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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**NOTICE TO CONTRACTORS
INSTRUCTIONS TO BIDDERS
GENERAL CONDITIONS
AND
SPECIAL PROVISIONS
FOR BUILDING CONSTRUCTION ADJACENT TO STATE
HIGHWAY IN
SHASTA COUNTY AT BURNEY AT THE BURNEY MAINTENANCE FACILITY**

CONTRACT NO. 02-350604
02-Sha-5705

Bids Open: August 27, 2002
Dated: July 29, 2002

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IMPORTANT SPECIAL NOTICES

- Attention is directed to the Notice to Contractors regarding references to the District and District Director's Office. The Office of the District Director for the Northern Region is located at Marysville.
- **Payment Bonds**
Attention is directed to Section 2-1.03, "Contract Bonds," of the Instructions to Bidders, regarding contract bonds. The payment bond shall be in a sum not less than one hundred percent of the total amount payable by the terms of the contract.

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DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

CONTRACT NO. 02-350604

02-Sha-5705

Sealed proposals for the work shown on the plans entitled:

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR BUILDING
CONSTRUCTION ADJACENT TO STATE HIGHWAY IN SHASTA COUNTY AT BURNEY AT THE BURNEY
MAINTENANCE FACILITY**

will be received at the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, CA 95814, until 2 o'clock p.m. on August 27, 2002, at which time they will be publicly opened and read in Room 0100 at the same address.

Proposal forms for this work are included in a separate book entitled:

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR
BUILDING CONSTRUCTION ADJACENT TO STATE HIGHWAY IN SHASTA COUNTY AT BURNEY AT THE
BURNEY MAINTENANCE FACILITY**

General work description: Construct equipment storage bays, resident mechanic's facility, covered storage buildings and wash rack.

This project has a goal of 3 percent disabled veteran business enterprise (DVBE) participation.

No prebid meeting is scheduled for this project.

Bids are required for the entire work described herein.

At the time this contract is awarded, the Contractor shall possess either a Class A license or Class B license or a combination of Class C licenses which constitutes a majority of the work.

The Contractor must also be properly licensed at the time the bid is submitted, except that on a joint venture bid a joint venture license may be obtained by a combination of licenses after bid opening but before award in conformance with Business and Professions Code, Section 7029.1.

This contract is subject to state contract nondiscrimination and compliance requirements pursuant to Government Code, Section 12990.

Preference will be granted to bidders properly certified as a "Small Business" as determined by the Department of General Services, Office of Small Business Certification and Resources at the time of bid opening in conformance with the provisions in Division 0.027, "Small Business Preference," of the special provisions, and Section 1896 et seq, Title 2, California Code of Regulations. A form for requesting a "Small Business" preference is included with the bid documents. Applications for status as a "Small Business" must be submitted to the Department of General Services, Office of Small Business Certification and Resources, 1531 "I" Street, Second Floor, Sacramento, CA 95814, Telephone No. (916) 322-5060.

A reciprocal preference will be granted to "California company" bidders in conformance with Section 6107 of the Public Contract Code. (See Divisions 2 and 3 of the special provisions.) A form for indicating whether bidders are or are not a "California company" is included in the bid documents and is to be filled in and signed by all bidders.

The District in which the work for this project is located has been incorporated into the Department's Northern Region. References in the Instruction to Bidders or the General Conditions or in the special provisions to the district shall be deemed to mean the Northern Region. The office of the District Director for the Northern Region is located at Marysville.

Project plans, special provisions, and proposal forms for bidding this project can only be obtained at the Department of Transportation, Plans and Bid Documents, Room 0200, MS #26, Transportation Building, 1120 N Street, Sacramento, California 95814, FAX No. (916) 654-7028, Telephone No. (916) 654-4490. Use FAX orders to expedite orders for project plans, special provisions and proposal forms. FAX orders must include credit card charge number, card expiration date and authorizing signature. Project plans, special provisions, and proposal forms may be seen at the above Department of Transportation office and at the offices of the District Directors of Transportation at Irvine, Oakland, and the district in which the work is situated.

Cross sections for this project are not available.

The successful bidder shall furnish a payment bond and a performance bond.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated, and available from the California Department of Industrial Relations' Internet Web Site at: <http://www.dir.ca.gov>. Future effective general prevailing wage rates which have been predetermined and are on file with the Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated July 29, 2002

FTN

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

**INSTRUCTIONS TO BIDDERS
AND
GENERAL CONDITIONS
FOR
BUILDING CONSTRUCTION**

JANUARY 2002

Issued by

DEPARTMENT OF TRANSPORTATION



Contract No. 02-350604

INSTRUCTIONS TO BIDDERS

SECTION 1

PROPOSAL REQUIREMENTS AND CONDITIONS

1-1.01 GENERAL

- The bidder shall carefully examine the instructions contained herein and shall be satisfied as to the conditions with which the bidder must comply prior to bid and to the conditions affecting the award of contract.
- These instructions form a part of the contract documents.
- Attention is directed to Section 1-1.01, "General," of the General Conditions regarding the use of masculine gender pronouns in these Instructions to Bidders.

1-1.02 CONTRACTOR'S LICENSING LAWS

- Attention is directed to the provisions of Chapter 9 of Division 3 of the Business and Professions Code concerning the licensing of contractors.
- All bidders and contractors shall be licensed in conformance with the laws of this State and any bidder or contractor not so licensed is subject to the penalties imposed by those laws.
- Attention is also directed to the requirements in Public Contract Code Section 10164. In all projects where Federal funds are involved, the Contractor shall be properly licensed at the time the contract is awarded.

1-1.03 EXAMINATION OF PLANS, SPECIAL PROVISIONS AND SITE OF THE WORK

- The bidder shall examine carefully the site of the work contemplated, the plans and special provisions and these instructions to bidders and contract forms therefor. The submission of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and scope of work to be performed, the quantities of materials to be furnished, and as to the requirements of these instructions to bidders, plans, special provisions, and the contract.
- Where the Department has made investigations of site conditions, including subsurface conditions in areas where work is to be performed under the contract, bidders or Contractors may, upon written request, inspect the records of the Department as to those investigations subject to and upon the conditions hereinafter set forth.
- Where there has been prior construction by the Department or other public agencies within the project limits, records of the prior construction that are currently in the possession of the Department and which have been used by, or are known to, the designers and administrators of the project will be made available for inspection by bidders or Contractors, upon written request, subject to the conditions hereinafter set forth. Those records may include, but are not limited to, as-built drawings, design calculations, foundation and site studies, project reports and other data assembled in connection with the investigation, design, construction and maintenance of those prior projects.
- Inspection of those records of investigations and project records may be made at the office of the district in which the work is situated, or in the case of records of investigations related to structure work, at the Transportation Laboratory, Sacramento, California. The records of investigations and project records are not a part of the contract and are available solely for the convenience of the bidder or contractor. It is expressly understood and agreed that the Department assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the investigations thus made, the records thereof, or of project records, or of the interpretations set forth therein or made by the Department in its use thereof and there is no warranty or guaranty, either express or implied, that the conditions indicated by the investigations or records are representative of those existing in or throughout those areas, or any part thereof, or that unlooked-for developments may not occur, or that materials other than, or in proportions different from those indicated, may not be encountered.
- No information derived from the inspection of investigations or compilation thereof made by the Department or from the Engineer, or his assistants, will in any way relieve the bidder or contractor from any risk or from properly fulfilling the terms of the contract.

1-1.04 PROPOSAL FORMS

- The Department will furnish to each bidder a standard proposal form, which, when filled out and executed may be submitted as that bidder's bid. Bids not presented on forms so furnished, and copies or facsimiles of the bidder's completed and executed proposal forms submitted as a bid will be rejected.
- The proposal form is bound together with the contract in a book entitled "Proposal and Contract." The proposal shall set forth the bid price, in clearly legible figures, in the space provided, and shall be signed by the bidder, who shall fill out all blanks in the proposal form as therein required.
- The proposal shall be submitted as directed in the "Notice to Contractors" under sealed cover plainly marked as a proposal, and identifying the project to which the proposal relates and the date of the bid opening therefor. Proposals which are not properly marked may be disregarded.

- All proposal forms other than for “District Opening” projects shall be obtained from the Department of Transportation, Plans and Bid Documents, Room 0200, Transportation Building, 1120 N Street, California 95814, or as otherwise designated in the “Notice to Contractor.”
- Proposals for “District Opening” projects shall be made on forms obtained from the District Director of Transportation in whose district the work is to be performed, but in all other respects the provisions in this Section 1-1.04 shall apply.

1-1.05 REQUIRED LISTING OF PROPOSED SUBCONTRACTORS

- Each proposal shall have listed therein the name and address of each subcontractor to whom the bidder proposes to subcontract portions of the work in an amount in excess of one-half of one percent of the total bid, in conformance with the Subletting and Subcontracting Fair Practices Act, commencing with Section 4100 of the Public Contract Code. The bidder’s attention is invited to other provisions of the Act related to the imposition of penalties for a failure to observe its provisions by using unauthorized subcontractors or by making unauthorized substitutions.
- A sheet for listing the subcontractors, as required herein, is included in the “Proposal and Contract” book.

1-1.055 STATE EMPLOYEES AND DESIGN ENGINEERS MAY NOT BID ON CONSTRUCTION CONTRACTS

- No employee of the State shall be eligible to submit a proposal for, nor to subcontract for any portion of, nor to supply any materials for any contract administered by the Department.
- No engineering or architectural firm which has provided design services for a project shall be eligible to submit a proposal for the contract to construct the project nor to subcontract for any portion of the work. The ineligible firms include the prime contractor for design, subcontractors of portions of the design, and affiliates of either. An affiliate is a firm which is subject to the control of the same persons, through joint ownership or otherwise.

1-1.06 PREVIOUS DISQUALIFICATION, REMOVAL OR OTHER PREVENTION OF BIDDING

- Pursuant to Section 10162 of the Public Contract Code the bidder shall complete, under penalty of perjury, the questionnaire in the Proposal relating to previous disqualification, removal or other prevention of bidding of the bidder, or officers or employees of the bidder because of violation of law or a safety regulation.
- A bid may be rejected on the basis of a bidder, any officer of the bidder, or any employee of the bidder who has a proprietary interest in the bidder, having been disqualified, removed, or otherwise prevented from bidding on, or completing a Federal, State, or local project because of a violation of law or a safety regulation.

1-1.07 PROPOSAL GUARANTY

- All bids shall be presented under sealed cover and accompanied by one of the following forms of bidder’s security:

Cash, a cashier’s check, a certified check, or a bidder’s bond executed by an admitted surety insurer, made payable to the Director of Transportation.

- The security shall be in an amount equal to at least 10 percent of the amount bid. A bid will not be considered unless one of the forms of bidder’s security is enclosed with it.
- The bidder’s bond shall conform to the bond form in the book entitled “Proposal and Contract” for the project and shall be properly filled out and executed. The bidder’s bond form included in that book may be used. Upon request, “Bidder’s Bond” forms may be obtained from the Department of Transportation.

1-1.08 COMPLIANCE WITH ORDERS OF THE NATIONAL LABOR RELATIONS BOARD

- Pursuant to Public Contract Code Section 10232, the Contractor shall swear by a statement, under penalty of perjury, that no more than one final, unappealable finding of contempt of court by a Federal court has been issued against the Contractor within the immediately preceding 2-year period because of the Contractor’s failure to comply with an order of a Federal court which orders the Contractor to comply with an order of the National Labor Relations Board. For purposes of Section 10232 a finding of contempt does not include any finding which has been vacated, dismissed, or otherwise removed by the court because the Contractor has complied with the order which was the basis for the finding. The State may rescind any contract in which the Contractor falsely swears to the truth of the statement required by Section 10232.
- The statement required by Public Contract Code Section 10232 is on the page preceding the signature page of the Proposal.

1-1.09 WITHDRAWAL OF PROPOSALS

- Any bid may be withdrawn at any time prior to the date and time fixed for the opening of bids only by written request for the withdrawal of the bid filed at the location at which the bid was received by the Department. The request shall be executed by the bidder or the bidder’s duly authorized representative. The withdrawal of a bid does not prejudice the right of the bidder to file a new bid. Whether or not bids are opened exactly at the time fixed for opening bids, a bid will not be received after that time, nor may any bid be withdrawn after the time fixed for the opening of bids.

1-1.10 PUBLIC OPENING OF PROPOSALS

- Proposals will be opened and read publicly at the time and place indicated in the Notice to Contractors. Bidders or their authorized agents are invited to be present.

1-1.11 REJECTION OF PROPOSALS

- Proposals may be rejected if they have been transferred to another bidder, or if they show any alterations of form, additions not called for, conditional bids, incomplete bids, erasures, or irregularities of any kind.
- When proposals are signed by an agent, other than the officer or officers of a corporation authorized to sign contracts on its behalf or a member of a partnership, a "Power of Attorney" must be on file with the Department prior to opening bids or shall be submitted with the proposal; otherwise, the proposal may be rejected as irregular and unauthorized.

1-1.12 COMPETITIVE BIDDING

- If more than one proposal be offered by any individual, firm, copartnership, corporation, association, or any combination thereof, under the same or different names, all of those proposals may be rejected. A party who has quoted prices on materials or work to a bidder is not thereby disqualified from quoting prices to other bidders, or from submitting a bid directly for the materials or work.
- All bidders are put on notice that any collusive agreement to control or affect the awarding of this contract is in violation of the competitive bidding requirements of the State Contract Act and the Business and Professions Code and may render void any contract let under those circumstances.

1-1.13 RELIEF OF BIDDERS

- Attention is directed to the provisions of Public Contract Code Sections 5100 to 5107, inclusive, concerning relief of bidders and in particular to the requirement therein, that if the bidder claims a mistake was made in the bid presented, the bidder shall give the Department written notice within 5 days after the opening of the bids of the alleged mistake, specifying in the notice in detail how the mistake occurred.

1-1.14 INELIGIBILITY TO CONTRACT

- Public Contract Code Section 10285.1 provides as follows:

Any State agency may suspend, for a period of up to three years from the date of conviction, any person from bidding upon, or being awarded, a public works or services contract with the agency under this part or from being a subcontractor at any tier upon the contract, if that person, or any partner, member, officer, director, responsible managing officer, or responsible managing employee thereof, has been convicted by a court of competent jurisdiction of any charge of fraud, bribery, collusion, conspiracy, or any other act in violation of any State or Federal antitrust law in connection with the bidding upon, award of, or performance of, any public works contract, as defined in Section 1101, with any public entity, as defined in Section 1100, including, for the purposes of this article, the Regents of the University of California or the Trustees of the California State University. A State agency may determine the eligibility of any person to enter into a contract under this article by requiring the person to submit a statement under penalty of perjury declaring that neither the person nor any subcontractor to be engaged by the person has been convicted of any of the offenses referred to in this section within the preceding three years.

- A form for the statement required by Section 10285.1 is included in the Proposal.

SECTION 2

AWARD AND EXECUTION OF CONTRACT

2-1.01 AWARD OF CONTRACT

. The right is reserved to reject any and all proposals. The award of the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed. The award, if made, will be made within 30 days after the opening of the proposals. This period will be subject to extension for any further period as may be agreed upon in writing between the Department and the bidder concerned.

2-1.02 RETURN OF PROPOSAL GUARANTIES

. The proposal guaranties accompanying the proposals of the first, second and third lowest responsible bidders will be retained until the contract has been finally executed, after which all those proposal guaranties, except bidders' bonds and any guaranties which have been forfeited, will be returned to the respective bidders whose proposals they accompany. The proposal guaranties, other than bidder's bonds, submitted by all other unsuccessful bidders will be returned upon determination, by the Department, of the first, second and third lowest responsible bidders.

2-1.03 CONTRACT BONDS

. The successful bidder shall furnish the 2 bonds required by the State Contract Act. One bond shall secure the payment of the claims of laborers, mechanics or materialmen employed on the work under the contract and the other bond shall guarantee the faithful performance of the contract. The bond forms will be furnished to the successful bidder by the Department.

. Except as otherwise provided in Section 3248 of the Civil Code and Section 30154 of the Streets and Highways Code, the payment bond shall be in a sum equal to the contract price and the performance bond shall be in a sum equal to at least one-half of the contract price.

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

2-1.04 EXECUTION OF CONTRACT

. The contract shall be signed by the successful bidder and returned, together with the contract bonds, within 8 days, not including Saturdays, Sundays and legal holidays, after the bidder has received the contract for execution.

2-1.05 FAILURE TO EXECUTE CONTRACT

. Failure of the lowest responsible bidder, the second lowest responsible bidder, or the third lowest responsible bidder to execute the contract and file acceptable bonds as provided herein within 8 days, not including Saturdays, Sundays and legal holidays, after that bidder has received the contract for execution shall be just cause for the forfeiture of the bidder's security. The successful bidder may file with the Department a written notice, signed by the bidder or the bidder's authorized representative, specifying that the bidder will refuse to execute the contract if it is presented. The filing of this notice shall have the same force and effect as the failure of the bidder to execute the contract and furnish acceptable bonds within the time hereinbefore prescribed.

GENERAL CONDITIONS
SECTION 1
DEFINITIONS AND TERMS

1-1.01 GENERAL

- Unless the context otherwise requires, wherever in the specifications and other contract documents the following abbreviations and terms, or pronouns in place of them, appear in the contract documents, the intent and meaning shall be interpreted as provided in this Section 1.
- Working titles having a masculine gender, such as "workman" and "journeyman" and pronouns, such as "he" and "himself", are utilized in these General Conditions, the Instructions to Bidders and the special provisions for the sake of brevity, and are intended to refer to persons of either gender.

1-1.02 ACCEPTANCE

- The formal written acceptance by the Director of Transportation of an entire contract which has been completed in all respects in conformance with the contract documents and any modifications thereof previously approved.

1-1.03 ADDENDUM

- A document or written communication issued by the Department during the bidding period which modifies, supersedes, or supplements the original contract documents.

1-1.04 BIDDER

- Any individual, firm, partnership, corporation, or combination thereof, submitting a proposal for the work contemplated, acting directly, or through a duly authorized representative.

1-1.05 CONTRACT

- The written agreement covering the performance of the work and the furnishing of labor, materials, tools and equipment in the construction of the work. The contract shall include the notice to contractors, Instructions to Bidders, proposal, plans, General Conditions, special provisions and contract bonds; also any and all supplemental agreements amending or extending the work contemplated and which may be required to complete the work in a substantial and acceptable manner. Supplementary agreements are written agreements covering alterations, amendments, or extensions to the contract and include contract change orders.

1-1.06 CONTRACTOR

- The person or persons, firm, partnership, corporation, or combination thereof, private or municipal, who have entered into a contract with the Department of Transportation, as party or parties of the second part or their legal representatives.

1-1.07 DAYS

- Unless otherwise designated, days as used in the contract documents will be understood to mean calendar days.

1-1.08 DEPARTMENT

- The Department of Transportation of the State of California, as created by law.

1-1.09 DIRECTOR

- The executive officer of the Department of Transportation, as created by law.

1-1.10 ENGINEER

- The Chief Engineer, Department of Transportation, acting either directly or through properly authorized agents, the agents acting within the scope of the particular duties delegated to them.

1-1.11 GENERAL NOTES

- The written instructions, provisions, conditions or other requirements appearing on the plans, and so identified thereon, which pertain to the performance of the work.

1-1.12 LABORATORY

- The Division of Engineering Services - Materials Engineering and Testing Services and the Division of Engineering Services - Geotechnical Services of the Department of Transportation, or established laboratories of the various Districts of the Department, or other laboratories authorized by the Department to test materials and work involved in the contract. When a reference is made in the specifications to the "Transportation Laboratory," the reference shall mean the Division of Engineering Services - Materials Engineering and Testing Services and the Division of Engineering Services - Geotechnical Services, located at 5900 Folsom Boulevard, Sacramento, CA 95819, Telephone (916) 227-7000.

1-1.13 LEGAL HOLIDAYS

- Those days designated as State holidays in the Government Code.

1-1.14 LIQUIDATED DAMAGES

- The amount prescribed in the special provisions, pursuant to the authority of Public Contract Code Section 10226, to be paid to the State or to be deducted from any payments due or to become due the Contractor for each day's delay in completing the whole or any specified portion of the work beyond the time allowed in the special provisions.

1-1.15 PLANS

- The official drawings including plans, elevations, sections, detail drawings, diagrams, plates, general notes, information and schedules thereon, or exact reproductions thereof, approved by the Engineer, which show the location, character, dimensions and details of the work to be performed. The plans include any drawings or plates bound within the special provisions.

1-1.16 PREMISES

- The area of State-owned property which surrounds the work site, limited by the property lines thereof. In some cases the premises may coincide with the work site.

1-1.17 PROPOSAL

- The offer of the bidder for the work when made out and submitted on the prescribed proposal form, properly signed and guaranteed.

1-1.18 PROPOSAL FORM

- The approved form upon which the Department of Transportation requires formal bids be prepared and submitted for the work.

1-1.19 PROPOSAL GUARANTY

- The cash, cashier's check, certified check, or bidder's bond accompanying the proposal submitted by the bidder, as a guaranty that the bidder will enter into a contract with the Department of Transportation for the performance of the work if the contract is awarded to the bidder.

1-1.20 SPECIAL PROVISIONS

- The special provisions are specific clauses setting forth conditions or requirements of the work and supplementary to these General Conditions and the Instructions to Bidders. The Department of Transportation publication entitled Labor Surcharge And Equipment Rental Rates is to be considered as a part of the special provisions.

1-1.21 STATE

- The State of California.

1-1.22 STATE CONTRACT ACT

- An act to regulate contracts for the erection, construction, alteration, repair or improvement of any state structure, building, road, or other State improvements of any kind, to be found in Chapter 1, Division 2 of the Public Contract Code.

1-1.23 WORK

- The furnishing of all labor, and the furnishing and installing of all materials, articles, supplies and equipment as specified, designated, or required by the contract.

1-1.24 WORKING DAY

- Every day except Saturdays, Sundays, legal holidays, and those days not charged as working days pursuant to Section 6-1.07, "Time of Completion," of these General Conditions.

1-1.25 WORK SITE

- The area of actual construction and the areas immediately adjacent thereto.

1-1.26 ABBREVIATIONS

AAMA	Architectural Aluminum Manufacturers' Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
APA	American Plywood Association
APHA	American Public Health Association

API	American Petroleum Institute.
AREA	American Railway Engineering Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWPA	American Wood Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
CBC	California Building Code
CEC	California Electrical Code
CS	Commercial Standards (US Department of Commerce)
EIA	Electronic Industries Association
ESO	Electrical Safety Orders
FGMA	Flat Glass Marketing Association
FM	Factory Mutual
FS	Federal Specification
IEEE	Institute of Electrical and Electronics Engineers
ICBO	International Conference of Building Officials
NAAMM	National Association of Architectural Metal Manufacturers
NBFU	National Board Fire Underwriters
NEC	National Electrical Code
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
PEI	Porcelain Enamel Institute
PS	Product Standard (US Department of Commerce)
RIS	Redwood Inspection Service
SCPI	Structural Clay Products Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
TCA	Tile Council of America
TPI	Truss Plate Institute
UBC	Uniform Building Code
UL	Underwriters' Laboratory
UPC	Uniform Plumbing Code
WCLB	Grade Stamp for WCLIB
WCLIB	West Coast Lumber Inspection Bureau (Grade Stamped WCLB)
WIC	Woodwork Institute of California
WWPA	Western Wood Products' Association

Units of Measurement

- Some of the symbols for units of measurement used in the specifications are defined as follows. The symbols for other units of measurement used in the specifications are as defined in ASTM Designation: E-380, or in the various specifications and test referenced in the specifications.

Symbols as used
in the Specifications

Definitions

A	amperes
g	gram
kg	kilogram
ha	hectare (10 000 m ²)
h	hour
J	joule
L	liter
m	meter
km	kilometer
mm	millimeter
μm	micrometer
nm	nanometer
m ²	square meter
m ³	cubic meter
N	newton
N·m	newton meter
Ω	ohm
Pa	pascal
kPa	kilopascal
MPa	megapascal
s	second
tonne	metric ton (1000 kg)
W	watt
V	volt

SECTION 2

CONTROL AND SCOPE OF THE WORK

2-1.01 AUTHORITY OF ENGINEER

• The Engineer shall decide all questions which may arise as to the quality or acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of the work; all questions which may arise as to the interpretation of the plans and special provisions; all questions as to the acceptable fulfillment of the contract on the part of the Contractor; and all questions as to compensation. The Engineer's decision shall be final, and the Engineer shall have authority to enforce and make effective those decisions and orders which the Contractor fails to carry out promptly.

2-1.02 INTENT OF PLANS AND SPECIAL PROVISIONS

• The intent of the plans and special provisions is to prescribe the details for the construction and completion of the work which the Contractor undertakes to perform in conformance with the terms of the contract. Where the plans or special provisions describe portions of the work in general terms, but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the first quality are to be used. Unless otherwise specified, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and do all the work involved in executing the contract in a satisfactory and workmanlike manner.

2-1.03 COORDINATION AND INTERPRETATION OF CONTRACT DOCUMENTS

• These General Conditions, the plans, special provisions, contract change orders, and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complementary, and to describe and provide for a complete work.

• Plans shall govern over these General Conditions; the special provisions shall govern over both these General Conditions and the plans.

• Should it appear that the work to be done or any of the matters relative thereto are not sufficiently detailed or explained in these General Conditions, the special provisions, or the plans, the Contractor shall apply to the Engineer for further explanations as may be necessary and shall conform to them as part of the contract. In the event of any doubt or question arising respecting the true meaning of these General Conditions, the special provisions or the plans, reference shall be made to the Engineer, whose decision thereon shall be final.

• In the event of any discrepancy, between any drawing and the figures written thereon, the figures shall be taken as correct. Detail drawings shall prevail over general drawings and general notes shall prevail over drawings.

2-1.04 SHOP DRAWINGS, DESCRIPTIVE DATA, SAMPLES, AND ALTERNATIVES

• It shall be the Contractor's responsibility to submit, so as to cause no delay in the work, all shop drawings, descriptive data, samples for the various trades as required by the special provisions, and offers of alternatives, if any. The submittals shall be checked and coordinated by the Contractor with the work of other trades involved before they are submitted to the Engineer for examination.

• Submittals shall be delivered to the locations indicated in the special provisions.

• Work requiring the submittal of shop drawings, descriptive data or samples shall not begin prior to approval of that submittal by the Engineer. Fifteen working days shall be allowed for approval or return for correction of each submittal or resubmittal. Approval of submittals shall not operate to waive any of the requirements of the plans and specifications or relieve the Contractor of any obligation thereunder, and defective work, materials and equipment may be rejected notwithstanding the approval of that submittal. Should the Engineer fail to complete his review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in review, an extension of time commensurate with the delay in completion of the work thus caused will be granted pursuant to the provisions in Section 6-1.08, "Liquidated Damages," of these General Conditions, and no additional compensation will be allowed for the delay.

• Submittals shall be made by a letter of transmittal which shall contain a list of all matter submitted and identification of all variations from the plans and special provisions contained in the submittal. The letter and all items accompanying the same shall be fully identified as to project name and location, Contractor's name, district, county, and contract number, with ample cross references to the contract documents, to facilitate identification of items and their location in the work. Additional specific requirements shall be as follows:

Shop Drawings

• The Contractor shall submit at least 5 copies of all shop drawings required by the special provisions. Two copies will be returned to the Contractor either approved for use or returned for correction and resubmittal. Shop drawings include any drawing which requires execution by a draftsman as distinguished from printed matter. The size of shop drawings shall be 559 mm x 864 mm or 279 mm x 432 mm in size.

Descriptive Data

• The Contractor shall submit 5 copies of each set of manufacturer's brochures or other data required by the special provisions. The State will examine the submittals and return 2 copies either approved for use or returned for correction and resubmittal.

Samples

• The Contractor shall submit samples of articles, materials or equipment as required by the special provisions. The work shall be in conformance with the approved samples. Samples shall be removed from State property when directed or may be incorporated in the work if approved by the Engineer. Samples not removed by the Contractor will become the property of the State or, at the State's option, will be removed or disposed of by the State at the Contractor's expense.

Alternatives

• For convenience in designation on the plans or in the special provisions, certain materials, articles, or equipment may be designated by a brand or a trade name or the name of the manufacturer together with catalog designation or other identifying information, hereinafter referred to generically as "designated by brand name". An alternative material, article, or equipment which is of equal quality and of the required characteristics for the purpose intended may be proposed for use provided the Contractor complies with the following requirements:

- 1 The Contractor shall submit his proposal for an alternative in writing. The request shall be made in ample time to permit approval without delaying the work, but need not be made in less than 35 days after award of the contract.
- 2 No proposal will be considered unless accompanied by complete information and descriptive data, necessary to determine the equality of the offered materials, articles, or equipment. Samples shall be provided when requested by the Engineer. The Contractor shall satisfy the Engineer as to the comparative quality, suitability, or performance of the offered materials, articles, or equipment. In the event that the Engineer rejects the use of the alternative materials, articles, or equipment, then one of the particular products designated by brand name shall be furnished.

• Approval of submittals by the Engineer shall not relieve the Contractor from responsibility for the successful completion of the work, nor shall it relieve the Contractor from responsibility for errors in the submittals. A failure by the Contractor to identify in the letter of transmittal, material deviations from the plans or specifications shall void the submittal and any action taken thereon by the Engineer. When specifically requested by the Engineer, the Contractor shall resubmit the shop drawings, descriptive data and samples as may be required.

• If any mechanical, electrical, structural, or other changes are required for the proper installation and fit of alternative materials, articles, or equipment, or because of deviations from the contract plans and special provisions, the changes shall not be made without the approval of the Engineer and shall be made without additional cost to the State.

2-1.045 DIFFERING SITE CONDITIONS

• During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site, the party discovering those conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

• Upon written notification, the Engineer will investigate the conditions, and if the Engineer determines that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding loss of anticipated profits, will be made and the contract modified in writing accordingly. The Engineer will notify the Contractor of his determination whether or not an adjustment of the contract is warranted.

• No contract adjustment which results in a benefit to the Contractor will be allowed unless the Contractor has provided the required written notice.

• No contract adjustment will be allowed under the provisions specified in this section for any effects caused on unchanged work.

• Any contract adjustment warranted due to differing site conditions will be made in conformance with the provisions in Section 3-1.01, "Changes," of these General Conditions, except as otherwise provided.

2-1.05 PRESERVATION AND CLEANING

• The Contractor shall clean up the work at frequent intervals and at other times when directed by the Engineer. While finish work is being accomplished, floors shall be kept clean, free of dust, construction debris and trash. Upon completion of the work, the Contractor shall remove from the premises the Contractor's construction equipment and any waste materials not previously disposed of, leaving the premises thoroughly clean and ready for final inspection.

2-1.06 LIMITATIONS ON WORK SITE AND PREMISES

- The Contractor shall limit the Contractor's construction operations to the work site unless otherwise shown on the plans or specified. The Contractor shall perform no operations of any nature over or on the premises except those operations as are authorized by the plans or special provisions, or as authorized by the Engineer.

2-1.07 SUPERINTENDENCE

- The Contractor shall designate in writing before starting work, an authorized representative who shall have the authority to represent and act for the Contractor.
- When the Contractor is comprised of 2 or more persons, firms, partnerships, or corporations functioning on a joint venture basis, the Contractor shall designate in writing before starting work, the name of one authorized representative who shall have the authority to represent and act for the Contractor.
- The authorized representative shall be present at the site of the work at all times while work is actually in progress on the contract. When work is not in progress and during periods when work is suspended, arrangements acceptable to the Engineer shall be made for any emergency work which may be required.
- Whenever the Contractor or the Contractor's authorized representative is not present on any particular part of the work where it may be desired to give direction, orders will be given by the Engineer, which shall be received and obeyed by the superintendent or foreman who may have charge of the particular work in reference to which the orders are given.
- Any order given by the Engineer, not otherwise required by the specifications to be in writing, will on request of the Contractor, be given or confirmed by the Engineer in writing.

2-1.08 CHARACTER OF WORKMEN

- If any subcontractor or person employed by the Contractor shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, they shall be discharged immediately on the request of the Engineer, and that person shall not again be employed on the work.

2-1.09 INSPECTION

- The Contractor shall at all times permit the Engineer and the Engineer's authorized agents to inspect the work or any part thereof. The Contractor shall maintain proper facilities and provide safe access for inspection by the Engineer to all parts of the work, and to the shops where the work is in preparation. Work shall not be covered up until authorized by the Engineer and the Contractor shall be solely responsible for notifying the Engineer where and when the work is in readiness for inspection and testing. Should any work be covered without authorization, it shall, if so ordered, be uncovered at the Contractor's expense.
- Whenever the Contractor intends to perform work on Saturday, Sunday, or a legal holiday, the Contractor shall give notice to the Engineer of the Contractor's intention 48 hours prior to performing that work, or a longer period as may be specified so that the Engineer may make necessary arrangements.

2-1.10 REMOVAL OF REJECTED AND UNAUTHORIZED WORK

- All work which has been rejected shall be remedied, or removed and replaced by the Contractor in a manner acceptable to the Engineer and no compensation will be allowed to the Contractor for the removal, replacement, or remedial work.
- Any work done beyond the lines shown on the plans or established by the Engineer, or any work done without written authority will be considered as unauthorized work and will not be paid for. Upon order of the Engineer, unauthorized work shall be remedied, removed, or replaced at the Contractor's expense.
- Upon failure of the Contractor to comply promptly with any order of the Engineer made under this Section 2-1.10, the Department may cause rejected or unauthorized work to be remedied, removed, or replaced, and the costs thereof will be deducted from any moneys due or to become due the Contractor.

2-1.11 COST REDUCTION INCENTIVE

- The Contractor may submit to the Engineer, in writing, proposals for modifying the plans, special provisions or other requirements of the contract for the sole purpose of reducing the total cost of construction. The cost reduction proposal shall not impair, in any manner, the essential functions or characteristics of the project, including but not limited to service life, economy of operation, ease of maintenance, desired appearance, or design and safety standards.
- Prior to preparing a cost reduction proposal, the Contractor shall request a meeting with the Engineer to discuss the proposal in concept and to determine the merit of the cost reduction proposal. Items of discussion will also include permit issues, impact on other projects, impact on the project schedule, peer reviews, and review times required by the Department and other agencies.
- Cost reduction proposals shall contain the following information:
 1. A description of both the existing contract requirements for performing the work and the proposed changes.
 2. An itemization of the contract requirements that must be changed if the proposal is adopted.

3. A detailed estimate of the cost of performing the work under the existing contract and under the proposed change. The estimates of cost shall be determined in the same manner as if the work were to be paid for as a change in the work as provided in Section 3, "Changes in the Work," of these General Conditions.
4. A statement of the time within which the Engineer must make a decision thereon.
5. The contract work affected by the proposed changes, including any quantity variation attributable thereto.

• The provisions of this Section 2-1.11 shall not be construed to require the Engineer to consider any cost reduction proposal which may be submitted hereunder; proposed changes in basic design will not be considered as an acceptable cost reduction proposal; and the Department will not be liable to the Contractor for failure to accept or act upon any cost reduction proposal submitted pursuant to this section nor for any delays to the work attributable to any cost reduction proposal. If a cost reduction proposal is similar to a change in the plans or special provisions, under consideration by the Department for the project, at the time the proposal is submitted or if the proposal is based upon or similar to standard special provisions adopted by the Department after the advertisement for the contract, the Engineer will not accept the proposal, and the Department reserves the right to make the changes without compensation to the Contractor under the provisions of this section.

• The Contractor shall continue to perform the work in conformance with the requirements of the contract until an executed change order, incorporating the cost reduction proposal has been issued. If an executed change order has not been issued by the date upon which the Contractor's cost reduction proposal specifies that a decision thereon should be made, or such other date as the Contractor may subsequently have specified in writing, the cost reduction proposal shall be deemed rejected.

• The Engineer shall be the sole judge of the acceptability of a cost reduction proposal and of the estimated net savings in construction costs from the adoption of all or any part of the proposal. In determining the estimated net savings, the right is reserved to disregard the schedules of values if, in the judgment of the Engineer, the schedule does not represent a fair measure of the value of work to be performed or to be deleted.

• The Department reserves the right where it deems action is appropriate, to require the Contractor to share in the Department's costs of investigating a cost reduction proposal submitted by the Contractor as a condition of considering the proposal. Where this condition is imposed, the Contractor shall indicate acceptance thereof in writing, and that acceptance shall constitute full authority for the Department to deduct amounts payable to the Department from any moneys due or that may become due to the Contractor under the contract.

• If the Contractor's cost reduction proposal is accepted in whole or in part the acceptance will be by a contract change order, which shall specifically state that it is executed pursuant to this Section 2-1.11. The change order shall incorporate the changes in the plans and special provisions which are necessary to permit the cost reduction proposal or that part of it as has been accepted to be put into effect, and shall include any conditions upon which the Department's approval thereof is based if the approval of the Department is conditional. The change order shall also set forth the estimated net savings in construction costs attributable to the cost reduction proposal effectuated by the change order, and shall further provide that the Contractor be paid 50 percent of that estimated net savings amount. The Contractor's cost of preparing the cost reduction incentive proposal and the Department's costs of investigating a cost reduction incentive proposal, including any portion thereof paid by the Contractor, shall be excluded from consideration in determining the estimated net savings in construction costs.

• Acceptance of the cost reduction proposal and performance of the work thereunder shall not extend the time of completion of the contract unless specifically provided for in the contract change order authorizing the use of the cost reduction proposal.

• The amount specified to be paid to the Contractor in the change order which effectuates a cost reduction proposal shall constitute full compensation to the Contractor for the cost reduction proposal and the performance of the work thereof pursuant to the change order.

• The Department expressly reserves the right to adopt a cost reduction proposal for general use on contracts administered by the Department when it determines that the proposal is suitable for application to other contracts. When an accepted cost reduction proposal is adopted for general use, only the Contractor who first submitted that proposal will be eligible for compensation pursuant to this section, and in that case, only as to those contracts awarded to that Contractor prior to submission of the accepted cost reduction proposal and as to which the cost reduction proposal is also submitted and accepted. Cost reduction proposals identical or similar to previously submitted proposals will be eligible for consideration and compensation under the provisions of this Section 2-1.11 if the identical or similar previously submitted proposals were not adopted for general application to other contracts administered by the Department. Subject to the provisions contained herein, the State or any other public agency shall have the right to use all or any part of any submitted cost reduction proposal without obligation or compensation of any kind to the Contractor.

• This Section 2-1.11 shall apply only to contracts awarded to the lowest bidder pursuant to competitive bidding.

SECTION 3
CHANGES IN THE WORK

3-1.01 CHANGES

- The Department reserves the right to order changes in the contract at any time prior to the acceptance of the work by the Director, and the Contractor shall comply with the ordered changes. Changes or deviations from the contract shall not be made without authority in writing from the Engineer, and changes to the work without the Engineer's written approval will be considered unauthorized work and will not be paid for.
- On the basis set forth in this Section 3, the contract lump sum price will be adjusted for any ordered change which results in a change in the cost of the work.
- When ordered by the Engineer, the Contractor shall halt work in the area affected by a proposed change. Whenever it appears to the Contractor that a change is necessary, the Contractor shall immediately notify the Engineer of the reasons for that change; however, work in the area affected shall not be discontinued unless ordered by the Engineer.
- For any approved change in the work, the Contractor shall be entitled to an adjustment in time equal to the number of working days which completion of the entire work is delayed due to the changed work, and the State will be entitled to an adjustment in time equal to the number of working days which completion of the entire work is advanced due to the changed work. For ordinary changes, the Contractor's cost estimate for the changed work shall state the amount of extra time, if any, that the Contractor considers should be allowed for making the requested change. Failure to request additional time when submitting the estimate, or failure to submit the estimate, shall constitute a waiver of the right to later claim any adjustment in time based upon changed work. For ordinary changes which decrease the amount of work and for indeterminate type changes, an adjustment in time commensurate with the changed work will be determined by the Engineer. Disagreement as to time adjustments shall not affect contract price adjustments, nor shall it be cause for not proceeding with the changed work when ordered by the Engineer. The Contractor shall have the right, however, to further pursue a time adjustment in the event agreement is not reached.

3-1.01A Ordinary Changes

- The Engineer will notify the Contractor in writing of any proposed changes and describe the intended change. Within 15 days after receipt of a written request, the Contractor shall submit his proposed price to be added or deducted from the contract price due to the change. The Contractor's proposed price to be added to or deducted from the contract price shall be supported by detailed estimates of cost prepared by the Contractor. The Contractor shall also provide information to support any request for an adjustment in contract time which is directly attributable to the changed work. The Contractor shall, upon request by the Engineer, permit inspection of his original contract estimate, subcontract agreements or purchase orders relating to the change.
- If agreement is reached on the adjustment in compensation as provided in Section 3-1.01C, "Agreed Cost for Changes," of these General Conditions, the Contractor shall proceed with the work at the agreed price.
- If the Contractor and the Engineer fail to agree as to the adjustment in compensation for the performance of the changed work, the Contractor, upon written order from the Engineer, shall proceed immediately with the changed work and the contract price will be adjusted in conformance with the provisions in Section 3-1.01D, "Failure to Agree to the Cost of Changes," of these General Conditions.
- If the Contractor fails to submit his cost estimate within the specified 15 day period, the specified period may be extended in writing by the Engineer. If the Engineer does not so extend the specified period, or if the Contractor fails to submit his cost estimate within the extended time period, the Contractor shall commence the work immediately upon receipt of written order from the Engineer and the contract price will be adjusted in conformance with the provisions in Section 3-1.01D, "Failure to Agree to the Cost of Changes," of these General Conditions.

3-1.01B Indeterminate Type Changes

- Changes in the work of a kind where the cost of the work cannot be determined until completed, may be authorized by the Engineer in writing. The written order shall state that it is issued pursuant to this Section 3-1.01B. Upon receipt of a written order from the Engineer, the Contractor shall proceed with the ordered work and the contract price will be adjusted in conformance with the provisions in Section 3-1.01D, "Failure to Agree to the Cost of Changes," of these General Conditions.

3-1.01C Agreed Cost For Changes

- If the Engineer and the Contractor agree as to the adjustment in compensation for the performance of changed work on the basis of the Contractor's proposed cost estimate of the work, the contract lump sum price will be adjusted accordingly. The adjustment in compensation shall be agreed to in writing and executed by both parties.

3-1.01D Failure To Agree To The Cost Of Changes

- When a proposed change order decreases the cost of the work and the Engineer and the Contractor fail to agree upon the decreased cost thereof, the Engineer's estimated decrease in cost will be deducted from the contract price. The Contractor will be allowed 15 days after receipt of a contract change order approved by the Engineer, in which to file a written protest

setting forth in what respects the Contractor differs from the Engineer's estimate of decreased cost, otherwise the decision of the Engineer to deduct the Engineer's estimate of decreased cost shall be deemed to have been accepted by the Contractor as correct.

- In the event the Engineer and the Contractor fail to agree on the cost of a change order which increases the cost of the work, the Engineer will maintain a daily job record containing a detailed summary of all labor, materials and equipment required by the ordered change. At the end of each day's work, the Contractor shall review the Engineer's daily job record comparing with the Contractor's own records, and after agreement is reached, the daily job record shall be signed by both the Engineer and the Contractor and shall become the basis for payment for the changed work. Upon completion of the work under the change order, the Contractor shall submit an invoice listing only those items of labor, materials and equipment that were agreed to by both the Engineer and the Contractor to be in addition to the requirements of the contract, together with allowable markups.

- When there is a failure to agree as to cost, no payment for the changed work will be made to the Contractor until all work called for in the change order has been completed, except that progress payments may be made on those portions of the changed work which the Contractor and the Engineer agree as to cost.

3-1.01E Allowable Costs For Changes

- The only costs which will be allowed because of changed work and the manner in which these costs shall be computed are set forth in Sections 3-1.01E(1) through 3-1.01E(5) of these General Conditions. Where the term "actual cost" is used in the aforesaid sections, it shall be deemed to mean "estimated cost" where the adjustment in compensation is of a necessity based upon estimated costs.

3-1.01E(1) Labor

- The Contractor will be paid an amount based on the actual cost for labor and supervision directly required for the performance of the changed work, including payments, assessment of benefits required by lawful labor union collective bargaining agreements; compensation insurance payments; contributions made to the State pursuant to the Unemployment Insurance Code, and for taxes paid to the Federal Government pursuant to the Social Security Act of August 14, 1935, as amended. No labor cost will be recognized at a rate in excess of the wages prevailing in the locality at the time the work is performed, nor will the use of a labor classification which would increase the cost be permitted unless the Contractor establishes to the complete satisfaction of the Engineer the necessity for payment at a higher rate.

3-1.01E(2) Materials

- The Contractor will be paid an amount based on the actual cost of the materials directly required for the performance of the changed work. The cost of materials may include the costs of procurement, transportation and delivery if necessarily incurred. If a cash or trade discount by the actual supplier is available to the Contractor, it shall be credited to the State. If the materials are obtained from a supply or source owned wholly or in part by the Contractor, payment therefor will not exceed the current wholesale price for the materials. If, in the opinion of the Engineer, the cost of materials is excessive, or if the Contractor fails to furnish satisfactory evidence of the cost to the Engineer from the actual supplier, the cost of the materials shall be deemed to be the lowest current wholesale price at which similar materials are available in the quantities required. The Department reserves the right to furnish the materials required by the change order as it deems advisable, and the Contractor shall have no claim for cost or markups on material furnished by the Department.

3-1.01E(3) Equipment

- The Contractor will be paid an amount based on the actual cost for the use of equipment directly required and approved by the Engineer in the performance of the changed work. No payment will be made for time while equipment is inoperative due to breakdowns or on days when no work is performed. In addition, the rental time shall include the time required to move the equipment to the work from the nearest available source of the required equipment, and to return it to the source. If the equipment is not moved by its own power, then loading and transportation costs will be paid. Moving time, loading and transportation costs will only be paid if the equipment is used exclusively on the changed work during the time between move in and move out. Individual pieces of equipment having a replacement value of \$500 or less shall be considered to be tools or small equipment, and no payment will be made therefor. For equipment owned, furnished, or rented by the Contractor, no cost therefor shall be recognized in excess of the rental rates established by distributors or equipment rental agencies in the locality where the work is performed.

3-1.01E(4) Markups

- When a change order increases the cost of the work, the Contractor may add the following maximum markups to the actual costs of labor, materials, or equipment rental:

- 33 percent for labor;
- 15 percent for materials; and
- 15 percent for equipment rental.

- The above markups include full compensation for bonds, profit and overhead.
- When a change order decreases the cost of the work, the reduction in cost shall include a 5 percent markup on the estimated cost for furnishing the labor, materials and equipment which would have been used on the work had the change order not been issued.
- When a change order involves both added work and deleted work, the markup or markups to be used shall be as follows:

The actual costs of labor, materials, and equipment rental for added and deleted work shall be calculated separately without adding markups. If the difference between the calculated costs for labor results in an increased cost, a markup of 33 percent shall be applied to the increased cost. If the difference between the calculated costs of materials or equipment rental results in an increased cost, a markup of 15 percent shall be applied to the increased costs of materials or equipment rental, as the case may be. If the difference between the calculated costs for labor, materials or equipment rental results in a decreased cost, a markup of 5 percent shall be applied to the decreased costs of labor, materials or equipment rental, as the case may be.

- When added or deleted work is performed by an authorized subcontractor, approved in conformance with the provisions in Section 1-1.05, "Required Listing of Proposed Subcontractors," of the Instructions to Bidders, an additional 5 percent will be added to the total cost of the work including all markups specified in this Section 3-1.01E(4). The additional 5 percent markup shall reimburse the Contractor for additional administrative costs, and no other additional payment will be made by reason of performance of the work by a subcontractor.

3-1.01E(5) General Limitation

- In no event shall any actual cost for added work be recognized in excess of market values prevailing at the time of the change, unless the Contractor can establish to the satisfaction of the Engineer that the Contractor investigated all possible means of obtaining the added work at prevailing market values and that the excess cost could not be avoided by the Contractor. The Engineer will determine the necessity for incurring the costs enumerated above, and as to whether they are directly required for the performance of the changed work. Lump sum quotations may be accepted at the option of the Engineer. When a change order deletes work from the contract, the computation of the cost thereof shall be the values which prevailed at the time bids for the work were opened.

- When work under this Section 3 is performed by forces other than the Contractor's organization, no additional payment will be made by the State by reason of the performance of the work by a subcontractor or other forces, except as provided elsewhere in this Section 3.

SECTION 4
CONTROL OF MATERIALS

4-1.01 MATERIALS

- The Contractor shall furnish all materials required to complete the work, except materials that are designated in the special provisions to be furnished by the State and materials furnished by the State in conformance with Section 3, "Changes in the Work," of these General Conditions.
- Unless otherwise specified in the special provisions, materials furnished by the Contractor for incorporation into the work shall be new. When the quality or kind of materials, articles, or equipment is not specifically indicated, then the quality or kind thereof shall be similar to those which are indicated.
- Articles or materials to be incorporated in the work shall be stored in such a manner as to insure the preservation of their quality and fitness for the work, and to facilitate inspection.
- All materials which do not conform to the requirements of the plans and special provisions, as determined by the Engineer, will be rejected whether in place or not. Rejected material shall be removed immediately from the site of the work, unless otherwise permitted by the Engineer. No rejected material, the defects of which have been subsequently corrected, shall be used in the work, unless approval in writing has been given by the Engineer. Upon failure of the Contractor to comply promptly with any order of the Engineer made under these provisions, the Engineer shall have authority to cause the removal and replacement of rejected material and to deduct the cost thereof from any moneys due or to become due the Contractor.
- Manufacturers' warranties, guaranties, instruction sheets and parts lists, which are furnished with certain materials incorporated in the work, shall be delivered to the Engineer before acceptance of the contract.
- Unless otherwise designated in the special provisions, materials furnished by the State will be delivered to the job site. Materials furnished by the State that are designated in the special provisions as available at locations other than the job site shall be hauled to the site of the work by the Contractor at his expense, including any necessary loading and unloading that may be involved.
- The Contractor will be held responsible for all materials furnished to him, and he shall pay all demurrage and storage charges. State-furnished materials lost or damaged from any cause whatsoever shall be replaced by the Contractor. The Contractor will be liable to the Department for the cost of replacing State-furnished material and those costs may be deducted from any moneys due or to become due the Contractor.

4-1.02 PRODUCT AND REFERENCE STANDARDS

- When descriptive catalog designations, including manufacturer's name, product brand name, or model number are referred to in the contract documents, those designations shall be considered as being those found in industry publications in effect on the day the Notice to Contractors for the work is dated.
- When standards or test designations are referred to in the contract documents by specific date of issue, they shall be considered a part of the contract. When those references do not bear a date of issue, the edition in effect on the day the Notice to Contractors for the work is dated shall be considered as part of the contract.

4-1.03 SAMPLING AND TESTING OF MATERIALS

- Unless otherwise specified, all tests shall be performed in conformance with the methods used by the Department of Transportation and shall be made by the Engineer or his designated representative.
- The Department has developed methods for testing the quality of materials and work. These methods are identified by number and are referred to as California Test. Up to five copies of individual California Tests are available at the Division of New Technology, Materials and Research, located at 5900 Folsom Boulevard, (P.O. Box 19128), Sacramento, CA 95819, and will be furnished to interested persons upon request. If a complete set of California Test Methods is desired, it can be purchased from the Department's Office of Business Management, Materiel Operations Branch, 1900 Royal Oaks Drive, Sacramento, CA 95815.
- Whenever a reference is made in the special provisions to a California Test by number, it shall mean the California Test in effect on the day the Notice to Contractors for the work is dated.
- Whenever the special provisions provide an option between 2 or more tests, the Engineer will determine the test method to be used.
- Whenever a specification, manual, or test designation provides for test reports (such as certified mill test reports) from the manufacturer, copies of those reports, identified as to the lot of material, shall be furnished to the Engineer. The manufacturer's test reports shall supplement the inspection, sampling and testing provisions of this Section 4-1.03 and shall not constitute a waiver of the State's right to inspect. When material which cannot be identified with specific test reports is proposed for use, the Engineer may, at his discretion, select random samples from the lot for testing. Testing specimens from the random samples, including those required for retest, shall be prepared in conformance with the referenced specification and furnished by the Contractor at his expense. The number of samples and test specimens shall be entirely at the discretion of the Engineer.

- When requested by the Engineer, the Contractor shall furnish, without charge, samples of all materials entering into the work, and no material shall be used prior to approval by the Engineer, except as provided in Section 4-1.04, "Certificates of Compliance," of these General Conditions.

4-1.035 TESTING BY CONTRACTOR

- The Contractor shall be responsible for controlling the quality of the material entering the work and of the work performed, and shall perform testing as necessary to ensure quality control. The test methods used for quality control testing by the Contractor shall be as determined by the Contractor. The results of those quality control tests shall be made available to the Engineer upon request. Contractor performed quality control tests are for the Contractor's use in controlling the work and will not be accepted for use as acceptance tests.

4-1.04 CERTIFICATES OF COMPLIANCE

- A Certificate of Compliance shall be furnished prior to the use of any materials for which the special provisions require that a Certificate of Compliance be furnished. In addition, the Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the special provisions. A Certificate of Compliance shall be furnished with each lot of such materials delivered to the work and the lot so certified shall be clearly identified in the certificate.
- Materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the plans and special provisions and any material not conforming to those requirements will be subject to rejection whether in place or not.
- The Department reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.
- The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer.

SECTION 5

LEGAL RELATIONS AND RESPONSIBILITIES

5-1.01 LAWS TO BE OBSERVED

The Contractor shall keep informed of and observe, and comply with and cause all of his agents and employees to observe and comply with all prevailing Federal and State laws, and rules and regulations made pursuant to the Federal and State laws, and county and municipal ordinances, and regulations, which in any way affect the conduct of the work of the contract. If any conflict arises between provisions of the contract and any laws above referred to, the Contractor shall notify the Engineer at once in writing. The Contractor shall protect and indemnify the State or any of its officers, agents, and servants against any claim or liability arising from or based on the violation of any law, rule, or regulation, whether by the Contractor or the Contractor's agents or employees.

5-1.01A Hours of Labor

Eight hours labor constitutes a legal day's work. The Contractor or any subcontractor under the Contractor shall forfeit, as a penalty to the State of California, \$25 for each worker employed in the execution of the contract by the respective Contractor or subcontractor for each calendar day during which that worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of the Labor Code, and in particular, Section 1810 to Section 1815, thereof, inclusive, except that work performed by employees of Contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon compensation for all hours worked in excess of 8 hours per day at not less than one and one-half times the basic rate of pay, as provided in Section 1815 thereof.

5-1.01B Labor Nondiscrimination

Attention is directed to Section 1735 of the Labor Code, which reads as follows:

"No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, or sex of such persons, except as provided in Section 12940 of the Government Code and every contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter."

Attention is directed to the following "Nondiscrimination Clause" that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations:

NONDISCRIMINATION CLAUSE

1. During the performance of this contract, contractor and its subcontractors shall not unlawfully discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical handicap, medical condition, marital status, age (over 40) or sex. Contractors and subcontractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination. Contractors and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Gov. Code, Section 12990 et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7285.0 et seq.). The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990, set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations are incorporated into this contract by reference and made a part hereof as if set forth in full. Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
2. This Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

STANDARD CALIFORNIA NONDISCRIMINATION CONSTRUCTION CONTRACT SPECIFICATIONS (GOVERNMENT CODE, SECTION 12990)

These specifications are applicable to all nonexempt State contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth herein. The specifications are applicable to all nonexempt State construction contracts and subcontracts of \$5,000 or more.

1. As used in the specifications:

- a. "Administrator" means Administrator, Office of Compliance Programs, California Department of Fair Employment and Housing, or any person to whom the Administrator delegates authority;
 - b. "Minority" includes:
 - (i) Black (all persons having primary origins in any of the black racial groups of Africa, but not of Hispanic origin);
 - (ii) Hispanic (all persons of primary culture or origin in Mexico, Puerto Rico, Cuba, Central or South America or other Spanish derived culture or origin regardless of race);
 - (iii) Asian/Pacific Islander (all persons having primary origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent or the Pacific Islands); and
 - (iv) American Indian/Alaskan Native (all persons having primary origins in any of the original peoples of North America and who maintain culture identification through tribal affiliation or community recognition).
2. Whenever the contractor or any subcontractor subcontracts a portion of the work, it shall physically include in each subcontract of \$5,000 or more the nondiscrimination clause in this contract directly or through incorporation by reference. Any subcontract for work involving a construction trade shall also include the Standard California Construction Contract Specifications, either directly or through incorporation by reference.
 3. The contractor shall implement the specific nondiscrimination standards provided in paragraphs 6(a) through (e) of these specifications.
 4. 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, Government Code, Section 12990, or the regulations promulgated pursuant thereto.
 5. In order for the nonworking training hours of apprentices and trainees to be counted, 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 or the California Department of Industrial Relations.
 6. The contractor shall take specific actions to implement its nondiscrimination program. 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 must be able to demonstrate fully its efforts under Steps a. through e. below:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and at 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 obligations to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Provide written notification within seven days to the director of DFEH 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.
 - c. Disseminate the Contractor's equal employment opportunity policy by providing notice of the policy to unions and training, recruitment and outreach programs and requesting their cooperation in assisting the Contractor to meet its obligations; and by posting the company policy on bulletin boards accessible to all employees at each location where construction work is performed.
 - d. Ensure all personnel making management and employment decisions regarding hiring, assignment, layoff, termination, conditions of work, training, rates of pay or other employment decisions, including all supervisory personnel, superintendents, general foremen, on-site foremen, etc., are aware of the Contractor's equal employment opportunity policy and obligations, and discharge their responsibilities accordingly.
 - e. 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 equal employment opportunity policy and the Contractor's obligations under these specifications are being carried out.
 7. Contractors are encouraged to participate in voluntary associations which assist in fulfilling their equal employment opportunity obligations. The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 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, 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.

8. The Contractor is required to provide equal employment opportunity 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 Fair Employment and Housing Act (Gov. Code, Section 12990 et seq.) if a particular group is employed in a substantially disparate manner.
9. Establishment and implementation of a bona fide affirmative action plan pursuant to Section 8104 (b) of this Chapter shall create a rebuttal presumption that a contractor is in compliance with the requirements of Section 12990 of the Government Code and its implementing regulations.
10. The Contractor shall not use the nondiscrimination standards to discriminate against any person because of race, color, religion, sex, national origin, ancestry, physical handicap, medical condition, marital status or age over 40.
11. The Contractor shall not enter into any subcontract with any person or firm decertified from state contracts pursuant to Government Code Section 12990.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and the nondiscrimination clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Government Code Section 12990 and its implementing regulations by the awarding agency. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Government Code Section 12990.
13. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company equal employment opportunity policy is being carried out, to submit reports relating to the provisions hereof as may be required by OCP 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 any easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

NOTE: Authority cited: Sections 12935(a) and 12990(d), Government Code. Reference: Section 12990, Government Code.

5-1.01C Prevailing Wage

• The Contractor and any subcontractor under the Contractor shall comply with Labor Code Sections 1774 and 1775. Pursuant to Section 1775, the Contractor and any subcontractor under the Contractor shall forfeit to the State or political subdivision on whose behalf the contract is made or awarded a penalty of not more than fifty dollars (\$50) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the Director of Industrial Relations for the work or craft in which the worker is employed for any public work done under the contract by the Contractor or by any subcontractor under the Contractor in violation of the provisions of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. The amount of this forfeiture shall be determined by the Labor Commissioner and shall be based on consideration of the mistake, inadvertence, or neglect of the Contractor or subcontractor in failing to pay the correct rate of prevailing wages, or the previous record of the Contractor or subcontractor in meeting their respective prevailing wage obligations, or the willful failure by the Contractor or subcontractor to pay the correct rates of prevailing wages. A mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages is not excusable if the Contractor or subcontractor had knowledge of their obligations under the Labor Code. In addition to the penalty and pursuant to Labor Code Section 1775, the difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by the Contractor or subcontractor. If a worker employed by a subcontractor on a public works project is not paid the general prevailing per diem wages by the subcontractor, the prime contractor of the project is not liable for the penalties described above unless the prime contractor had knowledge of that failure of the subcontractor to pay the specified prevailing rate of wages to those workers or unless the prime contractor fails to comply with all of the following requirements:

1. The contract executed between the contractor and the subcontractor for the performance of work on the public works project shall include a copy of the provisions of Sections 1771, 1775, 1776, 1777.5, 1813, and 1815 of the Labor Code.
2. The contractor shall monitor the payment of the specified general prevailing rate of per diem wages by the subcontractor to the employees, by periodic review of the certified payroll records of the subcontractor.

3. Upon becoming aware of the subcontractor's failure to pay the specified prevailing rate of wages to the subcontractor's workers, the contractor shall diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for work performed on the public works project.
4. Prior to making final payment to the subcontractor for work performed on the public works project, the contractor shall obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor has paid the specified general prevailing rate of per diem wages to the subcontractor's employees on the public works project and any amounts due pursuant to Section 1813 of the Labor Code.

• Pursuant to Section 1775 of the Labor Code, the Division of Labor Standards Enforcement shall notify the Contractor on a public works project within 15 days of the receipt by the Division of Labor Standards Enforcement of a complaint of the failure of a subcontractor on that public works project to pay workers the general prevailing rate of per diem wages. If the Division of Labor Standards Enforcement determines that employees of a subcontractor were not paid the general prevailing rate of per diem wages and if the Department did not retain sufficient money under the contract to pay those employees the balance of wages owed under the general prevailing rate of per diem wages, the contractor shall withhold an amount of moneys due the subcontractor sufficient to pay those employees the general prevailing rate of per diem wages if requested by the Division of Labor Standards Enforcement. The Contractor shall pay any money retained from and owed to a subcontractor upon receipt of notification by the Division of Labor Standards Enforcement that the wage complaint has been resolved. If notice of the resolution of the wage complaint has not been received by the Contractor within 180 days of the filing of a valid notice of completion or acceptance of the public works project, whichever occurs later, the Contractor shall pay all moneys retained from the subcontractor to the Department. These moneys shall be retained by the Department pending the final decision of an enforcement action.

• Pursuant to the provisions of Section 1773 of the Labor Code, the Department has obtained the general prevailing rate of wages (which rate includes employer payments for health and welfare, pension, vacation, travel time, and subsistence pay as provided for in Section 1773.8 of the Labor Code, apprenticeship or other training programs authorized by Section 3093 of the Labor Code, and similar purposes) applicable to the work to be done, for straight time, overtime, Saturday, Sunday and holiday work. The holiday wage rate listed shall be applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of workmen concerned. The general prevailing wage rates and any applicable changes to these wage rates are available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated. For work situated in District 9, the wage rates are available at the Labor Compliance Office at the offices of the District Director of Transportation for District 6, located at Fresno. General prevailing wage rates are also available from the California Department of Industrial Relations' internet web site at: <http://www.dir.ca.gov>.

• The wage rates determined by the Director of Industrial Relations for the project refer to expiration dates. Prevailing wage determinations with a single asterisk after the expiration date are in effect on the date of advertisement for bids and are good for the life of the contract. Prevailing wage determinations with double asterisks after the expiration date indicate that the wage rate to be paid for work performed after this date has been determined. If work is to extend past this date, the new rate shall be paid and incorporated in the contract. The Contractor shall contact the Department of Industrial Relations as indicated in the wage rate determinations to obtain predetermined wage changes.

• Pursuant to Section 1773.2 of the Labor Code, general prevailing wage rates shall be posted by the Contractor at a prominent place at the site of the work.

• Changes in general prevailing wage determinations which conform to Labor Code Section 1773.6 and Title 8 California Code of Regulations Section 16204 shall apply to the project when issued by the Director of Industrial Relations at least 10 days prior to the date of the Notice to Contractors for the project.

• The State will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the prevailing wage rate set forth in the contract. The possibility of wage increases is one of the elements to be considered by the Contractor in determining the bid, and will not under any circumstances be considered as the basis of a claim against the State on the contract.

5-1.01D Travel And Subsistence Payments

Attention is directed to the requirements in Section 1773.8 of the Labor Code. The Contractor shall make travel and subsistence payments to each workman, needed to execute the work, in conformance with the requirements in Labor Code Section 1773.8.

5-1.01E Payroll Records

• Attention is directed to the provisions of Labor Code Section 1776, a portion of which is quoted below. Regulations implementing Labor Code Section 1776 are located in Sections 16016 through 16019 and Sections 16207.10 through 16207.19 of Title 8, California Code of Regulations.

"1776. (a) Each contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per

diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

- (1) The information contained in the payroll record is true and correct.
- (2) The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

"(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis:

- (1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.
- (2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.
- (3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the contractor.

"(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.

"(d) A contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within 10 days after receipt of a written request.

"(e) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in a manner so as to prevent disclosure of an individual's name, address, and social security number. The name and address of the contractor awarded the contract or the subcontractor performing the contract shall not be marked or obliterated.

"(f) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.

"(g) The contractor or subcontractor shall have 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a). In the event that the contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars (\$25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of a subcontractor to comply with this section."

• The penalties specified in subdivision (g) of Labor Code Section 1776 for noncompliance with the provisions of Section 1776 may be deducted from any moneys due or which may become due to the Contractor.

• A copy of all payrolls shall be submitted weekly to the Engineer. Payrolls shall contain the full name, address and social security number of each employee, the employee's correct classification, rate of pay, daily and weekly number of hours worked, itemized deductions made and actual wages paid. They shall also indicate apprentices and ratio of apprentices to journeymen. The employee's address and social security number need only appear on the first payroll on which that name appears. The payroll shall be accompanied by a "Statement of Compliance" signed by the employer or the employer's agent indicating that the payrolls are correct and complete and that the wage rates contained therein are not less than those required by the contract. The "Statement of Compliance" shall be on forms furnished by the Department or on any form with identical wording. The Contractor shall be responsible for the submission of copies of payrolls of all subcontractors.

• If by the 15th of the month, the Contractor has not submitted satisfactory payrolls for all work performed during the monthly period ending on or before the 1st of that month, the Department will retain an amount equal to 10 percent of the estimated value of the work performed during the month from the next monthly estimate, except that this retention shall not exceed \$10,000 nor be less than \$1,000. Retentions for failure to submit satisfactory payrolls shall be additional to all other

retentions provided for in the contract. The retention for failure to submit payrolls for any monthly period will be released for payment on the monthly estimate for partial payments next following the date that all the satisfactory payrolls for which the retention was made are submitted.

- The Contractor and each subcontractor shall preserve their payroll records for a period of 3 years from the date of completion of the contract.

5-1.01F Trench Safety

- Attention is directed to the provisions of Section 6705 of the Labor Code concerning trench excavation safety plans.
- The Construction Safety Orders of the Division of Occupational Safety and Health shall apply to all excavations. For all excavations 1.5 m or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design and details of the protective systems to be provided for worker protection from the hazard of caving ground during excavation. The detailed plan shall include any tabulated data and any design calculations used in the preparation of the plan. Excavation shall not begin until the detailed plan has been reviewed and approved by the Engineer.
- Detailed plans of protective systems for which the Construction Safety Orders require design by a registered professional engineer shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California, and shall include the soil classification, soil properties, soil design calculations that demonstrate adequate stability of the protective system, and any other design calculations used in the preparation of the plan.
- No plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders.
- If the detailed plan includes designs of protective systems developed only from the allowable configurations and slopes, or Appendices, contained in the Construction Safety Orders, the plan shall be submitted at least 5 days before the Contractor intends to begin excavation. If the detailed plan includes designs of protective systems developed from tabulated data, or designs for which design by a registered professional engineer is required, the plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation.
- In addition to these provisions detailed plans of the protective systems for excavations on or affecting railroad property will be reviewed for adequacy of protection provided for railroad facilities, property, and traffic. These plans for excavations on or affecting railroad property shall be submitted at least 9 weeks before the Contractor intends to begin excavation requiring the protective systems. Approval by the Engineer of the detailed plans for the protective systems will be contingent upon the plans being satisfactory to the railroad company involved.

5-1.01G Apprentices

- Attention is directed to Sections 1777.5, 1777.6 and 1777.7 of the California Labor Code and Title 8, California Code of Regulations Section 200 et seq. To ensure compliance and complete understanding of the law regarding apprentices, and specifically the required ratio thereunder, each contractor or subcontractor should, where some question exists, contact the Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, CA 94102, or one of its branch offices prior to commencement of work on the public works contract. Responsibility for compliance with this section lies with the prime Contractor.
- It is State policy to encourage the employment and training of apprentices on public works contracts as may be permitted under local apprenticeship standards.

5-1.01H Fair Labor Standards Act

- The attention of bidders is invited to the fact that the State of California, Department of Transportation, has been advised by the Wage and Hour Division, U.S. Department of Labor, that contractors engaged in construction work are required to meet the provisions of the Fair Labor Standards Act of 1938 and as amended (52 Stat. 1060).

5-1.01I Workers' Compensation

- Pursuant to the requirements in Section 1860 of the Labor Code, the Contractor will be required to secure the payment of workers' compensation to the Contractor's employees in conformance with the requirements in Section 3700 of the Labor Code.
- Prior to the commencement of work, the Contractor shall sign and file with the Engineer a certification in the following form:

"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 the provisions of Section 3700 before commencing the performance of the work of this contract."

- This certification is included in the contract, and signature and return of the contract as provided in Section 2-1.04, "Execution of Contract," of the Instructions to Bidders shall constitute signing and filing of the certificate.

5-1.01J Air Pollution Control

- The Contractor shall comply with all air pollution control rules, regulations, ordinances and statutes which apply to any work performed pursuant to the contract, including any air pollution control rules, regulations, ordinances and statutes, specified in Section 11017 of the Government Code.
- Unless otherwise provided in the special provisions, material to be disposed of shall not be burned, either inside or outside the premises.

5-1.01K Use Of Pesticides

- The Contractor shall comply with all rules and regulations of the Department of Food and Agriculture, the Department of Health, the Department of Industrial Relations and all other agencies which govern the use of pesticides required in the performance of the work on the contract.
- Pesticides shall include but shall not be limited to herbicides, insecticides, fungicides, rodenticides, germicides, nematocides, bactericides, inhibitors, fumigants, defoliant, desiccants, soil sterilants, and repellents.
- Any substance or mixture of substances intended for preventing, repelling, mitigating, or destroying weeds, insects, diseases, rodents, or nematodes and any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant shall be considered a pesticide.

5-1.01L Sound Control Requirements

- The Contractor shall comply with all local sound control and noise level rules, regulations and ordinances which apply to any work performed pursuant to the contract.
- Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without the muffler.

5-1.01M Environmental Clearances

- The Department will obtain all environmental clearances and authorizations necessary for the project as set forth in the plans and specifications. The Contractor shall comply with the provisions, including giving notices during construction when required, of these authorizations. In the event the obtaining of these authorizations delays completion of all or any portion of the work, an extension of time determined pursuant to the provisions in Section 6-1.08, "Liquidated Damages," of these General Conditions will be granted and the Contractor shall not be entitled to any additional compensation because of the delays.

5-1.01N Permits And Licenses

- The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work.
- The Environmental Quality Act (Public Resources Code, Sections 21000 to 21176, inclusive) may be applicable to permits, licenses and other authorizations which the Contractor must obtain from local agencies in connection with performing the work of the contract. The Contractor shall comply with the provisions of those statutes in obtaining the permits, licenses and other authorizations and they shall be obtained in sufficient time to prevent delays to the work.
- In the event that the Department has obtained permits, licenses or other authorizations, applicable to the work, in conformance with the requirements in the Environmental Quality Act, the Contractor shall comply with the provisions of those permits, licenses and other authorizations.

5-1.01O Assignment Of Antitrust Actions

- The Contractor's attention is directed to the following requirements in Public Contract Code 7103.5 and Government Code Sections 4553 and 4554, which shall be applicable to the Contractor and the Contractor's subcontractors:

"In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgement by the parties."

"If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

"Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the

cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action."

5-1.01P Safety And Health Provisions

- The Contractor shall conform to all applicable occupational safety and health standards, rules, regulations and orders established by the State of California.
- Working areas utilized by the Contractor to perform work during the hours of darkness, shall be lighted to conform to the minimum illumination intensities established by California Division of Occupational Safety and Health Construction Safety Orders.
- All lighting fixtures shall be mounted and directed in a manner precluding glare to approaching traffic.

5-1.01Q Suits To Recover Penalties And Forfeitures

- Attention is directed to Sections 1730 to 1733, inclusive, of the Labor Code concerning suits to recover amounts withheld from payment for failure to comply with requirements of the Labor Code or contract provisions based on those laws.
- Those sections provide that a suit on the contract for alleged breach thereof in not making the payment is the exclusive remedy of the Contractor or the Contractor's assignees with reference to amounts withheld for those penalties or forfeitures; and that the suit must be commenced and actual notice thereof received by the awarding authority prior to 90 days after completion of the contract and the formal acceptance of the job.
- Submission of a claim under Section 7-1.07, "Final Payment and Claims," of these General Conditions for the amounts withheld from payment for those penalties and forfeitures is not a prerequisite for those suits and these claims will not be considered.

5-1.01R Water Pollution

- The Contractor shall exercise every reasonable precaution to protect streams, lakes, reservoirs, bays, and coastal waters from pollution with fuels, oils, bitumens, calcium chloride and other harmful materials and shall conduct and schedule operations so as to avoid or minimize muddying and silting of streams, lakes, reservoirs, bays and coastal waters. Care shall be exercised to preserve roadside vegetation beyond the limits of construction.
- Water pollution control work is intended to provide prevention, control, and abatement of water pollution to streams, waterways, and other bodies of water, and shall consist of constructing those facilities which may be shown on the plans, specified herein or in the special provisions, or directed by the Engineer.
- In order to provide effective and continuous control of water pollution it may be necessary for the Contractor to perform the contract work in small or multiple units, on an out of phase schedule, and with modified construction procedures. The Contractor shall provide temporary water pollution control measures, including but not limited to, dikes, basins, ditches, and applying straw and seed, which become necessary as a result of the Contractor's operations. The Contractor shall coordinate water pollution control work with all other work done on the contract.
- Before starting any work on the project, the Contractor shall submit, for acceptance by the Engineer, a program to control water pollution effectively during construction of the project. The program shall show the schedule for the erosion control work included in the contract and for all water pollution control measures which the Contractor proposes to take in connection with construction of the project to minimize the effects of the operations upon adjacent streams and other bodies of water. The Contractor shall not perform any clearing and grubbing or earthwork on the project, other than that specifically authorized in writing by the Engineer, until the program has been accepted.
- If the measures being taken by the Contractor are inadequate to control water pollution effectively, the Engineer may direct the Contractor to revise the operations and the water pollution control program. The directions will be in writing and will specify the items of work for which the Contractor's water pollution control measures are inadequate. No further work shall be performed on those items until the water pollution control measures are adequate and, if also required, a revised water pollution control program has been accepted.
- The Engineer will notify the Contractor of the acceptance or rejection of any submitted or revised water pollution control program in not more than 5 working days.
- The State will not be liable to the Contractor for failure to accept all or any portion of an originally submitted or revised water pollution control program, nor for any delays to the work due to the Contractor's failure to submit an acceptable water pollution control program.
- The Contractor may request the Engineer to waive the requirement for submission of a written program for control of water pollution when the nature of the Contractor's operation is such that erosion is not likely to occur. Waiver of this requirement will not relieve the Contractor from responsibility for compliance with the other provisions of this section. Waiver of the requirement for a written program for control of water pollution will not preclude requiring submittal of a written program at a later time if the Engineer deems it necessary because of the effect of the Contractor's operations.
- Unless otherwise approved by the Engineer in writing, the Contractor shall not expose a total area of erodible earth material, which may cause water pollution, exceeding 70 000 m² for each separate location, operation, or spread of equipment before either temporary or permanent erosion control measures are accomplished.

- Where erosion which will cause water pollution is probable due to the nature of the material or the season of the year, the Contractor's operations shall be so scheduled that permanent erosion control features will be installed concurrently with or immediately following grading operations.
- Nothing in the terms of the contract nor in the provisions in this Section 5-1.01R shall relieve the Contractor of the responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.
- When borrow material is obtained from other than commercially operated sources, erosion of the borrow site during and after completion of the work shall not result in water pollution. The material source shall be finished, where practicable, so that water will not collect or stand therein.
- The requirements of this section shall apply to all work performed under the contract and to all non-commercially operated borrow or disposal sites used for the project.
- The Contractor shall also conform to the following provisions:
 1. Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams, and during construction of the barriers, muddying of streams shall be held to a minimum.
 2. Removal of material from beneath a flowing stream shall not be commenced until adequate means, such as a bypass channel, are provided to carry the stream free from mud or silt around the removal operations.
 3. Should the Contractor's operations require transportation of materials across live streams, the operations shall be conducted without muddying the stream. Mechanized equipment shall not be operated in the stream channels of the live streams except as may be necessary to construct crossings or barriers and fills at channel changes.
 4. Water containing mud or silt from aggregate washing or other operations shall be treated by filtration, or retention in a settling pond, or ponds, adequate to prevent muddy water from entering live streams.
 5. Oily or greasy substances originating from the Contractor's operations shall not be allowed to enter or be placed where they will later enter a live stream.
 6. Portland cement or fresh portland cement concrete shall not be allowed to enter flowing water of streams.
 7. When operations are completed, the flow of streams shall be returned as nearly as possible to a meandering thread without creating possible future bank erosion, and settling pond sites shall be graded so they will drain and will blend in with the surrounding terrain.
 8. Material derived from roadway work shall not be deposited in a live stream channel where it could be washed away by high stream flows.
 9. Where there is possible migration of anadromous fish in streams affected by construction on the project, the Contractor shall conduct work operations so as to allow free passage of the migratory fish.
- Compliance with the requirements of this section shall in no way relieve the Contractor from the responsibility to comply with the other provisions of the contract, in particular the responsibility for damage and for preservation of property.

5-1.02 PROTECTION AND USE OF PROPERTY

- The Contractor shall be responsible for and provide and maintain all proper temporary walks, roads, guards, railings, lights, warning signs, and take precaution at all times to avoid injury or damage to any person or any property, and upon completion of the work, or at other times as directed, restore premises and adjacent property to a proper condition.
- The Contractor shall protect adjoining property and nearby buildings, including State buildings, State roads, and public streets or roads, from dust, dirt, debris, or other nuisance arising out of the Contractor's operations or storage practices, and, if ordered by the Engineer, the Contractor shall provide and install suitable safeguards, approved by the Engineer, to protect objects from damage. If any objects are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored at the Contractor's expense. The facilities shall be replaced or restored to a condition as good as when the Contractor entered upon the work, or as good as required by the specifications accompanying the contract, if any of the objects are a part of the work being performed under the contract.
- If the Contractor damages any buildings, roads or other property which belong to the State, or any department or agency thereof, then the Engineer, at his option, may retain from the money due under the contract an amount sufficient to insure repair of the damage.

. The Engineer may make or cause to be made those temporary repairs that are necessary to restore to service any damaged highway facility. The cost of the repairs shall be borne by the Contractor and may be deducted from any moneys due or to become due to the Contractor under the contract.

. The fact that any underground facility is not shown upon the plans shall not relieve the Contractor of the responsibility of protecting underground improvements or facilities. It shall be the Contractor's responsibility, pursuant thereto, to ascertain the location of those underground improvements or facilities, which may be subject to damage by reason of the Contractor's operations.

5-1.03 (BLANK)

5-1.031 INDEMNIFICATION

. With the exception that this section shall in no event be construed to require indemnification by the Contractor to a greater extent than permitted by law, the Contractor shall defend, indemnify and save harmless the State, including its officers, directors, agents (excluding agents who are design professionals), and employees, and each of them (Indemnitees), from any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, losses or liabilities, in law or in equity, of every kind and nature whatsoever (Claims), arising out of or in connection with the Contractor's performance of this contract for:

- A. Bodily injury including, but not limited to, bodily injury, sickness or disease, emotional injury or death to persons, including, but not limited to, the public, any employees or agents of the Contractor, State, Department, or any other contractor and;
- B. Damage to property of anyone including loss of use thereof;

caused or alleged to be caused in whole or in part by any negligent or otherwise legally actionable act or omission of the Contractor or anyone directly or indirectly employed by the Contractor or anyone for whose acts the Contractor may be liable.

. Except as otherwise provided by law, the indemnification provisions above shall apply regardless of the existence or degree of fault of Indemnitees. The Contractor, however, shall not be obligated to indemnify Indemnitees for Claims arising from conduct delineated in Civil Code section 2782. Further, the Contractor's indemnity obligation shall not extend to Claims to the extent they arise from any defective or substandard condition of the roadway which existed at or prior to the time the Contractor commenced work, unless this condition has been changed by the work or the scope of the work requires the Contractor to maintain existing Roadway facilities and the claim arises from the Contractor's failure to maintain. The Contractor's indemnity obligation shall extend to Claims arising after the work is completed and accepted only if these Claims are directly related to alleged acts or omissions of the Contractor which occurred during the course of the work. No inspection by the Department, its employees or agents shall be deemed a waiver by the Department of full compliance with the requirements of this section.

