot of penetration including the number of blows per inch for the last six inches, actual rate of hammer operation in blows per minute, and deviation from plumb and from the indicated location, and the cause and extent of any interruption of pile driving.

2.00 PRODUCTS

2.01 **GENERAL:** All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

- A. Concrete shall conform with the requirements of Section 03300. Concrete strengths shall conform with the Structural Drawings.
- B. Steel for Prestressing: ASTM A416. The supplement for low relaxation strand need not apply.
- C. Steel for Spiral Ties: Cold drawn wire conforming with ASTM A82.

2.03 PILES

- A. Piles shall be precast prestressed concrete piles fabricated on the premises of a certified fabricator approved by the Building Authority for this work.
- B. Concrete for precast prestressed concrete piles shall be placed in smooth mortar-tight forms. Uniformed surfaces shall be finished to a smooth surface. When removed from the form, the pile shall present true, smooth, even surfaces free from honeycombs and voids and shall be so straight that a line stretched from butt to tip on any face will not be more than one inch from the face of the pile at any point.
- C. Concrete piles shall be cured by being maintained continuously wet for a minimized period of 7 days after the concrete has been placed, or by other approved methods which will assure the indicated required concrete strengths.
- D. Prestressing steel shall be protected against physical damage and rust or other results of corrosion at all times from manufacture to encasing in concrete. Prestressing steel that has sustained physical damage at any time shall be rejected. The development of visible rust or other results of corrosion shall be caused for rejection when directed by the Engineer.

- E. Any time prestressing steel in the prestressing bed is exposed to the elements for more than 36 hours prior to encasement in concrete, approach measures shall be taken by the Fabricator to protect the steel from contamination or corrosion.
- F. Prestressing steel shall be tensioned by means of hydraulic jacks to the forces indicated on the Structural Drawings.
- G. Concrete piling will be inspected at the premises of the fabricator. The Contractor shall give the Engineer at least 10 days notice before encasing prestressing steel in concrete.

3.00 EXECUTION

3.01 EQUIPMENT

- A. Pile hammers shall be approved steam, air, or diesel hammers that develops sufficient energy to drive the piles at a penetration rate of not less than 1/8 inch per blow at the maximum indicated lengths.
- B. The heads of the piles shall be protected by a cushion driving block, maintained in good condition during the entire driving operation. The cushion driving block shall be so arranged that any prestressing steel projecting above the piles will not be displaced or injured in driving.

3.02 INSTALLATION

- A. Piles shall be driven only in the presence of the Engineer. The Contractor shall give the Engineer at least 10 days notice before driving any pile or group of piles.
- B. If possible, drive piles without interruption from first blow until the indicated driven lengths is obtained.
- C. If the final location of a pile deviates more than eight inches from the indicated location, additional pile or piles shall be driven as determined by the Engineer to realize an effective pile group center at the indicated location.
- D. Any spalling or breakage of the piles during transportation, handling or driving shall be caused for rejection.

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LONG BEACH, CALIFORNIA

SECTION 02355-4
DRIVEN PILES

- E. After driving to the indicated lengths, cutoff any excess lengths in a horizontal plane to obtain the indicated top of pile elevations. Expose all prestressing steel for the length indicated above the cutoff plane. Cutoff portions of piles shall remain the property of the Contractor, and shall be removed from the site.

END OF SECTION

SCR TD - DIVISION 12
MAINTENANCE BUILDING FACILITY &
YARD IMPROVEMENTS
LONG BEACH, CALIFORNIA

SECTION 02500-1
STORM DRAIN LINES

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Reinforced concrete pipe storm drains.
- D. Polyvinyl chloride (PVC) pipe and fittings.
- E. Reinforced concrete drainage structures.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 02221: Trenching, Backfilling and Compacting.
- B. Section 02625: Site Work Concrete.
- C. Section 01400: Tests and Inspections.

1.03 REFERENCE SPECIFICATIONS: "Standard Specifications for Public Works Construction", 1988 edition.

1.04 QUALITY ASSURANCE

- A. The District will provide inspection and testing services by a testing agency which meets the requirements of ASTM Designation E329 and which conforms to the requirements of the "Standard Specification for Public Works Construction", 1988 Edition.
- B. After inspection of all materials including pipe and fitting at the project site, set aside and remove from the site any material showing defects.
- C. Provide certified statement of compliance for all materials and products.

1.05 QUALITY ASSURANCE

A. Design Criteria:

1. Use only one type and class of pipe in any continuous line of storm drain between structures, unless otherwise indicated on the Drawings.

B. Source Quality Control:

1. Shop Tests: Factory test pipe materials listed in the following. Each pipe manufacturer must have facilities to perform listed tests. The Engineer reserves the right to require the manufacturer to perform such additional number of tests as the Engineer may deem necessary to establish the quality of the material offered for use.

	<u>Material</u>	<u>Test Method</u>	<u>Number of Tests</u>
a.	Reinforced Concrete Pipe	D-load bearing Strength Test as specified in Standard Specification Section 207-2	As specified in Standard Specification Section 207-2
b.	Polyvinyl Chloride Pipe	ASTM D 3034	As specified in ASTM D 3034
c.	Manhole Frame and covers, grating	ASTM A 48	As specified in A 48
d.	Precast reinforced Manhole Section	ASTM C 478	As specified in C 478

C. Reference Standards:

1. American Society for Testing and Materials:
 - a. ASTM A 48, Gray Iron Castings.
 - b. ASTM C 478, Precast Reinforced Concrete Manhole Sections, Spec. for.

- c. ASTM D 3034, Type PSM poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, Spec. for.
 - 2. Standard Specifications for Public Works Construction, current edition; herein referred to as "Standard Specifications". The references pertain only to materials, construction equipment, methods and labor. The payment provisions do not apply to work to be performed under this Contract.
- 2.00 PRODUCTS
- 2.01 REINFORCED CONCRETE PIPE: (RCP) Standard Specification Subsection 207-2.
 - 2.02 POLYVINYL CHLORIDE (PVC) PIPE: Pipe and Fittings conforming to ASTM D-3034-SDR 35.
 - 2.03 MANHOLE FRAME AND COVERS, GRATING, AND METAL APPURTENANCES: Conforming to City of Los Angeles Standard Plans indicated on drawings and applicable requirements of the Standard Specifications, Section 206.
 - 2.04 CLEANOUT STRUCTURES: Furnish and install cleanout ferrules made of cast iron and brass as indicated on drawings.
- 3.00 EXECUTION
- 3.01 PIPE LAYING: Lay RCP and PVC pipe in accordance with Standard Specification Subsection 306-1.2.2.
 - 3.02 FIELD JOINTING OF PIPES: Make field joints of reinforced concrete pipe in accordance with Standard Specifications Subsection 306-1.2.4.9b, 8(C).
 - 3.03 DRAINAGE STRUCTURES
 - A. Construct reinforced concrete structures in accordance with Section 02625.
 - B. Construct cleanout structures to grades and dimensions indicated on drawings.

3.04 FIELD QUALITY CONTROL

- A. General Requirements: Conduct tests specified herein so that each pipe line installed in the Project is tested to the Engineer's satisfaction.
 - 1. Provide tools, materials, apparatus and instruments necessary for pipe line testing.
 - 2. Conduct tests of every kind in the presence of and to the satisfaction of the Engineer.
 - 3. Conduct pipe line tests in conformance with Standard Specifications Subsection 306 - 1.4.
- B. Water Exfiltration Test: If required by the Engineer, conforming to Standard Specifications Subsection 306 - 1.4.2.
- C. Water Infiltration Test: If required by the Engineer, conforming to Standard Specifications Subsection 306 - 1.4.3.
- D. Mandrel Test of PVC Pipe: Conforming to Standard Specifications Subsection 306 - 1.4.6.
- E. Repair and Retest: When section or sections of sewer fails to meet test requirements specified previously:
 - 1. Determine source or sources of leakage.
 - 2. Repair or replace defective material, and if a result of improper workmanship, correct such.
 - 3. Take up and relay pipe sewer line section that has more than the maximum allowable deflection.
 - 4. Conduct additional tests required to demonstrate that sewer line meets specified test requirements.

END OF SECTION

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SECTION 02552-1
DOMESTIC WATER
DISTRIBUTION SYSTEM

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Furnish and install pipes, fittings, valves, and specialties as indicated on the Drawings and as required to complete the work. This section concerns work to within 5'-0" outside of the buildings.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Trenching, Backfilling and Compacting: Section 02221.
- B. Site Work Concrete: Section 02625.
- C. Tests and Inspections: Section 01400.

1.03 SUBMITTALS

- A. General: Comply with provisions of Division 1.
- B. The submittal data to be furnished shall included, but not be limited to the following:
 - 1. Pipe and fittings
 - 2. Valves
 - 3. Specialties

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.

2.00 PRODUCTS

2.01 PIPE AND FITTINGS - SYMBOL CW

- A. Domestic water piping, below ground (Symbol CW): Shall be Type "K", hard drawn copper tubing, ASTM B-88. Joints in copper tubing shall be made up with 95-5 solder and Nokorode Flux, in accordance with manufacturer's recommendations. Wrought copper fittings shall be used and where necessary, combination of fittings, reducers, and adapters shall be employed in making up the piping. Cast fittings will not be permitted.
- B. Wrapping of pipe:
1. Prior to delivery to the job site wrap buried pipe with corrosion protection wrap of pressure sensitive polyvinyl chloride or polyethylene tape applied after pipe has been thoroughly cleaned. Tape shall be nominal thickness of 20 mils consisting of one layer of 20 mil tape or two separate layers of 10 mil tape. Apply with suitable primer adhesive recommended by manufacturer.
 2. Tightly apply tapes with 1/2 inch minimum uniform lap, free from wrinkles and voids. Use approved wrapping machines and experienced operators.
 3. Tapes: "Chasekote" No. 775, Plicoflex No. 340-25, Polyker 922 and 923, "Scothwrap" No. 51, or equal. Apply tape after pipe is cleaned as recommended by the tape manufacturer.

2.02 GATE VALVES

- A. Buried gate valves shall conform to AWWA C500 for 200 PSI cold water working pressure. Valves shall be cast iron body double disc bronze trim, non-rising stem, "O" ring seals. All valves shall open counter clockwise. Buried gate valves shall be as manufactured by Mueller Co. Catalog #A-2380. Valves manufactured by Crane or Kennedy will be acceptable if they comply with the Specifications. All bolts related to valves installed underground (as stuffing box or mechanical joint bolts) shall be coated with protective paint or tar after installation and before backfilling.

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- B. Valve boxes: Valve boxes shall be provided for all buried valves and shall consist of an adjustable concrete body and a cast iron traffic cover marked "WATER". Valve boxes shall be installed flush with final grade or paving elevation. Show field location of valves as indicated on the Drawings. Provide extension stem to bring operation nut within two feet of valve box top. Provide a total of four valve keys, four feet long, and locate as directed by the Engineer.

2.03 THRUST BLOCKS

- A. Thrust blocks shall be installed wherever the pipe line changes direction (tees, bends), changes size (tees, crosses), stops (dead ends), and at shut-off valves.
- B. Thrust blocks shall be a minimum of 8". Concrete used for thrust blocks shall have a minimum 4000 PSI compressive strength at 28 days.

3.00 EXECUTION

3.01 GENERAL

- A. Install piping at elevation indicated with bedding as recommended by the manufacturer.
- B. All work shall be done to the elevations, and grades shown on the Contract Drawings.
- C. Include all drayage, hauling, hoisting, and placement of piping, appurtenances, and equipment specified herein.
- D. Maintain adequate protection of work from damage and protect the District's property from injury or loss arising in connection with this Contract. Protect adjacent property as provided by law and the Contract Documents.
- E. Construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavation, pits and trenches free of water.
- F. Provide protection against rain, wind, storms, or heat so as to maintain all work, materials, apparatus and fixtures free from injury or damage. At the end of each day's work all new work likely to be damaged shall be protected.

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- G. Take all necessary precautions for the safety of employees and comply with all applicable provisions of Federal, State and Municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the work is being performed.

3.02 TEST

- A. The District will provide the required tests. The Contractor shall provide all facilities, personnel, etc., necessary for testing as specified.
- B. Perform hydrostatic and leakage tests conforming to AWWA C603 to insure that the line will withstand normal working pressure (plus reasonable excess that may occur) and that the system is water-tight. Testing shall be done in segments between two valves, or test plugs. Furnish and install at no additional cost to the District test plugs, anchors and other devices that may be necessary for the test. The Contractor shall be responsible for any damage to public or private property caused by failure of any portion of the system.
- C. Hydrostatic pressure test: Each segment of line to be tested shall be complete with fittings, valves, thrust blocks, anchors, and required test plugs prior to testing. The line shall be filled with water 24 hours before testing. Testing shall be performed after partial backfilling, maintaining all joints and fittings open for inspection. Remove air from line. Hydrostatic test shall be performed at not less than 200 PSIG for 30 minutes.
- D. Leakage Test: After hydrostatic pressure test is performed and accepted, perform the leakage test to verify the water-tightness of pipe. Test shall be performed at 150 PSIG for two hours. The test shall be judged acceptable when leakage does not exceed that determined by the following formula:

$$L = \frac{2PN}{100}$$

L = maximum permissible leakage in gallons.

P = leakage allowance in gallons per 100 couplings per hour.

4" pipe	P = 1.42
6" pipe	P = 2.12

N = Actual number of couplings

After location of leaks and repairs of defects, the District will repeat test as many times as necessary, at all cost to the Contractor, until satisfactory performance of test has been completed and accepted. Water for the test and for disinfection shall be paid for by the Contractor.

3.03 DISINFECTION

- A. Disinfection shall conform with the latest revision of AWWA C601 Standard for disinfecting water mains. Disinfection shall include flushing pipe with clean potable water until no dirty water appears at the points of outlet, chlorination with a minimum initial dosage of 50 ppm chlorine, and final flushing. Water used in conjunction with chlorination and flushing shall be disposed of without damage to public or private property. Repeat disinfection process until satisfactory results are obtained.
- B. Provide sampling and bacteriologic test for water collected on two days, 24 hours apart and taken to a laboratory approved by the State. Submit to the Engineer (6) six copies of certified reports for each segment of pipe tested and disinfected.
- C. Under no circumstances shall the Contractor permit the use of any portion of water main for potable water usage until properly disinfected, flushed and certified by laboratory test.

3.04 CONNECTION TO WATER MAIN

- A. Contractor shall coordinate installation of new water distribution piping service with all other work, and shall make final connection to the existing water line after receipt of approval by the Engineer.
- B. Connection of new water distribution piping to the existing 3 1/2" line shall be performed after distribution piping has been tested and disinfected as specified.

3.05 EXCAVATION AND BACKFILL

- A. Comply with the requirements for trenching, backfilling and compaction as specified in Section 02221.

END OF SECTION

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SECTION 02560-1
SANITARY SEWER LINES

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Vitrified clay pipe gravity sewer.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 02221: Trenching, Backfilling and Compacting.
- B. Section 02625: Site Work Concrete.
- C. Section 01400: Tests and Inspections.

1.03 REFERENCE SPECIFICATIONS: "Standard Specifications for Public Works Construction", 1982 edition.

1.04 QUALITY ASSURANCE

- A. The District will provide inspection and testing services by a testing agency which meets the requirements of ASTM Designation E329 and which conforms to the requirements of the "Standard Specifications for Public Works Construction", 1982 Edition.
- B. After inspection of all materials including pipe and fitting at the project site, set aside and remove from the site any material showing defects.
- C. Provide certified statement of compliance for all materials and products.

2.00 PRODUCTS

2.01 VITRIFIED CLAY PIPE AND FITTINGS: ASTM C700, extra strength.

2.02 COMPRESSION JOINTS: ASTM C425.

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SECTION 02560-2
SANITARY SEWER LINES

- 2.03 MANHOLE FRAMES AND COVERS: Confirming to City of Los Angeles Standard Plans as indicated on plans.
- 3.00 EXECUTION
- 3.01 INSTALLATION OF PIPE: Install vitrified clay pipe in accordance with Standard Specification Subsections 306-1.2.2 and 306-1.2.3. (g).
- 3.02 INSTALLATION OF MANHOLE FRAME AND COVER: Install manhole frame and cover in accordance with Subparagraph 301-1.6 of 302-5.7 of the Standard Specifications.
- 3.03 HYDRAULIC TESTING: Test vitrified clay pipe for leakage by water exfiltration test in accordance with Standard Specification Subsection 306-1.4.2. The Contractor shall pay for all required retests until satisfactory performance of test has been completed and accepted by the Engineer.

END OF SECTION

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SECTION 02611-1
CRUSHED MISCELLANEOUS BASE

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Crushed miscellaneous base.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 02615: Portland Cement Concrete Pavement.
- B. Section 02200: Earthwork.
- C. Section 01400: Tests and Inspections.

1.03 REFERENCE SPECIFICATIONS: Standard Specification, "Standard Specifications for Public Works Construction", 1988 Edition.

2.00 PRODUCTS

2.01 CRUSHED MISCELLANEOUS BASE: Standard Specification Subsection 200-2.4.

3.00 EXECUTION

3.01 SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS

- A. Prepare subgrade as required or as directed by the Engineer, in accordance with Standard Specification Subsection 301-1. The Contractor shall be responsible and pay for the cost of this work.
- B. Spread and compact crushed miscellaneous base in accordance with Standard Specification Subsections 301-2.2 and 301-2.3. Place to compacted thickness shown on Drawings. Place over areas to receive portland cement concrete pavement.

END OF SECTION

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SECTION 02612-1
ASPHALT CONCRETE PAVEMENT

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Asphalt concrete pavement as may be required for pavement in utility trenches and patching of existing asphalt concrete pavement.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 02200: Earthwork.
- B. Section 01400: Tests and Inspections.

1.03 REFERENCE SPECIFICATIONS: "Standard Specifications for Public Works Construction", 1988 Edition.

1.04 QUALITY ASSURANCE: Provide certified statement that asphalt concrete complies with the requirements of the Specification.

2.00 PRODUCTS

2.01 ASPHALT CONCRETE FOR UTILITY TRENCHES AND PATCHING OF EXISTING ASPHALT CONCRETE PAVEMENT

- A. General: Type C1-AR-4000 conforming to Standard Specification Subsection 203-6.
- B. Asphalt: Paving asphalt AR-8000 conforming to Standard Specification Subsection 203-1.
- C. Aggregate: Standard Specification Subsection 203-6.2.2.
- D. Mineral Filler: Standard Specification Subsection 203-6.2.3.

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3.00 EXECUTION

3.01 ASPHALT CONCRETE PAVEMENT

- A. Prepare subgrade in accordance with Standard Specification subsection 301-1 as shown in Section 02611 3.01.A.
- B. Distribute, spread and compact in accordance with Standard Specification Subsection 302-5.4 and 302-5.5.
 - 1. Place over areas to lines and grades indicated on the Drawings.
- C. Provide a tack coat where abutting other materials, such as concrete.

END OF SECTION

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SECTION 02615-1
PORTLAND CEMENT
CONCRETE PAVEMENT

1.00 GENERAL

1.01 DESCRIPTION: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Portland cement concrete pavement.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 02611: Crushed Aggregate Base
- B. Section 01400: Tests and Inspections
- C. Section 02200: Earthwork
- D. Section 03200: Reinforcing Steel

1.03 QUALITY ASSURANCE

- A. Standard Specifications for Public Works Construction, current edition; herein referred to as "Standard Specifications". The references pertain only to materials, construction equipment, methods and labor. The payment provisions do not apply to work to be performed under this contract.
- B. Source Quality Control:
 - 1. Laboratory Tests: Materials stated herein require advance examination or testing according to methods referenced, or as required by the Engineer.
 - 2. Compression Test Cylinders: For laboratory trial batches, make in accordance with American Concrete Institute ACI 301 Method 1. Test to consist of four compression test cylinders for each class of concrete with two broken at seven days and two broken at 28 days; ASTM C39.
- C. Referenced Standards:
 - 1. American Concrete Institute: ACI 301, Specifications for Structural Concrete for Buildings.

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2. American Society for Testing and Materials:
 - a. ASTM C 31, Making and Curing Concrete Test Specimens in the Field.
 - b. ASTM C 42, Drilled cores and Sawed Beams of Concrete, Obtaining and Testing.
 - c. ASTM C 39, Compressive Strength of Cylindrical Concrete Specimens, Test for.
 - d. ASTM C 143, Slump or Portland Cement Concrete, Test for.
- D. Tolerances: Conforming to requirements specified in Standard Specifications Sections 302-6.3

1.04 SUBMITTALS

- A. Certificates of Compliance: Submit certificates of compliance for all materials and products, except those requiring a laboratory or mill test report.
 1. Concrete Test Reports: Submit two copies of laboratory trial mix design proposed in accordance with Method 1 of ACI 301 or one copy of each 30 consecutive test results and mix design used from a record of past performance in accordance with ACI 301 Method 2.
 2. Design Mix: 560 C 3250 - Prior to production of concrete, submit for approval a design mix indicating materials proportions and water-cement ratio. Use materials in such proposed design mix as specified herein. Make such adjustments in the proposed design mix as directed by the Engineer. Make such adjustments at no increase in contract price.
 3. Certificates: Furnish the Engineer and local authorities requiring same, certificates originated by the batch mixing plant certifying ready mixed concrete as manufactured and delivered to be in conformance with ASTM C 94.
 4. Delivery Tickets: A delivery ticket shall accompany each load of concrete from the batch plant.

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- a. Tickets must be signed by the Engineer, noted as to time and place of pour, and kept in a record at the site. Make such records available for inspection upon request by the Engineer.
- b. Information presented on the ticket shall include the tabulation covered by ASTM C 94, 15.1.1 through 15.2.8, as well as any additional information the local codes may require.

2.00 PRODUCTS

2.01 MATERIALS

- A. Crushed Aggregate Base: Conforming to requirements specified in Section 02611.
- B. Portland Cement Concrete: 560-C-3250 conforming to requirements specified in Section 201-1 of the Standard Specifications, 3" slump.
- C. Forms: Use wood or steel forms for longitudinal construction joints, at Contractor's option.
- D. Joint Sealer: Conforming to the requirements specified in Standard Specifications Section 201-3.6, Type C.
- E. Joint Filler: Conforming to the requirements specified in premolded Standard Specification Section 201-3.2.
- F. Concrete Curing Compound: Conforming to the requirements specified in Standard Specification Section 201-4.1 for Type 2, white pigmented.

3.00 EXECUTION

3.01 PREPARATION

- A. Prepare subgrade of crushed aggregate base as specified in Section 02511.

3.02 CONCRETE PAVEMENT

- A. Construct concrete pavement in accordance with requirements of the Standard Specification Section 302-6, except the joints must conform to the details shown on the Drawings.

- B. The final finishing of pavement slabs shall be medium broom finish in accordance with Section 302.6 of the Standard Specifications.

3.03 CURING

- A. If the selected curing method does not promote the proper curing and protection against cracking, the damaged pavement shall be removed and replaced, and another curing method shall be employed as directed by the Engineer.
- B. Respray (when spray curing compounds are selected) areas where the curing compound is damaged by subsequent construction operations within the curing period.

3.04 REPAIR OF DEFECTIVE PAVEMENT SLABS

- A. Broken slabs, random cracks, nonworking contraction joint near cracks, and spalls along joints and cracks shall be replaced or repaired as specified below. The Engineer will be responsible for determining, by means of a structural evaluation, whether defective pavement shall be repaired as specified below or replaced as specified in Paragraph 3.05.
- B. Broken slabs and random cracks shall be repaired by pressure epoxy-grout injection as specified hereinafter at no additional cost to the District.
- C. Epoxy Injection:
 - 1. Preparation of Crack Area: Remove all surface contamination by wire brushing, scraping or light sandblasting and remove dust in crack with light air jet. After approval of the preparation operation, the Contractor shall apply a seal of the surface of the crack, leaving ports for injection of epoxy material in accordance with the manufacturer's recommendations. Prior to epoxy injection, the Contractor shall deepen the adjacent sawed joint to at least 1/3 the pavement thickness.

2. Epoxy Injection Placement: The Contractor shall perform the necessary drilling and grouting at all random cracks which develop. The epoxy material shall be proportioned and injected as recommended by the manufacturer of the material for the intended use. The concrete cracks shall be mapped and the injection shall be on center-to-center spacing as necessary to perform structural bonding to the full depth of the crack. Epoxy injection of cracks shall not be started until the concrete has cured for a minimum of 7 days and the injection shall be completed within 14 days after placement.

3.05 REMOVAL AND REPLACEMENT OF DEFECTIVE PAVEMENT AREAS: Defective pavement shall be removed and replaced as specified herein with pavements of the thickness and quality required by these specifications at no additional cost to the Owner. In no case shall concrete removal and replacement result in a slab less than the full paving lane width or a joint less than 10 feet from a regularly scheduled transverse joint. When a portion of the unfractured slab is replaced, a saw cut three inches deep shall be made transversely across the slab in the required location, and the concrete shall be removed to provide an essentially vertical face in the remaining portion of the slab. Just prior to placement of concrete, the slab face shall be cleaned of debris and loose concrete, dust removed with light air jet, and then thoroughly coated with a thixotropic epoxy-resin adhesive manufactured specifically for bonding fresh portland cement concrete to existing hardened concrete. Longitudinal construction joints and transverse contraction joints shall not be coated with epoxy-resin adhesive. Asphaltic emulsion or other approved bond-breaking medium shall be painted on vertical construction and contraction joint faces. Longitudinal and transverse joints of the replaced slab or portion thereof shall be constructed as indicated. The joints shall be sealed as specified in paragraph 3.05 C. The Contractor shall be fully responsible for this work and no additional payment will be made for the defective pavements removed nor for the cost of replacement of the defective.

- A. Concrete Saw: A self-propelled power saw with water-cooled diamond or abrasive saw blades shall be provided for cleaning sawed joints, removing filler embedded in the joints or adhering to the joint faces, and cutting joints to the widths and depths specified.

- B. Sandblasting Equipment: Sandblasting equipment will include an air compressor, hose, and long-wearing, 1/4-inch venturi-type nozzle or proper size, shape, and opening. The air compressor shall be portable and shall be capable of furnishing not less than 150 cfm of air and maintaining a line pressure of not less than 90 psi at the nozzle while in use. Compressor capability to meet the performance requirements of the specifications under job conditions shall be demonstrated prior to commencement of joint cleaning or sealing operations. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. The nozzle or nozzles shall have an adjustable guide that will hold the nozzles aligned with the joint approximately 1 inch above the pavement surface. The height, angle of inclination, and size of the nozzles shall be adjusted as necessary to secure satisfactory results.
- C. Preparation of Joints: Immediately before installation of the joint sealer, the joints shall be thoroughly cleaned until all laitance, curing compound, filler, and protrusion of hardened concrete are removed from the sides and upper edges of the joint space to be sealed. Any irregularities in the joint seal and the joint face shall be corrected prior to installation of the joint seal. The following sequence of operations shall be used to clean the joint.
1. A power-driven concrete saw blade shall be used to saw through all sawed and filler-type joints to loosen and remove material until the joint groove is clear and open to full specified width and depth.
 2. If the joint has opened 1/16 inch or more as measured at the slab edge at the time of final sawing, the sawed width shall be increased so that the net width will meet the prescribed tolerances when the joint is closed.
 3. All loosened material shall be blown from the joint by compressed air.
 4. The exposed concrete joint faces and the pavement surfaces extending at least 1/2 inch from the edges of joints shall then be sandblasted using a multi-pass technique until the surfaces are free of dust, dirt, curing compound, filler, and any other material that might prevent ready insertion and bonding of the joint seal to the concrete.

5. Sand of proper size and quality shall be used in the sandblasting operation.
 6. A minimum 150 cfm of air at a nozzle pressure of 90 psi shall be used for sandblasting and for final cleaning of the joints.
 7. After final cleaning and immediately prior to filling, the joints shall be blown out with compressed air and shall be dry and free of sand.
- D. Time of Installation: Joints shall be sealed immediately following the concrete-curing period or as soon thereafter as weather conditions permit. The concrete inside the joints shall be surface dry, and atmospheric and pavement temperatures shall be above 40 degrees F at the time of installation of the joint seal. Open joints that cannot be sealed under conditions specified herein shall be provided with an approved temporary seal to prevent infiltration of foreign material. When rain interrupts sealing operations, joints shall be recleaned prior to installing the joint seal.
- E. Sequence of Installation: Longitudinal joints shall be sealed first, followed by transverse contraction joints, and then all other joints.

3.06 FIELD QUALITY CONTROL

- A. Concrete Testing (Also refer to Section 01400-2.03):
1. Concrete tests shall be made as work progresses.
 2. Standard 6 x 12 cylinders shall be used in concrete tests. Identify each test by number, mix, amount of admixture, origin of sample in the project, the date test specimen was made, the date test specimen was tested, the amount slump determined, and the compressive strength test results.
 3. Make one group of four (4) test cylinders for each 100 cubic yards of concrete poured or not less than four (4) test cylinders for any amount of concrete less than 100 cubic yards poured in one day work. The test requirements specified herein apply for each class of concrete poured.

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4. Mold and cure four test specimens for each strength test in accordance with ASTM C 31.
 5. Test specimens in accordance with ASTM C 39. Test two specimens at 7 days for information and two at 28 days for acceptance.
 6. Make slump tests for each strength test and whenever consistency of concrete appears to vary in accordance with ASTM C 143.
 7. The District will arrange and pay for concrete tests. The Contractor shall cooperate and coordinate with the Engineer for this work.
- B. Evaluation and Acceptance:
1. The strength level of the concrete will be considered satisfactory if 90% of the strength test results, and the averages of all sets of three consecutive strength and no individual test result is below specified strength by more than 500 psi.
 2. If the strength of cylinders falls below specified compressive strengths, the Engineer shall have the right to order a change in the mix proportions for the remaining concrete being poured.
 3. If required by the Engineer, obtain and test core specimens from hardened concrete in accordance with ASTM C 42.

END OF SECTION

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SECTION 02625-1
SITE WORK CONCRETE

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Curb, gutters, and sidewalks.
- D. Manholes, catch basins, concrete collars and drainage structure.
- E. Pipe bedding and encasement and thrust blocks.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 02221: Trenching, Backfilling and Compacting.
- B. Section 02400: Storm Drain Lines.
- C. Section 03200: Reinforcing Steel.
- D. Section 01400: Tests and Inspections.

1.03 REFERENCE SPECIFICATIONS: "Standard Specifications for Public Works Construction", 1985 edition.

1.04 INSPECTION AND TESTING

- A. Inspection and testing services will be provided by a testing agency which meets the requirements of Section 01400.
- B. Concrete Testing During Construction: Sample and test in accordance with Standard Specification Subsection 201-1.1.4 for each 150 cubic yards or fraction thereof of concrete placed in any 1 day, sample and test as follows:
 - 1. Obtain 4 samples for compressive strength test.
 - 2. Obtain 2 samples for slump and air content tests.
 - 3. Determine ultimate compressive strength by making 2 tests at 7 days and 2 tests at 28 days.

4. Determine slump by making 1 test.
5. Determine air content by making 1 test.

1.05 CONTRACTOR SUBMITTALS

- A. Certificates of Compliance: Submit certificates of compliance for all materials and products, except those requiring a laboratory or mill test report.
- B. Mill Test Reports: Submit mill test reports for each heat and size of reinforcing steel, showing physical and chemical analyses.
- C. Laboratory Test Reports: Submit laboratory test reports of all testing.
- D. All submittals in accordance with the Special Provisions.

2.00 PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM Designation C150, Type II.
- B. Coarse Aggregate: Standard Specification Subsection 200-1.4.
- C. Fine Aggregate: Standard Specifications 200-1.5.1 to 200-1.5.5, inclusive.
- D. Water: Standard Specification Subsection 201-1.2.3.

2.02 PORTLAND CEMENT CONCRETE

- A. Concrete curbs, gutters and sidewalks in accordance with Standard Specification Subsection 201-1, Class 520-C-2500, 4-inch maximum slump.
- B. Pipe collars, pre-cast manhole components, catch basins and drainage structures in accordance with Standard Specification Subsection 201-1, class 560-C-3250, 5-inch maximum slump.
- C. Pipe bedding and encasement in accordance with Standard Specification Subsection 201-1, Class 420-C2000, 4-inch maximum slump.

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SECTION 02625-3
SITE WORK CONCRETE

3.00 EXECUTION

3.01 CURBS, GUTTER AND SIDEWALKS

- A. Construct curbs, walks, and gutters in accordance with Standard Specification Subsection 303-5.

3.02 SITE WORK CONCRETE STRUCTURES

- A. Construct all other site work concrete structures in accordance with Standard Specification Subsection 303-1.

END OF SECTION

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SECTION 02831-1
CHAIN LINK FENCING

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Provide permanent chain link fencing at Tire Shop and Tire Storage.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Miscellaneous metal other than specified herein - refer to Section 05500.
- B. Concrete - refer to Section 02625.

1.03 SUBMITTALS

- A. Submit shop drawings, manufacturer's technical data and material specifications, and samples, as applicable.
- B. Design: Shop drawings shall include complete engineering drawings and calculations for posts and footing sizes. If required, provide heavier members than specified, but no lighter than specified.

2.00 PRODUCTS

- 2.01 GENERAL: All materials shall conform with Section 206-6 of the Standard Specifications and the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. If specified models are discontinued, the Contractor shall furnish the manufacturer's updated model at no additional cost to the District.

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SECTION 02831-2
CHAIN LINK FENCING

2.02 MATERIALS

- A. Fabric shall be 1-3/4" nominal, hot dipped galvanized after weaving, and shall conform with ASTM A392. Fabric shall be 9 gauge wire, with twisted and barbed selvage at top and bottom.
- B. Posts, rails and diagonal bracing at corners shall be standard pipe, as per ASTM A120. Terminal posts and corner posts shall be 3" O.D. Top and bottom line posts and corner bracing shall be 2-1/4" O.D.
- C. Tie wire for tying fabric to rails and intermediate posts shall be galvanized wire as per ASTM A112, same gauge as fabric. Ties for securing fabric to tension wire shall be 10 gauge galvanized hog rings. Ties shall be spaced approximately 18" on center.
- D. Fabric bands for securing fabric to terminal posts shall be galvanized 14 gauge x 5/8" wide, spaced vertically at 14" on center.
- E. Fittings, including post tops, couplings, clamps, and stretcher bars shall be heavy malleable iron, or pressed steel, hot dipped galvanized.
- F. Gates shall have same fabric as fence, with 3" O.D. pipe frame. Provide hinges and latch suitable for padlock at swing gates. Provide rollers, track and latch suitable for padlock at rolling gates.

3.00 EXECUTION

- 3.01 Field welds shall be cleaned off of any flux and spatter, all damaged galvanizing removed, and then coated with dry galvanizing.
- 3.02 All posts shall be set in concrete for a full depth of 24" in a 30" deep hole. Exposed surface of concrete shall be rounded to shed water.
- 3.03 Line posts shall be spaced at 10' or less on center.

END OF SECTION

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SECTION 03200-1
REINFORCING STEEL

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of General Provisions and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Furnishing all reinforcing steel.
- D. Placement of reinforcing steel and mesh in concrete work including dowels in concrete for masonry work.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Tests and inspections - refer to Section 01400.
- B. Placement of reinforcing steel in masonry - refer to Section 04200.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawings, manufacturer's technical data and material specifications, as applicable.
- B. Storage of Materials: Store reinforcing steel at site to permit easy access for proper inspection and identification of each shipment. Separate material of each shipment for size and shape.
- C. All concrete shall be reinforced, except paving and certain minor items of a non-structural nature. For conditions not specifically shown or detailed, framing and reinforcement shall be provided in a manner consistent with other similar details or conditions shown on the drawings.

2.00 PRODUCTS

2.01 GENERAL

- A. All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.
- B. All reinforcing shall be clean, new stock, conforming to ASTM Designation A615. All steel shall be tested and reported or identified and certified as specified in Section 01400.

2.02 MATERIALS

- A. Bars: Conform to ASTM A615-81, Grade 40 for No. 4 and smaller and 60 for all other.
- B. Mesh: Conform to ASTM A185.
- C. Tie Wire: Annealed copper-bearing steel wire of at least 16 gauge.
- D. Chairs, Spacers, Supports and Other Accessories: Except as herein otherwise specified, these items shall be of standard manufacture conforming to ACI-315, approved steel type and sizes. Where reinforcing is to be placed on grade, use suitable sized dense precast concrete supports with embedded wire ties. All accessories shall be galvanized or have other approved corrosion resisting coating.

3.00 EXECUTION

3.01 PLACING REINFORCING STEEL

- A. General: Provide reinforcing steel in sizes, gauges, lengths and bent to shape as indicated on the drawings. Reinforcing shall be thoroughly cleaned of loose mill scale, rust, oil and all coatings that will destroy or reduce the bond before placing and again before concrete is placed. Reinforcing shall be accurately positioned and secured in place. Fabricate in accordance with CRSI Manual of Standard Practice.
- B. Support: Use dense concrete blocks with embedded wire ties to hold reinforcement above earth at proper distance. Use wire chairs or bolsters for support reinforcement in forms in conformance with applicable requirements of CRSI. No aluminum will be permitted. Provide approved corrosion-resisting coating for accessories used on exposed concrete surfaces.

- C. Installation: Conform to ACI 318 and as follows: Reinforcement shall be wired together at all points where bars cross, and shall be lapped as shown or specified. Stagger splices in general so that adjacent splices will be 4'-0" apart. Care shall be taken to maintain proper clearance, 1-1/2" minimum between parallel bars. Make lapped splices in a manner to provide laps required by structural drawings. Secure dowels and bars extending through construction joints against displacement before concrete is placed, and clean concrete adhering thereto immediately after pour, while incrustations are soft.
- D. Protection: Protect reinforcement by thickness of concrete as indicated on drawings, or according to ACI-318.
- E. Tolerances: Fabrication tolerances shall conform to requirements of CRSI "Recommended Practice for Placing Reinforcing Bars".

3.02 WELDING OF REINFORCING STEEL

- A. Welding shall be done by certified welders in accordance with AWS Standard Code D1.4, using low hydrogen coated electrodes E70 series. All welding of reinforcing steel shall be done under continuous inspection, supervision of a qualified Registered Deputy Laboratory employed Inspector as specified in section "Tests and Inspections".
- B. Welded Bars: Reinforcement to be welded shall be indicated on the approved plans and the welding procedure to be used shall be specified. The specifications shall contain requirements in conformity with AWS D1.4.
- C. The carbon equivalent (C.E.) of reinforcing bars or splice material shall be calculated from the chemical composition as shown in the mill report by the following formula:
$$\text{C.E.} = \%C + \%Mn/6 + \%Cu/40 + \%Ni/20 + \%Cr/10 - \%Mo/50 - \%V/10$$
- D. If mill test reports are not available, chemical analysis shall be made of bars representative of the bars to be welded. ASTM A706 bars may be assumed to have a C.E. - 0.55. Bars with a C.E. above 0.75 shall not be welded. No welds shall be made at bends in reinforcing bars.

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SECTION 03200-4
REINFORCING STEEL

- 3.03 MESH FABRIC: Roll out, straighten, cut to required size, and lay out flat in place. Lap one full mesh at sides and 12-inch at ends and wire to each other reinforcement. Stagger end laps. At edges of slab and joints, extend mesh to within one inch of pour. As concrete is poured, lift mesh reinforcement in slabs at intervals to insure proper embedment. Locate mesh in center of slab unless indicated otherwise on the drawings.

END OF SECTION

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SECTION 03300-1
CONCRETE WORK

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of General Provisions and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Provide all concrete work of strengths and weights as indicated on drawings. Where not indicated, concrete shall be not less than 2,500 p.s.i.
- D. Construction and removal of forms for concrete including shoring, bracing, cribbing, centering and screeds.
- E. Placement, leveling, curing, protection, bonding, jointing, filling, grouting, sacking, honing, rubbing of concrete and finishing of concrete surfaces, except as otherwise specified.
- F. Bonding, drypacking, grouting, setting of plates, bolts, dowels, and setting and securing of sleeves, inserts, anchorage and embedded items in forms.
- G. Setting screeds and fine grading for concrete cast on grade.
- H. All miscellaneous concrete and related work not otherwise provided for.
- I. Housekeeping pads for equipment.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Reinforcing steel - refer to Section 03200.
- B. Sleeves, pipes, conduit, hangers, inserts, ties, anchor bolts and anchors and miscellaneous hardware required by other trades to be furnished and located by trades requiring same.
- C. Tests and Inspections: Refer to Section 01400.

- D. Design Mixes: Refer to Section 01400.
- E. Concrete pavements: Refer to Section 02615.
- F. Site concrete work: Refer to Section 02625.

1.03 REQUIREMENTS

- A. Submittals: Submit mix designs, shop drawings, manufacturer's technical data and material specifications, certificates and samples, as applicable.
- B. Grades and Uses of Concrete: Refer to General Notes, Structural Plans and Paragraph 3.01 of this section.

1.04 Conform with all applicable requirements of ACI Standards 301-81, 302-1R-80, 303-81, 304-73, 305-72, 306-66, 308-81, 309-74, 347-78.

1.05 INSPECTION

- A. Each truckload of concrete will be measured for slump by slump cone test, ASTM C143. A truckload of concrete shall be rejected if the slump exceeds slump specified in Paragraph 3.01 C except that, if slump is less, water may be added to achieve specified slump.
- B. Delivery of each truckload of concrete shall be timed so all loads will be deposited in the same elapsed time from start of mixing. Telephone contact with the plant shall be maintained as required for a well coordinated placement.

1.06 CONDITION OF CONCRETE SURFACES WITH EPOXY COATINGS

- A. The concrete surfaces shall be of sound structural grade and have a smooth wood float finish or fine broom finish, free of all ridges, fins, voids or air entrained holes.
- B. Concrete shall be cured by water curing method. Curing compounds or chemical curing agents of any type shall not be used.
- C. Concrete shall be cured at least 28 days and not coated until it is completely dry. Where required, the base slab shall be sloped for proper drainage.

- D. Saw-cut joints or expansion joints shall be properly installed over all structural supports or as recommended by the coating manufacturer.
- E. Voids, rock pockets and excessively rough surfaces shall be finished with an epoxy grout or ground to match the unrepaired areas.
- F. All surfaces shall be free of visible moisture, grease, dirt and corrosion. Remove all fresh asphalt, resin-based curing compounds, loose scale and any other foreign deposits.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacturer.

2.02 MATERIALS

- A. Concrete materials:
 - 1. Portland Cement: Conform to ASTM C150, Type I or II, low alkali, tested and of adequate chemical and physical characteristics, possessing a demonstrated low shrinkage potential. Do not change brand or type of cement during progress of work without prior permission of Engineer.
 - 2. Aggregates (Normal Weight Concrete):
 - a. Conform to ASTM C33, and as specified herein. Each specified or required size graded and batched separately. Submit pit source and characteristics of each type aggregate to Architect prior to designing mixes.
 - b. Sources of Aggregate: From approved deposits.

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 CONCRETE WORK

- c. Fine Aggregate: Washed natural sand of hard strong particles. To contain not more than 1% of deleterious material. Grading per grading table. Fineness modulus, 2.85 to 3.15.
- d. Coarse Aggregate: Clean washed gravel or sound crushed rock. Not more than 5% flat, thin, elongated or laminated material. Not more than 1% deleterious substances. 1" aggregate graded from 1/4" to 1". Fineness modulus, 6.90 to 7.40. 1-1/2" aggregate graded from 1/2" to 1-1/2". Fineness modulus 7.80 to 8.20.
- e. Aggregate Size Requirements: Largest practicable aggregate size shall be used for each condition of placement subject too the following limitations. Maximum size in any case shall not exceed:
 - (1) 3/4 of the clear distance between reinforcing and form surfaces.
 - (2) 1/3 of the depth of any slab section.
 - (3) 1/5 the minimum clear nonreinforced width in vertical sections.
- f. Grading of Aggregates - Table:

Minimum and Maximum Percentages Passing by Weight

<u>Sieve</u>	<u>Size</u>	<u>Combined 1" and Fine</u>	<u>Combined 1-1/2" 1" and Fine</u>
1-1/2	inch		95 to 100
1	inch	98 min.	75 to 90
3/4	inch	70 to 90	55 to 77
3/8	inch	45 to 65	40 to 55
#4	mesh	31 to 47	30 to 40
#8	mesh	23 to 40	22 to 35
#16	mesh	17 to 35	16 to 30
#30	mesh	10 to 23	10 to 20
#50	mesh	2 to 10	2 to 8
#100	mesh	0 to 3	0 to 3

- 3. Water used for mixing and curing concrete shall be clean, free from acids, alkalis, oil, decayed vegetable matter sugar, citrates, and shall be suitable for drinking.

4. Admixtures:

- a. A water-reducing admixture may be used for better workability, shrinkage reduction, plasticity, and adhesiveness of all concrete conforming to ASTM C494, Type D (water reducing and retarding) "Pozzolith 344N" manufactured by Master Builders. Where retardation is required, use Pozzolith 300R.
- b. Relative durability factor of 100% instead of 80% (as required by ASTM C494) shall be used. No admixture with rapid or excessive bleeding or which will require concrete to be reconsolidated, revibrated or retempered, shall be used.
- c. No product disclaimers of responsibility by manufacturers will be accepted or approved.
- d. When field service is requested for admixture use, a qualified concrete technician employed by the manufacturer shall be available to assist in proportioning concrete materials for optimum use, to advise on proper use of admixture and adjustment of concrete mix proportions to meet job site and climatic conditions. The concrete mix must meet ACI 318 standards.

B. Forming Materials:

1. Unexposed or Plastered Surfaces: New DFPA "Plyform B-B," or sound D.F. #2 and better boards and plank, milled shiplap or T&G.
2. Exposed Concrete Surfaces: High density overlaid plywood, form coated and edge sealed or Burke's "Neotex" form panels.
3. Where applicable, apply approved bond breaker prior to setting reinforcing steel mat. If rain occurs, remove reinforcing prior to reapplying bond breaker.
4. Metal Slab Forms: For self-supported slabs may be used in lieu of plywood where appearance is not a factor, if in good condition with straight even side joints capable of being securely closed to avoid leakage of concrete. Patented, prefabricated wall form system composed of metal frames containing plywood surfaces may be used upon approval of the Engineer.

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SECTION 03300-6
CONCRETE WORK

5. Studs, Wales, Shoring, Centering, Bracing: #2 grade or better D.F. of adequate size, utilizing doubled wales.
 6. Form Joint Filler for Exposed Concrete: Durable, insoluble paste wood filler similar and equal to "Plastic Wood" or "Wood Dough", well-sanded and sealed with penetrating sealer.
 7. Form Coating: Surface-conversing type form release compound, reapplied for each reuse to cleaned forms. Coating shall not leave residual matter or adversely affect bonding of finish material. Mineral oils or other nondrying ingredients are not permitted. "Nox-Crete" by Nox-Crete Chemicals, "Rich-Coate" by Neptune Manufacturing or equal.
 8. Forming Accessories: For exposed surfaces, use "Burke Architectural Snap Ties," "Dayton Sure Grip and Shore Company", or equal. Ties shall have a 1" diameter plastic cone spacer allowing a full 1" break-back. Form tie plugs shall be precast concrete, color as approved by the Engineer. Plug surface shall be dense and smooth. Ties for walls retaining earth shall not leave holes through the entire wall section and shall break back not closer to the exterior surface than 1-1/2". No wood, absorbent or compressible material shall be used for spreaders.
 9. Wood nailing blocks, grounds, bucks, where permitted, shall be clear D.F., milled dovetail shape, dip treated in "Woodlife" and dried at least 12 hours prior to use.
- C. Accessory Materials:
1. Curing Materials:
 - a. Curing materials, shall exceed the moisture requirement of ASTM C309. "Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete".
 - (1) "Masterkure" manufactured by Master Builders, "Thompsons Sealer" manufactured by Thompson, Inc., or equal.

- (2) Material shall provide moisture retention not to exceed a loss of 0.555 gm/cm² when used at a coverage of 450 sq. ft. per gallon tested in accordance with ASTM C156.
- b. Cloth Curing Mats: Conform to ASTM Designation C440.
- c. Waterproof Curing Paper: Conform to ASTM Designation C171 "Sisalkraft".
- 2. Control Joint Sealers and Fillers:
 - a. For sealing joints in exposed concrete slabs use "Epibond 585" manufactured by Furane Plastics or "Colma Joint Sealer" manufactured by Sika Chemical Co., "Hornflex Pourable" W.R. Grace & Co., gray color.
 - b. Filler-Sealer for Joints Under Resilient Flooring: Refer to Division 9 for neoprene based underlayment compound, applied as part of the resilient floor covering work.
- D. Cement Grout and Drypack:
 - 1. Precision support grout shall be Masterflow 713 Grout manufactured by Master Builders, Cleveland, Ohio consisting of a hydraulic cementitious system, specially graded and processed natural fine aggregate and additional technical components. Other products will only be acceptable providing written approval of the engineer is obtained prior to bidding. Acceptance will be granted only upon satisfactory evidence proving that the substitute material meets all of the following requirements, conforming to CRD 621-81 Corps of Engineers.
 - a. Free of gas producing or releasing agents.
 - b. Free of oxidizing catalysts.
 - c. Free of inorganic accelerators, including chlorides.
 - 2. Drypack: Premixed grout shall be used - use only enough water to make a stiff mix consistency. Premixed grout shall be used under base plates per manufacturer's recommendations.

- E. Concrete Hardener Materials: Shall be a pre-mixed, ready-to use product comprised of specially processed, size-graded metallic aggregate, combined with a cementitious binder, plasticizing and water reducing admixtures; color as directed by Engineer; other products similar in nature and meeting or exceeding these specifications are acceptable upon approval by the Engineer. Anvil-Top 200-I Master Builders or equal approved.
- F. All Curing-Compound for Concrete Floors including Hardened Concrete: Shall be equal to Master-Kure as manufactured by Master Builders. Other products similar in nature and meeting or exceeding these specifications are acceptable upon approval by the Engineer.

3.00 EXECUTION

3.01 CONCRETE PROPORTIONING

- A. General: Refer to "Tests and Inspections" for these provisions. Mix designs to produce concrete as called for in the General Notes on the Structural Drawings, minimum ultimate strengths at 28 days, dense, cohesive, and plastic.
- B. Admixtures: If used, adjust water to secure same workability and slumps as concrete without admixtures. Admixtures for concrete in contact with metal deck shall not contain chloride salts.
- C. Consistency: Water shall not exceed amount permitted in mix designs. To be checked by the slump test, ASTM Designation CVC143, to be made when test cylinders are cast, and additionally as required. Maximum slumps as follows: and shall not be exceeded:
 - 1. Slabs on grade and fill slabs: 3"
 - 2. Self-supported beams and columns: 4"
 - 3. Footings: 3"
 - 4. Reinforced walls: 5"
 - 5. Thin reinforced walls (less than 8" and congested situations): 6"

3.02 MIXING OF CONCRETE

- A. Ready-mixed concrete shall conform to ASTM C94 and T22-94305-c Method B and C, and as follows:
- B. Plant Requirements: Plant shall be equipped:
 - 1. To handle at least 4 sizes of aggregate to prevent intermixing before placing in weight hopper.
 - 2. With an accurate continuous-reading moisture meter connected to sand compartment of the weight hopper.
 - 3. Approved, positive method of dispensing admixtures accurate to within 3%.
- C. Water and Mixing Time: Concrete, at batching shall have a portion of the required water withheld (approximately 2-1/2 gals/cu.yd.) to be added under supervision of Job Inspector. Mix minimum 3 or more minutes after last water is added. Concrete shall be in final position within 1-1/2 hours after first water is added to batch provided concrete is still plastic. Retempering is not permitted.

3.03 FORM CONSTRUCTION

- A. General: Substantial, unyielding, true to line, plumb, level, and tight boards run horizontally, driven up tight, secured to each stud. Responsibility of Contractor, but subject to approval of the Engineer.
- B. Form ties shall be evenly spaced vertically and horizontally. Form ties in forms with ribbed liner shall be located in the recessed portion of the concrete rib.
- C. Formwork Accuracy: Deflection of $0.0025 \times \text{span}$ maximum. Tolerances as required by ACI 347.
- D. Form Joints: Treat all butt joints with closed cell vinyl foam gaskets fo the size necessary to produce a tight seal. Pressure sensitive tape shall be applied to the joints on the interior of the form. Care shall be taken to prevent displacement of the tape.

- E. Vertical and horizontal construction joints or pour joints where required shall occur only when approved by the Engineer.
- F. Coordination: Form for and provide slots, openings, chases, recesses, grounds, nailers, and screeds required by other trades and subsequent work. Assure that conduit, pipes, sleeves, anchors, hangers, ties, etc. are secured in forms before placement of concrete.
- G. Wood in Forms: No wood, temporary or permanent, to be used or installed inside forms, except for items specified.
- H. Openings for Cleaning and Form Removal: All blind areas and dead spaces shall be provided with openings to permit form removal and cleaning out of combustible debris and rubbish. After completion of cleaning, the blockout or opening shall be filled in.
- I. Earth backing may be used for forms for footings, etc. where excavations maintain clean, firm shape. Earth form shall be 1" wider than shown on all sides.

3.04 CONVEYING AND PLACING CONCRETE

- A. General:
 - 1. Clean and wet forms before placing concrete, and clean excavations of loose material.
 - 2. Time of Placing: Not until reinforcement, sleeves, anchorage, conduit, inserts are in place and have been inspected by the Engineer.
 - 3. Pouring Against Hardened Concrete Surfaces: Remove laitance and incrustations and expose 1/4" of solidly embedded sound aggregate. Wet surfaces; slush vertical surfaces with neat cement paste before placing new lift.
 - 4. Concrete conveying and placing shall conform with the requirements of ACI 304-73, except as herein modified. A description of methods and sequence of placement shall be determined in the pre construction conference and confirmed in writing by the Contractor to the Engineer. Proposed method shall be used in fabricating the sample panel.

B. Execution:

1. Conveying: Care shall be taken with conveying equipment to prevent contamination of exposed concrete by other mixes. Method of conveyance shall be the same for all exposed concrete unless approved by the Engineer.
2. Depositing:
 - a. Lifts shall be a minimum of 12" and a maximum of 18" deep.
 - b. Concrete shall not be dropped more than 6'. Appropriate placement devices shall be used to deposit concrete.
 - c. Place concrete in approximate final location. Do not move concrete with vibrators.
 - d. Stop pours at form joints only.
 - e. Place concrete directly into piles with an elephant trunk or tremie. Concrete shall not be placed when the temperature is above +90°F or below +45°F or if likely to go above +90°F or below +45°F, before the concrete has had its initial set, unless the Contractor takes special precautions to control the temperature of the concrete during that period of time.
3. Consolidation (Internal Vibration):
 - a. Internal vibration shall be used to consolidate all exposed concrete. Maintain a standby vibrator at all times. If a vibrator breaks down, use the standby and obtain another vibrator for standby use.
 - b. Vibrator insertation shall be approximately 18" cc maximum (so that affected areas overlap) within 4" of the form. Do not vibrate concrete within 2'-0" of an unconfined edge. Penetrate preceding lift 6" minimum when one exists. Hold vibrator in concrete until consolidation is complete and withdraw slowly.

4. Compacting: Thoroughly tamp and space fresh concrete to insure flow into all parts of forms and around reinforcement. Mechanical high-frequency, low amplitude vibrators producing minimum 7500 impulses per minute shall be used, one vibrator at each pour location per 10 yards per hour. Key pour lifts. Do not vibrate forms unless previously approved by the Engineer. Spade at form faces to bring up entrapped air and assure good surfaces with minimum air bubble pitting, using properly designed hardwood spading tools that will not damage form surfaces or entrap air.

3.05 PUMP METHOD OF PLACEMENT

- A. Pump method of placement may be authorized by approval from the Engineer for certain conditions. The work shall be the responsibility of the Contractor, for the efficiency of the method and the adequacy of the results obtained.
- B. Pumps used shall have a demonstrated capacity to deliver to the forms the types of mixes required by these specifications, at the slumps specified in Paragraph 3.01C, under average job conditions, or those required by this work.

3.06 CURING OF CONCRETE

- A. Cure all concrete for at least ten days. Forms maintained tight and wet are considered adequate curing. Fresh backfill is adequate curing for footings and subgrade walls. Expose concrete surfaces shall be cured by application of additional procedure.
- B. Horizontal Concrete and Slabwork: Commence curing during finishing of surfaces immediately after "bleed water" disappears by use of fine mist-type fog spray and continued without interruption until application of long-term curing, which shall be done after final troweling when concrete has attained final permanent set and bleeding has stopped. Long-term curing shall be done as specified below.

- C. All Slab Surfaces: Those receiving separate finishes such as toppings or tile setting beds shall be moist cured or cured with reinforced kraft paper or curing mats, maintained moist. Exposed surfaces or those receiving resilient floor finishes may be cured as specified above, or with specified liquid membrane-forming curing compound, applied completely and evenly in strict accordance with manufacturer's directions in two coats, one 90° to the other. Liquid curing compound shall be applied to all formed surfaces immediately upon loosening of forms.
- D. Curing shall conform to ACI 308. Proposed methods shall be used in fabricating the sample panel.

3.07 FORM REMOVAL

- A. Forms shall be removed a minimum of 48 hours and a maximum of 72 hours after placing.
- B. Remove forms at approximately the same elapsed time after the pour throughout the job.
- C. Remove tie cones as soon as forms are removed. Care shall be taken when removing cones to avoid spalling the edges of the cone hole.
- D. Forms, shoring and centering shall not be removed until concrete has hardened to permit removal safely and as indicated below:
 - 1. Footings, foundation walls, piers (not over 6' high) 3 days minimum.
 - 2. Walls, grade beam side forms - 5 days minimum, or when concrete has attained 2/3 of specified 28 days strength, whichever is longer.
- E. Take care in removing forms from exposed surfaces that surfaces are not marred or gouged, that corners are true, sharp and unbroken. Break back snapties neatly, without spalling tie holes at surface.
- F. No steel spreaders, ties, or other metal shall project from or be visible on any concrete surface.

- G. Tie holes shall be cleaned, flushed with water and patched while concrete is green, as specified hereinafter.

3.08 STOPPAGES AND CONSTRUCTION JOINTS

- A. The Engineer shall approve location of construction joints. Stop pours level with vertical keys as detailed. Maximum horizontal dimension of a single unit of placement, 80 feet in a straight line, coincident with designed architectural features.
- B. Provide keys and dowels at construction joints as indicated. Horizontal construction joints required to be bonded to subsequently placed concrete to be sand-blasted or treated with sprayed-on retardant to insure bonding surface. Wash surface to expose aggregate after section has set.
- C. Construction joints (pour joints) in slabs shall be made with "Burke" metal joint form as specified below.

3.09 SLAB CONTROL JOINTS

- A. Joint Spacing: Provide control joints at locations indicated on the drawings, or if not shown, locate joints at 20'-0" o.c. maximum spacing (column center-lines) using 1" tooled joint made with jointing tool capable of producing joint 1" deep by 1/8" wide at surface with slightly rounded edges.

3.10 FINISHING EXPOSED VERTICAL CONCRETE SURFACES

- A. Provisions herein apply to all concrete exposed in the finish work, painted or plain, exterior or interior.
- B. Fins, ridges, high spots shall be honed smooth with abrasive brick or power grinders while concrete is green, immediately after specified form removal. Excessive honing is not permitted. Grind all form marks flush.

- C. Rock pockets, honeycomb, sand streaks, shall be cut out at least 1" deep with sides perpendicular to surface, flushed out, coated with neat cement paste and filled with dry pack in at least two layers to overfull, cured and then honed to final correct surface, line or corner
- D. Thoroughly clean all surfaces of stains, spatter, dust, loose materials, etc., after the building is completed. Contractor shall use a 1/20 muriatic acid or trisodium phosphate wash if directed by the Owner's representative. Rake out and clean roots of all joints to receive caulking.
- E. Exposed exterior formed concrete where painting is required shall have a grout cleaned (sacked) finish.
- F. Any patching required shall be the same color as the surrounding concrete.

3.11 PATCHING

- A. All surface defects or damaged areas shall be repaired as soon as possible after form removal to allow patch work to age as nearly as possible along with base material.
- B. Repair techniques shall have been perfected in tests upon the sample panel.

3.12 PLUGS

- A. Form Tie Plugs: Precast plugs in tie holes shall be recessed 1/4" below finished surfaces of concrete. Use epoxy mastic to secure plugs.
- B. Tie plugs shall be Burke "Snaplugs" or similar product by Symons, or equal.
- C. Patch recess to match color of adjacent concrete.

3.13 COOPERATION - EMBEDDED ITEMS

- A. Cooperate with all trades to ensure all conduit, piping, sleeves, inserts are provided for, or properly installed and secured in correct position. Contractor is responsible for correct location of all items. Piping (unless shown on drawings) shall not be cast into concrete, but may pass through in sleeves.
- B. Provide all required openings, reinforce same as required. Set rough hardware provided by others.
- C. Conduits not permitted except where specifically detailed. Conduit and piping below slab on grade to be encased in belled slab. Provide sleeves for pipes or conduit required to pass through walls as approved by the Engineer.

3.14 ANCHORAGE, MISCELLANEOUS METAL AND INSERTS

- A. Provide and install, or install those provided by others accurately in sizes and in locations shown or required.
- B. Responsibility: Accrues to the Contractor for all such items substantially in place in proper locations. Also for proper projection of anchor bolts.

