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**STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION**

**NOTICE TO CONTRACTORS
INSTRUCTIONS TO BIDDERS
GENERAL CONDITIONS
AND
SPECIAL PROVISIONS
FOR
BUILDING CONSTRUCTION**

IN

**KERN COUNTY IN BAKERSFIELD AT THE BAKERSFIELD
SUBSHOP AT 1200 OLIVE DRIVE**

CONTRACT NO. 06-3670U4

06-Ker-L5505-

Bids Open: January 8, 2002

Dated: November 19, 2001

OSD

IMPORTANT SPECIAL NOTICES

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General Condition State(11-09-98.DOC

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

CONTRACT NO. 06-3670U4

Contract No. 06-3670U4

06-Ker-L5505

Sealed proposals for the work shown on the plans entitled:

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT
PLANS FOR BUILDING CONSTRUCTION IN KERN COUNTY IN BAKERSFIELD
AT THE BAKERSFIELD SUBSHOP AT 1200 OLIVE DRIVE**

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 January 8, 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 IN KERN COUNTY IN
BAKERSFIELD AT THE BAKERSFIELD SUBSHOP AT 1200 OLIVE DRIVE**

General work description: REMODEL OFFICE BUILDING AND CONSTRUCT NEW SUBSHOP BUILDING

The foregoing is a general description of the work to be performed and the Department of Transportation does not expressly or by implication agree that the actual items or amount of work will correspond therewith.

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

No pre-bid 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, or Class B license or a combination of Class C licenses which constitutes a majority of 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 accordance with Business and Professions Code, Section 7029.1.

The Department of Transportation reserves the right to reject any or all bids.

Each bid shall be presented under sealed cover and accompanied by one of the following forms of bidder's security:

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

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

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 accordance 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 accordance with Section 6107 of the Public Contract Code. (See Divisions 0.028 and 0.03 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.

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.

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 November 19, 2001

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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

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

JANUARY 1993

Issued by
DEPARTMENT OF TRANSPORTATION



INSTRUCTIONS TO BIDDERS

SECTION 1

PROPOSAL REQUIREMENTS AND CONDITIONS

1-1.01 GENERAL.—The bidder shall carefully examine the instructions contained herein and satisfy himself as to the conditions with which he 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 accordance with the laws of this State and any bidder or contractor not so licensed is subject to the penalties imposed by such laws.

Attention is also directed to the provisions of Public Contract Code Section 10164, which provides as follows:

"10164. In all state projects where federal funds are involved, no bid submitted shall be invalidated by the failure of the bidder to be licensed in accordance with the laws of this state. However, at the time the contract is awarded, the contractor shall be properly licensed in accordance with the laws of this state. The first payment for work or material under any contract shall not be made by the Controller unless and until the Registrar of Contractors certifies to the Controller that the records of the Contractors State License Board indicate that the contractor was properly licensed at the time the contract was awarded. Any bidder or contractor not so licensed shall be subject to all legal penalties imposed by law, including, but not limited to, any appropriate disciplinary action by the Contractors State License Board. The department shall include a statement to that effect in the standard form of prequalification questionnaire and financial statement. Failure of the bidder to obtain proper and adequate licensing for an award of a contract shall constitute a failure to execute the contract as provided in Section 10181 and shall result in the forfeiture of the security of the bidder."

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 such investigations subject to and upon the conditions hereinafter set forth. Such investigations are made only for the purpose of study and design.

Where there has been prior construction by the Department or other public agencies within the project limits, records of such 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. Such 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 such prior projects.

Inspection of such 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 such investigations or records are representative of those existing in or throughout such 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 such 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 his 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 provided.

The proposal shall be submitted intact in the bound book 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, P.O. Box 942874, Sacramento, California 94274-0001.

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 1/2 of one percent of his total bid, in accordance with the Subletting and Subcontracting Fair Practices Act, commencing at Section 4100 of the Public Contract Code. The bidder's attention is invited to other provisions of said 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 such bidder, or any employee of such bidder who has a proprietary interest in such 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 the bound book may be used. Upon request, "Bidder's Bond" forms may be obtained from the Department.

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 said 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 said Section 10232.

The statement required by said 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 time fixed in the public notice for the opening of bids only by written request for the withdrawal of the bid filed with the Office Engineer, Division of Construction. The request shall be executed by the bidder or his duly authorized representative. The withdrawal of a bid shall not prejudice the right of a bidder to file a new bid. Whether or not bids are opened exactly at the time fixed in the public notice for opening bids, a bid will not be received after that time, nor may any bid be withdrawn after the time fixed in the public notice for the opening of bids.

1-1.10 PUBLIC OPENING OF PROPOSALS.—Proposals will be publicly opened and read 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 such 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 such 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 his bid, 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. Such award, if made, will be made within 30 days after the opening of the proposals. If the lowest responsible bidder refuses or fails to execute the contract, the Director may award the contract to the second lowest responsible bidder. Such award, if made, will be made within 45 days after the opening of proposals. If the second lowest responsible bidder refuses or fails to execute the contract, the Director may award the contract to the third lowest responsible bidder. Such award, if made, will be made within 60 days after the opening of the proposals. The above time periods within which the award of contract may be made are subject to extension for such further period as may be agreed upon in writing between the Department and the bidder concerned.

2-1.02 RETURN OF BIDDERS' SECURITIES.—The bidders' securities accompanying the proposals of the first, second and third lowest responsible bidders will be retained until the contract has been fully executed, after which all such bidders' securities, except bidders' bonds and any bidders' securities which have been forfeited, will be returned to the respective bidders whose proposals they accompany. The bidders' securities, 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.

Each of the 2 bonds shall be in a sum equal to at least one-half of the contract price, except as otherwise provided in Section 3248 of the Civil Code when the total amount payable is \$5,000,000 or more and except as otherwise provided in Section 30154 of the California Toll Bridge Authority Act.

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 such 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 his authorized representative, specifying that the bidder will refuse to execute the contract if presented to him. The filing of such 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.—Whenever 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 sex.

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 accordance 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, copartnership, association, or any combination thereof, submitting a proposal for the work, acting directly, or through a duly authorized representative.

1-1.05 CONTRACT.—The agreement relating to the work to be performed, the labor, materials, and equipment to be furnished, and the payment to be made therefor. The contract incorporates all of the contract documents. The contract documents shall include the notice to contractors, the instructions to bidders, the proposal, plans, General Conditions, special provisions, contract bonds, addenda, and supplementary agreements. Supplementary agreements are written agreements providing for alterations, amendments, or extensions to the contract and include contract change orders.

1-1.06 CONTRACTOR.—The individual, firm, copartnership, corporation, association, or any combination thereof, who has entered into a contract with the Department of Transportation.

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 Deputy Director Transportation Engineering, acting either directly or through properly authorized agents, such 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 New Technology, Materials and Research 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 New Technology, Materials and Research, located at 5900 Folsom Boulevard, (P.O. Box 19128), Sacramento, CA 95819.

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, showing the location, character, dimension, and details of the work. 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 him.

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.

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
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
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

SECTION 2

CONTROL AND SCOPE OF THE WORK

2-1.01 AUTHORITY OF ENGINEER.—The contract shall be performed in a manner satisfactory to the Engineer who 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 shall have authority to enforce and make effective such 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 accordance 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 such 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. Such 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 said 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 such approval. 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 such 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 not exceed 22 inches by 36 inches.

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 such 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 accordance 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. Such 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 such 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 such 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 him from responsibility for errors in the submittals. A failure by the Contractor to identify in his 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 such 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, such 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 such 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 accordance 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 his 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 his 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 such 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, said 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.

Said 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 his 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, he shall be discharged immediately on the requisition of the Engineer, and such person shall not again be employed on the work.

2-1.09 INSPECTION.—The Contractor shall at all times permit the Engineer and his authorized agents to inspect the work or any part thereof. He shall maintain proper facilities and provide safe access for such 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 such work is in readiness for inspection and testing. Should any such 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, he shall give notice to the Engineer of such intention 48 hours prior to performing such work, or such 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 him for such 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.

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; 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 such 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 said proposal is submitted or if such a 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 such proposal and the Department reserves the right to make such changes without compensation to the Contractor under the provisions of this section.

The Contractor shall continue to perform the work in accordance 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, such cost reduction proposal shall be deemed rejected.

The Engineer will determine the acceptability of a cost reduction proposal and the estimated net savings in construction costs from the adoption of all or any part of such proposal. In determining the estimated net savings, the right is reserved to disregard the schedules of values if, in the judgment of the Engineer, such 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 such action 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 such proposal. Where such a condition is imposed, the Contractor shall indicate his acceptance thereof in writing, and such acceptance shall constitute full authority for the Department to deduct amounts payable to the Department from any monies 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 such acceptance will be by a contract change order, which shall specifically state that it is executed pursuant to this Section 2-1.11. Such change order shall incorporate the changes in the plans and special provisions which are necessary to permit the cost reduction proposal or such 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 said 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 said 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 said 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 such proposal will be eligible for compensation pursuant to this section, and in that case, only as to those contracts awarded to him prior to submission of the accepted cost reduction proposal and as to which such 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 such order. Changes or deviations from the contract shall not be made without authority in writing from the Engineer, and any 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 such 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 he considers should be allowed for making the requested change. Failure to request additional time when submitting such estimate, or failure to submit such 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 accordance with 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 accordance with 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 accordance with 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 he differs from the Engineer's estimate of decreased cost, otherwise the decision of the Engineer to deduct his 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 his 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 such 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. Such 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 such 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 him 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 such 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 such equipment, and to return it to the source. If such equipment is not moved by its own power, then loading and transportation costs will be paid. 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 such 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 such work is performed by an authorized subcontractor, approved in accordance 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 said work including all markups specified in this Section 3-1.01E(4). Said 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 such 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 he investigated all possible means of obtaining such work at prevailing market values and that the excess cost could not be avoided by him. 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 accordance 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 such 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, such 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 such 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 accordance 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 such 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 accordance with the referenced specification and furnished by the Contractor at his expense. The number of such 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 such control. The test methods used for such quality control testing shall be as determined by the Contractor. The results of such testing shall be made available to the Engineer upon request. Such 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 such a certificate 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.

All 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 such material not conforming to such 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 RESPONSIBILITY

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 said 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 such law 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 such law, rule, or regulation, whether by himself or his agents or employees.

5-1.01A HOURS OF LABOR.—Eight hours labor constitutes a legal day's work. The Contractor shall forfeit, as a penalty to the State of California, \$25 for each workman employed in the execution of the contract by the Contractor or any subcontractor under him for each calendar day during which such workman 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 said Section 1815.

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 insure 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 state contractors and subcontractors having a construction contract or subcontract 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 shall comply with Labor Code Sections 1774 and 1775. Pursuant to said Section 1775 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 him or her or by any subcontractor under him or her 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 Contractor's mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages, or the previous record of the Contractor in meeting his or her prevailing wage obligations, or a Contractor's willful failure 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 had knowledge of his or her obligations under the Labor Code. In addition to said penalty and pursuant to said Section 1775, the difference between such 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.

Pursuant to the provisions of Section 1773 of the Labor Code of the State of California, 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 said Code, apprenticeship or other training programs authorized by Section 3093 of said 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. These wage rates are included in the book entitled "Proposal and Contract" for the project.

The wage rates determined by the Director of Industrial Relations included in the Proposal and Contract 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 included in the Proposal and Contract 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. Changes, if any, to the general prevailing wage rates will be available at the Department of Transportation, Plans and Bid Documents, Room 0200, Transportation Building, 1120 N Street, P.O. Box 942874, Sacramento, California 94274-0001, Telephone No. (916) 654-4490, and at the Labor Compliance Office in the district offices of the Department of Transportation.

The prevailing wage rates to be posted at the job site will be furnished by the Department.

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 his 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 of Section 1773.8 of the Labor Code. The Contractor shall make travel and subsistence payments to each workman, needed to execute the work, in accordance with the requirements in said Section 1773.8.

5-1.01E PAYROLL RECORDS.—The Contractor's attention is directed to the provisions of Labor Code Section 1776, a portion of which is quoted below. Regulations implementing said Section 1776 are located in Sections 16016 through 16019 and Sections 16207.10 through 16207.19 of Title 8, California Code of Regulations. The Contractor shall be responsible for compliance by his subcontractors.

"(a) Each contractor and subcontractor shall keep an accurate payroll record, 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.

"(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 copies thereof made; provided, however, that 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) Each contractor 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.

"(d) 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 such a manner 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 performing the contract shall not be marked or obliterated.

"(e) 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.

"(f) In the event of noncompliance with the requirements of this section, the contractor shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respects the contractor must comply with this section. Should noncompliance still be evident after the 10-day period, the contractor 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."

The Contractor shall submit weekly a copy of all payrolls to the Engineer. The copy shall be accompanied by a statement signed by the employer or his agent indicating that the payrolls are correct and complete and that the wage rates contained therein are not less than those determined by the Department of Transportation. The Contractor and subcontractor shall use Department of Transportation certification set forth on Form HC-348 or the same certification appearing on the reverse side of optional Department of Transportation Form HC-347, or any form with identical wording. The Contractor shall be responsible for the submission of copies of payrolls of all subcontractors.

The payrolls and payroll records shall contain the full name, address and social security number of each employee, his 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 his name appears.

If, on or before 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 such 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 this 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 his 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. Excavation for any trench 5 feet or more in depth shall not begin until the Contractor has received approval, from the Engineer, of the Contractor's detailed plan for worker protection from the hazards of caving ground during the excavation of such trench, and any design calculations used in the preparation of such detailed plan. Such detailed plan shall show the details of the design of shoring, bracing, sloping or other provisions to be made for worker protection during such excavation. No such plan shall allow the use of shoring, sloping or a protective system less effective than that required by the Construction Safety Orders of the Division of Occupational Safety and Health. If such plan complies with the shoring system standards established by the Construction Safety Orders, the plan shall be submitted at least 5 days before the Contractor intends to begin excavation for the trench. If such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California, and the plan and design calculations shall be submitted at least 3 weeks before the Contractor intends to begin excavation for the trench.

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 insure 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, 525 Golden Gate Avenue, San Francisco, California, 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 of Section 1860 of the Labor Code, the Contractor will be required to secure the payment of workers' compensation to his employees in accordance with the provisions of 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 such provisions before commencing the performance of the work of this contract."

Said 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 said 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 said 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 said authorizations. In the event the obtaining of said 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 said 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. All permits and licenses shall be obtained in sufficient time to prevent delays to the work.

5-1.01O ASSIGNMENT OF ANTITRUST ACTIONS.—The Contractor's attention is directed to the following provision of Public Contract Code 7103.5 and Government Code Sections 4553 and 4554, which shall be applicable to the Contractor and his 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.

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 such laws.

Said 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 his assignees with reference to amounts withheld for such penalties or forfeitures; and that such 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 such penalties and forfeitures is not a prerequisite for such suits and such claims will not be considered.

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 such objects from damage. If such objects are damaged by reason of the Contractor's operations, they shall be replaced or restored at the Contractor's expense.

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 such temporary repairs as are necessary to restore to service any such damaged facility. The cost of such repairs shall be borne by the Contractor and may be deducted from any moneys due or to become due the Contractor under the contract.

5-1.03 RESPONSIBILITY FOR DAMAGE.—The State and all officers and employees thereof connected with the work, including but not limited to the Director and the Engineer, shall not be answerable or accountable in any manner: for any loss or damage that may happen to the work or any part thereof; for any loss or damage to any of the materials or other things used or employed in performing the work; for injury to or death of any person, either workmen or the public; or for damage to property from any cause which might have been prevented by the Contractor, or his workmen, or anyone employed by him.

The Contractor shall be responsible for any liability imposed by law and for injuries to or death of any person including but not limited to workmen and the public, or damage to property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance.

The Contractor shall indemnify and save harmless the State of California and all officers and employees thereof connected with the work, including but not limited to the Director and the Engineer, from all claims, suits or actions of every name, kind and description, brought forth, or on account of, injuries to or death of any person including but not limited to workmen and the public, or damage to property resulting from the performance of a contract, except as otherwise provided by statute. The duty of the Contractor to indemnify and save harmless includes the duties to defend as set forth in Section 2778 of the Civil Code.

With respect to third party claims against the Contractor, the Contractor waives any and all rights to any type of express or implied indemnity against the State, its officers or employees.

It is the intent of the parties that the Contractor will indemnify and hold harmless the State, its officers and employees from any and all claims, suits or actions as set forth above regardless of the existence or degree of fault or negligence on the part of the State, the Contractor, the subcontractor or employee of any of these, other than the active negligence of the State, its officers or employees.

In addition to any remedy authorized by law, so much of the money due the Contractor under and by virtue of the contract as shall be considered necessary by the Department may be retained by the State of California until disposition has been made of such suits or claims for damages as aforesaid.

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

1. The Department will give the Contractor 30 days notice of its intention to retain funds from any partial payment which may become due to the Contractor prior to acceptance of the contract. Retention of funds from any payment made after acceptance of the contract may be made without such prior notice to the Contractor.

2. 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 these General Conditions.

3. If the Department has retained funds and it is subsequently determined that the State is not entitled to be indemnified and saved harmless by the Contractor in connection with the matter for which such retention was made, the Department shall be liable for interest on the amount retained at the legal rate of interest for the period of such retention.

The Department will consider proposals by the Contractor to enter into special arrangements, such as posting securities or bonds acceptable to the Department, in lieu of the retention of funds. Such special arrangements shall be in writing, and approved by the surety on the performance bond and by the surety on the payment bond.

No funds will be retained or continue to be retained under the following terms and conditions:

A. The Contractor establishes to the satisfaction of the Department that at the time of the accident or occurrence giving rise to a claim or lawsuit against the State, the Department or its officers and employees, he had in full force and effect the following Bodily Injury Liability and Property Damage Liability insurance:

(1) Contractual Liability Insurance for liability assumed by the Contractor under agreement with the State of California. Such insurance as is afforded by the policy to the Contractor for Contractual Property Damage Liability insurance shall include coverage for property damage caused by blasting, collapse, structural injuries or damage to underground utilities. The policy shall not contain the so-called "x" "c" "u" exclusions. The minimum limits of liability for this insurance shall be as indicated in either (a) or (b) as follows:

(a)	Bodily Injury Liability	\$ 500,000 (Each Person)	\$ 1,000,000 (Each Occurrence)
	Property Damage Liability	\$ 250,000 (Each Occurrence)	\$ 500,000 (Aggregate)

(b)	A single limit for Bodily Injury Liability and Property Damage Liability combined of	\$ 500,000 (Each Occurrence)	\$ 500,000 (Aggregate)
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(2) An Additional Insured Endorsement to the Contractor's Liability insurance policy naming the State, the Department and its officers and employees as additional insureds in the form approved by the Department shall also be furnished. A copy of the approved endorsement form may be obtained from the Department of Transportation, 1120 N Street, Sacramento, California, 94274-0001, and at the offices of the District Directors of Transportation in the various Transportation Districts.

B. Evidence of insurance (Contractual Liability insurance and Additional Insured Endorsement) in compliance with the requirements of Paragraph A herein shall be furnished to the Department by Certificate of Insurance in the form as approved by the Department within 30 days after obtaining said insurance. A copy of the approved certificate form may be obtained from the Department of Transportation, 1120 N Street, Sacramento, California, 94274-0001, and at the offices of the District Directors of Transportation in the various Transportation Districts.

C. Such insurance shall be issued by a company or companies authorized to transact business in the State of California.

D. Insurance coverage in the minimum amounts set forth herein shall not be construed to relieve the Contractor for liability in excess of such coverage, nor shall it preclude the State from taking such other actions as is available to it under any other provision of this contract (except retainage of money due the Contractor) or otherwise in law.

The Contractor shall be responsible for any liability imposed by law and for injuries to or death of any person including but not limited to workmen and the public, or damage to property and shall indemnify and save harmless any county, city or district, its officers and employees connected with the work, within the limits of which county, city or district the work is being performed hereunder, all in the same manner and to the same extent as provided above for the protection of the State of California and all officers and employees thereof connected with the work, except that no retention of money due the Contractor under and by virtue of the contract will be made by the State of California pending disposition of suits or claims for damages brought against the said county, city or district.

Nothing in the contract is intended to create the public or any member thereof a third party beneficiary hereunder, nor is any term and 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 such event, the Contractor will be relieved of responsibility for any injury or damage to such part as results from such occupancy and use by the Department. If the Contractor carries insurance against damage to such premises or against liability to third persons covering the premises so used and occupied by the Department, and if such occupancy results in increased premiums for such insurance, the Department will pay to the Contractor the added cost for such insurance during the period of occupancy.

Such 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 such 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 he 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 such 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 at his own 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 such utilities may include communication cables or electrical cables which may be high voltage, and when working or excavating in the vicinity of such cables, or the ducts enclosing such cables, he shall observe at his own cost any special precautions required. 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 in the plans or in special provisions, or which are found in a location substantially different from that shown, and such utilities are not reasonably apparent from visual examination, then he 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 such adjustment, rearrangement, repair, removal, alteration, or special handling of such utility, including repair of the damaged utility. The Contractor shall perform the work described in such written order, and compensation therefor will be made in accordance with Section 3, "Changes in the Work", of these General Conditions relating to changes in the work. Except for the items of cost specified in said Section 3, the Contractor shall receive no compensation for any other cost, damage, delay, interference, or hindrance to him due to the presence of such utility. If the Contractor fails to give the notice specified above and thereafter acts without instructions from the Engineer, then he shall be liable for any or all damage to such utilities or other work of the contract which arises from his operations subsequent to discovery thereof, and he shall repair and make good such damage at his own cost.

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. All such 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 said Section 7-1.05.

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 said 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 such forces within or adjacent to said limits, the Contractor shall cooperate with all such 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 such 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 his personal attention to the fulfillment of the contract and shall keep the work under his control. When any subcontractor fails to prosecute a portion of the work in a manner satisfactory to the Engineer, the Contractor shall remove such subcontractor immediately upon written request of the Engineer, and he 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 such 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 said contract are incorporated in the subcontract. Subcontracts shall also contain certification by the subcontractor that said 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.

The Contractor shall not substitute any person as subcontractor in place of a subcontractor listed on his bid proposal without the written approval of the Engineer. Substitutions must be in accordance 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 his 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 him under the contract and such 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 his 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 him in advance of the said date of approval shall be considered as having been done by him at his own risk and as a volunteer unless said contract is so approved.

The delivery to the State for execution and approval of the contract properly executed on behalf of the Contractor and surety and the 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 his 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 his expense do such work as 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 such delay, hindrance or interference would have been compensable hereunder had work been commenced on the date of such 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 his choice or, if requested, the Engineer will furnish a form for the Contractor's use. If the Engineer furnishes a form, he 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 he will start the several salient features of the work, and the contemplated dates for completing the said 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 accordance 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 such period as he may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as he may deem 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 such 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 such days are working days within the meaning of the definition set forth in said Section 6-1.07.

In the event of a suspension of work under any of the conditions set forth in this Section 6-1.06, such suspension of work shall not relieve the Contractor of his 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 such 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 such 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 such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its 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 his 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 such 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 said day and the major portion of the day could be considered to be suitable for such 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 such 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 he 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 accordance 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 such 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 said 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 he may deem best to serve the interest of the State, and if he decides to increase the said number of working days, he shall further have the right to charge to the Contractor, his heirs, assigns or sureties and to deduct from the final payment for the work all or any part, as he 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 such extension, except that cost of preparation of final statement shall not be included in such 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, tidal waves, 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 any such delay. The Engineer shall ascertain the facts and the extent of the delay, and his 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 he has diligently made every effort to obtain such 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 such 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," 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 such 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 any such delay. The Engineer shall ascertain the facts and the extent of the delay.

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 said 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 such 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 such 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 such 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 such 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 such materials have been stored in the manner and at the locations he 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 such 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 such other work as may have been ordered to secure the project for termination, he will recommend that the Director formally accept the contract, and immediately upon and after such acceptance by the Director, the Contractor will not be required to perform any further work thereon and shall be relieved of his 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 such 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 he 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 said 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 his subcontractors, necessary to determine compensation in accordance with 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 such 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 his 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 he abandons the work and the contract work is completed in conformance with the provisions of Section 10255 of the State Contract Act, any dispute concerning the amount to be paid by the State to the Contractor or his surety or to be paid to the State by the Contractor or his surety, under the provisions of Section 10258 of said Act, shall be subject to arbitration in accordance with Section 7-1.10, "Arbitration," of these General Conditions. The surety shall be bound by the arbitration award and is entitled to participate in such 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 accordance 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 he shall have given the Engineer due written notice of potential claim as hereinafter specified, provided, however, that 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 6-1.08, "Liquidated Damages," of these General Conditions.

The written notice of potential claim shall set forth the reasons for which the Contractor believes additional compensation will or may be due, the nature of the costs involved, and, insofar as possible, the amount of the potential claim. The said notice as above required must have been given to the Engineer prior to the time that the Contractor shall have performed 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.

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 such matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that he shall have no right to additional compensation for any claim that may be based on any such act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

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 such estimate, and the value thereof. Such 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 such 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 said 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 such 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 said amount be reduced to less than 125 percent of the estimated value of the work yet to be completed as determined by the Engineer. Such 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 him to give such 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 such estimate or payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the contract.

No such estimate or payment shall be construed to be an acceptance of any defective work or improper materials.

Attention is directed to the express prohibition against payment to unlicensed contractors contained in Public Contract Code Section 10164, the provisions of which are set forth in Section 1-1.02, "Contractor's Licensing Laws," of the Instructions to Bidders.

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 said Section 7-1.05.

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.

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 such 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. Said 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. Within 30 days after the receipt thereof, the Contractor shall approve such statement or submit a written statement of all claims he has arising under or by virtue of the contract. The approval of said statement or the failure to file a claim within said 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 accordance with this paragraph.

The claims filed by the Contractor shall be in sufficient detail to enable the Engineer to ascertain the basis and amount of said claims. The Engineer will consider and determine the Contractor's claims and it will be the responsibility of the Contractor to furnish within a reasonable time such further information and details as may be required by the Engineer to determine the facts or contentions involved in his claims. Failure to submit such information and details will be sufficient cause for denying the claims.

The Deputy Director Transportation Engineering will make the final determination of any claims which remain in dispute after completion of claim review by the District administering the contract. A board or person designated by said Deputy Director will review such claims and make a written recommendation thereon. The Contractor may meet with the review board or person to make a presentation in support of such claims.

The Engineer shall examine any claim so filed and, if he finds the claim to be proper, he shall promptly cause a State warrant to be issued in the amount he finds due upon such claim. If the Engineer finds that any such claim is without merit he shall so notify the Contractor. The finding by the Engineer, on any such claim shall be binding and conclusive upon the State and the Contractor as to all questions relating to the performance of the contract and the amount to be paid thereunder 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 said 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 such payment shall be made.

7-1.09 GUARANTEE.—The Contractor hereby unconditionally guarantees that the work will be done in accordance with the requirements of the contract, and further guarantees the work of the contract to be and remain free of defects in workmanship and materials for a period of one year from the date of acceptance of the contract, unless a longer guarantee period is required by the special provisions. The Contractor hereby agrees to repair or replace any and all work, together with any other adjacent work which may be displaced in so doing, that may prove to be not in accordance 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.

Contract bonds shall remain in full force and effect during the guarantee period.

The Contractor further agrees, that within 10 calendar days after being notified in writing by the Department of any work not in accordance with the requirements of the contract or any defects in the 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 he 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 accordance 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 said regulations. A Complaint in Arbitration by the Contractor shall be made not later than 180 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.

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**STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION**

SPECIAL PROVISIONS

Annexed to Contract No. 06-3670U4

DIVISION 0 BIDDING AND CONTRACT REQUIREMENTS

0.01 INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS

The work embraced herein shall be done in accordance with the Instructions to Bidders And General Conditions For Building Construction of the Department of Transportation, dated January, 1993, a single publication attached hereto and referred to herein as "Instructions to Bidders" and "General Conditions", and in accordance with 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 such 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 he must observe in the preparation of the proposal form and the submission of the bid.

The third paragraph of Section 1-1.02, "Contractor's Licensing Laws," of the Instructions to Bidders is amended to read:

Attention is also directed to the provisions of 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.

In addition to the subcontractors required to be listed in accordance 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 done by each subcontractor listed. A sheet for listing the subcontractors is included in the Proposal.