. The Contractor's obligation to defend and indemnify shall not be excused because of the Contractor's inability to evaluate liability or because the Contractor evaluates liability and determines that the Contractor is not liable to the claimant. The Contractor will respond within 30 days to the tender of any claim for defense and indemnity by the State, unless this time has been extended by the State. If the Contractor fails to accept or reject a tender of defense and indemnity within 30 days, in addition to any other remedy authorized by law, so much of the money due the Contractor under and by virtue of the contract as shall reasonably be considered necessary by the Department, may be retained by the State until disposition has been made of the claim or suit for damages, or until the Contractor accepts or rejects the tender of defense, whichever occurs first.

. With respect to third party claims against the Contractor, the Contractor waives any and all rights of any type to express or implied indemnity against the State, its directors, officers, employees, or agents (excluding agents who are design professionals).

5-1.032 INSURANCE

. Insurance shall conform to the following requirements:

5-1.032A Casualty Insurance

. The Contractor shall, at the Contractor's expense, procure and maintain insurance on all of its operations with companies acceptable to the Department as follows. All insurance shall be kept in full force and effect from the beginning of the work through final acceptance by the State. In addition, the Contractor shall maintain completed operations coverage with a carrier acceptable to the Department through the expiration of the patent deficiency in construction statute of repose set forth in Section 337.1 of the Code of Civil Procedure.

5-1.032A(1) Workers' Compensation and Employer's Liability Insurance

. Workers' Compensation insurance shall be provided as specified in Section 7-1.01A(6), "Workers' Compensation." Employer's Liability Insurance shall be provided in amounts not less than:

- (a) \$1,000,000 for each accident for bodily injury by accident.
- (b) \$1,000,000 policy limit for bodily injury by disease.
- (c) \$1,000,000 for each employee for bodily injury by disease.

• If there is an exposure of injury to the Contractors' employees under the U.S. Longshoremen's and Harbor Workers' Compensation Act, the Jones Act or under laws, regulations or statutes applicable to maritime employees, coverage shall be included for such injuries or claims.

5-1.032A(2) Liability Insurance

• The Contractor shall carry General Liability and Umbrella or Excess Liability Insurance covering all operations by or on behalf of the Contractor providing insurance for bodily injury liability, and property damage liability for the limits of liability indicated below and including coverage for:

- (a) premises, operations and mobile equipment
- (b) products and completed operations
- (c) broad form property damage (including completed operations)
- (d) explosion, collapse and underground hazards
- (e) personal injury
- (f) contractual liability

5-1.032A(3) Liability Limits/Additional Insureds

• The limits of liability shall be at least:

- (a) \$1,000,000 for each occurrence (combined single limit for bodily injury and property damage).
- (b) \$2,000,000 aggregate for products-completed operations.
- (c) \$2,000,000 general aggregate. This general aggregate limit shall apply separately to the Contractor's work under this Agreement.
- (d) \$5,000,000 umbrella or excess liability. For projects over \$25,000,000 only, an additional \$10,000,000 umbrella or excess liability (for a total of \$15,000,000). Umbrella or excess policy shall include products liability completed operations coverage and may be subject to \$5,000,000 or \$15,000,000 aggregate limits. Further, the umbrella or excess policy shall contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.

• The State and the Department, including their officers, directors, agents (excluding agents who are design professionals), and State employees, shall be named as additional insureds under the General Liability and Umbrella Liability Policies with respect to liability arising out of or connected with work or operations performed by or on behalf of the Contractor under this contract. Coverage for those additional insureds shall not extend to liability:

- (1) arising from any defective or substandard condition of the Roadway which existed at or prior to the time the Contractor commenced work, unless that condition has been changed by the work or the scope of the work requires the Contractor to maintain existing Roadway facilities and the claim arises from the Contractor's failure to maintain; or
- (2) for claims occurring after the work is completed and accepted unless these claims are directly related to alleged acts or omissions of the Contractor which occurred during the course of the work; or
- (3) to the extent prohibited by Section 11580.04 of the Insurance Code.

• The policy shall stipulate that the insurance afforded the additional insureds shall apply as primary insurance. Any other insurance or self insurance maintained by the Department or State will be excess only and shall not be called upon to contribute with this insurance. Those additional insured coverage shall be provided by a policy provision or by an endorsement providing coverage at least as broad as Additional Insured (Form B) endorsement form CG 2010, as published by the Insurance Services Office (ISO).

5-1.032B Automobile Liability Insurance

• The Contractor shall carry automobile liability insurance, including coverage for all owned, hired and non-owned automobiles. The primary limits of liability shall be not less than \$1,000,000 combined single limit each accident for bodily injury and property damage. The umbrella or excess liability coverage required under Section 5-1.032A(3), "Liability Limits/Additional Insureds," shall also apply to automobile liability.

5-1.032C Policy Forms, Endorsements and Certificates

- The Contractor's General Liability Insurance shall be provided under Commercial General Liability policy form no. CG0001 as published by the Insurance Services Office (ISO) or under a policy form at least as broad as policy form no. CG0001.
- Evidence of insurance in a form acceptable to the Department, including the required "additional insured" endorsements, shall be furnished by the Contractor to the Department at or prior to the pre-construction conference. The evidence of insurance shall provide that there will be no cancellation, lapse, or reduction of coverage without thirty (30) days' prior written notice to the Department. Certificates of Insurance, as evidence of required insurance, for the General Liability, Auto Liability and Umbrella-Excess Liability policies shall set forth deductible amounts applicable to each policy and all exclusions which are added by endorsement to each policy. The Department may expressly allow deductible clauses, which it does not consider excessive, overly broad, or harmful to the interests of the State. Standard ISO form CG 0001 or similar exclusions will be allowed provided they are not inconsistent with the requirements of this section. Allowance of any additional exclusions is at the discretion of the Department. Regardless of the allowance of exclusions or deductions by the Department, the Contractor shall be responsible for any deductible amount and shall warrant that the coverage provided to the Department is consistent with the requirements of this section.

5-1.032D Enforcement

- The Department may take any steps as are necessary to assure Contractor's compliance with its obligations. Should any insurance policy lapse or be canceled during the contract period the Contractor shall, within thirty (30) days prior to the effective expiration or cancellation date, furnish the Department with evidence of renewal or replacement of the policy. Failure to continuously maintain insurance coverage as herein provided is a material breach of contract. In the event the Contractor fails to maintain any insurance coverage required, the Department may, but is not required to, maintain this coverage and charge the expense to the Contractor or terminate this Agreement. The required insurance shall be subject to the approval of Department, but any acceptance of insurance certificates by the Department shall in no way limit or relieve the Contractor of the Contractor's duties and responsibilities under the Contract to indemnify, defend and hold harmless the State, its officers, agents, and employees. Insurance coverage in the minimum amounts set forth herein shall not be construed to relieve the Contractor for liability in excess of that coverage, nor shall it preclude the State from taking other actions as is available to it under any other provision of the contract or law. Failure of the Department to enforce in a timely manner any of the provisions of this section shall not act as a waiver to enforcement of any of these provisions at a later date.

5-1.032E Self-Insurance

- Self-insurance programs and self-insured retentions in insurance policies are subject to separate annual review and approval by the State of evidence of the Contractor's financial capacity to respond. Additionally, self-insurance programs or retentions must provide the State with at least the same protection from liability and defense of suits as would be afforded by first-dollar insurance.

5-1.032F Miscellaneous

- Nothing contained in the Contract is intended to make the public or any member thereof a third party beneficiary of the Insurance or Indemnity provisions of these General Conditions, nor is any term, condition or other provision of the Contract intended to establish a standard of care owed to the public or any member thereof.

5-1.04 OCCUPANCY BY THE DEPARTMENT PRIOR TO ACCEPTANCE

- The Department reserves the right to occupy all or any part of the project prior to completion of the entire contract, upon written order therefor. In that event, the Contractor will be relieved of responsibility for any injury or damage to that part as results from the Department's occupancy and use by the Department. If the Contractor carries insurance against damage to the premises or against liability to third persons covering the premises so used and occupied by the Department, and if the occupancy results in increased premiums for insurance, the Department will pay to the Contractor the added cost for insurance during the period of occupancy.
- This occupancy does not constitute acceptance by the Director either of the complete work or of any portion thereof, nor will it relieve the Contractor of full responsibility for correcting defective work or materials found at any time before the formal written acceptance of the entire contract by the Director or during the full guarantee period after project acceptance, as provided in Section 7-1.09, "Guarantee," of these General Conditions.

5-1.05 CONTRACTOR'S RESPONSIBILITY FOR THE WORK

- Except as otherwise provided herein, the Contractor shall have the charge and care of the work and shall bear the risk of injury or damage to any part of the work by the action of the elements or from any other cause whether arising from the execution or from the nonexecution of the work until the acceptance of the contract by the Director. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any cause before its completion and acceptance, and shall bear the expense thereof. In case of suspension of work from any cause whatever, the Contractor shall be responsible for the work and shall also be responsible for all materials, and shall properly store them if necessary, and shall provide suitable drainage and erect temporary structures where necessary.

- The Contractor will be relieved of responsibility for any injury or damage to the work caused by the following:
 - (1) An earthquake in excess of a magnitude of 3.5 on the Richter Scale or a tidal wave, when the effect of that event has been proclaimed a disaster or state of emergency by the Governor of the State of California or by the President of the United States, or was of such magnitude at the site of the work as to have been sufficient to have caused a proclamation of disaster or state of emergency, had it occurred in a populated area.
 - (2) Occupancy and use by the Department or the public prior to the completion of the entire project.
 - (3) Acts of the Federal Government or the public enemy.

5-1.06 RESPONSIBILITY FOR UTILITIES

- The Contractor shall be responsible for the cost for any and all work, expense or special precautions caused or required by the existence or proximity of utilities encountered in performing the work, including without limitation thereon, repair of any or all damage and all hand or exploratory excavation required. The Contractor is cautioned that the utilities may include communication cables or electrical cables which may be high voltage, and when working or excavating in the vicinity of any cables, or the ducts enclosing cables, the Contractor shall observe any special precautions required and the cost of these special precautions. Suitable warning signs, barricades, and safety devices shall be erected as necessary or required.
- However, if during the course of the work the Contractor encounters utility installations which are not shown or indicated on the plans or in the special provisions, or which are found in a location substantially different from that shown, and the utilities are not reasonably apparent from visual examination, then the Contractor shall promptly notify the Engineer in writing. Where necessary for the work of the contract, the Engineer shall issue a written order to the Contractor to make adjustment, rearrangement, repair, removal, alteration, or special handling of the utility, including repair of utility if damaged. The Contractor shall perform the work described in the written order, and compensation therefor will be made in conformance with the provisions in Section 3, "Changes in the Work," of these General Conditions, relating to changes in the work. Except for the items of cost specified in Section 3, "Changes in the Work," of these General Conditions, the Contractor shall receive no compensation for any other cost, damage, delay, interference, or hindrance to him due to the presence of these utilities. If the Contractor fails to give the notice specified above and thereafter acts without instructions from the Engineer, then the Contractor shall be liable for any or all damage to these utilities or other work of the contract which arises from the Contractor's operations subsequent to discovery thereof, and the Contractor shall repair and make good any damage at the Contractor's expense.

5-1.07 PROPERTY RIGHTS IN MATERIALS

- Nothing in the contract shall be construed as vesting in the Contractor any right of property in the materials used after they have been attached or affixed to the work or soil or after partial payment has been made as provided in Section 7-1.05, "Partial Payment," of these General Conditions for material delivered on the ground or stored subject to or under the control of the State and unused. These material shall become the property of the State of California upon being so attached or affixed or upon payment for materials delivered on the ground or stored subject to or under the control of the State and unused, as provided in Section 7-1.05, "Partial Payment," of these General Conditions.

5-1.08 LEGAL ACTIONS AGAINST THE DEPARTMENT

- If, pursuant to court order, the Department temporarily suspends performance of all or any portion of the work, an extension of time determined pursuant to the provisions in Section 6-1.08, "Liquidated Damages," of these General Conditions will be granted, and the Contractor shall not be entitled to any additional compensation because of the suspension.

5-1.09 NO PERSONAL LIABILITY

- Neither the Director, the Engineer, nor any other officer or authorized employee of the Department of Transportation shall be personally responsible for any liability arising under the contract.

5-1.10 PATENTS

- The Contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work, and agrees to indemnify and save harmless the State of California, the Director, the Engineer, and their duly authorized representatives, from all suits at law, or actions of every nature for, or on account of the use of any patented materials, equipment, devices, or processes.

5-1.11 PAYMENT OF TAXES

- The contract price paid for the work shall include full compensation for all taxes which the Contractor is required to pay, whether imposed by Federal, State or local government, including, without being limited to, Federal excise tax. No tax exemption certificate nor any document designed to exempt the Contractor from payment of any tax will be furnished to the Contractor by the Department, as to any tax on labor, services, materials, transportation, or any other items furnished pursuant to the contract.

5-1.12 COOPERATION

• Should construction be under way by State forces or other forces or by other contractors within or adjacent to the limits of the work or should work of any other nature be under way by other forces within or adjacent to those limits, the Contractor shall cooperate with all the other contractors or other forces to the end that any delay, interference or hindrance to their work will be avoided. The right is reserved to perform other or additional work at or near the site at any time, by the use of other forces.

SECTION 6

PROSECUTION AND PROGRESS

6-1.01 SUBLETTING AND SUBCONTRACTING

• The Contractor shall be responsible for all work performed under the contract. All persons engaged in the work will be considered as employees of the Contractor. The Contractor shall give personal attention to the fulfillment of the contract and shall keep the work under the Contractor's control. When any subcontractor fails to prosecute a portion of the work in a manner satisfactory to the Engineer, the Contractor shall remove that subcontractor immediately upon written request of the Engineer, and the subcontractor shall not again be employed on the work. Although the sections of the contract may be arranged according to various trades, or general grouping of the work, the Contractor is not obligated to sublet the work in the same manner. The State will not arbitrate disputes among subcontractors or between the Contractor and one or more subcontractors concerning responsibility for performing any part of the work.

• Subcontracts shall include provisions that the contract between the State and the Contractor is part of the subcontract, and that all terms and provisions of the contract are incorporated in the subcontract. Subcontracts shall also contain certification by the subcontractor that the subcontractor is experienced in and qualified to do, and knowledgeable about, the subcontracted work. Copies of subcontracts shall be available to the Engineer upon written request, and shall be provided to the Engineer at the time any litigation against the State concerning the project is filed.

• Pursuant to the provisions of Section 6109 of the Public Contract Code, the Contractor shall not perform work on a public works project with a subcontractor who is ineligible to perform work on the public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

• The Contractor shall not substitute any person as subcontractor in place of a subcontractor listed on the Contractor's bid proposal without the written approval of the Engineer. Substitutions must be in conformance with the provisions of the "Subletting and Subcontracting Fair Practices Act" beginning with Section 4100 of the Public Contract Code. Violations of this Act by the Contractor may subject him to penalties which may include cancellation of contract, assessment of 10 percent of the subcontractor's bid, and disciplinary action by the Contractors' State License Board.

6-1.02 ASSIGNMENT

• The performance of the contract may not be assigned, except upon the written consent of the Director. Consent will not be given to any proposed assignment which would relieve the original Contractor or the Contractor's surety of their responsibilities under the contract nor will the Director consent to any assignment of a part of the work under the contract.

• The Contractor may assign moneys due or to become due the Contractor under the contract and the assignment will be recognized by the Department, if given proper notice thereof, to the extent permitted by law, but any assignment of moneys shall be subject to all proper set-offs in favor of the Department and to all deductions provided for in the contract and particularly all money withheld, whether assigned or not, shall be subject to being used by the Department for the completion of the work in the event that the Contractor should be in default therein.

6-1.03 BEGINNING OF WORK

• The Contractor shall begin work within 15 calendar days after receiving notice that the contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department, and shall diligently prosecute the same to completion within the time limit provided in the special provisions.

• The Contractor shall notify the Engineer, in writing, of the Contractor's intent to begin work at least 72 hours before work is begun. The notice shall be delivered to the Office of the District Director of Transportation in the district in which the work is situated and shall specify the date the Contractor intends to start. If the project has more than one location of work, a separate notice shall be given for each location.

• Should the Contractor begin work in advance of receiving notice that the contract has been approved as above provided, any work performed by the Contractor in advance of the date of approval shall be considered as having been done by the Contractor at the Contractor's own risk and as a volunteer unless the contract is approved.

• The delivery to the State for execution and approval of the contract properly executed on behalf of the Contractor and surety and the minimum 72 hours advance written notice as required above shall constitute the Contractor's authority to enter upon the site of the work and to begin operations, subject to the Contractor's assumption of the risk of the disapproval of the contract, as above provided, and subject also to the following:

- (1) The Contractor shall, on commencing operations, take all precautions required for public safety and shall observe all the provisions in these General Conditions and the special provisions.
- (2) In the event of disapproval, the Contractor shall at the Contractor's expense do that work that is necessary to leave the site in a neat condition to the satisfaction of the Engineer.
- (3) All work done according to the contract prior to its approval, will, when the contract is approved, be considered authorized work and will be paid for as provided in the contract.
- (4) The Contractor shall not be entitled to any additional compensation or an extension of time for any delay, hindrance or interference caused by or attributable to commencement of work prior to the date on which the contract was approved by the Attorney General or the attorney appointed and authorized to represent the Department, except to the extent the delay, hindrance or interference would have been compensable hereunder had work been commenced on the date of the approval and the progress thereof been the same as that actually made.

6-1.04 PROGRESS SCHEDULE

- The Contractor shall submit to the Engineer a practicable progress schedule within 15 days of approval of the contract, and within 7 days of the Engineer's written request at any other time.
- The Contractor may furnish the schedule on a form of the Contractor's choice or, if requested, the Engineer will furnish a form for the Contractor's use. If the Engineer furnishes a form, the Engineer will also furnish to the Contractor, on request, on or before the last day of each month a copy of the form showing the status of work actually completed during the preceding estimate period.
- The schedule shall show the order in which the Contractor proposes to carry out the work, the dates on which the Contractor will start the several salient features of the work, and the contemplated dates for completing those salient features.
- The progress schedules submitted shall be consistent in all respects with the time and order of work requirements of the contract.
- Subsequent to the time that submittal of a progress schedule is required in conformance with these General Conditions, no progress payment will be made for any work until a satisfactory schedule has been submitted to the Engineer.

6-1.05 SCHEDULE OF VALUES

- The Contractor shall submit to the Engineer a schedule of values for each lump sum item. The sum of the items listed in the schedule of values shall equal the contract lump sum prices. Overhead and profit shall not be listed as separate items. The schedule of values shall be approved by the Engineer before any partial payment estimate is prepared.

6-1.06 TEMPORARY SUSPENSION OF WORK

- The Engineer shall have the authority to suspend the work wholly or in part, for any time period as the Engineer deems necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for any time period as the Engineer deems necessary due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the contract.
- The Contractor shall immediately comply with the written order of the Engineer to suspend the work wholly or in part. The suspended work shall be resumed when conditions are favorable and methods are corrected, as ordered or approved in writing by the Engineer.
- If the Engineer orders a suspension of all of the work or a portion of the work which is the current controlling operation or operations, due to unsuitable weather or to such other conditions as are considered unfavorable to the suitable prosecution of the work, the days on which the suspension is in effect shall not be considered working days as defined in Section 6-1.07, "Time of Completion," of these General Conditions. If a portion of work at the time of the suspension is not a current controlling operation or operations, but subsequently does become the current controlling operation or operations, the determination of working days will be made on the basis of the then current controlling operation or operations.
- If a suspension of work is ordered by the Engineer, due to the failure on the part of the Contractor to carry out orders given or to perform any provision of the contract, the days on which the suspension order is in effect shall be considered working days if those days are working days within the meaning of the definition set forth in Section 6-1.07, "Time of Completion," of these General Conditions.
- In the event of a suspension of work under any of the conditions set forth in this Section 6-1.06, the suspension of work shall not relieve the Contractor of the Contractor's legal responsibilities as set forth in these General Conditions.
- The Contractor shall have no claim for damage or compensation for any delay, interference or hindrance resulting from an ordered temporary suspension of the work.
- In addition to the requirements specified above, the following shall apply:

If the performance of all or any portion of the work is suspended or delayed by the Engineer in writing for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry) and the Contractor believes that additional compensation or contract time or additional compensation and contract time is due as a result of the suspension or delay, the Contractor shall submit to the Engineer in writing a request for adjustment within

7 calendar days of receipt of the notice to resume work. The request shall set forth the reasons and support for the adjustment.

Upon receipt, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost or time or cost and time required for the performance of the contract has increased as a result of the suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, the Contractor's suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an adjustment (excluding profit) and modify the contract in writing accordingly. The Engineer will notify the Contractor of the Engineer's determination whether or not an adjustment of the contract is warranted.

No contract adjustment will be allowed unless the Contractor has submitted the request for adjustment within the time prescribed.

No contract adjustment will be allowed under the provisions specified in this section to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any term or condition of this contract.

6-1.07 TIME OF COMPLETION

• The Contractor shall complete all or any designated portion of the work called for under the contract in all parts and requirements within the time set forth in the special provisions.

• A working day is defined as any day, except Saturdays, Sundays and legal holidays and days on which the Contractor is specifically required by the special provisions to suspend construction operations, and except days on which the Contractor is prevented by inclement weather or conditions resulting immediately therefrom adverse to the current controlling operation or operations, as determined by the Engineer, from proceeding with at least 75 percent of the normal labor and equipment force engaged on the controlling operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations.

• Should the Contractor prepare to begin work at the regular starting time in the morning of any day on which inclement weather, or the conditions resulting from the weather, or the condition of the work, prevents the work from beginning at the usual starting time and the crew is dismissed as a result thereof and the Contractor does not proceed with at least 75 percent of the normal labor and equipment force engaged in the current controlling operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations, the Contractor will not be charged for a working day whether or not conditions should change thereafter during that day and the major portion of the day could be considered to be suitable for those construction operations.

• The current controlling operation or operations is to be construed to include any feature of the work which, if delayed, will delay the time of completion of the contract.

• Determination that a day is a nonworking day by reason of inclement weather or conditions resulting immediately therefrom shall be made and agreed upon during that day by conference between the Engineer and the Contractor. In the event of failure to agree, the Contractor will be allowed 15 days from the issuance of the weekly statement of working days in which to file a written protest setting forth in what respects the Contractor differs from the Engineer, otherwise the decision of the Engineer shall be deemed to have been accepted by the Contractor as correct. The Engineer will furnish the Contractor a weekly statement showing the number of working days charged to the contract for the preceding week, the number of working days of time extensions being considered or approved, the number of working days originally specified for the completion of the contract and the number of working days remaining to complete the contract and the extended date for completion thereof, except when working days are not being charged in conformance with the provisions in Section 6-1.06, "Temporary Suspension of Work," of these General Conditions.

6-1.08 LIQUIDATED DAMAGES

• It is agreed by the parties to the contract that in case all the work called for under the contract in all parts and requirements is not finished or completed within the number of working days as set forth in the special provisions, damage will be sustained by the State of California, and that it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which the State will sustain in the event of and by reason of the delay; and it is therefore agreed that the Contractor will pay to the State of California, the sum set forth in the special provisions per day for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed; and the Contractor agrees to pay the liquidated damages herein provided for, and further agrees that the Department may deduct the amount thereof from any moneys due or that may become due the Contractor under the contract.

• It is further agreed that in case the work called for under the contract is not finished and completed in all parts and requirements within the number of working days specified, the Director shall have the right to increase the number of working days or not, as the Director may deem best to serve the interest of the State, and if the Director decides to increase the number of working days, the Director shall further have the right to charge to the Contractor, the Contractor's heirs, assigns or sureties and to deduct from the final payment for the work all or any part, as the Director may deem proper, of the actual cost of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to the contract, and which accrue during the period of the extension, except that cost of final surveys and preparation of final statement shall not be included in the charges.

- 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 the special provisions for the completion of the work caused by acts of God or of the public enemy, fire, floods, tsunamis, earthquakes, epidemics, quarantine restrictions, strikes, labor disputes, shortage of materials and freight embargoes, provided, that the Contractor shall notify the Engineer in writing of the causes of delay within 15 days from the beginning of that delay. The Engineer shall ascertain the facts and the extent of the delay, and the Engineer's findings thereon shall be final and conclusive.
- No extension of time will be granted for a delay caused by a shortage of materials unless the Contractor furnishes to the Engineer documentary proof that the Contractor has made every effort to obtain the materials from all known sources within reasonable reach of the work in a diligent and timely manner, and further proof in the form of supplementary progress schedules, as required in Section 6-1.04, "Progress Schedule," of these General Conditions that the inability to obtain the materials when originally planned, did in fact cause a delay in final completion of the entire work which could not be compensated for by revising the sequence of the Contractor's operations. The term "shortage of materials," as used in this section, shall apply only to materials, articles, parts or equipment which are standard items and are to be incorporated in the work. The term "shortage of materials," shall not apply to materials, parts, articles, or equipment which are processed, made, constructed, fabricated or manufactured to meet the specific requirements of the contract. Only the physical shortage of material will be considered under these provisions as a cause for extension of time. Delays in obtaining materials due to priority in filling orders will not constitute a shortage of materials.
- If the Contractor is delayed in completion of the work by reason of changes made under Section 3, "Changes in the Work," of these General Conditions or by any act of the Engineer or of the Department, not contemplated by the contract, an extension of time commensurate with the delay in completion of the work thus caused will be granted and the Contractor shall be relieved from any claim for liquidated damages, or engineering and inspection charges or other penalties for the period covered by that extension of time; provided that the Contractor shall notify the Engineer in writing of the causes of delay within 15 days from the beginning of the delay. The Engineer shall ascertain the facts and the extent of the delay, and the Engineer's findings thereon shall be final and conclusive.
- Except as provided in Public Contract Code Section 7102, the Contractor shall have no claim for damage or compensation for any delay or hindrance whether or not contemplated by the contract.
- It is the intention of the above provisions that the Contractor shall not be relieved of liability for liquidated damages or engineering and inspection charges for any period of delay in completion of the work in excess of that expressly provided for in this Section 6-1.08.

6-1.09 TERMINATION

6-1.09A Termination Of Contract - "Convenience Of State"

- The Department reserves the right to terminate the contract at any time if the Director determines that to do so would be in the best interest of the State.
- Termination of the contract and the total compensation payable to the Contractor in the event of termination shall be governed by the following:
 - (1) The Engineer will issue the Contractor a written notice signed by the Director, specifying that the contract is to be terminated. Upon receipt of that written notice and, except as otherwise directed in writing by the Engineer, the Contractor shall:
 - (a) Stop all work under the contract except that specifically directed to be completed prior to acceptance.
 - (b) Perform work the Engineer deems necessary to secure the project for termination.
 - (c) Remove equipment from the site of the work.
 - (d) Take the required action as is necessary to protect materials from damage.
 - (e) Notify all subcontractors and suppliers that the contract is being terminated and that their contracts or orders are not to be further performed unless otherwise authorized in writing by the Engineer.
 - (f) Provide the Engineer with an inventory list of all materials previously produced, purchased or ordered from suppliers for use in the work and not yet used in the work, including its storage location, and any other information as the Engineer may request.
 - (g) Dispose of materials not yet used in the work as directed by the Engineer. It shall be the Contractor's responsibility to provide the State with good title to all materials purchased by the State hereunder, including materials for which partial payment has been made as provided in Section 7-1.05, "Partial Payments," of these General Conditions and with bills of sale or other documents of title for the materials.
 - (h) Subject to the prior written approval of the Engineer, settle all outstanding liabilities and all claims arising out of subcontracts or orders for materials terminated hereunder. To the extent directed by the Engineer, the Contractor shall assign to the Department all the right, title and interest of the Contractor under subcontracts or orders for materials terminated hereunder.

- (i) Furnish the Engineer with the documentation required to be furnished by the Contractor under the provisions of the contract including, on projects as to which Federal funds are involved, all documentation required under the Federal requirements included in the contract.
 - (j) Take other actions as the Engineer may direct.
- (2) Acceptance of the contract as hereinafter specified shall not relieve the Contractor of responsibility for damage to materials except as follows:

The Contractor's responsibility for damage to materials for which partial payment has been made as provided in Section 7-1.05, "Partial Payments," of these General Conditions and for materials furnished by the State for use in the work and unused shall terminate when the Engineer certifies that the materials have been stored in the manner and at the locations the Engineer has directed.

The Contractor's responsibility for damage to materials purchased by the State subsequent to the issuance of the notice that the contract is to be terminated shall terminate when title and delivery of those materials has been taken by the State.

When the Engineer determines that the Contractor has completed the work under the contract directed to be completed prior to termination and all other work as may have been ordered to secure the project for termination, the Engineer will recommend that the Director formally accept the contract, and immediately upon and after the acceptance by the Director, the Contractor will not be required to perform any further work thereon and shall be relieved of contractual responsibilities for injury to persons or damage to property which occurs after the formal acceptance of the project by the Director.

- (3) The total compensation to be paid to the Contractor shall be determined by the Engineer on the basis of the following:
- (a) The reasonable cost to the Contractor, without profit, for all work performed under the contract, including mobilization, demobilization and work done to secure the project for termination.
When in the opinion of the Engineer the cost of the work is excessively high due to costs incurred to remedy or replace defective or rejected work, the reasonable cost to be allowed will be the estimated reasonable cost of performing that work in compliance with the requirements of the plans and special provisions and the excessive actual cost shall be disallowed.
 - (b) A reasonable allowance for profit on the cost of work performed as determined under Subsection (a), provided the Contractor establishes to the satisfaction of the Engineer that it is reasonably probable that the Contractor would have made a profit had the contract been completed and provided further, that the profit allowed shall in no event exceed 4 percent of the cost.
 - (c) The reasonable cost to the Contractor of handling material returned to the vendor, delivered to the Department or otherwise disposed of as directed by the Engineer.
 - (d) A reasonable allowance for the Contractor's administrative costs in determining the amount payable due to termination of the contract.

All records of the Contractor and subcontractors, necessary to determine compensation in conformance with the provisions of this Section shall be open to inspection or audit by representatives of the Department at all times after issuance of the notice that the contract is to be terminated and for a period of 3 years, and these records shall be retained for that period.

After acceptance of the work by the Director, the Engineer may make payments on the basis of interim estimates pending issuance of the Final Statement, when in the Engineer's opinion the amount thus paid, together with all amounts previously paid or allowed, will not result in total compensation in excess of that to which the Contractor will be entitled. All payments, including payment upon the Final Statement, shall be subject to deduction for prior payments and amounts, if any, to be kept or retained under the provisions of the contract.

- The provisions of this Section shall be included in all subcontracts.

6-1.09B Termination Of Control - "Default Of Contractor"

- Failure to supply an adequate working force, or material of proper quality, or failure to comply with Section 10262 of the State Contract Act, or in any other respect to prosecute the work with the diligence and force specified by the contract, is grounds for termination of the Contractor's control over the work and for taking over the work by the State. The procedures for termination, completion of the work, and the rights and obligations of the parties are provided for in the State Contract Act (Public Contract Code Sections 10253-10260).

- If the Contractor's control of the work is terminated or the Contractor abandons the work and the contract work is completed in conformance with the provisions in Section 10255 of the State Contract Act, any dispute concerning the amount to be paid by the State to the Contractor or the Contractor's surety or to be paid to the State by the Contractor or the Contractor's surety, under the provisions in Section 10258 of the State Contract Act, shall be subject to arbitration in conformance with the provisions in Section 7-1.10, "Arbitration," of these General Conditions. The surety shall be bound by the arbitration award and is entitled to participate in the arbitration proceedings.

SECTION 7

ACCEPTANCE AND PAYMENT

7-1.01 ACCEPTANCE

- The contract will be accepted in writing by the Director when the whole shall have been completed in all respects in conformance with the provisions of the contract to the full satisfaction of the Department.

7-1.02 SCOPE OF PAYMENT

- The Contractor shall accept the compensation provided in the contract as full payment for furnishing all labor, materials, tools, equipment, and incidentals necessary to the completed work and for performing all work contemplated and embraced under the contract; also for loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the acceptance by the Director and for all risks of every description connected with the prosecution of the work, also for all expenses incurred in consequence of the suspension or discontinuance of the work as provided in the contract; and for completing the work according to the contract. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.

- No compensation will be made in any case for loss of anticipated profits.

7-1.03 NOTICE OF POTENTIAL CLAIM

- The Contractor shall not be entitled to the payment of any additional compensation for any act, or failure to act, by the Engineer, including failure or refusal to issue a change order, or for the happening of any event, thing, occurrence, or other cause, unless the Contractor shall have given the Engineer due written notice of potential claim as hereinafter specified. Compliance with this Section 7-1.03 shall not be a prerequisite as to matters within the scope of the protest provisions in Section 3, "Changes in the Work," or Section 6-1.07, "Time of Completion," or the notice provisions in Section 2-1.045, "Differing Site Conditions," or Section 6-1.08, "Liquidated Damages," or Section 5-1.06, "Responsibility for Utilities," of these General Conditions.

- The written notice of potential claim shall be submitted to the Engineer prior to the time that the Contractor performs the work giving rise to the potential claim for additional compensation, if based on an act or failure to act by the Engineer, or in all other cases within 15 days after the happening of the event, thing, occurrence, or other cause, giving rise to the potential claim.

- The written notice of potential claim shall be submitted on Form CEM-6201 furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650 - 12655. The notice shall set forth the reasons for which the Contractor believes additional compensation will or may be due and the nature of the costs involved. Unless the amount of the potential claim has been stated in the written notice, the Contractor shall, within 15 days of submitting the notice, furnish an estimate of the cost of the affected work and impacts, if any, on project completion. The estimate of costs may be changed or updated by the Contractor when conditions have changed. When the affected work is completed, the Contractor shall submit substantiation of the Contractor's actual costs. Failure to do so shall be sufficient cause for denial of any claim subsequently filed on the basis of that notice of potential claim.

- It is the intention of this Section 7-1.03 that differences between the parties arising under and by virtue of the contract be brought to the attention of the Engineer at the earliest possible time in order that those matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that the Contractor shall have no right to additional compensation for any claim that may be based on any act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

- Should the Contractor, in connection with or subsequent to the assertion of a potential claim, request inspection and copying of documents or records in the possession of the Department that pertain to the potential claim, the Contractor's records of the project, as deemed by the Department to be pertinent to the potential claim, shall be made available to the Department for inspection and copying.

7-1.04 STOP NOTICES

- The State of California, by and through the Department or other appropriate State office or officers, may at its option and at any time retain out of any amounts due the Contractor, sums sufficient to cover claims, filed pursuant to Section 3179 et seq of the Civil Code.

- Stop notice information may be obtained from the Departmental Disbursing Office at 1801 30th Street, East Building, Sacramento, California.

7-1.05 PARTIAL PAYMENTS

- The Department, once in each month upon request of the Contractor for partial payments, shall cause an estimate in writing to be made by the Engineer. The estimate shall include the total amount of work done and acceptable materials furnished to the time of the estimate, and the value thereof. The acceptable materials shall include materials that are furnished and delivered to the work site and are not incorporated in the work.
- The Department shall retain 10 percent of the estimated value of the work done and 10 percent of the value of materials so estimated to have been furnished and delivered and not incorporated in the work as aforesaid as part security for the fulfillment of the contract by the Contractor, except that at any time after 20 percent of the work has been completed, if the Engineer finds that satisfactory progress is being made, the Department may reduce the total amount being retained from payment pursuant to the above requirements to 5 percent of the total estimated value of the work and materials and may also reduce the amount retained from any of the remaining partial payments to 5 percent of the estimated value of the work and materials. In addition, on any partial payment made after 95 percent of the work has been completed, the Department may reduce the amount withheld from payment pursuant to the requirements of this Section 7-1.05, to such lesser amount as the Department determines is adequate security for the fulfillment of the balance of the work and other requirements of the contract, but in no event will that amount be reduced to less than 125 percent of the estimated value of the work yet to be completed as determined by the Engineer. The reduction will only be made upon the written request of the Contractor and shall be approved in writing by the surety on the Performance Bond and by the surety on the Payment Bond. The approval of the surety shall be submitted to the Disbursing Officer of the Department; the signature of the person executing the approval for the surety shall be properly acknowledged and the power of attorney authorizing the person to give that consent must either accompany the document or be on file with the Department.
- The Department shall pay monthly to the Contractor, while carrying on the work, the balance not retained, as aforesaid, after deducting therefrom all previous payments and all sums to be kept or retained under the provisions of the contract. No monthly estimate or payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in conformance with the provisions of the contract.
- No monthly estimate or payment shall be construed to be an acceptance of any defective work or improper materials.
- Attention is directed to the prohibitions and penalties pertaining to unlicensed contractors as provided in Business and Professions Code Sections 7028.15(a) and 7031.

7-1.06 PAYMENT OF WITHHELD FUNDS

- Attention is directed to Section 7-1.05, "Partial Payments," of these General Conditions and in particular to the retention provisions of Section 7-1.05, of these General Conditions.
- Upon the Contractor's request, pursuant to Public Contract Code Section 10263, the Department will make payment of funds withheld from progress payments to ensure performance of the contract if the Contractor deposits in escrow with the State Treasurer, or with a bank acceptable to the Department, securities equivalent to the amount withheld. The Contractor shall be beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon. Upon satisfactory completion of the contract, the securities shall be returned to the Contractor.
- Alternatively, upon the Contractor's request, the Department will make payment of retentions earned directly to the escrow agent. The Contractor may direct the investment of the payments into securities and the Contractor shall receive the interest earned on the investments upon the same terms provided for securities deposited by the Contractor. Upon satisfactory completion of the contract, the Contractor shall receive from the escrow agent all securities, interest, and payments received by the escrow agent from the Department, pursuant to the terms in Section 10263 of the Public Contract Code.
- Alternatively, and subject to the approval of the Department, the payment of retentions earned may be deposited directly with a person licensed under Division 6 (commencing with Section 17000) of the Financial Code as the escrow agent. Upon written request of an escrow agent that has not been approved by the Department under subdivision (c) of Section 10263 of the Public Contract Code, the Department will provide written notice to that escrow agent within 10 business days of receipt of the request indicating the reason or reasons for not approving that escrow agent. The payments will be deposited in a trust account with a Federally chartered bank or savings association within 24 hours of receipt by the escrow agent. The Contractor shall not place any retentions with the escrow agent in excess of the coverage provided to that escrow agent pursuant to subdivision (b) of Section 17314 of the Financial Code. In all respects not inconsistent with subdivision (c) of Section 10263 of the Public Contract Code, the remaining provisions of Section 10263 of the Public Contract Code shall apply to escrow agents acting pursuant to subdivision (c) of Section 10263 of the Public Contract Code.
- Securities eligible for investment shall include those listed in Section 16430 of the Government Code, bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the Department.

- The escrow agreement used pursuant to this Section 7-1.06 shall be substantially similar to the "Escrow Agreement for Security Deposits In Lieu of Retention" in Section 10263 of the Public Contract Code, deemed as incorporated herein by reference.
- The Contractor shall obtain the written consent of the surety to the agreement.

7-1.07 FINAL PAYMENT AND CLAIMS

- After acceptance of the work by the Director, the Department will make a final monthly payment pending approval of the final statement. The final monthly payment will be the balance found to be due after deduction of all previous payments, all amounts to be kept or retained under the provisions of the contract, and such further amounts as the Engineer determined to be necessary pending approval of the final statement. The Engineer will promptly submit to the Contractor a final statement of the sum due the Contractor under the contract. The statement shall take into account the contract price, as adjusted by any change order; amounts already paid; and sums to be withheld for incomplete work, liquidated damages, and for any other cause under the contract. The Contractor shall submit written approval of the final statement or submit a written statement of all claims arising under or by virtue of the contract so that the Engineer receives the written approval or statement of claims no later than close of business of the thirtieth day after receiving the final statement of the sum due the Contractor. If the thirtieth day falls on a Saturday, Sunday or legal holiday, then receipt of the written approval or statement of claims by the Engineer shall not be later than the close of business of the next business day. The approval of that statement or the failure to file a claim within the specified 30 day period shall constitute a waiver by the Contractor of any additional right to compensation under or by reason of the contract and the payment so made by the State shall thereupon become a complete statement between the State and the Contractor.
- To constitute the filing of a claim, the Contractor shall set forth in writing the basis for the claim and the amount of money for which demand is made and shall submit the same to the Engineer. No demand by the Contractor shall be recognized as a claim by the State unless it is filed in conformance with this paragraph.
- Claims filed by the Contractor shall be in sufficient detail to enable the Engineer to ascertain the basis and amount of those claims. If additional information or details are required by the Engineer to determine the basis and amount of the claims, the Contractor shall furnish additional information or details so that the information or details are received by the Engineer no later than the fifteenth day after receipt of the written request from the Engineer. If the fifteenth day falls on a Saturday, Sunday or legal holiday, then receipt of the information or details by the Engineer shall not be later than close of business of the next business day. Failure to submit the information and details to the Engineer within the time specified will be sufficient cause for denying the claim.
- The Contractor shall keep full and complete records of the costs and additional time incurred for any work for which a claim for additional compensation is made. The Engineer or any designated claim investigator or auditor shall have access to those records and any other records as may be required by the Engineer to determine the facts or contentions involved in the claims. Failure to permit access to those records shall be sufficient cause for denying the claims.
- Claims submitted by the Contractor shall be accompanied by a notarized certificate containing the following language:

Under the penalty of law for perjury or falsification and with specific reference to the California False Claims Act, Government Code Section 12650 et. seq., the undersigned,

_____,
 (name) _____ of

 (title)

 (company)

hereby certifies that the claim for the additional compensation and time, if any, made herein for the work on this contract is a true statement of the actual costs incurred and time sought, and is fully documented and supported under the contract between parties.

Dated _____

/s/ _____

Subscribed and sworn before me this _____ day

of _____.

Notary Public

My Commission Expires _____

- Failure to submit the notarized certificate will be sufficient cause for denying the claim.
- Any claim for overhead type expenses or costs, in addition to being certified as stated above, shall be supported by an audit report of an independent Certified Public Accountant. Any claim for overhead shall also be subject to audit by the State at its discretion.
- Any costs or expenses incurred by the State in reviewing or auditing any claims that are not supported by the Contractor's cost accounting or other records shall be deemed to be damages incurred by the State within the meaning of the California False Claims Act.
- The District Director of the District which administers the contract will make the final determination of any claims which remain in dispute after completion of claim review by the Engineer. A board or person designated by the District Director will review those claims and make a written recommendation thereon to the District Director. The Contractor may meet with the review board or person to make a presentation in support of those claims.
- Upon final determination of the claims, the Engineer will then make and issue the Engineer's final statement in writing and within 30 days thereafter the State will pay the entire sum, if any, found due thereon. That final statement shall be conclusive and binding against both parties to the contract on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Section 7-1.08, "Clerical Errors," of these General Conditions.

7-1.08 CLERICAL ERRORS

- Notwithstanding the provisions in Section 7-1.07, "Final Payment And Claims," of these General Conditions, for a period of 3 years after acceptance of the work, all estimates and payments made pursuant to Section 7-1.07, including the final statement and payment, shall be subject to correction and adjustment for clerical errors in the calculations involved in the determination of quantities and payments. The Contractor and the Department agree to pay to the other any sum due under the provisions of this Section 7-1.08, provided, however, if the total sum to be paid is less than \$200, no payment shall be made.

7-1.09 GUARANTEE

- The Contractor hereby unconditionally guarantees that the mechanical and electrical equipment and related components in the building work will be done in conformance with the requirements of the contract, and further guarantees the same to be and remain free of defects in workmanship and materials for a period of 6 months from the date of acceptance of the contract. The Contractor hereby agrees to repair or replace any and all mechanical and electrical equipment and related components in the building work that may prove to be not in conformance with the requirements of the contract or that may be defective in its workmanship or material within the guarantee period specified, without any expense whatsoever to the Department, ordinary wear and tear and unusual abuse or neglect excepted.
- A portion of the performance bond for the contract in a sum equal to one half the value of the mechanical and electrical equipment and related components in the building work, shall remain in full force and effect during the guarantee period. The value of those mechanical and electrical equipment and related components shall be the value determined in conformance with the requirements specified in Section 6-1.05, "Schedule of Values" of the General Conditions.
- The Contractor further agrees that, within 10 calendar days after being notified in writing by the Department of any mechanical and electrical equipment and related components in the building work not in conformance with the requirements of the contract or any defects in the mechanical and electrical equipment and related components in the building work, he shall commence and prosecute with due diligence all work necessary to fulfill the terms of this guarantee, and shall complete the work within a reasonable period of time, and, in the event the Contractor fails to comply, he does hereby authorize the Department to proceed to have such work done at the Contractor's expense and he shall honor and pay the cost and charges therefor upon demand. The Department shall be entitled to all costs and expenses, including reasonable attorney's fees, necessarily incurred upon the Contractor's refusal to honor and pay the above costs and charges.

7-1.10 ARBITRATION

- Sections 10240-10240.13, inclusive of the Public Contract Code provides for the resolution of contract claims by arbitration.
- Claims (demands for monetary compensation or damages) arising under or related to performance of the contract shall be resolved by arbitration unless the Department and the Contractor agree in writing, after the claim has arisen, to waive arbitration and to have the claim litigated in a court of competent jurisdiction. Arbitration shall be pursuant to Public Contract Code Sections 10240-10240.13, inclusive, and applicable regulations (see Subchapter 3 [Sections 301-382, inclusive] of Chapter 2 of Title 1 of the California Code of Regulations). The arbitration decision shall be decided under and in conformance with the law of this State, supported by substantial evidence and, in writing, contain the basis for the decision, findings of fact, and conclusions of law.
- Arbitration shall be initiated by a Complaint in Arbitration made in compliance with the requirements of those regulations. A Complaint in Arbitration by the Contractor shall be made not later than 90 days after the date of service in person or by mail on the Contractor of the final written decision by the Department on the claim.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 02-350604

DIVISION 0 BIDDING AND CONTRACT REQUIREMENTS

0.01 INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS

The work embraced herein shall conform to the provisions in the Instructions to Bidders and General Conditions for Building Construction of the Department of Transportation, dated January, 2002, a single publication attached hereto and referred to herein as "Instructions to Bidders" and "General Conditions", and the following special provisions.

In case of conflict between the Instructions to Bidders or the General Conditions and these special provisions, the special provisions shall take precedence over and be used in lieu of the conflicting portions.

0.02 PROPOSAL REQUIREMENTS AND CONDITIONS

The bidder's attention is directed to the provisions in Section 1, "Proposal Requirements and Conditions," of the Instructions to Bidders, and these special provisions for the requirements and conditions which the bidder must observe in the preparation of the proposal form and the submission of the bid.

In addition to the subcontractors required to be listed in conformance with Section 1-1.05, "Required Listing of Proposed Subcontractors," of the Instructions to Bidders, each proposal shall have listed therein the name and address of each DVBE subcontractor to be used for credit in meeting the goal, and to whom the bidder proposes to directly subcontract portions of the work. The list of subcontractors shall also set forth the portion of work that will be performed by each subcontractor listed. A sheet for listing the subcontractors is included in the Proposal.

The Bidder's Bond form mentioned in the last paragraph in Section 1-1.07, "Proposal Guaranty," of the Instructions to Bidders will be found following the signature page of the Proposal.

In conformance with Public Contract Code Section 7106, a Noncollusion Affidavit is included in the Proposal. Signing the Proposal shall also constitute signature of the Noncollusion Affidavit.

0.024 DISABLED VETERAN BUSINESS ENTERPRISE (DVBE)

Section 10115 of the Public Contract Code requires the Department to implement provisions to establish a goal for Disabled Veteran Business Enterprise (DVBE) in contracts.

It is the policy of the Department that Disabled Veteran Business Enterprise (DVBE) shall have the maximum opportunity to participate in the performance of contracts financed solely with state funds. The Contractor shall ensure that DVBEs have the maximum opportunity to participate in the performance of this contract and shall take all necessary and reasonable steps for this assurance. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of subcontracts. Failure to carry out the requirements of this paragraph shall constitute a breach of contract and may result in termination of this contract or other remedy the Department may deem appropriate.

Bidder's attention is directed to the following:

- A. "Disabled Veteran Business Enterprise" (DVBE) means a business concern certified as a DVBE by the Office of Small Business Certification and Resources, Department of General Services.
- B. A DVBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, or vendor of material or supplies.
- C. Credit for DVBE prime contractors will be 100 percent.
- D. A DVBE joint venture partner must be responsible for a clearly defined portion of the work to be performed. Responsibility means actually performing, managing and supervising that portion of the work with its own forces. The DVBE joint venture partner must share in the ownership, control, management responsibilities, risks and profits of the joint venture. The DVBE joint venturer must submit the joint venture agreement with the Caltrans Bidder DVBE Information form required in Division 0.026, "Submission of DVBE Information," elsewhere in these special provisions.
- E. A DVBE must perform a commercially useful function, i.e., 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.
- F. Credit for DVBE vendors of materials or supplies is limited to 60 percent of the amount to be paid to the vendor for the material unless the vendor manufactures or substantially alters the goods.
- G. Credit for trucking by DVBEs will be as follows:
 - 1. One hundred percent of the amount to be paid when a DVBE trucker will perform the trucking with his/her own trucks, tractors and employees.
 - 2. Twenty percent of the amount to be paid to DVBE trucking brokers who do not have a "certified roster."
 - 3. One hundred percent of the amount to be paid to DVBE trucking brokers who have signed agreements that all trucking will be performed by DVBE truckers if credit is toward the DVBE goal, a "certified roster" showing that all trucks are owned by DVBEs, and a signed statement on the "certified roster" that indicates that 100 percent of revenue paid by the broker will be paid to the DVBEs listed on the "certified roster."
 - 4. Twenty percent of the amount to be paid to trucking brokers who are not a DVBE but who have signed agreements with DVBE truckers assuring that at least 20 percent of the trucking will be performed by DVBE truckers if credit is toward the DVBE goal, a "certified roster" showing that at least 20 percent of the number of trucks are owned by DVBE truckers, and a signed statement on the "certified roster" that indicates that at least 20 percent of the revenue paid by the broker will be paid to the DVBEs listed on the "certified roster."

The "certified roster" referred to herein shall conform to the requirements in Division 0.026, "Submission Of DVBE Information," elsewhere in these special provisions.

- H. DVBEs and DVBE joint venture partners must be certified DVBEs as determined by the Department of General Services, Office of Small Business Certification and Resources, 1531 "I" Street, Second Floor, Sacramento, CA 95814, on the date bids for the project are opened before credit may be allowed toward the DVBE goal. It is the Contractor's responsibility to verify that DVBEs are certified.
- I. Noncompliance by the Contractor with these requirements constitutes a breach of this contract and may result in termination of the contract or other appropriate remedy for a breach of this contract.

0.025 DVBE GOAL FOR THIS PROJECT

The Department has established the following goal for Disabled Veteran Business Enterprise (DVBE) participation for this project:

Disabled Veteran Business Enterprise (DVBE): 3 percent.

It is the bidder's responsibility to make a sufficient portion of the work available to subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DVBE subcontractors and suppliers, so as to assure meeting the goal for DVBE participation.

The Office of Small Business Certification and Resources, Department of General Services, may be contacted at (916) 322-5060 or visit their internet web site at <http://www.osmb.dgs.ca.gov/> for program information and certification status. The Department's Business Enterprise Program may also be contacted at (916) 227-9599 or the internet web site at <http://www.dot.ca.gov/hq/bep/>.

0.026 SUBMISSION OF DVBE INFORMATION

The required DVBE information shall be submitted on the "CALTRANS BIDDER - DVBE INFORMATION" form included in the Proposal. If this information is not submitted with the bid, the DVBE information forms shall be removed from the documents prior to submitting the bid.

It is the bidder's responsibility to make enough work available to DVBEs and to select those portions of the work or material needs consistent with the available DVBEs to meet the goal for DVBE participation or to provide information to establish that, prior to bidding, the bidder made adequate good faith efforts to do so.

If the DVBE information is not submitted with the bid, the apparent successful bidder (low bidder), the second low bidder and the third low bidder shall submit the DVBE information to the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, California 95814 so the information is received by the Department no later than 4:00 p.m. on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening. DVBE information sent by U.S. Postal Service certified mail with return receipt and certificate of mailing and mailed on or before the third day, not including Saturdays, Sundays and legal holidays, following bid opening will be accepted even if it is received after the fourth day following bid opening. Failure to submit the required DVBE information by the time specified will be grounds for finding the bid or proposal nonresponsive. Other bidders need not submit DVBE information unless requested to do so by the Department.

The bidder's DVBE information shall establish that good faith efforts to meet the DVBE goal have been made. To establish good faith efforts, the bidder shall demonstrate that the goal will be met or that, prior to bidding, adequate good faith efforts to meet the goal were made.

Bidders are cautioned that even though their submittal indicates they will meet the stated DVBE goal, their submittal should also include their adequate good faith efforts information along with their DVBE goal information to protect their eligibility for award of the contract in the event the Department, in its review, finds that the goal has not been met.

The bidder's DVBE information shall include the names of DVBE firms that will participate, with a complete description of work or supplies to be provided by each, the dollar value of each DVBE transaction, and a written confirmation from the DVBE that it is participating in the contract. A copy of the DVBE's quote will serve as written confirmation that the DVBE is participating in the contract. When 100 percent of a portion of the work is not to be performed or furnished by a DVBE, a description of the exact portion of that work to be performed or furnished by that DVBE shall be included in the DVBE information, including the planned location of that work. The work that a DVBE prime contractor has committed to performing with its own forces as well as the work that it has committed to be performed by DVBE subcontractors, suppliers and trucking companies will count toward the goal.

If credit for trucking by a DVBE trucking broker is shown on the bidder's information as 100 percent of the revenue to be paid by the broker is to be paid to DVBE truckers, a "certified roster" of the broker's trucks to be used must be included. The "certified roster" must indicate that all the trucks are owned by certified DVBEs and must show the DVBE truck numbers, owner's name, Public Utilities Commission Cal-T numbers, and the DVBE certification numbers. The roster must indicate that all revenue paid by the broker will be paid to DVBEs listed on the "certified roster".

If credit for trucking by a trucking broker who is not a DVBE is shown in the bidder's information, a "certified roster" of the broker's trucks to be used must be included. The "certified roster" must indicate that at least 20 percent of the broker's trucks are owned by certified DVBEs and must show the DVBE truck numbers, owner's name, Public Utilities Commission Cal-T numbers, and the DVBE certification number. The roster must indicate that at least 20 percent of the revenue paid by the broker will be paid to DVBEs listed on the "certified roster".

A bidder shall be deemed to have made good faith efforts upon submittal, within time limits specified by the Department, of documentary evidence that all of the following actions were taken:

- A. Contact was made with the Office of Small Business Certification and Resources (OSBCR), Department of General Services or their web site at <http://www.osmb.dgs.ca.gov/> to identify Disabled Veteran Business Enterprises.
- B. Advertising was published in trade media and media focusing on Disabled Veteran Business Enterprises, unless time limits imposed by the Department do not permit that advertising.
- C. Invitations to bid were submitted to potential Disabled Veteran Business Enterprise contractors.
- D. Available Disabled Veteran Business Enterprises were considered.

0.027 SMALL BUSINESS PREFERENCE

Attention is directed to "Award and Execution of Contract" of these special provisions.

Attention is also directed to the Small Business Procurement and Contract Act, Government Code Section 14835, et seq and Title 2, California Code of Regulations, Section 1896, et seq.

Bidders who wish to be classified as a Small Business under the provisions of those laws and regulations, shall be certified as Small Business by the Department of General Services, Office of Small Business Certification and Resources, 1531 "I" Street, Second Floor, Sacramento, CA 95814.

To request Small Business Preference, bidders shall fill out and sign the Request for Small Business Preference form in the Proposal and shall attach a copy of their Office of Small Business Certification and Resources (OSBCR) small business certification letter to the form. The bidder's signature on the Request for Small Business Preference certifies, under penalty of perjury, that the bidder is certified as Small Business at the time of bid opening and further certifies, under penalty of perjury, that under the following conditions, at least 50 percent of the subcontractors to be utilized on the project are either

certified Small Business or have applied for Small Business certification by bid opening date and are subsequently granted Small Business certification.

The conditions requiring the aforementioned 50 percent level of subcontracting by Small Business subcontractors apply if:

- A. The lowest responsible bid for the project exceeds \$100,000; and
- B. The project work to be performed requires a Class A or a Class B contractor's license; and
- C. Two or more subcontractors will be used.

If the above conditions apply and Small Business Preference is granted in the award of the contract, the 50 percent Small Business subcontractor utilization level shall be maintained throughout the life of the contract.

0.028 CALIFORNIA COMPANY PREFERENCE

Attention is directed to "Award and Execution of Contract" of these special provisions.

In conformance with the requirements of Section 6107 of the Public Contract Code, a "California company" will be granted a reciprocal preference for bid comparison purposes as against a nonresident contractor from any state that gives or requires a preference to be given contractors from that state on its public entity construction contracts.

A "California company" means a sole proprietorship, partnership, joint venture, corporation, or other business entity that was a licensed California contractor on the date when bids for the public contract were opened and meets one of the following:

- A. Has its principal place of business in California.
- B. Has its principal place of business in a state in which there is no local contractor preference on construction contracts.
- C. Has its principal place of business in a state in which there is a local contractor construction preference and the contractor has paid not less than \$5000 in sales or use taxes to California for construction related activity for each of the five years immediately preceding the submission of the bid.

To carry out the "California company" reciprocal preference requirements of Section 6107 of the Public Contract Code, all bidders shall fill out and sign the California Company Preference form in the Proposal. The bidder's signature on the California Company Preference form certifies, under penalty of perjury, that the bidder is or is not a "California company" and if not, the amount of the preference applied by the state of the nonresident Contractor.

A nonresident Contractor shall disclose any and all bid preferences provided to the nonresident Contractor by the state or country in which the nonresident Contractor has its principal place of business.

Proposals without the California Company Preference form filled out and signed may be rejected.

0.03 AWARD AND EXECUTION OF CONTRACT

The bidder's attention is directed to the provisions in Section 2, "Award and Execution of Contract," of the Instructions to Bidders and these special provisions for the requirements and conditions concerning award and execution of contract.

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed and who has met the goal for DVBE participation or has demonstrated, to the satisfaction of the Department, adequate good faith efforts to do so. Meeting the goal for DVBE participation or demonstrating, to the satisfaction of the Department, adequate good faith efforts to do so is a condition for being eligible for award of contract.

A "Payee Data Record" form will be included in the contract documents to be executed by the successful bidder. The purpose of the form is to facilitate the collection of taxpayer identification data. The form shall be completed and returned to the Department by the successful bidder with the executed contract and contract bonds. For the purposes of the form, payee shall be deemed to mean the successful bidder. The form is not to be completed for subcontractors or suppliers. Failure to complete and return the "Payee Data Record" form to the Department as provided herein will result in the retention of 20 percent of payments due the contractor and penalties of up to \$20,000. This retention of payments for failure to complete the "Payee Data Record" form is in addition to any other retention of payments due the Contractor.

Attention is also directed to "Small Business Preference" of these special provisions. Any bidder who is certified as a Small Business by the Department of General Services, Office of Small Business Certification and Resources will be allowed a preference in the award of this contract, if it be awarded, under the following conditions:

- A. The apparent low bidder is not certified as a Small Business, or has not filled out and signed the Request for Small Business Preference included with the bid documents and attached a copy of their Office of Small Business Certification and Resources (OSBCR) small business certification letter to the form; and

- B. The bidder filled out and signed the Request for Small Business Preference form included with the bid documents and attached a copy of their Office of Small Business Certification and Resources (OSBCR) small business certification letter to the form.

The small business preference will be a reduction in the bid submitted by the small business contractor, for bid comparison purposes, by an amount equal to 5 percent of the amount bid by the apparent low bidder, the amount not to exceed \$50,000. If this reduction results in the small business contractor becoming the low bidder, then the contract will be awarded to the small business contractor on the basis of the actual bid of the small business contractor notwithstanding the reduced bid price used for bid comparison purposes.

Attention is also directed to "California Company Preference" of these special provisions.

The amount of the California company reciprocal preference shall be equal to the amount of the preference applied by the state of the nonresident contractor with the lowest responsive bid, except where the "California company" is eligible for a California Small Business Preference, in which case the preference applied shall be the greater of the two, but not both.

If the bidder submitting the lowest responsive bid is not a "California company" and with the benefit of the reciprocal preference, a "California company's" responsive bid is equal to or less than the original lowest responsive bid, the "California company" will be awarded the contract at its submitted bid price except as provided below.

Small business bidders shall have precedence over nonsmall business bidders in that the application of the "California company" preference for which nonsmall business bidders may be eligible shall not result in the denial of the award to a small business bidder.

DIVISION 4. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES

Attention is directed to the provisions in Sections 6-1.03, "Beginning of Work," 6-1.07, "Time of Completion," 6-1.07, "Liquidated Damages," and of the General Conditions and these special provisions.

The Contractor shall begin work within 15 calendar days after the contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department of Transportation.

The work (except plant establishment work) shall be diligently prosecuted to completion before the expiration of **350 WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$1,700 per day, for each and every calendar day's delay in finishing the work (except plant establishment work) in excess of the number of working days prescribed above.

The Contractor shall diligently prosecute all work (including plant establishment) to completion before the expiration of **440 WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$600 per day, for each and every calendar day's delay in completing the work in excess of the number of working days prescribed above.

In no case will liquidated damages of more than \$1,700 per day be assessed.

0.05 (BLANK)

0.052 DIFFERING SITE CONDITIONS

Attention is directed to Section 2-1.045, "Differing Site Conditions," of the General Conditions.

During the progress of the work, if subsurface or latent conditions are encountered at the site differing materially from those indicated in the "Materials Information," log of test borings, other geotechnical data obtained by the Department's investigation of subsurface conditions, or an examination of the conditions above ground at the site, the party discovering those conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

The Contractor will be allowed 15 days from the notification of the Engineer's determination of whether or not an adjustment of the contract is warranted, in which to file a notice of potential claim in conformance with the provisions of Section 7-1.03, "Notice of Potential Claim," of the General Conditions and as specified herein; otherwise the decision of the Engineer shall be deemed to have been accepted by the Contractor as correct. The notice of potential claim shall set forth in what respects the Contractor's position differs from the Engineer's determination and provide any additional information obtained by the Contractor, including but not limited to additional geotechnical data. The notice of potential claim shall be accompanied by the Contractor's certification that the following were made in preparation of the bid: a review of the contract, a review of the "Materials Information," a review of the log of test borings and other records of geotechnical data to the extent they were made available to bidders prior to the opening of bids, and an examination of the conditions above ground at the site. Supplementary information, obtained by the Contractor subsequent to the filing of the notice of potential claim, shall be submitted to the Engineer in an expeditious manner.

0.053 INTEREST ON PAYMENTS

Interest shall be payable on progress payments, payments after acceptance, final statement, ordered changes in the work payments, and claim payments as follows:

- A. Unpaid progress payments, payment after acceptance, and final statements shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
- B. Unpaid ordered changes in work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following receipt of a properly submitted and undisputed bill for ordered changes in the work. To be properly submitted, the bill must be submitted within 7 days of the performance of the ordered change in the work and in conformance with the provisions in Section 3, "Changes in the Work," and Section 7-1.05, "Partial Payments," of the General Conditions. An undisputed ordered change in the work bill not submitted within 7 days of performance of the ordered change in the work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
- C. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments, and ordered change in the work payments shall be 10 percent per annum.
- D. The rate of interest payable on a claim, protest or dispute ultimately allowed under this contract shall be 6 percent per annum. Interest shall begin to accrue 61 days after the Contractor submits to the Engineer information in sufficient detail to enable the Engineer to ascertain the basis and amount of that claim, protest or dispute.

The rate of interest payable on any award in arbitration shall be 6 percent per annum if allowed under the provisions of Civil Code Section 3289.

0.054 FINAL PAYMENT AND CLAIMS

Attention is directed to Section 7-1.07, "Final Payment and Claims," of the General Conditions.

If the Contractor files a timely written statement of claims in response to the proposed final estimate, the District that administers the contract will submit a claim position letter to the Contractor by hand delivery or deposit in the U.S. mail within 135 days of acceptance of the contract. The claim position letter will delineate the District's position on the Contractor's claims. If the Contractor disagrees with the claim position letter, the Contractor shall submit a written notification of its disagreement to be received by the District not later than 15 days after the Contractor's receipt of the claim position letter. The written notification of disagreement shall set forth the basis for the Contractor's disagreement and be submitted to the office designated in the claim position letter. The Contractor's failure to provide a timely, written notification of disagreement shall constitute the Contractor's acceptance and agreement with the determinations provided in the claim position letter and with final payment pursuant to the claim position letter.

If the Contractor files a timely notification of disagreement with the District claim position letter, the board of review designated by the District Director to review claims that remain in dispute will meet with the Contractor within 45 days after receipt by the District of the notification of disagreement. Attendance by the Contractor at the board of review meeting shall be mandatory.

If the District fails to submit a claim position letter to the Contractor within 135 days after the acceptance of the contract and the Contractor has claims that remain in dispute, the Contractor may request a meeting with the board of review designated by the District Director to review claims that remain in dispute. The Contractor's request for a meeting shall identify the claims that remain in dispute. If the Contractor files a request for a meeting, the board of review will meet with the Contractor within 45 days after the District receives the request for the meeting. Attendance by the Contractor at the District Director's board of review meeting shall be mandatory.

Failure of the Contractor to file a timely written statement of claims in response to the proposed final estimate, or to file a timely notification of disagreement with the District claim position letter, or to attend the District Director's board of review meeting shall constitute a failure to pursue diligently and exhaust the administrative procedures in the contract and shall be a bar to arbitration in conformance with the requirements in Section 10240.2 of the California Public Contract Code.

0.055 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES

When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe. The Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In conformance with Section 25914.1 of the Health and Safety Code, removal of asbestos or hazardous substances including exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If performance of the Contractor's current controlling operation is delayed in the area, and the delay could not be avoided by the judicious handling of forces, equipment, and plant, an extension of time determined in conformance with the provisions in Section 6-1.08, "Liquidated Damages," of the General Conditions will be granted. Compensation for the delay will be made only for the Contractor's actual losses due to idle time of equipment, necessary payments for idle time of workers, and cost of extra moving of equipment, in conformance with the provisions in Section 3-1.01E, "Allowable Costs for Changes," of the General Conditions, except that no markups will be added.

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0.067 YEAR 2000 COMPLIANCE

This contract is subject to Year 2000 Compliance for automated devices in the State of California.

Year 2000 compliance for automated devices in the State of California is achieved when embedded functions have or create no logical or mathematical inconsistencies when dealing with dates prior to and beyond 1999. The year 2000 is recognized and processed as a leap year. The product must also operate accurately in the manner in which it was intended for date operation without requiring manual intervention.

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 4-1.04, "Certificates of Compliance," of the General Conditions for all automated devices furnished for the project.

0.07 SUBCONTRACTOR AND DVBE RECORDS

The Contractor shall maintain records of all subcontracts entered into with certified DVBE subcontractors and records of materials purchased from certified DVBE suppliers. The records shall show the name and business address of each DVBE subcontractor or vendor and the total dollar amount actually paid each DVBE subcontractor or vendor.

Upon completion of the contract, a summary of these records shall be prepared on Form CEM-2402 (S) and certified correct by the Contractor or the Contractor's authorized representative, and shall be furnished to the Engineer.

0.075 PERFORMANCE OF DVBE SUBCONTRACTORS AND SUPPLIERS

The DVBEs listed by the Contractor in response to the provisions in Division 0.026, "Submission of DVBE Information," and Division 3, "Award and Execution of Contract," of these special provisions, which are determined by the Department to be certified DVBEs, shall perform the work and supply the materials for which they are listed, unless the Contractor has received prior written authorization to perform the work with other forces or to obtain the materials from other sources.

Authorization to utilize other forces or sources of materials may be requested for the following reasons:

- A. The listed DVBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract, when the written contract, based upon the general terms, conditions, plans and specifications for the project, or on the terms of the subcontractor's or supplier's written bid, is presented by the Contractor.
- B. The listed DVBE becomes bankrupt or insolvent.
- C. The listed DVBE fails or refuses to perform the subcontract or furnish the listed materials.
- D. The Contractor stipulated that a bond was a condition of executing a subcontract and the listed DVBE subcontractor fails or refuses to meet the bond requirements of the Contractor.
- E. The work performed by the listed subcontractor is substantially unsatisfactory and is not in substantial conformance with the plans and specifications or the subcontractor is substantially delaying or disrupting the progress of the work.
- F. The listed DVBE subcontractor is not licensed pursuant to the Contractor's License Law.
- G. It would be in the best interest of the State.

The Contractor shall not be entitled to payment for the work or material unless it is performed or supplied by the listed DVBE or by other forces (including those of the Contractor) pursuant to prior written authorization of the Engineer.

0.077 SUBCONTRACTING

Attention is directed to the provisions in Section 6-1.01, "Subletting and Subcontracting," of the General Conditions, and Division 0.02, "Proposal Requirements and Conditions," Division 0.026, "Submission of DVBE Information," and Division 0.030, "Award and Execution of Contract," of these special provisions.

Pursuant to the provisions in Section 1777.1 of the Labor Code, the Labor Commissioner publishes and distributes a list of contractors ineligible to perform work as a subcontractor on a public works project. This list of debarred contractors is available from the Department of Industrial Relations web site at:

<http://www.dir.ca.gov/DLSE/Debar.html>.

The DVBE information furnished under Division 0.026, "Submission of DVBE Information," of these special provisions is in addition to the subcontractor information required to be furnished in Section 1-1.05, "Required Listing of Proposed Subcontractors," of the Instructions to Bidders and Section 6-1.01, "Subletting and Subcontracting," of the General Conditions.

Section 10115 of the Public Contract Code requires the Department to implement provisions to establish a goal for Disabled Veteran Business Enterprise (DVBE) participation in highway contracts that are State funded. As a part of this requirement:

- A. No substitution of a DVBE subcontractor shall be made at any time without the written consent of the Department, and
- B. If a DVBE subcontractor is unable to perform successfully and is to be replaced, the Contractor shall make good faith efforts to replace the original DVBE subcontractor with another DVBE subcontractor.

The provisions in Division 0.024, "Disabled Veteran Business Enterprise (DVBE)," of these special provisions that DVBEs shall be certified on the date bids are opened does not apply to DVBE substitutions after award of the contract.

0.082 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS

Attention is directed to the provisions in Sections 10262 and 10262.5 of the Public Contract Code and Section 7108.5 of the Business and Professions Code concerning prompt payment to subcontractors.

0.09 PARTNERING

The State will promote the formation of a "Partnering" relationship with the Contractor in order to effectively complete the contract to the benefit of both parties. The purpose of this relationship is to maintain a cooperative communication and to mutually resolve conflicts at the lowest responsible management level.

The Contractor may request the formation of a "Partnering" relationship by submitting a request in writing to the Engineer after approval of the contract. If the Contractor's request for "Partnering" is approved by the Engineer, scheduling of a "Partnering Workshop," selecting the "Partnering" facilitator and workshop site, and other administrative details shall be as agreed to by both parties. If agreed to by the parties, additional "Partnering Workshops" will be conducted as needed throughout the life of the contract.

The costs involved in providing the "Partnering Workshop" facilitator and workshop site will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost in providing the "Partnering Workshop" facilitator and workshop site in conformance with the provisions in Section 3-1.01E(4), "Markups," of the General Conditions, and paying to the Contractor the sum of that cost, except no markups will be allowed. Itemization of labor, material and equipment rental costs is not required.

All other costs associated with "Partnering Workshops" will be borne separately by the party incurring the costs, such as wages and travel expenses, and no additional compensation will be allowed therefor.

The establishment of a "Partnering" relationship will not change or modify the terms and conditions of the contract and will not relieve either party of the legal requirements of the contract.

DIVISION 1. GENERAL REQUIREMENTS

1.01 SCOPE

The building work described herein and as shown on the plans shall conform to the requirements of the General Conditions and these special provisions.

The building work to be done consists, in general, of demolition of an existing buildings, grading and paving; constructing a 6-bay Equipment Bays Building, 5-bay pre-engineered steel Canopy, Mechanic's Shop, covered wash rack and mud rinse slab, covered Material Storage Bin, Salt Storage Building, Sand Storage Building, and Utility Room; including related mechanical, electrical, and sanitary work, and such other items or details, not mentioned above, that are required by the plans, General Conditions, or these special provisions shall be performed, placed, constructed or installed at the Burney Maintenance Station.

1.02 ORDER OF WORK

Prior to the relocation of the main switchboard, the utility conduit system to feed the relocated main switchboard and the conduit system to feed power to the Equipment Bays Building and CHP Building shall be completed.

Power shall be provided at all times to the Equipment Building and CHP Building unless otherwise permitted by the Engineer and required for the main switchboard relocation. The Contractor shall notify the Engineer 3 working days prior to de-energizing the Equipment Bays Building and CHP Building for the main switchboard relocation.

A minimum paved area shall be maintained during winter season when construction operations are in effect to allow for maintenance needs.

1.03 STATE-FURNISHED MATERIALS

Attention is directed to Section 4-1.01, "Materials," of the General Conditions and these special provisions.

The Contractor shall submit a written request to the Engineer for the delivery of State-furnished materials at least 15 days in advance of the date of their intended use. The request shall state the quantity and type of each material.

The Contractor shall be responsible for all materials furnished to him, and shall pay all demurrage and storage charges. State-furnished materials lost or damaged from any cause whatsoever shall be replaced by the Contractor at his expense. The Contractor shall be liable to the Department for the cost of replacing State-furnished material and such costs may be deducted from any monies due or to become due the Contractor.

All State-furnished materials that are not used in the work shall remain the property of the State and shall be delivered to the Engineer.

The following materials will be furnished free of charge to the Contractor at the site of the work:

Communications tower
Padlock for fire sprinkler main shut-off valve

Sufficient quantities of lubricants, oils, and automatic transmission fluid, as required, for testing the respective systems.

1.04 AREAS FOR CONTRACTOR'S USE

No area is available within the contract limits for the exclusive use of the Contractor. The Contractor shall arrange with the Engineer for areas to store equipment and materials within the work area.

1.05 COOPERATION

Attention is directed to Sections 5-1.06, "Responsibility for Utilities," and 5-1.12, "Cooperation," of the General Conditions and these special provisions.

Work by State forces will be in progress within the contract limits during the working period for this contract. Attention is also directed to on site facilities in use by the California State Highway Patrol. The Contractor shall coordinate with the Engineer regarding work which may affect CHP facilities.

The Contractor shall comply with all security policies and normal working hours of the State concerning the Burney Maintenance Station.

The Contractor shall plan his work to minimize interference with State forces and the public. Interruptions to any services for the purpose of making or breaking a connection shall be made only after consultation with and for such time periods as directed by the Engineer.

1.06 MEASUREMENT AND PAYMENT

The contract lump sum price paid for building work shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the building work, complete in place, as shown on the plans, as specified in the General Conditions and these special provisions, and as directed by the Engineer.

Full compensation for any incidental materials and labor, not shown on the plans or specified, which are necessary to complete the building work shall be considered as included in the contract lump sum price paid for building work and no additional compensation will be allowed therefor.

1.07 SUBMITTALS

Shop drawings, material lists, descriptive data, samples and other submittals specified in these special provisions shall be submitted for approval in accordance with the provisions in Section 2-1.04, "Shop Drawings, Descriptive Data, Samples, and Alternatives," of the General Conditions and these special provisions.

Unless otherwise permitted in writing by the Engineer and except submittals for "Alternatives" in conformance with the provisions of said Section 2-1.04 of the General Conditions, all submittals required by these special provisions shall be submitted within 35 days after the contract has been approved.

Attention is directed to the provisions in Section 2-1.01, "Authority of Engineer," of the General Conditions. The Engineer may request submittals for materials or products where submittals have not been specified in these special

provisions, or may request that additional information be included in specified submittals, as necessary to determine the quality or acceptability of such materials or products.

Submittals shall be delivered to the locations indicated in these special provisions. If a specific location is not indicated, the submittal shall be delivered to the Division of Structure Design, Documents Unit, Fourth Floor, Mail Station 9-4/4I, 1801 30th Street, Sacramento, California 95816, telephone (916) 227-8252, or the submittals shall be mailed to the Division of Structure Design, Documents Unit, Mail Station 9-4/4I, P. O. Box 942874, Sacramento, California 94274-0001.

1.08 SCHEDULE OF VALUES

The Contractor shall prepare and submit to the Engineer for approval 2 copies of a Schedule of Values within 15 working days of approval of the contract. The Engineer shall be allowed 15 working days for approval or return for correction of each submittal or resubmittal. Should the Engineer fail to complete the review within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in review, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 6-1.08, "Liquidated Damages," of the General Conditions.

The Schedule of Values shall cover each lump sum item for building work and shall be accurately divided into sections representing the cost of each separate building or structure. Any site work that is not part of a separate building or structure shall be included under a specific section as General Work and not included in the building or structure cost. Indirect costs and general condition items are to be listed as a separate line item of work. The sections representing each building or structure must be identified as to the building or structure they represent and be broken down to show the corresponding value of each craft, trade or other significant portion of the work. A sub-total for each section shall be provided.

The Schedule of Values shall be approved by the Engineer before any partial payment estimate is prepared.

The sum of the items listed in the Schedule of Values shall equal the contract lump sum price for building work. Overhead and profit shall not be listed as separate items, but shall be appropriately distributed across all line items of cost.

1.09 OBSTRUCTIONS

Attention is directed to Sections 5-1.02, "Protection and Use of Property," 5-1.03, "Responsibility for Damage," and 5-1.06, "Responsibility for Utilities," of the General Conditions and these special provisions.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 5 working days prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include but are not limited to the following:

Underground Service Alert
Northern California (USA)
Telephone: 1(800)642-2444

Underground Service Alert
Southern California (USA)
Telephone: 1(800)422-4133

South Shore Utility
Coordinating Council (DIGS)
Telephone: 1(800)541-3447

Western Utilities
Underground Alert, Inc.
Telephone: 1(800)424-3447

1.10 PRESERVATION OF PROPERTY

Attention is directed to Sections 5-1.02, "Protection and Use of Property," 5-1.03, "Responsibility for Damage," 5-1.05, "Contractor's Responsibility for the Work," and 5-1.06, "Responsibility for Utilities," of the General Conditions.

Operations shall be conducted in such a manner that existing facilities, surfacing, installations, and utilities which are to remain in place will not be damaged. Temporary surfacing, facilities, utilities and installations shall also be protected until they are no longer required. The Contractor, at his expense shall furnish and install piling, sheet piling, cribbing, bulkheads, shores, or whatever means may be necessary to adequately support material carrying such facilities, or to support the facilities themselves and shall maintain such support until they are no longer needed.

1.11 WATER POLLUTION CONTROL

Water pollution control work shall conform to the requirements in Section 5-1.101R, "Water Pollution," of the General Conditions, and these special provisions.

Water pollution control work shall conform to the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and the "Construction Site Best Management Practices (BMPs) Manual," and addenda thereto issued up to, and including, the date of advertisement of the project, hereafter referred to respectively as the "Preparation Manual" and the "Construction Site BMP Manual" and collectively as the "Manuals." Copies of the Manuals may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520. Copies of the Manuals may also be obtained from the Department's Internet Web Site at: <http://www.dot.ca.gov/hq/construc/stormwater.html>.

Copies of the Manual are also available for review at District 2 Office, 1657 Riverside Drive, Redding CA 96001.

The Contractor shall know and fully comply with the applicable provisions of the Manuals and Federal, State, and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction.

Unless arrangements for disturbance of areas outside the project limits are made by the Department and made part of the contract, it is expressly agreed that the Department assumes no responsibility whatsoever to the Contractor or property owner with respect to any arrangements made between the Contractor and property owner to allow disturbance of areas outside the project limits.

The Contractor shall be responsible for the costs and for liabilities imposed by law as a result of the Contractor's failure to comply with the requirements set forth in this section "Water Pollution Control" including, but not limited to, compliance with the applicable provisions of the Manuals and Federal, State, and local regulations. For the purposes of this paragraph, costs and liabilities include, but are not limited to, fines, penalties, and damages whether assessed against the State or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act.

In addition to the remedies authorized by law, an amount of the money due the Contractor under the contract, as determined by the Department, may be retained by the State of California until disposition has been made of the costs and liabilities.

The retention of money due the Contractor shall be subject to the following:

- A. The Department will give the Contractor 30 days notice of the Department's intention to retain funds from partial payments which may become due to the Contractor prior to acceptance of the contract. Retention of funds from payments made after acceptance of the contract may be made without prior notice to the Contractor.
- B. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 7-1.05, "Partial Payments," of the General Conditions.
- C. If the Department has retained funds and it is subsequently determined that the State is not subject to the costs and liabilities in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained at the legal rate of interest for the period of the retention.

Conformance with the requirements of this section "Water Pollution Control," shall not relieve the Contractor from the Contractor's responsibilities, as provided in Section 5-1.02, "Protection and Use of Property," and Section 5-1.03, "Responsibility for Damage," of the General Conditions.