3.15 DEFECTIVE CONCRETE

- A. Concrete not meeting minimum strength, nor formed as indicated, not true, plumb or level, not to required elevations, containing cracks detrimental to performance or appearance, containing shavings, debris, or has honeycombs or voids, shall be cut out, removed and replaced or repaired to the Engineer's satisfaction.
- B. Work required to repair, patch, replace improperly cleaned surfaces (by sandblasting if necessary) or otherwise make good any defective concrete shall be done promptly by Contractor at his expense, including all expense of additional inspection, tests of supervision made necessary as a result of defective concrete. Also applies to repairing holes resulting from taking cores, if cores are required.

- 3.16 CONCRETE FINISHES FOR FLAT WORK: Flat surfaces shall be screeded to the required levels and any excess water and laitance shall be removed. Concrete shall be compacted with a grid tamper and then floated to a true, level surface. Tolerance shall be as specified in ACI 117.
- A. Interior floor slabs which are to remain exposed shall receive a steel trowel finish in two troweling operations. After the concrete has hardened sufficiently so that the fine particles do not work to the surface, the concrete shall be hand or machine troweled to a smooth surface. After hardening sufficiently the surface shall receive a light or heavy broom finish as indicated.
 - B. Outdoor flatwork and exterior concrete walks shall have a hair broom finish. Submit samples of textures for approval.
 - C. Hardened Concrete: All concrete flatwork surfaces designated in the plans or specifications as having a hardened concrete shall be treated with the specified product. Apply at the rate as recommended by manufacturer in accordance with manufacturer's directions. Apply a light broom finish.
 - D. Interior Float Finish: Slabs to receive architectural flooring such as ceramic tile, shall be finished with a wood float and lightly broomed and brushed clean to provide bond for the finish materials.
 - E. Interior slabs to receive resilient floor covering shall be troweled, but not burnished.
 - F. Finish for concrete stair treads and ramps shall be a non-slip broom finish as shown or per details on the drawings.
 - G. Provide other finishes where noted.

3.17 EXTREME WEATHER PROTECTION

- A. Do not place concrete when temperature is below +45⁰F or above +90⁰F at the time of placing or it is likely to go below +45⁰F or above +90⁰F before the concrete has had its initial set. Precautions must be taken to assure concrete temperature of +70⁰F for at least 24 hours, and between +45⁰F and +90⁰F for an additional nine days, unless climatic conditions make longer periods of controlled concrete temperature desirable. During cold weather, concrete placement shall conform with requirements of "Recommended Practice for Winter Concreting" ACI 306. During hot weather, concrete placement shall conform with requirements of "Recommended Practice for Hot Weather Concreting" ACI 305. Protective measures proposed must be submitted for the Architect's approval. Do not mix chemicals or other foreign materials with concrete for purpose of preventing freezing or drying out. In freezing weather, an approved membrane sprayed curing compound shall be used in lieu of moist curing.
- B. Do not allow the concrete to freeze in cold weather or dry out in hot weather under any circumstances during the curing period. Provide all the equipment necessary to prevent any of these two events to happen. Should the Contractor allow any concrete to either freeze or dry out, it may be required, at the discretion of the Architect that the concrete in question be removed and replaced with new concrete.
- C. Keep permanent temperature record showing date and outside temperatures. Take thermometer readings at start of work in morning and noon and high-low during night. Record readings obtained.

- D. Heating for Cold Weather Concreting:
1. Provide and maintain space heaters to provide temporary heat 24 hours per day to protect curing concrete work when outdoor temperatures at site are below +55°F. Distribute space heaters to provide inside temperature of +55°F in parts of building where concrete is being placed or being cured. When temporary heat is required, enclose work with tarpaulins, ballooned at top and bottom so that all sections of work will be maintained at +55°F. Enclosure: wind-proof and strong enough to resist weather and wind conditions. Enforce strict fire prevention methods. Take caution to direct heat so that the concrete is not subjected to excessive temperatures or drying out. In place of space heaters for outside form surfaces, vapor-proof blanket insulation may be used, provided that above concrete temperatures are maintained. Provide adequate and tight moisture barriers for at least 5 days to prevent drying out of concrete.
 2. Temporary Heat: Smokeless hot air unit heaters or steam. Salamanders not permitted. Keep all temporary heating equipment properly fueled and attended.
- E. Whenever there is doubt as to suitability of weather conditions, the Contractor proceeds with concrete work at his own risk.

END OF SECTION

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SECTION 04220-1
CONCRETE BLOCK MASONRY

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of General Provisions and Division 1 apply to the work of this section.
- B. Provide concrete block units.
- C. Place reinforcing steel in masonry, including dowels in existing concrete for masonry work.
- D. Set sleeves, inserts, reglets, anchor bolts, and other embedded items related to masonry work or embedded in masonry.
- E. Temporary shoring for lintel block.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Furnishing reinforcing steel - Refer to Section 03200.
- B. Furnishing sleeves, inserts, reglets, lintels anchor bolts and other embedded items required to be set in masonry - refer to Sections 05500, 07600, and other applicable sections.
- C. Testing and inspection - refer to Section 01400.
- D. Installation of door and window frames - refer to Section 06100.
- E. Clear waterproof coating - refer to Section 07175.

1.03 SUBMITTALS

- A. Before starting any work, samples of each kind of block shall be submitted for approval. All materials used on the job shall conform to the approved samples.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

- A. Concrete Block: Hollow load bearing units, conforming to ASTM C90, Grade N-1 matching existing.
- B. Portland Cement: Low alkali and conforming to ASTM C150, Type I or II.
- C. Sand: ASTM C144, except that no less than 4% or more than 10% shall pass the No. 100 sieve.
- D. Pea Gravel: ASTM C404 graded with not more than 5% passing the No. 8 sieve with 100% passing the 3/8 sieve.
- E. Hydrated Lime: ASTM C207, Type S, containing 85% calcium oxide by weight.
- F. Water: Clean, from domestic supply.

2.03 MORTAR AND GROUT PROPORTIONS

- A. General: All parts by volume measurement.
- B. Mortar: 1 part portland cement, 4 parts sand, 1/4 part minimum to 1/2 part maximum hydrated lime and admixture.
- C. Grout: 1 part portland cement, 2-1/4 parts minimum to 3 parts maximum damp loose sand, 2 parts pea gravel and admixture in proportion as recommended by manufacturer.

2.04 MIXING MORTAR AND GROUT

- A. General: Determine all parts of mortar and grout by accurate volume measurements and mix in mechanical mortar mixer in batches containing not less than one full sack of cement, unless otherwise approved.
- B. Mixing: In mixing each batch of mortar or grout, mix the water, sand and cement until a smooth plastic mass without lumps is obtained. Grout shall contain sufficient water to cause it to flow freely without segregation.

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SECTION 04220-3
CONCRETE BLOCK MASONRY

- C. Retempering and Time Limit: Maintain mortar plastic and grout fluid continuously until used. Retemper on the mortar boards only by adding water within a basin formed with the mortar and work mortar into the water. Dashing or pouring water over the mortar will not be permitted. Do not retemper or use the mortar which has become harsh and nonplastic. When mortar has been maintained plastic, and grout fluid, they may be used up to but not more than one hour after original mixing.

3.00 EXECUTION

3.01 MASONRY INSTALLATION

- A. General Requirements: All work shall be plumb, level and true to within 1/8" in 10'-0" of line and dimensions shown on the drawings. Wetting of block will not be allowed.
- B. Laying Masonry: Lay up masonry in running bond in full bed of mortar with head joints solidly filled with mortar and shove into place. If necessary to move or shift a unit laid remove all setting mortar, clean and apply only fresh mortar for final placement.
- C. Unless specifically shown on the drawings, no masonry less than 1/2 length will be allowed in the work.
- D. Mortar in all bed joints shall be full-rounded. Furrowing of bed joints will not be permitted.
- E. All head or end joints shall have sufficient mortar to form dams to retain grout. Grout in lifts of no more than 4'-0" unless high-lift grouting is used in conformance to the Uniform Building Code.
- F. Sawcut all required cuts, slots, bevels, angles, etc.

3.02 SPECIAL REQUIREMENTS

- A. Extreme care shall be employed to prevent any grout or mortar from staining the face of the masonry to be left exposed. If any grout or mortar does contact the face of such masonry, it shall be removed immediately. Unless work is kept absolutely clean, Contractor may be required to remove and replace the work at his own expense.

- B. Protect all adjoining work from dropping of mortar or grout.
 - C. Where fresh masonry joins masonry that is partially or completely set, the exposed surface of the set masonry shall be cleaned with a wire brush and lightly wetted so as to obtain the best possible bond with the new work.
 - D. Wherever possible, grout from inside face of the masonry. Fill all wall, cavities by pouring full of grout. Puddle or vibrate grout immediately and sufficiently to cause it to fully encase the reinforcing steel. The use of a trowel for puddling is prohibited. If the work is stopped for one hour or longer the grout shall be stopped 1-1/2" below the top.
 - E. Jointing:
 - 1. General Requirements: Maintain uniform joints throughout. Solidly fill all joints between units and between units and other materials. Fill all holes made by line pins in exposed work.
 - 2. Joints: Strike all joints flush and tool to a smooth concave surface to match existing.
 - F. Reinforcing: Accurately set and place all reinforcing steel in strict accordance with the drawings and notes thereon. Secure vertical steel firmly in place by means of suitable devices. In any space containing reinforcement, clear distance between masonry and the reinforcement shall be at least 1/2 inch at all points.
 - G. Curing: All work shall be cured for 3 days by light sprinkling (do not use heavy watering) twice each day.
- 3.03 PROTECTION AND CLEANING: Protect corners subject to possible damage with substantial board covers. Clean off any mortar or grout on masonry work immediately. Any masonry showing mortar or grout at completion of work shall be replaced. All holes and/or openings 1/8" or larger shall be tuck-pointed with the same mortar mix as used in laying masonry.

END OF SECTION

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SECTION 05100-1
STRUCTURAL STEEL

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of General Provisions and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Provide steel girders, beams, purlins, columns, and all other fabricated and rolled shapes shown on structural drawings.
- D. Bolting and welding.
- E. Base and bearing plates, shims and wedges.
- F. Punching of holes for attachment of work of other trades.
- G. Shop prime coat.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Miscellaneous items of steel and iron - refer to Section 05500.
- B. Grouting of column base plates and installation of cast-in-place items furnished under this section - refer to Section 03300.
- C. Tests and Inspections - refer to Section 01400.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawings, manufacturer's technical data and material specifications, as applicable.
- B. Certification of Materials: Identify all structural steel by heat or melt number and accompany with mill analysis and test reports. Furnish evidence to the Architect that the materials conform with the requirements of these specifications.

C. Fabrication and Erection

1. Perform all work in accordance with the applicable provisions of the AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", and AWS "Structural Welding Code", latest edition.
2. All structural steel, both in the shop and in field shall be transported and handled and erected in such manner as will preclude any injury thereto and, in no case shall the material be subjected to any undue stresses in any part of connection.

D. Cooperation: Coordinate the work in the structural steel section with that of all other sections. Provide all punchings and drilling indicated on the drawings, or required for the attachment of their work to the structural steel framing for pipe and duct supports, anchors, aluminum sash, doors and similar work. Provide necessary drilling and punching; accurately locate and arrange to receive and engage the same.

E. Field Measurements: Before starting work, secure all field measurements pertaining to or affecting the work of this section and verify the locations and exact position of all anchor bolts occurring therein.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required they shall be of the same manufacture.

2.02 MATERIALS

- A. Structural steel shall conform with ASTM A36 for shapes, plates and bars.
- B. Welding electrodes shall conform with AWS D1.1, E70, series. Electrodes for welding reinforcing steel to be low hydrogen electrodes.
- C. Unfinished bolts and anchor bolts shall conform with ASTM A307. High strength bolts shall conform to ASTM A325, friction type.

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SECTION 05100-3
STRUCTURAL STEEL

- D. Headed Welded Studs: Nelson "Granular Flux-Filled Shear Connector and Anchor Studs", - "KSM Shear Connector Studs" or approved equal, manufactured of C1015, 1010, 1017 or 1020 cold-rolled steel conforming to ASTM A108.
- E. Pipe columns shall be ASTM A53, Grade B.
- F. Tube steel shall be ASTM A501, Grade B, 42 ksi.
- G. Primer Paint:
 - 1. General: All primer paint shall be compatible with the finish coating described in Section 09900 of these specifications.
 - 2. The standard shop paint shall conform to one of the following:
 - a. Steel Structures Painting Council Specification 15-68T, Type I (red oxide)
 - b. Steel Structures Painting Council Specification 15-68T, Type II (asphalt coating)
 - c. Fed. Spec. TT-P-86g, Type II or TT-P-636d.
 - d. Or, shall be a shop paint which meets the minimum performance requirements of one of the above listed specifications.

3.00 EXECUTION

3.01 WELDING

- A. Structural welding (shop and field) shall be done by the electric submerged or shielded metal arc process and shall have inspection by the laboratory of record. Operators shall be thoroughly trained and experienced in arc welding of structures, capable of making uniformly reliable butt and fillet welds in flat, vertical and overhead positions and by producing neat and consistent work in actual operation. Each operator shall have passed all welding tests of the American Welding Society.

- B. Surfaces to be welded shall be free of any paint, grease, loose scale and foreign matter. Clean welds each time the electrode is changed and chip clean all burned or flame-cut edges before welds are deposited thereon. The same electrode may be used with various thickness of plate, but change current used and number of passes made proportionately.
- C. After being deposited, brush welds with wire brushes. Welds shall exhibit uniform section, smoothness of welded metal, feathered edges without undercuts or overlays, and freedom from porosity and clinkers. Visual inspection at edges and ends of fillet and butt joint welds shall indicate a good fusion with penetration into base metal.
- D. During assembly and welding, hold component part of a built-up member with sufficient clamps or other adequate means to keep the parts straight and in close contact. In welding, precautions shall be taken to minimize "lockup" stresses and distortion due to heat. No welding shall be done under windy conditions until adequate wind protection screening has been provided. Any welds or parts of welds which are found to be defective shall be cut out with a chisel and replaced.
- E. The maximum space between members to be butt welded shall not exceed 1/4". Bevel all pieces or members up to 1/8" thickness to form a single or double "vee" before being welded. Bevel welds over 3/8" in thickness to form a double "vee" wherever possible.
- F. Lay fillet welds in the position indicated on the drawings and to the sizes shown. In measuring fillet welds, consider only the effective portion. The maximum space between pieces for members to be fillet welded shall not exceed 1/16".

3.02 ERECTION

- A. Erect all structural steel with qualified riggers and carefully plan and lay out so that a minimum of cutting shall be required. Erect work plumb, square and true to line and level, and in precise position, as indicated. Provide temporary bracing and guys, wherever necessary, to provide for the loads and stresses to which the structure may be subjected, including those due to erection equipment and their operation, and leave in place as long as it may be required for safeguarding all parts of the work.

- B. As erection progresses, securely bolt up work as required to maintain the steel in proper position while field bolting and welding is being done and as required to take care of all deadloads, wind and erection stresses. No field bolting or welding shall be done until the work has been properly aligned, plumbed and leveled.
- C. Set each column base plate in exact position as to alignment, plumb and height. The center of each base shall be true to the column center within a tolerance of 1/16", and its height shall be adjusted in exact position. Maintain all bases at the exact position and level while they are being grouted.
- D. Carry out erection of structural steel work in proper sequence with the work of other trades and frame, bed and anchor to concrete and related work in strict accordance with the detail drawings and approved setting drawings.

3.03 CONNECTIONS

- A. Unfinished Bolts: Make field connections with unfinished bolts only where indicated.
- B. High Strength Steel Boltings: Where structural joints are made using high strength bolts, hardened washers and nuts tightened to a high tension, the materials, method of installation and tension control, types of wrenches to be used, and inspection methods shall conform to Specification for Structural Joints using ASTM A325 or A490 bolts, established by the Research Council on Riveted and Bolted Structural Joints, of the Engineering Foundation.
 - 1. High strength bolts used shall have a suitable identifying mark placed on top of the head before leaving the factory.
 - 2. Tightening of nuts shall be done with properly calibrated wrenches. The minimum bolt tension for the size of bolt shall be in accordance with tables listed in the above-referenced standards.
 - 3. Calibrated wrenches shall be checked individually for accuracy at least once daily for actual conditions of application.

4. Bolts that have been completely tightened shall be marked with identifying symbol.
 5. Hardened washers shall be installed as per AISC Specifications.
 6. Contact bearing surfaces of bolted parts shall be free of scale, slag burrs, and pits, or dirt, paint or other foreign material and/or any defects which would prevent solid seating of parts.
 7. Bolt lengths shall be the grip plus 1-1/4"
- 3.04 **HEADED WELDED STUDS:** Perform inspection of all shop and field welding. Type and capacity of welding equipment shall be checked and approved by Welding Inspector. At the beginning of each day's work make minimum of two test stud welds with equipment to be used to metal which is same as actual work piece. Test studs shall be subjected to 90° bend test by striking them with heavy hammer. After test, weld section shall not exhibit any tearing out or cracking.
- 3.05 **ANCHOR BOLTS:** Inspect the installation of anchor bolts, make all necessary field measurements and, if necessary, furnish templates to insure that all structural steel will fit the job conditions. Locate all columns as indicated on the drawings. Setting of anchor bolts, in hardened concrete, which may be necessary because of error or oversight, and in existing concrete work, shall be made in suitable drilled holes and solidly grouted in placed, under the direction of the Engineer.
- 3.06 **FINISH:** Clean all steel and iron of any grease, rust, mill scale, or other foreign matter, and give one shop coat not less than 1.5 mils thick, of the specified primer. Material to be embedded in concrete shall not be primed. Clean and repair damaged shop prime coat in field with same prime as used in shop.

END OF SECTION

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SECTION 05300-1
METAL DECKING

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 - General Provisions and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Provide steel roof deck units.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Structural steel - refer to Section 05100.
- B. Cutting of openings other than those indicated on the structural drawings: Provided under those other applicable sections.
- C. Tests and inspections - refer to Section 01400.

1.03 SUBMITTALS: Submit shop drawings, manufacturer's technical data and material specifications, as applicable.

- A. Note diaphragm deck welding pattern on shop drawings.
- B. Comprehensive manufacturer's descriptive data including specifications and installation recommendations. Specifications shall include all physical properties and load tables.

1.04 QUALITY ASSURANCE - REFERENCE STANDARDS:

- A. Sections and properties of metal shall conform to minimum specifications for the design of "light gauge cold formed steel structural members" as published by AISI.
- B. The Standards of the Steel Deck Institute, the Factory Mutual Engineering Association Loss Prevention Data Sheet 1-289 requirements, and all applicable codes and ordinances shall be fully complied with.
- C. Deck is designed for diaphragm action to resist lateral forces. Welding pattern provided shall conform to an approved ICBO welding pattern arrangement.

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SECTION 05300-2
METAL DECKING

- 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING: Deliver, store and handle metal decking in such a manner that it will not be damaged or deformed. Exercise special care so as not to damage or overload the decking during the entire construction period. Do not use metal decking for storage or as a working platform until the sheets have been welded in position. Stack decking stored at the site before erection on platforms or pallets and suitably protect from the weather.
- 1.06 SUSPENDED ACOUSTIC TILE, GYPSUM BOARD AND PLASTER CEILINGS: Ceiling can be hung from purlins with hangers spaced at 4'-0" o.c. maximum each way. Weight of ceiling material shall not exceed 5 lbs. per sq. ft. Ceiling hanger connection to purlins shall be as shown on Architectural Drawings. Ceiling or any other fixture shall not be hung from the metal deck without Engineer's approval.
- 2.00 PRODUCTS
- 2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.
- 2.02 MATERIALS
 - A. Galvanized Metal Deck:
 - 1. Sectional profile, depth and minimum gauge are indicated on the structural drawings.
 - 2. Upper surfaces of the roof deck ribs shall be flat.
 - 3. Roof decks with stiffening grooves in the top horizontal hats of units are not acceptable.
 - B. Steel for Galvanized Deck: ASTM A446, Grade A.
 - C. Flashing and Closures: Galvanized sheet steel as specified for decking.

- D. Protective Coating: Zinc, ASTM A525 and FS-QQ-S-775d type 1, class e, G-90.
 - E. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Mil. Spec. MIL P-21035.
- 2.03 FABRICATION: Form deck units in lengths to span three or more support spacings with flush, telescoped or nested 2" end laps and interlocking side laps, unless otherwise shown or specified.
- 3.00 EXECUTION
- 3.01 Install all decking as per governing codes, drawing requirements, and manufacturer's specifications and recommendations.
 - 3.02 Ship all deck units to job site in standard widths and cut to proper lengths such that end joints occur over supporting members. Perform all column notching, bevel cuts and other field cuts as required.
 - 3.03 Place steel deck units on supporting framework and adjust to final position with proper bearing before permanently fastening. Verify that supports are properly aligned and sufficiently level to permit proper bearing and report all discrepancies.
 - 3.04 Provide flashings and closures where required to prevent concrete leakage. Provide between decking and columns and at open ends of all cell runs at columns, walls, openings, etc., and those which occur where cells change direction. Fasten in place by welding or sheet metal screws as per manufacturer's directions.
 - 3.05 The positioning and placement of stud shear connectors shall be in accordance with the WS specification on requirements for stud welding and as detailed on the drawings. The height of stud shall be a minimum of 1-1/2" above the top deck flute and a minimum of 1" below the top concrete surface.
 - 3.06 Make all welds in accordance with structural drawings. Use only welders certified for welding in light gauge metal.

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SECTION 05300-4
METAL DECKING

- 3.07 Opening reinforcement shall be as detailed on the drawings. Cutting of holes other than those detailed on the drawings shall be done only as specifically approved by the Engineer.. Holes not shown on structural drawings shall be cut and reinforced in accordance with details on drawings under this section but shall be located and paid for by trade requiring openings. In general, reinforcing is not required for holes 6" or less in diameter.

END OF SECTION

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SECTION 05500-1
MISCELLANEOUS METAL

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 - General Provisions and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Pipe railings, pipe sleeves, handrails and brackets.
- D. Gratings
- E. Steel ladders
- F. Supports for ceiling hung toilet partitions.
- G. Steel angle corner guards, pipe guards and rails.
- H. Channel door frames.
- I. Steel curbs where ducts penetrate roof deck.
- J. Structural shapes not included in structural steel work.
- K. All formed and bent plate 14 gauge and heavier.
- L. Supports for metal wall siding.
- M. Pipe supports for benches.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Structural steel - refer to Section 05100.
- B. Backing plates, sleeves, and other items in connection with plumbing, electrical and mechanical work - refer to respective sections.
- C. Rough hardware - refer to Section 06100.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawings, manufacturer's technical data and material specifications, and samples, as applicable.
- B. Field Measurements: Secure all field measurements required for proper and adequate fabrication and installation of all work covered by this section. Exact measurements are the Contractor's responsibility. Field alterations will not be permitted without approval of the Engineer.
- C. Dissimilar Metals: Where metals are in contact with plaster, concrete or other type metals paint contact faces of the metal before installation, with heavy bituminous coating.

2.00 PRODUCTS

2.01 GENERAL

- A. All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.
- B. All metals shall be free from any defects which would impair the strength, durability, appearance, and shall be of the best commercial quality, for the purposes intended and adequate to withstand the strains and stresses to which they will be subjected. Metals shall be protected from injury at the job, in transit, and until erected in place, inspected, and approved.

2.02 MATERIALS

- A. Structural steel such as rolled shapes, angles, plates, anchors, clips, etc. shall conform with ASTM A36.
- B. Architectural and miscellaneous steel shall be mild steel.
- C. Steel pipe other than structural pipe shall conform with ASTM A120.
- D. Sheet steel shall be high quality, low carbon, hot-rolled sheet with good welding and forming qualities.

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SECTION 05500-3
MISCELLANEOUS METAL

- E. Galvanized sheets, where required, shall be hot-dipped and tight coated steel sheet as per ASTM A525. Coating weight shall be not less than 1.25 oz. per square foot.
- F. Galvanizing structural member, angles, channels, bolts, etc., shall conform to ASTM A123, G-90.
- G. Primer Paint:
 - 1. General: All primer paint shall be compatible with the finish coatings described in Section 09900 of these specifications.
 - 2. The standard shop paint shall conform to one of the following:
 - a. Steel Structures Painting Council Specification 15-68T, Type I (red oxide).
 - b. Fed. Spec. TT-P-86g, Type II or TT-P-636d.
 - c. Or, shall be a shop paint which meets the minimum performance requirements of one of the above listed specifications.
- H. Cast steel shall conform with ASTM A27.
- I. Iron castings shall conform with ASTM A48.
- J. Checkered plate: 4-way galvanized, medium checkered plate as manufactured by Inland Steel or Ryerson Steel "Multi-Grip" S-400.
- K. Malleable iron casting shall conform with ASTM A47.
- L. Machine bolts shall conform with ASTM A307.
- M. Anchors for securing items of miscellaneous metal to concrete and masonry shall be cinch anchors, or approved equal, not less than 3/8", and of the threaded type for anchoring with the bolt head out. Anchor bolts where set in concrete shall be hook type, not less than 1/2".

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SECTION 05500-4
MISCELLANEOUS METAL

- N. Welding electrodes shall conform with AISC and the Code for Arc and Gas Welding in Building Construction, A.W.S. Publication D1.1, use E-70XX Series Electrodes.
- O. Metal gratings and trench covers and frames shall be galvanized traffic or non-traffic type, sizes and shapes as required.

3.00 EXECUTION

3.01 WELDING

- A. Except for any modifications indicated on drawings and/or specified herein, the AISC Code of Standard Practice for Steel Buildings, and the AWS Code for Fusion Welding and Gas Cutting in Building Construction, both as amended to date, shall govern all materials, fabrication and erection of all work under this section.
- B. Make all welds in accordance with the best standard practice. Perform welding on the unexposed sides to prevent pitting, discoloring weld-halo and other surface imperfections. Thoroughly clean surfaces to be welded. Welds shall show a uniform section and reasonable smoothness, without any distortion. Dress and finish exposed surfaces of welded joints to produce invisible connections. Furnish welding alloys in the same color and character as the surfaces of the metal joined.

3.02 WORKMANSHIP, FABRICATION AND ERECTION

- A. Workmanship shall be in accordance with the best standard practices of the trade and shall be done by mechanics skilled in the type of work required. Insofar as possible, fit and shop assemble all work ready for erection. Accurately make jointing and intersections in true planes, and with adequate fastenings. Make exposed joints even and smooth, and grind exposed weld joints smooth and flush.
- B. Provide holes of the proper size and in the correct location as required for attachment of the work of other trades. Cut, tap, and drill as required. All finished items shall be free from kinks, twists, burrs, and open joints. Damaged or distorted materials will not be acceptable.
- C. Work to be built in with concrete, or masonry, shall be of the proper form required for anchorage, or be provided with concealed anchors.

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- D. For all work true to detail, with clean, straight, sharply defined profiles. Exposed joints shall be close fitting and made where least conspicuous.
- E. Install supporting members, fastenings, frames, hangers, bracing, brackets, bolts, angles, and the like; all as required to set and connect all items of miscellaneous metal to concrete and steel framing.
- F. Countersink holes for exposed screwheads. Provide all necessary lugs, brackets, and clips so that the work can be assembled and installed in a neat and substantial manner.
- G. Conceal fastenings where possible. Unless otherwise indicated, bolts and screwheads shall be flathead or countersunk oval, as best suited for the purpose.
- H. Weld in place plates for mounting any items of finish hardware.
- I. Provide all bolts, anchors, inserts, and other miscellaneous steel and iron fastenings in forms before concrete is poured or built into masonry, as indicated on drawings, details or schedules, or as necessary to complete the work. Examine and check the Architectural, Structural, Mechanical and Electrical Drawings for number, type and locations of such items.

3.03 MISCELLANEOUS ITEMS

- A. Furnish, fabricate, and install all miscellaneous angles, channels, bent plate, clips, anchors and other miscellaneous metal work required for the complete job as indicated on the drawings. Form such as detailed or if not detailed, as required for the location and purposes served, and in accordance with the applicable provisions specified herein. Furnish and install all miscellaneous metal items not specifically mentioned herein, or in other sections, but which are customarily considered as part of the work, the same as if fully specified herein and detailed on the drawings.
- B. Furnish and install light steel structural items not noted on Structural Drawings or called for under "Structural Steel" section but which are shown on the Architectural Drawings or as required to complete the specified work.

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SECTION 05500-6
MISCELLANEOUS METAL

- C. Furnish and install sleeves through masonry or concrete walls and footings as required, of standard weight steel sections of a size sufficient to allow 1/4" clearance all around between the sleeve and item to be inserted.
- D. Furnish and install anchors, brackets, and plates of suitable steel where required in connection with steel, iron, masonry and concrete construction.
- E. Channel Supports for Ceiling Hung Toilet Partitions: Furnish and install channel supports over all ceiling hung toilet partitions. Suspend from structure above with rod hangers and clip angles as detailed. Punch lower flange of channel with 3/8" holes or as required to suit toilet compartment details.
- F. Ladders: Vertical steel ladders shall be of widths, as indicated fabricated from 3/8" x 3" mild steel side rails and 3/4" non-skid round steel rungs with square ends headed into rails, and the ends upset. Rungs shall be spaced not over 12" on center. Ladders shall be anchored at the bottom, top and at intermediate points not more than 5' apart with brackets secured with machine bolts. Brackets shall be of the same size as side rails and, unless otherwise indicated, shall hold the ladder 5" away from the wall.
- G. Neatly fabricate steel channel and angle frames for doors, duct openings, scuttles, mechanical equipment, louvers, and other frames as shown and detailed to the exact size required and in accordance with approved shop drawing. Corners shall be neatly joined, welded and ground smooth. For securing to concrete or masonry weld concealed anchors on the back. Secure bar stops to frames with countersunk flathead screws or plug weld from the back. Wherever required, prepare steel frames to receive the necessary hardware. Where mechanical equipment such as fans, blowers, etc., and sheet metal are shown or specified to be attached to steel frames, the drilling, tapping, and attachment will be done by trade involved.
- H. Furnish curb angles, corner guards, bumpers, etc., of the sizes and shapes called for and with anchors welded to the backs and of the sizes and spacing shown.

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SECTION 05500-7
MISCELLANEOUS METAL

3.04 FINISH

- A. Except where indicated, or specified to be galvanized, clean all miscellaneous steel and iron of any grease, rust, mill scale, or other foreign matter, and give one shop coat not less than 1.5 mils thick of the specified primer. Material to be embedded in concrete shall not be primed. Galvanize all exterior metal items. Touch up in field with primer paint comparable to shop applied primer.
- B. After welding is completed, repair any damage to the galvanizing by applying "Drygalv" as manufactured by Dynaflux, North Carolina, local wholesaler: Fesco Inc., Los Angeles (213) 254-9131; "Galvicon" as manufactured by Southern Coatings, Inc. South Carolina, local distributor: V.B. Anderson Co., Santa Ana, (714) 547-6684; "Z.R.C. Cold Galvanizing Compound" as manufactured by Z.R.C. Chemical Products Co., Massachusetts, local distributor: Mechanical Distributors, Whittier, (213) 698-6655. Apply touch up as per manufacturer's instructions to provide a coating equal to the original finish.

END OF SECTION

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SECTION 06100-1
ROUGH CARPENTRY

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Blocking and nailers.
- D. Miscellaneous items of rough carpentry work indicated on the drawings and required for a complete job.
- E. Install pressed metal door and window frames in existing building.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Finish Carpentry and Millwork - refer elsewhere in Division 6.
- B. Concrete Formwork - refer to Division 3.
- C. Installation of pressed metal door and window frames in gypsum wallboard walls - Refer to Section 09250.

1.03 SUBMITTALS: Submit manufacturer's technical data and material specifications, as applicable.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

- A. Blocking and Nailers: Douglas Fir, "Construction" grade, pressure treat with chromate zinc chloride.

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SECTION 06100-2
ROUGH CARPENTRY

- B. Plywood: Conform to U.S. Product Standard P.S. 1-74. Plywood shall be grade-marked by the American Plywood Association (APA), Pittsburgh Testing Laboratories (PTL) of Timber Engineering Company (TECO). Plywood shall be exterior grade, structural.
 - C. Nails, Screws, and Lag Screws: Commercial Standard.
 - D. Bolts and Washers: American Standard.
 - E. Treated Lumber: Cut surfaces in treated lumber shall be given a brush coat of approved type preservative.
 - F. Fire Retardant: All wood including all blocking and nailers and plywood shall be treated with Baxter "Pyresote", Barnard "Bar Flame" or equal.
- 3.00 EXECUTION
- 3.01 Provide and securely fasten in place all blocking and nailers and other rough carpentry work indicated or required to complete the work.

END OF SECTION

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SECTION 06200-1
FINISH CARPENTRY AND
MILLWORK

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Backboards for telephone and electrical equipment.
- D. Job-built shelving, laminated plastic and plywood.
- E. Laminated plastic counters.
- F. Methylmethacrylate blinder (corian or equal) counter top at restrooms vanities.
- G. Laminated plastic faced cabinet work.
- H. Oak gratings at Battery Room.
- I. Installation of finish hardware, except items installed under Sections 08100 AND 08400.
- J. Miscellaneous items of wood finish indicated on the drawings or required for a complete job.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Rough carpentry work - refer to Section 06100.
- B. Metal doors - refer to Section 08100.
- C. Paint finishes - refer to Section 09900.
- D. Dry wall - refer to Section 09250.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawings, manufacturer's technical data and material specifications, and samples, as applicable.
 - 1. Shop Drawings:
 - a. Submit shop drawings for all work, identified with location, quality, grade, type of finish and species of wood.
 - b. Affix Certified Compliance Grade Stamp indicating grade specified to the shop drawings, certifying that work will be manufactured in accordance with the grade specified.
 - c. The mill shall take such field measurements as may be required for their work and be responsible for same.
 - 2. Samples: Submit in triplicate, showing laminated plastic colors and corian counter top or equal as specified by the Engineer.
- B. Priming and Backpainting: Priming and backpainting of all carpentry and millwork is specified in Painting section. Do not set items until priming and backpainting have been done.
- C. Protection: Protect all work against damage of any kind until final acceptance of the building. Repair or replace damaged work to the satisfaction of the Engineer without additional cost to the Owner.

1.04 DELIVERY, STORAGE AND HANDLING

- A. No fabrication, finishing or installation shall be performed until shop and erection drawings and finish samples have been approved.
- B. Deliver, store and handle counter tops in a manner to prevent damage and deterioration.
- C. Defer delivery to the job until the installation and storage areas are complete and dry of all wet-type construction.

- D. Maintain relative humidity in storage areas not to exceed 60 percent.
- E. Protect all surfaces of work subject to damage while in transit.

1.05 REFERENCE SPECIFICATIONS AND STANDARDS

- A. Manufacture all millwork and cabinetwork in accordance with the standards established in the latest edition of the Manual of Millwork of the Woodwork Institute of California, or equivalent construction, in the grade or grades hereinafter specified or as shown on the drawings.
- B. All cabinet work shall be manufactured in accordance with the standards established in the latest edition of the Specification Guide for Wood Cabinets of the Southern California Association of Cabinet Manufacturers.
- C. Before delivery to the jobsite, the millwork suppliers shall issue a Certified Compliance Certificate indicating the products he will furnish for this job and certifying that they will fully meet all the requirements of the grade or grades specified.
- D. Each unit of casework shall bear the Certified Compliance Grade Stamp indicating the grade specified.
- E. Each plastic laminate counter top shall bear the Certified Compliance Grade Stamp indicating the grade specified.
- F. In lieu of the Certificate, furnish a Certificate of Compliance from an approved independent testing laboratory.

2.00 PRODUCTS

- 2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

- A. Lumber and plywood shall be new, clean stock of the species and WIC grades shown below.

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MILLWORK

1. Douglas Fir for concealed stripping, blocking and framing manufactured and graded in accordance with "Standard Grading and Dressing Rules 16 of W.C.L.I.B., "D" VG Finish Grade S4S, kiln-dried to a maximum 12% moisture content.
 2. Softwood: WIC Section 3, "Custom" grade Douglas Fir, vertical grain.
 3. Softwood Plywood: WIC Section 5, "Custom" grade Douglas Fir-rotary cut.
 4. Hardwood: Select Red Oak, WIC Section 6.
- B. Laminated Plastic Counter Tops and Splashes:
1. All laminated plastic counter tops and splashes shall be "Custom" grade per WIC Section 16, height as indicated on drawings, integral cove back, with self edge and splash. Color finish as selected by Engineer.
 2. Laminated plastic shall meet standards of the National Association of Electrical Manufacturers.
 3. Grade: Standard .050" thick for horizontal surfaces and 1/32" grade for vertical surfaces. All panels shall have backing sheets to assure stability and moisture resistance.
- C. VANITY TOPS AND BACKSPLASHES
- Tops to be one piece made of methylmethacrylate binder (Corian or equal) physical properties shall conform to manufacturer's standard specifications. The material shall be homogeneous water resistant, and not coated, laminated, or of composite construction. The material shall be 0.5" thick.
- D. CASEWORK
1. All casework shall be WIC "Custom" grade per WIC Section 15, plastic laminated faced cabinet.
 2. Construction shall be flush type.
 3. Cabinet doors shall be WIC Type H.

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4. Edge band all plywood shelving with glued solid hardwood stock set with tongue and grooved joints.
 5. Furnish and install cabinet hardware as specified herein. Submit standard products of other manufacturer in lieu of products specified herein, for approval by the Engineer.
- E. Gratings and Benches: Fabricate as detailed.
- F. Hardware:
1. Adjustable Shelf Standards: Knappe and Vogt 255 and 256 or Garco U73 and Y73 for flush mounting. Natural aluminum finish.
 2. Drawer Slides: Knappe and Vogt 1100 or Garco 381.
 3. Hang Rods: 1-5/8" o.d., .035 gauge, nickel plated steel tubing. Furnish center supports for spans four feet or greater.
 4. Pulls: Quality No. 179, or Builders Brass No. 9054, with backplate.
 5. Catches: Hager No. 1437 or Stanley No. 46.
 6. Lift Top Hinges: Stanley 311-1/4, or Hager CD 1311, size as required for top thickness.
 7. Hinges: Hager No. 1822-1/2 or Stanley No. 1583, 1-1/2" x 3/4" for flush doors and Hager No. 1043 or Stanley No. 331 for overlay doors.
 8. Locks: Schlage # 46-001 or Corbin #0796.
 9. Finish: US26D unless noted otherwise.
 10. Drawer Stops: Provide stops to prevent drawers from accidental removal.
 11. Self Brackets: 16 gauge formed brackets, as detailed, shop applied prime coat.

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SECTION 06200-6
FINISH CARPENTRY AND
MILLWORK

3.00 EXECUTION

3.01 CONDITION OF SURFACES

- A. Examine all grounds, stripping and blocking to secure cabinets.
- B. Correct all defects before proceeding.

3.02 MILLWORK: Assemble all millwork at the mill as far as practicable, and deliver to building ready to set in place. Work material in the best manner known to the trade, mortise and tenon, dowel, block, and glue together so as to avoid the use of nails as much as possible. Follow detail closely, cut moldings cleanly and define sharply and make miters accurately. Butt joints without an approved device for preventing the separation of the joint will not be accepted. Set all nails, and where screws are used in exposed surfaces, conceal with wood plugs.

3.03 INSTALLATION

- A. Install counter tops and cabinets plumb and level without distortion.
- B. Shim as necessary with concealed shims.
- C. Accurately scribe and closely fit all face plates, filler strips and trim strips to irregularities of adjacent surfaces.
- D. Shelving: Single boards may be used for shelving 12" or less in width. Built up shelves more than 12" wide shall be 3/4" thick plywood.
- E. Install nailers and blocking where shown or as required.

END OF SECTION

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SECTION 07111-1
MEMBRANE WATERPROOFING

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Waterproofing: Under mortar set tile floors, as shown on drawings.
- D. Protection of membrane waterproofing system.
- E. Flood test areas under mortar set tile.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Mortar set tile - refer to Section 09300.

1.03 SUBMITTALS: Submit manufacturer's technical data and material specifications, as applicable.

1.04 REQUIREMENTS

- A. All work in this section shall only be done in dry weather. All surfaces shall be dry before application of membrane waterproofing.
- B. Subsurfaces and other construction adjoining or affecting the work of this section shall be examined before any work is started, and the Engineer shall be notified in writing of any defects which would be detrimental to the work. The application of materials shall be considered as acceptance of the surfaces by the Contractor.

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MEMBRANE WATERPROOFING

- D. Drainage fittings, connections, metal aprons, metal edgings, flashings and counter flashings, collars and sleeves for pipes passing through the membrane shall be properly set.
- E. Applicator shall be approved, in writing, by the materials manufacturer.

1.05 GUARANTEE AND INSPECTION

- A. The manufacturer and applicator shall furnish a written guarantee that all membranes, flashing, counter flashing, and other elements essential to the water tightness will continue watertight for a period of two (2) years following acceptance of the work by the Engineer.
- B. Inspections, made without cost to the Owner, shall be made by the material supplier's representative and approval reported in writing to the Engineer.
 - 1. Prior to application of material.
 - 2. Upon completion of the work and before acceptance by the Engineer.
 - 3. Immediately prior to expiration of the two-year guarantee period.

1.06 Flood test areas under mortar set tile prior to application of tile. Dam up openings and flood with water. Repair all leaks.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where system numbers are indicated, if the specified systems are discontinued, the Contractor shall furnish the manufacturers' updated system at no additional cost to the Owner.

2.02 MATERIALS

- A. Membrane waterproofing shall be a single component modified polyurethane coating, horizontal and vertical grades, Multi-I-Thane 3000, as manufactured by MultiChemicals Products, Inc., 2128 North Merced Avenue, South El Monte, CA 91733, or Perma-Guard as manufactured by Neogard Corporation.
- B. Primer shall be Multi-Chemicals MIP-607.
- C. Joint sealant shall be Multi-Chemicals MC-283 or MC-284 two component or Multi-I-Seal 1000-NF one-component polyurethane sealants.

3.00 EXECUTION

3.01 PRIMING

- A. Surfaces shall be primed with primer around the periphery (outer 6") of the area to be coated and around vents, piping, drains, changes in plane and other areas where continuity of the membrane will be broken.
- B. Apply the primer at the approximate rate of 250 sq. ft. per gallon. Do not apply primer on wet or frosty surfaces or when surface temperatures are below 40°F or above 120°F. Allow the primer to dry at least 2 hours (@ 77°F) but no longer than 24 hours (@ 77°F) before applying coating.

3.02 APPLICATION: Prior to application, concrete surfaces shall be sound and thoroughly cured.

A. Horizontal Surfaces under Mortar Set Tile:

- 1. Apply the MULT-I-THANE 3000-SL by spray, squeegee, or roller at the rate of 4 gallons of material per 100 sq. ft. of surface to produce 60 dry mils of membrane. Two applications are required resulting in 30 dry mils of membrane per application. Allow a minimum of 18 hours of cure time between each coat.
- 2. Control application rate by means of premeasured surface areas.

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MEMBRANE WATERPROOFING

- 3.03 THICKNESS: The overall thickness of the completed MULTI-I-THANE 3000 Waterproofing system shall not be less than 60 dry mils. Hydrostatic or other unusual conditions as determined by the Engineer shall receive a third 30 dry mil coat to result in a 90 dry mil system.
- 3.04 FIELD QUALITY CONTROL
- A. As the application progresses and before the MULTI-I-THANE 3000 has attained its final set, verify the applied thickness by use of a mil-thickness gauge. To those areas which are deficient, immediately apply additional membrane to produce the required thickness.
 - B. Verify the integrity of the cured membrane on horizontal surfaces by damming the entire area and flooding with water to a minimum depth of 2 inches. Allow the water to set 24 to 48 hours and make visual inspections. If repairs are necessary, drain and dry, and then reapply membrane to areas where leakage is detected.
 - C. Prior to installation of the protection coarse, visually inspect all other areas which cannot be water tested for voids, damage or rupture. Repair as required.

END OF SECTION

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SECTION 07192-1
VAPOR RETARDER

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Provide the specified vapor barrier and two (2) layers of sand under building slabs on grade complete, in place, as shown on the drawings, specified herein, or needed for a complete and proper installation.

1.02 SUBMITTALS

- A. The Contractor shall submit to the Engineer: Complete materials list of all items proposed to be furnished and installed under this Section.
- B. Samples of the proposed vapor barrier membrane and the proposed system for closing and sealing the seams.
- C. Manufacturers' printed installation procedures which, when approved by the Engineer, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

2.00 PRODUCTS

2.01 MATERIALS

- A. Vapor barrier shall be moistop, a reinforced waterproof paper with polyethylene coating on both surfaces as manufactured by Fortifiber Corp, or equal. The reinforced paper shall consist of two (2) sheets of high-strength kraft laminated with high-melting-point asphalt, with tri-directional glass reinforcing fibers embedded in the asphalt. The top and bottom sheets of kraft shall be extrusion-coated with black polyethylene, combining the strength of reinforced waterproof paper with the inert quality of polyethylene. The membrane shall weigh approximately 7.2 lbs. per 100 sq. ft., 3.27 kg per 9.29 sq. m. and shall have the following attributes:

<u>Property</u>	<u>Value</u>	<u>Test</u>	<u>Method</u>
Vapor permeance, perms	0.10		ASTM E 96, Pro A
Water resistance, hours	76+		ASTM D 779
Puncture resistance, Beach units	52		ASTM D 781

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SECTION 07192-2
VAPOR RETARDER

- B. Provide a seam sealer system recommended by the manufacturer of the approved vapor barrier, capable of positively sealing all seams in the vapor barrier and preventing passage of vapor.

3.00 EXECUTION

3.01 INSPECTION

- A. Examine the area and conditions under which work of this Section will be installed. The area includes the concrete slab at the new maintenance building and the slabs at the repair area # 122, the Tire Storage area # 125, and the Tire Shop Area # 124. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 EXCAVATION

- A. Additional excavation and grading shall be performed to lower prepared subgrade to allow for sand layers required herein and shown on the drawings.

3.03 INSTALLATION

- A. Remove from the compacted subgrade all large, sharp stone particles which could damage the membrane.
- B. Place a layer of sand, 3 to 4 inches in thickness on the prepared subgrade.
- C. Compact the sand layer to a minimum of 90% of maximum density.
- D. Place the specified vapor barrier membrane over the compacted sand layer with the joints lapped not less than 6".
- E. Using the approved sealing system, seal all joints and seams in the membrane and seal around all projections through the membrane.
- F. Prior to placing the upper layer of sand, secure the Engineer's approval of the installed vapor barrier.
- G. Place a layer of sand, 3 to 4 inches in thickness on the approved membrane, taking special care to not damage the vapor barrier.
- H. Compact the sand to a minimum of 90% of maximum density.

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SECTION 07192-3
VAPOR RETARDER

3.04 PROTECTION

- A. Use all means necessary to protect the installed vapor barrier membrane during succeeding operations.

END OF SECTION

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SECTION 07200-1
BUILDING INSULATION

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Acoustical insulation in sound-rated partitions.
- D. Acoustical insulation at electrical, TV, and phone outlet boxes in sound rated partitions.
- E. Thermal insulation at all exterior walls of new building.
- F. Thermal insulation at ceilings of all enclosed areas in new building.
- G. Thermal insulation at ceilings of all air conditioned remodeled areas in existing building and as indicated on drawings.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Insulation for ductwork and piping - refer to Division 15.
- B. Thermal insulation at roof - refer to Section 07500.

1.03 REQUIREMENTS

- A. Submittals: Submit manufacturer's technical data, material specifications and samples as applicable.
- B. Certificate of Compliance: Submit certificate stating that the work of this section was performed in accordance with the plans, specifications and state energy regulations. This certificate shall be signed by both the installing subcontractor and General Contractor.

2.00 PRODUCTS

- 2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

A. Insulation shall be suitable for type of construction as applicable.

B. Acoustical Insulation:

1. Insulation shall conform to Fed. Spec. HH-I-521F, Type I, incombustible mineral fiber or glass fiber batts or blankets, thickness as required to develop a minimum STC rating of 50 for partitions in which sound insulation is installed, as manufactured by U.S. Gypsum. Mineral Wool Insulations, Owens-Corning Fiberglass or Johns-Manville.
2. Outlet Boxes: Polybutene-butyl rubber, minimum 1/8" thick, Lowry's Outlet Box Pads", as distributed by Harry A. Lowry & Associates, Van Nuys, California or Scotch 2200 vinyl mastic pad, 1/8" thick.

C. Thermal Wall Insulation:

Unfaced Batt Insulation: Fibrous glass batts, Fed. Spec. HH-I-521F, Type I and designed for friction-fit installation. R-Value of insulation used at all exterior walls shall be R-19.

1. Used where batt insulation is required for acoustical as well as thermal performance in a contained (unexposed) installation.

D. Thermal Ceiling Insulation:

1. Faced insulation shall be Owens-Corning Fiberglas Certified R Metal Building Insulation having an R-value of 19. It shall be faced by an approved laminator with polypropylene reinforced polyester facing. The composite product shall have a 25 flame spread rating or less and a 50 smoke developed rating or less as tested in accordance with UL 723. The facing shall have a perm rating of 0.10 (minimum) as tested in accordance with ASTM E96. Faced insulation shall be used in rooms #110 - Mechanical Room, #111 - Electrical Room in the new building and room 205 - Store Room, in the existing building.
2. Unfaced Batt Insulation: Fibrous glass batts, Fed. Spec. HH-1-521F, Type I having an R-value of R-19 shall be used in all enclosed rooms with ceilings in the new building.

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SECTION 07200-3
BUILDING INSULATION

3.00 EXECUTION

- 3.01 Install insulation between studs in a manner as recommended by manufacturer and as indicated on the drawings. Where necessary, cut and fit insulation and completely fill all areas including behind switches, boxes, etc. Butt all joints tight. Voids will not be accepted.
- 3.02 Outlet Box Pads Application: Clean surface of dirt, dust, oil, etc. Adhere pad to back of box, molding it completely around box and around conduit entering the box.
- 3.03 Replace any insulation, or facing, which becomes torn, water soaked or otherwise damaged.

END OF SECTION

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Submittals.
- D. Metal wall siding.
- E. Metal fascia siding.
- F. Metal reveal panel.
- G. Sheet metal flashings at wall siding.
- H. Fasteners, sub-girts, metal closures, trim, etc.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Sheet metal, except as specified herein - refer to Section 07600.
- B. Miscellaneous metal, girts, etc. - refer to Section 05500.
- C. Tests and inspections - refer to Section 01400.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawings, engineering calculations, manufacturer's technical data, manufacturer's printed installation procedures which when approved by the Engineer will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work, and material specifications. Color samples shall be not less than 12" x 12" for all products specified herein for the Engineer's review prior to start of work in this section.
- B. Cleanup: During the progress of the work, the premises shall be kept free of debris and waste resulting from the work in this section. Upon completion, all surplus material and debris shall be removed from the site.

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SECTION 07410-2
METAL SIDING

- C. Provide calculations performed by a California registered structural engineer indicating wall panels will conform with Code requirements for wind and seismic loads.

2.00 PRODUCTS

- 2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

- A. Manufacturer: George D. Widman, Inc., 17823 Evelyn Ave. Gardena, CA (213) 321-1660. The wall panel is # FL-12 or equal. The fascia panel is # W306 or equal. The reveal panel is detailed on the drawings.
- B. General:
 - 1. Pattern: Stucco embossed steel.
 - 2. Sheets: ASTM A 446, Grade B, 18 gauge steel for metal wall panels, metal reveal panel and associated trim and 22 gauge steel for metal fascia panels and associated trim. All panels with zinc coating conforming to ASTM A-525, G-90.
 - 3. Tolerance: 3/32" plus or minus adjustment feature.
 - 4. Interior female joints factory caulked.
 - 5. Joints: No exposed fasteners at exterior. Use pop rivets as per manufacturer specifications.
- C. Panel Faces:
 - 1. The wall panel shall be 1 1/2" thick by 12" wide with stiffening ribs as shown on drawings.
 - 2. The fascia panel shall be 1 1/2" thick by 36" wide.
 - 3. The reveal panel shall have stiffening ribs as indicated on the drawings.

D. Finish:

1. Metal shall be finished with Pennwalt Corporation "Kynar 500" fluorocarbon resin (Vinylidene Fluoride). Paint shall be applied in the factory and artificially cured in baking ovens. Paint shall be manufactured by a licensed formulator of Pennwalt Corporation.
2. The metal substate shall receive a pretreatment and prime in accordance with licensed formulator's specifications.
3. Painted material shall meet the following requirements:
 - a. Film Thickness: 0.8 mils or more.
 - b. Film Hardness: Grade F. minimum Eagle Turquoise.
 - c. Paint finishes are recommended for 20 years' durability.
4. Paint shall be manufactured by a licensed formulator and applied by an applicator approved by the formulator. At Contractor's option, paint shall be one-coat system, minimum 1.2 mils thickness.
5. Color: Color as selected by the Engineer.

E. Perimeter Trim: Trim shall be same embossed material, gauge, finish and color as metal siding it is trimming.

F. Girts: Cold rolled steel channels, 3/4" or 1-1/2" as required by manufacturer. Spacing as per manufacturers' specifications.

G. Oil - Canning: Due to steel mill production tolerances and panel manufacturers quality control efforts, panels or trim displaying waviness, which is commonly referred to as oil-canning, shall be reason for field rejection. Acceptance tolerances shall be at the Engineer's discretion. Contractor shall construct field mock-up display panels of 100-square-foot area for Engineer's inspection and approval. Mock-up display panels shall remain at the site until metal siding installation has been completed for comparison of appearance by the Engineer.

2.02 FABRICATION

- A. Fabricate components of the system at factory, ready for field assembly.

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SECTION 07410-4
METAL SIDING

- B. Fabricate components and assemble units to comply with fire and performance requirements specified.
- C. Apply specified finishes in conformance with manufacturer's standards, and according to coating manufacturer's instructions.
- D. Changes of plane, parallel or transverse to longitudinal axis shall be accomplished as detailed on the drawings.

3.00 EXECUTION

- 3.01 INSPECTION: Examine alignment of structural steel and related supports prior to installation and do not proceed until any defects are corrected.
- 3.02 FASTENERS: Secure units to supports as recommended by Manufacturer's structural engineer providing calculations and as indicated in reviewed shop drawings.
- 3.03 INSTALLATION AND ERECTION: Install metal walls, fasteners, trim and related items in conformance with approved drawings and manufacturer's specifications. Laps, joints, fastening, and accessories shall be sealed so as to positively prevent entry of moisture such as wind-driven-rain. Method of sealant shall comply to manufacturer's printed recommendation for a completely weathertight installation and Section 07900 - Sealants and Caulking. Accessories shall be fastened into framing members, except as otherwise approved. Scratched, chipped, or otherwise abraded surfaces shall be touched up as necessary with the manufacturer's printed recommended touch-up paint.
- 3.04 DAMAGED MATERIAL: Repair or replace all damaged material to satisfaction of the Engineer.
- 3.05 SEALING: All joints shall be sealed to provide a watertight installation.

END OF SECTION

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SECTION 07500-1
MEMBRANE ROOFING

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Built-up roofing over rigid insulation on roof deck and over plywood at parapet walls.
- D. Rigid insulation at roof.
- E. Base flashing.
- F. Cant strips.
- G. Parapet wall flashing.
- H. Walkway pads on roof.
- I. Cutting and patching of existing single ply modified bitumen roof of existing building.
- J. Installation of pitch pockets, as per Mechanical Drawing P-6.
- K. Supervision of installation of sheet metal items in connection with roofing.
- L. 20-year guarantee.
- M. Curbs

1.02 RELATED WORK IN OTHER SECTIONS

- A. Furnishing and installing sheet metal - refer to Section 07600.
- B. Flashings for pipes, ducts, conduit, etc., penetrating roof - refer to Divisions 15 and 16.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.
- B. All work in this section shall only be done in dry weather. All deck surfaces shall be dry before application of roofing.
- C. Surfaces shall be smooth, dry and swept clean and free from dust, debris or other loose materials.
- D. Roof subsurfaces and other construction adjoining or affecting the work of this section shall be examined before any work is started, and the Engineer shall be notified in writing of any defects which would be detrimental to the roofing work. The application of roofing materials to the roof deck surfaces shall be considered as acceptance of the roof surfaces by the Contractor.
- E. The work in this section shall include the supervision of the installation of metal flashings in connection with roofing work and which are specified to be furnished and installed under "Sheet Metal" section. The Contractor shall include in the guarantee connections between sheet metal work and roofing work.
- F. Drainage fittings, connections, metal aprons, metal edgings, flashings and counterflashing, collars and sleeves for pipes passing through the roof and metal overflows shall be properly set, or shall be on the job if they are to be built into the roofing assembly.
- G. Manufacturer's Certification:
 - 1. New Building: Submit manufacturer's letter of certification that the roof system specified herein is acceptable for application over substrate and qualifies for a 20-year guarantee as listed in the manufacturer's specification. Roofing Contractor will provide owner with 20-year guarantee from manufacturer.
 - 2. Existing Building: All roofing work will be done by same Contractor. All cutting and patching will follow manufacturer's recommended procedures and specifications

1.04 TESTS AND INSPECTIONS

- A. Immediately after roofing felts are in place and before applying cap sheet surfacing, notify the Owner who will at Owner's option, order testing laboratory to make material analysis tests and membrane test cuts. No more than 1 cut per 500 sq. ft. will be taken.
 - 1. Sample cuts will be 4" x 12" samples of roof membrane at right angles to plies for inspection and weighing.
 - 2. Patching in at cut: Contractor shall patch in with one base sheet, two glass sheets and three moppings applied over each patch. Fabric to extend 8" and 10" beyond patch.
- B. The District will pay all costs of testing unless tests show roofing has not been installed in accordance with specifications. In this event, the Contractor shall pay these fees and add layers of roofing as required to conform to specifications.

1.05 QUALITY ASSURANCE AND GUARANTEE

- A. Design Criteria: It is a requirement of this Specification Section that a 20-year guarantee as per FMI-90 with no dollar limit, UL Class A roofing system (composed of a 4-ply, asphalt and Type IV fiberglass felts, with aggregate surfacing and membrane flashings) including the insulation system provided under this Section, be provided for the new roof. Existing roof cutting and patching will require a 2-year materials and workmanship guarantee.
- B. Technical Review: Prior to submitting his bid, the Contractor shall review the roofing and flashing system material requirements, and installation conditions of such, with a technical representative of said materials manufacturer to ensure compliance with said manufacturer's guarantee requirements.
 - 1. Include in such technical review, an investigation of each particular membrane flashing to metal flashing condition to render such proposed installations consistent with the roofing manufacturer's guarantee requirements.
 - 2. Contractor shall include in Submittals, a certificate of compliance with this Technical Review requirement. Such certificate may be in the form of a letter on the roofing materials manufacturer's letterhead and signed by the technical representative involved in the Technical Review.

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SECTION 07500-4
MEMBRANE ROOFING

- C. Applicator Qualification: The roofing applicator shall show evidence of acceptability as a qualified installer by the roofing system products manufacturer. Submit such evidence along with the Product Data submission.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacturer. Where system numbers are indicated, if the specified systems are discontinued, the Contractor shall furnish the manufacturer's updated system at no additional cost to the Owner.

2.02 MATERIALS

- A. Insulation Board: At the new maintenance building provide one layer of 1 1/2" Fesco board, a homogeneous board formed of expanded perlite particles providing an R-Value of R-4.17 per RIC TIMA Standards. Provide tapered perlite insulation boards to form crickets.
- B. Built-Up Roofing: Glass base with two glass fiber plies with mineral surface cap sheet, Manville or Flintkote as specified herein or equal.

1. Manville Specification No. 4GIC (Modified):

Type III asphalt mopping over insulation	33 lbs.
GlasBase sheet	28 lbs.
GlasPly sheets (2 plies)	24 lbs.
Type III asphalt moppings between plies	
(3 @ 25 lbs.)	75 lbs.
Glaskap mineral surfaced glass cap sheet	72 lbs.
Approximate Total Weight per 100 Sq. Ft.	232 lbs.

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MEMBRANE ROOFING

2. Flintkote Specification No. A-3-M-1:

Type III asphalt mopping over insulation	33 lbs.
Glas Base base sheet	25 lbs.
Flintglas Ply Sheet (2 plies)	28 lbs.
Type III asphalt moppings between plies (3 @ 25 lbs. ea.)	75 lbs.
Flintglas Mineral Surface Cap Sheet	80 lbs.
Approximate Total Weight per 100 Sq. Ft.	241 lbs.

- C. Cants shall be 4" fiber board by Celotex or equal.
- D. Required Nails and Fasteners: Type, length and finish as required by manufacturer of roofing system. Use Lexsuco insulation clips, or equal, to secure insulation to metal deck. Insulation clips shall conform with Factory Mutual I-90.
- E. Roof walkway material shall be 3' x 4' x 1/2" thick Dek-Top, Roof Walk, J-Walk, Carey-Tred or equal.
- F. Gravel shall be clean and thoroughly dry. Color shall be as selected by Engineer. Gravel shall be 1/4" to 1/2" in size; no more than 10% fines shall pass a No. 4 screen and 2% to pass a No. 8 screen.
- G. All curbs to be Pate Pc-5 shall be of box section design, heavy gauge galvanized steel construction, continuous mitered and welded corner seams, integral base plate, factory installed pressure treated wood nailer and shall be insulated with 1 1/2" thick, rigid fiberglass board insulation and 45° canted curb.