The form of Bidder's Bond 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 accordance 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 veterans 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 specific contract items of work, or portions thereof. Responsibility means actually performing, managing and supervising 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 0.03A, "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:

a. signed agreements that all trucking will be performed by DVBE truckers if credit is toward the DVBE goal;

b. a "certified roster" showing that all trucks are owned by DVBEs; and

c. 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:

a. 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;

b. a "certified roster" showing that at least 20 percent of the number of trucks are owned by DVBE truckers; and

c. 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 0.03A, "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/>.

0.027 SMALL BUSINESS PREFERENCE

Attention is directed to "Award 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 said 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:

1. The lowest responsible bid for the project exceeds \$100 000, and
2. The project work to be performed requires a Class A or a Class B contractor's license, and
3. 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 accordance 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:

- (1) Has its principal place of business in California.
- (2) Has its principal place of business in a state in which there is no local contractor preference on construction contracts.
- (3) 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 SUBMISSION OF DVBE INFORMATION AND 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 submittal of DVBE information and award and execution of contract.

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 meet the goal for DVBE participation or to provide information to establish that, prior to bidding, the bidder made a good faith effort to do so.

0.03A DVBE INFORMATION

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 the DVBE goal will be met or that a good faith effort to meet the goal has been made.

Bidders are cautioned that even though their submittal indicates they will meet the stated DVBE goal, their submittal should also include their 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 information to show that the DVBE goal will be met shall include the names of DVBEs and DVBE joint venture partners to be used, with a complete description of work or supplies to be provided by each and the dollar value of each DVBE transaction. When 100 percent of a contract item of 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. (Note: DVBE subcontractors to whom the bidder proposes to directly subcontract portions of the work are to be named in the bid. - See Section 1-1.05, "Required Listing of Proposed Subcontractors," of the Instructions to Bidders and Division 0.02, "Proposal Requirements and Conditions," of these special provisions, regarding listing of proposed subcontractors).

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:

- (1) 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.
- (2) 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.
- (3) Invitations to bid were submitted to potential disabled veteran business enterprise contractors.
- (4) Available disabled veteran business enterprises were considered.

0.03B AWARD OF CONTRACT

Section 2-1.01, "Award of Contract," of the Instructions to Bidders is amended to read:

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. Such award, if made, will be made within 30 days after the opening of the proposals. This period will be subject to extension for such further period as may be agreed upon in writing between the Department and the bidder concerned.

The award of 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, good faith effort to do so. Meeting the goal for DVBE participation or demonstrating, to the satisfaction of the Department, good faith effort to do so is a condition for being eligible for award of contract.

A "Vendor 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, vendor 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 "Vendor 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 "Vendor 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:

(1) 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

(2) 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, said 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.

0.04 BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES

Attention is directed to the provisions in Section 6-1.03, "Beginning of Work," in Section 6-1.07, "Time of Completion," and in Section 6-1.08, "Liquidated Damages," 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.

Said work shall be diligently prosecuted to completion before the expiration of

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beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$550 per day, for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed above.

0.05 LABOR NONDISCRIMINATION

Attention is directed to the following Notice that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations.

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM (GOV. CODE, SECTION 12990)

Your attention is called to the "Nondiscrimination Clause", set forth in Section 5-1.01B, "Labor Nondiscrimination," of the General Conditions, which is applicable to all nonexempt state contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The Specifications are applicable to all nonexempt state construction contracts and subcontracts of \$5,000 or more.

0.051 CONTRACT BONDS

Attention is directed to Section 2-1.03, "Contract Bonds," of the Instructions to Bidders and these special provisions.

The payment bond shall be in a sum not less than the following:

1. One hundred percent of the total amount payable by the terms of the contract when the total amount payable does not equal or exceed five million dollars (\$5 000 000).
2. Fifty percent of the total amount payable by the terms of the contract when the total amount payable is not less than five million dollars (\$5 000 000) and does not exceed ten million dollars (\$10 000 000).
3. Twenty-five percent of the total amount payable by the terms of the contract when the total amount payable exceeds ten million dollars (\$10 000 000).

0.0515 TRANSPORTATION LABORATORY

Section 1-1.12, "Laboratory," of the General Conditions is amended to read:

1-1.12 LABORATORY.—The Office of Materials and Foundations 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 Office of Materials and Foundations, located at 5900 Folsom Boulevard, Sacramento, CA 95819.

The telephone number of the "Transportation Laboratory" is (916) 227-7000.

0.0517 ABBREVIATIONS

Section 1-1.26, "Abbreviations," of the General Conditions, is amended by adding the following abbreviations:

CBC California Building Code
CEC California Electrical Code

0.052 LABOR CODE REQUIREMENTS

Section 5-1.01A, "Hours of Labor," of the General Conditions is amended to read:

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.

Section 5-1.01C, "Prevailing Wage," of the General Conditions is amended to read:

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 the 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.

Section 5-1.01E, "Payroll Records," of the General Conditions is amended to read:

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 \$1000. 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.

0.0525 INDEMNIFICATION AND INSURANCE

Section 5-1.03, "Responsibility for Damage," of the General Conditions is deleted. All references to Section 5-1.03 in the Contract documents shall be deemed to mean Sections 5-1.031, "Indemnification," and 5-1.032, "Insurance," as added below.

The General Conditions is amended by adding the following Section 5-1.031, "Indemnification," and Section 5-1.032, "Insurance," before Section 5-1.04, "Occupancy by the Department Prior to Acceptance":

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 such 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 such 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. Such 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 such 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 Standard Specifications, 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.

0.053 NOTICE OF POTENTIAL CLAIM

Section 7-1.03, "Notice of Potential Claim," of the General Conditions is amended to read:

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 he 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 said notice, furnish an estimate of the cost of the affected work and impacts, if any, on project completion. Said 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 his actual costs. Failure to do so shall be sufficient cause for denial of any claim subsequently filed on the basis of said 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 such matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that he shall have no right to additional compensation for any claim that may be based on any such 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, Contractor shall make its records of the project, as deemed by the Department to be pertinent to the potential claim, available to the Department for inspection and copying.

0.054 PARTIAL PAYMENTS

The last paragraph of Section 7-1.05, "Partial Payments," of the General Conditions is amended to read:

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.

0.055 PAYMENT OF WITHHELD FUNDS

Section 7-1.06, "Payment of Withheld Funds," of the General Conditions, is amended by adding the following after the third paragraph:

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.

0.056 FINAL PAYMENT AND CLAIMS

Section 7-1.07, "Final Payment and Claims," of the General Conditions is amended to read:

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. Said 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 such final statement or submit a written statement of all claims arising under or by virtue of the contract so that the Engineer receives such 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 such 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 said statement or the failure to file a claim within said 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 accordance with this paragraph.

Claims filed by the Contractor shall be in sufficient detail to enable the Engineer to ascertain the basis and amount of said claims. If additional information or details are required by the Engineer to determine the basis and amount of said claims, the Contractor shall furnish such further 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 such information or details by the Engineer shall not be later than close of business of the next business day. Failure to submit such 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 such 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 such overhead claim 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 said District Director will review such 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 such claims.

Upon final determination of the claims, the Engineer will then make and issue his final statement of payment in writing and within 30 days thereafter the State will pay the entire sum, if any, found due thereon. Such final statement of payment 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.

0.057 ARBITRATION

The last paragraph in Section 7-1.10, "Arbitration," of the General Conditions is amended to read:

Arbitration shall be initiated by a Complaint in Arbitration made in compliance with the requirements of said 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.

0.058 INTEREST ON PAYMENTS

Interest shall be payable on progress payments, payments after acceptance, final payments, extra work payments and claim payments as follows:

1. Unpaid progress payments, payment after acceptance and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.

2. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following the receipt of a properly submitted and undisputed extra work bill. To be properly submitted, the bill must be submitted within 7 days of the performance of the extra work and in accordance with the requirements of Section 3, "Changes in the Work," and Section 7-1.05, "Partial Payments," of the General Conditions. An undisputed extra work bill not submitted within 7 days of performance of the extra work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
3. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments and extra work payments shall be 10 percent per annum.
4. 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 said 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.

0.06 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, and shall immediately cease work in the affected area and report the condition to the Engineer in writing.

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

Any delays or increased or decreased costs due to the removal of such asbestos or hazardous substances not shown on the plans or indicated in the specifications will be considered a change in the work as provided in Section 3, "Changes in the Work," of the General Conditions.

0.062 WATER POLLUTION

Section 5-1.01, "Laws to be Observed," of the General Conditions is amended by adding the following section:

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 750,000 square feet (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.

0.065 SURFACE MINING AND RECLAMATION ACT

Attention is directed to the Surface Mining and Reclamation Act of 1975, commencing in Public Resources Code, Mining and Geology, Section 2710, which establishes regulations pertinent to surface mining operations.

Material from mining operations furnished for this project shall only come from permitted sites in compliance with the Surface Mining and Reclamation Act of 1975.

The requirements of this division shall apply to all materials furnished for the project.

0.067 YEAR 2000 COMPLIANCE

This contract is subject to Year 2000 Compliance for automated devices in the State of California. Year 2000 compliance is defined as follows:

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 accordance with the provisions of Section 4-1.04, "Certificates of Compliance," of the General Conditions for all automated devices furnished for the project.

0.07 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 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 requirements in Division 0.03, "Submission of DVBE Information and Award and Execution of Contract," in 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:

- (1) The listed DVBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract, when such written contract, based upon the general terms, conditions, plans and specifications for the project, or on the terms of such subcontractor's or supplier's written bid, is presented by the Contractor.
- (2) The listed DVBE becomes bankrupt or insolvent.
- (3) The listed DVBE fails or refuses to perform his subcontract or furnish the listed materials.
- (4) 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.
- (5) The work performed by the listed subcontractor is substantially unsatisfactory and is not in substantial accordance with the plans and specifications, or the subcontractor is substantially delaying or disrupting the progress of the work.
- (6) The listed DVBE subcontractor is not licensed pursuant to the Contractors License Law.
- (7) It would be in the best interest of the State.

The Contractor shall not be entitled to any payment for such 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 8-1.01, "Subcontracting," of the Standard Specifications, Section 2, "Proposal Requirements and Conditions," Section 2-1.04, "Submission of DVBE Information," and Section 3, "Award and Execution of Contract," of these special provisions and 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 third paragraph of Section 8-1.01 of the Standard Specifications shall not apply to this contract.

The DVBE information furnished under Section 2-1.04, "Submission of DVBE Information," of these special provisions is in addition to the subcontractor information required to be furnished in Section 8-1.01, "Subcontracting," and Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications.

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 Section 2-1.02, "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.

0.08 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 will be to maintain cooperative communication and mutually resolve conflicts at the lowest possible management level.

The Contractor may request the formation of such 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.

The costs involved in providing a facilitator and a workshop site will be borne equally by the State and the Contractor. The Contractor shall pay all compensation for the wages and expenses of the facilitator, and of the expenses for obtaining the workshop site. The State's share of such costs will be reimbursed to the Contractor in a change order written by the Engineer. Markups will not be added. All other costs associated with the "Partnering" relationship will be borne separately by the party incurring the costs.

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 constructing a new Sub Shop, remodeling the existing Office Building, including related mechanical and electrical 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 Bakersfield Maintenance Station.

1.02 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:

Sufficient quantities of lubricants, oils, and fluids, including drum type containers, as required, for testing the respective systems.

Padlock for fire sprinkler system main shut-off valve.

1.03 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.

1.04 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.

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

1.05 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.

1.06 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.

1.07 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.

1.08 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

1.09 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.

1.10 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>.

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 5 days of receipt of the Engineer's comments. The Engineer will have 5 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 15th and April 15th.

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.

1.11 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.

1.12 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.

1.13 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.

1.14 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.

1.15 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.

1.16 ASBESTOS

The Contractor shall take special precautions for that portion of the work which may involve the handling of materials which contain asbestos, either in demolition or construction.

The presence of asbestos or its quantity is unknown. At a minimum, the ceiling tiles and pipe insulation are suspect.

The Contractor shall furnish sampling and testing programs for asbestos materials. The program shall be prepared and carried out by an industrial hygienist certified by the American Council of Industrial Hygiene. The number and location of samples shall be as designated by the Engineer.

REPORTING.--The sampling report shall be given to the Engineer within 10 days of the sampling.

If asbestos is not found, the Contractor may proceed with work in that area.

If asbestos is found, and when ordered by the Engineer in writing, the Contractor shall proceed with the removal and disposal of the debris.

Attention is directed to "Removal and Disposal of Asbestos" in Division 2, "Sitework," of these special provisions regarding governing codes and requirements for the removal and disposal of materials containing asbestos.

The sampling and testing program work done by the certified industrial hygienist, including furnishing the sampling program, sample collection, analysis and reporting, will be paid for as provided in Section 3, "Changes in the Work," of the General Conditions.

Any adjustment of contract time will be made in accordance with the provisions of Section 6-1.07, "Time of Completion," of the General Conditions.

Materials containing asbestos, which are designated on the plans or specified in these special provisions to be removed and disposed of, shall be disposed of away from the premises. The Contractor shall make his own arrangements for disposing of such materials, and shall pay all the costs involved. Said arrangements shall include, but not necessarily be limited to entering into agreements with said disposal site property owners and obtaining all required permits, licenses and environmental clearances. Prior to disposing of any material away from the premises, the Contractor shall furnish to the Engineer satisfactory evidence that the Contractor has entered into agreements with the property owners of the disposal site involved and has obtained said permits, licenses and clearances.

1.17 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 unknown.

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.

The Contractor shall furnish sampling and testing programs for lead or lead based materials. The program shall be prepared and carried out by an industrial hygienist certified by the American Council of Industrial Hygiene. The number and location of samples shall be as designated by the Engineer.

REPORTING

The sampling report shall be given to the Engineer within 10 days of the sampling.

If the paint system is found to contain safe levels, the Contractor may proceed with work in that area.

If the paint system is found to contain unsafe levels of lead, and when ordered by the Engineer in writing, the Contractor shall proceed with the removal and disposal of the debris.

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.

The sampling and testing program work done by the certified industrial hygienist, including furnishing the sampling program, sample collection, analysis and reporting, will be paid for as provided in Section 3, "Changes in the Work," of the General Conditions.

Any adjustment of contract time will be made in accordance with the provisions of Section 6-1.07, "Time of Completion," of the General Conditions.

1.18 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 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.

At new door and window openings in masonry, full depth saw cuts shall be made from both faces. Overcuts shall not be made at corners. Remaining material at corners shall be chipped out and the surfaces ground smooth.

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.

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.

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.

Existing reinforcement that is to be incorporated into the new work shall be protected from damage and thoroughly cleaned before being embedded in new concrete.

REPAIR.--

Roof decking.--Existing roof decking at the existing Office Building that are damaged by reason other than by the Contractor's operations shall be repaired when ordered by the Engineer. Such work shall be as directed by the Engineer, and will be paid for as an ordered change in accordance with the requirements in Section 3 "Changes in the Work," of the General Conditions.

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.

2.02 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.

2.03 REMOVAL AND DISPOSAL OF ASBESTOS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of removing and disposing of hazardous or asbestos-related materials which are designated on the plans or specified in these special provisions to be removed and disposed of.

Where existing hazardous or asbestos-related 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.

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

1. California Health and Safety Code, Division 20, Chapter 6.5, Hazardous Waste Control.
2. California Code of Regulations, Title 22, Division 4, Chapter 30, "Minimum Standards for Management of Hazardous and Extremely Hazardous Material," latest revisions, as applicable.
3. California Code of Regulations, Title 8, General Industry Safety Order 5208 Asbestos.
4. Occupational Safety and Health Administration, Part 26 (amended), of Title 29 of the Code of Federal Regulations.

Payment.--Removal, including necessary measures for protection of personnel, and disposal of asbestos materials will be paid for as provided in Section 3 "Changes in the Work," of the General Conditions.

PART 2.- PRODUCTS (Not applicable)

PART 3.- EXECUTION

REMOVAL.--

Preparation.--Prior to performing operations involving the removal of hazardous waste containing asbestos, the Contractor shall provide written notification to the following agencies:

State Department of Toxic Substances Control
400 P Street
Sacramento, CA 95814
Telephone No. (916) 322-0476

Division of Occupational Safety and Health
Contract No. «Dist»-«Contract_No»

2424 Arden Way, Suite 165
Sacramento, CA 95825
Telephone No. (916) 263-2800

Kern County CUPA
2700 "M" Street
Bakersfield, CA 93301
Telephone No. (661) 862-8754 FAX (661) 862-8701

The Contractor shall notify Division of Occupational Safety and Health (CAL OSHA) 24 hours prior to performing removal operations of materials containing asbestos.

The Contractor shall notify the Engineer 3 working days in advance of commencement of removal operations of material containing asbestos.

Handling.--The Contractor shall comply with all Federal, State, and local regulations for the removal of material containing asbestos 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 ASBESTOS FIBERS
BREATHING ASBESTOS DUST MAY
CAUSE SERIOUS BODILY HARM

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

The Contractor shall comply with all Federal, State and local requirements for safety which shall include providing employees with coveralls (preferably disposable plastic coated), rubber gloves (to be discarded after use), rubber boots (to be washed thoroughly after use), and disposable dust respirators (to cover nose and mouth). The use of goggles shall be optional.

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

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.

The Contractor shall dispose of all hazardous waste containing asbestos at a Class I, Class II-1, Class II-2, or Class 3 disposal site (old designation), or at a Class I, Class II, or Class 3 disposal site (new designation), which had previously agreed to accept the hazardous waste.

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

2.04 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 paid for as provided in Section 3 "Changes in the Work," of the General Conditions.

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 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 sides.

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 coated), 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.

2.05 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.

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.

2.06 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 2.- PRODUCTS (Not applicable.)

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, chain link fence, 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 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.

Grading Material Deficiency.--The grading shown on the plans will require approximately 1300 cubic meters of fill material to be supplied by the Contractor.

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.

Excess and waste materials from the excavation shall become the property of the Contractor and 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.

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.

2.08 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, 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, 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.

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 a placing a minimum depth of 100mm of compacted sand under all pipes and conduits.

Excavation adjacent to trees shall be performed by hand methods where necessary to avoid injury to trees and roots. Roots 50 mm in diameter and larger shall be protected with heavy burlap. Roots smaller than 50 mm in diameter adjacent to trees shall be hand trimmed. Cuts through roots 13 mm in diameter and larger shall be sealed with tree trimmers' asphaltic emulsion. If trenches remain open more than 24 hours, the side of the trench adjacent to the tree shall be shaded with burlap and kept damp. Materials shall not be stockpiled within the drip line of trees.

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.

Subgrade preparation.--Preparation of subgrade material for placing aggregate base, surfacing, or slabs thereon shall include fine grading, compaction, reworking as necessary. The upper 150 mm of the subgrade shall have the same compaction as the fill to be placed over it.

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

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.

2.09 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.

2.10 FREE DRAINING GRANULAR MATERIAL

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and placing free draining granular material beneath slabs 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.

2.11 ASPHALT CONCRETE

PART 1.- GENERAL

SUMMARY.--

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

Asphalt concrete shall be commercial quality, produced at a central mixing plant, 13 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-4000 (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.

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

13 mm Maximum Grading	
Sieve Sizes	Percentage Passing
19 mm	100
13 mm	95 - 100
4.75 mm	55 - 72
600 µm	18 - 33
75 µm	4 - 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.

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 one or more layers of 0.04 meter or less 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.

2.12 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.

2.13 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.

Schedule 40 plastic pipe supply line shall for irrigation sleeves conform to the requirements of ASTM Designation: D 1785.

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.

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 or angle pattern globe valves, as shown on the plans. Valves shall be brass 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.

The mass of valve box covers shall not exceed 16 kg.

Valve boxes used for wye strainer assemblies shall be precast portland cement concrete.

Covers for valve units and wye strainer assemblies shall be cast iron or steel.

Covers for valve wye strainer assemblies shall be cast iron or steel.

All other covers for concrete valve boxes shall be concrete, cast iron, or steel.

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 as shown on the plans and as specified in these special provisions.

Concrete.--

Concrete for irrigation system facilities shall contain not less than 300 kg of portland cement per cubic meter, and shall conform to the requirements specified under "Cast-In-Place Concrete" in Division 3, "Concrete and Reinforcement," in these special provisions.

Water.--

Water shall be of such quality that it will promote germination of seeds and growth of plants.

Plastic Pipe Irrigation Line.--

Plastic pipe irrigation line shall be polyethylene of the types and classifications shown on the plans or specified in these special provisions.

Polyethylene pipe shall conform to the specifications of ASTM Designation: D 1248, Type II, Class C, Grade P23, and shall withstand a 60-minute hydrostatic pressure of 345 kPa when tested in conformance with ASTM Designation: D 1598.

Wall thicknesses of polyethylene pipe shall conform to the following when determined in conformance with the requirements in ASTM Designation: D 2122:

Pipe Size Nominal (Millimeters)	Minimum* (Millimeters)	Maximum* (Millimeters)	Range (Percent)
15	1.3	1.8	12
18	1.4	1.9	12
20	1.5	2.0	12

* as measured at any point on the cross section

The polyethylene pipe shall provide leak-free, non-separating connections suitable for the purpose intended when connected to the fittings specified herein.

Polyethylene pipe shall show no evidence of failure when tested by the following environmental test:

Environmental Stress Cracking Test.--For each test, use 6 randomly selected 250-mm long specimens. Insert a 10 percent oversized barbed fitting into one end of each specimen. The barbed fitting shall have an outside diameter which is 10 percent greater than the maximum outside barb diameter specified in Table 1 of ASTM Designation: D 2609 for the pipe size being tested. Place the specimens in a 10 percent "Igepal CO-360" solution at 50°C for a 24-hour period. After 24 hours, examine the specimens for failure.

Utility grade polyethylene pipe will not be acceptable.

A Certificate of Compliance for the polyethylene pipe shall be furnished to the Engineer in conformance with the provisions in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

Fittings to be used with polyethylene pipe shall be the compression type, shall be of commercial quality, and shall be recommended by the manufacturer of the polyethylene pipe. Fittings shall have female sockets with an internal barb to provide a positive pipe-to-fitting connection that will not separate at the designed pressure.

Valve Assembly Units.--

Valve assembly units shall conform to the details shown on the plans and these special provisions.

A valve assembly unit shall consist of an electric remote control valve, a cartridge type filter or filters with housing, a valve box, wire mesh, brick, fittings, and pipe required for the assembly as shown on the plans.

Filter housings shall be manufactured of reinforced polypropylene plastic and shall be capable of withstanding a cold water working pressure of 860 kPa. The filter housings shall be cylindrical in shape, shall be approximately 125 mm in diameter and 300 mm long, and shall have 20 mm National Pipe Thread connections. Each filter housing shall be equipped with a removable filter cartridge.

Pipe used in valve assembly units shall be Schedule 80 polyvinyl chloride (PVC) 1120 or 1220 pressure rated pipe conforming to the requirements of ASTM Designation: D 1785. Fittings shall be injection molded PVC, Schedule 80, conforming to the requirements of ASTM Designation: D 2467.

Check valves shall be the spring action type capable of withstanding a working pressure of 861 kPa.

Immediately prior to acceptance of the contract, all previously installed filter cartridges shall be replaced with new filter cartridges and one pressure gage assembly shall be delivered to the Engineer. All screens in all pressure reducing valves shall also be cleaned or replaced prior to acceptance of the contract.

Sprinklers.--

Sprinklers shall be the type, pattern, and material and shall have the operating characteristics listed in the "Sprinkler Schedule" shown on the plans.

Backflow Preventer Assembly.--

The backflow preventer assembly shall consist of a backflow preventer, wye strainer, pipe supports, fittings, and pipe for the assembly as shown on the plans.

The backflow preventer shall be factory assembled and shall include 2 check valves, one pressure differential relief valve, 2 shut-off valves, and 4 test cocks. The backflow preventer, wye strainer, and valves shall be the same size as the pipeline in which they are installed, unless otherwise shown on the plans.

The backflow preventer shall be one of the approved reduced pressure principle devices listed by the California Department of Health Services, Division of Drinking Water and Environmental Management, 601 N. 7th Street, Mailing Station (MS) 92. PO Box 942732, Sacramento, CA 94234-7320.

Pressure loss through the backflow preventer shall not exceed the following:

Backflow Preventer Size (Millimeters)	Flow Rate (Liters per minute)	Pressure Loss (kPa)
25	115	76

Backflow preventer shutoff valves shall be manufactured from iron or bronze and shall be either resilient wedged gate valves, resilient seated and fully ported ball valves, or resilient seated butterfly valves.

If threaded type shut-off valves are used, shut-off valves shall be provided with a union on one side of each valve. Unions shall be brass or malleable iron.

The wye strainer shall have a cast iron or all-bronze body with a removable stainless steel or monel strainer, and shall be equipped with a gate valve at the outlet.

The strainer screen for the wye strainer 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.

Gate valves at the wye strainer outlet shall have a brass or bronze body, stem, and wedge. Seat rings shall be teflon on the discharge side of the valve. Wedges shall be driven obliquely by cam action into the seating rings.

All components of the backflow preventer assembly shall be capable of withstanding a cold water working pressure of 1034 kPa.

Fittings and pipe shall be galvanized steel unless otherwise shown on the plans.

The backflow preventer assembly shall be coated with at least one application of the applicable prime coat and coated with a minimum of 2 applications of finish enamel paint. The color of the paint shall be brown.

Electrical Equipment and Materials.--

Irrigation system electrical material and equipment shall conform to the details shown on the plans, this division, "Irrigation System," and the applicable requirements specified in Division 16, "Electrical," in these special provisions.

Electric Automatic Irrigation Controller.--

The controller shall operate on 120-volt, AC, 60 Hz current, and shall supply 24- to 30-volt, AC current for operating the remote control valves.

The controller shall be a single, independent controller conforming to the following:

1. The controller shall be fully automatic and shall be capable of operating a complete 14-day or longer irrigation program.
2. A switch or switches shall be provided on the face of the control panel that will turn the controller on or off and provide for automatic or manual operation. Manual operation shall allow cycle start at any desired station and shall allow activation of a single station.
3. The watering time of each station shall be displayed on the face of the control panel.
4. The controller and the low voltage output source shall be protected by fuses or circuit breakers.
5. The controller mechanism, panel, and circuit board shall be connected to the low voltage neutral and control conductors by means of plug and receptacle connectors located in the controller enclosure.
6. Each station shall have a variable or incremental timing adjustment with a range of 1 to a minimum of 59 minutes.
7. The controller shall be capable of a minimum of 2 program schedules.
8. The controller shall have an output that can energize a pump start circuit or a master remote control valve.
9. Timing and clock adjustments shall be made without inserting or removing pins.
10. A solid-state controller with a digital display shall not be used. Digital clocks will not be considered digital displays.
11. Where direct burial conductors are to be connected to the terminals strip, the conductors shall be connected with the proper size open-end crimp-on wire terminals. No exposed wire shall extend beyond the crimp of the terminal and the wires shall be parallel on the terminal strip.

The controller shall have a control relay for the remote control valves. Each relay shall be 24-volt, AC, 10-ampere, 2-pole, double throw general purpose type, enclosed in a clear plastic cover with 8-pin plug base. The socket for the relay shall be the barrier type, 8-contact relay socket with 10-ampere contacts and screw terminals.

A 20-ampere, 120/277-volt, AC "ON-OFF" switch shall be mounted in a steel box with a steel cover and shall be installed in the controller pedestal. For wall-mounted controllers, the switch shall be installed at the locations shown on the plans. "ON-OFF" switch may be installed at the project site.

Electric Automatic Irrigation Controller Enclosure Cabinet.--

Electric Remote Control Valves.--

Electric remote control valves shall conform to the following:

1. Master and electric remote control valves 40 mm and smaller shall be either high strength industrial polyvinyl chloride (PVC), glass filled nylon, brass, bronze or cast iron construction. Valves larger than 40 mm shall be of either brass, bronze or cast iron construction. PVC valves shall have metal seats. All metal parts of PVC and glass filled nylon valves shall be stainless steel. Cast iron bodied valves shall have replaceable, nonferrous, metallic seats.
2. Valves shall be normally closed.
3. Valves shall be completely serviceable from the top without removing the valve body from the system.
4. Valves shall be equipped with a device that will regulate and adjust the flow of water and shall be provided with a manual shutoff. The manual shutoff shall be operated by a cross handle.
5. The valves for each controller shall be the same model series and shall be compatible with the model series of the controller. Valves shall be manufactured by the same company as the controller, if the manufacturer of the controller also manufactures valves.
6. Valve solenoids shall operate on the low voltage AC circuit supplied by the controller.
7. Valves shall be angle pattern (bottom inlet) or straight pattern (side inlet) as shown on the plans.
8. Valves shall be provided with a manual bleeding device.
9. Valves shall be equipped with an internal diaphragm installed in the valve body casting.