WATER POLLUTION CONTROL PROGRAM PREPARATION, APPROVAL AND UPDATES.--As part of the water pollution control work, a Water Pollution Control Program, hereafter referred to as the "WPCP," is required for this contract. The WPCP shall conform to the requirements in Section 5-1.101R, "Water Pollution," of the General Conditions, the requirements in the Manuals, and these special provisions.

No work having potential to cause water pollution, as determined by the Engineer, shall be performed until the WPCP has been approved by the Engineer.

Within 15 days after the approval of the contract, the Contractor shall submit 3 copies of the WPCP to the Engineer. The Engineer will have 7 days to review the WPCP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the WPCP within 7 days of receipt of the Engineer's comments. The Engineer will have 7 days to review the revisions. Upon the Engineer's approval of the WPCP, 3 additional copies of the WPCP incorporating the required changes shall be submitted to the Engineer. Minor changes or clarifications to the initial submittal may be made and attached as amendments to the WPCP. In order to allow construction activities to proceed, the Engineer may conditionally approve the WPCP while minor revisions or amendments are being completed.

The WPCP shall identify pollution sources that may adversely affect the quality of storm water discharges associated with the project and shall identify water pollution control measures, hereafter referred to as control measures, to be

constructed, implemented, and maintained in order to reduce to the extent feasible pollutants in storm water discharges from the construction site during construction under this contract.

The WPCP shall incorporate control measures in the following categories:

- A. Soil stabilization;
- B. Sediment control;
- C. Tracking control;
- D. Wind erosion control;
- E. Non-storm water control; and
- F. Waste management and material pollution control.

Specific objectives and minimum requirements for each category of control measures are contained in the Manuals.

The Contractor shall consider the objectives and minimum requirements presented in the Manuals for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate into the WPCP and implement on the project, one or more of the listed minimum controls required in order to meet the pollution control objectives for the category. In addition, the Contractor shall consider other control measures presented in the Manuals and shall incorporate into the WPCP and implement on the project the control measures necessary to meet the objectives of the WPCP. The Contractor shall document the selection process in conformance with the procedure specified in the Manuals.

The WPCP shall include, but not be limited to, the following items as described in the Preparation Manual:

- A. Project description and Contractor's certification;
- B. Project information;
- C. Pollution sources, control measures, and water pollution control drawings; and
- D. Amendments, if any.

The Contractor shall amend the WPCP, graphically and in narrative form, whenever there is a change in construction activities or operations which may affect the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems or when deemed necessary by the Engineer. The WPCP shall be amended if the WPCP has not achieved the objective of reducing pollutants in storm water discharges. Amendments shall show additional control measures or revised operations, including those in areas not shown in the initially approved WPCP, which are required on the project to control water pollution effectively. Amendments to the WPCP shall be submitted for review and approval by the Engineer in the same manner specified for the initially approved WPCP. Amendments shall be dated and attached to the on-site WPCP document.

The Contractor shall keep a copy of the WPCP, together with updates, revisions and amendments at the project site.

WPCP IMPLEMENTATION.--Upon approval of the WPCP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting and maintaining the control measures included in the WPCP and any amendments thereto and for removing and disposing of temporary control measures. Unless otherwise directed by the Engineer or specified in these special provisions, the Contractor's responsibility for WPCP implementation shall continue throughout any temporary suspension of work ordered in accordance with Section 6-1.06, "Temporary Suspension of Work," of the General Conditions. Requirements for installation, construction, inspection, maintenance, removal and disposal of control measures are specified in the Manual and these special provisions.

Soil stabilization practices and sediment control measures, including minimum requirements, shall be provided throughout the winter season, defined as between October 15 and April 15.

Implementation of soil stabilization practices and sediment control measures for soil-disturbed areas of the project site shall be completed, except as provided for below, no later than 20 days prior to the beginning of the winter season or upon start of applicable construction activities for projects which begin either during or within 20 days of the winter season.

Throughout the rainy season, the active, soil-disturbed area of the project site shall be not more than 1.9 hectares. The Engineer may approve, on a case-by-case basis, expansions of the active, soil-disturbed area limit. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control measures to protect soil-disturbed areas on the project site before the onset of precipitation. A quantity of soil stabilization and sediment control materials shall be maintained on site equal to 100 percent of that sufficient to protect unprotected, soil-disturbed areas on the project site. A detailed plan for the mobilization of sufficient labor and equipment shall be maintained to fully deploy control measures required to protect unprotected, soil-disturbed areas on the project site prior to the onset of precipitation. A current inventory of control measure materials and the detailed mobilization plan shall be included as part of the WPCP.

Throughout the rainy season, soil-disturbed areas on the project site shall be considered to be nonactive whenever soil disturbing activities are expected to be discontinued for a period of 20 or more days and the areas are fully protected. Areas that will become nonactive either during the rainy season or within 20 days thereof shall be fully protected with soil

stabilization practices and sediment control measures within 10 days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

Throughout the rainy season, active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control measures unless fair weather is predicted through the following work day. The weather forecast shall be monitored by the Contractor on a daily basis. The National Weather Service forecast shall be used. An alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted prior to the end of the following work day, construction scheduling shall be modified, as required, and functioning control measures shall be deployed prior to the onset of the precipitation.

The Contractor shall implement, year-round and throughout the duration of the project, control measures included in the WPCP for tracking control, wind erosion control, non-storm water control, and waste management and material pollution control.

The Engineer may order the suspension of construction operations which create water pollution if the Contractor fails to conform to the provisions in this section "Water Pollution Control" as determined by the Engineer.

MAINTENANCE.--To ensure the proper implementation and functioning of control measures, the Contractor shall regularly inspect and maintain the construction site for the control measures identified in the WPCP. The Contractor shall identify corrective actions and time needed to address any deficient measures or reinitiate any measures that have been discontinued.

The construction site inspection checklist provided in the Preparation Manual shall be used to ensure that the necessary measures are being properly implemented, and to ensure that the control measures are functioning adequately. One copy of each site inspection record shall be submitted to the Engineer.

During the rainy season, inspections of the construction site shall be conducted by the Contractor to identify deficient measures, as follows:

- A. Prior to a forecast storm;
- B. After all precipitation which causes runoff capable of carrying sediment from the construction site;
- C. At 24-hour intervals during extended precipitation events; and
- D. Routinely, at a minimum of once every 2 weeks.

If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified control measure, the deficiency shall be corrected immediately. The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of subsequent precipitation events. The correction of deficiencies shall be at no additional cost to the State.

The Engineer will retain an amount equal to 25 percent of the estimated value of the contract work performed during estimate periods in which the Contractor fails to conform to the requirements of this section "Water Pollution Control" as determined by the Engineer.

Retentions for failure to conform to the requirements of this section "Water Pollution Control" shall be in addition to the other retentions provided for in the contract. The amounts retained for failure of the Contractor to conform to the requirements of this section will be released for payment on the next monthly estimate for partial payment following the date that a WPCP has been implemented and maintained, and water pollution is adequately controlled, as determined by the Engineer.

1.12 UTILITY CONNECTION

The Contractor shall make all arrangements and obtain all permits and licenses required for the extension of and connection to each utility service applicable to this project, shall furnish all labor and materials necessary for such extensions which are not performed or provided by the utility, and shall furnish and install any intermediate equipment required by the serving utilities.

Upon written request by the Contractor, the State will pay all utility permits, licenses, connection charges, and excess length charges directly to the utility. Such request shall be submitted not less than 45 days before service connections are required.

The costs incurred by the Contractor for the extension of utilities beyond the limits shown on the plans, and in furnishing and installing any intermediate equipment required by the serving utilities, will be paid for as an ordered change as provided in Section 3, "Changes in the Work," of the General Conditions.

Full compensation for any costs incurred by the Contractor to obtain the permits and licenses shall be considered as included in the contract lump sum price paid for building work and no additional compensation will be allowed therefor.

1.13 TEMPORARY UTILITIES

The Contractor may obtain electrical power and water from existing State outlets within the contract limits free of charge for contract operations where such utilities exist, provided that such utility services are in service and are not required by the State for other purposes and subject to the provisions in "Cooperation" of these special provisions.

The Contractor, at his own expense, shall obtain any additional electrical power and water or other utilities required for his operations and shall make and maintain the necessary service connections.

The Contractor shall provide and pay for telephone service he may require. State telephone facilities shall not be used.

The Contractor shall provide adequate temporary lighting to perform the work and allow the Engineer to inspect the project as each portion is completed.

1.14 SANITARY FACILITIES

When operational, State sanitary facilities will be available for use by the Contractor's employees, during normal State working hours. Tools shall not be cleaned nor shall cleaning liquids be disposed of in State sanitary facilities or sewers.

During rest room renovation or other periods when State-owned sanitary facilities are not operational, the Contractor shall provide and pay for wash facilities, drinking water fixtures and a minimum of two temporary toilet units for State forces. Separate toilet facilities shall be provided for Contractor personnel. Facilities shall include the periodic flushing, waste removal and cleaning of such facilities. Units shall be maintained in a clean and sanitary condition, including a supply of toilet tissue, toilet seat covers, paper towels and paper cups. Waste material shall be disposed of off site in a lawful manner. Temporary toilet units shall be single occupant units of the chemical, aerated recirculation or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

1.15 REFERENCES

Attention is directed to Section 1-1.26, "Abbreviations," of the General Conditions.

When reference is made to the Uniform Building Code (UBC) on the plans or in the special provisions, it shall be the 1997 Uniform Building Code as amended by the 1998 Title 24 California Building Standards Code.

1.16 PROJECT RECORD DRAWINGS

The Contractor shall prepare and maintain one set of project record drawings, using an unaltered set of original project plans, to clearly show all as-constructed information for the project. As a minimum, the information to be shown shall include 1) any plan clarifications or change orders, 2) locations of any underground utilities, or 3) the location, size, type, and manufacturer of all major products or components selected by the Contractor for use in the work.

All markings shall be placed on the project record drawings using red ink or red pencil. Original figures shall not be eradicated nor written over and superseded material shall be neatly lined out. Additional drawings shall be submitted if the required information cannot be clearly shown on the original set of project plans. The additional drawings shall be not less than 279 mm x 432 mm in size and shall have the contract number on each sheet. The Contractor shall sign and date each sheet of the project record drawings to verify that all as-constructed information shown on the drawings is correct.

The Contractor shall periodically review the set of project record drawings with the Engineer during the progress of the work to assure that all changes and other required information are being recorded.

Before completion of the work, the Contractor shall request a review of the project record drawings to determine the completeness and adequacy of them. If the project record drawings are unacceptable, the Contractor shall inspect, measure, and survey the project as necessary to record the required additional information.

The set of completed project record drawings shall be delivered to the Engineer prior to acceptance of the contract.

1.17 FIELD ENGINEERING

This section specifies administrative and procedural requirements for field engineering services to be performed by the Contractor.

Lines and grades.--Such stakes or marks will be set by the Engineer as he determines to be necessary to establish the lines and grades required for the completion of the work shown on the plans and as specified in these special provisions. In general, these will consist of the primary vertical and horizontal control points.

Stakes and marks set by the Engineer shall be carefully preserved by the Contractor. In case such stakes and marks are destroyed or damaged they will be replaced at the Engineer's earliest convenience. The Contractor will be charged for the cost of necessary replacement or restoration of such stakes and marks which in the judgment of the Engineer were carelessly or willfully destroyed or damaged by the Contractor's operations. This charge will be deducted from any moneys due or to become due the Contractor.

All other stakes or marks required to establish the lines and grades required for the completion of the work shall be the responsibility of the Contractor.

Existing utilities and equipment.--The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, the Contractor shall investigate and verify the existence and location of underground utilities and other construction.

Prior to construction, the Contractor shall verify the location and invert elevation at points of connection of sanitary and septic sewers, storm sewer, and water or fire service piping.

Surveys for layout and performance.--The Contractor shall perform all surveys for layout and performance, reduce field notes, and make all necessary calculations and drawings necessary to carry out the work.

The Contractor shall locate and layout site improvements, and other work requiring field engineering services, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means.

Batter boards shall be located and laid out for structures, building foundations, column grids and locations, floor levels and, control lines and levels required for mechanical and electrical work.

Survey accuracy and tolerances.--The tolerances generally applicable in setting survey stakes for foundations, slabs, and underground work shall not exceed the following:

Survey Stakes or Markers	Tolerance
Rough grading or excavation	30 mm
Trimming or preparation of subgrade for roadways	15 mm
Roadway surfacing, steel or concrete pipe	6 mm
Structures or building construction	3 mm

Such tolerance shall not supersede stricter tolerances required by the plans or special provisions, and shall not otherwise relieve the Contractor of responsibility for measurements in compliance therein.

1.18 LEAD BASED MATERIALS

The Contractor shall take special precautions for that part of the work which involve the handling of materials which may contain lead, either during demolition or construction.

The lead content of the existing paint system is known. The lead content of the existing paint system is available in "Site Investigation Report, Burney Maintenance Station" dated August 2000. Review of the "Site Investigation Report" is available at the District 2 Hazardous Waste Coordinator's Office at 1657 Riverside Drive, Redding CA 96001, Telephone (530)225-3173.

Any work that disturbs the existing paint system may expose workers to health hazards and may (1) produce amounts of material and residue containing heavy metal which exceed the hazardous thresholds established in the California Code of Regulations or (2) produce toxic fumes when heated.

Attention is directed to "Lead Abatement," in Division 2 of these special provisions regarding governing codes and requirements for the removal and disposal of lead based materials.

1.19 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS

Only materials and products conforming to the requirements of the specifications shall be incorporated in the work. When metric materials and products are not available, and when approved by the Engineer, and at no cost to the State, materials and products in the inch-pound (imperial) system which are of equal quality and of the required properties and characteristics for the purpose intended, may be substituted for the equivalent metric materials and products, subject to the following requirements:

Materials and products shown on the plans or in the special provisions as being equivalent may be substituted for the metric materials and products specified or detailed on the plans.

Before other non-metric materials and products will be considered for use the Contractor shall furnish, at the Contractor's expense, evidence satisfactory to the Engineer that the materials and products proposed for use are equal to or better than the materials and products specified or detailed on the plans. The burden of proof as to the quality and suitability of substitutions shall be upon the Contractor and the Contractor shall furnish all information necessary as required to the Engineer. The Engineer will be the sole judge as to the quality and suitability of the substituted materials and products and the Engineer's decision shall be final.

When the Contractor elects to substitute non-metric materials and products, including materials and products shown on the plans or in the special provisions as being equivalent, a list of substitutions to be made shall be submitted for approval.

The following substitutions of materials and products will be allowed:

SUBSTITUTION TABLE FOR SIZES OF HIGH STRENGTH STEEL FASTENERS, ASTM Designation: A 325M	
METRIC SIZE SHOWN ON THE PLANS mm x thread pitch	IMPERIAL SIZE TO BE SUBSTITUTED inch
M16 x 2	5/8
M20 x 2.5	3/4
M22 x 2.5	7/8
M24 x 3	1
M27 x 3	1-1/8
M30 x 3.5	1-1/4
M36 x 4	1-1/2

SUBSTITUTION TABLE FOR REINFORCEMENT	
METRIC BAR DESIGNATION NUMBER AS SHOWN ON THE PLANS	IMPERIAL BAR DESIGNATION NUMBER TO BE SUBSTITUTED
10	3
13	4
16	5
19	6
22	7
25	8
29	9
32	10
36	11
43	14
57	18

SUBSTITUTION TABLE FOR WELDED PLAIN WIRE REINFORCEMENT, ASTM DESIGNATION: A 185	
	US CUSTOMARY UNITS SIZE TO BE SUBSTITUTED inch ² x 100
MW9	W1.4
MW10	W1.6
MW13	W2.0
MW15	W2.3
MW19	W2.9
MW20	W3.1
MW22	W3.5
MW25	W3.9, except W3.5 in piles only
MW26	W4.0
MW30	W4.7
MW32	W5.0
MW35	W5.4
MW40	W6.2
MW45	W6.5
MW50	W7.8
MW55	W8.5, except W8.0 in piles only
MW60	W9.3
MW70	W10.9, except W11.0 in piles only
MW80	W12.4
MW90	W14.0
MW100	W15.5

The sizes in the following tables of materials and products are exact conversions of metric sizes of materials and products and are listed as acceptable equivalents:

CONVERSION TABLE FOR SIZES OF: (1) STEEL FASTENERS FOR GENERAL APPLICATIONS, ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55, and (2) HIGH STRENGTH STEEL FASTENERS, ASTM Designation: A 325 or A 449	
DIAMETER	
METRIC SIZE SHOWN ON THE PLANS mm	EQUIVALENT IMPERIAL SIZE inch
6, or 6.35	1/4
8 or 7.94	5/16
10, or 9.52	3/8
11, or 11.11	7/16
13 or 12.70	1/2
14, or 14.29	9/16
16, or 15.88	5/8
19, or 19.05	3/4
22, or 22.22	7/8
24, 25, or 25.40	1
29, or 28.58	1-1/8
32, or 31.75	1-1/4
35, or 34.93	1-3/8
38 or 38.10	1-1/2
44, or 44.45	1-3/4
51, or 50.80	2
57, or 57.15	2-1/4
64, or 63.50	2-1/2
70 or 69.85	2-3/4
76, or 76.20	3
83, or 82.55	3-1/4
89 or 88.90	3-1/2
95, or 95.25	3-3/4
102, or 101.60	4

CONVERSION TABLE FOR NOMINAL THICKNESS OF SHEET METAL			
UNCOATED HOT AND COLD ROLLED SHEETS		HOT-DIPPED ZINC COATED (GALVANIZED) SHEETS	
METRIC THICKNESS SHOWN ON THE PLANS mm	EQUIVALENT US STANDARD GAGE inch	METRIC THICKNESS SHOWN ON THE PLANS mm	EQUIVALENT GALVANIZED SHEET GAGE inch
7.94	0.3125		
6.07	0.2391		
5.69	0.2242		
5.31	0.2092		
4.94	0.1943		
4.55	0.1793		
4.18	0.1644	4.270	0.1681
3.80	0.1495	3.891	0.1532
3.42	0.1345	3.510	0.1382
3.04	0.1196	3.132	0.1233
2.66	0.1046	2.753	0.1084
2.28	0.0897	2.372	0.0934
1.90	0.0747	1.994	0.0785
1.71	0.0673	1.803	0.0710
1.52	0.0598	1.613	0.0635
1.37	0.0538	1.461	0.0575
1.21	0.0478	1.311	0.0516
1.06	0.0418	1.158	0.0456
0.91	0.0359	1.006 or 1.016	0.0396
0.84	0.0329	0.930	0.0366
0.76	0.0299	0.853	0.0336
0.68	0.0269	0.777	0.0306
0.61	0.0239	0.701	0.0276
0.53	0.0209	0.627	0.0247
0.45	0.0179	0.551	0.0217
0.42	0.0164	0.513	0.0202
0.38	0.0149	0.475	0.0187

CONVERSION TABLE FOR WIRE		
METRIC THICKNESS SHOWN ON THE PLANS	EQUIVALENT USA STEEL WIRE THICKNESS	GAGE NO.
mm	inch	
6.20	0.244	3
5.72	0.225	4
5.26	0.207	5
4.88	0.192	6
4.50	0.177	7
4.11	0.162	8
3.76	0.148	9
3.43	0.135	10
3.05	0.120	11
2.69	0.106	12
2.34	0.092	13
2.03	0.080	14
1.83	0.072	15
1.57	0.062	16
1.37	0.054	17
1.22	0.048	18
1.04	0.041	19
0.89	0.035	20

CONVERSION TABLE FOR COMMON NAILS				
NAIL SIZE	METRIC mm		ENGLISH inch	
	Length	Diameter	Length	Diameter
8d	63.5	3.33	2 1/2	0.131
10d	76.2	3.76	3	0.148
16d	88.9	4.11	3 1/2	0.162

CONVERSION TABLE FOR LUMBER	
METRIC NOMINAL SURFACE DRY SIZE	EQUIVALENT NOMINAL SURFACE DRY U S SIZE
mm	inch
51	2
102	4
152	6
203	8
254	10
305	12

CONVERSION TABLE FOR PLYWOOD	
METRIC mm	ENGLISH inch
6.4	1/4
7.9	5/16
9.5	3/8
11.1	7/16
11.9	15/32
12.7	1/2
15.1	19/32
15.9	5/8
18.3	23/32
19.1	3/4
22.2	7/8
25.4	1
28.6	1 1/8

CONVERSION TABLE FOR INSULATION R-VALUE	
METRIC (K m ² /W)	ENGLISH (HR FT ² F/BTU)
0.5	3
0.7	4
1.4	8
1.9	11
2.3	13
2.5	14
3.3	19
5.3	30

CONVERSION TABLE FOR VAPOR TRANSMISSION RATING	
METRIC (Perm-m)	ENGLISH (perm-inch)
0.29	0.02

CONVERSION TABLE FOR LOW PRESSURE	
METRIC (Pa)	ENGLISH (Inches of Water Column)
30	0.125
60	0.25
90	0.375
120	0.50
150	0.60
155	0.625
175	0.70
185	0.75
200	0.80
250	1.00
310	1.25

CONVERSION TABLE FOR PRESSURE	
METRIC (kPa)	ENGLISH (psi)
10	1.5
210	30
280	40
350	50
690	100
860	125
1040	150
1100	160
1210	175
1380	200
1730	250
2070	300
2170	315
2410	350
2590	375
2760	400
4830	700
5170	750
5520	800
13800	2000
17200	2500
20700	3000
27600	4000
34500	5000
137900	20000

CONVERSION TABLE FOR MIL THICKNESS	
METRIC (mm)	ENGLISH (inch/1000)
0.10	4
0.13	5
0.15	6
0.50	20
0.75	30
1.00	40

CONVERSION TABLE FOR HVAC DUCTING.	
METRIC (mm)	ENGLISH (inch)
100	4
125	5
150	6
175	7
200	8
225	9
250	10
300	12
360	14
410	16
460	18
510	20
560	22
610	24
660	26
710	28
760	30

CONVERSION TABLE FOR MECHANICAL PIPING		
METRIC (GSP, PVC, BSP, DUCTILE IRON)	METRIC (mm)	ENGLISH (inch)
NPS 1/2	15	1/2
NPS 3/4	20	3/4
NPS 1	25	1
NPS 1 1/4	32	1 1/4
NPS 1 1/2	40	1 1/2
NPS 2	50	2
NPS 2 1/2	65	2 1/2
NPS 3	75	3
NPS 4	100	4
NPS 6	150	6

CONVERSION TABLE FOR LUBRICATION PIPING TUBING WALL THICKNESS	
METRIC (mm)	ENGLISH (inch)
2.1	0.083
0.9	0.035

CONVERSION TABLE FOR HOSE/TUBING SIZES O. D.	
METRIC (mm)	ENGLISH (inch)
6	1/4
10	3/8
13	1/2
16	5/8
19	3/4
22	7/8
25	1

CONVERSION TABLE FOR DRUM SIZES			
METRIC		ENGLISH	
L	kg	gallons	pounds
205	180	55	400
60	55	16	120
19	16	5	35

CONVERSION TABLE FOR POWER	
METRIC (kW)	ENGLISH (HP)
0.037	1/20
0.075	1/10
0.18	1/4
0.25	1/3
0.37	1/2
0.55	3/4
0.75	1
1.1	1 1/2
1.5	2
2.2	3
3.7	5
5.5	7 1/2
7.5	10
11	15
15	20
18.5	25
22	30
30	40
37	50
45	60
55	75
75	100
90	120
110	150

CONVERSION TABLE FOR IMPELLER BALANCE		
SYNCHRONOUS RPM	METRIC (g mm/kg)	ENGLISH (ounce- inch/pound)
720	94	0.059
900	73	0.046
1200	54	0.034
1800	41	0.026
3600	17	0.011

CONVERSION TABLE FOR ELECTRICAL CONDUIT	
METRIC SIZE SHOWN ON THE PLANS mm	EQUIVALENT IMPERIAL SIZE inch
16	1/2
21	3/4
27	1
35	1 1/4
41	1 1/2
53	2
103	4

DIVISION 2. SITEWORK

2.01 DEMOLITION

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of demolition and removal of all improvements remaining either wholly or partially within the project limits, including, but not limited to, sheds, buildings, foundations, slabs above ground and other features shown to be removed.

PART 2.- PRODUCTS (Not applicable.)

PART 3.- EXECUTION

Description.--The general description of these improvements shall be as shown on the plans.

Preparation.--Prior to beginning demolition work, the Contractor shall make all arrangements with the serving utilities for disconnecting, removing, capping and plugging all utility services.

Disposal.--The Contractor shall not dispose of the improvements or material therefrom by sale, gift, or in any manner whatsoever to the general public at the site, provided however, that these provisions shall not be construed as limiting or prohibiting the sale or disposal of such improvements or materials at the site to duly licensed contractors or materials men, and provided that the materials are removed from the improvement by the State's Contractor. Removal of the buildings as a unit, or in sections capable of reassembly as a structure, is expressly prohibited.

2.02 DISPOSING OF ELECTRICAL EQUIPMENT

Fluorescent lamps shall be disposed of in conformance with California Department of Health Services Regulations set forth in Title 22, Division 4, Chapter 30, of the California Code of Regulations.

Ballasts that contain polychlorinated biphenyl (PCB) are designated as extremely hazardous wastes and fluorescent tubing and mercury lamps are designated as hazardous wastes under Title 22, Chapter 30, Article 9, Section 66680, of the California Code of Regulations.

The following electrical materials on the project are known to contain polychlorinated biphenyl (PCB):

A. Fluorescent lighting ballasts.

Identification of lighting ballasts containing PCB's is available in the "Site Investigation Report, Burney Maintenance Station" dated August 2000. Review of the "Site Investigation Report" is available at the District 2 Hazardous Waste Coordinator's Office at 1657 Riverside Drive, Redding CA 96001, Telephone (530)225-3173.

When 25 or more fluorescent lamps are to be disposed of, the lamps shall be treated as recyclable hazardous waste and shall be recycled within the State of California in conformance with Title 22, Chapter 30, Article 12, of the California Code of Regulations by a currently certified recycler such as, but not limited to, the following:

- A. Exceltrans Inc., P.O. Box 866, Benicia, CA 94510, Telephone (707) 745-8907.
- B. Roberts Enterprises, 2021 South Myrtle Avenue, Monrovia, CA 91016, Telephone (818) 303-2053.

The recyclable hazardous waste shall be packaged and then shipped via a currently certified hauler in conformance with Title 22, Chapter 30, Article 12, of the California Code of Regulations and other applicable local, State, and Federal regulations.

The Engineer shall be furnished with a statement noting which certified hauler and which certified recycler is proposed for utilization, together with a copy of the recycler's interim status document or a copy of the variance letter from the Department of Health Services. The statement shall be furnished within 15 calendar days after the contract has been approved by the Attorney General.

The State assumes generator responsibility for these wastes. The Engineer will prepare the Hazardous Waste Manifest for Shipment.

2.03 REMOVING PORTIONS OF EXISTING FACILITIES

PART 1.- GENERAL

Scope.--This work shall consist of removing portions of the existing facilities, including removal of existing work to gain access to or for new work, in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS (Not applicable)

PART 3.- EXECUTION

PREPARATION.--

General.--The limits of removal shall be located and identified. Items to be removed and the interface of items to be removed and items to remain intact shall be identified and marked.

Prior to removing concrete or masonry, a saw cut approximately 25 mm deep shall be made along the limits of removal on all faces that will be visible in the completed work.

REMOVAL.--

General.--Removal shall be to the limits shown on the plans. Removal shall be done carefully to minimize damage to the portions to remain. Remaining portions that are damaged by the Contractor's operation shall be restored to original condition at the Contractor's expense.

Assemblies to be salvaged which require dismantling for removal shall be matchmarked before dismantling.

Existing apparatuses, devices, or accessories which would be functionally impaired by new construction or remodeling shall be moved, brought out to new surfaces, or provided with new access covers, as necessary to restore apparatuses, devices, or accessories to their original usefulness.

Piping and conduits to be abandoned shall be capped or plugged. Piping and conduits to be abandoned greater than 300 mm in diameter shall be filled with sand.

Surfaces that are exposed to view at the limits of removal work shall be patched, bumps shall be removed and depressions filled, and the surface shall be finished to match the existing surrounding surfaces. Depressions in concrete less than 25 mm deep shall be deepened to 25 mm minimum depth before filling with cement mortar.

Anchor bolts and reinforcement shall be removed at least 25 mm below the surrounding surfaces, and the resulting hole shall be patched with cement mortar.

DISPOSAL.--

General.--Materials that are to be removed, shall become the property of the Contractor and shall be disposed of away from the premises. Such disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site.

SALVAGE.--

General.--Materials or equipment shown on the plans to be salvaged shall remain the property of the State and shall be removed, cleaned and stockpiled at a location at the project site designated by the Engineer.

2.04 RELOCATING MATERIALS AND EQUIPMENT

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of relocating existing materials and equipment in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS (Not applicable)

PART 3.- EXECUTION

RELOCATION.--

General.--Materials or equipment to be relocated shall be removed carefully to avoid damage to the materials or equipment or to the materials or equipment which are to remain. Assemblies to be relocated which require dismantling for removal shall be matchmarked before dismantling.

The Contractor shall notify the Engineer prior to the relocation work in order that the materials or equipment may be inspected for existing damage.

Materials or equipment to be relocated shall have all adhering concrete, mastics, earth or other deleterious materials removed and shall have all exterior surfaces cleaned.

Materials or equipment which are damaged by the Contractor's operations shall be replaced or restored to match the condition of the materials or equipment prior to the beginning of the Contractor's operations. Replacement or restoration of damaged materials or equipment shall be at the Contractor's expense.

Connections, anchorages and fasteners for relocated materials and equipment shall match existing and shall be furnished and installed by the Contractor. Assemblies which have been dismantled shall be reassembled to match the existing installation. Relocated materials and equipment shall be installed as required for new work.

Modifications to wiring and plumbing to accommodate relocated items shall be as shown on the plans. Ends of piping and conduits to be abandoned shall be capped.

Surfaces that are exposed to view upon removal or relocation of materials or equipment shall be patched. Bumps shall be removed and depressions filled, and the surface finished to match the existing surfaces. Depressions in concrete less than 25 mm deep shall be deepened to 25 mm minimum depth before filling with cement mortar.

DISPOSAL.--

General.--Material from existing facilities to be reused in the work, in the opinion of the Engineer, is unsuitable for use shall become the property of the Contractor and disposed of away from the premises. Such disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site. The unsuitable material shall be replaced as ordered by the Engineer and will be paid for as provided in Section 3, "Changes in the Work," of the General Conditions.

2.05 LEAD ABATEMENT

PART 1.- GENERAL

SUMMARY.--

Scope.--The work shall consist of procedures for removal, repair, and disposal of lead based materials which are designation on the plans or specified in these special provisions to be removed and disposed of.

Where existing lead based materials are to be removed during demolition, construction or alterations, such material shall be treated as hazardous waste, and shall be removed, hauled and disposed of in accordance with all applicable Federal, State and local laws and ordinances.

Payment.--Removal, including necessary measures for protection of personnel, and disposal of lead based materials will be considered as included in the lump sum price paid for building work.

SUBMITTALS.--

Health and safety.--A Code of Safe Practices, an Injury and Illness Prevention Program, and a Hazard Communication Program in accordance with the provisions of Construction Safety Orders 1509 and 1510 shall be submitted for approval.

QUALITY ASSURANCE.--

Codes and standards.--Codes which govern removal and disposal of materials containing lead include, but are not limited to the following:

1. California Health and Safety Code, Division 20, Chapter 6.5, "Hazardous Waste Control Act."
2. California Code of Regulations, Title 22, Division 4, Chapter 30, "Minimum Standards for Management of Hazardous and Extremely Hazardous Material."
3. California Code of Regulations, Title 8, General Industry Safety Order, Section 1532.1, Lead.
4. Occupational Safety and Health Administration, Part 26 (amended), of Title 29 of the Code of Federal Regulations.

Compliance program.--The Contractor shall submit the compliance programs required in subsection (e)(2), "Compliance Program," of said Section 1532.1, "Lead," to the Engineer for approval before starting removal work on the project and at such times when revisions to the program are ordered by the Engineer. The compliance programs shall be prepared by an industrial hygienist certified by the American Council of Industrial Hygiene. The Engineer will notify the Contractor of the approval or rejection of any submitted or revised compliance program in not more than 10 working days.

If measures being taken by the Contractor are inadequate to provide for worker safety and the containment and collection of residue from existing paint systems, the Engineer will direct the Contractor to revise his operations and the compliance program. Such directions will be in writing and will specify the items of work for which the Contractor's compliance programs are inadequate. No further work shall be performed on said items until the compliance programs are adequate and, if required, a revised compliance program has been approved.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised compliance program for worker safety and the containment and collection of residue from existing paint systems, nor for any delays to the work due to the Contractor's failure to submit an acceptable compliance program.

Field sampling.--The Contractor shall furnish sampling and testing programs for air and soil as applicable. The programs shall be prepared and carried out by an industrial hygienist certified by the American Council of Industrial Hygiene. The number and location of the samples shall be designated by the Engineer.

Air samples, if required, shall be collected during removal operations to measure concentrations of heavy metals and total particulate matter in the ambient air as PM-10 (particulate matter with an aerodynamic diameter less than or equal to 10 micrometers). Air samples shall be collected and analyzed in accordance with the Code of Federal Regulations 40 CFR PART 50. Appendix J, except as follows:

1. Air samples shall be Reference or Equivalent Method PM-10 Samplers as designated by the U. S. Environmental Agency and in accordance with requirements of 40 CFR PART 53.
2. Sampling time each day shall coincide with the time of removal operations but the duration of sampling shall be not less than 8 hours.
3. Immediately following analysis for PM-10, all samples will be analyzed for heavy metal content in accordance with 40 CFR PART 50, Appendix G.

A minimum of 4 soil samples shall be collected before start of work which disturbs the existing paint system, and a minimum of 4 soil samples shall be collected within 36 hours following completion of the work which disturbs the existing paint system. A soil sample shall consist of 5 plugs, each 20 mm diameter and 15 mm deep, taken at each corner and center of a 0.30 meter square area. Soil samples shall be analyzed for total lead, total chromium and total zinc in accordance with Method 3050 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846" by the United States Environmental Protection Agency.

Sample analysis results shall be submitted in triplicate to the Engineer within 10 days after sampling. Sample analysis reports shall be prepared by the certified hygienist and include the following information:

For both air and soil sample analysis results, the date and sample location of sample collection, sample number, contract number, and facility name as shown on the contract plans will be required.

For air sample analysis results, the following will be required:

1. Start time, end time and duration of sample collection.
2. Start time and end times of cleaning on the day of sample collection.
3. Concentrations of PM-10 expressed as micrograms PM-10 per standard cubic meter of air.
4. Concentrations of heavy metals expressed as micrograms per standard cubic meter of air.

For soil sample analysis results, the concentrations of heavy metal expressed as parts per million will be required.

PART 2.- PRODUCTS (Not applicable.)

PART 3.- EXECUTION

REMOVAL.--

Notification.--The Contractor shall notify the Engineer 3 working days in advance of commencement of removal operations of material containing lead or lead based materials.

Method of removal.--Painted materials shall be removed using the wet process removal equipment and methods, to a depth required to remove all paint and provide clean substrate suitable for a new finish.

Removed material and water used for removal shall be collected. Removed material shall be separated from water using approved filters.

Handling.--The Contractor shall comply with all Federal, State, and local regulations for the removal of material containing lead prior to demolition, shall place such removed material in approved plastic containers (double ply, 0.15 mm minimum thickness, plastic bags) with caution labels affixed to said bags. Such caution labels shall have conspicuous, legible lettering which spells out the following, or equivalent warning:

CAUTION CONTAINS LEAD

Temporary storage on the ground of material and residue produced when the existing paint system is disturbed will not be permitted. Material and residue shall be stored in leak proof containers and shall be handled in such a manner that no spillage will occur.

At the option of the Contractor, the removed lead based materials may be placed directly into a roll off or drop box which shall have the same caution label affixed on all side s.

Safety measures.--The Contractor shall comply with all Federal, State and local requirements for safety which shall include providing employees with coveralls (preferably disposable plastic coat ed), rubber gloves (to be discarded after use), rubber boots (to be washed thoroughly after use), and respirators.

The Contractor shall be responsible for verifying that all employees, who are involved in removal operations, wear the required protective devices during removal operations.

DISPOSAL.--

Transporting.--All haulers of hazardous waste material shall be currently registered with the State Department of Health Services (DOHS), and shall have a U.S. Environmental Protection Agency Identification Number (U.S. EPA I.D. Number). All vehicles used to transport hazardous waste material shall have affixed to the vehicle a valid Certificate of Compliance issued by DOHS. If a roll off or drop box is utilized, both the drop box and the transporting vehicle must have a valid Certificate of Compliance issued by DOHS.

Disposal.--The Engineer will obtain the required EPA generator identification numbers, and will sign the hazardous waste manifests.

All material and residue produced during removal operations shall be tested and disposed of by the Contractor in California at an approved Class 1 disposal facility in accordance with the requirements of the disposal facility operator.

The Contractor shall notify the proper authorities at the disposal site in advance of delivery of hazardous waste containing lead to the disposal site.

2.06 CLEARING AND GRUBBING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of removing all objectionable material from the building site in accordance with the details shown on the plans and these special provisions.

Clearing and grubbing shall be performed in advance of any other grading or construction operations.

The area to be cleared and grubbed shall be within the building work construction area.

SITE CONDITIONS.--

Traffic.--Clearing and grubbing shall be conducted to ensure minimum interference with roads, street, walks or other occupied areas.

Protection of existing landscaping and trees.--Existing landscaping and trees which are to remain in place shall be protected from injury or damage. Existing trees shall be protected with a temporary fence around the drip line.

PART 3.- EXECUTION

SITE CLEARING.--

General.--Remove trees, shrubs, grass and other vegetation, concrete and masonry, improvements, or obstructions interfering with the new construction.

Trees to be removed shall be grubbed to a depth of not less than 0.6 meter below finished grade.

REMOVAL OF WASTE MATERIAL.--

Hauling.--When hauling is done over highways or city streets, and when directed by the Engineer, the loads shall be trimmed and all material removed from shelf areas of the vehicles.

Disposal.--Trees, shrubs, grass, weeds and other vegetation, debris, , and any obstructions above or below the ground surface that interfere with the building work, shall be removed and disposed of off the premises.

2.07 MULCH (EROSION CONTROL)

PART 1.- GENERAL

Scope.--This work shall consist of applying materials around proposed plants and to all areas within the maintenance station property lines that are not designated to be covered by asphalt concrete pavement, portland cement concrete, or structures. Erosion control (mulch) shall be applied as a last item of work, or when the slope work and planting is finished. During the winter season as specified in "Water Pollution Control," of these special provisions, the erosion control shall be applied immediately.

PART 2.- PRODUCTS

Materials.--

Mulch shall be woody material. Woody materials shall consist of chipped, shredded or ground green materials such as shrubs, tree trimmings or clean processed wood products.

Mulch materials produced from pine trees grown in Alameda, Monterey, Santa Clara, Santa Cruz, San Luis Obispo or San Mateo Counties shall not be used.

Deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues that would be harmful to plant or animal life shall not exceed 0.1-percent of the mulch volume. Chipping shall include shredding, grinding or other methods used to reduce mulch materials to the specified size.

Wood chips shall have a particle size between 12 mm and 80 mm in length and not less than 9 mm in thickness. At least 85%, by volume, of wood chips shall conform to the sizes specified.

Shredded bark shall be a mixture of shredded bark and wood and shall have a particle size between 3 mm and 40 mm in thickness and 25 mm to 210 mm in length. At least 75%, by volume, of shredded bark shall conform to the sizes specified.

PART 3.- EXECUTION (Not applicable.)

2.08 ROUGH GRADING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of rough grading the site in accordance with the details shown on the plans and these special provisions.

Rough grading shall consist of excavation or removal of above grade material regardless of character and subsurface condition; filling of all holes, swales, embankments, and low points to the elevation shown on the plans or specified; and the preparation of basement material for the placing of other material thereon and the establishment of the grading plane.

Earthwork for building construction shall conform to the requirements specified under "Earthwork for Building Work" in this Division 2 of these special provisions.

Surplus grading material.--The grading shown on the plans will develop a surplus of approximately 7,800 cubic meters.

Attention is directed to the presence of low levels of hydrocarbons in the soil to be disposed of. The levels are identified in the "Site Investigation Report, Burney Maintenance Station" dated August 2000. Review of the "Site Investigation Report" is available at the District 2 Hazardous Waste Coordinator's Office at 1657 Riverside Drive, Redding CA 96001, Telephone (530)225-3173.

During soil excavation operations, the Contractor shall provide soil testing by a certified lab technician in the field. Initial testing of excavated soils shall be performed for each 100 cubic meters of excavation using a Hnu-Hanby colorimetric field test. Excavated soil shall then be segregated into 3 stockpiles on site, separated by the following categories as a result of the initial testing:

1. Soil indicating levels of TPH-D and TPH-MO of less than 20 ppm.
2. Soil indicating levels of TPH-D and/or TPH-MO in a range of approximately 20-110 ppm.
3. Soil indicating levels of TPH-D and/or TPH-MO above 100 ppm.

Any soil used on-site for fill or embankment material shall be taken from the stockpile in which initial soil tests indicate levels of TPH-D and/or TPH-MO in a range of approximately 20-110 ppm. If insufficient quantities exist in the stockpile for which initial soil tests indicate levels of TPH-D and/or TPH-MO in a range of approximately 20-110 ppm, then the Contractor shall take embankment or fill material from the stockpiles in which initial soil tests indicate levels of TPH-D and/or TPH-MO of less than 20 ppm.

The Contractor shall then provide certified lab testing of the remaining stockpiles, with 3 samples being taken from each 100 cubic meters. Lab testing shall determine the actual soil composition with analysis of percentages of TPH-D and TPH-MO. Written test results shall be supplied to the Engineer as procured, with a final report given summarizing the total of all test results. Results of these tests will determine disposal of the remaining surplus material as follows:

Soil from stockpiles in which final tests indicate levels of TPH-D and TPH-MO of less than 20 ppm shall become the property of the Contractor and shall be disposed of away from the premises at the Contractor's expense. Such disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site. An optional disposal area is available for the Contractor's disposal of this 'clean' material at the Caltrans storage facility located at the junction of Routes 89 and 299. The District Maintenance Supervisor shall be contacted prior to disposing any materials at this site regarding any specific disposal site requirements.

Soil from stockpiles in which final tests indicate levels of TPH-D and/or TPH-MO greater than 20 ppm shall be disposed of at an appropriate disposal or treatment facility. All hauling and disposal costs incurred in the offsite disposal of surplus material in which final tests indicate levels of TPH-D and/or TPH-MO greater than 20 ppm will be paid for as extra work by the State.

Full compensation for soil sampling and testing shall be considered as included in the lump sum price paid for building work and no additional payment will be made therefor.

PART 2.- PRODUCTS

Fill material.--

Material from the excavation that is suitable for the required compaction may be used for filling holes, swales and low points. Fill material shall be free of organic material. Rocks and lumps shall be well distributed with sufficient earth or other fine matrix material to produce a dense, compacted fill that is suitable for the construction and load support intended.

The Contractor shall furnish suitable borrow material to offset any material deficiencies developed from grading work.

PART 3.- EXECUTION

EXCAVATION.--

General.--Care shall be exercised to avoid disturbing material below and beyond the limits of excavation. When excavation is carried beyond the limits shown on the plans or specified, such excavation shall be replaced in kind and compacted at the Contractor's expense.

Limits of the excavation shall allow for adequate working space for installing materials and as required for safety of personnel. Such working space excavation shall be replaced in kind and compacted at the Contractor's expense.

Existing asphalt concrete pavement shall be removed as shown on the plans. Existing asphalt concrete pavement thickness is 107 mm, and covers approximately 6,700 square meters of the project site. Existing aggregate base thickness is 198 mm.

FILL.--

Subgrade preparation.--Preparation of subgrade material for placing other material thereon shall include fine grading, compaction, reworking as necessary, and preparation of cut, or fill upon which base materials, surfacing, or slabs are to be placed. The upper 200 mm of the subgrade shall have the same compaction as the fill to be placed over it.

Placing.--When footings are to be constructed in fill, the fill shall be constructed to the grading plane required for the building construction prior to excavating for the footings. Fill shall be placed and compacted in layers. The loose thickness of each layer before compaction shall not exceed 150 mm.

Water shall be added to the fill material as needed for compaction.

COMPACTION.--

General.--Relative compaction shall be determined in accordance with California Test 216 or 231.22.

Relative compaction (95 percent).--In fill relative compaction of not less than 95 percent shall be obtained for a minimum depth of 400 mm below finished grade for the width of the paved areas plus 0.9 meter on each side thereof.

The prism of fill directly underneath the building foundation and sloping downward at 1:1 shall be compacted to 95 percent.

Relative compaction (90 percent).--Relative compaction of not less than 90 percent shall be obtained in all fill except as specified above.

FIELD QUALITY CONTROL.--

Testing and inspection.--The State will conduct compaction tests during the earthwork operations.

2.09 EARTHWORK FOR BUILDING WORK

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of performing earthwork for building work in accordance with the details shown on the plans and these special provisions.

Earthwork for building work shall consist of structure excavation and structure backfill. Structure excavation shall include excavation for footings, foundations, slabs, clarifiers, and trenches. Structure backfill shall include backfilling under slabs; backfilling under and around footings; backfilling for pipes and conduits; backfilling holes resulting from removal of existing facilities. In addition to structure excavation and structure backfill, earthwork for building work shall include any other earthwork, not mentioned, but necessary to complete the building work.

Attention is directed to the Materials Information Handout for information regarding foundation recommendations and reports that were prepared for use during the design of this project.

Attention is directed to the requirements of "Field Engineering" in Division 1, "General Requirements," of these special provisions.

QUALITY ASSURANCE.--

Samples.--Samples of sand and pea gravel, or crushed stone, weighing not less than 11 kg, shall be submitted to the Engineer at the jobsite for approval.

SITE CONDITIONS.--

Existing underground piping and conduit.--The location of existing underground piping and conduit is based on the best records available. Before beginning work, the Contractor shall accurately locate the piping and conduit involved in the work. If the location of the existing piping or conduit deviates from the location shown on the plans by more than 1.5 meters, or, if no elevations are indicated and the piping or conduit is more than 0.9 meter below grade, the cost of the additional excavation, backfill, piping or conduit, and removal and replacement of concrete, if any, will be paid for as an ordered change in accordance with the requirements specified in Section 3, "Changes in the Work," of the General Conditions.

Existing surfaced or planted areas.--Existing surfaced or planted areas that are removed, broken or damaged by the Contractor's operations shall be restored to their original condition except as otherwise shown on the plans or specified herein.

Restoration materials shall be equal to or better than the original materials. Surfacing shall be replaced to match the material thickness, grades, and finish of the adjacent surrounding surfaces.

PART 2.- PRODUCTS

BACKFILL MATERIALS.--

Structure backfill.--

Structure and trench backfill shall be free of organic and other deleterious material and shall be suitable for the required compaction. Gravel without sand matrix shall not be used except as free draining granular material beneath slabs and footings.

Sand.--

Sand shall be clean, washed sand, free from clay or organic material graded such that 100 percent passes the 6 mm sieve, 90 percent to 100 percent passes the 4.75 mm sieve and not more than 5 percent passes the 75 µm sieve size.

Pea gravel (naturally rounded).--

Pea gravel (naturally rounded) shall be clean, washed, dry density of not less than 1522 kg/m³, free from clay or organic material and shall conform to the following grading as determined by California Test 202:

Sieve or Screen Size	Percentage Passing
19 mm	100
13 mm	90-100
9.5 mm	40-70
4.75 mm	0-15
2.36 mm	0-3

Pea gravel shall conform to the following requirements:

Test	California Test No.	Test Requirements
Durability Index	229	35 Min.

PART 3.- EXECUTION

PREPARATION & RESTORATION.--

Sawcutting.--Prior to excavation or trenching, existing surfacing shall be removed to saw cut lines, or to existing wood dividers or expansion joints, if any. The saw cut shall be to a neat line and have a depth not less than 25 mm.

Restoration.--Surfacing shall be replaced to match the thickness, grades and finish of the adjacent surrounding surfaces.

STRUCTURE EXCAVATION.--

General.--Unless otherwise noted, all excavation for building work shall be classified as structure excavation.

Footing excavation.--The bottom of excavations shall not be disturbed. The contractor shall excavate by hand to the final grade. The bottom of concrete footings shall be poured against undisturbed material. Unless otherwise noted, compaction of the bottom of footing excavation is not required unless the material is disturbed. The footing depths shown on the plans shall be changed to suit field conditions when directed by the Engineer. Solid rock at or near required depths shall not be disturbed. Unsuitable material shall be excavated down to firm bearing as directed by the Engineer. Work and materials required because of excavation in excess of the depths shown on the plans, when such excavation has been ordered by the Engineer, will be paid for as an ordered change in accordance with the requirements in Section 3, "Changes in the Work," of the General Conditions.

Excavate to the elevations and dimensions within a tolerance of ± 12 mm. Limits of the excavation shall allow for adequate working space for installing materials and as required for safety of personnel. Such working space excavation shall be replaced in kind and compacted at the Contractor's expense.

Overdepth excavation for footings shall be backfilled with concrete or such other material recommended by the Contractor and approved by the Engineer. Relative compaction shall be not less than 95 percent.

Excavation for pipes and conduits.--Pipes or conduits in the same trench shall have a minimum clear distance between pipes or conduits of 150 mm. Pipes or conduits shall have not less than 0.75 meter of cover from top of pipes or conduits to finished grade unless otherwise shown on the plans or specified.

Trenching shall be of sufficient depth to permit placing a minimum depth of 100 mm of compacted sand under all pipes and conduits.

Dewatering.--Excavations shall be kept clear of standing water. Water shall be removed by pumping if necessary. Water removed from excavation shall be carried away from the building site and disposed of in a manner that will not harm State or adjacent property.

STRUCTURE BACKFILLING.--

General.--Unless otherwise noted, all backfill for building work shall be classified as structure backfill. Backfill shall be placed and compacted in horizontal layers, not more than 150 mm thick prior to compaction, and to the lines and grades shown on the plans or to original ground.

Structure backfill.--After structures are in place and forms are removed, wood and other debris shall be removed from excavations before placing structure backfill.

Backfilling pipes and conduits.--Backfill placed under pipe and conduits shall be compacted sand, 100 mm minimum depth. Backfill material placed to a level 150 mm above tops of pipes and conduits shall be sand or fine earth and particles shall not exceed 13 mm in greatest dimension. For wrapped, coated, or plastic pipe or conduits, sand shall be used for backfill. Backfill material placed higher than 150 mm above tops of pipes or conduits shall consist of material free of stones or lumps exceeding 100 mm in greatest dimension except:

- (a) The top 300 mm of backfill under roads, walks or paving shall consist of aggregate base material.
- (b) The top 150 mm of backfill in planted areas shall consist of topsoil.

COMPACTION.--

General.--Relative compaction shall be determined in accordance with California Test 216 or 231. Unless otherwise noted below, all backfill shall be compacted to a minimum relative compaction of 90 percent. Unless approved in writing by the Engineer, compaction by jetting or ponding will not be permitted.

Compact original ground.--Original ground surface under fill with surfacing of concrete and asphalt concrete shall be compacted to a relative compaction of not less than 95 percent for a minimum depth of 150 mm.

Structure backfill.--Structure backfill shall be compacted to not less than 95 percent relative compaction.

Trench backfill.--Trench backfill placed beneath slabs or paved areas shall be compacted to a relative compaction of not less than 95 percent.

DISPOSAL.--

Surplus material.--Surplus material from the excavation shall be disposed of away from the premises.

FIELD QUALITY CONTROL.--

Inspection.--When the excavation is substantially completed to grade, the Contractor shall notify the Engineer. No concrete shall be placed until the foundation has been approved by the Engineer.

Testing.--The State will conduct compaction tests during the backfilling and compacting operations.

2.10 AGGREGATE BASE

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing, spreading and compacting aggregate base in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS

Aggregate base.--

Aggregate base shall be commercial quality aggregates consisting of broken stone; crushed gravel; natural, clean, rough-surfaced gravel and sand; or a combination thereof.

Aggregate base shall conform to the following grading as determined by California Test 202:

Sieve or Screen Size	Percentage Passing
25 mm	100
19 mm	90 - 100
4.75 mm	35 - 60
600 µm	10 - 30
75 µm	2 - 9

Aggregate base shall also conform to the following quality requirements:

Tests	California Test No.	Test Requirements
Durability Index	229	35 Min.
Resistance (R-Value)	301	78 Min.
Sand Equivalent	217	22 Min.

PART 3.- EXECUTION

SPREADING AND COMPACTING.--

Spreading.--Aggregate base shall be placed and compacted to the lines and grades shown on the plans.

Spreading and compacting shall be performed by methods that will produce a uniform base, free from pockets of coarse or fine material.

Compaction.--Relative compaction of each layer of compacted base material shall be not less than 95 percent, as determined by California Test 216 or 231.

2.11 FREE DRAINING GRANULAR MATERIAL

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and placing free draining granular material beneath slabs or within the french drain in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS

Free draining granular material.--

Free draining granular material shall be clean, hard, durable, free-draining rock. The material gradation shall be such that all passes the 25 mm screen, and not more than 10 percent passes the 4.75 mm sieve as determined by California Test 202. Granular material shall be free from organic material, clay balls or other deleterious substances.

PART 3.- EXECUTION

SPREADING AND CONSOLIDATING.--

General.--Free draining granular material shall be placed, spread and consolidated by tamping or vibrating.

2.12 CAST-IN-DRILLED-HOLE CONCRETE PILES

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of constructing cast-in-drilled-hole concrete piles in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS

Concrete and reinforcement.--

Concrete and reinforcement shall conform to the requirements specified under "Cast-In-Place Concrete" in Division 3, "Concrete and Reinforcement," of these special provisions.

PART 3.- EXECUTION

CONSTRUCTION.--

Drilling holes.--All holes for concrete piles shall be drilled to the tip elevations or depths shown on the plans. All holes shall be examined for straightness and any hole which on visual inspection from the top shows less than 1/2 the diameter of the hole at the bottom of the hole shall be rejected. Suitable casings shall be furnished and placed when required to prevent caving of the hole.

All loose material existing at the bottom of the hole after drilling operations have been completed shall be removed before placing concrete in the hole.

Material resulting from drilling holes shall be wasted on the job site as directed by the Engineer.

Surface water shall not be permitted to enter the hole and all water which may have infiltrated into the hole shall be removed before placing concrete therein.

Placing reinforcement.--The reinforcing cage shall be placed and secured symmetrically about the center of the pile and shall be securely blocked to clear the sides of the hole.

Longitudinal reinforcing steel shall be continuous for the entire length of pile, including pile extensions.

Placing concrete.--The concrete filling shall be vibrated to a dense and homogeneous condition. Concrete placed in drilled holes shall be placed against undisturbed material except when portions of the pile will be exposed to view. Surfaces exposed to view and adjacent surfaces within 250 mm of finished grade shall be formed.

Casing, if used in drilling operations, shall be removed from the hole as concrete is placed therein. The bottom of the casing shall be maintained not more than 1.5 meter nor less than 0.3 meter below the top of the concrete during withdrawal and placing operations, unless otherwise permitted by the Engineer. Separation of the concrete during withdrawal operations shall be avoided by hammering or otherwise vibrating the casing.

Formed surfaces shall conform to the requirements specified under "Cast-In-Place Concrete" in Division 3, "Concrete and Reinforcement," of these special provisions.

2.13 ASPHALT CONCRETE

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing, spreading, placing and compacting asphalt concrete for asphalt concrete surfacing, applying asphaltic emulsion paint binder and fog seal coat, in accordance with the details shown on the plans and these special provisions.

Asphalt concrete shall be 19 mm maximum, medium grade, as specified herein.

Areas to be surfaced with asphalt concrete shall be as shown on the plans. Areas to be surfaced with asphalt concrete shall include those locations where existing bituminous surfacing has been removed to facilitate the required work.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of Compliance shall be furnished for asphalt concrete and asphaltic emulsion in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

PART 2.- PRODUCTS

MATERIALS.--

Asphalts.--

Asphalt binder for asphalt concrete shall be steam-refined paving asphalt Grade AR-8000 (asphalt graded by viscosity), conforming to the requirements in AASHTO Designation: M 226.

Asphalt emulsion for paint binder and fog seal coat shall be asphaltic emulsion Grade SS1h conforming to the requirements in AASHTO Designation: M 140.

Aggregates.--

Aggregate for asphalt concrete shall be commercial quality asphalt concrete aggregate, and shall have a Sand Equivalent value of 30 minimum, when determined by California Test 217. Aggregate shall contain a minimum of 90% crushed aggregate for coarse aggregate and 70% crushed aggregate for fine aggregate (passing 4.75 mm sieve, retained on 2.36 mm) as determined by California Test 205. Aggregate shall also have a maximum loss of 10% at

100 revolutions and 45% at 500 revolutions as determined California Test 211 (Los Angeles Rattler). Aggregate shall also have a sand equivalence of 50 minimum as determined by California Test 217.

Before producing asphalt concrete, the Contractor shall submit in writing to the Engineer the gradation of the aggregate which he proposes to furnish. At least 2 weeks prior to their intended use, the Contractor shall furnish samples of aggregates, in the quantity requested by the Engineer, from the source the Contractor proposes to use for the project.

The combined aggregate gradings for the respective asphalt concrete mixture shall conform to the following gradations when determined by California Test 202:

19 mm Maximum Grading	
Sieve Sizes	Percentage Passing
25 mm	100
19 mm	95 - 100
9.5 mm	65 - 80
4.75 mm	49 - 54
2.36 mm	36 - 40
600 μm	18 - 21
75 μm	3 - 8

MIXING.--

General.--Asphalt binder to be mixed with the aggregate shall be between 5 percent and 8 percent by weight of the dry aggregate as determined by the Engineer. The amount of asphalt binder to be mixed with the aggregate for asphalt concrete will be determined by the Engineer in conformance with the requirements in California Test 367 using samples of the aggregates furnished by the Contractor.

PART 3.- EXECUTION

PREPARATION.--

Subgrade.--Immediately prior to placing asphalt concrete thereon, the surface of the grading plane shall not vary more than 0.015 meter above or below the grade established by the Engineer.

At the time of placing the asphalt concrete material thereon, the moisture content of the subgrade shall not be more than 3 percent above or below the optimum moisture content of the subgrade material as determined by California Test 216.

Paint binder.--Paint binder shall be furnished and applied to all existing surfacing upon which asphalt concrete is to be placed, vertical surfaces against which additional asphalt concrete material is to be placed and other surfaces designated by the Engineer.

SPREADING AND COMPACTING.--

Spreading.--The mixture shall be spread at a temperature of not less than 121°C. Spreading shall be performed by methods that will produce an asphalt concrete surfacing of uniform smoothness and texture. Asphalt concrete shall be placed only when the atmospheric temperature is above 10°C.

Asphalt concrete for surfacing more than 1.5 meters in width shall be spread in one operation with an approved spreader and be ready for compaction without further shaping.

Compacting.--Asphalt concrete shall be placed in two equal layers in compacted thickness to match the thickness as shown on the plans. The first coverage of initial or breakdown compaction shall be performed when the temperature of the mixture is not less than 121°C, and all breakdown compaction shall be completed before the temperature of the mixture drops below 93°C.

Asphalt concrete shall be thoroughly compacted with a self-propelled tandem roller, weighing not less than 7260 kg. At locations where asphalt concrete is to be placed and which are inaccessible to rolling equipment, compaction shall be obtained by hand rollers, vibrating plates, impactors or other methods approved by the Engineer.

FOG SEAL.--

General.--A fog seal coat of asphaltic emulsion shall be applied to all new, completed, asphalt concrete. The fog seal coat shall be applied in one application at a rate between 0.22 liter and 0.45 liter of bituminous binder per square meter of surface covered. The exact rate of application will be determined by the Engineer.

The spraying equipment used for the application of the fog seal coat shall be suitable for the intended use and shall be capable of producing a uniform application of emulsion material in the amounts specified herein. Application shall be at the pressures and temperatures recommended by the spray equipment manufacturer. Hand spray equipment shall be approved by the Engineer.

2.14 PAINTED PAVEMENT MARKINGS

PART 1.- GENERAL

Scope.--This work shall consist of furnishing and applying paint for pavement markings in accordance with the details shown on the plans and these special provisions.

Pavement markings include, but are not limited to, word and symbol markings, and parking stall markings.

PART 2.- PRODUCTS

Paint.--

Paint shall be top commercial quality for pavement marking, formulated for the use intended, and manufactured by a nationally recognized manufacturer of paint and other coating products.

The kind of paint to be used (solvent or water borne) shall be determined by the Contractor, based on local air pollution control regulations and weather conditions.

PART 3.- EXECUTION

ALIGNMENT AND LAYOUT.--All necessary alignment and layout work shall be performed by the Contractor, in a manner that will not damage the pavement.

Unless otherwise shown on the plans, the width of parking stall markings shall be 105 mm.

EQUIPMENT AND OPERATION.--Mechanical means shall be used to paint pavement markings.

All equipment used in the application of paint shall produce pavement markings of uniform quality.

All spray equipment shall be the proper type and of adequate capacity for the work involved.

Air atomized spray equipment shall be equipped with oil and water extractors and pressure regulators, and shall have adequate air volume and compressor recovery capacity. Spray gun tip needle assemblies and orifices shall be the proper size.

Rapid dry paint shall be applied only with airless type equipment.

Stencils and hand spray equipment shall be used to paint word and symbol markings. Stencils shall be furnished by the Contractor. The stencil layout shall conform to the dimensions shown on the plans.

SURFACE PREPARATION.--Surfaces which are to receive paint shall be cleaned of all dirt and loose material.

APPLICATION.--Paint shall be applied only on dry surfaces, and only during periods of favorable weather, in accordance with the manufacturer's recommendations.

On new surfacing, paint shall be applied in 2 coats. The first coat shall be dry before application of the second coat is applied.

On existing surfacing, paint shall be applied in one coat.

Completed pavement markings shall have clean and well-defined edges, and shall conform to the dimensions shown on the plans or as specified in these special provisions.

Drips, oversprays, improper markings, and paint material tracked by traffic shall be immediately removed from the pavement by methods approved by the Engineer. All such removal shall be at the Contractor's expense. If used, striping tape shall be applied in accordance with the manufacturer's specifications.

APPLICATION RATES.--Each application of paint shall be applied at the rates recommended by the paint manufacturer for the type of surface involved.

PROTECTION.--Newly placed pavement markings shall be protected from damage by traffic or other causes until the paint is thoroughly dry.

DISABLED ACCESSIBLE PARKING STALL SYMBOL.--Each parking space reserved for persons with physical disabilities shall have a minimum 0.9 m x 0.9 m surface identification with the international symbol of accessibility. The symbol and border shall be white and the background shall be blue conforming to Federal Standard 595B, Color No. 15090.

2.15 WASH WATER SYSTEM

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing, installing and constructing a wash water system and modifying portions of existing water systems in accordance with the details shown on the plans and these special provisions. Wash water system shall include other fittings and appurtenances, not mentioned, which are required for the complete installation and proper operation of the system.

Order of work.--Work which will curtail the use of the existing sewage system shall not be done until the facilities utilizing the system are closed and are no longer required.

SUBMITTALS.--

Product data.--Materials list for materials to be used shall be submitted for approval and shall include the name of the manufacturer and the source, model number, description, and standard of manufacture.

Manufacturer's descriptive data and catalog cuts to be submitted for approval are as follows:

- Bituminous coatings
- Clarifier tank
- Cleanout to grade
- Coatings
- Dielectric waterway
- Hose faucet
- Manhole
- Manhole frame and cover
- Meter box and cover
- Sewer pipe
- Drain pipe
- Vent pipe
- Pressure washer pipe
- Pipe wrapping and primer
- Underground tracer tape
- Unions
- Valve box and covers
- Waterproof membrane
- Water hose
- Water nozzle
- Frame and grates

QUALITY ASSURANCE.--

Codes and standards.--Work shall conform to the applicable portions of the current approved 1998 California Plumbing Code, pertaining to the selection and installation of recycle wash water system materials and products.

Certificates of Compliance.--Certificates of compliance shall be furnished for manhole covers and frames in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

PART 2.- PRODUCTS

IDENTIFICATION.--

Underground tracer tape.--

Underground tracer tape shall be permanent, bright colored, continuous printed plastic tape with copper wire or aluminum foil intended for direct burial service; not less than 50 mm wide x 0.1 mm thick; lettering shall read "CAUTION SEWER/WATER BURIED BELOW."

PIPES AND PIPE FITTINGS.--

General.--Provide pipes of one of the following materials, of weight and class indicated. Provide pipe fittings and accessories of same material and weight and class as pipes, with joining method as indicated.

Sewer pipe and fittings.--

Sewer pipe and fittings shall be polyvinyl chloride (PVC) gravity sewer plastic pipe and fittings conforming to ASTM Designation: D 3034, Standard Dimension Ratio (SDR) 35, with integral bell and bell and spigot rubber gasketed joints or conforming to ASTM Designation: D2665 with solvent welded fittings. Rubber gaskets shall conform to ASTM Designation: F 477. Stainless steel clamps with rubber boots shall not be used.

Drain pipe and fittings.--

Drain pipe and fittings shall be polyvinyl chloride (PVC) gravity sewer plastic pipe and fittings conforming to ASTM Designation: D 3034, Standard Dimension Ratio (SDR) 35, with integral bell and bell and spigot rubber gasketed joints or conforming to ASTM Designation: D2665 with solvent welded fittings. Rubber gaskets shall conform to ASTM Designation: F 477. Stainless steel clamps with rubber boots shall not be used.

Vent pipe and fittings.--

Vent pipe underground shall be plain end schedule 40 polyvinyl chloride (PVC) pipe with solvent welded fittings ASTM Designation: D 2241, Type I, Grade 1, Standard Dimension Ratio (SDR) 21, rated for 1380 kPa.

Vent pipe risers above ground and below ground shall be Schedule 40 galvanized steel pipe conforming to ASTM Designation: A 53, with 1040 kPa galvanized malleable iron banded screwed fittings and galvanized steel couplings. The weight of the zinc coating shall be not less than 90 percent of that specified in ASTM Designation: A 53.

Pressure washer pipe and fittings.--

Pressure washer pipe and fittings shall be as recommended by the high pressure washer manufacturer.

Sewer pipe adapters.--

Sewer pipe adapters for PVC to cast iron soil pipe or clay piping shall be appropriately sized PVC flexible coupling manufactured for connecting dissimilar pipes. Adapters shall be attached to piping with adjustable stainless steel band clamps with hex tightening screws. Rubber boots will not be allowed. Sewer pipe adapter shall be Indiana Seal; Fernco; or equal.

Union.--

Unions (for steel pipe) shall be 1730 kPa, threaded malleable iron, ground joint, brass to iron seat, galvanized or black to match piping.

Dielectric waterway.--

Dielectric waterway shall be a premanufactured unit that incorporates an insulated interior lining at least 75 mm in length between the 2 pipes being connected while maintaining metal to metal contact on the exterior surface. Dielectric water way shall be listed by IAPMO (International Association of Plumbing and Mechanical Officials).

CONCRETE TANKS.--**Clarifier tank.--**

Clarifier tank shall be a precast reinforced concrete tank of the size shown on the plans. All joints shall be at the top of the tank above the normal operating water level. Sampling box shall be the depth shown on the plans and supplied by the clarifier tank manufacturer. The clarifier tank shall be listed and approved by the International Association of Plumbing and Mechanical Officials (IAPMO) and tank shall be marked accordingly.

MANHOLES AND COVERS.--**Manhole.--**

Manhole sections and cones and grade rings shall be precast, reinforced concrete, conforming to ASTM Designation: C 478M or precast reinforced concrete pipe conforming to ASTM Designation: C 76.

Manhole frame and cover.--

Manhole frame and cover shall be gray cast iron conforming to ASTM Designation: A 48, Class 30B or greater (traffic type). Cover shall be no bolt, gas tight, closed pick hole and shall be factory marked "SS," "SEWER," or "SANITARY SEWER." The bearing surfaces of frames and covers shall be machined, and the cover shall seat firmly into the frame without rocking or sliding. Gray iron castings shall be true to pattern in form, dimensions and thickness; shall be free of surface defects; and shall be free from visible, x-ray, and machine operation defects which would affect the service value of the castings. Castings shall be matched sets in appearance, and lettering and sizing as shown on the plans.

METER AND VALVE BOX.--**Meter box.--**

Meter box shall be precast concrete meter box and cast iron cover with no holes. Cover shall be traffic rated, factory marked "SEWER," "SS," or "SANITARY SEWER." Meter box shall be Bes Concrete Products, Christy Concrete Products, Cook Concrete Products, or equal with extensions as required by plan dimension. Nominal inside dimensions shall be as shown on the plans.

Valve box.--

Valve box shall be precast concrete meter box and cast iron cover with no holes. Cover shall be traffic rated, factory marked "SEWER," "SS," or "SANITARY SEWER," or "WATER," as required. Valve box shall be Cook Concrete Products, Christy Concrete Products, Bes Concrete products, or equal with extensions as required. Nominal inside dimension shall be as shown on the plans.

CLEANOUTS.--**Cleanout to grade.--**

Cleanout piping shall terminate with an appropriately sized flexible PVC access cap and stainless steel band coupler with hex tightening screw. Rubber coupling or cap will not be allowed. Access cap shall be Indiana Seal; Fernco; or equal.

FAUCETS.--

Hose faucet.--

Hose faucet shall be compression type, angle pattern, wall flange at exterior locations, tee handle, NPS 3/4 female thread with hose end, rough chrome or nickel plated finish for locations inside building, rough brass finish for others. Hose faucet shall be supplied with an integral or nonremovable threaded outlet vacuum breaker which meets the requirements of the American Society of Sanitary Engineering (ASSE) Standard: 1011. Hose faucet shall be Nibco, No. 63VB; Chicago, No. 13T; or equal.

COATINGS.--

Bituminous coating.--

Bituminous coating shall conform to ASTM Designation: D 41.

Waterproof membrane.--

Waterproof membrane shall be a liquid, cold applied, seamless, single component, flexible, bitumen modified polyurethane formulated for hand application by roller or airless spraying.

Properties shall be as follows:

Property	Value	Test Designation
Wet film thickness	2.5 mm, min	Wet film thickness gage
Shore A hardness	10 min	ASTM D 2240
Elongation, %	350 min	ASTM D 412
Tensile strength (kPa)	550 min	ASTM D 412
Application rate, approximate	3 liters per square meter	Inspection, wet mil thickness

Waterproof membrane shall be Rexnord Chemical Products, HLM 5000; Polycoat Products, Aquaseal-1; Select Products Company, Select Poly-Kote LM; or equal.

MISCELLANEOUS MATERIALS.--

Frame and grates.--

Frame and grate shall be traffic rated. Grate shall be constructed of fiberglass roving reinforced thermoset plastic produced in a one-piece mold. Color shall be green or light gray and come with an anti-slip surface. Size of grate will depend on manufacturer, but shall not exceed 0.30 x 1.22 meters. Grate frame shall be supplied by the grate manufacture. Frame and grate shall be CSI, Strongwell, or equal.

Cement mortar.--

Cement mortar shall consist of one part cement to 2 to 3 parts clean plaster or concrete sand mixed with just enough water for suitable consistency.

Epoxy mortar.--

Epoxy mortar shall be commercial quality, low viscosity paste polysulfide extended epoxy formulated primarily for use in bonding new portland cement concrete to old portland cement concrete.

Sealant.--

Sealant for precast concrete tank shall be closed cell expanded neoprene conforming to ASTM Designation: D 1056, Grade RE 41.

Pipe wrapping tape and primer.--

Pipe wrapping tape shall be pressure sensitive polyvinyl chloride or pressure sensitive polyethylene tape having nominal thickness of 0.50 mm. Wrapping tape shall be Polyken, 922; Manville, Trantex VID-20; Scotchrap, 51; or equal.

Pipe wrapping primer shall be compatible with the pipe wrapping tape used.

Water hose.--

Water hose shall be 18 mm diameter x 30 m length commercial duty rubber hose, industrial 2-layer tire cord reinforcing, resistant to oil, chemicals, abrasion, and weather, with heavy duty brass couplings and octagon head for wrench or hand use.

Water nozzle.--

Water nozzle shall be straight nozzle, solid brass with barrel that moves freely from full open to full closed. Barrel shall be removable for use as full flow plain hose nozzle.

PART 3.- EXECUTION**INSTALLATION OF PIPE IDENTIFICATION.--**

General.--Continuous underground tracer tape shall be installed directly above all buried pipes and 150 mm to 200 mm below finished grade during backfilling operations. Appropriate tape shall be used for drain, sewer and water pipes.

INSTALLATION OF PIPE AND FITTINGS.--

General.--Pipe shall be installed upgrade unless otherwise permitted by the Engineer. Pipe slopes shall be as shown on the plans. Galvanized steel pipe for above ground air vents shall be installed vertical terminating at grades and mounted in accordance with the details shown on the plans and these special provisions.

Pipe and fittings.--Pipe and fittings shall be installed in accordance with the plans and specifications. Lines between manholes shall be flushed as necessary to remove collected material.

Cleaning and closing pipe.--The interior of all pipe shall be cleaned before installation. All openings shall be capped or plugged as soon as the pipe is installed to prevent the entrance of any materials. The caps or plugs shall remain in place until their removal is necessary for completion of the installation.

Flushing completed systems.--All completed systems shall be flushed and blown out.

Wrapping and coating steel pipe.--Steel pipe buried in the ground shall be wrapped as specified herein:

1. Wrapped steel pipe shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
2. Tapes shall be tightly applied with 1/2 uniform lap, free from wrinkles and voids with approved wrapping machines and experienced operators to provide not less than 1.00 mm thickness.
3. Field joints, fittings and valves for wrapped steel pipe shall be covered to provide continuous protection by puttying and double wrapping with 0.50 mm thick tape. Wrapping at joints shall extend a minimum of 150 mm over the adjacent pipe covering. Width of tape for wrapping fittings shall not exceed 50 mm. Adequate tension shall be applied so tape will conform closely to contours of fittings. Putty tape insulation compounds approved by the Engineer shall be used to fill voids and provide a smooth even surface for the application of the tape wrap.

Dielectric waterway.--Dielectric waterway shall be provided between metal pipes of different material, and between brass or bronze valves and steel piping.

Sewers near water pipes.--Sewers near water pipe shall be installed below, (with vertical separation of not less than 305 mm), water pipe in the same trench, in parallel trenches less than 3 m apart, or at any crossing as specified in the current edition of the California Plumbing Code.

When water pipes cross above a sewer pipe, a vertical separation of not less than 305 mm shall be maintained between the top of the sewer pipe and the bottom of the water pipe.

When water pipes cross under a sewer pipe, a vertical separation of not less than 455 mm shall be maintained between the top of the water pipe and the bottom of the sewer pipe. No sewer pipe joint shall be within 1.5 m of the water pipe.

Joint adapters.--Joints between different types of pipes shall be made only with approved standard manufactured adapters and fittings intended for that purpose as specified in these special provisions. Adapter couplings requiring polyethylene encasement shall be as shown on the plans and these special provisions.

Interior inspection.--Interiors of pipes shall be inspected to determine displacement or damage during installation or backfilling.

Damaged pipe shall be replaced.

Misaligned pipe shall be corrected prior to use.

INSTALLATION OF CONCRETE TANKS.--

General.--Manufactured precast clarifier tank and manhole frames and covers, traffic frames and covers, traffic frames and grates, and other appurtenances shall be installed in accordance with the manufacturer's recommendations and the approved shop drawings.

INSTALLATION OF MISCELLANEOUS ITEMS.--

Installing pipe supports.--Vent drain galvanized steel pipe supports shall be attached to existing equipment building walls with pipe supports.

INSTALLATION OF MANHOLES, ACCESS, VALVE AND METER BOXES.--

General.--Manufactured manholes, riser sections, concentric/eccentric cones, grade rings, valve, access, utility and meter boxes including extensions shall be installed in accordance with the plans, these specifications, code and standards and/or the manufacturer's recommendations where applicable when approved by the Engineer.

Joints and penetrations of manholes, valve, access, utility and meter boxes shall be sealed watertight, inside and outside, with epoxy mortar.

Where sewer manholes, valve, or meter boxes or cleanouts are to be installed to grade in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed in the immediate area.

The watertight access box shall be coated with a flexible membrane.

INSTALLATION OF CLEANOUTS.--

General.--Cleanouts shall be installed 90 degrees to finished grade and shall terminate in a valve or meter box as shown on the plans. A concrete pad, 455 mm long and 100 mm thick, shall be provided full width of the trench under the wye/two way cleanout tee branch. A reinforced concrete collar shall be formed and cast-in-place around each cleanout box in conformance to the details shown on the plans.

Cleanouts to grade shall be a combination of fittings as shown on the plans. Piping and fittings for NPS 4 pipe shall be sewer pipe and for NPS 3 and smaller shall be drain pipe. Cleanout piping shall terminate below grade in a valve box.

Collars shall be broom surface finished. Collars shall match existing/finished grade. Compaction prior to form work shall be as specified elsewhere in these special provisions.

Where cleanouts are to be installed to grade in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed in the indicated area.

APPLICATION OF COATINGS.--

General.--The edge and bottom of manhole cover seat areas shall be coated with a uniform application of heavy duty, waterproof automotive or industrial grease.

The flexible waterproofing membrane coatings shall be applied in accordance with the coating manufacturer's recommendations. Flexible membrane coating shall be applied without runs, holidays, sags, misses, pinholes, or other imperfections.

TAP CONNECTION.--

General.--Connections to existing systems shall be as shown on the plans and subject to approvals by the local agency and Engineer.

FIELD QUALITY CONTROL.--

General.--All pipes shall be tested for obstructions and leakage before covering. Obstructions or irregularities shall be removed or repaired.

Non pressure (Drain and sewer) pipes shall be tested for leakage for a minimum period of 4 hours by filling with water to an elevation of 1.2 m above the average invert of pipe. The system shall show no visible leaks. Drain and sewer pipe may be tested in sections with the test water progressively passed down the pipes if feasible. Water shall be released at a rate which will not create water hammer or surge in the plugged section of pipe.

Water pipes shall be tested for leakage for a minimum period of 4 hours by filling pipes with water to a pressure of 860 kPa. Provisions shall be made for release of air. Systems shall show no loss in pressure or visible leaks. The Contractor shall repair any leaks or irregularities.

Pressure washer pipe shall be tested for leakage for a minimum period of 4 hours by filling pipes with water to a pressure of 14 000 kPa. Provisions shall be made for release of air. Systems shall show no loss in pressure or visible leaks. The Contractor shall repair any leaks or irregularities.

In lieu of hydrostatic test with water, the air test method, as outlined in the Uniform Plumbing Code (UPC) as amended by the applicable portions of current California Code of Regulations, "Low Pressure Air Test for Building Sewers," may be used.

The clarifier tank shall be tested for leakage by filling the tank with water to the level of the outflow line for a period of 24 hours. All seams and joints shall be left exposed (except the bottom of the tank) for inspection purposes. The tank shall remain watertight. Repairs, if necessary, shall be made at the Contractor's expense.

2.16 IRRIGATION SYSTEM

GENERAL.--This work shall consist of furnishing and installing an electric automatic irrigation system in conformance with the details shown on the plans and these special provisions.

The irrigation system as shown on the plans, except for sprinkler locations, is diagrammatic.

SUBMITTALS.--Within 30 days after the Contractor has received notice of approval of the contract, the Contractor shall submit working drawings for the irrigation system, in conformance with the requirements specified under "Submittals" in Division 1, "General Requirements," in these special provisions.

The working drawings shall consist of a schematic wiring diagram drawn to the same scale as the contract plans for irrigation, and shall be signed by the controller manufacturer or his authorized agent. Information shown on the wiring plans shall include, but not be limited to, wire sizes, conduit and the wire routes between electrical components.

Three copies of the schematic wiring diagram, including any wiring modifications for the type of irrigation controller installed shall be submitted to the Engineer, prior to the completion of the contract.

One additional copy of the irrigation controller schematic wiring diagram and a copy of the reduced irrigation plans showing the equipment controlled by the controller, including the installed location and the correct station number for each electric remote control valve. Irrigation plans shall be covered separately on each side with clear, self-adhesive plastic, 0.25-mm minimum thickness, and shall be placed in a clear plastic envelope of the same thickness. The envelope shall be securely fastened to the inside of the controller enclosure door.

PRODUCTS.--

Materials.--

All materials for the irrigation system shall be commercial quality, unless otherwise shown on the plans or specified in these special provisions.

Pipe.--

Pipe and fittings shall conform to the details shown on the plans and these special provisions.

Plastic Pipe.--

Plastic pipe for the irrigation system shall be plastic pipe supply line and plastic pipe irrigation line as shown on the plans, and shall conform to these special provisions.