3.00 EXECUTION

3.01 GENERAL INSTALLATION OF ROOFING: All work shall be in accordance with the manufacturer's applicable specifications and the following:

- A. Apply asphalt at a temperature between 375°F and 450°F. Do not heat to temperature higher than 450°F. Provide accurate thermometer or thermostat on tank or kettle. Overheated asphalt will be rejected and shall be removed from job site.
- B. Sheet Metal Work: All metal flashings shall be primed with asphalt primer and allowed to dry before roofing materials are applied.

- C. Outlets: Set drain outlets below roof deck surface to permit free flow of water and to prevent forming water dams at rims. Seal roofing around drains and fill metal base of ring-type drains with flashing compound. After roofing is applied, install ring and tighten.
- D. Vent Pipe Flashing: Set flange in asphalt on first layer of base sheet. Seal flange with a 6" strip of glass fabric, set in asphalt. Follow with a collar of base sheet to fit around vents and overlap the flanges 6" on all sides applied in asphalt. After base sheets are applied form a cant of plastic cement around base of vent.
- E. Splash Pans: Install a sheet metal splash pan at all downspouts or outlets spilling out onto any roof areas. Set pan in hot mop.
- F. Pan Flashing: Where projections extend through the roof surface, install a minimum 4" high flashing collar with 6" flange. Install flange on top layer of felts in flashing compound. Seal with 6" wide strip of Glass Fabric set in asphalt. Cut 2 collars of base felt to fit snugly around collar and extend 6" and 12" beyond edge of flange applied in asphalt. Fill the inside of collar with flashing compound. Cant in the flashing compound around projection above the level of outside rim.
- G. Cant Strip: In angles of roof deck and vertical walls or curbs, install a 4" minimum cant strip. Prime the walls with asphalt primer and when dry embed the strips in asphalt. The cant strip shall fit flush at ends and to wall surface. Where scuppers occur, apply cant strip 2" back from flange and bevel cant 8" from ends.

3.02 INSTALLATION OF INSULATION BOARD

- A. Securing Insulation Board: Set units of insulation, long joints parallel to flutes, bearing on top flanges, short joints staggered, and secure layer with Factory Mutual approved insulation clips, Lexsuco or equal. Size and spacing as per FMI-90 recommended by manufacturer, but not less than 6 per 3' and 4' board.

- B. The insulation shall not be left exposed to the weather. No more insulation shall be applied than can be completely covered with the finished built-up roofing on the same day.

3.03 INSTALLATION OF BUILT-UP ROOFING

- A. Valleys: Reinforce valleys with an extra layer of felt not less than 36" wide, extending 12" up inclines. Apply in direction of slope of valley, lapping 4" on ends and sprinkle mop to deck.
- B. Roofing: Cut plies in lengths not to exceed 18' and allow to flatten. Longer lengths may be used when rolled or machined and broomed into place. Mop deck or insulation and apply base ply lapping 2" on sides. Solid mop base ply with asphalt and embed two plies, shingle method, lapping 19" on sides, mopping between plies. Solid mop ply sheets and embed mineral surface cap sheet with 2" side laps. All end laps shall be 6" and not less than 3' apart, diagonally staggered. (All side and end laps of each ply shall be staggered and offset from preceding plies).
- C. Base Flashings: On parapet walls and other vertical surfaces, install base flashing consisting of one layer of glass base sheet and one layer of mineral surfaced cap sheet applied in asphalt. Nail top edge through tin discs.
- D. In areas of standing water or valleys with slopes of 1/4" per ft. or less, apply hot asphalt at a rate of 50 lbs. per 100 sq. ft. and embed gravel surfacing at a rate of 300 lbs. per 100 sq. ft.

- 3.04 GLAZE COAT: Apply a glaze coat to all unfinished portions of the roof membrane at the end of each work day, or part of work day if work is stopped due to inclement weather. The glaze coat shall consist of 25 lbs. of bitumen per 100 sq. ft. of roof membrane.

END OF SECTION

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SECTION 07600-1
SHEET METAL

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Stainless steel catch pans.
- D. Coping.
- E. Overflow drains.
- F. Overflow hoods as detailed.
- G. Reglets, flashings and counterflashings.
- H. Sheet metal drips at exterior doors and windows.
- I. All formed and bent plate lighter than 14 gauge.
- J. Caulking and sealant for work of this section.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Counterflashing for plumbing vents, ducts, and mechanical equipment and piping extending through roof - refer to Division 15.
- B. Sheet metal work for ductwork grilles and similar items - refer to Division 15.
- C. Flashing for conduit through roof - refer to Division 16.

- D. Installation of pitch pockets and splash pans - refer to Section 07500.
 - E. Miscellaneous metal items specified in Section 05500.
 - F. Door louvers - refer to Section 08100.
 - G. Finish painting - refer to Section 09900.
- 1.03 SUBMITTALS: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.
- 1.04 COOPERATION
- A. Verify to make sure that adequate nailers, blocking, etc., as required for proper installation and attachment of sheet metal work have been provided and so as not to cause any delay in the work.
 - B. Roof flashings, reglets and similar work shall be in place or ready for placing before application of roofing materials. All sheet metal work installed in connection with roofing shall be applied under the supervision and inspection of the roofing applicator.
- 1.05 INSPECTIONS: Before completion of the work, examine, and if necessary, test all sheet metal work and installations specified herein. Make any repairs to the work as necessary for a completely watertight installation.
- 1.06 GUARANTEE: Guarantee all sheet metal work against any inherent or developed defects in material or installation, for a period of two (2) years.
- 2.00 PRODUCTS
- 2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if specified models are discontinued, the Contractor shall furnish the manufacturers' updated model at no additional cost to the Owner.

2.02 MATERIALS

- A. All sheet metal shall be galvanized sheet steel with not less than 1.25 oz. per sq. ft., commercial class zinc coating prime finish, conforming to ASTM A525. Steel shall be hot-dipped and shall be tight coated so that any working of the metal will not affect the zinc coating. Sheet metal shall be gauge as shown but not less than 24 gauge where not noted.
- B. Nails, rivets and other fastenings in connection with sheet metal shall be aluminum, stainless steel, galvanized or cadmium plated steel. Rivets shall be soft iron, tinned. Screws shall be Phillips-head, self-tapping type.
- C. Solder shall be a standard brand conforming to ASTM B32, 50% lead and 50% tin.
- D. Cauling and Sealants:
 - 1. Vertical Surfaces: 1-part polysulfide based compound conforming with Fed. Spec. TT-S-00230C, Type II, Class A, or 2-part polysulfide based compound conforming with Fed. Spec. TT-S-00227E, Type II, Class A, or silicone conforming with Fed. Spec. TT-S-01543A, Class A.
 - 2. Horizontal Surfaces: 1-part polysulfide based compound conforming with Fed. Spec. TT-S-00230C, Type I, Class A, or 2-part polysulfide based compound conforming with Fed. Spec. TT-S-00227E, Type I, Class A.
- E. Reglets shall be equal to "Springlock" reglets manufactured by Fry Reglet Corporation, Los Angeles, or "Cushion-Lock" by Superior Concrete Accessories, Inc.
- F. Catch pan linings shall be 16 gauge stainless steel, No. 4 finish.

3.00 EXECUTION

- 3.01 All surfaces to which sheet metal is to be applied shall be free from defects of any kind and brush clean. Set flush or remove as required any projections, nails, fins, etc., for a complete and workmanlike installation.

- 3.02 Field verify all dimensions for work which is to be shop fabricated. Accurately form all work with clean, straight and sharply defined profiles. Form, fabricate, and install sheet metal so as to provide for any necessary expansion and contraction in the completed work and, in addition, so that all joints will remain watertight and weathertight at all times.
- 3.03 Soldering: Thoroughly clean all surfaces before soldering. Execute soldering slowly with full flowing joints and with the joints as thin as possible. Make flat locked seams at least 1/2" wide, and sweat full of solder. Lap seams where soldered at least 3" wide. Make all flat and lap seam joints in the direction of flow.
- 3.04 Double back all exposed raw edges of sheet metal 1/2" minimum.
- 3.05 Where necessary to provide strength and stiffness, additionally reinforce joints with rivets and screws. Fasteners shall not be visible.
- 3.06 Provide sheet metal drips at the heads of exterior door openings which are exposed to the weather. Shape drips of 22 gauge as necessary to deflect the water.
- 3.07 Provide flashing reglets in concrete and at other locations indicated on drawings to receive counterflashings and other flashings as indicated and/or where required.
- 3.08 Weld all sheet metal, 18 gauge and heavier. Execute welding using the shielded electric arc method. Welding rods shall be as recommended by the manufacturer for use with galvanized sheet steel, zinc alloy sheet, cold-rolled sheet metal or stainless steel. Grind smooth and flush all welds on exposed surfaces. Touch up welds with "Drygalv" as manufactured by Dynaflux, North Carolina, local wholesaler: Fesco Inc., Los Angeles (213) 254-9131; "Galvicon" as manufactured by Southern Coatings, Inc., South Carolina, local distributor: V.B. Anderson Co., Santa Ana (714) 547-6684; "Z.R.C. Cold Galvanizing Compound" as manufactured by Z.R.C. Chemical Products Co., Massachusetts, local distributor: Mechanical Distributors, Whittier (213) 698-6655; or primer paint. Apply touch-up as per manufacturer's instructions to provide a coating equal to the original finish.

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SHEET METAL

- 3.09 Install sheet metal copings, gravel stops and the like which will be exposed in the finished work and which are visible from the exterior in 10' lengths and secure with 2 screws at midpoint. Install lengths 1/2" apart at gravel stops in mastic. Seal 6" wide cover plate over joint and secure with two screws. Screws shall have neoprene washers. Install joints with caulking sealant.
- 3.10 Install expansion joints in sheet metal work where shown and as required. Work shall conform to standards of the Sheet Metals and Air Conditioning Contractors Association.

END OF SECTION

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SECTION 07900-1
CAULKING AND SEALANTS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Caulk and seal open joints left between openings and both sides of frames on the exterior of the building and all other joints between building units or materials where the drawings call for caulking or sealant, interior and exterior, or where necessary to completely seal off joints against passage of water, air, or dust.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Caulking and sealants in connection with sheet metal - refer to Section 07600.
- B. Caulking and sealants in pavement areas - refer to Section 03300.

1.03 REQUIREMENTS

- A. Submittals: Submit manufacturer's technical data and material specifications, and samples, as applicable.
- B. Guarantee: All work shall be guaranteed against any inherent or developed defects in material or installation. All work shall be guaranteed to remain watertight for a period of two (2) years.

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SECTION 07900-2
CAULKING AND SEALANTS

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

A. Caulking and Sealants:

1. Vertical Surfaces: One part polysulfide based compound conforming with Fed. Spec. TT-S-00230C, Type II, Class A, or two part polysulfide based compound conforming with Fed. Spec. TT-S-00227E, Type II, Class A, or silicone conforming with Fed. Spec. TT-S-01543A, Class A.
2. Horizontal Surfaces (except see paragraph 3): One part polysulfide based compound conforming with Fed. Spec. TT-S-00230C, Type I, Class A, or two part polysulfide based compound conforming with Fed. Spec. TT-S-00227E, Type I, Class A.
3. Horizontal Walking Surfaces: One part urethane based compound conforming with Fed. Spec. TT-S-00230C, Type I, Class A, or two part urethane based compound conforming with Fed. Spec. TT-S-00227E, Type I, Class A. Shore hardness Durometer Shore A-35.

B. Primer: Primer shall be a nonstaining product specified by the manufacturer of the sealant or caulking compound used for each substrate surface.

C. Filler: Filler shall be a material compatible to sealant, nonrotting, compressible and 50% wider than the width of the joint, Ethafoam, Compriband, or Sonofoam "Backerod." Filler shall be of sizes and shapes to suit the various conditions and to be compatible with primer, caulking and sealant used.

D. Color of Compound: As approved by Engineer.

- E. Bond Release Material: Polyethylene strip, masking tape, polyethylene rope or other material approval by caulking and sealant manufacturer.

3.00 EXECUTION

- 3.01 SURFACE CONDITION: Joint surfaces to receive caulking or sealant shall be sound, smooth, clean, dry and free of all visible contaminants. Application of non-visible coatings or contaminants to surfaces of rabbet area prior to application of sealant shall be controlled by the Engineer/General Contractor in consultation with the sealant manufacturer.

3.02 PREPARATION OF SURFACES

- A. Primer: Thoroughly clean joints and apply primer, if recommended by sealant manufacturer, to dry surfaces. Apply primer prior to application of joint backing, bond breaker or sealants.
- B. Joint Backing: In joints where the depth of the joint exceeds the required depth of the sealant, install joint backing to provide backing and uniform depth of sealant. Joint backing shall be installed with approximately 30% compression. Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections.
- C. Bond Breaker Tape: Install bond breaker tape smoothly at back of joint where joint backing is not required or cannot be installed. (Sealant shall adhere only to the sides and not to the back of the joint so as to eliminate 3-sided adhesion).

3.03 INSTALLATION

- A. Caulking or Sealant Application: Apply caulking or sealant in accordance with manufacturer's application manual and instructions, using hand guns or pressure equipment, with proper nozzle size, on clean, dry, properly prepared substrates. Force caulking or sealant into joint and against sides of joint to make uniform. Avoid pulling of the caulking or sealant from the sides. Fill space completely with caulking or sealant.

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SECTION 07900-4
CAULKING AND SEALANTS

- B. Tooling: Tooling is required to ensure firm full contact with the interfaces of the joint. Tool joints to form smooth, uniform beads with slightly concave surfaces. Finish joints shall be straight, uniform, smooth and neatly finished. Remove any excess caulking or sealant from adjacent surfaces of joint, leaving the work in a neat, clean condition. Tooling agents should only be used if recommended by the caulking or sealant manufacturer.
 - C. Where an irregular surface or sensitive joint border exists, the applicator shall apply masking tape at the edge of the joint to insure joint neatness and protection. Tape to be removed after caulking or sealant is applied.
 - D. Take particular care not to damage any finish or adjoining surface. Leave all exposed surfaces in a clean condition after completion of caulking and sealant operation. Clean adjacent surfaces which have become soiled by caulking or sealant work.
 - E. The depth of caulking or sealant material in all joints shall be not less than 1/2 the width; except that all joints shall have a minimum depth of 1/4" caulking material.
- 3.04 CLEANING: Clean off excess compound or smears with cleaning material recommended by the manufacturer of the compound. Leave work in a condition satisfactory to the Engineer.

END OF SECTION

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Hollow metal doors, including Underwriters' labels where required on the doors.
- D. Pressed steel frames for doors, windows, and framed openings including Underwriters' labels required for labeled openings.
- E. Preparation for hardware.
- F. Installation of hollow metal doors and hardware thereof.
- G. Door louvers where indicated.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Furnishing hardware - refer to Section 08700.
- B. Installation of door frames - refer to Section 09250 and 06100.

1.03 SUBMITTALS: Submit shop drawing, manufacturer's technical data and material specifications, and samples as applicable.

1.04 REQUIREMENTS

- A. Steel doors and frames shall conform to Steel Door Institute S.D.I. 100 Series.
- B. Protect doors and frames from damage during transportation and from dampness and rusting at all times. Store at site in dry location on wood blocking or on suitable floors, in vertical position. Do not store in any portion of the building until after the plaster and concrete work has been completed and that portion of building has dried out. After installation, protect frames and doors from damage during installation, protect frames and doors from damage during subsequent construction activities.

Damaged work will be rejected and shall be replaced with new work without additional cost to Owner.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

- A. Shop Painting: Apply prime finish 1.5 mils thick to all metal surfaces furnished under this section. Clean and chemically treat metal surfaces to secure maximum paint adherence and apply a baked-on dip or spray coat of rust inhibitive metallic primer, standard with manufacturer on all exposed surfaces; clean and coat inside surfaces of metal doors with rust inhibitive paint. Finished surfaces shall be smooth and free from irregularities and rough spots. Inside surfaces of door frames shall be sprayed with manufacturer's standard sound-deadening bituminous material.
- B. Metal Frames for Doors, Windows and Framed Openings:
1. Metal for frames shall be cold-rolled, or hot-rolled, pickled and oiled, steel sheets with clean, smooth surfaces. Except where other gauges are indicated or specified, frames shall be fabricated from steel, not lighter than the following U.S. standard gauges: Frames for single interior doors over 36 inches wide, for pairs of interior doors and for exterior doors shall be 14 gauge; all other frames shall be 16 gauge.
 2. Provide concealed metal for hardware as required. The gauges of metal for reinforcement shall be in accordance with the manufacturer's recommendations, provided that the gauges used are not lighter than those required by S.D.I. 100.
 3. The finished work shall be strong and rigid, neat in appearance, and free from defects. Fabricate moulded members straight and true with corner joints well formed, in true alignment and fastenings concealed where practicable.
 4. Miter joints for welded type frames and continuously arc-weld for full depth and width of frame and trim. Close all contact edges tight and dress welds on exposed surfaces smooth and flush.

5. Prepare frames at the factory for the installation of hardware. Welding of hinges to frames will not be permitted. Frames shall be mortised, reinforced, drilled and tapped to templates to receive all mortised hardware; provide frames to receive surface applied hardware with reinforcing plates only. Where concealed overhead door closers are required in frame members, provide the necessary additional space, cutouts, reinforcements and provisions for fastenings in heads of frames to receive the closers. Provide cover boxes in back of all hardware cutouts. Punch door frames to receive rubber or vinyl door silencers; provide for three silencers on lock side of single doors, and two silencers for each leaf in heads of double door frames. Set and adjust lock strikes to provide clearance for silencers. Provide silencers with frames. Silencers shall not be provided at fire rated doors.
6. Provide metal anchors of shapes and sizes require for the adjoining type of wall construction. Fabricate jamb anchors of steel, not lighter than the gauge used for frame. Locate anchors on jambs near the top and bottom of each frame and at intermediate points not over 24" apart. Weld, or otherwise securely fasten anchors to back of frames at jambs; make provisions for securing anchors to studs.
7. Provide floor clips of not less than 16 gauge steel and fasten to bottom of each jamb member for anchoring frame to floor construction. Fix and drill clips to accommodate 3/8" diameter anchor bolts.
8. Mullions shall be closed of tubular construction and shall member with heads and jambs and be secured thereto; use butt-welded joints for welded construction. Reinforce the joints between members with concealed clip angles of the same thickness as frames.
9. Provide steel glazing stops, height to match integral stop, screw-attached to exterior side, at frames to receive glazing.

- C. Fire Doors and Frames: Provide approved hollow metal fire doors and frames at locations indicated. Construct and install approved doors, frames and hardware in accordance with requirements of the Underwriters' Laboratories for the class of door opening indicated or specified. Fire doors and frames which bear the Underwriters' Laboratories label for the class of opening indicated will be a basis of acceptance. Provide metal stops at openings in doors. The maximum transmitted temperature end point shall not exceed the requirements of governing building code at the end of 30 minutes of fire exposure.
- D. Requirements for Doors:
1. Metal for doors shall be cold-rolled pickled and oiled, stretcher leveled steel sheets with clean smooth surfaces.
 2. The finished work shall be rigid, neat in appearance, and free from defects. Form corners straight and true, well formed, and in true alignment. Dress all welded joints on exposed surfaces smooth so they are invisible after finishing.
 3. Provide doors of type, sizes and design indicated, 1-3/4" thick unless designated otherwise. Provide clearances for doors, except fire doors, of 3/32" at jambs and heads, 1/8" at meeting stiles of pairs of doors, and 5/8" at bottom unless indicated or specified otherwise. Provide clearances for approved fire doors as required by the authority having jurisdiction. Where metal edge strips, dividers or thresholds occur, provide 1/8" clearance to underside of door.
 4. Construct doors of two outer steel sheets not lighter than 18 gauge, with edges welded and finished flush. Seams or joints will not be permitted on door faces or edges. Reinforce the outer face sheets with 20 gauge interlocking vertical channels or z-shaped members spaced not over 6" apart and spot welded to outer face sheets. Provide continuous reinforcing channels welded to face sheets at top and bottom of doors. Provide approved sound absorbing material on inside of door. Provide mouldings not lighter than 18 gauge steel. Provide metal stops at openings in doors.
 5. All exterior doors, and doors in sound insulated partitions shall have foamed, fire-retardant urethane sound-thermal insulation. All other doors shall have a honeycomb core.

6. Round lock edges of stiles for double-acting doors and bevel 1/8" in 2" for other hollow metal doors. Unless detailed otherwise provide exterior doors and all pairs of approved fire doors with overlapped astragal welded to the active leaf as required.
7. Closed top and bottom edges of all exterior doors to provide a weather seal. This seal may be provided as part of the door construction or by the addition of inverted steel channels or other suitable shapes welded to the face sheets.
8. Prefit doors to their frames and hardware at the factory prior to shipment. Doors shall be mortised, reinforced, drilled and tapped at factory to receive all mortise type hardware. Provide reinforcing only for doors to receive surface applied hardware, except push plates and kick plates; drilling and tapping for surface applied hardware shall be done in the field. Provide metal reinforcing plates for locks and mortised hardware; provide reinforcing plates for surface applied hardware as required.
9. The gauges of metal for reinforcing plates shall comply with manufacturer's recommendations for the type of hardware used and the size and thickness of doors, provided that the gauges used are not lighter than those required by S.D.I. 100.

E. Louvers for Doors: Unless otherwise noted, louvers indicated for interior doors shall be stationary sightproof type, manufactured by Airolite, Ventilouver, Construction Specialities or equal. Construct louvers of 18 gauge steel. Unless indicated otherwise, louvers shall be 1" deep inverted "Vee" with extended vanes and flush mouldings. After fabrication, louvers shall be bonderized and given one shop coat of baked-on primer. Secure to door with screws.

2.03 LOCATION OF HARDWARE: (Verify all locations with the Engineer).

- A. Locks and Latches (Cylindrical), Mortise, Unit, Integral: 38" from finish floor to center of knob.
- B. Door Pulls: 38" from finish floor to center of grip.
- C. Push Plate: 45" from finish floor to center of plate.
- D. Push-Pull Bar: 38" from finish floor to center of bar or center between bars and combination.

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- E. Panic Devices (Mortise, Rim): 38" from finish floor to center of bar.
- F. Top Hinge: To manufacturer's standard, but not greater than 10" from head of frame to center line of hinge.
- G. Bottom Hinge: To manufacturer's standard, but not greater than 12-1/2" from finish floor to center line of hinge.
- H. Intermediate Hinge: Equally spaced between top and bottom hinge.
- I. Deadlocks Only (Cylindrical, Mortise, Rim): 38" from finish floor to center line of strike.
- J. Deadlocks (With Separate Latch-Set and/or Pull): 45" from finish floor to center line of strike.

3.00 EXECUTION

- 3.01 Erect doors and frames according to details on the drawings and/or approved shop drawings. Verify proper procedures to insure frame is installed correctly.
- 3.02 Neatly install doors and hardware in designed positions, after walls are finished with fixed units securely fastened in place and operative units adjusted to work properly.

END OF SECTION

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Wood doors, including Underwriters' labels where required on the doors.
- D. Pressed steel frames for doors, windows and framed openings including Underwriters' labels required for labeled openings.
- E. Preparation for hardware.
- F. Installation of hollow metal doors and hardware thereof.
- G. Door louvers where indicated.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Furnishing hardware - refer to Section 08700.
- B. Installation of door frames - refer to Section 09250 and 06100.

1.03 SUBMITTALS

- A. Samples: Submit such samples of face veneers and door constructions as Engineer may request.
- B. Certificates: Submit certificates by door manufacturer that doors conform to or exceed requirements of these Specifications.

1.04 REQUIREMENTS

- A. Reference Standard: National Woodwork Manufacturers Association (NWMA) Standards for Hardwood Veneered Flush Doors except as otherwise required herein.

- B. Rejected doors: At no extra cost to District, furnish doors conforming to specified requirements as replacements for any doors rejected because of damaged surfaces, improper fitting or hardware preparation, or other cause. Patching is not permitted for correction of defects.

1.05 WARRANTY

- A. Furnish a written warranty, subject to the NWMA "Standard Door Guarantee", against defects in materials and workmanship for two years, except guarantee wood face veneers against delamination without time limitation.

2.00 PRODUCTS

2.01 MANUFACTURE

- A. Furnish doors by one of the following manufacturers; refer to Division 1 for substitutions:

Cal-Wood Doors, Santa Rosa, California.
General Veneer Mfg. Company, South Gate, California
Roy-Den Door Company, El Monte, California
U.S. Plywood, Los Angeles, California
Weyerhaeuser Company, Los Angeles, California

2.02 SOLID CORE WOOD DOORS

- A. Hardwood veneered, 5-ply, conforming to reference standard and following requirements.
- B. Core: Staved glued low-density lumber core, or solid particleboard core with minimum 28 psf density conforming to Type 1, Density C, Class 1 of CS 236, hot press resin bonded.
- C. Edges: Minimum 1-1/4" wide hardwood top and bottom edges. Minimum 1-3/8" wide hardwood vertical edges, 1 piece or laminated, edge species to match face veneers. Fully bond edge strips to core before crossbanding is applied.
- D. Crossbanding: Minimum 1/6" thick hardwood, extending to the four edges of door.
- E. Face veneer: "Premium" grade domestic White Oak, rift cut free of heart, balanced, for natural finish.
- F. Adhesives: Type I or II for cores, Type I for crossbanding and for face veneers.

- G. Transom panels: Same construction as solid core wood doors, with latch the same as and continuous with as below.

2.03 LABELED SOLID CORE WOOD DOORS

- A. Face veneers as specified above; otherwise conforming to UL label requirements for rating scheduled. Furnish doors bearing appropriate UL labels on hinge stile.

2.04 GLAZED LIGHTS

- A. For both labeled and unlabeled wood doors, furnish steel frames bearing UL and California State Fire Marshal listing, similar and equal to Anemostat West FSG-75 steel glass stops, baked enamel finish, special color as selected by Engineer.

2.05 SEALING

- A. Seal door edges with one or more coats of clear resin sealer at factory or mill.

2.06 OPTIONAL FACTORY PREPARATION OF DOORS

- A. Wood doors may be prefit and premachined for hardware at factory or mill.
- B. Prefitting: Prefit doors according to referenced NWMA standard except as otherwise detailed, lock stiles beveled to conform to hardware. Apply a clear resin sealer on edges after sizing.
- C. Hardware preparation: Machine doors for all mortised hardware, including mortises for butts, locksets, concealed closers, and all other door hardware furnished under Section 08700. Obtain templates from hardware supplier, and carefully coordinate placement with metal frame supplier so that the doors and frames are properly fitted and equipped when installed, 3/64" maximum tolerance allowed in placing hardware.
- D. Seal all mortises and cutouts with clear resin sealer.

3.00 EXECUTION

3.01 INSTALLATION

- A. Refer to Division 6, Section 06200.

END OF SECTION

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SECTION 08300-1
SPECIAL DOORS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Rolling steel door.
- D. Rolling steel fire rated counter door.
- E. Hardware for doors.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Hollow metal doors and frames - refer to Section 08100.
- B. Electrical work to junction boxes including junction boxes - refer to Division 16.
- C. Storefront doors - refer to Section 08400.
- D. Finish painting - refer to Section 09900.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.
- B. Labels: Labeled fire doors and frames shall conform with all requirements of the National Fire Protection Association and shall bear the Underwriters' Laboratories Label for the type of opening in which they occur.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if the specified models are discontinued, the Contractor shall furnish the manufacturer's updated model at no additional cost to the Owner.

2.02 MATERIALS

A. Rolling Steel Doors:

1. Manufacture: Furnish rolling doors as manufactured by the Cookson Company, San Francisco, California 94107, Type FCM (Motor) or equal by Kinnear or Lawrence, complete with guides, hoods, operating mechanism and special features as hereinafter specified.
2. General Design: The rolling doors shall be designed to withstand a windload of 20 pounds per square foot. To insure ease of operation, the load of barrel and curtain shall be supported by two grease-sealed ball bearings.
3. Curtain: To be formed of 22 gauge interlocking slats fabricated from hot-dipped galvanized strip steel. Galvanized coating to be 1.25 oz. per sq. ft. in conformance with ASTM A525. Material to be given a grey acrylic prime coat before fabricating. Alternate slats are to be fitted with endlocks. Provide windlocks on doors. The bottom slat is to be reinforced by two steel angels, not less than 1/8" thick. Slat face will match existing. Weatherstrip all exterior doors.

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SECTION 08300-3
SPECIAL DOORS

4. Guides: To be composed of three steel angles as per manufacturer's specifications with a minimum 3/16" thickness bolted with 3/8" bolts to form a groove for the curtain. Wall angle is to be of the continuous type. The guide shall be attached to the wall with 1/2" machine bolts or lag screws on 36" centers. Top of each guide shall be well-flared to facilitate entry of curtain, and provided with cast iron stops.
5. Brackets: Shall be fabricated from steel plate of not less than 1/4" thick. Brackets shall be bolted to wall angle with 1/2" bolts.
6. Gears: All gears shall be cast iron with teeth cast from machine cut patterns. The pinion gears shall not be less than 3" pitch diameter. Gear ratio shall be designed for a maximum manual effort of not more than 30 pounds.
7. Barrel: To be not less than 4" diameter steel tubing and designed to limit maximum deflection to .03" per foot. Oil tempered torsion springs shall be capable of correctly counterbalancing weight of curtain. Springs shall be adjusted by means of an exterior wheel.
8. Operation: Shall be Motor Operation (FCM) - push button control.
9. Hood: To be fabricated from galvanized steel. Hoods shall be formed to fit the curvature of the brackets and attached securely thereto.
10. Finish: Curtain and hood shall have a baked grey acrylic primer. All other exposed surfaces shall be given one coat of rust inhibiting paint. All surfaces shall be free from irregularities, runs and rough spots.

B. Fire Rated Counter Door:

1. Manufacture: Furnish Series FD10-1 Rolling Fire Door as manufactured by the Cookson Company; San Francisco, California 94107 or equal by Kinnear or Lawrence.

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SECTION 08300-4
SPECIAL DOORS

2. General: These doors shall be constructed in accordance with Underwriters' Laboratories specifications and shall bear 3/4 hour rating.
 3. Operation: The doors shall be equipped with an automatic closing device which shall operate upon the operation of a Firemark No. FM 972U automatic closing device in conjunction with a smoke detector and fire alarm system. Doors shall be manually push-up operation.
 4. Construction: Curtain shall be No. 10 slat of 20 gauge galvanized steel. Bottom bar to be tubular and shall have a locking device operated by a keyed cylinder. Guides shall be a box section fabricated from steel. Hood shall be 24 gauge galvanized steel.
 5. Finish: Doors made with a galvanized steel curtain shall be given a factory prime coat of paint.
 6. Provide Cookson "Firefly" delayed action release device.
 7. Warning Device: Provide relay and warning bell, activated upon emergency release of doors.
- C. Power Operators:
1. Each door shall be furnished with a power operator with screw type limit switches with contacts at each end of travel, integral motor protection for both heat and current protection, two three button weather-proof push button stations and a test laboratory approved prewired control box mounted on the power operator. The control box shall be supplied with reversing contactor with mechanical and electrical interlocks, 24 volt control transformer with primary fuses, control relay for autoreversing and all other necessary components preconnected to a terminal strip within the control box to facilitate field connections to power source and push button stations. All electrical components shall be UL approved.

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SECTION 08300-5
SPECIAL DOORS

2. Each door shall be controlled by two sets of three-button push button stations and a safety door edge air switch. The push buttons shall be marked "open", "close" and "stop". The "open" push button shall open the door fully without any means of stopping the door until it is fully open. The "close" push button shall close the door fully unless the safety door edge or "stop" push button is activated; then the door shall stop and reverse to fully open position.
3. Doors shall have a manual chain operated over-ride for use in case of power failure.

3.00 EXECUTION

- 3.01 All doors shall be complete in every detail and shall be installed in accordance with approved shop drawings by installers trained and approved by the door manufacturer.

END OF SECTION

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SECTION 08305-1
ACCESS PANELS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Furnish access panels except panels provided by Divisions 15 and 16.
- D. Coordination related to all trades concerned with the installation of special access panels furnished by the mechanical trades (ceiling and wall).

1.02 RELATED WORK IN OTHER SECTIONS

- A. Installation of access panels - refer to Sections 09250 and 09200.
- B. Furnishing access panels required by the plumbing and air conditioning trades, refer to Division 15.

1.03 SUBMITTALS: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if specified models are discontinued, the Contractor shall furnish the manufacturer's updated model at no additional cost to the Owner.

2.02 MATERIALS

- A. Typical access doors as called for in the mechanical specification shall be steel, primed, 24" x 24", or as called out otherwise on the drawings, complete, as manufactured by Milcor, Karp or equal. Panels in ceramic tile walls shall be stainless steel.

	<u>Milcor</u>	<u>Karp</u>
Ceramic Tile:	M	214M
Drywall: DW	KDW	

- B. Access doors in fire rated partitions and ceilings shall carry same rating as partition or ceiling.

3.00 EXECUTION

- 3.01 Access doors shall be installed under the applicable sections by mechanics of the trades engaged in the finishes of the adjacent surfaces. The location shall be coordinated with the foremen of the trades requiring the access doors, such as Plumbers, Air Conditioning and Ventilating Contractors, Electrical and Electronic Contractors, etc. The Contractor shall bring to the attention of the Engineer any discrepancies, lack of adequate clearance, interferences with cabinetwork, lighting fixtures, etc., for final decision by the Engineer. All trades involved shall furnish necessary data to the Contractor two weeks before the start of work relating to this section.

- 3.02 The access doors shall be checked at the end of the job for proper opening and closing, and, if damaged, shall be repaired or replaced as necessary.

END OF SECTION

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SECTION 08400-1
ALUMINUM STOREFRONT
WINDOWS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Aluminum storefront windows.

1.02 RELATED WORK

- A. Section 08800 - Glass and Glazing
- B. Section 07900 - Caulking and Sealants
- C. Section 08700 - Finish Hardware

1.03 REQUIREMENTS: The Contractor shall submit to the Engineer.

- A. Shop Drawings: Submit fully dimensioned shop drawings to scale of all aluminum framing, windows, and entrance installations as necessary to complete the project.
- B. Samples: Submit aluminum samples of finish showing color as specified for Engineer approval.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if specified models are discontinued, the Contractor shall furnish the manufacturer's updated model at no additional cost to the Owner.

2.02 ALUMINUM

- A. Framing members, transition members, mullions, adapters, extrusions, and mounting shall be aluminum of 6063-T5 alloy complying with ASTM B221-54T.

2.03 FASTENING DEVICES

- A. All screws, miscellaneous fastening devices, and internal components shall be of stainless steel or plated or corrosion resistant materials of a strength to perform intended use.

2.04 ALUMINUM STOREFRONT

- A. Aluminum storefront shall be 2" x 4-1/2" offset glazing system similar to sections as manufactured by Kawneer, as detailed on the drawings and in arrangements shown on the drawings.

2.05 FINISH

- A. All aluminum window framing and glazing systems shall be given an anodized finish in compliance with Aluminum Association Finish Designation AA-M10C22A44. Color shall be dark bronze, as selected from samples as submitted. Finish shall be protected with a coating of methacrylate-type lacquer.

3.00 EXECUTION

3.01 ERECTION

- A. All work shall be erected plumb, level, square and in proper alignment and relationship to other work. All finished aluminum work shall be free of waves, buckles, dents, or other defects, and shall be securely anchored to the structure as detailed and required. All anchors, clips bolts, reglets, required to properly secure all work in place shall be furnished. No exposed screws, rivets, or bolts will be permitted for any portion of the work. Power-driven fasteners will not be permitted for securing aluminum members to concrete.
- B. Sealing: All joints around windows shall be tightly sealed to provide a watertight installation.

3.02 PROTECTION

- A. Provide adequate protection during fabrication, shipment, site storage and erection to prevent damage to framing members and finish.
- B. Wherever aluminum is installed in contact with dissimilar metal, concrete, or masonry, the aluminum shall be painted with a heavy coat of bitumastic paint or separated with butyl tape.

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WINDOWS

- C. After erection Contractor shall adequately protect exposed aluminum members from damage by machines, plaster, paint, acids and other harmful compounds.

3.03 CLEANING

- A. All aluminum shall be cleaned before acceptance, removing protective materials, and cleaning with plain water or water with soap or household detergent to remove all blemishes, finger marks, and oxidation.

END OF SECTION

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MAINTENANCE BUILDING FACILITY &
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LONG BEACH, CALIFORNIA

SECTION 08510-1
STEEL WINDOWS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Steel windows.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Hollow metal frames - refer to Section 08100.
- B. Caulking - refer to Section 07900.

1.03 SUBMITTALS: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if specified models are discontinued, the Contractor shall furnish the manufacturer's updated model at no additional cost to the Owner.

2.02 MATERIALS

- A. 3/4 hour rated horizontal sliding windows with automatic closing devices shall be "Fyre-Tec" Rusco Steel Fire Windows as manufactured by Summit Modular Construction.

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SECTION 08510-2
STEEL WINDOWS

- B. Construction: Frame and panel corners shall be neatly welded to form a weathertight joint, excess metal removed, and dressed smooth for minimal surface abrasion.
 - C. Hardware: A cam-type lever handle and strike shall be provided and shall be of solid bronze.
 - D. Weatherstripping: All contracts of frame and panels shall be factory weatherstripped with closed-cell foam in a weatherstripping groove.
 - E. Finish: Bonderized with manufacturer's standard baked on enamel, color as selected by Engineer.
- 3.00 EXECUTION
- 3.01 INSTALLATION: Shall be in strict accordance with manufacturer's printed instructions.

END OF SECTION

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SECTION 08700-1
FINISH HARDWARE

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as built and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Furnish finish hardware.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Installation of finish hardware.
- B. Rough hardware.
- C. Toilet compartments hardware.
- D. Metal shelf standards & supports
- E. Toilet room accessories.
- F. Sliding aluminum doors and windows hardware.
- G. Cabinet hardware.
- H. Metal access doors.

1.03 ABBREVIATIONS

- 1. Mount-Hard Hinges
- 2. Von Duprin
- 3. LCN
- 4. Trimco
- 5. Reese
- 6. Best

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SECTION 08700-2
 FINISH HARDWARE

1.04 QUALITY ASSURANCE

- A. Approved Manufacturer: Approval of equals is for hardware to be equal or better than specified item.

	<u>Listed</u>	<u>Approved as Equal</u>
Hinges	Mont-hard	Stanley, McKinney
Locks	Best	Schlage
Panics	Van Dupain	As Listed
Closers	LCN	As listed
Push-Pull-Kick	Trimco	BBW
Thresholds	Reese	Zero Reese
Seals & Bottoms	Reese	Zero Reese
Auto Flush Bolts	Trimco	G.J.
Coordinators	Glynn Johnson	Door Controls Trimco

- B. Hardware supplier must be a direct factory contract supplier and who has in his employment an experienced hardware consultant who is available at all reasonable times during consultation to the District, Engineer and Contractor.
- C. Exit Doors: Openable at all times from the inside without the use of a key or any special knowledge or effort.
- D. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80. This requirement takes precedence over other requirements for such hardware. Provide only hardware which has been tested and listed by UL for the type and size of each door required, and complies with the requirements of the door and door frame labels. Where panic exit devices are required on fire-rated doors, provide supplementary marking on doors UL label indicating "Fire Door to be Equipped with Fire Exit Hardware", and provide UL label on exit device indicating "Fire Exit Hardware". State Fire Marshal listing numbers are requested.

1.05 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.

- B. Schedules: Before delivery of hardware the supplier shall submit six copies, for approval of the Engineer, a full and complete schedule of hardware indicating the quantity, part number, installation location, and finish of each item required even though some may have been inadvertently omitted from this specification. Hardware supplier shall furnish in triplicate, keying schedule as approved by the District. Each item shall be properly identified, referenced to items listed, and organized into hardware sets in the same analogous format as listed in the specification. Include an index of Doors and Heading for ease of finding each opening requirement.

1.06 JOB CONDITIONS

- A. Coordination: Coordinate hardware with other work. Tag each item or package separately, with identification related to the final hardware schedule, and include basic installation instructions in the package.
- B. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check the shop drawings of such other work, to confirm that adequate provisions will be made for the proper installation of hardware.

1.07 GUARANTEE: Provide guarantee from hardware supplier as follows: Defects in materials and workmanship occurring during guarantee period shall be corrected to the complete satisfaction of the Engineer.

- A. Closers: Five years.
- B. All Other Hardware: Two years.

2.00 PRODUCTS

2.01 FINISH

- A. Generally to be BHMA613 Oiled Rubbed Bronze plated (or DKB-Stat) unless otherwise noted under the hardware set.
- B. Spray door closers to match, unless otherwise noted.
- C. Hinges BHMA 600 at HM frames.

2.02 MATERIALS

- A. Locksets: All locksets shall be mortise type with interchangeable 7 pin core. At labeled openings the levers to have fusible links. Handicapped requirements included. Best 35H
- B. Keying Requirements as Follows: Keying of cylinder locks shall be coordinated with the District. For estimate use Grandmasterkeying charge. Furnish construction core system. Stamp all keys "Do not Duplicate". Ship permanent keys to the District, copy of shipment to General Contractor. Removable core cylinders shall be furnished thru-out.
- C. Hinges: Outswinging exterior doors shall have non-removable (NRP) pin. All hinge open widths shall be minimum, but of sufficient height, add one additional for 30" of additional height or fraction thereof. Furnish security stud on outswinging exterior doors. Finish to be "PC" at HM Doors.
- D. Panic Hardware: Furnish all sets with six bolts unless otherwise specified. Touch pads shall have quiet return.
- E. Surface Door Closers: To be of the full rack and pinion type with removable non-ferrous cover and cast iron body, complete with sex bolts. Place closer inside building, stairs, room, etc. Closers shall be non-handed, non-sized, adjustable from size 2 through 6 on exterior and rated doors adjustable from size 1 through 4-1/2 on interior non-rated doors. Handicapped requirements included.
- F. Flush transom offset brackets shall be used where parallel arm closers are listed for doors with fixed panels over. Drop brackets would be required at narrow head rails.
- G. Kickplates: Except as indicated otherwise, provide 18 GA. stainless steel, 10" high x 2" less width of door. A11 B4E. To be installed as per finish hardware schedule.
- H. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where sound or light seal occurs.

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SECTION 08700-5
FINISH HARDWARE

- I. Screws: All exposed screws shall be Phillips head.
- J. Provide lead shield or similar type anchors for attaching hardware items to concrete or masonry.

3.00 EXECUTION

3.01 SETTING FINISH HARDWARE

- A. Secure finish hardware with suitable fasteners of the same material and finish as the item being attached.
- B. After fitting hardware to doors, remove all finish hardware except butt hinges, carefully replace in properly marked boxes, and place in storage until painting and finishing is completed. After painting and finishing is completed, permanently install finish hardware.

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SECTION 08700-6
 FINISH HARDWARE

SCHEDULE OF FINISH HARDWARE

HW-1
 Each pair to have

6	LOCK-NARROW BACKSET	MS 1851-A 1 PT. L/C	41
6	HINGE	BB991 - 4-1/2 IN.	1
1	EXIT DEVICE	3347EO	3
1	EXIT DEVICE	3347TL LESS PULL	3
1	CYLINDER	1E74	41
2	PULL	1191-3	5
2	SURFACE CLOSER	4040	4
2	AUTOMATIC DRAIN	AUTOMATIC DRAIN	4
1	THRESHOLD	S206	6
2	OVERHEAD STOP	1-331	17
	SEALS BY DOOR MFR.		

HW-2
 Each door to have

3	HINGE	1079 - 4-1/2 IN.	1
1	OFFICE LOCK	35H7E	41
1	STOP	W1276CCS	5
3	DOOR MUTES	1229A	5

HW-3
 Each door to have

3	HINGE	BB1079 - 4-1/2 IN.	1
1	OFFICE LOCK	35H7E	41
1	SURFACE CLOSER	4040	4
1	STOP	W1213ES	5
1 SET	SEALS	797 HEAD & JAMBS	6

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SECTION 08700-7
 FINISH HARDWARE

HW-4
 Each door to have

3	HINGE	BB991 - 4-1/2 IN.	1
1	LOCK-NARROW BACKSET	MS 1851-A 1 PT. L/C	12
2	CYLINDER	1E74	5
2	PULL	1191-3 BTB	5
1	SURFACE CLOSER	4040	4
1	ADAPTER PLATE	4040-18TJ	4
1	THRESHOLD	S205	6
1	STOP	W1213ES	5
	SEALS BY DOOR MFR.		

HW-5
 Each door to have

3	HINGE	BB991 - 4-1/2 IN.	1
1	EXIT DEVICE	99L	3
1	CYLINDER	1E72	41
1	SURFACE CLOSER	4040-EDA	4
1	KICK PLATE	1025 10 X 2IN. LDW	5
1	STOP	1214ES-2 1/4	5
1	THRESHOLD	S205	6
1 SET	SEALS	797 HEAD & JAMBS	6
1	SWEEP	353	6

HW-6
 Each door to have

3	HINGE	BB1079 - 4-1/2 IN.	1
1	OFFICE LOCK	35H73	41
1	STOP	W1213ES	5
1	THRESHOLD	S204	6

HW-7
 Each door to have

3	HINGE	BB1079 - 4-1/2 IN.	1
1	STOREROOM	35H7EW	41
1	SURFACE CLOSER	4040-EDA	4
1	STOP	W1213ES	5
1 SET	SEALS	797 HEAD & JAMBS	6

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SECTION 08700-8
 FINISH HARDWARE

HW-8
 Each door to have

3	HINGE	BB1079 - 4-1/2 IN.	1
1	PASSAGE	35HN	41
1	SURFACE CLOSER	4040	4
1	KICK PLATE	1025 10 X 2IN. LDW	5
1	STOP	W1213ES	5
1 SET	SEALS	797 HEAD & JAMBS	6

HW-9
 Each door to have

3	HINGE	BB1079 - 4-1/2 IN.	1
1	PUSH PLATE	1001 - 8 X 16	5
1	PULL PLATE	1017	5
1	SURFACE CLOSER	4040	4
1	KICK PLATE	1025 10 X 2IN. LDW	5
1	STOP	W1213ES	5
3	DOOR MUTES	1229A	5

HW-10
 Each door to have

3	HINGE	BB1079 - 4-1/2 IN.	1
1	PRIVACY LOCK	35HLF	41
1	SURFACE CLOSER	4040	4
1	STOP	W1213ES	5
1 SET	SEALS	797 HEAD & JAMBS	6
1	THRESHOLD	S814	1

HW-11
 Each pair to have

6	HINGE	BB1079 - 4-1/2 IN.	1
1 SET	AUTO LATCHING BOLT	3825 WD DRS	5
1	DUST PROOF STRIKE	3910	5
1	COORDINATOR	3093	5
1	OFFICE LOCK	35H7E	41
2	SURFACE CLOSER	4040-EDA	4
2	STOP	W1213ES	5
1 SET	SEALS	797 HEAD & JAMBS	6
2	ASTRAGAL	103	6

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SECTION 08700-9
FINISH HARDWARE

HW-12
Each pair to have

6	HINGE	1079 - 4-1/2 IN.	1
2	FLUSH BOLT	W3917	5
1	LOCK	L9080 P	2
2	DOOR HOLDER	PAH 60-180	4
2	THRESHOLD	S205	6

HW-13
Each door to have

1	PADLOCK	4B7T	41
	Balance of hardware by Door Manufacturer		

END OF SECTION

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SECTION 08800-1
GLASS AND GLAZING

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Glass and glazing.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Toilet room mirror refer to Section 10800.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.
- B. Protection of Glass: Glass which has been installed shall be identified with tapes or strings. These identifications shall be suspended near but not in contact with the glass. Tapes may be attached to the sash at head, jamb or sills with a nonstaining adhesive. Marking or coating the glass with soap, cleansing powders or other materials will not be permitted. Any glass which becomes stained because of marking or taping on the surfaces shall be replaced at no additional cost to the Owner.

1.04 BUTT-JOINT GLAZING SYSTEM

- A. The Contractor shall submit the silicone sealant manufacturer's:
 - 1. Adhesion test data to production samples of metal and glass, tested in accordance with ASTM C794.
 - 2. Compatibility statement that the materials in contact with the sealant such as gaskets, spacers, setting blocks, are compatible with the sealant after 21 days' exposure to ultra violet, 2000-4000 (micro watt u.v. radiation).

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SECTION 08800-2
GLASS AND GLAZING

3. Stress statement that the sealant dimensions (per detail) when exposed to the specified windload, the stress on the silicone sealant does not exceed 20 psi with a 6:1 safety factor.
 4. The Contractor shall provide the sealant manufacturer production runs of material for sealant manufacturer's evaluation including shop drawings, showing size of lights, design windload, and sealant dimensions for sealant manufacturer's statement on stress.
- 1.05 Provide Owner with containers of each type, size and color of glass installed for future use. Quantity to be provided shall be a minimum of 2% of area installed, but not less than two pieces of each size.
- 2.00 PRODUCTS
- 2.01 GENERAL: All material shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.
- 2.02 MATERIALS
- A. Glass:
1. All glass shall conform with Federal Specification DD-G-451d; Glass, Plate, Sheet, Figured (Corrugated and Float, for Glazing, Mirrors and Other Uses). Manufacturer shall certify glass supplied was produced in accordance with this specification.
 2. Tinted Glass: All glass on exterior of building is to be tinted. 1/4" thick PPG "Solarbronze". Manufacturer shall label "air" side and "tint" side of glass.
 3. Spandrel Glass: 1/4" thick "Spandrelite" or "Vitrolux". Color of ceramic frit backing to be selected by the Engineer.
 4. Wire Glass (for fire rated glazing): 1/4" thick "Baroque" or Misco" (horizontal and vertical wires).

5. Clear Glass: 1/4" clear float.
6. Glass shall be tempered where shown or required.
7. Tong marks will not be allowed.

- B. Butt-joint glazing shall conform with PPG Industries "Butt-Joint Glazing System Manual G-812" and requirements specified in paragraph 1.04 of this section.

3.00 EXECUTION

- 3.01 Glazing procedures shall, in general, conform with the printed recommendations and instructions of the Glazing Manual of the Flat Glass Manufacturer's Association. Contractor shall furnish all required materials and workmanship necessary to insure a completely watertight installation without any rattling. All glazing shall be performed by skilled glaziers in accordance with approved shop drawings. All glass sizes shall be verified before cutting and shall fit within a tolerance of 1/32" per 1/8" thickness. All glass shall be tight and true within the glazing members, using vinyl glazing beads where specified for this purpose. All glass shall be set without springing and with the convex side to the exterior. Any glass which is set with putty shall be shimmed, fully bedded, secured with stops, and then back-puttied on both sides.

3.02 CLEANUP AND REPLACEMENT

- A. The Contractor shall be responsible for all glass breakage during storage at the site, during erection and shall replace all broken glass as required to complete the installation, all prior to final acceptance of the building. Keep premises clean during progress of work.
- B. Upon completion of the building, all glass surfaces shall be thoroughly washed and polished. Any broken, scratched, chipped or otherwise defective glass, including any glass which has become stained shall be removed and replaced with proper materials and workmanship. The entire glazing operation shall be left in a neat, clean and acceptable condition, as approved by the Engineer.

END OF SECTION

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SECTION 09250-1
DRY WALL

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Gypsum board finish for walls and ceilings.
- D. Install access panels in gypsum board finish.
- E. Metal dry wall accessories.
- F. Taping, spackling and sanding for gypsum board.
- G. Install pressed metal door and window frames in dry wall partitions.
- H. Metal studs for walls with two sides dry wall and areas with no finish on walls.
- I. Metal studs for walls with two sides dry wall and areas with no finish on walls.
- J. Acoustical sealant at floors, ceilings, and masonry where shown or where required to meet STC ratings shown.
- K. Backing plates in stud walls provided under this section.
- L. Shaft wall.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Furnishing access panels - refer to Section 08305 and Divisions 15 and 16.

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SECTION 09250-2
DRY WALL

1.03 SUBMITTALS: Submit manufacturer's technical data and material specifications, and samples, as applicable.

1.04 REQUIREMENTS

- A. At all times, examine all preparatory work and verify that the gypsum dry wall finish may be substantially supported rigidly constructed and finished straight, plumb, level, true, and clean with no unfinished parts between dry wall work and adjoining work.
- B. Install all work so as to provide complete closures of work which is designated to be concealed. Properly coordinate dry wall work with that of other trades and provide for openings and built-in features. All plumbing, heating, electrical work, and other trades to be closed in shall be in proper place and condition before commencing dry wall work.
- C. Unless shown otherwise on the Drawings or required by code, install all dry wall work using the latest applicable standard methods and details in the latest edition of "Dry Wall Construction Handbook" by U.S. Gypsum Company.
- D. Where governing code requirements are more stringent than these specifications, the code requirements shall govern. Where they are less stringent, the specifications shall govern.
- E. Coordinate time of installation of attachment rods and wire for suspended ceilings to preclude omission.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

- A. Gypsum board shall be 5/8" thick as indicated and shall conform with ASTM C36. Provide Type X at all areas where a rated wall is noted on drawings. Boards shall have the long edges recessed or tapered for taping. Provide water-resistant boards conforming with ASTM C630 in toilet rooms and other wet areas.

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SECTION 09250-3
DRY WALL

- B. Tape shall be high strength paper type conforming to Fed. Spec. SS-J-570B, Type II.
- C. Joint Compound shall be all-purpose ready-mixed compound type conforming to Fed. Spec. SS-J-570B, Type I.
- D. Fasteners: Screws for attachment to furring channels and screw-on type studs shall be No. 6, blued steel, self-tapping sheet metal screws with flat, countersunk No. 2 Phillips head, 1" or 1-5/8" long. Screws for attachment of wallboard to 18 gauge or heavier studs shall be Type S-12 dry wall screws, manufactured by U.S. Gypsum, length 1" or 1-5/8" as required.
- E. Corner reinforcement shall be galvanized steel type with perforated edges. Casing for all edges of exposed gypsum board shall be galvanized steel J-type with perforated edges. Expansion control joints shall be galvanized steel type with perforated edges, USG #093 or equal.
- F. Furring channels for support of gypsum board shall be screw-on furring channels, rolled from .022 galvanized steel, 7/8" deep, manufactured by Blue Diamond or U.S. Gypsum.
- G. Resilient channels for support of gypsum board shall be screw-on type, rolled from minimum 26 gauge galvanized steel, 1/2" deep, manufactured by Blue Diamond or U.S. Gypsum.
- H. Carrying channels shall be minimum 1-1/2" cold-rolled steel weighing not less than 475 pounds per 1000 feet.
- I. Diagonal bracing shall be minimum 2-1/2", 20 gauge steel studs.
- J. Tie wire shall be minimum 16 gauge galvanized annealed wire.
- K. Hangers shall be minimum 8 gauge galvanized annealed wire and so placed to support a maximum 16 square feet of hung ceiling.
- L. Acoustic sealant shall be a nonhardening, nonstaining caulking compound. Provide 1/4" minimum bead at all perimeters of walls.
- M. Laminating adhesive shall be equal to U.S. Gypsum Durabond 90, Gold Bond Sta-Smooth Standard Set, or equal.

N. Metal Studs:

1. Studs shall be not less than 25 gauge, wide flange studs with not less than 1-3/8" flanges. Tracks shall be unpunched channels. Studs which will receive ceramic tile shall be not less than 18 gauge. All studs spanning horizontally shall be 16 gauge. Studs which will carry wall hung cabinets, fixtures etc. shall be 16 gauge.
 - a. All 14 gauge and 16 gauge components shall be made from cold-formed slit steel conforming to ASTM A446 Grade D with a minimum yield point of 50,000 psi.
 - b. 18 gauge and lighter components shall be made from cold-formed slit steel conforming to ASTM A446 Grade A with a minimum yield of 33,000 psi.
 - c. All studs shall have a factory applied galvanized coat with a minimum G-60 galvanized coating.
2. Shaft enclosure studs shall be U.S. Gypsum, "C-H" studs, Flintkote Series IV, "I" studs, or equal, with matching "J" tracks.
3. Studs shall be 4" size unless noted otherwise on the drawings and shall be galvanized. For partitions where shown or required by codes, provide heavier gauge studs.

O. Core boards, (shaft wall liner) shall be 1" thick, 24" widths, full height with "V" edges where shown. Boards shall have a fireproof gypsum core and shall be encased in strong paper.

P. Shaft wall shall be 1HR, WP7000. Construction type: Gypsum wallboard metal C-T studs. Installation shall comply to all UL testing requirements for WP7000.

3.00 EXECUTION

- 3.01 Metal studs for dry wall partitions shall be spaced at 16" o.c. unless otherwise noted and shall have the runner tracks fastened to concrete floors and underside of structure above (where studs extend through ceiling) with 7/32" dia. by 1-3/8" long penetration Ramset stud bolts spaced 32" on center and not more than 6" from each end of the runner track. Studs shall be inserted and screwed with No. 6 screws into the runner tracks. Allow for deflection in nonload bearing studs. Every third stud shall run to structure above if partition is not full height and shall be braced both sides at 4' o.c. from structure above with studs welded to top plate and extended at 45 degree angle. Provide 16 gauge double studs at doors and other openings and triple studs at corners. 25 gauge studs shall be screwed to plates (not welded).
- 3.02 Install metal door and window frames in stud walls in accordance with the drawings, shop drawings and manufacturer's details for applicable conditions.
- 3.03 **SUSPENDED CEILINGS**
- A. Saddle-tie hanger wire with ends twisted at least 3 times around itself at 3' o.c. to 1-1/2" runner channels spaced 4' on centers and to structure above as detailed; these to be crossed with furring channels clipped or tied to the runners. Spacing for furring channels shall be 16" o.c. or as indicated. Isolate runner channels from structural walls and partitions. Locate runner channels not over 6" from parallel boundary walls or beams, furring channels 2" from parallel walls.
- B. Provide additional ceiling framing in conjunction with mechanical and electrical trades as necessary to suspend the ceiling adequately where large ventilating ducts are to be installed and to accommodate fixtures on ceilings.
- 3.04 **GYPSUM BOARD ON WALLS AND CEILINGS**
- A. On walls, secure boards to solid bearings along all edges and joints of all boards. Place boards vertically. Block boards less than full height of wall at joint. Horizontal application of boards will be allowed provided all joints are staggered and blocked.

- B. On ceilings secure boards along perimeters of ceilings, around edges of openings, and to all furring members.
 - C. Power drive screws with an electric screwdriver. Drive screwheads so that there will be a slight depression below the surface of the wallboard without breaking the paper. Butt edges loosely together. End joints shall be staggered and secured on supports. On walls, secure boards at 12" on centers in the field of the board and 8" on centers staggered along all abutting edges. On ceilings, secure gypsum board at 8" on center in the field and along the abutting joints. Revise spacing as required by local codes for fire rated assemblies.
 - D. Install corner beads and stops, etc., in strict accordance with manufacturer's printed specifications.
 - E. Offset joints on one side of wall one stud minimum from joints on opposite side of wall.
- 3.05 **MULTIPLE-PLY GYPSUM BOARD APPLICATION:** Apply multiple layers of gypsum board with screws or with adhesive, whichever is required by code and in accordance with the following:
- A. **All Screw-On Applications:** Apply first layer of gypsum, with square edges, cut-in floor to ceiling height, shall be applied vertically to the face of the stud. Attach with No. 6 1-inch screws at 12" on center on abutting edges and in the field. Apply face layer of gypsum board, cut-in floor to ceiling height, vertically over the first layer so that the vertical joints are staggered with the backersboard joints. Attach face layer with No. 6 1-3/4" long screws at 12" on center, in the field and 8" on center at perimeter of boards. Horizontal application of boards will be allowed for the first layer. Stagger and block all joints.
 - B. **Adhesive Application:** Apply first layer as specified for single layer application, except that joints shall not be treated. Apply the succeeding layers with adhesive spread evenly over the back surface. Boards shall be at right angles to the first layer. Spread adhesive with a notched trowel in an irregular pattern to uniformly cover and back surface of the board. Place panels in position and temporarily secure with screws. After the adhesive has set for a minimum of 24 hours, remove or spackle temporary fastenings.

- C. Offset joints of second layer one stud minimum from joints in first layer.
- 3.06 **BACKING PLATES:** Examine all parts of the drawings and specifications for any conditions which require surface mounted cabinet work, equipment or other furnishing which will be supported on or secured to the drywall. Provide minimum 18 gauge by not less than 4" wide studs as backing for wall hung items, located by marking on the outside face of the finished dry wall, after installation. Backing shall be large enough, in each case, and adequate in area to provide uniform support for the load to be applied. Backing studs shall extend over at least 3 studs. Where backing has been omitted, remove wallboard as is necessary to properly install backing plates and then replace the gypsum board.
- 3.07 Install expansion control joints in gypsum board surfaces every 30' in each direction for walls and every 30' in each direction for ceilings.
- 3.08 **ACCESS PANELS**
- A. Install access panels in gypsum board walls. Coordinate location with installation requiring the access panels. Bring to the attention of the Engineer any discrepancies, lack of adequate clearance, interferences with cabinet-work, lighting fixtures, etc., for final decision by the Engineer.
 - B. Check access panels at the end of the job for proper opening and closing, and, if damaged, repair or replace as necessary.
- 3.09 **ACCESSORIES, TAPING**
- A. Cover all external corners with protective metal bead, secured with screws and covered with taping compound. At all locations where the gypsum board terminates in a free edge, a metal casing trim shall be provided.
 - B. Fill and tape all joints, including internal corners. Clean surfaces, free of dirt or dust, and set all nail heads, or screw heads, before taping.