Conductors.--

Irrigation system neutral and control conductors shall conform to the requirements specified in this division, "Irrigation System," and to the applicable requirements specified under "Conductors" in Division 16, "Electrical," in these special provisions.

Low voltage as used in this division, "Irrigation System," shall mean 36 volts or less.

Neutral and control conductors shall be color coded in conformance with the details shown on the plans and the requirements specified in this division, "Irrigation System."

The insulation color for low voltage neutral and control conductors shall be homogeneous throughout the entire thickness of the insulation.

Neutral and control conductors shall be of the size recommended by the controller manufacturer.

Pull Boxes.--

Pull boxes for the irrigation system shall be reinforced precast portland cement concrete, conforming to the requirements specified for underground pull boxes under "Outlet, Devices and Junction Boxes" in Division 16, "Electrical," in these special provisions, except that pull boxes for the irrigation system shall be marked "SPRINKLER CONTROL."

Marking pull box covers with the word "CALTRANS" will not be required, except when pull boxes are installed as part of the electric service installation to the controllers.

EXECUTION.--

INSTALLATION.--

TRENCHING AND BACKFILLING.--Trenching and backfilling for irrigation supply lines, irrigation sleeves, 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.

Trenches for plastic pipe and irrigation sleeves shall be smooth and free of jagged rubble or sharp objects which will cause abrupt bending stresses and uneven weight distribution during backfilling operations. Trenches for irrigation sleeves shall have the bottom graded and prepared to provide a firm and uniform bearing throughout toe entire length of the sleeves.

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 and 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.

The risers for sprinklers on slopes shall be set approximately perpendicular to the plane of the slope.

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.

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.

The bottom of the backflow preventer shall be installed not less than 0.3-m above the ground.

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.

MAINTAINING EXISTING WATER SUPPLY.--Before work is started on the existing water supply system or existing irrigation system, existing systems shall be checked for proper operation. Any repairs to the existing systems ordered by the Engineer after checking of the systems, and any further repairs required thereafter as 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, except as otherwise provided in the following paragraph.

Where damage to existing facilities is caused by the Contractor's operations, the Contractor shall, at the Contractor's expense, repair or replace damaged facilities promptly. Should the Contractor fail to perform the required repairs or replacements, the cost of performing repairs or replacements will be deducted from any moneys due or to become due the Contractor.

The Contractor shall notify the Engineer at least 4 days prior to shutting off the water supply to any portion of an existing irrigation system. The Engineer shall also be notified when the water supply is returned to each portion of the irrigation system.

Water supply for maintaining existing plantings shall be maintained as specified herein until the permanent water supply or a temporary supply system, approved by the Engineer, has been provided. If existing plantings are to be maintained by the State and Contractor from the same water supply, sufficient water shall be supplied to State forces for watering plantings as necessary to maintain a healthy condition throughout the life of the contract.

If the work causes a continuous interruption of water supply for more than 3 consecutive days, the Contractor shall water, at the Contractor's expense, all existing plantings, including those plantings being maintained by State forces, in the area irrigated from that water supply as often as necessary to maintain healthy plant growth. At the option of the Contractor, temporary connections to the existing irrigation system may be provided until the water service has been restored to the irrigation system.

Where work is performed on an existing irrigation system, the system shall be checked by the Contractor for proper operation after the work is completed and any malfunction resulting from the Contractor's operations shall be corrected by the Contractor at the Contractor's expense.

ELECTRICAL EQUIPMENT AND MATERIALS.--Unless otherwise shown on the plans or specified in these special provisions, all electrical equipment and materials shall be furnished and installed in conformance with the applicable requirements specified in Division 16, "Electrical," in these special provisions.

CONDUCTORS.--Low voltage as used in this division, "Irrigation System," shall mean 36 volts or less.

The neutral and control conductors shall be color coded. The color of the conductors from the controller shall be uniform to the remote control valves. All neutral conductors shall be white. White shall not be used for control conductors. Conductors with green colored insulation shall not be used except as required by the Code.

A common neutral conductor shall be installed from the controller to each remote control valve.

Each remote control valve shall have a separate control conductor with no other valves connected to the conductor.

Each low voltage neutral and control conductor in each valve box, at each controller terminal, and at all splices shall be marked with an adhesive cloth wrap-around marker.

Each low voltage neutral and control conductor in each pull box and each valve box and at each controller terminal shall be marked as follows:

Conductor terminations and splices shall be marked with adhesive backed paper markers or adhesive cloth wrap-around markers, with clear heat-shrinkable sleeves sealed over the markers.

Non-spliced conductors in valve boxes and pull boxes shall be marked with clip-on, "C" shaped, white extruded polyvinyl chloride sleeves. The marker sleeve shall have a black indented legend of uniform depth with a transparent overlay over the legend and a "chevron" cut for alignment of 2 or more sleeves.

The identification on the markers for control conductors shall be the appropriate controller station number and the appropriate number or letter designation of the controller. The identification on the markers for neutral conductors shall be the appropriate number or letter designation of the controller.

At least 600 mm of slack shall be left for each conductor at each pull box.

At each valve box, at least 600 mm of slack shall be left for each conductor that is connected to other facilities within the box or is spliced within the box.

Conductors shall be wrapped together with electrical tape at 1.5-m intervals.

Except as otherwise provided in this paragraph, conductors shall be buried directly in the ground. Where conductors are surface mounted, or where conductors pass under paved areas, through pipe conduit, or through concrete, the conductors shall be installed in electrical conduit. Electrical conduit shall be rigid non-metallic conduit, except surface-mounted conduit and conduit installed through concrete or installed by jacking or drilling shall be rigid metallic.

Where conductors are installed in the same trench or opening as the pipe, the conductors shall be placed at the same depth as the pipe. At other locations the conductors shall be installed not less than 300 mm below the ground surface.

At the Contractor' option, the Contractor may install conductors for the irrigation system by methods and with equipment other than by trenching provided the conductors are installed at the depths specified and the conductor insulation is not damaged by the methods and equipment used.

Splices shall be made only in pull boxes or valve boxes.

Low voltage neutral and control conductors shall be joined by the use of UL listed pressure connectors or other methods permitted by the Engineer. All splices, with or without connectors shall be soldered by the hot iron, pouring or dipping method, except that soldering of pressure connectors and terminals may be omitted provided the connectors and terminals are applied with the proper type tool as recommended by the manufacturer of the connector or terminal being applied. Open flame soldering will not be permitted. Finished connections and terminals shall comply with the requirements of Military Specification MIL-T-7928.

All splices shall be capable of satisfactory operation under continuous submersion in water.

Multi-conductor cables shall be spliced and insulated to provide a watertight joint and to prevent absorption of moisture by the cable.

At the Contractor's option, the Contractor may use other types of splice sealing materials and methods provided materials and methods have been approved in writing by the Engineer prior to the installation of any connectors.

Conductors in the controller cabinet shall not be sliced.

Temporary splices used for testing valve circuits shall not be used as permanent splices.

All permanent splice connections shall be made with freshly cut and skinned conductors.

PULL BOXES.--Irrigation system pull boxes shall be installed in conformance with the details shown on the plans and these special provisions.

Pull boxes shall be installed at the following locations:

1. At all conductor splices, except splices made in valve boxes.
2. At intervals not to exceed 150 m along any low voltage, neutral and control conductor runs. Valve boxes installed along a conductor run shall not be considered as pull boxes in determining the spacing.
3. Within 1.5 m of a controller for the low voltage, neutral and control conductors connecting to the controller.
4. At the ends of each conduit for control conductors.
5. Other locations shown on the plans.

The tops of pull boxes installed in walkways and paved areas shall be flush with the surrounding grade. The tops of pull boxes in other areas shall be installed 50 mm above the surrounding grade.

When pull boxes are installed at locations where they will be subjected to vehicle traffic loads, the pull boxes shall be installed with concrete collars and footings in conformance with the details shown on the plans. The covers for these pull boxes shall be hot-dip galvanized steel plate and shall conform to the details shown on the plans.

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.

TESTING BACKFLOW PREVENTER.--The irrigation system backflow preventer shall be tested for proper operation by a certified Backflow Preventer Tester.

The tester shall hold a valid certification 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 University of Southern California Foundation for Cross-Connection Control and Hydraulic Research.
2. The American Water Works Association.
3. A county which has a certification program for Backflow Preventer Testers.

Testing for proper operation shall conform to the provisions of the county in which the testing is being performed or, if such procedures are not available, tests shall conform to the provisions in the latest edition of the Cross-Connection Control Procedure and Practices manual, which is available from the California Department of Health Services, Sanitary Engineering Branch, 744 P Street, Sacramento, CA 95814.

Tests shall be satisfactorily completed after installation of the backflow preventer and before operation of the irrigation system.

The Contractor shall notify the Engineer at least 5 days prior to testing the backflow preventer.

One copy of all test results for the backflow preventer shall be furnished to the Engineer. If the backflow preventer should fail the required tests, the backflow preventer shall be repaired or replaced at the Contractor's expense.

The backflow preventer shall be retested one year after the satisfactory completion of the first tests or 10 days prior to completion of the plant establishment period, whichever is shorter.

Retesting of the backflow preventer after satisfactory completion of the first tests will not be required.

TESTING ELECTRICAL COMPONENTS.--Field tests and a functional test shall be performed by the Contractor to demonstrate that all parts of the irrigation system function as specified.

Field tests shall be performed on all irrigation system conductors in conformance with these special provisions prior to performing the functional tests. Where conductors are installed by trenching and backfilling, tests shall be performed after at least 0.15-m of backfill material has been placed over the conductors and material has been compacted in conformance with the requirements specified under "Trenching and Backfilling" elsewhere in this division "Irrigation System."

Prior to the start of the functional testing, the Contractor shall perform the following tests on all irrigation system electrical conductors in the presence of the Engineer:

1. Each circuit shall be tested for continuity.
2. Each circuit shall be tested for grounds.
3. An insulation resistance test at 500 volts DC shall be made on each circuit between the circuit and ground. The insulation resistance shall be not less than 10 megohms on all circuits.

The functional test for the electric automatic irrigation system shall consist of not less than 15 consecutive working days of operation during which time the controller shall complete at least 3 complete cycles automatically for each station controlled by the controller. The lengths and frequencies of the cycles will be determined by the Engineer. If unsatisfactory performance of the system develops, the condition shall be corrected and the test repeated until satisfactory operation is obtained.

The functional test shall be satisfactorily completed prior to the start of the plant establishment period.

Instruction shall be given to the Engineer on the use and adjustment of the installed electric automatic controller not less than 10 working days prior to the completion of the plant establishment period.

Repair of the irrigation system shall be made within 5 working days of a malfunction or damage to any portion of the system.

2.14 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.

2.15 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.

2.16 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

Accessible parking stall identification sign.--

Accessible 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.

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.--

Commercial fertilizer.--

Commercial fertilizer shall be in the form (pelleted, granular, or packet) and chemical analysis specified in these special provisions.

Commercial fertilizer (slow release) shall be a pelleted or granular form, shall be slow or controlled release with a nutrient release over an 8- to 12-month period, and shall fall within the following guaranteed chemical analysis range:

Ingredient	Percentage
Nitrogen	16-21
Phosphoric Acid	6-8
Water Soluble Potash	4-10

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

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.

Pesticides.--

Pesticides used to control weeds shall be limited to the following materials unless specified elsewhere in these special provisions or the Contractor has submitted a written request for and has received written approval from the Engineer for other pesticides prior to their use:

- Glyphosate
- Diquat
- Oryzalin (Preemergent)

Glyphosate shall be used to kill stolon type weeds.

Mulch.--

Mulch shall consist of shredded bark.

Shredded bark shall be a mixture of shredded bark and wood; shall have a particle size between 3 mm and 40 mm in thickness and 25 mm to 210 mm in length; and shall be free of salt and deleterious materials such as clods, coarse objects, and rocks. At least 75 percent, by volume, of shredded bark shall conform to the sizes specified.

A Certificate of compliance for mulch shall be furnished to the Engineer in conformance with the provisions in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

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 shown 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.

Plant Stakes.--

Each stake shall be of sufficient length to support the plant in an upright position. The stakes shall be either 50-mm nominal diameter round stakes or 38 mm x 38 mm square stakes, at the Contractor's option.

The cross-sectional dimensions of 50-mm stakes may be reduced if the strength and durability of the smaller dimensioned stake is not less than a corresponding 50 mm nominal redwood stake as determined by the Engineer. In no case shall stakes have a cross-section dimension of less than 32 mm, unless otherwise shown on the plans.

Each plant requiring stakes shall be tied with one tie to each stake. Ties for plant stakes shall be extruded vinyl-based tape, 25 mm wide and shall have a minimum thickness of 0.25 mm. Other materials approved by the Engineer may be used for ties.

EXECUTION.--

PREPARING PLANTING AREAS.--Preparing planting areas shall consist of clearing trash, debris and weeds; preparing planters and plant holes; 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 receive mulch and 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.

PREPARING PLANT HOLES.--Holes for plants shall be excavated or drilled. Backfill material for plant holes shall be a mixture of soil amendment, as shown on the plans, and soil. The materials shall be mixed thoroughly to the bottom of the hole so they are distributed evenly and without clods or lumps.

Unless larger planting holes are specified in the special provisions or shown on the plans, plants shall be planted in holes large enough to receive the root ball, backfill, amendments, and fertilizer.

Water shall not be used for excavation of planting holes.

CULTIVATING.--Areas to be planted shall be cultivated.

The outer limits of the areas to be cultivated shall extend 0.3-m beyond the outer rows of plants requiring cultivation, unless otherwise shown on the plans or specified elsewhere in these special provisions.

All weeds and debris shall be removed before cultivation and disposed of off the premises.

During cultivation, soil amendment shall be added to the cultivated areas at the rates and for the plants as specified or shown on the plans and shall be thoroughly mixed with the soil.

Cultivation shall be performed until the soil is in a loose, friable condition to a minimum depth of 0.15-m. Soil clods shall not be larger than 50 mm in any dimension after cultivation.

The use of rubber-tired equipment will be permitted for cultivating operations, provided the equipment used completely eradicates any compaction caused by the tires. Rubber-tired equipment of any kind will not be allowed on cultivated areas after cultivation.

Planting areas that have been cultivated and become compacted for any reason shall be recultivated by the Contractor at the Contractor's expense.

PESTICIDES.--Unless prohibited by the County Agricultural Commissioner, pesticides may be used for planting work. If the Contractor elects to use pesticides, usage shall conform to the requirements of the California Food and Agricultural Code and these special provisions.

The pesticides used to control weeds shall be limited to those specified under "Products," elsewhere in this division "Landscaping."

Weed oil and granular or pelleted forms of pesticides shall not be used.

Attention is directed to the requirements specified in Section 5-1.01K, "Use of Pesticides," of the General Conditions.

The Contractor shall obtain recommendations for the use of all pesticides from a licensed Pest Control Adviser in conformance with the requirements of the California Food and Agricultural Code. At least 15 days prior to using any pesticides, a copy of the recommendations shall be submitted to the Engineer for approval. The recommendations shall include, but not be limited to, the pesticides to be used, rates of application, methods of application and areas to which pesticides are to be applied.

Before using any pesticides, the Contractor shall obtain the Engineer's written approval of the Pest Control Adviser's recommendations.

When used, pesticides shall be used in conformance with the approved Pest Control Adviser's recommendations.

The Contractor shall notify the Engineer at least 24 hours prior to each application of pesticide and shall indicate the hours of application. No application of pesticides shall be made on Saturdays, Sundays or legal holidays, unless otherwise approved by the Engineer in writing.

Pesticides shall be mixed in conformance with the instructions provided on the applicable registered label. Prior to mixing any pesticide, a copy of the registered label for the pesticide to be mixed shall be given to the Engineer or, when a copy is unavailable, the Engineer shall be permitted to read the label on the container.

Pesticides for weed control shall be applied with a photosensitive dye which will produce a contrasting color when sprayed upon the ground. The color shall disappear between 2 and 3 days after being applied. The dye shall not stain any surfaces nor injure plant or animal life, when applied at the manufacturer's recommended application rate.

Pesticides shall not be applied when weather conditions, including wind conditions, are not acceptable for the work.

Plants shall be planted at least 3 days and irrigated prior to the application of oryzalin.

A minimum of 100 days shall elapse between applications of oryzalin.

No pesticides, except oryzalin or trifluralin, shall be applied within basin.

Any new or existing plants and soil, which in the opinion of the Engineer, have been damaged by the application of pesticides shall be replaced by the Contractor at the Contractor's expense.

At the end of each work week, a written report of that week's applications of all pesticides shall be submitted to the Engineer on forms furnished by the Engineer.

PLANTING.--

GENERAL.--No planting shall be done in any area until the area concerned has been prepared in conformance with these special provisions and presents a neat and uniform appearance satisfactory to the Engineer. When an irrigation system is required it shall be installed and checked for coverage to the satisfaction of the Engineer prior to planting.

Nursery stakes in plant containers stored at the project site shall be removed before transporting the plants to the planting areas, unless otherwise directed by the Engineer.

Where shrubs are shown on the plans to be planted in groups, the outer rows shall be parallel to the nearest curb, sidewalk, wall or fence. Shrubs in adjacent rows shall be staggered. Adjustment in the number or alignment of plants shall be made between the outer rows.

No more plants shall be distributed along planting areas than can be planted and watered on that day.

Plants shall be removed from containers in a manner that the ball of earth surrounding the roots is not broken, and they shall be planted and watered as hereinafter specified immediately after removal from the containers. Containers shall not be cut prior to delivery of the plants to the planting area.

Roots of plants not in containers shall be kept moist and covered at all times, and shall not be exposed to the air except while actually being placed in the ground.

Plants shall be set in backfill material, in flat bottomed holes, to a depth that, after the soil has settled, the top of the root ball shall be as shown on the plans. Plants shall be planted in a manner that roots will not be restricted or distorted.

Plants which have settled deeper than as shown on the plans, shall be raised back to the required level, or replaced, at the option of the Contractor.

No planting shall be performed in soil that is too wet or too dry or in a condition not generally accepted as satisfactory for planting from an agricultural standpoint. Planting shall be performed only in soil which is properly conditioned as specified herein. If the soil in the areas to be planted is not properly prepared, planting operations shall be suspended until these areas conform to these specifications.

Trees, shrubs and vines in the ground cover areas shall be planted and mulched, when mulch is required as shown on the plans or specified in these special provisions, before ground cover plants or cuttings are planted.

Mulch shall be applied at the rates shown on the plans.

Plants shall be watered as provided under "Watering" elsewhere in this division "Planting;" unsuitable plants shall be replaced as provided under "Replacement" elsewhere in this division "Planting;" trash and debris shall be removed and weeds shall be controlled; and damage caused by erosion shall be repaired as provided in Section 5-1.03, "Responsibility for Damage," of the General Conditions.

In addition to other requirements, planted areas shall be neat and clean before the Contractor is allowed to begin the plant establishment period.

PLANT STAKES.--At the time the plants are planted, wood stakes shall be placed at certain plants and the plants shall be tied thereto. The plants to be staked shall be as shown on the plans or as specified elsewhere in these special provisions. Stakes shall be installed against but not through the root ball to a minimum depth of 0.45-m below the ground, and shall be placed on the side toward the prevailing wind, unless otherwise directed by the Engineer.

Each plant requiring a stake shall be tied to the stake at 2 locations as directed by the Engineer. The tie shall form a figure eight by crossing the tie between the plant and the stake, and the figure eight shall be formed twice. Each end of the tie then shall be wrapped one and one-half turns around the stake and securely tied. Other methods approved by the Engineer may be used for ties.

After installation of the tree stakes, the height of the stake shall be a maximum of 50 mm above the upper tree tie.

WATERING.--If water is available from an irrigation source to be installed under this contract or an existing State-owned facility within the premises, water for the planting work may be obtained from the facility free of charge. Where water is not available from a facility, the Contractor shall make arrangements for furnishing and applying water and shall pay all costs.

All trees, shrubs and groundcover shall be watered immediately after planting. Water shall be applied until the backfill soil around and below the roots or ball of earth around the roots of each plant is thoroughly saturated. Where watering is done with a hose, a metal or plastic pressure reducing device approved by the Engineer shall be used. Under no circumstances shall the full force of the water from the open end of a hose be allowed to fall within the basin around any plant.

Ground cover plants in areas provided with an irrigation system shall be watered by sprinklers. Several consecutive waterings may be necessary to thoroughly saturate the soil around each plant. Not more than one hour shall elapse from the time any ground cover plant is planted until it has been watered unless otherwise authorized by the Engineer.

After the first watering, water shall be applied to all plants as often and in sufficient amount as conditions may require to keep the soil and plant roots moist during the life of the contract.

Master remote control valves or gate valves on the discharge side of backflow preventers shall be kept closed at all times, except while the irrigation system is actually in use.

Precautions shall be taken to prevent water from wetting adjacent property, vehicles, pedestrians, and pavement. Any erosion or slippage of the soil caused by watering shall be repaired by the Contractor at the Contractor's expense.

Compliance with these specifications shall not relieve the Contractor of responsibility for the replacement of plants as provided under "Replacement," elsewhere in this division "Landscaping." Any additional watering measures required to maintain the plants in a growing condition shall be furnished by the Contractor at his expense.

REPLACEMENT.--

All other plants, that show signs of failure to grow at any time, or which are so injured or damaged as to render them unsuitable for the purpose intended, as determined by the Engineer, shall be removed and replaced. Unless otherwise permitted by the Engineer, the Contractor shall complete all replacement of unsuitable plants within 2 weeks after the Engineer marks or otherwise indicates that the plants shall be replaced.

Replacement planting shall conform to the spacing and size requirements specified for the plants being replaced. Replacement ground cover plants shall be the same species as specified for the ground cover being replaced. Other replacement plants shall be either the same species as the plants being replaced.

Replacement plants shall be furnished and planted by the Contractor at the Contractor's expense.

Removed plantings shall be removed and disposed of off the premises. Disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site.

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 satisfactorily performed for at least 60 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.

REPLACEMENT PLANTING.--The Contractor, at the Contractor's expense, may use plants of a larger container size than those originally specified for replacement plants during the first 60 working days of the plant establishment period.

MAINTENANCE.--Not more than 20 working days prior to completion of the plant establishment period, the Contractor, when ordered by the Engineer, shall apply one application of a preemergent pesticide conforming to the provisions under "Pesticides," elsewhere in this division "Landscaping." This work, as ordered by the Engineer, will be paid for as an ordered change in conformance with the requirements specified in Section 3, "Changes in the Work," of the General Conditions.

During the plant establishment period, damage caused by erosion shall be repaired in conformance with the requirements in Section 5-1.03, "Responsibility for Damage," of the General Conditions.

Ground cover plant growth which extends onto sidewalks, curbs or dikes, or within 600 mm of fences, unless otherwise shown on the plans, shall be removed. Ground cover also shall be kept removed from within basins, including the basin walls, and from planting areas within header boards.

Basins and basin walls shall be kept well formed and free of weeds.

Plants shall be kept watered and unsuitable plants shall be replaced in conformance with the requirements specified under "Watering" and "Replacement," elsewhere in these special provisions.

Surplus earth, papers, trash, and debris, which accumulate in the planting areas, as designated on the plans or specified elsewhere in these special provisions, shall be removed and disposed of off the premises. Disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site.

FERTILIZER.--One application of commercial fertilizer (slow release) shall be applied to trees, shrubs and ground cover areas when directed by the Engineer. Commercial fertilizer shall be applied at the rates shown on the plans, shall be spread with a mechanical spreader wherever possible, and shall be watered into the soil after application. The Contractor shall notify the Engineer of intent to apply commercial fertilizer at least 5 days prior to applying application of commercial fertilizer.

WEED CONTROL.--Weeds in all planting areas, as designated on the plans or specified elsewhere in these special provisions, shall be controlled as specified in these special provisions and as directed by the Engineer.

Where pesticides are used to control weed as provided under "Pesticides," elsewhere in these special provisions, weeds shall be killed before they exceed 50 mm in length.

Where weeds are to be pulled by hand as specified elsewhere in these special provisions, they shall be pulled before they exceed 100 mm in length and shall be disposed of off the premises on the same day in which they are pulled. Disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site.

Weeds shall be controlled by any method conforming to the specifications for this contract. Dead weed growth which, in the opinion of the Engineer, will interfere with subsequent plant establishment or become unsightly shall be removed and disposed of off the premises. Disposal shall conform to the laws, rules, and regulations of all agencies having jurisdiction at the disposal site.

Weed control, as specified herein, shall be performed as often as required to maintain the project in a neat and uniform condition at all times.

ELECTRIC AUTOMATIC IRRIGATION SYSTEM.--During the plant establishment period, the electric automatic irrigation system shall be operated in the automatic mode, unless otherwise permitted by the Engineer.

When any electric automatic irrigation component is operated manually on a working day, that day will not be credited as a plant establishment working day unless the manual operation has been permitted in writing by the Engineer.

As part of the plant establishment work, 30 days prior to completion of the plant establishment period, instruction shall be given to the Engineer by a qualified person from the Contractor's personnel on the use and adjustment of the irrigation controller installed.

The approved watering schedule program shall be implemented within 15 days but not less than 5 days prior to the completion of the plant establishment period. The programming shall not relieve the Contractor of responsibility to apply sufficient water as conditions may require to keep the soil and plant roots moist.

2.18 DRAINAGE INLET

PART 1.- GENERAL

Scope.--This work shall consist of constructing concrete drainage inlets, in conformance with the designs and details shown on the plans and as specified in these specifications and the special provisions.

PART 2.- PRODUCTS

Concrete.--

Concrete for drainage inlet shall be commercial quality concrete, proportioned to provide a workable mix suitable for the intended use, with not less than 325 kilograms of cement per cubic meter.

Concrete shall be in accordance with the requirements specified under "Cast-In-Place Concrete" in Division 3, "Concrete and Reinforcement," of these special provisions.

Frames and grates.--

Frames and Grates shall conform to the dimensions and details shown on the plans and as specified in these special provisions.

At the option of the Contractor, grates shall be fabricated from either structural steel conforming to the requirements in ASTM Designations: A 36/A 36M or A 576 Grades 1021, 1022, 1026, 1029 or 1030, ductile iron castings, or carbon-steel castings.

Welding shall conform to the requirements in AWS D1.1.

Fabrication shall be performed in a workmanlike manner in conformance with the practice in modern commercial shops. Burrs, rough and sharp edges, and other flaws shall be removed. Warped pieces shall be straightened after all fabrication and galvanizing.

Drainage inlet frames and grates, except those which are to be on bridges, need not be galvanized or coated with asphalt paint.

Frames and grates, or frames and covers shall be matchmarked in pairs before delivery to the work and the grates and covers shall fit into their frames without rocking.