Plastic Pipe Supply Line.--

Plastic pipe supply line shall be polyvinyl chloride (PVC) of the types and classifications shown on the plans or specified in these special provisions. Plastic pipe supply line shall be approved by the National Sanitation Foundation, and shall conform to the requirements of either ASTM Designation: D 2241 or D 2672, except that plastic pipe supply line with a bell socket formed as an integral part of the pipe for use with rubber ring gaskets shall conform to the requirements of ASTM Designation: D 2241. The belled portion of said pipe for use with rubber ring gaskets shall conform to the requirements of ASTM Designation: D 3139, except for the dimensional ratio, shall be formed to maintain uniformity in alignment and roundness and shall be free of irregularities and defects.

The wall thickness of the bell shall be not less than the specified minimum wall thickness of the pipe or not less than the minimum thickness that will provide a joint assembly with a Hydrostatic Design Basis Category not lower than that of the Hydrostatic Design Basis Category of the pipe.

For pipe with wall thickness of the bell less than the specified minimum wall thickness of the pipe the Contractor shall furnish to the Engineer the following:

1. A Certificate of Compliance from the manufacturer of the pipe, conforming to the provisions in Section 4-1.04, "Certificates of Compliance," of the General Conditions, certifying that the joint assembly conforms to the requirements of ASTM Designation D 3139.
2. Detailed drawings of the joints, including all dimensions, along with certified copies of the tests performed to verify that the Hydrostatic Design Basis Category for the joint assembly is not lower than the Hydrostatic Design Basis Category of the pipe.
3. Certified copies of the laboratory qualifying tests for the Internal Pressure Test and for the Vacuum Test.
4. A minimum of 2 samples of each size and each class of pipe, not less than 0.6-m long, together with gaskets.

Items 2 and 3 above may be submitted to the California Department of Transportation Laboratory in Sacramento on an annual basis or more often when required because of manufacturer's design changes. The Certificate of Compliance for pipe used on a specific project may then refer to these prior submittals, giving date of original submittal and any other information needed to identify the documents.

The wall thickness of the bell end of the pipe may exceed the maximum allowable pipe thickness for a length not to exceed 600 mm from the end of the pipe.

Bell end pipe conforming to ASTM Designation: D 2672 may be marked with either ASTM Designation: D 2672 or D 2241. Gasketed bell end pipe shall be marked in conformance with ASTM Designation: D 2241.

Schedule 40 and Schedule 80 plastic pipe supply line shall conform to the requirements of ASTM Designation: D 1785.

Plastic pipe supply line and fittings that are on the supply side of control valves and are 50 mm or larger in diameter shall be either the rubber ring gasket type or the solvent cemented type, except that all pipe and fittings installed in conduits shall be the solvent cemented type. All other plastic pipe supply line and fittings shall be the solvent cemented type.

Threaded fittings and fittings to be solvent cemented to plastic pipe supply line shall be injection molded PVC, Schedule 40, conforming to the requirements of ASTM Designation: D 2466.

Fittings equipped with rubber ring gaskets for supply line shall be either injection molded PVC plastic pipe fittings, conforming to the requirements of ASTM Designation: D 2466 or D 3139, or machined pipestock fittings, conforming to the requirements of ASTM Designation: D 2241, with the exception in both applications of the dimensions and configurations of the barrel portion which receives the rubber ring. Rubber rings shall conform to the requirements of ASTM Designation: F 477.

Solvent cement and primer for PVC plastic pipe and fittings for supply lines shall be of commercial quality specifically manufactured for use with rigid PVC plastic pipe and fittings. The solvent cement and primer used shall be made by the same manufacturer. The color of the primer shall contrast with the color of the pipe and fittings.

Steel Pipe.--

Steel pipe and couplings and wrought iron couplings shall conform to the specifications of ASTM Designation: A 120, standard mass, galvanized, except the mass of the zinc coating shall be not less than 90 percent of that specified in ASTM Designation: A 120. Fittings, except couplings, shall be galvanized malleable iron, banded and threaded, conforming to ANSI Standard: B 16.3, Class 150.

Unions.--

Unions shall be brass or malleable iron. All unions shall withstand the working pressure range requirements of the pipes with which they are used.

Wye Strainers.--

Wye strainers shall have a cast iron or all-bronze body with a removable stainless steel or monel strainer. Wye strainers shall be capable of withstanding a cold water working pressure of 1034 kPa. Wye strainers at backflow preventer assemblies shall be equipped with a gate valve at the outlet. Wye strainers at all other locations shall be equipped with a garden valve at the outlet.

The strainer screen for the wye strainer in a backflow preventer assembly shall have an open area equal to at least 3 times the cross-sectional area of the pipe based on an iron pipe size and shall be 850- μ m woven wire mesh or perforated sheet with 1.14-mm diameter holes.

All other wye strainers shall be equipped with 425- μ m strainer screens.

Control Valves.--

Control valves shall be the electric remote control or the manual type, straight service pattern globe valves, as shown on the plans. Valves shall be either brass or bronze construction with replaceable compression disks or diaphragms and shall be of the same size as the pipeline which the valves serve, unless otherwise shown on the plans. Control valves shall be capable of withstanding a cold water working pressure of 1034 kPa. Handles shall be brass bronze or steel.

Straight pattern (side inlet) control valves shall be installed with a union on the inlet and discharge side of the valve. Unions may be an integral part of the valve body.

Gate Valves.--

Gate valves shall be either flanged, threaded or ring type, iron or bronze body, bronze trimmed valves with rising (internally threaded) or non-rising stem, and shall withstand a cold water working pressure of 1034 kPa. Gate valves shall be of the same size as the pipeline which the valve serves, unless otherwise shown on the plans.

All threaded type valves, except gate valves used as shut-off valves for backflow preventers, shall be provided with a union on each side of the valve. Handles shall be brass, bronze or steel.

VALVE BOXES.--

Valve boxes shall be precast portland cement concrete boxes with one piece covers marked "WATER" in cast-in-letters not less than 25 mm high.

The mass of valve box covers shall not exceed 16 kg.

Valve boxes installed in paved areas and valve boxes used for valve or filter assembly units and wye strainer assemblies shall be precast portland cement concrete.

All other valve boxes shall be either precast portland cement concrete or plastic. Plastic valve boxes shall be manufactured by the same company.

Plastic valve boxes installed in areas with slopes steeper than 1:4 (vertical:horizontal) shall be of sufficient rigidity that when a designated concentrated force is applied perpendicularly to the midpoint of one of the long sides at the top while the opposite long side is supported by a rigid surface, the cover can be removed without the use of tools. The designated concentrated force shall be 665 N for a box with cover dimensions up to 305 mm x 430 mm and shall be 445 N for a box with dimensions larger than 305 mm x 430 mm.

Covers for plastic valve boxes shall be plastic.

Covers for round concrete valve boxes and valve boxes installed in paved areas shall be concrete, cast iron, or steel.

Covers for valve or filter assembly units and wye strainer assemblies shall be plastic, cast iron or steel.

All other covers for concrete valve boxes shall be concrete, plastic, cast iron, or steel.

Plastic covers for concrete valve boxes shall be glass fiber reinforced plastic.

Covers for concrete valve boxes shall be one piece, except that when the mass of the valve box cover exceeds 16 kg, the cover shall be cut into equal sections so that no section exceeds 16 kg. All cuts shall be straight, uniform and smooth.

Covers shall be identified on the top surface as shown on the plans.

Covers of valve boxes for electric remote control valves shall be marked with the appropriate controller and valve identification letters and numbers in conformance with the details shown on the plans and as specified in these special provisions.

EXECUTION.--

INSTALLATION.--

TRENCHING AND BACKFILLING.--Trenching and backfilling for irrigation lines, corrugated steel pipe conduits and related electrical control conduits shall conform to the requirements specified under "Earthwork for Building Work" elsewhere in Division 2, "Sitework," of these special provisions, unless otherwise shown on the plans or specified in these special provisions.

Improvements including sidewalks, curbs, gutters, portland cement concrete and asphalt concrete pavement and surfacing; underlying material, lawns and plants; and any other improvements removed, broken or damaged by the Contractor's operations, shall be replaced or reconstructed with the same kind of material as found in the work or with materials of equal quality. The new work shall be left in a serviceable condition.

Irrigation supply line and electrical conduit installed in a common trench shall not be installed above each other or above other pipe.

Rocks and other debris encountered during trenching operations shall be brought to the surface of the ground at the Contractor's expense. Removing and disposing of these rocks and debris will be paid for as an ordered change in conformance with the requirements in Section 3, "Changes in the Work," of the General Conditions. The size of rocks and the quantity of rocks and debris to be disposed of will be determined by the Engineer.

Pavement, sidewalk and similarly paved areas encountered on or beneath the surface of the ground and not shown on the plans in areas to be trenched for irrigation pipes, and if ordered by the Engineer, shall be removed and disposed of as directed by the Engineer. Excavating through these paved areas, furnishing and placing topsoil to fill resulting holes, and removing and disposing of this pavement will be paid for as an ordered change in conformance with the requirements in Section 3,

"Changes in the Work," of the General Conditions. Disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site.

Existing pavement shown on the plans where trenches are to be excavated shall be removed and, unless otherwise permitted by the Engineer, disposed of away from the premises. Disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site.

Trenches for plastic pipe shall be of sufficient width to permit snaking of all plastic pipe not connected by rubber ring-type fittings.

Trenches for plastic pipe shall be smooth and free of jagged rubble or sharp objects which will cause abrupt bending stresses and uneven weight distribution during backfilling operations.

The backfilling of pipe trenches shall be accomplished in a manner that will protect the pipe from damage from sharp objects. Rocks shall not be placed directly on the pipe.

Except as otherwise specified in these special provisions, backfill material shall be compacted by ponding or jetting with water until the backfill material, after settlement, is level with the surrounding soil.

The backfill for excavations within surfaced areas, or areas shown on the plans to be surfaced, shall be compacted in conformance with the requirements specified under "Earthwork for Building Work," elsewhere in Division 2, "Sitework."

If for any reason the soil taken from the trench is determined by the Engineer to be unsuitable for a bedding material against the pipe, a suitable material, such as sand or topsoil, shall be furnished and placed as a bedding for the pipe before backfilling with the original soil taken from the trench. Furnishing and placing bedding material for pipe when ordered by the Engineer will be paid for as an ordered change in conformance with the requirements in Section 3, "Changes in the Work," of the General Conditions.

When any backfilled area has settled, the area shall be refilled and compacted by the Contractor at his expense, including furnishing, placing and compacting the fill material.

PIPE, FITTINGS, VALVES AND SPRINKLERS.--Except as provided elsewhere in these special provisions, irrigation pipe shall be installed by the open trench method. Excavation and backfill shall conform to the requirements specified under "Earthwork for Building Work," elsewhere in Division 2, "Sitework."

All underground metallic pipes, fittings, valves, or sprinklers made of dissimilar metals shall be connected through a dielectric coupling or bushing. Pipe installed in this manner shall be physically separated from other metal objects. Dielectric couplings shall physically separate the pipes a minimum of 3 mm in all directions. Non-conducting spacers which will insure physical separation of pipe from foreign objects may be required as determined by the Engineer.

At the Contractor's option, the Contractor may install plastic pipe supply line with solvent cemented fittings and plastic irrigation line for an irrigation system by methods and with equipment other than by trenching provided the pipes are installed at the depths specified.

Where connection is made to existing supply lines, compression type fittings may be used.

Pipe from water meters through backflow preventer assemblies to plastic pipe supply lines shall be galvanized steel unless otherwise shown on the plans.

Male pipe threads on galvanized steel pipe shall be coated with a joint compound that is non-hardening and non-corrosive.

All pipe shall be cut straight an true. After cutting, the ends shall be reamed out to the full inside diameter of the pipe.

All PVC pipe 40 mm diameter and smaller shall be cut with "PVC CUTTERS". Sawing of such PVC pipe will not be allowed.

Solvent cement welding shall be done in conformance with the printed instructions of the solvent manufacturer. A copy of the printed instructions shall be furnished to the Engineer before any joints are made.

All plastic pipe installed by trenching and backfilling methods, except pipe connected with rubber ring-type fittings, shall be snaked when installed. Pipe connected with rubber ring-type fittings need not be snaked.

If the location of a supply line interferes with the drilling of the plant holes, the plant holes shall be so located as to clear the supply lines. Supply lines shall not be installed through plant holes unless otherwise shown on the plans.

The male portion of each threaded plastic pipe and fitting connection shall be wrapped with at least 2 layers of an approved pipe thread sealant tape, or at the option of the Contractor, a nonhardening joint compound applied in conformance with the manufacturer's instructions may be substituted for pipe thread sealant tape.

Plastic pipe supply line with rubber ring gasket type joints shall be installed at least 0.45-m below the finished grade, measured to the top of the pipe.

Plastic pipe supply line with solvent cemented type joints shall be installed at least 0.3-m below the finished grade, measured to the top of the pipe, except for plastic pipe supply line downstream from the remote control valves for sprinklers which shall have a minimum cover of 0.15-m.

Plastic pipe supply line and fittings that are on the supply side of control valves and are 50 mm or larger in diameter shall be the rubber ring gasket type, except when supply line with a PR of 2172 kPa is required.

Plastic pipe irrigation line shall be installed at least 0.45-m below finished grade, measured to the top of the pipe.

Valves and sprinklers shall be installed not less than 2.1 m from curbs, dikes, sidewalks, and paved shoulders, and not less than 0.9-m from fences and walls unless otherwise shown on the plans or specified in these special provisions.

Foreign material shall be prevented from entering the irrigation system during installation. Immediately prior to assembling, all pipes, valves and fittings shall be cleaned. All unattached ends of pipe, fittings and valves shall be plugged or capped pending attachment of additional pipe or fittings. All lines shall be thoroughly flushed out prior to attachment of sprinklers, emitters and other terminal fittings.

Portland cement concrete for thrust blocks shall be produced from commercial aggregates and cement and shall contain not less than 300 kg of cement per cubic meter. Hand mixing of this concrete will be permitted.

VALVE BOXES.--Valve boxes with extensions shall be provided for housing control valves at the locations designated on the plans or specified in these special provisions.

The tops of valve boxes installed in walkway and paved areas shall be flush with the surrounding grade. The tops of valve boxes in other areas shall be installed 50 mm above the surrounding grade.

Each valve box that contains an electric remote control valve or valves shall be identified by stenciling the appropriate controller identification letter or letters and valve identification number or numbers, as shown on the plans, on the top side of the valve box cover. The letters and numbers shall be 50 mm in height. The stenciling paint shall be a commercial quality, epoxy resin base paint of a color which contrasts with the valve box cover.

TESTING.--

PRESSURE TESTING.--Pressure testing for leakage shall be performed on all pipelines installed by the Contractor, except for non-rigid pipelines. Pipelines to be tested shall be installed, and all open ends of the pipeline and fittings shall be plugged or capped prior to testing.

Pressure tests shall be performed in one or more operations.

Pipelines installed by trenching and backfilling and pipelines which are completely visible after installation shall be tested by either Method A or Method B as specified below. The method used will be at the Contractor's option. Water line crossovers that are connected to other pipelines to be tested shall be tested in the same manner as the pipelines to which they are connected. Water line crossovers that are not connected to other pipelines shall be tested by Method A as specified below except the testing period and allowable drop in pressure shall be modified from one to 1/2 hour and from 34 kPa to no drop in pressure, respectively. All other pipelines, including those installed in the ground by methods other than trenching and backfilling, shall be tested by Method A as specified below.

Method A pressure testing procedure for leakage shall conform to the following:

The Contractor shall notify the Engineer at least 24 hours prior to performing any pressure test. Pressure tests shall be performed only between the hours of 8:00 a.m. and 5:00 p.m. except that no pressure tests shall be made on Saturdays, Sundays or legal holidays, unless otherwise approved in writing by the Engineer. Each pressure test shall be observed by the Engineer.

Pipelines to be tested shall be filled with water, and a pressure gage shall be connected to the pipeline. The pipeline shall then be placed under a pressure of 862 kPa, except as otherwise specified below, by air or water pressure, after which the source of pressure shall be cut off leaving the line under the required pressure.

The pressure gage shall be calibrated from 0 to 1379 kPa in 20-N increments and shall be accurate within a tolerance of 9 N.

The pipeline shall be tested under the required pressure for a period of one hour. The pressure gage shall remain in place until each test period has been completed. All leaks that develop in the portion of the system installed by the Contractor shall be located and repaired after each test period when a drop of more than 34 kPa is indicated by the pressure gage. After such leaks have been repaired, the one hour pressure test shall be repeated and any necessary additional repairs made until the drop in pressure is 34 kPa or less.

When a system consists of new pipelines installed by the Contractor and existing pipelines, the testing pressure shall be the pressure of the water source to which the system is to be connected, as measured at the point of the connection, in lieu of the 862 kPa specified above. If any such system fails the specified pressure test, the new pipelines shall be isolated from the existing pipelines, at the Contractor's expense, and the new pipelines shall be tested separately at 862 kPa in conformance with these specifications.

Method B pressure testing procedure for leakage shall conform to the following:

The Contractor shall notify the Engineer at least 24 hours prior to performing any pressure test. Pressure tests shall be so performed that the testing periods end between the hours of 8:00 a.m. and 5:00 p.m. except that no pressure test period shall end on Saturdays, Sundays or legal holidays, unless otherwise approved in writing by the Engineer. Each pressure test shall be observed by the Engineer.

Before any portion of the pipeline on the supply side of a control valve is backfilled, water shall be turned into that portion of the line and maintained at full pressure from the water source for a period of not less than 8 consecutive hours after all air has been expelled from the line. Before any portion of the pipeline on the discharge side of a control valve is backfilled, a similar test shall be performed, except the test shall be for a duration of one hour. Any leaks that develop in the portion of the system installed by the Contractor shall be repaired. After such leaks have been repaired, the pressure test shall be repeated and any additional necessary repairs made until no leaks occur as determined by the Engineer.

REPAIRS AND COVERAGE.--All leaks that develop and all defective material in any portion of the irrigation system installed by the Contractor shall be repaired and replaced by him.

The entire system shall be checked and, if necessary, adjusted for uniform and complete coverage after installing the sprinklers. All emitters shall be checked for proper operation and, if necessary, cleaned or replaced.

Any revision of the proposed irrigation system ordered by the Engineer and necessary to achieve complete and adequate coverage of the areas to be watered will be paid for as an ordered change in conformance with the requirements in Section 3, "Changes in the Work," of the General Conditions.

2.17 LANDSCAPING

GENERAL.--This work shall consist of clearing areas to be planted; preparing planting areas and plant holes; and planting and maintaining plants, in conformance with the details shown on the plans and these special provisions.

PRODUCTS.--

Topsoil.--

Topsoil shall consist of material obtained from sources outside the premises in conformance with the provisions in Section 4, "Control of Materials," of the General Conditions.

Topsoil shall consist of fertile, friable soil of loamy character, and shall contain an amount of organic matter normal to the region. It shall be obtained from well-drained arable land and shall be reasonably free from subsoil, refuse, roots, heavy or stiff clay, stones larger than 25 mm in size, coarse sand, noxious seeds, sticks, brush, litter, and other deleterious substances. Topsoil shall be capable of sustaining healthy plant life.

Soil Amendment.--

Soil amendment shall be a wood or bark product, treated to absorb water quickly, or a relatively dry organic compost derived from sewage sludge or rice hulls; shall be friable and pass a 25-mm sieve and shall comply with the requirements of the California Food and Agricultural Code.

Rice hull compost shall not contain living vegetation, dirt or other objectionable material, pathogenic viruses, fly larvae, insecticides, herbicides, fungicides, nor poisonous chemicals that would inhibit plant growth.

All soil amendment shall be packaged so that compliance can be readily determined, or shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

Commercial Fertilizer (Packets).--

Commercial fertilizer shall conform to the requirements of the California Food and Agricultural Code.

Commercial fertilizer shall be in the form (pelleted, granular, or packet) and chemical analysis specified in these special provisions.

Commercial fertilizer (packet) shall be slow or controlled release and shall be in a biodegradable packet form. The packet shall gradually release nutrients over a 12-month period. Each packet shall have a mass of 10 g ± 1 g and shall have the following guaranteed chemical analysis:

Ingredient	Percentage
Nitrogen	20
Phosphoric Acid	10
Water Soluble Potash	5

Plants.--

Plants shall be the variety and size shown on the plans, or specified in these special provisions, and shall conform to the requirements specified in these special provisions.

No plant shall be transported to the planting area that is not thoroughly wet throughout the ball of earth surrounding the roots. Any plant that, in the opinion of the Engineer, has a damaged root ball or is dry or in a wilted condition when delivered to the planting area will not be accepted, and shall be replaced by the Contractor at his expense.

Each plant shall be handled and packed in the approved manner for that species or variety, and all necessary precautions shall be taken to insure that the plants will arrive at the site of the work in proper condition for successful growth. Trucks used for transporting plants shall be equipped with covers to protect plants from windburn.

All plants furnished by the Contractor shall be true to type or name as shown on the plans and shall be tagged identifying the plants by species or variety; however, determination of plant species or variety will be made by the Engineer and his decision shall be final. Plants shall be individually tagged or tagged in groups by species or variety.

All plants shall comply with Federal and State laws requiring inspection for plant diseases and infestations. Inspection certificates required by law shall accompany each shipment of plants, and certificates shall be delivered to the Engineer.

The Contractor shall obtain clearance from the County Agricultural Commissioner, as required by law, before planting plants delivered from outside the County in which they are to be planted. Evidence that the clearance has been obtained shall be filed with the Engineer.

Plants furnished by the Contractor shall be healthy, shapely, and well rooted, and roots shall show no evidence of having been restricted or deformed at any time. Plants shall be well-grown, free from insect pests and disease, and shall be grown in nurseries which have been inspected by the State Department of Food and Agriculture and have complied with the regulations thereof.

Root condition of plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than 2 plants nor more than 2 percent of the total number of plants of each species or variety, except when container grown plants are from several sources, the root of not less than 2 plants of each species or variety from each source will be inspected by the Engineer. In case the sample plants inspected are found to be defective, the State reserves the right to reject the entire lot or lots of plants represented by the defective samples. Any plants rendered unsuitable for planting because of this inspection will be considered as samples and will not be paid for.

The Contractor shall notify the Engineer when plants are to be shipped to the project site. Notification shall be given not less than 10 days prior to the actual shipment date.

EXECUTION.--

PREPARING PLANTING AREAS.--Preparing planting areas shall consist of clearing trash, debris and weeds; preparing plant holes and plant trenches; cultivating; constructing basins, and doing any other work necessary to prepare areas for planting as shown on the plans and specified in these special provisions.

Unless otherwise specified, a planting or planted area shall be any area in which the Contractor is required to do planting work.

At the time of planting, each area to be planted shall be free of trash, debris and living weeds.

Trash, debris and weeds shall be disposed of off the premises.

The Engineer will designate the ground location of all plants by directing the placing of the plants or by directing the placing of stakes or other suitable markers. The Contractor shall furnish all labor and materials required to adequately indicate the various plant locations.

Rocks and other debris encountered during subsurface soil preparation shall be brought to the surface of the ground at the Contractor's expense. Removing and disposing of the rocks and debris will be paid for as an ordered change in conformance with the requirements in Section 3, "Changes in the Work," of the General Conditions. The size of rocks and the quantity of rocks and debris to be disposed of will be determined by the Engineer.

Existing pavement shown on the plans where planting holes or trenches are to be excavated, or where cultivation is to be done, shall be removed and, unless otherwise directed by the Engineer, disposed of away from the premises. Disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site.

At locations shown on the plans, longitudinal basins shall be formed by constructing a continuous dike on each side of the planting line. Cross checks shall be formed to pond irrigation water around each plant.

PLANT ESTABLISHMENT WORK.--

GENERAL.--This work shall consist of maintaining and caring for the plantings, including adequately watering plants; replacing unsuitable plants; performing weed control work, pest control work and any other necessary type of control work; and performing other work as determined necessary by the Engineer, every calendar day during the plant establishment period as specified in these special provisions.

The plant establishment period shall be the time between completion of all work (except plant establishment work) and acceptance of the contract, provided however, that the contract will not be accepted unless the plant establishment work has been satisfactory performed for at least 90 working days.

The time required for plant establishment work shall be considered as included in the total time specified for the contract.

The Engineer will notify the Contractor in writing of the start of the plant establishment period and will furnish statements regarding days to be credited to the plant establishment work after the notification.

Working days upon which no work will be required, as determined by the Engineer, will be credited as one of the plant establishment working days, regardless of whether or not the Contractor performs plant establishment work.

Working days when the Contractor fails to adequately perform plant establishment including but not limited to watering plants, replacing unsuitable plants, repairing erosion damage, and doing weed, rodent and other pest control, determined to be necessary by the Engineer, will not be credited as plant establishment working days.

In order to carry out the plant establishment work, the Contractor shall furnish sufficient personnel and adequate equipment to perform the work during the plant establishment period.

2.18 GUARD POSTS

PART 1.- GENERAL

Scope.--This work shall consist of constructing guard posts in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS

Steel posts.--

Steel posts for guard posts shall be standard weight, galvanized steel pipe conforming to the details shown on the plans.

Concrete.--

Concrete for guard posts shall be commercial quality concrete, proportioned to provide a workable mix suitable for the intended use, with not less than 300 kilograms of cement per cubic meter.

PART 3.- EXECUTION

Installation.--The length and diameter of the guard posts shall conform to the details shown on the plans.

Guard posts shall be placed in holes excavated to the depth and cross section shown on the plans, and shall be installed plumb.

Guard posts shall be backfilled with concrete as shown on the plans.

Painting.--Guard posts shall be prepared and painted in accordance with the requirements specified under "Painting" in Division 9, "Finishes," of these special provisions.

2.19 PARKING BUMPERS

PART 1.- GENERAL

Scope.--This work shall consist of furnishing and installing precast concrete parking bumpers in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS

Parking bumpers.--

Parking bumpers shall be commercially available precast parking bumpers.

Parking bumpers shall be 1220 mm long, nominal 200 mm wide and 150 mm high with both top longitudinal corners continuously chamfered, and anchor holes 230 mm from each end.

PART 3.- EXECUTION

Layout.--Arrangement of parking bumpers shall be coordinated with the layout of parking stalls and traffic aisles, providing the proper angle to engage wheels and proper location to prevent overtravel of vehicles.

Parking bumpers shall be anchored with two 19 mm diameter reinforcing bars 380 mm in length. The reinforcing bars shall be installed such that the top of the bars is flush with the top of the parking bumper.

2.20 ACCESSIBLE PARKING AND AUTHORIZATION SIGNS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing accessible parking and authorization signs in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and sign fastening details shall be submitted for approval.

PART 2.- PRODUCTS

Disabled parking stall identification sign.--

Disabled parking stall identification sign shall be a metal sign with baked enamel finish and the international symbol of accessibility. Sign background shall be blue and shall conform to Federal Standard 595B, Color No. 15090. Symbol, lettering and border shall be white and shall conform to Federal Standard 595B, Color No. 17886.

Van accessible sign.--

Van accessible sign shall be a metal sign with baked enamel finish and the international symbol of accessibility. Sign background shall be blue and shall conform to Federal Standard 595B, Color No. 15090. Lettering and border shall be white and shall conform to Federal Standard 595B, Color No. 17886.

Unauthorized vehicles parking sign.--

Unauthorized vehicles parking sign shall be a metal sign with baked enamel finish. Sign background shall be blue and shall conform to Federal Standard 595B, Color No. 15090. Lettering and border shall be white and shall conform to Federal Standard 595B, Color No. 17886. Lettering shall be not less than 25 mm in height and shall read as shown on the plans.

Support post.--

Support post shall be commercial quality, standard weight, galvanized steel pipe. Pipe diameter shall be 35 mm.

Fastening hardware.--

Fastening hardware shall be galvanized or cadmium plated.

Concrete.--

Concrete for support posts shall be commercial quality concrete, proportioned to provide a workable mix suitable for the intended use, with not less than 300 kilograms of cement per cubic meter.

PART 3.- EXECUTION

Installation.--Support posts shall be placed in holes excavated to the depth and cross-section shown on the plans. Posts shall be set vertical and shall be firmly embedded in concrete backfill. The top of the concrete backfill around the post shall be crowned to drain water.

Support posts shall be fitted with a rainproof top.

Sign shall be fastened rigidly and securely to the support post.

The Engineer will provide the Contractor with the necessary information for the disabled authorization sign.

DIVISION 3. CONCRETE AND REINFORCEMENT**3.01 CAST-IN-PLACE CONCRETE****PART 1.- GENERAL****SUMMARY.--**

Scope.--This work shall consist of constructing cast-in-place concrete facilities in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data for admixtures, expansion joint material, vapor barrier, hardener, and sealer shall be submitted for approval.

Descriptive data shall be delivered to the Engineer at the jobsite.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of Compliance shall be furnished for cement, reinforcement, and admixtures in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

A Certificate of Compliance shall be furnished for each shipment of epoxy-coated reinforcing bars certifying that the coated bars conform to the requirements of ASTM Designation: D 3963. Said Certificate of Compliance shall include all certifications specified in ASTM Designation: D 3963 and a statement that the coating material has been prequalified by acceptance testing performed by the National Bureau of Standards or by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

Samples.--Prior to coating, the Contractor shall furnish to the Engineer a representative 0.11 kg sample from each batch of epoxy coating material used. The sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.

After coating, two 800 mm long samples of epoxy-coated reinforcing steel from each size and from each load shipped to the jobsite shall be submitted to the Engineer. The samples shall be representative of the material furnished. The samples, as well as any additional random samples taken by the Engineer, may be tested for specification compliance. Such additional sampling, and all tests performed by the Engineer, may be performed at any location deemed appropriate by the Engineer. Failure of any sample to meet the requirements of the specification will be cause for rejection of all reinforcing bars represented by the sample.

PART 2.- PRODUCTS

CONCRETE MIXES.--

Concrete (structural work).--

Commercial quality concrete shall be proportioned to provide a workable mix suitable for the intended use; shall have not less than 350 kg/m³ of cement; 0 to 50 mm penetration, inclusive, as determined by California Test 533.

The air content of the freshly mixed concrete shall be $6 \pm 1 \frac{1}{2}$ percent, as determined by California Test 504.

Concrete (minor work).--

Commercial quality concrete for sidewalks, RV sanitary station pad, thrust blocks and collars shall be proportioned to provide a workable mix suitable for the intended use; shall have not less than 300 kg/m³ of cement; 0 to 50 mm penetration, inclusive, as determined by California Test 533.

The air content of the freshly mixed concrete shall be $6 \pm 1 \frac{1}{2}$ percent, as determined by California Test 504.

Concrete (washrack and mudrinse slabs).--

Commercial quality concrete for vehicle washracks and mudrinse slabs, shall be proportioned to provide a workable mix suitable for the intended use; shall have not less than 400 kg/m³ total of a mixture of Type II cement and 15 percent by weight of a mineral admixture or Type IP (MS) Modified cement; 0 to 50 mm penetration, inclusive, as determined by California Test 533.

The air content of the freshly mixed concrete shall be $6 \pm 1 \frac{1}{2}$ percent, as determined by California Test 504.

CONCRETE MATERIALS.--

Cement.--

Cement shall conform to ASTM Designation: C 150, Types II, or III portland cement; or Type IP (MS) Modified cement. Type IP (MS) Modified shall conform to ASTM Designation: C 595 and shall be comprised of an intimate mixture of Type II Modified cement and not more than 20 percent of a pozzolanic material.

Aggregates.--

Aggregates shall be free from deleterious coatings, clay balls and other extraneous materials.

Aggregates proposed for use shall conform to the requirements for freezing and thawing shall as determined by California Test 528.

A list of sources of aggregates which have previously passed the freeze-thaw test is available in the District Office at 1657 Riverside Drive, Redding, CA 96001.

Admixtures.--

Admixtures used in portland cement concrete shall be included on the Department's current list of approved admixtures, and shall conform to ASTM Designation: C 494, Types A, B, D, F or G for chemical admixtures;

ASTM Designation: C 260 for air-entraining admixtures; and ASTM Designation: C 618 for mineral admixtures, except loss on ignition shall not exceed 4 percent. Properties of admixtures shall be uniform in each lot.

FORM MATERIALS.--

Forms for exposed finish concrete.--

Forms for exposed surfaces shall be plywood, metal or other panel type materials. Plywood shall be not less than 16 mm thick and without scars, dents, and delaminations. Forms shall be furnished in largest practical pieces to minimize number of joints.

Plywood shall conform to the requirements of U. S. Product Standard PS-1 for Exterior B-B (Concrete Form) Class I.

Forms for edges of slabs shall be nominal 50 mm solid stock lumber, plywood, or metal forms.

Forms for unexposed finish concrete.--

Forms for unexposed finish concrete surfaces shall be plywood, lumber, metal or other acceptable material.

Forms for cylindrical supports.--

Forms for cylindrical supports shall be metal, fiberglass reinforced plastic, paper or fiber tubes. Paper or fiber tubes shall be constructed of laminated plies using water-resistant adhesive with wax-impregnated exterior for protection against weather or moisture.

Form ties.--

Form ties shall be factory fabricated, removable or snapoff metal ties for use as necessary to prevent spreading of forms during concrete placement.

Form oil.--

Form oil shall be commercial quality form oil which will permit the ready release of the forms and will not discolor the concrete.

REINFORCING MATERIALS.--

Epoxy coated reinforcement.--

The reinforcing steel to be coated shall conform to ASTM Designation: A 615/A 615M, Grade 60 [420], or A 706/A 706M. Epoxy-coated reinforcement shall conform to ASTM Designation: D 775, except that the thickness of the coating shall be 0.2 mm plus or minus 0.05 mm. The coating shall have a light pastel color.

Bar supports.--

Bar supports for reinforcement shall be precast mortar blocks or ferrous metal chairs, spacers, metal hangers, supporting wires, and other approved devices of sufficient strength to resist crushing under applied loads.

RELATED MATERIALS.--

Anchor bolts, nuts, and washers.--

Nonheaded anchor bolts shall conform to ASTM Designation: A 36/A 36M, with a minimum hook length of 6.2 diameters.

Headed anchor bolts shall conform to ASTM Designation: F 1554, Grade 55, or A 449.

Threaded rods shall conform to ASTM Designation: A 572.

Nuts shall conform to ASTM Designation: A 563M, Grade A.

Washers for anchor bolts shall be commercial quality.

Exposed anchor bolts, nuts, and washers shall be hot dipped galvanized.

Expansion joint material.--

Expansion joint material shall be commercial quality asphalt impregnated pressed fiber sheets, 13 mm minimum thickness.

Vapor barrier.--

Vapor barrier shall be commercial quality polyethylene sheets not less than 0.15 mm thick.

Type A control joints.--

Type A control joints shall be commercial quality, preformed, T-shaped plastic strips with detachable top flange.

Keyed construction joint forms.--

Keyed construction joint forms shall be commercial quality, galvanized metal or plastic, factory fabricated construction joint forms. Forms shall produce a rabbeted key type joint.

Mortar.--

Mortar shall consist of one part cement to 2 parts clean sand and only enough water to permit placing and packing.

Curing compound.--

Curing compound shall be a non-pigmented curing compound with fugitive dye conforming to the requirements of ASTM Designation: C 309, Type 1-D, Class A.

Concrete hardener.--

Concrete hardener shall be commercial quality water borne penetrating type magnesium fluosilicate, zinc fluosilicate or combination thereof.

Concrete sealer (except for Sand and Salt Storage Buildings, and Material Storage Bin).--

Concrete sealer shall be commercial quality VOC-compliant, silane type sealer with hydrophobic and oleophobic properties. Concrete sealer shall be ProSoCo, Inc., Standoff Tile and Masonry Protector (TMP); Tamms Industries, Hey'Di H.O.S.; Textured Coatings of America, Inc., Rainstopper 1750W-Clear; or equal.

Concrete sealer (for Sand and Salt Storage Buildings, and Material Storage Bin).--

Concrete sealer shall be as specified under "Water Repellent Sealant" as specified in Division 7, "Thermal and Moisture Protection," of these special provisions.

ADMIXTURES.--

General.--Admixtures shall be used when specified or ordered by the Engineer and may be used at the Contractor's option to conserve cement or to facilitate any construction operation.

Calcium chloride shall not be used in any concrete.

Admixtures shall be combined with concrete materials by methods that produce uniform properties throughout the concrete.

If more than one admixture is used, said admixtures shall be compatible with each other so that the desirable effects of all admixtures will be realized.

Mineral admixtures may be used to replace up to 15 percent of Type II portland cement provided the weight of mineral admixture used is not less than the weight of cement replaced. Mineral admixtures shall not be used to replace Type IP (MS) Modified or Type III cements. Chemical admixtures may be used to reduce up to 5 percent of the portland cement except that the cement content shall not be less than 300 kg/m³. When both chemical and mineral admixtures are used with Type II cement, the weight of cement replaced by mineral admixture may be considered as cement in determining the resulting cement content.

Mineral admixtures will be required in the manufacture of concrete containing aggregates that are determined to be "deleterious" or "potentially deleterious" when tested in accordance with ASTM Designation: C 289. The use of mineral admixture in such concrete shall conform to the requirements in this section except that the use of set retarding admixtures will not be permitted.

When the use of a chemical admixture is specified or is ordered by the Engineer, the admixture shall be used at the rate specified or ordered. If no rate is specified or ordered, or if the Contractor uses a chemical admixture for his own convenience, the admixture shall be used at the dosage normally recommended by the admixture manufacturer.

When air-entrainment is specified or is ordered by the Engineer, the air-entraining admixture shall be used in amounts to produce concrete having the specified or ordered air content as determined by California Test 504. If the Contractor uses air-entrainment for his own convenience, the average air content shall not exceed 4 percent and no single test shall exceed 5 1/2 percent.

Chemical admixtures and air-entraining admixtures shall be dispensed in liquid form. Dispensers shall have sufficient capacity to measure at one time the total quantity required for each batch. If more than one liquid admixture is used in the concrete, a separate measuring unit shall be provided for each liquid admixture and dispensing shall be such that the admixtures are not mixed at high concentrations. When air-entraining admixtures are used with other liquid admixtures, the air-entraining admixtures shall be the first to be incorporated into the mix. Unless liquid admixtures are added to premeasured water for the batch, they shall be discharged to flow into the stream of water so that the admixtures are well dispersed throughout the batch.

BAR REINFORCING STEEL--

Bending.--Reinforcing steel bars shall accurately conform to the dimensions shown on the plans.

Bars shall be bent or straightened in a manner that will not crack or break the material. Bars with kinks or improper bends shall not be used.

Hooks, bends and splices shall conform to the provisions of the Building Code Requirements for Reinforced Concrete of the American Concrete Institute.

Epoxy-coated Reinforcing Steel.--In fabricating, handling, shipping, and placing of epoxy-coated reinforcing bars, adequate care shall be taken to avoid damage to the coating. Handling and shipping equipment shall have padded contact areas. All bundling bands shall be padded or suitable banding shall be used to prevent damage to the coating. All bundles of coated bars shall be lifted with a strongback or multiple support system to prevent bar-to-bar abrasion from sags in the bundles. Bars or bundles shall not be dropped or dragged.

All damage to the coating caused by handling and fabrication prior to shipment to the jobsite shall be repaired as required by ASTM Designation: D 775. Damage to the coating occurring during shipment or installation, or both, need not be repaired where the damaged areas are 6 mm by 6 mm or smaller and the sum of all damaged areas in each 300 mm length of bar does not exceed 2 percent of the bar surface area. All bars with total damage greater than 2 percent of the bar surface area will be rejected and shall be removed. On bars with a total damaged coating area not exceeding 2 percent of the bar surface area, all damaged areas larger than 6 mm square and all damage in sections of bar with more than 2 percent coating damage in a 300 mm length shall be repaired with patching material. The bar surface area covered by patching material shall not exceed 5 percent of the total surface area of the bar.

Patching material shall be compatible with the coating material, not harmfully reactive with the concrete, and shall be feasible for repairs by the coating applicator or bar fabricator or in the field. The patching material shall be prequalified as required for the coating material and shall be either identified on the container as meeting the requirements of Annex A1 of ASTM Designation: D 775 or shall be accompanied by a Certificate of Compliance certifying that the material meets the requirements of said Annex A1. Patching of damaged areas shall be performed in accordance with the patching material manufacturer's recommendations.

MIXING AND TRANSPORTING CONCRETE.--

General.--When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be complete within 1 1/2 hours, or before 250 revolutions of the drum or blades, whichever comes first, after the introduction of cement to the aggregates.

Truck mixers or agitator shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified. The counters shall be of the continuous-registering type, which accurately register the number of revolutions and shall be mounted on the truck so that the Engineer may safely and conveniently inspect them from alongside the truck. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, a time less than 1 1/2 hours may be required.

When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be complete within one hour after the introduction of cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C, or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

Each load of concrete for the work shall be accompanied by a trip ticket, a copy of which shall be delivered to the Engineer at the jobsite. The trip ticket shall show volume of concrete, weight of cement and aggregates, quantity of each admixture, quantity of water including water added at the jobsite, time of day the concrete is batched, and revolution counter readings on transit mix trucks at the times the truck is charged and unloaded.

PART 3.- EXECUTION

PREPARATION.--

Existing concrete construction.--Where fresh concrete joins existing or previously placed concrete or masonry, the contact surfaces of the existing or previously placed material shall be roughened, cleaned, flushed with water and allowed to dry to a surface dry condition immediately prior to placing the fresh concrete. The roughened surface shall be no smoother than a wood trowelled surface. Cleaning of the contact surfaces shall remove laitance, curing compounds, debris, dirt and such other substances or materials which would prevent bonding of the fresh concrete.

Abrasive blast methods shall be used to clean horizontal construction joints to the extent that clean aggregate is exposed.

Exposed reinforcing steel located at the contact surfaces which is to be encased in the fresh concrete shall be cleaned to remove any substance or material that would prevent bonding of the fresh concrete.

Forms.--Forms shall be mortar tight, true to the dimensions, lines, and grades shown on the plans, securely fastened and supported, and of adequate rigidity to prevent distortion during placing of concrete.

Forms for exposed surfaces shall be constructed with triangular fillets not less than 19 mm x 19 mm attached so as to prevent mortar runs and to produce smooth straight chamfers at all sharp edges of the concrete.

Form fasteners shall be removable without chipping, spalling, heating or otherwise damaging the concrete surface. Form ties shall be removed to a depth of at least 25 mm below the surface of the concrete.

The inside surfaces of forms shall be cleaned of all dirt, mortar and foreign material. Forms shall be thoroughly coated with form oil prior to use.

Forms shall not be stripped until at least 40 hours after placing concrete, except soffit forms and supports shall not be released or removed until at least 10 days after placing concrete.

Anchorage and embedded items shall be placed and rigidly secured at their planned locations prior to placing concrete.

Vapor barrier.--Vapor barrier shall be lapped 150 mm and securely taped at splices. Vapor barrier shall be protected with a 75 mm layer of clean uncompacted sand cover.

Unless otherwise shown on the plans, vapor barrier shall be placed under portions of the floor slab scheduled to receive finish flooring.

Placing reinforcing steel.--Reinforcing steel bars shall be accurately placed to the dimensions shown on the plans.

Bar reinforcement conforming to ASTM Designation: A 615/A 615M, Grade 60 [420], or A 706//A 706M shall be lapped at least 45 diameters.

Bars shall be firmly and securely held in position by means of wiring and approved bar supports. The spacing of supports and ties shall prevent displacement of the reinforcing or crushing of supports.

Tie wire shall be clear of concrete formwork and concrete surfaces.

All reinforcing steel shall be in place and inspected before concrete placement begins. Placing of bars on fresh layers of concrete will not be permitted.

Within areas where epoxy-coated reinforcement is required, tie wire and bar chairs or other metallic devices used to secure or support the reinforcement shall be plastic-coated or epoxy-coated to prevent corrosion of the devices or damage to the coated reinforcement.

Ground bar.--A continuous reinforcing steel bar shall be installed in the building foundation at the location indicated on the plans for the electrical ground bar. The use of epoxy coated reinforcing bar is not permitted. The end of the ground bar shall extend beyond the concrete surface and shall be protected from damage by construction operations.

Hydronic tubing.--Hydronic tubing shall be securely fastened to the bar reinforcing using nylon ties.

The hydronic heating system shall be fully tested prior to placing concrete.

PLACING CONCRETE.--

General.--Concrete shall be placed and consolidated by means of internal vibrators to form dense, homogeneous concrete free of voids and rock pockets.

Forms and subgrade shall be thoroughly moistened with water immediately before placing concrete.

Concrete shall be placed as nearly as possible to its final location and the use of vibrators for extensive shifting of the concrete will not be permitted.

Concrete shall be deposited and consolidated in a continuous operation within limits of construction joints, until the placing of the panel or section is completed.

When concrete is to be placed in large areas requiring more than two pours, concrete shall be placed in alternate long strips between construction joints and the final slab infilled.

Vibrators used to consolidate concrete containing epoxy-coated bar reinforcement shall have a resilient covering to prevent damage to such reinforcement.

FINISHING CONCRETE SURFACES.--

Finishing unformed surfaces.--Slabs shall be placed full thickness to finish elevation and leveled to screeds by use of long straightedges. The screeds shall be set to grade at approximately 1.8 meter centers. After leveling, screeds shall be removed and the surface shall be floated with wooden floats.

Type A control joint strips shall be inserted into the floated concrete so that the bottom of the top flange is flush with the finish elevation. Strips shall be standard manufactured lengths and shall be placed on an approximate straight line. The top flange of the strips shall be removed after the concrete has set and cured.

The floated surface shall be trowelled with steel trowels. Troweling shall form a dense, smooth and true finish. Walkways, pedestrian ramps, stairs and outdoor slabs for pedestrian traffic shall be given a non-slip broom finish unless a different finish is called for on the plans or in these special provisions.

The application of cement dust coat will not be permitted.

Concrete floor surfaces to receive ceramic tile shall be floated to grade and then, before final set of the concrete, the floated surfaces shall be roughened with stiff bristled brushes or rakes.

Finished surfaces of floor slabs shall not deviate more than 3 mm from the lower edge of a 3-meter long straight edge.

Finishing formed surfaces.--Formed concrete surfaces shall be finished by filling holes or depressions in the surface, repairing all rock pockets, and removing fins. All surfaces of formed concrete exposed to view shall have stains and discolorations removed, unsightly bulges removed, and all areas which do not exhibit the required smooth, even surface of uniform texture and appearance shall be sanded with power sanders or other approved abrasive means until smooth, even surfaces of uniform texture and appearance are obtained.

Cement mortar, patching and finishing materials used to finish exposed surfaces of concrete shall closely match the color of surrounding surfaces.

CURING CONCRETE.--

General.--Freshly placed concrete shall be protected from premature drying and excessive cold or hot temperatures.

Initial curing of floor slabs shall start as soon as free water has disappeared from the concrete surface. The concrete shall be kept continuously wet by application of water for not less than 7 days after the concrete has been placed.

Cotton mats, rugs, carpets, or sand blankets may be used as a curing medium to retain the moisture during the curing period. Curing materials that will stain or discolor concrete shall not be used on surfaces exposed to view.

Prior to placing the curing medium, the entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. At the expiration of the curing period, the concrete surfaces shall be cleared of all curing mediums.

Concrete surfaces, other than floor slabs, shall be kept moist for a period of at least 5 days by leaving the forms in place or by covering the exposed surfaces using moist rugs, cotton mats or other curing materials approved by the Engineer.

Concrete sidewalks, pads, and collars, and gutter depressions may be cured with a curing compound.

PROTECTING CONCRETE.--

General.--Concrete shall not be placed on frozen or frost covered surfaces.

Concrete shall be protected from damage due to rain, freezing or inclement weather, and shall be maintained at a temperature of not less than 4°C for 72 hours. When required by the Engineer, the Contractor shall provide a written outline of his proposed methods of protecting concrete.

Vehicles, equipment, or concentrated loads weighing more than 140 kg individually and material stockpiles weighing more than 240 kg/m² will not be permitted on the concrete within 10 calendar days after placing.

SPECIAL TREATMENTS.--

Concrete hardener.--Chemical concrete hardener shall be applied to the floor surfaces shown on the plans, prior to the application of concrete sealer. Surfaces shall be clean and dry before the application of hardener.

The solution shall be applied in accordance with the manufacturer's instructions.

After the hardener has dried, the surface shall be mopped with water to remove encrusted salts.

Concrete sealer.--Concrete sealer, except for Sand and Salt Storage Buildings, and Material Storage Bin, shall be applied to the concrete surfaces designated on the plans in accordance with the manufacturer's instructions for heavy duty use. The sealer shall be applied to dry concrete surfaces.

Concrete sealer for Sand and Salt Storage Buildings, and Material Storage Bin shall be applied as specified under "Water Repellent Sealant" as specified in Division 7, "Thermal and Moisture Protection," of these special provisions.

3.02 DRILL AND BOND DOWELS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of drilling holes in existing concrete and installing and bonding bar reinforcing steel dowels into such drilled holes in existing concrete in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS

Bonding material.--

The bonding material shall be magnesium phosphate concrete, either single component (water activated) or dual component (with a prepackaged liquid activator), as approved by the Engineer.

Dowels.--

Dowels shall be bar reinforcing steel, as specified under "Cast-In-Place Concrete" in Division 3, "Concrete and Reinforcement," of these special provisions.

PART 3.- EXECUTION

INSTALLATION.--The holes shall be drilled by methods that will not shatter or damage the concrete adjacent to the holes. The diameter of drilled holes shall be 13 mm larger than the nominal diameter of the dowels unless otherwise shown on the plans.

Immediately prior to placing the dowels, the holes shall be cleaned of dust and other deleterious materials, and the holes shall be dry.

Sufficient bonding material shall be placed in the hole so that no voids remain after the dowels are inserted.

Dowels which fail to bond or are damaged before new concrete is placed shall be removed and replaced.

Magnesium phosphate concrete shall be formulated for minimum initial set time of 15 minutes and minimum final set time of 25 minutes at 21°C. The materials, prior to use, shall be stored in a cool, dry environment.

Mix water used with water activated material shall be free from oil and impurities and contain not more than 2000 parts per million as Cl nor more than 1500 parts per million of sulfate as SO₄.

The quantity of water for single component type or liquid activator for dual component type to be blended with the dry component, shall be within the limits recommended by the manufacturer and shall be the least amount required to produce a pourable batter.

Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum, or copper metals.

The surface of any dowel coated with zinc or cadmium shall be coated with a colored lacquer before installation of the dowel. The lacquer shall be allowed to dry thoroughly before embedment of said dowels.

DIVISION 4. MASONRY

4.01 CONCRETE MASONRY UNITS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of constructing reinforced hollow concrete masonry units in accordance with the details shown on the plans and these special provisions.

Related work.--Water repellent coating shall be applied in accordance with the requirements specified under "Water Repellent Coating" in Division 7, "Thermal and Moisture Protection," of these special provisions.

PERFORMANCE REQUIREMENTS.--

Unit Strength.--Provide masonry units that develop the following installed compressive strengths (f'm) at 28 days:

Based on net area f'm = 10.34 MPa

SUBMITTALS.--

Product data.--Manufacturer's descriptive data for each type of masonry unit, accessory, and other manufactured products shall be submitted for approval.

Samples.--Two samples of masonry units of each color and architectural finish shall be submitted for approval.

QUALITY ASSURANCE.--

Masonry preconstruction testing service.--Required when special inspection is noted in the reinforced masonry Design Notes on the plans.

The Contractor shall employ and pay all costs for the services of a testing laboratory acceptable to the Engineer and experienced in performing preconstruction masonry tests. The testing laboratory shall comply with the requirements of ASTM Designation: E 329.

Preconstruction tests shall be performed on the following materials by the Unit Strength Method as defined by Section 2105, "Quality Assurance," of the Uniform Building Code:

Concrete masonry units shall be tested in accordance with ASTM Designation: C 140.

Grout shall be tested in accordance with ASTM Designation: C 1019.

In addition:

Mortar shall be tested in accordance with Uniform Building Code Standard: 21-16.

Test results shall be reported in writing to the Engineer and the Contractor on the same day the tests are made.

Single source responsibility.--Exposed masonry units of uniform color and texture shall be obtained from one manufacturer for each different product required for each continuous surface or visually related surfaces.

Mortar ingredients of uniform quality, including color for exposed masonry, shall be obtained from one manufacturer for each cementitious component and from one source and producer for each aggregate.

Certificates of Compliance.--Certificate of Compliance shall be furnished for masonry units, aggregate for grout and transit mixed grout in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

DELIVERY, HANDLING AND STORAGE.--

Delivery.--Masonry materials shall be delivered to the project in an undamaged condition.

Storage and handling.--Masonry units shall be stored and handled in order to prevent deterioration or damage due to moisture, temperature changes, contamination, corrosion or other causes.

PART 2.- PRODUCTS

CONCRETE MASONRY UNITS.--

Concrete masonry units.--

Concrete masonry units shall be nominal size, color and architectural finish as shown on plans; hollow load bearing, light weight or medium weight, Grade N, Type II, conforming to ASTM Designation: C 90; standard or open ended masonry units.

Special shapes shall be provided where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

MORTAR AND GROUT MATERIALS.--

Cement.--

Cement for mortar shall be Type II, low alkali portland cement conforming to ASTM Designation: C 150; or masonry cement conforming to ASTM Designation: C 91.

Cement for grout shall be Type II portland cement conforming to ASTM Designation: C 150 with maximum 15 percent Class N, F, or C mineral admixture conforming to ASTM Designation: C 618 except that the loss on ignition shall not exceed 4 percent; or Type IP(MS) blended hydraulic cement conforming to ASTM Designation: C 595.

Aggregate.--

Aggregate for mortar shall conform to ASTM Designation: C 144, except not more than 10 percent shall pass the No. 100 sieve.

Aggregate for grout shall conform to ASTM Designation: C 404, except 100 percent of the coarse aggregate shall pass the 9.5 mm sieve. Soundness loss shall not exceed 10 percent as determined by California Test 214.

Coloring for mortar.--

Coloring for mortar shall be chemically inert, fade resistant mineral oxide or synthetic type.

Lime.--

Lime shall conform to ASTM Designation: C 207, Type S.

Premixed mortar or grout.--

A premixed packaged blend of cement, lime, and sand, with or without color, that requires only water to prepare for use as masonry mortar or grout may be furnished. Packages of premix shall bear the manufacturer's name, brand, contents, weight, and color identification.

Transit mixed grout.--

Transit mixed grout shall conform to ASTM Designation: C 94, except aggregate shall be as specified herein for aggregate for grout. The minimum compressive strength shall be 17236 kPa at 28 days when tested in accordance with ASTM Designation: C 39. Admixtures, if used, shall conform to ASTM Designation: C 494, Types A, E or F and shall not contain chlorides.

REINFORCEMENT, TIES AND ANCHORING DEVICES.--

Bar reinforcement.--

Bar reinforcement shall conform to ASTM Designation: A 615/A 615 M, Grade 60 [420], or ASTM Designation: A 706/A 706 M.

Anchor bolts.--

Anchor bolts shall conform to ASTM Designation: A 36/A 6M with a minimum hook length of 6.2 diameters, and shall be 12 mm diameter unless otherwise shown on the plans.

Anchors, ties, angles, and metal lath.--

Anchors, ties, angles, and metal lath shall be commercial quality, and shall be galvanized.

Dry pack.--

Dry pack to set items into masonry shall be one part portland cement to not over 3 parts of clean sand and with a minimum amount of water for hydration and packing.

PROPORTIONING MORTAR AND GROUT.--

General.--Mortar shall be proportioned by loose volume and shall have one part cement, one quarter part of hydrated lime and 2 1/4 to 3 parts aggregate. Mortar shall be tinted with coloring to match the masonry units.

Grout, except transit mixed and packaged premix grout, shall be proportioned by loose volume and shall have one part cement, not more than 1/10 part hydrated lime, 2 1/4 to 3 parts sand aggregate, and not more than 2 parts gravel aggregate.

Aggregate shall be measured in a damp loose condition.

Grout shall be mixed with sufficient water to produce a mix consistency suitable for pumping without segregation. Slump shall not exceed 229 mm.

PART 3.- EXECUTION

CONSTRUCTION.--

General.--Masonry units shall be laid in running bond, except as otherwise shown on the plans.

Surfaces of metal, glass, wood, completed masonry, and other such materials exposed to view shall be protected from spillage, splatters and other deposits of cementitious materials from masonry construction. All such deposits shall be removed without damage to the materials or exposed surfaces.

Construction will comply with Section 2104 Construction of the 1998 California Building Code. Tolerances specified in Section 2104 shall be in affect unless otherwise shown on the plans.

Where fresh masonry joins concrete or masonry, the contact surfaces of existing material shall be roughened, cleaned and lightly wetted. The roughened surface shall be no smoother than a wood troweled surface. Cleaning shall remove laitance, curing compounds, debris, dirt and any substance which decreases bond to the fresh masonry.

Masonry shall not be erected when the ambient air temperature is below 5° C.

Surfaces of masonry erected when the ambient air temperature exceeds 38° C. shall be kept moist with water for a period of not less than 24 hours. Water shall be uniformly applied with a fog spray at the intervals required to keep the surfaces moist but not to exceed 3 hours unless otherwise approved by the Engineer.

All anchors, bolts, dowels, reglets and other miscellaneous items to be cast into the wall, shall be firmly secured in place before grout is poured.

Shoring for concrete masonry lintels shall remain in place a minimum of 15 days after the wall has been completed.

Laying masonry units.--Concrete masonry units shall be laid dry.

During laying of units all cells shall be kept dry in inclement weather by suitably covering incomplete walls. Wooden boards and planks shall not be used as covering materials. The covering shall extend down each side of masonry walls approximately 600 mm.

Chases shall be kept free from debris and mortar.

Bond beam units with an opening at each cross web shall be used at all horizontal reinforcing bars.

Where masonry unit cutting is necessary, all cuts shall be made with a masonry saw to neat and true lines. Blocks with excessive cracking or chipping of the finished surfaces exposed to view will not be acceptable.

Lintels.--Masonry lintels shall be as shown on the plans. Lintels shall be formed using U-shaped lintel units with reinforcing bars placed as shown on the plans. Formed-in-place lintels shall be temporarily supported.

Bar reinforcement.--Bar reinforcement shall be accurately positioned in the center of the cell and securely held in position with either wire ties or spacing devices near the ends of bars and at intervals not exceeding 192 bar diameters. Wire shall be 16-gage or heavier. Wooden, aluminum, or plastic spacing devices shall not be used. Tolerances for the placement of vertical reinforcement in walls and flexural elements shall be ± 12 mm. Tolerance for longitudinal reinforcement in walls shall be ± 50 mm.

The minimum spacing for splices in vertical reinforcement for masonry walls shall be 1220 mm plus lap.

Bar reinforcement shall not be placed in the plane of mortar joints.

Mortar.--Mortar joints shall be approximately 9.5 mm wide. Units shall be laid with all head and bed joints filled solidly with mortar for the full width of masonry unit shell. Head joints shall be shoved tight. Exposed joints shall be concave, tooled smooth, unless otherwise shown on the plans.

Mortar that has been mixed more than one hour shall not be retempered.

Mortar placed in joints shall preserve the unobstructed vertical continuity of the concrete filling. Any overhanging mortar projecting more than 12 mm, or other obstruction or debris shall be removed from the inside of such cells.

GROUTING.--

General.--All cells shall be filled solidly with grout. All grout in the cells shall be consolidated at the time of placement by vibrating and reconsolidated after excess moisture has been absorbed but before plasticity is lost. Slicing with a trowel is not acceptable.

Masonry units may be placed full height of the masonry work before grouting, or they may be placed in increments for individual grout pours.

Cleanouts shall be provided for all grout pours over 1524 mm in height. Such cleanouts shall be provided in the bottom course at every cell containing vertical reinforcement. After cell inspection, the cleanouts shall be sealed before filling with grout.

Masonry units shall be placed full height of the grout pour. Grout shall be placed in a continuous pour in grout lifts not exceeding 1828 mm. The interruption between placing successive lifts of grout shall be not more than one hour.

Between grout pours, a horizontal construction joint shall be formed by stopping the grout a minimum of 38 mm below the top of the last course, except if the joint is at a bond beam, it shall be 12 mm below the top of the bond beam unit, or at the top of the wall.

CLEANING AND PROTECTING MASONRY.--

General.--Splashes, stains or spots on the faces of the masonry exposed to view shall be removed.

Completed masonry shall be protected from freezing for a period of at least 5 days.

FIELD QUALITY CONTROL.--

General.--Field Quality Control is required when special inspection is noted in the reinforced masonry Design Notes on the plans.

The Contractor shall employ, at his own expense, a special inspector and testing laboratory to perform structural tests and inspections of masonry to verify that the construction conforms to the California Building Code in accordance with the requirements in Section 1701, "Special Inspections," and Section 2105, "Quality Assurance," of the California Building Code. The contractor shall submit a written Field Quality Control Plan that identifies the inspector, the lab, and the procedures used. The Field Quality Control Plan shall conform to these specifications and the 1997 California Building

Code. The contractor's Field Quality Control Plan shall be submitted to the Engineer for approval. The Engineer shall have three weeks to approve the plan.

The Contractor shall designate in the Field Quality Control Plan a masonry Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of masonry, including materials and workmanship, performed by the Contractor and all subcontractors.

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, and approving all correspondence, required submittals, and reports to and from the Engineer.

The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

Masonry special inspection personnel or testing firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for the following conditions:

Special Inspector.--The special inspector shall be, as a minimum, an International Conference of Building Officials (ICBO) certified Special Masonry Inspector. The special masonry inspector shall perform the inspections required under Section 1701.5.7., "Structural masonry" of the California Building Code. The special inspector shall prepare a "Daily Field Report" providing information regarding the specific operations witnessed, including placing of masonry units and bar reinforcing, grouting, fabrication of test specimens, and other observations of importance to the work. A "Daily Field Report" is required for each day that the Special Inspector is on the jobsite. A copy of these reports shall be delivered to the Engineer on the day following the preparation. The special inspector shall submit a final signed report to the Engineer and Contractor stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications, and the applicable workmanship provisions of these specifications and the California Building Code.

Testing.--The testing laboratory shall comply with the requirements of ASTM Designation: E 329. Test results shall be reported in writing to the Engineer and the Contractor on the same day the tests are made. Testing shall be done in accordance with Section 2105.3,"Compliance with fm" of the CBC. The contractor can establish fm by either sections 2105.3.2, 2105.3.3, or 2105.3.4. A set of tests shall be done for each 465 m² of wall area, but not less than one test per project. Tests shall be performed on the following materials by the Unit Test Method as defined:

Concrete masonry units shall be tested in accordance with ASTM Designation: C 140.

Grout shall be tested in accordance with ASTM Designation: C 1019.

In addition:

Mortar shall be tested in accordance with California Building Code Standard: 21-16.

Any work not meeting the requirements of section 2105 shall be redone and retested. Sampling, inspecting, reworking and retesting of material will be done at the contractor's expense.

DIVISION 5. METALS

5.01 STRUCTURAL STEEL FOR BUILDINGS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of fabricating, assembling, furnishing and erecting structural steel in accordance with the details shown on the plans and these special provisions.

Structural steel consists of:

- Steel Trusses
- Equipment Bays Building framing
- Mechanics Shop framing
- Evaporative cooler framing

Wash Rack Canopy
Material Storage Bin Canopy
Connections

Source quality control.--Materials and fabrication procedures are subject to inspection and tests in mill, shop and field, conducted by the Engineer or a qualified inspection agency. The Contractor or fabricator shall provide access to the Engineer or testing agency to places where the structural steel work is being fabricated or produced so that the required inspection and testing can be accomplished. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements. The testing agency may inspect the structural steel at the plant before shipment; however, the Engineer reserves the right, at any time before final acceptance to reject the material that does not conform to the contract requirements.

REFERENCES.--

General.--Structural steel shall be fabricated, assembled and erected in accordance with American Institute of Steel Construction (AISC), "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings."

Welding shall be in accordance with American Welding Society (AWS) D1.1, "Structural Welding Code - Steel."

SUBMITTALS.--

Product data.--Product data for items to be incorporated into the work, including structural steel, high strength bolts, nuts and washers and alternative connectors, shall be submitted for approval.

Shop drawings.--Shop drawings and calculations shall be submitted for approval.

Shop drawings shall show any changes proposed in the work, details of connections and joints exposed to the weather, details for connections not dimensioned on the plans, the sequence of shop and field assembly and erection, welding sequences and procedures. If required, the location of butt welded splices on a layout drawing of the entire structure, and the location and details of any temporary supports that are to be used.

Calculations and shop drawings for falsework to be used for the erection of structural steel shall be submitted for approval. The falsework shall be designed and constructed to provide the necessary rigidity and to support loads which will be applied. Shop drawings and design calculations shall be stamped and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California. The expiration date of the registration shall be shown.

CLOSEOUT SUBMITTALS.--

Final drawings.--At the completion of each building on the contract, one set of reduced prints on 27 kg (minimum) bond paper, 280 mm x 432 mm in size, of the corrected original tracings of all approved drawings for each building shall be furnished to the Engineer. An index prepared specifically for the drawings for each building containing sheet numbers and titles shall be included on the first reduced print in the set for each building. Reduced prints for each building shall be arranged in the order of drawing numbers shown in the index.

The edge of the corrected original tracing image shall be clearly visible and visually parallel with the edges of the page. A clear, legible symbol shall be provided on the upper left side of each page to show the amount of reduction and a horizontal and vertical scale shall be provided on each reduced print to facilitate enlargement to original scale.

QUALITY ASSURANCE.--

Qualifications for welding.--A certified copy of qualification test record for welders shall be submitted to the Engineer at the jobsite. Descriptive data for equipment for field welding structural steel, including type and electric power requirements, shall be submitted for approval.

Certificates of Compliance.--Certificate of Compliance shall be furnished for structural steel products in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions. Certificate of Compliance shall include mill test certificates for each heat number used in the work.

DELIVERY, HANDLING AND STORAGE.--

Structural materials shall be loaded, transported, unloaded and stored so that it is kept clean and undamaged. Material shall be stored above ground on platforms, skids, or other supports. Covers and protection shall be provided to protect the materials from corrosion.

Anchorage and anchor bolts, which are to be embedded in concrete or masonry, shall be delivered in ample time to not delay the work.

PART 2.- PRODUCTS

MATERIALS.--

Steel bars, plates and shapes.--

Steel bars, plates and shapes shall conform to ASTM Designation: A 572/A 572M, Grade 50 [345].

Steel tubing.--

Steel tubing shall conform to ASTM Designation: A 500, Grade B.

High strength (HS) bolts, nuts and washers.--

High strength (HS) bolts, nuts and washers shall conform to ASTM Designation: A 325M.

Direct tension indicators.--

Direct tension indicators shall conform to ASTM Designation: F 959.

Tension control fasteners.--

Tension control bolts shall have a splined end extending beyond the threaded portion of the bolt and which shears off when the specified bolt tension is attained.

Inorganic zinc primer.--

Inorganic zinc primer shall be a waterborne inorganic zinc primer conforming to the requirements of AASHTO Designation: M 300-92 I, Type II. Inorganic zinc primer shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

Mortar.--

Mortar shall consist of one part cement, measured by volume, to 2 parts clean sand and only enough water to permit placing and packing.

FABRICATION.--

Shop fabrication and assembly.--Workmanship and finish shall be equal to the best general practice in modern shops.

Cuts shall not deviate more than 2 mm from the intended line. Roughness, notches or gouges shall be removed.

Bearing stiffeners at points of loading shall be square with the web and shall have at least 75 percent of the stiffener in contact with the flanges.

Finished members shall be true to line, shall have square corners and smooth bends and shall be free from twists, kinks, warps, dents and open joints.

Exposed edges and ends of metal shall be dressed smooth, with no sharp edges and with corners slightly rounded.

Connections.--Abutting surfaces at connections shall be clean.

Cutting and welding at the jobsite will not be allowed except as shown on the approved drawings or specifically approved by the Engineer.

Finished holes for bolts shall be cylindrical and perpendicular to the plane of the connection. Subpunched and subdrilled holes shall be 6 mm smaller in diameter than the diameter specified for the finished hole.

Bolted Connections.--Bolts for connecting steel to steel shall be high-strength bolts conforming to ASTM Designation: A 325M.

High-strength structural steel bolts, or equivalent fasteners, other bolts attached to structural steel, nuts, and washers shall be galvanized by mechanically deposited coating.

Holes for other work.--Holes for securing other work to structural steel and passage of other work through steel framing members shall be as shown on the approved drawings.

Threaded nuts or specialty items for securing other work to steel members shall be as shown on the approved drawings.

Holes shall be cut, drilled or punched perpendicular to metal surfaces. Holes shall not be flame cut or enlarged by burning. Holes are to be drilled in bearing plates.

SHOP PAINTING.--

General.--Structural steel members, except those to receive sprayed-fireproofing, shall be painted.

Surface preparation.--Surfaces of structural steel to be receive inorganic zinc primer shall be blast cleaned in accordance with Steel Structures Painting Council, SSPC-SP 10, "Near-White Blast Cleaning."

Bolted connections.--Contact surfaces of high strength bolted connections and ungalvanized anchor bolt assemblies shall be blast cleaned and coated with waterborne inorganic zinc primer before assembly. The total thickness of primer on each surface shall be between 0.025 mm to 0.076 mm and may be applied in one application.

Painting.--Immediately after surface preparation, surfaces of structural steel shall receive an undercoat of waterborne inorganic zinc primer. Color shall essentially match Federal Standard 595B, No. 36373.

The manufacturer's published mixing and application instructions for inorganic zinc primer shall be followed.

PART 3.- EXECUTION

ERECTION AND ASSEMBLY.--

Field splices.--Field splices shall be made only at the locations shown on approved shop drawings.

The parts shall be accurately assembled in their final position as shown on the plans and in true alignment with related and adjoining work before final fastening.

All parts shall be supported adequately and at locations to provide a vibration free, rigid, and secure installation.

Bolted connections.--All high strength bolted connections shall be made with high strength bolts installed with direct tension indicator washers or tension control fasteners.

When used, one mechanically galvanized direct tension washer shall be installed with each high strength bolt. Bolts shall be tightened until a direct tension indicator washer gap is 0.13 mm or less. A zero gap will not be cause for rejection.

During installation of tension control bolts, the torque required to turn the nut on the tension control bolt shall be counterbalanced by the torsion shear resistance of the splined end of the bolt.

The bolt head type and head location shall be consistent within a joint.

Nuts shall be on side of member least exposed to view.

Setting bases and bearing plates.--Concrete and masonry surfaces shall be cleaned and roughened to improve bond. Bottom of base and bearing plates shall be clean.

Base plates and bearing plates for structural members shall be set on wedges or other adjusting devices.

Anchor bolts shall be wrench tightened after supported members have been positioned and plumbed.

Mortar shall be solidly packed between bearing surfaces and base or bearing plates to ensure that no voids remain. Exposed surfaces shall be finished and allowed to cure.

FIELD PAINTING.--

Touch-up painting.--After erection, the Contractor shall clean field welds, bolted connections, and abraded areas of shop paint and apply the same materials as applied for shop painting.

Surfaces which are scheduled to receive finish coats shall be painted with an additional prime coat and finish coats in accordance with the requirements specified for shop primed steel under "Painting" in Division 9.

QUALITY CONTROL.--

Testing and inspection.--Ultrasonic examination shall be performed by the Contractor on at least 50 percent of all full penetration butt-welded splices in accordance with the requirements of AWS D1.1 and these special provisions.

Welding procedures and methods shall be subject to inspection for conformance with AWS D1.1.

Butt welds shall be tested in accordance with AWS D1.1, Chapter 6, Part C, Ultrasonic Testing of Groove Welds.

Examination, reporting and disposition of tests shall be in accordance with the provisions of 6.12, AWS D1.1.

In addition to ultrasonic examinations by the Contractor, welds may be subject to inspection or non-destructive testing by the Engineer.

When additional inspection or non-destructive testing is required by the Engineer, the Contractor shall provide sufficient access facilities in the shop and at the jobsite to permit the Engineer or his agent to perform such inspection and testing.

The Contractor shall correct all deficiencies in the structural steel work which inspections and laboratory test reports have indicated to be not in compliance with these special provisions. Additional tests shall be performed by the Contractor at his expense to reconfirm any non-compliance of original work, and to show compliance of the corrected work.

5.02 METAL DECK

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing metal deck in accordance with the details shown on the plans and these special provisions.

Metal deck includes ribbed sheet steel decking units, bent plates, accessories, fasteners and such other components, not mentioned, but required for a rigid, secure and complete installation.

REFERENCES.--

General.--The design, fabrication and erection of metal deck shall conform to the applicable requirements of the American Iron and Steel Institute (AISI) publication, "Specifications for the Design of Light Gauge Cold Formed Steel Structural Members," and the applicable Steel Deck Institute Design Manual and these special provisions.

Welding shall be in accordance with American Welding Society (AWS) D1.3, "Structural Welding Code - Sheet Steel."

SUBMITTALS.--

Product data.--Manufacturer's descriptive data for each type of deck and accessories shall be submitted for approval.

Shop drawings.--Shop drawings showing complete erection layouts, details, dimensions, deck section properties shall be submitted for approval. Drawings shall show types and gages, fastening methods, including the location, type and sequence of connections, sump pans, cut openings, surface finishes and temporary supports or bracing.

QUALITY ASSURANCE.--

Qualification of field welding.--Welding processes and welding operators shall be qualified in accordance with "Welder Qualification," procedures in American Welding Society (AWS) D1.1, "Structural Welding Code - Steel."

Welding decking in place is subject to inspection and testing. Defective work shall be removed and replaced with acceptable work.

Certificates of Compliance.--Certificates of Compliance shall be furnished for the metal decking in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

DELIVERY, HANDLING AND STORAGE.--

General.--Metal deck units and accessories shall be transported, stored and erected in a manner that will prevent corrosion, distortion or other damage.

Deck units shall be stored off the ground with one end elevated to provide drainage.

PART 2.- PRODUCTS

MANUFACTURERS.--Acceptable manufacturers shall be; Verco Manufacturing Co.; BHP Co.; or equal.

MATERIALS.--

Deck units.--

Deck units, closures and plates shall be fabricated from galvanized sheet steel conforming to ASTM Designation: A 653/A 653M, Grade 40 [275].

Galvanizing shall conform to the requirements of ASTM Designation: A 924/A 924M, G60 [Z180].

Miscellaneous steel shapes.--

Miscellaneous steel shapes shall conform to ASTM Designation: A 36/A 36M.

Anchor clips, vent clips, flashing, saddle plates, flexible closure strips and other accessories.--

Anchor clips, vent clips, flashing, saddle plates, flexible closure strips and other accessories shall be as recommended by the decking manufacturer.

FABRICATION.--

General.--Deck units shall be formed to span 3 or more supports, with flush, telescoped or nested 50 mm laps at ends and interlocking or nested side laps unless otherwise shown on the plans.

Deck units shall conform to the configurations, metal thickness, depth and width and section properties shown on the plans.

End bearing shall be not less than 38 mm.

Metal closure strips.--Metal closure strips for opening between deck units and other construction shall be fabricated from the same gage and material as the adjacent deck units. Strips shall be formed to provide tight-fitting closures at end of cells or flutes and sides of decking.

Cleaning.--When spray-on fireproofing is specified, the decking manufacturer shall supply decking free of amounts of oil or lubricants which would significantly impair the adhesion of the spray-on fireproofing.

PART 3.- EXECUTION

INSTALLATION.--

General.--Deck units and accessories shall be installed in accordance with the manufacturer's recommendations and approved drawings and these special provisions.

Units shall be placed on supporting steel framework, adjusted in place and properly aligned before being permanently fastened. Ends of units shall have positive bearing over structural supports.

Cutting and fitting shall present a neat and true appearance with exposed burrs removed. Openings through the decking shall be cut square and shall be reinforced as recommended by the decking manufacturer.

The metal deck shall not be used as a working platform before deck units are fastened in place. Supplies, equipment or other loads shall not be stored on the deck. Mechanical equipment or other loads shall not be hung from metal roof decking.

Welding.--Welding shall conform to AWS requirements (D1.1 and D1.3) and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

Welding washers shall be used where recommended by the manufacturer.

Fastening roof deck units.--Roof deck units shall be fastened to supporting steel members as shown on the structural plans.

Fastening side laps.--Side laps of adjacent deck units shall be fastened as shown on the plans.

Field painting.--Immediately following erection, field welds, bolted connections and abraded areas shall be cleaned with a wire brush.

Galvanized surfaces shall be touched-up with galvanizing repair paint recommended by the manufacturer.

5.03 METAL FRAMING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing cold formed metal framing, including steel studs, and "C"-shaped steel joists, in accordance with the details shown on the plans and these special provisions.

REFERENCES.--

Component design.--Structural properties of studs and joists shall be computed in accordance with American Iron and Steel Institute (AISI), "Specification for Designing of Cold-Formed Steel Structural Members."

Welding.--Welding shall be in accordance with American Welding Society (AWS) D1.3, "Structural Welding Code - Sheet Steel."

Welders shall be qualified in accordance with "Welder Qualification," procedures of AWS D1.1, "Structural Welding Code-Steel."

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and installation instructions for each item of cold-formed metal framing and accessories shall be submitted for approval to the Engineer at the jobsite.

Installation instructions shall include instructions for securing studs to tracks and other framing connections.

DELIVERY, STORAGE AND HANDLING.--

General.--Cold formed metal framing components shall be protected from rusting and damage. Components shall be delivered to the jobsite in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Components shall be stored off ground in a dry ventilated space.

PART 2.- PRODUCTS

COLD FORMED METAL FRAMING.--

Steel studs and joists--

Studs shall be formed to channel shape, punched web, and knurled faces, fabricated from galvanized sheet steel conforming to ASTM Designation: A 653/A 653M. Studs shall be minimum thickness, section properties, yield strength, and size as shown on the plans.

Joists and other framing components shall be fabricated from galvanized steel sheets conforming to ASTM Designation: A 653/A 653M. Minimum thickness, section properties, yield strength, and size shall be as shown on the plans.

Steel Track.--

Track shall be formed from galvanized sheet steel, channel shape, and same width as studs; solid web.

ACCESSORIES.--**Fasteners.--**

Fasteners shall be hot-dipped galvanized, self-drilling, self-tapping screws, or bolts, nuts and washers.

Anchorage.--

Anchorage shall be ICBO approved for the purpose intended, integral stud type, powder driven or drilled expansion bolts.

FINISHES.--**Studs, track and joists.--**

Studs, tracks and joists shall be hot-dipped galvanized to conform to ASTM Designation: A 653/A 653M, G60 [Z180].

Miscellaneous metal parts.--

Miscellaneous parts, including, bracing, furring, plates, gussets, and bridging, shall be hot dipped galvanized to not less than 381 kilograms per square meter.

FABRICATION.--

General.--Cold formed metal framing components shall be fabricated in place or prefabricated into panels to the maximum extent possible prior to erection. Panels shall be fabricated plumb, square, true to line and braced against racking with joints welded. Lifting of prefabricated panels shall be performed in a manner to prevent damage or distortion.

Panels shall be fabricated in jig or templates to hold members in proper alignment and position to assure accurate placement.

Fastenings.--Components shall be fastened by shop welding, bolting or screw fasteners as shown on the approved drawings.

PART 3.- EXECUTION**INSTALLATION.--**

Studs.--Studs shall be erected plumb, except as needed for diagonal bracing or similar requirements. Channel tracks shall be aligned accurately to the wall layout at both floor and ceiling. Tracks shall be secured to floor and ceiling with fasteners spaced at not more than 406 mm intervals. Fasteners shall be provided at corners and ends of track.

Studs shall extend from floor to underside of ceiling except at wall openings. Each stud shall be secured to tracks at both top and bottom by bolting or screw fastening at both inside and outside flanges. Field welding shall not be permitted.

Studs at openings shall be fastened solidly and securely to floor clips. Floor clips shall be fastened to the floor with 2 anchors unless otherwise shown on the plans.

Supplemental framing, blocking and bracing shall be installed in steel stud system wherever walls or partitions are to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition.

Joists.--Joists shall be installed directly over bearing studs or a load distribution member shall be installed at the top track.

Web stiffeners shall be provided at reaction points where shown on the plans.

Ends of joists shall be reinforced with end clips, steel hangers, steel angle clips, steel stud section, or as otherwise recommended by the manufacturer.

Joists shall be secured to interior support systems to prevent lateral movement of bottom flanges.

5.04 BUILDING MISCELLANEOUS METAL

PART 1.- GENERAL

Scope.--This work shall consist of fabricating, furnishing and installing building miscellaneous metal in accordance with the details shown on the plans and these special provisions.

Building miscellaneous metal shall consist of the following:

- Overhead and roll-up door jambs, head, threshold, and track supports
- Declassification and exhaust fan snow guards
- Sand and Salt Building door jambs
- Miscellaneous bars, plates, and shapes

including all anchors, fastenings, hardware, accessories and other supplementary parts necessary to complete the work.

REFERENCES.--

Codes and standards.--Welding of steel shall be in accordance with American Welding Society (AWS) D 1.1, "Structural Welding Code-Steel" and D 1.3, "Structural Welding Code-Sheet Steel."

SUBMITTALS.--

Product data.--Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications.

Shop drawings.--Shop drawings of fabricated items shall be submitted for approval.