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SECTION 09250-8
DRY WALL

- C. Tape and sand all dry wall partitions. Press in well, first coat of joint cement to fill the entire joint without any voids, and apply thick enough to cover the recessed edges. Immediately press reinforcing tape tightly and evenly into the cement and embed. There shall be no air bubbles or other imperfections in this application. After the first application has dried completely, apply additional coats of cement as required and sandpaper until all surfaces are perfectly flush and smooth enough to receive finish painting. Patch all screw heads, dents, and other voids or surface irregularities with the same joint cement as used for taping joints.

END OF SECTION

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SECTION 09300-1
TILE WORK

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Ceramic floor tile.
- D. Ceramic base tile.
- E. Ceramic wall tile.
- F. Ceramic floor and wall tile at shower enclosure.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Drywall in back of wall tile - refer to Section 09250.
- B. Membrane waterproofing, except as specified herein - refer to Section 07111.

1.03 SUBMITTALS: Submit manufacturer's technical data and material specifications, and samples, as applicable.

1.04 REQUIREMENTS

- A. Except as may otherwise be specified herein, all tile work shall conform with Standard Specification issued by the American National Standards Institute (ANSI) and the Tile Council of America (TCA) as specified for each type of application, latest editions.

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SECTION 09300-2
TILE WORK

- B. Cut all tile for proper fitting around work in place. Rub exposed edges of cuts smooth with abrasive stone. Grind all tile and carefully fit where tile intersects with fixtures, plumbing and accessories. Tile shall be carefully fitted around outlets, pipes, fixtures, and fittings so that the plates, escutcheons, or collars all overlap the cut.
- C. Keep tile free of stains before placing.
- D. Patterns of tile shall be carefully laid out and established, working from center of each wall, or space, to assure equal size tile on the ends. Joints in walls shall align with joints in floors.
- E. Locations of all accessories, anchoring devices for equipment, toilet stalls, mirror frames, and similar items penetrating through the tile finish shall be located and properly marked before any tile work is started.
- F. Check all walls for plumb and all angles for square before the tile work is started. The starting of tile work shall imply acceptance of the subsurfaces.
- G. Provide and install barriers to close off floors to traffic until the tile work has set up. Install other forms of protection and coverings as required to prevent any damage. Where trucking or continuous traffic conditions occur over tile work, provide boards or plywood covering.
- H. Provide Owner with unopened containers of each type, size, and color of material installed for future use. Quantity to be provided shall be a minimum of 2% of area installed, but not less than 1 standard size container.

2.00 PRODUCTS

- 2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

2.02 MATERIALS

- A. Cement shall be standard brand of portland cement conforming with ASTM C150, Type I or Type II.
- B. Hydrated lime shall be high calcium lime, conforming with ASTM C206 or C207, Type S.
- C. Sand shall be clean, washed, sharp and fine aggregate as per ASTM C144. Sand for mortar setting beds shall be well graded to pass a No. 8 sieve with not more than 5% passing a No. 100 mesh screen.
- D. Water used for tile work shall be clean and drinkable.
- E. Grout for all tile shall be Hydroment Joint Filler by UPCO, Custom Building Products Type S, or equal. Color as selected by Engineer.
- F. Membrane waterproofing under thin-set tile floors above grade shall be Laticrete membrane coating 301/335, Merko BFP, or equal. Conform with Laticrete Bulletin No. 235.0 and Merko specification.
- G. Tile shall be Standard Grade and shall meet or exceed the requirements of TCA A137.1 specification for tile. Tile shall be manufactured by Dal-Tile, American Olean, Pomona Tile or equal.
 - 1. All tile colors shall be as selected by the Engineer.
 - 2. Glazed wall tile shall be 4-1/4" x 4-1/4" x 5/16" dust pressed, white body, square edge, machine made. Base shall match wall tile with built-in self cove.
 - 3. Ceramic floor tile shall be 2" x 2" x 5/16" with coefficient of friction of .60 or higher, in accordance with pertinent provisions of ASTM C1028.
 - 4. Furnish and install all sizes and shapes, bases, caps, stops, returns, trimmers and other shapes required to produce a completely finished installation.
 - 5. Provide honed marble thresholds where shown.

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SECTION 09300-4
TILE WORK

- H. Organic adhesive for thin-set tile work on drywall shall conform with ANSI A136.1, Type 1.
- I. Latex-portland cement mortar for thin-set tile work on drywall shall conform with ANSI A118.4.
- J. Curing paper for all tile work shall be nonstaining building paper.
- K. Divider strips shall be 1/8" wide, zinc alloy divider strips, manufactured by American Terrazzo Strip Company, Inc., Duggan Manufacturing Company, or approved equal.

3.00 EXECUTION

3.01 WALL TILE - THIN SET (CONTRACTOR MAY USE A OR B)

A. Organic Adhesive:

1. All tile shall be firmly embedded in adhesive and tapped into place; adhesive that has filmed over shall be removed and replaced with fresh adhesive. Tile joints shall be established by the space lugs on the tile, allowing a joint 1/16" thick. All joints, horizontal and vertical shall be straight and perfectly level or plumb. Surfaces found to be warped or varying from a true plane by more than 1/8" in 10' shall be removed and replaced as necessary to conform with these requirements.
2. All intersections, angles and returns shall be accurately formed. Cut edges of tile shall fit against other tiles, trim finish and built-in features, and shall be ground, rubbed smooth with a hone and carefully joined.
3. As the work progresses, surfaces of completed portions shall be cleaned with damp cloths to prevent stains. After mortar has set, the tile surfaces shall be washed down with clean water. Joints shall be cleaned and washed and then grouted.
4. Refer also to TCA, Handbook Detail No. B413, W242, and ANSI A108.4 Specification.

B. Latex-Portland Cement Mortar:

1. Mortar for setting of tile shall be a mix composed of one bag portland cement, 100 pounds clean fine sand (No. 40 mesh) and 5 gallons of Laticrete Tile Set Liquid No. 4237 to bring to a troweling consistency.
2. A coat of setting mortar shall be applied and combined with a notched trowel to leave uniform ridges, and using sufficient mortar to bed the tile completely. Tile shall be applied while the mortar surface is wet and tacky; tile shall not be applied to skinned over mortar. As the work progresses, the tiles shall be aligned and rubbed, or beaten with a block, then embed tile in mortar and assure a true surface.
3. Refer also to TCA Handbook Detail No. W243 and ANSI A108.5 Specification.

3.02 FLOOR TILE - THIN SET

- A. Apply membrane waterproofing at slabs above grade in accordance with manufacturer's directions.
- B. Mortar for setting of tile shall be a mix composed of one bag portland cement, 100 pounds clean fine sand (No. 40 mesh) and 5 gallons of Laticrete Tile Set Liquid No. 4237 to bring to a troweling consistency.
- C. A coat of setting mortar shall be applied over the floor slab, and combed with a notched trowel to leave uniform ridges, and using sufficient mortar to bed the tile completely. Tile shall be applied while the mortar surface is wet and tacky. As the work progresses, the tiles shall be aligned and rubbed, or beaten with a block, then embed tile in mortar and assure a true surface.
- D. Refer also to TCA Handbook Detail No. F1133 and ANSI A108.5 Specification.

3.03 FLOOR TILE - MORTAR BED

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SECTION 09300-6
TILE WORK

- A. Mortar setting bed shall be 1:6:1/10 mix of cement, sand and lime. The mortar shall be set to screeds so that tile will finish on the proper plane in line with cove base. Floor tile shall be set after a thin bed of dry portland cement has been dusted over the setting bed and worked lightly into the mortar.
 - B. Tile shall be set in position and beaten with a rubber mallet firmly into the mortar to the proper slopes and levels. Beating and leveling shall be completed within one hour after placing the sheets of tile. Care shall be taken in starting the tiles to assure that each size tile, in the pattern, will run in a true, straight line from wall to wall, and be at right angles to the wall.
 - C. Refer also to TCA Handbook Detail No. F111 and F121 and ANSI A108.1 Specification.
- 3.04 FLOOR EXPANSION JOINTS: Install expansion joints at perimeters of floors and 16' o.c. both ways. Fill with sealant to conform with Section 07900. Refer to TCA Handbook Detail No. EJ711.
- 3.05 GROUTING
- A. Floor Tile: A neat paste of grout shall be forced into the joints. Joints shall be filled completely flush and any excess grout shall be cleaned off with clean burlap or cloths. Before grout sets, all skips and gaps shall be filled. Grout shall be color as selected by the Engineer.
 - B. Wall Tile: Tile shall be wetted, if necessary, before application of grout. Grout shall be mixed to a thick slurry with color added (if required) and forced in to completely fill the joints. Before the grout sets, the joints shall be tooled, filling all gaps or slips. Surplus grout shall be removed. Upon completion, all joints shall be full and completely flush, and the tile surfaces left perfectly clean.
- 3.06 CURING: After grouting, all tile shall be covered and moist-cured for three days with paper. Paper shall be lapped and sealed with gummed tape.

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SECTION 09300-7
TILE WORK

- 3.07 CLEANING: All tile shall be cleaned after grouting and pointing have sufficiently set. Any traces of cement or dust accumulation shall be removed. Acid shall not be used in cleaning glazed tile. Following the cleaning, Vaseline shall be removed from the hardware and plumbing trim, and all metal cleaned and polished.

END OF SECTION

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SECTION 09500-1
ACOUSTICAL CEILINGS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under
- C. Acoustic ceilings, including suspension system.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Furnishing and installation of fluorescent and incandescent lighting fixtures.
- B. Air distribution devices.
- C. Framing, suspension, members, gypboard and appurtenances for drywall ceilings.

1.03 SUBMITTALS: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.

1.04 GENERAL REQUIREMENTS:

- A. Ceiling System: In ceiling suspension system, minimum load carrying capabilities of main runner members to be as required by Table No. 47-18-A, Title 21.
- B. Drawings and Specifications: The drawings and specifications for the Acoustical Ceiling are reasonably exact, however, extreme accuracy is not guaranteed. Exact locations, distances, levels and anchorages and all other requirements shall be governed by building conditions.
- C. Coordination: Coordinate the work of all trades in establishing locations of required electrical outlets, hanger wires, duct work, air diffusers, etc., to the end that completed work will finish in true alignment and precise position, with proper support at all required points.

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SECTION 09500-2
ACOUSTICAL CEILINGS

- D. Workmanship: Work shall be done by qualified workmen experienced in installation of systems specified and under direction of competent foremen. Perform installation in accordance with manufacturer's recommendations and directions.
- E. Shop Drawings: Submit to Engineer for approval complete shop drawings in triplicate showing all components, layouts, details sections, mechanical and electrical elements, installation and structural details and all pertinent information. After approval, six corrected copies of shop drawings shall be filed with the Engineer. All necessary additional corrected and approved copies shall be provided for all trades requiring same.
- F. Samples: Submit three (3) samples of acoustical units and all main suspension components for ceiling specified.

2.00 PRODUCTS

2.01 ACOUSTICAL CEILING: Materials listed herein, including all components are based upon Matren aluminum screw-slot system as manufactured and distributed by Universal Molding Co. and Anaheim Extrusions, Los Angeles, California. The installation shall create a modular flush type appearance with factory painted extruded aluminum grid system forming a framework braced rigidly in both directions and capable of supporting lighting fixtures, air distribution systems, and partitions. The ceiling system shall be rated minimum "Heavy-duty" structural. Equivalent aluminum screw-slot systems (channel-slot systems are not acceptable) will be considered providing all technical performance dimensional and structural data herein specified is strictly adhered to without exception.

- A. Hanger Wires: Shall be minimum 12 gauge pre-straightened, galvanized annealed steel at 4'-0" o.c. minimum along main runners, and at two (2) diagonal corners of fluorescent lighting fixtures. Wires shall be at 24" o.c. in rooms where excessive ceiling loads are indicated to be supported.

- B. Anchor each wire to the structure above with an approved device capable of supporting 75 pounds. Wires supporting fixtures shall be capable of supporting four times the fixture weight. Do not hang suspension wires more than 1 in 6 out of plumb unless counter sloping wires are provided. Do not attach wires to or bend around interfering materials such as duct work. Use trapeze or equivalent devices where obstructions interfere with direct suspension. Construct minimum trapeze suspensions for spans up to six feet with back-to-back 1-1/2" old formed channels. Show in detail on the Shop Drawings the lateral support system for ceilings. Demonstrate adequacy of system by calculations and/or tests, including adequacy of main runner splices and cross runner intersection connections. Base calculations on lateral loads. Provide wire supports for terminal ends of each main and cross runner. Do not use wall trim as primary support for runners or for lateral support of ceiling, and do not rivet runners to wall trim. In computing the vertical component in a splayed wire ceiling bracing system, a seismic factor of minimum .3g must be used.
- C. Main Runners: Shall be minimum heavy-duty structural rated in accordance with ASTM Standard C-635 and shall be 6063 T-5 alloy extruded aluminum with minimum 2 inch nominal high web and total face exposed width of 0.5625" maximum, including a continuous extruded 0.125" maximum screw slot.
- D. Cross Runners: Cross runners shall be the same configuration and profile as main runners, and shall have a positive, extruded structural locking clip device at the intersections, to allow for independent removal without damage to the runners.
1. Main runners and cross runners shall be cross scored at all intersections to provide a continuous 1/8" maximum screw slot regress in all directions. The cross sectional profile of the runners shall have a smooth, solid planar vertical side for at least 3/8" of the shoulder to fit "snugly" against the adjacent vertical side of the haunch of the acoustical panel to effect maximum STC for elimination of sound transmission.
 2. Members shall be one piece configuration of same materials with equal expansion and contraction coefficients. Suspension system shall meet structural 21.0 pounds per lineal foot with support wires at 48" o.c.

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SECTION 09500-4
ACOUSTICAL CEILINGS

3. Splicing and indexing shall occur at cross runner intersections only. Random splicing is not acceptable. Cross runners shall be indexed as shown on drawings to fit within the main or other cross runners so as to eliminate all lateral and/or torque misalignment.
- E. Perimeter Moldings: Perimeter at vertical intersection surfaces, as detailed on drawings, shall be metal with paint finish to match suspension system.
 - F. Positive Connection Clips: Shall be concealed structural extruded aluminum, structurally fastened to main and cross runners at each intersection. Conventional "stamped" or "pressed" clips not acceptable. Tension pull data shall be minimum 240 lbs. per bearing before clips open based upon "eccentric" load testing, i.e., 5 degrees in four (4) directions. The clip shall allow for independent removal of all cross runners without the use of special tools. Maximum relocatable flexibility is essential to the suspension system.
 - G. Finish: Suspension system shall be glare-free matte-white pebble-textured factory applied baked enamel finish to match adjacent acoustical units.
 - H. Acoustical Units: Cast mineral fiber, ASTM-E-84 or U.L. test #723 Class I-0-25, with factory applied washable white paint finish, weighting minimum 1.1 psf. The units shall be heavy-textured Celotex Texturetone, U.S.G. Glacier, or approved equal for the Matren system in 24" x 48" modular, 3/4" net minimum thickness.
 1. Profile: Factory haunched to rest on shoulder of suspension system to provide a flush face and even plane between the face of the acoustic unit and the suspension member. Manufacture all acoustical material "haunched" as a standard item for use with system specified. Provide letter of guarantee from tile manufacturer confirming that tile is manufactured for use with system specified, and is available for future replacement.
 2. NRC: Mounting 7, .70 to .80.

3. STC: 40 - 44 laboratory certified.
4. Light Reflection: Not less than 70.
5. Furnish extra tile, for the lay-in systems, in the amount of 1 percent of total installed units. Tile to be furnished in original cartons to the Owner.

3.00 EXECUTION

3.01 GENERAL REQUIREMENTS: Install in a first class workmanship manner all materials necessary for the complete interior environmental systems, and be responsible for supply and installation of all necessary clips and inserts for hanging of suspension system from structure.

- A. Comply with all local codes and/or ordinances.
- B. Provide trapeze type rigging as approved and where required for suspension in areas under wire ducts or other obstructions.
- C. System lay-outs shall be indicated on the drawings.
- D. Acoustical Ceiling:
 1. Main Runners: Install # 10 gauge galvanized annealed hanger wires at 24" o.c. as detailed along Matren main runners at two (2) diagonal corners at fluorescent lighting fixtures and secure with single wrap and three twists and attached to structure. Provide seismic "sway-wires" as detailed on the drawings.
 2. Cross Runners: Install Matren cross runners perpendicular to main runners at 48" o.c. and 24" o.c. in modules as indicated on the drawings.
 3. Perimeter Members: Shall be field mitered at interior and exterior corners and attached to the walls at a minimum of 18" o.c. with approved fasteners.

3.02 COMPLETION AND CLEANUP

- A. After all work above the ceiling line has been completed and inspected, install acoustic units.

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ACOUSTICAL CEILINGS

- B. Remove and replace any damaged units, touch up and/or clean any abraded spots, level ceilings to a tolerance of 1/8" in 12'.

END OF SECTION

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SECTION 09650-1
RESILIENT FLOORING

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Preparatory work.
- D. Vinyl composition floor tile.
- E. Cleaning, polishing and protections.
- F. Vinyl edge reducing strips.
- G. Topset base.

1.02 REQUIREMENTS

- A. Submittals: Submit manufacturer's technical data and material specifications, and samples, as applicable.
- B. All colors will be selected by the Engineer from manufacturer's standards.
- C. Provide Owner with unopened containers of each type, size, and color of material installed for future use. Quantity to be provided shall be a minimum of 2% of area installed, but not less than one (1) standard size container.

2.00 PRODUCTS

2.01 GENERAL

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SECTION 09650-2
RESILIENT FLOORING

- A. All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if the specified models are discontinued, the Contractor shall furnish the manufacturer's updated model at no additional cost to the Owner.
- B. All flooring shall be delivered in sealed cartons, plainly labeled or marked to indicated color, pattern, gauge, lot number, and sequence of manufacture within the lot. All flooring shall have been manufactured within the 6-month period previous to installation.

2.02 MATERIALS

- A. Vinyl composition tile shall be 12" x 12" x 1/8" thick with square and true edges, Fed. Spec. SS-T-312, Type IV, Grade B.
- B. Adhesive shall be as recommended by manufacturer.
- C. Topset base shall be 4" high, rubber, with preformed corners, Fed. Spec. SS-W-40a, Type I.
- D. Floor leveling cement shall be Ardex K-15 manufactured by Ratron, Inc., Northridge, California, or Floorstone manufactured by Tamms Industries.

3.00 EXECUTION

3.01 INSTALLATION

- A. Fill all cracks and low spots with a floor leveling cement. Remove all dirt, mortar, and plaster droppings and any other matter that would prevent adhesion or cause bumps, depressions, or other defects in the appearance or durability of this finish floor covering, and make surface smooth, level, and uniform.
- B. Maintain a temperature of not less than 70°F in the locations (at floor level) for not less than 48 hours before installation and for 10 days after installation. Allow flooring to condition in the locations for at least 24 hours before installation.

- C. Do not lay flooring until other work including painting has been substantially completed. Cement and lay flooring in a manner that will result in a complete and first-class installation. Install flooring on all covers for telephone and electrical ducts or other items which occur within the limits of the floor. Reference markers, holes, or openings, either existing or required for other trades that are in place, or plainly established, shall be replaced in the covered floor, in the case of holes or openings to be drilled or cut open as necessary.
 - D. Installation of Floor Tile:
 - 1. Lay tile with center of tile or joints of tile on the center lines of the room, or area, with borders equal in size. Locate transition between rooms with different colors at center of door when door is in a closed position. Match tile for color and pattern by using tile from cartons in the same sequence as manufactured.
 - 2. Tile shall be laid with grain pattern running in one direction. Grain pattern shall be run the long way of room or space.
 - E. Neatly cement all floor covering to the subflooring. Allow no open cracks or voids, and no raising or puckering at joints. Cut neatly to and around all permanent fixtures. Roll floor covering to assure a tight bond to the subfloor and eliminate all trapped air.
 - F. Provide vinyl reducing edge strips at all exposed unprotected edges of floor covering and with a smooth, even seam. Flooring shall abut or pass under thresholds.
- 3.02 **PROTECTION:** During installation operation, the entire areas shall be closed to traffic and work of other trades. Where traffic is unavoidable, floors shall be protected with building paper and also boards or plywood, where trucking is being done over the installed area.

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SECTION 09650-4
RESILIENT FLOORING

- 3.03 CLEANING: After completion, all resilient floor covering shall be protected from the work of other trades by covering with non-asphaltic building paper. After the work of all other trades has been completed, the temporary protections shall be removed, the surfaces washed with a neutral cleaner and all heel and scuff marks removed so that the resilient floor covering is ready to be waxed. One coat of wax shall be applied and polished with a polishing machine.

END OF SECTION

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SECTION 09811-1
EPOXY FLOOR COATING

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Battery room flooring.
- D. Pump room flooring.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Battery room wall finish - refer to Section 09812.
- B. Painting - refer to Section 09900.

1.03 SUBMITTALS: Submit manufacturer's technical data and material specifications, and color samples, as applicable.

- A. Submit samples not less than 6" x 6" in size, showing the approximate applied thickness, texture and color.
- B. Submit product data sheets and a list of materials by name and quantity to be used on the project in order to demonstrate compliance with these specifications.

1.04 Provide Owner with two gallons of same material as applied at completion of work.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where system numbers are indicated, if the specified systems are discontinued, the Contractor shall furnish the manufacturers' updated system at no additional cost to the Owner.

2.02 MATERIALS

- A. All products specified herein are No. 115 manufactured exclusively by Cono/Chem, Inc., 12923 Cerise Avenue, Hawthorne, CA 90250. Phone: (213) 679-3396. Equivalent products of Stonhard, Inc., will be acceptable. Submit to insure equivalency.
- B. Cono/Weld 501: Low viscosity, 2-component, penetrating epoxy primer for concrete and other siliceous substrates.
- C. Cono/Crete 115: 100% solids, chemical and abrasion resistant epoxy mortars.
- D. Finished Composite: The installed Cono/Crete surfacing system shall consist of a primer coat followed by application of the Cono/Crete epoxy mortar at 1/4" minimum.

2.03 The materials shall be delivered to the job site in the original sealed containers bearing the product name, color, manufacturer's lot number, directions for use and precautionary labels. Materials shall be stored indoors, protected from damage, moisture, direct sunlight and temperatures below 60°F or above 100°F.

3.00 EXECUTION

3.01 Applicator shall be trained and approved by the manufacturer. Apply materials in accordance with manufacturer's instructions.

3.02 Substrate Preparation: The concrete surface must be thoroughly clean, dry and free from any surface contaminants or cleaning residue. Acceptable methods of cleaning are acid etching followed by the complete and thorough removal of the resulting residue. Clean with Cono/Clean 7.

3.03 Environmental Conditions: The following conditions are required for proper application and cure of the Cono-Crete surfacing system:

- A. Surface and surrounding air temperature must exceed 50°F but must be less than 100°F., with materials at not less than 65°F during application.

- B. Application and curing must be performed with the work area free from drafts or wind, with temperature conditions controlled or falling, and with full protection from direct sunlight.
- C. Surface and air temperatures must be not less than 50F above the dew point during application at least the first 6 hours of cure.

3.04 INSTALLATION

A. Priming:

1. All surfaces shall be primed by roller or spray application applied uniformly at approximately 200-250 sq. ft. per gal. As part of the application, the primer shall be mechanically scrubbed into the surface with horizontally rotating electric floor scrubbing machines or equal.
2. The primer shall be mechanically mixed and applied in accordance with instructions, then allowed to cure to "initial set", but not more than 12 hours before proceeding with application of the Cono-Crete surfacer.

- B. Surfacing: The Cono-Crete aggregate filled epoxy mortar shall be mechanically mixed in accordance with instructions and applied using a screed box pulled in parallel adjoining segments allowing application at a controlled thickness of 1/4" minimum on flat profile surfaces. Each segment placed shall then be lightly troweled with steel finishing trowel to achieve a tight "closed" surface. The Cono/Crete mortar shall be applied at approximately 95-100 sq. ft. per large unit on flat new concrete floors, and at decreasing coverage rates based on surface profile and depth of erosion.

3.05 PROTECTION

- A. Adequately protect the completed work from water, airborne dust or other surface contamination until cured tack free, and until the surface cannot be penetrated by pushing with a screwdriver, approximately 15-24 hours after application.
- B. Protect from vehicular traffic and other physical abuse, immersion and chemical exposure until the completed system has thoroughly cured - approximately 48-72 hours.

END OF SECTION

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SECTION 09812-1
BATTERY ROOM WALL FINISH

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Battery room wall finish.
- D. Epoxy coating on bench rack in Battery Room.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Battery room flooring - refer to Section 09811.
- B. Painting - refer to Section 09900.

1.03 SUBMITTALS: Submit manufacturer's technical data and material specifications, and color samples, as applicable.

- A. Submit samples not less than 6" x 6" in size, showing the approximate applied thickness, texture and color.
- B. Submit product data sheets and a list of materials by name and quantity to be used on the project in order to demonstrate compliance with these specifications.

1.04 Provide Owner with two gallons of same material as applied at completion of work.

2.00 PRODUCTS

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SECTION 09812-2
BATTERY ROOM WALL FINISH

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where system numbers are indicated, if the specified systems are discontinued, the Contractor shall furnish the manufacturers' updated system at no additional cost to the Owner.

2.02 MATERIALS

- A. All products specified herein are No. Dux-O-Tex manufactured exclusively by Crossfield Products Corp., 3000 E. Harcourt Street, Compton, CA 90221, Phone: 213-636-0561. Equivalent products of Stonhard, Inc., will be acceptable. Submit to insure equivalency.
- B. Cross-guard Block Filler
- C. Wallcote Primer.
- D. Wallcote NG: 98% solids high build epoxy coatings.
- E. Finished Composite: The installed Wallcote NG coating system in 2 or more coats of Wallcote NG applied over the selected primer. Wallcote NG is usually applied at 10-18 mils nominal thickness per coat.

2.03 The materials shall be delivered to the job site in the original sealed containers bearing the product name, color, manufacturer's lot number, directions for use and precautionary labels. Materials shall be stored indoors, protected from damage, moisture, direct sunlight and temperatures below 60°F or above 100°F.

3.00 EXECUTION

3.01 Applicator shall be trained and approved by the manufacturer. Apply materials in accordance with manufacturer's instructions.

3.02 Substrate Preparation: Surfaces must be thoroughly clean, dry and free from any surface contaminates or cleaning residue. Fill all voids in masonry wall to provide a smooth surface with block filler.

3.03 Environmental Conditions: The following conditions are required for proper application and cure of the Wallcote NG surfacing system:

- A. Surface and surrounding air temperature must exceed 50°F but must be less than 100°F with materials at not less than 65°F during application.
- B. Application and curing must be performed with the work area free from drafts or wind, with temperature conditions controlled or falling, and with full protection from direct sunlight.
- C. Surface and air temperatures must be not less than 5°F above the dew point during application and at least the first 6 hours of cure.

3.04 INSTALLATION

A. Priming:

- 1. All surfaces shall be primed with appropriate primer for substrate by brush or spray application applied uniformly at approximately 200-250 sq. ft. per gal. and 300-350 sq. ft. per gal. on metal.
- 2. The primer shall be mechanically mixed and applied in accordance with instructions, then allowed to cure to "initial set", but not more than 48 hours before proceeding with application of the Wallcote NG surfacer.

B. Coating:

- 1. The Wallcote NG epoxy coating shall be mechanically mixed in accordance with instructions and each application shall be uniformly applied by brush, roller or airless spray, at the rate of approximately 100-150 sq. ft. per gal.
- 2. The application rate on horizontal surfaces may be as required to achieve the specified thickness, but shall be no greater than 150 sq. ft.

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SECTION 09812-4
BATTERY ROOM WALL FINISH

C. Surfacing: Brush roll or spray.

3.05 PROTECTION

- A. Adequately protect the completed work from water, airborne dust or other surface contamination until cured tack free, approximately 18-24 hours after application.
- B. Protect from physical abuse, immersion and chemical exposure until the completed system has thoroughly cured - approximately 48-72 hours.

END OF SECTION

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SECTION 09900-1
PAINTING

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Preparation of surfaces to be painted.
- D. Surfaces to be Painted: New construction only.
 - 1. Painting exterior metal.
 - 2. Painting black that portion of the ductwork interior which is visible through the grilles.
 - 3. Painting interior metals, and gypsum board.
 - 4. Painting pressed metal door, and window frames and hollow metal doors.
 - 5. Painting wood doors.
 - 6. Painting exposed mechanical and electrical items in areas to be painted.
 - 7. Painting nonferrous metals, prime coated, plated or factory finished items specifically noted to be painted or where such items occur as accessories or appurtenances to units otherwise required to be painted.
 - 8. Painting exterior mechanical equipment, and mechanical items on the roof or building exterior.
 - 9. Paint metal portions of door weather stripping.
 - 10. Painting concrete block.
 - 11. Other surfaces as indicated on drawings.

E. Surfaces Not to be Painted:

1. Aluminum with factory finish.
2. Stainless steel.
3. Finish hardware, except hardware with USP finish.
4. Acoustical ceilings.
5. Flooring.
6. Electrical fixtures and receptacles.
7. Exterior concrete pavements.
8. Toilet compartments and accessories.
9. All items with complete factory finish, except mechanical and electrical items as specified herein before. Verify with the Engineer which factory finish items such as grilles, diffusers, etc. require field painting.
10. Other surfaces as indicated on the drawings.
11. Existing construction except as indicated on the drawings.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Prime coat painting of miscellaneous metal - Section 05500.
- B. Prime coat painting of hollow metal doors and frames - Section 08100.
- C. Painting of nonferrous metals, unless specifically noted or shown as an integral part of a unit otherwise requiring painting - various sections.
- D. Parking striping - Section 02580.
- E. Epoxy coatings - Sections 09811 and 09812.

- 1.03 SUBMITTALS: Submit shop drawings, manufacturer's technical data and material specifications, and samples, as applicable.

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SECTION 09900-3
PAINTING

- A. Submit a complete list of all materials proposed for use in the work, in the form of a shop drawing, identified by manufacturer's name and product label prior to start of painting.
- B. Secure color sample before undercoating. Samples of colors selected and finished specified shall be furnished to the manufacturer for color-matching. Approval of color must be obtained before proceeding with the work. Unless otherwise specified, all undercoats shall be tinted slightly to approximate the finished colors and each undercoat shall be a different tone or value than the previous undercoat.
- C. Prepare and submit 8-1/2" x 11" samples of each color and finish before work of this section begins. For natural and stained finishes, provide samples on type and quality of wood installed on the project.
- D. Prepare sample wall areas as may be directed by the Engineer. These areas will be the standard of work for the project when approved.

1.04 REQUIREMENTS

- A. Provide, install, remove and transfer fixed, movable and hanging scaffold, staging and planking as necessary for proper performance of the required work. Do not use fixtures for scaffolding.
- B. Number of coats specified are minimum that shall be applied. It is intended that paint finishes of even, uniform color, free from cloudy or mottled surfaces be provided. Each coat shall be of proper ground color to receive succeeding coat and shall appreciably differ in color tint. Each coat shall be approved by the Engineer before next coat is applied; otherwise, an extra coat will be required over entire surface involved.
- C. All material must comply with local air pollution control requirements and Federal lead content requirements.
- D. Colors shall be as selected by the Engineer.
- E. Inspect surfaces to be painted and make a satisfactory correction of defects in workmanship or material that might affect the finish.

- F. Take extreme precautions to protect exposed construction from paint splatter. Work that will remain unpainted shall be free from paint blemishes.
- G. Provide Owner with unopened containers of each type, size, and color of material installed for future use. Quantity to be provided shall be a minimum of 2% of area installed, but not less than one (1) gallon size container.

2.00 PRODUCTS

2.01 **GENERAL:** All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required they shall be of the same manufacture.

2.02 MATERIALS

- A. All paints, enamels, varnishes, etc., shall be of the brand and quality specified and shall be delivered at the site of work in clean, unopened original containers and stored where designated.
- B. Materials necessary to complete the painting and finishing schedule as herein specified and listed by material numbers and names, are standards for kind, quality and function, and are taken from the stock list of architectural finishes of the Sinclair Paint Company and Dunn-Edwards.
- C. Materials as manufactured by the following companies may be submitted to the Engineer for approval for use on the project: Sinclair, Dunn-Edwards, Sherwin-Williams, Pratt & Lambert and Frazee.

3.00 EXECUTION

3.01 PREPARATION OF SURFACES

- A. **General:** Surfaces to be painted or finished shall be in a suitable condition for a proper finish.

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SECTION 09900-5
PAINTING

- B. Drywall (gypsum board) shall be dusted clean and free from incrustations and other foreign matter.
- C. Wood surfaces shall be sanded and dusted clean. Nail holes, cracks, or other defects shall be carefully puttied after the prime coat with putty matching the color of the paint. Knots and sappy areas shall be covered with clear shellac or approved known sealer where the finish is to be paint or enamel.
- D. Preparation of Metal Surfaces Not Galvanized: All grease, oil, dirt, etc., shall be removed by mineral spirits. Rust, scale, and defective protective paint shall, if necessary, be removed by scrapers, wire brushes, or other approved means, and then cleaned with mineral spirits. Final cleaning with mineral spirits shall be done not less than 30 minutes nor more than 3 hours before application of paint.
- E. Preparation of Galvanized Surfaces: Galvanized surfaces specified to be painted shall be first washed with paint thinner to remove all dirt, oil or grease. Surfaces shall then be washed with a solution of chemical phosphoric metal etch and allowed to dry. Cleaning of galvanized surfaces shall be done the same day they are to be painted with the specified prime coat.
- F. Preparation of Concrete Block Surfaces: Surfaces shall be dry (less than 12% moisture content) and free of efflorescence, incrustations and other foreign matter. Any glazed surfaces shall be slightly roughened. Any other coatings shall be removed with a light sandblast or hot water wash.
- G. Finish Hardware: Shall have been fitted and contact plates removed before painting. Plates for electric switches and plugs shall have been fitted and removed.
- H. Prime and backprime all items of wood furnished under Section 06200 and set against masonry or plaster.

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SECTION 09900-6
PAINTING

- 3.02 All work shall be executed by skilled craftsmen, experienced in their trade. All work shall be of the highest standards and methods. Paints shall be mixed and applied in strict accordance with the manufacturer's printed direction for his product. All materials shall be applied smoothly with proper film thickness, but not less than 1.5 mils thick per coat, without runs, sags, skips or any other defects. Enamels and varnishes shall be lightly sanded between coats, dusted and wiped clean before recoating.
- 3.03 Execute work under favorable weather conditions or conditions suitable for the production of first class work. No exterior or interior painting shall be done until surfaces are thoroughly dry and cured.
- 3.04 Protection: Protect all surfaces and objects inside and outside of buildings, grounds, lawns, shrubbery, and adjacent properties against damage. Be responsible for the orderly storage of materials, removal of all combustible rags, empty containers, etc., at the end of each day, taking every possible precaution to prevent fire.
- 3.05 Inspection: All work shall be approved by the Engineer and any work not complying with these specifications shall be properly and promptly corrected.
- 3.06 Schedule of Finishes:
- A. Finish Schedule: Surfaces shall be finished in accordance with the following procedures for the surface and desired finish.
All products specified are Dunn-Edwards.
- B. Exterior:
1. Metal - Ferrous:
- | | |
|----------|-------|
| 1st coat | 43-4 |
| 2nd coat | 42-23 |
| 3rd coat | 42-8 |
2. Metal - Galvanized:
- | | |
|----------|--------|
| 1st coat | QD43-7 |
| 2nd coat | 42-23 |
| 3rd coat | 42-8 |

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SECTION 09900-7
PAINTING

C. Interior:

1. Gypsum Board (Drywall):

1st coat	W101
2nd coat	V365
3rd coat	5 series

2. Wood Doors:

1st coat	V365
2nd coat	2 series
3rd coat	2 series

3. Concrete Block:

1st coat	42-9
2nd coat	5 series
3rd coat	5 series

4. Metal - Ferrous:

1st coat	42-44
2nd coat	5 series
3rd coat	5 series

5. Metal - Galvanized:

1st coat	QD43-7
2nd coat	V365
3rd coat	5 series

D. Painting Mechanical and Electrical Work:

1. Paint all roof mounted equipment, exposed exterior and interior heating, ventilating, plumbing, mechanical and electrical work, except items indicated not to be painted and items in mechanical rooms.
2. Thoroughly clean items such as equipment, pipes, vents, roof ventilators, duct fittings, miscellaneous supports and hangers, electrical conduit, fittings, pull boxes, outlet boxes, unfinished surfaces of plumbing fixtures, and all other work not specifically mentioned of all rust, corrosion, oil and other foreign materials, and remove all blisters or loose paint.

3. Prime unprimed surfaces and the bare areas of shop primed items.
4. After priming, finish all such mechanical and electrical work with the second and third coats of paint as specified.
5. Any of the above mentioned work occurring in finished rooms or spaces shall be prepared and primed as specified above, and then given the second and third coats of wall paint or enamel to match the adjoining wall or ceiling surfaces.
6. Paint inside surfaces of all ducts, dampers, and louvers, as far back as visible from the room in which they open, with two coats of flat black paint.
7. All exposed pipes, conduits, and major lines shall have the following color code and will be labeled for easy identification:
 - a. Engine Coolant (AF) - Light Blue
 - b. Chassis Grease (GR) - White
 - c. Compressed Air (CA) - Exposed Galvanized Pipe
 - d. Gear Oil (GO) - Purple
 - e. Motor Oil (MO) - Light Green
 - f. Sprinkler System - Red
 - g. Torque Oil (TO) - Brown
 - h. Parts Cleaning Solvent (S) - Tan
 - i. Industrial Water - Grey
 - j. Conduits - Color of ceiling
 - k. Solar collecting system - Medium Blue

END OF SECTION

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SECTION 10010-1
MISCELLANEOUS
SPECIALTIES

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included a work under this section.
- C. Fire extinguishers and cabinets.
- D. Kitchen appliances.
- E. Lockers.
- F. Locker room benches.
- G. Chalk boards, tack boards and bulletin boards.
- H. Telephone enclosure.
- I. Signs and graphics.
- J. Television wall bracket.
- K. Shower curtain.
- L. Roof Scuttle

1.02 RELATED WORK IN OTHER SECTIONS

- A. Toilet Compartments and Toilet Room Accessories - refer elsewhere in Division 10.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawings, manufacturer's technical data and material specifications, as applicable, for all products specified herein for the Engineer's review prior to start of work in this section.

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SECTION 10010-2
MISCELLANEOUS
SPECIALTIES

- B. Cleanup: During the progress of the work, the premises shall be kept free of debris and waste resulting from the work in this section. Upon completion, all surplus material and debris shall be removed from the site.
- C. Colors: Where items have a finish involving choice of colors, colors will be selected by the Engineer from manufacturer's standards.
- D. Manufacture: Products specified are to establish a quality. Equal products of other manufacturers will be allowed subject to approval of the Engineer.
- E. Fastenings: On gypsum board or plaster wall surfaces, fastenings shall be with screws into wood or metal blocking, bolts or molly anchors, not less than 1/4" diameter. Screwing into gypsum board or lath with plugs will not be acceptable.

2.00 PRODUCTS

- 2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if the specified models are discontinued, the Contractor shall furnish the manufacturers' updated model at no additional cost to the Owner.

2.02 MATERIALS

- A. Fire Extinguishers and Cabinets:
 - 1. Extinguishers: Model ABC-20, 20 lb. stored pressure type, U.L. rating 20A-80 B:C, manufactured by Standard, Sierra, Potter-Roemer, or equal.
 - 2. Cabinets: Model 4208 factory primed steel cabinet, surface mounted type with Style A door, manufactured by Standard Fire Equipment Division of Zurn Co. or equal by Potter-Roemer or Sierra.
- B. Kitchen Appliances:
 - 1. Microwave Oven: Model JVM 140 (G) Space Saver with built-in exhaust by General Electric.

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SECTION 10010-3
MISCELLANEOUS
SPECIALTIES

2. Built-In Cooktop: Model RU 38C by General Electric, 30" x 19" size.
 3. Refrigerator: Model TFX 22RL by General Electric.
- C. Lockers:
1. Manufacture: Republic, Lyons, or equal. Lockers shall be single tier, 12" x 18" x 6'-0". Provide for attachment to concrete base and sloping tops.
 2. Material: Doors and door frames shall be made of cold rolled and leveled sheet steel. Other parts shall be made from mild cold rolled steel. All steel to be free from imperfections and capable of taking a high grade enamel finish.
 3. Doors shall be 18 gauge steel, adequately flanged. Formations shall consist of 2 right angles at lock side of door; 2 right angles at hinge side; and 1 right angle formation at top and bottom.
 4. Door frames shall be not less than 16 gauge steel capable of taking same high grade finish as balance of locker. All parts to be channel formation securely welded together. Sides of frame shall form a continuous door strike.
 5. Locking device shall be a positive automatic type locking device of the pre-locking type, whereby locker may be locked while door is open, then closed without unlocking and without damaging locking mechanism. The silencers on the frame hooks shall be securely attached with a rivet having the head molded into the rubber. Lock bar shall be of double channel formation and tamperproof. All handle parts, including fixed case and lifting trigger, to be made from sturdy zinc die cast material. The fixed case to be attached to the door with 2 round Phillips Head screws with Sems external washers and 1 centering stud. The case fully shields the lifting trigger from below. The lifting trigger to have 2 right angle lugs that insert into the lock bar without the use of a fastening device. The lifting trigger to be equipped with rubber silencers at top and bottom to prevent metal-to-metal contact. The handle design must be free of openings or surfaces that permit leverage to be applied that forces the handle upward when in a locked position. There shall be 3 locking points on lockers.

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SECTION 10010-4
MISCELLANEOUS
SPECIALTIES

6. Latching shall be a one-piece, self-contained spring steel latch, so designed as to be easily removable from the lock bar for replacement, but completely contained within the lock bar without the use of additional fasteners, and is under tension to provide rattle-free operation. The latch shall be coated with a non-staining solidified lubricant to provide smooth trouble-free service. The lock bar shall be of double channel construction providing maximum strength, so formed as to hold the latch within the door channel at proper operating location. The lock bar shall be held laterally in the door channel by means of non-removable self-formed retainers, pierced from the door and held in place vertically by the lock bar handle lugs. Rubber silencers are provided at each frame hook on the door jamb. The rubber bumper is to be riveted to the frame hook with a non-corrosive rivet whose head is molded into the rubber making the rivet an integral part of the bumper.
7. Locks: All lockers shall be furnished with built-in master keyed grooved key for each lock. Locks of standard manufacturers.
8. Hinges shall be at least 2" wide of the full loop, tight pin style, to be securely welded to frame and riveted to door. Doors shall have 3 hinges.
9. Body: All locker body components shall be made of cold rolled steel specially flanged for added strength and rigidity to insure tight joints between bolts. All bolts and nuts shall be zinc plated.
10. Finish: Before enamel is applied, the surfaces of the steel shall be phosphatized in a 5 stage process to inhibit corrosion and increase the durability of the applied enamel. All parts shall then be finished with a heavy coat of enamel. Enamel shall be baked on. Body parts are finished in a standard neutral color. Exposed parts shall be color as selected by the Engineer. Bolts and nuts shall be zinc plated.
11. Number Plates: Each locker shall have a polished aluminum number plate with black numbers not less than 1/2" high. Plates to be attached with split rivets.

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SECTION 10010-5
MISCELLANEOUS
SPECIALTIES

12. Equipment: Lockers shall have 1 hat shelf approximately 9" below top of locker. Lockers shall have 1 double prong back hood and 2 single prong wall hooks. All hooks shall have ball points, and shall be made of steel. All hooks shall be attached with 2 bolts or rivets.
 13. Ventilation: Doors shall be louvered at top and bottom for ventilation. Lockers shall have 6 louvers at top and bottom.
 14. Provide for attachment to concrete metal base and sloping top for all lockers.
- D. Locker Benches manufactured by Lyon shall be made from laminated maple, 1-1/4" full finished thickness. Bench tops shall be 9 1/2" wide and furnished in lengths as shown. Tops shall be mounted on pedestals consisting of sturdy 1-1/4" O.D. Tubing with 10 gauge steel flanges welded to each end. The overall height shall be 17-1/2". Provide factory applied clear urethane finish.
- E. Shower Seats for Handicap: Bobrick B-5181 or equal by Parker.
- F. Dry-Marker Chalkboards: Greensteel, Inc., white color "Dry Marker Boards," porcelain enamel on steel, ground coat on concealed surface, on 1/4" plywood with 0.005" aluminum backer sheet, with snap-on aluminum trim and chalkrail, equivalent by Nelson-Adams, Claridge, or equal. Furnish 2 dozen marker pens per board, colors as selected. Tackboards shall be equal to Greensteel "Vinyl Tac-Text" tackboards, colors as selected, with trims as above for dry marker boards. Round ends of chalkrails to 2" radius. Sizes as shown on drawings.
- G. Bulletin Boards: Greensteel, Inc. "M" Series, size shown, with "Vinyl Tac-Text" back, equivalent by Nelson-Adams, Claridge, or equal. Sizes as shown on drawings.
- H. Signs and Graphics:
1. Room Exit, Toilet Rooms, (Men and Women), Conference Room, Lunch Room/Kitchen, Training Room and Miscellaneous Signs: Vomar ES 100, Insert Series, Helvetica medium text or equal. Submit shop drawings with lettering layouts, samples and product data.

2. Signs shall be the "silk screen" process type, as indicated.
 3. Exterior Painted Signs: Paint large identification numerals in Helvetica Medium typeface, size and placement indicated, using silicone polyester exterior enamel of color approved by the Engineer. Sign materials shall be galvanized steel.
- I. Telephone Enclosures: AT & T Mini-Shelf # 31094.
 - J. Television Wall Bracket: "Improved Style" wall bracket, Type OP, manufactured by Peerless Sales Co., (312) 865-8870, or equal. Secure to wall framing in a manner to prevent sagging.
 - K. Shower Curtain: Heavy duty translucent vinyl curtain.
 - L. Roof Scuttle: Furnish and install where indicated on plans metal roof scuttle Type S as manufactured by the Bilco Co., New Haven, CT. Cover shall be 11 Ga. Aluminum with 3" beaded flange, neatly welded. Insulation shall be glass fiber 1" thickness fully covered and protected by a metal liner of 18 GA aluminum.

3.00 EXECUTION

- 3.01 Install products of this section in accordance with the manufacturer's directions.

END OF SECTION

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SECTION 10161-1
TOILET AND SHOWER
COMPARTMENTS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Laminated plastic toilet partitions.
- D. Solid phenolic core shower partitions.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Miscellaneous steel framing (support for toilet partitions)
- B. Toilet room accessories - refer to Section 10800.
- C. Miscellaneous specialties - refer to Section 10010.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.
- B. Colors: Submit color chart to the Engineer for selection and approval.
- C. Fastenings:
 - 1. On gypsum board wall surfaces shall be with screws into wood or metal blocking, or with bolts or molly anchors, not less than 1/4" diameter. Screwing into gypsum board or plaster with plugs will not be acceptable.

2.00 PRODUCTS

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if the specified models are discontinued, the Contractor shall furnish the manufacturers' updated model at no additional cost to the Owner.

2.02 MATERIALS

- A. Partitions shall be "ceiling hung" type. Screens shall be wall hung units matching partitions. Shower partitions shall be wall hung units. Partitions shall be Sanymetal, Bobrick, or equal.
- B. Toilet Compartments:
 - 1. Doors, stiles, wallposts and panels shall have a finished thickness of 1" (25mm) and shall have a uniform flush front appearance.
 - 2. Core of doors, stiles, wall posts and panels shall be 3-ply, 45 lb. density, resin impregnated particle board. Stiles shall have leveling device welded to 11 gauge (3.2mm) steel core and be concealed by a one piece 4" (102mm) high, type 304 satin finish stainless steel.
 - 3. Surface of toilet compartments shall be high pressure laminated plastic 1/16" (1.6mm) thick with matte finish and shall be edged with type 304 satin finish stainless steel or self edged with laminated plastic. All laminating shall be done with adhesives that prevent delamination from moisture and heat in washrooms.
 - 4. All door hardware, mounting brackets and support brackets for seat shall be type 304 satin finish stainless steel.
 - 5. No door hardware or mounting brackets shall be exposed on exterior of toilet compartments and/or dressing compartments except on compartments with outswinging door.

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SECTION 10161-3
TOILET AND SHOWER
COMPARTMENTS

6. Threaded steel inserts shall be factory installed for mounting hinges and door latch with stainless steel one-way machine screws furnished. Provide a chrome plated cast alloy coat hook/door bumper. Stainless steel one-way sheet metal screws shall be furnished for installing coat hook and door keeper. Stainless steel Phillips head screws furnished for mounting brackets. Hinges shall hold door of unoccupied compartment partially open. Locked compartment may be opened from outside by lifting door.

C. Shower Partitions:

1. Panels shall have a finished thickness of 1/2".
2. Partitions shall be solid phenolic core.
3. All hardware, mounting brackets and support brackets for seat shall be type 304 satin finish stainless steel.
4. No door hardware or mounting brackets shall be exposed on exterior of shower compartments.

3.00 EXECUTION

- 3.01 Products of this section shall be installed in accordance with the drawings, approved shop drawings and manufacturer's printed instructions.

END OF SECTION

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SECTION 10800-1
TOILET ROOM ACCESSORIES

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Toilet room accessories.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Toilet partitions - refer to Section 10161.
- B. Miscellaneous specialties - refer to Section 10010.

1.03 REQUIREMENTS

- A. Submittals: Submit shop drawing, manufacturer's technical data and material specifications, and samples, as applicable.
- B. Colors: Where items have a finish involving choice of colors, colors will be selected by the Engineer from manufacturer's standards.
- C. Fastenings:
 - 1. On dry wall surfaces, fastenings shall be with screws or bolts into metal backing plates. Screwing into lath with plugs will not be acceptable.
 - 2. For fastening into concrete, self-drilling masonry anchors shall be used: Phillips Redhead, Bulldog, or Rawl Sabertooth.

2.00 PRODUCTS

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SECTION 10800-2
TOILET ROOM ACCESSORIES

2.01 GENERAL: All materials shall conform with the following requirements and shall be of new stock of the highest grade available, free from defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture. Where model numbers are indicated, if the specified models are discontinued, the Contractor shall furnish the manufacturers' updated model at no additional cost to the Owner.

2.02 MATERIALS

- | | | |
|----|--|------------------|
| A. | Surface Mounted Toilet Tissue Dispenser | B-274 |
| B. | Surface Mounted Toilet Seat Cover Dispenser | B-221 |
| C. | Hat and Coat Hook | B-682 |
| D. | Grab Bars | 36" x 48" B-5837 |
| E. | Recessed Paper Towel Dispenser & Waste Receptical | B-3944 & B-3947 |
| F. | Feminine Napkin - Tampon Vendor
10 cent operation | B-2802 |
| G. | Feminine Napkin Disposal | B-353 |
| H. | Soap Dispenser | B-112 |
| I. | Mirrors (sizes as indicated on drawings) | B-290 |
| J. | Surface Mounted Wall Serial | B-2766 |
| K. | Soap Dish with Grab Bar | B-681 |
| L. | Double Robe Hook | B-672 |
| M. | Mop & Broom Holder | B-233 x 24" |
| N. | Shower Curtain Rod | B-6107 |
| O. | Shower Curtain Hook | B-204-1 |
| P. | Vinyl Shower Curtain | B-204-3 |

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SECTION 10800-3
TOILET ROOM ACCESSORIES

3.00 EXECUTION

3.01 Products of this section shall be installed in accordance with the manufacturer's directions.

END OF SECTION

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SECTION 13980-1
SOLAR ENERGY SYSTEM

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Furnish and install solar collectors, piping and controls as indicated and as specified herein, complete with all appurtenances required.

1.02 SUBMITTALS

- A. General: Comply with provisions of Division 1.
- B. The submittal data to be furnished shall include, but not be limited to the following:

Pipe and Fittings
Valves
Solar Collectors

Instruments & Controls
Piping Specialities
Pumps
Solar Tank

- C. Certified Test Reports: Solar collectors.
- D. Operation and Maintenance Manual: Solar collectors.
- E. Posted Operating Instructions: Piping codes and diagrams of solar energy systems, Operating instructions, control matrix, and trouble shooting instructions.

1.03 SPECIAL PROVISIONS

- A. Collector Warranty: Collectors shall be covered by a five year warranty against defects in materials and workmanship.

- B. Services of Technical Representative of the Collector Manufacturer: The Contractor shall provide services of a technical representative of the collector manufacturer, at the job site during each phase of unloading installation, and testing. This technical representative shall certify in writing that the solar energy systems have been installed as recommended by the manufacturer.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the District.

1.05 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Finishes: Division 9
- B. Insulation: Division 15
- C. Electrical: Division 16

2.00 PRODUCTS

2.01 PIPING

- A. Solar water supply and return piping - Symbol SWS and SWR shall be Copper Pipe ASTM B88, Type L, hard drawn copper tubing.
- B. Bronze Flanges and Flanged Fittings: ANSI B16.24, flanged type up to 8 inches.
- C. Solder-Joint Fitting: ANSI B16.22, wrought copper.
- D. Unions: Nibco No. 733.
- E. Dielectric Union: Insulated union provided with a galvanized steel female pipe-threaded end and a copper solder joint and conforming with Fed. Spec. WW-U-531, Class 1, dimensional, strength and pressure requirements. Union shall have a water-strength and pressure requirements. Union shall have a water-impervious insulation barrier capable of limiting galvanic corresponding bimetallic joint. The dry insulation barrier shall be able to withstand a 600 volt breakdown test. Provide dielectric union where two dissimilar metals are connected.

- F. Expansion Joints: Bellow Type corrugated bellows with reinforcing rings and single-bellow expansion joints.

2.02 VALVES

- A. Provide end connections as indicated or as required. Valves shall open when turned counterclockwise.
- B. Gate Valves: Screw-in bonnet, bronze, Class 125 Nibco No. T-111, with solid wedge disc, rising stem, and threaded end.
- C. Check Valves: Bronze, Class 200, with spring loaded check with elastomer seats.

2.03 TRAPS AND VENT VALVES

- A. Air Traps: Class 150, non-thermostatic, float-controlled except that valves are arranged to close promptly when water enters traps. Minimum volume 44 cubic inches.
- B. Pressure Relief Valves: ASME labeled. The valves shall have a relief setting of 20 to 30 percent higher than the system pressure. The valve seats and moving parts exposed to fluid shall be of non-ferrous material.

2.04 SOLAR HOT WATER STORAGE TANKS - SYMBOL ST-1

- A. Provide solar hot water storage tanks as indicated on the Drawings suitable for 100 psig operating pressure.
- B. The tank shall be constructed with a glass lined carbon steel shell. The tank design and construction shall conform to the latest ASME Code for Unfired Pressure Vessels and shall be stamped for 100 psig operating pressure.
- C. The blow-off connection shall be located at the top. The hot water recirculating opening, hot water return opening, and the cold water supply openings shall be provided as indicated on the Drawings. The thermostat bulb well and the thermometer shall be provided in the upper part of the shell. The hot-water supply shall be located at the top. All connections for lines shall be heavily reinforced screwed pattern connections.

- D. Provide ASME rated pressure-temperature relief valve mounted in a 1" tapped opening.
- E. Tanks shall be insulated to meet requirements of ASHRAE 90A-1980 Standards. Factory installed jacket shall be provided over the insulation.
- F. Install the number and size of magnesium anodes to provide adequate cathodic protection for the tank.
- G. Manufacturer: A.O. Smith, American, Hansen.

2.05 SOLAR WATER CIRCULATING PUMP - SYMBOL CP-2

- A. Type: In-line mounting, bronze or stainless steel construction.
- B. Capacity: As shown.
- C. Construction: All bronze or stainless steel mechanical seal, bronze sleeve type bearings, resilient mounted motor spring type coupler, centrifugal impeller, alloy steel shaft machined and hardened thrust collar. Unit may have stainless steel impellor.
- D. Motor: Standard housing or integral mounting dripproof, voltage, phase, and current as shown.
- E. Acceptable manufacturers: "Bell & Gossett", "Armstrong", "Taco" or Grundfos.

2.06 SPECIALITIES

- A. Bolting: Carbon steel bolting; ASTM A307, Grade B. for bolts and ASTM A194, Grade 2 for nuts.
- B. Gaskets: Fluorocarbon elastomer. Gaskets shall be compatible in form with grooves in flanged faces.
- C. Brazing Metal: AWS A5.8, 15 percent Silver-base alloy, minimum melting point 1,500°F for pressure up to 120 psi.
- D. Strainers: Class 125, Style Y pattern, threaded or soldered ends for 2 inches and smaller.
- E. Piping Identification Labels: Plastic slip-on type or tape with pressure-sensitive adhesive conforming to ANSI A13.1.

- F. Hangers and Supports: MSS SP-58, with types as required MSS-SP-69.

2.07 SOLAR COLLECTORS

- A. General: The collector shall be designed to absorb incoming solar radiation and transfer the resulting heat to a circulating fluid. The collector shall consist of absorber plate coated with a selective surface, assembled in a manner to maintain thermal plus mechanical performance over a minimum 25 year service life. The collector shall be guaranteed against leaks and rusting, and degradation of the selective surface for a minimum of 5 years. Certification by the manufacturer of a collector's ability to meet the guaranty requirements shall be submitted to the Engineer prior to utilization of the product.
- B. Absorber Plant: Absorber plate shall be .010 copper sheet soft soldered (95 5 antimony silver) to copper tubes. Tube pattern shall be a connected vertical grid to a copper manifold. Vertical flow tubes shall be brazed to the manifold tubing. Solders and bracings shall be capable of withstanding 450 F at 125 psig. Tubing within the assembled collector shall have a working pressure of 125 psig.
- C. Absorber Plate Coating: Coating shall be a black chrome with the following spectral properties: minimum absorbitivity .94 and maximum emmissivity .12. Selective coating shall be durable at 450^oF.
- D. Glazing: Single glazing material shall be 1/8", no iron content, edges swiped, tempered glass. Total transmissivity of the glass shall be 91% or greater. The glazing shall be gasketed with a continuous U-shaped neoprene gasket on all sides. The collector units shall be designed to withstand adverse weather conditions with winds of 150 MPH, rain, snow, hail and dust.
- E. Collector Frame: Collector frame shall be of extruded, mill finish, aluminum sides with a .05 aluminum sheet for backing or better. Air space between the absorber plate and the glazing shall be between 3/4" and 1". The collector frame shall provide thermal breaks between the absorber plate and the collector frame capable of withstanding sustained 400 degree temperatures. Corners of the collector frame shall be mitered and sealed. Frame shall accommodate single or double glazing.

- F. Insulation: Insulation shall be provided behind the absorber plate. This insulation shall consist of 1" of fiberglass insulation immediately in contact with the absorber plate and 1" of foil faced urethane foam (non-offgasing) for a total R value of 10.0. Density of the fiberglass shall be 1.2 lbs/cubic feet.
- G. Collector Heat Transfer Fluid: Water.
- H. Collector Performance: Collector manufacturer shall provide independent third-party test results performed in agreement with ASHRAE 93-77 Method for Testing and Rating the Thermal Performance of Flat Place Collectors. Data shall be submitted with the name and location of the laboratory which performed the testing. Performance curbes shall be linear approximations of data points collected during testing. A linear equation in the form of $y = a + bx$, where y describes the instantaneous efficiency and x is the fluid parameter $(TF - TA) Q / I$ (where TF is the average plate temperature TA is the ambient temperature, and QI is the incident radiation falling on the collector aperture) shall be provided by the manufacturer. The minimum linear curbe acceptable will be where $(y = 748; x = 0)$ and $(y = 0.30; x = 0.45)$ (for glazed flat plate collector).
- I. Protection of collectors during Construction: Collector modules shall be covered with an opaque material after mounting during construction to prevent damage caused by stagnation conditions and to prevent injury to workmen due to high plate and manifold tubing temperatures as no flow conditions.
- J. Manufacturer: U.S. Solar or approved equal.

2.08 FLEXIBLE CONNECTORS

- A. Flexible connectors connecting piping to collector header shall be constructed of rubberized steel, reinforced hose suitable for 450 F and 125 psi service. Flexible connectors shall be resisting to adverse weather conditions without deterioration.

2.09 SOLAR ENERGY CONTROLS

- A. General: The control shall be of the differential thermostat type and shall operate in such a manner that the system circulating pump is activated when the temperature sensors (see detail drawings-control sensors) exceeds the set value on the control. Set points shall be field adjustable.

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- B. Control Sensors shall be matched thermistors having an electrical resistance of 10K at 77°F and a matched tracking accuracy of $\pm 1^\circ\text{F}$. Sensor housings shall be made of brass or copper. Control housing shall be weather tight when installed outdoors. Unit shall have digital readout as indicated on drawings.
 - C. When sensor indicates 36°F ambient temperature at panels, controller shall turn on circular pump to prevent freezing of water in panels.
 - D. Manufacturer: Independent Energy C-100 or approved equal.
- 2.10 SOLAR ENERGY SYSTEM MONITORING EQUIPMENT: Performance of the solar system shall be monitored using the following equipment:
- A. Sensors: Designed to withstand stagnation temperatures of solar collectors. Provide copper wells which can be inserted into the collector tube, or piping.
 - B. Liquid-in-Glass Thermometer.
 - C. Test Ports: Solid brass, 1/4" fitting to receive either a temperature or pressure probe 1/8" O.D., two valve cores of neoprene, fitted with color codes and marked cap with gasket, and rated for 1,000 psig.
 - D. Pressure Gauge (0-100 psi). 4" dial, located where shown on drawings. On thermally insulated equipment of piping standoff mounting brackets, bases, adapters, or extended tubes shall be provided to allow the sensing element full immersion in the pipe flow without impediment to the flow.
 - E. Controls to include relays, switches, contractors, fuses, transformers, pilot lights and panels to provide a completely integrated system controlling the solar energy collection system, hot water system and pump in accordance with the sequence shown on the drawings.
 - F. Provide wiring in conduit in accordance with the National Electric Code.
 - G. Submittal shall include a completely integrated wiring diagram showing function of all interrelated components of the solar and domestic water heating system.