Unless otherwise specified, materials shall conform to the following specifications:

Material	Specification
Steel bars, plates and shapes	ASTM Designation: A 36/A 36M or A 575, A 576 (AISI or M Grades 1016 through 1030 except Grade 1017)
Steel fastener components for general applications: Bolts and studs Headed anchor bolts Nonheaded anchor bolts High-strength bolts and studs, threaded rods, and nonheaded anchor bolts Nuts Washers	ASTM Designation: A 307 ASTM Designation: A 307, Grade B, including S1 supplementary requirements ASTM Designation: A 307, Grade C, including S1 supplementary requirements and S1.6 of AASHTO Designation: M 314 supplementary requirements or AASHTO Designation: M 314, Grade 36 or 55, including S1 supplementary requirements ASTM Designation: A 449, Type 1 ASTM Designation: A 563, including Appendix X1 ^a ASTM Designation: F 844
Components of high-strength steel fastener assemblies for use in structural steel joints: Bolts Tension control bolts Nuts Hardened washers Direct tension indicators	ASTM Designation: A 325, Type 1 ASTM Designation: F 1852, Type 1 ASTM Designation: A 563, including Appendix X1 ^a ASTM Designation: F 436, Type 1, Circular, including S1 supplementary requirements ASTM Designation: F 959, Type 325, zinc-coated
Stainless steel fasteners (Alloys 304 & 316) for general applications: Bolts, screws, nuts, studs, threaded rods, and nonheaded anchor bolts Washers	ASTM Designation: F 593 or F 738M ASTM Designation: A 240 and ANSI B 18.22M
Carbon-steel castings	ASTM Designation: A 27/A 27M, Grade 65-35 [450-240], Class 1
Malleable iron castings	ASTM Designation: A 47, Grade 32510 or A 47M, Grade 22010
Gray iron castings	ASTM Designation: A 48, Class 30B
Ductile iron castings	ASTM Designation: A 536, Grade 65-45-12
Cast iron pipe	Commercial quality standard soil
Steel pipe	Commercial quality welded
Other parts for general applications	Commercial quality

^a Zinc-coated nuts that will be tightened beyond snug or wrench tight shall be furnished with a dry lubricant conforming to Supplementary Requirement S2 in ASTM Designation: A 563.

PART 3.- EXECUTION

Installation.-- This work shall consist of constructing concrete structures to the lines and grades established by the Engineer and in conformance with the designs and details shown on the plans.

Where new drainage structures are located in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed immediately adjacent to the structure.

Forms.-- Concrete forms shall be mortartight, true to the dimensions, lines and grades of the structure, and of sufficient strength to prevent appreciable deflection during the placing of the concrete.

The inside surfaces of forms shall be cleaned of all dirt, mortar and foreign material. Forms which will later be removed shall be thoroughly coated with form oil prior to use. The form oil shall be a commercial quality form oil or other equivalent coating which will permit the ready release of the forms and will not discolor the concrete.

Concrete shall not be deposited in the forms until all work connected with constructing the forms has been completed, all materials required to be embedded in the concrete have been placed for the unit to be poured, and the Engineer has inspected the forms and materials. This work shall include the removal of all dirt, chips, sawdust, water and other foreign material from the forms.

The rate of depositing concrete in forms shall be controlled to prevent deflections of the forms or form panels in excess of the deflections permitted by these specifications.

Forms for all concrete surfaces which will not be completely enclosed or hidden below the permanent ground surface shall conform to the requirements herein for forms for exposed surfaces. Interior surfaces of underground drainage structures shall be considered to be completely enclosed surfaces.

Forms for drainage inlets may be constructed of any suitable material that will produce a structure with the inside dimensions and at least the wall thicknesses shown on the plans. Undulations of finished interior wall surfaces shall not exceed 15 mm. Outside forms shall extend at least 130 mm below the top of the inlet. Concrete may be deposited against excavated earth below this depth except that full depth outside forms or other protection shall be used whenever the instability of the earth or the Contractor's operations cause hazardous conditions or contamination of the concrete. Exterior forms shall be removed to not less than 130 mm below final ground surface. Exterior forms below this depth may remain in place if their total thickness does not exceed 25 mm.

The removal of forms which do not support the dead load of concrete members, other than railings and barriers, shall not begin until at least 24 hours after the concrete for the member has been placed and until the concrete has sufficient strength to prevent damage to the surface.

2.19 FLARED END SECTIONS

PART 1.- GENERAL

Scope.-- This work shall consist of furnishing and installing metal flared end sections required for drainage and transmission facilities; all as shown on the plans or as directed by the Engineer and as specified in these special provisions.

PART 2.- PRODUCTS

Steel flared end section.--

Flared end sections shall be constructed in accordance with the details and dimensions shown on the plans, except that minor variations may be accepted to permit the use of the manufacturer's standard methods of fabrication. Prefabricated steel flared end sections shall conform to the requirements in AASHTO Designations: M 36/M 36M and M 218.

PART 3.- EXECUTION

Installation.-- Steel flared end sections shall be installed as shown on the plans and in accordance with similar work of these specifications.

Earthwork.--Excavation, backfill shall conform to the provisions in Division 2, "Earthwork For Building Work," of these special provisions.

2.20 ROCK ENERGY DISSIPATER

PART 1.- GENERAL

Scope.--This work shall consist of constructing rock energy dissipater in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS

Rock slope protection.--

The individual classes of rocks used in rock slope protection shall conform to the following, unless otherwise specified in the special provisions, or as shown on the plans.

GRADING OF ROCK SLOPE PROTECTION								
Method B Placement Percentage Larger Than*								
Rock Mass	Classes							
	1T	1/2T	1/4T	Light	Facing	No. 1	No. 2	No. 3
1.8-Tonne	0-5	—	—	—	—	—	—	—
900-kg	50-100	0-5	—	—	—	—	—	—
450-kg	—	50-100	0-5	—	—	—	—	—
220-kg	95-100	—	50-100	0-5	—	—	—	—
90-kg	—	95-100	—	50-100	0-5	0-5	—	—
34-kg	—	—	95-100	—	50-100	50-100	0-5	—
11-kg	—	—	—	95-100	90-100	90-100	25-75	0-5
2.2-kg	—	—	—	—	—	—	90-100	25-75
0.4-kg	—	—	—	—	—	—	—	90-100

* The amount of material smaller than the smallest rock mass listed in the above tables for any class of rock slope protection shall not exceed the percentage limit listed in the above tables determined on a mass basis. Compliance with the percentage limit shown in the above tables for all other rock masses of the individual pieces of any class of rock slope protection shall be determined by the ratio of the number of individual pieces larger than the specified rock mass compared to the total number of individual pieces larger than the smallest rock mass listed in the above tables for that class.

The material shall also conform to the following quality requirements:

Test	California Test	Requirement
Apparent Specific Gravity	206	2.5 min.
Absorption	206	4.2% max.*
Durability Index	229	52 min.*

* Based on the formula listed below, absorption may exceed 4.2 percent if DAR is greater than 10. Durability Index may be less than 52 if DAR is greater than 24.

$$\frac{\text{CoarseDurabilityIndex}}{\% \text{Absorption} + 1} = \text{Durability Absorption Ratio (DAR)}$$

Rocks shall be of such shape as to form a stable protection structure of the required section. Rounded boulders or cobbles shall not be used on prepared ground surfaces having slopes steeper than 1:2 (vertical:horizontal). Angular shapes may be used on any planned slope. Flat or needle shapes will not be accepted unless the thickness of the individual pieces is greater than 0.33 times the length.

Rock slope protection fabric.--

Rock slope protection fabric shall be manufactured from polyester, nylon, polypropylene or polyvinylidene material or any combination thereof.

Rock slope protection fabric shall be treated with ultraviolet ray (UV) protection. The UV treated fabric shall provide a minimum of 70 percent breaking strength retention after 500 hours exposure when tested in conformance with the requirements in ASTM Designation: D 4355. Unless otherwise specified, the Contractor shall submit samples of the treated fabric to the Engineer at least 45 days prior to use.

Rock slope protection fabric shall be, at the option of the Contractor, either woven filament or nonwoven type fabric.

Woven filament type rock slope protection fabric shall be Type A or Type B as specified in the special provisions. The woven filament fabric shall be manufactured from individually extruded and quenched filaments, not from larger previously quenched fibers or films, and shall conform to the following:

Specification	Requirement	
	Type A	Type B
Weight, grams per square meter, min. ASTM Designation: D 3776	135	200
Grab tensile strength (25-mm grip), kilonewtons, min. in each direction ASTM Designation: D 4632	0.45	0.89
Elongation at break, percent max. ASTM Designation: D 4632	35	35
Toughness, kilonewtons, min. (Percent elongation x grab tensile strength)	15	31
Permittivity, 1/sec., min. ASTM Designation: D 4491	0.5	0.5

Edges of woven filament fabric shall be either selvaged or serged.

Nonwoven type rock slope protection fabric shall be Type A or Type B as specified in the special provisions and shall conform to the following:

Specification	Requirement	
	Type A	Type B
Weight, grams per square meter, min. ASTM Designation: D 3776	135	200
Grab tensile strength (25-mm grip), kilonewtons, min. in each direction ASTM Designation: D 4632	0.40	0.89
Elongation at break, percent min. ASTM Designation: D 4632	50	50
Toughness, kilonewtons, min. (Percent elongation x grab tensile strength)	26	53
Permittivity, 1/sec., min. ASTM Designation: D 4491	0.5	0.5

PART 3.- EXECUTION

Rock slope protection fabric.--Rock slope protection fabric shall be placed prior to placing rock slope protection, when the fabric is shown on the plans, or specified in these special provisions, or ordered by the Engineer.

Rock slope protection fabric shall be placed in conformance with the details shown on the plans and as specified in these specifications.

Prior to placing rock slope protection fabric, the surfaces upon or against which rock slope protection fabric is to be placed, shall be free of loose or extraneous material and sharp objects that may damage the fabric during installation.

Rock slope protection fabric shall be handled and placed in conformance with the manufacturer's recommendations and as directed by the Engineer. Rock slope protection fabric shall be placed loosely upon or against the surface to receive the fabric so that the fabric conforms to the surface without damage when the cover material is placed.

Rock slope protection fabrics shall be joined, at the option of the Contractor, either with overlapped joints or stitched seams.

When fabric is joined with overlapped joints, adjacent borders of the fabric shall be overlapped not less than 600 mm. The fabric shall be placed such that the fabric being placed shall overlap the adjacent section of fabric in the direction the cover material is being placed.

When the fabric is joined by stitched seams, the fabric shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The number of stitches per 25 mm of seam shall be approximately 5 to 7. The strength of stitched seams shall be the same as specified for the fabric, except when stitched seams are oriented up and down a slope, the strength shall be a minimum of 80 percent of that specified for the fabric.

Equipment or vehicles shall not be operated or driven directly on the rock slope protection fabric.

Equipment or vehicles shall not be operated or driven directly on the rock slope protection fabric.

Rock slope protection fabric damaged during placement shall be replaced or repaired, as directed by the Engineer, by the Contractor at the Contractor's expense. Fabric damaged beyond repair, as determined by the Engineer, shall be replaced. Repairing damaged fabric shall consist of placing new fabric over the damaged area. The minimum fabric overlap from the edge of the damaged area shall be one meter for overlap joints. If the new fabric joints at the damaged areas are joined by stitching, the stitched joints shall conform to the requirements specified herein.

Rock slope protection.--Rock slope protection shall be placed in conformance with one of the following methods as designated in these special provisions.

Method B Placement.--A footing trench shall be excavated along the toe of the slope as shown on the plans. shall be so placed as to provide a minimum of voids, and the larger rocks shall be placed in the toe course and on the outside surface of the slope protection. The rock may be placed by dumping and may be spread in layers by bulldozers or other suitable equipment.

Local surface irregularities of the slope protection shall not vary from the planned slopes by more than 0.3-m measured at right angles to the slope.

2.21 STORM DRAINAGE PIPE

PART 1.- GENERAL

Scope.--This work shall consist of furnishing and installing corrugated or ribbed plastic pipe for culverts, drains and conduits, with all necessary fittings and coupling systems, as shown on the plans or as directed by the Engineer and as specified in these special provisions.

PART 2.- PRODUCTS

Plastic pipe.--

Plastic pipe shall be either Type C, Type D or Type S corrugated polyethylene pipe, ribbed profile wall polyethylene pipe, or ribbed polyvinyl chloride drain pipe.

Where designated on the plans as corrugated interior wall type, plastic pipe shall be Type C corrugated polyethylene pipe.

Where designated on the plans as smooth interior wall type, plastic pipe shall be, at the option of the Contractor, either Type D or Type S corrugated polyethylene pipe, ribbed profile wall polyethylene pipe or ribbed polyvinyl chloride drain pipe.

Where the type of plastic pipe is not designated on the plans, plastic pipe shall be, at the option of the Contractor, either corrugated or smooth interior wall.

Materials.--

Type C, Type D and Type S corrugated polyethylene pipe shall conform to the requirements in AASHTO Designation: M 294, except as otherwise specified. Corrugated polyethylene pipe shall be manufactured from high density polyethylene (HDPE) virgin compounds.

Ribbed profile wall polyethylene pipe shall be manufactured from high density polyethylene (HDPE) virgin compounds and shall conform to the requirements in ASTM Designation: F 894, except as otherwise specified in these specifications.

PVC compounds used in the manufacture of plastic pipe culverts shall conform to the following Cell Classifications specified in ASTM Designation: D 1784:

Property	Cell Classification
Base resin	1
Impact strength (Izod)	2 through 6
Tensile strength	3 or 4
Modulus of elasticity	5 or 6
Deflection temperature	4 or 5
Chemical resistance	A, B or C

HDPE compounds used in the manufacture of plastic pipe culverts shall conform to the following Cell Classifications specified in ASTM Designation: D 3350:

Property	Cell Classification
Density	3
Melt index	2 ^a , 3 or 4
Flexural modulus	4, 5 or 6
Tensile strength	4, 5 or 6
Environmental stress crack resistance	1, 2 or 3
Hydrostatic design basis	0, 1, 2, 3 or 4
Ultraviolet stabilizer	C ^b

- a The Melt Index for Cell Classification 2 material used to manufacture pipe shall not be greater than 0.6. Rotationally molded couplings and end fittings may be produced from material compounds having a Melt Index Cell classification of 1.
- b HDPE resin shall contain not less than 2 ±0.5 percent carbon black ultraviolet stabilizer.

The residue from ignition of the HDPE and PVC compounds shall not exceed 30 percent as determined by ASTM Designation: D 2584, except that the muffle furnace temperature shall be 450 ±25°C.

In conformance with the provisions in Section 6-1.07, "Certificates of Compliance," a Certificate of Compliance shall be furnished to the Engineer for each type of plastic pipe furnished. The certificate shall also certify that the plastic pipe complies with the requirements of the specifications, and shall include the resin material Cell Classification, unit mass of pipe, average pipe stiffness and date of manufacture.

Pipe thickness, stiffness and unit mass.--

Wall thickness of Type C corrugated polyethylene pipe shall be measured at the inside valley of the corrugation. Wall thickness of Type D corrugated polyethylene pipe shall be measured as the thickness of the inner liner. Wall thickness of Type S corrugated polyethylene pipe shall be the thickness of the inner liner measured between corrugation valleys. Wall thickness of ribbed profile wall polyethylene pipe shall be measured in the gap between ribs. The wall thickness of the various types of polyethylene pipe, measured as specified above, shall equal or exceed the minimum wall thickness values in Table 1. The wall thickness of ribbed profile wall PVC pipe measured in the gap between ribs shall equal or exceed the minimum wall thickness values in Table 3.

The pipe stiffness shall be determined in conformance with the requirements in ASTM Designation: D 2412 at 5 percent deflection. Average pipe stiffness shall be determined for each manufactured run from 3 test specimens. The length of each test specimen shall equal the nominal pipe diameter, except that the specimen length shall not exceed 900 mm for pipe larger than 900 mm in nominal diameter. The average pipe stiffness shall equal or exceed the minimum pipe stiffness value for each individual kind and size of plastic pipe listed in Tables 1 and 3.

The pipe unit mass shall be computed as the average mass per meter of length determined from 3 test specimens, taken from each manufactured run. Each test specimen for pipes 600 mm in diameter and less shall be a minimum length of 2 diameters. The length of each test specimen for pipes larger than 600 mm in diameter shall be one diameter or a maximum of 900 mm, whichever is less. The mass of pipe specimens shall be determined with any suitable weighing device accurate to 0.05-kg. The pipe unit mass for each individual kind and size of plastic pipe shall equal or exceed the minimum unit mass value for each individual kind and size of plastic pipe listed in Tables 2 and 3.

TABLE 1
HDPE Pipe

Nominal Diameter (millimeters)	Minimum Wall Thickness (millimeters)	Minimum Pipe Stiffness (kPa)
300	0.89	345
375	0.89	290
450	1.27	275
525	1.27	260
600	1.27	235
675	1.27	215
750	1.27	195
825	1.27	170
900	1.27	150
1050	1.80	140
1200	1.80	125

TABLE 2
HDPE Pipe

Nominal Diameter (millimeters)	Minimum Unit Mass			
	Type C Corrugated (Kilograms per meter)	Type D Corrugated (Kilograms per meter)	Type S Corrugated (Kilograms per meter)	Ribbed (Kilograms per meter)
300	4.2	na	4.0	na
375	6.0	na	6.0	na
450	8.6	na	8.9	14.3
525	na	na	na	19.6
600	14.3	na	15.2	26.2
675	na	na	na	na
750	na	na	22.3	na
825	na	na	na	na
900	na	na	26.9	na
1050	na	33.0	33.0	na
1200	na	47.5	40.1	na

Note: "na" in the above table indicates that the pipe size of that type of pipe either is not available from manufacturers or has not been approved for use.

TABLE 3
Ribbed PVC Pipe

Nominal Diameter (millimeters)	Minimum Wall Thickness (millimeters)	Minimum Pipe Stiffness (kPa)	Minimum Pipe Unit Mass (kilograms per meter)
450	2.41	220	11.9
525	2.67	190	16.4
600	2.92	165	19.3
675	3.18	150	25.3
750	3.43	130	29.8
900	3.94	110	40.2
1050	4.32	95	56.6
1200	4.83	80	77.4

Joints.--

Where sleeve joint connections are utilized, the sleeve minimum width shall be 195 mm, and at least 2 corrugations from each pipe to be joined are engaged by the sleeve.

Where watertight joints are not specified, Type S corrugated polyethylene pipe shall incorporate, on each side of the joint, a closed-cell expanded rubber gasket conforming to the requirements in ASTM Designation: D 1056, Grade 2A2. Type D corrugated polyethylene pipe shall incorporate a rubber gasket in a groove on the spigot end of the pipe. The gasket for Type D polyethylene pipe shall conform to the requirements in ASTM Designation: F 477 or D 1056, Grade 2A2. The gaskets described in this paragraph shall be installed by the pipe manufacturer. Pipe shall be stored in a manner that protects the gaskets from weather. Cracks or splits occurring on gaskets will be cause for rejection.

Corrugated polyethylene pipe to be joined by sleeve joints shall be laid to line and grade with the separate sections not more than 40 mm apart and then joined together firmly with at least 2 corrugations from each pipe section engaged in the coupler.

Slurry cement backfill.--

Slurry cement backfill shall consist of a fluid, workable mixture of aggregate, cement and water.

Slurry cement backfill may be used as structure backfill for pipe culverts, except that slurry cement backfill shall not be used as structure backfill for aluminum and aluminum-coated pipe culverts.

When slurry cement backfill is used for structure backfill, the width of the excavation shown on the plans may be reduced so that the clear distance between the outside of the pipe and the side of the excavation, on each side of the pipe, is a minimum of 150 mm for pipes up to and including 1050 mm in diameter or span, or 300 mm for pipes over 1050 mm in diameter or span.

Slurry cement backfill shall be placed only for that portion of the structure backfill below the original ground or the grading plane or the top of the embankment placed prior to excavating for the culvert pipe. Where necessary, earth plugs shall be compacted at each end of the pipe prior to placing backfill in a manner that will completely contain the slurry in the pipe trench.

Cement shall be portland cement.

Water used for slurry cement backfill shall be free from oil, salts and other impurities which would have an adverse effect on the quality of the backfill material.

At the option of the Contractor, aggregate shall be either (1) material selected from excavation, imported material or a combination thereof, which is free of organic material and other deleterious substances, or (2) commercial quality concrete sand. Material selected from excavation, imported material or a combination thereof, shall meet the following grading:

Sieve Sizes	Percentage Passing
37.5-mm	100
25-mm	80 - 100
19-mm	60 - 100
9.5-mm	50 - 100
4.75-mm	40 - 80
150-µm	10 - 40

The aggregate, cement and water shall be proportioned either by mass or by volume. Not less than 110 kg of cement shall be used for each cubic meter of material produced. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.

Materials for slurry cement backfill shall be thoroughly machine-mixed in a pugmill, rotary drum, or other approved mixer. Mixing shall continue until the cement and water are thoroughly dispersed throughout the material. Slurry cement backfill shall be placed in the work within one hour after mixing.

Slurry cement backfill shall be placed in a uniform manner that will prevent voids in, or segregation of, the backfill, and will not float or shift the culvert. Foreign material which falls into the trench prior to or during placing of the slurry cement backfill shall be immediately removed.

Backfilling over or placing any material over slurry cement backfill shall not commence until 4 hours after the slurry cement backfill has been placed, except that when concrete sand is used for the aggregate and the in-place material is free draining, backfilling may commence as soon as the surface water is gone.

PART 3.- EXECUTION

Installation.--Plastic pipe shall be laid in a trench excavated to the lines and grades established by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe.

Plastic pipe shall be laid and jointed in accordance with generally accepted practice and the following provisions in order to be suitable for the purpose intended.

Necessary facilities shall be provided for lowering and properly placing the sections of pipe in the trench.

The pipe shall be laid to line and grade with the sections closely jointed.

Every precaution shall be taken to prevent flooding the pipe trench before backfilling operations.

New plastic pipe shall be connected to existing or new drainage facilities as shown on the plans.

Earthwork.--Excavation, backfill and shape bedding shall conform to the provisions in Division 2, "Earthwork For Building Work," of these special provisions, except at locations where pipe is to be backfilled with slurry cement backfill.

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.

Whenever the 28-day compressive strength shown on the plans is 25 MPa or greater, the concrete shall be considered to be designated by compressive strength. The 28-day compressive strengths shown on the plans which are less than 25 MPa, are shown for design information and are not to be considered a requirement for acceptance of the concrete.

Related work.--Compressive strength concrete shall conform to the requirements in "Compressive Strength Concrete," elsewhere in this Division 3.

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.

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.

Concrete (minor work).--

Commercial quality concrete for concrete curbs, walkway aprons, and air conditioning pads 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.

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.

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.

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.--

Bar reinforcement.--

Bar reinforcement shall conform to ASTM Designation: A 615/A 615M, Grade 60 [420], or ASTM Designation: A 706/A 706M.

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: A 307.

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.--

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.

Splash block.--

Splash blocks shall be precast concrete splash blocks with depressed runoff trough. Splash blocks shall be 305 mm x 610 mm x 89 mm in size unless otherwise shown on the plans.

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.

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.

Anchorage and embedded items shall be placed and rigidly secured at their planned locations prior to placing concrete.

Reglets or embedded flashing shall be installed on concrete forms before the concrete is placed.

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 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.

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.

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.

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 and driveway aprons 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 curbs 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 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.

3.02 PRECAST CONCRETE TILT-UP PANELS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work consist of constructing and erecting precast concrete tilt-up panels in accordance with the details shown on the plans and these special provision.

The requirements of this special provision are in addition to the applicable requirements for concrete (structural work) and bar reinforcing steel in "Cast-in-Place Concrete," elsewhere in this Division 3.

Alternatives.--The Contractor may submit an alternative design for tilt-up panels using different details, concrete strengths or reinforcement for approval by the Engineer. Submittals for an alternative design must include detailed drawings of all elements of the design affected and complete design calculations signed by a Civil or Structural Engineer licensed in the State of California. Conformance with the details shown on the plans will preclude the necessity for the submittal of design calculations.

SUBMITTALS.--

Product data.--Manufacturer's data for bond breakers, inserts, lifting devices and bracing shall be submitted for approval.

Shop drawings.--Complete shop drawings showing panel dimensions, openings, location of items cast into panels for lifting and bracing, additional reinforcement required for lifting and bracing devices, construction loads and other pertinent information shall be submitted for approval.

Shop drawings shall also include a location plan which shows the location, identification and sequence of erection of each tilt-up panel.

QUALITY ASSURANCE.--

Codes and standards.--Welds at panel connections shall conform to the requirements in AWS D1.1, "Structural Welding Code - Steel," for steel shapes and AWS D1.4, "Structural Welding Code - Reinforcing Steel," for bar reinforcing steel.

PART 2.- PRODUCTS

MATERIALS.--

Embedded items.--

Embedded items such as reglets, pressed metal door or window frames and other such items shall conform to the details shown on the plans.

Bond breaker.--

Bond breaker shall be a commercial quality solution containing no oils, waxes, paraffins, or other material which could affect the bond of subsequent finishes or natural appearance of the exposed concrete surfaces.

Form liners.--

Form liners shall be commercial quality liners as required to produce a panel finish as shown on the plans.

PART 3.- EXECUTION

CASTING PANELS.--

General.--The installation of inserts and anchorages required to be set into the concrete panels prior to casting shall be coordinated with other work.

Curing base casting slabs.--Concrete surfaces upon which wall panels are to be cast, shall be cured as specified for other concrete except that paper or other curing sheets are not to be used.

The concrete shall be kept continuously wet by application of water for a minimum of 48 hours. Mats, rugs or sand blankets may be used to retain the moisture.

Upon completion of the water cure, a curing compound, certified to have qualities of a bond breaker, shall be applied in accordance with the manufacturer's instructions.

Forms.--Forms for precast units shall be mortar tight and well supported to prevent deformation or damage to the units.

Form liners shall be accurately placed to provide a finished surface as shown on the plans.

Reinforcing steel and inserts.--Reinforcing steel shall be placed as for other concrete work. Anchorages, inserts and other cast-in-place items shall be located and firmly secured in position.

After placing reinforcing steel, inserts and other embedded items, the casting slab surface shall be checked for continuity of the bond breaker. Any damaged areas shall be repaired prior to placing the concrete.

Placing and curing concrete.--Concrete shall be placed, consolidated and cured as for other concrete work.

Curing may be completed with panels in the vertical position when sufficient strength is attained for lifting without damage.

ERECTION AND INSTALLATION.--

General.--Erection equipment shall be used with care to prevent damage to panels and floor slabs. Any damage shall be repaired prior to completion of the work.

Sequence of erection.--Sequence of erection and location of panels shall be as shown on the approved erection plan.

Erection.--Panels shall not be erected until at least 75 percent of the design strength shown on the plans has been attained and verified by the Contractor.

Panels shall be carefully lifted and tilted from the casting bed and erected plumb in accurate location and alignment. Wedges shall be used to accurately position panels. Panels shall be anchored in place as shown on the plans. Concrete mortar, grout or drypack shall be used to fill joints between the panels and foundation system.

Temporary bracing and supports shall be used to hold the panels in position. Braces and supports shall be maintained in position until closures, columns or other supporting structures are in place and capable of supporting the panels.

Welding.-- Panels shall be welded to supports as shown on the plans.

PATCHING.--

General.-- Holes in panels caused by lifting and bracing devices shall be patched as specified for other concrete work.

FIELD QUALITY CONTROL.--

Testing.-- Concrete strength at the time of lifting shall be verified with tests conducted by the Contractor.

3.03 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.

3.04 COMPRESSIVE STRENGTH CONCRETE

PART 1.- GENERAL

SUMMARY.--

Scope.--This work consist of furnishing and testing compressive strength portland cement concrete in accordance with the details shown on the plans and these special provision.

Whenever the 28-day design strength shown on the plans is 25 MPa or greater, the concrete shall be considered to be designated by compressive strength.

Concrete designated by compressive strength shall be proportioned such that the concrete will conform to the strength shown on the plans or specified in these special provisions.

Related work.--The requirements of this special provision are in addition to the applicable requirements for concrete (structural work) in "Cast-in-Place Concrete," elsewhere in this Division 3.

SUBMITTALS.--

Mix design.--Before using compressive strength concrete, the Contractor shall submit in writing to the Engineer a copy of the mix design.

Quality control submittals.--When concrete is specified by compressive strength, prequalification of materials, mix proportions, mixing equipment, and procedures proposed for use, will be required prior to the placement of such concrete. Prequalification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Prequalification data shall be based on the use of materials, mix proportions, mixing equipment, procedures and size of batch proposed for use in the work.

The certified test data and trial batch test reports shall include the following information:

- A. Date of mixing.
- B. Mixing equipment and procedures used.
- C. The size of batch in cubic meters and weight, type and source of all ingredient used.
- D. Penetration of the concrete.
- E. The air content of the concrete if an air-entraining admixture is used.
- F. The age at time of testing and strength of all concrete cylinders tested.

All certified test data and trial batch reports shall be signed by an official of the firm which performed the tests.

When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower quality is required.

Certified test data.--Certified test data, in order to be acceptable, must indicate that not less than 90 percent of at least 20 consecutive 28-day tests exceed the specified strength, and none of said tests are less than 95 percent of the specified strength. Strength tests included in such data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.