QUALITY ASSURANCE.--

Shop assembly.--Preassemble items in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark all units for reassembly and installation.

Inspection and tests.--Materials and fabrication procedures shall be subject to inspection and tests by the Engineer, in mill, shop and field. Such tests will not relieve the Contractor of responsibility of providing materials and fabrication procedures in compliance with specified requirements.

PART 2.- PRODUCTS

MATERIALS.--

Steel bars, plates and hot-rolled shapes.--

Steel bars, plates and hot-rolled shapes shall conform to ASTM Designation: A 36/A 36M.

Pipe.--

Pipe shall be commercial quality standard steel pipe.

Bolts, studs, threaded rods, nuts and washers.--

Bolts, studs, threaded rods, and nuts for general application shall conform to ASTM Designation: A 307.

Washers shall be commercial quality.

Expansion anchors.--

Expansion anchors shall be ICBO approved for the purpose intended, integral stud type anchor or internally threaded type with independent stud, hex nut and washer.

Powder driven anchors.--

Powder driven anchors shall be plated, spring steel alloy drive pin or threaded stud type anchors for use in concrete or steel. Spring steel shall conform to ASTM Designation: A 227M, Class 1. The diameter, length and type of shank and the number and type of washer shall be as recommended by the manufacturer for the types and thickness of material being anchored or fastened.

FABRICATION.--

Workmanship and finish.--Workmanship and finish shall be equal to the best general practice in modern shops.

Miscellaneous metal shall be clean and free from loose mill scale, flake rust and rust pitting, and shall be well formed and finished to shape and size with sharp lines and angles. Bends from shearing or punching shall be straightened.

The thickness of metal and details of assembly and support shall give ample strength and stiffness.

Built-up parts shall be true to line and without sharp bends, twists and kinks. Exposed ends and edges of metal shall be milled or ground smooth, with corners slightly rounded.

Joints exposed to the weather shall be made up to exclude water.

Galvanizing.--Items indicated on the plans to be galvanized shall be hot-dip galvanized after fabrication. The weight of galvanized coating shall be at least 460 grams per square meter of surface area, except drainage grates shall have at least 610 grams per square meter of surface area.

Painting.--Building miscellaneous metal items not galvanized shall be cleaned and prime painted prior to erection in accordance with the requirements specified for steel and other ferrous metals under "Painting" in Division 9, "Finishes," of these special provisions.

PART 3.- EXECUTION

GENERAL.--

Anchorage.--Anchorage devices and fasteners shall be provided for securing miscellaneous metal in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws and other connectors.

Cutting, drilling and fitting shall be performed as required for installation of miscellaneous metal fabrications. Work is to set accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.

Powder driven anchors.--Powder driven anchors shall be installed with low velocity powder actuated equipment in accordance with the manufacturer's instructions and State and Federal OSHA regulations.

DAMAGED SURFACES.--

General.--Galvanized surfaces that are abraded or damaged at any time after the application of the zinc coating shall be repaired by thoroughly wire brushing the damaged areas and removing all loose and cracked coating, after which the clean areas shall be painted with 2 applications of unthinned zinc-rich primer (organic vehicle type). Aerosol cans shall not be used.

5.05 EXPANSION JOINT COVER ASSEMBLIES

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing vertical and horizontal expansion joint assemblies, fillers and sealers for expansion and seismic joints in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and installation instructions for vertical and horizontal expansion joint assemblies, seals and sealants shall be submitted for approval.

PART 2.- PRODUCTS

MANUFACTURERS.--

Acceptable manufacturers.--Subject to these special conditions, acceptable manufacturers shall be Watson Bowman; Wabco; or equal.

MATERIALS.--

General.--Expansion joint closures and seals shall be aluminum extrusions and neoprene or silicone rubber seals of the type and size to suit the construction as shown on the plans.

Aluminum retainers and cover plates.--

Aluminum retainers and cover plates shall conform to ASTM Designation: B 221M, 6063-T5, anodized, of the configuration and size indicated or recommended by the expansion control system manufacture.

Visual seals.--

Visual seal shall be dense neoprene or dense silicone synthetic rubber conforming to ASTM Designation: C 864, 70 durometer hardness, plus or minus 5.

Functional seal.--

Functional seal shall be closed cell neoprene synthetic rubber conforming to ASTM Designation: C 509, medium density.

Fasteners.--

Fasteners shall be the expansion joint assembly manufacturer's standard corrosion resistant fasteners.

Sealant.--

Sealant shall be as recommended by the expansion joint assembly manufacturer.

PART 3.- EXECUTION

PREPARATION.--

Surface preparation.--Supporting joint surfaces shall be prepared as recommended by the manufacturer. Edges of the substrate shall be level and sound.

INSTALLATION.--

General.--Expansion joint cover assemblies shall be installed and set to the proper width for the ambient temperature at the time of setting.

Nominal width shall be based on an ambient width shown on the plans.

Expansion joint cover assemblies shall be set according to the manufacturer's recommendations.

CLEANING.--

General.--Unused materials, containers, and equipment shall be removed from the work area. Surfaces that are stained, marred or otherwise damaged shall be cleaned and repaired.

DIVISION 6. WOOD AND PLASTICS

6.01 ROUGH CARPENTRY

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing materials and performing rough carpentry work including wood framing, furring, and sheathing in accordance with the details shown on the plans and these special provisions.

Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed.

SUBMITTALS.--

Product Data.--Manufacturer's material data and installation instructions shall be submitted for gypsum sheathing, framing hardware and underlayments.

Wood treatment data.--Chemical treatment manufacturer's instructions shall be submitted for the handling, sorting, installation, and finishing of treated materials.

For each type of preservative treatment used, certification by treating plant shall include type of preservative solution and pressure process used, net amount of preservative retained and conformance with the applicable standards of the American Wood Preservers Association.

DELIVERY, HANDLING AND STORAGE.--

Delivery and storage.--Materials shall be kept under cover and dry. All materials shall be protected from exposure to weather and contact with damp or wet surfaces with blocking and stickers. All lumber, plywood and other panels shall be stacked in such a manner to provide air circulation within and around the stacks.

PART 2.- PRODUCTS

LUMBER.--

General.--Lumber shall be manufactured to comply with PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection.

Softwood lumber shall be quality grade stamped or shall be accompanied by a certificate of inspection. Inspection certificates or grade stamps shall indicate compliance with the grading requirements of WWPA, WCLIB, RIS, or other approved lumber inspection agencies.

All lumber used shall be nominal sized and dressed S4S unless otherwise specified in these special provisions.

Framing lumber shall be solid stock lumber, Douglas Fir-Larch, and the grades indicated under WCLIB or WWPA rules. Moisture content shall not exceed 19 percent and shall be grade stamped "S-Dry."

DIMENSION LUMBER.--

Except as otherwise shown on the plans, lumber shall have the following grades.

Vertical framing lumber.--

Vertical framing lumber, nominal 51 mm x 51 mm through 102 mm x 102 mm, shall be Construction grade or better.

Vertical framing lumber, nominal 51 mm x 152 mm through 102 mm x 152 mm shall be No. 2 or better.

Horizontal framing lumber.--

Horizontal framing lumber, nominal 51 mm x 102 mm and wider, including joists and rafters, shall be No. 2 or better.

Horizontal framing lumber, nominal 102 mm x 102 mm and wider, including joists and rafters, shall be No. 1 or better.

Miscellaneous lumber.--

Miscellaneous lumber for support or attachment of other work including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members shall be not less than No. 2 or better.

Lumber in contact with concrete or masonry construction shall be pressure treated Douglas Fir-Larch.

TIMBERS.--

Timbers (nominal 127 mm or thicker).--

Timbers shall be No. 1 or better.

PLYWOODPANELS.--

General.--Plywood panels shall comply with Voluntary Product Standard PS1, "U. S. Product Standard for Construction and Industrial Plywood."

Plywood panels shall be Group 1 unless otherwise noted.

Each plywood panel shall be factory marked with APA or other trademark evidencing compliance with grade requirements.

Structural plywood wall sheathing.--

Structural plywood wall sheathing for walls shall be APA RATED SHEATHING, Exposure 1. Thickness and grade shall be as shown on the plans.

Structural plywood roof and ceiling sheathing.--

Structure plywood roof and ceiling sheathing shall be APA RATED SHEATHING, Exposure 1. Span rating, thickness and grade shall be as shown on the plans.

MISCELLANEOUS MATERIALS.--

Rough Carpentry Hardware.--

Steel plates and rolled sections shall be mild, weldable steel, conforming to AISI grades 1016 through 1030 except 1017.

Nails, screws, bolts, nuts, washers shall be commercial quality. Exposed fasteners shall be hot dipped galvanized or stainless steel.

Joist hangers, clips and other standard framing hardware shall be ICBO approved, commercial quality, galvanized sheet steel or hot dipped galvanized, of the size shown on the plans.

Expansion anchors and powder driven anchors shall be as specified under "Building Miscellaneous Metal," in Division 5, "Metals," of these special provisions.

Nails.--

Nails shall conform to ASTM F 1667-95. "Common" nails shall conform to the following table:

Nail Size	Length (mm)	Diameter (mm)
8d	63.5	3.33
10d	76.2	3.76
16d	88.9	4.11

WOOD TREATMENT BY PRESSURE PROCESS.--

Preservative treatment.--

Preservative treatment shall be copper napthenate, pentachlorophenol or water-borne arsenicals (ACA, CCA or ACZA).

The following items shall be treated:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

Wood sills, sleepers, blocking, furring and other similar members in contact with concrete or masonry.

All holes, daps and cut ends of treated lumber shall be thoroughly swabbed with 2 applications of copper napthenate.

PART 3.- EXECUTION

INSTALLATION.--

Wood framing.--Wood framing shall be in accordance with Chapter 23 of the California Building Code.

Framing members shall be of sizes and spacing shown on the plans. Unless otherwise shown on the plans, structural members shall not be spliced between supports.

Wood framing shall be accurately cut and assembled to provide closely fitted members. Framing shall be erected true to the lines and grades shown on the plans and shall be rigidly secured in place as shown and as required by recognized standards. Bracing shall be placed wherever necessary to support all loads on the structure during erection.

The size and spacing of fasteners and the edge distance for nails shall be as shown on the plans.

Nailing schedule shall be as shown on the plans and shall comply with the California Building Code.

Plywood panels.--Plywood panels shall be attached to the framing as shown on the plans and these special provisions. All structural plywood sheathing (both roof and wall) shall be nailed with "Common" nails.

Plywood sheathing shall be nailed to the framing system and shall be continuous over 2 or more supports. Roof panels shall be installed with the long dimension across the supports, with end joints staggered 1.22 m. Wall sheathing shall have all edges blocked. Spacing between panels shall be 3 mm.

6.02 PRE-ENGINEERED WOOD TRUSSES

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of designing, fabricating, furnishing and erecting pre-engineered, factory fabricated wood trusses in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's data for lumber, metal plates, hardware and fabrication process shall be submitted for approval.

Shop drawings.--Complete shop drawings, erection drawings, if required, and design calculations for the pre-engineered wood trusses and permanent bracing shall be submitted for approval. Submittals shall be approved prior to the start of fabrication.

Shop drawings and design calculations shall be stamped and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California. The expiration date of the registration shall be shown. Engineer's original signature shall be submitted, copies will not be accepted.

Shop drawings shall show the lumber size, species and grades for all truss and temporary and permanent bracing members. Joint and connection details shall be shown.

Shop drawings shall include a location plan which shows the location and identification of each truss.

Calculations for the design of the trusses and bracing shall include a list of applied loads and load combinations, including fire sprinkler system if required, with the resulting member forces and member stresses.

If the design calculations contain or consist of computerized or tabulated calculations, the values pertaining to the design shall be identified, described or indexed in such a manner that a design review can be performed.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of Compliance shall be furnished for trusses in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

Codes and standards.--Wood trusses and permanent bracing shall be designed for the loads shown on the plans. The design shall be in accordance with the requirements of the California Building Code (CBC), the "National Design Specification for Wood Construction" by the National Forest Products Association (NFPA), the "Timber Construction Standards" by the American Institute of Timber Construction (AITC) and the "Design Specifications for Light Metal Connected Wood Trusses" by the Truss Plate Institute (TPI).

Wood trusses with light metal plate connectors shall be fabricated in accordance with the requirements of the UBC Section 2343.

DELIVERY, STORAGE AND HANDLING.--

Trusses shall be transported and handled in such a manner as to prevent damage due to warping, distortion and moisture.

Trusses shall be stored off the ground in such a manner as to avoid damage from bending, overturning or other cause for which the truss is not designed to resist or endure.

PART 2.- PRODUCTS

Pre-engineered truss.--

Pre-engineered truss shall be factory fabricated pre-engineered truss sized to fit the location shown on the plans. Lumber sizes, species and grades shall be as shown on the approved shop drawings. Lumber shall bear grade marks of a recognized grading association and the moisture content of the lumber shall be within the amount specified in the referenced specifications.

Connector plates.--

Connector plates shall be galvanized sheet steel conforming to ASTM Designation: A 653/A 653M, Grade 33 [230]. Zinc coating by hot dip galvanizing shall conform to ASTM Designation: A 924/A 924M, G60 [Z180].

FABRICATION.--

General.--Truss and bracing members shall be accurately cut to length and shape to provide tightly fitted joints.

Connectors, framing anchors and other hardware accessories shall be coordinated for placement in the proper locations and positions.

Camber, if required by the design, shall be built into the trusses.

Each truss shall be stamped or marked with a location identification mark or symbol and with the name and address of the manufacturer.

Connector plates.--Connector plates at sand and salt storage buildings shall be coated with epoxy paint after installation. Surfaces to be coated shall be prepared and painted as recommended by the paint manufacturer.

PART 3.- EXECUTION

INSTALLATION AND ERECTION.--

General.--Trusses shall be erected plumb and true and shall be secured rigidly in place in accordance with the truss manufacturer's recommendations.

Fasteners and connectors shall be placed as shown on the plans and as recommended by the truss manufacturer.

Longitudinal and transverse bracing shall be installed during erection to hold the trusses plumb and true and in a safe position until sufficient permanent construction is in place to provide full stability.

All permanent bracing shall be secured in place before any sustained permanent loads are applied to the roof truss system.

Materials loaded on the truss system shall be located in such a manner that the design load of the trusses is not exceeded in the area of placement of the loads.

6.03 FINISH CARPENTRY

PART 1.- GENERAL

SUMMARY.--

Scope.--This work consists of furnishing and installing materials and performing finish carpentry, including interior trim, softwood paneling, as shown on the plans and these special provisions.

Finish carpentry includes carpentry work not specified as part of other sections and which is generally exposed to view.

SUBMITTALS.--

Product data.--Manufacturer's specifications and installation instructions for each item of factory-fabricated siding and paneling.

Samples.--One sample shall be submitted to the Engineer at the jobsite for each species and cut or pattern of finish carpentry as shown below:

Interior standing and running trim - 610 mm long by full board or molding width, finished on one side and one edge.

Plywood paneling - 610 mm long x full panel width, finished on one side.

QUALITY ASSURANCE.--

Factory marks.--Each piece of lumber and plywood shall be marked with type, grade, mill and grading agency identification. Marks shall be omitted from surfaces to receive transparent finish. A mill certificate stating that material has been inspected and graded in accordance with requirements shall be furnished if marks cannot be placed on concealed surfaces.

PRODUCT DELIVERY, STORAGE AND HANDLING.--

Delivery.--Carpentry materials shall be delivered after painting, wet work and similar operations have been completed.

Protection.--Finish carpentry materials shall be protected during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

PART 2.- PRODUCTS

WOOD PRODUCT QUALITY STANDARDS.--

Softwood lumber.--Softwood lumber shall conform to the requirements of PS 20, "American Softwood Lumber Standard," with applicable grading rules of inspection.

Plywood.--Plywood shall conform to the requirements of Voluntary Products Standard PS-1, "U. S. Product Standard for Construction and Industrial Plywood."

Hardwood lumber.--Hardwood lumber shall conform to the requirements of the National Hardwood Lumber Association (NHLA) rules.

Woodworking.--Woodworking shall conform to the requirements of Woodwork Institute of California (WIC), "Manual of Millwork."

MATERIALS.--

General.--Lumber sizes indicated shall be nominal sizes except as indicated by detailed dimensions. Lumber which is to be dressed or worked and dressed shall be manufactured to the actual sizes as required by PS 20. Lumber shall be made of solid lumber stock.

Plywood paneling and wainscotting.--

Plywood paneling and wainscotting shall be APA Interior Grade A-C, Group 1, Exposure 1 plywood. Thickness shall be as shown on the plans.

Interior standing and running trim.--

Standing and running trim to be painted shall be paint-grade pine, solid stock or finger jointed.

Miscellaneous Materials.--

Nails, screws and other anchoring devices of the type, size, material and finish required shall be provided for secure attachment, concealed where possible.

Fasteners and anchorages for exterior use shall be hot dip galvanized.

PART 3.- EXECUTION

INSTALLATION.--

General.--All work shall be installed plumb, level and true with no distortions.

Standing and running trim.--Standing and running trim shall be installed with minimum number of joints possible, using full length pieces to the greatest extent possible.

Anchor finish carpentry.--Finish carpentry shall be anchored to framing or blocking built in or attached directly to the substrate.

Interior carpentry shall be attached to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing where required for complete installation. Fine finish nails shall be used for exposed nailing, countersunk and filled flush with finished surface and matching final finish where transparent finish is indicated.

ADJUSTMENT, CLEANING, FINISHING AND PROTECTION.--

General.--Damaged and defective finish carpentry work shall be repaired or replaced.

All exposed or semi-exposed surfaces shall be cleaned.

Finish carpentry shall be finished in accordance with the requirements specified under "Painting" in Division 9, "Finishes," of these special provisions.

DIVISION 7. THERMAL AND MOISTURE PROTECTION

7.01 WATER REPELLENT COATING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and applying water repellent coating to masonry surfaces in accordance with the details shown on the plans and these special provisions.

The water repellent coating shall be applied to all exterior masonry surfaces.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, application instructions and general recommendations for water repellents shall be submitted for approval.

QUALITY ASSURANCE.--

Codes and standards.--Water repellent coatings shall comply with all rules and regulations concerning air pollution in the State of California.

Certificates of Compliance.--Certificates of Compliance shall be furnished with each shipment of water repellent coating material in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

PART 2.- PRODUCTS

Water repellent coating.--

Water repellent coating shall be clear, colorless, water-based sealer. Water repellent coating shall be Hydrozo Inc., Clear Double 7; Euclid Chemical Co., Architectural Seal VOX; Tamms Industries Co., Chemstop; or equal.

PART 3.- EXECUTION

Preparation.--All surfaces to receive water repellent coating shall be dry and cleaned by removing contaminants that block pores of the surface. Cleaning methods shall be as recommended by the water repellent manufacturer.

Application.--The water repellent solution shall be applied in accordance with the manufacturer's printed instructions. The time period between applications of water repellent coating shall be not less than 24 hours.

Protection.--Surfaces of other materials surrounding or near the surfaces to receive the water repellent coating shall be protected from overspray or spillage from the waterproofing operation. Water repellent coating applied to surfaces not intended to be waterproofed shall be removed and the surfaces restored to their original condition.

7.02 WATER REPELLENT SEALANT

PART 1.- GENERAL

SUMMARY.--

Scope.--The work shall consist of cleaning and placing a silane sealant on exterior concrete surfaces and on those interior concrete wall and floor surfaces at the Sand and Salt Buildings.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and application instructions shall be submitted for approval.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of Compliance shall be furnished with each shipment of water repellent sealant in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions, and a Materials Safety Data Sheet.

PART 2.- PRODUCTS

Manufacturers.--Water repellent sealer shall be Hydrozo Inc., Enviroseal 40; Tamms Industries, Baracade Silane 40; Sonneborne, Penetrating Sealer 40; or equal.

Water repellent sealant.--

Water repellent sealant shall be a 40 percent minimum, organosilane solution, diluted in a suitable solvent, and shall consist of alkyltrimethoxy silanes with alkyl groups of i-butyl, i-octyl, n-octyl, singularly or in combination.

The water repellent sealant shall be tinted with a fugitive dye which will cause the concrete sealant to be distinguishable on the concrete surface for at least four hours after application, but shall disappear within seven days after application.

PART 3.- EXECUTION

PREPARATION.--

Protection.--Surfaces of other materials surrounding or near the surfaces to receive the water repellent sealant shall be protected from overspray or spillage from the waterproofing operation. Water repellent sealant applied to surfaces not intended to be waterproofed shall be removed and the surfaces restored to their original condition.

Surface preparation.--All surfaces to receive water repellent sealant shall be cleaned with light abrasive blasting. Blasting shall remove all dirt, debris and other deleterious materials, including removal of existing cement matrix. After cleaning, the concrete surfaces shall be air blown to dry and remove loose surface material prior to sealing.

APPLICATION.--

General.--The water repellent solution shall be applied in accordance with manufacturer's application instructions.

Water repellent sealant shall be applied only during periods of weather as recommended by the manufacturer, when the atmospheric temperature is between 4°C and 38°C and for exterior application when wind speed is less than 8 kilometers per hour.

Subject to written approval by the Engineer, the Contractor may provide suitable enclosures to permit concrete sealing during inclement weather.

FIELD QUALITY CONTROL.--

Tests.--Approximately 24 hours after placement of the water repellent sealant, the Contractor shall uniformly dampen the treated concrete surface using a fine water spray. Spray shall completely wet the surface without causing runoff.

After 5 days following sealant application, if required by the Engineer, the Contractor shall spray designated sealed concrete surfaces with a fresh water spray to verify sealant coverage. The water spray shall not penetrate the concrete surfaces, and surfaces determined to lack sufficient sealant coverage shall be resealed.

7.03 INSULATION (GENERAL)

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing insulation in accordance with the details shown on the plans and these special provisions.

Insulation materials shall be as specified in these special provisions, and shall be compatible with existing or new materials incorporated in the building.

Pipe and duct insulation shall be as specified under "Mechanical Insulation" in Division 15, "Mechanical," of these special provisions.

SUBMITTALS.--

Product data.--A list of materials, manufacturer's descriptive data, location schedule, and time schedule shall be submitted for approval.

The list of materials to be used shall include the trade name, manufacturer's name, smoke developed and flame spread classification, resistance rating and thickness for the insulation materials and accessories.

Schedules.--A location schedule and time schedule shall be submitted for approval.

The location schedule shall show where each material is to be installed.

The Contractor shall provide the Engineer at the jobsite with an accurate time schedule of the areas of the building to be insulated each day. The time schedule shall be submitted 3 working days in advance of the work.

Samples.--Samples of insulation material shall be submitted to the Engineer at the jobsite.

QUALITY ASSURANCE.--

Codes and standards.--All insulating materials shall be certified to comply with the California Quality Standards for Insulating Materials and shall be listed in the Department of Consumer Affairs publication "Consumer Guide and Directory of Certified Insulation Material."

DELIVERY, STORAGE AND HANDLING.--

General.--Insulating materials shall be delivered to the jobsite and stored in a safe dry location with labels intact and legible.

Insulating materials shall be protected from physical damage and from becoming wet or soiled.

In the event of damage, materials shall be repaired or replaced as necessary to comply with these specifications.

PART 2.- PRODUCTS (Not applicable.)

PART 3.- EXECUTION (Not applicable.)

7.03A BATT AND BLANKET INSULATION

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing batt or blanket insulation in accordance with the details shown on the plans and these special provisions.

Batt insulation shall include faced and unfaced batts in walls and ceilings, acoustical batts for sound control and exposed batt or blanket insulation for ceilings and walls.

QUALITY ASSURANCE.--

Laminator's qualifications.--Laminator for bonding polyethylene vapor-retarder to insulating batts shall be approved by the insulation manufacturer.

The name of the laminator shall be submitted with the Product Data.

Codes and standards.--All batt or blanket insulation, including facings such as vapor barriers, shall have a flame-spread rating not to exceed 25 and a smoke density not to exceed 450 when tested in accordance with CBC Standard No. 8-1.

The flame-spread and smoke density limitations do not apply to facings on batt insulation installed between ceiling joists, or in roof-ceiling or wall cavities, provided the facing is installed in substantial contact with the surface of the ceiling or wall finish.

PART 2.- PRODUCTS

INSULATING MATERIALS.--

General.--Fiberglass batts shall be thermal insulation produced by combining glass fibers with thermosetting resins to comply with ASTM Designation: C 665.

Wall insulation.--

Wall insulation shall be R-2.3 $K \cdot m^2/W$ fiberglass batts with paper-laminate vapor-retarder membrane on one face. Insulation shall conform to ASTM Designation: C 665, Type II, Class C.

Ceiling insulation.--

Ceiling insulation shall be R-5.3 $K \cdot m^2/W$ fiberglass batts with paper-laminate vapor-retarder membrane on one face. Insulation shall conform to ASTM Designation: C 665, Type II, Class C.

Acoustical insulation.--

Acoustical insulation shall be 89 mm, unfaced fiberglass insulation batts. Insulation shall conform to ASTM Designation: C 665, Type I.

Exposed insulation.--

Exposed insulation shall be fiberglass batts with bonded polyethylene vapor-retarder membrane on one face. Insulation shall conform to ASTM Designation: C 665, Type I. Exposed insulation for ceilings shall be R-5.3 $K \cdot m^2/W$ and R-3.3 $K \cdot m^2/W$ for walls.

VAPOR-RETARDERS.--

Paper-laminate vapor-retarder.--

Paper-laminate vapor-retarder shall be kraft paper sheets laminated together with asphalt or other vapor retarding compounds, scrim reinforced at edges of sheets.

Polyethylene vapor-retarder.--

Polyethylene vapor-retarder shall be factory-applied, 0.076 mm, white polyethylene film, a blend of fiberglass and polyester yarn reinforcement, and metallized polyester film laminated with a flame resistant adhesive, and a Class I flame-spread classification. Vapor retarder shall be Certainteed, White Poly Scrim kraft (PSK-faced); Owens Corning, Flame Spread 25 (white); or equal.

AUXILIARY INSULATION MATERIALS.--

Insulation tape.--

Insulation tape shall be as recommended by the insulation manufacturer.

Insulation adhesive.--

Insulation adhesive shall be the type recommended by the insulation manufacturer and complying with the requirements for fire resistance.

Line wire.--

Line wire shall be commercial quality 0.89 mm (20-gage) galvanized steel wire.

FABRICATION.--

General.--Polyethylene shall be factory laminated to fiberglass batts or blankets by an applicator approved by the manufacturer of the batts or blankets.

PART 3.- EXECUTION

INSTALLATION.--

General.--The vapor retarder on faced batts shall be toward the interior and shall be fastened to provide a sealed retarder. Punctures and holes in the retarder shall be repaired.

Unless otherwise shown on the plans or specified elsewhere in these special provisions, insulation shall be kept 75 mm to 100 mm clear of lighting fixtures and heat producing electrical appliances and equipment.

Installing batt type insulation.--Insulation batts shall be installed to completely fill the space between framing members. Apply a single layer of insulation of required thickness, unless otherwise shown on the plans or required to make up total thickness. Installation shall conform to the manufacturer's recommendations and these special provisions.

Installing exposed insulation.--When line wire is shown on the plans, blankets shall be supported with line wire spaced at 405 mm on center.

Joints in exposed insulation shall be sealed by lapping not less than 100 mm. Exposed insulation shall be fastened to framing at top, end and bottom, at perimeter of wall openings and at lap joints.

Overlapping joints shall be sealed with insulation adhesives as recommended by vapor retarder manufacturer's printed directions. Butt joints and fastener penetrations shall be sealed with insulation tape of the type recommended by the vapor retarder manufacturer. Joints at pipes, conduits, electrical boxes and similar items penetrating the vapor retarder shall be sealed.

7.03B RIGID WALL INSULATION

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing rigid wall insulation in accordance with the details shown on the plans and these special provisions.

Rigid insulation shall include rigid insulation, wood nailers, fasteners and such other materials, not mentioned, which are required for the complete installation of the rigid insulation system.

QUALITY ASSURANCE.--

Codes and standards.--Rigid foam insulation shall have a flame-spread rating not to exceed 75 and a smoke density not to exceed 450 when tested in accordance with CBC Standard No. 8-1. Rigid foam insulation shall be approved in accordance with CBC Standard 26-3 to be installed exposed, or without a thermal barrier on the room side of the insulation.

PART 2.- PRODUCTS

Rigid insulation.--

Rigid insulation shall be rigid rectangular boards of polyisocyanurate foam with aluminum foil facing on both sides and an aged thermal resistance of $R-1.9 \text{ K} \cdot \text{m}^2/\text{W}$. Facing on exposed insulation shall be white tinted aluminum foil.

Wood nailers.--

Wood nailers shall be Douglas fir, Hem-fir or equivalent western softwood. Nailers in contact with masonry or concrete shall be pressure treated after fabrication. Wood preservatives shall be waterborne type.

Insulation tape.--

Insulation tape shall be as recommended by the insulation manufacturer.

Adhesive.--

Adhesive shall be construction grade panel adhesive as recommended by the insulation manufacturer.

PVC strips.--

PVC strips shall be interlocking male and female white PVC strips.

Fasteners.--

Fasteners shall be concrete nails; Bostich, Pneumatic Nail System; Buildex, Tampon Fasteners; or equal.

EXECUTION.--

Installation of rigid insulation.--The preparation of the wall surfaces and the installation of insulation shall conform to the manufacturer's recommendations and these special provisions.

Rigid insulation placed behind plywood or gypsum board shall be tight fitting between nominal 51 mm x 102 mm wood nailers laid flat and spaced 0.6 meter on center. Wood nailers shall also be placed at the top and bottom of the plywood or gypsum board.

Exposed rigid insulation shall be installed tight fitting between PVC strips spaced at 1.2 meter on center. PVC strips shall align with the vertical joints of the plywood below. Adhesive shall be applied to the PVC strips and the wall as recommended by the insulation manufacturer. Exposed insulation shall have no horizontal joints between the top of the plywood and the bottom of the trusses.

All joints between insulation boards and between insulation boards and wood nailers shall be taped.

Insulation panels with broken or crushed corners or edges shall be trimmed free of such defects or shall be discarded. Replacement boards less than 300 mm wide shall not be used.

Damaged insulation in the completed work shall be removed and replaced. Insulation that has been wet or is wet shall be considered damaged.

7.03C RIGID ROOF INSULATION

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing rigid roof insulation in accordance with the details shown on the plans and these special provisions.

Rigid insulation shall include rigid insulation, underlayment, wood nailers, fasteners and such other materials, not mentioned, which are required for the complete installation of the rigid insulation system. Materials and installation shall be coordinated with the roof covering system to meet the requirements for a Class 1 Factory Mutual approved assembly.

PART 2.- PRODUCTS

Underlayment.--

Underlayment shall be building paper, Type I (No. 15) asphalt roofing felt, or rosin-sized paper.

Rigid roof insulation.--

Rigid roof insulation shall be multilayer, preformed board roof insulation having thermal conductance or resistance as shown on the plans. Glass fiber board conforming to ASTM Designation: C 726, or expanded perlite board conforming to ASTM Designation: C 728, or wood fiber board conforming to ASTM Designation: C 208.

Insulation tape.--

Insulation tape shall be as recommended by the insulation manufacturer.

Bitumen.--

Bitumen shall conform to ASTM Designation: D 312, for Type III roofing asphalt.

Fastener (metal decking)--

Fastener (metal decking) shall be galvanized spring steel barbed clip driven through galvanized 25 mm minimum nominal diameter caps; galvanized hardened steel nail with 25 mm minimum nominal diameter head and serrated shank to provide backout resistance; or threaded self tapping screw driven through 75 mm minimum nominal diameter galvanized cap.

PART 3.-EXECUTION

Preparation.--The preparation of the deck surfaces shall conform to the manufacturer's recommendations and these special provisions.

The deck surface shall be made smooth and level.

Installation.--Underlayment shall be fastened to nailable decks with randomly located roofing nails.

Insulation panels shall be placed in at least 2 layers with end joints staggered and with joints of the second layer offset at least 150 mm from joints in the first layer.

Insulation panels shall be oriented with the long side perpendicular to the direction roofing felts are to be laid. End joints between panels shall be staggered.

Insulation clips and fasteners shall resist the wind uplift classification specified for the roof covering.

The first layer of insulation shall be mechanically fastened as recommended by the manufacturer to meet the requirements of the Factory Mutual Loss Prevention Data 1-28. At least one fastener per 0.2 square meter of insulation panel shall be used. Panels that are cracked or broken by the installation of the mechanical fasteners shall be replaced.

Additional layers of insulation shall be secured with a solid uniform application of hot bitumen applied at the rate of 14.6 kilograms per 10 square meters.

The completed layer of insulation shall be smooth and level, and suitable for the proper bedding of succeeding layers of roofing material.

Insulation shall be laid just before application of roofing. Units shall be laid in parallel courses with transverse joints staggered, in moderate contact with adjoining surfaces.

No more insulation shall be laid than can be covered with roofing the same day. Cutoffs of 2 layers of hot mopped Type I (No. 15) asphalt saturated felt shall be installed, not less than 100 mm onto completed work and extended out not less than 150 mm onto the deck, at exposed edges of insulation at the end of each day's work. Cutoffs shall be removed when work is resumed.

Joints in the top layer of glass fiber roof insulation shall be taped with 150 mm wide felt stripping set in hot asphalt mopping.

Continuous joints between insulation units and parallel to decking flutes shall not occur over the flute openings. Both units shall have full edge bearing on rib tops.

Insulation panels with broken or crushed corners or edges shall be trimmed free of such defects or shall be discarded. Replacement boards less than 305 mm wide shall not be used.

Damaged insulation in the completed work shall be removed and replaced. Insulation that has been wet or is wet shall be considered damaged.

7.04 THROUGH-PENETRATION FIRESTOPPING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing firestopping materials at penetrations in fire-rated walls, floors, and ceilings in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--A list of materials, manufacturer's descriptive data, and location schedule shall be submitted for approval.

Descriptive data shall include trade names, manufacturers' names, complete information on the materials to be applied, California State Fire Marshal Listing, the material thickness for the required fire resistance ratings, and the manufacturer's printed instructions for installation. Manufacturer's assembly shall be California State Fire Marshal approved.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of Compliance shall be furnished with each shipment of firestopping material in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

DELIVERY, STORAGE AND HANDLING.--

Delivery.--Materials to be applied shall be delivered in original unopened packages. Packages shall be identified by the manufacturer's label and shall bear proper labels for fire resistance classification.

Storage.--Materials shall be stored above ground, under cover, and in a dry location until ready for use. Packages which have been exposed to moisture before use shall be discarded.

PART 2.- PRODUCTS

Fire-rated caulk.--

Fire-rated caulk shall conform to ASTM Designation: E 814 and shall be rated for use in 2 and 3-hour fire-rated assemblies. Fire-rated caulk shall be 3M Brand, Fire Barrier Caulk; Dow Corning, Fire Stop Sealant; Standard Oil, Fyre Putty; or equal.

Wrap strip.--

Wrap strip shall be nominal 6 mm thick intumescent elastomeric material in 50 mm wide strips, faced one side with aluminum foil, and rated for use in 1-hour and 2-hour fire-rated systems.

Packing material.--

Packing material shall be polyethylene backer rod or nominal one inch thickness of tightly packed ceramic (alumina silica) fiber blanket, mineral-wool batt or glass fiber insulation material.

Fire-rated mortar.--

Fire-rated mortar shall be non-asbestos, 753 to 913 kilograms per cubic meter air dried density portland cement fly ash through-penetration firestopping mortar. Fire-rated mortar shall conform to ASTM Designation: E 814 and shall be rated for use in 3-hour fire-rated systems at 75 mm minimum thickness.

Fire safing insulation.--

Fire safing insulation shall be inorganic 56 kilograms per cubic meter minimum density, non-combustible fiber insulation conforming to Federal Specifications HH-1-521F, when tested in accordance with ASTM Designation: E 119 and ASTM Designation: E 136 for 3 hour fire resistance.

PART 3.-EXECUTION.--

Installation.--Firestopping materials shall be installed to conform to the requirements of the California State Fire Marshal Listing and the manufacturer's recommendations.

7.05 METAL ROOFING**PART 1.- GENERAL****SUMMARY.--**

Scope.--This work shall consist of furnishing and installing preformed metal roofing in accordance with the details shown on the plans and these special provisions.

Metal roofing system shall consist of underlayment, prefinished metal roof panels, concealed fasteners, sealants, snow guards, and other accessories and components, not mentioned, which are required for a complete, securely fastened and weathertight installation.

SYSTEM DESCRIPTION.--

Design Requirements.--The roofing system shall conform to the wind design requirements for uplift in Chapter 16 of the California Building Code for the wind speed and exposure shown on the plans.

SUBMITTALS.--

Product Data.--Manufacturer's technical product data, installation instructions, and recommendations for each type of roofing material shall be submitted for approval.

Product data shall include the manufacturer's name and a complete material description of all components of the metal roofing system.

Samples.--Material samples shall include a 305 mm x 305 mm sample of the roofing panel for each color to be installed and a sample of each anchor clip and fastening device.

Shop Drawings.--Shop drawings showing the layout and details of the metal roofing shall be submitted for approval.

Shop drawings shall show the shape, size, thickness, and method of attachment for each component used in the work; the layout and spacing of fasteners; details of connections and closures; and details for expansion joints and weathertight joints.

Design calculations for the fastening system with the substrate shown on the plans shall be submitted to verify compliance with the design requirements.

Shop drawings and design calculations shall be stamped and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California. The expiration date of the registration shall be shown. The Engineer's signature shall be original.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of compliance shall be furnished for the metal roofing system in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

DELIVERY, HANDLING AND STORAGE.--

Delivery and handling.--Panels shall be protected against damage and discoloration.

Storage.--Panels shall be stored above ground, with one end elevated for drainage and protected against standing water and condensation between adjacent surfaces.

PART 2.- PRODUCTS

MATERIALS.--

SHEET MATERIAL.--

Base metal.--

Base metal shall be cold formed, 0.71 mm (24-gage), galvanized sheet steel conforming to ASTM Designation: A 653/A 653M, Grade 33 [230] with G90 [Z275] coating, except where a higher strength is required for performance, extra smooth; or cold formed aluminum-zinc alloy-coated, commercial quality, sheet steel conforming to ASTM Designation: A 792/A 792M, Grade 40 [275] with AZ55 [AZM 165], coating extra smooth.

Configuration.--

Metal roofing system shall be a standing seam system with a minimum of 45 mm high and spaced not less than 305 mm nor more than 460 mm on center.

METAL FINISHES.--

General.--Coatings shall be applied before or after forming and fabricating panels, as required for maximum coating performance capability.

Colors or color matches shall be as shown on the plans or, if not otherwise shown, shall be as selected by the Architect from the manufacturer's standard color palette.

Fluoropolymer coating.--

Finish shall be the manufacturer's standard Kynar coating with a baked on primer (0.005 mm) and a finish coat of 0.02 mm nominal for a total dry film thickness of approximately 0.025 mm nominal.

Interior finish shall consist of a 0.004 mm epoxy primer and a backer coat.

MISCELLANEOUS METAL SHAPES.--

Flashings.--

Flashings shall be formed from the same material, gage and in the same finish as the roofing panels.

MISCELLANEOUS MATERIALS--

Fastener clips.--

Fastener clips shall be noncorrosive ferrous metal fasteners as recommended by the metal roofing system manufacturer to resist the design loads.

Fasteners.--

Fasteners shall be as recommended by the metal roofing system manufacturer. Sheet metal screws shall not be used except to fasten trim and flashings.

Underlayment.--

Underlayment shall be as recommended by the metal roofing system manufacturer, but not less than 7 kilograms minimum asphalt impregnated fiber glass mat roofing felt.

Sealant and sealant tape.--

Sealant and sealant tape shall be as recommended by the roofing manufacturer.

Closures.--

Closures shall be rubber, neoprene, closed cell plastic or prefinished metal.

Snow guards.--

Snow guard shall be as specified under "Snow Guards" elsewhere in this Division of these special provisions.

FABRICATION.--

General.--Unless otherwise shown on the plans, or specified herein, roof panels shall be fabricated in continuous lengths for the length of the roof, from ridge or peak to eave, except such length shall not exceed the manufacturer's maximum production length. Flashings shall be fabricated in the longest practical lengths.

Roofing panels shall be factory formed. Field formed panels are not acceptable.

PART 3.- EXECUTION.--

INSTALLATION.--

Underlayment.--The roof and fascia panels shall be installed over underlayment. Underlayment shall be laid parallel to the eaves, shingle fashion with 152 mm edge laps and 305 mm end laps and shall be fastened as recommended by the metal roofing system manufacturer.

Roof panels.--The roof system shall be installed and fastened in accordance with the details shown on the plans and the approved shop drawings. Cutting and fitting shall present a neat and true appearance with exposed burrs removed. Openings through roof panels shall be cut square and shall be reinforced as recommended by the metal roofing system manufacturer.

Roof panels shall be adjusted in place and properly aligned for the detailed conditions before fastening. Panels shall not be warped, bowed or twisted. The surface finish on the panels shall not be cracked, blemished or otherwise damaged.

Gaskets, joint fillers, sealants and sealing tape shall be installed where indicated on the approved drawings or as required for weatherproof performance of panel systems.

Fasteners shall not be driven through roof panels or batten covers.

Miscellaneous metal shapes.--Trim, flashings, and other prefinished metal work shall be positioned to the correct alignment for each detailed condition. Metal work shall be securely attached to backing using fasteners at the spacing shown on approved shop drawings. Prefinished metal to be installed over concrete, masonry or plaster shall be back-coated with asphaltic paint as recommended by the metal roofing system manufacturer.

Roof panels, trim, and other prefinished metal that are marred, punctured, incorrectly bent, or incorrectly installed will be considered damaged and shall be replaced with undamaged units.

The metal roofing system shall be installed weathertight. Closures shall be tight fitting and shall be provided at the ends of panels, at the boundary of the roof, and as indicated on the approved shop drawings.

CLEAN UP AND CLOSE OUT.--

Clean up.--Adjacent surfaces shall be protected during the roofing system installation and sealant work. Excess sealant shall be removed as the installation progresses.

Roof panels, molding, trim, and other prefinished metal surfaces shall be cleaned after installation as recommended by the manufacturer. Exposed cuts shall be touched-up with a matching durable primer and paint as recommended by the metal roofing system manufacturer.

Touch up.--Damaged paint surfaces shall be touched up by using an air dry touch up paint supplied by the metal roofing system manufacturer. Only a small brush shall be used for touching up. No spraying of touch up paint is to be performed.

Damaged units.--Panels and other components of the work which have been damaged or have deteriorated beyond successful repair shall be removed and replaced.

7.06 SNOW GUARDS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing snow guards in accordance with the details shown on the plans and these special provisions.

Snow guards shall include roof seam clamps, color strip, fastening bolts, snow slips and accessories needed to provide a complete installation.

Related work.--Metal roofing shall be in accordance with the requirements specified under "Metal Roofing" in this Division 7, of these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, and installation instructions shall be submitted for approval.

Samples.--Three samples of the complete snow guard assembly shall be submitted for approval.

DELIVERY, STORAGE, AND HANDLING.--

Delivery.--Materials shall be delivered in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name.

Storage.--Materials shall be kept dry and protected from the weather.

PART 2.- PRODUCTS

Snow guards.--

Snow guards shall be 6061 T6 extruded aluminum, approximately 50 mm high, designed to receive a color strip and attach to the roof seam clamps with bolts and washers.

Roof seam clamps.--

Roof seam clamps shall be 6061 T6 extruded aluminum designed as appropriate for the roof seam profile and attached to the roof seam with 2 set screws.

Fasteners.--

Fasteners shall be Series 300 stainless steel bolts, washers and set screws. Bolts and set screws shall have a minimum diameter of 9.5 mm. Set screws shall have a rounded nose point to prevent damage to the panel finish.

Color strips.--

Color strips shall be prefinished metal of the same material and color as the prefinished metal roof panel.

PART 3.- EXECUTION

Installation.--Snow guards shall be installed true to line in accordance with the manufacturer's recommendations.

Set screws shall be on the same side of the roof seam clamp and on the same side of the roof seam throughout the installation. Set screws shall be torqued as recommended by the manufacturer to provide maximum holding strength. Set screws shall not penetrate the roof seam.

Snow guard installation shall not impair drainage of the roof.

7.07 SINGLE-PLY ROOFING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing a mechanically fastened single-ply sheet roofing in accordance with the detail shown on the plans and these special provisions.

Single-ply roofing includes membrane, fasteners, bonding adhesive, flashing and other materials required, but not necessarily mentioned, to provide a complete and waterproof installation.

Single-ply roofing shall be classified by Underwriters Laboratories as a Class A sheathing material for use in construction of a Class A fire retardant roofing assembly.

The single-ply roofing system shall be tested and meet the requirements of Factory Mutual Research Corp. Class I, I-90, as outlined in FM Standard 4470.

Related work.--Roof substrate shall conform to the requirements in "Metal Roof Decking" in Division 5 "Metals," and "Rigid Roof Insulation" in this Division 7 "Thermal and Moisture Protection," of these special provisions.

Wood nailers shall conform to the requirements in "Carpentry" in Division 6 "Wood and Plastic," of these special provisions.

Metal flashing shall conform to the requirements in "Sheet Metal Flashing" in this Division 7 "Thermal and Moisture Protection," of these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, Factory Mutual test reports, product specifications, storage requirements and installation instructions shall be submitted for approval.

Shop drawings.--Complete shop drawings showing roof configuration, sheet layout, seam locations, seam details, fastening details, details at perimeter and special conditions shall be submitted for approval.

Samples.--Three samples of finished roofing sheets, not less than 305 mm by 305 mm, including T-shaped side and end lap seam shall be submitted for approval.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of Compliance shall be furnished for single-ply roofing membrane in accordance with the requirements specified in Section 4.104, "Certificates of Compliance," of the General Conditions.

Single source responsibility.--Single-ply roofing materials shall be obtained from a single manufacturer. Secondary materials shall be as recommended by the single-ply roofing manufacturer.

Installer's qualification.--Single-ply roofing installer shall be approved and certified by the single-ply roofing manufacturer as qualified to install this type of roofing. A copy of the manufacturer's certification shall be given to the Engineer prior to the installation of any roofing materials.

Pre-roofing conference.--Prior to installation of roofing or associated work, the Contractor shall convene a pre-roofing conference with the installer, roofing manufacturer and the Engineer. Discussions and agreements shall be recorded and copies furnished to each participant.

Advance notice of the meeting shall be given in writing to each participant at least 72 hours prior to the meeting.

PROJECT CONDITIONS.--

Weather.--Roofing work shall proceed when existing and forecasted weather conditions permit the work to be performed in accordance with the manufacturer's recommendations and warranty requirements.

WARRANTY.--

Special project warranty.--A written warranty, signed by the manufacturer of the primary roofing materials, agreeing to replace or repair defective materials and workmanship as required to maintain roofing system in watertight condition shall be given to the Engineer prior to completion of the project.

Warranty shall be for a period of not less than 5 years after acceptance of the contract.

DELIVERY, STORAGE AND HANDLING.--

Delivery, storage and handling.--Materials shall be delivered to the job site in manufacturer's original unopened packages clearly labeled with manufacturer's name and identification numbers. Materials shall be stored in strict accordance with the manufacturer's printed storage requirements. Material shall be handled in such a manner as to prevent damage and premature curing.

PART 2.- PRODUCTS

GENERAL.--

Performance.--Roofing materials shall be provided which are recognized to be of generic type indicated and tested to show compliance with indicated performances.

Compatibility.--Products which are recommended by the manufacturer to be fully compatible with the substrate shall be provided.

MANUFACTURERS.--

Available manufacturers.--Subject to compliance with the requirements, manufacturers offering products which may be incorporated into the work include, but are not limited to, Stevens; Genflex; or equal.

MATERIALS.--

Membrane.--

Membrane shall be a thermoplastic polyolefin compound of ethylene and propylene not less than 1.14 mm thick. The exposed surface of the membrane shall be white.

Walkway pad.--

Walkway pad shall be a thermoplastic polyolefin compound of ethylene and propylene not less than 3.0 mm thickness.

Fasteners.--

Fasteners used to bond the roof membrane to the substrate as recommended by the roofing manufacturer.

Bonding Adhesive.--

Bonding adhesive shall be a contact-type adhesive used to bond the roof membrane to the substrate as recommended by the roofing manufacturer.

Flashing material.--

Flashing material shall be the manufacturer's standard materials and systems compatible with the roofing membrane.

Cant strips, tapered edge strips and accessories.--

Cant strips, tapered edge strips and accessories, including adhesive tapes, flashing cements and sealants, shall be as recommended by the roofing manufacturer and shall be provided at locations shown on the plans and at locations recommended by the manufacturer.

PART 3.- EXECUTION

PREPARATION.--

General.--The roof deck substrate shall be completely installed prior to installation of the roofing membrane. The roof deck surface shall be swept clean and be free of sharp edges, cracks, debris, oil and grease and otherwise suitably prepared to accept the roofing membrane.

Cant strips, flashings, and accessory items shall be installed as shown on the plans, and as recommended by the roofing system manufacturer.

INSTALLATION.--

General.--Installation shall conform to the manufacturer's instructions, except where more stringent requirements are indicated on the plans or in these special provisions.

Membrane installation.--Installation shall be started only in the presence of the manufacturer's representative if required by the manufacturer.

Membrane shall be installed in strict accordance with manufacturer's written instructions, the approved working drawings and the written record of the pre-roofing conference.

CLEAN-UP.--

General.--Upon completion of the installation, the roof surface shall be broom cleaned of all construction debris.

7.08 SHEET METAL FLASHING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of fabricating, furnishing and installing sheet metal flashing in accordance with the details shown on the plans and these special provisions.

Sheet metal shall include metal flashings, counterflashings, straps, and roof jacks.

QUALITY ASSURANCE.--

Codes and standards.--Sheet metal work shall in accordance with the requirements in the latest edition of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) "Standard Practice in Architectural Sheet Metal Work."

PART 2.- PRODUCTS

MATERIALS.--

Galvanized sheet steel.--

Galvanized sheet steel shall conform to ASTM Designation: A 653/A 653M with G 90 [Z275] coating, not less than 0.71 mm (24-gage), unless otherwise shown on the plans. Surfaces to be painted shall not have factory coatings on galvanizing that cannot be removed by paint thinner.

Solder.--

Solder shall conform to ASTM Designation: B 32, Alloy Grade Sn50.

Soldering flux.--

Soldering flux shall be acid type, conforming to Federal Specification: O-F-506C, Type I, Form A.

Lap joint sealant.--

Lap joint sealant for concealed locations shall be a non-drying butyl.

Flashing cement.--

Flashing cement shall be a bituminous plastic cement, asbestos free, conforming to ASTM Designation: D 4586, Type II.

Sealant.--

Sealant for exposed locations shall be a silicone sealant conforming to ASTM Designation: C 920.

Primer.--

Primer shall be as recommended by the sealant manufacturer.

FABRICATION.--

General.--Sheet metal shall be assembled to Sheet Metal and Air Conditioning Contractors National Association Standards.

Sheet metal shall be formed to the sizes, shapes and dimensions shown on the plans or as specified herein with angles and lines straight, sharp and in true alignment. The number of joints shall be kept to a minimum.

Angle bends and folds for interlocking the metal shall be made with full regard for expansion and contraction to avoid buckling or fullness in the metal after it is installed.

Joints in sheet metal work shall be closed watertight unless slip joints are specifically required. Watertight joints shall be mechanically interlocked and then thoroughly soldered for metals other than aluminum. Watertight joints in aluminum or between aluminum and other metals shall be sealed with acrylic sealant.

Sheet metal joints to be soldered shall be cleaned with steel wool or other means, pre-tinned and soldered watertight.

All joints shall be wiped clean of flux after soldering. Acid flux shall be neutralized by washing the joints with sodium bicarbonate.

Flashings shall have a 45 degree drip return at bottom edges. Unless otherwise shown on the plans, counterflashing shall extend not less than 100 mm over roofing or other materials protected by the counterflashing and shall be arranged so that roofing or materials can be repaired without damage to the counterflashing. Where reglets are indicated, counterflashing shall be fastened by lead wedges or snap-in flashing.

PART 3.- EXECUTION

PREPARATION.--Surfaces to receive sheet metal shall be clean, smooth and free from defects.

INSTALLATION.--

Roof penetration flashings.--All pipes, ducts, vents and flues passing through roofs shall be made waterproof with flashings of storm collars or counterflashings.

Roof penetration flashings shall be fabricated from galvanized sheet steel, not less than 0.71 mm (24-gage). Size and shape shall be as shown on the plans.

7.09 SEALANTS AND CAULKING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and applying sealants and caulking which are required for this project, but not specified elsewhere, in accordance with the details shown on the plans and these special provisions.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of compliance shall be furnished for the sealants and caulking in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and installation instructions for all sealants shall be submitted for approval.

Samples.--Color samples of all sealants shall be submitted for approval. Unless otherwise shown on the plans, colors will be selected by the Engineer from the manufacturer's standard colors.

PART 2.- PRODUCTS

MATERIALS.--

General.--All sealants, primers and accessories shall be non-staining to adjacent exposed surfaces. Products having similar applications and usage shall be of the same type and same manufacturer. Gun consistency compound shall be used unless otherwise required by the job conditions.

Acrylic sealant.--

Acrylic sealant shall be one compound, solvent release acrylic sealant.

Butyl sealant.--

Butyl sealant shall be one component, skinning type.

Silicone sealant.--

Silicone sealant shall be one component, low modulus building sealant. Sealant shall be tack-free in one hour, shall not sag or flow, shall be ozone resistant and capable of 100 percent extension without failure.

Joint sealant.--

Joint sealant shall be a two-part, non sag polysulfide base, synthetic rubber sealant formulated from liquid polysulfide polymer.

Backer rod.--

Backer rod shall be round, open or closed cell polyurethane. Backer rod shall be sized such that it must be compressed between 25 and 75 percent of its uncompressed diameter during installation in the joint.

Neoprene.--

Neoprene shall conform to the requirements of ASTM Designation: C 542.

PART 3.- EXECUTION**APPLICATION.--**

General.--Unless otherwise shown on the plans, sealants shall be applied in accordance with the manufacturer's instructions.

Silicone sealants shall not be used in locations where painting is required.

Butyl sealants shall not be used in exterior applications, and acrylic sealants shall not be used in interior applications.

Sealants shall be applied in a continuous operation for the full length of the joint. Immediately following the application of the sealant, the sealant shall be tooled smooth using a tool similar to that used to produce concave masonry joints. Following tooling, the sealant shall remain undisturbed for not less than 48 hours.

DIVISION 8. DOORS AND WINDOWS**8.01 HINGED DOORS**

GENERAL.--This work shall consist of furnishing and installing hinged doors and frames in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data, installation instructions for fire rated assemblies and a door schedule shall be submitted for approval. The door schedule shall include a description of the type, location and size of each door and frame.

PRODUCTS.--**Metal door.--**

Metal door shall be flush, seamless steel door factory prepared and reinforced to receive hardware and having cold rolled stretcher leveled sheet steel face sheets not less than 1.2 mm thick (18-gage). Face sheets shall be bonded with thermosetting adhesive to rigid board honeycomb or precured foam core; or face sheets shall be welded to all parts of an assembled grid of cold formed pressed metal stiffeners and framing members located around edges, ends, openings and at all locations necessary to prevent buckling of face sheets. Seams shall be tack welded, filled and ground smooth. Bottom edge and internal stiffeners of grid type core shall have moisture vents. Welds on exposed surfaces shall be ground smooth. Louvered or glazed openings shall be provided where shown on the plans.

Where fire rated doors are required, doors shall be listed and labeled for the fire rating shown on the plans.

Active leaf of double door shall have a full height astragal of 3 mm flat bar or folded sheet strip, not less than 1.5 mm thick (16-gage), welded on the outside of the active leaf.

Door shall be cleaned and treated by the bonderized process or approved phosphatizing process and then given one factory application of metal protective rust inhibitive primer. Primer shall not contain lead type pigments.

Glazing for doors.--

Glazing for doors shall be safety glass as specified under "Glazing" in Division 8, "Doors and Windows," of these special provisions. Glazing shall be not less than 5 mm thick.

Door louvers.--

Door louvers shall be inverted V-type factory primed, galvanized sheet steel louvers. Exterior door louvers shall not be removable from outside of the building. Louvers at exterior doors shall have inside mounted bronze insect screens.

Louvers shall be cleaned and treated by the bonderized process or approved phosphatizing process and then given one factory application of metal protective rust inhibitive primer. Primer shall not contain lead type pigments.

Pressed metal frame.--

Pressed metal frame shall be not less than 1.5 mm thick (16-gage) sheet steel with integral stop, mitered corners, face welded and ground smooth corners. Frames shall be reinforced for all hardware and shall be cleaned and treated by the bonderized process or an approved phosphatizing process and then given one factory application of metal protective rust inhibitive primer. Primer shall not contain lead type pigments.

Frames for fire rated doors shall be listed for the same rating shown on the plans for fire rated doors.

Sealants.--

Sealants shall be ultraviolet and ozone resistant, gun grade polysulfide or polyurethane, multicomponent, Federal Specification: TT-S-227.

EXECUTION.--

INSTALLATION.--Doors and frames shall be installed rigidly, securely, plumb and true and in such a manner that the doors operate freely without rubbing or binding. Clearance between frame and door shall be not more than 3 mm. The exterior frame shall be sealed weathertight.

Pressed metal frames shall be secured with clips and anchors as shown on the plans.

Fire rated assemblies shall be installed according to the manufacturer's recommendations.

Fire rated assemblies shall include doors, door frames, automatic smoke-actuated closers, self-closing mechanisms, panic hardware, wire glass, and fire rated louvers. Assemblies shall be approved by the California State Fire Marshal.

PAINTING.--Except for the primer application specified herein, doors and frames shall be cleaned, prepared and painted in accordance with the requirements specified under "Painting" in Division-9, "Finishes," of these special provisions.

8.02 ATTIC ACCESS DOORS

GENERAL.--This work shall consist of furnishing and installing attic access doors in accordance with the details shown on the plans and these special provisions

SUBMITTALS.--Manufacturer's descriptive data and installation instructions shall be submitted for approval.

PRODUCTS.--**Access doors.--**

Access doors shall be factory assembled and factory prime painted steel. Door panel shall be 1.90 mm thick (14-gage) and door frame shall be 1.5 mm thick (16-gage). The door and frame assembly shall have standard screw driver operated cam locks, concealed springs or continuous piano hinge and inside release handle. Access doors shall be by Babcock-Davis Hatchways, Bar-Co Access Doors, Inryco-Milcor, J.L. Industries, or equal.

EXECUTION.--

INSTALLATION.--Access doors shall be installed in accordance with the manufacturer's recommendations.

The access door assemblies shall be painted to match the color of the adjacent surrounding surfaces.

8.03 SECTIONAL OVERHEAD DOORS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing sectional overhead doors in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, roughing-in diagram and installation instructions for each size and type of door shall be submitted for approval.

Manufacturer's descriptive data shall include door panel construction and material thickness, door track size and material thickness, counterbalance spring service life and motor operator specifications.

Materials list shall contain all items proposed to be furnished and installed under this section of these special provisions.

Shop drawings shall show details of special components and installations which are not fully dimensioned or detailed in manufacturer's descriptive data.

QUALITY ASSURANCE.--

Single source.--Each sectional door shall be provided as a complete unit produced by one manufacturer, including frames, sections, bracket guides, tracks, counterbalance mechanisms, hardware, operators and installation accessories, to suit opening and head room available.

Wind loading.--Design and reinforce section overhead doors to withstand a 960 PA wind load with a midspan deflection not to exceed 1/120 span.

PART 2.- PRODUCTS

MANUFACTURERS.--

Available manufacturers.--Subject to compliance with the specifications, manufacturers offering products which may be incorporated into the work include, but are not limited to the following: Clopay Corp.; Overhead Door Corp.; Raynor Garage Doors.

STEEL SECTIONS.--

Door sections.--

Door sections shall be galvanized commercial quality steel sheets and a minimum of G60 zinc coating complying with ASTM Designation: A 525.

Face sheets shall be not less than 0.86mm (20-gage). Back sheet shall be not less than 0.45 mm (26-gage).

Sections shall be fabricated from a single sheet to provide sections not more than 610 mm high, and nominal 50 mm deep. Meeting horizontal edges shall be rolled to a continuous shiplap, rabbeted or keyed weather seal, with a reinforcing flange return.

Intermediate and end stiles shall be 1.52 mm (16-gage) galvanized steel welded in place. Intermediate stiles shall be spaced at not more than 1220 mm on center.

Bottom section shall be reinforced with a continuous channel or angle conforming to the bottom section profile.

Insulation.--

Insulation shall be the manufacturer's glass fiber, polystyrene or polyurethane foam type insulation and have an R-Value not less than $1.4 \text{ K}\cdot\text{m}^2/\text{W}$.

Finish.--

Finish shall be the manufacturer's standard baked on polyester or epoxy prime and finish coats, applied to interior and exterior faces.

TRACKS, SUPPORTS. AND ACCESSORIES.--**Door tracks.--**

Door tracks shall be the manufacturers standard galvanized steel track system, sized for door size and weight, and designed for the clearances shown on the plans. Complete track assembly shall be provided, including brackets, bracing and reinforcing for rigid support of ball bearing roller guides, for required door type and size.

Track reinforcement and supports.--

Track reinforcement and supports shall be galvanized steel. Tracks shall be reinforced and supported as required for the size and weight of door to provide strength and rigidity, and to ensure against sag, sway and vibration during operation.

Door seals.--

Doors shall have perimeter gasket seals at head and jambs and seal shall have a replaceable vinyl or neoprene bottom seal.

Vision panels.--

Vision panels shall be door manufacturer's standard glazed opening with wire safety glass, metal frame and vinyl or neoprene glazing gasket for water tight construction. The approximate size shall be as shown on the plans.

Adjustable louvers.--

Adjustable louvers shall be factory fabricated units of extruded aluminum alloy not less than 2.0 mm thick or galvanized steel not less than 0.91 mm thick (20-gage) with standard "Z" type blades set in a continuous channel frame, with a 6 mm mesh galvanized bird-screen in a removable frame on the inside.

Blades shall have center pivot on 10 mm aluminum rods in stainless steel ball bearings in cadmium plated races.

Adjustable louvers shall be equipped with hand-held fixed to the operating bar for easy adjustment with wingnut spring tension to lock louvers in desired position.

HARDWARE.--

General.--Hardware shall be heavy-duty, rust-resistant, with galvanized or cadmium-plated or stainless steel fasteners, to suit type of door.

Hinges.--

Heavy steel hinges shall be provided at each end stile and at intermediate stiles, per manufacturer's recommendations for size of door.

Rollers.--

Rollers shall be heavy-duty with steel ball bearings in case-hardened steel races, mounted to suit slope of track. Rollers shall have case-hardened tires.

COUNTERBALANCE MECHANISMS.--

Counterbalance spring.--

The door shall have a torsion spring counterbalance on a continuous cross header shaft; the entire assembly shall be all-bearing mounted. The spring shall have a rated service life of not less than 25,000 cycles.

ELECTRIC DOOR OPERATORS.--

Door operator shall be heavy duty, commercial type. Motor shall be a 230-volt, single-phase, high starting torque motor with single reduction worm gear, completely housed and running in an oil bath. Motor shall be of sufficient capacity to raise and lower the door at speed of approximately 0.2 m per second.

Door operator and assembly shall be equipped with solenoid brake, limit switches for upper and lower limits of door travel, emergency hand chain with electrical interlock to break motor circuit when hand chain is engaged, 3-button operating station in a NEMA Type 4 enclosure, and a factory wired NEMA Type 1 control panel.

Control panel shall contain an instrument transformer, reversing magnetic contactor with overload relay, and all necessary control relays and other devices required for complete automatic operation of the door. Motor shall be removable for repair without affecting emergency operation. Motor shall be centermounted or sidemounted as shown on the plans.

Reversing door edge.--

Reversing door edge shall be an electrically or pneumatically operated safety device extending across the full width of the bottom of the door which shall cause the door to stop automatically and return to open position upon contact with any obstruction.

PART 3.- EXECUTION

INSTALLATION.--

General.--Door, track, and operating equipment, complete with necessary hardware, jamb and head mold stops, anchors, inserts, hangers, and equipment supports, shall be installed in accordance with the final drawings, manufacturer's installation instructions and these special provisions.

Vertical track assembly shall be fastened to framing at not less than 610 mm on center. Horizontal track shall be hung from structural overhead framing with angle or channel hangers, welded or bolted into place. Sway bracing, diagonal bracing, and reinforcing as required for rigid installation of track and door operating equipment.

8.04 POWER OPERATED ROLL-UP STEEL DOOR

GENERAL.--This work shall consist of furnishing and installing electric motor operated, roll-up door in accordance with the details shown on the plans and these special provisions.

The mountings for the door shall be located above the ceiling for complete concealment.

SUBMITTALS.--Product descriptive data, materials list, shop drawings and installation instructions shall be submitted for approval.

Manufacturer's descriptive data shall show manufacturer's name and conformance to these special provisions for door panel construction and material thickness, curtain guide size and material thickness, counterbalance spring service life, and motor operator specifications.

Materials list shall contain all items proposed to be furnished and installed under this section of these special provisions.

Shop drawings shall show details of the door frame and track, elevations of the door design type, details of the sectional door panels, and all details required for complete installation and anchorage.

PRODUCT.--

Curtain.--

Curtain shall be interlocking flat faced sheet steel slats; sectional dimensions shall be 38 mm to 76 mm in height and 13 mm to 22 mm in depth. Sheet steel shall be galvanized and not less than 0.91 mm (20 gage) thickness. Both ends of alternate slats shall be fitted with endlocks. The bottom of the curtain shall be reinforced with two steel angles and provided with a pressure sensitive bottom edge. Angles shall be not less than 3.175 mm thick.

Insulation.--

Insulation shall be the manufacturer's glass fiber, polystyrene or polyurethane foam type insulation and have an R-Value not less than $1.4 \text{ K}\cdot\text{m}^2/\text{W}$.

Curtain guides.--

Curtain guides shall be fabricated from channels and angles of galvanized steel bolted together with 10 mm diameter bolts at 762 mm maximum spacing. All mounting holes in wall angle shall be slotted to allow for heat expansion.

Brackets.--

Bracket shall be constructed of heavy steel plate and reinforced to carry full door weight, roller shaft, hood, curtain and the motorized operator. Sealed ball bearings shall be furnished at all rotating support points. Bracket shall be attached to guide wall angle with a minimum of three 13 mm diameter bolts.

Roller shaft.--

Steel pipe or welded type with internal counterbalancing spring and sized to prevent distortion of the slats and deflection greater than 0.762 mm per 0.3048 m of span. Journal shall be fitted with self-lubricating bronze bearings of permanently lubricated shielded or sealed ball bearings.

Counterbalancing spring.--

Oil-tempered, helical torsion springs spring sized to provide sufficient torque for easy operation of curtain from any position. Spring tension shall be adjustable from outside without removing the hood or skirting. Spring shall be rated for a minimum of 10,000 cycle service life.

Hood.--

Hood shall be fabricated of galvanized sheet steel formed to fit the contour of the brackets and shall be not less than 0.76 mm (22 gage) nominal thickness, reinforced to prevent bending or sagging and to provide a rigid, quiet and vibrationless installation.

Motor.--

Instantly reversing type, single-phase, 240-volt minimum 0.37 kilowatt induction motor of size and type recommended by the door manufacturer to adequately power the unit for proper operation of the door. Motor shall be equipped with a nonfusible, combination reversible type line voltage starter in a NEMA type I enclosure. Starter shall have double break silver contacts and one bi-metallic thermal overloads unless protection is provided in the motor.

Reversing door edge.--

A safety device extending across the full width at the bottom of the door which will cause the door to stop automatically and return to open position upon contact with any obstruction.

Controls.--

Limit switches, remote control panel (3-button) control, and solenoid operated brake.

EXECUTION.--

The power operated roll-up steel door and accessories shall be installed in accordance with the manufacturer's instructions and shall operate freely without binding.

Curtain guides shall be secured, reinforced, braced and supported as necessary to prevent swaying and vibration of the door. Door control panel shall be located approximately 1219 mm above the floor at a convenient location on the interior wall adjacent to the roll-up door as shown on the plans. Conduit and wiring of adequate size shall be installed between the door control panel and the associated overhead door junction box.

Door shall be locked with an automatic brake and a hand-chain keeper. Locking device shall be installed on the inside of the door.

FINISH.--

Finish shall be the manufacturer's standard baked on polyester or epoxy prime and finish coats, applied to interior and exterior faces.

8.05 WINDOWS

PART 1.- GENERAL

SUMMARY.--This work shall consist of furnishing and installing windows in accordance with the details shown on the plans and these special provisions.

Windows shall be commercial (C) grade aluminum prime windows unless otherwise shown on the plans.

Windows shall meet the requirement of NAFS-1, "Voluntary Performance Specification for Windows, Skylights, and Glass Doors," and shall meet the C30 (Commercial) product designation unless otherwise shown on the plans. Windows shall be labeled with the AAMA label.

Finish for windows shall be Architectural Class I, clear anodized finish meeting American Architectural Manufacturer's Association Standard 611 unless otherwise shown on the plans.

Glazing for windows shall be in accordance with the requirements specified under "Glazing" in Division 8, "Doors and Windows," of these special provisions.

CERTIFICATES OF COMPLIANCE.--Certificates of compliance shall be furnished for all windows in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

SUBMITTALS.--Manufacturer's descriptive data, installation instructions and schedule shall be submitted for approval.

Manufacturer's descriptive data and installation instructions shall show window elevations, plan views, full size sections, anchoring details to all substrates, anchors and hardware.

Installation schedule shall show location, size and type for each window.

PART 2.- PRODUCTS

Fixed windows.--

Fixed windows shall be non-operable glazed panel inserted into a frame to include muntins, glazing stops, and glazing accessories.

Hopper windows.--

Hopper windows shall be equipped with glazing accessories, replaceable weatherstripping, vent screens, operating handles and locks on top hinged vents.

One operating pole shall be provided for every 10 windows installed 1.8 m or more above the floor. The operating pole and window operating handle shall be compatible. The bottom of the pole to be within a maximum of 915 mm from finish floor.

Horizontal sliding windows.--

Horizontal sliding windows shall be horizontal slide by windows with tightly contacting weatherstripped meeting stiles, self-lubricating rollers, glazing accessories, tubular sill, snap locks and push handle. Vents shall be screened.

Aluminum.--

Aluminum shall be extruded 6063-T5 aluminum alloy.

Screws, fasteners and window accessories.--

Screws, fasteners and window accessories shall be non-corrosive metals compatible with aluminum except guides and rollers may be vinyl and nylon respectively. Finish for locks, operators, strikes, keepers and other metal hardware shall match window finish.

Weatherstripping.--

Weatherstripping shall be continuous, replaceable type, wool pile mounted in metal or double runs of ultraviolet resistant neoprene or vinyl.

Vent screen.--

Vent screen shall be aluminum frame with 18 x 14 mesh aluminum screening and polyvinyl-chloride splines. Screen frames shall be removable from interior of building. Finish of screen frame shall match window finish.

Sealant.--

Sealant shall be single-component, solvent type acrylic, self-leveling, non-sag, conforming to Federal Specification: TT-S-230.

Tape.--

Tape shall be compatible with sealant; Pecora, "B-44 Extra-Seal;" Pittsburg Plate Glass, "Duribbon;" Protective Treatment, "PTU 606;" Tremco, "440 Tape;" or equal.

PART 3.- EXECUTION

FABRICATION.--Frame and sash shall be accurately machined and fitted to hairline joinery that develops the members. Joints shall be factory sealed weathertight.

Sash shall be removable from the interior only. Sash shall have concealed condensation weeps to the outside.

DELIVERY AND STORAGE.--Windows shall be delivered in original, unopened, unbroken containers, wrappings, or bags with labels bearing the brand name, name of manufacturer or supplier, standard of manufacture, and product description.

Windows and accessories shall be stored off the ground, kept dry, fully protected from weather and damage.

INSTALLATION.--Window units shall be set straight, level, plumb and in true alignment in prepared openings. Windows shall be centered in openings. Clearance between the window unit and the building framing shall be from 4 mm to 6 mm at the sides and 13 mm at the top. Ventilator sash shall be adjusted after glazing for easy, smooth and proper operation.

The installation shall be flashed and sealed weathertight.

All aluminum surfaces in contact with masonry, steel or other incompatible materials shall be isolated with pressure sensitive tape, zinc chromate primer, bituminous paint or such other material recommended by the window manufacturer and approved by the Engineer.

8.06 FINISH HARDWARE

PART 1.- GENERAL

SUMMARY.--

This work shall consist of furnishing and installing hardware items for doors in accordance with the details shown on the plans and these special provisions.

Hardware assemblies shall comply with the fire code and the disabled accessibility requirements indicated on the plans and specified in these special provisions.

SUBMITTALS.--

Manufacturer's technical information and catalog cuts for each item of door hardware and a door hardware schedule shall be submitted for approval prior to installation.

Manufacturer's catalog cuts shall include catalog numbers, material, grade, type, size, function, design, quality and finish of hardware.

The door hardware schedule shall indicate the location and size of door opening, the door and frame material, and the size, style, finish and quantity of the hardware components required.

FINISHES.--

Hardware shall be provided with standard US 26D metal plated finish or matching sprayed finish where indicated.

KEYING INSTRUCTIONS.--

New locks shall be compatible with the master key system of the existing facility and shall be keyed to the existing lock system in use.

Locks and cylinders shall be provided with six pin "O" cylinders and blank keys. Cylinders and blank keys shall be delivered to the Engineer for combining of cylinders and cutting of keys.

The Contractor shall provide cylinders for use during construction. Construction cylinders shall remain in place until permanent cylinders are installed. Construction cylinders shall remain the property of the Contractor.

Key bows shall be stamped "State of California" and "Do Not Duplicate."

PART 2.- PRODUCTS.--

GENERAL--

Door hardware equal in material, grade, type, size, function, design, quality and manufacture to that specified herein may be submitted for approval.

Butt hinges.--

Butt hinges shall be steel, 1 1/2-pair per door unless otherwise specified or shown on the plans. Nonremovable pins shall be provided at outswing exterior doors. Hinge size shall be 114 mm x 114 mm unless otherwise noted.

Standard weight hinges shall be:

Hager	BB 1279
McKinney	TB 2714
Stanley	BB 179
or equal.	

Mortise locksets.--

Mortise locksets shall be steel case with 32 mm x 203 mm face plate and 70 mm backset. Door and frame preparation for mortise locksets sets shall conform to ANSI A115.1.

Lever operated lockset shall be:

Best	35H 6FW 15H
Falcon	LM521 DG
Schlage	L9453P x 06
or equal.	

Cylindrical locksets and privacy sets.--

Cylindrical locksets and privacy sets shall be steel chassis, 54 mm diameter, 70 mm backset. Door and frame preparation for cylindrical lockset and privacy sets shall conform to ANSI A115.1.

Lever operated lockset shall be:

Best	83K6 AB 9C
Schlage	D53PD RHO
Falcon	LY501 DG
or equal.	

Lever operated privacy set shall be:

Best	83K OL 9C
Falcon	LY301 DG
Schlage	D40S RHO
or equal.	

Flush bolts.--

Flush bolts shall be installed at the top and bottom of the inactive leaf of pairs of doors.

Flush bolts for manual operation shall be:

Builders Brass	5020
Glynn Johnson	FB6
H.B. Ives	457
or equal.	

Door closers.--

Parallel arms for closers shall be installed at outswing exterior doors. Closers shall have sprayed finish to match other hardware on door.

Door closers shall be:

LCN	4040
Norton	85001
Dorma	7800
or equal.	

Floor mounted stops.--

Floor mounted stops shall be dome type. The height of the stop shall be determined by the clearance required when a threshold is used or not used.

Stops for openings with thresholds shall be:

Builders Brass	8063
Quality	431
Trimco	1213
or equal.	

Door mounted door stop.--

Door mounted door stop shall have a 95 mm projection and 3-point anchoring.

Door mounted door stop shall be:

Builders Brass	W96
Quality	38
Trimco	1236-1/4-2
or equal.	

Wall bumpers.--

Wall bumpers base diameter shall be 64 mm with a 25 mm projection.

Bumpers shall be:

Builders Brass	WC9
Quality	302
Trimco	1272-1/4-CCS
or equal.	

Automatic door bottom.--

Automatic door bottom shall be heavy duty, full mortise.

Bottom shall be:

Pemko	434 AR
Zero	360
or equal.	

Thresholds, rain drips, and door shoes.--

Thresholds, rain drips, and door shoes shall conform to the sizes and configurations shown on plans. Thresholds at door openings with accessibility requirements shall not exceed 13 mm in height.

Threshold, rain drip, and door shoe manufacturers shall be Pemko, Reese, Zero, or equal.

Threshold bedding sealant.--

Threshold bedding sealant shall conform to Federal Specification: SS-C-153.

Weatherstrip and smoke seal.--

Weatherstrip and smoke seal shall conform to the sizes and shapes shown on plans. Assemblies shall be UL listed and shall be provided where shown on the plans or as specified in these special provisions.

Weatherstrip and smoke seal manufacturers shall be Pemko, Reese, Zero, or equal.

Door signs and name plates.--

Door signs and name plates shall be as specified under "Signs" in Division 10, "Specialties," of these special provisions.

PART 3.- EXECUTION

DOORS AND FRAMES.--Doors and frames shall be set square and plumb and be properly prepared before the installation of hardware.

INSTALLATION.--Hardware items shall be accurately fitted, securely applied, and adjusted and lubricated in accordance with the manufacturer's instructions. Installation shall provide proper operation without bind or excessive play.

Hinges shall be installed at equal spacing with the center of the end hinges not more than 244 mm from the top and bottom of the door. Locksets and privacy sets and panic exit mechanisms shall be 1024 mm from the finished floor.

Thresholds shall be set in a continuous bed of sealant material.

Door controls shall be set so that the effort required to operate doors with closers shall not exceed 37.8 N maximum for exterior doors and 22.3 N maximum for interior doors. The effort required to operate fire doors may be increased above the values shown for exterior and interior doors but shall not exceed 66.7 N maximum.

Door stops located on concrete surfaces shall be fastened rigidly and securely in place with expansion anchoring devices. Door stops mounted elsewhere shall be securely attached with wood screws or expansion devices as required.

Backing shall be provided in wall framing at wall bumper locations.

The location and inscriptions for door signs and name plates shall be as shown on the plans.

Hardware, except hinges, shall be removed from surfaces to be painted before painting.

Upon completion of installation and adjustment, the Contractor shall deliver to the Engineer all dogging keys, closer valve keys, lock spanner wrenches, and other factory furnished installation aids, instructions and maintenance guides.

DOOR HARDWARE GROUPS AND SCHEDULE.--Hardware groups specified herein shall correspond to those shown on the plans:

GROUP 1

- 3-pair butt hinges
- 1 each cylindrical lockset
- 1 each flush bolt top and bottom
- 2 each weatherstrip
- 2 each door shoe with rain drip

GROUP 2

- 1 1/2-pair butt hinges
- 1 each mortise lockset
- 1 each floor mounted stop
- 1 each automatic door bottom
- 1 each weatherstrip
- 1 each door shoe with rain drip
- 1 each door closer
- 1 each threshold

GROUP 3

- 1 1/2-pair butt hinges
- 1 each cylindrical lockset
- 1 each door mounted door stop

GROUP 4

- 1 1/2-pair butt hinges
- 1 each cylindrical privacy set
- 1 each wall bumper

GROUP 5

All hardware supplied by door manufacturer.

8.07 GLAZING

PART 1.- GENERAL

SUMMARY.--

This work shall consist of furnishing and installing glazing in accordance with the details shown on the plans and these special provisions.

Glazing shall consist of glass sheets for windows, doors and other glazed openings.

All glass shall conform to ASTM Designation: C 1036 and the classifications specified herein and shall be clear glass except as noted.

Safety glass shall be furnished and installed at all locations designated in Consumer Product Safety Commission's Safety Standard For Architectural Glazing Materials 16 CFR 1201.

SUBMITTALS.--

A detailed list of glazing materials including glass, sheet, sealants, tapes, setting blocks, shims, compression seals, and glazing channels shall be submitted for approval. The list shall include a schedule of the materials to be used at each location.

LABELS.--

Each individual pane of heat strengthened or fully tempered glass shall bear an identification label in accordance with ASTM Designation: C 1048.

PART 2.- PRODUCTS

Sheet glass, float glass, or plate glass.--

Sheet glass, float glass, or plate glass shall be Type I, Class 1, Quality q4 or better, double strength for panes to 0.93 m², 5 mm thick for panes between 0.93 m² and 2.6 m², and 6 mm thick for panes over 2.6 m², except as otherwise shown on the plans.

Polycarbonate glazing.--

Polycarbonate glazing shall be 6.4 mm thick, commercial quality sheet material.