3.00 EXECUTION

3.01 INSTALLATION

- A. General: Install the solar collector system in accordance with this specification and the printed instructions of the manufacturers.
- B. Piping: Install piping as indicated. Accurately cut pipe to measurements established on site and work into place without springing or forcing. Locate piping out of the way of windows, doors, openings, light fixtures, electrical conduit, equipment and other piping. Install overhead piping in the most inconspicuous places. Provide for expansion and contraction. Do not bury, conceal, or insulate until piping has been inspected, tested and approved. Locate joints where they may be readily inspected. Provide flexibility in piping connected to equipment for thermal stresses and vibration. Support and anchor piping connected to equipment to prevent strain from thermal movement and weight from being imposed on equipment. Provide sway bracing as required. Use hangers and supports in accordance with MSS SP 69. Piping shall be graded to permit complete drainage of the system.
- C. Fittings: Use long-radius ells to reduce pressure drops. The bending of pipes will not be permitted. Mitering of pipe to form elbows, notching straight runs to form full-sized tees, or any similar construction will not be permitted. Use union for disconnection of valves and equipment for which a means of disconnection is not otherwise provided. Provide reducing fittings for changes of pipe size. Bushings shall not be used.
- D. Measurements: Determine and establish measurements for piping at the job site and accurately cut pipe and tubing lengths accordingly. Where possible, use full pipe lengths. Random lengths joined by couplings will not be accepted.
- E. Cleaning: Thoroughly clean interior of water piping before joining by blowing clear with either steam or compressed air. Maintain cleanliness of piping throughout installation. Provide caps or plugs on ends of cleaned piping as necessary to maintain cleanliness.

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SECTION 13980-9
SOLAR ENERGY SYSTEM

- F. Brazing: Brazing procedure qualification shall conform to ANSI B31.1 and preparation and procedures for joints shall be in accordance with ANSI B31.1 and CDA Copper Tube Handbook.
- G. Collector Connections to Headers: Connect collectors to top and bottom headers with soft-drawn long "S" or "U" copper tubes brazed with 15% silver solder. Use tube bender only. Hand-formed tubing will not be acceptable.
- H. Header Thermal Expansion and Contraction: Use slip-tube or bellow type expansion joints. Anchored flanged connections shall be placed for the expansion joints to work against.
- I. Flanged Joints: Use flanged joints for making flanged connecting to flanged valves and other flanged piping components. Install joints so that flanged faces bear uniformly on gas-tight. Engage bolts so that there is complete threading through the nuts and tighten until bolts are equally torqued.
- J. Sleeves: Provide schedule 10 galvanized steel sleeves for pipe and tubing passing through walls and partitions of either concrete or masonry construction. After piping has been installed, pack oakum into the space between the pipe or tubing within the sleeve and seal both ends with insulating cement.
- K. Flashing: Provide flashing for pipe and tubing extending through the roof. Flashing shall be installed so as to be watertight.
- L. Drain Lines: Provide drain lines from pressure relief valves to the nearest disposal points as directed.
- M. Identification: After piping has been tested, apply identification labels and arrows in accordance with ANSI A13.1. Insulated piping shall have identification applied over insulation jacket. Provide two copies of the piping identification code framed under glass and install where directed.
- N. Install collectors on supports and secure with bolts as indicated on drawings.

3.02 TESTS

- A. Before the system is declared operational the entire loop portion of the solar energy system shall be hydraulically tested and proved tight by applying and sustaining a pressure of 150 psig for a minimum of 2 hours. No pressure drop is acceptable. Repair defects and retest.
- B. Upon completion and prior to acceptance of the installation the following tests shall be made to verify the proper operation of the solar collection system. After review of the test data the collector manufacturer shall certify in a report to the Engineer that the system is operational.
- C. Operating tests shall take place over the duration of a typical operating day. (i.e. from the point when a minimum input of solar energy activates the automatic controls to the end of the day when diminishing sunlight causes the system to automatically shutdown.
- D. Start Up Function Test: To verify the proper operation of automatic start up control sequence record and note the following values and conditions.
 - 1. Time and date of initial start up.
 - 2. Sky conditions (haze or cloud cover will invalidate tests).
 - 3. Cold water temperature.
 - 4. Collector plate temperature at system start up.
 - 5. Hot water temperature.
- E. Operation Data Requirements. At half hour intervals during the period of the test, record the following values or note the following conditions:
 - 1. Cold water temperature.
 - 2. Collector plate temperature.
 - 3. Sky Conditions for each interval.

4. Ambient temperature.
 5. Time for each measurement.
 6. Inlet and outlet temperatures for solar storage tank.
- F. System Parameters: The following values and samples should be recorded once during the period of the test:
1. Circulating pump, note the pump make, model and rated capacity, and ammeter and voltmeter readings for pump during operation.
 2. All data values shall be read at the half hour unless otherwise specified. The report of the test (containing data as required by this specification) shall be supplied in quadruplicate to the Engineer. The Contractor shall furnish all instruments, test equipment, and test personnel required for the tests.

3.03 THERMAL INSULATION

- A. Insulate solar water supply and return piping as specified in Section 15.250 "Insulation of Mechanical Systems".

3.04 PAINTING AND FINISHING

- A. Factory Coating: Equipment and component items, when fabricated from ferrous metal, shall be factory finished with the manufacturer's standard weather resistant finishes.
- B. Field Painting: Painting required for surfaces not otherwise specified, and finish painting of items only primed at the factory are specified in Section: Painting.

3.05 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Bound Instructions: In accordance with Section 15.010 Mechanical General Provisions, complete sets of instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the Engineer. Each set shall be permanently bound and shall have a hard cover. The following identification shall be inscribed on the covers the words: "Operating and Maintenance Instructions", the name and location of the building, the name of the Contractor, and the contract number. Flysheets shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8-1/2 by 11 inches, with large sheets of drawing folded in. The instructions shall include, but shall not be limited to, the following:
1. System Layout showing piping, valves and controls.
 2. Approved wiring and control diagrams.
 3. A control sequence describing start-up, operation, and shutdowns.
 4. Operating and maintenance instructions for each piece of equipment, including lubrication instructions.
 5. Manufacturer's bulletins, cuts and descriptive data.
 6. Parts lists and recommended spare parts.
- B. Framed Instructions: Approved wiring and control diagrams showing the complete layout of the entire system, including equipment, piping, valves and control sequence, framed under glass or in approved laminated plastic, shall be posted, where directed. In addition, condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safety starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams, and posted beside the diagrams. Proposed diagrams, instructions and other sheets shall be submitted for approval prior to posting. The framed instructions shall be posted before acceptance-testing of the systems.

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SECTION 13980-13
SOLAR ENERGY SYSTEM

- C. Field Instructions: Upon completion of the work and at a time designated, the services of a project engineer shall be provided by the Contractor for a period of not less than two days to instruct the representative of the District in the operation and maintenance of the system. Those field instructions shall cover all the items contained in the bound instructions.

END OF SECTION

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SECTION 15010-1
MECHANICAL GENERAL
PROVISIONS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Requirements specified govern applicable portions of Mechanical Sections as follows:
 - 13980: Solar Energy System
 - 15010 Mechanical General Provisions
 - 15250: Insulation of Mechanical Systems
 - 15300: Special Systems
 - 15400: Plumbing Systems
 - 15800: Heating, Ventilating and Air Conditioning Systems
 - 15900: Controls and Instrumentation for Mechanical Systems

1.02 REQUIREMENTS

- A. Inspection of Conditions: Examine related work and surfaces before starting work of this Section. Report to Engineer, in writing, conditions which will prevent proper provision of this work. Beginning work of this Section without reporting unsuitable conditions to Engineer constitutes acceptance of conditions by Contractor. Perform any required removal, repair, or replacement of this work caused by unsuitable conditions at no additional cost to District.

1.03 PERMITS, FEES, CONNECTION CHARGES

- A. Obtain and pay for all permits, and temporary service charges required for execution of work included in Divisions 2 and 15. The District will pay all service charges, meter charges, and connection charges to public utilities. The Contractor shall be responsible for the coordination and payments by the District.

- B. Reference Utility Payment Schedule, Sheet No. F-101.

1.04 LOCATIONS

- A. Drawings show pipe and ductwork diagrammatically.
- B. Adhere to drawings as closely as possible in layout out work.
- C. Vary run of piping, run and shape of ductwork and make offset during progress of work as required to meet structural and other interferences as approved by the Engineer.
- D. Install piping and ductwork in furred spaces unless indicated otherwise. Run exposed piping and ductwork parallel to or at right angles to building walls.
- E. Keep horizontal lines as close to the floor slab above or roof structure as possible.
- F. Conform to ceiling heights established on architectural drawings.

1.05 REGULATORY AGENCIES AND DEFINITIONS

- A. Requirements of Regulatory Agencies:
 - 1. Materials and installations shall comply with applicable local, state, and national codes and ordinances.
 - 2. In case of conflict between the referenced codes and ordinances, more stringent requirements shall govern.
- B. Definitions:
 - 1. A "main" of any system of continuous piping is the principal artery of the system, to which branches may be connected.
 - 2. A "riser" is vertical waterline supplying two or more fixtures, or batteries of fixtures located in different rooms.
 - 3. A "battery" of fixtures is two or more fixtures served from same branch.

4. "Concealed", where used in connection with insulation and painting of piping, ducts, and accessories indoors, shall mean hidden from sight in trenches, chases, furred spaces, pipe shafts, or hung ceilings.
5. "Exposed", where used in connection with insulation and painting of piping, ducts, and accessories indoors, shall mean not "concealed" as defined above.
6. "Wide" as used for duct cross-section, shall mean the greater of the two dimensions.
7. "Provide" shall mean furnish and install.

1.06 COORDINATION

- A. Coordinate with other trades to avoid construction delays and maintain required clearances.
- B. Equipment foundations and bases: Provide certified details and drawings for approval before fabrication. Provide all parts necessary for each foundation subbase and support.
- C. Ducts, pipe sleeves and inserts: Provide all ducts, pipe sleeves and pipe support inserts before concrete is poured.
- D. Roof, wall and floor openings: Provide shop drawings showing exact locations and sizes of openings through roofs, walls, and floors.
- E. Buildings structure and roof are prefabricated and Contractor shall include in his bid all required structural elements, beams and bracing for support of overhead pipes and mechanical equipment. Piping or equipment shall not be supported from roof decking.

1.07 DESIGN CHANGES CAUSED BY PRODUCT SUBSTITUTION

- A. Contractor shall pay costs of design and installation for changes resulting from substitution of alternate products.
- B. Acceptance of alternate products by Engineer does not change this requirement.

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SECTION 15010-4
MECHANICAL GENERAL
PROVISIONS

1.08 CLEANING

- A. Cleaning operations are supplemented by detailed instruction for specific systems in Mechanical Systems.
- B. Piping, ductwork and equipment to be insulated: Clean exterior thoroughly to remove rust, plaster, and dirt before insulation is applied.
- C. Piping, ductwork and equipment to be painted: Clean exterior of piping, ductwork and equipment, exposed in completed structure, removing rust, plaster and dirt by wire brushing. Remove grease, oil and similar materials by wiping with clean rags and suitable solvents.
- D. Motors, pumps and other items with factory finish: Remove grease and oil and leave surfaces clean and polished.
- E. Plumbing fixtures: Clean and polish fixtures immediately prior to final inspection and/or District's occupancy.
- F. Site: Remove from site packing cartons, scrap materials and other rubbish resulting from operations by mechanical trades.

1.09 CUTTING

- A. Cutting, when required, subject to prior approval by Engineer.
- B. Cutting shall cause minimal damage to structure.

1.10 SHOP DRAWINGS, PRODUCT DATA AND INSTRUCTIONS

- A. General:
 - 1. Refer to Division 1, General Conditions for requirements governing submittals.
 - 2. No product will be accepted on job site without prior approval.
 - 3. Prepare shop drawings on transparencies at a scale suitable to clearly delineate the subject. Sheet sizes: multiples of 8-1/2" x 11". Scale shall be same as the Contract drawings.

4. Drawing legend shall contain project title, drawing title, drawing number and number of drawings to set.
 5. Reference catalog cuts and brochures of products to proper paragraph in the Specifications. Furnish numerical index by Specification paragraph number listing product name, catalog number and reference to page number of submittal brochure.
 6. Cross reference individual catalog numbers of substitute products to numbers of specified materials.
 7. Bind submittal in booklet form, otherwise the submittals will be rejected.
- B. Installation instructions: Submit manufacturer's printed installation instructions for products specified to be installed in accordance with manufacturer's instructions.

1.11 GUARANTEES

- A. In addition to the guarantees required in General Requirements, all materials and equipment provided and/or installed under this Division of the specifications shall be guaranteed for a period of one year from the date of final completion of the work, or longer where specified herein. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and materials to correct the trouble without any cost to the District. Any defective materials or inferior workmanship noticed at the time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the District and the Engineer.
- B. Standard warranty of manufacturer shall apply for replacement of parts after expiration of other warranty periods stated in Specifications if they are for shorter time than standard manufacturer's warranty. Manufacturer shall furnish and replace parts to District. Furnish Engineer printed manufacturer's warranties complete with material included and expiration dates upon completion of project.

2.00 PRODUCTS

2.01 STANDARDS OF QUALITY

- A. Materials and equipment shall be new and in good condition. The commercially standard items of equipment and the specific names mentioned herein are intended to establish the standards of quality and performance necessary for the proper functioning of the mechanical work.

2.02 EQUIPMENT GUARDS

- A. Provide equipment with exposed moving parts with coupling guards, fan guards/or other enclosures conforming to Title 8 of the California Administrative Code "General Industry Safety Orders", Sub-Chapter 7, Group 4.

2.03 PIPE SLEEVES

- A. Provide pipe sleeves for all mechanical piping.
- B. Size pipe sleeves to permit placing pipe and specified isolation material for pipes passing through concrete or masonry walls or concrete slabs.
- C. Sleeve for pipes through floor slabs standard weight black steel pipe with top of sleeve projecting 3" above finished floor. For waterproof sleeves, use J.R. Smith Fig. 1725 or equivalent by Zurn or Josam.
- D. Sleeves for pipes through walls standard weights black steel pipe or 20 gage galvanized sheet metal with ends flush with wall surfaces.
- E. Seal pipes passing through fire rated walls or floors. Use Dow Corning 3-6548 Silicone RTV Foam in the annular space between pipes and sleeves.
- F. Insulated pipe shall be insulated in sleeves, caulked and sealed as above. Use type CS-CW inserts as manufactured by Pipe Shields, Inc.
- G. Pipes passing through exterior walls and concrete walls shall be sealed watertight with Linkseal as manufactured by Thunderline Corp. Method of installation as recommended by the manufacturer.

2.04 PIPE ISOLATORS AND COVERING PROTECTION

- A. Pipe isolators: Provide each hanger or clamp for uninsulated piping with an isolation material, having metal backing, to isolate sound vibration and electrolysis, and similar to Elcen "Isolator". Isolator not required for fire protection automatic sprinkler piping, waste, vent, and natural gas piping.

2.05 IDENTIFICATION OF VALVES, PIPING AND EQUIPMENT

- A. General: Trademarks and numbers used for reference are products of Seton Name Plate Corp., 592 Boulevard, New Haven, Conn.
- B. Valve Identification:
 - 1. All valves shall be provided with "Style 250BL" numbered valve tag with abbreviation "PLBG" or "HTG", complete with "S" mounting. The abbreviations shall be extensive enough to cover all mechanical and plumbing systems and the valve number shall correspond to valve list.
 - 2. Provide a typed valve identification list mounted in a No. A-11G metal frame under glass, located as directed by the Engineer.
- C. Piping Identification:
 - 1. Identify all above-ground piping including piping located in suspended ceiling spaces, shafts, tunnels.
 - 2. Identify with "Setmark" pipe markers located in accordance with ASME Standards and ANSI A13.1-1956 color standards. Size of letters determined by outside diameter of pipe or if insulated by outside diameter of insulation as follows:
 - a. Up to 1-1/4" diameter: Style 9 or 18 for specific service; letter size: 1/2".
 - b. 1-1/2" diameter through 2-1/2": Style 4x or 6x for specific service; letter size: 1".
 - c. 3" diameter and over: Style 2 or 1x for specific service; letter size 2".

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3. All concealed piping shall have a 2" wide band of tape in applicable color as specified in Section 09900 for exposed piping.
4. Pipes in Inspection Area and Running Repair shall be labeled with name of pipe usage. Label shall be large enough to be easily readable (not less than 1/4" block letters).
5. Location: Space tape and labels at 20 feet on center at each take-off and at each change in direction and at each side of wall. Provide flow direction arrows at each marker style and size to correspond to marker style and size. Provide two identification charts designating color and function. Frame one chart in metal frame with glass front. Secure to walls as directed.

D. Equipment Identification:

1. Equipment labels: All equipment furnished and installed under this section shall be provided with manufacturer's metal labels securely attached to each individual piece of equipment and showing complete and comprehensive performance characteristics, size, model, serial number, etc.
2. Install bakelite nameplates with white letters 3/4" high for all new equipment, switches, controls, principal valves, zones and at room stats, damper motors, indicating zone, etc.
3. Submit to the Engineer for approval a list of items to be tagged within two (2) weeks after award of the Contract.

2.06 ESCUTCHEONS, PLATES:

- A. Fit pipes passing through finished walls, floors, and ceiling with wall plates of proper size to cover opening around pipes. Plates not required at floor slabs where sleeves project above floor and space between pipe and sleeve is caulked and sealed. Plates shall be Beaton and Cadwell No. 10. Floor plates and plates at tile walls chromium plated. Wall and ceiling plates prime coated. Equivalent plates by Frost are acceptable.

2.07 PIPING SPECIALTIES

- A. Pressure gauges: Install pressure gauges as indicated. Gauges to be 4-1/2" phenol or cast aluminum case, phosphor bronze bourdon, bronze bushed rotary movement, non-reflecting white metal dial face with black figures and balanced adjustable pointer. Pressure range compatible with service and no less than twice normal operating pressure. Accuracy 1/2% of scale range. Furnish gauge cocks on all and stem siphons for steam service. Acceptable manufacturers: U.S., Marsh, Ashcroft, or Trerice.
- B. Pressure and/or Vacuum Gauges for Special Systems:
1. Provide gauges where shown on the drawings, and in all motor oil, torque oil, grease, gear oil and air lines whether shown on drawings or not.
 2. Gauges: Gauges shall be of high quality within 2% accuracy in the middle third of the dial range. All gauges shall be 3-1/2" minimum middle third of the dial range. All gauges shall be 3-1/2" minimum dial size. Where not shown on schedule dial range shall be 2 times operating pressure. Gauges reading pressure over 1000 psi shall be 6" dial size. All diesel and lubricating oil and chassis grease gauges shall be liquid filled gauges. Diesel fuel gauges shall be 316 stainless steel tube steel socket U.S. gauge. Solfrunt Model 1911 T or equal. All diesel fuel gauges shall have a snubber, Operating and Maintenance Specialties Model 1,0 3000 psi range, brass construction.
 3. Gauge Cocks: Supply a needle point globe valve crane No. 88 or equal at each gauge connection.
 4. Unless otherwise noted, gauges on package equipment, such as air compressors, steam and high pressure hot water cleaner, pumps, etc. shall comply with the specification for general gauges specified above. Gauges on air pressure reducing sets may be standard supplied with set.
- C. Thermometers: Industrial type, brass case, glass front 9" scale straight from 3-1/2" stem range. Weiss separable socket or equal by Trerice, Marshall, or U.S. All thermometers shall be installed to be readable from the floor. The normal operating temperature reading shall be at middle of the full scale.

- D. Flexible pipe hoses (water): Provide two flexible pipe hoses at each expansion joint as shown on the drawings. The flexible pipe hoses shall be connected at 90 degrees to each other or to an elbow. The combined assembly shall be fabricated of adequate lengths of the hoses to handle + 5 in movement in the same planes in all directions. The hoses shall be corrugated metal double braided hoses. For copper piping, use hoses fabricated from bronze to withstand pressures from full vacuum to 300 psig minimum working pressure and 200oF temperatures. For steel piping, use hoses fabricated from Type 321 stainless steel to withstand pressures from full vacuum to 300 psig minimum working pressure and 1500 F temperature. Steel flanged ends, 150#, ASA or soldering ends. Suitable for the services intended. Provide hangers at the elbows connected between the hoses. Flexonics or equivalent products by U.S. Flex.
- E. Flexible Pipe Connectors (Water): Provide flexible connectors in water systems as indicated on the drawings. The connectors shall be Type 321 stainless steel braided with 300 lb. ASA steel flanged ends, and shall be suitable for the services intended. Nelson-Dunn Series ND F or equivalent by U.S. Flex.

2.08 PIPE HANGERS AND SUPPORTS

- A. General:
 - 1. Hold piping in place by approved hangers supports and anchors, designed to support weight of pipe weight of fluid and weight of pipe insulation.
 - 2. Arrange hangers to prevent transmission of vibration from piping to building structure and allow for expansion and contraction in hangers and supports.
 - 3. Clearances for application of specified insulation without cutting pipeline covering or fitting covering in installation of pipe hangers.
 - 4. Uninsulated copper or brass pie or buting shall be isolated from ferrous hangers or supports.

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5. Piping shall not be supported from roof decking. Prefabricated building manufacturer shall furnish and install structural members to span steel purline to distribute load. Refer to roof shop drawings for location of beams purlis and additional structural members for hangers.
 6. Hanger spacing: Shall comply with guides for seismic restraints of mechanical system and plumbing piping systems published 1982, by SMACNA and PPIC, California.
 7. Prepare piping shop drawings and submit to the Engineer for review. These drawings shall show anticipated expansion and contraction at each support point, initial and final forces on the building structure. It shall be the responsibility of the Contractor to coordinate the selection of piping supports with equipment supports to provide for a carefully engineered system designed to accommodate expansion and contraction without creating excessive stresses at equipment connections or in any portion of the piping. Submittal data shall include certification by the hanger and support manufacturer that the piping system has been examined for excessive stresses.
- B. Floor supports: Provide one of the following for supporting horizontal piping from floors:
1. Cast iron pipe rests, "Super Strut" Fig. R-786, "Grinnell" Fig. 264, "Elcen" Fig. 50 with pipe nipples to suit. Fasten to floor.
- C. Wall supports: Provide one of the following for supporting horizontal piping from wall.
1. Steel J-hook for pipe located close to wall up to 3" pipe, "Grinnel" Fig. 168, "Elcen" Fig. 45, "Super Strut" Fig. C-711.
 2. For hanger suspension, 1500 pound maximum loading, welded steel bracket "Grinnell" Fig. 195.

D. Vertical piping supports:

1. Support cast iron soil pipe at every floor and at base of stack; other pipes at every floor.
2. Support vertical pipe with steel extension pipe clamps, "Grinnell" Fig. 261, "Elcen" Fig.. 4-W for copper use 339 clamp. Refer to manufacturer's rated maximum loading for each size pipe. Bolt clamp securely to pipe; rest clamp-end extension on building structure.
3. Place pipe clamps above slab.

2.09 SEISMIC RESTRAINT OF EQUIPMENT

- A. The manufacturer of prefabricated or field-fabricated equipment shall be responsible for the engineering of the equipment and of all bracing and anchorage to the foundations or building structure. Contractor shall retain a licensed Structural or Civil Engineer shall provide signed design calculations, and bracing and anchorage details. The calculations showing all loads transmitted to the building structure and the related anchorage details shall be submitted for review to the Engineer to verify that the foundation or the building structure is capable of supporting these loads. Design of the equipment, bracing and anchorage shall be in conformance with the loads as specified herein.
- B. Seismic restraint of vibration isolated equipment: All vibration isolated equipment shall be provided with seismic restraints. A dynamic stress analysis shall be made by a licensed Civil or Structural Engineer responsible to the isolator equipment to meet the specified load requirements. The weight of the equipment established in the analysis shall include the equipment supporting base and all piping and the liquid content therein. The analysis shall accompany the manufacturer's installation details for each piece of equipment to be isolated.
 1. General properties of seismic restraints:
 - a. Restraints shall permit adjustment during installation to ensure sufficient clearance between vibration isolated element and rigid restraining device.

- b. Restraints shall not be installed until vibration isolators have been loaded and adjusted to achieve the specified static deflection and clearances.
 - c. Restraints shall be capable of restraining seismic forces in any direction.
 - d. Restraints at base supported equipment shall include resilient neoprene pads at all potential contact areas between isolated equipment and rigid restraining element.
2. Seismic restraint description:
- a. Restraining devices t all base supported vibration isolated equipment shall be separate units as manufactured by Mason Industries, Inc., Los Angeles, California, type "All Directional Double Acting Earthquake Snubber", or equal.
 - b. Restraints at all suspended piping and equipment shall consist of stainless steel cables together with neoprene snubbers arranged to achieve the required all-directional restraint and sized to resist the seismic forces as required. Shop drawings shall indicated proposed method for achieving vertical restraint for suspended piping. Cables shall have sufficient slack to avoid circuiting the vibration isolators.
- C. Seismic bracing of piping and ductwork:
1. General:
- a. Provide supports for seismically bracing piping and ductwork. An acceptable method is that described in "guidelines" for seismic restraints of mechanical systems and plumbing piping systems published 1982 by SMACNA and PPIC, California.
 - b. Where piping and ductwork cross structural separations, provide for proper movement of structural elements without damage to piping, ductwork, or their supports.

- c. Where temperature changes cause expansion or contraction of piping, etc., provide for changes without damage to anchorage and supports or equipment.
2. Ductwork bracing
 - a. Brace all rectangular ducts 6 sq. ft. of area and larger. Brace all round ducts 28" in diameter and larger.
 - b. Transverse bracing shall be installed at each duct turn and at each end of a duct run and at maximum 30-0' o.c. of straight duct run.
 - c. Provide longitudinal bracing at 60-0' o.c. maximum. Transverse bracing for one duct selection may also act as longitudinal bracing for a duct section connected perpendicular to it, if the bracing is installed within four feet of the intersection of both ducts and bracing is sized for the larger duct. Duct joints shall conform to SMACNA duct construction standard. All joints in duct section shall provide a positive fastening together of the section.
 - d. No bracing is required if the top of duct is suspended 12" or less from the supporting structural member and attached to top of duct.
 - e. Walls (including gyp-board non-bearing partitions) which have ducts running through them may replace a typical transverse brace. Provide solid blockings around duct penetration at stud wall construction.
 3. Piping bracing:
 - a. Brace all piping 1" and larger.
 - b. Seismic braces may be omitted: (1) when the top of the pipe is suspended 12" or less from the supporting structure member and the pipe is suspended by an individual hanger. (2) on all piping 3/4" and smaller.

- c. Vertical Piping:
 - (1) Attachment - Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents. Stacks shall be supported at the top and bottom by approved metal floor clamps.
 - (2) Screwed pipe and copper tubing shall be supported at each story for piping 1-1/2" and larger diameter, and at not more than 6 foot intervals for piping 1-1/2" and smaller in diameter.
 - (3) Pipes of other approved material shall be supported in accordance with their approved installation standards.
- d. Horizontal Piping
 - (1) Supports - Horizontal piping shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.
 - (2) Screwed pipe - Screwed pipe (I.P.S.) welded or flanged pipe shall be supported at approximately 10 foot intervals.
 - (3) Copper tubing - Copper tubing shall be supported at approximately 6 foot intervals for tubing 1-1/2" and smaller in diameter and 10 foot intervals for tubing 1-1/2" and smaller in diameter and 10 foot intervals for tubing 2" and larger in diameter.
 - (4) Pipes of other approved materials shall be supported in accordance with their approved installation standards.
- e. Provide transverse bracings at 40'-0" o.c. maximum unless otherwise noted.

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- f. Provide longitudinal bracings at 80'-0" o.c. maximum unless otherwise noted. When thermal expansion or contraction is involved, provide longitudinal bracings at anchor points. The longitudinal braces and the connections must be capable of resisting the force induced by expansion and contraction.
- g. Transverse bracing for one pipe section may also act as longitudinal bracing for the pipe section connected perpendicular to it, if the bracing is installed within 24" of the elbow or tee of similar size.
- h. For threaded piping the flexibility may be provided by the installation of swing joints. In welded or solder joint piping the flexibility shall be provided by expansion loops.
- i. Do not use branch lines to brace main lines.
- j. Trapeze hangers may be used. Provide flexibility in joints where pipes pass through building seismic or expansion joints, or where rigidly supported pipes connect to equipment with vibration isolators.
- k. A rigid piping system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Example: Wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.
- l. Provide large enough pipe sleeves through walls or floors to allow for anticipated differential movements.
- m. At vertical pipe risers, wherever possible, support the weight of the riser at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 30'-0" on center.
- n. Cast iron pipe of all types, where the top of the pipe is 12" or more from supporting structure shall be braced on each side of a change in direction of 90° or more. Riser joints shall be braced or stabilized between floors.

- o. For gas piping, transverse bracing shall be at 40'-0" o.c. maximum. No bracing is required for pipes 3/4" diameter and smaller.
- p. Proprietary bracing systems approved by the OSA may be used.
- q. The seismic bracing and support of fire sprinkler piping shall be completed in accordance with NFPA #13.

D. Seismic loads:

- 1. When resting on the ground, rigidly mounted equipment, vessel or machinery plus effective mass of its contents shall be designed for ground acceleration of 0.3g acting at center of gravity of equipment, vessel or machinery.
- 2. When resting on roof or suspended floor or connected to building, rigidly mounted equipment or machinery and ducts or piping shall be designed for seismic load due to 0.3g acting at center of gravity.
- 3. Multiple-legged elevated tanks plus effective mass of contents shall be designed for seismic load of 0.30g at center of gravity.
- 4. Spring mounted equipment and machinery shall be designed for a 100% greater seismic load than that specified for rigidly mounted equipment or machinery.

E. Installation of seismic restraints:

- 1. Submit calculations and details for approval prior to commencing work. All restraint items shall be installed at time of installation of piping, ductwork, and equipment.

2.10 ROOF PENETRATIONS

- A. Locate roof penetrations for vents, pipes, drain and ducts, a horizontal distance of 12" minimum from edge of penetration to edge of vertical walls, curbs, or parapets above.

2.11 MOTORS

- A. General: This Section is applicable to all integral HP, induction motors, open dripproof, totally enclosed or explosion proof, for mechanical systems. Motors shall comply with applicable provisions of NEMA, IEEE, and Underwriters' Laboratories, Inc. when explosion proof is specified. Motors shall be rated for a 40°C (104°F) ambient with Class B insulation. All motors outdoors shall be TEFC type. All motors, 1 HP to 25 HP, which are connected to equipment by flexible couplings or V-belts and not built-in as integral parts of the equipment, shall be of high efficiency design, "Gould" Plus, "Westinghouse" MAC II, or approved equal. V-belt drive shall be rated at 150% of design load.
- B. Electrical Specifications: Winding insulation system shall be NEMA, Class B or better and motors would for standard voltages of 120 volts, 208 volts or 480 volts. Provide packaged capacitors in NEMA enclosure for each motor of 30 horsepower or larger. Enclosures and a related motor terminal box shall be designed for conduit and wire interconnection. Capacitors shall be selected to correct power factor to 95% with motor 75% loaded. Mount enclosure adjacent to motor. Exterior capacitor enclosures shall be weatherproof.
- C. Mechanical Specification: Frame dimensions conform to NEMA standards for "T-frame" motors. Frame construction of motors larger than NEMA from 145T of cast iron or extruded aluminum construction and those of NEMA frame size 145T and small may be of fabricated steel type. Nameplates shall be stainless steel. Grease lubricated ball on roller bearings shall be supplied. On NEMA frame sizes 182T and larger make provisions for regreasing by use of removable grease plugs.

2.12 ACCESS COVERS AND ACCESS DOORS

- A. Provide access covers over underfloor buried mechanical valves, controls, cleanouts, located in interior and exterior floor and grade areas.
- B. Provide access doors over concealed mechanical valves, controls, duct coils, dampers, fire dampers, pipe chases, concealed mechanical equipment through fire rated walls and ceilings.

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- C. Provide fire rated doors for access to mechanical equipment and valves.
- D. Access covers - Interior concrete floors:
 - 1. Type: Square or rectangular frame with hinged and secured cover.
 - 2. Size: Nominal 10" x 10".
 - 3. Construction: Aluminum alloy frame and hinged scoriated XH cover with lifting device. Secure with vandalproof screws.
 - 4. Marking: Cast cover with work "Cleanout", "Gas Shut-off" or "Water Shut-Off" when used for these services.
 - 5. Acceptable manufacturers: Smith No. 4925, Zurn, Josam.
- E. Access covers - interior vinyl/asbest or tile floors.
 - 1. Type: Square or rectangular frame with recessed cover.
 - 2. Size: Nominal 10" x 10".
 - 3. Construction: Aluminum alloy frame and tile recess XH cover with lifting device. Secure with vandalproof screws at each corner.
 - 4. Acceptable manufacturers: Smith No. 4920, Zurn, Josam.
- F. Access doors - walls and ceilings.
 - 1. Type: Flush or recessed panel.
 - 2. Size: Minimum 12" x 12" nominal door for hand access, minimum 16" x 20" nominal door for personnel access.
 - 3. Location and style:

Masonry/concrete walls	Milcor "M" Standard
Gypsum wallboard walls and ceilings	Milcor "M" Standard

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Plastered surfaces (except
toilet and kitchen walls)

Milcor "K" Standard
with casing bead

Tile/terrazzo/kitchen/toilet
room walls stainless

Milcor "M"

Acoustical tile

Milcor "A" (check type
of ceiling system)

General areas

Milcor "M" Standard

Fire rated shafts, rated
walls and ceilings

Milcor "B" label

4. Material:

- a. Stainless steel, No. 302 with No. 4 finish.
- b. Standard manufacturer's standard construction and finish for type specified.

5. Locking:

- a. Screwdriver: Flush screwdriver operated with case hardened cam.

6. Acceptable manufacturers: Milcor, Zurn, Miami Carey, Potter-Roemer.

3.00 EXECUTION

3.01 TESTS

A. General:

1. Test systems as specified.
2. Tests are supplemented by detailed tests specified in each Section.
3. Tests must be performed and systems approved prior to painting, covering, insulating, furring, or concealing piping.

4. Provide all test equipment, instrumentation and labor in conjunction with tests.
 5. Prior to test, protect or remove all control devices, air vents, and other items which are not designed to stand pressures used in test.
 6. Accomplish testing of piping in sections so as not to leave any pipe or joint untested.
 7. Obtain prior approval for test procedures.
- B. Responsibility for damages: Bear costs of repair and restoration of work of other trades damaged by tests or cutting done in connection with tests.

3.02 REPAIRS AND RETEST

- A. Make other adjustments, repairs and alterations required to meet specified test results.
- B. Correct defects disclosed by tests or inspection; replace defective parts.
- C. Use only new materials in replacing defective parts; in case of pipe, replace with same length as defective piece.
- D. Repeat tests after defects have been corrected and parts replaced, until pronounced satisfactory.

3.03 OPERATING AND MAINTENANCE MANUALS

- A. Furnish to Engineer in accordance with requirements of this Specification, an Operating and Maintenance Manual, which shall be an assembly of following information bound in durable binding:
 1. Complete table of contents.
 2. Page indicating name, address, telephone number, and name of person to be contacted regarding building and equipment maintenance at office of Contractor.

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3. Sectionalize manual by dividers with tab indexes indicating various sections.
4. At front of each section, sheet indicating the name, address and telephone number of person to be contacted at office of major suppliers.
5. At each major subsection tab divider index listing of portions and materials within subsection.
6. Complete description of recommended operational procedures, maintenance, lubrication data, and spare replacement parts lists of equipment items. Include applicable catalog data, diagrams, cuts describing equipment, and sources from which replacement parts can be obtained.
 - a. Performance data (curves, charts, etc.) on all pumps, air handling equipment, motor ratings, and electrical single lines and wiring diagrams for motor control centers and major power circuit breakers and disconnect centers.
 - b. Complete nameplate data for each and every item of equipment provided under each section of the manual.
 - c. Complete "as-built" air conditioning controls diagram and written operating procedure with catalog literature describing each control instrument.
 - d. Complete and detailed "as-built" air balance log for the heating, ventilating and air conditioning systems identified by company doing balance work, their address and telephone number and signature of balance engineer that performed work.
 - e. Items specified in Paragraph 1.10 Shop Drawings Data and Instructions of this section shall be included in manual.

3.04 RECORD DRAWINGS

- A. Refer to Division 1 for requirements governing "as-built" record drawings. "As-built" drawings include:
 - 1. Principle shut-off valves plainly marked and identified.
 - 2. Position of buried or concealed pipe accurately dimensioned in both horizontal and vertical planes.
 - 3. Changes from Contract Drawings in location of ductwork, piping, and equipment, drawn to scale.
 - 4. Equipment layout drawings revised from shop drawings to reflect "as-built" conditions.

3.05 PRELIMINARY OPERATIONS

- A. Should the District require that any portion of the systems or equipment be operated prior to the final completion and acceptance of the work, the Contractor shall furnish such operation. All the expense thereof will be paid by the District separate and distinct from any money paid on account of the Contract.
- B. For such preliminary operation or testing, payment shall not be construed as final acceptance of any of the work of this Contract.

3.06 OPERATING INSTRUCTIONS

- A. The Contractor shall provide the services of a competent Operating Engineer to supervise the operation of all equipment specified herein and to instruct the District operators during a one day operating period. The operating instruction period shall be defined as straight time working hours and shall not include nights and weekends.
- B. The District shall be notified in writing at least five days before each operating instruction period begins. The District must accept the instructional starting time in writing to the Contractor. Upon arrival, the various instructors shall report to the District.

END OF SECTION

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SECTION 15250-1
INSULATION OF
MECHANICAL SYSTEMS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Insulation of piping systems:
 - 1. Hot water, domestic (supply).
- D. Insulation of air duct systems:
 - 1. All supply air ducts which are concealed and all return air ducts which are not lined, shall be insulated with duct wrap as specified in paragraph 3.03.
 - 2. Lining of zone head supply air ducts, exposed supply air ducts, return air ducts ten feet from the air conditioning units, and transfer ducts, shall be as specified in paragraph 3.03.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Finishes: Division 9.

1.03 PROVISIONS AND GENERAL REQUIREMENTS

- A. Documents affecting work of this section include but not necessarily limited to the General Provisions, Division 1 General Requirements and Section 15010 - Mechanical General Provisions of these specification.
- B. Inspection of conditions: Examine related work and surfaces before starting work of this Section. Report to Architect, in writing, conditions which will prevent proper provision of this work. Beginning work of this Section without reporting unsuitable conditions to Architect constitutes acceptance of conditions by Contractor. Perform any required removal, repair, or replacement of this work cause by unsuitable conditions at no additional cost to Owner.

1.04 LIST OF ACCEPTABLE MANUFACTURERS

Manville
Owens-Corning
PPG

Armstrong
National Gypsum
Falcon Foam

2.00 PRODUCTS

2.01 MATERIALS

A. Pipe Insulation:

1. Hot water (domestic) piping: Glass fiber, one-piece (HD) sectional pipe insulation with factory applied jackets. 3 PCF density minimum.

B. Air duct insulation:

1. Duct wrap, vapor barrier (Type A): Glass fiber flexible blanket insulation with vapor barrier facing of UL rated aluminum foil scrim Kraft. Insulation 0.75 PC K factor of 0.29 at 75°F mean temperature.
2. Flexible duct lining (Type B): Glass fiber with a black coating. Insulation with a minimum density of 1-1/2 PCF K factor of .28 at 75°F mean temperature. The lined shall have an air friction correction factor of not more than 1.1 at 1000 fpm or the Contractor shall oversize accordingly. Duct liner shall be applied with approved fire resistant adhesive and mechanical fasteners as per manufacturer's recommendation at stated velocities. Exposed edges, leading edges, cross joints and any damaged areas shall be heavily coated with approved fire resistant adhesive. For velocities above 4000 fpm, consult manufacturer for rated velocity and installation. Cover all leading edges with galvanized nosing strips. Class 1: Flame-spread rating for 25 maximum. Smoke-developed rating 50 maximum. Retard flame passage for at least 30 minutes.

C. Insulation accessories:

1. Hangers, mechanical: Pipe Shields Inc., CS-CW Series.
2. Wire, tie: 16 gauge soft, annealed, black or galvanized.

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SECTION 15250-3
INSULATION OF
MECHANICAL SYSTEMS

3. Emulsion, asphalt: Koppers No. 480 liquid asphalt emulsion.
4. Tape, vapor barrier: Scotch No. 473.
5. Angle, corner: 1-1/2" leg, aluminum or galvanized steel.
6. Foil aluminum: .02 mils thick.
7. Jacket, aluminum: .016" smooth jacket, weatherproof seal, factory applied vapor barrier for pipe exposed to weather. Ell and Tee jackets by Herren Metals Inc. or equal.
8. Adhesive, hanger: Benjamin-Foster No. 55; color: red-brown; Fire Safety, wet - Flash Point 55, dry - F.S. 5.
9. Adhesive, vapor barrier (lap): Benjamin-Foster No. 82-07; color: white, Fire Safety, wet - non flammable dry - F.S. 5.
10. Adhesive lagging: Benjamin-Foster No. 30-36; color: white, Fire Safety, wet - non-flammable, dry - F.S. 5 MIL-A-3326A, Type I.
11. Adhesive bonding: Benjamin-foster No. 85-o15; color: amber, Fire Safety, wet - Flash Point 30 F, dry - F.S. 10.
12. Adhesive, fire retardant (used in sealing duct lining): Benjamin-Foster No. 85-20, color: off-white; Fire Safety, wet - non-flammable, dry 0 F.S. 6.
13. Canvas: 8 ounce per square yard.
14. Fabric, glass membrane: Non-woven jackstraw pattern of short cable strands of glass fiber.
15. Cement, insulating: Same material as insulation to which it is applied, but in cement form.

3.00 EXECUTION

3.01 CONDITION OF SURFACES

- A. Examine related work and surfaces before starting work of this Section. See 1.02B "Inspection of conditions".

3.02 INSULATION OF PIPING SYSTEMS

A. Piping insulation schedule:

<u>System</u>	<u>Class I Temp. Range</u>	<u>Insulation and Min. Thickness</u>	<u>Jacket Exposed Pipe</u>	<u>Concealed Pipe</u>
Domestic Hot Water	to 180°F	1-1/2" (HD)		(AP-T)

Urethane foam or polystyrene pipe insulation will not be acceptable.

HD = Heavy Density

AP-T = All purpose with foil

B. Hot Piping:

1. Insulate specified piping systems with material and material thickness shown in schedule.
2. Provide shields outside of insulation where pipe hangers or rollers are installed. Tape shields around insulation.
3. Fittings: Provide insulating cement for piping up to 3" and PVC molded fittings for larger piping.
4. Insulate fittings and valve bodies with insulating cement, hand molded to thickness equal to adjoining insulation, covered with smooth coat of insulating cement.
5. Install insert section at hangers/rollers of waterproof calcium silicate impregnated with silicon of thickness equal to adjoining insulation. 360°F coverage along pipe, length of insert 9" minimum. Cover to match adjacent pipe.
6. Acceptable manufacturer: Pipe Shields Inc. "CS-CW".

3.03 INSULATION OF DUCT SYSTEMS

A. Ductwork insulation schedule: (Unless shown or specified otherwise)

Insulation Type-Key

Type A - Duct wrap, vapor barrier type

Type B - Lined duct

<u>System Ductwork</u>		<u>Insulation Thickness</u>
Supply air duct	(concealed)	1-1/2" type A
Supply air duct	(in the first five feet of horizontal ducts from zone head ducts and within plenums).	1" type B
Zone head ducts		as indicated on drawings, type "B"
Duct	(exposed to weather)	as indicated on drawings type "B"
Return ducts	(in the first ten feet from the unit and within plenums)	1" type B
Return ducts	(exposed above roof)	1-1/2" type B
Return ducts	(all except otherwise noted)	1" type A
Transfer ducts	(all)	1" type B

B. Air duct insulation, concealed Type A:

1. Wrap specified ducts with material and thickness shown in schedule. Cover all surfaces including standing seams with insulation joints lapped a minimum of 2". Fasten insulation with wire ties spaced 12" on centers maximum for straight runs and 3" on centers maximum for straight runs and 3" on centers for elbows and fittings. Flare door staples on 3" centers through laps. Tape all longitudinal and circumferential joints.
2. Additionally, secure insulation for ducts 24" or more in width by mechanical fasteners spaced 18" on center line of bottom of duct.
3. Two ducts wrapped together having a combined width of 48" or more shall have mechanical fasteners on center line of bottom of each duct spaced 18" on center in addition to wire.

C. Air duct and plenum insulation, lined type B.

1. Line specified ducts with material and thickness as shown in schedule. Secure insulation to sheet metal surface with coated side toward air stream, with minimum 50% coverage of bonding adhesive. Adhesive shall completely cover sheet metal at each end of section of ductwork.
2. Additionally, secure insulation for ducts over 2" wide, and on sides when width exceeds 24" with mechanical fasteners 12" on center maximum starting approximately 1-1/2" from every edge.
3. Apply fire retardant mastic to joints in liner and edges of the liner where sections of ductwork are joined.
4. Increase indicated size of ductwork to accommodate specified liner.
5. Protect leading edges per manufacturer's requirements.

END OF SECTION

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SECTION 15300-1
SPECIAL SYSTEMS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Document 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which is required to be included as work under this section.
- C. Compressed air system
- D. Gear oil system
- E. Chassis grease system
- F. Miscellaneous piping
- G. Testing and initial operation

1.02 PROVISIONS AND GENERAL REQUIREMENTS

- A. Inspection of Conditions: Examine related work and surfaces before starting work of this Section. Report to Engineer, in writing, conditions which will prevent proper execution of this work. Beginning work of this Section without reporting unsuitable conditions to engineer constitutes acceptance of conditions by the Contractor. Perform any required removal, repair or replacement of this work caused by unsuitable conditions at no additional cost to the District.
- B. Where the word "Provide" appears in equipment, it shall mean "Furnish and Install".

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Site Work: Division 2
- B. Concrete: Division 3
- C. Finishes: Division 9
- D. Electrical: Division 16

1.04 SUBMITTALS

- A. General: Comply with provisions of Sections 15010, Mechanical General Provisions.
- B. Product Data: Within 35 calendar days after receipt of Notice to Proceed, submit complete materials lists and manufacturer's brochures of all items proposed to be furnished and installed. Submittal shall include but not be limited to:

- Pipes and Fittings
- Hangers and Supports
- Valves
- Specialties, Gauges, Thermometers
- Air Compressors and Driers
- Pumps
- Valve Boxes and Manholes
- Automatic Valves

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section before, during and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the District.

2.00 PRODUCTS

2.01 COMPRESSED AIR SYSTEM

- A. Provide complete compressed air system including air compressors, accessories and piping.
- B. Air compressor Symbol CA 1.
 - 1. Compressor: Two-stage, air cooled, V-belt driven.
 - 2. Motor: open dripproof electric motor for V-belt drive guard.

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SECTION 15300-3
SPECIAL SYSTEMS

3. Mounting: Compressor and motor shall be mounted on a horizontal, 120 gallon, 200 PSIG ASME stamped air receiver with automatic drain valve, pressure relief valve service outlet valve and air cooled after cooler.
 4. Instruments: Pressure gauge and pressure switch for automatic start-stop operation.
 5. Capacity and sizes as noted on the drawings.
 6. Manufacturer: Gardner-Denver Company, Model ADS, Ingersoll-Rand Model T-30, Cambell Hausfed Model TK or approved equal.
- C. Air Dryer - Symbol AD-1
1. The dryer shall be installed on the downstream side of the receiver. The dryer shall be capable of drying the maximum anticipated air flow to an ⁰F, atmospheric dewpoint not less than minus 10 with entering air at 95 F⁰, saturated. The compressed air dryer shall be refrigerated type, self-contained complete with heat exchanger, refrigeration compressor automatic controls, trap for moisture removal, wiring, piping and refrigerant charge.
 2. Refrigeration unit shall be of hermetically sealed type and shall operate intermittently at all but maximum load conditions or shall have a hot gas bypass system which permits noncycling operation between no load and full load.
 3. Heat exchanger shall consist of air and refrigerant coils surrounded by heat conducting media of sufficient mass to insure adequate cooling capacity without causing excessive refrigeration cycling. Moisture separator shall be of centrifuge type located within the heat exchanger to provide for moisture separation at point of minimum air temperature. Heat exchanger temperature shall be thermostatically controlled and capable of adjustment. Means shall be provided to ascertain exchanger temperature.
 4. Cabinet: The entire unit shall be housed in a suitable steel cabinet. Cabinet shall be provided with hinged access door and front panel for easy access to all parts for maintenance and inspection. Cabinet shall be bonderized and finished with commercial enamel.

5. Unit shall be complete including the following:
 - a. Refrigerant analyzer gauge
 - b. Automatic drain
 - c. Power-on light
 - d. On off switch
 - e. High temperature warning light
 - f. Outlet air pressure gauge
 - g. Inlet air temperature gauge
6. Manufacturer: Pneumatech or equal.

2.02 SHOP SYSTEMS

- A. Modify existing automatic shop systems as follows:
 1. Chassis grease
 2. Gear oil

The systems shall include relocated supply pumps, new piping, and interconnection to existing piping and overhead service hose reels, dispenser valves and other accessories to form complete operating systems.

- B. Pumps:
 1. Gear oil pump - Symbol GOP-1 (mounted on drum) To be relocated from existing exterior location to new grease room.
 2. Chassis grease pump - Symbol CGP-1 (Mounted on drum) To be relocated from existing exterior location to new grease room. Provide new lift mechanism and connectors as listed below

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SPECIAL SYSTEMS

- a. 1/4" male pipe thread to 1/4" male pipe thread nipple. (ARO 1950).
 - b. Air operated pump lift shall be attached to the drum cover to raise the pump and drum cover for drum change over. Mounting of the lift shall be by a base plate with three 9/16" diameter holes. Lift height extended shall be 102" down to 60". Air line connectors shall be furnished for 85 cfm and 35 cfm. (ARO 640-067).
 - c. 5 ft. of 1/4" I.D., 250 psi working pressure air hose with 1/4" male pipe thread both ends. (ARO 622201-05).
 - d. 1/4" female pipe thread air line connector. (ARO 2609).
- C. Overhead Hose Reels:
1. Water Hose Assembly:
 - a. Heavy duty low pressure open hose reel which shall be designed to meet the strictest requirements of the most rugged service. The reel shall be heavily reinforced with heavy duty mounting brackets, rolled edge sheaves and extra large rollers. Reel shall have a dual needle bearing supporting hub. The fluid hub shall be rated at a minimum pressure of 3,000 psi. This heavy duty low pressure reel shall have a hose capacity of 50 ft. of 3/8" I.D. water hose described below. (ARO 614-232).
 - b. 30 ft. of 3/8" I.D., 300 psi working pressure water hose with 1/2" male pipe thread on one end and 1/4" male pipe thread on other end. (ARO 522401-30).
 - c. Hose stop for 3/8" I.D. water hose described above. (ARO 5671).
 - d. 1/4" female pipe thread, positive lever control, smooth flow, non-drip, neoprene rubber spout radiator bibb. (ARO 635-131).

2. Air hose assembly:
 - a. Heavy duty low pressure open hose reel which shall be designed to meet the strictest requirements of the most rugged service. The reel shall be heavily reinforced with heavy duty mounting brackets, rolled edge sheaves and extra large rollers. Reel shall have a dual needle bearing supporting hub. The fluid hub shall be rated at a minimum pressure of 3,000 psi. This heavy duty low pressure reel shall have a hose capacity of 50 ft. of 3/8" I.D. air hose described below. (ARO 614-232).
 - b. 30 ft. of 3/8" I.D., 300 psi working pressure air hose with 1/2" male pipe thread on one end and 1/4" male pipe thread on other end. (ARO 622401-30).
 - c. 1/4" female pipe thread air line coupler. 34 cfm full flow at 100 psi line pressure. (ARO 210).
 - d. 1/2" shut off valve at inlet of hose reel. (ARO Y25-2).
3. Air outlets:
 - a. 1/4" female pipe thread air line coupler, 34 cfm full flow at 100 psi line pressure, maximum inlet pressure 250 psi. (ARO 210).
 - b. 1/4" male pipe thread male to male nipple. (ARO 1950).
 - c. 1/4" male pipe thread air line connector. 34 cfm full flow at 100 psi line pressure. (ARO 2608).
 - d. 1/4" female pipe thread air line connector. 34 cfm full flow at 100 psi line pressure.

2.03 PIPING

A. Compressed Air - Symbol CA

1. Pipe and fittings: All piping shall be Schedule 40 galvanized steel pipe with galvanized 150 lb. malleable iron screwed or flanged fittings.

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SPECIAL SYSTEMS

B. Shop Systems Piping:

1. Pipe and fittings:

a. Gear oil - Symbol GO:

1. Above Ground: Schedule 80 black steel ASTM A106 Grade B seamless with 3000 lbs. forged steel socket weld fittings and welded joints.

b. Chassis grease - Symbol CG: Schedule 160 black steel pipe ASTM A106 Grade B seamless with 6000 lb. forged steel socket weld fittings and welded joints.

2. Special fittings, accessories and valves. (ARO).

C. Pipe for future anti-freeze below grade: Corrosion resistant fiberglass reinforced plastic pipe and fittings (F.R.P.), red thread II as manufactured by A.O. Smith-Inland Inc. Provide PVC secondary containment and slope toward maintenance building.

D. Pipe for future motor oil, and torque oil below ground: Schedule 80 blacksteel with seamless fittings and welded joints. Provide PVC secondary containment and slope toward maintenance building.

2.04 VALVES

A. Compressed Air System:

Ball valves: Nibco T-580
Check valves: Nibco T 413-Y
Gate valves: Nibco T-180

B. Gear oil, and chassis grease systems.

1. Gear oil shut-off valves shall be Clayton mark Pacific valves Petro 790K union end ball valves. 1" valve shall be rated at 3500 psi. Vogt SW-1871 forged steel globe valve may be used as an option.

2. Chassis grease shut-off valves shall carbon steel full port globe valve, or equal.

3.00 EXECUTION

3.01 PIPING INSTALLATION, GENERAL

- A. Installation of piping shall be made substantially as indicated on drawings, installed in accordance with the ANSI Standard Code for Pressure Piping B31.1, latest issue, including anchorage of piping guides and supports for such piping.
- B. Horizontal and vertical positions and arrangement of pipelines as shown on drawings shall be confirmed at the site of work prior to fabrication and installation. The accompanying drawings are intended for the Contractor's guidance, and Contractor shall verify their accuracy and immediately notify the Engineer of any discrepancies so that such discrepancies may be resolved prior to actual fabrication or installation of work. Minor changes in position of piping, as necessary to meet job conditions, shall be anticipated by the Contractor, and shall not be made the basis for change order. Changes affecting accessibility to or clearance about equipment or accessories shall be promptly communicated to the Engineer.
- C. Sizes and arrangement of piping shall be as shown on the drawings; in case of inconsistency of details for final connections, resulting in conflict, such conflict shall be resolved by the Engineer.
- D. Attention is called to the inclusion of the flow diagrams in the list of working drawings. These flow diagrams are not for the purpose of giving physical dimensions or locations, but rather to make clear the interconnections, by the piping, of the various units of the process. If an item is shown on either the flow diagram or the piping plan or detail drawings, but not on both, it will be assumed that the Contractor has included such item in his estimate of the cost of the work.
- E. In the assembly of the piping system, the longest available commercial standard lengths of piping shall be utilized to minimize number of piping joints. Piping shall be accurately cut to field measurement to permit placement without forcing or springing, except where requirements for cold springing are shown.

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SPECIAL SYSTEMS

- F. All piping shall be run straight and parallel with adjacent walls and shall present a uniform and neat appearance.
- G. Each piece of pipe fitting and valve shall be carefully inspected on the inside and outside to see that there is no defective workmanship or obstructions in the pipes, fittings or valves.
- H. During construction, open ends of piping shall be protected with temporary closures to prevent entry of dirt and debris into lines. Piping size reductions shall be made with eccentric fittings, with flow lines of piping in alignment. No bullhead connections will be permitted, except where specifically shown. Piping shall be plumb and square and arranged for venting or drainage as designated.
- I. Provide dielectric insulation at points where copper or brass piping and equipment comes in contact with ferrous piping or equipment. This requirement does not apply to brass valves in ferrous piping where such valves are not externally grounded. Provide on each ferrous pipe connected to underground piping system a flange insulator for complete electrical isolation. Pipeline Seal and Insulator Company, P.S.I. Type "D", full sleeve, double washers, or equal.

3.02 CLEANING AND FLUSHING OF PIPING SYSTEMS

- A. Flush all piping systems with a solution of approximately 10% inhibited HCL solution, or equivalent, to clean the inside of all pipes. Then flush systems with fresh water until no residue of solution is detected.

3.03 TESTS

- A. General:
 - 1. Tests must be performed and systems approved prior to painting, covering, insulating, furring, or concealing piping.
 - 2. Provide all test equipment, instrumentation and labor in conjunction with tests.

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SECTION 15300-10
SPECIAL SYSTEMS

3. Prior to test, protect or remove all control devices, air vents, and other items which are not designed to stand pressures used in test.
 4. Accomplish testing of piping in sections so as not to leave any pipe or joint untested.
 5. Obtain prior approval for test procedures.
 6. Responsibility for damages: Contractor shall pay for costs of repair and restoration of work of other trades damaged by tests or cutting done in connection with tests.
- B. Test each piping system with the service product for at least one hour at 150% of the operating pressure but not less than specified below:

<u>System tested</u>	<u>Gauge pressure at Start of the test (PSIG)</u>	<u>Test with</u>
Compressed air system	175	Air
Gear oil system	1,500	Oil
Chassis grease system	10,000	Oil

END OF SECTION

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SECTION 15400-1
PLUMBING SYSTEMS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as built and all other applicable requirements of Document 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Soil, waste, and vent systems.
- D. Domestic hot and cold water systems.
- E. Plumbing fixtures and trim.
- F. Water heaters.
- G. Plumbing services and connection to equipment fixtures furnished and installed under other Sections.
- H. Fuel gas system.
- I. Storm water disposal system including roof drains and interior downspouts.
- J. Tests
- K. Disinfecting water systems.
- L. Excavation, trenching and backfill.
- M. Condensate drains.

1.02 REQUIREMENTS

- A. Codes and standards: Comply with all pertinent recommendations contained in latest edition of Los Angeles Plumbing Code.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Site Work: Division 2.

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SECTION 15400-2
PLUMBING SYSTEMS

- B. Moisture Protection: Division 7.
- C. Finishes: Division 9.
- D. Electrical: Division 16.

1.04 SUBMITTALS

- A. General: Comply with provisions of Section 15010, Mechanical General Provisions.
- B. Product data: Within 35 calendar days after receipt of Notice to Proceed, submit complete materials list and manufacturer's brochures of all items proposed to be furnished and installed. Submittal shall include but not be limited to:

- Pipes and Fittings
- Hangers and Supports
- Valves
- Plumbing Fixtures
- Water Heaters
- Gas Pressure Regulators
- Cleanouts
- Drains
- Backflow Preventors

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section before, during and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.

2.00 PRODUCTS

2.01 GENERAL

- A. Pipe, valves, fixtures and appurtenances referred to herein by trade name and model number are intended as descriptive guidance and not as definitive specifications. All such references shall imply "or Approved Equal", by listed manufacturers.

2.02 PIPING

- A. Soil, waste, vent and storm drain piping (Symbols S, W, V, SD): Two inches and larger, above or below ground, inside of building to a point 5'-0" outside of buildings, shall be service weight, coated, hubless cast iron pipe, and fittings with stainless steel couplings in accordance with Cast Iron Soil Pipe Institute Standard No. 301-78.
- B. Waste and vent piping (Symbols W, V): Inside buildings, above ground, 1-1/2 inches, shall be galvanized steel, Schedule 40, or hubless cast iron pipe with stainless steel couplings in accordance with Cast Iron Soil Pipe Institute Standard No. 301-78.
- C. Domestic hot, cold water and industrialized cold water piping above ground (Symbols CW, HW, HWR, ICW): Shall be Type "L", hard drawn copper tubing, ASTM B-88. Joints in copper tubing shall be made up with 95-5 tin/antimony solder in accordance with manufacturer's recommendations. Wrought copper fittings shall be used, and/where necessary, combination of fittings reducers, and adapters shall be employed in making up the piping.
- D. Domestic water piping, below ground (Symbol CW): Shall be Type "K", hard drawn copper tubing, ASTM B-88. Joints in copper tubing shall be made up with 95-5 solder and Nokorode Flux, in accordance with manufacturer's recommendations. Wrought copper fittings shall be used and where necessary, combination of fittings, reducers, and adapters shall be employed in making up the piping. Cast fittings will not be permitted.
- E. Discharge from air vent or relief valve: Shall be seamless carbon steel ASTM A53 grade B, galvanized, schedule 40. Fittings shall be class 150 malleable iron, galvanized.
- F. Gas Piping (Symbol G, MPG)
 - 1. Gas piping above ground: Shall be Schedule 40 black steel ASTM A-120 as manufactured by National Tube, REpublic, LTV, or approved equal. Pipe thickness shall be in accordance with ANSI B36.10, latest edition. All gas piping shall be welded construction. Screwed fittings will be permitted in lieu of welded construction provided all screwed joints must be accessible for repair. Screwed fittings will not be permitted in furred ceilings or chases. Screwed fittings will not be allowed on pipe larger than 2 1/2".