Trial batch reports.--Trial batch test reports, in order to be acceptable, must indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch at not more than 28 days after molding shall be at least 4 MPa greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength.

Data contained in the report shall be from trial batches which were produced within one year of the proposed use of the specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.

All tests shall be performed in accordance with either the appropriate California Test methods or the comparable ASTM test methods. All equipment employed in testing shall be in good condition and shall be properly calibrated. If test are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures.

PART 2.- PRODUCTS (not applicable)

PART 3.- EXECUTION

FIELD QUALITY CONTROL.--

Testing.--The Contractor shall engage an independent testing agency to conduct field quality control testing in accordance with these special provisions.

The compressive strength of concrete will be determined from test cylinders which have been fabricated from concrete sampled in accordance with California Test 539. Test cylinders shall be molded and initial field cured in accordance with California Test 540. Test cylinders shall be cured and tested after receipt at the testing laboratory in accordance with California Test 521. A strength test shall consist of the average strength of 2 cylinders fabricated from material taken from a single load of concrete, except that, if any cylinder should show evidence of improper sampling, molding or testing, said cylinder shall be discarded and the strength test shall consist of the strength of the remaining cylinder.

When the concrete is designated by 28-day compressive strength rather than by cement content, the concrete strength to be used as a basis for acceptance will be determined from cylinders cured in accordance with Method 1 of California Test 540. If the result of a single 28-day compressive strength is below the specified strength but is 95 percent or more of the specified strength, the Contractor shall, at his expense, make corrective changes, subject to approval of the Engineer, in the mixing proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the State \$14.00 for each in-place cubic meter of concrete represented by the deficient test. If the result of a single 28-day test is below 95 percent of the specified strength but is 85 percent or more of the specified strength, the Contractor shall make the aforementioned corrections and pay to the State \$20.00 for each in place cubic meter of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of the concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at 28 days. All such concrete represented by a single test which indicates a compressive strength of less than 85 percent of the specified 28-day compressive strength shall be removed in accordance with the provisions in Section 2-1.10, "Removal of Rejected or Unauthorized Work," of the General Conditions.

If the test result indicates a 28-day strength below the specified strength, but 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at his expense obtains and submits sufficient evidence acceptable to the Engineer that the strength of the concrete placed in the work meets or exceeds the specified strength 28-day compressive strength. If the test result indicates a 28-day compressive strength below 85 percent, the concrete represented by such test will be rejected, unless the Contractor, at his expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If such evidence consists of cores taken from the work, the cores shall be obtained and tested in accordance with specifications of ASTM Designation: C 42.

No single 28-day strength test shall represent more than 230 m³.

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 = 10.3 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.--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 Uniform 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.-- 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 Uniform Building Code in accordance with the requirements in Section 1701, "Special Inspections," and Section 2105, "Quality Assurance," of the Uniform 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 Uniform 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 Uniform 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 Uniform 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 f'm" of the UBC. The contractor can establish f'm 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 Uniform 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:

- Sub Shop roof framing and columns
- Sub Shop braced frame
- Office Building roof framing and columns

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.

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 as shown on the plans.

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 painted shall be blast cleaned in accordance with Steel Structures Painting Council, SSPC-SP 6, "Commercial Blast Cleaning."

Bolted connections.--Contact surfaces of high strength bolted connections and ungalvanized anchor bolt assemblies shall be blast cleaned and primed with red oxide primer designed for steel surfaces 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 red oxide primer designed for steel surfaces.

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 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 OPEN WEB STEEL JOISTS

PART 1.- GENERAL

Scope.--This work shall consist of designing, fabricating, furnishing and erecting pre-engineered, factory fabricated steel joists and accessories in accordance with the detail shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturers descriptive data, layout and anchorage details, quality control manual, welder qualifications, and installation instructions shall be submitted for approval.

Shop drawings.--Complete shop drawings and design calculations for the pre-engineered steel joists, permanent bracing, continuity angles and connection details shall be submitted for approval. Submittals shall be approved prior to the start of fabrication.

Shop drawings shall show the size and shape of the truss members 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 steel joist.

Calculations for the design of the steel joists, bracing and connections shall include a list of applied loads and load combinations with the resulting member forces and member stresses. Steel joists and connections shall be designed for the chord forces shown on the plans.

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.

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.--

Manufacturer Qualification.--Steel joists shall be manufactured by a firm experienced in manufacturing steel joists similar to those specified and with a record of successful in-service performance. Manufacturer shall be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.

Codes and Standards.--Steel joists and permanent bracing shall be designed for the loads shown on the plans and other applied loads, including fire sprinkler systems. The design shall be in accordance with the requirements of the California Building Code (CBC) and the Steel Joist Institute "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders" (SJI-01).

Certificates of Compliance.--Certificates of Compliance shall be furnished for the steel joists in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

Identification.--Each joist shall be stamped or marked with a location identification mark or symbol and with the name and address of the manufacturer.

DELIVERY, STORAGE AND HANDLING.--

General.--Steel joists shall be delivered to the site in undamaged condition and stored off the ground in a well drained location, protected from damage, and easily accessible for inspection and handling. Covers shall be provided to protect the materials from corrosion.

Steel joists shall be handled in such a manner as to prevent damage due to bending and warping.

PART 2.- PRODUCTS

Open web steel joists.--

Open web steel joists shall conform to SJI-01, K-Series. Joists shall be tapered and shall be designed to support the loads shown on the plans.

Bearing plates, fasteners and accessories.--

Bearing plates, fasteners and accessories shall be as shown on the approved working drawings.

Anchors.--

Anchors shall conform to the requirements in "Building Miscellaneous Metal" specified under Division 5, "Metals," of these special provisions.

FABRICATION.--

General.--Workmanship and finish shall be equal to the best general practice in modern steel fabrication shops. Construction shall conform to the SJI Code of Standard Practice.

Camber, if required by the design, shall be built into the joists.

CLEANING AND SHOP PAINTING.—

Painting.--Immediately after cleaning, surfaces of steel joists shall receive a one-coat shop applied steel prime coat of red oxide ferrous metal primer at a rate to provide a dry film thickness of not less than 0.04 mm.

PART 3.- EXECUTION

EXAMINATION.—

General.—The Contractor shall examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

ERECTION.--

General.--Installation of joists shall be in accordance with the approved working drawings. Steel joists and bracing members shall be accurately cut to provide tightly fitted joints and connections.

Joists shall be handled in a manner to avoid damage. Damaged joists shall be removed from the site, except when field repair is approved by the Engineer and such repairs are satisfactorily made in accordance with the manufacturer's recommendations.

Installation.--Steel joists shall be erected plumb and true and shall be secured rigidly in place in accordance with the approved working drawings. Joists shall not be field cut or otherwise altered without the written approval of the Engineer.

Temporary bracing shall be installed during erection to hold the joists plumb and true and in a safe position until sufficient permanent construction is in place to provide full stability.

Bearing plates shall have full bearing after the supporting members have been plumbed and properly positioned, prior to placing superimposed loads.

Connectors, fasteners and other hardware accessories shall be coordinated for placement in the proper locations and positions.

Joist bridging and anchoring shall be secured in place prior to the application of any construction loads. Any temporary loads shall be distributed so that the design carrying capacity of any joist is not exceeded. Loads shall not be applied to bridging during construction or in the completed work.

All permanent bracing shall be secured in place before any sustained permanent loads are applied to the joist system.

Welding shall be by the tungsten inert gas arc welding method or the consumable electrode inert gas method. Welding processes that require the use of flux are not permitted.

All welds shall conform to the requirements of Section 8.15, "Quality of Welds," of the American Welding Society publication No. AWS D 1.1, "Structural Welding Code."

Exposed welds shall be ground smooth and flush.

CLEANING.—

General.—After erection, abraded, corroded, and field welded areas shall be cleaned and touched up with the same type of paint used in the shop painting.

FIELD PAINTING.--

General.--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.

5.03 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.

5.04 COLD FORMED METAL FRAMING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing cold formed metal framing, including load-bearing and non-bearing 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.

Installation instructions shall include instructions for securing studs to tracks and other framing connections.

Shop drawings.--Shop drawings and calculations for cold formed metal framing components not fully dimensioned in manufacturer's descriptive data shall be submitted for approval.

Shop drawings shall include framing members showing size and gage designations, number, type, location and spacing. Shop drawings shall include supplemental strapping, bracing, splices, bridging, accessories, and details required for proper installation.

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 have minimum thickness, section properties, yield strength, and size as shown on the drawings.

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 drawings.

Steel Track.--

Track shall be formed 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 headers.--

Studs, tracks and headers shall be hot-dipped galvanized to conform to ASTM Designation: A 653M, G60.

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. A 12 mm clearance shall be provided at the top shoes. Door openings shall have double studs continuous across head and from floor to ceiling on each jamb.

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 and rafters.--Joists and rafters 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.

5.05 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 door jambs, head, threshold, and track supports
- Ladders
- Roof curbs
- Steel tubing trellis
- Lube reel hangers
- 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.

Galvanized sheet steel.--

Galvanized sheet steel shall conform to ASTM Designation: A 653/A 653M, Grade 33 [230]. Galvanizing shall be G60 [Z180].

Checkered floor plates.--

Checkered floor plates shall be commercial quality steel with standard raised pattern.

Steel tubing.--

Steel tubing shall conform to ASTM Designation: A 500, Grade B, or A 501.

Bolts, studs, nuts and washers.--

Bolts, studs, 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.

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.--

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.

Steel tubing trellis shall be cleaned and powder coated in accordance with the requirements specified under "Powder Coating" 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.

5.06 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 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 Architectural Art Mfg.; Michael Rizza Company; MM Systems; or equal.

MATERIALS.--

General.--Expansion joint closures and seals shall have galvanized steel or aluminum flanges with neoprene, EPDM, elastomeric, or silicone rubber seals of the type and size to suit the construction as shown on the plans.

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 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 joist 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.—Plywoodpanels 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 sheathing.--

Structure plywood roof 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 naphthenate, 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 naphthenate.

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 and floor 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 GLUED LAMINATED MEMBERS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work consists of furnishing and erecting pre-engineered, factory fabricated glued laminated members, including beams, headers and laminated decking, in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's data, specifications and installation instructions for lumber, adhesives, fabrication process, preservative and fire-retardant treatment, accessories and protection shall be submitted for approval.

Shop drawings.--Shop drawings for glued laminated members shall be submitted for approval.

Shop drawings shall include erection drawings, if required, and a location plan which shows the position and identification of each glued laminated member.

QUALITY ASSURANCE.--

Codes and standards.--Glued laminated members, including beams and headers, shall conform to American National Standards Institute (ANSI) Standard A190.1, "Structural Glued Laminated Timber."

Glued laminated decking shall conform to American Standards Committee and Voluntary Standards PS 20.

Factory marks.--Glued laminated structural members shall be stamped with a APA EWS or similar mark which indicates that the member conforms to the requirements of ANSI Standard A190.1.

Such marks shall be placed on surfaces that will not be exposed in the completed work.

Certificates of Compliance.--Certificates of Compliance shall be furnished for glued laminated members in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

DELIVERY, STORAGE, HANDLING.--

Protection.--Water resistant wrapping on glued laminated members shall remain in place until units are erected.

Laminated members that are to be stored prior to erection shall be stored on blocks well off the ground with individual member separated for air circulation. Wrapping shall remain intact, lower side of wrapping shall be slit or punctured to permit drainage of water which may accumulate.

PART 2.- PRODUCTS

GLUED LAMINATED MEMBERS.--

Lumber.--

Glued laminated members shall be engineered, stress rated, factory laminated structural members with adhesive for wet use. Unless otherwise shown on the plans, structural glued laminated timber members shall be Combination 24F-V8 DF/DF for all cantilever beams and Combination 24F-V4 DF/DF for simple beam spans in accordance with AITC 117, "Design, Standard Specifications for Structural Glued Laminated Timber of Softwood Species."

Exposed members shall be of Architectural Grade and non-exposed members shall be of Industrial Grade complying with AITC 110.

Penetrating sealers.--

Penetrating sealers shall be the manufacturers standard translucent penetrating sealer which will not interfere with the application of wood stain and transparent finish or paint finish as shown on the plans.

Connectors, anchors, accessories.--

Steel plates and rolled sections shall be mild, weldable steel, conforming to ASTM Designation: A 36.

Nails, screws, bolts, nuts, washers shall be commercial quality. Fasteners for galvanized hardware shall be hot-dip galvanized.

Joist hangers, clips and other standard framing hardware shall be commercial quality, galvanized sheet steel or hot dipped zinc coated, manufacturer's standard units for timber sizes indicated.

FABRICATION.--

General.--Glue laminated members shall comply with ANSI/AITC A190.1 as indicated.

Members shall be shop-cut for connections and connecting hardware to greatest extent feasible, including drilling of bolt holes.

Members shall have location placement identification marks or symbols which correspond to the approved location plan and shall have stamps or marks which indicate the top of each member.

Camber.--Unless otherwise shown on the plans, the camber shall be the manufacturer's standard camber, but shall not exceed a 610 m radius.

Preservative treatment.--The entire surface of the members, including ends, shall be sealed with a penetrating sealer immediately following manufacture.

PART 3.- EXECUTION

INSTALLATION.--

General.--Miscellaneous steel connectors, anchors and accessories shall be installed as shown on the plans.

Members shall be erected so that a close fit and neat appearance of joints and structure as a whole will not be impaired.

Padded or non-marring slings shall be used when hoisting members. Corners shall be protected with wood blocking.

6.03 FINISH CARPENTRY

PART 1.- GENERAL

SUMMARY.--

Scope.--This work consists of furnishing and installing materials and performing finish carpentry, including interior trim, and plywood 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 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."

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 that is to be painted may be solid or glued-up lumber at the contractor's option.

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.

6.04 CABINETS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing stainless steel and plastic laminate tops, splashes and returns as shown on the plans and in these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's product data for plastic laminates and cabinet hardware shall be submitted for approval.

Samples.--Three samples shall be submitted for the items shown below:

Plastic laminate, 203 mm x 254 mm for each type, color, pattern and surface finish.

Stainless steel, 100 mm x 100 mm

Shop drawings.--Shop drawings for cabinets showing location of cabinets, dimensioned plans and elevations, attachment devices and other components shall be submitted for approval. Shop drawings shall bear the "WIC Certified Compliance Label," on the first sheet of the drawings.

QUALITY ASSURANCE.--

Codes and standards.--Cabinets and swinging gate shall be manufactured and installed in accordance with the Manual of Millwork of the Woodwork Institute of California (WIC) requirements for the grade or grades specified or shown on the plans.

Certificates of Compliance.--Prior to delivery to the jobsite, the cabinet manufacturer shall issue a WIC Certified Compliance Certificate indicating that the products he will furnish for this job and certifying that they will fully meet all the requirements of the grade or grades specified.

WIC Certified Compliance Label shall be stamped on all cabinet work and swinging gate.

Each plastic laminate top shall bear the WIC Certified Compliance Label.

Prior to completion of the contract, a WIC Certified Compliance Certificate for Installation shall be delivered to the Engineer.

DELIVERY, STORAGE AND HANDLING.--

Protection.--Cabinets shall be protected during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

PART 2.- PRODUCTS

ACCEPTABLE MANUFACTURERS.--

Manufacturers.--Subject to compliance with these specifications, high pressure decorative laminates shall be Consoweld Corp.; Formica Corp.; Nevamar Corp.; or equal.

MANUFACTURED UNITS.--

General.--Cabinets shall be fabricated to the dimensions, profiles, and details shown on the plans with openings and mortises precut, where possible to receive hardware and other items and work.

Fabrication, assembly, finishing, hardware application, and other work shall be completed to the maximum extent possible prior to shipment to the jobsite.

Laminate clad cabinets.--

Laminate clad cabinets shall be custom grade, flush overlay construction.

Laminate cladding shall be high pressure decorative laminate complying with NEMA LD 3. Color, pattern and finish shall be as shown on the plans. Laminate surface and grade shall be as follows:

Horizontal and vertical surfaces other than tops shall conform to GP-50 (1.27 mm nominal thickness).

Postformed surfaces shall conform to PF-42 (1.07 mm nominal thickness).

Laminated counter tops and splashes.--

Laminated counter tops and splashes shall be WIC custom grade.

Surface material shall be high pressure laminated plastic conforming to NEMA LD-3, 1.27 mm thickness.

Unless otherwise shown on the plans, splashes shall be 102 mm high from the surface of the deck. Back splashes shall be continuous formed and coved. Side splashes shall be top set.

Laminated counter tops self edged, counter tops to receive sinks or plumbing fixtures shall have a bullnose.

The underside of tops and backsides of splashes shall be covered with an approved backing sheet.

Stainless steel counter top.--

Stainless steel counter top surface shall be minimum 1.59 mm (16-gage) stainless steel, Type 304, No. 4 finish with mitered corners, ground smooth.

CABINET HARDWARE AND ACCESSORY MATERIALS.--

General.--Cabinet hardware and accessory materials shall be provided for cabinets. Hardware shall be provided with standard US 26D metal plated finish.

Drawer slides.--

Drawer slides shall be side mounting full extension with fully enclosed rolling balls and rollers. Concealed slides and bearings, and positive stop. Capacity shall be not less than 35 kg, except capacity shall be not less than 45 kg for heavy duty drawers.

Door guides.--

Sliding door guides shall be continuous, dual channel, metal guides, top and bottom. Bottom guide shall have crowned track.

Shelf supports.--

Shelf supports shall be adjustable, semi-recessed, chrome finished pressed metal, heavy duty standards and support clip, with one inch adjustment increments.

Cabinet hinges.--

Cabinet hinges shall be steel. Length of jamb leaf shall be 64 mm. The type of hinge shall be as shown on the plans.

Cabinet hinge manufacturers shall be Stanley, Hager, McKinney, or equal.

Cabinet catches.--

Cabinet catches shall be self aligning magnetic type in aluminum case with zinc plated steel strike. Cabinet catch manufacturers shall be Stanley, Hager, McKinney, or equal.

Cabinet pulls.--

Cabinet pulls shall be 8 mm diameter rod, with 33 mm projection and 75 mm center to center fastening. Cabinet pull manufacturers shall be Stanley, Hager, McKinney, or equal.

FABRICATION.--

Shop assembly.--Nails shall be countersunk and the holes filled, molds shall be neatly mitered and all joints shall be tight and true.

As far as practicable, work shall be assembled at the mill and delivered to the building ready to be set in place. Parts shall be smoothly dressed and interior work shall be belt sanded at the mill and hand sanded at the building. After assembly, work shall be cleaned and made ready for the specified finish.

Veneer sequence matching shall be maintained of cabinets with transparent finish.

All work shall be prepared to receive finish hardware. Finish hardware shall be accurately fitted and securely fastened as recommended by the manufacturer. Finish hardware shall not be fastened with adhesives.

Drawers shall be fitted with dust covers of 6 mm plywood or hardboard above compartments and drawers except where located directly under tops.

Precut openings.--Openings for hardware, appliances, plumbing fixtures, and similar items shall be precut where possible. Openings shall be accurately located and templates used for proper size and shape. Edges of cutouts shall be smoothed and edges sealed with a water-resistant coating.

PART 3.- EXECUTION

INSTALLATION.--

Cabinets.--Cabinets shall be installed without distortion so that doors and drawers fit openings properly and are accurately aligned. Hardware shall be adjusted to center doors and drawers in openings and to provide unencumbered operation. Installation of hardware and accessory items shall be completed as indicated on the approved drawings.

Laminate tops.--Laminate tops shall be securely fastened to base units and other support systems as indicated on the approved drawings.

Stainless steel counter top.--Stainless steel counter top shall be securely fastened to base units and other support systems as indicated on the approved drawings.

Cabinet hardware.--Doors for cabinets shall be equipped with one pair of hinges and one catch per leaf, unless otherwise shown on the plans. Each door leaf shall be equipped with one pull.

Drawers up to 610 mm wide shall have one pull and drawers over 610 mm wide shall have two pulls.

DIVISION 7. MOISTURE AND THERMAL 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 as shown on the plans.

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 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.

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.)

7.03 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 roofs and walls.

QUALITY ASSURANCE.--

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 foil-paper vapor-retarder membrane on one face. Insulation shall conform to ASTM Designation: C 665, Type III, Class A. Exposed insulation for ceilings shall be R-5.3 $K \cdot m^2/W$ and R-2.3 $K \cdot m^2/W$ 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.

Foil-paper vapor-retarder.--

Foil-paper vapor-retarder shall be 0.0076 mm reflective aluminum foil laminated with scrim reinforcing to plastic-coated Kraft paper.

AUXILIARY INSULATION MATERIALS.--

Insulation tape.--

Insulation tape shall be as recommended by the insulation manufacturer.

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.--Exposed insulation shall be installed to completely fill the space between framing members. Insulation shall be attached to the framing members as recommended by the manufacturer.

7.04 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 UBC Standard No. 8-1. Rigid foam insulation shall be approved in accordance with UBC 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, Tampcon 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.

7.05 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, 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, I-90, Factory Mutual approved assembly.

Codes and standards.--Rigid foam insulation shall have a flame-spread rating not to exceed 75 when tested in accordance with UBC Standard No. 8-1.

PART 2.- PRODUCTS

Rigid roof insulation.--

Rigid insulation shall be rigid rectangular boards of polyisocyanurate foam with facing on both sides and an aged thermal resistance of $R-1.26 \text{ K} \cdot \text{m}^2/\text{W}$ per 25.4 mm. Facing on exposed insulation shall be compatible with the roof covering.

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.

Wood nailers.--

Wood nailers shall be Douglas fir, hem-fir or equivalent western softwood pressure treated after fabrication. Wood preservatives shall be waterborne type.

Fastener (plywood decking).--

Fastener (plywood decking) shall be annular threaded galvanized nails having 25 mm minimum nominal diameter head or driven through galvanized caps.

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.--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.

Wood nailers shall be thick enough so the tops are flush with surrounding insulation.

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.

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.

7.06 THROUGH-PENETRATION FIRESTOPPING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing firestopping materials at penetrations in fire-rated walls 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 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.

7.07 SINGLE-PLY ROOFING

PART 1.--GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing fully adhered single-ply sheet roofing in accordance with the detail shown on the plans and these special provisions.

Single-ply roofing includes keystone ethylene ester elvaloy based membrane, 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 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.

Wood nailers shall conform to the requirements in "Carpentry" in Division 6 "Wood and Plastic," in 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.

Working drawings.--Complete working drawings showing roof configuration, sheet layout, seam locations, seam 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 4-1.04, "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 15 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, Flex; Thermoplastic Single Ply; Cooley Engineered Membrane; or equal.

MATERIALS.--

Membrane.--

Membrane shall be scrim reinforced elvaloy keystone ethylene ester not less than one mm thick. The exposed surface of the membrane shall be white.

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 INSULATED STEEL PANELS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing insulated steel panels in accordance with the details shown on the plans and these special provisions.

Related work.--Frames shall in accordance with the requirements specified under "Aluminum Entrance Door and Storefront" in Division 8, "Doors and Windows," of these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data, and installation instructions shall be submitted for approval.

Samples.--Three samples, 305 mm x 305 mm shall be submitted for approval.

DELIVERY, HANDLING AND STORAGE.--

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

Insulated steel panel.--

Insulated steel panel shall have a nominal overall thickness of 25 mm.

The interior and exterior skins shall be minimum 0.61 mm (24-gage) thickness, smooth steel.

The interior and exterior skins shall be laminated to a mineral insulation board.

All panel surfaces shall be free of seams, warp, and buckling.

Accessories and sealants--

Accessories and sealants shall be as recommended by the panel manufacturer.

PART 3.- EXECUTION

Installation.--Composite panels shall be installed in accordance with the manufacturer's recommendations.

Painting.--Panels shall be cleaned, prepared and painted in accordance with the requirements specified under "Painting" in Division 9, "Finishes," of these special provisions.

7.09 SOFFIT PANELS

PART 1.- GENERAL

Scope.--This work shall consist of furnishing and installing solid and perforated soffit panels 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.

Samples.--Material samples shall include a 305 mm x 305 mm sample of the soffit panels for each type and color to be installed shall be submitted for approval.

PART 2.- PRODUCTS

Soffit panels.--

Soffit panels shall be factory fabricated panels of aluminum, minimum 0.81 mm thickness. Soffit panels shall be perforated (fully vented) as shown on the plans.

Soffit panels shall be Peterson Aluminum, PAC 750; ATAS International, Inc., MPS 120./MPV 120; Innovative Metals Company, Inc., SP 120; or equal.

Supporting members.--

Supporting members for soffit panels shall be recommended by the manufacturer.

Fasteners.--

Fasteners for attaching soffit panels shall be the manufacturer's standard fasteners for the purpose intended.

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.

PART 3.- EXECUTION

Installation.-- Soffit panels shall be fastened to the supporting members in accordance with the manufacturer's recommendations.

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.

7.10 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, copings, straps, gutters, downspouts, reglets, roof jacks, scuppers and conductor heads.

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 "Standard Practice in Architectural Sheet Metal Work."

PART 2.- PRODUCTS

MATERIALS.--

Galvanized sheet steel.--

Galvanized sheet steel shall conform to ASTM Designation: A 361, 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.

Sheet aluminum.--

Sheet aluminum shall be not less than 0.81 mm thick, mill finish, 3003-H14 alloy, conforming to ASTM Designation: B 209.

Sheet lead.--

Sheet lead shall be not less than 1.6 mm thick, made from chemical lead, conforming to ASTM Designation: B 29.

Hardware and fastenings.--

Hardware and fastening for premolded roof flashings shall be stainless steel.

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.

Insect screen.--

Insect screen shall be industrial wire cloth and screen, medium grade, 18 mesh, 0.43 mm diameter, 1 mm openings, plain weave, galvanized steel conforming to ASTM Designation: E 437.

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.

Coal tar paint.--

Coal tar paint shall be coal-tar epoxy coating conforming to U.S. Corps of Engineers Specification: C-200 or Steel Structures Painting Council Paint Specification: SSPC-16-68T.

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.

PROTECTION.--Aluminum surfaces to be in contact with concrete, mortar, or dissimilar metals shall be given a heavy coat of coal tar paint.

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.

Hung gutters.--Hung gutters shall be fabricated from galvanized sheet steel, not less than 0.71 mm (24-gage). Gutters shall be size and shape as shown on the plans.

Gutters shall be fabricated in sections not less than 3 meters in length. Use sections as long as practicable for lengths over 3 meters.

Joints shall be lapped at least 38 mm, rivet and solder watertight. Butt type expansion joints, 19 mm wide, shall be provided at midpoint between down spouts and where expansion joints occur in the structure.

Downspouts.--Downspouts 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.

Downspouts shall be installed as shown on the plans, secured to the wall with straps near top, bottom and at intermediate points not more than 2.4 meters apart. Straps shall extend 50 mm out on wall and be secured with suitable anchors.

Unless otherwise shown on the plans, the lower end of downspout shall terminate with mitered 45 degree elbow.

7.11 SKYLIGHTS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing skylights in accordance with the details shown on the plans and these special provisions.

SYSTEM DESCRIPTION.--

Design requirements.--Skylights shall conform to the requirements on Section 2603.7 of the Uniform Building Code.

Skylights shall be rated by the manufacturer to withstand a 200 kilograms per square meter live loading.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and installation instructions shall be submitted for approval.

Samples.--A sample of the acrylic plastic and the anodized framing shall be submitted for approval.

QUALITY ASSURANCE.--

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

PART 2.- PRODUCTS

Skylight.--

Skylight shall be industrial type, curb mounted skylight with acrylic plastic glazing assembly mounted in an extruded aluminum framing. Glazing assembly shall be distortion free.

The skylight shall be quadruple glazed using CC2 acrylic, thermally formed in a double hip or pyramid shape.

The glazing assembly shall consist of a 4.75 mm smooth clear outer lens and 3 clear prismatic inner lenses, 3.15 mm nominal thickness. One inner lens shall have a heat mirror file. The assembly shall have a visible light transmittance of 0.69 and a shading coefficient of 0.36. The summer and winter U-values shall be 0.7 maximum.

Retaining and curb framing shall be 6063-T5 aluminum alloy and shall have mitered and full welded corners. Frames shall have integral condensation and weepage gutters which drain to the outside. Skylight frames shall be thermally broken. Acrylic glazing shall be separated from the frame with an EPDM rubber seal.