Safety glass.--

Safety glass shall conform to Consumer Product Safety Commission Safety Standard For Architectural Glazing Materials: 16 CFR 1201, and ANSI Standard Z97.1 and shall be one of the following:

Tempered glass.--

Tempered glass shall conform to ASTM Designation: C 1048, Kind FT, Condition A, Type 1, Quality q4 or better.

Wire glass.--

Wire glass shall be Type II, Class 1, Form 1, Mesh m1; 6 mm thick clear polished wire glass with diamond mesh.

Insulating glass assemblies.--

Insulating glass assemblies shall be double pane units consisting of 2 pieces of glass separated by a spacer and hermetically sealed with double seal sealants. The entrapped air shall be at atmospheric pressure and maintained in a hydrated condition by a drying agent located in the spacer

Seals, caulks, putties, setting blocks, shims, tapes, compression seals, felt, spacers, and channels.--

Seals, caulks, putties, setting blocks, shims, tapes, compression seals, felt, spacers, and channels shall be top grade, commercial quality, as recommended by the glass or sheet manufacturer and shall conform to the requirements in the publications of the Flat Glass Marketing Association.

PART 3.- EXECUTION

INSTALLATION.--

Glazing shall conform to the general conditions and applicable details in the publications of the Flat Glass Marketing Association.

Panes shall be bedded fully and evenly, set straight and square within panels in such a manner that the pane is entirely free of any contact with metal edges and surfaces.

For all panes on the exterior of the building, the glazing on both sides of window panes shall provide a watertight seal and watershed. Seals shall extend not more than 2 mm beyond the holding members. A void shall be left between the vertical edges of the panes and the glazing channel. Weep systems shall be provided to drain condensation to the outside.

Panes in assemblies using extruded gasket glazing shall be set in accordance with the assembly manufacturer's instructions using gaskets and stops supplied by the manufacturer.

Whenever welding or burning of metal is in progress within 4.6 m of glazing materials, a protective cover shall be provided over exposed surfaces.

REPLACEMENT AND CLEANING.--

All broken or cracked glass and glass with scratches which reduce the strength shall be replaced before completion of the project.

Panes shall be kept clean of cement and plaster products, cleansers, sealants, tapes and all other foreign material that may cause discoloration, etching, staining, or surface blemishes to the materials.

Excess sealant left on the surface of the glass or surrounding materials shall be removed during the work life of the sealant.

Solvents and cleaning compounds shall be chemically compatible with materials, coatings and glazing compounds to remain. Cleaners shall not have abrasives that scratch or mar the surfaces.

All panes shall be cleaned just before the final inspection. All stains and defects shall be removed. Paint, dirt, stains, labels (except etched labels), and surplus glazing compound shall be removed without scratching or marring the surface of the panes or metal work.

DIVISION 9. FINISHES

9.01 PORTLAND CEMENT PLASTER

GENERAL.--This work shall consist of installing lath and applying portland cement plaster in accordance with the details shown on the plans and these special provisions.

Plaster shall be 3 coat work. The total thickness of plaster shall be 19 mm unless otherwise shown on the plans. The color and the surface finish shall be as shown on the plans.

PRODUCTS.--

Sand.--

Sand shall be lean commercial quality plaster sand.

Cement.--

Cement shall be portland cement, blended hydraulic cement, or portland cement with a maximum of 15 percent mineral admixture. Portland cement shall be Type II, conforming to ASTM Designation: C 150. Blended hydraulic cement shall be Type IP, conforming to ASTM Designation: C 595. Mineral admixture shall be Class N, Class F or Class C, conforming to ASTM Designation: C 618, except loss on ignition shall not exceed 4 percent.

Lime.--

Lime shall conform to ASTM Designation: C 206.

Color for plaster.--

Color for plaster shall be non-fading, sunproof, and limeproof fine ground synthetic mineral oxide.

Premixed portland cement plaster.--

Premixed portland cement plaster shall be a premixed packaged blend of cement, lime and sand, with or without color, that requires only water to prepare for use as portland cement plaster, may be furnished. Premixed plaster shall be proportioned as specified herein. Packages of premix shall bear the manufacturer's name, brand, weight and color identification.

Metal lath.--

Metal lath shall be self-furring expanded metal diamond mesh with rust inhibitive coating and waterproof vapor barrier backing. Mesh shall weigh not less than 1.8 kg/m².

Metal lath fasteners.--

Metal lath fasteners shall be galvanized or corrosion resistant nails, screws or staples.

Beads, screeds, control joints and accessories.--

Beads, screeds, control joints and accessories shall be galvanized steel, not less than 0.50 mm thickness.

Vent screen.--

Vent screen shall be galvanized sheet steel combination screen and vent with corrosion resistant metal insect screen on the inside.

Water.--

Water shall be potable.

EXECUTION.--

METAL LATH INSTALLATION.--Metal lath, beads, screeds, control joints, vent screens and other metal accessories shall be installed rigidly and securely in place in accordance with the manufacturer's recommendations.

The type, size and spacing of fasteners for fastening the metal lath and accessories shall be as recommended by the metal lath manufacturer for the type of substrate and the location of the lath and accessories.

PLASTER PROPORTIONING AND MIXING.--Materials shall be accurately proportioned and measured for each batch. All batches for a given coat shall be proportioned the same. Plaster shall be proportioned one part cement to between 3 and 5 parts sand by volume, only sufficient water to obtain a workable mix, and a lime plasticizing agent. Not more than 9 kg of dry hydrated lime or lime putty per sack of cement shall be used in the first and second plaster coat. Plaster for finish coat shall contain not more than 42 kg of dry hydrated lime or lime putty per sack of cement. Lime shall not be used if mineral admixture or blended hydraulic cement is used.

Frozen materials shall not be used in the mix.

All plaster mixing ingredients shall be mixed in a mechanical mixer. After all ingredients are in the mixer, the plaster shall be mixed for a minimum of 2 minutes. The mixture shall be uniform in color after mixing. Hand mixing of plaster will be allowed only with the written approval of the Engineer.

Plaster to be colored shall be colored by mixing the coloring ingredient uniformly and homogeneously into the plaster. Color, if used, will be required only in materials for the finish coat.

PLASTER APPLICATION.--Plaster shall not be applied if the ambient temperature is 4°C or less. Plaster shall not be applied to frost covered or frozen surfaces. Surfaces to receive plaster shall be clean.

The coats of plaster shall be applied continuously in one general direction without allowing mortar to dry at the edges.

The first coat shall be applied with sufficient material and pressure to form full keys and good bond and to cover surfaces. Before setting, the first coat shall be cross-scratched to receive the second coat. The first coat shall be moisture cured, without soaking, for not less than 48 hours after application or until covered by the second coat.

The second coat of plaster shall not be placed until the first coat of plaster has set thoroughly or until at least 12 hours after the first coat of plaster has been placed. The second coat shall be brought out to grounds, straightened to a true, even surface, roughened to assure a bond with the finish coat, and made free of imperfections which would reflect in the finish coat. The second coat shall be moisture cured, without soaking, for not less than 48 hours after application.

The third coat of plaster shall not be placed until at least 7 days after the second coat of plaster has been placed. Troweling of the third coat of plaster shall leave the surface smooth and free from rough areas, trowel marks, checks, or other blemishes. The finished surface shall be true and even and shall not vary more than 3 millimeters in 1.5 meters from the required plane. Plaster with cracks, blisters, pits, stains, efflorescence, shadowing, dryouts, or checks will not be accepted. Surfaces shall be clean and sound.

The third coat shall have the type of finish shown on the plans.

After all other related work has been completed, pointing around trim and set work and repairing of damaged portions of plaster shall be done. Repairs and patching shall match surrounding work in texture and appearance.

Plaster coats shall be protected against freezing for a period of 24 hours after application.

9.02 GYPSUM WALLBOARD

GENERAL.--This work shall consist of furnishing, installing and finishing gypsum wallboard in accordance with the details shown on the plans and these special provisions.

Where assembly fire ratings are indicated on the plans, construction shall provide the fire resistance in accordance with the applicable standards in the Fire Resistance Design Manual published by the Gypsum Association.

Wallboard backing for use in restroom and shower areas shall be water-resistant gypsum backing board.

PRODUCTS.--

Gypsum wallboard.--

Gypsum wallboard shall conform to ASTM Designation: C 36/C 36M.

Water-resistant gypsum backing board.--

Water-resistant gypsum backing board shall conform to ASTM Designation: C 630/C C 630M.

Exterior gypsum soffit board.--

Exterior gypsum soffit board shall conform to ASTM Designation: C 931/C 931M.

Joint tape and joint and finishing compound.--

Joint tape and joint and finishing compound shall conform to ASTM Designation: C 475.

Corner beads, metal trim and control joints.--

Corner beads, metal trim and control joints shall be galvanized steel of standard manufacture.

Fasteners.--

Fasteners shall be gypsum wallboard nails conforming to ASTM Designation: C 514 or steel drill screws conforming to ASTM Designation: C 1002.

EXECUTION.--

DELIVERY AND STORAGE.--Materials shall be delivered in original packages, containers or bundles bearing brand name, applicable standard of manufacture, and name of manufacturer or supplier and shall be kept dry and fully protected from weather and direct sunlight exposure. Gypsum wallboard shall be stacked flat with adequate support to prevent sagging or damage to edges, ends and surfaces.

INSTALLATION.--Wallboard panels to be installed on ceilings and soffits shall be installed with the long dimension of the panels perpendicular to the framing members. Wallboard panels to be installed on walls may be installed with the long dimension of the panels either parallel or perpendicular to the framing members. The direction of placing the panels shall be the same on any one wall or partition assembly.

Edges of wallboard panels shall be butted loosely together. All cut edges and ends shall be smoothed as needed for neat fitting joints.

All edges and ends of gypsum wallboard panels shall coincide with the framing members, except those edges and ends which are perpendicular to the framing members. End joints on ceiling and on the opposite sides of a partition assembly shall be staggered.

Except where closer spacings are shown on the plans, the spacing of fasteners shall not exceed the following:

Nails	175 mm
Screws	300 mm
Screws at perimeter of panels for fire resistive assemblies having metal framing	200 mm

Type S steel drill screws shall be used to fasten wallboard to metal framing. Nails or Type W steel drill screws shall be used to fasten wallboard to wood framing. Except as shown on the plans, screws shall not be used in fire resistive assemblies.

Adhesives shall not be used for securing wallboard to framing.

Gypsum wallboard panels shown on the plans for shear wall sheathing or for fire resistive assemblies shall be fastened to all framing members. Gypsum wallboard panels at other locations and gypsum wallboard finish over plywood sheathed shear walls shall be fastened to all framing members except at the following locations:

At internal angles formed by ceiling and walls; ceiling panels shall be installed first with the fasteners terminating at a row 175 mm from the walls, except for walls parallel to ceiling framing. Wall panels shall butt the ceiling panels. The top row of wall panel fasteners shall terminate 200 mm from the ceiling.

At internal vertical angles formed by the walls; fasteners shall not be installed along the edge or end of the panel that is installed first. Fasteners shall be installed only along the edge or end of the panel that butts and overlaps the panel installed first.

Fasteners shall be located at least 10 mm from wallboard panel edges and ends. Nails shall penetrate into wood framing at least 30 mm. Screws shall penetrate into wood framing at least 20 mm. All metal fasteners shall be driven slightly below surface level without breaking the paper or fracturing the core.

Metal trim shall be installed at all free edges of panels, at locations where wallboard panels abut dissimilar materials and at locations shown on the plans. Corner beads shall be installed at external corners. Control joints shall be installed at the locations shown on the plans.

Joints between face panels, the internal angles formed by ceiling and walls and the internal vertical angles formed by walls shall be filled and finished with joint tape and at least 3 coats of joint compound. Tape in the corners shall be folded to conform to the angle of the corner. Tape at joints and corners shall be embedded in joint compound.

Dimples at nail and screw heads, dents, and voids or surface irregularities shall be patched with joint compound. Each patch shall consist of at least 3 coats and each coat shall be applied in a different direction.

Flanges of corner beads, control joints and trim shall be finished with a least 3 coats of joint compound.

Each coat of joint compound shall be feathered out onto the panel surface and shall be dry and lightly sanded before applying the next coat. The finished surfaces of joint compound at the panel joints, internal angles, patches and at the flanges of trim, corner beads and control joints shall be flat and true to the plane of the surrounding surfaces and shall be lightly sanded.

Good lighting of the work area shall be provided during the final application and sanding of the joint compound.

Gypsum wallboard used as backing boards for tile or rigid sheet wall covering or wainscoting shall be water resistant. Joints in backing board shall not be taped or filled and dimples at the fastener heads shall not be patched. Edges of cuts and holes in backing board shall be sealed with a primer or sealer that is compatible with the wall covering or wainscoting adhesive to be used.

Surfaces of wallboard to be textured shall receive an orange peel texture, unless otherwise shown on the plans.

9.03 CERAMIC TILE

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing ceramic tile in accordance with the details shown on the plans and these special provisions.

Ceramic tile shall include glazed wall tile, matte porcelain tile, trim tile, setting materials, grouts and such other materials as maybe required for a complete installation.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, a list of materials to be used, and installation instructions for all materials required for the work shall be submitted for approval.

Manufacturer's descriptive data shall be submitted for each type of tile, mortar bed materials, bond coat materials and additives, and grout materials and additives.

Materials list and installation instructions shall include all products and materials to be incorporated into the work. Friction reports shall be submitted for tile products to be used on floors and other pedestrian surfaces.

Samples.--Samples shall include 2 individual samples of each type and color of tile and trim to be installed and shall be of the same size, shape, pattern and finish as the tile and trim to be installed.

QUALITY ASSURANCE.--

Single source responsibility.--Each type and color of tile, grout and setting materials shall be obtained from a single source.

Master Grade Certificates.--Each shipment of tile to the project site shall be accompanied by a Master Grade Certificate issued by the tile manufacturer.

Certificates of Compliance.--Certificates of compliance shall be furnished for bond coat materials, setting bed materials and grout in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

DELIVERY, STORAGE AND HANDLING.--

Delivery.--Tile and packaged materials shall be delivered to the job site in sealed, unbroken, unopened containers with the labels intact. Tile containers shall bear the Standard Grade label.

Storage and handling.--Materials shall be stored and handled in such a manner as to prevent damage or contamination by water, freezing or foreign matter.

PROJECT CONDITIONS.--

Protection.--Tile work shall be protected and environmental conditions maintained during and after installation to comply with the reference standards and manufacturer's printed instructions.

Temperatures.--Unless otherwise specified in the manufacturer's installation instructions, the ambient temperature shall be maintained at not less than 10°C nor more than 38°C in tiled areas during installation and for 7 days after completion. Exterior work areas shall be shaded from direct sunlight during installation.

Tile shall not be installed when the temperature of the substrate is greater than 32°C or is frost covered.

Illumination.--Interior work areas shall be illuminated to provide the same level and angle of illumination as will be available during final inspection.

PART 2.- PRODUCTS

MANUFACTURERS.--

Available manufacture's.--Subject to compliance with the specifications, tile shall be American Olean Tile Co., Inc.; Summitville Tiles, Inc.; United States Ceramic Tile Co.; Dal Tile; or equal.

GENERAL.--

Ceramic tile.--Ceramic tile shall conform to the requirements in ANSI Standard: A137.1, "American National Standard Specifications for Ceramic Tile" for types and grades of tile indicated.

Ceramic tile shall conform to the "Standard Grade" requirements.

Tile installation materials.--Tile installation materials shall conform to the requirements in ANSI standard referenced with products and materials indicated for setting and grouting.

Tile color and size.--Tile color shall be as shown on the plans; tile size shall be as indicated in the Schedule elsewhere in this special provision.

Slip resistant tile.--Slip resistant tile shall have sufficient abrasives added such that the static coefficient of friction, wet or dry, shall be not less than 0.6 for walking surfaces and 0.8 for ramps when tested in accordance with ASTM Designation: C 1028.

TILE PRODUCTS.--

Glazed wall tile.--

Glazed wall tile shall be machine made, dust pressed white body clay, and shall have a glossy glaze finish, plain face, and cushion edges. Tile shall be 8 mm nominal thickness.

Ceramic tile trim shall match material, size and finish of field tile. Free edges of tiled areas of walls shall have bullnose type trim. Outside corners shall have bullnose type runner trim (not beads). Reentrant corners shall have cove type trim.

Matte porcelain tile.--

Matte porcelain tile shall be machine made, unpolished, dust pressed natural porcelain clay and shall have a plain face. Tile shall have a nominal thickness of 8 mm. Matte porcelain tile shall be slip resistant.

Matte porcelain trim tile shall include cove type base at walls and single piece intersecting cove base at corners.

SETTING MATERIALS.--

Portland cement mortar installation materials.--

Materials for portland cement mortar installation shall conform to the requirements in ANSI Standard: A108.1 as required for installation method designated, unless otherwise indicated.

Membrane.--Membrane shall be asphalt impregnated felt conforming to ASTM Designation: D 226, Type I, or polyethylene film conforming to ASTM Designation: C 171, Type 1.1.2. Polyethylene film shall not be less than 0.1 mm thick.

Reinforcement.--Reinforcement shall be galvanized welded wire fabric with 50 mm x 50 mm - 1.6 mm x 1.6 mm conforming to ASTM Designations: A 82 and A 185 except for minimum wire size. Reinforcement shall be provided in flat sheets.

Metal lath.--Metal lath shall be self furring, galvanized, conforming to ASTM Designation: C 847, flat expanded type weighing not less than 1.4 kg/m². Factory assembled metal lath and paper backing may be used where reinforcement over paper is shown on the plans.

Tile bond coat.--

Tile bond coat shall be latex-portland cement bond coat.

Latex-portland cement mortar bond coat shall be a prepackaged mortar mix, conforming to ANSI Standard: A118.4, incorporating a dry acrylic resin, and to which only water is added at the job site. Mortar shall be suitable for exterior use and be labeled for the type of tile to be installed.

GROUTING MATERIALS.--

Tile grout.--

Tile grout shall be latex-portland cement grout.

Latex-portland cement grout shall be a prepackaged grout mix, conforming to ANSI Standard: A118.6, incorporating a dry acrylic resin, and to which only water is added at the jobsite. Grout shall be suitable for exterior use and labeled for the type of tile to be installed.

Grout pigment.--

Grout pigment shall be chemically inert, fade resistant mineral oxide or synthetic type. Color shall be as shown on the plans.

SEALANTS.--

Sealant.--

Sealant for vertical expansion joints shall be a medium modulus silicone or polyurethane. Sealant for horizontal joints shall be a 2-part polyurethane type material with a Shore Hardness of 35 to 45.

Color of exposed sealants shall match color of grout in tile adjoining sealed joints.

MORTAR BEDS.--

Cement mortar bed.--

Cement mortar bed for walls shall be proportioned of one part cement, 1/2 part hydrated lime, 6 parts damp sand by volume and only enough water to provide the necessary workability. Ingredients shall be dry mixed, water added, and materials blended to produce a stiff mix. Mortar bed shall be not less than 20 mm in thickness.

Cement mortar bed for floors shall be proportioned of one part cement, 1/10 parts hydrated lime, 5 parts damp sand by volume and only enough water added to provide the necessary workability. Ingredients shall be dry mixed, water added, and materials blended to produce a stiff mix. Mortar bed shall be not less than 32 mm in thickness.

MISCELLANEOUS MATERIALS.--

Sand.--

Sand shall be a natural or manufactured sand conforming to ASTM Designation: C 144, except that no more than 10 percent shall pass the No. 150 μ m sieve.

Sealers.--

Sealer for grout shall be a penetrating proprietary compound designed for sealing grout. Silicone sealers shall not be used.

Cement.--

Cement shall conform to ASTM Designation: C 150, Type I.

Hydrated lime.--

Hydrated lime shall conform to ASTM Designation: C 206, Type S, or ASTM Designation: C 207, Type S.

Water.--

Water shall be clean and potable.

Metal edge strips.--

Metal edge strips shall be stainless steel terrazzo strips, 3 mm wide at top edge with integral provision for anchorage to mortar bed or substrate.

Cementitious tile backer board.--

Cementitious backer board shall be a backing and underlayment panel composed of a concrete core with glass mesh reinforcing on both faces and conforming to the requirements of ANSI Standard: A118.9.

MIXING MORTAR AND GROUT.--

Mixing.--Mortar and grout shall be mixed to comply with the requirements of referenced standards and manufacturers for accurately proportioning of materials, water or additive content, mixing equipment and mixer speeds, mixing containers, mixing time, and other procedures need to produce mortars and grout of uniform quality with optimum performance characteristics for application intended.

PART 3.- EXECUTION

PREPARATION.--

General.--Concrete, mortar, or masonry substrate surfaces which are to receive a mortar bed shall not vary more than 5 mm in 2.4 m from the required plane and shall be true, plumb at vertical surfaces, and square at intersection edges.

Surfaces to receive a mortar setting bed or a bond coat shall be cleaned adequately to assure a tight bond to the applied material. Such cleaning shall leave the surface thoroughly roughened and free from laitance, coatings, oil, sand, dust and loose particles.

The cleaned surfaces which are to receive a mortar bed shall be saturated with water just prior to placing mortar or the cleaned surfaces shall be coated with fresh neat cement slurry. If the surface is saturated with water, excess water shall be removed and the wetted surfaces uniformly dusted with portland cement. The slurry or wetted cement dust shall be broomed to completely coat the surface with a thin and uniform coating just prior to placing the mortar.

Substrates shall be inspected to insure that grounds, anchors, plugs, recessed frames, bucks, drains, electrical work, mechanical work, and similar items in or behind the tile have been installed before proceeding with installation of the tiles.

INSTALLATION.--

General.--Tile installation shall conform to applicable parts of ANSI 108 Series of the tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" and Tile Council of American, "Handbook for Ceramic Tile Installation."

All tile shall be installed on a bond coat over a setting bed. The setting bed shall be a cured cement mortar bed or a prepared, dimensionally stable substrate of concrete, masonry, cementitious backer board, or other cementitious material.

The back face of the tile shall be free of paper, adhesives, fiber mesh, resins, or other materials affecting the bond of the tile to the bedding material.

Tile sheets shall have permanent edge bonding or temporary mounting materials on the exposed face. Water soluble or absorbent adhesives shall not be used for edge bonding. Temporary mounting materials shall allow observation during tile setting operations.

Tile work shall extend into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as shown on the plans. Work shall be terminated neatly at obstructions, edges and corners without disrupting pattern or joint alignments.

Intersections and returns shall be accurately formed. Cutting and drilling of tile shall be performed without marring visible surfaces. Cut edges of tile abutting trim, finish or built-in items shall be carefully ground to produce straight aligned joints. Tile shall be closely fit to electrical outlets, piping, fixtures and other penetrations such that plates, collars, or covers overlap the tile.

Mortar bed placement.--The mortar bed, with or without reinforcement as shown on the plans, shall be placed, consolidated, and finished to the required thickness.

The surface of the mortar bed shall be true and pitched as shown on the plans, without high or low spots. The mortar bed surface shall not vary more than 3 mm in 2.4 m from a plane parallel to the finished tile surface when tile is installed on a cured mortar bed.

In no case shall the allowed tolerances result in offsets between adjoining tiles, low spots on finished tile surfaces than can pond water, or finished tile surfaces that are not plumb or not true.

Cement mortar beds to receive a tile bond coat shall be damp cured under cover for a minimum of 48 hours at a temperature of not less than 21°C.

Cementitious backer board.--Cementitious backer board shall be installed in accordance with the provisions of ANSI Standard: A118.11.

Tile bond coat.--The tile bond coat mortar shall be mixed according to the manufacturer's recommendations. The consistency of the mixture shall be such that ridges formed with the recommended notched trowel shall not flow or slump. Reworking will be allowed provided no water or materials are added. The setting bed surfaces shall be dampened before placing the bond coat as necessary tile installation, but the setting bed shall not be soaked.

The bond coat shall be floated onto the cured mortar bed surface with sufficient pressure to cover the surface evenly with no bare spots. The surface area to be covered with the bond coat shall be no greater than the area that can be tiled while the bond coat is still plastic. The bond coat shall be combed with a notched trowel as recommended by the manufacturer within 10 minutes before installing tile. Tile shall not be installed on a skinned over bond coat.

Installing tiles.--Tile shall be installed in accordance with the manufacturer's instructions and shall be set solid and shall be well bonded to the substrate.

Tile set on a tile bond coat shall be installed in accordance with ANSI Standard: A108.5.

If tiles are cut, the cuts shall be made with saws. Cut edges shall be rubbed with an abrasive stone to bring the edge of the glaze slightly back from the body of the tile. Cuts shall be accurately made to neatly fit the tile in place. Cut edges shall not be butted against other tile. Cut tile shall be at least half the size of a full size tile.

Tile shall completely cover wall areas behind mirrors and fixtures.

Tile shall be installed so that the finished tile surface does not vary more than 3 mm in 2.4 m from the finished tile surface shown on the plans. In no case shall there be offsets in adjoining tiles, low spots on finished tile surfaces that can pond water, or finished tile surfaces that are not plumb or true in the completed tile work.

Tiles shall be firmly pressed into the freshly notched bond coat. Tile on interior surfaces shall be tapped and beat into a true surface and to obtain at least 80 percent coverage by the mortar on the back of each tile. Tile on exterior surfaces shall have 100 percent coverage and shall be back-buttered immediately prior to setting the tile.

If tile is face mounted, the paper and glue shall be removed within one hour after tile is installed and all tiles that do not meet the requirements for joints and surface tolerance shall be adjusted or replaced.

Mortar that exudes into the grout spaces between tiles shall be removed to the bottom of tile.

Joints.--Joints between tile shall be continuous both vertically and horizontally. Joints shall be straight and of uniform and equal width. Where tiles on adjoining surface are the same size, the joints shall align, one with the other. Joint width shall be as recommended by the tile manufacturer.

Grouting tile.--Grout shall be mixed, applied and cured in accordance with the manufacturer's recommendations and ANSI Standard: A108.10 for cement grout.

Spacers, strings, ropes, pegs, glue, paper, and face mounting material shall be removed before grouting. Joints between glazed wall tile shall be wetted if they have become dry. Joints for epoxy mortar shall be dry.

Grouting shall not begin until at least 48 hours after installing tile.

A maximum amount of grout shall be forced into the joints between tiles in accordance with the manufacturer's recommendations. The grout shall be finished to the depth of the cushion for cushion edge tile and finished flush with the surface for square edge tile. All gaps and skips in the grout spaces shall be filled.

Mortar or mounting mesh shall not show through the grouted joints.

The finished grout shall have a uniform color and shall be smooth without voids, pinholes or low spots.

Expansion joints shall be kept free of grout or mortar.

Grout shall be protected from freezing or frost for a least 5 days after installation.

Expansion joints.--Expansion joints shall be installed at the perimeter of all tile floors and at all substrate control joints and changes in the substrate material. Exterior expansion joint spacing shall not exceed 5 m in any direction.

All expansion joints shall be made with sealant over backer rods. The thickness of sealant at the center of expansion joints shall not exceed the width of the joint. Joint edges shall be primed as recommended by the sealant manufacturer.

Edge strips.--Edge strips shall be installed at openings where the threshold has not been shown on the plans, but where tile floor abuts other flooring materials at the same level. Edge strips shall be installed centered under the closed door, or where there is no door, centered in the opening.

Sounding tile.--Tiled surfaces shall be sounded with a metal bar or chain for improperly bonded tile or setting bed. Tile or setting bed that emits a hollow sound shall be replaced.

Replacement.--Cracked, chipped, broken, or otherwise defective tiles shall be removed and replaced. All tiles which differ more than 2 mm in elevation from adjacent tile edges shall be removed and replaced.

Curing.--After the installation of tile and the grouting of joints, the tile and grout shall be cured by keeping the surface continuously damp for at least 72 hours after grouting. Curing materials shall not stain the tile or grouted joints. Curing methods shall not erode away the grout.

After grouting, horizontal tiled surfaces shall be closed to traffic, and all tiled surfaces shall be kept free from impact, vibration or shock, for at least 72 hours.

CLEANING AND PROTECTION.--

Cleaning tile surfaces.--All exposed tile surfaces shall be cleaned of all grout haze upon completion of grouting. Acids and chemicals used to clean tile shall conform to the tile manufacturer's recommendations. Cleaners shall not be harmful to materials on surfaces of abutting floors, walls, and ceilings. Tile work shall be rinsed thoroughly with clean water before and after using acid or chemical cleaners. After cleaning and rinsing, tile surfaces shall be polished using a soft cloth.

Tile work shall be cleaned and polished again immediately prior to completion of the contract. All dirt, grime, stains, paints, grease, and other discoloring agents or foreign materials shall be removed.

Protection.--After grouting, horizontal tiled surfaces shall be closed to traffic, and all tiled surfaces shall be kept free from impact, vibration or shock, for at least 72 hours after.

Tile surfaces damaged by construction operations shall be retiled.

SCHEDULES.--

Wall tile.--

Wall tile shall be nominal 203 mm x 203 mm glazed wall tile.

Installation on cementitious backer board, using a tile bond coat and grout, shall conform to the requirements of Method W 244, "Handbook for Ceramic Tile Installation."

Floor tile.--

Floor tile shall be nominal 102 mm x 102 mm matte porcelain tile installed on a mortar bed using a tile bond coat and grout and shall conform to the requirements of Method F 112, "Handbook for Ceramic Tile Installation."

9.04 RUBBER BASE

GENERAL.--This work shall consist of furnishing and installing rubber base in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data, installation instructions, color palette, and samples of rubber base shall be submitted for approval. Samples shall be not less than 50 mm in length.

PRODUCTS.--

Rubber base.--

Rubber base shall be manufacturer's best grade, rubber base, with premolded internal and external corner pieces. The height and color shall be as shown on the plans.

Adhesive.--

Adhesive shall be as recommended by base manufacturer.

EXECUTION.--

INSTALLATION.--Bases shall be firmly and totally attached to walls with adhesive and shall be accurately scribed to trim, molding and cabinets. All joints shall be tight fitting. Bases between premolded corners or other termini may be installed continuous or installed using one m minimum standard manufactured lengths. Filler pieces shall be not less than 0.5 m.

9.05 VINYL COMPOSITION TILE

GENERAL.--This work shall consist of furnishing and installing vinyl composition tile in accordance with the details shown on the plans and these special provisions.

Vinyl composition tile shall consist of vinyl composition tile, edger strips, floor wax and tile manufacturer's recommended primers and adhesives.

SUBMITTALS.--Manufacturer's descriptive data, installation instructions, color and pattern samples shall be submitted for approval. Samples of tile shall be 305 mm x 305 mm in size.

PRODUCTS.--

Vinyl composition tile.--

Vinyl composition tile shall be semi-flexible, 2.38 mm minimum thick, 305 mm x 305 mm tile conforming to Federal Specification: SS-T-312, Type IV. Color and pattern shall be as shown on the plans.

Primer, leveling compound crack filler and adhesives.--

Primer, leveling compound crack filler and adhesives shall be waterproof types as recommended by the tile manufacturer.

Wax.--

Wax shall be water emulsion, self-polishing type containing not less than 16 percent wax solids, wetting agents, and a nonslip agent. The wax shall meet UL antislip standards.

Edger strips.--

Edger strips shall be commercial quality, stainless steel or aluminum.

EXECUTION.--

PREPARATION.--Before placing adhesives, all surfaces to receive vinyl composition tile shall be made free of localized depressions or bumps. Bumps shall be ground flat. Holes, depressions and cracks shall be filled with crack filler or leveling compound.

Immediately prior to application of the tile flooring, the surface to be covered shall be thoroughly dry, free of paint, oil, grease, mortar, plaster droppings, scaly surfaces or other irregularities and shall be broom clean. Primer, when recommended, shall be thoroughly brushed on the surface at the rate recommended by the adhesive manufacturer and shall be completely dry before the application of adhesives.

The rooms where tile is to be installed shall be maintained at a temperature of at least 21°C for not less than 72 hours before installation, during installation and for 5 days after installation.

APPLICATION.--Tile shall be laid to a true, straight, smooth and even finished surface in accordance with the manufacturer's instructions. Joints shall be tight fitting. Floor covering shall be placed before floor mounted fixtures are installed. After tile has been set, the finished surface shall be rolled and crossrolled with a roller weighing 50 kg or more.

Edger strips shall be installed at free edges.

Where tile patterns between rooms differ, the pattern break at openings shall occur at the centerline of the common wall.

Upon completion of the tile application, all stains, surplus adhesive, dirt and debris resulting from the work shall be removed and the floor left broom clean. Tile shall be protected from damage at all times during construction. As a last order of work, tile shall be washed with soap and warm water, rinsed, and then waxed in accordance with the tile manufacturer's printed instructions. Not less than 2 applications of wax shall be placed on the tile flooring.

9.06 PAINTING

PART 1.- GENERAL

SUMMARY.--This work shall consist of preparing surfaces to receive coatings, and furnishing and applying coatings, in accordance with the schedules and details shown on the plans, and these special provisions.

The coatings specified in this section are in addition to any factory finishes, shop priming, or surface treatment specified elsewhere in these special provisions.

SUBMITTALS.--Manufacturer's descriptive data, a materials list, and color samples shall be submitted for approval.

Product descriptive data shall include product description, manufacturer's recommendations for product mixing, thinning, tinting, handling, site environmental requirements, product application and drying time.

Materials list shall include manufacturer's name, trade name, and product numbers for each type coating to be applied.

Color samples shall be manufacturer's color cards, approximately 50 mm x 75 mm, for each color of coating shown on the plans.

REGULATORY REQUIREMENTS.--Coatings and applications shall conform to the rules for control of volatile organic compound emissions adopted by the air quality control district in the air basin in which the coatings are applied.

SITE ENVIRONMENTAL REQUIREMENTS.--Coatings shall not be applied when the air temperature is below 10°C (20°C for varnishes) or when the relative humidity exceeds 75 percent.

The surface to be coated shall be maintained at a minimum temperature of 7°C for a period of 24 hours prior to, and 48 hours after the application of the coating. Heating facilities shall be provided when necessary.

Continuous ventilation shall be provided during application of the coatings.

A minimum lighting level of 865 lux, measured 1 m from the surface to be coated, shall be provided while surfaces are being prepared for coatings and during coating applications.

DELIVERY, STORAGE, AND HANDLING.--Products shall be delivered to the site in sealed, labeled containers and stored in a well ventilated area at an ambient air temperature of not less than 7°C. Container labeling shall include manufacturer's name, type of coating, trade name, color designation, drying time, and instructions for tinting, mixing, and thinning.

MAINTENANCE STOCK.--Upon completion of coating work, a full 3.8 liter container of each type and color of finish coat and stain used shall be delivered to the location at the project site designated by the Engineer. Containers shall be tightly sealed and labeled with color, texture, and room locations where used, in addition to the manufacturer's standard product label.

PART 2.- PRODUCTS

GENERAL.--The products shall be the best quality grade coatings of the specified types as regularly manufactured by nationally recognized paint and varnish manufacturers that have not less than 10 years experience in manufacturing paints and varnishes. Products that do not bear the manufacturer's identification as the best quality grade product shall not be used. Products for each coating system shall be by a single manufacturer and shall not contain lead type pigments.

Thinners, shellac, fillers, patching compounds, coloring tint, and other products required to achieve the specified finish shall be the manufacturer's best quality and shall be used as recommended.

PART 3.- EXECUTION

INSPECTION.--Surfaces to be coated at the jobsite shall be approved by the Engineer prior to the application of coatings. The Contractor shall notify the Engineer at least 3 working days prior to the application of coatings.

SURFACE PREPARATION.--Surfaces scheduled to be coated shall be prepared in accordance with the following, except that the surfaces not specified herein shall be prepared as recommended by the coating manufacturer.

GENERAL.--Hardware, cover plates, light fixture trim, and similar items shall be removed prior to preparing surfaces for coating. Following the application of the finish coating, the removed items shall be reinstalled in their original locations.

WOOD.--Oil and grease shall be removed by solvent wash. Mildew shall be removed by mildew wash. Surfaces to be coated shall be cleaned of all dirt, excess material, or filler by hand cleaning. Smooth surfaced wood shall be sanded lightly.

A sealer composed of equal parts of shellac and alcohol shall be spot applied to knots, sap, pitch, tar, creosote, and other bleeding substances.

After the application of the prime coat, all nail holes, cracks, open joints, dents, scars, and surface irregularities shall be filled, hand cleaned, and spot primed to provide smooth surfaces for the application of finish coats.

Irregularities in wood surfaces to receive a clear finish shall be filled and hand cleaned before the application of coatings. The color of the filler shall match the color of the coated wood.

GALVANIZED METAL.--Oils, grease, and fabrication lubricants shall be removed by solvent wash. Surfaces shall be cleaned of remaining surface treatments by hand cleaning. New surfaces shall be roughened by hand cleaning or light abrasive blasting.

Abraded or corroded areas shall be hand cleaned and spot coated with one coat of vinyl wash pretreatment. Abraded or corroded areas on new surfaces not scheduled to be painted shall be cleaned by solvent wash, hand cleaned, and given 2 spot applications of zinc rich paint.

STEEL AND OTHER FERROUS METALS.--Oils, grease, and fabrication lubricants shall be removed by solvent wash. Dirt, water soluble chemicals, and similar surface contamination shall be removed by detergent wash or steam cleaning. Mill scale and rust shall be removed by hand cleaning or abrasive blasting.

GYPSUM BOARD.--Holes, cracks, and other surface imperfections shall be filled with joint compound or suitable filler prior to application of coatings. Taped joints and filled areas shall be hand sanded to remove excess joint compound and filler.

CEMENT PLASTER.--New plaster shall be cured a minimum of 14 days before coating. Cracks, holes, and surface imperfections shall be filled with patching plaster and hand textured to match adjacent surfaces.

SHOP PRIMED SURFACES.--Dirt, oil, grease, or other surface contaminants shall be removed by water blasting, steam cleaning, or TSP wash. Minor surface imperfections shall be filled as required for new work. Mildew shall be removed by mildew wash. Chalking paint shall be removed by hand cleaning. The surfaces of existing hard or glossy coatings shall be abraded to dull the finish by hand cleaning or light abrasive blasting. Abrasive blasting shall not be used on wood or non-ferrous metal surfaces.

Chipped, peeling, blistered, or loose coatings shall be removed by hand cleaning, water blasting, or abrasive blasting. Bare areas shall be pretreated and primed as required for new work.

DEFINITIONS.--

DETERGENT WASH.--Removal of dirt and water soluble chemicals by scrubbing with a solution of detergent and water, and removal of all solution and residues with clean water.

HAND CLEANING.--Removal of dirt, loose rust, mill scale, excess base material, filler, aluminum oxide, chalking paint, peeling paint, or paint which is not firmly bonded to the surfaces by using hand or powered wire brushes, hand scraping tools, power grinders, or sandpaper and removal of all loose particles and dust prior to coating.

MILDEW WASH.--Removal of mildew by scrubbing with a solution of detergent, hypochlorite-type household bleach, and warm water, and removal of all solution and residues with clean water.

ABRASIVE BLASTING.--Removal of oil, grease, form release agents, paint, dirt, rust, mill scale, efflorescence, weak concrete, or laitance, by the use of airborne abrasives, and removal of loose particles, dust, and abrasives by blasting with clean air.

Abrasives shall be limited to clean dry sand, mineral grit, steel grit, or steel shot, and shall be graded to produce satisfactory results. Unwashed beach sand containing salt or silt shall not be used.

Abrasive blasting shall conform to the requirements of SSPC-SP6-85, Commercial Blast Cleaning, as defined in the Steel Structures Painting Council Manual.

Light abrasive blasting shall conform to the requirements of SSPC-SP7-85, Brush-Off Blast Cleaning, as defined in the Steel Structures Painting Council Manual.

SOLVENT WASH.--Removal of oil, grease, wax, dirt, or other foreign matter by using solvents, such as mineral spirits or xylol, or other approved cleaning compounds.

STEAM CLEANING.--Removal of oil, grease, dirt, rust, scale, or other foreign matter by using steam generated by commercial steam cleaning equipment, from a solution of water and steam cleaning compounds, and removal of all residues and cleaning compounds with clean water.

TSP WASH.--Removal of oil, grease, dirt, paint gloss, and other foreign matter by scrubbing with a solution of trisodium phosphate and warm water, and removal of all solution and residues with clean water.

WATER BLASTING.--High pressure, low volume water stream for removing dirt, light scale, chalking or peeling paint. Water blasting equipment shall produce not less than a 13 800 MPa minimum output pressure when used. Heated water shall not exceed 66°C. If a detergent solution is used, it shall be biodegradable and shall be removed from all surfaces with clean water.

PROTECTION.--The Contractor shall provide protective devices, such as tarps, screens or covers, as necessary to prevent damage to the work and to other property or persons from all cleaning and painting operations.

Paint or paint stains on surfaces not designated to be painted shall be removed by the Contractor at his expense and the original surface restored to the satisfaction of the Engineer.

APPLICATION.--

GENERAL.--Coatings shall be applied in accordance with the printed instructions and at the application rates recommended by the manufacturer to achieve the dry film thickness specified in these special provisions.

Mixing, thinning and tinting shall conform to the manufacturer's printed instructions. Thinning will be allowed only when recommended by the manufacturer.

Coatings shall be applied only when surfaces are dry and properly prepared.

Cleaning and painting shall be scheduled so that dust and other contaminants from the cleaning process will not fall on wet, newly coated surfaces.

Materials required to be coated shall have coatings applied to all exposed surfaces, including the tops and bottoms of metal doors, and other surfaces not normally visible from eye level.

APPLICATION SURFACE FINISH.--Each coat shall be applied to a uniform finish. Finished surfaces shall be free of surface deviations and imperfections such as skips, cloudiness, spotting, holidays, laps, brush marks, runs, sags, curtains, ropiness, improper cutting in, overspray, drips, ridges, waves, and variations in color and texture.

Each application of a multiple application finish system shall closely resemble the final color coat, except each application shall provide enough contrast in shade to distinguish the separate applications.

WORK REQUIRED BETWEEN APPLICATIONS.--Each application of material shall be cured in accordance with the coating manufacturer's recommendations before applying the succeeding coating. Enamels and clear finishes shall be lightly sanded, dusted, and wiped clean between applications.

Stain blocking primer shall be spot applied whenever stains bleed through the previous application of a coating.

TIMING OF APPLICATIONS.--The first application of the specified coating system shall be applied prior to any deterioration of the newly prepared surface. Metal surfaces shall be prepared and prime coated the same day that cleaning of bare metal is performed. Additional prime coats shall be applied as soon as drying time of the preceding coat permits.

Metal surfaces shall be prime coated within 12 hours of application of vinyl wash pretreatment.

Shellac sealer shall be allowed to dry at least 12 hours before applying the next coat.

Drying time between applications of water borne coatings shall be at least 12 hours.

APPLICATION METHODS.--Coatings shall be applied by brush, roller or spray. Rollers shall be of a type which do not leave a stippled texture in the paint film. Extension handles for rollers shall not be greater than 2 m in length.

If spray methods are used, surface deviations and imperfections such as, overspray, thickness deviations, lap marks, and orange peel shall be considered as evidence that the work is unsatisfactory and the Contractor shall apply the remainder of the coating by brush or roller, as approved by the Engineer.

DRY FILM THICKNESS.--

Vinyl wash pretreatment	0.007 mm to 0.13 mm, maximum.
Bituminous paint	0.1 mm, minimum.
Other primers, undercoats, sealers, and coatings	As recommended by the manufacturer.

BACKPRIMING.--The first application of the specified coating system shall be applied to all wood surfaces (face, back, edges, and ends) of wood materials that are not factory coated, immediately upon delivery to the project site, except

surfaces of interior finish woodwork that adjoin concrete or masonry shall be coated with one application of alkyd exterior wood primer before installation.

When clear coatings are required on millwork, trim, or paneling, varnish, reduced 25 percent by mineral spirits, shall be used for coating the back faces.

All primed metal surfaces in contact with concrete or concrete block exterior walls shall be coated with a bituminous paint on those surfaces in contact with the wall.

FINISHING MECHANICAL AND ELECTRICAL COMPONENTS.--Shop primed mechanical and electrical components shall be finish coated in accordance with the coating system entitled, "Shop Primed Steel." Louvers, grilles, covers, and access panels on mechanical and electrical components shall be removed and coated separately.

Interior surfaces of air ducts which are visible through grilles or louvers shall be coated with one application of flat black enamel, to limit of the sight line.

Exposed conduit, piping, and other mechanical and electrical components visible in public areas shall be painted.

Both sides and all surfaces, including edges and back of wood mounting panels for electrical and telephone equipment shall be finish coated before installing equipment.

CLEANING.--Upon completion of all operations, the coated surfaces shall be thoroughly cleaned of dust, dirt, grease, or other unsightly materials or substances.

Surfaces marred or damaged as a result of the Contractor's operations shall be repaired, at his expense, to match the condition of the surfaces prior to the beginning of the Contractor's operations.

COATING SYSTEMS.--The surfaces to be coated shall be as shown on the plans and as specified elsewhere in these special provisions. When a coating system is not shown or specified for a surface to be finish coated, the coating system to be used shall be as specified for the substrate material. The number of applications specified for each coating system listed herein is a minimum. Additional coats shall be applied if necessary to obtain a uniform color, texture, appearance, or required dry film thickness.

SYSTEM 1- CEMENT PLASTER.--

1 prime coat: masonry primer
2 finish coats: acrylic, exterior enamel, semi-gloss

SYSTEM 2- GALVANIZED METAL.--

1 pretreat coat: vinyl wash pretreatment
1 prime coat: galvanized metal primer
2 finish coats: acrylic, exterior enamel, semi-gloss

SYSTEM 3- GYPSUM BOARD.--

1 prime coat: PVA wall sealer
2 finish coats: acrylic, interior enamel, semi-gloss

SYSTEM 4- SHOP PRIMED STEEL.--

1 prime coat: red oxide ferrous metal primer
2 finish coats: alkyd, exterior enamel, semi-gloss

SYSTEM 5- STEEL AND OTHER FERROUS METALS.--

2 prime coats: red oxide ferrous metal primer
2 finish coats: alkyd, exterior enamel, semi-gloss

SYSTEM 6- WOOD, CLEAR FINISH.--

1 prime coat: polyurethane varnish, satin, reduced 25 percent by mineral spirits
2 finish coats: polyurethane varnish, satin

SYSTEM 7- WOOD, PAINTED.--

1 prime coat: alkyd, exterior wood primer
2 finish coats: acrylic, exterior enamel, semi-gloss

COLOR SCHEDULE.--Colors shall be as shown on the plans.

9.07 FIBERGLASS REINFORCED PLASTIC PANELS

GENERAL.--This work shall consist of furnishing and installing fiberglass reinforced plastic (FRP) panels and trim molding in accordance with details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data, installation instructions, and finish options shall be submitted for approval.

Product descriptive data shall show the manufacturer's name and shall indicate conformance to these special provisions.

Installation instructions shall show the FRP panel manufacturer's recommended method of installation.

Finish options shall show the manufacturer's standard color palette for FRP panels and trim molding. Color shall be as shown on the plans.

PRODUCTS.--

FRP panel.--

FRP panel shall be Class I flame-spread, minimum nominal thickness of 2 mm; Marlite, Class A/I FRP; Kemlite, Fire-X Glasbord; or equal.

Trim molding.--

Trim molding shall be manufacturer's standard vinyl molding with nailing flanges and a 9 mm deep channel of sufficient width to receive panels and sealant.

Adhesive and sealant.--

Adhesive and sealant shall be as recommended by the FRP panel manufacturer.

EXECUTION.--

INSTALLATION.--The FRP panels and trim molding shall be installed in accordance with the manufacturer's installation instructions.

Trim molding shall be nailed through the flange into solid wood backing. All nails shall be concealed by FRP panels in the completed installation. Trim shall be one continuous piece along each wall unless the wall length exceeds the manufacturer's standard trim length. If more than one piece is used on one wall, the pieces shall be approximately equal length, with no piece less than 1 m in length. All FRP panel edges shall be covered by a trim molding.

Panels shall be one continuous piece along each wall unless the wall length exceeds the manufacturer's standard panel length. If more than one panel piece is used on one wall, the pieces shall be approximately equal length, with no piece less than one meter in length.

CLEAN-UP.--Adjacent surfaces shall be protected from adhesive or sealant. Excess adhesive and sealant shall be removed as the installation progresses using a solvent or cleaning agent recommended by the FRP panel manufacturer.

DIVISION 10. SPECIALTIES

10.01 TACKBOARDS

GENERAL.--This work shall consist of furnishing and installing tackboards in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data, color and texture samples and installation instructions shall be submitted for approval. Color and texture will be selected by the Engineer after the award of the contract.

PRODUCTS.--

Tackboards.--

Tackboards shall be textured plastic coating on cotton-fabric, pressure laminated to 6 mm thick cork underlayment. Cork underlayment shall be bonded to a 6 mm thick hardboard backing. Tackboard dimensions shall be as shown on the plans.

Border moldings.--

Border moldings shall be factory applied, extruded clear anodized aluminum trim.

EXECUTION.--

INSTALLATION.--Tackboards shall be installed rigidly, securely, plumb and true, and in accordance with the manufacturer's recommendations.

10.02 MARKER BOARDS

GENERAL.--This work shall consist of furnishing and installing a marker boards in accordance with the details shown on the plans and these special provisions.

One felt eraser and 12 felt tipped liquid chalk markers of assorted colors shall be furnished for each marker board installed.

SUBMITTALS.--Manufacturer's descriptive data and installation instructions shall be submitted for approval.

PRODUCTS.--

Marker board.--

Marker board shall conform to Porcelain Enamel Institute Standard PEI-S-104, and shall be porcelain enamel surface on 0.61 mm thick (24-gage) sheet steel pressure laminated to 6 mm thick tempered hardboard. Hardboard shall have a backing of 0.38 mm nominal thickness aluminum sheet. Enamel surface shall be suitable for marking with felt tipped liquid chalk markers and erasing with a felt eraser or dry cloth. The enamel surface shall be white in color.

Marker board dimensions shall be as shown on the plans.

Trim and marker tray.--

Trim and marker tray shall be factory installed, satin finish, clear anodized aluminum extrusions.

EXECUTION.--

INSTALLATION.--Marker boards shall be installed rigidly, securely, plumb and true in accordance with the manufacturer's instructions.

10.03 LOUVERS

GENERAL.--This work consists of furnishing and installing louvers in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data and installation instructions shall be submitted for approval.

PRODUCTS.--

Louvers.--

Louvers shall be factory fabricated units of extruded aluminum alloy not less than 2 mm thick (12-gage) or galvanized steel sheet not less than 1.63 mm thick (16-gage) with standard "Z" type blades, and removable bronze 16 x 16 mesh insect screens mounted on the inside of the units.

Louvers shall have integral caulking strips and retaining beads.

The finish on louvers shall be baked on primer and fluorocarbon polymeric resin.

EXECUTION.--

INSTALLATION.--Louvers shall be installed in accordance with the manufacturer's instructions. The completed louver installation shall be weather tight.

10.04 SIGNS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing signs in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data for sign materials, colors and graphics, and for fastening hardware and material shall be submitted for approval.

PART 2.- PRODUCTS

Plastic signs (for doors indicated on the door schedule).--

Plastic signs for permanent room identification for other than restrooms shall be scratch resistant, non-static, fire retardent, washable melamine laminate with a non-glare surface, not less than 3 mm thick. Letters and numbers shall be upper case Helvetica, 25 mm in height, 0.80 mm above and integral with sign material, accompanied by Grade 2 Braille.

Grade 2 Braille dots shall be 2.5 mm on centers in each cell with 5 mm space between cells. Dots shall be raised a minimum of 0.6 mm above the background.

Plastic sign (restroom).--

Plastic sign for restroom shall be not less than 6 mm acrylic plastic. Sign background shall be blue and shall conform to Federal Standard 595B, Color No. 15090. Male/female symbol and lettering shall be white and shall conform to Federal Standard 595B, Color No. 17886.

Unisex restroom identification shall be a male and female symbol on a 305 mm equilateral triangle superimposed on a 305 mm diameter circle.

Accessible building entrance sign.--

Accessible building entrance sign shall be not less than 3 mm acrylic plastic, not less than 102 mm x 102 mm , with the international symbol of accessibility.

Sign background shall be blue and shall conform to Federal Standard 595B, Color No. 15090. Symbol and border shall be white and shall conform to Federal Standard 595B, Color No. 17886.

Fastening hardware and material.--

Fastening hardware and material shall be as recommended by the sign manufacturer. Fasteners shall be noncorrosive.

PART 3.- EXECUTION

Inscription.--Sign messages shall be as shown on the plans.

Installation.--Plastic signs for room identification and restrooms shall be fastened or secured to clean, finished surfaces in accordance with the sign manufacturer's instructions. Signs shall be installed at a location and height as shown on the plans.

Fastening hardware and material shall be installed within the sign as shown on the plans.

10.05 WARDROBE LOCKERS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing wardrobe lockers in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, installation instructions, and standard color palette shall be submitted for approval.

Unless otherwise shown on the plans, the color will be selected by the Engineer from the standard color palette after the award of the contract.

PART 2.- PRODUCTS

ACCEPTABLE MANUFACTURERS.--

Available manufacturers.--Subject to conformance with the contract provisions, metal lockers shall be Art Metal Products; Lyon Metal Products; Republic Storage Systems; or equal.

Lockers.--

Lockers shall be standard, factory fabricated steel units. Framing shall be 1.52 mm thick (16-gage) and face sheets shall be 0.61 mm (24-gage), except door face sheets shall be 1.5 mm (16-gage).

Lockers shall be equipped with the following: hat shelf located approximately 255 mm below the top of the wardrobe locker, side to side coat rod, coat hook, louver vents at top and bottom of door, nonbreakable grip and turn handle, provisions for a padlock, lockbar with 3-point latching contact with door frame and 1 1/2 pair full looped leaf hinges.

The approximate dimensions of the wardrobe lockers shall be 380 mm wide, 457 mm deep and 1829 mm high.

Closed base.--

Closed base shall be the manufacturer's standard continuous 152 mm base, fabricated of the same material and designed for use with the lockers provided. Bottoms shall be flanged inward for stiffening. Bases shall have the same finish as the locker units.

Top.--

Top shall be the manufacturer's standard continuous sloping top with end closure as needed, fabricated of the same material and designed for use with the lockers provided. Tops shall have the same finish as the locker units.

FABRICATION.--

Shop assembly.--Lockers shall be fabricated square, rigid, and without warp, with metal faces flat and free of dents or distortion.

Frame joints and seams shall be welded. Exposed welds shall be ground smooth. Hinge and latch connections shall be welded or riveted.

Bolts shall be used for assembly and mounting lockers components. Bolt or rivet heads on fronts of locker doors or frame shall not be exposed.

Factory finish.--Lockers shall be chemically pretreated with degreasing and phosphatizing process. Wardrobe lockers shall have a baked enamel finish on all surfaces, exposed and concealed.

PART 3.- EXECUTION

Installation.--Lockers shall be mounted on closed bases at locations shown in accordance with the manufacturer's instructions for plumb, level, rigid, and flush installation.

Wardrobe lockers shall be bolted together at tops and bottoms. The backs of the end lockers shall be bolted to wall anchors with 6 mm bolts installed near the tops of the wardrobe lockers as recommended by the locker manufacturer.

Trim, sloping tops, and metal filler panels, if required, shall be installed using concealed fasteners to provide flush, hairline joints against adjacent surfaces.

The number of lockers shall be as shown on the plans.

10.06 FIRE EXTINGUISHERS AND CABINETS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing fire extinguishers with cabinets in accordance with the details shown on the plans and these special provisions.

REFERENCES.--

General.--Fire Extinguishers shall conform to the requirements in California Code of Regulations, Title 19 Division 1, Chapter 3, "Portable Fire Extinguishers."

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and installation instructions shall be submitted for approval.

QUALITY ASSURANCE.--

Codes and standards.--Fire extinguishers shall be Underwriters Laboratories or Factory Mutual Laboratories approved for the type, rating and classification of extinguisher specified.

PART 2.- PRODUCTS

MANUFACTURER'S.--

Acceptable manufacturers.--Subject to contract compliance, manufacturers shall be J. L. Industries; Larsen's Manufacturing; Potter-Roemer; or equal.

COMPONENTS.--

Fire extinguisher.--

Fire extinguisher shall be fully charged, multi-purpose dry chemical type, with charge indicator, hose and nozzle, and attached service record tag. Fire extinguisher shall be of the capacity and type rating shown on the plans.

Fire extinguisher cabinet.--

Fire extinguisher cabinet shall be factory fabricated, constructed of steel with a clear plastic panel in a steel door frame, and shall have a baked enamel finish. Color to be selected by the Engineer from the manufacturer's standard colors.

Fire extinguisher cabinet shall be surface mounted, as shown on the plans.

PART 3.- EXECUTION

INSTALLATION.--

General.--Fire extinguishers shall be installed in locations and at mounting heights shown on the plans, or if not shown, at a height of 1220 mm from the finished floor to the top of the fire extinguisher.

Fire extinguisher cabinets shall be attached to structure, square and plumb, in accordance with the manufacturer's recommendations.

IDENTIFICATION.--

Cabinet-mounted.--Extinguishers in cabinets shall be identified with letter spelling "FIRE EXTINGUISHER" applied to the cabinet door. Letter size, styles, and color shall be selected by the Engineer from manufacturer's standard arrangements.

SERVICING.--

General.--Fire extinguishers shall be serviced, charged, and tagged not more than 5 days prior to contract acceptance.

10.07 FREE STANDING STEEL SHELVING

GENERAL.--This work shall consist of furnishing and installing free standing steel shelving in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data, installation instructions and standard color palette shall be submitted for approval. The color will be selected by the Engineer after the award of the contract.

PRODUCTS.--

Shelving.--

Shelving shall be factory fabricated steel shelves and supports capable of supporting loads of 1200 Pa of shelf area. Shelves shall not deflect more than 8 mm when subjected to the loads specified herein and shall show no permanent deflection after removal of such loads. Shelves shall be supported and attached by means of clips. Studs or bolts shall not be used. Shelves shall be adjustable in vertical increments of 75 mm or less. Shelving shall be of the approximate dimensions and number shown on the plans and shall have a baked enamel finish.

EXECUTION.--Free standing steel shelving shall be installed in accordance with the manufacturer's instructions.

10.08 TOILET AND SHOWER ACCESSORIES

PART 1.- GENERAL

Scope.--This work shall consist of furnishing and installing toilet and shower accessories in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and installation instructions and details shall be submitted for approval.

PART 2.- PRODUCTS

Toilet tissue dispenser.--

Toilet tissue dispenser shall be dual roll, surface mounted, stainless steel with satin finish, approximately 150 mm x 290 mm x 150 mm deep. Dispenser shall utilize standard toilet tissue rolls. The top roll shall automatically drop into place after the bottom roll is depleted. One dispenser per toilet stall.

Toilet seat cover dispenser.--

Toilet seat cover dispenser shall be white plastic dispenser, approximately 210 mm x 320 mm x 48 mm deep, single pack. One dispenser per toilet stall.

Waste receptacle.--

Waste receptacle shall be white enameled sheet steel waste receptacle, 45 liter minimum capacity. One receptacle per toilet room.

Clothes hook.--

Clothes hook shall be stainless steel clothes hook with 2 prongs.

Paper towel dispenser.--

Paper towel dispenser shall be white enameled sheet steel towel dispenser with a capacity of 1000 single fold paper towels. One dispenser per lavatory.

Liquid soap dispenser.--

Liquid soap dispenser shall be surface mounted, heavy duty plastic dispenser for industrial use with a capacity of at least 710 mL. One dispenser per lavatory.

Mirror, wall hung with shelf.--

Mirror, wall hung shall be Number 1 quality, 6 mm thick, electrolytically copper plated float or plate glass mirror with nonmoisture-absorbing filler. Mirror shall have a heavy gage galvanized steel back and stainless steel frame with integral 127 mm wide stainless steel shelf. The frame shall have a satin finish and shall be mitered and welded and the corners shall be ground smooth. Fasteners shall not penetrate surfaces of the frame exposed to view. Mirror

shall conform to Federal Specification: DD-M-411b and shall be guaranteed against silver spoilage for not less than 10 years.

Steel grab bars.--

Steel grab bars shall be stainless steel, 38 mm diameter bars and escutcheon covered integral mounting flanges.

PART 3.- EXECUTION

Installation.--Toilet and shower accessories shall be installed in accordance with the manufacturer's recommendations. Fasteners for mounting accessories shall be concealed and tamper proof.

Expansion anchors shall be used for mounting accessories on masonry or concrete walls.

Toilet and shower accessories shall be mounted after painting work is complete.

All toilet room accessories shall be mounted plumb, secure and rigid. Grab bars shall be supported adequately so the bars will withstand an applied load of 113 kg at any point.

Support assembly for folding seat shall bear solidly on the wall without rocking and shall be fastened rigidly and securely to the wall in accordance with the manufacturer's recommendations.

10.09 MOP HOLDER

GENERAL.--This work shall consist of furnishing and installing a mop holder in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data shall be submitted for approval.

PRODUCTS.--

Mop holder.--

Mop holder shall hold 3 mops and shall be fabricated of heavy gauge stainless steel with a polished satin finish.

Mop holder consists of spring loaded rubber cams on plated steel retainers. Mop holder shall be Bradley, Model 9953; Bobrick, Model B-223x24; Gamco, Model MS1; or equal.

EXECUTION.--

INSTALLATION.--Mop holder shall be installed rigidly and securely.

DIVISION 11. EQUIPMENT

11.01 HIGH PRESSURE WASHER (STATIONARY)

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing a stationary high pressure washer and accessories in accordance with these special provisions.

Natural gas piping and water piping shall be furnished and installed in accordance with the requirements specified under "Pipe, Fittings and Valves" in Division 15, "Mechanical," of these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data for high pressure washer shall be submitted for approval.

Manufacturer's descriptive data shall include a complete description, performance data and installation instructions for the materials and accessories specified herein.

CLOSEOUT SUBMITTALS.--

Operation and maintenance manuals.--Prior to the completion of the contract, 3 identified copies of the operation and maintenance instructions with parts lists for the equipment specified herein shall be delivered to the Engineer at the jobsite. The instructions and parts lists shall be in a bound manual form and shall be complete and adequate for the equipment installed. Inadequate or incomplete material shall be returned. The Contractor shall resubmit adequate and complete manuals at no expense to the State.

WARRANTY.--

Warranties and guarantees.--Manufacturers warranties and guarantees for materials or equipment used in the work shall be delivered to the Engineer at the jobsite prior to acceptance of the contract.

PART 2.- PRODUCTS

MANUFACTURERS.--

Acceptable manufacturers.--Subject to compliance with the requirements, products shall be Epps; Whitco; or equal.

MANUFACTURED UNITS.--

High pressure washer.--

High pressure washer shall be stationary type, electric motor driven, natural gas-fired, minimum 80 percent efficient, automatic operating type washer designed for continuous operation. The washer shall have a capacity of 38 liters per minute of hot water solution heated to 49°C at 13 800 kPa. The washer burner shall be natural draft, with automatic electric ignition and flame monitoring system. Heater unit shall be factor preset to operate between 15.5°C and 49°C. The heating coil shall have an inside diameter of not less than 12 mm. The unit shall be completely housed in a steel cabinet with parts shielded from spray or splash.

Washer unit shall be equipped with a remote on/off pump motor and washer heater switch control panel. All controls including remote operator shall be 24 volt AC. Unit shall have a timer automatic shutdown system preset for two minutes. The motor shall be 11 kW, 230 VAC, 3 phase as shown on the plans.

The control panel shall display temperature and pressure gauges and shall mount the motor starter and the power disconnect breaker.

The unit shall be equipped with safety controls, safety valve, vent stack and the following accessories: 864 mm heavy duty dual lance wand with trigger control; 12.7 mm diameter by 15 meters in length, high pressure hose with 2 swivel ends rated for 24 100 kPa at 121°C; spray nozzles to allow flat, round and wide angle spray patterns at full flow at 13 800 kPa and full flow at 6 900 kPa (total 6); and a wall mounted hose reel and gun rack.

ACCESSORIES.--

Drum dolly.--

Drum dolly shall have welded steel construction with a cross braced bottom and a 50 mm continuous perimeter lip, 4 ball bearing casters with steel or semi-steel wheels. Drum dolly shall be sized to match the liquid detergent drum with a minimum capacity of 450 kg.

Vent stack.--

Vent stack shall be listed Class B. Vent stack shall include back draft diverter, fire stop spacer, ventilating thimble with drip cap and listed vent cap.

Hose and gun reel.--

Hose and gun reel shall be heavy duty assembly of steel construction with connecting hose, locking automatic ratchet, guide rollers and heavy duty spring activated hose pickup. Hose and gun reel shall have bushings, swivels, ball stops, and sized for a 15 m delivery hose. The reel shall have a baked enamel finish. Manufacturers reel mounting brackets shall be supplied with reel.

Soap/water mixing meter.--

The soap/water mixing meter shall be wall mounted, have a blend center consisting of; siphon breaker; kick-off spring; stainless steel enclosure; vinyl tubing; proportioner; ceramic weight; pipe plug; magnetic housing; push button; spring; spacer; plunger valve body; pipe to garden hose adapter; foot valve; inlet screen; and meter tip kit.

Non-emulsifying soap.--

Non-emulsifying soap shall be a commercially formulated, concentrated liquid that removes surface dirt, road film, and bug residue from vehicle exteriors with minimal brushing when used in conjunction with a high pressure washer. The soap shall contain no solvents, caustics, acids or phosphates. It shall work with hot or cold water, rinse easily and leave no unsightly soap film or streaks. A drum containing 208 liters of the product shall be supplied by, or approved by the manufacturer of the high pressure washer. Product shall conform to the following:

Boiling point	>100°C
Specific Gravity	1.102
Solubility in water	100%
Evaporation rate	>1
pH	11-12

Expansion anchors.--

Expansion anchors shall be ICBO approved, integral stud type or internally threaded type with independent stud complete with hex nut and cut washer.

PART 3.- EXECUTION

INSTALLATION.--

General.--The high pressure washer shall be installed in accordance with the manufacturer's recommendations.

A reduced pressure backflow preventer shall be installed in the water line prior to the unit. Piping shall be installed to provide a minimum headroom clearance of 2.5 meters. Piping shall not be installed in travel areas at floor level.

Hose and gun reel assembly shall be attached to the wall with 6 mm (minimum) stud type expansion anchors. If hose and gun reel does not include brackets for the gun nozzle, wall brackets shall be installed at the Contractor's expense.

Factory fittings for mixing meter shall be installed on the 208 liter drum of non-emulsified soap and placed on the drum dolly. Soap and dolly shall be ready for use and placed in the equipment building or other location as designated by the Engineer.

FIELD QUALITY CONTROL.--

Testing.--Testing of the high pressure washer shall be conducted by the Contractor in the presence of the Engineer.

The Contractor shall notify the Engineer in writing not less than 5 days prior to the time that testing is to be conducted.

11.02 LUBRICATION AND COMPRESSED AIR SYSTEMS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing lubrication and compressed air systems in accordance with the details shown on the plans and these special provisions.

The lubrication system shall include drum dollies and pneumatic pumps for dispensing chassis lubricant, motor oil, automatic transmission fluid, gear lubricant and hydraulic fluid.

The compressed air system shall include a compressor, air-cooled aftercooler, regulators, air reel, gauges and compressed air piping.

Pipes and fittings shall be in accordance with the requirements specified under "Pipes, Fittings, and Valves," in Division 15, "Mechanical," of these special provisions.

Permits to operate.--Attention is directed to the latest Division of Industrial Safety (DIS) regulations regarding tank mounted air compressors.

The Contractor shall provide all permits to operate pressure vessels in accordance with the requirements of the DIS and shall pay all costs for such permits. Such permits shall be posted under glass at the work site.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data shall be submitted for approval.

Manufacturer's descriptive data shall include a complete description, performance data and installation instructions for the materials and equipment specified herein.

Performance data shall include the product delivery rate and discharge pressure for each type of pump assembly.

CLOSEOUT SUBMITTALS.--

Operation and maintenance manuals.--Prior to the completion of the contract, 3 identified copies of the operation and maintenance instructions with parts lists for the equipment specified herein shall be delivered to the Engineer at the jobsite. The instructions and parts lists shall be in a bound manual form and shall be complete and adequate for the equipment installed. Inadequate or incomplete material shall be returned. The Contractor shall resubmit adequate and complete manuals at no expense to the State.

WARRANTY.--

Warranties and guarantees.--Manufacturer's warranties and guarantees for materials or equipment used in the work shall be delivered to the Engineer at the jobsite prior to acceptance of the contract.

PART 2.- PRODUCTS

PUMP ASSEMBLIES.--

Air hose reel.--

The air hose reel shall have a 10-meter minimum length of 6.35 millimeter inside diameter hose, and outlet control valve. The delivery hose shall be rated for 1720 kilopascal working pressure. The air hose reel assembly shall be Croft, OT-35; Coxreels, SH 135; or equal.

Pneumatic lubrication assemblies.--

The pneumatic lubrication assemblies shall consist of an air-powered pump, delivery hose, control valve, and drum dolly. Pneumatic lubricant assemblies shall be provided for chassis lubricant, motor oil, automatic transmission fluid (ATF), and gear oil. Components shall be as follows:

Air powered pump for chassis lube shall be suitable for operation on mobile/portable 55 kilogram drums and shall be complete with drum cover and follower. Chassis lube pump shall have a minimum pressure ratio of 45:1 and a maximum pressure ratio of 50:1.

Air powered pump for motor oil, gear oil, hydraulic fluid, and ATF shall be suitable for operation on mobile/portable 181 kilogram drums and shall be complete with drum cover. The pump shall have a 75 millimeter minimum body diameter with a minimum pressure ratio of 4:1 and a maximum pressure ratio of 5:1.

Delivery hose for each lubrication assembly shall be 3 meter length with end coupling for connection to the pump and swivel adapter for connection to the control valve. Chassis lube delivery hose shall be 6.35 millimeter inside diameter and rated for 34000 kilopascal working pressure. Motor oil, gear oil, hydraulic fluid, and ATF delivery hose shall be 12.5- millimeter inside diameter and rated for 5000 kilopascal working pressure. A 10 meter long 6.35 millimeter inside diameter, 1720 kilopascal rated, air extension hoses fitted to connect to the pumps shall be included as part of each lubrication assembly.

Control valve for chassis lube shall be a high-pressure control handle valve complete with nozzle and adapters. Control valve for motor oil shall be an automatic pre-set 15 liter metering valve with a totalizer and a non-drip nozzle extension. Control valves for the gear oil, hydraulic fluid and ATF, shall be a 3-liter metering control valve with a totalizer and a non-drip nozzle.

Chassis lubrication assembly shall include 55 kilogram a platform type drum dolly. Drum dolly shall have 4 swivel casters and an enamel finish. Motor oil, gear oil, hydraulic fluid and ATF assemblies shall include a 181 kilogram rated drum truck. Drum trucks shall be three wheeled and have a tow handle.

Recyclable oil transfer pump.--

Recyclable oil transfer pump shall be an air operated double diaphragm pump with 25 mm inlet and outlet and a minimum pressure ratio of 1:1. Pump shall have aluminum housing with Buna-N trim. Recyclable oil transfer pump shall be Lincoln, Model 84852; Graco, Model D73-525; or equal.

MISCELLANEOUS COMPONENTS.--

Air compressor.--

Air compressor shall be 2-stage, 1210 kPa design, 860 kPa output, mounted on an ASME code horizontal type receiver. The air compressor shall be complete with unloader, V-belt drive, belt guard, oil and air pressure gauges, automatic pressure controller, outlet valve, ASME relief valve, air intake filter, ball valve drain and an automatic tank drain operated by either the compressor unloader or a governor, and air-cooled after cooler. Motor shall be high efficiency type, open dripproof with class B insulation. Air compressor shall be Champion, Ingersol Rand, Kellogg, or equal.

Pressure regulator.--

Pressure regulator shall be combination type with filter, bowl, pressure regulator and pressure gauge.

The filter bowl shall be the quick disconnect type, plastic with metal guard, manual drain, and 5 micron filter.

Pressure regulator shall be diaphragm controlled, balanced valve type, rated for 0 to 1100 kPa operation and shall be equipped with pressure gage, bottom clean-out plugs and internal strainers. Regulator shall be Wilkerson, Lincoln, Wabco, or equal.

Flexible coupling.--

Flexible coupling shall be brass flexible metal hose with threaded union ends and a minimum working pressure of 1380 kPa.

Pressure gage.--

Pressure gage shall be rotary type ANSI Standard: B40.1, Grade A, with 90 mm dial, liquid filled with cover, plain case, reset screw and bottom inlet. Pressure gage movement shall be phosphor bronze bushed. Gage shall read from 0 kPa to 1400 kPa. Each gage shall be equipped with a gage cock. Pressure gage shall be Marsh, Ashcroft, US Gage, or equal.

PART 3.- EXECUTION

INSTALLATION.--

General.--Pipelines shall be cleaned and flushed immediately prior to connecting the control valves.

Pressure relief kits shall be installed on the discharge side of the recyclable oil, gear lube, ATF and motor oil pumps as recommended by the pump manufacturer.

Air compressor shall be installed with drain piping, vibration isolation pads and expansion anchors.

Unions shall be installed before and after the pressure regulator/ball valve assembly.

Each pump assembly drum shall be supplied with a drum dolly.

FIELD QUALITY CONTROL.--

Testing.--All tests, including general performance tests to demonstrate the proper operation of the lubrication systems and the air compressor, shall be performed by the Contractor in the presence of the Engineer.

The air compressor system shall be tested for the operational range, the cut-off pressure and the operation of air drops and system components.

The lubrication system, including piping and hoses, shall be tested for leaks and the rates of delivery specified herein. The lubrication connections shall show no visible signs of leaks when the system is filled with the specified lubricant and tested at 1040 kPa lubricant pump inlet air pressure.

The Contractor shall demonstrate that the completed lubrication system will deliver the given product at the flowrate and discharge pressure specified by the pump assembly manufacturer. If no specification is given the lubricants shall be delivered at the following rates at 1040 kPa lubricant pump inlet air pressure:

Lubricant Material	Delivery Rate
Chassis lubricant NLGI No. 2 grease	0.7 liters per minute
Motor oil (10W/40)	7 liters per minute
Gear oil (85W/140)	6 liters per minute
ATF (SAE 10)	8 liters per minute

The required delivery rate values may be adjusted, as determined by the Engineer, when testing for delivery rates with different materials or at temperatures other than 21°C.

The drums and lubricating material for testing the lubrication system will be State-furnished as provided under "State-Furnished Materials" in Division 1, "General Requirements," of these special provisions.

11.03 EXHAUST EVACUATION HOSE REEL AND FAN

PART 1.- GENERAL

Scope.--This work shall consist of furnishing and installing exhaust evacuation hose reel and fan equipment, including overhead fume exhaust fan, hose reel, hose and remote operating station. All work shall be done in accordance with the details shown on the plans and these special provisions.

Supports, Mechanical and Electrical work and all other work incidental to, and necessary for, the proper installation and operation of the items of equipment shall conform to the requirements specified for similar work elsewhere in these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's description data, installation recommendations, shop drawings, schematic diagram, interconnection diagram, including reel installation mounting brackets, shall be submitted for approval. Fan, hose reel and push button station shall be from same manufacturer. System shall be Nederman, CarMon or equal.

PART 2.- PRODUCTS

Exhaust evacuation fan.--

Exhaust evacuation fan shall be centrifugal AMCA certified exhaust fan suitable for diesel or gasoline powered vehicle exhaust applications. Fan parts exposed to air stream shall be coated to prevent acid corrosion. The exhaust evacuation fan shall be mounted with vibration isolators on the reel. The fan size and performance shall be as shown on plans.

Hose reel assembly.--

Hose reel assembly shall be provided with 9 m minimum of 150 mm diameter flexible hose. The hose reel shall be motor operated and shall be capable of unwinding and recoiling the hose from a remote operating station. All electrical equipment necessary for operation shall be mounted on the hose reel assembly except for the remote operating station. The hose reel motor shall be interlocked with an adjustable limit switch that stops the reel when the tubing has been fully extended or fully retracted.

Hose.--

Exhaust hose shall be fabricated of a high strength woven glass fiber cloth supported by a helically wound spring steel wire. The hose shall be capable of withstanding temperatures of 150°C and shall be supplied with a rubber nozzle of the same size as hose provided.

Pushbutton station.--

Pushbutton operating station shall consist of a 3 button (up, down, on/off) controller wired directly to the hose reel assembly. The up and down buttons shall be momentary push button type.

Control panel.--

Control panel shall be a complete system routinely advertised, furnished and guaranteed by the exhaust evacuation hose reel and fan manufacturer.

Control panel shall include circuit breakers, starters, fan motor contactor, power supply, limit switch and controls that are required for proper operation.

PART 3.- EXECUTION

INSTALLATION.--

General.--The exhaust evacuation hose reel and fan shall be installed in accordance with the manufacturer's recommendations. The exhaust evacuation units and pushbutton station shall be located as shown on the plans.

FIELD QUALITY CONTROL.--

Testing.--The test shall consist of a general performance test to demonstrate the proper operation of the exhaust evacuation hose reel and fan system. The test shall be performed by the Contractor in the presence of the Engineer.

DIVISION 12. FURNISHINGS

12.01 HORIZONTAL BLINDS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing horizontal blinds in accordance with the details shown on the plans and these special provisions.

Horizontal blinds shall be standard, factory manufactured assemblies suitable for use on exterior wall windows.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, color chips, and installation instructions shall be submitted for approval.

PART 2.- PRODUCTS

Horizontal blinds.--

Horizontal blinds shall be nominal 25 mm wide, spring tempered virgin aluminum alloy horizontal slats supported by braided polyester ladders. Braided ladders shall hold slats at equal spaces, parallel, straight, and shall provide tilt control and adequate overlap of slats. The distance between ladders shall not exceed 585 mm. Slat tilt shall be adjustable by a transparent wand. Blinds shall be adjustable to any height using lift cords.

Hardware shall be enclosed in a metal head and the opening hardware shall be clinched to the head. All metal parts shall have a corrosion resistant coating.

PART 3.- EXECUTION

Installation.--Horizontal blinds shall be installed in accordance with the manufacturer's instructions.

DIVISION 13. SPECIAL CONSTRUCTION

13.01 PRE-ENGINEERED STEEL CANOPY

GENERAL.--This work shall consist of designing, fabricating, furnishing and erecting a pre-engineered steel canopy in accordance with the details shown on the plans and these special provisions.

Pre-engineered steel canopy shall be of the rigid frame type with tapered columns and shall include structural steel framing, permanent lateral force resisting system (portal frame), anchor bolts, base plate ties, fasteners, roof panels, sealants, flashings, and such other parts, which are required for the complete construction of the steel canopy structure.

The building dimensions shown on the plans are minimal and may be increased to accommodate manufacturer's standards. No additional compensation will be allowed for any changes required by such increased dimensions.

DESIGN CRITERIA.--The building and the building design shall be in accordance with the applicable requirements in the latest edition of the following publications: "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings," published by AISC; "Specification for the Design of Cold-Formed Steel Structural Members," published by AISI; the "Metal Building Systems Manual," published by the Metal Building Manufacturers Association and the California Building Code, including the modification to loads or stresses indicated therein.

The building shall be designed for simple erection with only bolted type field connections for framing.

The building shall be designed to support the weight of the building components, and the live load, wind load, seismic load, and other loads shown in the design notes on the plans. The design shall include wind and earthquake bracing.

Horizontal acting forces shall be applied parallel and perpendicular to the direction of the bents.

Rigidly connected structural framing shall be used to resist lateral loads, except roof panels may be used to resist lateral loads, provided that design calculations and laboratory test data, satisfactory to the Engineer, are submitted to substantiate their adequacy. Cables shall not be used for permanent lateral bracing.

The roof covering system shall be designed for an Underwriter Laboratory Class 60 minimum wind uplift rating.

SUBMITTALS.--Complete shop drawings, erection instructions and drawings, design calculations, complete material descriptive information and manufacturer's standard color palette shall be submitted for approval. Submittals shall be approved prior to the start of fabrication.

Shop drawings, and design calculations shall be stamped and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California. The expiration date of the registration shall be shown.

Shop drawings shall show the size, thickness, shape, configuration, type, grade, class, description and coating, if any, of all materials used in the building. Joint details, connection and anchoring details and details of all temporary and permanent bracing shall be shown.

Calculations for the design of the building and the bracing shall include a list of applied loads and load combinations with the resulting member forces and member stresses. Maximum upward acting, downward acting and horizontal acting forces at the base of columns shall be included.

If the design calculations consist of computerized or tabulated calculations, the values pertaining to the building design for this project shall be identified, described or indexed in such a manner that a design check can be performed.

The manufacturer's color palette shall show the standard color line of baked polyester enamel coatings for building and accent colors. The colors shall be as shown on the plans.

CERTIFICATES OF COMPLIANCE.--Certificates of Compliance shall be furnished for the pre-engineered steel building in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

DELIVERY, STORAGE AND HANDLING.--The pre-engineered steel canopy components shall be transported and handled in such a manner as to prevent damage due to twisting, distortion or deformation. Building components shall be stored off the ground.