2. Gas pipe fittings: Shall be of materials as follows:
 - a. All welding fittings shall be factory made but welded conforming to ANSI B16.971 and shall be used full line size, except as specified herein, for each and every tee, branch, elbow, etc., with reducers after fittings if required.
 - b. All screwed fittings shall be "Crane", or approved equal, class 150 malleable iron and shall conform to ANSI B16.3-71. Screw joints shall be made up with teflon tape. Screwed threads shall be in accordance with ANSI B2.1-68.
 3. Gas piping below ground: Shall be of the same materials and shall meet the same working pressure requirements specified for gas piping above ground, except that it shall be protected with tape wrap or plastic factory applied coating as specified hereafter. Threaded pipe will not be allowed below grade.
- G. Condensate Drain (Symbol CD): Type "M" copper with 50/50 solder and wrought copper fittings. Provide deep seal traps with plugged tees.
- H. Wrapping of pipe:
1. Prior to delivery to the job site wrap buried pipe with corrosion protection wrap of pressure sensitive polyvinyl chloride or polyethylene tape applied after pipe has been thoroughly cleaned. Tape shall be nominal thickness of 20 mils consisting of one layer of 20 mil tape or two separate layers of 10 mil tape. Apply with suitable primer adhesive recommended by manufacturer.
 2. Tightly apply tapes with 1/2 inch minimum uniform lap, free from wrinkles and voids. Use approved wrapping machines and experienced operators.
 3. Tapes: "Chasekote" No. 775, Plicoflex No. 340-25, Polyker 922 and 923, "Scotchwrap" No. 51, or equal. Apply tape after pipe is cleaned as recommended by the tape manufacturer.

4. Cover field joints and fittings by wrapping polyethylene or polyvinyl tape specified for wrapping pipe, except use two layers of 10 mil thick tape. Wrap joints to provide two full thickness of tape over joint and extend minimum of six inches over adjacent pipe covering. Where fittings are wrapped, width of tape shall not exceed two inches. Apply adequate tension so tape will conform tightly to contours of fittings. Use putty, tape insulation compounds such as "Scotchfill", or equal, to fill voids and provide smooth even surface for application of tape wrap.
5. Alternate: In lieu of tape wrap, factory applied plastic coating on steel pipe will be acceptable. Use tapes for field joints, fittings, and valves same as specified above. Pipe Coating: "X-Tru-Coat" (20 mil thick) as manufactured by 3M Company, or equal, with "X-Tru-Tape", or equal, for joints, fittings and valves.
6. Test wrapped or coated pipe, fittings and field joints on job site, after assembly with approved high voltage holiday detector Tinkler and Razor, or equal, with positive signaling device to indicate any flaws, holes, or breaks in wrapping. Set peak voltage to 10,000 volts. If Scotchkote 202 is used at peak voltage to 1,000 volts. Place piping on temporary blocks to allow testing to run along underside of pipe. Repair defects before covering. Conduct testing in presence of Engineer.

2.03 VALVES

A. General:

1. Valves in each group and pressure class shall be of one manufacturer.
2. Use rising stem gate valves wherever space permits. If not enough space, non rising stem gate valves will be acceptable.
3. Butterfly valves used as isolation valves or for future points of connection shall be equipped with manufacturer's flanged spools, be furnished with tapped lugs, or be of flanged body design.

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 PLUMBING SYSTEMS

4. All manually operated butterfly valves, ball valves and plug valves shall be fitted with adjustable stops for use as balancing valves.
5. All valves on copper pipe 2" and small shall have threaded ends.

B. Acceptable manufacturers:

<u>Valve Type</u>	<u>Manufacturer</u>
1. Gate, globe, angle and swing check	Crane, Walworth, Fairbanks Lunkenheimer, Grinnell, Stockham, Nibco, or Jenkins
2. Water check valves	Mission, Nibco, Grinnell, or Centerline
3. Plug Valves	Nordstrom, Walworth, DeZurik or Homestead
4. Ball Valves	Jamesbury, Grinnell, Crane, Nibco or Stockham
5. Butterfly valves	Nibco, Jenkins, Centerline Keystone, Grinnell, Demco, DeZurik, Stockham or Lunkenheimer
6. Relief valves	Farris, Crane or C.M. Bailey
7. Needle valves	Crane, Dragon, Whitey

C. Valves Schedule (Nibco Plate Numbers shown for reference unless otherwise identified).

<u>Service</u>	<u>Size</u>	<u>Description</u>	<u>Plate No.</u>
Gate Valve	2" and smaller	Union bonet, bronze	T-111
		Rising stem, solid Threaded Wedge, Class 125	T-111

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	2 1/2" and larger	Bolted bonnet, NRS Class 125 Flanged	F-619
Check Valve (swing type)	2" and smaller	Y-pattern bronze Class 125	T-413
Check Valve (non slam)	All sizes	Globe Type	Muessco #105 BP
Butterfly Valves	4" and larger	Lug type cast iron body, bronze, disc	NL 082 150 PSI WOG
<u>Gas</u>			
Gate Valve	2-1/2" & smaller	Union Bonnet Bronze, screwed ends, rising stem, class 125	T-111
	3" and larger	Bolted bonnet	F 619
Plug Valve	1" and smaller 1-1/2"	Semi-steel body screwed Semi-steel body	DeZurik 425 DeZurik 425
Plug Valve	2" 2-1/2" & smaller	screwed Semi steel body flanged ends	DeZurik 425
<u>Industrialized Cold Water</u>			
Gate Valve	3" and smaller	Union Bonnet, Rising Stem, Class 125	T-111
	4" and larger	Bolted Bonnet OS&Y, Class 125, Flanged	F 617-0
Check Valve (swing type)	2" and smaller	Bronze screwed ends, Y-pattern Class 125	T-413-B
	2-1/2" & larger	Iron body bolted bonnet, Class 125 flanged	F-918

2.04 FLANGES

A. General: Provide where indicated and/or specified. Flanges connecting to cast iron valves or equipment shall be flat faced. Extend flange bolts through nut four full threads when made up.

B. Flange Schedule:

1.	Service using black steel pipe	All	ANSI 150 pound weld-neck or slip-on as indicated or required
2.	Service using galvanized pipe	All	ANSI 150 pound galvanized cast iron screwed or victaulic flange
3.	Service using copper tubing	All	150 pound bronze
4.	Copper to steel	All	Dielectric flanges 300 pound working pressure

2.05 GASKETS

A. Services using steel
1/16" thick stainless steel inserted spiral asbestos Flexitalic CG, Garlock-Guardian, Crane or Goetze, Style 912.

B. Other Services
1/16" thick asbestos ring or full face gaskets, as required.

2.06 BOLTS AND NUTS

A. Services using cast iron or steel flanges
Regular unfinished carbon steel machine bolts with unfinished hexagon nuts, ASTM A307, Grade B.

B. Services using brass or copper flanges
Square head brass machine heavy semi-finished brass hexagon nuts

2.07 UNIONS

A. General: Unions shall be provided where indicated and/or required for proper installation and maintenance of the systems. They shall conform to the following schedule:

1.	All services using black steel pipe	All	Class 150, malleable iron, screwed, Stockham 698
2.	All services using galvanized steel pipe	All	Class 150, malleable iron, screwed, galvanized.
3.	All services using copper tubing	All	Wrought copper tail piece with red bronze nut Nibco No. 733
4.	Steel to copper	All	Dielectric unions, Class 150 Stockham 693-1/2

In addition to specified manufacturers, products by "Nibco", "Stockham", "Lunckenheimer" or "Crane" will be acceptable if they comply with specifications.

2.08 DROP-EAR ELBOWS

A. Drop-ear elbows, 90-degrees, shall be "Nibco", No. 707-5 copper to copper, or "Nibco", No. 707-3-5 for use at counter and wall, trim connection.

2.09 PIPING SPECIALITIES AND PIPING HANGERS

See Section 15010 Mechanical General Provisions

2.10 CLEANOUTS

A. Cleanouts shall be furnished for various locations and shall be similar and approved equal to the J.R. Smith catalog numbers listed. If it complies with these specifications one of the following manufacturers will be acceptable: Zurn, J.R. Smith, Josam or Tyler.

B. Cleanouts for outside of buildings - Symbol COTG:

1. Cast iron ferrule with brass plug brought up to 3" below grade and located in an access box. Access box shall be with cast iron double flanged body and secured, acoriated cast iron cover, lettered "Cleanout". Provide 24 square inch concrete ring for lower flange when access box is located in areas surfaces with asphalt paving or in non-surfaced areas. Cleanout shall be:

J.R. Smith No. 4258

C. Floor Cleanout - Symbol FCO:

1. Finished Areas (Tile):

Cast iron cleanout with brass plug and square nickel bronze top adjustable to finished floor. Cleanout shall be:

J.R. Smith No. 4048

2. Finished Areas (Concrete):

Cast iron cleanout with brass plug and round extra heavy duty, scoriated cast iron top adjustable to finished floor. Cleanout shall be:

J.R. Smith No. 4258

D. Wall Cleanout - Symbol WCO:

1. Plastered Wall:

Cast iron cleanout tee with brass plug complete with square chrome plated wall access cover and flush with the wall frame. Cleanout shall be:

J.R. Smith No. 4558

2. Tiled Wall:

Cast iron cleanout tee with brass plug complete with square chrome plated wall access cover and flush over-wall frame. Cleanout shall be:

J.R. Smith No. 4553

2.11 DRAINS

A. Floor drains shall be furnished for various locations and shall be similar and approved equal to the J.R. Smith catalog numbers listed. If it complies with these specifications one of the following manufacturers will be acceptable: Zurn, J.R. Smith, Josam, or Tyler.

B. Floor Drain - Symbol FD-1: Type - cast iron body, 5" square, polished nickel bronze grate with square holes, adjustable strainer head, caulk, bottom outlet, and trap primer connection.

J.R. Smith #1010-B-P

C. Floor Sink - Symbol FS-1: Type - cast iron body, porcelain enameled interior, dome bottom strainer, polished nickel bronze rim and grate with square holes, caulk type, with flashing flange half grate.

J.R. Smith #3150-12

D. Floor Sink - Symbol FS-2: Type - cast iron body, with solid water dam collar cast iron dome bottom strainer and underdeck clamp.

J.R. Smith #3960-Y

E. Trap primer - Symbol TP: As manufactured by Precision Plumbing Products or E & S Inc. and shall be approved by Los Angeles Testing Lab.

F. Roof Drain - Symbol RD-1: Type - cast iron body with flashing clamp, gravel stop and polyethylene dome.

J.R. Smith #1010

G. Overflow Drain - Symbol OD-1: Type - cast iron body with flashing clamp, gravel stop polyethylene dome, cast iron 2" water dam collar.

J.R. Smith #1080

2.12 BACKFLOW PREVENTERS

- A. Type: Reduced pressure type backflow preventers, as approved by local authorities.
- B. Acceptable manufacturers: Cla-Val Co., Hersey, Watts, or Neptune.

2.13 WATER HAMMER ARRESTORS

- A. Properly sized water hammer arrestors, designed and sized in accordance with Plumbing and Drainage Institute, Standard WH-201.

Zurn:	Z-1700 Series
Josam:	#1485 Series
Smith:	#5000 Series
Precision:	PPP Series

2.14 HOSE BIBBS

- A. HB-1: 3/4 faucet, vandalproof lackshield bonnet, removable wheel handle chrome-plated casting with chrome plated vacuum breaker. "Acorn" No. 8121, or approved equal.

2.15 PRESSURE AND TEMPERATURE RELIEF VALVES

- A. Type: ASME rated, bronze body; Watts Series No. 40, 140, 240 or 340.
- B. Acceptable Manufacturers: Watts, or McDonnell Miller.

2.16 PLUMBING FIXTURES AND TRIM

- A. General:
 - 1. Each fixture shall be installed at the height and location shown on Architectural Drawings.
 - 2. Fixtures shall be set level.
 - 3. Joints between fixture and floor or wall shall be smoothly grouted with G.E. Silicone grout.

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4. Fixtures shall be white, except as otherwise specified.
 5. Supplies, traps and trap arms shall be set square with the wall and in line with fixture outlets.
 6. All brass work and exposed piping used in conjunction with fixtures shall be polished chromium-plated, unless otherwise specified.
 7. All supplies and wastes shall have chromium plated escutcheons.
 8. All fixture P-traps shall be cast brass, solid or adjustable, L.A. pattern. Tubing traps will not be permitted.
 9. Exposed supply connections to fixture supply stops, flush valve and exposed waste connections from traps shall be made with chrome-plated I.P.S. brass nipples. Tubing sleeve covers will not be permitted.
- B. Acceptable manufacturers. Manufacturers shall be as listed below, except as otherwise specified for specific items.
1. Fixtures. Eljer, Kohler or American-Standard.
 2. Faucets, supply controls and drains: Eljer, Kohler, American-Standard, Chicago Faucet or T & S Brass.
 3. Supplies: Brass Craft, Harcraft or Chicago Faucet.
 4. Electric water coolers. Halsey Taylor Haws Sunroc.
 5. Flush valves: Sloan, Watrous or Delany.
 6. Closet seats: Beneke, Olsonite or Church.
 7. Fixtures carriers: Smith, Zurn, Josam, or Wade.
 8. Showers: Kohler, Acorn, American Standard.
 9. Emergency eye wash and showers: Haws or Western.

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- C. Fixtures are scheduled on drawings, and are indicated by symbols. Carefully check drawings and furnish everything indicated and/or required for a complete installation. No extra will be allowed for omission or misinterpretation. Manufacturer's models and fixture numbers specified are intended as descriptive guidance for quality, size and type. All such references shall imply "or approved equal" by listed manufacturers.
- D. Water Closet - Symbol WC-1:
1. Fixture: Kohler No. K-4430 ET, white vitreous china, water saver (3 gal.) siphon jet. elongated bowl, wall hung. 1-1/2" top spud.
 2. Flushometer valve: Sloan "Royal" No. 115-3 with center line of supply 24" above fixture.
 3. Seat: Beneke No. 527 SS, white. Open front less cover, self sustaining check hinges.
 4. Supports: Floor mounted carrier shall be suitable for service intended, J.R. Smith 200 series.
- E. Water Closet - Symbol WC-2:
1. Fixture: Kohler No. K-4268 ET, white vitreous china, water saver (3 gal.) siphon jet. elongated bowl, floor Mtd. 1-1/2" top spud 18" high.
 2. Flushometer valve: Sloan "Royal" No. 115-3 with center line of supply 24" above fixture.
 3. Seat: Beneke No. 527 SS, white. Open front less cover, self sustaining check hinges.
- F. Water Closet - Symbol WC-3: Same as WC-1, except mounted for handicapped.

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G. Urinal - Symbol UR-1

1. Fixture: Kohler No. K-4980-T "Bardon", white, vitreous china washout action jet, integral extended shields wall hung, 3/4" top spud, 2" outlet.
2. Flushometer valve: Sloan "Royal" No. 186-11-YB

H. Urinal - Symbol UR-2:

1. Fixture: Kohler No. K-5014-T "Dexter" white vitreous china siphon - jet action integral trap wall hung, 1 1/4" top spud, 2" outlet.
2. Flushometer valve: Sloan "royal" No. 180-YB

I. Laboratory - Symbol L-2

1. Fixture:
20" x 18" Kohler No. K-2032 "Greenwich" wall hung, white, vitreous china, with splash lip, soap depression concealed hanger.
2. Faucet: Kohler No. K-7408-T faucet and perforated grid strainer and 4" wrist blade handles.
3. Supplies: Brass Craft No. SST-R3712A - Insulate hot water supply.
4. Trap: 1-1/4" x 1-1/2" cast brass L.A. pattern P-trap - Insulate trap and arm.
5. Support: Floor mounted carrier shall be suitable for service intended, J.R. Smith 700 Series.

J. Laboratory - Symbol L-1

1. Fixture: Kohler No. K2900 Farmington, counter mounted, enameled cast iron with 4" faucet centers.

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2. Faucet: Kohler No. K-7408-T faucet and perforated grid strainer.
 3. Supplies: Brass Craft No. SST-R3712A
 4. Trap: 1-1/4" x 1-1/2" cast brass L.A. pattern P trap
 5. Metal frame: Stainless steel
- K. LAVORATORY - Symbol L-3:
1. Shall be same as specified for L-1 except faucet shall have 4" wrist control handles and supplies/trap shall be insulated for handicapped.
- L. Wash Fountain - Symbol WF-1
1. Fixture: Bradley Type CFC 54" stainless steel semi-circular wash fountain, with integral back splash, powder soap dispenser (MPSD), Thermostatic mixing valve, water saver spray head and stainless steelscuff base pedestal. Supplies and vent through wall.
 2. Trap: Code approved "P" - trap
- M. Service Sink - Symbol SS-2
1. Fixture: Kohler K-6710 "Whitby" enameled cast iron service sink, corner floor type, 28" with K8940 coated wire rim guard.
 2. Fittings: Kohler K-8928 chrome plated faucet with vacuum breaker, K-9146 perforated strainer, 3" I.P.S.
 3. Trap: Code approved "P" trap.

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N. Service Sink - Symbol SS-1

1. Fixture: Kohler K-6718 enameled cast iron service sink with blank back, 22" x 18" depth 12", with K8936 SS rim guard.
2. Fittings: Kohler K8928 chrome plated faucet with vacuum breaker, K-0146 perforated strainer, 3" I.P.S.
3. Trap: Code approved "P"-trap.

O. Shower - Symbol SH-1:

1. Aerated hand shower, Speakman VS-101, with VS-120 swivel connector, VS-123-24" slide bar, VS-145-64" square lock chrome plated brass hose with rubber liner and VS-111 shower arm diverter.
2. Shower Head: Acorn No. 800 K-Y shower head with 3.0 GPM restrictor
3. Valve: Kohler 6914 pressure balance mixing valve with integral stops
4. Drain: J.R. Smith #2010-A (2").
5. Trap: Code approved P trap.

P. Electric Water Cooler - Symbol EWC-1:

1. Fixture: Sunroc dual purpose stainless steel wall hung Model NWC-8-S, 8.0 GPH at Standard Rating Conditions.
2. Supply: Provide supply and loose key stop.
3. Trap: 1-1/4" Code approved P trap.

Q. Emergency Eyewash and Shower - Symbol EEW-1

1. Fixture: Relocate existing assembly provide new western #829 shower head

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R. Sink - Symbol S-1

1. Fixture: Just No. DL2233-A-GR self-rimming, 18 gauge stainless steel double compartment sink, 3 faucet hole drillings, left compartment with garbage disposer.
2. Trim: Kohler K-7761-T, Triton II, sink faucet with 8" swing spout, aerator, K-8801 Duostrainer.
3. Trap: 1-1/2" cast brass P-trap.
4. Garbage Disposer: In-Sink-Erator Model 77, 1/2 hp/115v/1ph/60hz.

2.17 WATER HEATERS

A. Water Heater (Gas) - Symbol WH-1:

1. Type: Automatic gas fired storage heater.
2. Capacities: As indicated on the drawings.
3. The tank shall be constructed in accordance with ASME Code and stamped with appropriate symbol for 160 psi working pressure. After complete fabrication, the tank shall be completely glass lined forming a non-ferrous, corrosion-resistant protective barrier.
4. The water heater shall be insulated with heavy density fiberglass insulation and trimmed with a baked enamel steel jacket.
5. Provide lower operating thermostat, upper operating thermostat, ASME pressure and temperature relief valve temperature limiting device and a drain valve.
6. The water heater shall include all standard equipment as shown on manufacturer's specification sheet, shall fit properly into the space provided for it, and shall conform to the drawing requirements. The complete installation shall be in accordance with all applicable state and local codes and installation drawings.

7. Provide anodes for cathodic protection.
8. Provide draft regulator.
9. Entire unit shall be listed by California energy Commission for efficiency and stand by losses.
10. Manufacturers: MORFLO or A.O Smith.

2.18 GAS REGULATORS

- A. Type: Balancing diaphragm type with internal relief valve, strainer, vent and automatic shut off.
- B. Capacities: As indicated on the drawings.
- C. Manufacturers: Fisher, Reliance, or Rockwell.

3.00 EXECUTION

3.01 PIPING, GENERAL

- A. Installation of piping shall be made indicated on drawings, installed in accordance with the local codes and regulations.
- B. Horizontal and vertical positions and arrangement of pipe lines as shown on drawings shall be confirmed at the site of work prior to fabrication and installation. The accompanying drawings are intended for the accuracy and immediately notify the Engineer of any discrepancies so that such discrepancies may be resolved prior to actual fabrication or installation of work. Minor changes in position of piping, as necessary to meet job conditions, shall be anticipated by the Contractor and shall not be made the basis for change order. Changes affecting accessibility to or clearance about equipment or accessories shall be promptly communicated to the Engineer.
- C. Sizes and arrangement of piping shall be as shown on the drawings; in case of inconsistency of details for final connections resulting in conflict, such conflict shall be resolved by the Engineer.

- D. Attention is called to the inclusion of the flow diagram in the list of working drawings. These flow diagrams are not for the purpose of giving physical dimensions or locations, but rather to make clear the interconnections, by the piping, of the various units of the process. If an item is shown on either the flow diagram or the piping detail drawings but not on both, it will be assumed that the Contractor has included such item in his estimate of the cost of the work and that he shall install same.
- E. In the assembly of the piping system, the longest available commercial standard lengths of piping shall be utilized to minimize number of piping joints. Piping shall be accurately cut to field measurements to permit placement without forcing or springing, except where requirements for cold springing are shown.
- F. All piping shall be run straight and parallel with adjacent walls and shall present a uniform and neat appearance.
- G. Each piece of pipe, fitting and valve shall be carefully inspected on the inside and outside to see that there is no defective workmanship on the pipe or obstructions in the pipes, fittings or valves.
- H. During constructions, open ends of piping shall be protected with temporary closures to prevent entry of dirt and debris into lines. Piping size reductions shall be made with eccentric fittings, with flow lines of piping in alignment. No bull head connections will be permitted, except where specifically shown. Piping shall be plumb and square and arranged for venting or drainage as designated.
- I. Pressure gauges: Mount pressure gauges in locations where they can be read easily from floor.
- J. Thermometers: Mount thermometers in locations where they can be read easily from floor.
- K. Relief Valves: Pipe from relief valves to waste receptors or atmosphere as required.

3.02 SOIL, WASTE, AND VENT SYSTEMS

- A. Cleanouts: Install cleanout at ends of soil, waste, sewer, at bends, changes in direction, and as shown with maximum spacing of 50 feet on straight runs inside building. Set covers flush with adjacent finished surface.

- B. Floor Drains, Waste Receptors: Install as shown and connect to cast iron, P-trap. Anchor waterproof membrane to flange with clamping collar and rustproof bolts when used.

3.03 DOMESTIC HOT AND COLD WATER SYSTEMS, AND INDUSTRIALIZED WATER SYSTEMS

- A. General: Install supply connections to fixtures through wall as high under fixtures as possible and take off hot water lines from top of main.
- B. Unions: Install on each branch from horizontal main, adjacent to each screwed valve and on connections to equipment. Installation of concealed unions not approved.
- C. Shut-Offs: Install gate valve in each branch line where branch takes off main, at connections to equipment, and as shown to isolate sections of piping and fixtures of repairs.
- D. Dielectric Insulators: Provide dielectric insulators between dissimilar metals.
- E. Water Hammer Arrestors: Install arrestors in upright position in hot and cold water lines at quick closing valves and at plumbing fixtures. Location, size, and quantity per PDI Standard No. WH 201.
- F. Air eliminators: Install air eliminators in high points of hot water lines and install shut off valve between line and eliminator. Pipe air vent to drain.
- G. Backflow Preventers: Install as shown.
- H. Water Heaters: Install heater as shown with pipe from relief valve to waste receptor. Furnish and install anchor bolts for installation of heater on slab.

3.04 TESTS

- A. General:
 - 1. Tests must be performed and systems approved prior to painting, covering, insulating, furring or concealing piping.
 - 2. Provide all test equipment, instrumentation and labor in conjunction with tests.

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3. Prior to test, protect or remove all control devices, air vents, and other items which are not designed to stand pressures used in test.
 4. Accomplish testing of piping in sections so as not to leave any pipe or joint untested.
 5. Obtain prior approval for test procedures.
 6. Responsibility for damages: Contractor shall pay for costs of repair and restoration of work to other trades damaged by tests or cutting done in connection with tests.
- B. Drainage systems: Cap or plug all outlets and fill entire waste and vent system with water to level of highest vent stack. System shall hold water for two hours. Tests of portions of system shall be similarly conducted except that stack of 15 feet above highest horizontal line to be tested shall be filled with water to maintain required head.
- C. Test each piping system for at least one hour.

<u>System Tested</u>	<u>Gage Pressure At Start of Test (PSIG)</u>	<u>Test With</u>
Domestic Hot and Cold Water	150	Water
Gas	60	Air
Industrialized Cold Water	150	Water
Condensate drain	50	Water

- D. Test wrapped or coated pipe, fittings, and field joints on job site, after assembly, with approved high voltage Holiday detector, Tinker and Razor, or equal, with positive signaling device to indicated any flaws, holes or breaks in wrapping. Set peak voltage to 10,000 volts. If Scotchkote 202 is used set peak voltage to 1,000 volts. Place piping on temporary blocks to allow testing to run along underside of pipe. Repair defects before covering. Conduct testing in presence of Engineer.

3.05 PIPE CLEANING AND DISINFECTION FOR DOMESTIC WATER PIPING

- A. Pipe cleaning and disinfection applies to hot and cold domestic (potable) water systems and shall be performed after all pipes, valves, fixtures and other components of the systems are installed, tested and ready for operation.
- B. All domestic water piping shall be thoroughly flushed with clean potable water prior to disinfection, to remove dirt and other contaminants. Screens of faucets shall be removed before flushing and reinstalled after completion of disinfection.
- C. Disinfection shall be done using chlorine, either gas or liquid. Calcium or sodium hypochlorite may be used as approved in AWWA C601-69 procedures.
- D. A service cock shall be provided and located at the water service entrance. The disinfecting agent shall be injected into and through the system from this cock only.
- E. The disinfecting agent shall be injected by a proportioning pump or device through the service cock slowly and continuously at an event rate. During disinfection, flow of disinfecting agent into main water supply is not permitted.
- F. All sectional valves must be operated during disinfection. All outlets must be fully opened at least twice during injection and the residual checked with orthotolidin solution.
- G. When the chlorine residual concentration, calculated on the volume of water the piping will contain, indicates not less than 50 ppm (parts per million) at all outlets, then all valves must be closed and secured.
- H. The residual chlorine shall be retained in the piping systems for a period of not less than 24 hours.
- I. After the retention, the residual shall be not less than 5 parts per million. If less, then the process shall be repeated as described above.
- J. If satisfactory, then all fixtures shall be flushed with clean potable water until residual chlorine by orthotolidin tests shall be not greater than the incoming water supply (this may be zero).

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- K. All work and certification of performance shall be performed by approved applicators or qualified personnel with chemical and laboratory experience. Certification of performance shall indicate:
1. Name and location of the job and date when disinfection was performed.
 2. Material used for disinfection.
 3. Retention period of disinfectant in piping system.
 4. Ppm chlorine during retention.
 5. Ppm chlorine after flushing.
 6. Statement that disinfection was performed as specified.
 7. Signature and address of company/person performing disinfection.
- L. Upon completion of final flushing (after retention period), the Contractor shall obtain minimum one water sample and submit samples to a State approved laboratory.
1. Name and address of approved laboratory testing the samples.
 2. Name and location of job and date the samples were obtained.
 3. The coliform organism count. An acceptable test shall show absence of coliform organisms.
- M. If analysis does not satisfy the above minimum requirements, the disinfection procedure must be repeated.
- N. Before acceptance of the systems, the contractor shall submit to the Engineer for his review, three (3) copies of laboratory report and three (3) copies of Certification of Performance as specified above.
- O. Under no circumstances shall the Contractor permit the use of any portion of domestic water systems until properly disinfected, flushed and certified.

3.06 CLEANING

- A. All equipment, piping, etc. shall be thoroughly cleaned so as to remove rust, scale plaster or any internal obstructions before any covering is installed or any piping or equipment is painted. No scarring or disfiguring of equipment, piping, etc. will be acceptable before covering or painting is applied.
- B. All parts of the work which are to be painted or which are exposed in the finished work shall be thoroughly cleaned and made ready to receive paint finish.
- C. The exposed parts of equipment shall be cleaned, oil and grease removed, and the bright parts left clean and polished.
- D. Upon completion of the work, remove all rubbish, debris and surplus materials, resulting therefrom, from the premises together with all his instruments and equipment and shall leave the site in a neat, clean and acceptable condition as approved by the Architect.

3.07 PRELIMINARY OPERATIONS

- A. Should the District require that any portion of the system or equipment be operated prior to the final completion and acceptance of the work, the Contractor shall furnish such operation. All the expense thereof will be paid by the Owner, separate and distinct from any money paid on account of the Contract.
- B. Such preliminary operation or testing payment shall not be construed as final acceptance of any of the work of this Contract.

3.08 EXCAVATION AND BACKFILL

- A. Comply with the requirements for trenching, backfilling and compaction as specified in Section 02221.

END OF SECTION

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SECTION 15800-1
HEATING, VENTILATING &
CONDITIONING SYSTEMS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Document 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Air conditioning systems including air conditioning units, ductwork, air outlets and air inlets.
- D. Air exhaust, transfer, and relief systems including fans, drives, ductwork, air outlets and air inlets, as indicated on drawings.
- E. Testing and preliminary system operation.
- F. Installation of control devices as indicated on drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete: Division 3
- B. Moisture Protection: Division 7
- C. Finishes Division 9
- D. Building Specialties: Division 10
- E. Electrical: Division 16

1.03 SUBMITTALS

A. General

- 1. Refer to the Division 1, General Conditions for requirements governing submittals.
- 2. No product will be accepted on job site without prior approval.
- 3. Prepare shop drawings on transparencies at a scale suitable to clearly delineate the subject. Sheet sizes: multiples of 8-1/2" x 11".

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4. Drawing legend shall contain project title, drawing title, drawing number and number of drawings to set.
 5. Reference catalog cuts and brochures of products to proper paragraph in Specifications. Furnish numerical index by Specification paragraph number listing product name, catalog number and references to page number of submittal brochure.
 6. Give name of manufacturer, brand name and catalog number of each item. Submit complete submittals, at one time, with items arranged in numerical sequence within each section and article of specifications. Listing items "as specified" without both make and model or type designation is not acceptable, except pipe and fitting not specified by brand names may be listed "as specified" without manufacturer's name, provided proposed materials comply with specification requirements.
 7. Descriptive data: Send copies of complete description, information, and performance data covering materials and equipment which are specified but for which catalog plate numbers, brand names, or specific models have not been used.
 8. Miscellaneous: Prior to installation submit to Construction Supervisor on job site, two copies of the following:
 - a. Installation instructions for each piece of mechanical equipment furnished.
 - b. Dimension drawings for all mechanical equipment pads and curbs including bolt sizes and locations.
 - c. Do not install any materials or equipment until written approval has been obtained from Architect.
- B. Submittal data: To be furnished for this project shall include but not limited to the following:
1. Air conditioning units, complete with fan and coil selection data, calculations, physical dimensions, horsepower, electrical requirements, motor, etc.
 2. Air filters, complete with all data specified.

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3. Exhaust fans, complete with selection data, vibration isolation, fan rotation, physical dimensions, capacity data, motor, fan balancing, etc.
4. Electric motors, furnished under this Division.
5. Sheet metal ductwork and hangers, complete with ductwork construction details of joints, connections, reinforcing hangers, etc. All construction details shall be properly indexed on each shop drawings, etc.
6. Air distribution equipment, including ceiling supply diffusers, registers, etc.
7. Automatic temperature controls, complete with all wiring diagrams, materials, control properties, etc.
8. Air balancing procedures and recording forms.
9. Supports, hangers, inserts.
10. Dampers, louvers, grills, registers diffusers.
11. Openings, special framing and access doors.
12. Isolation mounting.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the District.

2.00 PRODUCTS: (Refer to contract drawings for symbols and model numbers)

2.01 MATERIALS

- A. General: Throughout the Specifications, types of materials may be specified by manufacturer's name and catalog number in order to establish standards of quality and performance and not for the purpose of limiting completion unless specifically stated otherwise, the Bidder may assume the phrase "or approved equal", except that the burden is upon the Bidder to prove such equality. If the Bidder elects to prove such equality, he must request the Engineer's approval in writing to substitute such item for the specified item, stating the cost difference involved, with supporting data and samples, if required, to permit a fair evaluation of the proposed substitute with respect to quality, service ability, warranty and cost. Such supporting data shall include the basic specifications characteristics and other information concerning the proposed substitution demonstrating its equality to the specified item and the effect of the substitution on the schedule and cost, if any.

2.02 AIR CONDITIONING UNITS

- A. Type: Roof mounted packaged-type, single-zone, electric cooling, gas heating unit, meeting requirements of California Title 24, complete with all controls and zone dampers.
- B. Capacities: As shown on the drawings.
- C. DX cooling system:
1. The coils shall be non-ferrous construction with aluminum fins mechanically bonded to copper tubes. All coils shall be factory pressure leak tested.
 2. The system shall consist of two (minimum) totally independent refrigeration systems including compressor, condenser coil, condenser fan and evaporator coil with expansion valve. The condenser coils shall have sub-cooling rows. The compressors shall be mounted on vibration isolators and unit shall be complete with joints, connections, reinforcing hangers, etc. All construction details shall be properly indexed on each shop drawings, etc.
- D. Gas heating system:
1. The unit shall have two independent gas control systems.

2. Two-pass tubular heat exchanger shall be constructed of aluminized steel. Stainless steel power burner shall have pre-purge, intermittent spark ignition, 100% safety shutoff controls, electronic flame sensing controls, series gas valves and fan controls to terminate blower operation at night. An automatic safety shutoff valve shall be furnished.

E. Control Systems:

1. The unit control panel shall be prewired in the unit casing-furnished with a 24-V control transformer, low-pressure switches, compressor, condenser, and evaporator fan motor contactors, as well as other protective devices.
2. An economizer control shall be factory-assembled and installed in the unit. The economizer control shall maintain a fixed supply-air temperature during the "free" cooling operation by providing for full modulation of the operable outside and return-air dampers. The package shall be complete with necessary dampers, linkage, and spring-return modulating damper motor. The economizer controls shall include an enthalpy control capable of controlling the dampers by measuring the heat content of the outside air.

F. Controls: All controls shall be the sole responsibility of the mechanical equipment manufacturer and shall be installed, factory wired, and tested.

G. Frame and casing: All external surfaces shall be of painted outdoor enamel heavy gauge galvanized steel. All galvanized side and top panels shall be insulated with 1-1/2" thick fiberglass insulation. The top panels shall be sealed with a rubber tubing in the bottom of each standing seam. Side panel seams shall be sealed with polyurethane foam. All interior support members shall be heavy gauge steel. All access panels shall have locking door handles.

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- H. Supply air blowers: Supply air blowers shall have permanently lubricated ball bearings, velocity pressure converters, adjustable belt drives and a cradle motor mount where belt tension can be easily adjusted. The entire assembly shall be floated on rubber mounts with minimum static deflection shall be 2".
 - I. Outside air damper: Damper blades shall ride in nylon bearings. Damper actuator shall be full modulating with adjustable potentiometer for minimum position. Damper blades shall be equipped with gaskets for tight seal.
 - J. Exhaust damper: Damper blades shall ride in nylon bearings. Blades shall be gasketed for tight seal and quiet operation.
 - K. Filters: Provide Farr 30/30, 2" thick throwaway filters or approved equal by Cambridge or Continental.
 - L. Manufacturer: Payne or approved equal by Carrier or Trane.
- 2.03 EXHAUST FAN, POWER ROOF VENTILATOR, LOW SILHOUETTE TYPE (SEE SCHEDULE ON DRAWINGS)
- A. Type: Belt-driven centrifugal, low silhouette with aluminum housing for roof mounting, completely weatherized, capable to withstand 20 pounds per square foot wind load.
 - B. Capacity: As shown on the drawings.
 - C. Fan: Backward inclined with centrifugal wheel statically and dynamically balanced at factory.
 - D. Motor: Install motor in weatherproof housing outside of air stream. Electrical characteristics shown on the drawings. See Section 15.010.

- E. Drive: Belt drive with adjustable motor sheave. Belt, oil resistant.
- F. Disconnect switch: Provide factory wired non-fused disconnect switch located under hood of unit.
- G. Backdraft dampers: Installed in curb of the unit.
- H. Bird screen: Protect entire air outlet of fan by 1/2" aluminum mesh securely installed.
- I. Acceptable manufacturers: "Exitaire" or approved equal by "Cook" or "Pace".
- J. Provide neoprene pad between exhaust fan base and roof curb.

2.04 EXHAUST FANS

A. Utility Vent Sets:

1. Fans shall be either forward curved or backward curved vent sets, as scheduled. Each fan shall include a Class I blower, motor, V-belt drive, drive guard, weather shield if located outdoors, vibration isolators, and capacities as indicated on the drawings. All exhaust fans shall have rating certified by AMCA V-belt drive, and shall be sized for 150% of maximum connected motor horsepower. Ratio of sheaves shall not exceed 6:1.
2. Manufacturer: Pace, McQuay or Trane.

2.05 GRILLES, REGISTERS, AND DIFFUSERS:

- A. All supply diffusers and registers shall be provided with right angle volume extractors and opposed blade volume dampers in the air stream behind the outlet. All return air registers shall be provided with opposed blade volume dampers behind the inlet.

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- B. All diffusers, registers, and grilles shall be furnished with off-white baked enamel finish. After balancing and testing, the Contractor shall refinish all damaged spots and screw heads.
- C. All diffusers shall be installed in approximately the locations indicated on the drawings, but the Contractor shall verify the exact locations at the building, making any changes as may be required and as approved by the Architect.
- D. Ceiling diffusers shall be louver face, adjustable pattern type (downblow to horizontal) Krueger series SH with frame 23 (for lay-in tee-bar ceiling) and Series or approved equal by Anemostat or Tuttle and Bailey.
- E. Ceiling return registers and transfer grilles shall be louver face to match supply Krueger Series SH (for lay-in tee-bar ceiling) (for other types of ceiling) or approved equal by Anemostat or Tuttle and Bailey.
- F. Ceiling exhaust registers shall be louver face type with horizontal stationary deflecting vanes spaced on 3/4" centers set at 35° angle to restraint vision, Krueger series 5585-H or approved equal by Anemostat or Tuttle & Bailey.
- G. Sidewall return and exhaust registers shall be same as ceiling and exhaust register.
- H. Sidewall supply registers shall have double deflection grilles set on 3/4" centers with individually adjustable in both horizontal and vertical planes, Krueger Series 880-H or approved equal by Anemostat or Tuttle & Bailey.
- I. All diffusers, registers and grilles exposed to shower areas, battery room and pit areas shall be of stainless steel construction.

2.06 DUCTWORK

A. Materials

- 1. Galvanized (zinc-coated) steel sheets ASTM 526 64T for all duct work except otherwise noted.

2. Steel angles and shapes ASTM A7-65.
- B. Duct System, Sheet Metal: Metal gage, and reinforcements shall conform to Los Angeles City Code, SMACNA LVDCS, NFPA 90A and other local and state codes whichever is more stringent. Ductwork shall be air tight and shall not vibrate or pulsate when system is in operation. Round ducts may be spiral duct. All rectangular ducts regardless of size shall be cross-broken or beaded.
1. Curved elbows: Curved elbows shall have a center line radius not less than 1-1/2 times width or diameter of the duct.
 2. Joints: Joints for ducts shall be sealed airtight, with "United" or "Duro-Dyne" and no duct sealer dust mark from air leaks shall show at duct joints, or connections to grilles, registers and diffusers.
 3. Laps: Laps at joints shall be made in the direction of air flow. Button punch or bolt connection in standing seams shall be spaced at fixed centers not greater than 6 inches. Horizontal locks or seams, known as "Button Punch Snap Lock" may be used in lieu of Pittsburgh Lock.
 4. Fittings: Rectangular elbows, vaned elbows, take offs, branch connections, transitions splitters, duct volume dampers, flexible connections, and access door shall conform to recommendations of SMACNA LVDCS unless shown otherwise. Round fittings shall be by "United Sheet Metal" or approved equal.
 5. Flexible duct take-offs shall be combination butterfly damper and extractor as manufactured by Thermaflex or approved equal.
 6. Backdraft dampers: Backdraft dampers shall be galvanized steel or aluminum multiblade type. Blades shall have felt strips riveted or crimped in place. Blades shall be rigidly attached to a pivot rod. The rod shall extend into oil impregnated bronze bushings, or anti-friction bearings, located in the frames.

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7. Fire dampers: Fire dampers shall be California Fire Marshall approved and Los Angeles City Code NFPA 90A and UL 555. Provide 12" x 12" minimum access doors at all fire damper locations. Design is based on "Ruskin" IBD2.
8. Manual Dampers: Install in all branches of ductwork and where required for distribution control. Dampers shall be opposed blade type for rectangular ducts or butterfly type for round ducts lever operated, complete with locking device which permits the dampers to be adjusted and locked in position. A permanent black arrow shall be painted on duct to indicate proper position of the damper. Manual dampers shall be so linked that only one locking device is required.

C. Extractors:

1. Furnish and install a volume control deflector in duct collar outlet back of each supply outlet. Deflector to consist of a series of turning blades to provide for distribution of air over duct or grille face. Felt or rubber gaskets shall be installed between the deflector frame and the duct collar to ensure a tight fit and freedom from vibration. Deflectors shall have blades with locking device designed that the blade will remain in position after setting. Deflector shall be of the size required for installation in duct collar and shall be Deflectrol as manufactured by Barber-Colman or approved equal.

D. Access Doors in Ducts:

1. Provide an airtight access door where fire dampers are enclosed inside of ductwork, of such size as to permit inspection and adjustment and also to permit renewal of fire damper link or fan bearing through access opening. The minimum size shall be at least 14" x 14" wherever possible.
2. Door shall be double wall type with felt or foam rubber gasket seal, and shall have butt hinges and sash locks on 2 sides, at a maximum spacing of 9". Use sash locks on both sides where hinged door swings may be obstructed.
3. Door in insulated ducts shall contain full thickness of insulation between the door panels.

- E. Flexible duct: Comply with UL 181, Class 1, (including connectors), "Thermafex" M-KC or approved equal. Use for connections between rigid duct and outlets. Duct shall not be more than 12 feet long and without intermediate joints. Minimum working pressures shall be 2 inches water column. Flexible duct insulation shall be blanket or felt type one-inch nominal thickness and with a C-factor of 0.23 BTU/HR/SF/OF with a vapor barrier. Seal joints with pressure sensitive vapor seal adhesive tape or duct sealer and secure with sheet metal screws.

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- F. Louvers connected to ductwork shall be "Carnes" L-33 extruded aluminum with 1/2" birdscreen with natural mil finish or approved equal by "Ruskin" or "Air Balance, Inc." Provide No. 10 gauge galvanized 1/2" mesh birdscreen at the interior face of the louver.
- G. Flexible Duct connections Non combustible waterproof, airtight, glass fabric, double coated with neoprene, weight 30 ounce per square yard, UL approved as manufactured by "ventfabrics" Ventglas or approved equal.
- H. Square/Round Quadrants
 - 1. Type: Thumbscrew set with "open", "shut" indication.
 - 2. Material: Heavy gauge dial, die cast handle with socket head set screws; handle locked with wing nut; steel parts cadmium-plated.
 - 3. Acceptable Manufacturer: Young Regulator, Ventlock or Trimlock.
- I. Dial Regulators:
 - 1. Type: Wrench-set with "open", "shut" indication.
 - 2. Material: Die cast core, heavy gauge dial with 3/32" steel handle and 3/4" hexagon nut; steel parts cadmium-plated.
 - 3. Acceptable Manufacturer: Young Regulator, Ventlock or Trimlock.
- J. Turning Vanes:
 - 1. Type: Non-adjustable double walled air turns designed to reduce pressure loss in square duct elbows.
 - 2. Material: Galvanized steel, roll-formed from single sheet, surfaces and edges smooth. Blades assembled over formed tenons on side pieces for cutting to size and assembly in field.
 - 3. Acceptable Manufacturers: Tuttle & Bailey, Titus or Barber-Colman.

2.07 AIR FILTER GAUGE - MAGNEHELIC

- A. Type: Diaphragm actuated type.
- B. Range: 0-1" Water minor division 0.2". Accuracy + or -2 percent full scale.
- C. Construction: 4-1/2" diameter body, 3-7/8" diameter white dial, black figures and graduations, pointer with zero adjustment. Furnish two static pressure tips, settings for 1/4" metal tubing and mounting bracket.
- D. Acceptable Manufacturer: Dwyer or approved equal.

2.08 INSTRUMENT TEST HOLES

- A. Test holes shall be Ventfabrics Model #699-2 or approved equal. Test holes shall be installed as required. A minimum of one test hole shall be provided at the following locations:

Mixed Air Plenum
Supply Duct
Return Air Duct

3.00 EXECUTION

- 3.01 GENERAL: Furnish and install all piping, ductwork, equipment trim, etc., including all work necessary to make complete and properly operating systems, whether or not all details are mentioned in these specifications or indicated on the drawings.

- A. The installation of the air supply and distribution system shall conform to Local and State Code, NFPA 90A and SMACNA LVDCS mounting and supporting of ducts, equipment, accessories, and appurtenances shall be provided, including but not limited to structural supports, hangers, stands, clamps and brackets, access doors, and dampers. Installation of equipment shall conform to equipment manufacturer's recommendation, unless otherwise indicated. Equipment shall be installed, leveled, and located so that working clearance is available for all necessary servicing such as shaft removal, replacing or adjusting drives and motors, lubrication, and access to automatic controls. Electric isolation shall be provided between dissimilar metals for the purpose of minimizing galvanic corrosion. Provide supply air, return air and exhaust air distribution systems, as shown on the drawings, specified herein, or required for a complete and proper installation and not specifically called for under other Section of these specifications.

- B. Electrical work: Electric motor driven equipment specified herein shall be provided complete with motors and controls. Electrical equipment and wiring shall be in accordance with Division 16. Manual or automatic control and protective devices required for the operation herein specified and any control wiring required for controls and devices but not shown on the electrical plan shall be provided.

3.02 INSTALLATION OF DUCTWORK AND AIR MOVING DEVICES

- A. Ductwork Installation: Elbows, vaned elbows, take-offs, branch connections, transitions, splitters, duct volume dampers, flexible connectors, and access doors shall conform to SMACNA and shall be installed so that ductwork shall operate without chatter, vibration, and be air tight so that no dust marks from air leaks will show at connections or outlets.
- B. Field changes to ductwork: Changes such as those required to suit the size of factory fabricated equipment actually furnished shall be designed to minimize losses in pressure and performance due to sudden expansion and contraction. Transitions shall be used in field changes as well as modifications to connecting ducts.
- C. Splitters and Dampers: Dampers shall have accessible operating mechanism, and where operators occur unfinished portions of the building, operators shall be chromium plated with all exposed edges rounded. Splitter dampers shall be operated by quadrant operators or 3/16-inch rod brought through the side of the duct with locking setscrew and bushing. Two rods are required on splitters over 8 inches. Manual volume control dampers shall be operated by locking type quadrant operators. Dampers and splitters shall be two gages heavier than duct in which installed. Unless otherwise indicated, multileaf dampers shall be opposed bladed type with maximum blade width of 12". Access doors or panels shall be provided for all concealed damper operators and locking type quadrant operators for dampers, when installed on ducts to be thermally insulated, shall be provided with stand-off mounting brackets, bases or adapters to provide clearance between the duct surface and the operator not less than the thickness of the insulation. Stand-off mounting items shall be integral with the operator or standard accessory of the damper manufacturer. Volume dampers shall be provided where indicated on the drawings and as required by air balancing Contractor.

- D. Deflectors: Deflectors shall be provided in all square elbows duct-mounted supply outlets, take off or extension collars to supply outlets, and tap in branch take off connections. Deflectors shall be factory fabricated and factory-or-field-assembled curved turning vanes or louver blades for uniform air distribution and change of direction with minimum turbulence and pressure loss. Square elbows shall be provided with curved vanes.
- E. Access Doors: Access doors shall be provided at all coils, thermostats, temperature controllers, and other apparatus requiring service and inspection in the duct system.
- F. Connections: Branch take off connections to grille galvanized sheet steel, with one inch clearance except at grilles, registers and diffusers.
- G. Duct sleeves and prepared openings: The contractor shall be responsible for the proper size and location of sleeves and prepared openings.
 - 1. Duct sleeves: Fabricate from 20 gauge galvanized sheet steel, with one inch clearance except at grilles, registers and diffusers.
 - 2. Prepared openings: Provide one inch clearance except at grille, registers, and diffusers.
 - 3. Closure collar: Provide galvanized sheet metal not less than 4 inches wide, on each side of walls or floors where sleeves or prepared openings are provided except where grilles, registers, or diffusers are installed. Fabricate collars (for square and rectangular ducts) with a maximum side of 15 inches or less than 20 gauge galvanized steel. Collars shall be installed with nails on maximum 6 inch centers.
 - 4. Packing: Pack space between the sleeve or opening and the duct or duct insulation with mineral fiber.
- H. Duct supports: Install in accordance with Local Code. Straps may be used for round ducts. Where supports are required between structural framing member suitable intermediate metal framing shall be provided. Where C-clamps are used, install retainer clips provide seismic restraints on each duct by straping duct tight to beams, where duct runs parallel to beams, install seismic restraining as shown in SMACNA, Plate No. 5.

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- I. Flexible duct: Support every 3 feet. Stretch to smooth out internal corrugations, use long radius elbows where possible. Cut ducts to lengths required rather than create bends to take up excess lengths.
- J. Access panels: Provide for all valves, controls, dampers, duct access doors (when concealed) and any item requiring inspection and maintenance. Provide 12" x 12" minimum size access panels as specified in Section 15010, "Mechanical General Provision".
- K. Air filters: Provide access space for serving filters. Install filters with suitable sealing to prevent by passing of air.
- L. Inspection plates and test holes: Inspection plates and test holes when required in ductwork or casings for air balance measurements shall conform to SMACNA. Factory fabricate test holes, air tight, noncorrosive with screw cap and gasket. Extend cap through insulation.
- M. Flexible Collars: Provide in connections between fans and ducts or casings and where required. Make of neoprene coated glass fabric weighing approximately 30 ounces per square yard. Secure by zinc coated iron clinch-type draw bands for round ducts. For rectangular ducts, secure using normal duct construction standards.
- N. Cleaning of Duct System: Cleaning of rubbish, plaster dirt and any other debris after completing installation of ductwork. After installation of equipment and connections are made on fan, and before any grilles, outlets or registers are installed, entire system shall be blown out with dampers and outlets wide open.
- O. Diffusers, Registers and Grilles: Support independently of suspended ceilings with minimum of 3 equally spaced straps or wires or rigidly screwed to sheet metal duct.
- P. Screens: Install 18 gauge galvanized 1/2" mesh screens over outside air intake openings and exhaust fan discharge. Reinforce openings over 30" wide with angle iron.
- Q. Dampers - Motor Operated: Install damper and frame level in both directions. Install without twist or torsion. Blades shall not touch adjacent material through full travel of blade.

- R. The tailpipe fume, battery room and shower room exhaust ducts shall be fabricated with 26 gauge stainless steel 304. All joints and seams shall have continuous external weld. All underground ducts shall be sealed airtight.
- S. Joints between dissimilar metals: Isolate joints between dissimilar metals in ductwork with asbestos gaskets and bolts having fiber ferrules and washers.
- T. Flashings: Flashings shall be provided to all roof penetrations and shall be made waterproofed. Flashing shall conform to Division 7.
- U. Test holes: Drill instrument test holes into ductwork for pilot tube test. Install hole covers attached to ductwork by sheet metal screws.

3.03 EQUIPMENT

- A. General: Equipment and components shall be completely installed in a manner to insure proper and sequential operation of the equipment and its controls. Installation of equipment not covered herein or in manufacturer's instructions shall be installed as directed by manufacturer's representative. Proper platforms and supports for mounting of equipment, accessories, appurtenances, piping and controls shall be provided, including but not limited to supports, vibration isolators, stands, guides, anchors, clamps and brackets. Platforms or supports for equipment shall conform to equipment manufacturer's recommendation, unless otherwise shown on drawings. Anchor bolts and sleeves shall be set accurately using properly constructed templates. Equipment bases shall be leveled, using jacks or steel wedges, and neatly grouted-in using a nonshrinking type of grouting mortar. Equipment shall be located so that working space is available for all necessary servicing such as shaft removal disassembling compressor cylinders and pistons, replace or adjusting drives, coils, motors, or shaft seals, access to water heads and valves of sheet and tube equipment, tube cleaning or replacement, access to automatic controls, refrigerant charging lubrication, oil draining and working clearance under overhead lines. Dielectric isolation shall be provided between dissimilar metals for the purpose of minimizing galvanize corrosion.

3.04 FIELD INSPECTION AND TESTS

- A. Ductwork test: Test all supply, return, and exhaust ducts, plenums, and casings. Make substantially airtight pressure indicated for the system before covering with insulation or concealing. Substantially, airtight shall be construed to mean that no air leakage is noticeable through the senses of feeling or hearing at all duct joints.
- B. Preliminary tests: The air supply and distribution system and its components shall be given an operational test for a period of not less than 4 hours.
- C. Balancing: After preliminary test, the air supply and distribution system shall be tested, adjusted, and balanced in accordance with this Section.

3.05 TESTING AND BALANCING AIR DISTRIBUTION SYSTEMS

- A. Procure services of an independent balance and testing agency, and which is a member of the Associated Air Balance Council, to balance, adjust and test equipment and air distribution systems.
- B. Perform testing and balancing in accordance with AABC National Standards for Field Measurement and Instrumentation, Form No. 81236, Volume One, Standards for Field Measurement and Instrumentation.
- C. Work under direct supervision of qualified Engineer. Instruments shall be accurately calibrated and maintained in good working order. Conduct tests in presence of Engineer when requested.
- D. Balance and testing shall not begin until systems have been completed and are in full working order. Contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation and continue of same during each working day of testing and balancing.
- E. Compile test data upon completion and submit 6 copies of complete test data to Contractor for forwarding to Engineer of evaluation and approval. Records of balancing for each zone shall also be compiled for submittal to Engineer for evaluation and approval.

- F. Air balancing: Perform following tests and balance system in accordance with following requirements:
1. Install filters during all preliminary testing and operating. Replace filters at time of final acceptance.
 2. Test and adjust blower rpm to design requirements.
 3. Test and record motor full load amperes.
 4. Make pilot tube transverse of main supply ducts and obtain design cfm at fans.
 5. Test and record system static pressures, suction and discharge.
 6. Test and adjust system for design recirculated air, cfm.
 7. Test and adjust system for design cfm outside air.
 8. Test and record entering air temperature (D.B. heating and cooling).
 9. Test and record entering air temperature (W.B. cooling).
 10. Test and record leaving air temperatures (D.B. heating and cooling).
 11. Test and record leaving air temperatures (W.B. cooling).
 12. Adjust all main supply and return air ducts to design cfm.
 13. Test and adjust each diffuser, and register as to location and area.
 14. Identify each grille, diffuser, and register as to location and area.
 15. Size type, and manufacturer of diffuser grilles, registers, and all tested equipment to make required calculations.
 16. Readings and tests of diffusers, grilles and registers shall include required fpm velocity and test resultant velocity, required cfm and test resultant cfm after adjustments.

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3.06 START UP OF EQUIPMENT

- A. No start up of heating, ventilation and air conditioning equipment is permitted without the direct supervision or participation of the manufacturer's representative. The manufacturer must be given a minimum of 3 normal working days notice to schedule their representative for start up work.

3.07 PRELIMINARY OPERATIONS

- A. Should the Owner require that any portion of the system or equipment be operated prior to the final completion and acceptance of the work, the Contractor shall furnish such operation. All the expense thereof will be paid by the District separate and distinct from any money paid on account of the Contract.
- B. For such preliminary operation or testing, payment shall not be construed as final acceptance of any of the work of this Contract.

3.08 OPERATING INSTRUCTIONS

- A. The Contractor shall provide the services of a competent Operating Engineer to supervise the operation of all equipment specified herein and to instruct the District operators during a one day operating period. The operating instruction period shall be defined as straight time working hours and shall not include nights and weekends.
- B. The District shall be notified in writing at least five days before each operating instruction period begins. The District must accept the instructional starting time in writing to the Contractor. Upon arrival, the various instructors shall report to the District.

END OF SECTION

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SECTION 15900-1
CONTROLS AND
INSTRUMENTATION

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean up, as built and all other applicable requirements of Document 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Automatic controls, electric and electronic, for all items indicated on the drawings and described hereinafter including switches, relays, and control panels.
- D. All control wiring and conduit for temperature control system.
- E. Control panels.
- F. Complete calibration and adjustment of control system and instructions for maintenance and operation of control equipment.
- G. Composite control diagram showing interlocking equipment and control.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Finishes: Division 9
- B. Electrical: Division 16

1.03 SUBMITTALS

- A. General:
 - 1. Refer to Division 1, General Conditions for requirements governing submittals.
- B. Submittal data to be furnished shall include, but not limited to the following:
 - 1. Room thermostats.

2.00 PRODUCTS

2.01 GENERAL

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INSTRUMENTATION

- A. Automatic temperature control system shall be as manufactured by Barber-Colman Controls or Honeywell, Inc., or approved equal, complete with necessary thermostats, switches, relays, control panels and wiring. Air conditioning units shall be equipped with the complete control.
- B. The temperature control system shall be completely automatic and shall accomplish control sequence and results as hereinafter specified. Control devices shall be so located that they will be readily accessible for adjustment and servicing. Any temperature sensing devices which do not function properly because of incorrect location shall be relocated at no cost to the Owner.
- C. Provide substantial backing for any devices mounted on plaster walls.

2.02 PRODUCTS

- A. Provide such additional material, equipment and appurtenances as required to make satisfactory operating systems.
- B. The functional sequence of all controls shall be the responsibility of the Contractor.
- C. Coordinate the mechanical and electrical drawings to provide a complete interconnected wiring diagram.

3.00 EXECUTION

3.01 GENERAL

- A. Install thermostats indicated on drawings.
- B. Provide conduit and wiring for complete temperature control system in accordance with Division 16. Work shall be completed under this Section of the specifications.

3.02 TESTING

- A. Calibrate and adjust the system under operating conditions.
- B. At the Engineer's request the system shall be tested in the presence of the Engineer.

END OF SECTION

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1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0 and Division 1 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
- C. Work includes, but is not limited to the following:
- D. Addition of a new circuit breaker in existing main distribution switchboard DS and extending of 480V, 3 phase, service to the new building.
- E. Emergency power and lighting system.
- F. Distribution systems for power and lighting.
- G. Grounding system for switchboards, transformers, equipment.
- H. System of lighting, outlets and devices.
- I. Conduit and wiring for HVAC controls where not furnished under the mechanical section.
- J. Telephone and signal raceway systems, as indicated, including conduit, outlets, pull wires, sleeves, backboards.
- K. Conduit and wiring system for heating, ventilating, air conditioning and plumbing, including items of industrial control. Connection to package units furnished under Division "Mechanical".
- L. Conduit, wiring and connections to electrical equipment furnished under other sections and equipment furnished by Owner. Outlets, junction boxes, switches and devices to make a complete installation. Installation of controls furnished under other sections.
- M. Complete television and monitor system.

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- N. Paging system.
- O. Fire alarm system.
- P. Clock system.
- Q. Other specialized systems as may be specified herein.
- R. Excavation and backfill for work under this section.
- S. Shop drawings, wiring diagrams, equipment data.
- T. Testing, cleaning, adjusting of completed work.
- U. Record drawings.
- V. Permits, inspections, fees.
- W. Temporary power and lighting as required for work under this section.
- X. Metal supports, channels, plywood backing, vibration isolation, seismic bracing, as required for work under this section.
- Y. Exterior parking lighting.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Furnishing and setting of motors (Mechanical Trades)
- B. Painting, except shop finishing and field touch up (Section "Painting").
- C. Public telephone cable and instruments (Utility Company or Owner).
- D. Furnishing of package air conditioning controls (Section "Heating, Ventilating and Air Conditioning").
- E. Temporary service (General Conditions).
- F. Formed concrete (Section "Concrete").