Retaining and curb framing shall have full welded corners and condensation weeps to the outside.

PART 3.- EXECUTION

Installation.-- Skylights shall be installed rigidly and securely in accordance with the manufacturer's instructions. The installation shall be flashed and shall be weathertight.

Cleaning and protection.-- Plastic skylight units shall be cleaned and polished inside and out.

7.12 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.

Related work.--Fire safing material shall conform to the requirements under "Through-Penetration Firestopping" elsewhere in this Division 7.

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.

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 ROLLING COUNTER DOOR

GENERAL.--This work shall consist of furnishing and installing an electrically operated vertical rolling counter door in accordance with the details shown on the plans and these special provisions.

The door shall be manufactured by a nationally recognized door manufacturer for exterior use in commercial and institutional buildings. The manufacturer shall have an established parts store, and an authorized service organization in California.

SUBMITTALS.--Manufacturer's descriptive data, installation instructions, and drawings of supporting members, grille, control systems and motor operator shall be submitted for approval.

The name and address of the manufacturer's authorized service organization, and parts supply store, shall be included with the data submitted for approval. The length of time such businesses have serviced the manufacturer's products, and sold its parts shall be listed.

PRODUCTS.--

Curtain.--

Curtain shall be interlocking network of stainless steel slats. End links shall be designed to prevent the curtain from leaving the guides. The slats shall have a No. 4 finish.

Curtain guides.--

Curtain guides shall be channel shaped stainless steel, with silicon-treated wool pile or nonmetallic inserts which will prevent metal to metal contact, deaden noise, and prevent electrolytic action. Guides shall be designed to prevent the end links of the grille from pulling out of the guides.

Curtain guide supports.--

Curtain guide supports shall be stainless steel.

Counterbalancing assembly.--

Counterbalancing assembly shall be steel pipe or welded tube barrel shaft of the diameter and wall thickness required to limit the deflection under load to 0.7 mm per meter of grille width maximum, and with an internal counterbalancing spring mounted on a cold rolled steel inner shaft. Sealed ball bearings shall be provided to minimize wear of pipe shaft rotation around the inner shaft.

Counterbalancing spring shall be an oil tempered, helical spring sized to provide sufficient torque for easy operation of the curtain from any position. Spring tension shall be adjustable from outside of the end bracket plate without removing the hood.

Bracket plates.--

Bracket plates shall be steel plates of 6 mm minimum thickness to carry pipe and counterbalancing shaft, the hood and to house ends of grille coil.

Hood.--

Hood shall be stainless steel not less than 0.68 mm thick (24-gage), reinforced to prevent bending or sagging and to provide a rigid, quiet and vibrationless installation. The hood reinforcement shall be concealed.

Motor operator.--

Motor operator shall be high starting torque motor, reduction gearing, solenoid brake, limit switches for upper and lower limits of grille travel, lower limit switch shall have auxiliary contact, removable emergency hand crank with electric interlock to break motor circuit when hand crank is engaged, cylinder lock operating station in a NEMA waterproof enclosure, magnetic relay contactor, overload protection and prewiring to terminal block. Motor shall be removable for repair without affecting emergency operation or limit switch settings. Motor shall be a 120-volt, single-phase.

Safety bar.--

Safety bar shall be protective safety bar assembly which shall either stop or reverse the grille travel upon contact with an obstruction, shall be installed at the bottom of the grille.

Door control.—

Door control shall be flush mounted, push-button operated control station with open, close, and stop buttons.

EXECUTION.--

INSTALLATION.--Grilles and accessories shall be installed in accordance with the manufacturer's instructions and shall operate freely without binding.

The motor operator shall not interfere with the manual operation of the grille when the emergency hand crank has been engaged.

The operator controls and mechanism shall be easily accessible for adjustment and service.

The motor for the operator shall be the size and type recommended by the grille manufacturer, and shall adequately power the unit for proper operation of the grille.

All supporting members and guides shall be installed rigidly and securely to prevent swaying and vibration of the grille.

Conduit and wiring, of adequate size, shall be installed as required for proper operation of the grilles and controls. Conduit and conductors shall be furnished and installed in accordance with the requirements specified in Division 16, "Electrical," of these special provisions.

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-hold 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, for Equipment Service Bay doors, shall be heavy duty, commercial type. Motor shall be a 208-volt, 3-phase, 0.75 kW, 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, for Parts Warehouse door, shall be heavy duty, commercial type. Motor shall be a 120-volt, single-phase, 0.37 kW, 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 ALUMINUM ENTRANCE DOOR AND STOREFRONT

GENERAL.--This work shall consist of furnishing and installing aluminum entrance doors and storefront, including aluminum door frames with transom where shown on the plans, complete with all hardware and accessories necessary for a complete weathertight and operable installation, in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Complete shop drawings showing elevations of each door type; details of each frame type; typical and special details of construction; location installation requirements for hardware; size, shape, and thickness of materials; finishes; fastenings and method of anchoring; size and spacing of anchors; details of operating hardware; method and materials for weatherstripping; and details of installation.

Exposed surfaces shall be free from defects, scratches, streaks, or other surface blemishes. Color shall be uniform without light and dark spots.

Finish samples shall be a representative section of a specified window with the color finish specified applied to that section. Section shall be a minimum of 203 mm long complete with stops and glazing beads, fasteners and anchors for all substrates on the job.

FINISHES.--Finish on all exposed areas of aluminum windows and components shall be clear anodized as shown on the plans.

Exposed surfaces shall be free from defects, scratches, streaks, or other surface blemishes.

PRODUCTS.--

Entrance doors.--

Entrance doors shall be prefinished extruded 6063-T5 aluminum alloy, narrow stile type. Kawneer, PPG, Northrop, or equal.

Storefront.--

Storefront shall be prefinished extruded 6063-T5 aluminum alloy, frame size as indicated on the plans. Kawneer, PPG, Northrop, or equal.

Glazing.--

Glazing shall conform to the requirements under "Glazing," elsewhere in this Division 9 of these special provisions.

Screws, fasteners, anchors and accessories.--

Screws, fasteners, anchors and accessories shall be noncorrosive metals compatible with aluminum. Finish shall match adjacent surfaces.

Sealant.--

Sealant shall be self-leveling, non-sag, single component, solvent type acrylic terpolymer, Federal Specification TT-S-230. Color shall match aluminum.

Door closer.--

Door closure shall be LCN 4040, Norton 8400, or equal at each door leaf.

Security lock.--

Security lock shall be a 3 point lock. Cylinders by finish hardware supplier.

FABRICATION.--Door stiles and rails shall be securely joined and reinforced by means of structural corner assemblies, accurately machined and fitted to hairline joinery that develops the members. Joints shall be factory sealed weathertight. Doors shall be adjustable vertically and front to back. All cut-out operations for door hardware operation shall be accurately made and reinforced at the factory. Glass stops for doors shall be snap-on type with non-stretch neoprene beads.

Entrance door hardware, unless otherwise shown on the plans, shall be provided and installed as part of the work. Hardware shall be factory installed as practicable.

EXECUTION.--

PROTECTION.--Materials shall be delivered to the site of the work in original, unopened, unbroken containers, wrappings, or bags with labels intact and legible. Labels shall show the product name, brand, manufacturer, directions, color, and quality, all of which shall be legible at the time of use.

Materials and accessories shall be undamaged and shall be carefully stored off the ground to provide proper ventilation, drainage, and protection against weather, dampness, staining, soiling contamination, deterioration, chipping, and breakage.

INSTALLATION.--Entrance doors and storefront units shall be set straight, level, plumb and in true alignment in prepared openings in accordance with the installation instructions. Entrance doors and storefront shall be centered in the openings. Clearance between the unit and the building framing shall be from 4 mm to 6 mm at the sides and 13 mm at the top.

The installation shall be flashed and sealed weathertight.

Isolation coating shall be provided to separate adjoining incompatible materials.

Both inside and outside surfaces of metal shall be cleaned of all mortar, plaster, paint, and other foreign matter. Surfaces that are stained, discolored, or that cannot be satisfactorily cleaned and repaired shall be replaced with new materials at no additional cost to the State.

Offset pivot hinges shall have a 159 kg minimum capacity.

Push bar and pull handle shall be at each single-acting door leaf. and shall be prefinished to match storefront.

PERFORMANCE.--Deflection of storefront system shall be limited to L/175 when subjected to 718 Pa of wind pressure. Note: Higher wind load test pressures may be required. Comply with UBC and the American National Standard A58-1-1972 for applicable wind load test pressure. Provide wind load calculations. Calculations are to be signed by a California Licensed Engineer.

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

Door and transom windows.--

Door and transom windows shall be door or door frame manufacturer's standard window framing, glazing stops and glazing accessories.

Fixed windows.--

Fixed windows shall be non-operable glazed panel inserted into a frame to include muntins, glazing stops, and glazing accessories.

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.

Hung windows.--

Hung windows shall be single or double hung vertically operating vents, tightly weatherstripped meeting stiles, tubular sash head and sill extrusions and heavy duty sweep lock. Operating sash shall be as shown on the plans.

Sash shall have block and tackle balances. Spiral or helical balances shall not be used.

Extruded glazing stops, glazing accessories and vent screens shall be provided.

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 PRESSED METAL FRAMED WINDOWS

PART 1.- GENERAL

SUMMARY.--This work shall consist of furnishing and installing pressed metal framed windows in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data, shop drawings and installation instructions shall be submitted for approval.

PART 2.- PRODUCTS

Framing.--

Framing shall be pressed metal, not less than 1.52 mm thick (16-gage) with all members square and true, full mitered frame corners and continuous welds at all joints and cover plates. Welds at frame faces shall be ground smooth and flush with surrounding surfaces. All metal surfaces shall be cleaned and factory primed with one coat of metal protective rust inhibitive primer. Primer shall not contain lead type pigments.

Anchors.--

Anchors shall be manufacturer's standard.

Glazing.--

Glazing shall conform to the requirements specified under "Glazing," in Division 8, "Doors and Windows," of these special provisions.

Backer rod.--

Backer rod shall be close cell, non-absorbent, non-staining foam rod compatible with sealant.

Sealant.--

Sealant shall be ultraviolet and ozone resistant, gun grade polysulfide or polyurethane, single component. Sealant shall conform to Federal Specification: TT-S-227.

PART 3.- EXECUTION

INSTALLATION.--Frames shall be installed rigidly, securely, plumb and true. Installations shall be sealed watertight and weathertight.

PAINTING.--Except for the primer application specified herein, exposed frame surfaces shall be cleaned, prepared and painted in accordance with the requirements specified under "Painting" in Division 9, "Finishes," of these special provisions.

8.07 FIRE RATED WINDOW ASSEMBLY

GENERAL.--This work shall consist of furnishing and installing fire rated window assemblies in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--Manufacturer's descriptive data, shop drawings, installation instructions, and listing information shall be submitted for approval.

PRODUCTS.--

Fire rated window assembly.--

Fire rated window assembly shall be a factory-fabricated fixed glazed assembly with a steel frame and shall conform to CBC Section 713.3 and shall be tested in accordance with CBC Standard 7-4. Window assembly shall have a label or listing mark, showing the fire-protection rating.

Welds at frame faces shall be ground smooth and flush with surrounding surfaces. All metal surfaces shall be cleaned and factory primed with one coat of metal protective rust inhibitive primer. Primer shall not contain lead type pigments.

Anchors.--

Anchors shall be manufacturer's standard.

Backer rod.--

Backer rod shall be close cell, non-absorbent, non-staining foam rod compatible with sealant.

Sealant.--

Sealant shall be ultraviolet and ozone resistant, gun grade polysulfide or polyurethane, single component. Sealant shall conform to Federal Specification: TT-S-227.

EXECUTION.--

INSTALLATION.--Fire rated window assembly shall be installed in accordance with its listing and the manufacturer's recommendations.

Frames shall be installed rigidly, securely, plumb and true. Installations shall be sealed watertight and weathertight.

PAINTING.--Except for the primer application specified herein, exposed frame surfaces shall be cleaned, prepared and painted in accordance with the requirements specified under "Painting" in Division 9, "Finishes," of these special provisions.

8.08 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.

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.	

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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 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.	

Pushplates and pullplates.--

Pushplates and pullplates shall be 102 mm x 406 mm x 1.52 mm (16-gage). Grips shall be 25 mm diameter with 38 mm standoff and 203 mm center to center fastening, unless indicated otherwise.

Pushplates shall be:

Builders Brass	47
Quality	40
Trimco	1001-3
or equal.	

Pullplates shall be:

Builders Brass	47x290-1
Quality	1515
Trimco	01-3 x 1193-2
or equal.	

Kickplates.--

Kickplates shall be 254 mm in height x 51 mm less than door width x 1.52 mm (16-gage).

Kickplates shall be:

Builders Brass	37
Quality	48
Trimco	6000
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 without thresholds shall be:

Builders Brass	8061
Quality	331
Trimco	1210
or equal.	

Stops for openings with thresholds shall be:

Builders Brass	8063
Quality	431
Trimco	1213
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.	

Thresholds, rain drips, door sweeps and door shoes.--

Thresholds, rain drips, door sweeps 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, door sweep 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. Pushplates and door pulls shall be centered 1118 mm from the finished floor. Locksets and privacy sets shall be 1024 mm from the finished floor. Kickplates shall be mounted on the push side of the doors, 25 mm clear of door edges.

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.

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:

Building: Sub Shop

GROUP 1 EXTERIOR EXIT (Doors 1, 7, 17, 22, 25)

- 1 1/2-pair butt hinges
- 1 each lever operated mortise lockset
- 1 each door closer
- 1 each kickplate
- 1 each floor mounted door stop
- 1 each weatherstripping
- 1 each door shoe with rain drip
- 1 each threshold

GROUP 2 EXTERIOR EXIT (Doors 29, 30)

3-pair butt hinges
1 each lever operated mortise lockset
1 each door closer
2 each kickplate
2 each floor mounted door stop
2 each weatherstripping
2 each door shoe with rain drip
2 each flush bolt on inactive leaf

GROUP 3 OFFICE / WAREHOUSE (Doors 2, 3, 8, 14,15)

1 1/2-pair butt hinges
1 each lever operated cylindrical lockset
1 each kickplate
1 each wall bumper (floor mounted door stop at door 15)

GROUP 4 JANITOR / ELECTRICAL ROOM / VESTIBULE (Doors 4, 11, 12)

1 1/2-pair butt hinges
1 each lever operated cylindrical lockset
1 each door closer (door 12 only)
1 each kickplate
1 each wall bumper

GROUP 5 SHOP / TOOL STORAGE (Doors 13, 16)

1 1/2-pair butt hinges (2 pair at door 16)
1 each lever operated cylindrical lockset
1 each door closer
1 each kickplate
1 each floor mounted door stop
1 each smoke seal
1 each threshold

GROUP 6 MEN / WOMEN (Doors 5, 6)

1 1/2-pair butt hinges
1 each kickplate
1 each pushplate
1 each pullplate
1 each wall bumper
1 each door closer

GROUP 7 STORAGE (Doors 23, 24)

3-pair butt hinges
2 each kickplate
2 each floor mounted door stop
2 each flush bolt on inactive leaf

GROUP 8 ROLLING COUNTER DOOR (Door 9)

Per manufacturer

GROUP 9 SECTIONAL OVERHEAD DOOR (Doors 18, 19, 20, 21, 26, 27, 28)

Per manufacturer

Building: Office remodel

GROUP 1 EXTERIOR EXIT (Doors 1, 2)

- 1 1/2-pair butt hinges
- 1 each lever operated mortise lockset
- 1 each door closer
- 1 each kickplate
- 1 each floor mounted door stop
- 1 each weatherstripping
- 1 each door shoe with rain drip
- 1 each threshold

GROUP 2 OFFICES (Doors 3, 6, 10, 11, 12, 13, 14, 15, 18, 19, 22, 23, 27, 29, 30, 31, 32, 34)

- 1 1/2-pair butt hinges
- 1 each lever operated cylindrical lockset
- 1 each kickplate
- 1 each wall bumper

GROUP 3 JANITOR / PHONE EQUIPMENT / ELECTRICAL /MECHANICAL / STORAGE (Doors 5, 7, 17, 20, 21)

- 1 1/2-pair butt hinges
- 1 each lever operated cylindrical lockset
- 1 each kickplate
- 1 each wall bumper

GROUP 4 MEN / WOMEN (Doors 8, 24, 28)

- 1 1/2-pair butt hinges
- 1 each kickplate
- 1 each pushplate
- 1 each pullplate
- 1 each wall bumper
- 1 each door closer

GROUP 5 SHOWERS / WOMENS TOILET COMPARTMENT (Doors 9, 25, 26)

- 1 1/2-pair butt hinges
- 1 each lever operated privacy set
- 1 each kickplate
- 1 each floor mounted door stop

8.09 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.

Frosted glass.--

Frosted glass shall be Type II, Class 1, Form 3, Quality q8, Finish f1, Pattern p1 or p2; 3 mm thick flat figured glass, one surface smooth, other surface fine grid pattern.

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.

Tinted glass.--

Tinted glass shall be bronze; all the same tint.

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.

Cut edges of tinted glass shall conform to the recommendations of the glass manufacturer. The glazier shall inspect each edge of tinted glass. Panes with edges that do not conform to the manufacturer's standards for tinted glass edges for sunny elevations shall not be used.

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.

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 630M.

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.

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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 fire resistive assemblies shall be fastened to all framing members. Gypsum wallboard panels at other locations 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 wainscotting 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 wainscotting 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, patterned porcelain tile, unglazed matte porcelain floor tile, trim tile, setting materials, grouts and such other materials as may be 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.; 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.

Unglazed matte porcelain tile.--

Unglazed 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.

Unglazed 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.

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 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 that 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.

Cement mortar beds to receive an epoxy bond coat shall be damp cured under cover for a minimum of 96 hours at a temperature of not less than 21°C and allowed to dry thoroughly prior to setting tile.

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 setting bed surfaces for epoxy bond coat shall be dry.

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, and tile set on an epoxy mortar shall be installed in accordance with ANSI Standard: A108.6.

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.

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 and ANSI Standard: A108.9 for epoxy 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 102 mm x 102 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. Color samples for stains shall be submitted on wood of the same species, color, and texture as the wood to receive the stain.

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 transparent stain finish shall be filled and hand cleaned after the first coat of stain has been applied. The color of the filler shall match the color of the stained wood.

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.

ALUMINUM AND OTHER NON-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.

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.

CONCRETE AND CONCRETE UNIT MASONRY.--New material shall be cured a minimum of 14 days before coating. Surface dirt and dust shall be removed by brooming, air blast, or vacuum cleaner. Oil and grease shall be removed by steam cleaning. Form release agents, weak concrete, surface laitance, dirt, and other deleterious material shall be removed by sandblasting. Cracks and voids shall be filled with cement mortar patching material.

PREVIOUSLY COATED AND 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 wood and metal doors, the insides of cabinets, 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.
Epoxy polyamide primer	0.1 mm, minimum.
Aliphatic polyurethane enamel	0.05 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 or stain type 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.

PATCHES IN PREVIOUSLY COATED SURFACES.--Where patches are made on surfaces of previously coated walls or ceilings, the entire surface to corners on every side of the patch shall be coated with a minimum of one application of the finish coat.

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- ALUMINUM AND OTHER NON-FERROUS METALS.--

1 pretreat coat: vinyl wash pretreatment
1 prime coat: aluminum primer
2 finish coats: acrylic, exterior enamel, semi-gloss

SYSTEM 2- CEMENT PLASTER AND CONCRETE.--

1 prime coat: concrete and masonry primer
2 finish coats: acrylic, exterior enamel, semi-gloss

SYSTEM 3- CONCRETE UNIT MASONRY.--

1 pretreat coat: block filler
1 prime coat: concrete and masonry primer
2 finish coats: acrylic, exterior enamel, semi-gloss

SYSTEM 4- GALVANIZED METAL.--

1 pretreat coat: vinyl wash pretreatment
1 prime coat: galvanized metal primer
2 finish coats: acrylic, exterior enamel, semi-gloss

SYSTEM 5- GYPSUM BOARD.--

1 prime coat: PVA wall sealer
2 finish coats: acrylic, interior enamel, semi-gloss

SYSTEM 6- PREVIOUSLY COATED EXTERIOR SURFACES.--

1 prime coat : alkyd exterior enamel undercoat
2 finish coats: acrylic, exterior enamel, semi-gloss

SYSTEM 7- PREVIOUSLY COATED INTERIOR SURFACES.--

1 prime coat: alkyd interior wood primer
2 finish coats: acrylic, interior enamel, semi-gloss

SYSTEM 8- SHOP PRIMED STEEL.--

1 prime coat : red oxide ferrous metal primer
2 finish coats: alkyd, exterior enamel, semi-gloss

SYSTEM 9- STEEL AND OTHER FERROUS METALS.--

2 prime coats: red oxide ferrous metal primer
2 finish coats: alkyd, exterior enamel, semi-gloss

SYSTEM 10- 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 POWDER COATING

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and applying powder coating finishes to metal surfaces as shown on the plans and these special provisions.

Powdered coatings shall be applied to the following surfaces:

Steel tubing trellis

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and application instructions shall be submitted for approval.

Samples.-- Three samples, 200 mm x 200 mm, with finish color shall be submitted for approval.

QUALITY ASSURANCE.--

Certificates of Compliance.--Certificates of compliance shall be furnished for powder coating materials in accordance with the requirements specified in Section 4-1.04, "Certificates of Compliance," of the General Conditions.

PART 2.- PRODUCTS

Powder coating.--

Powder coating shall consist of dry polyester powder electrostatically adhered to metal surfaces and baked to form a uniform, durable surface.

Coating color shall be as shown on the plans.

Coating shall conform to the following performance criteria:

Property	Reference
Adhesion	ASTM Designation: D 3359B
Pencil hardness	ASTM Designation: D 3363
Flexibility	ASTM Designation: D 522
Impact resistance	ASTM Designation: D 2794, Modified
Abrasion resistance	ASTM Designation: D 4060, Modified
Salt spray resistance	ASTM Designation: B 117
Humidity resistance	ASTM Designation D 2247

PART 3.- EXECUTION

Application.--All surfaces to be coated shall be cleaned and prepared in accordance with the manufacturer's instructions.

Coatings shall be applied in a minimum thickness of not less than 0.08 mm and shall form a smooth, uniform surface.

9.08 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.

9.09 SUSPENDED CEILINGS

GENERAL.--This work shall consist of furnishing and installing suspended ceilings in accordance with the details shown on the plans and these special provisions.

Suspended ceilings shall consist of lay-in acoustical ceilings panels and an exposed grid suspension system. Listed fire rated assemblies shall be installed where shown on the plans.

DESIGN.--The suspension system shall be designed to support the weight of ceiling panels, lighting fixtures, air terminals, service assemblies and such other items, not mentioned, which are supported by the suspended ceiling system.

The deflection of any component of the suspension system shall not exceed 1/360 of the span.

The suspension system shall be designed for seismic restraint in accordance with ASTM Designation: E 580.

Lighting fixture attachments shall be designed for a capacity of 100 percent of the lighting fixture weight acting in any direction.

SUBMITTALS.--Manufacturer's descriptive data and installation instructions and complete shop drawings of all supporting details, lighting fixture attachments, lateral force bracing, partition bracing and runner and panel layouts shall be submitted for approval.

PRODUCTS.--

Acoustical panels.--

Acoustical panels shall be factory produced, lay-in panels, 610 mm x 1219 mm x 16 mm thick with non-directional natural fissured surface texture and factory applied, washable, off-white, vinyl latex finish. Panels shall conform to ASTM E 1264 Type III, form 2. Noise Reduction Coefficient (NRC) shall be minimum 0.65. Panels shall have a flame spread rating not exceeding 25.

Suspension system.--

Suspension system shall be galvanized steel, tee shaped main runners and cross runners and wall molding angles or channels conforming to ASTM Designation: C 635, intermediate duty or heavy duty. Runners shall have exposed flanges approximately one inch wide and positive interlocks between main runners and cross runners. Wall moldings shall have a 19 mm wide exposed face. Runners and moldings shall be bonderized and shall have a flat off-white color, factory painted finish unless otherwise shown on the plans.

Wire hangers.--

Wire hangers shall be 2.7 mm (12-gage) minimum, galvanized, soft-annealed, mild steel wire.

Assembly devices, splices, intersection connectors and expansion devices.--

Assembly devices, splices, intersection connectors and expansion devices shall be as recommended by the suspension system manufacturer.

EXECUTION.--

INSTALLATION.--The suspended ceiling shall be installed square, level and true in accordance with the approved shop drawings, the manufacturer's installation instructions and the requirements of ASTM Designations: C 636 and E 580 and Uniform Building Code (UBC) Standard No. 25-2.

Hangers for the suspension system shall be spaced at not more than 1.2 m on centers and shall be saddle tied or wrapped around the main runner members.

Except as specified herein, all lighting fixtures, air terminals, services or other ceiling supported items shall be positively attached to the suspension system.

Lighting fixtures, air terminals, services or other items weighing less than 25 kg shall have, in addition to the requirements specified herein, two 2.7 mm (12-gage) hangers connected from the housing of the fixture, terminal, service or other items to the structure above. These hanger wires may be slack.

Lighting fixtures, air terminals, services or other items weighing more than 25 kg shall be supported directly from the structure above.

The ceiling shall be leveled to within 3 mm in 3.6 m.

MAINTENANCE STOCK.--Upon completion of the suspended ceiling work, one unopened carton of acoustical panels shall be delivered to a location at the project site designated by the Engineer.

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 METAL TOILET PARTITIONS

GENERAL.--This work shall consist of furnishing and installing metal toilet partitions in accordance with the details shown on the plans and these special provisions.

Metal toilet partitions shall consist of panels, doors, pilasters, urinal screens, fasteners, anchorages and hardware. Internal reinforcement shall be provided at all fasteners, anchorages, hardware and accessories.

Doors, panels, pilasters, and urinal screens shall have a factory applied, baked on enamel finish consisting of not less than one prime coat over a chemically pretreated base followed by at least one baked on enamel finish coat.

SUBMITTALS.--Manufacturer's descriptive data, standard color palette, installation instructions and shop drawings shall be submitted for approval.

Colors will be selected from the manufacturer's standard color palette by the Engineer after the award of the contract.

Shop drawings shall show the plan layout, door and panel elevations and all details required for the complete installation and anchorage of the partition system.

PRODUCTS.--

Doors and panels.--

Doors and panels shall be flush, 25 mm minimum thickness, formed of two 0.86 mm (22-gage) minimum thickness, galvanized steel sheets over a honeycomb core. Doors and panels shall have formed edges sealed with a continuous oval crown locking strip, and shall be mitered, welded and finished at the corners.

Doors shall have controlled action hinges, with vertical pintle and ball bearing roller operating on adjustable cams, or moving parts of nylon and stainless steel. Top pivots shall be recessed into edges of doors.

Doors shall be provided with slide bar latch and a combination coat-hat hook and door stop, except as otherwise specified.

Doors on stalls designed for use by the disabled shall be provided with a grip and turn latch, combination coat-hat hook and door stop, and U-shaped door pulls immediately below the latch on the inside and outside of the door.

Pilasters.--

Pilasters shall be 32 mm thick, of the same construction as the doors and panels, except the galvanized face sheets shall be 1.0 mm (20-gage) minimum thickness, and shall have an adjustable, leveling base.

Pilasters shall be 32 mm thick, of the same construction as the doors and panels, except face sheets shall be 1.3 mm for galvanized steel and 1.2 mm for stainless steel (18-gage), with adjustable, leveling base incorporating two 9.5 mm diameter stud expansion anchors with leveling nuts.

Urinal screens.--

Urinal screens shall be wedge type, wall-mounted, and of the same construction as the doors and panels, except face sheets shall be 1.0 mm (20-gage) minimum thickness. All fasteners shall be concealed.

Fasteners and anchorages.--

Fasteners and anchorages shall be stainless steel with vandal resistant heads.

Hardware.--

Hardware shall be highly polished chromium plated, cast alloy, or heavy duty anodized aluminum.

Pilasters anchors.--

Pilasters anchors shall be integral stud anchor type or internally threaded expansion sleeve type with single cone expander. Self-drilling type anchorage shall not be used.

Pilaster shoes.--

Pilaster shoes shall be one-piece, stainless steel, with concealed hold down clips, and of sufficient height to completely cover the base and anchors.