PRODUCTS.--

Primary and secondary steel framing members.--

Primary and secondary steel framing members shall be manufacturer's standards for the type, size and shape of building to be constructed. The minimum steel strength shall be as shown on the plans.

Roof panels.--

Roof panels shall be not less than 0.55 mm thick (26-gage), cold-formed, galvanized sheet steel conforming to ASTM Designation: A 563/563M, Grade 33 [230] with G90 [Z275] coating. Panels shall have primary vertical ribs spaced at 300 mm maximum with 3 intermediate secondary ribs located between the primary ribs. The depth of the primary ribs shall be between 19 mm and 38 mm. The net minimum width of the panels shall be 600 mm. Each roof panel shall have an integral anti-siphon trough or break. Roof panels shall be continuous from ridge to eaves for all roof slopes 10.7 meters or less in length.

Fasteners.--

Fasteners for the steel frame, roof panels, and accessories shall be the building manufacturer's standards and shall be of the size, type and spacing required by the design.

Frame tie rods.--

Frame tie rods, nuts, and washers shall conform to ASTM Designation: A 572M, Grade 50.

Sealant.--

Sealant shall be single component polysulfide or butyl conforming to Federal Specification: TT-S-230A and ASTM Designation: C 920. Sealant shall be clear, translucent or opaque white.

Rib and flute closures.--

Rib and flute closures shall be ultraviolet and weather resistant rubber, neoprene or closed cell polyethylene.

Fascia, trim, coping, ridge cover, flashings, clips and miscellaneous support shapes.--

Fascia, trim, coping, ridge cover, flashings, clips and miscellaneous support shapes shall be building manufacturer's standards.

EXECUTION.--

FABRICATION.--Building frame components shall have all the bolt holes necessary for erecting, assembling and fastening made at the factory.

Bolt holes shall be either punched full size, drilled full size, subpunched and reamed, or subdrilled and reamed. The finished holes shall be cylindrical, perpendicular to the plane of the connection and shall be not more than 2 mm larger than the nominal diameter of the bolt. Mispunched or misdrilled holes shall not be corrected by welding unless approved by the Engineer.

FRAMING ERECTION.--Framing shall be erected plumb and true in accordance with the requirements of the AISC specifications and shall be secured rigidly in place in accordance with the details shown on the approved shop drawings and the recommendations to the building manufacturer.

Anchor bolts for the framing columns and the lateral tie rods shall be cast into the foundation foundations.

Temporary bracing shall be installed during erection to hold the framing plumb and true and in a safe position until sufficient permanent bracing and construction is in place to provide full stability. All permanent bracing shall be secured in

place before any sustained permanent loads are applied to the framing system. Bracing shall be positioned to clear electrical work and openings for accessories.

Openings for accessories shall be plumb and level, of the correct dimensions, located approximately where shown on the plans and reinforced to support the loads of the accessories.

Cutting, welding or altering of the framing members at the site shall not be allowed without written approval of the Engineer.

ROOF PANEL INSTALLATION.--Roof panels shall be installed in accordance with the manufacturer's recommendations.

Panels shall be adjusted to final position and brought to bear on the structural supports prior to fastening. Side laps shall be as recommended by the building manufacturer and shall be located over structural supports.

Cutting and fitting of the panels shall present a neat and true appearance with exposed burrs removed. Openings through the panels shall be cut square and shall be reinforced as recommended by the manufacturer.

Fasteners for panels shall be installed with an electric screwdriver equipped with a depth sensing nosepiece. Adjustment of the depth sensing nosepiece shall be checked prior to each day's use and when directed by the Engineer.

Isolation coatings shall be provided between surfaces of dissimilar metals.

Closures shall be installed and sealant shall be applied as recommended by the manufacturer to prevent weather penetration.

The completed installation shall be without defacements, bends, sags, dimples, undulations, or other deformations; shall be free of vibration, rattles and noise due to wind or thermal movement; and shall be weathertight.

SEALING JOINTS.--Sealant shall be applied in accordance with manufacturer's recommendations. Applications shall be a continuous operation for the length of the joint. Following the application of the sealant, the joint shall be tooled using a tool similar to that used to produce concave masonry joints. The joint shall remain undisturbed after tooling for not less than 48 hours.

PAINTING.--Surfaces of roof panels and trim exposed to view shall be cleaned, treated by either the bonderizing or an approved phosphatizing process, given at least 2 applications of the polyester enamel finish paint, and then oven baked.

All surfaces of steel framing shall be cleaned and painted with 2 coats of primer at the factory. Two applications of the finish coating shall be applied to exposed surfaces of steel framing either at the factory or after erection. Cleaning and painting shall be in accordance with the requirements specified for steel and other ferrous metals under "Painting" in Division 9, "Finishes," of these special provisions.

After erection, all areas where the factory applied primer or finish coatings have been damaged or have deteriorated shall be thoroughly cleaned and spot painted. Spot painted areas of primer shall be approved prior to the application of the finish coats. Spot painting of the finish coating shall extend to edges, corners or other features that conceal the differences between new painting and shop applied coatings.

Other surfaces exposed to view, that are not coated at the factory, shall be coated. Cleaning and coating shall be in accordance with the requirements specified for the particular type of substrate material under "Painting" in Division 9, "Finishes," of these special provisions.

CLEAN-UP.--Panels, trim and other prefinished metal surfaces shall be cleaned after installation as recommended by the building manufacturer. Exposed cuts in sheathing panels shall be touched-up with a durable primer and paint as recommended by the building manufacturer.

DIVISION 14. CONVEYING SYSTEMS

14.01 MOBILE VEHICLE LIFT

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing an above ground, 4-post, mobile vehicle lift and accessories in accordance with these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data for all equipment, including installation instructions, shall be submitted for approval.

Submittals shall include, but not necessarily be limited to the following:

- Assembly Drawings
- Dimensional Drawings
- Control Schematic Diagrams
- Wiring Diagrams
- Test Report Certifying Compliance with ANSI Standard B153.1.

CLOSEOUT SUBMITTALS.--

Operations and maintenance manuals.--Prior to completion of the contract, 3 identified copies of the operation and maintenance instructions for the vehicle lift shall be delivered to the Engineer at the jobsite. Manuals shall be bound and shall include the following:

- Manufacturer's name
- Name, address, and telephone number of factory authorized repair facility
- Model and serial number
- Service manual shall show:

- Assembly drawings, parts list, and simplified system diagrams
- Descriptions of all equipment and their basic operating features
- Routine maintenance and service requirements
- Troubleshooting and repair procedures
- Accessories and their features and requirements

Inadequate or incomplete manuals will be returned. The Contractor shall resubmit adequate and complete manuals at no expense to the State.

QUALITY ASSURANCE.--

Manufacturer's qualifications.--The vehicle lift shall be furnished and installed by a manufacturer or authorized representative who has not less than 5 years experience in the manufacture and installation of this type of equipment and who maintains an authorized service representative within the State of California.

Codes and standards.--All work, including equipment, materials and installation, shall conform to the California Building Standards Code, Title 24; the California Code of Regulations, Title 8, Chapter 4, Division of Industrial Safety (DIS); and the American National Standards Institute, Inc. (ANSI) Standard B153.1.

The lift including all components necessary for operation shall be tested as a unit for conformance to ANSI Standard B153.1. Where strength factors are specified, actual load tests shall be performed and the results documented. Where component assembly is specified to a particular code or standard, a statement of compliance with that code or standard shall be included. All tests shall be performed by an independent testing laboratory recognized by the Occupational Safety and Health Administration (OSHA) under the Nationally Recognized Testing Laboratories (NRTL) Recognition Program, Office of Variance Determination.

WARRANTY.--

Warranties and guarantees.--Manufacturer's warranties and guarantees for materials or equipment used in the work shall be delivered to the Engineer at the jobsite prior to acceptance of the contract.

PART 2.- PRODUCTS

EQUIPMENT.--

Lift.--

Lift shall be comprised of four portable electrically operated components that are connected by electrical cable with at least one of the components having controls to operate all four components. Lift shall be an electromechanical device featuring a screw drive, support base and lifting fork to raise vehicles by their wheels. The lift shall include a fail-safe mechanical locking system at each component to secure the lift at all required height positions.

Lift shall be heavy duty type with a minimum rated capacity of 27 216 kg and a minimum lifting height of 1.6 meters measured from the finish floor to the bottom of the lifting fork.

Lifting speed shall be a minimum of 508 mm per minute.

Each portable component shall be driven by an open dripproof electric motor suitable for operation on 3-phase, 230-volt, and 60 Hz service. Electrical controls for all lift components shall be designed for complete synchronized automatic operation, such that all lifting forks shall have parallel and simultaneous movement when going up or down. All movement shall be stopped if the controls are unable to maintain synchronous motion. Electrical control shall be suitable for operation on the supply voltage.

ACCESSORIES.--

Wheel adapters.--

Wheel adapters shall be included to allow lifting of large trucks with tire sizes up to 24 R 22.5 and passenger automobiles with tire sizes down to P175 80 R 13.

High lift tripod.--

Each high lift tripod shall have a lift capacity of not less than 6804 kg. Coarse adjustment of height shall be mechanically assisted using either a spring, pneumatic, or hydraulic system which will permit adjustment of the coarse height by one person. Fine adjustment of height shall be accomplished with a screw drive similar to the one used for the lift. Height shall be adjustable from 1.4 to 2 meters. A total of 4 high lift tripods shall be supplied.

Information plate.--

Information plate with the following inscriptions shall be attached to the lift:

- Manufacturer's name and address
- Model number
- Serial number
- Lift capacity
- Date of installation
- Statement of compliance with ANSI B153.1

PART 3.- EXECUTION

INSTALLATION.--

General.--All equipment shall be installed in accordance with the vehicle lift manufacturer's recommendations and the applicable codes.

FIELD QUALITY CONTROL.--

TESTS.--

Acceptance tests.--Testing of the vehicle lift shall be conducted by the Contractor in the presence of the Engineer, using a State-furnished vehicle under various loads up to the maximum specified. If the lift malfunctions or a failure develops, the parts causing the failure shall be replaced or repaired and the test repeated until the vehicle lift performs satisfactorily. The electric motors shall not exceed the full load current as listed on the nameplate of the motor.

The Contractor shall notify the Engineer in writing not less than 5 days prior to the time that the testing is scheduled.

Manufacturer's field service.--The Contractor shall arrange for a manufacturer's authorized representative at the site of the work to supervise installation, check start-up, and train State personnel.

DEMONSTRATION.--

Training.--The Contractor shall arrange instruction and training for up to 6 State personnel on the operation and maintenance of the equipment. Training shall be scheduled with the Engineer to occur within 2 weeks of the installation of the hoist. Training shall include 8 hours of instruction on equipment operation and maintenance.

14.02 FREESTANDING BRIDGE CRANE AND HOIST

PART 1.- GENERAL

SUMMARY.--

Scope.--This work consists of designing, constructing, furnishing and installing a 2700-kilogram freestanding electric bridge crane with an electric powered hoist on a motorized trolley, in accordance with the details shown on the plans, the requirements specified in these special provisions, and the recommendations and instructions of the hoist manufacturer.

The work shall also include the design, construction, furnishing and installation of a self supported runway system consisting of bi-directional moment frames, crane runway rails, and the bridge girder for the trolley and hoist.

SYSTEM DESCRIPTION.--

Design requirements.--The self supported runway system consisting of bi-directional moment frames, crane runway rails, and the bridge girder shall be designed to support the crane and hoist loads, including the required safety factors, as recommended by the crane and hoist manufacturer for the crane capacity specified herein and as recommended by the Materials Handling Institute Standard No. 74, "Top Running and Underhung Single Girder Electric Overhead Traveling Cranes," and as required by Title 24 of the California Building Standards Code, Title 8 of the California Code of Regulations and the 1998 California Building Code.

The crane runway rails shall be located as shown on the plans. The approximate spacing of the structural steel support frames shall be as shown on the plans. The minimum vertical clearance shall be as shown on the plans.

The bridge girder shall be designed for the span between the crane runways. The approximate length of span between the crane runways shall be as shown on the plans. Final span length shall be determined by the manufacturer. The length of travel of the trolley at each end shall be determined by the Contractor and shall be the maximum that can be attained while maintaining adequate operating clearances between the crane assembly and the building in which it is installed.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, performance data, parts list and installation instructions for the bridge crane and hoisting equipment shall be submitted for approval.

Shop drawings.--Shop drawings and design calculations for the self supported runway system consisting of bi-directional moment frames, crane runway rails, and bridge girder shall be submitted for approval.

Shop drawings shall include control panel schematic and wiring diagram, and a listing of electrical equipment and devices to be furnished.

Shop drawings and design calculations shall be stamped and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.

CONTRACT CLOSEOUT SUBMITTALS.--

Operation and maintenance manuals.--Prior to the completion of the contract, 3 identified copies of the operation and maintenance instructions with parts lists for the equipment specified herein shall be delivered to the Engineer at the jobsite. The instructions and parts lists shall be indexed and bound in a manual form and shall be complete and adequate for the equipment installed. Inadequate or incomplete material shall be returned. The Contractor shall resubmit adequate and complete manuals at no expense to the State.

QUALITY ASSURANCE.--

Certificate of Compliance.--Certificates of compliance shall be furnished for the bi-directional moment frames, crane runway rails, and bridge girder in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

Codes and standards.--All welding shall be in accordance with the requirements in American Welding Society (AWS) D14.1, "Specifications for Welding Industrial and Mill Crane and Other Material Handling Equipment."

PART 2.- PRODUCTS

MANUFACTURERS.--

Acceptable manufacturers.--Subject to project conditions, freestanding bridge crane and hoist shall be CraneVeyor Corp.; Detroit Hoist; Lift-Tech International, Inc.; or equal.

MANUFACTURED UNITS.--

Bridge crane.--

General.--The electric bridge crane with a 2700-kilogram capacity shall include an electric powered hoist on a motorized trolley, power bar conductors, and pendant-type electrical controls.

The bridge crane shall be a 2700-kilogram capacity, motor driven, underhung, single girder type crane. Bridge crane shall include bridge girder, end trucks, wheels, crane drive shaft, motor drive head, and drive motor. Bridge crane speed shall be 15 meters per minute.

The hoist and trolley shall be a 2700-kilogram, close headroom, wire rope hoist mounted on a single-speed, electric motor driven trolley.

Crane control system shall consist of a bridge girder mounted control panel, festooned bridge conductor system, conductor bar system, travel limit switches, fully solid-state softstart for the bridge crane and trolley motors, and 7 button pendant station complete with strain relief hardware for full operation of hoist, trolley and bridge. Controls shall be actuated by the pendant station.

COMPONENTS.--

Bridge girder and trucks.--

Bridge girder shall be fabricated from structural steel conforming to ASTM Designation: A 36, and shall have a maximum deflection of 1/600 of the span length under maximum loading conditions. The bridge girder shall be provided with travel stops.

The end trucks shall be designed to run on the lower flange of the runway rails and shall be constructed of welded structural steel shapes conforming to ASTM Designation: A 36. The end trucks shall be motorized and shall have not less than 4 forged steel wheels with sealed, tapered roller bearings.

The drive motor shall be a single gear driven motor with a common drive shaft or a dual drive motor system. The drive motor shall be rated for Class C Service, crane travel duty, and shall be reversible with motor brake. Horsepower, voltage and phase shall be as shown on the plans.

The crane drive shaft for single motor operation shall be supported on lubricated pillow blocks with precision ball bearings.

Hoist and trolley.--

The trolley shall be motorized and shall have not less than 4 hardened forged steel wheels with sealed, tapered roller bearings. The trolley frame shall be of rigid construction. The trolley operating speed shall be nominal 12 meter per minute. The trolley motor shall be continuous duty, reversible, with motor brake. Power requirements, voltage and phase shall be as shown on the plans.

The hoist shall be oil bath gear driven flanged drum with machined grooves, mechanical type disc brake, heavy duty ball bearings, have a high limit switch for the hook travel, and shall be equipped with a load limiting clutch to prevent damage from overloads. Hook shall be forged steel, with 360 degree swivel and spring latch. The hoist motor shall be continuous duty, reversible, with motor brake. Power requirements, voltage and phase shall be as shown on the plans.

Runway rails and moment frames.--

Runway rails and moment frames shall be fabricated from structural steel conforming to ASTM Designation: A 36. The rails shall have a maximum deflection of 1/600 of the span length under maximum loading conditions. The runway rails shall be provided with travel stops.

Control panel.--

Control panel shall be UL or FM listed for crane operation and shall include main disconnect, mainline contactor, hoist motor disconnect, bridge motor disconnect, trolley motor disconnect, hoist motor reversing starter, bridge motor reversing starter, trolley motor reversing starter, thermal overload relays, control transformer disconnect, control transformer, control relays, power terminal block and control terminal block. All contactors and starters shall be NEMA rated. Components shall be mounted on the interior mounting panel.

Control panel shall be a NEMA 12 enclosure, with interior mounting panel and hinged exterior dead front door. Control panel shall be factory prewired in conformance with Class-II Type 1C wiring. All wires entering or leaving the control panel shall terminate on terminal blocks. Control wires shall be 7 strand No. 14 Type MTW wires. Wiring shall be arranged such that any component may be removed without removing any wiring except that component's leads.

Control panel shall be a complete system, routinely advertised, furnished by the bridge crane and hoist manufacturer.

Power and control cable.--

Power and control cable shall be as recommended by the bridge crane and hoist manufacturer.

Festooned bridge conductor system.--

Festooned bridge conductor system shall consist of multi-conductor cable, cable grip, messenger chain, tag-line wire, 50 mm (inside diameter) conductor cable rings, take up brackets, 10 mm eye-bolts and other necessary hardware. Conductor sizes shall be as recommended by the hoist and trolley manufacturer.

Conductor bar system.--

Conductor bar system shall consist of enclosed power conductors, collectors and related covers, hangers, couplings and appurtenances. Conductor bar system shall be rated for 600 volts, 90 amperes continuous duty and 135 amperes intermittent duty. Conductor bars shall be one piece, copper conductors with thermoplastic insulating covers. End

covers shall be provided. Collectors shall be spring loaded, replaceable shoe type rated for 150 meters per minute (minimum) travel.

FABRICATION.--

Shop finishing.--Freestanding bridge crane and hoist shall be cleaned and receive 2 coats of the manufacturer's standard paint.

Identification.--An information plate, with the following information, shall be attached to the bridge crane hoist and trolley.

- Manufacturer's name and address
- Model number
- Serial number
- Crane capacity
- Hoist capacity
- Date of installation

PART 3.- EXECUTION

INSTALLATION.--

General.--The bridge crane and hoist shall be installed in accordance with the manufacturer's instructions and the approved shop drawings.

Crane runway sections shall be installed with couplings at joints to provide flush and level connections with a maximum gap between adjacent ends at the load-carrying flange not exceeding 2 mm except at free ends.

The bottom flanges of all crane runways shall be parallel and level with one another within a tolerance of plus or minus 6 mm throughout their entire length.

Hanger system shall provide for vertical adjustment of the runway beams so that the runways can be erected and maintained within level tolerance.

The crane control panel shall be mounted on the crane bridge and shall be actuated from a pendant station, suspended 1.2 meters above the floor. Main power and trolley power shall be by festooned bridge conductor system and shall be installed along the bridge crane from the control panel to the conductor bar system and trolley motor.

Each soft start unit for the bridge and trolley motors shall be enclosed in a NEMA 12 enclosure and may be installed near the bridge or trolley motor.

Power and control cables shall be fastened to the structural members with one-hole steel straps at a spacing of not to exceed 0.9 meter on center.

Field painting.--After installation, damaged and abraded areas of the shop paint shall be repainted using the same materials as applied in the shop.

FIELD QUALITY CONTROL.--

Tests.--The bridge crane and hoist shall be tested in the presence of the Engineer. Any equipment failure or malfunction shall be corrected by the Contractor at his expense.

Tests shall be as described herein:

NO LOAD TEST.--The trolley and hoist shall be operated to throughout the full length of the crane runways and the limits of hook travel. Travel limit switches shall be engaged.

LOAD TEST.--The minimum test load shall be 125 percent of the rated load capacity. The trolley shall be operated for the full length of the crane runways under the test load. The test load shall be raised to the hook height limit and lowered until the cable is slack. After a 5-minute waiting period, the test load shall be raised one foot and held in that position, without slipping, for a minimum time period of ten minutes.

LOSS OF POWER TEST.--The main power switch shall be opened while the test load is being lowered. The test load shall stop completely and immediately when the power switch is opened.

Manufacturer's field service.--The Contractor shall arrange for the bridge crane manufacturer's representative to be present during testing.

DIVISION 15. MECHANICAL

15.01 MECHANICAL WORK

GENERAL.--

Scope.--This work shall consist of performing mechanical work in accordance with the details shown on the plans and these special provisions.

Mechanical work shall include furnishing all labor, materials, equipment and services required for providing heating, ventilating, air conditioning, plumbing and natural gas distribution systems.

Earthwork, foundations, sheet metal, painting, electrical, and such other work incidental and necessary to the proper installation and operation of the mechanical work shall be in accordance with the requirements specified for similar type work elsewhere in these special provisions.

System layouts are generally diagrammatic and location of equipment is approximate. Exact routing of pipes, ducts, etc., and location of equipment is to be governed by structural conditions and obstructions. Equipment requiring maintenance and inspection is to be readily accessible.

Roof penetrations shall be flashed and sealed watertight in accordance with the requirements specified under "Sheet Metal Flashing" in Division 7, "Thermal and Moisture Protection," of these special provisions.

SUBMITTALS.--

Product data.--A list of materials and equipment to be installed, manufacturer's descriptive data, and such other data as may be requested by the Engineer shall be submitted for approval.

Manufacturer's descriptive data shall include complete description, performance data and installation instructions for the materials and equipment specified herein. Control and wiring diagrams, rough-in dimensions for plumbing fixtures, and component layout shall be included where applicable.

Manufacturer's descriptive data shall be submitted for the following:

- Pipe and tubing
- Valves
- Hose faucets
- Fire hydrant
- Cleanouts
- Water hammer arrestor
- Access door
- Compression stops
- Pressure gauge
- Backflow preventer
- Roof drain
- Valve box
- Floor drain
- Floor sink
- Pipe insulation
- Backflow preventer enclosure
- Alarm check valve
- Water flow indicator
- Check valve
- Alarm bell
- Supervisory switch
- Sprinkler head
- Spare sprinkler cabinet

Fire department connection
Water closet and accessories
Lavatory and accessories
Service sink and accessories
Electric water heater
Gas water heater
Electric water cooler
Emergency eyewash and shower
Shower unit and accessories
Evaporative cooler
Unit heater
Heat pump (ductless) and accessories
Electric duct heater
Electric radiant heater
Declassification fan
Exhaust fan
Fume exhaust fan
Cabinet fan
Combination heat/light/fan
Thermostats
Time switch
Ductwork
Fire damper
Pumps
Chemical feeder
Heat exchanger
Expansion tank
Air separator
Balance valves
Flow meter
Motorized valves
Thermometers
Air vent valves
Boiler and accessories

CLOSEOUT SUBMITTALS.--

Operation and maintenance manuals.--Prior to the completion of the contract, 3 identified copies of the operation and maintenance instructions with parts lists for the equipment specified herein shall be delivered to the Engineer at the jobsite. The instructions and parts lists shall be indexed and bound in a manual form and shall be complete and adequate for the equipment installed. Inadequate or incomplete material shall be returned. The Contractor shall resubmit adequate and complete manuals at no expense to the State.

Operation and maintenance manuals shall be submitted for the following equipment:

Air conditioning unit
Boiler
Exhaust fans
Evaporative coolers
Heat exchanger
Hydronic floor heating system components
Gas water heater
Unit heaters
Motorized valve
Chemical feeder
Thermostat
3-way motorized valve

QUALITY ASSURANCE.--

Codes and standards.--Mechanical work, including equipment, materials and installation, shall conform to the California Building Standards Code, Title 24, and to the California Code of Regulations, Title 8, Chapter 4, Division of Industrial Safety (DIS).

WARRANTY.--

Warranties and guarantees.--Manufacturer's warranties and guarantees for materials or equipment used in the work shall be delivered to the Engineer at the jobsite prior to acceptance of the contract.

SYSTEM IDENTIFICATION.--

Piping, ducts, valves and equipment.--Identification of piping, ducts, valves and equipment shall be as shown on the plans or these special provisions:

Above ground piping and ducts.--Markers shall be provided on lines which are either exposed or concealed in accessible spaces. For piping systems, except drain and vent lines, indicate the fluid conveyed or its abbreviation; either by preprinted markers or stenciled markings, and include arrows to show the direction of flow. Colors shall comply with ANSI Standard: A13.1. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through penetrations in floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 15 m maximum intervals along exposed portions of the lines. Marking of short branches and repetitive branches for equipment connections is not required.

Valves.--Valve tags shall be provided on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Provide brass or plastic laminate tags. Prepare and submit a tagged valve schedule, listing each valve by tag number, location and piping service. Valve schedule shall be mounted in a glazed frame at a location approved by the Engineer.

Equipment.--All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (for example, AC-4). Provide 13 mm high lettering, white on black background. Nameplates shall be permanently secured to the unit.

15.02 PIPE, FITTINGS AND VALVES

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing pipes, fittings and valves in accordance with the details shown on the plans and these special provisions. Pipe, fittings and valves shall include such plumbing and piping accessories and appurtenances, not mentioned, that are required for the proper installation and operation of the plumbing and piping systems.

All piping insulation and associated material shall be in accordance with the requirements specified under "Mechanical Insulation," elsewhere in this Division 15.

The pipe sizes shown on the plans are nominal pipe size. No change in the pipe size shown on the plans shall be permitted without written permission from the Engineer.

The pipe and fitting classes and material descriptions shall be as specified herein. No change in class or description shall be permitted without written permission from the Engineer.

QUALITY ASSURANCE.--

Codes and standards.--Pipe, fittings and valves shall be installed in accordance with the requirements in the latest edition of the California Plumbing Code, the manufacturer's recommendations and the requirements specified herein.

PART 2.- PRODUCTS

MATERIALS.--

PIPE AND FITTINGS.--

Class	Description
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A1.--

Schedule 40 galvanized steel pipe conforming to ASTM Designation: A 53, with 1040 kPa galvanized malleable iron banded screwed fittings and galvanized steel couplings. The weight of the zinc coating shall be not less than 90 percent of that specified in ASTM Designation: A 53.

A2.--

Schedule 40 galvanized steel pipe conforming to ASTM Designation: A 53, with black cast iron recessed drainage fittings. For rainwater leaders, neoprene-gasket compression couplings, Smith Blair, Dresser, or equal, may be used. The weight of the zinc coating shall be not less than 90 percent of that specified in ASTM Designation: A 53.

A3.--

Schedule 5 steel pipe conforming to ASTM Designation: A 135 with pressfit fittings and couplings for service as designated.

A4.--

Pipe and fittings shall be UL or FM listed, ferrous (Schedule 20 minimum) or copper (Type L minimum), suitable for the working pressure involved but not less than 1210 kPa. Pipe and fittings shall be in accordance with NFPA Code requirements.

B1.--

Schedule 40 black steel pipe conforming to ASTM Designation: A 53, with screwed fittings suitable for working pressure involved, but not less than 1210 kPa. Fittings shall be listed for fire protection.

B2.--

Schedule 40 black steel pipe conforming to ASTM Designation: A 53, with 1040 kPa black malleable iron banded screwed fittings and black steel couplings.

Steel pipe coating, where required, shall be factory applied plastic. Pipe coating shall be Standard Pipe Protection, X-Tru-Coat (0.50 mm thick); Pipe Line Service Corporation, Republic; 3M Company, Scotchkote 205 (0.30 mm thick); or equal.

C1.--

Hub and plain end cast iron soil pipe with neoprene gaskets conforming to Cast Iron Soil Pipe Institute's Standard 301. Pipe, fittings and gaskets shall be of one manufacturer.

C2.--

Hubless cast iron soil pipe with neoprene gaskets, corrugated stainless steel shields and stainless steel clamps conforming to Cast Iron Soil Pipe Institute's Standard 301. Joint materials shall be furnished by pipe manufacturer.

D1.--

Ductile iron push on joint pipe conforming to AWWA Designation: C151. Fittings shall be push on ductile iron conforming to AWWA Designation: C153. Joints shall be rubber gasketed and designed for a working pressure of 2420 kPa. Pipe and fittings shall be supplied with bituminous outer coating and cement lining. Pipe shall be listed for fire protection.

H1.--

Type DWV hard copper tubing conforming to ASTM Designation: B 306, with DWV drainage fittings, stop type couplings and threaded adapters.

H2.--

Type K hard copper tubing conforming to ASTM Designation: B 88, with wrought copper or cast bronze solder joint pressure fittings, stop type couplings and threaded adapters. Solder shall be lead-free.

H3.--

Type L hard copper tubing conforming to ASTM Designation: B 88, with wrought copper or cast bronze solder joint pressure fittings, stop type couplings and threaded adapters. Solder shall be lead-free.

J1.--

Vitrified clay sewer pipe and fittings conforming to ASTM Designation: C 700, with resilient cold joint ends; hot pour joint ends; or hubless type with neoprene gaskets, stainless steel clamps and hexagon head bolts. Cold joints shall conform to ASTM Designation: C 425, Type 1 and shall be made with interlocking, resilient, mechanical compression joint, formed on pipe at factory. When clay pipe is to join cast iron soil pipe, joints shall be made between bell end of clay pipe and spigot end of cast iron soil pipe using gasket and bitumastic joint compound as specified for hot pour joints.

P1.--

Polyvinyl chloride (PVC) gravity sewer plastic pipe and fittings conforming to ASTM Designation: D 3034, Standard Dimension Ratio (SDR) 35, with integral bell and bell and spigot rubber gasketed joints or conforming to ASTM Designation: D2665 with solvent welded fittings. Rubber gaskets shall conform to ASTM Designation: F 477. Stainless steel clamps with rubber boots shall not be used.

P2.--

Polyvinyl chloride (PVC) plastic pipe and fittings conforming to ASTM Designation: D 2241, Type I, Grade 1, Standard Dimension Ratio (SDR) 21, rated for 1380 kPa working pressure at 23°C, National Sanitation Foundation approved. Pipe shall have bell ends conforming to ASTM Designation: D 3139 with triple edge rubber sealing ring. For pipe sizes 50 mm diameter and smaller, plain end pipe with solvent welded fittings ASTM Designation: D 2241, Type I, Grade 1, Standard Dimension Ratio (SDR) 21, rated for 1380 kPa may be used.

P3.--

Polyvinyl chloride (PVC) standard weight pipe and fittings, Schedule 40, conforming to ASTM Designation: D 1785. Pipe shall meet or exceed requirements of National Sanitation Foundation Standard No. 14. Pipe shall have bell ends conforming to ASTM Designation: D 2672. For pipe sizes 75 mm and smaller, plain end pipe with solvent welded fittings conforming to ASTM Designation: D 2241, may be used.

P4.--

Polyvinyl chloride (PVC) plastic pipe and fittings shall conform to AWWA Designation: C900, class 150, Standard Dimension Ratio (SDR) 18. Pipe shall have bell end with a solid cross section elastomeric ring conforming to ASTM Designation: D 1869. Pipe shall be listed for fire protection.

P5.--

Polyethylene plastic gas pipe and fittings conforming to ASTM Designation: D 1248 and D 2513 with Standard Dimension Ratio (SDR) 11, rated for 415 kPa working pressure at 23°C, socket type fittings, joined by heat fusion.

P6.--

Polyvinyl chloride (PVC) natural gas pipe, Class 315, conforming to ASTM Designation: D 2513. Fittings shall be Schedule 40 conforming to ASTM Designation: D 2513, and shall be primed and glued. Primer shall conform to ASTM Designation: F656. Solvent cement shall conform to ASTM Designation: D2564. Approved adapters shall be used for transition to other pipe materials.

P7.--

Cross-linked Polyethylene tube (PEX) with oxygen barrier conforming to ASTM Designation: F876/F877 and International Standard 9001. Tubing shall be flexible thermoplastic type rated for 690 kPa working pressure at 82°C. Tube shall have a 25-year warranty.

Unions (for steel pipe).--

Unions (for steel pipe) shall be 1730 kPa, threaded malleable iron, ground joint, brass to iron seat, galvanized or black to match piping.

Unions (for copper or brass pipe).--

Unions (for copper or brass pipe) shall be 1040 kPa cast bronze, ground joint, bronze to bronze seat with silver brazing threadless ends or 860 kPa cast brass, ground joint, brass to brass seat with threaded ends.

Unions (for brass waste and flush pipes).--

Unions (for brass waste and flush pipes) shall be slip or flange joint unions with soft rubber or leather gaskets. Unions shall be placed on the fixture side of the traps.

Dielectric waterway.--

Dielectric waterway shall be a premanufactured unit that incorporates an insulated interior lining at least 75 mm in length between the 2 pipes being connected while maintaining metal to metal contact on the exterior surface. Dielectric water way shall be listed by IAPMO (International Association of Plumbing and Mechanical Officials).

Insulating union.--

Insulating union or flange as applicable shall be suitable for the service on which used. Connections shall be constructed such that the 2 pipes being connected are completely insulated from each other with no metal to metal contact. Insulating couplings shall not be used. Insulating union shall be F. H. Maloney; Central Plastics; EPCO; or equal.

Insulating connection (to hot water tanks).--

Insulating connection (to hot water tanks) shall be 150 mm minimum, flexible copper tubing with dielectric union at each end and designed to withstand a pressure of 1040 kPa and a temperature of 93°C.

VALVES.--

Gate valve (65 mm and smaller).--

Gate valve (65 mm and smaller) shall be bronze body and trim, removable bonnet and non rising stem, Class 125 and same size as pipe in which installed. Gate valve shall be Crane, 438; Nibco Scott, T-113; Jenkins, 370; or equal.

Gate valve in nonferrous water piping systems may be solder joint type with bronze body and trim. Valve shall be Kitz, 59; Nibco Scott, S-113; Jenkins, 1240; or equal.

Gate valve (75 mm and larger, above ground).--

Gate valve (75 mm and larger, above ground) shall be iron body with bronze trim, removable bonnet and non-rising stem, class 125 and same size as pipe in which installed. Gate valve shall be Crane, 461; Nibco Scott, F-619; Jenkins, 326; or equal.

Gate valve (75 mm and larger, below ground).--

Gate valve (75 mm and larger, below ground) shall be AWWA double disc, hub or rubber ring type, removable bonnet and non-rising stem, equipped with operating nuts, 1380 kPa working pressure, and Tee handle wrench for each valve. Valve shall be Mueller, A-2380; American Valve, Model 28; or equal.

Ball valve.--

Ball valve shall be two piece, minimum 2760 kPa WOG, bronze body and chrome plated or brass ball with full size port. Valve shall be Nibco Scott, T-580; Watts, B-6000; Kitz, 56; or equal.

Gas valve.--

Gas valve shall be natural gas service type, bronze body, quarter turn, flathead and rated for 860 kPa. Gas valve shall be Crane, American or equal.

Check valve (40 mm and smaller).--

Check valve (40 mm and smaller) shall be silent spring loaded type, threaded bronze body, nylon or teflon disc, beryllium or stainless steel helical spring and shaft, Class 125 and same size as pipe in which installed. Check valve shall be Nibco/Scott, T-480; CPV, 36; Kitz, 26; or equal.

Check valve (50 mm and larger).--

Check valve (50 mm and larger) shall be silent wafer type, full faced for installation between 860 kPa flanges, iron body with bronze trim, nylon or teflon disc, stainless steel helical spring and shaft, Class 125 and same size as pipe in which installed. Check valve shall be APCO, Series 300; CPV, 10D; Metraflex, Series 900; or equal.

Pressure reducing valve (PRV).--

Pressure reducing valve (PRV) shall be direct acting, spring loaded diaphragm type control valve with balanced single seat, bronze body, bronze trim and screwed connection. PRV shall be completely self-contained and shall require no external sensing pipes or outside control medium. The outlet pressure of the PRV shall be adjustable within a range of 170 kPa to 400 kPa.

FAUCET AND HYDRANTS.--**Hose faucet.--**

Hose faucet shall be compression type, angle pattern, wall flange at exterior locations, tee handle, 20 mm female thread with hose end, rough chrome or nickel plated finish for locations inside building, rough brass finish for others. Hose faucet shall be supplied with an integral or nonremovable threaded outlet vacuum breaker which meets the requirements of the American Society of Sanitary Engineering (ASSE) Standard: 1011. Hose faucet shall be Nibco, No. 63VB; Chicago, No. 13T; or equal.

Fire hydrant.--

Fire hydrant shall conform to the requirements of AWWA Designation: C503. Fire hydrant shall have 150 mm inlet, and have one nominal size 4 outlet steamer hose and two nominal size 2 1/2 outlets. Fire hydrant shall be Jones, Model J-3765; Rich, Model 960; American Cast, Darling Division, Mark-73; or equal.

CLEANOUTS.--**Cleanout through wall.--**

Cleanout through wall shall be cast iron cleanout tee type with polished stainless access plates. Plug shall be countersunk brass or bronze with tapered threads. Cleanout shall be Wade, No. W-8460; Smith, No. 4532; Zurn, No. 1445; or equal.

Cleanout through floor.--

Cleanout through floor shall have nonslip scoriated nickel bronze access plate and adjustable frame with square pattern top for ceramic tile and round pattern top for other finishes. Where floors are constructed with a membrane, access frame shall be provided with membrane clamping flange. Plug shall be countersunk brass or bronze with tapered threads. Cleanout shall be Wade, W-7000 Series; Smith, 4023 Series; Zurn, No. 1400; or equal.

Cleanout through floors in exterior locations shall be heavy duty, floating pipe type with cast iron cover. Cleanouts shall be Wade, No. W-8300-HF; Smith, No. 4253; Zurn, No. 1474; or equal.

Cleanout to grade.--

Cleanout to grade shall be cast iron ferrule type. Plug shall be countersunk brass or bronze with tapered threads. Cleanout to grade shall be Wade, No. W-8450; Smith, 4420; Zurn, No 1440; or equal.

MISCELLANEOUS ITEMS.--

Water hammer arrestor.--

Water hammer arrestor shall be stainless steel body with bellows or piston. Arrestor compression chambers shall be pneumatically charged. Water hammer arrestors shall be tested and certified in accordance with the Plumbing and Drainage Institute Standard: PDI-WH201 and sized as shown on the plans.

Access door.--

Access door shall be 1.52 mm prime coated steel, face mounting square frame, minimum 300 mm x 300 mm door with concealed hinge and screwdriver latch.

Compression stop (exposed).--

Compression stop (exposed) shall be metal full free waterway, angle type, ground joint union, non-rising stem, molded rubber seat and wheel handle.

Compression stop (concealed).--

Compression stop (concealed) shall be long neck, built-in compression stops for required wall thickness, loose key and exposed parts polished chromium plated. Supplies shall be Chicago, 1771; California Brass, No. 172; or equal.

Pressure gages (for PRV).--

Pressure gages (for PRV) shall have 0 to 700 kPa scale with 80 mm minimum diameter dial. Gages shall be installed within 150 mm of the inlet and outlet sides of the pressure reducing valve. Pressure gages shall be provided with a brass gage cock.

Gas regulator.--

Gas regulator shall be listed as suitable for gas and equipped with full capacity relief valve, low pressure safety shut-off and weatherproof and insect proof vent for outside installation. Capacity shall be as shown on the plans. Gas regulator shall be Fisher; Reliance; Rockwell; or equal.

Wye strainer.--

Wye strainer shall be wye pattern, cast iron body and Type 304 stainless steel or monel strainer screen. The strainer screen shall have an open area equal to at least 3 times the cross sectional area of the pipe in which it is installed and shall be woven wire fabric with 20 mesh or perforated sheet with 850 micron maximum diameter holes.

Backflow preventer.--

Backflow preventer shall be factory assembled with 2 check valves, one pressure differential relief valve, 2 ball valves and 4 test cocks. Backflow preventer shall be reduced pressure type with freeze protection. Backflow preventers shall be of the approved type reduced pressure principle devices listed by the County of Los Angeles Department of Health Services, Cross-Connection and Water Pollution Control Section, 2525 Corporate Place, Monterey Park, California 91754, Telephone (213) 881-4140.

Pipe hanger (for piping supported from overhead).--

Pipe hanger (for piping supported from overhead) shall be Grinnell, Model 269; Super Struct, C711; or equal.

Pipe wrapping tape and primer.--

Pipe wrapping tape shall be pressure sensitive polyvinyl chloride or pressure sensitive polyethylene tape having nominal thickness of 0.50 mm. Wrapping tape shall be Polyken, 922; Manville, Trantex VID-20; Scotchrap, 51; or equal.

Pipe wrapping primer shall be compatible with the pipe wrapping tape used.

Floor, wall, and ceiling plates.--

Floor, wall, and ceiling plates shall be chromium plated steel or plastic plates having screw or spring clamping devices and concealed hinges. Plates shall be sized to completely cover the hole.

Valve box.--

Valve box shall be precast high density concrete with polyethylene face and cast iron traffic rated cover marked "WATER," "GAS" or "CO-SS" as applicable. Extension shall be provided as required. Valve box shall be Christy, B3; Brooks Products Company, 3TL; Frazer, 3; or equal.

Roof drain.--

Roof drain shall be cast iron body, with integral flashing clamp and gravel stop with seepage openings, 400 mm nominal polyethylene low profile dome, 75 mm caulk or no-hub outlet and underdeck clamp. Roof drain shall be J. R. Smith, 1010; Zurn, Z-100; Wade, W-3500; or equal.

Floor drain.--

Floor drain shall be cast iron body and flashing collar, adjustable nickel bronze 150 mm strainer head with seepage openings and caulk or no-hub outlet. Floor drain shall be round or square as shown on the Architectural plans. Floor drain shall be J. R. Smith, 2005/2010; Wade, W-1100; Zurn, Z-415; or equal.

Floor sink.--

Floor sink shall be made of acid resisting enameled cast iron or stainless steel, square top, square hole (300 mm x 300 mm x 150 mm) with anti-tilt grate used to receive indirect wastes under equipment while grate permits adjacent pedestrian traffic with anti-splash interior bottom dome strainer. Floor sink shall be Wade, Zurn, or equal.

PART 3.- EXECUTION

INSTALLATION.--

INSTALLATION OF PIPES AND FITTINGS.--

Pipe and fittings.--Pipe and fittings shall be installed in accordance with the following designated uses:

Designated Use	Pipe and Fitting Class
Domestic water (CW and HW) in buildings	H3 or A1
Domestic water underground within 1.5 m of the building	A1 or H2
Domestic water underground 1.5 m beyond the building	P2, P3, P4, A1 or H2
Fire protection water, underground	B1,D1 or P4
Fire protection water riser	B1, D1 or H3
Fire protection sprinkler piping in building	A1, A3, A4 or B1
Hydronic piping (except in slab)	H2
Hydronic floor tubing in slab	P7
Sanitary drain piping above ground in building	H1, C1, or C2
Sanitary drain and vent piping underground within 1.5 m of the building	J1, C1 or C2
Sanitary vent piping above ground in building	A2, H1, C1, or C2
Sanitary drain pipe, 1.5 m beyond the building	J1, C1, C2, or P1
Natural gas, above ground	A1 or B2
Natural gas, underground	B2 (plastic coated), P5 or P6
Compressed air	A1
Equipment drains and relief valve discharge	H3 or A1

Installing piping.--Water piping shall be installed generally level, free of traps and bends, and arranged to conform to the building requirements.

Vitrified clay pipe shall be installed in accordance with ASTM Designation: C 12, Class C.

Piping installed underground shall be tested as specified elsewhere in these special provisions before backfilling.

Public use areas, offices, rest rooms, locker rooms, crew rooms, training rooms, storage rooms in office areas, hallway type rooms, and similar type use areas shall have concealed piping.

Warehouse rooms, equipment bays, and loft areas shall have exposed piping.

Piping shall not be run in floor fill, except as shown on the plans.

Piping shall be installed parallel to walls. All obstructions shall be cleared, headroom preserved and openings and passageways kept clear whether shown or not. Piping shall not interfere with other work.

Where pipes pass through exterior walls, a clear space around pipe shall be provided. Space shall be caulked water tight with silicone caulk.

Underground copper pipe shall have brazed joints. Underground plastic pipe shall be buried with No. 14 solid bare copper wire. Wire ends at pipe ends shall be brought up 200 mm and looped around pipe.

Exposed supply and drain piping in rest rooms shall be chrome finished.

Piping and tubing for hydronic heating shall be installed in accordance with the requirements specified under "Hydronic Heating System," elsewhere in this Division 15.

Compressed air piping shall be pitched to low point. Ball valved drips shall be provided at all low points. Branches shall be taken off top of main.

Gas piping shall not be installed under building concrete slabs or structure. An insulating connection and valve shall be installed above ground at each building supply.

Gas piping shall be pitched to equipment or to low point and provided with a 200 mm minimum dirt leg.

Plastic pipe used for natural gas shall be below grade outside of building only. Transition to Class B2 plastic coated shall be before meter, regulator, or building wall with approved metal to plastic transition fitting. PVC natural gas pipe shall be installed in accordance with International Association of Plumbing and Mechanical Officials (IAPMO) Standard: IS10.

Forty-five degree bends shall be used where offsets are required in venting. Vent pipe headers shall be sloped to eliminate any water or condensation.

Vent piping shall extend a minimum of 200 mm above the roof.

Horizontal sanitary sewer pipe inside buildings shall be installed on a uniform grade of not less than 2 percent unless shown otherwise on the plans.

Drainage pipe shall be run as straight as possible and shall have easy bends with long turns.

Wye fittings and 1/8 or 1/16 bends shall be used where possible. Long sweep bends and combination Wye and 1/8 bends may be used only for the connection of branch pipes to fixtures and on vertical runs of pipe.

Water pipe near sewers.--Water pipe shall not be installed below sewer pipe in the same trench or at any crossing, or below sewer pipe in parallel trenches less than 3 m apart.

When a water pipe crosses above a sewer pipe, a vertical separation of at least 300 mm between the top of the sewer and the bottom of the water pipe shall be maintained.

When water and sewer pipe is installed in the same trench, the water pipe shall be on a solid shelf at least 300 mm above the top of the sewer pipe and 300 mm to one side.

Pipe sleeves.--The Contractor shall provide sleeves, inserts and openings necessary for the installation of pipe, fittings and valves. Damage to surrounding surfaces shall be patched to match existing.

PVC pipe sleeves shall be provided where each pipe passes through concrete floors, footings, walls or ceilings. Inside diameter of sleeves shall be at least 20 mm larger than outside diameter of pipe. Sleeves shall be installed to provide at least 10 mm space all around pipe the full depth of concrete. Space between pipes and pipe sleeves shall be caulked watertight.

Pipe penetrations in fire rated assemblies.--Where pipes pass through fire rated wall, floor or ceiling assemblies, the penetration shall be protected in accordance with the requirements specified under "Through-Penetration Firestopping" in Division 7, "Thermal and Moisture Protection," of these special provisions.

Cutting pipe.--All pipe shall be cut straight and true and the ends shall be reamed to the full inside diameter of the pipe after cutting.

Damaged pipe.--Pipe that is cracked, bent or otherwise damaged shall be removed from the work.

Pipe joints and connections.--Joints in threaded steel pipe shall be made with teflon tape or a pipe joint compound that is nonhardening and noncorrosive, placed on the pipe and not in the fittings.

The use of thread cement or caulking on threaded joints will not be permitted. Threaded joints shall be made tight. Long screw or other packed joints will not be permitted. Any leaky joints shall be remade with new material.

Exposed polished or enameled connections to fixtures or equipment shall be made with special care, showing no tool marks or threads.

Cleaning and closing pipe.--The interior of all pipe shall be cleaned before installation. All openings shall be capped or plugged as soon as the pipe is installed to prevent the entrance of any materials. The caps or plugs shall remain in place until their removal is necessary for completion of the installation.

Securing pipe.--Pipe in the buildings shall be held in place by iron hangers, supports, pipe rests, anchors, sway braces, guides or other special hangers. Material for hangers and supports shall be compatible with the piping or neoprene isolators shall be used. Allowances shall be made for expansion and contraction. Steel pipe shall have hangers or supports every 3 m. Copper pipe 25 mm or smaller shall have hangers or supports every 2 m and sizes larger than 25 mm shall have hangers or supports every 3 m. Plastic pipe shall have hangers or supports every 1 m. Cast iron soil pipe with neoprene gaskets shall be supported at each joint. Vertical pipes shall be supported with clamps or straps. Horizontal and vertical piping shall be securely supported and braced to prevent swaying, sagging or flexing of joints.

Hangers and supports.--Hangers and supports shall be selected to withstand all conditions of loading to which the piping and associated equipment may be subjected and within the manufacturer's load ratings. Hangers and supports shall be spaced and distributed so as to avoid load concentrations and to minimize the loading effect on the building structure.

Hangers and supports shall be sized to fit the outside diameter of pipe or pipe insulation. Hangers shall be removable from around pipe and shall have provisions for vertical adjustment after erection. Turnbuckles may be used.

Materials for holding pipe in place shall be compatible with piping material.

Hanger rods shall be provided with locknuts at all threaded connections. Hanger rods shall be sized as follows:

Pipe Size	Minimum Hanger Rod Diameter
15 mm to 50 mm	10 mm
65 mm to 87 mm	13 mm
100 mm to 125 mm	16 mm
150 mm	19 mm

Wrapping and coating steel pipe.--Steel pipe buried in the ground shall be wrapped or shall be plastic coated as specified herein:

1. Wrapped steel pipe shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
2. Tapes shall be tightly applied with 1/2 uniform lap, free from wrinkles and voids with approved wrapping machines and experienced operators to provide not less than 1.00 mm thickness.
3. Plastic coating on steel pipe shall be factory applied. Coating imperfections and damage shall be repaired to the satisfaction of the Engineer.
4. Field joints, fittings and valves for wrapped and plastic coated steel pipe shall be covered to provide continuous protection by puttying and double wrapping with 0.50 mm thick tape. Wrapping at joints shall extend a minimum of 150 mm over the adjacent pipe covering. Width of tape for wrapping fittings shall not exceed 50 mm. Adequate tension shall be applied so tape will conform closely to contours of fittings. Putty tape insulation compounds approved by the Engineer shall be used to fill voids and provide a smooth even surface for the application of the tape wrap.

Wrapped or coated pipe, fittings, and filed joints shall be approved by the Engineer after assembly. Piping shall be placed on temporary blocks to allow for inspection. Deficiencies shall be repaired to the satisfaction of the Engineer before backfilling or closing in.

Thrust blocks.--Thrust blocks shall be formed by pouring concrete between pipe and trench wall. Thrust blocks shall be sized and so placed as to take all thrusts created by maximum internal water pressure.

Plastic pipe underground shall be provided with thrust blocks and clamps at changes in direction of piping, connections or branches from mains 50 mm and larger, and all capped connections.

Union.--Unions shall be installed where shown and at each threaded or soldered connection to equipment and tanks. Unions shall be located so piping can be easily disconnected for removal of equipment or tanks. Unions shall be omitted at compression stops.

Dielectric waterway.--Dielectric waterway shall be provided between metal pipes of different material, and between brass or bronze valves and steel piping.

Insulating union and insulating connection.--Insulating union and insulating connection shall be provided where shown and at the following locations:

1. In metallic water, gas and air service connections into each. Insulating connections shall be installed on the exterior of the building, above ground and after shut-off valve.
2. In water, gas and air service connections in ground at point where new metallic pipes connect to existing metallic pipes. Install valve box above insulating connection.
3. At points of connections of copper or steel water pipes to steel domestic water heaters and tanks.

Bonding at insulating connections.--Interior water piping and other interior piping that may be electrically energized and are connected with insulating connections shall be bonded in accordance with the California Electrical Code. Bonding shall all be coordinated with electrical work.

Compression stop.--Each fixture, including hose faucets, shall be equipped with a compression stop installed on water supply pipes to permit repairs without shutting off water mains. Ball valves may be installed where shown on the plans or otherwise permitted by the Engineer.

INSTALLATION OF VALVES.--

Pressure reducing valve.--A capped tee connection and strainer shall be installed ahead of the pressure reducing valve.

Exterior valves.--Exterior valves located underground shall be installed in a valve box marked "Water." Extensions shall be provided as required.

INSTALLATION OF FAUCETS AND HYDRANTS.--

Hose faucet and hydrants.--Faucets and hydrants shall be installed with outlets 0.5 m above finished grade.

INSTALLATION OF CLEANOUTS.--

Cleanouts.--A concrete pad 0.5 m long and 100 mm thick shall be placed across the full width of trench under cleanout Wye or 1/8 bend. Cast iron soil pipe (C1 or C2) and fittings shall be used from Wye to surface. Required clearance around cleanouts shall be maintained.

Cleanout risers outside of a building installed in a surface other than concrete shall terminate in a cleanout to grade. Cleanout to grade shall terminate in a valve box with cover marked "CO-SS". Top of box shall be set flush with finished grade. Cleanout plug shall be 100 mm below grade and shall be located in the box to provide sufficient room for rodding.

Cleanout risers installed in tile and concrete floors, including building aprons and sidewalks, shall terminate in a cleanout through floor.

INSTALLATION OF MISCELLANEOUS ITEMS.--

Water hammer arrestor.--Water hammer arrestor shall be installed so that they are vertical and accessible for replacement. Water hammer arrestor shall be installed with access door when in walls or there is no access to ceiling crawl spaces. Access door location shall be where shown on the plans or as approved by the Engineer.

Gas appliance connection.--Gas valve and flexible connector shall be provided for gas piping at each appliance. Appropriately rated gas cocks may be used in 15 mm gas pipe. Cock or valve shall be within one meter of the appliance.

Gas regulator.--Gas regulator shall be installed complete with dirt leg, capped test tee, union, insulating union, gas valve and fittings.

Backflow preventer.--Backflow preventer assembly shall include a wye strainer, backflow preventer, fittings and pipe. Assembly components shall be the same size as the pipe in which they are installed unless otherwise shown on the plans.

Backflow preventer shall be installed a minimum of 300 mm above ground and shall be the same size as the pipe in which it is installed unless otherwise shown on the plans.

Flushing completed systems.--All completed systems shall be flushed and blown out.

Chlorination.--The Contractor shall flush and chlorinate all domestic water piping and fixtures.

Calcium hypochlorite granules or tablets, if used, shall not be applied in the dry form, but shall first be dissolved into a solution before application.

The Contractor shall take adequate precautions in handling chlorine so as not to endanger workmen or damage materials. All pipes and fittings shall be completely filled with water containing a minimum of 50 ppm available chlorine. Each outlet in the system shall be opened and water run to waste until a strong chlorine test is obtained. The line shall then be closed and the chlorine solution allowed to remain in the system for a minimum of 24 hours so that the line shall contain no less than 25 ppm chlorine throughout. After the retention period, the system shall be drained, flushed and refilled with fresh water.

FIELD QUALITY CONTROL.--

Testing.--The Contractor shall test piping at completion of roughing in, before backfilling, and at other times as directed by the Engineer.

The system shall be tested as a single unit, or in sections as approved by the Engineer. The Contractor shall furnish necessary materials, test pumps, instruments and labor and notify the Engineer at least 3 working days in advance of testing. After testing, the Contractor shall repair all leaks and retest to determine that leaks have been stopped. Surplus water shall be disposed of after testing as directed by the Engineer.

The Contractor shall take precautions to prevent joints from drawing while pipes and appurtenances are being tested. The Contractor shall repair damage to pipes and appurtenances or to other structures resulting from or caused by tests.

General tests.--All piping shall be tested after assembly and prior to backfill, pipe wrapping, connecting fixtures, wrapping joints and covering the pipe. Systems shall show no loss in pressure or visible leaks.

The Contractor shall test systems according to the following schedule for a period of not less than 4 hours:

Test Schedule		
Piping System	Test Pressure	Test Media
Sanitary sewer and vent	250 mm head	Water
Water	860 kPa	Water
Gas (except P6)	690 kPa	Air
Gas (P6)	350 kPa	Air
Air	860 kPa	Air

During testing of water systems, valves shall be closed and pipeline filled with water. Provisions shall be made for release of air.

Sanitary sewers shall be cleared of obstructions before testing for leakage. The pipe shall be proved clear of obstructions by pulling an appropriate size inflatable plug through the pipe. The plug shall be moved slowly through the pipe with a tag line. The Contractor shall remove or repair any obstructions or irregularities.

Sanitary sewer pipes beyond 1.5 m perpendicular to the building shall be tested for leakage for a period of not less than 4 hours by filling with water to an elevation of 1.2 m above average invert of sewer or to top of manholes where less than 1.2 m deep. The system shall show no visible leaks. The sewer may be tested in sections with testing water progressively passed down the sewer as feasible. Water shall be released at a rate that will not create water hammer or surge in plugged sections of sewer.

Testing backflow preventers.--Backflow preventers installed by the Contractor shall be tested at the completion of the supply system installation for proper operation by a certified Backflow Preventer Tester.

The tester shall hold a valid certificate as a Backflow Preventer Tester from the county in which the device to be tested is located or, if the county does not have a certification program for Backflow Preventer Testers, the tester shall have a certificate from one of the following:

1. The American Water Works Association.
2. A county which has a certification program for Backflow Preventer Testers. The certification under which the tester has been certified shall be acceptable to the water purveyor and the local agency having jurisdiction.

Testing for proper operation shall conform to the procedures of the county in which the testing is being performed, or, if such procedures are not available in the county, such tests shall conform to the provisions in the latest edition of the Guidance Manual For Cross Connection Control Program, which is available from the California Department of Health Services, Division of Drinking Water and Environmental Management, 601 N 7th Street, P.O. Box 942732, Sacramento, CA 94234.

The Contractor shall notify the Engineer at least 5 days prior to testing backflow preventers. Such tests shall be satisfactorily completed after installation of the backflow preventer assemblies and before operation of the systems.

One copy of all test results for each backflow preventer shall be furnished to the Engineer.

Full compensation for providing the certified Backflow Preventer Tester and for testing the backflow preventers shall be considered as included in the lump sum price paid for building work and no additional compensation will be allowed therefor.

15.03 MECHANICAL INSULATION

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing mechanical insulation in accordance with the details shown on the plans and these special provisions.

Piping insulation shall be installed on all domestic hot water piping, above grade, in non-conditioned spaces.

Piping insulation shall be installed on all hydronic supply and return piping, above and below grade unless shown otherwise on the plans.

P-trap, hot water supply pipes and angle valves for lavatories and sinks, except in janitor closets or similar enclosed spaces, shall be insulated.

Backflow preventer enclosure shall be insulated for freeze protection.

QUALITY ASSURANCE.--

Codes and standards.--Mechanical insulation shall conform to California State Energy Commission regulations and, where applicable, shall meet American Society of Testing and Materials (ASTM) standards.

All materials shall bear the label of the Underwriters Laboratory (UL) or other approved testing laboratory indicating that the materials proposed for use conform to the required fire hazard ratings.

Pipe safety insulation shall conform to Section 1504(b) of Title 24, Part 5, California Plumbing Code.

PART 2.- PRODUCTS

MATERIAL.--

General.--All pipe insulation and wrapping material, including adhesives and jackets, located within buildings shall be certified to have a composite flame spread rating of not more than 25 and smoke development rating of not more than 450 when tested in accordance with ASTM Designation: E 84.

Duct insulation and wrapping material, including adhesives and jackets, located within buildings shall be certified to have a composite flame spread of not more than 25 and smoke development rating of not more than 50 when tested in accordance with ASTM Designation: E 84.

Domestic water and interior hydronic piping insulation.--

Piping insulation shall be glass fiber molded pipe insulation with factory applied jacket suitable for service temperatures up to 175°C. Covering jacket shall have pressure sealing lap adhesive joints. Pipe insulation shall have a minimum thermal resistance of $R-0.5 \text{ K}\cdot\text{m}^2/\text{W}$. Insulation and jackets shall be Owens-Corning, Fiberglass 25 with ASJ/SSL All Service Jacket; Manville, Micro-Lok 650ML with AP-T All Purpose Jacket; or equal.

Piping insulation cement.--

Insulation cement shall be Fenco, All Purpose Cement; Manville, JM375; or equal.

Exterior and in ground hydronic piping insulation

Piping insulation shall be polyurethane foam insulation with a service temperature range of 0°C to 120°C. A 0.15 mm vapor barrier shall be applied over the top off the insulation. The vapor barrier shall be installed with an adhesive as recommended by the manufacturer.

PVC jacket.--

PCV jacket shall be rated for a service temperature of 80°C. PVC jacket shall include covers specifically designed to cover pipe fittings.

Alternative pipe insulation.--

Alternative pipe insulation shall be closed cell, elastomeric material in a flexible tubular form. Insulation shall have a service temperature range between -40°C and 93°C, a minimum vapor transmission rating of 0.29 Perm-m, and a minimum thermal resistance of $R-0.5 \text{ K}\cdot\text{m}^2/\text{W}$.

Pipe safety insulation.--

Pipe safety insulation for P-traps, hot water supply pipes and angle valves shall be molded closed cell vinyl or closed cell foam with exterior vinyl surface. Pipe safety insulation shall be configured to protect against contact. Pipe safety insulation shall be Truebro Inc., Handi Lav-guard; Plumberex Specialty Products, Handy Shield; or equal.

Backflow preventer freeze protection.--

Backflow preventer shall be freeze protected by an insulated enclosure. The freeze protection must be approved by the backflow preventer manufacturer. The insulated backflow enclosure shall be easily openable for annual inspection and maintenance of backflow preventer.

PART 3.- EXECUTION

INSTALLATION.--

General.--Insulation materials shall be neatly installed with smooth and even surfaces, jackets drawn tight and smoothly cemented down.

Insulation material shall not be installed until all pipes or surfaces to be covered are tested for leaks, cleaned and dried, and foreign materials, such as rust, have been removed.

Piping insulation.--Piping insulation shall be in accordance with the following, except that unions, unless integral with valves, and flexible connections shall not be insulated.

- a. Where insulation butts against flanges or is discontinued, insulation shall be tapered to pipe to allow for covering jacket to completely seal off end of insulation.

Insulation shall be extended on the valve bodies up to the valve bonnet.

Extend insulation continuous through pipe hangers and pipe sleeves. At hangers where pipe is supported, provide an insulated protection shield.

Insulating cement shall be applied to fittings, valves, and strainers and troweled smooth to thickness of adjacent covering. Strainer cleanout plugs shall remain accessible. Covers fabricated from molded pipe covering may be used in lieu of cement, provided covers are neat and well secured.

- b. Jacket flap shall be sealed down with factory applied self-sealing lap. Seams shall be lapped not less than 40 mm. Jacket shall be secured with aluminum bands installed at 300 mm centers.
- c. Exposed outdoor insulation shall have an additional 0.40 mm minimum thickness aluminum jacket applied over the completed insulation. The jacket shall have a factory applied moisture barrier and shall be Childers; Smith; or equal.

End joints shall be lapped with aluminum holding traps located directly over the lap. Additional aluminum holding straps shall be placed at 200 mm centers. Jacket at ells and tees shall be mitered, or premanufactured fitting jackets shall be provided, with additional aluminum holding bands, as required. All joints shall be sealed watertight using silicon type, heat resistant sealant.

- d. In-ground insulation shall have an additional PVC jacket applied over the completed insulation and vapor barrier. PVC jacket shall be made water with adhesive or sealant as recommended by the PVC jacket manufacturer.

Alternate pipe insulation, where used, shall be installed on hot water piping before connections are made or the insulation may be slit lengthwise, applied to pipe and sealed with adhesive.

Pipe safety insulation.--Pipe safety insulation shall be installed in accordance with the manufacturer's recommendations.

15.04 AUTOMATIC FIRE SPRINKLER SYSTEM

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of designing, furnishing and installing an automatic wet pipe type fire sprinkler system, complete and ready for use, in accordance with the details shown on the plans and these special provisions.

The automatic fire sprinkling system shall include water flow indicator, check valve, electric alarm bell, valves, sprinkler heads and related appurtenances, valves, piping and fittings.

Design.--The design of the sprinkler system shall be in accordance with the code requirements for ordinary hazard occupancies, group 1, and shall provide coverage of the building area shown on the plans.

The water pressure and flow rate shall be verified with the local agency having jurisdiction.

SUBMITTALS.--

Shop drawings.--Complete shop drawings, including written verification of the water pressure and flow rate, shall be submitted for approval.

State Fire Marshal approval.--Prior to the submittal of the shop drawings, the Contractor shall have said drawings stamped "APPROVED" by the State Fire Marshal. Allow 12 weeks for State Fire Marshal review and approval.

QUALITY ASSURANCE.--

Codes and standards.--All work shall be in accordance with the requirements of the State Fire Marshal, the National Fire Protection Association (NFPA) Standard No. 13, "Installation of Sprinkler Systems," and the requirements of other regulatory authorities having jurisdiction.

PART 2.- PRODUCTS

Water flow indicator.--

Water flow indicator shall be UL or FM listed for fire protection, vane type switch designed for wet pipe systems. Water flow indicator shall be designed for minimum flow rate of 40 liters per minute, and shall have an adjustable delay setting of from 0 to 90 seconds. Water flow indicator shall be Viking, Model VSR-D; Grinnell, Model F620; Reliable, Model A; or equal.

Check valve.--

Check valve shall be UL or FM listed, swing type, self draining, iron body with brass trim and rubber clapper with removable cover plate. Check valve shall be Viking, Grinnell, Groeniger, or equal.

Alarm bell.--

Alarm bell shall be UL or FM listed electric bell type, 115 volt AC with a minimum sound rating of 95 decibels at 3 m. Alarm bell shall have a die cast aluminum housing with built-in rubber gasket for dust proof seal for bell striking mechanism. Alarm bell shall be Viking, Grinnell, Reliable, or equal.

Pipe and fittings.--

Pipe and fittings shall be in accordance with the requirements specified under "Pipe, Fittings and Valves," elsewhere in this Division 15.

Pipe and fittings for drain lines shall be as recommended by the valve manufacturer.

Pipe hangers.--

Pipe hangers shall be of types listed as acceptable for specific applications in NFPA No. 13.

Valves.--

Valves shall be UL or FM listed, outside screw and yoke (OS&Y) rising stem type.

Valves (OS&Y) 65 mm and larger in size shall be Crane, 467; Walworth, 8713F; Nibco Scott, F-607-0; or equal.

Valves (OS&Y) 50 mm and smaller in size shall be Crane, 459; Walworth, 873; Nibco Scott, T-104-D; or equal.

Optional; Valves 100 mm and larger may be butterfly type, UL or FM listed, working pressure 1210 kPa, gear operated, indicator flag, ductile iron body, bronze trim, with provisions for locking. Valve shall be provided with mounting block for supervisory switch.

Supervisory switch.--

Supervisory switch shall be UL or FM listed, for the type of valve supplied, single contact set with tamper resistant cover. Supervisory switch shall be suitable for exterior installations.

Sprinkler head.--

Sprinkler head shall be upright type above ceiling and pendant type below ceiling. Sprinkler head shall be brass body, chemical or solder fusing type, with proper temperature rating element. Sprinkler head shall be Viking, Grinnell, Reliable, or equal.

Spare sprinkler cabinet.--

Spare sprinkler cabinet shall be metal cabinet as recommended by the sprinkler head manufacturer and conforming to NFPA requirements. The cabinet shall be painted red.

Fire department connection.--

Fire department connection shall be UL or FM listed, horizontal single or double Siamese as required, with 65 mm inlets, drain cock, caps, chain, and brass nameplate. Inlets shall have national standard fire hose coupling screw threads. The fire department connection shall be Potter-Roemer, Grinnell, or equal.

Accessories.--

Drains, test connection, flush connections, pressure gauges, and other accessories shall be supplied as required.

Sign.--

Sign shall be sheet steel, not less than 0.76 mm thick, with red letters on a white background and a baked enamel coating.

PART 3.- EXECUTION

INSTALLATION.--

General.--Sprinkler piping and equipment shall be installed in accordance with the approved shop drawings and shall be located to avoid interference with the lighting system, access openings, or other piping.

Reductions in pipe size shall be made with one piece reduction fittings. Bushings shall not be used.

Piping.--Fire sprinkler piping shall be installed level.

Drain piping and test connections shall discharge into the nearest floor drain or to the outside of the building. Discharge piping shall not drain across walkways.

Pipe penetrations in fire rated assemblies.--Where pipes pass through fire rated wall, floor or ceiling assemblies, the penetration shall be protected in accordance with the requirements specified under "Through-Penetration Firestopping" in Division 7, "Thermal and Moisture Protection," of these special provisions.

Spare sprinkler cabinet.--The spare sprinkler cabinet shall be installed where temperatures will not exceed 38°C at any time. Such location shall be approved by the Engineer. Six spare sprinklers and 2 sprinkler head wrenches shall be furnished and placed in the cabinet.

Securing main shutoff valve.--A galvanized chain, with a nominal material diameter of at least 5 mm, shall be provided to lock the main shutoff in the open position. The lock will be State-furnished as provided under "State-Furnished Materials" in Division 1, "General Requirements," of these special provisions.

Signs.--Signs and messages shall be as required by NFPA No. 13 and the regulatory authorities having jurisdiction. Lettering shall be standard-type of the following heights:

Item	Minimum Lettering Height
Nameplate date	6 mm
Drain signs	19 mm
Tamper sign	19 mm

FIELD QUALITY CONTROL.--

Acceptance tests.--The Contractor shall arrange for testing of the automatic fire sprinkler system in the presence of the Engineer and the State Fire Marshal. Three days written notice of said testing shall be provided by the Contractor.

The system shall be pressure tested for 2 hours at 1380 kPa. A successful test shall have no visible leaks or loss of pressure.

The Contractor shall perform such other tests as may be required by the State Fire Marshal.

15.05 PLUMBING FIXTURES

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing plumbing fixtures in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS

General.--Plumbing fixtures shall be white in color and shall meet the following requirements:

Water closet (disabled accessible, 6 liters per flush, floor mounted with tank).--

Disabled accessible water closet shall be 6 liters per flush maximum, vitreous china, siphonable jet, 410 mm to 440 mm high elongated bowl, close coupled tank, floor mounted, with solid plastic open front elongated seat with check hinges. Water closet shall meet or exceed Americans with Disabilities Accessibility Act Guidelines (ADAAG) and ANSI Standards: A117.1 and A112.19.2. Closet and accessories shall be of the following types or equal:

	American Standard	Crane	Universal Rundle
Closet	"Cadet 17 EL1.6/PA" 2168.100 or 4086.800	"Hymont" 3-154E or 3-152 with 3-655	"Atlas 1.5" UR 4078-341 or UR 4078-342
Seat	Church 5321.070	Olsonite 95	Benke 527

Lavatory (wall-mounted).--

Lavatory shall be vitreous china, with back, integral perforated grid drain, drilled for 102 mm centers, size 508 mm x 457 mm, with single extra long lever mixing faucet and chair carrier with concealed arms. Lavatory shall be equipped with temperature controls to limit the hot water supply to 43°C. Lavatory shall be equipped with a flow limiting device that limits the flow rate of hot water to no more than 2 liters per minute. Lavatory and accessories shall be of the following types or equal:

	Eljer	Crane	Kohler
Lavatory	"Lucerne" 0355.012	"Norwich" 1-194-V	"Greenwich" K-2032
Drain	--	C-1065-G or Moen 52659	K-7715
Supplies	Brass Craft FR1711C	C-1151 or Moen 52664	K-7605
Faucet	2385.130	Moen 8400	K-15592-5
Trap	32 mm chromium plated brass exposed bent tube adjustable 1.37 mm (17-gage) minimum thickness.		
Carrier	Concealed wall mounted carrier with leveling screws and locking devices; Zurn, J.R. Smith, Josam, Wade, Jonespec, or equal.		

Service sink.--

Service sink shall be acid resisting enameled cast iron, plain undrilled back, stainless steel strainer, stainless steel or chrome plated sheet brass rim guard on three sides, size approximately 560 mm x 460 mm, with 75 mm trap with cleanout and floor mounting flange. Sink and accessories shall be of the following types or equal:

	American Standard	Eljer	Kohler
Service sink	"Lakewell" 7692.023	242-0120	"Bannon" K-6718
Strainer	8301.061	-----	-----
Trap	7798.176	804-1060 w/strainer	K-6673 w/strainer
Faucet	Bucket hook, vacuum breaker, integral stops, top brace, long spout with hose threads.		
	8344.111	749-1200	K8907

Water heater (electric).--

Water heater shall be minimum capacity as shown on plans, designed for minimum 860 kPa, interlocking (non-simultaneous) or single element, glass lined, and equipped with magnesium anodes, cold water drop tube, high temperature energy shut-off device, valved drain, high density R-1.4 K•m²/W minimum foam insulation and finished with a steel jacket with baked enamel finish. Water heater shall meet the requirements of the California Energy Commission.

Water heater shall be equipped with an ASME labeled, tank mounted, pressure and temperature relief valve sized for maximum input.

Water heater (gas).--

Water heater shall be minimum capacity as shown on plans, designed for minimum 860 kPa, glass lined, and equipped with gas pressure regulator, magnesium anodes, cold water drop tube, high temperature energy shut-off device, valved drain, high density R-1.4 K•m²/W minimum foam insulation and finished with a steel jacket with baked enamel finish. Water heater shall meet the requirements of the California Energy Commission.

Water heater shall be equipped with an ASME labeled, tank mounted, pressure and temperature relief valve sized for maximum input.

Electric water cooler (disabled accessible, wall mounted).--

Electric water cooler shall be wall mounted, wheelchair accessible, and shall produce a minimum of 28 liters of 10°C water per hour based upon an inlet water temperature of 27°C and an ambient room temperature of 32°C. Cooler shall have self closing, front and side mounted pushbar actuators, shielded bubbler, automatic stream regulator, loose key stop, adjustable thermostat and cast brass P-trap.

Compressor shall be hermetically sealed, positive start with fan cooled condenser and shall be mounted above the cooler top. Cooler shall be provided with 3-wire grounded plug and cord.

Electric water cooler shall be Haws, HWCA8D; Sunroc, HCWC-8S; Elkay, EHFS-8; or equal.

Emergency eyewash and shower.--

Emergency eyewash and shower shall be separate drench shower and eye bath, 32 mm minimum, galvanized steel pipe stand with 229 mm floor mounting flange and equipped with 216 mm x 279 mm pictorial and worded emergency identification sign.

Shower head shall have a 254 mm diameter ABS plastic head with a stay-open ball valve operated by a rigid pullrod with triangular handle.

Eyewash shall have a 254 mm diameter stainless steel bowl, anti-surge heads and circular chrome plated spray ring to bathe the entire face, dust cover assembly, and a stay-open ball valve operated by a flag handle. Eyewash unit shall be mounted on the shower pipe stand.

Emergency eyewash and shower shall be Haws, 8346; Speakman, SE-607; Western, 9231; or equal.

Emergency eye wash and shower shall be provided with Shower Test Kit and shall be Haws, 9010; Speakman, SE 950; or equal.

PART 3.- EXECUTION

INSTALLATION.--

General.--All finish for exposed metal on any fixture, including wall flanges, bolts, nuts and washer, shall be polished chrome plated.

Fixtures shall be sealed to wall or floor with silicone caulk bead.

All exposed metal surfaces on fixture supports shall be enameled to harmonize with fixtures.

Wall mounted fixtures shall be installed on concealed chair carriers designed to support weight of fixture from the floor, made for the specific fixture to be supported and for the particular installation conditions.

All fixtures, including showers, shall be provided with accessible metal stop valves.

Hot water supply, trap and tailpiece on lavatories shall be wrapped with insulating material.

Flush valves for fixtures designated on the plans as disabled accessible shall be installed so that the valve handle is on the widest side of the toilet space.

FIXTURE MOUNTING HEIGHTS.--

General.--Unless otherwise noted, fixtures shall be mounted at the heights shown on the plans.

Service sink.--Service sink double faucet shall be mounted on wall above sink back with spout outlet face 400 mm above service sink rim.

Water heater.--Water heater shall be installed with seismic restraints, inlet ball valve and insulating connections, and 20 mm pressure and temperature relief drain pipe.

Emergency eyewash and shower.--Emergency eyewash and shower shall be installed with a rigid bracket located 1.2 m above the floor. Bracket shall be minimum 1.52 mm (16-gage) steel and shall be braced to the wall.

FIELD QUALITY CONTROL.--

Testing.--The Contractor shall test piping in accordance with the requirements specified elsewhere in these special provisions.

All installed fixtures shall be tested for proper operation after all plumbing work has been completed.

15.06 WHEELCHAIR ACCESSIBLE SHOWER UNIT

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing a wheelchair accessible shower unit and fittings in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, installation instructions and color palette shall be submitted for approval. The color will be selected from the manufacturer's standard product line by the Engineer after approval of the contract.

QUALITY ASSURANCE.--

Codes and standards.--Shower units shall conform to the requirements of the California State Accessibility Standards contained in the California Building Standards Code, Title 24.

PART 2.- PRODUCTS

Shower stall.--

Shower stall shall be single unit, single piece construction with clear interior dimensions of 1065 mm wide, 1220 mm deep, with an entrance width of 915 mm, and no obstruction at the threshold. Shower stall shall be fabricated from gel-coated fiberglass or acrylic with a Class I Flame Spread. Shower unit shall be reinforced to accommodate the grab bars and seat.

Shower unit shall have a threshold or recessed drop, a maximum of 13 mm in height, sloped at an angle not exceeding 45 degrees from the horizontal. The floor shall be slip-resistant, sloping a maximum of 4 percent to a drain located near the rear wall.

Shower unit shall be provided with the following fittings and accessories: stainless steel corner grab bar and folding teakwood or woodgrain phenolic wheelchair transfer seat, each capable of resisting 1112 N of lateral, vertical and tensile load, stainless steel soap dish, chromium plated or stainless steel curtain rod, chromium plated steel hand-held shower head with ball joint, chromium plated 1525 mm long flexible shower spray hose, chromium plated fixed shower head, chromium plated metal outlet drain with removable strainer, chromium plated single lever control thermostatic mixing valve with control cartridge with no metal to metal wearing surface, a lever operated shower head selector, and vinyl shower curtain with corrosion resistant hooks.

Shower stall units shall be Crane; Florestone; Maron and Associates; or equal.

PART 3.- EXECUTION

INSTALLATION.--

General.--Shower shall be installed with the manufacturer's instructions. All joints shall be sealed and caulked watertight.

15.07 HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT AND SYSTEMS

PART 1.- GENERAL

Scope.--This work shall consist of furnishing, installing and testing heating, ventilating and air conditioning (HVAC) equipment and systems in accordance with the details shown on the plans and these special provisions.

The performance rating and electric service of the HVAC equipment shall be as shown on the plans.

Temperature controls.--Thermostats, relays, time switches, and other sensor type control devices required for this work shall be furnished and installed by the supplier of the heating, ventilating and air conditioning equipment. All temperature control wiring shall be furnished and installed in accordance with the requirements specified in Division 16, "Electrical," of these special provisions.

Codes and standards.--Equipment and systems shall conform to California State Energy Commission Regulations and, where applicable, shall be American Refrigeration Institute (ARI), American Gas Association (AGA), Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), and Air Movement and Control Association (AMCA) approved for performance ratings and application shown on the plans.

Any appliance for which there is a California standard established in the Appliance Efficiency Standards may be installed only if the manufacturer has certified to the Commission, as specified in those regulations, that the appliance complies with the applicable standards for that appliance. Space conditioning equipment may be installed only if the

manufacturer has certified that the equipment meets or exceeds all applicable efficiency requirements listed in the Energy Efficiency Standards.

PART 2.- PRODUCTS

HEATING AND COOLING UNITS.--

Evaporative cooler.--

Evaporative cooler shall be a factory assembled unit having removable side panels with filters and a bottom drain. The cabinet shall be fabricated from galvanized steel sheet metal with a baked-on enamel finish. Interior surfaces of the cabinet bottom shall be asphalt coated. The drain fitting shall be threaded for connection to drain piping.

All parts of the float valve and recirculating pump, which come into contact with water, shall be of stainless steel or other corrosion resistant material.

The control switch shall be a 4-position switch with the following selective settings: cool, vent, pump and off.

The evaporative cooler shall be Williams; Essick; Universal; or equal.

Unit heater.--

Unit heater shall be gas-fired, propeller fan type, AGA approved for natural gas and shall be equipped with aluminized steel heat exchanger, built in backdraft diverter, fan switch marked "SUMMER"-"WINTER," adjustable discharge louvers, gas pressure regulator, intermittent ignition device, gas main and pilot shutoff valves, automatic gas valve, high limit shutoff, 24-volt transformer, and fan motor local disconnect. All components shall be factory assembled. Unit heater shall be Reznor; Modine; Hastings; or equal.

Unit heater fan motor shall have integral thermal overload protection.

Split type air conditioner and heat pump (ductless).--

Heat pump shall consist of an outdoor condenser unit with an evaporator unit. The condenser unit shall consist of a rotary type compressor, condensing coil, fan and all controls, tubing and appurtenances required for a complete operating system. The evaporator units shall consist of an evaporating coil, expansion control device, propeller fan, auxiliary electric heat strips and thermostat. In addition, the evaporator unit shall come with a plug or local disconnect. The system shall provide heating or cooling as required by the thermostat. Units shall be Sanyo, Mitsubishi Electric, Toshiba, or equal.