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1.03 LEGAL REQUIREMENTS AND STANDARDS

- A. Codes and Regulations: Comply with applicable sections of national, state and local codes, laws, ordinances, rules and regulations of authorities having jurisdiction, including:
1. National Electric Code (NEC).
 2. Occupational Safety and Health Administration (OSHA).
 3. State and local fire regulations and requirements.
 4. National Fire Protection Association (NFPA).
 5. Underwriters' Laboratories, Inc. (UL).
 6. City and State Electrical Codes. Applicable portion or local Building Codes.
- B. Standards: Comply with latest editions of applicable regulations and standards of:
1. Insulated Power Cable Engineers Association (IPCEA).
 2. Institute of Electrical and Electronics Engineers (IEEE).
 3. National Electrical Manufacturers Association (NEMA).
 4. American National Standards Institute (ANSI).
 5. National Bureau of Standards (NBS).
 6. Certified Ballast Manufacturers (CBM).
- C. Minimum Requirements:
1. Comply with the requirements of authorities and listed standards as minimum acceptable work.
 2. The drawings and specifications take precedence when they call for materials or construction of better quality or larger size than required by codes, laws, rules and regulations.

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- D. Permits: Obtain and pay for all fees, permits and inspections, unless otherwise specified. Deliver all certificates of inspection to the Architect and include copies with maintenance manual. Code compliance inspections will be performed by the Electrical Engineer of SCRTD. Notify the SCRTD requesting all code required inspections.
- E. Guarding:
 - 1. Provide protection for moving parts and hazardous conditions.
 - 2. Provide industrial accident and warning signs per ANSI and OSHA.
 - 3. Erect and maintain suitable barriers, protective devices, lights and warning signs for the protection of the public and employees from the work under this section.
 - 4. Conform with applicable safety regulations, including those required by the Engineer and Owner.

1.04 SERVICES

- A. Ground transformers, switchboards as specified and per code requirements. Provide ground at public telephone terminals.
- B. Verify exact location of existing feeder conduits scheduled to be reused for the new building. Reconnect as required.

1.05 SUBSTITUTION OF MATERIALS

- A. The applicable paragraphs of General Requirements, Division 1 shall apply herein.
- B. Basis for Design:
 - 1. The manufacturer's name and product listed on the drawings or in these specifications are used as a basis for design to establish space requirements, a standard of quality and performance.

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2. The phrase "or equal by" followed by manufacturer' name means that this manufacturer's product shall match the performance, construction, fit, features, etc., against those selected for design, and implies that his standard catalogue product could require certain modifications to meet specified requirements.

C. Substitutions

1. Provide bid based on specified material and equipment, except the contractor may submit proposed substitutions prior to ten days before bid opening. Such proposed substitutions must receive written approval from the Engineer prior to bidding.
2. In proposing a substitution, the Contractor assumes full responsibility for any associated modifications in building openings, circuiting, control wiring, and space considerations, and bear all costs.
3. Engineer reserves right to reject any proposed substitution.

- D. Liability of Substitutions: Performance of substitutions shall be equal or superior to the item used for basis for design and shall meet all requirements of above "or equal by" clause. Should the substituted item fail to perform in accordance with specifications, replace with the originally specified item without extra compensation.

1.06 SUBMITTALS OF MATERIALS AND EQUIPMENT

- A. General: Make submittals in accordance with the General Requirements, in order as listed. Obtain material list approval prior to submission of manufacturer's data and shop drawings.

1. Material and Equipment List.
2. Manufacturer's Data and Shop Drawings.

B. Submittals:

1. Piecemeal submittals will not be acceptable.

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2. Submit in brochure form with all listings referenced to applicable paragraph in the specifications.
- C. Review: Submittals will be reviewed for general design only, and not for method of assembly erection, construction or detailed compliance with Contract Documents.
- D. Condition of Acceptance of Submittals:
1. No deviation permitted from Contract Documents unless specifically so noted by Contractor and accepted by Engineer.
 2. Assume responsibility for:
 - a. Error or omissions in submittals regardless of review status of such submittals.
 - b. Coordination with work of other trades.
 - c. Space coordination and maintenance of code required aisle space.
 - d. Erection and installation techniques, including structural adequacy and suitable bracing.
 - e. Maintenance of installation safety.
 - f. Satisfactory performance of all work.
- E. Material List:
1. Submit a complete list of materials and equipment proposed for the job, including manufacturer's name, referenced to applicable sections and paragraphs of the specifications.
 2. List only names of proposed manufacturer. Catalog numbers and performance data are not required and will not be reviewed prior to complete submission.
 3. Submit all materials and equipment, even if same as specified or shown on the drawings.
- F. Manufacturer's Data: Submit with associated shop drawings after review of material list.

G. Shop Drawings:

1. Identify with project name and number and with item designation as indicated on drawings and reference to applicable paragraphs of the specifications.
2. Submit legible reproducible transparency and two prints minimum for the Engineer's record. Make necessary prints of reviewed transparency for distribution. If reproducible is not available, submit a minimum of six copies of catalog cuts.
3. Prior to submission, check all shop drawings for conformance with the requirements of the drawings and specifications, and against available space. Obtain public utility company approval of service metering and indicate on shop drawing. Have motor control centers reviewed by respective mechanical trades for motor size and control coordination. Have submittals signed by all reviewing parties. Make required corrections before forwarding to the Architect for review.
4. Include dimensional data, weights, ratings, construction details, component descriptive data and sufficient information to illustrate compliance with the specifications. List labeling and approving agencies and standards of design employed in manufacture.
5. Submit shop drawings and technical data on all equipment and auxiliary systems, including:
 - a. Switchboards, motor control centers, panelboards.
 - b. Signal system components, wiring diagrams, conduit and outlet diagrams, system function description.
 - c. Gutters and wireways, concrete pull boxes or manholes, specially fabricated pull boxes.
 - d. Catalog cuts of lighting fixtures.

1.07 RECORD DRAWINGS

- A. Record of Job Progress: Provide and maintain in good order a complete set of blue line electrical contract drawings available at the site for inspection. Keep an accurate dimensional record of as-built locations and all job changes, including dated authorizations. Refer to Section 01720 for additional information.

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- B. Record of Installation: At the conclusion of the work, receive from the Engineer a set of reproducible electrical drawings and incorporate all as-built data in a clearly legible and reproducible manner utilizing contract drawing symbols and notations.
- C. Include in Record Drawings the following:
 - 1. Corrected panel schedules indicating installed condition.
 - 2. Revisions, including sketches, change orders, written directives, regardless of source of the revision.
 - 3. Physical routing of feeders and conduits two inch trade size and larger.
 - 4. Location of underground conduit and stubouts dimensioned from building structure.
 - 5. Location of site pull boxes, and manholes by elevation and dimensioned from buildings and permanent structures.
- D. Acceptance: As a condition for acceptance of the work, deliver signed and dated reproducible drawings and one set of prints to the Engineer and obtain receipt.

1.08 SPARES, SPARE PARTS, SPECIAL TOOLS

- A. General:
 - 1. Provide to Owner as specified in other paragraphs of the specification and as follows.
 - 2. Obtain receipts and include copy with Operating and Maintenance Instruction Manual (s).
 - 3. Provide lists of each category describing type, rating and use and include lists with Operating and Maintenance Instruction Manual (s).
- B. Fuses:
 - 1. Three spares of each current rating for each type including communication and control system fuses.

2. Where quantity exceeds thirty, provide wall mounted cabinet with hinged lockable door and shelving adequate for storage and display. Locate as directed.
- C. Pilot Light Lamps: The percent by type, but not less than two each.
- D. Overload Heaters: Two set of three for each rating.
- E. Breaker Lockout Devices: One for each six panelboard circuit breakers or as noted, whichever is greater.
- F. Receptacle Plugs: One for each receptacle excluding NEMPA 5-15R and 5-20R and L5-15R types.
- G. Special Tools: Provide, as standard accessories, tools not readily available in commercial market required for assembly, adjustment and/or maintenance of equipment provided under this section.

1.09 OPERATING AND MAINTENANCE DATA

- A. General: As a condition for acceptance of the work, provide to Architect three copies of Operating Instruction Manual, complete and at one time, in looseleaf three ring binders with permanent covers, identified, indexed and cross-referenced to the specifications. Include the following:
 1. Complete set of "as-built" shop drawings.
 2. Catalog data.
 3. Wiring and block diagrams.
 4. Brief system operation description for signal systems.
 5. Motor starter overload schedule.
 6. Operating and maintenance data.
 7. Parts lists and source for parts and service.
 8. Guarantee and warranties.

9. Receipts for all items delivered to Owner.
10. Test reports.
11. Inspection certificates.
12. Suppliers and manufacturers conformance certificates.
13. Material list as installed.
14. Manufacturer's directions.
15. Instruction reports.

B. Verbal Instructions: Instruct the Owner's designated operating personnel in the operation and maintenance of all systems. Submit written report with operating instructions indicating date and time of instruction and personnel involved, and signed by personnel receiving instruction.

C. Inspections: In addition to required service calls, make a minimum of two inspections accompanied by operating personnel, within the guarantee period, at no expense to the Owner, to insure all systems to be in satisfactory operating condition. Submit written report signed by operating personnel witnessing inspection to the Owner indicating inspection results with a copy to the Engineer.

1.10 COMPLETION

A. Before final review: The work hereunder will not be reviewed for final acceptance until Operating and Maintenance Data, Manufacturer's Literature, Identification and Nameplates specified herein have been approved and properly posted in the building and final cleaning has been completed.

B. Before operating any equipment for demonstration or test, comply with manufacturer's preparation instructions.

C. Demonstration of Operations: When the installation is complete and specified adjustments have been made, operate the systems for a period of one week, during which time demonstrate to the Engineer that systems are completed and operating in conformance with these specifications.

1.11 GUARANTEE

A. General:

1. Comply with guarantee requirements of Division 1.
2. Guarantee all material, equipment and work for a period of one year from written acceptance of the work, against defects of any kind, covering all parts.
3. Guarantee fluorescent and high intensity discharge fixture lighting ballasts for period of two years after ballast manufacture, but not less than eighteen months after written acceptance of the work for material and labor. Submit guarantee along with "Operating and Maintenance Instruction Manual(s)" and include name and telephone number of designated representatives who will perform required maintenance.

B. Parts Warranty: Obtain guarantees and/or warranties for factory assembled equipment and include with "Operating and Maintenance Instruction Manual(s)".

C. Replacement: In the event of failure of any work, equipment, or device during the life of the guarantee at no cost to Owner, repair or replace the defective work and remove, replace or restore any parts of the structure or building which may be damaged as the direct result of the defective work or in the course of making the replacement of defective work or materials.

1.12 PRELIMINARY OPERATION: The Owner reserves the right to operate portions of the electrical system on a preliminary basis without voiding the guarantee or relieving the Contractor of his responsibilities.

2.00 PRODUCTS

2.01 GENERAL

- A. Provide material and equipment of new and recent manufacture, UL labeled and/or listed for the specified use.
- B. Where UL labeling is not available, provide certification by a nationally recognized testing laboratory.

- C. For each category of material and equipment use products of the same manufacture and type.

2.02 RACEWAYS AND WIREWAYS

- A. Rigid Conduit Including Couplings, Locknuts, and Nipples: Steel, hot-dipped galvanized inside and out, after threading, galvanized, threaded malleable iron or steel fittings, notched locknuts with gripping teeth.
- B. Intermediate Metal Conduit Including Couplings, Locknuts, and Nipples: Steel, hot-dipped galvanized outside, interior galvanized, lacquered or enameled, galvanized threads, galvanized threaded malleable iron or steel fittings, notched locknuts with gripping teeth.
- C. Electric Metallic Tubing Including Locknuts, Fittings, Couplings and Connectors: Galvanized steel, lacquered or enameled interior, raintight gland ring compression type fittings, insulated throat connectors and couplings. Submit sample fittings for approval. Indenture fittings are not acceptable.
- D. Flexible Conduit: Manufactured from single steel strip, galvanized on all four sides prior to fabrication, galvanized steel twist-in connectors, UL listed for ground continuity.
- E. Liquidtight Flexible Conduit: Flexible galvanized steel core, with extruded polyvinyl chloride cover. Liquidtight insulated throat fittings shall seal and ground conduit. Provide separate bond wire where integral conductor is not available.
- F. Gutters and Wireways: Galvanized sheet steel, hinged covers, elbows and fittings without sharp edges or projections.
- G. Nonmetallic Conduit: High impact 90°C polyvinyl chloride, Schedule 40 extruded to iron pipe sizes with manufactured spacers, couplings, bends and offsets. Plastic to plastic connections by means of solvent welding per manufacturer's directions. Plastic to metal connection with UL listed adapters.

2.03 FITTINGS, OUTLETS AND JUNCTION BOXES: Provide bright and new stock, stored where continuously protected from the weather and conforming to the following:

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- A. Outlet Boxes and Covers: Pressed steel, knockout type, with full access screw-on covers or plaster rings, hot dipped, galvanized, with cadmium plated machine screws.
- B. Cast Outlet Boxes: Cast ferrous metal construction, galvanized, complete with threaded hubs for rigid conduit, number and location as required, and plugs in unused hubs; gasketed cast covers; cast device plates suitable for indicated device; in hazardous area, approved for the class of hazard. Provide for Class "1", Division "1", Group "B" hazard classification unless otherwise indicated.
- C. Small Junction and Pull Boxes: As specified for outlet boxes.
- D. Large Junction or Pull Boxes: Galvanized code gauge sheet steel construction, with full access screwed on covers and cadmium plated or galvanized machine screws; minimum size per the governing electrical code or as noted on the drawings, whichever is greater; barriers for required separation; special configurations, where determined from field measurements to surmount structural conditions; factory painted with gray enamel. For flush mounting, covers shall extend 3/4" beyond edges of boxes. Where used for cable support, brace box to support cable weight. For junction boxes larger than 36 inches in any dimension, provide 3/4" diameter steel pipe cable supports with flanged ends bolted to box frame, and with continuous fiber insulating sleeve spaced on 36 inch centers maximum.
- E. Junction Boxes on Exterior or Where Exposed to Moisture (e.g., Tunnels, Pits, Mechanical Rooms): Edges welded and ground smooth, leaving interior fillets; galvanized after fabrication; gasketed covers; stainless steel screws, countersunk; factory painted with gray enamel. Gaskets to be factory made of an approved type.
- F. Floor Mounted Junction or Pull Boxes: Heavy wall cast iron with flanged lip; galvanized; gasketed, screwed-on, watertight coverplate; drilled and tapped conduit openings as required; minimum size 6 inches square by 4 inches deep.

- G. Floor Boxes: Watertight cast iron units; galvanized; adjustable before and after installation; 4" diameter by 3-1/2" deep; gasket between adjusting ring and box, drilled and taped conduit entrances as required; plugs in unused openings; ganged barriered units where indicated; 4 inch round heavy brass cover with 1 and 2-1/8" plugs (or cover compatible with device); brass carpet flange in carpeted areas. For junction box use, provide conduit elbow with adjustable flush brass coupling to allow for conduit extension above floor. Use shallow boxes where required by slab thickness. Galvanized steel boxes may be used in suspended slabs. For duplex outlet flush with floor, provide cover with individual hinged caps.

2.04 CONCRETE PULL BOXES

- A. Precast Concrete Pull Boxes Outside Building, Branch Circuiting: Where not otherwise noted or detailed, provide bottomless units with reinforced bolt down concrete cover; outside dimensions 13 by 19 by 12 inches deep minimum; in traffic areas, provide bolt down traffic covers. Provide 12 inch depth of crushed rock or pea gravel below boxes for drainage.
- B. Pull Boxes, Distribution:
1. Provide precast concrete pull boxes where indicated, 48 inches square by 48 inches deep minimum dimensions, complete with pull irons on four sides, conduit entry provisions on four sides, dry sump, cable racks, galvanized steel frame and two piece, bolt down, cast iron or steel cover (where not covered by electrical equipment). Traffic type in traffic areas.
 2. Caulk between sections and coat exterior with waterproof compound.
 3. Set pull boxes on 6 inch deep gravel or sand bed, flush with paving in paved areas with paving sloping away from pull boxes. In unpaved areas locate boxes so that runoff water will not drain to pull box, set cover 2 inches above finished grade and provide 6 inch thick by 12 inch wide concrete apron around box, sloping away from cover.
 4. Alternate: Poured in place pull boxes of equivalent characteristics may be provided. Submit structural details and calculations for review.

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5. Identification: Cast system designation in covers in 2 inch size letters as directed Secondary power ELECTRICAL. Communications systems - SIGNAL.

- C. Hand Holes (Grounding): 10" round (I.D.) cast traffic box with cast iron or galvanized steel cover.

2.05 CONDUCTORS - 600 VOLT

A. General:

1. Manufactured within eight (8) months of installation, of soft drawn copper of not less than 98 percent conductivity, conforming to ASTM Specification and NEC; 600 volt insulation unless specifically noted otherwise, of the type specified; standard American Wire Gauge (AWG) sizes; stranded for No. 8 AWG and larger; insulation not less than temperature requirements.
2. Provide new conductors delivered to the site in original, unbroken packages, plainly marked or tagged with Underwriters' labels; size, type, insulation and voltage rating of the wire; name of manufacturing company and the trade name of the wire; date of manufacture.

B. Insulation:

1. All sizes - THHW, XHHW.
2. No. 6 AWG and Smaller: THW, THWN, XHHW. For Dry Locations: THW, THWN, XHHW, THHN.
3. Connections to recessed fixtures from closest outlet in wet locations - AVL.
4. Through ballast housings, and for connections to recessed fixtures in dry locations - AVA, ABV, RHH, THHN, XHHW.
5. In exposed conduit on exterior, on roof or in conduit concealed under roofing material - AVL, MI (wet locations).

Exceptions: Short conduit extensions (six feet or less) to roof mounted equipment may be same as remainder of circuit.

6. For communication and signal systems and for control of mechanical equipment - THWN throughout unless otherwise specified.
 7. For pendants and cords - Underwriters' Type SJ or SJO with ground wire, or as indicated.
- 2.06 GROUND ELECTRODES: Provide, where indicated, driven ground rods of cone pointed electrolytic copper bonded to carbon steel core, sectional type where over 10 feet in length, die stamped near top with name or trademark of the manufacturer and length of rod in feet; diameter sufficient to permit driving without damage, but shall be not less than 5/8 inch; approved copper alloy clamps brazed to upper end of rod. Bolt ground wires to rods.
- 2.07 SWITCHBOARD, MOTOR CONTROL CENTERS
- NOT APPLICABLE
- 2.08 PANELBOARDS
- A. General Features:
1. Code gauge galvanized or galvanized sheet steel cabinets, with corners lapped and welded or riveted, dead front, dead rear, front accessible.
 2. In equipment or storage rooms, trim and cabinet to be factory phosphatized, primed and finished medium gray inside and out to match switchboards. In painted walls where exposed to public view (e.g., corridors, offices), field paint trim to match wall.
 3. Full height unreduced copper bus, rigidly supported. Solderless, saddle type, copper core CU-AL lugs for connection per Paragraph "Installation of Conductors". Bus feeder sequence as for switchboards. Solid neutral bar for grounded systems. Lugs sized for feeders. Subbreakers, split bus, main lugs, main breaker, double lugs, voltage and current ratings, all as indicated on the drawings.

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4. Minimum bus rating of 225 amperes, except where 100 amperes is specifically indicated, but not less than feeder protective device rating.
5. Main breakers, where required, mounted vertically ahead of panel bus. Replacing of branch devices with main breaker is not acceptable.
6. Copper equipment ground bus for termination of feeder and/or branch circuit grounding conductors.
7. Oversize gutters for feed through, where indicated or required, sized not less than five times the total cross-sectional area of the through feed cable in addition to required branch circuit gutter. Provide suitable pull box or gutter adjacent to panels for connections, in lieu of double lugs or feed through, where required by code or field conditions.
8. Incorporate associated contractors, relays, etc., in separate control sections of the panel, behind separate door, but with common frame, or in separate enclosure. Where push button or contractor bypass is required, mount on dead plate behind panel door so that no live parts are exposed.
9. Flush mounted in areas exposed to public view. Surface mounted in electrical, communication, mechanical and storage rooms.
10. Hinged lockable door covering all devices. Flush catch and cylinder lock with point catch at top, bottom and center. Vault handle on doors over 4 ft. height. All panels and cabinets keyed alike. Provide two keys per panel and cabinet. Keys to match existing panelboards where adding to existing facility.

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11. Raintight enclosures in damp locations.
12. Certify conformance with the specifications.

B. Lighting and Appliance Panelboards Additional Features:

1. Minimum size 20 inches wide by 5-3/4 inches deep, unless specifically indicated otherwise.
2. Metal sided index cardholders with typewritten circuit schedules reflecting as-built circuiting, behind clear plastic cover on inside of door.
3. Automatic circuit breakers, molded case, trip free, quick-make, quick-break, thermal magnetic type, bolted to the bus, with handles clearly indicating size and tripped position, of size and arrangement as shown on schedules. Common internal trip with single handle for multipole breakers. Permanent plastic or metal circuit numbers on adjacent trim (including spaces), screwed or riveted to trim. Adhesively applied labels are not acceptable. Where indicated, or where used for switching, use UL listed SWD switching duty breakers.
4. Minimum panel and breaker interrupting rating of 10,000 (22,000 where noted) amperes below 150 volts to ground and 14,000 (25,000 where noted) amperes above 150 volts to ground, RMS symmetrical.
5. Breaker handle padlocking devices for 120 volt circuits serving electric discharge lamps, built integral with panel.
6. Breaker lockout device per Paragraph "Spares".

C. Power Panelboards Additional Features:

1. All requirements of lighting panelboards, including doors.
2. Convertible type construction.
3. RMS symmetrical rating equal to interrupting capacity of smallest device but not less than 22,000A (240V) and 25,000A (480V).
4. Breaker ratings per paragraph "Circuit Breakers, Molded Case".
5. Device handle padlocking provision.
6. Minimum bus rating of 225 amperes.
7. Minimum side wiring gutter width for branch wiring of 5 inches where largest device is 225 amperes and 8 inches for larger devices.
8. Where number of devices requires use of more than one section, provide totally enclosed sections, each with full capacity bus, and double lugs for full capacity feeder connection between sections.
9. Equipped spaces as shown, but not less than one per board.

D. Switching Panels:

1. Where toggle switches and/or other devices are indicated to be grouped in a panel, provide panelboard construction, flush mounted. Mount devices on a dead plate.
2. Barrier devices of different voltages and normal and emergency power.
3. Provide nameplates or engraved designation for each device, indicating function.

2.09 TERMINAL CABINETS

- A. Construct as described for lighting panels and key alike with panels.

- B. 12" wide by 18" high by 4-1/2" deep, minimum dimensions.
- C. Vertical barrier between line and low voltage sections, and where required.
- D. Fireproofed plywood backing 3/4" thick, for attachment of terminal strips. For fire alarm system, omit plywood and provide metal channels.
- E. Requirements of signal system supplier as specified under appropriate sections of the specification.

2.10 CONTROLLERS, CONTROL DEVICES

- A. Magnetic Motor Starters (Unless Otherwise Indicated):
 - 1. Full voltage, across-the-line, nonreversing, horsepower rated, size No. 1 minimum with three ambient compensated thermal bimetallic type overload relays and undervoltage release. Overloads sized for actual motor nameplate data per manufacturer's recommendation. Coil 120 volt rated and fused.
 - 2. Arc extinguishing characteristics and silver to silver renewable contacts. Auxiliary contacts as required by wiring diagrams but not less than two normally open, field convertible.
 - 3. Wiring points brought out to numbered terminals. Interlock requirements, remote control, status indication, per control sequence and/or wiring diagrams on mechanical and electrical drawings.
 - 4. For 480 volt starters where control circuit is energized from motor circuit conductors, provide individual control transformer with 480 volt primary and 120 volt secondary and with (2) primary and (1) secondary fuses, adequate for controls energized from transformer, but not less than:

Minimum
Starter Size

Transformer Size

- | | |
|---|-------------------------------|
| 1 | Standard Transformer + 50 VA |
| 2 | Standard Transformer + 50 VA |
| 3 | Standard Transformer + 100 VA |
| 4 | Standard Transformer + 100 VA |
5. Mount oiltight devices on starter face including manual reset button, red RUNNING push-to-test, transformer type pilot light, hand-off-automatic switch for automatically controlled motors, and additional devices where indicated or scheduled.
 6. Separately mounted combination starters to have magnetic motor starter and switch or circuit breaker (as indicated) in common enclosure behind door with bypassable door interlock, features as specified for components.
 7. Magnetic starters for remote control of 120 volt motors to be in separate enclosures and mounted adjacent to panelboard from which they are supplied.
 8. Enclosures to be NEMA Type 12 dust tight for separately mounted units. In motor control centers, conform with requirements for motor control centers.
- B. Manual Motor Starters: Voltage as required, horsepower rated, padlockable, toggle operated, with pole and overload heater for each ungrounded leg, ON, OFF and TRIPPED indication, integral RUNNING pilot light, flush mounted where practical. Where located in motor control centers or panels, group in control section on dead plate assembly, barriered from other voltages. Where used for motor disconnect switch, omit overloads and pilot light. Interlock or status contact where shown.

C. Contactors and Relays:

1. For Remote Control of Lighting Circuits (Unless Otherwise Indicated): UL listed, mechanically held, electrically operated, momentarily energized, single solenoid, relays and/or contractors of indicated ratings, operating independently of gravity or switch position, positive locking in both positions, manual operation without tools, manual operating lever for ratings 60 amperes and above. For branch circuits control, use 25 ampere rated relays with required number of poles. Install on sound absorbing shock mounts in switchboards, panels, or where individually mounted. Designation "LC".
2. For Magnetically Held Contractors: Resistive load and horsepower rated motor starters less overload elements applied per manufacturer's recommendations. Designation "EC".
3. For Control of Resistive Heating Devices: Heavy duty heater control contractors, resistive load rated for 100,000 operations. Designation "HC".
4. For Air Conditioning Systems or Motor Control: 600 volt, AC, 10 ampere, heavy duty, industrial type relays, magnetically held contacts as indicated with minimum of one normally open and one normally closed contact, field convertible, "T" rated for tungsten lamps, continuous duty coils, visible contacts or indicator. Designation "R".
5. For Line Switching of 120 Volt Motors Automatically Controlled: Magnetic motor starters with integral hand-off-automatic switch and pilot light.
6. Where required by number of poles indicated, use multiple relays in parallel.
7. NEMA Type 12 enclosure for individually mounted units.

D. Time Switches:

1. General: Type, voltage, and with number of poles indicated; heavy duty, self-starting, high torque, synchronous motors, 20 amperes, tungsten rated contacts at 277 volts. Manual bypass switch for each pole, accessible without opening door or externally mounted, which does not disturb automatic settings. Spring driven reserve to operate clock for ten hours minimum on power failure and automatically rewind on power restoration. Terminal strip for No. 10 AWG wire minimum, dead front with door open.
2. For HVAC and Plumbing Control, and Where Indicated; Seven Day Calendar Type: 6-1/2 inch minimum dial. Accuracy of plus or minus 15 minutes, integral hand-off-automatic control, accessible, without opening cover, or externally mounted, for each circuit, ON-OFF trippers with minimum one hour on period and two hours between consecutive OFF and ON operation.
3. For Control of Exterior Lighting and Signs (Where Not Photocell Controlled) and Where Noted: Twenty four hour, astronomic dial. One to six day skip operation. Sunset ON, adjustable OFF, in one-half hour increments. Set for city of use.
4. For Control of Interior Circuits and Exterior Lights on Photocell: Seven day calendar type unless otherwise, noted.
5. For Control of Mechanically Held Contractors: Double throw contacts.
6. For Control of Mechanically Held Contractors in Parallels With Other Control Devices: Double throw, momentary contacts, rated for 120 amps inrush at 120 volts.
7. Engraved micarta nameplate to indicate clock designation and load controlled.

- E. Photocell Control: Solid state silicon junction photocell ALR #SST-PV with three year guarantee and six year warranty. Surge protected; fail-safe design; rated 1,000 VA HID and 1,000 VA tungsten; mount to IEEE-NEMA locking receptacle. Use with double throw electrically held relays for operation of mechanically held relays and contractors.

2.11 CIRCUIT PROTECTIVE DEVICES: Type as indicated on the drawings conforming with the following:

A. Circuit Breakers, Molded Case:

1. Trip free, quick-make, quick-break, thermal magnetic handles clearly indicating rating and ON, OFF, or TRIPPED position, type and rating indicated and specified. Multipole breakers to be common trip with single molded handle. For nonautomatic units, omit trip.
2. Individually mounted breakers in NEMA Type 12 enclosures generally and NEMA Type 3R for weather-proof units and NEMA Type 4 stainless steel in corrosive locations. NEMA type 1 where flush mounting is indicated.
3. Padlocking provisions for breakers individually mounted and in switchboards, motor control center, and power panelboards.
4. For switchboards, power panelboards, motor control centers, or for individual mounting, UL labeled interrupting rating not less than the rating specified for the equipment, or the following, whichever is greater:

<u>Breaker Rating</u>	<u>Frame</u>	<u>RMS Symmetrical</u>
15A to 60A	100A	22,000A @ 240V 25,000A @ 480V
70A to 225A	225A	25,000A @ 240V 22,000A @ 480V
250A to 350A	400A	42,000A @ 240V 30,000A @ 480V
400A to 800A	800A	42,000A @ 240V 30,000A @ 480V

B. Disconnect Switches:

1. Heavy duty (HD) horsepower rated, quick-make, quick break, safety type, externally operated, rating and number of poles required, capable of switching 10 times switch rating. Fused for branch circuit protection and in elevator machine rooms, with UL rejection type clips. Nonfused for motor disconnect where indicated.
2. Include bypassable interlock, padlock provisions, positive ON and OFF indication, molded case breaker mechanism or visible blades, single switch mechanism to preclude mechanical single phasing, solid neutral bar for four wire feeders, copper core CU-AL terminals spring loaded clips with noncurrent carrying springs.
3. Use manual motor starting switches for manual control and/or disconnecting of 120 volt fractional horsepower motors up to 5 HP at 230V and 10 HP at 480V.
4. For flush mounted disconnects, provide nonautomatic circuit breakers with flanged trim.
5. Enclosures to be NEMA Type 12 in interior, NEMA Type 3R on exterior and in wet locations, NEMA Type 4 stainless steel in corrosive location.

C. Fuses, Low Voltage: Provide NEC dimensions rejection type fuses as follows:

1. 600 Ampere and Smaller: Class RK1, low peak dual element with separate overload and short circuit elements.
2. Coordinate fuses with each other and with circuit breakers which they are protecting.
3. Provide label inside each switch cover indicating specific type of fuse required for replacement.
4. Provide spare fuses per Paragraph "Spares".

2.12 TRANSFORMERS, DRY TYPE

A. General:

1. UL listed, dry type, ratings as indicated, built per IEEE, ANSI, and NEMA Standards, utilizing Group III insulation, rated at 220°C. Normal life expectancy and winding temperature rise not exceeding 150°C in a maximum ambient of 40°C, and an average ambient of 30°C, with continuous rated nameplate load connected to the secondary side, at rated voltage.
2. Minimum impedance of 4.25% for ratings over 100 KVA, indicated on nameplate.
3. Delta primary and wye secondary connections for three phase units.
4. Vibration dampeners between core and case. Exterior lifting holes.
5. Two 2-1/2 percent taps each, above and below normal for ratings above 5 KVA.
6. Terminals below, bottom and side conductor entrance temperature rise in terminal compartment suitable for 60°C or higher insulated conductors. Case temperature rise 35°C maximum at rated load.
7. Rodent proof bottom enclosures. Ventilating openings arranged to prevent contact with live parts. Weather shield on all ventilated units, for drip protection.
8. Epoxy encapsulated units, sealed against moisture, dust, and fumes, for 30 KVA and smaller units.
9. Braced per latest ANSI "Short Circuit Characteristics" specifications.
10. BIL Ratings: 600 volt class and below - 10 KV.
11. Provide anti-turn solderless, copper core, CU-AL saddle type incoming and outgoing feeder terminals per Paragraph "Installation of Conductors".

- B. Tests: Factory tests based on NEMA and ANSI reference temperatures. Submit certified test reports for duplicate units of each rating with shop drawings.
1. Applied voltage test to other winding and ground 600 volt class - 4 KV primary and secondary.
 2. Induced voltage at twice rated voltage.
 3. Ratio and polarity.
 4. Sound level not to exceed 46 db.
 5. Efficiency, impedances, losses.
 6. Temperature rise.
 7. Short circuit (latest ANSI Short Circuit Test Code).
- C. Control Transformers:
1. Machine tool designed for high inrush.
 2. Temperature rise below 55^oC at continuous rated full load.
 3. Terminal board construction.
 4. Secondary board construction.
 5. Rating not less than indicated or specified but adequate for inrush currents of connected control devices.

2.13 WIRING DEVICES

- A. General:
1. Specification grade.
 2. Device colors:

General Use Ivory (As available)
and Emergency

Isolated Ground Orange

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3. Screw type terminals on all devices, suitable for up to No. 10 solid copper conductors.
 4. Where not specified herein, provide configuration as indicated on drawings.
 5. Explosion proof devices to meet classification of location. Class 1, Division 1, Group B, where not otherwise indicated.
- B. Toggle Switches:
1. Flush tumbler, AC type, insulated base, completely enclosed.
 2. 20 ampere, tungsten load rated, at 277 volts.
 3. 1 pole, 2 pole, 3-way, 4-way or key operated as indicated on drawings. Symbols: S, S2, S3, S4, Sk.
 4. Thermal overload switch, rated 1 HP at 120 volts, equipped with bimetallic or melting alloy type overloads sized for motor controlled, number of poles as required. Symbol: Sm.
 5. Momentary type, three position, single pole, double throw, two circuit, spring return to center OFF position. Symbol: Sr.
 6. Pilot lights, where indicated, flush neon type with lucite jewel suitable for use in switch plate opening ganged on plate with associated switch 120 or 277 volt as required, red jewel on emergency systems, green jewel on normal systems, lighted in the ON position unless otherwise noted. Symbol: Sp.
- C. Receptacles:
1. General: Number of poles and ampere rating as shown on drawings and of NEMA standard configurations. Ground pole connected to circuit grounding conductor.
 2. Duplex Convenience Receptacles: 20 amperes, 125 volt; grounding third pole; side wired for 2 wire circuit use. Where 2 circuits are indicated, provide individual circuit for each half. NEMA 5-20R.

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3. Ground Fault Interrupting (GFI) Receptacles: NEMA 5-20R with integral ground fault protection and weatherproof lift cover. Mount in cast box on exterior.
 4. Clock Receptacles for Surface Clocks: Flush type with recessed grounding receptacle and clock support hanger with removable stainless steel plate, NEMA 5-15R. For recessed clocks, install back box furnished by clock supplier.
 5. Single 120 Volt Convenience Receptacles in Floor Boxes: Grounding type, with adapters as required, for mounting in floor box. NEMA 5-20R.
 6. Duplex Receptacles in Floor Boxes: Standard device behind special plate described under floor boxes. NEMA 5-20R.
 7. Duplex Receptacles on Floor Boxes: Standard device in horizontal cast aluminum, satin finish fitting nipples to floor box. Double duplex receptacles back-to-back where indicated. NEMA 5-20R.
 8. Weatherproof Duplex Outlets (Unless Otherwise Noted): Two single grounding receptacles mounted in tandem cast box with cast plate and chain retained screw covers. For wall mounting, recess box in wall and provide adapter plate for cast cover. Furnish weatherproof plug with threaded cap for each outlet. For freestanding outlet, stub mount and provide plugged hubs in top and sides for extension. NEMA 5-20R.
 9. Isolated Ground Duplex Receptacles (IG): Configuration as indicated, but with grounding pole isolated from outlet body.
- D. Motor Control:
1. Push Buttons, Selector Switches: Oiltight for starter and contractor control, 10 ampere tungsten lamp rated, miniature type.
 2. Pilot Lights: Oiltight, push-to-test, miniature, transformer type.

E. Wall Plates:

1. Device plates of one make and design for all outlets, smooth, satin finish, type 302, stainless steel, 0.040" thick, beveled edges, to fit device.
2. For Surface Mounted, Pressed Steel Outlets in Utility Areas: Galvanized pressed steel plates, 0.040" thick, to conform with box and device.
3. For Exterior Locations: Cast plates on cast boxes.
4. Provide split plate one hole covers for telephone and intercom desk instrument outlets with 5/8" I.D. vinyl grommet and mounting yoke.

F. Telephone and Signal Systems:

1. Public Telephone Outlet on Floor Box: Horizontal cast aluminum, satin finish fitting with 1" bushed opening, to match receptacle floor outlet, nipped to floor box with 1" nipple.
2. Signal System Outlet on Floor Box: Same as telephone outlet.

2.14 LIGHTING FIXTURES, LAMPS ACCESSORIES

A. General:

1. Provide complete lighting system, wired, assembled and operable, including lighting equipment and accessories as shown on the drawings, described in the fixture schedules, specified herein and covered by allowance. Accessories include canopies, suspension of proper lengths, hickey, castings, sockets, holders, reflectors, ballasts, diffusing material, louvers, plaster and mounting frames, lamps, recessing boxes, supporting brackets and channels to span structural members.
2. Catalog numbers are given for manufacturer's identification. Conform to written descriptive requirements governing material and fabrication, either in the general or specific sections. Where catalog numbers are indicated as modified, no modification will be required if the standard unit fully conforms to all descriptive requirements in the specifications and conforms with specified construction. Fixtures to be UL labeled for location and operating conditions indicated.

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3. Fixtures of the same type to be of one manufacturer and of identical finish and appearance. Where not identified on drawings, provide same type as indicated in similar locations.
4. For recessed fixtures, provide frame and trim compatible with ceiling type and construction.
5. Provide adequate lamp shielding, proper ventilation and heat dissipation.
6. Secure diffusers to trim by devices not requiring tool for removal, or for relamping.
7. Locate fixture outlets and recessed fixtures by reference to architectural drawings, Architectural reflected ceiling plans and measurement of building construction. Do not scale electrical drawings.
8. Provide shop drawings for custom and modified standard fixtures, and catalog cuts illustrating conformance with specifications, for standard fixtures. Drawing to indicate materials, assembly, and finish. Coordinate fixture type with ceiling supplier and submit fixture compatible with ceiling system.

Include dimensions of the assembled fixture, weight ballast characteristics, description of lens or diffuser material and finish, frame, housing, reflector, special accessories, recommended lamps and list of agencies which have labeled the fixture. Indicate the number and type of wires for which fixture with attached junction box has been approved. Indicate conformance with temperature rating requirements of specifications.

Provide (for types in quantity of 30 or more) photometric report from an independent testing laboratory equal to the standard report furnished by E.T.L., including candlepower distribution curves and tables, luminaire brightness readings, tabulation of coefficients of utilization and percent efficiency, and a description of the unit and test conditions.

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9. Before ordering the specified light fixtures (for quantities of 30 or more), make available to the Engineer, on request, samples for his final approval. These samples may be on display at local distributor or manufacturer's showroom. The Owner reserves the right to change the fixture selection at no additional cost to himself except for actual fixture cost difference.

B. Construction - General:

1. Sheet Metal: Free of tool marks and dents. Finished to eliminate exposed sharp edges. Intersections and joints formed true, sufficiently rigid to prevent distortion after assembly.
2. Castings: Free of blemishes, scale and rust, and finished smooth.
3. Aluminum Surfaces, Nonreflecting: Anodized clear or with color as indicated. Castings may be irridited, sandblasted or anodized.
4. Aluminum Reflectors: Treat with alzak process to provide permanent reflective surface of 85% minimum. Extruded reflectors to be unscored, bright dipped and clear anodized.

C. Fluorescent Fixture Ballasts:

1. 60 Hertz, energy saving, usable with normal or energy saving lamps, voltage as indicated, E.T.L. approved, 95% power factor in recessed troffer.
2. UL Class P, with non-PCB type capacitors and core, coil and capacitor protection.
3. An "A" sound rating for rapid start 48 and 36 inch lamps.
4. Two lamp rapid start ballast with 48" lamps in recessed fixture to produce 95% light output +5%, -3%, with energy saving lamps and 78 watts input +5%.
5. Trigger start for 24 inch lamps.
6. Special types as indicated.

7. Ballasts fastened directly to metal fixture housing with three captive bolts or screws or acceptable equivalent method.

D. Fluorescent Fixture Temperature Rating:

1. Design Recessed Fixtures to Limit Ballast Case Temperature Installed in Fixtures to 90°C Under Following Conditions:
 - a. Line Voltage: 277 volts plus 5 percent.
 - b. Room Ambient: 25°C plus 5 percent.
 - c. Plenum Ambient: 55°C plus 5 percent.
 - d. Ceiling Material: Not to exceed R factor of 20.
2. Provide premium low operating temperature ballasts where required to achieve specified fixture temperature rating.
3. Certify conformance on submittals.
4. Conform with Guarantee Requirements per Paragraph "Guarantee".

E. Fluorescent Fixture Construction:

1. Sockets: Securely fastened to brackets or socket straps with machine screws in a manner to eliminate excessive flexing under normal lamp pressure, replaceable without removing fixture from the installation. In fixtures with end plates, backed by fixture housing to prevent twisting. Where sockets cannot be backed up by housing, secure with two screws or bolts.
2. Housings and Bodies: Fabricated of die-formed, cold-rolled steel not less than 20 U.S. gauge welded into a one-piece assembly using lap seam construction. Breaks, bends, edges, holes and knockouts accomplished by die-forming and machine operation. Alternately, fabricated of extruded aluminum sections or die-formed from aluminum sheet of not less than No. 16B and S gauge aluminum, with sections positively interlocked to provide a rigid unit. A complete die-formed housing of 22 U.S. gauge steel will be acceptable providing the unit is ribbed, embossed or paneled so as to be equivalent in strength to the above specified.

Provide wiring and ballast compartment accessible from below when the fixture is in the installed position, with wiring secured to the body of the fixture with the cover removed.

In suspended ceilings, in addition to seismic suspension, provide four clips attached to fixtures to positively tie fixture to T-bar or ceiling channel suspension. In plaster and dry wall ceilings, provide plaster frame and U channel supports.

In fixed ceilings, provide access to fixture outlet box through fixture.

3. Finish: Finish visible fixture trim in color designated on drawings, or baked matte white enamel where not otherwise noted.

Rustproof Metal Parts in the Following Sequence Degrease washing; hot water rinsing; zinc phosphatizing rust-inhibitor; cold water rinsing; chromic neutralizer. Provide enamel finish, baked-on at a minimum temperature of 300^oF. Enamel reflective surface to have 87 percent reflectivity, minimum.

4. Diffusers: Provide diffusers of type specified with characteristics as follows:
 - a. Lens: Flat lens designed to direct light down and present low surface brightness within normal viewing angles; high molecular weight virgin acrylic plastic having maximum melt flow rate of 2.2 grams/10 minutes per ASTM D1238 Condition 1 and minimum flow temperature of 315^oF per ASTM D569; smooth on one side, uniform pattern of cones or hexagonal prisms on the other; 1/8" average thickness up to two foot width 3/16" for three and four foot width; average determined by adding overall thickness to minimum unpenetrated thickness and dividing sum by two.
 - b. Parabolic Louvers: Specular finish louvers designed to provide low glare illumination, with controlled shielding. Lower blades shall be fully close at the top. For number of cells per fixture and/or size of louver cells, refer to specific fixture type in drawings fixture schedule.

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5. Door: Provide minimum trim, separable hinged door constructed of not less than 16 B and S gauge aluminum, with mitered corners, secured in place by inconspicuous spring loaded, visible, finger operated catches, removable without tools, but hinged to preclude accidental dislodgement in the open position. Incorporate light trap between door and fixture. Retain lens firmly in door with clips or clamping frame, but allowing for lens replacement without special tools.
6. Fixture Wiring: Wire with 600 volt, 105°C rated thermoplastic or asbestos insulation, No. 14 AWG minimum size. Interconnect between sockets and ballasts and provide twelve inch minimum length pigtails. Provide two wire pigtail for single circuit connection four wire for two circuit connection. Where fixture is served from two sources, barrier wiring from emergency source and provide inside notation indicating separate source. Connect to fixture outlet, with six foot length of flex and conductor insulated for rated fixture operating temperature.

F. Incandescent Fixtures:

1. Medium base sockets below 300 watts and mogul base for 300 watts and larger, unless otherwise noted.
2. For recessed fixtures, provide mounting frame with an attached prewired junction box, rated for through wiring with 60°C conductors, designed for installation without installing trim, diffusers or lens. Verify suitability of attached junction boxes for number of conductors indicated on drawings, and provide additional boxes where attached junction box capacity is exceeded. Provide UL damp location label for exterior or wet locations.

Provide I.C. rating in insulating ceilings. Use concrete pour type in concrete construction.
3. Fasten fixture sockets and reflectors securely to body to prevent rotation or rocking during relamping.
4. Fasten or hinge trims and lenses to the fixture body so that no part of the fixture must be held during the relamping procedure. Securely retain lenses in lens doors so that dropping of door cannot dislodge lens.
5. Glass lenses or diffusers to be free from spherical chromatic imperfections and have thermal characteristics of "Pyrex".

6. Color filters to withstand fixture operating temperature without cracking or fading.
7. Guarantee black alzak finished reflectors against fading for a minimum of two years including material and replacement cost.
8. Where cool beam lamps are indicated, provide fixture UL approved for that use.

G. Lamps:

1. Unless specified otherwise herein furnish and install a lamp for each fixture of type and wattage indicated on drawings. Refer to Paragraph "Spares".
2. Fluorescent Lamps: Energy saving type, compatible with specified ballast, 48 inch (or 36 inch where noted) rapid start, 24 inch trigger start, T12 Bi-Pin warm white unless otherwise noted.
3. Incandescent Lamps: Inside frosted or as recommended by fixture manufacturer. For fixtures mounted higher than 14 feet above floor, and where otherwise noted, provide 130 volt rating.

H. Lighting Fixture Description: Refer to schedule on drawings and to General Requirements in other paragraphs herein.

2.15 APPROVED MANUFACTURERS

A. Raceways and Wireways:

1. Rigid Steel Conduit and Fittings, Hot-Dipped Galvanized: Allied Tube and Conduit, Republic, Torrance Tubing, Triangle, Wheatland.
2. Intermediate Metal Conduit: Allied Tube and Conduit Torrance Tubing.
3. Insulated Bushings: O.Z. Gedney Types A, B and BLG equal by EFCOR, T & B.
4. Electric Metallic Tubing, Galvanized: Allied Tube and Conduit, Republic, Torrance Tubing, Triangle, Wheatland.

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5. EMT Fittings Raintight: Appleton TW Series, Crouse-Hinds MW Series Steel City TC710 Series, Thomas and Betts 5120 Series, Tomic 20 Series.
6. Flex - Galvanized: Anaconda Metal Hose, O.Z. Gedney, Triangle.
7. Liquidtight Flex: Type U.A. with built-in bond wire, American Flex Conduit, Anaconda, O.Z. Gedney.
8. Gutters and Wireways: Circle AW, Hoffman Engineering Company, Square D.
9. Nonmetallic Conduit, Polyvinyl Chloride: Carlon Schedule 40, 90 degrees C rated
10. Hubs: Myers.
11. Conduit Seals: Crouse-Hinds Type EYS.
12. Expansion Joints: O.Z. Gedney Type "DX" or as detailed or specified.
13. Wall Entrance Seals: O.Z. Gedney Type "FSK".
14. Cauling Compound:
 - a. General: Tremco - "Acoustic Sealant", Manville, "Duxseal", Interchemical - "Prestite 579.64", Chase Foam.
 - b. Fire Rated Wall or Partitions: Chase Foam.
15. Conduit Wrapping: Polyvinyl tape - 20 mil 1/2 lap Manville, Minnesota Mining "Scotch". 40 mil PVC coating - Occidental Coating Company.

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B. Outlet Boxes:

1. Pressed steel, 4" square by 1-1/2" deep minimum, Bowers, Raco, Steel City.
2. Cast Boxes and Condulet: Appleton, Crouse-Hinds, Pyle.
3. Floor Boxes: Hubbell "Dual Level", equal by Lew.

C. Floor Junction and Pull Boxes:

1. Cast iron, Thomas and Betts, O.Z. Gedney.
2. Precast Concrete Pull Boxes: Associated Concrete Products, Brooks Products.
3. Hand Hole: Brooks Products No. 3-RT.

D. Conductors - 600 Volt:

1. Steel Spring Connectors (No. 8 and Smaller): Scotchlok Types R and Y.
2. Solderless Connectors (No. 6 and Larger) Bolted Saddle Type: Burndy - "Versitaps", Thomas and Betts "Locktite", Trumbull - solderless, O.Z. Gedney solderless.
3. Compression Connectors: T&B Stakon or equal (motor connections).
4. Tape: Scotch #23 rubber tape and #88 vinyl tape.
5. Sealant: Scotchkote.
6. Pulling Compound: Powdered Soapstone, Ideal Yellow 77, Wirelube, Minerallac #100.
7. Conductors: Annixter, Anaconda, General Cable, General Electric, Okonite, Phelps Dodge.
8. Cable Supports: O.Z. Gedney split wedge, Kellems cable clamps.

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E. Vibration Isolators:

<u>Type</u>	<u>Description</u>	<u>Manufacturer: Mason Inc.</u> <u>Equal by Amber/Booth</u>
PN	Neoprene Pad	W (Plus Bearing Plated
MN	Neoprene Mount	ND
HN	Neoprene Hanger	HD
MS	Spring Mount	SLFH
HS	Suspension Hanger	30 or PC30

F. Switchboards, Panelboards, Terminal Cabinets: General Electric, Square "D", Westinghouse.

G. Motor Control Centers: Allen Bradley, General Electric, Square "D", Westinghouse, equal to G.E. 7700 Line.

H. Motor Starters: Allen Bradley, General Electric, Square "D", Westinghouse.

I. Contactors and Relays:

1. Mechanically Held: 25 amperes ASCO Bulletin 1255-166; 30 amperes and larger - ASCO Bulletin 920.
2. Magnetically Held Contactors: Same as for motor starters.
3. Magnetically Held Relays: Industrial grade with normally open and normally closed contacts. Manufacturers same as for motor starters. Equal to Square "D" Class 8501, Type H, GE CR2810.
4. Time Delay Relays: Manufacturers same as for motor starters. Equal to G.E. CR2820B Series.
5. Transfer Switches: ASCO Bulletin 940.

J. Time Switches: All with spring wound reserve.

1. 7 Day: Tork TW-LE Series, equal by Paragon.
2. 24 Hour with Astro Dial: Tork TZ-LE Series, equal by Paragon.

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- K. Photoelectric Cells: ALR #SST-PY, voltage as required.
- L. Circuit Breakers: Molded case.
 - 1. For Lighting Panelboards: Same as panel manufacturer.
 - 2. For Switchboards, Motor Control Centers, Power Panels, (Less than 400A): General Electric, ITE, Square "D".
 - 3. For Switchboards, Motor Control Centers, Power Panels, (400A and above): General Electric, ITE, and Square "D".
- M. Disconnect Switches (Heavy Duty, Quick-Make, Quick-Break):
 - 1. 800 Amere and Smaller: General Electric, ITE, Square D. Rejection type for fused units.
 - 2. Motor Switches: Equal to Square D Class 2510. For 120 volt, 230 volt up to 5 HP, 460 volt up to 10 HP.
- N. Fuses:
 - 1. 601 Ampere and Larger: Current limiting time delay (CLTD) Class L, Buss KRP-C.
 - 2. 600 Ampere and Smaller: Low peak, dual element Class RK1, Buss LPN-RK (250V) LPS-RK (600V).
- O. Transformers Dry Type: General Electric, ITE, Square D.
- P. Wiring Devices:
 - 1. Switches:
 - a. Maintained: Hubbell 1221-I Series, equal by Arrow Hart, Leviton, Sierra.
 - b. Momentary - Hubbell 1557-I, equal by Arrow Hart.
 - c. Door Operated Switch - Arrow Hart 4029/4030, Edwards 502/503.

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2. Pilot Lights (Ganged with Switch): Neon type, Arrow Hart #1720, voltage and color as specified.
3. Duplex Outlets: Hubbell 5352-I, equal by Arrow Hart, Bryant, General Electric, Leviton, Sierra.
4. Special Receptacles: Hubbell. NEMA configurations as shown on drawings. Equal by Arrow Hart.
5. Weatherproof Receptacles: Crouse-Hinds DS222 in FS box with WP832 plug.
6. Ground Fault Interrupting Receptacles: Hubbell GF 53621, WP26 plate indoors, WPF-26 plate outdoors.
7. Clock Receptacle with Stainless Steel Plate: Arrow Hart 452, General Electric 4224-5, Hubbell 5235.
8. Plates: Smooth satin finish Type 302 stainless steel. Hubbell, Leviton, Sierra.
9. Telephone Plates: Sierra S755N with 5/8" I.D. hole.

Q. Lighting Fixtures:

1. Conform with all requirements described under "Lighting Fixtures, Lamps and Accessories" in addition to scheduled descriptions. Submit itemized conformance list with bid.
2. Lighting Fixture Schedule: Verify ceiling construction on Architectural Drawings. Supply fixture types compatible with ceiling.

R. Ballasts (Per Specification): Advance, General Electric, Universal Energy saving type. Equal to GE Maximiser II.

S. Lamps: General Electric, Norelco, Sylvania. Fluorescent to be energy saving type equal to GE Wattmiser.

3.00 EXECUTION

3.01 DRAWINGS AND SITE

A. Site Conditions:

1. Examine all the drawings and the specifications, survey the existing conditions, and include all necessary allowances in bid proposal.
2. Resolve all conflicts with code requirements, site conditions and the work of other trades.
3. Verify the locations of all existing utilities prior to construction and protect them from damage.
4. Pay all costs incurred due to damage of existing utilities or other facilities.

B. Locations:

1. Drawings are essentially diagrammatic, and although the size and locations of equipment are generally shown to scale, make use of data in all Contract Documents, and informational documents, and verify this information against field conditions.
2. Drawings indicate the required size and points of termination of conduits, and the number and size of wires and suggest proper routing of conduit. Install conduit with all necessary offsets, junction boxes, and fittings to conform to the structure, avoid obstructions, preserve headroom, maintain required accessibility, and satisfy the requirements of the governing codes and the standards of good practice.
3. Architectural and structural drawings and specifications take precedence over the electrical drawings in the representation of the general construction work. Civil drawings take precedence in the representation of the site work. Refer to the drawings, specifications, and reviewed shop drawings for all work, in other to coordinate electrical work with other work of the project.

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4. When changes in indicated locations or arrangements are necessary due to conditions in building construction, rearrangement of furnishings or equipment, or conflict in location, make such changes at no cost to Owner, provided that the change is ordered before conduit is installed and that length of conduit run is not revised by more than ten percent (10%) of indicated run, for conduits 1" nominal or smaller, and five percent (5%) for larger conduits.
5. Bring discrepancies between different drawings, between drawings and actual field conditions, or between drawings and specifications, promptly to the attention of the Engineer for decision, and stop pertinent work subject to resolution of the conflict.
6. Equipment in mechanical and electrical and signal rooms or spaces has been laid out in accordance with the requirements of typical equipment of the class indicated. Modify wiring and location and pay all costs, to meet the requirements of the particular manufacturer's equipment, which is installed where it is different from that shown on the drawings. Do not use equipment which exceeds space or which infringes on required aisle or access space.
7. Coordinate the location of the lighting fixtures and framing with the ceiling construction so that the over-all pattern is acceptable to the Architect. Architectural reflected ceiling drawings, plans and details govern. Locate lighting fixtures in mechanical and equipment rooms to avoid ductwork, piping and equipment. Coordinate location with trade supplying equipment prior to lighting fixture installation.
8. Locate sleeves, floor and wall outlets, and devices serving equipment, built-in fixtures and appliances, in accordance with dimensions on the respective equipment drawings of the equipment supplier.
9. Provide clarifying details where required by inspecting authority and obtain Engineer's and Inspector's approval prior to installation.

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C. Responsibility:

1. Provide complete functioning systems and include all labor, material and associated tools and transportation required for the system to operate safely and satisfactorily. Provide empty conduit systems where specified, complete, clear, and with pull wires, ready to accept conductors and allow for equipment installation.
2. Provide all work indicated on the drawings whether or not specifically mentioned in the specifications.
3. Coordinate the installation of electrical items with the schedules for work of other trades to prevent delays in total work. Assume responsibility for any cooperative work which must be altered due to lack of proper supervision or failure to make proper provision in time. Perform alterations to Architect's satisfaction, and pay all costs.
4. Resolve code conflicts prior to installation. Remove and replace all work conflicting with codes or, in the Engineer's opinion, not meeting specified requirements and pay all costs.

D. Quality Assurance:

1. Provide and experienced superintendent in charge of erection of the work, together with all necessary journeymen, helpers and laborers required to properly unload, erect, connect, adjust, operate and test the work involved to provide a neat, workmanlike installation. Latest industry standards are considered minimum.
2. For the actual fabrication, installations, and testing of the work of this section, use only thoroughly trained and experienced personnel who are completely familiar with the requirements for this work and with the specified items. Where specified, provide factory personnel for testing and adjusting.
3. For signal system, communication and specialized systems, perform all work in accordance with instructions provided by, and under the supervision of, factory authorized agents. Evidence shall be provided that the factory agent has five projects equal in scope to specified systems, operating satisfactorily.

Submit a letter, with bid proposal, from principals of the equipment manufacturing company specifying the location of factory authorized parts and service organizations now in service intended to serve the subject project, the length of time which they have been in operation (which shall not be less than three years) and the guarantee available for their continued operation.

4. For major equipment such as transformers, switchboards, panelboards, motor control centers, circuit breakers, control devices, etc., submit letters from principals of the equipment manufacturing company, with bid proposal, specifying the location of factory authorized parts and service organizations intended to serve the subject project.

3.02 SEISMIC REQUIREMENTS

- A. Scope: Brace electrical systems and equipment to withstand lateral and vertical forces that result from earthquake or wind.
- B. Equipment: Anchor all equipment, switchboards, panelboards, and transformers by securely bolting them in place to the building structure. Provide bolts, anchors and bracing to withstand acceleration of 0.5 g.
- C. For suspended conduits, 2" nominal and larger, provide diagonal bracing to structure at hangers at changes in direction and on 30' + centers.
- D. Lighting Fixtures: Provide 2 ten gauge steel support wires on diagonal corners or 4 twelve gauge at 4 corners of recessed fluorescent fixtures, tied to building structure. Allow 1/4" slack in wire. Provide approved seismic fixture suspension for pendant fixtures.

3.03 EXCAVATION, BACKFILLING

- A. General:
 1. Provide excavation, backfilling, and pumping required for work under this section, in accordance with requirements of Earthwork Section, Division 2, of the Specifications. Remove surplus materials as directed.

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2. Where trenches are required through existing paving resurface after installation to match existing in accordance with appropriate sections of Division 2, by accredited journeymen of respective trade.
- B. Conduit Trenches: Provide minimum cover over buried conduit as follows: 42" over primary conduit outside building; 36" over primary conduit within building; 36" over 2" and larger secondary and signal conduits outside building; 30" for 1-1/2" and smaller outside building; 24" for 1-1/2" and larger secondary and signal conduit within building footprint. Cut trenches to bottom of conduit, allowing for concrete encasement where specified, and make cuts as narrow as possible. For nonmetallic conduit without encasement, excavate 4" below conduit and backfill with sand. In rock, excavate 6" below conduit and backfill with gravel for encased conduit and sand for direct buried conduit. Separate signal and power conduit in a common trench by 12" of tamped earth or 6" of concrete.
 - C. Within building footprint, run buried conduit, 1-1/4" nominal and smaller, 6" minimum below slab. Conduits with diameter less than 1/3 of slab thickness may be run in slab on grade where practical and acceptable to Architect.
- 3.04 EQUIPMENT PADS AND CURBS
- A. Install floor mounted switchboards, motor centers, and transformers on 4" high level concrete pads in basement, ground floor and roof levels, and in mechanical rooms on all levels, and where indicated extend concrete pad in front of equipment for maintenance where device handles exceed 6'-6" above room floor.
 - B. Provide exact pad size, location and conduit entries based on equipment shop drawings to concrete section for construction.
- 3.05 SLEEVES, OPENINGS, FLASHING, CUTTING AND PATCHING
- A. Locations of Openings: Locate all chases, shafts, sleeves, openings, anchors and inserts required for the installation of the electrical work during framing of the structure and before concrete placement. Obtain approval from the Engineer in writing, for penetration of structural member or blockouts through slabs for grouped conduits, prior to installation.

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- B. Cutting and Patching: Provide additional cutting, core drilling and associated patching required, due to improperly located or omitted openings, by accredited journeymen of the respective trades without cost to Owner and per Engineer's requirements.

Do not sleeve, cut or drill structural members or footings without written approval of Engineer. Fill all blockouts and preformed openings provided for work under this section with concrete in a manner to maintain the fire rating integrity of the floor or wall.

- C. Location of Sleeves: Place conduits which pass through slabs on grade before concrete is poured. Where penetrating masonry or concrete interior slabs or walls, solidly grout steel conduits one inch nominal or smaller, and plaster in where penetrating partition walls. For conduits 1-1/4" nominal and larger, provide sleeves of ample size to provide 1/4" to 1/2" annular joints.

- D. Types of Sleeves:

1. Suspended Floor Slabs: Standard weight, 16 gauge minimum, black steel pipe, stub 1" above finished floor.
2. Walls and Partitions: 18 gauge galvanized sheet steel or steel pipe, ends flush with finished surface, and finished smooth.
3. Membranes: Stub sleeve 6" beyond membrane and provide flanges suitable for sealing of membrane. Obtain Engineer's approval of sleeve detail.
4. Caulking:
 - a. Through exterior walls, caulk conduit penetrations for full wall thickness for waterproofing. At fire rated floors and partitions, pack sleeves with fiberglass for full sleeve depth and caulk both ends.
 - b. Where sleeves or openings in fire rated floors and partitions contain conductors not enclosed in a raceway, fill with silicone foam the full depth of the sleeve or opening per manufacturer's instructions.
5. Cut all sleeves smooth, ream and install perpendicular to floor or wall.