EXECUTION.--

INSTALLATION.--Metal toilet partitions shall be installed rigidly, securely, plumb, and true and in accordance with the manufacturer's recommendations. Tops and bottoms of doors shall align with tops and bottoms of panels, and all horizontal lines shall be level.

Rigid backing shall be provided in walls to receive anchorages.

Panels shall be anchored with at least 3 brackets at each wall and pilaster. Two anchors shall be used to fasten each pilaster base to the floor.

Doors shall not bind during opening and closing. The clearance between the door edges and pilasters shall be uniform, equidistant, and shall not exceed 5 mm. Hinges shall be adjusted to hold doors ajar when unlatched. Doors on stalls designed for use by the disabled shall return to the closed position.

Drilling, cutting and fitting of wall and floor finishes shall be concealed by the completed installation.

CLEAN-UP.--Toilet partitions shall be cleaned, polished and free of all defects. Chipped, dented, scratched, or otherwise damaged work shall be replaced at the Contractor's expense.

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 (permanent room identification).--

Plastic signs for permanent room identification for other than restrooms shall be scratch resistant, non-static, fire retardant, 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.

Male restroom identification shall be a male symbol on an equilateral triangle with edges 305 mm long and a vertex pointing upward.

Female restroom identification shall be a female symbol 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.

Metal signs shall be attached securely with galvanized or cadmium plated fasteners.

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.

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 16-gage, 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. Base shall be set 13 mm off the flange of the cabinet.

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 WOOD BENCHES

GENERAL.--This work shall consist of furnishing and installing wood benches 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.--

Acceptable manufacturer's.--Subject to compliance with these requirements, manufacturer's shall be Penco Products, Inc.; Republic Storage Systems, Inc.; Interior Steel Equipment Co.; or equal.

Seat.--

Seat shall be factory fabricated, laminated seat units of solid birch or other suitable, dense hardwood and manufacturer's standard clear coating. Seat units shall be approximately 240 mm wide by 32 mm thick, in lengths as shown on the plans. Edges of the seat shall be rounded and all surfaces shall be smooth and free of splinters which would snag clothing or skin.

Supports assemblies.--

Supports assemblies shall be standard steel pedestal assemblies with continuously welded top and bottom flange fittings. Flanges shall have provisions for fasteners to the floor and securing to the bench. Pedestal diameter shall be not less than 32 mm. Pedestal color and finish shall be selected from the manufacturer's standard colors.

Fasteners.--

Fasteners for fastening seat units and support assemblies shall be the manufacturer's standard fasteners for the purpose intended.

PART 3.- EXECUTION

Installation.--Bottom flange fittings of the support assemblies shall bear solidly on the floor without rocking and shall be fastened rigidly and securely to the floor in accordance with the manufacturer's recommendations.

10.07 FIRE EXTINGUISHERS AND CABINETS

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing fire extinguishers with cabinets or mounting brackets 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 extinguishers shall have the capacity and type rating of 2A:10BC in the Office area, and 4A:60BC in the Equipment Service Bays.

Mounting bracket.--

Mounting bracket shall be the manufacturer's standard painted, surface mounted type.

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 semi-recessed 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 mounting brackets and cabinets shall be attached to structure, square and plumb, in accordance with the manufacturer's recommendations.

IDENTIFICATION.--

Bracket-mounted.--Extinguishers shall be identified with red letter decals spelling "FIRE EXTINGUISHER" applied to wall surface. Letter size, style and location as selected by the Engineer.

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.

10.08 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.

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.

10.09 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.

Combination paper towel dispenser and waste receptacle.--

Combination paper towel dispenser and waste receptacle shall be semi-recessed unit of stainless steel with satin finish. The approximate size shall be 355 mm x 1880 mm x 190 mm deep with 102 mm skirt. The paper towel dispenser shall have a capacity of 1000 single fold paper towels. The waste receptacle shall have a

capacity of not less than 37 liters. One unit per lavatory.

Toilet seat cover dispenser.--

Toilet seat cover dispenser shall be stainless steel dispenser with satin finish, approximately 210 mm x 320 mm x 48 mm deep, single pack. One dispenser per toilet stall.

Napkin receptacle.--

Napkin receptacle shall be wall hung, stainless steel napkin receptacle with satin finish, hinged top and bottom, disposable liner, approximate 3.8 liter capacity container. One receptacle per women's toilet stall.

Waste receptacle.--

Waste receptacle shall be stainless steel waste receptacle with satin finish, 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 stainless steel towel dispenser with satin finish and 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.--

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. 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.

Mirror, wall hung with shelf (at women's restroom).--

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.

Privacy curtain.--

Privacy curtain shall be flame resistant, one-way draw, nylon reinforced, anti-bacterial vinyl fabric. Curtain shall be 1.8 meters long.

Privacy curtain rod shall be stainless steel, fixed mounted shower rod with stainless steel mounting plates.

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.

10.10 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 A&J Modes UJ13A; Bradley Model 9953; Bobrick Model B-223; or equal.

EXECUTION.--

INSTALLATION.--Mop holder shall be installed rigidly and securely.

DIVISION 11. EQUIPMENT

11.01 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; overhead hose reels and pneumatic pumps for dispensing chassis lubricant, motor oil, automatic transmission fluid, gear lubricant and anti-freeze; overhead hose reels for compressed air and water; overhead electric light; and all connecting pipelines, hoses, accessories and mounting assemblies.

The compressed air system shall include a compressor, regulators, 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

OVERHEAD HOSE REEL ASSEMBLIES.--

General.--Overhead hose reel assemblies shall be heavy duty assemblies of steel construction with connecting hoses, locking automatic ratchets, guide rollers and heavy duty spring activated hose pickups. Reels shall have bushings, swivels, ball stops, delivery hoses and control valves. The reels shall have a baked enamel finish. Manufacturers reel mounting brackets shall be supplied with reels.

Chassis lubrication reel assembly.--

The chassis lubricant reel assembly shall have a 12 m minimum length, minimum 6 mm outside diameter, high pressure delivery hose and outlet control valve. The delivery hose shall be rated for 34.5 MPa working pressure and 137.9 MPa bursting pressure. The chassis lubricant reel assembly shall be Lincoln, 85051; Graco, 224-363, 224-417, and 202-577; or equal.

Motor oil reel assembly.--

The motor oil reel assembly shall have a 10 liter metering shutoff valve assembly with totalizer, non-drip nozzle extension, strainer and a 12 m minimum length of 13 mm inside diameter, medium pressure delivery hose. The delivery hose shall be rated for 5520 kPa working pressure and 27.6 MPa bursting pressure. The motor oil reel assembly shall be Lincoln, 83464 and 899; Graco, 224-057, 218-549, 222-648, 203-265, 157-958, and 108-478; or equal.

Automatic transmission fluid reel assembly.--

Automatic transmission fluid (ATF) reel assembly shall have a volume control valve, non-drip nozzle and 12 m minimum length of 13 mm outside diameter, medium pressure delivery hose. The delivery hose shall be rated for 5520 kPa working pressure and 27.6 MPa bursting pressure. The ATF reel assembly shall be a Lincoln, 83464 and 776; Graco, 224-057, 218-549, and 222-413; or equal.

Gear lubricant reel assembly.--

Gear lubricant reel assembly shall have 10 liter metering shut-off valve assembly with totalizer, non-drip nozzle and a 12 m minimum length of 13 mm outside diameter, medium pressure delivery hose. The delivery hose shall be rated for 5520 kPa working pressure and 27.6 MPa bursting pressure. The gear lubricant reel assembly shall be Lincoln, 83464 and 881; Graco, 224-057, 218-549, 222-648, 201-701, 157-958 and 108-478; or equal.

Anti-freeze reel assembly.--

The anti-freeze reel assembly shall have a shutoff valve assembly with totalizer, non-drip nozzle extension, strainer and a 12 m minimum length of 13 mm outside diameter, medium pressure delivery hose. The delivery hose shall be rated for 5520 kPa working pressure and 27.6 MPa bursting pressure. The anti-freeze reel assembly shall be Lincoln, 83464 and 899; Graco, 224-057, 218-549, 222-648, 203-687, 157-958 and 108-478; or equal.

Compressed air reel assembly.--

Compressed air reel assembly shall have 12 m minimum length of 13 mm inside diameter, low pressure delivery hose with quick disconnect coupler. The delivery hose shall be rated for 1.2 Mpa working pressure. Compressed air reel assembly shall be Lincoln, 85005; Graco, 224057; or equal.

Water reel assembly.--

Water reel assembly shall have 12 m minimum length of 13 mm inside diameter, low pressure delivery hose and a heavy duty radiator faucet type filler. Water reel assembly shall be Lincoln, 85005; Graco, 224057; or equal.

PUMP ASSEMBLIES.--

General.--Pump assemblies shall be lubricant and oil type pump assemblies with air driven motors and shall be suitable for operation with stationary, exposed drums. Pump assemblies shall include pressure relief kits. Air connector hose shall be rated for 1720 kPa minimum working pressure. Product connector hose shall be as specified for the individual reel assembly. Pump assemblies shall produce the flowrates and pressures as specified under "Testing".

Chassis lubricant pump assembly.--

Chassis lubricant pump assembly shall be suitable for use with stationary, exposed 55 kg drums, complete with drum cover, air coupler and follower plate, and shall have a minimum pressure ratio of 45:1 and a maximum pressure ratio of 50:1. The chassis lubricant pump assembly shall be Lincoln, 918; Alemite, 8550; Graco, 225-014; or equal.

Motor oil, ATF and gear oil pump assemblies.--

Motor oil, ATF and gear oil pump assemblies shall be suitable for use with stationary, exposed 205 liter drums and equipped with a bung bushing and an air expeller in the pump tube and shall have a 76 mm air motor. The motor oil pump assembly shall be equipped with a flow compensator. Pump assemblies shall be Lincoln, 424; Alemite, 8569; Graco, 225-640; or equal.

Anti-freeze pump assembly.--

Anti-freeze pump assemblies shall be suitable for use with stationary, exposed 205 liter drums and equipped with a bung bushing, 316 stainless steel construction, and teflon packing. Pump assemblies shall be Lincoln, 84830; Aro, 612041; Graco, 226-942 and 213013; or equal.

MISCELLANEOUS COMPONENTS.--

Light reel assembly.--

Light reel assembly shall be overhead type light reel with a positive reel latch cord lock mechanism, release mechanism, reel cord retractor, 9 m minimum length of 3-wire cord, 600 mm pigtail, ball stop, vapor-tight high impact phenolic plastic holder without switch or receptacle with heavy duty lamp guard and 100-watt incandescent bulb or 15-watt fluorescent tube. The incandescent light reel assembly shall be Alemite, 330005C; or equal. The fluorescent light reel assembly shall be Hi Reel, 3005-AFL; Woodhead, 945-3SW-1003-3S; or equal.

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. 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 1700 kPa. Each gage shall be equipped with a gage cock. Pressure gage shall be Marsh, Ashcroft, US Gage, or equal.

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 for 55 kg, drums or 205 liter drums as applicable.

PART 3.- EXECUTION

INSTALLATION.--

General.--The hose reels shall be installed rigidly and securely to the reel mounting bracket. The mounting bracket shall be attached to the overhead structure as shown on the plans.

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
Anti-freeze (50 % solution)	8 liters 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.

11.02 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 continuously 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.

11.03 WORKBENCH

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing a workbench in accordance with the details shown on the plans and these special provisions.

SUBMITTALS.--

Product data.--Manufacturer's descriptive data and standard color palette shall be submitted for approval.

PART 2.- PRODUCTS

Workbench.--

Workbench shall be standard, factory fabricated and factory painted heavy duty workbench unit with plywood reinforced steel top, drawers, curb and shelves. Plywood top reinforcement shall consist of two layers of securely fastened 19 mm thick exterior type plywood. The drawers, shelves and curb shall be as shown on the plans. Paint shall be an industrial grade enamel.

Leg anchors.--

Leg anchors shall be ICBO approved, integral stud type expansion anchors or internally threaded type anchors with independent stud.

PART 3.- EXECUTION

Installation.-- The workbench shall be installed with the top level and the legs rigidly and securely fastened to the floor.

Anchors for the legs shall be installed in accordance with the manufacturer's instructions.

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. (BLANK)

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, 208-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 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 a minimum of 2 hours of instruction on equipment operation and maintenance for each session.

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:

- Water hammer arrestor
- Access door
- Trap seal primer valve
- Compression stop
- Hose faucet
- Pipe insulation
- Cleanouts
- Valve box
- Floor drains
- Water closets
- Urinals
- Lavatory
- Lavatory carrier
- Lavatory and sink faucets
- Mop sink
- Kitchen sink
- Service sink
- Water heaters
- Electric water cooler
- Emergency shower and eyewash
- Check valves
- Gate valves
- Ball valves
- Balancing damper
- Exhaust fans
- Heat-vent-light combination
- Evaporative coolers
- Air conditioning units
- Thermostats

Time switches
Diffusers
Registers
Duct insulation
Duct liner
Fire department inlet connection
Detector check valve
Ductile iron pipe and fittings
Galvanized steel pipe and flanges
Post indicator valve
Flush valve
Backflow preventer
Vacumn breaker
Flexible hose

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:

Evaporative coolers
Air conditioning units
Exhaust fans
Electric water cooler
Flush valves
Backflow preventer

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.

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 Uniform 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. Flanges and flanged fittings shall be UL or FM listed suitable for working pressures not less than 1210 kPa, i.e., steel flanges are welded to pipe. The whole assembly shall be hot-dipped galvanized.

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.

LP1.--

2.1 mm thick seamless steel tubing with high pressure flareless steel tube fittings. Bends, if required, shall be made with tube bender on 115 mm minimum radius.

LP2.--

0.9 mm thick seamless steel tubing with high pressure flareless steel tube fittings. Bends, if required, shall be made with tube bender on 115 mm minimum radius.

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.

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.

Automatic trap seal primer valve.--

Automatic trap seal primer valve shall be bronze body with removable operating parts and integral vacuum breaker. Trap seal primer shall be designed for horizontal in-line installation and shall operate automatically on pressure fluctuation in the water supply. Automatic trap seal primer valve shall be Josam, 88250; Zurn, Z-1022; Jonespec. 77250; or equal.

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.

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.

Flexible hose.--

Flexible hose shall be PVC flat roll discharge type, synthetic reinforcing cord, and rated for 350 kPa minimum. Hose nipple shall be 316 stainless steel, male NPT x hose shank. Hose clamps for flexible hose shall be stainless steel and rated for 350 kPa.

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
Sanitary drain piping above ground in building	H1, C1, or C2
Sanitary drain and vent piping underground within 1.5 m of the building	C1 or C2
Sanitary vent piping above ground in building	A2, H1, C1, or C2
Sanitary drain pipe, 1.5 m beyond the building	C1, C2, or P1
Natural gas, above ground	A1 or B2
Natural gas, underground	B2 (plastic coated), P5 or P6
Lubrication piping, less than 30 m in length	LP1 (16 mm outside diameter)
Lubrication piping, over 30 m in length	LP1 (22 mm outside diameter)
Gear oil, motor oil, and automatic transmission fluid (ATF) piping; less than 8 m in length	LP2 or H3 (16 mm outside diameter)
Gear oil, motor oil, and ATF piping; over 8 m in length	LP2 or H3 (22 mm outside diameter)
Compressed air	A1
Rainwater leaders	A2
Equipment drains and relief valve discharge	H3 or A1
Soap lines	H3

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.

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 field 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.
4. At each end of buried ferrous pipe protected by cathodic protection.

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 National 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.

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
Lubrication piping	860 kPa	Air and Product

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.

P-trap, hot water supply pipes and angle valves for lavatories and sinks, except in janitor closets or similar enclosed spaces, shall be insulated.

Duct insulation shall be installed on all rigid ductwork installed in concealed non-conditioned spaces.

Duct liner shall be installed in all rectangular ductwork installed in exposed non-conditioned spaces and in exterior locations. Plenum liner shall be installed in all plenums in non-conditioned spaces or in walls facing a non-conditioned space.

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 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.

PVC jacket.--

PVC 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 K•m²/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.

External duct insulation.--

External duct insulation shall be 38 mm thick, 0.5 kg density glass-fiber blanket type. Material and coatings shall be fire resistive and shall be approved by the State Fire Marshal. External duct insulation shall be Fiberglas, Type PF-336; Ultralite, No. 100; Pittsburgh Plate Glass, Superfine; Johns-Manville, Microlite; Silvercote, Silvercel; or equal.

Plenum and duct liner.--

Plenum and duct liner shall be 25 mm minimum thickness. Material and coatings shall be fire resistive and shall be approved by the State Fire Marshal. Liner shall be Gustin-Bacon, Ultra-Liner duct insulation; Owens-Corning Fiberglas, Type CE; Gustin-Bacon, coated insulation Board No. 90-A; Owens-Corning Fiberglas 0.7 kg density coated flexible duct liner; Johns-Manville, MicroBar, or 0.7 kg density coated Microlite; Pittsburgh Plate Glass, Superfine 0.7 kg density coated interior duct insulation; or equal.

Adhesive.--

Adhesive shall be non-flammable type: Benjamin Foster Company, No. 85-20 Spark Safe; Goodloe E. Moore Company, Tuff Bond No. 6; Permacel, No. PA-310; 3M, No. 38 Insulation Adhesive; Swift's, No. 7228 brush type or No. 7336 spray type; Chicago Mastic, 17-461; or equal.

Studs.--

Studs shall be cement-in-place type, pneumatic driven type or percussive welding type, and shall have 25 mm minimum diameter washers.

Insulation inserts.--

Insulation inserts at pipe hangers supports for pipes NPS 2 or larger shall be calcium silicate, cellular glass, or other acceptable material of the same thickness as the adjacent insulation and not less than 6 kg density.

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.

Duct insulation.--Ragged edges shall be repaired or taped. Coverings shall be neatly finished at joints and edges. Each joint shall have a 50 mm minimum lap.

Where transitions are made between externally covered ducts and lined ducts, the lined duct shall be overlapped 200 mm with external covering.

Insulation shall be flush with but not cover control devices, damper controls or access doors.

Before insulation is wrapped around concealed ducts, an adhesive shall be spot applied at a maximum of 100 mm centers on each side of the ducts to prevent sagging of the insulation. Insulation shall be wrapped entirely around the ducts and shall be wired securely in place with No. 16 copper clad wire, metal bands at least 10 mm wide or plastic ties. Supports shall be spaced a maximum of 300 mm on centers. Metal bands shall be installed with the use of a banding machine. Seams in the insulation shall be taped.

The finished insulation covering shall be even and level and shall not contain humps.

Plenum and duct liner.--Plenums and exposed ducts shall be lined with plenum and duct liner. Plenums and ducts shall be sized to provide the clear inside dimensions shown on plans after the liner is installed.

The insulation shall be applied with coated side exposed to air stream to prevent surface erosion.

The lining shall be fastened in place with adhesive and with studs with washers spaced a maximum of 500 mm on center each way.

Applying adhesive.--The adhesive shall be liberally applied over entire interior surfaces of ducts or plenums.

Stud installation.--Studs shall be installed as follows:

- a. Cement-In-Place Type Studs.--Cement-in-place type studs shall be cemented in place with adhesives manufactured for this purpose and shall be as recommended by the stud manufacturer. Cement-in-place type studs shall be used where concrete walls form part of plenum.
 - b. Percussive Welding Type Studs.--Percussive welding type studs shall be carefully welded in place with current settings that will not appreciably burn galvanizing on opposite side of the sheet metal.
- Pneumatic Driven Type Studs.--At locations where pneumatic driven type studs are used, hardened steel backup plates or dollies shall be used under the sheet metal.

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 2, 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.--

State Fire Marshal approval.--The Contractor shall submit complete shop drawings of the Automatic Fire Sprinkler System to the State Fire Marshal for review and approval. Allow 12 weeks for State Fire Marshal review and approval.

Shop drawings.--After State Fire Marshal approval, the complete shop drawings stamped "APPROVED" by the State Fire Marshal, and written verification of the water pressure and flow rate, shall be submitted by the Contractor for approval to the California Department of Transportation as specified under "Submittals" in Division 1, "General Requirements," of these special provisions.

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, 1996 edition, "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, 115volt 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, floor mounted with flush valve)--

Disabled accessible water closet shall be vitreous china, floor mounted, siphon jet, 410 mm to 440 mm high elongated bowl, 40 mm top spud for exposed flush valve, 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	Kohler
Closet	"Cadet 17H EL1.6/FV" 3043.102	"Hymont" 3H-701	"Highcrest" K-4271
Seat	Church 5321.070	Olsonite 95	"Lustra" K-4670-C
Flush valve	Exposed, diaphragm type, chrome plated, with oscillating handle, integral control stop, adjustable tail piece and vacuum breaker suitable for use with 40 mm spud water closets.		

Water closet (floor mounted with flush valve)--

Water closet shall be vitreous china, floor mounted, siphon jet, elongated bowl, 40 mm top spud for exposed flush valve, with solid plastic open front elongated seat with check hinges. Closet and accessories shall be of the following types or equal:

	American Standard	Crane	Kohler
Closet	"Tribor" 2342.012	"Whirlton" 3-325	"Downing" K-4262-ET
Seat	Olsonite 95	Church 5321.070	"Lustra" K-4670-C
Flush valve	Exposed, diaphragm type, chrome plated, with oscillating handle, integral control stop, adjustable tail piece and vacuum breaker suitable for use with 40 mm spud water closets.		

Urinal.--

Urinal shall be vitreous china, wall hung, washout, 20 mm top spud, integral shields, spreader and trap. Urinal and valve shall be of following types or equal:

	American Standard	Crane	Kohler
Urinal	"Washbrook" 6501.010	"Cromwell" 7-187	"Bardon" K-4960-T
Flush valve	Exposed, diaphragm type, chrome plated, with oscillating handle, integral control stop, adjustable tail piece and vacuum breaker suitable for use with 20 mm spud urinals.		

Urinal (disabled accessible).--

Urinal shall be vitreous china, wall hung, siphon jet or washout, top spud, integral shields, spreader and trap, with 380 mm maximum extension from wall. Urinal and valve shall meet Americans with Disabilities Accessibility Act Guidelines (ADAAG) and shall be of following types or equal:

	American Standard	Crane	Kohler
Urinal	"Allbrook" 6540.017	"Manhattan" 7-109	"Bardon" K-4960-T
Flush valve	Exposed, diaphragm type, chrome plated, with oscillating handle, integral control stop, adjustable tail piece and vacuum breaker suitable for use with top spud urinals.		

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 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.		

Lavatory (counter mounted).--

Lavatory shall be self-rimming vitreous china, integral perforated grid drain, drilled for 102 mm centers, nominal bowl size 254 mm x 457 mm, with single extra long lever mixing faucet. 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:

	American Standard	Eljer	Kohler
Lavatory	"Aqualyn" 0476.028	"Kathy" 051-3334	"Rondelle" K-2185
Drain	2411.015	803-052	K-7715
Supplies	Brass Craft FR1711C	801-0111	K-7606
Faucet	Moen 8425	-----	15592-5
Trap	32 mm chromium plated brass exposed bent tube adjustable 1.37 mm (17-gage) minimum thickness.		

Wash sink.--

Wash sink shall be acid resisting enamel cast iron, with wall hanger, integral perforated grid drain, single trap, 3 back mounted double faucets, 2 soap dishes, and a minimum length of 1.5 meters. Sink and accessories shall be of the following types or equal:

	American Standard	Eljer	Kohler
Wash sink	"Carnegie" 8513.152	"Blaine" 232-2202	"Brockway" K-3200
Faucet	8340.234	739-0400	K-8892
Strainer	4362.026	803-0570	K-8820
Trap	40 mm chromium plated brass exposed bent tube adjustable 1.37 mm (17-gage) minimum thickness.		

Mop sink.--

Mop sink shall be acid resisting enameled cast iron, 711 mm x 711 mm outside dimensions, 75 mm trap, vinyl coated rim guard, vacuum breaker faucet with hose and wall hook. Sink and accessories shall be of the following types or equal:

	American Standard	Eljer	Kohler
Mop sink	"Florwell" 7740.020	"Custodial" 242-0050	"Whitby" K-6710
Strainer	7721.038	803-0630	K-9146
Faucet	8344.111	749-1450	K-8928

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

Kitchen sink.--

Kitchen sink shall be constructed of 18-gage minimum stainless steel with full undercoating. Sink shall be single compartment, self-rimmed with ledge for faucet. Normal bowl size shall be 533 mm x 381 mm with an outside depth of 178 mm or less. Sink shall be supplied with stainless steel strainer and chrome P-trap. Kitchen sink faucet shall be metal body, chrome plated, single lever mixing type with 200 mm long swing spout aerator and replacable ceramic cartridge.

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.

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.

Mop sink.--Mop sink double faucet shall be mounted on wall above sink back with spout outlet face one meter above the floor.

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% 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 teak or wood grain 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 in accordance 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.--

Single-package (gas heating/electric cooling) unit.--

Single-package (gas heating/electric cooling) unit shall be standard, commercial quality, curb or slab mounted unit with weatherproof acoustically lined cabinet. The cabinet shall have convenient access panels and a baked-on enamel finish. The roof curb shall be insulated and shall be supplied by the unit manufacturer.

Unit shall be provided with positive pressure combustion and mechanical flue gas venting and furnace safety controls.

Compressor shall be hermetically sealed unit, vibration isolated, with quick-start components if single phase voltage, short cycling protection, pressure relief valve, high and low pressure switches, liquid-line filter-dryer and crankcase heater.

Indoor air blower shall be adjustable V-belt drive type. The fan and fan motor shall provide the specified air flow, with wet coil, against the external static pressure as noted on the plans.

Units of 10 kW and smaller capacity can have direct drive indoor air blower. Motors shall have integral thermal overload protection.

Unit with fan capacity over 1180 L/second shall be provided with an economizer.

Single-package unit shall be Carrier, Bryant, York, Trane, or equal.

Economizer.--

Economizer shall be modulating type assembly either provided by the manufacturer or fabricated to match the unit. The economizer shall be complete with damper motor and linkage for full range modulation of the outdoor and return air dampers, barometric damper, screened rain hoods, factory wiring for convenient connections, automatic compressor lockout, minimum position damper control, and air filters sized to have a maximum velocity of 125 meters per minute, all installed in an enclosure similar in color to the basic unit with paint applied by the manufacturer of the economizer. Barometric damper area shall be equal to outside air intake area and be capable of relieving 100 percent of the rated air conditioning unit. The economizer shall be constructed to meet SMACNA requirements and shop drawings shall be submitted prior to fabrication.

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. Unit shall be curb mounted and installed with a cold weather damper.

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 McGraw-Edison, Fan-Air, Arctic Circle, or equal.

Unit heater.--

***48. Edit for use with natural gas or LPG. When designing this system keep in mind that tube lengths are related to burner capacity.**

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.

FANS AND VENTILATORS.--

Exhaust fan (ceiling mounted).--

Exhaust fan shall be ceiling mounted, AMCA certified and shall be equipped with grille, backdraft damper and metal housing. Exhaust fan motor shall have integral thermal overload protection. Ceiling exhaust fan shall be Broan, Greenheck, Penn, or equal.

Exhaust fan (wall mounted).--

Exhaust fan shall be wall mounted, AMCA certified and shall be equipped with grille, metal housing, motorized damper, centrifugal fan wheel and bird screen. Fan motor and fan assembly shall be isolated from base with rubber vibration isolators. Fan shall be completely weatherproof and shall have a disconnect means under the hood and fan motor shall have integral thermal overload protection. Wall exhaust fan shall be Greenheck; Penn; or equal.

Combination heat lamp/vent/light.--

Combination heat lamp/vent/light shall be ceiling mounted, recessed type unit consisting of fan forced heater, exhaust fan, and light, with metal housing, grille and backdraft damper. Unit shall have a hinged glass lens for relamping and automatic reset thermal protection. Ducting size shall be as required by the manufacturer. Unit shall be supplied with a single gang, 3-switch control by the unit manufacturer. Combination heatlamp/vent/light shall be Broan, No. 655; Nutone, No. 665; or equal.