Electric duct heater.--

Electric duct heater shall be UL listed, slip-in type, all metal construction and shall have an over-temperature protection and external disconnect. Heater manufacturer shall supply heater with a two-step control, line voltage, duct thermostat. Thermostat shall energize the first stage of heating at 10-degrees Celsius, and the second stage at 2-degrees Celsius.

Electric radiant heater.--

Electric radiant heater shall be UL listed, surface mounted, low temperature radiant heating panel. Heater shall have a graphite heating element and insulation in a steel housing. Electric radiant heater shall be Chromalox type CP, Aztec, or equal.

FANS AND VENTILATORS.--

Declassification fan (wall mounted).--

Declassification fan shall be wall mounted, AMCA certified and shall be equipped with a metal "dome" housing, a backdraft damper, a centrifugal fan wheel and a bird screen. Declassification fan shall be Type "B" spark resistant construction as defined by the AMCA Standards. The motor and fan assembly shall be isolated from the base with rubber vibration isolators. The fan shall be completely weatherproof, shall have a local disconnect under the hood

and the motor shall have integral thermal overload protection. Declassification fan shall be Greenheck, Penn, or equal.

Declassification fan (in-line).--

Declassification fan shall be in-line, AMCA certified and shall be equipped with a centrifugal fan wheel, a metal housing and motor guard. Declassification fan shall be Type "B" spark resistant construction as defined by the AMCA Standards. The motor and fan assembly shall be isolated from the base with rubber vibration isolators. Internal parts shall be accessible for repair without disturbing the ductwork. The fan shall have a local disconnect and the motor shall have integral thermal overload protection. Declassification fan shall be Greenheck, Penn, or equal.

Exhaust fan (wall mounted).--

Exhaust fan shall be wall mounted, propeller type, AMCA certified fan with a metal housing, venturi orifice, backdraft damper, and safety grille. The motor and fan assembly shall be isolated from the base with rubber vibration isolators. The motor shall be continuous duty with integral thermal overload protection. Exhaust fan shall be Greenheck, Penn, or equal.

Fume exhaust fan (in-line).--

Fume Exhaust fan shall be in-line, AMCA certified and shall be a centrifugal belt drive duct fan in a metal housing. The motor and fan assembly shall be isolated from the base with rubber vibration isolators. Internal parts shall be accessible for repair without disturbing the ductwork. The fan shall have a local disconnect and the motor shall have integral thermal overload protection. Fume Exhaust fan shall be Greenheck, Penn, or equal.

Cabinet fan (above ceiling).--

Cabinet fan shall be in-line, AMCA certified and shall be a centrifugal fan with a backdraft damper in a metal housing. The motor and fan assembly shall be isolated from the base with rubber vibration isolators. The fan motor shall have a local disconnect and shall have integral thermal overload protection. Vestibule supply fan shall be Breidert, ILG, or equal.

Combination heat lamp/light/fan.--

Combination heat lamp/light/fan shall be ceiling mounted, recessed type unit with metal housing, grille and backdraft damper. Ducting size shall be as required by the manufacturer. Unit shall be provided with one 75-watt flood lamp and one 250 watt R40infrared lamp. Combination heat lamp/light/fan shall be Broan, No. 164; Nutone, No. 9427; or equal.

HVAC CONTROLS.--

Unit heater thermostat.--

Unit heater thermostat shall be low voltage type, single set point range internally adjustable from 4°C to 27°C, and provided with a blank cover.

Hydronic heating thermostat.--

Hydronic heating thermostat shall be line voltage type, single set point range internally adjustable from 4°C to 27°C. Thermostat shall be insulated from outside wall.

Radiant heater thermostat for boiler room freeze protection.--

Radiant heater thermostat shall be line voltage type, single set point range internally adjustable from 4°C to 27°C, and provided with a blank cover.

Thermostat (office only).--

Thermostat shall be 24-volt, 7-day programmable, electronic heating/cooling thermostat, with the ability to program the fan-on mode during normal working hours, and fan-off mode during unoccupied periods. Thermostat shall be provided with sub-base selector switches for "AUTO-HEAT-OFF-COOL" and fan "AUTO-ON". Thermostat shall be auto-changeover type, and have full temperature range setback capacity. Thermostat shall be same manufacturer as split system office air conditioning system; Robertshaw, 7900; Honeywell, T7300; or equal.

Time switch.--

Time switch shall be one-hour, spring-wound, "OFF" type time switch without a "HOLD" feature. Time switch shall be Intermatic, Type F60M; Tork, A500 Series; or equal.

AUXILIARY HVAC COMPONENTS.--

Unless specified herein, all components shall be sized and have the characteristics as shown on the plans.

Rigid ductwork.--

Rigid ductwork shall be galvanized steel sheet metal conforming to the latest edition of the SMACNA "Low Velocity Duct Construction Standards." Galvanized steel shall be cleaned by washing with mineral spirit solvent sufficient to remove any oil, grease or other materials foreign to the galvanized coating.

Spiral duct.--

Spiral duct shall be prefabricated type.

Duct supports.--

Duct supports shall be hot-dip galvanized steel.

Flexible ductwork.--

Flexible ductwork shall be UL 181, Class 1 air duct rated and shall meet the requirements of NFPA 90-A. Duct shall have steel helix wire, flexible insulation, minimum thermal resistance of R-0.7 (m²*K/W), and flame resistant vapor barrier. Inner and outer surfaces shall be non-metallic. Outer surface shall be Copolymer or Mylar, factory applied.

Flexible connection.--

Flexible connection shall be prefabricated type and shall be commercial quality flexible glass fabric coated on both sides with neoprene or hypalon.

Ceiling diffuser (for gypsum board ceilings).--

Ceiling diffuser for gypsum board ceilings shall be rectangular or square type. Diffuser shall be steel with oven baked-on enamel bone white dull finish or extruded aluminum, equipped with a removable core and a standard flanged frame with sponge rubber or felt gasket. Diffuser shall have individually adjustable curved blades, counter-sunk screw holes, shall be surface mounted, with face velocity less than 3.05 m/s; Titus, 250; Air Mate, 400-O; Hart and Cooley, A40; or equal.

Fire damper.--

Fire damper shall be approved or listed by the State Fire Marshal. Each fire damper shall have an approved fusible link with a temperature rating 10°C. above normal maximum operating temperature, and precision machined bronze sleeve type bearings. Fire damper shall have all steel parts factory painted with an oven baked-on metal primer and enamel finish.

Vents and flues (for heaters).--

Vents and flues for heaters shall be approved Type B.

Refrigerant and condensate drain piping.--

Refrigerant and condensate drain piping shall be rigid, Type L copper tubing with brazed solder fittings. The suction line shall be insulated, with vapor barrier and shall be weatherproofed for exterior installation. Factory sealed tubing shall not be used.

PART 3.- EXECUTION

INSTALLATION.--

Heaters.--Unit heaters, radiant heaters shall be installed in such a manner as to insure adequate furnace clearance and separation of combustion air and circulating air. Appliances shall be connected to a rigidly mounted gas pipe supply system by an AGA approved flex connector and gas valve.

Ventilators--Exhaust ducts connected to exhaust fans shall be routed as shown on the plans and shall terminate in a weatherproof cap. Duct sizes shall be as shown on the plans or as recommended by the manufacturer, whichever is larger.

Condensate drains.--Air conditioning units and heat pumps shall be provided with condensate drain trap and piping. Outdoor piping shall extend to the nearest roof drain, gutter or as shown on the plans. Air gap shall be installed where required by code. Interior condensate drain piping shall be insulated with foam insulation.

Evaporative cooler.--Wall mounted evaporative cooler shall be provided with drain piping routed to within 150 mm of the ground.

Mounting heights.--Thermostats and time switches shall be installed as shown on the plans.

Temperature controls.--Temperature control for each unit radiant heater shall be provided by 2 low voltage thermostats and a time switch. One thermostat shall be set at 7°C. for low-limit temperature control and the second thermostat shall be set at 21°C. The first thermostat shall energize the heater whenever the temperature is below the setpoint. The second thermostat shall be wired in series with the time switch and shall de-energize the heater above the setpoint.

Each thermostat shall be insulated from the outside walls, and shall be provided with an aluminum radiation shield above the thermostat.

The time switch shall be installed beside the thermostat or where shown on the plans.

Vents and flues.--Vents and flues shall be securely fastened to the building construction, shall be provided with a collar at all ceiling penetrations and shall terminate with a weather cap fabricated of the same material.

Access door.--Access doors shall be provided in rigid ducts and plenums for access to volume dampers, fire dampers and control devices located within such ductwork; and shall be provided at such other locations as shown on the plans.

Ducts and vents.--Ductwork within the building shall be installed to clear lighting fixtures, doors, windows and other obstructions. Ductwork shall preserve head room and shall keep openings and passageways clear whether shown on plans or not.

Ductwork shall be installed and braced according to the latest edition of the SMACNA "HVAC Duct Construction Standards."

Slopes in sides at transitions shall be approximately one to five. The ductwork system shall not contain abrupt changes or offsets of any kind unless otherwise shown on the plans.

Where ducts pass through walls, floors or ceilings, galvanized sheet metal or steel angle collars shall be installed around the ducts.

Duct sections shall be connected by beaded sleeve-type couplings using joint sealer as recommended by the duct manufacturer. Duct sections shall be mechanically fastened with pop rivets or sheet metal screws and sealed with mastic or insulated, reinforced silver tape.

Flexible connections shall be provided at both inlet and outlet of fan coil and ventilating units.

Sheet metal plenums shall be adequately braced and supported from the floor or structure with structural steel angles to prevent sagging, flexing and vibration.

All standing seams and transverse joints of supply, return and exhaust ducts and seams around plenums, fan and coil housings shall be sealed with sealant and taped.

Duct penetrations in fire rated assemblies.--Where ductwork passes through fire rated wall, floor or ceiling assemblies, the penetration shall be protected in accordance with the requirements specified under "Through-Penetration Firestopping" in Division 7, "Thermal and Moisture Protection," of these special provisions.

Ductwork identification.--Ductwork shall be identified as follows:

Duct Description	Identification Symbol
Supply duct	S
Exhaust duct	EXH
Outside air duct	OA

Identification symbol letters shall be stenciled at locations visible from the access routes to be used by maintenance workers. Such letters shall be painted with black colored paint and shall be a minimum of 50 mm high.

FIELD QUALITY CONTROL.--

Pre-test requirements.--Before starting or operating systems, equipment shall be cleaned and checked for proper installation, lubrication and servicing.

In each system, at least one air path, from fan to final outlet, shall have all balance dampers open. The final air quantities shall be achieved by adjusting the volume dampers or the fan RPM.

Final adjustments and balancing of the systems shall be performed in such a manner that the systems will operate as specified and as shown on the plans.

The Contractor shall replace or revise any equipment, systems or work found deficient during tests.

All automatic operating devices which are pertinent to the adjustment of the aforementioned air systems shall be set and adjusted to deliver the required quantities of air and at temperatures specified by the Engineer. All control work shall be done in collaboration with the control manufacturer's representative.

Project completion tests.--The Engineer shall be notified at least 3 working days in advance of starting project completion tests.

The project completion tests shall consist of the following:

1. **Air Systems.**--All air systems shall be tested and balanced to the conditions set forth on the plans and in these special provisions. This work shall be performed by an Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) certified contractor. The air systems include, but are not necessarily limited to, the following:
 - a. Supply air systems
 - b. Exhaust air systems
2. **Operational Data.**--The tests shall include operation of the heating, cooling, and ventilating systems for not less than two 8-hour days, each system shall operate at not less than 90 percent of their full specified capacities.

The required data shall be accurately measured. The data shall be measured during one operational cycle in the presence of the Engineer and shall be submitted for approval.

The following data shall be measured and tabulated:

- a. Ambient temperatures and conditions, °C
- b. Supply and return air quantities, L/sec, each room
- c. Thermostat set point, °C
- d. Air temperatures at room center, °C
- e. Fan motor amperages and voltages
- f. System static pressures, Pa

15.08 HYDRONIC HEATING SYSTEM

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing, installing and testing a hydronic heating system in accordance with details shown on the plans and these special provisions.

Piping and tubing for hydronic heating shall conform to the requirements in "Pipe, Fittings, and Valves," elsewhere in this Division 15.

Thermostats, relays, time switches, and other sensor type control devices required for this work shall be furnished and installed by the supplier of the heating, ventilating and air conditioning equipment. All temperature control wiring shall be furnished and installed in accordance with the requirements specified in Division 16, "Electrical," of these special provisions.

QUALITY ASSURANCE.--

Codes and standards.--Equipment and systems shall conform to California State Energy Commission Regulations and, where applicable, shall be American Refrigeration Institute (ARI), American Gas Association (AGA), Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), and Air Movement and Control Association (AMCA) approved for performance ratings and application shown on the plans.

PART 2.- PRODUCTS

COMPONENTS.--

Pumps.--

Pumps shall be close coupled type with non-overloading characteristics. Pumps shall not overload the motor above its horsepower rating under any operating conditions with the ratings based on continuous operation. Motor sizes shown are estimated minimum requirements and larger motors shall be furnished if necessary to meet non-overloading requirements. Motors shall have built-in overcurrent protection.

Pump material shall be compatible with the working fluid, and shall be sized to meet the operating requirements specified.

Pumps shall not be connected to the piping before the piping is thoroughly flushed and cleaned of dirt and grit. After the connections have been made, the system shall be filled before starting the pumps. Pumps shall not be run dry under any circumstances.

Piping shall be supported from the building structure to prevent strain on the pump casings. A final check for alignment of the piping connections shall be made after the pump has been secured.

Pumps shall be designed especially for these type of installations. Each pump shall have a cast iron case, bronze impeller, mechanical seal, flexible coupling and flanged connections to permit easy removal of the complete unit from the piping system. Pumps shall be Grundfos, Bell and Gosset, or equal.

Chemical feeder.--

Chemical feeder shall be bypass feeder, pot type with 3.79 L minimum capacity. Feeder shall be provided with union and ball valve on both the supply and return lines, configured as recommended by the manufacturer.

Heat exchanger.--

Heat exchanger shall be counterflow, plate type with channel, cover plates and connection fittings constructed of Type 316 stainless steel. The heat exchanger shall be rated for a working pressure 550 kPa and rated for a temperature of at least 150°C.

Expansion tank.--

Expansion tank shall be of welded steel construction and shall be ASME inspected and stamped for 860 kPa working pressure. The tank shall be equipped with drain valve, air charging valve, and gauge glass. Expansion tank shall have the capacity shown on the plans.

Gauge glass.--

Gauge glass shall be 12 mm in size and of adequate length to indicate the entire contents of the tank. The gauge shall be an automatic type with drain cock and shall be valved top and bottom to allow changing the glass without draining the tank.

Air separator.--

Air separator shall be furnished and installed as shown on the plans and shall be rated for 92 liters per minute. Air separator shall be constructed for 860 kPa working pressure and comply with ASME boiler and pressure vessel code. Air separator shall be Amtrol, Bell & Gossett, or equal.

Balance valves.--

Balance valves shall be as specified for "ball valve" elsewhere in these special provisions. Valves shall have removable handles.

Flow meter.--

Flow meter shall be in-line, direct reading, see-through type, rated for 82°C temperature and 860 kPa working pressure with accuracy to within 2 percent of full scale reading.

Flow meter on pump discharge shall have a maximum scale range of 92 liters per minute (LPM). Meter on the circuit balancing loop shall have a maximum scale range of 20 LPM.

Flow meter shall be Blue-White Industries, Hedland Products, Letro Thermometer Incorporated; or equal.

Hydronic heat /three-way motorized valve.--

The three-way motorized valve is used to hold a constant system water temperature of a zone and perform equally well in mixing and diverting applications. Adjustable temperature range set for an outlet temperature as shown on the plans. It consists of transformer, 24-volt valve motor and digital controlling device.

Thermometer.--

Thermometer shall be liquid dial type, minimum 125 mm diameter, with 1°C graduations and a temperature range that includes 0°C and 80°C.

Accuracy shall be within \pm one percent.

Thermometer shall be provided with extension neck or stem such that the thermometer face is above the surface of insulation or other materials.

Liquid thermometer shall be designed for and be installed in a thermowell which projects into the flow stream and is completely immersed in liquid. The thermowell shall prevent system fluid loss when the thermometer is removed. Pipe size shall be increased at the thermowell where necessary to allow for full flow without excessive resistance.

Pressure gage.--

Pressure gage shall be ANSI Standard: B40.1, Grade A, 110 mm minimum diameter dial, liquid filled with cover, plain case, reset screw, 7 mm bottom inlet. Gage shall read from 0 kPa to 210 kPa. Each pressure gage shall be equipped with a gage cock.

Gage cocks.--

Gage cocks shall be 7 mm, brass or bronze, 1040 kPa rated with female and male threaded ends, and tee handle. Gage cocks shall be installed at each pressure gauge.

Air vent valves.--

Air vent valves shall consist of ball valves and copper tubing connected to the top of all high points in the hot water system. Tubing shall be 7 mm and shall extend down to easily accessible 7 mm globe valves mounted approximately 1.5 m above the floor. The 7 mm tubing shall discharge to the building floor and shall terminate 150 mm above finish floor.

Hydronic heating manifold.--

Hydronic heating manifold shall be bronze construction, complete with throttling valves and tubing connections.

PART 3.- EXECUTION

INSTALLATION.--

Installation of pipe and tubing.--Installation of all heating water supply and return pipe and tubing shall conform to the requirements for cutting, cleaning, closing, securing and insulating of water piping as specified in "Pipe, Fittings, and Valves," and "Mechanical Insulation" elsewhere in this Division 15.

Heating water supply and return sections which are cast into the concrete floor slab at each circuit balancing valve box shall consist of a continuous section of wrapped Type L, soft drawn copper tubing. No fitting or joint shall be cast in the concrete slab. Unions shall be installed at both ends of heating water supply and return tubing which are cast in the slab as shown on the plans.

Heating water floor coil layout shall conform to the details shown on the plans. The spacing between tubing runs shall be 300 mm on center. Vertical clearance from the surface of the slab to the tubing shall be as shown on the plans. The minimum radius for tubing bends shall be 229 mm.

Floor coil tubing shall be laid in continuous lengths with no splicing. Tubing shall be secured directly to the bar reinforcement using nylon ties located at 3 m intervals along straight runs, at the mid-point of each radius on bends and at other locations as directed by the Engineer.

The piping system in the floor slab shall be tested prior to placing concrete. The compressor, pump, gauges and other materials or equipment required for testing the piping systems shall be furnished and installed by the Contractor.

The piping shall be visually leak tested with water at 690 kPa for 4 hours prior to the placement of the slab concrete. At the conclusion of the water testing, the floor slab concrete shall be placed. The water pressure shall be maintained in the piping system during the concrete placement operation. Leaks that develop shall be repaired immediately. The water pressure shall be released 2 hours after completion of the concrete placement and repressurization shall not take place until the concrete has attained sufficient strength to resist the piping expansion as determined by the Engineer.

The ends of the in-slab pipe risers shall remain capped and protected from damage. After the above slab portion of the supply and return piping has been installed and tested, both systems shall be flushed with clean, potable water and then connected.

The completed above and below slab systems shall be pressure tested using water pressure at 690 kPa for 8 hours. The system shall show no loss in pressure. At the conclusion of the pressure test, the system shall be filled with a 50-50 solution of glycol and water.

The contractor shall be responsible for freeze protecting all piping prior to the completion of the hydronic system.

FIELD QUALITY CONTROL.--

Pre-test requirements.--Before starting or operating systems, equipment and controls shall be cleaned and checked for proper installation and operation.

Each separate circuit shall have the flows balanced and recorded. The pumping rate for each pump shall be adjusted to the value shown on the plans.

Final adjustments and balancing of the systems shall be performed in such a manner that the systems will operate as specified and as shown on the plans.

The Contractor shall replace or revise any equipment, systems or work found deficient during tests.

All automatic operating devices which are pertinent to the adjustment of the aforementioned system shall be set and adjusted to deliver the required performance at temperatures specified by the Engineer. All control work shall be done in collaboration with the control manufacturer's representative.

Acceptance testing.--Prior to completion of hydronic system installation, and before permitting use of the system, the Contractor shall fire the boiler and demonstrate all operating and safety controls in the presence of the Engineer.

The Contractor shall notify the Engineer at least 3 working days in advance of the dates and times tests are to be performed.

Upon completion of mechanical work and pre-test requirements, or at such time prior to contract acceptance as determined by the Engineer, the Contractor shall operate and test the complete hydronic heating system for at least 5 consecutive 8-hour days to demonstrate satisfactory overall operation.

INSTRUCTION AND MAINTENANCE.--

Instruction.--The Contractor shall instruct State personnel in the proper use, operations and daily maintenance of the hydronic heating system, including the boiler.

Emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies, shall be reviewed.

State personnel shall be trained in normal procedures to be followed in checking sources of operation failures or malfunctions.

Immediately prior to substantial completion, the Contractor shall conduct a final inspection with State personnel present to determine that control systems and operating devices are operating properly.

Project completion tests.--The Engineer shall be notified at least 3 working days in advance of starting project completion tests.

The project completion tests shall consist of the following:

During the test period the following data shall be measured and recorded twice a day:

1. Ambient temperature and conditions.
2. Circulating fluid flow through each pump.
3. Slab and air temperature in the service bays and shop areas.

The measurements shall be taken prior to 8:00 a.m. each morning and after 1:00 p.m. each afternoon.

At the completion of the test period, the flow rates for each individual circuit of the radiant heating system shall be recorded. Flow rate data shall be tabulated and submitted to the Engineer at the jobsite for approval.

15.09 BOILER

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing, installing and testing the natural gas fired boiler, equipment and systems in accordance with the details shown on the plans and these special provisions.

Temperature controls.--Thermostats, relays, time switches, and other sensor type control devices required for this work shall be furnished and installed by the supplier of the heating, ventilating and air conditioning equipment. All temperature control wiring shall be furnished and installed in accordance with the requirements specified in Division 16, "Electrical," of these special provisions.

QUALITY ASSURANCE.--

Installer's qualification.--Installation of the boiler shall be by the boiler manufacturer or a licensee of the manufacturer, who has not less than 5 years successful experience with the installation of similar boilers and who maintains a service facility within 100 km of the jobsite.

Codes and standards.--Equipment and systems shall conform to Uniform Mechanical Code, California State Energy Commission Regulations and, where applicable, shall be American Refrigeration Institute (ARI), American Gas Association (AGA), Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), and Air Movement and Control Association (AMCA) approved for performance ratings and application shown on the plans.

PART 2.- PRODUCTS

MANUFACTURED UNITS.--

Boiler.--

Boiler shall be a packaged unit, ASME inspected and stamped, UL or FM rated, AGA certified for natural gas fuel. The unit shall be a forced draft, intermittent ignition, high-low firing, hot water boiler with 80 percent minimum efficiency, insulated steel jacket and stainless steel positive pressure flue stack with cap.

The entire unit shall be finished with a rust, corrosion and heat resistant industrial type enamel paint.

The boiler capacity shall be as shown on the plans.

ACCESSORIES.--

Controls.--

The boiler units shall include the following controls:

- Operating low water shut-off
- Low water safety fuel shut-off with manual reset
- ASME rated relief valve
- Adjustable operating control
- High limit safety control with manual reset
- Pressure gauge and temperature indicator
- Flame safety control
- Safety pilot control
- Flue gas thermometer
- Air eliminator
- Blow-off valve for bottom blowdown

Boiler test kit.--

Boiler test kit shall be a package unit designed to analyze the boiler combustion by-products. The kit shall have a single probe for insertion into the flue stack and shall be complete with a pump for continuously sampling combustion by-products. All components necessary for the test kit operation shall be contained in a single carrying case. The kit shall be capable of measuring, calculating, displaying and printing out the following values within the range specified:

- Oxygen (0 to 25 percent)
- Excess air (0 to 250 percent)
- Carbon monoxide (0 to 3000 parts per million)
- Combustion efficiency (0 to 99.9 percent)
- Stack loss (0 to 99.9 percent)
- Carbon dioxide (0 to 29 percent)
- Flue stack temperatures (0°C to 1093°C)
- Oxides of Nitrogen (0 to 2000 parts per million)
- Sulfur Dioxide (0 to 2000 parts per million)

Boiler test kit shall be programmed for a least the following fuels: natural gas, No. 2 fuel oil, No. 6 fuel oil, and liquified petroleum gas (LPG).

Boiler test kit shall operate with a dual power capacity by having a rechargeable battery capable of powering the unit for not less than 12 hours of continuous use, and 120 VAC line power.

Boiler test kit shall have 2 flue traps for filtering water, soot, and particulates before they enter the instrument.

Boiler test kit shall have digital LED displays, a real time display of 12 or 24 hours, and an output for personnel computer data transfer.

Boiler test kit shall have a printer capable of printing all calculated and measured values of the combustion process, serial number of unit, time and date of the test, and name of the testing organization. Printer paper shall be standard thermal printer paper.

Boiler test kit shall have self and local diagnostic capabilities, and inform the operator on condition of all sensors during operation. Error codes shall be displayed when sensors require calibration or replacement.

Boiler test kit shall be Bacharach, Enerac, Lynn, Neotronics, Teledyne, or equal.

PART 3.- EXECUTION

INSTALLATION.--

Boiler.--The boiler shall be installed in accordance with manufacturer's recommendations.

The boiler shall be installed to provide the minimum access clearances recommended by the manufacturer for servicing and cleaning.

FIELD QUALITY CONTROL.--

Pre-test requirements.--Before starting or operating the boiler, equipment shall be cleaned and checked for proper installation.

All operating controls and safety controls shall be independently checked for proper installation and operation.

Acceptance testing.--Prior to completion of boiler installation, and before permitting use of the boiler, the Contractor shall fire the boiler and demonstrate all boiler operating and safety controls in the presence of the Engineer.

The Contractor shall notify the Engineer and the inspection department of governing agencies in advance of the dates and times tests are to be performed.

Upon completion of mechanical work and pre-test requirements, or at such time prior to contract acceptance as determined by the Engineer, the Contractor shall operate and test installed boiler system for at least 3 consecutive 8-hour days to demonstrate satisfactory overall operation.

Boiler test kit shall be factory calibrated and shall be demonstrated at the jobsite by a factory trained representative in the presence of the Engineer.

INSTRUCTION AND MAINTENANCE--

Instruction.--The Contractor shall instruct State personnel in the proper use, operations and daily maintenance of the boiler.

Emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies, shall be reviewed.

State personnel shall be trained in normal procedures to be followed in checking sources of operation failures or malfunctions.

Immediately prior to substantial completion, the Contractor shall conduct a final inspection with State personnel present to determine that control systems and operating devices are operating properly.

Maintenance.--The Contractor shall provide continuing maintenance and inspection of the boiler for a period of one year following completion of the contract.

DIVISION 16. ELECTRICAL

16.01 ELECTRICAL WORK

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of performing electrical work in accordance with the details shown on the plans and these special provisions.

Electrical work shall include furnishing all labor, materials, equipment and services required to construct and install the complete electrical system shown on the plans and the work of installing electrical connections for the thermostats, motors, and controls specified elsewhere in these special provisions.

System layouts are generally diagrammatic and location of equipment is approximate. Exact routing of conduits and other facilities and location of equipment is to be governed by structural conditions and other obstructions, and shall be coordinated with the work of other trades. Equipment requiring maintenance and inspection shall be located where it is readily accessible for the performance of such maintenance and inspection.

Related work.--Earthwork, foundations, sheet metal, painting, mechanical and such other work incidental to and necessary for the proper installation and operation of the electrical work shall be done in accordance with the requirements specified for similar work elsewhere in these special provisions.

CLOSEOUT SUBMITTALS.--

Operation and maintenance manuals.--Prior to the completion of the contract, 3 identified copies of the operation and maintenance instructions with parts lists for the equipment specified herein shall be delivered to the Engineer at the jobsite. The instructions and parts lists shall be in a bound manual form and shall be complete and adequate for the equipment installed. Inadequate or incomplete material will be returned. The Contractor shall resubmit adequate and complete manuals at no expense to the State.

QUALITY ASSURANCE.--

Codes and standards.--All work performed and materials installed shall be in accordance with the National Electrical Code; the California Building Standards Code, Title 24, Part 3, "California Electrical Code," and the California Code of Regulations, Title 8, Chapter 4, "Electrical Safety Orders," and all state ordinances.

Warranties and guarantees.--Manufacturer's warranties and guarantees for materials or equipment used in the work shall be delivered to the Engineer at the jobsite prior to acceptance of the contract.

TESTING.--

After the electrical system installation work has been completed, the electrical system shall be tested in the presence of the Engineer to demonstrate that the electrical system functions properly. The Contractor shall make necessary repairs, replacements, adjustments and retests at his expense.

16.02 BASIC MATERIALS AND METHODS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing conduits, conductors, fittings, and wiring devices in accordance with the details shown on the plans and these special provisions.

Conduits, conductors, fittings, and wiring devices shall include those accessories and appurtenances, not mentioned, that are required for the proper installation and operation of the electrical system.

Related work.--Roof penetrations shall be flashed and sealed watertight conforming to the requirements specified under "Sheet Metal Flashing" in Division 7, "Thermal and Moisture Protection," of these special provisions.

Where conduits pass through fire rated wall, floor or ceiling assemblies, the penetrations shall be protected in accordance with the requirements specified under "Through-Penetration Firestopping" in Division 7, "Thermal and Moisture Protection," of these special provisions.

SUBMITTALS.--

Product data.--A list of materials and equipment to be installed, manufacturer's descriptive data, and such other data as may be requested by the Engineer shall be submitted for approval.

Manufacturer's descriptive data shall include complete description, performance data and installation instructions for the materials and equipment specified herein. Control and wiring diagrams, rough-in dimensions for recessed junction and pull boxes, and component layout shall be included where applicable. All control and power conductors on the shop drawings shall be identified with wire numbers.

PART 2.- PRODUCTS

CONDUITS AND FITTINGS.--

Rigid steel conduit and fittings.--

Rigid steel conduit shall be threaded, full weight rigid steel, hot-dip galvanized inside and outside with steel or malleable iron fittings. Fittings shall be threaded unless otherwise specified or shown on the plans.

Split or three-piece couplings shall be electroplated, malleable cast iron couplings.

Insulated grounding bushings shall be threaded malleable cast iron body with plastic insulated throat and steel, lay-in ground lug with compression screw.

Insulated metallic bushings shall be threaded malleable cast iron body with plastic insulated throat.

Electrical metallic tubing (EMT) and fittings.--

Electrical metallic tubing shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam with zinc coating outside and enamel or lacquer coating inside.

Couplings shall be electroplated, rain and concrete tight, gland compression type, steel body couplings with malleable iron nuts.

Connectors shall be electroplated, rain and concrete tight, gland compression type, steel body connectors with male hub, die cast zinc nut and insulated plastic throat.

Flexible metallic conduit and fittings.--

Flexible metallic conduit shall be fabricated in continuous lengths from galvanized steel strip, spirally wound and formed to provide an interlocking design.

Fittings shall be electroplated screw-in type with malleable cast iron body and threaded male hub with insulated throat.

Liquid tight flexible metallic conduit and fittings.--

Liquid tight flexible metallic conduit shall be fabricated in continuous length from galvanized sheet steel, spirally wound and formed to provide an interlocking design with an extruded polyvinyl chloride cover.

Fittings shall be electroplated, malleable cast iron body, with cap nut, grounding ferrule, and connector body with insulated throat.

Rigid non-metallic conduit and fittings.--

Rigid non-metallic conduit shall be Schedule 40, high impact, nonconducting, self-extinguishing polyvinyl chloride (PVC) rigid non-metallic conduit for direct underground burial.

Couplings shall be PVC, socket type or thread on one end and socket type on the other end as required for the particular application.

Terminal adapters for adapting PVC conduit to boxes, threaded fittings, or metallic conduit system shall be PVC adapters with threads on one end and socket type on the other end.

Cable Runway.--

Cable runway shall be constructed of rectangular steel tubing with cross members installed every 305 mm. Cable runway width shall be 305 mm. Steel tubing dimensions shall be 9.5 mm X 38 mm. Cable runway shall be provided with a threaded ceiling kit to secure the cable runway to the ceiling. Cable runway shall be Chatsworth, Part No. 10250-112; B-Line Telecom, Part No. SB-15-12-9R; or equal.

CONDUCTORS.--

Conductors shall be stranded copper wire.

Conductor insulation types unless otherwise shown or specified, shall be as follows:

1. Conductors across hinges of control panel enclosures shall be Type MTW.
2. Conductors shall be type XHHW-2 in wet and outdoor locations.
3. Conductors shall be type THHN in dry locations.

Wire connections and devices.--

Wire connections and devices shall be pressure or compression type, except that connectors for No. 10 AWG and smaller conductors in dry locations may be preinsulated spring-pressure type.

ELECTRICAL BOXES.--**Outlet, device and junction boxes.--**

Unless otherwise shown or specified, boxes shall be galvanized steel boxes with knock-outs and shall be the size and configuration best suited to the application indicated on the plans. Minimum size of outlet, receptacle, switch or junction boxes shall be 100 mm square by 40 mm deep, except that switch boxes for the installation of single switches and outlet boxes for flush-mounted light fixtures shall be 50 mm by 75 mm by 40 mm deep.

Multiple switches shall be installed in standard gang boxes, unless otherwise specified or shown on the plans.

Cast metal boxes shall be cast iron boxes with threaded hubs and shall be of the size and configuration best suited to the application shown on the plans.

Flush-mounted boxes shall have stainless steel covers, one mm thick. Cover screws shall be metal with finish to match cover finish.

Unless otherwise shown or specified, surface-mounted boxes shall have galvanized steel covers with metal screws.

Weatherproof junction boxes shall have cast metal covers with gaskets.

Weatherproof switch and receptacle boxes shall have gasketed covers with gasketed hinged flaps to cover switches and receptacles.

Unless otherwise shown or specified, all PVC boxes shall be PVC boxes with hubs or equivalent means for conduit entry and shall be the size and configuration best suited to the application indicated on the plans. Minimum size of

outlet, receptacle, switch or junction boxes shall be 100 mm square by 40 mm deep, except that switch boxes for the installation of single switches and outlet boxes for light fixtures shall be 50 mm by 75 mm by 40 mm deep.

All PVC junction boxes shall have PVC covers with gaskets.

All PVC switch and receptacle boxes shall have gasketed covers with gasketed hinged flaps to cover switches and receptacles.

Sectional device plates will not be permitted.

Underground pull boxes.--

Pull boxes shall be high density reinforced concrete box with ultraviolet inhibitor polyethylene etched face anchored in concrete and fiberglass cover with hold down bolts. The polyethylene and fiberglass material shall be fire resistant and show no appreciable change in physical properties with exposure to the weather. No. 3 1/2 pull box shall be Brooks Products, No. 3 1/2; Christy Concrete Products, N9; or equal. No. 5 pull box shall be Brooks Products No. 5; Christy Concrete Products, N30; or equal. No. 6 pull box shall be Brooks Products, N6; Christy products, N36; or equal.

Traffic rated pull boxes shall be high density reinforced concrete box with steel cover with hold down bolts and bonding strap. Pull box and cover shall be designed for H20 loading. No. 3 1/2 pull box shall have inside dimensions of 270 mm by 440 mm and No. 5 pull box shall have inside dimensions of 335 mm by 610 mm. No. 6 pull box shall have inside dimensions of 432 mm by 762 mm.

RECEPTACLES AND SWITCHES.--

Ground fault circuit interrupter receptacles, (GFCI).--

Ground fault circuit interrupter receptacles shall be NEMA Type 5-20R, feed-through type, ivory color, 3-wire, 20-ampere, 125-volt AC, grounding type, specification grade, duplex receptacle with ground fault interruption. Receptacle shall detect and trip at current leakage of 5 milliamperes and shall have front mounted test and reset buttons.

Duplex receptacles.--

Duplex receptacles shall be NEMA Type 5-20R, 3-wire, 20-ampere, 125-volt AC, safety grounding, ivory color, specification grade receptacle suitable for wiring with stranded conductors.

Management information system (MIS) receptacles.--

Management information system (MIS) receptacles shall be NEMA Type 5-20R, 3-wire, 20-ampere, 125-volt AC, isolated grounding, orange color, specification grade receptacle suitable for wiring with stranded conductors.

Welding receptacles.--

Welding receptacles shall be surface-mounted, 600-volt, 60-ampere, 2-wire, 3-pole, circuit breaking, weather resistant, raintight receptacle with female interior assembly. The receptacle shall be complete with back box, angle adapter and spring door. The receptacle shall be grounded through extra pole and shell, and shall have crimp or solder type connections. A mating plug for the receptacle shall be provided.

Vehicle lift receptacle.--

Vehicle lift receptacle shall be surface-mounted, 600-volt, 60-ampere, 3-wire, 4-pole, circuit breaking, weather resistant, raintight receptacle with female interior assembly. The receptacle shall be complete with back box, angle adapter and spring door. The receptacle shall be grounded through extra pole and shell, and shall have crimp or solder type connections. A mating plug for the receptacle shall be provided.

Steam cleaner receptacle.--

Steam cleaner receptacle shall be surface-mounted, 600-volt, 30-ampere, 2-wire, 3-pole, circuit breaking, weather resistant, raintight receptacle with female interior assembly. The receptacle shall be complete with back box, angle adapter and spring door. The receptacle shall be grounded through extra pole and shell, and shall have crimp or solder type connections. A mating plug for the receptacle shall be provided.

Snap switches.--

Snap switches shall be 20-ampere, 120/277-volt AC, quiet type, specification grade, ivory color switch with silver cadmium alloy contacts. Switch shall be suitable for wiring with stranded conductors.

Combination heat fan light switch.--

Combination heat fan light switch shall be triplex-three rocker switches in a single gang box. Rocker switch shall be rated 15-ampere, 120-volt, AC switch.

Lights timer switch.--

Lights timer switches shall be a spring-wound mechanical timer switch with 2-hour range in a surface mounted weatherproof enclosure. The contact shall be rated 20-ampere at 125-volt AC.

Exhaust fan timer switch.--

Exhaust fan timer switch shall be a spring-wound mechanical timer switch with 2-hour range in a surface mounted weatherproof enclosure. The contact shall be rated 20-ampere at 125-volt AC.

Bypass timer switch.--

Bypass timer switches shall be a spring-wound mechanical timer switch with 2-hour range. The contact shall be rated 20-ampere at 125-volt AC.

Three-way toggle switches.--

Three-way toggle switches shall be 20-ampere, 120/277-volt AC, quiet type, specification grade, ivory color switch with silver cadmium alloy contacts. Switch shall be suitable for wiring with stranded conductors.

MISCELLANEOUS MATERIALS.--**Warning Tape.--**

Warning tape shall be 100 mm wide and contain the printed warning "CAUTION ELECTRICAL CONDUIT" in bold 19 mm black letters at 760 mm intervals on bright orange or yellow background. The printed warning shall be non-erasable when submerged under water and resistant to insects, acids, alkali, and other corrosive elements in the soil. The tape shall have a tensile strength of not less than 70 kg per 100 mm wide strip and shall have a minimum elongation of 700 percent before breaking.

Pull ropes.--

Pull ropes shall be nylon or polypropylene with a minimum tensile strength of 225 kg.

Watertight conduit plugs.--

Watertight conduit plugs shall be a hollow or solid stem expansion plugs complete with inner and outer white polypropylene compression plates and red thermoplastic rubber seal. Seal material shall be non-stick type rubber resistant to oils, salt, and alkaline substances normally available at the construction sites.

Anchorage devices.--

Anchorage devices shall be corrosion resistant, toggle bolts, wood screws, bolts, machine screws, studs, expansion shields, and expansion anchors and inserts.

Electrical supporting devices.--

Electrical supporting devices shall be one hole conduit clamps with clamp backs, hot-dipped galvanized, malleable cast iron.

Construction channel shall be 41 mm x 41 mm, 2.66 mm (12-gage) galvanized steel channel with 13 mm diameter bolt holes, 40 mm on center in the base of the channel.

Ground rod(s).--

Ground rod(s) shall be a 19 mm (minimum) galvanized or copper clad steel rod, 3 meters long.

Telephone and speaker outlet boxes.--

Telephone outlet boxes shall be 102 mm square boxes and plates with modular type telephone outlet. Boxes on stud walls shall have plaster ring. Speaker outlets shall be similar except with blank plates.

Plates for flush mounting outlets in finished room shall be Type 430 stainless steel, one mm thick with satin finish.

PART 3.- EXECUTION

INSTALLATION.--

Conduit, general.--Rigid steel conduit shall be used unless otherwise shown on the plans or specified in these special provisions.

Electrical metallic tubing may be used in furred spaces and for exposed work indoors above the switch height unless otherwise noted on the plans.

Unless otherwise specified or shown on the plans, flexible metal conduit shall be used to connect suspended lighting fixtures, motors, HVAC equipment, and other equipment subject to vibration in dry locations.

Unless otherwise specified or shown on the plans, liquid-tight flexible metal conduit shall be used to connect motors, HVAC equipment, and other equipment subject to vibration in wet locations.

Rigid non-metallic conduit shall be used at the locations shown on the plans for direct underground burial outside the building foundation and for exposed work inside the Salt Storage and Sand Storage buildings as shown on the plans.

Conduit installation.--Conduit trade sizes are shown on the plans. No deviation from the conduit size shown on the plans will be permitted without written permission from the Engineer.

Conduit shall be concealed unless otherwise shown on the plans.

Conduits shall be tightly covered and well protected during construction using metallic bushings and bushing "pennies" to seal open ends.

Rigid non-metallic conduit bends of 30 degrees or greater shall be factory-made long radius sweeps. Bends less than 30 degrees shall be made using an approved heat box.

A pull rope shall be installed in all empty conduits. At least one meter of pull rope shall be doubled back into the conduit at each termination.

Locations of conduit runs shall be planned in advance of the installation and coordinated with the ductwork, plumbing, ceiling and wall construction in the same areas and shall not unnecessarily cross other conduits or pipe, nor prevent removal of ceiling tiles or panels, nor block access to mechanical or electrical equipment.

Where practical, conduits shall be installed in groups in parallel, vertical or horizontal runs and at elevations that avoid unnecessary offsets.

Exposed conduit shall be installed parallel and at right angles to the building lines.

Conduits shall not be placed closer than 300 mm from a parallel hot water or steam pipe or 75 mm from such lines crossing perpendicular to the runs.

All raceway systems shall be secured to the building structures using specified fasteners, clamps and hangers.

Single conduit runs shall be supported by using one hole pipe clamps. Where run horizontally on walls in damp or wet locations, conduit shall be installed with "clamp backs" to space conduit off the surface.

Multiple conduit runs shall be supported with construction channel secured to the building structure. Conduits shall be fastened to construction channel with channel compatible pipe clamps.

Raceways of different types shall be joined using approved couplings or transition fittings.

Expansion couplings shall be installed where conduit crosses a building separation or expansion joint.

All floor and wall penetrations shall be sealed water-tight.

Existing underground conduit to be incorporated into a new system shall be cleaned with a mandrel or cylindrical wire brush and blown out with compressed air.

Conduit terminations.--Rigid steel conduits shall be securely fastened to cabinets, boxes and gutters using 2 locknuts and specified insulating metallic bushing. Electrical metallic tubing shall be securely fastened to cabinets, boxes and gutters using specified connectors. Conduit terminations at exposed weatherproof enclosures and cast outlet boxes shall be made watertight using specified hubs.

Grounding bushings with bonding jumpers shall be installed on all type of conduits terminating at concentric knockouts and on all conduits containing service conductors, grounding electrode conductor, and conductors feeding separate buildings.

Rigid non-metallic conduits shall be securely fastened to the non-metallic boxes and lighting fixtures using specified connectors.

Rigid non-metallic conduits shall be terminated inside the underground pull boxes with an approved conduit bushings or fittings. All conduits shall enter the pull box at an angle of 45 degrees or more.

All future conduits terminated in underground pull boxes or exposed indoor and outdoor shall be provided with watertight conduit plugs.

Cable runway installation.--Cable runway shall be installed with the bottom of the cable runway at 2311 mm above the finished floor. The sections of the cable runway system shall be installed with the cross members up and the side rails down. Any sections that require cutting shall have the burrs removed and the cut ends painted with gray enamel paint.

Threaded ceiling kit shall be installed to support the cable runway system. Threaded ceiling kits shall be installed in pairs with the kits directly opposite each other at each installation point. Threaded ceiling kit shall be installed within 75 mm to 150 mm at the start or end of the runway and at a maximum of 1500 mm intervals. Excess threaded rod approximately 3 mm below the nut shall be cut.

Warning Tape.--Warning tape shall be placed over each conduit in a trench. Each warning tape shall be centered over the conduit and shall be placed over the 150 mm layer of sand covering the conduit as described elsewhere in these special provisions.

Conductor and cable installation.--Conductors shall not be installed in conduit until all work of any nature that may cause injury is completed. Care shall be taken in pulling conductors that insulation is not damaged. An approved non-petroleum base and insulating type pulling compound shall be used as needed.

All cables shall be installed and tested in accordance with manufacturer's recommendations.

Splices and joints shall be insulated with insulation equivalent to that of the conductor.

Provide 155 mm of slack at each outlet and device connection. If the outlet or device is not at the end of a run of wire, connection shall be made with correctly colored pigtails tapped to the runs with splices as specified herein.

Branch circuit conductors in panelboards and load centers shall be neatly trained along a path from the breaker terminals to their exit point. The conductors shall have ample length to transverse the path without strain, but shall not be so long as to require coiling, doubling back, or cramming. The path shall transverse the panelboard gutter spaces without entering a gutter containing service conductors and, unless otherwise shown on the plans, without entering the gutter space of any panelboard feeder.

All pressure type connectors and lugs shall be retightened after the initial set.

Splices in underground pull boxes and similar locations shall be made watertight.

Junction boxes in furred or accessible ceiling spaces shall be identified with felt-tip pen denoting the circuits contained in the box.

Conductor identification.--The neutral and equipment grounding conductors shall be identified as follows:

Neutral conductor shall have a white or natural gray insulation except that conductors No. 4 and larger may be identified by distinctive white marker such as paint or white tape at each termination.

Equipment grounding conductor shall be bare or insulated. If insulated, equipment grounding conductors shall have green or green with one or more yellow stripes insulation over its entire length except that conductors No. 4 and larger may be permanently identified by distinctive green markers such as paint or green tape over its entire exposed insulation.

Feeder and branch circuit ungrounded conductors shall be color coded by continuously colored insulation, except conductors No. 6 AWG or larger may be color coded by colored tape at each connection and where accessible. Ungrounded conductor color coding shall be as follows:

SYSTEM	COLOR CODE
120/240V-Single phase	Black, blue
120/240V-Three phase	Black, orange, blue

Where more than one branch circuit enters or leaves a conduit, panel, gutter, or junction box, each conductor shall be identified by its panelboard and circuit number. All control conductors including control conductors of manufacturer supplied and field wired control devices shall be identified at each termination with the wire numbers shown on the plans, approved shop drawings, and as directed by the Engineer where deemed necessary. Identification shall be made with one of the following:

1. Adhesive backed paper or cloth wrap-around markers with clear, heat shrinkable tubing sealed over either type of marker.
2. Self-laminating wrap around type, printable, transparent, permanent heat bonding type thermoplastic film markers.
3. Pre-printed, white, heat-shrinkable tubing.

Each terminal block shall have a molded marking strip attached with screws. The identifying numbers of the terminating conductors, as shown on the plans or on the submittal drawings, shall be engraved in the marking strip.

Outlet, device and junction box installation.--Where exposed threaded steel conduits are connected to an outlet, device, or junction box below switch height, the box shall be a cast metal box. Unless otherwise shown on the plans or specified in these special provisions, all other boxes shall be sheet steel boxes. Weatherproof outlet, device and junction boxes shall have cast metal covers with gaskets. Unless otherwise shown on the plans or specified in these special provisions, all other boxes shall have standard galvanized covers.

All boxes shall finish flush with building walls, ceiling and floors except where exposed work is called for.

Raised device covers (plaster rings) shall be installed on all boxes concealed in concrete, masonry or stud walls.

No unused openings shall be left in any box. Knockout seals shall be installed as required to close openings.

Outlet, device, and junction boxes shall be installed at the locations and elevations shown on the plans or specified herein. Adjustments to locations may be made as required by structural conditions and to suit coordination requirements of other trades.

Boxes in stud walls and partitions shall not be mounted back to back. Through-wall boxes shall not be used.

Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on heavy gauge galvanized steel, snap-in box supports.

Fixture outlet boxes installed in suspended ceilings of gypsum board or lath and plaster construction shall be mounted on 1.52 mm (16-gage) metal channel bars attached to main ceiling runners.

Fixture outlet boxes for pendant-mounted fixtures installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structures above.

Underground pull box installation.--Electrical pull box covers or lids shall be marked "ELECTRICAL." Telephone service pull box covers or lids shall have plain, unmarked covers.

The bottom of pull boxes shall be bedded in 155 mm of clean, crushed rock or gravel and shall be grouted with 40 mm thick grout prior to installation of conductors. Grout shall be sloped to a 25 mm PVC pipe drain hole. Conduit shall be sealed in place with grout.

Top of pull boxes shall be flush with surrounding grade or top of curb. In unpaved areas where pull box is not immediately adjacent to and protected by a concrete foundation, pole or other protective construction, the top of pull box shall be set at plus 30 mm above surrounding grade. Pull boxes shown on the plans in the vicinity of curbs shall be placed adjacent to the back of curb. Pull boxes shown on the plans adjacent to lighting standards shall be placed on the side of foundation facing away from traffic.

Ground rod(s) installation.--The ground rod(s) shall be driven vertically until the top is 155 mm above the surrounding surface. When vertical penetration of the ground rod cannot be obtained, an equivalent horizontal grounding system, approved by the Engineer, shall be installed.

Anchorage.--Hangers, brackets, conduit straps, supports, and electrical equipment shall be rigidly and securely fastened to surfaces by means of toggle bolts on hollow masonry; expansion shields and machine screws, or expansion anchors and studs or standard preset inserts on concrete or solid masonry; machine screws or bolts on metal surfaces; and wood or lag screws on wood construction.

Anchorage devices shall be installed in accordance with the anchorage manufacturer's recommendations.

Mounting heights.--Electrical system components shall be mounted at the following mounting heights, unless otherwise shown on the plans. The mounting height dimensions shall be measured above the finished floor to the bottom of the device or component.

Thermostats	1.1 m, office areas 1.0 m in service bays 1.25 m, hallways
Wall switches	1.0 m
Convenience outlets	510 mm, office areas 1.25 m, all other areas
Electric water cooler outlet	As recommended by the water cooler manufacturer.
Telephone outlets	510 mm, office areas

16.03 SERVICE AND DISTRIBUTION

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing service and distribution equipment in accordance with the requirements of the serving utilities, the details shown on the plans and these special provisions.

Attention is directed to "Utility Connection" in Division 1, "General Requirements," of these special provisions regarding arrangements, permits, licenses, charges, fees and costs for utility connections and extensions.

Related work.--Concrete and reinforcement for service equipment shall conform to the requirements specified for minor work under "Cast-in-Place Concrete," in Division 3, "Concrete and Reinforcement," of these special provisions.

SUBMITTALS.--

Installation details.--The Contractor shall submit complete service installation details to the serving utilities for approval. Prior to submitting installation details to the serving utility, the Contractor shall have said drawings reviewed and stamped "APPROVED" by the Engineer. Submittals shall be approved by the serving utility prior to commencing work.

Product data.--A list of materials and equipment to be installed, manufacturer's descriptive data, and such other data as may be requested by the Engineer shall be submitted for approval.

Manufacturer's descriptive data shall include complete description, performance data and installation instructions for the materials and equipment specified herein. Control and wiring diagrams, rough-in dimensions, and component layout shall be included where applicable. All control and power conductors on the shop drawings shall be identified with wire numbers.

PART 2.- PRODUCTS

Service equipment.--

Service equipment shall be a main switchboard containing a pull section, metering and current transformer compartment, service disconnect switch compartment, a blank section and a distribution section for 120/240-volt, 800-ampere, 3-phase, 4-wire service.

Enclosure.--

Enclosure shall be NEMA 3R enclosure. Exterior shall be 2.66 mm (12-gage) and interior shall be 1.90 mm (14-gage) sheet steel. All screws, latches, hinge pins and similar hardware shall be stainless steel. Circuit breaker shall be operable with the exterior door open. Exterior door shall be lockable with a padlock. Enclosure finish shall be baked enamel or baked thermosetting polyester finish.

Service disconnect switch.--

Service disconnect switch shall 3-pole, 600-volt, 800-ampere frame, 800-ampere trip, molded case circuit breaker with AC magnetic trip adjusted to 4000 amperes. The interrupting capacity of the circuit breaker shall be not less than 65 000 amperes (symmetrical) at 240-volt. Breaker shall be Square D, General Electric, or equal.

Distribution circuit breakers.--

Interrupting rating for circuit breakers in the distribution shall not be less than 65 000 amperes (symmetrical) at 240 volts.

Lightning arrester and surge capacitor.--

Lightning arrester and surge capacitor shall be suitable for use at the service entrance of a 120/240 volt, three-phase, 4-wire, 60 Hz distribution system and shall be mounted inside the service disconnect switch compartment. Lightning arrester shall meet the design tests as required by ANSI/IEEE C62.11 for 10 kA, 4x10 microsec impulses. Lightning arrester and surge capacitor shall be as manufactured by General Electric; Delta; or equal.

Blank Section.--

Blank section shall be a full size switchboard section suitable for a future 800 A manual transfer switch as shown on the plans.

Concrete.--

Concrete for the main switchboard shall be commercial quality concrete, proportioned to provide a workable mix for the intended use; shall contain not less than 285 kilograms of cement per cubic meter.

PART 3.- EXECUTION

Foundation for the main switchboard shall be as shown on the plans.

Installation of service and distribution equipment shall be in accordance with the requirements of the serving utilities as shown on the approved installation details.

16.04 ELECTRICAL EQUIPMENT**PART 1.- GENERAL****SUMMARY.--**

Scope.--This work shall consist of furnishing and installing panelboards, starters, disconnect switches, transformers, and related accessories in accordance with the details shown on the plans and these special provisions.

Related work.--Anchorage devices shall be as specified under "Basic Materials and Methods" elsewhere in this Division 16.

SUBMITTALS.--

Product data.--A list of materials and equipment to be installed, manufacturer's descriptive data, and such other data as may be requested by the Engineer shall be submitted for approval.

Manufacturer's descriptive data shall include complete description, performance data and installation instructions for the materials and equipment specified herein. Control and wiring diagrams, rough-in dimensions, and component layout shall be included where applicable. All control and power conductors on the shop drawings shall be identified with wire numbers.

PART 2.- PRODUCTS**PANELBOARDS.--****Panelboard A.--**

Panelboard A shall be indoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/240-volt, AC panelboard at least 508 mm wide with 300-ampere main circuit breaker, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panel shall be Square D Company; General Electric; or equal.

Panelboard E.--

Panelboard E shall be indoor type, surface-mounted, factory assembled, single-phase, 3-wire, 120/240-volt, AC panelboard at least 508 mm wide with 100-ampere main lugs, insulated neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panel shall be Square D Company; General Electric; or equal.

Panelboard M.--

Panelboard M shall be indoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/240-volt, AC panelboard at least 508 mm wide with 400-ampere main circuit breaker, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panel shall be Square D Company; General Electric; or equal.

Panelboard N.--

Panelboard N shall be indoor type, surface-mounted, factory assembled, single-phase, 3-wire, 120/240-volt, AC panelboard at least 508 mm wide with 225-ampere main lugs, insulated neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panel shall be Square D Company; General Electric; or equal.

Panelboard P.--

Panelboard P shall be outdoor type, surface-mounted, factory assembled, single-phase, 3-wire, 120/240-volt, AC panelboard at least 508 mm wide with 60-ampere main circuit breaker, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panel shall be Square D Company; General Electric; or equal.

Panelboard W.--

Panelboard W shall be indoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/240-volt, AC panelboard at least 508 mm wide with 125-ampere main circuit breaker, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panel shall be Square D Company; General Electric; or equal.

Panelboard S.--

Panelboard S shall be outdoor type, surface-mounted, factory assembled, single-phase, 3-wire, 120/240-volt, AC panelboard at least 508 mm wide with 80-ampere main circuit breaker, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panel shall be Square D Company; General Electric; or equal.

Panelboard T.--

Panelboard T shall be outdoor type, surface-mounted, factory assembled, single-phase, 3-wire, 120/240-volt, AC panelboard at least 508 mm wide with 60-ampere main circuit breaker, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panel shall be Square D Company; General Electric; or equal.

STARTERS.--**Air compressor starters.--**

Air compressor starter shall be combination 3-pole, 240-volt, NEMA Size 1, NEMA rated, line voltage starter and motor circuit protector in a NEMA-1 enclosure. Air compressor starter shall have two, 2-ampere, dual element, 250-volt fuses with 2-pole barrier type fuse base; 240-volt coil, double-break silver contacts and 3 manual reset, non-adjustable thermal overloads, set to trip between 115 and 125 percent of full load motor current, as quoted on the nameplate by the motor manufacturer. Reset button shall be externally operable.

Evaporative cooler starters.--

Evaporative cooler starter shall be combination 3-pole, 240-volt, NEMA Size 0, NEMA rated, line voltage starter and motor circuit protector in a NEMA-1 enclosure. Evaporative cooler starter shall have dual element fuse sized to suit circulating pump, 120-volt coil, double-break silver contacts and 3 manual reset, non-adjustable thermal overloads, set to trip between 115 and 125 percent of full load motor current, as quoted on the nameplate by the blower motor manufacturer. Reset button shall be externally operable.

Fume exhaust fan manual starter.--

Fume exhaust fan manual starter in the Equipment Bays Building shall be 3-pole, 240-volt, manual motor starter with "start" and "stop" pushbutton in a NEMA Type 1 enclosure complete with thermal overloads, set to trip between 115 and 125 percent of full load motor current, as quoted on the nameplate by the motor manufacturer.

Declassification fan manual motor starters, ST11, ST12 and ST13.--

Declassification fan manual motor starter in the Equipment Bays Building shall be 3-pole, 240-volt, manual motor starter with "start" and "stop" pushbutton in a NEMA Type 1 enclosure complete with thermal overloads, set to trip between 115 and 125 percent of full load motor current, as quoted on the nameplate by the motor manufacturer. Manual motor starter shall have one normally open auxiliary contact as shown on the plans.

Exhaust fan contactors.--

Exhaust fan contactors in the Salt Building and Sand Building shall be NEMA rated, NEMA Size 00, 2-pole full voltage contactor with 120-volt coil in a weatherproof enclosure.

CONTROL PANELS.--**Declassification fans control panels.--**

Declassification fans control panel enclosure shall be single exterior hinged door, dust tight NEMA Type 12 containing an electrical mounting panel and door clamps. The enclosure shall be factory prewired in conformance with NEMA Class II, Type C wiring. The following components shall be mounted on the door: Start/Stop pushbuttons; and Pilot light, PL. The following components shall be mounted on the electrical mounting panel: Main circuit breaker, CB; Motor disconnects, MD1, MD2 and MD3; Control disconnect: CD, Starters, ST1, ST2 and ST3; Motor contactors, MC1 and MC2 and terminal blocks, TB. The main circuit breaker shall be externally operable. The door handle shall only open when the main circuit breaker, CB, is in the "OFF" position. Quantity of breakers, contactors and starters per declassification fan control panel shall be as shown on the plans.

All circuit breakers except for CD shall be 240 V with number of poles and trip rating as shown on the plans. Circuit breaker, CD, shall be 120 V. The pilot light, PL, shall be 120 V type LED pilot light. Start/Stop pushbuttons shall be as specified under "Declassification fan pushbutton station" in these special provisions. Terminal blocks shall be as specified under "Terminal Block" in these special provisions. Starters, ST1, ST2 and ST3, shall be 3-pole, 240 V, NEMA Size 0, NEMA rated, line voltage starter. Starter shall have 120-volt coil, double-break silver contacts and manual reset, non-adjustable thermal overloads, set to trip between 115 and 125 percent of full load motor current, as quoted on the nameplate by the motor manufacturer. Motor contactors, MC1 and MC2, shall be 3-pole, 240 V, NEMA Size 0, NEMA rated, full voltage contactor. Contactors shall have 120-volt coil, double break silver contacts and one normally open auxiliary contact as shown on the plans.

All the components mounted inside the enclosure shall be identified with nameplates having the abbreviation used on the plans (for example: CB, MD1, MD2, MD3, ST1, ST2, ST3, MC1 and MC2). The panel, the operating handles of the circuit breakers and the pushbuttons shall have identification nameplate with inscription identifying their functions (DECLASSIFICATION FAN CONTROL PANEL, MAIN, WEST FAN, EAST FAN, START AND STOP). All letters shall have 7 mm height. All nameplates mounted on the door shall be attached to the door using glue.

Declassification fan pushbutton stations.--

Declassification fan pushbutton station shall be "start-stop" heavy duty, oil-tight, two-button unit mounted in a NEMA Type 4 enclosure. The contact shall be rated 60 A make, 6 A break, and 10 A continuous at 120 V, AC and 35 percent power factor. The unit shall have identifying nameplate with inscription "DECLASSIFICATION FANS" in 7 mm height letters.

Circulating pumps control panel.--

Circulating pumps control panel enclosure shall be single exterior hinged door, dust tight NEMA Type 12 containing an electrical mounting panel and door clamps. The enclosure shall be factory prewired in conformance with NEMA Class II, Type C wiring. The following components shall be mounted on the door: Selector switches, SS1, SS2 and SS3. The following components shall be mounted on the electrical mounting panel: Main circuit breaker, CB; Pump disconnects, PD1, PD2 and PD3; Control disconnect, CD; Boiler Control Panel Disconnect,

BCPD; Starters, ST1, ST2 and ST3; Relays, R1 and R2; and terminal blocks, TB. The main circuit breaker shall be externally operable. The door shall only open when the main circuit breaker, CB, is in the "OFF" position. Quantity of breakers and starters in the circulating pumps control panel shall be as shown on the plans.

All circuit breakers except for CD and BCPD shall be 240-volt with number of poles and trip rating as shown on the plans. CD and BCPD shall be 120-volt circuit breakers. All starters shall be 2-pole, 240-V, NEMA Size 0, NEMA rated, line voltage starter. Starter shall have 120-V coil, double-break silver contacts and manual reset, non-adjustable thermal overloads, set to trip between 115 and 125 percent of full load motor current, as quoted on the nameplate by the motor manufacturer. Selector switch shall be rotary action, single-pole, 3-position, 10-A, 120-V switch. Switch contacts shall have an inductive pilot duty rating of 60 A (make), 6 A (break) and 10 A (continuous) at 120 V and 35 percent power factor. Selector switch shall have legend plate marked MANUAL-OFF-AUTO. Relays shall be 120 V (AC) coil, general purpose relay with 2-pole, double-throw, 10 A, 120 V (ac) contacts. Relay shall be enclosed in a clear plastic with 8-pin plug base. Socket for the relay shall be barrier type, 8-contacts relay socket with 10 A contacts and screw terminals.

All the components mounted inside the enclosure shall be identified with nameplates having the abbreviation used on the plans (CB, PD1, PD2, PD3, CD, BCPD, ST1, ST2, ST3, R1 and R2). The panel, the operating handles of the circuit breakers and the selector switches shall have identification nameplate with inscription identifying their functions (CIRCULATING PUMPS CONTROL PANEL, BOILER, PUMP 1, PUMP 2, PUMP 3 and CONTROL). All letters shall have 7 mm height. All nameplates mounted on the door shall be attached to the door using glue.

Terminal Blocks.--

Terminal block shall be 30 A, 300 V, molded plastic with two or more mounting holes and two or more terminals in each cast block. The molded plastic shall have a high resistance to heat, moisture, mechanical shock, and electrical potential and shall have a smooth even finish. Each block shall have a molded marking strip attached with screws. Terminal blocks shall have tubular, high pressure clamp connectors.

SWITCHES.--

Evaporator unit disconnect switch.--

Evaporator unit disconnect switch shall be 2-pole, 240-volt, AC, fused, heavy duty safety switch in a NEMA Type 1 enclosure. The ampere rating and fuses shall be sized to suit the evaporator unit of the air conditioning unit furnished.

Condenser unit disconnect switch.--

Condenser unit disconnect switch shall be 2-pole, 240-volt, AC, fusible, heavy duty safety switch in a NEMA Type 1 enclosure. The ampere rating and fuses shall be sized to suit the condenser unit of the air conditioning unit furnished.

Door operator and roll-up door disconnect switches.--

Door operator and roll-up door disconnect switches shall be 2-pole, 240-volt, AC, 30-ampere, non-fusible, heavy duty safety switches in NEMA-1 enclosures with provision for padlocking in the "OFF" position.

Evaporative cooler disconnect switches.--

Evaporative cooler disconnect switch shall be 3-pole, 240-volt, AC, 30-ampere, non-fusible, heavy duty safety disconnect switch in NEMA Type 3R enclosure.

Exhaust evacuation system disconnect switch.--

Exhaust evacuation system disconnect switch shall be 2-pole, 240-volt, AC, 30-ampere non-fusible, heavy duty safety switch in a NEMA Type 1 enclosure.

Fume exhaust fan manual motor starting switch.--

Fume exhaust fan manual motor starting switch in the Mechanic's shop shall be single-pole, 120-volt, fractional horsepower motor manual starter with toggle type operator in a NEMA Type 1 enclosure complete with thermal overloads.

Fume exhaust fan disconnect switch.--

Fume exhaust fan disconnect switch in the Equipment Bays Building shall be 3-pole, 240-volt, nonfusible heavy duty disconnect switch in a NEMA Type 1 enclosure.

Crane disconnect switch.--

Crane disconnect switch shall be 3-pole, 240-volt, AC, 30-ampere, non-fusible, heavy duty safety switch in a NEMA-1 enclosure with provision for padlocking in the "OFF" position.

Exhaust fan disconnect switches.--

Exhaust fan disconnect switches in the Sand Storage and Salt Storage Buildings shall be single-pole, 20 A, 120/277-volt, AC, snap switches in a weatherproof non-metallic type enclosures.

Radiant heater disconnect switch.--

Radiant heater disconnect switch shall be 2-pole, 240-volt, AC, 30-ampere, non-fusible, heavy duty safety switch in a NEMA-1 enclosure.

MISCELLANEOUS MATERIALS.--**Trailer hook-up pedestal.--**

Trailer hook-up pedestal shall be a meter pedestal suitable for outdoor use, factory assembled, single-phase, 120/240-volt, AC pedestal with 100 ampere main circuit breaker, 50 ampere, 2-pole circuit breaker and a NEMA 14-50R, 50A 125/250 V receptacle outlet. Pedestal base shall be configured such that the meter height is 914 mm above grade. Pedestal shall be suitable for underground conduit entry with insulated groundable neutral and hinged door. Pedestal shall include a telephone terminal mounting bracket. Pedestal shall have a blank meter face. Shorting bars shall be provided for bypassing the meter socket jaw. Pedestal shall be Square D Company, Hitch-N-Post series; Cutler Hammer, Power outlet panel series; or equal.

Telephone panel and radio panel.--

Telephone panel and radio panel shall be a surface mounted telephone cabinet, at least 300 mm X 600 mm X 150 mm deep, NEMA Type 1 panel with hinged cover. Panel shall be complete with 21 mm plywood backboard.

Declassification fans warning signs.--

Declassification fans warning signs shall be sheet steel, not less than 1.2 mm thick (18-gage) with a baked enamel coating and shall have red letters, 50 mm in height, on a white background.

Nameplates.--

Nameplates shall be laminated phenolic plastic with white core and black front and back. Nameplate inscription shall be in capitals letters etched through the outer layer of the nameplate material.

Device plates.--

Device plates shall be laminated phenolic plastic with white core and black front and back. Device plates inscription shall be in capitals letters etched through the outer layer of the nameplate material.

Plywood backing board.--

Plywood backing board for mounting electrical or telephone equipment shall be 19 mm, APA plywood panels, C-D PLUGGED and touch-sanded, Exposure 1.

PART 3.- EXECUTION**INSTALLATION.--**

Plywood backing board.--Plywood backing board shall be securely fastened to walls or other vertical framing. Surface to be coated shall be cleaned of all dirt, excess materials, of filler by hand cleaning.

Plywood backing board exposed surfaces shall receive the following paint system: one prime coat, alkyd, interior wood primer and 2 finish coats, acrylic, interior enamel, semi-gloss. Color shall match surrounding surfaces, or shall be as directed by the Engineer.

Coatings shall be applied in accordance with the manufacturer's instructions. Each coat shall be applied to a uniform finish, free of skips, brush marks, laps or other imperfections.

Existing panelboards.--Provide new circuit breakers, where required to match existing type unless otherwise shown on the plans. Provide mounting hardware, bus straps, and related materials for proper circuit breaker installation. Provide new panelboard identification nameplate with designation as shown for each panelboard. Remove existing nameplates where applicable. Provide new typewritten circuit directory reflecting changes made under the Contract.

Panelboard installation.--Set cabinets plumb and symmetrical with building lines. Train interior wiring as specified under "Conductor and Cable Installation" in "Basic Materials and Methods" of these special provisions. Touch-up paint any marks, blemishes, or other finish damage suffered during installation. Replace cabinets, doors or trim exhibiting dents, bends, warps or poor fit which may impede ready access, security or integrity.

Mounting height shall be 1.67 meters to the highest circuit breaker handle, measured above the finished floor.

Where "Space" is indicated on the plans, branch connectors, mounting brackets, and other hardware shall be furnished and installed for future breaker.

A typewritten directory under transparent protective cover shall be provided and set in metal frame inside each cabinet door. Directory panel designation for each circuit breaker shall include complete information concerning equipment controlled, including room number or area designated on the plans.

Equipment identification.--Equipment shall be identified with nameplates fastened with self-tapping, cadmium-plated screws or nickel-plated bolts.

Nameplate inscriptions shall read as follows:

1. Inscriptions for panelboards shall include designation, voltage, and phase of supply and shall read in the following example: PANEL M, 120/240 V, 225 A, 3-PHASE, 4-WIRE;
2. Inscription for disconnect switches and pushbuttons shall be the respective device it is controlling and shall read in the following example: OVERHEAD DOOR;
3. Inscription for lighting control stations shall be the panel designation as shown in the plans and shall read in the following example: BAYS LIGHTING CONTROL PANEL.

Device plates.--Device plates shall be attached on the wall beside the designated equipment with self-tapping cadmium-plated screws or nickel-plated bolts.

Declassification fans warning sign.--Declassification fans warning sign with the message as shown on the plans shall be fastened to the wall at locations as shown on the plans with at least six anchorage devices.

16.05 LIGHTING

GENERAL.--This work shall consist of furnishing, installing and connecting all lighting equipment in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive information, photometric curves, catalog cuts, and installation instructions shall be submitted for approval. Wiring diagrams for lighting control station and lighting control panels shall be submitted for approval.

PRODUCTS.--

Lighting fixture lamps.--

Lighting fixture lamps shall be type and size as shown on the plans. Lamps shall be General Electric, Phillips, Sylvania, or equal. Fluorescent lamps, unless otherwise noted, shall be 4100K tri-phosphor with a CRI of 70 or greater.

Ballasts.--

All fixtures shall be equipped with high power factor ballasts suitable for the line voltage and for the type, size and number of lamps required by the fixture. Fluorescent ballasts shall be UL Listed, Class P and ETL Certified ballasts with sound rating A. Fluorescent ballasts shall be high-frequency electronic ballasts with power factor greater than 0.95, nominal ballast factor of 0.88 unless specified otherwise, total harmonic distortion less than 20 percent, crest factor less than or equal to 1.7, complying with ANSI C 62.41 Category A for surge protection, and FCC Part 18 for interference.

Lighting fixtures.--

Lighting fixtures shall be as shown on the plans and as specified herein. Outdoor luminaires shall be listed and labeled "Fixture Suitable For Wet Locations."

F1.--

Ceiling-mounted fluorescent fixture with one 32-watt T8 lamp, electronic ballast and one-piece, clear acrylic, wrap-around diffuser. The fixture shall be Columbia Lighting, Apollo RO4 Series; Lithonia, CB140 Series; or equal.

F2.--

Stem or ceiling mounted fluorescent fixture with two 32-watt T8 lamps, electronic ballast and one piece clear prismatic acrylic wraparound. The fixture shall be Lithonia, 2LB Series; Columbia Lighting, Apollo AWW 4 Series; or equal.

F3.--

Stem mounted heavy duty industrial fluorescent fixture with two 59-watt T8 lamps, electronic ballast and white baked enamel ribbed reflector, complete with end plates. The fixture shall be Lithonia, AF series; Columbia Dynamo KL series; or equal.

F4.--

Similar to F3 except F4 shall be bracket mounted.

F5.--

Ceiling-mounted fluorescent fixture with two 32-watt T8 lamps and listed suitable for wet locations. Ballast shall be rated for 0°C or lower. Housing shall have be white, ABS slow burning thermoplastic. Fixture shall have neoprene gasket around the perimeter and secured with stainless steel lens latches. Lens shall be high impact clear acrylic.

F6.--

Recessed, compact, open reflector fluorescent downlight fixture two 13-watt twin tube compact lamps, integral ballast and aluminum lampholder housing. Reflector shall be precision spun 0.050 aluminum. Fixture shall have grooved black baffle. Maximum ceiling opening shall be 203 mm in diameter. Fixture shall have two horizontally mounted plug-in sockets. The fixture shall be Capri Lighting, PL-5 Series; Lithonia, Gotham Downlighting Series; or equal.

F7.--

Wall mounted, outdoor type fluorescent fixture with one 13-watt twin tube lamp. The fixture shall be Daybrite Lighting, Zircon Series; Lithonia Lighting, TWL Series; or equal.

H1.--

Pole mounted, 250-watt, 120-volt, high pressure sodium, cutoff luminaire with integral ballast. The luminaire shall fit at the end of the arm as shown on the plans. The luminaire shall be General Electric, Catalog No. M-250R2; ITT Series 25; or equal.

Pole for luminaire shall be round tapered galvanized steel and have 331 MPa minimum yield strength. The pole shall be able to withstand stresses produced by steady state wind with velocity of 40 m/s. Pole shall have hand hole with cover plate, base plate and all necessary hardware.

MH1.--

Premium enclosed refractor, acrylic reflector, industrial type, pendant mounted, 250-watt, 120-volt, metal halide luminaire with integral ballast and pulse start system. Fixture housing shall be rugged heavy-duty die cast aluminum with white polyester powder finish. Enclosed optical shall be clear tempered glass lens and shall be hinged and attached for easy maintenance. The fixture shall be Lithonia, THR Series; Stingray 250 W MH; or equal.

MH2.--

Flood light luminaire, 175-watt, 120-volt, metal halide luminaire with integral ballast and yoke mount bracket. The fixture shall be Ruud, MFS4 Series; GE, Powerflood Series; or equal.

MH3.--

Outdoor, wall mounted, 175-watt, 120-volt, metal halide luminaire with integral ballast. The fixture shall be Holophane Wallpack Series; Lithonia, TWH Series; or equal.

MH4.--

Outdoor, ceiling mounted, 175-watt, 120-volt, metal halide luminaire with integral ballast. The fixture shall be Daybrite CL1 Series; Lithonia, VR4C Series; or equal.

MH5.--

Outdoor, wall mounted, 100-watt, 120-volt, metal halide luminaire with integral ballast and built-in photoelectric control unit. The fixture shall Holophane, Wallpackette Series; Lithonia, TWL Series; or equal.

MH6.--

Outdoor, wall mounted, 175-watt, 120-volt, metal halide luminaire with integral ballast and built-in photoelectric control unit. The fixture shall be Holophane, Wallpack Series; Lithonia, TWH Series; or equal.

MH7.--

Outdoor, wall mounted, 250-watt, 120-volt, metal halide luminaire with integral ballast. The fixture shall be Holophane, Wallpack Series; Lithonia, TWH Series; or equal.

Fused splices.--

Fused splices shall be Buss, Elastimold, or equal; with standard midget, ferrule, 5-ampere, 120-volt, slow blowing fuses.

Photoelectric unit, PEC.--

Photoelectric unit shall be cadmium sulfide photoelectric control with capacity of 1800-watt inductive or fluorescent load, mounting adapter, and EEI-NEMA twist lock receptacle; Fisher-Pierce, Ripley, or equal.

Lighting control stations, LCS1 and LCS2.--

Lighting control stations, LCS1 and LCS2, shall be shall consist of a lighting contactor, time clock, terminal block, snap switches, selector switch and pilot light in a surface mounted NEMA Type 12 enclosures with a hinged door.

Bays lighting control panel.--

Bays lighting control panel in the Equipment Building shall consist of a time clock, selector switch, lighting contactors, and terminal block in a surface mounted NEMA Type 12 enclosure with a hinged door.

Indoor lighting control panel.--

Indoor lighting control panel shall consist of a time clock, lighting contactors, selector switch and terminal block in a surface mounted NEMA Type 12 enclosure with a hinged door.

Time clock , TC.--

Time clock shall be a 120-volt, AC, solid state programmable timer with power on-off and manual override. Time clock shall be able to program for a minimum of 3 independent schedules for any days of the week, in addition to

being able to skip selected days. Time clock shall have a single-pole, double-throw output contact and shall be rated at not less than 16-ampere, 120-volt, AC.

Lighting contactors, LC, LC1, LC2, LC3 and LC4.--

Lighting contactor shall be electrically held, lighting contactor with 120-volt AC coil and 20-ampere, double-break, silver alloy contacts; Square D Company, I.T.E., General Electric, or equal. Number of poles for each contactor shall be as shown on the plans.

Selector switch, SS.--

Selector switch shall be rotary action, single-pole, 3-position, 10-ampere, 120-volt switch. Switch contacts shall have an inductive pilot duty rating of 60 amperes (make), 6 amperes (break) and 10 amperes (continuous) at 120 volts and 35 percent power factor. Selector switch shall have legend plate marked MANUAL-OFF-AUTO.

Pilot light, PL.--

Pilot light shall be panel mounted, heavy duty, oil tight indicating light with 120-volt, AC, LED lamp with green domed cap.

Snap switches.--

Snap switches in the lighting control stations, LCS1 and LCS2, shall be as specified elsewhere in these special provisions.

Terminal block, TB.--

Terminal block shall be 30-ampere, 300-volt, molded plastic with two or more mounting holes and two or more terminals in each cast block. The molded plastic shall have a high resistance to heat, moisture, mechanical shock, and electrical potential and shall have a smooth even finish. Each block shall have a molded marking strip attached with screws. Terminal blocks shall have tubular, high pressure clamp connectors.

Concrete.--

Concrete shall be as specified under "Cast-In-Place Concrete" in Division 3, of these special provisions. The concrete shall be commercial quality portland cement concrete containing not less than 337 kilograms of cement per cubic meter.

FABRICATION.--

Component mounting.--All lighting control stations and lighting control panels shall be factory pre-wired control panels in accordance with NEMA class II, type C wiring.

The following electrical components shall be mounted on the back panel of the lighting control stations, LCS1 and LCS2 and on the back panel of the lighting control panels:

- Terminal Block
- Lighting contactors
- Time clock

The following electrical components shall be mounted on the hinged door of the lighting control station:

- Selector switch
- Pilot light
- Snap switches

The selector switch shall be mounted on the hinged door of lighting control panels.

All the components mounted inside the lighting control stations and lighting control panels shall be identified with nameplates having the abbreviation used on the plans (TC, SS, LC, LC1, LC2, PL and SS). The panel, the operating handles of the circuit breakers, snap switches and the selector switches shall have identification nameplate with inscription identifying their functions (for example: BAYS LIGHTING CONTROL PANEL, AREA LIGHT, BUILDING EXTERIOR LIGHT). All letters shall have 7 mm height. All nameplates mounted on the door shall be attached to the door using glue.

EXECUTION.--

LIGHTING FIXTURES.--Lighting fixtures shall be mounted securely in accordance with the manufacturer's recommendations. Mounting methods shall be suitable for the particular type of ceiling or support at each location.

The Contractor shall provide all supports, hangers, spacers, channels, fasteners and other hardware necessary to support the fixtures.

Fixtures shall be set at the mounting heights shown on the plans, except heights shown shall be adjusted to meet conditions.

BALLASTS.--All fluorescent fixtures shall be equipped with high power factor ballasts suitable for the line voltage and for the type, size and number of lamps required by fixture.

All ballasts used in unheated areas inside the building shall be -20°C ballasts or less.

POLE MOUNTED LUMINAIRES.--In the pull box adjacent to each pole for luminaire, H1, a fused splice connector shall be installed in each ungrounded conductor between the line and the ballast. The connector shall be readily accessible in the pull box and shall be insulated and made waterproof in accordance with the splice connector manufacturer's recommendations.

Concrete foundations shall be as shown on the plans. Anchor bolts or devices shall be accurately located and positioned to match the holes in the pole base plates. Pole and luminaire orientation shall be as indicated on the plans.

The poles for pole mounted type fixtures shall be mounted rigidly and securely on the foundations as recommended by the fixture and pole manufacturer.