- E. Caulking Compound Characteristics:
 - 1. General: Putty like; workable with hands down to 35°F; remain pliable when exposed to air; adhere to metal, plastic, concrete, masonry and cable insulation; harmless to hands; seal without causing deterioration of material sealed.
 - 2. Fire Rated Walls or Partitions: UL classified fire retardant silicone foam.
- F. Flashing: Wherever conduit extends through roof, provide galvanized iron flashing, consisting of 24 gauge roof jack extending 6" out on roof and up conduit at least 8", with flashing collar covering top of roof jack. Caulk between jack and conduit. Coordinate installation of flashing with roofing installation. Provide pitch pockets as option and where indicated.

3.06 NOISE AND VIBRATION

- A. General: System shall be free of noise and/or vibration transmission to building from transformers, rotating machinery or electric equipment through structure or conduit connections. Correct, at no cost to Owner, conditions resulting in noise transmission to facility from work under this section.
- B. Connections: Connect to motors, transformers and all isolated or vibrating equipment with 24" minimum length of liquidtight flexible conduit, slack connected. For transformers, conduit may be stubbed into bottom, not connected to frame, in lieu of flexible connection.
- C. Vibration Isolation: Provide between structure and vibrating or rotating equipment furnished and/or installed under this section.

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<u>Equipment</u>	<u>Design Deflection</u>	<u>Isolator</u>
Transformers (Below 100 KVA) Slab, On Grade	0.06"	PN
Above Grade, Supported	0.3"	MN
Above Grade, Suspended	0.3"	HS
Transformers (Above 100 KVA) Slab, On Grade	0.06"	PN
Above Grade, Supported	0.3"	MN

- D. Switchgear, Switchboards, Distribution Boards, Motor Control Centers: Manufacturers to size brace and arrange bus within gear and design enclosure to preclude hum and vibration. Provide sound baffles and shock mounts for relays and contractors.
- E. Wiring: In multiple runs of feeder conductors in conduit or wireway, twist associated phase and neutral conductors together to avoid abnormal field generation.
- F. Equipment Frames: For vibrating or rotating equipment to be isolated, provide mounting frames and/or brackets to carry the load of the equipment without causing mechanical distortion or stress to the equipment.
- G. Machinery Rooms:
 1. In machinery and electrical rooms located above occupied spaces, do not penetrate floor slab without specific approval in writing. Where floor has membrane, avoid penetrations and run all conduit overhead.
 2. In general, run conduits to motors and equipment overhead. For overhead drops exceeding 8 feet in length or floor risers over 2 feet high, provide unistrut or pipe brace to floor or structure. For slabs on grade 6 inches thick minimum, conduits 1 inch nominal or smaller may be run in slabs to floor mounted equipment. Verify stub-up location with equipment supplier.
 3. Do not run conduit through vibration isolated (floating) concrete slabs.

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- H. Outlets: Do not use back-to-back outlets or through boxes. Separate outlets on opposite sides of wall by 12 inches minimum unless otherwise detailed. For residential occupancies observe applicable local ordinances.

3.07 GROUNDING SYSTEM

- A. General: Provide new service and isolated system grounds with resistance to ground of three ohms or less and in accordance with applicable code requirements. Maintain equipment ground continuity through entire system including raceways, wireways, equipment enclosures, lighting fixtures and devices. Provide grounding as specified and as shown on drawings. Include ground conductor in all nonmetallic conduits. Use green insulated copper ground conductors sized per tables herein.

B. Service Ground:

1. Provide 50 foot length of bare copper conductor extended full length and embedded along bottom of building concrete foundation, supported to provide two inch concrete encasement minimum. In steel frame buildings bond to a minimum of two steel columns. Bring loop out at center to accessible concrete hand hole located in main electrical room of the new building.
2. Bond from building cold water main, 2 inch or larger to service ground with insulated ground conductor in steel conduit at hand hole.
3. Extend engine generator neutral, transformer neutrals and equipment ground from main switchboard and transformers with insulated conductor in steel conduit to hand hole and bond to service ground.
4. Extend isolated system grounds to service ground at switchboard ground bus or at hand hole when located in same building as service.
5. Service Ground Conductor:

<u>Service Amperes</u>	<u>Embedded AWG</u>	<u>Cold Water & AWG</u>	<u>Service Ground Conduit</u>
500A - 800A	2/0	2/0	1"

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- 6. Where required to obtain specified resistance to ground, drive additional ground rods, number as required, and bond to service ground.
- 7. Engrave hand hole cover - GROUND ELECTRODE.

C. Isolated System Grounds: Ground transformers and generator from neutral bus or bushing to service ground, with insulated conductor in steel conduit as follows:

<u>KVA</u>	<u>208/120 Volts</u>		<u>480/277 Volts</u>	
	<u>AWG Size-Conduit</u>		<u>AWG Size-Conduit</u>	
30 and Less	8	3/4	8	3/4
45	4	3/4	8	3/4
75	2	3/4	4	3/4
112-1/2	1/0	1	4	3/4
150, 225	2/0	1	2/0	1

Alternately, up to 150 KVA rating, ground conductor may be run back to service ground with transformer feeder.

D. Ground Continuity:

- 1. Provide green insulated ground conductor with TW or THW insulation in all nonmetallic conduits, each conduit run for feeders and where indicated for branch circuits. For lighting circuits, connect ground wire to fixture ground lead where available or bond to fixture housing by mechanical means. Connect grounding conductors to ground busses in panels, switchgear, motor control centers and switchboards, and to terminals on devices, and bond to all equipment. Provide copper ground conductor, sized not less than following:

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Circuit Device			30	70	110	225	450	700
Setting Amperes:	15	to	to	to	to	to	to	
Ground Conductor:		20	60	100	200	400	600	800
AWG Size:	14	12	10	8	6	2	1	1/0

For parallel feeders or circuits, run ground in each conduit. Refer to schedule on drawings.

2. Provide ground bushings, fittings, jumpers as required at expansion and seismic fittings, isolated sections and wherever ground continuity is broken. Provide ground bushings on conduit stub-ups and bond to enclosure and ground bus.
 3. Bond plug strip, isolated metal parts of lighting fixtures, and ground terminal of receptacles to equipment ground.
 4. Provide separate green ground conductor in circuits serving isolated ground outlets, ground fault outlets, and all outlets in computer rooms and rooms with raised deck floors.
- E. Antennas and Masts: Provide 1 #8 (minimum) copper ground conductor in 3/4" conduit from antennas and masts to service ground, or 2" or larger cold water pipe.
- F. Communications Ground: Provide 1 #8 (minimum) copper ground conductor in 3/4" conduit from main telephone room and/or telephone terminal to service ground if available or to cold water pipe 2" or larger. Extend to other telephone terminals where indicated.
- G. Materials and Methods:
1. For ground loop, use soft drawn stranded copper conductors size as scheduled. Snake buried conductors to allow for settlement, and bury 12" minimum below concrete slabs on grade.
 2. Install continuous conductors without splices. Where joints are required, use exothermic welding to join all conductor strands, providing completed joint equal to or larger than conductor. Obtain inspection before covering joints.

3. Provide conductor embedded in foundations, extended to precast concrete hand holes. Engrave cover "Grounding Electrode".

3.08 INSTALLATION OF RACEWAY AND WIREWAYS

- A. General: Deliver raceways and wireways to the site in standard lengths, and store where continuously protected from moisture and weather. Install as follows:
 1. Conduit sizes on the drawings are minimum, sized for copper conductors, for normal (THHN) insulation. Use 3/4 inch trade size minimum. Increase sizes where required by physical conditions, or conductor insulations. Do not combine runs without written approval. Allow for grounding conductor as described under Paragraph "Grounding".
 2. Conceal conduit above ceiling, below floors or in walls where possible.
 3. Conduit may be exposed in shop and utility areas and where indicated. Install all conduit runs parallel with or perpendicular to structural members. Surmount obstructions by use of bends, offsets, and where necessary with junction and pull boxes. Use cast boxes and/or condulets for outlet and small junction boxes located within seven feet of floor, in exposed locations.
 4. Cut conduits and raceways square and free of burrs. Ream conduit ends and clean conduits before pulling conductors. Secure rigid conduits to panels, pull boxes, wireways and enclosures with locknuts, inside and out, and provide high impact plastic or insulated throat steel bushings at terminations in pull boxes, wireways signal cabinets, boxes and enclosures. Zinc insulated throat hubs with "O" ring gaskets may be used in lieu of double locknut and bushing. For feeder conductors No. 4 AWG and larger, provide steel insulating bushings with plastic liner. For EMT provide insulated throat connectors secured with locknut on interior of box or enclosure. For flex conduit, provide insulated throat steel twist-in connectors secured with locknut on interior of box or enclosure, or steel twist-in connectors with plastic bushing, and locknut. At panelboards, switchboards and gear specified with ground bus, terminate conduits with ground bushing bonded to ground bus with code size conductor No. 8 AWG minimum. Use approved couplings or unions. Running thread, threadless coupling, or split coupling connections are not permitted.

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5. Cap open ends of conduits with approved manufactured conduit seals. Install as complete system, mechanically and electrically continuous between outlets, gear and equipment.
6. Where conduits or wireways cross expansion or seismic joints, provide approved expansion fittings, which allow deflection in all directions, except where alternate details have been provided.
7. For bends and offsets in conduit 1 inch and larger, use larger radius factory fittings or a hydraulic bender. Replace all flattened, deformed or kinked conduit.
8. Route raceways and wireways so as to prevent insulated conductors from being subjected to high ambient temperature conditions. Maintain the following Minimum Clearances:

Crossing uninsulated pipe or duct - 3 inches.
Crossing insulated pipes or ducts - 1 inch.
Parallel to uninsulated pipes or ducts - 3 feet.
Parallel to insulated pipes or ducts - 6 inches.
9. For underground steel conduit coat all joints and points where wrenches have been applied, with bitumastic paint.
10. Extend underground stub outs as shown on drawings, but 3 feet minimum beyond building foundations or concrete paving.
11. Provide No. 14 AWG blackiron pull wire or polyethylene or nylon pull rope rated 250 pounds tensile strength in all empty conduits and stubs over 10' in length, extending at least 12" beyond conduit.
12. Where entering refrigerated spaces, provide approved compound filled sealing fitting, installed in accessible location, on warmer side of wall.
13. Provide compound filled sealing fitting for conduits terminating in or passing through hazardous areas per applicable sections of code.

In vehicles maintenance and garage areas, area within 18" of floor shall be considered hazardous. Run conduit overhead and keep conduit, devices and equipment out of hazardous area where possible. Unless otherwise indicated, area classification is Class I, Division I, Group "B".

14. Where conduit extending into building from site enters occupied level, slope conduits to drain away from building and seal to prevent entrance of moisture.
15. Terminate conduits in concrete light pole bases a vertical distance of 4" above top of foundation and inclined towards the light pole hand hole. Extend conduit stubs a minimum distance of 3' from outside of concrete foundation and cap. Before pouring of concrete bases, position all conduits at correct height and bond together. Hold anchor bolts and conduits in place by means of templates until concrete sets. Allow 72 hours for concrete set before erecting standards.
16. Stub conduit into bottom of dry type transformers where possible and bond to case.
17. Terminate branch circuit or communication conduits turning from floor into interior removable nonmasonry partitions or freestanding appliances or equipment with flush floor couplings before extending conduit.
18. Route openable raceways and wireways so as to be readily accessible.
19. Gutter and wireway dimensions indicated on the drawings are minimum. Provide sufficient cross section to contain conductors including all splices in accordance with code allowed percent fill. Where covers occur on bottom, provide removable wire supports not more than 3' apart.
20. Refer to Paragraph "Identification" for additional requirements.

B. Conduit:

1. Use Rigid Steel Conduit in All Sizes or Intermediate Steel Conduit Up to 4 Inches: In slab on grade; on exterior/ encased in exterior masonry or concrete walls; in wet locations; in refrigerated spaces; in exposed locations within seven feet of floor or walking surfaces.

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2. Use rigid or intermediate steel conduit for trade sizes 2-1/2 inches and larger installed above grade throughout.
3. For underground installations use concrete encase rigid steel, intermediate or non-metallic below building or outside building. Provide rigid or intermediate steel conduit elbow. For PVC terminations - conduit shall be installed 24" below grade.
4. Where indicated in writing by the Engineer, underground steel conduit and couplings may, in lieu of concrete, be protected with plastic wrap or coating:
 - a. Factory wrap with 1/2 lap of 20 mil thick identified polyvinyl tape to provide uniform 40 mil coating. Field tape joints shall provide equivalent coating.
 - b. Factory coat with 40 mil thick PVC coating bonded to conduit. Coating on couplings shall extend beyond coupling ends for one conduit diameter up to 1-1/2".
5. Use rigid steel or electric metallic tubing in trade size 2" and smaller in dry concealed locations, in exposed locations above 7' from floor or walking surfaces, in electrical and telephone rooms at all heights.
6. Use flexible steel conduit, 1/2" minimum trade size, for connection to lighting fixtures from fixture outlet. Where structural conditions make use of rigid conduit or tubing impractical, obtain written permission from Engineer to use flexible conduit.
7. Use 24" Minimum Length of Liquidtight Flexible Steel Conduit, 1/2" Minimum Trade Size, Slack Connected. Connected for: Connection from outlet to motor and other moving or vibrating equipment; code length to lighting fixtures in damp or wet locations; to transformer housing; to kitchen equipment; all flexible connections in exposed areas.

Where conduit stubs into bottom of dry type transformer, without connecting to enclosure, bond conduit to enclosure and omit flex connection.

8. Provide bend radius for flexible conduit not less than 5 times the trade size.
9. For connection to exterior lighting standards, Schedule 40 PVC may be used with encasement. Use rigid steel in concrete pole base. Include ground wire and size conduit accordingly.
10. Where penetrating floors or fire separations, use UL listed fittings and/or devices to maintain separation integrity.
11. Where crossing existing pavement, place conduit under pavement by approved jacking method. Keep jack pit two feet clear of edge of pavement. Do not undermine paving with excessive water. If jacking cannot be accomplished, obtain Architect's permission in writing to cut and patch paving.

C. Support and Fastening:

1. Install rigid steel conduit with threaded couplings. Support conduits 1" and larger on 10' intervals, smaller than 1" on 7' intervals, all sizes within 3' of connection to box, cabinet or fitting. Support vertical runs 2" and larger a minimum of once, and on 15' centers maximum. Support vertical runs smaller than 2" on 8' centers maximum.
2. Support electric metallic tubing on maximum spacing of 10' and within 3' of connection to box, cabinet or fitting including couplings.
3. Support flexible metal conduit on 4' intervals, within 1' of outlet box or fitting (except at connections to recessed lighting fixtures) and within 2' of vibrating equipment.
4. Support gutter and wireways at 5 foot intervals and at changes of direction, in a manner to allow full access.
5. Attach to field poured concrete with preset inserts for conduits 3 inch and larger and with preset inserts or lead expansion screw anchors for smaller sizes. Shot driven studs are not permitted without written approval from the Engineer. Secure conduit with cast conduit clamps and cadmium plated machine or lag screws.

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6. Attach to plaster, dry wall or hollow masonry walls with toggle bolts.
7. Attach to solid masonry walls with lead expansion anchors.
8. Do not fasten rigid conduit or tubing to equipment subject to vibration or mounted on shock mounts.
9. Secure conduits 1-1/4" and smaller to steel deck with cast conduit clamps and one inch minimum cadmium plated or galvanized sheet metal screws.
10. Where attaching to steel members, use beam clamp, welded threaded studs or machine screws.
11. Where not otherwise specified herein, support all sizes of suspended conduit from structure with factory made pipe hangers with split hinged malleable iron or springable steel pipe rings and solid round mild steelrods, 1/4" diameter for up to 1-1/4" conduit, 3/8" diameter up to 2" conduit and 1/2" diameter for larger conduit.
12. Provide trapeze type hangers where three or more conduits run parallel and clamp conduit to hanger.
13. Provide plated or galvanized hangers, rods, channels and metallic support and fastening material or provide two coats of rust resistant paint, in all damp or corrosive locations (e.g., vehicle maintenance garage, labs).
14. Do not use perforated metal strap or wood as support material.
15. Support conduit to structure above suspended ceilings three inch minimum above ceiling to allow removal of tile. Do not support from T-bars or T-bar hanger wires. Maintain a two inch clearance above recessed light fixtures.
16. Above fixed ceilings, tie conduit to furring or support channels with No. 16 gauge galvanized wire ties 4 feet on center, maximum.

17. Attach to precast or prestressed concrete as described under applicable sections of the specifications. Coordinate installation of precast unistrut or inserts where required, or obtain written approval from the Architect of alternate support methods.

3.09 INSTALLATION OF BOXES AND DEVICES

A. General: Use new bright stock and store where continuously protected from weather.

1. Install all outlets and boxes in readily accessible locations.
2. Provide additional pull or outlet boxes as required to meet code requirements or to facilitate pulling of wires. Locate in utility areas, above accessible ceilings, or in approved locations.
3. Size boxes for devices contained and the number of wires passing through or terminating therein, not less than 4 inches square by 1-1/2 inch deep, or equivalent configuration. Pull and junction boxes to be of adequate size for splices and terminations contained therein.
4. For door alarms and switches, use special boxes designed to fit in door frame.
5. For receptacles 30A rating and greater, use 2-1/8" deep box with two gang ring and plate to match device.
6. Use 4-11/16" square box with round plaster ring, for surface mounted ceiling fixtures.
7. Where more than one switch is shown at one location, group behind common plate. Use gang boxes for three or more devices. Provide barrier between 277 volt switches controlling two or more circuits.
8. Use 4-11/16 inch square by 2-1/8 inch deep boxes, minimum size, for more than two flexible connections to lighting fixtures.

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9. For wall mounted outlets serving desk telephone or intercom instruments, use 4-11/16 inch square by 2-1/8 inch deep box with one gang flush plaster ring. In hollow partition walls, use plaster ring secured to wall with epoxy glue and terminate conduit in a bushing just above edge of plaster ring.
10. Use cast metal, gasketed boxes for locations noted on drawings and as follows: Stub mounted outlets; outlets on exterior or within exterior walls facing the exterior; surface mounted outlets within 7 feet of the floor wet or corrosive locations. For flush mounted outlets provide adapter plates. Provide threaded plugs in unused hubs.
11. For concrete work, use concrete boxes which allow the placing of conduit without displacing the reinforcing bars. Use masonry boxes in block and masonry walls.
12. Use extension rings with blank covers for surface extension from flush box.
13. Barrier conductors from different sources in same box.
14. Recess boxes in finished areas, and wherever possible in utility, mechanical and electrical spaces. Provide extension rings and/or plaster rings to finish flush with finished surfaces. Install approved factory made knockout seals where knockouts are not intact, and close all openings.
15. Support light fixture outlets to building structure and equip with fixture stud and hanger bar or supporting device as required, including outlets for fixtures furnished by others. Support lighting fixtures in excess of 60 pounds to structure independently of outlet box.
16. Do not use back-to-back outlets or through boxes. See paragraph "Noise and Vibration".
17. Provide boxes for all devices. For devices not specified or scheduled, use boxes as approved.
18. For communication and signal systems, refer to Paragraph "Auxiliary Systems and Equipment".
19. Provide designations per Paragraph "Identification".

B. Support:

1. Install boxes with box hangers, expansion shields in masonry, and machine screws on metal work. Do not nail to structure. Use plated or galvanized screws throughout.
2. Secure pull and junction boxes to the structure independently of the conduits by means of bolts, rod hangers or brackets.

C. Devices:

1. Unless specifically directed otherwise, install switches with single gang vertical plate on latch side of door. Verify door swing before installation.
2. Unless noted otherwise, install duplex receptacles, single receptacles, telephone and communications outlets vertically. For vertically mounted receptacles, locate ground slot to top. Where horizontal mounting is required, locate ground slot to right when facing outlet.
3. Connect green ground wire to receptacle grounding screw and box.
4. Plumb and align all devices and install plaster rings flush with wall surface so that plates fit tight against wall and device surface without strain.
5. On exterior, and interior locations subject to moisture, use weatherproof devices.

D. Mounting Heights:

1. Install outlets to clear built-in features and equipment. Check architectural details and building equipment drawings before installation of outlets.
2. Install outlets for specific equipment or appliances per equipment suppliers' instructions.
3. Mounting height for wall mounted outlet is from center-line of outlet to finished floor, and is indicated on the drawing by "+".
4. Where not otherwise noted or detailed, use mounting heights herein indicated.

5. Switches and Push Buttons: + 48 inches.
6. Receptacle in Office Areas: + 12 inches.
7. Receptacles in Equipment Rooms, Vehicle Maintenance or Garage: + 42 inches.
8. At communication and/or telephone terminal backboards provide multi outlet raceway (Plugmold) below backboard at + inches.
9. Desk Mounted Telephone and Intercom Outlet: + 12 inches.
10. Back Box for Wall Mounted Telephones: + 60 inches.
11. Signal System Device Requiring Manual Operation: + 48 inches.
12. Manual Fire Alarm Reporting Station: + 48 inches.
13. Thermostats: + 48 inches.
14. Signal System Audible Device: Locate outlet so that device clears finished ceiling by 1 inch, where not otherwise indicated.
15. Clock Outlet: + 84 inches. Above door center between top of door frame and ceiling.
16. Bracket Light Outlet: + 96 inches, unless otherwise indicated.

3.10 INSTALLATION OF CONDUCTORS

- A. General: Store conductors where continuously protected from sunlight heat and weather. Install as follows:
 1. Install all conductors (line voltage, low voltage, signal and control) in conduit. Complete conduit system and clean and dry conduit before pulling in conductors. Install conductors after general construction work in areas has progressed sufficiently to avoid conductor damage.

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2. Circuit as indicated on plans and single line diagrams.
3. Provide conductors in parallel of identical lengths.
4. Use fish tapes with ball type heads for pulling conductors. Pull conductors in without kinking wires or scoring conduit.
5. Use only lubricant, which does not damage conductors as a pulling aid.
6. Fan and tie branch circuit and control conductors in panelboards, switchboards and terminal cabinets. Identify spare conductors (line, control and signal) and ground both ends to enclosure case.
7. Run neutral conductors continuous to panel. Do not combine. Run feeders continuous to panel or equipment without splices. Do not splice or tap in equipment enclosures or condulets. Make necessary splices or taps only in junction boxes, pull boxes or in oversize wiring gutters designed for the purpose at panelboards.
8. Use No. 12 AWG minimum for lighting and power and No. 14 AWG minimum for signal and communications and control, except where special conductors are specified.
9. Allow 18 inch minimum free length of conductor where terminating in outlet or pull box. Provide longer lengths where indicated.
10. Do not loop through receptacle terminals; connect by means of conductor taps joined to branch circuit conductors.
11. Where branch circuit conductors extend from ground fault interrupting breakers, enclose conductors in plastic tubing within panelboard.
12. See Paragraph "Identification and Warning Signs".

B. Color Coding:

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1. For lighting and outlet branch circuits, use factory colored conductors. For motor circuits and feeders, use pressure sensitive colored tapes at all panelboards, safety switches, motor starters, motor and equipment outlets. Where more than one multiconductor circuit is run in a conduit, tape each multiconductor circuit together with its neutral at each junction point and outlet.

2. Color Codes for Line Conductors:

Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray (Where permitted)
Traveler	Brown	As approved
Equipment Ground	Green	
Instrument Ground	Yellow Stripes	

3. Color code conductors use in communication and signal systems and of control wiring in-line and low voltage control panels, motor control centers and supervisory panels. use white for grounded conductor and green for equipment ground, exclusively.

C. Connectors and Terminations, Line Voltage:

1. For joints, splices, taps and connections for 600 volt conductors, use solderless connectors.
2. For branch circuit conductors No. 8 AWG and smaller use steel spring with semi-rigid insulating shell, setscrew type, taped.
3. Terminate all solid conductors, No. 10 AWG and smaller by a fast holding application of the conductor directly to the binding screws of the equipment to be connected.
4. For conductors No. 6 AWG and larger, use copper or copper core CU-AL bolted saddle connectors and lugs, sized for conductors. For conductors No. 4 AWG and larger, use lugs with two bolts through tongue, minimum. Connectors and lugs which are crimp type or which apply setscrews directly to the conductors are not acceptable. For breaker connection in convertible switchboards where saddle lug termination is not available, dip conductor ends in solder prior to termination. Do not clip conductor strands.

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5. Coordinate equipment terminations with equipment supplier to insure that terminals provided conform with requirements specified herein.
6. For connections at motors, use lugs on motor and branch circuit conductors, bolted and taped. For conductors No. 8 AWG and smaller, crimp lugs to conductors.
7. Splice grounding conductors by means of exothermic welding and terminate by means of approved grounding connectors. Do not solder.
8. Tape all noninsulated connections with lap wound layers of vinyl plastic tape (Scotch #88) or lap wound layers of rubber tape covered by lap wound layers of friction tape, too provide insulation equivalent to 150 percent of the conductor's insulation, but in no case less than three layers. Split bakelite casings with stainless steel spring clips designed for specific connectors may be used alternately.
9. Position all splices in pull boxes and junction boxes, so they are accessible from the removable cover side or the box.
10. Provide waterproof connections in wet locations. Pencil and roughen conductors and apply rubber tape equal to insulation thickness. Cover with two half-lapped layers of 8.5 mil, all weather, vinyl plastic tape, suitable for below freezing application, and coat with sealant. Form conductors into drip loops so that water does not collect on connections. Blow out conduit to remove moisture and seal conduit ends with waterproof compound.

D. Connector and Terminations, Signal Systems and Control:

1. Run conductors from equipment to terminal cabinets and devices. Do not splice.
2. In terminal cabinet and junction boxes terminate on solder terminals, screw type terminals, telephone type punch terminals or wire wrapped terminals.

3. At equipment or devices terminate on screw type terminals throughout.
4. For fire alarm systems and control use screw type terminals throughout.
5. For flexible connection use stranded conductors and crimp type lugs.
6. For shielded conductors, make shield continuous and isolate shields from ground and other shields.

3.11 EQUIPMENT INSTALLATION

- A. Clearances: Maintain required aisles, work space and clearances in front of equipment and behind accessible section of freestanding equipment as required by code and follows:
 1. For equipment less than 600 volts to ground, maintain 3 feet clear minimum in front, 3-1/2 feet between accessible side and grounded surface, and 4 feet between rows.
 2. For equipment over 600 volts to ground, maintain 5 feet clear minimum in front, 6 feet between accessible side and grounded surface, and 9 feet between rows.
 3. For dry ventilated transformers, maintain minimum clearance between transformer ventilation openings and adjacent structure: 12 inches below 300 KVA; 24 inches for 300 KVA and larger.
- B. Mounting Heights:
 1. Install panelboards on a common wall with tops even. Mount panels at 78 inches to top unless approved otherwise.
 2. Mount individual switches, starters, or controls at 72 inches from finished floor to top. Where required to be lower by equipment arrangement or configuration maintain 18 inches to bottom from finished floor.
- C. Fastening: Fasten floor standing equipment with four 5/8 inch bolts minimum. Grout channel sills, where provided into concrete pad. Fasten surface mounted equipment to structural wall members. Provide support channel spanning structural members where equipment does not span members.

- D. Panelboards: Install three 3/4" conduits minimum from each flush mounted panelboard into accessible ceiling space above and below panel and cap.

3.12 LIGHTING FIXTURE INSTALLATION

- A. Connections: Use Underwriters' Laboratories approved solderless connectors as specified elsewhere herein, for splicing.
- B. Blocking: Provide supplementary blocking and support under this section, as required to support fixture from structural members adequate for fixture weight.
- C. Pendant Fixtures: Suspend fixtures with one piece steel stems with white enamel or lacquer finish and matching canopies using ball aligner swivels allowing 45 degree swing. Hangers to be approved for seismic conditions by enforcing agency.
- D. Pendant Mounted Fluorescent Fixtures, Continuous Rows: Provide rigid coupling between fixtures, fastened to each fixture with a minimum of two bolts. Hang fixtures with two supports per eight foot or four foot fixture. Limit continuous rows to forty foot length separated by 1-1/2 inch minimum with separate circuit connections to separated rows. Do not nipple between separated rows. Provide an approved swivel at the junction of stem and fixture. Where indicated, provide channel bracing for rows of fixtures.
- E. Surface Mounted Fixtures: Secure to structural members or to metal supports which span structural members with 1/4 inch minimum machine screws. Strip fixtures may be secured to T-bars with scissor clips designed for the purpose and 1/4 inch machine screws.
- F. Fixture Outlets: In accessible tile ceilings, locate outlet within four feet of fixture, rigidly fastened to structural member or suspended from structure with rod or channel. In nonaccessible ceilings, provide access to outlet through fixture housing or by lowering fixture from ceiling.

- G. Connections: Provide fixture outlet for each fixture, continuous row, or cluster of fixtures, which can be connected by six foot flexible connections. Do not use fixtures as pull or junction boxes. Do not flex between separated, suspended fixtures. Surface mounted fixtures, separated by not more than six inches in utility areas, may be nipped together. Connect from recessed fixtures to fixture outlet with six foot length of flexible conduit and conductors with insulation type described under Paragraph "Conductors".
- H. Machine Rooms: Prior to installation, coordinate light fixture location in machine rooms with equipment, piping, and ductwork to properly illuminate room and avoid interferences.
- I. Adjustable Fixtures: Aim adjustable fixtures as directed by Architect. For exterior units, adjust during evening hours to Architect's satisfaction.
- J. Location: Locate fixture outlets, recessed fixtures, and determine the length of custom, continuous row cove or "reverse cove" fixtures by reference to Architectural Drawings and measurement of building construction. Do not scale electrical drawings.
- K. Lamping: For initial lamping of overhead fluorescent fixtures during construction, omit diffuser installation. Prior to final acceptance and when directed by the Owner in writing, clean the fixtures, remove construction lamps relamp with new lamps and install diffusers.

3.13 AUXILIARY SYSTEMS AND EQUIPMENT

- A. Air Conditioning, Heating, Ventilating and Plumbing Control:
 - 1. Provide Under This Section:
 - a. Motor control centers, motor starters, disconnects, circuit protection, items of industrial control, individually mounted controls, as specified or required.
 - b. Control wiring in conduit, to remote line voltage control devices, where indicated on the drawings.
 - c. Connections to motors and controls as shown, but coordinated with motor supplier.

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- d. Verification of point of connection to motors with equipment suppliers prior to conduit installation. For roof mounted exhaust fans, rise within housing where possible.
 - e. Connection to package unit controls furnished as part of equipment.
 - f. Installation and connection of separately mounted electric line voltage thermostats and controls furnished with equipment, as indicated.
 - g. Connection to devices in piping or ductwork (such as aquastats, solenoids, float switches) installed under Division 15.
2. The following is specified to be provided under other divisions:
 - a. Furnishing and installation of motors.
 - b. Furnishing of thermostats, and controls which are part of equipment.
 - c. Furnishing and installation of air conditioning chiller starters as specified in Division 15.
 - d. Installation of devices in piping or ductwork.
 3. Refer to Divisions 15 and 17 of the specifications, and mechanical and electrical drawings to establish complete scope of work.
- B. Interior Public Telephone System - Provide:
1. Empty telephone raceway system for the telephone utility's wiring as indicated on the drawings and as specified herein, including all distribution conduit, wireways, sleeves, grounds, pull wires, plywood backboards, outlets and plates indicated on the drawings. Minimum conduit to be 3/4 inch trade size.
 2. Conduit bends with a minimum radius in feet equal to the diameter of conduit in inches, and not exceeding the equivalent of two 90 degree bends in a single run. Where over two 90 degree bends as required, install accessible pull box in run. Bus ends of all conduits. Do not use condulets.

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3. Conduits at telephone terminal backboards terminated 6 inches above floor or within 6 inches of top of backboard.
4. Outlets and split type telephone plate for each outlet.
5. Plywood terminal backboards, 8 feet high by length indicated, for telephone and/or signal systems where indicated on electrical drawings, of 3/4 inch thick, APA exterior grade Douglas Fir A-C treated with fire retardant chemical to provide a flame spread rating of not more than 25 when tested according to ASTM E84. Install backboards over plaster or gypsum wallboard, not directly to studs. Use full sheets where practicable and attach to plaster walls with 1/4 inch flat head toggle bolts.

Attach to gypsum wall board using fire retardant,, nonexplosive contact cement, applied in strips spaced 16 inches on center horizontally or vertically cross panels, and in a continuous band around perimeter of panels. Install panels with clear face exposed to view and with long dimension vertical.

- C. Communications and Signal Raceway Systems: Provide empty raceway systems, including sleeves, grounds, pullwires, cabinets and plywood backboards as indicated on the drawings for wiring systems provided under other sections or by the Owner.
- D. Electrically Operated Equipment:
 1. Where electrically operated equipment indicated on the drawings is specified under other divisions of the specification, provide unless otherwise indicated, all conduit, wiring and connections under this section as required for proper operation and in accordance with wiring diagrams furnished by equipment supplier.
 2. Install controls furnished by equipment supplier, and provide disconnect switches within sight of controller.
 3. Refer too equipment specification for coordination of work.
- E. Food Service Equipment and Appliances:
 1. Appliances and equipment are installed under other sections of these Specifications, or by Owner. Provide connections and/or outlets as indicated on drawings.

2. Determine exact location, mounting height and type of outlets and/or stub-ups required from shop drawings furnished by appliance supplier. Do not scale electrical drawings.
3. In general, equipment requiring more than 1650 watts and motors 1/2HP or larger will operate on 208 or 480 volts, 1 or 3 phase, and motors 1/3 HP or smaller will operate on 120 volts, 1 phase. Verify equipment ratings with supplier before circuiting.
4. Provide and install heavy duty 3 wire cord and plug for toasters, suitable for rating or appliance.
5. Install disposer controls in accessible position near unit on mounting bracket and connect all controls.
6. Install all controls furnished by equipment supplier and provide all required disconnect switches.

F. Owner Furnished Equipment:

1. Owner Furnished Owner Installed (OFOI): Provide circuiting and terminations as indicated on drawings. Verify all provisions with Owner prior to installation. Owner will install and make final connections.
2. Owner Furnished, Contractor Installed (OFCI):
 - a. Items indicated as OFCI will be delivered to the site by the Engineer.
 - b. Confer with the Engineer to establish required delivery schedule for all Owner furnished items within 15 days after the award of the contract. At this time, submit quantity takeoffs itemizing the specified item, the quantity required and the desired delivery date.
 - c. Take delivery, unpack, check assemble, distribute, install and connect in place, complete, the items indicated as OFCI electrical equipment, provided in accordance with equipment requirements as obtained from the Engineer.

- d. Make a complete and careful check of all materials and furnish a receipt acknowledging acceptance of the delivery and condition of the materials delivered.
- e. After such acceptance, assume full responsibility for the safekeeping and protection of same, until such time as the complete installation has been approved and accepted.
- f. Furnish and install any auxiliary mounting or installation supports required in connection with lighting fixtures or equipment installed but not furnished under this section, such as inserts and bolts.
- g. Provide the branch circuiting terminating in outlets, junction boxes, or disconnect switches as indicated on the drawings. Verify exact location of connection point on the equipment with Owner prior to installing provisions.
- h. Insure that the appropriate structural, architectural, and utility rough-ins have been provided in accordance with equipment requirements as obtained from Engineer.
- i. Clean the equipment and with the Vendor's representative, test the equipment in the presence of the Engineer.
- j. Include as part of the basic proposal any appropriate allowances for general overhead and profit as a result of the provisions of this subsection.

3.14 PROTECTION AND CLEANING

- A. **Materials and Equipment:** Cover all transformers, switchboards, panelboards, lighting fixtures, etc., stored or installed on the site, with polyethylene sheets or approved equivalent, to protect equipment from moisture, plaster, cement, paints, or other work of other trades. Cover outlet boxes with cardboard or plastic closures. Plug or cap conduit ends until final connection. Protect conduit stubs, stub-ups and risers from construction equipment.
- B. **Storage:** Provide proper and adequate storage facilities. Store conductors, raceways and fittings, in dry, protected locations.

- C. Damage: Replace all damaged or defective work, materials or equipment. Install sensitive or delicate equipment after major construction work is completed.
- D. Parts: Store and protect all portable and detachable parts or portions of the installation such as spare parts, fittings, fuses, keys, locks, adapters, locking clips and inserts until completion of the work. As a precondition for acceptance of the work, deliver to the Engineer and obtain itemized receipt. Include receipts with the Operating and Maintenance Instruction Manual (s) required under other paragraphs of the specifications.
- E. Site Cleaning: Periodically remove waste and rubbish and maintain order.
- F. Equipment Finish: Clean and polish finished metal surfaces. Clean and prepare prime coated gear for painting.
- G. Light Fixtures: Remove dust and handprints from light fixture surfaces. Clean diffusers before project acceptance.
- H. Electrical Equipment: Clean exterior and interior of all equipment. Vacuum interiors - do not blow out. Apply permanent identification and remove temporary and unauthorized notations.
- I. Acceptance: Remove all debris, dirt, grease and oil from building surfaces, caused by work under this section. Clean out and vacuum electric rooms.

3.15 PAINTING

- A. In Equipment and Utility Areas: Provide factory finished equipment including prime coat and medium dark gray finishing over rust-inhibitor.
- B. Outdoors and in Wet Locations: Provide additional factory coat of exterior lacquer for a two mils finish thickness. Indicate finish on shop drawings.
- C. In Public Areas: Provide shop prime coat for equipment installed flush in painted walls. Finish painting is under Section "Painting".

- D. Touch up: Use factory supplied paint for touch up of rusty or scratched surfaces. Replace marred or scratched plated finishes.
- E. Supports: All conduit hangers, racks and structural supports for electrical material and equipment required under other paragraphs to be galvanized or plated, to be field painted, if not plated, under this work in conformance with Section "Painting".

3.16 IDENTIFICATION AND WARNING SIGNS

A. Nameplates - General:

- 1. Provide laminated, engraved plastic nameplates with one-half inch high letters for all switchboards, motor control centers and panelboards.

Provide similar nameplates with three-eighths inch high letters for transformers, time switches, individually mounted breakers, switches and controls, and switchboard and motor center branch devices. Attach nameplates to gear with sheet metal screws. Adhesive mounted nameplates are not acceptable.

- 2. Include nameplate schedule on shop drawing submittals.
- 3. Indicate on gear nameplates:

Line 1	Equipment Designation
Line 2	Voltage, Phase, Number of Wires

Example	"PANELBOARD" 120/208 VOT, 3 PHASE, 4 WIRES
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- 4. Indicate equipment and/or equipment controlled and designation on component nameplates. Examples:

Example	Motor Starter "AIR HANDLING UNIT AH-1"
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- 5. Install panelboard nameplates behind panel door in public areas and on panel face in equipment rooms.

B. Nameplate Color Schedule:

1. 277 through 600 volts - green letters on white label.
2. 120 through 240 volts - black letters on white label.
3. Fire Alarm System: Black letters on red label.
4. Communication or Signal Systems: White letters on black label. Identify system.

C. Stencilled Designations and Labels:

1. Provide stencilled designations for the following with 1/2 inch high letters on background of contrasting color, colors as outlined under nameplates fabricate stencils of brass and deliver to Owner on completion of work.
 - a. Junction boxes and cabinets of signal and communication systems identifying system and voltage.
 - b. 277 volt lighting outlet and junction boxes - 277/480.
 - c. 480 volt outlet and junction boxes - 480 VOLTS.
 - d. Conduit runs on 25 foot centers and on both sides of wall and floor penetrations, where visible from floor as follows:
 - 1) Indicate circuit designation and number on all feeders.
 - 2) Indicate system on all signal and communications system conduit sized 1-1/2 inches and larger.
2. At all fusible devices, either individually mounted or part of gear, provide a label (as supplied by fuse manufacturer) or nameplate inside each switch cover, indicating specific type of fuse required for replacement.
3. All junction box covers shall have panel and circuit of each conductor marked on cover with waterproof ink.

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D. Conduit and Conductors:

1. Tag feeders at panels, switchboards, pull boxes, and other accessible enclosures, indicating circuit number and conductor ampere rating.
2. In exterior or wet locations and for medium voltage conductors in all locations, provide 1-1/2 inch diameter brass discs engraved or stamped with 3/8 inch high letters and tied with No. 16 gauge galvanized wire.
3. In interior dry locations, provide metal or laminated plastic discs as above, attached with nylon cord.
4. Tag exposed ends of conduit stubs indicating system, name of panel, switchboards, etc., of origin and conduit size.
5. Identify all branch circuit system conductors with premarked, self-adhesive, wraparound cloth wire markers, indicating circuit number and name of panel, cabinet, etc., of origin, at panelboards, motor centers, switchboards, terminal cabinets, wireways, junction boxes and at outlet boxes containing more than one neutral wire.
6. Provide, above underground conduits stubbed for future use, engraved flush bronze marker anchored in 4 inch square by 12 inch deep concrete block, flush with grade, indicating system, conduit size and point of origin.

E. Devices: Machine engrave on each device plate with 3/16 inch high block letters filled with black enamel as follows:

1. All device plates - panel and circuit number of devices.
2. Lock switch and switch with pilot light - device controlled.
3. Switch for fan, motor, unit heater - equipment controlled.
4. Switch where lights or equipment are out of sight equipment controlled.
5. Switches in gangs of three or more - description of lights or equipment switched.

6. Receptacles over 150 volts to ground and/or 30 amperes and higher rating - voltage and ampere rating.
 7. Where wording is not indicated, allow for ten letters per device and use wording as directed.
 8. For switch cabinets engrave each device or provide engraved nameplate.
- F. Warning Signs: Provide signs with 1 inch high black letters in all electrical and communication rooms and closets reading: ELECTRICAL (OR SIGNAL) ROOM - NO STORAGE PERMITTED.
- G. Panel Schedules: Provide typewritten panel schedules on inside of panel doors behind clear plastic. Indicate as-built number and type of outlets served and general location of outlets or fixtures and/or item of equipment served.
- H. Diagrams: For signal and communication systems, provide block wiring and location diagram mounted behind clear plastic and posted at system control location or as directed. Submit diagram for approval with shop drawings.

3.17 TESTS

- A. General: Provide testing as specified under individual equipment and system specifications and as follows:
1. Upon completion of the work, and as a condition for acceptance, test all components and systems in the presence of the Engineer to demonstrate compliance with the specifications. Provide tests as specified and as required by the code or enforcing authorities.
 2. Provide supervisory personnel experienced with the particular systems involved, and where specified, arrange for the presence of factory representatives to direct indicated testing. Check all field connections prior to testing.
 3. Provide all required testing instruments and pay all costs for testing and for any resulting repair or replacement.
 4. Tighten all bolted connections and meggar all equipment and bus prior to testing.

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5. Tabulate all test data and prepare typewritten report covering all testing performed and include in Operating and Maintenance Instruction Manual(s).
- B. Test and Measurements: Include all required factory service engineering time to cover the outline testing. Submit a per diem cost to cover additional testing which may be requested.
- C. Ground Resistance: Test ground resistance at each ground loop for transformer grounding and at the secondary of each transformer, sized 75 KVA and larger. Perform test in accordance with the latest edition of James G. Biddle manual on "Earth Resistance Testing" and describe tests and results in test report. Where ground resistance is in excess of specified values add ground electrodes as required to meet specifications. Perform tests before associated slabs are poured so that corrective measures are not precluded.
- D. Switchboards: Set, test and operate each operable device.
- E. Ground Fault Detectors: Verify proper neutral grounding and installation of ground fault detector. In zero sequence system, neutral and phase conductors to pass through sensor in same direction and equipment ground to be outside sensor. Demonstrate operation of each detector using factory authorized test equipment.
- F. Conductors: Test for continuity short circuit and improper ground. Meggar all feeders with switchboards and/or panels connected, but with branch loads disconnected, and meggar circuits for 20 HP and larger motors. Insulation resistance to be not less than cable manufacturer's recommendation.
- G. Panelboards: Test with main disconnect open branch circuits connected, wall switches closed, lighting fixtures and/or outlets permanently connected, without lamps for neutral ground, short circuit, continuity, improper ground, and multiple neutral grounds.
- H. Signal and Communication Systems: Factory engineer to test each system to demonstrate specified operation of all components. For code required systems, arrange for code authorities to witness tests.

- I. Ground Fault Interrupting Receptacle:
 1. Verify that receptacle is installed per manufacturer's instructions and terminal connections are secure and clean.
 2. With the aid of a GFI Tester, Such as Hubbell #GFT2-G, verify:
 - a. Hot - neutral - ground connections.
 - b. At two and three milliamps respectively, GFI shall not trip within 10 seconds.
 - c. At five milliamps, GFI shall trip within one second.

- J. Adjustments: After project loads are in full operation, and a time acceptable to the Owner.
 1. Take voltage readings at each transformer. Where voltage on secondary of building transformers is above or below required rating in excess of 2-1/2 percent at full load, make appropriate tap changes.
 2. Take current readings on each phase at each panel. Adjust branch circuiting between phases where required to balance phase currents within 10 percent. Reflect revisions in panel schedules. Circuit revisions shall not compromise multiwire circuits sharing a common neutral.
 3. Tabulate adjustment data by transformer and panel and submit with test data.

END OF SECTION

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SECTION 16100-1
ELECTRONIC SYSTEMS

1.00 GENERAL

1.01 SCOPE: Work includes but is not necessarily limited to the following:

- A. Definitions, guarantees, submittals, clean-up, as-builts and all other applicable requirements of Documents 0, Division 1 and Section 16010 apply to the work of this section.
- B. Examine all other sections for work related to those sections which are required to be included as work under this section.
 - 1. Fire alarm system.
 - 2. Clock system.
 - 3. Paging system.
 - 4. Closed circuit television system complete.
 - 5. All work and material required in order to produce complete and operable systems under this section not provided under the work of any other section.
 - 6. Testing and equalization.
 - 7. Coordination of conduit work with electrical section, coordination of devices.
 - 8. Wiring diagrams and shop drawings.
 - 9. Record drawings.
 - 10. Permits, inspections, fees.
 - 11. Identification and instruction.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Conduit, speaker back boxes, grilles (Section 16010).
- B. Telephone equipment.

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SECTION 16100-2
ELECTRONIC SYSTEMS

- 1.03 **CONDITIONS:** Examine other sections and Section 16010 and ascertain their effect upon and relationship to the work in this section. Provide the products, and execute the work for this section in accordance with the product and execution requirements, where applicable, as set forth in Section 16010 to provide interrelated electrical system.
- 1.04 **MATERIALS:** Throughout the specification, types of material may be specified by manufacturer's name or catalog number in order to establish standards of quality and performance and not for the purpose of limiting competition. Unless specifically stated otherwise, the bidder may assume the phrase "or approved equal", except that the burden is upon the bidder to prove such equality. If the bidder elects to prove such equality, he must request, in writing, approval from the Architect and Engineer to substitute such items for the specified item. Provide supporting data and samples, if required, to permit a fair evaluation of the proposed substitute with respect to quality, service ability, warranty and cost. Such supporting data shall include the basic specifications characteristics and other information concerning the proposed substitution demonstrating its equality the specified item(s) and the effect of the substitution on the schedule and cost, if any.
- 1.05 **GENERAL**
- A. Installation of all conduit, wire, sleeves, outlet boxes, insulating bushings, system cabinets, terminal boxes, junction boxes, inserts, anchors, system devices, etc., shall be in accordance with the appropriate requirements of the Southern California Rapid Transit Division.
 - B. Coordinate the work of all trades involved so that exact locations are obtained for all outlets, apparatus, appliances and wiring.
 - C. Provide 3/16" diameter polyethylene or polypropylene pull ropes, with 700 pound minimum breaking strength in all empty conduits provided for this section under Section 16010 Electrical.
 - D. Major equipment for each system specified herein shall be products of a single manufacturer, as far as practicable, of established reputation and experience, who shall have produced similar apparatus for a period of at least 5 years and who shall be able to refer to similar installations now rendering satisfactory service.

1.06 FIRE ALARM SYSTEM

A. General:

1. Furnish and install a complete and operable Pyrotronics Fire Alarm System as herein described. It shall be installed as a single unit, supplied by the same manufacturer, properly interconnected, wires tagged, neatly laced and formed, and to operate in a manner satisfactory to the Engineer.
2. Furnish a letter from the representative of the manufacturer to the effect that the systems involved in this section are correctly and satisfactorily installed and guaranteed for a one year period from the date of final installation.
3. The manufacturer shall have a factory authorized service center within a 50 mile radius of the job site and provide 24 hours, seven day a week service.
4. The manufacturer shall present to the Owner, at the completion of the project, a one year maintenance contract, to provide a regularly schedule preventive maintenance program, and a Fire Alarm Inspection and Testing Agreement.

B. Operation of the Fire Alarm Control Panel shall be as follows:

1. Normal Condition: All system alarm and trouble LEDs shall be off. All function switches shall be in a normal position. Only the Normal Power LED shall be illuminated at this time.
2. Trouble Conditions:
 - a. An open in any portion of any alarm initiating loop shall report trouble to the control panel. An open in any portion of the smoke detector power wiring shall report trouble to the Control Panel. Any open in any portion of the bell circuit shall report trouble to the Control Panel.
 - b. In addition, a shorted bell loop also cause a trouble indication at the Control Panel. A grounded wire condition, whether a positive or negative state, shall indicate a trouble condition at the Control Panel.

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- c. Primary power failure will be indicated at the Control Panel via battery standby. Standby batteries and charger unit are monitored for low, overcharged, disconnected, or polarity reversed batteries. Charger is monitored for trouble conditions. Any of these conditions shall indicate their respective trouble at the Control Panel.
 3. Alarm Conditions:
 - a. Activation of the manual pull station shall sound the general alarm in all buildings.
 - b. Activation of any smoke detector shall sound the general alarm in the building of alarm only.
 - c. Activation of any thermo-detector shall sound the general alarm in the building of alarm only.
 - d. The appropriate control module zone shall indicate alarm condition of the area of the alarm activation.
 - e. The alarm signals shall sound until such time as the system components are reset.
- C. Equipment:
 1. Fire Alarm Control Panel shall consist of a mother board, a transformer, dual zone, with test switch, signal module, and a 4 round coder. It shall all be housed in a compact self-contained cabinet with a locked door and a viewing glass to view status of LEDs. One manual station shall be located in the supervisor/clerks office to sound general alarm by authorized personnel.
 2. Smoke detectors shall be listed UL to the current standard for photoelectric type smoke detectors (UL 168 and 167). Detectors shall be rate compensated typical 135⁰, fixed sensitivity, providing minimum response time to all types for fires. The detector light source shall be an LED, and operate on the multiple cell concept regulating photocell circuit matched to the smoke detection alarm circuitry from the same 2 wires. The detector shall lock-in an alarm and have a lock-in alarm/trouble indicator light.

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3. Heat and rate-of-rise detectors - Thermodetectors, shall be rated at 136^oF fixed temperature with an air chamber, vent, flexible metal diaphragm, to operate on the rate-of-rise principle.
4. Bells shall be vibrating, 6" red 24 VDC rated at not less than 90 db.
5. Horns shall be 24 VDC, red, polarized, rated at not less than 102 db. Fire alarm horns shall be fully supervised and be parallel connected. They shall be flush mounted in a 5911 box.
6. Zoning shall be as indicated on the plans.
7. Wiring: Wiring of the system shall be done to conform with the fire alarm manufacturer's wiring diagram, and in accordance with the instructions of the Owner and/or Engineer.
8. The installation shall be made under the supervision and responsibility of the equipment supplier with all final connections under the supervision of an accredited manufacturer's representative. Proper operation shall be the responsibility of the manufacturer's representative.
9. The manufacturer, or his representative, will instruct the Owner's personnel in the proper operation and basic maintenance of the fire alarm system.

1.07 PAGING SYSTEM

- A. Provide equipment, conduit, wire, cables, outlet boxes, material and labor necessary to provide a complete operating system performing all of the functions described herein and satisfactory to the Owner and Engineer. Equipment and installation material required shall be furnished and installed whether or not enumerated herein or shown. The system shall be checked and guaranteed by a factory authorized sound engineering representative of the manufacturer.

B. Provide the following equipment, or an approved equal:

1. Paging system mixer/amplifier shall consist of a 100 watt Raymer Model No. 810-100A with four (4) inputs as follows: Two (2) microphones, one (1) music and 1 600 ohm telephone. The mixer/amplifier shall be complete with cover and shall have all necessary equipment and devices required to interface with the building AC system, speakers, microphones and local key telephone systems. Four outputs shall be provided: 4 and 8 ohm unbalanced; 25 volts and 70 volts balanced. The unit shall operate from a 115 VAC 60 Hz source.
2. The booster amplifier shall consist of a 100 watt Raymer Model No. 811-100 with one (1) high impedance input which shall be convertible to low impedance. A parallel input shall be provided to enable the booster amplifier to operate in parallel with the mixer amplifier. The booster amplifier shall operate from a 115 VAC 60 Hz source.
3. Inside flush mounted speaker assemblies shall consist of a Soundolier Speaker Model No. C10T70 with 70 volt line transformer with taps mounted in a Soundolier speaker enclosure Model No. 95-8 with a Soundolier baffle Model No. 51-8, and a Soundolier No. 81-8 mounting frame for a T bar ceiling or No. 75-8 mounting ring for stud supported ceilings.
4. Outside speakers shall be Atlas Model No. APR-30T with 70 volt line transformer (tapped as required). The outside speakers shall be switched on or off by a 24 hour timer without affecting the volume of the other speakers.
5. Inside speakers, shop area, shall be ceiling hung Atlas No. APC-30T with 70 volt line transformer (tapped as required).
6. Paging system microphones shall be Shure Model No. 522 with fingertip control bar to actuate mike and external relay and shall be equipped with 7 foot of four conductor (two shielded) cable terminated with a Switchcraft No. A5M Series plug.

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7. Microphone wall receptacles shall be single gang stainless steel wall plate with Switchcraft No. B5F connector.
8. Speaker cable shall be one pair No. 18 stranded wire, Belden No. 8461.
9. Microphone cable in conduit shall be two shielded pairs No. 22 stranded wire, Belden No. 8723.

1.08 MASTER CLOCK SYSTEM

A. General:

1. Furnish and install a complete and operable Master Clock System as herein described. It shall be installed as a single unit, supplied by the same manufacturer, properly interconnected, wires tagged, neatly laced and formed and to operate in a manner satisfactory to the Engineer.
2. Furnish a letter from the representative of the manufacturer to the effect that the systems involved in this section are correctly and satisfactorily installed and guaranteed for a one year from the date of final installation.
3. The manufacturer shall have a factory authorized service center within a 50 mile radius of the job site, and provide a 24 hours, seven day a week service.
4. The manufacturer shall present to the Owner, at the completion of the project, a one year maintenance contract, to provide a regularly schedule preventive maintenance program, and a Fire Alarm Inspection and Testing Agreement.

B. Equipment:

1. The clock and program system shall be a SET/8100 Series as manufactured by the Standard Electric Time Corporation Model Number SET/8100 and constitute the design, type and quality of the equipment to be furnished. Any requests for substitution shall be submitted by the Contractor in writing so that they will be received by the Architect not later than 35 days after the award of the contract. Requests for substitution shall include product data sheets, system wiring diagrams, evidence of UL listing and other information that may be requested to determine if the request for substitution is equal in all respects to the specified equipment. The SET/8100 continuous run master clock shall be the SET/8100 series employing microprocessor and integrated low-power solid state control plug-in printed circuit boards. All IC's shall be socketed for service ability and trouble shooting. The sealed battery-powered crystal controlled reserve shall maintain the time base of the master clock during commercial power failures for a period of up to 100 hours. A constant trickle charge shall be provided by the master clock to maintain the battery at peak reserve power. Circuitry shall be provided within the master clock to correct the minute hand of all system secondaries within one hour of restoration of power. All system secondary clocks will be synchronized twice daily to the master clock time base. Daylight Savings and Leap Year corrections shall be fully automatic without need for manual initiation by means of a switch or time adjustments. Corrections for Daylight Savings and Leap Year not fully automatic and requiring visitations to the job site for these annual adjustments are not acceptable.

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2. The SET/8100 Master Time Programmer shall provide synchronization of all secondary clocks in the system. Two independent clock circuits are controlled from the master, thus providing expansion flexibility. The microprocessor shall incorporate a 365 day programmer which will automatically account for leap years and advances of retard of both master and secondary clocks for daylight savings time. Programming shall be accomplished by using the 16 push-button multifunction keyboard on the face of the Master Clock. A key switch shall protect unauthorized access of the program and shall be keyed the same as the cabinet. Program tapes, bars, ROMS or special equipment at additional costs for programming the master clock are not acceptable. The programmability shall be completely consumer programmability with easy to read pictorial instructions posted inside the door of the master clock. Each program circuit shall be capable of 250 program events, AM or PM, and the event duration shall be adjustable from 1 second to 11 seconds per circuit of program.
- C. Controls: The following controls shall be provided on the front of the unit.
1. Individual manual momentary slide switches for each bell circuit.
 2. An all-call feature for activation of all bell circuits simultaneously.
 3. Manual wall clock correction and power switches for manual operation of secondary wall clocks.
 4. LED indication for day of the week.
 5. LED indication for AM or PM
 6. LED indication for Holiday status.
 7. SCAN capability for the review of any circuit and its contents.
 8. 16 pushbutton multifunction keyboard with key lock switch for access protection.
- D. Service ability: Control circuitry shall be mounted on plug-in printed circuit board cards which may be easily removed for quick replacement and testing.

E. Secondary Clocks:

1. Furnish and install secondary clocks as shown on the plans and as specified herein. Clock case color shall be metal with a textured aluminum finish. Dials shall be white with black Arabic numerals and markers. The hours and minute hands shall be black with the sweep second hand finished in red.
2. The clock movement shall have a protective dust cover and come equipped with a ten inch extension cable with molded connecting plug. A matching receptacle having eight inch color coded leads shall be supplied with each clock.
3. Service area clocks shall be Model Number J100051, 12" round, flush mount wall clock. Office area clocks shall be model Number J100050, 10" round flush mount wall clock. Back box shall be Model Number 105232 Universal back box, flush mount.

F. Program Signals: The Electrical Contractor shall install the program clock as shown on the plans and wire into the signal distribution panel (bell control board) as indicated on the manufacturer's drawing. Provide audible signal chimes in office only, and buzzer in all other locations, where shown on the plans, as per schedule provided by the Owner.

G. Wiring and Installation:

1. All wiring for signal shall be uniformly color coded throughout the transposition of colors will not be permitted. Leave at least 18" free end at all outlets for connections to the equipment and at least 36" free ends at all terminal cabinets.
2. All wiring in terminal cabinets shall be neatly formed, laced and made up on terminal blocks. Wirenut type connections are not acceptable. Contractor shall follow the requirements of the equipment manufacturer in making up wiring terminal cabinets and shall secure information relative to forming lacing grouping and tagging conductors before proceeding with the make-up of terminal cabinets. Color coding shall be as follows:

Clocks: 1#12 RED, 1#12 BLK, 1#12 WHT.

Chimes &

Buzzer: 1#12 YEL, (Common). 1#12 BLU. per bell to bell control board and terminal cabinets.

3. Wiring shall consist of two (2) #12 wires common to all secondary clocks from the master clock and three (3) #12 wires (one GRN, GROUND) to the master clock from an unswitched power source and protected by a 20 amp circuit breaker. Source circuit shall be discrete and shall not share loads with wall plug receptacle and or appliances which may cause inductive AC interference. All wiring shall be in accordance with the National Electrical Code.
 4. The manufacturer's authorized representative shall perform a quality inspection of the final installation and in the presence of the Electrical Contractor and Engineer shall perform a complete functional test of the system.
- H. Guarantee: All components, parts, and assemblies supplied by the manufacturer shall be guaranteed against defects in material and workmanship for a period of 12 months commencing upon start-up and beneficial use, provided such defects are not caused by misuse, abuse, unauthorized tampering or modification or acts of God. Warranty service shall be provided by a qualified factory-trained representative of the equipment manufacturer during normal working hours Monday through Friday excluding holidays. The representative shall be based in a fully staffed branch office located within a reasonable distance from the job site and an adequate supply of repair parts shall be maintained in the branch office. The manufacturer shall not be responsible for consequential damages. The manufacturer's statement of warranty shall be included in the submittals.
- 1.09 CLOSED CIRCUIT TELEVISION SYSTEM
- A. General: Furnish and install a complete and operable closed circuit television system as herein described and shown on the drawings.

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B. Equipment:

1. Cameras shall be RCA TC 2000 Series with V11-110 lenses with mounting arms V 17UM in an environmental housing V84-00H with blower and thermostat assembly Model V8400 HV.
2. Receiver sets shall be RCA TC-1109 (17" desktop monitor).
3. Cabling shall be coaxial Belden Type 8281.
4. Cabling:
 - a. All cabling shall be run in conduit.
 - b. Provide bushed single hole cover plates at outlets.
5. Guarantee: All components, parts and assemblies shall be guaranteed against defects in materials and workmanship for a period of 12 months commencing upon start-up.
6. Testing: The system shall be tested and demonstrated to the Owner prior to acceptance.

END OF SECTION