Fume exhaust fan.--

Fume exhaust fan shall be AMCA certified and shall be equipped with metal housing, centrifugal fan wheel, backdraft damper and bird screen. Fan motor and fan assembly shall be isolated from base with rubber vibration isolators. Fan motor shall have integral thermal overload protection. Fume exhaust fan shall be completely weatherproof and shall have a disconnect means under the hood. Roof curb shall be insulated and shall be supplied by the fan manufacturer.

Declassification fan.--

Declassification fan (roof mounted in Equipment Bays) shall be constructed in accordance with the requirements of the latest edition of the AMCA Publication 99, "Standards Handbook." Declassification fan motor shall be 3-phase, continuous duty and explosion proof.

Declassification fan shall be completely weatherproof and shall a disconnect means under the hood.

Declassification fan shall be Penn; Carnes; Greenheck; or equal.

Roof cap.--

Roof cap shall be galvanized steel or aluminum construction, with 360 degree air opening and bird screen. Roof cap curb shall be supplied by the cap manufacturer.

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.

Thermostat (in Storage Room).--

Thermostat shall be line voltage, single set point type. Thermostat shall be single pole, double throw, and shall be set at 26°C.

Thermostat (for package heating cooling unit).--

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 Robertshaw, 9700; Honeywell, T7300; or equal.

Time switch.--

Time switch shall be single-pole, 6-hour range, spring-wound, "OFF" type time switch without a "HOLD" feature. Time switch contacts shall be rated 20 amps at 120 volts. Time switch shall be Intermatic; Tork; 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.

Return register (for gypsum board ceilings).--

Return register for gypsum board ceilings shall be rectangular or square, and shall be steel with oven baked-on enamel bone white dull finish or extruded aluminum, fixed bar type, die formed louvers set at 45 degrees, 13 mm spacing maximum, surface mounted; Titus, 335; Air Mate, 280; or equal.

Ceiling diffuser (for suspended ceilings).--

Ceiling diffuser for suspended ceilings shall be 610 mm square. Diffuser shall be steel with oven baked-on enamel bone white dull finish or extruded aluminum, perforated face hinged for easy access, and shall be fitted with fully adjustable air pattern controllers, a removable core, and a standard flanged frame; Titus, PAS; Air Mate, 700; or equal.

Return register (for suspended ceilings).--

Return register for suspended ceilings shall be 610 mm square, steel or extruded aluminum, perforated face hinged for easy access; Air Mate, 700RA; Titus, PAR; or equal.

Ceiling diffuser (for exposed round duct).--

Ceiling diffuser for exposed duct installation shall be round type. Diffuser shall be steel or aluminum with oven baked on enamel white finish. The diffuser shall have four round cones and round neck inlets. The diffuser shall be adjustable from verticle to horizontal discharge pattern. Round diffuser shall be as manufactured by Titus, TRMA; Hart and Cooley, P3; or equal.

Return register (for fume exhaust fan exposed round duct).--

Return register for exposed duct shall be round as manufactured by Hart and Cooley, P16 with duct ring; Air Mate; or equal.

Duct inlet grille.--

Duct inlet grille shall be of heavy duty all steel construction, 18-gage minimum, 70 percent free area minimum, with one set of horizontal fixed bars at zero degrees, 25 mm spacing, duct mounted.

Duct inlet grille shall be Titus Core 30; Hart and Coley; or equal.

Volume damper.--

Volume damper shall be opposed blade type, operable from face with screw driver or Allen-head wrench, shall be same manufacturer as diffuser or may be furnished as part of the diffuser and register.

Balance damper.--

Balance damper shall be butterfly type, 1.52 mm (16-gage) minimum galvanized steel blade, end bearings with steel shaft and locking and indicator operator. Balance damper shall be Ventlock, Young, Anemostat, or equal.

Air filter (for HVAC units).--

Air filter shall be permanent metal viscous impingement type, constructed of aluminum or galvanized steel, 50 mm minimum thickness and be approved for Class 2 use. Filter shall have a minimum efficiency rating of 50 percent as determined when tested in accordance with ASHRAE Test Standard 52. Filter shall be mounted in 1.52 mm (16-gage) galvanized steel holding frames. Two cans of recharging adhesive shall be provided with the filter and shall be nearly odorless, have a high flash point, rapid wetting characteristics, dye tracer and be water soluble. Filter shall be Airspan, Type AF, Eco-Air Products, Inc., Type HIA; Snyder General, Type AAF; or approved equal.

4-way diffuser box.--

4-way diffuser box shall be steel with baked-on enamel bone white dull finish or extruded aluminum, equipped with 150 mm minimum deep box, adjustable volume dampers on four sides and flanged connection. Diffuser box shall be sized to match evaporative cooler and shall be Air Mate, 1100; Shoemaker, 400; or equal.

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.—Furnaces and unit heater 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.

Roof fans and roof caps shall be curb mounted.

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.

Evaporative cooler.--Roof mounted evaporative cooler shall be provided with drain piping routed to the nearest roof drain or gutter. Air gap shall be installed where required by code.

Mounting heights.--Thermostats and time switches shall be installed as shown on the plans.

Temperature controls.--Temperature control for each unit heater shall be provided by 2 line 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.

Air outlets.--Volume dampers shall be furnished and installed for all diffusers. Blocking shall be provided on all sides of air outlets between ceiling or wall joists. Collars shall be supplied for all outlets and shall be taped and sealed in place.

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
Return duct	R
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. Return air systems
 - c. 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

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.

Manuals shall be submitted for the following equipment:

Intrusion Alarm System

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, malleable iron 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.

CONDUCTORS.--

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 THW 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.

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. 6 pull box shall be Brooks Products No. 6; Christy Concrete Products, B1730; 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. 5 pull box shall have inside dimensions of 335 mm by 610 mm and 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.

Reel light receptacles.--

Reel light receptacles shall be 3-wire, 15-ampere, 125-volt AC, twist-lock, grounding type, single, 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 each 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.

Timer switches.--

Timer switches shall be spring-wound mechanical timer switch with 6-hour range. The contact shall be rated one-horsepower at 125-volt AC.

Combination heat lamp/vent/light switches.--

Combination heat lamp/vent/light switches shall be triplex-three rocker switches in a single gang box supplied by the combination heat lamp/vent/light unit.

Motion sensor wall switches.--

Motion sensor wall switches shall be wall-mounted, 3-wire, not less than 1000-watt fluorescent, off-auto-on, passive infrared sensor switch with adjustable photocell override and time delay and shall operate on 120/277 volts. The sensor switch shall cover a minimum of 84 square meters of floor, be suitable for installation in a single gang box, and shall have a field of view of not less than 170 degrees. The time delay setting shall be adjustable from 30 seconds to 20 minutes, initially set at 5 minutes. Light level adjustment shall be adjustable from 215 lux to 2153 lux, initially set at 753 lux. Integral light level sensor shall have a minimum range of 53 lux to 2153 lux.

Motion sensor ceiling switches.--

Motion sensor ceiling switches shall be ceiling-mounted, 3-wire, 1000-watt incandescent or fluorescent, passive infrared sensor switch with adjustable time delay and shall operate on 120/277 volts. The sensor switch shall have a minimum coverage radius of 3.9 meters at 2.4-meter mounting height, be suitable for installation in a single gang box, and shall have a field of view of not less than 360 degrees. The time delay setting shall be adjustable from 30 seconds to 20 minutes, initially set at 5 minutes.

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.

Four-way toggle switches.--

Four-way switches shall be 20-ampere, 120/277-volt AC, quite type, specification grade, ivory color switch with silver cadmium alloy contacts. Switch shall be suitable for wiring with stranded conductors.

Three-position switches.--

Three-position switches shall be rotary action, 3-position, 10-ampere, 120-volt selector switch. Switch 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. Three-position switch shall have legend plate marked AUTO-OFF-HAND.

Bypass timer switches.--

Bypass timer switches shall be in-wall, spring wound interval mechanical time switch with 2 hour range. The switch shall be rated 20 amperes at 125 volts, AC. Switch shall require no electricity to operate.

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, radio and speaker outlet boxes.--

Telephone outlet boxes shall be 102 mm square boxes and plates with modular type telephone outlet and data outlet. Boxes on stud walls shall have plaster ring. Radio and speaker outlet boxes 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 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.

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.

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
120/208V-Three phase	Black, red, 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 1.2 m in equipment 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 and radio outlets	510 mm

16.03 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.

Related work.--Anchorage devices shall be as specified under "Basic Materials and Methods" elsewhere in this Section 12-16.

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 M.--

Panelboard M shall be outdoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/208-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 A.--

Panelboard A shall be indoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/208-volt, AC panelboard at least 508 mm wide with 175-ampere main circuit breaker, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panels shall be Square D Company; General Electric; or equal.

Panelboard B.--

Panelboard B shall be indoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/208-volt, AC panelboard at least 508 mm wide with 225-ampere main lugs, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panels shall be Square D Company; General Electric; or equal.

Panelboard N.--

Panelboard N shall be indoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/208-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. Panels shall be Square D Company; General Electric; or equal.

Panelboard S.--

Panelboard S shall be indoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/208-volt, AC panelboard at least 508 mm wide with 225-ampere main lugs, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panels shall be Square D Company; General Electric; or equal.

Panelboard T.--

Panelboard T shall be indoor type, surface-mounted, factory assembled, 3-phase, 4-wire, 120/208-volt, AC panelboard at least 508 mm wide with 225-ampere main lugs, insulated groundable neutral, hinged door and molded case branch circuit breakers as shown on the plans. Panels shall be Square D Company; General Electric; or equal.

STARTERS.--

Air compressor starter.--

Air compressor starter shall be combination 3-pole, 208-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; 208-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 starter.--

Evaporative cooler starter shall be combination 3-pole, 208-volt, NEMA Size 0, NEMA rated, line voltage starter and motor circuit protector in a NEMA-1 enclosure. Evaporative cooler starter shall have a 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 blower motor current, as quoted on the nameplate by the motor manufacturer. Reset button shall be externally operable. Starter shall be

lockable in the “off” position.

CONTROL PANELS.--

Declassification fans control panel.--

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 IIC 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 and MD2; Starters, ST1 and ST2; and terminal blocks, TB. The circuit breakers shall be externally operable.

Circuit breakers CB, MD1 and MD2 shall 3-pole, 240-volt with trip rating as shown on the plans. The pilot light, PL, shall be 120-volt 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 elsewhere in these special provisions. Starters, ST1 and ST2, shall be 3-pole, 208-volt, NEMA Size 0, NEMA rated, line voltage starter. Starter shall have 120-volt coil, double-break silver contacts and one manual reset, non-adjustable thermal overload, set to trip between 115 and 125 percent of full load motor current, as quoted on the nameplate by the motor manufacturer.

All the components mounted inside the enclosure shall be identified with nameplates having the abbreviation used on the plans (CB, MD1, MD2, ST1, and ST2). 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, NORTH FAN, SOUTH 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 fans pushbutton station.--

Declassification fans pushbutton station shall be heavy duty, oil-tight, two-button unit mounted in a NEMA Type 4 enclosure. The contact shall be rated 60-ampere make, 6-ampere break, and 10-ampere continuous at 120-volt, AC and 35 percent power factor. The unit shall have identifying nameplate with inscription “DECLASSIFICATION FANS” in mm height letters.

SWITCHES.--

Power transfer switch.--

Power transfer switch shall be 3-pole, double throw switch rated at 400 amperes at 600-volt, AC in a NEMA Type 3R enclosure. Switch shall have a legend plate with inscriptions “UTILITY” and “STANDBY”.

Fume exhaust fan manual motor starting switch.--

Fume exhaust fan manual motor starting switch shall be single-pole, 120-volt, manual motor starter with toggle type operator in a NEMA-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.

Exhaust evacuation unit disconnect switch.--

Exhaust evacuation unit disconnect switch shall be 3-pole, 240-volt, AC, 30-ampere, non-fusible general duty safety switch in a NEMA-1 enclosure.

A/C disconnect switch.--

A/C disconnect switch for the air conditioner units A/C-1, A/C-2, A/C-3, and A/C-4 shall be 3-pole, 600-volt, AC, fused, heavy duty safety switch in a NEMA-3R enclosure. The fuses and ampere rating of the switch shall be sized to suit the air conditioner unit furnished.

Door operator disconnect switch.--

Door operator disconnect switch for the Equipment Service Bays shall be 3-pole, 240-volt, AC, 30-ampere, non-fusible, general duty safety switch in a NEMA-1 enclosure with provision for padlocking in the "OFF" position.

Door operator disconnect switch for the Parts Warehouse shall be a 20-ampere snap switch.

Rolling door disconnect switch.--

Rolling door disconnect switch for the Parts Warehouse shall be a 20-ampere snap switch.

Exhaust fan disconnect switches.--

Exhaust fan disconnect switches for declassification fans and fume exhaust fans shall be supplied as part of the exhaust fans as specified under "Mechanical," Division 15, of these special provisions.

TRANSFORMER.--

Transformer, T.--

Transformer shall be outdoor, dry type, floor mounted, 3-phase, 480-volt primary, 120/208-volt secondary, 225-kVA transformer with weatherproof type enclosure. Transformer shall have two 2 1/2 percent full capacity taps above and four 2 1/2 percent full capacity taps below normal primary voltage, copper windings and 150°C temperature rise.

MISCELLANEOUS MATERIALS.--

Declassification fans warning sign and SPR warning sign.--

Declassification fans warning sign and SPR warning sign 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.

Plywood backing board.--

Plywood backing board for mounting electrical, telephone (TTB) or radio (RTB) 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 or switchboard identification nameplate with designation as shown for each panelboard or switchboard. 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.

Transformer installation.--Connect primary to minimum value taps during construction period and prior to initial building start-up. Make voltage readings and adjust tap connections to nominal voltage during final construction review and prior to building occupancy. Install conduit connections which will prevent transmission of the transformer vibrations to the conduit system. A 106 mm concrete pad shall be provided for the floor mounted transformer. Transformers shall be bolted to concrete pad when pad mounted and bolted to wall with support brackets when wall mounted. Pad mounted transformers shall be installed at locations as shown 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, 120/208 V, 400 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: HEAT PUMP;
3. Inscription for lighting control stations shall be the panel designation as shown in the plans and shall read in the following example: WAREHOUSE LIGHTING CONTROL PANEL.

Declassification fans warning sign and SPR warning sign.--Declassification fans warning sign and SPR warning sign with the message as shown on the plans shall be fastened to the wall at the locations as shown on the plans with at least six anchorage devices.

16.04 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.

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. Dimming ballasts shall be high frequency ballasts as specified above and shall be capable of dimming the light output from 100 percent to 20 percent of the rated light output.

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.--

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.--

Lay-in 600 mm x 600 mm specification grade lensed troffer with two 31-watt U lamps and electronic ballast. The fixture shall be Columbia Lighting, 5PS22-2 Series; Lithonia, SP Series; or equal.

F4.--

Lay-in 600 mm x 1200 mm specification grade lensed troffer with two 32-watt T8 lamps and electronic ballast. The fixture shall be Columbia Lighting, 5PS24-2 Series; Lithonia, SP Series; or equal.

F5.--

Lay-in 600 mm x 1200 mm specification grade lensed troffer with three 32-watt T8 lamps and electronic ballast. The fixture shall be Columbia Lighting, 5PS24-3 Series; Lithonia, SP Series; or equal.

F6.--

Stem mounted general purpose industrial fluorescent fixture with two 59-watt T8 slimline lamps, electronic ballast and white heavy gage cold-rolled steel reflector complete with end plates. The fixture shall be Columbia Lighting, CSR Series; Lithonia Lighting, EJA Series; or equal.

F7.--

Bracket mounted heavy duty industrial fluorescent fixture with two 59-watt T8 slimline 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.

F8.--

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.

F9--

Lay-in 300 mm x 1200 mm specification grade lensed troffer fluorescent fixture with two 32-watt T8 lamps, 265 MA electronic ballast. The fixture shall be provided with a dry-wall grid adapter or flange adapter kit for recessed type mounting in a plaster type ceiling. The fixture shall be Columbia, Catalog No. 4PS26-52-222 EOCT; Day-Brite, Catalog No. 2SG2220-SFS02C; Lithonia, SP Series; or equal.

F10--

Wall mounted, outdoor type fluorescent fixture with one 13-watt twin tube lamps. The fixture shall be Daybrite Lighting, Zircon Series; Lithonia Lighting, TWL Series; or equal.

F11--

F11 shall be similar to F1 except F11 shall be stem mounted.

H1--

Outdoor, wall mounted, 70-watt, 120-volt high pressure sodium luminaire with integral ballast. The luminaire shall be Holophane, Wallpockette Series; Lithonia, TWL Series; or equal.

H2--

Outdoor, wall mounted, 150-watt, 120-volt high pressure sodium luminaire with integral ballast. The luminaire shall be Holophane, Catalog No. Wallpack Series; Lithonia, TWP Series; or equal.

H3--

Outdoor, recessed mounted, square lens, 70-watt, 120-volt, high pressure sodium luminaire with integral ballast. The fixture shall be Capri Lighting HS-10 Series; Lithonia, LAH Series; or equal.

MH1--

Premium enclosed refractor, acrylic reflector, industrial type, pendant mounted, 250-watt, 120-volt, metal halide luminaire with integral pulse start ballast. The fixture shall be Lithonia, THR Series; Stingray 250 W MH; or equal.

Photoelectric cell unit, PEC--

Photoelectric cell 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 station, LCS1 and LCS2--

Lighting control station, 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-12 enclosure with a hinged door.

Bays lighting control panel--

Bays lighting control panel shall consist of a transformer, time clock, master switch, photocontroller, lighting contactors, relays and terminal block in a surface mounted NEMA-12 enclosure with a hinged door.

Warehouse lighting control panel--

Warehouse lighting control panel shall consist of a transformer, time clock, master switch, photocontroller, lighting contactor, relay and terminal block in a surface mounted NEMA-12 enclosure with a hinged door.

Hallway, crew room and restrooms control panel--

Hallway, crew room and restrooms lighting control panel shall consist of a lighting contactor, time clock and terminal block in a surface mounted NEMA-12 enclosure with a hinged door.

Hallway and restrooms lighting control panel.--

Hallway and restrooms lighting control panel shall consist of a time clock, lighting contactor, selector switch and terminal block in a surface mounted NEMA-12 enclosure with a hinged door.

Lighting contactors, LC, LC1 and LC2.--

Lighting contactors, LC, LC1 and LC2, shall be electrically held, combination lighting contactor with 120-volt AC coil and 20-ampere, double-break, silver alloy contacts; Square D Company, I.T.E., Westinghouse, or equal. Number of poles shall be as shown on the plans.

Lighting contactors, R1 and R2.--

Lighting contactors, R1 and R2, shall be electrically held, combination lighting contactor with 24-volt AC coil and 20-ampere, double-break, silver alloy contacts; Square D Company, I.T.E., Westinghouse, or equal. Number of poles shall be as shown on the plans.

Selector switch, SS.--

Selector switch, SS, shall be rotary action, 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.

Master switch, MS.--

Master switch, MS, shall be rotary action, 3-position, 10-ampere, 120-volt selector 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.

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. Single-pole, double-throw output contact shall be rated at not less than 16-ampere, 120-volt, AC. Time clock shall have one single-pole, double-throw output contact.

Snap switch.--

Snap switches in the lighting control stations, LCS1 and LCS2, shall be as specified elsewhere in these special provisions.

Photocontroller.--

Photocontroller shall be a photo cell lighting control system which automatically switches an electrical lighting load in response to natural daylight utilizing remotely mounted photosensors. Photocontroller shall include the following features: time delay to prevent intermittent or false switching; delay "off" switch for testing and calibration; adjustable set points for flexibility of lighting control, and 10-ampere relay output to energize the lighting contactors as shown on the plans. The photocontroller shall include circuit control board output relays and built-in timers. The circuit control board shall receive input from the photosensors. A timer board shall be provided with an adjustable range of 30 seconds to 2 hours. The photocontroller shall provide a maintained relay output to drive the lighting contactor. The photocontroller shall be initially set to energize at 54 lux and de-energize at 540 lux. At the time of the control system start-up, the photocontroller shall be calibrated and light level setting are to be made in accordance with the manufacturer's recommendations and instructions. The control functions are to be demonstrated to the Resident Engineer and a designated facility employee.

Photosensor.--

Photosensor shall be a photoconductive sensor type recommended by the photocontroller manufacturer and it shall be suitable to be mounted under the skylight as shown on the plans. The photosensor shall be capable of responding to change in natural daylight and it shall be designed to supply an analog signal to the photocontroller. The sensor shall be adjustable to respond in the range of 0 to 750 footcandles.

Transformer, T1.--

Transformer, T1, shall be a 120-volt primary, 24-volt secondary control transformer. Size shall be suitable to feed the photocontroller, photosensor and relays as shown on the plans.

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.

FABRICATION.--

Component mounting.--All lighting control stations and lighting control panels shall be factory pre-wired control panels.

The following electrical components shall be mounted on the back panel of the lighting control station, LCS1 and LCS2:

- Terminal Block, TB
- Lighting contactor, LC
- Time clock

The following electrical components shall be mounted on the hinged door of lighting control station, LCS1 and LCS2:

- Selector switch, SS
- Pilot light, PL
- Snap switches

The time clock, lighting contactors (LC1 and LC2), relays, (R1 and R2), photocontroller, transformer and terminal block shall be mounted on the back panel of the bays lighting control panel. The master switch shall be mounted on the hinged door of the bays lighting control panel.

The time clock, lighting contactor (LC1), relay (R1), photocontroller, transformer and terminal block shall be mounted on the back panel of the warehouse lighting control panel. The master switch shall be mounted on the hinged door of the warehouse lighting control panel.

The time clock, lighting contactors (LC1 and LC2) and terminal block shall be mounted on the back panel of the hallway and restrooms lighting control panel. The selector switch shall be mounted on the hinged door of the hallway and restrooms lighting control panel.

The time clock, lighting contactor (LC) and terminal block shall be mounted on the back panel of the hallway, crew room and restrooms lighting control panel. The selector switch shall be mounted on the hinged door of the hallway, crew room and restrooms lighting control panel.

Nameplates.--Panel equipment identification shall be as specified elsewhere in these special provisions. 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 (for example: TC, LC, LC1, LC2, R1, R2, T1). The operating handles of the selector switches, snap switches and the master switch shall have identification nameplate with inscription identifying their functions (for example: MASTER SWITCH). 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. The Contractor has the option to install low voltage dimming control provided that the Contractor submit plans and specifications with appropriate revisions for the low voltage dimming control to the Engineers for approval prior to installation.

All ballasts used in unheated areas inside the building shall be -20°C ballasts or less.

16.05 INTRUSION ALARM SYSTEM

PART 1.- GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing a complete and operational intrusion alarm system in accordance with the details shown on the plans and these special provisions.

The system shall include all materials, whether mentioned or not, that are necessary for a complete and operational intrusion alarm system.

SYSTEM DESCRIPTION.--

Design requirements.--The intrusion alarm systems shall be a low voltage, direct current, zoned alarm system, and shall consist of magnetic contact switches, combination detectors, glass break discriminators, digital keypad stations and an individual control panel per system as shown on the plans. Each zone shall be "supervised, Class B circuit." The end of line resistor shall be installed in the control panel.

The alarm system shall self-test and report status of individual zones.

The alarm system shall provide an automatically rechargeable back-up power supply system in case of building power interruption.

The alarm system components shall be U.L. or F.M. Listed. The system proposed shall be approved by the Federal Communication Commission (FCC).

SUBMITTALS.--

Product data.--Manufacturer's descriptive information and installation instructions shall be submitted for approval.

Installation instructions shall include manufacturer and catalog reference, and model number of equipment to be furnished, conduit and conductor sizes, wiring diagram, and floor plan showing locations of multiple switch contact monitor and devices.

QUALITY ASSURANCE.--

Installer qualification.--The installer of the security alarm system shall be licensed by the State Department of Consumer Affairs, Bureau of Collection and Investigative Services. License numbers and expiration dates shall be included on all correspondence.

PART 2.- PRODUCTS

Control panel.--

The control panel (Radionics 9412 or equal) shall be a surface-mounted, locking cabinet, completely self-contained control panel suitable for 120-volt, AC, input power with separate terminals for all external wires.

The control panel shall meet the following requirements:

- UL listed for Commercial Fire and Burglar reporting;
- Minimum 8 zones (capable of expansion);
- Digital dialer communicator;
- 12-volt auxiliary power supply (minimum 24 hours);
- Rechargeable battery (8 hour minimum);
- Battery charger;
- Low battery reporting;
- Silent alarm signaling;
- System connected to RJ31X or RJ38X telephone jack or equivalent;
- Line test every twenty-four (24) hours;
- 120-volt, AC, input;
- Front accessible control and indication digital keypad;
- UL listed for commercial use;
- Remote control identification.

Magnetic contact switch.--

Magnetic door switch for pedestrian door shall be a 2-section, self-lock mounting type switch, and shall be compatible with the material of the door on which it is installed. The switch shall be epoxied in the switch housing. Magnetic contact switches shall be the type capable of being concealed on the top of the door frame.

Magnetic contact switches for the overhead vehicle doors shall be 2-section, extra heavy-duty, floor mounting type switch with stainless steel armored cable.

Switch shall be housed in a non-magnetic case.

Glass break discriminator.--

Glass break discriminator shall be an acoustic glass break detector. Detector shall respond to energy of breaking windows using piezo-electric crystal microphone. Sensor coverage pattern shall be directional, detecting breakage of uncovered glass in a 10.5 meters wide area at a distance of 3.5 meters minimum. The sensor shall be housed in a fire retardant ABS housing.

Digital keypad.--

Keypad shall be 12 button keypad with 16 user codes capable of expansion to 120, surface-mounted low-voltage (12 VDC/24 VDC), vandal-resistant device with programmable ability for user codes 1-6 digits. Keypad shall have an EEPROM memory for backup of all codes, have a relock time delay adjustable from 1-90 seconds or on/off and have a tamper switch to detect unauthorized access to the keypad working system. The keypad shall incorporate four on-board relays for electric door locks, alarm shunting, forced door monitoring and door ajar monitoring.

PART 3. EXECUTION.--

INSTALLATION.--

General.--The intrusion alarm system shall be installed in accordance with the manufacturer's recommendations.

The switch section without wires shall be recessed flush into the top edge of the door at the approximate center of the door, and the switch section with wires shall be recessed flush in the top section of the door frame. The two sections of the switch shall be mounted directly opposite each other to provide maximum sensitivity. The wiring from each magnetic switch shall be run to the control panel in the zone dedicated for the intrusion alarm circuit.

The switch section mounted on the bottom edge of the overhead door shall be without wires. The switch section with wire shall be mounted on the floor directly below the switch part without wires. Magnetic contact switches for overhead doors shall be mounted .

The glass break discriminator shall be mounted on the ceiling at locations shown on the plans.

Intrusion alarm zoning.--Intrusion alarm panel zoning shall be as shown on the plans.

Conduit and conductors.--All intrusion alarm system wiring shall be installed in conduit system conforming to the requirements under "Basic Materials and Methods" elsewhere in these special provisions. Conduit size shall be as recommended by the intrusion alarm manufacturer, except that conduits shall be not less than 16 mm diameter. Within the equipment service bays, electrical room, parts warehouse and storage's in the Sub Shop, conduits shall be exposed. All other areas, conduits shall be concealed in ceiling or walls.

All conductors and cables for the intrusion alarm system wiring shall be as recommended by the intrusion alarm system manufacturer.

FIELD QUALITY CONTROL.--

Testing.--The operational test for the intrusion alarm system shall be performed by the Contractor in the presence of the Engineer. The operational tests shall demonstrate that all functions of the system operate in the manner described in the manufacturer's literature and demonstrate system stability under normal vibration and shocks to components. The Contractor shall notify the Engineer in writing not less than 10 days in advance of performing the operational tests.

Monitoring.--The contractor shall provide monitoring services for the facility for one year after the acceptance of the contract. The services shall include a toll-free telephone line connecting to the 24-hour on call monitoring station. Monitoring station shall contact designated site representative in the event of alarm and dispatch an immediate on-site response to the alarm location if the site representative cannot be reached or verification of the cause of the alarm cannot be determined.

Monitoring services after the first year will be handled by the State.

DEMONSTRATION.--

Training.--The Contractor shall provide one hour of on-site training on the use, operation, and maintenance of the system for not more than 8 designated State employees. The Contractor shall notify the Engineer in writing not less than 10 days in advance of proposed training class.